ADeS – AADL Simulator

Presentation

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Interest of simulation

- Evaluation of the behavior of an AADL description
  - compatibility of deadlines, WCET, periods with schedulability
  - determination of mode changes
  - dimensionning
- Prototyping
- Validation of AADL models as soon as possible
ADeS overview (1/2)

- 1\textsuperscript{st} version developed before AADL v1.0
- Current version
  - event-driven simulator
  - developed in Java for Eclipse
  - based on OSATE
ADeS overview (2/2)
ADeS structure

- Core
- Base Simulation
- AADL
- OSATE
- ADeS

Simulation objects
Simulation events
AADL simulation objects
UI components
Standard behavior

- The simulated behavior of AADL components is based on the AADL standard, even if some details are not yet fully represented.
Currently supported AADL components

<table>
<thead>
<tr>
<th>AADL category</th>
<th>Supported by AdeS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Not yet</td>
</tr>
<tr>
<td>Components:</td>
<td></td>
</tr>
<tr>
<td>Bus</td>
<td>X</td>
</tr>
<tr>
<td>Data</td>
<td>X</td>
</tr>
<tr>
<td>Memory</td>
<td>X</td>
</tr>
<tr>
<td>Process</td>
<td>X</td>
</tr>
<tr>
<td>Processor</td>
<td>X</td>
</tr>
<tr>
<td>Subprogram</td>
<td>X</td>
</tr>
<tr>
<td>System</td>
<td>X</td>
</tr>
<tr>
<td>Thread</td>
<td>X</td>
</tr>
<tr>
<td>Features:</td>
<td></td>
</tr>
<tr>
<td>Bus Access</td>
<td>X</td>
</tr>
<tr>
<td>Data Access</td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
## AADL properties

- Every AADL properties are supported
- For each property used in ADeS, a default value is set in a configuration file
- Used properties:

<table>
<thead>
<tr>
<th>Category</th>
<th>Property name</th>
<th>Default property value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread</td>
<td>Period</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Compute_Execution_Time</td>
<td>20..20</td>
</tr>
<tr>
<td></td>
<td>Deadline</td>
<td>1</td>
</tr>
<tr>
<td>Processor</td>
<td>Preemption_Period</td>
<td>1</td>
</tr>
<tr>
<td>Bus</td>
<td>Propagation_Delay</td>
<td>1..1</td>
</tr>
<tr>
<td>Data</td>
<td>Source_Data_Size</td>
<td>1</td>
</tr>
<tr>
<td>Memory</td>
<td>Read_Time, Write_Time</td>
<td>10..10, 10..10</td>
</tr>
</tbody>
</table>
Behaviour description

- Use of an AADL annex mechanism
- Current: simple keywords "compute", "pend", "post"
- Future: support of the standard behavior annex

```plaintext
thread ThreadDest
    features
        input: in event port;
    properties
        Period => 140ms;
        Compute_Execution_Time => 41 ms .. 45 ms;
end ThreadDest;

thread implementation ThreadDest.impl
    annex behaviour {**
        compute(20);
        pend(input);
        compute(20);
    **};
end ThreadDest.impl;
```
Behaviour description check

- The feature a "post" or a "pend" refers to must appear in the features list of the component type.
- The sum of the action durations must be smaller than the compute execution time property value.
Current state and perspectives

- Simulation kernel and bases completely done
- Details to be added (some states of component...)
- AADL modes management under development
- Graphical user interface to be adapted and completed depending on industrial needs
  - Graphical representation of the simulated system
  - Display of the simulation result
Coordination with end users

- Too many things may be imagined (graphical representations, extraction of data, verifications, import/export with other tools...)

- For efficiency, we will adapt the development of ADeS to actual needs of industrial partners

- Advantages:
  - More effort for what is important
  - Adaptation of the GUI for end users
  - Adaptation with the industrial context and needs

=> Interest for partnership to support the development (contact: aadl@axlog.fr)