



# Lab 3 Stream Analytics, Blob Storage and Power BI

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This lab assumes you have completed Lab 2.

If you have any issues or concerns, please email: [virtualbootcamphelp@microsoft.com](mailto:virtualbootcamphelp@microsoft.com).

**Execution Time:** 30 minutes.

**Required Hardware:**

- Windows 10 PC
- IoT Hardware kit: <https://www.adafruit.com/product/3605> or similar hardware.
- Access to a WiFi network (without a captive portal aka web page login)

**Required Operating System:**

- Windows 10

**Other Requirements:**

- Azure Subscription

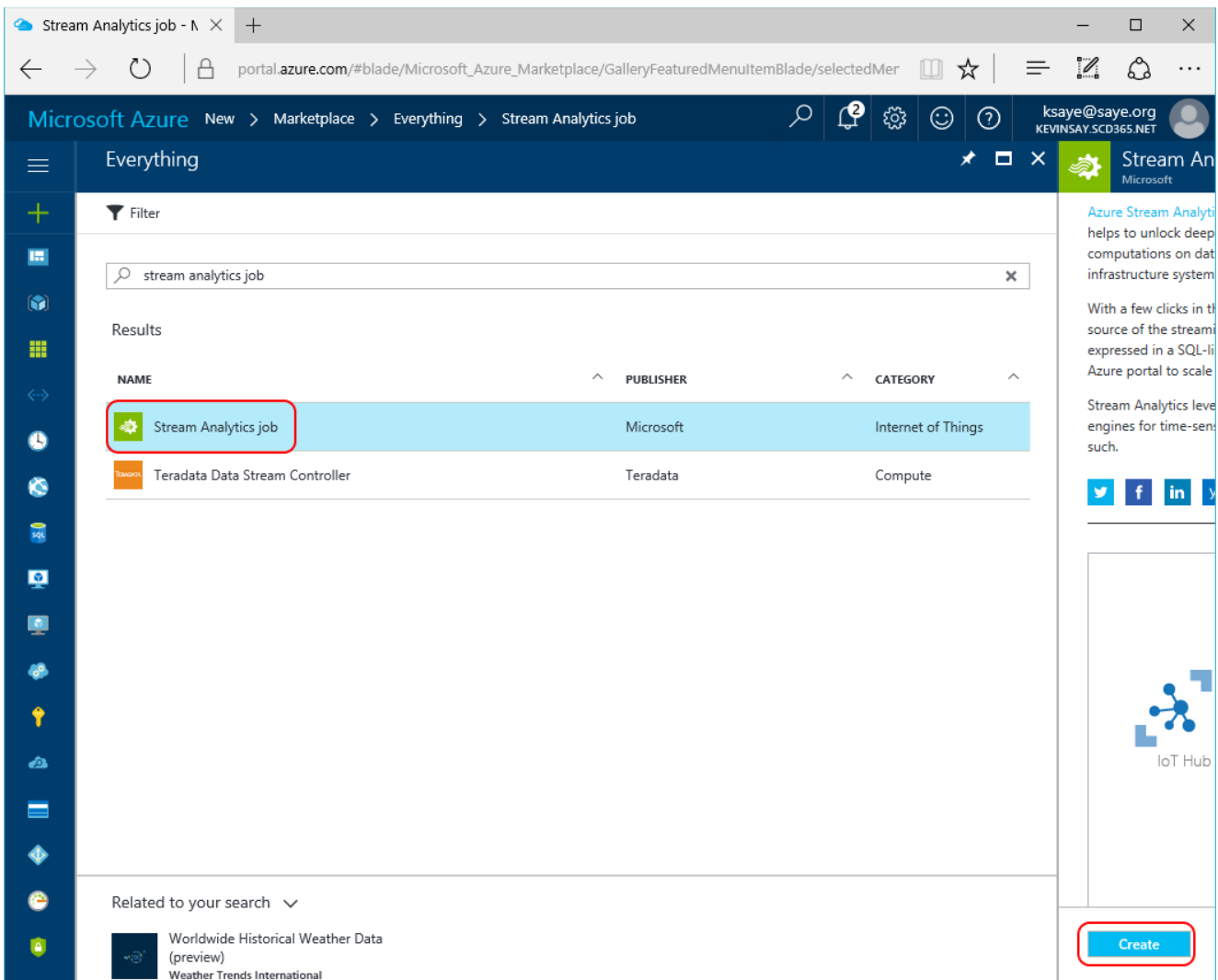
**Required Software:**

- None

Step 1. Go to <http://portal.azure.com>, click the Plus sign on the left and search for **Stream Analytics Job**



Step 2. Select the **Stream Analytics job by Microsoft** and click Create.



Step 3. Give your job a unique name, select the correct Azure Subscription, select the Resource Group created in the prior lab and click create.

New Stream Analytics Job

portal.azure.com/#create/Microsoft.StreamAnalyticsJob

Microsoft Azure < Everything > Stream Analytics job > New Stream Analytics Job

ksaye@saye.org  
KEVINSAY.SCD365.NET

New Stream Analytics Job

\* Job name  
iotStreamJob ✓

\* Subscription  
MSDN Personal

\* Resource group  
☐ Create new ☒ Use existing  
kevinsayho

\* Location  
East US

☐ Pin to dashboard

Create Automation options

Step 4. Click the Resource Group Icon on the left, select the resource group you just created and click on your Stream Analytics Job just created.

