# SQL Driven Infrastructure for Cybersecurity ML Operations

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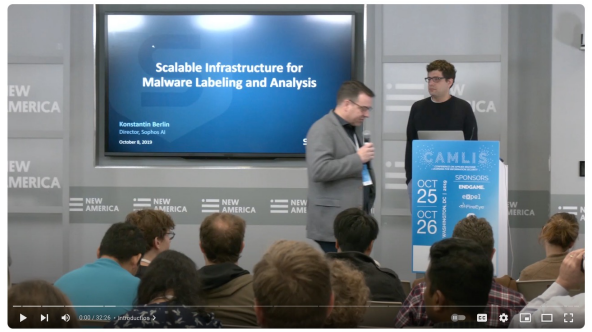
CAMLIS 2023

Image by DALL·E 3

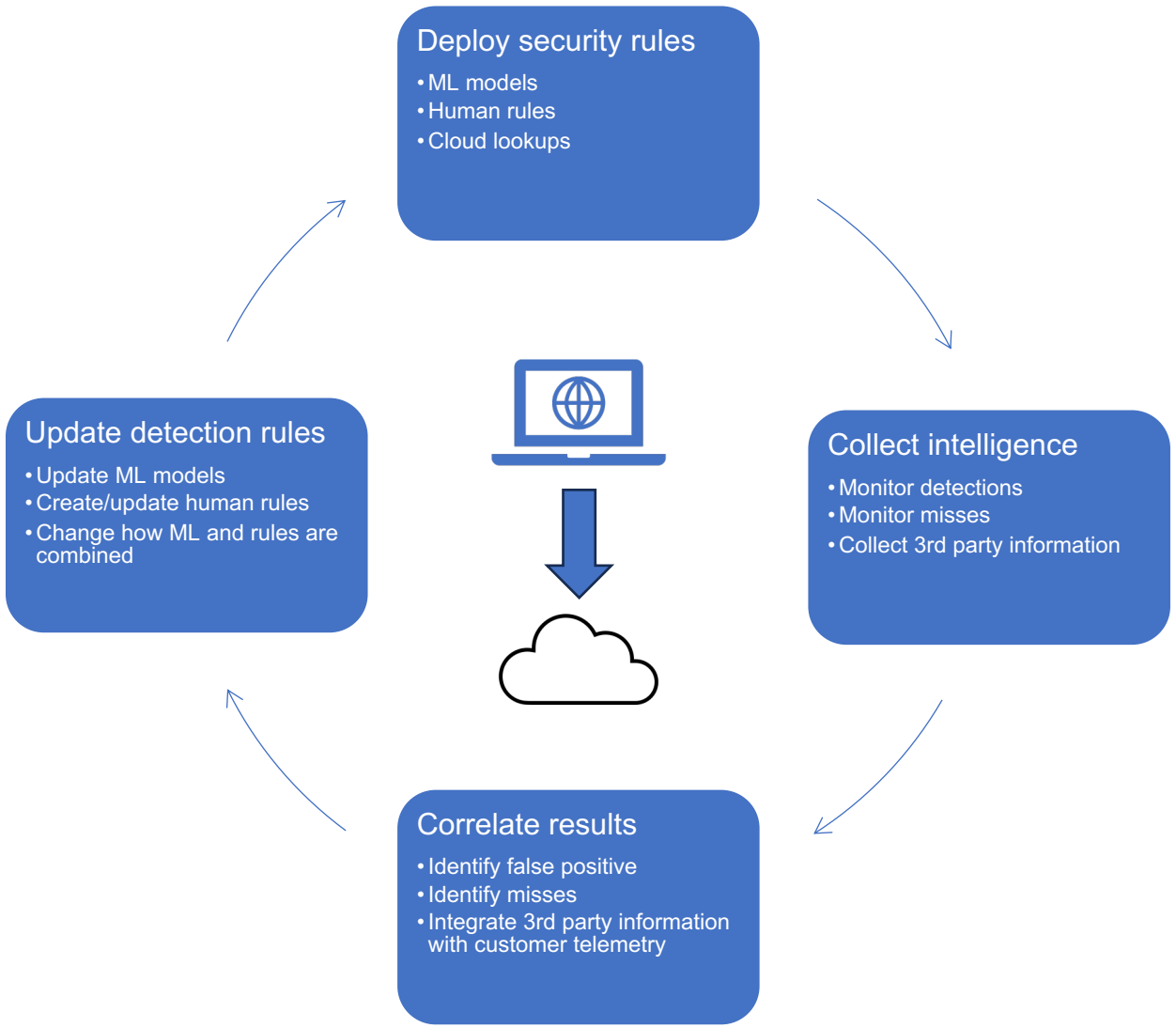
# Who am I and why am I talking about this?

