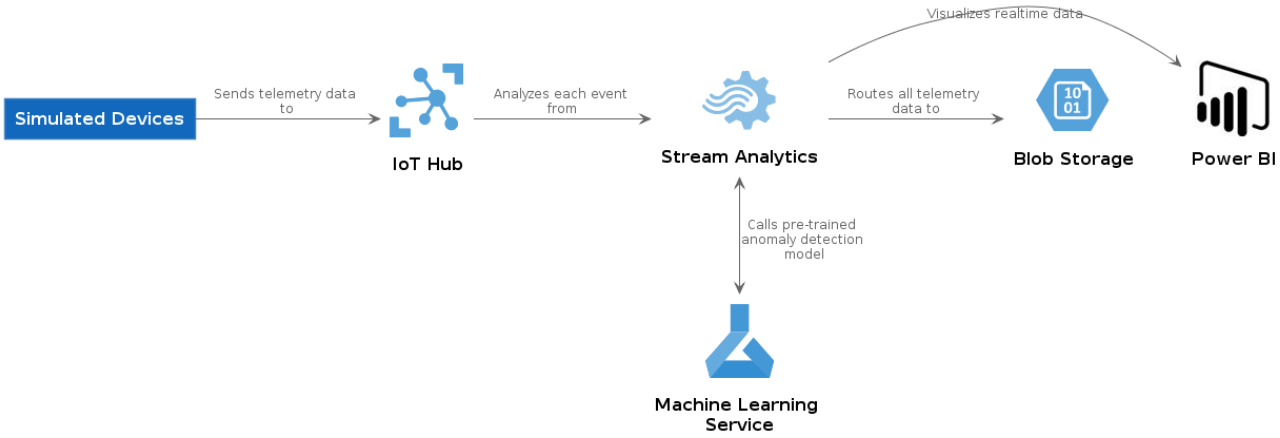
Global Azure Bootcamp 2019 - Hands-On Session

https://gazaicdocsta.z6.web.core.windows.net

Klassifikation von Sensordaten durch ML-Modelle in Echtzeit

Architektur



Links

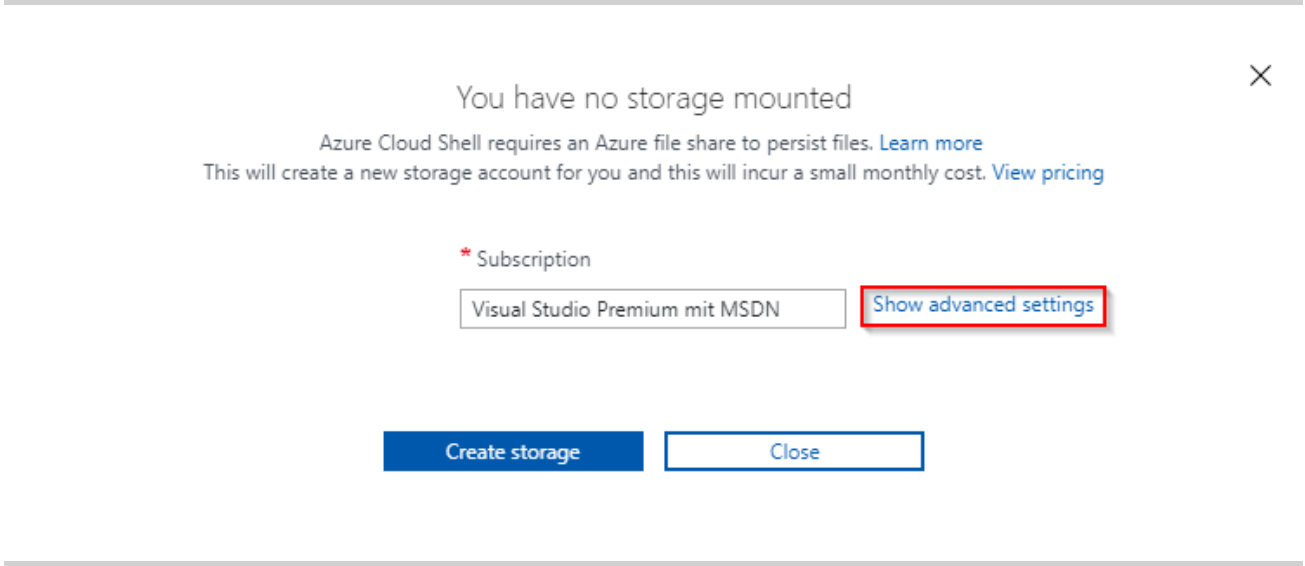
- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI

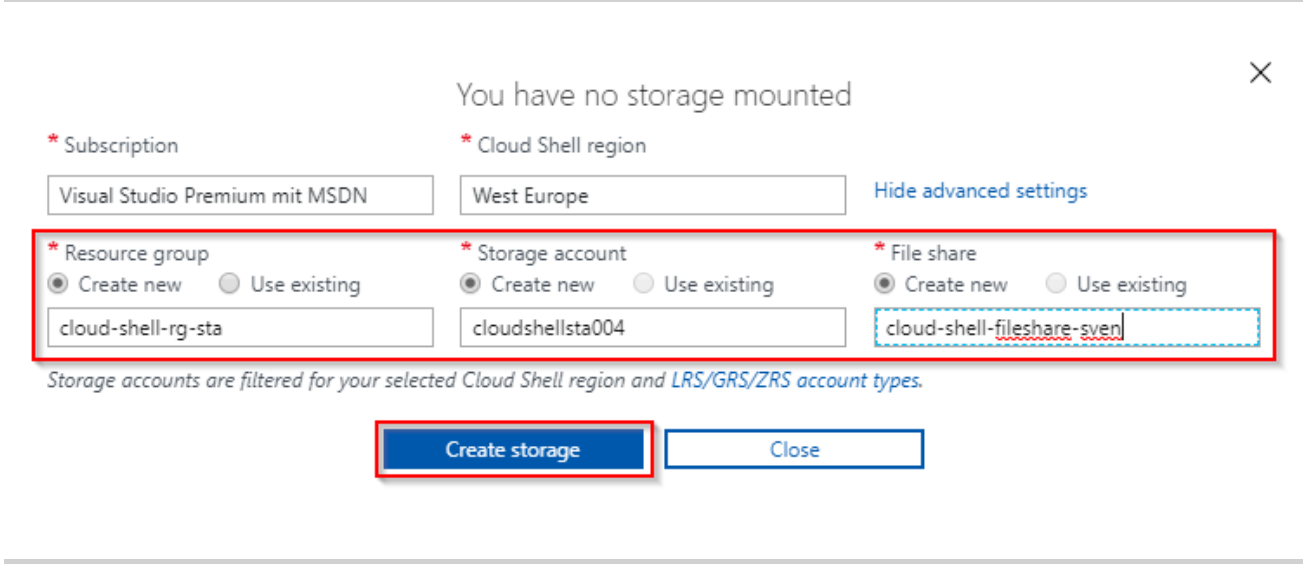
Global Azure Bootcamp 2019 - Hands-On Session

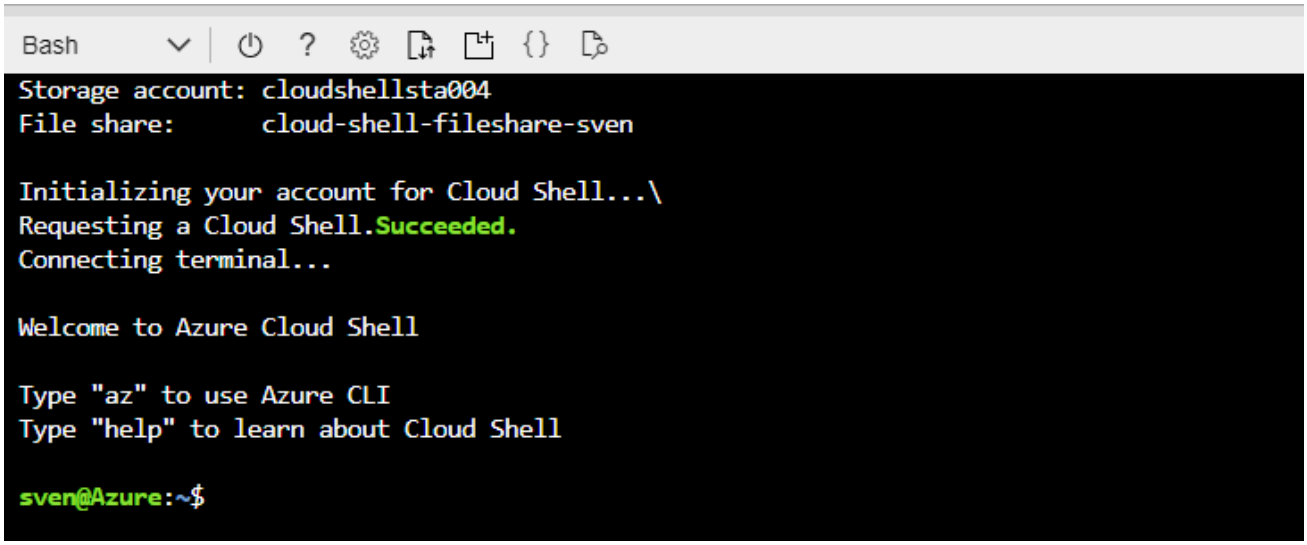
https://gazaicdocsta.z6.web.core.windows.net

Azure Cloud Shell

Azure-Portal rechts oben im Menü auf die Schaltfläche Cloud Shell klicken:







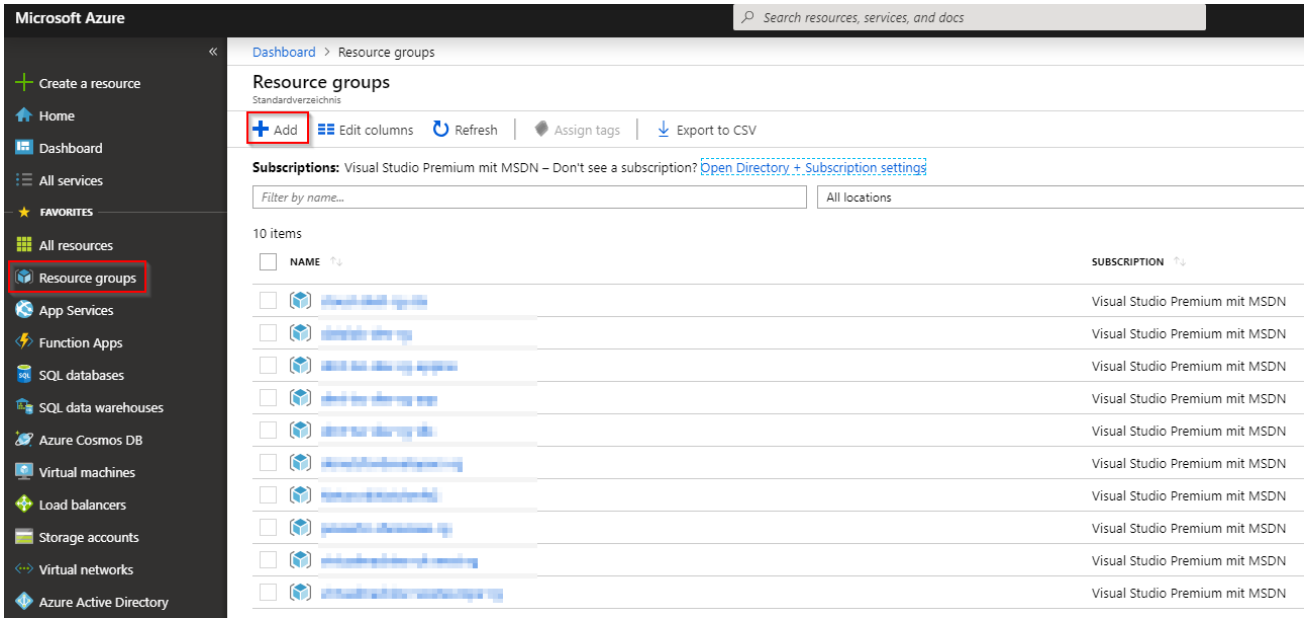
Links

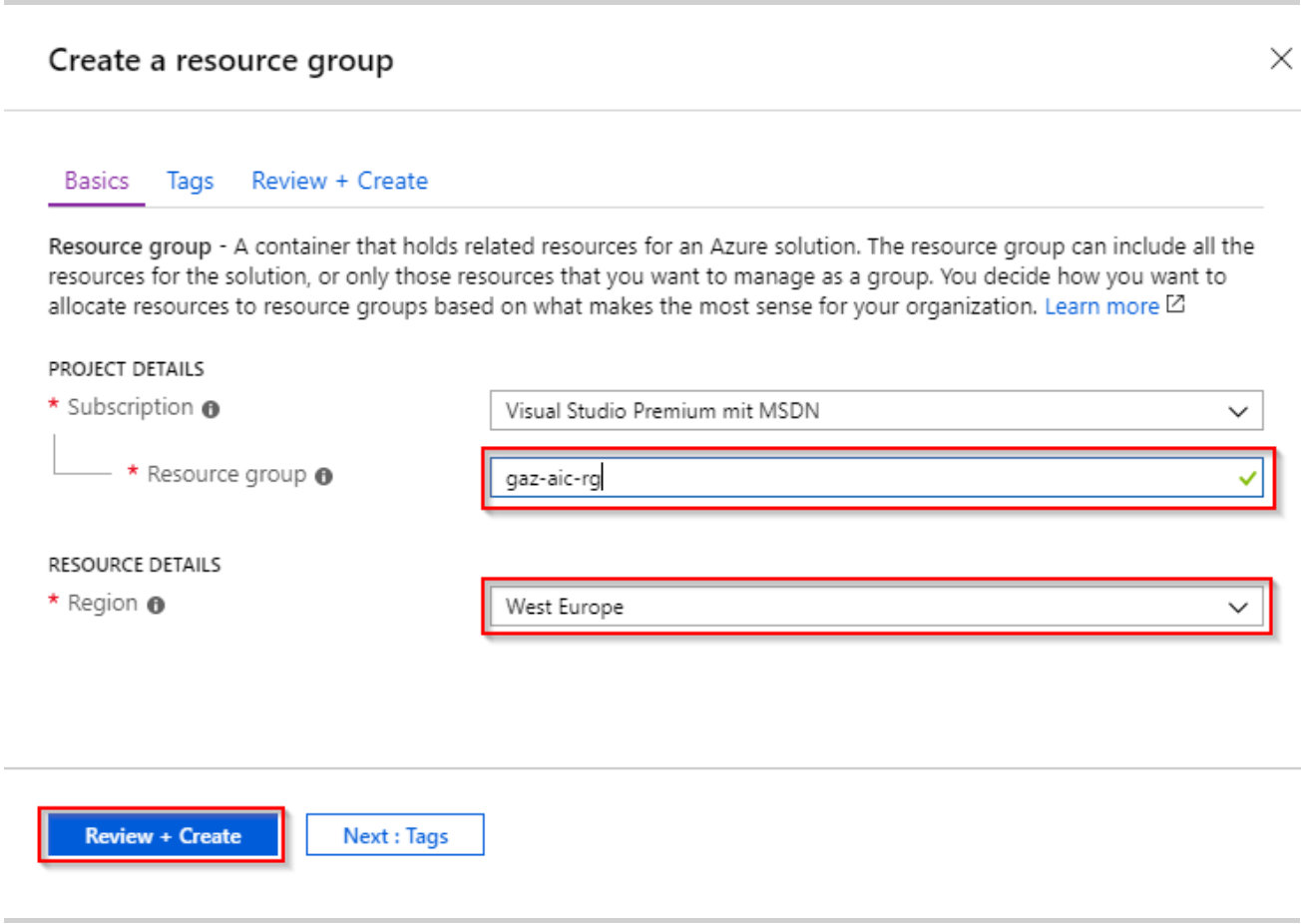
- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI

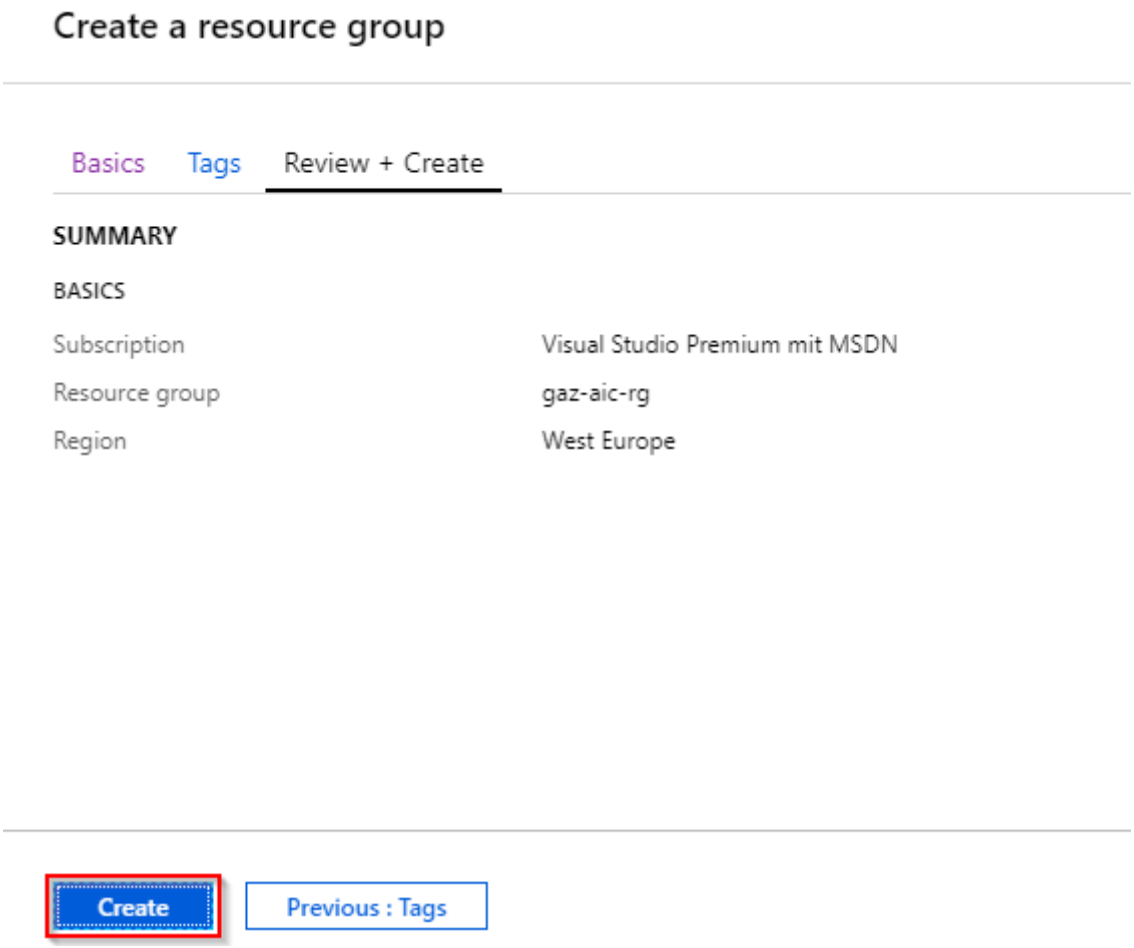
Global Azure Bootcamp 2019 - Hands-On Session

