**MODULE – 4**

[**Get started with Real-Time Intelligence in Microsoft Fabric**](https://learn.microsoft.com/en-us/training/modules/get-started-kusto-fabric/)

* **Ingest and transform real-time data**

**Eventstreams** in Microsoft Fabric are used to capture, transform, and load real-time data from a wide range of streaming data sources.

Data sources for eventstreams:

* External services: AZ storage, AZ event hubs, CDC etc
* Fabric events: data changes in onelake data stores, changes to items in fabric
* Sample data: samples that can help you explore real-time analytics scenarios

Data transformations in eventstreams:

Transform data 🡪 enables to filter, summarize, and reshape before storing

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| **Filter** | Filter based on value of a field in the input. Eg: is null or is not null |
| **Manage fields** | **add, remove, change data type, rename** fields coming in from i/p or another transformation. |
| **Aggregate** | To calculate aggregation: **sum, min, max, avg** everytime a new event occurs over a period of time. Renaming aggregated cols, filtering, slicing |
| **Group By** | Calculate aggregations across all events within a certain time window. |
| **Union** | To connect two or more nodes and add events with shared fields into one table. Fields -> not matched => dropped and not included in the output. |
| **Expand** | Array transformation; to create a new row for each value within an array |
| **Join** | To combine data from two streams based on a matching condition between them. |

Data destinations in eventstreams:

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| **Eventhouse** | Let’s you ingest real-time event data into an eventhouse. (use KQL) to query and analyze the data. |
| **Lakehouse** | To transform real-time events before ingesting them into lakehouse. Real time events into delta lake format and then store into lakehouse tables. |
| **Derived stream** | To redirect o/p of eventstream to another eventstream |
| **Fabric Activator** | To directly connect your real time event data to a fabric activator (intelligent agent) that can automate actions based on values in stream. |
| **Custom endpoint** | To route real time events to a custom endpoint. To direct real-time data to an external system/ custom application outside MS fabric. |

* **Store and query real-time data:**

This is where you store real-time data, often ingested by an eventstream and loaded into tables for further processing and analysis.

* **KQL databases:** real time optimized data stores
* **KQL querysets:** collections of KQL queries

Querying Data:

Use KQL – Kusto Query Language – To write queries in Azure Data Explorer, Azure Monitor log analytics, MS Fabric, MS Sentinel

KQL – read-only request to process data and return results.

KQL query statements:

Operators: **take, filter, transform, aggregate, join**

Eg:1

To retrieve 10 rows form table named stock:

**Stock**

**| take 10**

Eg:2

To find the average stock price per stock symbol in last 5 minutes:

**Stock**

**| where [“time”] > ago(5m)**

**| summarize avgPrice = avg(todecimal(bidPrice)) by symbol**

**| project symbol, avgPrice**

Eg: Using SQL

Select top 10 \* from stock;

* **Visualize realtime data:**

Each tile -> dashboard -> diff info on KQL query that extracts real-time data from tables in an eventhouse.

Creating a real-time dashboard

Workspace -> Create real-time dashboard -> configure source/ create one directly from KQL queryset in eventhouse.

Dashboard 🡪 >=1 tiles 🡪 each tile 🡪 visualization based on KQL query expression.

By default🡪 shows the results of query as table 🡪 edit tile to customize how to display data.

* **Automate actions:**

**Activator 🡪** enables automated processing of events that trigger actions.

Eg: To notify by email when value in eventstream deviates from a specific range/ to run a notebook to perform some spark-based data processing logic when a real time dashboard is updated.

Activator Key concepts:

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| **Events** | Each record in stream of data that occurred in a specific point in time |
| **Objects** | Data in an event record(eg: sales order, sensor, business entity) |
| **Properties** | Fields in event data can be mapped to properties of the business object, representing some aspect of its state.  Eg: tot\_amt 🡪 sales order total  Temp 🡪 temperature measured by environmental sensor |
| **Rules** | Key to using activator to automate actions based on events  Rules set conditions under which an action is triggered based on property values of objects referenced in events  Eg: Define a rule that sends an email to a maintenance manager if the temperature measured by a sensor exceeds a specific threshold. |

Activator – Use Cases:

Dynamic inventory management, real-time customer engagement, effective resource allocation in cloud environments.

Use cases:

* Initiate marketing actions when product sales drop
* Send notifications when temp changes could affect perishable goods.
* Flag real-time issues affecting the user experience on apps and websites.
* Trigger alerts when a shipment has not been updated within an expected time frame.
* Send alerts when a customer’s account balance crosses a certain threshold.
* Run ads when same store sales decline.
* Alert store managers to move food from failing grocery store freezers before it spoils.