PROJECT REPORT

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TITLE: Intelligent Customer Help Desk with Smart Document Understanding

Category: Artificial Intelligence Internship at SMARTINTERNZ

Application ID:SPS_APL_20200000963

Project ID:SPS_PRO_99

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1. INTRODUCTION

1 .1 Overview: A customer care chat bot can answer simple questions, such as store l ocations and hours, directions, and perhaps even making appointments.In this project, the queries will be handled in a better way. If the customer's q uestion is about the operation of a device, the application shall pass the q uestion onto Watson Discovery Service and we can handle the queries in a b etter way.

We will build a chat bot that uses various Watson AI Services like Watson D iscovery, Watson Assistant, Watson Cloud functions and Node-Red and d eliver an effective user friendly Web User Interface.

➤ Project Requirements I BM Cloud, IBM Watson, Node-Red, NodeJS

➤ Functional Requirements I BM Cloud

➤ Technical Requirements Artificial Intelligence, Machine Learning, Watson AI, NodeJS

➤ Software Requirements W atson Assistant, Watson Discovery, Node-Red

➤ Project Deliverables I ntelligent Chatbot with Smart document

understand

➤ Project Team Rishit Sahu

➤ Project Schedule : 30 days

1.2 Purpose:

The typical customer care chat bot can answer simple questions, such as s tore locations and hours, directions, and even making appointments. W hen a question falls outside of the scope of the pre-determined question s et, the option is typically to tell the customer the question is not valid or o ffer to speak to a real person. I n this project, there will be an another option. If the customer question is a bout the operation of a device, the application shall pass the question o nto Watson Discovery Service, which has been pre-loaded with the d evice's owners manual. So now, instead of "Would you like to speak to a c ustomer representative?" we can return relevant sections of the owners m anual to help solve our customers' problems. T o take it a step further, the project shall use the Smart Document U nderstanding feature of Watson Discovery to train it on what text in the o wners manual is important and what is not. T his will improve the answers returned from the queries.

2. LITERATURE SURVEY

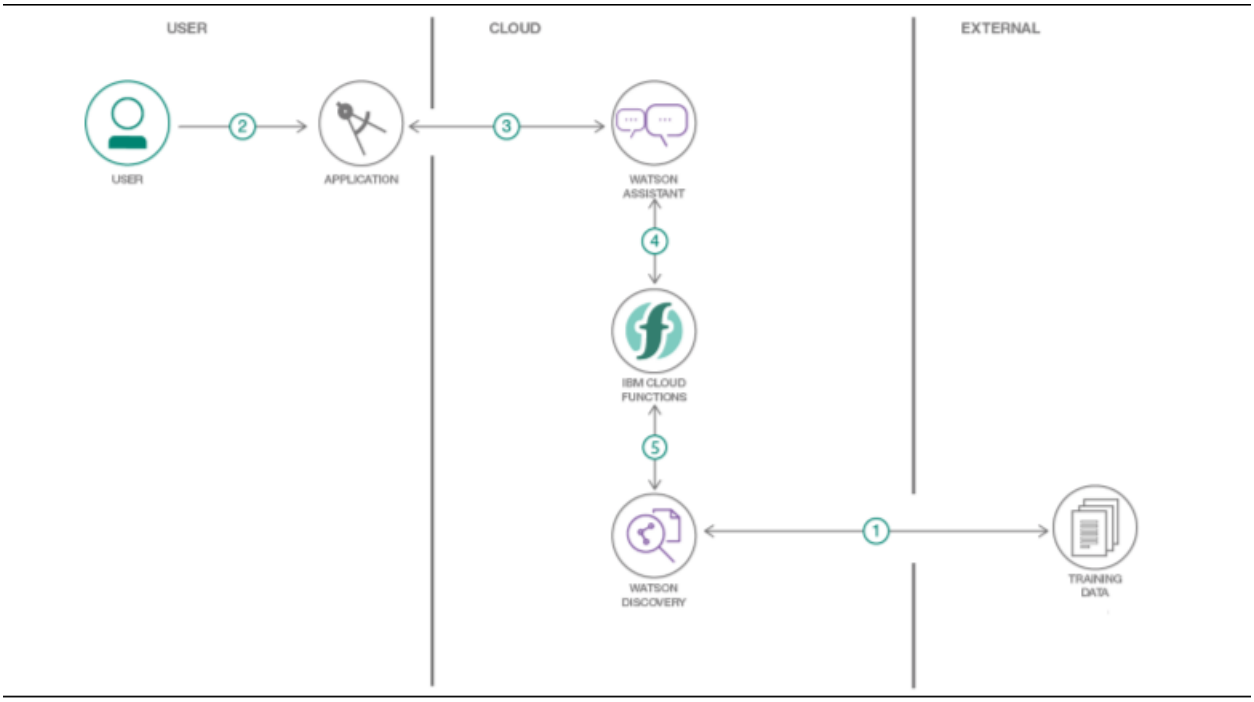
2 .1 Existing problem: Generally Chatbots means getting input from users and getting only r esponse questions and for some questions the output from bot will be like " try again", "I don't understand", "will you repeat again", and so on… and d irects customer to customer agent but a good customer Chatbot should m inimize involvement of customer agent to chat with customer to clarify h is/her doubts. So to achieve this we should include an virtual agent in chat b ot so that it will take care of real involvement of customer agent and c ustomer can clarifies his doubts with fast chatbots.

