

Theme: New Technologies

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Specific Problems

- New technologies bring research problems:
 - Simulating on the Cloud
 - Simulating on Sensor Networks
- Applications can call for need for new technologies
 - Identify new applications

Simulation on Sensor Networks

- Sensors collect data and use the data to simulate the "future". Sensors can also contain simulators
- Applications:
 - traffic simulations,
 - computer networks,
 - environmental monitoring,
 - emergency planning and response,
 - climate change, etc.

Important Issues

- How to incorporate data into potentially mobile sensors in real time
 - What if data are bad? (communication)
 - What if a sensor fails? (reliability)
 - Input modeling in the presence of correlated data streams (spatio-temporal correlation structure, incomplete/wrong information due to sensor failures, fast and energy-efficient input modeling algorithms)
- Execution Issues for centralized/decentralized simulation
 - Scheduling: how to assign processors to multiple concurrent simulations
 - Synchronization: communication among processors

Important Issues (cont'd)

- How to improve system performance
 - Replicated data, but with dependence
 - Location of sensors (dynamic vs. static optimal deployment)
 - Finite battery time of sensors should be considered
 - Modeling and optimization must be done continually due to data updates (modeling and optimization need to be done concurrently)
 - Distributed vs. centralized simulation
 - Security/robustness (a sensor may be hacked to send malicious data)
 - Detection of anomalous sensor behavior
 - Transient vs. steady-state vs. other? (nonstationarity, chaos, etc.)

Simulation on the Cloud

- Lack of community-wide simulation platforms (e.g., Hadoop)
- How to handle uncertainties in physical platform, e.g., uncertainties in timing
- Need for an economic model (*not just time*) due to CPU time cost
- Load distribution/scheduling and allocation of resources based on customers' demand
- Do replications gain advantage for steady-state simulations?
- Lots of issues from sensor networks carry over...