Project Report

Topic: Intelligent Customer Helpdesk with Smart Document Understanding

Category: Machine Learning/Artificial Intelligence

Application ID: SPS_APL_20200000745

Project ID: SPS_PRO_99

Internship at: SMARTINTERNZ

Completed by: Atig Ghosh

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Contents:

1. INTRODUCTION

1.1. Overview

A customer helpdesk, chatbot, is designed for Ecobee3. Ecobee3 is a smart thermostat falling under the category of smart home devices. The chatbot helps the user to gather information by raising query. This chatbot accesses an unstructured document (user manual) of Ecobee3, by smart understanding of the document it replies to any query related to Ecobee3.

1.2. Purpose

The main purpose is to enhance the efficiency of the chatbot (Customer Helpdesk) by incorporating Smart Document Understanding. So that, both predefined and non-predefined queries get an answer.

2. LITERATURE SURVEY

2.1. Present Problem

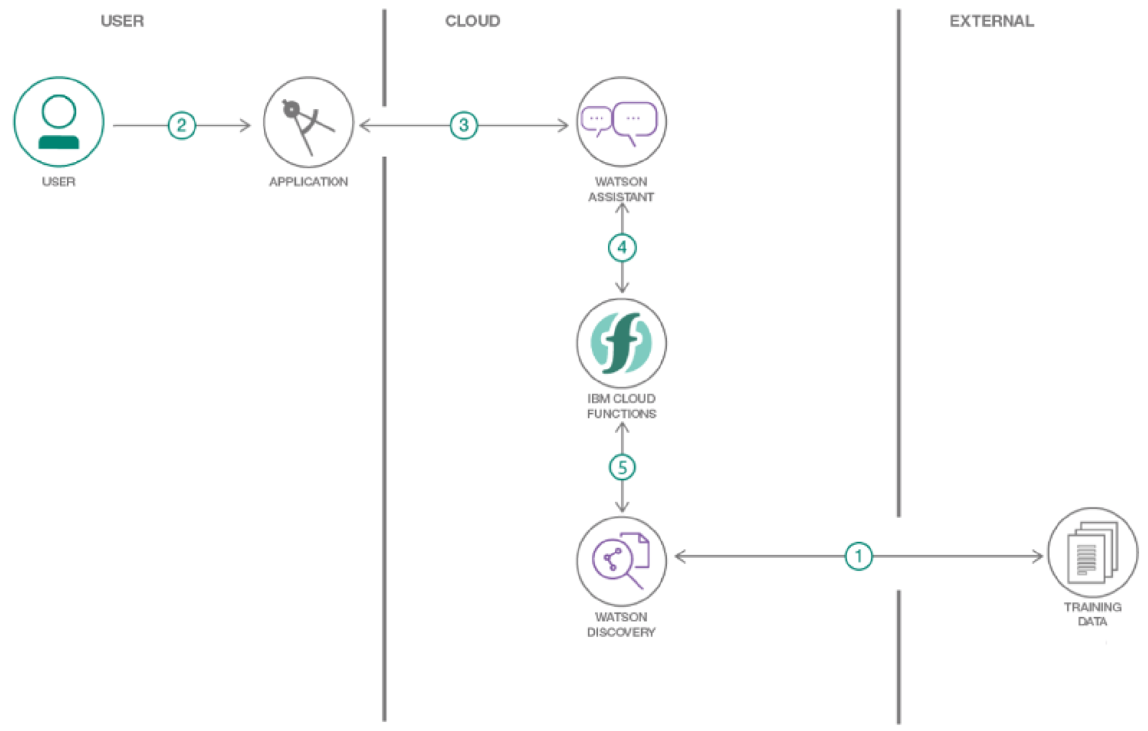
The usual chatbots are able to help customers with specific queries, like "What is the store location?", "What is the operation time?", "Book me an appointment." and so on. They are unable to give details about a particular device and its operations. So, whenever the query falls outside the predefined set, the chatbot initiates the conversation to a real person, customer care represantative.

2.2. Proposed Solution

This project deals with those queries which are out of the set of predefined queries. One of the major part of these kind of queries are about a device specification and handling assistance of the device.
Usually, facts about operating a device is available in the user manual. With the help of Watson Discovery (an IBM cloud service), we are able to smartly analyze the user manual to obtain the important parts of the manual and divide it subtitle wise. Therefore, any query regarding the operations of the device gets a reply from the Helpdesk after it has accessed the user manual using Smart Document Understanding.

3. THEORITICAL ANALYSIS

3.1. Block Diagram



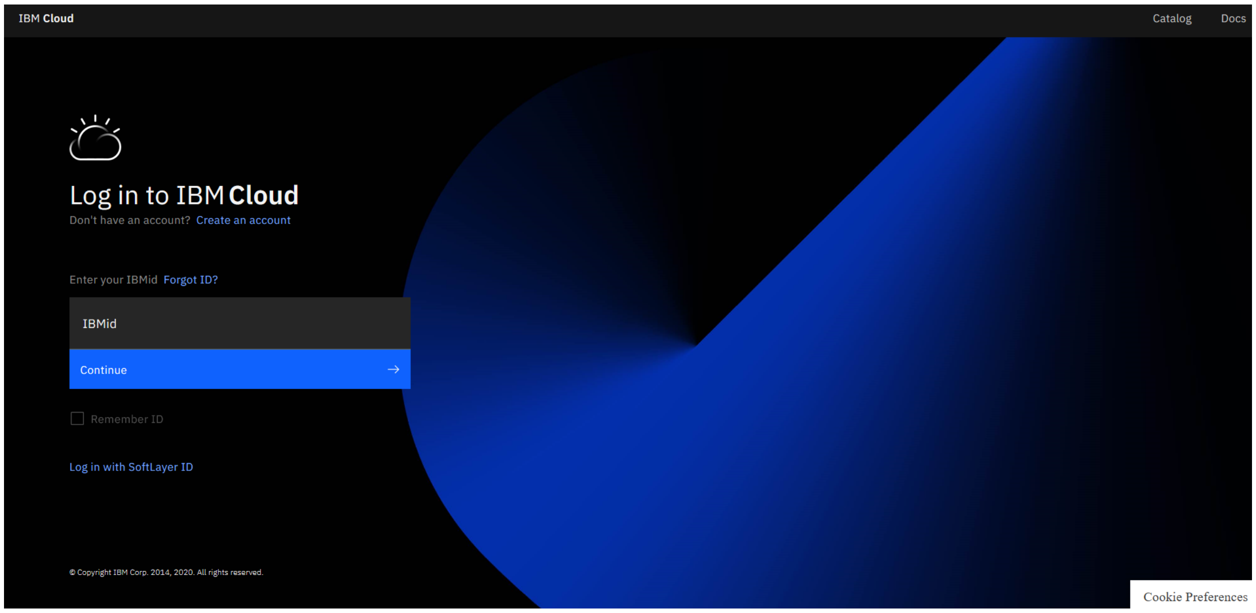
3.2. Hardware/Software Requirements

We have to build an IBM Cloud account. By creating IBM Cloud account we are eligible to create various IBM Services. For this project, we are required to build Watson Discovery Service, IBM Cloud function action, Watson Assistant Service and Node-Red App. Also, a document of the user manual of ecobee3 is needed, which is fed to Watson Discovery Service.

4. PROCEDURAL ANALYSIS

- Create an IBM Cloud account.

To create IBM Cloud account, go to https://www.ibm.com/cloud



IBM Cloud

Catalog Docs

Log in to IBM **Cloud**

Don't have an account? Create an account

Enter your IBMid Forgot ID?

IBMid

Continue

Remember ID

Log in with SoftLayer ID

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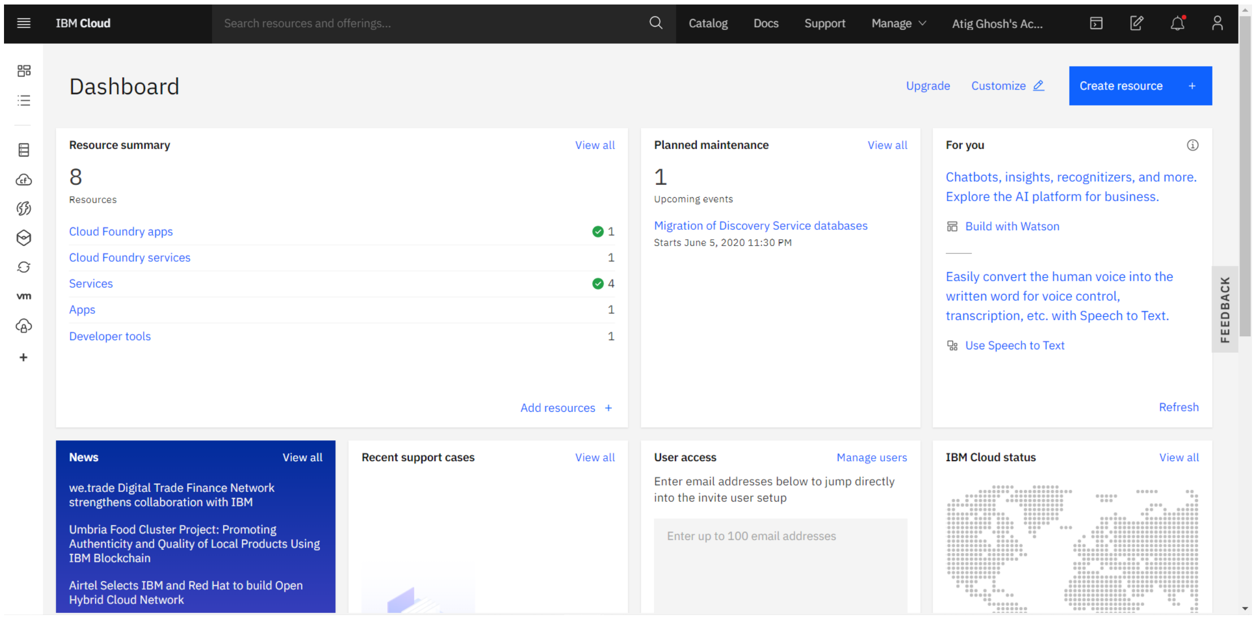
Cookie Preferences

Click on Create an account.

If an account exists then log in with the IBMid and password.

After loging in, check Dashboard for present Services.



IBM Cloud

Search resources and offerings...

Catalog Docs Support Manage Atig Ghosh's Ac...

Dashboard

Upgrade Customize Create resource +

Resource summary View all

8

Resources

Cloud Foundry apps	✓ 1
Cloud Foundry services	1
Services	✓ 4
Apps	1
Developer tools	1

Add resources +

Planned maintenance View all

1

Upcoming events

Migration of Discovery Service databases

Starts June 5, 2020 11:30 PM

For you

Chatbots, insights, recognizers, and more. Explore the AI platform for business.

Build with Watson

Easily convert the human voice into the written word for voice control, transcription, etc. with Speech to Text.

Use Speech to Text

Refresh

FEEDBACK

News View all

we.trade Digital Trade Finance Network strengthens collaboration with IBM

Umbria Food Cluster Project: Promoting Authenticity and Quality of Local Products Using IBM Blockchain

Airtel Selects IBM and Red Hat to build Open Hybrid Cloud Network

Recent support cases View all

User access Manage users

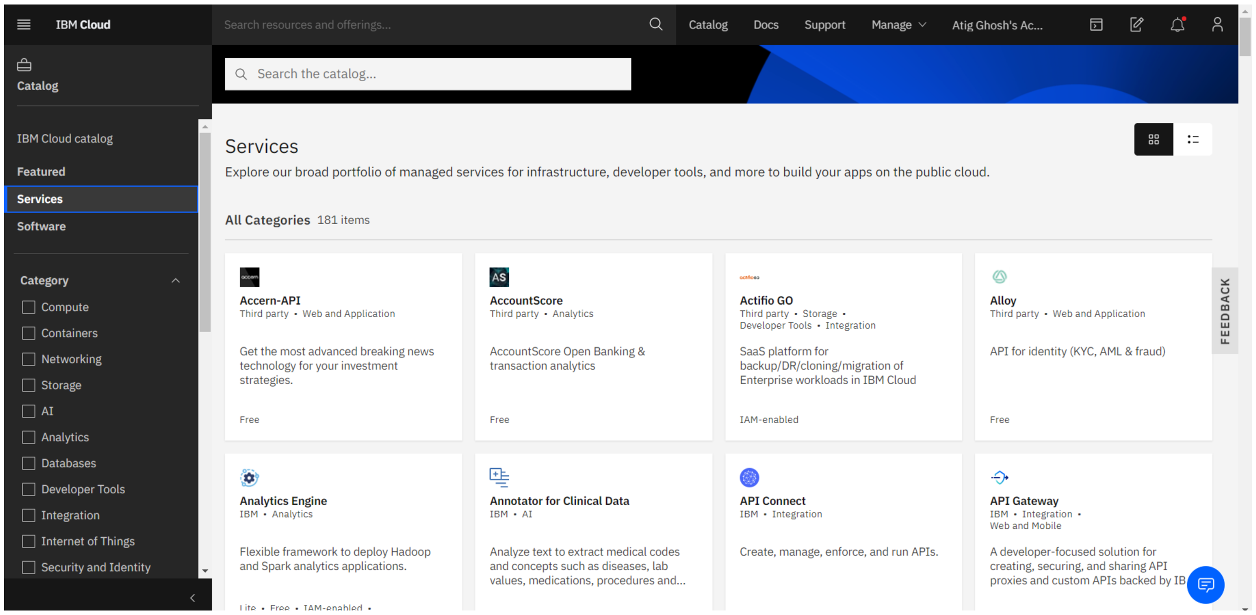
Enter email addresses below to jump directly into the invite user setup

Enter up to 100 email addresses

IBM Cloud status View all

- Create Watson Discovery.

Open the catalog option in IBM Cloud account and select Services.



Services

Explore our broad portfolio of managed services for infrastructure, developer tools, and more to build your apps on the public cloud.

All Categories 181 items

Accern-API
Third party • Web and Application
Get the most advanced breaking news technology for your investment strategies.
Free

AccountScore
Third party • Analytics
AccountScore Open Banking & transaction analytics
Free

Actifio GO
Third party • Storage • Developer Tools • Integration
SaaS platform for backup/DR/cloning/migration of Enterprise workloads in IBM Cloud
IAM-enabled

Alloy
Third party • Web and Application
API for identity (KYC, AML & fraud)
Free

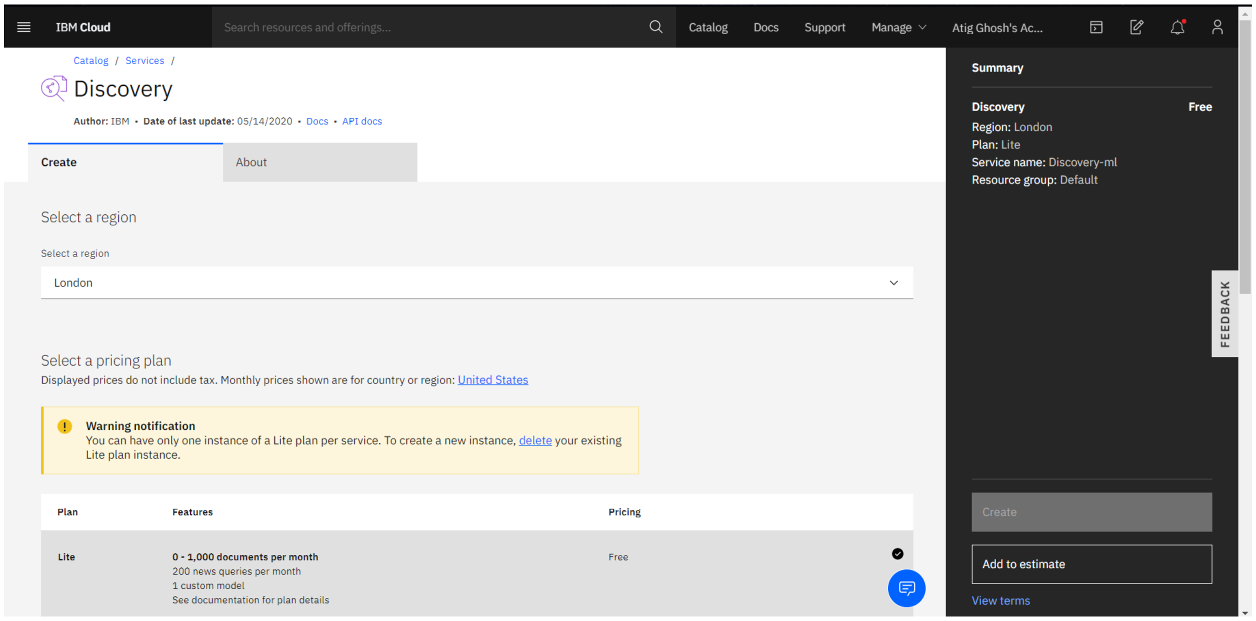
Analytics Engine
IBM • Analytics
Flexible framework to deploy Hadoop and Spark analytics applications.
Lite • Free • IAM-enabled •

Annotator for Clinical Data
IBM • AI
Analyze text to extract medical codes and concepts such as diseases, lab values, medications, procedures and...