The screenshot shows the Microsoft Azure portal interface. The top navigation bar indicates the user is logged in as 'ksaye@saye.org'. The main header shows 'Resource groups > kevinssayhol'. The left sidebar contains a list of resource group icons, with the 'kevinssayhol' icon highlighted. The main content area displays the 'kevinssayhol' resource group details. Under the 'Essentials' section, the 'iotStreamJob' resource is listed and highlighted with a red box. The 'Overview' tab is selected, showing details about the subscription and the job's status.

Step 5. Once the Stream Job is crated (less than a minute), click on the Inputs icon.

The screenshot shows the Microsoft Azure portal interface for the 'iotStreamJob' resource. The top navigation bar indicates the user is logged in as 'ksaye@saye.org'. The main header shows 'Resource groups > kevinssayhol > iotStreamJob'. The left sidebar contains a list of resource group icons, with the 'kevinssayhol' icon highlighted. The main content area displays the 'iotStreamJob' resource details. Under the 'Essentials' section, the 'Inputs' tab is selected and highlighted with a red box. The 'Inputs' tab shows a list of inputs with '0' results. The 'Query' tab is also visible, showing a query editor with a red box around the 'Query' icon. The 'Outputs' tab is also visible, showing a list of outputs with '0' results.

Step 6. Click the Add button then on the right, create the alias **iothub**, Source Type: Data stream, Source: IoT hub, Import option: "Use IoT hub from current subscription", IoT hub: the hub created earlier.

New input - Microsoft Azure

portal.azure.com/#resource/subscriptions/e79e744c-05b2-44e0-abde-00b96cc09de9/resourceGroups/kt

Microsoft Azure Resource groups > kevinsayhol > iotStreamJob - Inputs > New input

ksaye@saye.org KEVINSAY.SCD365.NET

New input

+ Add

NAME	SOURCE TYPE	SOURCE
Empty		

\* Input alias  
iothub ✓

\* Source Type ⓘ  
Data stream ▼

\* Source ⓘ  
IoT hub ▼

\* Import option  
Use IoT hub from current subscription ▼

IoT hub  
hol ▼

\* Endpoint ⓘ  
Messaging ▼

Shared access policy name  
iothubowner ▼

Shared access policy key  
.....

Consumer group  
\$Default ▼

\* Event serialization format ⓘ  
JSON ▼

Encoding ⓘ  
UTF-8 ▼

Create

Step 7. Back at Stream Job, select Outputs.

The screenshot shows the Microsoft Azure portal interface for a Stream Analytics job named 'iotStreamJob'. The left-hand navigation pane is open, and the 'Outputs' tab is selected and highlighted with a red rectangle. The main content area shows the job's configuration and monitoring details.

**Navigation Pane:**

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- SETTINGS
  - Locks
- JOB TOPOLOGY
  - Inputs
  - Functions
  - Query
  - Outputs**

**Main Content Area:**

Settings Start Stop Delete

Created

Essentials

Inputs: 1 (iothub)

Query: <>

Outputs: 0 (No results)

Monitoring: InputEvents, OutputEvents and one more metric past hour

100
80
60

Edit

Step 8. Click Outputs → Add and select an existing or create a unique blob storage account, as shown below.  
Be sure to select CSV for later use

