Fellowwind

From zero to Kusto hero at 30.000 ft

A unified analytics solution for the era of AI

sqlbits

2024

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Fellowmind

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MVP Microsoft Most Valuable Professional

Microsoft
FastTrack Recognized Solution Architect Power BI
2022 >>

Microsoft
Certified Trainer Data Platform
2018 >>

AGENDA

The history of Kusto
Where does Kusto and RTA fit in the Data area
RTA in Fabric – incl. roadmap
Capabilities using Kusto
Get started for free
Introduction to the KQL language

BREAK

Kusto data in Power BI – with ninja tricks 🥷
Kusto Functions
Next level KQL language
Outliers
Visualization
Dash-boarding

Jaques Cousteau
1910-1997

Jaques Cousteau
1910-1997

Image is AI generated

The history of Kusto

Azure Sentinel

Log Analytics

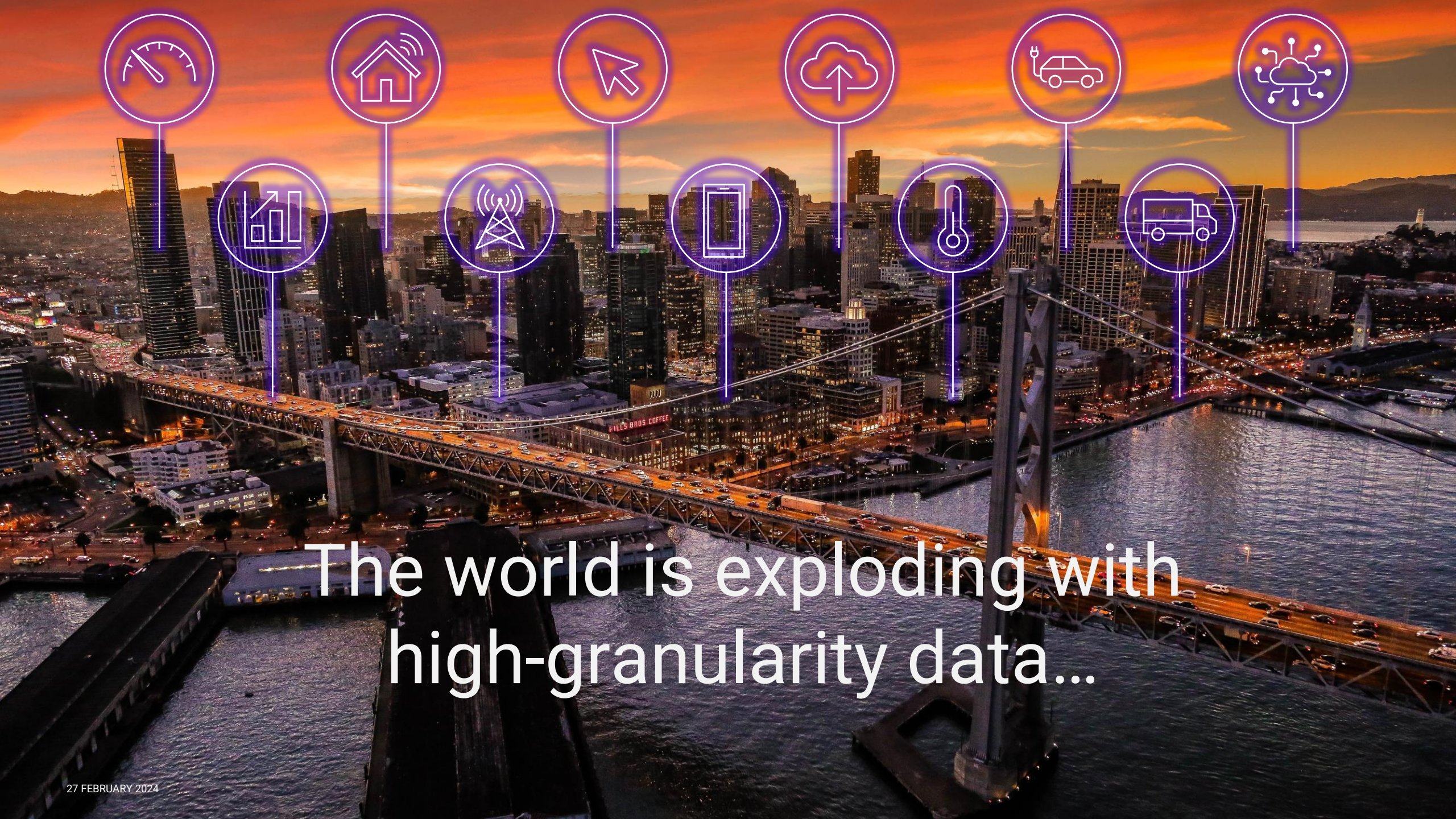
Real-Time Analytics

Azure resource graph

Microsoft 365 Defender

CMPivot

CMPivot



The world is exploding with high-granularity data…

It all starts with data

Telemetry – a key data for digital transformation

Telemetry – a key data for digital transformation

