IBM Watson IoT – T2 – Platform – NodeRED flow

Commissioning task 2

1. Introduction

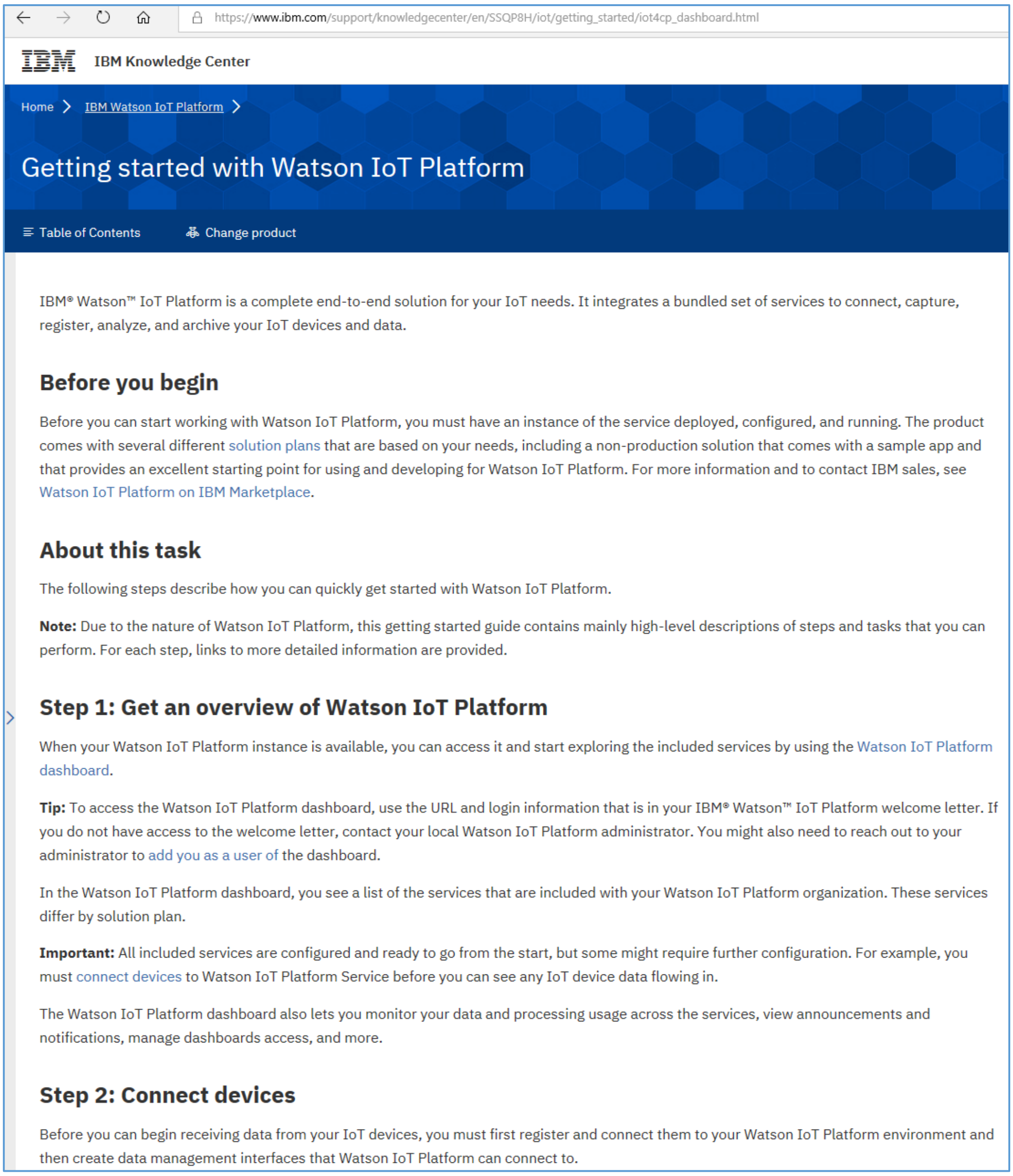
In the commissioning task 1 you signed for an user id into IBM Cloud environment, created a device authentication and wrote device data either with MQTT application or micro controller.

If you did not complete the above mentioned task according to instruction in this commissioning task series you can look for instructions in the latest instructions published by IBM. Browse to IBM Knowledge Center and further to subtitle IBM Watson IoT.

https://www.ibm.com/support/knowledgecenter/en/SSQP8H/iot/kc_welcome.html

Please select ”Getting Started”. Most probably you will end up to page

https://www.ibm.com/support/knowledgecenter/en/SSQP8H/iot/getting_started/iot4cp_dashboard.html



https://www.ibm.com/support/knowledgecenter/en/SSQP8H/iot/getting_started/iot4cp_dashboard.html

IBM Knowledge Center

Home > IBM Watson IoT Platform >

Getting started with Watson IoT Platform

Table of Contents Change product

IBM® Watson™ IoT Platform is a complete end-to-end solution for your IoT needs. It integrates a bundled set of services to connect, capture, register, analyze, and archive your IoT devices and data.

Before you begin

Before you can start working with Watson IoT Platform, you must have an instance of the service deployed, configured, and running. The product comes with several different solution plans that are based on your needs, including a non-production solution that comes with a sample app and that provides an excellent starting point for using and developing for Watson IoT Platform. For more information and to contact IBM sales, see Watson IoT Platform on IBM Marketplace.

About this task

The following steps describe how you can quickly get started with Watson IoT Platform.

Note: Due to the nature of Watson IoT Platform, this getting started guide contains mainly high-level descriptions of steps and tasks that you can perform. For each step, links to more detailed information are provided.

Step 1: Get an overview of Watson IoT Platform

When your Watson IoT Platform instance is available, you can access it and start exploring the included services by using the Watson IoT Platform dashboard.

Tip: To access the Watson IoT Platform dashboard, use the URL and login information that is in your IBM® Watson™ IoT Platform welcome letter. If you do not have access to the welcome letter, contact your local Watson IoT Platform administrator. You might also need to reach out to your administrator to add you as a user of the dashboard.

In the Watson IoT Platform dashboard, you see a list of the services that are included with your Watson IoT Platform organization. These services differ by solution plan.

Important: All included services are configured and ready to go from the start, but some might require further configuration. For example, you must connect devices to Watson IoT Platform Service before you can see any IoT device data flowing in.

The Watson IoT Platform dashboard also lets you monitor your data and processing usage across the services, view announcements and notifications, manage dashboards access, and more.

Step 2: Connect devices

Before you can begin receiving data from your IoT devices, you must first register and connect them to your Watson IoT Platform environment and then create data management interfaces that Watson IoT Platform can connect to.

Kuva 1. IBM Knowledge Center. Getting Started with Watson IoT Platform. / https://www.ibm.com/support/knowledgecenter/en/SSQP8H/iot/getting_started/iot4cp_dashboard.html 19.5. 2019 and 1.10. 2020

By following the instructions and the instructions behind the links in the page you need to establish a IBM Watson IoT platform and at least one device authentication in the platform.

Now you are ready to begin with this commissioning task 2.

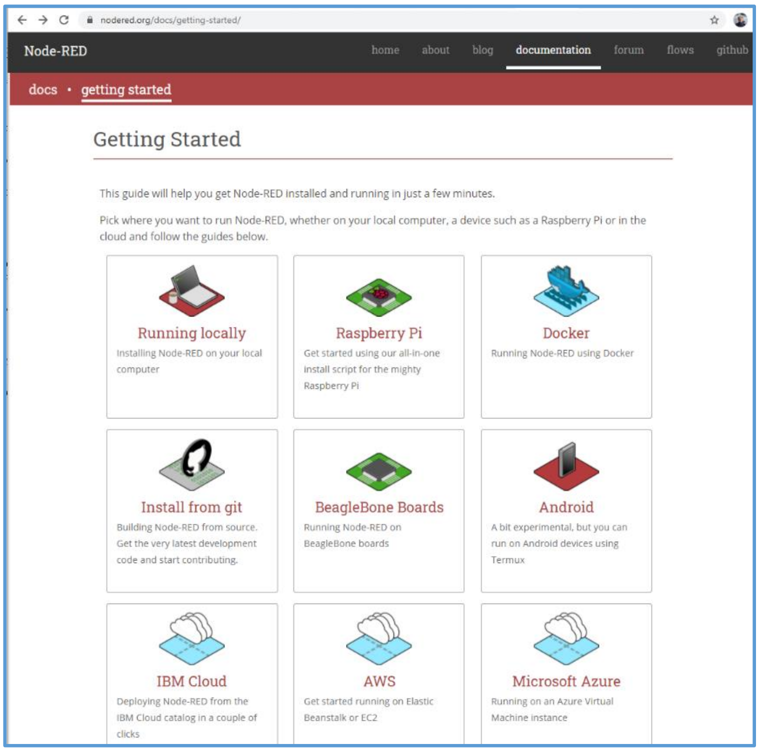
In the commissioning task 2 we process device data in the Watson IoT platform.

Please note that the IBM is continuously updating and developing their services. When you will be reading this the operations introduced in these instructions might already look different or exist on different web addresses. Anyway, the commissioning tasks introduced in these instructions are those that you would always need to complete.

2. Processing the device data. A device simulated in the Node-RED development environment.

Node-RED is an easy to use visual tool that can be used to develop applications, connections between applications and connections to external services.

You can have a look on options on building with the Node-RED at https://nodered.org/docs/getting-started/



Getting Started

This guide will help you get Node-RED installed and running in just a few minutes.

Pick where you want to run Node-RED, whether on your local computer, a device such as a Raspberry Pi or in the cloud and follow the guides below.

Running locally
Installing Node-RED on your local computer

Raspberry Pi
Get started using our all-in-one install script for the mighty Raspberry Pi

Docker
Running Node-RED using Docker

Install from git
Building Node-RED from source. Get the very latest development code and start contributing.

BeagleBone Boards
Running Node-RED on BeagleBone boards

Android
A bit experimental, but you can run on Android devices using Termux

IBM Cloud
Deploying Node-RED from the IBM Cloud catalog in a couple of clicks

AWS
Get started running on Elastic Beanstalk or EC2

Microsoft Azure
Running on an Azure Virtual Machine instance

Fig. 2.1 The Node-RED / https://nodered.org/docs/getting-started/ 1.10. 2020

In the next steps we will import into your Watson IoT platform a packet which includes the Node-RED installation, a CloudantNoSQL database used by Node-RED and a ready to use example.

A link to the installation package can be found both in the IBM Developer documentation and in the IBM Cloud Catalog.

In the IBM Developer page

https://developer.ibm.com/recipes/tutorials/getting-started-with-watson-iot-platform-using-node-red/

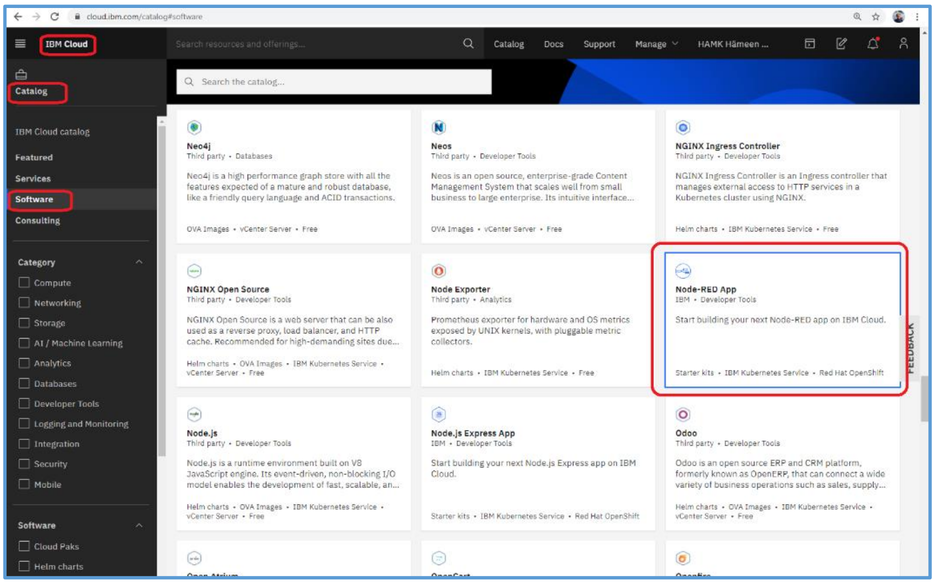
there is a link as use large button ” Create toolchain ”. Click the link, register with your IBM ID and follow the instructions.

OR

in navigate to the IBM Cloud Catalog

https://cloud.ibm.com/catalog

Look for software ”Node-RED” .



