

The ConcurTaskTrees Environment Help

CTT Notation

- Syntax of Temporal Relationship in CTT:

NAME	SYNTAX
Choice	$T1 \square T2$
Order Independency	$T1 \mid = \mid T2$
Interleaving	$T1 \parallel T2$
Synchronization	$T1 \mid \square \mid T2$
Sequential composition (enabling)	$T1 \gg T2$
Sequential composition with information passing	$T1 \square \gg T2$
Disabling	$T1 \mid > T2$
Infinite Iteration (unary operator)	$T1^*$
Optional Execution (unary operator)	$[T1]$
Suspend/Resume	$T1 \mid > T2$

- Temporal Relationship Priority:

Following it is reported the priority ordering of the temporal relationship listed from major to minor:

unary operator $\square \mid = \mid \parallel \mid \square \mid \mid > \mid > \gg \square \gg$

- Temporal Relationship Combining

There is the possibility to combine the unary operators with the others, but in this case some expression can be result wrong.

The tool offer the possibility to check those inconsistency. Following we present the possible wrong expression that it is possible build.

- The expression $A^* \gg B$ is wrong , B is never reachable
- Left and right side of the operator $\mid > , \mid > \mid$ and $\square$ can not be optional.

CTT Environment

The Concurrent Task Tree Environment is a tool realised by the [Human Computer Interaction Group - CNUCE \(Pisa\)](#). With this editor you can build a task model and generate an interactor-based architectural model (this beta version does not support it yet). It is possible build Cooperative Tasks Models or Single User Task Model.

To start the tool enter in the " Ctte " directory and execute the command:

- ctte (for Windows 95/98/NT)
- java DrawTree (for Unix)

1. How to Build a new single-user task model

- **The first screenshot**
When you start CTTE, the "Root" node of a new single-user task model is shown, and its category is set by default to "abstraction" (a cloud-shaped icon is used). At that moment the root is the only node in the task model: within the editor panel it is highlighted as the "*current*" task (see the black frame around its icon).
- **Focus on the "*current*" task**
Apart from very few exceptions, at any time while you use CTTE only one task will be highlighted as the "*current*" task, meaning that every action you do will be referred to this task. Changing the current task is easy: select the icon of the concerned task. Some information about the current task is shown in the main window to allow you quick access and editing.
- **Adding new tasks: the insertion mode**
A new task can be added according two possible *insertion modes* (the current insertion mode is represented by a two-state button included in the CTTE global toolbar):
 - o as the *farthest right child* of the currently selected task. This insertion mode is selected by default and in this case the two-state button displays a downward arrow.
 - o as the *left sibling* of the currently selected task. In this case the two-state button displays a leftward arrow.

In order to change the insertion mode you can use the two-state button displayed within the toolbar, or alternatively use the menubar and select **Insert |Below(child)** or **Insert |To the left(sibling)** depending on the desired insertion mode.

If you want to add a new task as the *farthest right child of a task T* do the following 1.-3. steps:

3. make sure that the appropriate insertion mode is selected within the tool (namely, the two-state button displays a *downward* arrow);
4. select task T (namely, click on its icon);
5. select the icon associated with the appropriate task category within the related toolbar

If you want to add a new task as the *left sibling of task T*: make sure that the appropriate insertion mode is selected within the tool (namely, the two-state button displays a *leftward* arrow), then follow the previous 2.-3. steps.

- **Add operator between tasks**

You can add a temporal operator on the right side of the currently selected task.

Thus, if you have two sibling tasks, *Task1* and *Task2* and you want to specify *Task1 op Task2* (where *op* is a CTT operator) you have to click on the icon associated with *Task1*, then select (within the operator toolbar) the button associated with the desired operator .

- **Change properties of a task**

To change the properties of a task, double-click on its icon. A new window will be displayed making you able to change the properties you are interested in. A subset of relevant properties about the *current* task is also displayed within the main window in order to give you quick access to them.

2. How to Build a new cooperative task model

- **Enable "Cooperative mode" option**

When you start CTTE, by default you are supposed to build a single-user task model.

If you want to create a cooperative task model you have to enable the

View|Cooperative mode option. As a result, the root of the Cooperative task model ("Cooperative root") will be displayed in the editor panel and the "Cooperative" label is displayed in the tabbed panel within the main window, meaning that the task of the "Cooperative" task model is currently shown.

