



osCAN

Embedded Real-time Operating Systems

> **OSEK/VDX**  Specification

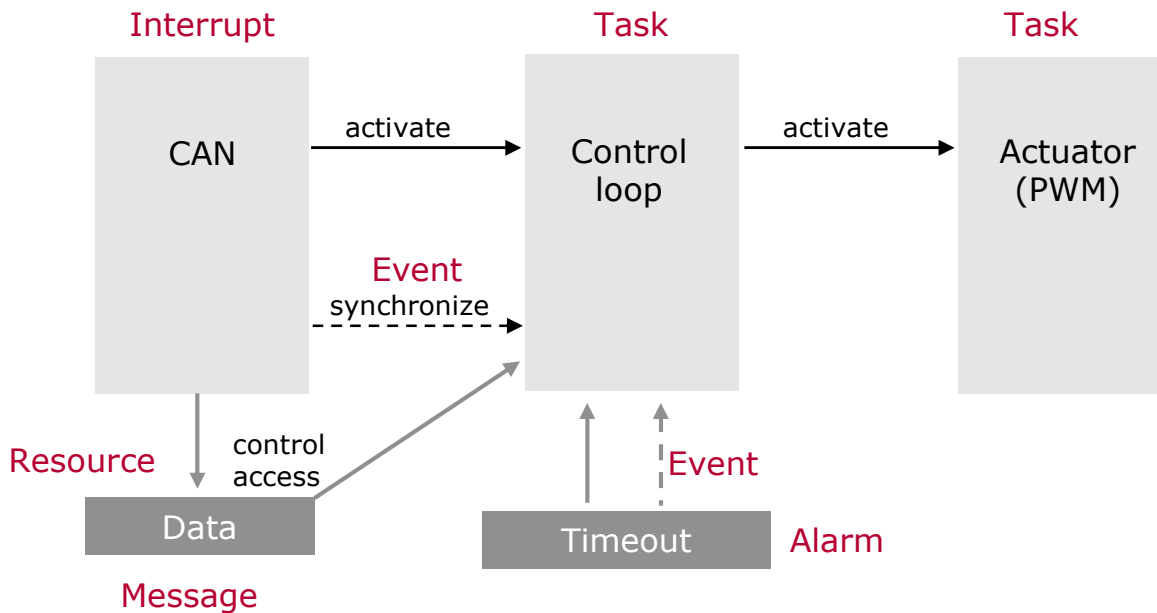
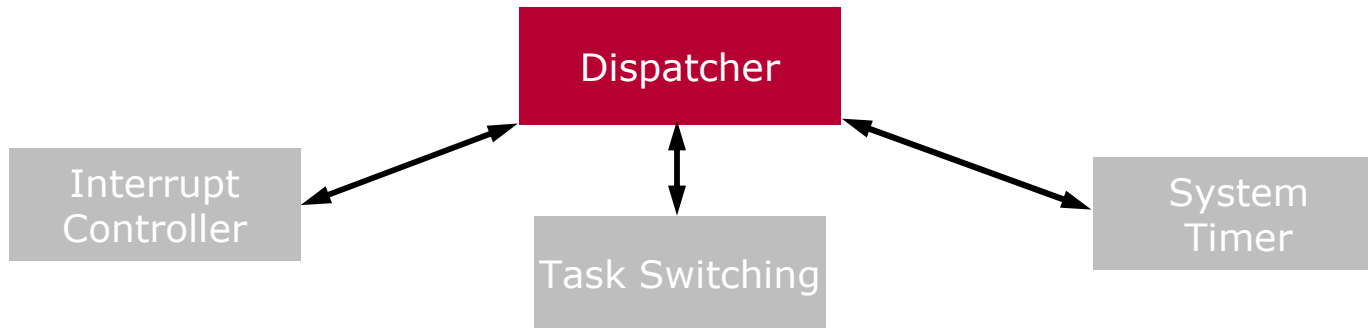
osCAN  Product

- ❑ Specification of a full pre-emptive real-time operating system
- ❑ Small, ruggedized kernel
- ❑ Standardized
- ❑ Dispatcher with mechanisms for timing control, data passing and synchronization
- ❑ Static configuration
- ❑ Implementations are available for many micro processor families
- ❑ Proven reliability; employment in many automotive control units since 2000
- ❑ Certification process defined

The OSEK/VDX specification was initiated by

- ❑ Adam Opel AG (GM)
- ❑ BMW AG
- ❑ Daimler AG
- ❑ PSA
- ❑ Renault
- ❑ Robert Bosch GmbH
- ❑ Siemens AG
- ❑ Volkswagen AG
- ❑ University of Karlsruhe

