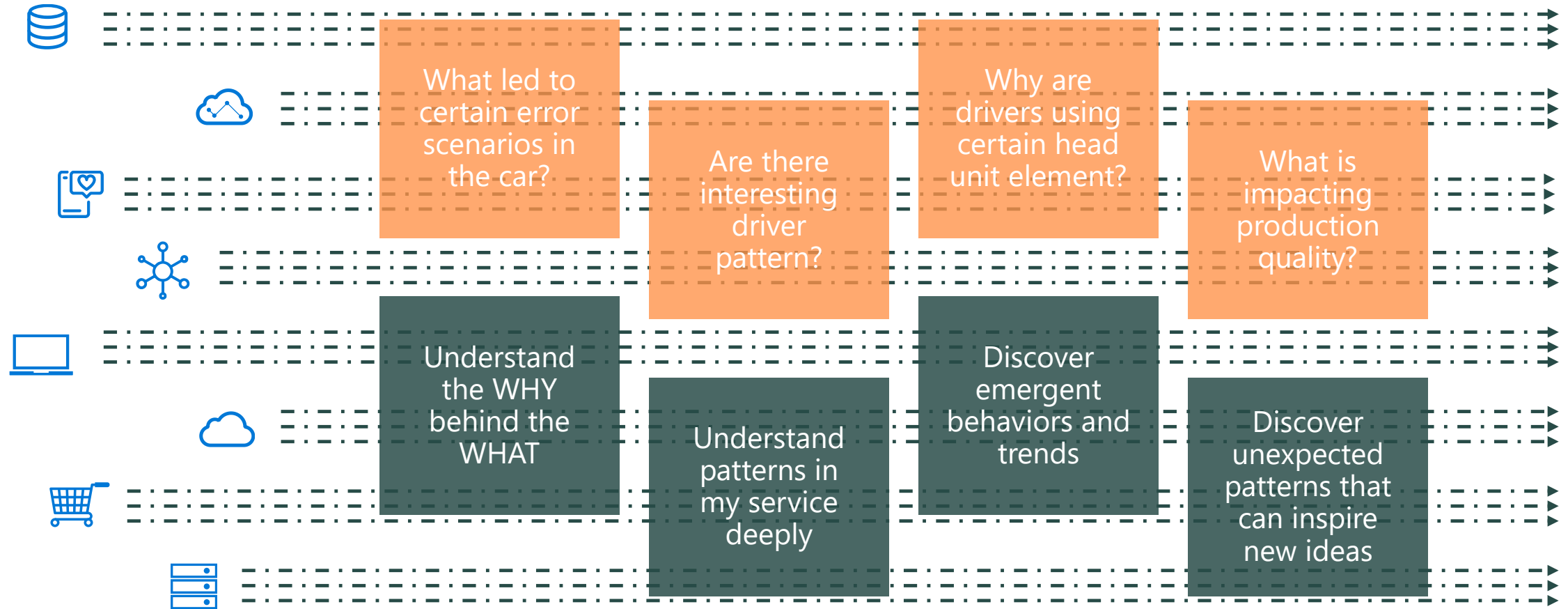


BMW ADX intro

Henning Rauch (30 min)

