

BOT Platform – Overview

Release V 1.0_14

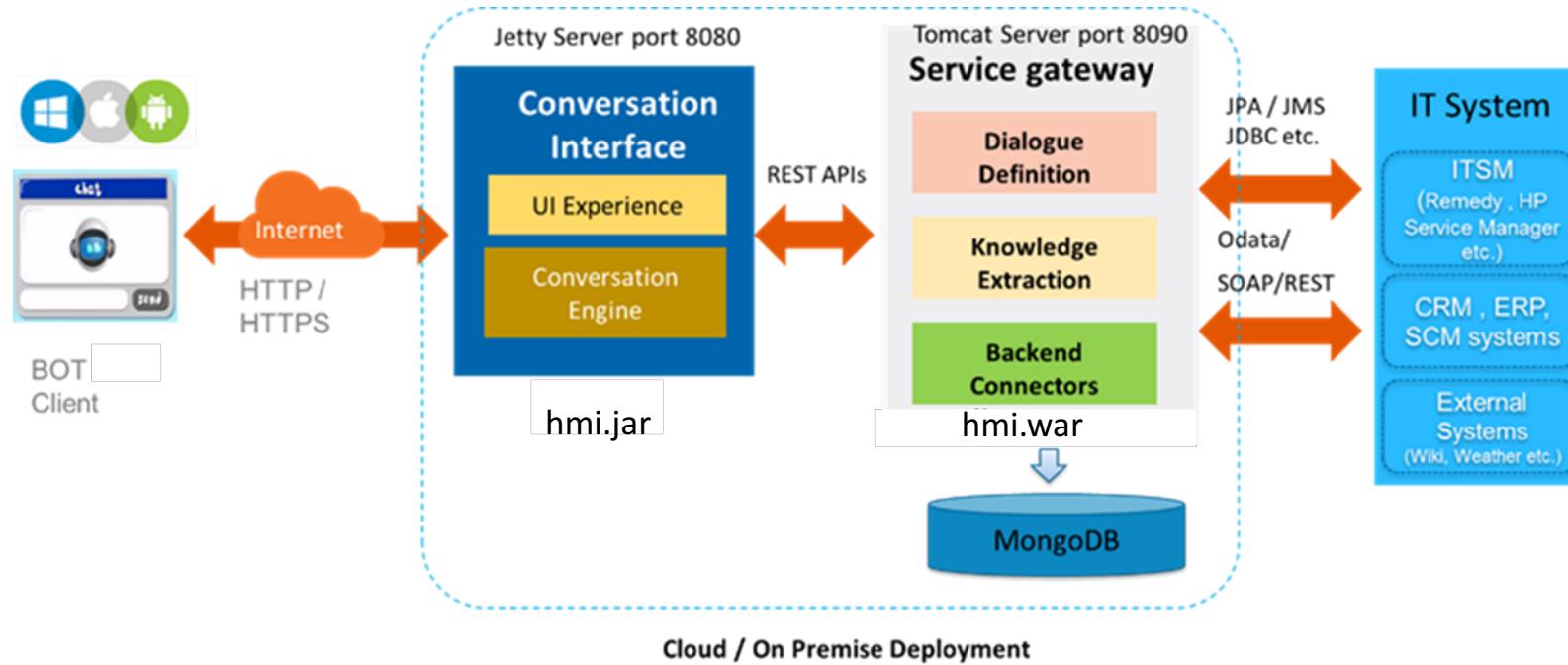
Aug-2018

Revision History

- CR-101 (7 Apr'18) - Added the IGNORE_PREV_TASK flag in bot.properties so that user can still switch to new task but can ignore the previous context.
- CR-102(8 Apr'18) – Added the task level CACHE mechanism to transfer info across tasks. (see appendix-7)
- CR-103(9 Apr'18) – Added clarifyQuestion XML tag to provide more natural response in case user fail to answer.
- CR-104(20 Apr'18) – You can now set the ITO value through groovy action (slide -13)
- CR-105(11 May'18) – GDPR compliance mask personal data in user utterance before storing it in Logs
- CR-106(15 May'18) – fallbackQuestion tag in DDF now supports use of ITO values. (e.g. Hi %loginUser_ , How are you ?) (slide-11)
- CR-107(22 May'18) – support for Arabic language , minor fixes and updated python scripts.
- CR-108(29 May'18) – support user with invocation of cancelTask if he/she fails to answer ITO for consecutive 2 attempts.
- CR-109(14 Jun'18) – added Slider ITO for taking range based number input and also the like, dislike feedback for end user
- CR-110(13 Jul'18) – added new transliteration API (Appendix 11) and bug fix for lastAccessedITO_ access in helpTask
- CR-111(14 Jul'18) – failure Log and bot exit task fixes
- CR-112(15 Jul'18)- now custom.urlList_X and custom.multiUrlList_X supports sending url parameters in PARAMS properties. (slide-19)
- CR-113(21 Jul'18) – added failureAttempts tag to DDF XML to make it configurable
- CR-114(28 Aug'18) – rework on CR-112 , addition of lastAccessedTask_ to ITO and repeating question for meaningless single character inputs
- CR-115(13 Sep'18) – added MASK_DATA flag in configuration to mask sensitive data during logging and added Spanish language

BOT Platform – Overview

The BOT platform is Client-Server architecture , client being Browser , App or Messenger like FB, Slack, Skype etc. The BOT server is completely REST based and run on Jetty Server. This document describes the core bot engine available in form Java library (viz. hmi.jar)



Prerequisite –

Java 1.8+ and all system variables (JAVA_HOME etc.)

Python 3.6 (numpy, scipy, sklearn, nltk, flask modules)

Apache-tomcat-9.0 or later on host server. (optional - requires serviceGateway module)

MongoDB 3.2.8 or later (optional - requires serviceGateway module)

BOT Platform – Getting Started

1. Unzip the hmi.zip to a folder



autocomplete	Contains required scripts for autocomplete feature when user types
bots	Contains script to handle generic conversations – Hi, How are you ?etc.
classifiers	Stanford NLP CRF (conditional random Field) classifier for NER
config	Config folder contains bot.properties file , license properties etc.
dialogues	Contains different dialogue definition XML files
dictionary	Contains stopwords, domain synonyms and SODA files
entities	Stores all data for custom named entities and custom parsers.
events	Stores all event dialogues that can be triggered externally
html	Browser client code reside here (https://10.77.36.45:8080)
intents	Contains BOT intent training related data and models (refer Appendix-3)
keys	Contains your SSL certificate JKS and license key and signature
logs	Contains log that can be used for BOT monitoring & training
temp	Used for temporary storages
upload	The uploaded documents will be stored in this folder

2. Running the BOT server on local console as a standalone (for Testing) or as REST based Server (for Production)

C:\HMI\Demo> java hmi.jar -i rest -r insurance

→ -i rest => for REST options and -r insurance is for running dialogue insurance.xml

C:\HMI\Demo> java hmi.jar -i console -r insurance

→ -i console => for CONSOLE options and -r insurance is for running dialogue insurance.xml

1. Deploy BOT using the command provided on earlier slide

- Once BOT Server is started it runs Jetty server at default port 8080

```
INFO: Scanning for root resource and provider classes in the packages.
      cto.hmi.processor.ui
Apr 17, 2017 10:30:55 AM com.sun.jersey.api.core.ScanningResourceConfig logClass
es
INFO: Root resource classes found:
      class cto.hmi.processor.ui.RESTInterface
Apr 17, 2017 10:30:55 AM com.sun.jersey.api.core.ScanningResourceConfig init
INFO: No provider classes found.
Apr 17, 2017 10:30:55 AM com.sun.jersey.server.impl.application.WebApplicationIm
pl _initiate
INFO: Initiating Jersey application, version 'Jersey: 1.19.1 03/11/2016 02:08 PM
'
[main] INFO org.eclipse.jetty.server.handler.ContextHandler - Started o.e.j.w.We
bAppContext@7fbdb894{/file:///D:/Corp-CTO/Platform/Demo/res/html/,AVAILABLE}
[main] INFO org.eclipse.jetty.server.AbstractConnector - Started ServerConnector
@4b213651{HTTP/1.1,[http/1.1]}{0.0.0.0:8080}
[main] INFO org.eclipse.jetty.server.Server - Started @8088ms
INFO (RESTInterface): REST interface started on http://192.168.0.106:8080/
x
T
```

It will show the url and port details of jetty server on console
<http://192.168.0.106:8080/> - (in this case)

To start the instance of Bot you need to append /hmi/bot to above url as explained on next slide.

BOT Platform – Calling BOT server APIs

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2. Creating BOT instance from REST Client

Enter below details to your RESTClient tool (postman or soapUI etc.)

Method – POST

URL - <https://10.88.246.15:8080/hmi/bot>

Param - url-encoded-body parameter – key => user value => John

The screenshot shows the Postman interface with a POST request to <https://10.88.246.15:8080/hmi/bot>. The 'Body' tab is selected, showing a key-value pair 'user' with value 'John' in x-www-form-urlencoded format. Other tabs include Authorization, Headers (1), Body (selected), Pre-request Script, Tests, form-data, raw, and binary.

Once this request is sent , BOT will create a unique URL for every user and returns it in HTTP header response.

Copy that url <https://10.88.246.15:8080/hmi/bot/d1-XXOS37ATGV75>

#curl -k -i -X POST --data-urlencode "user=John" <https://10.88.246.15:8080/hmi/bot>

access-control-allow-credentials → true

access-control-allow-origin → chrome-extension://fhbjgbiflinjbdggehcddcbncddomop

content-type → application/json

date → Wed, 13 Jun 2018 12:55:53 GMT

location → <https://10.88.246.15:8080/hmi/bot/d1-XXOS37ATGV75>

BOT Platform – Calling BOT server APIs

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3. Start conversation

Using the URL that was obtained in step -2 , call following method to initiate the conversation

The screenshot shows a POST request in Postman. The URL is <https://10.88.246.15:8080/hmi/bot/d1-XX0S37ATGV75>. The Body tab is selected, showing a key-value pair: userUtterance: "I want to book a ticket". The response body is a JSON object:

```
1 {  
2   "user": "John",  
3   "sessionId": "d1-XX0S37ATGV75",  
4   "timeStamp": "2018-06-13 18:32:19",  
5   "language": "en",  
6   "source": "trip",  
7   "result": [  
8     {"query": "I want to book a ticket",  
9      "reply": "OK, where do you want to go?",  
10     "speech": "OK, where do you want to go?",  
11     "intent": {  
12       "name": "getTripInformation",  
13       "label": "Book ticket"  
14     },  
15     "currentEntity": {  
16       "name": "getDestinationCity",  
17       "label": "City Name",  
18       "type": "sys.location.city",  
19     }  
20   ]  
21 }
```

Method – POST

URL - <https://10.88.246.15:8080/hmi/bot/d1-XX0S37ATGV75>

Param - url-encoded-body parameter – key => userUtterance
value => I want to book a ticket

Once this request is sent , Bot will process the userUtternace and will send JSON response with a reply -> “OK, Where do you want to go?”

speech → JSONObject is provisioned for Alexa like devices or message that needs to be sent to TTS engine
It also send status on entities and action

Meta-Information such as sessionId, user, source is used to log the details.

