

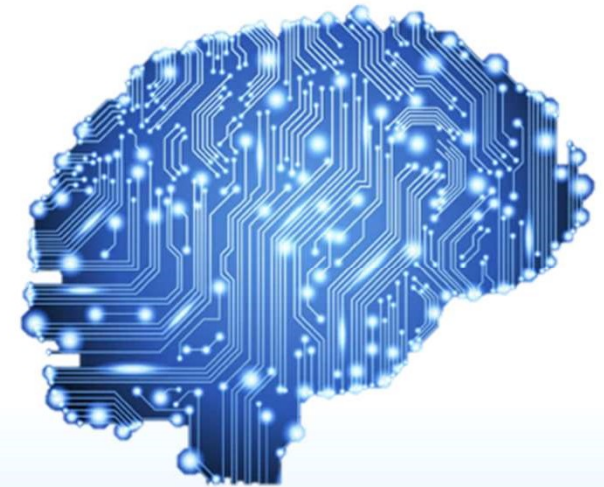
Operational analytics at cloud grade



13th Cloud Control Workshop - Discussion 7

June, 14 2018

Moderator: eranra@il.ibm.com



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Start by asking people not to engage in emails and other laptop activities, as explicitly passive participants reduce energy in the room



Abstract



In this session we will discuss the challenges, processes and analytic tools available for cloud SREs.

We will review available cloud analytic techniques and discuss the challenge of "closing the loop":

- Efficient data acquisition @scale
- Persistency and data-curation
- Analytics and insights
- Actuation; and back to acquisition.

We will focus on multi-layer network analytics as a potential impact path, and discuss the place of manual vs. automated processes in such a challenge



Motivation – SRE = ???

“ Fundamentally, it’s what happens when you ask a software engineer to design an operations function...

... SRE team is responsible for availability, latency, performance, efficiency, change management, monitoring, emergency response, and capacity planning.

REF: <https://landing.google.com/sre/interview/ben-treynor.html>



DEVELOPERS

More on SREs ? (Site Reliability Engineering)

SRE is what you get when you treat **operations** as if it’s a **software problem**. Our mission is to protect, provide for, and progress the software and systems behind all of Google’s public services — Google Search, Ads, Gmail, Android, YouTube, and AppEngine, to name just a few — with an **ever-watchful eye** on their availability, latency, performance, and capacity.



REF: <https://landing.google.com/sre/>



Motivation – Cloud = ???

- ❑ The world has changed
 - Thread and Processes → Micro-services
 - Event processing → Lambda function / OpenWhisk
 - File systems → External data services
 - Algorithmic code → Analytics service
 - ...
- ❑ We need new cloud native SW development and operation tools
 - To support micro-services @scale architectures
 - Support stacked network layers





CogNETive service



CogNETive
Your network explored for the first time

[Login](#) [Register](#)

This new visual communication debugger for cloud DevOps engineers provides step-by-step path traversal to pinpoint failures with lightning speed!

<p>Collects and learns system behavior to create a</p> <p>coherent multi-layer view</p> <p>of the entire system. It offers topology@scale, including all layers from storage application, through virtual platform, to physical layer.</p>	<p>Continuously captures system metrics and performs cross-layer analytics to</p> <p>detect anomalies</p> <p>and quickly identify suspect sub-systems. This includes equipment failure, service unavailability, system overload, and more.</p>	<p>Acts as a</p> <p>system debugger</p> <p>for the interconnected storage system and the supporting communication infrastructure. It covers covering the entire path from storage system to consumers, providing tools to quickly identify and diagnose issues.</p>
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<https://cognetiveyz.sl.haifa.il.ibm.com/>

Cookie Preferences







Dashboard

Getting started

Troubleshooting

Dashboard

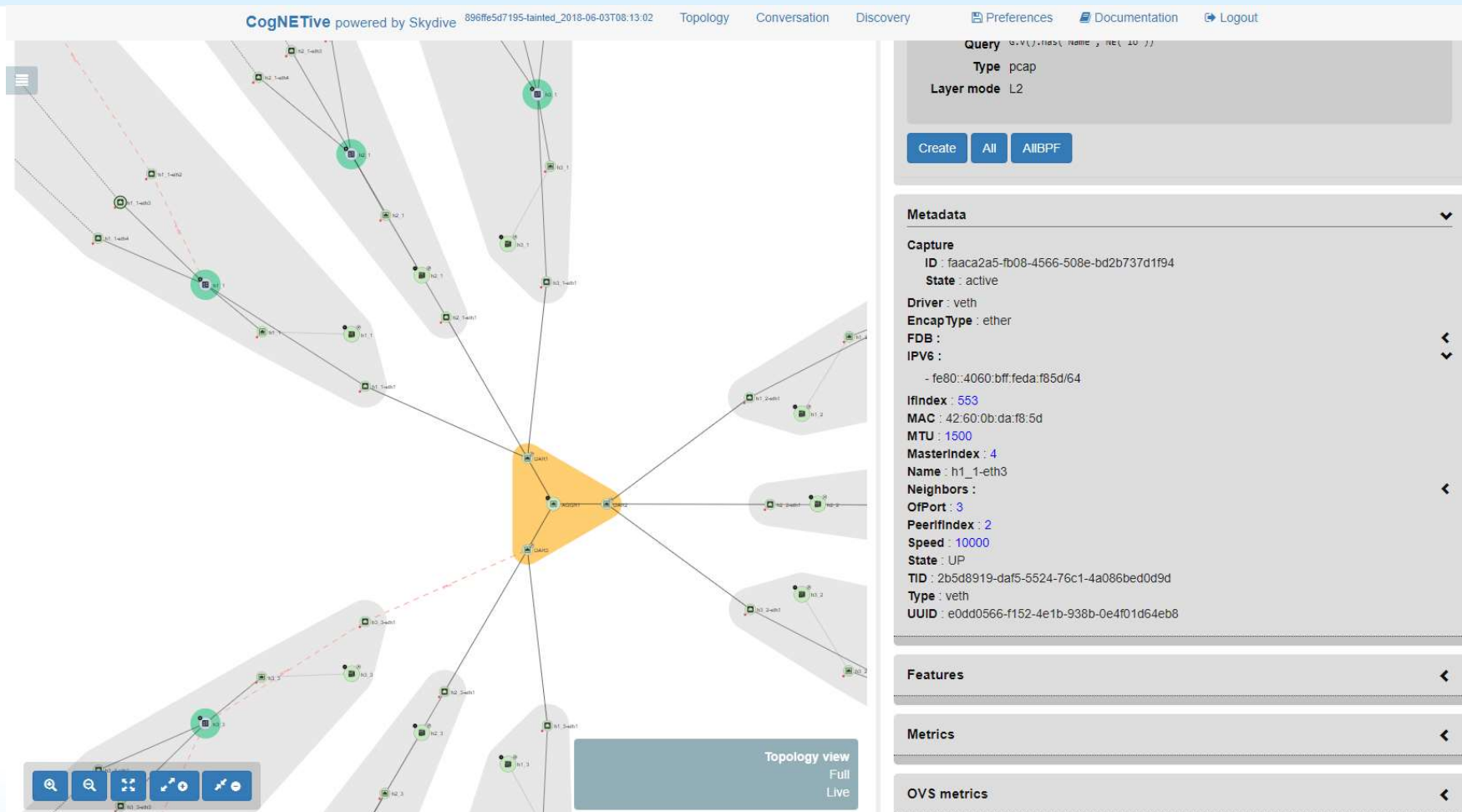
The network Visualization and Troubleshooting service for Operations@Scale.

