Introduction to UPPAAL

2018.09.30

Overview

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What is State Machine?

A state machine captures the idea that a system progresses through a set of states by performing a set of actions.

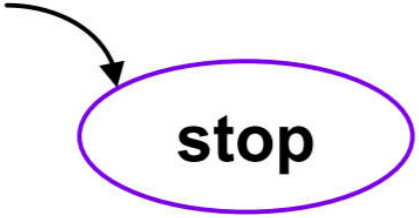
Thus there are two key concepts

- **States**
- **Actions**

How to design a state machine?

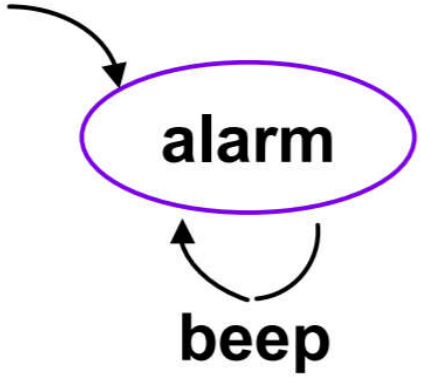
- What are the possible states?
- What is the initial state of the machine?
- What are the possible actions?
- How the state changes when actions occur?

Example



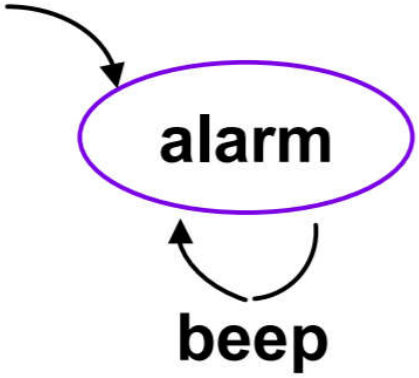
- **States: {stop}**
- **Actions: {}**
- **Initial state: {stop}**

Another Example



States=?
Initial state=?
Actions=?

Another Example



- **States: {alarm}**
- **Actions: {beep}**
- **Initial state: {alarm}**

Example: turnstile

A turnstile[1] is a gate with three rotating arms.

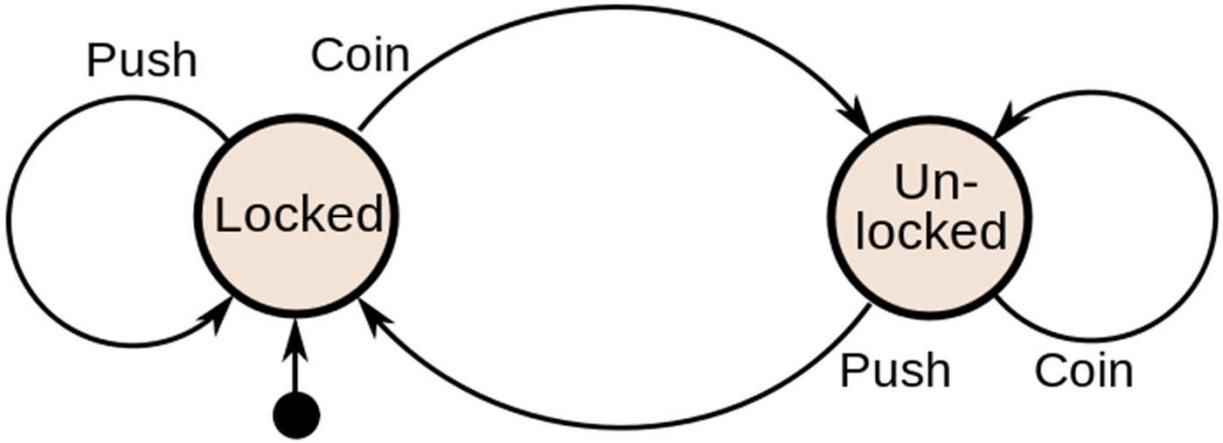
Initially the arms are locked, blocking the entry, preventing patrons from passing through.

Inserting a coin unlocks the arms, allowing a single customer to push through.