BOT Platform – Calling BOT server APIs

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4. Continue your conversation -

You can continue your conversation by sending the user utterance in “userUtterance” parameter

POST <https://10.88.246.15:8080/hmi/bot/d1-XX0S37ATGV75>

Authorization [No Title] Headers (1) Body Pre-request Script Tests

form-data x-www-form-urlencoded raw binary

Key	Value
<input checked="" type="checkbox"/> userUtterance	I want to go to Mumbai
New key	Value

Body Cookies Headers (6) Test Results

Pretty Raw Preview JSON ↗

```
1 {  
2   "user": "John",  
3   "sessionId": "d1-XX0S37ATGV75",  
4   "timeStamp": "2018-06-13 18:36:03",  
5   "language": "en",  
6   "source": "trip",  
7   "result": {  
8     "query": "I want to go to Mumbai",  
9     "reply": "for how many persons to Mumbai ?",  
10    "speech": "for how many persons to Mumbai ?",  
11    "intent": {  
12      "name": "getTripInformation",  
13      "label": "Book ticket"  
14    },  
15    "currentEntity": {  
16      "name": "getNumberOfPersons",  
17      "label": "No of persons",  
18      "type": "custom.slider_1",  
19      "value": ""  
20    }  
21  }  
22}
```

Once this request is sent , Bot will process the userUtternace and will send JSON response with a reply

If it has executed any action it will populate the details (intent name and entities) in action JSON object.

BOT Platform – Dialog Definition file (DDF)

```
<?xml version="1.0" encoding="UTF-8"?>
<n:dialog xsi:schemaLocation="http://cto.net/hmi schema1.xsd" xmlns:n="http://cto.net/hmi/1.0"
instance" name="trip" company="ABCCorp" version="1.0">
  <startTaskName>start</startTaskName>
  <globalLanguage>en</globalLanguage>
  <useSODA>true</useSODA>
  <allowSwitchTasks>true</allowSwitchTasks>
  <allowOverAnswering>true</allowOverAnswering>
  <allowDifferentQuestion>true</allowDifferentQuestion>
  <allowCorrection>false</allowCorrection>
  <useIntentEngine>true</useIntentEngine>
  <failureAttempts>2</failureAttempts>
  <tasks>
    <!--#DO NOT CHANGE System Task. Acts as a starting task for all the conversations -->
    <task name="start" label="Initial Task"> ... </task>
    <task name="getTripInformation" label="Book ticket"> ... </task>
    <task name="getWeatherInformation" label="Weather information"> ... </task>
    <task name="getWikipediaCityInfo" label="City information"> ... </task>
    <!--#DO NOT CHANGE System Task. Invoked when user explicitly wants to cancel the task
    <task name="cancelTask" label="Cancel"> ... </task>
    <!--#DO NOT CHANGE System Task. Invoked whenever there is two consecutive failed attempt
    <task name="helpTask"> ... </task>
    <!--#DO NOT CHANGE System Task. Invoked whenever number of failed attempts exceeds ALL
    <task name="handoverTask"> ... </task>
    <!--#DO NOT CHANGE System Task. Invoked whenever user says bye , bye bye or exit at start
    <task name="exitTask"> ... </task>
  </tasks>
</n:dialog>
```

Domain or Dialog name ,
Company name , dialog version

Global Flags for defining Dialog
behavior

Different Tasks that BOT needs to
perform

“cancelTask” , “helpTask” , “handoverTask” and “exitTask” are reserved tasks used for

- Cancelling the current task (user explicitly want to cancel the task)
- Providing help to user in case there are consecutive failed attempts in answering ITO as configured in <failureAttempts>
- Coming out of current task and to handover the chat from bot to human respectively
- If user says (bye, exit or bye bye) this task will get final confirmation from user before logout.

BOT Platform – DDF - Global Flags

```
<startTaskName>start</startTaskName>
<globalLanguage>en</globalLanguage>
<useSODA>true</useSODA>
<allowSwitchTasks>true</allowSwitchTasks>
<allowOverAnswering>true</allowOverAnswering>
<allowDifferentQuestion>true</allowDifferentQuestion>
<allowCorrection>false</allowCorrection>
<useIntentEngine>true</useIntentEngine>
<failureAttempts>2</failureAttempts>
```

```
resulted in: seek[0.0428] action[0.0101] prov[0.9471] -> prov
```

startTaskName – This specify the initial task to be executed by BOT. Initial task may be other than “start” but after execution the initial task BOT will return to start task.

globalLanguage – This specifies the BOT language. This has to be in ISO language code. (e.g. English – en, Hindi – hi, Danish-da, Dutch-nl, Swedish-sv Arabic-ar Spanish – es etc.)

useSODA (System Of Dialogue Act) – Each utterance will be classified using Max Entropy Classifier to find whether user is => seeking the information **or** => Providing information **or** => issuing the defined command (e.g. switch ON, Switch OFF)

If set to true, dialog manager will check if the user is seeking the information if yes, will switch the task for its fulfillment.

allowSwitchTasks – if set to true it will allow sub-dialogues from other tasks , if set to false only sub-dialogues of same task will be executed. (e.g. for trip.xml DDF use case - User can only answer questions specific to getTripInformation and will not allowed to switch to getWeatherInformation task)

allowOverAnswering - if set to true the user is allowed to provide more than the information that has been asked for (but at least the current question) (e.g. for trip.xml – user while in getTripInformation can provide information like “want to go to London for four people” which will fill ITOs for getDestinationCity and getNumberOfPersons)

allowDifferentQuestion - if set to true the user can ignore current question and answer a different unanswered question (e.g. for trip.xml – user while in getTripInformation task can say “I want to leave tomorrow” when Bot is actually asking about “where do you want to go?”)

allowCorrection - if set to true user can change a value of an already asked question (e.g. for trip.xml – user while in getTripInformation can say “I want to go to Paris” when Bot is asking “for how many persons”. This will refill the getDestinationCity with new value “Paris”)

useIntentEngine – if set to true , the intent will be identified using internal intent engine trained separately (see appendix -3), else will use BOW (Bag Of Words) specified in <selector> part of dialogue definition file.

failureAttempts – is an integer number which is number of consecutive attempts that will be allowed to user to answer specific ITO. In case he/she fails to answer, he/she will be redirected to “helpTask”

BOT Platform – DDF – Task definition

```
<task name="getWeatherInformation" label="Weather information">
  <selector>
    <bagOfWordsTaskSelector>
      <word>weather|forecasts|temprature</word>
    </bagOfWordsTaskSelector>
  </selector>
  <itos>
    <ito name="getDestinationCity" label="Weather information">
      <AQD>
        <type>
          <answerType>sys.location.city</answerType>
        </type>
      </AQD>
      <fallbackQuestion>for which city do you want to know the weather?</fallbackQuestion>
      <clarifyQuestion>Would you mind providing correct city name?</clarifyQuestion>
      <required>true</required>
      <useContext>true</useContext>
    </ito>
  </itos>
  <action>
    <httpAction>
      <returnAnswer>true</returnAnswer>
      <utteranceTemplate>The temperature in %getDestinationCity is #result</utteranceTemplate>
      <method>get</method>
      <params>q=%getDestinationCity&mode=xml&units=metric&APPID=APIKEY</params>
      <url>http://api.openweathermap.org/data/2.5/weather</url>
      <xpath>/current/temperature/@value</xpath>
      <jpath></jpath>
    </httpAction>
  </action>
</task>
```

Unique task name (intent)

This defines the intent through all the possible utterances.
(Uses bag of words approach after removal of stop words.
Refer /res/dictionary/ stopwords_en for details (you can
use ML based intent engine instead)

These are entities called ITO (Information transfer object)
The slots are filled based on the AQD types (Abstract
Question Descriptor)

This is a fall back question asked to user if slot is not filled
and if “required” flag is true.

You can give multiple options by using “|” separator. You
can also use ITOs by preceding the ITO name with %. e.g.
for which city do you want to know the weather? | Hey,
%loginUser_ what city would you want temperature? (currently for
ENGLISH language) (%loginUser_ and %sessionId_ are system
default)

(optional) This is clarify question which bot will use in
case user fails to provide correct answer. (will use this
over regular reply i.e. Sorry, I did not understand that. Please try
again. for which city do you want to know the weather?)

(optional) If useContext flag is set to true , it will fill this
ITO automatically , if it has been already answered in any
of earlier conversation. (refer Appendix 6)

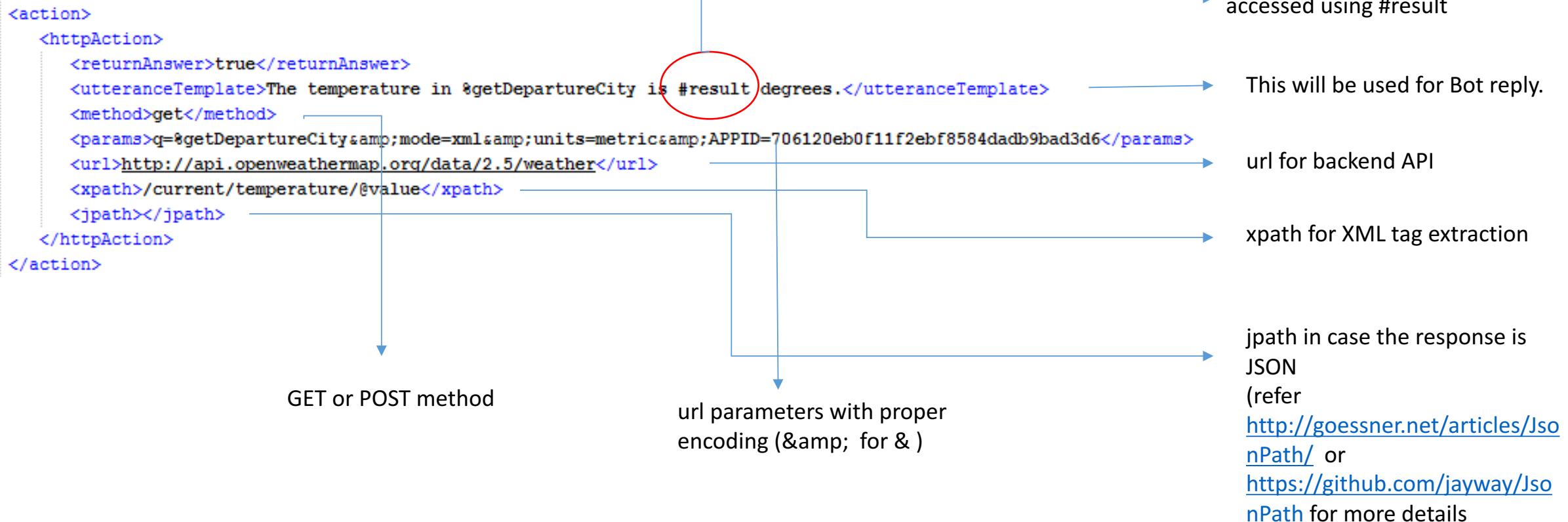
Global ITO

If ITO name ends with “_” then this is treated as global entity and will be passed to every task.

The system also provide loginUser_ , sessionId_ , lastAccessedTask and lastAccessedITO_ as default global ITOs and
any task can use these by referring it as %loginUser_ , %sessionId_ ,%lastAccessedTask_ , %lastAccessedITO_

BOT Platform – DDF (Dialogue Definition File) - Action

1. Supports REST Action



BOT Platform – DDF–Groovy Action with Result Mapping

Supports Groovy Action and also result mapping

```
<action>
  <groovyAction>
    <resultMappings>
      <resultMapping>
        <message/>
        <redirectToTask>homeLoanEligibility</redirectToTask>
        <resultValue>1</resultValue>
        <resultVarName>action</resultVarName>
      </resultMapping>
      <resultMapping>
        <message/>
        <redirectToTask>homeLoanMenu</redirectToTask>
        <resultValue>2</resultValue>
        <resultVarName>action</resultVarName>
      </resultMapping>
    </resultMappings>
    <returnAnswer>true</returnAnswer>
    <utteranceTemplate/>
    <code>
      <![CDATA[
        Integer res = new Integer(2);
        String type=new String(frame.get("getOkInfo"));
        if (type.matches("(?i)^.*?\b(ok|OK|Okay)\b.*?"))
          res = 1;
        else if (type.matches("(?i)^.*?\b(info|Info|INFO)\b.*?"))
          res = 2;
        executionResults.put("action",res.toString());
        executionResults.put("getOkInfo","processing");
      ]]]
    &lt;/code&gt;
  &lt;/groovyAction&gt;
&lt;/action&gt;</pre>
```

Task redirection based on the result of groovy action
Or could be http based action.
The #action value will decide the new task to be created.(API result is always stored in result variable)

NOTE- you can access the variable using # in utteranceTemplate tag. (e.g. #action)
Do not use result as variable as it is internally used in code.