CAMLIS 2019



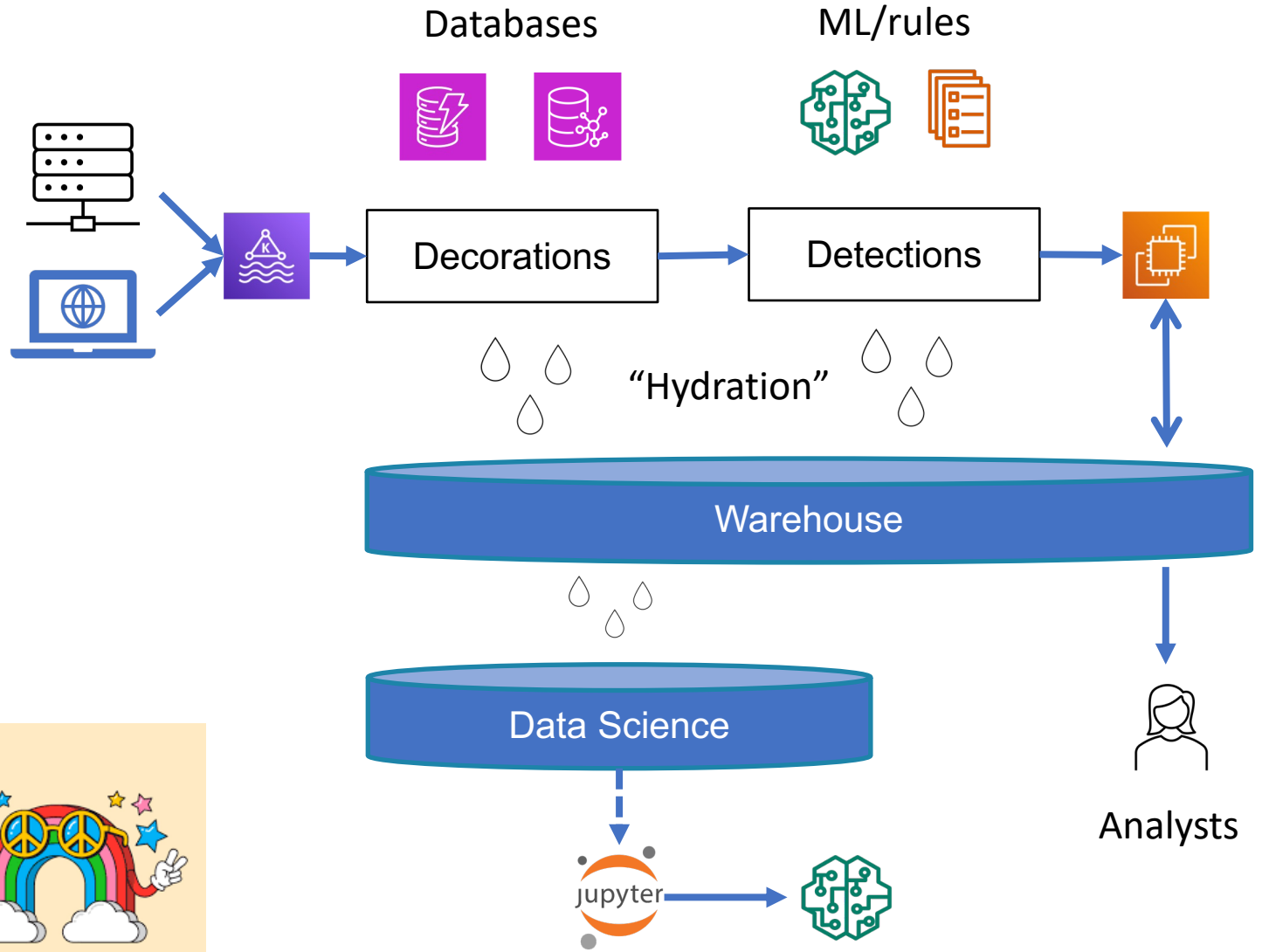

- Former Head of AI at Sophos
- Worked on the cyber MLOps problem for 7+ years
- Bad infra is the main problem for most AI teams
- Good infra lets you do great work: @CAMLIS2023
  - Web content filtering through knowledge distillation of Large Language Models – Tamas Voros (tomorrow)
  - Playing Defense: Benchmarking Cybersecurity Capabilities of Large Language Models - Adarsh Kyadige (tomorrow)
- **Views are my own**

# Observe, Orient, Decide, Act (OODA) Loop In Cybersecurity




- This is **war**
- Iteration time between new detection logic releases determines company success
- The more information taken into the decision the more attacks can be found
- Releasing new detection capabilities requires collaboration across teams
