Pintos实验配置

李勇　　574086042@qq.com

罗燕媚 lym_254565361@qq.com

中山大学软件学院

Pintos相关介绍

1. Pintos是一个运行在8086处理器上的一个简易的操作系统框架。

2. 关于Bochs，它是一个x86硬件平台的开源模拟器。Bochs模拟的是整个PC平台，包括I/O设备、内存和BIOS。

3. Pintos实现了kernel threads、加载和运行用户程序、文件系统。但是这些实现都很简单，需要进一步的完善。

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步骤一： 安装Ubuntu 14.10。选择双系统或者用虚拟机安装都可以。

步骤二：下载相关实验包，直接解压。

下载 Pintos 地址：

http://www.stanford.edu/class/cs140/projects/pintos/pintos.tar.gz

下载 Bochs 2.6.2 版，其他版本未经测试。

地址: http://sourceforge.net/projects/bochs/files/bochs/2.6.2/bochs-2.6.2.tar.gz/download

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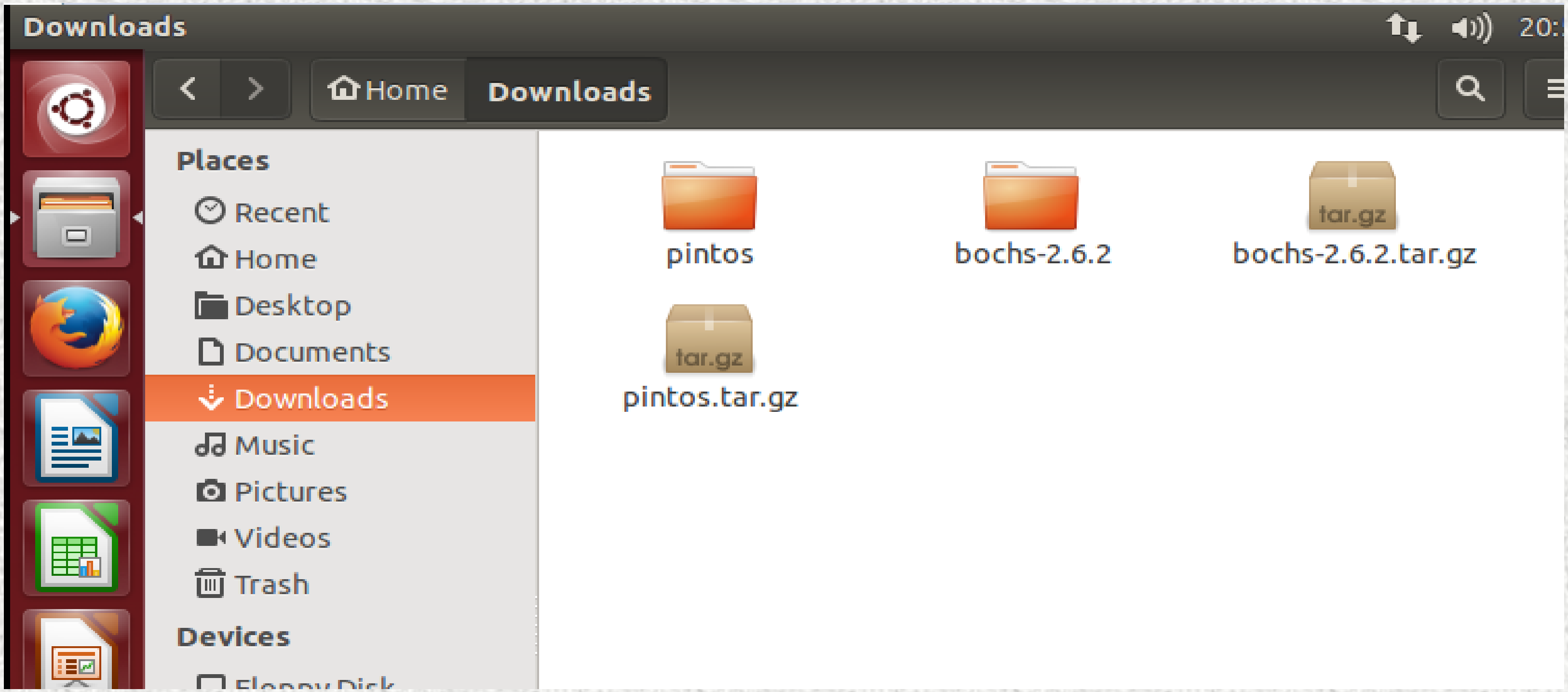

