The Cloud and Web Tech

Will Leeson

The Cloud

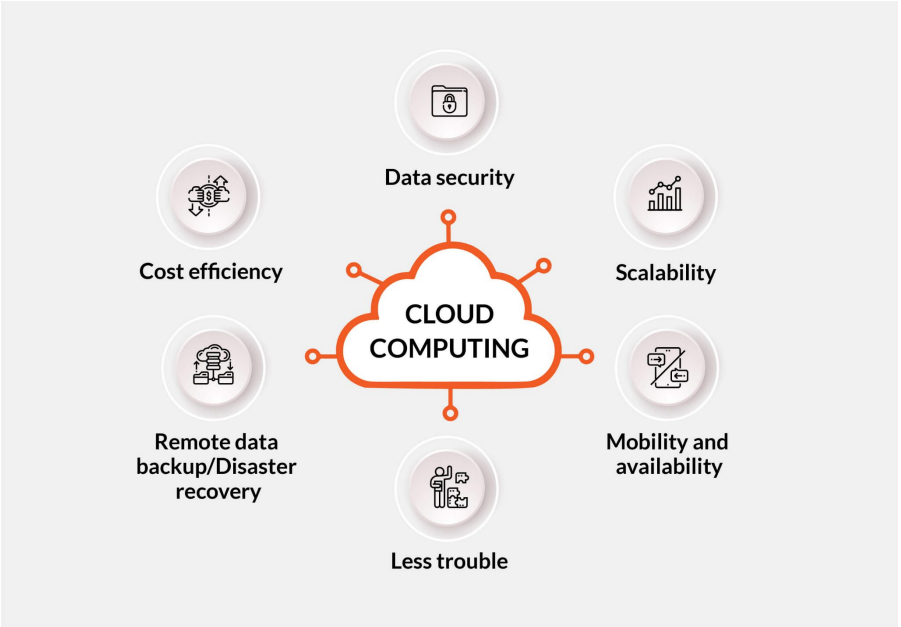
Cloud Computing

Definition - Cloud Computing

The on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user.

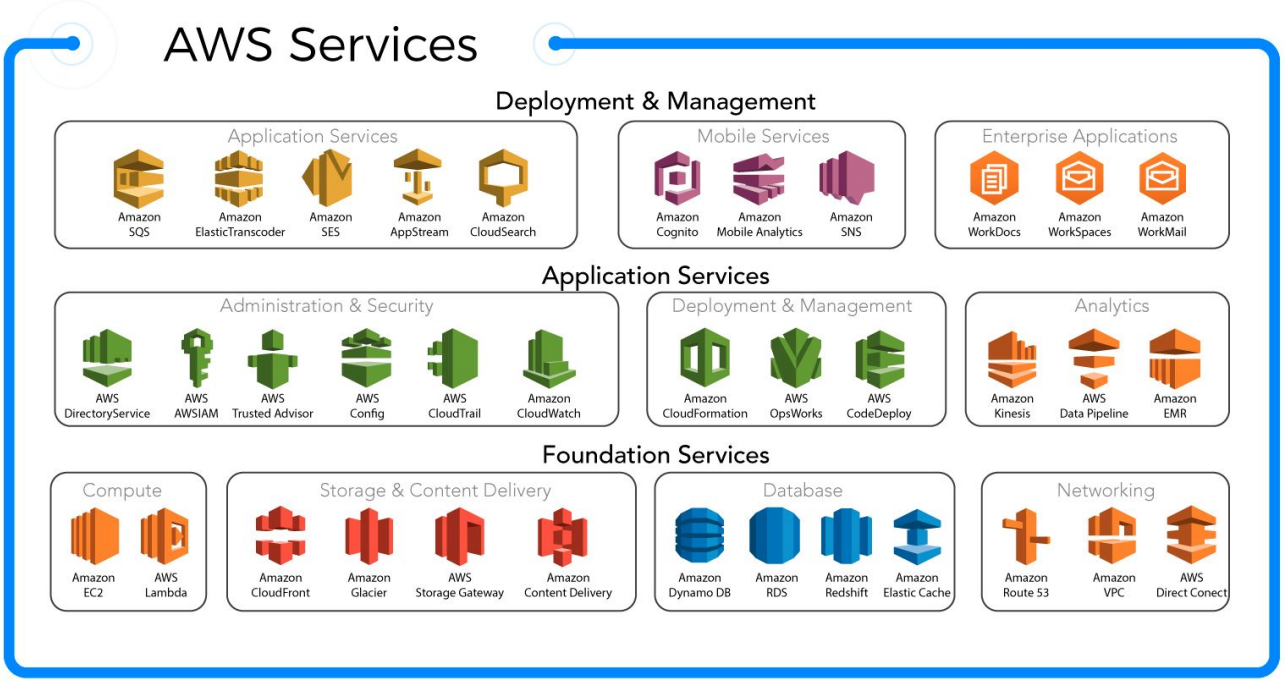
Why cloud computing?

