COMPUTER PRINCIPLES FOR PROGRAMMERS

IT Jobs, Source Code Licensing, Spam, Privacy, Intellectual Property

News of the Week

Agenda

- Lecture:
  1. IT Jobs
  2. What is open-source software and licensing?
  3. What is a “Closed/Proprietary Software?”
  4. Hybrid Open and Closed Source Systems in today’s Software Market
  5. Spam and Privacy, CASL & PIPEDA
  6. Who owns “Intellectual Property?

Activity

1. How much Open Source Software …
   – can be used for regular tasks on your computer?
     What are the OS alternatives to the propriety apps you have?
   – for personal use is available on Seneca MyApps?
     What of those could you use yourself that you don't use already?
   – might be present on the Internet's infrastructure (the back-end server-side) when surfing the web?
2. What OSS projects might you get involved in to gain marketable experience?

Tech & IT careers in 2023

Position (in Toronto)	**Salary Range**	**midpoint**
Developer/Programmer Analyst: Java, JavaScript, Python, C# .NET, C / C++	$73,010 - $113,948	$92,306
Web Developer	$76,921 - $99,607	$88,655
Quality Assurance Analyst/Associate	$68,577 - $107,168	$91,263
Business Systems Analyst	$75,750 - $136,500	$110,250
Database: SQL (structured) NoSQL (unstructured)	$96,250 - $136,500	$107,000
Project Manager: PMP, Agile, Scrum	$93,750 - $138,250	$114,000

