OPEN-ISA.ORG, RV32M1, VEGABOARD & SDK

OVERVIEW





Agenda

- www.open-isa.org
- RV32M1 SoC
- VEGAboard
- VEGAboard SDK

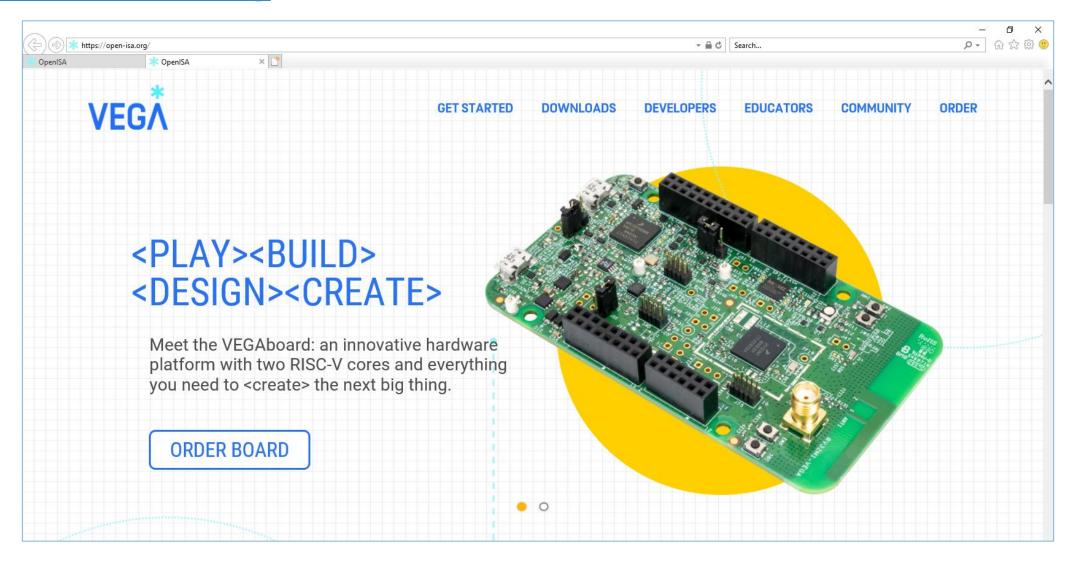


www.open-isa.org

- One site for all Open-source ISA enthusiasts
- Open-ISA's Role → Expand RISC-V Ecosystem
- Open to any and all relevant ecosystem partners
- Developers sharing ideas & experiences
- Discussion board
- Order VEGAboard & download documentation

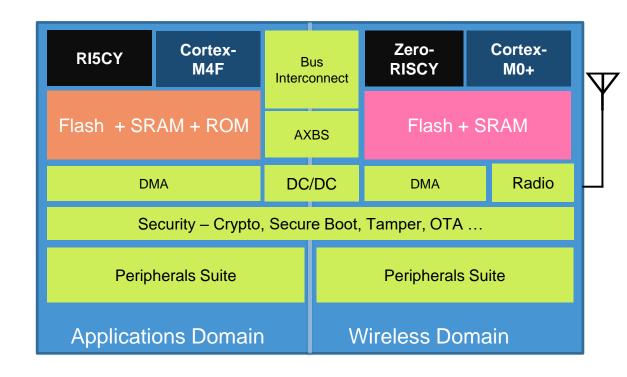
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RV32M1 SOC

