Interaction Modeling for Independent Water and Energy Models with Distributed Simulation

Hessam S. Sarjoughian and Mostafa D. Fard
Arizona Center for Integrative Modeling and Simulation
School of Computing and Augmented Intelligence

https://acims.asu.edu
Hybrid systems have multifaceted relationships

- Relationship between independent mass-balance discrete-time Water and Energy models are formalized using Knowledge Interchange Broker (KIB) and DEVS.
DEVS Interaction Model (DEVS-IM)

- **structure, behavior, time**
- Time-based and event-driven interactions
- Lightweight I/O connectors to external simulators/systems
Conclusions

Developing heterogenous composable models pose challenges that are beyond the reach of data schemes and

- Concise syntax and operational semantics (KIB and DEVS)
- Developed using RESTful framework technology for WEAP-KIB-LEAP distributed simulation
- DEVS-IM provides model templates for WEAP and LEAP tools
- Supports partial DEVS-IM code generation for the DEVS-Suite simulator
- Supports persistent interaction models using MongoDB

Performance (water-energy simulations for Phoenix, Arizona, USA)

<table>
<thead>
<tr>
<th>Simulation Performance Measurements (seconds)</th>
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<tbody>
<tr>
<td>Direct Data Exchange</td>
<td>Algorithmic</td>
</tr>
<tr>
<td>394.5</td>
<td>975.2</td>
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</tbody>
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SW/HW platform
- Windows 10 64-bit OS
- 3.2 GHz (Intel CPU)
- 20 GB RAM

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