
INTELLIGENCE AS A SERVICE. SELF-MANAGEMENT OF SERVICES
Intelligent infrastructure design for the IoT (DII)
(Second Part)

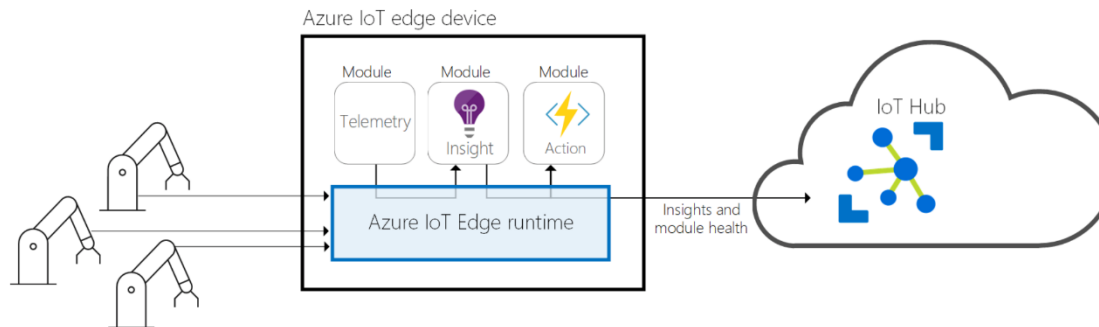


- ▶ Alfonso González Briones
- ▶ Based on material created by Jorge Gómez Sanz

Introduction SaaS and Serverless

▶ PaaS for IoT

- ▶ Azure + IoT Edge: adds Edge computing capabilities. Allows code to be deployed to run there.



- ▶ Azure Digital Twins, manage digital twins, <https://www.youtube.com/watch?v=AtYEpnvEpp0>
- ▶ Others
 - ▶ Apache kafka, real time data processing. <https://kafka.apache.org>
 - ▶ Apache spark, off-line data processing. <https://spark.apache.org/>

Introduction SaaS and Serverless

▶ Introduction to SaaS

- ▶ SaaS or Software as a Service is another cloud paradigm where the idea is that the software you need is not on your premises.
- ▶ You rely on others to maintain this software and become a remote customer.
- ▶ Much like the old business model of the 70's before PC's.
- ▶ Gartner - <https://gcom.pdodev.aws.gartner.com/en/newsroom>
 - ▶ [2012] - "Gartner says organizations are more likely to use SaaS for sensitive data than for mission-critical data."
 - ▶ [2014] - "Gartner survey reveals SaaS deployments are now mission critical."
- ▶ Cost reduction... yes; operational agility... also

Introduction SaaS and Serverless

▶ What about IoT?

- ▶ **Azure:** + IoT Central, connect and manage your IoT devices, <https://docs.microsoft.com/en-us/azure/iot-central/> + IoT Hub, communication hub for IoT, <https://azure.microsoft.com/en-us/services/iot-hub/>
- ▶ **IBM:** + Internet of Things Platform, <https://console.bluemix.net/catalog/services/internet-of-things-platform> + AT&T Flow Designer, design IoT solutions with graphics + Bosch IoT Rollouts, update device firmware + Car diagnostic API, to read and interpret OBD codes + Precision location, using WIFI, gps, cellular or hybrid location + Unification Engine, an IoT messaging platform covering SMS, email, whatsapp to connect human and devices using NLP
- ▶ **OpenSource + thingsboard:** <https://thingsboard.io/>; <https://github.com/thingsboard> + FIWARE: <https://www.fiware.org/successstories/smartappcity>; <https://github.com/Fiware> + AEROGEAR: <https://aerogear.org/>
- ▶ Not so open source + OneSignal: <https://onesignal.com/>; <https://github.com/OneSignal/> + Circuit: <https://www.circuito.io> + Makecode: <https://makecode.adafruit.com/>; <https://www.microsoft.com/en-us/makecode>

Introduction PaaS and IaaS

- ▶ You have already used a cloud service that consists of creating a Virtual Machine in Azure. Exercise:
 - ▶ Start the Azure virtual machine
 - ▶ Open a console
 - ▶ The "last reboot" command indicates how long the server has been running.

boot uiajnusks

Reset password

Redeploy

Ubuntu Advantage support p...

