

Zylin CPU

Soft CPU Demo

yvind Harboe, General Manager, Zylin AS

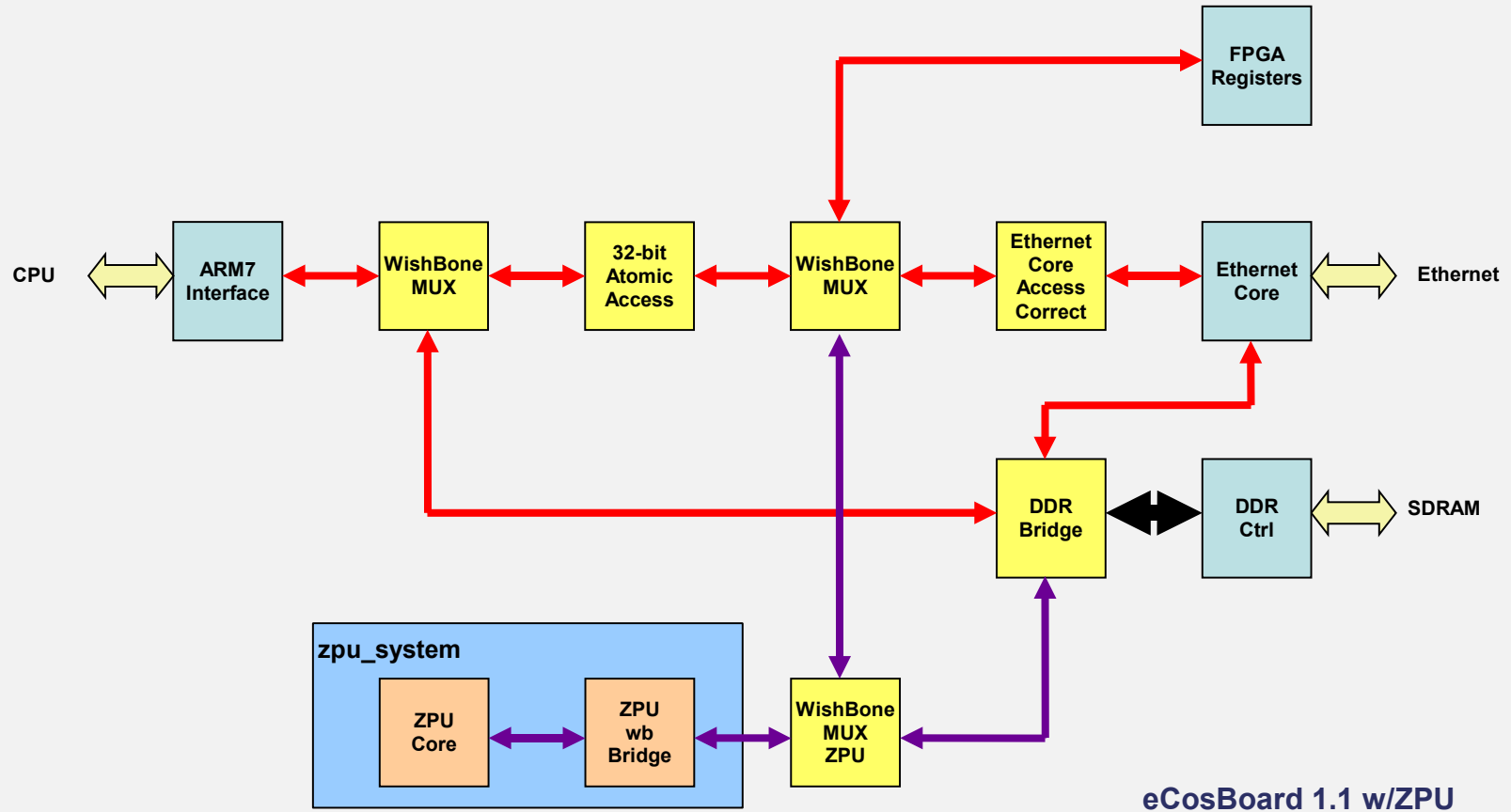


Demo

- Xilinx XC3S400
- Runs TCP/IP stack & web server under eCos
- Wishbone interfaces
- 16 bit DDR SDRAM



Zylin eCosBoard



eCosBoard 1.1 w/ZPU



Dhrystone 2.1

- Feeble 16 bit DRAM memory subsystem
- ZPU 1.8 DMIPS using 16 bit DRAM only
- AT91FR40162R ARM7 - 3 DMIPS using SRAM + DRAM