- Allows you to focus on what's important
  - No infrastructure
  - No maintenance
  - No upgrades
- On demand access
- Leave it to the experts



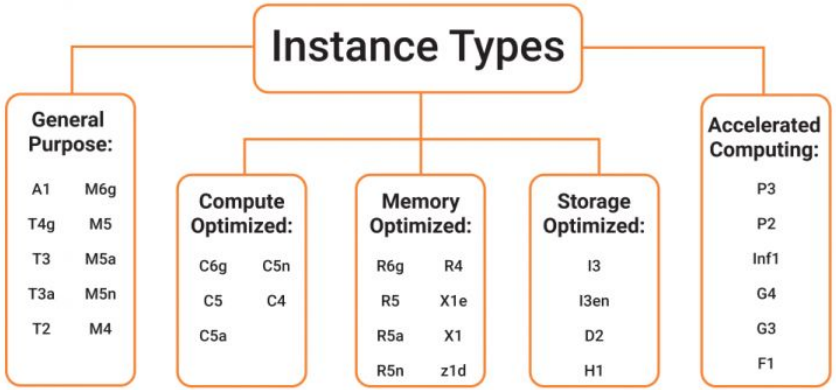
THE CLOUD
aws
imgflip.com

What can you do with the cloud?



Cloud Computing

- Product: Renting a computer's time
- Range in power
  - 1 Core CPU, 0.5GB RAM
  - 192 Core CPU, 768GB RAM
  - Select according to needs
- Different levels of control
  - One extreme - essentially a fresh computer
  - Other extreme - a specialized application



Infrastructure as a Service (IaaS)

- Most basic form of cloud computing
- Most control for user
- Essentially logging into another machine
  - Can install software
  - Run programs
  - Etc.
- Cloud takes care of
  - Servers
  - Storage
  - Networking

EC2

Google Compute Engine

Platform as a Service (PaaS)

- Cloud provides a setup “environment”
- Trade-off
  - Less control of what tools you have access to
  - Less set up for you
- Cloud takes care of
  - IaaS setup
  - Environment
- Requires knowing what you need beforehand

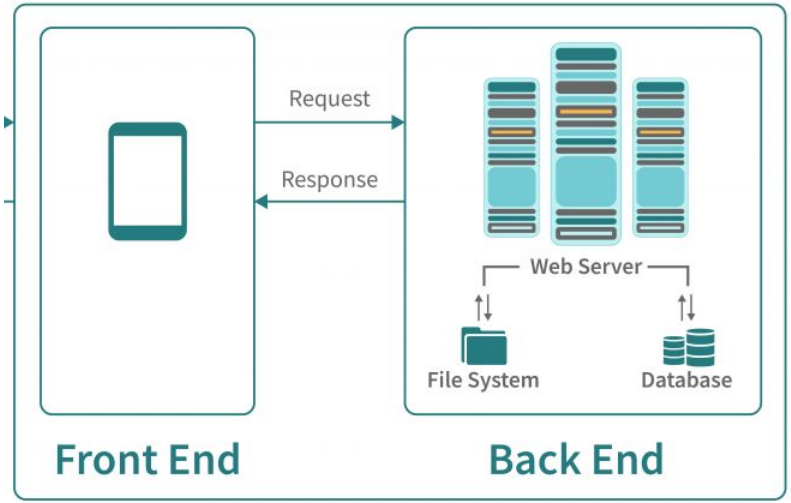
Software as a Service (SaaS)

