

REPORT

LAB3



PREPARED BY

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LAB₃

Debug the last program using gdb

- -Physical Board: VersatilePB
- -Processor: Arm926ej-s

Run the Board:

```
♠ MINGW64://Embedded Systems/Github/Master-Embedded-Systems/Unit_3_Embedded_C/Lec_3/Lab_3

mohammed kadry@victus MINGW64 /f/Embedded Systems/Github/Master-Embedded-Systems

/Unit_3_Embedded_C/Lec_3/Lab_3 (main)

$ c:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

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| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -kernel Mohamed_Kadry.elf

| C:/qemu-system-arm -M versatilepb -m 128M -nographic -s -S -
```

Open the GNU Debugger(gdb):

```
nohammed kadry@victus MINGW64 /f/Embedded Systems/Github/Master-Embedded-Systems
/Unit 3 Embedded_C/Lec_3/Lab_3 (main)
$ arm-none-eabi-gdb.exe Mohamed_Kadry.elf
GNU gdb (GDB) 7.5.1
Copyright (C) 2012 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <a href="http://gnu.org/licenses/gpl.html">http://gnu.org/licenses/gpl.html</a>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law. Type "show copying"
and "show warranty" for details.
This GDB was configured as "--host=i686-pc-mingw32 --target=arm-none-eabi".
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>...
Reading symbols from F:\Embedded Systems\Github\Master-Embedded-Systems\Unit_3_E
mbedded_C\Lec_3\Lab_3\Mohamed_Kadry.elf...done.
(gdb) target remote localhost:1234
Remote debugging using localhost:1234
reset () at startup.s:4
        ldr sp , =stack_top
(gdb) warning: Source file is more recent than executable.
```

5.2v

Breakpoints:

```
(gdb) target remote localhost:1234
Remote debugging using localhost:1234
reset () at startup.s:4
4     ldr sp, =stack_top
(gdb) b main
Breakpoint 1 at 0x10018: file app.c, line 7.
(gdb) b Uart_Send_String
Breakpoint 2 at 0x10038: file uart.c, line 9.
```

continue to get to Breakpoint:

used to stop

the program run in the middle

watchpoints act on variables:

used to pause the program whenever a watched variable's value is modified.

```
(gdb) watch string_buffer
Hardware watchpoint 3: string_buffer
(gdb)
```

Print Commands:

The print command prints the value of the variable specified, and print/x prints the value in hexadecimal:

```
(gdb) watch string_buffer
Hardware watchpoint 3: string_buffer
(gdb)
```

Stepping:

```
(gdb) s
                   UARTODR=(unsigned int)(*P_tx_string);
(gdb)
(gdb) si
0x00010040
                               UARTODR=(unsigned int)(*P_tx_string);
               11
(gdb) si
                               UARTODR=(unsigned int)(*P_tx_string);
0x00010044
               11
(gdb) si
0x00010048
               11
                               UARTODR=(unsigned int)(*P_tx_string);
(gdb) si
               P_tx_string++; /*New Char*/
```



```
mohammed kadry@victus MINGW64 /f/Embedded Systems/Github/Master-Embedded
/Unit_3_Embedded_C/Lec_3/Lab_3 (main)
<8M -nographic -s -S -kernel Mohamed_Kadry.elf
L</pre>
```

Where == backtrace commands:

produces a stack trace of the function calls that lead to a segfault

```
(gdb) where
#0 Uart_Send_String (
    P_tx_string=0x10078 <string_buffer> "Learn-in-Depth:<Mohamed Kadry>")
    at uart.c:12
#1 0x00010020 in main () at app.c:7
(gdb) backtrace
#0 Uart_Send_String (
    P_tx_string=0x10078 <string_buffer> "Learn-in-Depth:<Mohamed Kadry>")
    at uart.c:12
#1 0x00010020 in main () at app.c:7
(gdb)
```

info breakpoints command:

shows

information about all declared breakpoints

```
(gdb) info breakpoints

Num Type Disp Enb Address What

1 breakpoint keep y 0x00010018 in main at app.c:7
breakpoint already hit 1 time

2 breakpoint keep y 0x00010038 in Uart_Send_String at uart.c:9
breakpoint already hit 1 time

3 hw watchpoint keep y string_buffer

(gdb)
```