Serial console

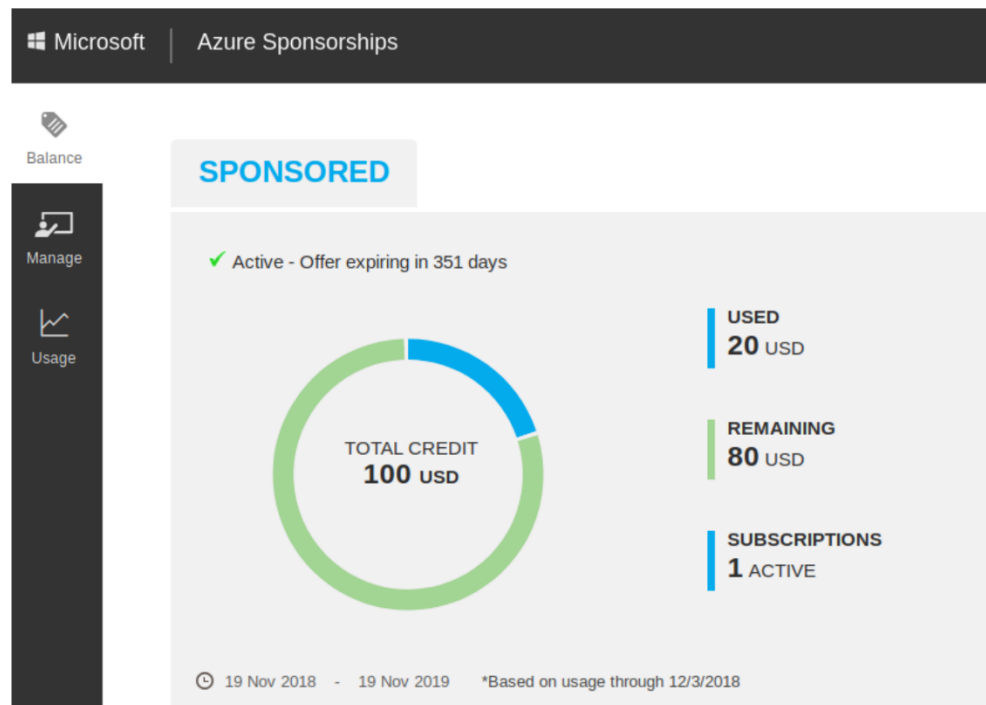
Connection troubleshoot

```
maestro@ejercicioigrpc:~$ last reboot
reboot   system boot  4.15.0-1032-azur Mon Dec  3 16:00   still running
reboot   system boot  4.15.0-1032-azur Mon Dec  3 15:43 - 15:52 (00:09)
reboot   system boot  4.15.0-1032-azur Mon Nov 26 15:28 - 21:00 (05:31)
reboot   system boot  4.15.0-1032-azur Fri Nov 23 23:13 - 23:29 (00:16)
reboot   system boot  4.15.0-1030-azur Fri Nov 23 22:54 - 23:12 (00:17)
reboot   system boot  4.15.0-1030-azur Wed Nov 21 14:20 - 15:45 (01:25)

wtmp begins Wed Nov 21 14:20:30 2018
```

Introduction PaaS and IaaS

- ▶ Then go to <https://www.microsoftazuresponsorships.com> and choose "check your balance".



Introduction PaaS and IaaS

- ▶ Within the same site, go to "usage" on the left and download the usage statistics.

Azure para estudiantes	01/12/18	Storage	Standard HDD Managed Disks	EU West	S4 Disks	0.064512	0.099090432
Azure para estudiantes	01/12/18	Storage	Tables	All	LRS Data Stored	7.2E-05	0.00000504
Azure para estudiantes	01/12/18	Storage	Standard HDD Managed Disks	EU West	S30 Disks	0.032256	1.32120576
Azure para estudiantes	01/12/18	Storage	Tables	All	Batch Write Operations	0.0146	0.00000584
Azure para estudiantes	01/12/18	Storage	Standard Page Blob	All	LRS Data Stored	9.6E-05	0.0000048
Azure para estudiantes	02/12/18	Storage	Standard HDD Managed Disks	EU West	S4 Disks	0.059136	0.090832896
Azure para estudiantes	02/12/18	Storage	Tables	All	LRS Data Stored	6.9E-05	0.00000483
Azure para estudiantes	02/12/18	Storage	Standard HDD Managed Disks	EU West	S30 Disks	0.029568	1.21110528
Azure para estudiantes	02/12/18	Storage	Tables	All	Batch Write Operations	14	0.0000056
Azure para estudiantes	02/12/18	Storage	Standard Page Blob	All	LRS Data Stored	9.2E-05	0.0000046
Azure para estudiantes	03/12/18	Storage	Standard HDD Managed Disks	EU West	S4 Disks	0.034944	0.053673984
Azure para estudiantes	03/12/18	Storage	Tables	All	LRS Data Stored	4.2E-05	0.00000294
Azure para estudiantes	03/12/18	Storage	Standard HDD Managed Disks	EU West	S30 Disks	0.017472	0.71565312
Azure para estudiantes	03/12/18	Storage	Tables	All	Batch Write Operations	8	0.0000032
Azure para estudiantes	03/12/18	Storage	Standard Page Blob	All	LRS Data Stored	5.6E-05	0.0000028

