Free Software: Freedoms and Responsibilities

CS 153 Compilers – Fall 2021
Trystan S. Goetze, Ph.D. (he/they/she)

Wait, who are you?

Dr. Trystan Goetze (say "TRISS-tin GETS")

Pronouns: any (he, they, and she are fine)

Postdoctoral Fellow of Embedded EthiCS in the Department of Philosophy

Research: moral responsibility, injustice in knowledge-sharing, computer ethics

Recent Teaching: computer ethics, AI ethics

Some links:
- My website: https://www.trystangoetze.ca/
- Games: https://errantcanadian.itch.io/
- GitHub: https://github.com/errantcanadian/
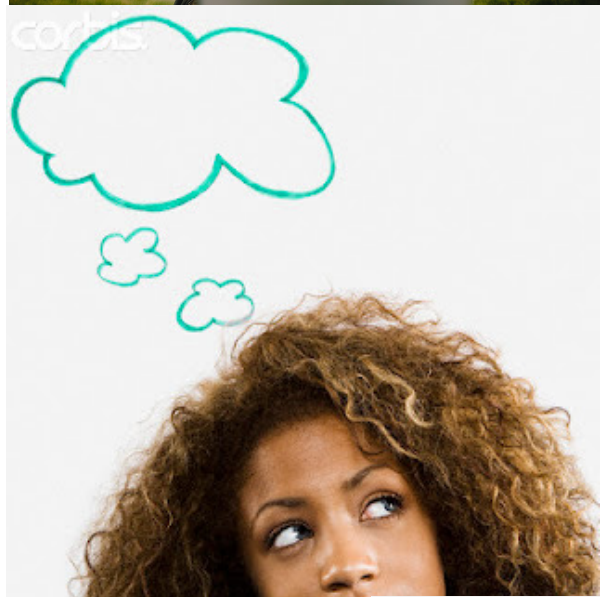
Why talk about this in CS 153?

As Steve said in lecture 1, compilers are a highly technical topic.

So why talk about free software, or ethics, in this course?

One reason: ***all technology raises ethical issues***.
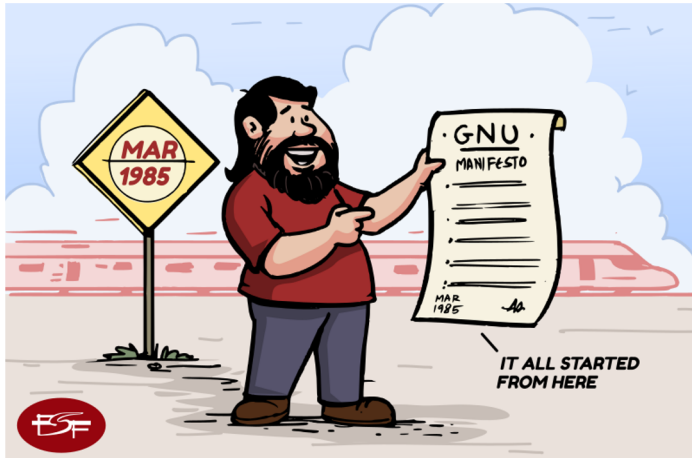
Another reason:
- Compilers are essential to modern computer programming.
- Should anyone be allowed to ***own*** compilers?
- Compare: no one can own a natural language.
- Many compilers are open-source or free, but some are not. ***Is this fair?***
- ***Could*** all compilers be free, given that much hardware isn't?

Readings

Required Reading:

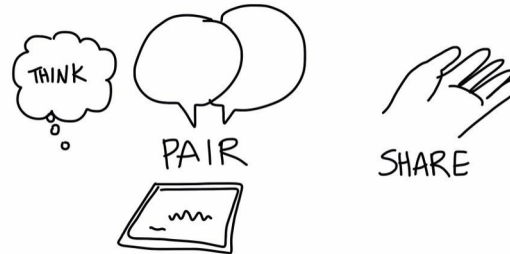Richard Stallman, 1993/1985, The GNU Manifesto (same as the PDF on Canvas), https://www.gnu.org/gnu/manifesto.en.html

Optional Supplemental Reading:

Trystan Goetze, 2021, An IP Cheat Sheet, https://bit.ly/ip-cheat-sheet

Today's Agenda

1. Origins of free software

2. The four freedoms

3. Do freedoms come with responsibilities?

4. Discussion of a case

5. Assignment

Free Software: A Parable

Early software developers (1960s–70s) were influenced by hippie counterculture.

