



ESE516 CLOUD STARTER

Eduardo Garcia
Spring 2022



MQTT Tools

Setting up a mqtt broker

- Go to <http://www.mqtt-dashboard.com/index.html>
- This is a public MQTT broker. You can find the parameters to join on the right. You do not need to do any action at this point – it is just informative!

MQTT connection settings

Host: broker.hivemq.com

TCP Port: 1883

Websocket Port: 8000

MQTT Client

<http://www.hivemq.com/demos/websocket-client/>

You can use this website client to connect to the MQTT server and publish/subscribe to topics. This can be really useful to determine that data is getting to the system.

The screenshot shows the HiveMQ Websockets Client Showcase interface. At the top, there is a header with the HiveMQ logo (a yellow circle with a black bee) and the text "HIVEMQ ENTERPRISE MQTT BROKER" on the left, and "Websockets Client Showcase" on the right. Below the header, the interface is divided into several sections. On the left, there is a "Connection" section with a green dot and the text "connected". Below this is a "Publish" section with a "Topic" input field containing "testtopic/1", a "QoS" dropdown menu set to "0", a "Retain" checkbox, and a "Publish" button. Below the "Publish" section is a "Messages" section with a list of messages. The first message is from "2021-04-19 20:21:51" with the topic "P2_GAME_ESE516_T0" and QoS "1", containing the JSON payload {"game": [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]}. On the right, there is a "Subscriptions" section with a blue "Add New Topic Subscription" button and a list of subscriptions. The first subscription is for the topic "P2_GAME_ESE516..." with QoS "2".

SETUP – IBM NODE RED

IBM CLOUD ACCOUNT

- Go to ibm.com/academic and hit **Register Now** button

Harness the power of IBM. Get easy no-charge access to the tools you need to develop the next great thing. Enjoy powerful technical and strategic resources from IBM. Jump right in with access to powerful services and the most prominent open-source computer technologies, or take advantage of hands-on resources that will teach you about data science, artificial intelligence, security and more.

[Already registered? Log in](#)

[Register now](#)

IBM CLOUD ACCOUNT

- Enter your email and fill the information. You should register for an account

Enter your academic institution issued email to begin

Only the students and faculty of participating academic institutions are eligible to access this website. Please enter your academic institution issued email below to register.

Your academic institution issued email

Find answers in our [frequently asked questions](#)

Submit

IBM CLOUD ACCOUNT

- Enter your email and fill the information. You should register for an account.

Register Below

Complete the information below to register. In addition to the forms below you will need to register for an IBM ID to enroll in the program.

Your University Email : sample-user@rpi.edu

University Name : Rensselaer Polytechnic Institute

Select one

☒ Student

☐ Faculty

Current Degree

Select ▼

Sought Degree

Select ▼

Expected Graduated Date

Select ▼

Select ▼

Department

Select ▼

Please click on the links to read and accept the program agreement and privacy statement

☐ I Agree to the Academic Initiatives Terms of Service

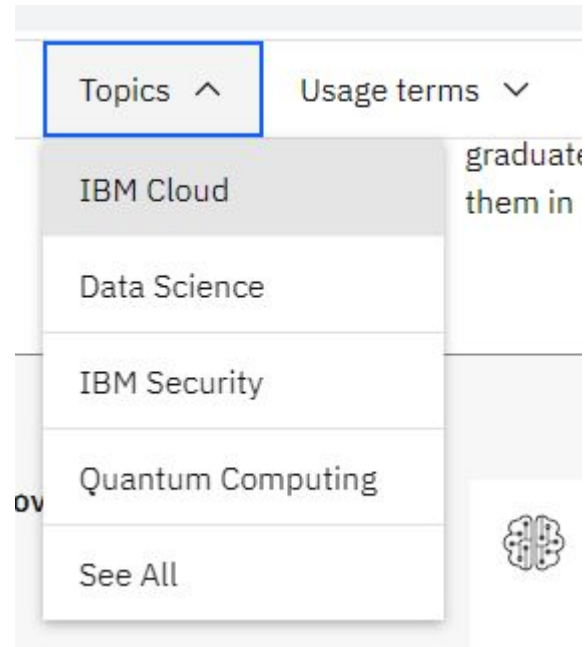
☐ I Agree to the Privacy Consent

IBM CLOUD ACCOUNT

- Once you have an account, go back to www.ibm.com/academic

IBM CLOUD ACCOUNT

- Go to **Topics-> Cloud** on the top toolbar of the webpage



IBM CLOUD ACCOUNT

- Scroll down until you get to the following. Select **Software – IBM Cloud Feature Code**

Courseware

Software

Resources

IBM Cloud Feature Code

Get enhanced access to the IBM Cloud the cloud platform that offers a choice of scalable and flexible resources in one consistent experience. Bringing together APIs and services, IBM Cloud offers a rich and continuously expanding ecosystem of

→

OpenLiberty

A lightweight open framework for building fast and efficient cloud-native Java microservices. Build cloud-native apps and microservices while running only what you need. Open Liberty is the most [...]

→

IBM CLOUD ACCOUNT

- Scroll down until you get to the following. Select **Software – IBM Cloud Feature Code**

Courseware

Software

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IBM Cloud Feature Code

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→

OpenLiberty

A lightweight open framework for building fast and efficient cloud-native Java microservices. Build cloud-native apps and microservices while running only what you need. Open Liberty is the most [...]

→

IBM CLOUD ACCOUNT

- Click on **Request Feature Code**

IBM Cloud Feature Code

Get enhanced access to the IBM Cloud the cloud platform that offers a choice of scalable and flexible resources in one consistent experience. I continuously expanding ecosystem of services to accelerate the pace of innovation.

[Request Feature Code →](#)

[How to create your IBM Cloud trial account →](#)

Knowledge base

Tutorials



Documentation

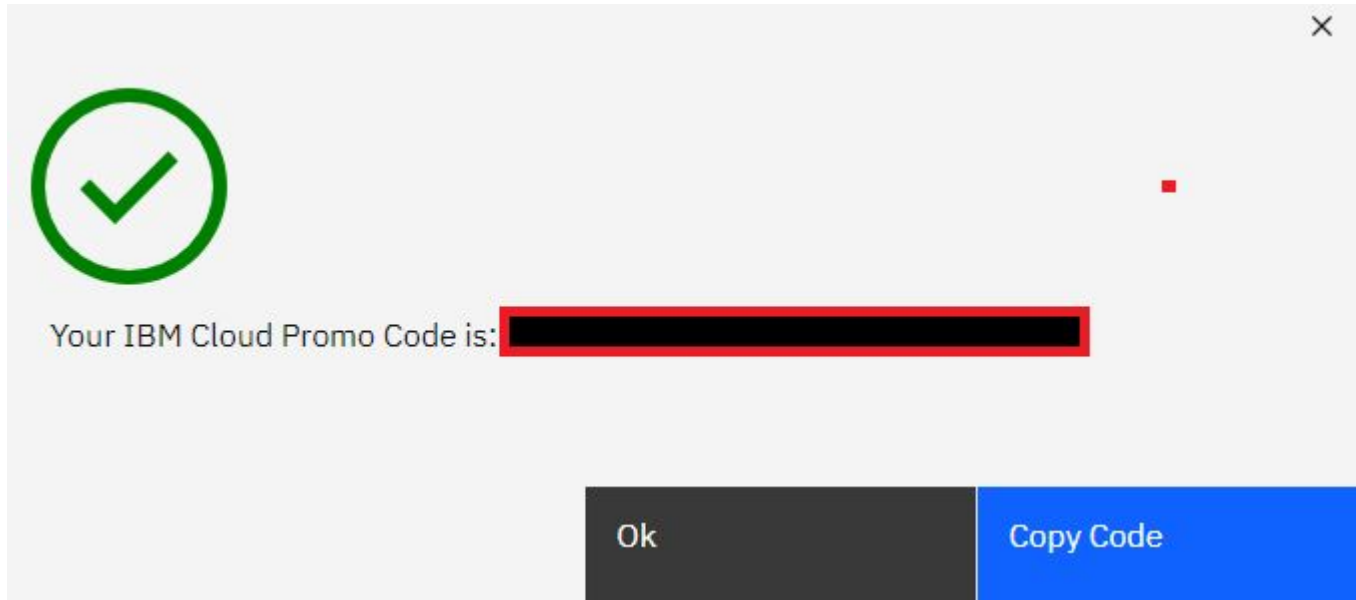


Support



IBM CLOUD ACCOUNT

- Copy the Promo Code.