OSEK/VDX has been published as ISO 17356



OSEK/VDX

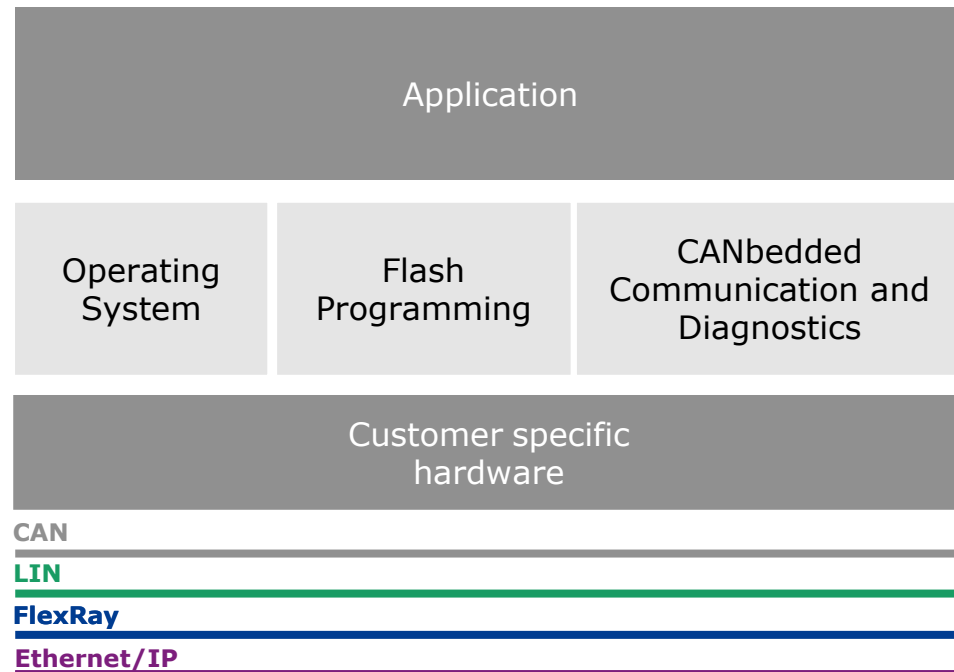
> **osCAN**

CANbedded - Protocols and drivers

- ❑ CAN
- ❑ LIN
- ❑ FlexRay
- ❑ Ethernet (TCP/IP)

Diagnostic - Protocols

CANflash - Flash Bootloader



Type

- ❑ real time multitasking operating system

Scheduling Strategy

- ❑ all (preemptive, non-preemptive, mixed)

Memory

- ❑ 1-10kB ROM, depending on platform and configuration

Conformity

- ❑ OSEK/VDX-OS 2.2 **certified**

Conformance Classes

- ❑ BCC1, BCC2, ECC1, ECC2
- ❑ CCCA, CCCB [for OSEK-COM]

ORTI Support

- ❑ ORTI 2.0 and ORTI 2.1

OSEK/VDX certification process

- ❑ Operating systems have to be certified before the trademark “OSEK/VDX” may be used
- ❑ Certification is performed by an independent test agency (MBTech)
- ❑ Trademark is held by Siemens AG

Vector Informatik's quality approach

OSEK/VDX

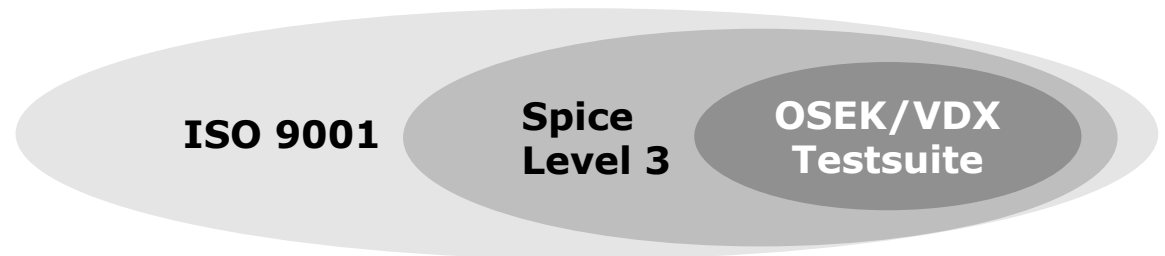
- ❑ Vector's operating system osCAN is compliant with the OSEK/VDX standard.
- ❑ The certification test suite is a standard element of the development process
- ❑ Certifications can be found on the official homepage of the OSEK/VDX committee.
- ❑ Vector Informatik is an active member in the standardization committees of OSEK/VDX.

Spice

- ❑ The development process of the operating systems has a process maturity congruent with Spice Level 3.
- ❑ This has been attested to Vector Informatik by an assessment conducted by customers.

ISO 9001

- ❑ Vector Informatik is already ISO 9001 certified since 1998.



