Operating Systems for Cars

Patrick Shelly
Senior Solutions Architect
Mentor Graphics Corporation
Mentor Graphics

- Electronic design automation (EDA) industry pioneer
- Global innovator of advanced design solutions
- Over 5,200 employees worldwide
- Market Share ~24% of worldwide EDA market
- Revenue of $1.18B in FY 2013, Approximately 60% revenue Non-US
Mentor Embedded Portfolio

Professional Services & Partner Ecosystem

Integrated Toolchain
- Compiler, Debugger
- Simulation, JTAG
- Runtime Optimized
- Advanced Analysis

Custom Toolchains
- Compiler, Debugger
- SDK

Integrated Graphical User Interface
- Connectivity
- File System
- Security
- Nucleus® RTOS
- Process Model
- Power Aware Microkernel
- GENIVI™ Compliant
- Commercial Support
- Profiling & Analysis
- Linux®
- Fast Boot
- Yocto Project™ Compliant
- Android™
- Platform Optimizations
- Hypervisor
- ARM® TrustZone®
- Hypervisor

Hardware Platform & BSPs

ECU Tools
- Architect
- COM Design
- Build
- Integrator
- Synthesis

AUTOSAR
- VStar BSW

mentor.com/embedded
Operating System Trends

- Cockpit electronics trend toward open source
  - Systems are becoming mature, many successful approaches
    - QNX, Microsoft, Linux, others
  - Beginning to see Open Source mandate for cost reasons
    - Including Android

- Standardization for “underhood” electronics
  - Beginning to see increased OEM adoption of AUTOSAR here

- New ADAS features appearing
  - Many have strict safety requirements (including ISO 26262)
  - Seeing AUTOSAR and other RTOS here, Linux for prototypes
  - Also driving new vehicle network architectures

- EV often offers opportunity for clean-sheet designs
  - Great examples include new digital instrument cluster designs, HEV powertrain, and battery
Vehicle Networks

- Networking is often considered a core component of the operating system
  - “Network Operating System” is a term used frequently
  - Networks are closely tied in to the bootloader
  - Now seeing software update and FOTA requirements

- Conventional vehicle networks include CAN, LIN, and FlexRay

- Ethernet is rolling out, largely for diagnostics

- Ethernet AVB is also being embraced
  - Replacement for MOST for traditional multimedia applications
  - Also enabling new architectures including
    - Rear view cameras and other video sensors
    - Restructuring/optimization of the traditional multimedia systems
Android for Cockpit Electronics

- Open Automotive Initiative launched in early 2014
- Competing with Apple approach
  - Apple sells hardware, not always open to licensing software
  - Google more open to software licensing
  - Both seems to be supporting “projection” technologies for device connectivity
- Android: The Automotive Use Case
  - Native Android seems to be rolling out
    - Hypervisors for next generation
  - Shortcomings in connectivity
    - USB Host v. Device
    - Pairing with other devices, including Apple and Microsoft devices
    - Access and security for in-vehicle networks
  - Driver Distraction considerations