This created a culture of software sharing in computer science research.

In 1980, Congress passed the *Computer Software Copyright Act.*

The same year, Richard Stallman was a programmer in MIT's AI lab.

Stallman wanted to write some custom software to make a new printer's job queue more efficient. He had done so with the previous printer in the lab.

Xerox refused to give him the source code, citing their intellectual property rights.

Stallman left MIT to found the Free Software Foundation (FSF) and GNU Project.

Richard Stallman

"Free" as in Freedom

The GNU General Public License (GPL) preserves the following freedoms:

- **Freedom 0**: To run the program, for any purpose.
- **Freedom 1:** To study how the program works.
- **Freedom 2:** To make and share copies of the program.
- **Freedom 3:** To improve the program and share your improvements with the public.

But there is an important restriction:

- Copies and alterations must also be free.

Thanks to these freedoms, free software has become a resource that anyone can use.

Free vs. Open-Source vs. Proprietary

Free

GNU

LibreOffice

GNU Compiler Collection

GNU General Public License (GPL)

Open-Source

Android

OpenOffice

LLVM

Apache License

Proprietary

Windows

Word

Visual C#

Copyright, patents, trademarks, trade secrets, end-user license agreements

Pros/Cons of the different licenses

Proprietary	Open-Source	Free
Pro: Better support services & documentation	**Pro:** Can be reused in your own proprietary software	**Pro:** Protects the four freedoms
Con: Closed-source	**Con:** At any time, future updates could become closed-source	**Con:** Cannot be reused in proprietary software
Con: Owner can control how you are allowed to use the software	**Con:** When not dependent on community maintenance, usually dependent on Big Tech	**Con:** Highly dependent on community maintenance

Free Software and Responsibilities

We might think that freedoms come with responsibilities (or duties, obligations).

For example, the freedoms granted by society might come with the responsibility help your fellow citizens in need.

Are there **ethical obligations** that you might acquire from using free/open-source software?

One possibility: maybe you have an obligation to **contribute** to the project – donations of labor, money, equipment, bug reports…

How You Can Contribute

(Nowadays, for software tasks to work on, see the High Priority Projects list and the GNU Help Wanted list, the general task list for GNU software packages. For other ways to help, see the guide to helping the GNU operating system.)

I am asking computer manufacturers for donations of machines and money. I'm asking individuals for donations of programs and work.
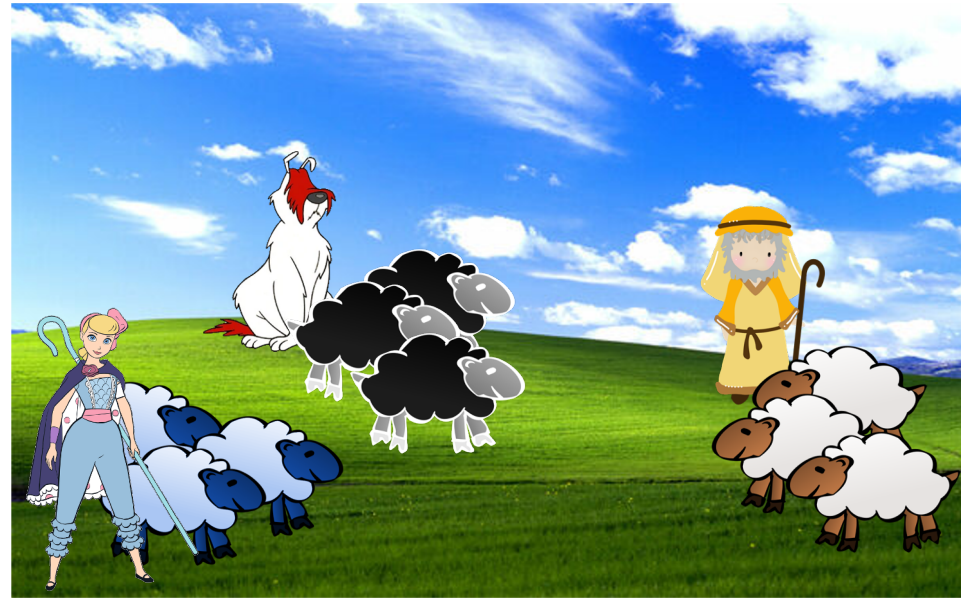
Tragedy of the Commons

