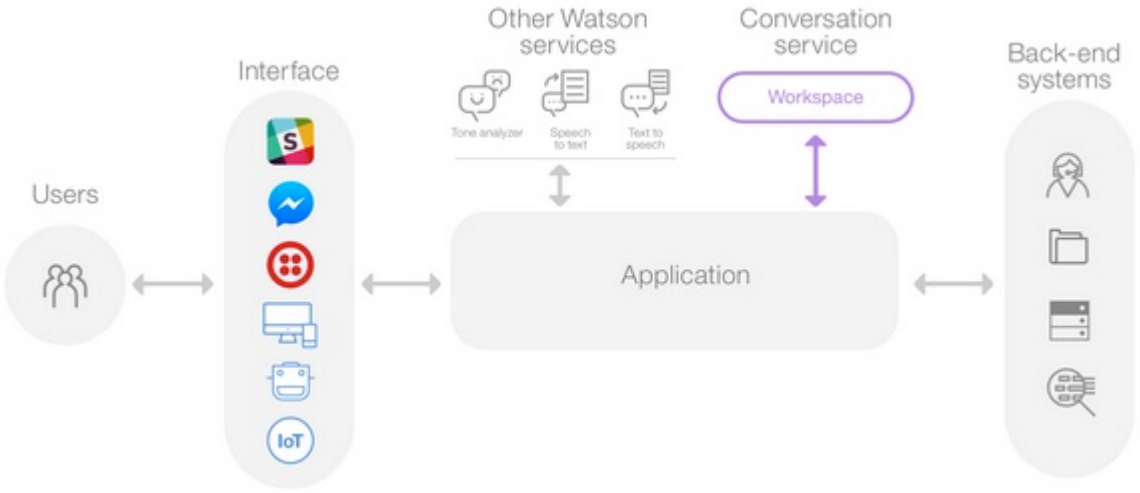
Watson Conversation

Overview

In this lab, you will create an Automated Robotic Concierge (ARC) application for a hotel. The application is a chat-bot which the user can interact with whilst in their hotel room. The bot allows simple functions such as controlling the appliances in the room – switching lights on and off for example, as well as more complex functions such as ordering a taxi – which require a conversation to take place. The core of this application is the Watson Conversation service, which has a tool to help you create and test the chat-bot logic. You will use this tool to create and train the ARC chat-bot. You will also build a simple Node-RED application that will provide an interface for the user to interact with the chat-bot. Note that in the full application other services may also be used such as consulting weather or traffic data.



Note: some of the tasks below contain a shortened link to the Bluemix dashboard that opens the US South Region. If you wish to use the UK region instead then substitute the link below

- US South: http://bit.ly/bluemix_new_us
- UK: http://bit.ly/bluemix_new_uk

In Watson Conversation, chat-bots are trained using three key concepts:

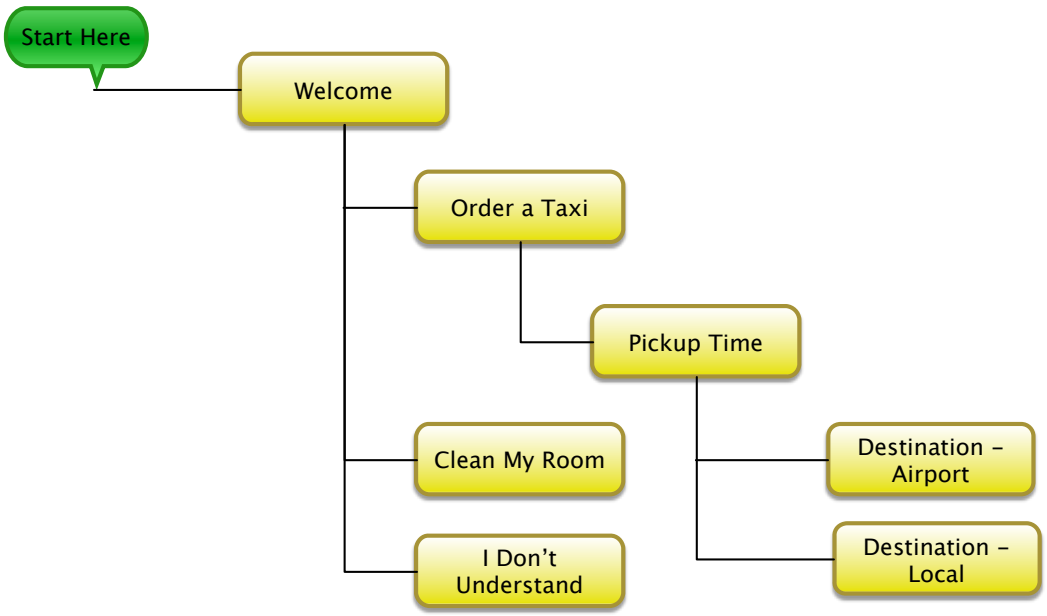
Intents. Example user phrases are grouped into broad "intents" - this allows the chat-bot to understand the underlying meaning behind the users input. Intents are marked with a hashtag. Example:

- #turn_off – example phrases include "Shutdown", "I don't need you any more", "Goodbye", "I'm done"

Entities determine key pieces of information – categories of words and phrases that the chat-bot needs to understand and can use to change its response. Entities are marked with an 'at' symbol. Examples:

- @appliance: fan, heater, light, lock
- @genre: classical, pop, rock

Dialogs are based on Intents and Entities and define the flow of the conversation. Dialogs are built using a tree of nodes – each node in the tree represents a single interaction with the user – that is an input from the user followed by a response by the bot:

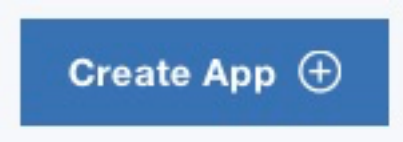


Dialogs may give simple responses when specific Intents are detected (such as "Clean My Room") and require no other information. Other responses require an Intent and an Entity – such as "turn on" – which would need to know which appliance to turn on. Dialogs may also form more complex interactions by requesting more information from the user.

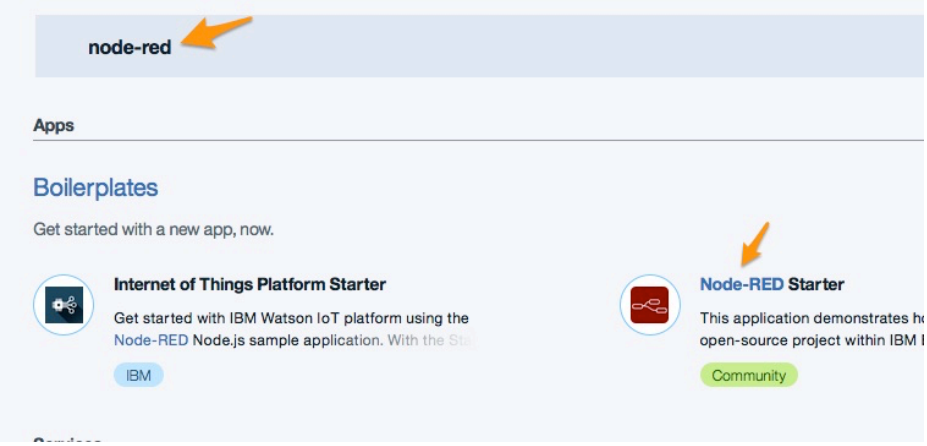
Task 1. Deploy New Application

In this task, you will deploy a new Node-RED Starter application and add the Watson Conversation service.

1. Deploy new application:
   a. Open your Bluemix dashboard: http://bit.ly/bluemix_new_us
   b. In the **All Apps** section, click **Create App**::



   c. In the **Search** bar, type `node-red`
   d. Click the **Node-RED Starter** Boilerplate:



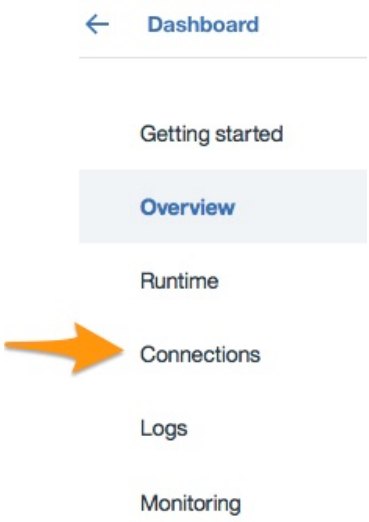
   e. Give the new application a unique name

TIP: Suggestion: IoT-BB-Conversation+YourInitials+DOB

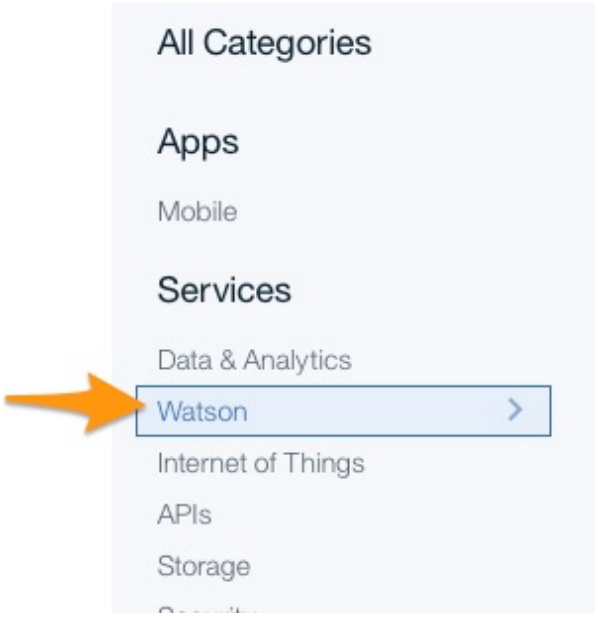
f. Click **Create**
g. Wait for the application to deploy

TIP: Check the logs and look for the message "Started Flows"

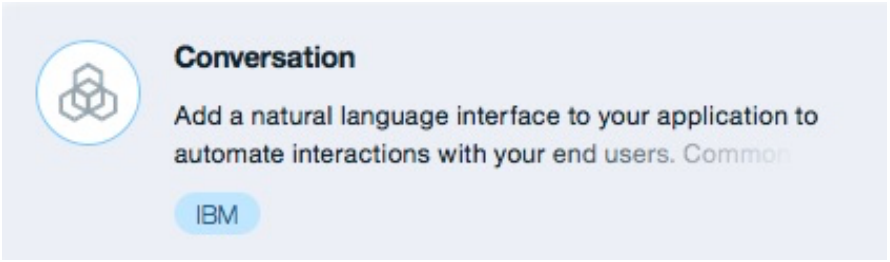
2. Connect a new Conversation Service
   a. Click the **Connections** tab in the sidebar:



   b. Click **Connect New**
   c. In the sidebar, click **Watson**



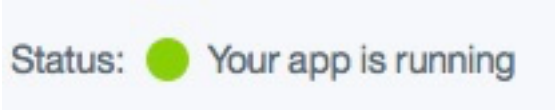
d. Click the **Conversation** service:



e. Click **Create**:

f. Click **Restage** to restage the application:

g. Wait until the application has finished restaging and is running:

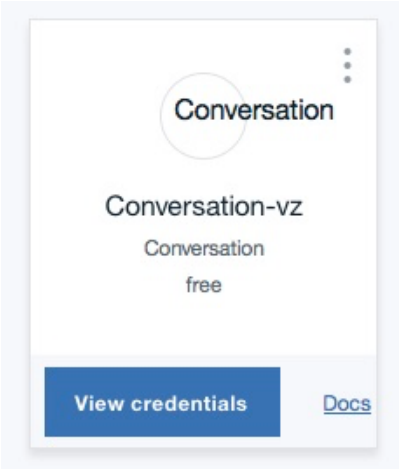


Task 2. Define Intents

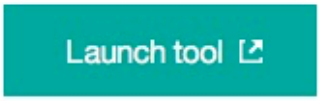
Training data and the flow of the dialog for chat-bots is kept in a **workspace**. A single conversation service instance may have multiple workspaces – one for each chat-bot. In this task, you will create a workspace for the ARC chat-bot and create the first of the three things you need to train the bot – ***Intents***. An intent is a group of example phrases a user might use to communicate a specific goal or idea. This helps Watson understand the underlying *intent* behind the user's words.

To define an **Intent**, first identify something the user might want (for example they want the room cleaned or order a taxi) – then give a few examples of how they might express that need. In this first example, you will define two Intents – one that expresses a need for maintenance (something in the room isn't working) and another that will allow the user to control appliances in the room.

