AUTOMOTIVE USER PROFILES
FLOWS AND TOOLS - OVERVIEW

Cadence Automotive Tiger Team
SAFETY CRITICAL DISTRIBUTED SYSTEMS DESIGN CHALLENGES

- *Early* Distributed Architecture Adoption
- *Late* Distributed Architecture Physical Validation
  - Sub-Systems’ Integration Issues Discovered Late
  - Robustness to Faults Checked Late
VIRTUAL INTEGRATION BASED FLOW

- Design Exploration, Validation and Optimization of Distributed/Safety Critical Applications via
  - Early Virtual Integration of Sub-Systems and Network Buses → Virtual Prototyping
  - Early Fault Injection on a Virtual Prototype of the Application → Analysis in Regular and Faulty Conditions
• Enabler of the Design Contract between system architect and SW developer, OEM and Tier1 Supplier
  – Early sub-system SW development before the other sub-systems are available as HW components

• Support for design refinement from specification to implementation
**Distributed System Architect and Integrator**

- Definition of Target Distributed Architecture Implementation for the Distributed Control Algorithm
- Allocation of Control Algorithm Sub-Functions to Sub-Systems
- Allocation of Local Constraints to Sub-Systems from Global Constraints (e.g. bit/sec, requirements)
- Integration of Sub-Systems
- Optimization of Target Distributed Architecture (e.g. fewer ECU’s)
- Fault Injection and Analysis

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**ECU Architect and Integrator**

- Definition of ECU Architecture
- Definition of the HW/SW partition
- Optimization of ECU Architecture (e.g. cheaper, fewer CPU’s)
- Allocation of local Constraints to CPU’s from ECU Constraints
- Integration of HW and SW
- Fault Injection and Analysis
TOOLS

For the Distributed System Architect
Virtual Integration Platform for the Definition, Integration, and Verification of Automotive Safety Critical Distributed Applications

Import/Export Capabilities
Enabler of the Design-by-Contract

For the ECU Architect and Integrator
Virtual Integration Platform for the Definition, Integration, and Verification of HW/SW ECU Implementations
**Distributed System Architect and Integrator**

- Definition of Target Distributed Architecture Implementation for the Distributed Control Algorithm
- Allocation of Control Algorithm Sub-Functions to Sub-Systems
- Allocation of Local Constraints to Sub-Systems from Global Constraints (e.g. bit/sec, requirements)
- Integration of Sub-Systems
- Optimization of Target Distributed Architecture (e.g. fewer ECU’s)
- Fault Injection and Analysis

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**ECU SW Architect**

- Definition and Validation of Sub-System Control Algorithm
- Implementation of ECU SW
- ECU SW Validation against (Real-Time) Constraints
For the Distributed System Architect

Virtual Integration Platform for the Definition, Integration, and Verification of Automotive Safety Critical Distributed Applications

Import/Export Capabilities

Enabler of the Design-by-Contract

For the ECU SW Architect

Design-by-Contract Enabled Platform for the Validation of Safety Critical ECU SW Implementations