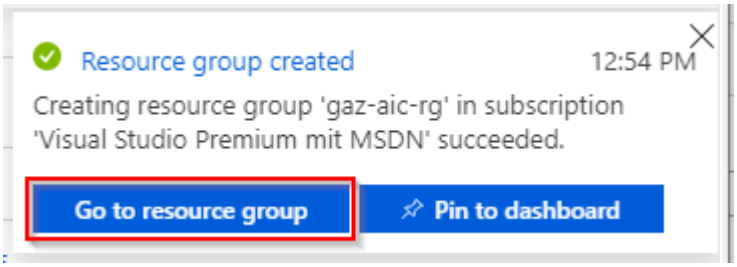
https://gazaicdocsta.z6.web.core.windows.net

Resourcegroup erstellen









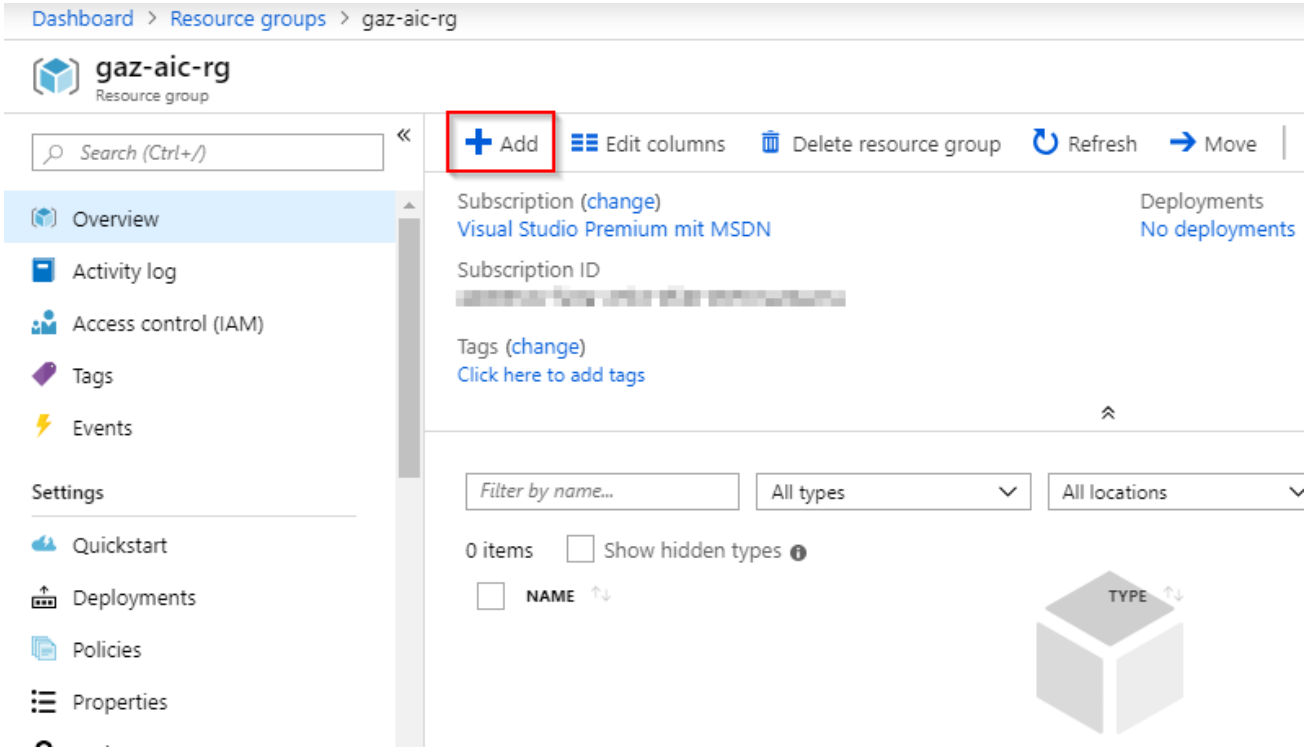
Links

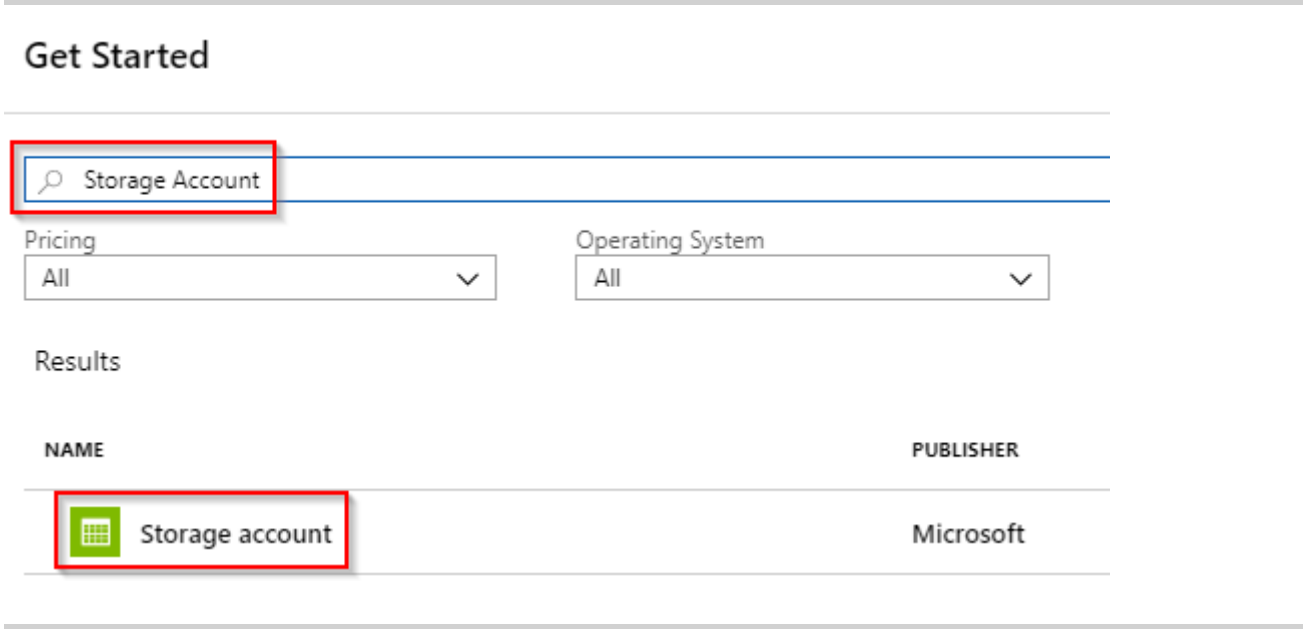
- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI

Global Azure Bootcamp 2019 - Hands-On Session

https://gazaicdocsta.z6.web.core.windows.net

Storage Account erstellen





Storage account
Microsoft

Storage account

Microsoft

Create | Save for later

Want to deploy programmatically? Get started →

Microsoft Azure provides scalable, durable cloud storage, backup, and recov
works with the infrastructure you already have to cost-effectively enhance y
continuity strategy, and provide the storage required by your cloud applicat
data such as video, audio, and images.

Create storage account

Basics | Advanced | Tags | Review + create

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. Learn more

PROJECT DETAILS

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

* Subscription: Visual Studio Premium mit MSDN

* Resource group: gaz-aic-rg

Create new

INSTANCE DETAILS

The default deployment model is Resource Manager, which supports the latest Azure features. You may choose to deploy using the classic deployment model instead. Choose classic deployment model

* Storage account name: gazaicsta001w

* Location: West Europe

Performance: (•) Standard ( ) Premium

Account kind: StorageV2 (general purpose v2)

Replication: Locally-redundant storage (LRS)

Access tier (default): ( ) Cool (•) Hot

Review + create | Previous | Next : Advanced >

Create storage account

Validation passed

Basics | Advanced | Tags | Review + create

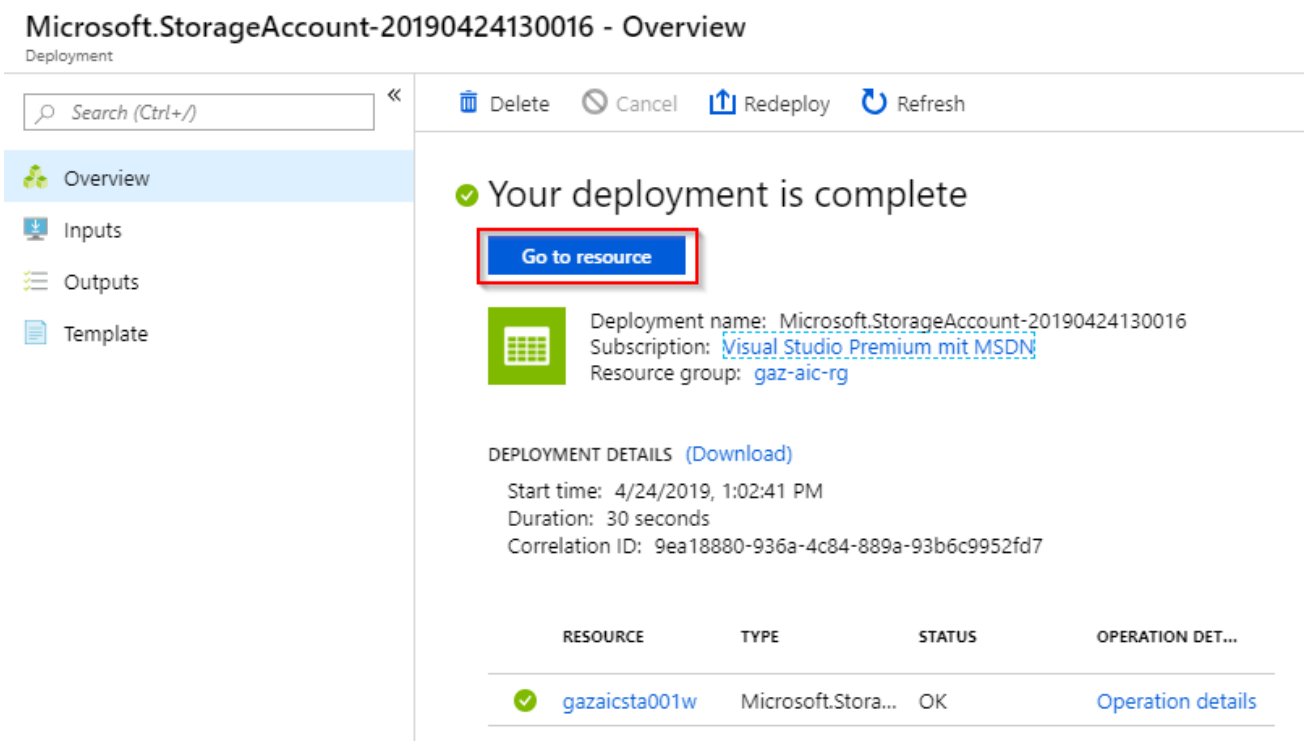
BASICS

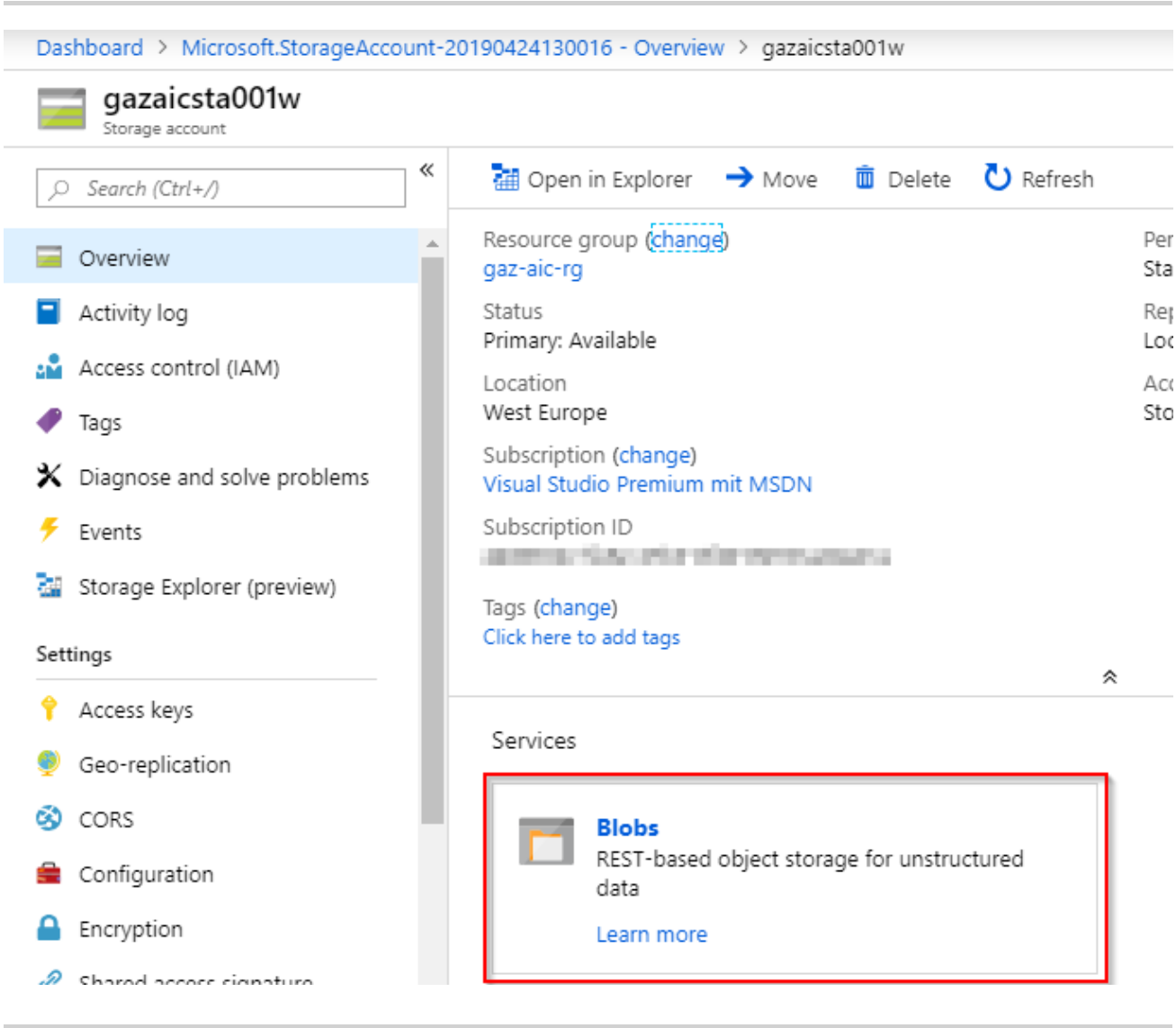
Subscription	Visual Studio Premium mit MSDN
Resource group	gaz-aic-rg
Location	West Europe
Storage account name	gazaicsta001w
Deployment model	Resource manager
Account kind	StorageV2 (general purpose v2)
Replication	Locally-redundant storage (LRS)
Performance	Standard
Access tier (default)	Hot

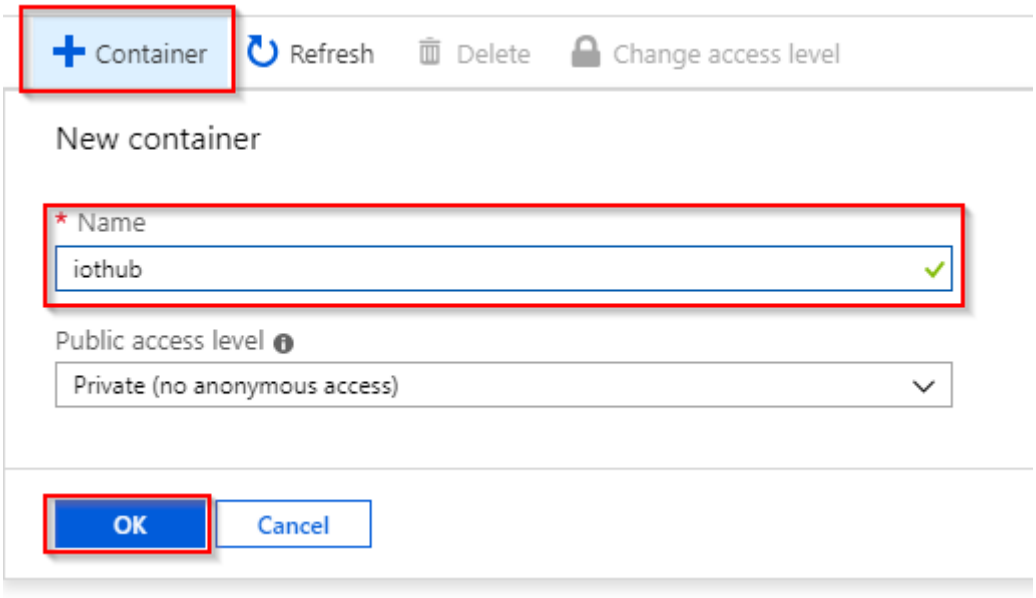
ADVANCED

Secure transfer required	Enabled
Allow access from	All networks
Hierarchical namespace	Disabled
Blob soft delete	Disabled

Create | Previous | Next | Download a template for automation


Microsoft.StorageAccount-20190424130016 - Overview
Deployment
Search (Ctrl+/)
Overview
Inputs
Outputs
Template
Delete
Cancel
Redeploy
Refresh
Your deployment is complete
Go to resource
Deployment name: Microsoft.StorageAccount-20190424130016
Subscription: Visual Studio Premium mit MSDN
Resource group: gaz-aic-rg
DEPLOYMENT DETAILS (Download)
Start time: 4/24/2019, 1:02:41 PM
Duration: 30 seconds
Correlation ID: 9ea18880-936a-4c84-889a-93b6c9952fd7
RESOURCE
TYPE
STATUS
OPERATION DET...
gazaicsta001w
Microsoft.Stora...
OK
Operation details


