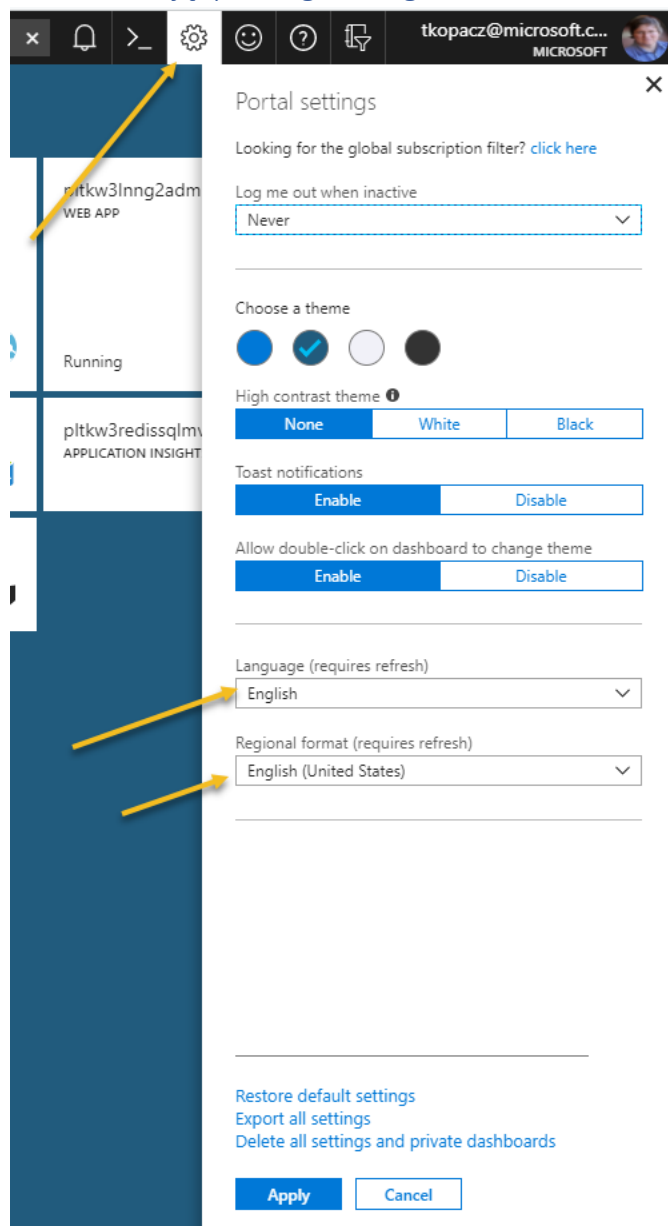


Workshop 1H

1. Uwaga! Do każdego stanowiska dołączone jest konto do logowania się do portalu azure
2. Portal do zarządzania: <https://portal.azure.com/?feature.customportal=false>
 - a. Azure Cloud Shell (dla miłośników CLI w chmurze): <https://shell.azure.com/>
 - b. Uwaga – ten skrypt zakłada używanie portalu!
 - c. Zakładamy że w portalu wybrany jest język ANGIELSKI
3. Opcjonalne oprogramowanie (edytor kodu): <https://code.visualstudio.com/>
4. Ważne – jak portal nie działa – to **wyłączyć ad-block** w używanej przeglądarce.
5. Uwaga! Skrypt z założenia ma towarzyszyć w „*instructor-led lab*”, na wypadek, gdyby uczestnik „się zgubił” lub musiał wrócić kilka kroków.

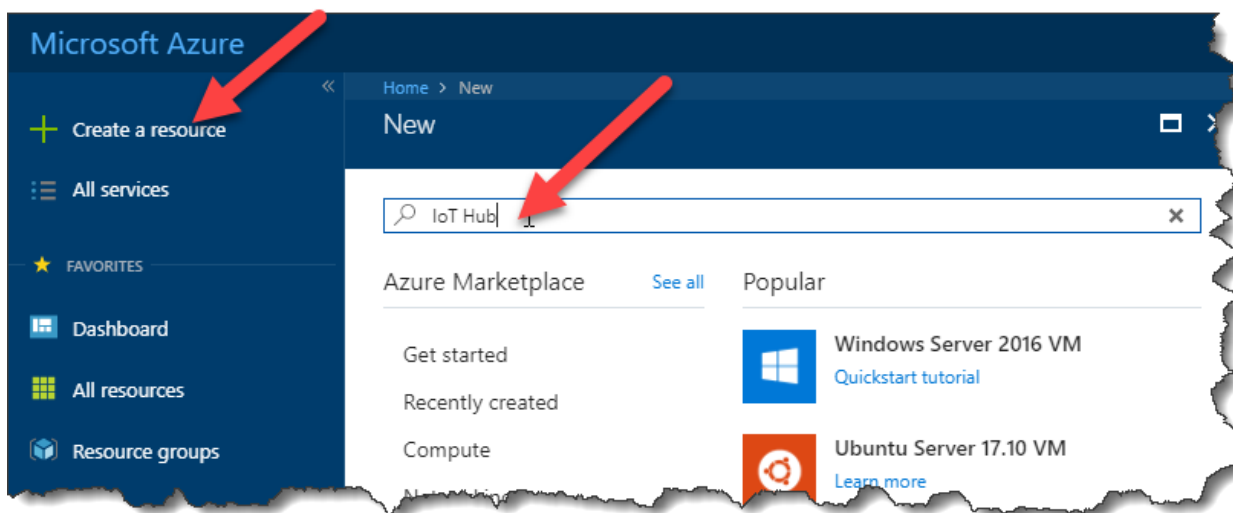
Tworzenie zasobów w Azure

Ustawienie języka angielskiego



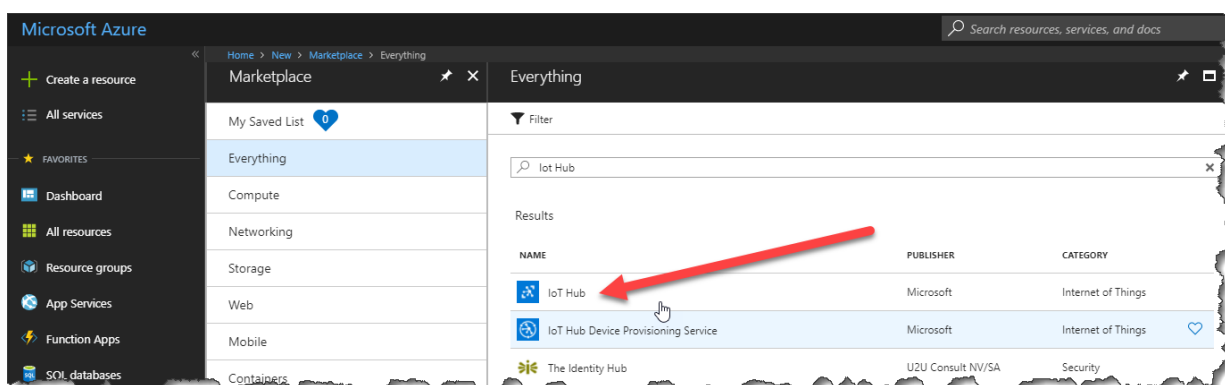
Rysunek 1 Ustawienie języka angielskiego na portalu

Założenie IoT Hub i Resource Group



Rysunek 2 Wyszukanie IoT Hub

Po kliknięciu Enter pojawi się lista usług.



Rysunek 3 Wybór IoT Hub

Microsoft Azure

Create a resource

All services

FAVORITES

Dashboard

All resources

Resource groups

App Services

Function Apps

SQL databases

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Cost Management + Billing

Help + support

Home > New > IoT Hub

IoT Hub

Microsoft

Simultaneously support millions of connected devices—whether they run Windows, Linux, or real-time operating systems. Then monitor performance and send commands to accelerate your digital transformation.

Save for later

Overview

Activity log

Access control (IAM)

Tags

Keys

SETTINGS

Shared access policies

Pricing and scale

Operations monitoring

IP filter

Certificate

Properties

Locks

Automation script

INTEGRATIONS

Query Explorer

DEVICE MANAGEMENT

IoT Devices

IoT Edge (preview)

METRICS

Pin upload

Capabilities

Routes

Resource group (string)

Name (string)

Status

Active

Location

EastUS

Subscription (string)

Subscription ID

Subscription ID

Hardware

cloud.azure.com

Pricing and scale for

IoT Hub

Number of IoT Hub units

Need a way to provision millions of devices?

Want to learn more about IoT Hub?

We'd love your feedback!

IoT Hub Usage

Messages: 0 / 400000 Daily

IoT Devices: 0

IoT Edge Devices: 2

IoT Edge Deployments: 0

Device twin operations (subscriptions)

Device to cloud messages (subscriptions)

PUBLISHER

Microsoft

Documentation

Device management

Service overview

Pricing and scale details

Learn more about Azure IoT Hub

USEFUL LINKS

Create

Rysunek 4 Tworzenie IoT Hub

Home > New > IoT Hub > 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 ⓘ HACKATON01

* Resource Group ⓘ ☒ Create new ☐ Use existing
rglotTK ✓

* Region ⓘ North Europe

* IoT Hub Name ⓘ iottk20180514 ✓

Review + create Next: Size and scale » Automation options

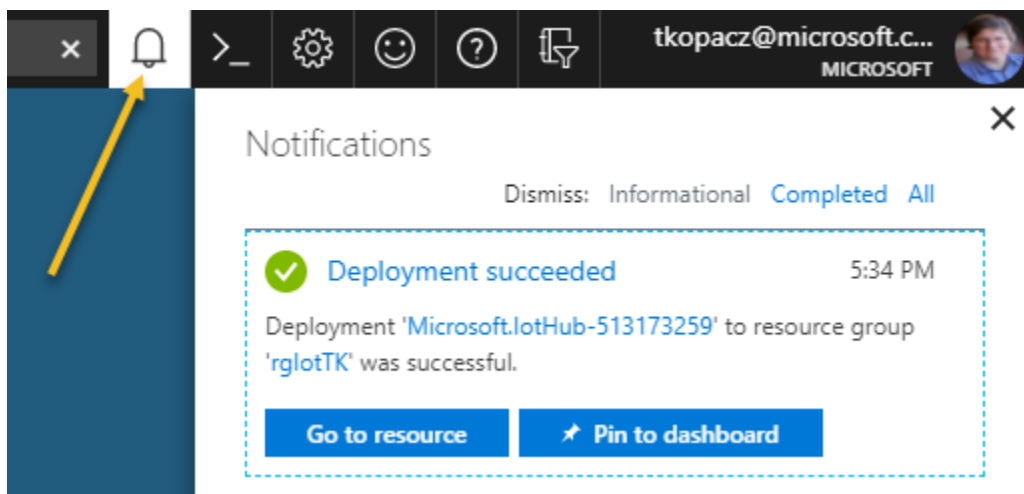
Rysunek 5 Parametry IoT Hub. Należy podać nazwę Resource Group, region i nazwę (nazwa musi być unikalna, najlepiej – inicjały + dzisiejsza data)

