Petri Net model of a Production System

Systeemsimulatie 2002

The assignment

You will use the meta-modelling environment AToM^3 which you can download from the AToM^3 distribution page. The system to model consists of a workshop depicted below.
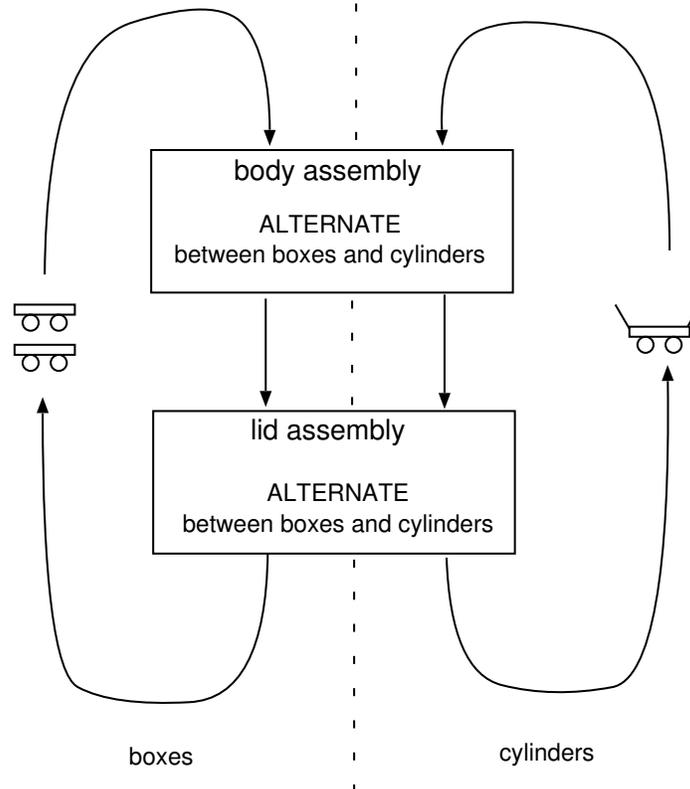
The workshop produces two types of products: boxes and cylinders. For both types of products, the production consists of two stages: the body assembly and the lid assembly. Body assembly and lid assembly are performed by two dedicated machines. These machines are flexible enough to process either boxes 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

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

To remove this formalism, go to File/Close meta-model. Select `Entity Relationship Diagram` 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.

You are now ready to load the `PetriNets` formalism by means of File/Open meta-model. 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 the Producer_Consumer_PN.py example.