步骤二完成之后，做一个符号的约定，此后不再重复：

$PINTOSDIR： pintos 解压后的文件夹

$BOCHSDIR： Bochs 解压后所在的文件夹

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步骤三：安装必要的软件及库。

Ubuntu 安装软件或者库方法： sudo apt-get install [+软件包名称]

3.1 必要软件及库（必须安装）

安装 GCC, Perl, Make， G++等这些软件 Ubuntu 14.10 已经自带，一般无需配置，

若提示缺少相关库，请尝试执行下面的代码：

```
sudo apt-get install build-essential
```

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3.2 安装 autoconf（为了下文执行./configure）

```
sudo apt-get install autoconf
```

3.3 安装Bochs

3.3.1： 打开 terminal (Ubuntu 下快捷键为 Ctrl + Alt + T)

3.3.2 ： 进入 bochs 解压后的文件夹

```
cd $BOCHSDIR //注意将$BOCHSDIR 替换为你的 Bochs 文件夹路径
```

3.3.3： 初始化配置：

```
./configure --with-nogui
```

参数说明： 第一个参数文本输出即可，提高运行速度。

可能提示permission denied，此时先执行chmod +x ./configure

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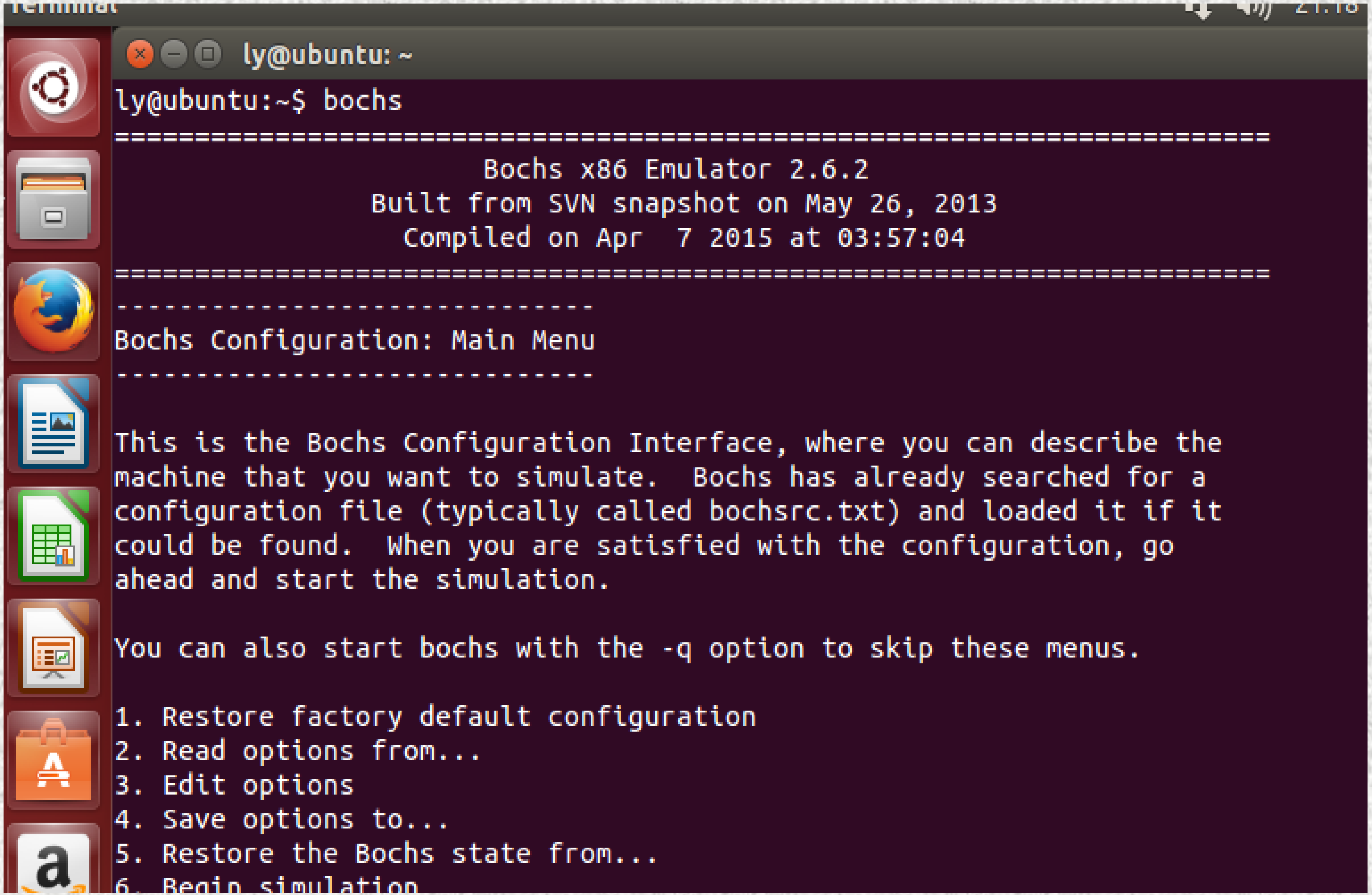
3.3.4： 编译安装