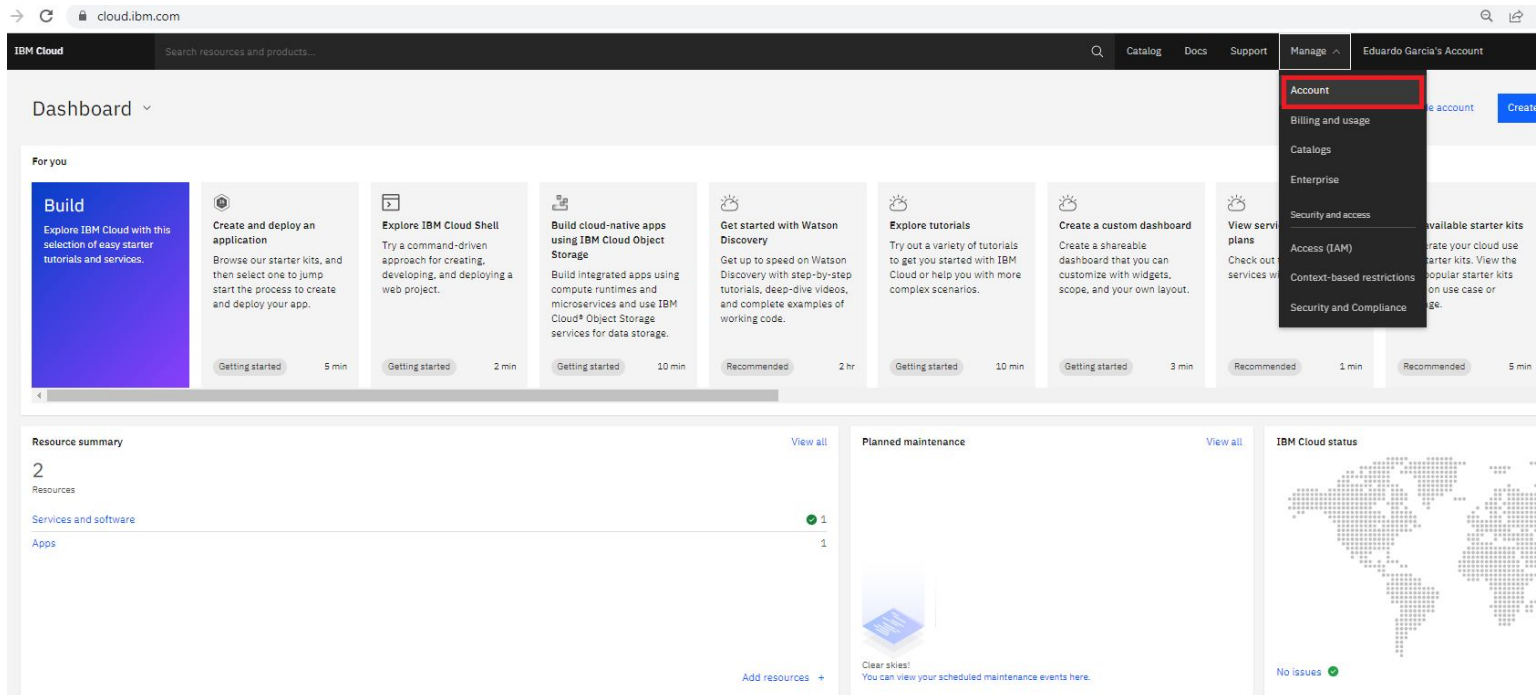


IBM CLOUD ACCOUNT

- Go to <https://cloud.ibm.com/> and log in

IBM CLOUD ACCOUNT

- On the top right, select **Manage -> Account**



The screenshot shows the IBM Cloud dashboard interface. At the top, the navigation bar includes 'IBM Cloud', a search bar, and links for 'Catalog', 'Docs', 'Support', 'Manage', and 'Eduardo Garcia's Account'. The 'Manage' dropdown menu is open, with 'Account' highlighted in red. Other options in the menu include 'Billing and usage', 'Catalogs', 'Enterprise', 'Security and access', 'Access (IAM)', 'Context-based restrictions', and 'Security and Compliance'. The main dashboard area features a 'For you' section with various quick-start guides like 'Build', 'Create and deploy an application', 'Explore IBM Cloud Shell', 'Build cloud-native apps using IBM Cloud Object Storage', 'Get started with Watson Discovery', 'Explore tutorials', 'Create a custom dashboard', and 'View service plans'. Below this, there are three summary cards: 'Resource summary' showing 2 resources, 'Planned maintenance' with a 'Clear skies!' message, and 'IBM Cloud status' showing 'No issues' with a world map.

IBM CLOUD ACCOUNT

- Select **Account Settings** on the left toolbar



IBM CLOUD ACCOUNT

- Select **Apply code** and type the code you copied

IBM Cloud

Search resources and products...

Account settings

Account

Eduardo Garcia's Account

Account Type

Lite (Free)

Account upgrade

Pay-As-You-Go

Add your credit card to unlock the full power of IBM Cloud with a Pay-As-You-Go account. You'll still be eligible for free runtime and service allowances, and you'll be charged only for paid services that you use. [Learn more](#)

Add credit card

Subscription

Get discounted pricing and increased billing predictability when you commit to a set amount of usage over time. [Learn more](#)

Upgrade

Need help?

[Contact sales](#)

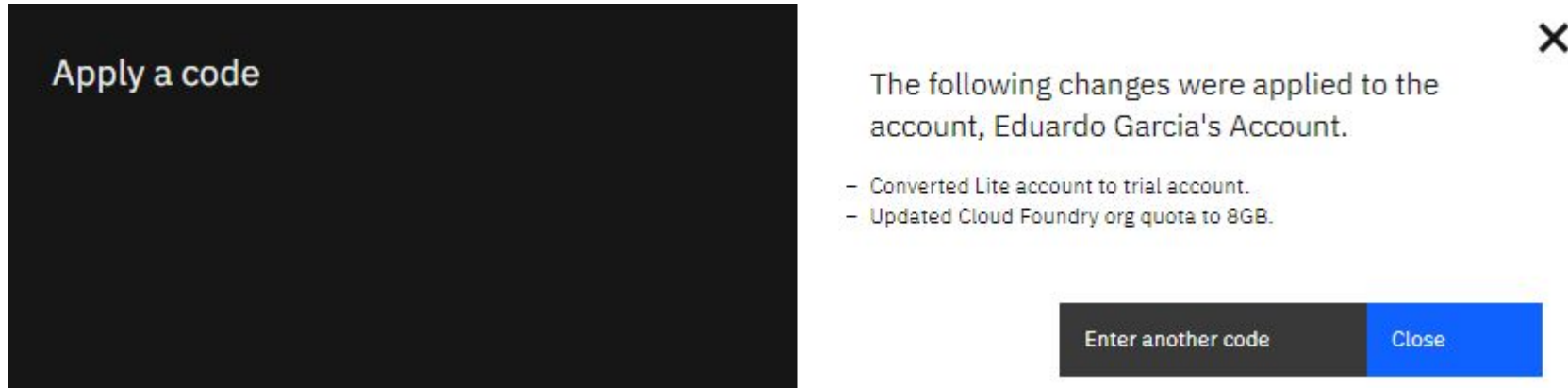
Subscription and feature codes

Subscription codes add platform and support credit for your purchased subscriptions. Feature codes unlock additional IBM Cloud capabilities for your account. Each code can be applied only once. [Learn more](#)

Apply code

IBM CLOUD ACCOUNT

- You should see a message like the following. NOTE: it might not be exactly the same as my account was made years ago (Lite Accounts do not exist anymore)



Add resource

- Once you have your account ready, go back to the dashboard. You will be greeted with the IBM Cloud Dashboard. Click on the “**Create**” button on the top right

The screenshot displays the IBM Cloud Dashboard interface. At the top right, the 'Create resource' button is highlighted with a red rectangular box. The dashboard is organized into several sections:

- For you:** A horizontal row of ten cards, each representing a different service or tutorial. The first card, 'Build', is highlighted in blue. The other cards include 'Monitor your resources', 'Grant users or services access to resources', 'Plan your hosting environment', 'Use Text to Speech', 'IBM Cloud Migration Services', 'Use Continuous Delivery', 'Use Speech to Text', 'Learn about Support Center', and 'Get Started with W Studio'. Each card features an icon, a title, a brief description, and a 'Get started' button with a time estimate.
- Resource summary:** A section on the left with a blue header and a 'View all' link. It contains a message: 'No resources available to display. Create a resource or spin up an app using starter kits.' accompanied by a small graphic of blue cubes.
- Planned maintenance:** A section in the middle with a blue header and a 'View all' link. It features a small graphic of a blue box and the text: 'Clear skies! You can view your scheduled maintenance events here.'
- IBM Cloud status:** A section on the right with a blue header and a 'View all' link. It displays a world map composed of small dots and the text: 'No issues' with a green checkmark icon.
- News:** A section at the bottom left with a blue header and a 'View all' link. It lists two items: 'Introducing IBM Bare Metal Servers for Oracle Workloads' and 'IBM Tech Now: April 11, 2022'.
- Recent support cases:** A section at the bottom middle with a blue header and a 'View all' link.
- User access:** A section at the bottom right with a blue header and a 'Manage users' link. It includes the text: 'Enter email addresses below to jump directly into the invite user setup:' and a text input field with the placeholder 'Enter up to 100 email addresses'.