API Connect
IBM • Integration
Create, manage, enforce, and run APIs.

API Gateway
IBM • Integration • Web and Mobile
A developer-focused solution for creating, securing, and sharing API proxies and custom APIs backed by IB

Under the Artificial Intelligence(AI) section, Discovery Service can be found.



Discovery

Author: IBM • Date of last update: 05/14/2020 • Docs • API docs

Select a region

Select a region: London

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: United States

Warning notification
You can have only one instance of a Lite plan per service. To create a new instance, delete your existing Lite plan instance.

Plan	Features	Pricing
Lite	0 - 1,000 documents per month 200 news queries per month 1 custom model See documentation for plan details	Free

Summary

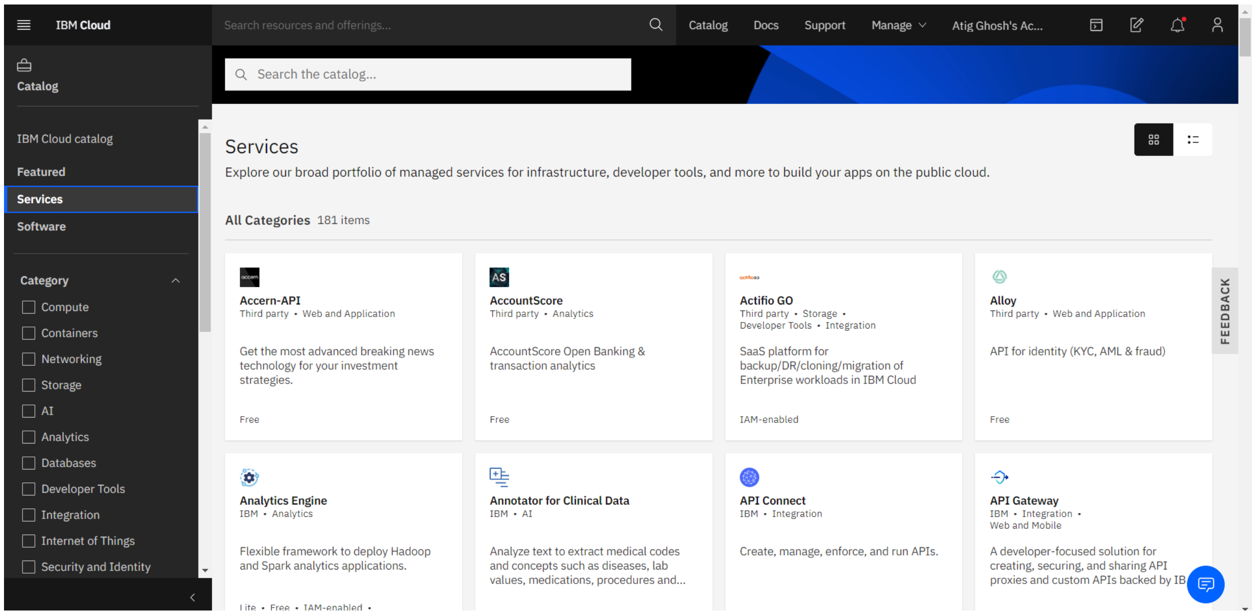
Discovery Free
Region: London
Plan: Lite
Service name: Discovery-ml
Resource group: Default

Select a region and plan and configure the service. Then click on Create.
Discovery Service will be created successfully.
Copy the "url" and "api key" value, these will be required in cloud function action.

Then click on Launch Watson Discovery to launch the Discovery Service.

- Create Watson Assistant.

Open the catalog option in IBM Cloud account and select Services.



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AccountScore
Third party • Analytics
AccountScore Open Banking & transaction analytics
Free

Actifio GO
Third party • Storage • Developer Tools • Integration
SaaS platform for backup/DR/cloning/migration of Enterprise workloads in IBM Cloud
IAM-enabled

Alloy
Third party • Web and Application
API for identity (KYC, AML & fraud)
Free

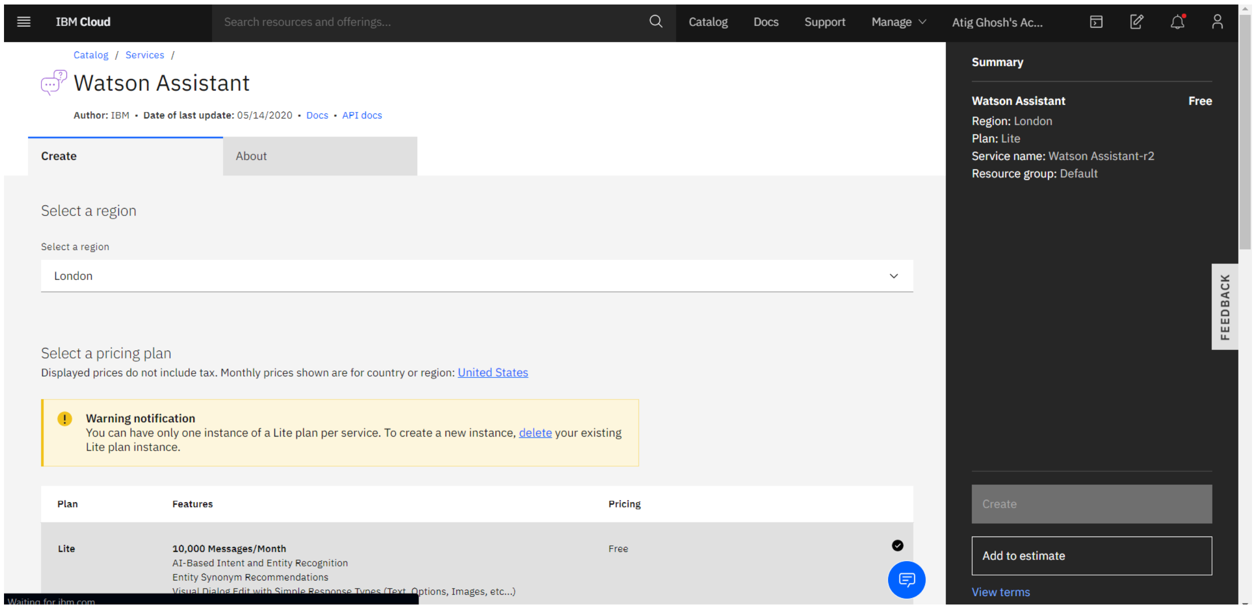
Analytics Engine
IBM • Analytics
Flexible framework to deploy Hadoop and Spark analytics applications.
Lite • Free • IAM-enabled •

Annotator for Clinical Data
IBM • AI
Analyze text to extract medical codes and concepts such as diseases, lab values, medications, procedures and...

API Connect
IBM • Integration
Create, manage, enforce, and run APIs.

API Gateway
IBM • Integration • Web and Mobile
A developer-focused solution for creating, securing, and sharing API proxies and custom APIs backed by IB

Under the Artificial Intelligence(AI) section, Watson Assistant Service can be found.



Watson Assistant

Author: IBM • Date of last update: 05/14/2020 • Docs • API docs

Select a region

Select a region: London

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: United States

Warning notification
You can have only one instance of a Lite plan per service. To create a new instance, delete your existing Lite plan instance.

Plan	Features	Pricing
Lite	10,000 Messages/Month AI-Based Intent and Entity Recognition Entity Synonym Recommendations Visual Dialog Edit with Simple Response Types (Text, Options, Images, etc...)	Free

Summary

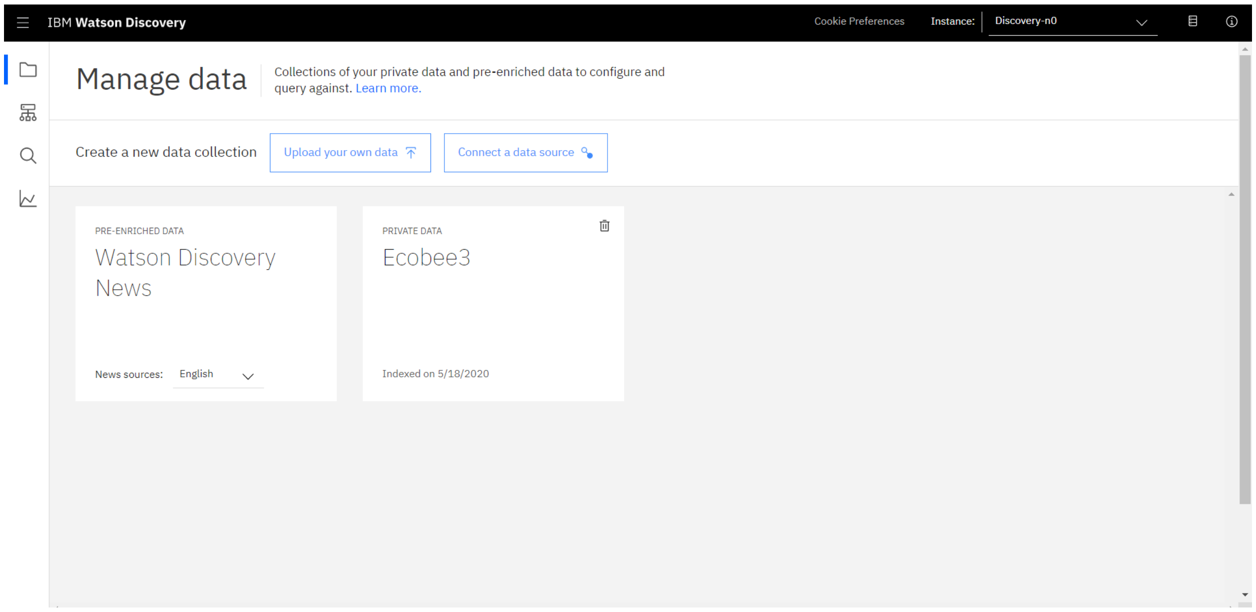
Watson Assistant — Free
Region: London
Plan: Lite
Service name: Watson Assistant-r2
Resource group: Default

Select a region and plan and configure the service. Then click on Create.
Assistant Service will be created successfully.
Copy the "url" and "api key" values, these will be required in Node-Red flow.

Then click on Launch Watson Assistant to launch the Assistant Service.

- Configure Watson Discovery

IBM Watson Discovery when launched.

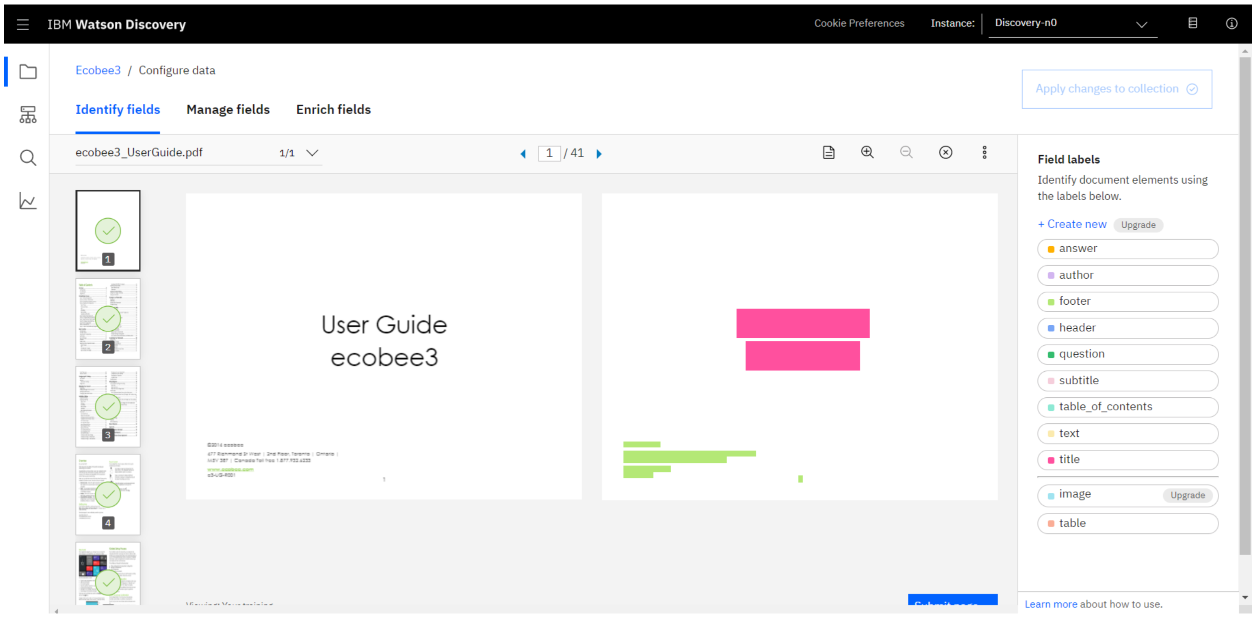


Collections of your private data and pre-enriched data to configure and query against. Learn more.

Indexed on 5/18/2020

Click on Upload your own data to upload a new dataset (any unstructured file).

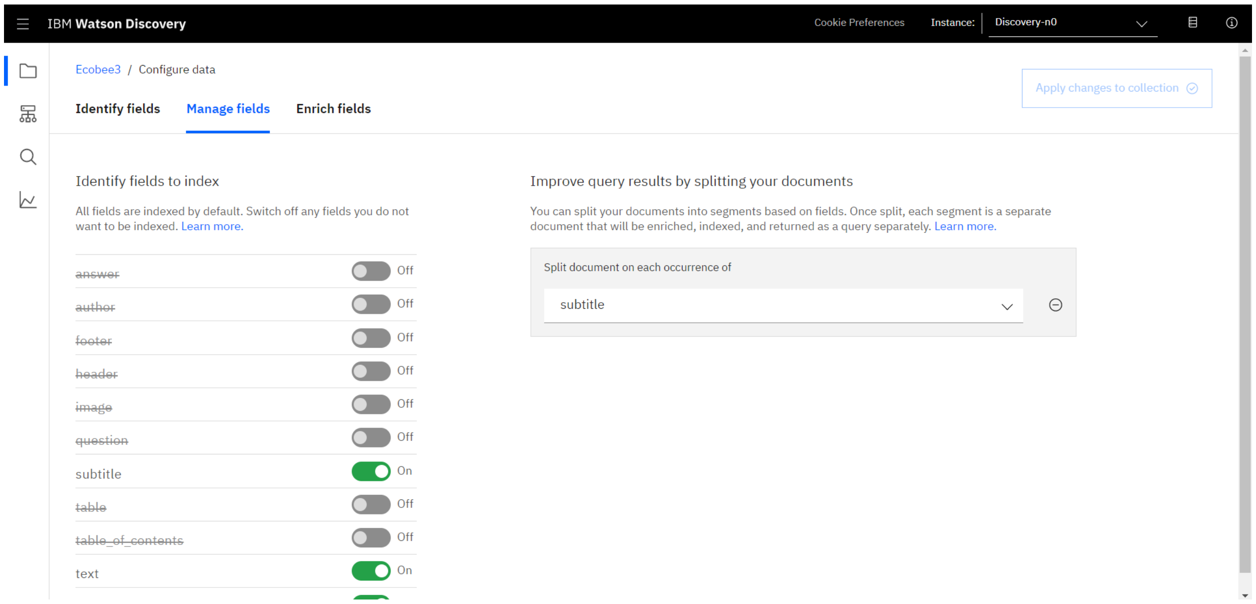
Go to Configure data after opening the dataset.



Identify document elements using the labels below.

Learn more about how to use.

In Identify labels, label the data on the basis of fields like "title", "subtitle", "text", "footer" and so on.


IBM Watson Discovery

Cookie Preferences Instance: Discovery-n0

Ecobee3 / Configure data

Apply changes to collection

Identify fields | Manage fields | Enrich fields

Identify fields to index

All fields are indexed by default. Switch off any fields you do not want to be indexed. Learn more.

