



Being Productive with Open Source

Eclipse IDE and C/C++ Compiler

Jonah Graham

Kichwa Coders

OSDForum Sep 18 2019

Eclipse CDT: The Open Source IDE for C/C++

What is CDT?

Creating and Configuring Projects

Navigate and Edit

Debug and Run

Conclusion

Eclipse CDT:
The Open
Source IDE
for C/C++

What is CDT?

Creating and Configuring Projects

Navigate and Edit

Debug and Run

Conclusion

What is Eclipse CDT

- Advanced C/C++ Integrated Development Environment



Who am I?

- Jonah Graham @ Kichwa Coders
- Consultant specializing on helping companies leverage Open Source Software
 - Embedded Tools in the Cloud
 - Custom C/C++ Workbenches (CDT)
 - Multicore Debug
- Eclipse CDT project lead

Eclipse CDT:
The Open
Source IDE
for C/C++

What is CDT?

Creating and Configuring Projects

Navigate and Edit

Debug and Run

Conclusion



Eclipse CDT is Project Based

- Where to start?
 - Import Existing Eclipse Project
 - For example, from the VEGA SDK
 - Create New Project
 - Use templates, e.g. Hello World
 - Vendor specific templates
 - Convert existing code to Eclipse Project
 - Add Eclipse CDT project information