Add resource

- On the Catalog page, select **Type – Software**, and **Delivery Method – Starter Kit**.
- Then, select the **NODE-RED APP**

The screenshot displays the IBM Cloud Catalog interface. At the top, there's a search bar labeled 'Search the catalog...'. Below it, the 'Category' section shows 'AI / Machine Learning (1)' and 'Developer tools (8)'. The 'Type' filter is set to 'Software', and the 'Delivery method' filter is set to 'Starter kits'. The 'Deployment target' filter is set to 'IBM Cloud Kubernetes Service' and 'Red Hat OpenShift'. The main content area shows a grid of application cards. The 'Node-RED App' card is highlighted with a red box. The card details include: 'Node-RED App By IBM', 'Start building your next Node-RED app on IBM Cloud.', and 'Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift'.

Catalog

Search the catalog...

Category

AI / Machine Learning (1)

Developer tools (8)

Type

All

Software

Delivery method

Cloud Paks

Helm charts

OVA Images

Starter kits

Deployment target

IBM Cloud Kubernetes Service

Red Hat OpenShift

Viewing 9 products

Filters: Starter kits x Software x Clear all

Go Gin App By IBM

Start building your next Go Gin app on IBM Cloud.

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Java Liberty App By IBM

Start building your next Java Liberty app on IBM Cloud.

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Java Spring App By IBM

Start building your next Java Spring app on IBM Cloud.

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Natural Language Understanding Node.js App By IBM

Collection of APIs that can analyze text to help you understand its concepts, entities, keywords, sentiment, and can create a custo...

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Node-RED App By IBM

Start building your next Node-RED app on IBM Cloud.

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Python Django App By IBM

Start building your next Python Django app on IBM Cloud.

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Python Flask App By IBM

Start building your next Python Flask app on IBM Cloud.

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Swift Kitura App By IBM

Start building your next Swift Kitura app on IBM Cloud.

Starter kits • IBM Cloud Kubernetes Service • Red Hat OpenShift

Get Started

Catalog / Create app /

Node-RED

About

Create

Details

Author IBM

Updated 2/10/2020

Type Starter kit

Source code

[GitHub](#)

Helpful links

[Terms](#)

[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?

 **Cloudant**

Free to start [View pricing](#)

[View docs](#) [View API reference](#)

[Get started](#)

Hit “Get Started”

Set a
name –
any
name!

About

Create

App details

App name

ESE516 Project Cool Starter

Resource group

Default

Tags

Examples: env:dev, version-1

Platform

☒ Node.js

Service details

Cloudant

Region

Dallas

Resource group

Default

Plan

Lite

[Pricing details](#) [Terms](#)

Cancel


Create

Wait a minute
for system to
load!

Resource list / App details /



ESE516 Project Cool Starter [Add tags](#)



Details

App URL	You must deploy your app first
Source	Download code 


Resource group	Default
Deployment target	You must deploy your app first
Created	4/19/2021

Services

 **Cloudant**
 Provisioning service credentials


[Connect existing services](#)  [Create service](#) 

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.


[Deploy your app](#) 

Click **Deploy your app**

[Resource list](#) / [App details](#) /

ESE516 Project Cool Starter [Add tags](#)

Details


App URL	You must deploy your app first
Source	Download code 
Resource group	Default
Deployment target	You must deploy your app first
Created	4/19/2021


Services




Cloudant

[Open dashboard](#)  [Documentation](#)  [API reference](#) 

Credentials 

Connect existing services 


Create service 

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.

Deploy your app 

Select the following.

Press “New” to generate a key. You can copy it somewhere if you like.


ESE516 Project Cool Starter


☒ Select the deployment target ☐ Configure the DevOps toolchain


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.

**Code Engine**
IBM
Run your app, job, or container on a managed serverless platform. Auto-scale workloads, and pay only for the resources that you consume.

IBM Cloud API key



The value is required.

Number of instances

Memory allocation per instance

64 MB

2000 MB

1008

Region Organization Space

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.



Code Engine IBM

Run your app, job, or container on a managed serverless platform. Auto-scale workloads, and pay only for the resources that you consume.

IBM Cloud API key

.....




New +

Number of instances

1

Memory allocation per instance

64 MB  2000 MB 1024

Region

Dallas

Organization

edgarc@seas.upenn.edu

Space

dev

Host

ese516-project-cool

Domain

mybluemix.net

Cancel

Next

Give it 1024 MB of memory and hit next.

Do not provide more than 1 (one) GB of memory

Hit Next

[Resource list](#) / [App details](#) /

ESE516 Project Cool

✓ Select the deployment target

● Configure the DevOps toolchain

Configure the DevOps toolchain

Give your toolchain a name and select the region to create your toolchain in.

DevOps toolchain name

ESE516ProjectCool

Accept the default name, or enter a value up to 100 characters.

Region

Dallas

Back


Create

Wait a minute



[Resource list](#) / [App details](#) /




ESE516 Project Cool [Add tags](#)


Details



App URL	You must deploy your app first
Source	Download code 
Resource group	Default
Deployment target	You must deploy your app first
Created	4/12/2022

Services


 **Cloudant** 

[Open dashboard](#)  [Documentation](#)  [API reference](#) 

Credentials 


[Connect existing services](#)  [Create service](#) 

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.

 Generating code...

App will be deploying! Take a coffee 9-15 minute break – this will take a while, Mine took 12.5 minutes


[Resource list](#) / [App details](#) /

ESE516 Project Cool [Add tags](#)

Details

App URL	You must deploy your app first
Source	https://us-south.git.cloud.ibm.com/edgarc/ESE516ProjectCool
Resource group	Default
Deployment target	You must deploy your app first
Created	4/12/2022

Services




 **Cloudant**

[Open dashboard](#) [Documentation](#) [API reference](#)

Credentials ▾

[Connect existing services](#) [Create service](#)

Deployment Automation

Name	ESE516ProjectCool
Location	Dallas
Tool integrations	
<h4>Delivery Pipelines</h4>	
Name	ci-pipeline
Status	 In progress
Name	pr-pipeline
Status	 No stages detected

Done!

[Resource list](#) / [App details](#) /

ESE516 Project Cool [Add tags](#)

Details

App URL	https://ese516-project-cool.mybluemix.net
Source	https://us-south.git.cloud.ibm.com/edgarc/ESE516ProjectCool
Resource group	Default
Deployment target	ESE516 Project Cool
Created	4/12/2022

Services



Cloudant

[Open dashboard](#) [Documentation](#) [API reference](#)

Credentials

Connect existing services



Create service

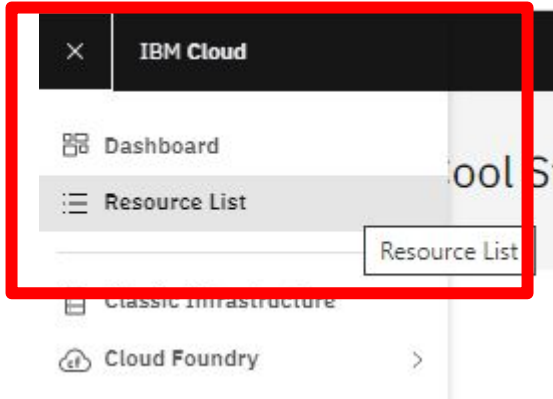


Deployment Automation

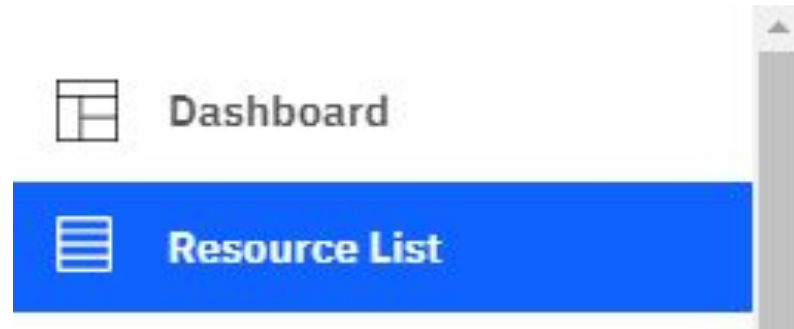
Name	ESE516ProjectCool
Location	Dallas
Tool integrations	

Delivery Pipelines

Name	ci-pipeline
Status	Success
Name	pr-pipeline
Status	No stages detected



You can now access the resources made on the top left bar – under “Resource List”



Node JS
(For Node
Red)

Here you can see the services
started!

Resource list

Name	Group	Location	Product
Q Filter by name or IP address...			
Filter by group or org...			
Filter...			
Q Filter...			
Devices (0)			
VPC infrastructure (0)			
Clusters (0)			
Container Registry (0)			
Satellite (0)			
Cloud Foundry apps (1)			
ESE516 Project Cool	edgarc@seas.upenn.edu / dev	Dallas	Node.js
Cloud Foundry services (1)			
ese516-project-cool-cloudant-1649820565085-13594	edgarc@seas.upenn.edu / dev	Dallas	Cloudant
Services and software (2)			
Continuous Delivery	Default	Dallas	Continuous Delivery
ese516-project-cool-cloudant-1649820565085	Default	Dallas	Cloudant
Storage (0)			
Network (0)			
Functions namespaces (0)			
Apps (1)			
ESE516 Project Cool	Default	Global	Cloud Application
Developer tools (1)			
ESE516ProjectCool	Default	Dallas	Toolchain
VMware (0)			
Schematics workspaces (0)			
Code Engine (0)			

Node Red App (what we just compiled)

DB

Continuous
Delivery

Before our next steps, we need to stop the current app. On the Cloud Foundry Apps, click on “Stop” to stop that process. You will encounter errors if you do not do this step.

