Integrating real-time analysis into design flows

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Integration into the design process

Translation
- Unit Testing
- Integration and Test
- Validation
- Scheduling policies
  - Architectural real-time models
  - Concurrency patterns
- System Engineering
  - Synchronization patterns
- Priority Assignment
- Sensitivity analysis

Testing
- WCET evaluation
- Generation of detailed real-time models
- High-level real-time analysis
- Identification of real-time situations:
  - Transactions
  - Timing requirements
  - Work loads

Design
- Detailed Design
- Mechanism Design
- Architectural Design
- Object analysis
- Mapping real-time properties to subsystems
- High-level real-time analysis

Analysis
- Requirements Analysis
- Schedulability analysis
- Priority Assignment
- Sensitivity analysis

Slide by: M. Drake
Integration of tools, techniques and standards

Component-Based Methods
- MDD
- UML
Deployment & Configuration
- Frameworks/C ode Generation

Validation Tools
- OS & Middleware & Networks

Hardware

Higher Abstraction Level

Non Real-Time
- Soft Real-Time
- Hard Real-Time
Integration of tools, techniques and standards

Higher Abstraction Level

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Hardware

RT-CB Methods
RT Models
UML/MARTE
RT-Frameworks
Simulation/Performance
Schedulability Analysis
POSIX/Ada/Java/RT Corba
CAN-Bus, TTP, AFDX,...
WCET
Special-purpose HW

Lower

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ACHIEVED

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Conclusion

Work in real-time systems has to pay attention to:

• More work in the methods and tools at the higher levels of abstraction

• Integration of design flows
  - models and standards

• While, at the same time, all the tool chain evolves to adapt to new hardware and implementation technology
  - multicore architectures