

# Professional development tools for RISC-V

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## Agenda

- IAR Systems
- Embedded Workbench for RISC-V
- Compiler
  - Optimizations
- Debug
  - I-jet
- Code quality and Safety
  - Static analysis
  - Certified toolchain
- Demo



## Providing developers of embedded systems





#### IAR Embedded Workbench for RISC-V

#### IAR Embedded Workbench Complete build and debug toolchain for RISC-V



User-friendly IDE features and broad ecosystem integration

Outstanding performance through sophisticated optimization technology

Comprehensive debugger

ISO/ANSI C/C++ compliance with support for C11 and C++17

Integrated static analysis

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#### IAR Embedded Workbench Device support for RISC-V

RV32I Base Int instruction set

Supported extensions:

- M integer mul & div
- F single precision float
- D double precision float
- C compressed instructions

Support for SiFive E Cores 32-bit embedded cores Single core options

Out-of-the-box experience on Digilent Xilinx Arty A7 35T/100T board.

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**EIAR** SYSTEMS



## Compiler

## Compiler

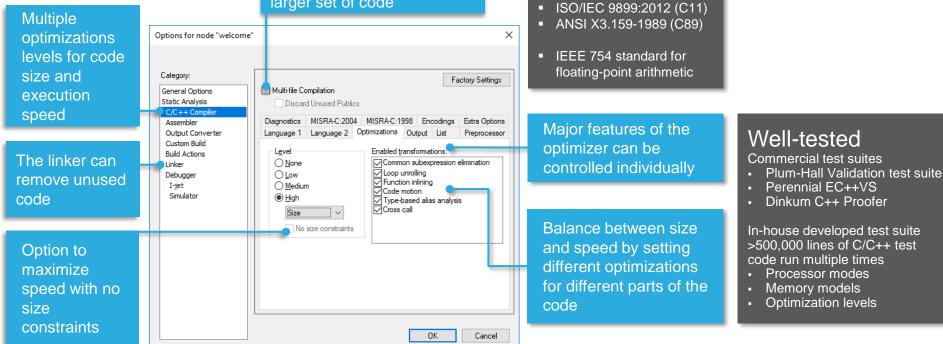


- Proprietary design based on 36 years of experience
- Based on a platform that is common among different targets to handle global optimizations, etc.
- Target unique backend for specific adaptations and optimizations
- RISC-V specifics
  - Primary focus will be on adding standard extensions
  - Initial prioritization is on code size



## IAR C/C++ Compiler

Multi-file compilation allows the optimizer to operate on a larger set of code



Language standards

ISO/IEC 14882:2015

(C++14, C++17)





## Debug

## Debugger



#### Integrated debugger for source and disassembly debugging

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#### I-jet in-circuit debugging probe

- Supports RISC-V and Arm cores
- Hi-speed USB 2.0 interface (480Mbps)
- Target power of up to 400mA can be supplied from I-jet with overload protection
- Target power consumption can be measured with ~200µA resolution at 200kHz
- JTAG and Serial Wire Debug (SWD) clocks up to 32MHz (no limit on the MCU clock speed)
- Support for SWO speeds of up to 60MHz
- Unlimited flash breakpoints (\*to be added for RISC-V)
- Debug adapter for Arty 7 board

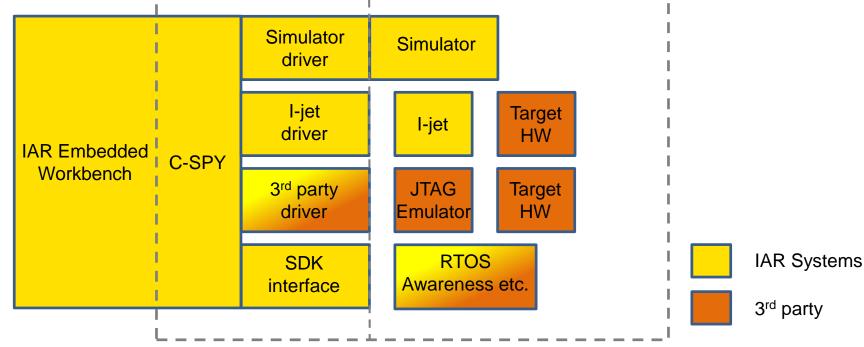


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#### IAR C-SPY Debugger overview



IAR C-SPY Debugger Target system with application SW



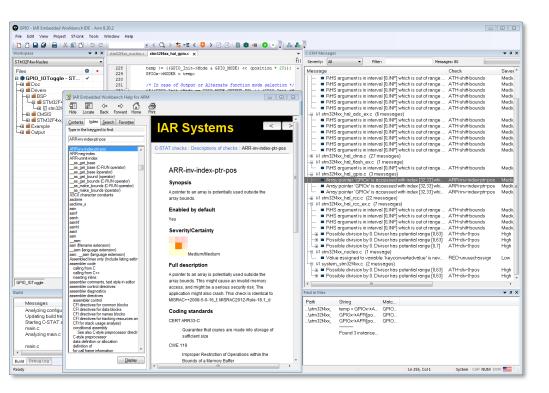


#### Code quality and Functional Safety

#### **C-STAT Static analysis**

Complete static analysis tool fully integrated in IAR Embedded Workbench

- Intuitive and easy-to-use settings with flexible rule selection
- Support for export/import of selected checks
- Support for command line execution
- Extensive and detailed documentation
- List of messages and data base file available
- Checks compliance with MISRA C:2004, MISRA C++:2008 and MISRA C:2012
- Includes ~250 checks mapping to hundreds of issues covered by CWE and CERT C/C++





#### Solutions for safety-critical applications

#### Certified toolchain

 A special functional safety edition of IAR Embedded Workbench

#### Simplified validation

- Functional Safety certificate from TÜV SÜD
- Safety report from TÜV SÜD
- Safety Guide
- Guaranteed support through the product life cycle
  - Prioritized support
  - Validated service packs
  - Regular reports of known problems



Standards IEC 61508 ISO 26262 EN 50128 IEC 62304



## Demo



#### Thank you for your attention!

#### www.iar.com