- Least flexible
- Cloud provides a service
  - Email
  - Google Docs
  - Storage
- Only does that service
- Cloud takes care of
  - PaaS setup
  - Portal to software

Web Technologies

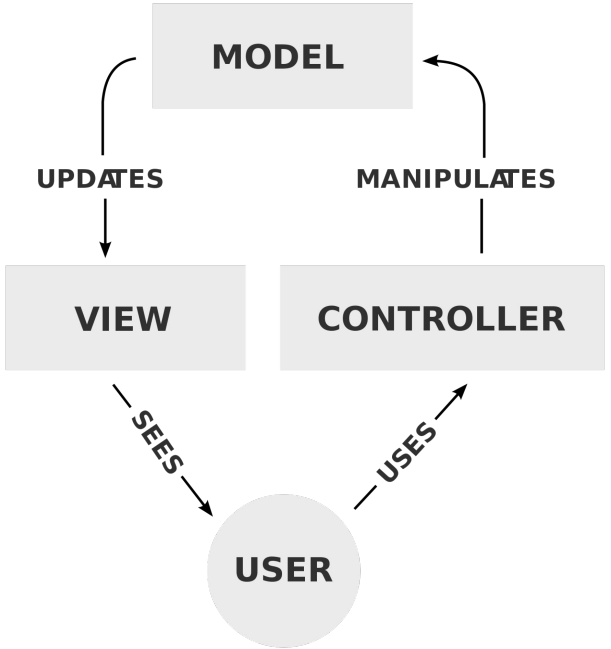
Website Architecture

- Frontend
  - What the user interacts with
  - In charge of display information
- Backend
  - Informs the front end
  - Takes place on the server side
- Interplay between the two
  - Frontend receives input from user
  - Backend performs computation
  - Backend send information to frontend
  - Frontend changes display accordingly



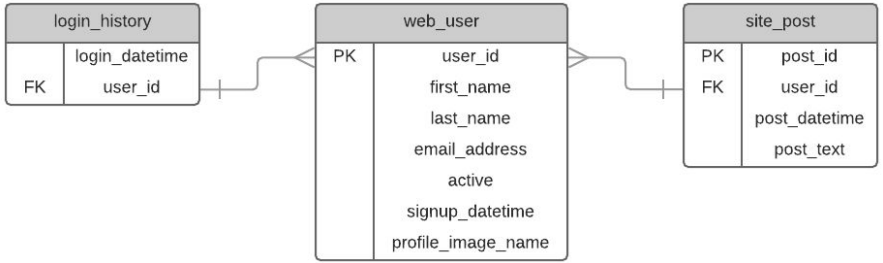
Model - View - Controller (MVC)

- Pattern for GUIs
- Popular Web Design pattern
- Separates programmatic view (Model) from User view
- Implemented by many web frameworks