Suppose we have three shepherds who share some grazing land.

If they each send out only one sheep, and they each contribute to maintaining the land, **all get a small benefit**.

If one chooses to send more of their sheep or stop maintaining, **that shepherd** gets a greater benefit.

But if they **all** choose to send more sheep…

Or if they **all** stop maintaining the land…
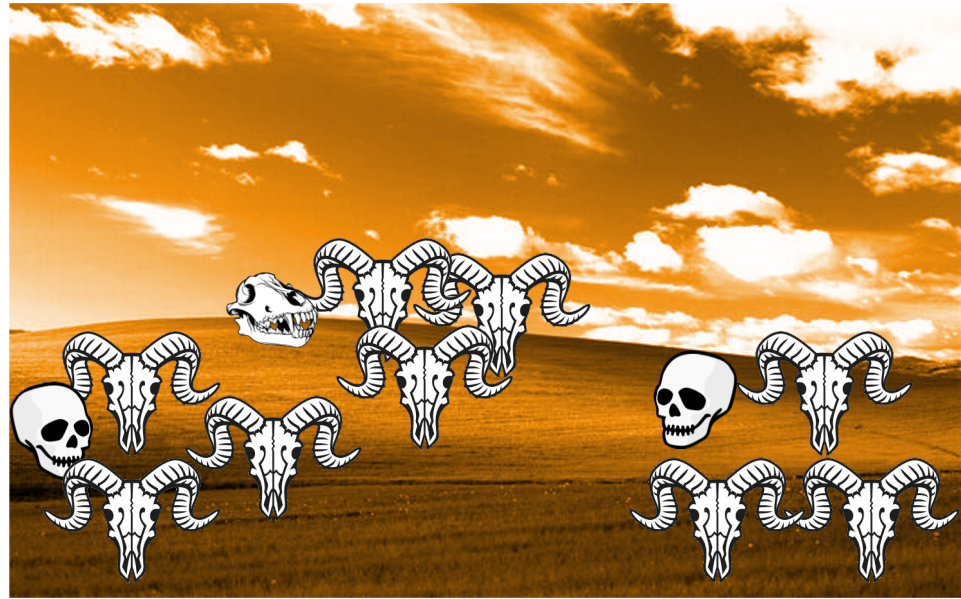
Tragedy of the Commons

…then the common land is ruined, and **no one benefits.**

If each shepherd acts according to what is in their **self-interest**, everyone ends up worse off.

Conclusion: We each have a duty to help maintain shared community resources.

Not over-using it.

Helping to maintain it.

Comparison with Free or Open-Source Software (FOSS)

FOSS is a kind of community resource.

With contributions, the project can be sustained.

With few contributors, the project could collapse because of burnout, disinterest, lack of time…

If you use FOSS extensively, maybe you have an ethical obligation to contribute to the project.

A *dis*analogy: Unlike the commons, using software isn't using up a limited resource.

The software still needs upkeep, but perhaps a small, passionate team can handle it.