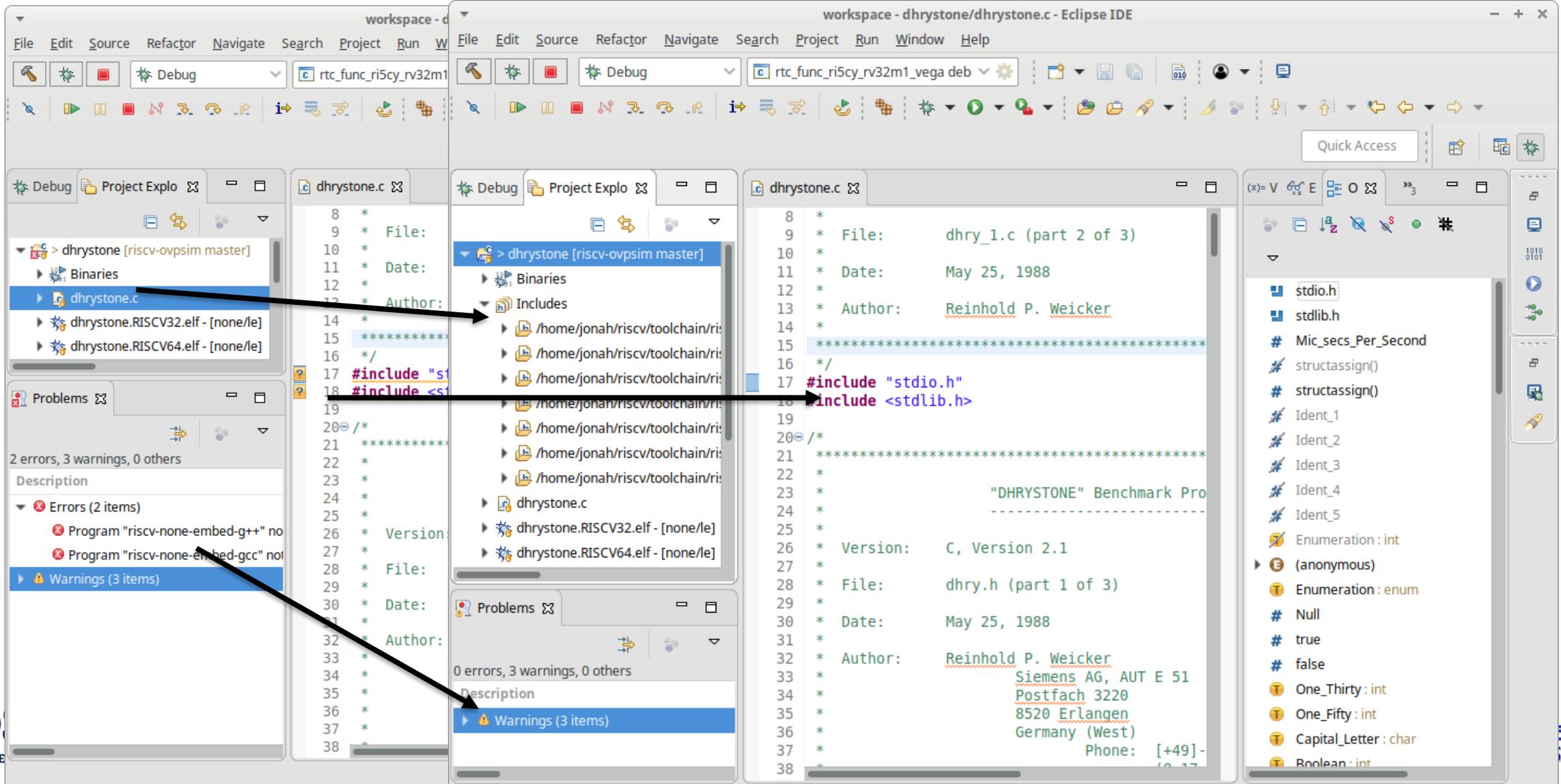
Configure Project

The image shows three overlapping Eclipse IDE configuration windows for a project named 'rtc_func_ri5cy_rv32m1_vega'.

- Settings (Toolchains):** Shows configuration for the 'GNU MCU RISC-V GCC (riscv-none-embed-gcc)' toolchain. Fields include Architecture (RISC-V), Prefix (riscv32-unknown-elf-), C compiler (gcc), and C++ compiler (g++).
- Preprocessor Include Paths, Macros etc.:** Shows the 'Preprocessor Include Paths' section. A search filter 'type filter text' is active. The 'Setting Entries' list includes paths like '/home/jonah/riscv/vega/boards/rv32m1_vega/demo_apps' and '# CPU_RV32M1_ri5cy=1'.