SIZE AND SCALE

Pricing and scale tier ⓘ	S1
Number of S1 IoT Hub units ⓘ	1
Messages per day ⓘ	400,000
Cost per month	25.00 USD

Create « Previous: Size and scale Automation options

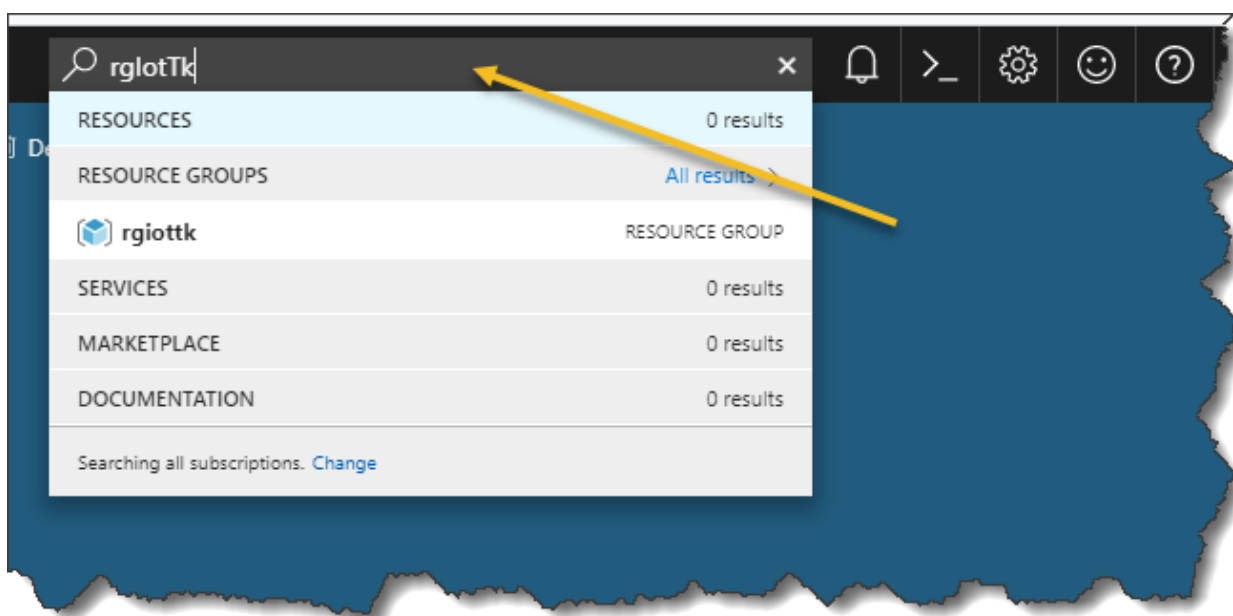
Rysunek 6 Koszty i podsumowanie



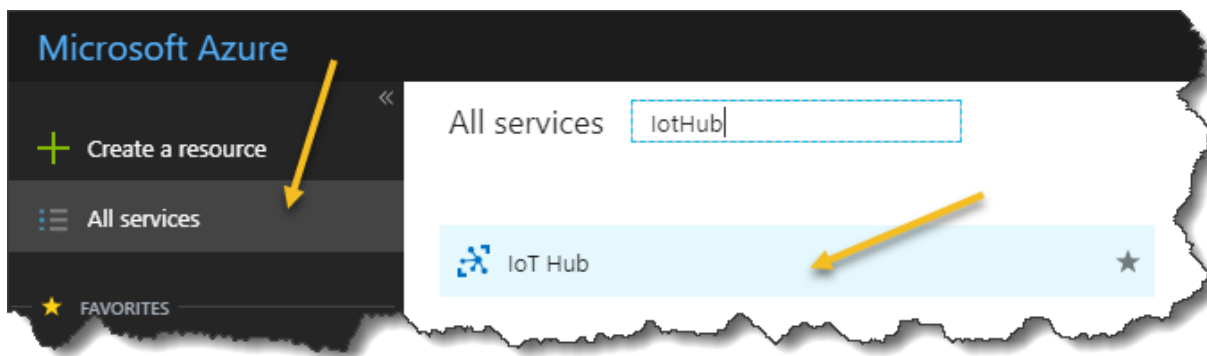
Rysunek 7 Po chwili pojawi się okno stanu z założonym zasobem

Znalezienie IoT Hub (i Resource Group)

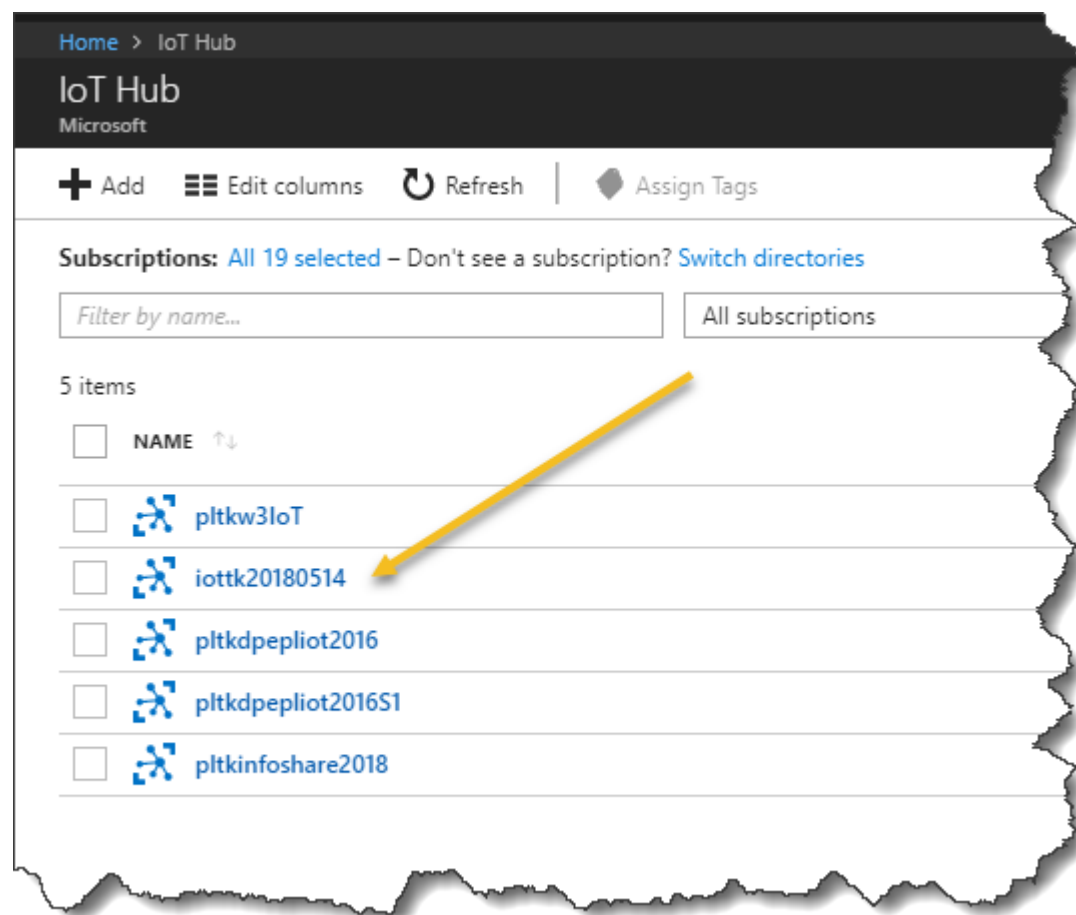
Jeżeli nie przypniemy zasobu do dashboard („pin” na Rysunek 7 Po chwili pojawi się okno stanu z założonym zasobem).