~~answer~~	Off
~~author~~	Off
~~footer~~	Off
~~header~~	Off
~~image~~	Off
~~question~~	Off
subtitle	On
~~table~~	Off
~~table_of_contents~~	Off
text	On

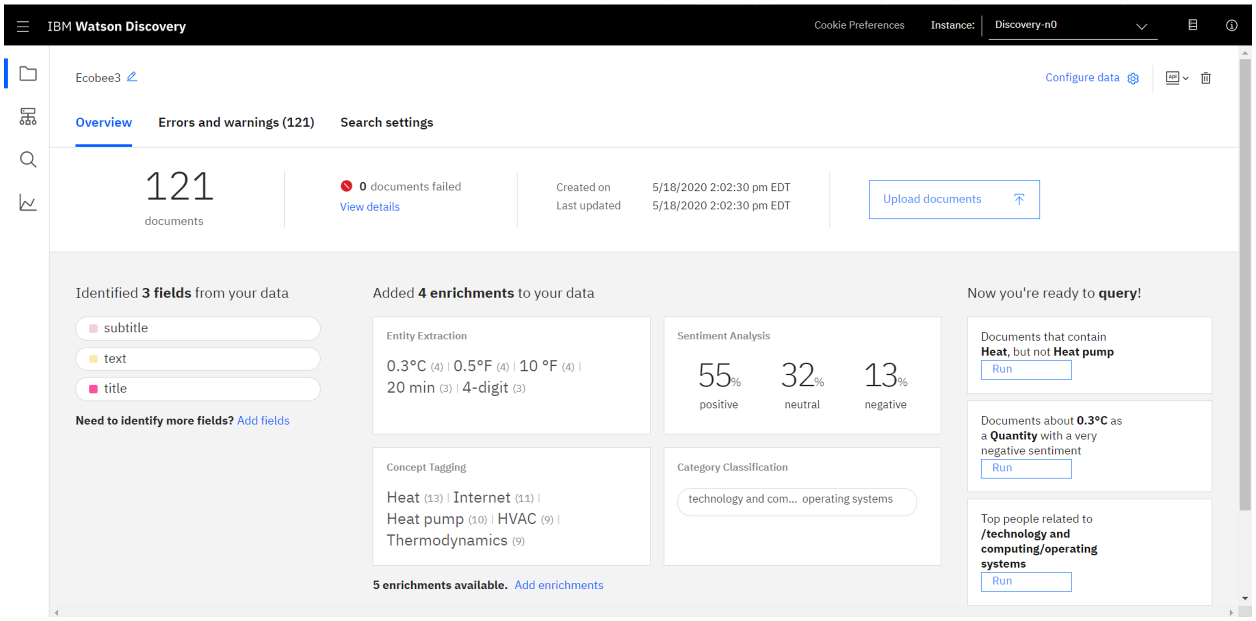
Improve query results by splitting your documents

You can split your documents into segments based on fields. Once split, each segment is a separate document that will be enriched, indexed, and returned as a query separately. Learn more.

Split document on each occurrence of: subtitle

Then the document is split in the Manage Fields on the basis of "subtitle" in this case, by selecting split document on each occurence of "subtitle".
Then click Apply changes to collection and upload the original document to save the changes.

The Overview page of the document after field identification and splitting.


IBM Watson Discovery

Cookie Preferences Instance: Discovery-n0

Ecobee3

Configure data

Overview | Errors and warnings (121) | Search settings

121 documents

0 documents failed
View details

Created on	5/18/2020 2:02:30 pm EDT
Last updated	5/18/2020 2:02:30 pm EDT

Upload documents

Identified **3 fields** from your data
- subtitle
- text
- title

Need to identify more fields? Add fields

Added **4 enrichments** to your data

Entity Extraction: 0.3°C (4) | 0.5°F (4) | 10 °F (4) | 20 min (3) | 4-digit (3)

Sentiment Analysis: 55% positive, 32% neutral, 13% negative

Concept Tagging: Heat (13) | Internet (11) | Heat pump (10) | HVAC (9) | Thermodynamics (9)

Category Classification: technology and com... operating systems

5 enrichments available. Add enrichments

Now you're ready to **query!**

Documents that contain **Heat**, but not **Heat pump** — Run

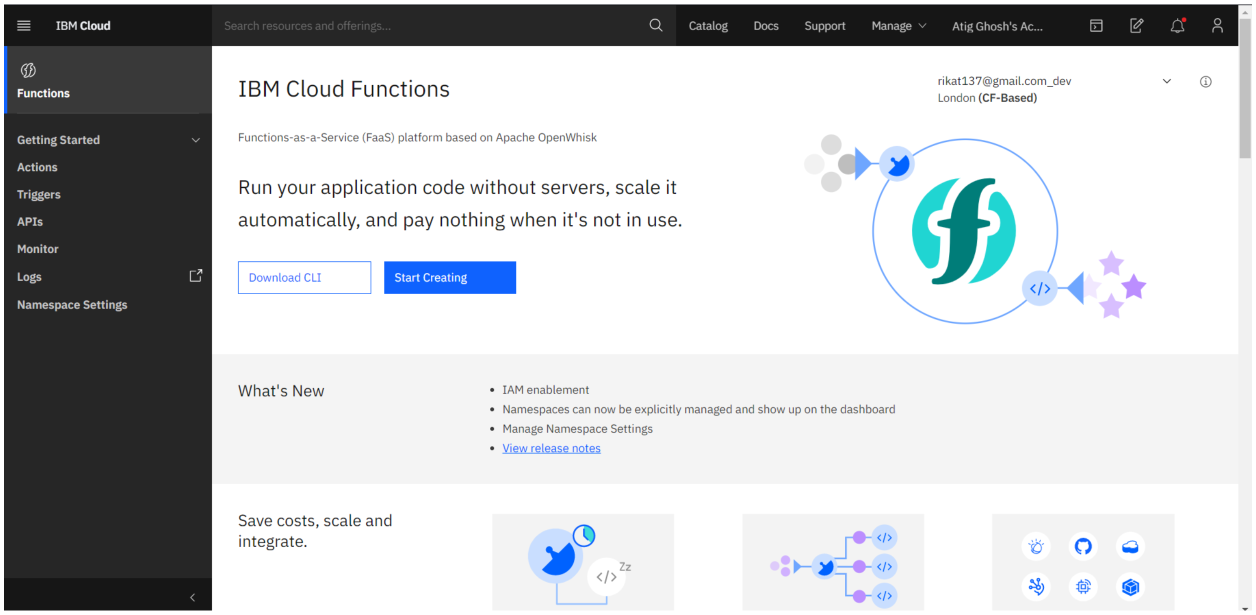
Documents about **0.3°C** as a **Quantity** with a very negative sentiment — Run

Top people related to **/technology and computing/operating systems** — Run

Now we see that the original document is split into 121 documents. Also, Sentiment Analysis is seen. Build your own query helps to test the accuracy.
Copy the api values of "collection ID" and "environment ID", these will be required in the cloud function action (parameter).

- Create IBM Cloud function action.

The web action that will make queries against the Discovery collection (data) is built. Go to IBM Cloud Dashboard and click on Create Resources then select functions.



IBM Cloud Functions

Functions-as-a-Service (FaaS) platform based on Apache OpenWhisk

Run your application code without servers, scale it automatically, and pay nothing when it's not in use.

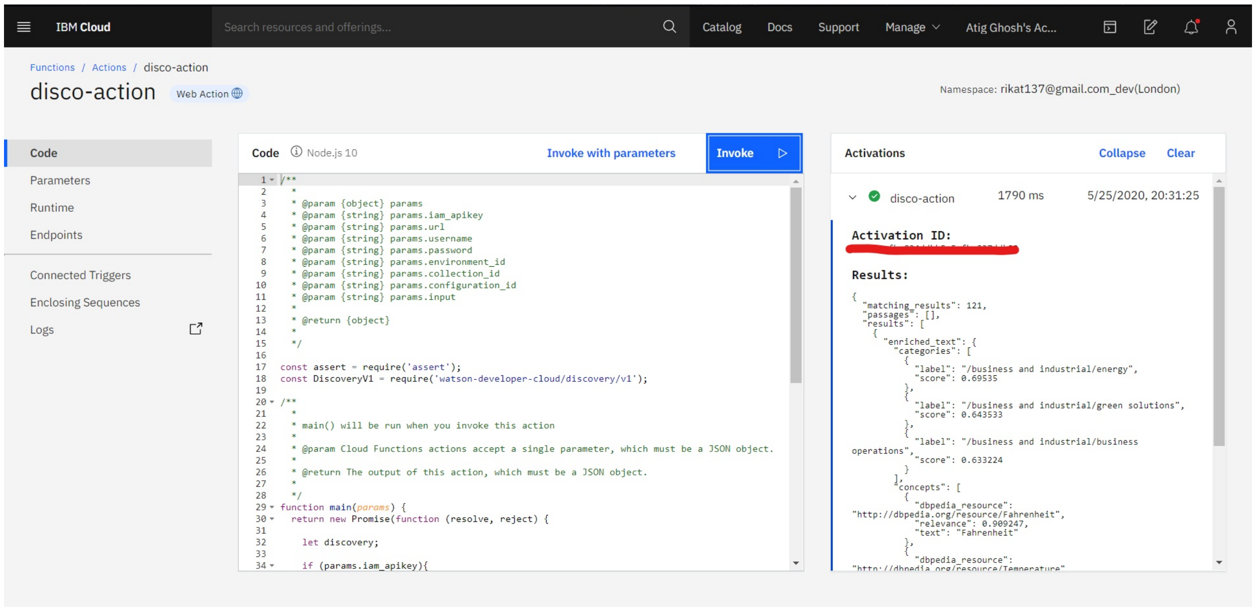
What's New

- IAM enablement
- Namespaces can now be explicitly managed and show up on the dashboard
- Manage Namespace Settings
- View release notes

Save costs, scale and integrate.

Click on Actions on the left panel. Then select Create and provide a unique action name.

Click on Code tab. A certain code is written which, connects function to the Discovery Service, makes the query against the collection and returns the result.



```javascript
/**
  *
  * @param {object} params
  * @param {string} params.iam_apikey
  * @param {string} params.url
  * @param {string} params.username
  * @param {string} params.password
  * @param {string} params.environment_id
  * @param {string} params.collection_id
  * @param {string} params.configuration_id
  * @param {string} params.input
  *
  * @return {object}
  *
  */

const assert = require('assert');
const DiscoveryV1 = require('watson-developer-cloud/discovery/v1');

/**
  *
  * main() will be run when you invoke this action
  *
  * @param Cloud Functions actions accept a single parameter, which must be a JSON object.
  *
  * @return The output of this action, which must be a JSON object.
  *
  */
function main(params) {
  return new Promise(function (resolve, reject) {

    let discovery;

    if (params.iam_apikey){
```

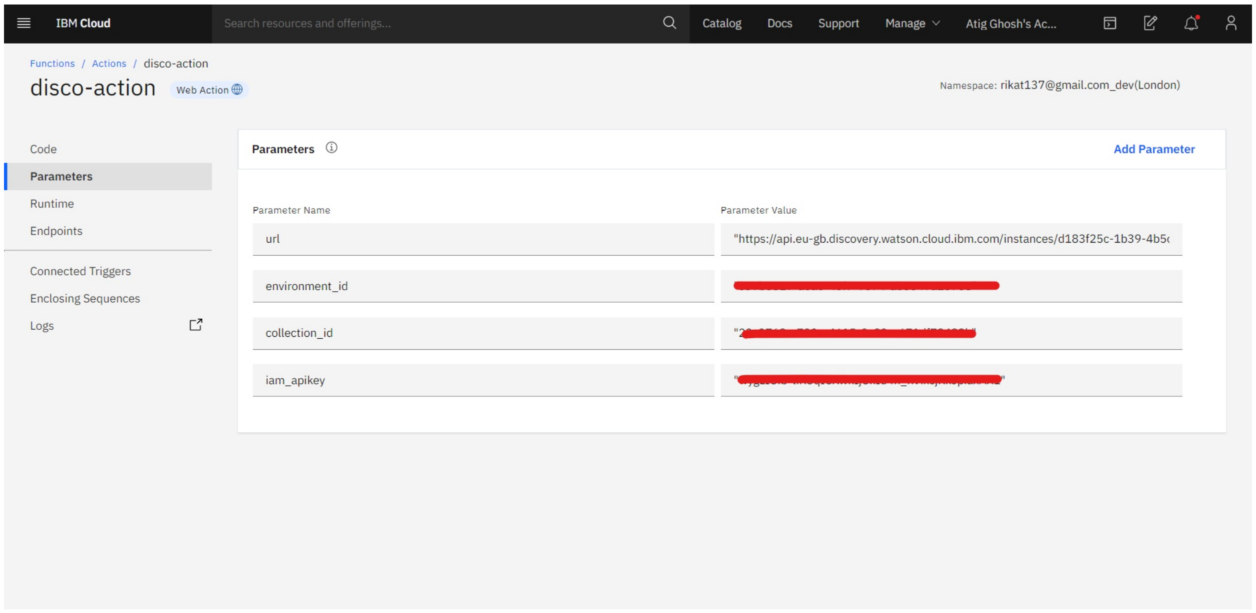
```
Activation ID:
[redacted]

Results:

{
  "matching_results": 121,
  "passages": [],
  "results": [
    {
      "enriched_text": {
        "categories": [
          {
            "label": "/business and industrial/energy",
            "score": 0.69535
          },
          {
            "label": "/business and industrial/green solutions",
            "score": 0.643533
          },
          {
            "label": "/business and industrial/business
operations",
            "score": 0.633224
          }
        ],
        "concepts": [
          {
            "dbpedia_resource":
"http://dbpedia.org/resource/Fahrenheit",
            "relevance": 0.909247,
            "text": "Fahrenheit"
          },
          {
            "dbpedia_resource":
"http://dbpedia.org/resource/Temperature"
```

The code is provided under the name of disco-action.js in Source Codes (Appendix).

Click on Parameters tab.



IBM Cloud
Search resources and offerings...
Catalog
Docs
Support
Manage
Atig Ghosh's Ac...
Functions / Actions / disco-action

disco-action Web Action

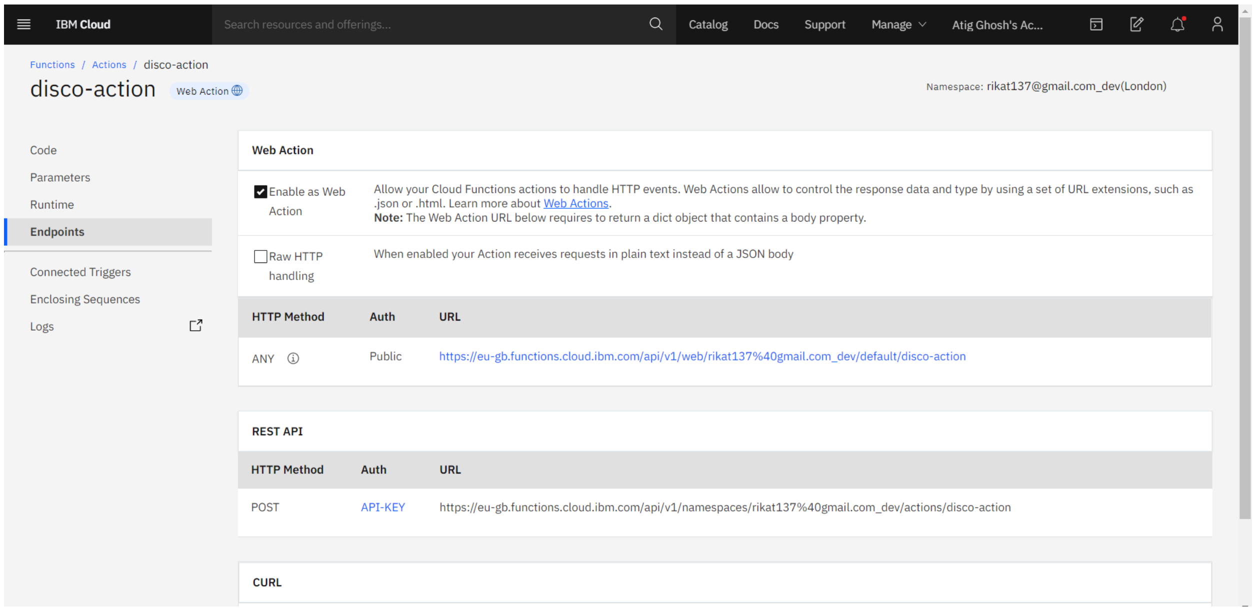
Namespace: rikat137@gmail.com_dev(London)

Parameters

Parameter Name	Parameter Value
url	"https://api.eu-gb.discovery.watson.cloud.ibm.com/instances/d183f25c-1b39-4b5(
environment_id	[redacted]
collection_id	[redacted]
iam_apikey	[redacted]

The values of following parameters, "url", "environment_id", "collection_id" and "iam_apikey" can be accessed from the Discovery Service. This helps the action to connect to the Discovery Service.