- Preferences (Global RISC-V Toolchains Paths):** Shows the 'Global RISC-V Toolchains Paths' section. It allows configuring the locations of GNU RISC-V toolchains. Fields include Default toolchain (GNU MCU RISC-V GCC), Toolchain name (GNU MCU RISC-V GCC), and Toolchain folder (/home/jonah/riscv/toolchain/riscv32-unknown-elf-gcc/bin).

The left sidebar of the IDE shows a navigation tree with 'Settings' selected under 'C/C++ Build'.

Before & After



Eclipse CDT: The Open Source IDE for C/C++

What is CDT?

Creating and Configuring Projects

Navigate and Edit

Debug and Run

Conclusion



CDT has a feature rich editor

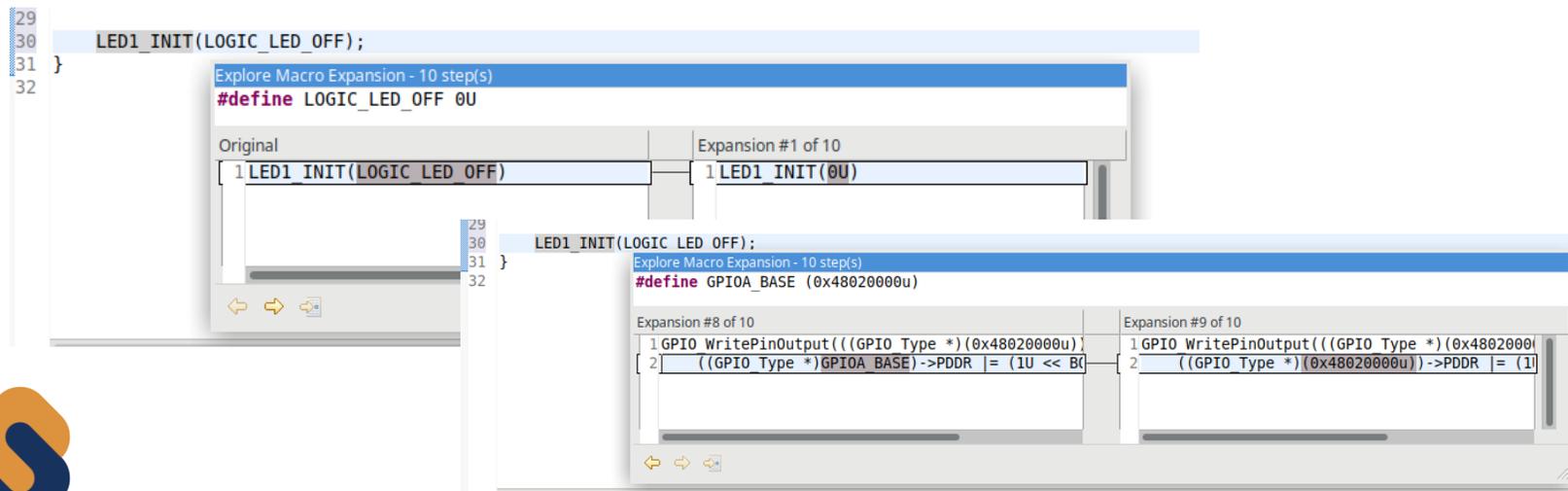
- *Much more than just Syntax Highlighting*
- Indexer behind the magic
 - CDT's indices hold a complete model of the code.
- Jump to definition
- Autocompletion
- Call Hierarchy
- Outline
- Refactoring

