

Real-Time Analytics

Azure Stream Analytics enables real-time data analysis and insights, making it an ideal solution for processing data from IoT devices such as the Raspberry Pi Azure IoT Online Simulator. By integrating the simulator with Azure Stream Analytics, you can ingest telemetry data in real-time through Azure IoT Hub, process it using SQL-like query capabilities, and derive actionable insights or trigger workflows. This setup allows you to monitor key metrics like temperature, humidity, or device status, applying filtering, aggregations, or complex event processing to identify anomalies or trends instantly. The seamless integration with Azure services like Power BI or Azure Blob Storage ensures that the analyzed data can be visualized or stored for further analysis, creating a powerful pipeline for real-time IoT data analytics.

Service Used	Purpose
IoT Hub	To get Real time data from Raspberry Simulator
Azure Stream Analytics	To ingest Data, Transform and Sync Data
ADLS Gen 2	To store The Output Data
Azure Synapse Analytics	To use sink data, to connect in powerBI
PowerBI	To Create Dashboard

Use Case-

To analyze the raspberry pi data and monitor in app.powerbi.com

Steps

Creating IoT Hub Account

Microsoft Azure

Upgrade

Search resources, services, and docs (G+/I)

Copilot

pashviprajapati753@g...
DEFAULT DIRECTORY

Home > IoT Hub >

IoT hub

Microsoft

Basics

Networking

Management

Add-ons

Tags

Review + create

Create an IoT hub to help you connect, monitor, and manage billions of your IoT assets. [Learn more](#)

Project details

Choose the subscription you'll use to manage deployments and costs. Use resource groups like folders to help you organize and manage resources.

Subscription *

Azure subscription 1

Resource group *

Stream-data

[Create new](#)

Instance details

IoT hub name *

iot-stream

Region *

East US

Tier *

Standard (most popular)

[Compare tiers](#)

Daily message limit *

400,000 (\$25/month)

[See all options](#)

Review + create

< Previous

Next: Networking >

Now after configuring IoT hub we will add device to it.

Microsoft Azure

Upgrade

Search resources, services, and docs (G+)

Copilot

pashviprajapati753@g...
DEFAULT DIRECTORY

Home > **iot-stream-1118174727** | Overview > **iot-stream** | Devices >

Create a device

Find Certified for Azure IoT devices in the Device Catalog

Device ID *
Demo-Device

☐ IoT Edge Device

Authentication type
Symmetric key X.509 Self-Signed X.509 CA Signed

Auto-generate keys
☒

Connect this device to an IoT hub
Enable Disable

Parent device
No parent device
[Set a parent device](#)

Save

Adding IoT Simulator to our device - <https://azure-samples.github.io/raspberry-pi-web-simulator/> As well, copying the primary key to our IoT Simulator

Microsoft Azure

Upgrade

Search resources, services, and docs (G+)

Copilot

pashviprajapati753@g...
DEFAULT DIRECTORY

Home > **iot-stream-1118174727** | Overview > **iot-stream** | Devices >

Aman-Device

iot-stream

Save

Manage keys

Message to Device

Direct method

Add Module Identity

Device twin

Refresh

Device ID
Aman-Device

Primary key
.....

Secondary key
.....

Primary connection string
.....

Secondary connection string
.....