Dashboard > Microsoft.StorageAccount-20190424130016 - Overview > gazaicsta001w
gazaicsta001w
Storage account
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Events
Storage Explorer (preview)
Settings
Access keys
Geo-replication
CORS
Configuration
Encryption
Open in Explorer
Move
Delete
Refresh
Resource group (change)
gaz-aic-rg
Status
Primary: Available
Location
West Europe
Subscription (change)
Visual Studio Premium mit MSDN
Subscription ID
Tags (change)
Click here to add tags
Services
Blobs
REST-based object storage for unstructured data
Learn more



Links

- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI

Global Azure Bootcamp 2019 - Hands-On Session

https://gazaicdocsta.z6.web.core.windows.net

Senden von Telemetriedaten an eine IoT Hub-Instanz

Voraussetzung

.NET Core SDK 2.1.0 oder höher. Dazu in der Cloud Shell folgenden Befehl absetzen.

```
dotnet --version
```

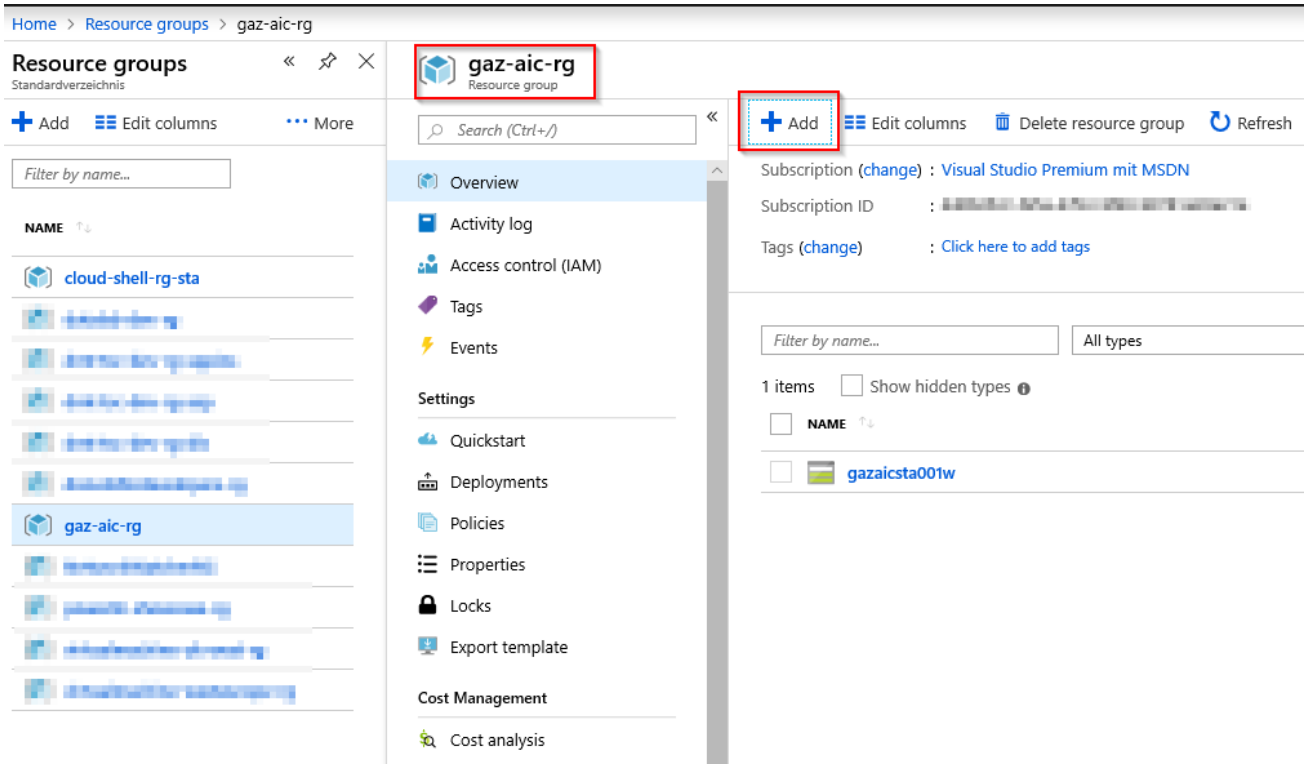
Hinzufügen der Microsoft Azure IoT-Erweiterung für die Azure-Befehlszeilenschnittstelle zur Cloud Shell Instanz. Dazu in der Cloud Shell folgenden Befehl absetzen.

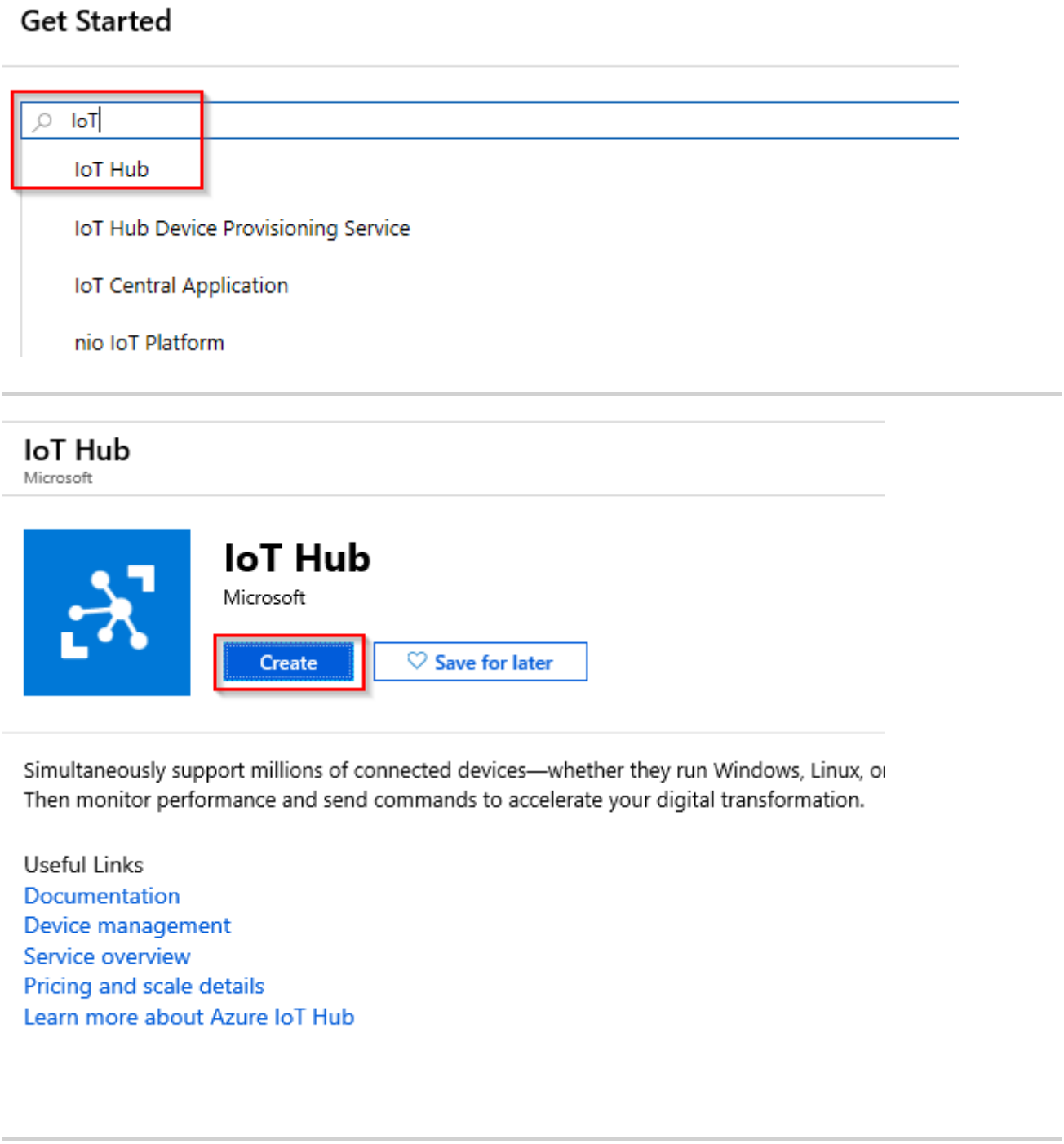
```
az extension add --name azure-cli-iot-ext
```

Beispiel herunterladen. Dazu in der Cloud Shell folgende Befehle absetzen

```
mkdir work
cd work
wget https://gazaicdocsta.z6.web.core.windows.net/src/simulated-device.zip
unzip simulated-device.zip
```

Erstellen eines IoT Hubs




Get Started
IoT
IoT Hub
IoT Hub Device Provisioning Service
IoT Central Application
nio IoT Platform
IoT Hub
Microsoft
IoT Hub
Microsoft
Create
Save for later
Simultaneously support millions of connected devices—whether they run Windows, Linux, o
Then monitor performance and send commands to accelerate your digital transformation.
Useful Links
Documentation
Device management
Service overview
Pricing and scale details
Learn more about Azure IoT Hub

IoT hub
Microsoft

Basics | Size and scale | Review + create

Create an IoT Hub to help you connect, monitor, and manage billions of your IoT assets. Learn More

PROJECT DETAILS

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

* Subscription: Visual Studio Premium mit MSDN
* Resource Group: gaz-aic-rg
  Create new
* Region: West Europe
* IoT Hub Name: gaz-aic-iot-hub

Review + create | Next: Size and scale » | Automation options

IoT hub
Microsoft

Basics | Size and scale | Review + create

BASICS

Subscription	Visual Studio Premium mit MSDN
Resource Group	gaz-aic-rg
Region	West Europe
IoT Hub Name	gaz-aic-iot-hub

SIZE AND SCALE

Pricing and scale tier	S1
Number of S1 IoT Hub units	1
Messages per day	400.000
Cost per month	21.08 EUR

Create | « Previous: Size and scale | Automation options

Registrieren eines Devices

Dazu in der Cloud Shell folgenden Befehle absetzen und zumindest die `YourIoTHubName` anpassen.

```
az iot hub device-identity create --hub-name YourIoTHubName --device-id MyDotnetDev
az iot hub device-identity show-connection-string --hub-name YourIoTHubName --devic
```

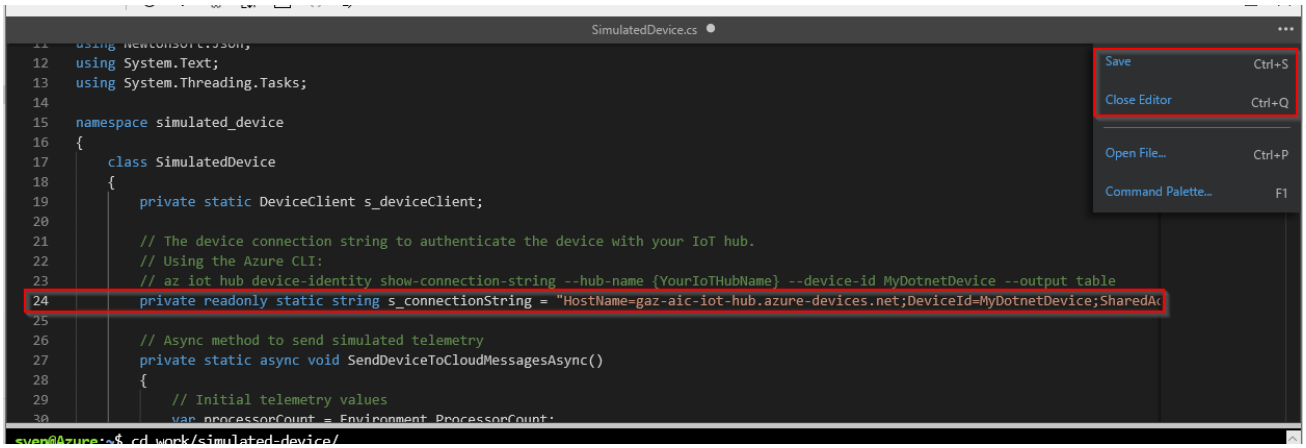
Das Ergebnis des zweiten Befehls kopieren.

```
HostName={YourIoTHubName}.azure-devices.net;DeviceId=MyNodeDevice;SharedAccessKey=
```

In der Cloud Shell in das Verzeichnis `work/simulated-device/` wechseln und die Datei `SimulatedDevice.cs` bearbeiten.

```
cd work/simulated-device
code SimulatedDevice.cs
```

Die Zeile 24 anpassen und anschließend die Datei speichern und den Editor schließen.

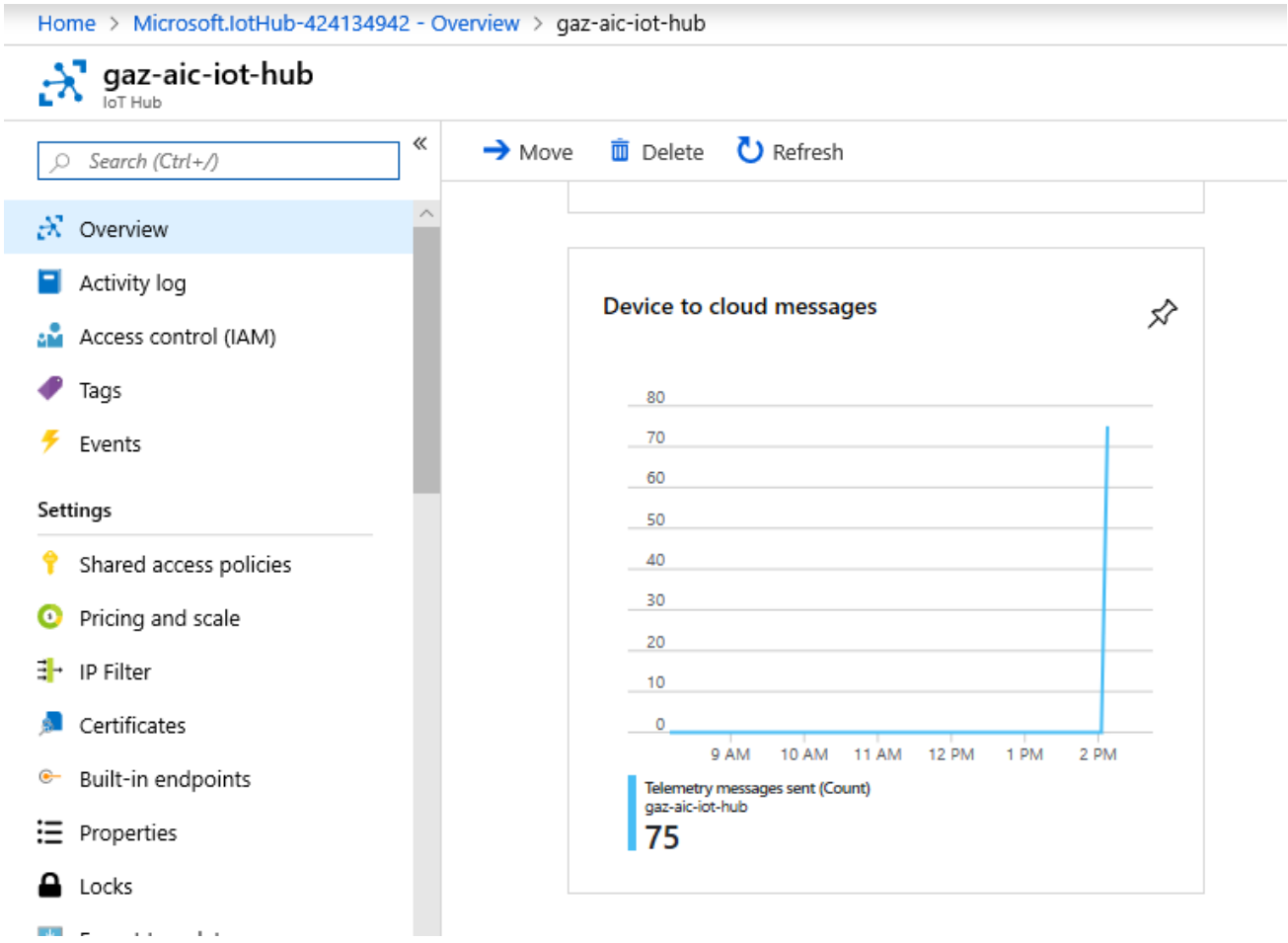


Folgende Befehler in der Cloud Shell ausführen, um die benötigen Pakete zu installieren und den Simulator zu starten.

```
dotnet restore
dotnet run
```

```
sven@Azure:~/work/simulated-device$ dotnet run
IoT Hub Quickstarts #1 - Simulated device. Ctrl-C to exit.

4/24/19 12:07:40 PM > Sending message: {"cpuUsage":0.0,"cpu0Usage":0.0,"cpu1Usage":0.0}
4/24/19 12:07:41 PM > Sending message: {"cpuUsage":1.02,"cpu0Usage":1.02,"cpu1Usage":0.0}
4/24/19 12:07:42 PM > Sending message: {"cpuUsage":0.51,"cpu0Usage":1.0,"cpu1Usage":0.0}
4/24/19 12:07:43 PM > Sending message: {"cpuUsage":1.01,"cpu0Usage":1.02,"cpu1Usage":0.0}
4/24/19 12:07:44 PM > Sending message: {"cpuUsage":0.51,"cpu0Usage":1.0,"cpu1Usage":1.01}
4/24/19 12:07:45 PM > Sending message: {"cpuUsage":1.52,"cpu0Usage":2.0,"cpu1Usage":0.0}
4/24/19 12:07:46 PM > Sending message: {"cpuUsage":0.5,"cpu0Usage":1.0,"cpu1Usage":0.0}
4/24/19 12:07:47 PM > Sending message: {"cpuUsage":0.0,"cpu0Usage":0.0,"cpu1Usage":0.0}
4/24/19 12:07:48 PM > Sending message: {"cpuUsage":1.02,"cpu0Usage":1.01,"cpu1Usage":1.02}
4/24/19 12:07:50 PM > Sending message: {"cpuUsage":0.5,"cpu0Usage":0.0,"cpu1Usage":1.0}
```