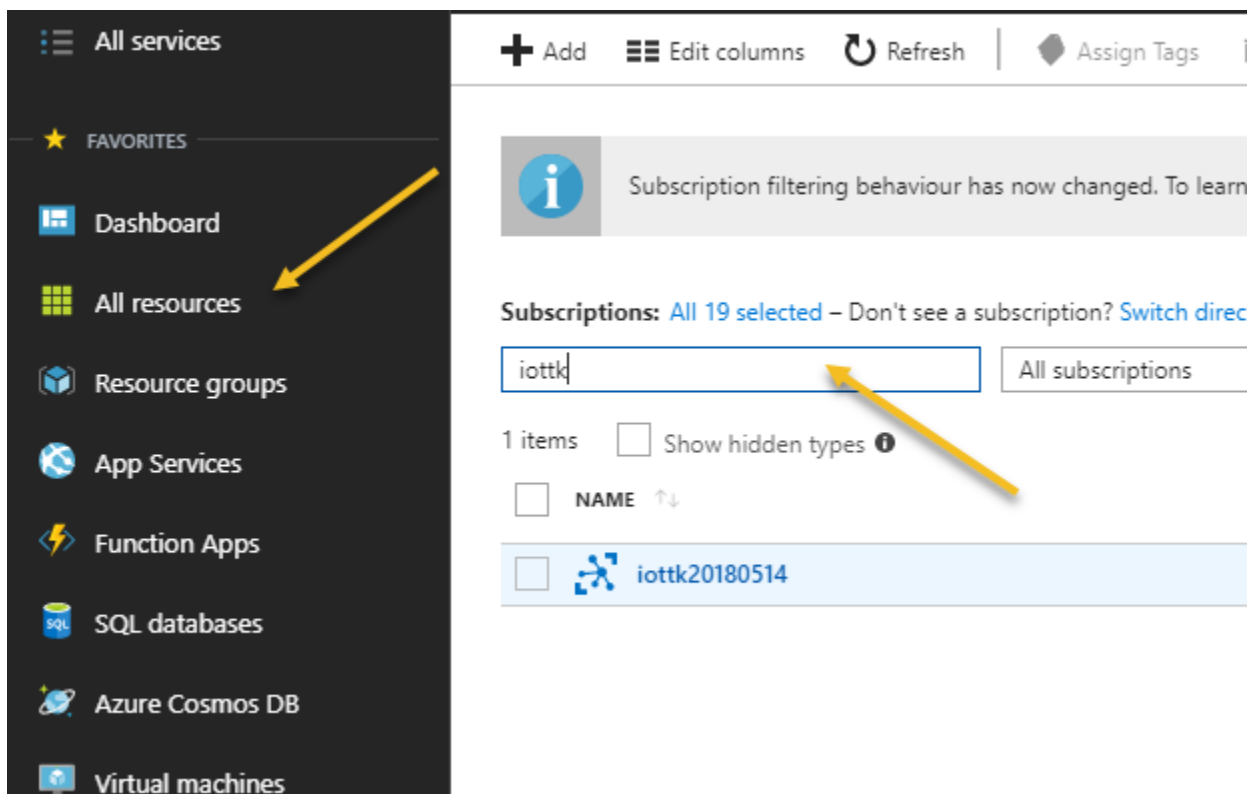
Rysunek 8 Wyszukiwanie Resource Group



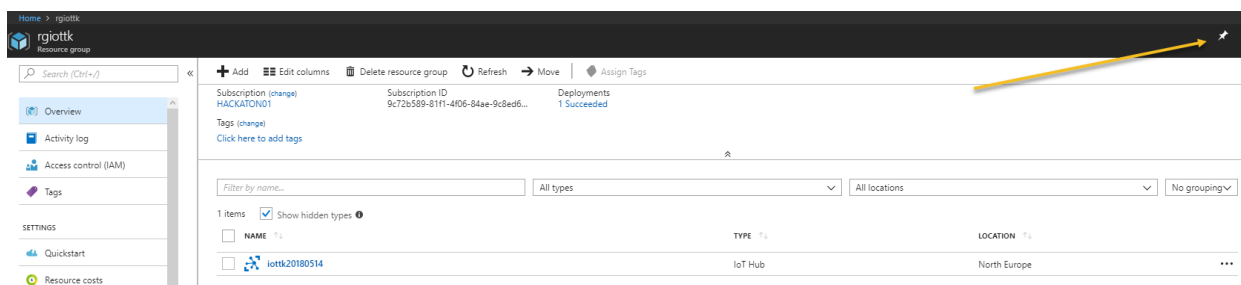
Rysunek 9 Wyszukiwanie IoT Hub



Rysunek 10 Lista IoT Hub we wszystkich subskrypcjach (na szkoleniu zwykle jest jedna)



Rysunek 11 Filtrowanie listy wszystkich zasobów



Rysunek 12 Wygodnie przypiąć do dashboard

Rejestracja urządzenia

Home > [rgiottk](#) > iottk20180514

iottk20180514

IoT Hub

Operations monitoring

IP Filter

Certificates

Properties

Locks

Automation script

EXPLORERS

Query explorer

IoT devices

AUTOMATIC DEVICE MANAGEMENT

IoT Edge (preview)

MESSAGING

File upload

Endpoints

Routes

«

Delete


Resource group ([change](#))
[rglotTK](#)

Status
Active


Location
North Europe

Subscription ([change](#))
[HACKATON01](#)

Subscription ID
9c72b589-81f1-4f06-84ae-9c8ed64ac66a



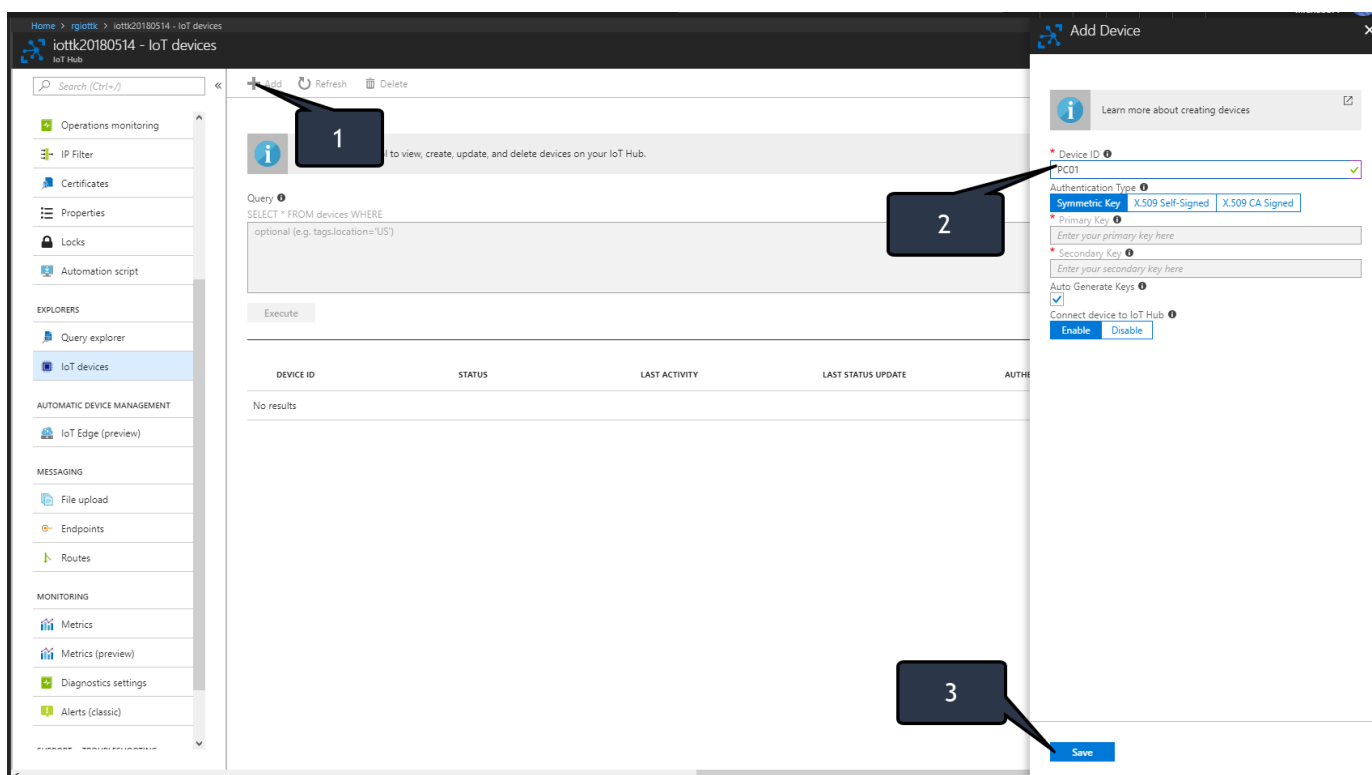
**Need a way to pro
devices?**
IoT Hub Device Provisior
touch, just-in-time provi:
without requiring humar



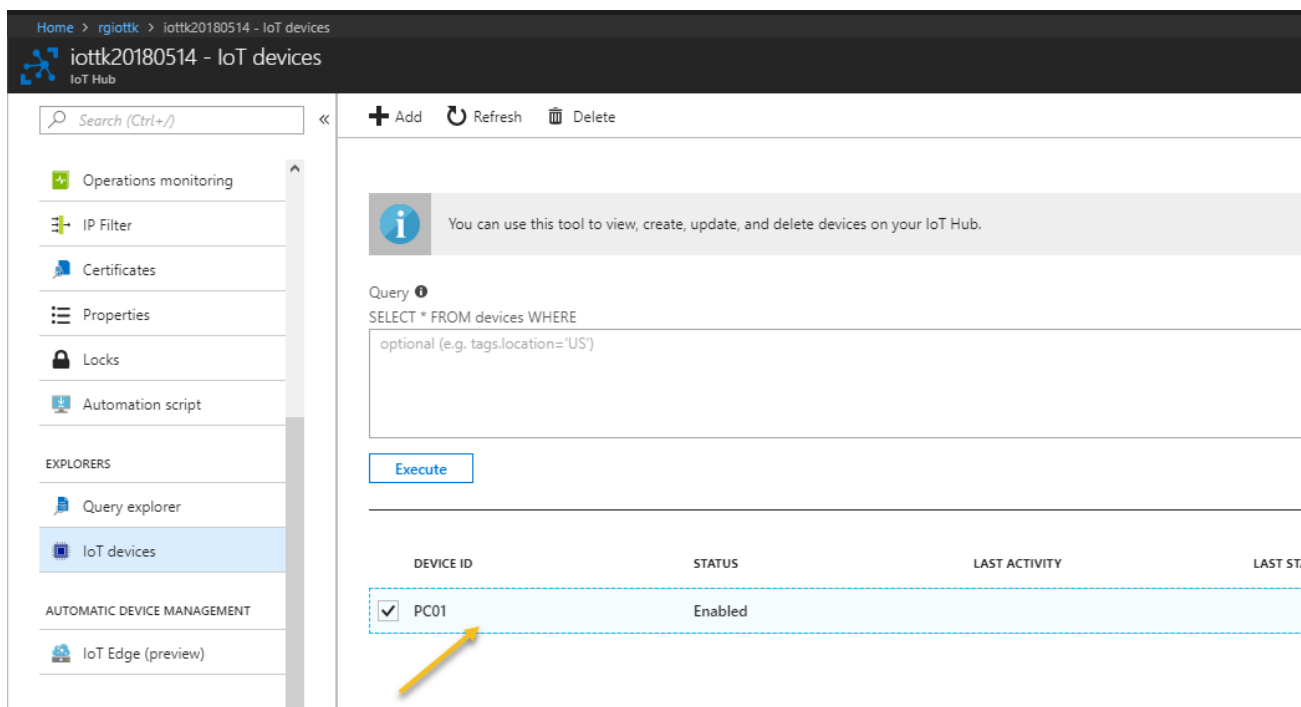
IoT Hub Usage

■ Messages: 0 / 4000000

Rysunek 13 Zarządzanie urządzeniami



Rysunek 14 Dodanie nowego urządzenia (klucze się same wygenerują)



Rysunek 15 Szczegóły urządzenia

Home > rgiothk > iottk20180514 - IoT devices > Device Details

Device Details

PC01

Save Device Twin Message To Device Direct Method Add Module Identity Refresh

Device Id: **PC01**

Primary key **TDvyUZ2ypwa+e5TxuuSM8Kk7ZWVoH+MYEw1XTL8JQic=**

Secondary key **73UhLB0bqgxt+X2dyGJ+Kh3ySjuRWir8Deaw2J+u4Dk=**

Connection string—primary key **HostName=iottk20180514.azure-devices.net;DeviceId=PC01;SharedAccessKey=TDvyUZ2ypwa+e5TxuuSM8Kk7ZWVoH+MYEw1XTL8JQic=**

Connection string—secondary key **HostName=iottk20180514.azure-devices.net;DeviceId=PC01;SharedAccessKey=73UhLB0bqgxt+X2dyGJ+Kh3ySjuRWir8Deaw2J+u4Dk=**

Connect device to IoT Hub **Enable Disable**

Module Identities

Module Identities associated with this device.