One can use frame.get("<ITO Name>") method to read the ITO value in Groovy action.

You can modify the ITO value in groovy action by using executionResults.put ("<ITO Name>","<value>")
Note- The changed value will be reflected in subsequent task if referred.

BOT Platform – DDF–Groovy Action ..sending predefined response

Use Groovy whenever you want to send the standard responses with no back end API call.

```
<task name="getCareCenter">
  <selector>
    <bagOfWordsTaskSelector>
      <word>closest care center</word>
    </bagOfWordsTaskSelector>
  </selector>
  <action>
    <groovyAction>
      <returnAnswer>true</returnAnswer>
      <utteranceTemplate>Anthony C Lopez - MD FACC is the closest among all which is at 173 North Morrison Ave, San
      Jose, CA 95126, Phone number (408) 293-1088.</utteranceTemplate>
      <code></code>
    </groovyAction>
  </action>
</task>
```

Pre defined answer with no
back end call.

OR

```
          <fallback_question>additional info that you want to provide ?</fallback_question>
          <required>true</required>
        </ito>
      </itos>
      <action>
        <groovyAction>
          <returnAnswer>true</returnAnswer>
          <utteranceTemplate>Hey %loginUser_ , this trip to %getDestinationCity costs #price Dollars.
          info % getInfo</utteranceTemplate>
          <code><![CDATA[executionResults.put("price","255")]]></code>
        </groovyAction>
      </action>
    </task>
```

BOT Platform – DDF-Action with follow up question for confirmation

Supports Follow up question post executing the action

```
<action>
  <httpAction>
    <returnAnswer>true</returnAnswer>
    <utteranceTemplate>#result</utteranceTemplate>
    <method>get</method>
    <params>format=json&amp;action=query&amp;prop=extracts&amp;explaintext&amp;exser
    <url>http://en.wikipedia.org/w/api.php</url>
    <xpath></xpath>
    <jpath>$..extract</jpath>
  </httpAction>
</action>
<followup>
  <ito name="anotherOne" label="Another City">
    <AQD>
      <type>
        <answerType>sys.decision</answerType>
      </type>
    </AQD>
    <fallbackQuestion>do you want to know about other cities?</fallbackQuestion>
    <required>true</required>
  </ito>
  <answerMapping>
    <item key="YES">getWikiCityInfo</item>
  </answerMapping>
</followup>
-->
```

Use Uppercase. This KEY will be
matched with ITO value.
(sys.decision or custom.item_X)

Follow-up question will be asked
immediately after executing the task.

BOT Platform – In built ITOs into platform

Following are the ITOs already available in the platform

City	=> sys.location.city
Time	=> sys.temporal.time => 1:00 AM, morning, evening etc.
Date	=> sys.temporal.date
Person	=> sys.person
Mail	=> sys.mail
Contact	=> sys.contact => (+1 234-567-890)
First Name	=> sys.person.firstname
Last Name	=> sys.person.lastname
Dummy	=> dummy => captures all free text and passes it to ITO
Organization	=> sys.organization
QA Parser	=> sys.corpus.qa (for checking the answer in domain corpus)
Yes/No Parser	=> sys.decision => results in YES or NO
ON/OFF Parser	=> sys.onoff => results in ON or OFF
Custom Buttons	=> custom.button_X=>(x from 1 onwards based on corpus collection)
Custom List	=> custom.item_X=>(x from 1 onwards based on the corpus collection)
Custom List	=> custom.urlList_X=>(x from 1 onwards based on the corpus collection) (in case of multiple selection items use below ones)
Custom List	=> custom.multiItem_X=>=>(x from 1 onwards based on the corpus collection)
Custom List	=> custom.multiUrlList_X=>=>(x from 1 onwards based on the corpus collection)
Custom Parser	=> custom.pattern_X (X from 1 onwards based on REGEX pattern)
Custom Classifier	=> custom.classifier_Y(Y is domain name) => This is ML based text classifier
Open Text	=> sys.opentext => capturing free text .. <i>(used in conjunction with interactive widgets, to be used in conjunction with other ITO)</i>

This is used to fill the ITO in case the domain corpus has answer to the user question. This will use bot.properties file located at /res/config
If USE_QACHECK=True it will call QA_URL => which should return True or False based on if it has answer to the question

[Important –
Method => POST

url => QA_URL

Parameters => userUtterance="what is ATM"?

Response =>

{"response":"true"} or {"response":"false"}

]

If answer is "YES" this ITO will be filled and you can use <Action> to call the appropriate URL

QA Parser is treated at ITO level as against USE_DOMAIN flag which is treated at intent level (see slide – 25)

BOT Platform – In built ITOs into platform

Generic Number

=> sys.number

Scaling Number

=> sys.number.scale

Floating Number

=> sys.number.float

Slider Number

=> custom.slider_X -> X (from 1 onwards)

This is used to take range based number input (float or int) from user. The range is defined in /res/entities/slider_1.txt file.

Note – the sequence of entering number has to be MIN,MAX,STEP and DEFAULT

```
##DO NOT REMOVE THIS LINE - SLIDER #MIN #MAX #STEP #DEFAULT
9.0
15.0
0.1
10.0
```

One two three => 123

Forty One Hundred => 4100

1,239 => 1239

23545 => 23545

1 hundred => INVALID

Hundred thousand => INVALID

1.2 L => 120000

1.2 Lac => 120000

10 K => 10000

1,239 => 1239

23545 => 23545

.2L => INVALID

1 hundred => INVALID

Hundred thousand => INVALID

1.256 => 1.256

123 => 123

.234 => INVALID

10 K => INVALID

1,239 => INVALID

1 hundred => INVALID

Hundred thousand => INVALID

BOT Platform –Creating Custom ITOs - Named Entities

(custom list , url based, and RegEX pattern)

There is often need to fill the slot that are business specific and are not available as part of standard NER. This can be achieved using custom named entities. Platform supports different ways of creating custom ITOs

=> If the single items need to be filled –

- custom_item_1 or custom_urlList_1 or custom_pattern_1

⇒ If multiple Items needs to be filled –

- custom_multitem_1 or custom_multiUrlList_1

1. Custom List

```
<itos>
  <ito name="getType">
    <AQD>
      <type>
        <answerType>custom.item_4</answerType>
      </type>
    </AQD>
    <fallbackQuestion>whom do you want to contact?</fallbackQuestion>
    <required>true</required>
  </ito>
</itos>
```

If the file has name value pair (item=category) as shown, the ITO will be filled with category when item appears in utterance.



item_4.txt file in
/res/entities folder

```
##DO NOT REMOVE THIS LINE - to check
all
broker
brokers
claim
claims
support
individual
```



```
##DO NOT REMOVE THIS LINE - list of a
truck=auto
car=auto
honda=auto
ford=auto
chevrolet=auto
mercedes=auto
chrysler=auto
genral motors=auto
audi=auto
```

BOT Platform –Creating Custom ITOs - Named Entities (url Based list entities)

2. Custom Url List – In this we get the list of items fetched from external API. Following steps are taken to support this method

- Create urlList_X.txt in /res/entities folder. This file specify parameters specific to API
- The API need to respond with the list of items in csv format. e.g.

```
{"type":"userIDs",
"list":"johnd, jeevanK,mathew"
}
```

```
<itos>
<ito name="selectUser" label="User Name">
  <AQD>
    <type>
      <answerType>custom.urlList_1</answerType>
    </type>
  </AQD>
  <fallbackQuestion>what is user name?</fallbackQuestion>
  <required>true</required>
</ito>
</itos>
```

urlList_1.txt file in /res/entities folder

```
1 #The item list will be populated from below URL properties
2 URL_METHOD=GET
3 URL=http://api.openweathermap.org/data/2.5/weather
4 PARAMS=q=%getDestinationCity&mode=json&APPID=706120eb0f11f2eb
5 JPATH=$..list → json object that contains list
6 CACHE_DAYS=0 → No of days for which data can be cached. If cache is not required set it to "0"
```

(Optional) Contains url parameters(if any). You can refer to ITO value by using %<ITOName> (e.g. %getDestinationCity). It will replace with ITO value ,if already filled in. (this is not yet implemented)

BOT Platform –Creating Custom ITOs - Named Entities (button selection entities)

3. Custom Button List – This is similar to list view but has been categorized as button list to show it as a button selection. (as against drop down list selection)

- Create buttont_X.txt in /res/entities folder.

```
<itos>
  <ito name="getClass" label="Class">
    <AQD>
      <type>
        <answerType>custom.button_1</answerType>
      </type>
    </AQD>
    <fallbackQuestion>what class would you like to travel?</fallbackQuestion>
    <required>true</required>
  </ito>
</itos>
```

button_1.txt file in /res/entities folder

```
1 ##DO NOT REMOVE THIS LINE - to check if it is new or list
2 Economy
3 First
4 Business|
```

BOT Platform –Creating Custom ITOs - Named Entities (REGEX based parser)

4. Custom Parser

You can provide list of REGEX pattern that will be used to extract entities from user utterance

```
<ito name="getTime">
  <AQD>
    <type>
      <answerType>custom.pattern_1</answerType>
    </type>
  </AQD>
  <fallbackQuestion>what date was it when you applied for your claim?</fallbackQuestion>
  <required>true</required>
</ito>
```

pattern_1.txt file in /res/entities folder



```
#DO NOT REMOVE THIS LINE - This pattern will find date in DD Month YYYY
\b[0-9]+\s[a-zA-Z0-9-]+\s[0-9-]{4}+\b
```

BOT Platform –Creating Custom ITOs- Multiple Item selection (item & urlList based)

At times , we need the ITOs that need to be filled with multiple items.

e.g. what devices are owned by user – ITO can fill in one or more items from list (e.g. Mobile, Desktop, VOIP, Laptop etc.)

You can use custom.multipleItem_X or custom.multipleUrlList_X to extract entities from user utterance

```
<ito name="getMenu" label="Menu">
  <AQD>
    <type>
      <answerType>custom.multiItem_1</answerType>
    </type>
  </AQD>
  <fallbackQuestion>food items that you want to order?</fallbackQuestion>
  <required>true</required>
</ito>
```



multiItem_1.txt file in /res/entities folder

```
##DO NOT REMOVE THIS LINE
Breakfast = BF
Lunch = LCH
Dinner = DNR
Desert = DST
```

(Optional) Contains url parameters. It will replace it with ITO value ,if already filled in.

```
<ito name="getDevices" label="Devices">
  <AQD>
    <type>
      <answerType>custom.multiUrlList_1</answerType>
    </type>
  </AQD>
  <fallbackQuestion>the devices registered against your ID?</fallbackQuestion>
  <required>true</required>
</ito>
```



multiUrlItem_1.txt file in /res/entities folder

```
1 #The item list will be populated from below URL properties
2 URL_METHOD=GET
3 URL=http://www.mocky.io/v2/5b49de1131000072138bc086
4 PARAMS=type=%getType&lang=en
5 JPATH=$..list
6 CACHE_DAYS=0
```



JSON response of this API -
{ "type": "deviceTypes", "list": "mobile,desktop,pc,laptop,voip" }

BOT Platform –Creating Custom ITOs

– ML based text classifier (only for ENGLISH)

At times , we need ITO capable of classifying user text to one of the classes.

e.g. if one has to classify nature of ticket when user is asked to describe the problem. As an example “I am facing logging into mail outlook” can be classified as “login” class.

Follow below steps to create ML based classifier ITO.