Neo4j
Third party • Databases
Neo4j is a high performance graph store with all the features expected of a mature and robust database, like a friendly query language and ACID transactions.
OVA Images • vCenter Server • Free

Neos
Third party • Developer Tools
Neos is an open source, enterprise-grade Content Management System that scales well from small business to large enterprise. Its intuitive interface...
OVA Images • vCenter Server • Free

NGINX Ingress Controller
Third party • Developer Tools
NGINX Ingress Controller is an Ingress controller that manages external access to HTTP services in a Kubernetes cluster using NGINX.
Helm charts • IBM Kubernetes Service • Free

NGINX Open Source
Third party • Developer Tools
NGINX Open Source is a web server that can be also used as a reverse proxy, load balancer, and HTTP cache. Recommended for high-demanding sites due...
Helm charts • OVA Images • IBM Kubernetes Service • vCenter Server • Free

Node Exporter
Third party • Analytics
Prometheus exporter for hardware and OS metrics exposed by UNIX kernels, with pluggable metric collectors.
Helm charts • IBM Kubernetes Service • Free

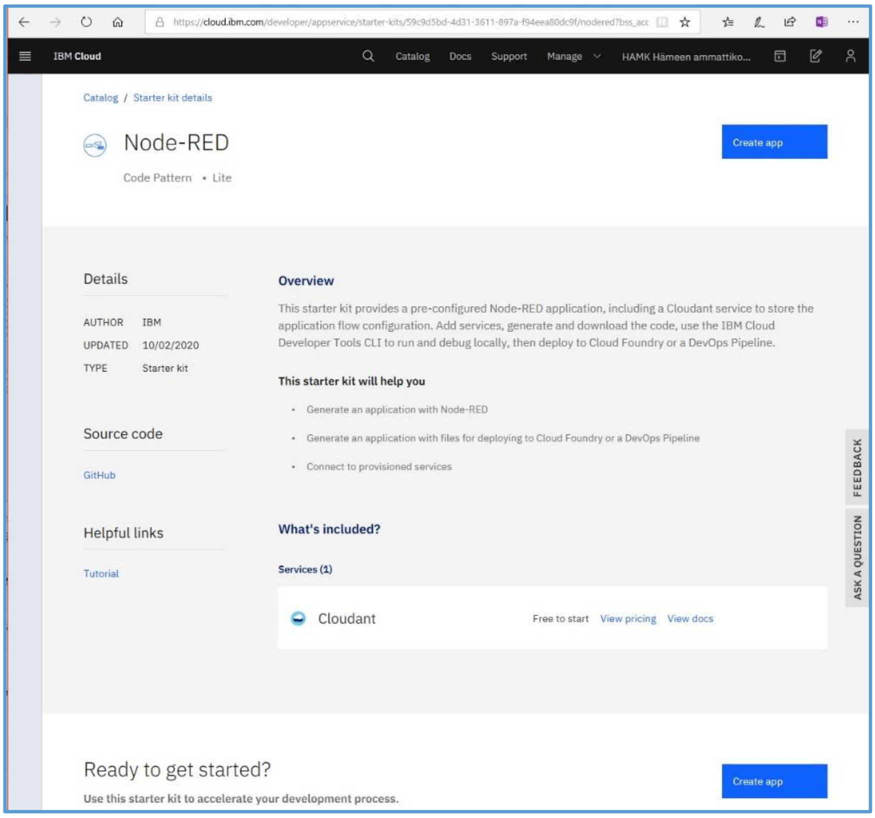
Node-RED App
IBM • Developer Tools
Start building your next Node-RED app on IBM Cloud.
Starter kits • IBM Kubernetes Service • Red Hat OpenShift

Node.js
Third party • Developer Tools
Node.js is a runtime environment built on V8 JavaScript engine. Its event-driven, non-blocking I/O model enables the development of fast, scalable, an...
Helm charts • OVA Images • IBM Kubernetes Service • vCenter Server • Free

Node.js Express App
IBM • Developer Tools
Start building your next Node.js Express app on IBM Cloud.
Starter kits • IBM Kubernetes Service • Red Hat OpenShift

Odoo
Third party • Developer Tools
Odoo is an open source ERP and CRM platform, formerly known as OpenERP, that can connect a wide variety of business operations such as sales, supply...
Helm charts • OVA Images • IBM Kubernetes Service • vCenter Server • Free

Fig. 2.2 IBM Cloud Catalog. Node-RED App. / https://cloud.ibm.com/catalog 1.10. 2020


https://cloud.ibm.com/developer/appservice/starter-kits/59c9d5bd-4d31-3611-897a-f94eea80dc9f/nodered?bss_acc
IBM Cloud
Catalog
Docs
Support
Manage
HAMK Hämeen ammattiko...
Catalog / Starter kit details
Create app
FEEDBACK
ASK A QUESTION

Node-RED

Code Pattern • Lite

Details

AUTHOR IBM
UPDATED 10/02/2020
TYPE Starter kit

Source code

GitHub

Helpful links

Tutorial

Overview

This starter kit provides a pre-configured Node-RED application, including a Cloudant service to store the application flow configuration. Add services, generate and download the code, use the IBM Cloud Developer Tools CLI to run and debug locally, then deploy to Cloud Foundry or a DevOps Pipeline.

This starter kit will help you

- Generate an application with Node-RED
- Generate an application with files for deploying to Cloud Foundry or a DevOps Pipeline
- Connect to provisioned services

What's included?

Services (1)

Cloudant Free to start View pricing View docs

Ready to get started?

Use this starter kit to accelerate your development process.

Create app

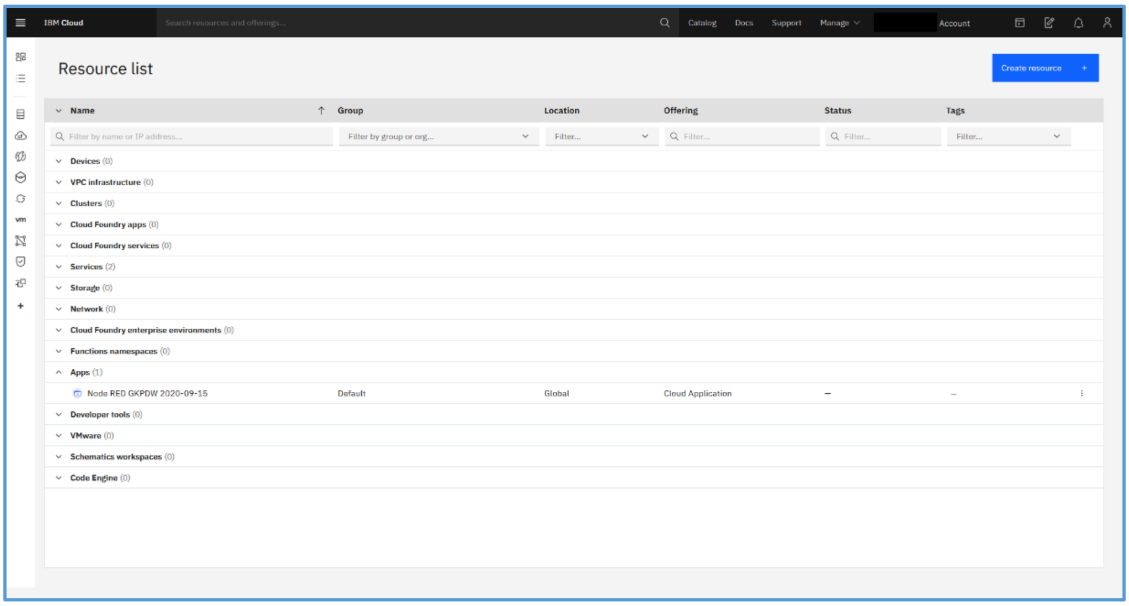
Fig 2.3 NodeRED. / 21.2.2020

Click the Create App.

In this stage there might be parameters to fill in. Please fill in the name for your application. It is preferable to write the name by using no spaces and using only common letter and number characters. Please use a name that you can later easily recognise as a name for this application.

Select the same region as you have selected in the earlier Watson IoT exercises.

The new application will be visible on your IBM Cloud Resource list.



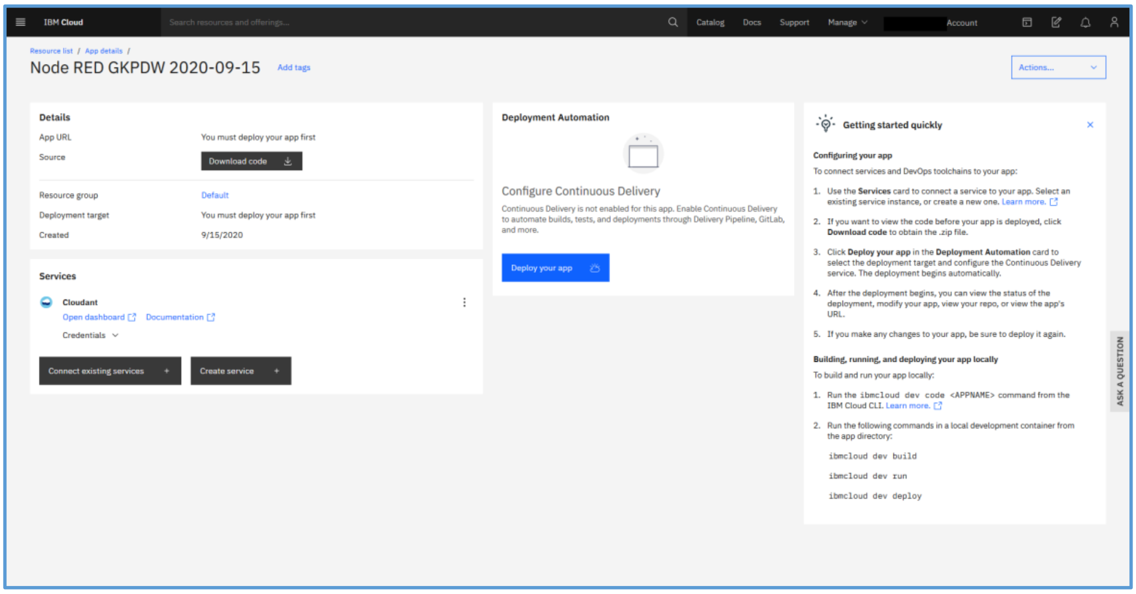
[redacted]

Resource list

Name	Group	Location	Offering	Status	Tags
Filter by name or IP address...	Filter by group or org...	Filter...	Filter...	Filter...	Filter...
Devices (0)					
VPC infrastructure (0)					
Clusters (0)					
Cloud Foundry apps (0)					
Cloud Foundry services (0)					
Services (2)					
Storage (0)					
Network (0)					
Cloud Foundry enterprise environments (0)					
Functions namespaces (0)					
Apps (1)					
Node RED GKPDW 2020-09-15	Default	Global	Cloud Application	–	–
Developer tools (0)					
VMware (0)					
Schematics workspaces (0)					
Code Engine (0)					

Fig. 2.4 A student's view on creating Node-RED app / student M.Y. 1.10. 2020

Open the Node RED….



[redacted]

Node RED GKPDW 2020-09-15

Details

App URL: You must deploy your app first

Source: Download code

Resource group: Default

Deployment target: You must deploy your app first

Created: 9/15/2020

Services

Cloudant

Deployment Automation

Configure Continuous Delivery

Continuous Delivery is not enabled for this app. Enable Continuous Delivery to automate builds, tests, and deployments through Delivery Pipeline, GitLab, and more.

Getting started quickly

Configuring your app

To connect services and DevOps toolchains to your app:

1. Use the **Services** card to connect a service to your app. Select an existing service instance, or create a new one. Learn more.
2. If you want to view the code before your app is deployed, click **Download code** to obtain the .zip file.
3. Click **Deploy your app** in the **Deployment Automation** card to select the deployment target and configure the Continuous Delivery service. The deployment begins automatically.
4. After the deployment begins, you can view the status of the deployment, modify your app, view your repo, or view the app's URL.
5. If you make any changes to your app, be sure to deploy it again.

Building, running, and deploying your app locally

To build and run your app locally:

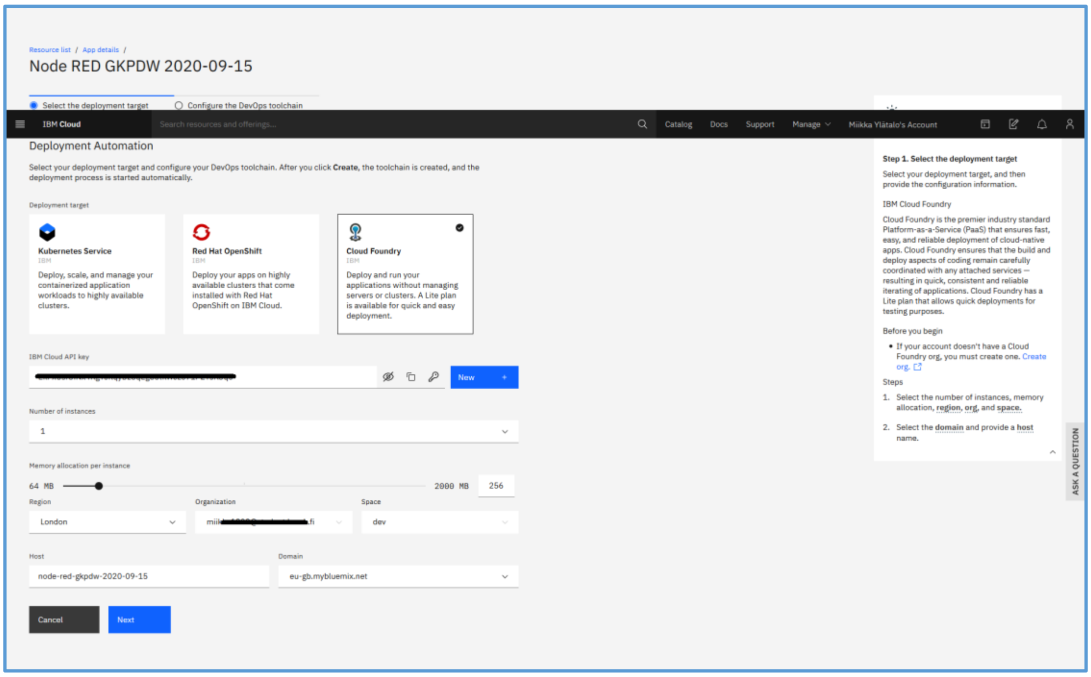
1. Run the `ibmcloud dev code <APPNAME>` command from the IBM Cloud CLI. Learn more.
2. Run the following commands in a local development container from the app directory:

```
ibmcloud dev build

ibmcloud dev run

ibmcloud dev deploy
```

Fig. 2.5 Deploy the app / student M.Y. 1.10. 2020

Deploy the app by clicking Deploy your app.

