DiVinE

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Contents

Chapter 1

Reference Manual

This is a reference manual of DiVinE = Distributed Verification Environment.

DiVinE is an open-source library aimed at an easy implementation of distributed verification algorithms. The big contribution of DiVinE project is its own modularity. Well defined interfaces of separate units allows to the developer to use any of "boxes," that he needs for his application. Furthermore the abstract interface of system allows to use

DiVinE is **not** a model checker! But there is a support for a LTL model checking algorithms:

- property process in a syntax of DVE source files

- transformation of a LTL formula to the property process

Nevertheless DiVinE itself can't do LTL modelchecking at all. You have to write your own program that uses DiVinE library or use any program, that is based on DiVinE library, but is not the part of DiVinE Library. Currently there are 8 model checking algorithms based of the DiVinE Library. This collection of tools forms so called DiVinE ToolSet.

Figure 1.1: Structure of the application based on DiVinE

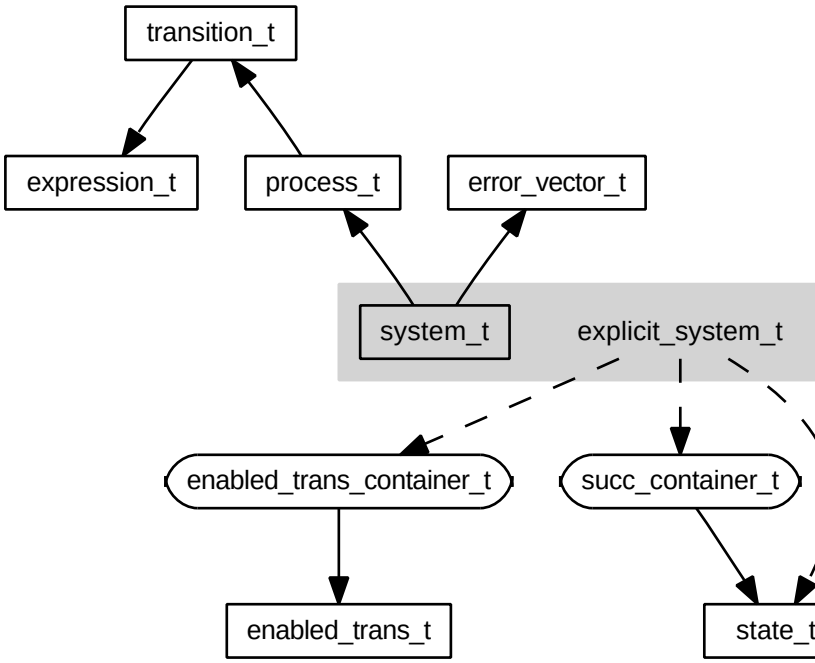

Figure 1.2: Structure of the explcit system and relations with other classes used library

The main parts of this project:

- system - represents the model of the verified system The system is understood as a system of paralelly running processes (class system_t)
- explicit system - descendant of system, adds a support for an enumerative model checking, i. e. initial state and its successors generation (class explicit_system_t

- it is a child class of system_t)

- storage - implementaion of a set of states (class explicit_storage_t)
- distributed layer - communication primitives, barrier synchronization and termination detection (classes distributed_t and network_t)
- reporter - standardized output of applications (classes distr_reporter_t and reporter_t)
- POR - sample implementation of partial order reduction - currently only for DVE system (class por_t)
- HW informations unit - monitors resources taken by the application (classes vminfo_t and timeinfo_t)

For details see `Related Pages` and the `Compound List`.

Another parts of this library:

- error handling unit - unified unit used to handle errors in whole project

Chapter 2

Error Handling Unit

2.1 Overview

Error Handling Unit is a unit for a facile creating and handling error messages. First it was motivated by the fact that creating a string containing names and current values of variables was not a single-line statement.

Second there was a motivation originating from a parser creation. We sometimes only want to *store* the information about the (possible) problem, but we do not want to stop the syntax analysis. Therefore we need some mechanism where to (temporarily) store a list of found errors (we would rather call such errors as 'warnings').

Third there was a need to be able to manage the messages in a different (but in enclosed parts of program in a unified) way. For example we sometimes need to flush all the error messages immediatelly to the standard error output. But in a graphical environment we would like to have a list of errors in a separate window (or more windows - each for some part of the system).

The main class that implements these features is error_vector_t. Its instances are called **error vectors**.

2.2 Parametrization

2 Classes of Messages

Error vector recognizes 2 classes of error messages: warnings and errors. They are maintained in a different ways. Warnings represent such errors, which do not seriously threaten the computation. Errors represent such errors, which are really fatal for the computation and a program have to jump out of such dangerous place in a code to another place where the exceptions are catched.

Error Identifiers and Types

Error messages can have identifiers. These identifiers are numbers of type ERR_-id_t and they should be unique in your program (therefore you should divide carefully an identificator space between another units). There exists also constant ERR_UNKNOWN_ID, that is equal to zero (you can count on it) and represents unspecified error ID.

Error messages can also have types. Error types are numbers of type ERR_throw_-t and they are the numbers passed to the `catch` block by a `throw` statement. This error handling unit sometimes throws such exceptions and you can use error types for example to divide behaviour according to the seriousness of the situation (specified when an exception was called).

Callbacks

In a error vector there exist callback functions called 'warning handling callback' and 'error handling callback' (see ERR_psh_callback_t and ERR_thr_callback_t). Their default behaviour is described in a reference manual to ERR_default_psh_-callback() and ERR_default_thr_callback() functions.

When use use error_vector_t::set_push_callback() and error_vector_t::set_throw_-callback() functions to change the default behaviour of 'warning/error handling callbacks', you preserve some conventions like: 'warning handling callback' will never call *throw*, 'error handling callback' wiil call *throw* and moreover it will print some messages on the output (terminal, window, ...), etc.

2.3 Usage

The basic usage is the following:

```
gerr << "I'm a mess" << "age" << " nbr. " << 1 << thr(3,13565);
```

This causes creating and storing of message "I'm a message nbr. 1" with error ID 13565 and type 3. Then the default 'error handling callback' flushes all messages stored in a memory to the standard error output, clears the memory of messages and calls `throw 3;`.

By the same token:

```
gerr << "I'm a mess" << "age" << " nbr. " << 1 << psh(3,13565);
```

This code causes the end of creation of an error message and message is stored into the list of errors. Then the default 'error handling callback' prints this newly created message to the standard error output and erases a printed message from a memory. Default 'error handling callback' do not use an error type.

Note:

In both - `psh` and `thr`: Parameters error type and error ID are optional. If you want to set error ID (e.g. 1777) and you do not want to set the error type, feel free to write `0` instead of error type (e.g. `thr(0,1777)`). You can also use preddefined constant ERR_UNKNOWN_TYPE, that is also equal to zero.

Note 2:

Default 'warning/error handling callbacks do not use a list of errors They always store only 1 message and speedily they remove it from a list immediately after printing to the standard error output.

Catching Exceptions:

If you have set 'error handling callback' to throw exceptions (default behaviour) you should also catch these exceptions. To catch an exception produced by `terr << thr()`, you should use construction

```
try { ... } catch (ERR_throw_t & err_type) { ... }
```

The above code should be a wrapper for all commands of DiVinE, which you call in your program. The simplest way is:

```
int main(int argc, char * argv[])
{
 try
  {

  }
 catch (ERR_throw_t & err_type)
  { return err_type; }
 return 0;
}
```

But you can also create more complex hiearchy of catching exceptions and manipulate them in a various ways. You can also want to move the most of functionality to the 'error handling callback' (that you can set by error_vector_t::set_throw_callback() function). It really depends on a type of application, where you use this unit.

2.4 Advanced Usage

There are many functions to access the messages in an error vector. For detailed information about complete interface of error vector see error_vector_t class reference. Here we will discuss only some classes of these advanced methods:

- 'that' methods - serve to throw a prepared error messge (with given error ID and type)
- 'push' method - inserts a message without calling 'error/warning handling callback'
- 'pop∗', 'clear' and 'flush' methods
  - serve to erase selected or all messages from a memory
- 'empty' method - returns whether there exists any stored message
- 'perror∗' methods - serve to print a stored message to the standard error output
- 'string∗' methods - serve to get a text of a stored message
- 'id∗' methods - serve to get an error ID of a stored message

Chapter 3

Explicit System

Explicit system is the system extended by a capability of creating successors.

Its abstract interface is the class explicit_system_t (which is a descendant of system_t).

It can also compute the enabled transitions in any state of the system using explicit_system_t::get_enabled_trans() method.

The basic functionality of this class is the generation of states of the system using functions explicit_system_t::get_initial_state() and explicit_system_t::get_succs(). The rest of basic functions os contained in the group of methods called "Obligatory part of abstact interface" in the description of explicit_system_t.

3.1 Results of methods for creating successors

All methods for creating successors of a state of the system (we denote them as get_succs() methods) return a bitwise sum of constants SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK. They have the following meaning:

- SUCC_NORMAL ... is equal to 0. If get_succs() method returns SUCC_NORMAL, it means that some successors were generated, if property is not in a deadlock. It also means that there were no registered errors during the computation of successors.
- SUCC_ERROR ... if SUCC_ERROR is comprised in a return value of get_succs() method it means that there was registered at least one error during the computation of successors
- SUCC_DEADLOCK ... if SUCC_DEADLOCK is comprised in a return value of get_succs() method. In the system without property process it means that no successors were generated. In the system with property it means, that the system excluding property is in a deadlock, but property process is not in a deadlock.

  Warning:

  > In the case of a system with a property process successors are generated even when get_succs() returns SUCC_DEADLOCK

  To simply test the return values of get_succs() methods you can use inlined functions succs_normal(), succs_error() and succs_deadlock().

3.2 Enabled transitions and system transitions

This section is valid only for systems, which are able to work with system transitions and enabled transitions (e. g. DVE system)

System transition is a tuple of process transitions. It can be understood as a product of transitions of processes.

Enabled transition is a system transition + erroneousness of evaluation of guards. It can be untedstood as a product of transition of processes with satisfied guards in a given

state. Erroneousness is added because of possible errors during an evaluation of guards (e. g. division by 0).

It depends on the system, which system/enabled transitions are valid.

Example 1: In an asynchronous DVE systems synchonized transitions are represented by system/enabled transitions containing 2 transitions. In the case of the system with property process there is one additional transition in each system/enabled transition.

Example 2: In a case of synchronous DVE systems each system/enabled transition contains exactly *process_count* transitions.

For generation of enabled transitions in a given state use a method get_enabled_trans().

To create the successors of all enabled transitions stored in a container of enabled transitions (see enabled_trans_container_t) you can use the method get_enabled_trans_succs().

For further informations see explicit_system_t.

3.3 Currently present implementations

Currently there are 2 implementations of explicit system present in DiVinE:

- DVE system - full featured implementation
- BYMOC system - very limited implementation - used for future support of Promela modeling language

Chapter 4

Identifiers used in a symbol table, system and its descendants

The identifiers used in DiVinE are always indexes to the array. Therefore if there exist COUNT objects of some type, you can be sure that there exist objects of such type with identifiers 0, 1, 2, ... , (COUNT-1).

- *SID* = symbol identifier = unique ID of symbols (symbol is a channel, a variable, a process state or a process)

Usually you can use it when you work with names of symbols (e. g. when you are searching in a symbol table).

- *GID* = global identifier = identifier of a particular type of object. It is unique in whole system.

These types of objects have their own GIDs: transitions, processes, process states, variables and channels.

GIDs are unique only for a particular type of object. E. g. there may exist a transition with the same GID as some variable, but there don't exist any two different transitions with the same GID.

- *LID* = local identifier = identifier of a particular type of object. It is unique in a given process.

These types of objects have their own LIDs: transitions, process states and variables.

LIDs are unique only for a particular type of object. E. g. there may exist a transition with the same GID as some variable declared in a same process, but there don't exist any two different transitions with the same LID in the same process. On the other hand in the different processes there may exist two trantitions with the same LID.

- *Partial ID* - Special identifier for transitions which identifies uniquely a transition with a particular synchronisation in a given process.

You can obtain this identifier by transition_t::get_partial_id() or you can use this identifier in functions process_t::get_transition(const sync_mode_t sync_mode,const std::size_t trans_nbr) and process_t::get_trans_count(const sync_mode_t sync_mode) .

Maybe you do not need such an identifier, but the generator of successors do.

Chapter 5

DVE Symbol table

Symbol table is an object implemented by class dve_symbol_table_t. Therefore see dve_symbol_table_t for detials.

Symbol table contains all declarations of symbols (see dve_symbol_t and DVE Symbols). Symbol is a channel, process, variable or process state.

Symbol table is contained in a DVE system (dve_system_t) and it is created at the same time as system.

Chapter 6

DVE Symbols

There exist 4 types of DVE symbols:

6.1 Variables

Variables can be constant or not. Constant variables do not influence the complexity of computation and they are almost the same as numeral constants. To determine whether the variable is constant you can use method is_const().

There are 2 types of variables

- byte variables - see VAR_BYTE
- integer variables - see VAR_INT

You can determine the type of variable by method get_var_type() or by methods is_byte() and is_int().

Variables can be also divided to scalar and vector. You can find out whether a variable is vector by the method is_vector().

Scalar variables

There is a set of methods determined specially for scalar variables. This time there is only the method get_init_expr(), which returns an expression initalizing the variable.

Vector variables

There is a set of methods determined specially for vector variables. You can get the size of vector using a method get_vector_size(). Furthermore there is a set of methods determined to get the initializating expressions of the vector: get_init_expr_count(), get_init_expr(const std::size_t i).

6.2 Process states

Process states are the states of a single process. They can be declared only locally in each process. Each process has a special process state `_error_`, which is used for error detection (variable overflow, division by zero etc.).

6.3 Channels

Channels can be declared only globally. There are 2 types of channels:

- channels which pass the value
- channels which do not pass the value See channel_type_t for details (in fact there is one more type of channel - unused channel). Use can get the type of channel using the method get_channel_type().

6.4 Processes

Processes can be declared only globally.

Chapter 7

System

In DiVinE word "system" means a simulated model. The system is read in and stored using the class system_t, which forms the abstract interface to the system together with classes process_t, transition_t and expression_t.

Class system_t itself can do only a little. It contains a list of processes (see process_t). To obtain any process you can use the function system_t::get_process(). To obtain a count of all processes in a system (including invalid) you can use the function system_t::get_process_count().

Because the class system_t is only the abstract interface, there may be many implementations of this interface. The abstract interface is designed in the way, that provides the full access to the structure of the system, if the implementation of the system allows this access. And at the same time is makes only small requirements to the basic well working implementation of the system. This is done using so called "abilities". The developer of an application based on the DiVinE Library should use system_t::get_abilitities() or can_$*$ methods to derive, which features of the system can be used in the application. Even if all can_$*$ methods return false, i. e. the system has no advanced abilities, it is still possible to write the model checking algoritm based on such a system. But in that case for example no access to the structure of the system is provided (thus no partial order reduction is possible) etc.

Example 1: DVE system - the full-featured implementation of system_t interface

Example 2: BYMOC system - the very limited implementation of system_t interface allowing only to read in the system and generate its states

Chapter 8

Todo List

Class reporter_t Currently it prints a memory consumtion only in the end of the run of the program. It should print a maximum during a run of the program

Chapter 9

Class Index

9.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 10

Class Index

10.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 11

File Index

11.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 12

Class Documentation

12.1 array_of_abstract_t Class Template Reference

Simple resizable container representing 1-dimensional array.

`#include <array_of_abstract.hh>`

Public Types

- typedef array_of_abstract_iterator_t< T, const T ** > const_iterator

  Constant iterator.

- typedef array_of_abstract_iterator_t< T, T ** > iterator

  Iterator.

Public Member Functions

- array_of_abstract_t (const array_of_abstract_t< T, SingleAlloc > &to_copy)

  A copy constructor.

- array_of_abstract_t (const void *params, size_int_t allocate=2, size_int_t step=2)
- void assign_from (const array_of_abstract_t< T, SingleAlloc > &to_copy)

  Copies 'to_copy' to this container.

- const T & back () const

  Returns a constant reference to the last item in the container.

- T & back ()

  Returns a reference to the last item in the container.

- const_iterator begin () const

  Returns a constant iterator pointing to the first item of the container.

- iterator begin ()

  Returns an iterator pointing to the first item of the container.

- void clear ()

  Lowers the size of array to zero, but does not release allocated memory.

- const_iterator end () const
- iterator end ()
- void extend (const size_int_t count)

  Extends the container **by** *count members.*

- void extend_to (const size_int_t count)

  Extends the container to the size of 'count' elements.

- const T & front () const

  Returns a constant reference to the first item in the container.

- T & front ()

  Returns a reference to the first item in the container.

- size_int_t get_alloc_step () const

  Returns an allocation step.

- size_int_t get_allocated () const

  Returns a count of items allocated in a memory of this container.

- const_iterator last () const

  Returns a constant iterator pointing to the last item of the container.

- iterator last ()

  Returns an iterator pointing to the last item of the container.

- const T & operator[ ] (const size_int_t i) const

  Returns a constant reference to 'i'-th item in the container.

- T & operator[ ] (const size_int_t i)

  Returns a reference to 'i'-th item in the container.

- T pop_back ()

  Removes the last item from the container.

- void push_back (T what)

Appends 'what' to the end of the container.

- void resize (const size_int_t count)

  Resizes the container to the size of 'count' elements.

- void set_alloc_step (const size_int_t new_alloc_step)

  Sets an alloc_step step.

- void shrink_to (const size_int_t count)

  Shrinks the container to the size of 'count' elements.

- size_int_t size () const

  Returns a count of items stored in a container.

- void swap (array_of_abstract_t< T, SingleAlloc > &second)

  Swaps the containment of instance 'second' and this.

- ~array_of_abstract_t ()

  A destructor.

Protected Attributes

- T * field

  The entire field of objects stored in array_t.

12.1.1 Detailed Description

template<class T, T *(*)(const void *params) SingleAlloc> class array_of_abstract_t< T, SingleAlloc >

Simple resizable container representing 1-dimensional array.

This container reimplements array_t template for cases of abstract classes. They cannot be normally instantiated, therefore this container stores only pointers to them. In fact it stores pointers to the childs of the abstract class.

This container presumes, that all items have the same (but unknown) type derived from T (where T is a parameter of template). The unknown type is given by the function SingleAlloc given as a second parameter of a template. SingleAlloc creates the instance of the unknown type and returns it in the form of pointer to the abstract class.

This has been espesially useful in an implementation of enabled_trans_container_t, derived from array_of_abstract_t. It enables enabled_trans_container_t to be relatively fast (no redundant allocation and deallocation) and universal for all possible systems.

12.1.2 Member Typedef Documentation

12.1.2.1 typedef array_of_abstract_iterator_t<T, const T**> const_iterator

Constant iterator.

Constant iterator - you cannot change the value to which the iterator points. Dereferencing, increasing and descresing takes time *O(1)* and it is really fast.

12.1.2.2 typedef array_of_abstract_iterator_t<T, T**> iterator

Iterator.

Iterator. Dereferencing, increasing and descresing takes time *O(1)* and it is really fast.

12.1.3 Constructor & Destructor Documentation

12.1.3.1 array_of_abstract_t (const void * *params*, size_int_t *allocate* = 2, size_int_t *step* = 2) [inline]

A constructor

Parameters:

params = parameters of allocation

12.1.4 Member Function Documentation

12.1.4.1 void assign_from (const array_of_abstract_t< T, SingleAlloc > & *to_copy*) [inline]

Copies 'to_copy' to this container.

Copies the entrire contents of one instance of container to another one.

This operation takes both memory and time *O(n)*, where *n* is a number of items in *to_copy* instance of the container.

12.1.4.2 const_iterator begin () const [inline]

Returns a constant iterator pointing to the first item of the container.

It is really fast operation running in time *O(1)*

12.1.4.3 iterator begin () [inline]

Returns an iterator pointing to the first item of the container.

It is really fast operation running in time *O(1)*

Referenced by dve_explicit_system_t::append_new_enabled(), and dve_explicit_-system_t::get_async_enabled_trans().

12.1.4.4 void clear () [inline]

Lowers the size of array to zero, but does not release allocated memory.

Lowers the size of array to zero, but does not release allocated memory. It is the same as `shrink_to(0)`.

Reimplemented in enabled_trans_container_t.

Referenced by enabled_trans_container_t::clear().

12.1.4.5 const_iterator end () const [inline]

Returns a constant iterator pointing immediatelly behind the last item of the container

It is really fast operation running in time *O(1)*

12.1.4.6 iterator end () [inline]

Returns an iterator pointing immediatelly behind the last item of the container

It is really fast operation running in time *O(1)*

12.1.4.7 void extend (const size_int_t *count*) [inline]

Extends the container **by** count members.

Parameters:

count = the count of items we want to add to the container

Its running time is *O(n)*, where *n* is a number of items stored in the container.

Referenced by dve_explicit_system_t::append_new_enabled(), dve_explicit_system_-t::append_new_enabled_prop_sync(), dve_explicit_system_t::compute_successors_-without_sync(), por_t::generate_composed_ample_sets(), dve_explicit_system_-t::get_async_enabled_trans(), and dve_explicit_system_t::get_sync_succs_internal().

12.1.4.8 void extend_to (const size_int_t *count*) [inline]

Extends the container to the size of 'count' elements.

Warning:

Important: This method presumes, that *count* >= size().

Its running time is *O(n)*, where *n* is a number of items stored in the container.

12.1.4.9 size_int_t get_alloc_step () const [inline]

Returns an allocation step.

Returns an allocation step. Allocation step is the least step of allocation of new items (we always allocate the number of items, which is divisible by get_alloc_step())

12.1.4.10 size_int_t get_allocated () const [inline]

Returns a count of items allocated in a memory of this container.

Returns a count of items allocated in a memory of this container. It's return value is always more or equal to return value of size()

12.1.4.11 const_iterator last () const [inline]

Returns a constant iterator pointing to the last item of the container.

It is really fast operation running in time *O(1)*

12.1.4.12 iterator last () [inline]

Returns an iterator pointing to the last item of the container.

It is really fast operation running in time *O(1)*

12.1.4.13 T pop_back () [inline]

Removes the last item from the container.

Removes the last item from the container and returns its value. It doesn't relesase the memory allocated for the last item (this memory will be reused in the next push_back()) - therefore it runs in a time *O(1)* and it it really fast operation.

12.1.4.14 void push_back (T *what*) [inline]

Appends 'what' to the end of the container.

Appends *what* to the end of the container. If neccessary it extends the allocated memory. Therefore in that case it runs in a time*O(n)*, where *n* is a number of items stored in the container.

12.1.4.15 void resize (const size_int_t *count*) [inline]

Resizes the container to the size of 'count' elements.

It is implemented using shrink_to() and extend_to() methods. Therefore if *count* <= size() it runs in a time *O(1)* (it uses shrink_to() method), otherwise it runs in a time

O(n) (it uses extend_to() method), where *n* is a number of items stored in the container.

12.1.4.16 void set_alloc_step (const size_int_t *new_alloc_step*) [inline]

Sets an alloc_step step.

Sets an allocation step. Allocation step is the least step of allocation of new items (we always allocate the number of items, which is divisible by get_alloc_step())

12.1.4.17 void shrink_to (const size_int_t *count*) [inline]

Shrinks the container to the size of 'count' elements.

Warning:

Important: This method presumes, that *count* <= size().

Its running time is *O(1)* and it is really fast operation

12.1.4.18 void swap (array_of_abstract_t< T, SingleAlloc > & *second*) [inline]

Swaps the containment of instance 'second' and this.

Swaps the containment of instance 'second' and this. On one hand (unlike assign_from()) it changes its parameter, but on the other hand it runs only in *O(1)* time, what is much faster than the running time of assign_from()

The documentation for this class was generated from the following file:

- array_of_abstract.hh

12.2 array_t Class Template Reference

Simple resizable container representing 1-dimensional array.

`#include <array.hh>`

Public Types

- typedef const T * const_iterator

  Constant iterator.

- typedef T * iterator

  Iterator.

Public Member Functions

- array_t (const array_t< T, Alloc > &to_copy)

  A copy constructor.

- array_t (size_int_t allocate=2, size_int_t step=2)

  A constructor.

- void assign_from (const array_t< T, Alloc > &to_copy)

  Copies 'to_copy' to this container.

- const T & back () const

  Returns a constant reference to the last item in the container.

- T & back ()

  Returns a reference to the last item in the container.

- const_iterator begin () const

  Returns a constant iterator pointing to the first item of the container.

- iterator begin ()

  Returns an iterator pointing to the first item of the container.

- void clear ()

  Lowers the size of array to zero, but does not release allocated memory.

- const_iterator end () const
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- void extend (const size_int_t count)

  Extends the container **by** *count members.*

- void extend_to (const size_int_t count)

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- const T & front () const

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  Returns an allocation step.

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  Returns a count of items allocated in a memory of this container.

- const_iterator last () const

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  Returns a constant reference to 'i'-th item in the container.

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  Removes the last item from the container.

- void push_back (T what)

  Appends 'what' to the end of the container.

- void resize (const size_int_t count)

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- void set_alloc_step (const size_int_t new_alloc_step)

  Sets an alloc_step step.

- void shrink_to (const size_int_t count)

  Shrinks the container to the size of 'count' elements.

- size_int_t size () const

  Returns a count of items stored in a container.

- void swap (array_t< T, Alloc > &second)

Swaps the containment of instance 'second' and this.

- ~array_t ()

  A destructor.

Protected Attributes

- T * field

  The entire field of objects stored in array_t.

12.2.1 Detailed Description

template<class T, T *(*)(const size_int_t count) Alloc = default_new_field_of_objects<T>> class array_t< T, Alloc >

Simple resizable container representing 1-dimensional array.

This container implement a resizable 1-dimensional array of a choosen type. The access to the single item of an array is implemented simply using operator [].

Constraints imposed on type that can be paramater of this template: Type must not have contructor or destructor. It should be a scalar type like integer, pointer, etc.

You can do reallocation using methods resize(), shrink_to(), extend_to(), extend() or push_back().

The purpose of this container is to implement container with really fast random access times to it. The penalty for the really fast read/write operations is a possibly slow realocation. Reallocation is implemented such way that if the container has not allocated sufficiently large memory, reallocation methods resize(), extend(), extend_to() or push_back() allocate a larger piece of memory. It means that resize(), extend(), extend_to() and push_back() may have time complexity *O(n)*, where *n* is a number items in an array. You can influence how often the array will be reallocated using set_alloc_step() method.

There are defined functions swap() and assign_from() to copy the contents of one instace of the container to another instance.

12.2.2 Member Typedef Documentation

12.2.2.1 typedef const T* const_iterator

Constant iterator.

Constant iterator - you cannot change the value to which the iterator points. Dereferencing, increasing and descresing takes time *O(1)* and it is really fast.

12.2.2.2 typedef T* iterator

Iterator.

Iterator. Dereferencing, increasing and descresing takes time *O(1)* and it is really fast.

12.2.3 Constructor & Destructor Documentation

12.2.3.1 array_t (size_int_t *allocate* = 2, size_int_t *step* = 2) [inline]

A constructor.

Parameters:

allocate = the number of items to pre-alllocate

step = the step of allocation in case of extending the container

12.2.4 Member Function Documentation

12.2.4.1 void assign_from (const array_t< T, Alloc > & *to_copy*) [inline]

Copies 'to_copy' to this container.

Copies the entrire contents of one instance of container to another one.

This operation takes both memory and time *O(n)*, where *n* is a number of items in *to_copy* instance of the container.

12.2.4.2 const_iterator begin () const [inline]

Returns a constant iterator pointing to the first item of the container.

It is really fast operation running in time *O(1)*

12.2.4.3 iterator begin () [inline]

Returns an iterator pointing to the first item of the container.

It is really fast operation running in time *O(1)*

Referenced by dve_explicit_system_t::get_sync_succs_internal(), and dve_transition_t::~dve_transition_t().

12.2.4.4 void clear () [inline]

Lowers the size of array to zero, but does not release allocated memory.

Lowers the size of array to zero, but does not release allocated memory. It is the same as `shrink_to(0)`.

Referenced by dve_explicit_system_t::get_async_enabled_trans_succs(), dve_prob_explicit_system_t::get_succs(), bymoc_explicit_system_t::get_succs(), dve_explicit_system_t::get_sync_enabled_trans(), dve_explicit_system_t::get_sync_succs_internal(), dve_transition_t::read(), and dve_prob_transition_t::read().

12.2.4.5 const_iterator end () const [inline]

Returns a constant iterator pointing immediatelly behind the last item of the container

It is really fast operation running in time *O(1)*

12.2.4.6 iterator end () [inline]

Returns an iterator pointing immediatelly behind the last item of the container

It is really fast operation running in time *O(1)*

Referenced by dve_explicit_system_t::get_sync_succs_internal(), and dve_transition_t::~dve_transition_t().

12.2.4.7 void extend (const size_int_t *count*) [inline]

Extends the container **by** count members.

Parameters:

count = the count of items we want to add to the container

Its running time is *O(n)*, where *n* is a number of items stored in the container.

Referenced by dve_process_t::add_assertion(), dve_process_t::add_state(), and dve_expression_t::dve_expression_t().

12.2.4.8 void extend_to (const size_int_t *count*) [inline]

Extends the container to the size of 'count' elements.

Warning:

Important: This method presumes, that *count* >= size().

Its running time is *O(n)*, where *n* is a number of items stored in the container.

12.2.4.9 size_int_t get_alloc_step () const [inline]

Returns an allocation step.

Returns an allocation step. Allocation step is the least step of allocation of new items (we always allocate the number of items, which is divisible by get_alloc_step())

Referenced by array_t< dve_symbol_t * >::assign_from().

12.2.4.10 size_int_t get_allocated () const [inline]

Returns a count of items allocated in a memory of this container.

Returns a count of items allocated in a memory of this container. It's return value is always more or equal to return value of size()

Referenced by array_t< dve_symbol_t * >::assign_from().

12.2.4.11 const_iterator last () const [inline]

Returns a constant iterator pointing to the last item of the container.

It is really fast operation running in time *O(1)*

12.2.4.12 iterator last () [inline]

Returns an iterator pointing to the last item of the container.

It is really fast operation running in time *O(1)*

12.2.4.13 T pop_back () [inline]

Removes the last item from the container.

Removes the last item from the container and returns its value. It doesn't relesase the memory allocated for the last item (this memory will be reused in the next push_back()) - therefore it runs in a time *O(1)* and it it really fast operation.

12.2.4.14 void push_back (T *what*) [inline]

Appends 'what' to the end of the container.

Appends *what* to the end of the container. If neccessary it extends the allocated memory. Therefore in that case it runs in a time*O(n)*, where *n* is a number of items stored in the container.

Referenced by dve_symbol_table_t::add_channel(), dve_prob_process_t::add_prob_transition(), dve_system_t::add_process(), dve_symbol_table_t::add_process(), dve_symbol_table_t::add_state(), dve_process_t::add_state(), dve_process_t::add_transition(), dve_symbol_table_t::add_variable(), por_t::ample_set_succs(), dve_explicit_system_t::compute_successors_without_sync(), prob_system_t::consolidate(), dve_explicit_system_t::get_async_enabled_trans_succs(), dve_prob_explicit_system_t::get_succs(), dve_explicit_system_t::get_sync_enabled_trans_succs(), and dve_explicit_system_t::get_sync_succs_internal().

12.2.4.15 void resize (const size_int_t *count*) [inline]

Resizes the container to the size of 'count' elements.

It is implemented using shrink_to() and extend_to() methods. Therefore if *count* <= size() it runs in a time *O(1)* (it uses shrink_to() method), otherwise it runs in a time *O(n)* (it uses extend_to() method), where *n* is a number of items stored in the container.

Referenced by dve_expression_t::assign(), and prob_transition_t::set_trans_count().

12.2.4.16 void set_alloc_step (const size_int_t *new_alloc_step*) [inline]

Sets an alloc_step step.

Sets an allocation step. Allocation step is the least step of allocation of new items (we always allocate the number of items, which is divisible by get_alloc_step())

12.2.4.17 void shrink_to (const size_int_t *count*) [inline]

Shrinks the container to the size of 'count' elements.

Warning:

Important: This method presumes, that *count* <= size().

Its running time is *O(1)* and it is really fast operation

12.2.4.18 void swap (array_t< T, Alloc > & *second*) [inline]

Swaps the containment of instance 'second' and this.

Swaps the containment of instance 'second' and this. On one hand (unlike assign_from()) it changes its parameter, but on the other hand it runs only in *O(1)* time, what is much faster than the running time of assign_from()

Referenced by dve_expression_t::swap().

The documentation for this class was generated from the following file:

- array.hh

12.3 bit_string_t Class Reference

Class for impementation of field of bits.

`#include <bit_string.hh>`

Public Member Functions

- void add (const bit_string_t &from)
  Bitwisely adds 'from' to (∗this).
- void alloc_mem (const size_int_t bit_count)
  Allocation/realocation method.
- bit_string_t (const size_int_t bit_count)
  A constructor allocating space for 'bit_count' bits.
- bit_string_t ()
  A default constructor.
- bit_string_t (const bit_string_t &bit_str2)
  A copy constructor.
- void clear ()
  Sets all bits to 0.
- void DBG_print (std::ostream &outs=cerr) const
- void disable_bit (const size_int_t i)
  Sets 'i'-th bit to 0.
- void enable_bit (const size_int_t i)
  Sets 'i'-th bit to 1.
- size_int_t get_allocated_4bytes_count () const
  Return a count of 4-byte items allocated.
- bool get_bit (const size_int_t i) const
  Returns a value of 'i'-th bit.
- size_int_t get_bit_count () const
  Returns a count of allocated bits.
- byte_t ∗ get_mem ()
  Returns a memory containing array of bits.
- size_int_t get_mem_size ()

Returns a size of allocated memory in bytes.

- void invert_bit (const size_int_t i)
  Inverts 'i'-th bit.
- bit_string_t & operator= (const bit_string_t &bit_str2)
  Copies a content of right side to the bit_string_t instance on the left side.
- void set_bit (const size_int_t i, const bool value)
  Sets 'i'-th bit to 'value'.
- ~bit_string_t ()
  A destructor.

Friends

- bool operator & (const bit_string_t &bs1, const bit_string_t &bs2)
  Returns true iff ('bs1' & 'bs2') != 0.
- bool operator^ (const bit_string_t &bs1, const bit_string_t &bs2)
  Returns true iff ('bs1' xor 'bs2') != 0.
- bool operator| (const bit_string_t &bs1, const bit_string_t &bs2)
  Returns true iff ('bs1' | 'bs2') != 0.

12.3.1 Detailed Description

Class for impementation of field of bits.

12.3.2 Constructor & Destructor Documentation

12.3.2.1 bit_string_t (const size_int_t *bit_count*) [inline]

A constructor allocating space for 'bit_count' bits.

This is a simple contructor, that automaticaly allocates a memory for number of bits given in *bit_count*

All bits are initially 0.

12.3.3 Member Function Documentation

12.3.3.1 void alloc_mem (const size_int_t *bit_count*) [inline]

Allocation/realocation method.

This method can be used for initial allocation of memory space (given in count of bits to be allocated - parameter *bitcount*).

All bits are initially 0.

Referenced by por_t::init().

12.3.3.2 void clear () [inline]

Sets all bits to 0.

Warning:

Do not use this function, if no bits are allocated before!

Referenced by por_t::init().

12.3.3.3 void DBG_print (std::ostream & *outs* = cerr) const [inline]

Prints a sequence of zeros and ones representing a content to output stream 'outs'.

Referenced by por_t::init().

12.3.3.4 size_int_t get_allocated_4bytes_count () const [inline]

Return a count of 4-byte items allocated.

Storage in this class is implemented using allocation of field of 4-byte variables in a memory. This method returns a count of these variables.

The documentation for this class was generated from the following file:

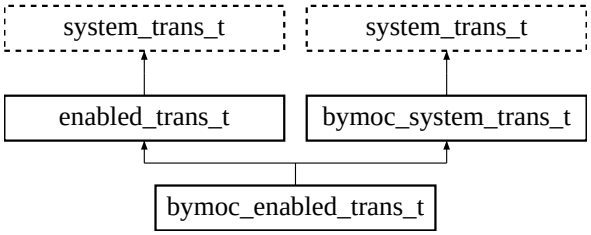
- bit_string.hh

12.4 bymoc_enabled_trans_t Class Reference

Class implementing enabled trasition in BYMOC system.

`#include <bymoc_system_trans.hh>`

Inheritance diagram for bymoc_enabled_trans_t::



Public Member Functions

- virtual enabled_trans_t & operator= (const enabled_trans_t &second)

  An assignment operator.

12.4.1 Detailed Description

Class implementing enabled trasition in BYMOC system.

BYMOC system does not support system transitions and enabled transitions. This class is here only for abstract interface compatibility reasons.

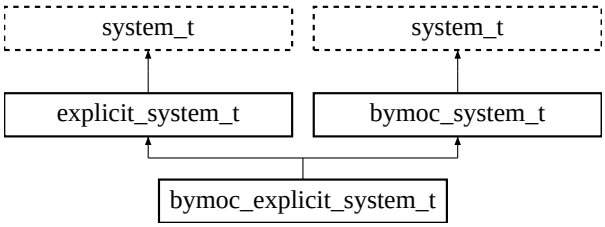
The documentation for this class was generated from the following files:

- bymoc_system_trans.hh
- bymoc_system_trans.cc

12.5 bymoc_explicit_system_t Class Reference

`#include <bymoc_explicit_system.hh>`

Inheritance diagram for bymoc_explicit_system_t::



Public Member Functions

- bymoc_explicit_system_t (error_vector_t &evect)

  A constructor.

- process_decomposition_t * get_property_decomposition ()

  Returns property decomposition, or 0, if subsystem is not available.

- virtual ~bymoc_explicit_system_t ()

  A destructor.

Methods for expression evaluation

These methods are not implemented and can_evaluate_expressions() returns false

- virtual bool eval_expr (const expression_t *const expr, const state_t state, data_t &data) const

  Not imlemented in BYMOC system - throws error message.

Methods working with system transitions and enabled transitions

These methods are not implemented and can_system_transitions() returns false

- virtual int get_enabled_ith_trans (const state_t state, const size_int_t i, enabled_trans_t &enb_trans)

  Not imlemented in BYMOC system - throws error message.

- virtual int get_enabled_trans (const state_t state, enabled_trans_container_t &enb_trans)

  Not imlemented in BYMOC system - throws error message.

- virtual int get_enabled_trans_count (const state_t state, size_int_t &count)

  Not imlemented in BYMOC system - throws error message.

- virtual bool get_enabled_trans_succ (const state_t state, const enabled_trans_t &enabled, state_t &new_state)

  Not imlemented in BYMOC system - throws error message.

- virtual bool get_enabled_trans_succs (const state_t state, succ_container_t &succs, const enabled_trans_container_t &enabled_trans)

  Not imlemented in BYMOC system - throws error message.

- virtual int get_succs (state_t state, succ_container_t &succs, enabled_trans_container_t &etc)

  Not imlemented in BYMOC system - throws error message.

- virtual enabled_trans_t * new_enabled_trans () const

  Not imlemented in BYMOC system - throws error message.

Obligatory part of abstact interface

These methods have to implemented in each implementation of explicit_system_t

- virtual state_t get_initial_state ()

  Implements explicit_system_t::get_initial_state() in BYMOC system.

- virtual int get_ith_succ (state_t state, const int i, state_t &succ)

  Implements explicit_system_t::get_ith_succ() in BYMOC system.

- virtual size_int_t get_preallocation_count () const
- virtual property_type_t get_property_type ()

  Implements explicit_system_t::get_preperty_type().

- virtual int get_succs (state_t state, succ_container_t &succs)

  Implements explicit_system_t::get_succs() in BYMOC system.

- virtual bool is_accepting (state_t state, size_int_t acc_group=0, size_int_t pair_member=1)

  Implements explicit_system_t::is_accepting() in BYMOC system.

- virtual bool is_erroneous (state_t state)
- virtual void print_state (state_t state, std::ostream &outs=std::cout)
- virtual size_int_t violated_assertion_count (const state_t state) const

  Implements explicit_system_t::violated_assertion_count() in BYMOC.

- virtual std::string violated_assertion_string (const state_t state, const size_int_t index) const

  Implements explicit_system_t::violated_assertion_string() in BYMOC.

- virtual bool violates_assertion (const state_t state) const

  Implements explicit_system_t::violates_assertion() in BYMOC.

12.5.1 Detailed Description

Class serving for evaluation of possible transitions (of a system given by bytecode source) by the way of explicit state creating.

bymoc_explicit_system_t is the immediate descendant of a class system_t.

It takes over the system of expression evaluation from system_t. Only for evaluating varibles, fields and state identifiers there are defined special functions, which return their value accoring a state of system (given by a piece of a memory).

12.5.2 Constructor & Destructor Documentation

12.5.2.1 bymoc_explicit_system_t (error_vector_t & *evect*)

A constructor.

Parameters:

evect = error vector used for reporting of error messages

References system_t::get_abilities(), and system_abilities_t::system_can_-decompose_property.

12.5.2.2 ~bymoc_explicit_system_t () `[virtual]`

A destructor.

A destructor.

12.5.3 Member Function Documentation

12.5.3.1 size_int_t get_preallocation_count () const `[virtual]`

Implements explicit_system_t::print_state() in BYMOC system, but see also implementation specific notes below

This methods always returns 10000. No better estimation is implemented.

Implements explicit_system_t.

12.5.3.2 bool is_erroneous (state_t *state*) `[virtual]`

Implements explicit_system_t::is_erroneous() in BYMOC system, but see also implementation specific notes below

It constantly returns true - till now virtual machine does not support any constrol of error states (created e. g. by division by zero)

Implements explicit_system_t.

12.5.3.3 void print_state (state_t *state*, std::ostream & *outs* = std::cout) [virtual]

Implements explicit_system_t::print_state() in BYMOC system, but see also implementation specific notes below

Implements explicit_system_t.

References state_t::ptr.

12.5.3.4 virtual size_int_t violated_assertion_count (const state_t *state*) const [inline, virtual]

Implements explicit_system_t::violated_assertion_count() in BYMOC.

Currently it only returns 0, because assertions are not supported by BYMOC

Implements explicit_system_t.

References state_t::ptr.

12.5.3.5 virtual std::string violated_assertion_string (const state_t *state*, const size_int_t *index*) const [inline, virtual]

Implements explicit_system_t::violated_assertion_string() in BYMOC.

Currently it only returns empty string, because assertions are not supported by BYMOC

Implements explicit_system_t.

References state_t::ptr.

12.5.3.6 virtual bool violates_assertion (const state_t *state*) const [inline, virtual]

Implements explicit_system_t::violates_assertion() in BYMOC.

Currently it only returns false, because assertions are not supported by BYMOC

Implements explicit_system_t.

References state_t::ptr.

The documentation for this class was generated from the following files:

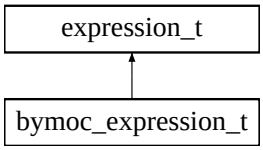
- bymoc_explicit_system.hh
- bymoc_explicit_system.cc

12.6 bymoc_expression_t Class Reference

Class representing an expression in BYMOC system.

`#include <bymoc_expression.hh>`

Inheritance diagram for bymoc_expression_t::



Public Member Functions

- virtual void assign (const expression_t &expr)

  Not implemented in BYMOC system - throws error message.

- **bymoc_expression_t** (system_t *const system=0)
- virtual int from_string (std::string &expr_str, const size_int_t process_gid=NO_ID)

  Not implemented in BYMOC system - throws error message.

- virtual int read (std::istream &istr, size_int_t process_gid=NO_ID)

  Not implemented in BYMOC system - throws error message.

- virtual void swap (expression_t &expr)
- virtual std::string to_string () const

  Not implemented in BYMOC system - throws error message.

- virtual void write (std::ostream &ostr) const

  Not implemented in BYMOC system - throws error message.

- virtual ~bymoc_expression_t ()

  Not implemented in BYMOC system - throws error message.

12.6.1 Detailed Description

Class representing an expression in BYMOC system.

BYMOC system does not support expressions. This class is here only for abstract interface compatibility reasons.

12.6.2 Member Function Documentation

12.6.2.1 void swap (expression_t & *expr*) [virtual]

IMPLEMENTATION OF VIRTUAL INTERFACE OF expression_t ///// Not implemented in BYMOC system - throws error message

Reimplemented from expression_t.

References gerr.

The documentation for this class was generated from the following files:

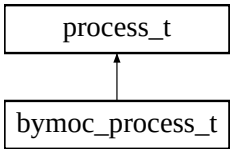
- bymoc_expression.hh
- bymoc_expression.cc

12.7 bymoc_process_t Class Reference

Class representing a process in BYMOC system.

`#include <bymoc_process.hh>`

Inheritance diagram for bymoc_process_t::



Public Member Functions

- virtual void add_transition (transition_t *const transition)
  Adds new transition to the process.
- **bymoc_process_t** (system_t *const system)
- virtual int from_string (std::string &proc_str)
  Not implemented in BYMOC system - throws error message.
- virtual size_int_t get_trans_count () const
  Not implemented in BYMOC system - throws error message.
- virtual const transition_t * get_transition (const size_int_t id) const
  Not implemented in BYMOC system - throws error message.
- virtual transition_t * get_transition (const size_int_t id)
  Not implemented in BYMOC system - throws error message.
- virtual int read (std::istream &istr)
  Not implemented in BYMOC system - throws error message.
- virtual void remove_transition (const size_int_t transition_gid)
  Not implemented in BYMOC system - throws error message.
- virtual std::string to_string () const
  Not implemented in BYMOC system - throws error message.
- virtual void write (std::ostream &ostr) const
  Not implemented in BYMOC system - throws error message.
- virtual ~bymoc_process_t ()
  Not implemented in BYMOC system - throws error message.

12.7.1 Detailed Description

Class representing a process in BYMOC system.

BYMOC system does not support processes. This class is here only for abstract interface compatibility reasons.

12.7.2 Member Function Documentation

12.7.2.1 void add_transition (transition_t *const *transition*) [virtual]

Adds new transition to the process.

Parameters:

transition = pointer to the transition to add

This method modifies the added transition because it has to set transition LID and Partial ID.

Implements process_t.

References gerr.

The documentation for this class was generated from the following files:

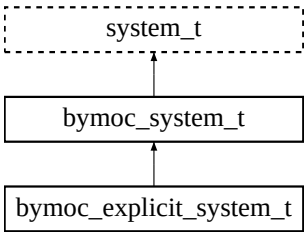
- bymoc_process.hh
- bymoc_process.cc

12.8 bymoc_system_t Class Reference

Class for Promela/Bytecode system representation.

`#include <bymoc_system.hh>`

Inheritance diagram for bymoc_system_t::



Public Member Functions

- bymoc_system_t (error_vector_t &evect=gerr)
  A constructor.
- virtual ~bymoc_system_t ()
  A destructor.

Methods modifying a system

These methods are not implemented and can_be_modified() returns false.

- virtual void add_process (process_t *const process)
  Not imlemented in BYMOC system - throws error message.
- virtual void remove_process (const size_int_t process_id)
  Not imlemented in BYMOC system - throws error message.

Obligatory part of abstact interface

These methods have to implemented in each implementation of system_t

- virtual slong_int_t from_string (const std::string str)
  Warning - this method is still not implemented - TODO.
- virtual slong_int_t read (const char *const filename)
  *Implements system_t::read(const char * const filename) in BYMOC system.*
- virtual slong_int_t read (std::istream &ins=std::cin)
  Warning - this method is still not implemented - TODO.

- virtual std::string to_string ()
  Warning - this method is still not implemented - TODO.
- virtual void write (std::ostream &outs=std::cout)
  Warning - this method is still not implemented - TODO.
- virtual bool write (const char *const filename)
  Warning - this method is still not implemented - TODO.

Methods working with processes

These methods are not implemented and can_processes() returns false.

- virtual const process_t * get_process (const size_int_t id) const
  Not imlemented in BYMOC system - throws error message.
- virtual process_t * get_process (const size_int_t gid)
  Not imlemented in BYMOC system - throws error message.
- virtual size_int_t get_process_count () const
  Not imlemented in BYMOC system - throws error message.
- virtual property_type_t get_property_type ()
  Not implemented in BYMOC system - throws error message.

Methods working with property process

These methods are not implemented and can_property_process() returns false

- virtual size_int_t get_property_gid () const
  Not imlemented in BYMOC system - throws error message.
- virtual const process_t * get_property_process () const
  Not imlemented in BYMOC system - throws error message.
- virtual process_t * get_property_process ()
  Not imlemented in BYMOC system - throws error message.
- virtual void set_property_gid (const size_int_t gid)
  Not imlemented in BYMOC system - throws error message.

Methods working with transitions

These methods are not implemented and can_transitions() returns false.

- virtual size_int_t get_trans_count () const
  Not imlemented in BYMOC system - throws error message.
- virtual const transition_t * get_transition (size_int_t gid) const
  Not imlemented in BYMOC system - throws error message.
- virtual transition_t * get_transition (size_int_t gid)
  Not imlemented in BYMOC system - throws error message.