1. Define your classes in json format as shown.
2. Save your file with proper naming convention in
/res/entities/classifier/data/classifier_<domain name>.json (e.g. classifier_ticketType.json)
3. Set your threshold score that would qualify the class in
/res/entities/classifier/config/classifier.properties #stores configuration
THRESHOLD_SCORE=0.6
4. Now you can use this classifier in your DDF file as shown. Whenever the user utterance matches with any of the class (with confidence score \geq threshold score) the ITO will get filled.
5. Please note the ITO value will contain “Class:<name> Utterance:<user utterance>” e.g.
“Class:**software** Utterance:Assignment of ticket to user not working”.
6. **Important:** please delete all the models whenever you update the classes in
classifier_<domain name>.json file.

Keep “allowDifferentQuestion” and “allowCorrection” flag to false to keep minimal collision with other ITOs

```
<useSODA>true</useSODA>
<allowSwitchTasks>true</allowSwitchTasks>
<allowOverAnswering>true</allowOverAnswering>
<allowDifferentQuestion>false</allowDifferentQuestion>
<allowCorrection>false</allowCorrection>
<useIntentEngine>true</useIntentEngine>
```

```
{
  "domain": "ticketType",
  "classes": [
    {
      "name": "login",
      "utterances": ["I am not able to login into system",
        "user and password is not working on outlook",
        "authentication failed for outlook",
        "can not login into the system",
        "user id and password are not accepted",
        "login issue"]
    },
    {
      "name": "software",
      "utterances": ["Not able to generate report in remedy",
        "The service ticket is not appearing",
        "Ticket assignment is not working",
        "fail to export the file to local folder"]
    },
    {
      "name": "hardware",
      "utterances": ["Printer is not working",
        "Paper jam in printer",
        "keyboard is malfunctioning",
        "Monitor is flickering",
        "Desktop is powering up"]
    }
  ]
}
```

```
<ito name="getInfo" label="Additional Info">
  <AQD>
    <type>
      <answerType>custom.classifier_ticketType</answerType>
    </type>
  </AQD>
  <fallback_question>describe the nature of problem?</fallback_question>
  <required>true</required>
</ito>
```

BOT Platform – Training, activity and Dialog Logs

1- The failed conversation as well as tasks that are flagged by user as “liked” and “disliked” are logged into a log file <mmm>_<dd>_failures.log , <mmm>_<dd>_likes.log and <mmm>_<dd>_dislikes.log respectively. (mmm is current month and dd is current date) located in folder /res/logs/training/<MMM>

```
Fri Jun 08 14:26:52 IST 2018 domain:trip_en user: sessionId: clientIP: task:getTripInformation utterance:S: for how many persons to Pune ? U: ?
```

This log will help in training the BOT - for intents that seems to be correct but not defined in DDF file , user not satisfied by bot answer etc.

2- The logs are captured whenever action is executed in a file <mmm>_<dd>_activity.log (mmm is current month and dd is current date) located in folder /res/logs/activity/<MMM>

```
Sat May 13 23:37:32 IST 2017 domain:trip user:John task:getFAQ TYPE:GroovyAction@4f5de9f8
Sat May 13 23:38:09 IST 2017 domain:trip user:John task:getTripInformation TYPE:GroovyAction@647e46e1
Sat May 13 23:39:42 IST 2017 domain:trip user:John task:getWeatherInformation TYPE:HTTPAction@2bf4b0ef
```

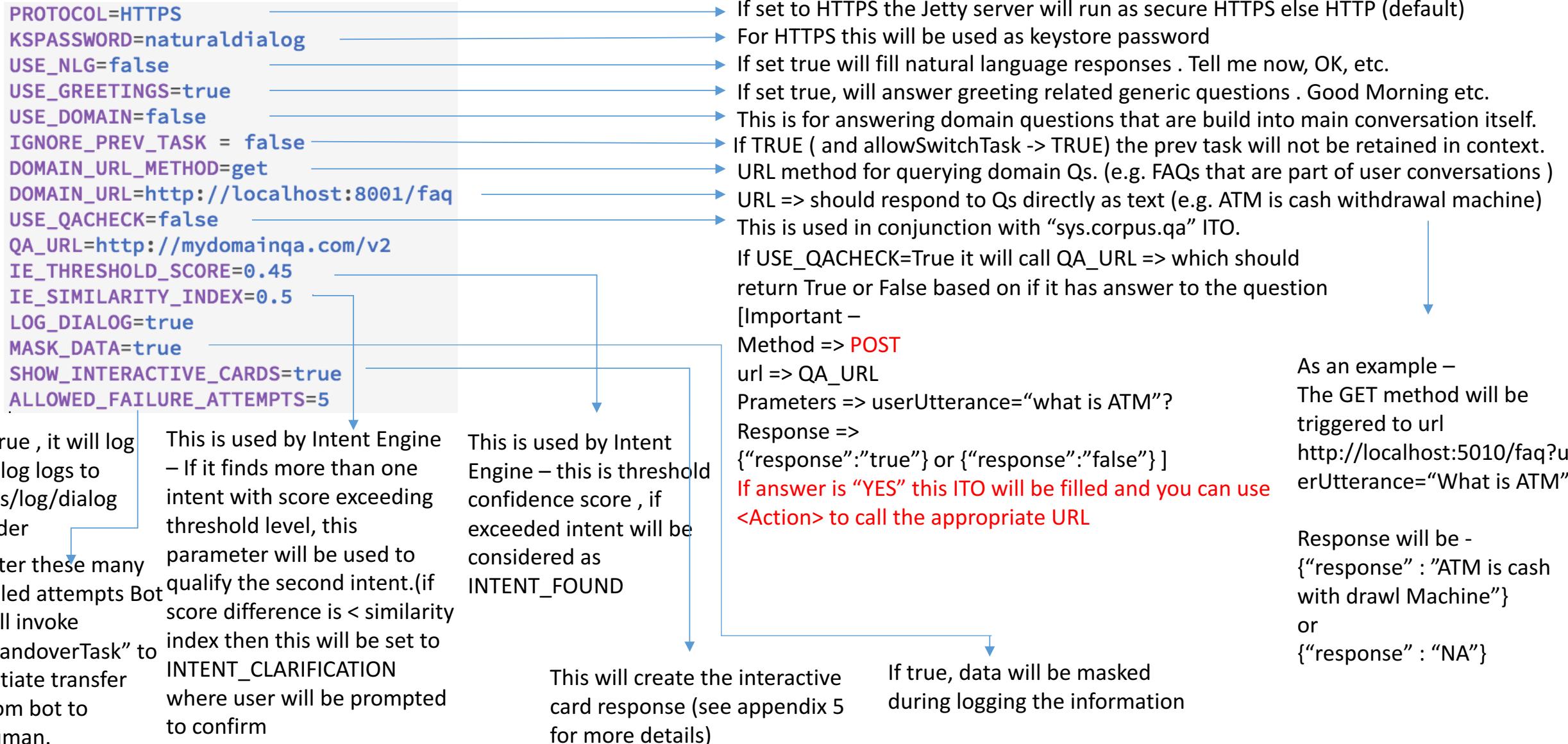
3- The dialog conversations are logged if LOG_DIALOG flag in bot.properties is set to true (LOG_DIALOG=true). They are stores in a file <mmm>_<dd>_dialog.log (mmm is current month and dd is current date) located in folder /res/logs/dialog/<MMM>

```
Sun May 14 16:34:39 IST 2017 domain:trip client_ip:192.168.0.109 user:John id:d1-5SABSB4MOVIF dialog:"S":"How may I help you?","U":"Hi","S":"Hello t
Sun May 14 16:37:52 IST 2017 domain:trip client_ip:192.168.0.109 user:John id:d2-VDQMVNCDSFYB dialog:"S":"How may I help you?","U":"How is weather",
```

Due to GDPR compliance requirement all the important data provided by user is masked (replaced with ??) while storing in LOG file.

BOT Platform – BOT configuration

Bot configuration file is located in /res/config folder and stores some global properties parameter.



BOT Platform – Triggering Event Dialogs

...(1/4)

Platform provides mechanism to trigger dialog events that are outside main DDF. The event specific dialogs are not part of main DDF and are written separately in “/res/events” folder. For ease of use , it is written in yaml format with file extension .yml.

- All DDF features are available as listed below

- use of custom itos
- support of groovy and http action
- resultMapping feature to trigger task based on action (http or groovy) result
- followup task

- The events are triggered by sending “userUtterance” parameter as “@<eventName>” in POST request

For example “@feedbackEvent” will look for event dialog file “feedbackEvent.yml” file in /res/events folder

The screenshot shows the Postman application interface. At the top, there is a dropdown menu set to "POST" and a URL field containing "https://192.168.0.105:8080/.../bot/d1-KQBT30BS4OK5". Below the URL, there are tabs for "Authorization", "Headers", "Body" (which is selected), and "Pre-request Script" and "Tests". Under the "Body" tab, there are four radio button options: "form-data", "x-www-form-urlencoded" (which is selected), "raw", and "binary". Below these options is a table with two columns, "Key" and "Value". A single row is present in the table, with "userUtterance" in the "Key" column and "@feedbackEvent" in the "Value" column. There are also "New key" and "Value" labels at the bottom of the table.

- The event dialog contains set of tasks that the BOT engine will execute as if they are part of main dialog. The tasks of event dialog once executed will be removed automatically as they are not part of main dialog defined in DDF.
- All global parameters that are set in main DDF dialog files will automatically apply for event triggered dialogues.
- The other advantage of using yaml , there is no need to restart BOT engine whenever you add new event triggered dialogue in event folder.

BOT Platform – Triggering Event Dialogs

...(2/4)

Following are few samples of event triggered dialog file -

Single Task with groovy Action – testSample1.yml

```
# Details of a event
---
tasks :
  - task :
      name : EVT_getFeedback
      label : Feedback
      itos :
        - ito :
            name : getConfirmation
            label : 'Confirmation'
            required : true
            answerType: sys.decision
            fallbackQuestion: 'if BOT was able to answer to your query?'
        - ito :
            name : getRating
            label : Rating
            required : true
            answerType: sys.number
            fallbackQuestion: 'how would you rate this on scale of 0-5?'
    action :
      type : groovyAction
      returnAnswer : true
      utteranceTemplate : '#msg Please visit again.'
      code : 'executionResults.put("msg","Thank you for your feedback.")'
...

```

Please note that all the task name must start with "EVT_"

→ Use variable other than "result"

Single Task with groovy Action with followup – testSample2.yml

```
# Details of a event
---
tasks :
  - task :
      name : EVT_getFeedback
      label : Feedback
      itos :
        - ito :
            name : getConfirmation
            label : 'Confirmation'
            required : true
            answerType: sys.decision
            fallbackQuestion: 'if BOT was able to answer to your query?'
        - ito :
            name : getRating
            label : 'Rating'
            required : true
            answerType: sys.number
            fallbackQuestion: 'how would you rate this on scale of 0-5?'
    action :
      type : groovyAction
      returnAnswer : true
      utteranceTemplate : '#msg'
      code : 'executionResults.put("msg","Thank you for your feedback.")'
    followup :
      ito :
        name : anotherOne
        label : 'More feedback'
        required : true
        answerType : sys.decision
        fallbackQuestion: 'do you want to give another feedback'
      answerMapping:
        - map :
            # use quotes for key
            key : 'YES'
            value : EVT_getFeedback
        - map :
            # use quotes for key
            key : 'NO'
            value : start
...

