GRMON Scripts for the LEON 3FT

Table 1: Cross Reference of Applicable Products

Product Name:	Manufacturer Part Number	SMD #	Device Type	Internal PIC
LEON3FT	UT699	5962-08228	ALL	WG07

1.0 Overview

GRMON is the debugger monitor for the LEON 3FT processor and for SOC (System on Chip) designs based on the GRLIB IP library. GRMON includes the following functions:

- Read/write access to all system registers and memory
- Built-in disassembler and trace buffer management
- Downloading and execution of LEON applications
- Breakpoint and watchpoint management
- Remote connection to GNU debugger (GDB)
- Support for USB, JTAG, RS232, PCI, and SpaceWire debug links

An Evaluation and professional version of GRMON is currently supported on Linux and Windows hosts. GRMON is available at http://www.gaisler.com. For installation of GRMON, please referrer to the *GRMON Manual.*

2.0 GRMON Scripts.

One can use batch files or scripts when using GRMON; they are inputs when starting GRMON, or run in GRMON at the command line interface:

Staring GRMON:
-c *batch_file (*Run the commands in the batch file at start-up).

GRMON Command line interface:
batch *batch_file* (Execute a batch file of GRMON commands).

The following batch file performs the following commands:

1. Read(**mem)**/Write(**wmem)** to a memory location in SRAM
2. **wash** SRAM/SDRAM
3. **load** a hello world program
4. **disassemble** the code at 0x4000 0000
5. **break** at the function **stop()**
6. **disassemble stop()**
7. **continue** to run the program
8. unlock the **flash** memory
9. erase the **flash** memory
10. **load** a prom image in to PROM.
    (See GRMON user manual for detail descriptions of commands)

Load_dis_flash.bat:

```
mem 0x40000000
wmem 0x40000000 0x1234abcd
mem 0x40000000
wash
load hello
disassemble 0x40000000
break stop
run
echo BREAK AT STOP FUNCTION
disassemble stop
cont
flash unlock all
flash erase 0x0 0x100000
flash load hello.prom
flash lock all
echo
echo Please Push Reset to run the PROM image
echo
echo GRMON will now quit.....
echo
quit
```

hello.c: (The program that is compiled using BCC, and downloaded and ran using GRMON)

```
#include <stdio.h>
#include <stdlib.h>

int stop(void)
{
        printf("GO!!!\n");
        return 0;
}
int main(void)
{
        printf("Hello World\n");
        printf("STOP!\n");
        stop();
        return 0;
}
```

Makefile: (Used to create the executable and the PROM image).

```
all:
        sparc-elf-gcc hello.c -o hello
        mkprom2 –v -ramws 2 -romws 5 -baud 38400 -freq 66  hello -o hello.prom
```

Output of Makefile:

```
$ make all
sparc-elf-gcc hello.c -o hello
mkprom2 -v -ramws 2 -romws 5 -baud 38400 -freq 66  hello -o hello.prom

LEON2/3/ERC32 MKPROM prom builder for BCC, ECOS, RTEMS and ThreadX v2.0.38
Copyright Gaisler Research 2004-2007, all rights reserved.

phead0: type: 1, off: 65536, vaddr: 40000000, paddr: 40000000, fsize: 24720, msi
ze: 25752
```

```
phead1: type: 1, off: 91288, vaddr: 40006498, paddr: 40006498, fsize: 0, msize:4
section: .text at 0x40000000, size 21808 bytes
Uncoded stream length: 21808 bytes
Coded stream length: 11537 bytes
Compression Ratio: 1.890
section: .data at 0x40005530, size 2912 bytes
Uncoded stream length: 2912 bytes
Coded stream length: 829 bytes
Compression Ratio: 3.513

creating LEON3 boot prom: hello.prom
Searching for compiler to use (sparc-elf, sparc-rtems or sparc-linux):
sparc-elf-gcc (BCC 4.4.2 release 1.0.36b) 4.4.2
Copyright (C) 2009 Free Software Foundation, Inc.
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warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.


sparc-elf-gcc.exe -O2 -g -N -Tc:/opt/mkprom2/linkprom -Ttext=0x0  c:/opt/mkprom2
/promcore.o c:/opt/mkprom2/prominit.o c:/opt/mkprom2/prominit_leon3.o c:/opt/mkp
rom2/promcrt0.o c:/opt/mkprom2/promload.o c:/opt/mkprom2/promdecomp.o  -nostdlib
 c:/opt/mkprom2/prombdinit.o  dump.s  -o hello.prom
multidir:
```

Output from GRMON to HyperTerminal:

```
Hello World
STOP!
GO!!!
```

Output after reset in HyperTerminal:

```
 MkProm2 boot loader v2.0
 Copyright Gaisler Research - all rights reserved

 system clock   : 66.0 MHz
 baud rate      : 38372 baud
 prom           : 512 K, (5/5) ws (r/w)
 sram           : 2048 K, 1 bank(s), 2/2 ws (r/w)

 decompressing .text to 0x40000000
 decompressing .data to 0x40005530

 starting hello

Hello World
STOP!
GO!!!
```

GRMON Output:

