

Supercharge FHIR search with Large Language Models(LLMs)



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Who am I?

- Ruchika Kharwar
- Customer Engineer (Google Cloud Platform - Healthcare and Life Sciences)

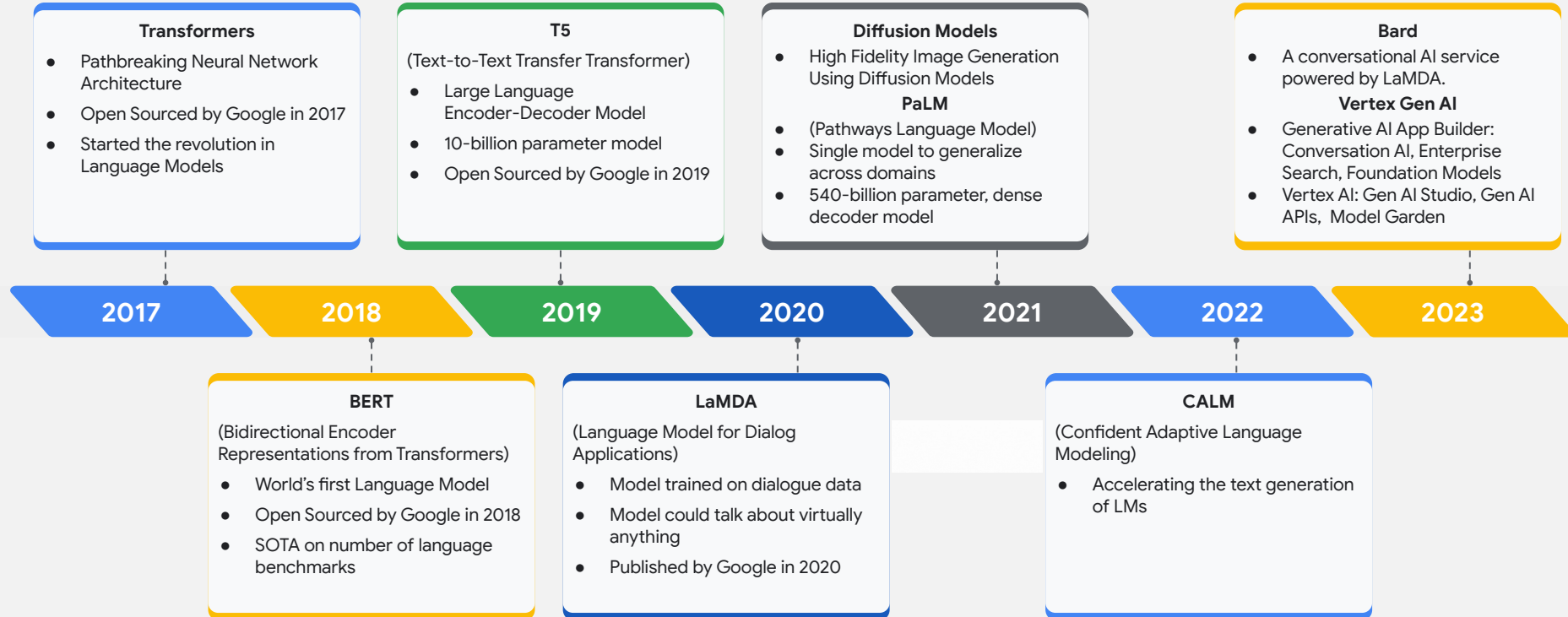


Agenda

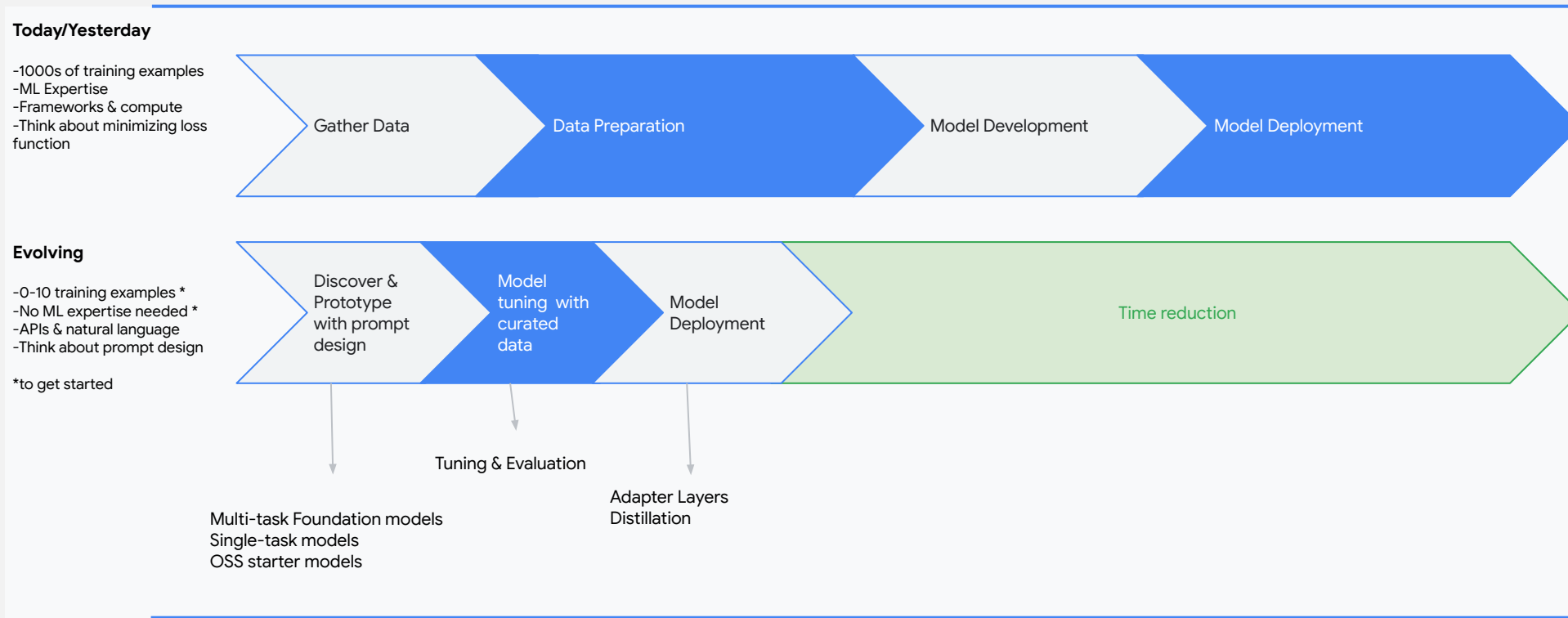