Click on Endpoints tab.



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Functions / Actions / disco-action

disco-action Web Action

Namespace: rikat137@gmail.com_dev(London)

Web Action

[✓] Enable as Web Action — Allow your Cloud Functions actions to handle HTTP events. Web Actions allow to control the response data and type by using a set of URL extensions, such as .json or .html. Learn more about Web Actions.
Note: The Web Action URL below requires to return a dict object that contains a body property.

[ ] Raw HTTP handling — When enabled your Action receives requests in plain text instead of a JSON body

HTTP Method	Auth	URL
ANY	Public	https://eu-gb.functions.cloud.ibm.com/api/v1/web/rikat137%40gmail.com_dev/default/disco-action

REST API

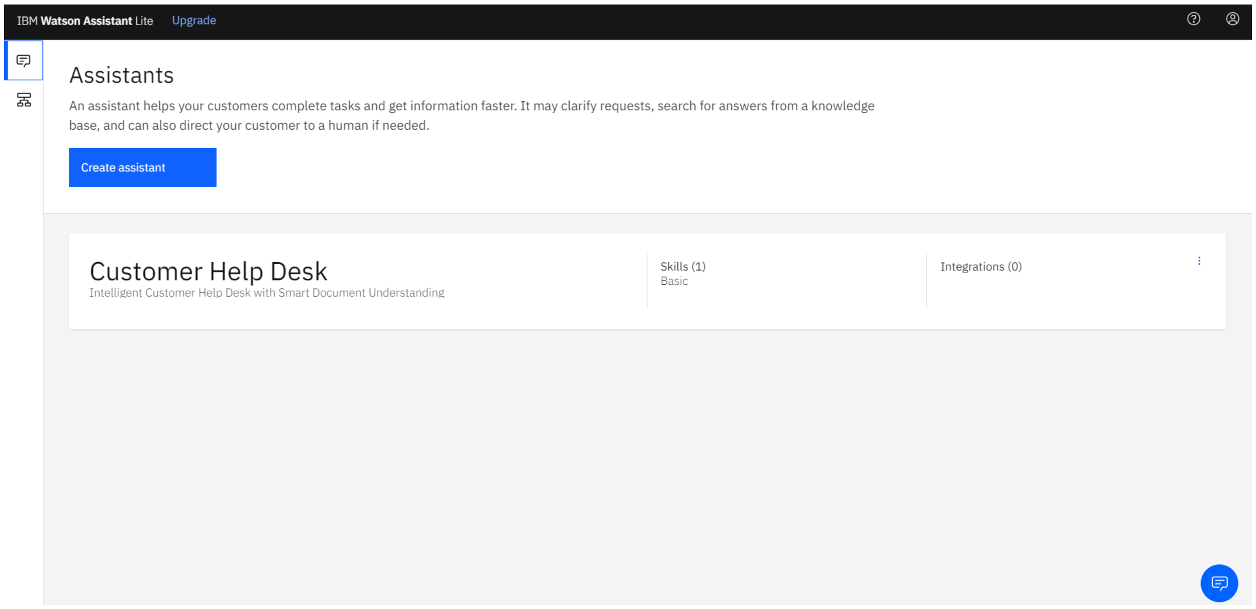
HTTP Method	Auth	URL
POST	API-KEY	https://eu-gb.functions.cloud.ibm.com/api/v1/namespaces/rikat137%40gmail.com_dev/actions/disco-action

CURL

Click on Enable as Web Action. This generates an URL of cloud function action. Copy this URL, this will be required in Watson Assistant as webhooks.

- Configure Watson Assistant.

IBM Watson Assistant when launched.



Assistants

An assistant helps your customers complete tasks and get information faster. It may clarify requests, search for answers from a knowledge base, and can also direct your customer to a human if needed.

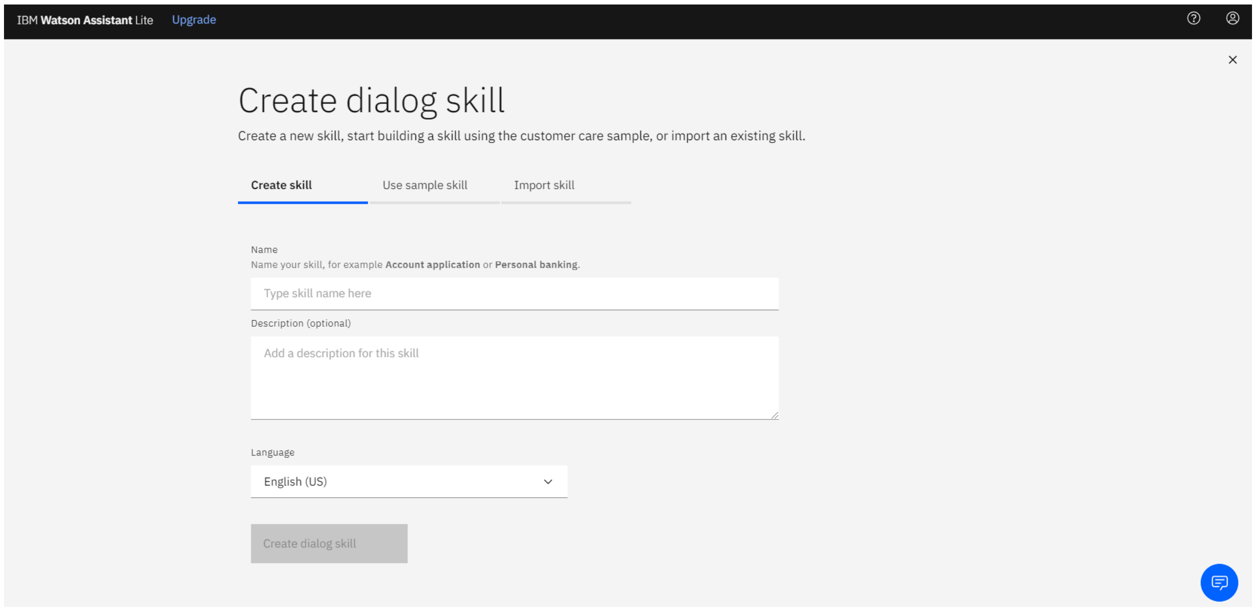
Customer Help Desk
Intelligent Customer Help Desk with Smart Document Understanding

Skills (1)
Basic

Integrations (0)

Then go to Skills tab and select Create Skills.

Two types of skills can be made, Dialog and Search (only for Plus plan). Select Dialog Skill.



Create dialog skill

Create a new skill, start building a skill using the customer care sample, or import an existing skill.

Name
Name your skill, for example **Account application** or **Personal banking**.

Type skill name here

Description (optional)

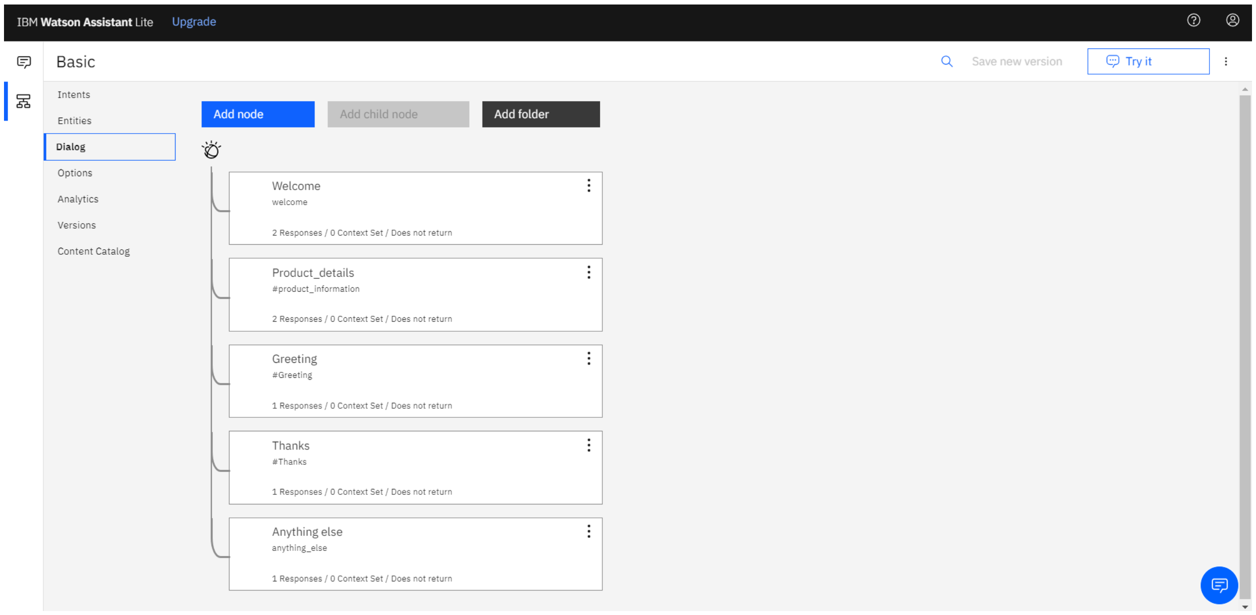
Add a description for this skill

Language

English (US)

Select Create skill and provide a name and description of the skill. Skills can also be imported using Import skills and default predefined skill can be used using Use sample skill.

Intents is a goal or purpose of user's questions. Entities is a specific detail of questions and statements. Dialogue puts intent and entity together to provide interaction.
We create respective Intents and Entity. Also, a dialogue flow is created.



Welcome
welcome
2 Responses / 0 Context Set / Does not return

Product_details
#product_information
2 Responses / 0 Context Set / Does not return

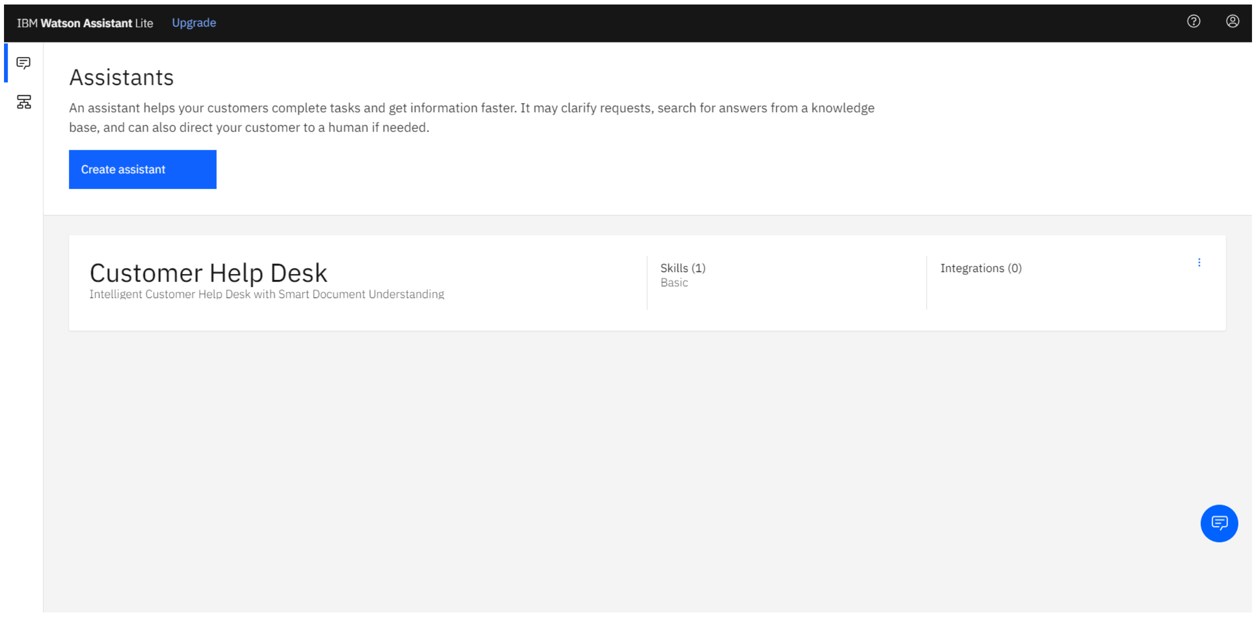
Greeting
#Greeting
1 Responses / 0 Context Set / Does not return

Thanks
#Thanks
1 Responses / 0 Context Set / Does not return

Anything else
anything_else
1 Responses / 0 Context Set / Does not return

The dialogue box "Product_details" is for customer interaction using the user manual.
In Skills tab, click on View API details of the skill. Copy the "Skill ID", this will be required in Node-RED flow.

Open the Assistants tab and click on Create Assistant.



Assistants

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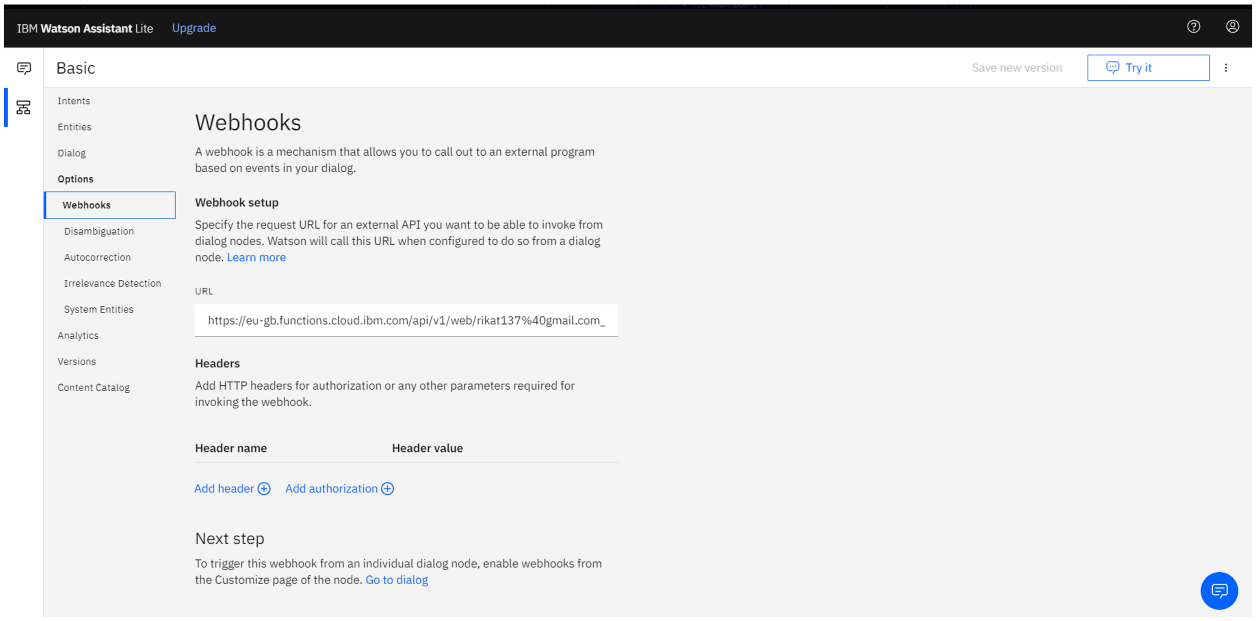
Customer Help Desk
Intelligent Customer Help Desk with Smart Document Understanding
Skills (1)
Basic
Integrations (0)

Give a name to the assistant. Add the created skill to the assistant.
So, the assistant acquires the skill created and is able to answer the queries.

To turn on Webhooks, click on Options.



Webhooks

A webhook is a mechanism that allows you to call out to an external program based on events in your dialog.

Webhook setup

Specify the request URL for an external API you want to be able to invoke from dialog nodes. Watson will call this URL when configured to do so from a dialog node. Learn more

URL

https://eu-gb.functions.cloud.ibm.com/api/v1/web/rikat137%40gmail.com_

Headers

Add HTTP headers for authorization or any other parameters required for invoking the webhook.