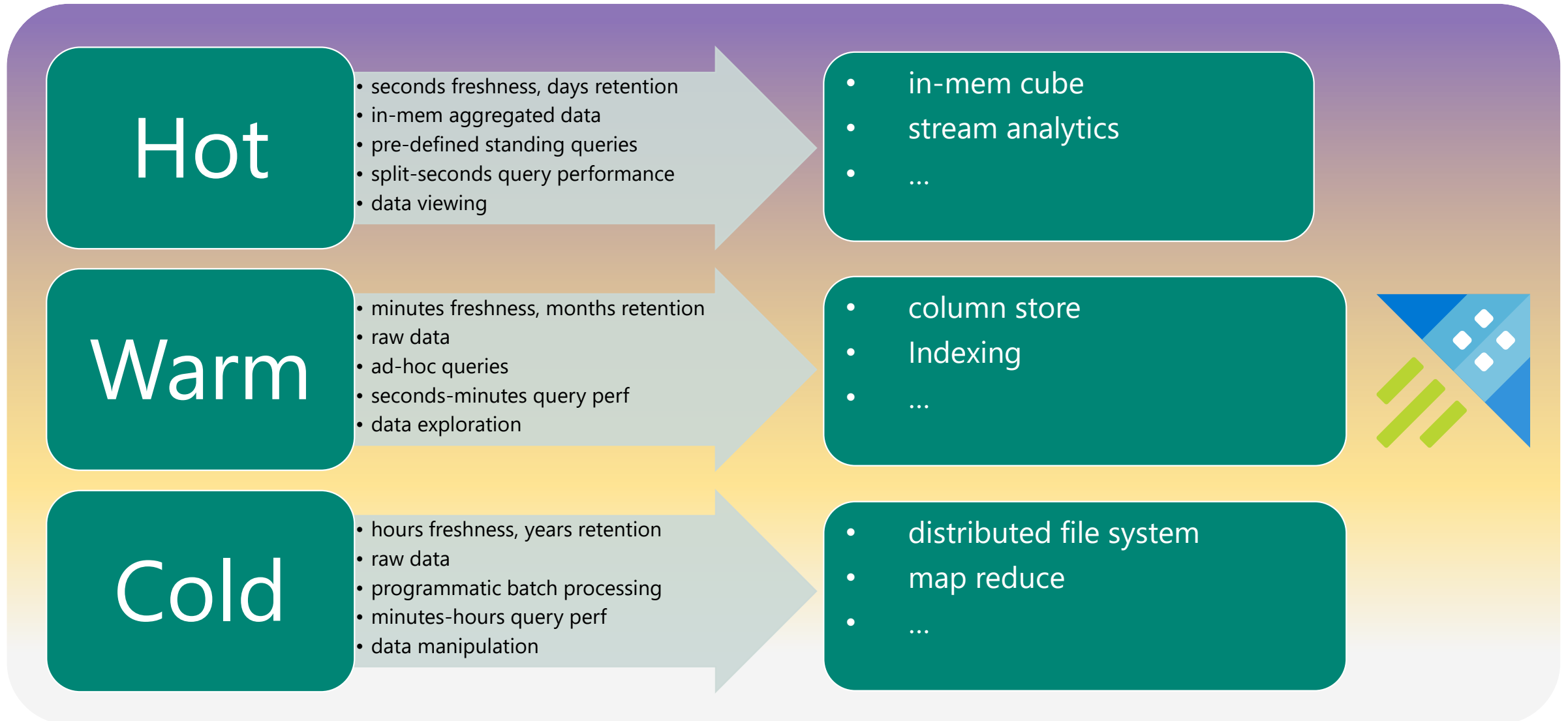
Adi Eldar (60 min)

Take action on details that differentiate your business



New insight develops when you explore your data freely, unconstrained.

Multi-temperature data processing paths



Azure Data Explorer

Fast and fully managed data analytics platform



Fully managed for efficiency

Focus on insights, not the infrastructure for fast time to value

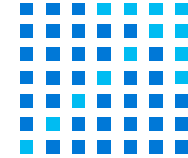
No infrastructure to manage; provision the service, choose the SKU for your workload, and create database.



Optimized for streaming data

Get near-instant insights from fast-flowing data

Scale linearly up to **200 MB per second per node** with highly performant, low latency ingestion.



Designed for data exploration

Run ad-hoc queries using the intuitive query language

Returns results from **1 Billion records < 1 second** without modifying the data or metadata

