What is HW-SW Co-Design?

... integrated design of systems that consist of hardware- and software-components

- Analysis of HW/SW boundaries and interfaces
- Evaluation of design alternatives

Review: Target Architectures

Hardware/Software Boundaries

- General purpose systems (PC, workstation)
  - processor design:
    - processor ▶ compiler, operating system
- Embedded systems (cell phone, automotive electronics)
  - design of specialized processors:
    - processor ▶ compiler, operating system
  - system design:
    - processors ▶ dedicated hardware devices

Why Codesign? (1)

- Modern embedded systems require "design" optimization
  - many functions, great variability, high flexibility
  - heterogeneous target systems
    - processors, ASICs, FPGAs, systems-on-chip, ...
  - many design goals
    - performance, cost, power consumption, reliability, ...
- Advances in formal / automated design methods
  - automation on the system level becomes possible
  - reduction of cost and time-to-market

Why Codesign? (2)

- Optimization of the "design process"

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System Design

- Specification
- System Synthesis
- Estimation
- SW-Compilation
- Instruction Set
- HW-Synthesis
- Intellectual Prop. Code
- Machine Code
- Intellectual Prop. Block
- Net lists

System Design (i705PALM)


Course benefits? Learn about...

- ... challenges and approaches in modern system design
- ... useful design optimization methods
- ... performance estimation of distributed systems
- ... compiler/OS level optimization techniques

... a current research area