https://www.roberthalf.ca/en/salary-guide/specialization/technology

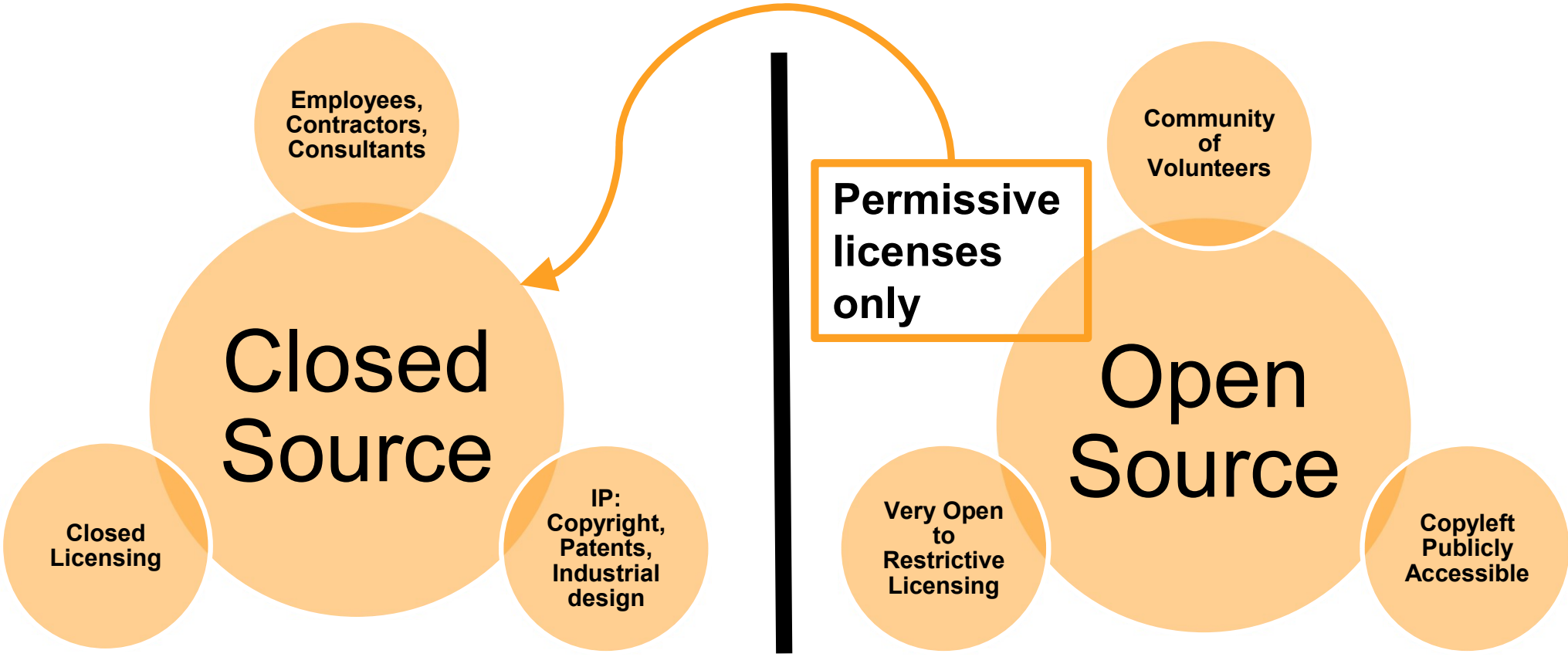
Tech Opportunities

Developer Skills	Growth Industries
Problem Solving, Soft Skills	FinTech, Healthcare, Robotics
Web Dev stacks, Front/Back End	Transportation and Logistics

Digital Transformation (DX)
Cloud architecture, containers, micro-services, serverless platforms
Analytics, Big Data, IoT, Security + Privacy
5G, AI / ML, Robotics, Edge Computing, AR/VR, Blockchain

Software Licensing: Open vs Closed/Proprietary

Open and Closed/Proprietary Software



Free and Open-Source Software

- **Free as in Speech** (at liberty to use for any purpose)
  - Free Redistribution, with Source Code, allows modifications and derived works
- Derivative works *distribution*
  - **Free and OSS – Copyleft**: **Once Open, Always Open.** *All* distributed software inherits license, e.g. GNU GPL, from *any* original FS and/or OSS included within the distribution
  - **OSS – Permissive**: allows proprietary derivatives, e.g. Apple macOS from FreeBSD
- **Free as in Beer** (no cost software)
  - batteries not included; some assembly required.
  - try before you commit; may not be enterprise ready.
  - consider TCO: Total Cost of Ownership
- GitHub, SourceForge, Bitbucket, GitLab, etc, etc

Be careful where you D/L from.

What is a Closed/Proprietary Source Software?

- Run-time license for compiled software. (Source code is n/a.)
- Enterprise Scalability:
  - network admin control to manage apps on hundreds or thousands of PCs
  - server apps suitable for hundreds or thousands of concurrent users
- Supported Life Cycle:
  - continuous development
  - end-user level training and support
  - patches for security, bug fixes, functionality, and usability enhancements
  - end-of-life migration paths
- Cloud-based deployment options
- examples: IBM OSs & DB2. Apple iOS & macOS. Microsoft Windows (PC and Server), MS-SQL Server (DB), MS-Office 365 Apps.