Games

- No operating system. libgloss + newlib.
- Standard C applications
- Eliza simple text based
- Sumeria - uses -lm math library

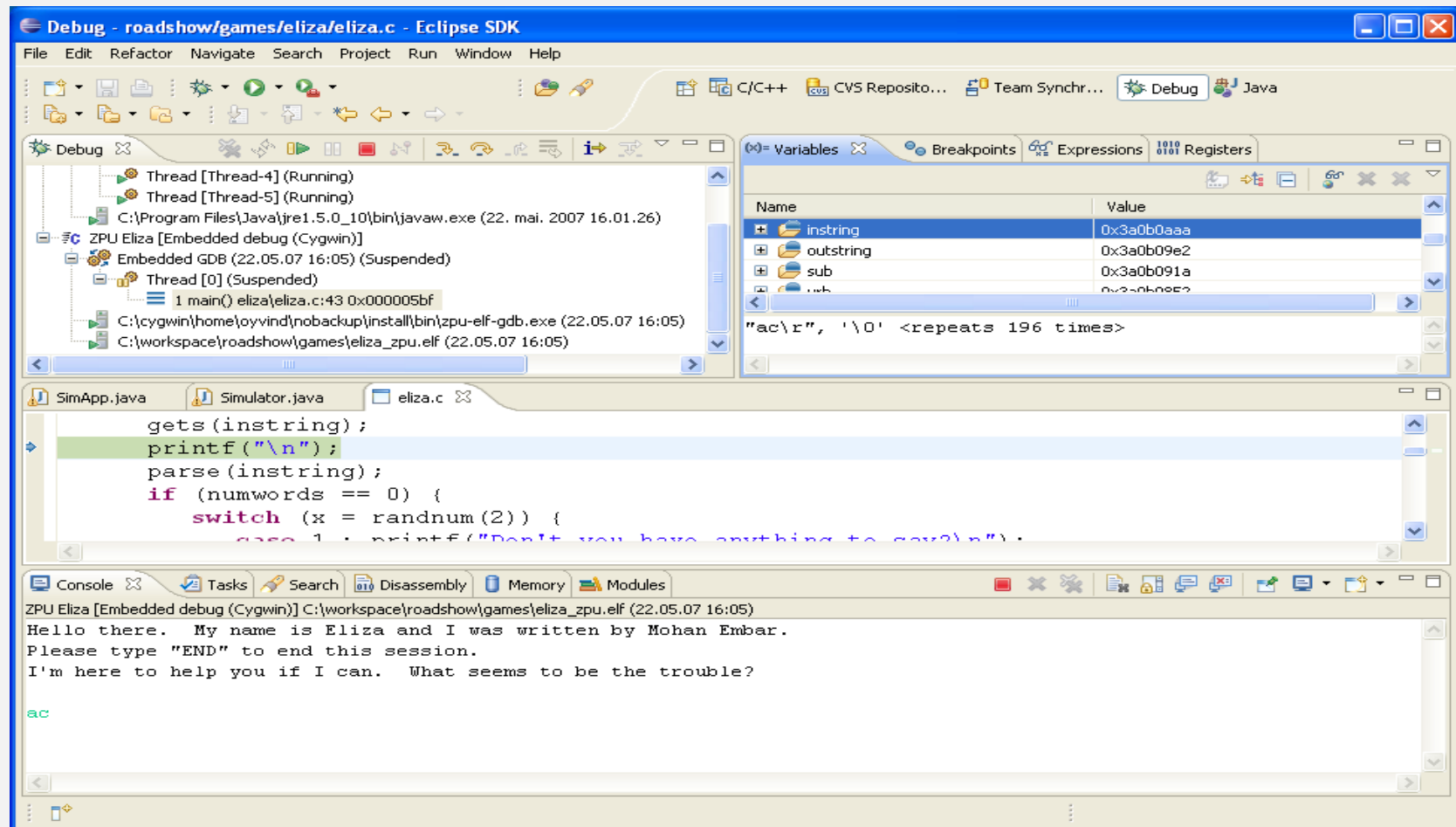


eCos TCP/IP

- TCP/IP stack
- eCos web server, e.g. configuration pages, status, logs



ISS GDB & CDT



ISS GDB & CDT

The screenshot displays the Eclipse IDE interface during a GDB debug session. The top toolbar shows various debugging actions. The Debug console on the left lists threads and processes, including 'Thread [Thread-4] (Running)', 'Thread [Thread-5] (Running)', and 'Thread [0] (Suspended)'. The source code editor shows the following C code:

```
gets(instring);  
printf("\n");  
parse(instring);  
if (numwords == 0) {  
    switch (x = randnum(2)) {  
        case 1: printf("Don't you have anything to say? \n");
```

