Praxis

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27th October, 2011
This talk
Will cover...

- My passion, Linux
  - Brief history
  - Modern distributions
    - What are they?
    - How to get started...

- MACS computing services
  - Remote login
  - Remote file transfer
  - Life in plain text
  - Version control systems

- How to get involved in computer science in Edinburgh...

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1 http://www.linuxsoftwareblog.com
Linux: A Brief History
In the 60’s, computers were *expensive and enormous*. Every computer had a different *operating system*. In 1969, Dennis Ritchie and others at Bell laboratories started addressing these problems, developing an OS that was:

- Simple and elegant
- Written in the C programming language, not assembly code
- Designed an OS *kernel*

They called it “**Unix**”
Linux

A very brief history

The C programming language

- Specifically designed for creating Unix
- ...to develop a system that runs on different types of hardware
- Computers on a network could communicate!
- Easier for users and developers to switch between computers

Unix:

- In the 60’s, deployed on mainframes
- In the 80’s, deployed on personal computers...for the lucky few
A very brief history

But... Unix was proprietary, and *not free*

Then, **Richard Stallman** changed everything in September, 1983...

Free Unix!

Starting this Thanksgiving I am going to write a complete
Unix-compatible software system called GNU (for Gnu’s Not Unix), and
give it away free to everyone who can use it. Contributions of time,
money, programs and equipment are greatly needed.

To begin with, GNU will be a.....
Linux
A very brief history

But one thing was missing from GNU... a free Unix-like kernel.

Enter, Linus Torvalds in July, 1991...

From: torvalds@klaava.Helsinki.FI (Linus Benedict Torvalds)
Newsgroups: comp.os.minix
Subject: Gcc-1.40 and a posix-question
Message-ID: <1991Jul3.100050.9886@klaava.Helsinki.FI>
Date: 3 Jul 91 10:00:50 GMT
Hello netlanders,
Due to a project I’m working on (in minix), I’m interested in the posix standard definition. Could somebody please point me to a (preferably) machine-readable format of the latest posix rules? Ftp-sites would be nice.

● **Motivation** “open source is the only right way to do software”
● **Ambition** A free system that was completely compliant with UNIX.
Linux

Influential computer scientists

Dennis Ritchie
- Invented the C programming language
- Invented Unix, with Ken Thompson
- Ported Unix to many systems

Richard Stallman
- Launched GNU project in September 1983
- Founded Free Software Foundation, Oct 1985
- Main author of the GNU license

Linus Torvalds
- Released Linux in October 1991
- Released Git in April 2005
## Linux

### Code contributions

- **Linux Kernel 3.0 released 22nd July 2011**
- **Most active employers, of Linux 3.0 changesets**

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<tr>
<th>Employer</th>
<th>changeset</th>
<th>percentage</th>
</tr>
</thead>
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<tr>
<td>(None)</td>
<td>1085</td>
<td>12.0%</td>
</tr>
<tr>
<td>Red Hat</td>
<td>1000</td>
<td>11.1%</td>
</tr>
<tr>
<td>Intel</td>
<td>839</td>
<td>9.3%</td>
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<tr>
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<td>569</td>
<td>6.3%</td>
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<td>441</td>
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<td>361</td>
<td>4.0%</td>
</tr>
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<td>Atheros Communications</td>
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</tr>
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<tr>
<td>AMD</td>
<td>162</td>
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<td>Nokia</td>
<td>158</td>
<td>1.8%</td>
</tr>
<tr>
<td>Fujitsu</td>
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</tr>
<tr>
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</tr>
<tr>
<td>University of Cambridge</td>
<td>119</td>
<td>1.3%</td>
</tr>
<tr>
<td>Analog Devices</td>
<td>118</td>
<td>1.3%</td>
</tr>
</tbody>
</table>
Linux
Where is Linux?

Linux is everywhere!

- Desktop computers
- Laptops
- Mobile phones
- Tablet devices
- Phone exchanges
- Digital video recorders
- ...
Revolution OS is a 2001 documentary which traces the history of GNU, Linux, and the open source and free software movements. Interviews with Richard Stallman, Michael Tiemann, Linus Torvalds, Larry Augustin...
Linux Distributions
Linux

What is a Linux distribution?

