

CONCURRENT SYSTEM DESIGN

SE 3BB4 - TUTORIAL

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PRELIMINERIES

- ▶ The class will be split into three groups for tutorials
- ▶ Attendance at tutorials is compulsory
- ▶ You **MUST** attend your assigned session of the tutorial
- ▶ There will be a mandatory graded quiz/exercise in every tutorial
- ▶ Total percentage for the tutorial exercise is 20

INTENDED LEARNING OUTCOME

- ▶ Introduction to Modeling and Model Checking
- ▶ Installing Model Checking tool - LTSA
- ▶ FSP Language Specification

WHY MODELLING IN SE?

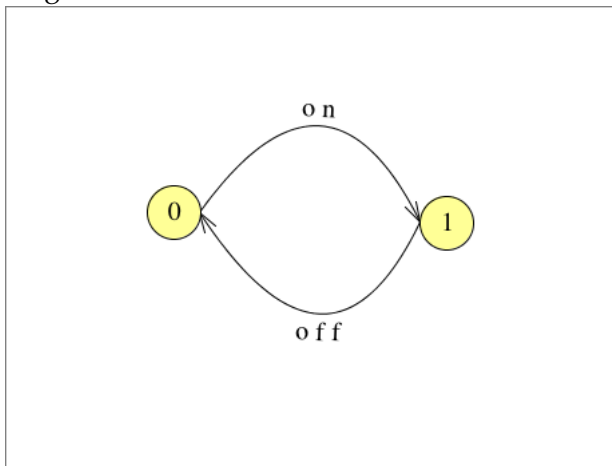
- ▶ Building analysis models early in the software lifecycle
- ▶ Models are developed shortly after the initial requirements capture
- ▶ Refined in parallel with further requirements elicitation
- ▶ Potential design problems of the proposed system can be detected early
- ▶ Modeling provides insight into concurrent behavior
- ▶ Aids reasoning about particular designs.

MODEL REPRESENTATION

Models are described using **state machines**, known as Labelled Transition Systems LTS

- ▶ Textual Representation
 - ▶ finite state processes (FSP) to model processes as sequences of actions
- ▶ Graphical Representation
 - ▶ labelled transition systems (LTS) to analyse, display and animate behavior

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- Navigation icons: back, forward, search, etc.

LTSA

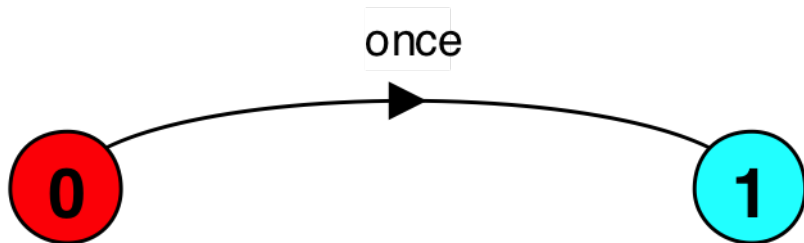
- Install the tool form the following link:

http://www.doc.ic.ac.uk/~jnm/book/ltsa/LTSA_applet.html

FSP - ACTION PREFIX

- If x is an action and P a process then $(x \rightarrow P)$ describes a process that initially engages in the action x and then behaves exactly as described by P .

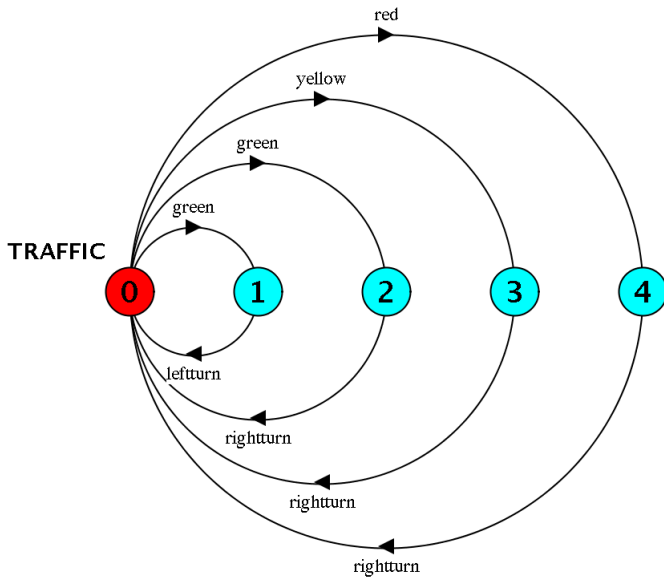
LTS - ACTION PREFIX



FSP - CHOICE

- ▶ If x and y are actions then $(x \rightarrow P | y \rightarrow Q)$ describes a process which initially engages in either of the actions x or y .
- ▶ After the first action has occurred, the subsequent behavior is described by P if the first action was x and Q if the first action was y .

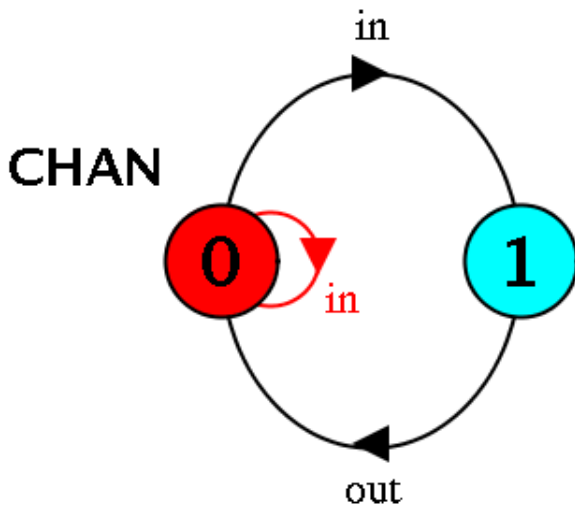
LTS - CHOICE



FSP - NON-DETERMINISM

- ▶ Process $(x \rightarrow P \mid x \rightarrow Q)$ describes a process which engages in x and then behaves as either P or Q .

LTS - NON-DETERMINISM



TUTORIAL EXERCISE

- Please give the Finite State Process (FSP) for the following LTS graph.