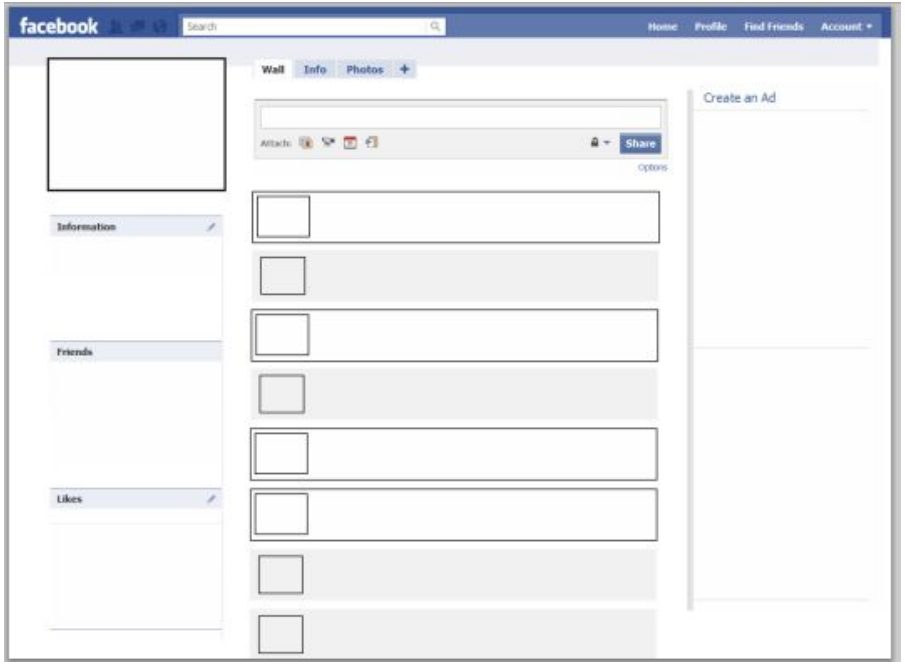
Model

- What is “behind the scenes”
- Controls:
  - How data is stored
  - How data is used
  - What is sent to the user
  - How the site evolves
- Controlled by the backend
- Ex. Facebook
  - Stores your information
  - Determines what posts you see
  - Determines posts order



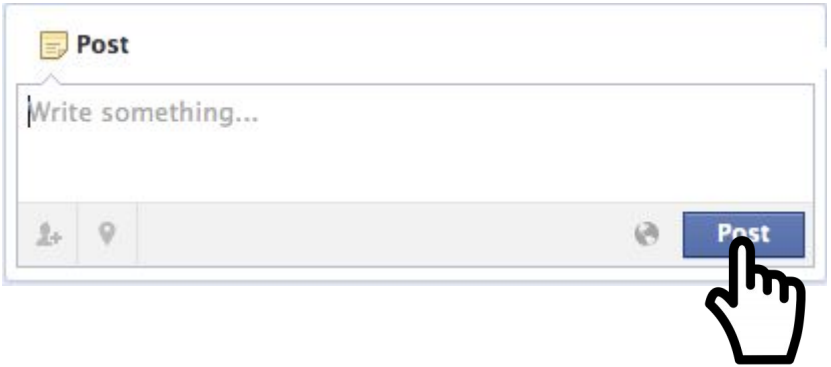
View

- What the user sees
- Controls:
  - How things are visualized
  - Accepting input (sometimes)
- Controlled by the frontend
- Ex. Facebook
  - How your wall looks
  - How posts are presented to you



Controller

- The bridge between Model and View
- Controls:
  - Accepting input (typically)
  - Passing input to Model
- Frontend and Backend handle
- Ex. Facebook:
  - Liking pages
  - Making posts



