Sessions start at: 5.00PM and 6.15PM

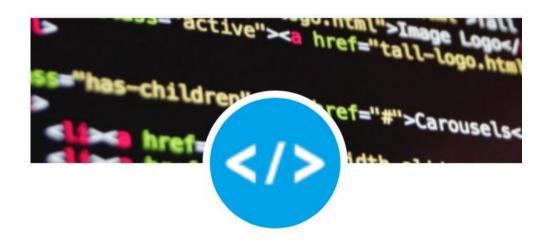
Online Meeting Rules

Azure Meetup

FRANKFURT

- · If not muted, mute yourself.
- · Ask your questions in the chat window.
- · Use mic if you are explicitly asked.
- · If you want to show something, we will make you be a presenter
- If you like you can activate your camera. We love to see you all ©
- Please do not spam the chat window.
- Do not post inappropriate content.
- · Have fun. ©













PRÄSENZ- UND ONLINESCHULUNGEN



Offene Schulungen



FÜR ENTWICKLER, SOFTWAREARCHITEKTEN, ADMINS UND PROJEKTMANAGER

Inhouse- / Firmenschulungen



Individualschulungen



100.542

TEILNEHMENDE

1.658

SEMINARTHEMEN

26.236

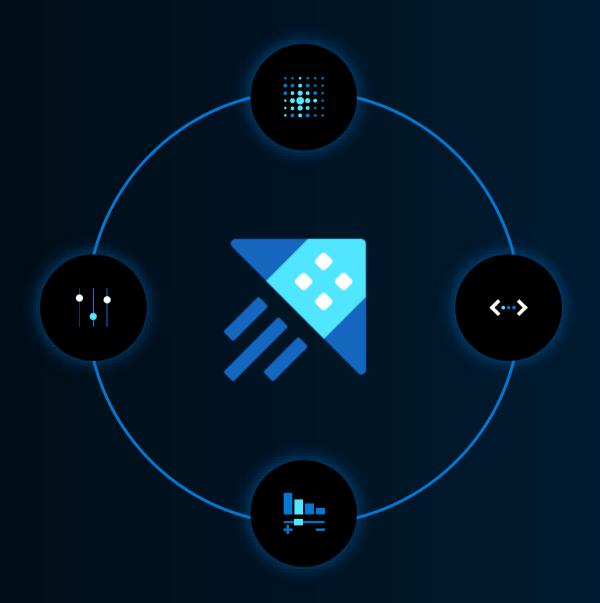
DURCHGEFÜHRTE SEMINARE



Azure Data Explorer for I(I)oT

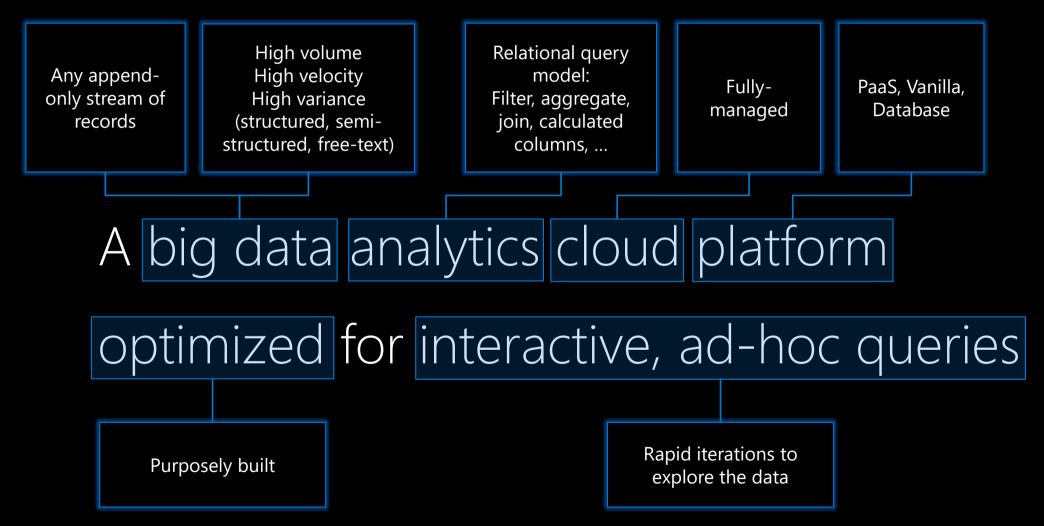


Henning Rauch, Principal Program Manager, Kusto



Introducing Azure Data Explorer!