Header name	Header value

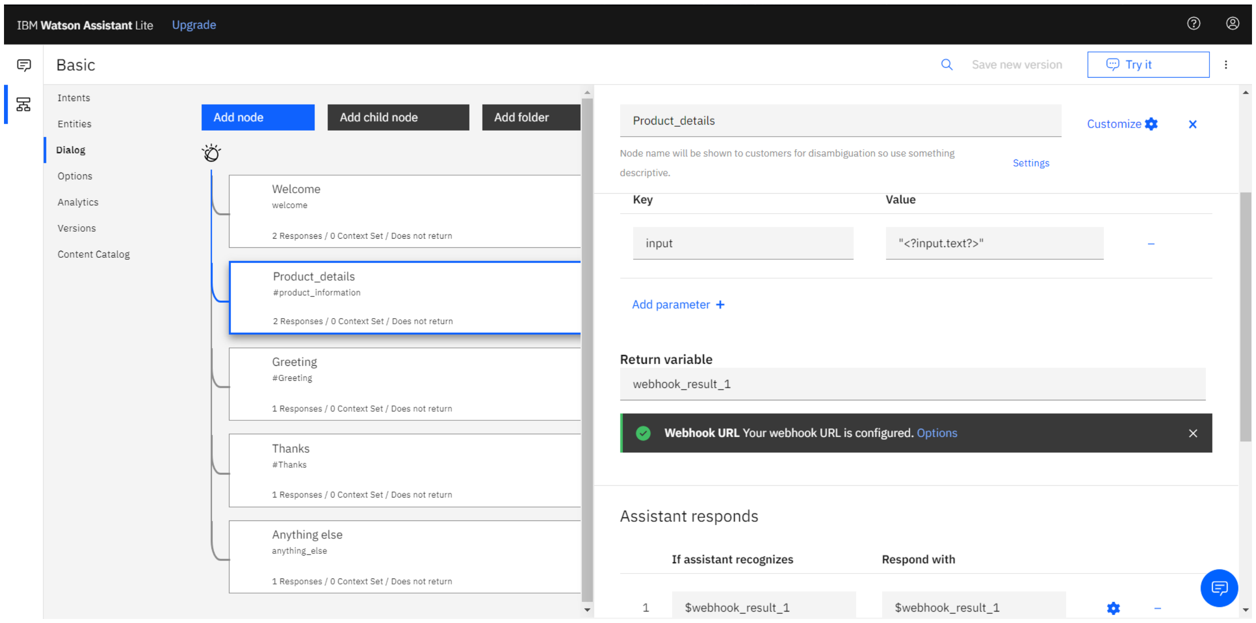
Add header ⊕ Add authorization ⊕

Next step

To trigger this webhook from an individual dialog node, enable webhooks from the Customize page of the node. Go to dialog

Paste the url of cloud function action into the Webhooks' url section. It is a must to end the url in webhook with ".json". Therefore, now the assistant is linked to the cloud function using Webhooks. Whereas the cloud function action is connected to the Watson Discovery Service. Thus, the assistant is indirectly connected to Discovery Service using Cloud function.

Customize the "Product_details" dialogue and turn on the Webhooks option.



Product_details

Node name will be shown to customers for disambiguation so use something descriptive.

Key	Value
input	"<?input.text?>"

Return variable

webhook_result_1

Webhook URL Your webhook URL is configured. Options

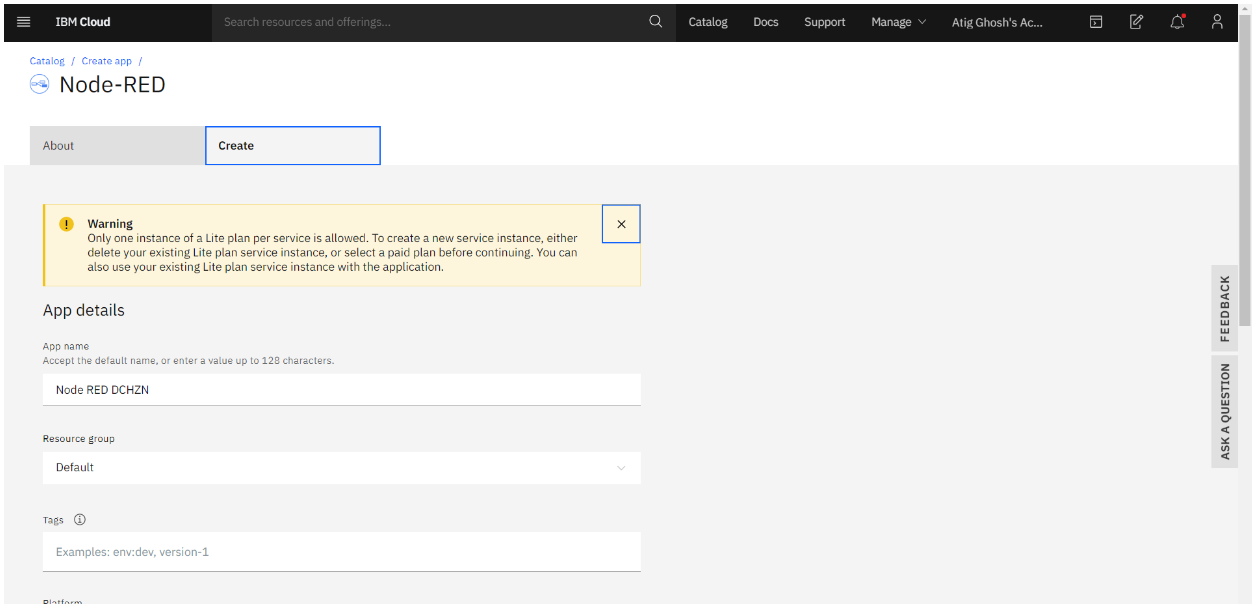
Assistant responds

	If assistant recognizes	Respond with
1	$webhook_result_1	$webhook_result_1

The query of the user is passed through the key "input" to Discovery Service. The response from Discovery service is captured in variable "$webhook_result_1".

- Build Node-RED flow to integrate all services together.

Go to Create Resource and search for Node-RED App. Open the Node-RED App.



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Catalog / Create app /

Node-RED

About | Create

Warning
Only one instance of a Lite plan per service is allowed. To create a new service instance, either delete your existing Lite plan service instance, or select a paid plan before continuing. You can also use your existing Lite plan service instance with the application.

App details

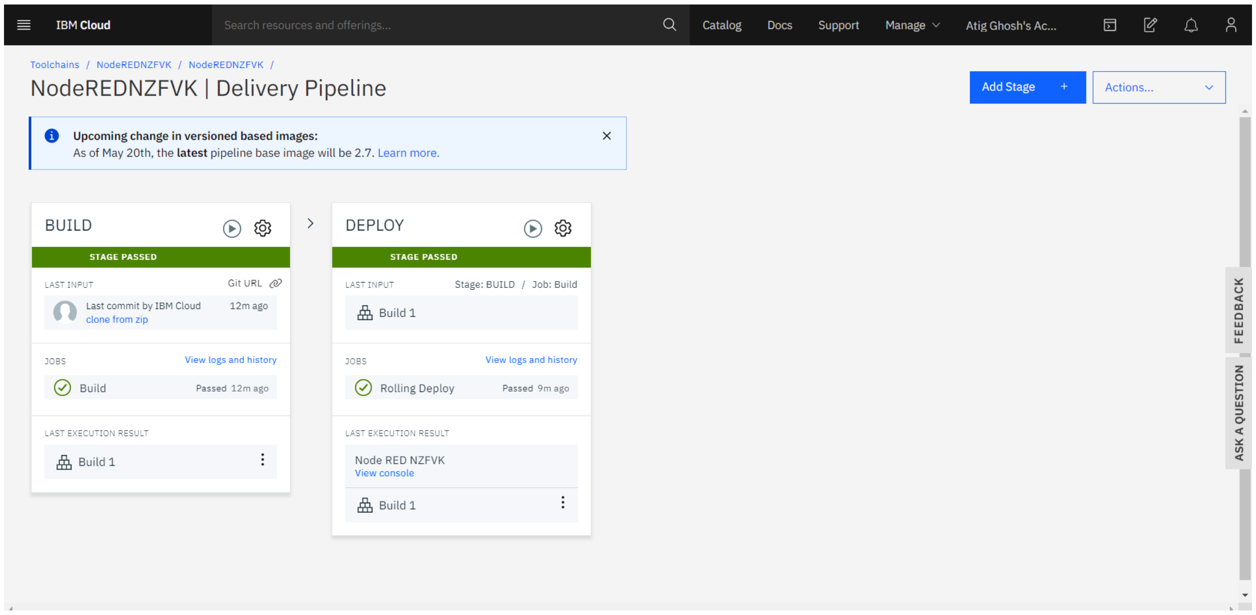
App name
Accept the default name, or enter a value up to 128 characters.
Node RED DCHZN

Resource group
Default

Tags
Examples: env:dev, version-1

Provide a unique name for the app or accept the default name. Provide IBM Cloud API key or generate a new one. Also provide memory per instance (in this case 256Mb). Select region to create the DevOps toolchain and select Create.

Intially, the Status in Delivery Pipelines will show "in progress". The Deploy stage will take time to get completed. Once the Deploy stage is passed, the status will turn to "success".



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Toolchains / NodeREDNZFVK / NodeREDNZFVK /

NodeREDNZFVK | Delivery Pipeline

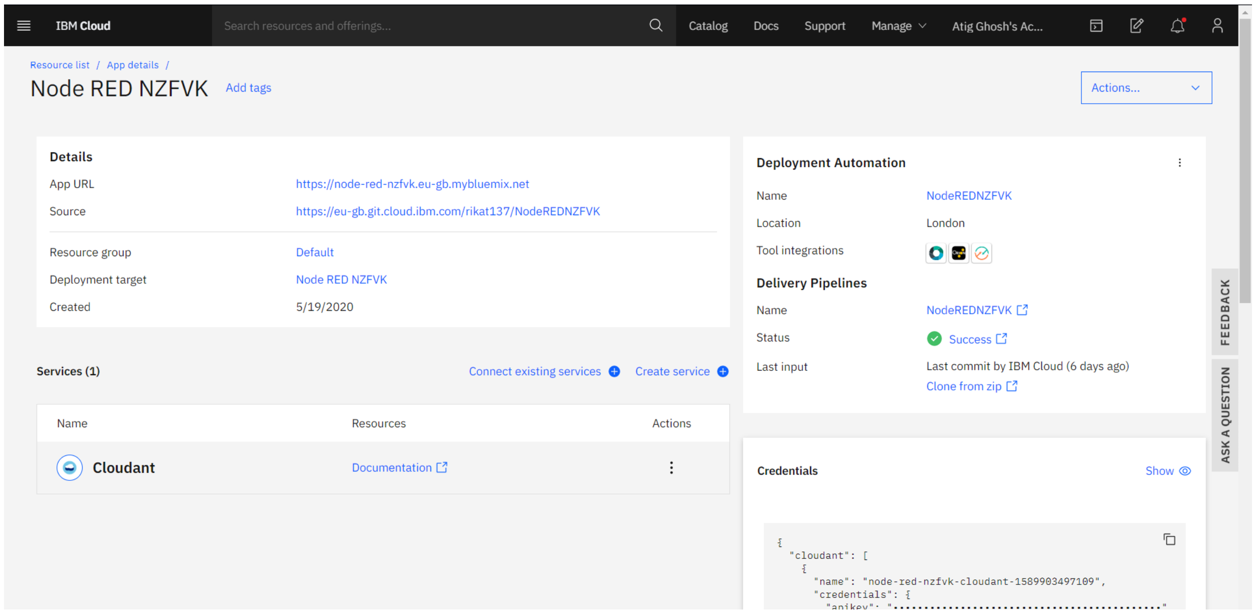
Add Stage + | Actions...

Upcoming change in versioned based images:
As of May 20th, the **latest** pipeline base image will be 2.7. Learn more.

BUILD
STAGE PASSED
LAST INPUT — Git URL
Last commit by IBM Cloud — 12m ago
clone from zip
JOBS — View logs and history
Build — Passed 12m ago
LAST EXECUTION RESULT
Build 1

DEPLOY
STAGE PASSED
LAST INPUT — Stage: BUILD / Job: Build
Build 1
JOBS — View logs and history
Rolling Deploy — Passed 9m ago
LAST EXECUTION RESULT
Node RED NZFVK
View console
Build 1

The details of the application page after deploy stage is passed.


IBM Cloud | Search resources and offerings... | Catalog | Docs | Support | Manage | Atig Ghosh's Ac...

Resource list / App details /

Node RED NZFVK Add tags Actions...

Details

App URL	https://node-red-nzfvk.eu-gb.mybluemix.net
Source	https://eu-gb.git.cloud.ibm.com/rikat137/NodeREDNZFVK
Resource group	Default
Deployment target	Node RED NZFVK
Created	5/19/2020

Services (1) Connect existing services Create service

Name	Resources	Actions
Cloudant	Documentation	⋮

Deployment Automation

Name	NodeREDNZFVK
Location	London
Tool integrations	

Delivery Pipelines

Name	NodeREDNZFVK
Status	Success
Last input	Last commit by IBM Cloud (6 days ago) Clone from zip

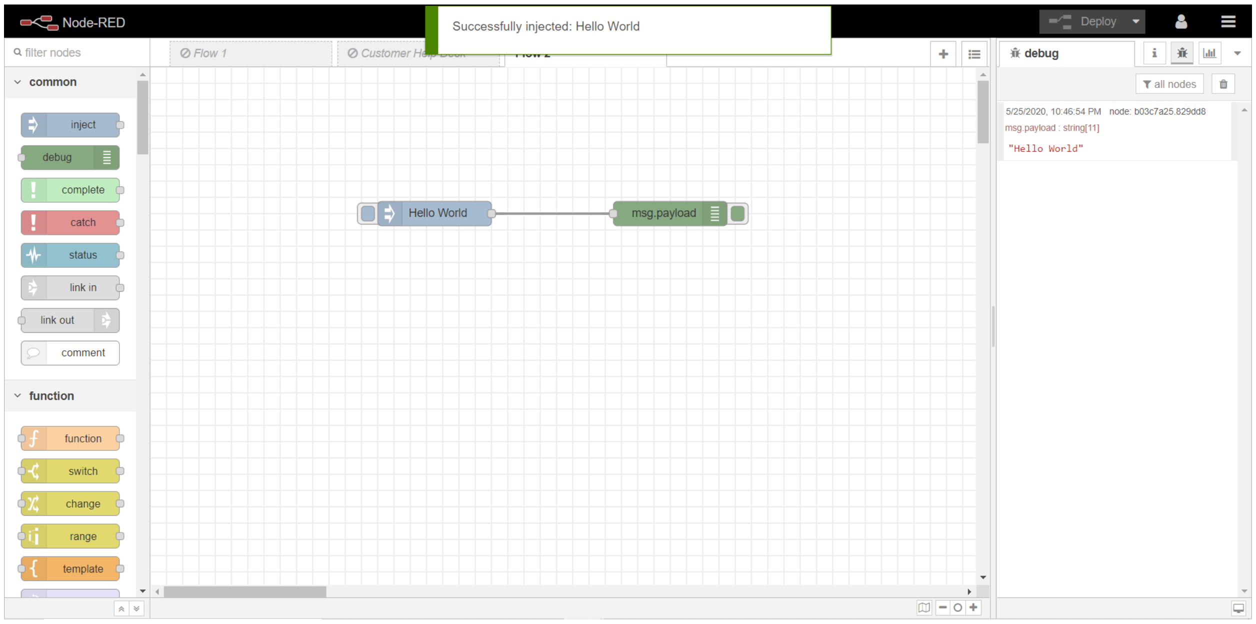
Credentials Show

```
{
  "cloudant": [
    {
      "name": "node-red-nzfvk-cloudant-1589903497109",
      "credentials": {
        "apikey": "....................................."
```

FEEDBACK ASK A QUESTION

The newly created Node-RED App will be listed under the App Section in Resource list. Also a corresponding entry under the Cloud Foundry App section can be seen.

