Fixed Priorities or EDF for Distributed Real-Time Systems?

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GOAL: to compare how FP and EDF can influence the schedulability of a distributed real-time system under a variety of conditions: different system sizes, deadline/period ratios, different lengths of end-to-end flows, ...; inspired by [1]

Example specification:
- 20 E2E flows
- Up to 8 steps per E2E flow
- 10 single step E2E flows
- 5 processors
- Maximum periods ratio = 1000
- D=Num. of steps in E2E flow*T
- FP, local and global EDF
- PD and HOSPA

Evolution rules:
- 50 seed models
- Initial and last utilizations: 40%-99%
- Utilization step: 1%
- Uniform utilization distribution

24000 tests executed
- Analysis, optimization and calculation of slacks

Computation times:
- Almost 4 months of CPU time
- Less than 15 hours of supercomputer usage

Results for an Example

Database (HDF5)
- Maximum utilizations reached for scheduling optimization techniques
- Slacks when applying schedulability analysis techniques
- Computation times for tests

GEN4MAST (Generator)

- Number of end-to-end (E2E) flows
- Maximum number of steps per E2E
- Number of E2Es with a single step
- Number of processors and networks
- Deadline and period ranges and ratios
- Type of schedulers: FP, local or global EDF

Evolution Rules
- Number of seed models with the same specification
- Initial and last utilization values (%)
- Utilization step (%)
- Utilization distribution (uniform/non-uniform)

GEN4MAST (Results Processing)

- Computation times for tests

Other MAST Tools

Model Builders
(Graphical editor, UML profile, Ada components, etc.)
Results Viewer
Simulation

MAST home page: http://mast.unican.es/