CS 6420 DISTRIBUTED SIMULATION

Semester Hours: 3.0
Coordinator: TBD
Text: TBD
Author(s): TBD
Year: TBD
Contact Hours: 3

SPECIFIC COURSE INFORMATION

Catalog Description:
Principles of distributed simulation and applications using multiprocessor systems. Synchronization and time management for distributed environments. High-level architecture for distributed simulation. Prerequisite: CS 3270 or Full Admission to MS in CS Program.

Course type: Elective

SPECIFIC COURSE GOALS

• TBD

LIST OF TOPICS COVERED

• Introduction
  o Why simulation
  o Why parallel and distributed simulation
  o Analytic simulation vs virtual environment
  o Typical applications

• Discrete Event Simulation Fundamentals
  o Basic concepts: system attribute, state variables, event list, simulation time
  o Basic mechanisms: time advance, event scheduling, inherent parallelism
  o Modeling issues and logical processes
  o Data model, probability distributions, statistics collection

• Parallel Processing Overview
  o Brief intro to parallel processing
  o Overview of cluster computing with MPI
  o Underlying technologies
  o Concurrent simulation processes

• Conservative Synchronization Algorithms
  o Synchronization problem
- Deadlock avoidance using null messages
- Lookahead and the simulation model
- Deadlock detection and recovery
- Synchronous execution
- Barriers Synchronization, Transient Messages, Time Distance between Logical Processes
- Performance issues
- Pros and cons of conservative mechanism

- Optimistic Synchronization Method
  - Time Warp
  - Rolling Back and Error Correction, Global Virtual Time, Memory Management Issues
  - Performance issues
  - Optimization techniques
  - Comparing optimistic and conservative synchronization

- Hybrid Protocols
  - Moving time windows
  - Space time simulation
  - Breathing time buckets
  - Local time warp

- Distributed Simulation Standards
  - Distributed virtual environment
  - High level architecture, HLA
  - Overview, Rules, Object Model, Run-Time Infrastructure, Communication Issues