

1. ===== build the verilator simulator =====
shawnliu@shawnliu-Aspire-TC-780:/var/cpu_testbench/git_hub/Cookabarra_SOC\$ make all

and then start the simulator

shawnliu@shawnliu-Aspire-TC-780:/var/cpu_testbench/git_hub/Cookabarra_SOC\$./tb

```
Built with Verilator 4.212 2021-09-01.
Recommended: Verilator 4.0 or later.
This emulator compiled with JTAG Remote Bitbang client. To enable, use +jtag_rbb_enable=1.
Listening on port 9823
Attempting to accept client socket
Accepted successfully.
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
===== reset the system from boot_addr =====
reset the cpu,done
===== reset the system from boot_addr =====
invalid instruction opcode (00), pc=      128,  the instruction is (00000000)
invalid instruction opcode (00), pc=      128,  the instruction is (00000000)
dm write dmcontrol, data=0x00000000, dmcontrol =0x00000000
```

2. ===== openocd =====
shawnliu@shawnliu-Aspire-TC-780:/var/cpu_testbench/git_hub/Cookabarra_SOC/openocd\$ openocd -f
./openocd_local_bitbang.cfg

```
Open On-Chip Debugger 0.10.0+dev (SiFive OpenOCD 0.10.0-2020.04.6)
Licensed under GNU GPL v2
For bug reports:
  https://github.com/sifive/freedom-tools/issues
Info : only one transport option; autoselect 'jtag'
Info : Initializing remote_bitbang driver
Info : Connecting to localhost:9823
Info : remote_bitbang driver initialized
Info : This adapter doesn't support configurable speed
Info : JTAG tap: riscv.cpu tap/device found: 0x1e200a6f (mfg: 0x537 (Wuhan Xun Zhan Electronic
Technology), part: 0xe200, ver: 0x1)
Info : datacount=1 progbufsize=0
Warn : We won't be able to execute fence instructions on this target. Memory may not always appear
consistent. (progbufsize=0, impebreak=0)
Info : Examined RISC-V core; found 1 harts
Info : hart 0: XLEN=32, misa=0x40001100
Info : Listening on port 3333 for gdb connections
Info : Listening on port 6666 for tcl connections
Info : Listening on port 4444 for telnet connections
```

3. ===== gdb =====
shawnliu@shawnliu-Aspire-TC-780:/var/cpu_testbench/git_hub/Cookabarra_SOC/sw_app/bootrom/frondends\$ riscv32-unknown-elf-gdb
GNU gdb (GDB) 8.2.50.20181127-git
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <<http://gnu.org/licenses/gpl.html>>
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=x86_64-pc-linux-gnu --target=riscv32-unknown-elf".
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".

```
(gdb) show remotetimeout
Timeout limit to wait for target to respond is 2.
(gdb) set remotetimeout 20
```

3.1 ===== connect to openocd (gdb server) =====

```
(gdb) target remote localhost:3333
Remote debugging using localhost:3333
warning: No executable has been specified and target does not support
determining executable automatically. Try using the "file" command.
Ignoring packet error, continuing...
0x80000036 in ?? ()
```

3.2 ===== access gpr registers =====

```
(gdb) info reg
ra          0x5f555555      0x5f555555
sp          0x0            0x0
gp          0xd0580000      0xd0580000
tp          0x80000178      0x80000178
t0          0xff          255
t1          0x0            0
t2          0x0            0
fp          0x0            0x0
s1          0x0            0
a0          0x0            0
a1          0x0            0
a2          0x0            0
a3          0x0            0
a4          0x0            0
a5          0x0            0
a6          0x0            0
a7          0x0            0
s2          0x0            0
s3          0x0            0
s4          0x0            0
s5          0x0            0
s6          0x0            0
s7          0x0            0
s8          0x0            0
s9          0x0            0
s10         0x0            0
s11         0x0            0
t3          0x0            0
t4          0x0            0
t5          0x0            0
t6          0x0            0
pc          0x80000036      0x80000036
(gdb)
```

3.3 ===== access csr =====

```
(gdb) p $misa
$1 = 1073746176
(gdb) p $mtvec
$2 = 1
(gdb) p $mstatus
$3 = 6280
(gdb) p $mvendorid
$4 = 0
(gdb) p $minstret
$5 = 513177
(gdb) p $mcycle
$6 = 540351
(gdb) p $mcycleh
$7 = 0
(gdb) p $mie
$8 = 128
(gdb) p $mtvec
```

```
$9 = 1
(gdb)
```

```
3.4 =====access memory =====
```

```
(gdb) x/wx 0x100000
0x100000: 0x7e40006f
(gdb) x/wx 0x100004
0x100004: 0x53dbd36b
(gdb) x/wx 0x100008
0x100008: 0xafc353cf
(gdb) x/wx 0x80
0x80: 0xe4f6fdf4
(gdb) x 0x80
0x80: 0x003007b7
```

```
3.5 ===== load file =====
```

```
(gdb) target remote localhost:3333
Remote debugging using localhost:3333
warning: No executable has been specified and target does not support
determining executable automatically. Try using the "file" command.
Ignoring packet error, continuing...
0x00000000 in ?? ()
(gdb) file ./bootrom.elf
A program is being debugged already.
Are you sure you want to change the file? (y or n) y
Reading symbols from ./bootrom.elf...
(No debugging symbols found in ./bootrom.elf)
(gdb) load
Loading section .vectors, size 0x84 lma 0x0
Loading section .text, size 0xc00 lma 0x84
Loading section .rodata, size 0x2fc lma 0xc84
Ignoring packet error, continuing...
Loading section .data, size 0x10 lma 0xf80
Ignoring packet error, continuing...
Start address 0x84, load size 3984
Ignoring packet error, continuing...
Transfer rate: 255 bytes/sec, 996 bytes/write.
```

```
3.5 ===== jump to a address or a function=====
```

```
jump function
set $pc=address
(gdb) jump reset_handler
Continuing at 0x8f8.
Could not write register "pc"; remote failure reply 'E0E'
```

```
(gdb) monitor reset halt
JTAG tap: riscv.cpu tap/device found: 0x1e200a6f (mfg: 0x537 (Wuhan Xun Zhan
Electronic Technology), part: 0xe200, ver: 0x1)
(gdb)
```