LLVM Home | Documentation » Getting Involved »

Contributing to LLVM

- Ways to Contribute
  - Bug Reports
  - Bug Fixes
  - Reporting a Security Issue
  - Bigger Pieces of Work
- How to Submit a Patch
- Helpful Information About LLVM

Alternative Supports for FOSS

Have **large corporations** pick up the cost.

For example, Google maintains Chromium, the open-source version of Chrome (also used in Edge, Opera).

But, this makes us dependent on large tech corporations.
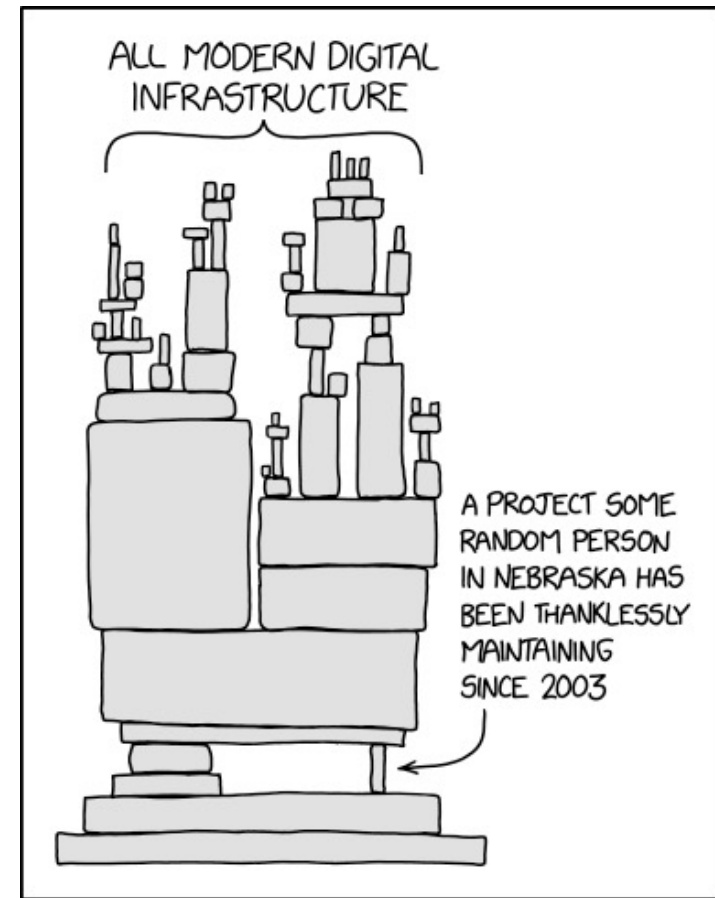
Government support:
- A software tax, that is redistributed to developers.
- Transfer all software intellectual property to a public trust.

But, maybe government help would hurt businesses.

Conclusions?

- The four freedoms have made FOSS an important community resource

- FOSS requires contributions to be sustainable

- Who should make those contributions?
  - Individuals who use FOSS
  - Dedicated individuals who are passionate about FOSS
  - Large corporations
  - Governments

- Which do you think is best?

ALL MODERN DIGITAL INFRASTRUCTURE

A PROJECT SOME RANDOM PERSON IN NEBRASKA HAS BEEN THANKLESSLY MAINTAINING SINCE 2003

https://xkcd.com/2347/

Case Study & Discussion

Physicker®

Song Li is a senior developer for Physicker, a healthcare technology company. Her boss, Mavis Sloane, has asked Song to use mainly open-source tools so that the company can save on costs. Song selects an open-source compiler that works well with the languages Physicker's development pipeline prefers.

Song soon finds that some of the hardware used by a few of Physicker's clients isn't very well supported by the compiler she chose, and there aren't good open-source alternatives with a frontend that supports their preferred languages. So, she spends some time developing a new backend for the compiler.

Sloane is impressed, and wants to keep the new backend as a proprietary trade secret. Song, on the other hand, wants to release her work under the same open-source license as the original compiler.

What could Song argue when she presents her case to Sloane?