Links

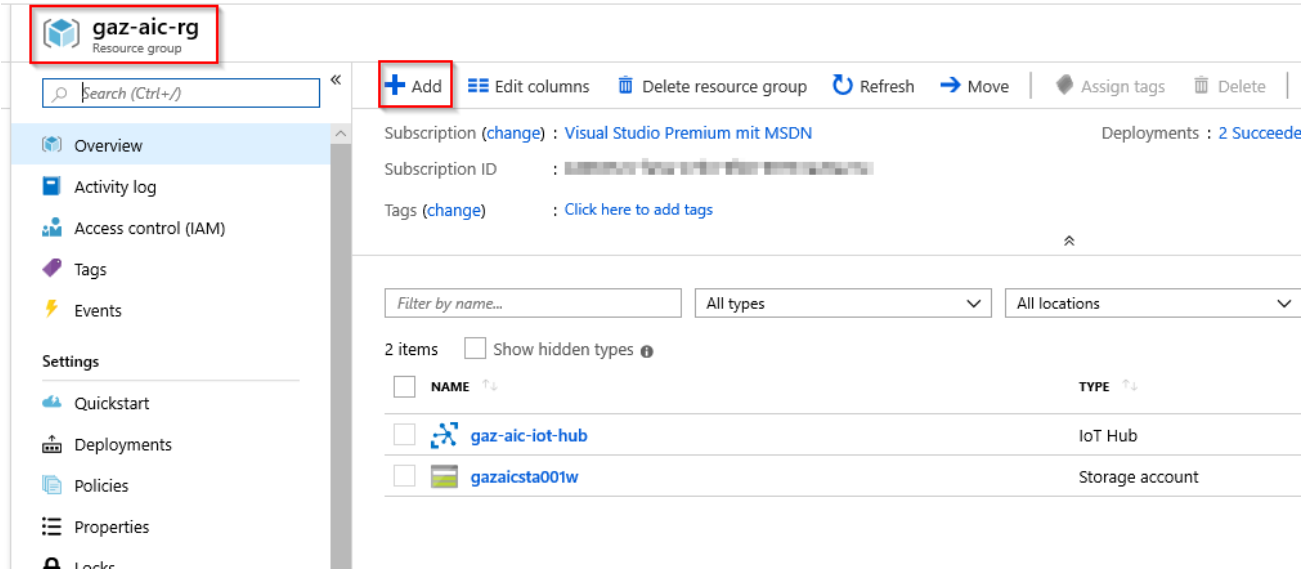
- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI

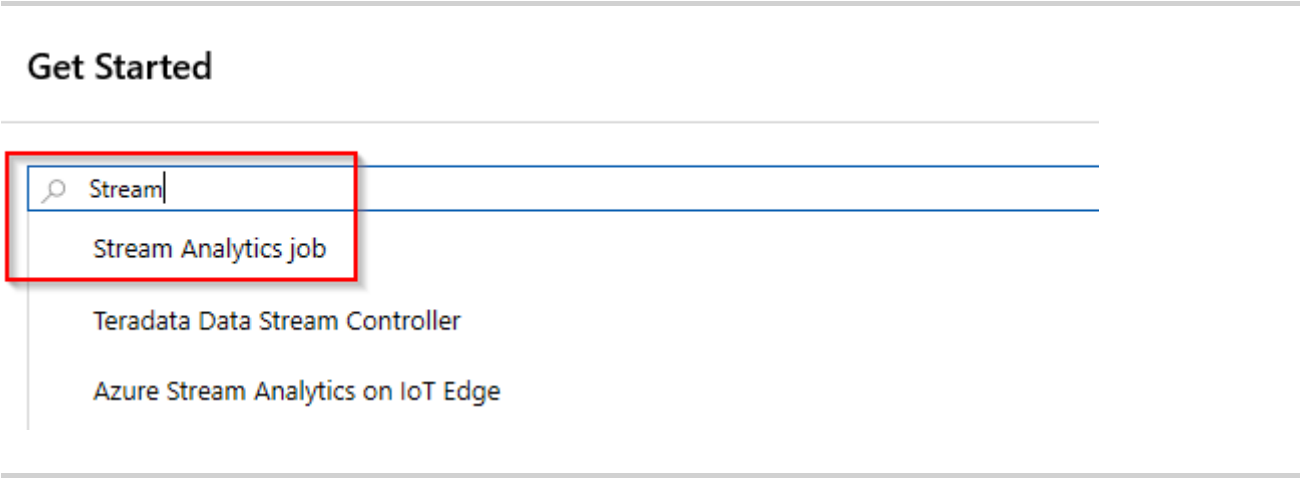
Global Azure Bootcamp 2019 - Hands-On Session

https://gazaicdocsta.z6.web.core.windows.net

Daten in einem BLOB speichern

Die Daten werden mittels Stream Analytics in einem BLOB-Container gespeichert.





Stream Analytics job
Microsoft

Stream Analytics job

Microsoft

Create Save for later

Azure Stream Analytics is a fully managed, cost effective real-time event processing engine t
insights from data. Stream Analytics makes it easy to set up real-time analytic computations
devices, sensors, web sites, social media, applications, infrastructure systems, and more.

With a few clicks in the Azure portal, you can author a Stream Analytics job specifying the inp
data, the output sink for the results of your job, and a data transformation expressed in a SQ
monitor and adjust the scale/speed of your job in the Azure portal to scale from a few kiloby
events processed per second.

Stream Analytics leverages years of Microsoft Research work in developing highly tuned stre
sensitive processing, as well as language integrations for intuitive specifications of such.

