Volvo use case overview

EMC2 @ Artemis Technology Conference

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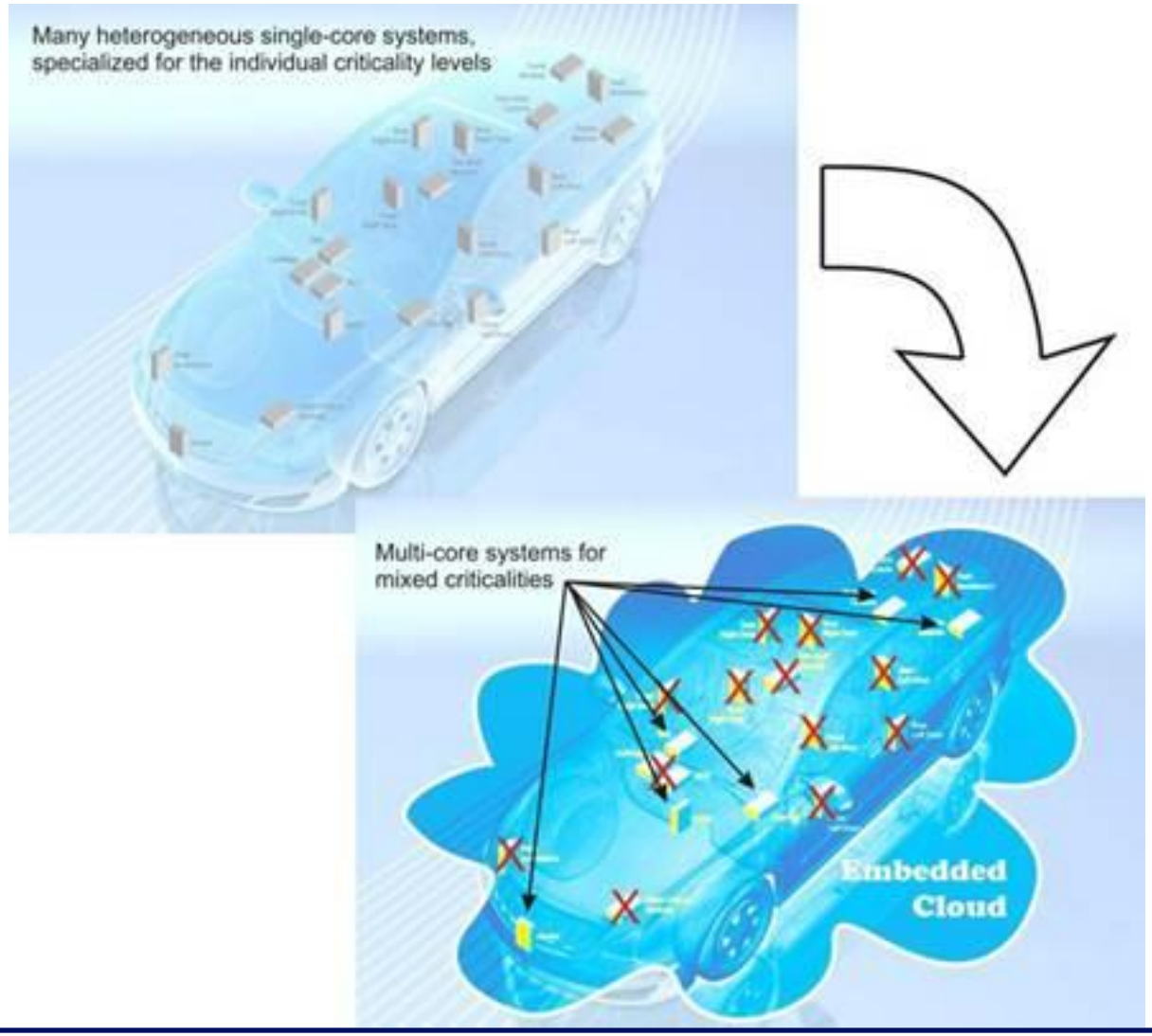
Vision for automotive



By using multicore technology:

decrease the number of ECUs,

homogenous ECUs,

and ECUs with the capability to execute applications of mixed criticality level.