- The Linux **kernel**
- A collection of **GNU utilities**
- Graphical applications
- Desktop environments
- Package managers

Popular examples

- Ubuntu
- Fedora
- OpenSuse
- Mint
- ...
Linux Desktop Environments

Gnome
Linux Desktop Environments
KDE
Linux Desktop Environments

Unity
Linux Desktop Environments

XMonad

```haskell
([^modMask], shiftMask, \(\alpha\) (Return)) spawn "term" -- @ Launch an xterm
([^modMask], \(\alpha\) f) spawn "xwin-menus menu_path [ menu drain ] eexec \$xterm" -- @ Launch a menu
([^modMask], shiftMask, \(\alpha\) k) spawn "~/.xinitrc" -- @ Launch xmonad
([^modMask], shiftMask, \(\alpha\) c) (kill) -- @ Close the focused window
([^modMask), kspace], switchLayout) -- @ Rotate through the available layout algorithms
([^modMask], \(\alpha\) n), refresh) -- @ 'nudge': resize viewed windows to the correct size

-- move focus up or down the window stack
([^modMask], \(\alpha\) (Tab), focusUp) -- @ Move focus to the next window
([^modMask], \(\alpha\) k), focusDown) -- @ Move focus to the previous window
([^modMask], \(\alpha\) h), focusUp) -- @ Move focus to the next window
([^modMask], \(\alpha\) k), focusDown) -- @ Move focus to the previous window

-- modulating the window order
([^modMask], (Return), swapMaster) -- @ Swap the focused window and the master window
([^modMask], shiftMask, \(\alpha\) w), switchWindow) -- @ Swap the focused window with the next window
([^modMask], shiftMask, \(\alpha\) k), switchWindow) -- @ Swap the focused window with the previous window

-- resizing the master/slave ratio
([^modMask), \(\alpha\) c (h), sendMessage Shrink) -- @ Shrink the master area
([^modMask), \(\alpha\) c (l), sendMessage Expand) -- @ Expand the master area

-- increase or decrease number of windows in the master area
([^modMask), \(\alpha\) (comma), sendMessage (IncrementN 1)) -- @ Increase the number of windows in the master area
([^modMask), \(\alpha\) (period), sendMessage (IncrementN (-2))) -- @ Decrease the number of windows in the master area

```

Compilation finished at Mon May 28 09:14:01

[12:07] Running xmonad (XMonad) | xmonad-Hs.hs, dist/build/xmonad-xmonad-top/XMonad.o)
[12:07] Compiling Config.hs | Config.hs, Config.hs-0.0.0.0

```

XMonad

```
```
Linux

Why install a Linux distribution?

- **It’s safe** Not vulnerable to viruses; worms
- **Fast** . . . and always getting faster
- **Easy to use** Desktop environments are awesome
- **Fun** to use, and are rewarding!
- **Community** join millions of *developers; testers; designers*

- **It’s FREE!** as in beer **and** in speech
Linux
How to install a Linux distribution

- Go to a distro website
  - e.g. http://www.ubuntu.com/download
- Download the distribution
- Put it on a USB stick
- ...or burn to DVD
- Boot your computer and install
- Never look back...
Open Source Software

Popular open source software

- Web browsers
  - Firefox; Chrome...
- Office suites
  - OpenOffice; LibreOffice...
- Multimedia
  - VLC; XMBC...
- Android
- Compilers
  - gcc; ghc...
- Version control systems
  - Git; Svn...
Linux

GUI or CLI?
Essential Linux Utilities
Navigating the filesystem

bash-3.2$ cd ~/praxis_presentation/
bash-3.2$ ls *.tex
slides.tex

bash-3.2$ pwd
/u1/pg/rs46/Documents/praxis_presentation

bash-3.2$ file slides.tex
slides.tex: LaTeX 2e document text

bash-3.2$ cd ~/Desktop
bash-3.2$ touch file.txt
bash-3.2$ echo "Hello world" > file.txt
bash-3.2$ cat file.txt
Hello world
**Linux**

**Running executables**

```
bash-3.2$ firefox

bash-3.2$ convert face.png face.pdf

bash-3.2$ grep -R "Linux is fun" *
notes/lecture_notes.txt:Linux is fun

bash-3.2$ pdftk A=100p-inputfile.pdf cat A22-36 > output outfile_p22-p36.pdf

bash-3.2$ locate *.tex
~/documents/notes/haskell_slides.tex
~/documents/notes/compiler_slides.tex
~/documents/papers/conf2011/draft.tex
```
Steve Mowbray has written an excellent online guide.

- Logging in
- Unix commands
  - File commands
  - History commands
  - Background processes
- Email access
- Printing
- Lots of stuff...

http://www.ma.hw.ac.uk/~steve/brief_guide/
MACS Computing Services
Remote login

- **Host** ssh.macs.hw.ac.uk
- **Username & password**: MACS login info

bash-3.2$ ssh rs46@ssh.macs.hw.ac.uk
bash-3.2$ locate lecture_notes.txt
~/documents/notes/lecture_notes.txt

For a specific machine:

bash-3.2$ ssh rs46@linux60.macs.hw.ac.uk
MACS Computing Services
Remote file access

- **Host** ftp.macs.hw.ac.uk
- **Username & password**: MACS login info

