Petri Net assignment

Fall Term 2002

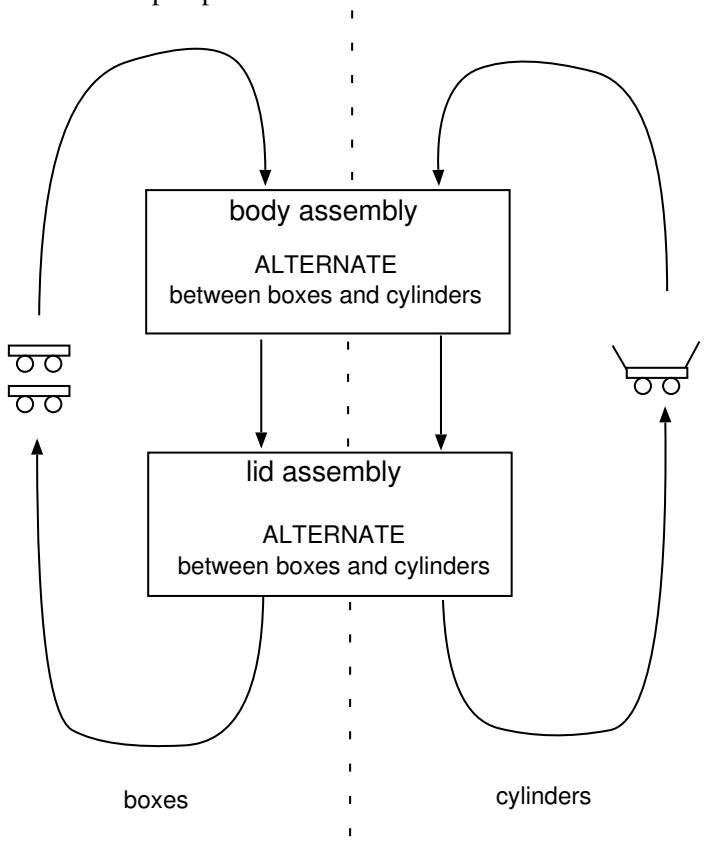
General Information

- The due date is **Wednesday 30 October 2002**, before midnight.
- Submissions must be done via WebCT. Beware that WebCT's clock may differ slightly from yours. As described on the Assignments page, *all* results must be uploaded to WebCT and accessible from links in the index.html file. There is no need to upload AToM3.
- The assignment can be made in groups of upto 2 people. It is understood that all partners will understand the complete assignment (and will be able to answer questions about it).
- Grading will be done based on correctness and completeness of the solution. Do not forget to document your requirements, assumptions, design, implementation *and* modelling and simulation results in detail !
- Extensions, if given, will involve extending not only the alotted time, but also the assignment !

The assignment

You will use the meta-modelling environment AToM^3 (which you also used for the first assignment), but now load the Petri Net formalism to interactively construct a Petri Net model.

The system to model consists of a workshop depicted below.



The workshop produces two types of products: boxes and cylinders. For both types of products, the production consists of two stages: the body assembly and the lid assembly. Body assembly and lid assembly are performed by two dedicated machines. These machines are flexible enough to process either boxes or cyclinders. The machines will each, independently, *strictly alternate* between processing boxes and processing cylinders. As they work independently, the machines do not need to be synchronized. Initially, both machines are set to process boxes. It is assumed there is an infinite supply of raw material available. The work pieces (boxes and cylinders) are transported on dedicated pallets. There are two pallets for boxes and one pallet for cylinders. The arrows between both machines indicate the moving of pallets (with boxes and with cylinders, one item per pallet). As such, there is "buffer" space between the two machines.

The assignment consists of three parts.

1. Build and document a Petri Net model of this process.
2. Perform a few simulation steps of this process and comment.
3. Build the coverability tree for this Petri Net and draw some conclusions (related to boundedness, alternation between types, invariants, ...).

Constructing Petri Net models in AToM^3

You will first need to untar the `PNModels` directory in the `AToM3.asgn` directory. `PNModels` can be downloaded as PNModels.tgz.

AToM^3 is a multi-formalism modelling environment which means it can be used to work in different formalisms. By default the Causal Block Diagram formalism is loaded.

To remove this formalism, go to File/Close formalism. Select `CausalBlockDiagram` and press `delete` and subsequently, `OK`. You will notice that the buttons on the left hand side of the canvas disappear as there are now no formalisms loaded.

To be able to load the `PetriNets` formalism, you will have to now set the search path. Under File/Options, add `PNModels` by clicking on `new`.

You are now ready to load the `PetriNets` formalism by means of File/Open formalism. Go into the `PNModels` directory and select `PetriNets.py`.

You may also wish to change the formalism which is loaded when AToM^3 starts to Petri Nets by setting `Initial Meta-Model` to `PetriNets` under File/Options.

In the `PNModels/models` directory, you will find some examples (from class).