OpenSource Software

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LIMITLESS **POTENTIAL** | LIMITLESS **OPPORTUNITIES** | LIMITLESS **IMPACT**

Outline

Free(dom) Software

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Definition of the Free Software Foundation (FSF)

- *Software which may be used, copied, studied, modified and redistributed ("free as in free speech"), but is not necessarily available for no charge* [Wikipedia]
- Source code **must** be open
- Various licenses are permissive like GPL, MIT, and Creative Commons (CC)

Ecosystem of free software (Example)

- The GNU Project is a free-software mass-collaboration project
  - ▶ Collection of useful software tools
  - ▶ Announced 1983 by Richard Stallman at MIT
  - ▶ Aim: to give computer users freedom and control in their use of their computers and computing devices

Why does Open/Freedom Matter for us?

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Regarding Software

■ Gives us liberty to work with software
  ▶ Training: learn from others
  ▶ Patch bugs
  ▶ Enhance functionality/port it to other hardware
  ▶ Quick prototyping of anything: stand on the shoulder of giants
■ Increases trust into software
  ▶ Is the software correct?
  ▶ Does it respect my privacy?
■ Prevent vendor lock-in: handle unwilling/bankrupt companies
  ▶ Theoretically, provide unlimited support for software!
  ▶ Switch support contract for software if you are not satisfied

Freedom matters for other material as well

Relevance of Freedom for other Artefacts

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- Immaterial
  - Books, songs, photos, video
- Hardware
  - RISC-V (CPU), pacemaker, gas heater
- The license terms matter
  - Public domain
  - Open/permissive license
  - Proprietary
- Examples:
  - Wikipedia
  - Fan works (pics/texts/videos)
- Legislation is not keeping up with need
  - Derived work is often gray area
  - Books become public domain 50+y

Figure: A Non-Free Picture

The Open Source Initiative (OSI)

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- Similar to FSF, formed 1998, but valuing commercial idea more
- Purpose: convince companies to see benefit of open source
- In contrast, FSF is concerned about ethic implications of freedom
  - Against threats to computer user freedom (DRM/software patents)
  - Dislikes a single non-free software piece (e.g., firmware)

Example that are open source but not free* software

- TiVo digital recorder ships with apps derived from open source
  - But users cannot modify it (signed software execution, like "secure boot")!

Truth About Open Source[1]

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- Open source is **secure**!
  - ▶ Security by obscurity is a typical misconception
- Open source is **licensed/legal** (albeit it may be free)
- **Big software companies** use open source
  - ▶ Actually: The government and NHS encourages open source!
- Open source comes with **support** (albeit enhanced support may cost sth.)
- Often, open source software is **reliable and has a high quality**
- Open source companies **own their intellectual property** but **share it**!
- Open source software is often **compatible** with proprietary

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[1]See also: https://www.totaralms.com/blog/10-common-myths-about-open-source

Which Companies Use and Contribute to Open Source?[2]

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- ■ Adobe (250+ public repositories)
- ■ Automaticc (Wordpress; powers 28% of the Internet)
- ■ Canonical (Ubuntu, OpenStack)
- ■ Cloudera, Hortonworks (Big Data company around Hadoop)
- ■ Elastic (ElasticSearch, Kibana, Beats)
- ■ Facebook (React; 15,682 contributors on GitHub)
- ■ GitHub (well now Microsoft)
- ■ Microsoft (.NET development, Visual Studio, GitHub)
- ■ Google (2000 open source projects, Android, Chromium, Tensorflow)
- ■ IBM (e.g. WebSphere)
- ■ Intel
- ■ NetFlix

[2] https://www.datamation.com/open-source/35-top-open-source-companies-1.html

Companies and Open Source

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How to Make Money with OSS?