- ▶ You pay money to have the machine even without running it because you are taking up space. *Use only what you need.*

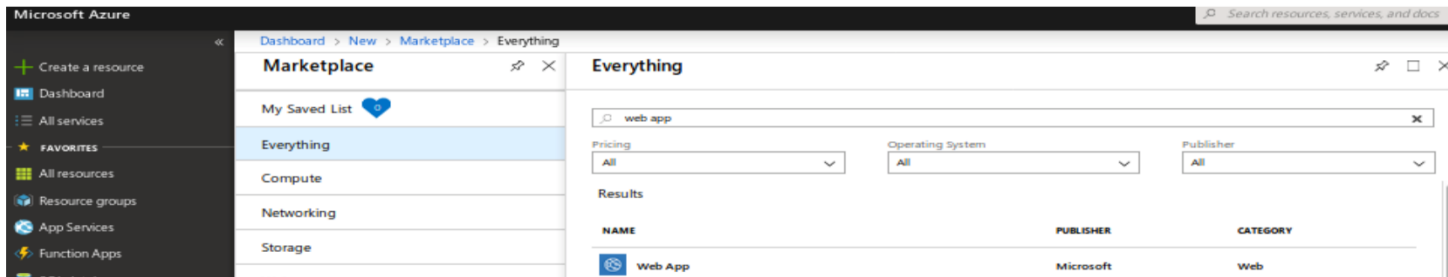
Introduction PaaS and IaaS

- ▶ **What can I do to use cloud services more efficiently?**
 - ▶ Three options:
 - ▶ **IaaS:** based on virtualization technology. Running virtual machines as guests in a data center.
 - ▶ **PaaS:** you get a platform on which applications are delivered.
 - ▶ **SaaS:** the software is obtained directly through the web.
 - ▶ A fourth: no server. It's the lambda (AWS) or functions (Azure). (<https://www.ibm.com/cloud/learn/iaas-paas-saas>) [<https://www.ibm.com/cloud/learn/iaas-paas-saas>]

Introduction PaaS and IaaS

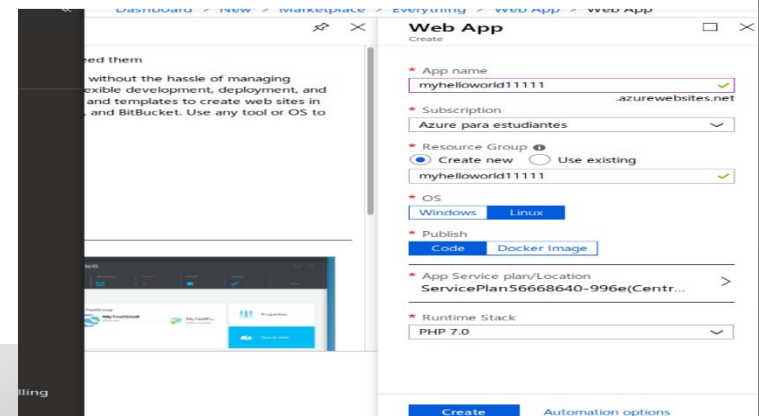
▶ Example of PaaS with Azure

- ▶ Create a resource and search for "web app". Select the "Web App" option and click "create".



- ▶ Search for an unused web application name.

- ▶ Green check:



Introduction PaaS and IaaS

- ▶ **Example of PaaS with Azure**

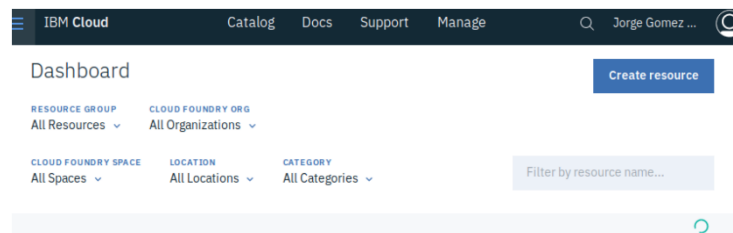
- ▶ If you see this problem, which requires contacting, ignore it and try again later.