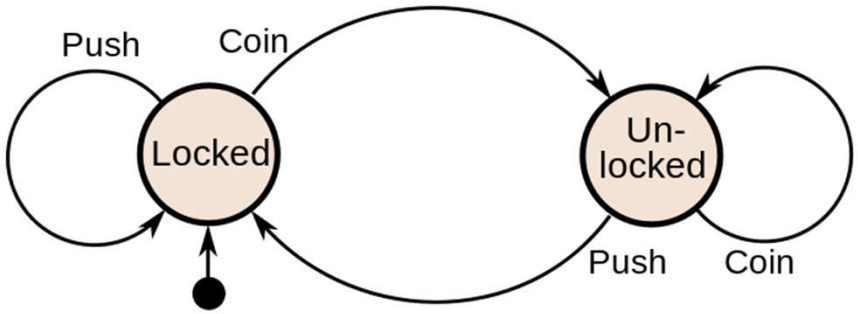
After the customer passes through, the arms are locked again until another coin is inserted.

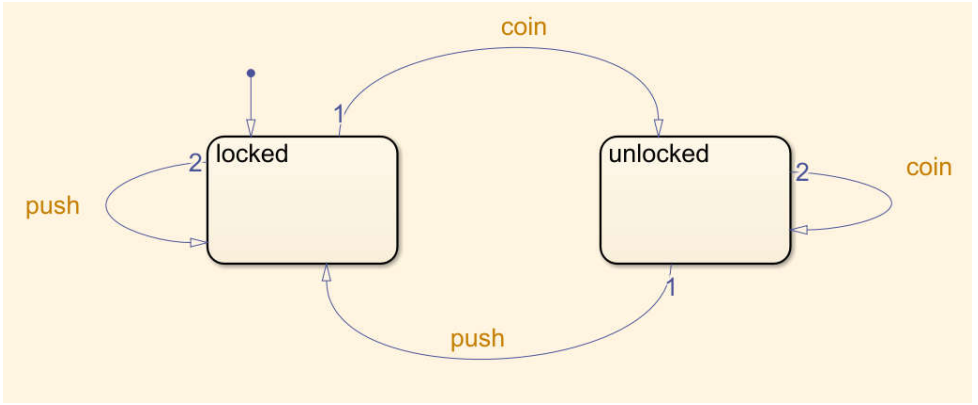
[1] https://en.wikipedia.org/wiki/Finite-state_machine