A new view will open.



Resource list / App details /

Node RED GKPDW 2020-09-15

● Select the deployment target ○ Configure the DevOps toolchain

IBM Cloud
Search resources and offerings...
Catalog
Docs
Support
Manage
Miikka Ylätalo's Account

Deployment Automation

Select your deployment target and configure your DevOps toolchain. After you click **Create**, the toolchain is created, and the deployment process is started automatically.

Deployment target

Kubernetes Service
IBM
Deploy, scale, and manage your containerized application workloads to highly available clusters.

Red Hat OpenShift
IBM
Deploy your apps on highly available clusters that come installed with Red Hat OpenShift on IBM Cloud.

Cloud Foundry ●
IBM
Deploy and run your applications without managing servers or clusters. A Lite plan is available for quick and easy deployment.

IBM Cloud API key: [redacted]

Number of instances: 1

Memory allocation per instance: 64 MB – 2000 MB: 256

Region: London

Organization: miil[redacted].fi

Space: dev

Host: node-red-gkpdw-2020-09-15

Domain: eu-gb.mybluemix.net

Step 1. Select the deployment target

Select your deployment target, and then provide the configuration information.

IBM Cloud Foundry

Cloud Foundry is the premier industry standard Platform-as-a-Service (PaaS) that ensures fast, easy, and reliable deployment of cloud-native apps. Cloud Foundry ensures that the build and deploy aspects of coding remain carefully coordinated with any attached services — resulting in quick, consistent and reliable iterating of applications. Cloud Foundry has a Lite plan that allows quick deployments for testing purposes.

Before you begin

- If your account doesn't have a Cloud Foundry org, you must create one. Create org.

Steps

1. Select the number of instances, memory allocation, **region**, **org**, and **space.**
2. Select the **domain** and provide a **host** name.

Fig. 2.6 Cloud Foundry! / student M.Y. 1.10. 2020

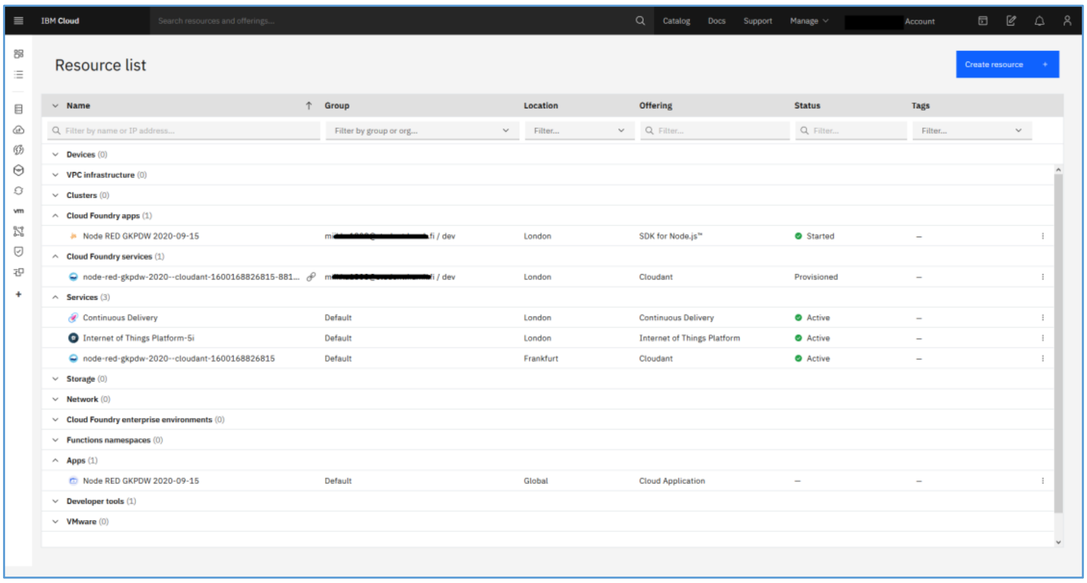
Select the Cloud Foundry!

Create a new API key. Copy your API key in a text file. Save it!!

The fields are filled with default values as seen on the picture. Select the same region as earlier.

Click Next. And wait….. for a long time….. you will see " in progress " or similar message.

Finally it will be in your Resource list.



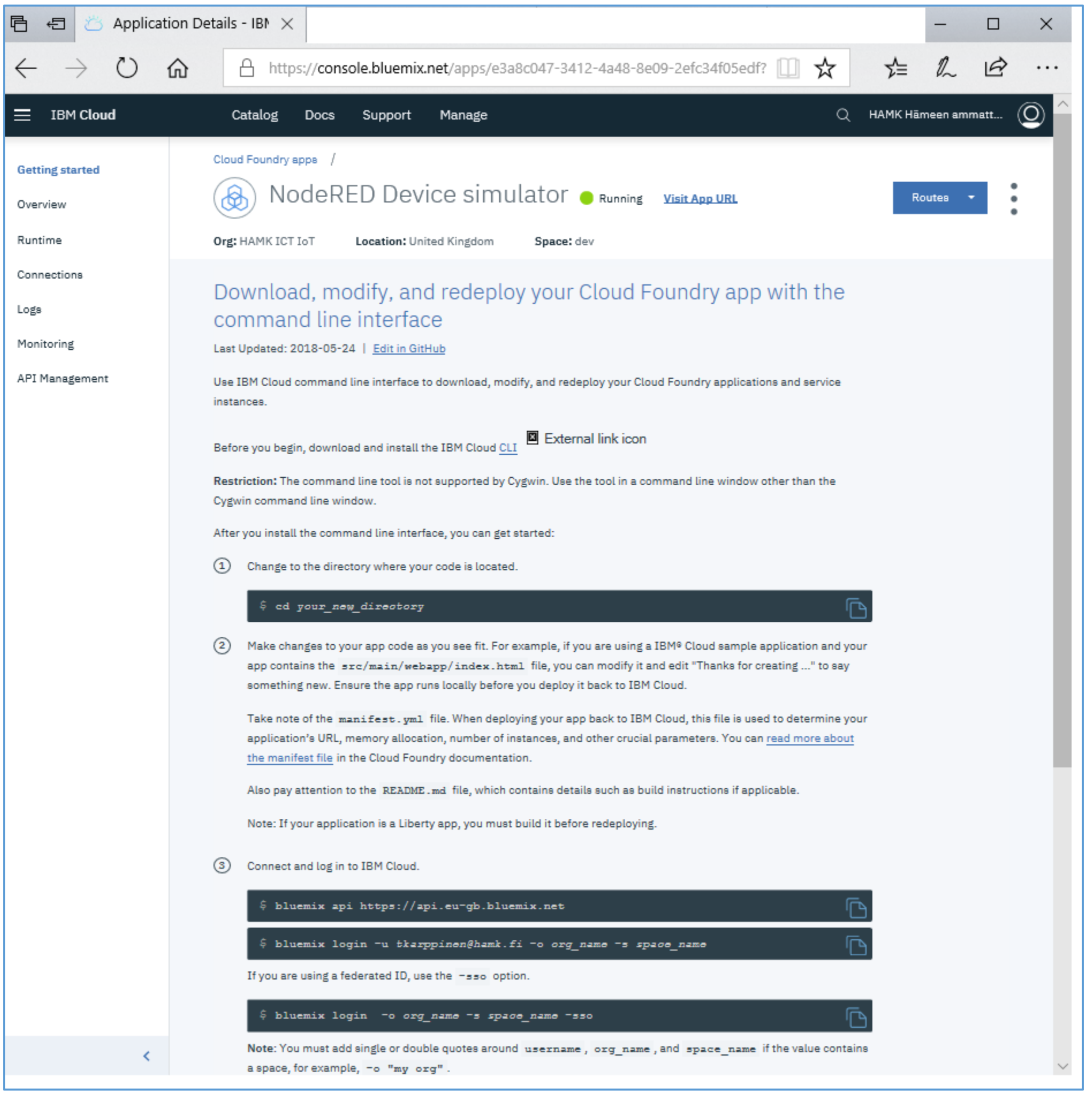
Resource list

Name	Group	Location	Offering	Status	Tags
Devices (0)					
VPC infrastructure (0)					
Clusters (0)					
Cloud Foundry apps (1)					
Node RED GKPDW 2020-09-15	mi[redacted].fi / dev	London	SDK for Node.js™	Started	–
Cloud Foundry services (1)					
node-red-gkpdw-2020--cloudant-1600168826815-881…	m[redacted]fi / dev	London	Cloudant	Provisioned	–
Services (3)					
Continuous Delivery	Default	London	Continuous Delivery	Active	–
Internet of Things Platform-5i	Default	London	Internet of Things Platform	Active	–
node-red-gkpdw-2020--cloudant-1600168826815	Default	Frankfurt	Cloudant	Active	–
Storage (0)					
Network (0)					
Cloud Foundry enterprise environments (0)					
Functions namespaces (0)					
Apps (1)					
Node RED GKPDW 2020-09-15	Default	Global	Cloud Application	–	–
Developer tools (1)					
VMware (0)					

Fig. 2.7 The Node-RED application with it's resources in the IBM Cloud Resource list. / student M.Y. 1.10. 2020

Now you can select the Cloud Foundry apps, Node RED …. and start it if it is not started.

When the ”starting” changes finally to “Running” the installation is ready. This can take several minutes!



NodeRED Device simulator ● Running Visit App URL

Org: HAMK ICT IoT **Location:** United Kingdom **Space:** dev

Download, modify, and redeploy your Cloud Foundry app with the command line interface

Last Updated: 2018-05-24 | Edit in GitHub

Use IBM Cloud command line interface to download, modify, and redeploy your Cloud Foundry applications and service instances.

Before you begin, download and install the IBM Cloud CLI ☒ External link icon

Restriction: The command line tool is not supported by Cygwin. Use the tool in a command line window other than the Cygwin command line window.

After you install the command line interface, you can get started:

1. Change to the directory where your code is located.

```
$ cd your_new_directory
```

2. Make changes to your app code as you see fit. For example, if you are using a IBM® Cloud sample application and your app contains the `src/main/webapp/index.html` file, you can modify it and edit "Thanks for creating ..." to say something new. Ensure the app runs locally before you deploy it back to IBM Cloud.

   Take note of the `manifest.yml` file. When deploying your app back to IBM Cloud, this file is used to determine your application's URL, memory allocation, number of instances, and other crucial parameters. You can read more about the manifest file in the Cloud Foundry documentation.

   Also pay attention to the `README.md` file, which contains details such as build instructions if applicable.

   Note: If your application is a Liberty app, you must build it before redeploying.