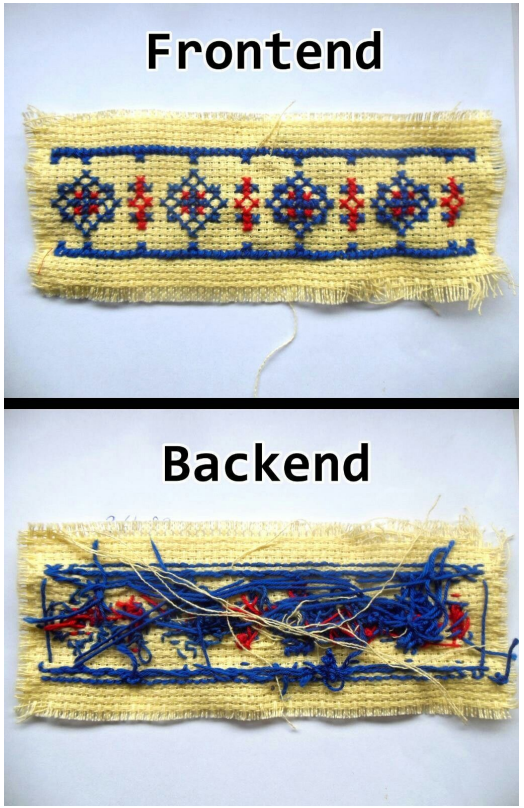
Activity: MVC Examples

MVC Example

- Group up
- Choose a website or app
- Discuss
  - What is in the model?
  - How does the view evolve?
  - What must the controller handle?

Frontend

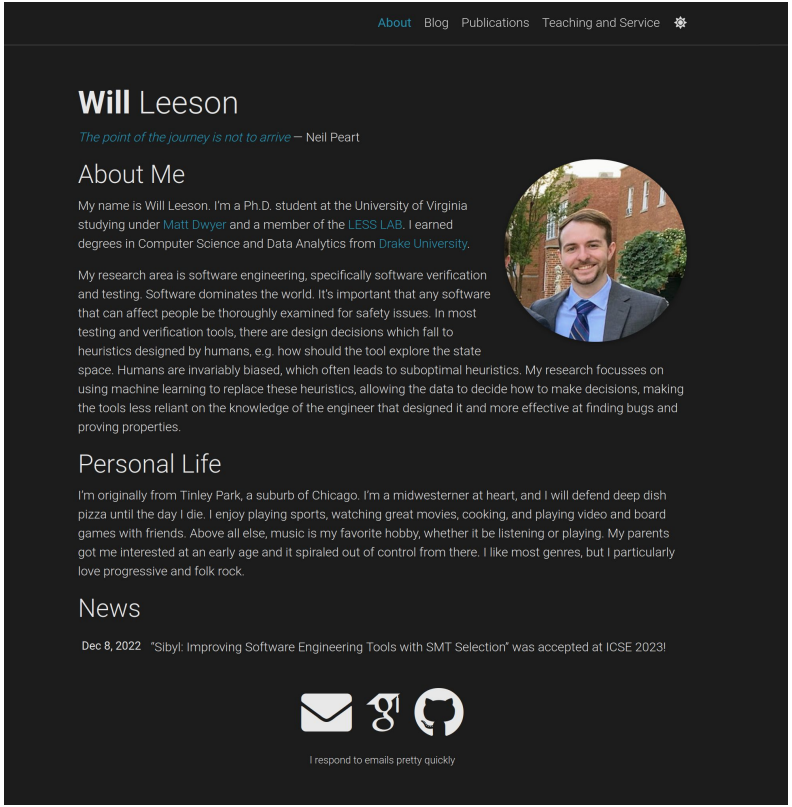
- HTML - What's being shown
- CSS - How its being shown
- Javascript - How it changes
- Writing HTML and CSS from scratch is tedious
  - Lots of trial and error
  - Requires lots of code to get complex ideas
- My suggestion: use a framework