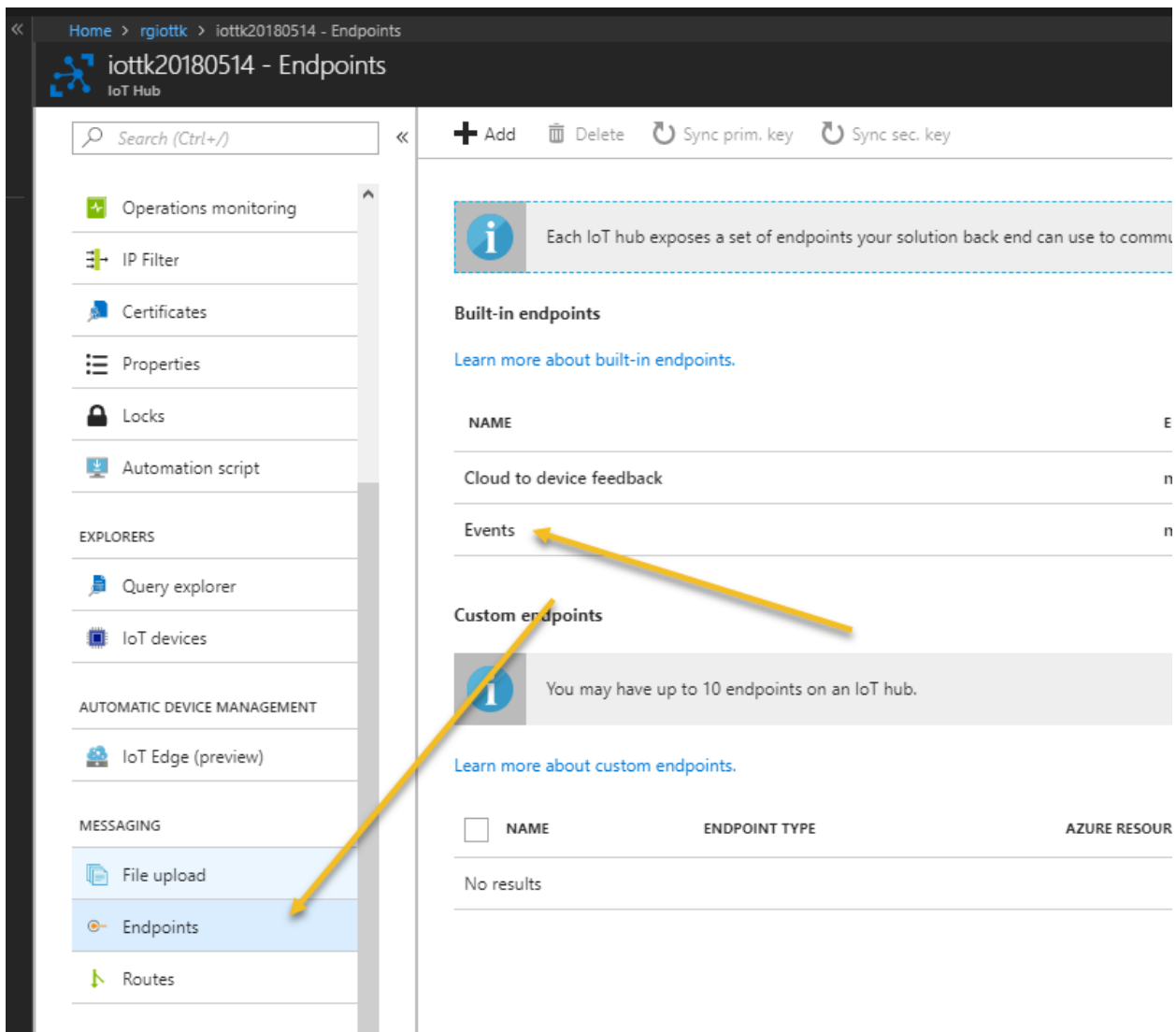
MODULE IDENTITY NAME	CONNECTION STATE	CONNECTION STATE L
No module identities listed.		

Rysunek 16 Connection String – skopiować

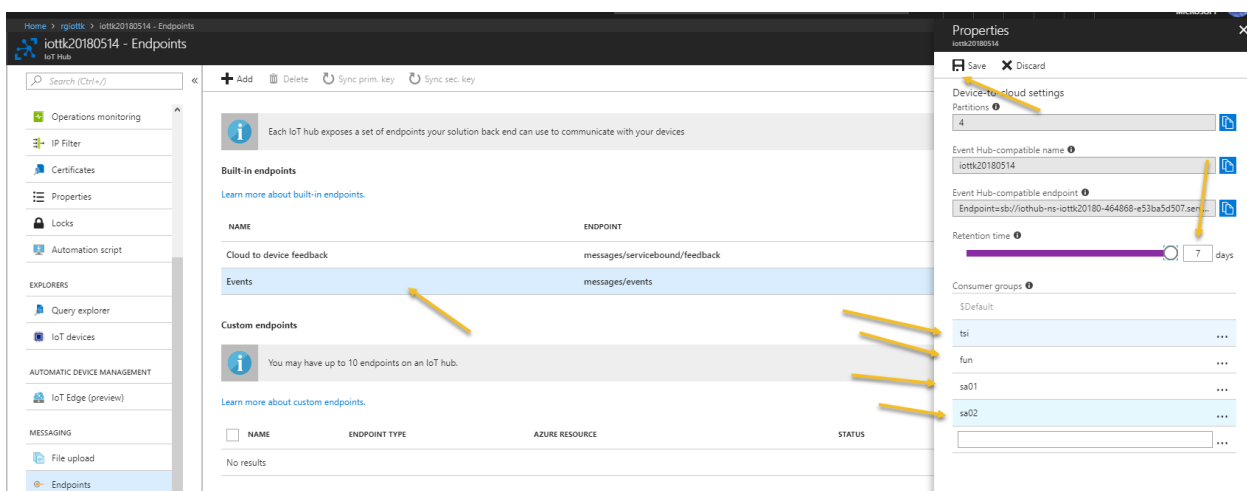
**** Przykład łańcucha:

HostName=iottk20180514.azure-devices.net;DeviceId=PC01;SharedAccessKey=ABABABABA

Dodanie czterech consumer group



Rysunek 17 Dodawanie consumer group 1/2



Rysunek 18 Dodawanie consumer group 2/2

Tworzenie Time Series Insight (do podglądu wiadomości)

Microsoft Azure

Create a resource

All services

FAVORITES

Dashboard

All resources

Resource groups

App Services

Function Apps

SQL databases

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Cost Management + Billing

Help + support

Home > New > Time Series Insights

Time Series Insights

Microsoft

Azure Time Series Insights is a fully managed analytics, storage, and visualization service that makes it incredibly simple to explore and analyze billions of IoT events simultaneously. Time Series Insights gives you a global view of your data, letting you quickly validate your IoT solution and avoid costly downtime to mission-critical devices by helping you discover hidden trends, spot anomalies, and conduct root-cause analyses in near real-time.

- Find actionable insights in seconds
- Start in seconds, scale in minutes
- Create a global view of your IoT-scale data
- Leverage Time Series Insights in your Apps and Solutions

Save for later

CHART

Showing 12 series of 192 total from Query1, Query2, Query3

Zoom

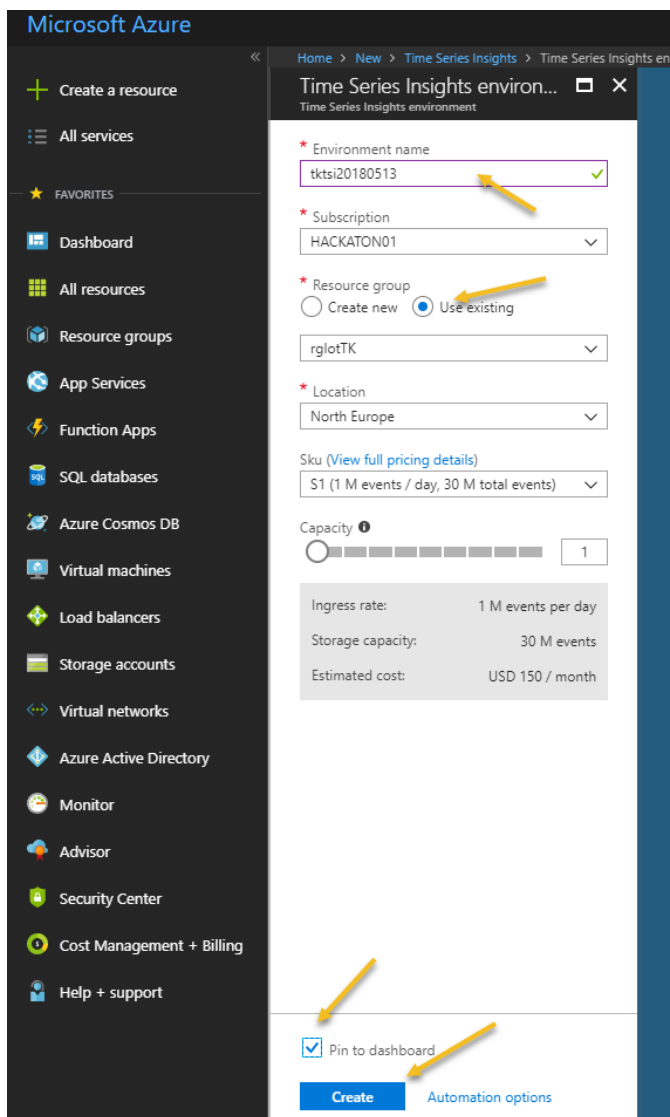
Explore Events

EVENTS

Timestamp	Lat	Alt	Speed	Altitude	PhysicalType	Processed
2017-01-11 00:00:00.000	45.75	19.13	0.00	0.00	0.00	0.00
2017-01-11 00:00:00.000	45.75	19.13	0.00	0.00	0.00	0.00
2017-01-11 00:00:00.000	45.75	19.13	0.00	0.00	0.00	0.00
2017-01-11 00:00:00.000	45.75	19.13	0.00	0.00	0.00	0.00

Create

Rysunek 19 Tworzenie TSI



Rysunek 20 Parametry TSI

Home > tktsi20180513

tktsi20180513
Time Series Insights environment

Search (Ctrl+ /)

« Delete Go to Environment

Essentials ^

Resource group
rglotTK
Provisioning State
Succeeded
Subscription ID
9c72b589-81f1-4f06-84ae-9c8ed64ac66a
Sku
S1
Retention Policy
31 Days

Environment Topology

Event Sources	Reference Data Sets
0	0
Empty	Empty

Monitoring

IngressReceivedMessages, IngressReceivedBytes and 2 more metrics past hour

100
80
60

Overview

Activity log

Access control (IAM)