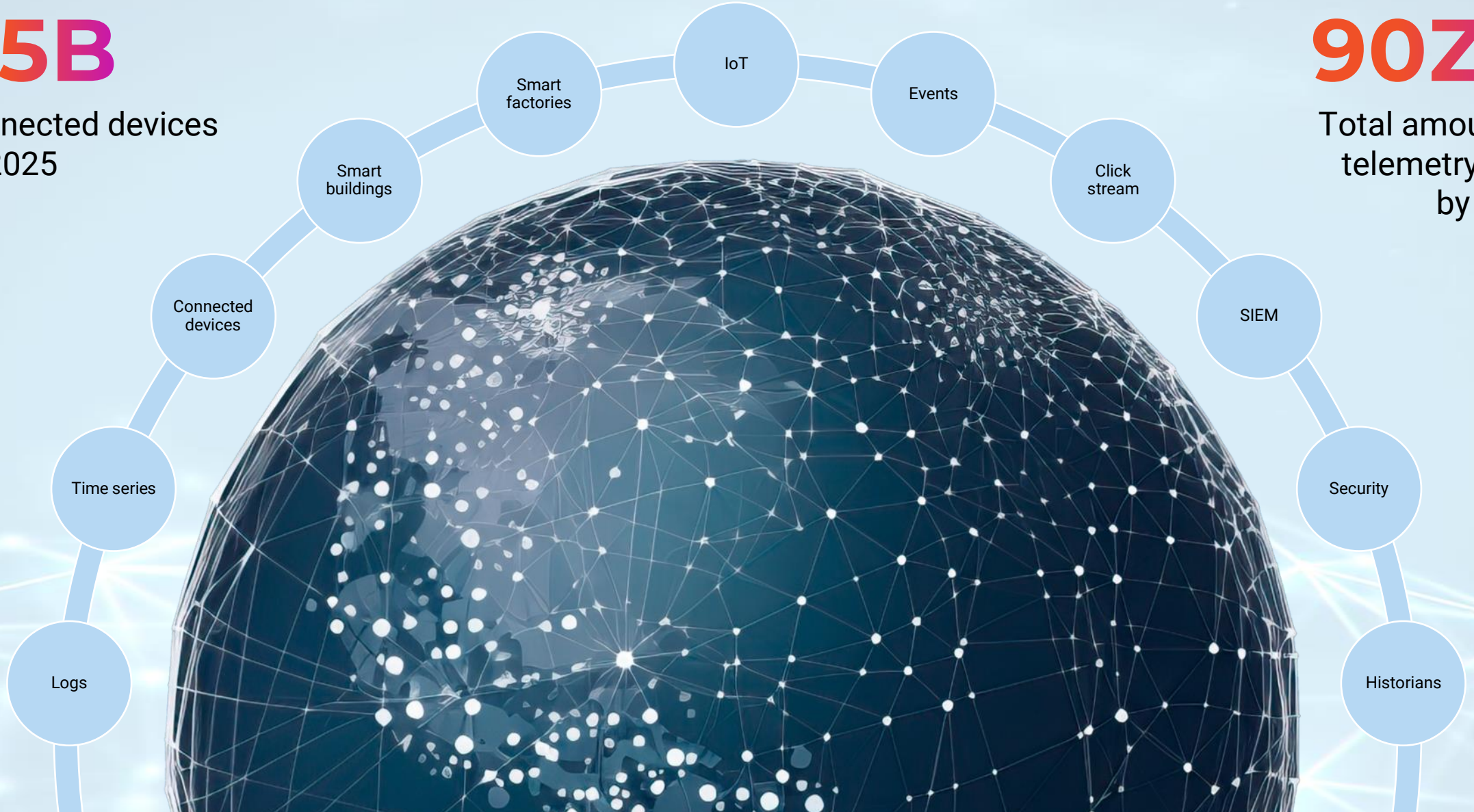
Telemetry – a key data for digital transformation

75B

Connected devices by 2025

90ZB

Total amount of telemetry data by 2025



Digital transformation

Cybersecurity
Asset tracking and management
Predictive maintenance
Supply chain optimization
Customer experience
Energy management
Inventory management
Quality control
Environmental monitoring
Fleet management
Health and safety

Microsoft Fabric

Get data

Data Factory

Prepare data

Synapse Data Engineering

Synapse Data Warehouse

Synapse Data Science

Synapse Real-Time Analytics

Use data

Power BI

Data Activator

Store data

OneLake

Microsoft Fabric

Get data

Data Factory

Prepare data

Synapse Data Engineering

Synapse Data Warehouse

Synapse Data Science

Synapse Real-Time Analytics

Use data

Power BI

Data Activator

Store data

OneLake

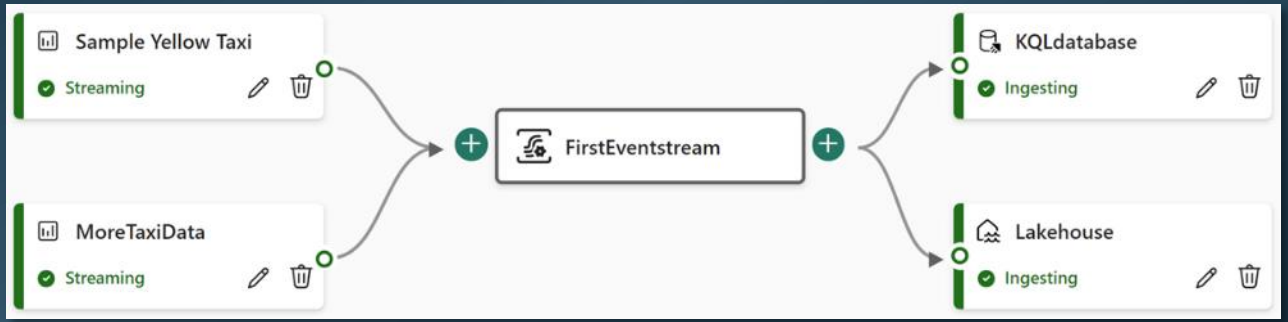
Fabric Real-time Analytics solution enables organizations to consume **vast amount of data**, focus and **scale up** their Analytics solution with **data in motion, empower** their business analysts, and **democratize their data** for citizen data scientists and Data Engineers

