

Project Report

on

Intelligent Customer Helpdesk with Smart Document
Understanding

in

Artificial Intelligence

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(SPS_PRO_99)

Intelligent Customer Help Desk with Smart Document Understanding

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1. Introduction

1.1 Overview

We will build a chatbot that uses IBM Services (Watson Discovery, Watson Assistant, Watson Cloud Functions and Node-Red) to deliver an effective Web based UI through which we can chat with the assistant.

We will integrate the Watson Discovery service with Watson Assistant using webhooks.

- Project Requirements: Node-RED, IBM Cloud, IBM Watson, Node JS, User Manual
- Functional Requirements: IBM Cloud
- Technical Requirements: AI, ML, Watson AI, Node JS
- Software Requirements: Watson Assistant, Watson Discovery, Watson Cloud Functions, Node-RED
- Project Deliverables: Intelligent Chatbot with Smart Document Understanding
- Project Team: Individual
- Project Duration: 28 Days

1.2 Purpose

The typical customer care chatbot can answer simple questions, such as store locations and hours, directions, and maybe even making appointments. When a question falls outside of the scope of the pre-determined question set, the option is typically to tell the customer the question isn't valid or offer to speak to a real person.

In this project, there will be another option. If the customer question is about the operation of a device, the application shall pass the question onto Watson Discovery Service, which has been pre-loaded with the device's owners manual. So now, instead of "Would you like to speak to a customer representative?" we can return relevant sections of the owners manual to help solve our customers' problems. So unless and until customer specifically asks for a customer representative the bot will try to solve all your queries.

To take it a step further, the project shall use the Smart Document Understanding feature of Watson Discovery to train it on what text in the owner's manual is important and what is not. This will improve the answers returned from the

queries. Then using Watson actions as webhook, Watson Discovery can be integrated with Watson assistant. Finally using Node-Red, Watson assistant can be integrated with a web UI. This UI can then be used to connect with Watson assistant and chat with it.

1.2.1 Scope of Work

- Create a customer care dialog skill in Watson Assistant
- Use Smart Document Understanding to build an enhanced Watson Discovery collection
- Create an IBM Cloud Functions web action that allows Watson Assistant to post queries to Watson Discovery
- Build a web application with integration to all these services & deploy the same on IBM Cloud Platform

2. Literature Survey

2.1 Existing Problem

The typical customer care chatbot can answer simple questions, such as store locations and hours, directions, and maybe even making appointments. When a question falls outside of the scope of the pre-determined question set, the option is typically to tell the customer the question isn't valid or offer to speak to a real person.