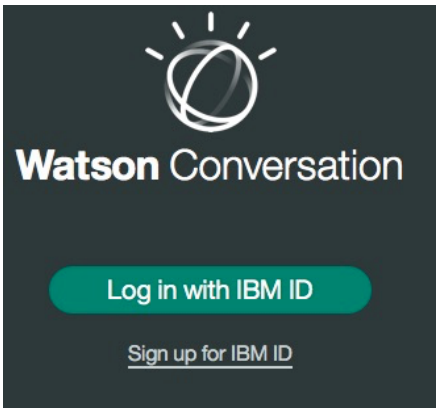
1. Open the Conversation Tool:
   a. Click the **Conversation** service:



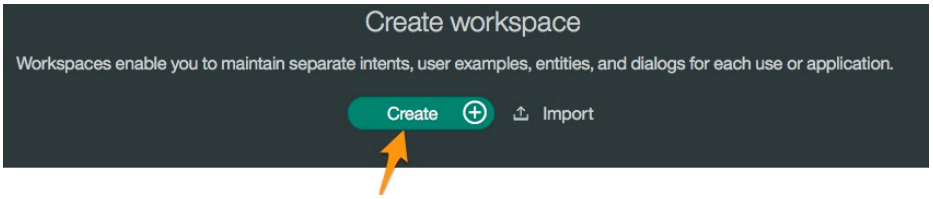
   b. Click **Launch Tool**:



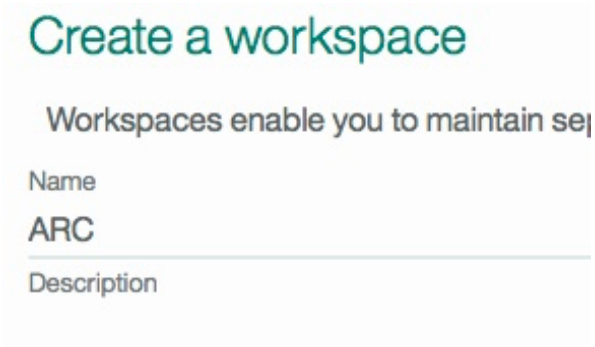
   c. Click **Log in with IBM ID**:



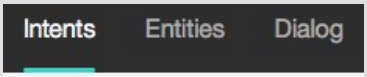
2. Create a Workspace:
   a. Click **Create**:



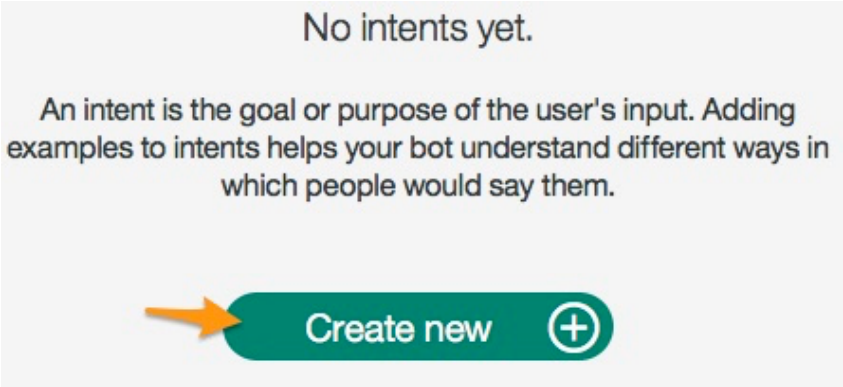
   b. In the **Name** field, type ARC:



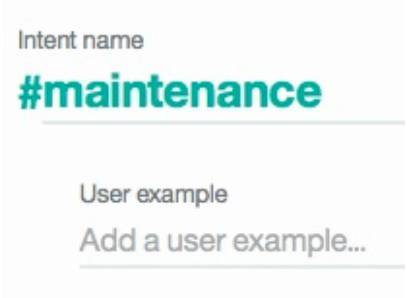
   c. Click **Create**
3. Create an Intent:

TIP: Note that the menu bar has tabs to define Intents, Entities and Goals. You are currently on the Intents tab: 

   b. Click **Create new**:

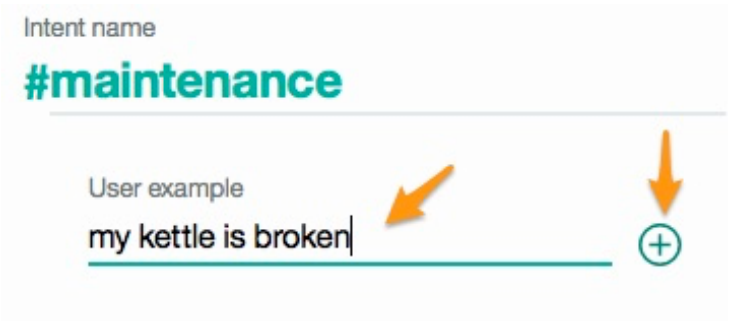


c. In the **Intent name** field, type `maintenance`:



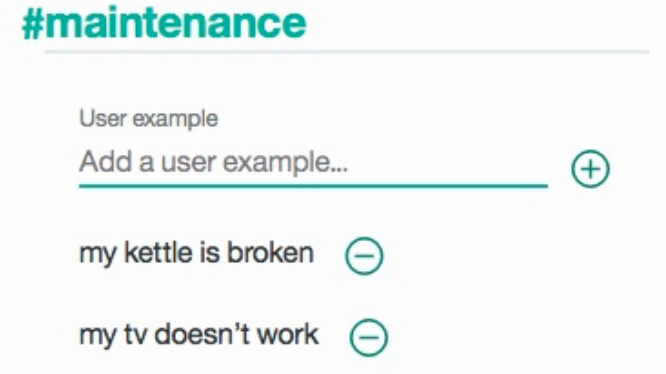
TIP: Note that an Intent is marked using a hash tag (#) – you will use the same notation later in Dialogs when referring to Intents

d. In the **Add a user example** field, type `my kettle is broken` and then click **Add example:**



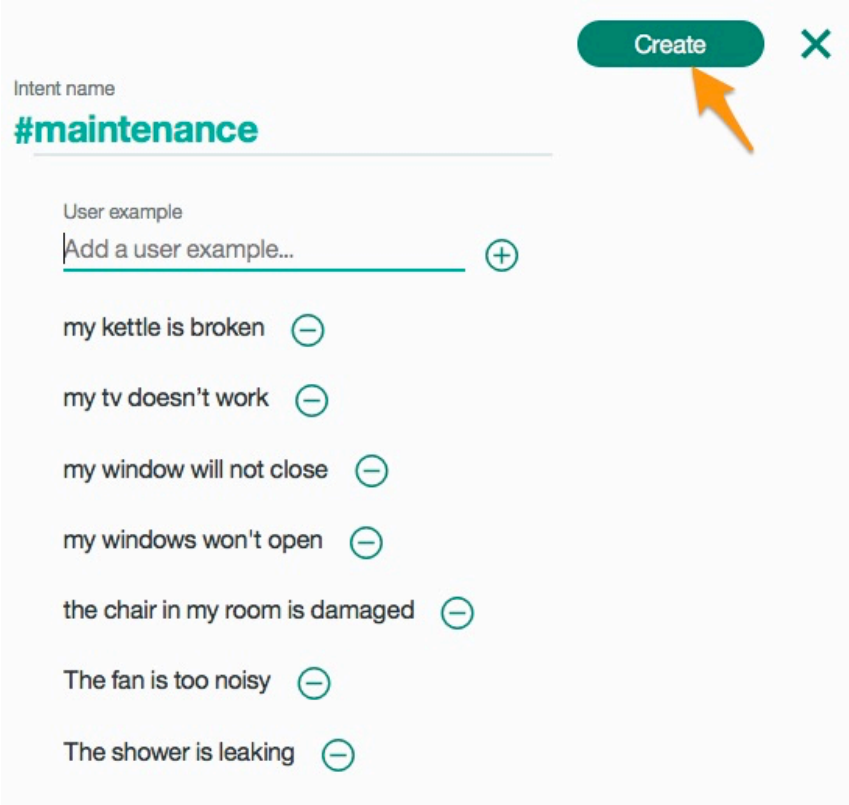
TIP: Instead of clicking **Add example** you can simply press the **enter** key

e. Repeat step **d** using the text `my tv doesn't work`



f. Repeat step **d** several times using other phrases and questions that could be categorized as relating to wanting room service

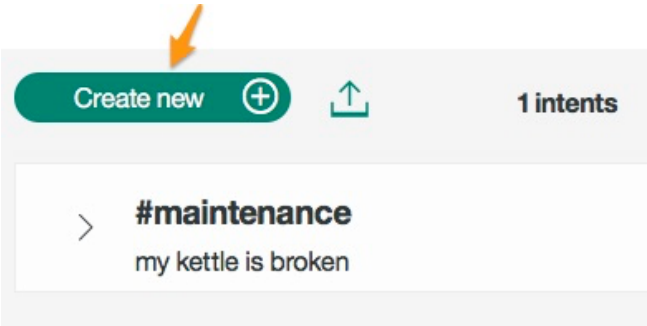
g. When you have entered enough examples, click **Create**:



TIP: The service requires at least five examples to begin training

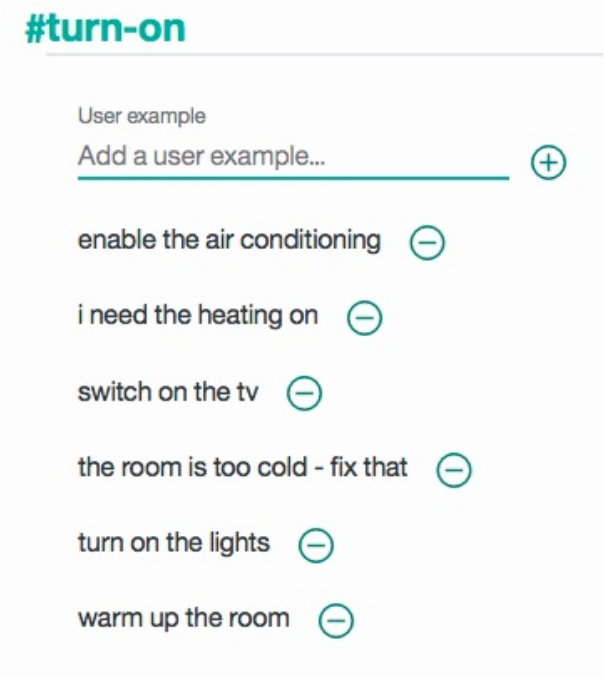
4. Add a second intent:

a. Click **Create new**:



b. In the **Intent name** field, type `turn-on`:

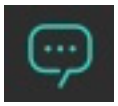
c. As before, add at least five examples of questions or phrases that could be interpreted as turning on a device or appliance:



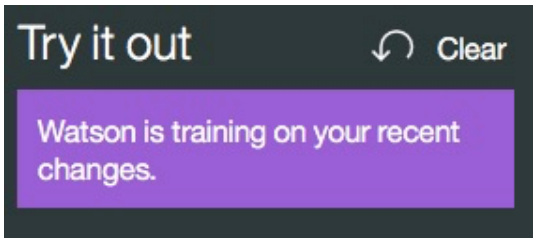
d. Click **Create**

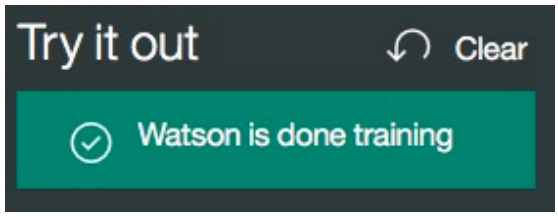
5. Test the Intents:

a. In the top right-hand corner of the page, click the **chat** symbol:

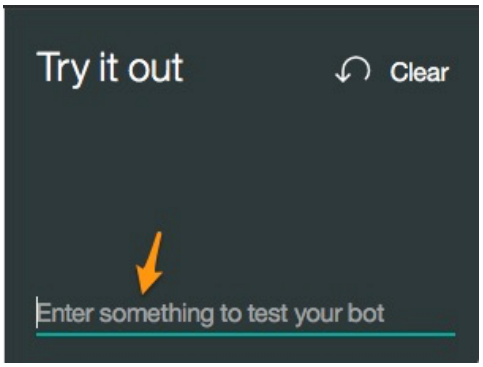


b. Wait for Watson to finish training itself on your changes:



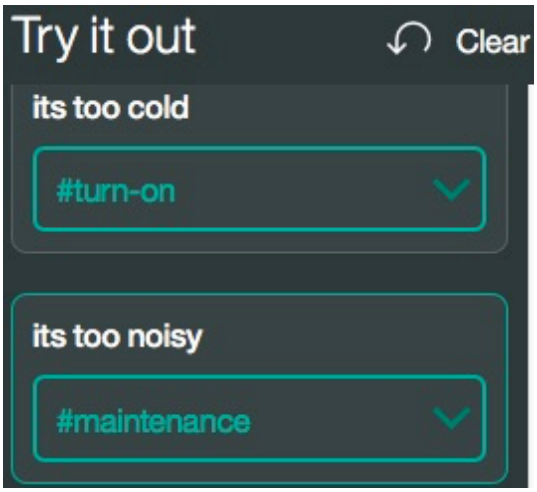


c. In the Enter something to test your bot field, type `it's too cold` and hit the **enter** key.



TIP: If Watson gets it wrong, you can use the drop-down menu to categorize the statement into the correct intent – helping Watson to learn.

d. Try *its too noisy*



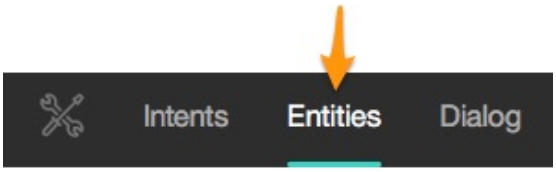
TIP: Try a few questions of your own. If Watson gets it wrong, then use the combo box to correct the response.