Protected Attributes

- nipsvm_t **nipsvm**

Friends

- class **bymoc_process_decomposition_t**

12.8.1 Detailed Description

Class for Promela/Bytecode system representation.

This class implements the abstract interface system_t

This implementation is based on external virtual machine for special bytecode. Therefore this system is called BYMOC system.

It supports only very basic functionality of system_t interface (processes, transition and expressions are not supported). The calls of non-implemented methods cause error messsages.

12.8.2 Constructor & Destructor Documentation

12.8.2.1 bymoc_system_t (error_vector_t & *evect* = gerr)

A constructor.

Parameters:

estack = the **error vector**, that will be used by created instance of system_t

The documentation for this class was generated from the following files:

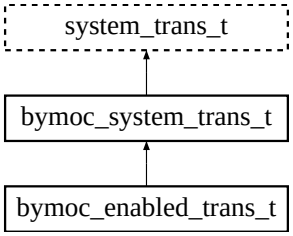
- bymoc_system.hh
- bymoc_system.cc

12.9 bymoc_system_trans_t Class Reference

Class implementing system trasition in BYMOC system.

`#include <bymoc_system_trans.hh>`

Inheritance diagram for bymoc_system_trans_t::



Public Member Functions

- virtual size_int_t get_count () const
  Not implemented in BYMOC system - throws error message.
- virtual system_trans_t & operator= (const system_trans_t &second)
  Not implemented in BYMOC system - throws error message.
- virtual transition_t ∗const & operator[ ] (const int i) const
  Not implemented in BYMOC system - throws error message.
- virtual transition_t ∗& operator[ ] (const int i)
  Not implemented in BYMOC system - throws error message.
- virtual void set_count (const size_int_t new_count)
  Not implemented in BYMOC system - throws error message.
- virtual std::string to_string () const
  Not implemented in BYMOC system - throws error message.
- virtual void write (std::ostream &ostr) const
  Not implemented in BYMOC system - throws error message.

12.9.1 Detailed Description

Class implementing system trasition in BYMOC system.

BYMOC system does not support system transitions and enabled transitions. This class is here only for abstract interface compatibility reasons.

The documentation for this class was generated from the following files:

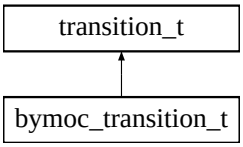
- bymoc_system_trans.hh
- bymoc_system_trans.cc

12.10 bymoc_transition_t Class Reference

Class representing a transition in BYMOC system.

`#include <bymoc_transition.hh>`

Inheritance diagram for bymoc_transition_t::



Public Member Functions

- **bymoc_transition_t** (system_t *const system)
- virtual int from_string (std::string &trans_str, const size_int_t process_gid=NO_ID)

  Not implemented in BYMOC system - throws error message.

- virtual int read (std::istream &istr, size_int_t process_gid=NO_ID)

  Not implemented in BYMOC system - throws error message.

- virtual std::string to_string () const

  Not implemented in BYMOC system - throws error message.

- virtual void write (std::ostream &ostr) const

  Not implemented in BYMOC system - throws error message.

- virtual ~bymoc_transition_t ()

  Not implemented in BYMOC system - throws error message.

12.10.1 Detailed Description

Class representing a transition in BYMOC system.

BYMOC system does not support transitions. This class is here only for abstract interface compatibility reasons.

The documentation for this class was generated from the following files:

- bymoc_transition.hh
- bymoc_transition.cc

12.11 comm_matrix_t Class Reference

Communication matrix.

`#include <network.hh>`

Public Member Functions

- comm_matrix_t (int rows, int col, error_vector_t &arg0=gerr)

  A contructor, creates matrix with rows *rows and* col *columns.*

- int getcolcount (void)

  Function that returns number of columns in the matrix.

- int getrowcount (void)

  Function that returns number of rows in the matrix.

- int & operator() (int row, int col)

  Operator that retrieves elements of the matrix.

- ~comm_matrix_t ()

  A destructor, frees space allocated for the matrix.

Protected Attributes

- error_vector_t & **errvec**

Friends

- pcomm_matrix_t operator* (const pcomm_matrix_t &m, int a)

  Operator that multiplies matrix m *by integer* a*, analogous to operator*()*.*

- pcomm_matrix_t operator* (int a, const pcomm_matrix_t &m)

  Operator that multiplies matrix m *by integer* a*.*

- pcomm_matrix_t operator+ (const pcomm_matrix_t &m1, const pcomm_matrix_t &m2)

  Operator that adds matrix m1 *to matrix* m2*.*

- pcomm_matrix_t operator- (const pcomm_matrix_t &m1, const pcomm_matrix_t &m2)

  Operator that subtracts matrix m2 *from matrix* m1 *(element-wise).*

- pcomm_matrix_t operator- (const pcomm_matrix_t &m)

Operator that inverts all elements in the matrix ("puts minus" in front of every element).

12.11.1 Detailed Description

Communication matrix.

Matrix returned by methods of network_t is usually of size $cl\_size * cl\_size$, where *cl_size* if the number of computers in the cluster, which can be retrieved by network_t::get_cluster_size() method. In i-th row and j-th column of the matrix is an integer that stores information about data sent by workstation with id *i* to workstation with id *j*.

12.11.2 Constructor & Destructor Documentation

12.11.2.1 comm_matrix_t (int *rows*, int *col*, error_vector_t & *arg0* = gerr)

A contructor, creates matrix with *rows* rows and *col* columns.

Parameters:

rows - number of rows of the matrix to be created

col - number of columns of the matrix to be created

arg0 - object used for error reporting

Use this constructor to create matrix with *rows* rows and *col* columns. If you don't want errors to be handled in a default way, pass your own error handling object of type error_vector_t.

12.11.3 Member Function Documentation

12.11.3.1 int getcolcount (void) [inline]

Function that returns number of columns in the matrix.

Returns:

number of columns in the matrix

Use this function to get the number of columns in the matrix.

12.11.3.2 int getrowcount (void) [inline]

Function that returns number of rows in the matrix.

Returns:

number of rows in the matrix

Use this function to get the number of rows in the matrix.

12.11.3.3 int & operator() (int *row*, int *col*)

Operator that retrieves elements of the matrix.

Parameters:

row - specifies the row of the element to be retrieved

col - specifies the column of the element to be retrieved

Returns:

value of the retrieved element

Use this operator to retrieve element at position (*i*, *j*) in the matrix by passing *i* as the first parameter and *j* as the second parameter.

12.11.4 Friends And Related Function Documentation

12.11.4.1 pcomm_matrix_t operator∗ (int *a*, const pcomm_matrix_t & *m*) [friend]

Operator that multiplies matrix *m* by integer *a*.

Parameters:

a - integer that is to be multiplied with all elements of the matrix passed as second parameter

m - pointer to matrix whose elements are to be multiplied by the integer passed as first parameter

Returns:

pointer to matrix whose elements are elements of *m* multiplied by *a*

Use this operator to multiply all elements of matrix by an integer.

12.11.4.2 pcomm_matrix_t operator+ (const pcomm_matrix_t & *m1*, const pcomm_matrix_t & *m2*) [friend]

Operator that adds matrix *m1* to matrix *m2*.

Parameters:

m1 - pointer to matrix, first addend

m2 - pointer to matrix, second addend

Returns:

pointer to sum matrix of *m1* and *m2*

Use this operator to add two matrices.

12.11.4.3 pcomm_matrix_t operator- (const pcomm_matrix_t & *m1*, const pcomm_matrix_t & *m2*) [friend]

Operator that subtracts matrix *m2* from matrix *m1* (element-wise).

Parameters:

m1 - pointer to matrix, minuend

m2 - pointer to matrix, subtrahend

Returns:

pointer to difference matrix between *m1* and *m2*

Use this operator to subtract two matrices.

12.11.4.4 pcomm_matrix_t operator- (const pcomm_matrix_t & *m*) [friend]

Operator that inverts all elements in the matrix ("puts minus" in front of every element).

Parameters:

m - pointer to matrix whose elements are to be inverted

Returns:

pointer to matrix with inverted elements

Use this operator to get matrix with all elements inverted.

The documentation for this class was generated from the following files:

- network.hh
- network.cc

12.12 compacted_t Struct Reference

Class to access compacted expressions.

`#include <dve_expression.hh>`

Public Member Functions

- void create_gid (int _op, size_int_t _gid) const

  Constructor – Creates s compacted representation of a unary leaf in the syntax tree.

- void create_val (int _op, all_values_t _value) const

  Creates a compacted representation of a unary leaf in the syntax tree.

- compacted_viewer_t * first () const

  Returns pointer to the first subexpression.

- int get_arity () const

  Returns arity.

- size_int_t get_gid () const

  Returns gid of stored in T_ID, T_SQUARE_BRACKET, or T_DOT leaf.

- int get_operator () const

  Returns operator.

- all_values_t get_value () const

  Returns value of a T_NAT leaf.

- void join (int _op, compacted_viewer_t *_left, compacted_viewer_t *_right) const

  Contructor – Joins to compacted expression into one with given operator.

- compacted_viewer_t * last () const

  Returns pointer to the last subexpression.

- compacted_viewer_t * left () const

  Returns pointers to left subexpression.

- compacted_viewer_t * right () const

  Returns pointers to right subexpression.

- std::string to_string ()

  To string.

Public Attributes

- compacted_viewer_t * **ptr**

12.12.1 Detailed Description

Class to access compacted expressions.

This class is to view compacted expressions. It uses compacted_viewer_t to view the memory block pointed by the member pointer.

12.12.2 Member Function Documentation

12.12.2.1 void create_gid (int *_op*, size_int_t *_gid*) const

Constructor – Creates s compacted representation of a unary leaf in the syntax tree.

Creates memory block that keeps, in a compacted way, a leaf of type different from T_NAT of the tree of subexpressions.

References compacted_viewer_t::arity, compacted_viewer_t::op, compacted_viewer_t::r_offset, and compacted_viewer_t::size.

Referenced by dve_expression_t::compaction().

12.12.2.2 void create_val (int *_op*, all_values_t *_value*) const

Creates a compacted representation of a unary leaf in the syntax tree.

Creates memory block that keeps, in a compacted way, a leaf of type T_NAT of the tree of subexpressions.

References compacted_viewer_t::arity, compacted_viewer_t::op, compacted_viewer_t::r_offset, and compacted_viewer_t::size.

Referenced by dve_expression_t::compaction().

12.12.2.3 compacted_viewer_t* first () const [inline]

Returns pointer to the first subexpression.

Returns pointer to the first subexpression in a given compacted subexpression.

12.12.2.4 int get_arity () const [inline]

Returns arity.

Returns arity of the compacted expression.

12.12.2.5 size_int_t get_gid () const [inline]

Returns gid of stored in T_ID, T_SQUARE_BRACKET, or T_DOT leaf.

Returns gid of stored in T_ID, T_SQUARE_BRACKET, or T_DOT leaf in compacted expression.

Referenced by dve_system_t::fast_eval(), and to_string().

12.12.2.6 int get_operator () const [inline]

Returns operator.

Returns operator of the compacted expression.

Referenced by dve_system_t::fast_eval().

12.12.2.7 all_values_t get_value () const [inline]

Returns value of a T_NAT leaf.

Returns value of a T_NAT leaf in compacted expression.

Referenced by dve_system_t::fast_eval(), and to_string().

12.12.2.8 void join (int *_op*, compacted_viewer_t * *_left*, compacted_viewer_t * *_right*) const

Contructor – Joins to compacted expression into one with given operator.

Creates memory block that keeps, concatenation of given subexpression that is preceded with the connecting connective in a compacted way. of the tree of subexpressions.

References compacted_viewer_t::arity, compacted_viewer_t::op, compacted_viewer_t::r_offset, and compacted_viewer_t::size.

Referenced by dve_expression_t::compaction().

12.12.2.9 compacted_viewer_t* last () const [inline]

Returns pointer to the last subexpression.

Returns pointer to the last subexpression in a given compacted subexpression.

12.12.2.10 compacted_viewer_t* left () const [inline]

Returns pointers to left subexpression.

Returns pointer to the left subexpression in a given compacted subexpression.

Referenced by dve_system_t::fast_eval(), and to_string().

12.12.2.11 compacted_viewer_t* right () const [inline]

Returns pointers to right subexpression.

Returns pointer to the right subexpression in a given compacted subexpression.

Referenced by dve_system_t::fast_eval(), and to_string().

12.12.2.12 std::string to_string ()

To string.

Prints compacted expression to string.

References get_gid(), get_value(), left(), compacted_viewer_t::op, ptr, right(), and to_string().

Referenced by dve_system_t::fast_eval(), and to_string().

The documentation for this struct was generated from the following files:

- dve_expression.hh
- dve_expression.cc

12.13 compacted_viewer_t Struct Reference

Structure of a single compacted expression. In the memory block, this initial structure is followed by the left subexpression (if present), and then by right subexpression (if present). r_offset is an offset to the right subexpression.

`#include <dve_expression.hh>`

Public Attributes

- int **arity**
- int **op**
- int **r_offset**
- int **size**

12.13.1 Detailed Description

Structure of a single compacted expression. In the memory block, this initial structure is followed by the left subexpression (if present), and then by right subexpression (if present). r_offset is an offset to the right subexpression.

The documentation for this struct was generated from the following file:

- dve_expression.hh

12.14 compressor_t Class Reference

Compression implementation class.

`#include <compressor.hh>`

Public Member Functions

- void clear ()

  Clears data structures initialized inside compressor.

- bool compress (state_t, char *&pointer, int &size)

  Compress a state according current compression method.

- bool compress_without_alloc (state_t, char *&pointer, int &size)

  Compress a state according current compression method, but returned pointer points to an internal buffer of compressor_t.

- compressor_t ()

  A constructor.

- bool decompress (state_t &, char *pointer, int size)

  Decompress the state using current compression method.

- bool init (int method, int appendix_size)

  Initializes compressor instance.

- ~compressor_t ()

  A destructor.

12.14.1 Detailed Description

Compression implementation class.

12.14.2 Member Function Documentation

12.14.2.1 void clear ()

Clears data structures initialized inside compressor.

Dealocates data that are created during initialization of compressor. This is needed especially for clearing the arena of compressor.

Referenced by explicit_storage_t::init().

12.14.2.2 bool compress (state_t, char *& *pointer*, int & *size*)

Compress a state according current compression method.

Returns where the state is compressed and how long the compressed representation is.

Referenced by explicit_storage_t::insert(), and explicit_storage_t::is_stored_if_not_-insert().

12.14.2.3 bool compress_without_alloc (state_t, char *& *pointer*, int & *size*)

Compress a state according current compression method, but returned pointer points to an internal buffer of compressor_t.

Works the same way as compressor_t::compress(), but compressed state is stored internally in compressor_t, thus it does not need to be deleted

Referenced by explicit_storage_t::is_stored().

12.14.2.4 bool decompress (state_t &, char * *pointer*, int *size*)

Decompress the state using current compression method.

Decompress the state from the given pointer and size using current compression method.

Referenced by explicit_storage_t::reconstruct().

12.14.2.5 bool init (int *method*, int *appendix_size*)

Initializes compressor instance.

Requires identification of compression method, extra space that should be allocated at each compressed state (appendix) and pointer to explicit_system_t.

Referenced by explicit_storage_t::init().

The documentation for this class was generated from the following file:

- compressor.hh

12.15 data_t Class Reference

Class representing a general data type.

`#include <data.hh>`

Public Member Functions

- template<class T>
  void **assign** (const T &value)

12.15.1 Detailed Description

Class representing a general data type.

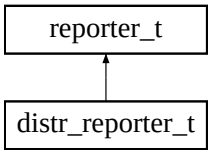
The documentation for this class was generated from the following file:

- data.hh

12.16 distr_reporter_t Class Reference

`#include <distr_reporter.hh>`

Inheritance diagram for distr_reporter_t::



Public Member Functions

- void **collect** ()
- void collect_and_print (std::size_t type_of_output=REPORTER_OUTPUT_NORMAL)

  Same as collect_and_print() but prints the report into the standard file.

- void collect_and_print (std::size_t type_of_output, std::ostream &out)

  Collects informations from workstations.

- distr_reporter_t (distributed_t *d)

  A constructor.

- void **print** (std::size_t type_of_output, std::ostream &out)
- void **set_global_info** (std::string s, std::string a, const std::string &long_name)
- void set_global_info (std::string s, std::string a)

  Sets global information to report.

- void **set_global_info** (std::string s, double a, const std::string &long_name)
- void set_global_info (std::string s, double a)

  Sets global information to report.

- void **set_info** (std::string s, double a, const std::string &long_name, size_t flag=REPORTER_MASTER)
- void set_info (std::string s, double a, size_t flag=REPORTER_MASTER)

  Sets specific information to report.

Protected Member Functions

- void **_set_pr** (std::ostream &out, double a)
- void **print_specific_value** (std::ostream &out, const std::string label, const divine::size_int_t i)

Protected Attributes

- distributed_t * distributed

  Pointer to the instance of distributed_t.

- std::map< std::string, global_info_value_t > **global_info**
- std::map< std::string, std::string > **global_long_name**
- std::vector< std::vector< double > > **results**
- std::map< std::string, std::size_t > specific_info_flag

  Specific information of the report - adjustable by set_info().

Static Protected Attributes

- static const size_int_t **BASIC_ITEMS** = 6

12.16.1 Detailed Description

Class distr_reporter_t extends the class reporter_t with support for distributed computation.

12.16.2 Member Function Documentation

12.16.2.1 void collect_and_print (std::size_t *type_of_output*, std::ostream & *out*)

Collects informations from workstations.

Master prints it into the given ostream *out*. The *type_of_output* specifies the verbosity of the output.

12.16.2.2 void set_info (std::string *s*, double *a*, size_t *flag* = REPORTER_MASTER) [inline]

Sets specific information to report.

The last argumet specifies what should be reported in the case of REPORTER_-OUTPUT_SHORT (only one value is reported in this case).

The documentation for this class was generated from the following files:

- distr_reporter.hh
- distr_reporter.cc

12.17 distributed_t Class Reference

Main distributed support class.

`#include <distributed.hh>`

Public Member Functions

- distributed_t (divine::error_vector_t &arg0=divine::gerr)
- void finalize ()

  Finalizes network. Remember that you can finalize only once.

- void **force_poll** (void)
- int get_all_received_sync_msgs_cnt (void)

  Get all received synchronization messages count.

- int get_all_sent_sync_msgs_cnt (void)

  Get all sent synchronization messages count.

- int get_all_sync_barriers_cnt (void)

  Get all synchronization barriers count.

- void get_comm_matrix_rsm (pcomm_matrix_t &ret, int target)

  Get communication matrix of received sync messages.

- void get_comm_matrix_ssm (pcomm_matrix_t &ret, int target)

  Get communication matrix of sent sync messages.

- const message_processor_t * get_message_processor () const

  Returns a message processor.

- void get_proc_msgs_buf_excluseve_mem (bool &value)
- int get_state_net_id (divine::state_t &state)

  The same as partition_function(), left here for historical reasons.

- void initialize ()

  Completes initialization. Remember that you can initialize only once.

- bool is_manager () const

  Returns, whether this workstation is a manager of the distributed computation.

- void network_initialize (int &argc, char **&argv)

  Network initialization.

- int partition_function (divine::state_t &state)

  Function to determine owner of a state.

- void process_messages (void)

  Function that checks for arrived messages and participates in synchronization.

- void set_busy (void)

  Avoids synchronization.

- void set_hash_function (hash_functions_t)

  Sets hash function to be used for partitioning.

- void set_idle (void)

  Allows synchronization.

- void set_message_processor (message_processor_t *proc_message)

  Sets a message processor.

- void set_proc_msgs_buf_exclusive_mem (bool value)
- bool synchronized (abstract_info_t &info)
- bool synchronized (void)

  Function that together with process_messages does synchronization.

Public Attributes

- int cluster_size

  Total number of computers.

- network_t network

  instance of network_t, you can use it to send/receive messages, etc.

- int network_id

  Unique computer identifier.

- void(* process_user_message)(char *buf, int size, int src, int tag, bool urgent)

  Pointer to user-defined function that processes user messages.

- string processor_name

  Name of the computer.

Protected Types

- enum **distr_mode_t** { **PRE_INIT**, **PRE_INIT_NET_OK**, **NORMAL** }

Protected Attributes

- divine::error_vector_t & **errvec**
- hash_function_t **hasher**
- distr_mode_t **mode**
- sync_data_t **sync_collector**
- sync_data_t **sync_one_result**

12.17.1 Detailed Description

Main distributed support class.

The class provides support for common operations necessary for distributed computing such as partition function and termination detection (synchronization).

12.17.2 Constructor & Destructor Documentation

12.17.2.1 distributed_t (divine::error_vector_t & *arg0* = divine::gerr)

A constructor, does't initialize anything!,

non-default error handling vector can be specified

12.17.3 Member Function Documentation

12.17.3.1 int get_all_received_sync_msgs_cnt (void)

Get all received synchronization messages count.

Returns:

Number of synchronization messages received by the calling workstation.

12.17.3.2 int get_all_sent_sync_msgs_cnt (void)

Get all sent synchronization messages count.

Returns:

Number of synchronization messages sent by the calling workstation.

12.17.3.3 int get_all_sync_barriers_cnt (void)

Get all synchronization barriers count.

Returns:

Number of synchronization barriers on the calling workstation.

12.17.3.4 void get_comm_matrix_rsm (pcomm_matrix_t & *ret*, int *target*)

Get communication matrix of received sync messages.

Similar to get_comm_matrix_ssm(), but the position (*i*, *j*) of the matrix contains the count of synchronization messages received on workstation with id *i* from workstation with id *j*.

12.17.3.5 void get_comm_matrix_ssm (pcomm_matrix_t & *ret*, int *target*)

Get communication matrix of sent sync messages.

Parameters:

ret - output parameter, pointer to communication matrix (of type comm_matrix_t) that contains at position (*i*, *j*) the count of synchronization messages sent by workstation with id *i* to workstation with id *j*

target - only one workstation gets valid pointer ret, this workstation is specified by *target* parameter, which must be the same on all workstations

Returns:

true if the function suceeds, **false** otherwise

Synchronization process requires communication between workstations. Use this function to get the counts of synchronization messages sent by each workstation to each workstation. The function must be called in a way explained for the network_-t::barrier() function.

12.17.3.6 void get_proc_msgs_buf_excluseve_mem (bool & *value*)

Gets the value of a variable that determines whether the parameter *buf* in process_-user_message() points directly to internal buffers.

true means *buf* points to newly allocated (exclusive) memory, **false** means it points to internal buffers.

false is default, it saves both time and memory.

12.17.3.7 bool is_manager () const [inline]

Returns, whether this workstation is a manager of the distributed computation.

The same as

```
distributed.network_id == NETWORK_ID_MANAGER
```

References NETWORK_ID_MANAGER.

12.17.3.8 void network_initialize (int & *argc*, char **& *argv*)

Network initialization.

Parameters:

argc = Number of command line parameters.
Passing the first argument of main is common.

argv = Array of command line parameters.
Passing the second argument of main is common.

Initializes network, since then cluster_size, network_id and processor_name are valid. You can also set send buffer's limits using functions of network. But you still cannot send/receive messages, etc. To complete initialization call the initialize() function.

References cluster_size, network_t::get_cluster_size(), network_t::get_id(), network_t::get_processor_name(), network_t::initialize_network(), network, network_id, and processor_name.

12.17.3.9 int partition_function (divine::state_t & *state*)

Function to determine owner of a state.

Parameters:

state = a state, which association with a computer is to be retrieved

Returns:

computer unique identifier of the state owner

Partition function, returns the number of the computer which the state passed as the argument belongs to.

12.17.3.10 void process_messages (void)

Function that checks for arrived messages and participates in synchronization.

This function checks for new messages. If some message arrived, it receives it and calls process_user_message() function, that's function user must write and give to distributed_t by assigning it's pointer to process_user_message().

When called on manager worstation (the one with id NETWORK_ID_MANAGER), it checks whether the workstation is idle (that is no user message was received in this process_messages() call and user did not call set_busy()), if yes and user also called synchronized() function previously, then synchronization process is initiated.

References DIVINE_TAG_SYNC_COMPLETION, DIVINE_TAG_SYNC_ONE, DIVINE_TAG_SYNC_READY, DIVINE_TAG_SYNC_TWO, DIVINE_TAG_USER, network_t::flush_all_buffers_timed_out_only(), network_t::get_all_received_msgs_cnt(), network_t::get_all_sent_msgs_cnt(), network_t::is_new_message(),

network_t::is_new_urgent_message(), network, network_id, NETWORK_ID_MANAGER, process_user_message, network_t::receive_message(), network_t::receive_message_non_exc(), network_t::receive_urgent_message(), network_t::receive_urgent_message_non_exc(), network_t::send_urgent_message(), network_t::stats_num(), network_t::stats_Recv_bytes, and network_t::stats_Sent_bytes_local.

12.17.3.11 void set_busy (void)

Avoids synchronization.

This method must be called before process_messages() to be effective.

12.17.3.12 void set_idle (void)

Allows synchronization.

This method must be called before process_messages() to be effective.

References network_t::flush_all_buffers(), network_t::flush_some_buffers(), and network.

12.17.3.13 void set_proc_msgs_buf_exclusive_mem (bool *value*)

Determines whether the parameter buf in the process_user_message() function points

directly to internal buffers

Parameters:

value - if **true**, then the *buf* parameter in process_user_message() points to exclusive memory and the user is responsible for freeing it. if **false**, then no special memory is allocated and *buf* points directly to internal buffer and user must not free it.

12.17.3.14 bool synchronized (abstract_info_t & *info*)

Function that together with process_messages does synchronization and allows to collect some information during the synchronization process

Similar to synchronized() but it allows to collect some information. Let's take updateable info as an example (see updateable_info_t). You must create a structure (of type struct), attributes of the structure will be used for the collected data. The structure also contains update() function, which manipulates with the attributes. Create an instance of updateable_info_t and pass the structure as its template parameter (the actual structure used for collected data is accessible via the updateable_info_t::data parameter). Pass the instance as the parameter of this function. After all workstations are synchronized, manager workstation (0) sends the contents of the structure to workstation 1, workstation 1 sends it to workstation 2, etc. The last workstation then completes the round. On every workstation the update() function is called, which can manipulate with the attributes.

12.17.3.15 bool synchronized (void)

Function that together with process_messages does synchronization.

Returns:

true if workstations are synchronized.

It works in the following way. By first call to this function (on all workstations in the cluster) you are telling that you want to perform some distributed computation and at the end you wan to synchronize. During the computation you send messages using network_t::send_message() or network_t::send_urgent_message(). To receive message use the process_messages() function which calls process_user_message(), where you can do something with the received message. By subsequent calls to synchronized() you determine if all workstations finished their work. In distributed computation, work mosly implies sending messages, but if you want to do some bigger amount of work without sending messages and you don't want to synchronize, use the set_busy() function. Don't forget to call set_idle() function when your work is finished and remember to call them before process_messages(). synchronized() and process_messages() should be called quite often to make the computation efficient.

Warning:

Synchronization is performed in process_messages() method.

References network_t::barrier(), DIVINE_TAG_SYNC_READY, and network.

12.17.4 Member Data Documentation

12.17.4.1 void(∗ process_user_message)(char ∗buf, int size, int src, int tag, bool urgent)

Pointer to user-defined function that processes user messages.

Parameters:

buf - pointer to message data, it points either to newly allocated memory or to internal buffers (see set_proc_msgs_buf_exclusive_mem())

size - size of the received message

src - id of the sender workstation

tag - tag of the message (Remember that all user messages must have tag greater or equal to DIVINE_TAG_USER.

urgent - specifies whether the received message is urgent or not

To be able to use synchronization together with sending your own messages, you must write this function and assign it's pointer to process_user_message().

Referenced by process_messages().

The documentation for this class was generated from the following files:

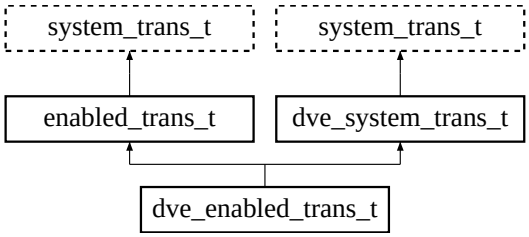
- distributed.hh
- distributed.cc

12.18 dve_enabled_trans_t Class Reference

Class implementing enabled trasition in DVE system.

`#include <dve_system_trans.hh>`

Inheritance diagram for dve_enabled_trans_t::



Public Member Functions

- dve_enabled_trans_t (const dve_enabled_trans_t &second)

  A copy constructor.

- dve_enabled_trans_t ()
- virtual enabled_trans_t & operator= (const enabled_trans_t &second)

12.18.1 Detailed Description

Class implementing enabled trasition in DVE system.

12.18.2 Constructor & Destructor Documentation

12.18.2.1 dve_enabled_trans_t () [inline]

CONSTRUCTORS //// A constructor

12.18.3 Member Function Documentation

12.18.3.1 enabled_trans_t & operator= (const enabled_trans_t & *second*) [virtual]

VIRTUAL INTERFACE OF ENABLED_TRANS_T //// Implements enabled_trans_t operator=() in DVE system

Implements enabled_trans_t.

The documentation for this class was generated from the following files:

- dve_system_trans.hh

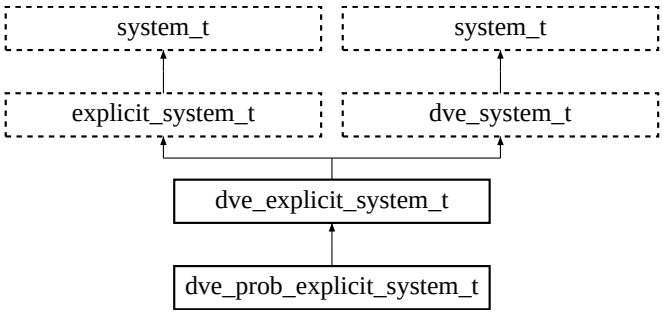
- dve_system_trans.cc

12.19 dve_explicit_system_t Class Reference

Class in DVE system interpretation.

`#include <dve_explicit_system.hh>`

Inheritance diagram for dve_explicit_system_t::



Public Member Functions

- dve_explicit_system_t (error_vector_t &evect=gerr)

  A constructor.

- size_int_t get_channel_pos (const size_int_t gid) const

  Returns a position of channel in a state of the system with process GID 'gid'.

- size_int_t get_process_pos (const size_int_t gid) const

  Returns a position of process in a state of the system with process GID 'gid'.

- size_int_t get_process_size (const size_int_t gid) const

  Returns a size of process in a state of the system with process GID 'gid'.

- size_int_t get_var_pos (const size_int_t gid) const

  Returns a position of variable in a state of the system with process GID 'gid'.

- virtual ~dve_explicit_system_t ()

  A destructor.

DVE system specific methods

These methods are implemented only in DVE system and they cannot be run using an abstract interface of system_t.

- void DBG_print_state (state_t state, std::ostream &outs=std::cerr, const ulong_int_t format=ES_FMT_PRINT_ALL_NAMES)

  Prints a state to output stream 'outs' formated according to 'format'.

- void DBG_print_state_CR (state_t state, std::ostream &outs=std::cerr, const ulong_int_t format=ES_FMT_PRINT_ALL_NAMES)
- all_values_t eval_expr (const dve_expression_t *const expr, const state_t state, bool &eval_err) const

  Evaluates the expression in the context of the state of explicit system.

- dve_transition_t * get_property_trans (const system_trans_t &sys_trans) const

  Returns a transition of property process contained in enabled transition.

- dve_transition_t * get_receiving_trans (const system_trans_t &sys_trans) const

  Returns a receiving transition contained in enabled transition.

- dve_transition_t * get_sending_or_normal_trans (const system_trans_t &sys_trans) const

  Returns a normal or a sending transition contained in enabled transition.

- size_int_t get_space_sum () const

  Returns a number of bytes necessary to store a state of the system.

- size_int_t get_state_of_process (const state_t state, size_int_t process_id) const
- all_values_t get_var_value (const state_t state, size_int_t var_gid, const size_int_t index=0)

  Returns the value of the variable in a given state of the system.

- bool is_accepting (state_t state, size_int_t process_id)

  Returns, whether process 'process_id' is in a accepting process state.

- virtual slong_int_t read (const char *const filename, bool do_comp)

  Read in a DVE source given by 'filename' and avoids expression compaction if 'do_comp' is false.

- virtual slong_int_t read (const char *const filename)

  Reads in a DVE source given by 'filename'.

- bool set_var_value (state_t state, const size_int_t var_gid, const all_values_t v, const size_int_t index=0)

  Changes the value of the variable in a given state of the system.

Methods for expression evaluation

These methods are implemented and can_evaluate_expressions() returns true

- virtual bool eval_expr (const expression_t *const expr, const state_t state, data_t &data) const

  Implements explicit_system_t::eval_expr() in DVE system.

Methods working with system transitions and enabled transitions

These methods are implemented and can_system_transitions() returns true

- virtual int get_enabled_ith_trans (const state_t state, const size_int_t i, enabled_trans_t &enb_trans)
- virtual int get_enabled_trans (const state_t state, enabled_trans_container_t &enb_trans)

  Implements explicit_system_t::get_enabled_trans() in DVE system.

- virtual int get_enabled_trans_count (const state_t state, size_int_t &count)

  Implements explicit_system_t::get_enabled_trans_count() in DVE system.

- virtual bool get_enabled_trans_succ (const state_t state, const enabled_trans_t &enabled, state_t &new_state)

  Implements explicit_system_t::get_enabled_trans_succ() in DVE system.

- virtual bool get_enabled_trans_succs (const state_t state, succ_container_t &succs, const enabled_trans_container_t &enabled_trans)

  Implements explicit_system_t::get_enabled_trans_succs() in DVE system.

- virtual int get_succs (state_t state, succ_container_t &succs, enabled_trans_container_t &etc)
- virtual enabled_trans_t * new_enabled_trans () const

  Implements explicit_system_t::new_enabled_trans() in DVE system.

Obligatory part of abstact interface

These methods have to implemented in each implementation of explicit_system_t

- virtual state_t get_initial_state ()

  Implements explicit_system_t::get_initial_state() in DVE system.

- virtual int get_ith_succ (state_t state, const int i, state_t &succ)
- size_int_t get_preallocation_count () const

  Implements explicit_system_t::get_preallocation_count() in DVE system.

- virtual int get_succs (state_t state, succ_container_t &succs)
- virtual bool is_accepting (state_t state, size_int_t acc_group=0, size_int_t pair_member=1)
- virtual bool is_erroneous (state_t state)

  Implements explicit_system_t::is_erroneous() in DVE system.

- virtual void print_state (state_t state, std::ostream &outs=std::cout)

  Implements explicit_system_t::print_state() in DVE system.

- virtual size_int_t violated_assertion_count (const state_t state) const

  Implements explicit_system_t::violated_assertion_count() in DVE system.

- virtual std::string violated_assertion_string (const state_t state, const size_int_t index) const

Implements explicit_system_t::violated_assertion_string() in DVE system.

- virtual bool violates_assertion (const state_t state) const

  Implements explicit_system_t::violates_assertion() in DVE system.

Methods to check the SCCs of property process graph

- process_decomposition_t * get_property_decomposition ()

  Returns property decomposition.

Protected Member Functions

- void append_new_enabled (dve_transition_t *const t_answ, dve_transition_t *const t_ask, const bool trans_err)
- void append_new_enabled_prop_sync (dve_transition_t *const t_answ, dve_transition_t *const t_prop, const bool trans_err)

  Appends a new enabled transition given by sending and receiving property.

- bool apply_effect (const state_t state, const dve_expression_t *const effect)

  Creates a successor of 'state' by applying effect 'effect'.

- bool apply_transition_effects (const state_t state, const dve_transition_t *const trans)

  Creates a successor of 'state' by applying effects of the transition 'trans'.

- size_int_t channel_content_count (const state_t &state, const size_int_t gid)
- bool channel_is_empty (const state_t &state, const size_int_t gid)

  Returns true iff channel with GID 'gid' is empty in state 'state'.

- bool channel_is_full (const state_t &state, const size_int_t gid)

  Returns true iff channel with GID 'gid' is full in state 'state'.

- bool compute_enabled_of_property (const state_t state)
- bool compute_enabled_stage1 (const size_int_t process_number, channels_t *channels, const state_t state, const bool only_commited)
- bool compute_enabled_stage2 (const size_int_t process_number, channels_t *channels, const state_t state, const bool only_commited)
- bool compute_successors_without_sync (const size_int_t process_number, succ_container_t &succs, const state_t state)
- state_t create_error_state ()

  Creates "erroneous state".

- int get_async_enabled_trans (const state_t state, enabled_trans_container_t &enb_trans)

  Implementation of get_enabled_trans() in asynchronous DVE systems.

- bool get_async_enabled_trans_succ (const state_t state, const enabled_trans_t &enabled, state_t &new_state, const state_t property_state)
- bool get_async_enabled_trans_succ (const state_t state, const enabled_trans_t &enabled, state_t &new_state)

  Implementation of get_enabled_trans_succ() in asynchronous DVE systems.

- bool get_async_enabled_trans_succ_without_property (const state_t state, const enabled_trans_t &enabled, state_t &new_state)
- bool get_async_enabled_trans_succs (const state_t state, succ_container_t &succs, const enabled_trans_container_t &enabled_trans)

  Implementation of get_enabled_trans_succs() in asynchronous DVE systems.

- int get_async_succs (const state_t state, succ_container_t &succs, enabled_trans_container_t &enb_trans)

  Implementation of get_succs() in asynchronous DVE systems.

- int get_async_succs (const state_t state, succ_container_t &succs)

  Implementation of get_succs() in asynchronous DVE systems.

- int get_async_succs_internal (const state_t state, succ_container_t &succs)

  Internal method for implementation of both variants of get_async_succs().

- all_values_t get_state_creator_value_of_var_type (const state_t state, size_int_t var_gid, const dve_var_type_t var_type, const size_int_t index=0)

  Returns a value of a variable with GID 'var_gid' in a state 'state'.

- int get_sync_enabled_trans (const state_t state, enabled_trans_container_t &enb_trans)

  !Implementation of get_enabled_trans() in synchronous DVE systems

- bool get_sync_enabled_trans_succ (const state_t state, const enabled_trans_t &enabled, state_t &new_state)

  Implementation of get_enabled_trans_succ() in synchronous DVE systems.

- bool get_sync_enabled_trans_succs (const state_t state, succ_container_t &succs, const enabled_trans_container_t &enabled_trans)

  Implementation of get_enabled_trans_succs() in synchronous DVE systems.

- int get_sync_succs (state_t state, succ_container_t &succs, enabled_trans_container_t &etc)

  Implementation of get_succs() in synchronous DVE systems.

- int get_sync_succs (state_t state, succ_container_t &succs)

  Implementation of get_succs() in synchronous DVE systems.

- int get_sync_succs_internal (state_t state, succ_container_t &succs, enabled_trans_container_t *const etc)

  Internal method for implementation of both variants of get_sync_succs().

- void go_to_error (state_t state)
- bool is_commited (state_t state)

  Returns, whether at least one process is in a commited state.

- bool not_in_glob_conflict (const dve_transition_t *const t1, const dve_transition_t *const t2)
- bool passed_through (const state_t state, const dve_transition_t *const t, const dve_state_int_t state1, bool &eval_err)
- void **pop_front_channel** (state_t &state, const size_int_t gid)
- void prepare_channels_info ()

  Clears list of transitions created by compute_enabled_stage1().

- void **push_back_channel** (state_t &state, const size_int_t gid)
- all_values_t **read_from_channel** (const state_t &state, const size_int_t gid, const size_int_t item_index, const size_int_t elem_index=0)
- all_values_t **retype** (dve_var_type_t type, all_values_t value)
- bool set_state_creator_value (state_t state, const size_int_t var_gid, const all_values_t v, const size_int_t index=0)
- void set_state_creator_value_extended (const state_t &state, const state_t &new_state, const dve_expression_t &to_assign, const all_values_t &val, bool &error)

  Sets a value 'val' to the variable given by 'to_assign'.

- bool set_state_creator_value_of_var_type (state_t state, const size_int_t var_gid, const dve_var_type_t var_type, const all_values_t v, const size_int_t index)

  Sets a value of a variable with GID 'var_gid' in a state 'state'.

- void **write_to_channel** (state_t &state, const size_int_t gid, const size_int_t item_index, const all_values_t value)

Protected Attributes

- size_int_t * **array_sizes**
- enabled_trans_container_t * **aux_enabled_trans**
- enabled_trans_container_t * **aux_enabled_trans2**
- succ_container_t * **aux_succ_container**
- size_int_t * **channel_buffer_size**
- size_int_t * **channel_element_size**
- size_int_t ** **channel_item_pos**
- dve_var_type_t ** **channel_item_type**
- channels_t * **channels**
- size_int_t **first_in_succs**

- size_int_t **glob_count**
- array_t< byte_t * > **glob_filters**
- process_position_t **global_position**
- size_int_t **max_succ_count**
- enabled_trans_container_t * **p_enabled_trans**
- size_int_t **process_count**
- process_position_t * **process_positions**
- size_int_t **prop_begin**
- size_int_t **prop_size**
- size_int_t **property_position**
- array_t< prop_trans_t > **property_trans**
- size_int_t **space_sum**
- std::vector< state_creator_t > **state_creators**
- size_int_t **state_creators_count**
- size_int_t * **state_positions_channel**
- size_int_t * **state_positions_proc**
- size_int_t * **state_positions_state**
- size_int_t * **state_positions_var**
- size_int_t * **state_sizes_var**
- size_int_t **trans_count**

Classes

- struct state_creator_t

12.19.1 Detailed Description

Class in DVE system interpretation.

This class implements the abstract interface explicit_system_t.

It is a child of dve_system_t - thus it also contains the representation of DVE system.

DVE system interpretation in this case comprises state generation, enabled transitions generation and expression evaluation.

This implementation of the abstract interface implements full set of its methods. Furthermore It takes over the system of expression evaluation from system_t. Only for evaluating varibles, fields and state identifiers there are defined special functions, which return their value accoring a state of system (given by a piece of a memory).

Furthermore it provides the set of methods, which are purely DVE system specific.

12.19.2 Constructor & Destructor Documentation

12.19.2.1 dve_explicit_system_t (error_vector_t & *evect* = gerr)

A constructor.

Parameters:

evect = error vector used for reporting of error messages

References system_t::get_abilities(), and system_abilities_t::system_can_-decompose_property.

12.19.3 Member Function Documentation

12.19.3.1 void append_new_enabled (dve_transition_t *const *t_answ*, dve_transition_t *const *t_ask*, const bool *trans_err*) [protected]

Appends an new enabled transition given by sending and receiving transition and erroneousness.

It also combines sending and receiving transitions with property transitions stored in private variable property_trans, if there are any. Thus it stores 1 enabled transition for a system without property process and n enabled transition for a system with property process with n executable transitions stored in property_trans.

References array_of_abstract_t::back(), array_of_abstract_t::begin(), array_of_-abstract_t::extend(), system_t::get_with_property(), system_trans_t::set_count(), enabled_trans_t::set_erroneous(), and array_of_abstract_t::size().

Referenced by compute_enabled_stage2().

12.19.3.2 void append_new_enabled_prop_sync (dve_transition_t *const *t_answ*, dve_transition_t *const *t_prop*, const bool *trans_err*) [protected]

Appends a new enabled transition given by sending and receiving property.

Parameters:

t_answ = sending transition

t_prop = receiving transition of the property process

trans_err = says, whether an evaluation of some of guards of transitions was erroneous

References array_of_abstract_t::extend(), system_trans_t::set_count(), and enabled_-trans_t::set_erroneous().

Referenced by compute_enabled_stage2().

12.19.3.3 size_int_t channel_content_count (const state_t & *state*, const size_int_t *gid*) [protected]

Returns a count of elements stored in a channel with GID 'gid' in state 'state'

Referenced by channel_is_empty(), channel_is_full(), and DBG_print_state().

12.19.3.4 bool compute_enabled_of_property (const state_t *state*) [protected]

Computes trasitions of property process with satisfied guards and stores them to the list property_trans

References compute_successors_without_sync(), process_t::get_gid(), dve_process_t::get_trans_count(), dve_process_t::get_transition(), passed_through(), dve_system_t::pproperty, and SYNC_NO_SYNC.

Referenced by get_async_enabled_trans().

12.19.3.5 bool compute_enabled_stage1 (const size_int_t *process_number*, channels_t * *channels*, const state_t *state*, const bool *only_commited*) [protected]

Searching for receiving transitions with satisfied guards (stores them to 'channels' - transition sorted by the used channel)

References dve_process_t::get_commited(), process_t::get_gid(), dve_process_t::get_trans_count(), dve_process_t::get_transition(), passed_through(), dve_system_t::processes, and SYNC_ASK.

Referenced by compute_successors_without_sync(), and get_async_enabled_trans().

12.19.3.6 bool compute_enabled_stage2 (const size_int_t *process_number*, channels_t * *channels*, const state_t *state*, const bool *only_commited*) [protected]

Searching for sending transitions and trasitions without synchronization with satisfied guards.

It combines them with transitions from 'channels' created by compute_enabled_stage1(). It creates a list of enabled transisitions in p_enabled_trans.

References append_new_enabled(), append_new_enabled_prop_sync(), channel_is_empty(), channel_is_full(), dve_transition_t::get_channel_gid(), dve_process_t::get_commited(), process_t::get_gid(), dve_system_t::get_property_gid(), dve_process_t::get_trans_count(), dve_process_t::get_transition(), system_t::get_with_property(), passed_through(), dve_system_t::processes, SYNC_ASK, SYNC_ASK_BUFFER, SYNC_EXCLAIM, SYNC_EXCLAIM_BUFFER, and SYNC_NO_SYNC.

Referenced by get_async_enabled_trans().

12.19.3.7 bool compute_successors_without_sync (const size_int_t *process_number*, succ_container_t & *succs*, const state_t *state*) [protected]

Computes successors of 'state' using transitions of process with GID 'process_number' without any regard to synchronization

References apply_transition_effects(), array_of_abstract_t::back(), compute_enabled_stage1(), array_of_abstract_t::extend(), process_t::get_gid(), dve_process_t::get_trans_count(), dve_process_t::get_transition(), go_to_error(), passed_through(), dve_system_t::processes, array_t::push_back(), system_trans_t::set_count(), and enabled_trans_t::set_erroneous().

Referenced by compute_enabled_of_property(), and get_sync_succs_internal().

12.19.3.8 state_t create_error_state () [protected]

Creates "erroneous state".

Creates "erroneous state", which is the unique in whole system. This state should not be interpreted (you would get unexpected values of varibles, which you want to see).

You can detect error states by function is_erroneous().

References get_space_sum(), and dve_system_t::processes.

12.19.3.9 void DBG_print_state (state_t *state*, std::ostream & *outs* = std::cerr, const ulong_int_t *format* = ES_FMT_PRINT_ALL_NAMES)

Prints a state to output stream ‘outs’ formated according to ‘format’.

This is a function meant espesially for debugging purposes.

Parameters:

state = state of the system to print

outs = output stream where you want to print the state

format = format of output - you can set how the output should be structured and which names of identifiers should appear in the printout of the state (bitwise sum of the constants ES_FMT_PRINT_STATE_NAMES, ES_FMT_PRINT_VAR_NAMES, ES_FMT_PRINT_PROCESS_NAMES, ES_FMT_DIVIDE_PROCESSES_BY_CR).

References dve_explicit_system_t::state_creator_t::array_size, channel_content_count(), ES_FMT_DIVIDE_PROCESSES_BY_CR, ES_FMT_PRINT_PROCESS_NAMES, ES_FMT_PRINT_STATE_NAMES, ES_FMT_PRINT_VAR_NAMES, dve_symbol_table_t::get_channel(), dve_symbol_t::get_channel_type_list_size(), dve_symbol_t::get_name(), dve_symbol_table_t::get_process(), dve_symbol_table_t::get_state(), dve_symbol_table_t::get_variable(), dve_explicit_system_t::state_creator_t::gid, is_erroneous(), dve_system_t::processes, dve_system_t::psymbol_table, dve_explicit_system_t::state_creator_t::type, and dve_explicit_system_t::state_creator_t::var_type.

12.19.3.10 void DBG_print_state_CR (state_t *state*, std::ostream & *outs* = std::cerr, const ulong_int_t *format* = ES_FMT_PRINT_ALL_NAMES) [inline]

It is the same as DBG_print_state(), but finally calls 'outs << std::endl' (thus prints 'new-line' character and flushes the buffer).

Referenced by get_initial_state().

12.19.3.11 all_values_t eval_expr (const dve_expression_t *const *expr*, const state_t *state*, bool & *eval_err*) const [inline]

Evaluates the expression in the context of the state of explicit system.

Parameters:

expr = pointer to the expression represented by dve_expression_t

state = state of the system

eval_err = if there was an error during an evaluation of an expression, *eval_err* is set to true. Otherwise it is **unchanged**.

Returns:

The value of the expression *expr* in the context of *state*

References dve_system_t::eval_expr(), dve_system_t::fast_eval(), dve_expression_t::get_p_compact(), dve_expression_t::is_compacted(), and ES_parameters_t::state.

