Instructions on using Bochs 2.0 for your ECS 150 programming assignments

- ### *What is Bochs?*

Bochs is an IA-32 (x86) PC emulator. It includes emulation of the Intel x86 CPU, common I/O devices, and custom BIOS. Currently, Bochs can be compiled to emulate a 386, 486 or Pentium CPU. Bochs is capable of running most Operating Systems inside the emulation including Linux, Windows® 95, DOS, and recently Windows® NT 4.

For more information, you can visit the official website at:
http://bochs.sourceforge.net/

- ### *Getting started*

Create a directory called **ecs150** in your home directory (or something else, it is your choice really).

Download the Minix setup file from the link below, and save it to the directory you just created.
(Caution: You will need about 50MB of disk space to setup Minix)
http://wwwcsif.cs.ucdavis.edu/downloads/minix.tar.gz

After you have downloaded the file, uncompress the file by typing the following command:
```
> tar –zxf minix.tar.gz
```
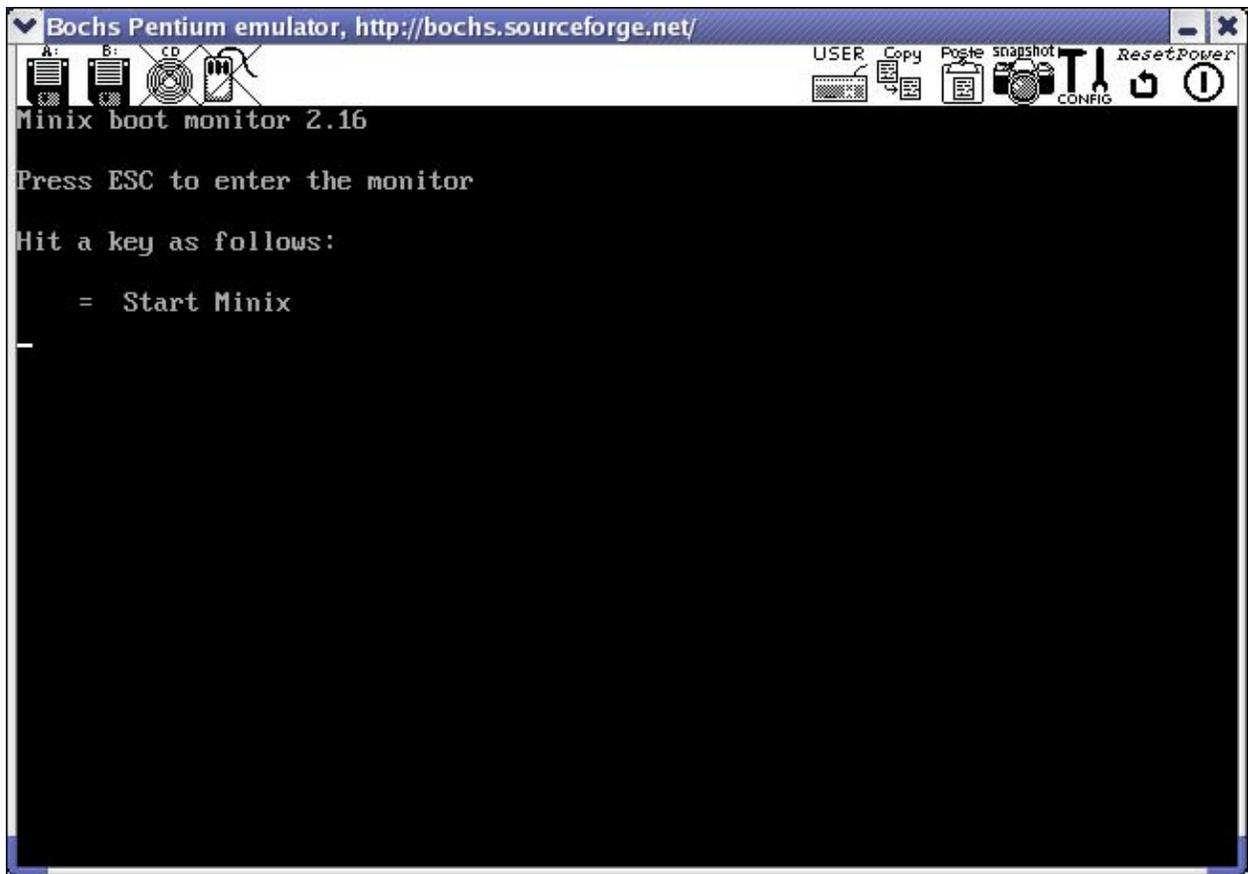
You should now have 2 new files in your directory:
- *bochsrc.txt*: This file contains the parameters for Bochs to setup and initialize the emulation.
- *minix203.img*: This file contains the Minix 2.03 OS