Supercharge FHIR search with Large Language Models(LLMs)

- Large Language Models(LLMs)
- Approaches
- Common Use Cases
- Examples illustrating Google's Large Language Models on FHIR data
- It's just the beginning

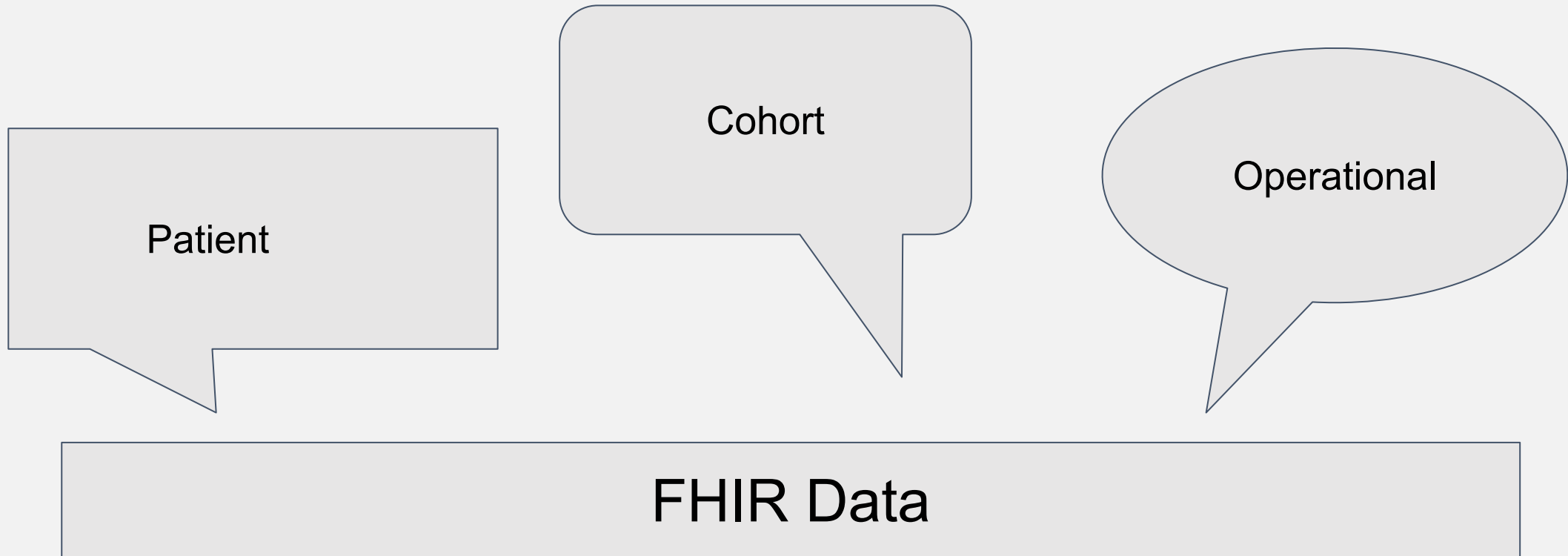
The beginnings of the Generative AI revolution