Synapse Real-Time Analytics

Streaming data with ease

EVENTSTREAM

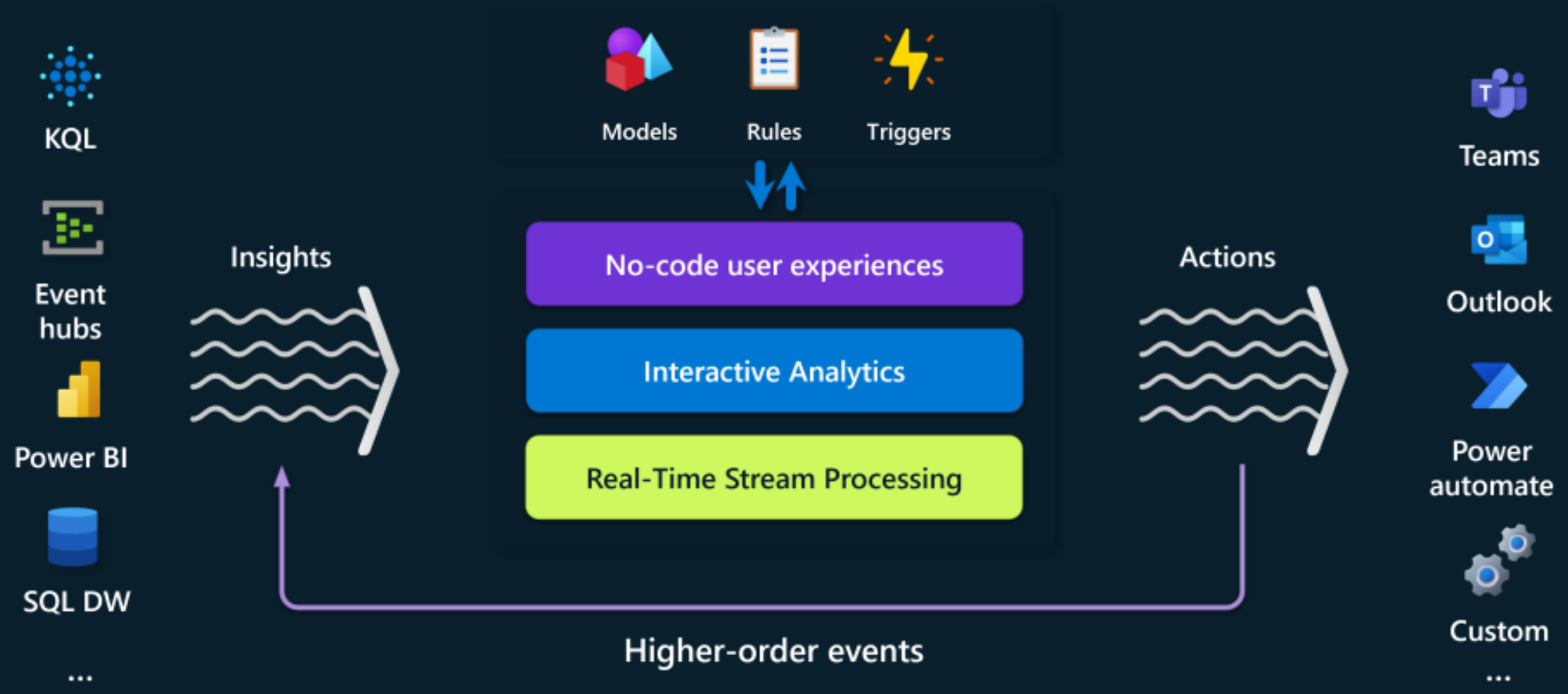
The brand-new event stream service, leverages the ability to get data from several sources of streaming data and save it to a wide variety of destinations, including OneLake, KQL databases and Azure services.



The service computes the data once and can pipe it out to several destinations at once. All configured and maintained from within the Microsoft Fabric portal and “coded” with your mouse.

Imagine scenarios of IoT devices loading data to both the data warehouse and other 3-rd party destinations – this can now be done using the low-code approach from Event Stream.

Data Activator



KQL database
Key capabilities

Unlimited Scale (query, ingestion and storage)