3. Connect and log in to IBM Cloud.

```
$ bluemix api https://api.eu-gb.bluemix.net
```

```
$ bluemix login -u tkarppinen@hamk.fi -o org_name -s space_name
```

If you are using a federated ID, use the `-sso` option.

```
$ bluemix login  -o org_name -s space_name -sso
```

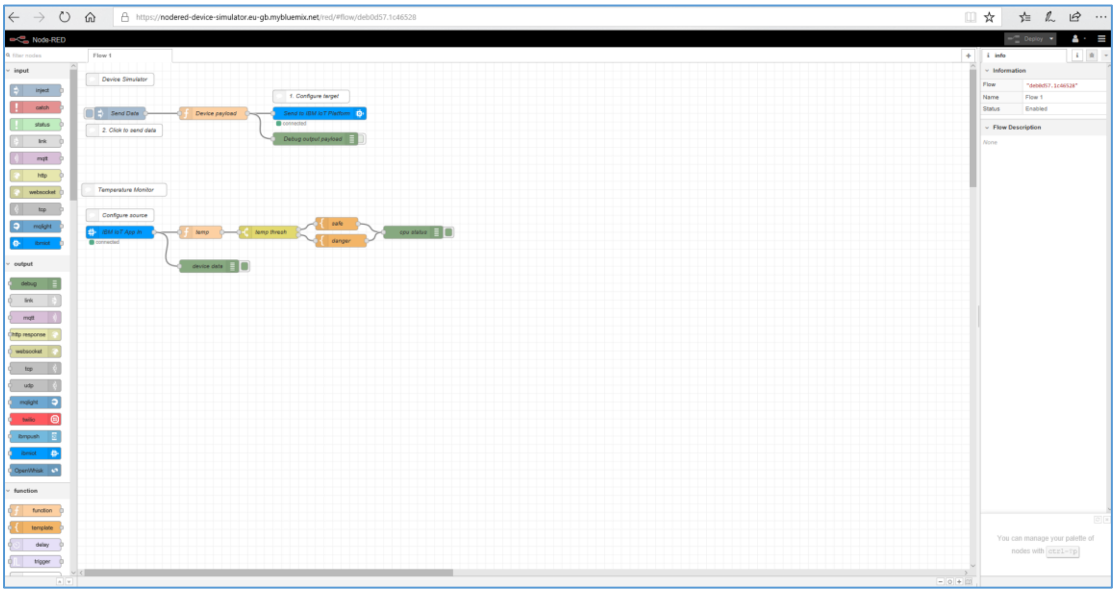
Note: You must add single or double quotes around `username`, `org_name`, and `space_name` if the value contains a space, for example, `-o "my org"`.

Fig. 2.8 Your own NodeRED environment has just been created.. / 2019

Click with the mouse right button ”Visit App URL” tai ”Routes”.

By clicking you will open a Node-RED editor. That looks like the red coloured Node-RED environment. For the editor you need to create a user name and a pass word.

You might end up to a ready to use Node-RED editor page.



Flow "deb0d57.1c46528"
Name Flow 1
Status Enabled
None

Fig. 2.9 NodeRED flow editor. / 2019

Or the page could be almost empty with just two nodes. (1.10.2020) .

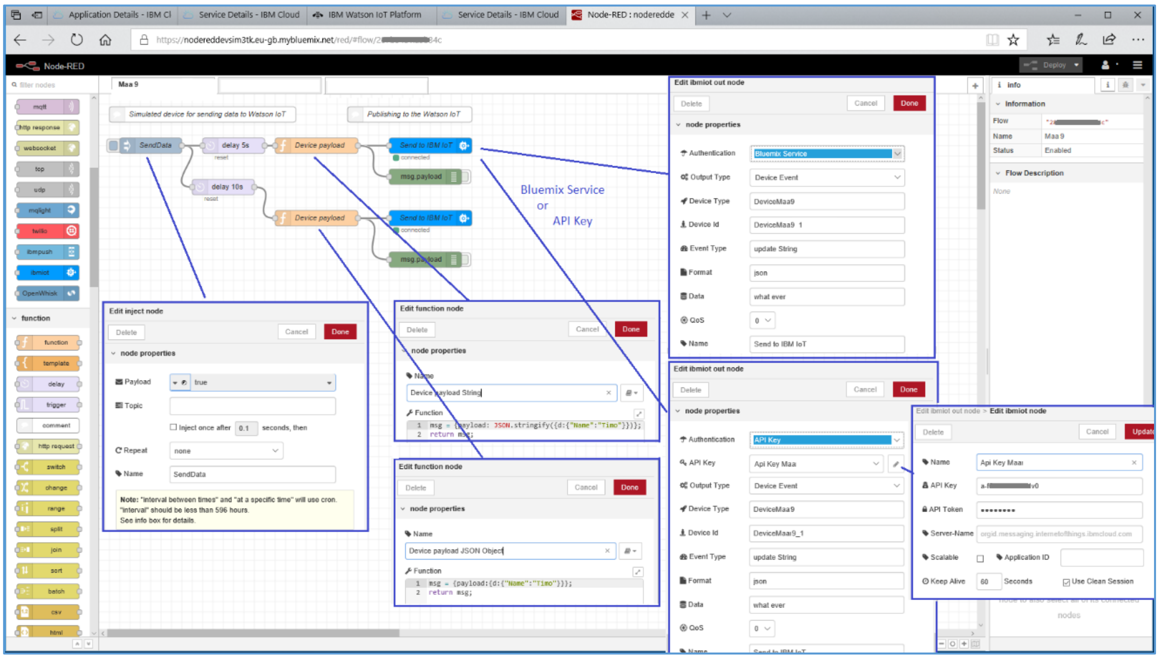
When making changes to this so called flow editor you need to press the “Deploy” in the top right corner to get these changes updated.

The type of each node can be recognised by the colour and symbol. The name text is often rewritten.

The messages from the Debug nodes will be visible after you click the bug image “debug” on the top right corner.

You might have an empty flow page if you did not create the Node-RED environment by installing the “Internet of Things Platform Starter”. If this is what happened that is no problem. You can still create the same functions by creating a Node-RED flow page. Import the same nodes. Populate the nodes with the same content as seen in the next picture.

You can as well complete the flow from “Internet of Things Platform Starter” to have exactly the same nodes with the similar content.



https://nodereddevsim3tk.eu-gb.mybluemix.net/red/#flow/2[redacted]84c

Maa 9

Simulated device for sending data to Watson IoT

Publishing to the Watson IoT

Edit inject node

node properties

Payload: true

Topic:

☐ Inject once after 0.1 seconds, then

Repeat: none

Name: SendData

Note: "interval between times" and "at a specific time" will use cron. "interval" should be less than 596 hours. See info box for details.

Edit function node

node properties

Name: Device payload String

Function:

```
msg = {payload: JSON.stringify({d:{"Name":"Timo"}})};
return msg;
```

Edit function node

node properties

Name: Device payload JSON Object

Function:

```
msg = {payload:{d:{"Name":"Timo"}}};
return msg;
```

Edit ibmiot out node

node properties

Authentication: Bluemix Service

Output Type: Device Event

Device Type: DeviceMaa9

Device Id: DeviceMaa9 1

Event Type: update String

Format: json

Data: what ever

QoS: 0

Name: Send to IBM IoT

Edit ibmiot out node

node properties

Authentication: API Key

API Key: Api Key Maa

Output Type: Device Event

Device Type: DeviceMaa9

Device Id: DeviceMaa9_1

Event Type: update String

Format: json

Data: what ever

QoS: 0

Edit ibmiot out node > Edit ibmiot node

Name: Api Key Maa

API Key: a-[redacted]v0

API Token: ••••••••

Server-Name: orgid.messaging.internetofthings.ibmcloud.com

Scalable ☐ Application ID

Keep Alive 60 Seconds ☑ Use Clean Session

Information

Flow: "2[redacted]c"

Name: Maa 9

Status: Enabled

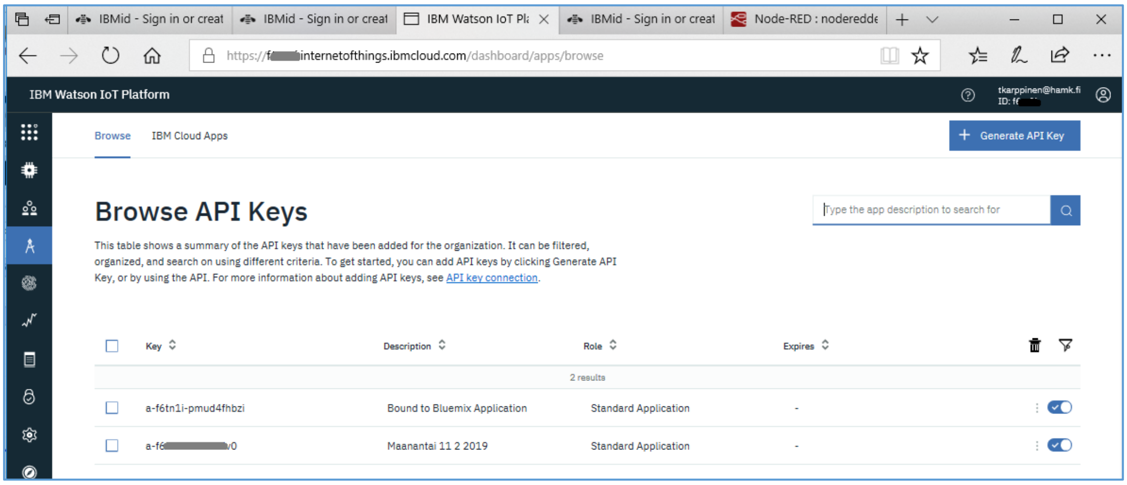
Flow Description: None

Fig. 2.10 Flow with the nodes and the node parameters.

There is a reason for sending the message payload both as string and as object to the Watson IoT mqtt broker.

In the node Send to IBM IoT you have as Authentication obtions Quick Start and API Key. With my user rights it was possible to select Bluemix Service as seen on the picture.

In the node Send to IBM IoT there are parameters Device Type, Device Id, API Key and API Token. The same Device Type, Device Id, API Key and API Token needs to be defined similarly at the Watson IoT platform where the node would be connecting to.



https://f[redacted]internetofthings.ibmcloud.com/dashboard/apps/browse

IBM Watson IoT Platform

tkarppinen@hamk.fi
ID: f[redacted]

Browse API Keys

This table shows a summary of the API keys that have been added for the organization. It can be filtered, organized, and search on using different criteria. To get started, you can add API keys by clicking Generate API Key, or by using the API. For more information about adding API keys, see API key connection.

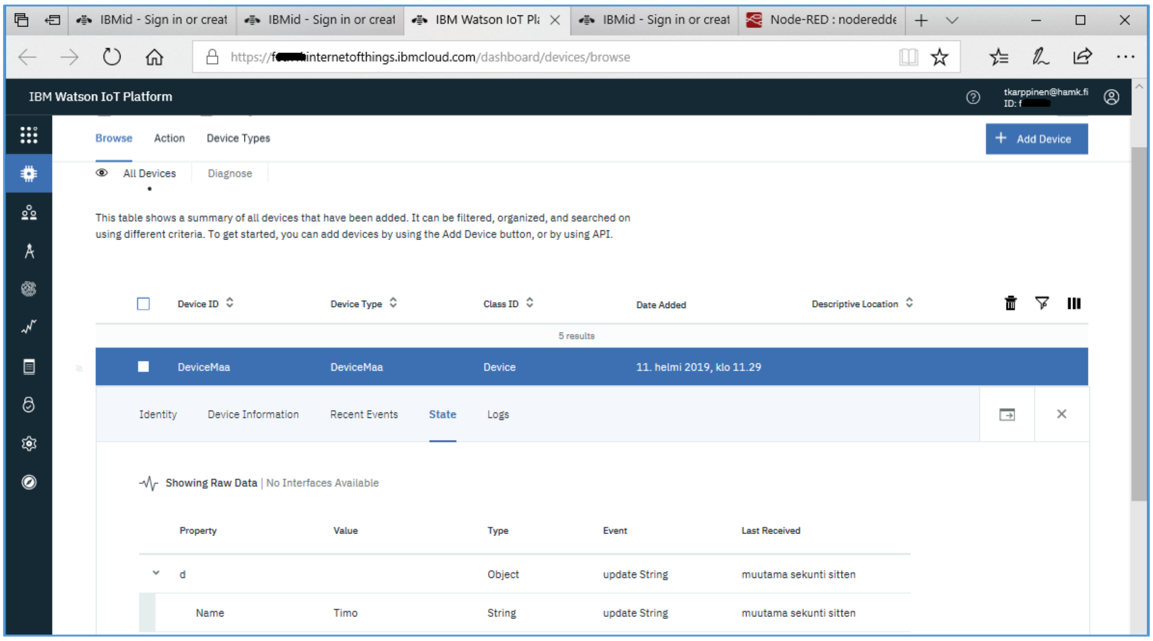
Type the app description to search for

2 results

Key	Description	Role	Expires
a-f6tn1i-pmud4fhbzi	Bound to Bluemix Application	Standard Application	-
a-f6[redacted]v0	Maanantai 11 2 2019	Standard Application	-

Fig. 2.11 API Key

For the API Key you can select the Standard Application. Please remember to save your new Token. Later you will not be able to get it visible in the page Browse API keys.



