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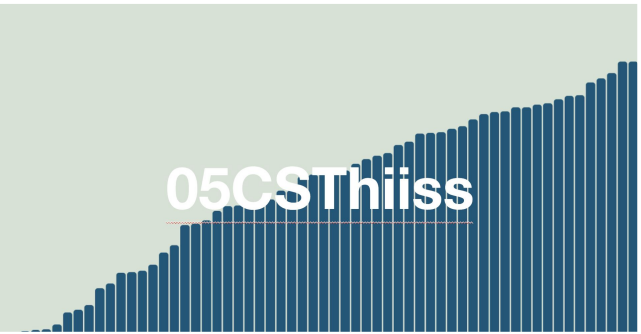
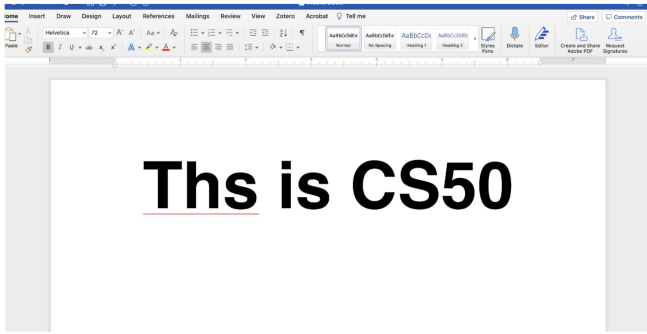
This is CS50.

This is CS50





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Mar.	26	27	28	29	30	31	1
Apr.	2	3	4	5	6	7	8
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	16	17	18	19	20	21	22
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	30	1	2	3	4	5	6
May	7	8	9	10	11	12	13

Today

	Sat	Sun	Mon	Tue	Wed	Thu	Fri
Mar.	26	27	28	29	30	31	1
Apr.	2	3	4	5	6	7	8
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	23	24	25	26	27	28	29
	30	1	2	3	4	5	6
May	7	8	9	10	11	12	13

Test 🎉

	Sat	Sun	Mon	Tue	Wed	Thu	Fri
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Apr.	2	3	4	5	6	7	8
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	23	24	25	26	27	28	29
	30	1	2	3	4	5	6
May	7	8	9	10	11	12	13

Project

	Sat	Sun	Mon	Tue	Wed	Thu	Fri
Mar.	26	27	28	29	30	31	1
Apr.	2	3	4	5	6	7	8
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	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	1	2	3	4	5	6
May	7	8	9	10	11	12	13

Status Report

	Sat	Sun	Mon	Tue	Wed	Thu	Fri
Mar.	26	27	28	29	30	31	1
Apr.	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	1	2	3	4	5	6
May	7	8	9	10	11	12	13

Project Due

What questions do you have?

EthiCS

CS50 Week 10

About me

William Cochran

Postdoctoral Fellow in Philosophy

Embedded EthiCS program @ Harvard

The Embedded EthiCS course modules teach students to...

identify ethical and social issues

reason through ethical and social issues

communicate their reasoned position

design ethically and socially responsible systems

Goals

1. Prepare you to reflect on the ethics of your final project

2. Tease out some general themes of work we've already done together thinking about ethics in CS50

Plan for Today

1. Overview of past Embedded EthiCS mini-modules in CS50

2. "Mapping the moral landscape"
   a. How is a final project in CS50 like developing a new building?

3. Value Sensitive Design
   a. Together: emoji
   b. In groups: past projects

4. Time to reflect on the ethics of your final projects

Review

previous ethiCS mini-modules

Axes

Correctness

Design

Style

Ethics

Answering the question: *should* I do this?