12.19.3.12 bool get_async_enabled_trans_succ (const state_t *state*, const enabled_trans_t & *enabled*, state_t & *new_state*, const state_t *property_state*) [protected]

Creates a successor of 'state' using the enabled transition 'enabled' and a successor 'property_state' gained by the transition of property

This function optimizes a generation of successors of one state, because it does not compute transitions of property process any more. It uses precomputed state of property process.

References get_async_enabled_trans_succ_without_property(), get_property_trans(), and state_t::ptr.

12.19.3.13 bool get_async_enabled_trans_succ_without_property (const state_t *state*, const enabled_trans_t & *enabled*, state_t & *new_state*) [protected]

Creates a successor of 'state' using the enabled transition 'enabled' and doesn't use the property component of the enabled transition.

References apply_transition_effects(), eval_expr(), dve_symbol_table_t::get_channel(), dve_transition_t::get_channel_gid(), dve_symbol_t::get_channel_type_list_item(), dve_symbol_t::get_channel_typed(), enabled_trans_t::get_erroneous(), get_receiving_trans(), get_sending_or_normal_trans(), dve_transition_t::get_sync_expr_list_item(), dve_transition_t::get_sync_expr_list_size(), go_to_error(), dve_system_t::psymbol_table, set_state_creator_value_extended(), SYNC_ASK_BUFFER, and SYNC_EXCLAIM_BUFFER.

Referenced by get_async_enabled_trans_succ().

12.19.3.14 int get_enabled_ith_trans (const state_t *state*, const size_int_t *i*, enabled_trans_t & *enb_trans*) [virtual]

Implements explicit_system_t::get_enabled_ith_trans() in DVE system, but see also implementation specific notes below

Warning:

Computing of this method is the same as the running time of get_enabled_trans() (it is more efficient to use get_enabled_trans() and store generated enabled transitions, if it is possible).

Implements explicit_system_t.

References get_enabled_trans().

Referenced by get_ith_succ().

12.19.3.15 int get_enabled_trans_count (const state_t *state*, size_int_t & *count*) [virtual]

Implements explicit_system_t::get_enabled_trans_count() in DVE system.

The running time of this method is the same as the running time of get_enabled_trans().

Implements explicit_system_t.

References get_enabled_trans(), and array_of_abstract_t::size().

12.19.3.16 int get_ith_succ (state_t *state*, const int *i*, state_t & *succ*) [virtual]

Implements explicit_system_t::get_ith_succ() in DVE system, but see also implementation specific notes below

Warning:

The running time of this function is relatively high. The running time is the running time of get_succs(). It is usually more efficient to use get_succs() and to store all generated states, if it is possible.

Implements explicit_system_t.

References get_async_enabled_trans_succ(), get_enabled_ith_trans(), and SUCC_-ERROR.

Referenced by por_t::ample_set_succs().

12.19.3.17 dve_transition_t * get_property_trans (const system_trans_t & *sys_trans*) const

Returns a transition of property process contained in enabled transition.

If the system contains a property process, this method returns the pointer to the property process's transition contained in an enabled transition.

Otherwise it returns 0.

Warning:

This method presumes, that *sys_trans* has been created by this class.

References system_trans_t::get_count(), and system_t::get_with_property().

Referenced by get_async_enabled_trans_succ(), and dve_prob_explicit_system_-t::get_succs().

12.19.3.18 dve_transition_t * get_receiving_trans (const system_trans_t & *sys_trans*) const

Returns a receiving transition contained in enabled transition.

If get_sending_or_normal_trans(sys_trans) returns sending transition, this method returns its receiving counterpart.

Otherwise it returns 0.

Warning:

This method presumes, that *sys_trans* has been created by this class.

References system_trans_t::get_count(), and system_t::get_with_property().

Referenced by por_t::generate_ample_sets(), por_t::generate_composed_ample_-sets(), and get_async_enabled_trans_succ_without_property().

12.19.3.19 dve_transition_t * get_sending_or_normal_trans (const system_trans_t & *sys_trans*) const

Returns a normal or a sending transition contained in enabled transition.

Transition of DVE system can consist of at most 3 transitions of processes. It always contains either non-synchronized transition or a sending transition (and its receiving counterpart)

This method guaranties to always return the transition, if *sys_trans* contains any (which should be truth, if enabled transition has been created by this class).

Warning:

This method presumes, that *sys_trans* has been created by this class.

Referenced by por_t::generate_ample_sets(), por_t::generate_composed_ample_sets(), get_async_enabled_trans_succ_without_property(), and dve_prob_explicit_system_t::get_succs().

12.19.3.20 all_values_t get_state_creator_value_of_var_type (const state_t *state*, size_int_t *var_gid*, const dve_var_type_t *var_type*, const size_int_t *index* = 0) [protected]

Returns a value of a variable with GID 'var_gid' in a state 'state'.

Parameters:

state = state of system

var_gid = GID of variable

var_type = type of variable

index = index for a case of vector of variables

Returns:

a value of variable with GID *var_gid* in a state *state*. It uses *var_type* to determine the type of conversion and *index* (voluntary) for determining an pointer to the variable in a vector

12.19.3.21 size_int_t get_state_of_process (const state_t *state*, size_int_t *process_id*) const

Returns a state LID of state of a given process in a given state of the system.

References dve_system_t::processes.

Referenced by por_t::generate_ample_sets(), por_t::generate_composed_ample_sets(), dve_process_decomposition_t::get_process_scc_id(), and dve_process_decomposition_t::get_process_scc_type().

12.19.3.22 virtual int get_succs (state_t *state*, succ_container_t & *succs*, enabled_trans_container_t & *etc*) [inline, virtual]

Implements explicit_system_t::get_succs(state_t state, succ_container_t & succs, enabled_trans_container_t & etc) in DVE system

Implements explicit_system_t.

12.19.3.23 virtual int get_succs (state_t *state*, succ_container_t & *succs*) [inline, virtual]

Implements explicit_system_t::get_succs(state_t state, succ_container_t & succs) in DVE system

Implements explicit_system_t.

Referenced by dve_prob_explicit_system_t::get_succs().

12.19.3.24 bool get_sync_enabled_trans_succ (const state_t *state*, const enabled_trans_t & *enabled*, state_t & *new_state*) [protected]

Implementation of get_enabled_trans_succ() in synchronous DVE systems.

!!!Transmitting of values through channels is ignored!!!!

References apply_transition_effects(), system_trans_t::get_count(), and enabled_trans_t::get_erroneous().

Referenced by get_sync_enabled_trans_succs().

12.19.3.25 void go_to_error (state_t *state*) [protected]

METHODS: Changes the state of process (repr. by 'process') to 'error'

References dve_system_t::processes.

Referenced by compute_successors_without_sync(), get_async_enabled_trans_succ_without_property(), and get_sync_succs_internal().

12.19.3.26 bool is_accepting (state_t *state*, size_int_t *process_id*) [inline]

Returns, whether process 'process_id' is in a accepting process state.

Parameters:

state = state of the system

process_id = GID of process, which we are asking for an acceptance

Returns:

whether a process with GID *process_ID* is in an accepting state or not

12.19.3.27 virtual bool is_accepting (state_t *state*, size_int_t *acc_group* = 0, size_int_t *pair_member* = 1) [inline, virtual]

Implements explicit_system_t::is_accepting() in DVE system. Returns true if the property automaton state belongs to the by-parameters-specified set of accepting condition. The set of accepting condition is specified using accepting group id and possibly pair

member. Accepting !groups correspond to individual sets of states, or pairs of sets of states given by the accepting condition of the property automaton. Grups are identified by the numbers including zero (0,..,n-1) while pair members using numbers 1 and 2.

For example let Streett's accepting condition be (L1,U1), (L2,U2), (L3,U3). To check whether state q is present in U2, is_accepting(q,1,2) should be used.

Implements explicit_system_t.

12.19.3.28 bool not_in_glob_conflict (const dve_transition_t *const *t1*, const dve_transition_t *const *t2*) [inline, protected]

Returs true iff transitions 't1' and 't2' assign to the same global varibles.

References dve_transition_t::get_glob_mask().

12.19.3.29 bool passed_through (const state_t *state*, const dve_transition_t *const *t*, const dve_state_int_t *state1*, bool & *eval_err*) [inline, protected]

Returns true iff transition 't' is a transitiom from a process state 'state1' with satisfied guard in a system state 'state'

Returns also errors during an evaluation to the variable *eval_err*

References dve_transition_t::get_guard(), and dve_transition_t::get_state1_lid().

Referenced by compute_enabled_of_property(), compute_enabled_stage1(), compute_enabled_stage2(), and compute_successors_without_sync().

12.19.3.30 slong_int_t read (const char *const *filename*, bool *do_comp*) [virtual]

Read in a DVE source given by 'filename' and avoids expression compaction if 'do_comp' is false.

Is uses system_t::read(const char * const filename), therefore see that function for more information (about return value etc.) Furthermore it makes some analysis and extraction of information from the system and symbol table. Morover if 'do_comp' is false avoids expression compaction

References dve_system_t::get_property_gid(), system_t::get_with_property(), process_decomposition_t::parse_process(), and dve_system_t::read().

12.19.3.31 virtual slong_int_t read (const char *const *filename*) [inline, virtual]

Reads in a DVE source given by 'filename'.

Is uses system_t::read(const char * const filename), therefore see that function for more information (about return value etc.) Furthermore, it makes some analysis and extraction of information from the system and symbol table

Reimplemented from dve_system_t.

Reimplemented in dve_prob_explicit_system_t.

Referenced by dve_prob_explicit_system_t::read().

12.19.3.32 bool set_state_creator_value (state_t *state*, const size_int_t *var_gid*, const all_values_t *v*, const size_int_t *index* = 0) [inline, protected]

set_state_creator_value_of_var_type() with ‘var_type‘ set to ‘var_types[var_gid]‘

Referenced by apply_effect(), and set_state_creator_value_extended().

12.19.3.33 void set_state_creator_value_extended (const state_t & *state*, const state_t & *new_state*, const dve_expression_t & *to_assign*, const all_values_t & *val*, bool & *error*) [protected]

Sets a value ‘val’ to the variable given by ‘to_assign’.

Parameters:

state = original state

new_state = new state, where the value of variable should be assigned

to_assign = expression representing a variable of indexed element of array (index is evaluated in a constext of *state*)

val = value to assign

error = erroneousness of possible evaluation of index of array or potential breaking of bound of an array

References eval_expr(), dve_expression_t::get_ident_gid(), dve_expression_t::get_operator(), dve_expression_t::left(), and set_state_creator_value().

Referenced by get_async_enabled_trans_succ_without_property().

12.19.3.34 bool set_state_creator_value_of_var_type (state_t *state*, const size_int_t *var_gid*, const dve_var_type_t *var_type*, const all_values_t *v*, const size_int_t *index*) [protected]

Sets a value of a variable with GID ‘var_gid’ in a state ‘state’.

Parameters:

state = state of system

var_gid = GID of variable

var_type = type of variable

index = index for a case of vector of variables

v = value to assign

Returns:

true iff no error occured during a call (i. e. value is in bounds of its type)

References dve_symbol_t::get_name(), dve_symbol_table_t::get_variable(), and dve_system_t::psymbol_table.

Referenced by get_initial_state().

12.19.3.35 bool set_var_value (state_t *state*, const size_int_t *var_gid*, const all_values_t *v*, const size_int_t *index* = 0) [inline]

Changes the value of the variable in a given state of the system.

Parameters:

state ... system state to which the variable value should be set

var_gid ... GID of variable to set

v ... value to set (be aware of bounds of byte and int types)

index ... optional parameter for the case of arrays - it is the index to an array

Returns:

true iff setting value was not successsful - i. e. value breaks the bounds of the type of variable, or variable is the constant

The documentation for this class was generated from the following files:

- dve_explicit_system.hh
- dve_explicit_system.cc

12.20 dve_explicit_system_t::state_creator_t Struct Reference

`#include <dve_explicit_system.hh>`

Public Types

- enum **state_creator_type_t** { **VARIABLE**, **PROCESS_STATE**, **CHANNEL_BUFFER** }

Public Member Functions

- **state_creator_t** (const state_creator_type_t sc_type, dve_var_type_t vtype, const size_int_t arr_size, const size_int_t gid_arg)

Public Attributes

- size_int_t **array_size**
- size_int_t **gid**
- state_creator_type_t **type**
- dve_var_type_t **var_type**

12.20.1 Detailed Description

Internal structure used to store inforamtions about non-constant varibles, process states and channel buffers.

Programmer of algorithms using DiVinE usually should not use this structure.

The documentation for this struct was generated from the following file:

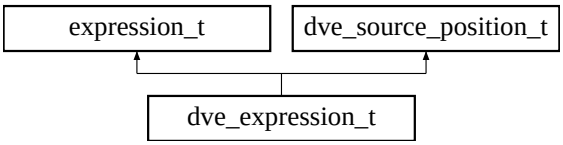
- dve_explicit_system.hh

12.21 dve_expression_t Class Reference

Class representing an expression in DVE system.

`#include <dve_expression.hh>`

Inheritance diagram for dve_expression_t::



Public Member Functions

- virtual void assign (const expression_t &expr)

  Implements expression_t::assign() in DVE system.

- dve_expression_t (const dve_expression_t &expr)

  A copy constructor.

- dve_expression_t (const std::string &str_expr, system_t *const system, size_int_t process_gid=NO_ID)

  A constructor from a string.

- dve_expression_t (int expr_op, const dve_expression_t &expr_left, system_t *const system=0)
- dve_expression_t (int expr_op, const dve_expression_t &expr_left, const dve_expression_t &expr_right, system_t *const system=0)
- dve_expression_t (int expr_op, std::stack< dve_expression_t * > &subexprs_stack, const short int ar=0, system_t *const system=0)

  A constructor used by a parser.

- dve_expression_t (system_t *const system=0)

  A contructor of empty expression.

- virtual int from_string (std::string &expr_str, const size_int_t process_gid=NO_ID)

  Implements expression_t::from_string() in DVE system.

- virtual int read (std::istream &istr, size_int_t process_gid=NO_ID)

  Implements expression_t::read() in DVE system.

- virtual void swap (expression_t &expr)

  Implements expression_t::swap() in DVE system.

- virtual std::string to_string () const

  Implements expression_t::to_string() in DVE system.

- virtual void write (std::ostream &ostr) const

  Implements expression_t::write() in DVE system.

- virtual ~dve_expression_t ()

DVE system specific methods

These methods are implemented only in DVE system and they cannot be run using an abstract interface of expression_t

- size_int_t arity () const
- void compaction ()

  Computes compatc version of the expression (single memory block).

- size_int_t get_ident_gid () const
- int get_operator () const
- compacted_viewer_t * get_p_compact () const

  Returns pointer to compacted representation.

- dve_symbol_table_t * get_symbol_table () const

  Returns a pointer to the symbol table corresponding to this expression.

- all_values_t get_value () const
- bool is_compacted () const

  Says whether the expression is compacted.

- const dve_expression_t * left () const

  Returns the left-most constant immediate subexpression.

- dve_expression_t * left ()

  Returns the left-most immediate subexpression.

- const dve_expression_t * right () const

  Returns the right-most constant immediate subexpression.

- dve_expression_t * right ()

  Returns the right-most immediate subexpression.

- void set_arity (const size_int_t new_arity)
- void set_ident_gid (const size_int_t gid)
- void set_operator (const int oper)
- void set_value (const all_values_t value)
- const dve_expression_t * subexpr (size_int_t index) const

  Returns the 'index'-th constant immediate subexpression.

- dve_expression_t * subexpr (size_int_t index)

  Returns the 'index'-th immediate subexpression.

12.21.1 Detailed Description

Class representing an expression in DVE system.

This class implements the abstract interface of expression_t and moreover it provides many methods beside methods of that interface.

Expressions are stored in a structure of a syntax tree. The methods of class dve_expression_t enables to obtain or change the informations about the top-most node in a syntax tree of the expression. To edit the lower levels of the syntax tree you can use methods left(), right() and subexpr().

The syntax tree is little different than you are probably used to. The inner nodes may contain following operators:

- () ... T_PARENTHESIS ... parenthesis,
- [] ... T_SQUARE_BRACKETS ... array indexing,
- < ... T_LT,
- <= ... T_LEQ,
- = ... T_EQ,
- != ... T_NEQ,
- >= ... T_GEQ,
- > ... T_GT,
- + ... T_PLUS,
- - ... T_MINUS,
- * ... T_MULT,
- / ... T_DIV,
- % ... T_MOD,
- & ... T_AND,
- | ... T_OR,
- ^ ... T_XOR,
- << ... T_LSHIFT,
- >> ... T_RSHIFT,
- and ... T_BOOL_AND,
- or ... T_BOOL_OR,
- -> ... I_IMPLY,
- - ... T_UNARY_MINUS ... unary minus

- ~ ... T_TILDE ... bitwise negation
- not ... T_BOOL_NOT ... logical negation
- = ... T_ASSIGN ... assignment operation (permitted only in effects)

The leaf nodes may contain following operators:

- . ... T_DOT ... question on a state of process
- <number> ... T_NAT ... integer constant
- <variable> ... T_ID ... variable

Note:

In a T_DOT node you can use get_ident_gid() method to get a GID of process state contained in an expression. The identifier of process which owns that process state can be obtained by the function symbol_t::get_process_gid(), e.g. `table->get_state(expr->get_ident_gid())->get_process_gid()`.

12.21.2 Constructor & Destructor Documentation

12.21.2.1 ~dve_expression_t () [virtual]

IMPLEMENTATION OF VIRTUAL INTERFACE OF expression_t ///// A destructor.

12.21.2.2 dve_expression_t (int *expr_op*, const dve_expression_t & *expr_left*, const dve_expression_t & *expr_right*, system_t *const *system* = 0) [inline]

A constructor that creates a new expression from 2 expressions and an operator.

12.21.2.3 dve_expression_t (int *expr_op*, const dve_expression_t & *expr_left*, system_t *const *system* = 0) [inline]

A constructor that creates a new expression from 1 expression and an operator.

12.21.2.4 dve_expression_t (const std::string & *str_expr*, system_t *const *system*, size_int_t *process_gid* = NO_ID)

A constructor from a string.

Parameters:

str_expr = string assigning the expression to represent

par_table = symbol table containing symbols needed to recognize in the expression (e.g. variable names)

process_gid = GID of process in which the expression is given (NO_ID means no process, that is a global environment)

References gerr, and read().

12.21.3 Member Function Documentation

12.21.3.1 size_int_t arity () const [inline]

Returns a number of chilren of the top-most node in the syntax tree of the expression.

Referenced by compaction(), and dve_system_t::eval_expr().

12.21.3.2 size_int_t get_ident_gid () const [inline]

Returns an identifier contained in the top-most node of the syntax tree of the expression.

It can be used only if operator in this node is T_ID (scalar variable), T_SQUARE_BRACKETS (vector variable) or T_DOT (process state).

It returns GID of the object of a certain type - the type is given by get_operator() (values T_ID, T_SQUARE_BRACKETS, T_DOT).

Referenced by dve_parser_t::check_restrictions_put_on_property(), compaction(), dve_system_t::eval_expr(), dve_parser_t::expr_assign(), dve_explicit_system_t::set_state_creator_value_extended(), and dve_parser_t::trans_sync().

12.21.3.3 int get_operator () const [inline]

Returns an operator in the top-most node of the syntax tree of the expression.

Referenced by compaction(), dve_system_t::eval_expr(), dve_parser_t::expr_assign(), dve_explicit_system_t::set_state_creator_value_extended(), and dve_parser_t::trans_sync().

12.21.3.4 all_values_t get_value () const [inline]

Returns a value contained in the top-most node of the syntax tree of the expression. It can be used only if operator in this node is T_NAT (number).

Referenced by compaction(), and dve_system_t::eval_expr().

12.21.3.5 void set_arity (const size_int_t *new_arity*) [inline]

Sets a number of chilren of the top-most node in the syntax tree of the expression.

12.21.3.6 void set_ident_gid (const size_int_t *gid*) [inline]

Sets an identifier contained in the top-most node of the syntax tree of the expression.

It can be used only if operator in this node is T_ID (scalar variable), T_SQUARE_-BRACKETS (vector variable) or T_DOT (process state).

It returns GID of the object of a certain type - the type is given by get_operator() (values T_ID, T_SQUARE_BRACKETS, T_DOT).

12.21.3.7 void set_operator (const int *oper*) [inline]

Sets an operator in the top-most node of the syntax tree of the expression.

12.21.3.8 void set_value (const all_values_t *value*) [inline]

Sets a value contained in the top-most node of the syntax tree of the expression. It can be used only if operator in this node is T_NAT (number).

The documentation for this class was generated from the following files:

- dve_expression.hh
- dve_expression.cc

12.22 dve_parser_t Class Reference

Class that provides an interface to the parsing of DVE sources.

`#include <dve_parser.hh>`

Public Types

- enum parser_mode_t {
  SYSTEM, PROCESS, PROB_TRANSITION, TRANSITION,
  EXPRESSION }
  Modes of parsing.

Public Member Functions

- void check_restrictions_put_on_property ()
- dve_parser_t (error_vector_t &evect, dve_expression_t *my_expression)
  A constructor for creating of a parser of DVE expression.
- dve_parser_t (error_vector_t &evect, dve_prob_transition_t *my_transition)
  A constructor for creating of a parser of DVE transition.
- dve_parser_t (error_vector_t &evect, dve_transition_t *my_transition)
  A constructor for creating of a parser of DVE transition.
- dve_parser_t (error_vector_t &evect, dve_prob_process_t *my_process)
  A constructor for creating of a parser of probabilistic DVE process.
- dve_parser_t (error_vector_t &evect, dve_process_t *my_process)
  A constructor for creating of a parser of DVE process.
- dve_parser_t (error_vector_t &evect, dve_system_t *my_system)
  A constructor for creating of a parser of entire DVE source file.
- size_int_t get_current_process () const
  Returns the context for parsing of expression or transition.
- dve_expression_t * get_dve_expression_to_fill ()
  Returns a expression, which is filled in by the parser.
- dve_prob_transition_t * get_dve_prob_transition_to_fill ()
  Returns a probabilistic transition, which is filled in by the parser.
- dve_process_t * get_dve_process_to_fill ()

Returns a process, which is filled in by the parser.

- dve_system_t * get_dve_system_to_fill ()

  Returns a system, which is filled in by the parser.

- dve_transition_t * get_dve_transition_to_fill ()

  Returns a transition, which is filled in by the parser.

- dve_expression_t * get_expression () const

  Returns the last parsed expression.

- parser_mode_t get_mode ()

  Returns a mode of parsing.

- bool get_probabilistic ()

  Returns, whether parsed system can be probabilistic.

- void set_current_process (size_int_t process_gid)

  Sets the context for parsing of expression or transition.

- void set_dve_expression_to_fill (dve_expression_t *const expr)

  Sets a expression, which should be filled in a parser.

- void set_dve_prob_transition_to_fill (dve_prob_transition_t *const trans)

  Sets a probabilistic transition, which should be filled in a parser.

- void set_dve_process_to_fill (dve_process_t *const proc)

  Sets a process, which should be filled in a parser.

- void set_dve_system_to_fill (dve_system_t *const sys)

  Sets a system, which should be filled in a parser.

- void set_dve_transition_to_fill (dve_transition_t *const trans)

  Sets a transition, which should be filled in a parser.

- void set_mode (const parser_mode_t new_mode)

  Sets a mode of parsing.

- void set_probabilistic (const bool can_be_prob)

  Sets, whether parsed system can be probabilistic.

- ~dve_parser_t ()

  A destructor.

Parsing-time methods

These methods are called by a Yacc/Bison generated parser and they are determined to store the informations from the syntax analysis.

These functions should not be interesting for a usual developer.

- void accept_genbuchi_muller_set_complete ()
- void accept_rabin_streett_first_complete ()
- void accept_rabin_streett_pair_complete ()
- void accept_type (int type)
- void assertion_create (const char *state_name)

  Called by Bison parser after parsing of assertion definition.

- void channel_decl (const char *name)

  Called by Bison parser, when declaration of channel is parsed.

- void done ()

  Method called by Bison parser after finished parsing.

- void expr_array_mem (const char *name, int expr_op=T_SQUARE_BRACKETS)
- void expr_assign (const int assignType)
- void expr_bin (const int binaryType)
- void expr_false ()
- void expr_id (const char *name, int expr_op=T_ID)
- void expr_nat (const int num)
- void expr_parenthesis ()
- void expr_state_of_process (const char *proc_name, const char *name)
- void expr_true ()
- void expr_unary (const int unaryType)
- void expr_var_of_process (const char *proc_name, const char *name, const bool array=false)
- void expression_list_store ()

  Called by Bison parser, when the item of the list of expressions is parsed.

- int get_fcol ()

  Returns the first column of the current position of Bison parser.

- int get_fline ()

  Returns the first line of the current position of Bison parser.

- int get_lcol ()

  Returns the column line of the current position of Bison parser.

- int get_lline ()

  Returns the last line of the current position of Bison parser.

- void prob_trans_create (const char *name)

  Called by Bison parser, when probabilistic transition is detected.

- void prob_transition_part (const char *name, const int weight)

Called by Bison parser, when a part of probabilistic transition is read.

- void proc_decl_begin (const char *name)

  Called by Bison parser, when it observes the begin of process.

- void proc_decl_done ()

  Called by Bison parser, when it observes the end of process.

- void set_fpos (int line, int col)
- void set_lpos (int line, int col)
- void state_accept (const char *name)
- void state_commit (const char *name)

  Called by Bison parser, when declaration of commited state is parsed.

- void state_decl (const char *name)

  Called by Bison parser, when declaration of state is parsed.

- void state_genbuchi_muller_accept (const char *name)
- void state_init (const char *name)

  Called by Bison parser, when declaration of initial state is parsed.

- void state_list_done ()
- void state_rabin_streett_accept (const char *name)
- void system_property (const char *name)

  Called by Bison parser, when a name of the property process is parsed.

- void system_synchronicity (const int sync, const bool prop=false)

  Called by Bison parser, when synchronicity of a system is parsed.

- void take_expression ()

  Called by Bison parser, when parsing of expression is expected.

- void take_expression_cancel ()

  Called by Bison parser in case of error during parsing of expression.

- void trans_create (const char *name1, const char *name2, const bool has_guard, const int sync, const int effect_count)

  Called by Bison parser after parsing of transition.

- void trans_effect_list_begin ()

  Called by Bison parser after keyword "effect" is parsed.

- void trans_effect_list_cancel ()

  Called by Bison parser, when error occurs during parsing of effects.

- void trans_effect_list_end ()

  Called by Bison parser after all effects are parsed.

- void trans_effect_part ()

  Called by Bison parser, when single effect is parsed.

- void trans_guard_expr ()

  Called by Bison parser, when guard in a transition is parsed.

- void trans_sync (const char *name, const int sync, const bool sync_val)

  Called by Bison parser, when synchronization in a transition is parsed.

- void type_is_const (const bool const_prefix)
- void type_list_add (const int type_nbr)

  Called by Bison parser, when the item of the list of types is parsed.

- void type_list_clear ()
- void typed_channel_decl (const char *name, const int buffer_size)

  Called by Bison parser, when declaration of typed channed is parsed.

- void var_decl_array_size (const int bound)
- void var_decl_begin (const int type_nbr)

  Called by Bison parser, when variable declaration begins.

- void var_decl_cancel ()
- void var_decl_create (const char *name, const int arrayDimesions, const bool initialized)
- void var_decl_done ()

  Called by Bison parser after finished parsing of declaration of variable.

- void var_init_field_part ()
- void var_init_is_field (const bool is_field)

  Called by Bison parser, during parsing of initial value of variable.

12.22.1 Detailed Description

Class that provides an interface to the parsing of DVE sources.

It is used by reading methods of dve_system_t, dve_process_t, dve_transition_t and dve_expression_t

12.22.2 Member Enumeration Documentation

12.22.2.1 enum parser_mode_t

Modes of parsing.

Used in methods get_mode(), set_mode(). Mode of parsing is automatically set by used constructor od dve_parser_t

Enumerator:

SYSTEM Parser will parse entire DVE source file.

PROCESS Parser will parse only DVE process.

PROB_TRANSITION Parser will parse only DVE prob. transition.

TRANSITION Parser will parse a DVE transition.

EXPRESSION Parser will parse a DVE expression.

12.22.3 Member Function Documentation

12.22.3.1 void accept_genbuchi_muller_set_complete ()

Called by Bison parser, when the declaration of an accepting set in GenBuchi or Muller accepting condition is complete

12.22.3.2 void accept_rabin_streett_first_complete ()

Called by Bison parser, when the declaration of first part of the accepting pair in Rabin or Street accepting condition is complete

12.22.3.3 void accept_rabin_streett_pair_complete ()

Called by Bison parser, when the declaration of an accepting pair in Rabin or Street accepting condition is complete

12.22.3.4 void accept_type (int *type*)

Called by Bison parser, when property type is clear (ie complete accepting condition parsed)

References dve_process_t::set_acceptance(), and dve_process_t::set_acceptance_type_and_groups().

12.22.3.5 void check_restrictions_put_on_property ()

Takes a property process currently set in a filled system and checks, whether all restrictions are fulfilled. If not, it throws errors.

References dve_symbol_table_t::get_channel(), dve_transition_t::get_channel_gid(), dve_transition_t::get_effect(), dve_transition_t::get_effect_count(), dve_expression_t::get_ident_gid(), dve_symbol_t::get_process_gid(), dve_system_t::get_property_process(), dve_source_position_t::get_source_first_col(), dve_source_position_t::get_source_first_line(), dve_source_position_t::get_source_last_col(), dve_source_position_t::get_source_last_line(), dve_transition_t::get_sync_expr_list_size(), dve_transition_t::get_sync_mode(), process_t::get_trans_count(), process_t::get_transition(), dve_symbol_table_t::get_variable(), dve_expression_t::left(), SYNC_EXCLAIM, and SYNC_NO_SYNC.

Referenced by system_property().

12.22.3.6 void expr_array_mem (const char * *name*, int *expr_op* = T_SQUARE_BRACKETS)

Called by Bison parser, when token representing an identifier of array is read during parsing of an expression

References dve_symbol_table_t::find_global_symbol(), dve_symbol_table_t::find_visible_symbol(), dve_symbol_table_t::get_symbol(), dve_symbol_t::is_variable(), and dve_symbol_t::is_vector().

Referenced by expr_var_of_process().

12.22.3.7 void expr_assign (const int *assignType*)

Called by Bison parser, when assignment is read during parsing of an expression

Assignment is usually not allowed in the syntax of expressions, but this method is only called in effect of transition.

References dve_expression_t::get_ident_gid(), dve_symbol_t::get_lid(), dve_symbol_t::get_name(), dve_expression_t::get_operator(), dve_symbol_t::get_process_gid(), dve_symbol_table_t::get_symbol(), dve_symbol_table_t::get_variable(), dve_symbol_t::is_const(), and dve_symbol_t::is_variable().

12.22.3.8 void expr_bin (const int *binaryType*)

Called by Bison parser, when binary operator is read during parsing of an expression

12.22.3.9 void expr_false ()

Called by Bison parser, when token "true" is read during parsing of an expression

12.22.3.10 void expr_id (const char * *name*, int *expr_op* = T_ID)

Called by Bison parser, when token representing an identifier of variable is read during parsing of an expression

Variable must not be an array - arrays are covered by method expr_array_mem()

References dve_symbol_table_t::find_global_symbol(), dve_symbol_table_t::find_visible_symbol(), dve_symbol_table_t::get_symbol(), and dve_symbol_t::is_variable().

Referenced by expr_var_of_process().

12.22.3.11 void expr_nat (const int *num*)

Called by Bison parser, when token representing a natural number is read during parsing of an expression

12.22.3.12 void expr_parenthesis ()

Called by Bison parser, when parethesis are read during parsing of an expression

At the time of calling of this method everything inside them is already parsed.

12.22.3.13 void expr_state_of_process (const char * *proc_name*, const char * *name*)

Called by Bison parser, when a test on a state of a process has been read during parsing of an expression

References dve_symbol_table_t::find_global_symbol(), dve_symbol_table_t::find_symbol(), dve_symbol_t::get_gid(), dve_symbol_t::get_name(), dve_symbol_table_t::get_symbol(), dve_symbol_t::get_symbol_type(), dve_symbol_t::get_valid(), and SYSTEM.

12.22.3.14 void expr_true ()

Called by Bison parser, when token "false" is read during parsing of an expression

12.22.3.15 void expr_unary (const int *unaryType*)

Called by Bison parser, when unary operator is read during parsing of an expression

12.22.3.16 void expr_var_of_process (const char * *proc_name*, const char * *name*, const bool *array* = `false`)

Called by Bison parser, when a value of a foreign variable has been read during parsing

References expr_array_mem(), expr_id(), dve_symbol_table_t::find_global_symbol(), dve_symbol_t::get_gid(), dve_symbol_table_t::get_symbol(), and dve_symbol_t::get_valid().

12.22.3.17 dve_expression_t * get_expression () const

Returns the last parsed expression.

Causes an exception, when there is not exacly one expression stored in a stack of parsed expressions

12.22.3.18 parser_mode_t get_mode () `[inline]`

Returns a mode of parsing.

Parser is able to parse a system (in DVE format), process, transition or expression according to the pointer given in a constructor

12.22.3.19 void set_fpos (int *line*, int *col*)

Called by Bison parser in case of reporting of the beginning of the current position to this class

12.22.3.20 void set_lpos (int *line*, int *col*)

Called by Bison parser in case of reporting of the end of the current position to this class

12.22.3.21 void state_accept (const char * *name*)

Called by Bison parser, when the declaration of accepting state in Buchi accepting condition is done

References dve_symbol_table_t::find_symbol(), dve_symbol_t::get_lid(), and dve_-symbol_table_t::get_symbol().

Referenced by state_genbuchi_muller_accept(), and state_rabin_streett_accept().

12.22.3.22 void state_genbuchi_muller_accept (const char * *name*)

Called by Bison parser, when the declaration of accepting state in GenBuchi or Muller accepting set is done

References state_accept().

12.22.3.23 void state_list_done ()

Called by Bison parser, when declarations of all states of current process are parsed

12.22.3.24 void state_rabin_streett_accept (const char * *name*)

Called by Bison parser, when the declaration of accepting state in Rabin or Streett accepting set is done

References state_accept().

12.22.3.25 void trans_effect_part ()

Called by Bison parser, when single effect is parsed.

Last expression (containing effect's assignment) is then taken as an effect of the current transition

12.22.3.26 void type_is_const (const bool *const_prefix*) [inline]

Called by Bison parser, when it observes, that newly declared variable is constant

12.22.3.27 void type_list_clear ()

Called by Bison parser, when the item of the list of types is already copied somewhere and thus it can be cleared

12.22.3.28 void var_decl_array_size (const int *bound*)

Called by Bison parser, when number representing a bound of array is parsed.

References DVE_MAX_ARRAY_SIZE.

12.22.3.29 void var_decl_begin (const int *type_nbr*)

Called by Bison parser, when variable declaration begins.

Bison parser tells to this class the type of curretly declared variable in parameter *type_nbr*

12.22.3.30 void var_decl_cancel ()

Called by Bison parser, when error occures during parsing of declaration of variable

12.22.3.31 void var_decl_create (const char * *name*, const int *arrayDimesions*, const bool *initialized*)

Called by Bison parser after parsing of identifier and initial values

Creates a symbol in Symbol table

References take_expression_cancel().

12.22.3.32 void var_decl_done ()

Called by Bison parser after finished parsing of declaration of variable.

Currently empty method - variable is really created in var_decl_create()

12.22.3.33 void var_init_field_part ()

Called by Bison parser, while it finishes a parsing of expression initialization

Stores last parsed expression to the vector of initial values

12.22.3.34 void var_init_is_field (const bool *is_field*)

Called by Bison parser, during parsing of initial value of variable.

Parser reports, whether initial value is an array of scalar value

The documentation for this class was generated from the following files:

- dve_parser.hh
- dve_parser.cc

12.23 dve_position_t Struct Reference

Structure for storing of position in a source code.

`#include <dve_commonparse.hh>`

Public Member Functions

- **dve_position_t** (const dve_position_t &loc)
- void **lines** (int num)
- void **reset** ()
- void **step** ()

Public Attributes

- int **first_column**
- int **first_line**
- int **last_column**
- int **last_line**

12.23.1 Detailed Description

Structure for storing of position in a source code.

This structure is used in an implementation of parser of DVE files You should not need to use it during an implementation of program based on this library

The documentation for this struct was generated from the following file:

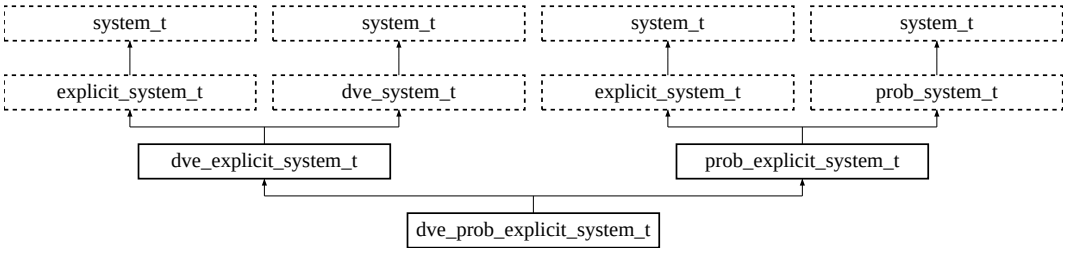
- dve_commonparse.hh

12.24 dve_prob_explicit_system_t Class Reference

Class in DVE system interpretation.

`#include <dve_prob_explicit_system.hh>`

Inheritance diagram for dve_prob_explicit_system_t::



Public Member Functions

- dve_prob_explicit_system_t (error_vector_t &evect=gerr)

  A constructor.

- virtual int get_succs (state_t state, prob_succ_container_t &succs)

  Creates probabilistic successors of state 'state'.

- virtual int get_succs (state_t state, prob_succ_container_t &succs, enabled_-trans_container_t &etc)

  Creates probabilistic successors of state 'state'.

- virtual int **get_succs_ordered_by_prob_and_property_trans** (state_t state, prob_succ_container_t &succs)
- virtual slong_int_t read (const char *const filename)

  Reads in a DVE source given by 'filename'.

- virtual slong_int_t read (std::istream &ins)

  Implements system_t::read(std::istream & ins = std::cin) in DVE system.

- virtual ~dve_prob_explicit_system_t ()

  A destructor.

12.24.1 Detailed Description

Class in DVE system interpretation.

This class implements the abstract interface explicit_system_t.

It is a child of dve_system_t - thus it also contains the representation of DVE system.

DVE system interpretation in this case comprises state generation, enabled transitions generation and expression evaluation.

This implementation of the abstract interface implements full set of its methods. Furthermore It takes over the system of expression evaluation from system_t. Only for evaluating varibles, fields and state identifiers there are defined special functions, which return their value accoring a state of system (given by a piece of a memory).

Furthermore it provides the set of methods, which are purely DVE system specific.

12.24.2 Constructor & Destructor Documentation

12.24.2.1 dve_prob_explicit_system_t (error_vector_t & *evect* = gerr) [inline]

A constructor.

Parameters:

evect = error vector used for reporting of error messages

12.24.3 Member Function Documentation

12.24.3.1 virtual int get_succs (state_t *state*, prob_succ_container_t & *succs*) [inline, virtual]

Creates probabilistic successors of state 'state'.

Creates probabilistic successors of state *state* and saves them to successor container *succs* (see prob_succ_container_t).

Parameters:

state = state of the system

succs = successors container for storage of successors of *state*

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK (use functions succs_normal(), succs_error() and succs_deadlock() for testing)

Implements prob_explicit_system_t.

12.24.3.2 int get_succs (state_t *state*, prob_succ_container_t & *succs*, enabled_trans_container_t & *etc*) [virtual]

Creates probabilistic successors of state 'state'.

Creates probabilistic successors of state *state*. In addition to get_succs(state_t state, prob_succ_container_t & succs) this method also creates a piece of information about enabled transitions used for successor generation.

Together with methods prob_system_t::get_prob_trans_of_trans(), prob_system_t::get_index_of_trans_in_prob_trans() and methods of prob_transition_t it is possible to extract all additional information (and even more) that is stored in prob_succ_container_t.

Implements prob_explicit_system_t.

References enabled_trans_container_t::clear(), array_t::clear(), transition_t::get_gid(), prob_system_t::get_index_of_trans_in_prob_trans(), prob_system_t::get_prob_trans_of_trans(), prob_system_t::get_prob_transition(), dve_explicit_system_t::get_property_trans(), dve_explicit_system_t::get_sending_or_normal_trans(), dve_explicit_system_t::get_succs(), prob_transition_t::get_weight(), prob_transition_t::get_weight_sum(), system_t::get_with_property(), array_t::push_back(), and array_t::size().

12.24.3.3 virtual slong_int_t read (const char *const *filename*) [inline, virtual]

Reads in a DVE source given by 'filename'.

Is uses system_t::read(const char * const filename), therefore see that function for more information (about return value etc.) Furthermore, it makes some analysis and extraction of information from the system and symbol table

Reimplemented from dve_explicit_system_t.

References dve_explicit_system_t::read().

The documentation for this class was generated from the following files:

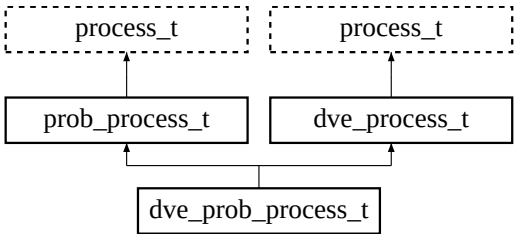
- dve_prob_explicit_system.hh
- dve_prob_explicit_system.cc

12.25 dve_prob_process_t Class Reference

Class representing a DVE process in probabilistic system.

`#include <dve_prob_process.hh>`

Inheritance diagram for dve_prob_process_t::



Public Member Functions

- virtual void add_prob_transition (prob_transition_t ∗const prob_trans)

  Implements prob_process_t::add_prob_transition() for DVE probabilistics process.

- dve_prob_process_t (prob_system_t ∗const system)

  A constructor.

- dve_prob_process_t ()

  A constructor.

- virtual int from_string (std::string &proc_str)

  Implements process_t::from_string() for DVE probabilistics process.

- virtual size_int_t get_prob_trans_count () const

  Implements prob_process_t::get_prob_trans_count() for DVE probabilistics process.

- virtual const prob_transition_t ∗ get_prob_transition (const size_int_t prob_trans_lid) const

  Implements prob_process_t::get_prob_transition() for DVE probabilistics process.

- virtual prob_transition_t ∗ get_prob_transition (const size_int_t prob_trans_lid)

  Implements prob_process_t::get_prob_transition() for DVE probabilistics process.

- virtual int read (std::istream &istr)

  Implements process_t::read() for DVE probabilistics process.

- virtual void remove_prob_transition (const size_int_t transition_index)

  Implements prob_process_t::remove_prob_transition() for DVE probabilistics process.

- virtual std::string to_string () const

  Implements process_t::to_string() for DVE probabilistics process.

- virtual void write (std::ostream &ostr) const

  Implements process_t::write() for DVE probabilistics process.

- virtual ~dve_prob_process_t ()

  A destructor.

12.25.1 Detailed Description

Class representing a DVE process in probabilistic system.

This class implements the abstract interface prob_process_t.

The documentation for this class was generated from the following files:

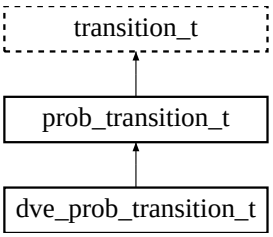
- dve_prob_process.hh
- dve_prob_process.cc

12.26 dve_prob_transition_t Class Reference

Class representing a DVE transition in probabilistic system.

`#include <dve_prob_transition.hh>`

Inheritance diagram for dve_prob_transition_t::



Public Member Functions

- dve_prob_transition_t (prob_system_t *const system)

  A constructor.

- dve_prob_transition_t ()

  A constructor.

- virtual int from_string (std::string &trans_str, const size_int_t process_-gid=NO_ID)

  Implements transition_t::from_string() in probabilistic DVE system.

- bool **get_valid** () const
- virtual int read (std::istream &istr, size_int_t process_gid=NO_ID)

  Implements transition_t::read() in probabilistic DVE system.

- void set_valid (const bool is_valid)

  Sets validity of the transition ('true' means valid).

- virtual std::string to_string () const

  Implements transition_t::to_string() in probabilistic DVE system.

- virtual void write (std::ostream &ostr) const

  Implements transition_t::write() in probabilistic DVE system.

Protected Attributes

- bool **valid**

12.26.1 Detailed Description

Class representing a DVE transition in probabilistic system.

This class implements the abstract interface prob_transition_t.

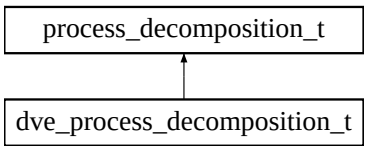
The documentation for this class was generated from the following files:

- dve_prob_transition.hh
- dve_prob_transition.cc

12.27 dve_process_decomposition_t Class Reference

`#include <dve_process_decomposition.hh>`

Inheritance diagram for dve_process_decomposition_t::



Public Member Functions

- **dve_process_decomposition_t** (dve_explicit_system_t &system)
- int get_process_scc_id (state_t &)
- int get_process_scc_type (state_t &)
- int get_scc_count ()
- int get_scc_type (int)
- int **get_scc_type_for_gid** (int)
- bool is_weak ()
- void parse_process (std::size_t)

12.27.1 Detailed Description

This class is used to decompose a graph of a single process specified in a dve file into SCCs. The decomposition is not accesible directly but with member functions returning for a given state SCC id and type.

12.27.2 Member Function Documentation

12.27.2.1 int get_process_scc_id (state_t &) [virtual]

Returns id of an SCC that the given local state of the process belongs to.

Implements process_decomposition_t.

References dve_explicit_system_t::get_state_of_process().

12.27.2.2 int get_process_scc_type (state_t &) [virtual]

Returns type of an SCC that the given local state belongs to. Returned values: 0 means nonaccepting component, 1 means partially accepting component, and 2 means fully accepting component.

Implements process_decomposition_t.

References dve_explicit_system_t::get_state_of_process().

12.27.2.3 int get_scc_count () [virtual]

Returns the number of SCCs in the decomposition.

Implements process_decomposition_t.

12.27.2.4 int get_scc_type (int) [virtual]

Returns type of the given SCC, where 0 means nonaccepting component, 1 means partially accepting component, and 2 means fully accepting component.

Implements process_decomposition_t.

12.27.2.5 bool is_weak () [virtual]

Returns whether the process has a weak graph.

Implements process_decomposition_t.

12.27.2.6 void parse_process (std::size_t) [virtual]

Performs the decomposition of a process with a given (global) id.

Implements process_decomposition_t.

References dve_process_t::get_acceptance(), dve_process_t::get_initial_state(), dve_system_t::get_process(), dve_transition_t::get_state1_lid(), dve_transition_t::get_state2_lid(), dve_process_t::get_state_count(), dve_process_t::get_trans_count(), and dve_process_t::get_transition().

The documentation for this class was generated from the following files:

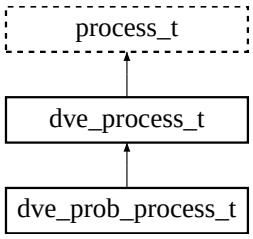
- dve_process_decomposition.hh
- dve_process_decomposition.cc

12.28 dve_process_t Class Reference

Class representing a process.

`#include <dve_process.hh>`

Inheritance diagram for dve_process_t::



Public Member Functions

- dve_process_t (system_t *const system)

  A constructor (initializates the process_t part and DVE specific parts).

- dve_process_t ()
- virtual ~dve_process_t ()

  A destructor.

DVE system specific methods

These methods are implemented only in DVE system and they cannot be run using an abstract interface of process_t.

- void add_assertion (size_int_t state_lid, dve_expression_t *const assert_expr)

  Associates state with LID 'state_lid' with assertion 'assert_expr'.

- void add_state (const size_int_t state_gid)
- void add_variable (const size_int_t var_gid)
- bool get_acceptance (size_int_t lid, size_int_t group=0, size_int_t pair_member=1) const
- size_int_t get_accepting_group_count () const
- property_type_t get_accepting_type () const

  Returns property accepting type.

- const dve_expression_t * get_assertion (const size_int_t state_lid, const size_int_t index) const

  Returns a constant pointer to expression representing assertion.

- dve_expression_t * get_assertion (const size_int_t state_lid, const size_int_t index)

Returns a pointer to expression representing assertion.

