Parallel Discrete Event Simulation: A Pedestrian View

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December 23, 2024

Outline I

Relevance for SDA

1. Define Parallel Discrete Event Simulation
2. Space domain application
3. Parallelism challenges and opportunities

Approaches

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Original Papers

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Experiment

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Essential Background Knowledge

1. Conservative vs. optimistic mechanisms
2. Deadlock management strategies
3. Parallelism challenges and opportunities

Approaches

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Deadlock Management

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Parallelism: Problems and Promise

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Essential Background Knowledge

1. MM1 Queue Simulation
2. Traffic flow
3. Epidemic modeling
4. Predator-prey dynamics
5. Scripts: Python, Julia, Octave

Approaches

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Deadlock Management

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SIR models with discrete events

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Predator-prey dynamics

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From Toy Models

1. Conservative vs. optimistic mechanisms
2. Deadlock management strategies
3. Parallelism challenges and opportunities

Libraries

1. Adevs
2. BigSim
3. JiST

Deadlock Management

1. Adevs
2. BigSim
3. JiST

Parallelism: Problems and Promise

1. NVIDIA
2. TAU
3. Vampir

Essential Background Knowledge

1. Benefits of distributed and parallel systems
2. HPC pipelines: MPI or OpenMP
3. HPC pipelines: Coarrays
4. HPC workflows

Approaches

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Message Passing Interface: MPI

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OpenMP

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Coarrays

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Bibliography I

[1] R. E. Bryant. Simulation of packet communication architecture computer systems. Tech. rep. USA, 1977.

[2] Bernard P. Zeigler. Multifacetted modelling and discrete event simulation. USA: Academic Press Professional, Inc., 1984. ISBN: 0127784500.

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