Tags

SETTINGS

Locks

Automation script

Configure

ENVIRONMENT TOPOLOGY

Data Access Policies

Event Sources

Reference Data Sets

MONITORING

Metrics

SUPPORT + TROUBLESHOOTING

New support request

Rysunek 21 Dodanie źródła dla TSI

Home > tktsi20180513 - Event Sources > New event source

+ Add

NAME

Empty

Rysunek 22 Wskazanie stworzonego IoT 1/2

New event source

* Event source name ✓

* Source

* Import option

* Subscription Id ⓘ

* Iot hub name ⓘ

* Iot hub policy name ⓘ

* Iot hub policy key ⓘ

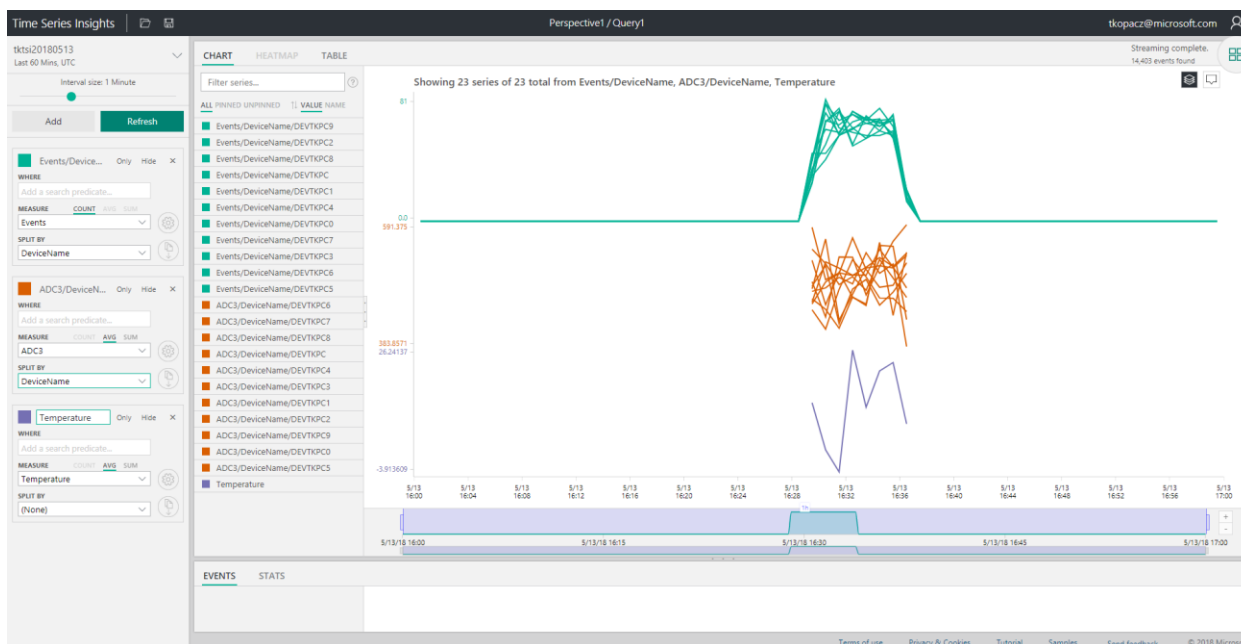
⚠ This consumer group should be used exclusively for this event source as there can be only one active reader from a given consumer group at a time.

* Iot hub consumer group ⓘ

Event serialization format ⓘ

Timestamp property name ⓘ

Create



Rysunek 23 Widok TSI

Wysyłanie telemetry do IoT Hub

Prace z kodem zakłada że kod źródłowy jest w Z:\AzureFY18TK\20-IoT-Hub\2018_Workshop_1H\

Jeżeli znajduje się w innym folderze – ścieżkę do plików należy odpowiednio zmodyfikować.

.NET Core

Z:\AzureFY18TK\20-IoT-Hub\2018_Workshop_1H\Step01SendNetCore\Step01SendNetCore\Program.cs

Zmienić:

```
string cnn = "HostName=iottk20180514.azure-  
devices.net;DeviceId=PC01;SharedAccessKey=ABABABABA";
```

Na:

```
string cnn = "skopiowany łańcuch połączenia w poprzednim kroku, oznaczony *** ";
```

Uruchomić

Node JS

npm install

Z:\AzureFY18TK\20-IoT-Hub\2018_Workshop_1H\Step01SendNodeJS\SimulatedDevice\SimulatedDevice.js

```
var connectionString = 'HostName=iottk20180514.azure-  
devices.net;DeviceId=PC01;SharedAccessKey=ABABABABA';
```

Na:

```
var connectionString = 'skopiowany łańcuch połączenia w poprzednim kroku, oznaczony ****';
```

Python

pip install azure-iot-hub-device-client azure-iot-hub-service-client

Z:\AzureFY18TK\20-IoT-Hub\2018_Workshop_1H\Step01SendPython\SimulatedDevice.py

```
CONNECTION_STRING = "HostName=iottk20180514.azure-  
devices.net;DeviceId=PC01;SharedAccessKey=ABABABABA"
```

Na

```
CONNECTION_STRING = " skopiowany łańcuch połączenia w poprzednim kroku, oznaczony **** "
```

Podgląd komunikatów

Po pewnym czasie (kilka minut) proszę zobaczyć co jest widoczne na Time Series Insight

Wysyłanie poleceń z chmury do urządzenia

Aby to zadziałało, urządzenie musi

1. Albo nasłuchiwać na protokole http (post + timeout)
2. Albo otworzyć sesję AMQP
3. Albo nasłuchiwać na odpowiednim topic-u MQTT (ten sposób tu użyjemy)

.NET Core – po stronie urządzenia

Z:\AzureFY18TK\20-IoT-

Hub\2018_Workshop_1H\Step02ReceiveCommandsNetCore\Step02ReceiveCommandsNetCore\Program.cs

Zmienić:

```
string cnn = "HostName=iottk20180514.azure-  
devices.net;DeviceId=PC01;SharedAccessKey=ABABABABA";
```

NodeJS – po stronie urządzenia

Z:\AzureFY18TK\20-IoT-Hub\2018_Workshop_1H\Step02ReceiveCommandsNodeJS\receive.js

Zmienić:

```
var connectionString = 'HostName=iottk20180514.azure-  
devices.net;DeviceId=PC01;SharedAccessKey=ABABABABA';
```

Python – po stronie urządzenia

Z:\AzureFY18TK\20-IoT-Hub\2018_Workshop_1H\Step02ReceiveCommandsPython\Receive\receive.py

Zmienić:

```
CONNECTION_STRING = "HostName=iottk20180514.azure-  
devices.net;DeviceId=PC01;SharedAccessKey=ABABABABA"
```

Python – do wysyłania poleceń

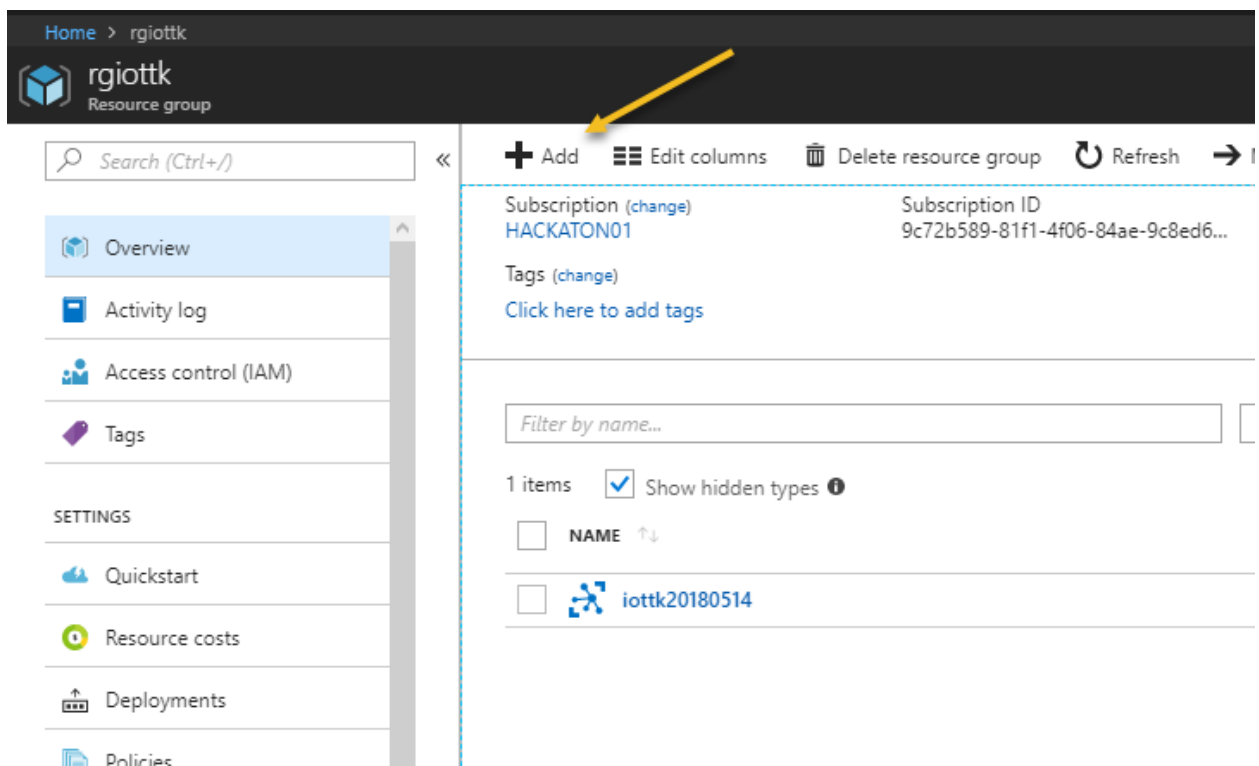
Z:\AzureFY18TK\20-IoT-Hub\2018_Workshop_1H\Step02ReceiveCommandsPython\Send\BackEndApplication.py

Uwaga! Używamy połączenia Service z IoT Hub – a nie konkretnego dla Device.

```
CONNECTION_STRING = "HostName=iottk20180514.azure-  
devices.net;SharedAccessKeyName=service;SharedAccessKey=AAAAAA"
```