Operating System

Stack check

Check for stack overflow (task, event, system)

Internal Trace

Trace API calls, configurable size

Timer Initialization

MCU standard timer setup

Configuration report generator

HTML based documentation

Component Management

Multiple OIL files for one application

Template generation

Generated task **template file**

Optimized alarm management

Minimum timer interrupt runtime

Extended error checking

e.g. consistence of OS data

API is configurable

API functions can be switched on or off

Generator in batch mode

Run generator via batch file

- ❑ Delivered as source code
- ❑ Small, efficient and stable kernel
- ❑ Broad availability, many microcontrollers supported>>

Supported Micro Controllers (A-M)

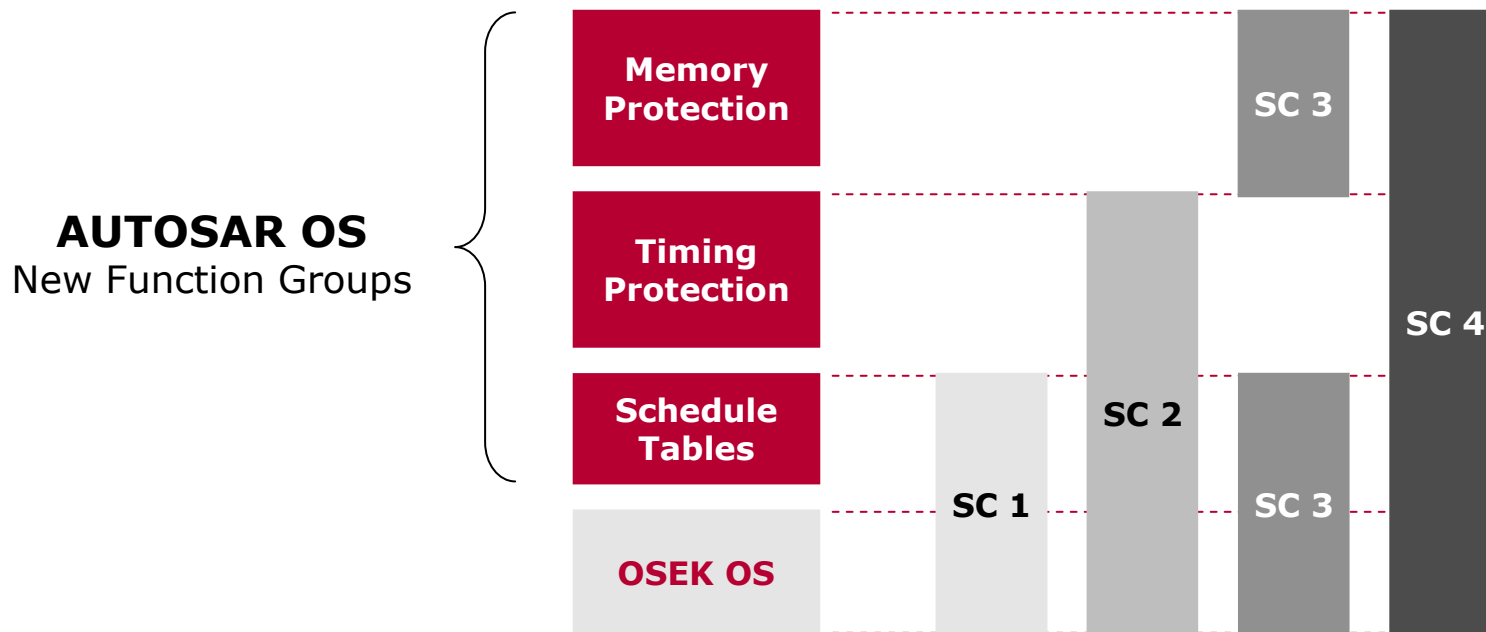
| | | |
|---------------------|--|--|
| Altera | Excalibur (ARM7-TDMI) NIOSII | Green Hills GNU |
| ARM | ARM7-TDMI | Green Hills |
| Atmel | AT91 (ARM7-TDMI) | Green Hills |
| Europe Technologies | easyCAN | ARM |
| Freescall | 68HC08 68HC12, MC9S12 MC9S12X MPC5xx MPC55xx MAC71xx Mcore | Cosmic Cosmic, Metrowerks, IAR Cosmic, Metrowerks Metrowerks, DiabData, Green Hills DiabData, Green Hills Green Hills DiabData |
| Fujitsu | FJ16LX, FJ16FX FR30, FR50 FR60, FR70 | Fujitsu Softune Fujitsu Softune Fujitsu Softune |
| Infineon | C167, XC16x XC2000 Tricore | Keil, Tasking Tasking VX Tasking |
| Intel | PXA27x | Green Hills |
| Microchip | PIC18 dsPic30 | Microchip Microchip |
| Micronas | CDC32xxG (ARM7-TDMI) | Green Hills |