Example: turnstile



Example: model turnstile in Stateflow



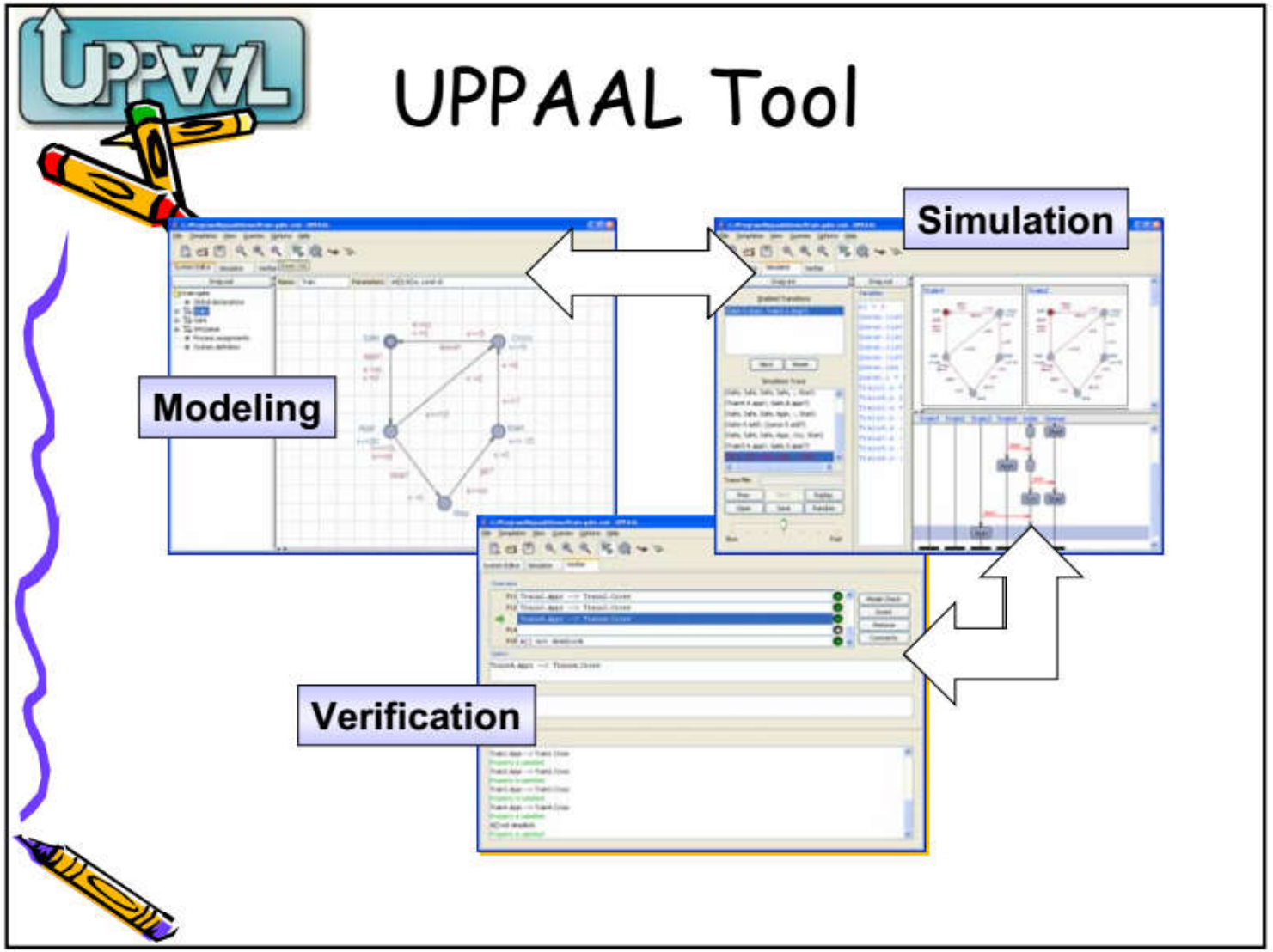


UPPAAL

- Uppaal is an integrated tool environment for modeling, validation and verification of real-time systems modeled as networks of timed automata, extended with data types (bounded integers, arrays, etc.).

- Website: http://www.uppaal.org/

UPPAAL Tool



RELATED TOOLS: TIMES | Stratego | CORA | TRON | TIGA | SMC | COVER | PORT | PRO

UPPAAL

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UPPAAL is an integrated tool environment for modeling, validation and verification of real-time systems modeled as networks of timed automata, extended with data types (bounded integers, arrays, etc.).

The tool is developed in collaboration between the Department of Information Technology at Uppsala University, Sweden and the Department of Computer Science at Aalborg University in Denmark.

Download

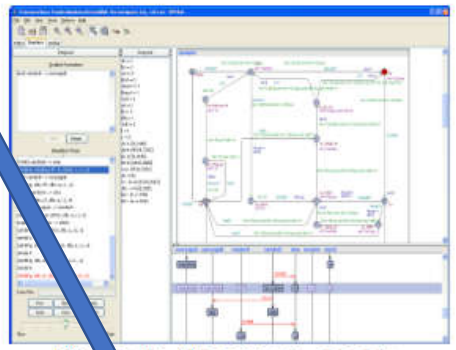


Figure 1: UPPAAL on screen.

License

The UPPAAL tool is free for non-commercial applications in academia **only**. For commercial applications a commercial license is required. Please see the Download section or www.uppaal.com for more information.

To find out more about UPPAAL, read this short introduction. Further information may be found at this web site in the pages About, Documentation, Download, and Examples.