Any data source

Any data format

Structured
Semi-structured
Free-text

Real-time transformation og complicated data strcutures

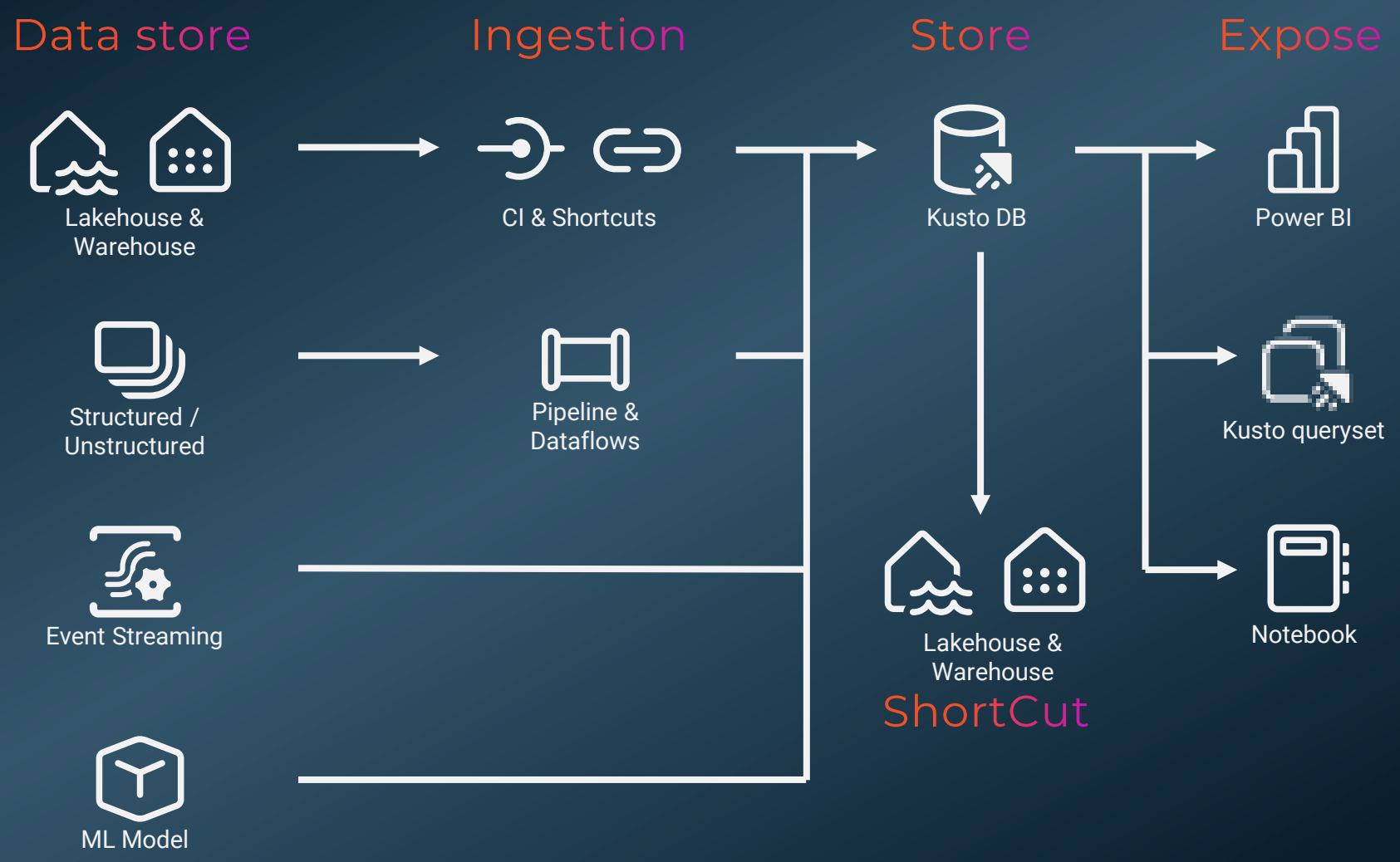
Streaming analytics in Near-Real-Time

High performance
Low latency
High freshness

Timeseries database

Everything is indexed and partitioned

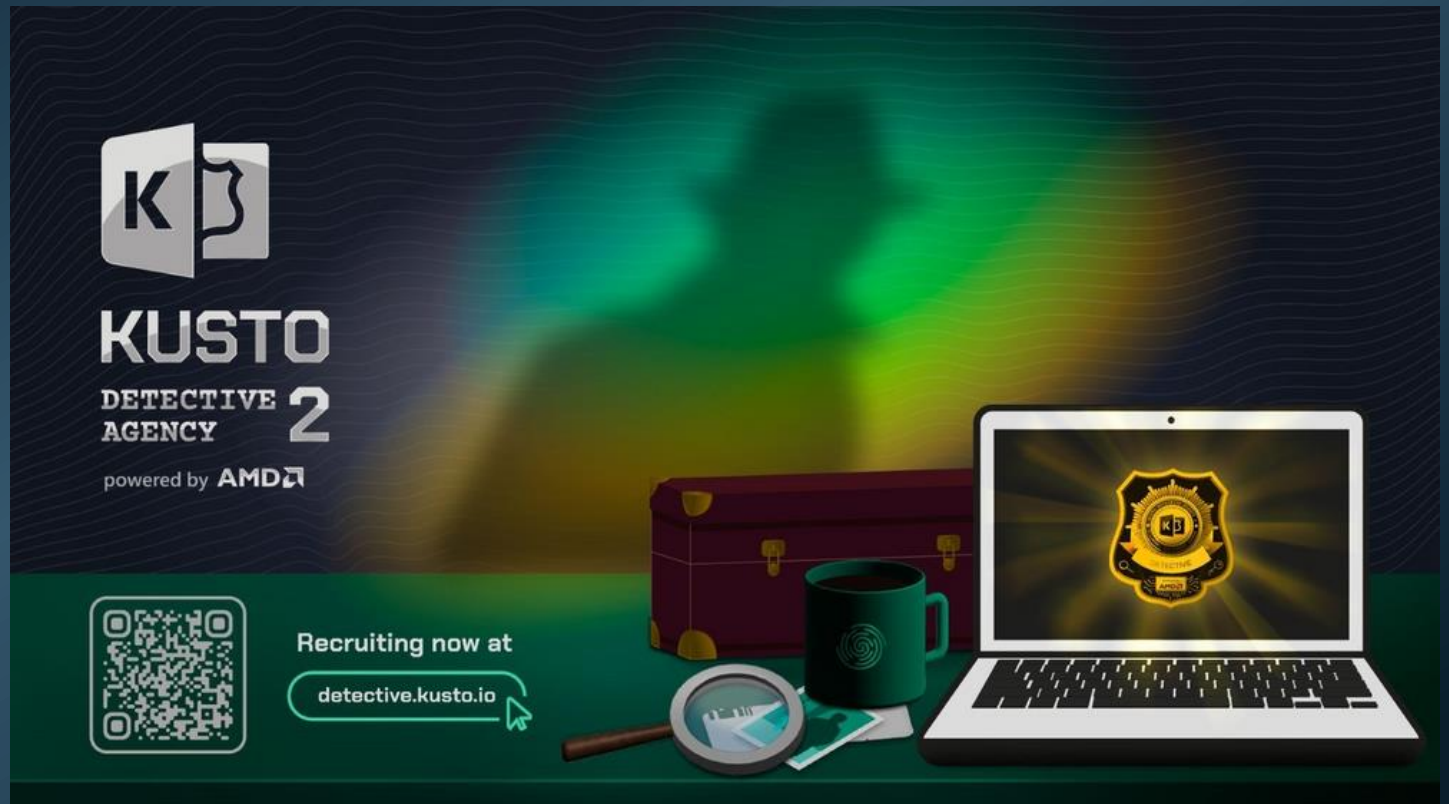
Real-Time Analytics



Get started for free

https://dataexplorer.azure.com/freecluster

https://detective.kusto.io



Forget everything you know about

query performance vs data types
&
data modelling best practices

Data modelling Kusto in Power BI

- Single table reporting can be a good option, if you can include all columns from dimensions to the table
- M:M relations are hard to avoid, but not a big deal → all queries will be translated to KQL
- All dimensions must be tagged with “IsDimension=true”
- Dimensions can be imported if they are <1 mio rows.
- INTEGER and DECIMAL er slow joins compared to STRING