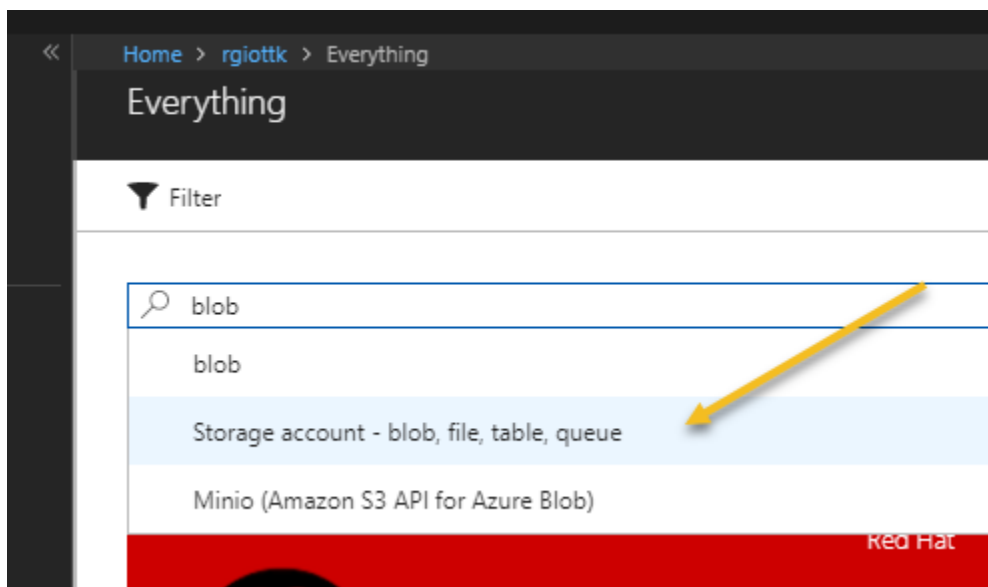
Analiza strumieniowa

Tworzenie Azure Blob

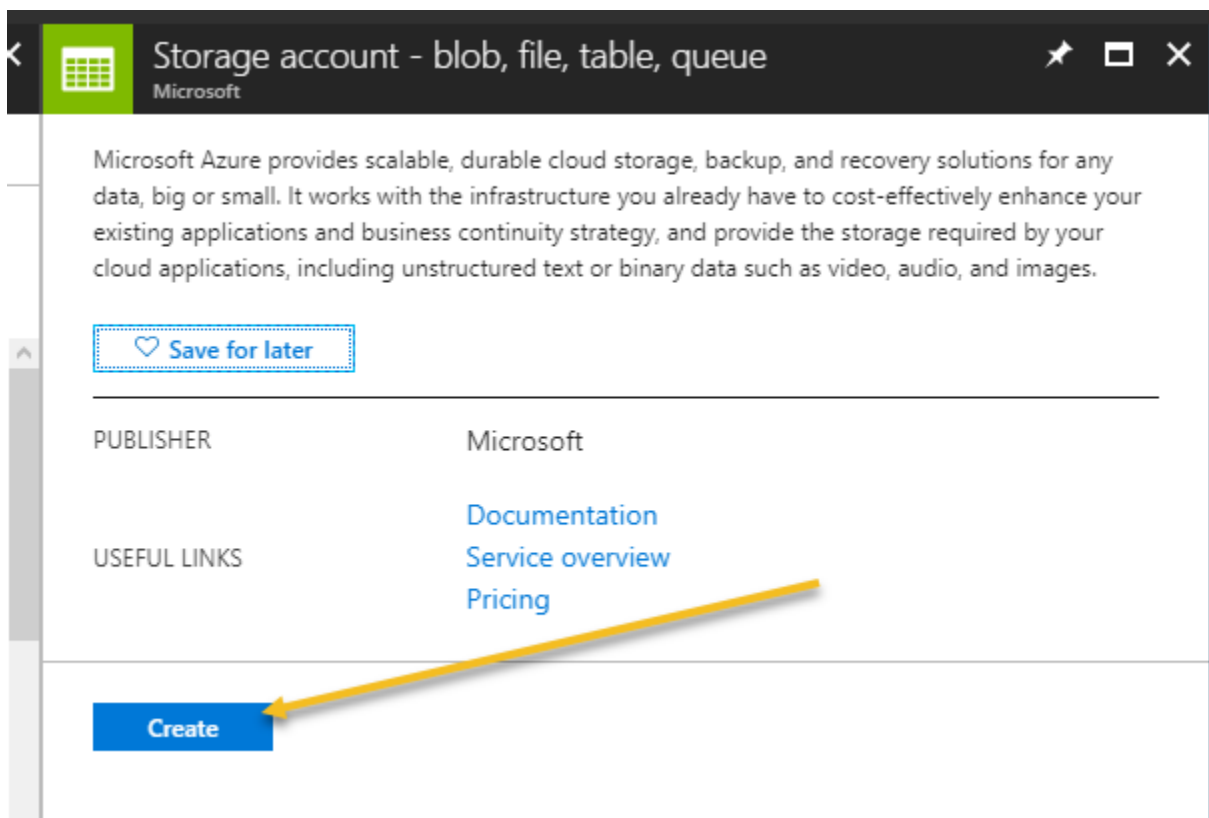


The screenshot shows the Azure portal interface for a resource group named 'rgiottk'. The top navigation bar includes a search bar and several action buttons: '+ Add', 'Edit columns', 'Delete resource group', 'Refresh', and a right arrow. A yellow arrow points to the '+ Add' button. The left sidebar contains a list of navigation options: Overview (selected), Activity log, Access control (IAM), Tags, SETTINGS, Quickstart, Resource costs, Deployments, and Policies. The main content area displays the subscription 'HACKATON01' with its ID '9c72b589-81f1-4f06-84ae-9c8ed6...'. Below this, there is a section for 'Tags' with a link to 'Click here to add tags'. A filter bar shows 'Filter by name...' and '1 items'. A checkbox labeled 'Show hidden types' is checked. A table lists the resources, with one item visible: 'iottk20180514'.

Rysunek 24 Tworzenie BLOB (do zapisu danych)



Rysunek 25 Wybór Storage



Rysunek 26 Create

Home > rgiottk > Everything > Storage account - blob, fi

Create storage account

The cost of your storage account depends on the usage and the options you choose below. [Learn more](#)

* Name ⓘ
blob20180515tk ✓
.core.windows.net

Deployment model ⓘ
Resource manager Classic

Account kind ⓘ
StorageV2 (general purpose v2) ▼

* Location
North Europe ▼

Replication ⓘ
Locally-redundant storage (LRS) ▼

Performance ⓘ
Standard Premium

Access tier (default) ⓘ
Cool Hot

* Secure transfer required ⓘ
Disabled Enabled

* Subscription
HACKATON01 ▼

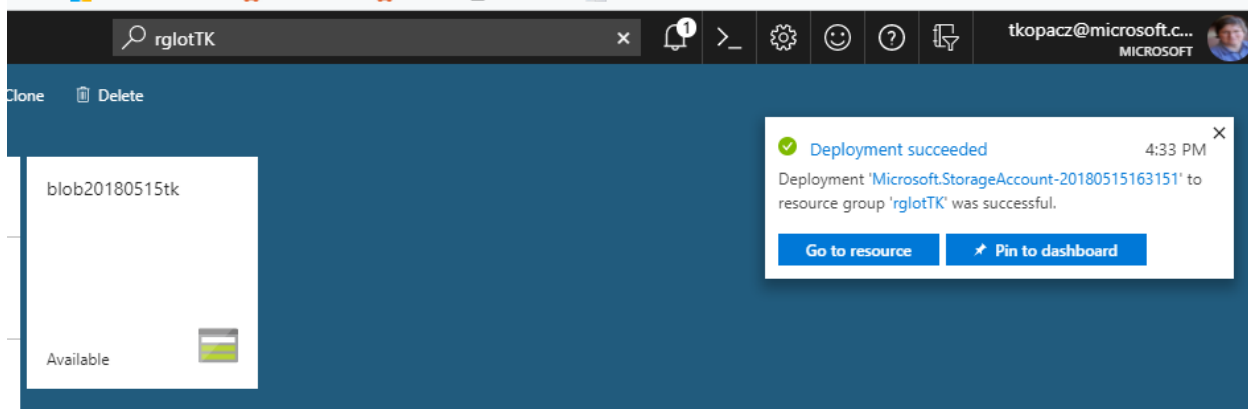
* Resource group ⓘ
☐ Create new ☒ Use existing
rglotTK ▼

Virtual networks
Configure virtual networks ⓘ
Disabled Enabled

☒ Pin to dashboard

Create Automation options


Rysunek 27 Parametry konta. Nazwa (data + inicjały), wersja V2, ta sama Resource Group co poprzednio



Rysunek 28 Warto konto przypiąć

Tworzenie SQL Database i SQL Server

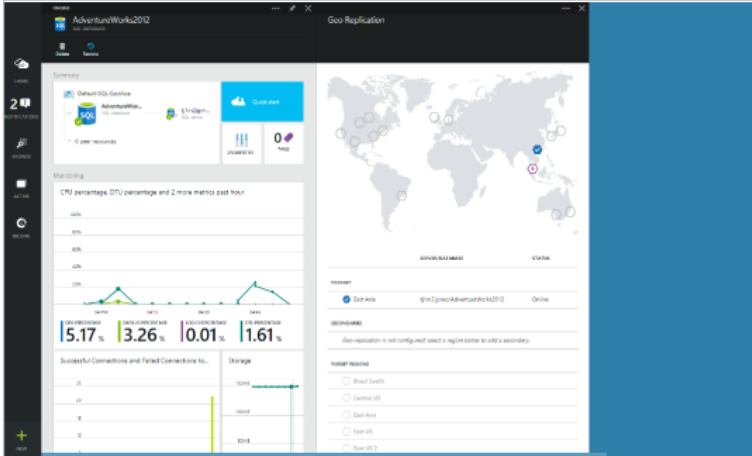
Home > New > SQL Database

 **SQL Database**
Microsoft

SQL Database is a cloud database service built for application developers that lets you scale on-the-fly without downtime and efficiently deliver your applications. Built-in advisors quickly learn your application's unique characteristics and dynamically adapt to maximize performance, reliability, and data protection.

Use this template to create a new database in the SQL Database service. You can create the database on a new logical server or on a logical server that already exists in your subscription.