Publications

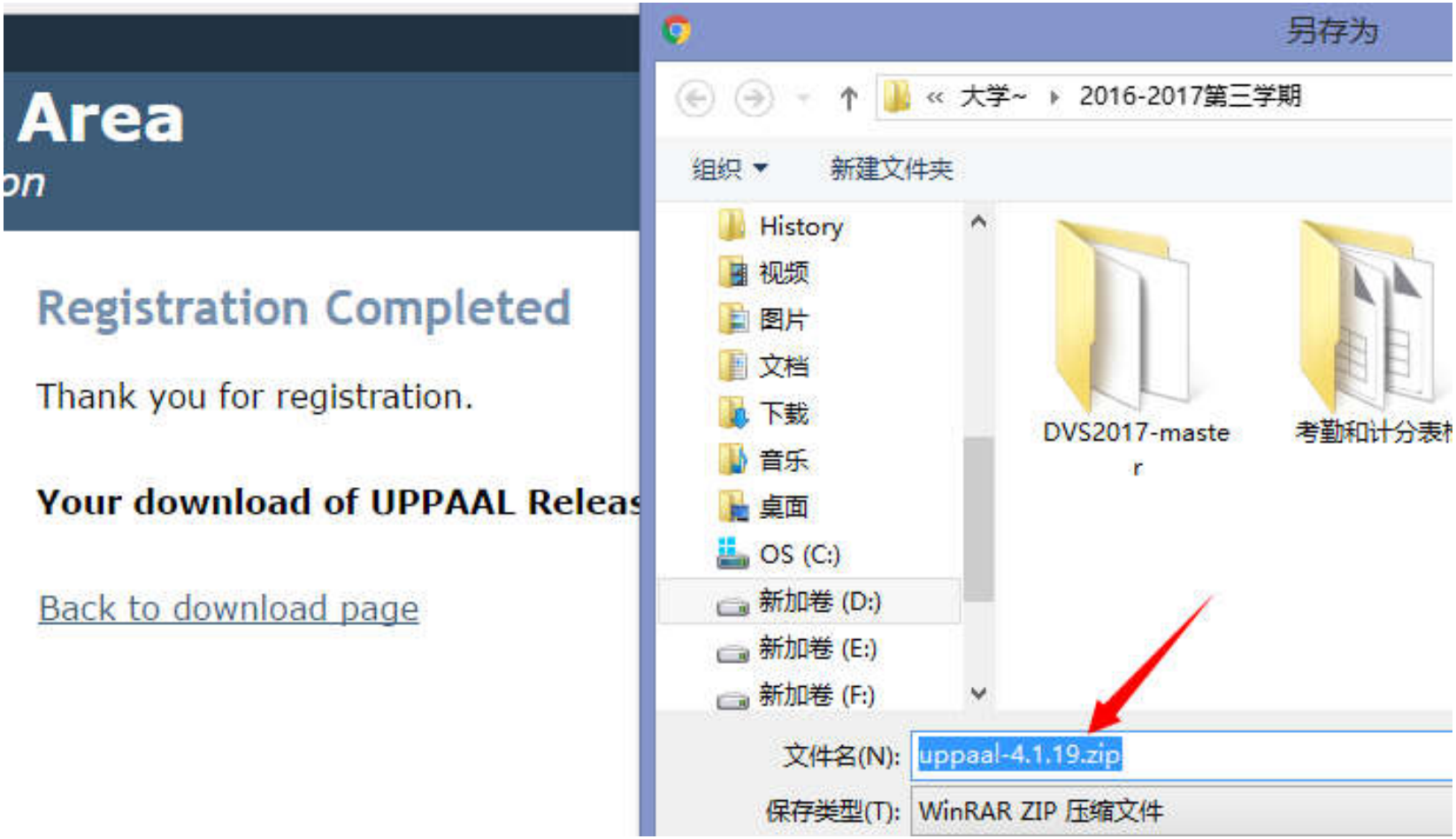
Tool

Case Studies

Installation

- Choose the version from the download area.
- Fill in the license agreement and press the "Accept and Download" button.
- Download the zip-file containing the installation files.
- Unzip the downloaded zip-file. This should created a number of files, including: uppaal.jar, uppaal, and the directories bin-Linux, bin-Win32, and demo. The bin-directories should all contain the two files server(.exe) and verifyta(.exe) plus some additional files, depending on the platform. The directory demo should contain some demo files with suffixes.xml, and .q.
- Make sure you have at least Java 7 configured on your system. The Uppaal GUI will not run without Java installed. Java for Windows and Linux can be downloaded from java.oracle.com.
- To run Uppaal on Linux systems run the startup script named uppaal. To run on Windows systems, just double-click the file uppaal.jar.