This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Device ID	Device Type	Class ID	Date Added	Descriptive Location
DeviceMaa	DeviceMaa	Device	11. helmi 2019, klo 11.29	

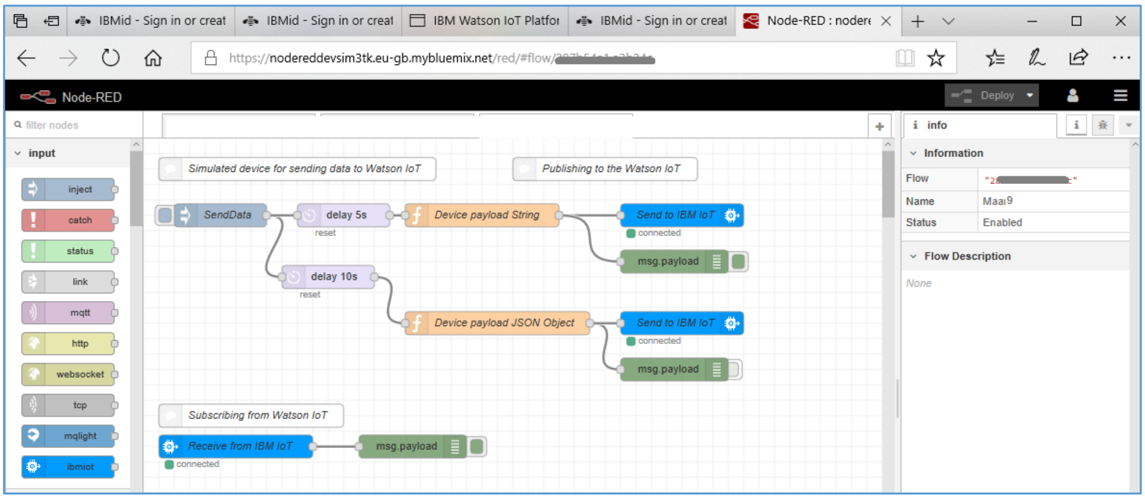
5 results

	Property	Value	Type	Event	Last Received
˅	d		Object	update String	muutama sekunti sitten
	Name	Timo	String	update String	muutama sekunti sitten

Fig. 2.12 The content of the message from the Node-RED flow visible on IoT platform.

The message and the message payload sent on the Node-RED flow will be visible on the Watson IoT platform page. In this document there is later an instruction how to create the necessary new device in the Watson IoT platform.

In the same flow editor we can still create a node which will register as a subscriber to the mqtt broker in the Watson IoT and will read the mqtt messages.



Flow	"2[redacted]"
Name	Maa9
Status	Enabled

Flow Description

None

Fig. 2.13 IBM IoT Subscriber.

Please import an ibmiot node from the input group. Similar parameters will be written as was earlier written for the ibmiot node imported from the output group.

Note 1 on year 2020 !

YOU PROBABLY DID NOT GET THE **IBM IOT** NODES IN THE NODE MENU ON THE LEFT ON YOUR NodeRED – the bright blue nodes in the picture above! We will correct the situation according to instructions published by IBM. This way we will save the available memory resource for the application.

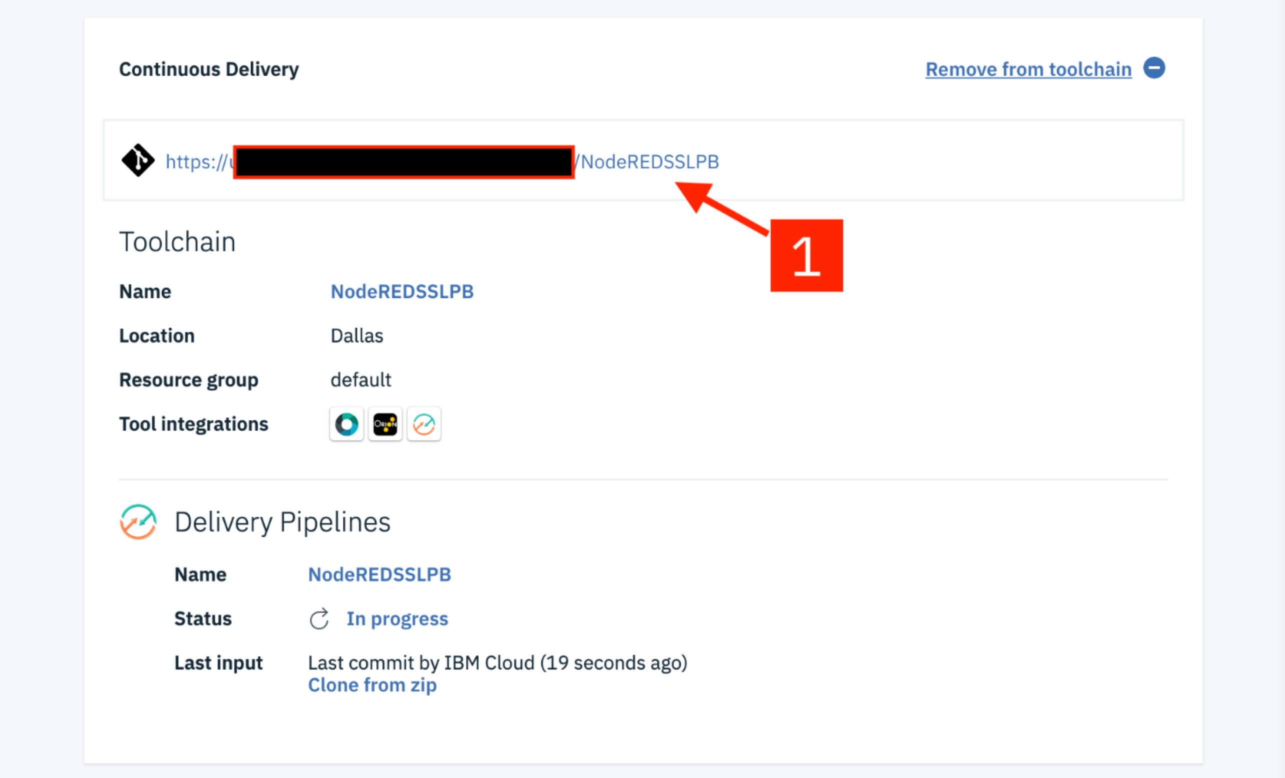
Add extra nodes to your Node-RED palette

Node-RED provides the palette manager feature that allows you to install additional nodes directly from the browser-based editor. This is convenient for trying nodes out, but it can cause issues due to the limited memory of the default Node-RED starter application.

The recommended approach is to edit your application's package.json file to include the additional node modules and then redeploy the application.

This step shows how to do that in order to add the node-red-dashboard module and node-red-contrib-scx-ibmiotapp.

1. On your application's details page, click the url in the **Continuous Delivery** box. This will take you to a git repository where you can edit the application source code from your browser.



Continuous Delivery

https://[redacted]/NodeREDSSLPB

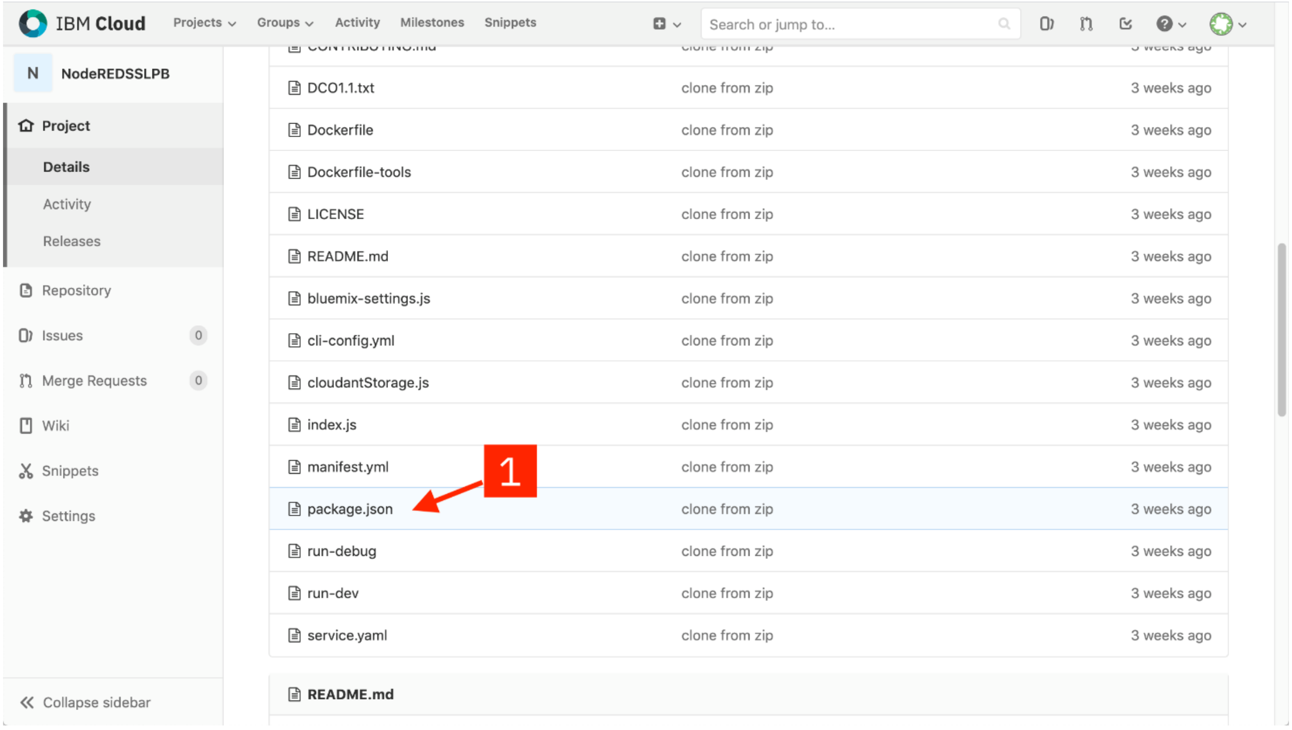
Toolchain

Name	NodeREDSSLPB
Location	Dallas
Resource group	default
Tool integrations	

Delivery Pipelines

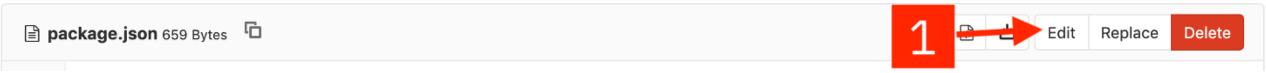
Name	NodeREDSSLPB
Status	In progress
Last input	Last commit by IBM Cloud (19 seconds ago) Clone from zip

2. Scroll down the list of files and click on `package.json`. This file lists the module dependencies of your application.



DCO1.1.txt	clone from zip	3 weeks ago
Dockerfile	clone from zip	3 weeks ago
Dockerfile-tools	clone from zip	3 weeks ago
LICENSE	clone from zip	3 weeks ago
README.md	clone from zip	3 weeks ago
bluemix-settings.js	clone from zip	3 weeks ago
cli-config.yml	clone from zip	3 weeks ago
cloudantStorage.js	clone from zip	3 weeks ago
index.js	clone from zip	3 weeks ago
manifest.yml	clone from zip	3 weeks ago
package.json	clone from zip	3 weeks ago
run-debug	clone from zip	3 weeks ago
run-dev	clone from zip	3 weeks ago
service.yaml	clone from zip	3 weeks ago

3. Click the `Edit` button

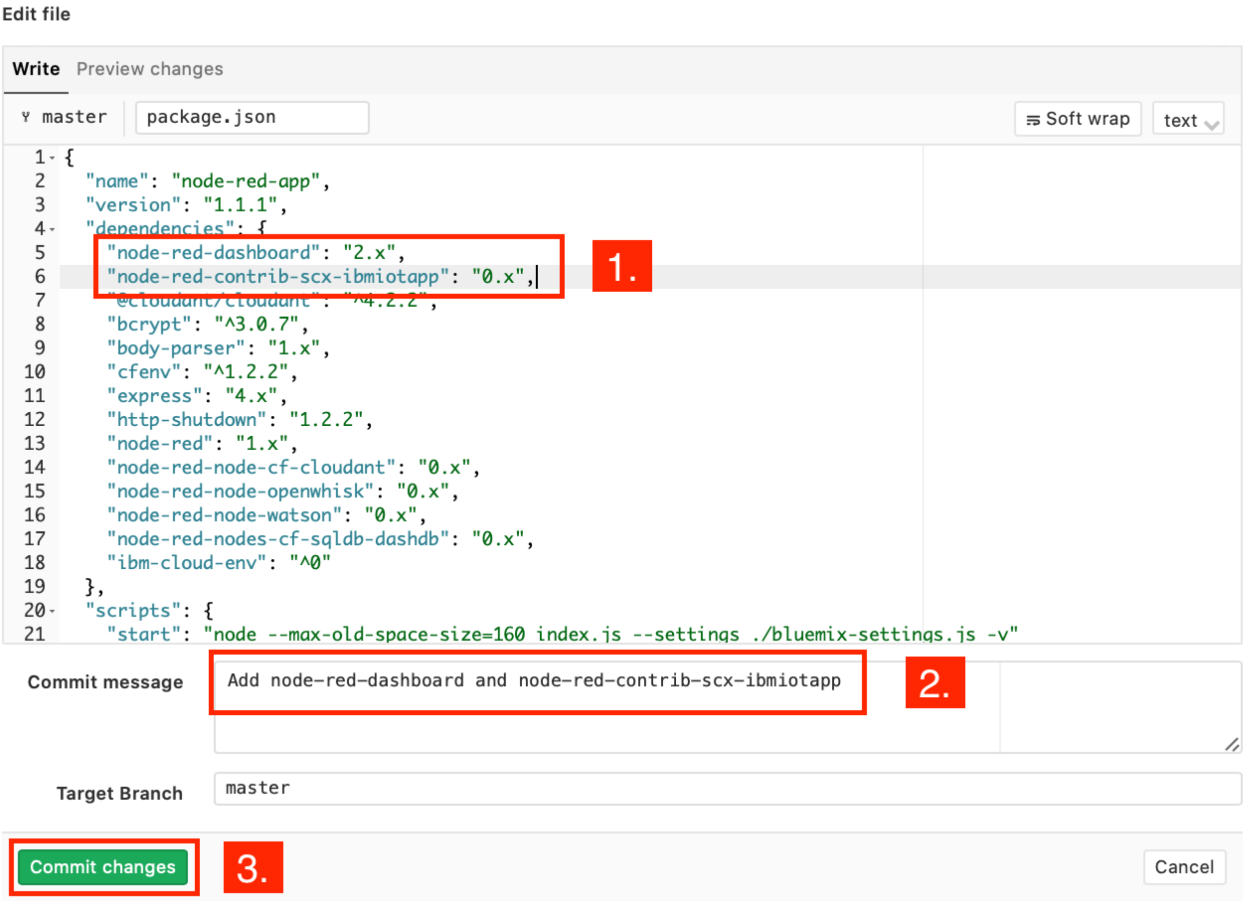


4. Add the following entry to the top of the dependencies section (1):

```
"node-red-dashboard": "2.x",
"node-red-contrib-scx-ibmiotapp": "0.x",
```

Note: Do not forget the comma (,) at the end of the line to separate it from the next entry.