sudo make install

此时 Bochs 已经安装在你的机器上了。



```
ly@ubuntu:~$ bochs
========================================================================
                        Bochs x86 Emulator 2.6.2
                 Built from SVN snapshot on May 26, 2013
                   Compiled on Apr  7 2015 at 03:57:04
========================================================================
------------------------------
Bochs Configuration: Main Menu
------------------------------

This is the Bochs Configuration Interface, where you can describe the
machine that you want to simulate.  Bochs has already searched for a
configuration file (typically called bochsrc.txt) and loaded it if it
could be found.  When you are satisfied with the configuration, go
ahead and start the simulation.

You can also start bochs with the -q option to skip these menus.

1. Restore factory default configuration
2. Read options from...
3. Edit options
4. Save options to...
5. Restore the Bochs state from...
6. Begin simulation
```

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步骤四：配置pintos的环境变量

（$PINTOSDIR/src/utils 中有我们编译测试所需要的工具，我们将它加入到环境变量中去。）

4.1 cd ~ //进入本用户 home 目录

4.2 gedit .profile //编辑.profile 文件

4.3 在.profile 文件最后一行加上(注意双引号需要为英文的双引号，最好手打)

```
export PATH=”$PATH:$PINTOSDIR/src/utils”
```

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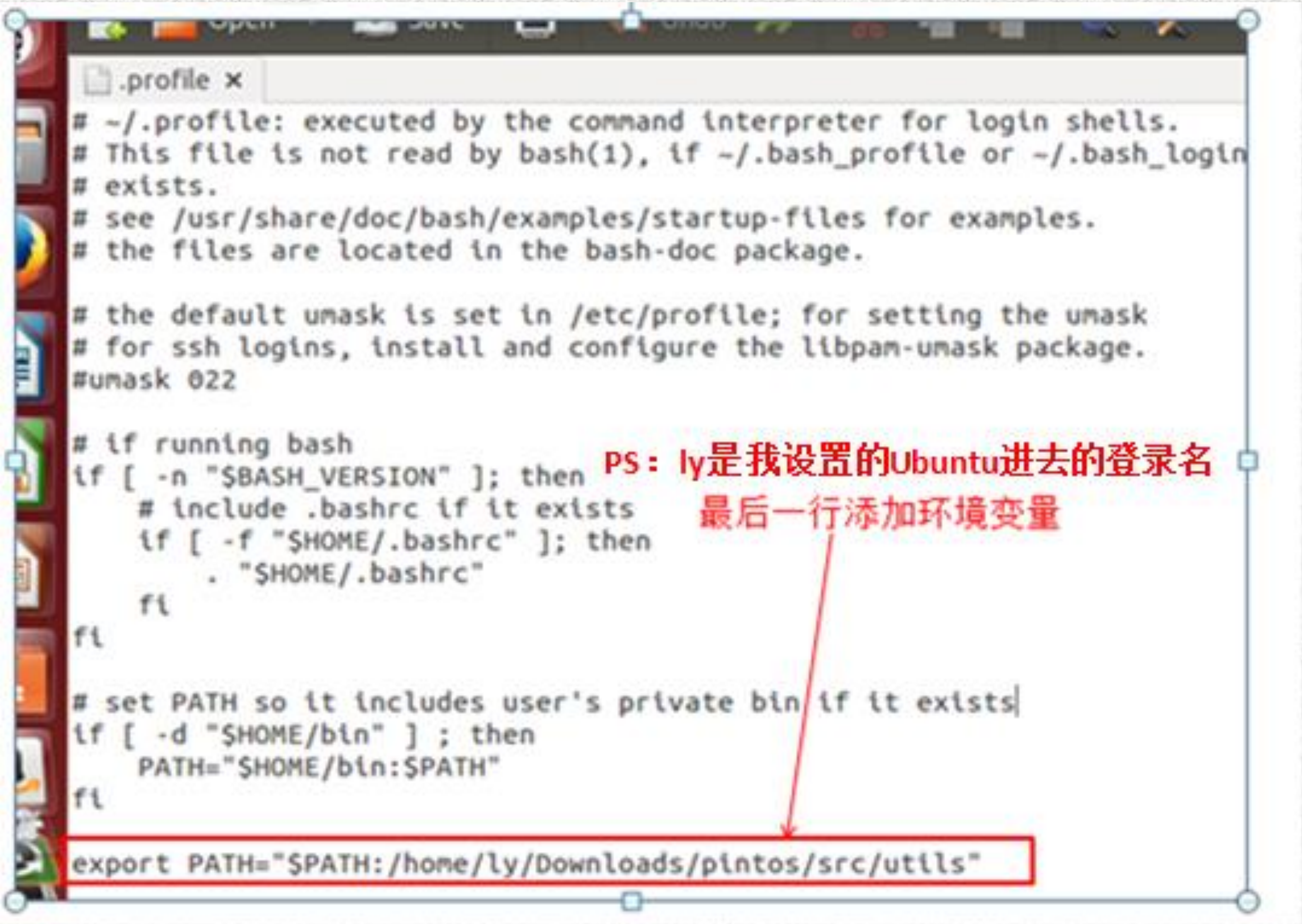

```
# ~/.profile: executed by the command interpreter for login shells.
# This file is not read by bash(1), if ~/.bash_profile or ~/.bash_login
# exists.
# see /usr/share/doc/bash/examples/startup-files for examples.
# the files are located in the bash-doc package.

# the default umask is set in /etc/profile; for setting the umask
# for ssh logins, install and configure the libpam-umask package.
#umask 022

# if running bash
if [ -n "$BASH_VERSION" ]; then
    # include .bashrc if it exists
    if [ -f "$HOME/.bashrc" ]; then
        . "$HOME/.bashrc"
    fi
fi

# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
    PATH="$HOME/bin:$PATH"
fi

export PATH="$PATH:/home/ly/Downloads/pintos/src/utils"
```

