HiPEAC Collaborating Projects

Nacho Navarro, UPC, Spain
Outline

- NSF-IST collaboration framework
- European partner: HiPEAC NOE
- Princeton – Patras
- Rutgers – UPC / FORTH
- Experiences and Remarks
• First call, June 2004
• Two HiPEAC collaborations were approved
• University of Patras – Princeton University
  – Margaret Martonosi, Princeton University, USA
  – Stefanos Kaxiras, Univ. of Patras, Greece
• U. Politecnica Catalunya / FORTH – Rutgers University
  – Liviu Iftode, Rutgers University, USA
  – Angelos Bilas, Univ. of Crete and FORTH, Greece
  – Nacho Navarro, UPC, Spain
Princeton/Patras Persons

Prof. Margaret Martonosi
Princeton University
NDP Project

Prof. Stefanos Kaxiras
Univ. of Patras
HiPEAC member
Scalable Architectures Cluster
SiSCAPE project U.of P.

Gilberto Contreras
3rd year grad. student
Princeton University
NDP Project
M. Martonosi advisor

3 months (Jun-Aug)
@ Patras
Princeton:
NDP: **Network Driven Processor**
**CMP** architecture where an intelligent
Network orchestrates execution
(scheduling of threads, communication,
thread-mapping, etc).
Network provides generality, high-performance.

Patras:
Scalable Architectures & **SiSCAPE**:
**CMP** architectures where the role of the
network is less important if at all.
Communication via shared memory.
Targeted towards embedded, low-power,
low-cost, specific (not G.P.) applications.
Lack of super ICN: low-power, low-cost,
easier to make (reliability ...)

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USA-EU Workshop
USA–EU Workshop

Collaborative Contributions

Princeton: NDP

Core Work:
Porting of embedded, media, & streaming apps to NDP

Efficient management of thread stack state.

Extension of thread-cloning concept to include dynamic data granularity management

Patras: Scalable Architectures & SiSCAPE

Embedded application mapping on an architecture with little network support
Princeton/Patras Experiences

- Student exchange is great to advance collaborative efforts (also supported by past experience between Martonosi / Kaxiras)
- Significant contributions in both ways
- Students get involved in other local activities besides main collaboration effort
  - Seeds for future collaborations
  - Joint papers in a larger context
- Reinforces relationship between primary researchers
Rutgers/UPC/FORTH Topics

- **Rutgers:**
  - Indoor-outdoor cooperative computing
  - Spatial Programming with bounded timers
  - Smart Messages (self-routing, consistency)
  - Intelligent Distributed Transportation Systems (TrafficView)

- **UPC/FORTH:**
  - Embedded High Performance Computer Architecture and Compilers
  - Runtime customization for embedded systems
  - Energy analysis at system/application level
  - Dynamic runtime for wireless sensor networks
  - Storage and High Performance communications
• Distributed computing for networks of embedded systems
  - Efficient execution using Smart Messages
• Add energy dimension to Spatial Programming model
• Expand work on Vehicular embedded systems
• Scalability issues (communication, storage, I/O, security) for mixed environments (appliances, cars, miniature devices)
• Bilateral visitor exchanges each year; write joint papers
  - One student from UPC to Rutgers during this August; from Rutgers to UPC/FORTH in Spring/Summer 2006
• Great ideas, but in this case, no previous collaboration
  – Meetings and discussions, but hard to decide on the specifics of the collaboration
  – Difficult to involve students at EU side (due to no funding)
  – Something that would not had happen without this USA/EU collaboration?

• NSF:
  – Some funding
  – Match the objectives of ITR grant; results are needed

• IST:
  – No specific funding, we depend on NSF partner, only during students exchange
  – NOE goal is to establish links for future projects
Experiences and Remarks

• The most important (and probably the only viable) thing is to work on topics of common interest

• Collaboration is something from which we can learn a lot, and for this reason there is merit into making the effort
  – But it is also a matter of bridging expectations from partners
  – Students research horizons are expanded
  – Good opportunity to agree on state of the art compatible infrastructure, for example

• Although faculty had been already in contact
  – this formal support from USA/EU institutions is very useful to set the bases for common projects