Cloud Foundry apps (1)						
ESE516 Project Cool	edgar@seas.upenn.edu / dev	Dallas	Node.js	Started	—	<div>Stop</div>
Cloud Foundry services (1)						
ese516-project-cool-cloudant-1649820565085-13594	edgar@seas.upenn.edu / dev	Dallas	Cloudant	Provisioned	—	<div>Restart</div>
Services and software (2)						
Continuous Delivery	Default	Dallas	Continuous Delivery	Active	—	<div>Edit name</div>
ese516-project-cool-cloudant-1649820565085	Default	Dallas	Cloudant	Active	—	<div>Add tags</div>
Storage (0)						

Before we begin, we have to install Node-Red modules for the system! Click on the Cloud Application under APPS

Name	Group	Location	Product	Status
Filter by name or IP address...	Filter by group or org...	Filter...	Filter...	Filter...
Devices (0)				
VPC infrastructure (0)				
Clusters (0)				
Container Registry (0)				
Satellite (0)				
Cloud Foundry apps (1)				
ESE516 Project Cool	edgarc@seas.upenn.edu / dev	Dallas	Node.js	Stopped
Cloud Foundry services (1)				
ese516-project-cool-cloudant-1649820565085	edgarc@seas.upenn.edu / dev	Dallas	Cloudant	Provisioned
Services and software (2)				
Continuous Delivery	Default	Dallas	Continuous Delivery	Active
ese516-project-cool-cloudant-1649820565085	Default	Dallas	Cloudant	Active
Storage (0)				
Network (0)				
Functions namespaces (0)				
Apps (1)				
ESE516 Project Cool	Default	Global	Cloud Application	—
Developer tools (1)				
ESE516ProjectCool	Default	Dallas	Toolchain	—
VMware (0)				
Schematics workspaces (0)				
Code Engine (0)				

Here we will be able to access the Github project for our deployment. Click the link on the right as shown.

[Resource list](#) / [App details](#) /

ESE516 Project Cool

[Add tags](#)

Details

App URL	https://ese516-project-cool.mybluemix.net
Source	https://us-south.git.cloud.ibm.com/edgarc/ESE516ProjectCool
Resource group	Default
Deployment target	ESE516 Project Cool
Created	4/12/2022

Services

Cloudant

[Open dashboard](#) [Documentation](#) [API reference](#)

Credentials

Connect existing services

Create service

This will take you to a Github page with code for the Node-Red deployment.

We will modify one file:

- Package.json: To install some useful NODE-RED nodes!

master

ESE516ProjectCool / +

History

Find file

Clone

Clone from ZIP
IBM Cloud Continuous Delivery authored 23 minutes ago

a2e6460b

Upload File

README

Apache License 2.0

CONTRIBUTING

Add CHANGELOG

Configure Integrations

Name	Last commit	Last update
.github	Clone from ZIP	23 minutes ago
defaults	Clone from ZIP	23 minutes ago
nodes	Clone from ZIP	23 minutes ago
public	Clone from ZIP	23 minutes ago
routers	Clone from ZIP	23 minutes ago
scripts	Clone from ZIP	23 minutes ago
server/config	Clone from ZIP	23 minutes ago
.cignore	Clone from ZIP	23 minutes ago
.dockerignore	Clone from ZIP	23 minutes ago

Open package.json

Hit “Edit”

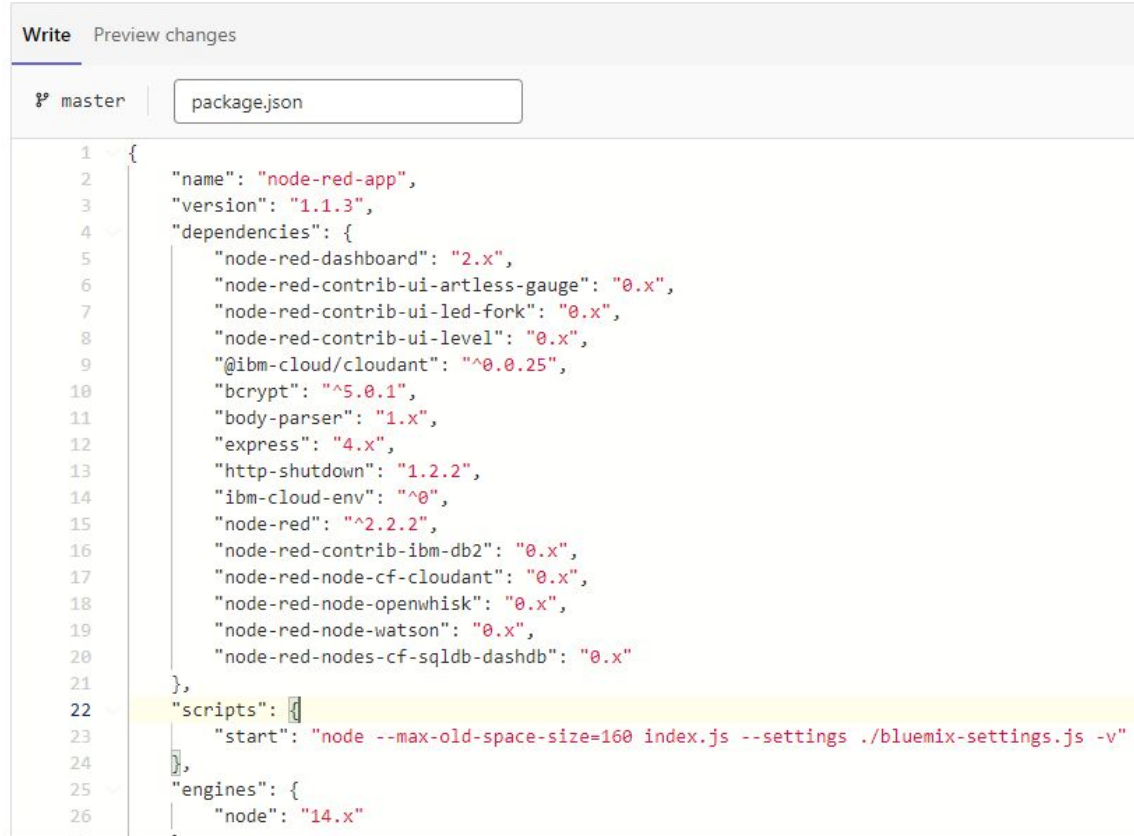
Add the following at the very top of the dependencies:

"node-red-dashboard": "2.x",

"node-red-contrib-ui-artless-gauge": "0.x",

"node-red-contrib-ui-led-fork": "0.x",

"node-red-contrib-ui-level": "0.x",



```
1 {
2   "name": "node-red-app",
3   "version": "1.1.3",
4   "dependencies": {
5     "node-red-dashboard": "2.x",
6     "node-red-contrib-ui-artless-gauge": "0.x",
7     "node-red-contrib-ui-led-fork": "0.x",
8     "node-red-contrib-ui-level": "0.x",
9     "@ibm-cloud/cloudant": "^0.0.25",
10    "bcrypt": "^5.0.1",
11    "body-parser": "1.x",
12    "express": "4.x",
13    "http-shutdown": "1.2.2",
14    "ibm-cloud-env": "^0",
15    "node-red": "^2.2.2",
16    "node-red-contrib-ibm-db2": "0.x",
17    "node-red-node-cf-cloudant": "0.x",
18    "node-red-node-openwhisk": "0.x",
19    "node-red-node-watson": "0.x",
20    "node-red-nodes-cf-sqlldb-dashdb": "0.x"
21  },
22  "scripts": {
23    "start": "node --max-old-space-size=160 index.js --settings ./bluemix-settings.js -v"
24  },
25  "engines": {
26    "node": "14.x"
```

When you hit “Commit Changes”, the system will compile the project again. We need to wait until it compiles again. Click to see progress!

[Resource list](#) / [App details](#) /

ESE516 Project Cool [Add tags](#) 

Details

App URL	https://ese516-project-cool.mybluemix.net
Source	https://us-south.git.cloud.ibm.com/edgarc/ESE516ProjectCool
Resource group	Default
Deployment target	ESE516 Project Cool-OLD-1649825236
Created	4/12/2022

Services



Cloudant

[Open dashboard](#)  [Documentation](#)  [API reference](#) 

Credentials 

Connect existing services



Create service



Deployment Automation

Name	ESE516ProjectCool
Location	Dallas
Tool integrations	   

Delivery Pipelines

Name	ci-pipeline 
Status	 In progress 
Name	pr-pipeline 
Status	 No stages detected 

When you changed the code, it triggered an automatic rebuild. The system will tell you the state of the new build and deploy on the cloud. Wait until everything passed! If you had errors... Time for Piazza! It will take a while! ~ 5-10 min.

