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Real-Time Architectures 2003/2004

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Summary

- Resource reservation
 - Usage of priorities
 - Motivation
 - Application domains
- A real-time architecture for MCTs
 - System requirements
 - Challenges & approaches
 - Application execution model
 - A co-operative QoS approach
 - A retrospect on real-time issues

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Resource reservation

- Usage of priorities:
 - Guarantee deadlines (FPS and DPS);
 - Assign relative priorities (FPS only);
 - Co-operation protocols (FPS only).
- Motivation:
 - Temporal protection;
 - Independent design, analysis and validation;
 - Re-use of legacy applications;
 - Quality-of-Service;
 - Hybrid open systems:
 - critical next to non-critical.

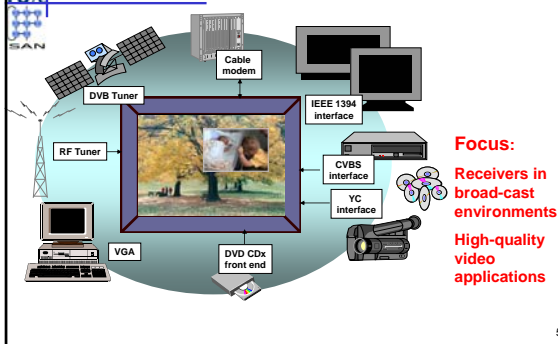
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Resource reservation

- Application domains
 - Aerospace
 - temporal protection
 - Real-time control systems
 - hybrid systems
 - Multi-media systems (all but re-use...)
 - robustness & predictability → temporal protection;
 - short time-to-market → independent development;
 - cost-effectiveness → QoS;
 - control & media processing → hybrid open systems.

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Multimedia Consumer Terminals



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A real-time architecture for MCTs

- System requirements:
 - Product:
 - open & flexible → from HW to SW;
 - robustness & predictability → temporal protection;
 - cost-effectiveness → QoS;
 - control & media processing → hybrid open systems.
 - Process:
 - product families → scalable video applications;
 - short time-to-market → independent development;
- Challenges & approaches:
 - QoS → maximize system utility;
 - mode changes → mode-change protocol;
 - dynamic load → control.

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Application execution model

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Co-operative QoS approach

- Multi-disciplinary team;
- System:
 - adaptive applications;
 - QoS-based resource management.

Global system utility control	Optimizes system utility, sets quality levels + allocates resources
Adaptive applications	
Local quality control	Provide quality levels + estimated resource req.
SVAs	
Resource manager	Provides guaranteed resource budgets

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A retrospect on real-time issues

- Real-time is a QoS parameter:
 - input shall not be missed;
 - audio is more important than video
 - audio is therefore **not** scalable;
 - audio deadlines shall not be missed.
 - deadlines of video frames may be missed (as a last resort).
- Control becomes of utmost importance:
 - control hierarchy:
 - global system utility control;
 - local quality control
- Scheduling:
 - periodic budgets;
 - asynchronous tasks (sharing a budget).

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