- size_int_t get_assertion_count (const size_int_t state_lid) const
  Returns a count of assertions associated with state with LID 'state_lid'.
- bool get_commited (size_int_t lid) const
  Returns, whether state with LID = 'lid' is commited or not.
- size_int_t get_initial_state () const
  Returns a LID of initial state of this process.
- size_int_t get_state_count () const
  Returns a count of process states in this process.
- size_int_t get_state_gid (size_int_t lid) const
  Returns a GID of process state with LID 'lid'.
- dve_symbol_table_t * get_symbol_table () const
  Returns a symbol table of the system, where this process is contained.
- size_int_t get_trans_count (const sync_mode_t sync_mode) const
  Returns a count of transitions of given synchronization mode.
- const dve_transition_t * get_transition (const sync_mode_t sync_mode, const size_int_t trans_nbr) const
- dve_transition_t * get_transition (const sync_mode_t sync_mode, const size_int_t trans_nbr)
- bool get_valid () const
  Returns true iff process is valid.
- size_int_t get_variable_count () const
  Returns a count of local variables in this process.
- size_int_t get_variable_gid (size_int_t lid) const
  Returns a GID of variable with LID 'lid'.
- void set_acceptance (size_int_t lid, bool is_accepting, size_int_t group=0, size_int_t pair_member=1)
- void set_acceptance_type_and_groups (property_type_t prop_type, size_int_t groups_count)
  Sets accepting type and number of accepting groups.
- void set_commited (size_int_t lid, bool is_commited)
  Sets, whether state with LID = 'lid' is commited or not.
- void set_initial_state (const size_int_t state_lid)
  Sets, which process state is initial.
- void set_valid (const bool is_valid)
  Sets validity of the process ('true' means valid).

Methods modifying a process

These methods are implemented only if can_transitions() returns true.

- virtual void add_transition (transition_t ∗const transition)
- virtual void remove_transition (const size_int_t transition_lid)

  Implements process_t::remove_transition() in DVE system.

Methods for reading a process from a string representation

These methods are implemented and can_read() returns true.

- virtual int from_string (std::string &proc_str)

  Implements process_t::from_string() in DVE system.

- virtual int read (std::istream &istr)

  Implements process_t::read() in DVE system.

Methods working with transitions of a process

These methods are implemented and can_transitions() returns true.

- virtual size_int_t get_trans_count () const

  Implements process_t::get_trans_count() in DVE system.

- virtual const transition_t ∗ get_transition (const size_int_t lid) const
- virtual transition_t ∗ get_transition (const size_int_t lid)

Obligatory part of abstact interface

- virtual std::string to_string () const

  Implements process_t::to_string() in DVE system.

- virtual void write (std::ostream &ostr) const

  Implements process_t::write() in DVE system.

Protected Member Functions

- int **read_using_given_parser** (std::istream &istr, dve_parser_t &parser)
- void **write_declarations** (std::ostream &ostr) const

12.28.1 Detailed Description

Class representing a process.

This class implements the abstract interface process_t

Notice, there are methods, which are not virtual and they are already present in the class process_t (e. g. process_t::get_gid()) and there are also virtual methods with default virtual implementation. They are not changed in dve_transition_t (e. g. process_t::set_gid()).

It supports the full set of methods of an abstract interface and adds many DVE specific methods to this class, corresponding to the DVE point of view to transitions of processes.

12.28.2 Constructor & Destructor Documentation

12.28.2.1 dve_process_t ()

IMPLEMENTATION OF VIRTUAL INTERFACE ///// A constructor (initializates the process_t part and DVE specific parts)

12.28.3 Member Function Documentation

12.28.3.1 void add_assertion (size_int_t *state_lid*, dve_expression_t *const *assert_expr*)

Associates state with LID 'state_lid' with assertion 'assert_expr'.

Several assertions can be associated with the same state

References array_t::back(), and array_t::extend().

Referenced by dve_parser_t::assertion_create().

12.28.3.2 void add_state (const size_int_t *state_gid*)

This function should not be used if the process is the part of the system Otherwise is may cause inconsistencies in a system.

References array_t::back(), array_t::extend(), dve_symbol_table_t::get_state(), get_symbol_table(), array_t::push_back(), and dve_symbol_t::set_lid().

12.28.3.3 void add_transition (transition_t *const *transition*) [virtual]

Implements process_t::add_transition() in DVE system, but see also implementation specific notes below

This method modifies the added transition because it has to set transition LID and Partial ID.

Implements process_t.

References dve_transition_t::get_sync_mode(), array_t::push_back(), transition_t::set_lid(), dve_transition_t::set_partial_id(), and array_t::size().

12.28.3.4 void add_variable (const size_int_t *var_gid*)

This function should not be used if the process is the part of the system Otherwise is may cause inconsistencies in a system.

12.28.3.5 bool get_acceptance (size_int_t *lid*, size_int_t *group* = 0, size_int_t *pair_member* = 1) const [inline]

Returns, whether state with LID = 'lid' in accepting group 'group' and pair member 'pair_member' is s accepting or not.

Referenced by dve_process_decomposition_t::parse_process().

12.28.3.6 size_int_t get_accepting_group_count () const [inline]

Returns number of accepting groups. Accepting groups correspond to the number of sets in accepting condition of generalized Buchi automaton or number of pairs in accepting conditions of Rabin and Streett automata.

12.28.3.7 const dve_expression_t* get_assertion (const size_int_t *state_lid*, const size_int_t *index*) const [inline]

Returns a constant pointer to expression representing assertion.

Parameters:

state_lid = LID of state, which the assertion is associated with

index = number from 0 to get_assertion_count(state_lid)-1

12.28.3.8 dve_expression_t* get_assertion (const size_int_t *state_lid*, const size_int_t *index*) [inline]

Returns a pointer to expression representing assertion.

Parameters:

state_lid = LID of state, which the assertion is associated with

index = number from 0 to get_assertion_count(state_lid)-1

12.28.3.9 size_int_t get_trans_count (const sync_mode_t *sync_mode*) const [inline]

Returns a count of transitions of given synchronization mode.

Returns a count of transitions of synchronization mode given by parameter *sync_mode*

Partial ID then can be from 0 to (get_trans_count(sync_mode) - 1)

12.28.3.10 const dve_transition_t* get_transition (const sync_mode_t *sync_mode*, const size_int_t *trans_nbr*) const [inline]

Returns a pointer to the selected constant transition. For further informations see get_-transition(const sync_mode_t sync_mode, const size_int_t trans_nbr) above.

12.28.3.11 dve_transition_t* get_transition (const sync_mode_t *sync_mode*, const size_int_t *trans_nbr*) [inline]

Returns a pointer to the transition given by the synchronization and Partial ID.

Returns a pointer to the transition given by parameters:

Parameters:

sync_mode = synchronization mode of the transition (SYNC_NO_SYNC, SYNC_ASK or SYNC_EXCLAIM)

trans_nbr = ID of the transition in this process

12.28.3.12 virtual const transition_t* get_transition (const size_int_t *lid*) const [inline, virtual]

Implements process_t::get_transition(const size_int_t lid) const in DVE system

Implements process_t.

12.28.3.13 virtual transition_t* get_transition (const size_int_t *lid*) [inline, virtual]

Implements process_t::get_transition(const size_int_t lid) in DVE system

Implements process_t.

Referenced by dve_explicit_system_t::compute_enabled_of_property(), dve_-explicit_system_t::compute_enabled_stage1(), dve_explicit_system_t::compute_-enabled_stage2(), dve_explicit_system_t::compute_successors_without_sync(), dve_process_decomposition_t::parse_process(), dve_parser_t::prob_trans_create(), dve_system_t::set_property_gid(), and dve_prob_process_t::write().

12.28.3.14 void set_acceptance (size_int_t *lid*, bool *is_accepting*, size_int_t *group* = 0, size_int_t *pair_member* = 1) [inline]

Sets, whether state with LID = 'lid' in accepting group 'group' and pair member 'pair_-member' is s accepting or not.

Referenced by dve_parser_t::accept_type().

12.28.3.15 void set_initial_state (const size_int_t *state_lid*) [inline]

Sets, which process state is initial.

Sets, which process state is initial.

Parameters:

state_lid = LID of initial state.

Referenced by dve_parser_t::state_init().

The documentation for this class was generated from the following files:

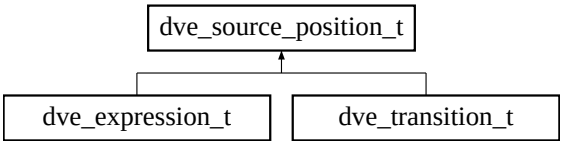
- dve_process.hh
- dve_process.cc

12.29 dve_source_position_t Class Reference

Class for storage of position in a source code.

`#include <dve_source_position.hh>`

Inheritance diagram for dve_source_position_t::



Public Member Functions

- dve_source_position_t (const size_int_t fline, const size_int_t fcol, const size_int_t lline, const size_int_t lcol)

  A constructor.

- dve_source_position_t ()

  A constructor (initializs all position parameters to zero).

- size_int_t get_source_first_col () const

  Returns the first column of the position in a source code.

- size_int_t get_source_first_line () const

  Returns the first line of the position in a source code.

- size_int_t get_source_last_col () const

  Returns the last column of the position in a source code.

- size_int_t get_source_last_line () const

  Returns the last line of the position in a source code.

- void get_source_pos (dve_source_position_t &second)

  Sets a position in a source code (copies parameters from the given object).

- void get_source_pos (size_int_t &fline, size_int_t &fcol, size_int_t &lline, size_int_t &lcol) const

  Copies the position in a source code to four given parameters.

- void set_source_pos (const dve_source_position_t &second)

  Copies te position in a source code to the given object.

- void set_source_pos (const size_int_t fline, const size_int_t fcol, const size_int_t lline, const size_int_t lcol)

Sets a position in a source code given by four given parameters.

12.29.1 Detailed Description

Class for storage of position in a source code.

This class represents a position in a source code. Other classes representing various objects in the source code derive from this class to be possible to locate them in the code.

Position in the source code consists of four parameters:

- first line
- first column
- last line
- last column

12.29.2 Member Function Documentation

12.29.2.1 void get_source_pos (size_int_t & *fline*, size_int_t & *fcol*, size_int_t & *lline*, size_int_t & *lcol*) const

Copies the position in a source code to four given parameters.

Parameters:

fline = first line of position

fcol = first column of position

lline = last line of position

lcol = last column of position

12.29.2.2 void set_source_pos (const size_int_t *fline*, const size_int_t *fcol*, const size_int_t *lline*, const size_int_t *lcol*)

Sets a position in a source code given by four given parameters.

Parameters:

fline = first line of position

fcol = first column of position

lline = last line of position

lcol = last column of position

Referenced by dve_expression_t::assign(), and dve_expression_t::swap().

The documentation for this class was generated from the following files:

- dve_source_position.hh
- dve_source_position.cc

12.30 dve_symbol_t Class Reference

`#include <dve_symbol.hh>`

Public Member Functions

- dve_symbol_t (const dve_sym_type_t t, const char *const n, const size_int_t l)
  A constructor.
- size_int_t get_gid () const
  Returns a GID of symbol.
- size_int_t get_lid () const
  Returns a LID of symbol.
- const char * get_name () const
  Returns a name of symbol.
- size_int_t get_name_length () const
  Returns a length of name of symbol.
- size_int_t get_process_gid () const
  Returns a GID of process in which the symbol is declared.
- size_int_t get_sid () const
  Returns a SID of symbol.
- dve_sym_type_t get_symbol_type () const
  Returns a type of symbol - see dve_sym_type_t.
- bool get_valid () const
  Returns whether symbol is considered valid (invalid==ignored).
- bool is_channel () const
  Returns true iff symbol is a channel.
- bool is_process () const
  Returns true iff symbol is a process.
- bool is_state () const
  Returns true iff symbol is a process state.
- bool is_variable () const
  Returns true iff symbol is a variable.
- void set_gid (const size_int_t gid_arg)

Sets a GID of symbol.

- void set_lid (const size_int_t lid_arg)
  Sets a LID of symbol.
- void set_name (const char *const str, const size_int_t length)
  Sets a name of a symbol and its length.
- void set_name (const char *new_name)
  Sets a name of symbol - be aware of correct length of 'new_name'.
- void set_process_gid (const size_int_t nbr)
  Sets a GID of process in which the symbol is declared.
- void set_sid (const size_int_t symb_id)
  Sets a SID of symbol.
- void set_symbol_type (const dve_sym_type_t symb_type)
  Sets a type of symbol - see dve_sym_type_t.
- void set_valid (const bool is_valid)
  Sets whether symbol is considered valid (invalid==ignored).
- ~dve_symbol_t ()
  A destructor.

Following functions can be called only for vector variables

- void create_init_expr_field ()
- const dve_expression_t * get_init_expr (const size_int_t i) const
  Returns a pointer to the i-th initial value.
- size_int_t get_init_expr_count () const
  Returns a count of values initializing the vector.
- std::vector< dve_expression_t * > * get_init_expr_field ()
  Returns a pointer to the vector of initial values.
- size_int_t get_vector_size () const
  Returns a size of the vector.
- void no_init_expr_field ()
  Tells that array has no inital values.
- void set_init_expr (const size_int_t i, dve_expression_t *const trans)
  Sets 'i'-th initial value from inital expression field.

- void set_vector_size (const size_int_t ar_size)

  Sets a size of the vector.

Following functions can be called only for channel symbols

- slong_int_t get_channel_buffer_size () const

  Returns a size of a buffer of typed channel.

- size_int_t get_channel_item_count () const

  Returns a number of items transmittable through a channel simultaneously.

- dve_var_type_t get_channel_type_list_item (const size_int_t index) const
- size_int_t get_channel_type_list_size () const
- bool get_channel_typed () const

  Returns true iff the channel is a typed channel.

- void set_channel_buffer_size (const slong_int_t buffer_size)

  Sets a size of a buffer of typed channel.

- void set_channel_item_count (const size_int_t size)

  Sets a number of items transmittable through a channel simultaneously.

- void set_channel_type_list_item (const size_int_t index, const dve_var_type_t type_item)
- void set_channel_type_list_size (const size_int_t size)
- void set_channel_typed (const bool typed)

  Sets, whether channel is typed ('typed'==true) or not ('typed'==false).

Following functions can be called only for scalar variables

- const dve_expression_t * get_init_expr () const
- dve_expression_t * get_init_expr ()

  Returns an initial value of scalar variable.

- void set_init_expr (dve_expression_t *const p_expr)

  Sets an initial value of scalar variable.

Following functions can be called only for variable symbols

- dve_var_type_t get_var_type () const

  Returns a type of variable - see dve_var_type_t.

- bool is_byte () const

  Returns true iff a variable symbol is of byte type.

- bool is_const () const

  Returns true iff a variable symbol is constant.

- bool is_int () const
  Returns true iff a variable symbol is of integer type.
- bool is_vector () const
  Returns true iff a variable symbol is a vector.
- void set_const (const bool const_var)
  Sets, whether a variable symbol is constant.
- void set_var_type (const dve_var_type_t var_type)
  Sets a type of variable - see dve_var_type_t.
- void set_vector (const bool is_vector)
  Sets, whether a variable symbol is a vector.

Static Public Attributes

- static const size_int_t CHANNEL_UNUSED = MAX_SIZE_INT
  Return value get_channel_item_count() iff channel has not been used.

12.30.1 Detailed Description

Class that represents the declaration of symbol (= process, channel, variable or process state).

dve_symbol_t represents so called symbol. Symbol is a named entity in a system.

The common properties of symbols Each symbol has a unique identifier SID. You can obtain it using get_sid().

Each symbol has also an identifier GID. GID is unique too, but only among the symbols of the same type. You can get it using get_gid().

Locally declared symbols have also an identifier LID. LID is unique among all symbols inside the samo process. Only variables and process states can be declared locally. You can get LID of symbol using get_lid(). Method get_lid() has a **special semantics in case of global symbols**.

Each locally declared symbol has a unique parent process (a process where the symbol was declared). You can obtain a GID of this process by method get_process_gid(). In case of global symbols method get_process_gid() returns NO_ID.

Each symbol has its name of course. You can get it using a method get_name(). The length of this name is available using a method get_name_length().

It is requested to distinguish among separate types of symbols. You can do is using a method get_symbol_type() or using a set of functions is_variable(), is_process(), is_channel() and is_state().

There are altogether 4 types of symbols - see DVE Symbols for details.

12.30.2 Constructor & Destructor Documentation

12.30.2.1 dve_symbol_t (const dve_sym_type_t *t*, const char *const *n*, const size_int_t *l*) [inline]

A constructor.

Parameters:

t = type of a symbol

n = name of a symbol

l = length of a name of a symbol

12.30.3 Member Function Documentation

12.30.3.1 void create_init_expr_field () [inline]

Creates a new field of initial values (be aware: old one should be deleted first)

12.30.3.2 size_int_t get_channel_item_count () const [inline]

Returns a number of items transmittable through a channel simultaneously.

For typed channels it is the same as get_channel_type_list_size()

Returns:

initially CHANNEL_USUSED, until the number of items is set

Referenced by dve_parser_t::trans_sync().

12.30.3.3 dve_var_type_t get_channel_type_list_item (const size_int_t *index*) const [inline]

Returns a type of 'index'-th element of data sent simultaneously through a typed channel

Referenced by dve_explicit_system_t::get_async_enabled_trans_succ_without_property(), and dve_system_t::write().

12.30.3.4 size_int_t get_channel_type_list_size () const [inline]

Returns a count of types of values transmitted simultaneously through a typed channel

Referenced by dve_explicit_system_t::DBG_print_state(), dve_parser_t::trans_sync(), and dve_system_t::write().

12.30.3.5 const dve_expression_t* get_init_expr () const [inline]

The same as get_init_expr() above, but for constant instances of this class.

12.30.3.6 dve_expression_t* get_init_expr () [inline]

Returns an initial value of scalar variable.

Returns an initial value of scalar variable. Initial value is represented by a pointer to the expression (see dve_expression_t) and it can be 0, when there was no initial value.

Referenced by dve_system_t::write().

12.30.3.7 size_int_t get_lid () const [inline]

Returns a LID of symbol.

Returns a LID of symbol. If the symbol is global, it returns:

- GID in case of process, channel and state
- index to the list of global variables (you can use it as a parameter of system_t::get_global_variable_gid())

Referenced by dve_parser_t::assertion_create(), dve_parser_t::expr_assign(), dve_transition_t::set_state1_gid(), dve_transition_t::set_state2_gid(), dve_parser_t::state_accept(), dve_parser_t::state_commit(), dve_parser_t::state_init(), and dve_parser_t::trans_sync().

12.30.3.8 size_int_t get_process_gid () const [inline]

Returns a GID of process in which the symbol is declared.

Returns a GID of process in which the symbol is declared. If the symbol is global, returns NO_ID.

Referenced by dve_symbol_table_t::add_state(), dve_symbol_table_t::add_variable(), dve_parser_t::check_restrictions_put_on_property(), dve_parser_t::expr_assign(), dve_parser_t::trans_sync(), and dve_expression_t::write().

12.30.3.9 bool is_byte () const [inline]

Returns true iff a variable symbol is of byte type.

Returns true iff a variable symbol is of type byte - that is dve_symbol_t::get_var_type() returns VAR_BYTE.

Referenced by dve_system_t::write().

12.30.3.10 bool is_int () const [inline]

Returns true iff a variable symbol is of integer type.

Returns true iff a variable symbol is of integer type - that is dve_symbol_t::get_var_type() returns VAR_INT.

12.30.3.11 void no_init_expr_field () [inline]

Tells that array has no inital values.

Sets a internal pointer to is field of initial values to zero. Thus tells, that there are no inital values for the field

12.30.3.12 void set_channel_item_count (const size_int_t *size*) [inline]

Sets a number of items transmittable through a channel simultaneously.

For typed channels it is the same as set_channel_type_list_size()

Referenced by dve_parser_t::trans_sync().

12.30.3.13 void set_channel_type_list_item (const size_int_t *index*, const dve_var_type_t *type_item*) [inline]

Sets a type of 'index'-th element of data sent simultaneously through a typed channel

12.30.3.14 void set_channel_type_list_size (const size_int_t *size*) [inline]

Sets a count of types of values transmitted simultaneously through a typed channel

12.30.4 Member Data Documentation

12.30.4.1 const size_int_t CHANNEL_UNUSED = MAX_SIZE_INT [static]

Return value get_channel_item_count() iff channel has not been used.

Constant returned by get_channel_item_count() if the number of items transmittable simultaneously through a channel has not been initialized (by the first usage of channel)

Referenced by dve_parser_t::trans_sync().

The documentation for this class was generated from the following files:

- dve_symbol.hh
- dve_symbol.cc

12.31 dve_symbol_table_t Class Reference

Class which stores the declaration of symbols (see dve_symbol_t).

`#include <dve_symbol_table.hh>`

Public Member Functions

- void add_channel (dve_symbol_t *const symbol)

  Appends a symbol of channel to the list of symbols of channels.

- void add_process (dve_symbol_t *const symbol)

  Appends a symbol of process to the list of symbols of processes.

- void add_state (dve_symbol_t *const symbol)

  Appends a symbol of state to the list of symbols of process states.

- void add_variable (dve_symbol_t *const symbol)

  Appends a symbol of variable to the list of symbols of variables.

- dve_symbol_table_t (error_vector_t &evect)
- std::size_t find_global_symbol (const char *name) const

  Searches for a symbol in the list of global symbols.

- std::size_t find_symbol (const char *name, const std::size_t proc_gid) const

  Searches for a symbol in a given process.

- std::size_t find_visible_symbol (const char *name, const std::size_t proc_gid) const
- bool found_global_symbol (const char *name) const

  Returns, whether there exists a global symbol of name 'name'.

- bool found_symbol (const char *name, const std::size_t proc_gid) const

  Returns, whether symbol exists.

- const dve_symbol_t * get_channel (const std::size_t gid) const

  Returns a pointer to the constant symbol of channel with GID 'gid'.

- dve_symbol_t * get_channel (const std::size_t gid)

  Returns a pointer to the symbol of channel with GID 'gid'.

- std::size_t get_channel_count () const

  Returns a count of all channels.

- const dve_symbol_t * get_process (const std::size_t gid) const

  Returns a pointer to the constant symbol of process with GID 'gid'.

- dve_symbol_t * get_process (const std::size_t gid)
  Returns a pointer to the symbol of process with GID 'gid'.
- std::size_t get_process_count () const
  Returns a count of all variables.
- const dve_symbol_t * get_state (const std::size_t gid) const
  Returns a pointer to the constant symbol of process state with GID 'gid'.
- dve_symbol_t * get_state (const std::size_t gid)
  Returns a pointer to the symbol of process state with GID 'gid'.
- std::size_t get_state_count () const
  Returns a count of all variables.
- const dve_symbol_t * get_symbol (const std::size_t sid) const
- dve_symbol_t * get_symbol (const std::size_t sid)
  Returns the pointer on a symbol that has a given SID.
- std::size_t get_symbol_count () const
  Returns the count of all symbols.
- const dve_symbol_t * get_variable (const std::size_t gid) const
  Returns a pointer to the constant symbol of variable with GID 'gid'.
- dve_symbol_t * get_variable (const std::size_t gid)
  Returns a pointer to the symbol of variable with GID 'gid'.
- std::size_t get_variable_count () const
  Returns a count of all variables.
- const char * save_token (const char *const token)

Protected Attributes

- array_t< dve_symbol_t * > **channel_symbs**
- array_t< dve_symbol_t * > **global_symbols**
- array_t< dve_symbol_t * > **process_symbs**
- array_t< std::size_t > **processes_of_symbols**
- array_t< dve_symbol_t * > **state_symbs**
- array_t< dve_symbol_t * > **symbols**
- array_t< array_t< dve_symbol_t * > * > **symbols_of_processes**
- error_vector_t & **terr**
- dve_token_vector_t **token_vector**
- array_t< dve_symbol_t * > **variable_symbs**

12.31.1 Detailed Description

Class which stores the declaration of symbols (see dve_symbol_t).

12.31.2 Constructor & Destructor Documentation

12.31.2.1 dve_symbol_table_t (error_vector_t & *evect*) [inline]

METHODS: A constructor.

12.31.3 Member Function Documentation

12.31.3.1 void add_process (dve_symbol_t *const *symbol*)

Appends a symbol of process to the list of symbols of processes.

Warning:

Important: If the symbol table is the part of system, **DO NOT USE THIS METHOD**. It would cause the inconsistencies. To avoid it, please use dve_system_t::add_process().

References dve_symbol_t::get_name(), array_t::push_back(), save_token(), dve_symbol_t::set_gid(), dve_symbol_t::set_name(), dve_symbol_t::set_sid(), and array_t::size().

12.31.3.2 std::size_t find_global_symbol (const char * *name*) const

Searches for a symbol in the list of global symbols.

Parameters:

name = name of symbol

Returns:

SID of symbol if the symbol exists in the list of global symbols, otherwise it returns NO_ID.

References find_visible_symbol(), and array_t::size().

Referenced by dve_parser_t::expr_array_mem(), dve_parser_t::expr_id(), dve_parser_t::expr_state_of_process(), dve_parser_t::expr_var_of_process(), find_visible_symbol(), dve_parser_t::system_property(), and dve_parser_t::trans_sync().

12.31.3.3 std::size_t find_symbol (const char * *name*, const std::size_t *proc_gid*) const

Searches for a symbol in a given process.

Parameters:

name = name of symbol

proc_gid = GID of process in which we look for a symbol

Returns:

SID of symbol if the symbol exists in a process with GID *proc_gid*, otherwise it returns NO_ID.

References array_t::size().

Referenced by dve_parser_t::assertion_create(), dve_parser_t::expr_state_of_process(), find_visible_symbol(), dve_parser_t::state_accept(), dve_parser_t::state_commit(), dve_parser_t::state_init(), and dve_parser_t::trans_create().

12.31.3.4 std::size_t find_visible_symbol (const char * *name*, const std::size_t *proc_gid*) const

Searches for a symbol in a given process and in the list of global symbols.

This method searches for a symbol visible from a process with GID *proc_gid*. First it searches in the list of symbols of a given process and only then it searches in the list of global symbols.

Parameters:

name = name of symbol

proc_gid = GID of process in which we look for a symbol

Returns:

SID of symbol if the symbol exists in a process or in the list of global symbols, otherwise it returns NO_ID.

References find_global_symbol(), and find_symbol().

Referenced by dve_parser_t::expr_array_mem(), dve_parser_t::expr_id(), and find_global_symbol().

12.31.3.5 bool found_global_symbol (const char * *name*) const

Returns, whether there exists a global symbol of name 'name'.

Searches for a symbol in the list of global symbols.

Parameters:

name = name of symbol

Returns:

true iff symbol of name *name* exists and it is a global symbol

References array_t::size().

12.31.3.6 bool found_symbol (const char * *name*, const std::size_t *proc_gid*) const

Returns, whether symbol exists.

Searches for a symbol in a selected process

Parameters:

name = name of symbol

proc_gid = GID of process

Returns:

true iff symbol was found

References array_t::size().

12.31.3.7 std::size_t get_channel_count () const [inline]

Returns a count of all channels.

The set of channels in a symbol table should be the same as the set of channels in the entire system that contains this symbol table (if there is such a system)

12.31.3.8 std::size_t get_process_count () const [inline]

Returns a count of all variables.

The set of processes in a symbol table should be the same as the set of processes in the entire system that contains this symbol table (if there is such a system)

12.31.3.9 std::size_t get_state_count () const [inline]

Returns a count of all variables.

The set of process states in a symbol table should be the same as the set of process states in the entire system that contains this symbol table (if there is such a system)

Referenced by por_t::init().

12.31.3.10 const dve_symbol_t* get_symbol (const std::size_t *sid*) const [inline]

The same as get_symbol() above, but this is used in a contant instances of dve_-symbol_table_t

12.31.3.11 std::size_t get_symbol_count () const [inline]

Returns the count of all symbols.

Returns the count of all symbols stored in a symbol table. The set of symbols in a symbol table should be the same as the union of sets of all variables, channels, processes and process states in the entire system that contains this symbol table (if there is such a system)

12.31.3.12 std::size_t get_variable_count () const [inline]

Returns a count of all variables.

The set of variables in a symbol table should be the same as the set of variables in the entire system that contains this symbol table (if there is such a system)

12.31.3.13 const char* save_token (const char *const *token*) [inline]

Stores given string into the internal structure and returns the pointer to this (newly created) string.

Referenced by add_channel(), add_process(), add_state(), and add_variable().

The documentation for this class was generated from the following files:

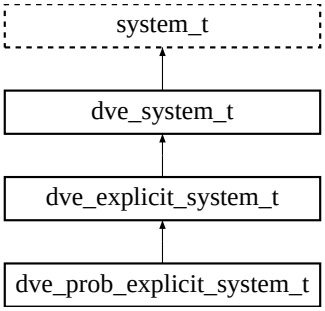
- dve_symbol_table.hh
- dve_symbol_table.cc

12.32 dve_system_t Class Reference

Class for a DVE system representation.

`#include <dve_system.hh>`

Inheritance diagram for dve_system_t::



Public Member Functions

- dve_system_t (error_vector_t &evect=gerr)

  A constructor.

- virtual ~dve_system_t ()

  A destructor.

Methods modifying a system

These methods are implemented and can_be_modified() returns true.

- virtual void add_process (process_t *const process)
- virtual void remove_process (const size_int_t process_id)

  Implements system_t::remove_process().

DVE system specific methods

These methods are implemented only in DVE system and they cannot be run using an abstract interface of system_t.

- void DBG_print_all_initialized_variables ()

  For debugging purposes.

- size_int_t get_channel_count () const

  Returns a count of channels in the system.

- size_int_t get_channel_freq (size_int_t ch_gid) const

  Returns count of channel usage in processes ('ch_gid' = GID of channel).

- size_int_t get_channel_freq_ask (size_int_t ch_gid) const
- size_int_t get_channel_freq_exclaim (size_int_t ch_gid) const
- size_int_t get_global_variable_count () const

  Returns a count of global varibles.

- size_int_t get_global_variable_gid (const size_int_t i) const

  Returns a GID of global varibles.

- bool get_property_with_synchro () const

  Returns true, iff whether the property process contains any synchronizaiton.

- dve_symbol_table_t * get_symbol_table () const

  Returns pointer to the symbol table.

- system_synchronicity_t get_system_synchro () const

  Returns a synchronicity of the system.

- bool not_in_limits (dve_var_type_t var_type, all_values_t value)

  Returns, whether value of 'value' is in bounds of type 'var_type'.

- void set_property_with_synchro (const bool contains_synchro)

  Sets, whether the property process contains any synchronizaiton.

- void set_system_synchro (const system_synchronicity_t sync)

  Sets a synchronicity of the system.

Obligatory part of abstact interface

These methods have to implemented in each implementation of system_t

- virtual slong_int_t from_string (const std::string str)

  Implements system_t::from_string(const std::string str) in DVE system.

- virtual slong_int_t read (const char *const filename)

  *Implements system_t::read(const char * const filename) in DVE system.*

- virtual slong_int_t read (std::istream &ins=std::cin)

  Implements system_t::read(std::istream & ins = std::cin) in DVE system.

- virtual std::string to_string ()

  Implements system_t::to_string() in DVE system.

- virtual void write (std::ostream &outs=std::cout)

  Implements system_t::write(std::ostream & outs = std::cout) in DVE system.

- virtual bool write (const char *const filename)

  *Implements system_t::write(const char * const filename) in DVE system.*

Methods working with processes

These methods are implemented and can_processes() returns true.

- virtual const process_t * get_process (const size_int_t id) const
  Implements system_t::get_process(const size_int_t id) const in DVE system.
- virtual process_t * get_process (const size_int_t gid)
  Implements system_t::get_process(const size_int_t gid) in DVE system.
- virtual size_int_t get_process_count () const
  Implements system_t::get_process_count() in DVE system.

Methods working with property process

These methods are implemented and can_property_process() returns true

- virtual size_int_t get_property_gid () const
  Implements system_t::get_property_gid() in DVE system.
- virtual const process_t * get_property_process () const
  Implements system_t::get_property_process() in DVE system.
- virtual process_t * get_property_process ()
  Implements system_t::get_property_process() in DVE system.
- virtual property_type_t get_property_type ()
  Implements system_t::get_property_type() in DVE system.
- virtual void set_property_gid (const size_int_t gid)
  Implements system_t::set_property_gid() in DVE system.

Methods to check the SCCs of property process graph

These methods are implemented only if can_decompose_property() returns true.

- virtual int get_property_scc_count () const
- virtual int get_property_scc_id (state_t &_state) const
- virtual int get_property_scc_type (state_t &_state) const
- virtual int get_property_scc_type (int _scc) const
- virtual bool is_property_weak () const

Methods working with transitions

These methods are implemented and can_transitions() returns true.

- virtual size_int_t get_trans_count () const
- virtual const transition_t * get_transition (size_int_t gid) const
  Implements system_t::get_transition(size_int_t gid) const in DVE system.
- virtual transition_t * get_transition (size_int_t gid)
  Implements system_t::get_transition(size_int_t gid) in DVE system.

Protected Member Functions

- all_values_t eval_expr (const dve_expression_t *const expr, bool &eval_err) const

  Evaluates an expression.

- all_values_t fast_eval (compacted_viewer_t *p_compacted, bool &eval_err) const

  Evaluates a compacted expression.

Protected Attributes

- size_int_t **channel_count**
- bool * **constants**
- all_values_t(* eval_dot)(const void *parameters, const dve_expression_t &subexpr, bool &eval_err)
- all_values_t(* **eval_dot_compact**)(const void *parameters, const dve_symbol_table_t *symbol_table, const size_int_t &gid, bool &eval_err)
- all_values_t(* eval_id)(const void *parameters, const dve_expression_t &expr, bool &eval_err)
- all_values_t(* **eval_id_compact**)(const void *parameters, const size_int_t &gid, bool &eval_err)
- all_values_t(* eval_square_bracket)(const void *parameters, const dve_expression_t &subexpr, const size_int_t &array_index, bool &eval_err)
- all_values_t(* **eval_square_bracket_compact**)(const void *parameters, const size_int_t &gid, const size_int_t &array_index, bool &eval_err)
- size_int_t glob_var_count

  count of global varibles

- size_int_t * **initial_states**
- SYS_initial_values_t * initial_values

  initial values for some symbols (see union SYS_initial_values_t)

- size_int_t * initial_values_counts

  additional information to 'initial_values'

- const size_int_t MAX_INIT_VALUES_SIZE

  Constant set to initial_values_counts for scalar variables with initializer.

- void * parameters
- dve_process_t * pproperty

  The pointer to the property process.

- size_int_t process_field_size

  capacity of field 'processes'

- array_t< dve_process_t * > processes

  field of processes (0th element is not used)

- size_int_t prop_gid

  GID of the property process

- bool property_has_synchronization

  Says, whether the property contains synchronization.

- dve_symbol_table_t * psymbol_table

  "Symbol table"

- size_int_t **state_count**
- size_int_t * **state_lids**
- system_synchronicity_t **system_synchro**
- size_int_t **var_count**
- dve_var_type_t * var_types

  types of varibles (GID of variable is an index to this field)

12.32.1 Detailed Description

Class for a DVE system representation.

This class implements the abstact interface system_t.

This implementation contains the **symbol table** (dve_symbol_table_t) (as its element). It can read in and write out DVE source files. It can also offers basic informations about the system represented read from DVE source file. It implements the full DiVinE abstract interface and the model of the system has the complete structure of DiVinE system - it means, that processes, transitions and expressions are supported.

Furthermore it provides the set of methods, which are purely DVE system specific.

The very DVE system specific properties: (1) System can be synchronous or asynchronous. These two types of system differ in runs which they can do. In the synchronous system all processes have to do the transition each round of run of the system. In the asynchronous system only one process does do the transition except for transitions which are synchronized and transitions of the property process. Therefore in the asynchronous system there can simultaneously work at most 3 processes (the second process is synchronized with the first process and the third process can be only the property process). Such a tuple of transitions which can be used in a given state of the asynchronous system is called enabled transition.

(2) The system needs to know the declarations of channels, varibles, states and processes. For that reason it uses the class dve_symbol_table_t (symbol table) to store these declarations separatelly. Therefore system_t itself doesn't provide many informations about the declarations of symbols. To get these informations you should get the symbol table first. You can use the function system_t::get_symbol_table().

12.32.2 Constructor & Destructor Documentation

12.32.2.1 dve_system_t (error_vector_t & *evect* = gerr)

A constructor.

Parameters:

evect = the **error vector**, that will be used by created instance of system_t

References system_abilities_t::explicit_system_can_evaluate_expressions, system_abilities_t::explicit_system_can_system_transitions, system_t::get_abilities(), initial_values, initial_values_counts, parameters, system_abilities_t::process_can_be_modified, system_abilities_t::process_can_read, system_abilities_t::process_can_transitions, property_has_synchronization, psymbol_table, system_abilities_t::system_can_be_modified, system_abilities_t::system_can_processes, system_abilities_t::system_can_property_process, system_abilities_t::system_can_transitions, system_abilities_t::transition_can_be_modified, system_abilities_t::transition_can_read, and var_types.

12.32.3 Member Function Documentation

12.32.3.1 void add_process (process_t *const *process*) [virtual]

Implements system_t::add_process() in DVE system, but see also implementation specific notes below.

Imporant thing is, that this is the only permitted way of adding the process to the system. Program should not use dve_symbol_table_t::add_process() instead of this method.

Implements system_t.

References process_t::get_gid(), dve_symbol_table_t::get_process(), processes, psymbol_table, and array_t::push_back().

12.32.3.2 void DBG_print_all_initialized_variables ()

For debugging purposes.

Prints all varibles with their initial values

References SYS_initial_values_t::all_value, dve_symbol_t::get_name(), dve_symbol_table_t::get_variable(), initial_values, initial_values_counts, dve_symbol_t::is_vector(), and psymbol_table.

12.32.3.3 all_values_t eval_expr (const dve_expression_t *const *expr*, bool & *eval_err*) const [protected]

Evaluates an expression.

Carries out complete expression evaluation. Evaluation of varibles and state identifiers can be changed in the descendant by changing protected varibles 'eval_id', 'eval_-square_bracket', and 'eval_dot'.

Parameters:

expr = pointer to structure representing expression

eval_err = boolean that says, whether evaluation passed correctly

References SYS_initial_values_t::all_value, SYS_initial_values_t::all_values, dve_-expression_t::arity(), eval_dot, eval_id, eval_square_bracket, fast_eval(), dve_-expression_t::get_ident_gid(), dve_expression_t::get_operator(), dve_expression_-t::get_p_compact(), dve_expression_t::get_value(), initial_values, initial_values_-counts, dve_expression_t::is_compacted(), dve_expression_t::left(), parameters, dve_-expression_t::right(), and dve_expression_t::to_string().

Referenced by dve_explicit_system_t::eval_expr().

12.32.3.4 all_values_t fast_eval (compacted_viewer_t * *p_compacted*, bool & *eval_err*) const [protected]

Evaluates a compacted expression.

Carries out complete expression evaluation over compacted expression. Evaluation of varibles and state identifiers can be changed in the descendant by changing protected varibles 'eval_id_compact', 'eval_square_bracket_compact', and 'eval_dot_-compact'.

Parameters:

p_compacted = pointer to compacted expresion

eval_err = boolean that says, whether evaluation passed correctly

References SYS_initial_values_t::all_value, SYS_initial_values_t::all_values, gerr, compacted_t::get_gid(), compacted_t::get_operator(), compacted_t::get_value(), initial_values, initial_values_counts, compacted_t::left(), parameters, psymbol_table, compacted_t::ptr, compacted_t::right(), and compacted_t::to_string().

Referenced by eval_expr(), and dve_explicit_system_t::eval_expr().

12.32.3.5 size_int_t get_channel_freq_ask (size_int_t *ch_gid*) const [inline]

Returns count of channel usage in processes in a synchronization with a question mark.

12.32.3.6 size_int_t get_channel_freq_exclaim (size_int_t *ch_gid*) const [inline]

Returns count of channel usage in processes in a synchronization with a exclamaion mark.

12.32.3.7 size_int_t get_global_variable_gid (const size_int_t *i*) const [inline]

Returns a GID of global varibles.

Returns a GID of global varibles. *i* is an index to the list of global varibles (in an interval 0..(get_global_variable_count()-1)). You can obtain this index by dve_symbol_t::get_lid().

12.32.3.8 virtual int get_property_scc_count () const [inline, virtual]

Returns the number of SCCs in the decomposition.

References gerr.

12.32.3.9 virtual int get_property_scc_id (state_t & *_state*) const [inline, virtual]

Returns id of an SCC that the given state projects to.

References gerr, and state_t::ptr.

12.32.3.10 virtual int get_property_scc_type (state_t & *_state*) const [inline, virtual]

Returns type of an SCC that the given state projects to, where 0 means nonaccepting component, 1 means partially accepting component, and 2 means fully accepting component.

References gerr, and state_t::ptr.

12.32.3.11 virtual int get_property_scc_type (int *_scc*) const [inline, virtual]

Returns type of the given SCC, where 0 means nonaccepting component, 1 means partially accepting component, and 2 means fully accepting component.

References gerr.

12.32.3.12 dve_symbol_table_t* get_symbol_table () const [inline]

Returns pointer to the symbol table.

Symbol table (= instance of class dve_symbol_table_t) is automatically created in creation time of system_t as its private data member. It contains all declarations of all named symbols (processes, channels, varibles and process states).

See symbol table and dve_symbol_table_t for details.

Referenced by dve_transition_t::get_symbol_table(), dve_process_t::get_symbol_table(), dve_expression_t::get_symbol_table(), and por_t::init().

12.32.3.13 system_synchronicity_t get_system_synchro () const [inline]

Returns a synchronicity of the system.

Returns:

value of type system_synchronicity_t:

- SYSTEM_ASYNC iff system is defined as asynchronous
- SYSTEM_SYNC iff system is defined as synchronous

12.32.3.14 virtual size_int_t get_trans_count () const [inline, virtual]

Implements system_t::get_trans_count() in DVE system, but see also implementation specific notes below

Returned count of transitions comprises also invalid transitions (transitions, where transition_t::get_valid() returns false)

Implements system_t.

Referenced by por_t::init(), and por_t::static_c3().

12.32.3.15 virtual bool is_property_weak () const [inline, virtual]

Returns whether the process has a weak graph.

References gerr.

12.32.3.16 void set_property_with_synchro (const bool *contains_synchro*) [inline]

Sets, whether the property process contains any synchronizaiton.

Parameters:

contains_synchro = true, iff the property process contains any synchronizaiton

12.32.4 Member Data Documentation

12.32.4.1 all_values_t(* eval_dot)(const void *parameters, const dve_expression_t &subexpr, bool &eval_err) [protected]

functional variable that points to the function, which should be used to evaluate state identifiers

Referenced by eval_expr().

12.32.4.2 all_values_t(∗ eval_id)(const void ∗parameters, const dve_expression_t &expr, bool &eval_err) [protected]

functional variable that points to the function, which should be used to evaluate varibles

Referenced by eval_expr().

12.32.4.3 all_values_t(∗ eval_square_bracket)(const void ∗parameters, const dve_expression_t &subexpr, const size_int_t &array_index, bool &eval_err) [protected]

functional variable that points to the function, which should be used to evaluate variable fields

Referenced by eval_expr().

12.32.4.4 size_int_t∗ initial_values_counts [protected]

additional information to 'initial_values'

'initial_values_counts' is the additional information to 'intial_values': initial_values_counts[i] =

- 0 => no initial value
- MAX_INIT_VALUES_SIZE => scalar, state or procname
- 1..(MAX_INIT_VALUES_SIZE-1) => vector

Referenced by DBG_print_all_initialized_variables(), dve_system_t(), eval_expr(), fast_eval(), and dve_explicit_system_t::get_initial_state().

12.32.4.5 void∗ parameters [protected]

parameters points to the piece of the memory where additional informations for 'eval_∗' functions are stored.

Referenced by dve_system_t(), eval_expr(), fast_eval(), and dve_explicit_system_t::∼dve_explicit_system_t().

The documentation for this class was generated from the following files:

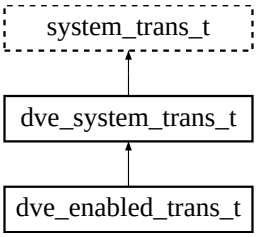
- dve_system.hh
- dve_system.cc

12.33 dve_system_trans_t Class Reference

Class implementing system trasition in DVE system.

`#include <dve_system_trans.hh>`

Inheritance diagram for dve_system_trans_t::



Public Member Functions

- dve_system_trans_t (const dve_system_trans_t &second)

  A copy constructor.

- dve_system_trans_t ()

  A constructor.

- virtual system_trans_t & operator= (const system_trans_t &second)

  Implements system_trans_t::operator=() in DVE system.

- virtual std::string to_string () const

  Implements system_trans_t::to_string() in DVE system.

- virtual void write (std::ostream &ostr) const

  Implements system_trans_t::write() in DVE system.

- virtual ~dve_system_trans_t ()

  A destructor.

Methods accessing transitions forming a system transition

These methods are implemented and system_t::can_transitions() in the system that has generated the instance of this class returns true.

- virtual size_int_t get_count () const

  Implements system_trans_t::get_count() in DVE system.

- virtual transition_t *const & operator[ ] (const int i) const

  Implements system_trans_t::operator[ ](const int i) const in DVE system.

- virtual transition_t *& operator[ ] (const int i)
  Implements system_trans_t::operator[ ](const int i).
- virtual void set_count (const size_int_t new_count)
  Implements system_trans_t::set_count() in DVE system.

Protected Member Functions

- void **copy_from** (const system_trans_t &second)
- void **create_from** (const system_trans_t &second)

12.33.1 Detailed Description

Class implementing system trasition in DVE system.

The documentation for this class was generated from the following files:

- dve_system_trans.hh
- dve_system_trans.cc

12.34 dve_token_vector_t Class Reference

Class used by dve_symbol_table_t to store the names of symbols.

`#include <dve_token_vector.hh>`

Public Member Functions

- const char * **save_token** (const char *const token)

12.34.1 Detailed Description

Class used by dve_symbol_table_t to store the names of symbols.

This is an internal type. Programmer of algorithms using DiVinE usually should not use this structure.

The documentation for this class was generated from the following file:

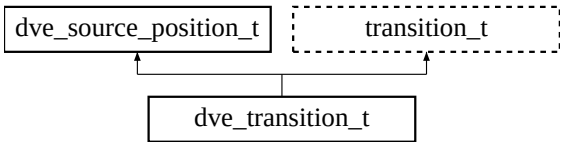
- dve_token_vector.hh

12.35 dve_transition_t Class Reference

Class representing a transition.

`#include <dve_transition.hh>`

Inheritance diagram for dve_transition_t::



Public Member Functions

- dve_transition_t (system_t *const system)
- dve_transition_t ()

  A constructor (no system set - call set_parent_system() after creation).

- virtual ~dve_transition_t ()

  A destructor.

DVE system specific methods

These methods are implemented only in DVE system and they cannot be run using an abstract interface of transition_t.

- void add_effect (dve_expression_t *const effect)

  Adds an effect to the list of effects contained in a transition.

- void alloc_glob_mask (const size_int_t count_of_glob_vars)
- size_int_t get_channel_gid () const

  Returns a GID of channel used in a synchronisation of this transition.

- dve_expression_t * get_effect (size_int_t eff_nbr) const

  Returns an `eff_nbr-ith effect.`

- size_int_t get_effect_count () const

  Returns a count of effects in this transition.

- void get_effect_expr_string (size_int_t i, std::string &str) const

  Returns the string representation of i-th effect in the argument str.

- const bit_string_t & get_glob_mask () const

  Returns a bit mask of assigned variables.

- const dve_expression_t * get_guard () const

- dve_expression_t * get_guard ()
  Returns a guard of this transition.

- bool get_guard_string (std::string &str) const
  Sets the string represetation of guard or returns false.

- size_int_t get_partial_id () const
- size_int_t get_process_gid () const
  Returns a process GID of process owning this trantision.

- size_int_t get_state1_gid () const
  Returns a GID of first (starting) state of a transition.

- size_int_t get_state1_lid () const
  Returns a LID of first (starting) state of a transition.

- const char * get_state1_name () const
  Returns the name of the first state.

- size_int_t get_state2_gid () const
  Returns a GID of a second (finishing) state of a transition.

- size_int_t get_state2_lid () const
  Returns a LID of a second (finishing) state of a transition.

- const char * get_state2_name () const
  Returns the name of the second state.

- dve_symbol_table_t * get_symbol_table () const
  Returns a symbol table corresponding to this transition.

- const char * get_sync_channel_name () const
  Returns the name of channel or 0 (see details).

- const dve_expression_t * get_sync_expr_list_item (const size_int_t i) const
- dve_expression_t * get_sync_expr_list_item (const size_int_t i)
  Returns the 'i'-th expression in a synchronization written after '!' or '?'.

- size_int_t get_sync_expr_list_size () const
  Returns a count of expressions written after '!' or '?'.

- bool get_sync_expr_string (std::string &str) const
- sync_mode_t get_sync_mode () const
  Returns a synchronization mode of this transition.

- bool get_valid () const
  Returns, whether this transition is valid or not.

- bool is_sync_ask () const
  Returns true iff transition contains synchronisation of type 'question'.