Toolschains / ESE16ProjectCoolStarter / ci-pipeline Dashboard

PipelineRuns

Status: All Trigger: All

<input type="checkbox"/>	#	Status	Name	Pipeline	Trigger ⓘ
<input type="checkbox"/>	7		simple-hosted-pipeline-f79c3eeb-f76b-412a-8a70-77b5a...	simple-hosted-pipeline	
<input type="checkbox"/>	6		simple-hosted-pipeline-4ca70200-93a4-4980-0326-200e...	simple-hosted-pipeline	
<input type="checkbox"/>	5		simple-hosted-pipeline-83dabb6e-8003-4800-abc8-bcd8...	simple-hosted-pipeline	
<input type="checkbox"/>	4		simple-hosted-pipeline-123c0ccc-9af9-4eeb-89a5-9692d...	simple-hosted-pipeline	
<input type="checkbox"/>	3		simple-hosted-pipeline-213d77ee-0ba4-4964-8ef4-0063d...	simple-hosted-pipeline	
<input type="checkbox"/>	2		simple-hosted-pipeline-54358fdd-8be9-4641-9730-fbb8...	simple-hosted-pipeline	
<input type="checkbox"/>	1		simple-hosted-pipeline-542aaa4f-800e-4063-a7b1-db6a...	simple-hosted-pipeline	

Items per page: 30 1 - 7 items

Yay! It passed!



Status: All Trigger: All

<input type="checkbox"/>	#	Status	Name	Pipeline	Trigger ⓘ	Created	Duration
<input type="checkbox"/>	11		simple-hosted-pipeline-4ebe0715-85f0-41ab-b22d-e9110fc...	simple-hosted-pipeline		April 19, 2021, 10:42 PM	10 minutes 2 seconds
<input type="checkbox"/>	10		simple-hosted-pipeline-f5897f37-8e8e-4c9c-b9bc-6fa51c12...	simple-hosted-pipeline		April 19, 2021, 10:21 PM	10 minutes 6 seconds
<input type="checkbox"/>	9		simple-hosted-pipeline-feae57ef-7a66-4be1-b2fc-22d9bd2c...	simple-hosted-pipeline		April 19, 2021, 10:13 PM	5 minutes 1 second

Success!


[Resource list](#) / [App details](#) /

ESE516 Project Cool Add tags


Details

App URL	https://ese516-project-cool.mybluemix.net
Source	https://us-south.git.cloud.ibm.com/edgarc/ESE516ProjectCool
Resource group	Default
Deployment target	ESE516 Project Cool-OLD-1649825236
Created	4/12/2022

Services

 **Cloudant**

[Open dashboard](#) [Documentation](#) [API reference](#)

Credentials 

Connect existing services



Create service



Deployment Automation

Name	ESE516ProjectCool
Location	Dallas
Tool integrations	   

Delivery Pipelines

Name	ci-pipeline
Status	 Success
Name	pr-pipeline
Status	 No stages detected

Go back and click this link. It will take you to the Node Red instance



Resource list / App details /

ESE516 Project Cool [Add tags](#)


Details

App URL	https://ese516-project-cool.mybluemix.net
Source	https://us-south.git.cloud.ibm.com/edgarc/ESE516ProjectCool
Resource group	Default
Deployment target	ESE516 Project Cool-OLD-1649825236
Created	4/12/2022

Services

 **Cloudant** 

[Open dashboard](#) [Documentation](#) [API reference](#)

Credentials 

[Connect existing services](#) [Create service](#)

Go thru the next steps

Choose a password you can share with your class partner, and is easy to remember!

Welcome to your new Node-RED instance on IBM Cloud

We know you're eager to start wiring up your flows, but first there are a couple of tasks you should do:

- Secure your Node-RED editor
- Learn how to install additional nodes

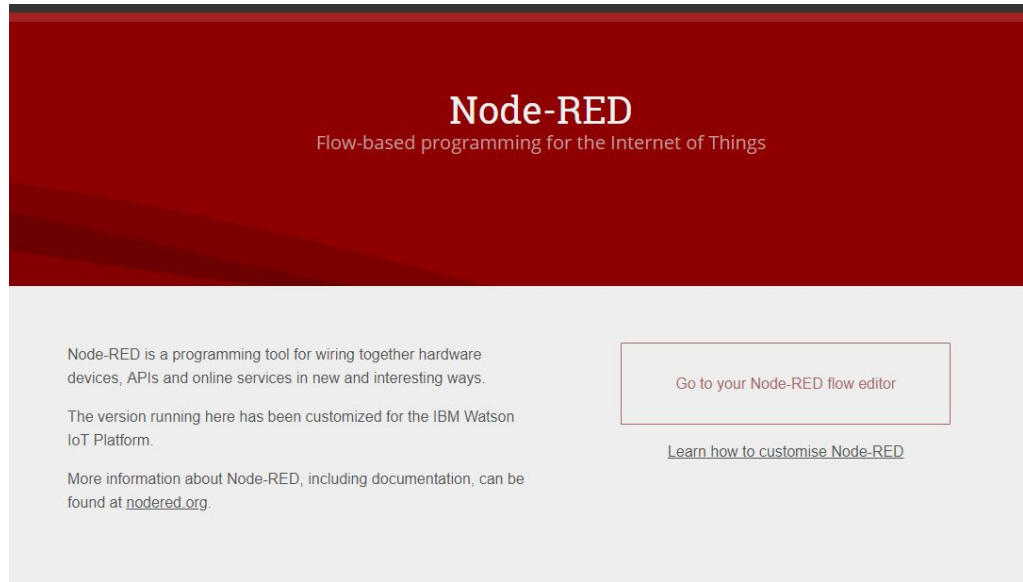


Previous

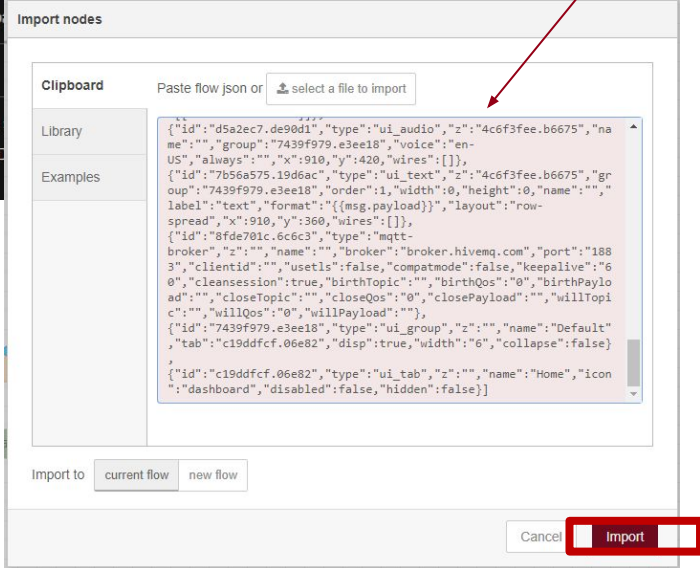
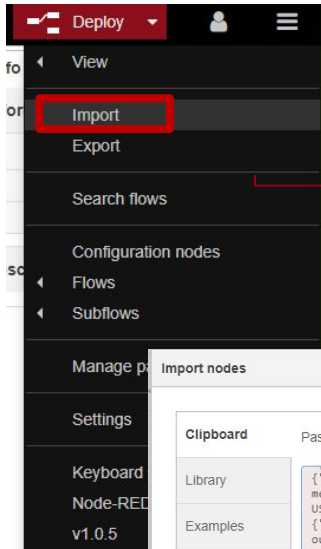
Next

Node-Red

- Your Node-Red is now ready! Click on the “Go To your Node-RED flow editor” to open the editor. Otherwise, click on “Learn how to customize Node RED” for a quick tutorial to start up.