- Offer of an additional professional version (more features)
- Providing support
  - ▶ Very important for any commercial organization that depends on a produxt
- Sell products generated using OSS (e.g., GIMP, blender)
- Sell something that comes with OSS (Cloud, Android, Service model)
- Advertisement (on webpages or in the software)

Benefit for the companies by using OSS

- Contributions from externals
- Increased trust
- Train developers that may become future employees

British Computer Society's Open Source Specialist Group

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The BCS OSSG aims to

- Educate and inform of Open Source and its implications
- Provide a reliable, honest and independent view of Open Source
- Encourage debate and examination of Open Source practice
- Reduce professional uncertainty around the subject of Open Source
- Act as a centre of expertise

bcs Open Source Specialist Group
The Chartered Institute for IT

https://ossg.bcs.org/

Popular Open Source: The Linux kernel

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- First Linux kernel release: September 17, 1991
- Available on http://www.kernel.org
- LOC: 20 Million![3]

Management

- Clear maintenance policies[4]
- Managed using the Git version control system
- Maintainers: 1308+ for different subsystems
- Sometimes rough developers discussions (lately a Code of Conduct)

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[3] https://www.linuxcounter.net/statistics/kernel
[4] https://github.com/torvalds/linux/blob/master/MAINTAINERS

Relevance of Linux

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Market Share

- Desktop $< 2\%$ (a shame)

- Mobile 80% Android with Linux kernel !

- Embedded systems: most systems use Linux! (Windows $< 8\%$)

- High-performance computing 99%

- Servers: widely used; even Azure cloud is now dominated by Linux

Reasons for the use of GNU/Linux

- Linux + most distributions are free as in freedom and cost nothing

- Long term maintenance, 20 year old programs can still be used

- Maturity of code

- Flexible and capable to run on any hardware system

- Rich ecosystem

Outline

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My Experience

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History

- Around 1998: First experience with SUSE Linux
- 2001-2004: Tried to replace Windows, used dual boot
- 2005: Only used Linux, if really needed: Windows in a VM
  - Distributions: Debian, SUSE, Gentoo, Slackware, Ubuntu (now)
  - I liked the moral implications of open source software
- Several minor patches to various open source repositories
- 2009+: I develop all useful software (openly) on GitHub
- Contributions to various open source projects

My Experience: The Bad

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Open source development

- Sometimes difficult discussions with peers
- Dealing with licenses can be non-trivial

Using Linux and Open Source Software

- Sometimes time consuming when setting up new systems
  - ▶ Missing drivers (e.g., printers)
  - ▶ Unsupported hardware (but mostly not needed capabilities)
- Sometimes annoying dealing with proprietary software
  - ▶ Using formats like CPT, DOCX, incompatibilities, ...
- Only fraction of PC games supported

My Experience: The Good

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- Became more capable computer scientist
  - Better understanding; taking control of software and systems
  - Automation of literally all PC work that I dislike
  - Various programming languages + command line
  - Can resolve pretty much any hardware/software issue
- High productivity
  - Professional letters, CV, presentations, ...
  - Higher focus on content instead of layout
  - Updates to a new Linux distribution: 1 hour: everything works
- Never lost any data since switching to Linux and open source
  - Also no confusion with inaccessible file formats
- All software I use is free* and also costs nothing
  - I do not miss a single program from MS-world, replacements are out there
- I contributed to software that is used world-wide (motivating!)

Creation of this Slide Deck Used only Free Software

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- Linux distribution: Ubuntu 18.04
- LaTeX Beamer for text setting
  - ▶ Had to create a template similar to UoR PPTX template first
  - ▶ Released the template under a permissive license
- Text editor: Atom
- Version management/backup: Git

Summary

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- ■ FSF and OSI support open source software
- ■ Open source typically does not cost money directly
  - ▶ But please contribute patches to public development
    - • Hidden costs is your time and devotion!
  - ▶ If you can't code but make quite some money using open source
    - • Hire a company that contributes to open source
- ■ I strongly belief in Open Source Licenses for any Artefact
  - ▶ Transparent, secure, reliable, compatible, business-relevant
- ■ Join local activities
  - ▶ Linux User Group at the University of Reading
    https://hps.vi4io.org/teaching/clubs/linux
  - ▶ BCS Open Source Specialist group (it is free to attend meetings!)
    https://ossg.bcs.org

Useful Links

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- ■ Running Linux inside a VirtualBox: `https://www.lifewire.com/run-ubuntu-within-windows-virtualbox-2202098`
- ■ Linux distro discussion for beginners: `https://itsfoss.com/best-linux-beginners/`
- ■ Command line: `https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners`
- ■ Alternative software:
  - ▶ `https://opensource.com/alternatives`
  - ▶ `https://alternativeto.net/`
  - ▶ `https://www.datamation.com/open-source/78-open-source-replacements-for-expensive-applications-1.html`
  - ▶ `http://guides.library.kumc.edu/freeware/popware`
- ■ `https://opensource.org/osd`