EMC2 Industrial domains - Living Labs – Use Cases

- **WP7 LL Automotive (Volvo)**
  1. **ADAS and C2X, TNO**
  2. **Highly automated driving, IXION**
  3. **Design and validation of next generation hybrid powertrain / E-Drive, AVL**
  4. **Modelling and functional safety analysis of an architecture for ACC system, CRF**
  5. **Infotainment and eCall Application Multi-Critical Application, CSoft**
  6. **Next Generation Electronic Architecture for Commercial Vehicles, Volvo**
- WP8 LL Avionics (Selex-ES)
  7. Multi Domain Avionic Architecture, SELEX
  8. Hybrid Avionics Integrated Architecture, EADS
- WP9 LL Space (Thales)
  9. MPSoC Hardware for Space: TASE
  10. MPSoC Software and Tools for Space, ITI
  11. Payload Applications, TASE
  12. Platform Applications, TASI
  13. Spaceborne Radar Applications, TASI
- WP10 LL Industrial manufacturing and logistics (Danfoss)
  14. Electric drives, Danfoss
  15. Short range passive ID, IFAT
  16. Identification/authentication, NXPGE
  17. Tracking, ACORDE
  18. Manufacturing Quality control by 3D inspection, ITI
- WP11 LL Internet of Things (Quobis)
  19. Multimedia communication WEBRTC, Quobis
  20. Open deterministic networks, TTT
  21. Autonomic home networking, HUA
  22. Ultralowpower high datarate communication, BlueICe
  23. Synchronized low-latency deterministic networks, 7S
- WP12 LL Cross domain applications (Fornebu)
  24. Seismic surveying by ship, WG
  25. Video surveillance for critical infra¬structure, eVision
  26. Signal, image and video processing, BUT
  27. Self-aware camera system, AIT
  28. Access control and situational awareness, HIB
  29. Biometric access control system, eVision
  30. Medical imaging, Philips
  31. Control applications for critical infrastructure, ABB
  32. Railway applications, TAT

Volvo Use Case:
Next Generation Electronic Architecture for Commercial Vehicles

- Currently on-going activities
  - Architecture topology
  - Allocation and scheduling of single core SW to multicore
  - Service-oriented Architecture (SoA)

Architecture topology

Going from

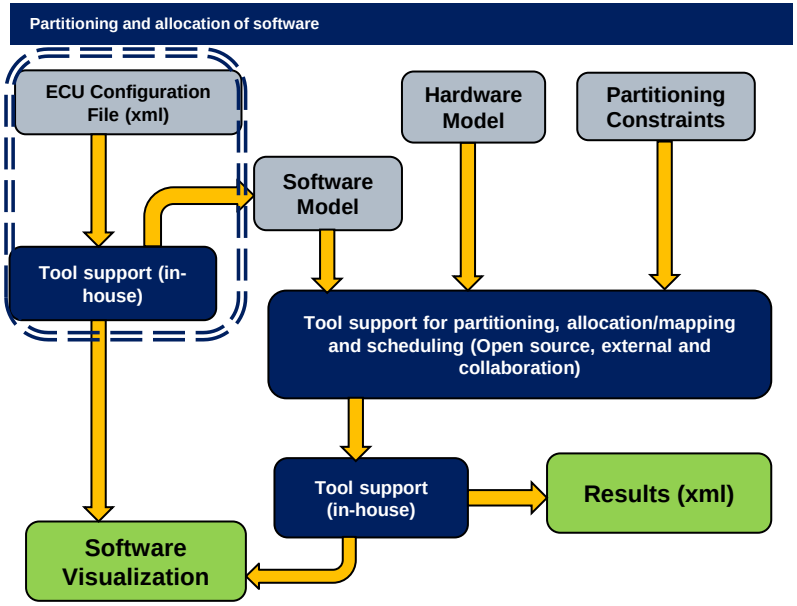
- Todays heterogeneous distributed architecture
  - One function per single core ECU
  - Fast functionality growth = Fast increasing number of ECUs
  - I/O on most ECUs
  - CAN based

to

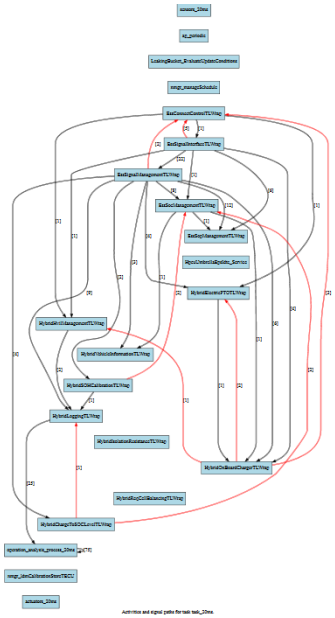
- Homogenous centralized architecture
  - By utilizing multicore and technology for mixed criticality
  - All application software move to computational node
  - No I/O on computational node
  - All I/O on simpler I/O nodes
  - Ethernet based
  - Scalable