- **Add new roles**

Before building the cooperative task model, you should specify the task model of the involved "roles", so you have to add new roles to the cooperative task model. In order to do it select the "New Role" button in the bottom-right hand corner of the window displayed when the tabbed panel selects the "Cooperative" task model. As a result, the tabbed panel is automatically switched to the brand-new role task model allowing you to edit the task model of a single-user role.

- **Focus on the "connection tasks"**

If you are building a cooperative task model, you are supposed to have specified - within the task model of each role- some "connection tasks" Such tasks are displayed -for each role- when the Cooperative task model is selected in the right-hand part of the main window and they are useful to build easily the cooperative task model.

- **Building the cooperative task model: set connection tasks**

All the leaves of the cooperative task model have to be connection tasks previously defined in the task model of the involved role. If you want to add a (connection) task in the cooperative task model you have to add the task in the cooperative task model as usual (that is by selecting the appropriate icon in the left-hand part of the window). Then, make this task the *current* task and select the appropriate role/task in the lists displayed in the right-hand part of the window, then click "Set Connection" button.

3. How to Edit an existing single-user/cooperative task model

- **General commonly-used editing operations are available within the CTTE**
 - a) Cut/copy either the current selected task (Edit | Cut Selection) or the whole task tree having the current task as its root (Edit | Cut Subtree); Paste the task currently saved in the clipboard (Edit | Paste)
 - b) Undo the last editing action performed (Edit | Undo)
 - c) Insert a task whose specification is stored in a separate file (Insert | Subtree from File)
 - d) Make a new task father of a number of tasks: with the "^Control" key pressed, select such tasks, then Insert | New Level
- **Some other features are available in order to support users while editing their task models**
 - a) Find a task (Edit | Find...)
 - b) Hide some parts of a task model (Edit | Hide Subtree), justify a task tree, line up different tasks at the same level,
 - c) Drag a task (select the task with the left button of the mouse and drag it) or a whole task tree (select the root of the concerned task tree with the right button of the mouse and drag)
- **Obtain some information about the task models**
 - a) Get general information about the number/type of tasks (Info | Task Model Statistics...)
 - b) Compare two task models (Info | Compare...) to get their differences.

4. How to Save a single-user/cooperative task model in different formats

There are three main file formats in which you can save a task model (or a part of it):

- **".cctt"/".ctt" formats**

The extension of a CTT specification is ".ctt" for single-user task models and ".cctt" for cooperative task models. By default you save the entire task model, but you can also save only a part of it (by selecting the root of the concerned subtree: File | Save Subtree as)
- **".jpg" format**

The CTTE give the users the possibility to save their task models in ".jpg" format (File | Save Tree as JPG to save a whole tree, File | Save Subtree as JPG to save the subtree whose root is the *current* task). This capability is very handy to manage task model specifications.
- **".xml" format**

A CTT specification can be saved also in XML format to enhance the interchange with other commonly-used notations and formats (File | Save CTT as XML).

5. How to Check the single-user/cooperative task model structure

In order to facilitate the users to build correct task model specifications, the CTTE offers the possibility to perform some automatic checks on the specification itself, regarding all the possible errors which might make the specification incomplete or ambiguous (i.e.: a task with only one child, lack of temporal operators between two children, a connection task which does not appear in the cooperative task model, ...). To enable such functionality select **Tools | Check Model Structure**. A window appears with the list of errors (if any) together with the possibility of having quick access to the task referred by a specific error (by double-click on the error itself)

6. How to Obtain a task model starting from an informal description of the system

Sometimes users might have available an informal description of a system, or some sample scenarios describing typical behaviour of the system itself. The CTT Environment offers the useful capability of supporting users while they extract relevant information from such scenarios in order to build a more formal specification (**Tools | Informal to Formal Description**).

7. How to Simulate the behaviour of the specification within the CTT Environment

Especially with large specifications it is very useful to have the possibility to generate and follow some specific execution sequences or paths that are possible within a task model. Once you have specified the behaviour of a specific system, the Ctt Environment allow you to "simulate" some behaviour by means of the Task Model Simulator (**Tools | Start Task Model Simulator**). The main feature of the simulator is to enable from time to time only the tasks which are possible to execute according to the model specification and depending on the previously selected tasks.