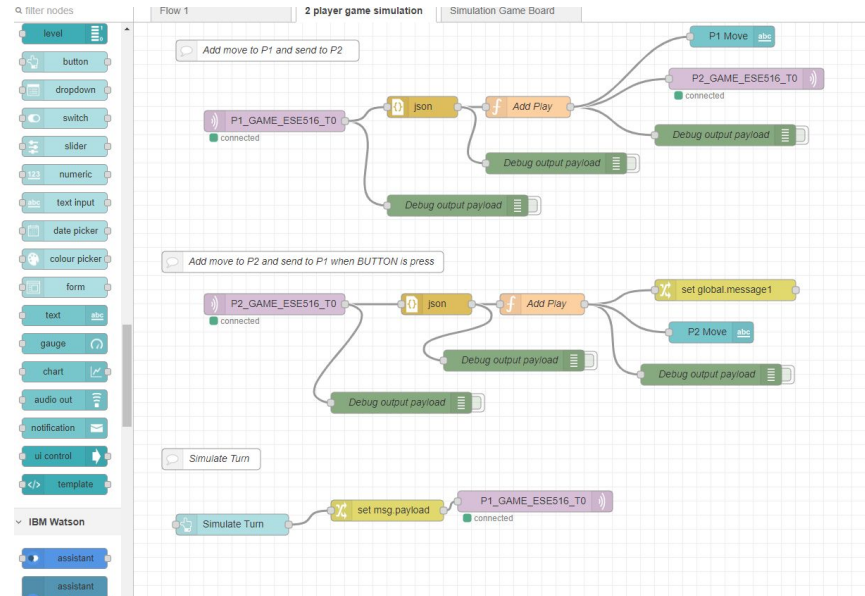
Copy this text!



```
{
  "id": "d5a2ec7.de9d1", "type": "ui_audio", "z": "4c6f3fee.b6675", "name": "", "group": "7439f979.e3ee18", "voice": "en-US", "always": "", "x": 910, "y": 420, "wires": [] },
  { "id": "7b56a575.19d6ac", "type": "ui_text", "z": "4c6f3fee.b6675", "group": "7439f979.e3ee18", "order": 1, "width": 0, "height": 0, "name": "", "label": "text", "format": "{(msg.payload)}", "layout": "row-spread", "x": 910, "y": 360, "wires": [] },
  { "id": "8fde701c.6c6c3", "type": "mqtt-broker", "z": "", "name": "", "broker": "broker.hivemq.com", "port": "1883", "clientId": "", "useTls": false, "compatMode": false, "keepAlive": "60", "cleanSession": true, "birthTopic": "", "birthQos": "0", "closePayload": "", "willTopic": "", "willQos": "0", "willPayload": "", "willTopic": "", "closeTopic": "", "closeQos": "0", "closePayload": "", "willTopic": "", "willQos": "0", "willPayload": "" },
  { "id": "7439f979.e3ee18", "type": "ui_group", "z": "", "name": "Default", "tab": "c19ddfcf.06e82", "disp": true, "width": "6", "collapse": false },
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false }, "id": "3c01459a.82910a", "type": "ui_tab", "z": "", "name": "2 Player Simulation", "icon": "dashboard", "order": 2, "disabled": false, "hidden": false }, "id": "43e5bb99.cfe0e4", "type": "ui_tab", "z": "", "name": "One Player Game", "icon": "dashboard", "order": 3, "disabled": false, "hidden": false }, "id": "eff19175.c358e", "type": "ui_group", "z": "", "name": "Color", "tab": "43e5bb99.cfe0e4", "order": 1, "disp": true, "width": "6", "collapse": false }, "id": "d7d463f4.cae2c", "type": "ui_group", "z": "", "name": "PI LED Board", "tab": "3c01459a.82910a", "order": 2, "disp": true, "width": "4", "collapse": false }, "id": "4c314b97.169624", "type": "ui_spacer", "name": "spacer", "group": "d7d463f4.cae2c", "order": 2, "width": 1, "height": 1 }, "id": "1980e43f.b4d1c", "type": "function", "z": "4c6f3fee.b6675", "name": "temp", "func": "return\n\n{\n  payload: msg.payload.d.temp,\n  outputs: 1,\n  noerr: 0,\n  x: 390,\n  y: 480,\n  wires: [[\"4c3b8d0.9c3558\"]],\n  id: \"4c3b8d0.9c3558\",\n  type: \"switch\",\n  z: \"4c6f3fee.b6675\",\n  name: \"temp\"\n}\n\nthresh: {\n  property: \"payload\",\n  propertyType: \"msg\",\n  rules: [{\n    \"lte\": \"v\": 40,\n    \"v\": \"str\"\n  }, {\n    \"gt\": \"v\": 40,\n    \"v\": \"str\"\n  }],\n  checkAll: true,\n  repair: false\n},\n  outputs: 2,\n  x: 550,\n  y: 480,\n  wires: [[\"5af543bd.70630c\"], [\"3eb20e6.6fb63\"]],\n  id: \"6e974680.39cd28\",\n  type: \"debug\",\n  z: \"4c6f3fee.b6675\",\n  name: \"cpu\"\n}\n\nstatus: {\n  active: false,\n  complete: false,\n  x: 890,\n  y: 480,\n  wires: []\n},\n  id: \"ea07eb98.b0c448\",\n  type: \"debug\",\n  z: \"4c6f3fee.b6675\",\n  name: \"device data\",\n  active: false,\n  console: false,\n  complete: true,\n  x: 410,\n  y: 560,\n  wires: []\n},\n  id: \"5af543bd.70630c\",\n  type: \"template\",\n  z: \"4c6f3fee.b6675\",\n  name: \"safe\",\n  field: \"payload\",\n  fieldType: \"msg\",\n  syntax: \"mustache\",\n  template: \"Temperature {{{payload}}} within safe limits\",\n  x: 710,\n  y: 460,\n  wires: [[\"6e974680.39cd28\"], [\"7b56a575.19d6ac\"]],\n  id: \"3eb20e6.6fb63\",\n  type: \"template\",\n  z: \"4c6f3fee.b6675\",\n  name: \"danger\",\n  template: \"Temperature {{{payload}}} critical\",\n  x: 720,\n  y: 500,\n  wires: [[\"6e974680.39cd28\"]],\n  id: \"3db4e47f.4a9dfc\",\n  type: \"inject\",\n  z: \"4c6f3fee.b6675\",\n  name: \"Send Data\",\n  topic: \"payload\",\n  true: \"payloadType:bool\",\n  repeat: \"cronbat\",\n  once: false,\n  x: 120,\n  y: 140,\n  wires: [[\"20164732.524cf8\"]],\n  id: \"20164732.524cf8\",\n  type: \"function\",\n  z: \"4c6f3fee.b6675\",\n  name: \"Device payload\",\n  func: \"Thermostat's location:{{location}}\n\nvar longitudeI = -98.49;\nvar latitudeI = 29.42;\n\n// Array of pseudo random temperatures\nvar tempI = [15,17,18.5,20,21.5,23,24,22,19,18];\n\n// Array of pseudo random relative humidities\nvar humidityI = [50,55,61,68,65,60,53,49,45,47];\n\n// Counter to select from array\nvar counterI = context.get('counterI')||0;\n\nif(counterI > 9) counterI = 0;\n\ncontext.set('counterI',counterI);\n\n// Create MQTT message in JSON\nvar msg = {\n  payload: JSON.stringify(\n    {\n      d: {\n        temp: tempI[counterI],\n        humidity: humidityI[counterI],\n        location: {\n          longitude: longitudeI,\n          latitude: latitudeI\n        }\n      }\n    }\n  );\n  return msg;\n},\n  noerr: 0,\n  x: 340,\n  y: 140,\n  wires: [[\"5f9f3a85.1b8ff4\"], [\"d63227f.c8819e8\"]],\n  id: \"5f9f3a85.1b8ff4\",\n  type: \"debug\",\n  z: \"4c6f3fee.b6675\",\n  name: \"Debug output\"\n},\n  active: false,\n  console: false,\n  complete: \"payload\",\n  x: 580,\n  y: 200,\n  wires: []\n},\n  id: \"33e5da99.a54c16\",\n  type: \"comment\",\n  z: \"4c6f3fee.b6675\",\n  name: \"Device Simulator\",\n  info: \"Sends simulated device sensor data to IBM Watson IoT Platform.\n\nCan be configured to send on click or on an automatic interval.\n\nPrerequisite\n\nOutput node device type and device ID need to match a device that it registered in a running IBM Watson IoT Platform service.\n\n# Watson IoT Platform docs\n\nConnecting\"
}
```

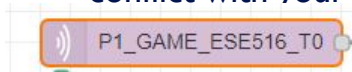
Node-Red

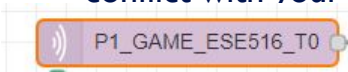
You should now have the ESE516 Simulator on your flow. Take some time to explore what is going on! The next slider will explain some of the most important nodes.



Node-Red – MQTT IN

MQTT Node: The MQTT IN NODE listens to a command received from a broker. If you double click it you can edit what it listens to! Notice that it is connected to the MQTT broker we mentioned before, and is listening to the P1_GAME_ESE516_T0. You will need to change this T0 to a unique number so it does not conflict with your colleagues!