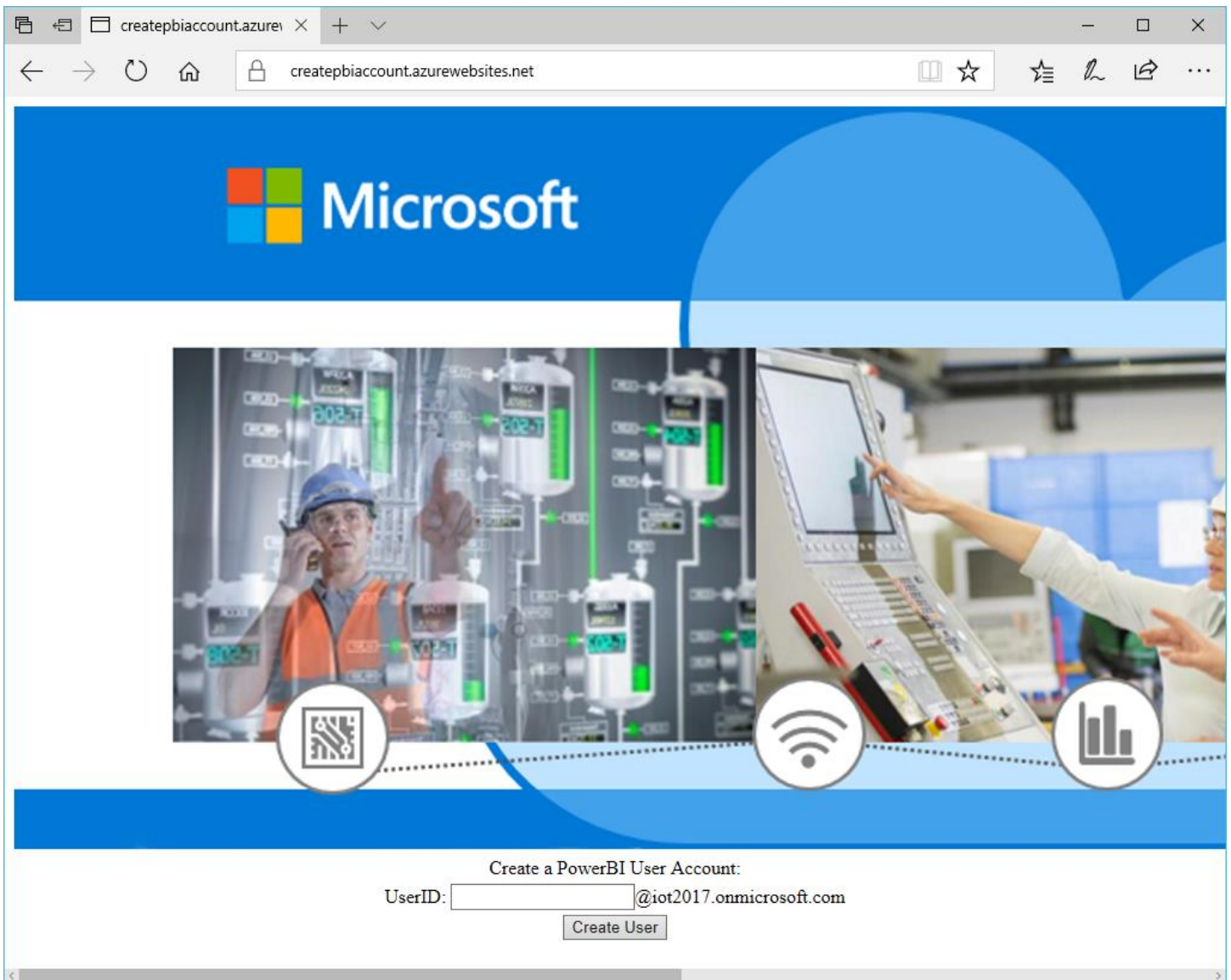
The screenshot shows the 'New output' configuration page in the Microsoft Azure portal. The page is titled 'New output' and has a breadcrumb trail: 'Resource groups > iotbootcamp > iotStreamJob - Outputs >'. The left sidebar contains various Azure service icons. The main content area is a form for configuring a new output. The form has the following fields:

- Output alias:** 'blob' (with a green checkmark)
- Sink:** 'Blob storage' (dropdown menu)
- Import option:** 'Select blob storage from your subscriptions' (dropdown menu)
- Storage account:** 'Create a new storage account' (dropdown menu)
- Storage account:** 'mystorageaccount' (text input)
- Container:** 'mycontainer' (text input)
- Path pattern:** (empty text input)
- Date format:** 'YYYY/MM/DD' (dropdown menu)
- Time format:** 'HH' (dropdown menu)
- Event serialization format:** 'CSV' (dropdown menu)
- Delimiter:** 'comma (,)' (dropdown menu)
- Encoding:** 'UTF-8' (dropdown menu)

A red box highlights the 'Sink' section, which includes the 'Sink', 'Import option', 'Storage account', 'Storage account', 'Container', 'Path pattern', 'Date format', 'Time format', and 'Event serialization format' fields. Another red box highlights the 'Create' button at the bottom of the form.



Step 9. Open a new window and create a Power BI Account by accessing:  
<https://createbiaccount.azurewebsites.net/>. Note, you can use an existing PBI account if you have one.



The screenshot shows a web browser window with the address bar displaying "createbiaccount.azurewebsites.net". The page features the Microsoft logo at the top. Below the logo is a large banner image showing a worker in a hard hat and safety vest interacting with a complex industrial control system. The banner also includes icons for a circuit board, a Wi-Fi signal, and a bar chart. At the bottom of the page, there is a section titled "Create a PowerBI User Account:" with a text input field for "UserID:" followed by "@iot2017.onmicrosoft.com". A "Create User" button is located below the input field.

Create a PowerBI User Account:

UserID: @iot2017.onmicrosoft.com

Create User

Step 10. Log into <http://powerbi.com> as the account you just created to complete the setup, which may include changing password etc. Skip the invitation portion. **Note, these demonstration accounts will be deleted at a later time.**

Step 11. Back at Stream Job, select Outputs.

The screenshot shows the Microsoft Azure portal interface for a Stream Analytics job named 'iotStreamJob'. The left-hand navigation pane has the 'Outputs' option highlighted with a red rectangle. The main content area displays the job's configuration in a 'Created' state. It includes sections for 'Inputs' (showing 1 input named 'iotHub'), 'Query' (empty), and 'Outputs' (showing 0 outputs with the message 'No results.'). Below these is a 'Monitoring' section with a line graph titled 'InputEvents, OutputEvents and one more metric past hour', showing data points at 100, 80, and 60.

Step 12. Name the alias **powerBI**, select the Sink to be Power BI and click the Authorize button.