2.2 Proposed solution: For the above problem to get solved we have to put a virtual agent in chat b ot so that it can understand the queries that are posted by customers. The v irtual agent should be trained on some modules of records based on the c ompany background so that it can answer the queries related to the p roduct or related to company. In this project I have used Watson Discovery t o achieve the above solution,along with Watson Assistant and built an U ser Interface using Node-RED

3. THEORITICAL ANALYSIS

3 .1 Block/Flow Diagram

The following flow is the basic working flow of the project.



1 . The document is annotated using Watson Discovery SDU

2 . The user interacts with the backend server via the app UI. The front end a pp UI is a chat bot that engages the user in a conversation.

3 . Dialog between the user and the backend server is coordinated using a W atson Assistant dialog skill.

4 . If the user asks a product operation question, a search

query is passed t o the predefined IBM Cloud Functions action.

5 . The Cloud Functions action will pass the query to the Watson Discovery s ervice and returns the result.

3 .2 Hardware / Software designing:

1 . Create IBM Cloud services

2 . Configure Watson Discovery

3 . Create IBM Cloud Functions action

4 . Configure Watson Assistant

5 . Create flow and configure node

6 . Deploy and run Node Red app.

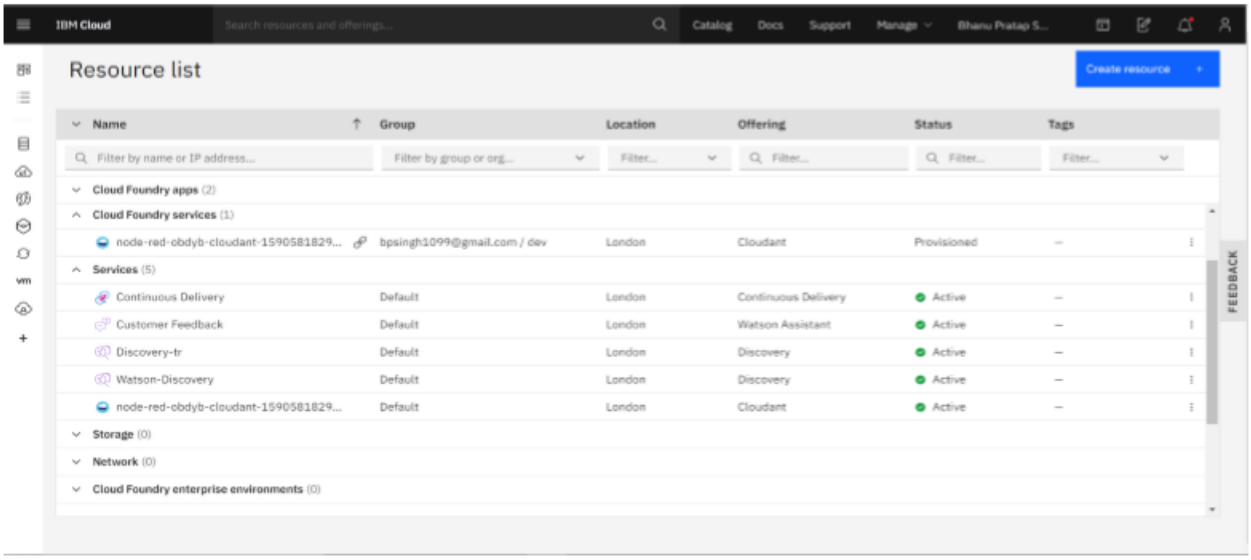
4. EXPERIMENTAL INVESTIGATIONS

1. Create IBM Cloud services

Create the following services:

- Watson Discovery
- Watson Assistant
- Node Red

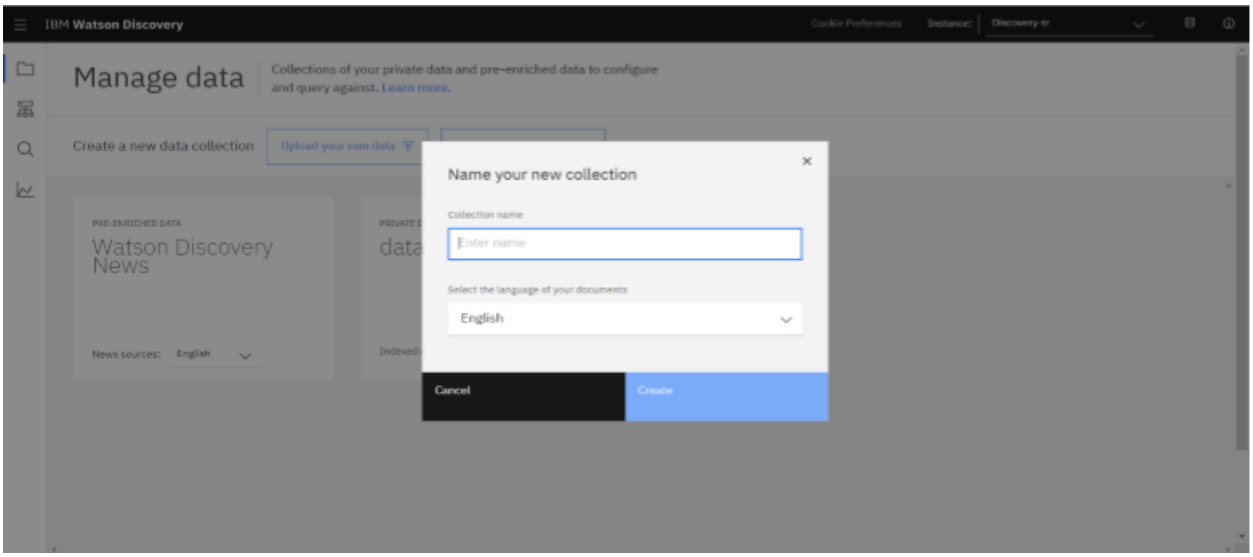
The resources tab of IBM Account will look like this after creation of the above services.