Home > Resource groups > gaz-aic-rg > Get S

New Stream Analytics job

* Job name
gaz-aic-saj

* Subscription
Visual Studio Premium mit MSDN

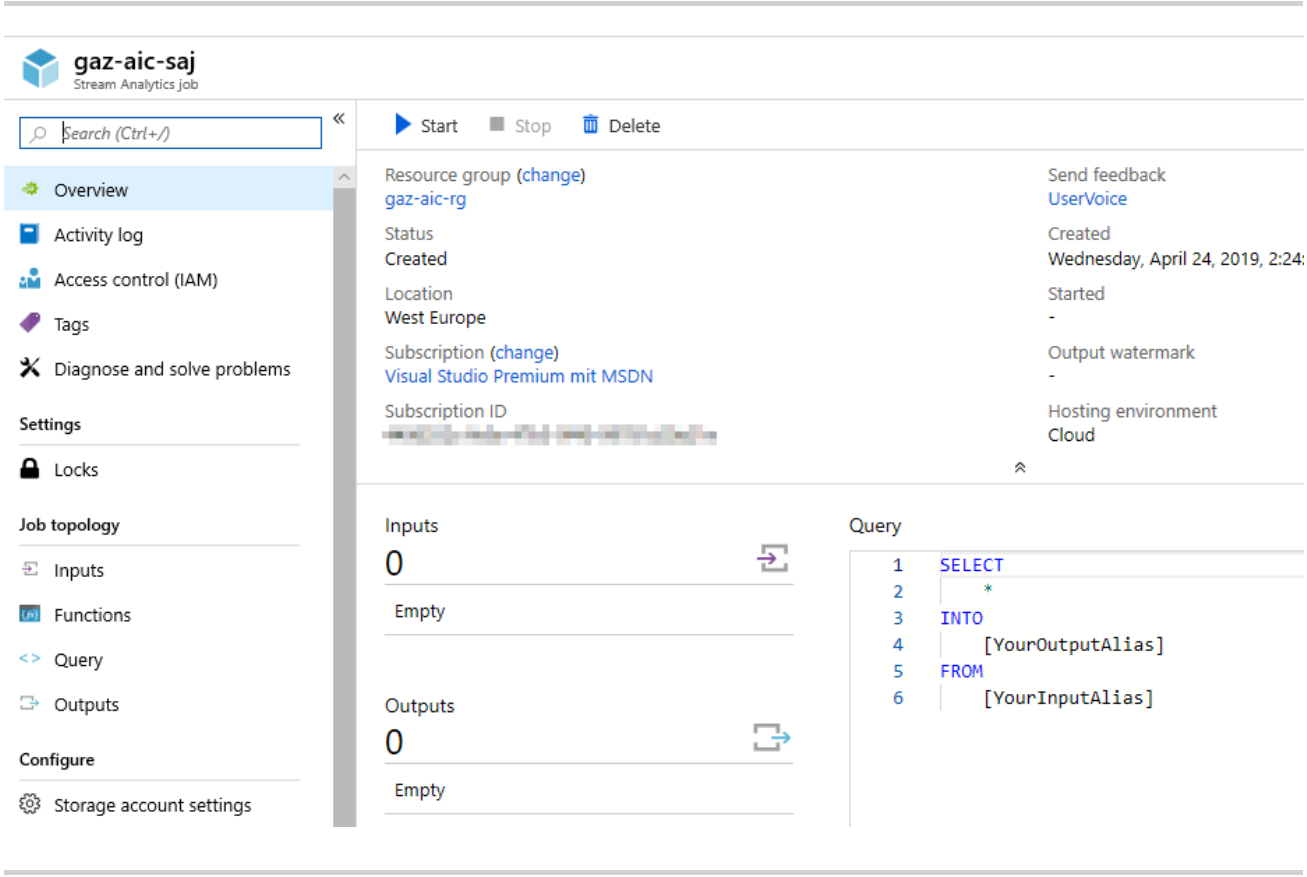
* Resource group
gaz-aic-rg
Create new

* Location
West Europe

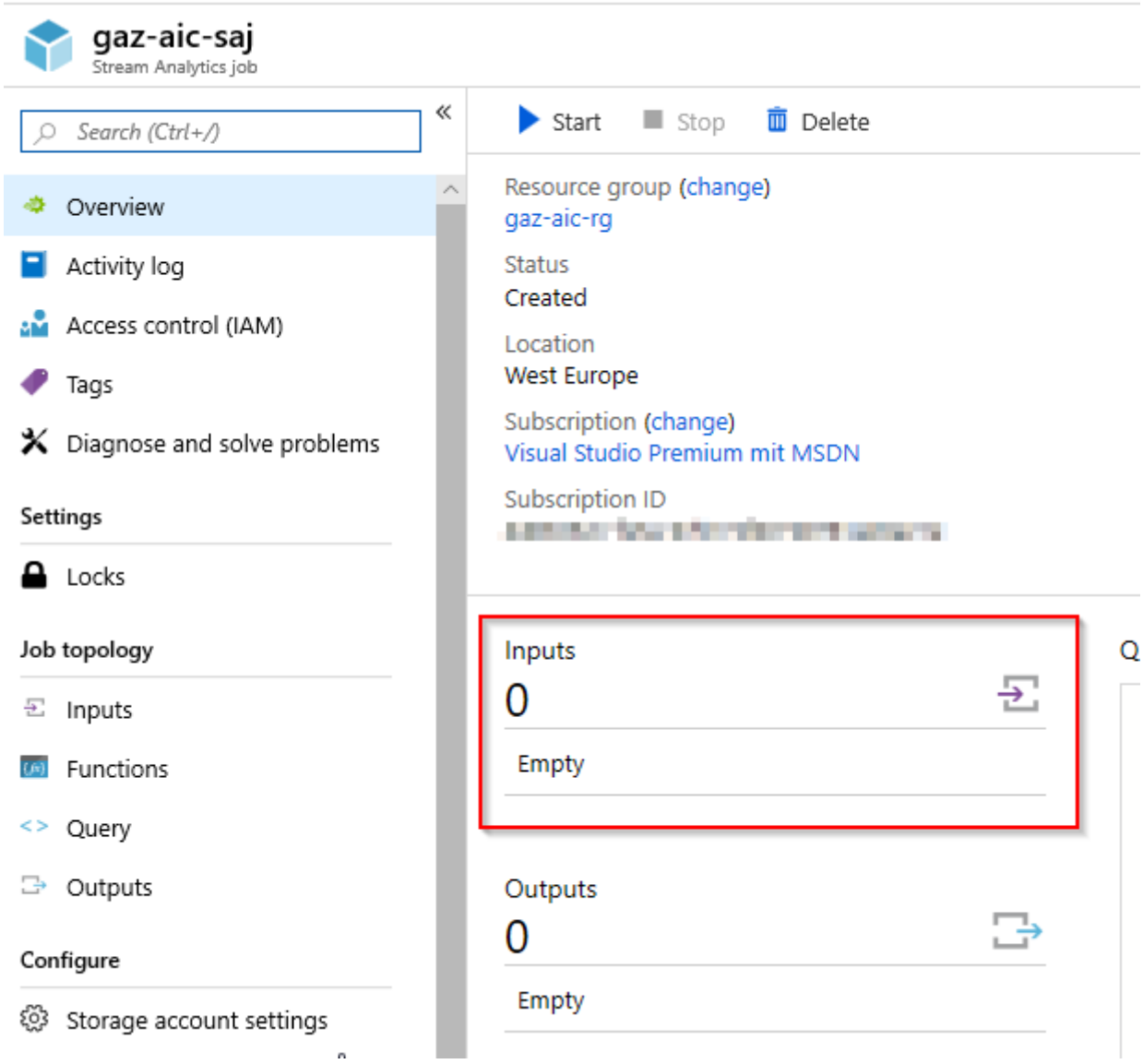
Hosting environment
Cloud Edge

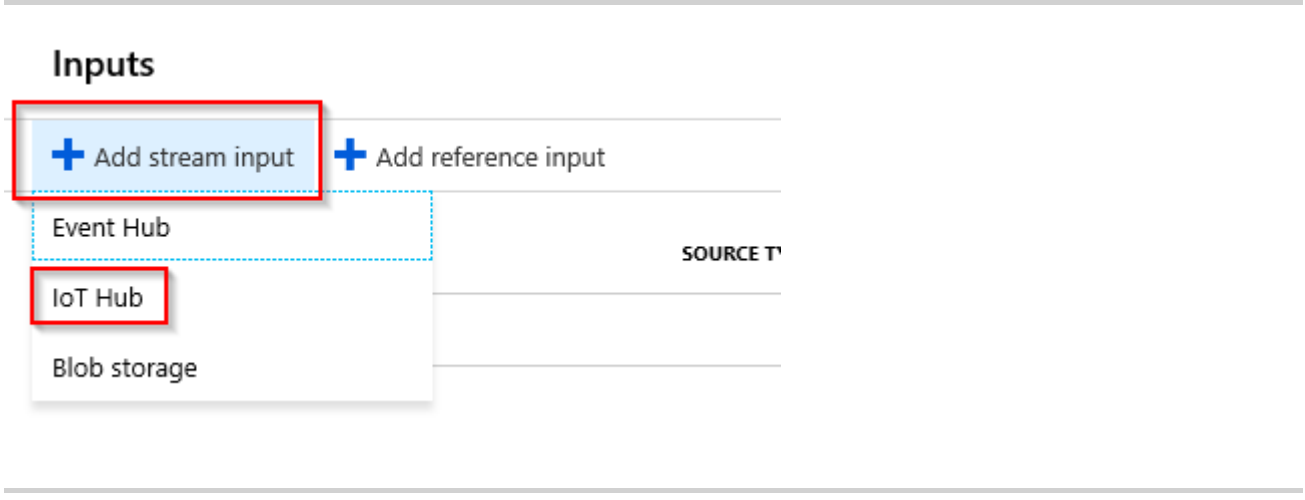
Streaming units (1 to 192)
3

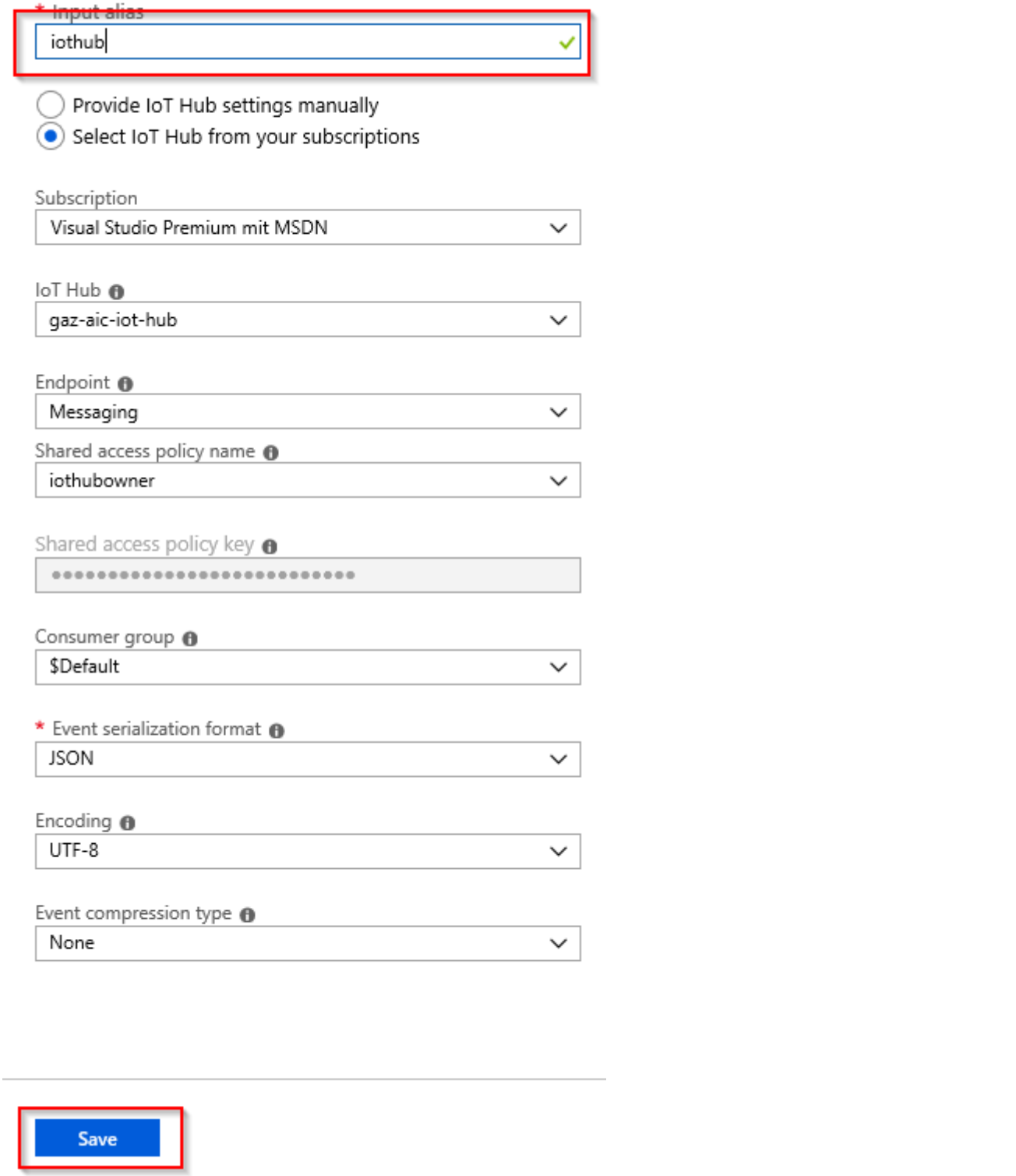
Create Automation options

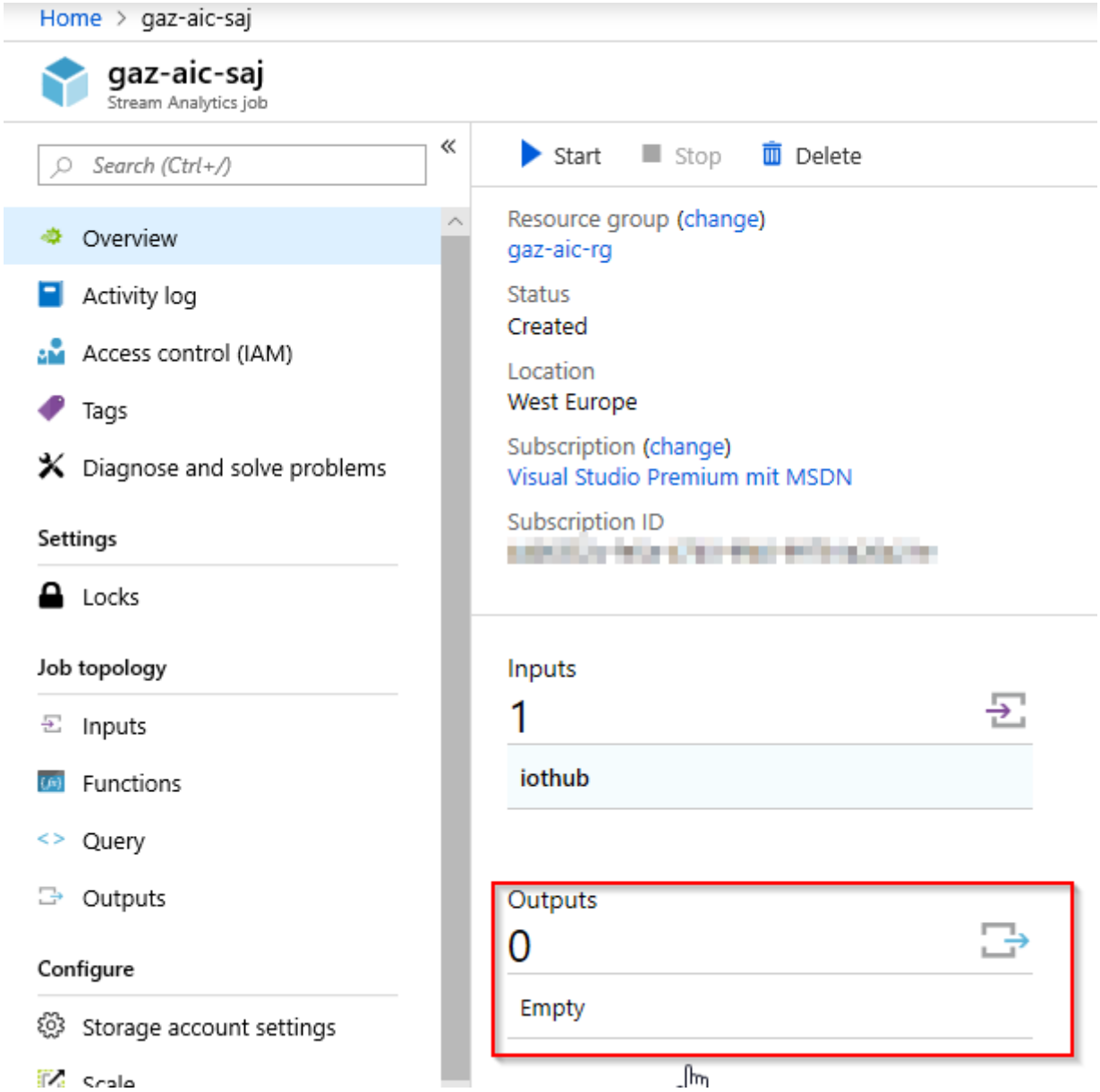


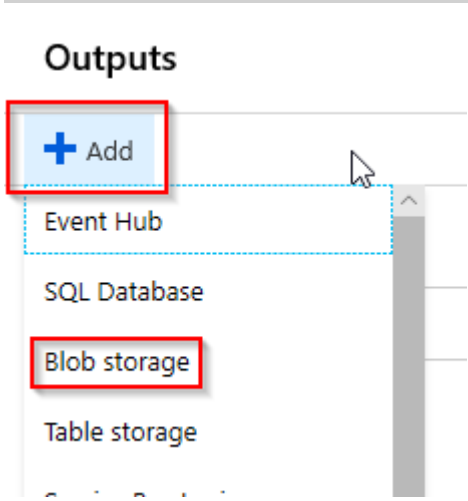
Hinzufügen einer Ein- und Ausgabe

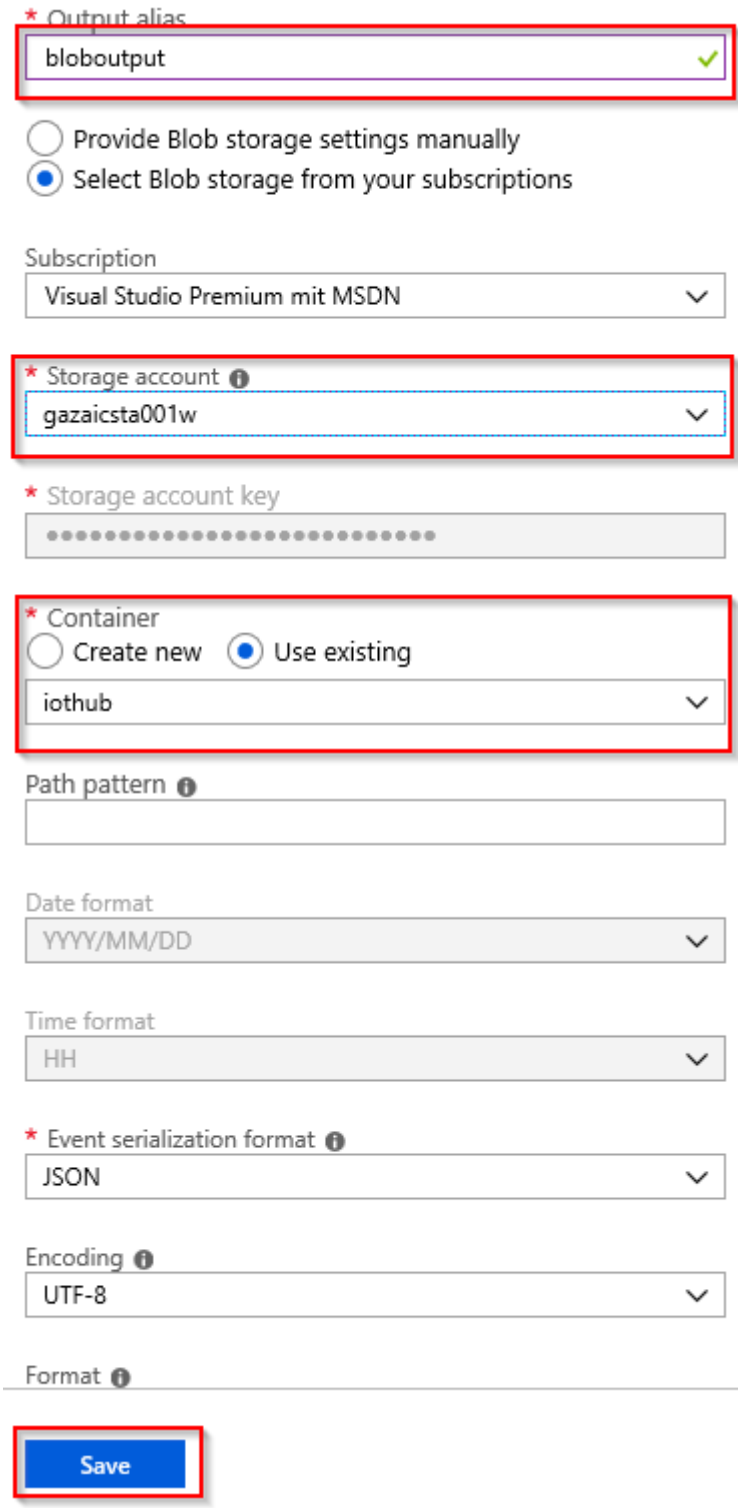

gaz-aic-saj
Stream Analytics job
Search (Ctrl+/)
Start
Stop
Delete
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Settings
Locks
Job topology
Inputs
Functions
Query
Outputs
Configure
Storage account settings
Resource group (change)
gaz-aic-rg
Status
Created
Location
West Europe
Subscription (change)
Visual Studio Premium mit MSDN
Subscription ID
Inputs
0
Empty
Outputs
0
Empty


Inputs
Add stream input
Add reference input
Event Hub
IoT Hub
Blob storage
SOURCE T

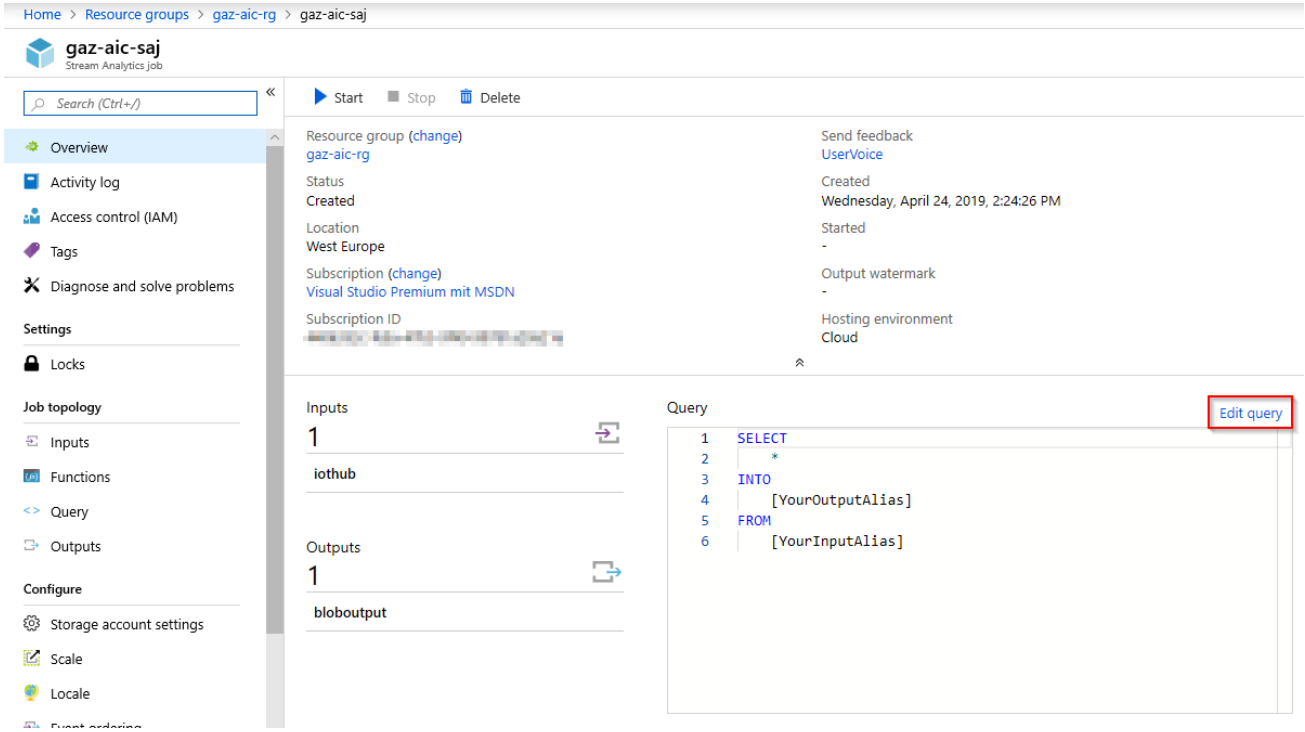

* Input alias
iothub
Provide IoT Hub settings manually
Select IoT Hub from your subscriptions
Subscription
Visual Studio Premium mit MSDN
IoT Hub
gaz-aic-iot-hub
Endpoint
Messaging
Shared access policy name
iothubowner
Shared access policy key
Consumer group
$Default
* Event serialization format
JSON
Encoding
UTF-8
Event compression type
None
Save

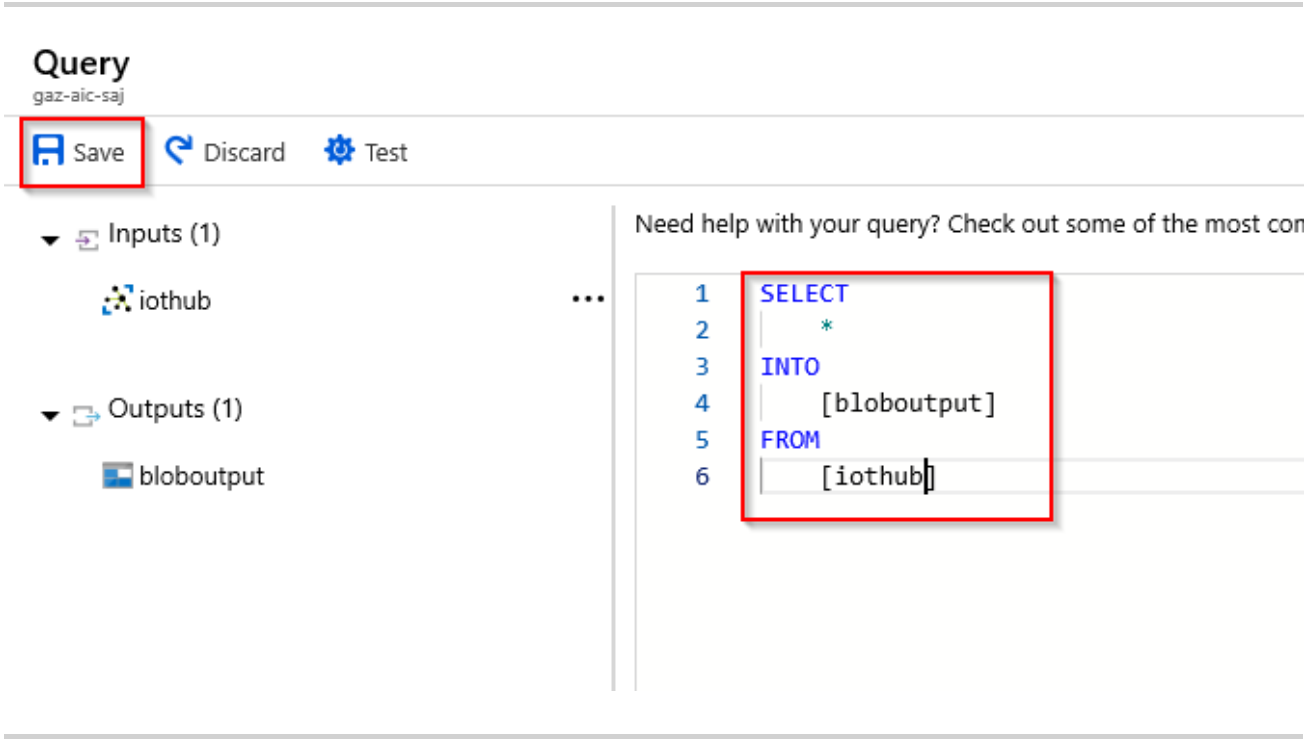

Home > gaz-aic-saj
gaz-aic-saj
Stream Analytics job
Search (Ctrl+/)
Start
Stop
Delete
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Settings
Locks
Job topology
Inputs
Functions
Query
Outputs
Configure
Storage account settings
Resource group (change)
gaz-aic-rg
Status
Created
Location
West Europe
Subscription (change)
Visual Studio Premium mit MSDN
Subscription ID
Inputs
1
iothub
Outputs
0
Empty