The screenshot shows the 'New output' configuration page in the Microsoft Azure portal. The left-hand navigation pane has the 'Add' button highlighted with a red rectangle. The main content area features a table with columns 'NAME' and 'SINK'. To the right of the table, there are two input fields: 'Output alias' (set to 'powerBI') and 'Sink' (set to 'Power BI'), both highlighted with red rectangles. Below these fields is an 'Authorize Connection' section with a message: 'You'll need to authorize with Power BI to configure your output settings.' and an 'Authorize' button, which is also highlighted with a red rectangle.

Step 13. At the Power BI Authorize screen, you will need your “Organization Id” created in step 9. Power BI does not allow a consumer id (example: xxx@live.com, xxx@msn.com, xxx@hotmail.com, etc).

Sign in to your account - Microsoft Edge

Microsoft Corporation [US] login.microsoftonline.com/common/oauth2/authorize?client\_id=66f1e791-7bfb-4e18-aed8-1720056421c7&resource=https%3a%2f%2fanalysis.wir

Cloud optimize your business

Microsoft Azure

Work or school account

someone@example.com

Password

☐ Keep me signed in

Sign in

Step 14. Once authorized, name the Dataset: **HandsonLabDS**, the table **HandsOnLabTable** and click create.

New output - Microsoft

portal.azure.com/#resource/subscriptions/e79e744c-05b2-44e0-abde-00b96cc09de9/resourceGroups/kevinsayhol/iotStreamJob - Outputs > New output

Microsoft Azure Resource groups > kevinsayhol > iotStreamJob - Outputs > New output

ksaye@saye.org KEVINSAY.SCD365.NET

New output

NAME	SINK
Empty	

\* Output alias  
powerBI

\* Sink  
Power BI

Group Workspace  
My Workspace

\* Dataset Name  
HandsonLabDS

If the dataset or table already exists in yo... Microsoft Power BI subscription, it will be overwritten.

\* Table Name  
HandsOnLabTable

Currently authorized as Kevin Saye (kevinsay@microsoft.com)

Create

Step 15. Back at Stream Job, select Query.

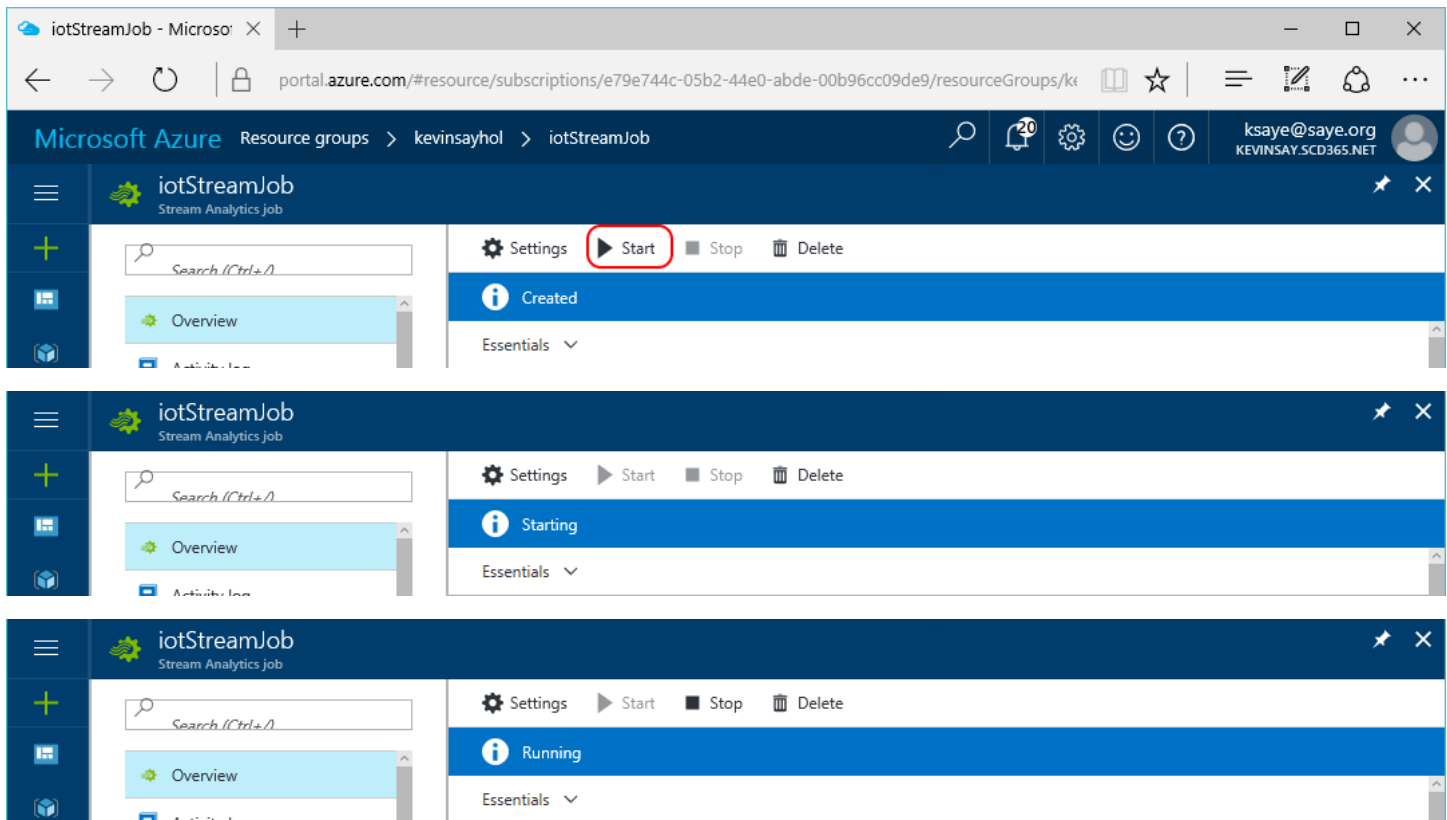
The screenshot shows the Microsoft Azure portal interface for a Stream Analytics job named 'iotStreamJob'. The left-hand navigation pane is open, and the 'Query' tab is highlighted with a red rectangle. The main content area shows the 'Job Topology' with one input named 'iothub' and one output named 'powerBI'. Below the topology, the 'Monitoring' section displays a graph of 'InputEvents, OutputEvents and one more metric past hour' with data points at 100 and 80.

