EXP 2: Familiar with PCSpim

(Ver. 0.92 2018-4-6 By Wangxp@fudan.edu.cn)

1、Objective

1.1 To be familiar with PCSPim simulator;

1.2 To be familiar with Assemblers, linkers;

1.3 To understand the architecture of MIPS computer, esp. MIPS instruction set, Registers, F-registers, syscalls, call & return, stacks.

2、Files

2.1 PCSPim, ZIP files (pcspim.zip);

2.2 Examples (examples.zip, containing 8 examples);

2.3 Manuals, a lot of pdfs, and you can get more from internet.

3、Install Software

3.1 Extract PCSPim zip files to one directory.

3.2 Run “Setup.msi” to install PCSPim to one specify directory, i.e. “c:\program files\pcspim”.

3.3 Run “Pcspim.exe” under the directory, i.e. “c:\program files\pcspim”.

3.4 Extract examples “examples.zip” to one specify directory, i.e. “c:\pcspim”.

3.5 In “Pcspim.exe”, choose “open” to select one example files, i.e., “p7.asm”, and debug the program step by step.

4、Tasks

4.1 Debug p1.asm, p2.asm, p3.asm, observe and record what you have seen.

4.2 Rewrite p1.asm, using MIPS & the Simulator, to accept two integers and the output the result, the following is the typical Input & output:

Please enter 1st number: 20

Please enter 2nd number: 50

The result of 20 & 50 is : 70

Do you want to try another(0—continue/1—exit):

4.3 Translate the following c Code into MIPS, then debug your code and optimize your code.

```
int sumn(int* arr, int n)
{
    int sum=0;
    for(idx=0;idx<n;idx++) sum += arr[idx];
    return sum
 }
Int main(){
    int[] arrs = {9,7,15, 19,20,30,11,18};
    int N = 8;
    int result = sumn(arrs,N);
    Print(“The result is :”)
```

```
    print(result);

    return 0;
}
```

4.4* Read chapter 3 of Ref.[5], write a program called fib-o+.asm which is faster that fib-o.asm, and explain the reason.

5、References

5.1 Getting Started with PCSPim. PDF documents, PCSpim_getstarted.pdf, included, highly recommend, a read-first manual.

5.2 MIPS Assembly Language Programming CS50 Discussion and Project Book. PDF documents, cs50-asm.pdf. (Included), highly recommend, a read-first book.

5.3 MIPS Assembly Language Programming using QtSpim, PDF documents, MIPStextSMv11, included, highly recommend, content except QtSpim is high-quality.

5.4 Assemblers, linkers, and the SPIM simulator, PDF documents, HP_AppA.pdf, Louis Brandeis. Included, recommend, content for computer GURU.

6、TIPS

6.1 QtSpim[9.1.9] has a big flaw: syscall does not function. So we choose PCSim 9.1.9 .

6.2 Please notice: Native Instructions are supported by MIPS machine, while pseudo-instructions are supported by MIPS assembler which will be translated into one or more native instructions, please refer to 4.4 in Page. 57 of Ref.[2].