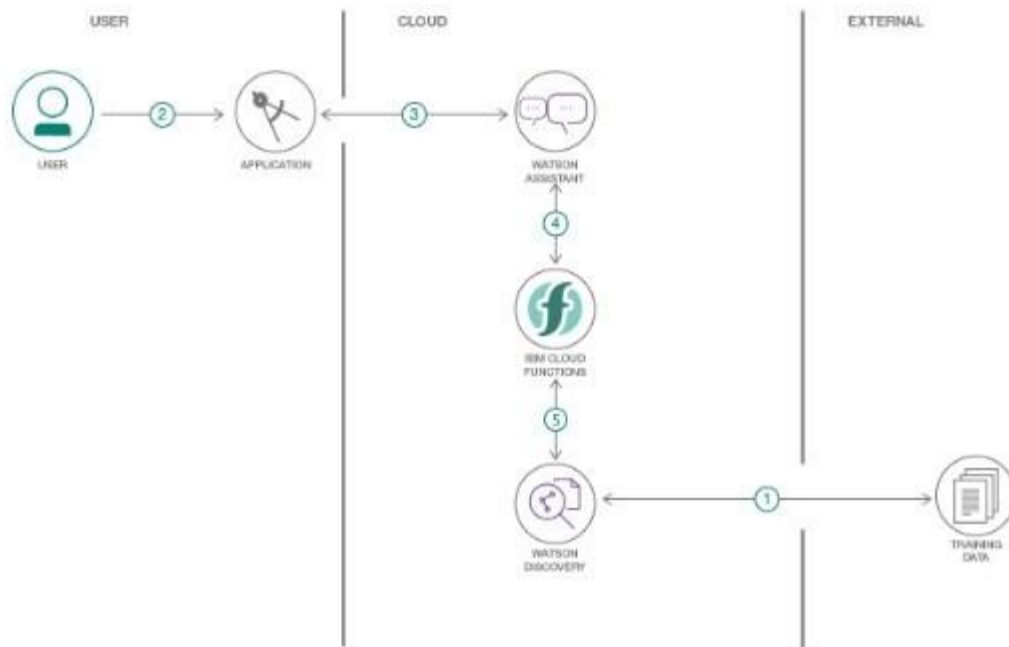
2.2 Proposed Solution

In this project, there will be another option. If the customer question is about the operation of a device, the application shall pass the question onto Watson Discovery Service, which has been pre-loaded with the device's owners manual. So now, instead of "Would you like to speak to a customer representative?" we can return relevant sections of the owners manual to help solve our customers' problems. So unless and until customer specifically asks for a customer representative the bot will try to solve all your queries.

To take it a step further, the project shall use the Smart Document Understanding feature of Watson Discovery to train it on what text in the owners manual is important and what is not. This will improve the answers returned from the queries. Then using Watson actions as webhook, Watson Discovery can be integrated with Watson assistant. Finally using Node-Red, Watson assistant can be integrated with a web UI. This UI can then be used to connect with Watson assistant and chat with it.

3. Theoretical Analysis

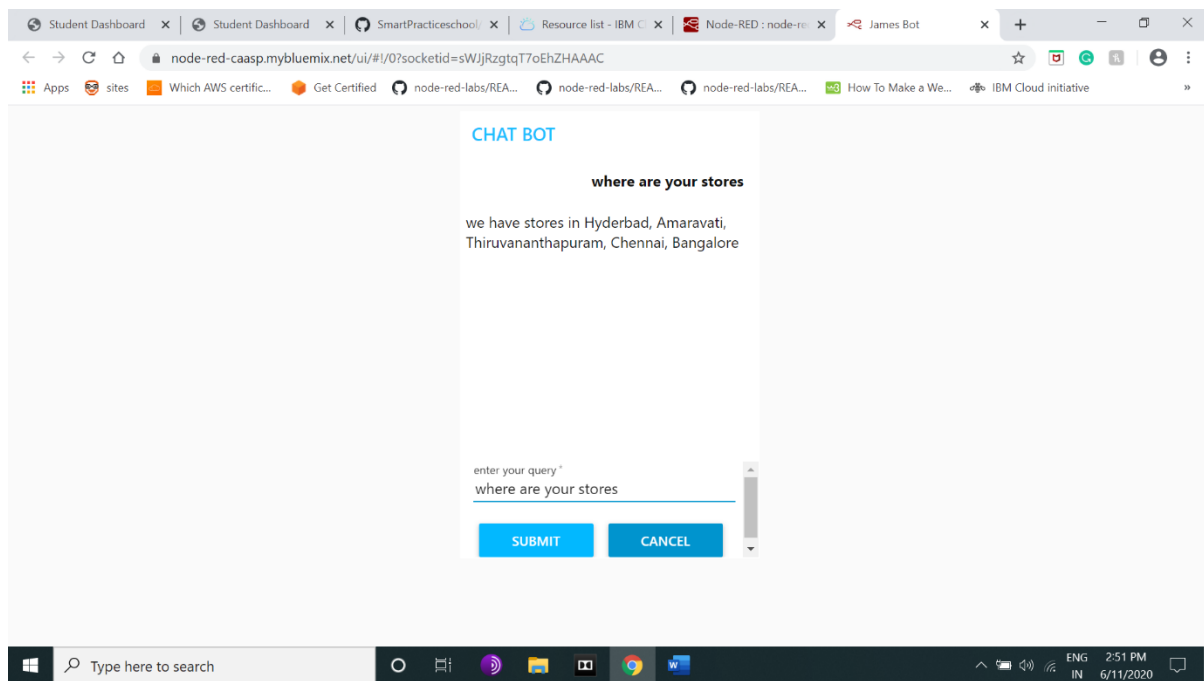
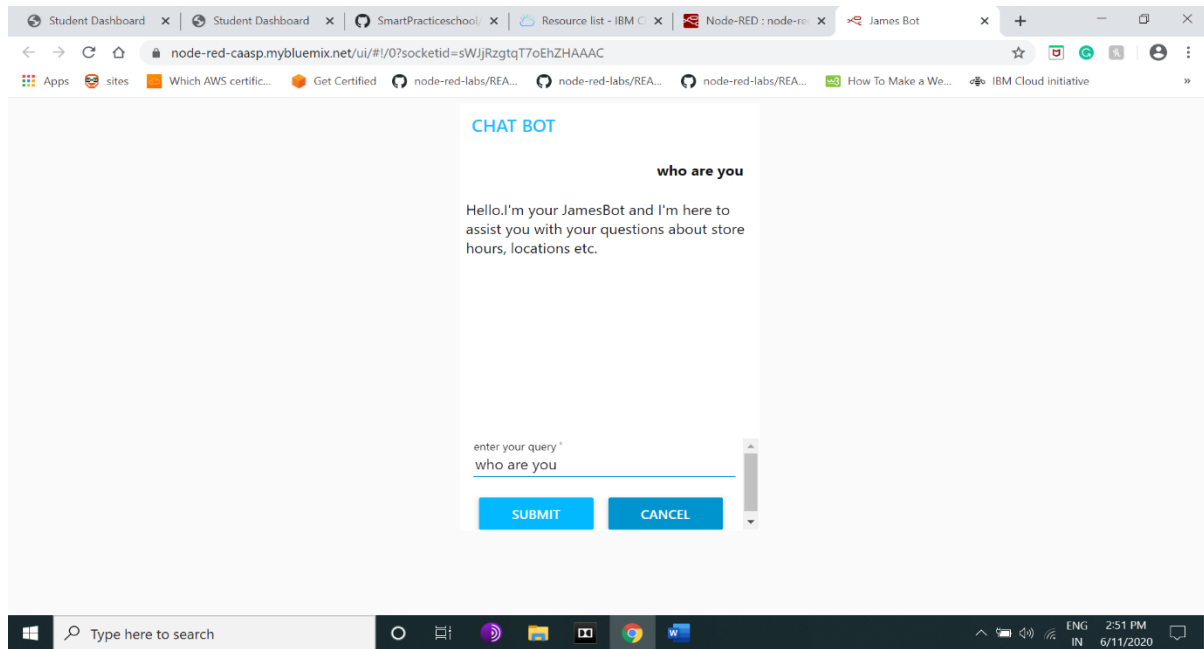
3.1 Block / Flow Diagram