```

BOT Platform – Triggering Event Dialogs ... (3/4)

Following are few samples of event triggered dialog file -

Single Task with resultMapping Action – testSample3.yml

```
# Details of a event
---
tasks :
  - task :
      name : EVT_getFeedback
      label : Feedback
      itos :
        - ito :
            name : getConfirmation
            label : 'Confirmation'
            required : true
            answerType: sys.decision
            fallbackQuestion: 'if BOT was able to ans
        - ito :
            name : getRating
            label : 'Rating'
            required : true
            answerType: sys.number
            fallbackQuestion: 'how would you rate thi
    action :
      type : groovyAction
      resultMappings :
        - map :
            message : 'Thank you for your feedbac
            redirectToTask : start
            resultVarName : action
            # use quotes for key
            resultValue : '1'
      returnAnswer : true
      utteranceTemplate : null
      code : 'executionResults.put("action","1")'
...
```

Single Task with httpAction – testSample4.yml

```
# Details of a event
---
tasks :
  - task :
      name : EVT_getTemprature
      label : Temprature
      itos :
        - ito :
            name : getCityName
            label : 'City Name'
            required : true
            answerType: sys.location.city
            fallbackQuestion: 'for which city do you want to know the weather?'
    action :
      type : httpAction
      returnAnswer : true
      utteranceTemplate : 'The temperature in %getCityName is #result degrees
      method : GET
      params : q=%getCityName&mode=xml&units=metric&APPID=706120eb0f11f2ebf85
      url : http://api.openweathermap.org/data/2.5/weather
      xpath : /current/temperature/@value
      jpath : null
...
```

BOT Platform – Triggering Event Dialogs

...(4/4)

Following are few samples of event triggered dialog file -

Multiple Task with resultMapping Action – testSample5.yml

```
# Details of a event
---
tasks :
  - task :
    name : EVT_getBooking
    label : 'Ticket Booking'
    itos :
      - ito :
        name : getDepartureCity
        label : 'Departure city'
        required : true
        answerType: sys.location.city
        fallbackQuestion: 'where do you want to go?'
      - ito :
        name : getDate
        label : 'Departure Date'
        required : true
        answerType: sys.temporal.date
        fallbackQuestion: 'when do you want to leave?'
      - ito :
        name : getInfo
        label : 'Addition Info'
        required : true
        answerType: sys.opentext
        fallbackQuestion: 'any additional information that you may have?'
    action :
      type : groovyAction
      resultMappings :
        - map :
          message : 'Your ticket for %getDepartureCity city is booked. Tl
          redirectToTask : EVT_getTemprature
          resultVarName : action
          # use quotes for key
          resultValue : '1'
      returnAnswer : true
      utteranceTemplate : null
      code : 'executionResults.put("action","1")'
```

```
- task :
  name : EVT_getTemprature
  label : 'City Temprature'
  itos :
    - ito :
      name : getCityName
      label : 'City Name'
      required : true
      answerType: sys.location.city
      fallbackQuestion: 'For which city do you want to know the weather?
  action :
    type : httpAction
    returnAnswer : true
    utteranceTemplate : 'The temperature in %getCityName is #result degree
    method : GET
    params : q=%getCityName&mode=xml&units=metric&APPID=706120eb0f11f2ebf8
    url : http://api.openweathermap.org/data/2.5/weather
    xpath : /current/temperature/@value
    jpath : null
```

BOT Platform API for messenger integration

Bot can be used to integrate with Messaging platform like Facebook or slack by calling appropriate API's listed below.

1. To create the BOT instance for specific user ID (e.g. if a unique user ID is 1000345667)

Method => GET

URL => <http://192.168.3.19:8080/hmi/msgbot?userID=1000345667>

Return =>

if successful creates the BOT instance

if unsuccessful returns

- if no userID provided returns `{"response": "Error: need user ID for BOT creation"}`

- initialization failed if instance is already running

2. To send the user message to instance that has been created in STEP-1

Method => GET

URL => <http://192.168.3.19:8080/hmi/msgbot/1000345667?userMessage=Hi>

-> use `URLEncoder.encode(userUtterance, "UTF-8")` for sending the user Utterance

Return => JSON response with response in result.reply JSONObject

3. To check if instance is already available

Method => GET

URL => <http://192.168.3.19:8080/hmi/msgbot/hasInstance?userID=1000345667>

Returns=> `{"response": "false"}` or `{"response": "true"}` based on whether such instance is available.

BOT Platform – Other tools

1. Always have “cancelTask” at the bottom of DDF , if you are not using Intent engine. This will be triggered when user says “I want to cancel the task” or user makes two consecutive failed attempts at any ITO . It will have follow-up confirmation and if user says “YES” , it will come out of current task.

[Important – If the user says this while in “start” task all the global parameters will be set to NULL]

2. HTML client is available in /html folder

<http://X.X.X.X:8080/> for running it from browser

<http://X.X.X.X:8080/hmi/bot> for creating bot instance from REST client

<http://X.X.X.X:8080/hmi/authenticateUser> for user authentication (optional - requires services module)

3. For running local MongoDB (optional - requires services module)

D:\Programs\MongoDb\bin>mongod --dbpath D:\Programs\MongoDb\data

4. For running local tomcat (optional - requires services module)

D:\Programs\Tomcat-7\bin\startup.bat

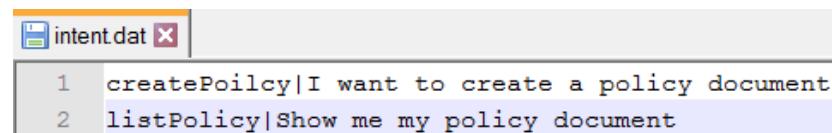
5. In order to get the proper Bag Of words that needs to go in DDF follow below steps –

- create file intent.dat in /res/intents/data folder that contains “|” separated task and intent

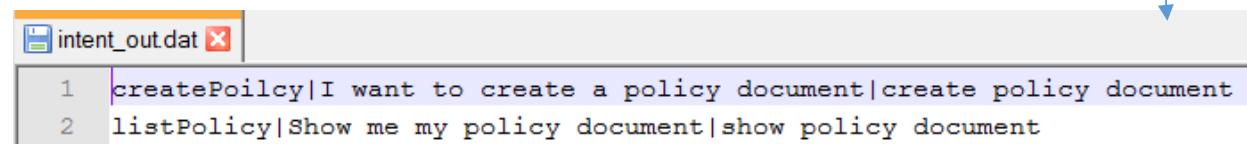
- go to hmi.jar and run below command

- `>java -cp hmi.jar cto.hmi.bot.util.CreateIntent -f /res/intents/data/intent.dat`

- It will process file and will generate the output file intent_out.dat with intents that can be fed into DDF.



```
intent.dat
1 createPoilcy|I want to create a policy document
2 listPolicy>Show me my policy document
```



```
intent_out.dat
1 createPoilcy|I want to create a policy document|create policy document
2 listPolicy>Show me my policy document|show policy document
```

Appendix -1 Managing interactive response through HTTP action

One can build the interactive chat by building the API that can return following response.

e.g. To show a issued insurance card in a image window , if you build a API that can return a JSON response like this -

Note – Single quotes that are used to specify the image source. (the use of double quote will make the JSON an invalid JSON)

```
[{"message": {  
    "data": {  
        "error": "",  
        "info": {  
            "image": "<div><img src='http://localhost:8090/lima/images/DupInsuranceCard.jpg'></div>",  
            "video": "",  
            "audio": ""  
        }  
    },  
    "chat": "Please note down the policy number and group number from the duplicate insurance card in image section."  
},  
]  
]
```

Here is the BOT response that will have appended JSON object at the bottom

```
,  
    "action": {  
        "name": "getWeatherInformation",  
        "entities": {  
            "getWeatherCity": "Pune"  
        }  
    },  
    "message": {  
        "data": {  
            "error": "",  
            "info": {  
                "image": "<div><img src='http://localhost:8090/lima/images/DupInsuranceCard.jpg'></div>",  
                "video": "",  
                "audio": ""  
            }  
        },  
        "chat": "Please note down the policy number and group number from the du  
        ↪
```

```
        ↪  
        <fallback_question>for which card you need duplicate?</fallback_question>  
        <required>true</required>  
        <useContext>true</useContext>  
        </ito>  
        </itos>  
        <action>  
            <httpAction>  
                <returnAnswer>true</returnAnswer>  
                <utteranceTemplate>#result</utteranceTemplate>  
                <method>get</method>  
                <params>id=%getCardType</params>  
                <url>http://10.44.22.76:8090/lima/serlayer/getDuplicateInsuranceCard</url>  
                <xpath></xpath>  
                <jpath>$..message</jpath>  
            </httpAction>  
        </action>  
    </task>  
]  
]
```

Here is task to read the same

- specify jpath as JSON object \$..message
- **use only #result** in utteranceTemplate
 - this will put chat object here if present. (this is required irrespective of you have chat object or not)

Note this is a JSON object and not key

Appendix -1 Managing interactive response through Groovy action

One can build similar experience using Groovy action (refer earlier slide for understanding the interactive action using HTTP)

The BOT JSON response will append the JSON body that you can use on client for creating interactive card.

Build API that has below response. (Needs to have chat object for returning the BOT reply)

```
"message": {  
    "data": {  
        "error": "",  
        "info": {  
            "image": "<div><img src='img/ticket.jpg' alt='ticket.jpeg'> </div>",  
            "video": "<div class='video-container'><iframe src='https://www.youtube.com/embed/0' allowfullscreen class='video'></iframe></div>",  
            "audio": "",  
            "text": "Your ticket is booked. Please see the details in attached file."  
        }  
    },  
    "chat": "<p>Your ticket is booked successfully for 600 Dollars. Wish you a safe journey!</p>  
    <a href='https://www.irctc.co.in/eticketing/loginHome.jsf'>Click here for login</a>"  
}
```

Here is the BOT response that will have appended JSON object at the bottom

```
[{"id": "4",  
 "name": "cancelTask",  
 "label": "Cancel"},  
,  
 {"message": {  
     "data": {  
         "error": "",  
         "info": {  
             "image": "<div><img src='img/ticket.jpg' alt='ticket.jpeg'> </div>",  
             "video": "<div class='video-container'><iframe src='https://www.youtube.com/embed/0' allowfullscreen class='video'></iframe></div>",  
             "audio": "",  
             "text": "Your ticket is booked. Please see the details in attached file."  
         }  
     },  
     "chat": "<p>Your ticket is booked successfully for 600 Dollars. Wish you a safe journey!</p>  
    .irctc.co.in/eticketing/loginHome.jsf'>Click here for login</a>"  
},  
]
```

```
<action>  
    <groovyAction>  
        <resultMappings>  
            <resultMapping>  
                <message></message>  
                <redirectToTask>start</redirectToTask>  
                <resultCode>1</resultCode>  
                <resultVarName>action</resultVarName>  
            </resultMapping>  
        </resultMappings>  
        <returnAnswer>true</returnAnswer>  
        <utteranceTemplate>#result</utteranceTemplate>  
        <code>  
            <![CDATA[  
                String type=new String(frame.get("getImageNumber"));  
                Integer action = new Integer(1);  
                import org.codehaus.jettison.json.JSONException  
                import org.codehaus.jettison.json.JSONObject  
                def url = new URL('http://www.mocky.io/v2/58dfb92c1000007d03cc15ca');  
                def connection = url.openConnection();  
                connection.requestMethod = 'GET';  
                if(connection.responseCode == 200) {  
                    body = connection.content.text;  
                    executionResults.put("body",body);  
                }  
                executionResults.put("action",action.toString());  
            ]]>  
        </code>  
    </groovyAction>  
</action>
```

- Populate the JSON response in “body” variable
- **use only** #result in utteranceTemplate this will put chat object here if present.
- You can as well populate a variable for redirection , if required. (action = 1 in this case)

Appendix -2 -Managing interactive response through Groovy

One can manage the API integration completely through Groovy.

```
<resultMapping>
  <message></message>
  <redirectToTask>getWeatherInformation</redirectToTask>
  <resultValue>1</resultValue>
  <resultVarName>action</resultVarName>
</resultMapping>
</resultMappings>
<returnAnswer>true</returnAnswer>
<utteranceTemplate>#chat</utteranceTemplate>
<code>
<![CDATA[
import org.codehaus.jettison.json.JSONException;
import org.codehaus.jettison.json.JSONObject;
import java.util.logging.Logger;
import java.net.URLEncoder;
Logger logger = Logger.getLogger("");
String body = new String("");
String chat = new String("");
def url =new URL('http://10.44.22.76:8090/lima/serlayer/getDuplicateInsuranceCard');
def connection = url.openConnection();
if (connection.responseCode == 200) {
body = connection.content.text;
JSONObject json = new JSONObject(body);
if (json.getJSONObject("message").has("chat"))
chat = json.getJSONObject("message").getString("chat");
logger.info ("chat output ====="+chat);
}
executionResults.put("chat",chat);
executionResults.put("body",body);
//for result mapping
executionResults.put("action","1");
]]>
</code>
</groovyAction>
<action>
```

1. Please populate body as a total JSON response. It will look for message (see JSON response on Appendix-1 slide) and if present will process it.
2. Parse which ever object you want in your utterance (#chat in this case)

Option-1 – if you use #chat then it will only give utterance and will not append it in BOT processed response. But you can customize your response.