Harness the Power (BI) of Kusto

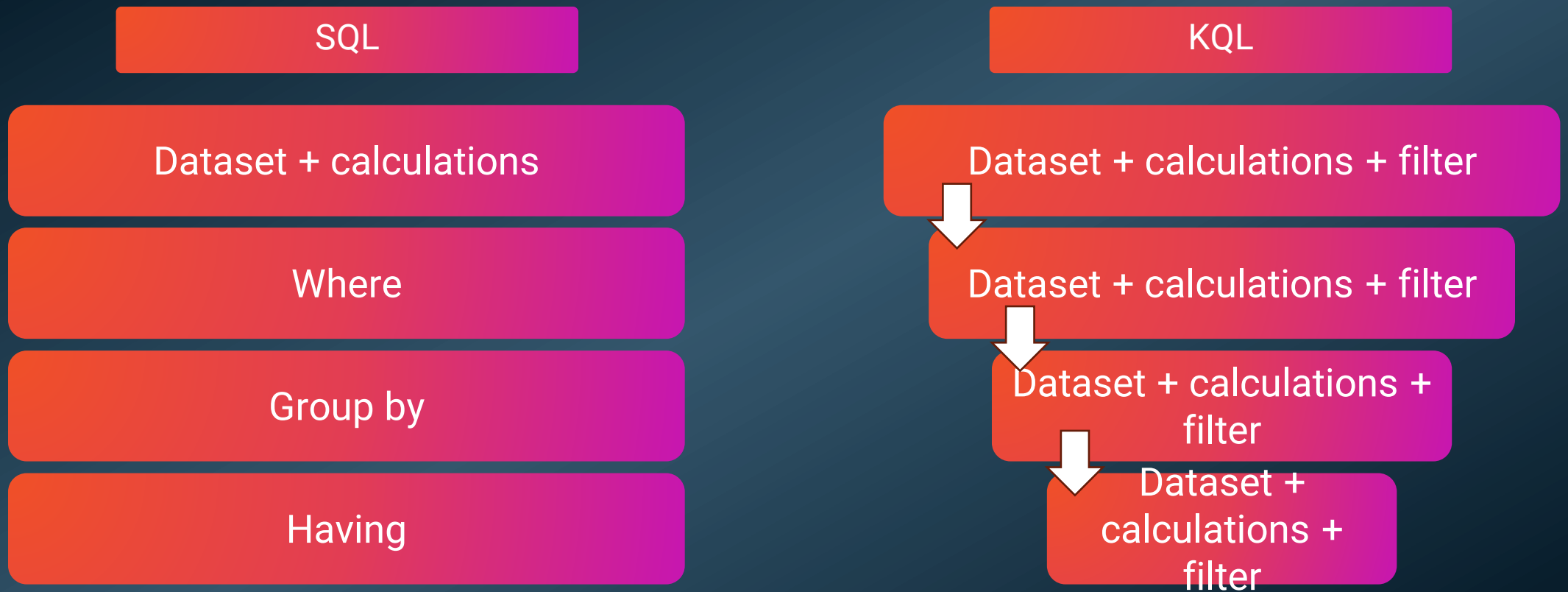
Let Power BI build the KQL

- In Power Query
- Using DAX

Or build a Kusto function

Fellowwind

The language and structure



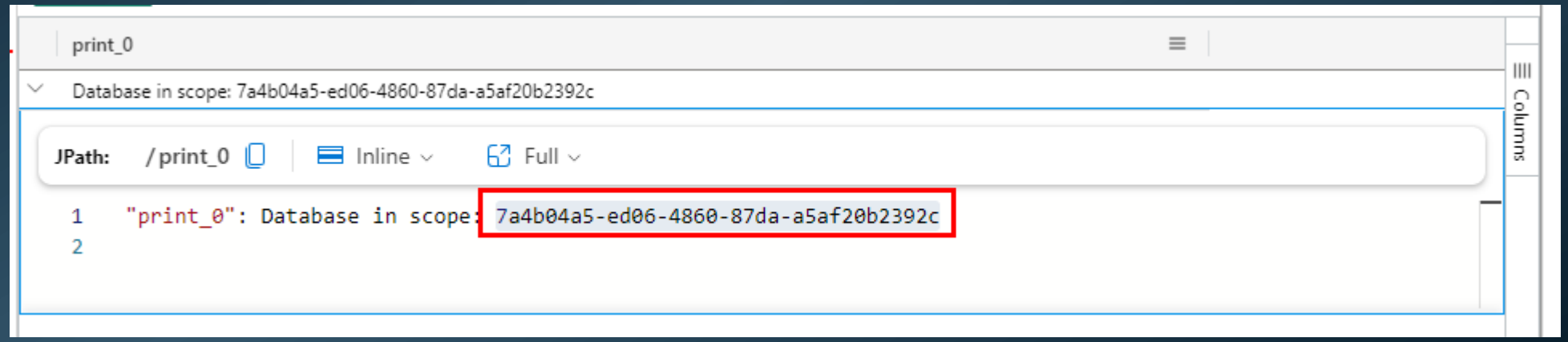
SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

The language and structure

Using the Notebook feature in Azure Data Studio to demo

Get the database id from your Fabric Kusto cluster

print strcat("Database in scope: ", current_database())



SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

DEMO

Live coding

(hopefully no demo-ghost 👻)

The language and structure

KQL: Kusto Query Language

SQL	KQL
select * from NYCTaxi	NYCTaxi

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

The language and structure

SQL

```
select * from NYCTaxi
where VentorID = 2
```

KQL

```
NYCTaxi
| where VendorID == 2
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

The language and structure

SQL

```
select * from NYCTaxi
where VentorID = 2
order by passenger_count
```

KQL

```
NYCTaxi
| where VendorID == 2
| order by passenger_count
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

