



## Azure Stream Analytics

Azure Stream Analytics is a real-time event processing engine provided by Microsoft Azure. It allows you to analyze and process streaming data in real-time from various sources such as IoT devices, applications, sensors, and logs. Stream Analytics enables you to extract insights, detect patterns, and trigger actions based on the streaming data.

Key features of Azure Stream Analytics include:

1. **Real-time Data Processing:** Stream Analytics processes streaming data in real-time, enabling you to gain insights and take immediate actions based on the incoming data.
2. **SQL-based Query Language:** It provides a familiar SQL-like query language for defining queries to filter, aggregate, and transform streaming data.
3. **Integration with Azure Services:** Stream Analytics integrates seamlessly with other Azure services such as Azure Event Hubs, Azure IoT Hub, Azure Blob Storage, Azure SQL Database, Azure Cosmos DB, and more, enabling you to build end-to-end data processing pipelines.
4. **Scalability and Performance:** It automatically scales based on the incoming data volume and processing requirements, ensuring high throughput and low latency for data processing.
5. **Built-in Functions and Operators:** Stream Analytics provides a rich set of built-in functions and operators for performing various operations on streaming data, including windowing, tumbling, hopping, and sliding windows, as well as aggregations and temporal joins.
6. **Monitoring and Management:** It offers built-in monitoring and management capabilities, including metrics, diagnostics logs, and integration with Azure Monitor for monitoring the health and performance of your streaming jobs.
7. **Integration with Power BI and Azure Machine Learning:** Stream Analytics integrates with Power BI for real-time visualization of streaming data and with Azure Machine Learning for building and deploying machine learning models on streaming data.

Overall, Azure Stream Analytics enables organizations to derive valuable insights from streaming data, detect anomalies, trigger alerts, and automate decision-making processes in real-time, making it suitable for various use cases such as IoT data processing, real-time analytics, fraud detection, predictive maintenance, and more.



## Use cases of Stream Analytics:

Azure Stream Analytics finds applications in various industries and scenarios where real-time data processing, analysis, and action are crucial. Here are some common use cases:

1. **IoT Data Processing:** Azure Stream Analytics can ingest and process data from IoT devices in real-time, enabling organizations to monitor equipment health, detect anomalies, optimize operations, and enable predictive maintenance.
2. **Real-time Analytics:** Businesses can use Stream Analytics to analyze and gain insights from streaming data generated by websites, mobile apps, social media platforms, and

other sources. This allows organizations to make data-driven decisions, personalize user experiences, and optimize marketing campaigns in real-time.

3. **Fraud Detection:** Financial institutions and e-commerce companies can use Stream Analytics to detect fraudulent activities in real-time by analyzing transaction data, user behavior, and other relevant information. By applying machine learning models and business rules, organizations can identify suspicious patterns and trigger alerts for further investigation.
4. **Supply Chain Optimization:** Stream Analytics can be used to monitor and optimize supply chain operations in real-time by analyzing data from sensors, RFID tags, GPS trackers, and other sources. This enables organizations to track shipments, optimize routes, manage inventory levels, and improve overall supply chain efficiency.
5. **Predictive Maintenance:** By analyzing streaming data from industrial equipment, machinery, and sensors, organizations can predict equipment failures, schedule preventive maintenance, and avoid costly downtime. Stream Analytics can analyze telemetry data, detect anomalies, and trigger maintenance alerts based on predefined thresholds and patterns.
6. **Real-time Monitoring and Alerting:** Stream Analytics can be used to monitor system health, network performance, and security events in real-time. By analyzing log data, event streams, and sensor data, organizations can detect anomalies, identify security threats, and trigger alerts for immediate action.
7. **Customer Experience Optimization:** Organizations can use Stream Analytics to analyze customer interactions, feedback, and sentiment in real-time from various channels such as social media, customer support chats, and surveys. This enables organizations to respond to customer queries, address issues promptly, and improve overall customer satisfaction.
8. **Energy Management:** Stream Analytics can be used to monitor energy consumption, analyze utility data, and optimize energy usage in real-time. By analyzing data from smart meters, sensors, and energy management systems, organizations can identify energy-saving opportunities, implement demand-response strategies, and reduce energy costs.

In this lab exercise, we're setting up Azure Stream Analytics to ingest streaming data from an Event Hub, process it using SQL-like queries, and store the processed data into a SQL Database. The end goal is to create a real-time data processing pipeline that enables organizations to analyze, transform, and store streaming data for further analysis or reporting. This pipeline facilitates the extraction of valuable insights from streaming data, enabling organizations to make data-driven decisions and improve operational efficiency.