Download


Area
on
Registration Completed
Thank you for registration.
Your download of UPPAAL Releas
Back to download page
另存为
« 大学~ ▸ 2016-2017第三学期
组织
新建文件夹
History
视频
图片
文档
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音乐
桌面
OS (C:)
新加卷 (D:)
新加卷 (E:)
新加卷 (F:)
DVS2017-maste
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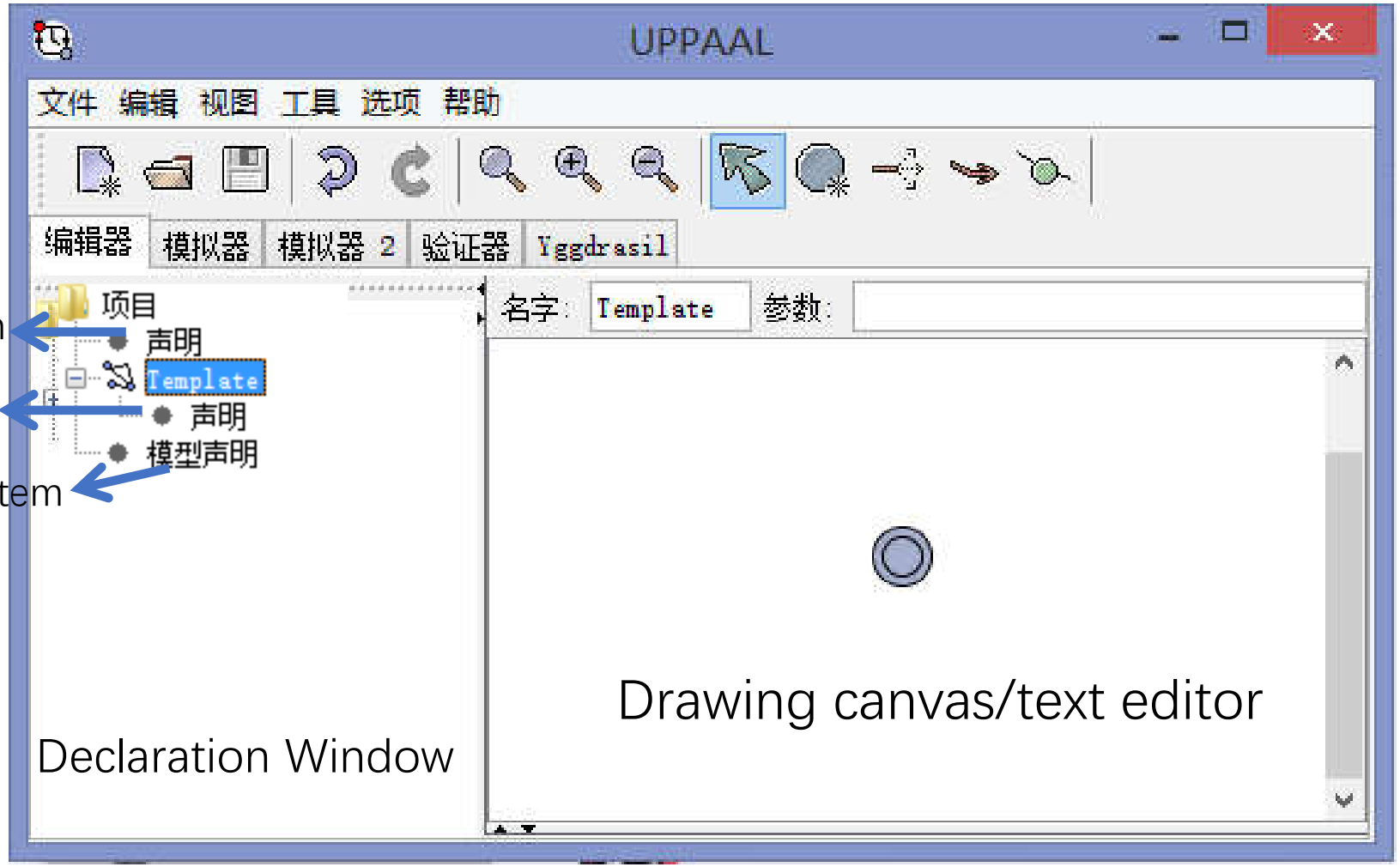
考勤和计分表
文件名(N): uppaal-4.1.19.zip
保存类型(T): WinRAR ZIP 压缩文件

