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Connecting your RPi to the IBM Watson IoT Foundation(NodeRed and Cloudant!)

Miracle's IoT Workshop| Miracle Innovation Labs

Premier Business Partner IBM™

MIRACLELABS
EMPOWERING CHANGE THROUGH INNOVATION

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An Explosion of Possibilities

50 Billion Connected Devices that can compute and communicate!

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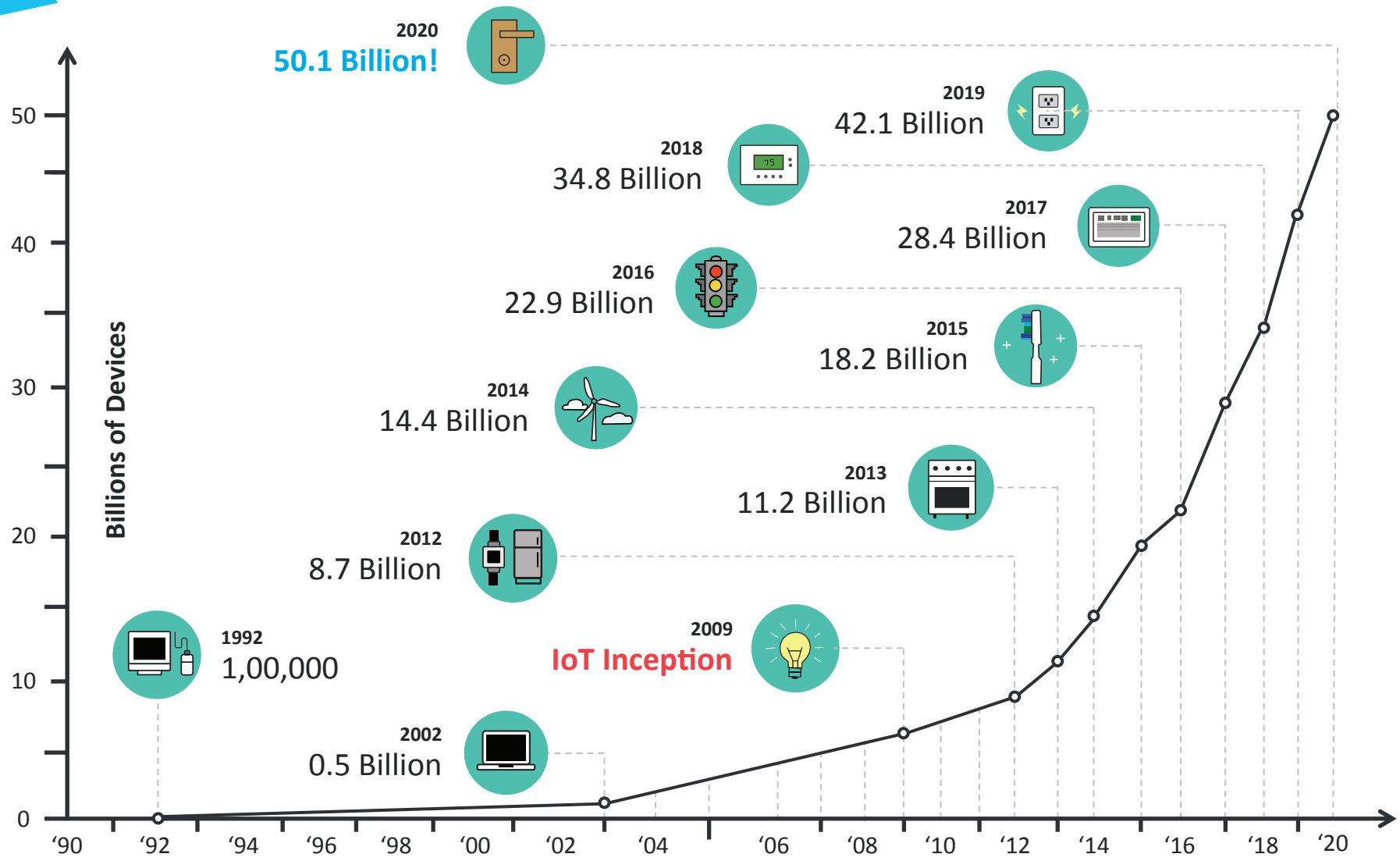
An Explosion of Possibilities