Task 3. Define Entities

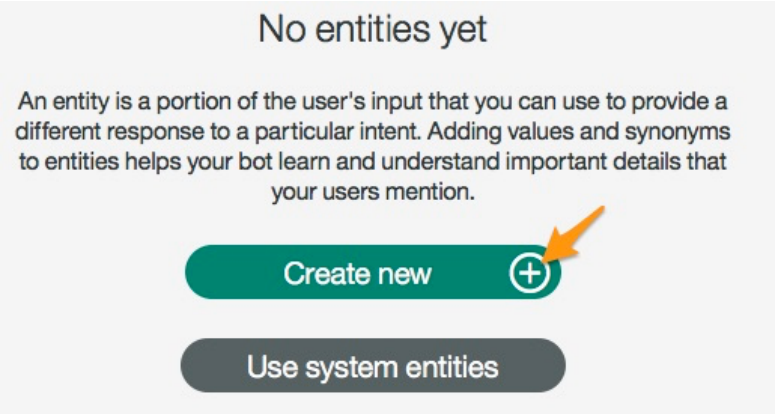
In this task, you will define **Entities**. An Entity represents a term or object (or more accurately the classification of such objects) in the user's input that Watson can use to slightly alter the way it responds to the Intent. Entities make it possible for a single Intent to represent multiple specific actions. For example, the user could turn off the TV, or the Lights in the room. The Intent would be *turn-off*, whilst the TV and Light represent what the user wants to turn off. TV and Light might then be both classified as an *appliance* Entity.

When the user's input is received, the conversation recognizes both Intents and Entities. Your dialog flow can then use these to provide the best answer. You should only create an Entity for **something that matters** in terms of **changing the way the application responds to an intent.** For example, in the case of a maintenance request – the application may not care what the problem is and will simply send someone to the room – in which case there is no need to define the myriad array of items that could be broken or damaged as Entities.

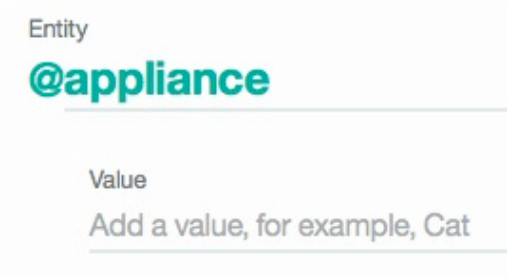
1. Create Entities:
   a. In the menu bar, click **Entities**:



   b. Click **Create new**:

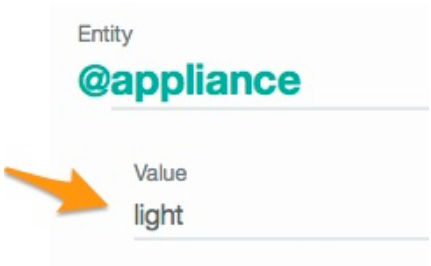


c. In the **Entity** field, type **appliance**:



TIP: Note that an Entity is marked using an at sign (@) – you will use the same notation later in Dialogs when referring to Entities

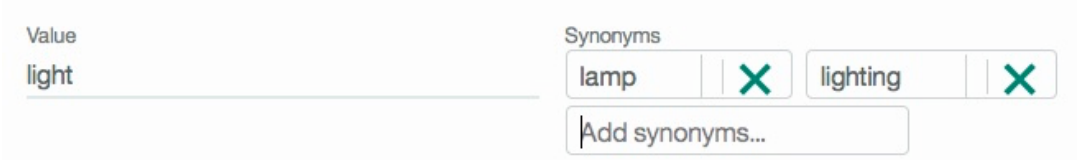
d. In the **Value** field, type `light`:



TIP: Use the **Tab** key to move quickly between fields

e. In the **Synonyms** field, type `lamp` and then press the **enter** key

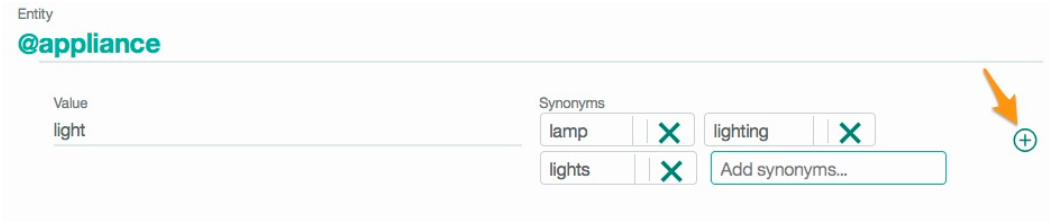
f. In the **Add Synonyms** field, type `lighting` and then press the **enter** key:



g. Add another synonym - *lights*

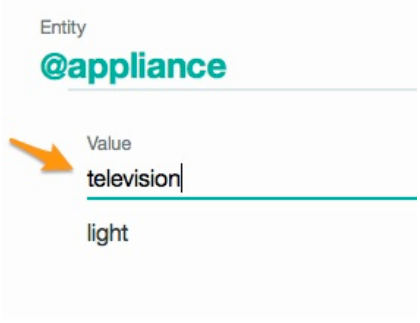
TIP: You may find http://www.thesaurus.com invaluable when adding synonyms ☺. Note that while Watson applies machine learning to Intents – allowing it to interpret what you've said without the need to explicitly define each possible phrase – the same is not true for Entities. If you do not explicitly include the synonym 'lights' then "turn on lights" will not work while "turn on light" will.

h. When you are done adding synonyms, for this Entity click **Add new value**:

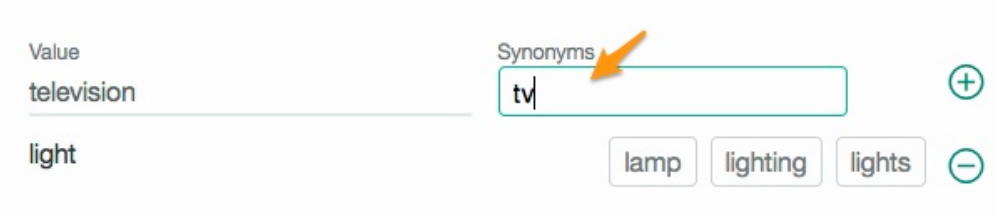


TIP: Add new value will add another entry into this Entity category.

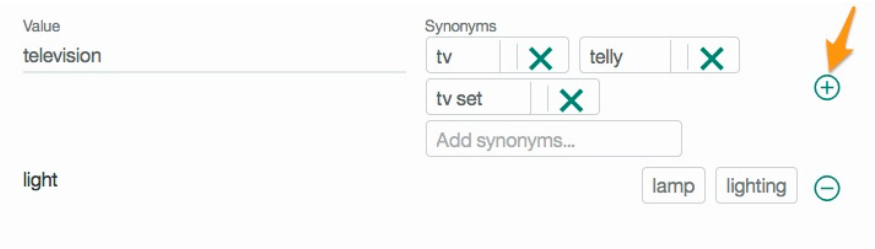
2. Add another appliance
   a. In the **Value** field, type `television`:



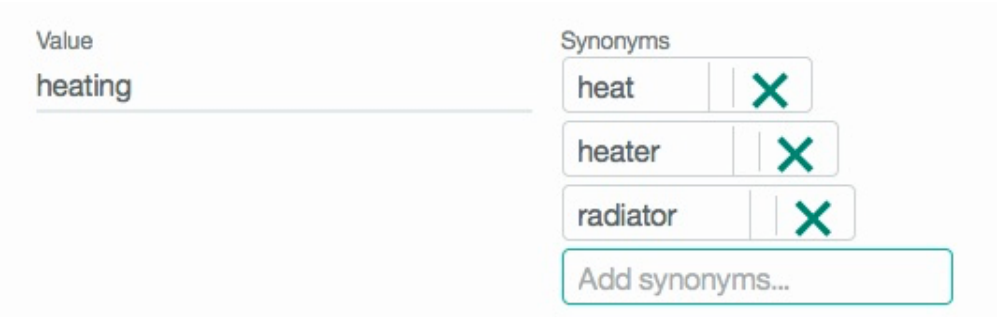
b. In the **Synonyms** field, type `tv` and then press the enter key



c. As before, add several more synonyms for 'television'
d. When you have entered the synonyms for 'television' click **Add new value**:

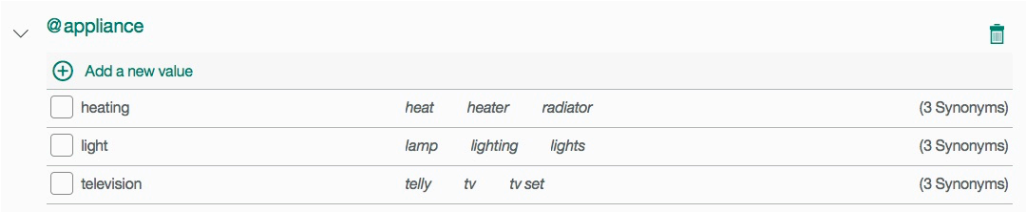


e. Add one more Entity – `heating` with synonyms `heat`, `heater` and `radiator`:

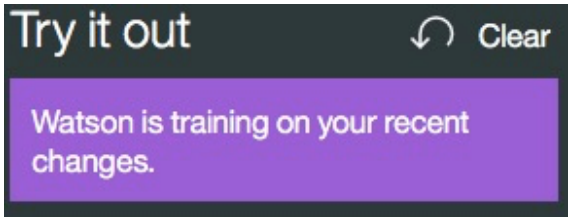


f. Click **Create**

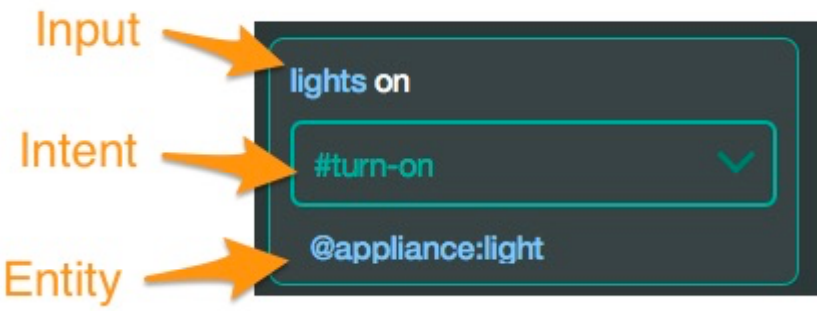
g. Click the **@appliance** Entity to view it:



3. Test the chat-bot:
   a. Wait for Watson to finish training on your new changes:



b. As before, type into the chat window to test Watson's responses:



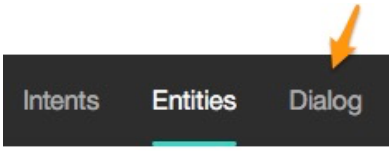
TIP: Click Clear to clear the chat window: 

TIP: Click  to close the chat window – you can re-open it at any time by clicking the chat icon: 

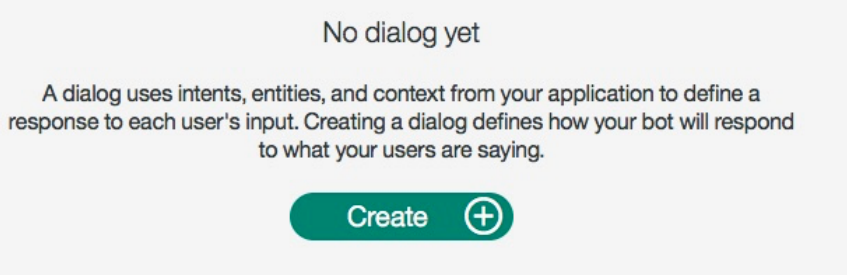
Task 4. Build a Simple Dialog

Dialogs involve *interactions* – that is inputs from the user followed by responses from Watson. Each of those interactions is represented by nodes in a tree. When Watson receives an input from a user it tries to match the input against the interaction nodes in the tree (more on that later). Interactions may be simple or complex. In this example, matching a *#maintenance* **Intent** in an interaction node is enough information for the application to respond appropriately. In the case of a *#turn-on* **Intent** – an **Entity** is also required so the ARC application can switch on the appropriate appliance. Later you will see how even more complex interactions can occur – with Watson requesting additional information that it requires to progress the conversation.