The language and structure

SQL

```
select count(*) from
NYCTaxi
```

KQL

```
NYCTaxi
| count
```

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The language and structure

SQL

```
select
    passenger_count
    ,VendorID
    ,trip_distance
from NYCTaxi
```

KQL

```
NYCTaxi
| project passenger_count, VendorID, trip_distance
```

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The language and structure

SQL

```
select
    passenger_count
    ,VendorID
    ,trip_distance
    ,total_amount / passenger_count as AmtPsngr
from NYCTaxi
```

KQL

```
NYCTaxi
| extend AmtPsngr = total_amount / passenger_count
| project passenger_count, VendorID, trip_distance,
AmtPsngr
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

The language and structure

SQL

```
select
    sum(passenger_count) as SumPassenger
    ,VendorID
from NYCTaxi
group by VendorID
```

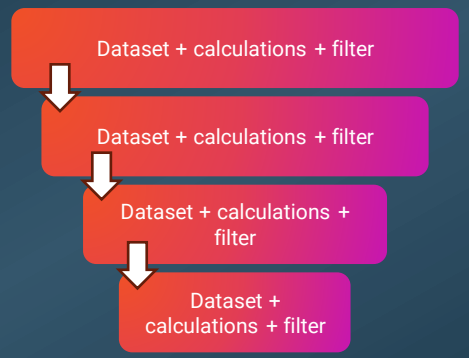
KQL

```
NYCTaxi
| summarize SumPassenger = sum(passenger_count) by
VendorID
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

The language and structure

KQL




```
NYCTaxi
| where passenger_count > 1
| project passenger_count, total_amount, VendorID, fare_amount
| extend AmtPsngr = total_amount / passenger_count
| where AmtPsngr > 10
| summarize TotalAmount = sum(total_amount), AvgAmtPsngr = avg(AmtPsngr) by VendorID
| where VendorID  <> 1
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

Data discovery and outlier detection

Data discovery is what we've just been through – use select statements and filter your data to find and explore the data given to you.

RENDERING!!

```
NYCTaxi
| where tpep_pickup_datetime between (datetime(2009-01-01)..datetime(2015-01-01))
| extend PickUpdate = startofday(tpep_pickup_datetime)
| summarize SumPsngrCount = sum(passenger_count) by PickUpdate
| project PickUpdate, SumPsngrCount
| render  timechart
    with(
        title = "timechart"
        ,xtitle = "Time"
        ,ytitle = "Fares"
    )
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

Data discovery and outlier detection

Outliers

series_outliers() - LINK
series_decompose() - LINK
series_decompose_anomalies() - LINK
series_decompose_forecast() - LINK

```
range x from 0 to 364 step 1
| extend t = datetime(2023-01-01) + 1d*x
| extend y = rand() * 10
// generate a sample series with outliers at first day of each month
| extend y = iff(monthofyear(t) != monthofyear(prev(t)), y+20, y)
| summarize t = make_list(t), series = make_list(y)
| extend outliers=series_outliers(series)
| extend pos_anomalies = array_iff(series_greater_equals(outliers, 1.5), 1, 0)
| render anomalychart with(xcolumn=t, ycolumns=series, anomalycolumns=pos_anomalies)
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

Functions

Functions in Kusto is equivalent to a stored procedure in the SQL world.

With additional functionality to be able to go outside of the cluster and service and ask for data from a different place in the world.

```
.create-or-alter function GetSysLogs(TimeWindow:string , Bucket:string )
{
cluster('help').database('SampleLogs').RawSysLogs
| where timestamp > ago(totimespan(TimeWindow))
| summarize LogCount=count() by name, bin(timestamp, totimespan(Bucket))
| order by timestamp asc
}