Allocation and scheduling of single core SW to multicore

- Method and tool
WP3/DTU and WP7/VOLVO

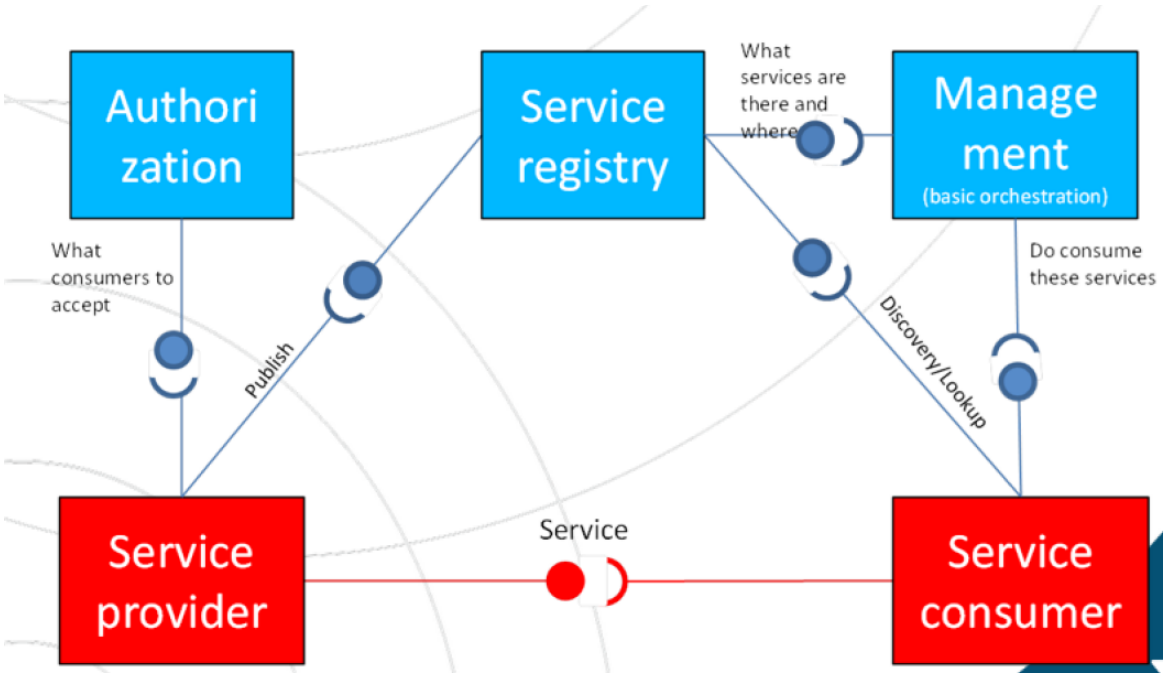


- Resulting graph, task view

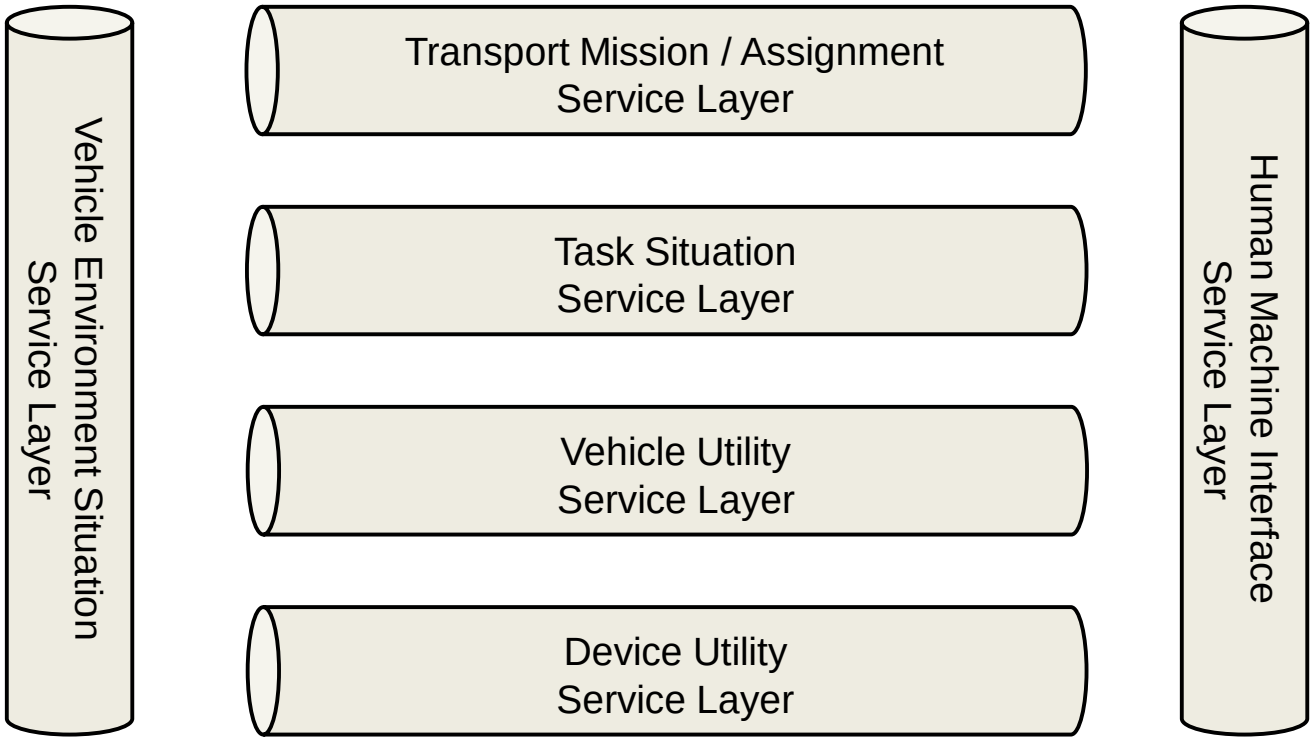


- Resulting task allocation three cores

Service-oriented Architecture: Architectural principles and building blocks



Service-oriented Architecture:
To be combined with the Functionality Architecture



Service-oriented Architecture: Service objects in Functionality Architecture

- Demo of Climate Control developed in cooperation between LTU and VOLVO
- To be demonstrated by Atul Yadav