The following shows the batch file *load_dis_flash.bat* being executing in GRMON.

```
$ grmon -xilusb -c load_dis_flash.bat

 GRMON LEON debug monitor v1.1.47 professional version

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 Comments or bug-reports to support@gaisler.com

Try to open libusb filter driver (install from http://libusb-win32.sourceforge.n
et)
 Xilinx cable: Cable type/rev : 0x3
 JTAG chain: UT699A

 Device ID: : 0x699
 GRLIB build version: 2564

 initializing .....................
 detected frequency:  66 MHz

 Component                       Vendor
 LEON3FT SPARC V8 Processor          Gaisler Research
 AHB Debug UART                  Gaisler Research
 AHB Debug JTAG TAP                Gaisler Research
 Fast 32-bit PCI Bridge            Gaisler Research
 PCI/AHB DMA controller            Gaisler Research
 GR Ethernet MAC                 Gaisler Research
 GRSPW Spacewire Link              Gaisler Research
 GRSPW Spacewire Link              Gaisler Research
 GRSPW Spacewire Link              Gaisler Research
 GRSPW Spacewire Link              Gaisler Research
 FT Memory Controller            Gaisler Research
 AHB/APB Bridge                  Gaisler Research
 LEON3 Debug Support Unit          Gaisler Research
 OC CAN controller               Gaisler Research
 Generic APB UART                Gaisler Research
 Multi-processor Interrupt Ctrl    Gaisler Research
 Modular Timer Unit              Gaisler Research
 Clock gating unit               Gaisler Research
 PCI Arbiter                     European Space Agency
 General purpose I/O port          Gaisler Research
 AHB status register             Gaisler Research

 Use command 'info sys' to print a detailed report of attached cores

mem 0x40000000
            40000000  12345678  00000000  81c123ec  01000000    .4Vx.....• #• ....
            40000010  a1480000  a7500000  108011ef  ac102001    íH..ºP.....• ¼. .
            40000020  91d02000  01000000  01000000  01000000    æ•  .............
            40000030  91d02000  01000000  01000000  01000000    æ•  .............

wmem 0x40000000 0x1234abcd
```

```
mem 0x40000000
        40000000  1234abcd  00000000  81c123ec  01000000    .4½• .....• #• ....
        40000010  a1480000  a7500000  108011ef  ac102001    íH..ºP.....• ¼. .
        40000020  91d02000  01000000  01000000  01000000    æ•  .............
        40000030  91d02000  01000000  01000000  01000000    æ•  .............

wash
        clearing 8192 kbyte SRAM:  40000000 - 40800000
        clearing 131072 kbyte SDRAM:  60000000 - 68000000
load hello
        section: .text at 0x40000000, size 21808 bytes
        section: .data at 0x40005530, size 2912 bytes
        total size: 24720 bytes (633.8 kbit/s)
        read 163 symbols
        entry point: 0x40000000
disassemble 0x40000000
        40000000  88100000   clr  %g4
        40000004  09100011   sethi  %hi(0x40004400), %g4
        40000008  81c123ec   jmp  %g4 + 0x3ec
        4000000c  01000000   nop
        40000010  a1480000   mov  %psr, %l0
        40000014  a7500000   mov  %wim, %l3
        40000018  108011ef   ba  0x400047d4
        4000001c  ac102001   mov  1, %l6
        40000020  91d02000   ta  0x0
        40000024  01000000   nop
        40000028  01000000   nop
        4000002c  01000000   nop
        40000030  91d02000   ta  0x0
        40000034  01000000   nop
        40000038  01000000   nop
        4000003c  01000000   nop
break stop
run
echo BREAK AT STOP FUNCTION
        BREAK AT STOP FUNCTION
disassemble stop
        400011a4  03100015   sethi  %hi(0x40005400), %g1
        400011a8  901060d0   or  %g1, 0xd0, %o0
        400011ac  40000036   call  0x40001284
        400011b0  01000000   nop
        400011b4  82102000   mov  0, %g1
        400011b8  b0100001   mov  %g1, %i0
        400011bc  81e80000   restore
        400011c0  81c3e008   retl
        400011c4  01000000   nop
        400011c8  9de3bfa0   save  %sp, -96, %sp
        400011cc  03100015   sethi  %hi(0x40005400), %g1
        400011d0  901060d8   or  %g1, 0xd8, %o0
        400011d4  4000002c   call  0x40001284
        400011d8  01000000   nop
        400011dc  03100015   sethi  %hi(0x40005400), %g1
        400011e0  901060e8   or  %g1, 0xe8, %o0

cont
```

```
flash unlock all
        flash erase 0x0 0x100000
        Erase in progress
        Block @ 0x00000000 : code = 0x00800080  OK
        Block @ 0x00040000 : code = 0x00800080  OK
        Block @ 0x00080000 : code = 0x00800080  OK
        Block @ 0x000c0000 : code = 0x00800080  OK
        Block @ 0x00100000 : code = 0x00800080  OK
        Erase complete
flash load hello.prom
        section: .text at 0x0, size 18176 bytes
        total size: 18176 bytes (70.5 kbit/s)
        read 136 symbols
        entry point: 0x00000000
flash lock all
echo
echo Please Push Reset to run the PROM image
echo
echo GRMON will now quit.....
echo
        Please Push Reset to run the PROM image

        GRMON will now quit.....
quit
        Closing  Xilinx cable
```

The programs *hello* and *hello.prom* are executed on the GR-UT699 evaluation board. GRMON connection is established by the JTAG Debug Link using Xilinx Platform USB cable (***-xilusb)*** and a serial connection for the output of the programs.

3.0 Conclusion

Using batch files in GRMON, one can perform all the built-in commands within a batch file instead of typing in each command one at a time. Batch file are executed in GRMON at start up or while GRMON is running.

4.0 References

1. Aeroflex Colorado Springs Inc., UT699 LEON 3FT/SPARCTM V8 MicroProcessor Advanced User Manual, Aug. 2010
2. Aeroflex Gaisler Inc., GRMON User Manual, Version 1.1.49 April 2011
3. Aeroflex Gailser Inc., MKPROM2 User's Manual, Version 2.0.35 January 2011