```
bash-3.2$ sftp rs46@ftp.macs.hw.ac.uk

sftp> get notes.txt
Fetching /u1/pg/rs46/notes.txt to notes.txt

sftp> put assignment.odt
Uploading assignment.odt to /u1/pg/rs46/assignment.odt
```
MACS Computing Services

Remote file access

Connected to 192.168.1.100:21
220 (vsFTPD 2.2.0)
USER pirat9
331 Please specify the password.
PASS xxxx
230 Login successful.
SYST
215 UNIX Type: L8
TYPE I
200 Switching to Binary mode.
PWD
257 ""
Loading directory listing / from server (LC_TIME=en_US.UTF-8)
PASV
227 Entering Passive Mode (192,168,1,100,67,190).
LIST -aL
Revision control is the management of changes to documents, programs, and other information stored as computer files.

Why bother?

- You will be writing a lot of code in the next 4 years
- It saves a lot of time managing code between machines
- Maintains history of coding projects
- ... enabling rollbacks/rollforwards
- Encourages collaboration in 3rd year group projects
- You will be asked about VCS skills in job interviews!
Popular choice is **Git**, a distributed and widely used VCS.

- Written by Linus Torvalds
- Used for many open source projects including:
  - Linux (obviously!)
  - Android
  - gcc
  - Gnome
  - Ruby on Rails
  - Perl
- Installed on MACS PC’s
- ...allowing you to work from anywhere!

For more info: [http://www.macs.hw.ac.uk/~rs46/git_slides/](http://www.macs.hw.ac.uk/~rs46/git_slides/)
LaTeX

- LaTeX is a document markup language
- Widely used in academia

Used to create:
- Slide shows
- Articles
- Dissertations
- Books
- ...

Based on the idea that authors should be able to focus on the content of what they are writing without being distracted by its visual presentation
Life in Plain Text

LaTeX

\documentclass{beamer}
\usetheme{Boadilla}
\title{Praxis}
\author[Rob Stewart]{Rob Stewart \url{r.stewart@hw.ac.uk}}
\date{27th October, 2011}
\institute{Heriot Watt University}

\begin{frame}
\frametitle{Life in Plain Text}
\framesubtitle{LaTeX}

\begin{itemize}
\item LaTeX is a document markup language
\item Widely used in academia
\item Used to create:
  \begin{itemize}
  \item Slide shows
  \item Articles
  \item Dissertations
  \item Books
  \item \ldots
  \end{itemize}
\end{itemize}

\begin{quotation}
Based on the idea that authors should be able to focus on the content of what they are writing without being distracted by its visual presentation
\end{quotation}

\end{frame}
Computer Science in Edinburgh

Extra curricular activities

- **Tech Meetup** [http://techmeetup.co.uk/](http://techmeetup.co.uk/)
  - Meetings at Appleton Tower
  - “Talk about some of the cool stuff we’re doing”
  - “There’s pizza and beer, a projector and techies arguing about stuff”

- **British Computer Society** [http://www.edinburgh.bcs.org/](http://www.edinburgh.bcs.org/)
  - Meet once a month at Informatics Forum
  - Available to members *and* non-members!
  - 2nd November - *BDD & Feature Injection*
  - 7th December - *Challenging Requirements*

- **Girl Geeks Scotland** [http://www.girlgeekscotland.co.uk/](http://www.girlgeekscotland.co.uk/)
  - Community interested in technology, creativity & computing
  - Frequent talks, in Edinburgh, Dundee, Glasgow & Aberdeen
Extra curricular activities

  - Aim to promote the use of Linux, other Open Source tools
  - Monthly talks & open source demo’s at White Horse pub

- **Ed Lambda** [http://www.edlambda.co.uk/](http://www.edlambda.co.uk/)
  - Edinburgh group for people interested in functional programming
  - Meet in the Outhouse pub once a month

- **Github** [http://www.github.com](http://www.github.com)
  - Social coding
  - Project to simplify sharing code
  - Start following your favourite open source projects!
  - Be my friend [https://github.com/robstewart57](https://github.com/robstewart57)
The lab

Your turn...

- Filesystem navigation
- Simple GNU utilities
- Figure out ssh & ftp
- Git fun... inspect the source code of these slides!

Find the tutorial, here:

http://www.macs.hw.ac.uk/~rs46/teaching.php