// to execute the function
GetSysLogs('5d','1h')
```

SQL to Kusto query translation - Azure Data Explorer & Real-Time Analytics | Microsoft Learn

Eventstream and Data Activator

Eventstream

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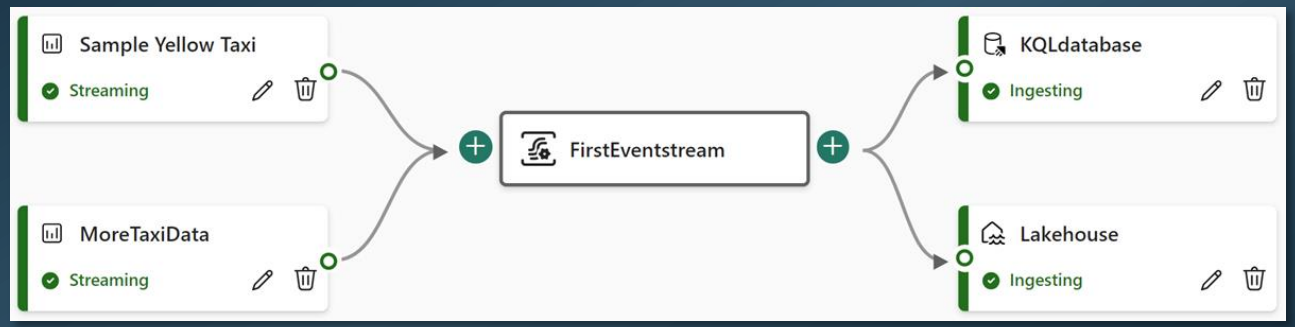
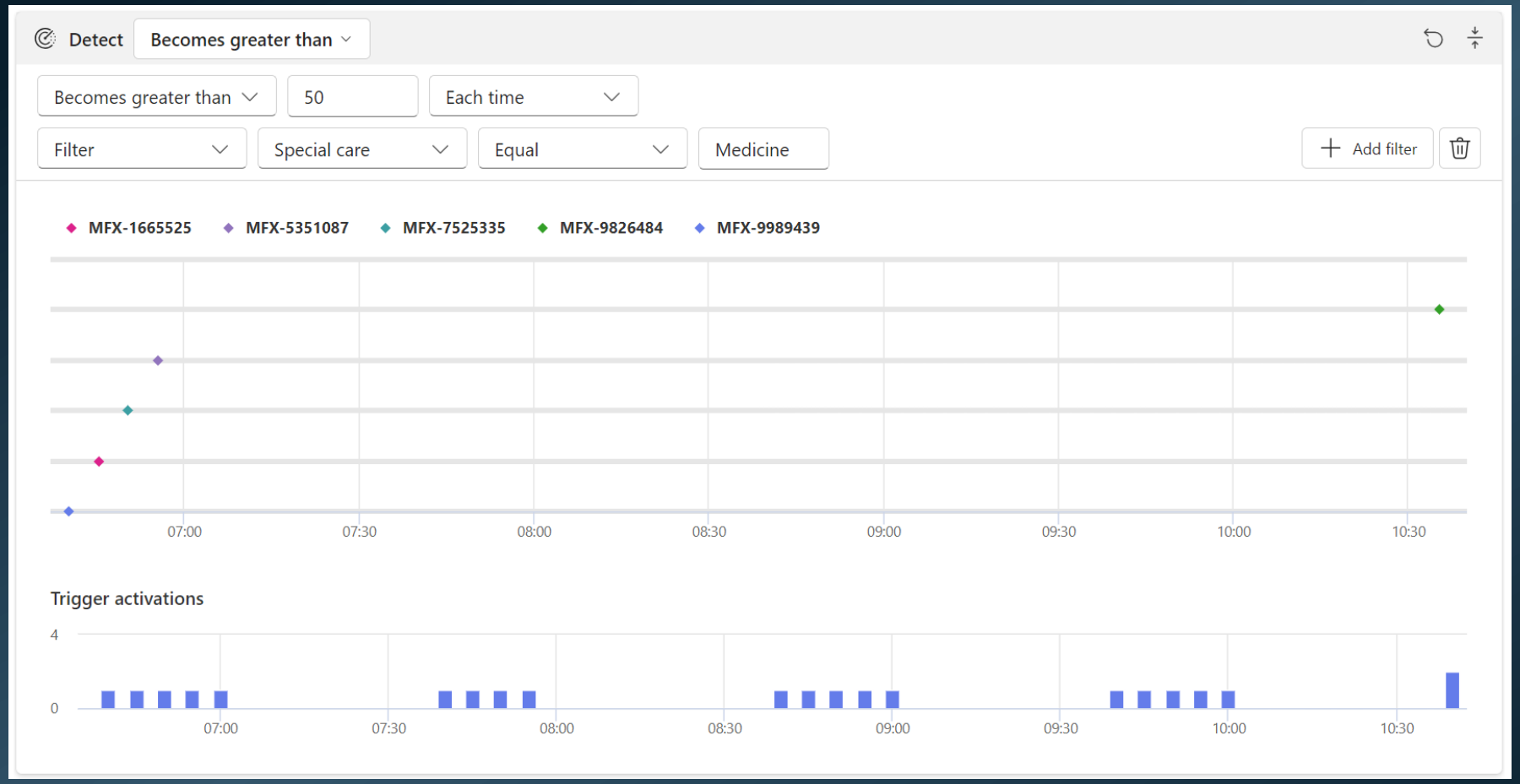


Data Activator

Activeli listens to your data from either the Eventstream service or a Power BI dataset.
Can react to values outside of defined boundaries and, for now, send an e-mail for a Teams message.

Eventstream and Data Activator

Data Activator



Eventstream and Data Activator

Data Activator

Act | Send email

Send to *

BR Brian Bønk Rueløkke

Subject *

Reflex trigger 'Medicine package is too warm

Headline *

The condition for Reflex trigger 'Medicine package is too warm' has been met

Optional message

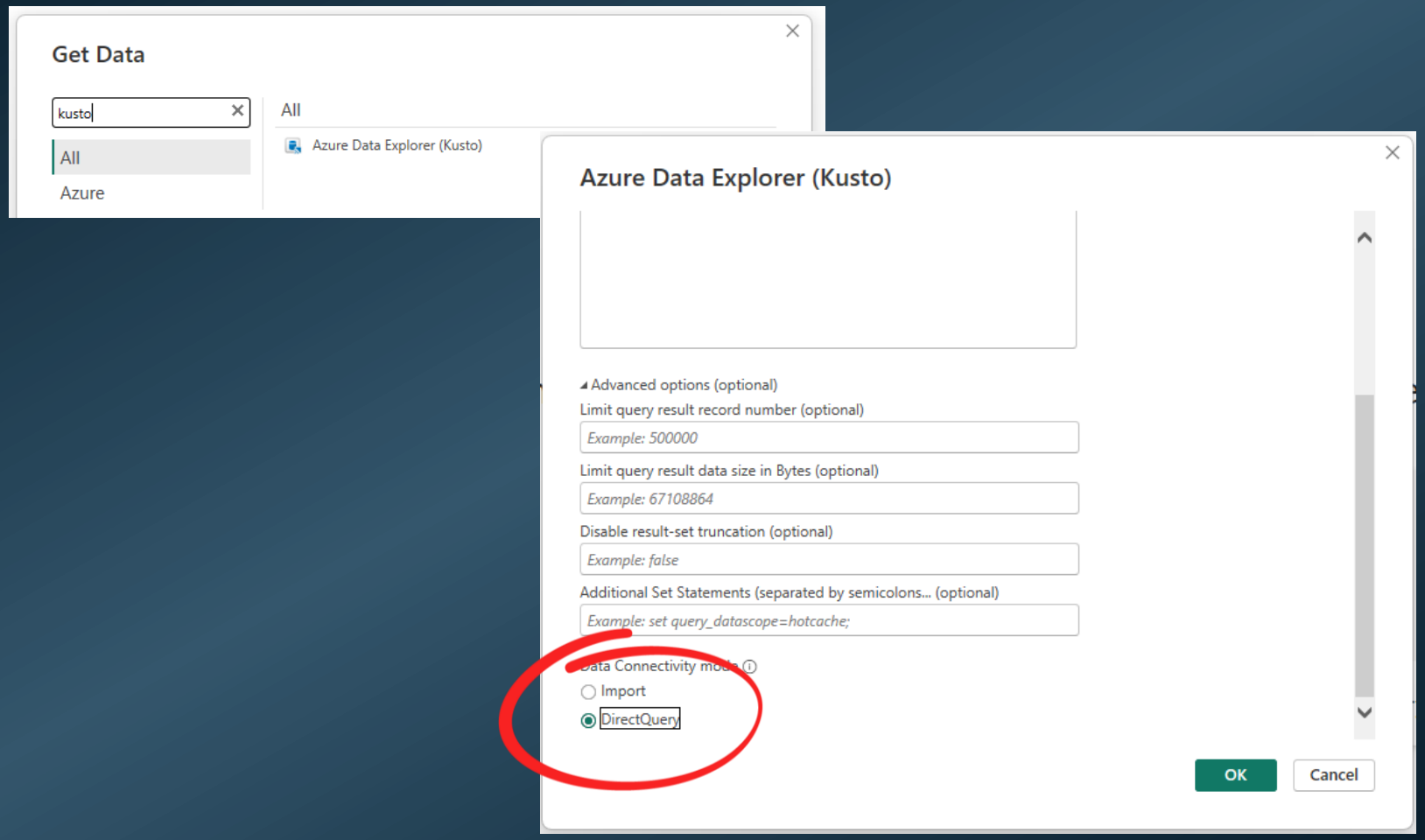
Additional information

Select properties to include in your notification

Limit of 5.

Analysis and reporting

Power BI



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| summarize LogCount=count() by name, bin(timestamp,
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| order by timestamp asc
}

GetSysLogs('5d','1h')
```