3.2 Hardware / Software Designing

1. Create necessary Watson Services.
2. Configure Watson Discovery.
3. Create Watson Cloud Functions Action.
4. Configure Watson Assistant.
5. Integrate Watson Discovery with Watson Assistant using webhook.
6. Build Node-RED flow to integrate Watson Assistant and Web Dashboard.

4. Experimental Investigation



Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM C x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/0?socketid=sWjJRzgtqT7oEhZHAAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative »

CHAT BOT

where are you available in bangalore

We are available through out Bangalore

enter your query *

where are you available in bangalore

SUBMIT CANCEL

Type here to search

ENG IN 2:52 PM 6/11/2020

Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM C x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/0?socketid=sWjJRzgtqT7oEhZHAAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative »

CHAT BOT

Hyderabad store timings

Everyday from 7 A.M - 10 P.M

enter your query *

Hyderabad store timings

SUBMIT CANCEL

Type here to search

ENG IN 2:53 PM 6/11/2020

Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/0?socketid=sWjJRzgtqT7oEhZHAAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative

CHAT BOT

spain store timings

Sorry, we don't have any store in spain. We have Stores only in Hyderabad, Amaravathi, Bangalore, Chennai, Thiruvananthapuram.

enter your query *

spain store timings

SUBMIT CANCEL

Type here to search

ENG 2:54 PM IN 6/11/2020

Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/0?socketid=sWjJRzgtqT7oEhZHAAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative

CHAT BOT

setting alarm time

1. Rotate the crown while in its normal position to align the mode hand with alarm [ALM] mode as indicated on the mode sub dial. • Second hand: The hand rapid advances to the ON or OFF position. • 24-hour hand, hour hand, minute hand: The move to indicate the alarm time last set. • Function hand: Stops at the 0 position. 2. Pull the crown out two 'steps' to position 2 (alarm set position). • The alarm setting is automatically turned ON.

