"Wiggling" Using arm-elf-gdb/insight-gdb

A small "step-by-step"-guide by Martin Thomas, Kaiserslautern, Germany

Intro

There have been a lot of questions about using Wiggler-type JTAG-adaptors with LPC2000 ARM controllers. I hope this guide will at least help with the first steps. The Olimex ARM-JTAG ("Wiggler-clone") has been used but there are other schematics available in the internet which are simpler and seem to work more reliably. See the LPC-yahoo-groups file-archive for schematics.

Hard- and Software

- WinARM 4/2005 (arm-elf-gcc 4.0.0, insight-gdb 5.2.1)
- Macraigor's ocdremote 2.11 (ocdremote.exe needs the cygwin1.dll, not need to install the complete cygwin-environment, just download the cygwin1.dll and place it into the same directory as ocdremote.exe)
- Olimex "Wiggler" ARM-JTAG with additional internal connection from pin 8 to 15 on the "PC-side"
- Olimex Board LPC-P2129 (Philips LPC2129 ARM7DTMI-S) with DEBUG jumper set
- PC with Windows 2000 OS, CPU: PII-400, Printerport set to EPP in BIOS

But method should be the same for other version of the gnu-tools, other Wiggler-clones (and of cause the original) and different target CPUs.

Example Software

The example program is a simple "LED-Blinky" which turns the two LEDs on a Olimex LPC-P2129-Boad (Philips LPC2129) on and off. The source is available in the zip-archive from http://www.siwawi.arubi.uni-kl.de/avr_projects/arm_projects/. The important makefile-settings for this test are:

- RUN_MODE=RAM_RUN : Code must be compiled "for RAM"
- OPT = 0 : to avoid compiler optimisation
- DEBUG = stabs : dwarf-2 seems to be not supported by the old gdb version

"Step-by-Step"

- 1. Compile and link the source (make all)
- 2. Configure settings in the script (batch-file) start_wiggler.cmd according to your system. The script is included in the source archive.

3. Start start_wiggler.cmd. This will try to establish a connection to the target CPU. If it fails verify the settings. If it still fails lower the speed by increasing the SPEED-value (maximum: 8 = slowest connection). Around 30 retries were "normal" on the test-system using an Olimex "ARM-JTAG" (sometimes it connects on the first try...). The maximum speed I have reached has been 3. Other Wiggler-clones are know to work at speed-setting 1, but so far I have no other adaptor here for tests. The final output has to be like this:

C:\WINNT\system32\cmd.exe	_ 🗆 🗙
OCDemon InitializeTarget Error : Cable Disconnected	
OCDemon InitializeTarget Error : Cable Disconnected	
OCDemon InitializeTarget Error : Cable Disconnected	
OCDemon InitializeTarget Error : Cable Disconnected	
ocdremote 2.11: WIGGLER via LPT 1 at speed : 3	
JTAG SDO <- CPU(1) ARM7TDMI-S : listening on port 8888 <- JTAG SDI	
	-

- 4. Configure settings in the script (batch-file) start_insight.cmd. The script is included in the source archive
- 5. Start start_insight.cmd
- 6. Select File/Target Settings... and configure like shown in the following picture.

📸 Target S	election		×
		🔽 Set breakpoint at 'main'	
Connect	Remote/TCP	🔲 Set breakpoint at 'exit'	
Hostname:	localhost	Set breakpoint at	
Port:	8888	🔲 Display Download Dialog	
		🔲 Use xterm as inferior's tty	
マ Fewer Opt	ions		
Run Options			
Run Method			
	Download Program	Continue from Last Stop	
Command to	o issue after attaching:		
		OK Cancel He	elp

7. Select File/Open, browse in the source-dir and select the elf-File to debug (ledswitch.elf in this example):

Load New Executa	ble			? ×
<u>S</u> uchen in:	🔁 src	•] ← 🖻 👉 [Ⅲ ▼
Verlauf Verlauf Desktop Eigene Dateien Arbeitsplatz	. dep . crto.lst . crto.lst . crto.s . crto.S . ledswitch . edswitch.lef . ledswitch.lss . ledswitch.lst . ledswitch.o . ledswi	i∎LPC2129-RAM,ld i∎lpc21xx_keil i∎ Makefile		
Heizweikungeb	Datei <u>n</u> ame:	ledswitch		▼ Ö <u>f</u> fnen
	Dateityp:	All Files (*.*)		Abbrechen

8. Select Run/Connect to target. A message will appear in the "ocdremote-window":

C:\WINNT\system32\cmd.exe	_ 🗆 🗙
OCDemon InitializeTarget Error : Cable Disconnected	
OCDemon InitializeTarget Error : Cable Disconnected	
OCDemon InitializeTarget Error : Cable Disconnected	
OCDemon InitializeTarget Error : Cable Disconnected	
ocdremote 2.11: WIGGLER via LPT 1 at speed : 3	
JTAG SDO <- CPU(1) ARM7TDMI-S : listening on port 8888 <- JTAG SDI	
CPU[1] Accepted gdb connection on port 8888.	
	-

9. Select Run/Download. Verify in the status bar that the binary has been downloaded:



- 10. Select Run/Run (or use the "running man"-button in the toolbar)
- 11. Since "Set breakpoint at main" has been enabled in the target selection dialog the program will halt at the first line in main:

💏 ledswitch.c - Source Window	_ 🗆 ×
Elle Run View Control Preferences Help	
💐 የካ (ዮ *ዐ 😗 🕼 😹 🐴 🚍 🔗 📾 📲 🖾 Find:	et et et
ledswitch.c 💌 main 💌	SOURCE 💌
<pre>1 ////////////////////////////////////</pre>	
- 18 TODIRA = (1< <led1pin) (1<<led2pin); bits="LEUs" of<br="" set="">- 18 TODIRA = (1<<ed1pin) (1<<led2pin); a<="" define="" td="" ed-pins=""><td>s outputs</td></ed1pin) (1<<led2pin);></led1pin) (1<<led2pin);>	s outputs
19	
20 while (1)	
- 22 IOCLR0 = (1< <led1pin);< td=""><td>-</td></led1pin);<>	-
Program stopped at line 17	0×40000120 17

12. Now the menu "Control" or the toolbar-buttons can be used to step thru the code. Useful information is available from the options in the "View" menu (or equivalents in the toolbar)