## To begin with the Lab:

1. In your Azure Portal search for Stream Analytics and choose this service accordingly.

# Stream Analytics job

Microsoft

**Stream Analytics job** Add to Favorites

Microsoft | Azure Service

★ 4.0 (189 ratings)

Plan

Stream Analytics job Create

2. Now you need to choose your resource group and then give it a name.

Basics   Storage   Tags   Managed Identity   Review + create

Azure Stream Analytics is a fully managed, SQL-based stream processing engine designed to help you tackle scenarios like streaming ETL to Azure Data Lake Storage, real-time dashboarding with Power BI, event driven applications with Azure SQL DB & Cosmos DB, remote monitoring, predictive maintenance, and more. [Learn more about Azure Stream Analytics](#)

## Project details

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

Subscription \* ⓘ Azure Pass - Sponsorship

Resource group \* ⓘ demo-grp

[Create new](#)

## Instance details

Name \* demostream120

Region \* ⓘ (Europe) North Europe

Hosting environment \*

Cloud

Edge

3. Then keep streaming units to 3.

## Streaming unit details

Streaming units (SUs) represents the computing resources that are allocated to execute a Stream Analytics job. The higher the number of SUs, the more CPU and memory resources are allocated for your job. The number of SUs can be modified once you create the job. You will be charged for the job's Streaming Units only when the job runs. [Learn more about streaming units](#)

All new Stream Analytics jobs created through the portal use Standard V2 pricing. [Visit Stream Analytics's pricing page to learn more.](#)

[For more options, visit here](#)

Streaming units \*

4. After that move to the review page and create your stream.
5. Once your stream is created go to resources.

demostream120

Stream Analytics job

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Job topology

Settings

Developer tools

Monitoring

Automation

Get started Properties Monitoring Tutorials

Essentials

	:		
Resource group (move)	: demo-grp	Created	: Thursday, May 9, 2024 4:31 PM
Location	: North Europe	Started	:
Status	: Created	Output watermark	:
Subscription (move)	: Azure Pass - Sponsorship	Cluster	: Shared
Subscription ID	: 3541d15a-44aa-4f0e-a120-1b7a6d5925bf	Hosting environment	: Cloud
Pricing plan	: StandardV2 (manage)	Virtual Network	: Disabled
Tags (edit)	: Add tags		

6. After that you need to open your SQL Database in SSMS. Then choose your database right-click on it and click on it to make a new query.

Object Explorer

Connect ▾

sqlserver120.database.windows.net (SQL Server 12.0.2000.8 - sqladmin)

Databases

System Databases

demodata1201

SQLQuery1.sql - sql...201 (sqladmin (87))

7. After that you are going to create new table whose name is orders.

SQLQuery1.sql - sql...201 (sqladmin (87)) \* X

```
CREATE TABLE [dbo].[Orders]
(
    [OrderID] varchar(10),
    [Quantity] int,
    [UnitPrice] decimal(5,2),
    [DiscountCategory] varchar(10)
)
```

165 %

Messages

Commands completed successfully.

Completion time: 2024-05-09T16:38:47.5625278+05:30

8. Now in your stream analytics job expand job topology from the left and click on Inputs.
9. So, the entire purpose of this job is to go ahead and take in streaming input.

demostream120 | Inputs ⭐ ...

Stream Analytics job

Search

Add input Refresh

Access control (IAM)

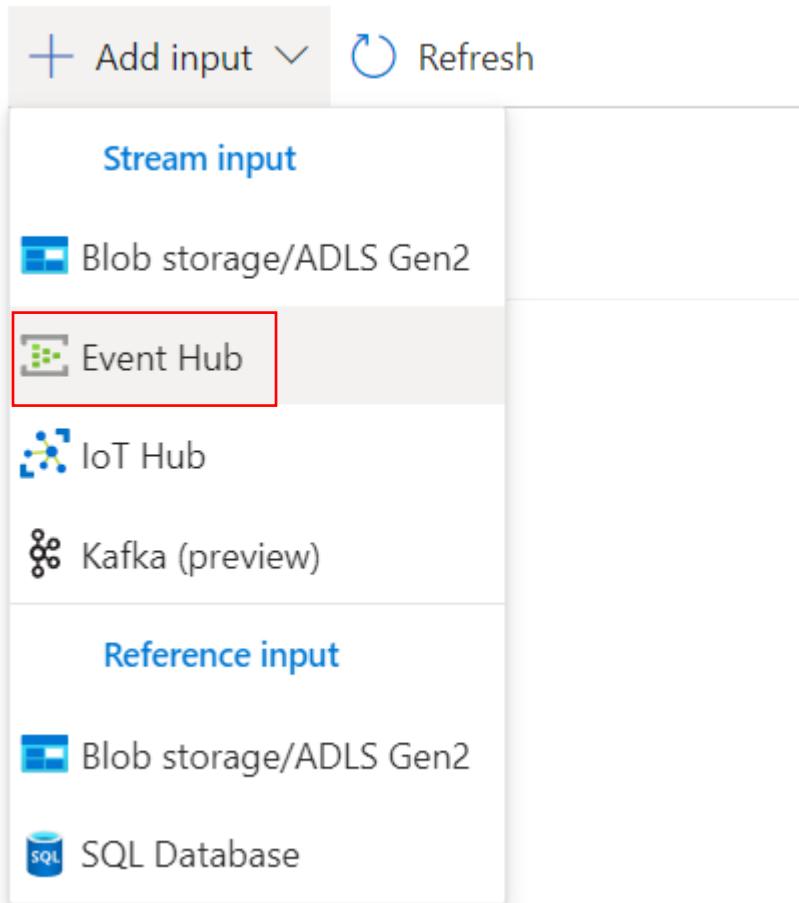
Tags

Diagnose and solve problems

Job topology

Inputs ⭐

10. Then you have to click on Add input and choose Event Hub.



11. After that once you have clicked on it then it will ask show you some information keep that to default and just click on save. Just check whether authentication method is set to connection strings.
12. Now you need to go to outputs in job topology and click on add output.