Analysis and reporting

Dashboards in RTA - planned - to come...

Real-Time Analytics

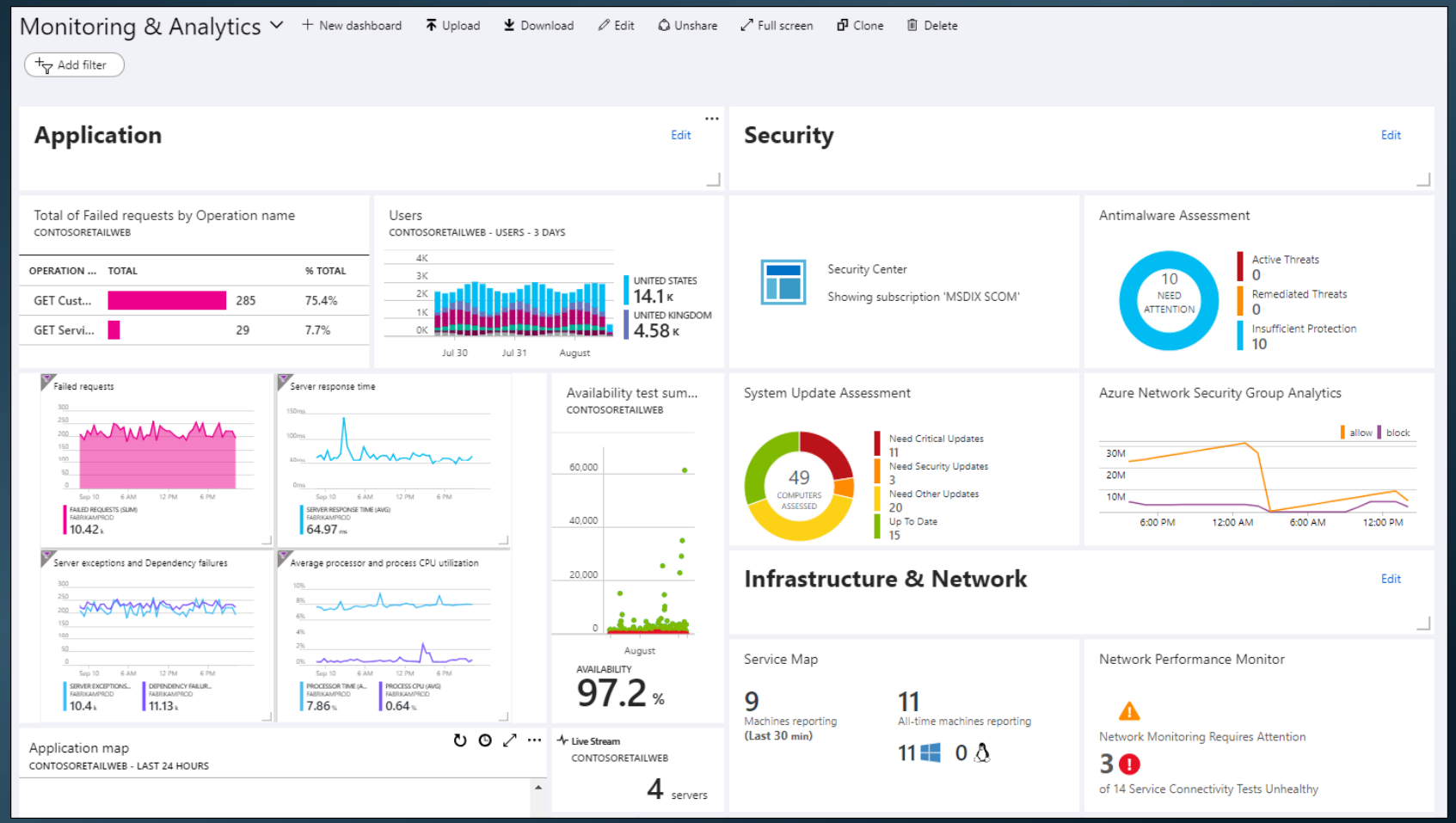

Image from James Westall

Thank you

Connect with me at:

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https://github.com/brianbonk