The screenshot displays the Azure portal interface. On the left is a dark navigation menu with the following items: Azure Active Directory, Monitor, Advisor, Security Center, Cost Management + Billing, and Help + support. The main content area shows a 'Runtime Stack' dropdown menu currently set to 'PHP 7.0'. Below this, there is a red error notification box with a white exclamation mark icon and the text: 'We're having problems communicating with the server. Click to contact Azure Support.' At the bottom of the interface, there are two buttons: a grey 'Create' button and a blue 'Automation options' link.

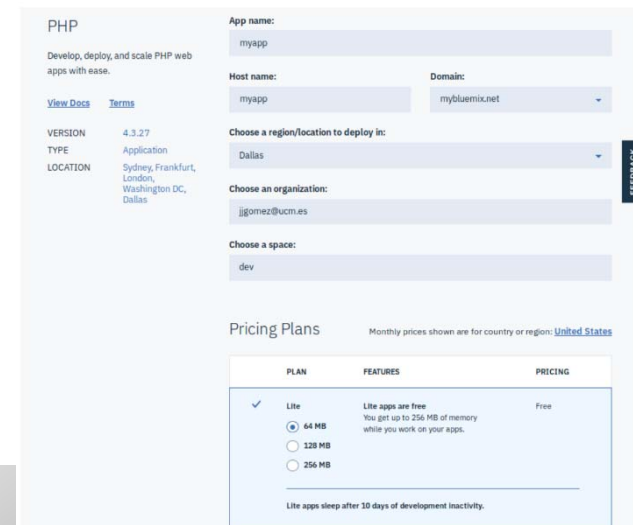
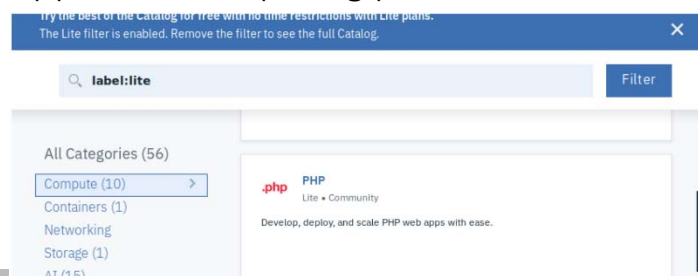
Introduction PaaS and IaaS

▶ PaaS with IBM Cloud example

- ▶ Register at <https://developer.ibm.com/academic/>
- ▶ Enter the application panel <https://console.bluemix.net/dashboard/apps/> and select "Create Resource". Choose Compute and Php



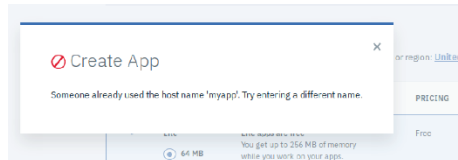
▶ Choose app name and pricing plan



Introduction PaaS and IaaS

▶ PaaS with IBM Cloud example

- ▶ If the host name is chosen (it must be unique), then this message will appear and must be changed.



- ▶ IBM asks for the IBM Cloud command line interface to be installed and instructs if you want to update the code.

If not, access the url of the app:

Cloud Foundry apps / myapp This app is awake. [View App URL](#)

Org: ibmdev@ibm.com Location: Dallas Space: dev

Before you begin, download and install the IBM Cloud CLI

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

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

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

```
ibmcloud --url=https://mybluemix.net
```
- 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 `src/main/webapp` 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 `resources.yml` 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.

```
ibmcloud --url=https://mybluemix.net --username=  
ibmcloud --url=https://mybluemix.net --password=  
If you are using a Federated ID, use the --sso option.

```
ibmcloud --url=https://mybluemix.net --sso=
Note: You must add single or double quotes around --username, --password, and --sso, unless the value contains a space, for example, --sso "my user".
```


```
- 4 From your_new_directory, redeploy your app to IBM Cloud by using the `ibmcloud app push` command. For more information about the `ibmcloud app push` command, see [Using the push command](#).
- 5 Access your app by browsing to `https://myapp@mybluemix.net`.

Command line interface
Run your code locally. Manually push to IBM Cloud.