Module Name	Status
 Explore	 Ready
 Analyze	 Ready
 Capture & Store	 Ready

Note: CogNETive service is a research project, available in beta mode only. Use it at your own risk.

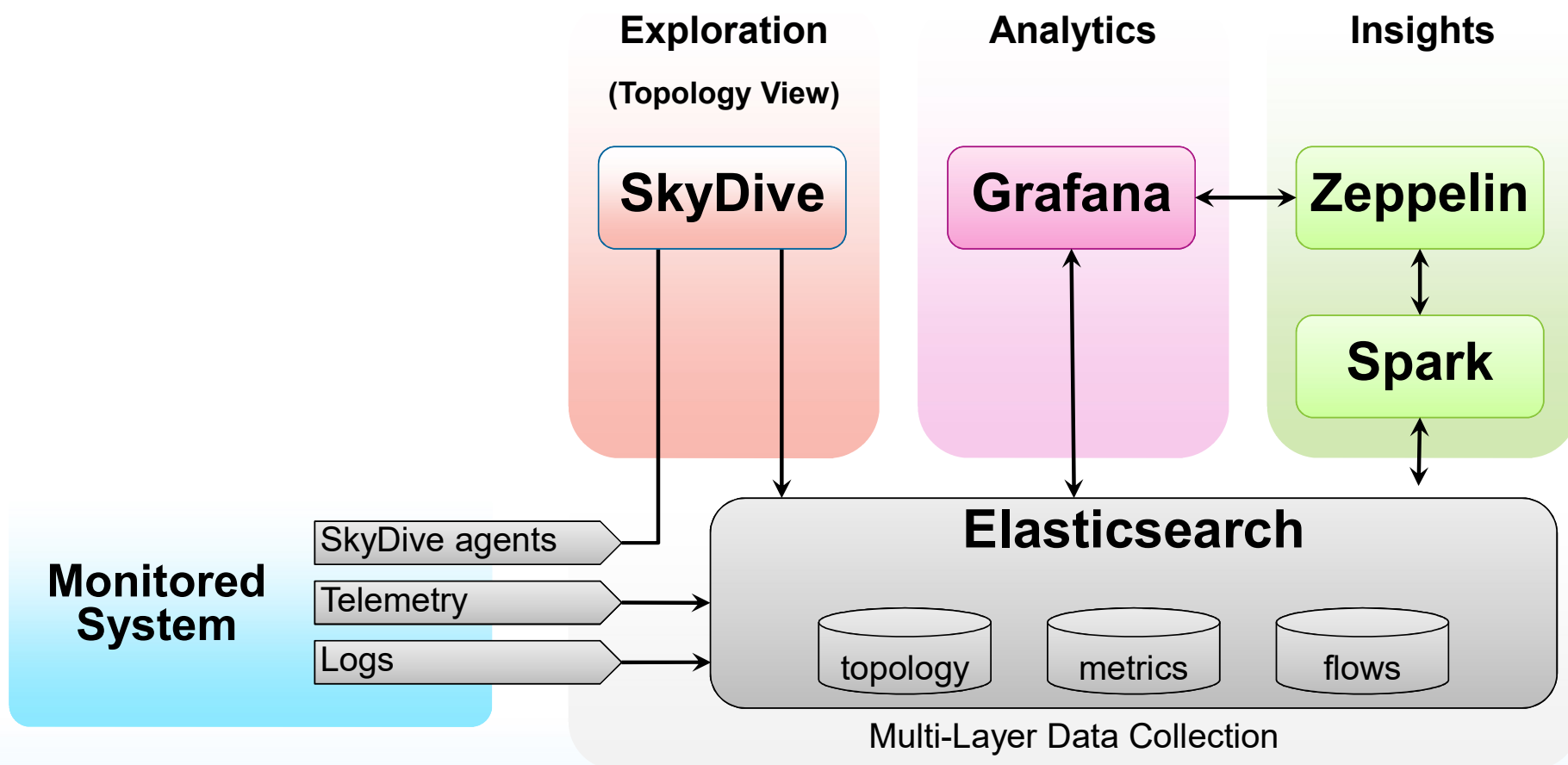
IBM Research - 2018 | CogNETive.support@il.ibm.com

Note: All components are copyright of their respective creators.





