Lecture 20: Discrete Event Simulators

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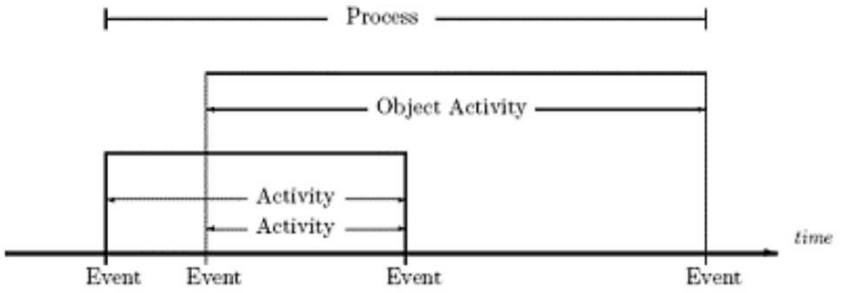
Classes of Simulators

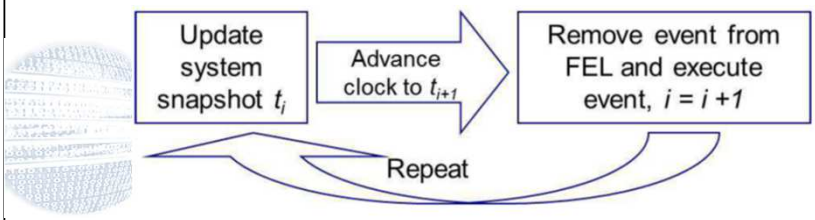
- Simulators mimic the operation of real or proposed systems.
- Discrete-Time Simulators (DTS)
  - Calculation or analysis is performed for every change in time (new time slot).
  - Similar to the one you built.
  - Applications: heat transfer, car flow, aerodynamics, etc
- Discrete Event Simulators (DES)
  - Calculation or analysis is performed at the occurrence of every event.
  - Examples of events: A phone call is initiated, packet arrives at a queue, a timeout fires, a cashier finishes serving a customer, etc.

Events



Future Event List

- A list of events pending or expected, ordered by time of occurrence is maintained.
- Called future event list (FEL).
- At any given time t, FEL contains all scheduled future events and their associated event times $(t_1, t_2, \ldots)$
- Time is progressed till the next event.



DES Applications

- Computer networks whether wired or wireless keep sending and receiving packets (events). This fits really well with DES.
- Other applications include: queuing in banks/ supermarkets. Queueing in manufacturing assembly line, call centers, etc.
- OPNET Modeler (now Riverbed Modeler)
- ns-2 (network simulator version 2)
- ns-3 (network simulator version 3)
- OMNeT++
- QualNet
- NetSim

Professional = Many Details

- Detailed packet formats
- Protocols with details from the standards
- Different types of channels
- Terrain and location
- Elaborate wireless channel propagation models
- Trajectories and mobility

Quick Demo

- OPNET
- ns-3