The Disassembly window at the bottom shows the following instructions:

```
0x000005be <main+90>: callpre1  
printf("\n");  
0x000005bf <main+91>: nop  
0x000005c0 <main+92>: nop  
0x000005c1 <main+93>: im 3  
0x000005c2 <main+94>: im -60  
0x000005c3 <main+95>: im -48  
0x000005c4 <main+96>: storesp 4
```



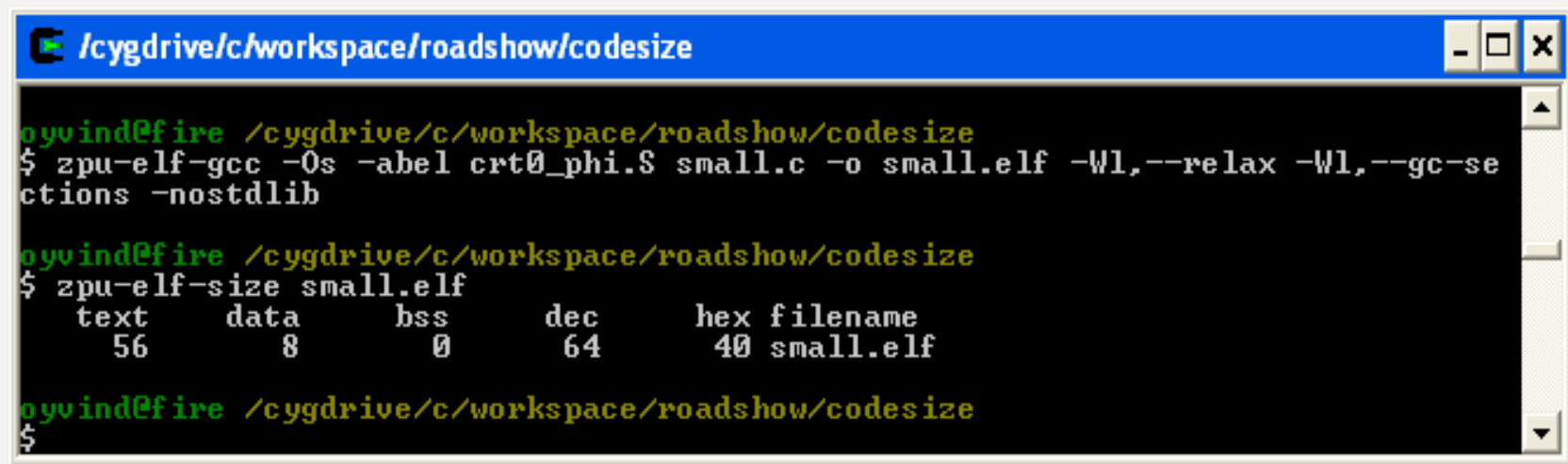
Toolchain codesize

```
oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$ zpu-elf-gcc -Os -abel smallstd.c -o small.elf -Wl,--relax -Wl,--gc-sections
oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$ zpu-elf-gcc -Os -abel smallstd.c -o smallstd.elf -Wl,--relax -Wl,--gc-sections
oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$ zpu-elf-size smallstd.elf
  text    data    bss     dec     hex filename
 1743     952     36     2731    aab smallstd.elf
oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$ cat smallstd.c
int main(int argc, char **argv)
{
    volatile int *someRegister=(volatile int *)0;
    volatile int *otherRegister=(volatile int *)4;
    while (*someRegister!=0)
    {
        *otherRegister++;
    }
}
oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$
```



Toolchain codesize custom startup

- Use more FPGA resources, reduce fixed overhead



```
oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$ zpu-elf-gcc -Os -abel crt0_phi.S small.c -o small.elf -Wl,--relax -Wl,--gc-sections -nostdlib

oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$ zpu-elf-size small.elf
   text    data     bss     dec     hex filename
    56      8       0     64     40 small.elf

oyvind@fire /cygdrive/c/workspace/roadshow/codesize
$
```



Demo summary

- DMIPS
- Games standard C with math library, etc.
- eCos - TCP/IP stack and drivers
- ISS Instruction set simulator and debugger



Questions?