enter your query *

setting alarm time

SUBMIT CANCEL

Type here to search

ENG 2:55 PM IN 6/11/2020

Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM C x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/l/0?socketid=sWjJRzgtqT7oEhZHAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative

CHAT BOT

what are echo drive watches

- This Eco-Drive watch features a solar panel under the dial and is powered by converting solar energy into electrical energy.
- This watch also features functions such as a perpetual calendar (which automatically adjusts the date at month ends and leap years) a daily alarm (that can be set according to a 24-hour system), and a chronograph (capable of measuring up to 59 minutes, 59.95 seconds, in 1/20 second units).

enter your query "

what are echo drive watches

SUBMIT CANCEL

Type here to search

ENG 2:55 PM IN 6/11/2020

Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM C x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/l/0?socketid=sWjJRzgtqT7oEhZHAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative

CHAT BOT

how to order a watch

>Please visit our official website >Browse the website to find the watch >Select the watch you want to buy >Then place the order by completing the payment

enter your query "

how to order a watch

SUBMIT CANCEL

Type here to search

ENG 2:56 PM IN 6/11/2020

Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/0?socketid=sWjJRzgtqT7oEhZHAAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative

CHAT BOT

will you accept credit cards

We accept all kinds of credit and debit cards, cash on delivery, and also accept all online payments....For any further queries please contact us on "+911234567890" or mail us on gsk5stores@gsk.com

enter your query *

will you accept credit cards

SUBMIT CANCEL

Type here to search

ENG 2:57 PM IN 6/11/2020

Student Dashboard x Student Dashboard x SmartPracticeschool x Resource list - IBM x Node-RED : node-re x James Bot x

node-red-caasp.mybluemix.net/ui/#/0?socketid=sWjJRzgtqT7oEhZHAAAC

Apps sites Which AWS certific... Get Certified node-red-labs/REA... node-red-labs/REA... node-red-labs/REA... How To Make a We... IBM Cloud initiative

CHAT BOT

how to cancel my product

Would you like me to transfer you to our representative?

