



HIPEAC²: 3rd Task Force Meeting on Reliability and Availability

Paphos, January 29, 2009

Paphos Agenda

Intro/Overview - 10min

Industrial Presentations and QA - 60min

Stelios Mamagkakis, IMEC

Davide Pandini, ST

Bilha Mendelson, IBM

Projects, consortium formation for FP7 call – 20 min

Reliability and Availability

Technology developments are presenting us with the challenge of building computer systems made of unreliable parts.

Worst scenario: **reliability constraints may obviate the benefits of technology scaling. High cost to provide reliability and availability slows down ICT and economic growth.**

Future systems need to be Dependable: ability to operate correctly and satisfactory in the presence of faults

- Online detect, repair, recover

- Reduced down time

- High dependability/euro ratio

HiPEAC's response

Task Force on reliability to promote awareness and research in this area
Orthogonal to many clusters

1st Meeting in Barcelona, 6.2008

2nd Paris 11.2008

GOALS OF THE R&A TF

Agree on the definition of terms reliability and availability

Collect/understand the constraints and requirements of applications, system, core and technology providers concerning reliability and availability

Collect state of the art and foreseeable technologies that could fulfill 2), analyze potential gaps.

Enforce awareness and promote, advance the state of the art in the techniques improving reliability and availability, both from a hardware and a software point of view.

Instruments

Regular meetings in the HiPEAC cluster context
Exposure to industrial perspective
Awareness about activities in different groups
Who is who: key players, conferences, workshops
Tutorials, workshops, conference, summer school courses
Project proposals (next FP7 call)
Contribute to the roadmap
Contribute to this TF
Other?

Messages from Meetings

If reliability not addressed adequately we will experience cost increases in computing devices and slow market growth

Overprovisioning: acceptable approach for area, energy. How much?

No single answer for all. depends on market segment. Unclear how overprovisioning scales with technology (stay same or increase)?

Different types of reliability concerns for hw and sw and
For different market segments there are different concerns with different weight

Different reliability metrics for different levels of design and market segments.

Challenge to meet the different reliability criteria in isolation and provide an overall reliable design

Solutions

Software: code reviewing process

Razor technology to catch delay bugs

redundant cores

Software aware placement to avoid mapping to defective parts.

os, compiler, and run time environment

Reliability can affect-complicate WCET analysis

Solutions Meeting

Need to design for R&A not just an add-on.
R&A design complexity may be higher than
faulty free path

Exploit zero patterns of values in datapath to
reduce what needs to be checked for short
errors

Reliability can affect both architectural and non-
architectural resources.

former necessary to protect for correctness. latter
may be to ensure good performance.

Fight process variation using adaptive body bias

NEWS

FP7 Computing Systems ICT Call:
Reliability is one of focus areas

HiPEAC Conference:

1st Workshop on Design for Reliability

Tutorial on Soft Errors Reliability by Joel Emer
and Shubu Mukherjee

Discussion

What are the major technological trends challenges that will affect reliability issues (near and mid-term)?

What are the implications of the above? Can we predict them?

- Process-variation

- Soft-errors (state and logic),

- Wear-out

- Operating below V_{cc-min}

- Manufacturing yield

How much can be taken care by process, devices, circuits people?

- Can they eliminate the problem?

What is the research role of architects, compiler, os writers?

Need synergistic solutions across different layers?

Industrial perspective

Existing solutions? Scalable?

Mobilize the HiPEAC community trying to address these issues?

FP7 ICT Call

Project, consortium formation

Todos List

Designate representatives in different clusters

Register in the R&A TF email list

Send me email with brief description of your research activity and link to your project web site

Participate and contribute in future meetings and R&A TF related events

and...

Increase R&A awareness in the other clusters and the projects you are involved

Thank you for participating!