Step 16. In the Query window, type the following query and click save. You can copy and paste from: <https://tinyurl.com/IOTVBCStream>.

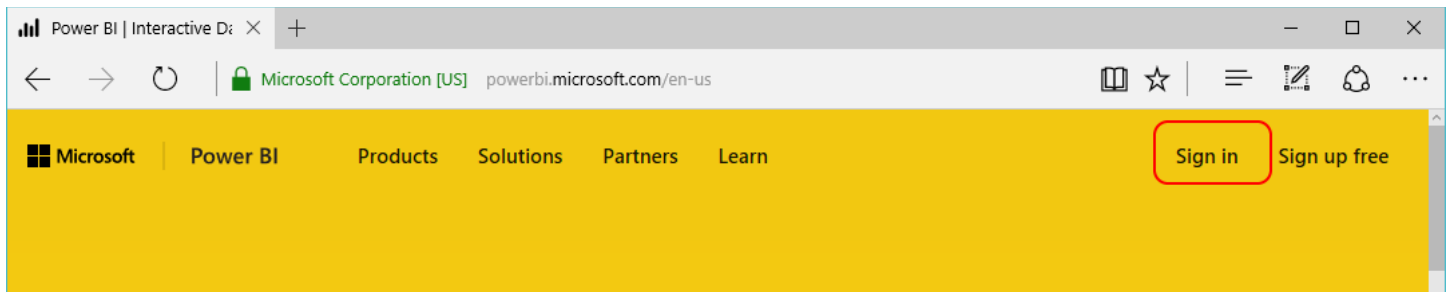
```
1 SELECT
2     AVG(temperature),
3     iothub.iothub.connectiondeviceid as deviceName,
4     DATEPART(minute, System.Timestamp) as minute,
5     DATEPART(hour, System.Timestamp) as hour,
6     DATENAME(weekday, System.Timestamp) as day,
7     DATENAME(month, System.Timestamp) as month,
8     DATENAME(year, System.Timestamp) as year
9 INTO
10    powerbi
11 FROM
12    iothub
13 Group By
14     TumblingWindow (minute, 1), iothub.iothub.connectiondeviceid
15
16 SELECT
17     *
18 INTO
19     blob
20 FROM iothub
```

The screenshot shows the Stream Analytics Query Editor. The left-hand pane shows the 'Inputs (1)' section with 'iothub' and the 'Outputs (2)' section with 'blob' and 'powerbi'. The main area displays a SQL query that calculates the average temperature and extracts date and time components from the timestamp. The query is saved into the 'powerbi' output.