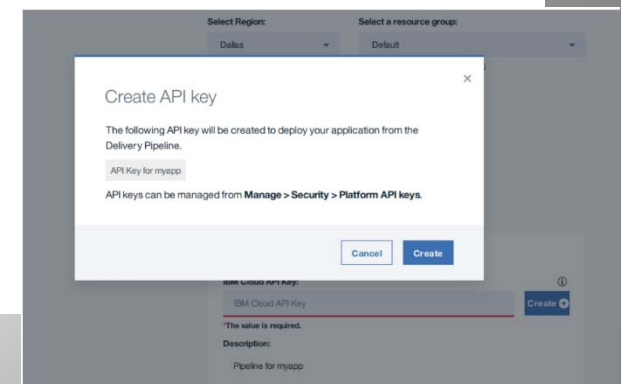
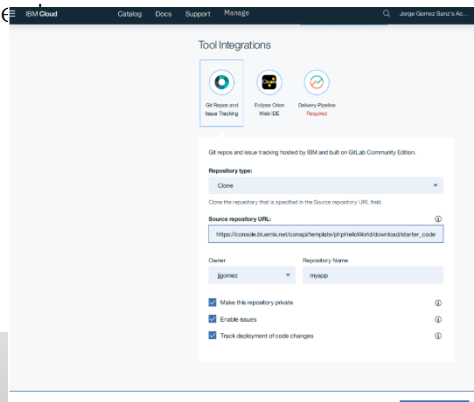
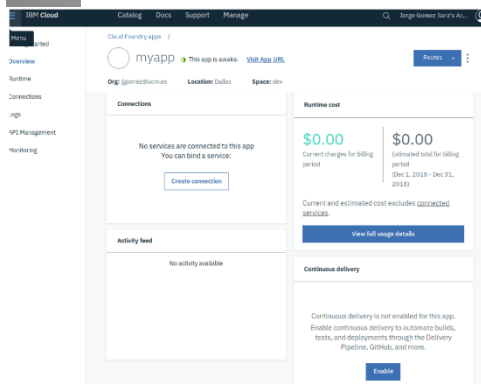
Continuous delivery
Build, test, and deploy by using DevOps practices.

Introduction PaaS and IaaS

▶ APP development with IBM Cloud

- ▶ Once the application is deployed and a name is assigned to it, it is necessary to upload the changes. 2 options:
 - ▶ Using the **IBM Cloud CLI** (you need to install it on your computer)
 - ▶ Using a **tool chain** and connecting the application to a git repo
- ▶ In the example above, click on "continuous delivery" and then on "creating a toolchain from an app". The tutorial indicates how to create a toolchain, how to assign the toolchain to an app. This is a summary:
 - ▶ With the application, click on summary and then "enable" continuous delivery (bottom right).

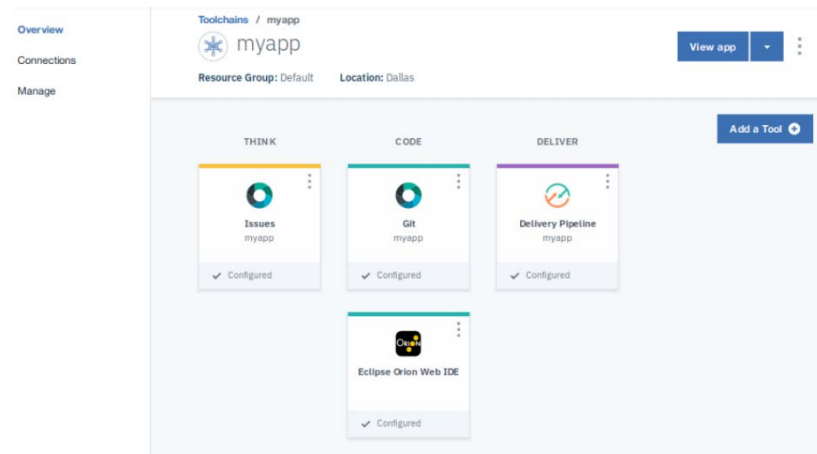
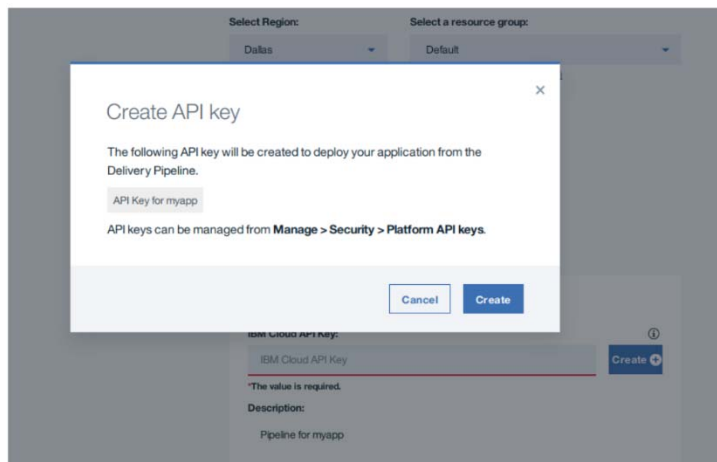
Then click Create
in create