- Infrastructure silos prevent experimentation and rapid deployment of new tech
- More complex detection logic being added to the cloud (XDR/MDR)

# Current Imperative Cyber Pipelines






We ingest trillions of IOCs

Marketing

I haz pandas on my laptop

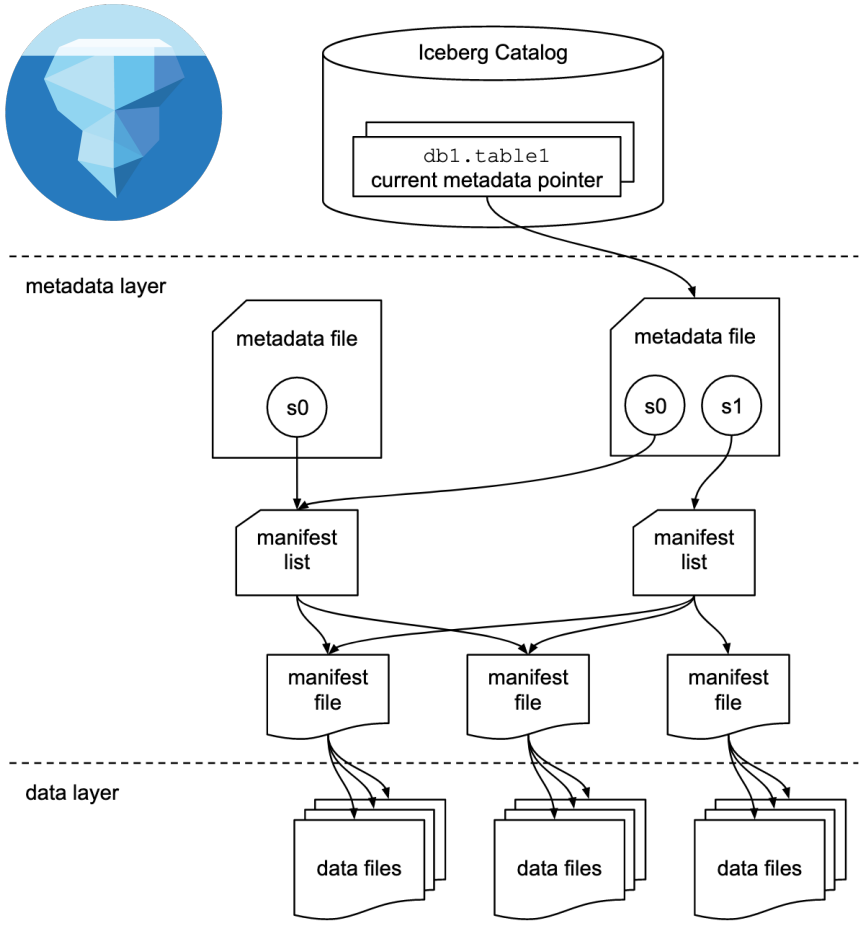
Data Scientist

imgflip.com

## Major Issues

- Decorations have limited access to data
- Detections have limited context
- Dependency between components
- Hard to run multiple versions at the same time
- DS visibility into the pipeline low
- Skewed distributions in DS
- DS has no agency
  - Difficult to get new data
  - Impossible to test before deployment
- DS wrangling capacity limited to a single notebook or requires engineering support
- New flows take months/years to deploy
- Super expensive

