

Requirements for Flexible Scheduling in Complex Embedded Systems

ARTIST2

ARTIST2 Workshop Paris (Massy)

Friday June 16 2006

- **9:30 to 13:00: Workshop**
- **13:00 to 14:00: Lunch**
- **14:00 to 16:30: Workshop**

Motivation for the workshop

Increasing complexity in embedded applications

- **Increased gap between timing requirements and scheduling services**
- **Mixture of quality of service, hard and soft real-time, and multiple resource management**
- **We need to raise the level of abstraction of the scheduling services**

Objectives of the workshop

To develop a set of requirements for building a flexible scheduling framework

- **for applications demanding various types of tasks, constraints, and scheduling paradigms within the same system;**
- **oriented towards the contract-based scheduling of multiple resources such as**
 - **processors, networks, dynamically reconfigurable modules, interrupts with time protection, shared resources with time protection, memory protection, energy/power-aware scheduling, ...**

Objectives of the workshop

The framework should address different application domains

- **industrial control systems**
- **media processing applications**
- **automotive embedded systems**
- **telecommunications**
- **artificial intelligence**
- **...**

The set of requirements developed in the workshop should allow ongoing and future research

- **to focus on the real needs of embedded systems**
- **collected from group of experts covering different expertise**

Discussion

Discussion of requirements for flexible scheduling in different platforms, application areas or technological environments

- **focused on embedded & real-time systems**
- **focused mostly on**
 - **requirements that the application may have on schedulable resources**
 - **services that the system may offer in regard to the use of schedulable resources**
- **5 minutes presentation of initial ideas**
- **open discussion and brainstorming**

Agenda

Application environments

- ***U. Kaiserslautern***: Multimedia applications
- ***Visual Tools***: Media processing applications
- ***U. York***: Artificial intelligence
- ***Thales***: Telecommunication applications
- ***EVIDENCE***: Automobile applications
- ***U. Cantabria***: Industrial automation applications

QoS management

- ***SSSA Pisa***: Energy-aware quality of service
- ***Tech. U. of Madrid***: Quality of Service
- ***Polytechnic Inst. of Porto***: Dynamic Quality of Service

Agenda (cont'd)

Support for component-based design methods

- **Thales**: Component-based framework
- **CEA**: Real-time components

Specific schedulable resources

- **Rapita Systems**: Worst-case execution time
- **U. Aveiro**: Real-time networks & distribution
- **Czech Technical University in Prague**: FPGAs, reconfigurable architectures
- **EVIDENCE**: Multiprocessor platforms
- **U. of Valencia**: Memory management