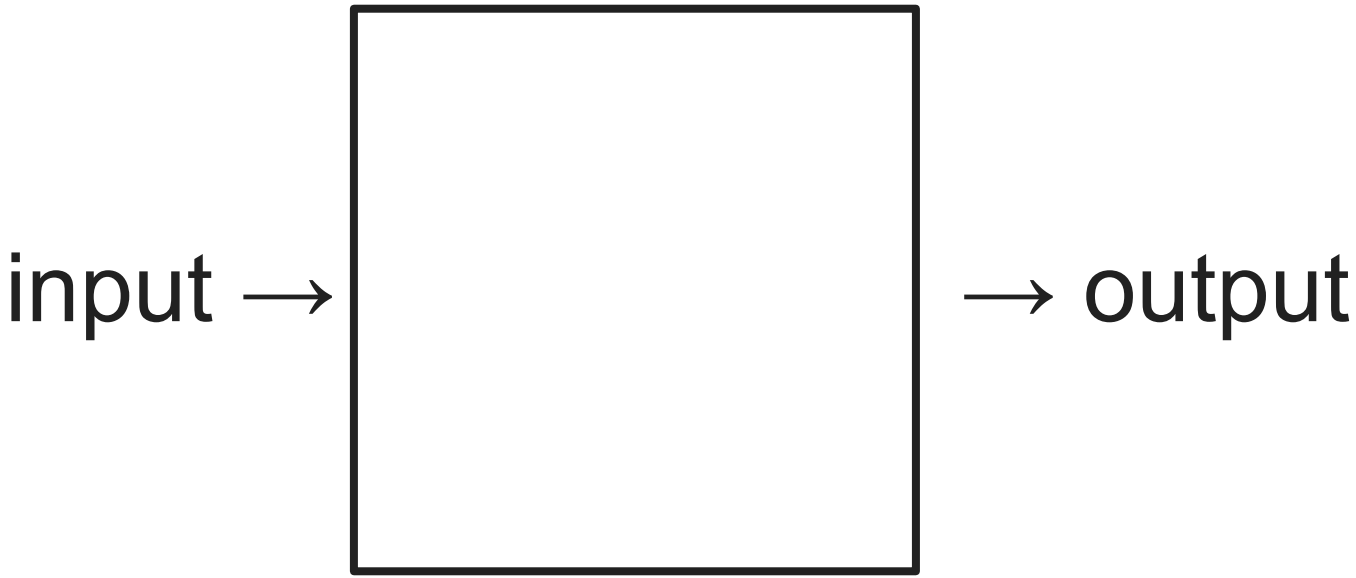
Small group activity: You're asked to implement a contacts application (as you've seen before in lecture). But now you're being asked to add a feature that recommends to users the people they call most frequently at certain times of the day.

What are some questions we could ask about our code to determine whether we should do this?

Take five minutes to talk with those at your table.

When we come back, I'll ask you to share your questions with the class.

- What are the steps involved in **compilation**?
  - What is the role of **trust** in computer science?
- When should we use **arrays**?
- What are **strings**, really?
- What's the point of **command-line arguments**?
- What makes for good **design**?


input
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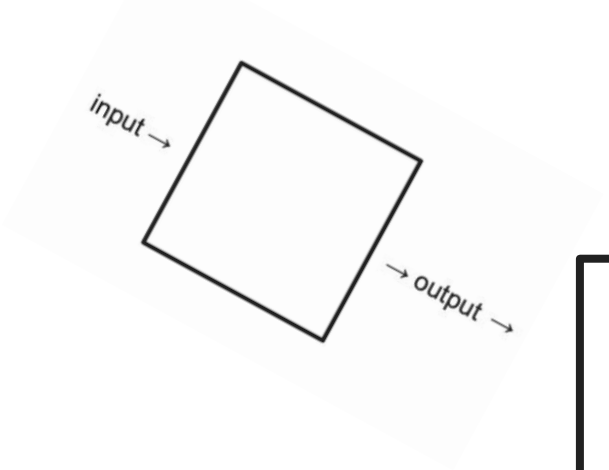
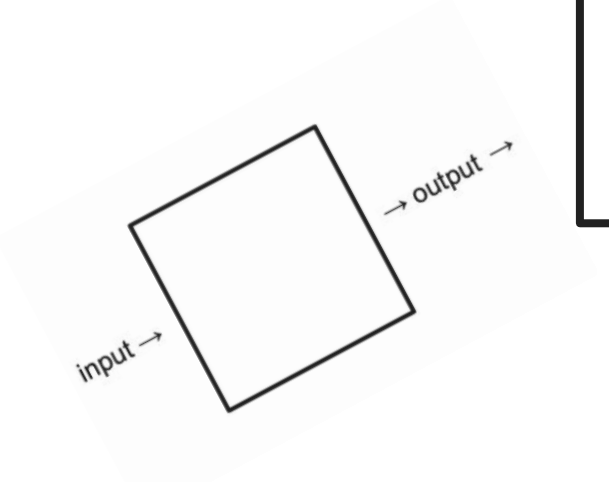