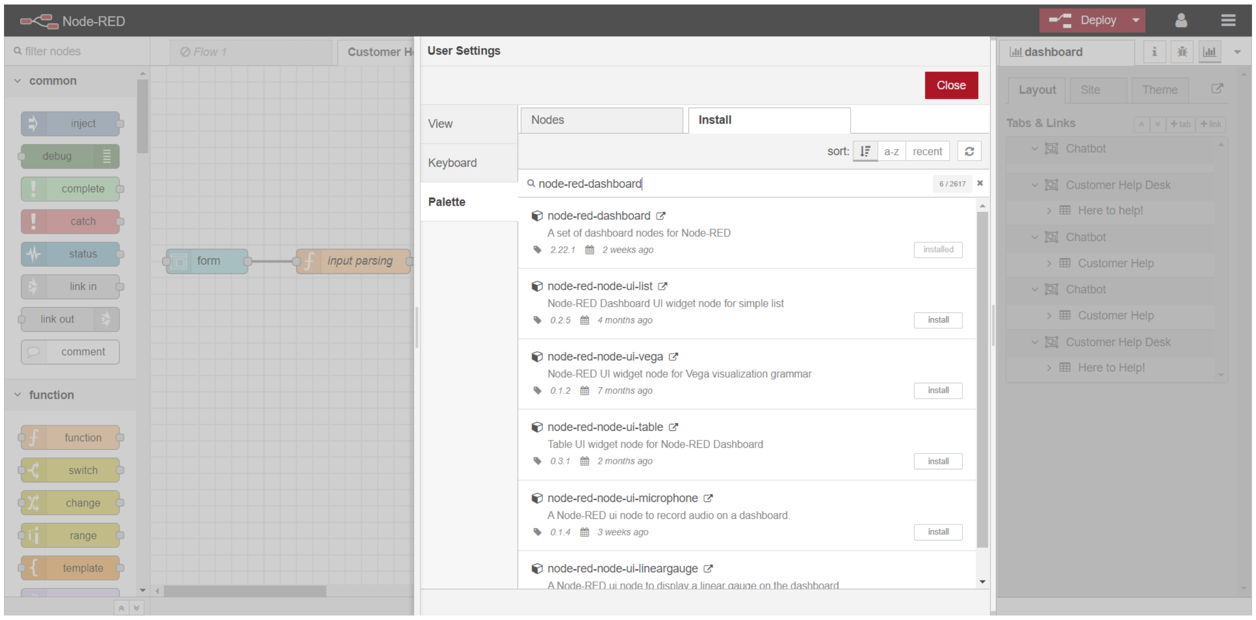
Click to open the App URL. The Node-RED editor will open.



The Node-RED editor shows a basic flow (Flow 2), where the output can be seen in the debug window (on the right). On the left is the pallete.
The nodes present in this flow are "inject" and "debug".

- Build a web dashboard using Node-Red flow.

Go to Settings and then Install Tab and search for Node-red-dashboard. Install the Node-red-dashboard.



User Settings

Close

View | Keyboard | Palette

Nodes | Install

sort: a-z recent

node-red-dashboard 6 / 2617

node-red-dashboard
A set of dashboard nodes for Node-RED
2.22.1 2 weeks ago installed

node-red-node-ui-list
Node-RED Dashboard UI widget node for simple list
0.2.5 4 months ago install

node-red-node-ui-vega
Node-RED UI widget node for Vega visualization grammar
0.1.2 7 months ago install

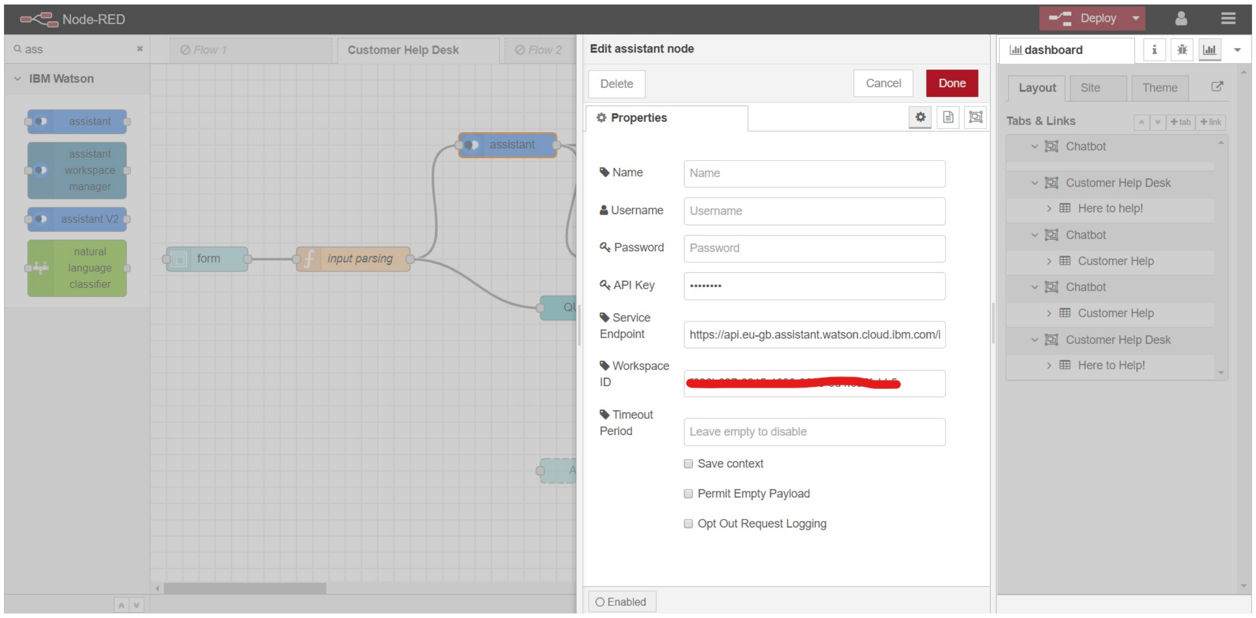
node-red-node-ui-table
Table UI widget node for Node-RED Dashboard
0.3.1 2 months ago install

node-red-node-ui-microphone
A Node-RED ui node to record audio on a dashboard.
0.1.4 3 weeks ago install

node-red-node-ui-lineargauge
A Node-RED ui node to display a linear gauge on the dashboard

By installing node-red-dashboard, "form" node becomes available.

The "assistant" node is used to link the flow with the assistant (Customer Help Desk).



Edit assistant node

Delete | Cancel | Done

Properties

Name	Name
Username	Username
Password	Password
API Key	••••••••
Service Endpoint	https://api.eu-gb.assistant.watson.cloud.ibm.com/i
Workspace ID	[redacted]
Timeout Period	Leave empty to disable

Save context

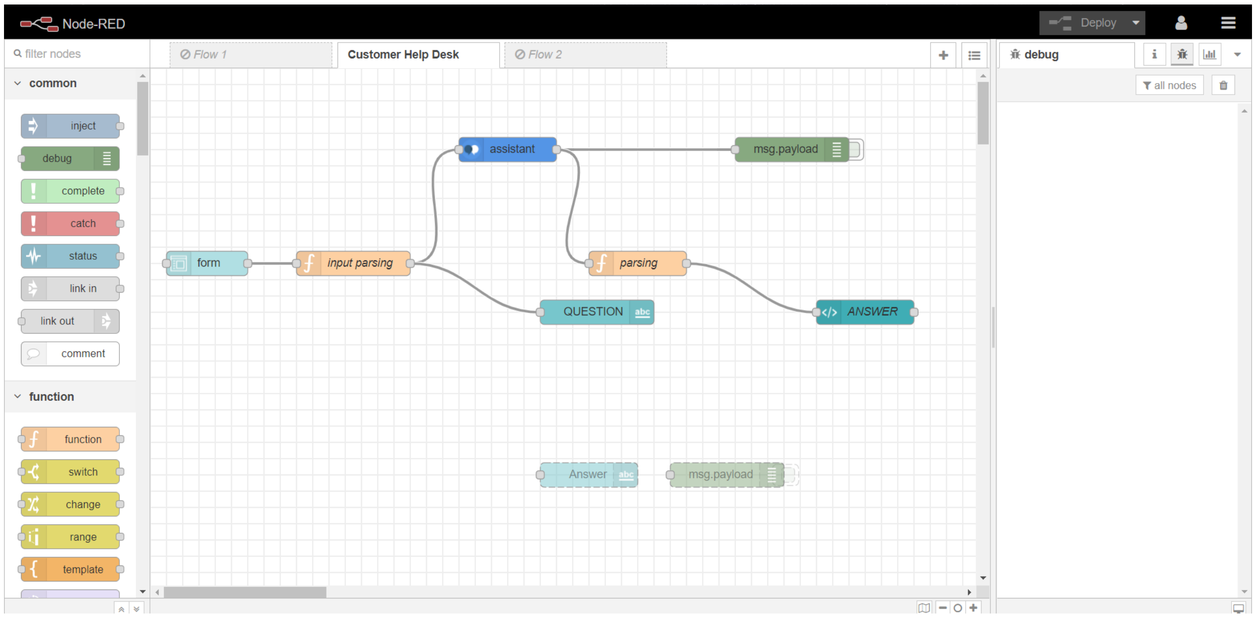
Permit Empty Payload

Opt Out Request Logging

Enabled

The Workspace ID, Service endpoint and API key are the Skill ID, URL and API key respectively of the Watson Assistant.

Taking various other nodes from pallete, the desired web dashboard is built.

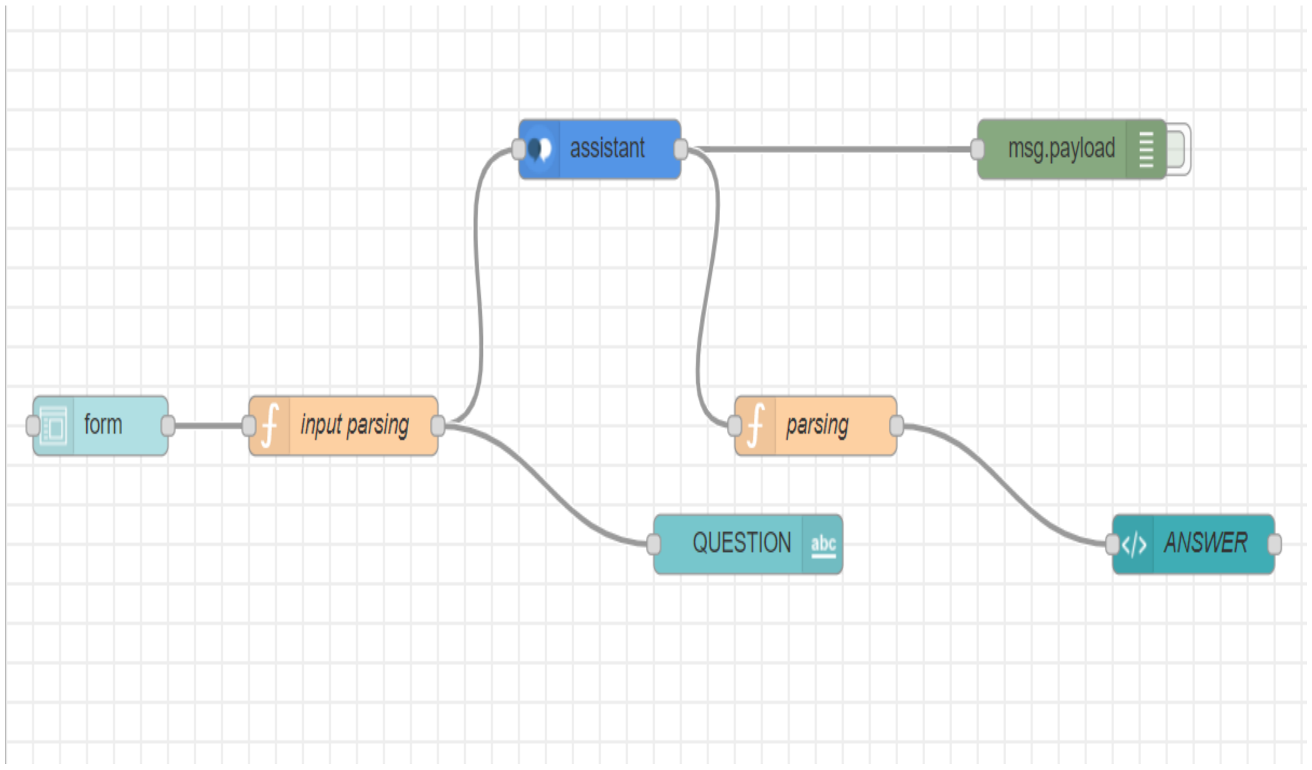


"form" node helps to built the query section for the user.
"text" node is named as "QUESTION" which displays the query.
"template" node is named as "ANSWER" which displays the answer of the query.
"assistant" node links the flow with the Watson Assistant (Customer Help Desk) to feed questions and obtain answer from it.
There are two "function" nodes, one named as "input parsing" for feeding the question text to the assistant and the other named as "parsing" which converts output of assistant from json to text format.
"debug" node is used to help the designer debug the outputs.

The two "function" nodes have to be coded in order to extract text from json. The code is given in Source Code (Appendix)

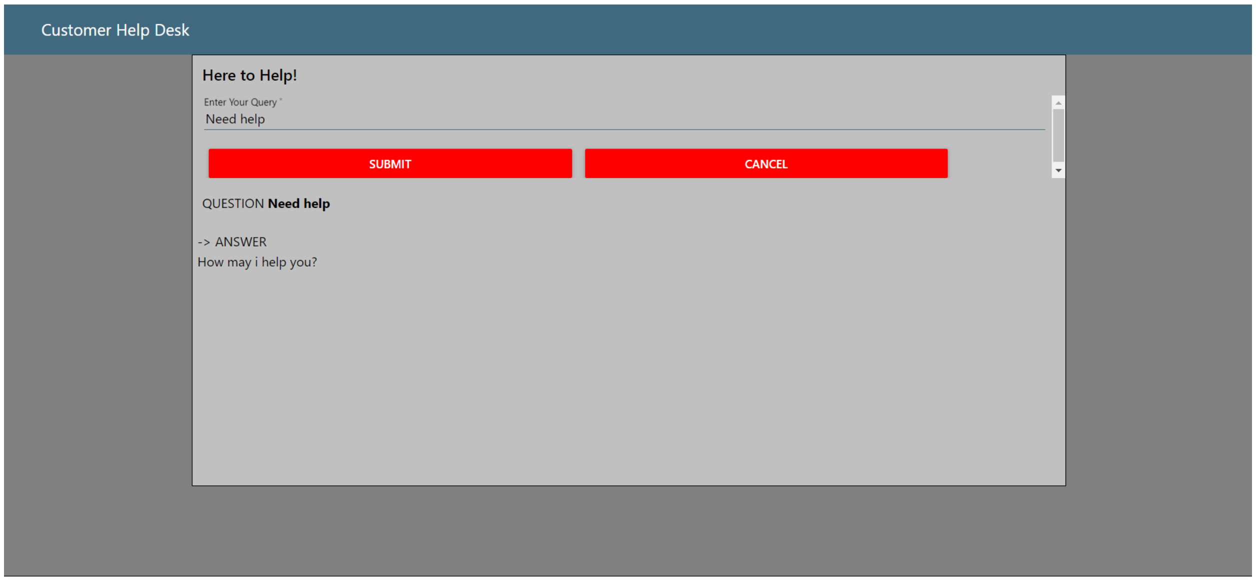
Deploy the app after adding and connecting all nodes. To see the UI select dashboard in the right column and click on

5. FLOWCHART


assistant
msg.payload
form
input parsing
parsing
QUESTION
abc
ANSWER

6. RESULTS

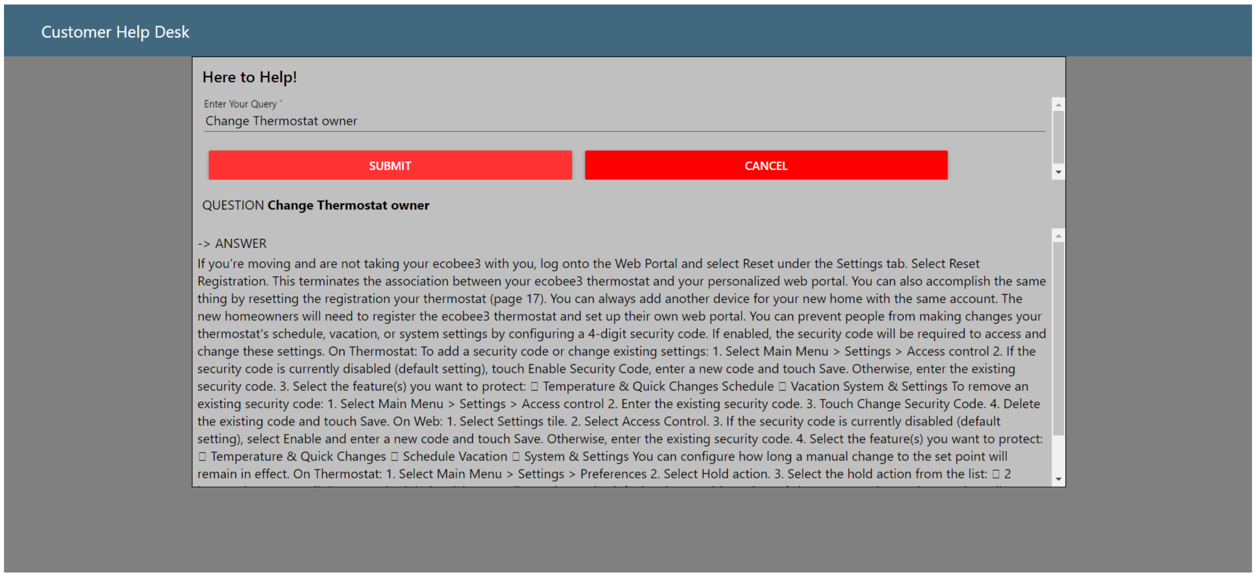
Response of Customer Help Desk to few demo queries are as follows-