Azure Data Explorer overview

1. Capability for many data types, formats, and sources

Structured (numbers), semi-structured (JSON/XML), and free text

2. Batch or streaming ingestion

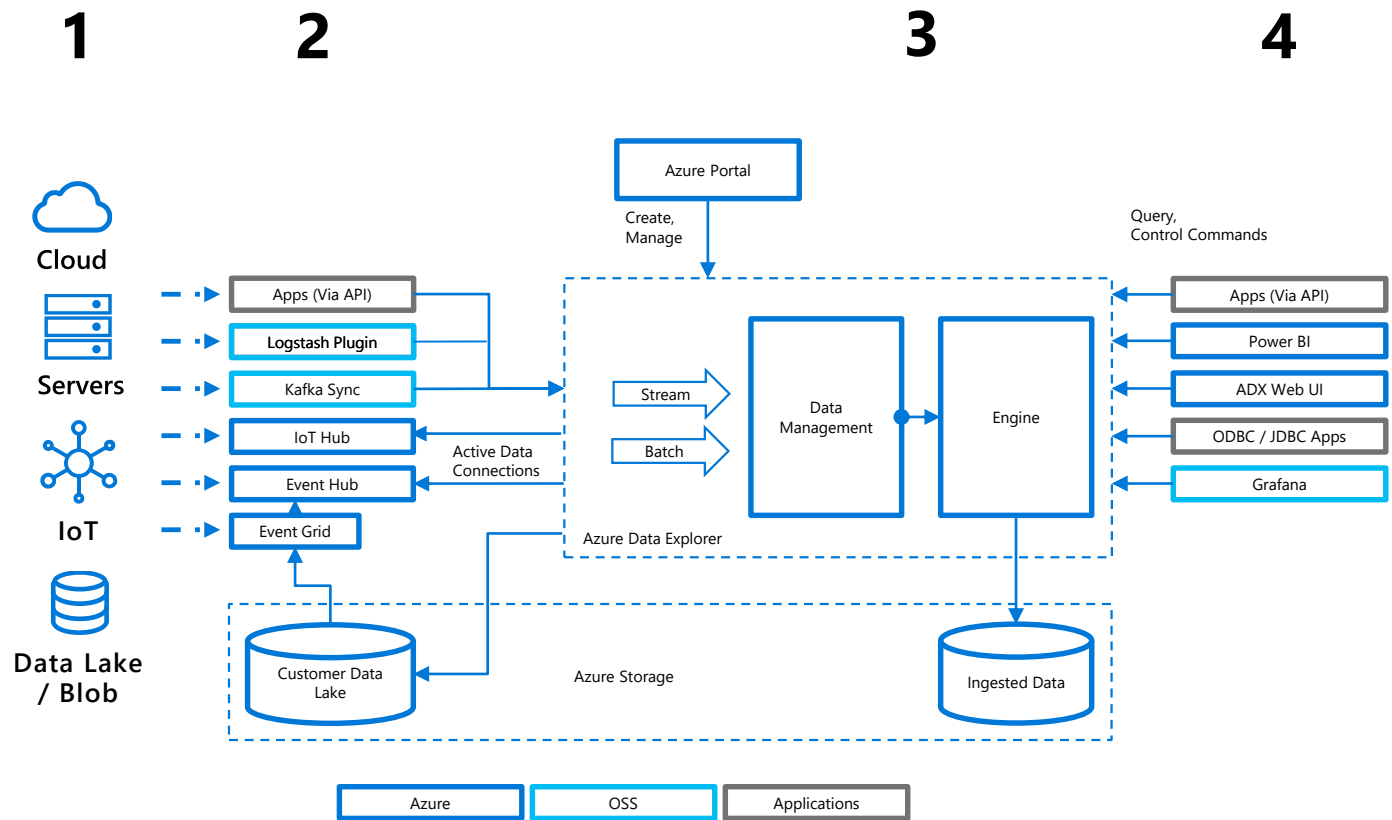
Use managed ingestion pipeline or queue a request for pull ingestion

3. Compute and storage isolation

- Independent scale out / scale in
- Persistent data in Azure Blob Storage
- Caching for low-latency on compute

4. Multiple options to support data consumption

Use out-of-the box tools and connectors or use APIs/SDKs for custom solution



Simple provisioning

Easy provisioning

- No infrastructure to manage: Azure PaaS
- Use Azure Portal, APIs, or PowerShell to provision
- Storage Optimize/Compute Optimize SKUs
- Flexible data caching and retention options at database and table level

Rapid elasticity

- Buy only what you need
- Scale out/in manually or use autoscale
- Dedicated resources

Maintenance-free

- All columns are compressed and indexed during ingestion
- No index maintenance required