Save for later



PUBLISHER

Microsoft

USEFUL LINKS

Documentation

Service Overview

Solutions you can deliver

Pricing Details

Create

Create

Rysunek 29 Tworzenie bazy danych

23 | Page

Home > New > SQL Database > SQL Database > Server > New server

SQL Database

- * Database name:
- * Subscription: HACKATON01
- * Resource group: ☐ Create new ☒ Use existing (rgIoT)
- * Select source: Blank database
- * Server: pltksqlinfoshare2018srv1 (France...)
- Want to use SQL elastic pool? ☐ Yes ☒ Not now
- * Pricing tier: Standard S0: 10 DTUs, 250 GB
- * Collation: SQL_Latin1_General_CP1_CI_AS

☐ Pin to dashboard

Create Automation options

Server

+ Create a new server

pltksqlinfoshare2018srv1
France Central rgIoT

New server

- * Server name: srv20180515
- * Server admin login:
- * Password:
- * Confirm password:
- * Location: France Central
- ☒ Allow azure services to access server

Select

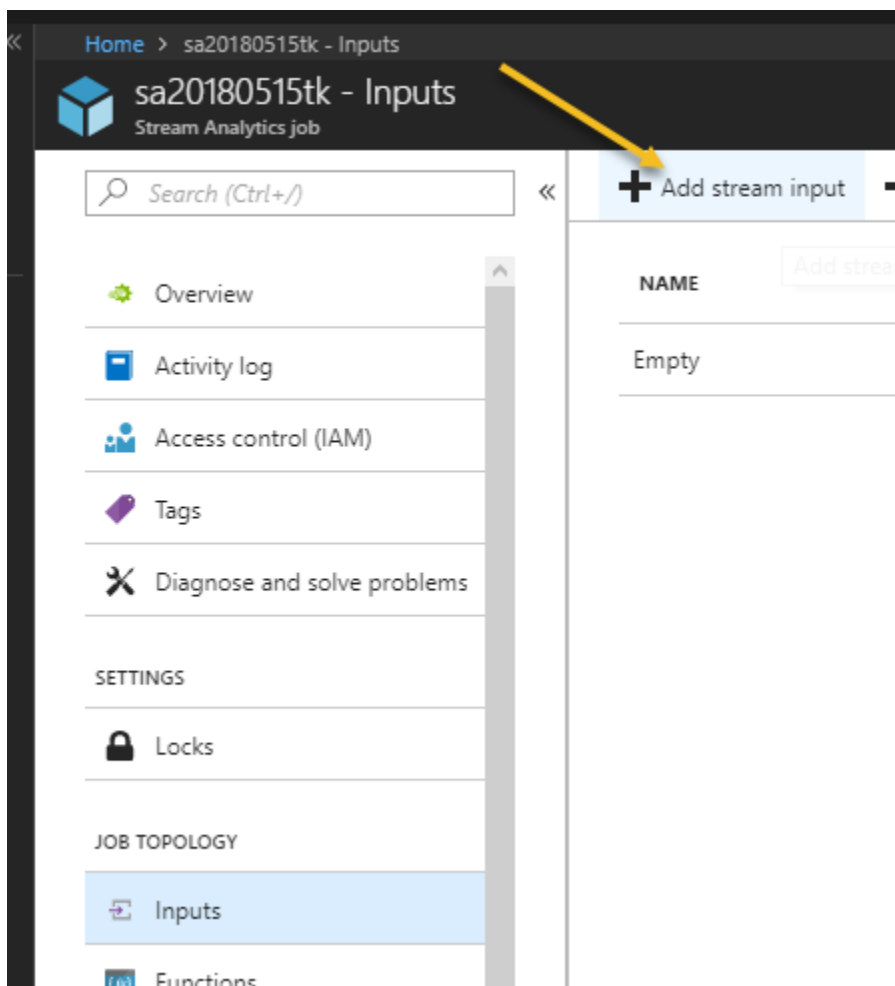
Rysunek 30 Parametry SQL

Tworzenie Stream Analytics

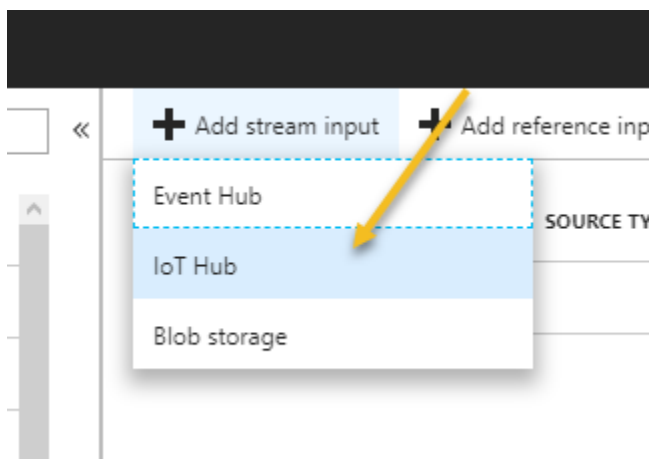
Rejestracja IoT Hub jako wejścia

The screenshot displays the Azure Stream Analytics portal interface. The top navigation bar shows the breadcrumb 'Home > sa20180515tk' and the job name 'sa20180515tk' with the subtitle 'Stream Analytics job'. Below the navigation bar, there is a search bar and a set of action buttons: 'Start', 'Stop', and 'Delete'. The left-hand navigation pane is divided into several sections: 'Overview' (with a gear icon), 'Activity log', 'Access control (IAM)', 'Tags', 'Diagnose and solve problems', 'SETTINGS' (containing 'Locks'), 'JOB TOPOLOGY' (containing 'Inputs', 'Functions', 'Query', and 'Outputs'), and 'CONFIGURE' (containing 'Scale' and 'Locale'). A yellow arrow points to the 'Inputs' option under the 'JOB TOPOLOGY' section. The main content area on the right is titled 'Created' and displays the following information: 'Resource group (change) rglotTK', 'Status Created', 'Location North Europe', 'Subscription (change) HACKATON01', and 'Subscription ID 9c72b589-81f1-4f06-84ae-9c8ed64ac66a'. Below this, there are sections for 'Inputs' and 'Outputs', both showing a count of '0' and the status 'Empty'. At the bottom of the main content area, the 'Monitoring' section is partially visible.

Rysunek 33 Rejestracja IoT hub jako wejścia



Rysunek 34 Rejestracja IoT Hub jako wejścia



Rysunek 35 Rejestracja IoT Hub jako wejścia

Microsoft IoT Hub New input

+ Add stream input + Add reference input

NAME	SOURCE TYPE
Empty	

* Input alias
iot ✓

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

Subscription
HACKATON01

IoT Hub ⓘ
iottk20180514

Endpoint ⓘ
Messaging

Shared access policy name ⓘ
iothubowner

Shared access policy key ⓘ

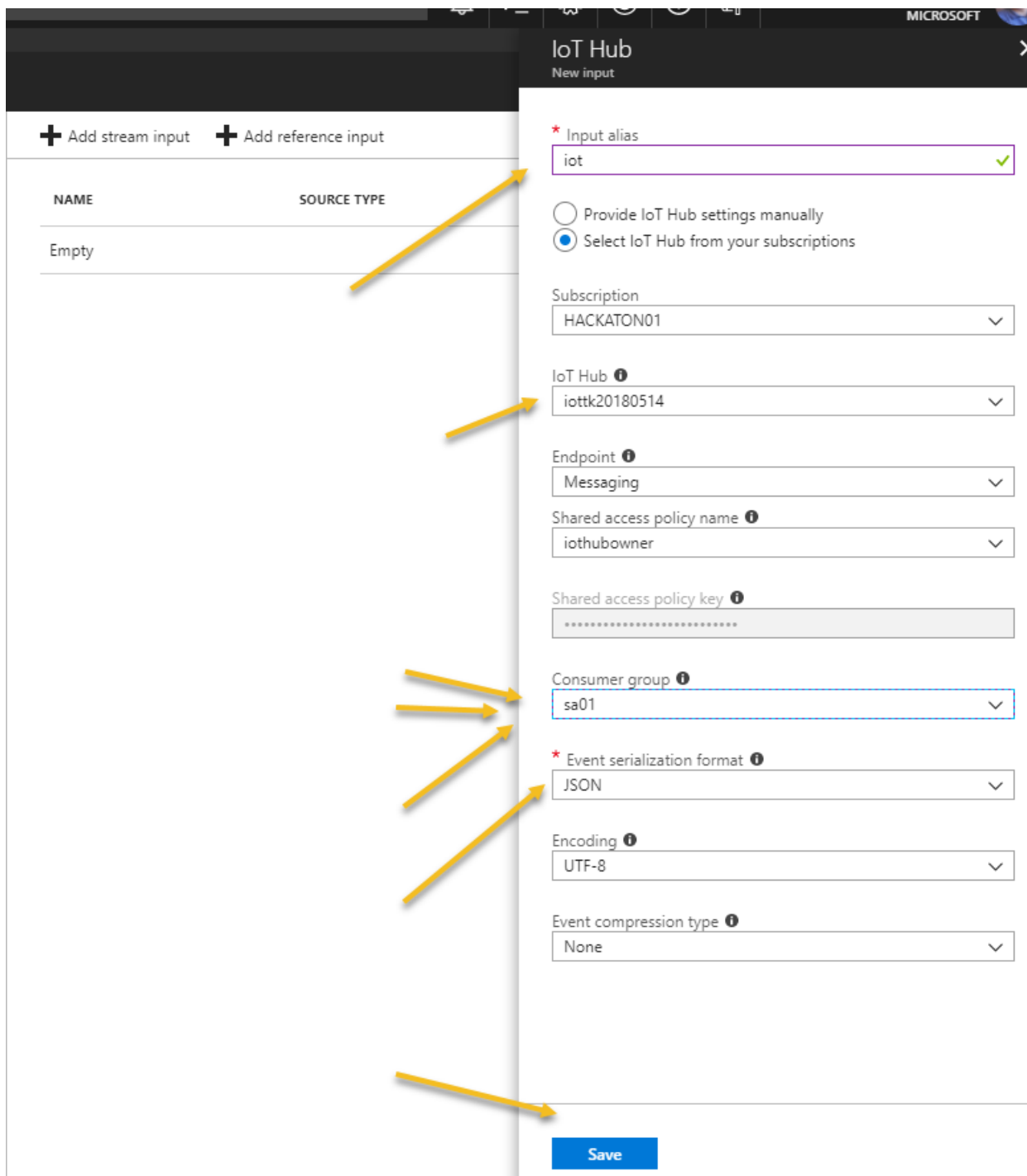
Consumer group ⓘ
sa01

* Event serialization format ⓘ
JSON

Encoding ⓘ
UTF-8

Event compression type ⓘ
None

Save



Rysunek 36 Parametry wejścia - ważne - Consumer Group

Blob - filterjoin

Blob storage
New output

* Output alias
filterjoin ✓

☐ Provide Blob storage settings manually
☒ Select Blob storage from your subscriptions

Subscription
HACKATON01

* Storage account ⓘ
blob20180515tk

* Storage account key

* Container
☒ Create new ☐ Use existing
infoshare2018 ✓

Path pattern ⓘ
filterjoin/{date}/{time} ✓

Date format
YYYY/MM/DD

Time format
HH

* Event serialization format ⓘ
CSV

Delimiter ⓘ
tab

Encoding ⓘ
UTF-8

Save

Rysunek 37 Parametry wyjścia - blob (analogicznie inne)