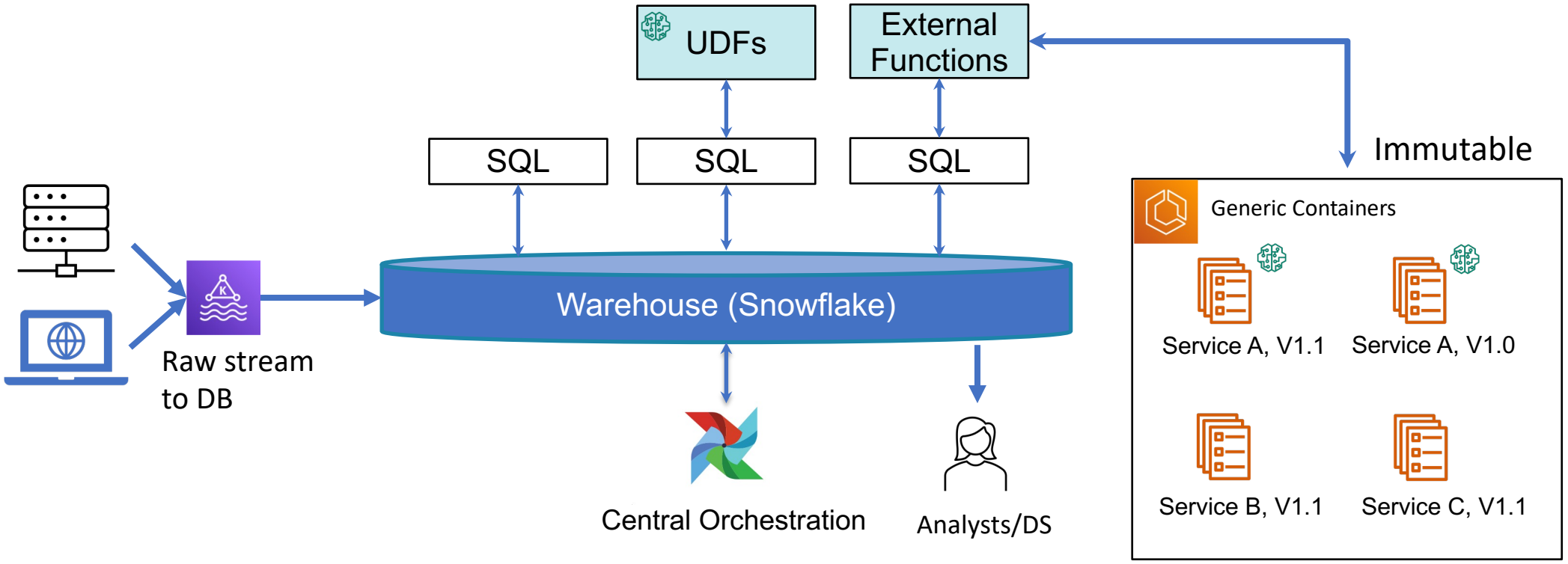
# Cloud Native Modern Declarative SQL Warehouses: Snowflake, Databricks, Iceberg, etc.




- SQL pipelines are more declarative
  - You define the what
  - Warehouse decided the how automatically
- Previously the automatic how was very bad
  - A lot of hacking of the how (imperative)
- Now the automatic how is approaching the manual imperative approaches
  - Storage based on massively scalable data lakes (ex. S3)
  - Data management layer removes a lot of the how
- Scaling and speed approaches imperative systems
  - Compute separate from storage
  - On-demand infinite compute
  - Resource independent workflows
  - Streaming support
- All the data in one place
  - Quick development
- Semi-structured data support
- Build the declaratively pipeline optimize later

https://www.dremio.com/resources/guides/apache-iceberg-an-architectural-look-under-the-covers/