What's the diff between Azure Synapse Data Explorer and Azure Data Explorer?

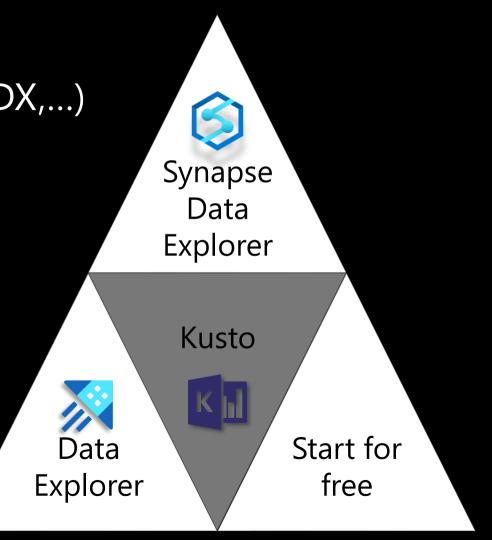


The engine is Kusto

- Regardless of its deployment (SDX, ADX,...)
- Same capabilities

ADX vs SDX

- Integration work into Synapse
- Low friction integration with other Synapse engines



Key pillars of Azure Data Explorer





Near real-time insights on big data



Optimized engine to interactively query on log data



Integrated cloud data platform for time series and loT data



Automated scaling from Gigabytes to Petabytes

Proven Technology



In production since 2015 for internal Microsoft workload, GA since Feb 2019.

Battle tested for Microsoft internal workload

The platform for analytical solutions (SaaS)

Available as PaaS

























































Kusto by the numbers



85 PB

Data ingested daily

1.3 Billion

Queries per day

6.6 ExabyteTotal Data Size

2.4M

VM Cores running

>350K

KQL Developers

A key to Microsoft's digital transformation journey





Oil & Gas industry



Industry specific solutions and partners



Major Oil and Gas companies
/ Energy Producers



FPSOs (Floating Production and Storage Offloading)