Finish command:

runs until the current function is finished delete - deletes a specified breakpoint

```
(gdb) finish
Run till exit from #0 Uart_Send_String (
    P_tx_string=0x10078 <string_buffer> "Learn-in-Depth:<Mohamed Kadry>")
    at uart.c:12
main () at app.c:8
8 }
```

Debug the program using eclipse

```
eclipse - F/Embedded Systems/(Sithub/Master-Embedded-Systems)(Unit 3_Embedded_C/Lec_3)(Lab_3)uart.c - Eclipse IDE
                                                                                                                                                      - 0 ×
  Edit Source Refactor Navigate Search Project Run Window Help
□ □ ■ Memory 23
                                                                                                                      #include "uart.h"
                                                                                                                          0000000000000FFD0 00000000 000
                                #define UARTODR
                                                   *((volatile unsigned int* const)((unsigned int*)0x101f1000
                                                                                                                          000000000000FFE0 00000000
                                                                                                                                                       000
                                                                                                                          000000000000FFF0
                               6 void Uart_Send_String(unsigned char* P_tx_string)
                                                                                                                          0000000000010000 04D09FE5
                                                                                                                          0000000000010010 00482DE9
                                                                                                                                                        04B
                                     /*Loop until end of string*/
                                                                                                                          0000000000010020 0088BDE8
                                                                                                                                                        780
                               9 while(*P_tx_string!='\0')
                                                                                                                          0000000000010030 OCD04DE2
                                                                                                                                                       080
                                         UARTODR=(unsigned int) (*P_tx_string);
P_tx_string++; /*New Char*/
                                                                                                                          0000000000010040 08201BE5
                                                                                                                                                       002
                                                                                                                          0000000000010050
                                                                                                                          0000000000010060
                                                                                                                                            000053E3
                                                                                                                                                        F4F
                                                                                                                          0000000000010070 1EFF2FE1
                                                                                                                                                       001
                                                                                                                          0000000000010080
                                                                                                                                            2D446570
                                                                                                                                                        746
                                                                                                                          0000000000010090
                                                                                                                                            4B616472
                                                                                                                                                        793
                                                                                                                          00000000000100A0
                                                                                                                          00000000000100В0
                                                                                                                                                        000
                                                                                                                                            00000000
                                                                                                                          0000000000010000 00000000
                                                                                                                                                       000
                                                                                                                          00000000000100D0 00000000
                                                                                                                                                       000
                                                                                              ■ 🖫 🕶 🖂 🔡 Disassembly 💢
                             lab1 [C/C++ Attach to Application] "C/Program Files (x86)/GNU Tools ARM Embedded/,7 2017-q4-major/bin/arm-none-eabi-gdb.exe" (8.0.50.20171128)
                                                                                                        00010028:
                                                                                                                              {r11}
r11, sp, #0
                                                                                                                      push
                                                                                                                                                ; (str r1
                             0x0001002c
                                                                                                                               sp, sp, #12
r0, [r11, #-8]
                                                                                                         00010030:
                                                                                                                      sub
                                                                                                                        while (*P_tx_string!='\0')
0x10058 <Uart_Send_String
                             0x00010030
                                                                                                       •00010038:
                                                                                                                            UARTODR=(unsigned int) (*P
r3, [pc, #48] ; 0x100
r2, [r11, #-8]
                                                                                                         11
                             0x00010034
                                                                                                         0001003c:
                                                                                                                                               ; 0x10074
                                                                                                         00010040:
                                                                                                                      ldr
                                                                                                                              r2, [r2]
r2, [r3]
                                                                                                         00010044:
                                         while (*P_tx_string!='\0')
                                                                                                        00010048:
                                                                                                                      str
                                                                                                                            P tx string++; /*New Char*/
```