CogNETive! Framework architecture





ANALYTICS - GRAFANA



Find dashboards by name

Recent

- Topology CogNETive Native
- Bandwidth Heat Chart CogNETive Spark
- First person view CogNETive Spark
- network CogNETive Native
- Latency histogram CogNETive Spark

General

- Anomaly Detection** CogNETive Spark
- Bandwidth Heat Chart CogNETive Spark
- First person view CogNETive Spark
- Latency histogram CogNETive Spark
- network CogNETive Native
- Topology CogNETive Native

Filter by: Clear

Tags

- New dashboard
- New folder
- Import dashboard
- Find dashboards on Grafana.com

None installed. [Browse Grafana.com](#)

Installed Panels

None installed. [Browse Grafana.com](#)

Installed Datasources

None installed. [Browse Grafana.com](#)



Apache Zeppelin

Web-based notebook that enables data-driven, interactive data analytics and collaborative documents with SQL, Scala and more.

[GET STARTED](#)[DOWNLOAD](#)

<https://bluejeans.com/812434643>

TECHNOLOGIES



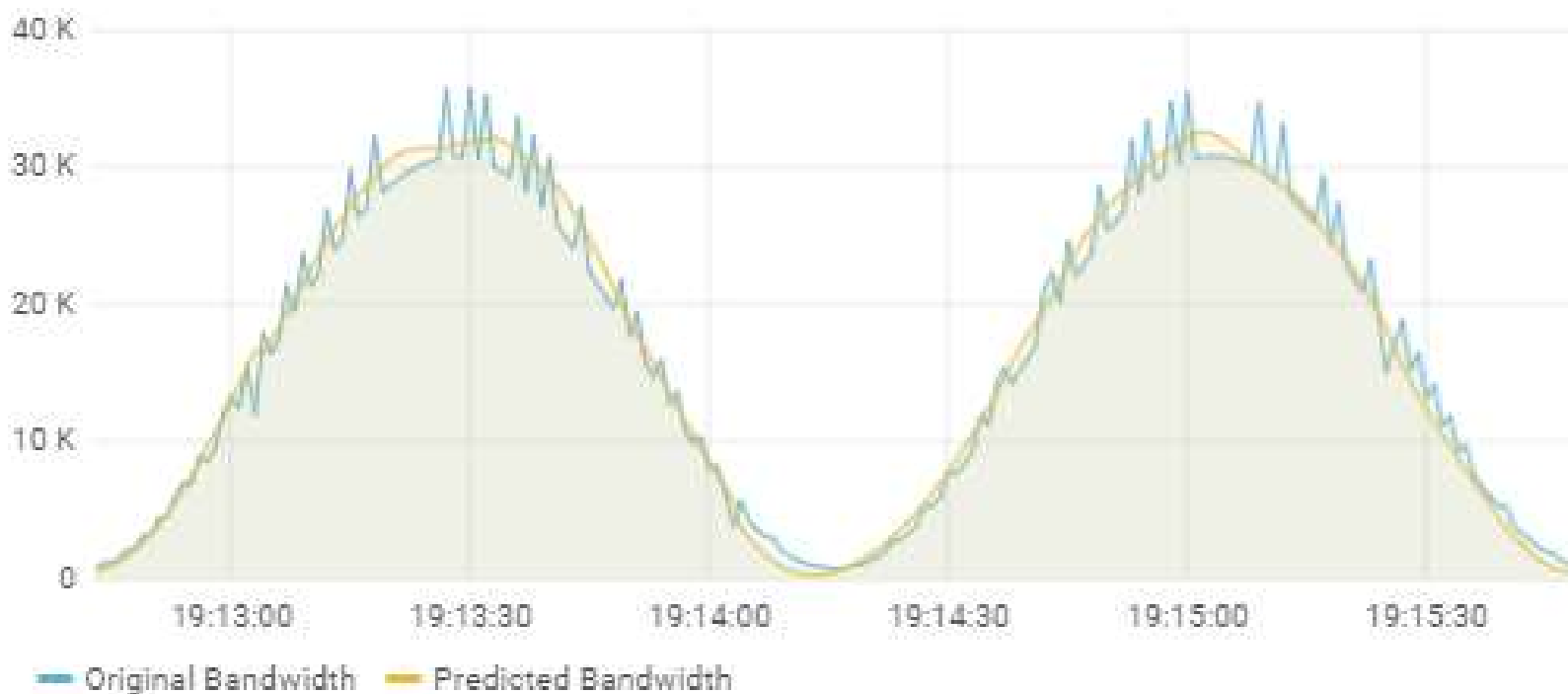
SQL



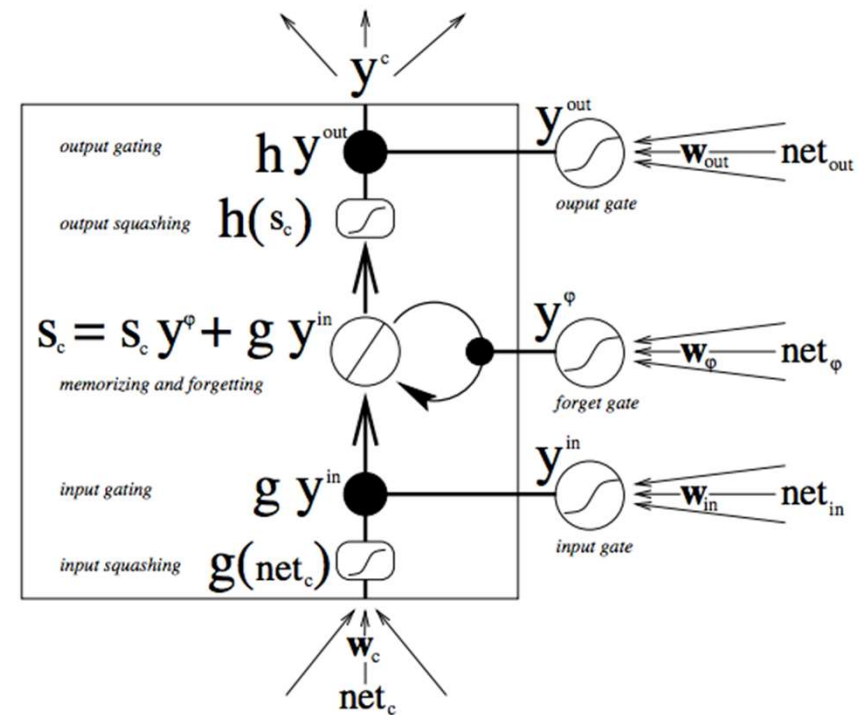
<https://zeppelin.apache.org/>



ANALYTICS – ANOMALY DETECTION - MODEL



Long short-term memory (LSTM) units (or blocks) are a building unit for layers of a [recurrent neural network](#) (RNN). A RNN composed of LSTM units is often called an LSTM network. A common LSTM unit is composed of a **cell**, an **input gate**, an **output gate** and a **forget gate**. The cell is responsible for "remembering" values over arbitrary time intervals





ANALYTICS – ANOMALY DETECTION - STREAM

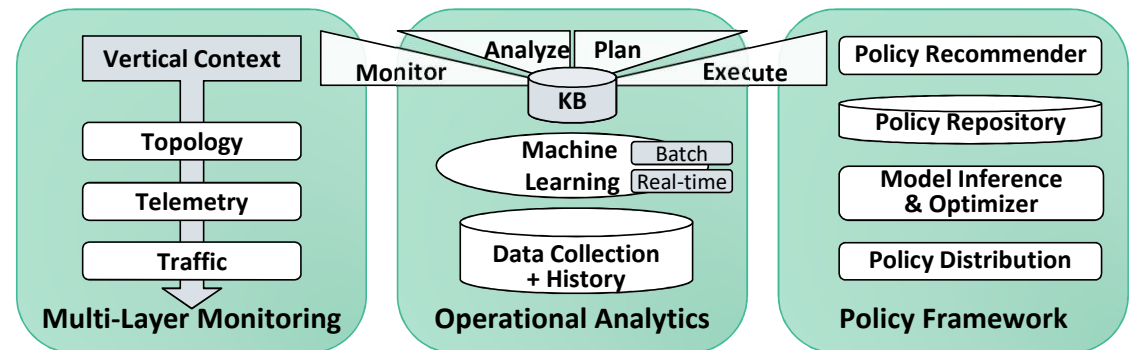


Alerts

Cognitive Slice Management – SLICENET


❑ Operational Analytics meets Autonomous Computing

- MAPE-K model
- Analytics create the ‘K’
 - Predictions, alerts, thresholds,
- Policy Framework “closes the loop”
 - Takes action based on gained knowledge



❑ Vertical Context – slice through network layers

- Analytics per context (identify vertical data)
- Integrated feedback from application (QoE)
 - Vertically aware “sensors” at all levels – infrastructure, PaaS, app.
- Multiple MAPE loops / multiple analytics
 - Each layer has different data, different aggregation, different goals
 - Share results with other layers