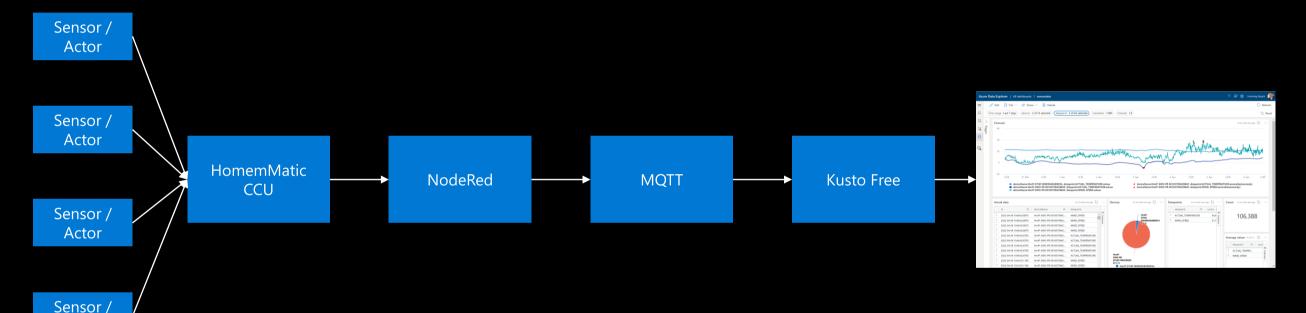
I(I)oT



Sample architecture – Hennings home

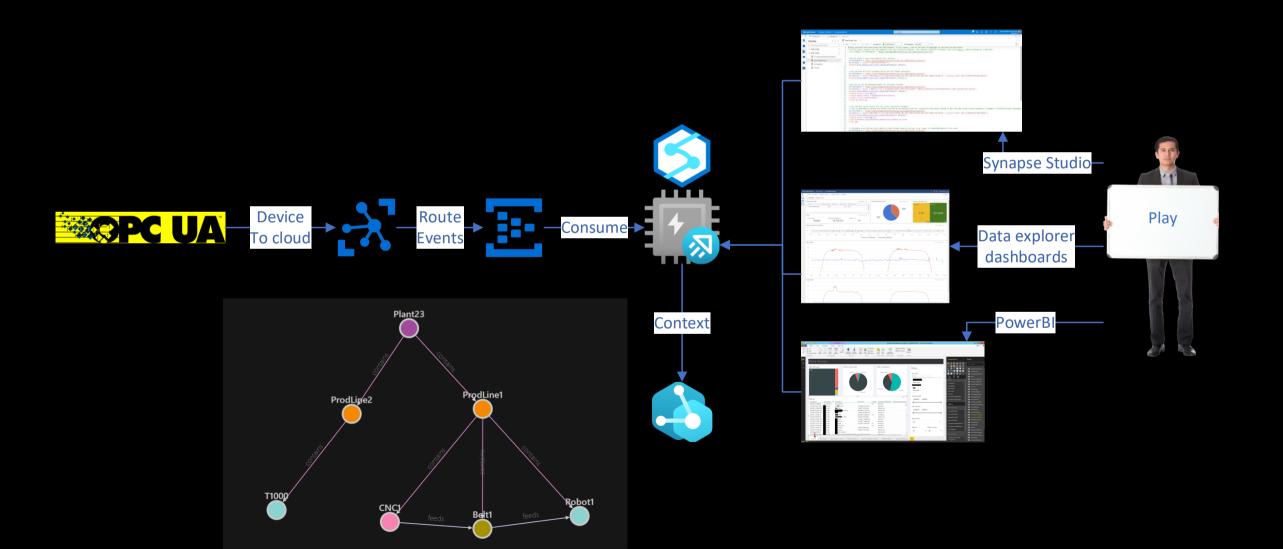
Actor





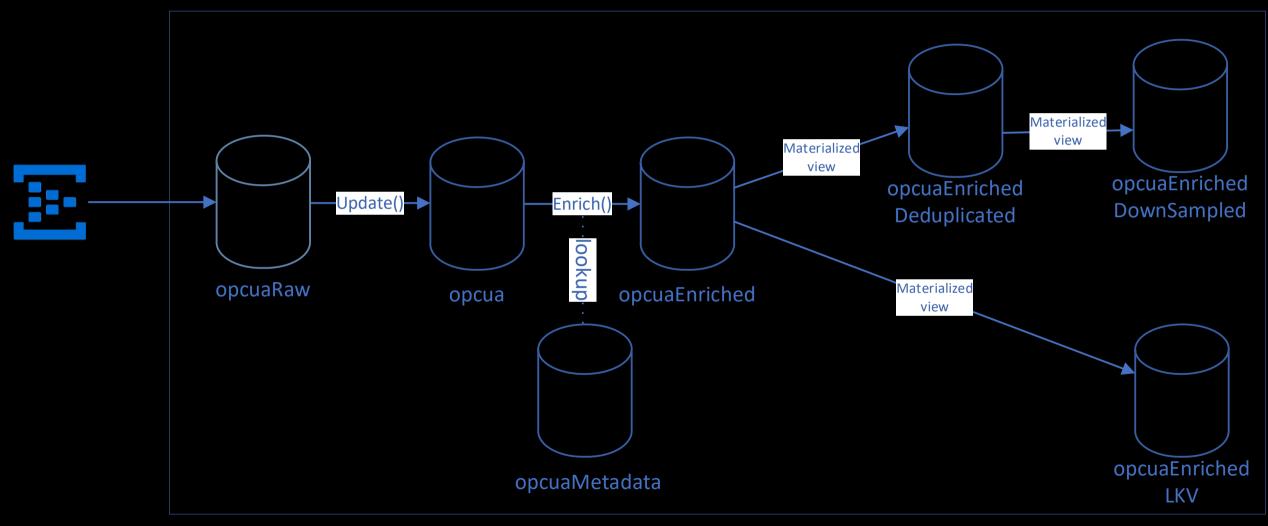
Sample architecture





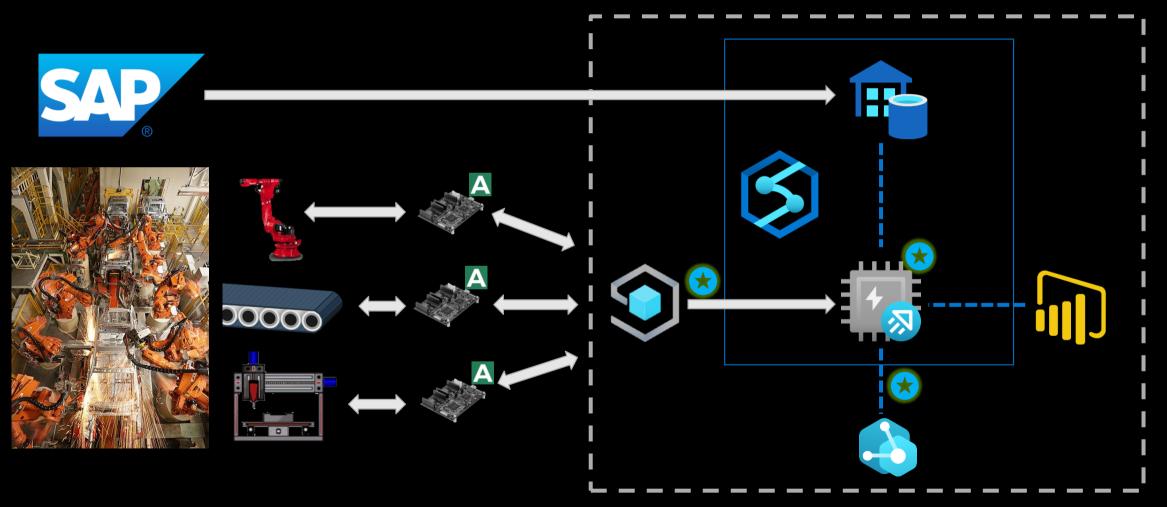
Sample architecture





Sample architecture







Tracking the ISS with Azure Digital Twins and Azure Data Explorer

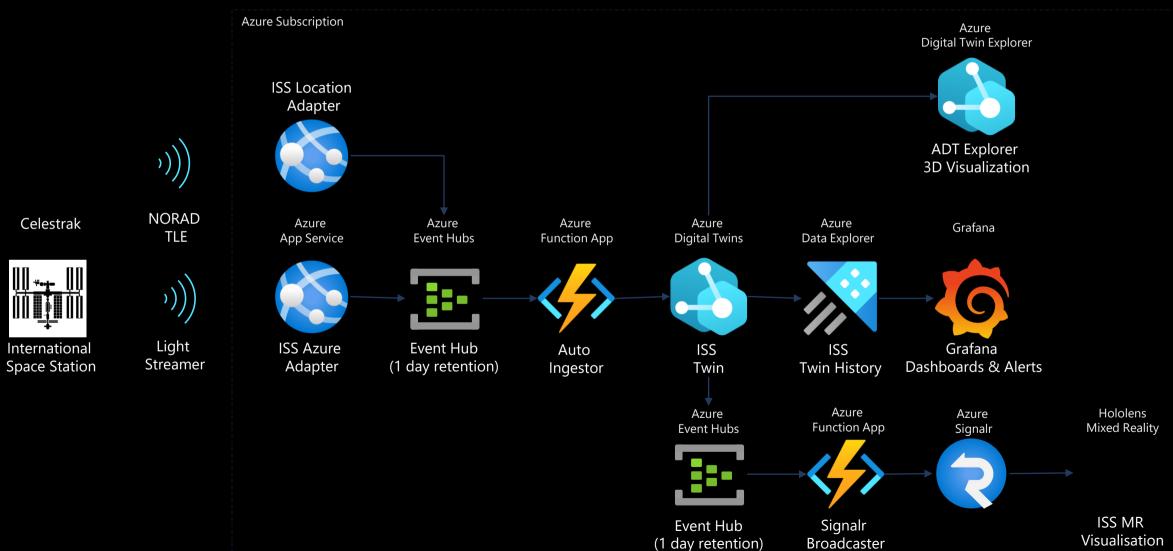