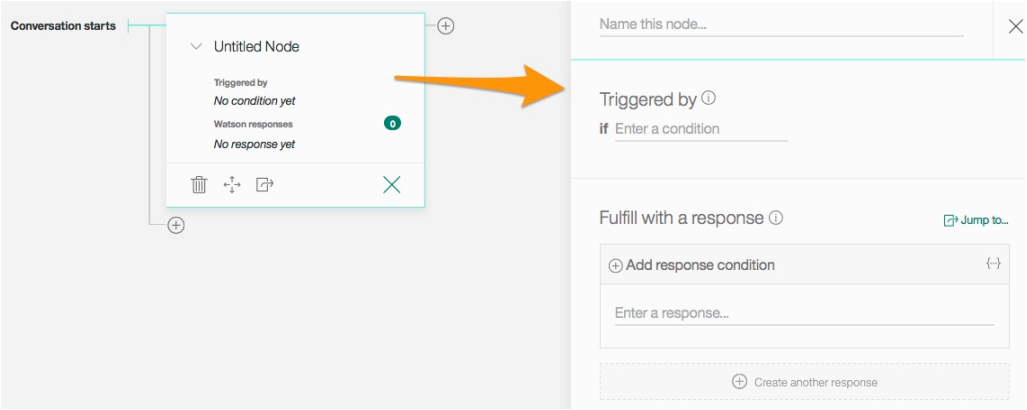
1. Create a Dialog:
   a. In the menu bar, click **Dialog**:



   b. Click **Create**:



c. Note that an initial node has been created and it is open for editing:

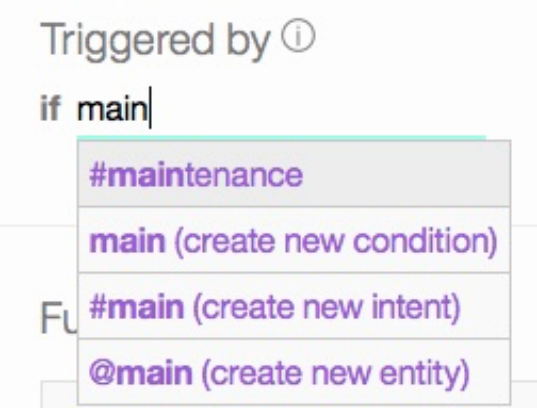


TIP: Dialogs are defined by creating a tree of nodes. When a user input is received, Watson tries to match it against the **child nodes** of the currently active node (the 'context') in the tree. At the start of the conversation the currently active node is the virtual "Conversation starts" node – in other words at the start of the conversation Watson tries to match against the top-level set of nodes. Checks are performed sequentially – in the order the nodes appear in the tree – that is top to bottom. As soon as a match is made – that node becomes the context (no more matching checks are made) and the conversation continues from there.

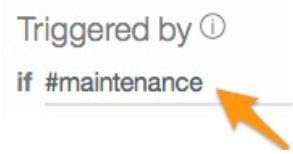
TIP: In text based chat-bots it is common to have a single root node that is automatically triggered when the application starts – usually displaying some sort of welcome message. In voice-controlled applications it is more common to wait for a trigger phrase – again this would be a root node in the tree. However, for simplification this example will skip a root 'welcome' node and we assume the application is always listening.

2. Create a Maintenance node:

a. In the **Triggered by** field, type `main` and note the **auto-completion** options:

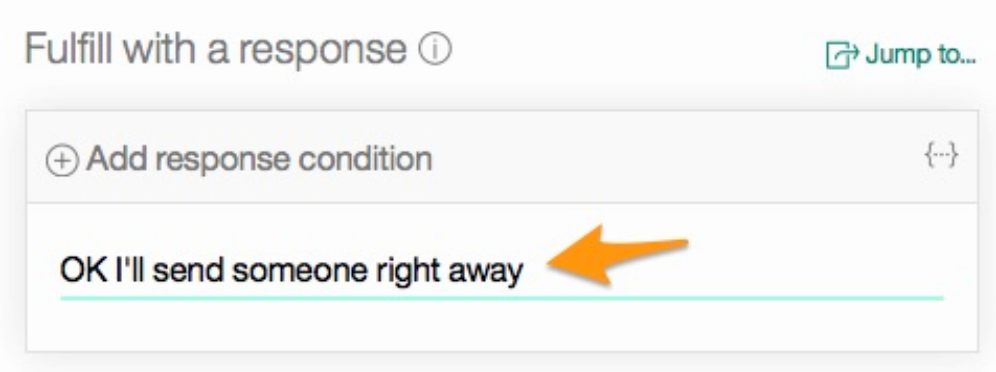


b. Use the mouse or keyboard to select **#maintenance**:

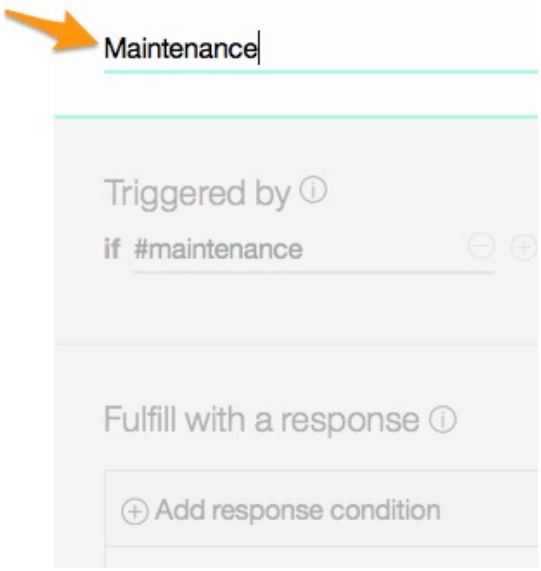


TIP:	Remember # denotes an Intent – so this node will be matched if the user input is identified as being a #maintenance Intent
TIP:	Conditions are expressed using the Spring Expression Language (SpEL): http://ibm.biz/springexplang

c. In the **Enter a response** field, type `OK I'll send someone right away:`

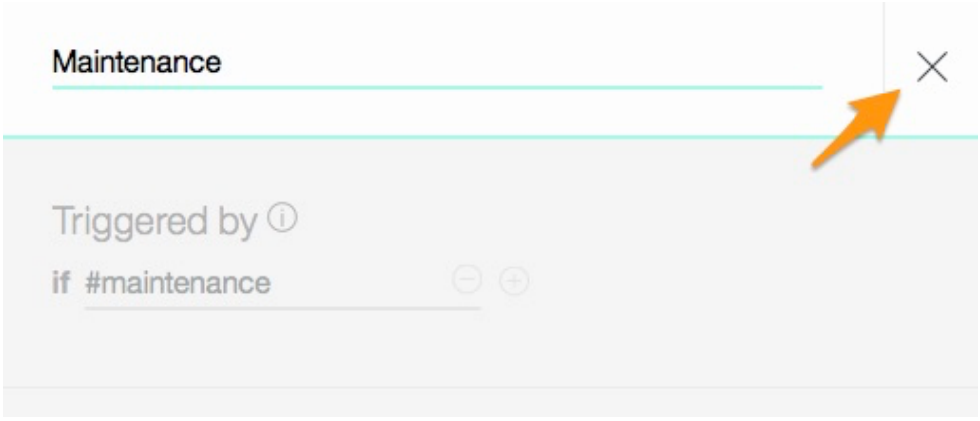


d. In the **Name this node field**, type `Maintenance`:



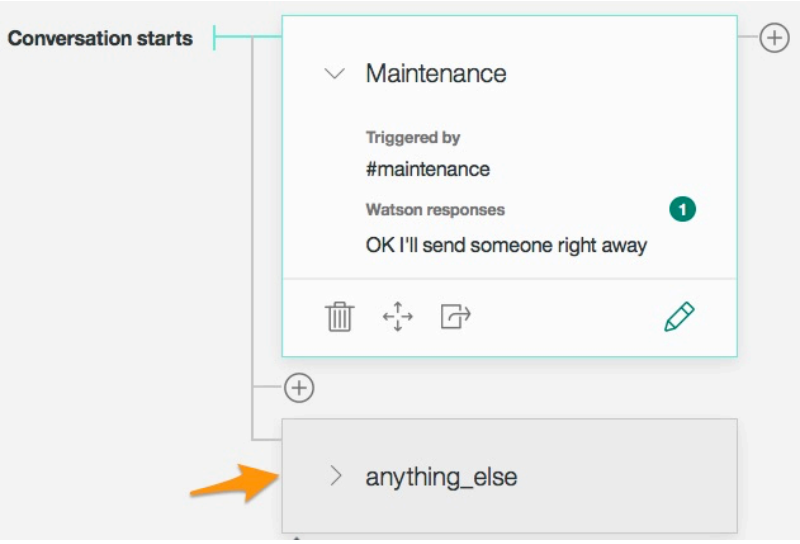
TIP: Naming nodes is optional but helps to identify them later.

e. Click **X** to close the editor panel:

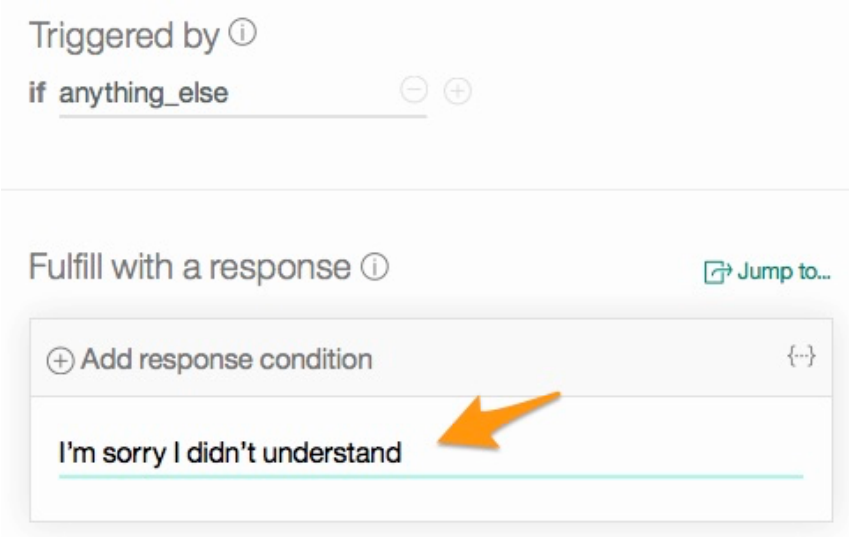


3. The anything_else response:

a. Note that an **anything_else** node has been automatically added to the root:

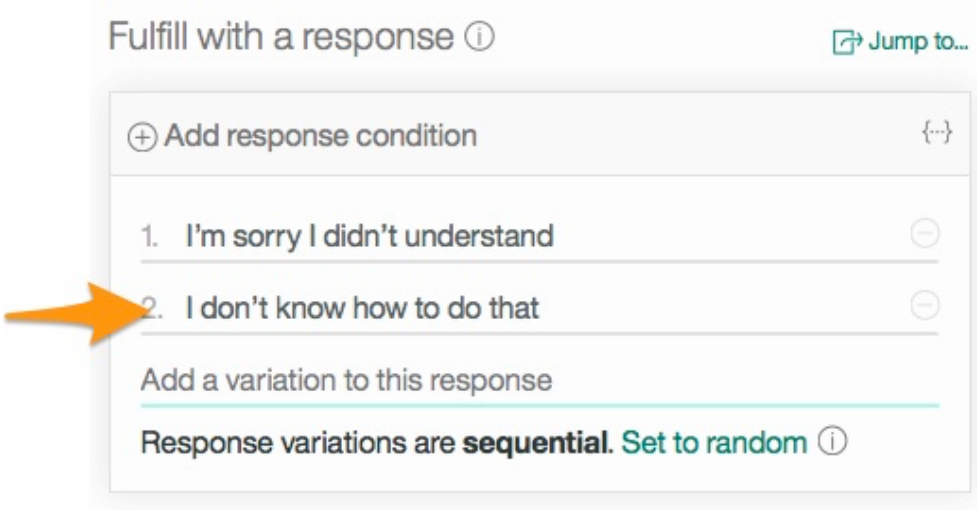


b. Click the **anything_else** node to edit it
c. In the **Enter a response** field, type `I'm sorry I didn't understand`:



TIP: When user input is received, Watson first tries to match it against the Maintenance node. If that succeeds, then that node is processed – in this case by giving the user the response that someone is on their way. If it does not match, then it moves to the next node and tries to match that – in this case that would be the anything_else node which has no condition and always matches. Once a 'leaf' node (that is a node that has no children) has been processed, the flow of the conversation returns to the root. Since both nodes you have right now are leaf nodes – as soon as either node is processed, the conversation resets.