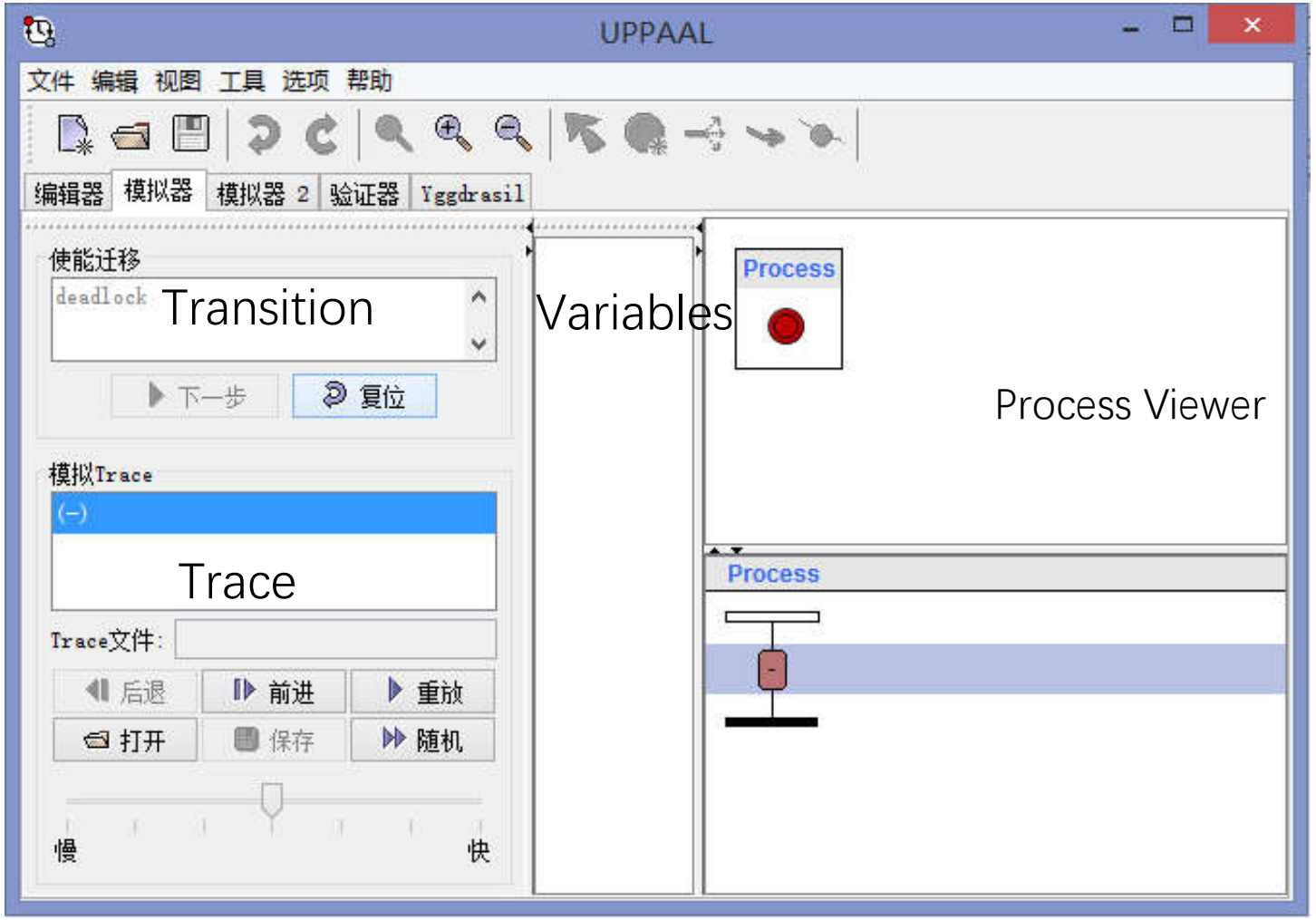
Package Folder

Click uppaal.jar to launch Uppaal

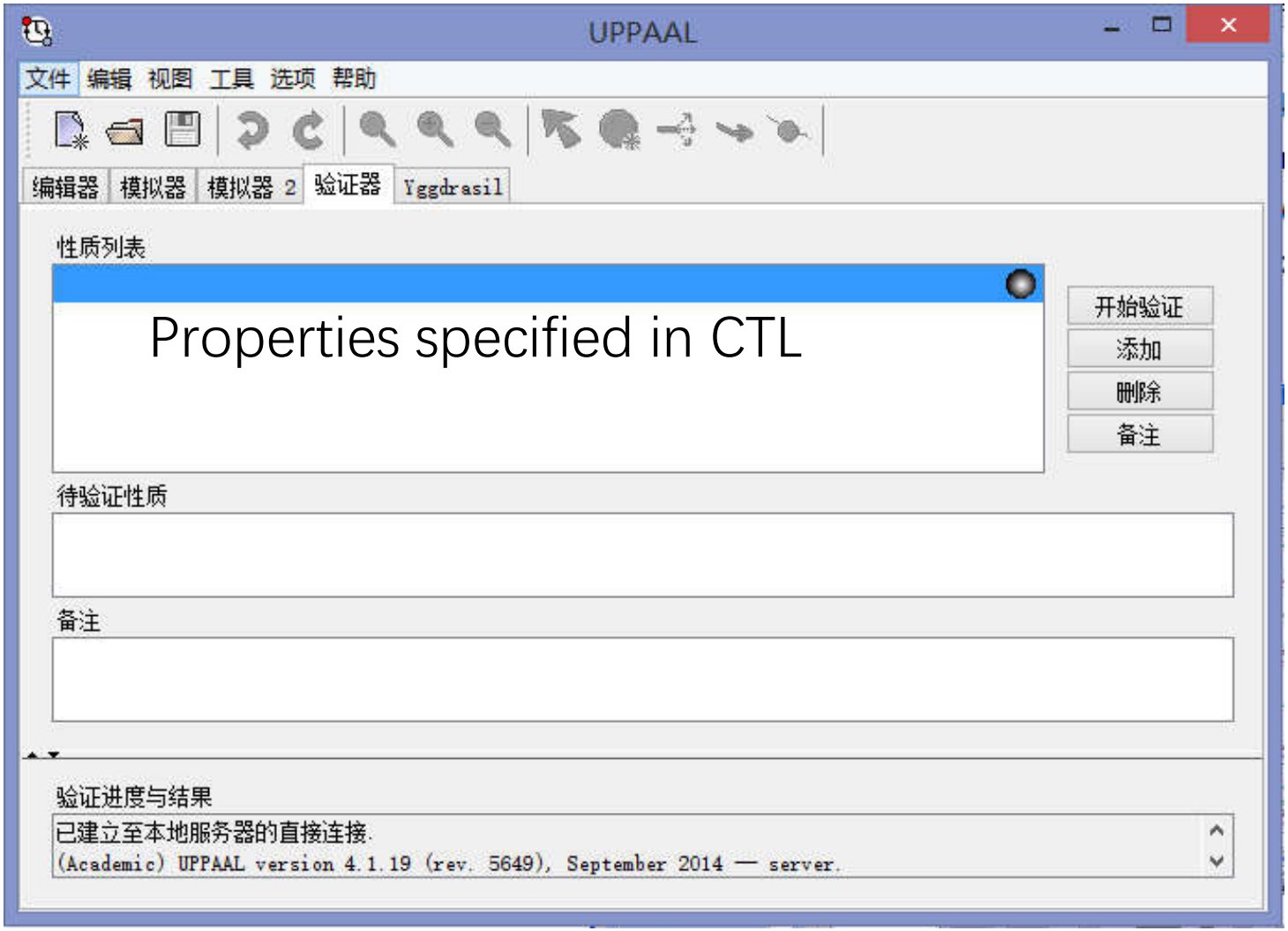
Interface


UPPAAL
文件 编辑 视图 工具 选项 帮助
编辑器 模拟器 模拟器 2 验证器 Yggdrasil
项目
声明
Template
声明
模型声明
名字: Template
参数:
Global Declaration
Local Declaration
Declaration of System
Declaration Window
Drawing canvas/text editor

Simulator


UPPAAL
文件 编辑 视图 工具 选项 帮助
编辑器 模拟器 模拟器 2 验证器 Yggdrasil
使能迁移
deadlock
Transition