The bigger picture

(A Microsoft hack project that turned out to be super great)



Architecture





Azure Digital Twin Data Ingestion





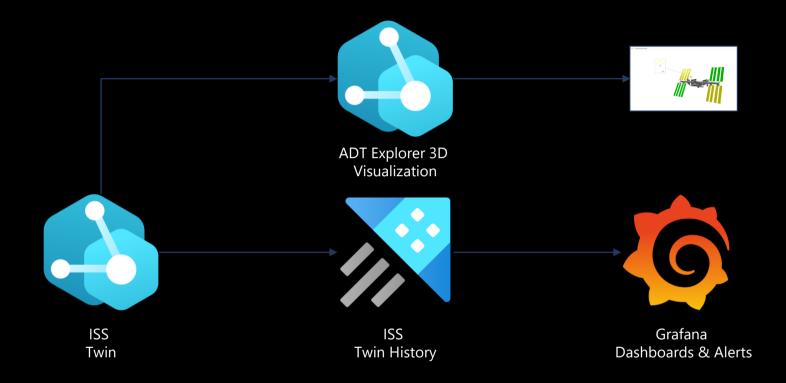
The <u>Azure Digital Twin Auto Ingestor</u> function app takes JSON messages from an Event Hub – and uses the message Payload to Generate DTDL Models and twins for the incoming Telemetry.

