

System Observability, Analytics & Insights Platform



Team Kowalski

Before We Start

Data Storage/Solutions Sector



Introduction to Sector:

- Various companies: Adata, Western Digital, Samsung, Crucial, ...
- Market value in the tens of billions annually, with continuous growth.
- Diverse user base from individuals to large corporations and governments.
- Handles exabytes to zettabytes of data, constantly expanding with digital content growth.

Industry Products:

- Hardware: SSDs, HDDs, etc...
- Software: Cloud Storage Services
- Different solutions for different needs



SAMSUNG

**Individually
Collect**

**Manually
Analyze**

**Store
Analysis**

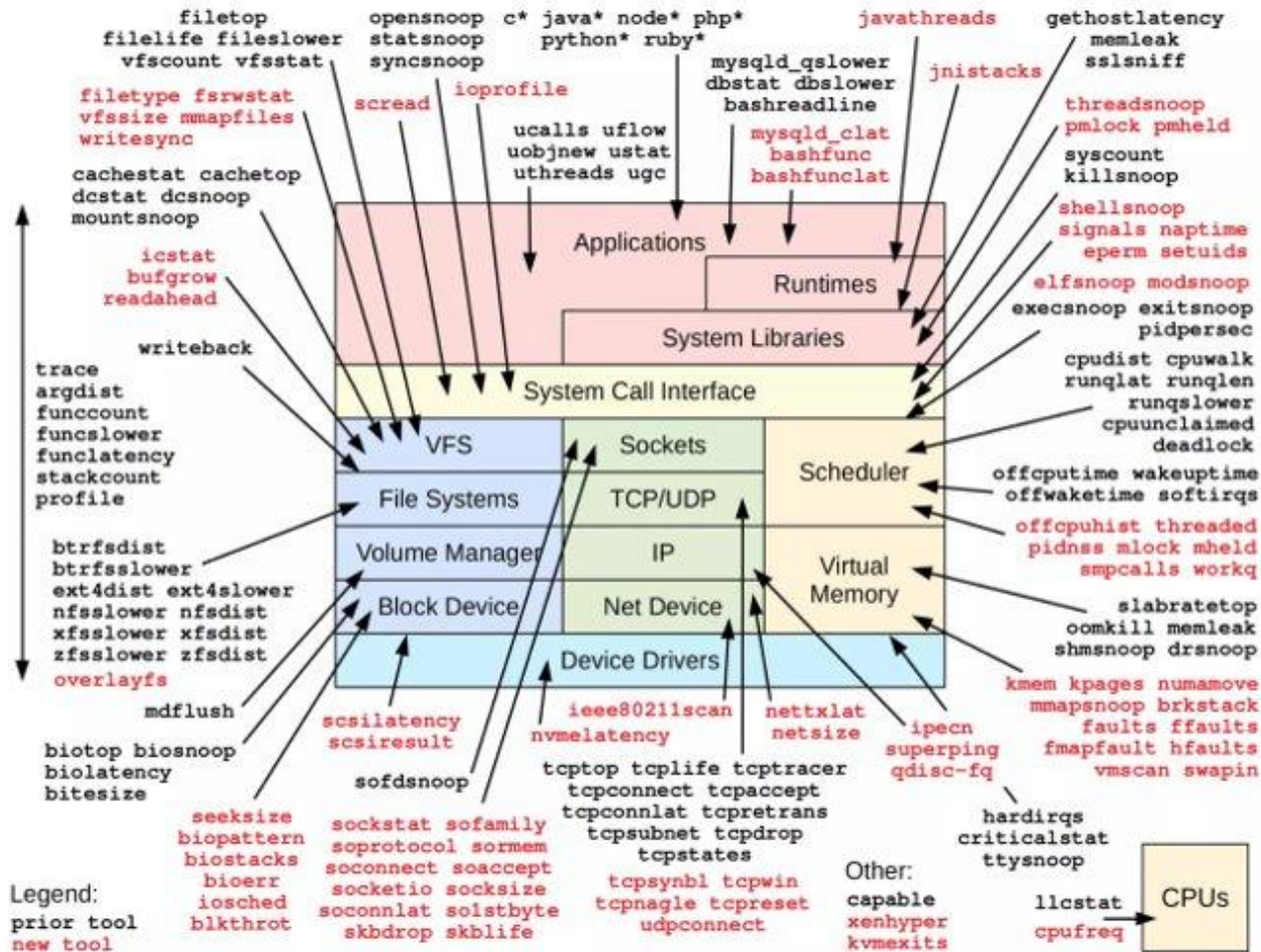
Workflow Inefficiencies:

- Manual Testing Process
- No Data Analysis Automation
- Individual Device Testing

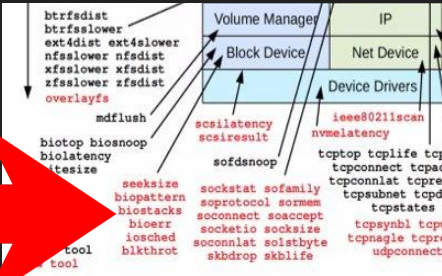
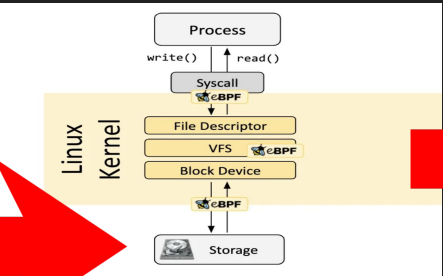
Issues at Hand:

- Silent Error/Failure Detection
- Limited long-term performance monitoring
- Everyone needs to be an expert

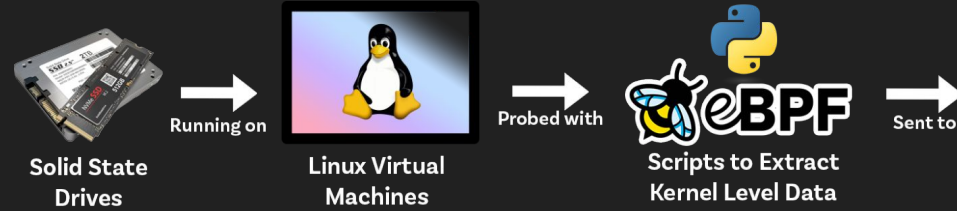
The Problem



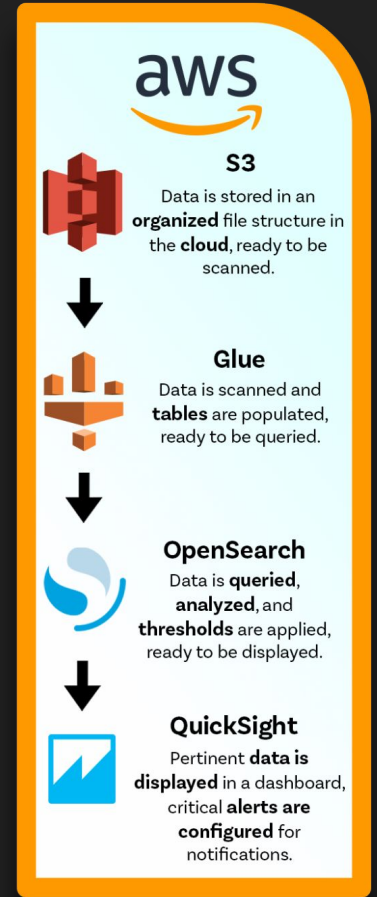
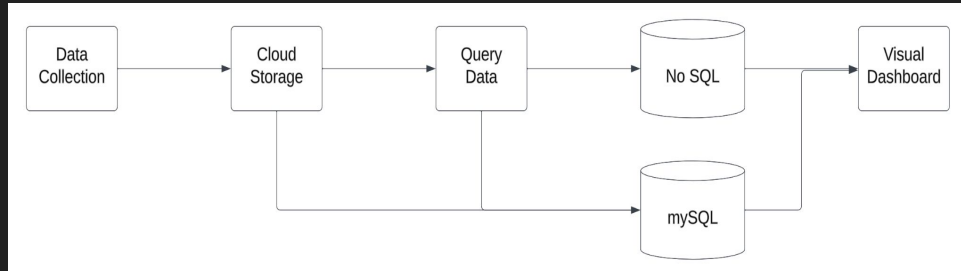
Opening the black box



The Solution



We propose building a comprehensive platform to automate and streamline storage companies data analytics workflow, addressing current inefficiencies and enhancing data observability.



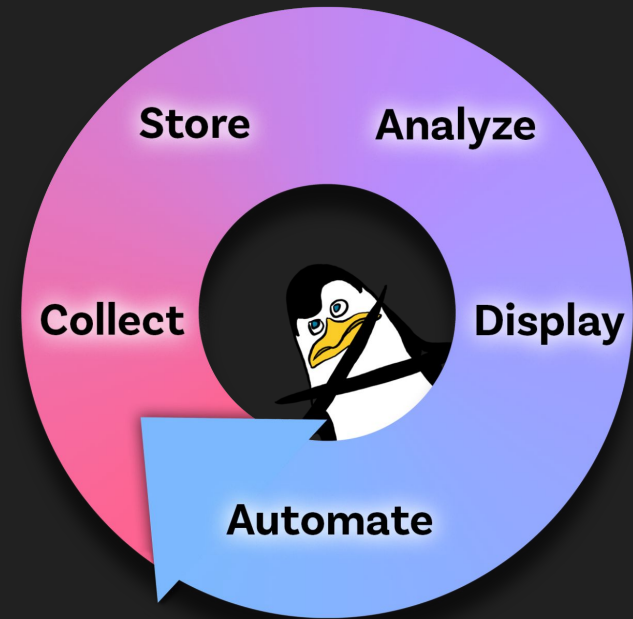
Base Requirements

How they were obtained...