The approach to Machine learning has drastically changed.

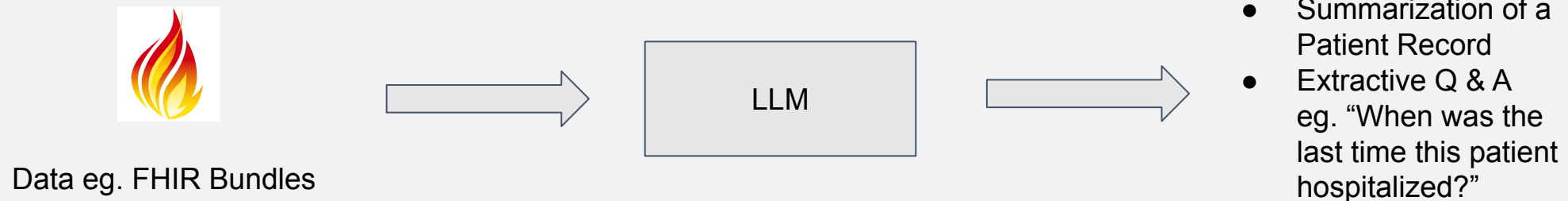


Applying Large Language Models to FHIR data



Fundamental approaches ..

(1) FHIR data wrangle through LLM



Challenges with pushing FHIR Data through LLMs (Security)

“I am concerned about security sending PHI/PII data”

“Is the vendor LLM going to use my data to train their model”

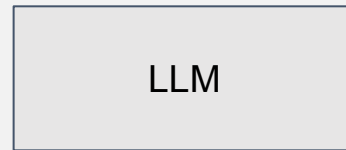
“How do I manage data security concerns?”

“If I de-identify my data, will the LLM results still be useful ?”

Fundamental approaches ..

(2) Use LLM for Operational functions

Expressions in “*Natural Language*”



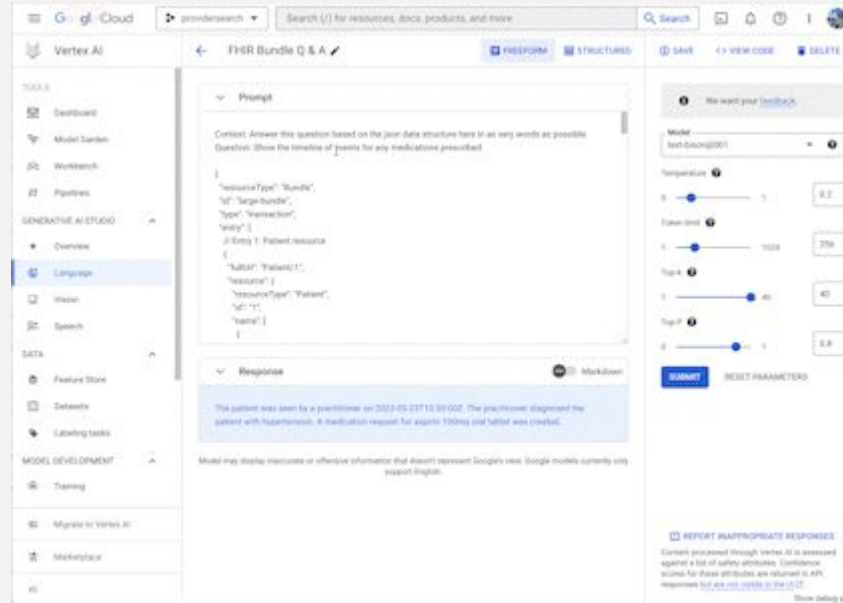
- Generation of FHIR Search String (Operational Queries)
- Generation of SQL on FHIR (Data Analytics Queries)



**Less PII/PHI concerns*

Q & A on FHIR Bundles

- What are the active prescribed medications
- When was the last time the patient visited the ER ?
- Who was the last doctor the patient saw ?