- ### *Using Bochs*

In the ecs150 directory that contains the *bochsrc.txt* and *minix203.img*, type:
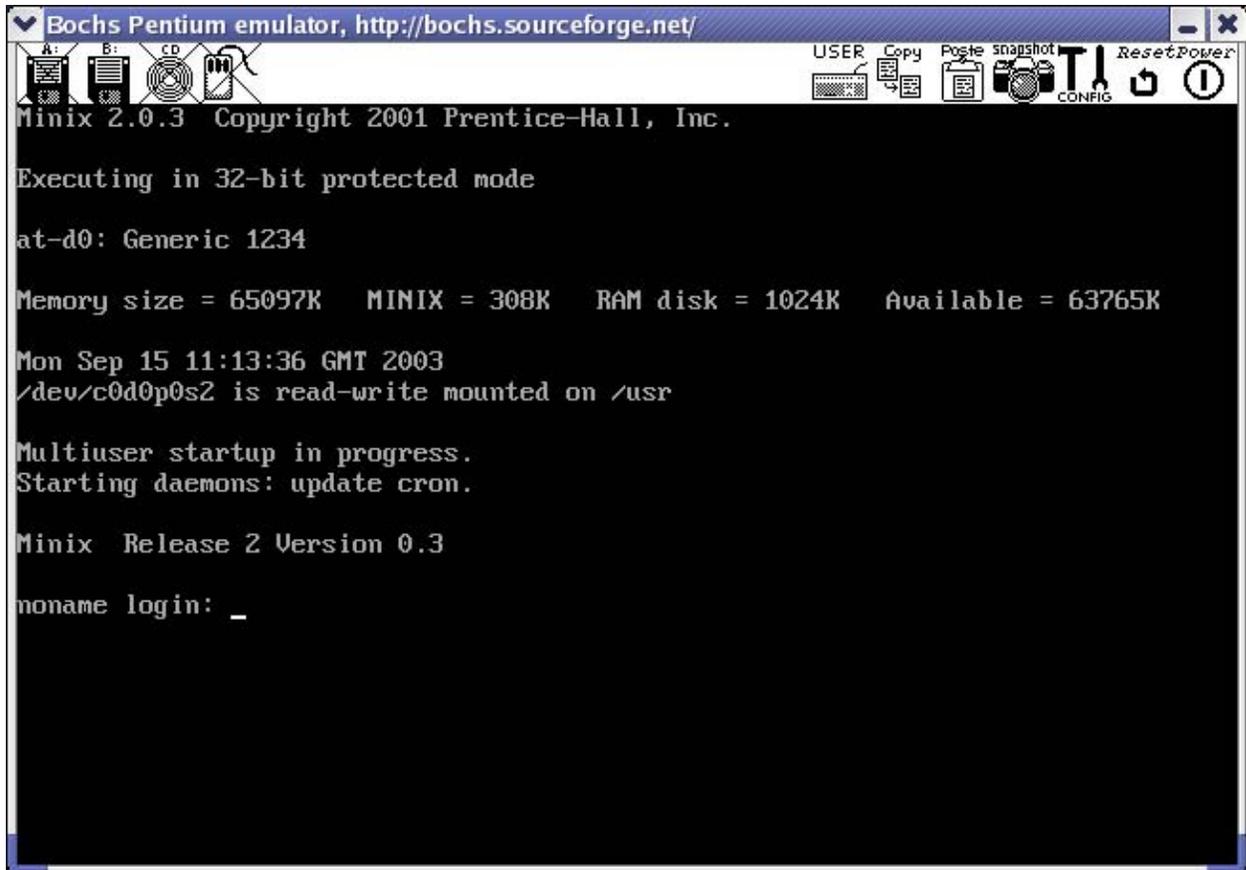```
> bochs –q
```

The emulator will launch in a new window, like the one shown below:

*Fig. 1 – Initial Startup Screen*

Press the equal key (=) to start Minix. You should then see the following screen:

*Fig. 2 – Login Prompts*

Type **root** at the login prompt, there is no password required.

You are now inside Minix!

- **Layout of the Bochs window**

    On the top portion of window is the Bochs toolbar. The buttons on the toolbar are explained in follows:

    

    Floppy drive A and B:

    When an 'X' is over the floppy drive icon, it means the drive is unmounted under Bochs. Click on the drive icon to mount/unmount the drive in Bochs

    

    CD-ROM drive:

Click on the CD icon to mount/unmount the CD-ROM in Bochs.

**Mouse emulation:**
Click on the mouse icon to turn on/off mouse emulation in Bochs.

**User button shortcut:**
Setup the user button shortcut. Please refer to the official documentation for details.

**Copy/Paste:**
Copy/Paste text to and from Bochs.

**Snapshot:**
Take a snapshot of the Bochs screen, and save it in a file called *snapshot.txt* in the same directory you launched Bochs.

**Config:**
Configure the Bochs runtime options. You will need to switch to the terminal to configure the settings.

**Reset:**
Reset the emulator.

**Power:**
Shutdown the emulator.

- **Using the floppy drive under Bochs in Minix**

  In Bochs, the two floppy drives are configured as follows:
  Floppy drive A: **/dev/fd0** in Minix, the physical floppy drive on the machine
  Floppy drive B: **/dev/fd1** in Minix, a file called *floppy.img* in the same directory as bochsrc.txt

  The *floppy.img* file mentioned above can be downloaded in the link below. Be sure to save the file into the same directory as *bochsrc.txt* (the same directory you launch Bochs)
  http://wwwcsif.cs.ucdavis.edu/downloads/floppy.tar.gz

  After you have downloaded the file, uncompress the file by typing the following command:
  ```
  > tar –zxf floppy.tar.gz
  ```

- **Using floppy drive A (You will need a floppy disk)**

  Before you can use the floppy drive A, you will need to have Minix-formatted floppy.

  - To create a Minix-formatted floppy disk:
    1. Start up the emulator and log on to Minix as usual.
    2. Insert a floppy disk into the floppy drive on the machine.
    3. Make sure the **Floppy Drive A** icon is not crossed. If it is, click once on the icon to mount the floppy under Bochs.
    4. In Minix, type `mkfs /dev/fd0 1440`

  - Mounting the floppy drive A:
    1. Insert a Minix-formatted disk into the floppy drive, and make sure it is mounted under Bochs.
    2. In Minix, type `mount /dev/fd0 /fd0`
    3. The floppy is now mounted under /fd0. You can now save files into that directory.

  - Unmounting the floppy drive A:

    1. In Minix, type `umount /dev/fd0`
    2. Click on the **Floppy Drive A** icon on the Bochs toolbar to unmount the floppy under Bochs.
    3. Remove the disk from the drive.

- **Using floppy drive B (A floppy disk is not required)**