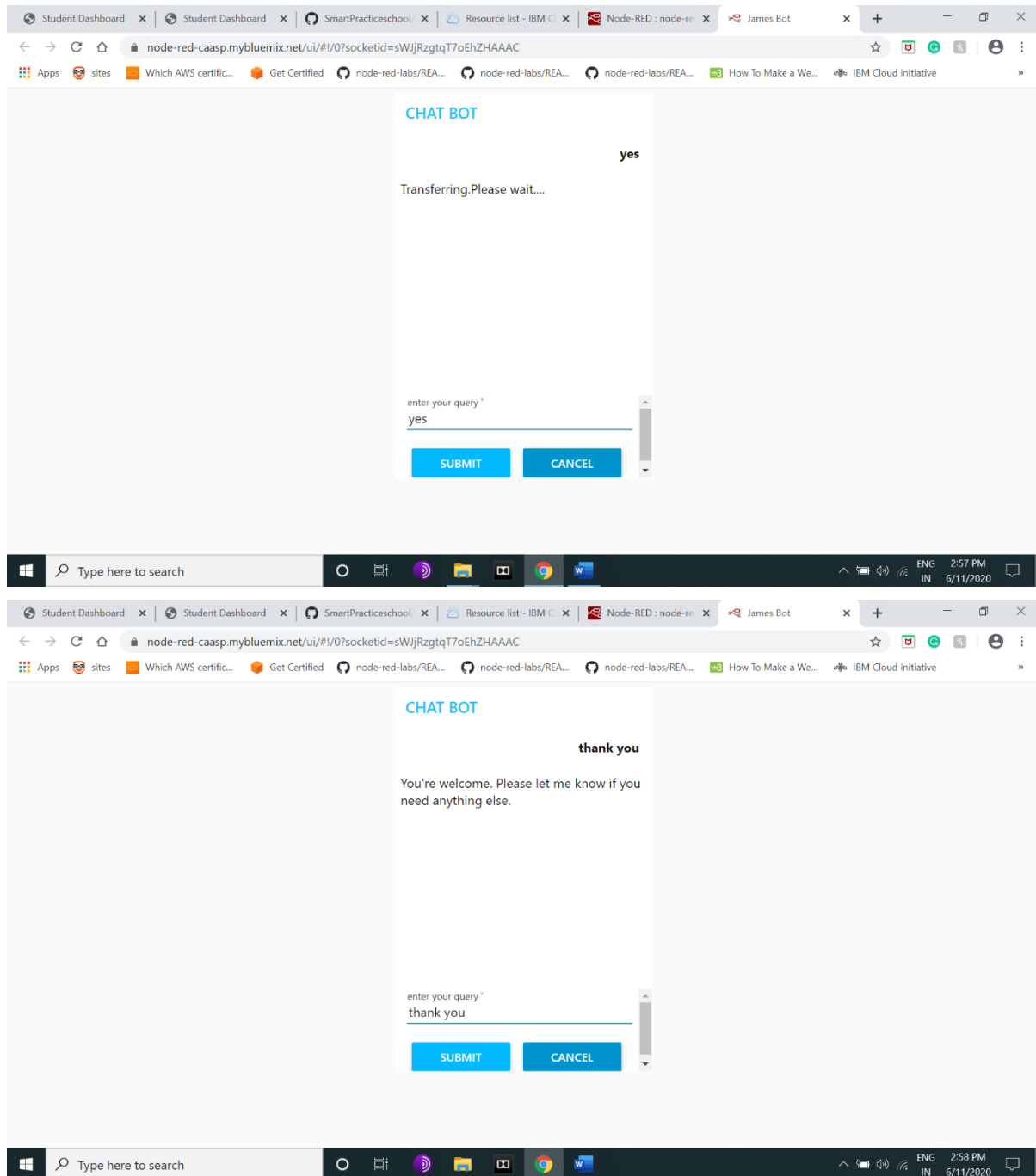
enter your query *

how to cancel my product

SUBMIT CANCEL

Type here to search

ENG 2:57 PM IN 6/11/2020

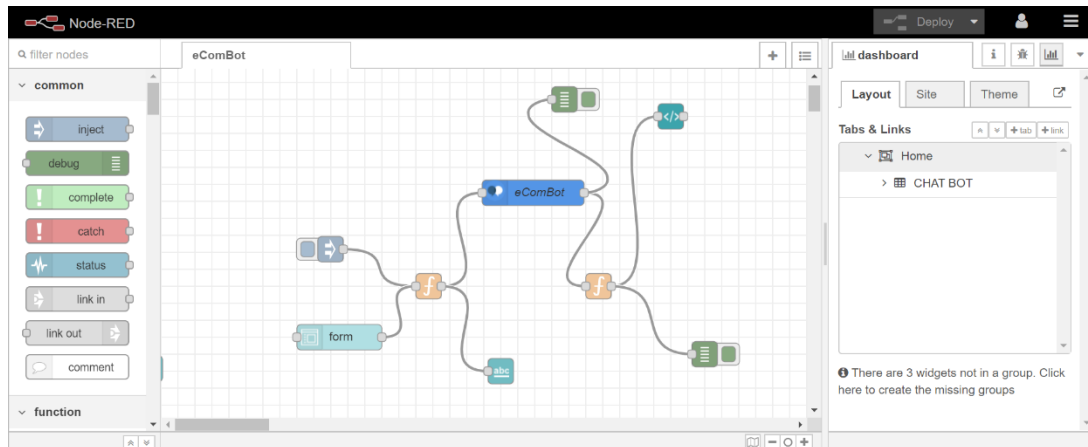


5. Flowchart

Insert the following nodes into the flow in Node-RED.

- Inject
- ui_form
- Function (Input function and output function)
- ui_text
- Watson-conversation-v1 (Watson assistant node)

- Debug (Assistant debug and output function debug)
- ui_template



6. Results

Web based UI was developed by integrating all the services using Node-RED.

URL for UI Dashboard : <https://node-red-caasp.mybluemix.net/ui>

7. Advantages & Disadvantages

Advantages

1. Reduces Man Power
2. Cost Efficient
3. Less and less calls will be diverted to Customer Representatives.

Disadvantages

1. Sometimes it can mislead customers as it tries to search irrelevant information in the manual.
2. It may also give same answers to different queries.