Add a **Commit message** (2) and click `Commit changes` (3)

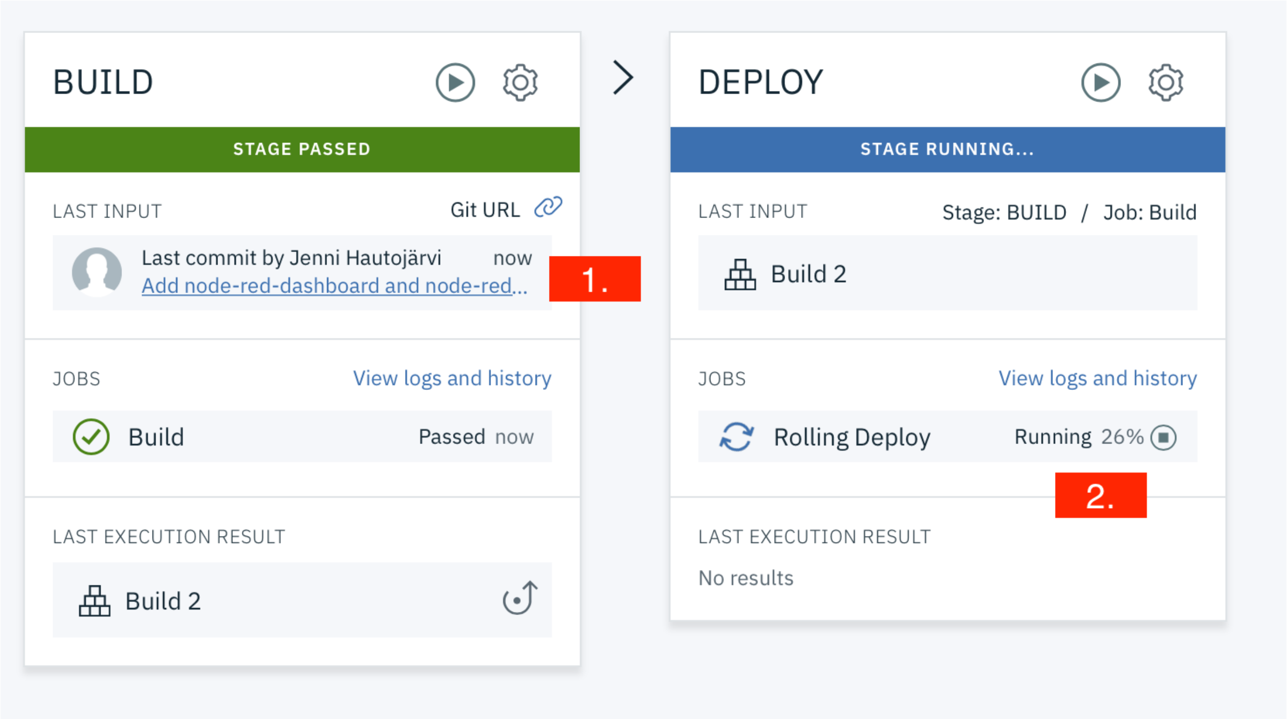


```
{
  "name": "node-red-app",
  "version": "1.1.1",
  "dependencies": {
    "node-red-dashboard": "2.x",
    "node-red-contrib-scx-ibmiotapp": "0.x",
    "@cloudant/cloudant": "^4.2.2",
    "bcrypt": "^3.0.7",
    "body-parser": "1.x",
    "cfenv": "^1.2.2",
    "express": "4.x",
    "http-shutdown": "1.2.2",
    "node-red": "1.x",
    "node-red-node-cf-cloudant": "0.x",
    "node-red-node-openwhisk": "0.x",
    "node-red-node-watson": "0.x",
    "node-red-nodes-cf-sqldb-dashdb": "0.x",
    "ibm-cloud-env": "^0"
  },
  "scripts": {
    "start": "node --max-old-space-size=160 index.js --settings ./bluemix-settings.js -v"
```

Commit message: Add node-red-dashboard and node-red-contrib-scx-ibmiotapp

Target Branch: master

5. At this point, the Continuous Delivery pipeline will automatically run to build and deploy that change into your application. If you view the Delivery Pipeline you can watch its progress. The Build section shows you the last commit made (1) and the Deploy section shows the progress of redeploying the application (2).



BUILD

STAGE PASSED

LAST INPUT Git URL

Last commit by Jenni Hautojärvi now
Add node-red-dashboard and node-red...

JOBS View logs and history

Build Passed now

LAST EXECUTION RESULT

Build 2

DEPLOY

STAGE RUNNING...

LAST INPUT Stage: BUILD / Job: Build

Build 2

JOBS View logs and history

Rolling Deploy Running 26%

LAST EXECUTION RESULT

No results

6. Once the Deploy stage completes, your application will have restarted and now have the node-red-dashboard nodes preinstalled.

If the nodes are not showing in Node-red. Refresh browser. You might need to login to your application.

End of NOTE 1 ! / IBM Cloud 2020

Assignment ”Commissioning 1”

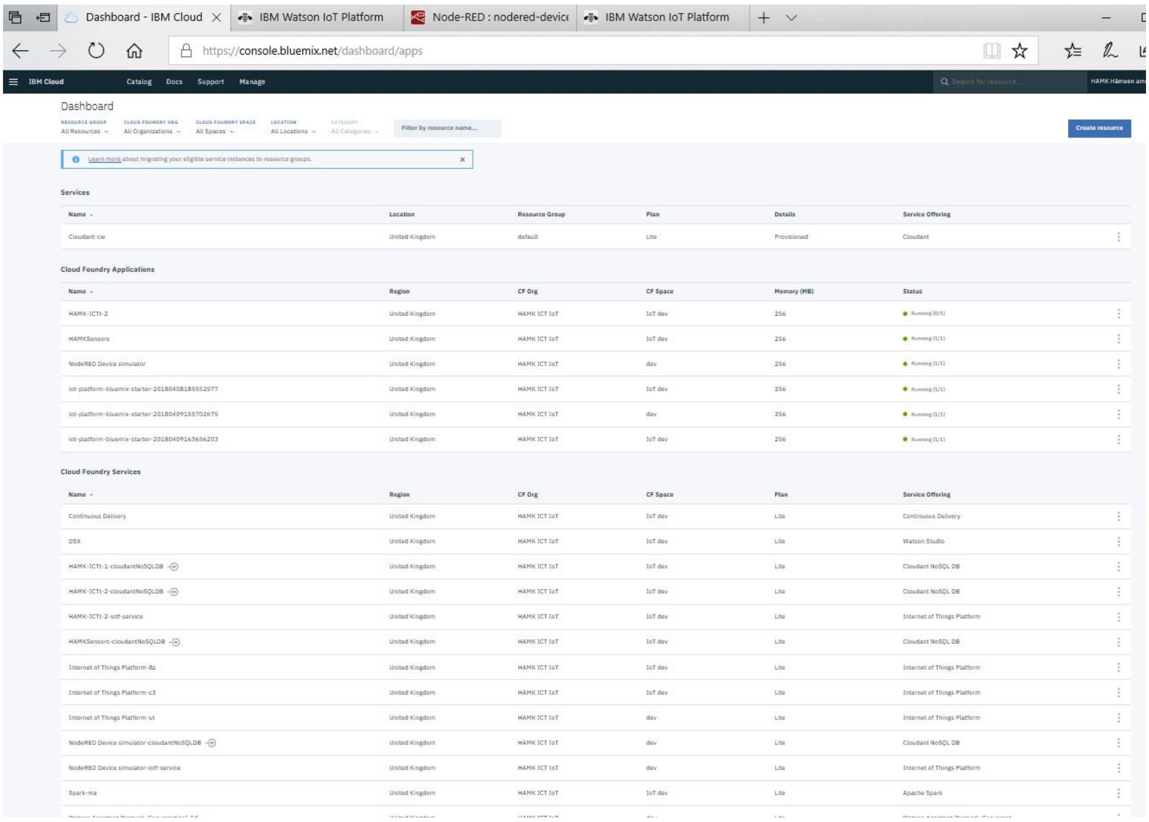
Test the operation! Which one of the messages – JSON object or JSON string – will correctly authenticate in the IBM Watson IoT and will publish the payload?

Finally – please save for yourself the address for your Node-RED flow. For example:

https://nodered-device-simulator.eu-gb.mybluemix.net/red/#flow/deb0d57.1c46528

Later you can access this flow editor page. But of course the access will be possible with correct user name and pass word only.

You have created a new service in the IBM Cloud platform. You will see the service instance by selecting the “three lines” in the top left corner of the IBM Cloud Dashboard page.



Learn more about migrating your eligible service instances to resource groups.

Services

Name	Location	Resource Group	Plan	Details	Service Offering
Cloudant-cw	United Kingdom	default	Lite	Provisioned	Cloudant

Cloud Foundry Applications

Name	Region	CF Org	CF Space	Memory (MB)	Status
HAMK-ICTt-2	United Kingdom	HAMK ICT IoT	IoT dev	256	● Running (0/1)
HAMKSensors	United Kingdom	HAMK ICT IoT	IoT dev	256	● Running (1/1)
NodeRED Device simulator	United Kingdom	HAMK ICT IoT	dev	256	● Running (1/1)
iot-platform-bluemix-starter-20180408185552577	United Kingdom	HAMK ICT IoT	IoT dev	256	● Running (1/1)
iot-platform-bluemix-starter-20180409155702675	United Kingdom	HAMK ICT IoT	dev	256	● Running (1/1)
iot-platform-bluemix-starter-20180409163656203	United Kingdom	HAMK ICT IoT	IoT dev	256	● Running (1/1)

Cloud Foundry Services

Name	Region	CF Org	CF Space	Plan	Service Offering
Continuous Delivery	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Continuous Delivery
DSX	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Watson Studio
HAMK-ICTt-1-cloudantNoSQLDB	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Cloudant NoSQL DB
HAMK-ICTt-2-cloudantNoSQLDB	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Cloudant NoSQL DB
HAMK-ICTt-2-iotf-service	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Internet of Things Platform
HAMKSensors-cloudantNoSQLDB	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Cloudant NoSQL DB
Internet of Things Platform-8z	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Internet of Things Platform
Internet of Things Platform-c3	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Internet of Things Platform
Internet of Things Platform-ut	United Kingdom	HAMK ICT IoT	dev	Lite	Internet of Things Platform
NodeRED Device simulator-cloudantNoSQLDB	United Kingdom	HAMK ICT IoT	dev	Lite	Cloudant NoSQL DB
NodeRED Device simulator-iotf-service	United Kingdom	HAMK ICT IoT	dev	Lite	Internet of Things Platform
Spark-ma	United Kingdom	HAMK ICT IoT	IoT dev	Lite	Apache Spark

Fig 2.14 Console Dashboard.

You will recognise the service from the name you gave to it earlier in this commissioning task.

Assignment ”Commissioning 2”

If you created the Node-RED environment example by installing the “Internet of Things Platform Starter” you got as an example a room thermostat application. If you did not start from the “Internet of Things Platform Starter” you can still get the same function by importing a function node and filling it with the following java script code:

```
// Microcontrollers with sensors:
var area = ["Greenhouse1","Greenhouse2","Greenhouse3"];
// Array of pseudo random temperatures
var temp1 = [15,17,17.5,20,21.5,23,24,22.2,19,17];

// Array of pseudo random relative humidities
var humidity1 = [50,55,61,68,65,60,53,49,45,47];

// Counter to select from array.
var counter2 = context.get('counter2')||0;
counter2 = counter2+1;
if(counter2 > 2) counter2 = 0;
context.set('counter2',counter2);

// Counter to select from array.
var counter1 = context.get('counter1')||0;
counter1 = counter1+1;
if(counter1 > 9) counter1 = 0;
context.set('counter1',counter1);
```

```
// Create MQTT message in JSON
msg = {
  payload: JSON.stringify(
    {
      d:{
        "Area":area[counter2],
        "Temp" : temp1[counter1],
        "Humidity" : humidity1[counter1],
      }
    }
  )
};
return msg;
```

Please make to following changes in the application.

