

Requirements Gathering and Architecture

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ML Systems Gone Wrong

Racial bias found in widely used health care algorithm



An estimated 200 million people are affected each year by similar tools that are used in hospital networks

Nov. 6, 2019, 11:38 AM PST / Updated Nov. 7, 2019, 8:07 AM

By Quinn Gawronski

Why everyone is mad about New York's AI hiring law

The law is a first step in regulating AI, but critics aren't happy

By Tate Ryan-Mosley

MIT
Technology
Review

July 10, 2023

KHARI JOHNSON

BUSINESS MAR 7, 2022 7:00 AM

WIRED

How Wrongful Arrests Based on AI Derailed 3 Men's Lives

Robert Williams, Michael Oliver, and Nijeer Parks were misidentified by facial recognition software. The impact cast a long shadow.

Cruise says it's not at fault for woman injured in San Francisco crash

By Zak Sos , Allie Rasmus and Andre Torrez | **Updated** October 3, 2023 8:10am PDT | San Francisco | KTVU FOX 2 | [↗](#)

BUSINESS

California allows robo-taxis to expand and emergency responders aren't happy

AUGUST 10, 2023 · 4:44 PM ET



Dara Kerr

NEWS | BAY AREA & STATE

Waymo driverless car set on fire, destroyed by San Francisco crowd

By **Katie Dowd**

Feb 11, 2024



Who do you get requirements from?

- *All stakeholders:*
 - Customers
 - Project owners/leadership
 - Operations teams
 - Regulators
 - Affected
- Project owners will change their minds often, and will be vague
- Don't forget safety, responsibility, ethics (hopefully some of this comes from regulators)

What requirements should we collect?

- Goals of the project
 - Measurable metrics for each goal
- Data sources
- Potential risks: this list is huge
 - Risk mitigation strategies
- Outline of architectural components
 - This may be flexible, depending on what's available to you

What if we were asked to build a Smart Transportation System?

- The SFMTA wants to implement a smart transportation management system to optimize traffic flow, reduce congestion, and lower emissions. Using data from traffic cameras, vehicle sensors, public transit GPS, mobile apps, weather services, and scheduled events, the system would predict traffic patterns and adjust traffic light timings, suggest route alternatives, and manage MUNI schedules. The system should be able to adjust to unexpected events, such as collisions, and ensure equitable service across neighborhoods. It should be live 24/7 and demonstrate measurable improvements in commute times and air quality.



What if we were asked to build a Smart Transportation System?