input → output



```
int main(void)
{
    print("Hello");
}
```

```
...
main:                                   #
@main
    .cfi_startproc
# BB#0:
    push    %rbp
.Ltmp0:
    .cfi_def_cfa_offset 16
.Ltmp1:
    .cfi_offset %rbp, -16
    movq    %rsp, %rbp
.Ltmp2:
    .cfi_def_cfa_register %rbp
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Week 2

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Scenario

- Imagine you work for a company that has created a personal digital assistant that runs on a mobile device’s OS.
- Customer reports lead you think that the assistant often has trouble recognizing its "wake word", especially when users have non-English accents.

- As a potential solution, your Product Manager has proposed that your team gather, store, and make available for review more representative voice data.
- Your job is to determine which data structure will be best to store voice data, and to implement a prototype of the structure to show to your team.

How does ethics factor into the trade-off?

- Just as there are technical trade-offs involved in making this choice, there are ethical trade-offs to consider as well.
- Thinking about these ethical trade-offs should factor into your decision-making process.
- Even if there is no easy answer about what to do, the most important thing is that you *recognize* there are ethical considerations at play.
- Since individual programmers are often the ones actually making these (tough and important!) decisions, it is up to you to try to choose *well*.

Database Design Principles

Ideally, when designing databases, data practitioners should strive to create databases that at least:

- Minimize redundancies [increases efficiency]
- Permit adaptability [easier to add new data]

Today: *examine how databases are sometimes used in the "real world" to see if we can generate new design principles.*

Week 7

Wrongfully Accused by an Algorithm

In what may be the first known case of its kind, a faulty facial recognition match led to a Michigan man's arrest for a crime he did not commit.

Some overarching themes

- Work in computer science is embedded within a broader social context.

  → *therefore requires thinking about its moral/social implications of your work.*

- There is often an absence of external structures that enforce accountability

  → *therefore often up to the developers themselves to make sure their work is going to be ethical.*

“with great power comes great responsibility”

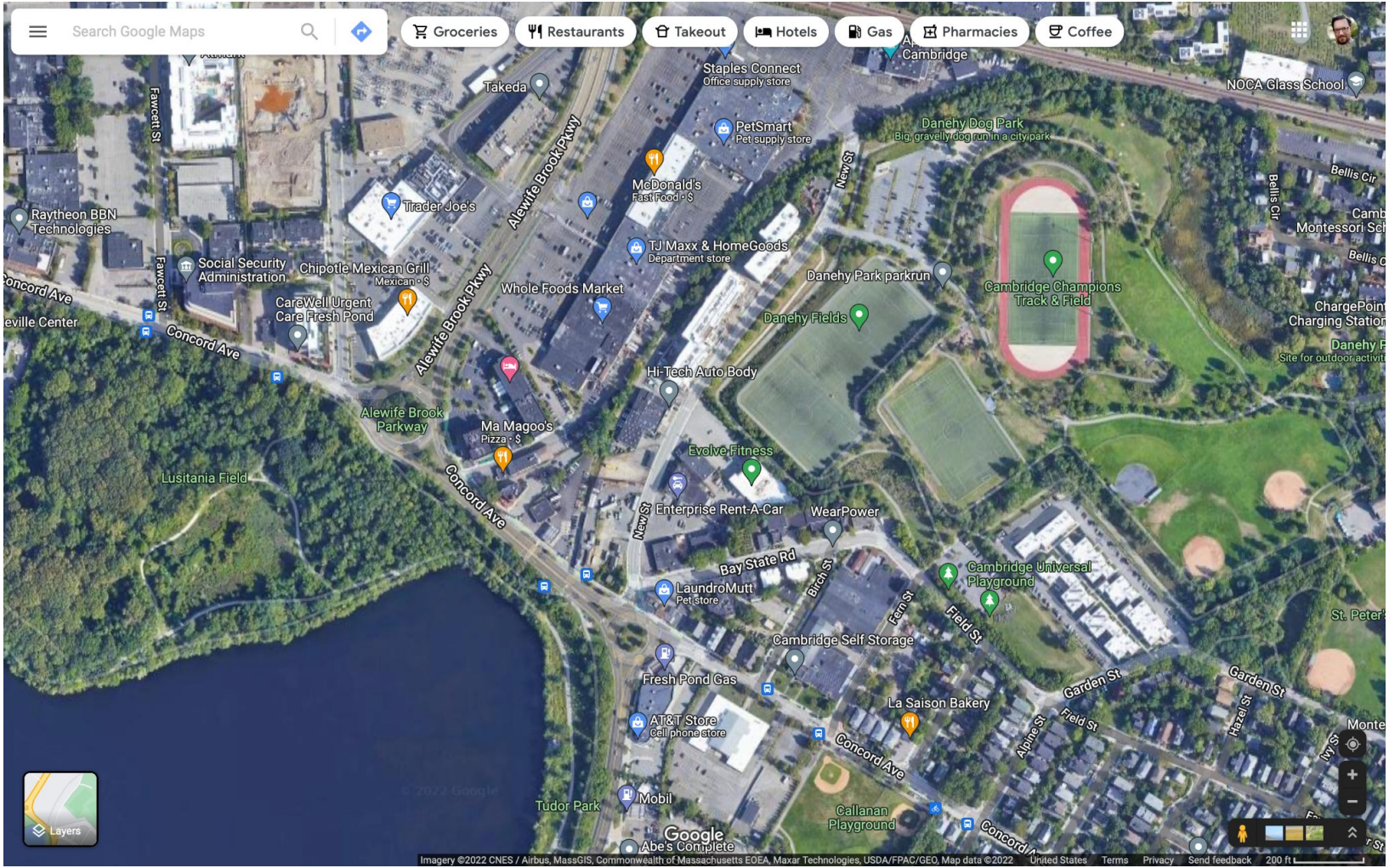
Mapping the Moral Landscape

how is a final project in CS50 like developing a new building?

- Imagine your a developer—a property developer—and you come across a hot tip: this lot's lease is coming up and the tenants don't plan to renew.