Fully managed for efficiency



Create an Azure Data Explorer Cluster

Basics | Review + create

PROJECT DETAILS
Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

* Subscription: PM_POC
* Resource group: customers_poc
[Create new](#)

CLUSTER DETAILS
* Cluster name: mynewadx
* Location: East US 2
* Compute specifications (View full pricing details):

Recommended
D14_v2 (16 vCPUs, 614 GB Cache, 112 GB Ram)
L16 (16 vCPUs, 2.7 TB Cache, 128 GB Ram)

All Available Pricing
D13_v2 (8 vCPUs, 307 GB Cache, 56 GB Ram)
D14_v2 (16 vCPUs, 614 GB Cache, 112 GB Ram)
L8 (8 vCPUs, 1.3 TB Cache, 64 GB Ram)
L16 (16 vCPUs, 2.7 TB Cache, 128 GB Ram)

Select compute specifications
Available plans - PREVIEW

The price is an estimate of the cluster's virtual machines and Azure Data Explorer service costs. Other costs are not included. Please see Azure calculator page for an estimate and the Azure Data Explorer pricing page for full pricing information.

D13_V2	D14_V2
8 vCPUs	16 vCPUs
307 GB Cache	614 GB Cache
56 GB Ram	112 GB Ram
Compute \$0.759/h	Compute \$1.518/h
Azure Data Explorer \$0.44/h	Azure Data Explorer \$0.88/h
1.20 USD/H (ESTIMATED)	2.40 USD/H (ESTIMATED)

L8	L16
8 vCPUs	16 vCPUs
1.3 TB Cache	2.7 TB Cache
64 GB Ram	128 GB Ram
Compute \$0.144/h	Compute \$1.488/h
Azure Data Explorer \$0.44/h	Azure Data Explorer \$0.88/h
1.18 USD/H (ESTIMATED)	2.37 USD/H (ESTIMATED)

[Review - create](#) [Next: Review + create >](#)

[Select](#)

Fast ingestion

Easy input from multiple data sources

Multiple data sources

- Managed ingestion (e.g. Event Hub, IoT Hub) or programmatic ingestion (e.g. connectors, SDKs)

Multiple formats

- Tabular formats: CSV, TSV, PSV, SCSV
- JSON (line-separated, multiline), Avro
- ZIP and GZIP compression (for Batch)

Versatile ingestion

- Use batch or streaming ingestion

Easy input from multiple formats

- Tabular formats: CSV, TSV, PSV, SCSV
- JSON (line-separated, multiline), Avro
- ZIP and GZIP compression (for Batch)

Instant integration with simple transforms

- Reshape the data with update policies (Database Ingest Triggers)