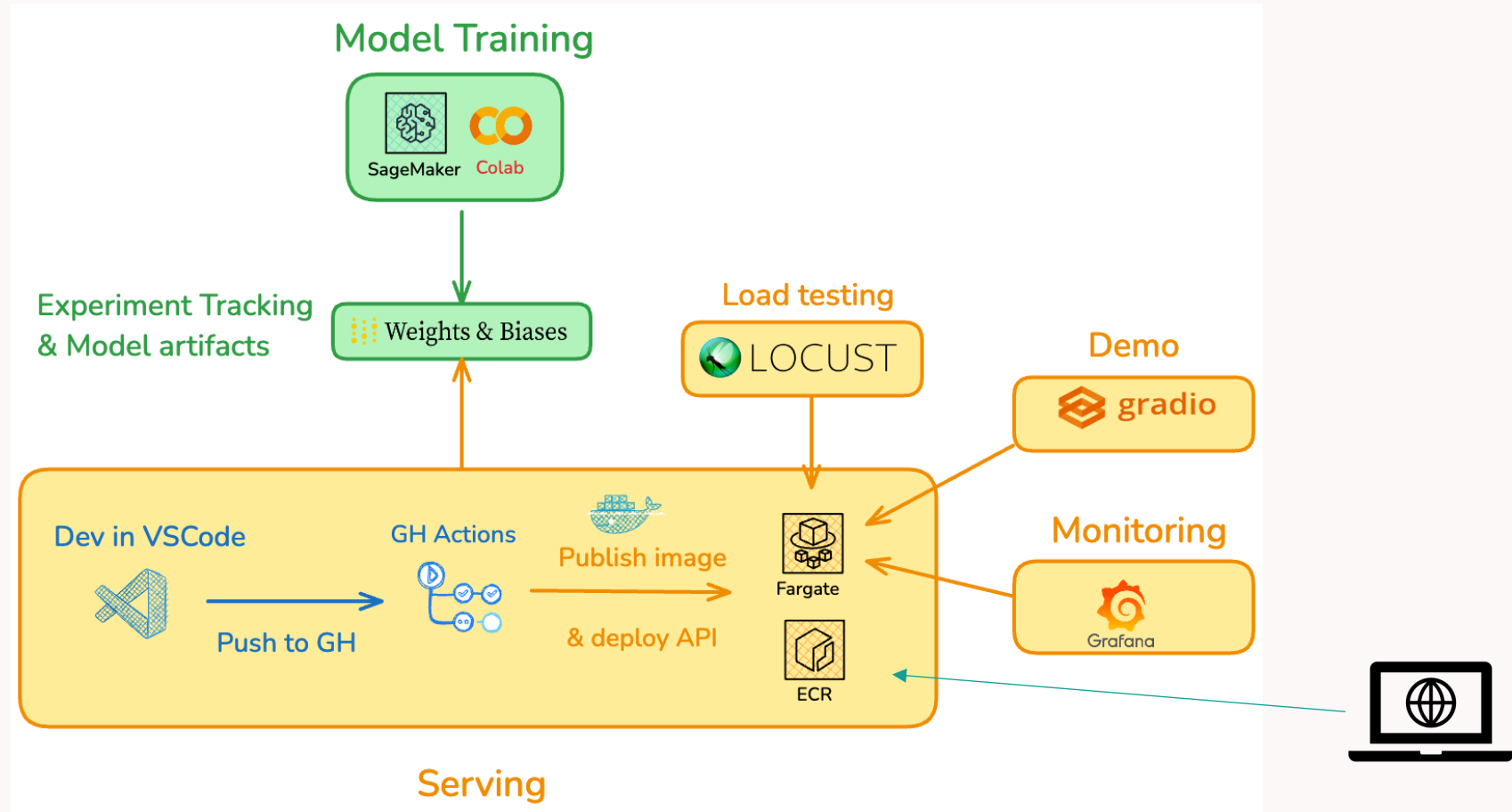
- Let's focus on just scheduling the lights on ***one street*** according to live traffic from traffic cameras and sensors. In Slack:
List two low-level goals? And what metrics can we use to measure our goals?