# Declarative SQL Driven Infrastructure

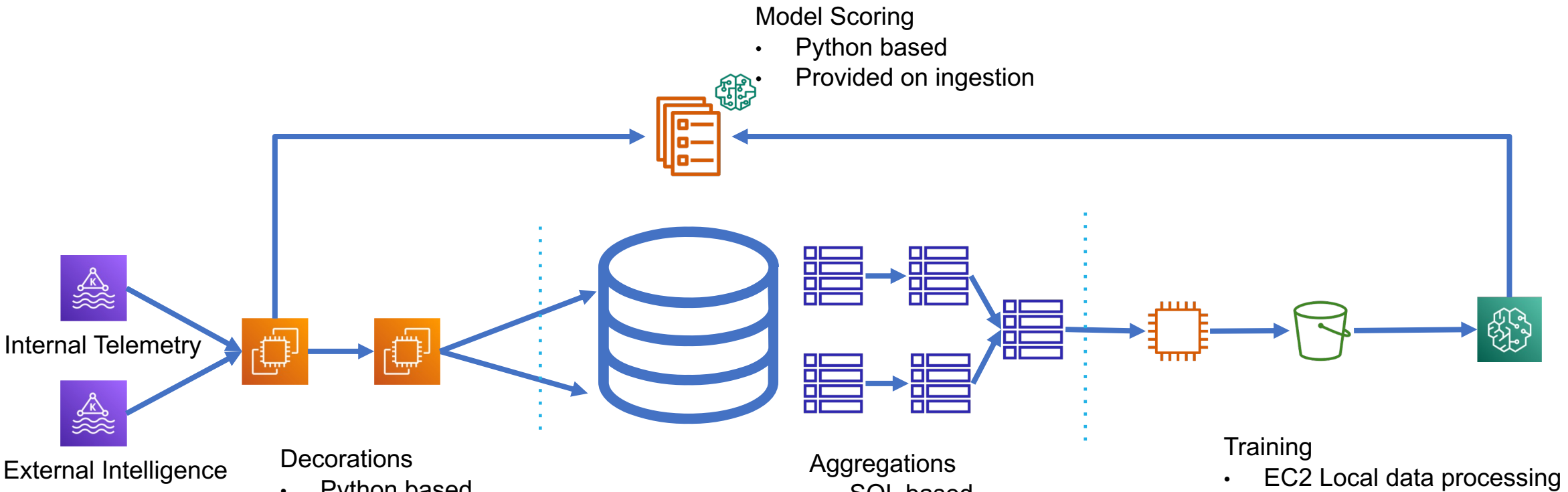



- Pipeline purely logical
- Deployment and dev is unified
- New pipelines easy to test and deploy
- Same scalability as in production

Example:

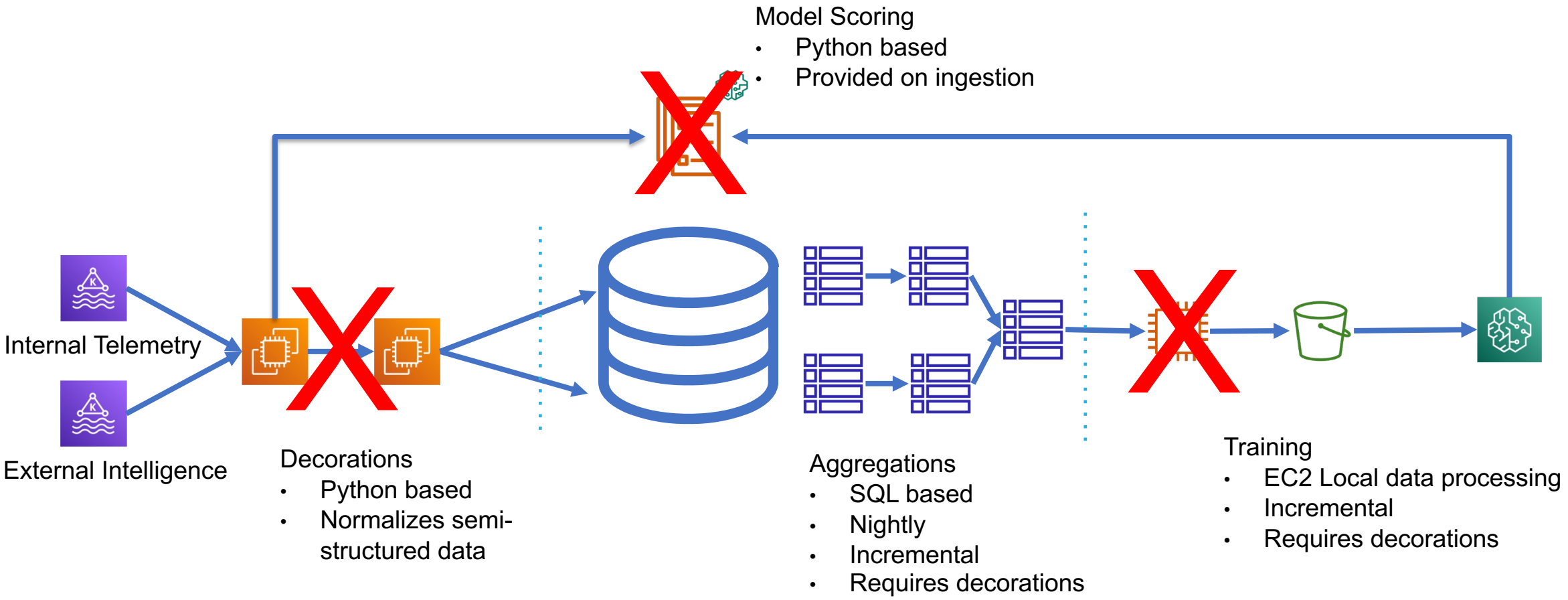
SELECT url, **url_model**(**url_features**(url)) as score
FROM mdr WHERE type='url_scan'