PS：ly是我设置的Ubuntu进去的登录名

最后一行添加环境变量

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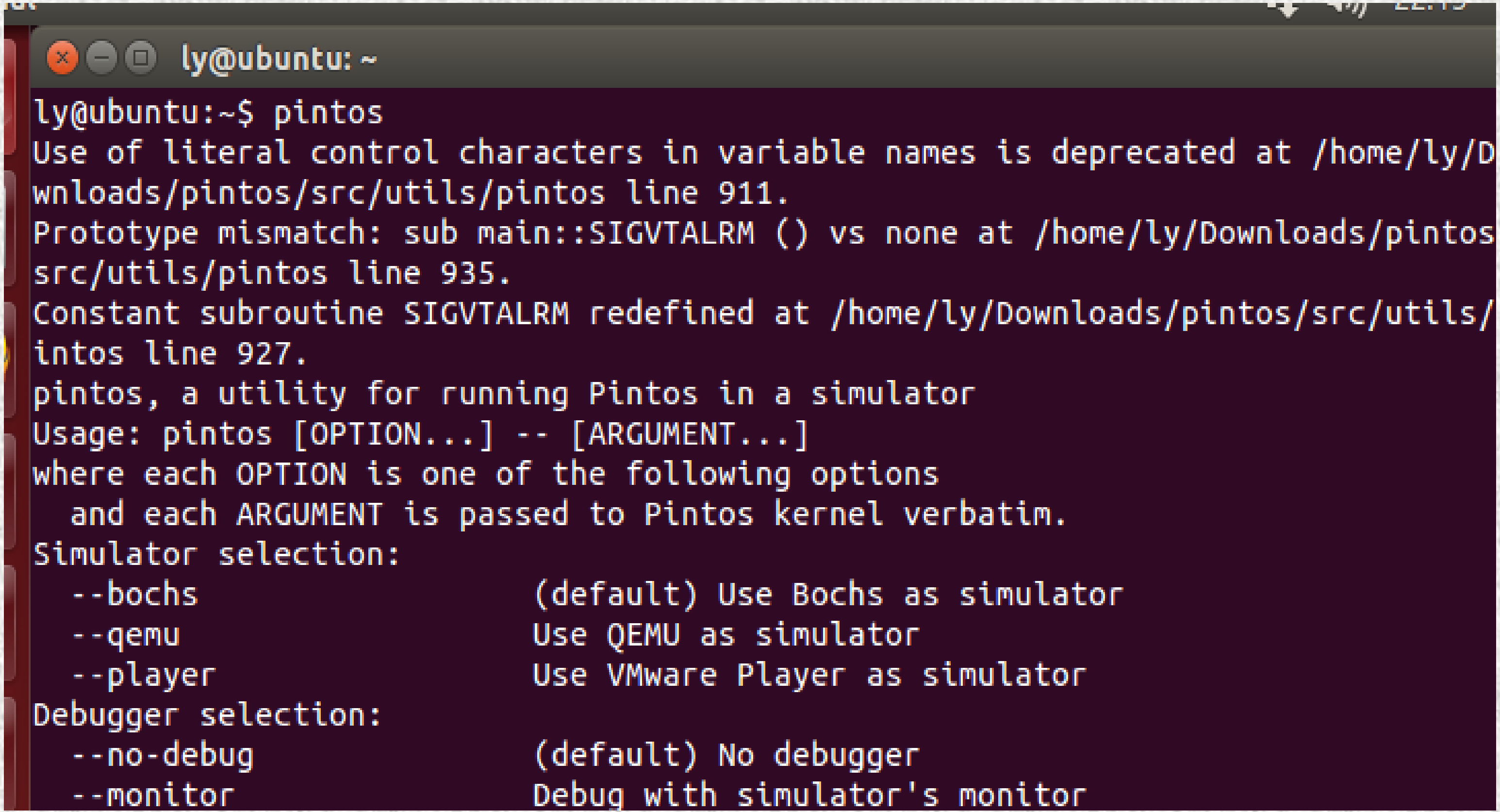
4.4 执行 source .profile命令，使.profile 文件生效