Need help

QUESTION **Need help**

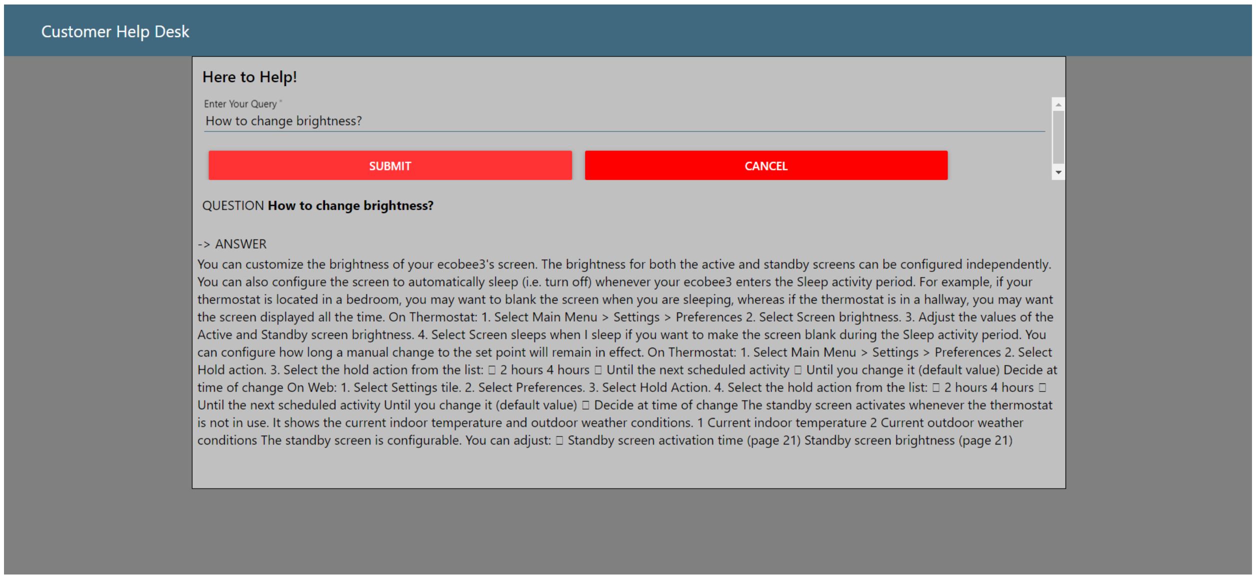
-> ANSWER
How may i help you?



Change Thermostat owner

QUESTION **Change Thermostat owner**

-> ANSWER
If you’re moving and are not taking your ecobee3 with you, log onto the Web Portal and select Reset under the Settings tab. Select Reset Registration. This terminates the association between your ecobee3 thermostat and your personalized web portal. You can also accomplish the same thing by resetting the registration your thermostat (page 17). You can always add another device for your new home with the same account. The new homeowners will need to register the ecobee3 thermostat and set up their own web portal. You can prevent people from making changes your thermostat's schedule, vacation, or system settings by configuring a 4-digit security code. If enabled, the security code will be required to access and change these settings. On Thermostat: To add a security code or change existing settings: 1. Select Main Menu > Settings > Access control 2. If the security code is currently disabled (default setting), touch Enable Security Code, enter a new code and touch Save. Otherwise, enter the existing security code. 3. Select the feature(s) you want to protect: Temperature & Quick Changes Schedule Vacation System & Settings To remove an existing security code: 1. Select Main Menu > Settings > Access control 2. Enter the existing security code. 3. Touch Change Security Code. 4. Delete the existing code and touch Save. On Web: 1. Select Settings tile. 2. Select Access Control. 3. If the security code is currently disabled (default setting), select Enable and enter a new code and touch Save. Otherwise, enter the existing security code. 4. Select the feature(s) you want to protect: Temperature & Quick Changes Schedule Vacation System & Settings You can configure how long a manual change to the set point will remain in effect. On Thermostat: 1. Select Main Menu > Settings > Preferences 2. Select Hold action. 3. Select the hold action from the list: 2


Customer Help Desk

Here to Help!

Enter Your Query *

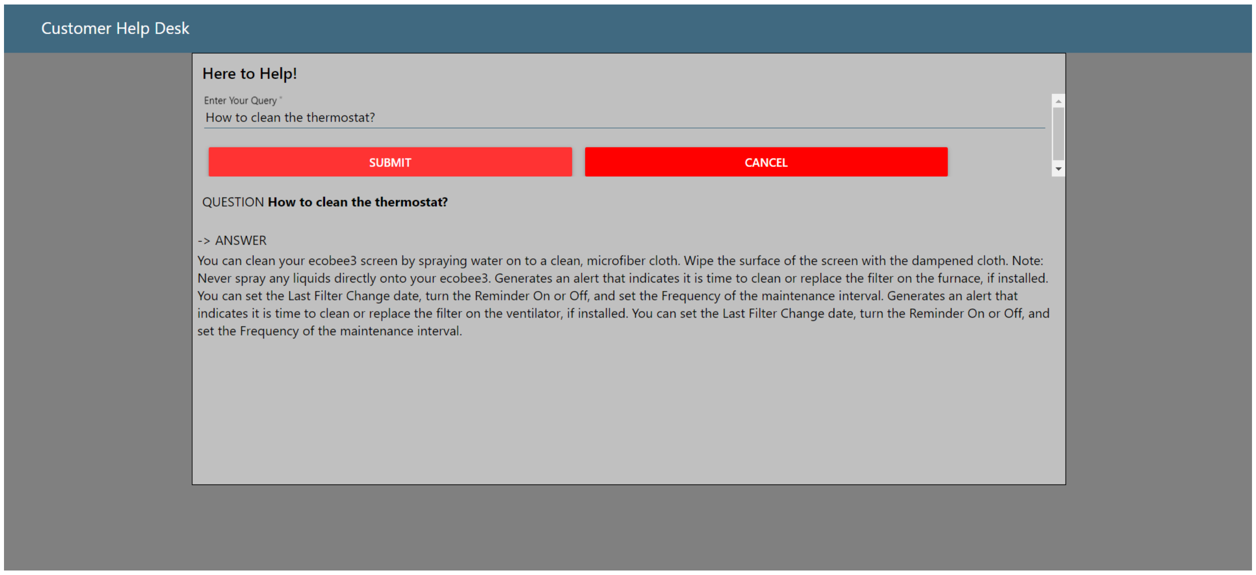
How to change brightness?

SUBMIT CANCEL

QUESTION **How to change brightness?**

-> ANSWER

You can customize the brightness of your ecobee3's screen. The brightness for both the active and standby screens can be configured independently. You can also configure the screen to automatically sleep (i.e. turn off) whenever your ecobee3 enters the Sleep activity period. For example, if your thermostat is located in a bedroom, you may want to blank the screen when you are sleeping, whereas if the thermostat is in a hallway, you may want the screen displayed all the time. On Thermostat: 1. Select Main Menu > Settings > Preferences 2. Select Screen brightness. 3. Adjust the values of the Active and Standby screen brightness. 4. Select Screen sleeps when I sleep if you want to make the screen blank during the Sleep activity period. You can configure how long a manual change to the set point will remain in effect. On Thermostat: 1. Select Main Menu > Settings > Preferences 2. Select Hold action. 3. Select the hold action from the list: 2 hours 4 hours Until the next scheduled activity Until you change it (default value) Decide at time of change On Web: 1. Select Settings tile. 2. Select Preferences. 3. Select Hold Action. 4. Select the hold action from the list: 2 hours 4 hours Until the next scheduled activity Until you change it (default value) Decide at time of change The standby screen activates whenever the thermostat is not in use. It shows the current indoor temperature and outdoor weather conditions. 1 Current indoor temperature 2 Current outdoor weather conditions The standby screen is configurable. You can adjust: Standby screen activation time (page 21) Standby screen brightness (page 21)


Customer Help Desk

Here to Help!

Enter Your Query *

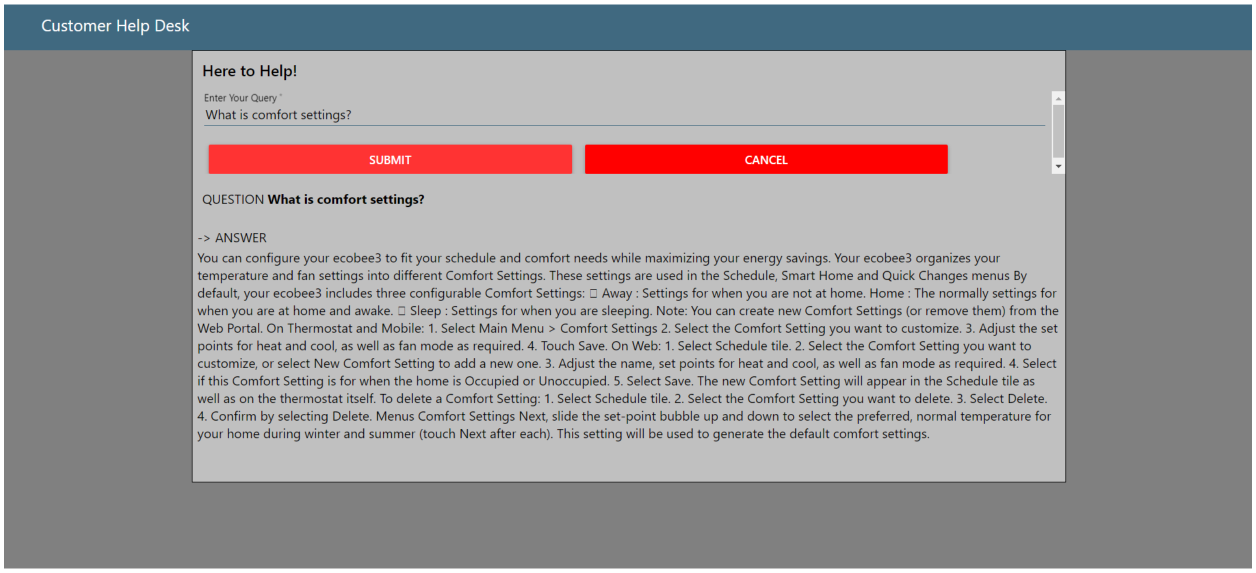
How to clean the thermostat?

SUBMIT CANCEL

QUESTION **How to clean the thermostat?**

-> ANSWER

You can clean your ecobee3 screen by spraying water on to a clean, microfiber cloth. Wipe the surface of the screen with the dampened cloth. Note: Never spray any liquids directly onto your ecobee3. Generates an alert that indicates it is time to clean or replace the filter on the furnace, if installed. You can set the Last Filter Change date, turn the Reminder On or Off, and set the Frequency of the maintenance interval. Generates an alert that indicates it is time to clean or replace the filter on the ventilator, if installed. You can set the Last Filter Change date, turn the Reminder On or Off, and set the Frequency of the maintenance interval.


Customer Help Desk

Here to Help!

Enter Your Query *

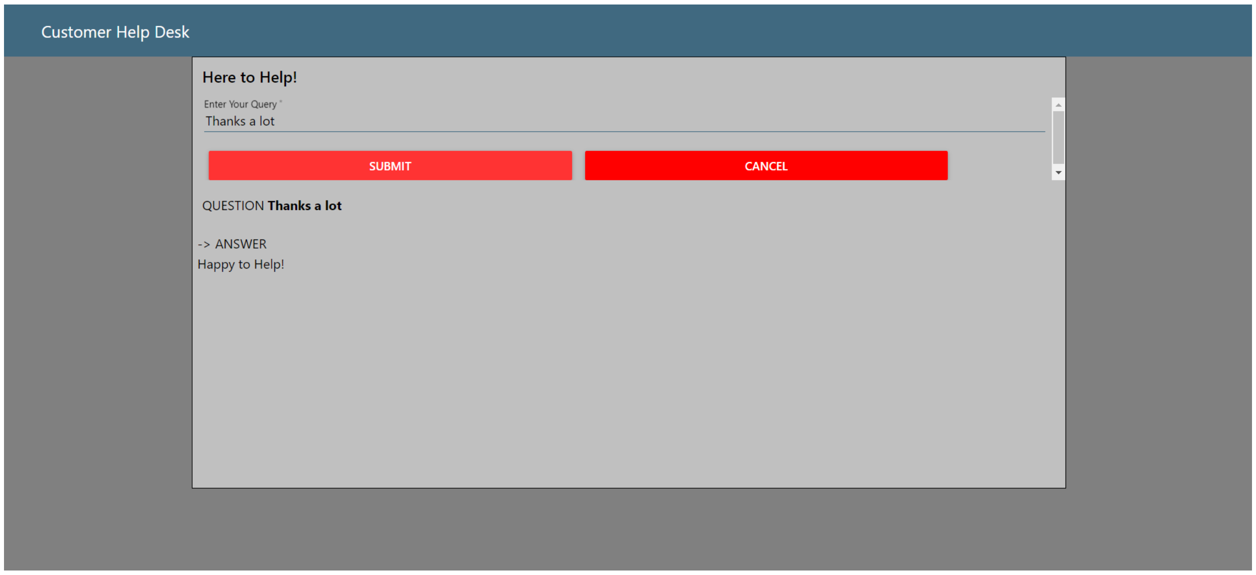
What is comfort settings?

SUBMIT CANCEL

QUESTION **What is comfort settings?**

-> ANSWER

You can configure your ecobee3 to fit your schedule and comfort needs while maximizing your energy savings. Your ecobee3 organizes your temperature and fan settings into different Comfort Settings. These settings are used in the Schedule, Smart Home and Quick Changes menus By default, your ecobee3 includes three configurable Comfort Settings: Away : Settings for when you are not at home. Home : The normally settings for when you are at home and awake. Sleep : Settings for when you are sleeping. Note: You can create new Comfort Settings (or remove them) from the Web Portal. On Thermostat and Mobile: 1. Select Main Menu > Comfort Settings 2. Select the Comfort Setting you want to customize. 3. Adjust the set points for heat and cool, as well as fan mode as required. 4. Touch Save. On Web: 1. Select Schedule tile. 2. Select the Comfort Setting you want to customize, or select New Comfort Setting to add a new one. 3. Adjust the name, set points for heat and cool, as well as fan mode as required. 4. Select if this Comfort Setting is for when the home is Occupied or Unoccupied. 5. Select Save. The new Comfort Setting will appear in the Schedule tile as well as on the thermostat itself. To delete a Comfort Setting: 1. Select Schedule tile. 2. Select the Comfort Setting you want to delete. 3. Select Delete. 4. Confirm by selecting Delete. Menus Comfort Settings Next, slide the set-point bubble up and down to select the preferred, normal temperature for your home during winter and summer (touch Next after each). This setting will be used to generate the default comfort settings.


Customer Help Desk

Here to Help!

Enter Your Query *

Thanks a lot

SUBMIT CANCEL

QUESTION **Thanks a lot**

-> ANSWER

Happy to Help!

7. ADVANTAGES AND DISADVANTAGES

Advantages:

- Quick responses to complex query.
- Multiple customer handling possible.
- Reduction in work load of customer care representative.
- 24*7 availability.

Disadvantages:

- Less accurate.
- Limited fields of reply.

8. APPLICATION

This chatbot, Customer Helpdesk, is mainly applicable for any device operation query. Instead of searching for details about the operations of a device from its user manual or waiting for reply from customer care representatives, the chatbot helps to find answers by just raising a query about any specific topic of the device.