The screenshot shows the Google Cloud Vertex AI interface. The main window displays a chat conversation titled "FHIR Bundle Q & A".

Prompt:

```
Context: Answer this question based on the json data structure here in as many words as possible
Question: Show the timeline of visits for any medications prescribed.

{
  "resourceType": "Bundle",
  "id": "large-bundle",
  "type": "transaction",
  "entry": [
    {
      "entry": {
        "resource": {
          "resourceType": "Patient",
          "id": "1",
          "name": {
            [

```

Response:

The patient was seen by a practitioner on 2023-05-23T10:30:00Z. The practitioner diagnosed the patient with hyperemesis. A medication request for aspirin 100mg oral tablet was created.

Model may display inaccurate or offensive information that doesn't represent Google's view. Google models currently only support English.

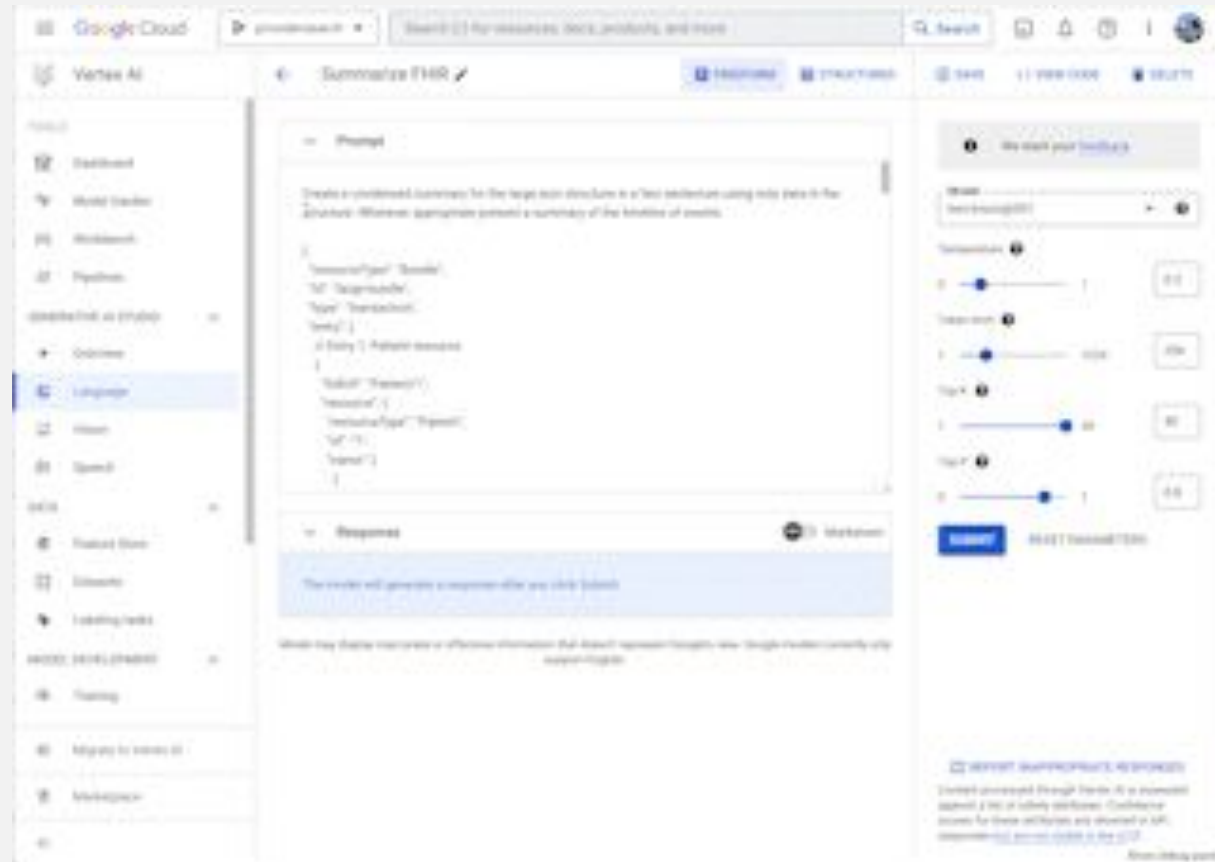
Model was displayed in response to an interactive prompt that doesn't represent Google's view. Google models currently only support English.