2 . Configure Watson Discovery

➤ Import the document

➤Launch the Watson Discovery tool and create a new data collection



by selecting the Upload your own data option.

➤ *Give the data collection a unique name.*

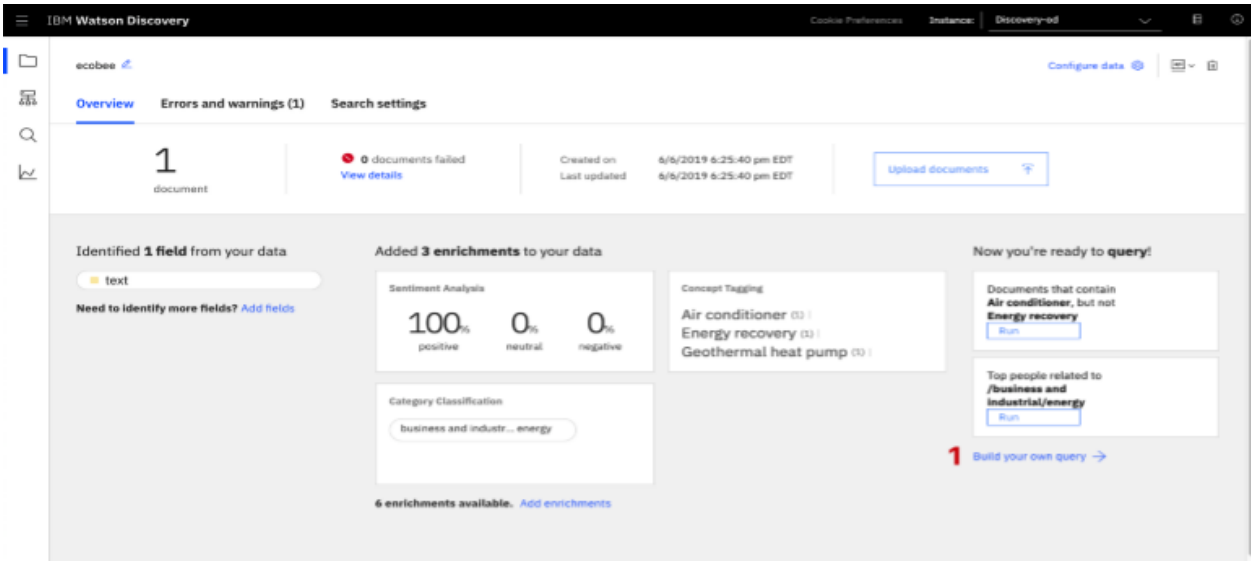
➤ *When prompted, select and upload the ecobee3_UserGuide.pdf file l*

ocated in the data directory of your local repository.

➤ *The Ecobee is a popular residential thermostat that has a wifi i nterface and multiple configuration options.*

➤ *Before applying SDU to our document, lets do some simple queries o n the data so that we can compare it to results found after applying S DU.*

➤ *Enter queries related to the operation of the thermostat and view the r esults.*