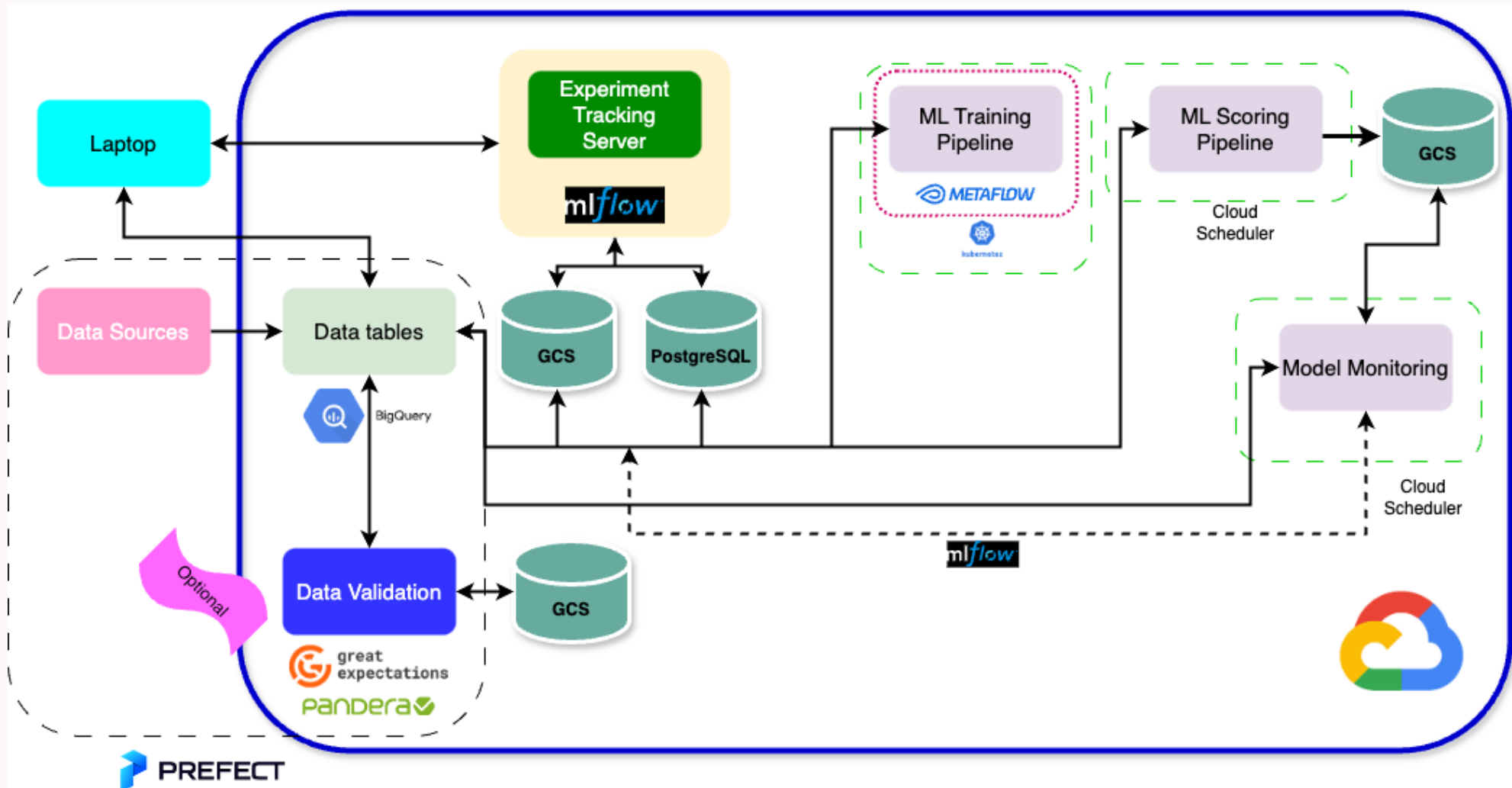
ML System Architecture

Let's first zoom in on the MLOps
architecture

What pieces is the system made of?



What pieces is the system made of?



Environments



DEV

Environments

STAGE



The diagram consists of a large, light pink rectangular area. A vertical dark purple line runs from the top to the bottom of this area, positioned approximately one-fifth of the way from the left edge. The word "STAGE" is written in bold, dark purple, uppercase letters above the line, near the top right corner of the pink area.

Environments



PROD

Now let's zoom out and
consider the entire system

What if we were asked to build a Smart Transportation System?

- Let's focus on just scheduling the lights on ***one street*** according to ***estimated*** (not live) traffic from traffic cameras and sensors.



How about these other use cases?

This is next word prediction

More considerations:

- Cost
- Privacy
- Fairness
- Accuracy
- Model size
- Explainability
- Feedback loop

How about these other use cases?



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How about these other use cases?

The screenshot shows a Google search interface. The search bar contains the text "How much energy is used by AI". Below the search bar, the "All" tab is selected. The search results include an "AI Overview" section with a blue star icon. The overview text states that AI, particularly generative models, consumes a significant amount of energy, with training a model like GPT-3 estimated to use nearly 1,300 megawatt-hours (MWh) of electricity, equivalent to the annual power consumption of 130 U.S. homes. Below this, a section titled "Here's a more detailed breakdown of AI's energy usage:" includes a "Training Energy:" subsection. This subsection lists that training a large language model like GPT-3 is estimated to consume nearly 1,300 MWh of electricity, and that this is roughly equivalent to the annual power consumption of 130 U.S. homes. A "Show more" button with a downward arrow is located at the bottom of the overview section. To the right of the overview, there are two search snippets. The first snippet is titled "How much energy will AI really consume? The good, the bad and ..." and is dated Mar 5, 2025. The second snippet is titled "How much electricity do AI generators consume? - The Verge" and is dated Feb 16, 2024.

Google

How much energy is used by AI

All Images News Videos Short videos Shopping Web : More Tools

◆ AI Overview [Learn more](#)

AI, particularly generative models, consume a significant amount of energy, with training a model like GPT-3 estimated to use **nearly 1,300 megawatt-hours (MWh) of electricity**, equivalent to the annual power consumption of 130 U.S. homes.

Here's a more detailed breakdown of AI's energy usage:

Training Energy:

- Training a large language model like GPT-3 is estimated to consume nearly 1,300 MWh of electricity.
- This is roughly equivalent to the annual power consumption of 130 U.S. homes.

Show more

How much energy will AI really consume? The good, the bad and ...
Mar 5, 2025 — On average, according to their latest results, generating an image from a text prompt consumes about 0.5...

Nature

How much electricity do AI generators consume? - The Verge
Feb 16, 2024

The Verge