Introductory Exercise:
Logging On...

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Some of this may be familiar to you, and some may not — most people nowadays are quite at home with computers, graphical windows, and the use of a mouse,but some of the procedures described here may well be new to you — especially if you are a Windows or Mac user. Feel free to ask for help if you get stuck, or if you don't understand what's being described.

What you should know

This practical is an introduction to the computing systems in Informatics, and is a familiarisation exercise. Working through this practical ***in conjunction with the lecture notes***[1] should teach you:

- How to login to Gnome using the DICE login screen
- How to open terminal windows and position the mouse for input
- How to select items from the menus, and hide&show menu bars.
- How to log out of Gnome
- How to change your password
- How to browse the web
- How to print
- How to use the Unix command line, and execute simple commands

This practical is *optional* — there is no need to actually do the exercises *if you feel confident enough with the material described*.

1Some commands may not be fully described in this practical - refer to the lecture notes for more detail

Conventions

When examples of commands are shown in the text, they may appear with a full Unix command-line prompt, or merely "**%**" — the latter may be interpreted as "whatever your Unix prompt happens to be", and should not be typed in when following the example.

Also, the command may be enclosed in quotation marks - these should not be typed in when entering the command.

Some commands use special keystrokes, and involve either the "Control" or the "ESCape"(also known as the "Meta") key.

The Control key is often written as "Ctrl", "^" (called 'hat' or 'caret'), or "C-". We will be using the 'Ctrl-' convention, so Ctrl-x should be read as "while pressing and holding down the key marked 'Control', press and release the 'x' key".

Likewise, 'Meta' commands are often written as 'M-', and can use either a special 'Meta' key (if your keyboard has one), or the 'Escape' (ESC) key. So M-x should be read as "press the 'Escape' (ESC) key, and then press the 'x' key" (or —if you have a 'Meta' key — "while pressing and holding down the 'Meta' key, press and release the 'x' key") [2]

In the "Ctrl-" and "M-" sequences, the following letter may be given in upper or lower case — always type it in lower case.

2 Note the difference between the use of the 'Meta' and 'Escape' keys - the former is pressed down while you press the other key, that latter is pressed down and released before the next key is pressed.

Logging on

First, make sure you have your DICE ***username*** and ***password*** (you should have receive details of these via e-mail) — if you *haven't* got these yet, check with the ISS (Informatics Student Services, in Room 4.02 of Appleton Tower).

Machines for student use (both undergraduates and postgraduates) are available at:

- Appleton Tower Level 5
- Appleton Tower Level 4
- Appleton Tower Level 3

The main labs are on Level5 - for a detailed list of all labs, see the "Computing Labs" web page at:

http://www.inf.ed.ac.uk/admin/ITO/computinglabs.html

Once you have found a free machine, try logging in:

- **Type your username in the "Username:" box**, remembering to type it in lower case, and press <*Return*>

(If the screen is blank, or the prompt does not appear, press the <*Return*> key on the keyboard (or move the mouse) and the prompt should then appear.

Once you have entered your username (*login*, or *account name*) successfully, you should then see a password prompt — supply your password:

- **Type your password in the "Password:" box**.

Type this in exactly as given (as it appears in your DICE account email). Make sure that upper case letters are typed in upper-case (hold down the <Shift> key to get upper-case). Your password will not be displayed on the screen —you'll see one dot per character instead (to keep track of how many characters you've typed, and to prevent anyone from reading your password on the screen).

If you make any mistakes while typing in your username and password[3], use the <*Delete*> key to correct the mistakes, or just press <*Return*> (to fail & start again). If you just get the password wrong, you will (after a short pause) get an "Authentication failed" message (which you will need to acknowledge by clicking the "OK" button). You will then get the "Username:" prompt again. Enter your username and password again, and press <*Return*> after each one.

If you are sure that you have correctly typed in your username and password, but still can't log in, let one of the lab demonstrators know (make sure you have checked this a few times first, and check that you haven't turned caps-lock on unintentionally).

3 If you make a mistake, you may see the message "Incorrect username or password. Letters must be typed in the correct case." at the bottom of the screen, in which case try again!

XWindows & Gnome

Once you have successfully logged in, the main desktop screen should appear, with a menu-bar at the top, containing a clock (far right), application icons (left) — including one for the Firefox web-browser — plus the main pop-up (pull-down) Applications menu (far left), which has a larger selection of applications, utilities, and short-cuts. There should also be (at least) three icons at the top left of the screen.