EU H2020 Project

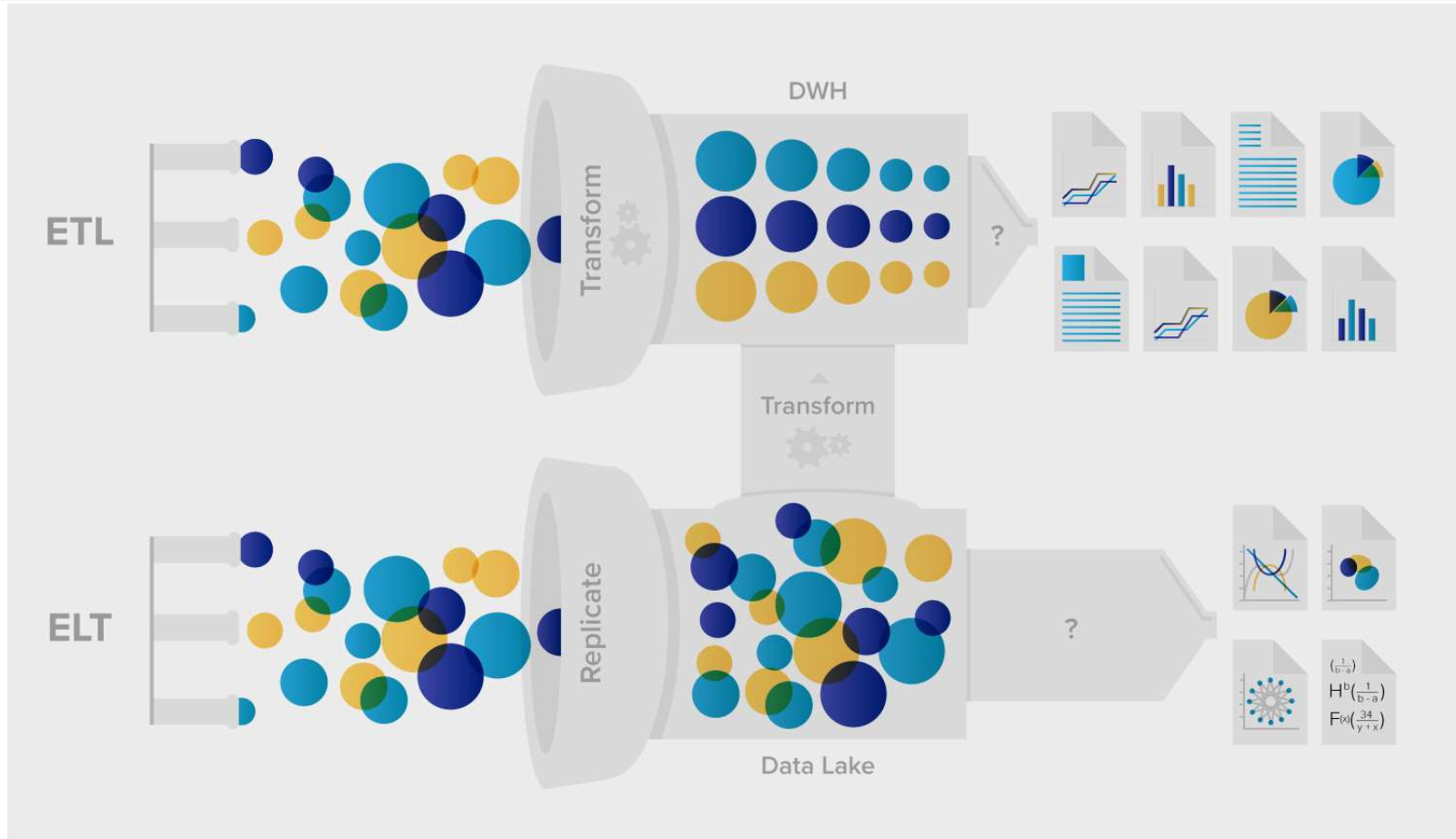
Domain: 5G Network Slicing

3 UCs: eHealth, SmartGrid, SmartCity

Large consortium

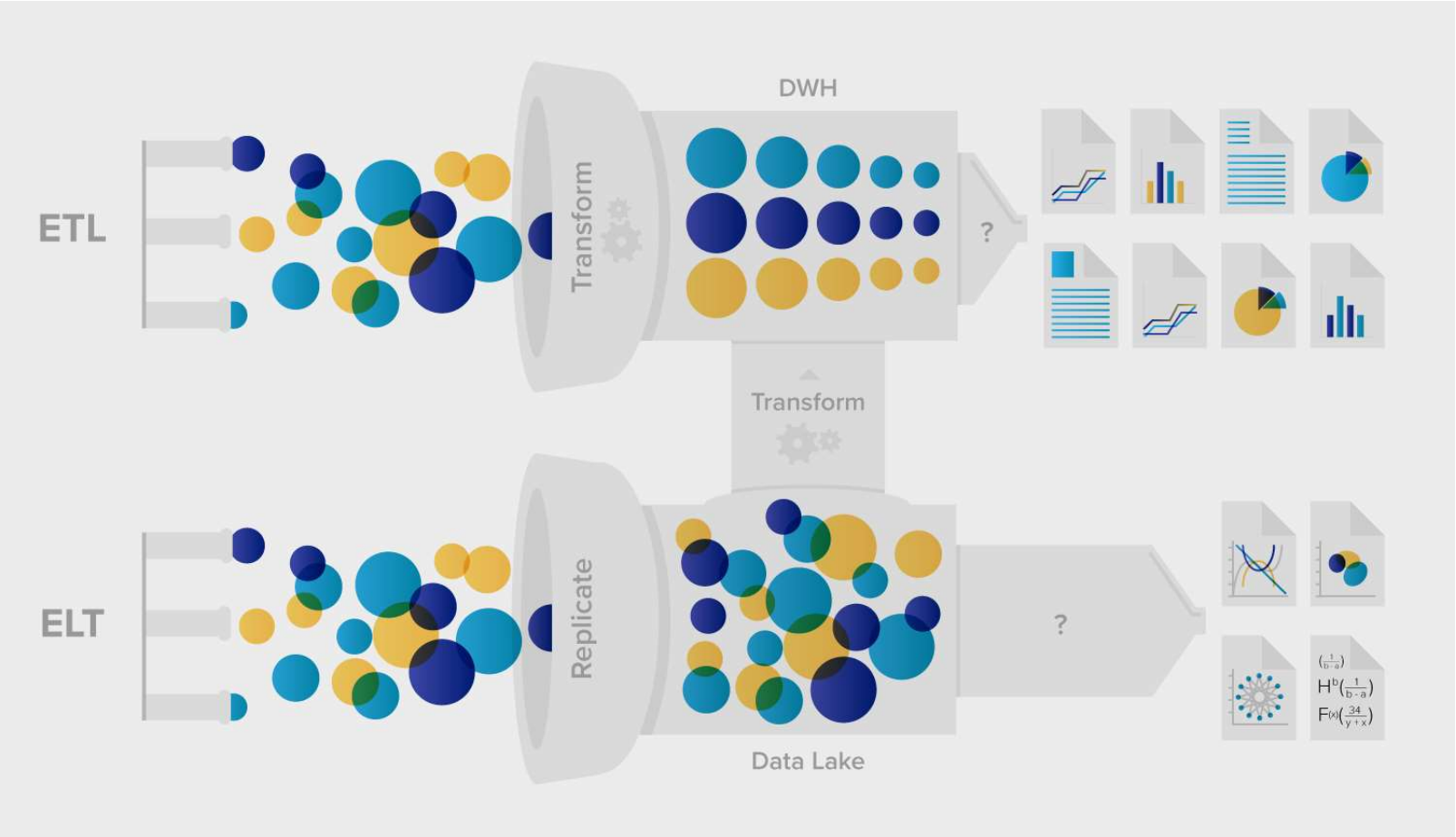


Leading questions





Leading questions



Extract
Transform
Load

Extract
Load
Transform



Leading questions

❑ Capturing@scale

– Is data-lake a real thing for operational data?

(capture and put in object-storage, later decide what to do with the captured data)

– Curation and Granularity

- what is good time to archive/delete data?

Symmetrical policy for all data

- How much data is enough?






Change data resolution on ... ?