You can manage #action in case you need to redirect the task based on the result in conjunction with resultMapping

Option-2 – If you use ONLY #result then it will be automatically processed for chat object for response and additionally append JSON response at the end of BOT processed response.

Appendix -3 – Using Intent Engine for training the BOT .. 1/3

BOT provides two ways of defining the Intent or task.

1 – Bag Of Words Approach => In this approach a collection of words if appear in mentioned order , the task gets identified.

As an example –

This will identify “appointment” task for all of the following utterances

Schedule meeting with john

Schedule with John a meeting -> ‘with’ and ‘a’ are stop words and John will be filled in for ‘*’

Fix an appointment with John

```
<task name="appointment">
  <selector>
    <bagOfWordsTaskSelector>
      <word>schedule meeting</word>
      <word>schedule * meeting</word>
      <word>appointment</word>
    </bagOfWordsTaskSelector>
  </selector>
  <itos>
```

Note there is utility to remove the stop words and get the BOW that you can use for configuring the “selector” in DDF.

In order to get the proper Bag Of words that needs to go in DDF follow below steps –

- create file intent.dat in /res/intents/data folder that contains “|” separated task and intent
- go to hmi.jar and run below command
- `>java -cp hmi.jar cto.hmi.bot.util.CreateIntent -f /res/intents/data/intent.dat`
- It will process file and will generate the output file intent_out.dat with intents that can be fed into DDF.

```
intent.dat
1 createPoilcy|I want to create a policy document
2 listPolicy>Show me my policy document
```

```
intent_out.dat
1 createPoilcy|I want to create a policy document|create policy document
2 listPolicy>Show me my policy document|show policy document
```

Appendix -3 – Using Intent Engine for training the BOT .. 2/3

BOT provides two ways of defining the Intent or task.

2 – ML based Intent Engine Approach => In this approach we train a BOT on all the intents and their possible utterances. In order to train BOT follow below steps.

- create <domain>_<language>.json file (e.g. insurance_en.json) with following JSON structure
- you can add domain specific synonyms to synonyms_en.txt located in res/dictionary folder

```
{  
  "domain": "insurance",  
  "tasks": [  
    {  
      "name": "listCertificate",  
      "utterances": ["Certificates",  
                    "I want to get a certificate of insurance",  
                    "can you give me a certificate of liability insu",  
                    "I want to see my new certificate",  
                    "show my certificate",  
                    "show me the list of certificates"]  
    },  
    {  
      "name": "createNewCertificate",  
      "utterances": ["Create New Certificate",  
                    "I want to create a new certificate",  
                    "can you create a new certificate",  
                    "show me how to create a new certificate"]  
    }  
  ]  
}
```

Domain name - Insurance

task name – “listCertificate”

All possible
utterances

- Copy this file into /res/intents/data folder
- Ensure that domain name matches with the one in DDF
- Set the ‘useIntentEngine’ flag to true => <useIntentEngine>true</useIntentEngine>
- Ensure you use intent/task name in your DDF same as that defined in <domain>.json file.
- Keep the <selector> tag empty as intent Engine will identify the task.

“en” for ENGLISH
“hi” for HINDI
“mr” for MARATHI

auto, vehicle, truck
mail, e-mail
text, sms, message

The diagram illustrates the mapping between a JSON domain file and its corresponding DDF XML configuration. On the left, a JSON snippet defines a domain ('insurance') with tasks ('listCertificate' and 'createNewCertificate'). Each task has a list of utterances. On the right, the corresponding DDF XML shows the domain name ('insurance'), global language ('en'), and the 'useIntentEngine' flag set to 'true'. The XML also includes a task definition for 'listCertificate' with a selector and an action block containing a groovyAction that returns the template 'Here is list of you'.

```
xmlns:n="http://cto.net/hmi/1.0"  
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
name="insurance" company="xyz" version="1.0">  
<start_task_name>start</start_task_name>  
<global_language>en</global_language>  
<useSODA>true</useSODA>  
<allowSwitchTasks>true</allowSwitchTasks>  
<allowOverAnswering>true</allowOverAnswering>  
<allowDifferentQuestion>true</allowDifferentQuestion>  
<allowCorrection>true</allowCorrection>  
<useIntentEngine>true</useIntentEngine>  
<tasks>  
  <task name="start" label="Initial Task">  
  <task name="listCertificate">  
    <selector></selector>  
    <itos></itos>  
    <action>  
      <groovyAction>  
        <returnAnswer>true</returnAnswer>  
        <utteranceTemplate>Here is list of you</utteranceTemplate>  
        <code></code>  
      </groovyAction>  
    </action>  
  </task>  
</tasks>  
</insurance>
```

The ML based model will auto train the BOT on intents and its utterances.

In case you add any new utterance to JSON file, you need to restart the BOT instance.

Appendix -3 – Using Intent Engine for training the BOT .. 3/3

2 – ML based Intent Engine Approach (Continued...) =>

This approach uses two parameters specified in bot.properties file.

```
PROTOCOL=HTTPS  
KSPASSWORD=naturaldialog  
USE_NLG=false  
USE_GREETINGS=true  
USE_DOMAIN=false  
DOMAIN_URL_METHOD=get  
DOMAIN_URL=http://localhost:5000/faq  
USE_QACHECK=false  
QA_URL=http://www.mocky.io/v2/583c63e7290000970b  
IE_THRESHOLD_SCORE=0.45  
IE_SIMILARITY_INDEX=0.5  
LOG_DIALOG=true  
SHOW_INTERACTIVE_CARDS=true  
ALLOWED_FAILURE_ATTEMPTS=3
```

This is used by Intent Engine – If it finds more than one intent with score exceeding threshold level, this parameter will be used to qualify the second intent.(if score difference is < similarity index then this will be set to INTENT_CLARIFICATION where user will be prompted to confirm)

This is used by Intent Engine – this is threshold confidence score , if exceeded intent will be considered as INTENT_FOUND

These parameters should be fine tuned such that BOT is able to identify the intents properly. In case the intents are too similar it will prompt user for clarification.

Important –

There is provision to call the task directly using #<taskname>

e.g. if userUtterance is #getTripInformation and if it is present in DDF , the BOT engine will directly call this task bypassing the intent engine.

Appendix -4 – Managing both Transactional and FAQ conv. using intent engine

In order to manage both Transactional and FAQ conversation in one dialogue one can follow below approach

- Use Intent Engine to handle all your transactional scenarios. (No need to add FAQ specific utterances)
- Create “getFAQ” task to handle all FAQ specific questions
..(Important – task name has to be “getFAQ” and “overanswering” flag to be set to true)
- Set USE_DOMAIN parameter in bot.properties to “false” as we do not want 2 sources for finding FAQ answers
- In DDF add getFAQ task as shown here (use groovy for better control on chat response) note – use answerType as “dummy”

```
#Sat Oct 29 15:04:24 IST 2016
USE_NLG=true
USE_GREETINGS=true
USE_DOMAIN=false
DOMAIN_URL_METHOD=get
DOMAIN_URL=http://localhost:5000/faq
```

```
<task name="getFAQ" label="Find FAQ">
  <selector></selector>
  <itos>
    <ito name="getQuestion">
      <AQD>
        <type>
          <answerType>dummy</answerType>
        </type>
      </AQD>
      <fallback_question>OK</fallback_question>
      <required>true</required>
    </ito>
  </itos>
  <action>
    <groovyAction>
      <returnAnswer>true</returnAnswer>
      <utteranceTemplate>#chat</utteranceTemplate>
      <code>
        <![CDATA[
import org.codehaus.jettison.json.JSONException
import org.codehaus.jettison.json.JSONObject
String question=new String(frame.get("getQuestion"));
String body = new String("");
String chat = new String("");
String api = "http://www.mocky.io/v2/590ae3b82900004b0523d934";
String urlParam = "?userUtterance="+ URLEncoder.encode(question, "UTF-8");
def url = new URL(api+urlParam);
def connection = url.openConnection();
connection.requestMethod = 'GET';
if (connection.responseCode == 200) {
body = connection.content.text;
JSONObject json = new JSONObject(body);
if (json.has("response"))
chat = json.getString("response");
if (chat.equals("NA"))
chat="Sorry, I did not understand that.";
}
executionResults.put("body",body);
executionResults.put("chat",chat);
]]>
      </code>
    </groovyAction>
  </action>
</task>
```

Appendix -5 – Building Interactive Widgets

.....1/3

The JSON provides 2 types of iCard object (if enabled in bot.properties file).

1- The iCard object with type “taskList” for user to select the task with a click of button. (use #getTripInformation in userUtterance urlencoded body parameter to call getTripInformation task)

```
"iCard": {  
    "type": "taskList",  
    "feedback": {  
        "isVisible": "true",  
        "likes": "1",  
        "dislikes": "0"  
    },  
    "tasks": [  
        {  
            "id": "1",  
            "name": "getTripInformation",  
            "label": "Book ticket"  
        },  
        {  
            "id": "2",  
            "name": "getWeatherInformation",  
            "label": "Weather information"  
        },  
        {  
            "id": "3",  
            "name": "getWikipediaCityInfo",  
            "label": "City information"  
        },  
        {  
            "id": "4",  
            "name": "cancelTask",  
            "label": "Cancel"  
        }  
    ]  
}
```

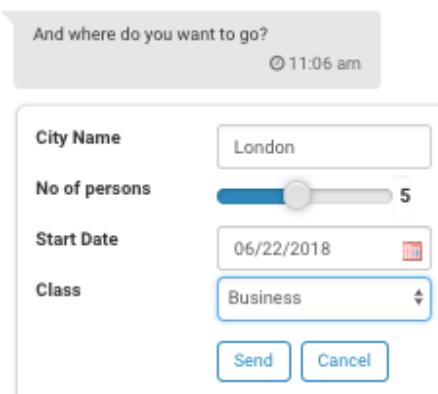
This is count of likes and dislikes given by the user

Type of UI
e.g. text, number, button, list, multiSelectionList, radio, date, time , slider etc.

For UI type list, multitemplist, slider and radio this will show the elements.