Macro Expansion

- Example (add to board.c)

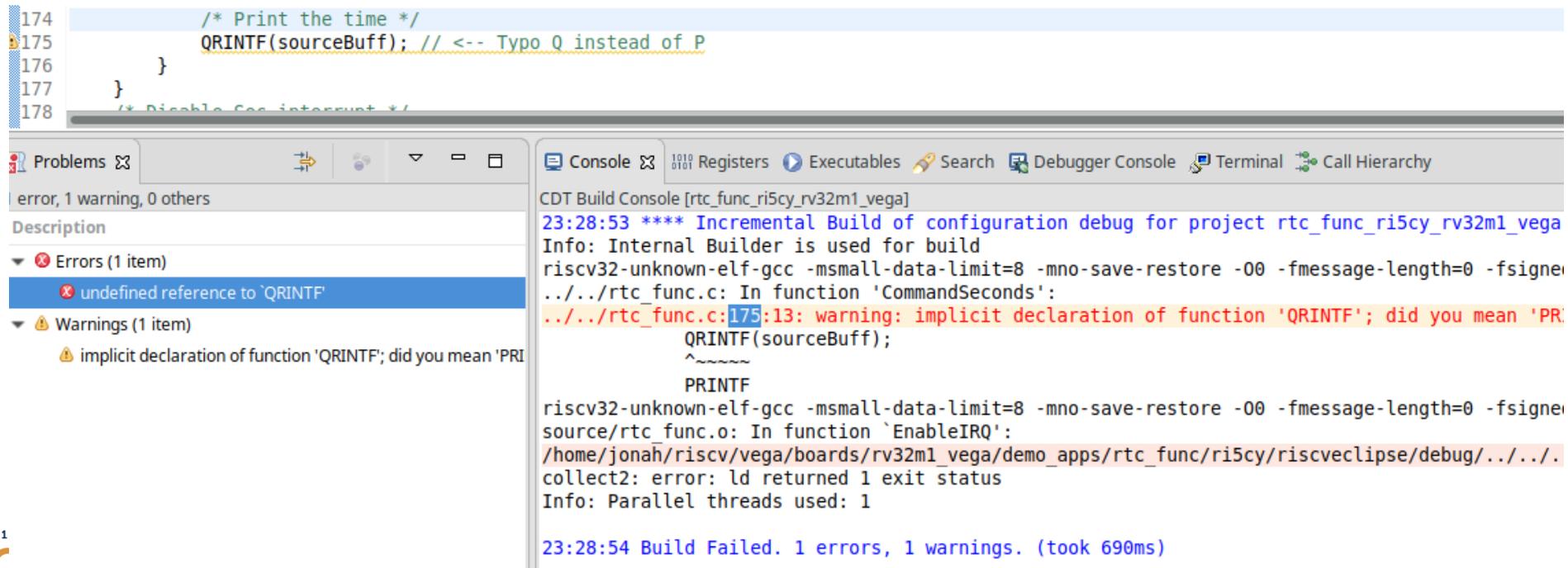
```
LED1_INIT(LOGIC_LED_OFF);
```

- Right-Click and choose Macro Expansion
- Use Alt-Left and Alt-Right to cycle
- Use F3 to jump to definition



Build Project

- Build project automatically, or manually
- Errors reported in the Build Console
- Highlighted lines can be clicked