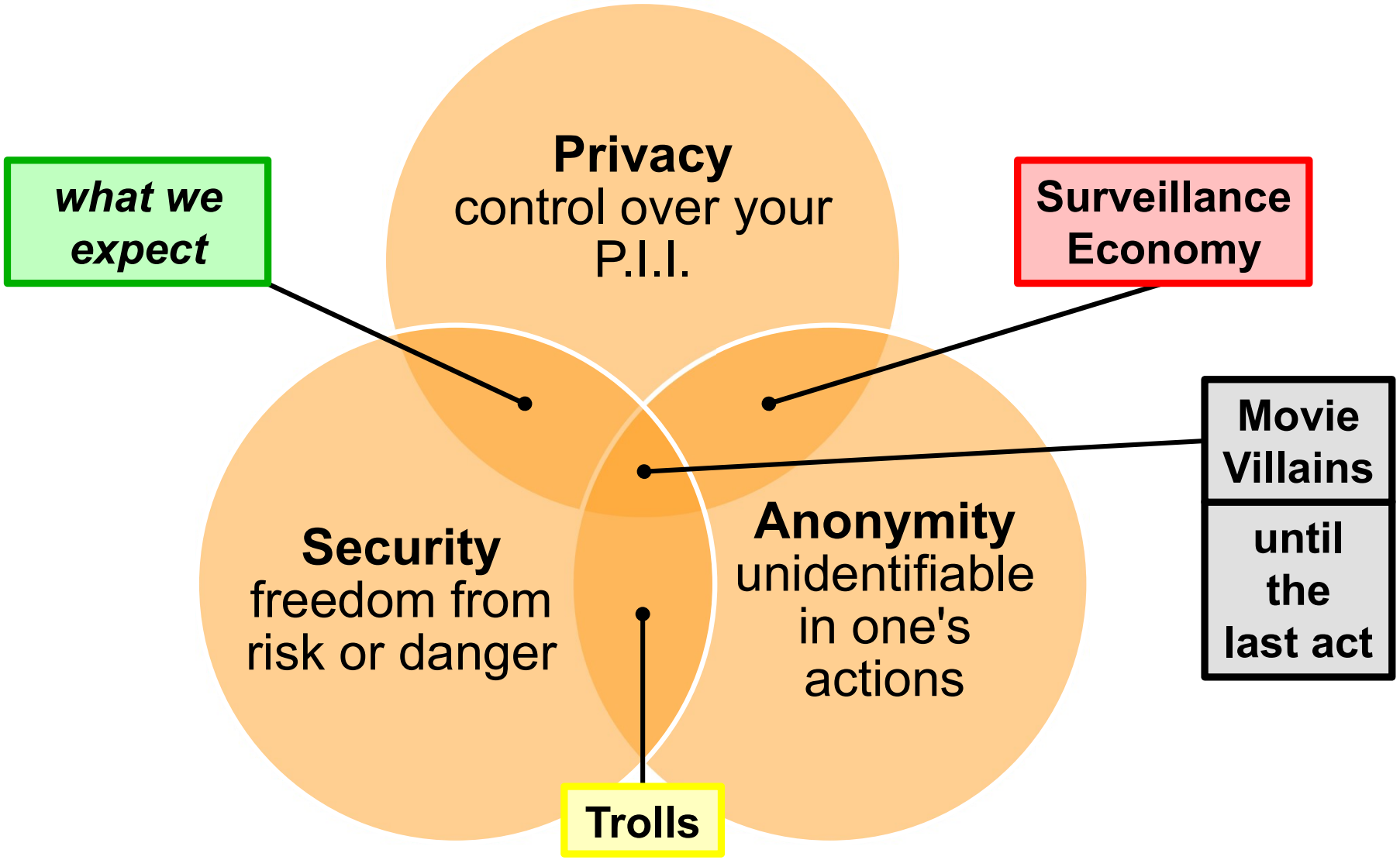
Hybrid Open and Closed Source Systems in ICT

- Enterprise scale ICT uses a hybrid of open and closed source systems
  - Linux servers, LAMP and MEAN stacks, open web frameworks.
  - Apache Hadoop (open) and IBM DB2 (closed) for big data
- Microsoft, Apple, and IBM have many open source projects *included within their propriety offerings*.
  - https://opensource.microsoft.com/ e.g. VS Code, Terminal, PowerShell, PowerToys
  - https://opensource.apple.com/
  - https://www.ibm.com/opensource/
  - https://en.wikipedia.org/wiki/List_of_free_software_project_directories

Red Hat + Open Source = $2B service business

- Red Hat developed a distro of the Linux OS, 1994
- Fedora (free): rapid development of latest technology
- Red Hat Enterprise Linux – certified and integrated platform
  - Support, Training, SLAs, Secure, Stable, Tested, Hardened, Long Life Cycle, single source of Open Software, scales to large organizations
- Red Hat Enterprise Linux Server, per socket pair per year
  - Self-support USD$349, Standard USD$799, Premium (24x7) USD$1,299
- Red Hat Enterprise Linux for Virtual Datacenters, Premium with Smart Management, High Availability, and Resilient Storage for USD$8,964 / socket pair / year