Open a terminal window by selecting "Terminal" from the "Applications ⇒ Accessories" menu, or "Open Terminal" from the right-click mouse menu (assuming the mouse cursor is positioned over the desktop background - if it is positioned over some other icon or application, the behaviour may be different).

Move the cursor around the screen. Notice how the pointer changes shape depending on where it is. For example, when it is over the desktop background it looks like an arrow, and when it is over the shell (terminal) window, it changes to an I-shaped bar.

- **Move the mouse (cursor) around and see if you notice any other shapes** (you should find one more—but you may only see it fleetingly until you know where it is). What do you think this might do? Try it...

- **Move the pointer to the desktop background, click once on the left-hand mouse button, and press some keys (avoid the <*Return*> key) on the keyboard.** Do they have any effect?

You've probably seen that typing characters has done nothing — but note that the space bar and <*Return*> key may be treated differently.

- **Move the focus to the shell window**. Can you see how you might tell when the terminal window has the focus? (Click back on the desktop background, and then move the cursor over the shell window and click the mouse again — what's changed?)

- **Move the cursor over the desktop, out of the terminal window** — *but do not click the mouse*. **Type something on the keyboard**. Where is the text displayed?

— you *should* see what you type appear on the screen, in the shell window. (Hit <*Return*> and see what happens!)

- **Browse the pop-up menus**. Some will have sub-menus, or "cascading" menus — find the menu item that allows you to change your preferences about the look & feel of the screensaver...[4]

- **Click on either of the black arrows at the extreme left or right of the task bar**. The task bar should disappear — click on the arrow again to restore it. If you don't have arrows on your task bar, you can add them by right-clicking the mouse on a blank area of the task bar (which should bring up a list of actions) and choose "Properties" —then select "Show hide buttons" (this needs to be done for each task bar). What changes? Try clicking on the arrows...

- **Move to each of the virtual desktops** (by clicking on the "virtual desktops list" on the

4 Hint: "System ⇒ Preferences" is a good place to start! When finished, exit via "Close" button, or top-left close-window button.

right-hand side of the control panel at the bottom of the screen). Give the screens names[5]. How can you tell the new names have taken effect?

To close windows that you may have open, you can:

- use the “close” button in the top right corner (a small box with an “X” in it)
- use the “Close” option on the window menu (left-click on the Window Menu icon in the extreme top-left of the window, or right-click on the title-bar of the window).
- if the window has a “File” menu in the top left-hand corner, there may be a “Close”, “Quit”, or “Exit” option under it.

If you are using a shell (terminal) window, you can use the close button, or “File ⇒ Close Window” menu option, or type Ctrl-D (^D) at the prompt[6].

Exiting Gnome (Logging off)

Once you feel comfortable with moving around the desktop, you can end your session (“log out”) using the “Log Out...” entry on the pop-up “System” menu on the task bar. **Try the “Log Out...” option from the “System” menu** —but **choose ‘Cancel’** so that you can continue working.

5 Right-click on any of the virtual desktop buttons (which should bring up an actions list) and choose “Preferences” — which should give you a “Workspace Switcher Preferences” window. You should see four default workspace names — give these more meaningful names (by clicking once to highlight the default text, and again to edit it), such as “Tools”, “Editors”, “Mail”, etc (these names are merely suggestions, you can re-name them according to your working methods).

6 Anything written Ctrl-*key* or “^*key*” means “press both the control key (usually marked ’Ctrl’ on the keyboard) and key at the same time, and then release both.

Changing your password

Note that if you've set up your own account details using the link sent to you via email, you will already - hopefully - have set a **memorable password**. However, feel free to change it again if you would like (otherwise you can skip this section).

In order to change your password, you'll need to login (if you're not logged in already) using your *original* password, and then use a shell (terminal) window to type the password-changing command `passwd` (or use the "Change Password" option in "System ⇒ Preferences ⇒ About Me".

- **Log back on to the machine** and wait until Gnome has started up again.
  (Assuming you're not already logged in.)

- **Open a shell window,** and move the cursor to it (and click if required) to give it focus.
  (This makes it *active — the current window —* so that you can type in it.)