Leading questions



Tabular

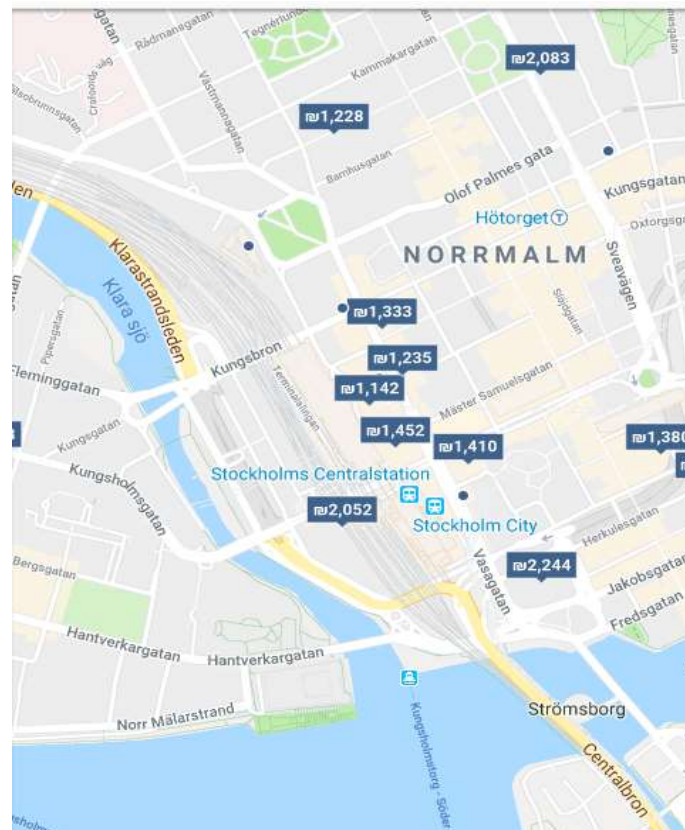
Sort by Highest rating ▾		37 hotels
Grand Hôtel 4.6 ★★★★★ (1,441) · 5-star hotel Luxe hotel from 1874 offering water views, posh dining & an ornate bar, plus a spa & indoor pool. 📶 Free Wi-Fi 🍳 Free breakfast		
Downtown Camper by Scandic ₪1,380 4.5 ★★★★★ (795) · 4-star hotel Trendy, camping-inspired quarters in a cool hotel offering an industrial-chic restaurant & a bar. 📶 Free Wi-Fi 🍳 Free breakfast		
Nobis Hotel ₪1,756 4.5 ★★★★★ (314) · 5-star hotel High-end accommodations offering a posh Italian restaurant, a chic bar & a stylish lounge.		
Hotel At Six ₪1,321 4.5 ★★★★★ (207) · 4-star hotel Contemporary rooms & suites in an upscale hotel featuring 2 bars, a posh restaurant & a 24/7 gym.		
Hotel ₪1,962		



