
GDB Einführung

Übungen zur Vorlesung

Entwicklungsumgebung

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Aufrufen

- Interaktive gdb-Session:
% make gdb
- gdb-Dashboard:
% make debug
- Manueller Aufruf:
% arm-none-eabi-gdb \
-x ezs_dashboard.gdb app.elf
- Parameter -nh verwenden falls
.gdbinit vorhanden

Fenster

1. Source Code
2. Assembly
3. Stack
4. Threads
5. Lokale Variablen

```
File Edit View Search Terminal Help
and "show warranty" for details.
This GDB was configured as "--host=x86_64-pc-linux-gnu --target=arm-none-eabi".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from ezs-aufgaben/ezs-aufgaben/HelloWorld/build/app.elf...done.
Target voltage: unknown
Available Targets:
No. Att Driver
1 STM32F4xx
--- Source
36 res_ps = (PRESCALER+1) * 1000000L / RCCCLK;
37 res_us = res_ps / 1000000L;
38 }
39
40 cyg_uint64 ezs_counter_get(void) {
41     return timer_get_counter(TIM5);
42 }
43
44 cyg_uint64 ezs_counter_resolution_us(void){
45     return res_us;
46 }
--- Assembly
0x08000450 ezs_counter_get+0      push    {r3, lr}
0x08000452 ezs_counter_get+2      ldr     r0, [pc, #8] ; {0x080045c <ezs_counter_get()+12>}
0x08000454 ezs_counter_get+4      bl     0x0800f00 <timer_get_counter>
0x08000458 ezs_counter_get+8      movs   r1, #0
0x0800045a ezs_counter_get+10     pop    {r3, pc}
--- Stack
[8] from 0x08000452 in ezs_counter_get+2 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/HelloWorld/libE2S/drivers/stm32f4/ezs_counter.cpp:41
(no arguments)
[1] from 0x080004e6 in ezs_delay_us+110 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/HelloWorld/libE2S/src/ezs_delay.c:15
arg microseconds = 1000
[1]
--- Threads
[1] id 0 from 0x08000452 in ezs_counter_get+2 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/HelloWorld/libE2S/drivers/stm32f4/ezs_counter.cpp:41
--- Locals
ezs_counter_get () at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/HelloWorld/libE2S/drivers/stm32f4/ezs_counter.cpp:41
41     return timer_get_counter(TIM5);
Loading section .rom_vectors, size 0xb lma 0x8000000
Loading section .ARM.exidx, size 0x0 lma 0x8000000b
Loading section .text, size 0xd924 lma 0x80000010
Loading section .rodata, size 0x12a8 lma 0x8000d938
Loading section .data, size 0x4a0 lma 0x8000e0b8
Start address 0x80000010, load size 61564
Transfer rate: 16 KB/sec, 918 bytes/write.
>>> □
```



gdb Kommandos – I

Befehle haben Langformen (break) und Kurzformen (b)