下一步
复位
模拟Trace
(-)
Trace
Trace文件:
后退
前进
重放
打开
保存
随机
慢
快
Variables
Process
Process Viewer
Process

Verifier


UPPAAL
文件 编辑 视图 工具 选项 帮助
编辑器 模拟器 模拟器 2 验证器 Yggdrasil
性质列表
Properties specified in CTL
开始验证
添加
删除
备注
待验证性质
备注
验证进度与结果
已建立至本地服务器的直接连接.
(Academic) UPPAAL version 4.1.19 (rev. 5649), September 2014 — server.

Vending Machine

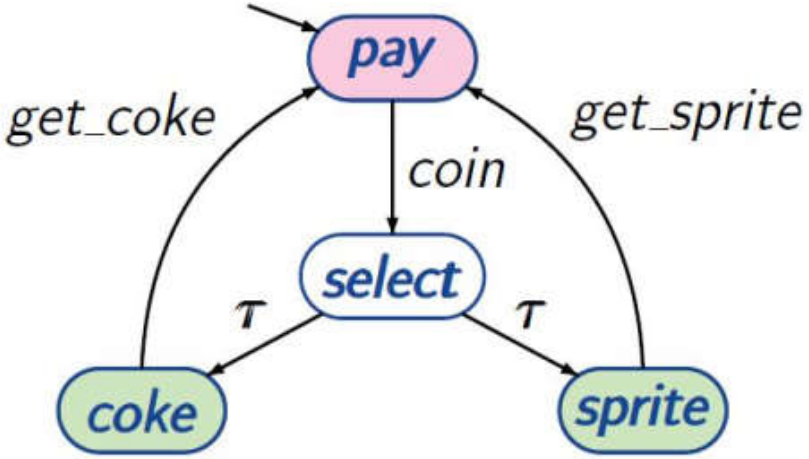
There is a vending machine selling coke and sprite.