- Make the Send Data to send a new measurement value every two minutes.
- make some changes in the node **Device payload String** in the function written in javascript. The function is creating measurement values by selecting a value from a table.

Please add in an **ibmiot** type node - which is seen as the **Receive from IBM iot** node in the flow in the pictures above - a function for receiving the messages:

> return {payload:{"msgArea":msg.payload.d.Area,"msgTemp":msg.payload.d.Temp,"msgHum":msg.payload.d.Humidity}};

and after that an other **function** type node with a function:

```
var farea = msg.payload.msgArea;
var ftemp = msg.payload.msgTemp;
var fhum = msg.payload.msgHum;
var trigger = [false,false];
var msgOut = ["",""];

if (farea == "Greenhouse1"&&ftemp > 20)
{
    trigger[0] = true;
}
msgOut[0] = {payload:{"trcommand":trigger[0]}};

if (farea == "Greenhouse2"&&ftemp > 21)
{
    trigger[1] = true;
}
msgOut[1] = {payload:{"trcommand":trigger[1]}};

   return msgOut;
```

The flow can look like following:

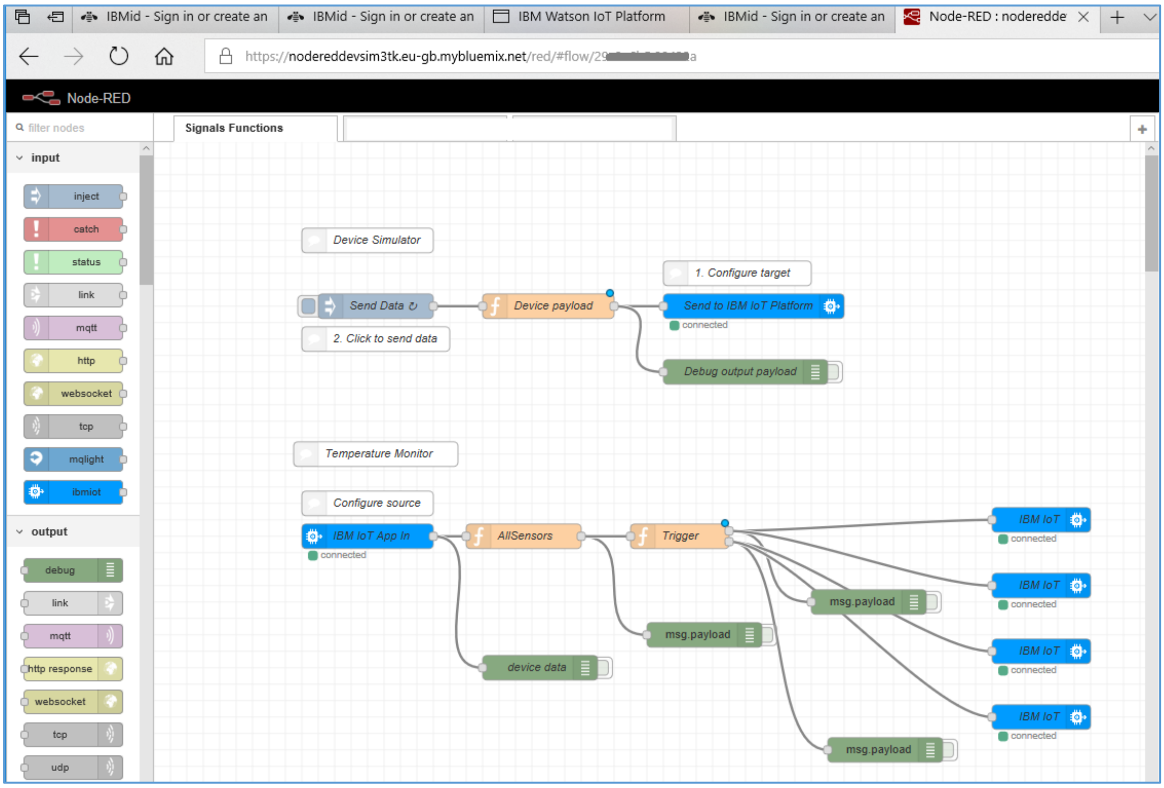


Fig. 2.15 Modified flow.

3. A device created in the Watson IoT platform

We can create a device in the Watson IoT platform to correspond the device simulated in the Node-RED flow.

Please look at the subtitle Cloud Foundry Services. You will see there the new

- Cloudant NoSQL DB
- Internet of Things Platform

You can again recognise those form the name you gave earlier.

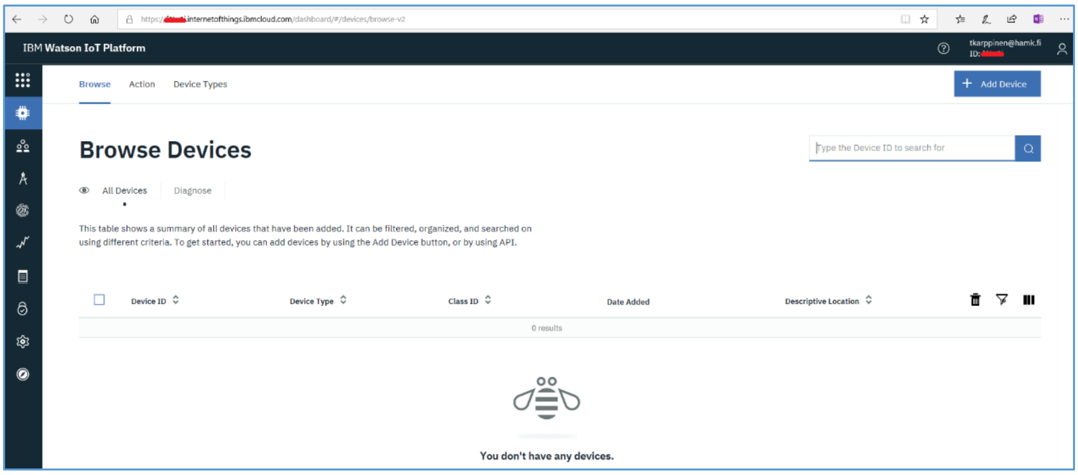
The database includes the NodeRED flow. The Internet of Things Platform is still an empty platform. Or if you added the NodeRED into IoT platforms from the earlier exercises you might have there already some device definitions.

Click the correct IoT platform. In the opening page please select Launch.

You will get an empty view or you might get a view with devices from earlier exercises.

Click the name of your IoT Platform. In the next page select the Launch.

You might get an empty view of devices or you might get a list of devices from earlier exercises.



https://[redacted].internetofthings.ibmcloud.com/dashboard/#/devices/browse-v2

IBM Watson IoT Platform

tkarppinen@hamk.fi
ID: [redacted]

Browse Devices

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Device ID	Device Type	Class ID	Date Added	Descriptive Location

0 results

You don't have any devices.

Fig 3.1 Device view. Overwriten with red the ”Organization ID”.

Please write down or copy with copy paste the organization ID. In the picture this is overwritten with red colour.

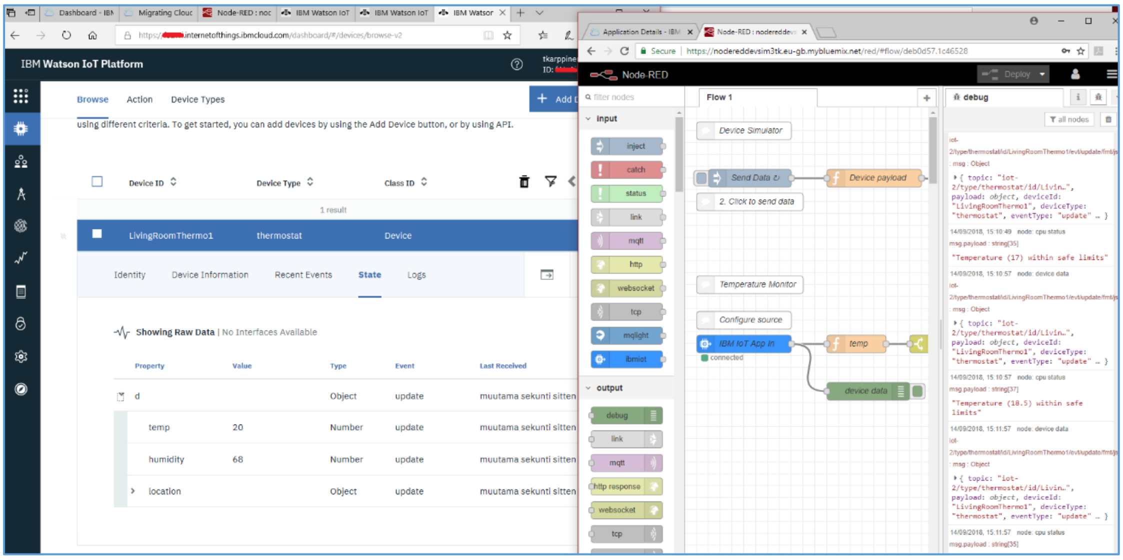
Please create a new device with Add Device. Fill in the Device Type and Device ID fields exactly with the same text as in the Node-RED example.

Device Type xxxxxxxxxxxxxxx

Device ID xxxxxxxxxxxxxxx_1

Continue with Next. You can leave the Device Information page as it is. Continue with Next. Let the Authentication Token be created automatically. Continue with Next and further with Done. Please write down in a text file the device information and the Authentication Token.

Return to device view. Click the row of your device.



https://[redacted].internetofthings.ibmcloud.com/dashboard/#/devices/browse-v2

IBM Watson IoT Platform

tkarppine
ID: [redacted]

using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Device ID	Device Type	Class ID
LivingRoomThermo1	thermostat	Device

1 result

Showing Raw Data | No Interfaces Available

Property	Value	Type	Event	Last Received
d		Object	update	muutama sekunti sitten
temp	20	Number	update	muutama sekunti sitten
humidity	68	Number	update	muutama sekunti sitten
location		Object	update	muutama sekunti sitten

https://nodereddevsim3tk.eu-gb.mybluemix.net/red/#flow/deb0d57.1c46528

```
iot-2/type/thermostat/id/LivingRoomThermo1/evt/update/fmt/js
: msg : Object
▸{ topic: "iot-2/type/thermostat/id/Livin…", payload: object, deviceId: "LivingRoomThermo1", deviceType: "thermostat", eventType: "update" … }
14/09/2018, 15:10:49  node: cpu status
msg.payload : string[35]
"Temperature (17) within safe limits"
14/09/2018, 15:10:57  node: device data
iot-2/type/thermostat/id/LivingRoomThermo1/evt/update/fmt/js
: msg : Object
▸{ topic: "iot-2/type/thermostat/id/Livin…", payload: object, deviceId: "LivingRoomThermo1", deviceType: "thermostat", eventType: "update" … }
14/09/2018, 15:10:57  node: cpu status
msg.payload : string[37]
"Temperature (18.5) within safe limits"
14/09/2018, 15:11:57  node: device data
iot-2/type/thermostat/id/LivingRoomThermo1/evt/update/fmt/js
: msg : Object
▸{ topic: "iot-2/type/thermostat/id/Livin…", payload: object, deviceId: "LivingRoomThermo1", deviceType: "thermostat", eventType: "update" … }
14/09/2018, 15:11:57  node: cpu status
msg.payload : string[35]
```

Fig. 3.2   Simulated values are transmitted to IoT platform to the device view.

Assignment ”Exercise 1”

Please change the Node-RED flow:

The application field is traffic counting. The sensor device is an intelligent device with capabilities on image processing. The device can make a difference between cars, cyclists and pedestrians. Every 15 minutes it produces numbers on how many cars, cyclists and pedestrians have passed the observation point.

Every 15 minutes there will be new message with: Location, time, calculated amounts of traffic. The message has a JSON structure. JSON was used in the original example as well.

Please return: Screen capture with changes in the function in the node in the Node-RED flow. Screen capture with variables and values visible at the IoT platform device view.

4. How could you find again your Node-RED flow ?

To be able to continue the development you of course need to ne able to edit again your Node-RED flow.

Please sign in into the **IBM Cloud**. There are a number of ways to find the right site to sign in. You can fore example search with word **IBM Cloud Catalog**. Or you can use the link https://cloud.ibm.com/catalog . And please sign in with your IBM ID.

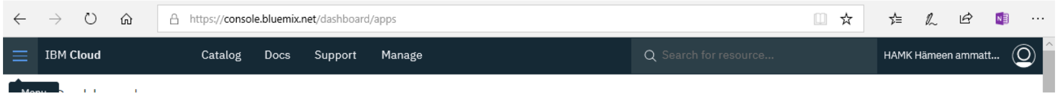


Fig. 4.1 IBM Cloud Menu.

Please click the “**three lines**” visible on the top left corner.