- Mentorship
- Proposal Sheet
- Tech Demos
- Research in eBPF

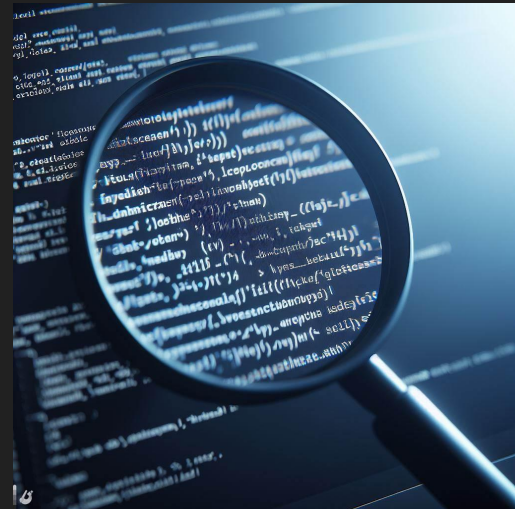
Key Requirement Threshold

- Repeated Collection of Data from Data Centers
- Pipeline between Data Center Collection to Cloud Databases
- Analysis of Data in Cloud Databases
- Display of Data from the Cloud Databases
- Alert of Data of Interest at the Display level
- Automation of Program



Functional Requirements

- Direct Insight of Kernel Level
 - Understanding the “Open Black Box”
- Versatile and Flexible Probing (Collection) of Data
- Data Storage and Manipulation in the Cloud
- Observability Dashboard
- System Automation



Non-Functional and Environmental Requirements

Non-Functional

- Scalability
- Malleability
- Accurate Data Handling
- System Efficiency

Environmental

- Operating System - Linux environment (Ubuntu 24.02)
- Languages - eBPF (C, C++ Syntax), Python
- Storage/Analysis/Display - AWS (Boto3 API, S3, Glue, OpenSearch, Quicksight)



eBPF

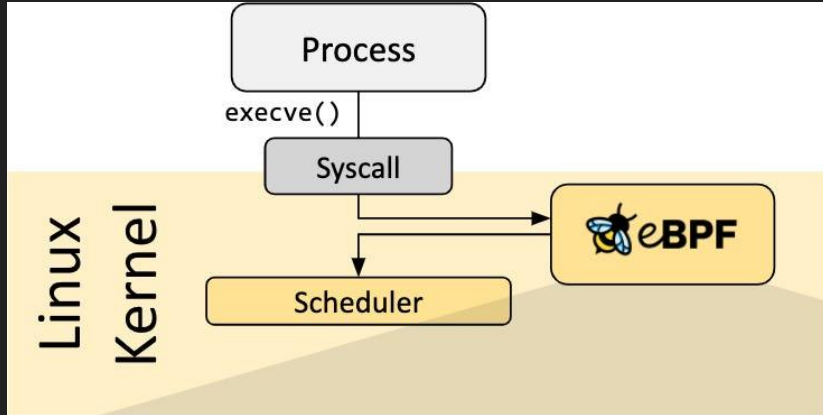
Potential Risks and Feasibility

Potential Risks:

- Client backing issues
- Linux version compatibility
- AWS pricing feasibility

Mitigations:

- Leverage connections at previous sponsor.
- Research Linux version updates in relation to kernel/eBPF.
- AWS prototyping and testing.



Planned Process from Now

Improve Tech Demo
(Now-Dec. 14)

Currently working on complete tech demo, highlighting the core components of our system.

Finalize Documentation
(Now-Dec. 14)

Revise and adjust documentation to our new plan of development.

Begin Minimum
Viable Product
(Dec.14-TBD)

Once documentation is complete, we will start minimum viable product development as soon as possible.

Planned Process from Now

Software Design Documentation
(2nd-5th Week of January)

Document to be written up about the software's architecture, use, and adjustments to personal (Company) need.

Software Testing
(All of Spring Semester)

Testing to apply to said software program. This ranges to self-inserted errors to mutations, coverage, and automated testing

Finalization of MVP
(Spring Semester:Week 15)

Upon continuous testing, requirements, goals, and specifications accomplished, MVP is ready to be finalized through polishments and delivered.

Recap

Problem

- Silent Failures/Errors
- Lack of Data Consistency
- Long Term Performance Monitoring

Solution Program

- Automated collection of data that is analyzed and displayed to observe inefficiencies and abnormalities for Company's data centers

Functionalities

- Direct insight and data collection of Kernel Level
- Cloud Storage Querying, Transformation and Analytics

Project Risks Involved

- Linux Compatibility
- Client Backing

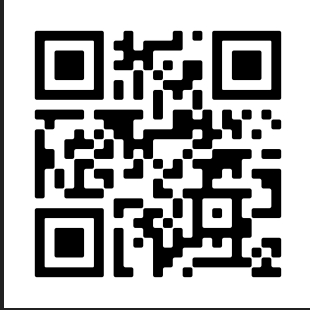
Mitigations

- Research Linux Kernel Documentations
- Take what we have and continue on

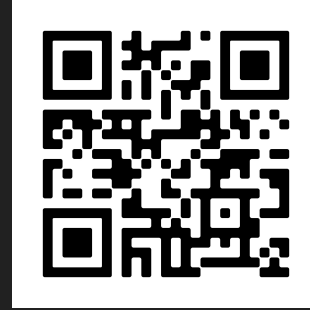


Thank You

Questions?



Our Website



Tech Demo