Fudan ICS Spring 2013
Lab 3: Pipelined Y86 Implementation

Assigned: Apr. 18, Due: Jun. 10, 23:59

Guobao Jiang (guobaojiang@fudan.edu.cn) is the lead person for this lab.
Note: Please give me your team information (team leader, team name, team members) before May 1, 2013 by email.

1 Introduction

In this lab, you will learn about the design and implementation of a pipelined Y86 processor. You can design this lab based on textbook **Sec. 4.5 Pipelined Y86 Implementations** (Page 317, English-Version).

This lab is team work, 2-4 persons for each group. Each team should has a team leader who assigns the tasks and give the final presentation (report). Three persons per team is appropriate, one for design GUI, one for design Y86 instuctions, one for documentation and presentation.

2 Example

In textbook, Figure 4.42 (Page 324) gives us the example of Y86 instruction. This code loads values 10 and 3 into program registers %edx and %eax.

```
# prog1
0x000: irmov1 $10, %edx
0x006: irmovl $3, %eax
0x00c: nop
0x00d: nop
0x00e: nop
0x00f: add %edx, %eax
0x011: halt
```

Figure 1 shows the pipelined execution of **prog1** without special pipeline control.

Figure 1: Pipelined execution of **prog1**.

3 Y86 Implementation

You can use any programming language to finish this lab, such as **C/C++, Java, VB, C#, Lisp, Python** and etc.

In this lab, you should implement the basic functions as follow.
1. Design a GUI for users, which shows the following infomations (30 pts):

- For each cycle, GUI shows the each stage's opration (**F**etch, **D**ecode, **E**xecute, **M**emory, **W**rite back). For example, (Figure 1) the opration in cycle 6: R[%eax]←3.

- For each cycle, show the register, condition code register,the data memory, and the program counter.

2. Y86 instruction implementation (15+15+15+5 pts)
four move instructions (**irmovl, rrmovl, mrmovl,rmmovl**)
four integer operation instructions (**addl, subl, andl, xorl**)
seven jump instructions (**jmp, jle, jl, je, jge, jg**)
two selective instructions from **call, pushl, popl, halt**.

3. Implement one of avoiding data hazards and give corresponding test instance. (10 pts)

Note: Any addtional implementations and test instaces will for 10 pts.

4 Hand In Instructions

After you finished this lab, you should upload the flowing files:
1. experiment report (.pdf format).

Figure 2: An GUI example.

2. presentation slides (.pdf/.ppt/.pptx format).
3. software source code files (put this files in `software` folder).
Note: a "readme" file should be included in `software` folder, which tells the users how to install and run this software.

5   An GUI Example and ICS2012 excellent lab3

Figure 2 shows an GUI example.

In **ftp/lab3** folder, a project "TianYingtao" was given. This project was ICS2012 excellent lab3. Run this project at following steps:
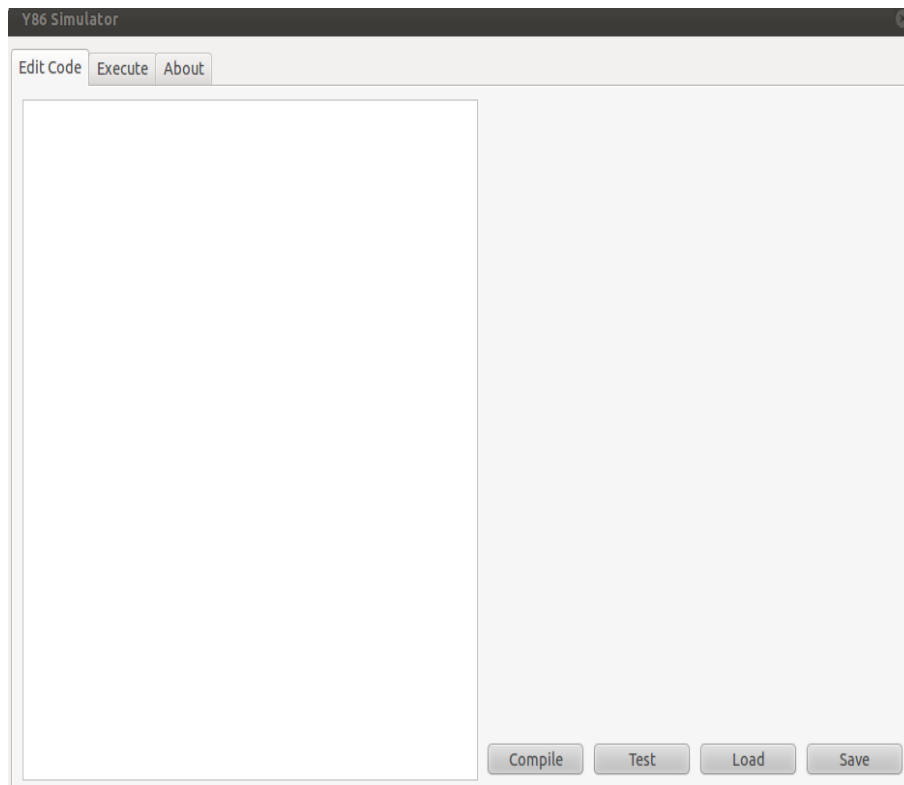
Figure 3: ICS2012 excellent lab3 by TianYingtao.

0. install python-qt4 $> sudo apt-get install python-qt4
1. change the dir to "TianYingtao/workspace/gui";
2. run $> python Y86.py
3. if you find this warning: (python:31413): Gtk-WARNING **: Unable to locate theme engine in module_path: "pixmap"
run $> sudo apt-get install gtk2-engines-pixbuf
4. this project GUI as Figure 3.