SYSTEM SIMULATION AND MODELLING

LECTURE 5

Section B

TOPIC COVERED: Selection of Simulation Software, Simulation in C++, GPSS, Simulations Packages, Trends in

simulation Software

Selection of Simulation Software

- Great diversity of simulation languages and tools
  - about 200 commercial tools
  - more university tools
  - few in both worlds
    - implementation, maintenance, support significant, not possible for most universities
    - often training and consulting is sold
    - but modern concepts migrate slowly in commercial products
  - survey: www.lionhrtpub.com/software-surveys.shtml
    - by OR/MS Today, every two years
    - about 50 tools, costs from $50 to $40000

Selection of Simulation Software

- Some popular packages
  - general-purpose simulation languages / packages
    - AweSim, GPSS/H, Micro Saint, MODSIM III, CACI, SES/workbench, SIMPLE++, SIMUL8, Taylor Enterprize Dynamics, ...
  - packages for manufacturing applications
    - AutoMod, Extend, Arena, ProModel, QUEST, Taylor Enterprize Dynamics, WITNESS, Plant Simulation, ...
  - packages for communication applications
    - COMNET III, OPNET, NS, OMNeT++, ...

Trends in Simulation Software

- High-fidelity
  - excellent graphics, virtual reality, accurate emulation
- Data exchange standards
  - SDX (layout of building blocks)
  - XML
- The Internet
  - client: GUI, server: simulation machine
  - models distributed on many computers
- Component libraries
  - system providers contribute models of their components
- Distributed simulation
  - DoD effort for connecting simlators: High-Level Architecture (HLA) for building and running a federation of many simulators, each modeling some aspect of a composite system
- Optimization
  - automatic search in the parameter space to optimize some measure
  - evolution strategies, neural networks, tabu search, simulated annealing, ...

Trends in Simulation Software

- Agent-based simulation
  - decentralized active objects with even more abilities: “intellect”, spatial awareness, social ability, …
- Specification languages
  - connection with application-specific specification languages
  - e.g., SDL (common in telecommunication industry) and UML
- Embedded simulation
  - simulation embedded inside other software components
  - e.g., factory floor scheduling
- Real-time decision-making
  - e.g., air-traffic control, combat decision-making
- New applications
  - e-commerce, logistics, pervasive computing, security, biotechnology, finance, …
- recent information
  - winter simulation conference, particularly tutorial papers
  - http://www.informs-cs.org/wscpapers.html