8. Applications

1. This chatbot can be deployed to various websites as it can solve a lot of basic questions.
2. It can be used to deploy as Customer Helpdesk for small scale products as their manual usually has the solution for the user's problems.

9. Conclusion

An Intelligent Customer Helpdesk Chatbot was created using various Watson services like Watson Discovery, Watson Assistant, Watson Cloud Functions and Node-RED.

10. Future Scope

In the future, various other Watson services like Text-To-Speech and Speech-To-Text can be integrated in the chatbot. This can make the chatbot Hands-free.

11. Bibliography

1. Node-RED Starter Application: <https://developer.ibm.com/tutorials/how-to-create-a-node-red-starter-application/>
2. Build your open AI assistant: <https://www.youtube.com/watch?v=hitUOFNne14>
3. How to use Watson Assistant with Webhooks: <https://www.youtube.com/embed/5z3i5IsBVnk>
4. Watson Discovery: <https://cloud.ibm.com/docs/discovery?topic=discovery-getting-started>
5. Smart document understanding in Watson discovery: <https://www.youtube.com/watch?v=-yniuX-Poyw&feature=youtu.be>

Appendix

Source Code

Watson Cloud Function Action Code

```
/**
 *
 * @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);
    });
});
}

```

Node-RED Flow code

```

[

1. {
  o "id": "d1783847.bc32e8",
  o "type": "tab",
  o "label": "eComBot",
  o "disabled": false,
  o "info": ""

},

2. {
  o "id": "2e93fba8.8d7b34",
  o "type": "function",
  o "z": "d1783847.bc32e8",
  o "name": "Input Function",
  o "func": "msg.payload=msg.payload.input;\nreturn msg;",
  o "outputs": 1,
  o "noerr": 0,
  o "x": 315,
  o "y": 300,
  o "wires": [
    1. [
      1. "80938bcb.654be8",
      2. "b2085fe3.10285"
    ]

  ],
  o "l": false

},

3. {
  o "id": "85e44d34.38974",
  o "type": "function",
  o "z": "d1783847.bc32e8",
  o "name": "Output Function",

```



```

    ○ "func":"if(msg.payload.output.generic[0].response_type=="option")\n
      {\n
        msg.payload=msg.payload.output.generic[0].description\n
      }\nelse{\n  msg.payload=msg.payload.output.text[0]\n  }\nreturn
      msg;";
    ○ "outputs":1,
    ○ "noerr":0,
    ○ "x":515,
    ○ "y":300,
    ○ "wires":[
1. [
1. "89f8b87b.3c5c38",
2. "2e0c4b38.0c22e4"

    ]

    ○ ],
    ○ "l":false

    },

4. {
    ○ "id":"f6e6bf48.ce449",
    ○ "type":"inject",
    ○ "z":"d1783847.bc32e8",
    ○ "name":"",
    ○ "topic":"ChatBot",
    ○ "payload":"",
    ○ "payloadType":"date",
    ○ "repeat":"",
    ○ "crontab":"",
    ○ "once":false,
    ○ "onceDelay":0.1,
    ○ "x":199.60000610351562,
    ○ "y":256.4000015258789,
    ○ "wires":[
1. [
1. "2e93fba8.8d7b34"

    ]

    ○ ],
    ○ "l":false

    },

5. {
    ○ "id":"bbc89dd4.83d82",
    ○ "type":"ui_form",
    ○ "z":"d1783847.bc32e8",
    ○ "name":"",

```

```

    ○ "label": "",
    ○ "group": "cfe507dc.3c62c8",
    ○ "order": 3,
    ○ "width": "0",
    ○ "height": "0",
    ○ "options": [
1. {
    ■ "label": "enter your query",
    ■ "value": "input",
    ■ "type": "text",
    ■ "required": true,
    ■ "rows": null

    }

    ○ ],
    ○ "formValue": {
    ■ "input": ""

    },

    ○ "payload": "",
    ○ "submit": "submit",
    ○ "cancel": "cancel",
    ○ "topic": "",
    ○ "x": 210,
    ○ "y": 360,
    ○ "wires": [
0. [
0. "2e93fba8.8d7b34"

    ]

    ○ ]
6. },
7. {
    ○ "id": "c6639b16.d4dac8",
    ○ "type": "ui_text",
    ○ "z": "d1783847.bc32e8",
    ○ "order": 0,
    ○ "width": 0,
    ○ "height": 0,
    ○ "name": "",
    ○ "label": "text",
    ○ "format": "{{msg.payload}}",
    ○ "layout": "row-spread",
    ○ "x": -13,
    ○ "y": 397,
    ○ "wires": [

    ],

