Back to the future

- Early co-design research developed HW/SW partitioning methods.
- These architectures are now embodied in platform FPGAs.
Challenges and results

• System-level performance analysis.
• Software performance analysis.
• Power analysis.
• Synthesis of multiprocessor systems.
• Software transformation and optimization.
• Communication-centric system synthesis.
Trends

- Complex multiprocessor SoCs (Viper, etc.).
- Sophisticated memory systems.
- Networked SoCs.
- Networks-on-chips.
- Configurable processors (Tensilica, etc.).
Architecture is a skill

- Brute force can be used to implement some design decisions.
- Architectural decisions can and should be made by a small group of people.
More analysis, less synthesis

- Architects need simulation and analysis results.
  - Simulation farms, efficient simulation environments.
  - Final decisions may require judgment calls.
Application-specific architecture

• People still care about cost:
  – Area.
  – Power consumption.
• There is no magic universal architecture.
• Full employment for system architects and designers.
Know your application

• Some optimizations are general.
• Some optimizations require detailed knowledge of the application.
• Middleware helps to define the system:
  – Specifies architecture.
  – Defines primitives for application code.