- bool is_sync_exclaim () const
  Returns true iff transition contains synchronisation of type 'exclaim'.
- bool is_without_sync () const
  Returns true iff transition contains no synchronisation.
- void set_channel_gid (const size_int_t gid_of_channel)
  Sets a GID of channel used in a synchronisation of this transition.
- void set_glob_mark (const size_int_t i, const bool mark)
  Turns bit i-th bit in a global variables mask to 'mark'.
- void set_guard (dve_expression_t *const guard_expr)
  Sets a guard of this transition.
- void set_partial_id (const size_int_t partial_id)
  Sets Partial ID of this transition.
- void set_process_gid (const size_int_t gid)
  Sets a process GID of process owning this trantision.
- void set_state1_gid (const size_int_t state_gid)
  Sets a GID of first (starting) state of a transition.
- void set_state2_gid (const size_int_t state_gid)
  Sets a GID of a second (finishing) state of a transition.
- void set_sync_expr_list_item (const size_int_t i, dve_expression_t *const synchro_expr)
  Sets the 'i'-th expression in a synchronization written after '!' of '?'.
- void set_sync_expr_list_size (const size_int_t size)
  Sets a count of expression written after '!' or '?'.
- void set_sync_mode (const sync_mode_t synchro_mode)
  Sets a sync_mode mode of this transition.
- void set_valid (const bool valid_value)
  Sets the validity of the transition ('true' means valid).

Methods for reading a transition from a string representation

These methods are implemented only if can_read() returns true.

- virtual int from_string (std::string &trans_str, const size_int_t process_gid=NO_ID)
  Implements transition_t::from_string() in DVE system.

- virtual int read (std::istream &istr, size_int_t process_gid=NO_ID)
  Implements transition_t::read() in DVE system.

Obligatory part of abstact interface

- virtual std::string to_string () const
  Implements transition_t::to_string() in DVE system.
- virtual void write (std::ostream &ostr) const
  Implements transition_t::write() in DVE system.

Protected Types

- typedef array_t< dve_expression_t * > **effects_container_t**

Protected Attributes

- size_int_t **channel_gid**
- effects_container_t **effects**
- bit_string_t **glob_mask**
- dve_expression_t * **guard**
- size_int_t **part_id**
- size_int_t **process_gid**
- size_int_t **state1_gid**
- size_int_t **state1_lid**
- size_int_t **state2_gid**
- size_int_t **state2_lid**
- array_t< dve_expression_t * > **sync_exprs**
- sync_mode_t **sync_mode**
- bool **valid**

12.35.1 Detailed Description

Class representing a transition.

This class implements the abstract interface transition_t.

Notice, there is the set of methods, which are not virtual and they are already present in the class transition_t (e. g. transition_t::get_gid(), transition_t::get_lid(), ...) and there are also virtual methods with default implementation. They are not changed in dve_transition_t (e. g. transition_t::set_gid(), transition_t::set_lid(), ...).

It supports the full set of methods of an abstract interface and adds many DVE specific methods to this class, corresponding to the DVE point of view to transitions of processes.

Very DVE system specific feature: This class also contains a global variables mask that tells which global variables are used in this transition. This mask is maintained by system during its creation or consolidation. Functions for access to this mask are get_glob_mask(), set_glob_mask() and alloc_glob_mask().

There is a list of all transitions in dve_system_t (use functions system_t::get_trans_count() and system_t::get_transition()) and also each process has a list of his own transitions (functions process_t::get_trans_count() and process_t::get_transition()

12.35.2 Constructor & Destructor Documentation

12.35.2.1 dve_transition_t (system_t *const *system*) [inline]

A constructor (transition has to be created in a context of a system

- especially its symbol table given in a parameter 'system')

12.35.3 Member Function Documentation

12.35.3.1 void alloc_glob_mask (const size_int_t *count_of_glob_vars*) [inline]

Prepare bitmask of global variables - allocate as many bits as a count of global variables

12.35.3.2 size_int_t get_channel_gid () const [inline]

Returns a GID of channel used in a synchronisation of this transition.

Returns a GID of channel used in a synchronisation of this transition. Is has no reasonable meaning, when get_sync_mode()==SYNC_NO_SYNC

Referenced by dve_parser_t::check_restrictions_put_on_property(), dve_explicit_system_t::compute_enabled_stage2(), dve_explicit_system_t::get_async_enabled_trans_succ_without_property(), and por_t::init().

12.35.3.3 dve_expression_t* get_effect (size_int_t *eff_nbr*) const [inline]

Returns an `eff_nbr-ith effect.`

Parameters:

eff_nbr = number of effect (effects have numbers from `0` to `get_effect_count()-1`)

Referenced by dve_explicit_system_t::apply_transition_effects(), dve_parser_t::check_restrictions_put_on_property(), por_t::init(), and write().

12.35.3.4 const bit_string_t& get_glob_mask () const [inline]

Returns a bit mask of assigned variables.

Returns an object of type bit_string_t, which represents the bit mask of assigned variables in effects of this transition

Referenced by dve_explicit_system_t::not_in_glob_conflict().

12.35.3.5 const dve_expression_t* get_guard () const [inline]

Returns a pointer to the constant expression representing a guard of this transition

In case when there is no guard get_guard() returns 0.

12.35.3.6 dve_expression_t* get_guard () [inline]

Returns a guard of this transition.

In case when there is no guard get_guard() returns 0.

Referenced by por_t::init(), and dve_explicit_system_t::passed_through().

12.35.3.7 bool get_guard_string (std::string & *str*) const

Sets the string represetation of guard or returns false.

Parameters:

str = variable to which to return the string repr. of guard

Returns:

true iff transition has a guard

References dve_expression_t::to_string().

Referenced by write().

12.35.3.8 size_int_t get_partial_id () const [inline]

Returns an index into vector of transitions of process with the same 'sync_mode'

Together with *sync_mode* forms an unique identifier of transition inside the process. To gain a single identifier use a function get_id()

12.35.3.9 dve_symbol_table_t * get_symbol_table () const

Returns a symbol table corresponding to this transition.

In this symbol table there are stored declarations of variables states, processes and channels, which are used in this transition.

References dve_system_t::get_symbol_table(), and transition_t::parent_system.

Referenced by get_state1_name(), get_state2_name(), get_sync_channel_name(), set_state1_gid(), and set_state2_gid().

12.35.3.10 const char * get_sync_channel_name () const

Returns the name of channel or 0 (see details).

If the transition is synchronised it returns the name of channel used for this synchronisation. Otherwise it returns 0.

References dve_symbol_table_t::get_channel(), dve_symbol_t::get_name(), get_symbol_table(), and SYNC_NO_SYNC.

Referenced by write().

12.35.3.11 const dve_expression_t* get_sync_expr_list_item (const size_int_t *i*) const [inline]

Returns the 'i'-th constant expression in a synchronization written after '!' or '?'

Returns the 'i'-th constant expression in a synchronization of this transition. In case when there is no synchronization * get_sync_expr() returns 0.

12.35.3.12 dve_expression_t* get_sync_expr_list_item (const size_int_t *i*) [inline]

Returns the 'i'-th expression in a synchronization written after '!' or '?'.

Returns the 'i'-th expression in a synchronization of this transition. In case when there is no synchronization * get_sync_expr() returns 0.

Referenced by dve_explicit_system_t::get_async_enabled_trans_succ_without_property(), and por_t::init().

12.35.3.13 bool get_sync_expr_string (std::string & *str*) const

Sets the string represetation of expression in a synchronization or returns false

Parameters:

str = variable to which to return the string repr. of expression from synchronisation

Returns:

true iff transition has an expression in a synchronisation

References array_t::size(), and to_string().

Referenced by write().

12.35.3.14 bool get_valid () const [inline]

Returns, whether this transition is valid or not.

Returns, whether this transition is valid or not. When transition is not valid, it is not used, when we generate the states of system

12.35.3.15 void set_partial_id (const size_int_t *partial_id*) [inline]

Sets Partial ID of this transition.

Warning:

Partial ID should be set only by process_t, when trantition is added to the list of process's transitions

Referenced by dve_process_t::add_transition().

12.35.3.16 void set_process_gid (const size_int_t *gid*) [inline]

Sets a process GID of process owning this trantision.

Warning:

Use this method carefuly. Do not try to cause inconsistencies

The documentation for this class was generated from the following files:

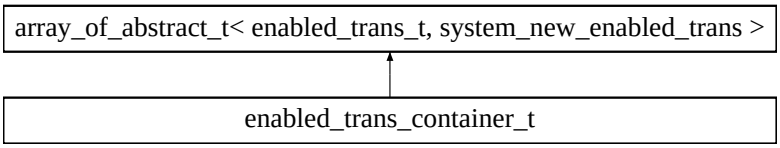
- dve_transition.hh
- dve_transition.cc

12.36 enabled_trans_container_t Class Reference

Container determined for storing enabled processes in one state.

`#include <system_trans.hh>`

Inheritance diagram for enabled_trans_container_t::



Public Member Functions

- void clear ()

  Empties whole contents of container.

- enabled_trans_container_t (const explicit_system_t &system)

  A constructor.

- size_int_t get_begin (const size_int_t process_gid) const
- size_int_t get_count (const size_int_t process_gid) const

  Returns a count of transitions of process with GID 'process_gid'.

- const enabled_trans_t * get_enabled_transition (const size_int_t process_gid, const size_int_t index) const

  The definition of get_enabled_transition() for the case of constant.

- enabled_trans_t * get_enabled_transition (const size_int_t process_gid, const size_int_t index)

  Returns a pointer to the enabled transition of process with GID.

- size_int_t get_property_succ_count () const

  Returns a count of transitions enabled in a property process.

- void set_next_begin (const size_int_t process_gid, const size_int_t next_begin)

  Sets, where the list of enabled transitions of next process begins.

- void set_property_succ_count (const size_int_t count)

  Sets a count of transitions enabled in a property process.

- ~enabled_trans_container_t ()

  A destructor.

12.36.1 Detailed Description

Container determined for storing enabled processes in one state.

This container should be used in calls of explicit_system_t::get_succs() and explicit_-system_t::get_enabled_trans() functions for storing the list of transitions enabled in a given state. Its contructor has an instance of explicit_system_t as a parameter, because it tries to guess the size of memory sufficient to store maximal count of transitions, which are enabled in one state of the system. This guess prevent the big count of reallocations at the beginning of the run.

If the system is with property process, then the property_succ_count must be set (by set_property_succ_count() function) to correct usage of this container.

Note:

See array_of_abstract_t for details and more methods of this class

12.36.2 Member Function Documentation

12.36.2.1 size_int_t get_begin (const size_int_t *process_gid*) const [inline]

Returns the index of first enabled transition of process with GID 'process_gid'.

Referenced by por_t::ample_set_succs().

The documentation for this class was generated from the following files:

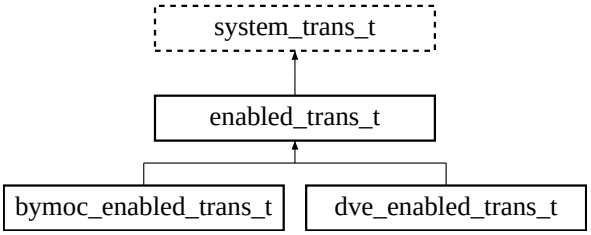
- system_trans.hh
- system_trans.cc

12.37 enabled_trans_t Class Reference

Class storing informations about one enabled transition.

`#include <system_trans.hh>`

Inheritance diagram for enabled_trans_t::



Public Member Functions

- enabled_trans_t ()

  A constructor.

- bool get_erroneous () const

  Returns, whether an enables transition is erroneous.

- virtual enabled_trans_t & operator= (const enabled_trans_t &second)=0

  An assignment operator.

- void set_erroneous (const bool is_errorneous)

  Sets, whether an enabled transition is erroneous.

12.37.1 Detailed Description

Class storing informations about one enabled transition.

Enabled transition = system transition + erroneous property

Enabled transitions can be produced by explicit system (explicit_system_t), if it can work with enabled transitions.

Each enabled transition represents a possible step of a system in a given state of the system.

The documentation for this class was generated from the following file:

- system_trans.hh

12.38 ERR_throw_t Struct Reference

`#include <error.hh>`

Public Member Functions

- **ERR_throw_t** (const ERR_type_t type_arg, const ERR_id_t id_arg)

Public Attributes

- ERR_id_t **id**
- ERR_type_t **type**

12.38.1 Detailed Description

Integer type used to throw or catch exceptions with a parameter of ERR_throw_t type. This parametr is also called error type

The documentation for this struct was generated from the following file:

- error.hh

12.39 ERR_triplet_t Struct Reference

`#include <error.hh>`

Public Member Functions

- **ERR_triplet_t** (const ERR_char_string_t mes, const ERR_type_t tt=ERR_-UNKNOWN_TYPE, const ERR_id_t num=ERR_UNKNOWN_ID)

Public Attributes

- const ERR_id_t **id**
- const ERR_char_string_t **message**
- const ERR_type_t **type**

12.39.1 Detailed Description

Structure for storing (usualy constant) error messages in a standardized form.

You can use this structure if you want to store a complete error message including its error ID and type.

The documentation for this struct was generated from the following file:

- error.hh

12.40 error_string_t Class Reference

Class determined for storing error messages.

`#include <error.hh>`

Public Member Functions

- void **delete_content** ()
- **error_string_t** (error_string_t &s2)
- **error_string_t** (const error_string_t &s2)
- std::string & **operator*** ()
- std::string * **operator** → ()
- error_string_t & **operator<<** (const error_string_t second_str)
- error_string_t & **operator<<** (const ERR_std_string_t &second_str)
- error_string_t & **operator<<** (const ERR_char_string_t second_str)
- error_string_t & **operator<<** (const int i)
- error_string_t & **operator<<** (const unsigned int i)
- error_string_t & **operator<<** (const signed long int i)
- error_string_t & **operator<<** (const unsigned long int i)
- void **recreate** ()

Static Public Member Functions

- static divine::size_int_t **allocated_strings** ()

Friends

- const std::string & **operator*** (const error_string_t &errstr)
- std::ostream & **operator<<** (std::ostream &ostr, const error_string_t s)

12.40.1 Detailed Description

Class determined for storing error messages.

Class determined for storing error messages (1 error message in 1 instance of error_string_t).

This class should not be explicitly used in usual programs.

The documentation for this class was generated from the following files:

- error.hh
- error.cc

12.41 error_vector_t Class Reference

The main class in error.hh determined for storing.

`#include <error.hh>`

Public Member Functions

- void clear ()

  Removes all error messages from a memory.

- ERR_nbr_t count ()

  Returns a number of error messages in the vector.

- bool empty ()

  Returns whether there exists any error message in a memory.

- error_vector_t ()

  A constructor.

- void flush ()

  Flushes all stored error messages.

- bool get_silent () const

  Returns, whether it can write messages to STDERR (true) or not (false).

- ERR_id_t id (const ERR_nbr_t i)
- ERR_id_t id_back ()

  Returns error ID of the error message from the end of the list of errors.

- ERR_id_t id_front ()
- error_vector_t & operator<< (const int i)
- error_vector_t & operator<< (const unsigned int i)
- error_vector_t & operator<< (const signed long int i)
- error_vector_t & operator<< (const unsigned long int i)
- error_vector_t & operator<< (const error_string_t second_str)

  Appends second_str *to the error message creating in the error vector.*

- error_vector_t & operator<< (const ERR_std_string_t &second_str)

  Appends second_str *to the error message creating in the error vector.*

- error_vector_t & operator<< (const ERR_char_string_t second_str)

  Appends second_str *to the error message creating in the error vector.*

- void operator<< (const psh &e)

  Finishes creating of an error message and calls 'warning handling callback'.

- void operator<< (const thr &e)

  Finishes creating of an error message and calls 'error handling callback'.

- void perror (ERR_char_string_t mes, const ERR_nbr_t i)
- void perror (const ERR_nbr_t i)
- void perror_back (ERR_char_string_t mes)
- void perror_back ()
- void perror_front (ERR_char_string_t mes)
- void perror_front ()
- void pop (const ERR_nbr_t begin, const ERR_nbr_t end)

  Removes interval of errors.

- void pop (const ERR_nbr_t index)

  Removes 'index'-th error.

- void pop_back ()

  Removes 1 error message from the end of the list of errors.

- void pop_back (const ERR_nbr_t n)

  Removes last n errors.

- void pop_front ()

  Removes 1 error message from the beginning of the list of errors.

- void pop_front (const ERR_nbr_t n)

  Removes first n errors.

- void print (ERR_char_string_t mes)

  Prints mes *to the standard error output.*

- void push (error_string_t &mes, const ERR_id_t id=ERR_UNKNOWN_ID)

  Inserts an error message to the end of a list of errors.

- void set_push_callback (const ERR_psh_callback_t func)

  Sets a 'warning handling callback'.

- void set_silent (const bool be_silent)

  Sets, whether it can write messages to STDERR (true) or not (false).

- void set_throw_callback (const ERR_thr_callback_t func)

  Sets a 'error handling callback'.

- const error_string_t string (const ERR_nbr_t i)
- const error_string_t string_back ()

  Returns the string of the error message from the end of the list of errors.

- const error_string_t string_front ()
- void that (error_string_t &mes, const ERR_type_t err_type=ERR_UNKNOWN_TYPE, const ERR_id_t id=ERR_UNKNOWN_ID)

  Serves to store standardized error messages given by elements.

- void that (const ERR_c_triplet_t &st)
- ~error_vector_t ()

  A destructor.

12.41.1 Detailed Description

The main class in error.hh determined for storing.

This is the main class in error.hh. It is determined to store and handle all errors and warnings in your program. It is a replacement of standard error handling through throw & catch statements, but it defaultly uses throw & catch constructs to jump out of the problematic piece of a program code (that caused a possible error).

The main advantage of this class is a user friendly interface formed especially by '<<' operators, which permits to work with error_vector_t similarly as with *ostream* class.

The another advantage and the reason why this is a vector instead of single error buffer is that we distinguish between non-fatal errors (we call them 'warnings') and fatal errors (we call them 'errors').

The behaviour in a case of storing of error or warning can be selected or changed by functions set_push_callback() and set_throw_callback().

For more informations about usage see Error Handling Unit.

12.41.2 Constructor & Destructor Documentation

12.41.2.1 error_vector_t () [inline]

A constructor.

Only initializes callback functions serving creation of error messages private attributes *throw_callback* and *push_callback*.

12.41.2.2 ~error_vector_t () [inline]

A destructor.

Only do some deallocation of dynamically allocated memory (in instances of error_string_t)

References ERR_UNKNOWN_ID, and ERR_UNKNOWN_TYPE.

12.41.3 Member Function Documentation

12.41.3.1 void flush ()

Flushes all stored error messages.

Prints all error messages stored in a memory to the standard error output and calls clear() to empty the memory.

References clear(), count(), and perror().

Referenced by ERR_default_thr_callback().

12.41.3.2 ERR_id_t id (const ERR_nbr_t *i*)

Returns error ID of *i-th* error message from the beginning of the list of errors

12.41.3.3 ERR_id_t id_front ()

Returns error ID of the error message from the beginning of the list of errors

12.41.3.4 error_vector_t& operator<< (const int *i*) [inline]

Appends string representing *i* to the error message creating in the error vector

12.41.3.5 error_vector_t& operator<< (const unsigned int *i*) [inline]

Appends string representing *i* to the error message creating in the error vector

12.41.3.6 error_vector_t& operator<< (const signed long int *i*) [inline]

Appends string representing *i* to the error message creating in the error vector

12.41.3.7 error_vector_t& operator<< (const unsigned long int *i*) [inline]

Appends string representing *i* to the error message creating in the error vector

12.41.3.8 void operator<< (const psh & *e*)

Finishes creating of an error message and calls 'warning handling callback'.

Finishes creating of an error message and inserts prepared error message to the end of the list of errors. Then calls 'warning handling callback' (see ERR_psh_callback_t)

References psh::c, push(), and psh::t.

12.41.3.9 void operator<< (const thr & *e*)

Finishes creating of an error message and calls 'error handling callback'.

Finishes creating of an error message and inserts prepared error message to the end of the list of errors. Then calls 'error handling callback' (see ERR_thr_callback_t)

References thr::c, thr::t, and that().

12.41.3.10 void perror (ERR_char_string_t *mes*, const ERR_nbr_t *i*)

Prints *mes* and *i-th* message (from the beginning of the list of errors) to the standard error output

12.41.3.11 void perror (const ERR_nbr_t *i*)

Prints *i-th* message (from the beginning of the list of errors) to the standard error output

Referenced by flush(), por_t::generate_ample_sets(), and por_t::generate_composed_ample_sets().

12.41.3.12 void perror_back (ERR_char_string_t *mes*)

Prints *mes* and the first message from the end of the list of errors to the standard error output

12.41.3.13 void perror_back ()

Prints the first message from the end of the list of errors to the standard error output

Referenced by ERR_default_psh_callback().

12.41.3.14 void perror_front (ERR_char_string_t *mes*)

Prints *mes* and the first message from the beginning of the list of errors to the standard error output

12.41.3.15 void perror_front ()

Prints the first message from the beginning of the list of errors to the standard error output

12.41.3.16 void pop (const ERR_nbr_t *begin*, const ERR_nbr_t *end*)

Removes interval of errors.

Removes all error messages with ordering number from *begin* (inclusive) to *end* (exclusive) in a list of errors.

12.41.3.17 void pop (const ERR_nbr_t *index*)

Removes 'index'-th error.

Removes *index-th* error message from the beginning of the list of errors

12.41.3.18 void pop_back (const ERR_nbr_t *n*)

Removes last n errors.

Removes n error messages from the end of the list of errors. If $n = 0$, then removes all errors from a memory.

References pop_back().

Referenced by ERR_default_psh_callback().

12.41.3.19 void pop_front (const ERR_nbr_t *n*)

Removes first n errors.

Removes n error messages from the begining of the list of errors. If $n = 0$, then removes all errors from a memory.

References pop_front().

12.41.3.20 void push (error_string_t & *mes*, const ERR_id_t *id* = ERR_UNKNOWN_ID)

Inserts an error message to the end of a list of errors.

Inserts an error message to the end of a list of errors. It does not call any of callback functions (= any of warning/error handling callbacks).

Note: parameter *id* is optional.

References error_string_t::recreate().

Referenced by operator<<(), and that().

12.41.3.21 const error_string_t string (const ERR_nbr_t *i*)

Returns the string of *i-th* error message from the beginning of the list of errors

12.41.3.22 const error_string_t string_front ()

Returns the string of the error message from the beginning of the list of errors

12.41.3.23 void that (error_string_t & *mes*, const ERR_type_t *err_type* = ERR_UNKNOWN_TYPE, const ERR_id_t *id* = ERR_UNKNOWN_ID)

Serves to store standardized error messages given by elements.

```
terr.that(message, id, type)
```

is functionally equivalent to

```
terr << message << thr(type, id)
```

Note: Parameters *err_type* and *id* are not obligatory.

References push().

12.41.3.24 void that (const ERR_c_triplet_t & *st*)

Serves to store standardized error messages (in triplets ERR_triplet_t).

```
terr.that(triplet)
```

is functionally equivalent to

```
terr << triplet.message << thr(triplet.type, triplet.id)
```

References error_string_t::delete_content(), ERR_triplet_t::id, ERR_triplet_t::message, push(), and ERR_triplet_t::type.

Referenced by operator<<().

The documentation for this class was generated from the following files:

- error.hh
- error.cc

12.42 ES_parameters_t Struct Reference

Structure determined for passing parameters to ES_∗_eval() functions.

`#include <dve_explicit_system.hh>`

Public Attributes

- size_int_t ∗ **array_sizes**
- size_int_t ∗ **initial_states**
- SYS_initial_values_t ∗ **initial_values**
- state_t **state**
- size_int_t ∗ **state_lids**
- size_int_t ∗ **state_positions_proc**
- size_int_t ∗ **state_positions_state**
- size_int_t ∗ **state_positions_var**
- dve_var_type_t ∗ **var_types**

12.42.1 Detailed Description

Structure determined for passing parameters to ES_∗_eval() functions.

dve_explicit_system_t defines its own structure for passing parameters to its own functions ES_∗_eval(), which are replacing SYS_∗_eval() fuctions used by system_t.

This is really internal thing and the programmer of algorithms using DiVinE usually should not use this structure.

The documentation for this struct was generated from the following file:

- dve_explicit_system.hh

12.43 explicit_storage_t Class Reference

explicit storage class

`#include <explicit_storage.hh>`

Public Member Functions

- void * app_by_ref (state_ref_t refer)
- void delete_all_states (bool leave_collision_lists=false)
- bool delete_by_ref (state_ref_t)
- explicit_storage_t (divine::error_vector_t &=gerr)
- template<class appendix_t>
  bool get_app_by_ref (state_ref_t refer, appendix_t &result)
- size_t get_coltables ()
- size_t get_ht_occupancy ()
- size_t get_max_coltable ()
- size_t get_mem_max_used ()
- size_t get_mem_used ()
- size_t get_states_max_stored ()
- size_t get_states_stored ()
- void init ()
- void insert (state_t, state_ref_t &)
- void insert (state_t)
- bool is_stored (state_t, state_ref_t &)
- bool is_stored (state_t)
- bool is_stored_if_not_insert (state_t, state_ref_t &)
- state_t reconstruct (state_ref_t)
- template<class appendix_t>
  bool set_app_by_ref (state_ref_t refer, appendix_t appen)
- template<class appendix_t>
  void set_appendix (appendix_t)
- void set_appendix_size (size_t)
- void set_col_init_size (size_t)
- void set_col_resize (size_t)
- void set_compression_method (size_t)
- void set_hash_function (hash_functions_t)
- void set_ht_size (size_t)
- bool set_mem_limit (size_t)

Protected Member Functions

- void **mem_counting** (int)

Protected Attributes

- size_t **appendix_size**
- size_t **col_init_size**
- size_t **col_resize**
- size_t **compression_method**
- compressor_t **compressor**
- error_vector_t & **errvec**
- hash_function_t **hasher**
- size_t **ht_size**
- bool **initialized**
- size_t **mem_limit**
- size_t **mem_max_used**
- size_t **mem_used**
- storage_t **storage**

12.43.1 Detailed Description

explicit storage class

12.43.2 Constructor & Destructor Documentation

12.43.2.1 explicit_storage_t (divine::error_vector_t & = gerr)

Constructor. An error_vector_t may be specified.

12.43.3 Member Function Documentation

12.43.3.1 void * app_by_ref (state_ref_t *refer*)

Returns pointer to appendix stored at the referenced state.

References state_ref_t::hres, and state_ref_t::id.

12.43.3.2 void delete_all_states (bool *leave_collision_lists* = `false`)

Deletes all stored states and collision lists. Method has a voluntary parameter leave_-collision_lists. If called with leave_collision_lists = true, then colission lists are only cleared and remain allocated.

12.43.3.3 bool delete_by_ref (state_ref_t *state_reference*)

Deletes the state that is referenced by given state_ref_t. Returns false if the delete operation was unsuccessful.

References state_ref_t::hres, and state_ref_t::id.

12.43.3.4 bool get_app_by_ref (state_ref_t *refer*, appendix_t & *result*) [inline]

Returns appendix stored at the referenced state.

References state_ref_t::hres, and state_ref_t::id.

12.43.3.5 size_t get_coltables ()

Returns sum of sizes of collision tables (sum of lengths of all collision lists).

12.43.3.6 size_t get_ht_occupancy ()

Returns the number of occupied lines (lines with at least one state stored) in the hashtable.

12.43.3.7 size_t get_max_coltable ()

Returns maximum size of a single collision table (maximum length of a collision list).

12.43.3.8 size_t get_mem_max_used ()

Returns maximal (up to the time if this call) number of bytes allocated by storage and compressor instances. Note this differ from real memory consumption as no fragmentation is included.

12.43.3.9 size_t get_mem_used ()

Returns current number of bytes allocated by storage and compressor instances. Note this differ from real memory consumption as no fragmentation is included.

12.43.3.10 size_t get_states_max_stored ()

Returns maximum number of states stored in the set.

12.43.3.11 size_t get_states_stored ()

Returns current number of states stored in the set.

Referenced by logger_t::log_now().

12.43.3.12 void init ()

This member function performs initialization of the hash table. It must be called in order to use the class for storing states. This function call may be predecessed by calls of various set functions.

References compressor_t::clear(), and compressor_t::init().

12.43.3.13 void insert (state_t *state*, state_ref_t & *state_reference*)

Insert a copy of the given state in the set of visited states. An exception is generated in the case of unsuccesfull insert. Also sets the given state_ref_t to reference the newly inserted state.

References compressor_t::compress(), hash_function_t::get_hash(), state_ref_t::hres, state_ref_t::id, state_t::ptr, and state_t::size.

12.43.3.14 void insert (state_t *state*)

Insert a copy of the given state in the set of visited states. An exception is generated in the case of unseccesfull insert.

12.43.3.15 bool is_stored (state_t *state*, state_ref_t & *state_reference*)

Returns true if the state is inserted in the set of visited states and if so then sets the state_ref_t to reference the state.

References compressor_t::compress_without_alloc(), hash_function_t::get_hash(), state_ref_t::hres, state_ref_t::id, state_t::ptr, and state_t::size.

12.43.3.16 bool is_stored (state_t *state*)

Returns true if the state is inserted in the set of visited states.

12.43.3.17 bool is_stored_if_not_insert (state_t *state*, state_ref_t & *state_reference*)

Tests whether given state is stored in the set of visited states. In the case the state is present in the set, the function returns true and sets the given state_ref_t to reference the state in the set, otherwise a copy of the state is inserted in the set, the given state_ref_t is set to the state that has been just inserted, and false is returned. In the latter case an exception is generated in the case of unseccesfull insert.

References compressor_t::compress(), hash_function_t::get_hash(), state_ref_t::hres, state_ref_t::id, state_t::ptr, and state_t::size.

12.43.3.18 state_t reconstruct (state_ref_t *state_reference*)

Reconstructs state referenced by given state_ref_t. Invalid reference will cause warning and crash the application.

References compressor_t::decompress(), state_ref_t::hres, state_ref_t::id, state_t::ptr, and state_t::size.

12.43.3.19 bool set_app_by_ref (state_ref_t *refer*, appendix_t *appen*) [inline]

Rewrites the appendix stored at referenced state with the given one.

References state_ref_t::hres, and state_ref_t::id.

12.43.3.20 void set_appendix (appendix_t) [inline]

Sets the size of appendix using an instance of an appendix strucute. Must be called before member function init.

12.43.3.21 void set_appendix_size (size_t *appendix_size_in*)

Sets the size of instance of an appendix structure. The call of this function must preceed the call of init member function.

12.43.3.22 void set_col_init_size (size_t *coltable_init_size*)

Sets initial size of a collision table (default=1). The call of this function must preceed the call of init member function.

12.43.3.23 void set_col_resize (size_t *coltable_resize_by*)

Sets the factor by which a collision table is enlarged if necessary. The call of this function must preceed the call of init member function.

12.43.3.24 void set_compression_method (size_t *compression_method_id*)

Sets compression method. Where the possibilities are: NO_COMPRESS (default) and HUFFMAN_COMPRESS. The call of this function must preceed the call of init member function.

12.43.3.25 void set_hash_function (hash_functions_t *hf*)

Sets hash function to be used.

References hash_function_t::set_hash_function().

12.43.3.26 void set_ht_size (size_t *hashtable_size*)

Sets the hash table size (default: 2^16 = 65536). The call of this function must preceed the call of init member function. The call of this function must preceed the call of init member function.

12.43.3.27 bool set_mem_limit (size_t *memory_limit*)

Sets a limit for the number of allocated bytes (not including memory fragmentation). The call of this function must preceed the call of init member function.

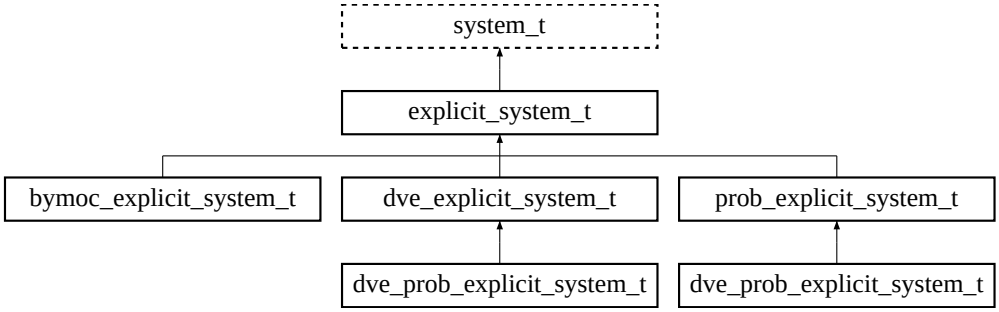
The documentation for this class was generated from the following files:

- explicit_storage.hh
- explicit_storage.cc

12.44 explicit_system_t Class Reference

`#include <explicit_system.hh>`

Inheritance diagram for explicit_system_t::



Public Member Functions

- bool can_evaluate_expressions ()
- bool can_system_transitions ()
- explicit_system_t (error_vector_t &evect)

  A constructor.

- virtual ~explicit_system_t ()

  A destructor.

Methods for expression evaluation

These methods are implemented only if can_evaluate_expressions() returns true

- virtual bool eval_expr (const expression_t *const expr, const state_t state, data_t &data) const =0

  Evaluates an expression.

Methods working with system transitions and enabled transitions

These methods are implemented only if can_system_transitions() returns true

- virtual int get_enabled_ith_trans (const state_t state, const size_int_t i, enabled_trans_t &enb_trans)=0

  Computes the i-th enabled transition in a state 'state'.

- virtual int get_enabled_trans (const state_t state, enabled_trans_container_t &enb_trans)=0

  Creates a list of enabled transitions in a state 'state'.

- virtual int get_enabled_trans_count (const state_t state, size_int_t &count)=0
  Computes the count of transitions in a state 'state'.

- virtual bool get_enabled_trans_succ (const state_t state, const enabled_trans_t &enabled, state_t &new_state)=0
  Generates a successor of 'state' using enabled transition 'enabled'.

- virtual bool get_enabled_trans_succs (const state_t state, succ_container_t &succs, const enabled_trans_container_t &enabled_trans)=0
- virtual int get_succs (state_t state, succ_container_t &succs, enabled_trans_container_t &etc)=0
  Creates successors of state 'state'.

- virtual enabled_trans_t * new_enabled_trans () const =0
  Creates an instance of enabled transition.

Obligatory part of abstact interface

A destructor.

These methods have to implemented in each implementation of explicit_system_t

- virtual state_t get_initial_state ()=0
  Returns an initial state of the system.

- virtual int get_ith_succ (state_t state, const int i, state_t &succ)=0
  Computes i-th successor of 'state'.

- virtual size_int_t get_preallocation_count () const =0
  Returns a count of successors to preallocate in successor container.

- virtual int get_succs (state_t state, succ_container_t &succs)=0
  Creates successors of state 'state'.

- virtual bool is_accepting (state_t state, size_int_t acc_group=0, size_int_t pair_member=1)=0
- virtual bool is_erroneous (state_t state)=0
  Returns, whether the state of the system is erroneous.

- virtual void print_state (state_t state, std::ostream &outs=std::cout)=0
  Prints the standard text representation of a state of the system.

- virtual size_int_t violated_assertion_count (const state_t state) const =0
  Returns a count of assertions violated in the state 'state'.

- virtual std::string violated_assertion_string (const state_t state, const size_int_t index) const =0
- virtual bool violates_assertion (const state_t state) const =0
  Returns, whether any assertion is violated in the state 'state'.

12.44.1 Detailed Description

Abstract interface of a class represinting a state generator based on the model of system stored in system_t

The role of explicit system implemented by explicit_system_t is to provide an interface to the generator of states of a model of the system stored in the parent class system_t.

The most important methods are get_initial_state() and get_succs(). Values returned from get_succs() can be analyzed by succs_normal(), succs_error() and succs_deadlock().

12.44.2 Constructor & Destructor Documentation

12.44.2.1 explicit_system_t (error_vector_t & *evect*) [inline]

A constructor.

Parameters:

evect = error vector used for reporting of error messages

12.44.3 Member Function Documentation

12.44.3.1 bool can_evaluate_expressions () [inline]

Tells whether the implementation of explicit_system_t interface can evaluate expressions

12.44.3.2 bool can_system_transitions () [inline]

Tells whether the implementation of explicit_system_t interface can work with system_trans_t and enabled_trans_t

12.44.3.3 virtual bool eval_expr (const expression_t *const *expr*, const state_t *state*, data_t & *data*) const [pure virtual]

Evaluates an expression.

Parameters:

expr = expression to evaluate

state = state of the system, in which we want to evaluate the expression *expr*

data = computed value of the expression

Returns:

false iff no error occured during the evaluation of the expression

This method is implemented only if can_evaluate_expressions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.4 virtual int get_enabled_ith_trans (const state_t *state*, const size_int_t *i*, enabled_trans_t & *enb_trans*) [pure virtual]

Computes the i-th enabled transition in a state 'state'.

Computes the i-th enabled transition in a state *state*.

Parameters:

state = state of the system

i = the index of the enabled transition (0..get_async_enabled_trans_count)

enb_trans = the variable for storing computed transition

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK (use functions succs_normal(), succs_error() and succs_deadlock() for testing)

This method is implemented only if can_system_transitions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.5 virtual int get_enabled_trans (const state_t *state*, enabled_trans_container_t & *enb_trans*) [pure virtual]

Creates a list of enabled transitions in a state 'state'.

Creates a list of enabled transitions in a state *state* and stores it to the container *enb_trans* (see enabled_trans_container_t).

Parameters:

state = state of the system

enb_trans = container for storing enabled transitions (see Enabled transitions for details)

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK (use functions succs_normal(), succs_error() and succs_deadlock() for testing)

This method is implemented only if can_system_transitions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.6 virtual int get_enabled_trans_count (const state_t *state*, size_int_t & *count*) [pure virtual]

Computes the count of transitions in a state 'state'.

Computes the count of transitions in a state *state*.

Parameters:

state = state of the system

count = computed count of enabled transitions

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK (use functions succs_normal(), succs_error() and succs_deadlock() for testing)

Note:

In fact the count of transitions in state 'state' is equal to the number of successors of state 'state'.

This method is implemented only if can_system_transitions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.7 virtual bool get_enabled_trans_succ (const state_t *state*, const enabled_trans_t & *enabled*, state_t & *new_state*) [pure virtual]

Generates a successor of 'state' using enabled transition 'enabled'.

Parameters:

state = state of system

enabled = enabled transition to use for generation of successor

new_state = state to rewrite by the successor of *state*

This method is implemented only if can_system_transitions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.8 virtual bool get_enabled_trans_succs (const state_t *state*, succ_container_t & *succs*, const enabled_trans_container_t & *enabled_trans*) [pure virtual]

Generates successors of 'state' using list of enabled transitions 'enabled_trans'

Parameters:

state = state of system

succs = container for storage of successors of *state*

enabled_trans = list of enabled transitions to use for generation of successors

This method is implemented only if can_system_transitions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.9 virtual state_t get_initial_state () [pure virtual]

Returns an initial state of the system.

This method takes a model of the system stored in system_t (parent of this class) and computes the initial state of the system.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.10 virtual size_int_t get_preallocation_count () const [pure virtual]

Returns a count of successors to preallocate in successor container.

succ_container_t uses this method to estimate an amount of memory to preallocate. Repeated reallocation is slow - therefore good estimation is useful, but not necessary.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.11 virtual int get_succs (state_t *state*, succ_container_t & *succs*, enabled_trans_container_t & *etc*) [pure virtual]

Creates successors of state 'state'.

Creates successors of state *state* and saves them to successor container (see succ_container_t). Furthermore it stores enabled transitions of the systems which are used to generate successors of *state*

Parameters:

state = state of the system

succs = successors container for storage of successors of *state*

etc = container of enabled transitions (see enabled_trans_container_t and enabled_trans_t)

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK (use functions succs_normal(), succs_error() and succs_deadlock() for testing)

This method is implemented only if can_system_transitions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.12 virtual int get_succs (state_t *state*, succ_container_t & *succs*) [pure virtual]

Creates successors of state 'state'.

Creates successors of state *state* and saves them to successor container (see succ_container_t).

Parameters:

state = state of the system

succs = successors container for storage of successors of *state*

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK (use functions succs_normal(), succs_error() and succs_deadlock() for testing)

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.13 virtual bool is_accepting (state_t *state*, size_int_t *acc_group* = 0, size_int_t *pair_member* = 1) [pure virtual]

Returns, whether the state is accepting in the specifed accepting group of Buchi or generalized Buchi automata, or whether the state belongs to the first or second component of the specified accepting pair of Rabin or Streett automata.

Parameters:

state = state of the system

Returns:

whether *state* (i.e. its property automaton projection) belongs to specified accepting group of Buchi or generalized Buchi automaton, or whether it belongs to the first ('pair_member=1') or second ('pair_member=2') component of the specified accepting pair of Rabin and Streett automata.

Note:

If the system is specified without property process, false is returned.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.14 virtual bool is_erroneous (state_t *state*) [pure virtual]

Returns, whether the state of the system is erroneous.

An erroneous state is a special state that is unique in the whole system. It is reached by bad model specification (model that permits variable/index overflow synchronization collision etc.)

Parameters:

state = state of the system

Returns:

true iff any of processes is in the state 'error'.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.15 virtual enabled_trans_t* new_enabled_trans () const [pure virtual]

Creates an instance of enabled transition.

This method is needed by enabled_trans_container_t, which cannot allocate enabled transitions itself, because it does not know their concrete type. The abstract type enabled_trans_t is not sufficient for creation because of its purely abstract methods.

{ Example - implementation of this method in DVE system:}

```
enabled_trans_t * dve_explicit_system_t::new_enabled_trans() const
 {
  return (new dve_enabled_trans_t);
 }
```

This method is implemented only if can_system_transitions() returns true.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.16 virtual size_int_t violated_assertion_count (const state_t *state*) const [pure virtual]

Returns a count of assertions violated in the state 'state'.

If an implementation of explicit_system_t do not support assertions, this method can be implemented so that it returns always 0.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.17 virtual std::string violated_assertion_string (const state_t *state*, const size_int_t *index*) const [pure virtual]

Returns a string representation of index-th assertion violated in the state 'state'

If an implementation of explicit_system_t do not support assertions, this method can be implemented so that it returns always empty string.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

12.44.3.18 virtual bool violates_assertion (const state_t *state*) const [pure virtual]

Returns, whether any assertion is violated in the state ‘state’.

If an implementation of explicit_system_t do not support assertions, this method can be implemented so that it returns always `false`.

Implemented in bymoc_explicit_system_t, and dve_explicit_system_t.

The documentation for this class was generated from the following file:

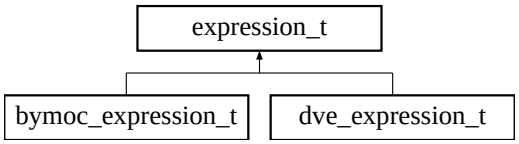
- explicit_system.hh

12.45 expression_t Class Reference

Abstact interface of a class representing an expression.

`#include <expression.hh>`

Inheritance diagram for expression_t::



Public Member Functions

- virtual void assign (const expression_t &expr)

  Copies the contents of 'expr' into this expression (time O(n)).

- expression_t (const expression_t &second)

  A copy constructor.

- expression_t (system_t *const system)

  A constructor.

- expression_t ()

  A constructor.

- virtual int from_string (std::string &expr_str, const size_int_t process_gid=NO_ID)=0

  Reads in the expression from a string representation.

- system_t * get_parent_system () const

  Returns a "parent" system of this expression.

- expression_t & operator= (const expression_t &second)

  The assignment operator for expressions.

- virtual int read (std::istream &istr, size_int_t process_gid=NO_ID)=0

  Reads in the expression from a string representation in stream.

- virtual void set_parent_system (system_t &system)

  Sets a "parent" system of this expression.

- virtual void swap (expression_t &expr)

  Swaps the content of 'expr' and this expression (time O(1)).

- virtual std::string to_string () const =0

  Returns string representation of the expression.

- virtual void write (std::ostream &ostr) const =0

  Writes a string representation of the expression to stream.

- virtual ~expression_t ()

  A destructor.

Protected Attributes

- system_t * **parent_system**

12.45.1 Detailed Description

Abstact interface of a class representing an expression.

Class expression_t represents expressions interpretable in a system given in a constructor expression_t(system_t * const system) of in a method set_parent_system(system_t & system)

Note:

Developer is responsible for correct setting of "parent" system (but expressions created during reading of the system from a file have the "parent" system set correctly).

12.45.2 Constructor & Destructor Documentation

12.45.2.1 expression_t (system_t *const *system*) [inline]

A constructor.

Parameters:

system = "parent" system of this expression

12.45.3 Member Function Documentation

12.45.3.1 virtual int from_string (std::string & *expr_str*, const size_int_t *process_gid* = NO_ID) [pure virtual]

Reads in the expression from a string representation.

Parameters:

expr_str = string containing source of an expression

process_gid = context of a process (default value NO_ID = global context)

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_expression_t, and dve_expression_t.

12.45.3.2 expression_t& operator= (const expression_t & *second*) [inline]

The assignment operator for expressions.

It copies the content of *second* (the right argument of an operator) to the left argument of an operator.

It is implemented simply by assign() method and you can also write `left_argument.assign(right_argument)` instead of `left_argument = right_argument`.

Returns:

The reference to this object (left argument of an operator after an assignment)

12.45.3.3 virtual int read (std::istream & *istr*, size_int_t *process_gid* = NO_ID) [pure virtual]

Reads in the expression from a string representation in stream.

Parameters:

istr = input stream containing source of expression

process_gid = context of process (default value NO_ID = global context)

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_expression_t, and dve_expression_t.

12.45.3.4 virtual std::string to_string () const [pure virtual]

Returns string representation of the expression.

Implementation issue: This function is slower than write(), because it does a copying of potentially long string

Implemented in bymoc_expression_t, and dve_expression_t.

The documentation for this class was generated from the following file:

- expression.hh

12.46 hash_function_t Class Reference

Class that unifies hash functions in the library.

`#include <hash_function.hh>`

Public Member Functions

- size_int_t get_hash (unsigned char *, size_int_t, size_int_t=1) const

  Returns hash key for a given piece of memory. An optional parameter specify a seed or initvalue for the hash function.

- hash_function_t ()

  Constructor.

- hash_function_t (hash_functions_t)

  Constructor.

- size_int_t hash_state (state_t, size_int_t=1) const

  Returns hash key for a given state. An optional parameter specify a seed or initvalue for the hash function.

- void set_hash_function (hash_functions_t)

  Sets hash function to be used for hashing.

- ~hash_function_t ()

  Destructor.

Protected Attributes

- hash_functions_t **hf_id**

12.46.1 Detailed Description

Class that unifies hash functions in the library.

The documentation for this class was generated from the following files:

- hash_function.hh
- hash_function.cc

12.47 logger_t Class Reference

`#include <logger.hh>`

Public Member Functions

- void init (string tmpstr_in, int format_in=0)
- void init (distributed_t *divine_ptr_in, std::string basename, int format=0)
- void log_now ()
- logger_t ()
- void register_double (const log_double_t &functor, std::string description="")
- void register_double (doublefunc_t func_ptr, std::string description="")
- void register_int (intfunc_t func_ptr, std::string description="")
- void register_slong_int (const log_slong_int_t &functor, std::string description="")
- void register_ulong_int (const log_ulong_int_t &functor, std::string description="")
- void register_unsigned (unsignedfunc_t func_ptr, std::string description="")
- void set_storage (explicit_storage_t *storage_ptr)
- void stop_SIGALRM ()
- void use_SIGALRM (unsigned int period=1)
- ~logger_t ()

Public Attributes

- unsigned int **signal_period**

12.47.1 Detailed Description

Class logger_t is used to periodically log various values into logfiles. There are as many logfiles produced as there are workstations participating the computation. The logfiles may be further processed by plotlog script that uses gnuplot to create corresponding (e)ps graphs. The class can be used only in combination with class distributed_t.

NOTE: Usage of the logger_t class slowdowns the execution of the algorithm.

12.47.2 Constructor & Destructor Documentation

12.47.2.1 logger_t ()

Constructor does nothing. To initialize the instance of the class use the init member function.

12.47.2.2 ~logger_t ()

Destructor prints footer to the logfile and closes the logfile.

12.47.3 Member Function Documentation

12.47.3.1 void init (string *tmpstr_in*, int *format_in* = 0)

The same as init(distributed_t * divine_ptr_in, std::string basename, int format), but divine_ptr_in = 0 implicitly.

References init().

12.47.3.2 void init (distributed_t * *divine_ptr_in*, std::string *basename*, int *format* = 0)

This member function is called to initialize an instance of logger_t class. It accepts two obligatory parameters: a pointer to instance of distributed_t class and a base name of logfiles. (The base name is extended with .00, .01, .02, etc, by logger_t to distinguish individual logfiles.) The third parameter that gives the format of logfiles is optional (default value is 0, which corresponds to the format compatibile with plotlog script).

The method opens the logfile and print header into it according the chosen format. The function should be called after the set_storage and all the register member functions were called.

divine_ptr_in can be zero value (network-related values will be then zero too).

Referenced by init().

12.47.3.3 void log_now ()

Forces the logger to log current values now. If signal/alarm mechanism is involved, then this function is typically called just before the destructor to log final values. If no signal/alarm mechanism is used, then this function is supposed to be called periodically.