Value of ITO, if filled

Is this ITO currently active



Interactive Card

2- The iCard object with type “entityList” for user to enter various entity data and send

```
"iCard": {  
    "type": "entityList",  
    "entities": [  
        {  
            "id": "1",  
            "name": "getDestinationCity",  
            "label": "City Name",  
            "entityType": "sys.location.city",  
            "type": "text",  
            "elements": "",  
            "value": "Mumbai",  
            "isVisible": "true",  
            "isActive": "false"  
        },  
        {  
            "id": "2",  
            "name": "getNumberOfPersons",  
            "label": "No of persons",  
            "entityType": "customSlider",  
            "type": "slider",  
            "elements": "1,10,1,5",  
            "value": "",  
            "isVisible": "true",  
            "isActive": "true"  
        },  
        {  
            "id": "3",  
            "name": "getStartDate",  
            "label": "Start Date",  
            "entityType": "sys.temporal.date",  
            "type": "date",  
            "elements": "",  
            "value": "",  
            "isVisible": "true",  
            "isActive": "false"  
        }  
    ]  
}
```

Show the element only if this flag is set to “true”. This is done to handle ITOs like “opentext” as they take free text

Appendix -5 – Interactive chat by embedding HTML tags.....2/3

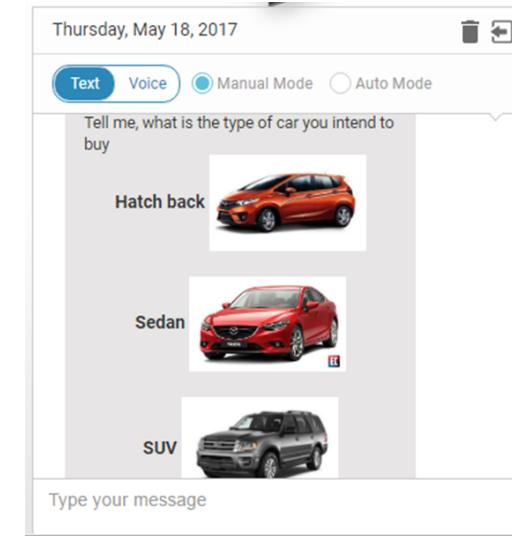
One can use [CDATA] wrapper in utterance tags like

<fallback_question> , <utteranceTemplate> or <message> to build more structured response including images.

```
<task name="bookCar" label="Book Car">
    <selector></selector>
    <itos>
        <ito name="getCarType" label="Car Type">
            <AQD>
                <type>
                    <answerType>custom.item_1</answerType>
                </type>
            </AQD>
            <fallbackQuestion><![CDATA[<p>what is the type of car you intend to buy?</p>
<br><center><b>Hatch back</b><img src='img/hatchback.jpg' height='50%' width='50%'></center><br>
<br><center><b>Sedan</b><img src='img/sedan.jpg' height='50%' width='50%'></center><br>
<br><center><b>SUV</b><img src='img/suv.jpg' height='50%' width='50%'></center><br>]]></fallbackQuestion>
            <required>true</required>
        </ito>
```

The images can be kept at /res/html/img folder

This is custom parser =>
HatchBack, Sedan, SUV



Important – The key message that BOT needs to speak through (TTS) needs to be embedded in <p> tag.
The message is automatically parsed and sent to “speech” JSONObject in its REST response

Appendix -5 – Processing utterance filled through i-forms3/3

If interactive cards are created for user to enter the data , in order to process ITOs seamlessly following provision has been made that require special treatment -

City	=> sys.location.city	=> city:<data>;
Person	=> sys.person	=> person:<data>;
First Name	=> sys.person.firstname	=> firstName:<data>;
Last Name	=> sys.person.lastname	=> lastName:<data>;
Organization	=> sys.organization	=> organization:<data>;

e.g. For trip booking the filled in data by user in form for ITO's (getDestinationCity, getNumberOfPerson, getStartDate, getEndDate) could be passed like

city:Mumbai;<space>4;<space>7/3/17;<space>7/14/17

Appendix -6 – Use of context to fill ITOs automatically

When ITO is being defined in DDF there are two flags that can be effectively used to fill them based on the context. The ITO will be filled in automatically if it uses the same name as defined earlier in other task and <useContext> flag is set.

There is another xml TAG that can be used to clear the context in case you are sure that the intended use of ITO is done and now needs to be cleared from history. For example

```
<task name="getTripInformation" label="Book ticket">
  <selector></selector>
  <itos>
    <ito name="getDestinationCity" label="City Name">
      <AQD>
        <type>
          <answerType>sys.location.city</answerType>
        </type>
      </AQD>
      <fallback_question>where do you want to go? |what is your destination city?</fallback_question>
      <required>true</required>
    </ito>
  </itos>
</task>
```

TASK-1



In this task , we defined ITO “getDestinationCity” which takes city name

```
<task name="getWeatherInformation" label="Weather information">
  <selector></selector>
  <itos>
    <ito name="getDestinationCity" label="Weather information">
      <AQD>
        <type>
          <answerType>sys.location.city</answerType>
        </type>
      </AQD>
      <fallback_question>for which city do you want to know the weather?</fallback_question>
      <required>true</required>
      <useContext>true</useContext>
      <clearContext>true</clearContext>
    </ito>
  </itos>
</task>
```

TASK-2



In this task , we again defined ITO “getDestinationCity” but with a two XML tags <useContext> and <clearContext> to true.

With this configuration, if the ITO is used in earlier conversation e.g. London, the user will not be asked again. The ITO will be filled in with London. Also since the “clearContext” has been set to true , it will also cleared from history as task gets completed.. So next time user asks the Weather Information , Bot will prompt user with fallback question “for which city do you want to know the weather?”

Appendix -7 – Storing and passing the information at Task level

For certain scenarios we need a feature where we need to capture the information in one task (captured in dummy ITO) and pass it to the another task to fill different ITOs.

For such scenario there is a provision of **storeCache** , **useCache** and **clearCache** flags –

Here are the steps to follow

- set **<storeCache>** to true for ITO of which you want to store the information (e.g. dummy or opentext etc.)
- Use XML attribute **useCache** and set it to true while defining the task which wants to use this info
- You can clear the CACHE by setting **<clearCache>** to true in ITO that you think is appropriate.

Here is the sequence of events –

User -> I want weather information => will switch to getWeatherInformation

Bot-> for which city you want to know weather

User -> London => (London will be stored as a String in CACHE)

Bot -> Temp is London is 12 degree. How may I help you?

User -> I want to Book a ticket => (here along with this utterance , London will also be passed as useCache attribute is set to TRUE)

Bot -> For How many persons => (The getDestinationCity will automatically filled with London and will also clear it from CACHE)

– note-“allowOverAnswering” flag is set to true



Appendix -8 – APIs to get DDF and current task stack1/5

In order to get the Dialog definition following API is available

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/getDDF

e.g. <http://192.168.0.103:8080/hmi/bot/d1-YDEHE06UPRMM/getDDF>

Here is a sample response -

```
{  
  "allowCorrection": true,  
  "name": "trip",  
  "company": "xyz",  
  "useIntentEngine": true,  
  "allowDifferentQuestion": true,  
  "useSODA": true,  
  "allowSwitchTasks": true,  
  "allowOverAnswering": true,  
  "tasks": [  
    {  
      "name": "start",  
      "label": "",  
      "itos": [  
        {  
          "name": "welcome",  
          "label": "",  
          "type": "open-ended"  
        }  
      ]  
    },  
    {  
      "name": "getTripInformation",  
      "label": "Book ticket",  
      "itos": [  
        {  
          "name": "getDestinationCity",  
          "label": "To city",  
          "type": "sys.location.city",  
          "value": null  
        },  
        {  
          "name": "getNumberOfPersons",  
          "label": "No of persons",  
          "type": "sys.number",  
          "value": null  
        },  
        {  
          "name": "getStartDate",  
          "label": "Start Date",  
          "type": "sys.temporal.date",  
          "value": null  
        },  
        {  
          "name": "getEndDate",  
          "label": "End Date",  
          "type": "sys.temporal.date",  
          "value": null  
        }  
      ]  
    }  
  ]  
}
```

In order to get the active tasks on stack following API is available

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/tasks

e.g. <http://192.168.0.103:8080/hmi/bot/d1-YDEHE06UPRMM/tasks>

Here is sample response -

```
{  
  "tasks": [  
    {  
      "name": "getTripInformation",  
      "label": "Book ticket",  
      "entities": [  
        {  
          "name": "getDestinationCity",  
          "label": "To city",  
          "type": "sys.location.city",  
          "value": null  
        },  
        {  
          "name": "getNumberOfPersons",  
          "label": "No of persons",  
          "type": "sys.number",  
          "value": null  
        },  
        {  
          "name": "getStartDate",  
          "label": "Start Date",  
          "type": "sys.temporal.date",  
          "value": null  
        },  
        {  
          "name": "getEndDate",  
          "label": "End Date",  
          "type": "sys.temporal.date",  
          "value": null  
        }  
      ]  
    }  
  ]  
}
```

Appendix -8 – APIs to get dialogs, terminate instance...2/5

In order to get dialogs between user and bot following API is available

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/getDialog

e.g. <http://192.168.0.103:8080/hmi/bot/d1-YDEHE06UPRMM/getDialog>

Here is sample response-

```
{  
    "user": "John",  
    "userAgent": "[Mozilla/5.0 (Windows NT 10.0; Win64; x64) A  
    "clientIP": "10.88.250.101",  
    "instanceID": "d1-FZP1O9PXOKGG",  
    "timeStamp": "2017-05-19 18:42:27",  
    "dialog": [  
        {  
            "S": "How may I help you?"  
        },  
        {  
            "U": "I want to book a ticket"  
        },  
        {  
            "S": "where do you want to go?"  
        }  
    ]  
}
```

In order to terminate the dialog instance following API is available

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/kill

e.g. <http://192.168.0.103:8080/hmi/bot/d1-YDEHE06UPRMM/kill>

Here is a sample response

```
{  
    "response": "INFO:Removed instance d1-3BXY78BBPJ0M"  
}
```

Get Dialog Failure Info

In order to get dialog failure count in dialog (bot failed to answer and user likes and dislikes) following API is available

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/failureInfo

e.g. <http://192.168.0.103:8080/hmi/bot/d1-NDMMAMPK0XFS/failureInfo>

Here is a sample response

```
{  
    "sessionId": "d1-JUHIHLFWCBRM",  
    "failures": "1",  
    "likes": "2",  
    "dislikes": "0"  
}
```

Appendix -8 – Bot engine status and custom entities...3/5

In order to get bot engine's current status following API is available (it gives id and current failures in responding to user)

Method -> **POST**

URL -> <http://<IP>/hmi/status>

e.g. <http://192.168.0.103:8080/hmi/status>

Here is sample response-

```
{  
    "status": {  
        "domain": "trip",  
        "currentSessions": "2",  
        "uiType": "RESTInterface",  
        "company": "abc corporation",  
        "URI": "https://192.168.0.102:8080/",  
        "startedOn": "Fri Jun 08 23:31:45 IST 2018",  
        "sessionIDs": [  
            {  
                "failures": "3",  
                "dislikes": "12",  
                "id": "d1-IUXAHITAEUIT",  
                "user": "John",  
                "likes": "8",  
                "lastAcess": "2018-06-08 22:32:25"  
            },  
            {  
                "failures": "3",  
                "dislikes": "4",  
                "id": "d2-4J6VU00SP3XB",  
                "user": "Steve",  
                "likes": "17",  
                "lastAcess": "2018-06-08 23:32:40"  
            }  
        ]  
    }  
}
```

In order to obtain custom entities from engine to make BOT client more interactive by providing the user option , one can use this API

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/getEntityData

e.g. <http://192.168.0.103:8080/hmi/bot/d1-YDEHE06UPRMM/getEntityData>

Here is sample response-

```
{  
    "name": "trip",  
    "version": 1.1,  
    "items": [  
        {  
            "values": [  
                "Hatch back",  
                "Sedan"  
            ],  
            "name": "item_1"  
        },  
        {  
            "values": [  
                "all",  
                "broker",  
                "claim",  
                "support",  
                "individual"  
            ],  
            "name": "item_5"  
        }  
    ]  
}
```

Appendix -8 – APIs to get autocomplete data ...4/5

In order to provide the user with recommended words while typing on chat window , bot engine provides list of words based on the users current utterance. Following steps are required to be taken for using this feature

- 1- Create the corpus (contains all the possible utterances and FAQ Qs that user may type) in /res/autocomplete/data folder with the file name as corpus.txt
- 2- Call below API from BOT client as user types in (ONCHANGE event of JavaScript in text input field)
- 3- Get the recommend list of words from bot engine by calling following API

Method -> **POST**

URL -> http://<IP>/hmi/autocomplete

URL encoded body parameter -> userUtterance="I want "

e.g. <http://10.88.250.233:8080/hmi/autocomplete>

NOTE: if you have uploaded new corpus to BOT , please delete the Pickle file (.pkl) file in model folder.

