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# CSE 331

## Software Design & Implementation

Topic: Ethics + Accessibility (half lecture)

 **Discussion:** What are your big takeaways from this course?

# Reminders

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- Will not accept *any* work after Aug. 19 (Friday) at 11pm
- Please fill out course evals ASAP
  - Very valuable to me as a new instructor!

# Upcoming Deadlines

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- HW9 due Thursday (8/17)

## Last Time...

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- End-of-quarter timeline
  - Lectures
  - Final Grades
- Some Systems Stuff

## Today's Agenda

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- Short discussion

# Lecture Timeline

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Last few lectures will be content-sparse. Will have lots of work time during class.

- Today's lecture is about the high-level ideas needed to build **massive** systems
- Next lecture will include information on **ethics in CS** and a **class discussion** on related topics
- Friday's lecture will start with **student demos** and end with a **course wrap-up**

# Grading Timeline

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- All work needs to be submitted to us by **Friday** at 11pm
- Course staff will finish grading HW9 and regrades by **Sunday evening**
- Grades will be posted on Canvas on late **Sunday night**
  - You should check that these are consistent with what you expected!
- Soham will calculate final GPA based on these grades on **Monday**
  - This is when I will account for extra credit and special circumstances
- Grades due to the university on **Tuesday at noon**

# What's *still* missing

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CSE 331 is about *how* to design and implement software

It's not about the important topic of *what* to build and *for whom*

- Even *before* the well-understood steps like *requirements analysis* (CSE 403 topic)

This is about our effect on *humans* and *societies*

- Implicit decisions you don't notice you're making are still decisions
- Good decision-making benefits from explicit understanding of ethics, values, differences among people/peoples, ...
- [Leaders of our field (e.g., faculty 😊) care a lot about this, but aren't always good at showing it 😞]
- See also: CSE 492E

# The big stuff you hear about

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- Black-box algorithm to assign length of prison sentences??
- Facial recognition technology for job screening??
- Bugs in self-driving cars
- Cameras that only see light-skinned people
- ...

*But it is **not** just the news items – software, like an engineered system – is full of value judgements*

# Is software inherently amoral?

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- Dijkstra's algorithm can help the elderly complete errands or a thief complete robberies
- Encryption can shield "good" people" or "bad" people
- Surveillance technology can prevent human trafficking or find political enemies
- ...



# Is this *your* problem?

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- Old [?] view: We're trained to be engineers – others have to decide proper use
  - Ethicists, politicians, doctors, ...
  - Provocative quotation: *“My job is to make sure the missiles go up; somebody else decides where they come down”*
- But our understanding of the technology is unique – we have an essential role to play in the conversation
  - Which requires understanding not just the technology, but the people it affects and the tradeoffs
  - Can you communicate your technical choices to decision-makers?
  - Can others communicate their needs to you?

# A familiar example

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- Consider a simple graphical web app for giving walking directions on the UW campus
  - You know, just hypothetically 😊
- What assumptions that favor some people/peoples over others in your application?
  - Did you notice as you were doing your assignment?
  - What could/should/would you do about it?
- If you're stuck: *When might someone not prefer the shortest path and why?*

# Some of your instructor's answers

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1. Directions may include steps, which excludes people in wheelchairs
2. Directions do not favor well-lit paths, which is important for safety after dark, particularly for statistically-targeted groups (e.g. women or minorities)
3. Your website is not usable by blind users even though the underlying data is text-based
4. Any instructions only in English?
5. Other?

# Fixable?

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- Some of these issues are unfixable given the underlying data
  - Key idea behind the phrase “*data is biased*”
  - What you don’t collect is full of value judgments/assumptions!
- Others are fixable but should we *require* that?
  - The assignment was already difficult
  - There are features and tools for accessible websites
    - See also: CSE340
  - Regulation is an important check on economic incentive but can impede innovation
    - Cell phones didn’t used to support 911

# Be explicit about inclusion

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- If you don't spend the time to think about who your software includes, you will exclude more people
  - Diverse teams have an inherent advantage here!
- Embarrassing [?] fact: CSE 331 had “GUI for walking directions on the UW campus” for *ten years* before someone noticed that the course should include this short lecture
  - Ask your managers in your future projects
  - Ask your instructors in your future courses
  - Most importantly, ask yourself
- You're going to have a lot of impact on the world
  - Make it positive

```
public class Person {  
  
    public String first;  
    public String last;  
  
    public Person(String a, String b) {  
        if (first.length() <= 3 || last.length() <= 3) {  
            throw new Exception("Please provide your full name");  
        }  
        first = a;  
        last = b;  
    }  
  
    public String getFirst() { return first; }  
    public String getLast() { return last; }  
}
```

```
public class Person {  
  
    public char[] first;  
    public char[] last;  
  
    public Person(String a, String b) {  
        if (first.length() <= 3 || last.length() <= 3) {  
            throw new Exception("Please provide your full name");  
        }  
        first = a.toCharArray();  
        last = b.toCharArray();  
    }  
  
    public String getFirst() { return new String(first); }  
    public String getLast() { return new String(last); }  
}
```

# Before next class...

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1. Work on [HW9](#)
  - Let me know if you want to demo extra credit
    - Can be small things like a slightly different layout
    - Can be big things like adding a whole new feature
2. Wrap-up any regrades for [HW1-8](#)
  - Won't accept late work after the last day of class
3. Please fill out [course evaluations](#) before they close on Friday!