Optimized for streaming data



Managed services



Azure Event Grid



Azure Event Hub



Azure IoT Hub



Azure Blob



Azure Data Lake

Connectors/Plugins



logstash



kafka

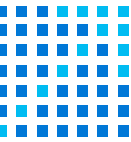
SDKs and APIs



REST API

Intuitive querying

Designed for data exploration



Simple and powerful

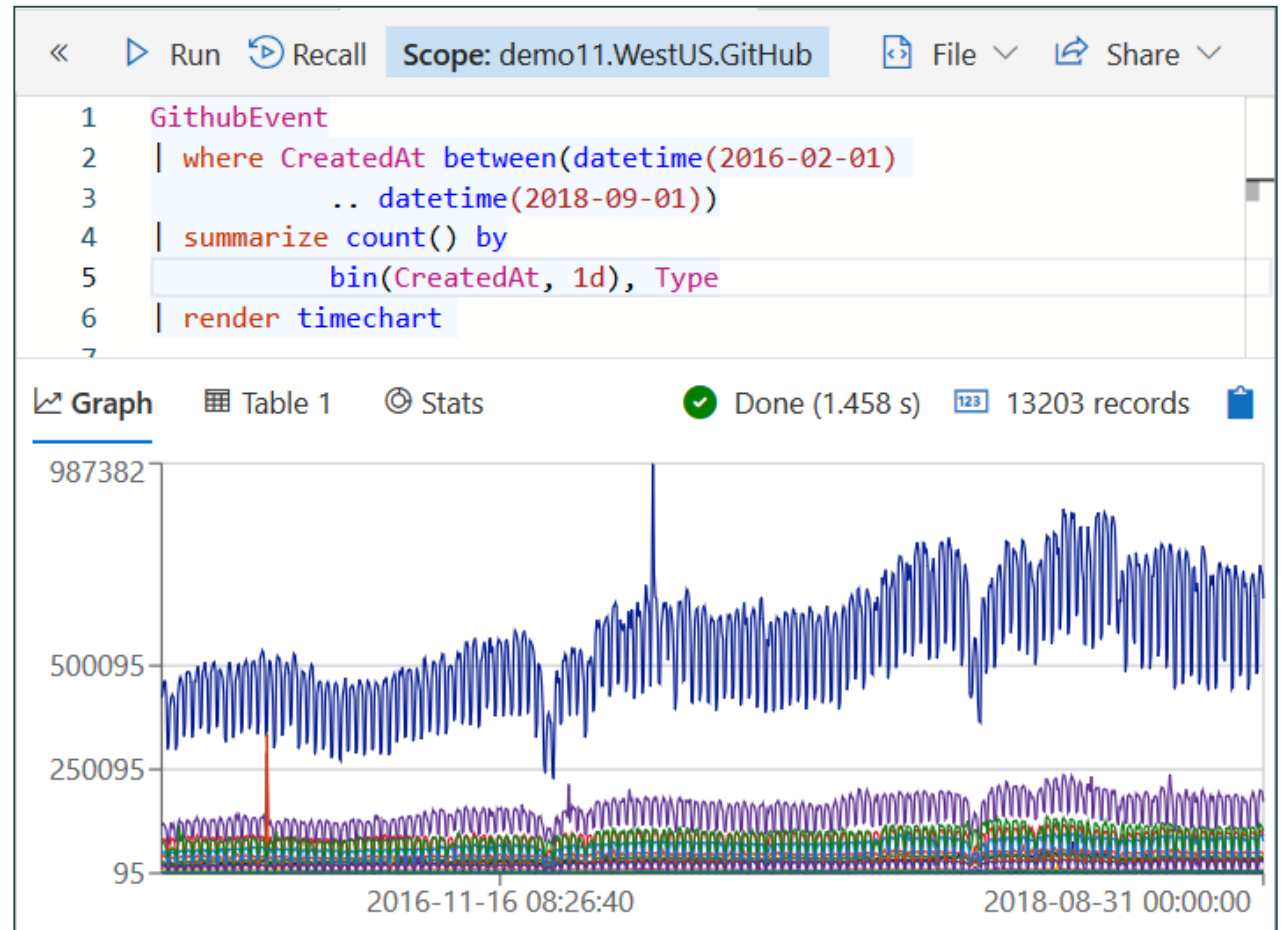
- Rich relational query language (filter, aggregate, join, calculated columns, and more)
- Built-in full-text search, time series, user analytics, and machine learning operators
- Out-of-the box visualization (render)
- Easy-to-use syntax + Microsoft IntelliSense
- Highly recognizable hierarchical schema entities

Comprehensive

- Built for querying over structured, semi-structured and unstructured data simultaneously

Extensible

- In-line Python
- SQL



Typical scenarios

Log Analytics Platform

Fast, fresh, cost efficient, indexed access to all activity records, events and time series data
Platform for internal applications and services



Multitenant Analytics Solutions as a Service

Customer facing analytical solution in a variety of domains
Complementing the main product or the product itself



Advanced Analytics

Power data science and machine learning workloads
Boost data science team productivity



The platform for analytical Solutions(aaS)

Azure Monitor

- Log Analytics
- Application Insights



Security Products

- Windows Defender
- Azure Security Center
- Azure Sentinel



IoT

- Time Series Insights
- Azure IoT Central
- Microsoft Connected Vehicle Platform



Gaming

- PlayFab



The data lake at your fingertips



Cached, indexed access to the data lake

- Ad hoc query over raw data with full indexing
- Automatic ingestion from selected lake repositories
- Sensing new data as it enters the lake
- ADLS G2 and Azure Blob storage

Continuous export to the data lake

- Data ingested via other channels
- Automatically saved to a data lake folder
- Parquet, CSV