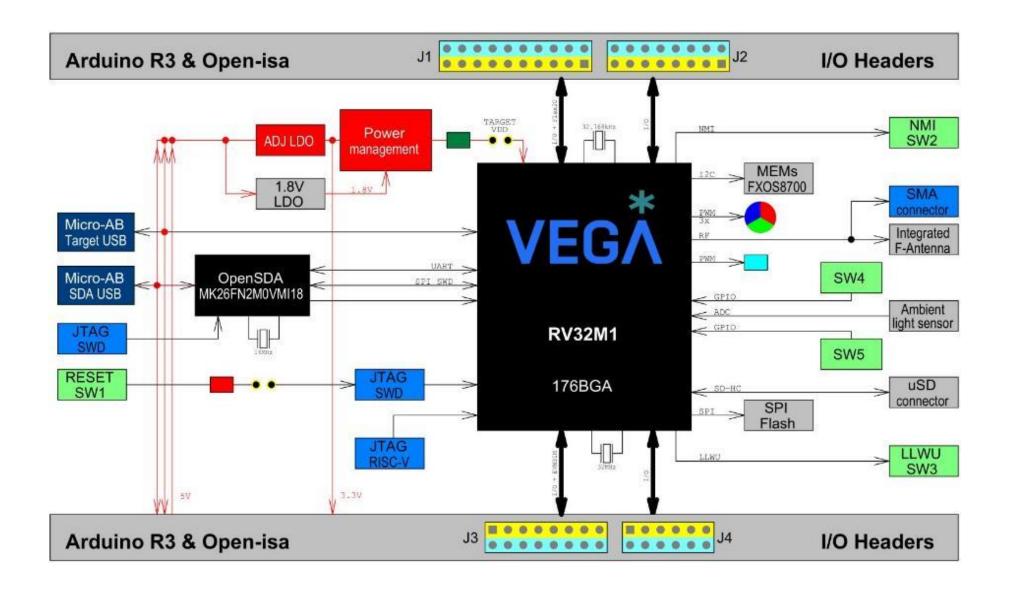




- Intended only as silicon evaluation vehicle
- Not for SALE!

- 4 CPU cores, up to 72MHz
 - One RISC-V RI5CY and one RISC-V ZERO_RISCY
 - One ARM Cortex-M4F and one Cortex-M0+
- Low power consumption and high integration
 - Support BLE, Generic FSK, 802.15.4
 - Security engine include AES128/196/256, DES/3DES,
 SHA-256, RSA and ECC PK-256/Curve25519
 - USB2.0 FS, SAI support I2S and AC'97,SDHC, EMVSIM
 - 1x32ch FlexIO, 4xUART, 4xI2C, 4x16-bit LPSPI,
 1x12bit ADC
 - 2x6ch PWM, 1x2ch PWM, RTC, LPTimer
 - 1.25 MB Flash, 384 KB SRAM

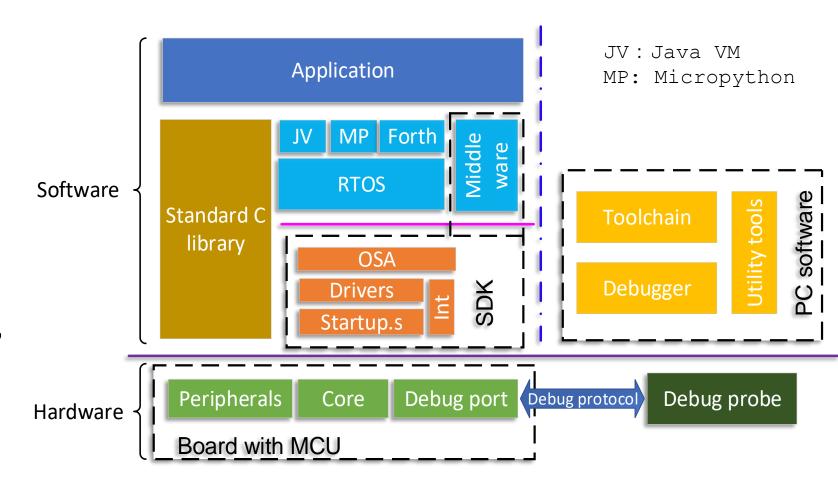
VEGAboard - Full-Featured RISC-V Secure Connected Platform