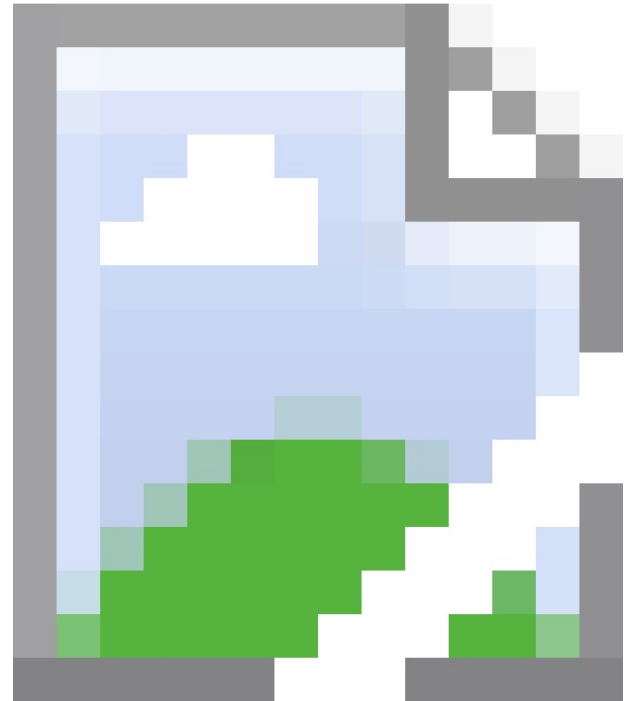**What counterarguments might Sloane make in response? How could Song reply?**

Padlet

Record your thoughts in the Padlet now.

Point your browser to this link:

[REDACTED]
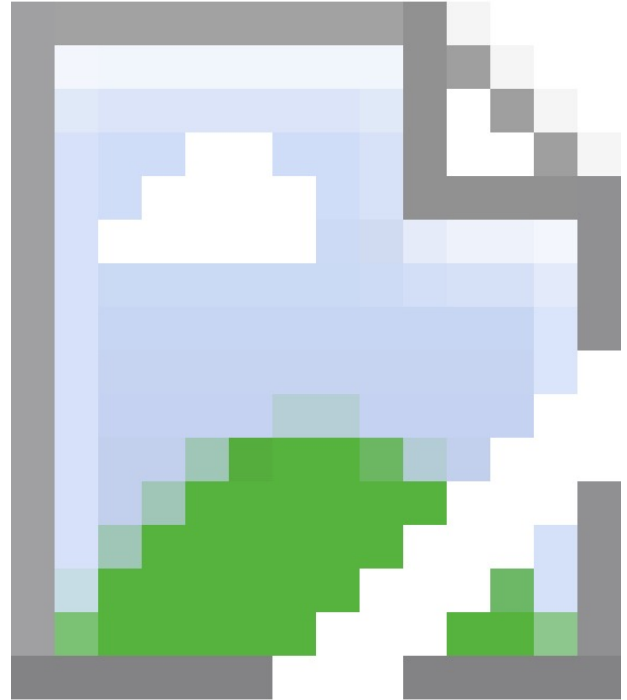
Or, scan the QR code to the right 👉

Wrapping up

In this module, we talked about:

- The origins of free software

- The freedoms of free software

- Whether the freedoms of free software come with responsibilities

- Some potential ways of fulfilling those responsibilities

Let us know how we did!

[REDACTED]

Your Assignment (option 1)

In the style of a blog post, write about 250–300 words answering the following questions:

> Should the government levy a tax on proprietary software, and distribute the funds to support free and open-source software? Why or why not?

Refer to the reading for this lecture and any other sources you find in your own research to help answer these questions.

Your Assignment (option 2)

In the style of a blog post, write about 250–300 words answering the following questions:

> Does the purpose of a piece of software (e.g. medical, accounting, software development) matter when considering whether to release it under a free or open-source license? Why or why not?

Refer to the reading for this lecture and any other sources you find in your own research to help answer these questions.