References distributed_t::cluster_size, network_t::get_all_barriers_cnt(), network_t::get_all_buffers_flushes_cnt(), network_t::get_all_received_msgs_cnt(), network_t::get_all_sent_msgs_cnt(), network_t::get_sent_msgs_cnt_sent_to(), explicit_storage_t::get_states_stored(), distributed_t::network, vminfo_t::scan(), and vminfo_t::vmsize.

12.47.3.4 void register_double (const log_double_t & *functor*, std::string *description* = "")

This function can be used to register functor that will be called by the log_now function to obtained double f. p. value to be logged into logfile. The second optional parameter is a short (below 8 characters) description of the value that could be (depending on format) printed in the header of the file.

This can be used to log the number of states stored in the queue of states waiting for exploration, for example.

References gerr.

12.47.3.5 void register_double (doublefunc_t *func_ptr*, std::string *description* = "")

This function can be used to register function that will be called by the log_now function to obtained double value to be logged into logfile. The second optional parameter is a short (below 8 characters) description of the value that could be (depending on format) printed in the header of the file.

12.47.3.6 void register_int (intfunc_t *func_ptr*, std::string *description* = "")

This function can be used to register function that will be called by the log_now function to obtained int value to be logged into logfile. The second optional parameter is a short (below 8 characters) description of the value that could be (depending on format) printed in the header of the file.

12.47.3.7 void register_slong_int (const log_slong_int_t & *functor*, std::string *description* = "")

This function can be used to register functor that will be called by the log_now function to obtained signed int value to be logged into logfile. The second optional parameter is a short (below 8 characters) description of the value that could be (depending on format) printed in the header of the file.

This can be used to log the number of states stored in the queue of states waiting for exploration, for example.

References gerr.

12.47.3.8 void register_ulong_int (const log_ulong_int_t & *functor*, std::string *description* = "")

This function can be used to register functor that will be called by the log_now function to obtained unsigned int value to be logged into logfile. The second optional parameter is a short (below 8 characters) description of the value that could be (depending on format) printed in the header of the file.

This can be used to log the number of states stored in the queue of states waiting for exploration, for example.

References gerr.

12.47.3.9 void register_unsigned (unsignedfunc_t *func_ptr*, std::string *description* = "")

This function can be used to register function that will be called by the log_now function to obtained unsigned int value to be logged into logfile. The second optional parameter is a short (below 8 characters) description of the value that could be (depending on format) printed in the header of the file.

This can be used to log the number of states stored in the queue of states waiting for exploration, for example.

12.47.3.10 void set_storage (explicit_storage_t * *storage_ptr*)

If logging of the number of states kept in the storage is requested, this member function should be used to set the pointer to instance of explicit_storage_t class.

Should be called before init member function.

12.47.3.11 void stop_SIGALRM ()

Stops POSIX signal/alarm mechanism. (Starts ingoring incomming signals.)

12.47.3.12 void use_SIGALRM (unsigned int *period* = `1`)

Starts POSIX signal/alarm mechanism to call log_now function periodically. The period is given in seconds. (One second is the shortest possible period.)

Should be called after the init member function.

The documentation for this class was generated from the following files:

- logger.hh
- logger.cc

12.48 message_t Class Reference

Class representing a data to send or receive using network_t.

`#include <message.hh>`

Public Member Functions

- void append_bool (const bool flag)

  Writes a flag to the message.

- void append_byte (const byte_t number)

  Writes a number of type byte_t to the message.

- void append_data (const byte_t *const data_to_copy, const size_int_t size_to_copy)

  Writes 'size_to_copy' bytes from 'data_to_copy' to the message.

- void append_sbyte (const sbyte_t number)

  Writes a number of type sbyte_t to the message.

- void append_size_int (const size_int_t number)

  Writes a number of type size_int_t to the message.

- void append_slong_int (const slong_int_t number)

  Writes a number of type slong_int_t to the message.

- void append_sshort_int (const sshort_int_t number)

  Writes a number of type sshort_int_t to the message.

- void append_state (const state_t state)

  Writes a complete representation of state to the message.

- void append_state_ref (const state_ref_t state_ref)

  Writes a state reference 'state_ref' to the message.

- void append_ulong_int (const ulong_int_t number)

  Writes a number of type ulong_int_t to the message.

- void append_ushort_int (const ushort_int_t number)

  Writes a number of type ushort_int_t to the message.

- size_int_t get_allocated_size () const

  Returns a size of byte sequence representing a message.

- const byte_t * get_data () const

Returns a stored byte sequence representing a message.

- byte_t * get_data ()

  Returns a stored byte sequence representing a message.

- size_int_t get_written_size () const
- void load_data (byte_t *const new_data, const size_int_t new_allocated_size)

  Replaces a data in a message by given data (using memory copying).

- message_t (const size_int_t number_of_preallocated_bytes=1024, const size_int_t reallocation_step=1024)

  A constructor.

- void read_bool (bool &flag)

  Copies a flag from the message to 'flag'.

- void read_byte (byte_t &number)

  Copies a number of type byte_t to 'number'.

- void read_data (char *const data_to_copy, const std::size_t size_to_copy)

  Copies 'size_to_copy' bytes from the message to 'data_to_copy'.

- void read_sbyte (sbyte_t &number)

  Copies a number of type sbyte_t to 'number'.

- void read_size_int (size_int_t &number)

  Copies a number of type size_int_t to 'number'.

- void read_slong_int (slong_int_t &number)

  Copies a number of type slong_int_t to 'number'.

- void read_sshort_int (sshort_int_t &number)

  Copies a number of type sshort_int_t to 'number'.

- void read_state (state_t &state)

  Copies a state stored in the message to 'state'.

- void read_state_ref (state_ref_t &ref)

  Copies a reference to state stored in the message to 'ref'.

- void read_ulong_int (ulong_int_t &number)

  Copies a number of type ulong_int_t to 'number'.

- void read_ushort_int (ushort_int_t &number)

  Copies a number of type ushort_int_t to 'number'.

- void rewind ()

  Moves both reading and writting heads to the beginning of the message.

- void rewind_append ()

  Moves a writting head to the beginning of the message.

- void rewind_read ()

  Moves a reading head to the beginning of the message.

- void set_data (byte_t *const new_data, const size_int_t new_allocated_size)

  Sets a byte sequence stored in a message.

- void set_data (byte_t *const new_data, const size_int_t new_allocated_size, const size_int_t new_written_size)

  Sets a byte sequence stored in a message.

- void set_written_size (const size_int_t new_size)

  Sets a size of written part of message.

- ~message_t ()

  A destructor.

12.48.1 Detailed Description

Class representing a data to send or receive using network_t.

This class is good for sending or receiving of messages consisting of several items (of possibly various types). It supports a transmission of basic integer types, states, state references and general sequences of bytes.

Warning:

This class implicitly allocates 4096 B. It is not good idea to have 1000000 instances of it or to create and destroy its instances many times. It is presumed, that in a program there will be only few "global" instances shared by all sending and receiving procedures.

12.48.2 Constructor & Destructor Documentation

12.48.2.1 message_t (const size_int_t *number_of_preallocated_bytes* = 1024, const size_int_t *reallocation_step* = 1024)

A constructor.

Parameters:

number_of_preallocated_bytes = a count of bytes to allocate for a byte sequence representing a message

reallocation_step = how much more bytes to allocate in case of reallocation

12.48.2.2 ~message_t () [inline]

A destructor.

It only deallocates a byte sequence stored in a message

12.48.3 Member Function Documentation

12.48.3.1 void append_bool (const bool *flag*)

Writes a flag to the message.

Warning:

Flag is stored to the single byte (not to sizeof(bool) bytes!)

References append_byte().

12.48.3.2 void append_data (const byte_t *const *data_to_copy*, const size_int_t *size_to_copy*)

Writes 'size_to_copy' bytes from 'data_to_copy' to the message.

Parameters:

data_to_copy = pointer to the sequence of bytes

size_to_copy = number of bytes to copy from the byte sequence given in *data_to_copy*

12.48.3.3 void append_state (const state_t *state*)

Writes a complete representation of state to the message.

Parameters:

state = state to copy to the message

Writes 'state.size' and the byte sequence referenced by 'state.ptr' to the message

References state_t::ptr, and state_t::size.

12.48.3.4 size_int_t get_written_size () const [inline]

Returns a size of part of the message, where something has been written using append_* methods

Referenced by network_t::send_message(), and network_t::send_urgent_message().

12.48.3.5 void load_data (byte_t *const *new_data*, const size_int_t *new_allocated_size*) [inline]

Replaces a data in a message by given data (using memory copying).

Writes a given byte sequence to the begin of the message. The reading head in rewound to the begin of the message, writting head is moved to the end of new message content.

Implemented simply as `this->rewind(); this->append_data(new_data, new_allocated_size);`

12.48.3.6 void read_data (char *const *data_to_copy*, const std::size_t *size_to_copy*)

Copies 'size_to_copy' bytes from the message to 'data_to_copy'.

Parameters:

data_to_copy = the pointer to the byte sequence at least *data_to_copy* bytes long

size_to_copy = count of bytes to copy from the message

12.48.3.7 void read_state (state_t & *state*)

Copies a state stored in the message to 'state'.

Parameters:

state = the state which will be rewritten by the copy of state stored in the message

Warning:

This method does not deallocate the byte sequence in state.ptr. This method allocated a new memory space and the user is reponsible for a deallocation of written state.ptr.

12.48.3.8 void rewind () [inline]

Moves both reading and writting heads to the beginning of the message.

Then get_written_size() will return 0, append_* methods will write from the beginning of the message and read_* methods will read from the beginning of the message Use this method if you do not care of the stored message and you want to write a new message to the same instance of this class.

12.48.3.9 void rewind_append () [inline]

Moves a writting head to the beginning of the message.

Then get_written_size() will return 0 and append_∗ methods will write from the beginning of the message. Use this method if you do not care of the stored message and you want to write a new message to the same instance of this class.

12.48.3.10 void rewind_read () [inline]

Moves a reading head to the beginning of the message.

Then all read_∗ methods will read from the beginning of the message

12.48.3.11 void set_data (byte_t ∗const *new_data*, const size_int_t *new_allocated_size*)

Sets a byte sequence stored in a message.

The same as `message_t::set_data(new_data,new_allocated_size,new_allocated_size)`

Warning:

The byte sequence set by this method will be deallocated in a destructor! If you do not like this behavior, use a method load_data().

12.48.3.12 void set_data (byte_t ∗const *new_data*, const size_int_t *new_allocated_size*, const size_int_t *new_written_size*)

Sets a byte sequence stored in a message.

Parameters:

new_data = byte sequence to store in a message

new_allocated_size = size in bytes of the memory referenced by *new_data*

new_written_size = the number of bytes, which are already written in the message (valid bytes)

Warning:

The byte sequence set by this method will be deallocated in a destructor! If you do not like this behavior, use a method load_data().

Referenced by network_t::receive_message().

12.48.3.13 void set_written_size (const size_int_t *new_size*) [inline]

Sets a size of written part of message.

It can be useful if you need to write a part of message directly to the memory referenced by get_data().

Referenced by network_t::receive_message().

The documentation for this class was generated from the following files:

- message.hh
- message.cc

12.49 network_t Class Reference

Network communication support class.

`#include <network.hh>`

Public Member Functions

- bool abort (void)

  Abort computation.

- bool all_gather (char *sbuf, int ssize, char *rbuf, int rsize)

  Similar to gather(), but the collected information are received on every workstation.

- bool barrier (void)

  Finalizes network, essentially closes connections and frees buffers.

- bool finalize ()

  Finalizes network, frees all allocated buffers.

- bool flush_all_buffers ()

  All buffers flush.

- bool flush_all_buffers_timed_out_only ()

  Only timed out buffers flush.

- bool flush_buffer (int dest)

  One send buffer flush.

- bool flush_some_buffers ()

  Some buffers flush.

- bool gather (char *sbuf, int ssize, char *rbuf, int rsize, int root)

  Similar to barrier() but allows to collect some data on selected workstation.

- bool get_all_barriers_cnt (int &cnt)

  Get count of all barrier() calls.

- bool get_all_buffers_flushes_cnt (int &cnt)

  Get number of flushes of all send buffers.

- bool get_all_received_msgs_cnt (int &cnt)

  Get all received messages count (including urgent messages).

- bool get_all_sent_msgs_cnt (int &cnt)

  Get all sent messages count (including urgent messages).

- bool get_all_total_pending_size (int &size, bool test)
  Get total size of pending (blocked) send buffers for all workstations.
- bool get_buf_msgs_cnt_limit (int &limit)
  Get send buffer's message count limit.
- bool get_buf_size_limit (int &limit)
  Get send buffer's size limit.
- bool get_buf_time_limit (int &limit_sec, int &limit_msec)
  Get send buffer's time limit.
- bool get_buffer_flushes_cnt (int dest, int &cnt)
  Get number of flushes of send buffer for workstation dest.
- bool get_cluster_size (int &size)
  Retrieves the number of computers in the cluster.
- bool get_comm_matrix_rnm (pcomm_matrix_t &ret, int target)
  Get communication matrix of received normal messages.
- bool get_comm_matrix_rum (pcomm_matrix_t &ret, int target)
  Get communication matrix of received urgent messages.
- bool get_comm_matrix_snm (pcomm_matrix_t &ret, int target)
  Get communication matrix of sent normal messages.
- bool get_comm_matrix_sum (pcomm_matrix_t &ret, int target)
  Get communication matrix of sent urgent messages.
- bool get_id (int &id)
  Retrieves the identifier of the calling workstation.
- bool get_processor_name (char *proc_name, int &length)
  Retrieves the name of the calling workstation.
- int get_recv_msgs_cnt_recv_from (int from)
  Get number of messages received from given workstation.
- bool get_recv_msgs_cnt_recv_from (int from, int &cnt)
  Get number of messages received from given workstation.
- int get_sent_msgs_cnt_sent_to (int to)
  Get number of messages sent to a given workstation.

- bool get_sent_msgs_cnt_sent_to (int to, int &cnt)

  Get number of messages sent to a given workstation.

- bool get_total_pending_size (int dest, int &size, bool test)

  Get size of pending (blocked) send buffer for workstation dest.

- bool get_user_received_msgs_cnt (int &cnt)

  Get normal received messages count (only normal messages, without urgent messages).

- bool get_user_sent_msgs_cnt (int &cnt)

  Get normal sent messages count (only normal messages, without urgent messages).

- bool initialize_buffers ()

  Completes initialization, must be called after and only after initialize_network().

- bool initialize_network (int &argc, char **&argv)
- bool is_new_message (int &size, int &src, int &tag, bool &flag)

  Non-blocking message probe.

- bool is_new_message_from_source (int &size, int src, int &tag, bool &flag)

  Non-blocking message from specific source probe.

- bool is_new_urgent_message (int &size, int &src, int &tag, bool &flag)

  Non-blocking urgent message probe.

- bool is_new_urgent_message_from_source (int &size, int src, int &tag, bool &flag)

  Non-blocking urgent message probe from specific source.

- network_t (error_vector_t &arg0=gerr)
- bool receive_message (message_t &message, int &src, int &tag)

  Blocking message receive.

- bool receive_message (char *buf, int &size, int &src, int &tag)

  Blocking message receive.

- bool receive_message_from_source (char *buf, int &size, int src, int &tag)

  Blocking message from source receive.

- bool receive_message_non_exc (char *&buf, int &size, int &src, int &tag)

  Blocking message receive, which sets buf to point to internal buffer.

- bool receive_urgent_message (char *buf, int &size, int &src, int &tag)

  Blocking message receive.

- bool receive_urgent_message_from_source (char *buf, int &size, int src, int &tag)

  Blocking urgent message from source receive.

- bool receive_urgent_message_non_exc (char *&buf, int &size, int &src, int &tag)

  Blocking urgent message receive, which sets buf to point to internal buffer.

- bool send_message (const message_t &message, int dest, int tag)

  Blocking message send.

- bool send_message (char *buf, int size, int dest, int tag)

  Blocking message send.

- bool send_urgent_message (const message_t &message, int dest, int tag)

  Blocking urgent message send.

- bool send_urgent_message (char *buf, int size, int dest, int tag)

  Blocking urgent message send.

- bool set_buf_msgs_cnt_limit (int limit)

  Set send buffer's message count limit, see get_buf_msgs_cnt_limit() doc for more info.

- bool set_buf_size_limit (int limit)

  Set send buffer's size limit, see get_buf_size_limit() doc for more info.

- bool set_buf_time_limit (int limit_sec, int limit_msec)

  Set send buffer's time limit, see get_buf_time_limit() doc for more info.

- void **stats_init** (statistics *stats)
- double **stats_max** (statistics *stats)
- double **stats_mean** (statistics *stats)
- double **stats_min** (statistics *stats)
- unsigned **stats_num** (statistics *stats)
- double **stats_sqrt_var** (statistics *stats)
- void **stats_update** (statistics *stats, double val)
- double **stats_var** (statistics *stats)
- ~network_t ()

  A destructor, frees allocated memory.

Public Attributes

- statistics **stats_Recv_bytes**
- statistics **stats_Sent_bytes_local**
- double **stats_slice_begin**
- double **stats_slice_end**
- double **stats_time_begin**

Protected Attributes

- error_vector_t & **errvec**

12.49.1 Detailed Description

Network communication support class.

This class mainly provides methods for buffered transmission of messages. Additionally barrier and gather methods are included. Methods for detailed statistics are a matter of course.

12.49.2 Constructor & Destructor Documentation

12.49.2.1 network_t (error_vector_t & *arg0* = gerr)

A constructor, does't initialize network!,

non-default error handling vector can be specified

12.49.3 Member Function Documentation

12.49.3.1 bool abort (void)

Abort computation.

Returns:

true if the function succeeds, **false** otherwise Use this function to terminate all processes participating in the distributed computation

References ERR_triplet_t::message, NET_ERR_ABORT_FAILED, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.2 bool all_gather (char * *sbuf*, int *ssize*, char * *rbuf*, int *rsize*)

Similar to gather(), but the collected information are received on every workstation.

Differs from gather() in that all workstations must have *rbuf* and *rsize* valid, not only one workstation.

References ERR_triplet_t::message, NET_ERR_ALLGATHER_FAILED, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.3 bool barrier (void)

Finalizes network, essentially closes connections and frees buffers.

Returns:

true if initialization was successful, **false** otherwise

Use this function ti finalize network, this works only if the network was previously initialized, otherwise error occurs. The current implementation does not allow to initialize the network more than once, so subsequent calls to initialize_network() will cause error. Stops the computation until all workstation call barrier()

Returns:

true if barrier was successful, **false** otherwise

Use this function to "synchronize" all workstation. The function blocks until all workstations call it.

References ERR_triplet_t::message, NET_ERR_BARRIER_FAILED, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by distributed_t::synchronized().

12.49.3.4 bool flush_all_buffers ()

All buffers flush.

Returns:

true if the function succeeds, **false** otherwise

Use this function to flush all buffers (Technically, the function calls flush_buffer() function for all workstations in the cluster.

References flush_buffer(), ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by distributed_t::set_idle().

12.49.3.5 bool flush_all_buffers_timed_out_only ()

Only timed out buffers flush.

Returns:

true if the fuction succeeds, **false** otherwise

Use this fuction to flush all buffers that have the time limit exceeded (the time limit can bee adjusted by the set_buf_time_limit() function).

References flush_buffer(), ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by distributed_t::process_messages().

12.49.3.6 bool flush_buffer (int *dest*)

One send buffer flush.

Parameters:

dest - identifcation of the buffer (id of the workstation the buffer is designated for) to be flushed

Returns:

true if the function succeeds, **false** otherwise

Use this function to send data in the buffer determined by the *dest* parameter.

References ERR_triplet_t::message, NET_ERR_INVALID_DESTINATION, net_err_msgs, NET_ERR_NOT_INITIALIZED, NET_ERR_SEND_MSG_FAILED, and NET_TAG_NORMAL.

Referenced by flush_all_buffers(), flush_all_buffers_timed_out_only(), and flush_some_buffers().

12.49.3.7 bool flush_some_buffers ()

Some buffers flush.

Returns:

true if the function succeeds, **false** otherwise

Use this function to flush "some" of the largest buffers (currently, the function only calls flush_buffer() for the single workstation with the largest amount of work buffered, since this already appears to give good performance in practice).

References flush_buffer(), ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by distributed_t::set_idle().

12.49.3.8 bool gather (char * *sbuf*, int *ssize*, char * *rbuf*, int *rsize*, int *root*)

Similar to barrier() but allows to collect some data on selected workstation.

Parameters:

sbuf - pointer to buffer that contains the data to be collected

ssize - size of the data sbuf points to (in sizeof(char))

rbuf - pointer to buffer that receives the collected data (relevant only on selected workstation)

rsize - size of the collected data corresponding to one workstation, therefore *rsize* should be equal to ssize (relevant only on selected workstation)

root - id of the selected workstation that receives the collected data

Returns:

true if the function succeeds, **false** otherwise

Use this function to "synchronize" workstations (in the sense explained for barrier() function) and collect some information at the same time. Each workstation must call gather with the same *ssize*, all workstations except for the selected one can pass **NULL** and **0** as rbuf and rsize parameters, respectively. Root parameter must be the same on all workstations. The selected workstation should pass the same value as *ssize* as *rsize*. The buffer to which *rbuf* points must be of size *rsize* $*$ [number of computers in the cluster].

The collected data are in order imposed by workstation ids.

References ERR_triplet_t::message, NET_ERR_GATHER_FAILED, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.9 bool get_all_barriers_cnt (int & *cnt*)

Get count of all barrier() calls.

Parameters:

cnt - output parameter that receives the count of all barrier() function calls on the calling workstation

Returns:

true if the function succeeds, **false** otherwise

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_-INITIALIZED.

Referenced by logger_t::log_now().

12.49.3.10 bool get_all_buffers_flushes_cnt (int & *cnt*)

Get number of flushes of all send buffers.

Parameters:

cnt - output parameter that receives the count of all send buffer flushes on the calling workstation

Returns:

true if the function succeeds, **false** otherwise

References get_buffer_flushes_cnt(), ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by logger_t::log_now().

12.49.3.11 bool get_all_received_msgs_cnt (int & *cnt*)

Get all received messages count (including urgent messages).

Parameters:

cnt - output parameter that receives the count of all messages received on the calling workstation

Returns:

true if the function succeeds, **false** otherwise

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_-INITIALIZED.

Referenced by logger_t::log_now(), and distributed_t::process_messages().

12.49.3.12 bool get_all_sent_msgs_cnt (int & *cnt*)

Get all sent messages count (including urgent messages).

Parameters:

cnt - output parameter that receives the count of all messages sent by the calling workstation

Returns:

true if the function succeeds, **false** otherwise.

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_-INITIALIZED.

Referenced by logger_t::log_now(), and distributed_t::process_messages().

12.49.3.13 bool get_all_total_pending_size (int & *size*, bool *test*)

Get total size of pending (blocked) send buffers for all workstations.

Parameters:

size - output parameter that receives total size of memory occupied by all pending send buffers

test - if test = true, tests are performed and exact value is retrieved, if test = false, upper estimate is returned

Returns:

true if the function succeeds, **false** otherwise

References get_total_pending_size(), ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.14 bool get_buf_msgs_cnt_limit (int & *limit*)

Get send buffer's message count limit.

Parameters:

limit - the maximal count of messages send buffer can hold

Returns:

true if the function succeeds, **false** otherwise

Use this function to get the send buffer's message count limit. If the number of messages in any send buffer (on each workstation there is one send buffer for every workstation) is equal to this limit, the whole contents of the buffer is sent to the workstation the buffer is designated for.

100 messages is default.

This limit can be set by set_buf_msgs_cnt_limit() function, but only before initialize_buffers() function is called.

12.49.3.15 bool get_buf_size_limit (int & *limit*)

Get send buffer's size limit.

Parameters:

limit - the maximal size of the send buffer

Returns:

true if the function succeeds, **false** otherwise

Use this function to get the send buffer's size limit. If the size of any send buffer (on each workstation there is one send buffer for every workstation) is about to exceed or equal this limit, the whole contents of the buffer is sent to the workstation the buffer is designated for.

8192 chars is default.

This limit can be set by set_buf_size_limit() function, but only before initialize_buffers function is called.

12.49.3.16 bool get_buf_time_limit (int & *limit_sec*, int & *limit_msec*)

Get send buffer's time limit.

Parameters:

limit_sec - together with *limit_msec* the "maximal" amount of time send buffer can hold data without flush (in seconds)

limit_msec - together with *limit_sec* the "maximal" amount of time send buffer can hold data without flush (in miliseconds)

Returns:

true if the function succeeds, **false** otherwise

Use this function to get the send buffer's time limit. If the time of any send buffer (on each workstation there is one send buffer for every workstation) is about to exceed or equal this limit, the whole contents of the buffer is sent to the workstation the buffer is designated for. The previous sentence is not completely true, because if nobody calls some function that checks the limit, the data can stay in the buffer for more that the limit. There is no "timer" that check the limit.

300 miliseconds is default.

This limit can be set by set_buf_time_limit() function, but only before initialize buffers function is called.

Setting the limit to 0 seconds and 0 miliseconds turns timed flushing off.

12.49.3.17 bool get_buffer_flushes_cnt (int *dest*, int & *cnt*)

Get number of flushes of send buffer for workstation *dest*.

Parameters:

dest - identification of the send buffer

cnt - output parameter that receives the count of all times the send buffer designated for workstation with id *dest* has been flushed

Returns:

true if the function succeeds, **false** otherwise

References ERR_triplet_t::message, NET_ERR_INVALID_DESTINATION, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by get_all_buffers_flushes_cnt().

12.49.3.18 bool get_cluster_size (int & *size*)

Retrieves the number of computers in the cluster.

Parameters:

size - output parameter that receives the retrieved value

Returns:

true if the function succeeds, **false** otherwise

Use this function to get the number of computers in the cluster. The variable that receives the actual size of the cluster is passed as the first parameter.

You must call initialize_network() function before this function.

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by distributed_t::network_initialize().

12.49.3.19 bool get_comm_matrix_rnm (pcomm_matrix_t & *ret*, int *target*)

Get communication matrix of received normal messages.

Similar to get_comm_matrix_snm(), but the position (*i*, *j*) of the matrix contains the count of normal messages (sent by send_message() function) received on workstation with id *i* from workstation with id *j*.

12.49.3.20 bool get_comm_matrix_rum (pcomm_matrix_t & *ret*, int *target*)

Get communication matrix of received urgent messages.

Similar to get_comm_matrix_snm(), but the position (*i*, *j*) of the matrix contains the count of urgent messages (sent by send_urgent_message() function) received on workstation with id *i* from workstation with id *j*.

12.49.3.21 bool get_comm_matrix_snm (pcomm_matrix_t & *ret*, int *target*)

Get communication matrix of sent normal messages.

Parameters:

ret - output parameter, pointer to communication matrix (of type comm_matrix_t) that contains at position (*i*, *j*) the count of normal messages (sent by function send_message()) sent by workstation with id *i* to workstation with id *j*

target - only one workstation gets valid pointer ret, this workstation is specified by *target* parameter, which must be the same on all workstations

Returns:

true if the function suceeds, **false** otherwise

Use this function to get the counts of messages sent by each workstation to each workstation. The function must be called in a way explained for the barrier() function.

12.49.3.22 bool get_comm_matrix_sum (pcomm_matrix_t & *ret*, int *target*)

Get communication matrix of sent urgent messages.

Similar to get_comm_matrix_snm(), but the position (*i*, *j*) of the matrix contains the count of urgent messages (sent by send_urgent_message() function) sent by workstation with id *i* to workstation with id *j*.

12.49.3.23 bool get_id (int & *id*)

Retrieves the identifier of the calling workstation.

Parameters:

id - output parameter that receives the workstation id

Returns:

true if the function succeeds, **false** otherwise

Use this function to get the unique identifier of the calling workstation. The identifier is in the range [0..*cluster_size* - 1], where *cluster_size* is the number of computers in the cluster and can be obtained by calling the get_cluster_size() function.

You must call initialize_network() function before this function.

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_-INITIALIZED.

Referenced by distributed_t::network_initialize().

12.49.3.24 bool get_processor_name (char * *proc_name*, int & *length*)

Retrieves the name of the calling workstation.

Parameters:

proc_name - output parameter that receives the workstation name

length - output parameter that receives the number of characters in the name

Returns:

true if the function succeeds, **false** otherwise

Use this function to get the name of the calling workstation.

You must call initialize_network() function before this function.

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_-INITIALIZED.

Referenced by distributed_t::network_initialize().

12.49.3.25 int get_recv_msgs_cnt_recv_from (int *from*)

Get number of messages received from given workstation.

Parameters:

from - specifies the workstation we are interested in

Returns:

the count of all message received on the calling workstation from the workstation specified by *from* parameter

References ERR_triplet_t::message, NET_ERR_INVALID_WORKSTATION_-NUMBER, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.26 bool get_recv_msgs_cnt_recv_from (int *from*, int & *cnt*)

Get number of messages received from given workstation.

Parameters:

from - specifies the workstation we are interested in

cnt - output parameter that receives the count of all message received on the calling workstation from the workstation specified by *from* parameter.

Returns:

true if the function succeeds, **false** otherwise

References ERR_triplet_t::message, NET_ERR_INVALID_WORKSTATION_-NUMBER, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.27 int get_sent_msgs_cnt_sent_to (int *to*)

Get number of messages sent to a given workstation.

Parameters:

to - specifies the workstation we are interested in

Returns:

the count of all messages sent by calling workstation to a workstation specified by *to* parameter

References ERR_triplet_t::message, NET_ERR_INVALID_WORKSTATION_-NUMBER, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.28 bool get_sent_msgs_cnt_sent_to (int *to*, int & *cnt*)

Get number of messages sent to a given workstation.

Parameters:

to - specifies the workstation we are interested in

cnt - output parameter that receives the count of all messages sent by calling workstation to a workstation specified by *to* parameter.

Returns:

true if the function succeeds, **false** otherwise

References ERR_triplet_t::message, NET_ERR_INVALID_WORKSTATION_NUMBER, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by logger_t::log_now().

12.49.3.29 bool get_total_pending_size (int *dest*, int & *size*, bool *test*)

Get size of pending (blocked) send buffer for workstation *dest*.

Parameters:

dest - identification of the send buffer

size - output parameter that receives total size of memory occupied by pending send buffer designated for workstation with id *dest*

test - if test = true, tests are performed and exact value is retrieved, if test = false, upper estimate is returned

Returns:

true if the function succeeds, **false** otherwise

References ERR_triplet_t::message, NET_ERR_INVALID_DESTINATION, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

Referenced by get_all_total_pending_size().

12.49.3.30 bool get_user_received_msgs_cnt (int & *cnt*)

Get normal received messages count (only normal messages, without urgent messages).

Parameters:

cnt - output parameter that receives the count of all normal messages received on the calling workstation

Returns:

true if the function succeeds, **false** otherwise

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_INITIALIZED.

12.49.3.31 bool get_user_sent_msgs_cnt (int & *cnt*)

Get normal sent messages count (only normal messages, without urgent messages).

Parameters:

cnt - output parameter that receives the count of all normal messages sent by the calling workstation

Returns:

true if the function succeeds, **false** otherwise.

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_-INITIALIZED.

12.49.3.32 bool initialize_buffers ()

Completes initialization, must be called after and only after initialize_network().

Returns:

true if initialization was successful, **false** otherwise

Use this function to complete initialization process. It initializes buffers, thus enabling the send/receive functions, which use buffering.

References ERR_triplet_t::message, net_err_msgs, and NET_ERR_NOT_-INITIALIZED.

Referenced by distributed_t::initialize().

12.49.3.33 bool initialize_network (int & *argc*, char **& *argv*)

Initializes network, essentially establishes connections and gives all workstations

the command line parameters

Parameters:

argc - number of command line parameters, passing the first parameter of main() is recommended

argv - command line parameters, passing the second parameter of main() is recommended

Returns:

true if initialization was successful, **false** otherwise

Use this function to initialize network. After successful initialization you can obtain workstation identification by calling get_id() function, number of computers in cluster by calling get_cluster_size() function and workstation name using get_processor_name() function. You can also set some properties of build-in buffering scheme using set-functions.

References ERR_triplet_t::message, NET_ERR_ALREADY_INITIALIZED, NET_ERR_INITIALIZATION_FAILED, and net_err_msgs.

Referenced by distributed_t::network_initialize().

12.49.3.34 bool is_new_message (int & *size*, int & *src*, int & *tag*, bool & *flag*)

Non-blocking message probe.

Parameters:

size - output parameter that receives the size of the message, if there is one

src - output parameter that receives the source workstation of the message, if there is one

tag - output parameter that receives the tag of the message, if there is one

flag - output parameter that determines if there is a message waiting to be received

Returns:

true if the function succeeds, **false** otherwise

Use this function to find out whether there is some unreceived message waiting. The function is non-blocking in the sense that it does not wait for messages to arrive, it only finds out whether there are some.

This function only looks for messages sent by send_message() function.

Referenced by distributed_t::process_messages().

12.49.3.35 bool is_new_message_from_source (int & *size*, int *src*, int & *tag*, bool & *flag*)

Non-blocking message from specific source probe.

Similar to is_new_message(), but the *src* parameter is input. It means that the function only looks for messages from speceified source workstation.

12.49.3.36 bool is_new_urgent_message (int & *size*, int & *src*, int & *tag*, bool & *flag*)

Non-blocking urgent message probe.

Similar to is_new_message(), but it looks only for messages sent by send_urgent_message() function.

Referenced by distributed_t::process_messages().

12.49.3.37 bool is_new_urgent_message_from_source (int & *size*, int *src*, int & *tag*, bool & *flag*)

Non-blocking urgent message probe from specific source.

Similar to is_new_message(), but it looks only for messages sent by send_urgent_message() function and only for those of them that are from source workstation specified by the input parameter *src*.

12.49.3.38 bool receive_message (message_t & *message*, int & *src*, int & *tag*)

Blocking message receive.

Parameters:

message - instance of message_t, where the data will be stored

src - output parameter that gets id of the source workstation of the received message

tag - output parameter that gets the tag of the received message

Returns:

true if the function suceeds, **false** otherwise

Use this function to receive a message from network. The receiving process is blocking in the sense that the function does not terminate until the message is completely received. Apart from the other things, It means that if there is no message to be received, the function will block the computation until one arrives.

This function only concerns messages sent by the send_message() function.

References message_t::get_allocated_size(), message_t::get_data(), receive_message(), message_t::set_data(), and message_t::set_written_size().

12.49.3.39 bool receive_message (char * *buf*, int & *size*, int & *src*, int & *tag*)

Blocking message receive.

Parameters:

buf - pointer to memory used to store the received data

size - output parameter that receives the size of the received message

src - output parameter that gets id of the source workstation of the received message

tag - output parameter that gets the tag of the received message

Returns:

true if the function suceeds, **false** otherwise

Use this function to receive a message from network. The receiving process is blocking in the sense that the function does not terminate until the message is completely received. Apart from the other things, It means that if there is no message to be received, the function will block the computation until one arrives.

This function only concerns messages sent by the send_message() function.

Referenced by distributed_t::process_messages(), and receive_message().

12.49.3.40 bool receive_message_from_source (char * *buf*, int & *size*, int *src*, int & *tag*)

Blocking message from source receive.

Similar to receive_message(), but it receives only messages sent by send_urgent_message function.

12.49.3.41 bool receive_message_non_exc (char *& *buf*, int & *size*, int & *src*, int & *tag*)

Blocking message receive, which sets buf to point to internal buffer.

Similar to receive_message(), but the *buf* parameter is output and need not be initialized, because the function sets it to point to internal buffer containing the received data, which saves both memory and time. It is obvious that the memory *buf* points to must neither be freed nor rewritten.

Referenced by distributed_t::process_messages().

12.49.3.42 bool receive_urgent_message (char * *buf*, int & *size*, int & *src*, int & *tag*)

Blocking message receive.

Similar to receive_message(), but it receives only messages sent by send_urgent_message function.

Referenced by distributed_t::process_messages().

12.49.3.43 bool receive_urgent_message_from_source (char * *buf*, int & *size*, int *src*, int & *tag*)

Blocking urgent message from source receive.

Similar to receive_message_from source(), but it receives only messages sent by send_urgent_message() function.

12.49.3.44 bool receive_urgent_message_non_exc (char *& *buf*, int & *size*, int & *src*, int & *tag*)

Blocking urgent message receive, which sets buf to point to internal buffer.

Similar to receive_message_non_exc(), but it receives only messages sent by send_urgent_message() function.

Referenced by distributed_t::process_messages().

12.49.3.45 bool send_message (const message_t & *message*, int *dest*, int *tag*)

Blocking message send.

Parameters:

message - a message to send

dest - id of the workstation that receives the data

tag - additional information attached to the message, which is typically used to identify the type of the message

Returns:

true if the function succeeds, **false** otherwise

Use this function to send data to a workstation, the sending process is blocking in the sense that as soon as the function finishes the data which *buf* points to has already been copied to "lower level" and the original memory can be safely rewritten.

The function is connected to a buffering mechnism, it means that the messages are not sent instantly, but they are accumulated in a special buffer. There is one such buffer for each workstation. The data from a buffer are sent to the destination workstation as soon as one of the limits (set by functions set_buf_msgs_cnt_limit(), set_buf_size_limit(), set_buf_time_limit()) is exceeded or flush_buffer() function is called.

References message_t::get_data(), message_t::get_written_size(), and send_message().

12.49.3.46 bool send_message (char * *buf*, int *size*, int *dest*, int *tag*)

Blocking message send.

Parameters:

buf - pointer to data that are to be sent

size - size of the data to be sent (in sizeof(char))

dest - id of the workstation that receives the data

tag - additional information attached to the message, which is typically used to identify the type of the message

Returns:

true if the function succeeds, **false** otherwise

Use this function to send data to a workstation, the sending process is blocking in the sense that as soon as the function finishes the data which *buf* points to has already been copied to "lower level" and the original memory can be safely rewritten.

The function is connected to a buffering mechnism, it means that the messages are not sent instantly, but they are accumulated in a special buffer. There is one such buffer for each workstation. The data from a buffer are sent to the destination workstation as soon as one of the limits (set by functions set_buf_msgs_cnt_limit(), set_buf_size_limit(), set_buf_time_limit()) is exceeded or flush_buffer() function is called.

Referenced by send_message().

12.49.3.47 bool send_urgent_message (const message_t & *message*, int *dest*, int *tag*)

Blocking urgent message send.

Similar to send_message() function but of course there are differences. The function is not connected to buffering mechanism, so the messages are sent immediately. Different functions are used to receive messages sent by this function.

References message_t::get_data(), message_t::get_written_size(), and send_urgent_message().

12.49.3.48 bool send_urgent_message (char * *buf*, int *size*, int *dest*, int *tag*)

Blocking urgent message send.

Similar to send_message() function but of course there are differences. The function is not connected to buffering mechanism, so the messages are sent immediately. Different functions are used to receive messages sent by this function.

Referenced by distributed_t::process_messages(), and send_urgent_message().

The documentation for this class was generated from the following files:

- network.hh
- network.cc

12.50 por_t Class Reference

Class for utilization of partial order reduction.

`#include <por.hh>`

Public Member Functions

- int ample_set (state_t s, enabled_trans_container_t &enabled_trans, std::size_t &proc_gid)

  Generates all enabled transitions and proc_gid of ample set choosed by estimated heuristic.

- int ample_set_succs (state_t s, succ_container_t &succs, std::size_t &proc_gid)

  Generates successors of ample set choosed by estimated heuristic.

- int generate_ample_sets (state_t s, bool *ample_sets, enabled_trans_container_t &enabled_trans, std::size_t &ample_proc_gid)

  Generates all enabled transitions and offers possible candidates to an ample set.

- int generate_composed_ample_sets (state_t s, bool *ample_sets, enabled_trans_container_t **ample_trans, enabled_trans_container_t &all_enabled_trans)

  Generates all enabled transitions and offers possible candidates to an ample set composed of several processes.

- void **get_dep** (bit_string_t *result)
- void get_pre (bit_string_t *result)

  Returns field of bit_string_t storing for all transition set of processes whose may enable this transition.

- bit_string_t get_visibility ()

  Returns a bit_string_t structure (see bit_string_t class) containing information which transition is visible or not (trans[i]==true iff transition with GID=i is visible).

- void init (explicit_system_t *S, list< expression_t * > *vis_list=NULL)

  Initialization and static analysis of the system, **necessary** *to call.*

- por_t (void)

  A creator.

- void set_choose_type (std::size_t type)

  Method for estimating of choosing specific ample set, parameter type is one of constants POR_FIRST, POR_LAST, POR_SMALLEST or POR_FIND_ONLY.

- void **set_dep** (bit_string_t *new_dep)

- void **set_pre** (bit_string_t *new_pre)
- void set_visibility (bit_string_t trans)

  Method for changing of visibility relation (trans[i]==true iff transition with GID=i is visible).

- void static_c3 ()

  Adds to visible transitions so called sticky transitions in order to fulfill cycle condition (by static analysis).

- ~por_t ()

  A destructor (frees some used memory).

Public Attributes

- bool **count_approx_interuptions**
- unsigned * **dep_interupted**
- bit_string_t * **full_dep**
- bit_string_t * **full_pre**
- bit_string_t **full_vis**
- unsigned * **pre_interupted**
- unsigned * **vis_interupted**

12.50.1 Detailed Description

Class for utilization of partial order reduction.

Class implements basic features necessary to using partial order reduction, i.e. static analysis findindg dependency and visibility relations, or choosing appropriate candidates for ample-sets. **The cycle condition is not ensured by this class and it has to be treated externally.**

12.50.2 Member Function Documentation

12.50.2.1 int ample_set (state_t *s*, enabled_trans_container_t & *enabled_trans*, std::size_t & *proc_gid*)

Generates all enabled transitions and proc_gid of ample set choosed by estimated heuristic.

If proc_gid==system_tget_process_count(), then the state must be fully expanded.

Parameters:

s = state for which we generate ample set

enabled_trans = container of all enabled transitions as generated by function explicit_system_t::get_async_enabled_trans (programmer hasn't generate them again, which would be time consumed)

proc_gid = GID of process whose (enabled) transitions can be taken as ample set. The process is choosed by estimated heuristic (see a creator of this class por_t::por_t)

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK according to explicit_system_t::get_enabled_trans (use functions explicit_system_t::succs_normal(), explicit_system_t::succs_error() and explicit_system_t::succs_deadlock() for testing)

References generate_ample_sets(), and dve_system_t::get_process_count().

12.50.2.2 int ample_set_succs (state_t *s*, succ_container_t & *succs*, std::size_t & *proc_gid*)

Generates successors of ample set choosed by estimated heuristic.

Parameters:

s = state for which we generate ample set

succs = container of generated successors

Returns:

GID of process whose (enabled) transitions can be taken as ample set. The process is choosed by estimated heuristic (see a creator of this class por_t::por_t). If proc_gid==system_tget_process_count(), then the state is fully expanded (and parameter <it>succs</it> contains all enabled successors).
bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK according to explicit_system_t::get_enabled_trans (use functions explicit_system_t::succs_normal(), explicit_system_t::succs_error() and explicit_system_t::succs_deadlock() for testing)

References generate_ample_sets(), enabled_trans_container_t::get_begin(), enabled_trans_container_t::get_count(), dve_explicit_system_t::get_enabled_trans_succs(), dve_explicit_system_t::get_ith_succ(), dve_system_t::get_process_count(), and array_t::push_back().

12.50.2.3 int generate_ample_sets (state_t *s*, bool * *ample_sets*, enabled_trans_container_t & *enabled_trans*, std::size_t & *ample_proc_gid*)

Generates all enabled transitions and offers possible candidates to an ample set.

Parameters:

s = state for which we generate ample set

ample_sets = set of dimension equal to number of processes of the system. If ample_sets[i]=true, then the set of transitions of the i-th process is a candidate to ample set.

enabled_trans = container of all enabled transitions as generated by function explicit_system_t::get_async_enabled_trans (programmer don't have to generate them again, which would be time consumed)

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK according to explicit_system_t::get_enabled_trans (use functions explicit_system_t::succs_normal(), explicit_system_t::succs_error() and explicit_system_t::succs_deadlock() for testing)

References error_vector_t::clear(), error_vector_t::count(), gerr, bit_string_t::get_bit(), enabled_trans_container_t::get_count(), dve_explicit_system_t::get_enabled_trans(), enabled_trans_container_t::get_enabled_transition(), process_t::get_gid(), transition_t::get_gid(), dve_system_t::get_process_count(), dve_transition_t::get_process_gid(), dve_system_t::get_property_gid(), dve_explicit_system_t::get_receiving_trans(), dve_explicit_system_t::get_sending_or_normal_trans(), dve_explicit_system_t::get_state_of_process(), dve_system_t::get_transition(), system_t::get_with_property(), error_vector_t::perror(), array_of_abstract_t::size(), and SUCC_ERROR.

Referenced by ample_set(), and ample_set_succs().

12.50.2.4 int generate_composed_ample_sets (state_t *s*, bool * *ample_sets*, enabled_trans_container_t ** *ample_trans*, enabled_trans_container_t & *all_enabled_trans*)

Generates all enabled transitions and offers possible candidates to an ample set composed of several processes.

Extension of classic ample_set notion: ample set can composed of several processes here.

Parameters:

s = state for which we generate ample set

ample_sets = set of dimension equal to number of processes of the system. If ample_set[i]=true, then there exists an ample set A containing process i, where A is a proper subset of all enabled conditions.

ample_trans = array of enabled_trans_container_t of dimension equal to number of processes of the system. if ample_set[i]=true, then ample_trans[i] contains (enabled) transitions of an ample set which covers transitions of the i-th process.

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK according to explicit_system_t::get_enabled_trans (use functions explicit_system_t::succs_normal(), explicit_system_t::succs_error() and explicit_system_t::succs_deadlock() for testing)

References array_of_abstract_t::back(), enabled_trans_container_t::clear(), error_vector_t::clear(), error_vector_t::count(), array_of_abstract_t::extend(), gerr, bit_string_t::get_bit(), enabled_trans_container_t::get_count(), dve_explicit_system_t::get_enabled_trans(), enabled_trans_container_t::get_enabled_transition(), process_t::get_gid(), transition_t::get_gid(), dve_transition_t::get_process_gid(), dve_system_t::get_property_gid(), enabled_trans_container_t::get_property_succ_count(), dve_explicit_system_t::get_receiving_trans(), dve_explicit_system_t::get_sending_or_normal_trans(), dve_explicit_system_t::get_state_of_process(), dve_system_t::get_transition(), system_t::get_with_property(), error_vector_t::perror(), dve_explicit_system_t::print_state(), state_t::ptr, enabled_trans_container_t::set_next_begin(), enabled_trans_container_t::set_property_succ_count(), array_of_abstract_t::size(), state_t::size, and SUCC_ERROR.

12.50.2.5 void init (explicit_system_t * *S*, list< expression_t * > * *vis_list* = NULL)

Initialization and static analysis of the system, **necessary** to call.

If the system is without property, visibility is computed from the list of expressions given in the argument vis_list. For the systems with the property the parameter is omitted.

References bit_string_t::alloc_mem(), bit_string_t::clear(), bit_string_t::DBG_print(), bit_string_t::enable_bit(), bit_string_t::get_bit(), dve_transition_t::get_channel_gid(), dve_transition_t::get_effect(), dve_transition_t::get_effect_count(), transition_t::get_gid(), dve_system_t::get_global_variable_count(), dve_transition_t::get_guard(), transition_t::get_lid(), dve_symbol_table_t::get_process(), dve_system_t::get_process(), dve_system_t::get_process_count(), dve_transition_t::get_process_gid(), dve_system_t::get_property_process(), dve_transition_t::get_state1_gid(), dve_transition_t::get_state1_lid(), dve_transition_t::get_state2_gid(), dve_symbol_table_t::get_state_count(), dve_system_t::get_symbol_table(), dve_transition_t::get_sync_expr_list_item(), dve_transition_t::get_sync_expr_list_size(), dve_transition_t::get_sync_mode(), process_t::get_trans_count(), dve_system_t::get_trans_count(), process_t::get_transition(), dve_system_t::get_transition(), dve_symbol_table_t::get_variable(), dve_symbol_t::get_vector_size(), system_t::get_with_property(), dve_symbol_t::is_vector(), dve_expression_t::left(), dve_expression_t::right(), bit_string_t::set_bit(), SYNC_ASK, SYNC_ASK_BUFFER, SYNC_EXCLAIM, SYNC_EXCLAIM_BUFFER, and SYNC_NO_SYNC.

The documentation for this class was generated from the following files:

- por.hh
- por.cc

12.51 prob_and_property_trans_t Struct Reference

`#include <prob_explicit_system.hh>`

Public Member Functions

- bool operator!= (const prob_and_property_trans_t &second)

  An operator of inequality.

- bool operator== (const prob_and_property_trans_t &second)

  An operator of equality.

- prob_and_property_trans_t (const size_int_t init_prob_trans_gid, const size_int_t init_property_trans_gid)

  A constructor.