4. Add alternative responses:
   a. In the **Add a variation to this response** field, type `I don't know how to do that`:



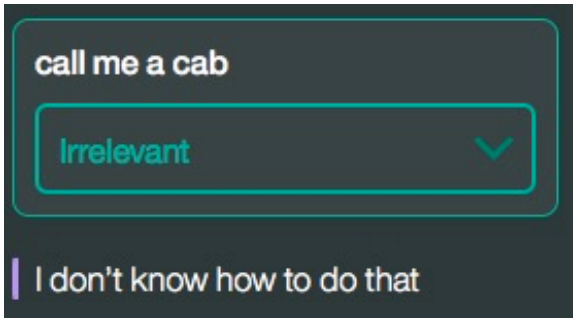
TIP: Variations in responses help to create more natural interactions by avoiding repetition. Response variations may be set to *sequential* or *random*.

b. Click **X** to close the editor

5. Test the bot:
   a. If the chat panel is closed, then click the chat icon in the top right-hand corner of the page to open it: 

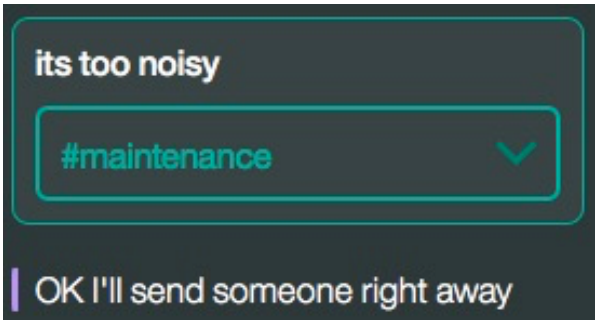
TIP: Note that the bot immediately responds with "I'm sorry I didn't understand". This is because upon starting, an initial empty input is created. Watson tries to match against the child nodes of "Conversation starts here". The Maintenance node is not matched but the anything_else node is. (This is typically why you would have a starting node with a welcome message – see the documentation on Bluemix for the various types of starting node you can use)

   b. In the chat window, `type call me a cab`



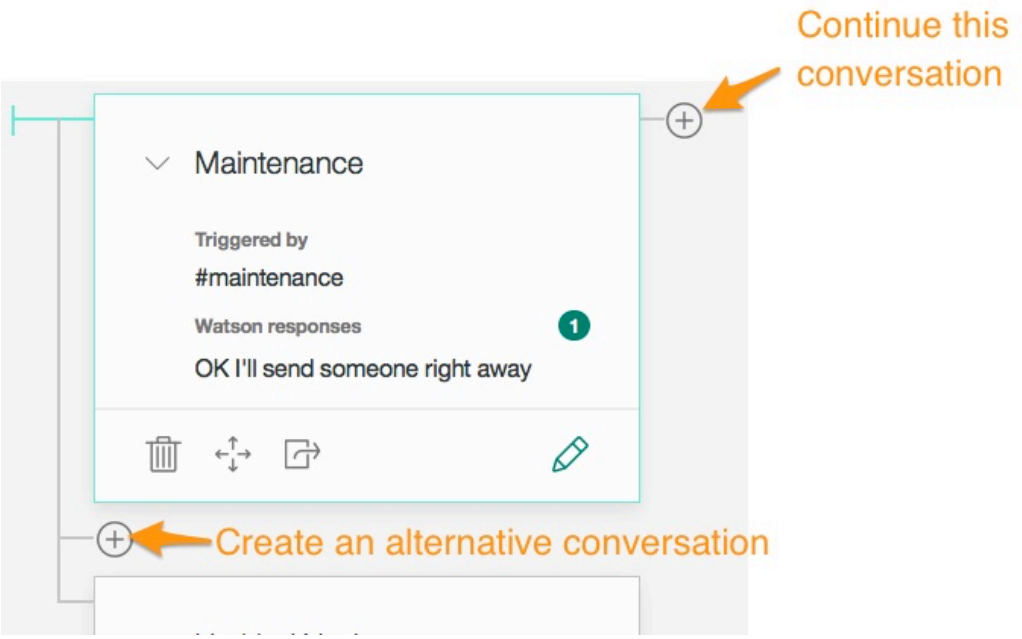
TIP: The user input does not match the Maintenance node so Watson tries the next node – the anything_else – this does match and is processed. Since that node is a leaf then Watson returns to the root.

c. In the chat window, `type its too noisy`

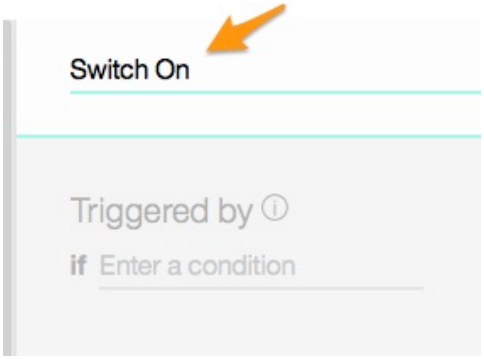


TIP: This time the Maintenance node does match and so Watson looks no further – that node is processed.

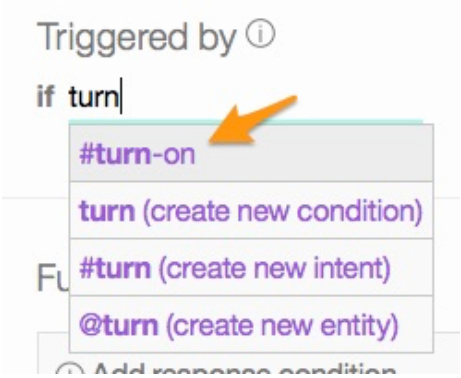
6. Add an Appliance Control Node:
   a. **Close** the **chat** window
   b. Click the **Maintenance** node in the tree
   c. Click **Create an alternative conversation**:



d. In the **Name this node** field, type `Switch On`:

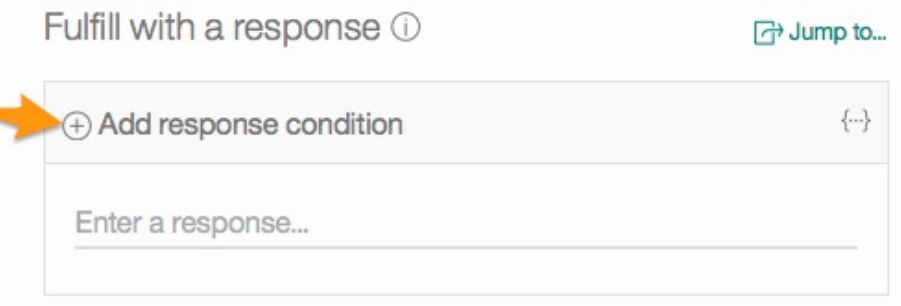


e. Click away from the **Name this node** field to apply the change (or press the **enter** key)
f. In the **Triggered By** field, type `turn`
g. Select the **#turn-on** Intent:

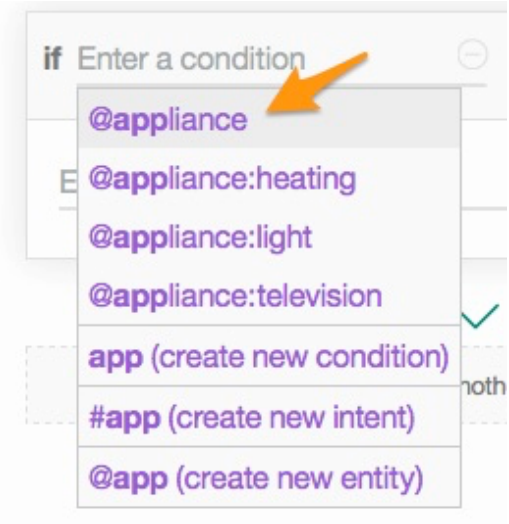


TIP: Sometimes when creating Dialogs, you find you need to create a new Intent – note that you can do that directly here (as well as Entities and Conditions). If you do – be sure to switch to the Intent later and provide the alternative phrases.

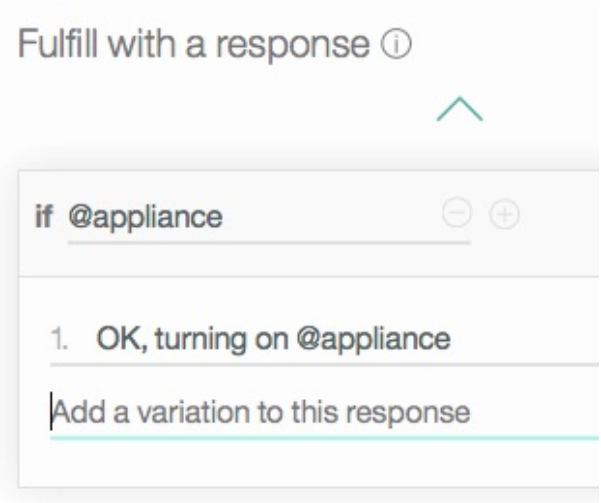
7. Add a Conditional Response:
   a. Click **Add response condition**:



   b. In the **Enter a condition** field, type `app`
   c. Select the **@appliance** Entity:

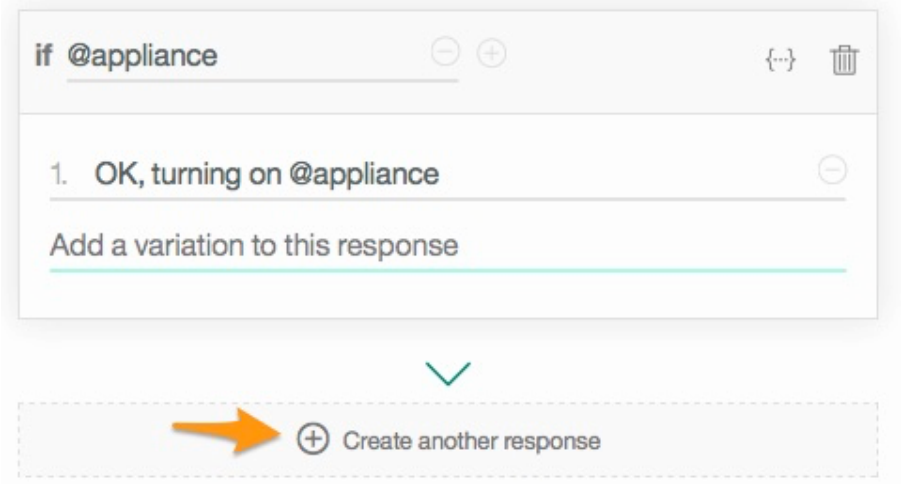


d. In the **Enter a response** field, type `OK, turning on @appliance`

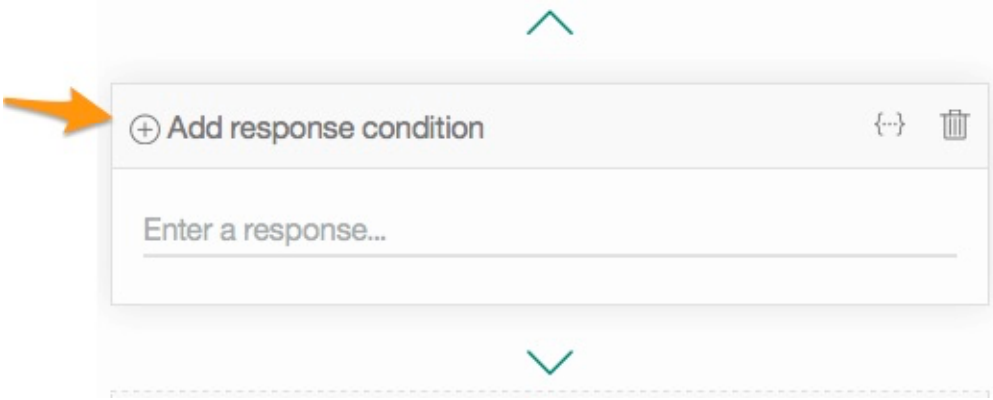


TIP: Note that this response will be used when the input is matched against the #turn-on Intent AND the input is matched against any object in the @appliance Entity. Note that you could also add variation here to avoid repetitive responses.

8. Add Another Conditional Response:
   a. Click **Create another response**:

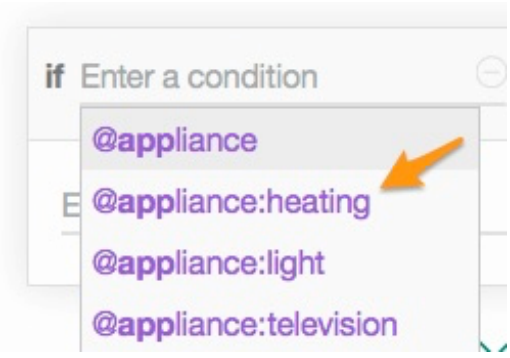


b. In the new response, click **Add response condition**:

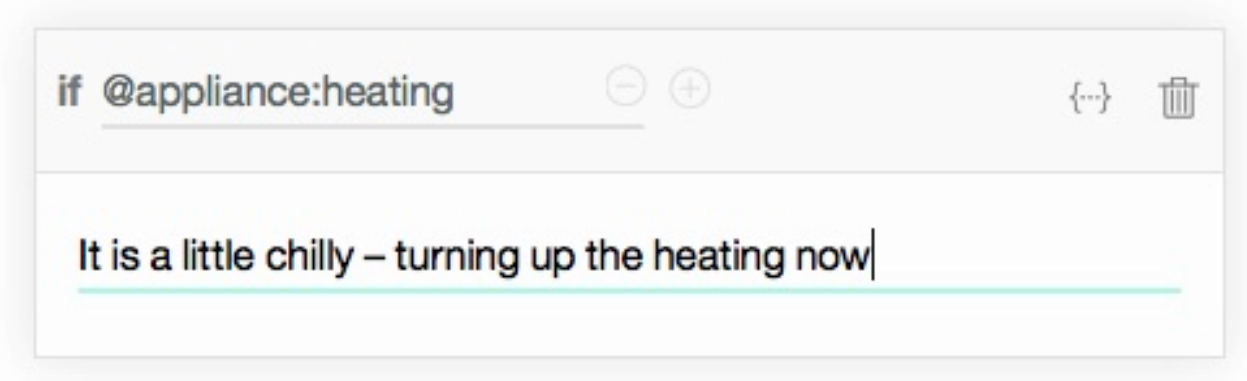


c. In the **Enter a condition** field, type `app`

d. Select the **@appliance:heating** Entity:



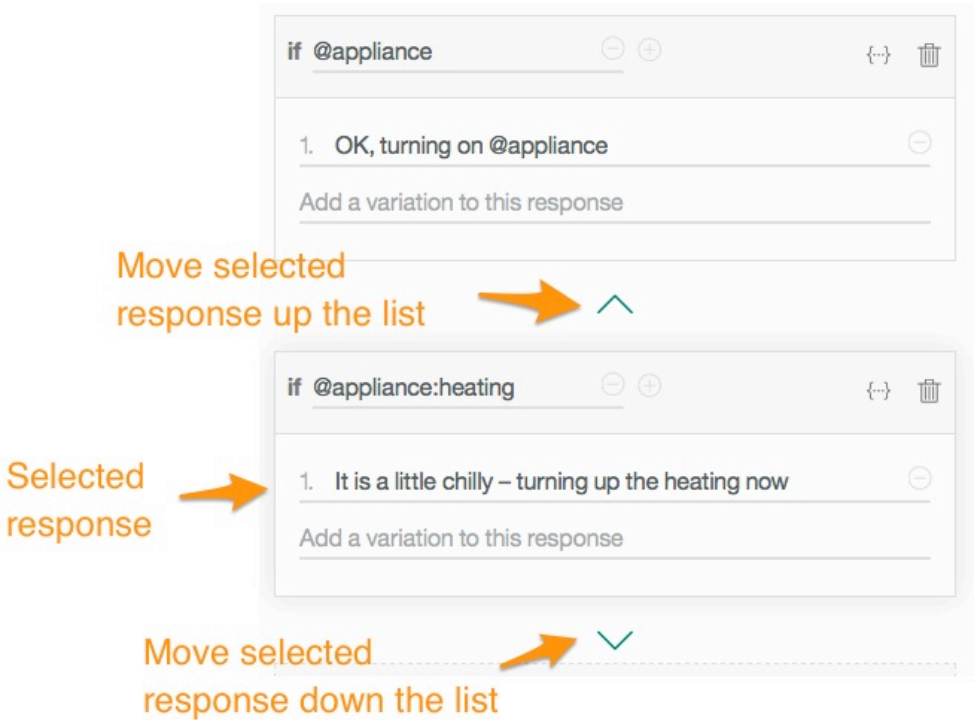
e. In the **Enter a response field**, type `It is a little chilly – turning up the heating now`



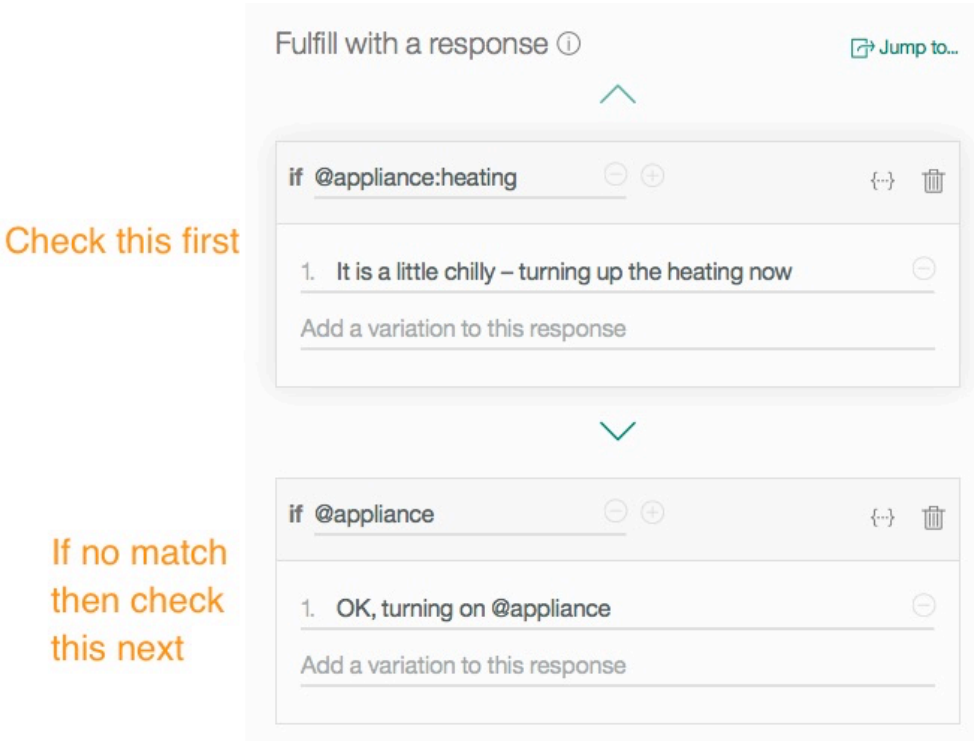
9. Re-order conditional responses:

TIP: Like nodes in the tree, responses are processed in order and as soon as a match is found no more matching takes place. Therefore, you should have the more generic responses **below** the more specific ones.

b. Click the **up arrow** above the **@appliance:heating** response to move it up the list:



c. Note the order the responses will be checked:

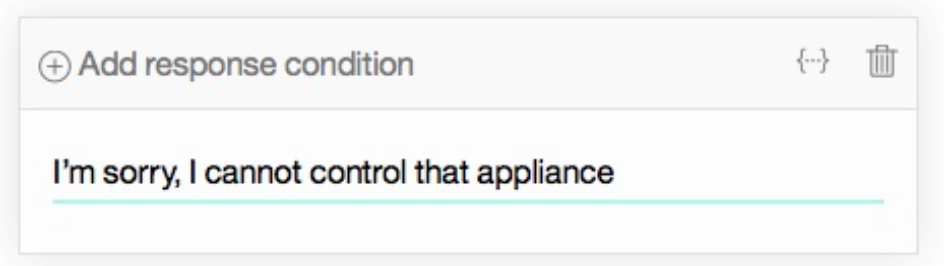


10. Add a Default Response:

TIP: What happens when the user tries to control a device or appliance we cannot identify? Watson tries to match in two stages. In stage 1 it tries to match against the child nodes of the current context. If no match is found, then it moves to stage 2 – it returns to the root and tries to match against the top-level set of child nodes. Having an *anything_else* **root** node allows the chat-bot to have a generic 'I didn't understand' type of response. However, we can add specific 'anything else' type nodes in the dialog to give specific responses when something is not recognized. Let's do that now.

b. Click **Create another response**

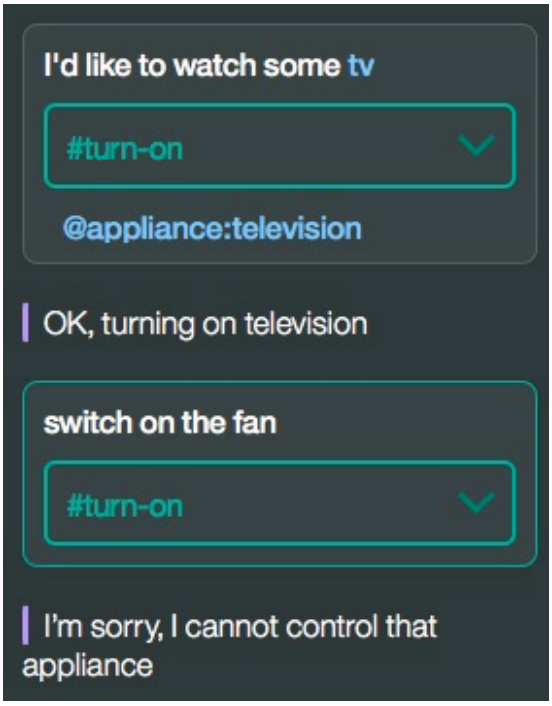
c. In the **Enter a response** field, type `I'm sorry, I cannot control that appliance`:



TIP: Make sure this response is the last one in the list as it has no conditions and therefore will always match.

d. Click **X** to close the editor

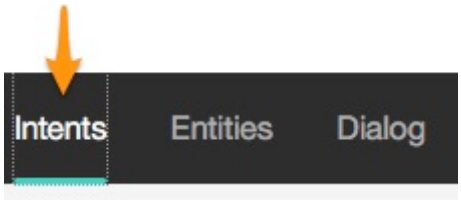
11. Test the bot:
    a. Click the **chat** button to open the chat panel (if it is not already open)
    b. In the chat window – try various ways of asking ARC to switch on appliances (including ones we haven't identified)



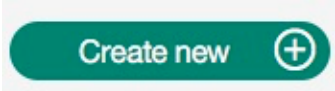
Task 5. Order a Taxi

In this task, you will begin creating a more complex interaction and see how you can have the chat bot you have built interact with an application. You could build that application in Java, JavaScript etc. and use the APIs to communicate – see the Bluemix documentation for details. In this example, you will build a simple Node-RED flow to interact with the bot. You will build that flow a little later - in this task, you will extend the chat-bot to have a conversation with the user around ordering a taxi.

1. Add an Intent:
    a. In the menu bar, click **Intents**:



    b. Click **Create new**:



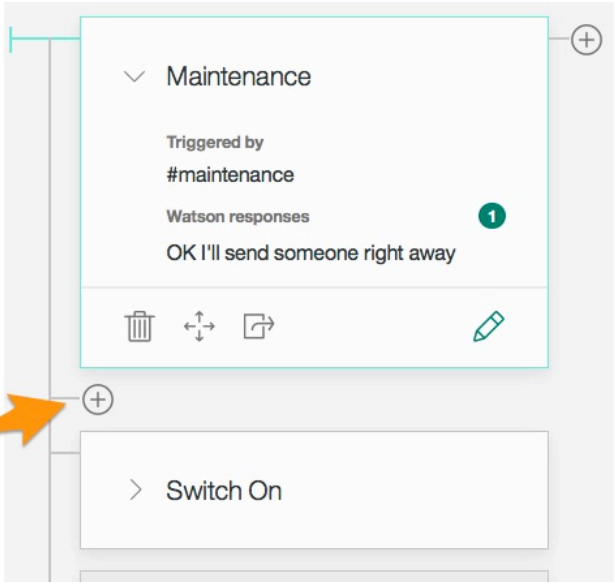
c. In the **Intent name** field, type `taxi`

d. In the **Add a user example** field, type `call me a taxi` and hit the **enter** key
e. In the **Add a user example** field, type `i'd like a car to take me to work` and hit the **enter** key
f. In the **Add a user example** field, type `I need to get to the airport` and hit the **enter** key
g. In the **Add a user example** field, type `i would like to order a taxi` and hit the **enter** key
h. In the **Add a user example** field, type `take me to the train station` and hit the **enter** key
i. Click **Create**:

2. Add Entities:
   a. In the menu bar, click **Entities**
   b. Click **Create new**
   c. **Name** the new Entity `destination`:

d. In the **Value** field, type `airport`
e. Add the **Synonyms**: `airfield, terminal`
f. Click **Add new value**: ⊕
g. In the **Value** field, type `railway`
h. Add the **Synonyms**: `railway station, rail, train`
i. Click **Create**:

3. Modify the dialog:
   a. In the menu bar, click **Dialog**
   b. Click the **Maintenance** node
   c. Click **Create alternative conversation**:

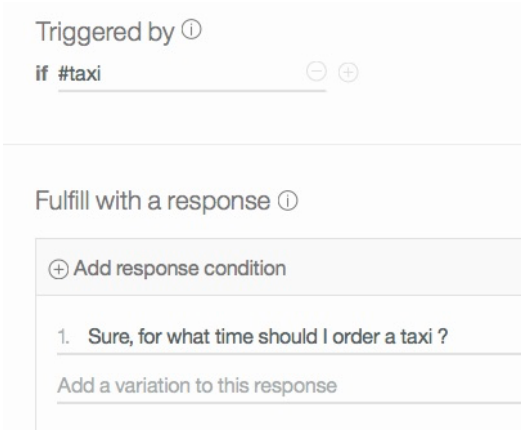


TIP: This will insert a new node between Maintenance and Switch On. Remember nodes are processed in order from top to bottom. In this case, it doesn't really matter where the new node goes – so long as it is above the *anything_else* node.

d. In the **Name this node** field, type `Taxi` and then click away from the field to apply it (or press the **enter** key)

e. In the **Triggered by** field, type `tax` and then select **#taxi**

f. In the **Enter a response** field, type `Sure, for what time should I order a taxi ?`

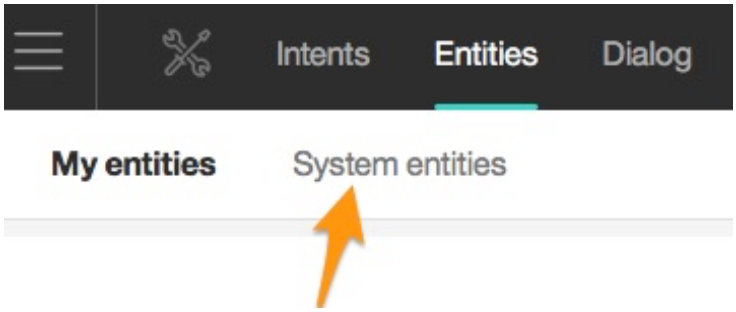


g. Click **X** to close the editor

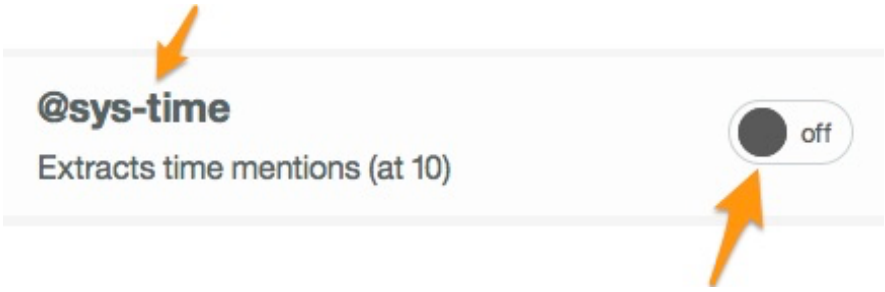
4. Add a System Entity:

TIP: The bot has now asked the user for more information - another input. Before you add nodes to the conversation to handle the next input, you need an entity to identify the various *time* responses. To do this you will use a built-in Entity that can do this automatically.