  The *floppy.img* you have downloaded is already formatted as a Minix floppy disk. You can start using it immediately.

  - Mounting the floppy drive B:
    1. Make sure the 'disk' is mounted under Bochs.

2. In Minix, type `mount /dev/fd1 /fd1`
3. The floppy is now mounted under /fd1. You can now save files into that directory.

- Unmounting the floppy drive B:

1. In Minix, type `umount /dev/fd1`
2. Click on the **Floppy Drive B** icon on the Bochs toolbar to unmount the floppy under Bochs.

Treat the *floppy.img* as if it is a real floppy disk. Make backup copies of the file in case you accidentally deleted the file or the file becomes corrupted.

- **When you are done using Minix**

Type `shutdown` at the Minix command prompt, and then click the Power Button on the Bochs toolbar to quit the emulator.

- *Problems and troubleshooting*

**Q:** **I have inserted a Minix-formatted floppy into the floppy drive in the machine. However when I try to mount the floppy, it gives me an error.**
A: Make sure the floppy is mounted under Bochs. If the floppy icon on the Bochs toolbar is crossed, click on it to mount the floppy. If it is not crossed, click on the floppy icon once to unmount it, and then click on it again to mount the drive.

If that still doesn't work, you may want to reset the emulator by clicking on the reset button on the Bochs toolbar.

**Q:** **Sometimes I have to switch to another application from Bochs. However when I switch back to Bochs, whatever I typed in Bochs showed up as garbage in the emulator. Is there anyway to fix it?**
A: Unfortunately no, you will have to reset the emulator by clicking on the reset button on the Bochs toolbar.

**Q:** **I think I have done something wrong to the Minix system and now it won't work correctly. What can I do?**
A: Replace the *minix203.img* from the archive you have downloaded during the **Getting Started** phase. You may also need to replace *bochsrc.txt* if you have modified it.

**Q:** **I want to install Bochs on my home computer. What can I do?**
A: If you are using Linux, you can download the following file:
http://wwwcsif.cs.ucdavis.edu/downloads/minix.tar.gz

After you have downloaded the file, uncompress the file by typing the following command:
```
> tar –zxf bochs.tar.gz
```

You should now have 3 new files in your directory:
o *bochs-2.0.2.i386.rpm*: This file contains the Bochs 2.0.2 installer in RPM format.
o *svgalib-devel-1.9.17-1.i386.rpm*: This file contains library files required by Bochs.
o *wxGTK-2.3.3-1cl.i386.rpm*: This file contains the library files required by Bochs.

**How to install:**
You have to install the two library RPMs first. You can do this by using the following command:
```
> rpm –i svgalib-devel-1.9.17-1.i386.rpm
> rpm –i wxGTK-2.3.3-1cl.i386.rpm
```

After you have installed the two library files, you can install Bochs by typing:
```
> rpm –i bochs-2.0.2.i386.rpm
```

Bochs is now installed on your machine. It should be installed under /usr/bin/bochs

If you are using some other operating systems, such as Microsoft Windows or Apple Mac OS 9 / OS X, you can download the installers from the official Bochs website:
http://bochs.sourceforge.net/