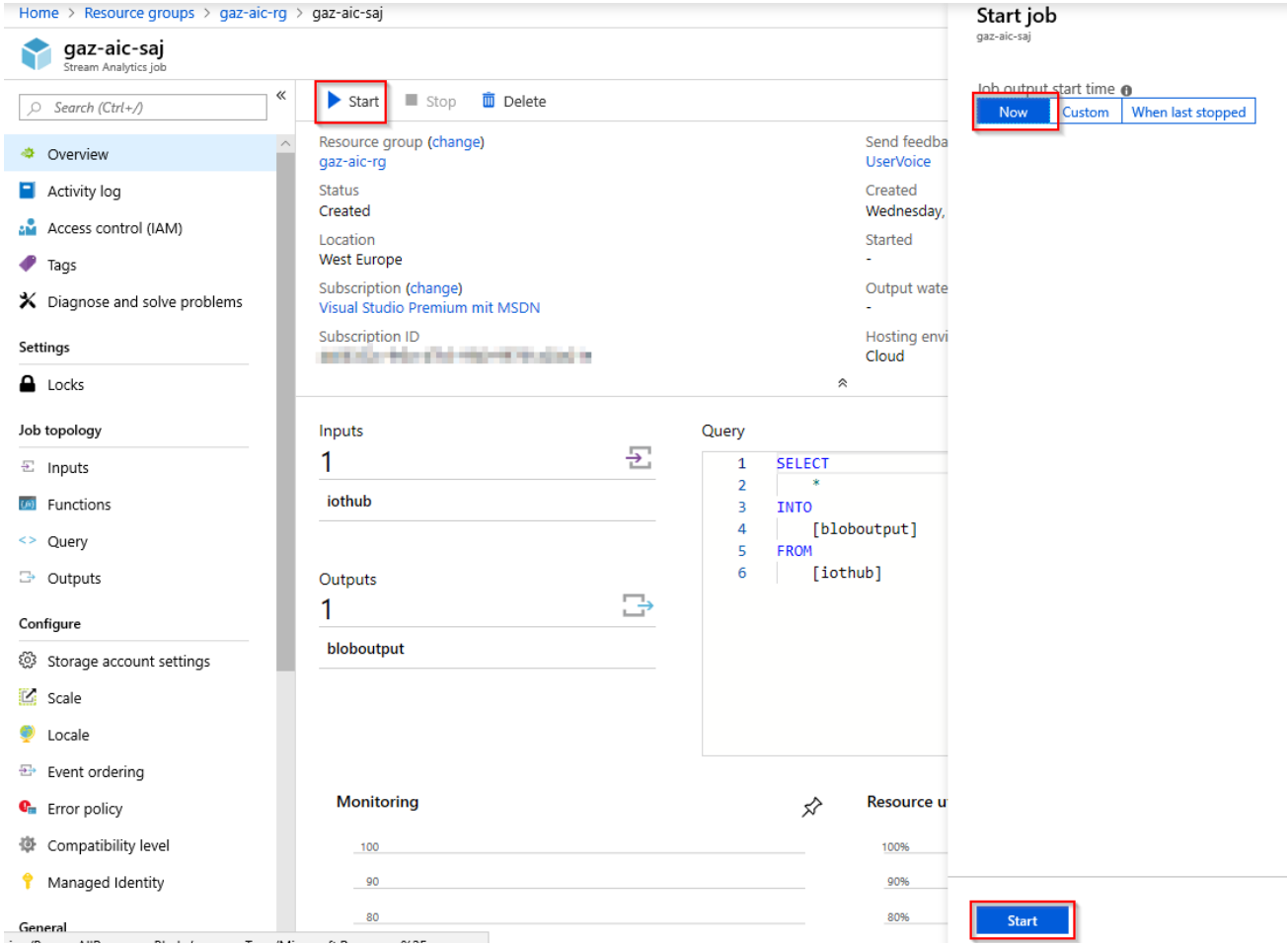

Outputs
Add
Event Hub
SQL Database
Blob storage
Table storage



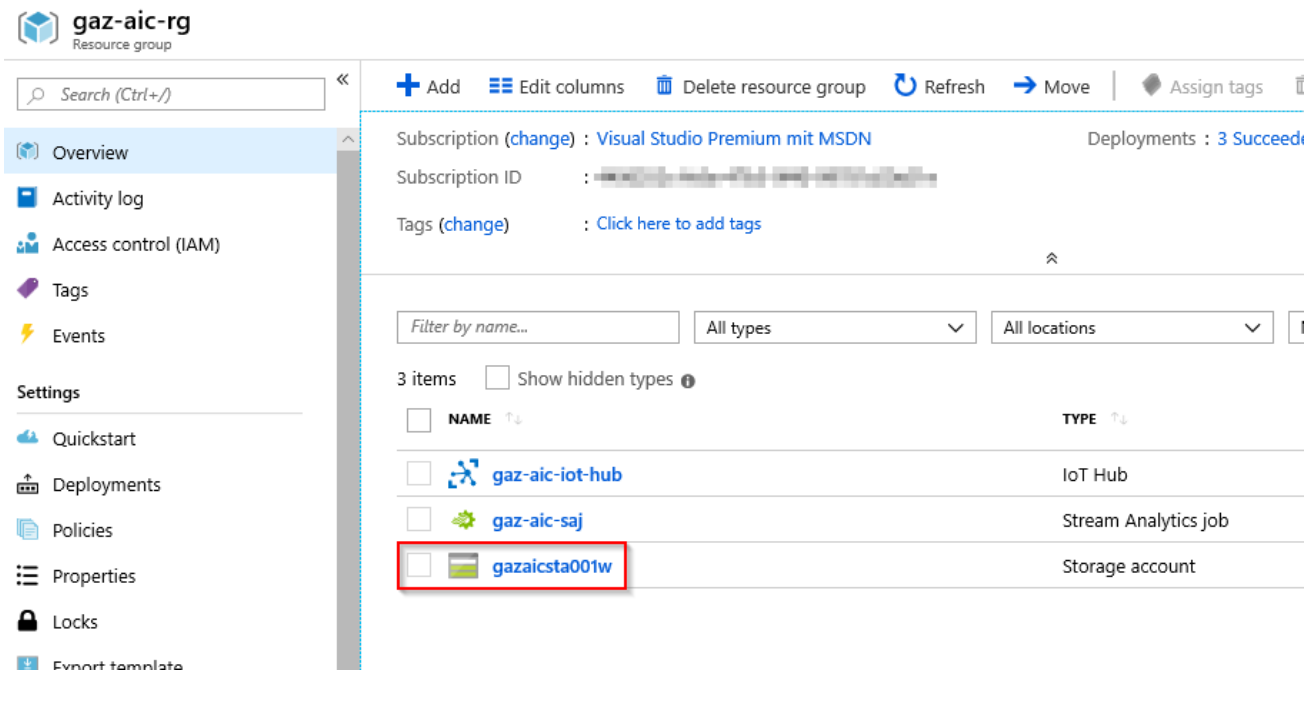
Anpassen der Query und Starten des Jobs

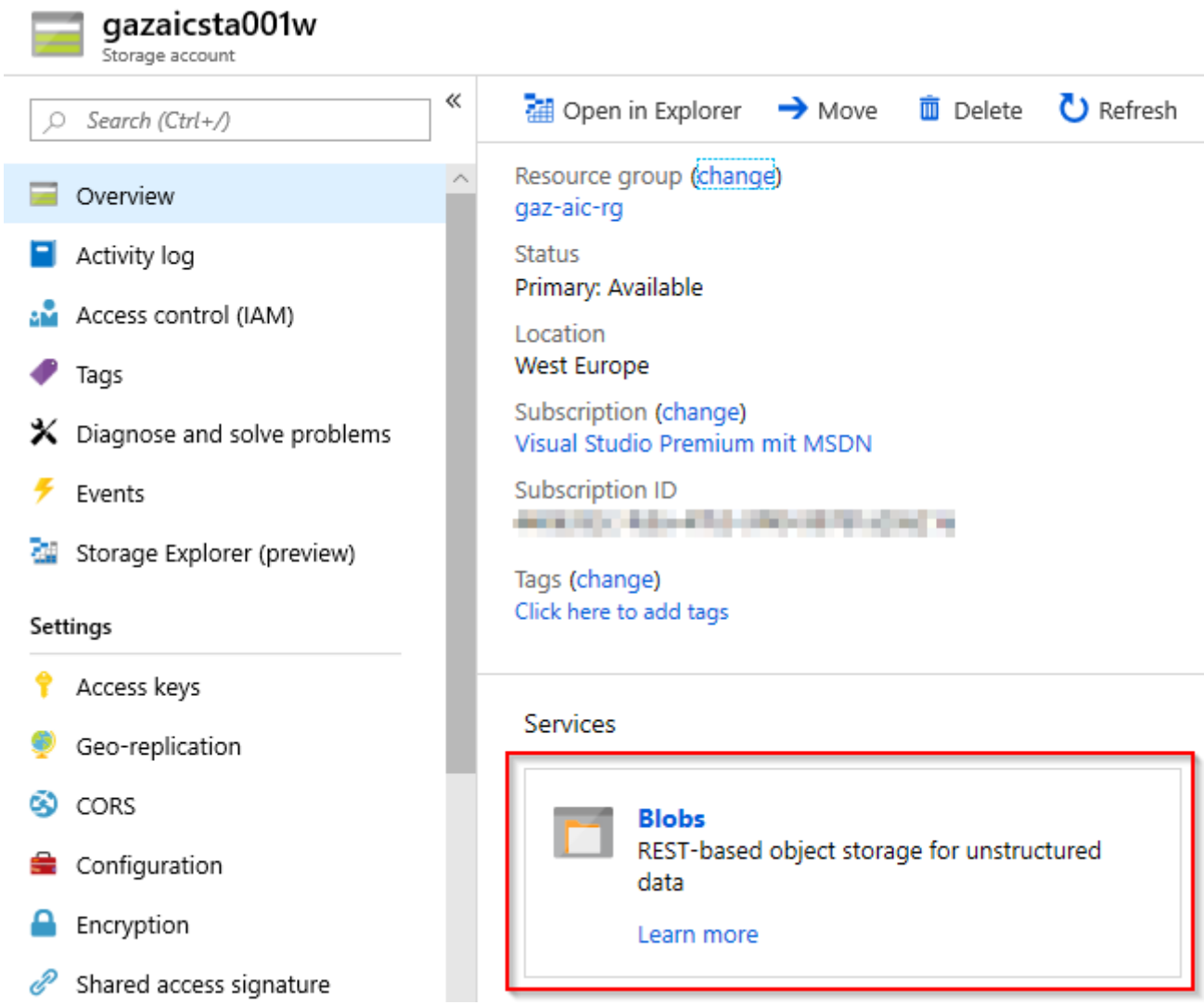

Home > Resource groups > gaz-aic-rg > gaz-aic-saj
gaz-aic-saj
Stream Analytics job
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Settings
Locks
Job topology
Inputs
Functions
Query
Outputs
Configure
Storage account settings
Scale
Locale
Start
Stop
Delete
Resource group (change)
gaz-aic-rg
Status
Created
Location
West Europe
Subscription (change)
Visual Studio Premium mit MSDN
Subscription ID
Send feedback
UserVoice
Created
Wednesday, April 24, 2019, 2:24:26 PM
Started
-
Output watermark
-
Hosting environment
Cloud
Inputs
1
iothub
Outputs
1
bloboutput
Query
Edit query
1 SELECT
2 *
3 INTO
4 [YourOutputAlias]
5 FROM
6 [YourInputAlias]

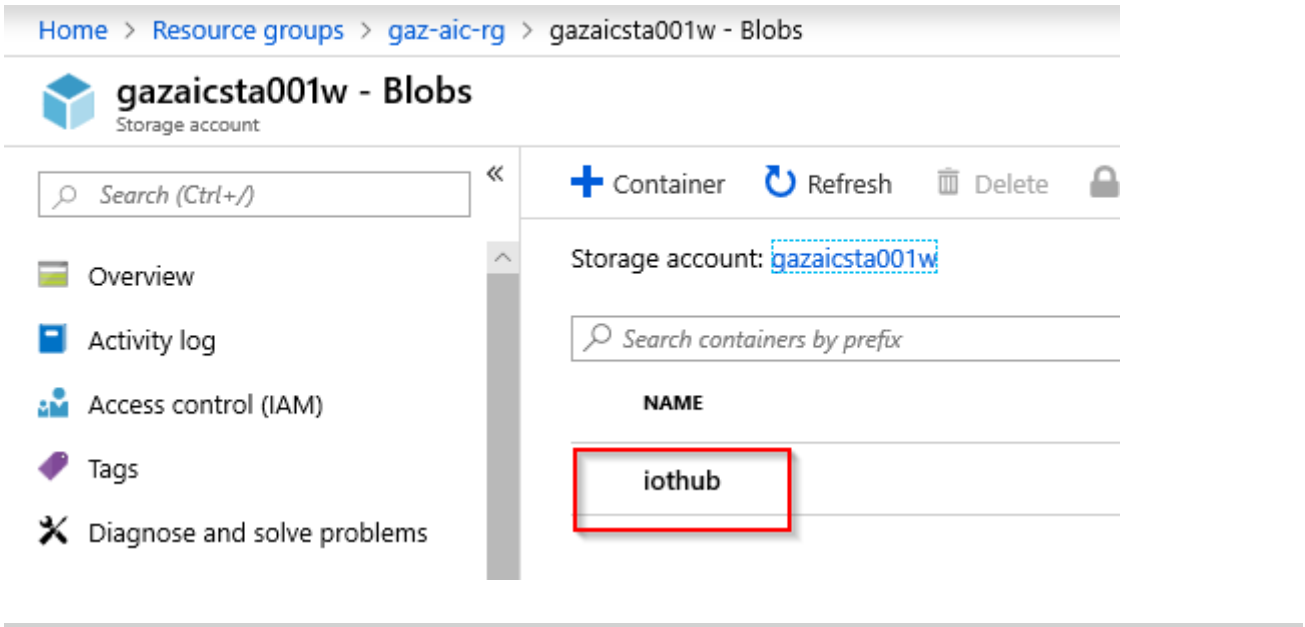

Query
gaz-aic-saj
Save
Discard
Test
Inputs (1)
iothub
Outputs (1)
bloboutput
Need help with your query? Check out some of the most con
1 SELECT
2 *
3 INTO
4 [bloboutput]
5 FROM
6 [iothub]

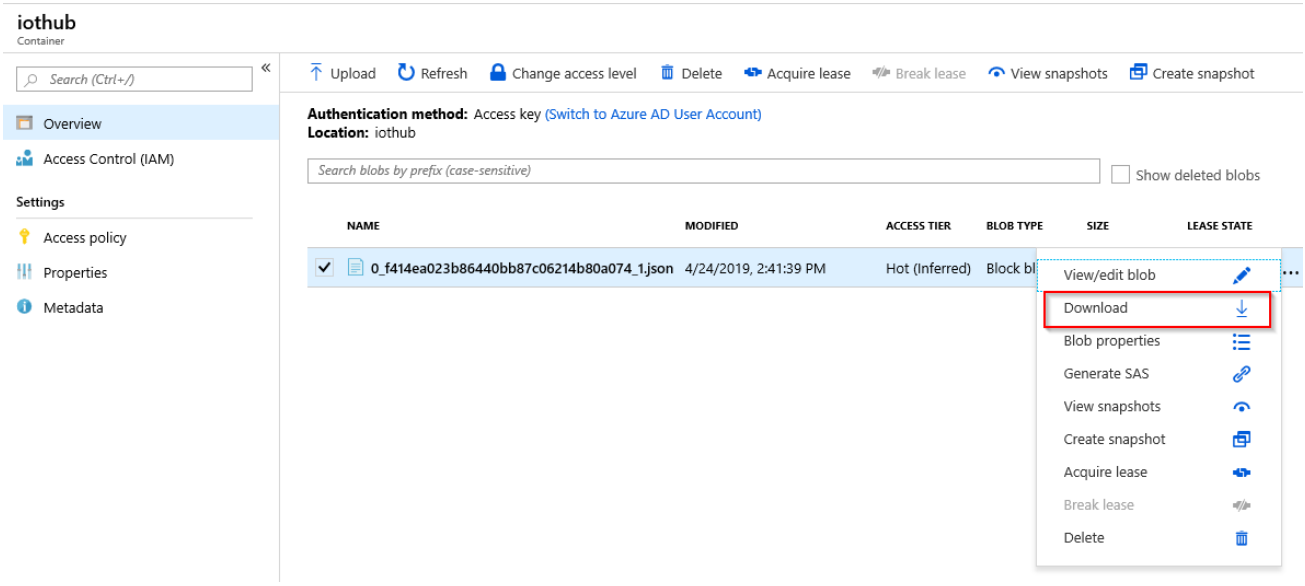


Telemetriedaten aus BLOB herunterladen




gazaicsta001w
Storage account
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Events
Storage Explorer (preview)
Settings
Access keys
Geo-replication
CORS
Configuration
Encryption
Shared access signature
Open in Explorer
Move
Delete
Refresh
Resource group (change)
gaz-aic-rg
Status
Primary: Available
Location
West Europe
Subscription (change)
Visual Studio Premium mit MSDN
Subscription ID
Tags (change)
Click here to add tags
Services
Blobs
REST-based object storage for unstructured data
Learn more


Home > Resource groups > gaz-aic-rg > gazaicsta001w - Blobs
gazaicsta001w - Blobs
Storage account
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Container
Refresh
Delete
Storage account: gazaicsta001w
Search containers by prefix
NAME
iothub



Links

- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI

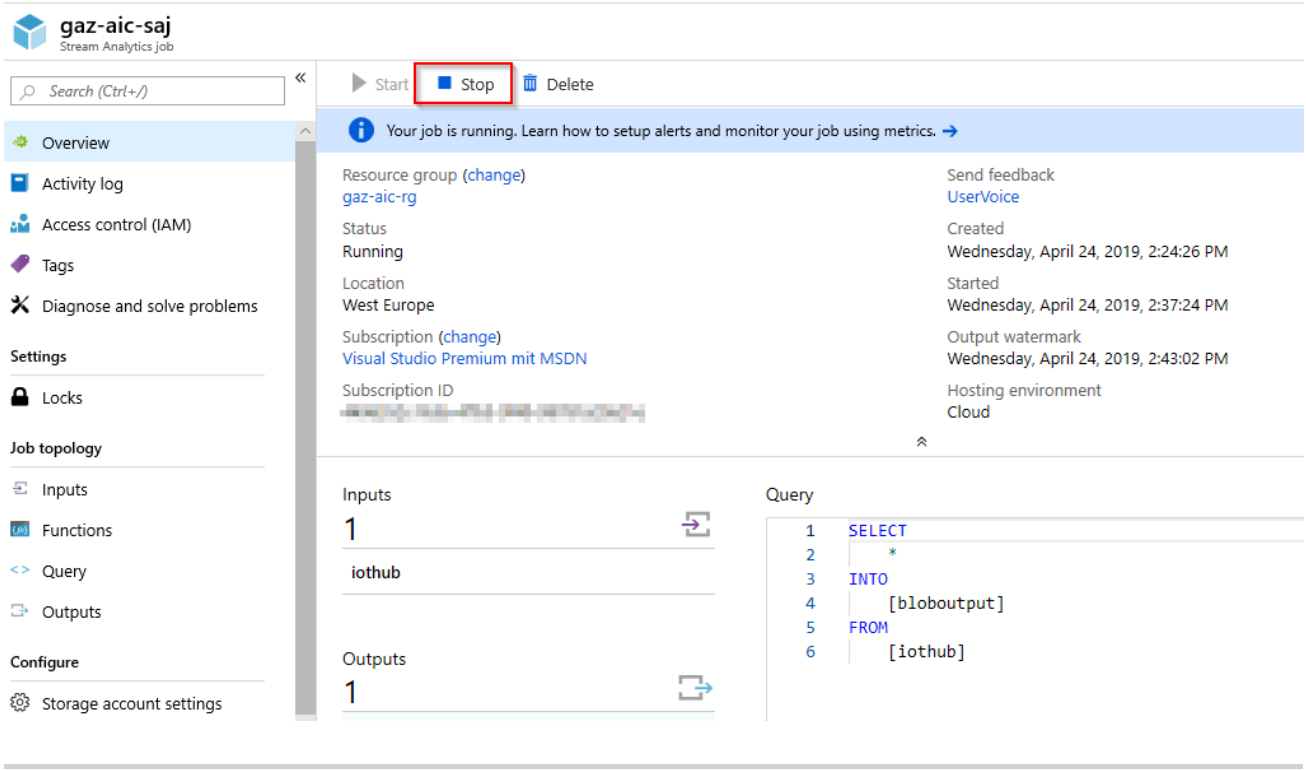
Global Azure Bootcamp 2019 - Hands-On Session