REPORT INAPPROPRIATE RESPONSES

Content processed through Vertex AI is assessed against a list of safety attributes. Confidence scores for these attributes are returned in API responses but are not visible in the UI.

Summarization of FHIR Bundle

- Extremely common use case
- Show timeline of events
- Summarize the patient's LPR



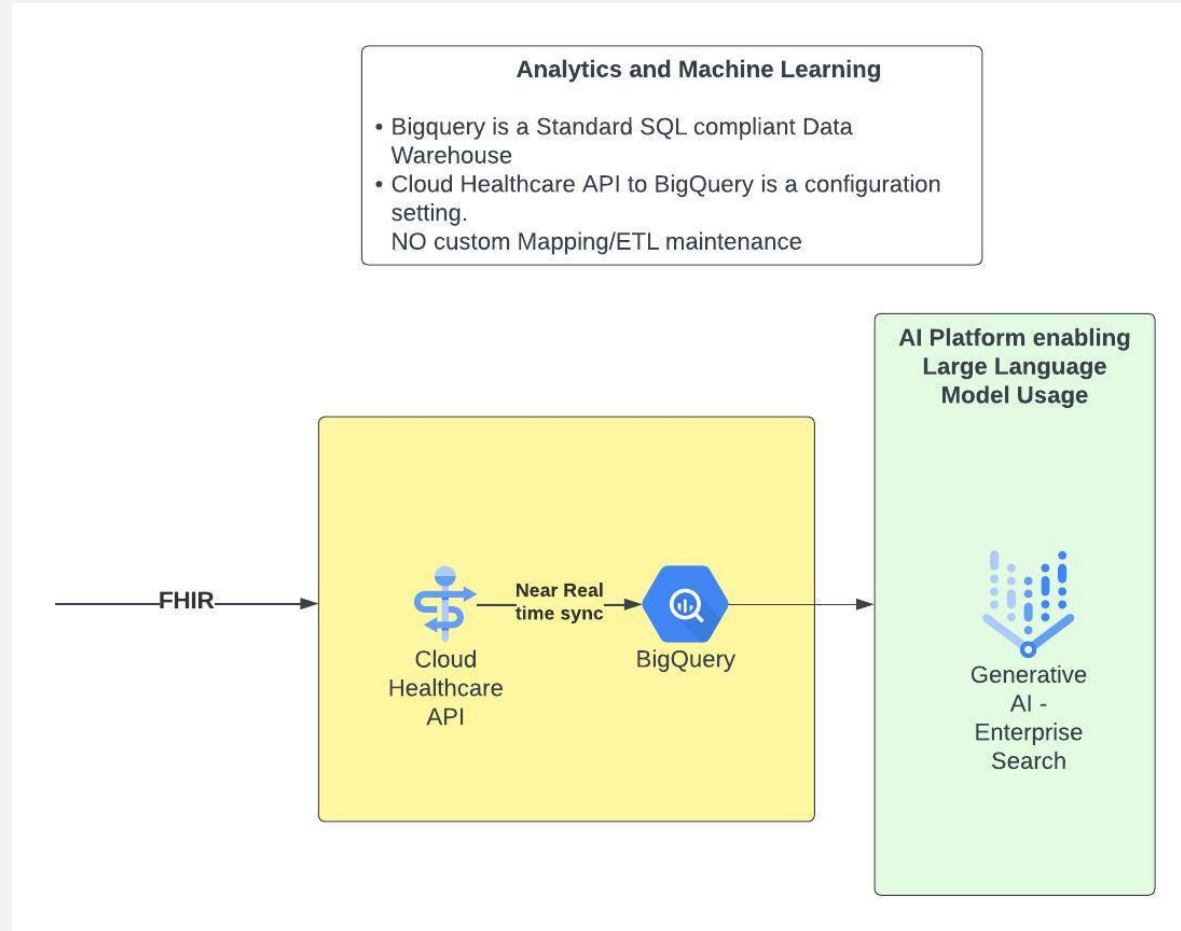
Generation of FHIR Search Queries

- “FHIR Search String” creation offloaded to LLM
- The user can say things like
 - *Search for all observations with a BMI of 21*
 - *Search query for observations with diastolic blood pressure greater than 90 OR systolic blood pressure greater than 140*