Data Privacy, PIPDEA, CASL, IP


Privacy
control over your P.I.I.
what we expect
Surveillance Economy
Movie Villains
until the last act
Security
freedom from risk or danger
Anonymity
unidentifiable in one's actions
Trolls

PIPEDA - Personal Information Protection and Electronic Documents Act

- PIPEDA for **private businesses** and **federal agencies**
- FIPPA adds for Ontario **provincial agencies**
- **P**ersonally **I**dentifiable **I**nformation belongs to the user
  - ICT servers, ICT databases, ICT applications, but *not all* ICT *data*. Data supplied by users belongs to users. Data *derived* from user data belongs to ICT company.
- Business Policy states **use** and **retention period** of data
- Breach of Security Safeguards Regulations, 2018 results
  - Canadian rules for data breach record-keeping and notifications.
- Modernizing Canada's Privacy Act – C-27 status

Canada's Anti-Spam Legislation (CASL)

- **All electronic messages:**
  email, instant messaging (SMS|MMS texts), and social media
- **sent for commercial activity:**
  advertising, marketing, or promotional
- Need **consent** or prior business relationship prior to sending messages
- **Traceable** to sender with contact info
- Easy to **unsubscribe**
- **Honest** and transparent
- Spam quiz

What is Intellectual Property?
What are Intellectual Property Rights (IPR)?

Copyright: automatic protection of the *expression* of ideas.

Patent: granted protection of a new idea which must be novel, useful, and inventive

(i.e. not obvious to a specialist)

What is Intellectual Property (IP)?

Intellectual Property

- creations of the mind. the output of innovation.

IP Rights are registration of

- Patents – exclusive rights to innovations
- Copyright – asserts reproduction or publishing rights
- Industrial Designs – exclusive rights to visual appearance
- Trademarks – exclusive rights to brand identification
- Trade secrets – business info which has value only when secret

Software is IP … To whom does it belong?

- Anything you create using *only* your own resources is automatically copyrighted.
  - *Proving you created it is up to you.*
- "work-made-for-hire" the employer or client paying for the code owns the copyright. (includes WIL/coop students)
- If other's resources (college/employer) are used to create your work, they own/share the copyright.
  - Seneca Intellectual Property Policy exception:
  - students retain copyright on work created for course requirements
- *Need a contract or published policy to override legal defaults.*
- *Use of open-source software is governed by the OS licence.*

Canadian Intellectual Property Office

- CIPO administers intellectual property in Canada
  - patents, trademarks, copyrights, industrial designs, and integrated circuit topographies.
  - CIPO website. Registration of copyright is $50
- Blockchain registry for artists from Prescient Innovations
- https://www.blockcerts.org/ - Seneca academic credentials

NOTES

Patents Vs. Copyrights

Patent:

- an exclusive *right*
  - restricting others from using or selling your invention
- granted for an *invention*
  - a product or a process providing a new way of doing something,
  - or a new technical solution to a problem.
- to protect a novel idea
  e.g. process or algorithm embodied in software

Copyright:

- protects the particular form in which an idea is expressed, i.e. source and object code, and unique + original UI elements.

PIPEDA - Personal Information Protection and Electronic Documents Act

- PIPEDA controls all collection and retention of personal information by all businesses in Canada. In the Public sector, it controls the collection and retention of *employee information only* for Federal agencies. FIPPA is an Ontario version.
- In 2001, 'Adequate' per EU Data Protection Directive (1995)
  - may not be so under EU General Data Protection Regulation (2018)
- Short PIPEDA quiz https://services.priv.gc.ca/quiz/index_e.asp
- 5 minute video on PIPEDA for businesses https://www.youtube.com/watch?v=KyOEv5fW5NE

“Organizations covered by the Act must obtain an individual's consent when they collect, use or disclose the individual's personal information. The individual has a right to access personal information held by an organization and to challenge its accuracy, if need be. Personal information can only be used for the purposes for which it was collected. If an organization is going to use it for another purpose, consent must be obtained again. Individuals should also be assured that their information will be protected by appropriate safeguards.”