The screenshot shows an IDE interface. The top part is a code editor with the following code:

```
174     /* Print the time */
175     QRINTF(sourceBuff); // <-- Typo Q instead of P
176 }
177 }
178 /* Disable Cpp interrupt */
```

The line 175 is highlighted in yellow. Below the code editor is a toolbar with icons for Problems, Console, Registers, Executables, Search, Debugger Console, Terminal, and Call Hierarchy. The 'Problems' panel on the left shows a list of errors and warnings:

- error, 1 warning, 0 others
- Errors (1 item)
 - undefined reference to 'QRINTF'
- Warnings (1 item)
 - implicit declaration of function 'QRINTF'; did you mean 'PRI

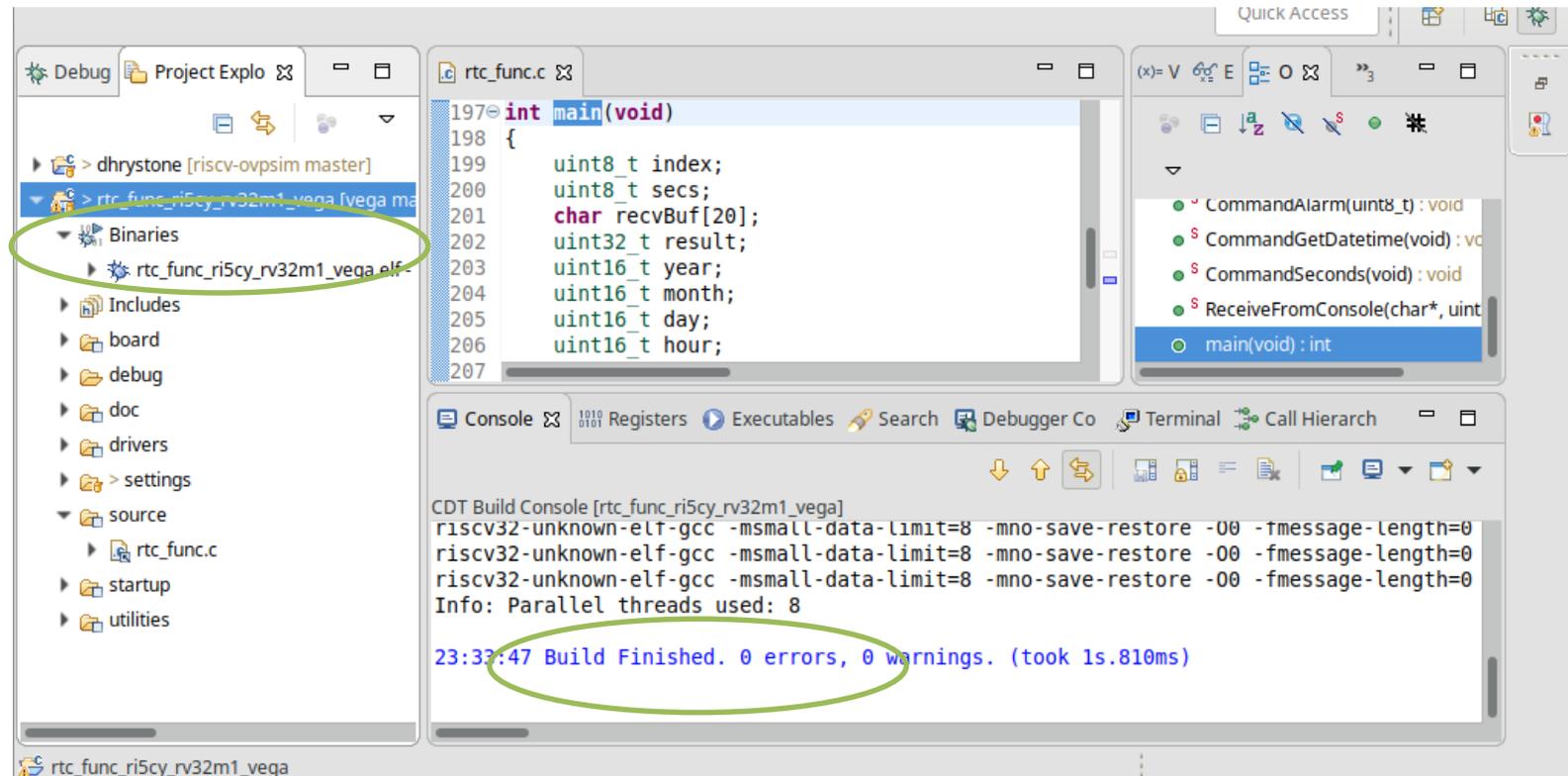
The 'Console' panel on the right shows the build output:

```
CDT Build Console [rtc_func_ri5cy_rv32m1_vega]
23:28:53 **** Incremental Build of configuration debug for project rtc_func_ri5cy_rv32m1_vega
Info: Internal Builder is used for build
riscv32-unknown-elf-gcc -msmall-data-limit=8 -mno-save-restore -O0 -fmessage-length=0 -fsigne
.../rtc_func.c: In function 'CommandSeconds':
.../rtc_func.c:175:13: warning: implicit declaration of function 'QRINTF'; did you mean 'PRI
QRINTF(sourceBuff);
^~~~~~
PRINTF
riscv32-unknown-elf-gcc -msmall-data-limit=8 -mno-save-restore -O0 -fmessage-length=0 -fsigne
source/rtc_func.o: In function `EnableIRQ':
/home/jonah/riscv/vega/boards/rv32m1_vega/demo_apps/rtc_func/ri5cy/riscveclipse/debug/../../.
collect2: error: ld returned 1 exit status
Info: Parallel threads used: 1

23:28:54 Build Failed. 1 errors, 1 warnings. (took 690ms)
```