Tags
No tags

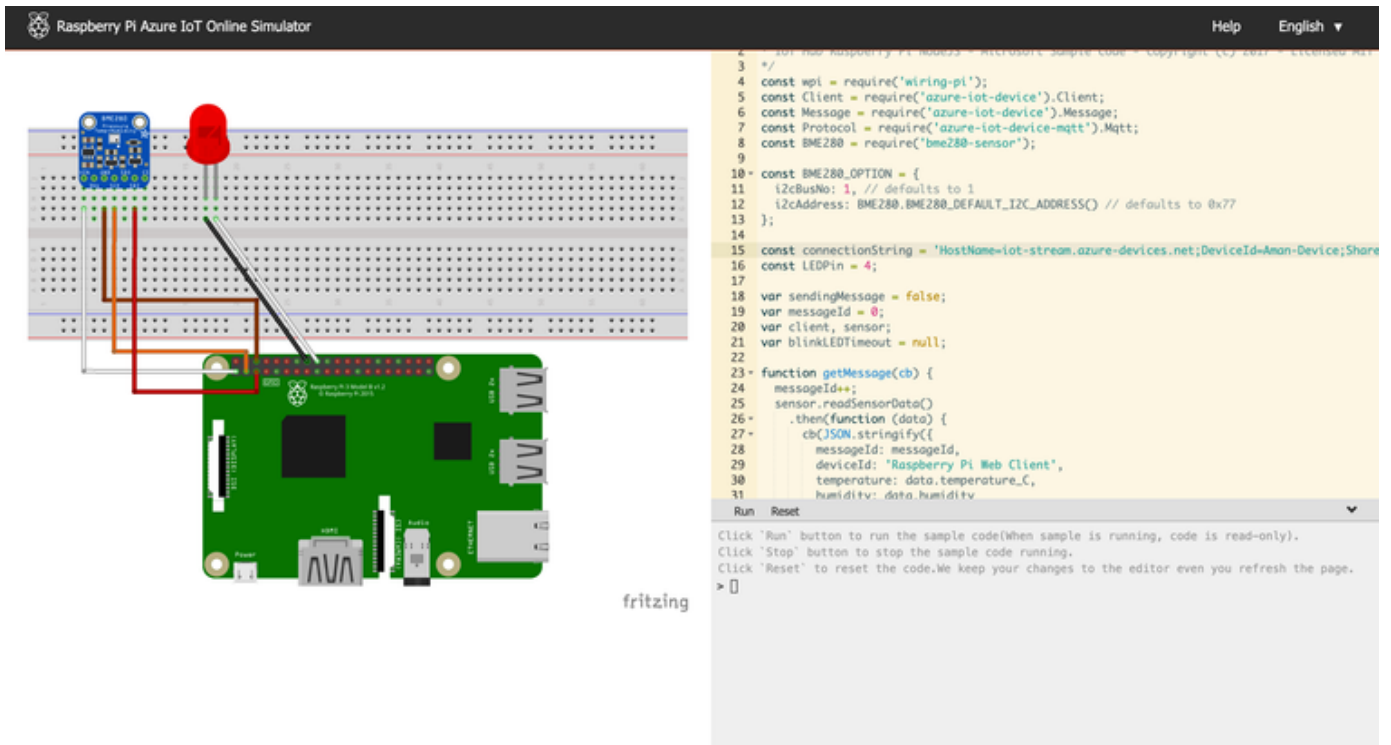
Enable connection to IoT Hub
☒ Enable ☐ Disable

