OS-9 in Automotive Applications

OS-9 Technonolgy Day

Realtime Requirements in Automotive

Echtzeit Anforderungen in Automotive Designs

Marketing vs. Technics

Can OS-9 help:

- Get better business
- Get shorter project times
- Integrate new hardware

Automotive Realtime

- Situation Today
- Special Requirements in Automotive
- OS-9 in Automotive
- Future

Situation Today HW

- More than 40 control units in one car
- High end control units based on 32bit controllers from Freescale (PowerPC MPC5xxx), Infineon (TriCore) , TI (TMS4xx)
- Deeply Embedded controllers with Flash and all peripherals on Chip
- Standard communication interfaces like CAN, LIN, MOST, …
- High volume makes serial cost very important
- New controllers are coming from communication and other industries

Current Situation SW

- Control units running realtime operating system (OSEK)
- Static operating system requires complete compilation
- Tpyical Tasks are activated by time schedule (1ms / 10ms)
- Communication interfaces like CAN, LIN, MOST, … are driven by customer software. So called „drivers“ are supplied by external sw companies
- Complexe Software Development is done with high level tools (Matlab, …)

Current Situation SW

- OSEK is a static operating system
- OSEK contains well defined communcation interface layer (COM)
- OSEK is static
- No data protection, no user/supervisor support…

=> What more arguments for OS-9?

Real Products

- Hybrid car control unit with OS-9 on MPC555
- Realized in 2000 from Compact Dynamics
- Supports full Power Management and Engine Control
- Interfaces: Ethernet, CAN,…

Real Products

- Engine control unit for Motorsports
- Dual core MPC565
- Supports all fuel engines from 4 up to 10 cylinder
- OS-9 with 1ms tick
- Communication interface drivers running in tasks and using events for other task activation
- Different user/group for data protection

- Advantage for the customer
- Very short development time
- Exchange of single tasks in running system
- Process communication interface to peripherals

Real Products

- High Speed Measurement Application in automtive environment
- First Ethernet – in – Car Application on IAA 2001

=> See presentation from H.Styrsky (Compact Dynamics)

Real Products

- Automotive Evaluation Plattforms for MPC555…MPC5554 from KANIS:

Freescale 5554 CPU, 150MHz
Flash FPGAs
Burst Flash 8MB,
2xBurst SRAM 4MB
3xCAN,
Ethernet 100Mb, twisted pair
Serial V24 and RS485 interface,
QSPI serial high speed interface
2x16 digital I/O, 48 A/D inputs
40 timer, counter, PWM
Debug interface: Nexus
Multi layer board, 160x100mm,
Power Supply +8V..25V
Expansion connectors
OS-9 BSP available

Future

- HW Automotive

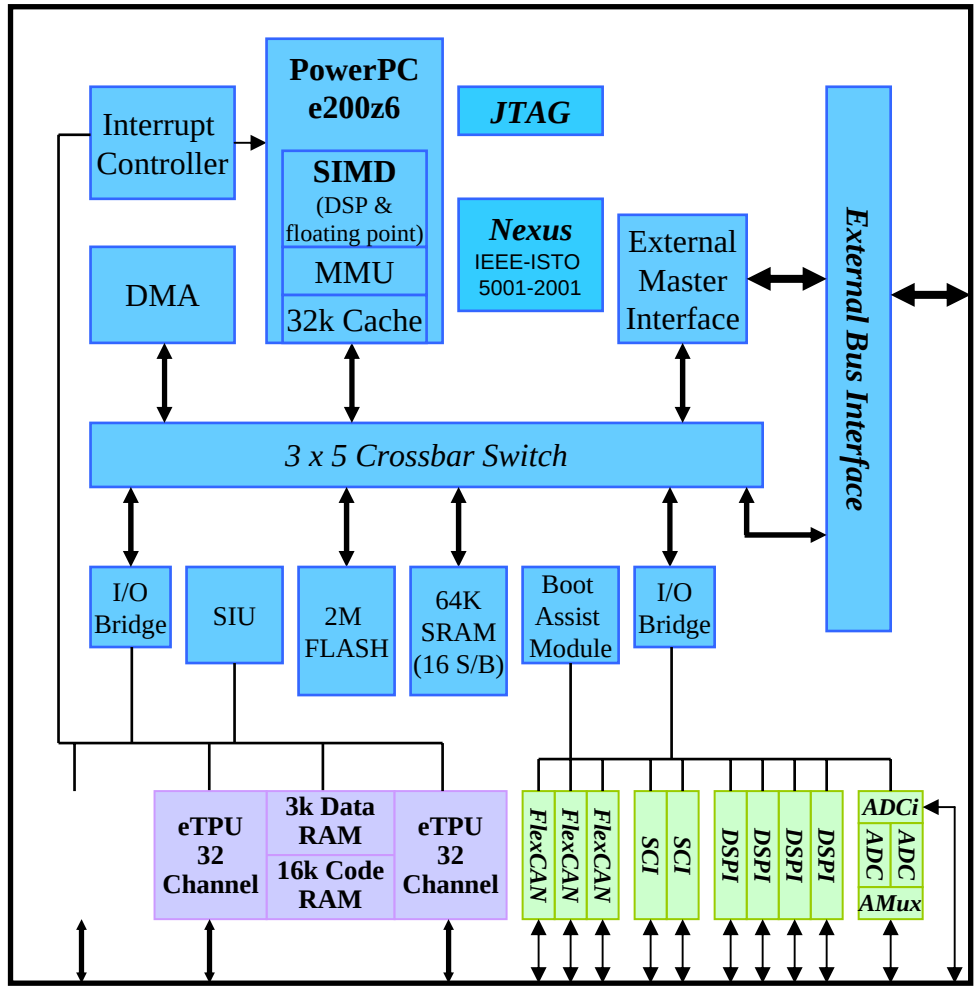
- SW Automotive

HW Future

- Automotive Volume ist not driving Microcontroller technology
- New processors in automotive will have:
  - MMU
  - Cache
  - Dualcore
  - Ethernet

HW Future

- MPC555x
- 2MByte Flash on Board
- CAN, LIN, Flexray and Ethernet on Board
- MMU on Board
- Cache
- OS-9 support



SW Future: Autosar

- New opearting system requirements must support :
  - Independent memory areas for Tasks
  - Data protection
  - Extended process communication
- Automotive industries is working on AUTOSAR 2.0 specification

Autosar Future

- AUTOSAR is defined for :
  - Add tasks from different suppliers to on control unit
  - Protect data areas
  - Protect operating system from user tasks
- OS-9 gives this all!
- But: …

Company Profile

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- OS-9-System Solutions for Embedded Applications
- OS-9- BSP for new Freescale Controllers (PPC)
- Complete Systems, e.g. 55xx-EMUF with SW
- Assistant Professor at University of Applied Science Munich