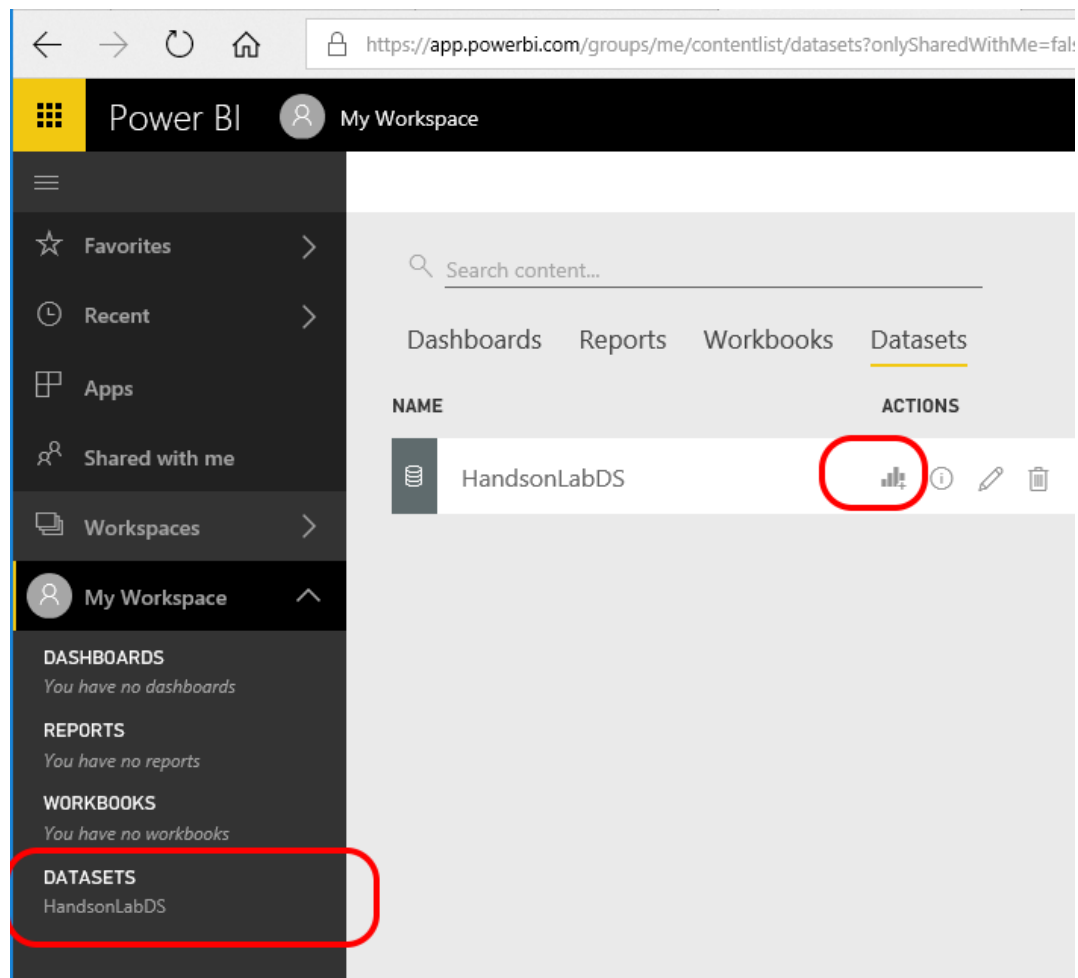
Step 17. Back at Stream, click Start and watch the process go from Starting to Running. **Note, make sure your Device Explorer is not monitoring your Huzzah device, else you may get a conflict (consumer group).**



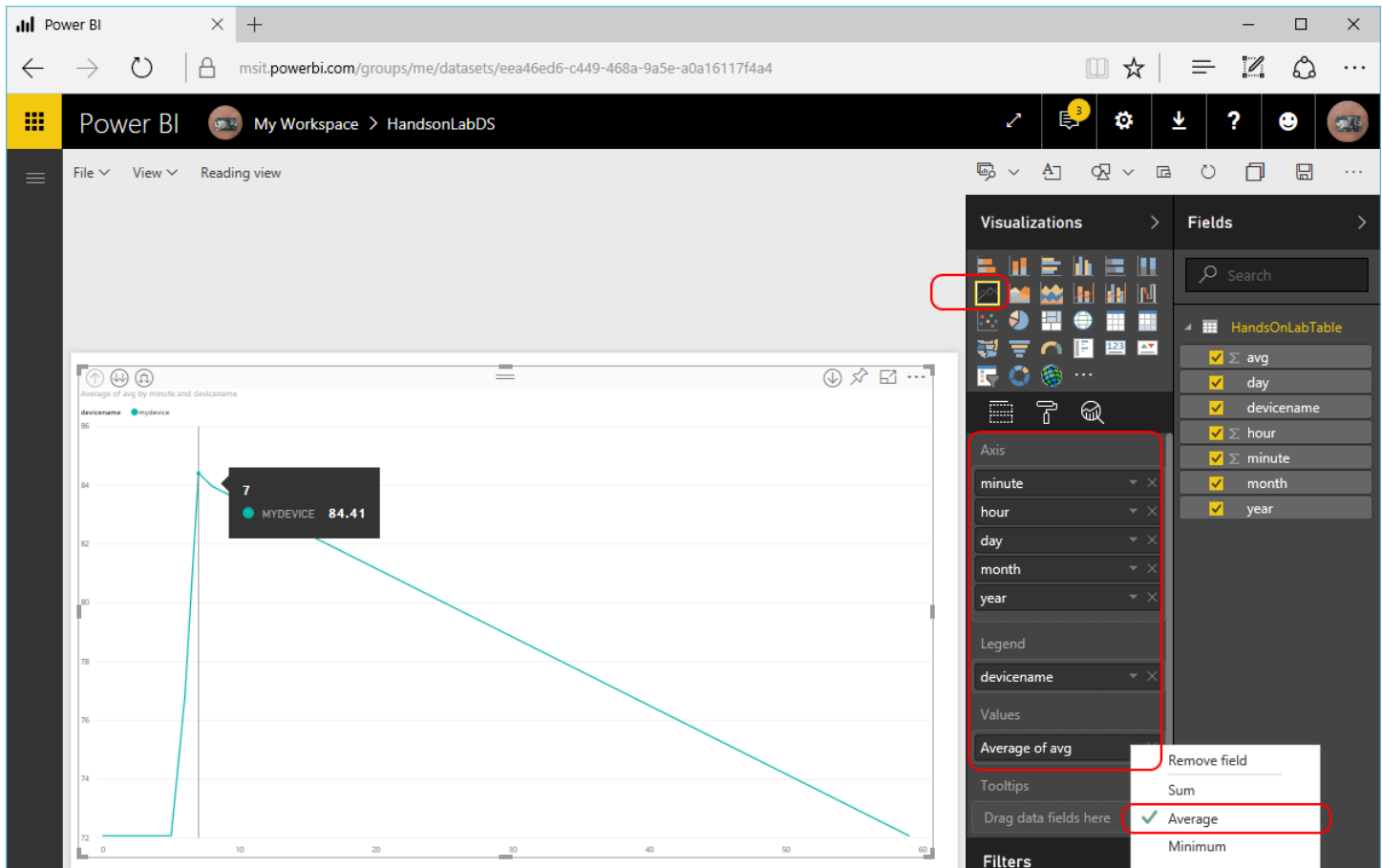
Step 18. Go to <http://powerbi.com/>, and click Sign in.