Successfully Built Project

- Successfully built project collects executables (ELFs) into "Binaries" folder



Eclipse CDT: The Open Source IDE for C/C++

What is CDT?

Creating and Configuring Projects

Navigate and Edit

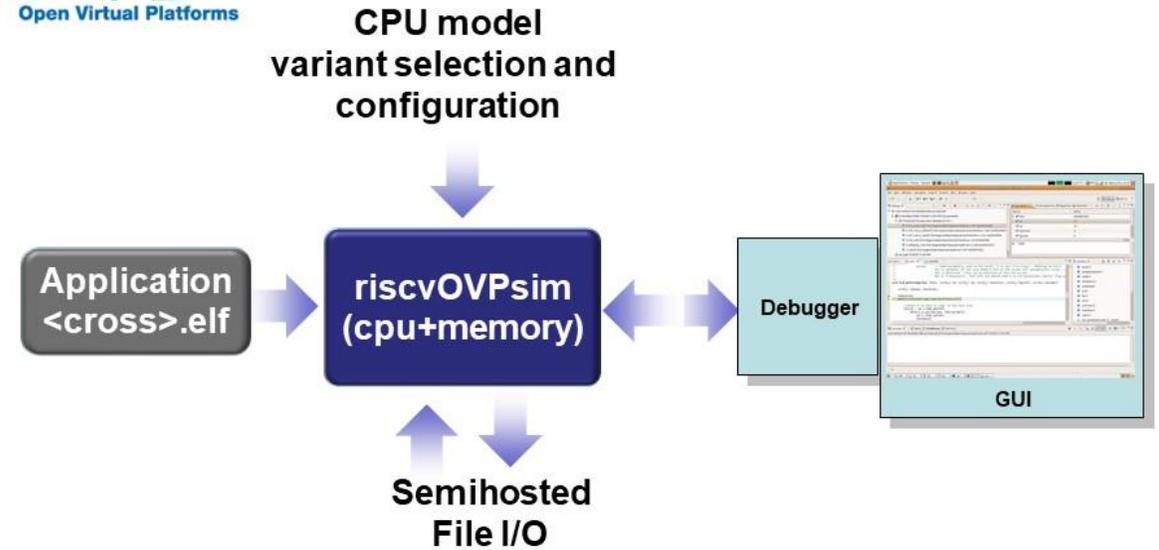
Debug and Run

Conclusion



CDT Makes Debugging Effective

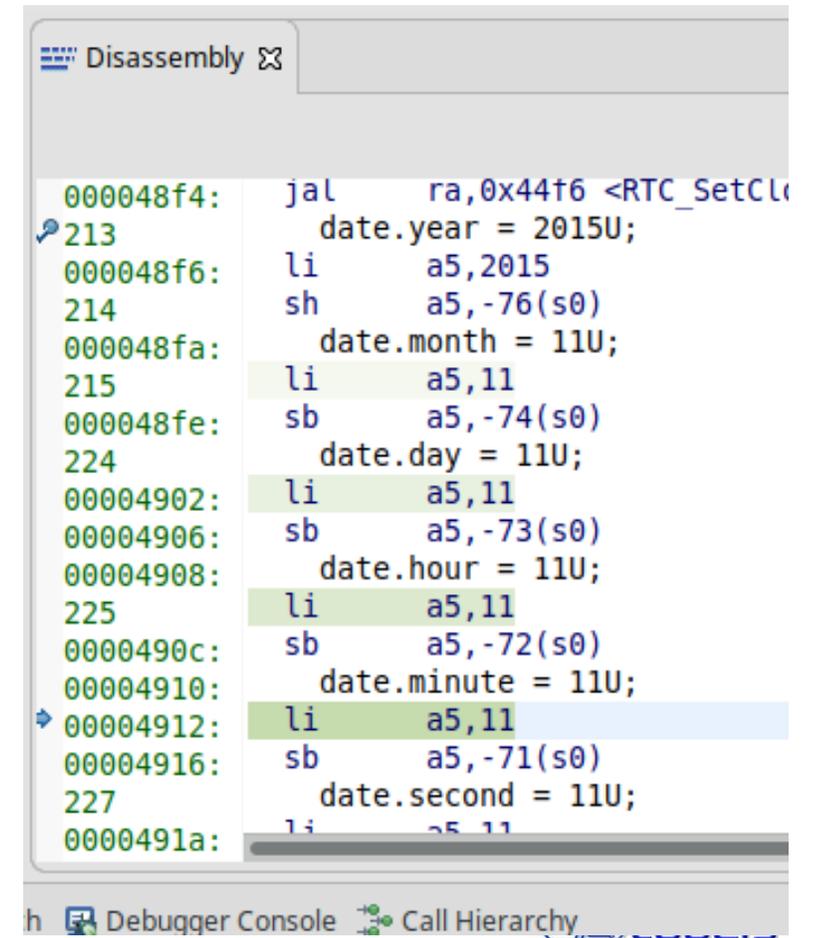
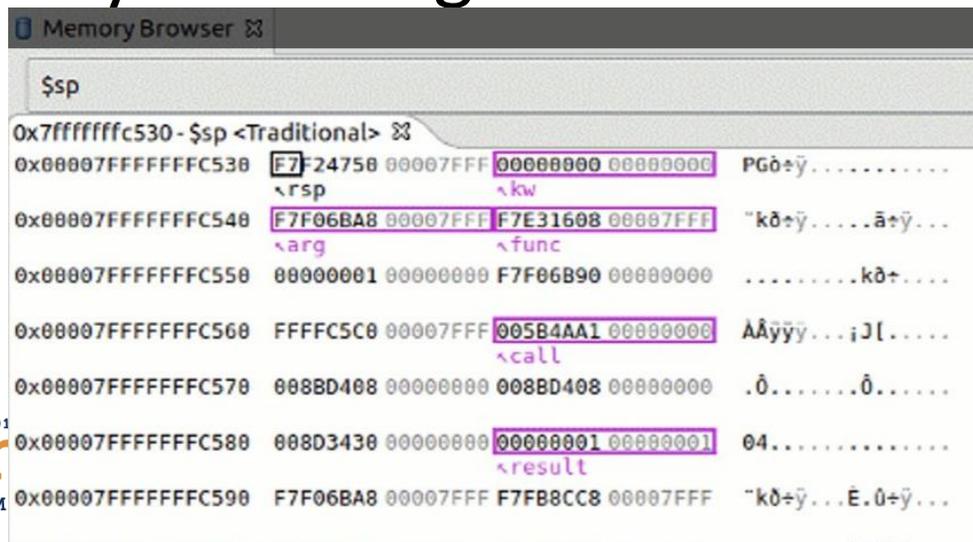
- Target any board or simulator
- High level interface to GDB
- OpenOCD, SEGGER, etc too.