Introduction PaaS and IaaS

- ▶ APP development with IBM Cloud
 - ▶ Test again.

When finished, you will have a repo, a SaaS with Eclipse Orion...



Introduction PaaS and IaaS

▶ APP development with IBM Cloud

- ▶ You can access the toolchain again from the application script.

The screenshot shows the IBM Cloud application dashboard for an application named 'myapp'. The dashboard is organized into several sections:

- Connections:** A section titled 'Connections' with the text 'No services are connected to this app. You can bind a service:' and a 'Create connection' button.
- Runtime cost:** A section titled 'Runtime cost' showing 'Current charges for billing period' as '\$0.00' and 'Estimated total for billing period (Dec 1, 2018 - Dec 31, 2018)' as '\$0.00'. Below this, it states 'Current and estimated cost excludes connected services.' and includes a 'View full usage details' button.
- Activity feed:** A section titled 'Activity feed' with the text 'No activity available'.
- Continuous delivery:** A section titled 'Continuous delivery' with the text 'You enabled continuous delivery and have a toolchain. With your toolchain, you can automate builds, tests, deployments, and more. [View Docs](#).' and a 'View toolchain' button.

At the top of the dashboard, there is a navigation bar with the application name 'myapp', a status indicator 'This app is awake.', a 'Visit App URL' link, and a 'Routes' dropdown menu. Below the navigation bar, the organization 'Org: jgomez@ucm.es', location 'Location: Dallas', and space 'Space: dev' are displayed.

From here you can do whatever you want:

- ▶ Use Eclipse Orion to access the file and edit it
- ▶ Clone the repo locally and drive the changes

Introduction PaaS and IaaS

▶ APP development with IBM Cloud

- ▶ In order to make the changes visible, it is necessary to activate the delivery pipeline as in image 1.

Toolchains / myapp / myapp
myapp | Delivery Pipeline

The screenshot shows a delivery pipeline with two stages: 'Build Stage' and 'Deploy Stage'. The 'Build Stage' is marked 'STAGE PASSED' and shows a job 'Build' that passed 3m ago. The 'Deploy Stage' is marked 'STAGE FAILED' and shows a job 'Deploy' that failed 'now'. A blue button labeled 'SEND TO Deploy Stage' is visible at the bottom.

Toolchains / myapp / Delivery
Delivery | Delivery Pipeline

The screenshot shows a delivery pipeline with two stages: 'MyStage' and 'Build'. The 'MyStage' is marked 'STAGE PASSED' and shows a job 'Build' that passed 9m ago. The 'Build' stage is also marked 'STAGE PASSED' and shows a job 'Deploy' that passed 'now'.

Introduction PaaS and IaaS

▶ APP development with IBM Cloud

- ▶ It may fail if the parameters are not the same. The application name must match the host name.
- ▶ Troubleshooting:
 - ▶ messages with "the route... is already in user". The namespace "dev" and the same first name as the host name must be chosen in the delivery.
 - ▶ I can't see the changes in the URL that IBM gave me. Verify that you have made changes to the git repository and that you went through the pipeline.
 - ▶ The changes are not appearing. Try refreshing the web page where you view the application. It may change over time for a while.

Deploy Remove

Deploy configuration

Deployer type ⓘ
Cloud Foundry

IBM Cloud region ⓘ
Dallas - https://api.ng.bluemix.net

API key ⓘ
Provide an API key to get organizations and spaces.(Preferred)

Organization ⓘ
jjgomez@ucm.es

Space ⓘ
dev

Application name ⓘ
myappjorge

Deploy script ⓘ

```
#!/bin/bash
cf push "${CF_APP}"
```

Run conditions

Stop running this stage if this job fails ⓘ