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An Explosion of Possibilities

"From homes to retail stores, things around you are starting to become **intelligent** and **communicate** with each other! **Welcome to the new age of Connected Things ☺**"

An Explosion of Possibilities

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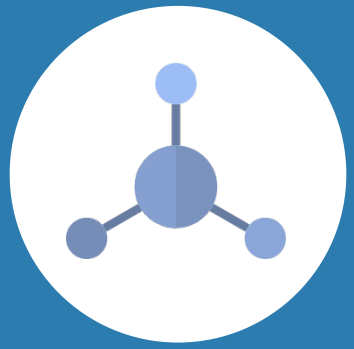
What can you do with IoT Data?

Predict

Outcomes and demand through data and patterns collected by connected things

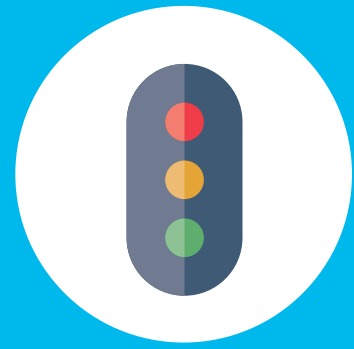
Monetize

Data coming from your network of things and expose to the world for innovation



Extend

Your devices and sensors as APIs and Services to be consumed in innovative ideas



Control

Machines, homes and more through your smart phones and network of connections

Control your car with a mobile device (or) predict machine health and failure with a sensor!

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IBM Bluemix and the IoT Foundation(IoTf)

Connect Devices and Sensors to the Cloud in minutes ☺

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IBM Bluemix for Innovation

Rapidly bring new products and services to market at lower cost

Balance agility with quality, security and governance.

Extend existing IT investments into cloud business and delivery models

Build your apps, your way
Use the most prominent compute technologies to power your app: Cloud Foundry, Docker, OpenStack.

Scale more than just instances
Development, monitoring, deployment, and logging tools allow the developer to run and manage the entire application.

Extend apps with services
A catalog of IBM, third party, and open source services allow the developer to stitch an application together quickly.

Deploy and manage hybrid apps seamlessly
Get a seamless dev and management experience across a number of hybrid implementations options.

Layered Security
IBM secures the platform and infrastructure and provides you with the tools to secure your apps.

Flexible Pricing
Try compute options and services for free and, when you're ready, pay only for what you use. Pay as you go and subscription models offer choice and flexibility.

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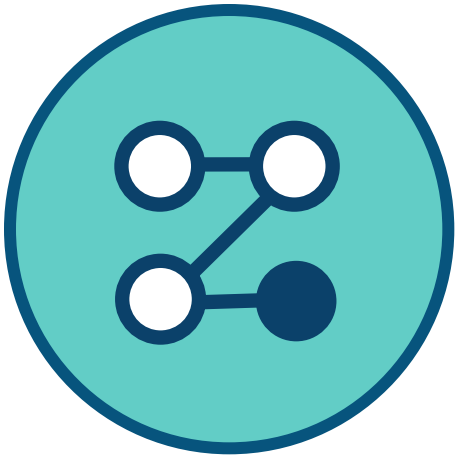
IBM IoT Foundation



Responsive Connectivity

Device Management

Secure Communication

Storage and Access to Data

IBM Bluemix

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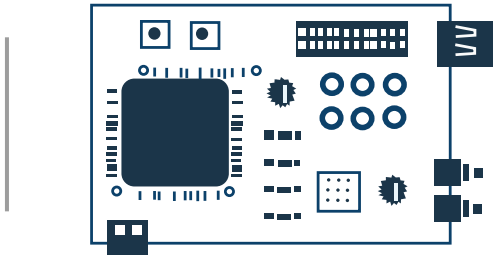
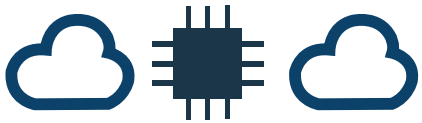
Understanding Things?