source .profile

4.5 键入 pintos 命令， 查看是否成功。成功示例如下：



```
ly@ubuntu:~$ pintos
Use of literal control characters in variable names is deprecated at /home/ly/D
wnloads/pintos/src/utils/pintos line 911.
Prototype mismatch: sub main::SIGVTALRM () vs none at /home/ly/Downloads/pintos
src/utils/pintos line 935.
Constant subroutine SIGVTALRM redefined at /home/ly/Downloads/pintos/src/utils/
intos line 927.
pintos, a utility for running Pintos in a simulator
Usage: pintos [OPTION...] -- [ARGUMENT...]
where each OPTION is one of the following options
  and each ARGUMENT is passed to Pintos kernel verbatim.
Simulator selection:
  --bochs                  (default) Use Bochs as simulator
  --qemu                   Use QEMU as simulator
  --player                 Use VMware Player as simulator
Debugger selection:
  --no-debug               (default) No debugger
  --monitor                Debug with simulator's monitor
```

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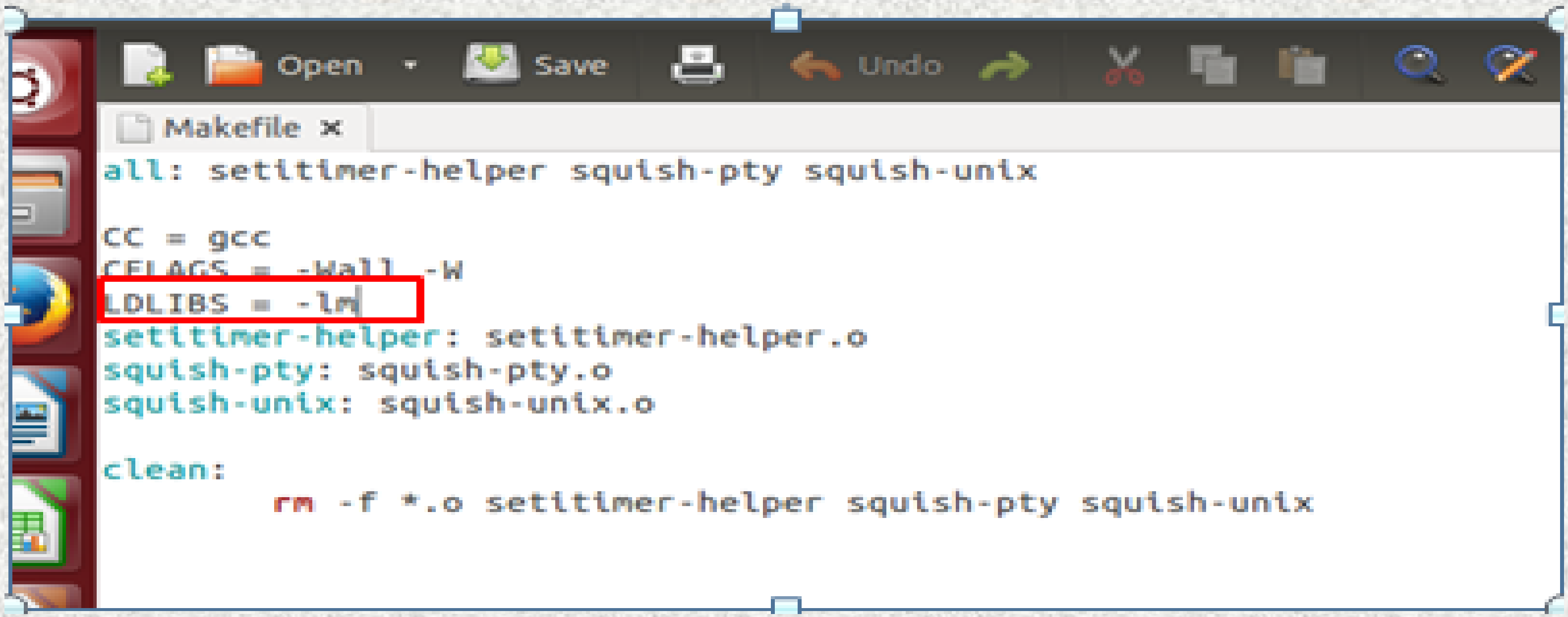
4.6： 编译 utils 文件夹内容(pintos 脚本需要)