To buy a drink, the customer needs to firstly insert coin, and then select the type of the drink.

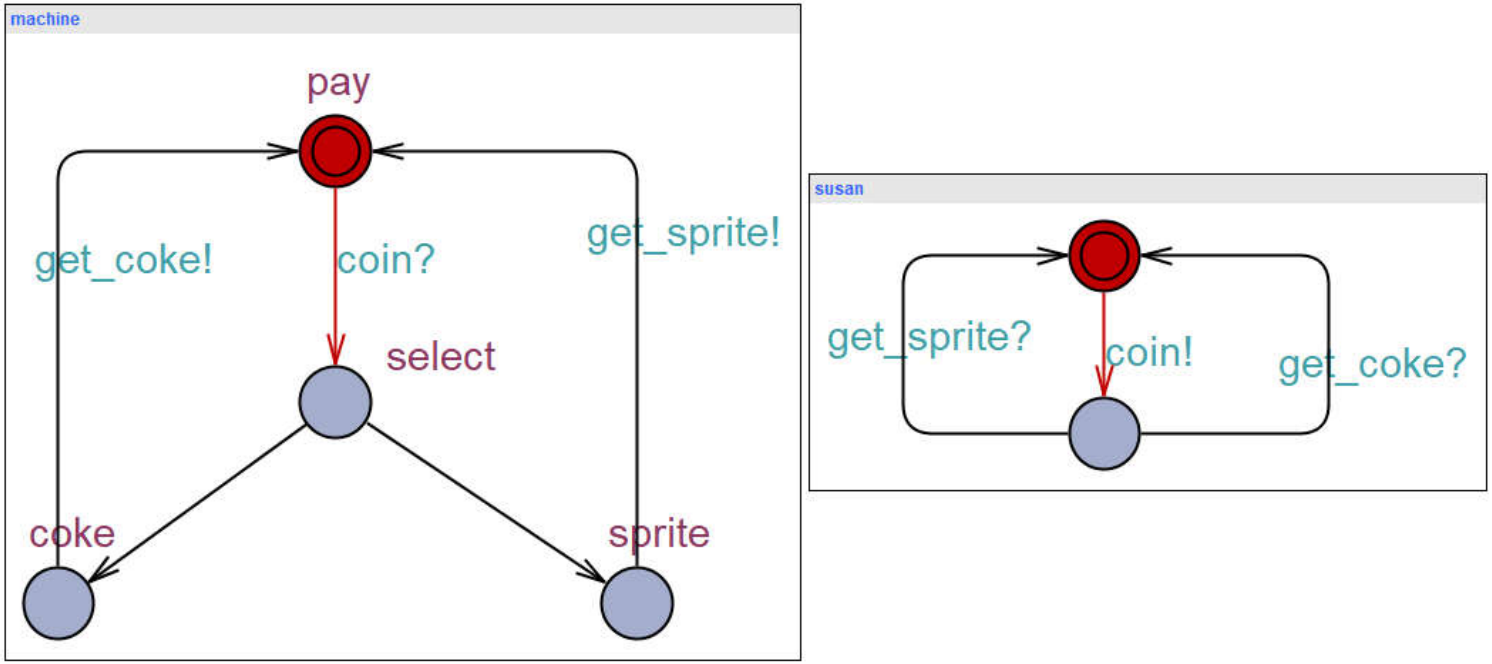
The machine will provide drink to the customer after the selection.

Inserting one coin can only get one drink.

Transition systems for beverage machine



actions:
- *coin*
- τ
- *get_sprite*
- *get_coke*


machine
pay
get_coke!
coin?
get_sprite!
select
coke
sprite
susan
get_sprite?
coin!
get_coke?

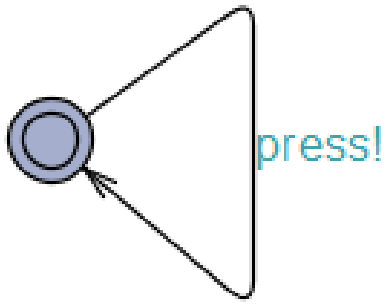
Light Control System

If the user presses a button, then the light is turned on.

When the light is on, if the user presses the button, the light becomes bright.

When the light is bright, if the user presses the button, the light will be turned off.

User



Light