Your device or gateway

MQTT

REST and Real-Time APIs



IBM Internet of Things Foundation

Your application and analytics

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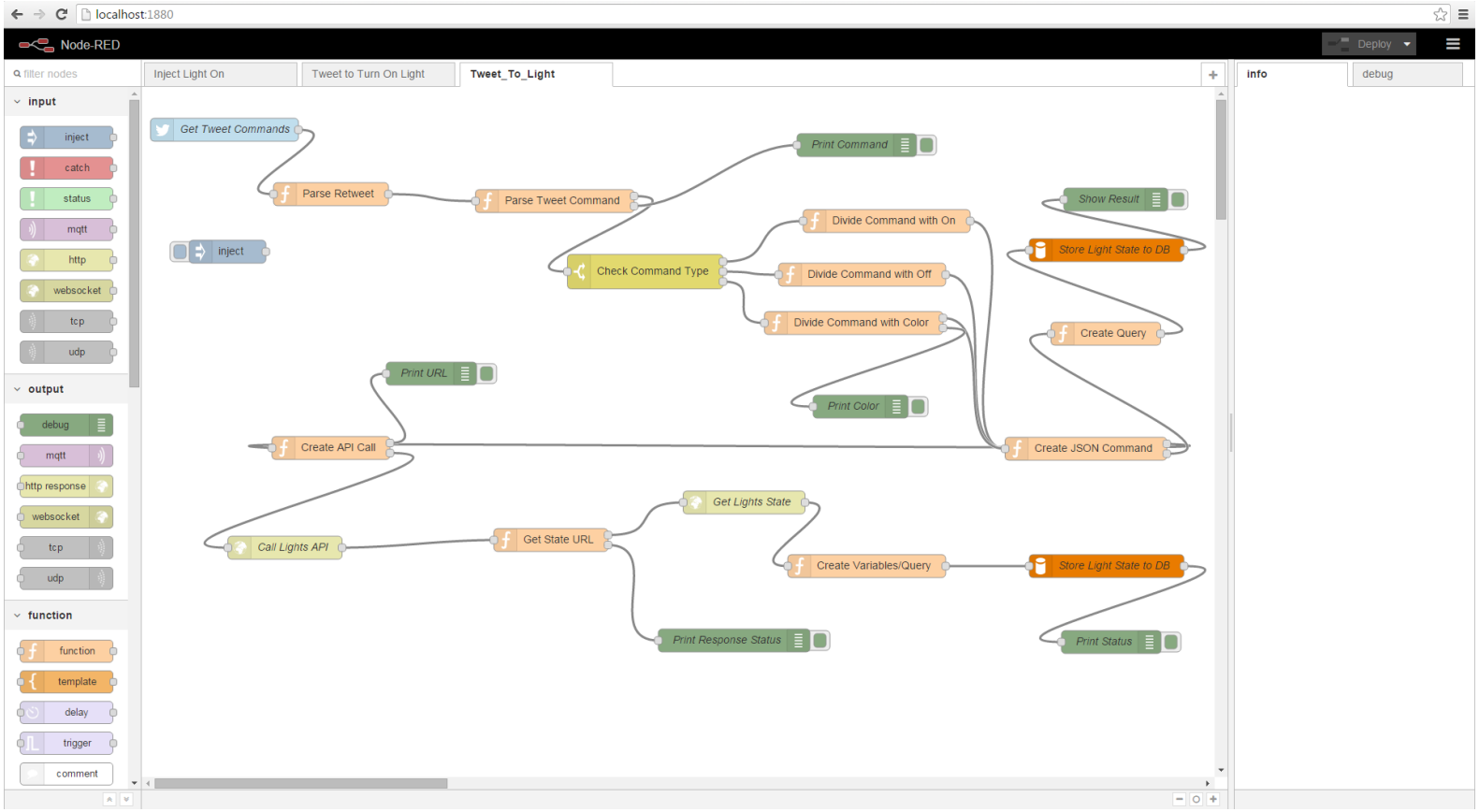
Introducing NodeRed