Supported Micro Controllers (N-Z)

| | | |
|--------------------|-----------------------|--------------------------------|
| NEC | 78k0 | IAR |
| | V850 | Green Hills, IAR |
| NXP (Philips) | SAF7780 (ARM7-TDMI) | ARM, Green Hills |
| | SJA2020 (ARM7-TDMI) | ARM, Green Hills |
| | LPC2000 | Green Hills |
| OKI | ML67Q0100 (ARM7-TDMI) | Green Hills |
| | ML665S | OKI |
| Renesas | H8S, H8SX | Renesas |
| | H8 tiny | Renesas |
| | M16C | IAR, Renesas, Tasking |
| | M32C | IAR, Renesas |
| | M32R | Renesas |
| | M7600 | IAR |
| | R32C | IAR, Renesas |
| | SH2 | Renesas |
| STmicroelectronics | ST10 | Keil, Tasking |
| Texas Instruments | TMS470 (ARM7-TDMI) | Green Hills, Texas Instruments |
| | TMS430 | IAR |
| Toshiba | TLCS900 | Toshiba |
| | TX19 / TX39 / TX49 | Green Hills, Toshiba |

Your preferred micro processor is not listed? Please ask for an adaptation.

- ❑ AUTOSAR **extends** the OSEK/VDX standard of operating systems
- ❑ AUTOSAR Add-ons are segmented into Scalability Classes (SC)



Vector offers a complete range of services to support the usage of the operating systems

Training

Workshops to explain the usage of OSEK-OS and the design of applications.

Updates

Offering software updates for

- specification changes
- support of a new derivative or compiler version

Support

Helping a customer with the handling of osCAN in a project, e.g help with the installation (set up) or configuration.

Consulting

Assistance with the design and the architecture of your software

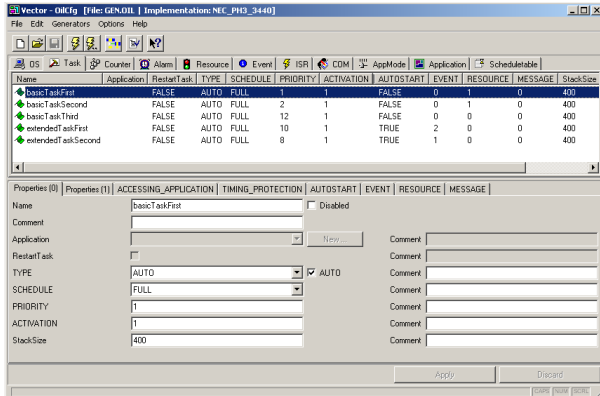
Custom-specific solutions

Implementation of an application as a customer's subcontractor

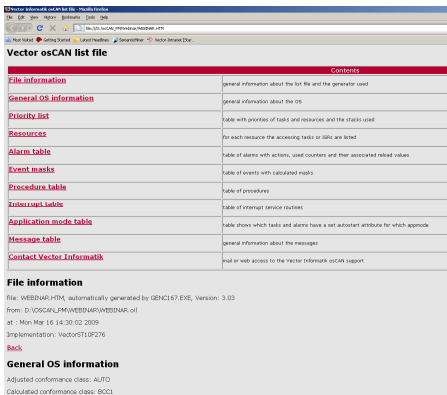
Technical Benefits

- ❑ Small and fast OS kernel due to static architecture
- ❑ full pre-emptive operating system
- ❑ Short booting times for fast power up of automotive SW
- ❑ Automated system set-up
 - ❑ Complete support of interrupt controllers and even nested interrupts
 - ❑ Complete setup of system timers
 - ❑ Timer are selectable out of a list of available hardware timers
- ❑ Available for numerous processor cores and compilers
- ❑ Seamless integration in Vector's tool chain
e.g. CANoe helps during the complete development process
- ❑ TimingAnalyzer visualizes the behavior of tasks and resources even during the design time
- ❑ Graphical User Interface for fast configuration

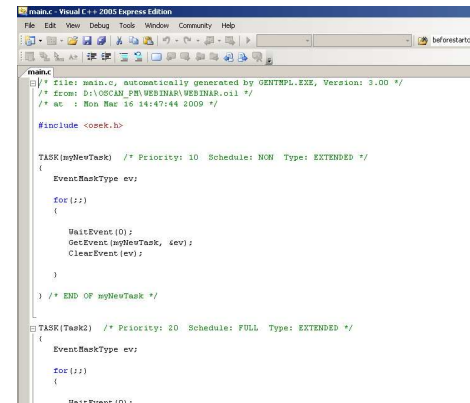
Oil Configurator - a Simple, intuitive to use, flexible Tool



HTML based configuration list



Code skeleton to start with



Thank you for your attention.

For detailed information about Vector
and our products please have a look at:

www.vector.com

Author:

Helmut Brock

Vector Informatik GmbH

Ingersheimer Str. 24

70499 Stuttgart