Container: **infoshare2018**

Path pattern: **filterjoin/{date}/{time}**

Date format: **YYYY/MM/DD**

Time format: **HH**

Blob – rawdata

Podobnie dodajemy ujście o nazwie rawdata

Path pattern: **rawdata/{date}/{time}**

Blob – aggregate

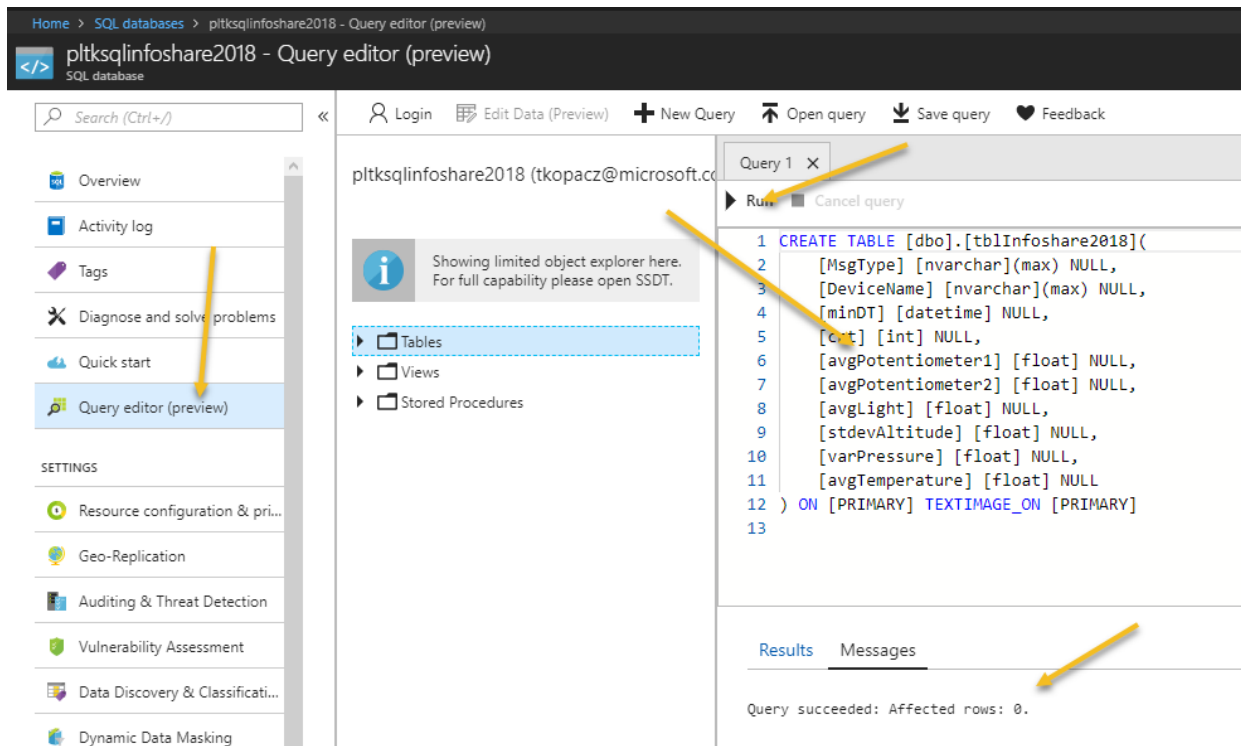
Podobnie dodajemy ujęcie o nazwie aggregate

Path pattern: **aggregate/{date}/{time}**

SQL – sql

Najpierw należy w SQL Server utworzyć tabelę która będzie pasować do schematu kwerendy

```
CREATE TABLE [dbo].[tblInfoshare2018](
    [MsgType] [nvarchar](max) NULL,
    [DeviceName] [nvarchar](max) NULL,
    [minDT] [datetime] NULL,
    [cnt] [int] NULL,
    [avgPotentiometer1] [float] NULL,
    [avgPotentiometer2] [float] NULL,
    [avgLight] [float] NULL,
    [stdevAltitude] [float] NULL,
    [varPressure] [float] NULL,
    [avgTemperature] [float] NULL
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
```



Rysunek 38 Tworzenie tabeli SQL przy użyciu Portalu

Rejestracja w Stream Analytics

SQL Database

New output

*

Output alias

sql

✓

Provide SQL Database settings manually

Select SQL Database from your subscriptions

Subscription

HACKATON01

▼

Database ⓘ

pltksqlinfoshare2018

▼

Server name

pltksqlinfoshare2018srv1.database.windows.net

*

Username

tkadmin

✓

*

Password

.....

✓

*

Table

tblInfoshare2018

✓

Rysunek 39 Dodanie wyjścia do SQL Database

EventHub - Rejestracja wspólnego ujścia

Event Hub

New output

* Output alias

eh01




- ☒ Provide Event Hub settings manually
☐ Select Event Hub from your subscriptions

Subscription

Subscription information not needed



* Service Bus namespace 

infoshare-eh-common




* Event Hub name 

☐ Create new ☒ Use existing

eh



* Event Hub policy name 

send



* Event Hub policy key

.....



Partition key column 

* Event serialization format 

JSON



Encoding 

UTF-8



Format 

Line separated



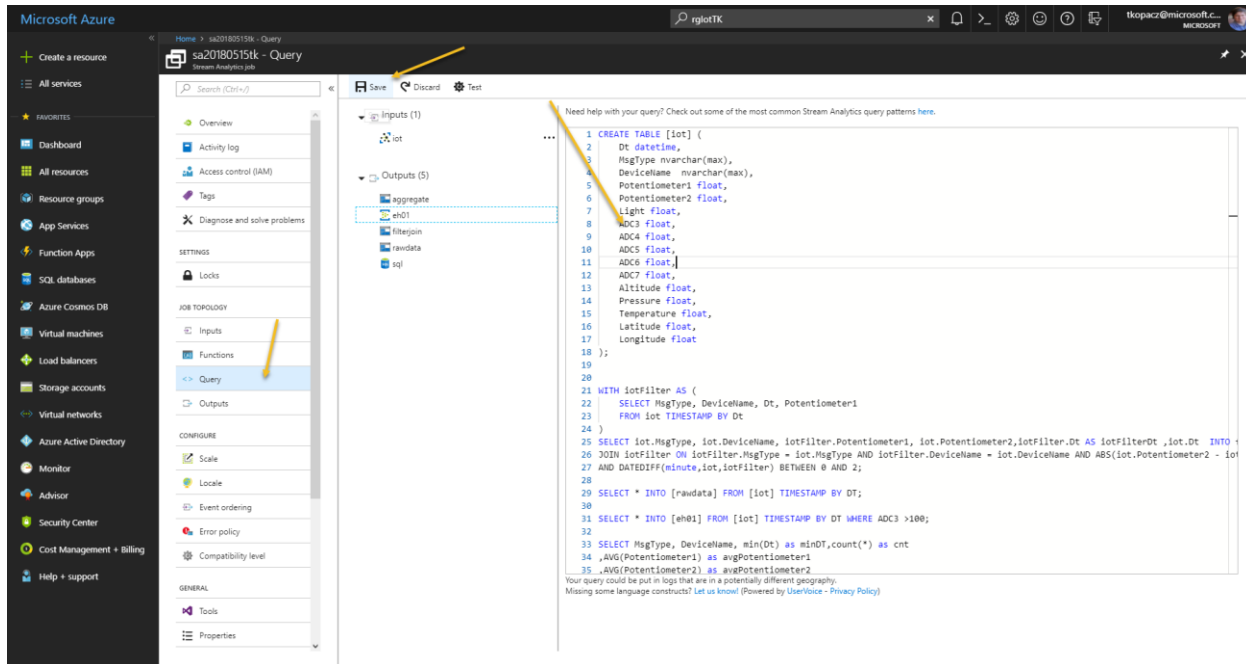
Save



If the chosen resource and the stream analytics job are located in different regions, you will be billed to move data between regions.

Endpoint=sb://infoshare-eh-
common.servicebus.windows.net/;SharedAccessKeyName=send;SharedAccessKey=ddyh8h1jz66PW///uRJJxUkLO/+3enq
5LrXH5v71gtc=

Query:



Rysunek 41 Kwerenda w Stream Analytics

```
CREATE TABLE [iot] (  
    Dt datetime,  
    MsgType nvarchar(max),  
    DeviceName nvarchar(max),  
    Potentiometer1 float,  
    Potentiometer2 float,  
    Light float,  
    ADC3 float,  
    ADC4 float,  
    ADC5 float,  
    ADC6 float,  
    ADC7 float,  
    Altitude float,  
    Pressure float,  
    Temperature float,  
    Latitude float,  
    Longitude float  
);
```

```

WITH iotFilter AS (
    SELECT MsgType, DeviceName, Dt, Potentiometer1
    FROM iot TIMESTAMP BY Dt
)
SELECT iot.MsgType, iot.DeviceName, iotFilter.Potentiometer1, iot.Potentiometer2, iotFilter.Dt AS iotFilterDt, iot.Dt
INTO filterjoin FROM iot TIMESTAMP BY Dt
JOIN iotFilter ON iotFilter.MsgType = iot.MsgType AND iotFilter.DeviceName = iot.DeviceName AND
ABS(iot.Potentiometer2 - iotFilter.Potentiometer1) < 1
AND DATEDIFF(minute, iot, iotFilter) BETWEEN 0 AND 2;

```

```

SELECT * INTO [rawdata] FROM [iot] TIMESTAMP BY DT;
OR
SELECT * INTO [eh01] FROM [iot] TIMESTAMP BY DT WHERE ADC3 > 100;

```

```

SELECT MsgType, DeviceName, min(Dt) as minDT, count(*) as cnt
,AVG(Potentiometer1) as avgPotentiometer1
,AVG(Potentiometer2) as avgPotentiometer2
,AVG(Light) as avgLight
,STDEV(Altitude) as stdevAltitude
,VAR(Pressure) as varPressure
,AVG(Temperature) as avgTemperature
INTO [aggregate] FROM [iot] TIMESTAMP BY DT GROUP BY MsgType, DeviceName, TumblingWindow(minute, 10);

```

```

SELECT MsgType, DeviceName, min(Dt) as minDT, count(*) as cnt
,AVG(Potentiometer1) as avgPotentiometer1
,AVG(Potentiometer2) as avgPotentiometer2
,AVG(Light) as avgLight
,STDEV(Altitude) as stdevAltitude
,VAR(Pressure) as varPressure
,AVG(Temperature) as avgTemperature
INTO [sql] FROM [iot] TIMESTAMP BY DT GROUP BY MsgType, DeviceName, TumblingWindow(minute, 10);

```

Uruchomić źródła i poczekać ;

Co dalej - rozważania?

Data processing in Event Grid and Web

Data processing in Azure Function

Edge processing