9. CONCLUSION

The intelligence of Customer Helpdesk is increased using Smart Document Understanding. To incorporate the various operations in the Chatbot, functions like Watson Assistant, Watson Discovery, Cloud function action and Node-RED Application have been used.
Each of the services helps to build different sections of the chatbot. Integration of different sections is possible by the use of Node-RED. Also, it provides an UI for the customer interaction.
The results obtained show that the Customer Helpdesk is able to communicate with the user like a normal chatbot. In addition to this, Customer Helpdesk is able to give details about the device operations and configurations.

10. FUTURE SCOPE

Device operation related answers are obtained but there is limited field of reply. Higher number of documents (data) feeding can lead to more accuracy.
A personalized or more user friendly Chatbot is seen as the future scope to this system.

11. BIBLIOGRAPHY

Reference links:

1. https://github.com/IBM/watson-discovery-sdu-with-assistant

2. https://www.youtube.com/watch?v=-yniuX-Poyw&feature=youtu.be

3. https://developer.ibm.com/tutorials/how-to-create-a-node-red-starter-application/

4. https://drive.google.com/file/d/1pKM2It793hv9RIBAWl4-VGihMXCTF4vl/view

5.
http://www.iotgyan.com/learning-resource/integration-of-watson-assistant-to-node-red

6. https://drive.google.com/file/d/15s07ymOgBMInOf7mabqIa5mLiAtIVJ31/view

7. https://www.youtube.com/watch?v=Jpr3wVH3FVA&feature=youtu.be

8. https://cloud.ibm.com/

APPENDIX

SOURCE CODES

<u>disco-action.js (Cloud function action code)</u>

```
/**
 *
 * @param {object} params
 * @param {string} params.iam_apikey
 * @param {string} params.url
 * @param {string} params.username
 * @param {string} params.password
 * @param {string} params.environment_id
 * @param {string} params.collection_id
 * @param {string} params.configuration_id
 * @param {string} params.input
 *
 * @return {object}
 *
 */

const assert = require('assert');
const DiscoveryV1 = require('watson-developer-cloud/discovery/v1');

/**
 *
 * main() will be run when you invoke this action
 *
 * @param Cloud Functions actions accept a single parameter, which must be a JSON
object.
 *
 * @return The output of this action, which must be a JSON object.
 *
 */
function main(params) {
 return new Promise(function (resolve, reject) {
    let discovery;

    if (params.iam_apikey){
      discovery = new DiscoveryV1({
        'iam_apikey': params.iam_apikey,
        'url': params.url,
        'version': '2019-03-25'
      });
    }
    else {
      discovery = new DiscoveryV1({
        'username': params.username,
        'password': params.password,
        'url': params.url,
        'version': '2019-03-25'
      });
    }

    discovery.query({
      'environment_id': params.environment_id,
      'collection_id': params.collection_id,
      'natural_language_query': params.input,
      'passages': true,
      'count': 3,
      'passages_count': 3
    }, function(err, data) {
      if (err) {
        return reject(err);
      }
      return resolve(data);
    });
  });
}
```

skill-basic.json (Watson Assistant Skill Code)

```
{
  "intents": [
    {
      "intent": "Thanks",
      "examples": [
        {
          "text": "thanks for the help"
        },
        {
          "text": "Was of great help"
        },
        {
          "text": "thanks"
        },
        {
          "text": "was helpful"
        },
        {
          "text": "thank you"
        },
        {
          "text": "Thanks a ton"
        },
        {
          "text": "very helpful"
        }
      ],
      "description": ""
    },
    {
      "intent": "product_information",
      "examples": [
        {
          "text": "wiring configuration?"
        },
{
  "text": "Accessory confirmation?"
},
{
  "text": "Equipment configuration"
},
{
  "text": "how to reboot"
},
{
  "text": "What is smart recovery?"
},
{
  "text": "Diagnostics"
},
{
  "text": "Wi-fi radio"
},
{
  "text": "How do i turn on the heater?"
},
{
  "text": "How do i set the time?"
},
{
  "text": "How to adjust temperature?"
},
{
  "text": "Overview of the device"
},
{
  "text": "Network"
},
{
  "text": "What mode if on vacation?"
},
{
        "text": "How to access the settings?"
      },
      {
        "text": "Moved to new house"
      },
      {
        "text": "Changing owner"
      },
      {
        "text": "thresholds"
      },
      {
        "text": "How do I access the settings"
      },
      {
        "text": "Guided Setup process"
      }
    ]
  },
  {
    "intent": "Goodbye",
    "examples": [
      {
        "text": "Bye"
      },
      {
        "text": "adieu"
      },
      {
        "text": "Goodbye"
      }
    ],
    "description": ""
  },
  {
    "intent": "Greeting",
    "examples": [
{
  "text": "Hello agent"
},
{
  "text": "Hey you"
},
{
  "text": "You there"
},
{
  "text": "Who is this?"
},
{
  "text": "What's up?"
},
{
  "text": "Help"
},
{
  "text": "Help me"
},
{
  "text": "Can you help"
},
{
  "text": "Assist me"
},
{
  "text": "Hello"
},
{
  "text": "Hey"
},
{
  "text": "yo"
},
{
  "text": "Hola"
},
{
  "text": "I had a question"
},
{
  "text": "I am facing trouble"
},
{
  "text": "I am facing difficulty"
},
{
  "text": "can you help me"
},
{
  "text": "need help"
},
{
  "text": "Good morning"
},
{
  "text": "Hi there"
},
{
  "text": "Hey there"
},
{
  "text": "Hey advisor"
},
{
  "text": "Hi"
},
{
  "text": "how are you"
},
{
  "text": "Hello I am looking for some help"
```

```
        }
      ],
      "description": ""
    }
  ],
  "entities": [
    {
      "entity": "Help",
      "values": [
        {
          "type": "synonyms",
          "value": "Help",
          "synonyms": [
            "Help",
            "support",
            "need"
          ]
        }
      ],
      "fuzzy_match": true
    }
  ],
  "metadata": {
    "api_version": {
      "major_version": "v2",
      "minor_version": "2018-11-08"
    }
  },
  "webhooks": [
    {
      "url":
"https://eu-gb.functions.cloud.ibm.com/api/v1/web/rikat137%40gmail.com_dev/default
/disco-action.json",
      "name": "main_webhook",
      "headers": []
    }
  ],
"dialog_nodes": [
 {
  "type": "response_condition",
  "parent": "Welcome",
  "conditions": "anything_else",
  "dialog_node": "response_2_1590237977828",
  "previous_sibling": "response_10_1590237975624"
 },
 {
  "type": "response_condition",
  "output": {
   "generic": [
    {
     "values": [
      {
       "text": "Hey there. I am Ecobee3 ChatBot. "
      }
     ],
     "response_type": "text",
     "selection_policy": "sequential"
    }
   ]
  },
  "parent": "Welcome",
  "dialog_node": "response_10_1590237975624"
 },
 {
  "type": "response_condition",
  "output": {
   "text": {
    "values": [
     "Try rephrasing"
    ],
    "selection_policy": "sequential"
   }
  },
  "parent": "node_8_1589837059252",
      "conditions": "anything_else",
      "dialog_node": "response_5_1589837095700",
      "previous_sibling": "response_5_1589837092740"
    },
    {
      "type": "response_condition",
      "output": {
        "generic": [
          {
            "values": [
              {
                "text": "$webhook_result_1"
              }
            ],
            "response_type": "text",
            "selection_policy": "sequential"
          }
        ]
      },
      "parent": "node_8_1589837059252",
      "conditions": "$webhook_result_1",
      "dialog_node": "response_5_1589837092740"
    },
    {
      "type": "standard",
      "title": "Goodbye",
      "output": {
        "generic": [
          {
            "values": [
              {
                "text": "Hope to see you again."
              }
            ],
            "response_type": "text",
            "selection_policy": "sequential"
          }
    ]
  },
  "conditions": "#Goodbye",
  "dialog_node": "node_4_1590434812528",
  "previous_sibling": "Welcome"
},
{
  "type": "standard",
  "title": "Anything else",
  "output": {
    "generic": [
      {
        "values": [
          {
            "text": "I didn't understand. You can try rephrasing."
          },
          {
            "text": "Can you reword your statement? I'm not understanding."
          },
          {
            "text": "I didn't get you."
          }
        ],
        "response_type": "text",
        "selection_policy": "sequential"
      }
    ]
  },
  "conditions": "anything_else",
  "dialog_node": "Anything else",
  "previous_sibling": "node_4_1590245252192",
  "disambiguation_opt_out": true
},
{
  "type": "standard",
  "title": "Greeting",
  "output": {
    "generic": [
      {
        "values": [
          {
            "text": "How may i help you?"
          },
          {
            "text": "Hey there! What do you want to know?"
          }
        ],
        "response_type": "text",
        "selection_policy": "sequential"
      }
    ]
  },
  "conditions": "#Greeting",
  "dialog_node": "node_6_1590249431012",
  "previous_sibling": "node_8_1589837059252"
},
{
  "type": "standard",
  "title": "Thanks",
  "output": {
    "generic": [
      {
        "values": [
          {
            "text": "Happy to Help!"
          },
          {
            "text": "Most welcome!"
          }
        ],
        "response_type": "text",
        "selection_policy": "sequential"
      }
    ]
  },
  "conditions": "#Thanks",
  "dialog_node": "node_4_1590245252192",
  "previous_sibling": "node_6_1590249431012"
},
{
  "type": "standard",
  "title": "Product_details",
  "actions": [
    {
      "name": "main_webhook",
      "type": "webhook",
      "parameters": {
        "input": "<?input.text?>"
      },
      "result_variable": "webhook_result_1"
    }
  ],
  "metadata": {
    "_customization": {
      "mcr": true
    }
  },
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  "digress_in": "does_not_return",
  "dialog_node": "node_8_1589837059252",
  "previous_sibling": "node_4_1590434812528"
},
{
  "type": "standard",
  "title": "Welcome",
  "metadata": {
    "callout": {
      "name": "main_webhook",
      "type": "webhook",
      "parameters": {
        "": ""
```

```
          },
          "result_variable": "webhook_result_1"
        },
        "_customization": {
          "mcr": true
        }
      },
      "conditions": "welcome",
      "dialog_node": "Welcome"
    }
  ],
  "counterexamples": [],
  "system_settings": {
    "off_topic": {
      "enabled": true
    },
    "disambiguation": {
      "prompt": "Did you mean:",
      "enabled": true,
      "randomize": true,
      "max_suggestions": 5,
      "suggestion_text_policy": "title",
      "none_of_the_above_prompt": "None of the above"
    },
    "system_entities": {
      "enabled": true
    },
    "human_agent_assist": {
      "prompt": "Did you mean:"
    },
    "spelling_auto_correct": true
  },
  "learning_opt_out": false,
  "name": "Basic",
  "language": "en",
  "description": "Basic functions like greets and replies to appreciation."
}
```

flows.json (Node-RED flow)

```
[
  {
    "id": "769193eb.2c4c5c",
    "type": "tab",
    "label": "Customer Help Desk",
    "disabled": false,
    "info": ""
  },
  {
    "id": "4e66091a.c83b08",
    "type": "watson-conversation-v1",
    "z": "769193eb.2c4c5c",
    "name": "",
    "workspaceid": "f686b627-0215-4393-8636-0d4fc85febb5",
    "multiuser": false,
    "context": false,
    "empty-payload": false,
    "service-endpoint":
"https://api.eu-gb.assistant.watson.cloud.ibm.com/instances/15523db3-346d-402c-8ef
9-cdc8ce44c235",
    "timeout": "",
    "optout-learning": false,
    "x": 440,
    "y": 100,
    "wires": [
      [
        "ed1ff330.f4a0f",
        "95878e6e.66c3f"
      ]
    ]
  },
  {
    "id": "ed1ff330.f4a0f",
    "type": "debug",
    "z": "769193eb.2c4c5c",
        "name": "",
        "active": false,
        "tosidebar": true,
        "console": false,
        "tostatus": false,
        "complete": "payload",
        "targetType": "msg",
        "x": 790,
        "y": 100,
        "wires": []
    },
    {
        "id": "95878e6e.66c3f",
        "type": "function",
        "z": "769193eb.2c4c5c",
        "name": "parsing",
        "func": "msg.payload.text=\"\";\nif(msg.payload.context.webhook_result_1){\n
for(var i in msg.payload.context.webhook_result_1.results){\n
msg.payload.text=msg.payload.text+\"\\n\"+msg.payload.context.webhook_result_1.re
sults[i].text;\n}\n    msg.payload=msg.payload.text;\n}\n\nelse\nmsg.payload =
msg.payload.output.text[0];\nreturn msg;\n",
        "outputs": 1,
        "noerr": 0,
        "x": 600,
        "y": 240,
        "wires": [
            [
                "49550237.e80dcc"
            ]
        ]
    },
    {
        "id": "55e3785b.a08f58",
        "type": "ui_text",
        "z": "769193eb.2c4c5c",
        "group": "3b0920fb.1cb87",
        "order": 2,
    "width": 20,
    "height": 1,
    "name": "",
    "label": "QUESTION",
    "format": "{{msg.payload}}",
    "layout": "row-left",
    "x": 550,
    "y": 300,
    "wires": []
  },
  {
    "id": "1df321bc.117c2e",
    "type": "ui_text",
    "z": "769193eb.2c4c5c",
    "d": true,
    "group": "3b0920fb.1cb87",
    "order": 4,
    "width": 20,
    "height": 8,
    "name": "",
    "label": "Answer",
    "format": "{{msg.payload}}",
    "layout": "col-center",
    "x": 540,
    "y": 500,
    "wires": []
  },
  {
    "id": "15556cbb.74cd33",
    "type": "debug",
    "z": "769193eb.2c4c5c",
    "d": true,
    "name": "",
    "active": false,
    "tosidebar": true,
    "console": false,
    "tostatus": false,
        "complete": "payload",
        "targetType": "msg",
        "x": 710,
        "y": 500,
        "wires": []
    },
    {
        "id": "edf0d7ca.bf4c58",
        "type": "function",
        "z": "769193eb.2c4c5c",
        "name": "input parsing",
        "func": "msg.payload=msg.payload.text;\nreturn msg;",
        "outputs": 1,
        "noerr": 0,
        "x": 250,
        "y": 240,
        "wires": [
            [
                "4e66091a.c83b08",
                "55e3785b.a08f58"
            ]
        ]
    },
    {
        "id": "db73d447.d0b2d8",
        "type": "ui_form",
        "z": "769193eb.2c4c5c",
        "name": "",
        "label": "",
        "group": "3b0920fb.1cb87",
        "order": 1,
        "width": 0,
        "height": 0,
        "options": [
            {
                "label": "Enter Your Query",
                "value": "text",
                "type": "text",
                "required": true,
                "rows": null
            }
        ],
        "formValue": {
            "text": ""
        },
        "payload": "",
        "submit": "submit",
        "cancel": "cancel",
        "topic": "",
        "x": 70,
        "y": 240,
        "wires": [
            [
                "edf0d7ca.bf4c58"
            ]
        ],
        "info": "Creates the dashboard of the form"
    },
    {
        "id": "49550237.e80dcc",
        "type": "ui_template",
        "z": "769193eb.2c4c5c",
        "group": "3b0920fb.1cb87",
        "name": "ANSWER",
        "order": 3,
        "width": 20,
        "height": 6,
        "format": "<p>-> ANSWER</p>\n<strong></strong><div
ng-bind-html=\"msg.payload\"></div></strong>",
        "storeOutMessages": true,
        "fwdInMessages": true,
        "resendOnRefresh": false,
        "templateScope": "local",
        "x": 880,
        "y": 300,
        "wires": [
            []
        ]
    },
    {
        "id": "3b0920fb.1cb87",
        "type": "ui_group",
        "z": "",
        "name": "Here to Help!",
        "tab": "2f86dbd3.9f0314",
        "order": 1,
        "disp": true,
        "width": "20",
        "collapse": false
    },
    {
        "id": "2f86dbd3.9f0314",
        "type": "ui_tab",
        "z": "",
        "name": "Customer Help Desk",
        "icon": "dashboard",
        "disabled": false,
        "hidden": false
    }
]
```

input parsing (function node code)

```
msg.payload=msg.payload.text;
return msg;
```

parsing (funciton node code)

```
msg.payload.text="";
if(msg.payload.context.webhook_result_1){
   for(var i in msg.payload.context.webhook_result_1.results){

msg.payload.text=msg.payload.text+"\n"+msg.payload.context.webhook_result_1.result
s[i].text;
}
   msg.payload=msg.payload.text;
}

else
msg.payload = msg.payload.output.text[0];
return msg;
```