 P1_GAME_ESE516_T0

⚙ Properties

🌐 Server

broker.hivemq.com:1883

✎

📄 Topic

P1_GAME_ESE516_T0

⚙ QoS

1

▼

➡ Output

auto-detect (string or buffer)

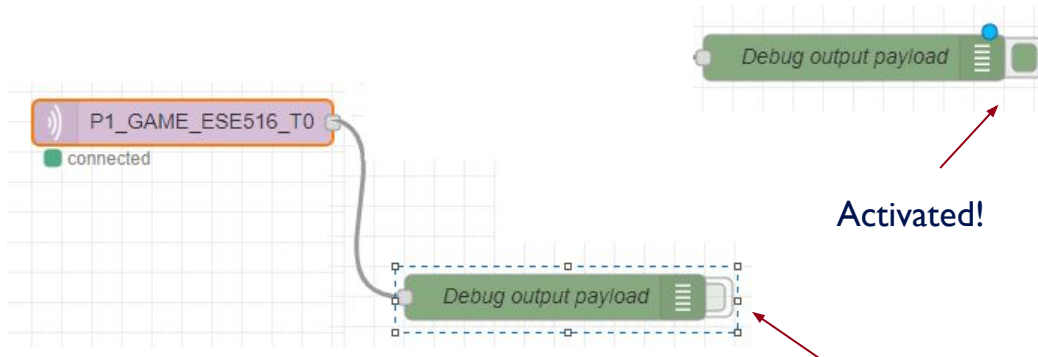
▼

🏷 Name

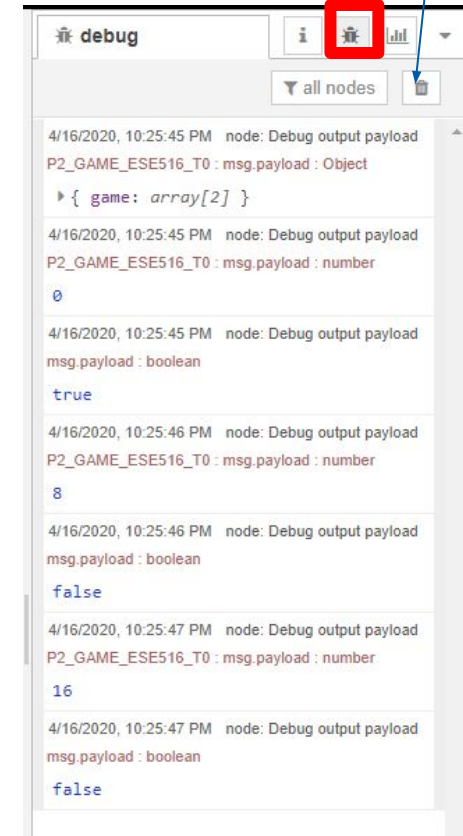
Name

Node-Red – debug node

Debug NODE: Connected to this node is a DEBUG NODE. A debug node will print whatever it is connected to on the debug window. You can get to this window on the right screen of the backend view of Node Red (where you see the nodes). You can click on the green rectangle to activate/deactivate debug output.

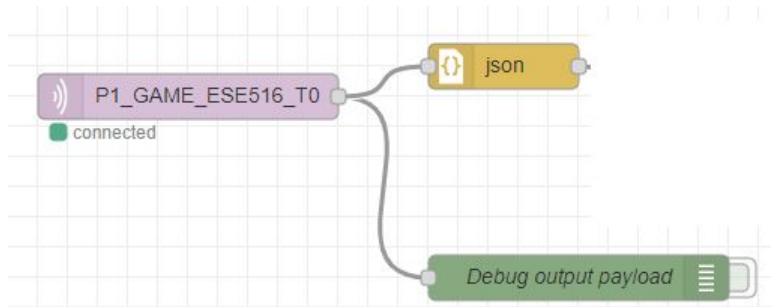


Click to
clear
output!



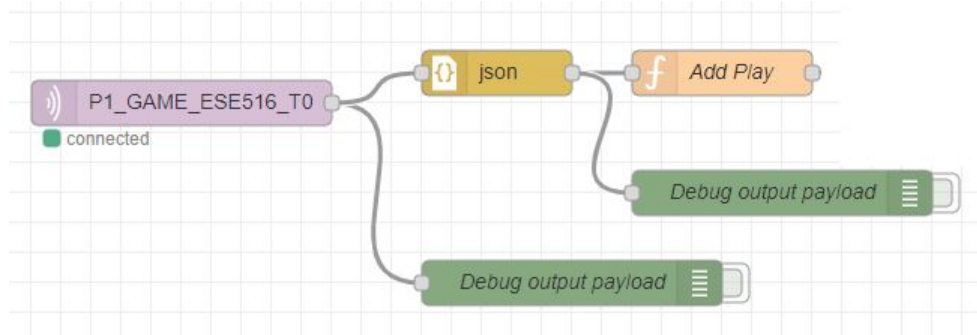
Node-Red JSON Block

- The JSON block converts a JSON string into a Javascript Object. This will allow us to use Javascript on the data later on!

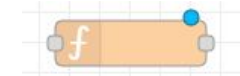


Node-Red Javascript Block (Function)

- The function block can be added to run Javascript code! Double click on “Add Play” to see its code. In our example, this block is used to add a game play (random number between 0 to 15) to the end of the received play!



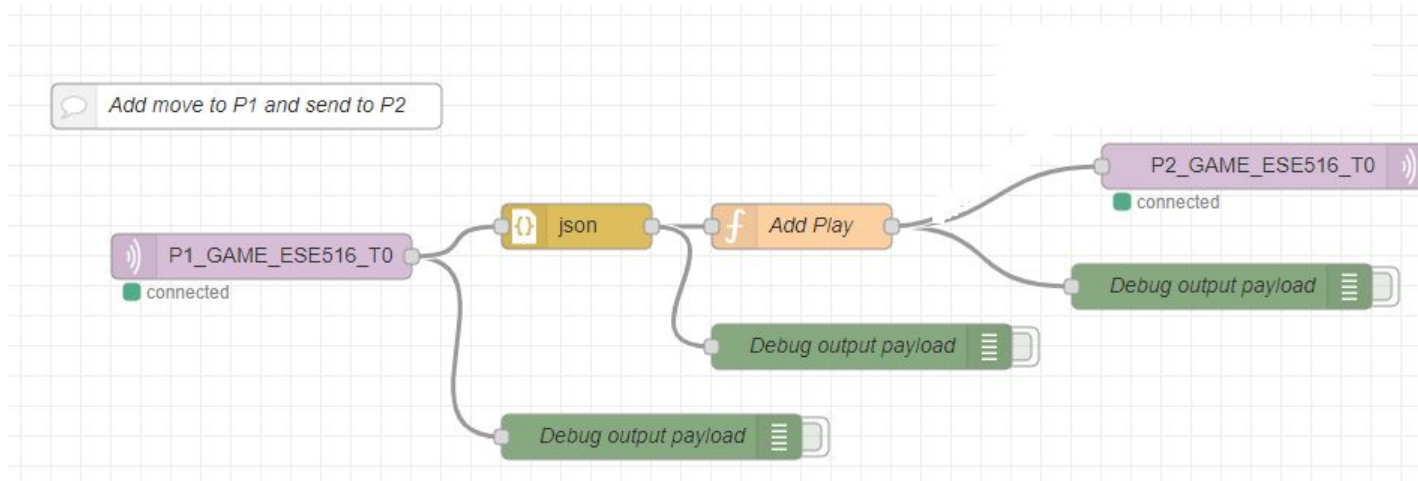
Function block



```
Function
1
2 if(msg.payload.game.length <= 20){
3
4 //Concatenate a play
5 msg.payload.game.push(Math.round(Math.random()*15))
6
7 }
8 else{
9 //Pop out first game in list and add a new one at th
10 msg.payload.game.shift(); // Remove an item from the
11 msg.payload.game.push(Math.round(Math.random()*15))
12 }
13
14
15 return msg
```

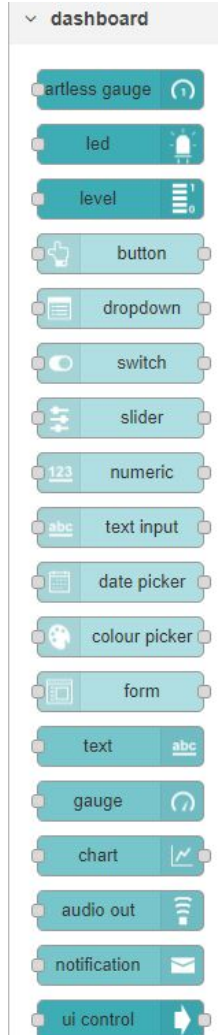
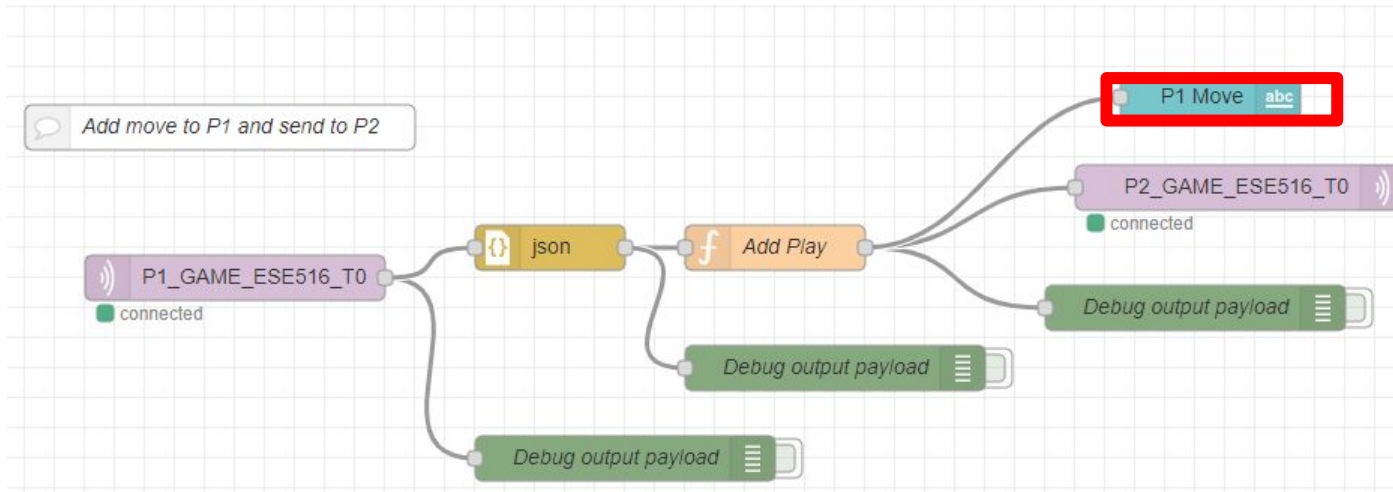
MQTT Out Block

- MQTT Out button: Similar to the MQTT in, the MQTT Out will publish data to an MQTT Topic. In this case, we publish to the player 2 (P2_GAME_ESE516_T0).