A Visual Tool for **WIRING** the **Internet of Things** ☺

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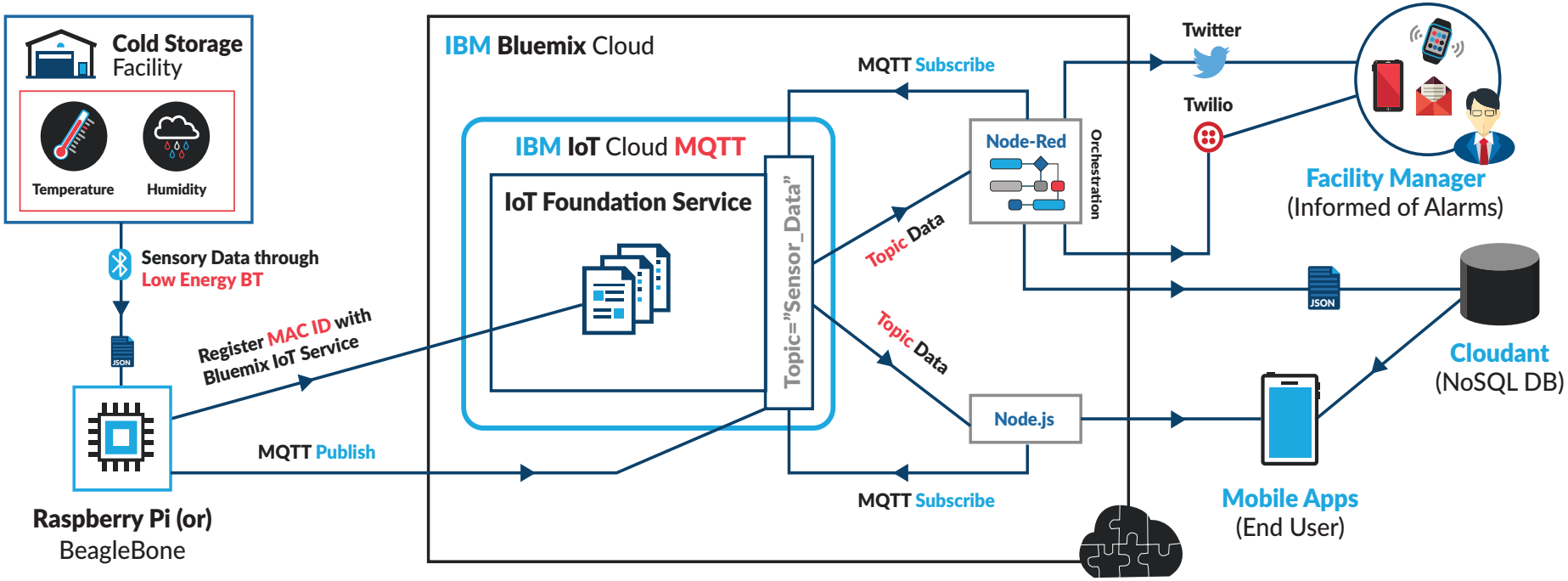
Exploring IoT @ A Cold Storage Facility



IBM Bluemix, NodeRed and Raspberry Pi for a Connected Cold Storage Facility

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Lets go Hands-On with IBM Bluemix

Follow Us and Let us know if you need help ☺

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#1 | Get the Tutorial Pack

Option #1 : Go to
https://github.com/MiracleLabs/IotWorkshop

download the ZIP File using the UI (or)

Option #2 : Use the following command to download directly from Terminal/Command Prompt

curl –Lo master.zip https://github.com/MiracleLabs/IotWorkshop/zipball/master

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#2 | Login to IBM Bluemix

www.bluemix.net

Create your organization and space for development

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#3 | Connect to your RPi

- **Ping** your RPi and make sure that you are able to get a response the access its terminal using **SSH** (or) **Putty**
- Download the **IoTF Recipe** and install with the **dpkg** command

---

curl –LO https:/github.com/ibm-messaging/iot-raspberrypi/releases/download/1.0.1.1/iot_1.0-2_armhf.deb

---

service iot status (and) **service iot getdeviceid**

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#4 | Create IoTF Application and Service

- Select **Internet of Things Foundation Starter** from the Application Boiler Plates
  - You will get a **Node.js** based SDK and **Cloudant NoSQL DB** as default within the application
- Once the application is staged, go back to the Catalog and create a new **Internet of Things Foundation Service**
  - **Bind** this service to the your IoTF Starter Application
- **Restage** your application(2-3 Minutes)!