Parent device
No parent device

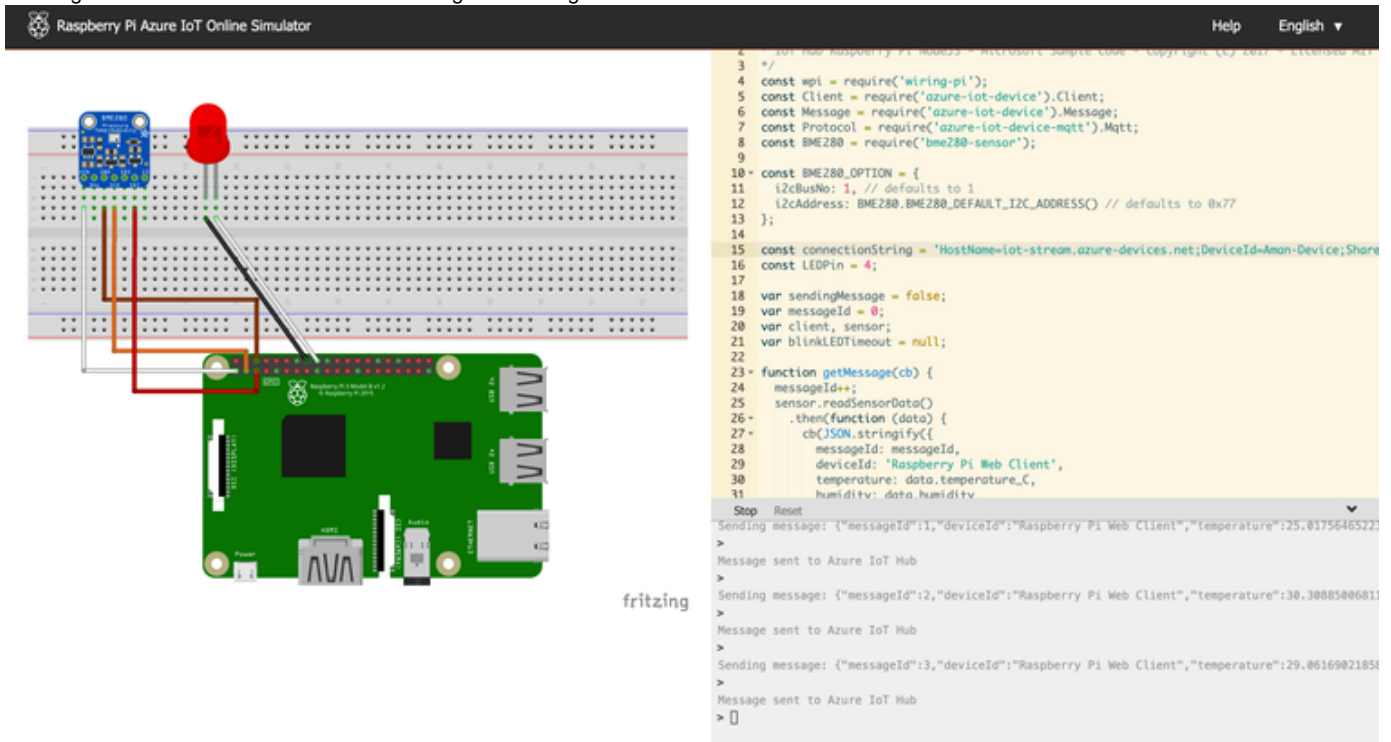
Module Identities

Configurations

Module ID	Connection State	Connection State Last Updated ...	Last Activity Time (UTC)
There are no module identities for this device.			



Running the simulator to test whether its sending the message to IoT hub or not.



After testing we will create stream analytics job

Microsoft Azure

Upgrade

Search resources, services, and docs (G+/I)

Copilot

pashviprajapati753@g...
DEFAULT DIRECTORY (PASHVIPRAJAPATI753@G...)

Home > Stream Analytics jobs >

New Stream Analytics job

BasicsStorageTagsManaged IdentityReview + 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 subscription 1

Resource group * Stream-data
[Create new](#)

Instance details

Name * Stream-job

Region * (US) East US

Hosting environment *
☒ Cloud
☐ Edge

PreviousNextReview + create

[Give feedback](#)

After creating stream analytics job creating an input from job-topology section.

Microsoft Azure

Upgrade

Search resources, services, and docs (G+/I)

Copilot

pashviprajapati753@g...
DEFAULT DIRECTORY (PASHVIPRAJAPATI753@G...)

Home > StreamAnalyticsJob | Overview > Stream-job

Stream-job | Inputs

Stream Analytics job

Search

+ Add input Refresh

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Job topology

- Inputs
- Functions
- Query
- Outputs
- No-code editor (preview)

Settings

Developer tools

Monitoring

Automation

Help

Alias ?	Source type	Type
---------	-------------	------

IoT Hub

New input

Input alias *
iot-stream

☐ Provide IoT Hub settings manually
☒ Select IoT Hub from your subscriptions

Subscription
Azure subscription 1

IoT Hub *
iot-stream

Consumer group *
\$Default

Shared access policy name *
iothubowner

Shared access policy key
.....

Endpoint
Messaging

Partition key

Save

Query to get the Average temperature and average humidity.

Microsoft Azure Upgrade Search resources, services, and docs (G+/) Copilot pashviprajapati753@g... DEFAULT DIRECTORY

Home > Stream-job

Stream-job | Query

Stream Analytics job

Search Start job Open in VS Code Diagnostic settings Refresh Query language docs Share feedback Tutorial Job ready to start

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Job topology
 - Inputs
 - Functions
 - Query**
 - Outputs
 - No-code editor (preview)
- Settings
- Developer tools
- Monitoring
- Automation
- Help

Inputs (1) IoT-stream

Outputs (1) outputdata

Functions (0)

```

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-stream-analytic
5 */
6 SELECT
7     system.timestamp() as Time,
8     avg(temperature) as avg_temperature,
9     avg(humidity) as avg_humid
10 INTO
11     [outputdata]
12 FROM
13     [iot-stream] group by tumblingwindow(Second,10)
  
```

Test query Save query Discard changes

Input preview Test results Job simulation (preview)