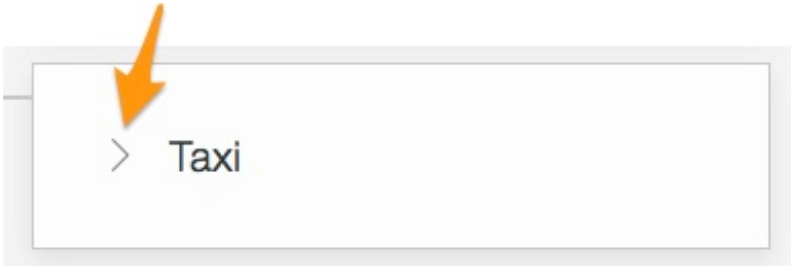
b. In the menu bar, click **Entities**
c. Click **System entities**:



d. Click the **switch** next to **sys-time** to give the bot the ability to extract times from user responses:

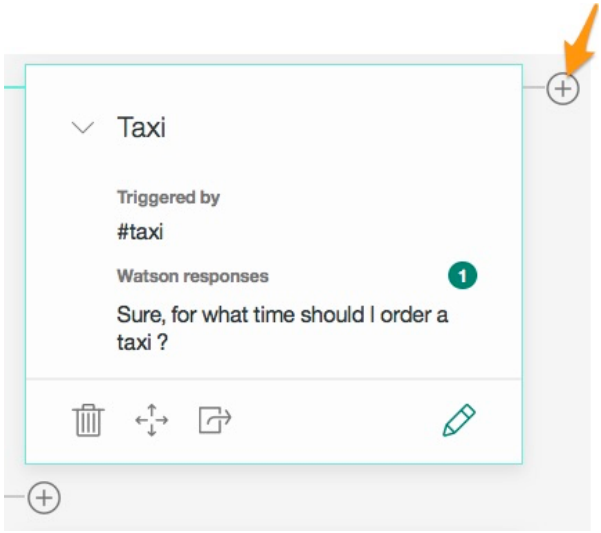


5. Continue the conversation:
   a. In the menu bar, click **Dialog**
   b. Click the **>** symbol in the **Taxi** node:



TIP: If you click anywhere else on the node, then it will open the editor which will be in the way of what you want to do which is add a new node. If this happens click the X to close the editor

   c. Click **Continue conversation**:

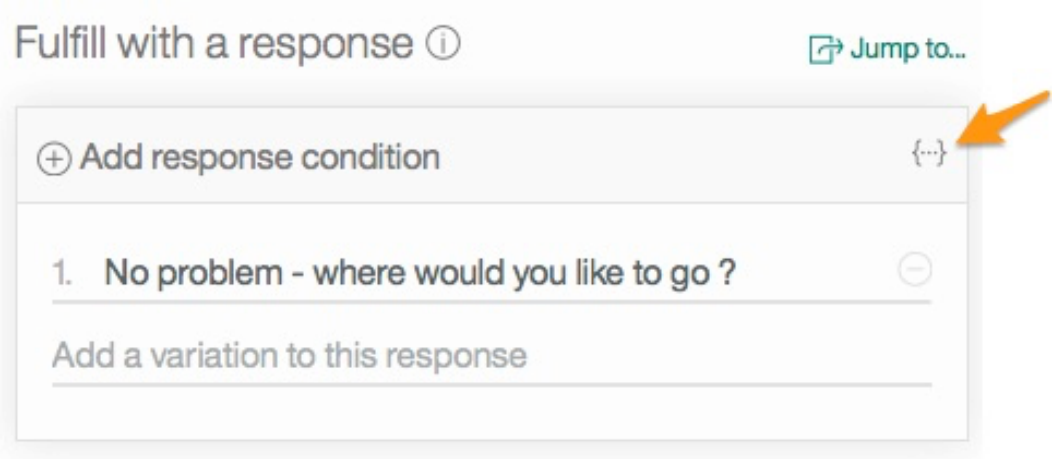


TIP: A new node is created which will continue the conversation after the Taxi node has been processed.

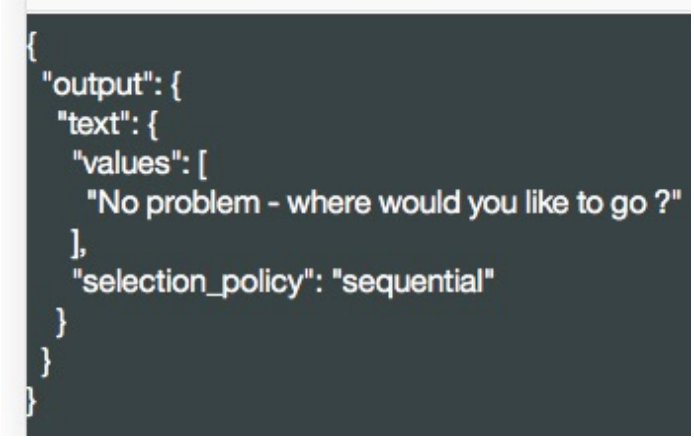
d. In the **Name this node** field, type `Pickup Time` and then click away from the field to apply it
e. In the **Triggered by** field, type `sys` and then select **@sys-time**
f. In the **Enter a response** field, type `No problem - where would you like to go ?`

TIP: As well as responding to the user, you want the bot to store the time that was recognized in the response. *Context variables* are used to store information for use between nodes and between the bot and any application that interacts with it. You will now store the time in a context variable using the advanced response editor.

6. Store the time:
   a. In the **Add response condition** header, click the **{...}** button:



TIP: This expands to show the JSON object that is sent as a response. Note that it has an output, with a text object containing an array of values:



b. Modify the JSON by adding an extra attribute. The full text is shown below with the additional text in bold:

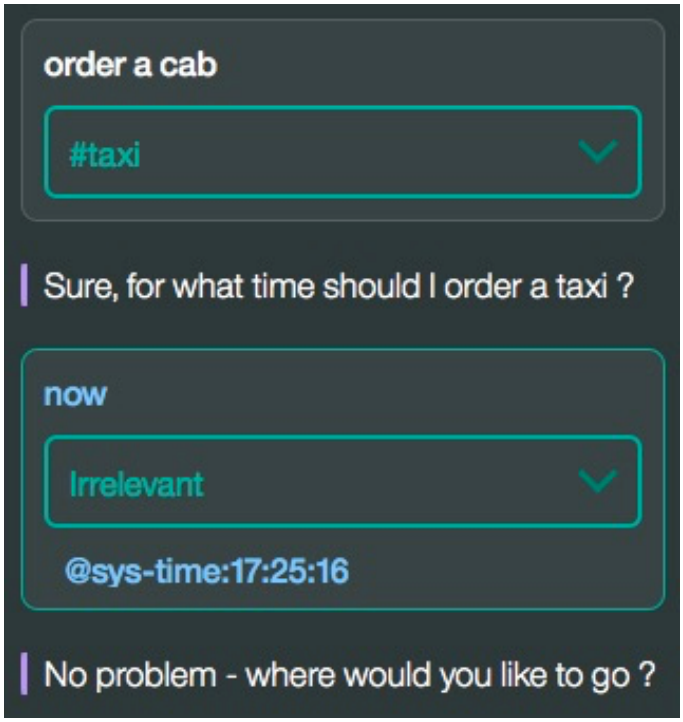
```
{
 "context": {
    "time": "@sys-time"
  },
  "output": {
    "text": {
      "values": [
        "No problem - where would you like to go ?"
      ],
      "selection_policy": "sequential"
    }
  }
}
```

TIP: This will store the current value of the **sys-time** Entity into a context variable called **time**. Refer to the documentation for other options: https://www.ibm.com/watson/developercloud/doc/conversation/dialog-build.html#defining-a-response

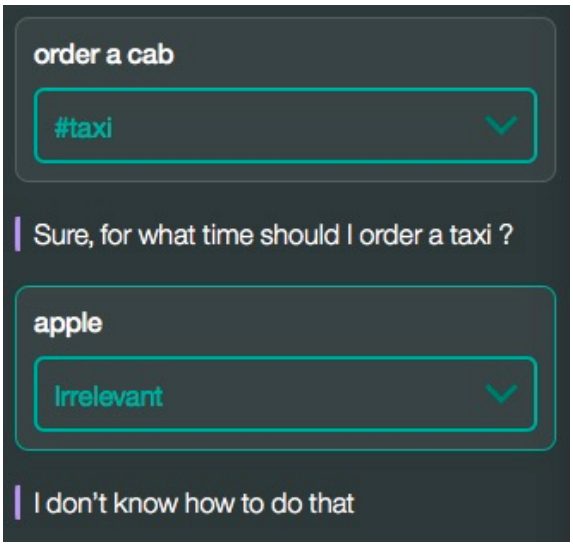
TIP: Pay attention to the border of the advanced editor – if your JSON is incorrectly formatted the boundary will turn red – however this is VERY subtle and not at all obvious. Try temporarily deleting a comma or curly brace to see the effect.

c. Click the **{...}** button to close the advanced editor
d. Click the **X** to close the node editor

7. Test the bot:
   a. Open the chat window if it is not already open
   b. In the chat window, type `order a cab`
   c. In the chat window, type `now`



   d. In the chat window, type `order a cab`
   e. In the chat window, type `apple`



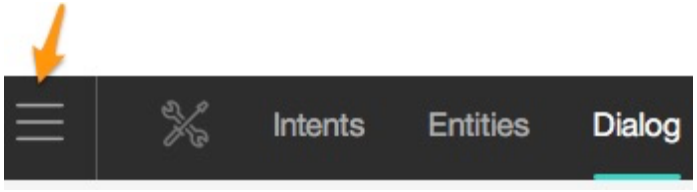
TIP: In this case the @sys-time was not recognized in the user response. Since you have no 'anything_else" type node in this branch of the tree – no match was made and so Watson proceeded to Stage 2 – it returned to the root and tried to match there. In this case, it did not match the Maintenance node and so continued – matching against the anything_else node. This is important to understand as you build your dialog – if you don't add 'catch all' nodes in your conversation then Watson always returns to the start when an unrecognized input occurs.

Task 6. Create a Node-RED Flow

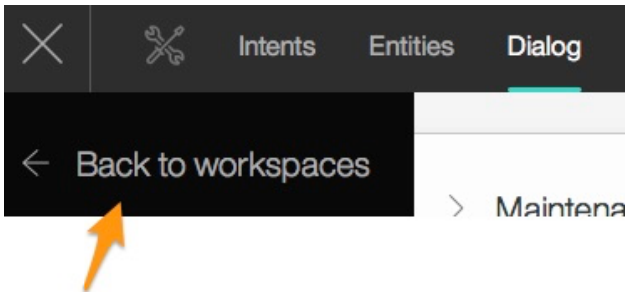
At this point you will create a simple flow in Node-RED and see how you can send and receive data from the bot. Once this is working you will complete the ARC application by asking the user where they need to go – and responding with information appropriate to their target destination (perhaps using other services like traffic or weather).