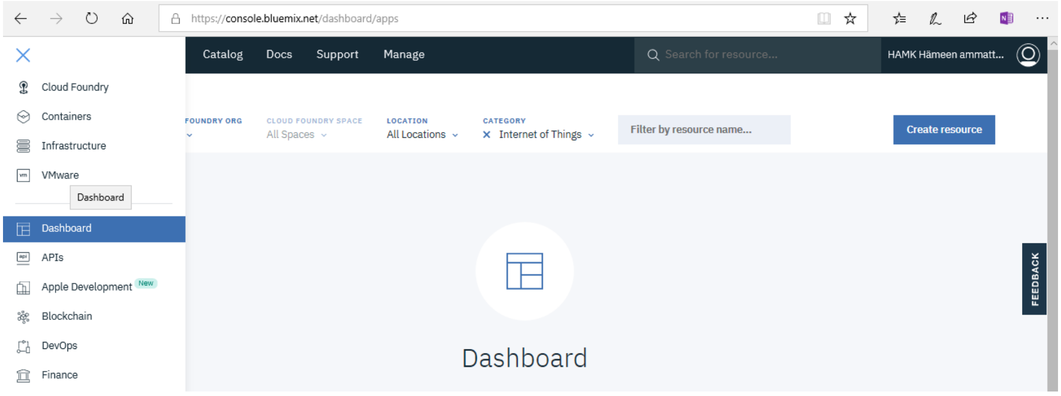
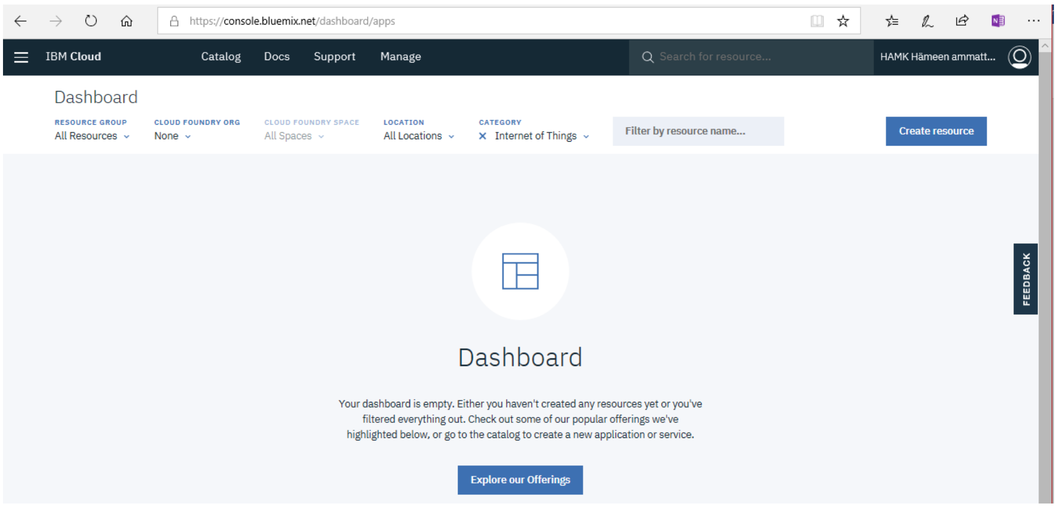


Fig. 4.2 Dashboard

Select the **Dashboard** on the menu on left.



https://console.bluemix.net/dashboard/apps

Dashboard

RESOURCE GROUP: All Resources
CLOUD FOUNDRY ORG: None
CLOUD FOUNDRY SPACE: All Spaces
LOCATION: All Locations
CATEGORY: Internet of Things

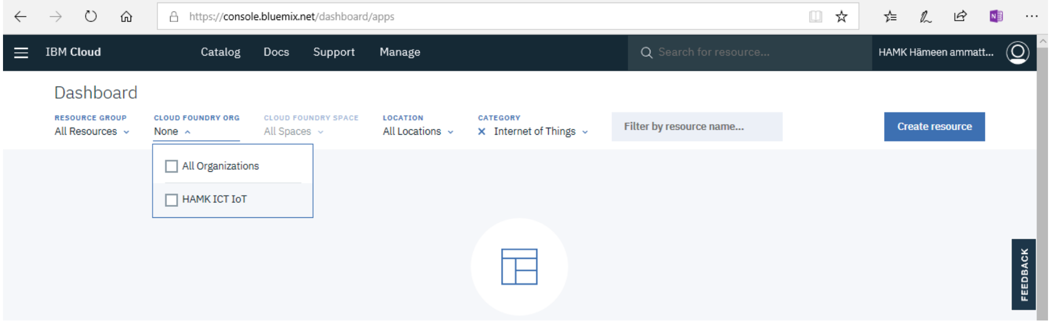
Dashboard

Your dashboard is empty. Either you haven't created any resources yet or you've filtered everything out. Check out some of our popular offerings we've highlighted below, or go to the catalog to create a new application or service.

Fig. 4.3 Dashboard empty

Either yopu will get a full catalog of your development platforms or you might get an empty dashboard page.

If you got an empty dashboard please select on the menu on top the **CLOUD FOUNDRY ORG** and further **the organisation id** where you developed the NodeRED example.



https://console.bluemix.net/dashboard/apps

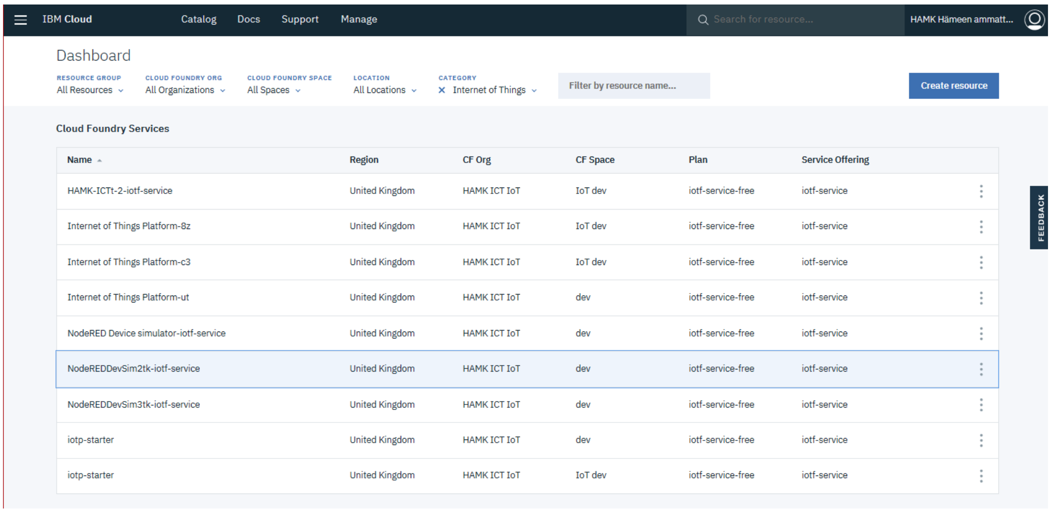
Dashboard

RESOURCE GROUP: All Resources
CLOUD FOUNDRY ORG: None
CLOUD FOUNDRY SPACE: All Spaces
LOCATION: All Locations
CATEGORY: Internet of Things

□ All Organizations
□ HAMK ICT IoT

Fig. 4.4 Organization

Now you should have your instances visible .



Dashboard

RESOURCE GROUP: All Resources
CLOUD FOUNDRY ORG: All Organizations
CLOUD FOUNDRY SPACE: All Spaces
LOCATION: All Locations
CATEGORY: ✕ Internet of Things

Filter by resource name...

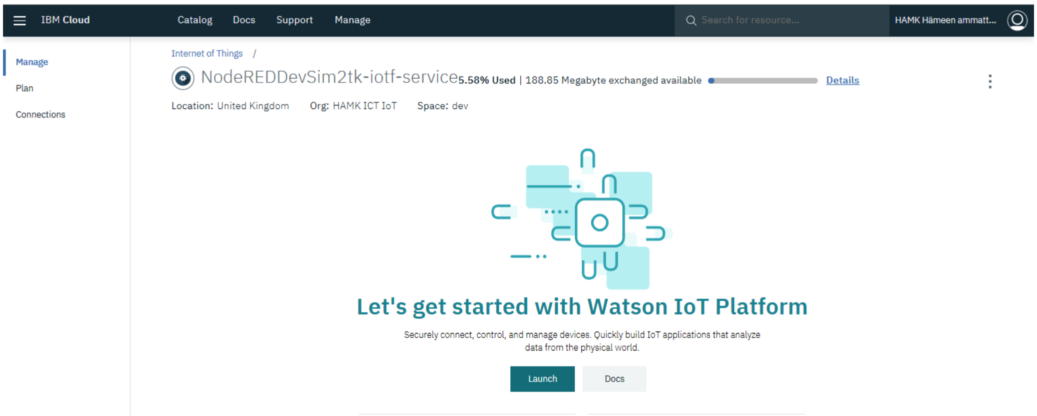
Create resource

Cloud Foundry Services

Name	Region	CF Org	CF Space	Plan	Service Offering
HAMK-ICTt-2-iotf-service	United Kingdom	HAMK ICT IoT	IoT dev	iotf-service-free	iotf-service
Internet of Things Platform-8z	United Kingdom	HAMK ICT IoT	IoT dev	iotf-service-free	iotf-service
Internet of Things Platform-c3	United Kingdom	HAMK ICT IoT	IoT dev	iotf-service-free	iotf-service
Internet of Things Platform-ut	United Kingdom	HAMK ICT IoT	dev	iotf-service-free	iotf-service
NodeRED Device simulator-iotf-service	United Kingdom	HAMK ICT IoT	dev	iotf-service-free	iotf-service
NodeREDDevSim2tk-iotf-service	United Kingdom	HAMK ICT IoT	dev	iotf-service-free	iotf-service
NodeREDDevSim3tk-iotf-service	United Kingdom	HAMK ICT IoT	dev	iotf-service-free	iotf-service
iotp-starter	United Kingdom	HAMK ICT IoT	dev	iotf-service-free	iotf-service
iotp-starter	United Kingdom	HAMK ICT IoT	IoT dev	iotf-service-free	iotf-service

Fig. 4.5 Service instance

You can select the instance from the catalog and continue with **Launch**.



NodeREDDevSim2tk-iotf-service **5.58% Used** | 188.85 Megabyte exchanged available

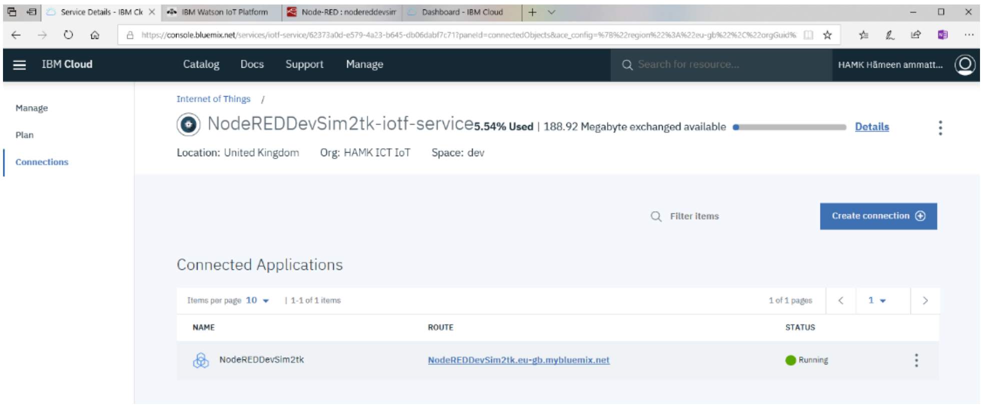
Location: United Kingdom Org: HAMK ICT IoT Space: dev

Let's get started with Watson IoT Platform

Securely connect, control, and manage devices. Quickly build IoT applications that analyze data from the physical world.

Fig. 4.6 The IoT platform is started.

On the subtitle **Connections** you can find your **NodeRED flow**.



https://console.bluemix.net/services/iotf-service/62373a0d-e579-4a23-b645-db06dabf7c71?paneId=connectedObjects&ace_config=%7B%22region%22%3A%22eu-gb%22%2C%22orgGuid%

NodeREDDevSim2tk-iotf-service **5.54% Used** | 188.92 Megabyte exchanged available

Location: United Kingdom Org: HAMK ICT IoT Space: dev

Connected Applications

Items per page 10 | 1-1 of 1 items 1 of 1 pages 1

NAME	ROUTE	STATUS
NodeREDDevSim2tk	NodeREDDevSim2tk.eu-gb.mybluemix.net	Running

Fig. 4.7 NodeRED flow

5. References in the GitHub

Good starting page for Node-RED related topics is

https://github.com/watson-developer-cloud/node-red-labs

There are introductions to different Node-RED nodes – Basic Examples.

https://github.com/watson-developer-cloud/node-red-labs/blob/master/basic_examples/README.md

There are exercises where nodes are combined and applications created – Advanced Labs.

https://github.com/watson-developer-cloud/node-red-labs/blob/master/advanced_examples/README.md

Application examples which you can use as starting point for your own development – Node-RED Starter Kits.

https://github.com/watson-developer-cloud/node-red-labs/blob/master/starter-kits/README.md

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