# URL Pipeline: Legacy Setup



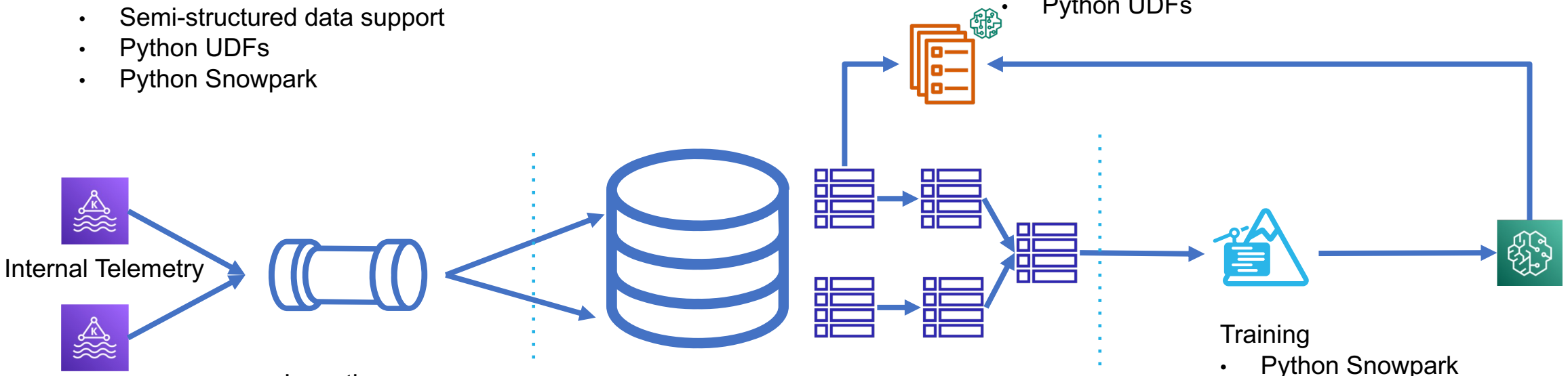

http://g.com/search?q=♥
http://g.com/search?q=%E2%99%A5

# URL Pipeline: Legacy Setup



# URL Pipeline: Snowflake Centric Setup

Key Snowflake Tech:
- Snowpipe
- Semi-structured data support
- Python UDFs
- Python Snowpark



# Observed Benefits

- Significantly improved our OODA loop iteration time
- Unifying deployment and development platforms
- Simplified data wrangling by giving data scientists an easy-to-use distributed compute platform
- Provided cross-team access to all key pieces of detection tech within an easy-to-use SQL interface
- Allowed data scientists to directly develop models on top of “raw” semi-structured data input

# Questions?

“Electric castle in space that has 100 dogs in it.”
Image generated by Emmanuel Berlin