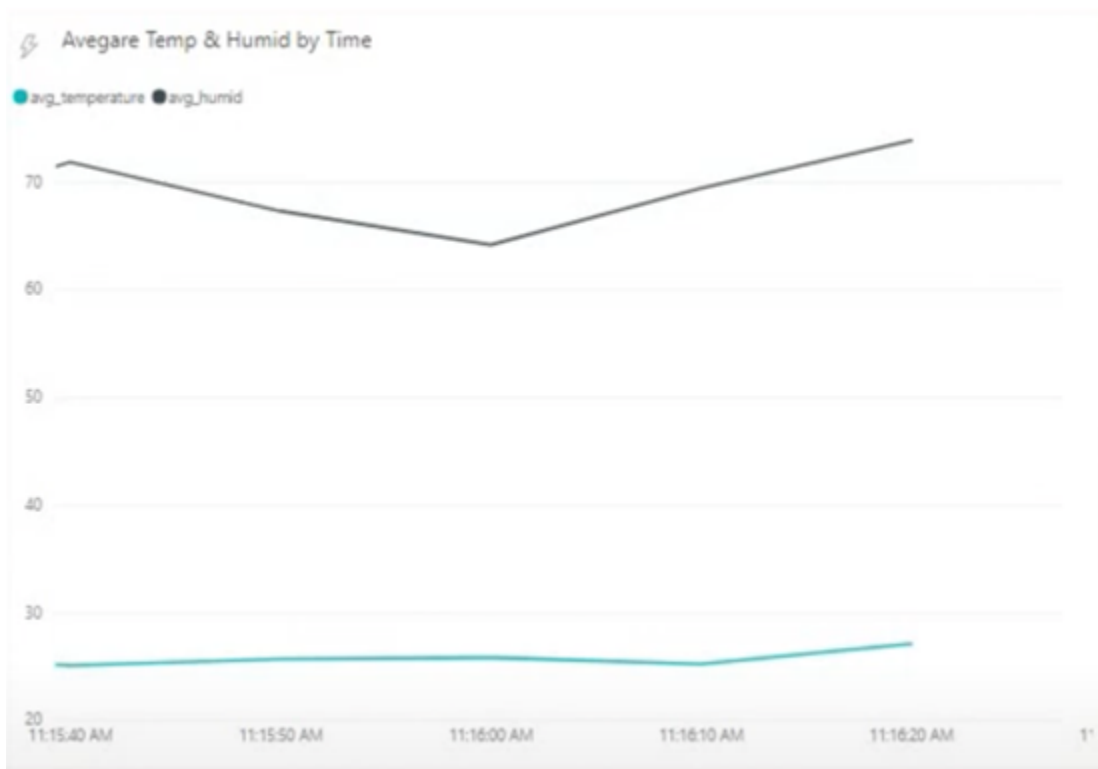
Showing sample events from 'iot-stream'.

Table Raw Refresh Select time range Upload sample input Download sample data

messageid	deviceid	temperature	humidity	EventProcessedUtcTime	PartitionId
bigint	string	float	float	datetime	bigint
1	"Raspberry Pi Web Cli...	27.105769924840708	73.90226252553117	"2024-11-19T01:43:31..."	2
2	"Raspberry Pi Web Cli...	29.718496862503976	61.998935169294526	"2024-11-19T01:43:31..."	2
3	"Raspberry Pi Web Cli...	24.84499378596851	63.3206297621238	"2024-11-19T01:43:31..."	2

While sampling data, no data was received from '3' partitions. Ln 1, Col 1

On PowerBi web we can analyze it as follow:



Now connecting the datasource to synapse analytics

Microsoft Azure | Synapse Analytics | tokyo-olympics-synapse

Synapse live | Validate all | Publish all

Data | Workspace | Linked

Filter resources by name

Lake database

tokyo_olympic_db

Tables

athletes

tokyo_olympic_db

SQL script 1

Run | Undo | Publish | Query plan | Connect to | Built-in | Use database | tokyo_olympic_db

1 SELECT * from athletes;

Properties

General | Related (0)

Name *
SQL script 1

Description

Type
.sql script

Size
96 bytes

Results settings per query ⓘ
☒ First 5000 rows (default)
☐ All rows

Results | Messages

View | Table | Chart | Export results

Search

PersonName	Country	Discipline
AALERUD Katrine	Norway	Cycling Road
ABAD Nestor	Spain	Artistic Gymnastics
ABAGNALE Giovanni	Italy	Rowing
ABALDE Alberto	Spain	Basketball

Connecting Synapse Analytics to PowerBI

File | Home | Insert | Modeling | View | Optimize | Help

Clipboard | Get data | Excel | OneLake | SQL | Enter data | Datasource | Recent sources | Transform Refresh data | Queries | New visual | Text box | More visuals | New visual calculation | New measure | Quick measure | Sensitivity | Publish | Copilot

Build visuals with your data

Select or drag fields from the Data pane onto the report canvas.