Here is sample response-

The screenshot shows a Postman interface with the following details:

- Request URL:** http://10.88.250.176:8080/autocomplete
- Method:** POST
- Body Type:** x-www-form-urlencoded (selected)
- Body Data:**

Key	Value
userUtterance	I want
New key	Value
- Response Preview:** {"list": ["to", "the"]}

Appendix -8 – APIs to capture user feedback (like and dislike) ...5/5

In order to capture user feedback on whether he/she has got satisfied answer or not from BOT , after every task completion , user will be provided with like and dislike option. The count of likes and dislikes is maintained and can be seen in status API call. (see slide 46)
Here is flow for taking user feedback -

- 1- User is presented with Like and Dislike icon (using iCard json) after every task completion
2. User clicks Like or Dislike button (optional for user to click or not)
- 2- APIs are called upon clicking the icons and count of the same is maintained
- 3- The task information is logged into a log file <mmm>_<dd>_likes.log and <mmm>_<dd>_dislikes.log respectively in /res/logs/training folder. (see slide 24)

Following APIs are provided to take user feedback.

API

LIKE

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/like

e.g. <https://10.88.246.15:8080/hmi/bot/d2-L2IDCOQCFFCJ/like>

Response -> { "response": "INFO:registered like response"}

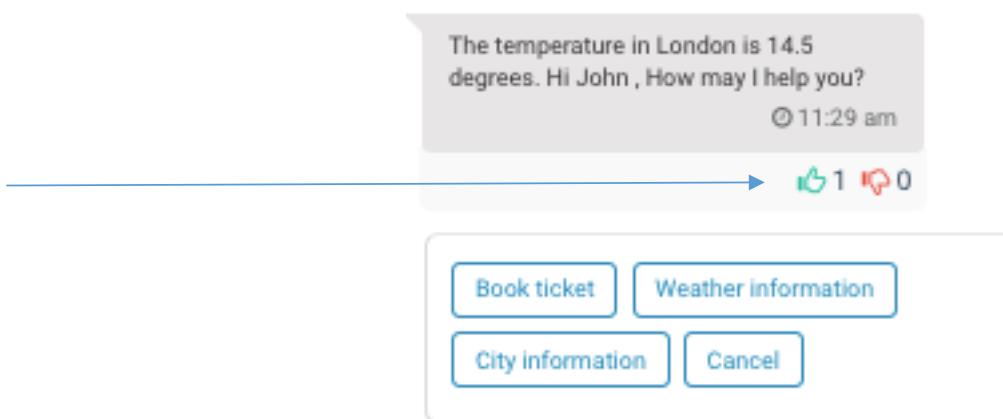
DISLIKE

Method -> **POST**

URL -> http://<IP>/hmi/bot/{instance_id}/dislike

e.g. <https://10.88.246.15:8080/hmi/bot/d2-L2IDCOQCFFCJ/dislike>

Response -> { "response": "INFO:registered dislike response"}



Appendix -9 – APIs to upload the content to server

In order to provide the user to upload the file content to BOT server following API is available

Method -> **POST**

URL -> http://<IP>/bot/{instance_id}/upload

Form Data body parameter -> file=<Selected File>

e.g. <https://192.168.0.105:8080/hmi/bot/d1-A4ULWNYQMYHS/upload>

1- On client user will select the file to be uploaded.

2- Once uploaded the file will be stored on server in /res/upload folder with following prefix - <User>_<Time>_<FileName>

Example => John_Sun Aug 20 23/29/08 IST 2017_InvoiceForm.png

The screenshot shows the Postman application interface for making a POST request. The top bar has 'POST' selected and the URL is set to <https://192.168.0.105:8080/> /bot/d1-A4ULWNYQMYHS/upload. The 'Params' tab is visible. Below the URL, the 'Body' tab is selected, indicated by an orange underline. Under 'Body' type, 'form-data' is selected. A table below shows a single key-value pair: 'file' with a value of 'InvoiceForm.png'. The 'Body' tab is also underlined at the bottom of the interface. At the bottom, there are tabs for 'Pretty', 'Raw', 'Preview', and 'Text' (with a dropdown arrow), and a code editor window showing the response: 1 {"response": "Successfully uploaded the file"}.

Appendix -10 – License

Three types of license are available

- 1- LIFE_TIME -> does not come with expiry date
- 2- SINGLT_TIME -> One time license with expiry date
- 3-TRIAL - Trial for experimentation with expiry date

- All the license keys and signatures are stored in /res/keys folder (viz. license.key and license.sig)
- All the license properties are stored in /res/config/license.properties folder (**CAUTION** - Do not tamper with this file)

```
#Please do not update this file
EMAIL=xyz@gmail.com
COMPANY=xyz
LICENSE_TYPE=life_time
EXPIRATION=0000-00-00
VERSION=1.2
```

Appendix -11 – Creating Hindi Bot

One can create Hindi Bot by following below mentioned steps -

- 1- Create the <domain>_hi.json file that contains all the possible user utterances in Hindi (e.g. in this case “trip_hi.json” file to be stored in /res/intents/data folder)
- 2 – Add domain specific synonyms , if any to “synonyms_hi.txt” file located in /res/dictionary folder
- 3 – Create the DDF file <domain>.xml that contains all hindi specific messages. Ensure <globalLangauge> set to “hi”. (e.g. in this case trip.xml to be stored in /res/dialogues folder)
- 4 – The utterances in Hindi are processed in English so the HINDI is transliterated into ENGLISH during utterance processing by BOT engine

e.g. मैं इकॉनमी क्लास से जाऊंगा => mai ikonami klasa se ja'unga

So all the ITOs need to be accordingly created. Example below shows Custom.item_1 ITO for getting class of travel -

```
##DO NOT REMOVE THIS LINE
Economy=Economy
ikonami=Economy
First=First
Business=Business
Business=Business
```

To accommodate the transliteration issues

In order to know the transliterated words that needs to go in ITO follow below steps –

- create file utternce.dat in /res folder that contains all possible utterances
- go to hmi.jar and run below command
- `>java -cp hmi.jar cto.hmi.bot.util.Transliteration -f /res/utterance.dat -t DEV_TO_ENG ..(for European use EU_TO_ENG , for arabic ARB_TO_ENG or ENG_TO_DEV, ENG_TO_ARB)`
- It will process file and will generate the output file utterance_out.dat with transliterated words that can be used in ITO. OR
`>java -cp hmi.jar cto.hmi.bot.util.Transliteration -u "viajar con clase ejecutiva" -t EU_TO_ENG -process utterance directly`

```
{
  "domain": "trip",
  "tasks": [
    {
      "name": "getTripInformation",
      "utterances": ["मैं टिकट बुक करना चाहता हूँ",
        "मुझे टिकट बुक करना है",
        "मुझे रिजर्वेशन करना है",
        "मुझे रिजर्वेशन करना है",
        "मैं यात्रा करना चाहता हूँ",
        "मैं टिकट आर्डिनेट करना चाहता हूँ",
        "क्या आप कृपया मेरे लिए टिकट बुक कर सकते हैं"]
    },
    {
      "name": "getWeatherInformation",
      "utterances": ["मौसम कैसा है?"]
    }
  ],
  <startTaskName>getWeatherInformation</startTaskName>
  <globalLanguage>hi</globalLanguage>
  <useSODA>true</useSODA>
  <allowSwitchTasks>true</allowSwitchTasks>
  <allowOverAnswering>true</allowOverAnswering>
  <allowDifferentQuestion>true</allowDifferentQuestion>
  <allowCorrection>true</allowCorrection>
  <useIntentEngine>true</useIntentEngine>
  <tasks>
    <task name="start"> ... </task>
    <task name="getTripInformation" label="टिकट बुकिंग"> ... </task>
    <task name="getWeatherInformation" label="मौसम की जानकारी"> ... </task>
  </tasks>
}
```

मैं business क्लास से जाऊंगा |mai business klasa se ja'unga
मैं इकॉनमी क्लास से जाऊंगा |mai ikonami klasa se ja'unga

..(for European use EU_TO_ENG , for

arabic ARB_TO_ENG or ENG_TO_DEV, ENG_TO_ARB)

It will process file and will generate the output file utterance_out.dat with transliterated words that can be used in ITO. OR
`>java -cp hmi.jar cto.hmi.bot.util.Transliteration -u "viajar con clase ejecutiva" -t EU_TO_ENG -process utterance directly`

Appendix -12 – Creating AR based dialogue

In order to create the augmented reality application one need to take following approach.

- The user enters into either virtual room or AR android application where bot will greet the user. (this is the default mode of interaction)
- When user gets into conversation with intent that needs the AR feature the event will be triggered and user will be taken into a AR mode (ViewID = ARMode). The app will move from BOT mode to AR mode (cameras will be turned ON). The user will continue to interact till the “ViewID” is “ARMode” – (this is mainly DIY mode where user will follow steps suggested by BOT using “ARMode”)
- User can make use of “navigationBar” menu to navigate through different steps.
- When user wants to take help of external human expert then the mode is switched from “ARMode” to “RTCMODE” (real time communication) <TBD>

```
"message": {
  "chat": "OK. Identifying type..",
  "userUtterance": "",
  "ARdata": {
    "viewID": "ARMode",
    "object": "Router",
    "overlayItems": [
      {
        "name": "Text1",
        "label": "STEP-1",
        "type": "text",
        "size": "10",
        "position": "X,Y,Z",
        "rotation": "0",
        "color": "R,G,B",
        "isClickable": "false"
      },
      {
        "name": "Image1",
        "label": "",
        "type": "image",
        "size": "1",
        "position": "X,Y,Z",
        "rotation": "0",
        "color": "R,G,B",
        "isClickable": "false"
      }
    ],
    "navigationBar": {
      "left_2": "cancel",
      "left_1": "previous",
      "center_0": "play",
      "right_1": "next",
      "right_2": "mic"
    },
    "menuBar": {
      "menu_1": "remoteExpert",
      "menu_2": "logout"
    }
  }
}
```

Appendix -13 – Supporting new language to BOT

In order to add new language to BOT following steps are required

- For generic conversation add required utterances in AIML format in /res/bots/aiml/Generic_xx.aiml file. E.g.
`<category><pattern>jeg har det godt</pattern> <template>godt at høre, at</template> </category>`
- Add necessary utterances in /res/bots/aiml/Nlgfiller.aiml to cover the NLU generation.
- Create the dialog file that is specific to given language. Ensure that XML tag `<globalLanguage>` specifies the language code e.g. da for Danish
- Add all the stopwords in /res/dictionary folder and name it as stopwords_xx.txt (where xx is language code)..DO=dog etc.
- Add synonyms ,if any to /res/dictionary folder and name it as synonyms_xx.txt (where xx is language code) .. bestil,reservere
- All ITOs in /res/entities needs to be created in transliterated English for engine to identify.
- Create the intents and its utterance variations in /res/intents/data/<domain>_xx.json file.
- Create the dialogue and events in /res/dialogues and /res/events folder respectively

(This section is not for Bot Builder , only for Bot Developer)

- Add necessary utterances to SODA classifier (/res/dictionary)to identify whether utterance is of information, command or seek type.
- Add the locale and region combination to DialogManagerContext , and transliteration details in DialogManagerHelper class
- Add the standard messages that are part of core conversation i.e. SORRY_MSG(Sorry I did not understand that), GOT_MSG(I go that) etc. to /res/config/appMessages_xx.properties file. (where xx is language code. For example, da for danish)
(IMPORTANT – The nonEnglish characters must be entered in Unicode's e.g OR_MSG=\u0905\u0925\u0935\u093E , take help of [converter tool](https://r12a.github.io/app-conversion/))