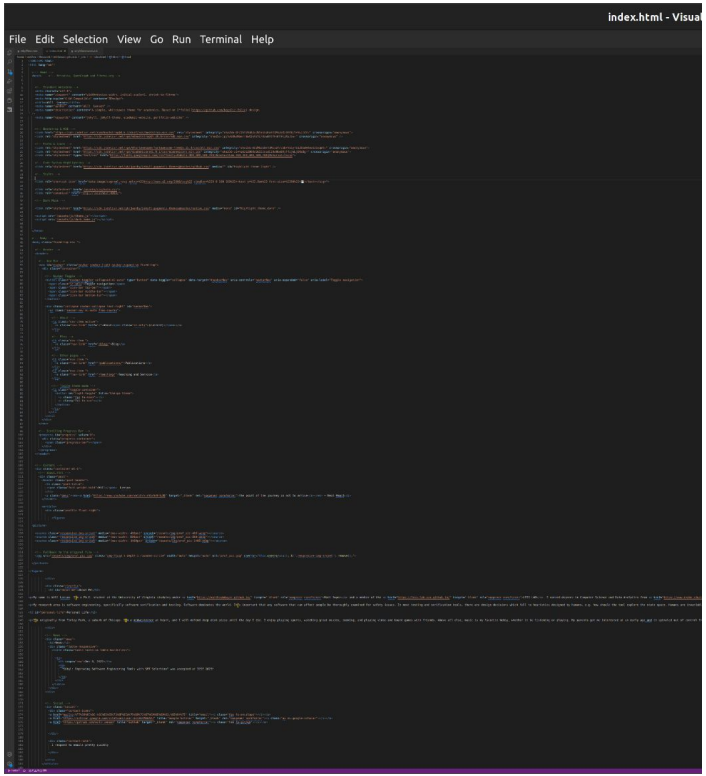
Site Generators

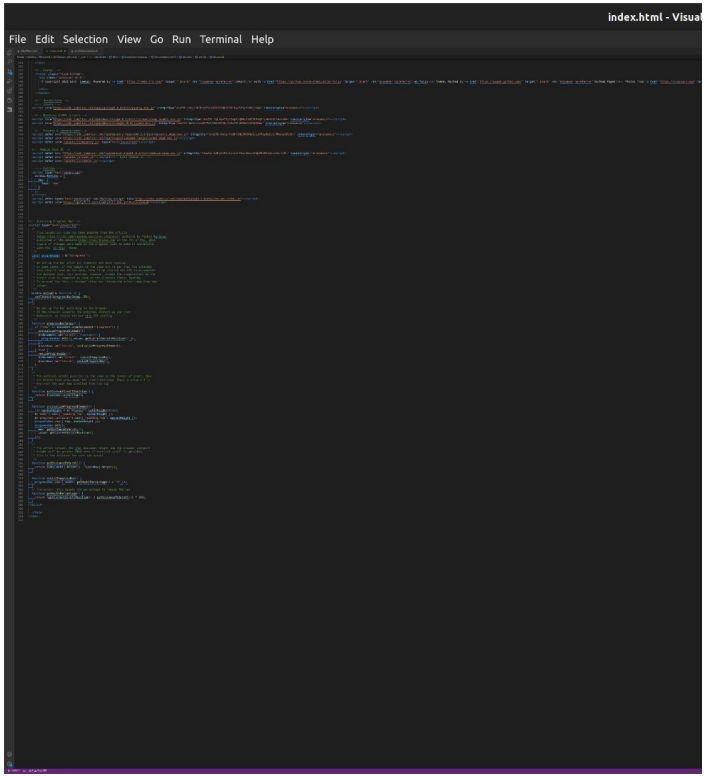
- Static Site Generators
  - Select a theme
  - Write text or image locations where needed
  - Generates a site following the theme
  - Simple Personal Website
- Content Management Systems
  - Select theme
  - Select Plugins
  - Add text and other information
  - Generates (potentially dynamic) Website