These Models are then used to Create Or Update Twins in the ISS Azure Digital Twins Instance.

Details on how this works can be found in the github repository linked above

Data Visualization





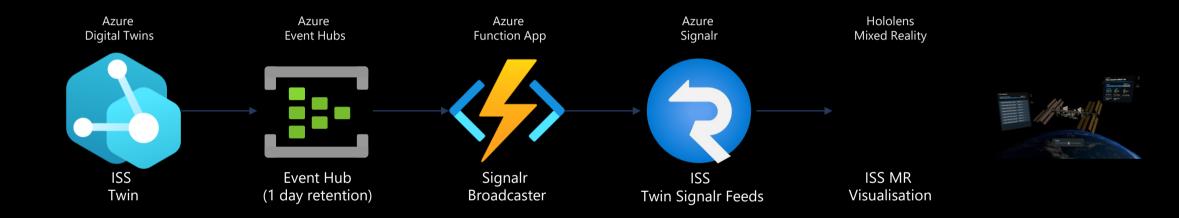
The Azure Digital Twin Instance containing the ISS Twin will use the data history feature for Azure Digital Twins which automatically historizes twin updates to ADX

An Azure Hosted Grafana Instance will host dashboards powered by joint ADT/ADX queries using the ADT plugin for ADX.

<u>Azure Digital Twin Explorer</u> will be used to show a 3D Representation of the ISS with Visual State Rules based off telemetry properties of the ISS

Mixed Reality Visualisation





The Azure Digital Twin Instance containing the ISS Twin emits property change events to an Azure Event Hub.

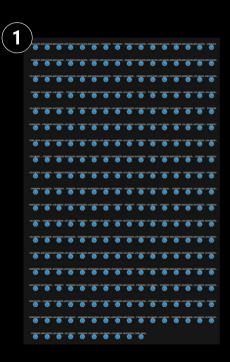
An Azure Function app takes Property Update events and sends them to Signalr with the Signalr topic of the \$dtld

A Hololens App visualizes the International Space station and updates key properties using the Signalr feed.

Building The Twin



- We automated the creation of the initial twin from the actual Telemetry from the Space Station. This saved an immense amount of time and helped us "Discover" out data capabilities.
- Once these Twins were created and data was flowing, I then created parent twins (modules, panels) based on the documented ISS architecture

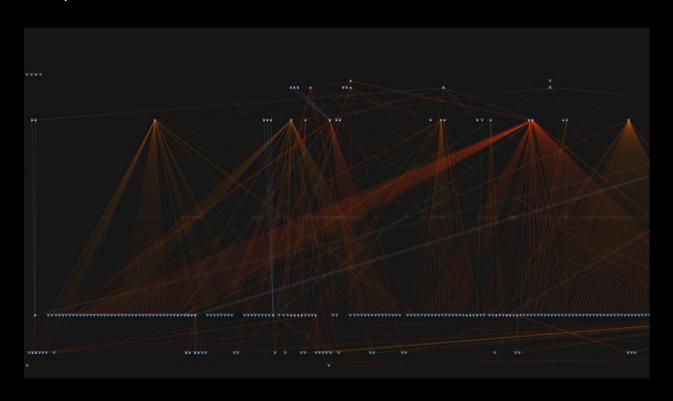


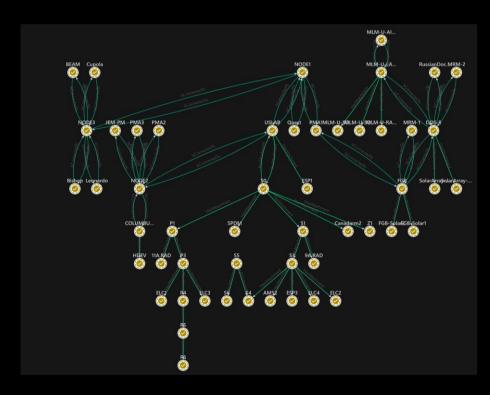
2		
	Create Relationship	
	Source ID	
	USLAB000084	
	Target ID	
	\$6000003	
	Relationship	
	Select an option	
	Save Cancel	
		80000S600003

Houston, We Have Lift Off



The Finished twin is quite simple – we've modelled the International space station in terms of Physical Structure (Modules, Components) and Discipline (Mission Control Desks).





