Open On-Chip Debugger

Fachhochschule Augsburg
Fachbereich Informatik
D-86 161 Augsburg

by Dominic Rath

supervised by Prof. Hubert Högl
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Dominic.Rath@gmx.de, Hubert.Hoegl@fh-augsburg.de

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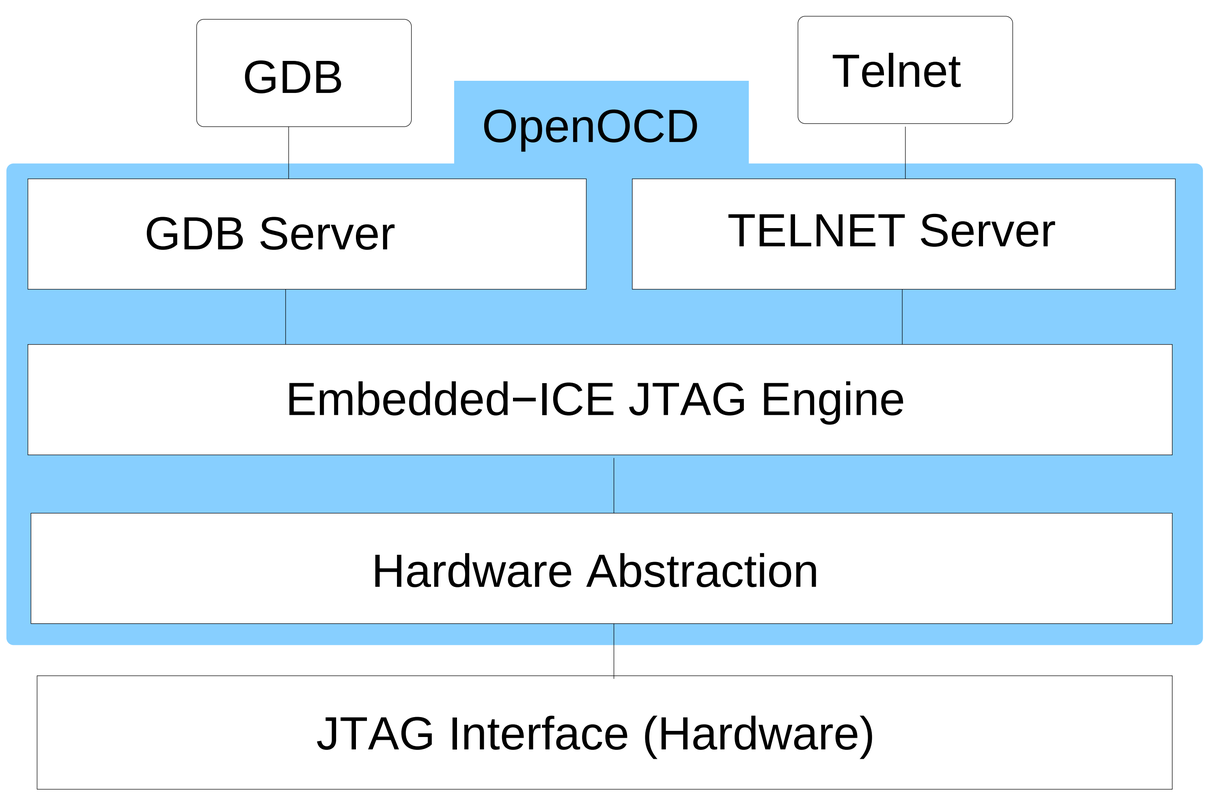
Abstract

OpenOCD is a free on-chip debug solution for targets based on the **ARM7** and **ARM9** family with Embedded-ICE (JTAG) facility. It enables **sourcelevel debugging** with the standard **GNU Debugger gdb** compiled for the ARM architecture. In addition internal and external **FLASH** memory programming is supported. Besides debugging, OpenOCD can control any JTAG-based operation, e.g. programming CPLDs or FPGAs by an integrated **XSVF** player. Any GDB-aware integrated development environment, e.g. **Eclipse** [4] and **Emacs**, can benefit from OpenOCD. "Free" means that it is licensed under the **General Public License** (GPL) [5].