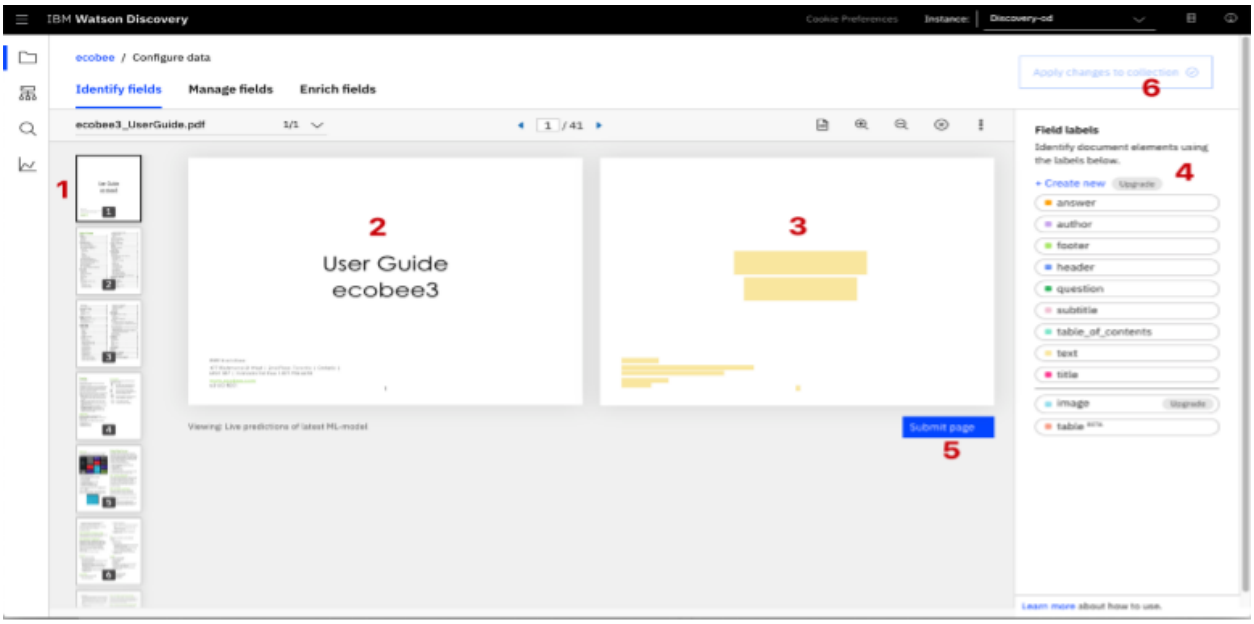


➤ The goal is to annotate all of the pages in the document so Discovery c an learn what text is important, and what text can be ignored.

Follow the following instructions to achieve this task:

- [1] is the list of pages in the manual. As each is processed, a green c heck mark will appear on the page.
- [2] is the current page being annotated.

- [3] is where you select text and assign it a label.
- [4] is the list of labels you can assign to the page text.
- Click [5] to submit the page to Discovery.
- Click [6] when you have completed the annotation process



- As you go though the annotations one page at a time, Discovery is l earning and should start automatically updating the upcoming p ages. Once you get to a page that is already correctly annotated, you c an stop, or simply click Submit [5] to acknowledge it is correct. The m ore pages you annotate, the better the model will be trained.

- For this specific owner's manual, at a minimum, it is suggested

to m ark the following:

○ The main title page as title

○ The table of contents as table_of_contents

○ All headers and sub-headers (typed in light green text) as a s ubtitle

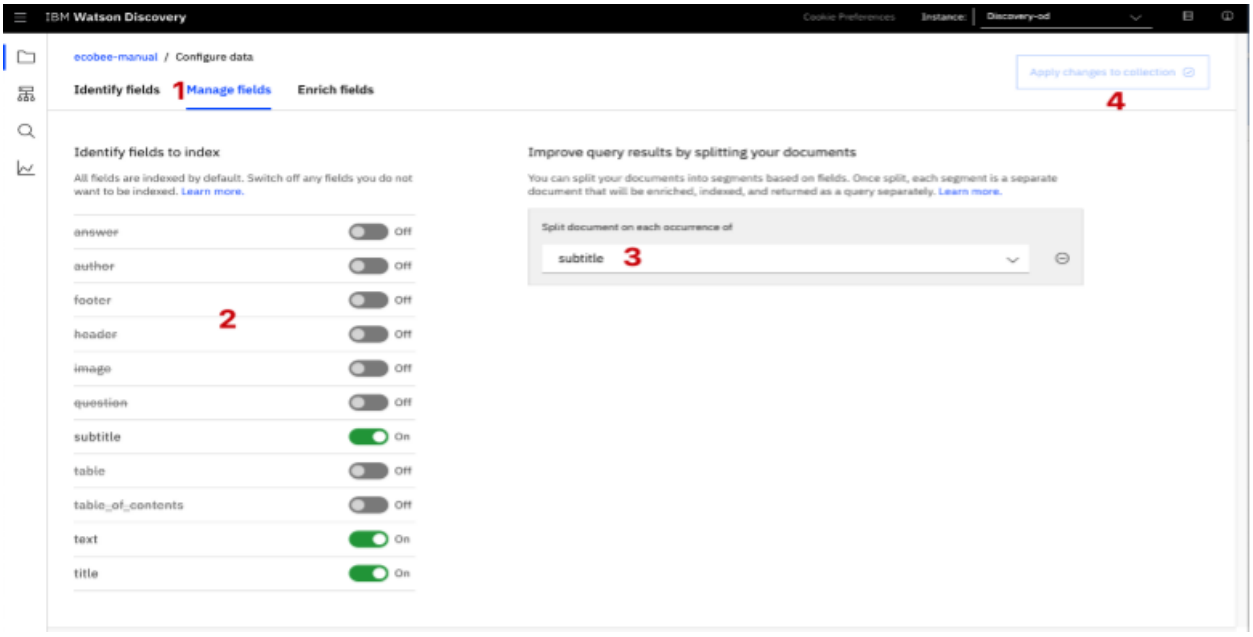
○ All page numbers as footers

○ All warranty and licensing information (located in the last few p ages) as a footer

○ All other text should be marked as text.

● Once you click the Apply changes to collection button [6], you will be a sked to reload the document. Choose the same owner's manual .pdf d ocument as before.