Filters

Search

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Visualizations

Build visual

Values

Add data fields here

Drill through

Cross-report

Keep all filters

Add drill-through fields here

Data

Search

realtime_analysis

C1

C2

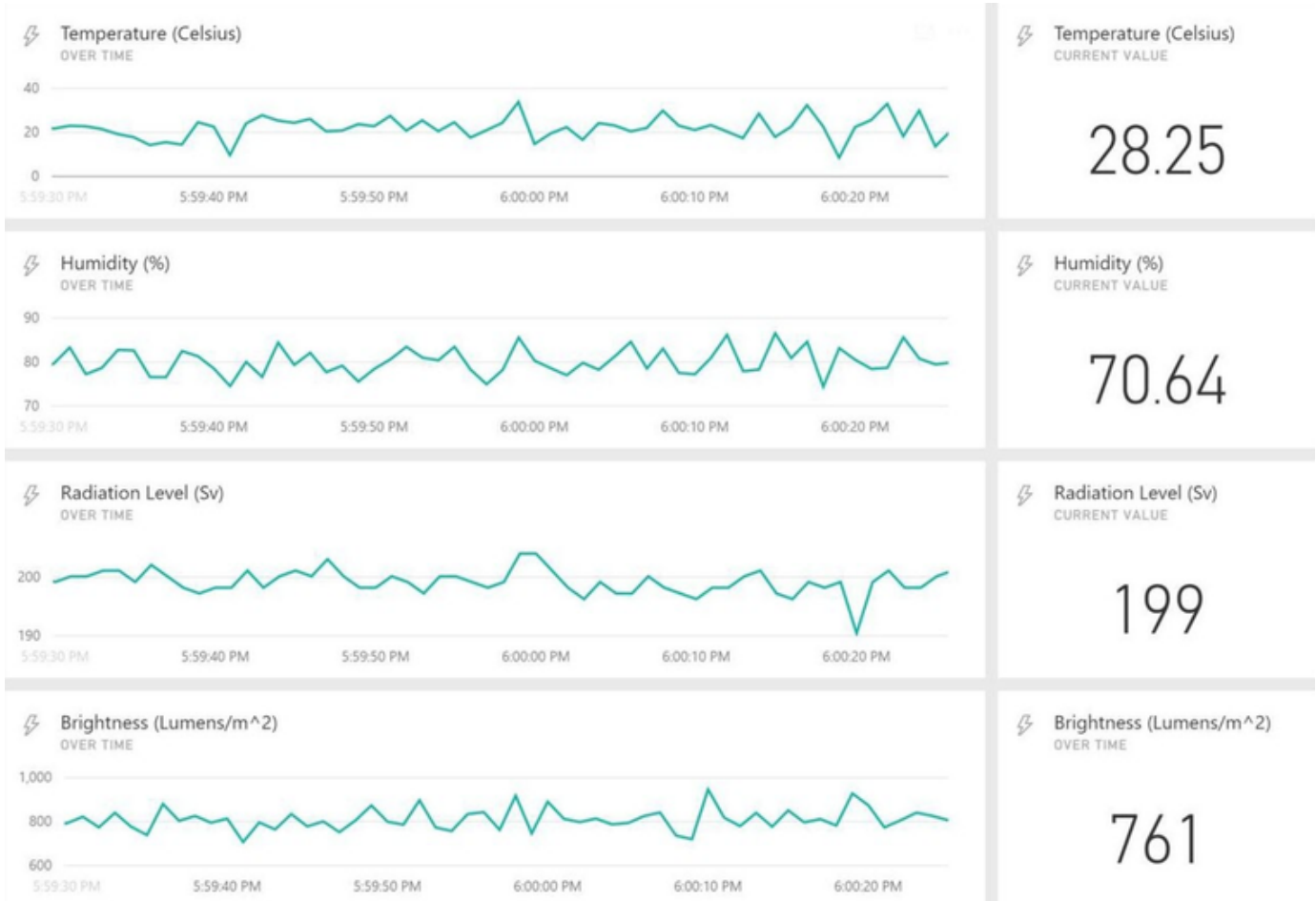
C3

Page 1 of 1

Page 1

70%

PowerBI Dashboard



Challenges Faced	Solution
Due to OS issue was not able to download PowerBi Dashboard	Download Azure VM and installed PowerBI
Unable to link synapse as output sync destination in azure stream analytics due to free subscription, dedicated sql pool was not being created	Loaded into ADLS Gen2 and then created a LinkedIn service in synapse analytics to add the output data to Synapse Analytics.
Output dataset were only being sent as json format	Created a pipeline in synapse and performed copy activity to move dataset format to parquet