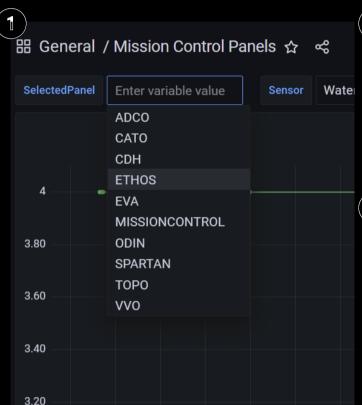
Grafana Dashboards



1 Dropdowns allow users to select what they want to view.

These dropdowns are populated using Azure Data Explorer queries (Kusto) which utilise the Azure Digital Twins Query Plugin

Based on the user's selection in the dropdowns, the System Queries the Azure Data Explorer table Containing Azure Digital Twin Property History values.



// Get all disciplines

let ADTendpoint = \$AdtEndpoint;

let ADTquery =

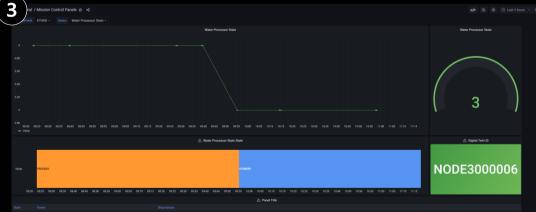
""SELECT t.\$dtld as tid FROM DIGITALTWINS t

WHERE IS_OF_MODEL(t, 'dtmi:com:iss:discipline;1')";

evaluate azure_digital_twins_query_request(ADTendpoint, ADTquery)

| extend tid_string = tostring(tid)

| project-away tid



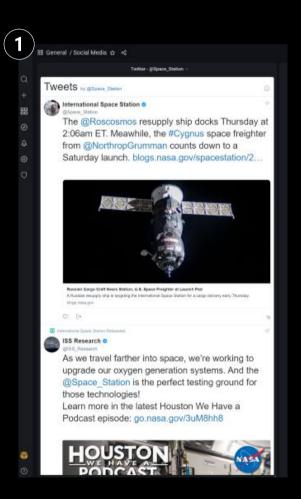
Grafana Alerts



- 1 On Tuesday, we noticed that there was going to be a resupply mission tomorrow.
- We browsed the twin found a sensor which is the range finder for docking. "RUSSEG000005" and wrote an Azure Data Explorer query for the Historized data.

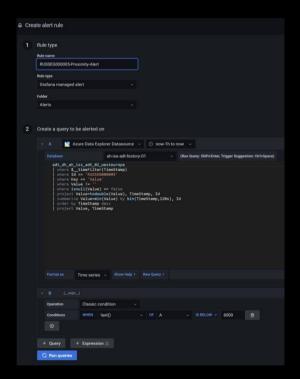
This query was then used as a basis for a Teams Alert rule in Grafana.

On Thursday we awoke to find that there had indeed been a "Proximity" alert issued when the Cygnus Freighter Docked!



2)



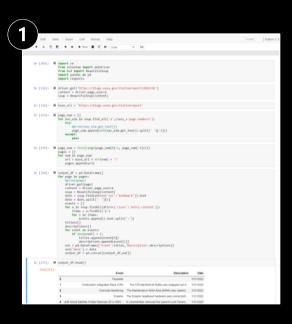


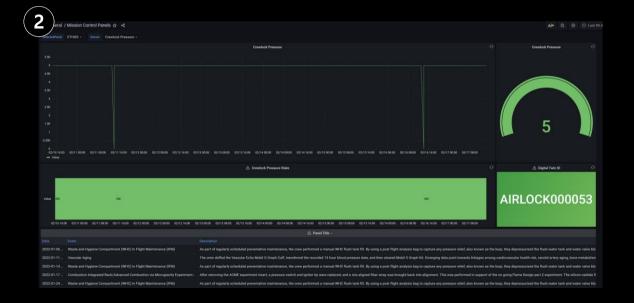


Data Contextualization



- An Azure ML Notebook was made to scrape the daily station report and put it into the same Azure Data Explorer Database as the Historized twin data.
- We then used the Kusto
 Queries in Grafana to
 compare sensor and module
 information with the daily
 report data we have
 extracted.