- You think: This is great. I can buy this property and develop a building here. I can make a bunch of money, and I can maybe house some people, too.

- But what else do you think the developer should consider when planning to build a new building?


Search Google Maps
Groceries
Restaurants
Takeout
Hotels
Gas
Pharmacies
Coffee
Staples Connect
Office supply store
Takeda
PetSmart
Pet supply store
Danehy Dog Park
Big, gravelly dog run in a city park
NOCA Glass School
McDonald's
Fast Food · $
Trader Joe's
Alewife Brook Pkwy
New St
Bellis Cir
Raytheon BBN Technologies
Social Security Administration
Chipotle Mexican Grill
Mexican · $
TJ Maxx & HomeGoods
Department store
Danehy Park parkrun
Cambridge Champions Track & Field
Fawcett St
Concord Ave
CareWell Urgent Care Fresh Pond
Whole Foods Market
Danehy Fields
Hi-Tech Auto Body
Alewife Brook Parkway
Ma Magoo's
Pizza · $
Evolve Fitness
Lusitania Field
Enterprise Rent-A-Car
WearPower
New St
Bay State Rd
LaundroMutt
Pet store
Birch St
Fern St
Field St
Cambridge Universal Playground
Cambridge Self Storage
Fresh Pond Gas
La Saison Bakery
Garden St
Hazel St
AT&T Store
Cell phone store
Alpine St
Concord Ave
Tudor Park
Mobil
Callanan Playground
Abe's Complete
Google
Layers
Imagery ©2022 CNES / Airbus, MassGIS, Commonwealth of Massachusetts EOEA, Maxar Technologies, USDA/FPAC/GEO, Map data ©2022
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Privacy
Send feedback
200 ft

Some takeaways

- Buildings don’t pop up in the middle of nowhere
- They’re embedded in a broader social context (a neighborhood)
- The change to the neighborhood can have impacts on the people who live there.

- The same principle applies when developing a project in CS
- Though it may not seem like it, your build is going to interact with a larger landscape.

How do you map the moral landscape?

1. Identify *who* might be affected by the technology and, in particular, what they care about.

2. Think through *how* the technology might impact these people, especially as it scales up.

Exercising your

moral imagination

and your capacity

for empathy

Value Sensitive Design

shaping technology with moral imagination

Value Sensitive Design

“Ultimately, value sensitive design asks that the technical, civil, and other communities broaden the goals and criteria for judging the quality of technological systems to include those that advance human flourishing” (p.4)

- Theory and methods for integrating ethical values into the design process.

- Provides techniques to consider a broad range of stakeholders, values, and impacts.

Stakeholders

Direct stakeholders: people directly impacted by the technology. Some examples:

- People who use the technology
- People on whom the technology is used

Indirect stakeholders: people who are impacted by the technology, but don't interact with it directly. Some examples:

- Family members of users
- People who can't access the technology

Note: Developers of the technology can also be direct or indirect stakeholders.

When identifying stakeholders, try to be specific (e.g. "women who use the platform" rather than "users").

Values

What do different stakeholders value?

What do they want or need? What do they think is important?

Some examples of *ethical* values:

- Justice (fair treatment in society)
- Privacy (the ability to control information about oneself)
- Security (freedom from danger)
- Autonomy (the ability to decide what you do and what happens to you)
- Community (sense of belonging to a group)
- Flourishing (happiness and fulfillment in life)
- Health (access to food, water, shelter, etc.)

Scale

Time:

What might be the immediate and short-term impacts of this technology?

What about the long-term impacts (i.e., multiple years after launch)?

Pervasiveness:

What are the impacts of the technology when only a small group of people are affected?

Do these effects change as the technology becomes more widely adopted? How?

Further Questions for Reflection

Should the design be changed? Should it be pursued at all?

How does the impact on stakeholders change as the project scales up? (For example, how could one of your project's features be misused?)

Does the project remain aligned with stakeholder values as it scales up? (For example, are there any types of users who might have difficulty using your project?)

How could potential problems with scale be mitigated?

What tradeoffs between ethical values and other values might arise?

Can you think of any ethical design principles that should have been adhered to?

emoji

Your turn

Project 1 - https://tinyurl.com/CS50project1

Project 2 - https://tinyurl.com/CS50project2

Instructions

- Go to a station with your table group; watch your assigned project (either 1 or 2)
- Fill in the boxes identifying direct and indirect stakeholders for your group using one color maker
- Identify values of these stakeholders using another color
- Fill in the boxes about scale (time and pervasiveness)
- Answer at least 1 question for reflection (make sure to identify which question(s) you're answering)

- Next, your group will move to the station beside you and work on the other project.
- Watch the video
- Examine the previous group's work, and add anything you think should be included (ideally, use a different color marker than the two already used at this station)

Survey

https://tinyurl.com/CS50week10