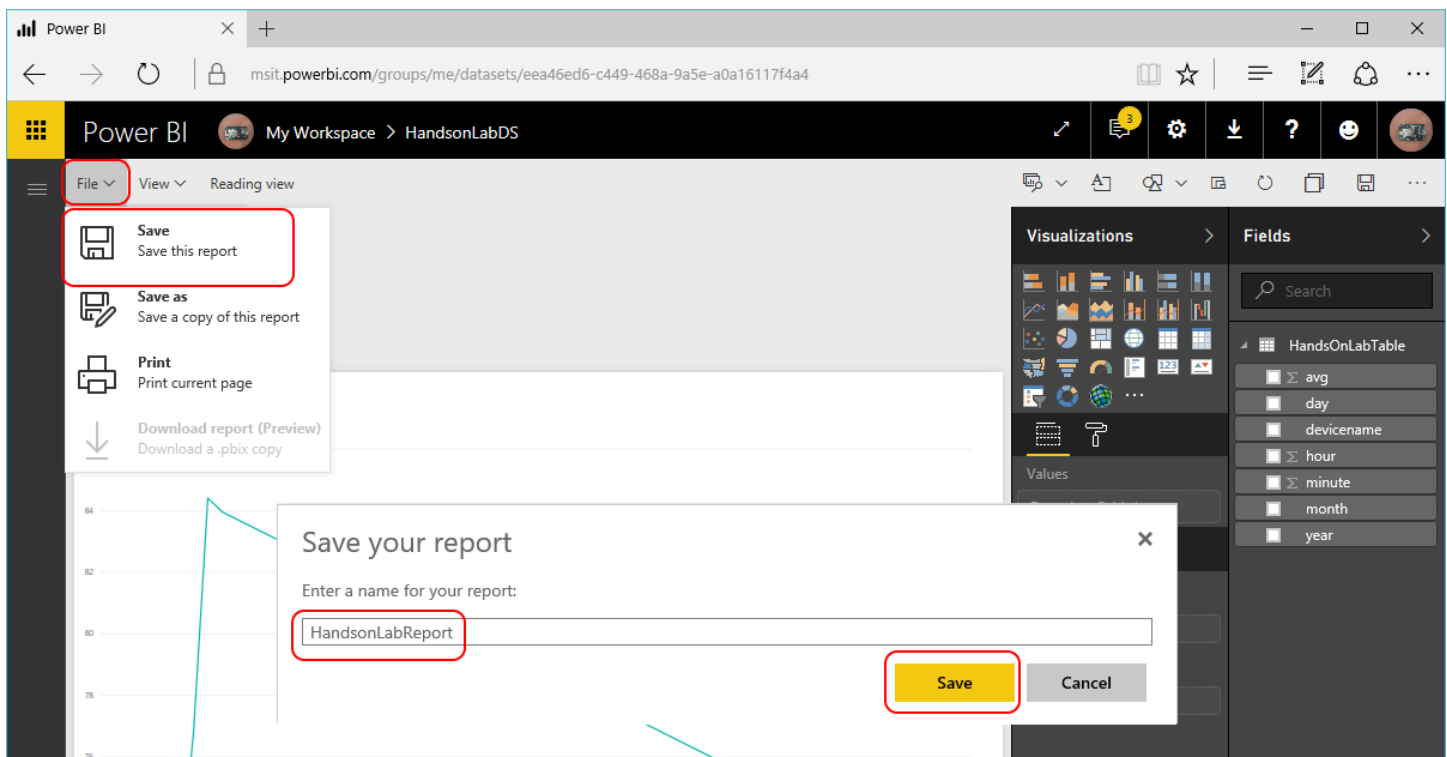
Step 19. In Power BI, select "My Workspace". Under Datasets, click Streaming dataset and then click the Create Report on the table "HandsonLabDS".



Step 20. In Power BI, create a Line chart, using deviceName as the Legend and minute, hour day, month and year as the Axis. Lastly, change the val to Average of avg. Holding your hand over the sensor for over a minute will show the difference seen below.



Step 21. Click File and save the report as **HandsonLabReport**.