- prob_and_property_trans_t ()

  A default constructor (set "uninitialized" values to both items).

Public Attributes

- size_int_t prob_trans_gid

  GID of probabilistic transition

- size_int_t property_trans_gid

12.51.1 Detailed Description

Duple of transitions GIDs denoting probabilistic transition of the system multipied with transitions of the property process

12.51.2 Member Data Documentation

12.51.2.1 size_int_t property_trans_gid

GID of transition of the property process

Referenced by operator!=(), and operator==().

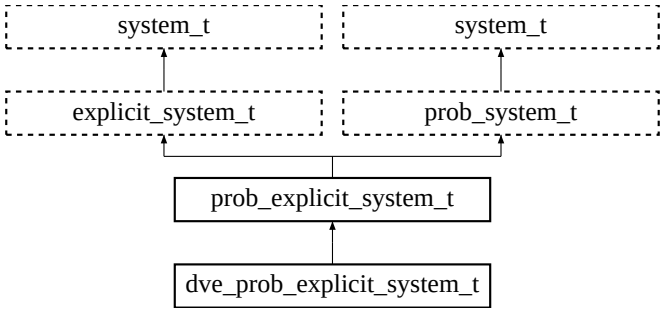
The documentation for this struct was generated from the following file:

- prob_explicit_system.hh

12.52 prob_explicit_system_t Class Reference

`#include <prob_explicit_system.hh>`

Inheritance diagram for prob_explicit_system_t::



Public Member Functions

- virtual int get_succs (state_t state, prob_succ_container_t &succs, enabled_trans_container_t &etc)=0

  Creates probabilistic successors of state 'state'.

- virtual int get_succs (state_t state, prob_succ_container_t &succs)=0

  Creates probabilistic successors of state 'state'.

- prob_explicit_system_t (error_vector_t &evect)

  A constructor.

12.52.1 Detailed Description

Abstract interface of a class representing a state generator based on the model of system stored in prob_system_t

This class works like explicit_system_t, but in addition to explicit_system_t it also provides methods:

- get_succs(state_t state, prob_succ_container_t & succs, enabled_trans_container_t & etc)
- get_succs(state_t state, prob_succ_container_t & succs), which

These methods return successors with their weight and GID of used probabilistic transition. All these informations are also possible to find out using information about enabled transitions (parameter *etc* of get_succs()) and methods prob_system_t::get_prob_trans_of_trans(), get_index_of_trans_in_prob_trans() and interface of prob_transition_t, but parameter *etc* is voluntary and thus get_succs(state_t state, prob_-

succ_container_t & succs) provides a minimal interface to do a probabilistic state space generation.

12.52.2 Constructor & Destructor Documentation

12.52.2.1 prob_explicit_system_t (error_vector_t & *evect*) [inline]

A constructor.

Parameters:

evect = error vector used for reporting of error messages

12.52.3 Member Function Documentation

12.52.3.1 virtual int get_succs (state_t *state*, prob_succ_container_t & *succs*, enabled_trans_container_t & *etc*) [pure virtual]

Creates probabilistic successors of state 'state'.

Creates probabilistic successors of state *state*. In addition to get_succs(state_t state, prob_succ_container_t & succs) this method also creates a piece of information about enabled transitions used for successor generation.

Together with methods prob_system_t::get_prob_trans_of_trans(), prob_system_t::get_index_of_trans_in_prob_trans() and methods of prob_transition_t it is possible to extract all additional information (and even more) that is stored in prob_succ_container_t.

Implemented in dve_prob_explicit_system_t.

12.52.3.2 virtual int get_succs (state_t *state*, prob_succ_container_t & *succs*) [pure virtual]

Creates probabilistic successors of state 'state'.

Creates probabilistic successors of state *state* and saves them to successor container *succs* (see prob_succ_container_t).

Parameters:

state = state of the system

succs = successors container for storage of successors of *state*

Returns:

bitwise OR of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK (use functions succs_normal(), succs_error() and succs_deadlock() for testing)

Implemented in dve_prob_explicit_system_t.

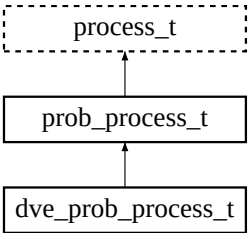
The documentation for this class was generated from the following file:

- prob_explicit_system.hh

12.53 prob_process_t Class Reference

`#include <prob_process.hh>`

Inheritance diagram for prob_process_t::



Public Member Functions

- virtual void add_prob_transition (prob_transition_t *const transition)=0
- prob_system_t * get_parent_prob_system () const

  Returns the "parent" probabilistic system of this process.

- virtual size_int_t get_prob_trans_count () const =0

  Returns a number of probabilistic transitions contained in a process.

- virtual prob_transition_t * get_prob_transition (const size_int_t prob_trans_lid)=0

  Returns a pointer to the probabilistic transition with LID prob_trans_lid.

- virtual const prob_transition_t * get_prob_transition (const size_int_t prob_trans_lid) const =0
- prob_process_t (prob_system_t *const prob_system)

  A constructor.

- prob_process_t ()

  A constructor.

- virtual void remove_prob_transition (const size_int_t prob_trans_lid)=0
- virtual void set_parent_prob_system (prob_system_t &system)

  Sets the "parent" probabilistic system of this process.

- virtual ~prob_process_t ()

  A destructor.

Protected Attributes

- prob_system_t * parent_prob_system

  Protected data item storing a parent probabilistic system.

12.53.1 Detailed Description

Abstact interface of a class representing a probabilistic process of a probabilistic system

A "parent" probabilistic system is set in a constructor prob_process_t(prob_system_t * const system) or using the method set_parent_system().

Note:

Developer is responsible for correct setting of corresponding "parent" system (but he/she rarely needs to create own processes - they are usually created automatically during reading of a source of the system from a file)

12.53.2 Constructor & Destructor Documentation

12.53.2.1 prob_process_t (prob_system_t *const *prob_system*) [inline]

A constructor.

Parameters:

system = "parent" system of this process

12.53.2.2 virtual ~prob_process_t () [inline, virtual]

A destructor.

A destructor

12.53.3 Member Function Documentation

12.53.3.1 virtual void add_prob_transition (prob_transition_t *const *transition*) [pure virtual]

Adds the probabilistic transition 'transition' to the process and sets its LID

Implemented in dve_prob_process_t.

12.53.3.2 virtual const prob_transition_t* get_prob_transition (const size_int_t *prob_trans_lid*) const [pure virtual]

Returns a pointer to the constant probabilistic transition with LID prob_trans_lid

Implemented in dve_prob_process_t.

Referenced by prob_system_t::consolidate().

12.53.3.3 virtual void remove_prob_transition (const size_int_t *prob_trans_lid*) [pure virtual]

Removes the probabilistic transition with LID 'prob_trans_lid' from the process

Implemented in dve_prob_process_t.

The documentation for this class was generated from the following file:

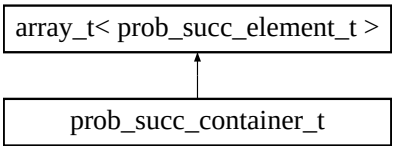
- prob_process.hh

12.54 prob_succ_container_t Class Reference

Class determined to store probabilistic successors of some state.

`#include <prob_explicit_system.hh>`

Inheritance diagram for prob_succ_container_t::



Public Member Functions

- prob_succ_container_t (const explicit_system_t &system)
- prob_succ_container_t ()
- ~prob_succ_container_t ()

  A destructor.

12.54.1 Detailed Description

Class determined to store probabilistic successors of some state.

It is the descendant of array_t<prob_succ_element_t> and it differs only in a constructor. Its constructor has a parameter of type explicit_system_t, which is used to set the sufficient size of this constainer.

The main reason for this class is a better efficiency.

12.54.2 Constructor & Destructor Documentation

12.54.2.1 prob_succ_container_t () `[inline]`

A constructor (only calls a constructor of array_t<state_t> with parameters 4096 (preallocation) and 16 (allocation step).

12.54.2.2 prob_succ_container_t (const explicit_system_t & *system*) `[inline]`

A constructor (needs only 'system' to guess the preallocation needed for lists of successors).

The documentation for this class was generated from the following file:

- prob_explicit_system.hh

12.55 prob_succ_element_t Struct Reference

Single element to store in prob_succ_container_t.

`#include <prob_explicit_system.hh>`

Public Member Functions

- **prob_succ_element_t** (state_t init_state, const ulong_int_t init_weight, const ulong_int_t init_sum, const prob_and_property_trans_t init_prob_and_property_trans)

Public Attributes

- prob_and_property_trans_t prob_and_property_trans

  GID of probabilistic transition and GID of property transition used for generation of a successor

- state_t state

  A state (successor).

- ulong_int_t sum

  Sum of weights of transitions contained in probabilistic transition with GID 'prob_and_property_trans.prob_trans_gid'.

- ulong_int_t weight

  Weight of a transition used for generation of a successor.

12.55.1 Detailed Description

Single element to store in prob_succ_container_t.

The structure consists of a state (successor in a state generation), a weight of a transition and a used probabilistic transition.

The documentation for this struct was generated from the following file:

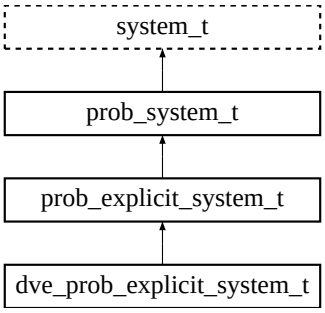
- prob_explicit_system.hh

12.56 prob_system_t Class Reference

Abstract interface of a class representing a model of a system.

`#include <prob_system.hh>`

Inheritance diagram for prob_system_t::



Public Member Functions

- size_int_t get_index_of_trans_in_prob_trans (const size_int_t trans_gid) const
- virtual size_int_t get_prob_trans_count () const

  Returns a count of probabilistic transitions.

- size_int_t get_prob_trans_of_trans (const size_int_t trans_gid) const
- virtual const prob_transition_t * get_prob_transition (size_int_t gid) const

  Returns the pointer to the constant probabilistic transition given by GID.

- virtual prob_transition_t * get_prob_transition (size_int_t gid)

  Returns the pointer to the probabilistic transition given by GID.

- prob_system_t (error_vector_t &evect=gerr)

  A constructor.

- virtual ~prob_system_t ()

  A destructor.

Protected Member Functions

- void consolidate ()

  Protected method called after reading of input.

12.56.1 Detailed Description

Abstract interface of a class representing a model of a system.

This class provides an interface to the model of system. Depending on abilities (see get_abilities()) you can more or less deeply analyse the model.

Furthermore you can generate states of the system using child class explitcit_system_t (and its children)

12.56.2 Constructor & Destructor Documentation

12.56.2.1 prob_system_t (error_vector_t & *evect* = gerr) [inline]

A constructor.

Parameters:

evect = the **error vector**, that will be used by created instance of system_t

12.56.3 Member Function Documentation

12.56.3.1 size_int_t get_index_of_trans_in_prob_trans (const size_int_t *trans_gid*) const [inline]

Returns the index of transition with GID *'trans_gid'* in a probabilistic transition

Parameters:

trans_gid = GID of transition

Returns:

index of transition with GID *trans_gid* in a probabilistic transition, which contains it. If there is no such a probabilistic transition, it returns NO_ID

Referenced by dve_prob_explicit_system_t::get_succs().

12.56.3.2 size_int_t get_prob_trans_of_trans (const size_int_t *trans_gid*) const [inline]

Returns GID of probabilistic transition containing transition with GID 'trans_gid' or returns NO_ID

Parameters:

trans_gid = GID of transition

Returns:

GID of probabilistic transition containing transition with GID *trans_gid*. If there is no such a probabilistic transition, it returns NO_ID

Referenced by dve_prob_explicit_system_t::get_succs().

The documentation for this class was generated from the following files:

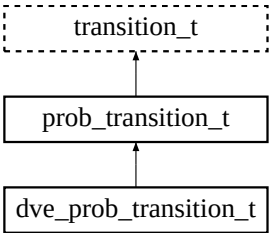
- prob_system.hh
- prob_system.cc

12.57 prob_transition_t Class Reference

Abstract interface of a class representing a probabilistic transition.

`#include <prob_transition.hh>`

Inheritance diagram for prob_transition_t::



Public Member Functions

- size_int_t get_trans_count () const
- const transition_t ∗ get_transition (const size_int_t i) const
- transition_t ∗ get_transition (const size_int_t i)

  Returns a pointer to the 'i'-th transition of the probabilistic transition.

- ulong_int_t get_weight (const size_int_t i) const

  Returns a weight of 'i'-th transition.

- ulong_int_t get_weight_sum () const
- prob_transition_t (prob_system_t ∗const system)

  A constructor.

- prob_transition_t ()

  A constructor.

- void set_trans_count (const size_int_t size)

  Sets a number of transitions contained in the probabilistic transition.

- void set_transition_and_weight (const size_int_t i, transition_t ∗const p_trans, const ulong_int_t weight)

  Sets 'i'-th transition and its weight.

Protected Member Functions

- void initialize ()

  A protected initializer.

Protected Attributes

- array_t< ulong_int_t > **prob_weights**
- array_t< transition_t * > **trans**
- ulong_int_t **weight_sum**

12.57.1 Detailed Description

Abstract interface of a class representing a probabilistic transition.

This class represents a probabilistic transition. It is a part of the model of a probabilistic system.

This class is derived from transition_t, although, in fact, it is really different from the ordinary system transition:

- it consists of several ordinary transitions
- each ordinary transition contained in a probabilistic transition has a weight (probability of the i-th ordinary transition can be computed as `prob_trans.get_weight(i)/prob_trans.get_weight_sum()`

12.57.2 Member Function Documentation

12.57.2.1 size_int_t get_trans_count () const [inline]

Returns a number of transition, which the probabilistic transition consists of

Referenced by prob_system_t::consolidate(), and dve_prob_process_t::write().

12.57.2.2 const transition_t* get_transition (const size_int_t *i*) const [inline]

Returns a pointer to the constant 'i'-th transition of the probabilistic transition

12.57.2.3 ulong_int_t get_weight_sum () const [inline]

Returns a sum of weights of all transitions contained in the probabilistic transition

Note:

Usage of get_weight_sum() is faster than computation of the sum explicitly using repeated call of get_weight(). get_weight_sum() returns precomputed value.

Referenced by dve_prob_explicit_system_t::get_succs().

12.57.2.4 void set_trans_count (const size_int_t *size*)

Sets a number of transitions contained in the probabilistic transition.

Note:

Existing transitions are not lost by setting new count of transitions. Do not forget to delete all transitions, which you do not plan to use.

References array_t::resize().

Referenced by dve_parser_t::prob_trans_create().

12.57.2.5 void set_transition_and_weight (const size_int_t *i*, transition_t *const *p_trans*, const ulong_int_t *weight*)

Sets 'i'-th transition and its weight.

Warning:

If there has alreadty been set 'i'-th transition before, this transition is not deleted automatically. Thus, do not forget to call `delete(pr_trans.get_transition(i))` before rewritting it by the pointer to another transition.

Referenced by dve_parser_t::prob_trans_create().

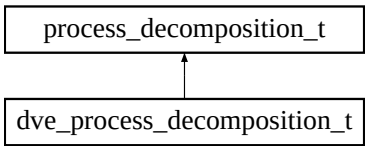
The documentation for this class was generated from the following files:

- prob_transition.hh
- prob_transition.cc

12.58 process_decomposition_t Class Reference

`#include <process_decomposition.hh>`

Inheritance diagram for process_decomposition_t::



Public Member Functions

- virtual int get_process_scc_id (state_t &)=0
- virtual int get_process_scc_type (state_t &)=0
- virtual int get_scc_count ()=0
- virtual int get_scc_type (int)=0
- virtual int **get_scc_type_for_gid** (int)=0
- virtual bool is_weak ()=0
- virtual void parse_process (std::size_t)=0

12.58.1 Detailed Description

This class is used to decompose a graph of a single process specified in a dve file into SCCs. The decomposition is not accesible directly but with member functions returning for a given state SCC id and type.

12.58.2 Member Function Documentation

12.58.2.1 virtual int get_process_scc_id (state_t &) [pure virtual]

Returns id of an SCC that the given local state of the process belongs to.

Implemented in dve_process_decomposition_t.

12.58.2.2 virtual int get_process_scc_type (state_t &) [pure virtual]

Returns type of an SCC that the given local state belongs to. Returned values: 0 means nonaccepting component, 1 means partially accepting component, and 2 means fully accepting component.

Implemented in dve_process_decomposition_t.

12.58.2.3 virtual int get_scc_count () [pure virtual]

Returns the number of SCCs in the decomposition.

Implemented in dve_process_decomposition_t.

12.58.2.4 virtual int get_scc_type (int) [pure virtual]

Returns type of the given SCC, where 0 means nonaccepting component, 1 means partially accepting component, and 2 means fully accepting component.

Implemented in dve_process_decomposition_t.

12.58.2.5 virtual bool is_weak () [pure virtual]

Returns whether the process has a weak graph.

Implemented in dve_process_decomposition_t.

12.58.2.6 virtual void parse_process (std::size_t) [pure virtual]

Performs the decomposition of a process with a given (global) id.

Implemented in dve_process_decomposition_t.

Referenced by dve_explicit_system_t::read().

The documentation for this class was generated from the following file:

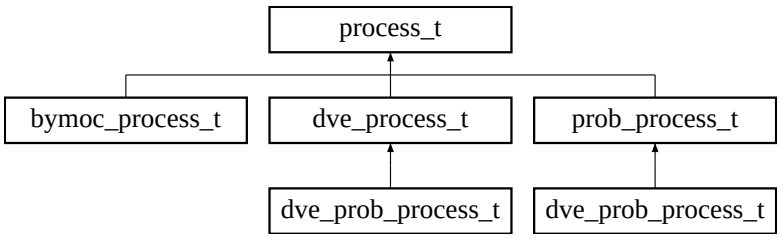
- process_decomposition.hh

12.59 process_t Class Reference

Abstact interface of a class representing a process of a system.

`#include <process.hh>`

Inheritance diagram for process_t::



Public Member Functions

- bool can_be_modified () const

  Tells, whether processes can be modified.

- bool can_read () const

  Tells, whether process can be read from a string representation.

- bool can_transitions () const

  Tells, whether process can work with transitions and contains them.

- size_int_t get_gid () const

  Returns a GID of this process.

- system_t * get_parent_system () const

  Returns a "parent" system of this process.

- process_t (system_t *const system)

  A constructor.

- process_t ()

  A constructor.

- virtual void set_parent_system (system_t &system)

  Sets a "parent" system of this process.

- virtual ~process_t ()

  A destructor.

Methods modifying a process

These methods are implemented only if can_transitions() returns true.

- virtual void add_transition (transition_t *const transition)=0
  Adds new transition to the process.
- virtual void remove_transition (const size_int_t transition_gid)=0
  Removes a transition from the process.
- virtual void set_gid (const size_int_t new_gid)
  Sets a GID of this process.

Methods for reading a process from a string representation

These methods are implemented only if can_read() returns true.

- virtual int from_string (std::string &proc_str)=0
  Reads in the process from the string representation.
- virtual int read (std::istream &istr)=0
  Reads in the process from the string representation in stream.

Methods working with transitions of a process

These methods are implemented only if can_transitions() returns true.

- virtual size_int_t get_trans_count () const =0
  Returns a count of transitions of this process.
- virtual const transition_t * get_transition (const size_int_t lid) const =0
  Returns a pointer to the constant transition with LID 'lid'.
- virtual transition_t * get_transition (const size_int_t lid)=0
  Returns a pointer to the transition with LID 'lid'.

Obligatory part of abstact interface

- virtual std::string to_string () const =0
  Returns a string representation of the process.
- virtual void write (std::ostream &ostr) const =0
  Writes a string representation of the process to a stream.

Static Protected Member Functions

- static error_vector_t & get_error_vector ()
- static void set_error_vector (error_vector_t &evect)

Protected Attributes

- size_int_t gid

  Protected data item storing GID of this process.

- system_t * parent_system

  Protected data item storing a parent system.

Static Protected Attributes

- static error_vector_t * pproc_terr = &gerr

12.59.1 Detailed Description

Abstact interface of a class representing a process of a system.

This class represents a process of a system. Its "parent" system is given in a constructor process_t(system_t * const system) or a method set_parent_system().

Note:

Developer is responsible for correct setting of corresponding "parent" system (but he rarely needs to create own processes - they are usually created automatically during reading of a source of the system from a file)

12.59.2 Constructor & Destructor Documentation

12.59.2.1 process_t (system_t *const *system*) [inline]

A constructor.

Parameters:

system = "parent" system of this process

12.59.2.2 virtual ~process_t () [inline, virtual]

A destructor.

A destructor

12.59.3 Member Function Documentation

12.59.3.1 virtual void add_transition (transition_t *const *transition*) [pure virtual]

Adds new transition to the process.

Parameters:

transition = pointer to the transition to add

This method modifies the added transition because it has to set transition LID and Partial ID.

Implemented in bymoc_process_t, and dve_process_t.

12.59.3.2 virtual int from_string (std::string & *proc_str*) [pure virtual]

Reads in the process from the string representation.

Parameters:

proc_str = string to read from

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_process_t, dve_prob_process_t, and dve_process_t.

12.59.3.3 static error_vector_t& get_error_vector () [inline, static, protected]

Protected static method returning , which will be used in case of any error message

12.59.3.4 virtual size_int_t get_trans_count () const [pure virtual]

Returns a count of transitions of this process.

Then LID of transitions can be from 0 to (get_trans_count()-1)

Note:

The sum of returned values obtained by calling this method for all processes of the system is equal to the value obtained by method system_t::get_trans_count()

Implemented in bymoc_process_t, and dve_process_t.

Referenced by dve_parser_t::check_restrictions_put_on_property(), and por_t::init().

12.59.3.5 virtual const transition_t* get_transition (const size_int_t *lid*) const [pure virtual]

Returns a pointer to the constant transition with LID 'lid'.

LID of transitions can be from 0 to (get_trans_count()-1)

Implemented in bymoc_process_t, and dve_process_t.

12.59.3.6 virtual transition_t* get_transition (const size_int_t *lid*) [pure virtual]

Returns a pointer to the transition with LID 'lid'.

LID of transitions can be from 0 to (get_trans_count()-1)

Implemented in bymoc_process_t, and dve_process_t.

Referenced by dve_parser_t::check_restrictions_put_on_property(), and por_t::init().

12.59.3.7 virtual int read (std::istream & *istr*) [pure virtual]

Reads in the process from the string representation in stream.

Parameters:

istr = input stream containing source of the process

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_process_t, dve_prob_process_t, and dve_process_t.

12.59.3.8 virtual void remove_transition (const size_int_t *transition_gid*) [pure virtual]

Removes a transition from the process.

Parameters:

transition_gid = GID of removed transition

Implemented in bymoc_process_t, and dve_process_t.

12.59.3.9 static void set_error_vector (error_vector_t & *evect*) [inline, static, protected]

Protected static method setting , which will be used in case of any error message

12.59.4 Member Data Documentation

12.59.4.1 error_vector_t * pproc_terr = &gerr [static, protected]

Static protected data item storing an used in case of any error messages

Referenced by dve_prob_process_t::add_prob_transition().

The documentation for this class was generated from the following files:

- process.hh
- process.cc

12.60 psh Struct Reference

Structure determined for causing storing/printing error messages.

`#include <error.hh>`

Public Member Functions

- **psh** (ERR_type_t tt=ERR_UNKNOWN_TYPE, ERR_id_t i=ERR_-UNKNOWN_ID)

Public Attributes

- ERR_id_t **c**
- ERR_type_t **t**

12.60.1 Detailed Description

Structure determined for causing storing/printing error messages.

This structure should be used as follows:

```
terr << "My warning mess" << "age" << psh(3,13565)
```

where "My warning message" is an example of error message sent into error_vector_t 'terr', 3 is an example of so called error type (see ERR_type_t) and 13565 is an example of error ID.

Sending psh() to an instance of error_vector_t through an operator '<<' causes the end of assigning of a message. Message is then stored at the end of a list of error messages. Then 'warning handling callback' is called (callback that can be set by error_vector_-t::set_push_callback()).

The documentation for this struct was generated from the following file:

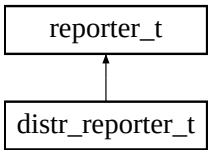
- error.hh

12.61 reporter_t Class Reference

Class for messuring and reporting.

`#include <reporter.hh>`

Inheritance diagram for reporter_t::



Public Member Functions

- double get_time ()
- void print ()
- void print (std::ostream &out)
- void set_alg_name (std::string s)
- void set_file_name (std::string s)
- void **set_info** (std::string s, double a, const std::string &long_name)
- void set_info (std::string s, double a)
- void set_obligatory_keys (std::string _alg_name, std::string _file_name, std::string _problem, size_int_t _states_stored, size_int_t _succs_calls)
- void set_problem (std::string s)
- void set_states_stored (size_int_t stored)
- void set_succs_calls (size_int_t calls)
- void start_timer ()
- void stop_timer ()

Protected Attributes

- std::string **alg_name**
- std::string **file_name**
- double **init_time**
- std::string **problem**
- std::map< std::string, double > **specific_info**
- std::map< std::string, std::string > **specific_long_name**
- size_int_t **states_stored**
- size_int_t **succs_calls**
- double **time**
- timeinfo_t **time_info**
- vminfo_t **vm_info**

12.61.1 Detailed Description

Class for messuring and reporting.

Class reporter_t is used to measure and report (in standard format) statistics about the computation of an algorithm.

Todo

Currently it prints a memory consumtion only in the end of the run of the program. It should print a maximum during a run of the program

12.61.2 Member Function Documentation

12.61.2.1 double get_time () [inline]

Returns the time (to be used after stop_time); usefull e.g. for calculating speed

12.61.2.2 void print ()

Prints the report into the file with 'standard name' (at the moment file_name.report).

12.61.2.3 void print (std::ostream & *out*)

Prints the report into the given ostream.

12.61.2.4 void set_alg_name (std::string *s*) [inline]

Sets name of the algorithm.

12.61.2.5 void set_file_name (std::string *s*) [inline]

Sets name of the dve file which is the input of the algorithm.

12.61.2.6 void set_info (std::string *s*, double *a*) [inline]

Sets any specific information which we want to report (e.g., set_info("states", states_-num);

12.61.2.7 void set_obligatory_keys (std::string *_alg_name*, std::string *_file_name*, std::string *_problem*, size_int_t *_states_stored*, size_int_t *_succs_calls*) [inline]

Sets all obligatory keys (algorithm name, input file name, problem, number of states and number of calling successor function)

12.61.2.8 void set_problem (std::string *s*) [inline]

Sets the description of the problem that the algorithm solves (e.g., 'reachability x==3', 'ltl GF hungry == 0')

12.61.2.9 void set_states_stored (size_int_t *stored*) [inline]

Sets the number of stored states

12.61.2.10 void set_succs_calls (size_int_t *calls*) [inline]

Sets the number of calling get_succs() function

12.61.2.11 void start_timer () [inline]

Starts the timer which measure the (real) time taken by computation. Convention: This should be called after inicializations.

12.61.2.12 void stop_timer () [inline]

Stops the timer.

The documentation for this class was generated from the following files:

- reporter.hh
- reporter.cc

12.62 state_ref_t Class Reference

State reference class.

`#include <explicit_storage.hh>`

Public Member Functions

- void invalidate ()
- bool is_valid ()
- std::string **to_string** ()

Public Attributes

- size_t **hres**
- size_t **id**

12.62.1 Detailed Description

State reference class.

This class is a constant-sized short representation of state stored in an instance of explicit_storage_t.

explicit_storage_t guaranties that this reference is a unique identifier of a state for each instance of explicit_storage_t.

Operators ==, !=, <, <= and > and >= are defined for this class.

References are also useful in distributed environment in a connection with the identifier of computer that keeps the referenced state. It suffices to send a reference and computer ID instead of relatively long explicit representation of a state.

12.62.2 Member Function Documentation

12.62.2.1 void invalidate ()

Invalidates the reference, i.e. make it hold an invalid value.

12.62.2.2 bool is_valid ()

Tests whether the reference holds a valid value or not.

The documentation for this class was generated from the following files:

- explicit_storage.hh
- explicit_storage.cc

12.63 state_t Struct Reference

Structure representing the state of the system.

`#include <state.hh>`

Public Member Functions

- state_t ()

  A constructor (only sets ptr to 0).

Public Attributes

- char * ptr

  Pointer to the piece of memory, where the state is stored in.

- std::size_t size

  Variable that stores the size of the state.

12.63.1 Detailed Description

Structure representing the state of the system.

There are many functions that can work with states. The list and the description of them can be found in a manual page of file state.hh

The documentation for this struct was generated from the following files:

- state.hh
- state.cc

12.64 static_info_t Class Template Reference

Class used to collect data during synchronization.

`#include <distributed.hh>`

Inherits abstract_info_t.

Public Member Functions

- virtual void **get_data_ptr** (char ∗&ptr)
- virtual void **get_data_size** (int &size)

12.64.1 Detailed Description

template<class static_data_t> class static_info_t< static_data_t >

Class used to collect data during synchronization.

Instances of this class are passed to distributed_t::synchronized(abstract_info_t &info) function.

The *static_data_t* type should be struct with simple types in it (no dynamic arrays, strings, etc.) - the struct holds the collected data.

The word "static" means that each workstation cannot change the data being collected during the synchronization process. For more information see distributed_t::synchronized(abstract_info_t &info) function.

The documentation for this class was generated from the following file:

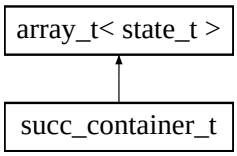
- distributed.hh

12.65 succ_container_t Class Reference

Class determined to store successors of some state.

`#include <explicit_system.hh>`

Inheritance diagram for succ_container_t::



Public Member Functions

- succ_container_t (const explicit_system_t &system)
- succ_container_t ()
- ~succ_container_t ()

  A destructor.

12.65.1 Detailed Description

Class determined to store successors of some state.

It is the descendant of array_t<state_t> and it differs only in a constructor. Its constructor has a parameter of type explicit_system_t, which is used to set the sufficient size of this constainer.

The main reason for this class is a better efficiency.

12.65.2 Constructor & Destructor Documentation

12.65.2.1 succ_container_t () [inline]

A constructor (only calls a constructor of array_t<state_t> with parameters 4096 (preallocation) and 16 (allocation step).

12.65.2.2 succ_container_t (const explicit_system_t & *system*) [inline]

A constructor (needs only 'system' to guess the preallocation needed for lists of successors).

The documentation for this class was generated from the following file:

- explicit_system.hh

12.66 SYS_initial_values_t Union Reference

Internal type for storing initial values of various identifiers.

`#include <dve_system.hh>`

Public Attributes

- all_values_t all_value
  for scalar variable (initial value)
- all_values_t * all_values
  for vector variable (initial values)
- size_int_t size_t_value
  procname symbols (initial state number)

12.66.1 Detailed Description

Internal type for storing initial values of various identifiers.

Type that can contain either initial value of scalar variable or field of initial values of vector variable or initial process state for state of procname symbols.

This is an internal type. Programmer of algorithms using DiVinE usually should not use this structure.

12.66.2 Member Data Documentation

12.66.2.1 size_int_t size_t_value

procname symbols (initial state number)

for state symbols (state number) and

The documentation for this union was generated from the following file:

- dve_system.hh

12.67 SYS_parameters_t Struct Reference

`#include <dve_system.hh>`

Public Member Functions

- SYS_parameters_t (SYS_initial_values_t *const initial_vals, size_int_t *const init_st, size_int_t *const initial_vals_counts, size_int_t *const st_lids)

  A constructor.

Public Attributes

- size_int_t * initial_states

  pointer to field initial_states

- SYS_initial_values_t * initial_values

  pointer to field initial_values

- size_int_t * initial_values_counts

  initial_values_counts

- size_int_t * state_lids

12.67.1 Detailed Description

Structure for passing parameters to 'eval_*' functions (parameters are pointers to some necessary private data of class system_t)

12.67.2 Member Data Documentation

12.67.2.1 size_int_t* initial_values_counts

initial_values_counts

pointer to field

12.67.2.2 size_int_t* state_lids

pointer to field state_lids

The documentation for this struct was generated from the following file:

- dve_system.hh

12.68 system_abilities_t Struct Reference

Structure storing abilities of system and its subordinate components.

`#include <system_abilities.hh>`

Public Member Functions

- system_abilities_t ()

  A constructor.

Public Attributes

- bool explicit_system_can_evaluate_expressions

  = *true iff explicit system can evaluate expressions*

- bool explicit_system_can_system_transitions

  = *true iff explicit system can work with system transitions and enabled transitions*

- bool process_can_be_modified

  = *true iff process can be modified*

- bool process_can_read

  = *true iff process can be read from a string representation*

- bool process_can_transitions

  = *true iff process can work (and contains) transitions*

- bool system_can_be_modified

  = *true iff system can be modified*

- bool system_can_decompose_property

  = *true iff system can decompose property process graph*

- bool system_can_processes

  = *true iff system can work with processes*

- bool system_can_property_process

  = *true iff system can work with property process*

- bool system_can_transitions

  = *true iff system can work with transitions*

- bool transition_can_be_modified

  = *true iff transition can be modified*

- bool transition_can_read

  = *true iff transition can be read from a string representation*

12.68.1 Detailed Description

Structure storing abilities of system and its subordinate components.

An instance of this method is returned by system_t::get_abilities(). Values stored in data items differ according to methods which are implemented in a given representation of a system (e. g. in a system created from DVE source or a system created from Promela bytecode).

This "system of abilities" has been created to preserve rich abstract interfaces for a price of testing of their abilities - but without a need of typecasting.

12.68.2 Constructor & Destructor Documentation

12.68.2.1 system_abilities_t () [inline]

A constructor.

Sets all abilities to false (system is defaultly as dumb as possible)

The documentation for this struct was generated from the following file:

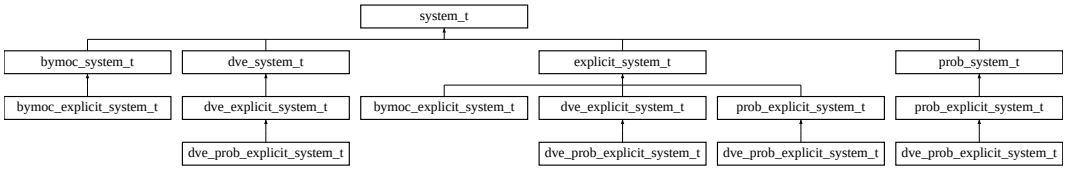
- system_abilities.hh

12.69 system_t Class Reference

Abstract interface of a class representing a model of a system.

`#include <system.hh>`

Inheritance diagram for system_t::



Public Member Functions

- bool can_be_modified () const

  Tells, whether current system can be modified.

- bool can_decompose_property () const

  Tells, whether current system is able to work with processes.

- bool can_processes () const

  Tells, whether current system is able to work with processes.

- bool can_property_process () const

  Tells, whether current system is able to work with property process.

- bool can_transitions () const

  Tells, whether current system is able to work with transitions.

- const system_abilities_t & get_abilities () const

  Returns a structure storing a list of abilities of current system.

- system_abilities_t & get_abilities ()

  Returns a structure storing a list of abilities of current system.

- const error_vector_t & get_error_vector () const

  Returns a constant reference to the error_vector_t inside of system_t.

- error_vector_t & get_error_vector ()

  Returns a reference to the error_vector_t inside of system_t.

- bool get_with_property () const

  Returns, whether a property process is specified or not.

- void set_with_property (const bool is_with)

  Sets, wheter system is the system with a property process.

- system_t (error_vector_t &evect=gerr)

  A constructor.

- virtual ~system_t ()

  A destructor.

Methods modifying a system

These methods are implemented only if can_be_modified() returns true.

- virtual void add_process (process_t *const process)=0

  Method for adding of process to system.

- virtual void remove_process (const size_int_t process_id)=0

  Method for removing of process from system.

Obligatory part of abstact interface

These methods have to implemented in each implementation of system_t

- virtual slong_int_t from_string (const std::string str)=0

  Method for reading a model of a system from a source stored in a string.

- virtual property_type_t get_property_type ()=0
- virtual slong_int_t read (const char *const filename)=0

  Method for reading a model of a system from a file.

- virtual slong_int_t read (std::istream &ins=std::cin)=0

  Method for reading a model of a system from a stream.

- virtual std::string to_string ()=0
- virtual void write (std::ostream &outs=std::cout)=0
- virtual bool write (const char *const filename)=0

  Method for writing currently stored model of a system to a file.

Methods working with processes

These methods are implemented only if can_processes() returns true.

- virtual const process_t * get_process (const size_int_t gid) const =0

  Returns a constant instance of a process with process GID 'gid'.

- virtual process_t * get_process (const size_int_t gid)=0

  Returns a process with process GID 'gid'.

- virtual size_int_t get_process_count () const =0

Returns a count of processes in the system.

Methods to check the SCCs of property process graph

- virtual process_decomposition_t * get_property_decomposition ()
  Returns property decomposition, or 0, if subsystem is not available.

Methods working with property process

These methods are implemented only if can_property_process() returns true.

- virtual size_int_t get_property_gid () const =0
  Returns GID of property process.
- virtual const process_t * get_property_process () const =0
  Returns a pointer to the constant instance of property process.
- virtual process_t * get_property_process ()=0
  Returns a pointer to the property process.
- virtual void set_property_gid (const size_int_t gid)=0
  Sets, which process is a property process.

Methods working with transitions

These methods are implemented only if can_transitions() returns true.

- virtual size_int_t get_trans_count () const =0
  Returns the count of all transitions in the system.
- virtual const transition_t * get_transition (size_int_t gid) const =0
  Returns a constant instance of transition with transition GID = 'gid'.
- virtual transition_t * get_transition (size_int_t gid)=0
  Returns a transition with transition GID = 'gid'.

Static Public Attributes

- static const ERR_id_t **ERR_FILE_NOT_OPEN** = 65134
- static const ERR_type_t **ERR_TYPE_SYSTEM** = 100

Protected Member Functions

- void **copy_private_part** (const system_t &second)

Protected Attributes

- system_abilities_t **abilities**
- error_vector_t & **terr**
- bool **with_property**

12.69.1 Detailed Description

Abstract interface of a class representing a model of a system.

This class provides an interface to the model of system. Depending on abilities (see get_abilities()) you can more or less deeply analyse the model.

Furthermore you can generate states of the system using child class explitcit_system_t (and its children)

12.69.2 Constructor & Destructor Documentation

12.69.2.1 system_t (error_vector_t & *evect* = gerr) [inline]

A constructor.

Parameters:

evect = the **error vector**, that will be used by created instance of system_t

12.69.3 Member Function Documentation

12.69.3.1 virtual void add_process (process_t *const *process*) [pure virtual]

Method for adding of process to system.

This method is implemented only if can_be_modified() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.2 bool can_be_modified () const [inline]

Tells, whether current system can be modified.

Generally thr system can be modified using add_process() and remove_process() together with methods modifying processes

12.69.3.3 virtual slong_int_t from_string (const std::string *str*) [pure virtual]

Method for reading a model of a system from a source stored in a string.

Parameters:

str = string to read

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.4 const system_abilities_t& get_abilities () const [inline]

Returns a structure storing a list of abilities of current system.

It also stores the list of abilites of processes and transitions, which are a part of a system and abilities of explicit system

12.69.3.5 system_abilities_t& get_abilities () [inline]

Returns a structure storing a list of abilities of current system.

It also stores the list of abilites of processes and transitions, which are a part of a system and abilities of explicit system

Referenced by bymoc_explicit_system_t::bymoc_explicit_system_t(), transition_t::can_be_modified(), process_t::can_be_modified(), transition_t::can_read(), process_t::can_read(), process_t::can_transitions(), dve_explicit_system_t::dve_explicit_system_t(), and dve_system_t::dve_system_t().

12.69.3.6 virtual const process_t* get_process (const size_int_t *gid*) const [pure virtual]

Returns a constant instance of a process with process GID 'gid'.

Parameters:

gid = process GID of a process (can be any from an interval 0..(get_process_count()-1))

Returns:

process (represented by a pointer to process_t)

This method is implemented only if can_processes_true_methods() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.7 virtual process_t* get_process (const size_int_t *gid*) [pure virtual]

Returns a process with process GID 'gid'.

Parameters:

gid = process GID of a process (can be any from an interval 0..(get_process_count()-1))

Returns:

process (represented by a pointer to process_t)

This method is implemented only if can_processes_true_methods() returns true.

Implemented in bymoc_system_t, and dve_system_t.

Referenced by prob_system_t::consolidate().

12.69.3.8 virtual size_int_t get_process_count () const [pure virtual]

Returns a count of processes in the system.

This method is implemented only if can_processes_true_methods() returns true.

Implemented in bymoc_system_t, and dve_system_t.

Referenced by prob_system_t::consolidate(), and enabled_trans_container_t::enabled_trans_container_t().

12.69.3.9 virtual size_int_t get_property_gid () const [pure virtual]

Returns GID of property process.

This method is implemented only if can_property_process() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.10 virtual const process_t* get_property_process () const [pure virtual]

Returns a pointer to the constant instance of property process.

This method is implemented only if can_property_process() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.11 virtual process_t* get_property_process () [pure virtual]

Returns a pointer to the property process.

This method is implemented only if can_property_process() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.12 virtual property_type_t get_property_type () [pure virtual]

Method for identifying type of the accepting condition of the property process. Possible types are NONE, BUCHI, GENBUCHI, MULLER, RABIN, STREETT.

Implemented in bymoc_explicit_system_t, bymoc_system_t, and dve_system_t.

12.69.3.13 virtual size_int_t get_trans_count () const [pure virtual]

Returns the count of all transitions in the system.

This method is implemented only if can_transitions() returns true.

Note:

Returned value is the sum of returned values obtained by calling process_t::get_trans_count() for all processes of the system

Implemented in bymoc_system_t, and dve_system_t.

Referenced by prob_system_t::consolidate().

12.69.3.14 virtual const transition_t* get_transition (size_int_t *gid*) const [pure virtual]

Returns a constant instance of transition with transition GID = 'gid'.

This method is implemented only if can_transitions() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.15 virtual transition_t* get_transition (size_int_t *gid*) [pure virtual]

Returns a transition with transition GID = 'gid'.

This method is implemented only if can_transitions() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.16 virtual slong_int_t read (const char *const *filename*) [pure virtual]

Method for reading a model of a system from a file.

Parameters:

filename = path to a source of a model

Returns:

0 iff successfuly opens the file and successfuly parses it. Otherwise it returns non-zero value. If the error was caused by the impossibility to open a file, it returns

system_t::ERR_FILE_NOT_OPEN.

Implemented in bymoc_system_t, dve_explicit_system_t, dve_prob_explicit_system_t, and dve_system_t.

12.69.3.17 virtual slong_int_t read (std::istream & *ins* = `std::cin`) `[pure virtual]`

Method for reading a model of a system from a stream.

Parameters:

ins = input stream containing a source of a model

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_system_t, dve_prob_explicit_system_t, and dve_system_t.

12.69.3.18 virtual void remove_process (const size_int_t *process_id*) `[pure virtual]`

Method for removing of process from system.

This method is implemented only if can_be_modified() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.19 virtual void set_property_gid (const size_int_t *gid*) `[pure virtual]`

Sets, which process is a property process.

Parameters:

gid = GID of new property process

This method is implemented only if can_property_process() returns true.

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.20 virtual std::string to_string () `[pure virtual]`

Method for writing source of actually stored model of a system to the string

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.21 virtual void write (std::ostream & *outs* = `std::cout`) [pure virtual]

Method for writing currently stored model of a system to a stream. (parameter 'outs')

Implemented in bymoc_system_t, and dve_system_t.

12.69.3.22 virtual bool write (const char *const *filename*) [pure virtual]

Method for writing currently stored model of a system to a file.

Parameters:

filename = path to a file

Returns:

true iff successfuly opens the file

Implemented in bymoc_system_t, and dve_system_t.

The documentation for this class was generated from the following files:

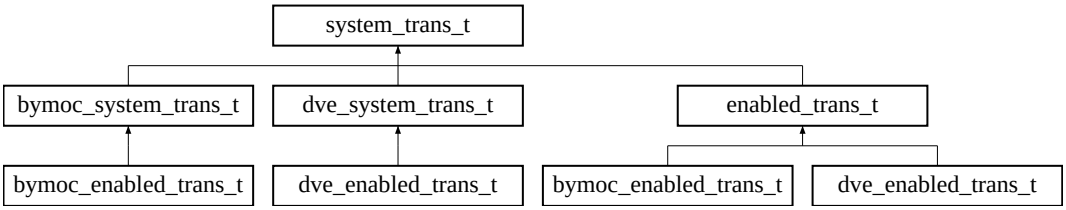
- system.hh
- system.cc

12.70 system_trans_t Class Reference

Class storing informations about one system transition.

`#include <system_trans.hh>`

Inheritance diagram for system_trans_t::



Public Member Functions

- virtual system_trans_t & operator= (const system_trans_t &second)=0

  An assignment operator.

- system_trans_t ()

  A constructor.

- virtual std::string to_string () const =0

  Returns a string representation of enabled transition.

- virtual void write (std::ostream &ostr) const =0
- virtual ~system_trans_t ()

  A destructor.

Methods accessing transitions forming a system transition

These methods are implemented only if system_t::can_transitions() in the system that has generated the instance of this class returns true.

- virtual size_int_t get_count () const =0
- virtual transition_t *const & operator[ ] (const int i) const =0

  Returns 'i'-th transition forming this transition of the system.

- virtual transition_t *& operator[ ] (const int i)=0

  Returns 'i'-th transition forming this transition of the system.

- virtual void set_count (const size_int_t new_count)=0

  Sets a count of transitions of processes forming this enabled transition.

12.70.1 Detailed Description

Class storing informations about one system transition.

System transition consists of several transitions (of type transition_t, iff system can work with transitions)

System transition represent the step of the entire system (compared to the transition_t, which represents the step of a single process).

Developer will usually use system_trans_t as its child enabled_trans_t which adds the "erroneous" property to this class.

12.70.2 Member Function Documentation

12.70.2.1 virtual size_int_t get_count () const [pure virtual]

Returns a count of transitions of processes forming this enabled transition

Implemented in bymoc_system_trans_t, and dve_system_trans_t.

Referenced by dve_explicit_system_t::get_property_trans(), dve_explicit_system_t::get_receiving_trans(), and dve_explicit_system_t::get_sync_enabled_trans_succ().

12.70.2.2 virtual system_trans_t& operator= (const system_trans_t & *second*) [pure virtual]

An assignment operator.

Makes a hard copy of system transition => takes a time O(second.size())

Implemented in bymoc_system_trans_t, and dve_system_trans_t.

12.70.2.3 virtual void write (std::ostream & *ostr*) const [pure virtual]

Prints a string representation of enabled trantition to output stream 'ostr'

Implemented in bymoc_system_trans_t, and dve_system_trans_t.

The documentation for this class was generated from the following file:

- system_trans.hh

12.71 thr Struct Reference

Structure determined for causing storing/printing error messages.

`#include <error.hh>`

Public Member Functions

- **thr** (ERR_type_t tt=ERR_UNKNOWN_TYPE, ERR_id_t i=ERR_UNKNOWN_ID)

Public Attributes

- ERR_id_t **c**
- ERR_type_t **t**

12.71.1 Detailed Description

Structure determined for causing storing/printing error messages.

This structure should be used as follows:

```
terr << "My error mess" << "age" << thr(3,13565)
```

where "My error message" is an example of error message sent into error_vector_t 'terr', 3 is an example of so called error type (see ERR_type_t) and 13565 is an example of error ID.

Sending thr() to an instance of error_vector_t through an operator '<<' causes the end of assigning of a message. Message is then stored at the end of a list of error messages. Then 'error handling callback' is called (callback that can be set by error_vector_t::set_throw_callback()).

The documentation for this struct was generated from the following file:

- error.hh

12.72 timeinfo_t Class Reference

Class for a time measuring.

`#include <sysinfo.hh>`

Public Member Functions

- double **gettime** ()
- void **print** ()
- void **reset** ()
- void **settimeout** (double)
- void **settimeout** (long, long)
- bool **testtimeout** (timeval &)
- bool **testtimeout** ()
- **timeinfo_t** (long, long)
- **timeinfo_t** (double)

Protected Member Functions

- void **print_time** (long, long)

Protected Attributes

- timeval **stored**
- long **tv_sec**
- long **tv_usec**

12.72.1 Detailed Description

Class for a time measuring.

The documentation for this class was generated from the following files:

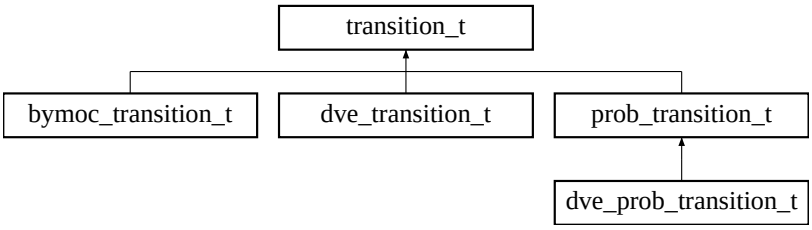
- sysinfo.hh
- sysinfo.cc

12.73 transition_t Class Reference

Abstract interface of a class representing a transition.

