Presentation of Spices

Support for Predictable Integration of mission Critical Embedded Systems

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Overview of the project
Consortium and figures

- European ITEA project with France, Spain and Belgium
- Partners:
  - Airbus, Axlog, CEA, Féria, Lester, THALES Avionics, THALES communications, Verimag
  - Barco, Cetic, K.U. Leuven
  - SQS, U. Cantabria
- From 2006-09-01 to 2009-08-31
- Budget: 16 M€
The principal goals of SPICES are to extend the capacities of the microCCM component-based framework and to couple it with an AADL modeller in order to offer to system architects, software architects and applications designers a component-based modelling, design and analysis environment for distributed real-time embedded systems that should be deployed over heterogeneous targets such as GPP, DSP or FPGA.
Aimed process

1. Modeling
   - AADL

2. Verification/validation
   - formal techniques
   - simulation

3. Port on platform
   - container generation
   - SystemC generation

Need for a component

CCM Container
Organization of the project

- **WP1**: How to model CCM components with AADL 
  *(step 1 of the process)*

- **WP2**: Which verifications and validations, development of the tools to support them 
  *(step 2 of the process)*

- **WP3**: How to port on the target platform, development of the tools to support it 
  *(step 3 of the process)*

- **WP4**: Case studies

- **WP5**: Dissemination
Organization of the project

- **EXTENDED AADL**
- **AADL MODELLING TOOL**
- **VALIDATION & VERIFICATION TOOLS**
- **CONTAINER GENERATOR**
- **SystemC GENERATOR**
- **Component Descriptors (IDL3 & XML)**
- **Application Codes (components)**
- **Deployment Descriptors (XML)**
- **ADMINISTRATION**
- **EXECUTION**

**WP1**
- Extended AADL
- Validation & Verification Tools

**WP2**
- AADL Modelling Tool
- Component Descriptors (IDL3 & XML)
- Container Generator
- SystemC Generator
- Containers Code
- DEV TOOLS (Compiler / Link Edit)

**WP3**
- Deployable Components & Containers
- Application Codes (components)
- Deployment Descriptors (XML)
- Administration

**SystemC**
Outputs

- Modeling CCM with AADL
  - Method guide, new property sets, new annexes
  - Verification/validation tools integrated with OSATE
    - Simulation
    - Qualification of CCM components
    - WCET measure and prediction
    - Power consumption prediction
- Porting on target platform
  - Generation of CCM descriptors
  - AADL to SystemC translator
Contributions to AADL

- Static properties
  - Modeling CCM
  - Power consumption
- Dynamic properties
  - Behavior annex
- Core language improvement
  - Feedback from case studies
- Tool developments
- Dissemination and promotion
Preliminary requirements for AADL
Some general requirements expressed by partners

- Describe the behavior of the system external environment
- Describe the main temporal constraints and/or performances of the system
- Hierarchically design the system as a component-based application
- Describe hierarchically the hardware architecture and its associated runtime environment
- Specify the deployment plan of the application on the hardware architecture and its runtime environment, including dynamic reconfiguration constraints
Impact on AADL

- Need for a **methodology** to use AADL
- Modeling of CCM components and interfaces (facets/receptacles and event exchanges)
  - Impact on subprogram concept
- Modeling of hardware aspects
  - Problem with current semantics rules of devices
  - Support for DSPs, FPGAs, ASICs, etc.
- Many new specific AADL properties
  - Temporal constraints, power consumption, etc.