System Level Design with Embedded Platforms

Tutorial Session 3.

Friday June 9

DAC 2000

Intro
What will we learn today

- Problem definition
  - What is System Level Design
  - Productivity Gap in new Designs
- Terminology
  - Embedded Systems
  - Platform
  - Models of Computation & Models of Architecture
  - Y-chart methodology

DAC System Level Design with Embedded Platforms Tutorial

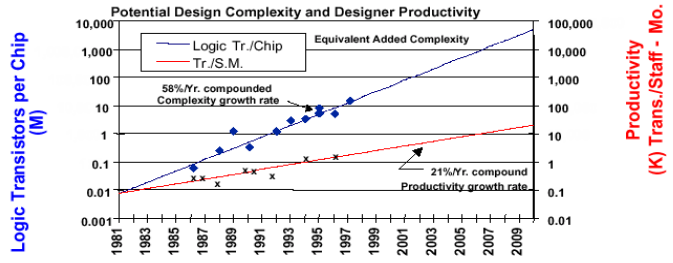
Intro
What will we learn today(2)

- Exploration in Wireless Design.
- Separation of concerns
  - Function versus Architecture
  - Communication versus Computation
  - Exploration of design alternatives
- Current System Level Design in an industrial setting
  - Video application characteristics
  - Modern CPU design
  - Multi-media platform

Intro
What will we learn today(3)

- The way applications are written have an profound impact on the system level performance and power consumption.

Alberto Sangiovanni Vincentelli

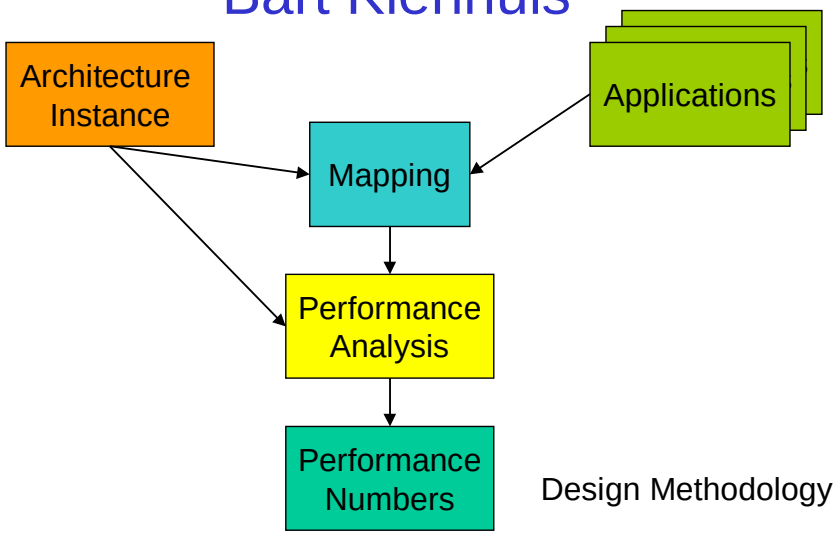


Year	Technology	Chip Complexity	Frequency	3 Yr. Design Staff	Staff Cost*
1997	250 nm	13 M Tr.	400	210	90 M
1998	250 nm	20 M Tr.	500	270	120 M
1999	180 nm	32 M Tr.	600	360	160 M
2002	130 nm	130 M Tr.	800	800	360 M

* @ $150K / StaffYr. (In 1997 Dollars)

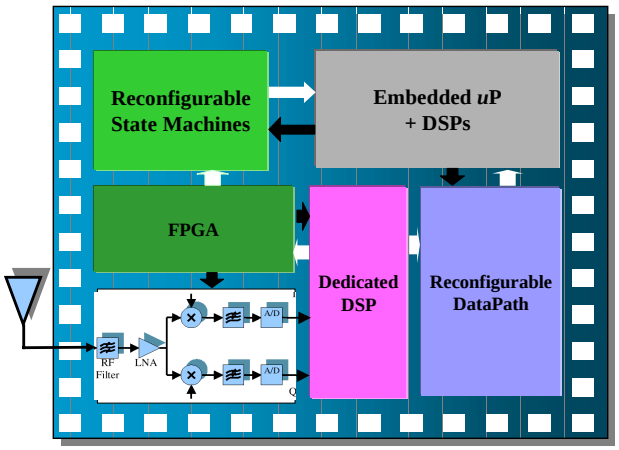
Design Productivity Gap -> reuse-> Platforms

