

***nix for research:**
Research Methods in the Unix style
Operating Systems

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concepts

- The Linux Commandline
- Programming in Linux
- Networking in Linux
- Using Linux for collaboration
- Writing this document - L^AT_EX document preparation

Linux vs. Windows

For those of you who aren't familiar with (modern) Linux
Linux is not as different to windows as you may think!

- Similar Interface
- Similar windows

But Linux does have some extras:

- Crashes elegantly
- Free programs included that enhance the user experience
- FREE software including an MSOffice compatible

The Linux Commandline

Benefits of the Linux commandline over the Windows
Command Prompt

- The Differences
- Autocompletion
- PERL scripting
- C-style scripting
- Grep and Regular Expressions
- Extra programs

The Command line

Why use the command line when we have a GUI?

Why are Microsoft starting to use the command line more?

- speed
- batch jobs
- failure resistant
- low memory and processor intensity

Commandline Differences

slightly different commands

- ls - dir
- cd - cd
- find and search
- vi - edit

Autocomplete

The command line and many Linux programs will complete your commands automatically when you press TAB. Many will even give a list of possible completions if there are multiple possible matches. Command substitution is also available

Scripting

Linux allows scripting in a number of different languages and styles, the main two being:

- PERL
- C-style shell script

These have various differences and strengths. PERL (Practical Extraction and Report Language) is useful for text processing, C-style scripting provides a simple to learn (especially for programmers), logical and very powerful method of scripting.

Grep and Regular Expressions

Linux has a very powerful system for searching for bits of files

- Grep matches any regular expression in a file or set of files
- * and ? are used (commonly) to denote bits to autocomplete

Extras

- dd - write directly to a sector of a disk
- compilers - more later

Programming in Linux

Programming made easier by Linux

- Emacs
- GNU - GNU really isn't UNIX
- GCC/G++ - GNU C/C++ Compiler
- GDB - The GNU Debugger
- Make

Emacs

Emacs is a text editor with a number of added extras including the ability to enter scripts, create lay-outs for your programming language of choice, and even enter shell commands!

Emacs also includes advanced search facilities similar to grep.

Gnus Not Unix

GNU provides a “license” for free, open source programs
meaning that the program is protected.

try <http://www.gnu.org>

GCC and G++

G++ and GCC are built in compilers for c++, c and some OTHER languages including:

- FORTRAN
- ADA
- Assembler (including non x86)

GCC and G++

They also provide mechanisms for linking libraries (both static and dynamic) and to make a c or c++ program able to run on any processor. The main benefits of this are in programming and compiling operating systems, especially on new chipsets.

Its quite hard to compile on a system that you don't, or can't, have an os on!

GDB - GNU debugging

This is just a simple, free, efficient debugger that allows break points to be entered and moved, and the checking of memory allocation. It also comes with a set of tools for diagnosing potential segmentation errors or “buffer overflows”

Makefiles

Make is an exceptionally good tool for putting together large projects and making big jobs into little ones. It has the ability to compile multiple source files at the same time, to automate jobs on prerequisites and to reduce both complexity and redundancy in compiling, installing and removing files.

Networking in Linux

Why do Hackers use Linux?

- The Kernel
- Routed
- Ethereal

The Kernel

why hackers love to use Linux

Start with “it has a Firewall built into the KERNEL!”

Actually **most** of the best things about Linux *are* kernel level since the kernel is designed by programmers for programmers. The ability to do many packet level operations and to route packets in certain ways are add-ons to windows but are core to Linux!

Routed

The routing daemon

Provides the ability to exist as a router on which you can directly run diagnostic tools such as Ethereal. Excellent for analyzing packets between hosts *and* it is likely to run faster than some “normal” routers, dependent on the machine’s specification.

Ethereal

Ethereal is a packet capturing tool which intercepts network data as it accesses the network interface. The program is able to interpret and sort much of the data it receives into user readable and manageable forms.

Using Linux for collaboration

Perhaps you might like to share that with us?

- CVS - concurrent versioning systems
- NFS - non-secure file sharing
- Samba file sharing

CVS - the Concurrent Version System

CVS is a system where multiple programmers can work on the same code at the same time. Each time a programmer wishes to edit code they have to create a sandbox in which to work. When they commit their changes the version number of the software is automatically updated and the old version is put into a repository. It is designed to prevent programmers ever working at crossed purposes.

NFS and SAMBA

Both NFS and SAMBA work just like Windows file sharing. Although NFS is very insecure, providing no security at all, it is very quick and simple to set up. SAMBA on the other hand provides Kerberos security and secures access only to those with both SAMBA access and sufficient rights on the file.

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For more information

<http://www.opensource.org> contains most information

<http://www.redhat.com>, <http://www.debian.org>,

<http://www.knoppix.org> and <http://www.slackware.com>

amongst others have distributions

AND if there is enough call for it I could be persuaded to talk for a few hours on any one of the subjects in this seminar: m.p.davies@newi.ac.uk or if you need help of course!