Ptolemy HSIM application example
Summary

• Today's complex systems increasingly require heterogeneity and hierarchy in the design process.

• A comprehensive design environment should leverage mature design capabilities and resources of both commercial and research tools.

• BDT’s extensible Ptolemy HSIM supports heterogeneous co-simulation between arbitrary design combinations from multiple tools.

• Here’s what HSIM looks like: LAN-based teleconferencing example.

• contact BDT by email: hsim@bdti.com or by phone: (510) 791-9100
  Please stop by our booth for a demo of Ptolemy HSIM.
Technical Issues

• Semantic mappings raise subtle and sometimes complex issues.
  • e.g. should a nested DE design run reactively or synchronously?
  • or, if no new data is available, but the parent requires some, what should the heterogeneous boundary do?

• Since multiple mappings may be valid, give the designer the ability to choose which is appropriate in a given design.
  • make the choice an explicit design decision
Capabilities Needed for Heterogeneous Design

- Support arbitrary combinations of designs from multiple tools - using hierarchy and heterogeneity.

- Provide for flexible semantic mapping at heterogeneous boundaries.

- Must be efficient and offer a cost-effective solution for integration of high-level design tools.

- Should be easy to use.
What is Ptolemy HSIM?

- A co-simulation mechanism that offers efficient heterogeneous interoperability to high-level design tools.
- Ptolemy HSIM includes additions and extensions to the kernel constructs.

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<table>
<thead>
<tr>
<th>SPW</th>
<th>BONeS</th>
<th>Other</th>
<th>Sim Matrix</th>
<th>Various HW simulators</th>
</tr>
</thead>
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Existing Ptolemy Kernel

SDF
DDF
DE
CP

Existing and future Ptolemy domains
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Value of Generalized Heterogeneous Design

• Benefit from using the right tool for the job.
  • natural form of expression
  • efficient simulation
  • possibility of efficient synthesis

• Gain ability to mix widely varying levels of abstraction throughout the entire design process.
  • improved prototyping at system level
  • flexible vehicle for validation at all levels

• Leverage from specialization of successful commercial tools.
  • libraries, computational models, analysis and visualization tools

• Encourage reuse of existing tools and designs.
  • a cost effective approach
Focus on Heterogeneity

BDT is focusing on Ptolemy's support for heterogeneous design.

• Today's systems are increasingly complex and are best described using multiple computational models.
  • designers gain leverage when working with a mixture of specialized tools applied at higher levels of abstraction.

• A primary technical contribution from the Ptolemy research is support for heterogeneity.
  • commercial high-level design tools offer little interoperability
Under **RASSP**, BDT is leveraging UCB Ptolemy concepts and software to bring heterogeneous capabilities to existing high-level, commercial system design tools.

- **BDT** has developed a heterogeneous co-simulation mechanism for use with existing commercial or research high-level design tools (including Ptolemy!).

- We call our Ptolemy-based, tool-independent mechanism **Ptolemy HSIM**.

- For RASSP, we are using it to integrate tools within the Enterprise framework for co-simulation.