Bart Kienhuis



Design Methodology

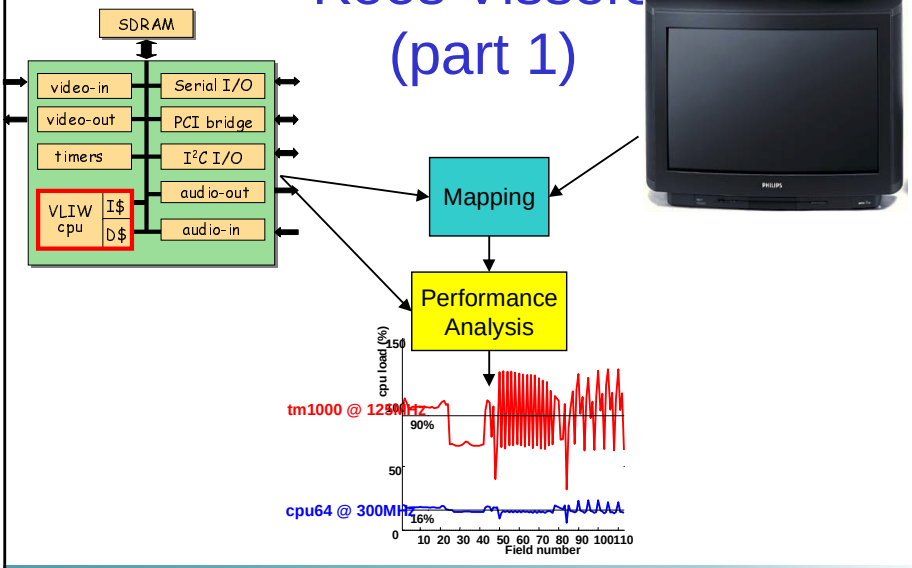
Jan Rabaey



Wireless Context

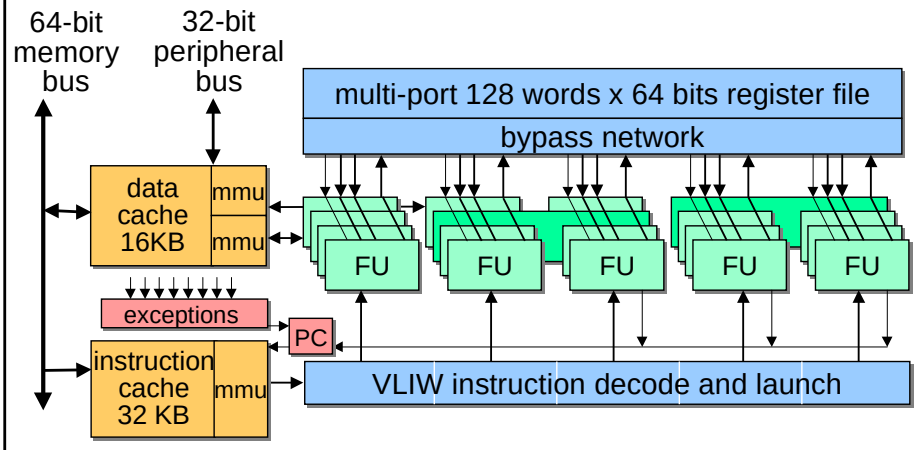
DAC System Level Design with Embedded Platforms Tutorial

Kees Vissers (part 1)



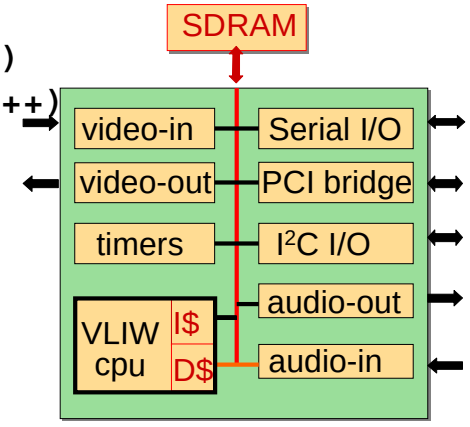
DAC System Level Design with Embedded Platforms Tutorial

Kees Vissers (part 2)



Diederik Verkest

```
for (i=0;i<n;i++)
  for (j=0; j<3; j++)
    for (k=1; k<7; k++)
      … = A[i*4+k];
```



Memory Bottleneck

Schedule Morning

- 09:10 - 10:00, Alberto Sangiovanni Vincentelli
  - "*System Design Paradigms*"
- 10:00 - 11:00, Bart Kienhuis
  - "*Y-chart methodology and Models of Computation and Architecture*"
- 11:00 - 12:00, Jan Rabaey
  - "*Embedded System Design for Wireless Applications*"
- 12:00 - 13:00 Lunch

Schedule Afternoon

- 13:00 - 13:30, Alberto Sangiovanni Vincentelli
  - "*Platform-based Design: an Automotive Example*"
- 13:30 - 15:30, Kees Vissers
  - "*Video Algorithms and Architectures*"
  - "*TriMedia CPU64*"
  - "*MPEG decoder Case*"
- 15:30 - 16:30, Diederik Verkest
  - "*Memory Organization in Embedded Multimedia Platforms*"
- Wrap-up

Special thanks to Mary Stewart (UC Berkeley) for the Artwork

DAC System Level Design with Embedded Platforms Tutorial