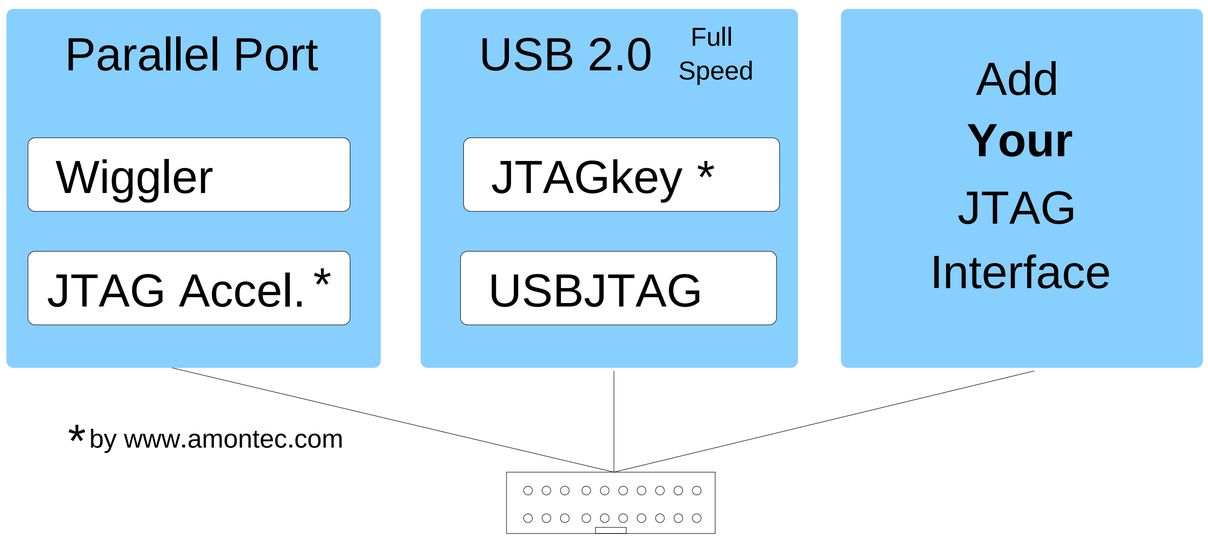
1 Overview

OpenOCD is a server which opens a **GDB remote target** port and a **Telnet** port. In the direction to the target a JTAG channel is opened.



2 JTAG Interfaces

OpenOCD can easily talk to different JTAG interfaces. A traditional low-cost **Parallel Port** interface with free schematics is the **Wiggler**. As an alternative, the **Chameleon** dongle by Amontec [8] can be configured as Wiggler and (very fast) **JTAG Accelerator**.



The interfaces in the **USB** group are all based on the **FT2232C** by FTDIChip [7]. You can easily add future interfaces, implemented e.g. by μ**Cs with USB** full-speed interface (e.g. Atmel AT91SAM7S64), **USB 2.0 high-speed** interface (e.g. Cypress FX2), **TCP/IP** enabled devices, **FPGAs** and so on.

3 Supported ARM Cores

- **ARM7TDMI**: ADuC7000 series, AT91SAM7 series
- **ARM7TDMI-S:** LPC2000 family
- **ARM720T:** Hynix HMS30C7202
- **ARM920T:** Atmel AT91RM9200
- **ARM922T:** Sharp LH7A404
- **ARM926EJ-S:** Atmel AT91SAM9261 (soon)
- want to integrate your ARM?

Note: the mentioned controllers are only examples.

4 Platforms

OpenOCD is developed on **Linux**, but it works on **Windows** as well. The Windows port needs **Cygwin** [6]. The **WinARM** project [3] currently integrates OpenOCD in a test release.

5 Future Extensions

- More ARM **cores**
- More **FLASH** devices
- Boundary Scan Description Language (**BSDL**)
- More "intelligent" JTAG hardware for **faster JTAG speed**
- **Boundary-Scan Testing** features

References

[1] **OpenOCD** homepage: `http://openocd.berlios.de`.
[2] **ARM** homepage `http://www.arm.com`
[3] **WinARM** - GNU and other tools for ARM `http://www.siwawi.arubi.uni-kl.de/avr_projects/arm_projects/index.html`
[4] **Arm/Eclipse** Tutorial by James Lynch `http://www.olimex.com/dev/arm-jtag.html`
[5] **GPL** `http://www.gnu.org/licenses/licenses.html`
[6] **Cygwin** - A Linux-like environment for Windows `http://www.cygwin.com/`
[7] **FTDIChip** `http://www.ftdichip.com`
[8] **Amontec** `http://www.amontec.com`
[9] **Fachhochschule Augsburg** Prof. Högl `http://www.fh-augsburg.de/~hhoegl`