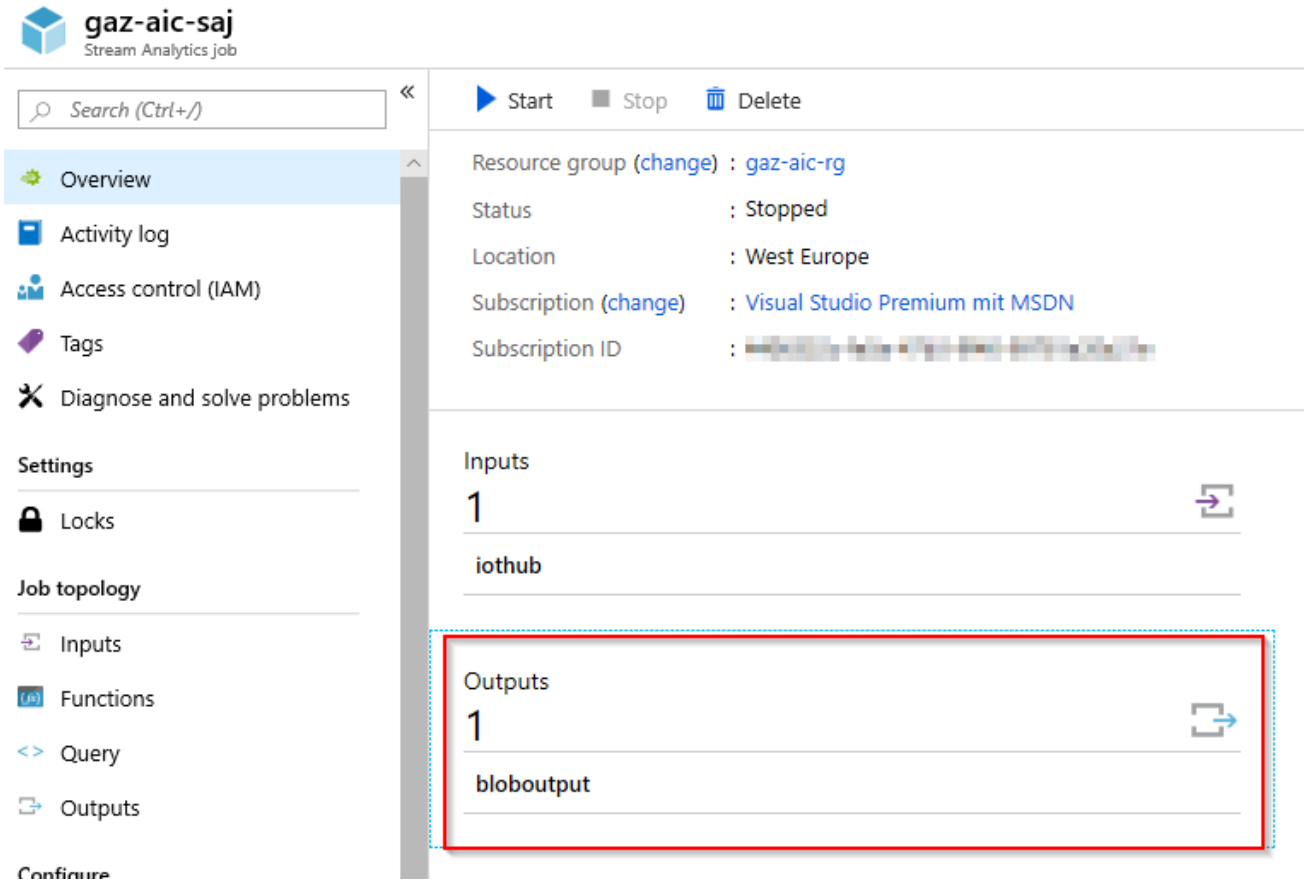
https://gazaicdocsta.z6.web.core.windows.net

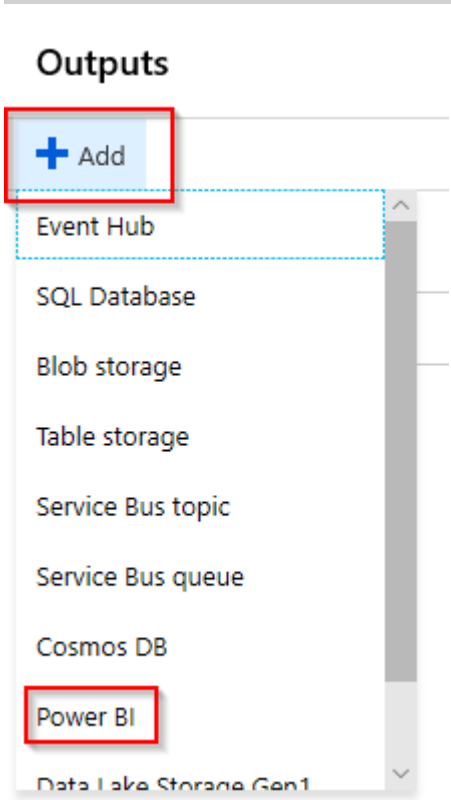
Anomalieerkennung in Stream Analytics und Streamen in Power BI

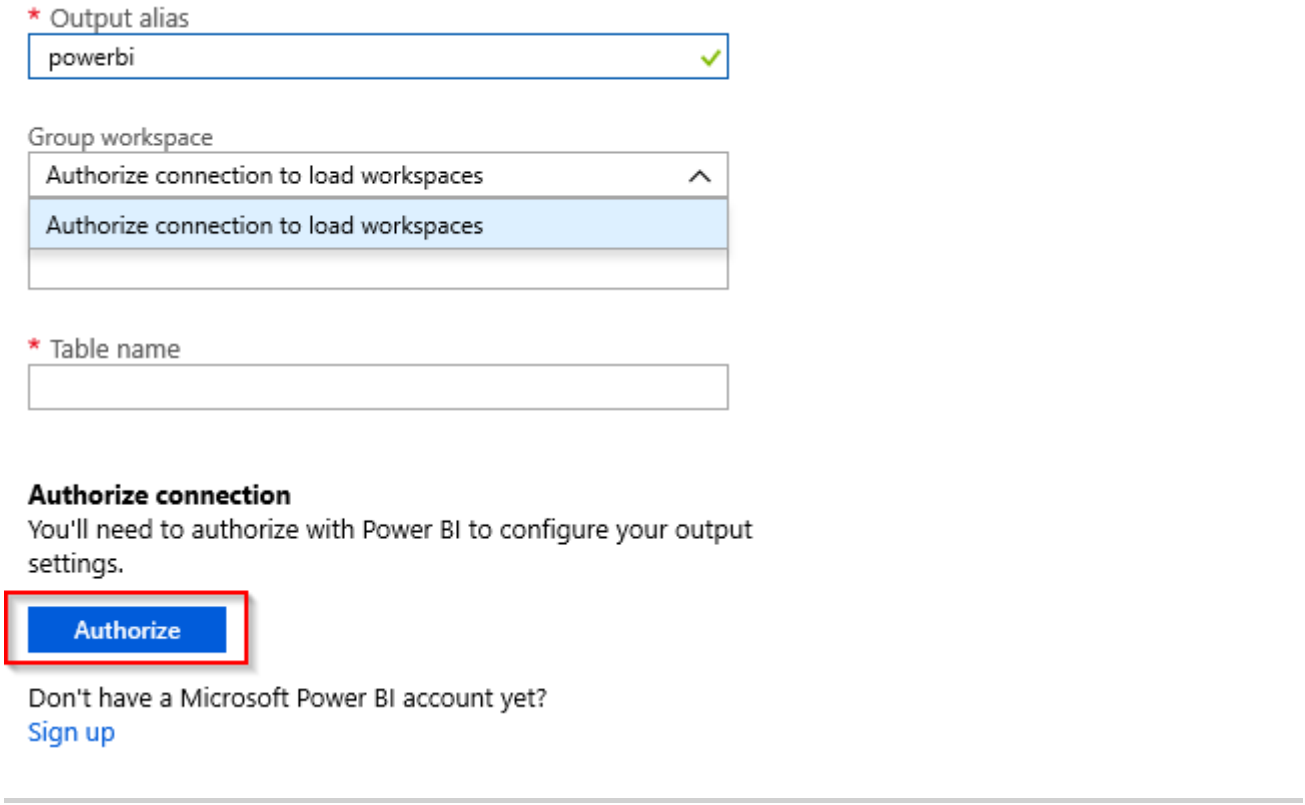
Power BI als Ausgabeziel hinzufügen

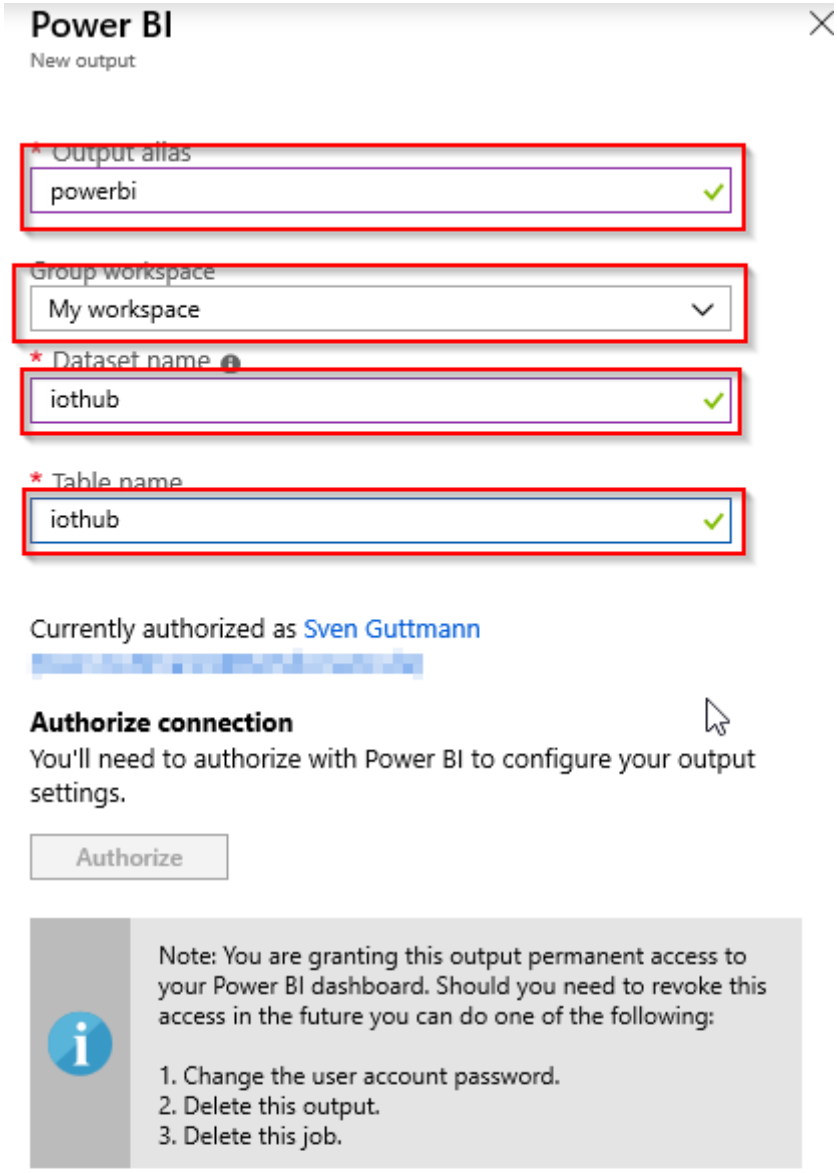
Als erstes den Job beenden.

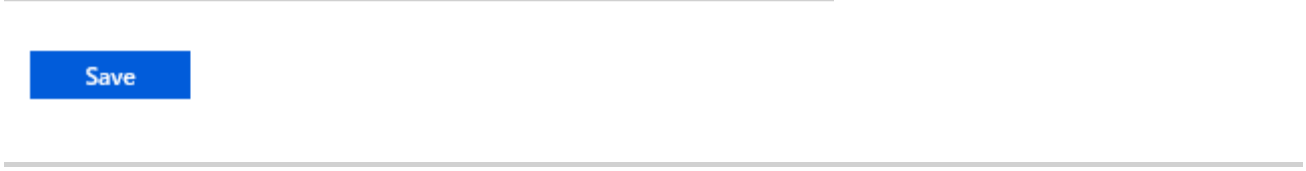


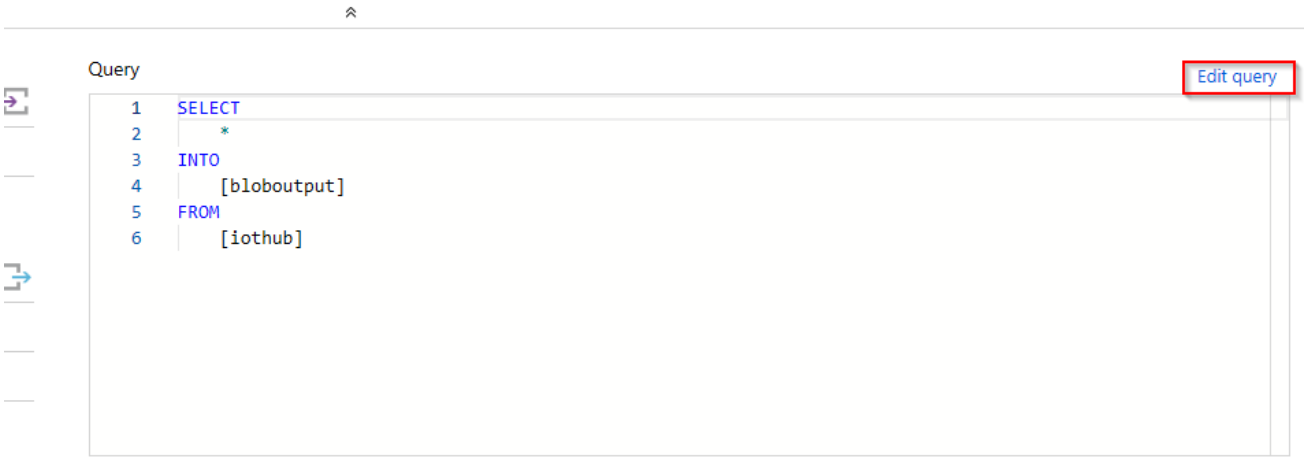

gaz-aic-saj
Stream Analytics job
Search (Ctrl+/)
Start
Stop
Delete
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Settings
Locks
Job topology
Inputs
Functions
Query
Outputs
Resource group (change) : gaz-aic-rg
Status : Stopped
Location : West Europe
Subscription (change) : Visual Studio Premium mit MSDN
Subscription ID :
Inputs
1
iothub
Outputs
1
bloboutput


Outputs
Add
Event Hub
SQL Database
Blob storage
Table storage
Service Bus topic
Service Bus queue
Cosmos DB
Power BI


* Output alias
powerbi
Group workspace
Authorize connection to load workspaces
Authorize connection to load workspaces
* Table name
Authorize connection
You'll need to authorize with Power BI to configure your output settings.
Authorize
Don't have a Microsoft Power BI account yet?
Sign up


Power BI
New output
* Output alias
powerbi
Group workspace
My workspace
* Dataset name
iothub
* Table name
iothub
Currently authorized as Sven Guttmann
Authorize connection
You'll need to authorize with Power BI to configure your output settings.
Authorize
Note: You are granting this output permanent access to your Power BI dashboard. Should you need to revoke this access in the future you can do one of the following:
1. Change the user account password.
2. Delete this output.
3. Delete this job.

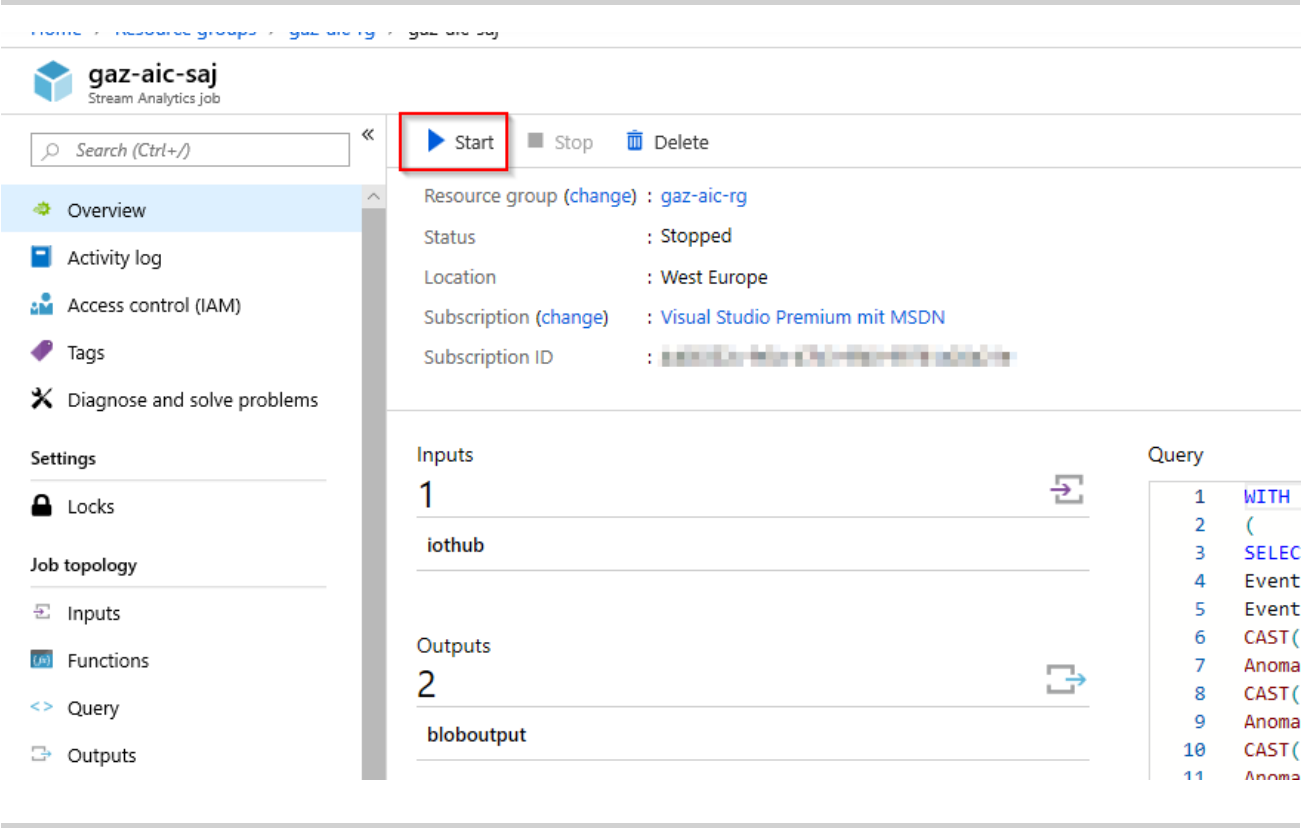

Save




```
WITH AnomalyDetectionStep AS
(
SELECT
EventEnqueuedUtcTime,
EventProcessedUtcTime,
CAST(cpuUsage AS FLOAT) as cpuUsage,
AnomalyDetection_SpikeAndDip(CAST(cpuUsage AS FLOAT), 95, 120, 'spikesanddips') OVI
CAST(cpu0Usage AS FLOAT) as cpu0Usage,
AnomalyDetection_SpikeAndDip(CAST(cpuUsage AS FLOAT), 95, 120, 'spikesanddips') OVI
CAST(cpu1Usage AS FLOAT) as cpu1Usage,
AnomalyDetection_SpikeAndDip(CAST(cpuUsage AS FLOAT), 95, 120, 'spikesanddips') OVI
FROM [iothub]
)
SELECT
EventEnqueuedUtcTime,
EventProcessedUtcTime,
CAST(cpuUsage AS FLOAT) as cpuUsage,
CAST(GetRecordPropertyValue(SpikeAndDipScoresCpu, 'Score') as FLOAT) AS SpikeAndDi
CAST(GetRecordPropertyValue(SpikeAndDipScoresCpu, 'IsAnomaly') AS BIGINT) AS IsSpi
CAST(cpu0Usage AS FLOAT) as cpu0Usage,
CAST(GetRecordPropertyValue(SpikeAndDipScoresCpu0, 'Score') as FLOAT) AS SpikeAndD
CAST(GetRecordPropertyValue(SpikeAndDipScoresCpu0, 'IsAnomaly') AS BIGINT) AS IsSp
```

```
CAST(cpu1Usage AS FLOAT) as cpu1Usage,
CAST(GetRecordPropertyValue(SpikeAndDipScoresCpu1, 'Score') as FLOAT) AS SpikeAndD
CAST(GetRecordPropertyValue(SpikeAndDipScoresCpu1, 'IsAnomaly') AS BIGINT) AS IsSp
INTO [powerbi]
FROM AnomalyDetectionStep

SELECT
    *
INTO
    [bloboutput]
FROM
    [iothub]
```