PIPEDA

What is Software Licensing?

- Business organizations often change or update their operating software in an effort to keep pace with technology.
- A software license is a "legal instrument" (usually by way of contract law, with or without printed material) governing the "use or redistribution of software."
- For example, a typical software licensing contract will contain provisions relating to:
  - performance warranties,
  - installation and troubleshooting,
  - user training,
  - limited liability and indemnification of the vendor,
  - infringement disclaimers,
  - payment and finance terms

What is Software Licensing

- A **software license** is a legally binding document that sets rules about how a piece of **software** can or cannot be used.
- **Open-source licenses** are **licenses** that comply with the **open-source** definition -- allowing software to be freely used, modified, and shared.
- A **perpetual license** allows the customer to use the **licensed** software indefinitely. For the first year, the **perpetual license** also entitles the customer to download all updates to the software and to receive technical support.

What is Open-Source Software?

- Open-source software is computer software with its source code made available with a license in which the copyright holder provides the "rights to study, change, and distribute the software to anyone and for any purpose."
- In other words, open-source licenses are licenses that comply with the open-source definition, that is, allowing software to be freely used, modified, and shared (a typical example of an open-source Software License is shown in the next slide.)
- Open-source software may be developed in a collaborative public manner. MYSQL, APACHE, and PHP are some examples.

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Microsoft EULA Excerpts

An intro to “Data Privacy” in the IT field

- Data Piracy is the “illegal copying, distribution, or use of data.” Disputes and litigation do occur in the IT field when enterprises fail to keep customer and employee information secure.
- Sensitive information is stored in digital format, and thus susceptible to theft. Hackers and other cyber criminals routinely target financial institutions, e-commerce websites, and ordinary businesses, sometimes gaining access to customers’ data.
- The Privacy Commissioner investigates all complaints and produces a report recommending changes, actions, etc.

What is Intellectual Property Rights (IPR)? (Cont'd)

- Intellectual property rights is a collective term for the processes of assigning property rights through patents, copyrights and trademarks.
- IPRs allow the holder to exercise a monopoly on the use of the item for a specified period.
- IPRs protect the intangible rights of ownership in an asset such as a software program.

What is Intellectual Property Rights (IPR)? (Cont'd)

- Each intellectual property "right" is itself an asset, a slice of the overall ownership pie.
- The law provides different methods for protecting these rights of ownership based on their type.
- Four types of intellectual property rights relevant to software include:
  - patents, copyrights, trade secrets and trademarks (to be discussed in more details in the next slides.)

Main Types of Intellectual Property Rights (IPR)

- Each IP “Right” provides a different type of legal protection.
- Patents, copyrights and trade secrets can be used to protect the technology itself.
- Trademarks do not protect technology, but the *names* or *symbols* used to distinguish a product in the marketplace.

Patents Vs. Trade Secrets

- A patent is a twenty year exclusive monopoly on the right to make, use and sell a qualifying invention. The legal monopoly is considered a reward for the time and effort expended in creating the invention.
- A trade secret is any formula, pattern, compound, device, process, tool, or mechanism that is not generally known or discoverable by others, is maintained in secrecy by its owner, and gives its owner a competitive advantage because it is kept secret. Can theoretically last “forever”

Trademark

- A proprietary term that is usually registered with the Patent and *Trademark* Office to assure its exclusive use by its owner.
- A Trademark is distinctive design, graphics, logo, symbols, words, or any combination thereof that uniquely identifies a firm and/or its goods or services.

Sample Trademarks