Simulation Track

PreMaDoNa kick-off meeting

Sander Stuijk and Orlando Moreira
October 15th, 2004
Analysis and simulation?

- Analysis techniques do not exist for all relevant aspects of a system design (e.g. perceived quality);
- Simulation can be used to study system behavior for specific input stream (soft real-time);
- Confirming analysis results;
- Profiling in dynamic context for hard real-time;

**Predictability: analysis + simulation**
Design flow

- system-designer
  - functional-level
  - transaction-level
  - cycle / flit-accurate

- tasks to processors
  - memory mapping
  - system dimensioning
Design flow

- system-designer
  - functional-level
  - transaction-level
  - cycle / flit-accurate

quality: deadline misses,
number processed objects

Application
  Computation
  Communication
  Storage

Hardware
  Processors
  Network
  Memory

Timing
Resources
Energy
Transaction-level simulation

Provides quantification of relevant aspects of architecture / application combination, while abstracting from architectural details.

- C
- KPN
- CBDF
- SDF
- HSDF

Simulation:
- YAPI
- HAPI
- HAPI
- HAPI

Analysis:
- CAST
- ?
- ?
- Heracles
Simulation environment: HAPI

- Conditional boolean data flow environment;
- Model for predictable sharing of computational resources;
- Model for Aethereal guaranteed throughput channel;
- Model for mapping large data structures in a system-on-chip;
- Mixed simulation between abstract time and cycle-accurate simulators;
- Focus is on timing;
- Reconfiguration is not yet supported;
Research topics

- Statistical analysis in combination with simulations
- Code analysis / transformations
  - Block per block
  - Worst-case
  - Based on input data sets
- Mixed-level simulation
- Standardized interface between profiling tools and simulators