Mixed Reality Visualization



The Azure Digital Twin Instance containing the ISS Twin emits property change events to an Azure Event Hub which are then picked up via Signalr by the Hololens app which adjusts the ISS Model. In this video you can see the location of the ISS Change along with the orientation of the Solar Panels.



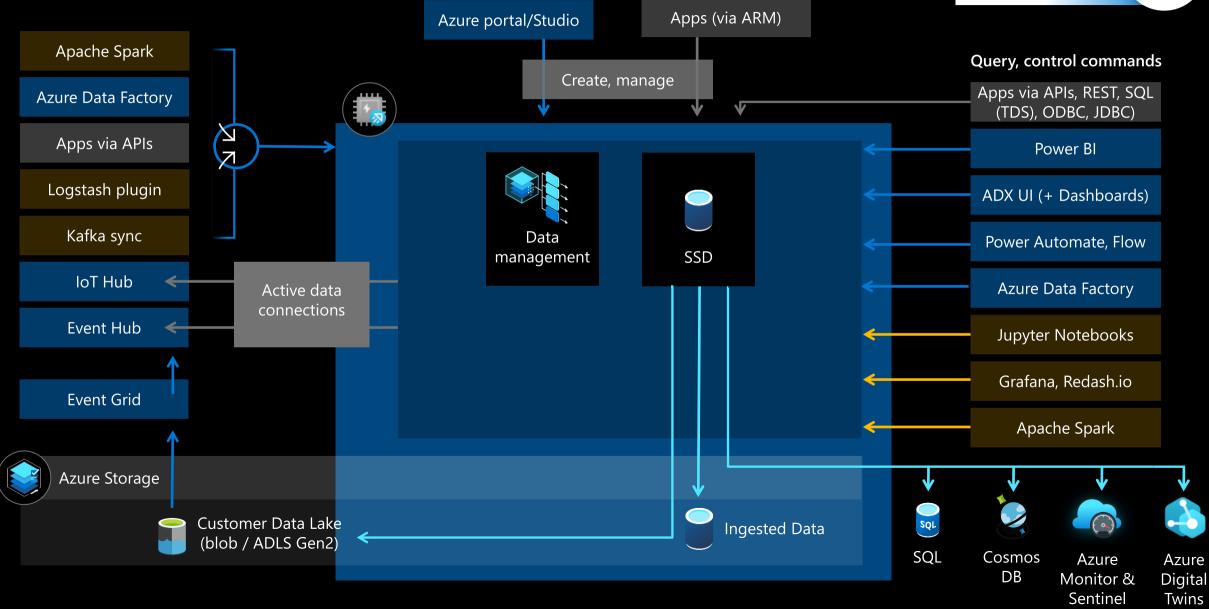


Backup



Data Explorer pool architecture



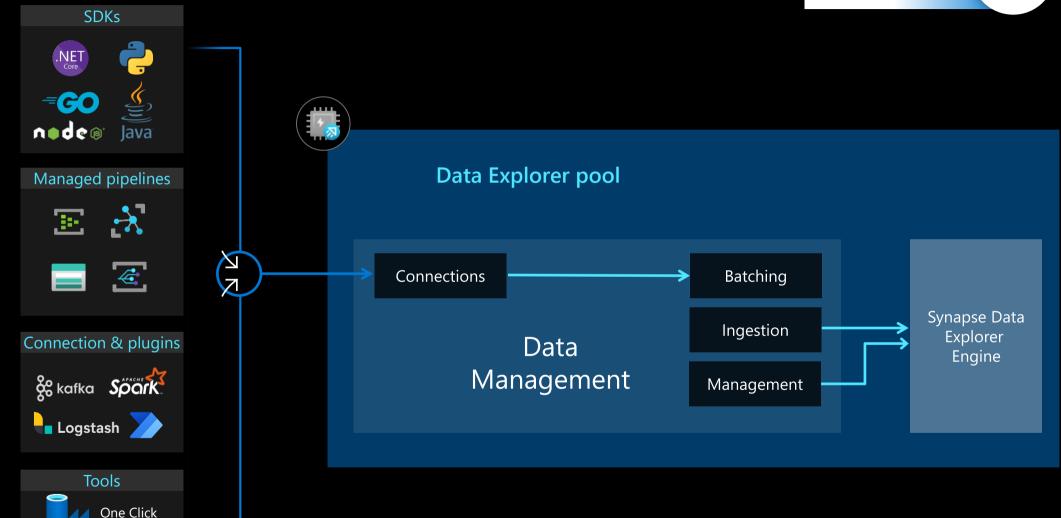


Data Management and Ingestion

Ingestion

LightIngest





Distributed Query Engine

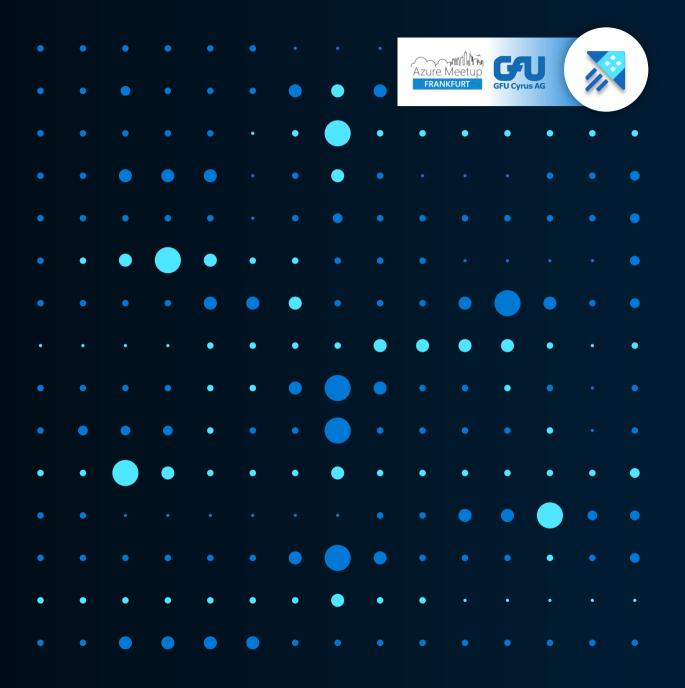




- Storage and Compute isolated
- Auto compression, indexing, optimization
- Semi-structure (JSON) and unstructured data (free text) indexing
- Data is sharded, distributed, cached across nodes on local SSDs and persisted on cloud storage
- Ingestion time-based partitioning + custom partitioning
- Hot and cold data management
- Table level caching + results set caching
- Workload management
- Partitioning
- Materialized views
- External tables for Blob, Data Lake, and SQL



Other topics



How to become an ADX expert



Product

- Product Page: https://aka.ms/adx.pp
- Docs: https://aka.ms/adx.docs
- Cost Estimator: https://aka.ms/adx.cost (Excel)
- Whitepaper: https://aka.ms/adx.techwhitepaper