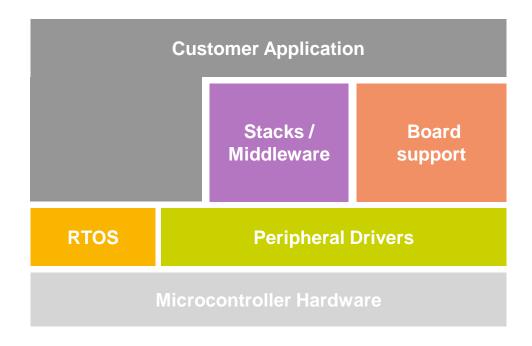
Development based on VEGAboard



- Development Tools
 - Eclipse IDE
 - GNU GCC RISC-V toolchain
 - OpenOCD debugger
- Software
 - SDK can be downloaded from OPEN-ISA website with drivers, middleware and examples
- Application development
 - Consistent with general MCU



VEGAboard SDK











Features

Architecture:

- Single driver for each peripheral
- Transactional APIs w/ optional DMA support for communication peripherals

Integrated RTOS:

- FreeRTOS v9
- RTOS-native driver wrappers

Integrated Stacks and Middleware

- USB Host, Device and OTG
- BLE stack
- Amazon Web Service IoT
- QCA WiFi Stacks
- IwIP, FatFS
- Crypto acceleration plus wolfSSL
- SD and eMMC card support

Reference Software:

- Peripheral driver usage examples
- Application demos
- FreeRTOS usage demos

License:

BSD 3-clause for startup, drivers, USB stack

Toolchains:

- Eclipse IDE
- GCC w/ Cmake

Quality

- Production-grade software
- MISRA 2004 compliance
- Checked with Coverity® static analysis tools

SDK Introduction – Folder Structure

```
<sdk root directory>
          SOC peripheral driver source code and toolchain support code
 boards Demo source code and project files
 rtos FreeRTOS support package
 middleware Third Party middleware source code
 tools
        CMake supporting files
 RISCV
        RISCV supporting files
 Getting Started with RV32M1 SDK RISCV.pdf Getting Started Tutorial
 SW-Content-Register.txt Software Content Register File
LA_OPT_NXP_Software_License.htm
                                    License Files
 LA OPT WOLFSSL EVAL.htm
```

SDK Introduction – SoC Folder Structure

```
devices
RV32M1
             SOC specific driver code
drivers
utilities SOC independent printf implementation
        GCC toolchain startup code
   system_RV32M1_ri5cy.c
                            system level initialization for ri5cy
   system RV32M1 ri5cy.h
   RV32M1_ri5cy.h
                              SOC register and bitfiled definition and feature definition file for ri5cy
   RV32M1_ri5cy_features.h
   system_RV32M1_zero_riscy.c
                                 system level initialization for zero_riscy
   system_RV32M1_zero_riscy.h
   RV32M1_zero_riscy.h
                                   SOC register and bitfiled definition and feature definition for zero_riscy
   RV32M1_zero_riscy_features.h
   fsl_device_registers.h FSL device register header
```

SDK Introduction – Board Folder Structure

```
boards
rv32m1_vega
demo_apps out of box demos
driver_examples barematel examples for demo driver of various on-chip/on-board peripherals
rtos_examples demos in freertos context
multicore examples rpmsg-lite based multicore examples
usb_examples various usb examples
  wireless_examples
  bluetooth bluetooth examples
\parallel rv32m1 ri5cy.cfg ri5cy OpenOCD config file
rv32m1 zero riscy.cfg zero_riscy openOCD config file
```

SDK Introduction – Example Folder Structure

```
rtos_examples
 freertos hello
ri5cy/zero_riscy
   riscveclipse eclipse project files
   riscvgcc armgcc project files
   | freertos_hello.c Demo main source file, has a different name for different demos
     board.c board level configuration facility APIs, common for all the demo
     board.h for example, debug console initialization
     FreeRTOSConfig.h Demo specific FreeRTOS configuration
     clock_config.c
                      Demo specific clock configuration
      clock config.h
     readme.txt Demo introduction
   pin mux.c
               Demo specific pin mux and pad configuration
   pin mux.h
```



SECURE CONNECTIONS FOR A SMARTER WORLD