`#include <transition.hh>`

Inheritance diagram for transition_t::



Public Member Functions

- bool can_be_modified () const

  Tells, whether this transition can be modified.

- bool can_read () const

  Tells, whether this transition can be modified.

- size_int_t get_gid () const

  Returns transition GID of this transition.

- size_int_t get_lid () const

  Returns transition LID of this transition.

- system_t * get_parent_system () const

  Returns a "parent" system of this transition.

- virtual void set_parent_system (system_t &system)

  Sets a "parent" system of this transition.

- transition_t (system_t *const system)

  A constructor.

- transition_t ()

  A constructor.

- virtual ~transition_t ()

  A destructor.

Methods for reading a transition from a string representation

These methods are implemented only if can_read() returns true.

- virtual int from_string (std::string &trans_str, const size_int_t process_gid=NO_ID)=0
  Reads in the transition from a string representation.
- virtual int read (std::istream &istr, size_int_t process_gid=NO_ID)=0
  Reads in the transition from a string representation in stream.

Methods for modifying a transition

These methods are implemented only if can_be_modified() returns true.

- virtual void set_gid (const size_int_t gid)
  Sets a GID of this transition.
- virtual void set_lid (const size_int_t id)
  Sets a LID of this transition.

Obligatory part of abstact interface

These methods have to implemented in each implementation of transition_t (if transitions are supported by the system).

- virtual std::string to_string () const =0
  Returns a string representation of the transition.
- virtual void write (std::ostream &ostr) const =0
  Writes a string representation of the transition to stream.

Static Protected Member Functions

- static error_vector_t & get_error_vector ()
- static void set_error_vector (error_vector_t &evect)

Protected Attributes

- size_int_t global_id
  Protected data item containing GID.
- size_int_t local_id
  Protected data item containing LID.
- system_t * parent_system
  Protected data item containing "parent" system.

Static Protected Attributes

- static error_vector_t * ptrans_terr = &gerr

12.73.1 Detailed Description

Abstract interface of a class representing a transition.

This class represents a transition. It is a part of the model of a system. The corresponding system is given as a parameter of constructor transition_t(system_t * const system) or by method set_parent_system(). Developer is reponsible for correct setting of this "parent" system (but developer rarely creates new transitions - they are automatically created by system during source file reading).

12.73.2 Constructor & Destructor Documentation

12.73.2.1 transition_t (system_t *const *system*) [inline]

A constructor.

Parameters:

system = "parent" system of this transition

12.73.3 Member Function Documentation

12.73.3.1 bool can_be_modified () const

Tells, whether this transition can be modified.

This method uses "parent" system given in a constructor or a method set_parent_system(). Therefore "parent" system has to be set before the first call of this method.

References system_t::get_abilities(), parent_system, and system_abilities_t::transition_can_be_modified.

12.73.3.2 bool can_read () const

Tells, whether this transition can be modified.

This method uses "parent" system given in a constructor or a method set_parent_system(). Therefore "parent" system has to be set before the first call of this method.

References system_t::get_abilities(), parent_system, and system_abilities_t::transition_can_read.

12.73.3.3 virtual int from_string (std::string & *trans_str*, const size_int_t *process_gid* = NO_ID) [pure virtual]

Reads in the transition from a string representation.

Parameters:

trans_str = string containing a source of a transition

process_gid = context of a process (default value NO_ID = global context)

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_transition_t, dve_prob_transition_t, and dve_transition_t.

12.73.3.4 static error_vector_t& get_error_vector () [inline, static, protected]

Protected static method returning , which will be used in case of any error message

12.73.3.5 size_int_t get_gid () const [inline]

Returns transition GID of this transition.

Note:

This method is not virtual, because it should be really fast

Referenced by prob_system_t::consolidate(), por_t::generate_ample_sets(), por_t::generate_composed_ample_sets(), dve_prob_explicit_system_t::get_succs(), and por_t::init().

12.73.3.6 size_int_t get_lid () const [inline]

Returns transition LID of this transition.

Note:

This method is not virtual, because it should be really fast

Referenced by por_t::init(), dve_system_trans_t::write(), and dve_prob_process_t::write().

12.73.3.7 virtual int read (std::istream & *istr*, size_int_t *process_gid* = NO_ID) [pure virtual]

Reads in the transition from a string representation in stream.

Parameters:

istr = input stream containing a source of transition

process_gid = context of process (default value NO_ID = global context)

Returns:

... 0 iff no error occurs, non-zero value in a case of error during a reading.

Implemented in bymoc_transition_t, dve_prob_transition_t, and dve_transition_t.

12.73.3.8 static void set_error_vector (error_vector_t & *evect*) [inline, static, protected]

Protected static method setting , which will be used in case of any error message

12.73.3.9 virtual void set_gid (const size_int_t *gid*) [inline, virtual]

Sets a GID of this transition.

Warning:

See the description of concrete implementation. This method often cannot be used by developer from consistency reasons (even if it is implemented).

Referenced by prob_system_t::consolidate().

12.73.3.10 virtual void set_lid (const size_int_t *id*) [inline, virtual]

Sets a LID of this transition.

Warning:

See the description of concrete implementation. This method often cannot be used by developer from consistency reasons (even if it is implemented).

Referenced by dve_prob_process_t::add_prob_transition(), and dve_process_t::add_-transition().

12.73.3.11 virtual std::string to_string () const [pure virtual]

Returns a string representation of the transition.

If system can work with transitions (according to system_t::can_transitions()), this method is obligatory to implement.

Implemented in bymoc_transition_t, dve_prob_transition_t, and dve_transition_t.

12.73.3.12 virtual void write (std::ostream & *ostr*) const [pure virtual]

Writes a string representation of the transition to stream.

If system can work with transitions (according to system_t::can_transitions()), this method is obligatory to implement.

Implemented in bymoc_transition_t, dve_prob_transition_t, and dve_transition_t.

Referenced by dve_prob_process_t::write().

12.73.4 Member Data Documentation

12.73.4.1 error_vector_t * ptrans_terr = &gerr [static, protected]

Protected static data item containing , which will be used in case of any error message

Referenced by dve_transition_t::read(), dve_prob_transition_t::read(), and dve_prob_-transition_t::write().

The documentation for this class was generated from the following files:

- transition.hh
- transition.cc

12.74 updateable_info_t Class Template Reference

Class used to collect data during synchronization.

`#include <distributed.hh>`

Inherits abstract_info_t.

Public Member Functions

- virtual void **get_data_ptr** (char *&ptr)
- virtual void **get_data_size** (int &size)
- virtual void **update** (void)

Public Attributes

- constant_data_t const_data
- updateable_data_t data

  Structure that stores collected data.

12.74.1 Detailed Description

template<class updateable_data_t, class constant_data_t = no_const_data_type_t> class updateable_info_t< updateable_data_t, constant_data_t >

Class used to collect data during synchronization.

Instances of this class are passed to distributed_t::synchronized(abstract_info_t &info) function.

The *updateable_data_t* type should be struct with simple types in it (no dynamic arrays, strings, etc.) - the struct holds the collected data. It must have a "void update(void)" function, which will be called on every workstation.

The word "updateable" means that each workstation can change the data being collected during the synchronization process (by calling the update() function). For more information see distributed_t::synchronized(abstract_info_t &info) function.

12.74.2 Member Data Documentation

12.74.2.1 constant_data_t const_data

Structure that stores local constant part of info (usually needed for computation of the collected part)

The documentation for this class was generated from the following file:

- distributed.hh

12.75 updateable_info_t< updateable_data_t, no_const_data_type_t > Class Template Reference

Class used to collect data during synchronization.

`#include <distributed.hh>`

Inherits abstract_info_t.

Public Member Functions

- virtual void **get_data_ptr** (char *&ptr)
- virtual void **get_data_size** (int &size)
- virtual void **update** (void)

Public Attributes

- updateable_data_t data

  Structure that stores collected data.

12.75.1 Detailed Description

template<class updateable_data_t> class updateable_info_t< updateable_data_t, no_const_data_type_t >

Class used to collect data during synchronization.

Instances of this class are passed to distributed_t::synchronized(abstract_info_t &info) function.

The *updateable_data_t* type should be struct with simple types in it (no dynamic arrays, strings, etc.) - the struct holds the collected data. It must have a "void update(void)" function, which will be called on every workstation.

The word "updateable" means that each workstation can change the data being collected during the synchronization process (by calling the update() function). For more information see distributed_t::synchronized(abstract_info_t &info) function.

The documentation for this class was generated from the following file:

- distributed.hh

12.76 vminfo_t Class Reference

Class for a memory consumtion measuring.

`#include <sysinfo.hh>`

Public Member Functions

- int **getvmdata** ()
- int **getvmrss** ()
- int **getvmsize** ()
- void **print** ()
- void **scan** ()

Public Attributes

- int **vmdata**
- int **vmexe**
- int **vmlck**
- int **vmlib**
- int **vmrss**
- int **vmsize**
- int **vmstk**

Protected Attributes

- char **filename** [100]
- int **lineskip**
- int **pid**
- bool **statm**

12.76.1 Detailed Description

Class for a memory consumtion measuring.

The documentation for this class was generated from the following files:

- sysinfo.hh
- sysinfo.cc

Chapter 13

File Documentation

13.1 array.hh File Reference

Classes

- class array_t

  Simple resizable container representing 1-dimensional array.

Functions

- template<class T>
  T * **default_new_field_of_objects** (const size_int_t count)

13.1.1 Detailed Description

This header file contains a complete definition of the array_t class template

This class template is commonly used (e. g. in system_t and explicit_system_t). It is used as a replacement of slow containers from STL.

Author:

Pavel Simecek

13.2 bit_string.hh File Reference

Classes

- class bit_string_t

  Class for impementation of field of bits.

Variables

- static const ulong_int_t **bit_values** [32]

13.2.1 Detailed Description

Unit implementing a simple vector of bits using class bit_string_t

Author:

Pavel Simecek

13.2.2 Variable Documentation

13.2.2.1 const ulong_int_t bit_values[32] [static]

Initial value:

```
{1, 2, 4, 8, 16, 32, 64, 128, 256, 1<<9, 1<<10, 1<<11, 1<<12, 1<<13, 1<<14,
 1<<15, 1<<16, 1<<17, 1<<18, 1<<19, 1<<20, 1<<21, 1<<22, 1<<23, 1<<24,
 1<<25, 1<<26, 1<<27, 1<<28, 1<<29, 1<<30, 1<<31}
```

13.3 bymoc_explicit_system.hh File Reference

Classes

- class bymoc_explicit_system_t

13.3.1 Detailed Description

The main contribution of this file is the class bymoc_explicit_system_t

13.4 bymoc_expression.hh File Reference

Classes

- class bymoc_expression_t

  Class representing an expression in BYMOC system.

13.4.1 Detailed Description

The main contribution of this file is the class bymoc_expression_t.

13.5 bymoc_process.hh File Reference

Classes

- class bymoc_process_t

  Class representing a process in BYMOC system.

13.5.1 Detailed Description

The main contribution of this file is the class bymoc_process_t.

13.6 bymoc_process_decomposition.hh File Reference

13.6.1 Detailed Description

Process graph decomposition into SCCs including types

13.7 bymoc_system.hh File Reference

Classes

- class bymoc_system_t

  Class for Promela/Bytecode system representation.

13.7.1 Detailed Description

The main contribution of this file is the class bymoc_system_t

13.8 bymoc_system_trans.hh File Reference

Classes

- class bymoc_enabled_trans_t

  Class implementing enabled trasition in BYMOC system.

- class bymoc_system_trans_t

  Class implementing system trasition in BYMOC system.

13.8.1 Detailed Description

This file contains definitions of classes bymoc_system_trans_t and bymoc_enabled_-trans_t.

13.9 bymoc_transition.hh File Reference

Classes

- class bymoc_transition_t

  Class representing a transition in BYMOC system.

13.9.1 Detailed Description

The main contribution of this file is the class bymoc_transition_t.

13.10 compressor.hh File Reference

Namespaces

- namespace **divine**

Classes

- class compressor_t

  Compression implementation class.

Defines

- #define **HUFFMAN_COMPRESS** 12
- #define **NO_COMPRESS** 11

13.10.1 Detailed Description

Unit for compression of explicit states of system. Implemented by class compressor_t.

Author:

Jiri Barnat

13.11 data.hh File Reference

Classes

- class data_t

  Class representing a general data type.

Variables

- const ushort_int_t **DATA_TYPE_BYTE** = 1
- const ushort_int_t **DATA_TYPE_SBYTE** = 0
- const ushort_int_t **DATA_TYPE_SIZE_INT** = 6
- const ushort_int_t **DATA_TYPE_SLONG_INT** = 4
- const ushort_int_t **DATA_TYPE_SSHORT_INT** = 2
- const ushort_int_t **DATA_TYPE_UBYTE** = 1
- const ushort_int_t **DATA_TYPE_ULONG_INT** = 5
- const ushort_int_t **DATA_TYPE_UNKNOWN** = MAX_USHORT_INT
- const ushort_int_t **DATA_TYPE_USHORT_INT** = 3

13.11.1 Detailed Description

This file contains a definition of the class data_t - the general container of data computed in system or explicit system

13.12 distr_reporter.hh File Reference

Classes

- class distr_reporter_t

Variables

- const size_t **REPORTER_AVG** = 2
- const size_t REPORTER_MASTER = 0

  These are constants for set_info.

- const size_t **REPORTER_MAX** = 4
- const size_t **REPORTER_MIN** = 1
- const size_t REPORTER_OUTPUT_LONG = 3

  Long detailed output with values on all workstations.

- const size_t REPORTER_OUTPUT_NORMAL = 2

  Normal output, with avg/max/min... etc, but without the list of values.

- const size_t REPORTER_OUTPUT_SHORT = 1

  Short output, compatible with sequential one.

- const size_t **REPORTER_SUM** = 3

13.12.1 Detailed Description

This file contains a definition of distr_reporter_t - class for reporting and measuring during distributed computations

Author:

Radek Pelanek

13.13 distributed.hh File Reference

Classes

- class distributed_t

  Main distributed support class.

- class static_info_t

  Class used to collect data during synchronization.

- class updateable_info_t

  Class used to collect data during synchronization.

- class updateable_info_t< updateable_data_t, no_const_data_type_t >

  Class used to collect data during synchronization.

Variables

- const int DIVINE_TAG_SYNC_COMPLETION = 3

  Constant used internaly, of no relevance to user of distributed_t.

- const int DIVINE_TAG_SYNC_ONE = 1

  Constant used internaly, of no relevance to user of distributed_t.

- const int DIVINE_TAG_SYNC_READY = 0

  Constant used internaly, of no relevance to user of distributed_t.

- const int DIVINE_TAG_SYNC_TWO = 2

  Constant used internaly, of no relevance to user of distributed_t.

- const int DIVINE_TAG_USER = 144

  All messages sent by user must have tags greater or equal to this constant.

- const int NETWORK_HASH_SEED = 0xbafbaf99

  Default hash seed for partition function.

- const int NETWORK_ID_MANAGER = 0

  Id of the workstation that initiated the distributed computation.

13.13.1 Detailed Description

Distributed computing support unit header

13.14 dve_commonparse.hh File Reference

Classes

- struct dve_position_t

  Structure for storing of position in a source code.

Defines

- #define MAXLEN 64

  !!DO NEVER INCLUDE ONLY gramsymb.hh

- #define **YYLTYPE** dve_position_t

Functions

- void dve_eeerror (const char *msg)
- int dve_eeparse ()

  Bison's parser of DVE expressions.

- void dve_pperror (const char *msg)
- int dve_ppparse ()

  Bison's parser of DVE processes.

- void dve_tterror (const char *msg)
- int dve_ttparse ()

  Bison's parser of DVE transactions.

- void dve_yyerror (const char *msg)
- int dve_yyparse ()

  Bison's parser of DVE files.

13.14.1 Detailed Description

Auxiliary header file used in parser. You should not need to use it explicitly during an implementation of program based on this library

Author:

Pavel Simecek

13.14.2 Function Documentation

13.14.2.1 void dve_eeerror (const char * *msg*)

Method called by Bison's parser in case of unrecorvable syntax error in expression (of DVE syntax)

13.14.2.2 void dve_pperror (const char * *msg*)

Method called by Bison's parser in case of unrecorvable syntax error in process (of DVE syntax)

13.14.2.3 void dve_tterror (const char * *msg*)

Method called by Bison's parser in case of unrecorvable syntax error in transition (of DVE syntax)

13.14.2.4 void dve_yyerror (const char * *msg*)

Method called by Bison's parser in case of unrecorvable syntax error in DVE file

13.15 dve_explicit_system.hh File Reference

Classes

- class dve_explicit_system_t

  Class in DVE system interpretation.

- struct dve_explicit_system_t::state_creator_t
- struct ES_parameters_t

  Structure determined for passing parameters to ES_∗_eval() functions.

Typedefs

- typedef ushort_int_t dve_state_int_t
- typedef ES_parameters_t ∗ ES_p_parameters_t

  Pointer to ES_parameters_t.

Variables

- const size_int_t ES_FMT_DIVIDE_PROCESSES_BY_CR = 8

  Print 'new-line' character after each process∗/.

- const size_int_t ES_FMT_PRINT_ALL_NAMES
- const size_int_t ES_FMT_PRINT_PROCESS_NAMES = 4

  Print names of processes before printing of its state and varibles.

- const size_int_t ES_FMT_PRINT_STATE_NAMES = 1

  Print names of states instead of state IDs.

- const size_int_t ES_FMT_PRINT_VAR_NAMES = 2

  Print names of varibles before printing of their values.

13.15.1 Detailed Description

The main contribution of this file is the class dve_explicit_system_t

13.15.2 Typedef Documentation

13.15.2.1 ushort_int_t dve_state_int_t

dve_state_int_t is an interger type that is used to store state ID

13.15.3 Variable Documentation

13.15.3.1 const size_int_t ES_FMT_PRINT_ALL_NAMES

Initial value:

```
ES_FMT_PRINT_VAR_NAMES |
                                                ES_FMT_PRINT_STATE_NAMES |
                                                ES_FMT_PRINT_PROCESS_NAMES |
                                                ES_FMT_DIVIDE_PROCESSES_BY_CR
```

Print all the things given by ES_FMT_PRINT_STATE_NAMES, ES_FMT_PRINT_-VAR_NAMES, ES_FMT_PRINT_PROCESS_NAMES and ES_FMT_DIVIDE_-PROCESSES_BY_CR

13.16 dve_expression.hh File Reference

Classes

- struct compacted_t

  Class to access compacted expressions.

- struct compacted_viewer_t

  Structure of a single compacted expression. In the memory block, this initial structure is followed by the left subexpression (if present), and then by right subexpression (if present). r_offset is an offset to the right subexpression.

- class dve_expression_t

  Class representing an expression in DVE system.

Variables

- const size_int_t **DVE_MAXIMAL_ARITY** = 2

13.16.1 Detailed Description

The main contribution of this file is the class dve_expression_t.

13.17 dve_grammar.hh File Reference

Functions

- void dve_expr_init_parsing (dve_parser_t *const, error_vector_t *, std::istream &mystream)

  Initializes a Bison's parser of DVE expressions before parsing.

- void dve_init_parsing (dve_parser_t *const, error_vector_t *, std::istream &mystream)

  Initializes a Bison's parser of DVE files before parsing.

- void dve_proc_init_parsing (dve_parser_t *const, error_vector_t *, std::istream &mystream)

  Initializes a Bison's parser of DVE processes before parsing.

- void dve_trans_init_parsing (dve_parser_t *const, error_vector_t *, std::istream &mystream)

  Initializes a Bison's parser of DVE transitions before parsing.

13.17.1 Detailed Description

This file only contains function *init_parsing() which are further used in system_t::read(), process_t::read(), transition_t::read() and expression_t::read().

13.18 dve_parser.hh File Reference

Classes

- class dve_parser_t

  Class that provides an interface to the parsing of DVE sources.

Variables

- const size_int_t DVE_MAX_ARRAY_SIZE = 2147483647

  maximal bound for array in DVE source

13.18.1 Detailed Description

The main contribution of this file is class dve_parser_t, that serves as a symbol table and the interface for parsing and analysing DVE sources.

Author:

Pavel Simecek

13.19 dve_prob_explicit_system.hh File Reference

Classes

- class dve_prob_explicit_system_t

  Class in DVE system interpretation.

13.19.1 Detailed Description

The main contribution of this file is the class dve_prob_explicit_system_t

13.20 dve_prob_process.hh File Reference

Classes

- class dve_prob_process_t

  Class representing a DVE process in probabilistic system.

13.20.1 Detailed Description

The main contribution of this file is the abstact interface dve_prob_process_t.

13.21 dve_prob_system.hh File Reference

13.21.1 Detailed Description

The main contribution of this file is the class dve_prob_system_t

13.22 dve_prob_transition.hh File Reference

Classes

- class dve_prob_transition_t

  Class representing a DVE transition in probabilistic system.

13.22.1 Detailed Description

The main contribution of this file is the class dve_prob_transition_t.

13.23 dve_process.hh File Reference

Classes

- class dve_process_t

  Class representing a process.

Variables

- const size_int_t DVE_PROCESS_ALLOC_STEP = 20

13.23.1 Detailed Description

The main contribution of this file is the class dve_process_t.

13.23.2 Variable Documentation

13.23.2.1 const size_int_t DVE_PROCESS_ALLOC_STEP = 20

Alloctaion steps for array_t used in an implementation of dve_process_t

- quite internal thing

13.24 dve_process_decomposition.hh File Reference

Classes

- class dve_process_decomposition_t

13.24.1 Detailed Description

Process graph decomposition into SCCs including types

13.25 dve_source_position.hh File Reference

Classes

- class dve_source_position_t

  Class for storage of position in a source code.

13.25.1 Detailed Description

The main contribution of this file is the class dve_source_position_t.

13.26 dve_symbol_table.hh File Reference

Classes

- class dve_symbol_table_t

  Class which stores the declaration of symbols (see dve_symbol_t).

13.26.1 Detailed Description

The main contribution of this file is a definition of class dve_symbol_table_t.

13.27 dve_system.hh File Reference

Classes

- class dve_system_t

  Class for a DVE system representation.

- union SYS_initial_values_t

  Internal type for storing initial values of various identifiers.

- struct SYS_parameters_t

Typedefs

- typedef SYS_parameters_t * **SYS_p_parameters_t**

Enumerations

- enum system_synchronicity_t { **SYSTEM_SYNC** = 0, **SYSTEM_ASYNC** = 1 }

13.27.1 Detailed Description

The main contribution of this file is the class dve_system_t

13.27.2 Enumeration Type Documentation

13.27.2.1 enum system_synchronicity_t

Type of system - SYSTEM_SYNC = synchornous system, SYSTEM_ASYNC = asynchronous system

13.28 dve_system_trans.hh File Reference

Classes

- class dve_enabled_trans_t

  Class implementing enabled trasition in DVE system.

- class dve_system_trans_t

  Class implementing system trasition in DVE system.

13.28.1 Detailed Description

This file contains definitions of classes dve_system_trans_t and dve_enabled_trans_t.

13.29 dve_token_vector.hh File Reference

Classes

- class dve_token_vector_t

  Class used by dve_symbol_table_t to store the names of symbols.

13.29.1 Detailed Description

This file contains class dve_token_vector_t that can store a long vector of strings and serves as a dealocator of the memory used for strings.

This class is used in class table_t for storing names of identifiers.

13.30 dve_transition.hh File Reference

Classes

- class dve_transition_t

  Class representing a transition.

Enumerations

- enum sync_mode_t {

  SYNC_NO_SYNC = 0, SYNC_EXCLAIM = 1, SYNC_ASK = 2, SYNC_-EXCLAIM_BUFFER = 3,

  SYNC_ASK_BUFFER = 4 }

  Synchronization mode of a transition.

Variables

- const size_int_t TR_effects_alloc_step = 20
- const size_int_t TR_effects_default_alloc = 10

13.30.1 Detailed Description

The main contribution of this file is the class dve_transition_t.

13.30.2 Enumeration Type Documentation

13.30.2.1 enum sync_mode_t

Synchronization mode of a transition.

Enumerator:

SYNC_NO_SYNC transition is not synchronized

SYNC_EXCLAIM transition is synchronized and sends a value to another process

SYNC_ASK transition is synchronized and receives a value from another process

SYNC_EXCLAIM_BUFFER transition is asynchronous and a message is stored into a buffer

SYNC_ASK_BUFFER transition is asynchronous and a message is taken from a buffer

13.30.3 Variable Documentation

13.30.3.1 const size_int_t TR_effects_alloc_step = 20

Allocation step of array_t used in an implementation of dve_transition_t

- quite internal thing

13.30.3.2 const size_int_t TR_effects_default_alloc = 10

Default allocation size of array_t used in an implementation of dve_transition_t - quite internal thing

13.31 error.hh File Reference

Classes

- struct ERR_throw_t
- struct ERR_triplet_t
- class error_string_t

  Class determined for storing error messages.

- class error_vector_t

  The main class in error.hh determined for storing.

- struct psh

  Structure determined for causing storing/printing error messages.

- struct thr

  Structure determined for causing storing/printing error messages.

Defines

- #define **UNIMPLEMENTED**(type)

Typedefs

- typedef const ERR_triplet_t ERR_c_triplet_t

  Definition of constant ERR_triplet_t.

- typedef const char * ERR_char_string_t

  Header file for error handling //.

- typedef int ERR_id_t

  Integer type used for identifiers of errors.

- typedef unsigned int ERR_nbr_t

  Integer type used for index of an error in an error vector.

- typedef void(* ERR_psh_callback_t)(error_vector_t &terr, const ERR_throw_t)

  Callback function type (for handling of '<< psh()').

- typedef const std::string **ERR_std_string_t**
- typedef void(* ERR_thr_callback_t)(error_vector_t &terr, const ERR_throw_t)

  Callback function type (for '<< thr()').

- typedef int ERR_type_t

  Integer type used for identifiers of errors.

Functions

- void ERR_default_psh_callback (error_vector_t &terr, const ERR_throw_t)

  Default 'warning handling callback'.

- void ERR_default_thr_callback (error_vector_t &terr, const ERR_throw_t)

  Default 'error handling callback'.

- template<typename T>
  T **noreturn** ()

Variables

- const ERR_id_t ERR_UNKNOWN_ID = 1
- const ERR_type_t ERR_UNKNOWN_TYPE = 1
- error_vector_t gerr

  Global error vector 'gerr'.

13.31.1 Detailed Description

Header file of a handling unit. This unit is independent of DiVinE and can be used in an arbitrary project.

Extern variable gerr is the global error vector that can be used in arbitrary file that includes error.hh

For more informations see Error Handling Unit page

13.31.2 Define Documentation

13.31.2.1 #define UNIMPLEMENTED(type)

Value:

```
do { \
        gerr << "unimplemented " << __FILE__ << ":" << __LINE__ << thr(); \
        return noreturn<type>(); \
    } while(0)
```

13.31.3 Typedef Documentation

13.31.3.1 typedef const char* ERR_char_string_t

Header file for error handling //.

String, which is field of characters finished by ”

13.31.3.2 typedef void(* ERR_psh_callback_t)(error_vector_t &terr, const ERR_throw_t)

Callback function type (for handling of ‘<< psh()’).

Type of callback function for handling commands like

```
terr << psh();
```

where ‘terr’ is an instance of error_vector_t.

We will call functions of this type ’warning handling callbacks’.

13.31.3.3 typedef void(* ERR_thr_callback_t)(error_vector_t &terr, const ERR_throw_t)

Callback function type (for ‘<< thr()’).

Type of callback function for handling commands like

```
terr << psh();
```

where ‘terr’ is an instance of error_vector_t.

We will call functions of this type ’error handling callback’.

13.31.4 Function Documentation

13.31.4.1 void ERR_default_psh_callback (error_vector_t & *terr*, const *ERR_throw_t*)

Default ’warning handling callback’.

This is a default ’warning handling callback’ in error_vector_t.

To exchange this function by another function in an instance of error_vector_t you can call error_vector_t::set_push_callback().

This default callback function has the following behaviour:

1. Prints the last kept message on the standard error output.
2. Erases printed message from a memory.

References error_vector_t::perror_back(), and error_vector_t::pop_back().

13.31.4.2 void ERR_default_thr_callback (error_vector_t & *terr*, const *ERR_throw_t*)

Default 'error handling callback'.

This is a default 'error handling callback'.

To exchange this function by another function in an instance of error_vector_t you can call error_vector_t::set_thr_callback().

This default callback function has the following behaviour:

1. Flushes all messages stored in a memory to the stadard error output.
2. Clears the memory of messages.
3. Throws exception of type ERR_throw_t (parameter *error* type).

References error_vector_t::flush().

13.31.5 Variable Documentation

13.31.5.1 const ERR_id_t ERR_UNKNOWN_ID = 1

Constant that is substituted instead of error ID, if you don't specify any error ID to the function that has error ID as a parameter.

Referenced by error_vector_t::~error_vector_t().

13.31.5.2 const ERR_type_t ERR_UNKNOWN_TYPE = 1

Constant that is substituted instead of of integer sent by throwing, if you don't specify any error ID to the function that has error ID as a parameter.

Referenced by error_vector_t::~error_vector_t().

13.31.5.3 error_vector_t gerr

Global error vector 'gerr'.

Global error vector *gerr*. You can use it in your programs, but you can also declare your own error vector and use it instead of *gerr*. This global object is proper because of functions which are not wrapped in a structure or class with own error vector.

Referenced by bymoc_process_t::add_transition(), dve_parser_t::assertion_create(), bymoc_expression_t::assign(), dve_expression_t::dve_expression_t(), dve_system_t::fast_eval(), bymoc_transition_t::from_string(), bymoc_process_t::from_string(), bymoc_expression_t::from_string(), por_t::generate_ample_sets(), por_t::generate_composed_ample_sets(), bymoc_system_trans_t::get_count(), dve_system_t::get_property_scc_count(), dve_system_t::get_property_scc_id(), dve_system_t::get_property_scc_type(), bymoc_process_t::get_trans_count(), bymoc_process_t::get_transition(), dve_system_t::is_property_weak(), bymoc_enabled_trans_t::operator=(),

bymoc_system_trans_t::operator=(), bymoc_system_trans_t::operator[ ](), array_t< dve_symbol_t * >::operator[ ](), bymoc_transition_t::read(), bymoc_process_t::read(), bymoc_expression_t::read(), logger_t::register_double(), logger_t::register_slong_int(), logger_t::register_ulong_int(), bymoc_process_t::remove_transition(), bymoc_system_trans_t::set_count(), distr_reporter_t::set_global_info(), bymoc_expression_t::swap(), dve_parser_t::system_property(), dve_parser_t::system_synchronicity(), bymoc_transition_t::to_string(), bymoc_system_trans_t::to_string(), bymoc_process_t::to_string(), bymoc_expression_t::to_string(), dve_parser_t::trans_sync(), dve_expression_t::write(), bymoc_transition_t::write(), bymoc_system_trans_t::write(), bymoc_process_t::write(), and bymoc_expression_t::write().

13.32 explicit_storage.hh File Reference

Classes

- class explicit_storage_t
  explicit storage class
- class state_ref_t
  State reference class.

Defines

- #define **EXPLICIT_STORAGE_ERR_TYPE** 11
- #define **EXPLICIT_STORAGE_HASH_SEED** 0xBA9A9ABA

Functions

- static bool operator!= (const state_ref_t &r1, const state_ref_t &r2)
  Operator for non-equality of references.
- static bool operator< (const state_ref_t &r1, const state_ref_t &r2)
  Operator "<" for references.
- std::ostream & operator<< (std::ostream &ostr, const state_ref_t &ref)
  Prints a reference representation to the given stream.
- static bool operator<= (const state_ref_t &r1, const state_ref_t &r2)
  Operator "<=" for references.
- static bool operator== (const state_ref_t &r1, const state_ref_t &r2)
  Operator for equality of references.
- static bool operator> (const state_ref_t &r1, const state_ref_t &r2)
  Operator ">" for references.
- static bool operator>= (const state_ref_t &r1, const state_ref_t &r2)
  Operator ">=" for references.

13.32.1 Detailed Description

state hashing support

Author:

Jiri Barnat

13.33 explicit_system.hh File Reference

Classes

- class explicit_system_t
- class succ_container_t

  Class determined to store successors of some state.

Functions

- bool succs_deadlock (const int succs_result)

  Returns, whether return value of get_succs() comprises SUCC_DEADLOCK.

- bool succs_error (const int succs_result)

  Returns, whether return value of get_succs() comprises SUCC_ERROR.

- bool succs_normal (const int succs_result)

  Returns, whether get_succs() method has returned SUCC_NORMAL.

Variables

- const int SUCC_DEADLOCK = 2
- const int SUCC_ERROR = 1
- const int SUCC_NORMAL = 0

13.33.1 Detailed Description

This file contains:

- constants SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK
- functions succs_normal(), succs_error(), succs_deadlock() ... for analyses of return values of explcit_system_t::get_succs() and similar methods
- definition of the class succ_container_t ... container of generated successors of states of the system
- definition of the abstract interface explicit_system_t ... the most important part of this unit

13.33.2 Function Documentation

13.33.2.1 bool succs_deadlock (const int *succs_result*) [inline]

Returns, whether return value of get_succs() comprises SUCC_DEADLOCK.

Parameters:

succs_result = return value of get_succs() method

Returns:

true iff *succs_results* bitewise contains SUCC_DEADLOCK (*succs_results* is a bitwise sum of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK)

See Results of methods for creating successors for details.

References SUCC_DEADLOCK.

13.33.2.2 bool succs_error (const int *succs_result*) [inline]

Returns, whether return value of get_succs() comprises SUCC_ERROR.

Parameters:

succs_result = return value of get_succs() method

Returns:

true iff *succs_results* bitwise contains SUCC_ERROR (*succs_results* is a bitwise sum of SUCC_NORMAL, SUCC_ERROR and SUCC_DEADLOCK)

See Results of methods for creating successors for details.

References SUCC_ERROR.

13.33.2.3 bool succs_normal (const int *succs_result*) [inline]

Returns, whether get_succs() method has returned SUCC_NORMAL.

Parameters:

succs_result = return value of get_succs() method

Returns:

true iff *succs_results* == SUCC_NORMAL

See Results of methods for creating successors for details.

References SUCC_NORMAL.

13.33.3 Variable Documentation

13.33.3.1 const int SUCC_DEADLOCK = 2

Constant that is a possible return value of get_succs() functions. See Results of methods for creating successors for deatails

Referenced by dve_explicit_system_t::get_async_enabled_trans(), bymoc_explicit_system_t::get_succs(), dve_explicit_system_t::get_sync_succs_internal(), and succs_deadlock().

13.33.3.2 const int SUCC_ERROR = 1

Constant that is a possible return value of get_succs() functions. See Results of methods for creating successors for deatails

Referenced by por_t::generate_ample_sets(), por_t::generate_composed_ample_sets(), dve_explicit_system_t::get_async_enabled_trans(), dve_explicit_system_t::get_async_succs_internal(), dve_explicit_system_t::get_ith_succ(), dve_explicit_system_t::get_sync_succs_internal(), and succs_error().

13.33.3.3 const int SUCC_NORMAL = 0

Constant that is a possible return value of get_succs() functions. See Results of methods for creating successors for deatails

Referenced by dve_explicit_system_t::get_async_enabled_trans(), dve_explicit_system_t::get_sync_succs_internal(), and succs_normal().

13.34 expression.hh File Reference

Classes

- class expression_t

  Abstact interface of a class representing an expression.

13.34.1 Detailed Description

The main contribution of this file is the abstact interface expression_t.

13.35 hash_function.hh File Reference

Classes

- class hash_function_t

  Class that unifies hash functions in the library.

Enumerations

- enum hash_functions_t { **DEFAULT**, **JENKINS**, **DIVINE**, **HC4** }

  Type to identify hash functions.

13.35.1 Detailed Description

This header file contains the definition of class hash_function_t. The class is instantiated by explicit_storage_t and distributed_t instances.

Author:

Jiri Barnat

13.36 huffman.hh File Reference

Variables

- huff_sym_t **sym** [256]

13.36.1 Detailed Description

File containing table for Huffman coding. Each symbol is coded by code sym[symbol][0] in sym[symbol][1] bits

13.37 inttostr.hh File Reference

Functions

- template<typename T>
  static char * **create_string_from** (T i)
- void **dispose_string** (char *const str)

13.37.1 Detailed Description

This file contains the funcions which can convert some integer types to the string representation (e. g. convert 2345 to "2345").

It also contains the function dispose_string that only calls free() on a given argument.

These function are only used in error.hh (Error Handling Unit) for converting numbers on the error input to strings.

13.38 logger.hh File Reference

Classes

- class logger_t

13.38.1 Detailed Description

This file contains declaration of logger_t class.

13.39 mcrl2_explicit_system.hh File Reference

13.39.1 Detailed Description

The main contribution of this file is the class mcrl2_explicit_system_t

13.40 mcrl2_system.hh File Reference

Defines

- #define **MCRL2_ATERM_INIT**(x, y) do{}while(0)

13.40.1 Detailed Description

The main contribution of this file is the class mcrl2_system_t

13.41 network.hh File Reference

Classes

- class comm_matrix_t

  Communication matrix.

- class network_t

  Network communication support class.

Defines

- #define **OPT_STATS**
- #define **OPT_STATS_MPI_RATE**
- #define **STATS_INTERVAL** 3.0

Typedefs

- typedef auto_ptr< comm_matrix_t > pcomm_matrix_t

  Communication matrix auto pointer.

Variables

- const int NET_ERR_ABORT_FAILED = 13

  Network abort function failed.

- const int NET_ERR_ALLGATHER_FAILED = 15

  Function allgather failed.

- const int NET_ERR_ALREADY_INITIALIZED = 1

  Trying to initialize, when network is already initialized.

- const int NET_ERR_BARRIER_FAILED = 12

  Barrier function failed.

- const int NET_ERR_FINALIZATION_FAILED = 4

  Finalization of network failed.

- const int NET_ERR_GATHER_FAILED = 14

  Function gather failed.

- const int NET_ERR_GET_MSG_SIZE_FAILED = 11

  Getting message size from network failed.

- const int NET_ERR_INITIALIZATION_FAILED = 3

  Initialization of network failed.

- const int NET_ERR_INVALID_DESTINATION = 6

  Trying to send message to or aquire information about a non-existing destination.

- const int NET_ERR_INVALID_MSG_SIZE = 5

  Trying to send message whose size exceeds the buffer size.

- const int NET_ERR_INVALID_SOURCE = 7

  Trying to get message from or aquire information about a non-existing source.

- const int NET_ERR_INVALID_WORKSTATION_NUMBER = 16

  Trying aquire information about a non-existing workstation.

- const int NET_ERR_MSG_PROBE_FAILED = 9

  Probe for messages failed.

- const ERR_triplet_t net_err_msgs [17]

  Array of error descriptions.

- const int NET_ERR_NOT_INITIALIZED = 2

  Trying to do something that requires initialized network, when network is not initialized.

- const int NET_ERR_RECEIVE_MSG_FAILED = 10

  Receiving of message failed.

- const int NET_ERR_SEND_MSG_FAILED = 8

  Sending of message failed.

- const int NET_NO_ERROR = 0

  Everything's ok.

- const int NET_TAG_NORMAL = 0
- const int NET_TAG_URGENT = 1
- const int NETWORK_ERR_TYPE = 1729

  Identifier of exceptions raised by network_t.

13.41.1 Detailed Description

Network support unit header

13.41.2 Typedef Documentation

13.41.2.1 typedef auto_ptr<comm_matrix_t> pcomm_matrix_t

Communication matrix auto pointer.

Points to communication matrix. Variables of this type are outputs of some statistical methods of network_t. The only important thing you need to know about auto pointers is that if auto pointer is destroyed (or rewritten), then the object it points to is also destroyed (unless some other pointer points to the object).

13.41.3 Variable Documentation

13.41.3.1 const int NET_TAG_NORMAL = 0

MPI tag for normal messages

This tag is used internally by network_t and has nothing to do with tags passed as parameters to network_t methods. Programmers using network_t do not have direct access to MPI, hence this constant is irrelevant to them.

Referenced by network_t::flush_buffer().

13.41.3.2 const int NET_TAG_URGENT = 1

MPI tag for urgent messages

This tag is used internally by network_t and has nothing to do with tags passed as parameters to network_t methods. Programmers using network_t do not have direct access to MPI, hence this constant is irrelevant to them.

13.42 path.hh File Reference

Defines

- #define PATH_CYCLE_SEPARATOR "================"

13.42.1 Detailed Description

This file contains definition of path_t class

13.42.2 Define Documentation

13.42.2.1 #define PATH_CYCLE_SEPARATOR "================"

Class path_t is used to construct and print the reprezentation of path in the state space. For building a 'normal' path, just keep adding states from the beginning or end of the path. For building a path with cycle, start from one end, keep adding states on path and mark the state where the cycle starts. You add this state only one time.

Programmer should take care that states are added correctly (such that transitions between them exists)

13.43 por.hh File Reference

Classes

- class por_t

  Class for utilization of partial order reduction.

Variables

- const std::size_t POR_FIND_ONLY = 4

  Defines the type of choosing ample set - only finds processes whose transitions can be taken as ample set.

- const std::size_t POR_FIRST = 1

  Defines the type of choosing ample set - transitions from the **first** *proper process will be taken.*

- const std::size_t POR_LAST = 2

  Defines the type of choosing ample set - transitions from the **last** *proper process will be taken.*

- const std::size_t POR_SMALLEST = 3

  Defines the type of choosing ample set - transitions from the proper process with **smallest** *number of transitions will be taken.*

13.43.1 Detailed Description

∗ This file contains the class por_t for utilization of partial order reduction.

13.44 prob_explicit_system.hh File Reference

Classes

- struct prob_and_property_trans_t
- class prob_explicit_system_t
- class prob_succ_container_t

  Class determined to store probabilistic successors of some state.

- struct prob_succ_element_t

  Single element to store in prob_succ_container_t.

13.44.1 Detailed Description

This file contains:

- definition of the abstract interface prob_explicit_system_t the most important part of this unit

13.45 prob_process.hh File Reference

Classes

- class prob_process_t

13.45.1 Detailed Description

The main contribution of this file is the abstact interface prob_process_t.

13.46 prob_system.hh File Reference

Classes

- class prob_system_t

  Abstract interface of a class representing a model of a system.

13.46.1 Detailed Description

The main contribution of this file is the abstact interface prob_system_t - the class representing a model of the propabilistic system

13.47 process.hh File Reference

Classes

- class process_t

  Abstact interface of a class representing a process of a system.

13.47.1 Detailed Description

The main contribution of this file is the abstact interface process_t.

13.48 process_decomposition.hh File Reference

Classes

- class process_decomposition_t

13.48.1 Detailed Description

Process graph decomposition into SCCs including types

13.49 reporter.hh File Reference

Classes

- class reporter_t

  Class for messuring and reporting.

13.49.1 Detailed Description

This file contains definition of reporter_t class (class for runtime statistics and reports)

Author:

Radek Pelanek

13.50 state.hh File Reference

Classes

- struct state_t

  Structure representing the state of the system.

Functions

- void **byte_to_state_pos** (const state_t state, const std::size_t pos, const byte_t value)
- void clear_state (state_t)

  Fills a memory representing the state with zeros.

- void delete_state (state_t &state)

  Deletes the state.

- state_t duplicate_state (state_t state)

  Creates a copy of state 'state' and returns a pointer to it.

- void **int_to_state_pos** (const state_t state, const std::size_t pos, const sshort_int_t value)
- state_t new_state (char *const state_memory, const std::size_t size)

  Creates a new state and returns a pointer to it.

- state_t new_state (const std::size_t size)

  Creates a new state and returns a pointer to it.

- bool operator!= (const state_t &arg1, const state_t &arg2)

  Returns whether state 'arg1' is different from 'arg2' using function memcmp().

- bool operator< (const state_t &arg1, const state_t &arg2)

  Returns whether state 'arg1' is smaller than 'arg2' using function memcmp().

- bool operator== (const state_t &arg1, const state_t &arg2)

  Returns whether state 'arg1' is the same as 'arg2' using function memcmp().

- bool operator> (const state_t &arg1, const state_t &arg2)

  Returns whether state 'arg1' is larger than 'arg2' using function memcmp().

- void realloc_state (state_t &state, size_t new_size)

  Realloc state. Exisiting data blosk is deleted, and replpaced with a new one of given size.

- template<class T>
  void set_to_state_pos (const state_t state, const std::size_t pos, const T value)

  Sets the value of type 'T' to 'state' at the position 'pos'.

- template<>
  void **set_to_state_pos**< **byte_t** > (const state_t state, const std::size_t pos, const byte_t value)
- template<>
  void **set_to_state_pos**< **sshort_int_t** > (const state_t state, const std::size_t pos, const sshort_int_t value)
- template<>
  void **set_to_state_pos**< **ulong_int_t** > (const state_t state, const std::size_t pos, const ulong_int_t value)
- template<>
  void **set_to_state_pos**< **ushort_int_t** > (const state_t state, const std::size_t pos, const ushort_int_t value)
- template<class T>
  T state_pos_to (const state_t state, const std::size_t pos)

  Returns the value of type 'T' stored in 'state' at the position 'pos'.

- template<>
  byte_t **state_pos_to**< **byte_t** > (const state_t state, const std::size_t pos)
- template<>
  sshort_int_t **state_pos_to**< **sshort_int_t** > (const state_t state, const std::size_t pos)
- template<>
  ulong_int_t **state_pos_to**< **ulong_int_t** > (const state_t state, const std::size_t pos)
- template<>
  ushort_int_t **state_pos_to**< **ushort_int_t** > (const state_t state, const std::size_t pos)
- byte_t **state_pos_to_byte** (const state_t state, const std::size_t pos)
- sshort_int_t **state_pos_to_int** (const state_t state, const std::size_t pos)
- ushort_int_t **state_pos_to_uint** (const state_t state, const std::size_t pos)
- ulong_int_t **state_pos_to_ulong_int** (const state_t state, const std::size_t pos)
- void **uint_to_state_pos** (const state_t state, const std::size_t pos, const ushort_int_t value)
- void **ulong_int_to_state_pos** (const state_t state, const std::size_t pos, const ulong_int_t value)

13.50.1 Detailed Description

The main contribution of this file is a class state_t and methods for the work with it (especially new_state(), delete_state(), state_pos_to_∗() functions ∗_to_state_pos() functions and functions for comparing states.

13.50.2 Function Documentation

13.50.2.1 state_t new_state (char *const *state_memory*, const std::size_t *size*)

Creates a new state and returns a pointer to it.

Parameters:

state_memory = pointer to the memory representing a state of the system - the content will be copied to the

size = size of the memory referenced by 'state_memory' in bytes

References state_t::ptr, and state_t::size.

13.50.2.2 void set_to_state_pos (const state_t *state*, const std::size_t *pos*, const T *value*) [inline]

Sets the value of type 'T' to 'state' at the position 'pos'.

Sets the value of type *T* to *state* at position *pos*. It can be instatiated by the following types *T* :

- byte_t
- sshort_int_t
- ushort_int_t
- ulong_int_t

13.50.2.3 T state_pos_to (const state_t *state*, const std::size_t *pos*) [inline]

Returns the value of type 'T' stored in 'state' at the position 'pos'.

Returns the value of type *T* stored in *state* at the position *pos* It can be instatiated by the following types *T* :

- byte_t
- sshort_int_t
- ushort_int_t
- ulong_int_t

13.51 sysopen.hh File Reference

13.51.1 Detailed Description

This header file declare class that should be used for opening models, printing help and version in divine-cluster tools.

Author:

Jiri Barnat

13.52 system.hh File Reference

Classes

- class system_t

  Abstract interface of a class representing a model of a system.

Enumerations

- enum **property_type_t** {
  NONE, **BUCHI**, **GENBUCHI**, **MULLER**,
  RABIN, **STREETT** }

13.52.1 Detailed Description

The main contribution of this file is the abstact interface system_t - the class representing a model of the system.

13.53 system_abilities.hh File Reference

Classes

- struct system_abilities_t

  Structure storing abilities of system and its subordinate components.

13.53.1 Detailed Description

The main contribution of this file is the definition of structure system_abilities_t.

13.54 system_trans.hh File Reference

Classes

- class enabled_trans_container_t

  Container determined for storing enabled processes in one state.

- class enabled_trans_t

  Class storing informations about one enabled transition.

- class system_trans_t

  Class storing informations about one system transition.

Functions

- enabled_trans_t * **system_new_enabled_trans** (const void *params)

13.54.1 Detailed Description

This file contains:

- definition of abbstract interface system_trans_t, which represents a transition of the system (composed from one or more transition_t - synchronized transitions)
- simple extension of system_trans_t called enabled_trans_t, which is used to represent a system transition, which is enabled (it is only extented by the possibility of being erroneous).
- definition of a container for storing of enabled transitions (based on array_of_-abstract_t).

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