Ad hoc query over raw data (New)

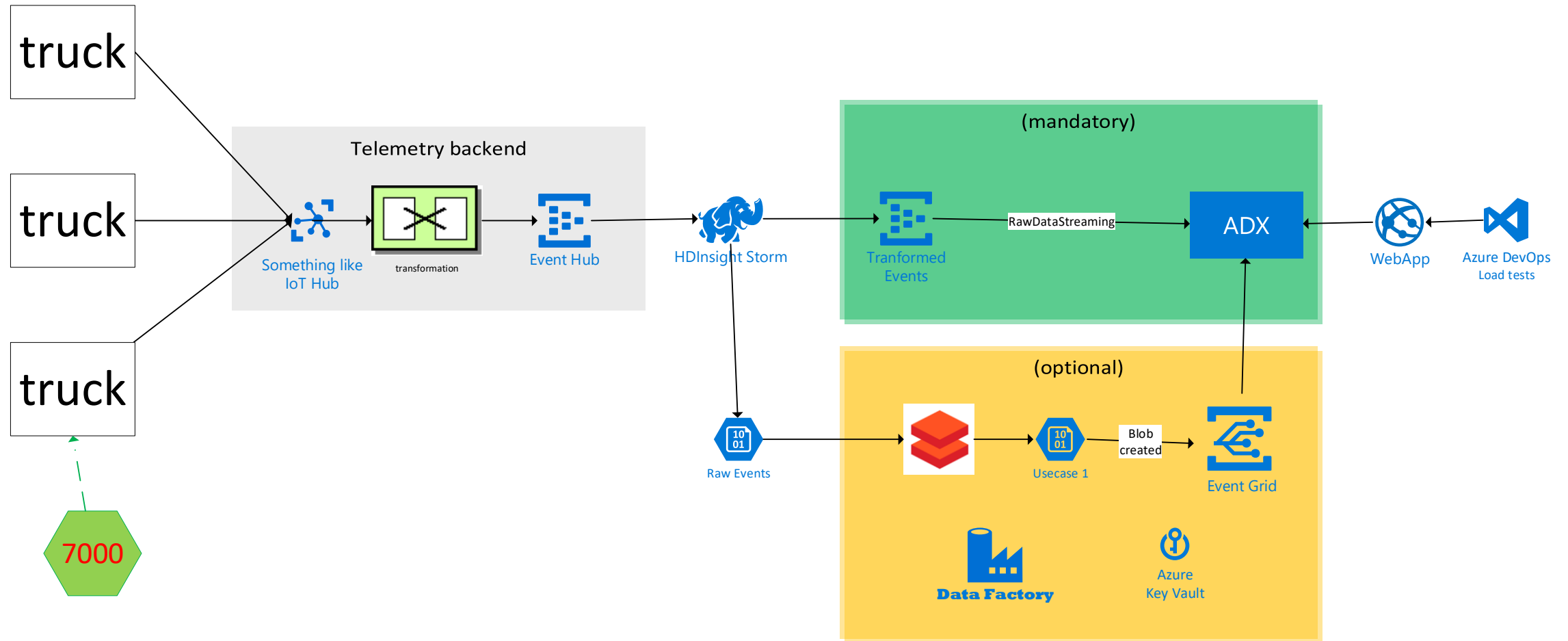
- Ad hoc query data in its natural format in the lake
- Leverage data partitioning to optimize query time
- Join across indexed and natural lake data

Advanced Analytics - Machine Learning with Azure Data Explorer

Out of the box	Distributed Custom Code Execution	Spark Integration	Tools
<ul style="list-style-type: none">• Auto Clustering• Anomaly detection• Regressions• Forecasting• Series shape detection	<ul style="list-style-type: none">• Distributed Python execution• Push code near the data• User defined functions• Stored functions	<ul style="list-style-type: none">• Connector for heavy duty model training• Upload model or data into ADX for ongoing model scoring	<ul style="list-style-type: none">• Jupyter Integration with KQL Magic• Python, Java SDKs