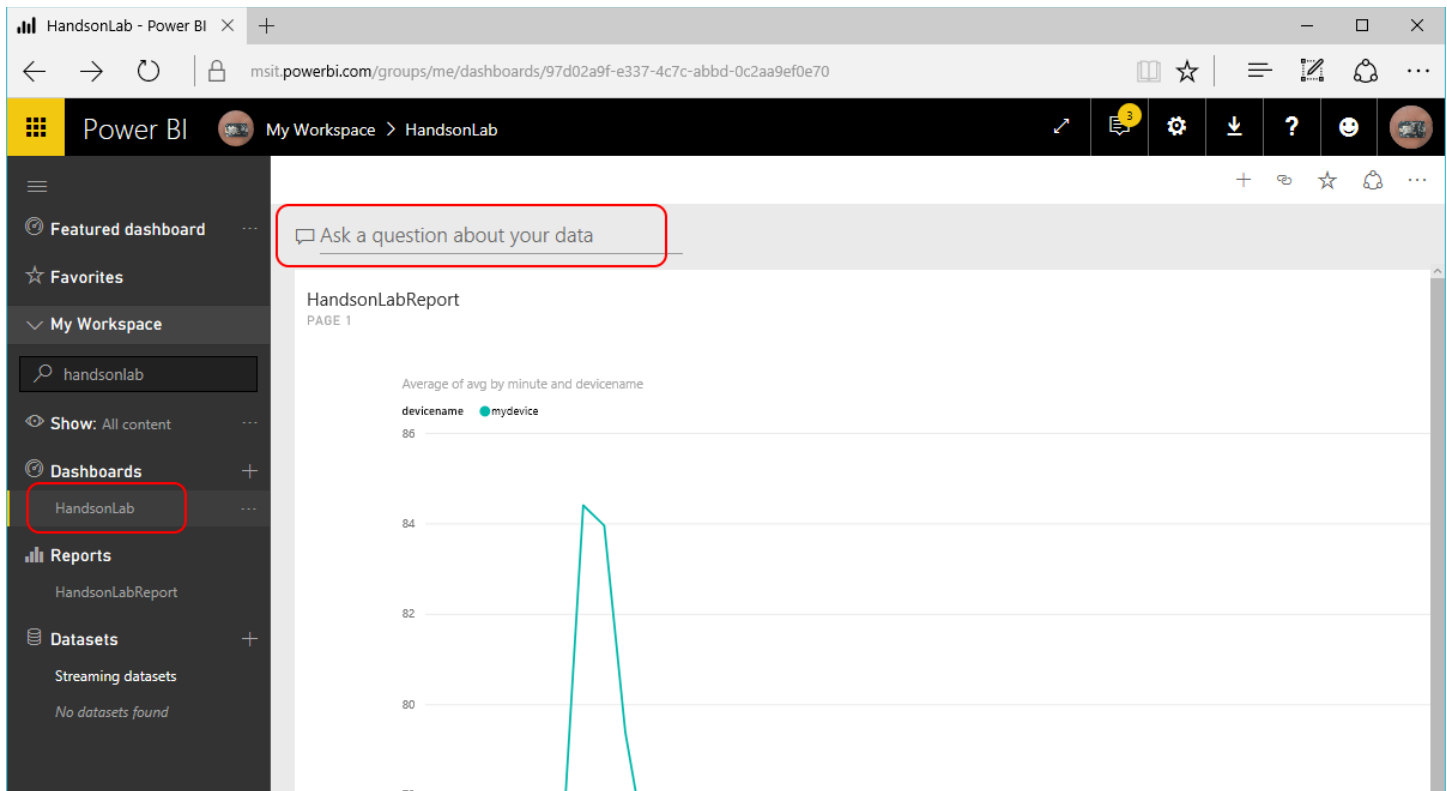


Step 22. Expand the left navigation bar by clicking the icon at the top. Then select the report “HandsonLabReport” and at the top left, click the pin to dashboard icon. Lastly, name the report and “pin live”.

The screenshot shows the Microsoft Power BI web application interface. The left-hand navigation pane is expanded, showing a list of items including 'Featured dashboard', 'Favorites', 'My Workspace', 'Search', 'Show: All content', 'Dashboards', 'Reports', 'HandsonLabReport' (highlighted with a red box), 'People View', 'Datasets', 'kevinsaydw', 'Messages', 'People View', and 'Streaming datasets'. The main content area displays a preview of the 'HandsonLabReport' with a line chart. A 'Pin to dashboard' dialog box is open in the foreground, prompting the user to select an existing dashboard or create a new one. The 'New dashboard' option is selected, and the text 'HandsonLab' is entered in the input field. The 'Pin live' button is highlighted with a red box. The top of the interface shows the 'Power BI' logo and the 'My Workspace > HandsonLabReport' breadcrumb. The right-hand side of the interface shows a vertical pane with 'Visualizations', 'Fields', and 'Filters' tabs.



Step 23. You now have a Dashboard that you can ask questions by clicking in the ask a question area.



Exit Q&A

hand on lab table

avg	devicename	minute	hour	day	month	year
72.01	mydevice	13	16	Tuesday	April	2017
72.08	mydevice	0	16	Tuesday	April	2017
72.08	mydevice	1	16	Tuesday	April	2017
72.08	mydevice	2	16	Tuesday	April	2017
72.08	mydevice	3	16	Tuesday	April	2017
72.08	mydevice	4	16	Tuesday	April	2017
72.08	mydevice	5	16	Tuesday	April	2017

Step 24. Ask Power BI a few questions like:

- what is the average avg
- what is the average avg by day
- what is the average avg by minute
- what is the count of avg
- avg

While we did not view the data in the Storage account, if time permits you can download and view the content of the CSV file.

This concludes this lab.