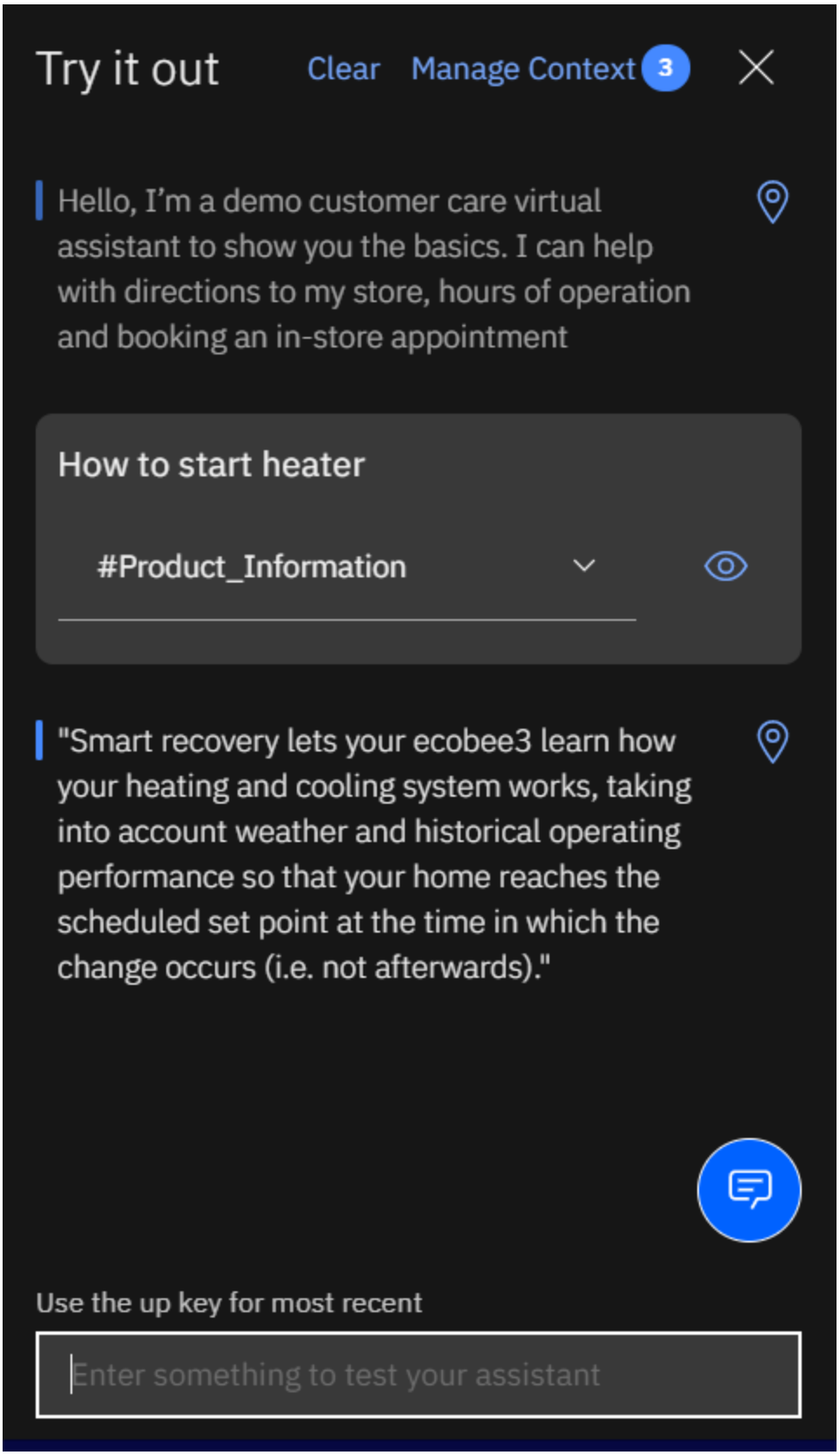
● Next, click on the Manage fields [1] tab



- [2] Here is where you tell Discovery which fields to ignore. Using the o n/off buttons, turn off all labels except subtitles and text.
- [3] is telling Discovery to split the document apart, based on subtitle.
- Click [4] to submit your changes.
- Once again, you will be asked to reload the document.
- Now, because of splitting the document apart, your collection will l ook very different
- Return to the query panel (click Build your own query) and see how much better the results are:

➤ Test in Assistant Tooling

- From the Dialog panel, click the Try it button located at the top right s ide of the panel.
- Enter some user input:


Try it out
Clear
Manage Context
3
Hello, I'm a demo customer care virtual assistant to show you the basics. I can help with directions to my store, hours of operation and booking an in-store appointment
How to start heater
#Product_Information
"Smart recovery lets your ecobee3 learn how your heating and cooling system works, taking into account weather and historical operating performance so that your home reaches the scheduled set point at the time in which the change occurs (i.e. not afterwards)."
Use the up key for most recent
Enter something to test your assistant

5. FLOWCHART

➤ At first go to manage pallete and install dashboard.