Truck telemetry analytics

Truck telemetry analytics - architecture



Truck telemetry analytics - data

```
{
  "VIN": "XXX",
  "MSG_TYPE": "SIGNAL",
  "TSC": [
    {
      "E": 1550478143711,
      "V": 2
    },
    {
      "E": 1550478189310,
      "V": 2
    },
    {
      "E": 1550478169077,
      "V": 2
    },
    {
      "E": 1550478166098,
      "V": 1
    },
    {
      "E": 1550478187382,
      "V": 1
    }
  ],
  "CGV": [
    {
      "E": 1550478140127,
      "V": 6
    },
    {
      "E": 1550478183965,
      "V": 0
    }
  ],

```



Vin	TS	TS C	CG V
xxx	2019-02-20 15:13:20	2	6		
yyy	2019-02-20 15:13:20	3	5		

```
{
  "StartTimestamp": "1558275110000",
  "SpacialCount": "120",
  "EndTimestamp": "1558275229000",
  "TriggerType": "NA",
  "SpacialSum": "9.242128906250073",
  "Sequence": "402",
  "Trigger": "analytics",
  "Version": "3",
  "Source": "ctpSource",
  "Signal": "Accel_Y_Cval",
  "Max": "1.4604609375000006",
  "Pts": "1558393275917",
  "Rts": "1558393275856",
  "Min": "-1.5297734374999994",
  "Vin": "3AKJHHDR9LSLP8810",
  "T0s": "0.2104609375000006",
  "T110s": "0.2700312500000006",
  "T101s": "0.2602656250000006",
  "T116s": "0.3701289062500006",
  "T108s": "0.2700312500000006",
  ...
}
```



Truck telemetry analytics - result

- Reimplement current dashboard functions using Azure Data Explorer
- Insert data continuously (100 raw event inserts per second)

ID	eature	PoC median response (ms) 60 concurrent users	Old system median response (ms)
1	Dashboard map	968	2 concurrent users = 13,700 10 concurrent users = 96,000
2	Crash events	386	10 concurrent users = 324 60 concurrent users = 957
3	Fuel Efficiency	179	10 concurrent users = 2,145 60 concurrent users = 7,527

Truck telemetry analytics - conclusion

Higher performance:

- Response time: Up to 100 times faster

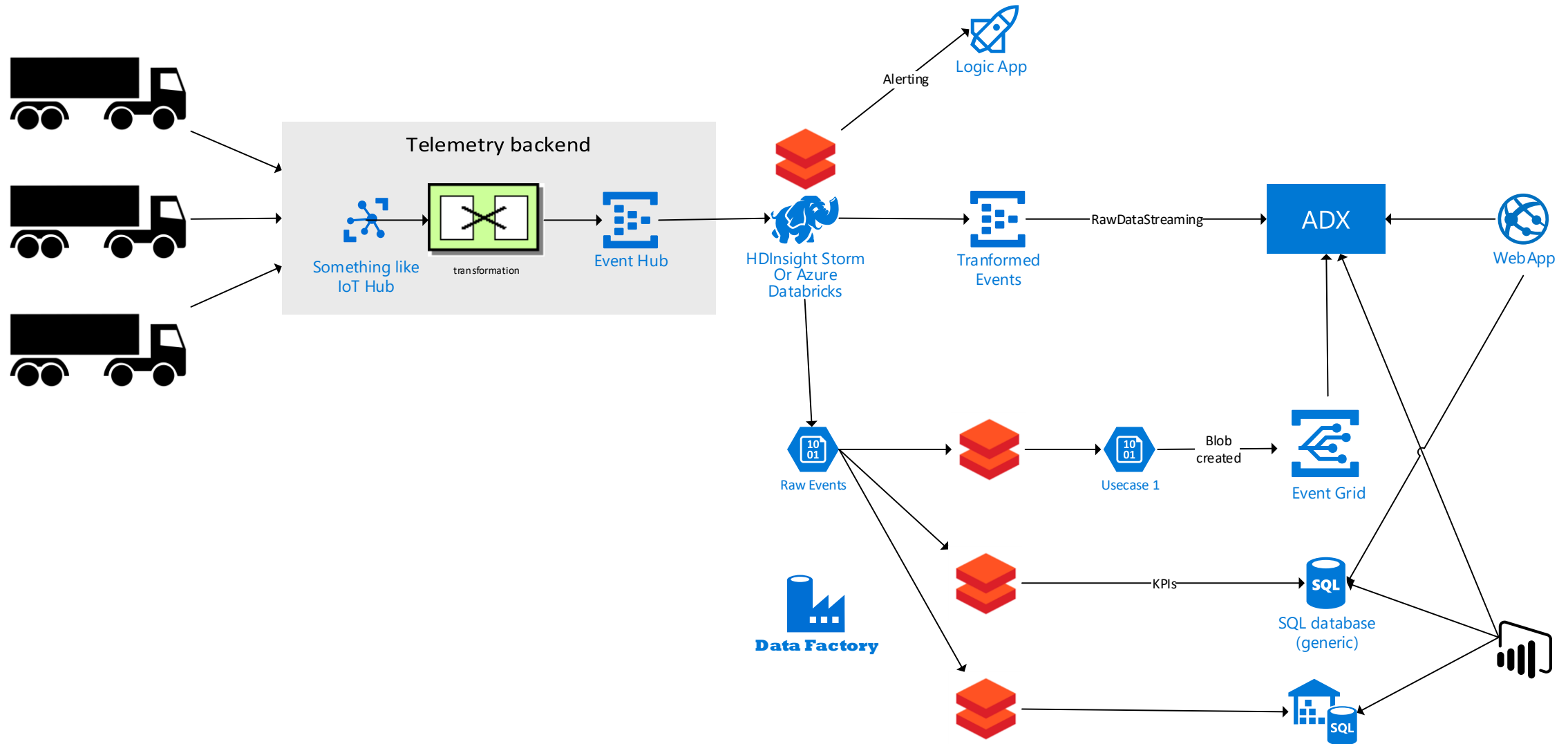
Costs are lower

- Cost per vehicle: At least 18.73% (up to 80%) less
- Fully PaaS service

Code is simpler

- Fewer lines of code
- Query language is well-suited to IoT telemetry analysis

Truck telemetry analytics – bigger scope





Azure Data Explorer – The platform for Analytical SaaS

Customer Need	Azure Monitor	Azure Security *	Industrial IoT - Time Series Insights -	Xbox Playfab	MCVP
A fit for purpose end to end solution.	<p>Lead with Azure Monitor Log Analytics and Application insights when the customer needs an E2E solution for IT infrastructure, services and applications monitoring and analytics.</p> <ol style="list-style-type: none"> App and infra monitoring models and knowledge OOB Full multitenant monitoring experience with alert, dashboards Smart analytics for monitoring Solution framework for specific more knowledge domains Powerful analytics capabilities of KQL over time series and telemetry data 	<p>Lead with the Microsoft security solutions like Windows Defender Advanced Threat protection, Azure Security Center and azure Security Insights when the customer needs a security solution</p> <ol style="list-style-type: none"> Security knowledge applied out of the box Automatic remediation, protection Powerful analytics capabilities of KQL over time series and telemetry data 	<p>Lead with TSI when the customer needs an end-end-end solution for Industrial IoT analytics that offers:</p> <ol style="list-style-type: none"> IoT-optimized, turnkey, PAYG, serverless platform Rich semantic modeling for contextualization of time series data Asset-based analytics user experience for discovery, trending, anomaly detection and operational intelligence 	<p>Lead with Playfab when the customer needs full platform for game development including game analytics and data exchange</p>	<p>Lead with MCVP for connected cars E2E fit for purpose solution and platform</p>
A flexible platform to build custom analytical solutions.	<p>Recommend ADX when the customer is building their own analytics solution or platform and needs:</p> <ol style="list-style-type: none"> Full control of data sources, data schema and data management Powerful analytics capabilities of KQL over time series and telemetry data Reserved resources cost model 				



Azure Data Explorer customers



"In terms of usability it is beyond compare any other database query language we have used so far."

*Emilian Ertel
Senior Key Expert*



"The solution was so simple that we were up and running in a week, ingesting and analyzing 17 TB of data per day."

*Ariel Pisetky
Vice President of IT*