Wichtige Befehle

- Breakpoint setzen:
>>> b(reak) cyg_user_start
- Einzelschritt (Funktionen betreten):
>>> s(tep)
- Einzelschritt (Funktionen nicht betreten):
>>> n(ext)
- Programm fortsetzen:
>>> c(ontinue)
- Bis zum Ende der Funktion ausführen:
>>> fin(ish)
- Funktion anzeigen:
>>> l(ist) <funktionsname>
- gdb schließen:
>>> q(uit)

```
File Edit View Search Terminal Help
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from ezs-aufgaben/ezs-aufgaben>HelloWorld/build/app.elf...done.
Target voltage: unknown
Available Targets:
No. Att Driver
  1  STM32F4xx
--- Source ---
36  res_ps = (PRESCALER+1) * 100000L / RCCLOCK;
37  res_us = res_ps / 100000L;
38
39
40  cyg_uint64 ezs_counter_get(void) {
41  return timer_get_counter(TIM5);
42  }
43
44  cyg_uint64 ezs_counter_resolution_us(void){
45  return res_us;
46  }
--- Assembly ---
0x08000450 ezs_counter_get+0  push    {r3, lr}
0x08000452 ezs_counter_get+2 ldr     r9, [pc, #0] ; {0x800045c <ezs_counter_get()+12>}
0x08000454 ezs_counter_get+4  bl     0x8000f00 <timer_get_counter>
0x08000458 ezs_counter_get+8  movs   r1, #0
0x0800045a ezs_counter_get+10 pop     {r3, pc}
--- Stack ---
[0] from 0x08000452 in ezs_counter_get+2 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben>HelloWorld/libEZ5/drivers/stm32f4/ezs_counter.cpp:41
(no arguments)
[1] from 0x080004e6 in ezs_delay_us+110 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben>HelloWorld/libEZ5/src/ezs_delay.c:15
arg microseconds = 1000
[2]
--- Threads ---
[1] id 0 from 0x08000452 in ezs_counter_get+2 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben>HelloWorld/libEZ5/drivers/stm32f4/ezs_counter.cpp:41
--- Locals ---
ezs_counter_get () at /home/noctux/work/ezs-aufgaben/ezs-aufgaben>HelloWorld/libEZ5/drivers/stm32f4/ezs_counter.cpp:41
41  return timer_get_counter(TIM5);
Loading section .rom_vectors, size 0x8 lma 0x8000000
Loading section .ARM.exidx, size 0x8 lma 0x8000008
Loading section .text, size 0x924 lma 0x8000010
Loading section .rodata, size 0x12a8 lma 0x8000938
Loading section .data, size 0x4a0 lma 0x8000e80
Start address 0x8000010, load size 61564
Transfer rate: 16 KB/sec, 91B bytes/write.
>>> break hello.c:40
Breakpoint 1 at 0x80000ec: file /home/noctux/work/ezs-aufgaben/ezs-aufgaben>HelloWorld/hello.c, line 40.
>>> □
```



Wichtige Befehle (Fortsetzung)

- Backtrace (Aufruf-Stack) anzeigen:
>>> b(ack)t(race)
- Dashboard neu zeichnen:
>>> dashboard
- Breakpoints anzeigen:
>>> info breakpoints
- Breakpoint löschen:
>>> delete <nummer>
- Variable anzeigen:
>>> p(rint) <variablenname>

```
File Edit View Search Terminal Help
Source
35 int time_us = 0;
36 float dac_val = 0;
37
38 while(1)
39 {
40     if ((time_us/delay_us) % (100000/delay_us) == 0)
41         printf("Hallo Welt!\n");
42
43     up = not up;
44     ezs_gpio_set(up);
45
Assemble
0x080000e4 test_thread+20 ldr.w r8, [pc, #132] ; 0x800016c <test_thread+156>
0x080000e8 test_thread+24 ldr r7, [pc, #108] ; (0x8000158 <test_thread+136>)
0x080000ee test_thread+26 ldr r6, [pc, #112] ; (0x800015c <test_thread+140>)
0x080000ec test_thread+28 mov r0, r4
0x080000ee test_thread+30 asrs r1, r4, #31
0x080000f0 test_thread+32 mov.w r2, #1000 ; 0x3e8
0x080000f4 test_thread+36 movs r3, #0
Stack
[0] from 0x080000ec in test_thread+28 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/helloWorld/hello.c:
40
arg arg = <optimized out>
[1] from 0x08003872 in Cyg_HardwareThread::thread_entry+18 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/scripts/gen_14exs/files/ecos/packages/kernel/current/src/common/thread_cxx:94
arg thread = 0x20000730 <threaddata>
[1]
Threads
[1] id 0 from 0x080000ec in test_thread+28 at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/helloWorld/hello.c:40
Locals
arg = <optimized out>
up = false
time_us = 0
dac_val = <optimized out>
>>> info breakpoints
Num Type Disp Enb Address What
1 breakpoint keep y 0x080000ec in test_thread at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/helloWorld/hello.c:40
breakpoint already hit 1 time
2 breakpoint keep y 0x08000170 in cyg_user_start at /home/noctux/work/ezs-aufgaben/ezs-aufgaben/helloWorld/hello.c:55
>>> [1]
```



- gdb-Dashboard benötigt einen gdb mit python-Bindings
- gdb „abschießen“:
`% killall arm-none-eabi-gdb -s SIGKILL`
- GDB Spickzettel:
<http://darkdust.net/files/GDB%20Cheat%20Sheet.pdf>



Fragen?

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