1. 进入 src/utils (cd $PINTOSDIR/src/utils)

2. 打开该文件夹下的 MakeFile 文件， 修改以下内容：

更改 LDFLAGS = -lm 改成 LDLIBS = -lm ， 如图：



```
all: setitimer-helper squish-pty squish-unix

CC = gcc
CFLAGS = -Wall -W
LDLIBS = -lm
setitimer-helper: setitimer-helper.o
squish-pty: squish-pty.o
squish-unix: squish-unix.o

clean:
	rm -f *.o setitimer-helper squish-pty squish-unix
```

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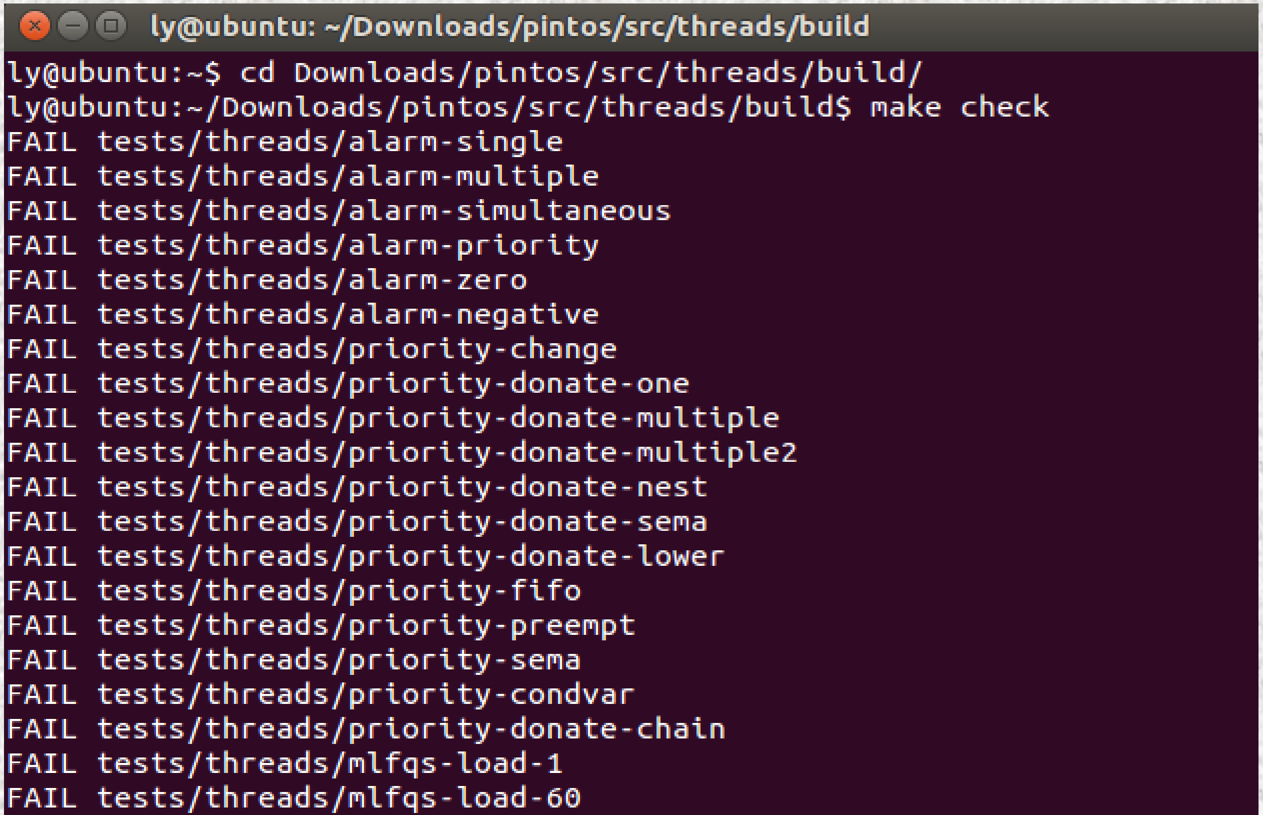
4.7：开始测试