```

```

    ○ "l":false

    },

8. {
  ○ "id":"80938bcb.654be8",
  ○ "type":"watson-conversation-v1",
  ○ "z":"d1783847.bc32e8",
  ○ "name":"eComBot",
  ○ "workspaceid":"1e88c415-f23d-42f0-9579-1902607376b2",
  ○ "multiuser":false,
  ○ "context":true,
  ○ "empty-payload":true,
  ○ "service-endpoint":"https://api.us-
    south.assistant.watson.cloud.ibm.com/instances/39477079-278d-
    4e54-ab93-0ba4f3aa5b56",
  ○ "timeout":"",
  ○ "optout-learning":true,
  ○ "x":438.00000762939453,
  ○ "y":190.00000476837158,
  ○ "wires":[
0. [
0. "85e44d34.38974",
1. "4bc3039d.3e693c"

    ]

  ○ ]
9. },
10. {
  ○ "id":"b2085fe3.10285",
  ○ "type":"ui_text",
  ○ "z":"d1783847.bc32e8",
  ○ "group":"cfe507dc.3c62c8",
  ○ "order":1,
  ○ "width":6,
  ○ "height":1,
  ○ "name":"",
  ○ "label":"",
  ○ "format":"{{msg.payload}}",
  ○ "layout":"row-spread",
  ○ "x":400,
  ○ "y":400,
  ○ "wires":[

    ],

  ○ "l":false

  },

```

```

11. {
  o "id": "4bc3039d.3e693c",
  o "type": "debug",
  o "z": "d1783847.bc32e8",
  o "name": "",
  o "active": true,
  o "tosidebar": true,
  o "console": false,
  o "tostatus": false,
  o "complete": "true",
  o "targetType": "full",
  o "x": 475,
  o "y": 80,
  o "wires": [

    ],

  o "l": false

},

12. {
  o "id": "89f8b87b.3c5c38",
  o "type": "ui_template",
  o "z": "d1783847.bc32e8",
  o "group": "cfe507dc.3c62c8",
  o "name": "",
  o "order": 2,
  o "width": 6,
  o "height": 5,
  o "format": "<!DOCTYPE html>\n<html>\n<head>\n<style>\nndiv.scr1
{\n background-color: white;\n width: 310px;\n height: 400px;\n
overflow: auto;\n\n margin-
bottom:20px;\n}\n</style>\n</head>\n<body>\n<div
class=\"scr1\">{{msg.payload}}</div>\n</body>\n</html>\n",
  o "storeOutMessages": false,
  o "fwdInMessages": true,
  o "resendOnRefresh": false,
  o "templateScope": "local",
  o "x": 600,
  o "y": 100,
  o "wires": [

0. [

    ]

  o ],
  o "l": false

},

```

```

13. {
  o "id": "2e0c4b38.0c22e4",
  o "type": "debug",
  o "z": "d1783847.bc32e8",
  o "name": "",
  o "active": true,
  o "tosidebar": true,
  o "console": false,
  o "tostatus": false,
  o "complete": "true",
  o "targetType": "full",
  o "x": 640,
  o "y": 380,
  o "wires": [

    ],

  o "l": false

},

14. {
  o "id": "cfe507dc.3c62c8",
  o "type": "ui_group",
  o "z": "",
  o "name": "CHAT BOT",
  o "tab": "32a8854c.684eca",
  o "order": 1,
  o "disp": true,
  o "width": "6",
  o "collapse": false

},

15. {
  o "id": "32a8854c.684eca",
  o "type": "ui_tab",
  o "z": "",
  o "name": "Home",
  o "icon": "dashboard",
  o "disabled": false,
  o "hidden": false

}

]

```