My Website

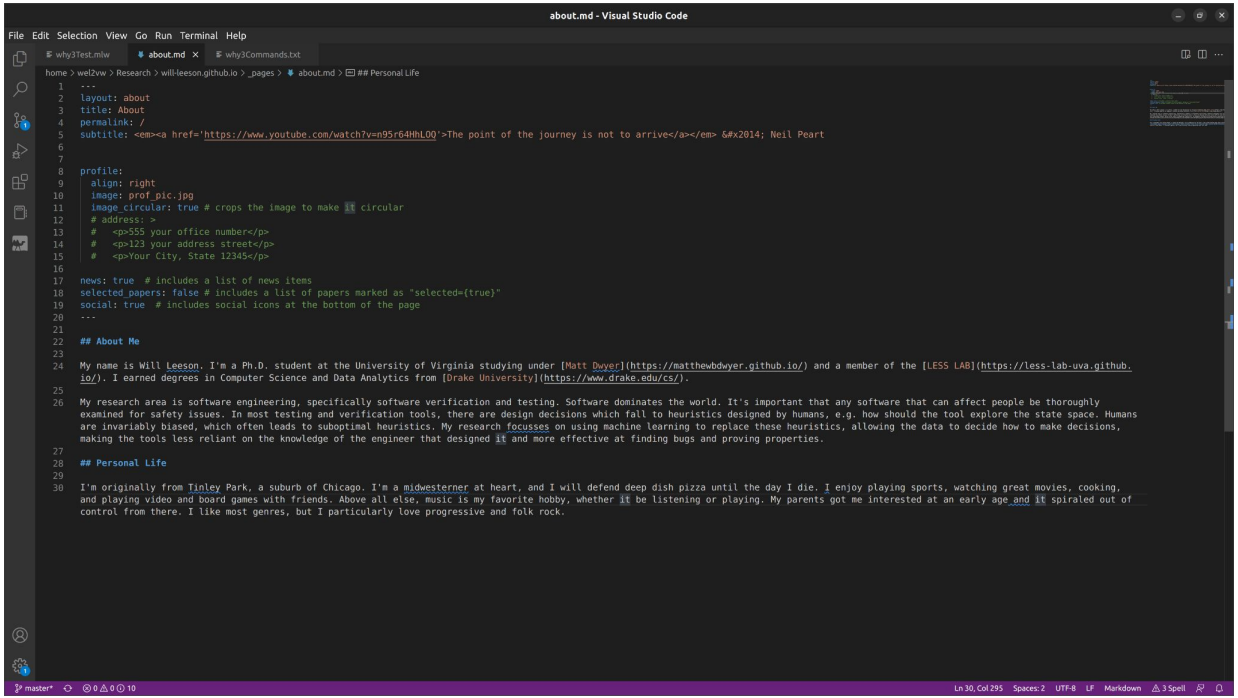

About Blog Publications Teaching and Service
Will Leeson
The point of the journey is not to arrive — Neil Peart
About Me
My name is Will Leeson. I'm a Ph.D. student at the University of Virginia studying under Matt Dwyer and a member of the LESS LAB. I earned degrees in Computer Science and Data Analytics from Drake University.
My research area is software engineering, specifically software verification and testing. Software dominates the world. It's important that any software that can affect people be thoroughly examined for safety issues. In most testing and verification tools, there are design decisions which fall to heuristics designed by humans, e.g. how should the tool explore the state space. Humans are invariably biased, which often leads to suboptimal heuristics. My research focusses on using machine learning to replace these heuristics, allowing the data to decide how to make decisions, making the tools less reliant on the knowledge of the engineer that designed it and more effective at finding bugs and proving properties.
Personal Life
I'm originally from Tinley Park, a suburb of Chicago. I'm a midwesterner at heart, and I will defend deep dish pizza until the day I die. I enjoy playing sports, watching great movies, cooking, and playing video and board games with friends. Above all else, music is my favorite hobby, whether it be listening or playing. My parents got me interested at an early age and it spiraled out of control from there. I like most genres, but I particularly love progressive and folk rock.
News
Dec 8, 2022 "Sibyl: Improving Software Engineering Tools with SMT Selection" was accepted at ICSE 2023!
I respond to emails pretty quickly

