

Accessing ilab, writing, compiling, and running your first C program

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January 20, 2022

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Accessing materials

- ▶ Class canvas: <https://rutgers.instructure.com/courses/160141>
- ▶ Most of the time, materials are on the Modules page
- ▶ Long range syllabus linked from Canvas:
<https://yipenghuang.com/teaching/2022-spring/>

Recitations

- ▶ Recitations start next week, the week of 1/24.
- ▶ You can attend any or all of the recitations, independent of which specific section you are registered for.
- ▶ Review the material and get help on the programming assignments.

Importance of the programming assignments

- ▶ Programming assignments $\approx 77\%$ of course grade.
- ▶ Quizzes replace the role of exams and are overall worth $\approx 23\%$.

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Why use Linux?

Do you have Linux? Trick question...

Why use Linux?

- ▶ Stable
- ▶ Open source
- ▶ Flexible: all form factors (wearables, IoT, Raspberry Pi, Roku, Android, laptops, iLab, web hosting, warehouse-scale datacenters)
- ▶ A critical piece of infrastructure for practicing computer science

Key steps to get going

1. **Activate account:** `https://services.cs.rutgers.edu/accounts/`
2. **Familiarize yourself with CS department infrastructure:** `https://resources.cs.rutgers.edu/docs/new-users/beginners-info/`
3. Use what you are familiar with to log onto iLab remotely. Command line: Windows command line, macOS, terminal, PuTTY. Graphical: X2Go...
4. Use what you are familiar with to move files. SCP, Filezilla, Cyberduck...
5. Use what you are familiar with to edit files. Vim, Emacs, other text editors, VS Code...

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Accessing the programming assignments

1. **Canvas:** `https://rutgers.instructure.com/courses/160141/assignments/1896539`
2. **GitHub:** `https://github.com/yipenghuang0302/2022_0s_221`
3. Cloning a repository
4. `git`: version control tool; interfaces with `github.com`

Preview of the plan for programming assignments

1. PA0, 2% of course grade, ten day work time
2. PA1, 5% of course grade, one week work time
3. PA2, 14% of course grade, two week work time
4. PA3, 14% of course grade, two week work time
5. PA4, 14% of course grade, three week work time
6. PA5, 14% of course grade, two week work time
7. PA6, 14% of course grade, two week work time

Why study C?

C is fast

- ▶ C is close to the machine: directly manipulate memory
- ▶ C is compiled
- ▶ C is strongly typed

C is influential

- ▶ C is old
- ▶ C has a relatively short specification
- ▶ Influenced Java, Python, C++, and most major programming languages
- ▶ <https://www.tiobe.com/tiobe-index/>

See one, do one, teach one

To practice programming, you can...

- ▶ Read about it from a book (e.g., Modern C).
- ▶ Listen about it from someone talking about concepts (e.g., lecture slides in Supplementary Reading).
- ▶ Watch someone else program.
- ▶ Practice it.
- ▶ Explain / teach it to a friend.

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A program that prints if a number is even or odd

- ▶ Headers
- ▶ Command line arguments
- ▶ printf and format specifiers
- ▶ EXIT_SUCCESS

Including headers

- ▶ `#include <stdio.h>`
- ▶ `#include <stdlib.h>`
- ▶ `#include <stdbool.h>`

Printing to command line

The format string in `printf(char* format, args)`

- ▶ `%d`: integer
- ▶ `%ld`: long integer
- ▶ `%s`: string
- ▶ `%c`: character
- ▶ `%f`: float

Compiling and running your program

How does a program end up on your computer?

How a Makefile works

- ▶ $\$@$: target file name
- ▶ $\$<$: first prerequisite
- ▶ $\$^$: all prerequisites

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Opening a file

The mode in `FILE *fopen(const char *filename, const char *mode)`

- ▶ "r": read from the file
- ▶ "w": write, starting at the beginning of the file
- ▶ "a": write, starting at the end of the file (append)

Reading characters from a file

- ▶ `int fgetc(FILE *stream)`
- ▶ `char *fgets(char *str, int n, FILE *stream)`
- ▶ `int fscanf(FILE *stream, const char *format, ...)`