Leading questions



Visual

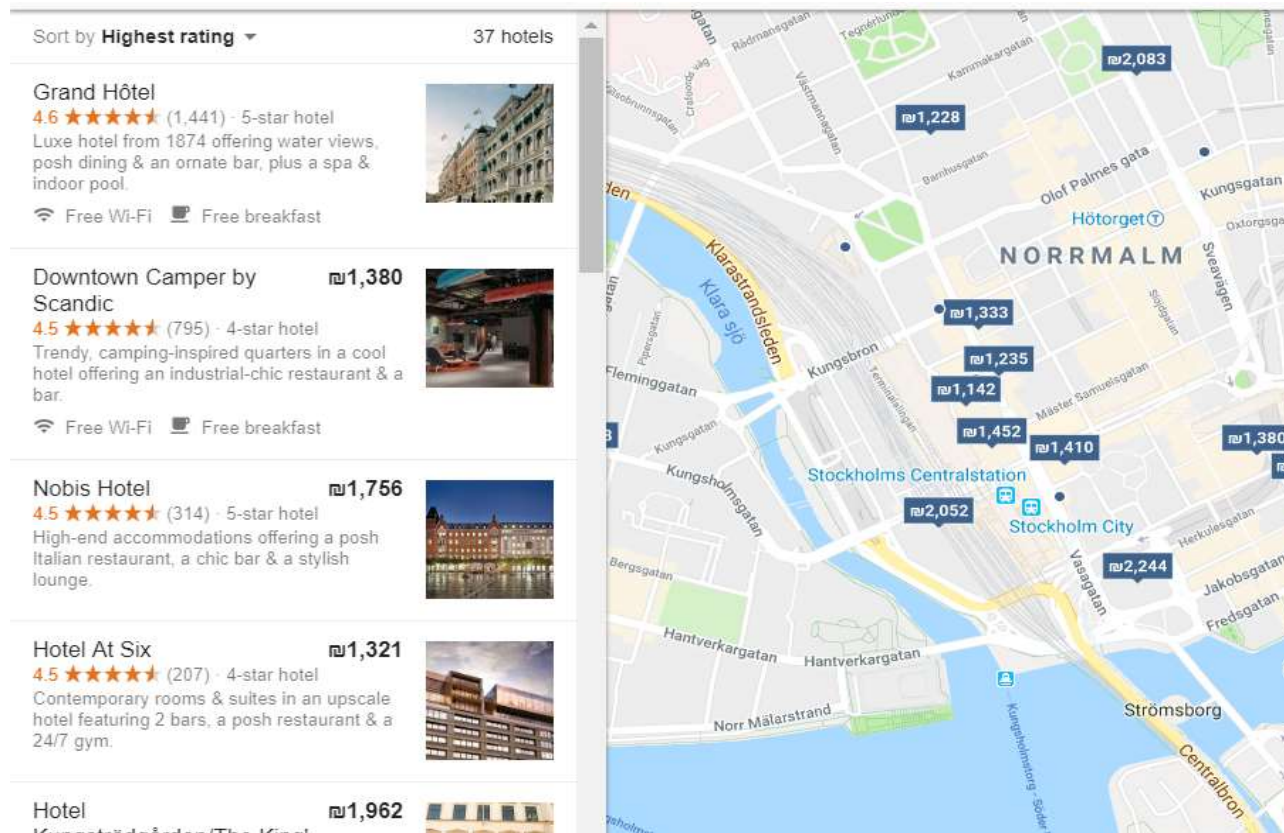




Leading questions

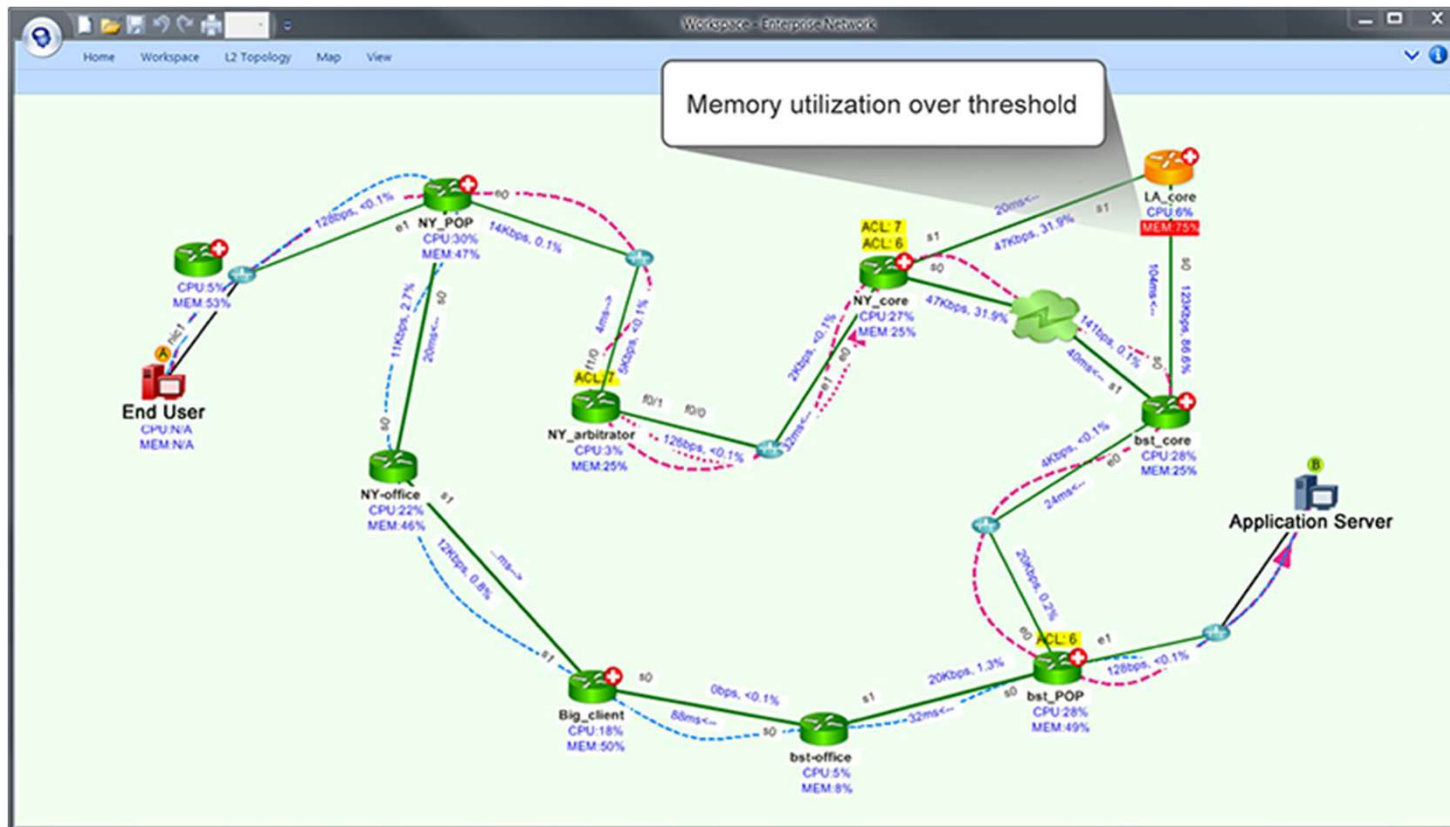


Better
Together?





Leading questions





Leading questions

❑ Exploration

- Tables or Maps (data visualization really helps)?
- Scale ? What are some good examples for tools that works
 - [Graphs?](#)
 - [Maps? Waze?](#)
 - [Skydive, Weave-Scope, K8S UI](#)
- UI or CLI?



Leading questions



Analytics Engine

Flexible framework to deploy Hadoop and Spark analytics applications.

Lite IBM



Cloudant NoSQL DB

Cloudant NoSQL DB is a fully managed data layer designed for modern web and mobile applications.

Lite IBM



Compose for etcd

etcd is a key/value store for distributed server configuration management.

IBM Beta



Compose for MySQL

MySQL is a fast, easy-to-use, and flexible RDBMS.

IBM Beta



Compose for Redis

Redis is an open-source, blazingly fast, low maintenance key/value store.

IBM



Apache Spark

IBM Analytics for Apache Spark for IBM Cloud.

Lite IBM



Compose Enterprise

IBM Compose Enterprise is a service which provides a private isolated cluster for IBM Cloud.

IBM



Compose for JanusGraph

JanusGraph is a scalable graph database optimized for storing and querying highly-structured data.

IBM Beta



Compose for PostgreSQL

Postgres is a powerful, open source object-relational database that is highly customizable.

IBM



Compose for RethinkDB

RethinkDB is a JSON document based, distributed database with an integrated administration console.

IBM



BigInsights for Apache Hadoop (Subscription)

Provision managed bare metal Apache Hadoop clusters for production use or POCs at scale.

IBM Deprecated



Compose for Elasticsearch

Elasticsearch combines the power of a full text search engine with the indexing strengths of Apache Lucene.

IBM



Compose for MongoDB

MongoDB is a JSON document store with a rich query and aggregation framework.

IBM



Compose for RabbitMQ

RabbitMQ asynchronously handles the messages between your applications and databases.

IBM



Compose for ScyllaDB

ScyllaDB is a highly performant, in-place replacement for the Cassandra wide-column database.

IBM Beta



Leading questions

❑ Analytics@scale

– Tools

- Open vs/ proprietary?
 - *Elastic / Kibana / Grafana / Kafka / Hadoop / Spark – all OpenSource?*
- Distribution model?