- Use the `passwd` command — enter your old and new passwords when prompted, as in the following example (and hit <*Return*> after each password entry):

```
% passwd
Changing password for user infteach:
Current password: <password typed here - but is not shown>
New password: <password typed here - but is not shown>
Retype new password: <password typed here - but is not shown>
passwd: all authentication tokens updated successfully
%
```

Remember that, when using the command-line method, **you won't see anything** when you type in your new password - the characters are not printed on the screen...

If you fail to choose a suitable password, you may see the following errors:

- BAD PASSWORD: it is WAY too short
- BAD PASSWORD: is too similar to the old one
- BAD PASSWORD: it does not contain enough DIFFERENT characters

Alternatively, you may use the graphical version to change your password:

- Choose "Change Password" from "System ⇒ Preferences ⇒ About Me".

You should then be prompted for your "Current password", which is your usual password, and then for a new password, and then for confirmation of the new password.

Or you can use the "`userpasswd`" command on the command line:

```
% userpasswd
```

– which will bring up the same password-changing dialogue box as in the graphical version above. In both the command line and graphical cases, you may cancel[7] at any point before completion.

- **Now log out of the computer, cross your fingers, and try logging back in again using your new password!**

7 Using the "Cancel" button in the graphical method, or by pressing the "Ctrl"and"c"keys simultaneously in the command line method.

If this fails (using your *new* password), try again using your *old* password. If this fails, you'll need to get outside help to change it to something that works! (Remember to check both methods a couple of times before you give up and get help!)

Web-browsing

The default web-browser is **Firefox** — try starting this (you should be able to do this from the button on the control panel[8], or from one of the options under "Internet" on the "Applications" menu[9]. It is better (for the moment) if you stick to using Firefox as your browser, unless you are more familiar with others that are available.

Browse the Edinburgh University pages, starting at the URL http://www.ed.ac.uk/. You might also want to look at the Informatics Teaching pages at http://www.inf.ed.ac.uk/student-services/teaching-organisation.

The "Introduction to the Computer System" notes are also available at http://www.inf.ed.ac.uk/teaching/courses/inf1/system/, and this exercise is available under the "Lab and Tutorial Exercises" section, called "Introductory Exercise: Logging on...").

If your homepage is not already set to the Informatics Student Home Page:

- Enter the URL http://www.inf.ed.ac.uk/student-services/student-services (either via the location bar, or the "File ⇒ Open Location" menu option — which will just highlight the location bar).

- Once the page is displayed, use the "Edit ⇒ Preferences ⇒ General" section to set the "Home Page" by clicking the "Use Current Page" button.

— or use this method to set it to something else, if you feel that the Informatics Student Home Page is not sufficiently interesting.

8 The one with a globe and mouse — holding the cursor over this button should show"Web Browser".
9 You can also use the command"`firefox`" on the command line —but this will tie-up your terminal window until you quit.

Printing

In order to be able to print, you must select a default printer, or specify one explicitly with the print command. To select a default printer, type the following magic incantation:

```
echo "export PRINTER=printername" >> ~/.benv
```

— where *printername* is the printer that you have identified as your default. (One way of identifying various printers is to select "File ⇒ Print" with Firefox, which will bring up a printer selection list. Identify a suitable printer, and take a note of the character string below "Printer" - this is the *printername*. Don't forget to cancel the Firefox print request!)

Once a default printer is selected, you should run the above command again, but without the "`echo`" command, without the quotes, and without the output re-direction (that's without the "`>> ~/.benv`" bit):

```
export PRINTER=printername
```

(this enables default printing in your current window — it would otherwise not be effective until you logged in next time). You may now check that you have a default printer:

- Type "`lpq`" (that's lower-case L P Q)

— if this produces recognisable status output (see lecture notes), you are now able to print files with the "`lpr` *filename*" command.

Some Simple Unix Commands

To use Unix (Linux) commands, we need a prompt (command-line).To experiment with this:

- **Open a shell window**.
- **Type any random text at the shell prompt** and then use the <*Backspace*> and <*Delete*> keys on the keyboard to change the text.

See what happens if you press <*Return*> before you delete all the text. If you type a command that the shell does not recognise, it will display a message similar to:

```
-bash: xyz: command not found
```

where "`xyz`" is what you typed (and what it didn't understand).
(Remember to press <*Return*> after you have typed in your commands.)

