


Reinder J. Bril, r.j.bril@tue.nl  
TU/e Informatica, System Architecture and Networking




## Real-Time Architectures 2007/2008

### Assignments

Reinder J. Bril and Mike Holenderski

18-03-2008 1

Reinder J. Bril, r.j.bril@tue.nl  
TU/e Informatica, System Architecture and Networking




## Assignments – a recap

- Termed “Literature study” earlier, but also includes a “design study”:
- General
  - one week work (40 hours);
  - necessary for passing (!);
  - “earn” 0, 1, or 2 points;
  - report + presentation in block F;
  - groups: max size 5;
  - 5 assignments are available on StudyWeb;
  - at most 3 groups per assignment.

2

Reinder J. Bril, r.j.bril@tue.nl  
TU/e Informatica, System Architecture and Networking




## Overview of assignments

1. Study and compare 3 articles
  - H-FPPS, *independent* applications
2. Study and compare 3 articles
  - H-FPPS, applications sharing resources
3. Design a layer for PCP
  - on top of a COTS RTOS
4. Literature study concerning FPDS
  - development, architecture, application domains
5. Investigate real-time systems found in nature

3

Reinder J. Bril, r.j.bril@tue.nl  
TU/e Informatica, System Architecture and Networking




## Assignment 1

- Analysis for hierarchical fixed-priority pre-emptive scheduling (H-FPPS) for *independent* applications
  - Study and compare 3 articles from the literature;
  - Assumptions of real-time scheduling models
    - task model and budget model;
  - Implications for analysis:
    - tasks, applications, budgets, system;
  - Verify claims made in the articles;
  - Summarize your findings.

4

Reinder J. Bril, r.j.bril@tue.nl  
TU/e Informatica, System Architecture and Networking




## Assignment 2

- Analysis for hierarchical fixed-priority pre-emptive scheduling (H-FPPS) for *dependent* applications
  - Study and compare 3 articles from the literature;
  - Assumptions of real-time scheduling models
    - task model and budget model;
    - resource access protocol;
  - Implications for analysis:
    - tasks, applications, budgets, system;
  - Verify claims made in the articles;
  - Summarize your findings.

5

Reinder J. Bril, r.j.bril@tue.nl  
TU/e Informatica, System Architecture and Networking



## Assignment 3

- Design a layer for PCP on top of a COTS RTOS
  - software architecture (4+1 model of Kruchten): logical view, execution view, module view, deployment view + scenarios;
  - “provides” interface (towards applications and tasks);
  - “requires” interface (towards the RTOS);
  - sketch a design;
  - discuss whether or not semaphores are needed.

6

Reinder J. Bri, r.j.bri@tue.nl  
TU/e Informatica, System Architecture and Networking

## Assignment 4

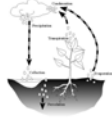
- Literature study concerning FPDS
  - Background: *motivation* for FPDS:
    - cost of arbitrary pre-emptions of FPPS, and
    - *complexity* of resource access protocols for FPPS
  - *development considerations*:
    - how to insert pre-emption points (compiler or manually);
  - *architectural considerations*:
    - pipelined processors versus general purpose processors;
    - cache memory, local memory, and global memory;
    - interrupt handling;
    - multi-processor systems, e.g.
      - DSP (as co-processor) with FPDS;
      - GPP for interrupt handling and scheduling
  - *application domains* (control versus HQ-Video)

7

Reinder J. Bri, r.j.bri@tue.nl  
TU/e Informatica, System Architecture and Networking

## Assignment 5

- Investigate real-time systems found in nature




8

Reinder J. Bri, r.j.bri@tue.nl  
TU/e Informatica, System Architecture and Networking

## Assignment 5

- Investigate real-time systems found in nature

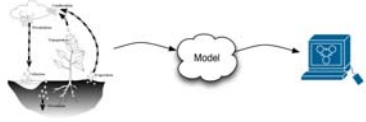


9

Reinder J. Bri, r.j.bri@tue.nl  
TU/e Informatica, System Architecture and Networking

## Assignment 5

- Investigate real-time systems found in nature



10

Reinder J. Bri, r.j.bri@tue.nl  
TU/e Informatica, System Architecture and Networking

## Assignment 5

- Investigate real-time systems found in nature
  - Study and compare 3 articles from the literature
    - or find examples yourself
  - Investigate objective function and mechanisms
  - Abstract a useful model
  - Discuss the trade-offs and define application domain
  - Sketch how you would apply the model to a particular example in IT domain
  - Summarize your findings
  - Don't be fooled!

11