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#6 | Register Your Device with IBM IoTf

- Launch the **IoTf Dashboard** from the IoTf Service that you created in **Bluemix**
- Create a new Device Type called **“rpi” and** Create a new **Device** in the dashboard
- Get the following **configuration data** for the device
  - Authentication Token
  - Device ID
  - Organization ID
  - Authentication Method
  - Device Type

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#7 | Configure your RPi

- Stop the IoT Service with the **service iot stop** command
- Create the **device.cfg** file
  - **var token** = <Your Authentication Token>
  - **var type** = <Your Device Type>
  - **var id** = <Your Device ID>
  - **var org** = <Your Organization ID>
  - **var auth-method** = “token”
- Restart the IoT Service with the **service iot start** command

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#8 | Visualize Data in Bluemix/NodeRed

- Check the **flow of events** and **connection status** in the IoT Foundation Dashboard
- Go back to your IoTF Application and access the **Node Red Flow Editor** within Bluemix
- Create a Flow to print the device data by using the following nodes,
  - **IBMIOT Node = Get data from the IoT Foundation Service**
  - **Debug Node = Print the Simulator Data to the Debug Column**
  - **Function Node = Filter the JSON response of the device**
- Once completed **deploy** the flow and check in the **debug** column

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#9 | Store Sensor Data in Cloudant

- Access the **Cloudant DB Dashboard** from the Application that you created
- Create a new DB **“rpi_data”** in the dashboard
- Add the **Cloudant Node** to your NodeRed Flow and configure the properties
- Connect the function node to the Cloudant node instead of the Debug Node and Deploy the flow
- Note that the Cloudant node stores the **msg.payload** property by default

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#10 | Access Cloud9 and Create Space

- Login (or) Sign Up at **http://c9.io**
- Create a new **workspace** and call it "StrongLoopSpace"
- Select the **Node.js Template** when prompted

- Install **StrongLoop** with the following npm command,
  - **npm install –g strongloop**

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#11 | Create the StrongLoop REST API

- Start by creating the Application Model with the command **slc loopback**
  - Remember your Directory/Application Name
- Navigate to your application with **cd <app-name>/server** and open the **datasources.json** file and add the Cloudant Connector details(JSON)
  - You can also use the GUI of Cloud9 to access the file
- Install **Cloudant Connector** with the **npm install loopback-connector-cloudant** command

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#12 | Create the Loopback Model

- Create the loopback model by using the **slc loopback:model** command
  - Enter the Model Name
  - Select the Cloudant DB as your Data Source
  - Select the PersistedModel as the Base Class
  - Add your required properties for the model
    - For example add **fuel** and **deviceId** as String Types
- Run the StrongLoop API Explorer by using the command **node .** and open the link **http://0.0.0.0:8080/explorer** from the terminal

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#13 | Add Loopback:Model to NodeRed

- For the flow to execute properly we must **add the loopbackModel name** to our NodeRed Flow
- Replace the function node with the following,

---

msg.payload = {“fuel”:msg.payload.d.fuel,
”loopback__model__name” : <Your Model Name>}

- **Go to the Explorer and test the GET Operation!**

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Question and Answers Time!!

We're more than happy to help out

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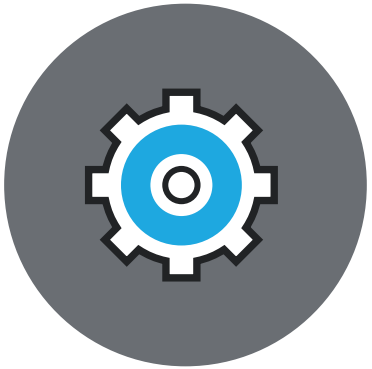
Reach Out! @Innovation

Give us a call @ **248-412-0425** (or) email us at **innovation@miraclesoft.com**

Enterprise Mobility and NextGen Tech

DevOps, IoT and Enterprise Cloud

Big Data and Analytics



API Economy and REST

Check out our work at **miraclesoft.com/library**

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Thank You

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