If you type a long (or even not so long) command on the command line and get it wrong, you don't need to re-type the whole thing when correcting it. You can take advantage of the **history mechanism**, which stores the most recent of your commands in a list that you can select from. If you type "`history`" at the prompt, you will see a list of your last commands — for example:

```
[corgarff]infteach: history
1 echo "export PRINTER=lw3" >> /home/infteach/.benv
2 cat /home/infteach/.benv
3 lpq
4 export PRINTER=lw3
5 firefox
6 bg
7 lpq
8 history
[corgarff]infteach:
```

You can then use the up and down arrow keys, or Ctrl-P (for "previous") and Ctrl-N (for "next"), to select the command you want[10] (each command is displayed in turn on the current line). When you see the line that you want, you can use the cursor and delete keys to edit or change the line, and then just hit the <*Return*> key to execute the new command.

Files and Directories

To see what files you have in your current directory (which should still be your "home directory"), you can use the "ls"[11] command:

- From a shell window, **run the "`ls`" command** (that's lower-case L S) — see what you get.
- From the desktop, **click on the "Home" icon** and compare output with that of the "`ls`" command.

You can also tell "`ls`" to look elsewhere by giving it an argument:

---

10 The command appears on the current line — there is no interaction with the output from the "history" command.
11 **That's the lower-case letters "L" and "S" — the first character is not digit "one"!**

- **Use "`ls /home/infteach`"** to examine the contents of the demo account <`infteach`>.

- What is the shorthand way of referring to "the home directory of the infteach account"?

Copies of files can be made with the "`cp`" command[12]. You can either duplicate your own files, or take copies of files in other locations (provided they are readable by you, of course — private files can't be copied).

- **copy the file "`/home/infteach/system/testfile1`" to your home directory, calling it "`example1`"**.

If you have successfully copied the example file to your home directory, you should be able to view it with a pager[13]:

- **type "`less example1`" at the prompt** and see what is displayed.

  — you should see something that starts like this:

```
John Barleycorn
===============

There was three Kings into the east,
...
```

- **move to the '`infteach`' area** as above, confirm that you're in the right directory, list the files there, and then move back to your home directory using the shortcut version of the command.

  In the `infteach` directory, you should see a sub-directory called `Files`.

- **using "`cd`", "`ls`", and "less", try moving to this directory and see if you can view the file contents**.

Note that this will not be possible for all files: for example, those files which end in '`.ps`' are PostScript files[14], and should not be viewed using `less` — they require a special viewer. If a file will not view properly with "less", you will see the warning:

```
"filename" may be a binary file. See it anyway?
```

— type "`n`" at this point to cancel the operation.

Disk usage and Quota

You can check your disk space quota with the "`fs listquota`" command (which can be shortened to "`fs lq`"). This gives your maximum quota figure and your current usage (both in Kb). For example:

```
infteach% fs listquota
Volume Name           Quota      Used %Used Partition
user.infteach       1000000     19442    2%       61%
infteach%
```

12 For details of usage, see the accompanying lecture notes.
13 Use "q" to quit pager.
14 PostScript is a low-level page description language.

This shows that the user `infteach` has a maximum quota of 1Gb (the default quota for all undergraduate and MSc students) and has used approximately 19Mb, which is two per cent of the user's allocated quota (also shown is the percentage of space used on the disk partition which contains the user's home directory).

- **Find out what your quota and current usage is, using the shortened version of the quota command**

Creating directories & moving files

Make sure that you're in your home directory before running these commands. **If you're *not* in your home directory, you may not be able to create the necessary files**.

- **create a directory called "`examples`"**
- **copy the file "`example1`"[15] into the newly-created "`examples`" directory**.
- **rename the file "`example1`" (in your home directory) to "`assessment`"**
- **move to the "`examples`" directory** (by using the `cd` command) and **check that you have a file called "`example1`"** in it (using `ls`)
- **try moving to the "`system`" directory in the '`infteach`' area** (use `cd` to get there), and **copy the file "`testfile2`" back into your "`examples`" directory**, and call it "`example2`". (Use `ls` in your examples directory to make sure that you've been successful.)

To delete files, you should use the "`rm`" command. Make sure you're in your home directory, and then:

- **delete the file "`assessment`"**

To delete directories, use the `rmdir` command:

- **try removing your new "`examples`" directory**.

Does this work, or is there an error?[16]

- **remove any files remaining in your "`examples`" directory and *then* remove the directory**.

Command Line Completion

To complete long filenames, use the<Tab> key.