 **demostream120 | Outputs** ☆ ...  
Stream Analytics job

◊ « » + Add output ⟳ Refresh

 Access control (IAM)

 Tags

 Diagnose and solve problems

▽ Job topology

 Inputs

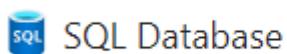
 Functions

 Query

Outputs ☆

 No-code editor  
(preview)

13. Then from the drop-down menu you need to choose SQL Database. You will find it at the bottom.



14. Here you will get most of the information auto-filled for you, but you have to enter the name of the table.

# SQL Database

X

New output

Output alias \*

demodata1201 ✓

Manual entry

Off

Subscription

Azure Pass - Sponsorship ✓

Database \* ⓘ

demodata1201 (sqlserver120) ✓

Table \*

Orders ✓

**Load existing tables**

15. Then in the authentication give your username and password.

Authentication mode

SQL server authentication ✓

Username \*

sqlserver ✓

Password \*

..... ✓

16. Once it is done then you need to go to Query in Job topology.

17. Here from the demo hub or say event hub we can see our data.

18. Now you have to send this data from the event hub or say demo hub to our Orders table on our SQL database.

demostream120 | Query

Stream Analytics job

Inputs (1): demohub

Outputs (1): demodata1201-1

Functions (0)

OrderID	Quantity	UnitPrice	DiscountCategory	EventProcessedUtcTim
"O1"	10	9.99	"Tier 1"	"2024-05-09T11:55:40..."
"O2"	15	10.99	"Tier 2"	"2024-05-09T11:55:40..."
"O3"	20	11.99	"Tier 3"	"2024-05-09T11:55:40..."
"O4"	25	12.99	"Tier 1"	"2024-05-09T11:55:40..."

19. For that in your query you have to write that from our demo hub we need to send the data into demo data which is nothing but our SQL database.

20. Then click on save query.

Test query

Save query Discard changes

```
1 /*  
2  Here are links to help you get started with Stream Analytics Query Language:  
3  Common query patterns - https://go.microsoft.com/fwlink/?LinkID=619153  
4  Query language - https://docs.microsoft.com/stream-analytics-query/query-language-elements-azure-sa  
5 */  
6  SELECT  
7      [OrderID,Quantity,UnitPrice,DiscountCategory]  
8  INTO  
9      [demodata1201-1]  
10 FROM  
11     [demohub]
```

21. Now to start this job we need to go to the overview of the stream analytic job and start the job.

Created

Essentials

Resource group (move)	: demo-grp	Created	: Thursday, May 9, 2024 4:31 PM
Location	: North Europe	Started	:
Status	: Created	Output watermark	:
Subscription (move)	: Azure Pass - Sponsorship	Cluster	: Shared
Subscription ID	: 3541d15a-44aa-4f6e-a120-1b7a6d5925bf	Hosting environment	: Cloud
Pricing plan	: StandardV2 (manage)	Virtual Network	: Disabled
Tags (edit)	: Add tags		

22. Now to start this job we need to choose our start time. Choose it to custom and give the time in the past when you created your .NET program to send and receive events.
23. Also, if we choose now as job start time then it will start from now and it will not consider the events that happened in the past.

## Start job

demostream120

i You have not configured the diagnostic settings for this job yet.  
[Add diagnostic settings in the diagnostic settings pane.](#)

Streaming units i  
3

Environment i  
Standard

Job output start time i  
 Now  
 Custom

Start time  
Thu May 09 2024 15:30:00 i

24. Once you get this message that stream analytics job started successfully.

More events in the activity log → Dismiss all

---

✓ Stream Analytics job started successfully ×

Started Stream Analytics job 'demostream120' successfully.

2 minutes ago

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25. Then you need to go back to SSMS and run the select query to check that the data come into our table.
26. But below you can see that we have our data in place.
27. Below you can see 10 entries because we ran the program two times.

```
SELECT * FROM [Orders]
```

165 %

Results Messages

	OrderID	Quantity	UnitPrice	DiscountCategory
1	O1	10	9.99	Tier 1
2	O2	15	10.99	Tier 2
3	O3	20	11.99	Tier 3
4	O4	25	12.99	Tier 1
5	O5	30	13.99	Tier 2
6	O1	10	9.99	Tier 1
7	O2	15	10.99	Tier 2
8	O3	20	11.99	Tier 3
9	O4	25	12.99	Tier 1
10	O5	30	13.99	Tier 2