➤ Now,Create the flow with the help of following node: ● Template

● Assistant

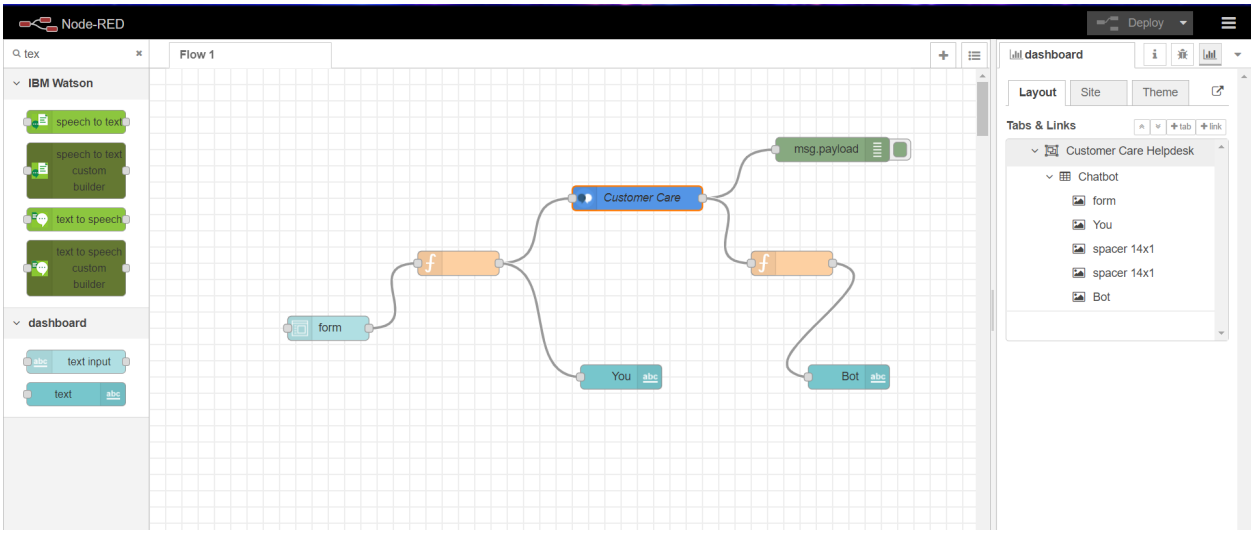
● Debug

● Function

● Ui_Form

● Ui_Text

Flowchart of node-red app will look like this:



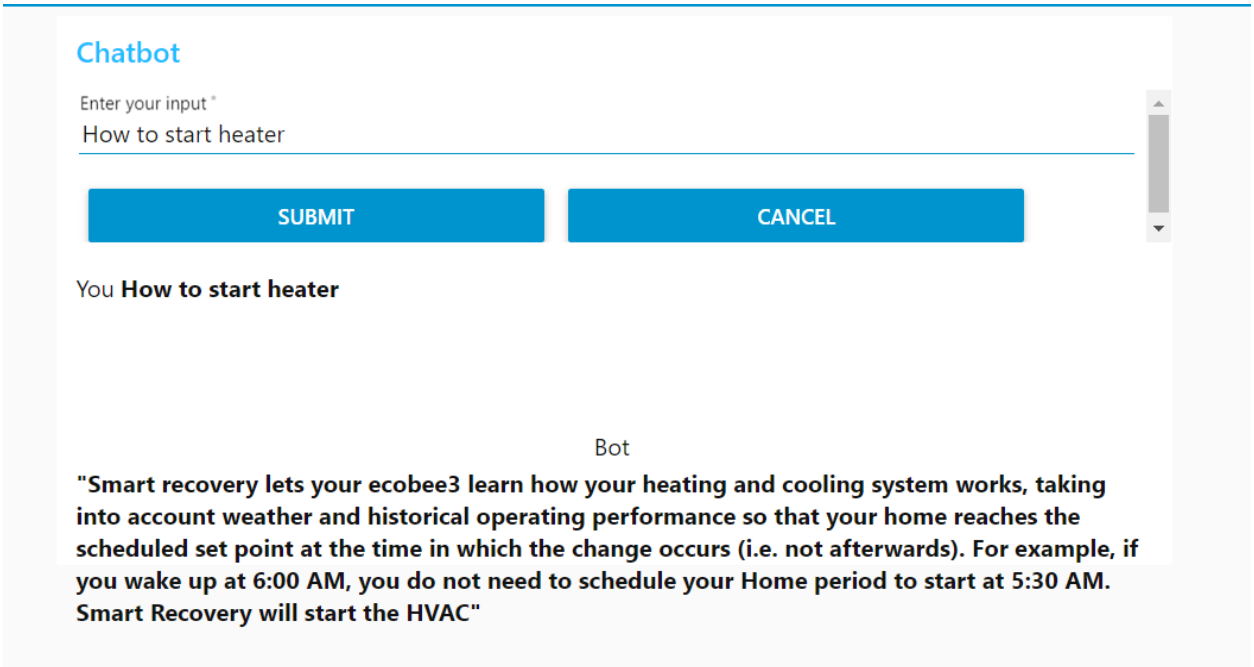
6. RESULTS

➤ Finally our Node-RED dash board integrates all the

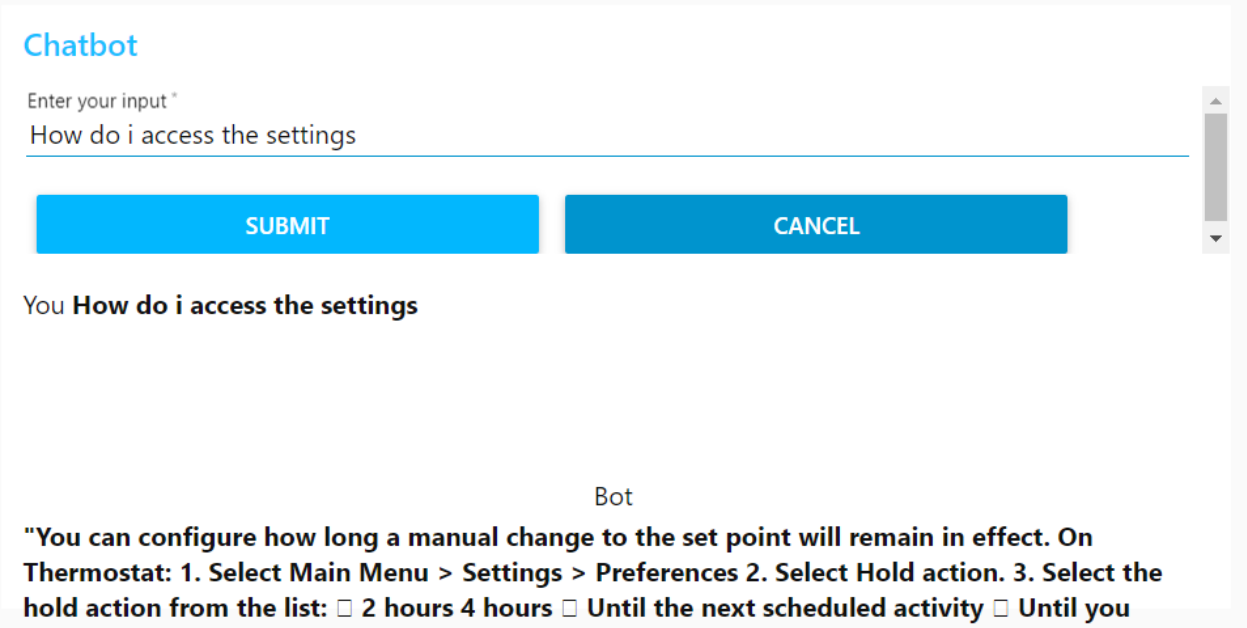
components and displayed in the Dashboard UI by typing URL https://node-red-bvosg.eu-gb.mybluemix.net/ui/#!/0?socketid=FyWQ8hU_UhOKXoWmAAAB browser.

➤ Here are some pictures showing the responses of our queries by the c hat bot :

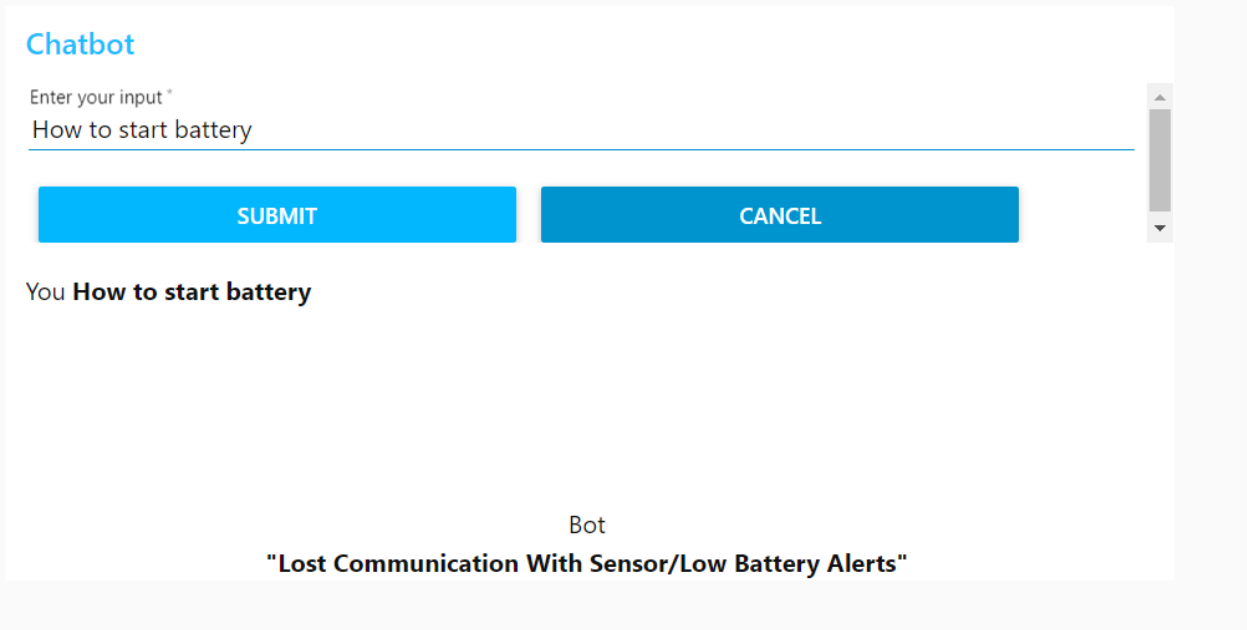
● Query 1



● Query 2


Chatbot
Enter your input *
How do i access the settings
SUBMIT
CANCEL
You How do i access the settings
Bot
"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."

- Query 3


Chatbot
Enter your input *
How to start battery
SUBMIT
CANCEL
You How to start battery
Bot
"Lost Communication With Sensor/Low Battery Alerts"

7. ADVANTAGES & DISADVANTAGES

Advantages:

➤ Companies can deploy chatbots to rectify simple and general human q ueries .
➤ Reduces man power
➤ Cost efficient
➤ No need to divert calls to customer agent and customer agent can l ook on other works.

Disadvantages:

➤ Some times chat bot can mislead customers
➤ Giving same answer for different sentiments.
➤ Some times cannot connect to customer sentiments and intentions.