- **type: "`less ~infteach/av`" <*PRESS TAB*>**

The shell will magically fill in the rest of the filename for you — it will fill in as much as it can, but if there is a choice, it will fill in the shared portion (those characters that are common to all possible options) and wait for you to fill in the rest. You can type in some characters and press

15 Which you should have created in your home directory earlier in this practical — if not, go back over these notes and track it down.
16 You should see "rmdir: 'examples': Directory not empty."

<*Tab*> again to complete the filename, or pressing <*Tab*> twice will list all the alternatives.

- **type: "`less ~infteach/ch`" <*PRESS TAB THREE TIMES*>**

This shows that there are two files which begin with 'ch' — choose additional (unique) letters to specify a particular file, and press <*Tab*> again.

You may wish to experiment further with these commands to make sure that you know exactly how they work. If you are feeling brave, try reading the **manual page** for particular commands — the manual pages are not very user-friendly, but they *do* give you a list of the syntax of each command (how to use it, what arguments and flags it takes, and suchlike). To do this, use the "`man`" command followed by the command name you want to look up (you can even use it on itself):

```
% man man
```

If you have any further questions, ask your lab demonstrator, or complete the on-line help form (http://www.inf.ed.ac.uk/systems/support/form), or ask the course lecturer.

Unix Files

This section will give you some practice in finding out information about files.

Unix Commands & Utilities

1. Look at the manual page for "`ls`", or type the command "`ls --help`", and acquaint yourself with all the various options and flags. Work out how to do listings in colour, and without colour.

2. *This next one may take a bit of working through — feel free to skip it if you're short of time*
   The man page for `ls` refers to the `info` command. Using "`info ls`" ("`q`" to quit), see if you can identify all the parts of the output of "`ls -o .bash_history`" (assuming you are in your home directory).

   You'll need to work out how to drive "`info`" first! For more info on `info`, see the "`info`" man page — note that there's more than one "`info`", so you'll need to specify which section of the manual you want to look in (use "`man 1 info`").

3. Identify the most recently modified file in your home directory
   (Hint — check flags for "`ls`").

4. How many characters does the poem file (`~infteach/system/poem`) have?[17]

5. Using the `file` command, examine the files in the `~infteach/Files` directory. Do you agree with what `file` says? (There is at least one file that it gets wrong — albeit understandably.)

Special characters

1. The "**`*`**" (star) character matches anything and everything (zero or more instances of something).

   How would you specify all filenames (and directories) in the current directory which contain the string "`test`"?

   (Test your answer using "`ls ~infteach/<`*your pattern here*`>`").

2. The "**`?`**" character matches one character only. How would you use it to match all files of eight characters?

3. How would you use "**`*`**" and "**`?`**" to list filenames of *at least* four characters?

Chaining commands together[18]

1. Roughly[19] how many files and directories do you have in your home directory?[20]

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17 See "`man wc`"
18 See "`man bash`" ("Pipelines" section, under "SHELL GRAMMAR")
19 There may well be "hidden" files (those that start with a dot), that are not included here).
20 In this case, "your home directory" means just at top level, not including contents of sub-directories

2. How many files are in the "`~infteach`" directory[21] (at top level)?

3. There may be more files in "`~infteach`" than will fit on one screen. How would you use a pager (for example, "`less`") to display only a screenful at a time?

Editing Text With Emacs

Note that the first Haskell practical should give you an excellent opportunity to practice your Emacs skills. If, however, you would like to experiment a little more first, there is an Emacs tutorial within Emacs itself:

1. Start Emacs from the command line (just type "`emacs`" at the Unix prompt and hit "<*Return*>")

   or

   Select "Emacs" from the "Applications ⇒ Accessories" menu.

2. Select "Emacs Tutorial" from the "Help" menu at the top of the Emacs window.

3. When you've finished, type "Ctrl-x, Ctrl-s" to save it[22], then "Ctrl-x, Ctrl-c" to quit.

Or (or in addition) you can try the local tutorial by taking a look at the Emacs tutorial document, http://www.inf.ed.ac.uk/teaching/courses/inf1/system/practicals/emacs-tutorial.pdf.

21 If you use "ls -o" you may need to use the "-L" flag too, as "ls -o" may show you that "infteach" is just a link (shortcut) to another location. The "-L" flag hides this confusing fact.

22 If you selected the "Emacs Tutorial" from the "Help" menu, the file will be saved as "TUTORIAL" in your home directory.