Links

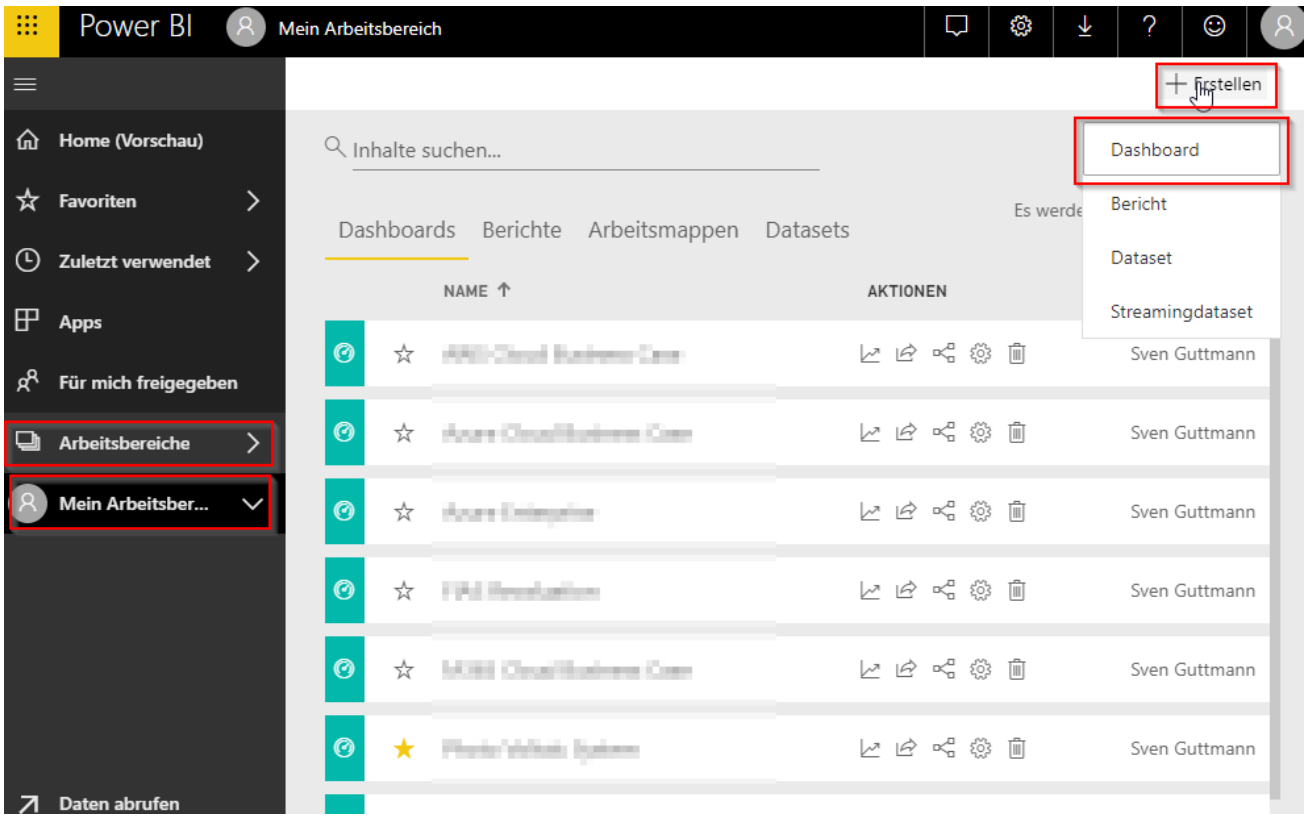
- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI

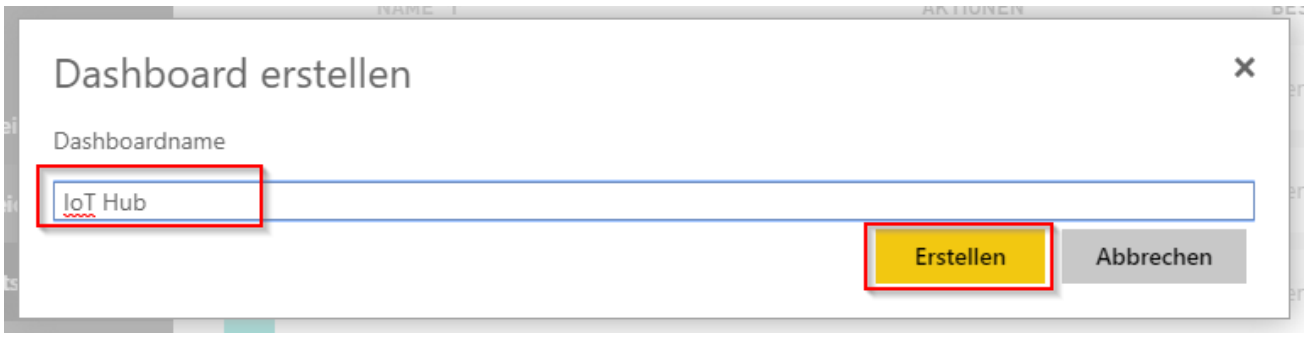
Global Azure Bootcamp 2019 - Hands-On Session

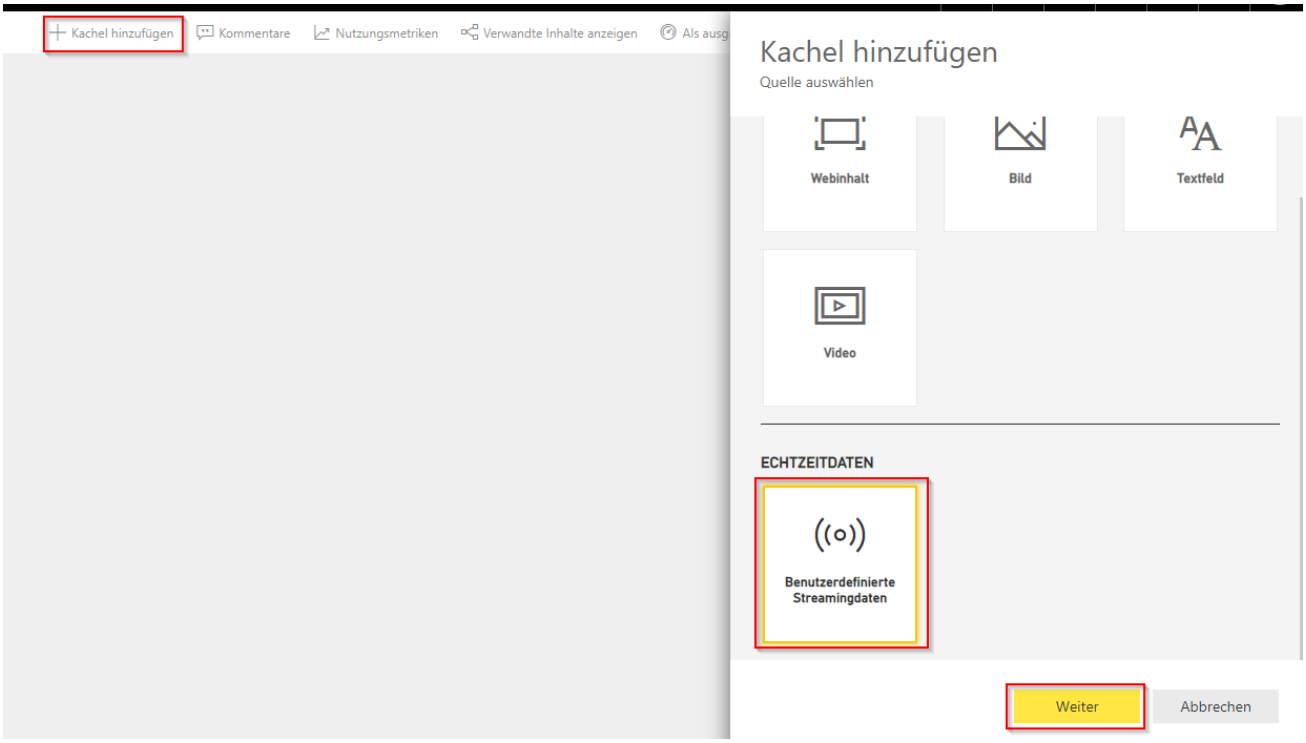
https://gazaicdocsta.z6.web.core.windows.net

Visualisierung in Power BI

Anmelden bei Power BI PowerBIService

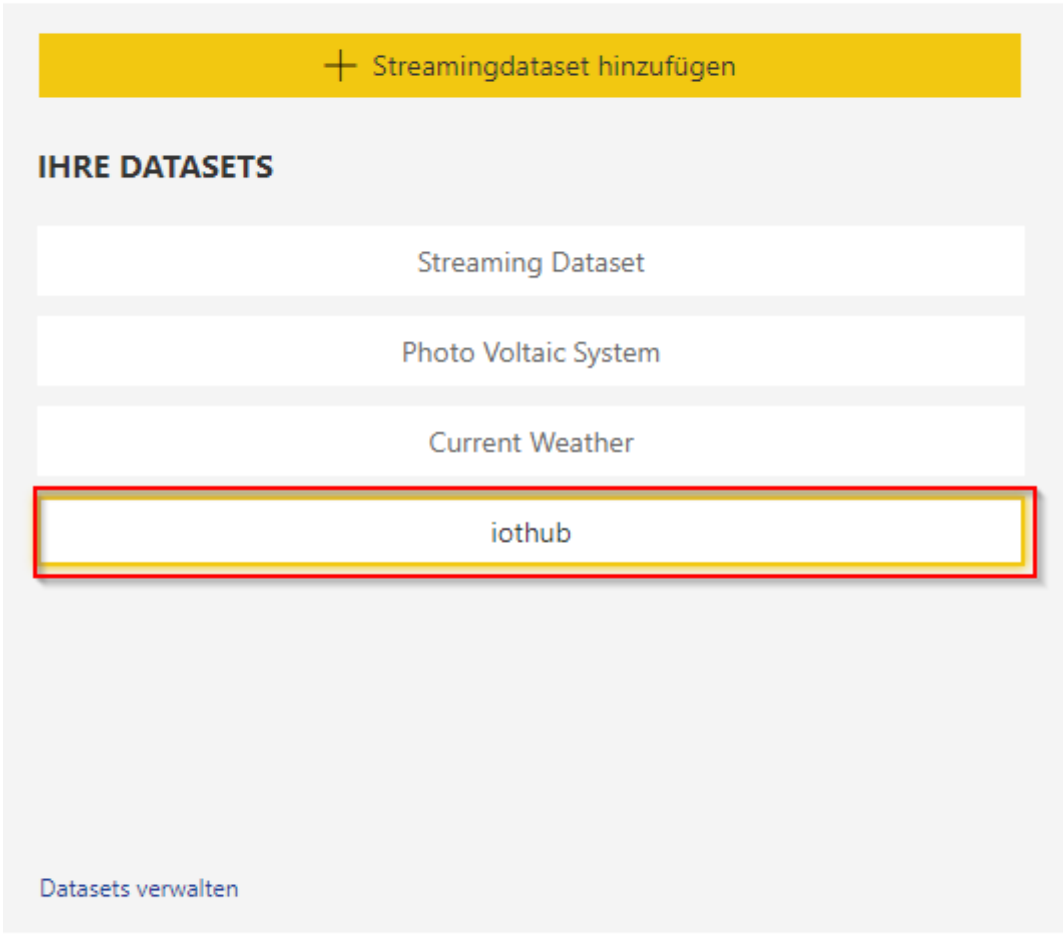





Kachel hinzufügen
Kommentare
Nutzungsmetriken
Verwandte Inhalte anzeigen
Kachel hinzufügen
Quelle auswählen
Webinhalt
Bild
Textfeld
Video
ECHTZEITDATEN
Benutzerdefinierte Streamingdaten
Weiter
Abbrechen

Kachel für benutzerdefinierte Streamingdaten hinzufügen

Streamingdataset auswählen



Zurück | Weiter | Abbrechen

Kachel für benutzerdefinierte Streamingdaten hinzufügen

Streamingdataset auswählen > Visualisierungsdesign

Visualisierungstyp

Liniendiagramm

Achse

eventenqueuedutctime

+ Wert hinzufügen

Legende

+ Wert hinzufügen

Werte

cpuusage

+ Wert hinzufügen

Das anzuzeigende Zeitfenster

Letzter 5 Minuten

Datasets verwalten

Zurück Weiter Abbrechen

Kacheldetails

* Erforderlich

Details

Titel und Untertitel anzeigen

Titel

CPU Usage

Untertitel

Funktionalität

Benutzerdefinierte Verknüpfung festlegen

Verknüpfungstyp

Externer Link

Verknüpfung mit einem Dashboard oder Bericht im aktuellen Arbeitsbereich

URL *

Benutzerdefinierten Link auf derselben Registerkarte öffnen?

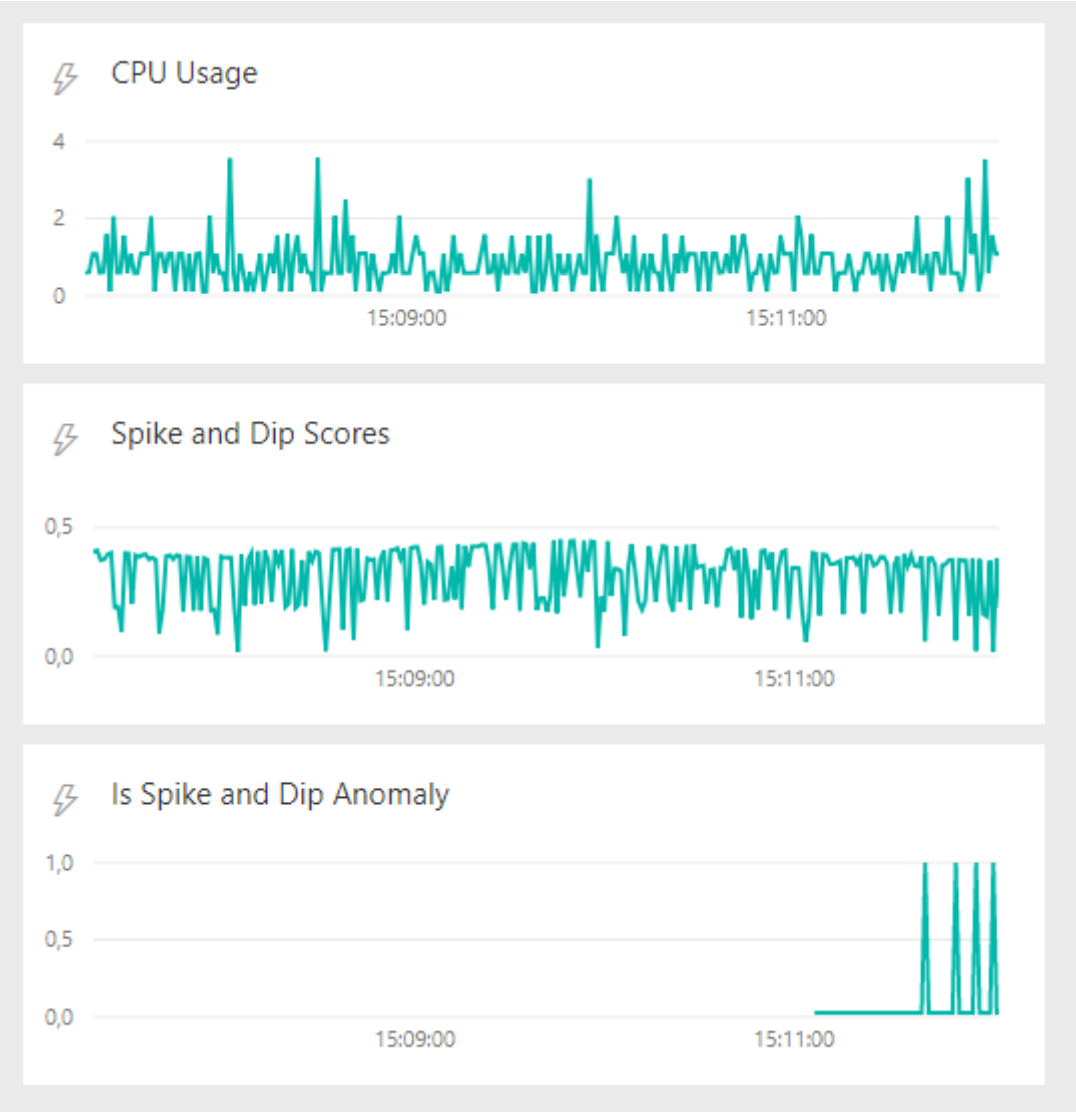
Ja

Nein

Standard wiederherstellen

Technische Details

Zurück | Übernehmen | Abbrechen



Optional - Last erzeugen

Zweite Cloud Shell öffnen und folgenden Befehl absetzen.

```
while [ 1 -eq 1 ]; do find / >/dev/null 2>&1; done
```

Links

- Home
- Cloud Shell
- Resource group
- Storage Account
- Senden von Telemetriedaten an eine IoT Hub-Instanz
- Daten in einem BLOB speichern
- Anomalieerkennung in Stream Analytics und Streamen in Power BI
- Visualisierung in Power BI