Imperas riscvOVPsim Compliance Simulator

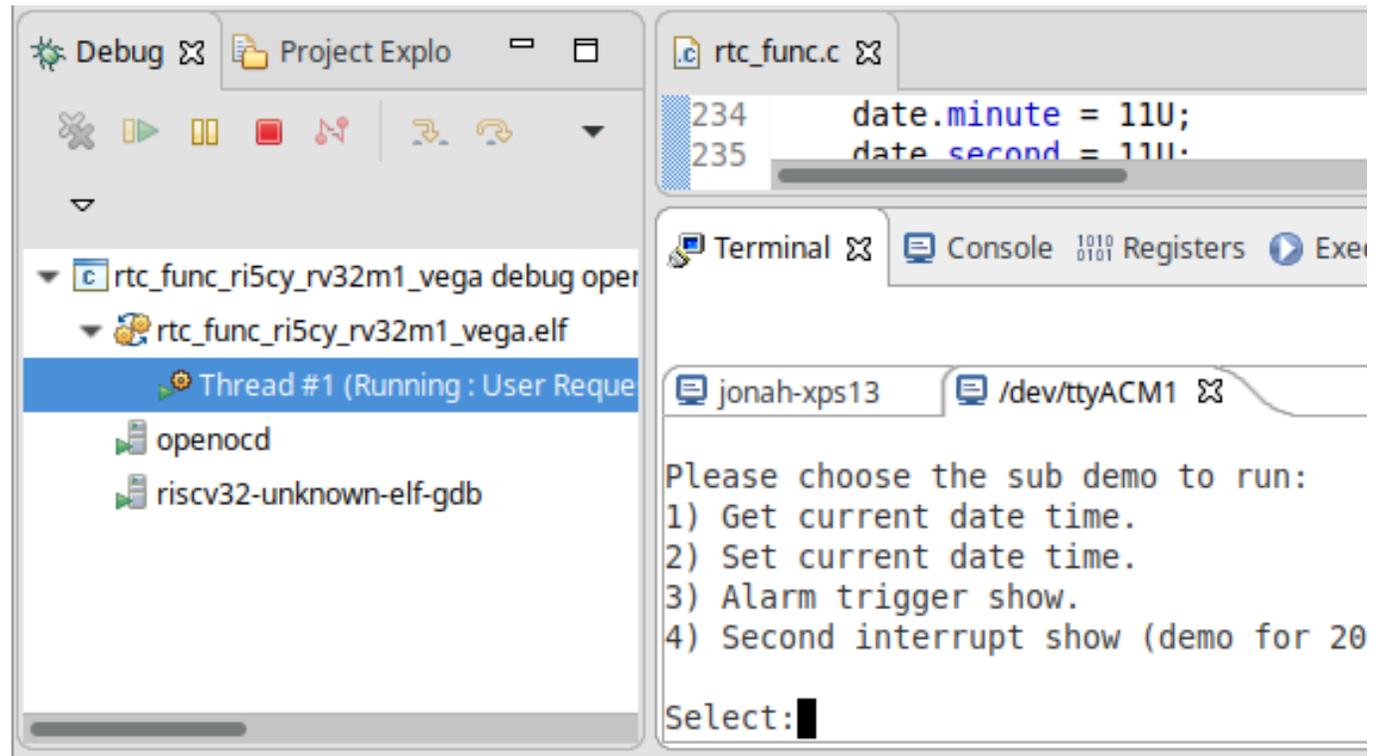
CDT views show rich debug information

- Variables, Breakpoints, Expressions & Hovers
- Disassembly
 - Instruction Stepping
 - Gradients to easily visualize stepping
- Memory Browsing with Annotations



Command Line Tool Integration

- Integrated Terminals and Consoles
- Debugger Console View
 - Full GDB command line experience with all the niceties of an IDE
- Terminal View
 - Serial Connection target
 - Telnet/SSH (e.g. to openocd)
 - Local terminal (e.g. bash)



Eclipse CDT: The Open Source IDE for C/C++

What is CDT?

Creating and Configuring Projects

Navigate and Edit

Debug and Run

Conclusion



Thank you!

- Get in touch:
 - jonah@kichwacoders.com
 - <https://github.com/jonahgraham>
 - <https://twitter.com/jonahgrahamkc>
- Get involved:
 - cdt-dev@eclipse.org
 - <https://www.eclipse.org/cdt/>
 - <https://wiki.eclipse.org/CDT/contributing>