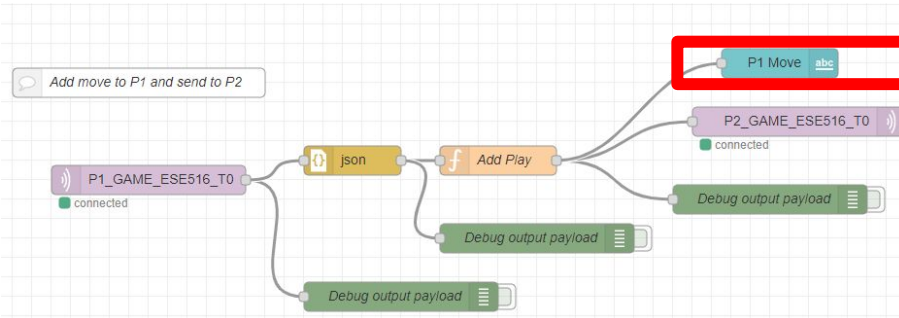
Front end (ui) blocks

- There are going to be special nodes (listed under DASHBOARD) that will allow us to develop a front end GUI. In this example, we use a text label that prints the output to P2.



Node-Red UI

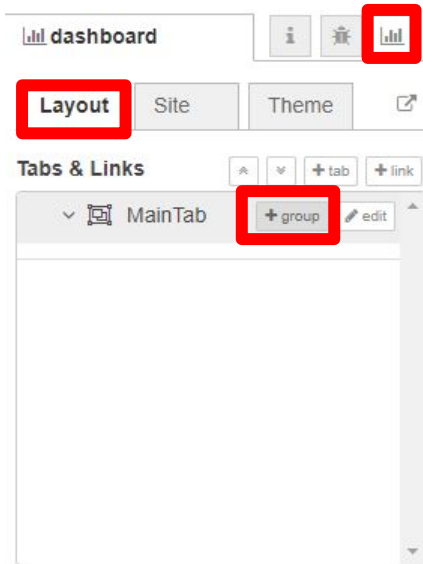
- When you double click a dashboard component you can modify how it will look! You can also assign to what group it will be added to (where it will be shown on the UI).



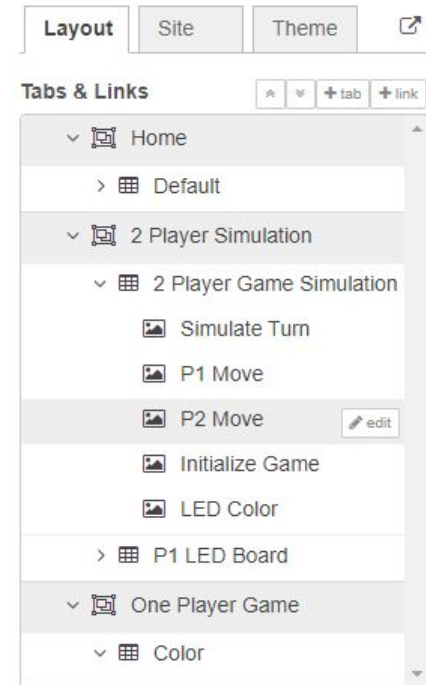
Group	[2 Player Simulation] 2 Player Game Sir	
Size	auto	
Label	P2 Move	
Value format	{{msg.payload}}	
Layout	<div>label value</div> <div>label value</div> <div>label value</div> <div>label value</div> <div>label value</div>	
Name		

Node-Red UI

- To configure the Layout of Dashboard block, you will need to configure the layout. To do so you can click on the topright layout button. On the layout tab you can add tabs and modify the position of existing DASHBOARD blocks into new groups.



Example of layout of our flow. For example the string we saw, P2 Move, is on the 2 PLAYER GAME SIMULATION Tab.



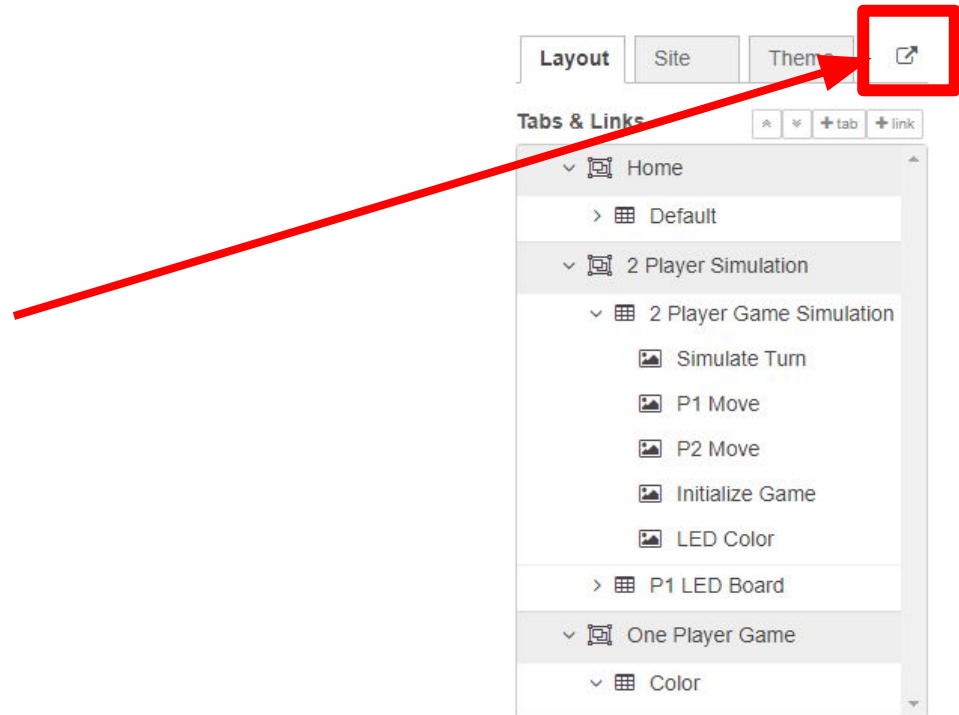
Node-Red- Deploy

- Once you made changes and want to deploy your new code, hit the “Deploy” button on the top right. This will deploy your flow! It will mention any issues that might arise if they are present.



GOING TO THE UI

- You can open the UI Website by clicking on the link in the Layout table.



NODE RED DASHBOARD

- Website you can access from anywhere to see your dashboard

UI Organized by how you did it on the UI options

The screenshot shows the Node-RED dashboard interface. At the top, there are tabs for 'Layout', 'Site', and 'Theme'. Below these is the 'Tabs & Links' sidebar, which is expanded to show a list of tabs. The tabs are organized into a hierarchy: 'Home' (expanded), 'Default', '2 Player Simulation' (expanded), '2 Player Game Simulation' (expanded), 'Simulate Turn', 'P1 Move', 'P2 Move' (with an 'edit' button), 'Initialize Game', 'LED Color', 'P1 LED Board', 'One Player Game', and 'Color'. A red arrow points from the 'Website you can access from anywhere to see your dashboard' text to the browser address bar. Another red arrow points from the 'UI Organized by how you did it on the UI options' text to the '2 Player Simulation' tab in the sidebar.

← → ↻ ese516-starter.mybluemix.net/ui/#/l/0?socketid=YS13JeA1feQ3WfR-AAAS

The screenshot shows the Node-RED dashboard interface. The top bar is teal and contains the text '2 Player Simulation'. Below this, the dashboard is divided into two main sections. The left section is titled '2 Player Game Simulation' and contains a 'SIMULATE TURN' button, a 'P1 Move' button with a JSON object `{"game": [0, 8]}`, a 'P2 Move' button with a JSON object `{"game": [0, 8, 12]}`, an 'INITIALIZE GAME' button, and a small orange square. The right section is titled 'P1 LED Board' and displays a 4x4 grid of 16 red LEDs.

COOL! I want to learn more!

- Node Red Cookbook: <https://cookbook.nodered.org/>
- Node Red Tutorial: <http://noderedguide.com/>