- 101 blog: https://aka.ms/adx.blog.101
- · Reference Architectures https://aka.ms/adx.architectures

Social and Community

- Twitter: <u>@AzDataExplorer</u>
- Stack overflow: https://aka.ms/adx.sof
- Tech Community Blog: https://aka.ms/adx.blog
- Tech Community Forum: http://aka.ms/adx.techcommunity
- YouTube Channel: https://aka.ms/adx.youtube

Free Online Courses

- · MS Learn: https://aka.ms/learn.adx
- Pluralsight: https://aka.ms/adx.pluralsight:
 KQL from Scratch, Azure data exploring, How to start with ADX (blog), Advanced KQL (blog)

Hands on

- · Lab: https://aka.ms/adx.lab
- Help and samples http://aka.ms/adx.try
- Microhacks (available soon)

Please comment:

What other things do you need to help people becoming experts on ADX?



Partner program



Partner Program



Free POC for ADX/SDX resources

- No charges on the Kusto resources
- Well defined POC scope and goals
- https://aka.ms/adx.freepoc.request

Partner ECIF for AMD powered deployments

AAAP ECIF offer & blog post

Training, upskilling and technical backup during projects

Partner discovery experiences

Based on geo, reference projects and more

join us: https://aka.ms/adx.partnersinfo



Thanks!

Q&A

Reach out to me on

herauch@microsoft.com
Henning Rauch | LinkedIn
@cosh23 | Twitter