My Website - Raw HTML





My Website - What I wrote




```
github_username: will-leeson
gitlab_username: # your GitLab user name
twitter_username: # your Twitter handle
linkedin_username: # your LinkedIn user name
scholar_userid: GI1kkKMAAAAJ
semanticscholar_id: # your Semantic Scholar ID
whatsapp_number: # your WhatsApp number (full ph
orcid_id: # your ORCID ID
medium_username: # your Medium username
quora_username: # your Quora username
publons_id: # your ID on Publons
research_gate_profile: # your profile on Researc
blogger_url: # your blogger URL
work_url: # work page URL
keybase_username: # your keybase user name
wikidata_id: # your wikidata id
dblp_url: # your DBLP profile url
stackoverflow_id: # your stackoverflow id
kaggle_id: # your kaggle id
lastfm_id: # your lastfm id
spotify_id: # your spotify id
pinterest_id: # your pinterest id
unsplash_id: # your unsplash id
instagram_id: # your instagram id
facebook_id: # your facebook id
discord_id: # your discord id (18-digit unique n
```

```
title: blank # the website title (if bl
first_name: Will
middle_name:
last_name: Leeson
email: will-leeson@virginia.edu
description: > # the ">" symbol means t
  A simple, whitespace theme for academ
footer_text: >
  Powered by <a href="https://jekyllrb.
  Hosted by <a href="https://pages.gith
  Photos from <a href="https://unsplash
keywords: jekyll, jekyll-theme, academi

lang: en # the language of your site (f
icon: 💾  # the emoji used as the favic

url: https://will-leeson.github.io # th
baseurl: # the subpath of your site, e.
last_updated: false # set to true if yo
impressum_path:  # set to path to inclu
```

CSS Frameworks

- Design your site using building blocks
- Framework defines a grid
  - Place various items in the grid
  - Tables, buttons, etc.
- Pros:
  - Modern looking features
  - Far less code
  - Can make your own building blocks
  - Can deviate from the framework
- Cons:
  - Grid can be finicky
  - Requires knowledge of HTML and CSS

Bootstrap

BULMA

Foundation

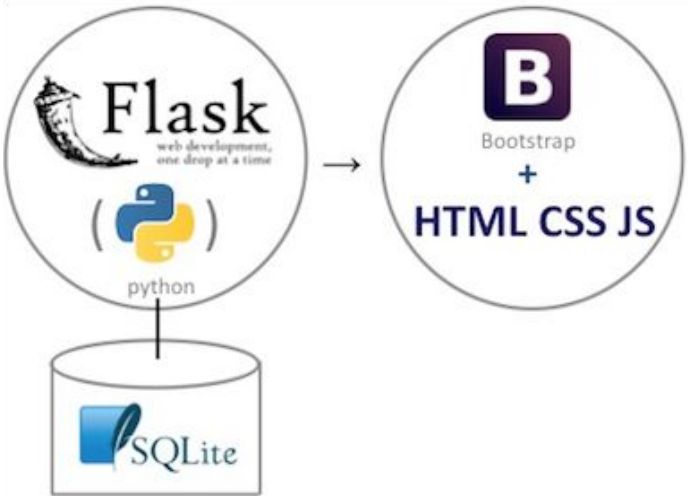
Start here, build everywhere.

Backend

- Many language options
  - Python, PHP, Ruby, Java, etc.
  - Really depends on your preference
- Many framework options
  - Python - Flask, Django
  - PHP - Laravel
  - Ruby - Ruby on Rails
  - Databases - MySQL, MongoDB

Web Development

- Front End Developers
  - Specialize in markup and web languages
  - Handle browser support, accessibility, look and feel of website
- Back End Developers
  - Specialize in programing and scripting languages
  - Handle database, security, and scalability
- Full stack Developers
  - Do both frontend and backend



Build your own website!

- It can be free!
  - Github will host static sites for free
  - https://pages.github.com/
- It can be fun!
  - Problem solving
  - Show off to your friends
- It can be easy!
  - Choose a theme: https://github.com/topics/jekyll-theme
  - Follow tutorials: https://docs.github.com/en/pages/setting-up-a-github-pages-site-with-jekyll