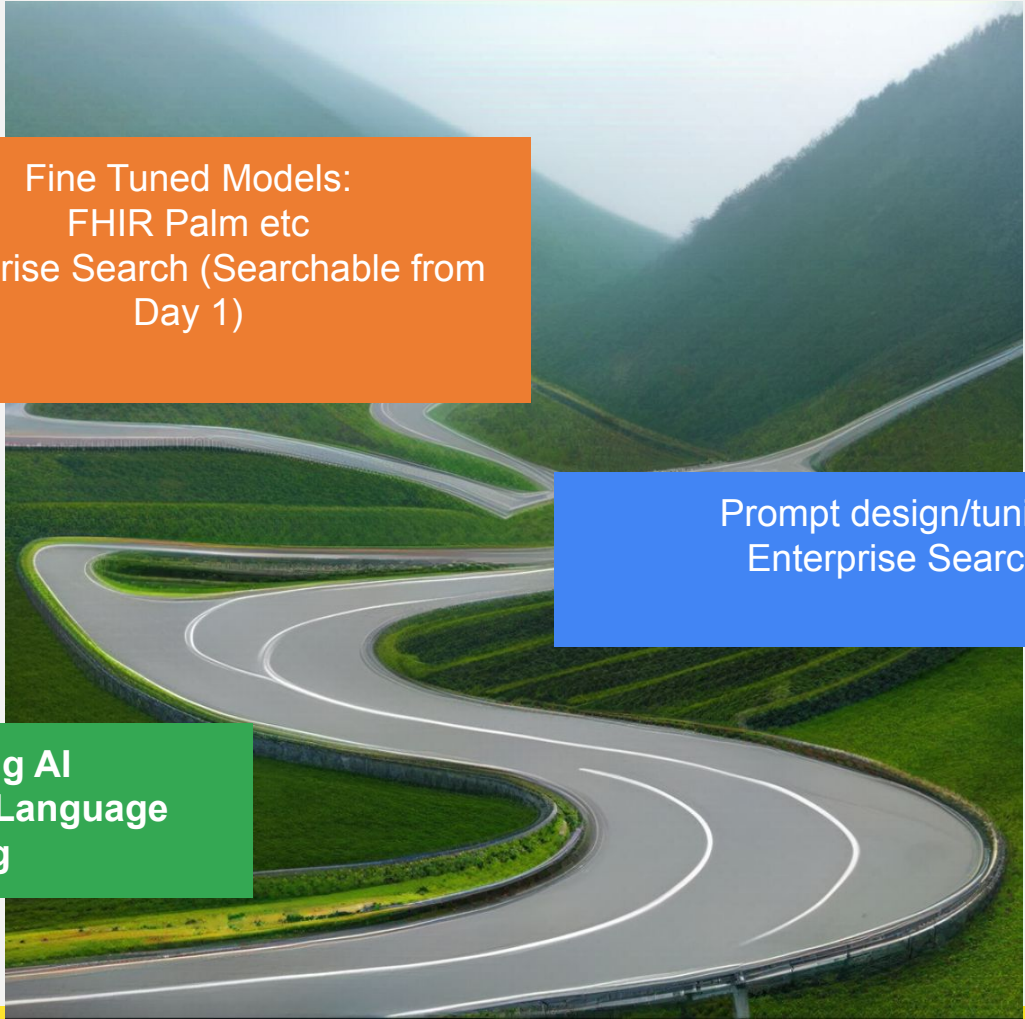


Generation of SQL Queries

Possibilities on the Horizon Healthcare Data searchable from Day 1 (On Google Cloud Platform)



It's a journey and not a destination



Fine Tuned Models:
FHIR Palm etc
Enterprise Search (Searchable from
Day 1)

Prompt design/tuning
Enterprise Search

Medical Coding AI
Healthcare Natural Language
Processing

Special Thanks

- Kalyan Pamarthy
- Scott Penberthy
- Will Rosenfeld
- Will Morris
- Reshma Kapadia

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Q&A

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