– Algorithms

- Do we really need deep learning?
 - TensorFlow / Keras/ also OpenSource?*



IBM Cloud object storage – use-case





Leading questions



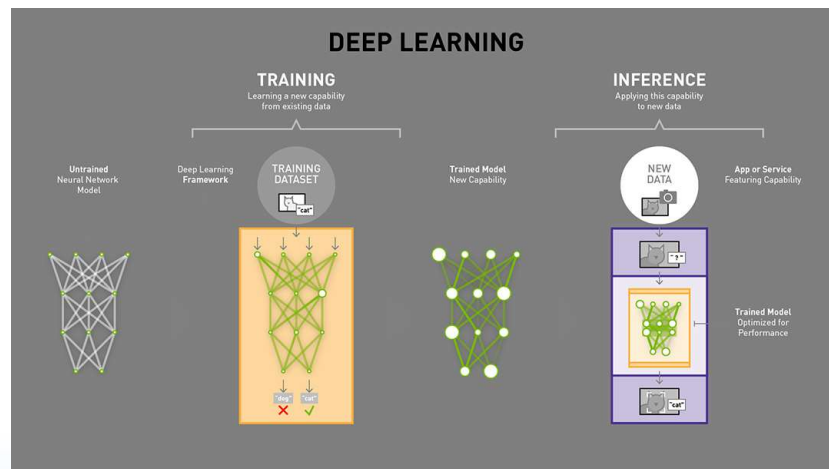
❑ Analytics@scale

– Do we really need high accuracy ?

- Scheduling
- Predictions / Anomaly detection?
- Clustering?

– Price of computation@scale


- GPUs?





Thank you !

README.md

 Build Status go report A+ tech stack

Skydive

Skydive is an open source real-time network topology and protocols analyzer. It aims to provide a comprehensive way of understanding what is happening in the network infrastructure.

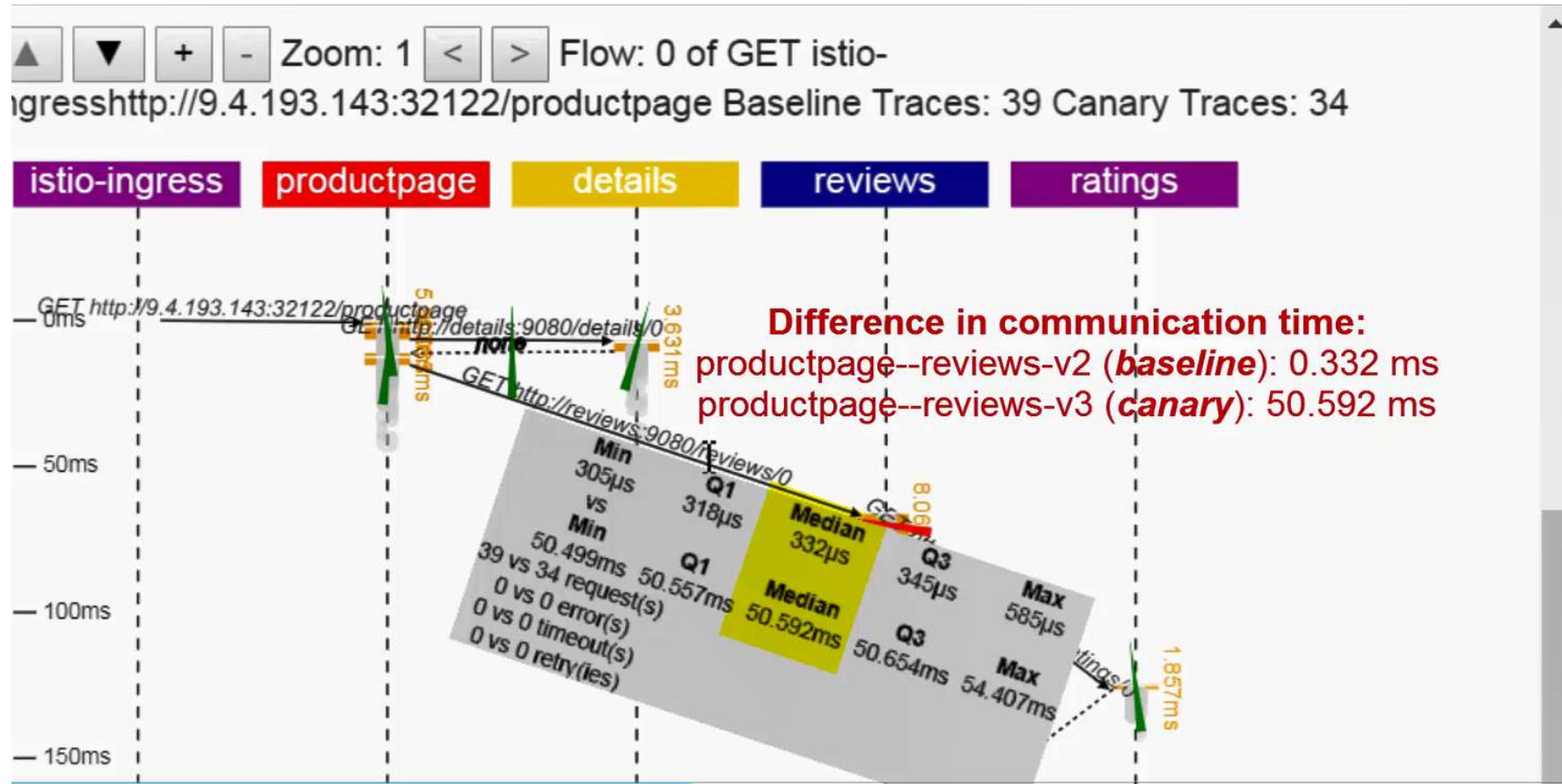
Skydive agents collect topology informations and flows and forward them to a central agent for further analysis. All the informations are stored in an Elasticsearch database.

Skydive is SDN-agnostic but provides SDN drivers in order to enhance the topology and flows informations.



<https://github.com/skydive-project/skydive>

Multi-layer Analytics – K8S



Multi-layer Analytics – K8S