1. cd $PINTOSDIR/src/threads

2. make

3. 此时会生成 build 文件夹，进入 build 文件夹(cd build)

4. 检查一：执行 make check



```
ly@ubuntu:~$ cd Downloads/pintos/src/threads/build/
ly@ubuntu:~/Downloads/pintos/src/threads/build$ make check
FAIL tests/threads/alarm-single
FAIL tests/threads/alarm-multiple
FAIL tests/threads/alarm-simultaneous
FAIL tests/threads/alarm-priority
FAIL tests/threads/alarm-zero
FAIL tests/threads/alarm-negative
FAIL tests/threads/priority-change
FAIL tests/threads/priority-donate-one
FAIL tests/threads/priority-donate-multiple
FAIL tests/threads/priority-donate-multiple2
FAIL tests/threads/priority-donate-nest
FAIL tests/threads/priority-donate-sema
FAIL tests/threads/priority-donate-lower
FAIL tests/threads/priority-fifo
FAIL tests/threads/priority-preempt
FAIL tests/threads/priority-sema
FAIL tests/threads/priority-condvar
FAIL tests/threads/priority-donate-chain
FAIL tests/threads/mlfqs-load-1
FAIL tests/threads/mlfqs-load-60
```

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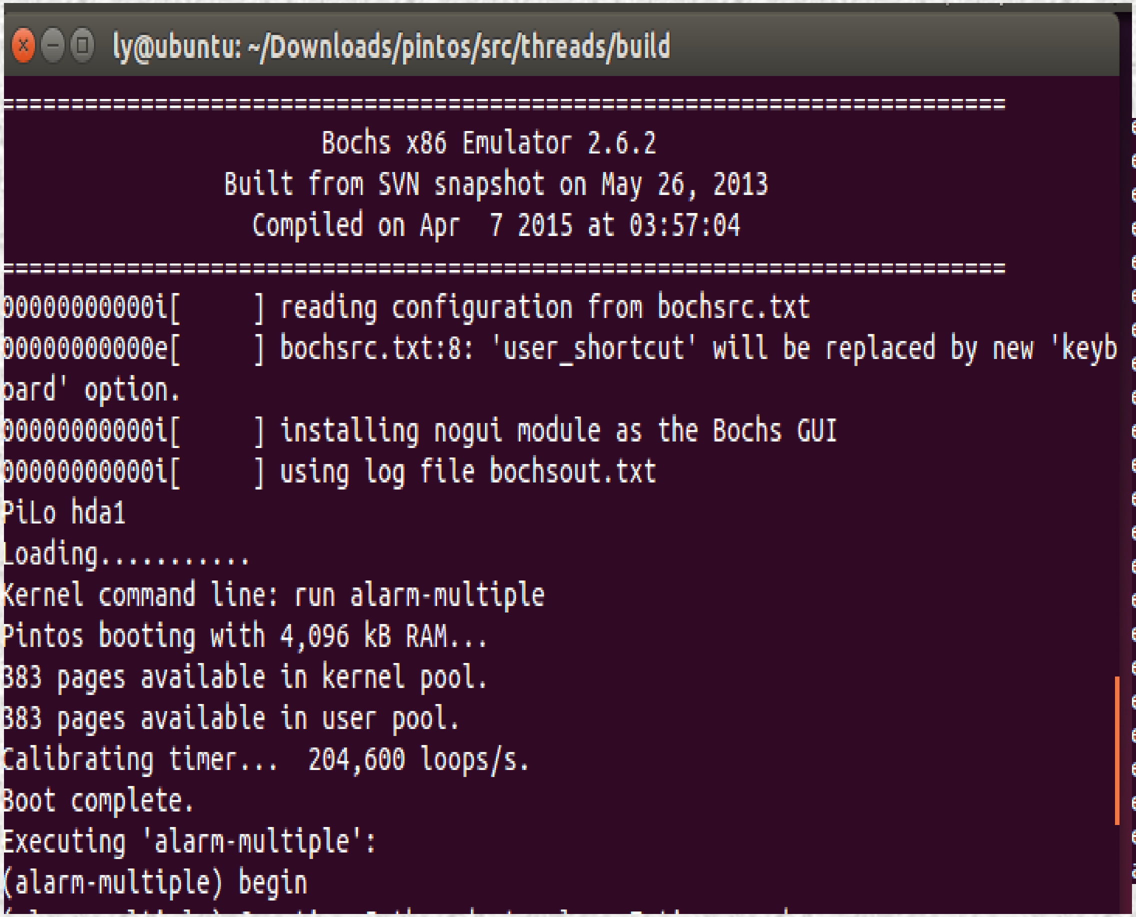
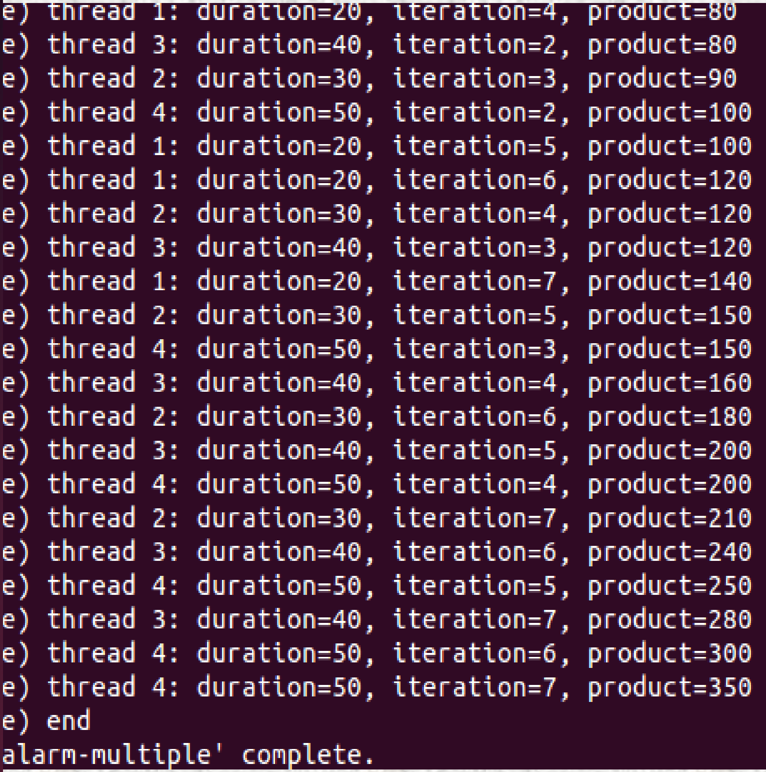
4.7：开始测试