8. APPLICATIONS

➤ It can be deployed on many popular social media applications like f acebook, slack, telegram.
➤ Chatbot can deploy any website to clarify basic doubts of viewers.

9. CONCLUSION

➤ By doing the above procedure and we have successfully created the I ntelligent help desk smart chat bot using Watson assistant, Watson d iscovery, Node-RED and cloud-functions.

10. FUTURE SCOPE

➤ We can include Watson studio text to speech and speech to text s ervices to access the chat bot hands free. This is one of the future scope of the project.

11. BIBILIOGRAPHY

Source Code:
Cloud Functions Action

```
/**
 *
 * @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

```
[
   {
      "id": "c40bb888.eb34d8",
      "type": "tab",
      "label": "Customer Help Desk",
      "disabled": false,
      "info": ""
   },
   {
      "id": "51edf5aa.83120c",
      "type": "debug",
      "z": "c40bb888.eb34d8",
      "name": "",
      "active": true,
      "tosidebar": true,
      "console": false,
      "tostatus": false,
      "complete": "false",
      "x": 780,
      "y": 120,
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   },
   {
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      "type": "function",
      "z": "c40bb888.eb34d8",
```

```
        "name": "",
        "func": "msg.payload = \" \"+msg.payload.input\nreturn msg;",
        "outputs": 1,
        "noerr": 0,
        "x": 340,
        "y": 260,
        "wires": [
          [
            "453b40fd.5ab6c",
            "c8ebc71f.5855a8"
          ]
        ]
    },
    {
        "id": "9a963555.0b4c98",
        "type": "function",
        "z": "c40bb888.eb34d8",
        "name": "",
        "func":
"msg.payload.text=\"\";\nif(msg.payload.context.webhook_result_1)\n{\n
for(var i in msg.payload.context.webhook_result_1.results)\n    {\n
msg.payload.text =
msg.payload.text+\"\\n\"+msg.payload.context.webhook_result_1.results[i]
.text;\n    }\n    msg.payload = msg.payload.text;\n}\nelse\nmsg.payload =
msg.payload.output.text[0];\nreturn msg;",
        "outputs": 1,
        "noerr": 0,
        "x": 760,
        "y": 260,
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          [
            "e29667cc.f23f08"
```

```
        ]
    ]
},
{
    "id": "453b40fd.5ab6c",
    "type": "ui_text",
    "z": "c40bb888.eb34d8",
    "group": "f9fe34ac.23efe8",
    "order": 3,
    "width": 0,
    "height": 0,
    "name": "",
    "label": "Your query: ",
    "format": "{{msg.payload}}",
    "layout": "col-center",
    "x": 490,
    "y": 360,
    "wires": []
},
{
    "id": "1fcad56.7369c2b",
    "type": "ui_form",
    "z": "c40bb888.eb34d8",
    "name": "",
    "label": "",
    "group": "f9fe34ac.23efe8",
    "order": 2,
    "width": 0,
    "height": 0,
    "options": [
        {
            "label": "Enter your query",
```

```
            "value": "input",
            "type": "text",
            "required": true,
            "rows": null
        }
      ],
      "formValue": {
        "input": ""
      },
      "payload": "",
      "submit": "submit",
      "cancel": "cancel",
      "topic": "",
      "x": 120,
      "y": 360,
      "wires": [
        [
          "93f16dfc.0495b"
        ]
      ]
    },
    {
      "id": "c8ebc71f.5855a8",
      "type": "watson-conversation-v1",
      "z": "c40bb888.eb34d8",
      "name": "",
      "workspaceid": "b3831072-c77f-4b32-a112-f6ed96f655d7",
      "multiuser": false,
      "context": false,
      "empty-payload": false,
      "service-endpoint":
"https://api.eu-gb.assistant.watson.cloud.ibm.com/instances/0d6e0bb1-9e
```


kfkkfbfbhhrhfvyueryyuryh

```
8c-4cd4-b0e2-87b0981c50b9",
        "timeout": "",
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        "y": 160,
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            [
                "51edf5aa.83120c",
                "9a963555.0b4c98"
            ]
        ]
    },
    {
        "id": "e29667cc.f23f08",
        "type": "ui_template",
        "z": "c40bb888.eb34d8",
        "group": "eb8fe3b6.ab982",
        "name": "ChatBot",
        "order": 0,
        "width": "20",
        "height": "6",
        "format": "<div ng-bind-html=\"msg.payload\">\n</div>",
        "storeOutMessages": true,
        "fwdInMessages": true,
        "resendOnRefresh": true,
        "templateScope": "local",
        "x": 900,
        "y": 360,
        "wires": [
            []
        ]
    },
```

```
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        "id": "f9fe34ac.23efe8",
        "type": "ui_group",
        "z": "",
        "name": "CHATBOT: Ask me anything about our product",
        "tab": "8797a074.5526c",
        "order": 1,
        "dish": true,
        "width": "20",
        "collapse": false
    },
    {
        "id": "eb8fe3b6.ab982",
        "type": "ui_group",
        "z": "",
        "name": "CHATBOT's response",
        "tab": "8797a074.5526c",
        "order": 2,
        "disp": true,
        "width": "20",
        "collapse": false
    },
    {
        "id": "8797a074.5526c",
        "type": "ui_tab",
        "z": "",
        "name": "Customer Help Desk",
        "icon": "dashboard",
        "disabled": false,
        "hidden": false
    }
]
```