5. 检查二： 执行 pintos run alarm-multiple



```
========================================================================
                      Bochs x86 Emulator 2.6.2
               Built from SVN snapshot on May 26, 2013
                 Compiled on Apr  7 2015 at 03:57:04
========================================================================
00000000000i[     ] reading configuration from bochsrc.txt
00000000000e[     ] bochsrc.txt:8: 'user_shortcut' will be replaced by new 'keyb
oard' option.
00000000000i[     ] installing nogui module as the Bochs GUI
00000000000i[     ] using log file bochsout.txt
PiLo hda1
Loading..........
Kernel command line: run alarm-multiple
Pintos booting with 4,096 kB RAM...
383 pages available in kernel pool.
383 pages available in user pool.
Calibrating timer...  204,600 loops/s.
Boot complete.
Executing 'alarm-multiple':
(alarm-multiple) begin
```



```
e) thread 1: duration=20, iteration=4, product=80
e) thread 3: duration=40, iteration=2, product=80
e) thread 2: duration=30, iteration=3, product=90
e) thread 4: duration=50, iteration=2, product=100
e) thread 1: duration=20, iteration=5, product=100
e) thread 1: duration=20, iteration=6, product=120
e) thread 2: duration=30, iteration=4, product=120
e) thread 3: duration=40, iteration=3, product=120
e) thread 1: duration=20, iteration=7, product=140
e) thread 2: duration=30, iteration=5, product=150
e) thread 4: duration=50, iteration=3, product=150
e) thread 3: duration=40, iteration=4, product=160
e) thread 2: duration=30, iteration=6, product=180
e) thread 3: duration=40, iteration=5, product=200
e) thread 4: duration=50, iteration=4, product=200
e) thread 2: duration=30, iteration=7, product=210
e) thread 3: duration=40, iteration=6, product=240
e) thread 4: duration=50, iteration=5, product=250
e) thread 3: duration=40, iteration=7, product=280
e) thread 4: duration=50, iteration=6, product=300
e) thread 4: duration=50, iteration=7, product=350
e) end
alarm-multiple' complete.
```

PPT内容摘自以下文档：

http://my.ss.sysu.edu.cn/courses/os/2014Spring_Mobile/setup.pdf

Pintos 安装的详细教程参见（推荐）：

http://www.stanford.edu/class/cs140/projects/pintos/pintos_12.html#SEC166

实验配置的Q&A

http://my.ss.sysu.edu.cn/courses/os/2014Spring_Mobile/Q&A.pdf

The End