To connect your node-red application to the correct dialog (you could have several) you will first obtain the workspace ID for the ARC dialog

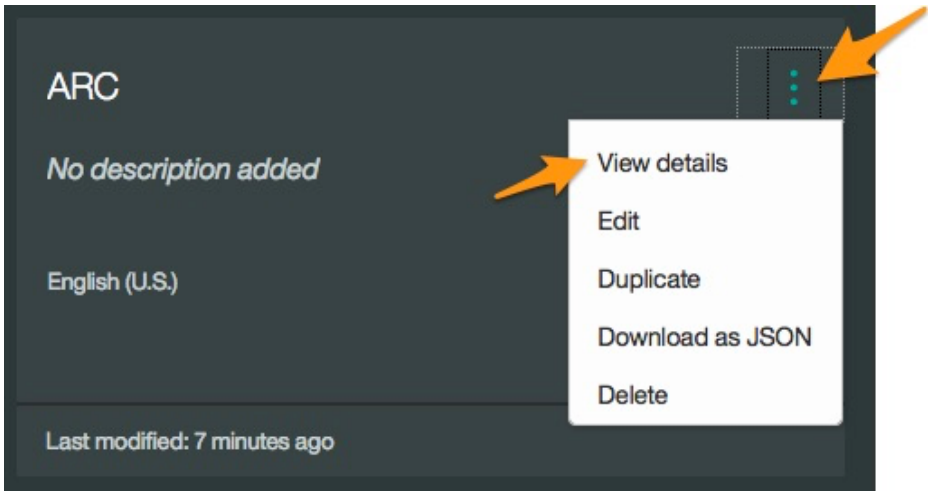
1. Obtain the workspace ID:
   a. In the menu bar, click the 'burger' menu icon:



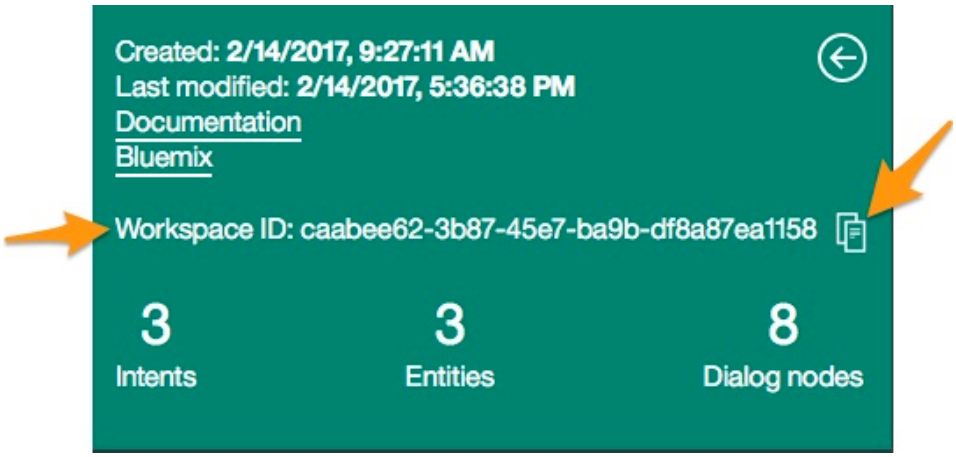
   b. Click **Back to workspaces**:



c. Click the **menu** symbol in the ARC tile and select **View details**:

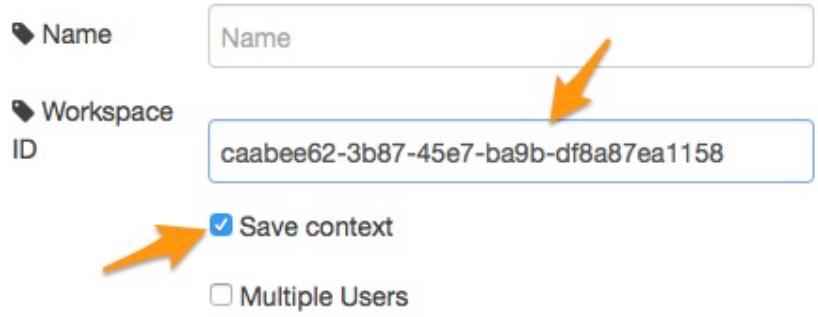


d. Click the **copy** button next to the **Workspace ID** to place it in the copy buffer:



2. Open the Node-RED Application:
   a. Switch back to your Bluemix web browser tab and open the Node-RED flow editor for the application
3. Connect to Watson Conversation:
   a. From the palette, drag on a **conversation** node:

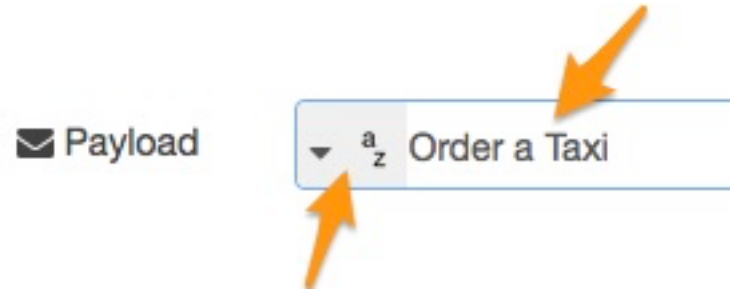
b. **Double-click** the new node to edit it
c. **Paste** the **workspace ID** you copied in the step above into the **Workspace ID** field
d. Select **Save context**



TIP: Watson dialog itself retains no state information when accessed from an application. Unless you include the context when you send a request to the service – each request is treated as a brand-new conversation. If you write your own application in Java, JavaScript etc then you must manually include context when sending in requests.

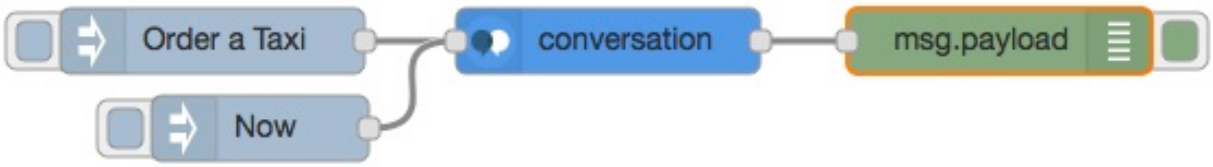
e. Click **Done**
f. From the palette, drag on an **inject** and a **debug** node
g. Connect the nodes together as shown below:

h. Double-click the **inject** node to edit it
i. Change the payload **type** to **string**
j. In the **Payload** field, type `Order a Taxi`



k. Click **Done**
l. Make a copy of the inject node and change its payload to `Now`

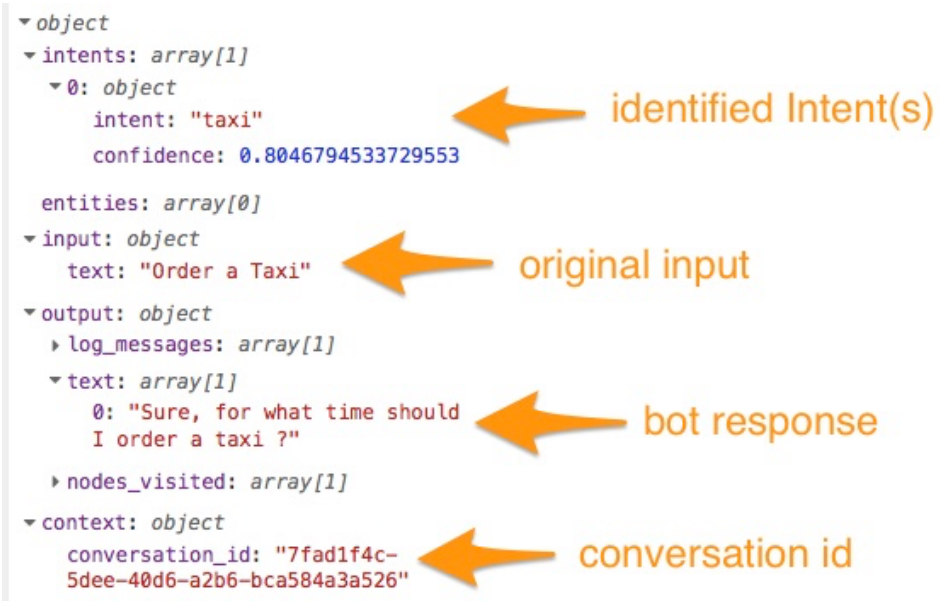
m. Connect the new node to the flow as shown below:



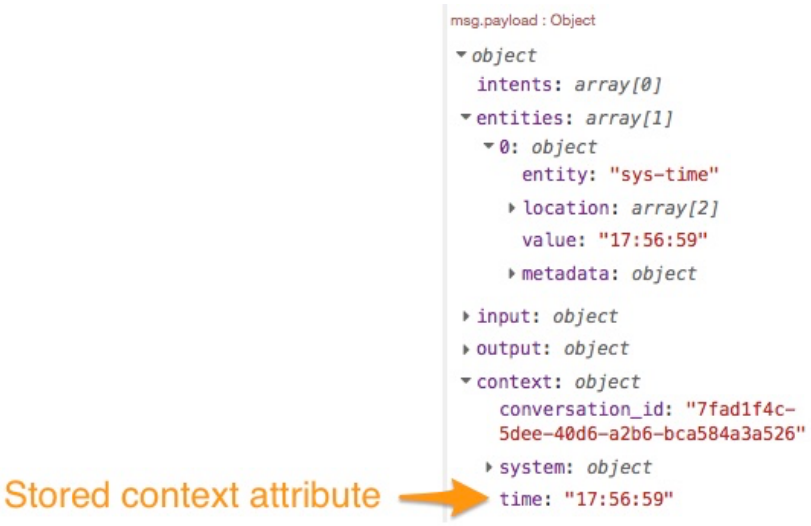
n. Click **Deploy**

4. Test the flow:

a. Activate the **Order a Taxi** inject node and observe the output in the debug panel:



b. Activate the **Now** inject node and observe the output in the debug panel:



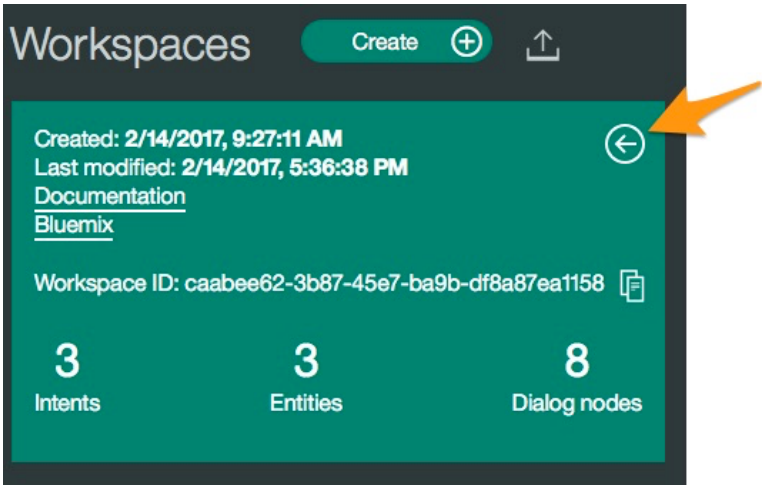
TIP: Note the stored context attribute. Note also that the conversation_id is the same as the previous message – this is because the option to save the context was set on the conversation node.

Task 7. Add More Complex Interaction

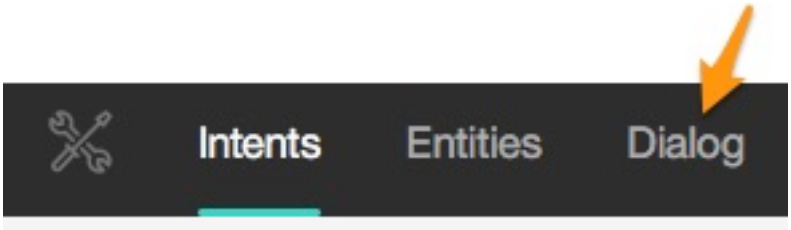
In this task, you will modify the bot to provide different responses depending on the user's choice of location. In this simple example if the user is headed to the airport then you will provide a simple 'bon voyage'. If they are not headed to the airport, then the application will check the weather and the bot will advise the user if they need an umbrella. Since this may involve further interactions – you will split the dialog at this point into two separate branches.

Note that in this simple example the node-red flow will simply assume it's raining – in a real system the app would perhaps ask the user if they would like the weather checked - and use the weather service to do it. The following steps serve to highlight the mechanism whereby the bot and the node-red flow can interact.

1. Modify the Bot Interaction:
   a. Switch back to the Watson Conversation tab
   b. Click the **back** button in the ARC tile:

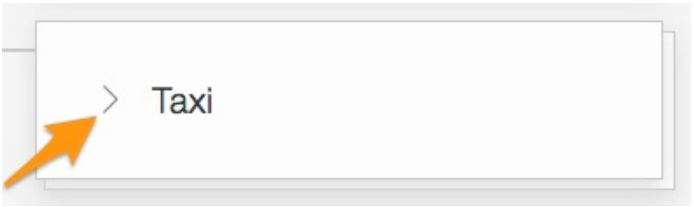


c. Click the **ARC** tile to edit the workspace
d. In the menu bar, click **Dialog**:

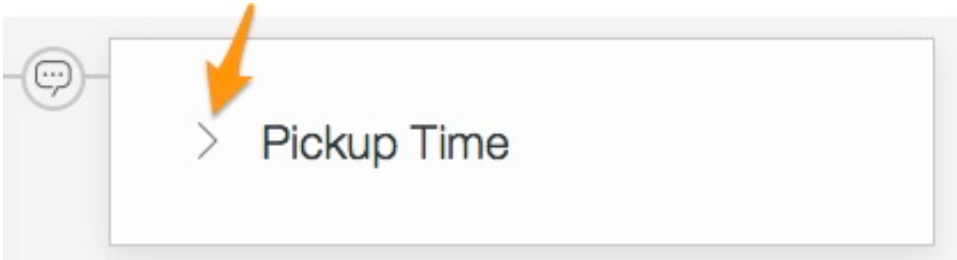


e. Note that the Taxi node icon reflects the fact that it has **child nodes**:

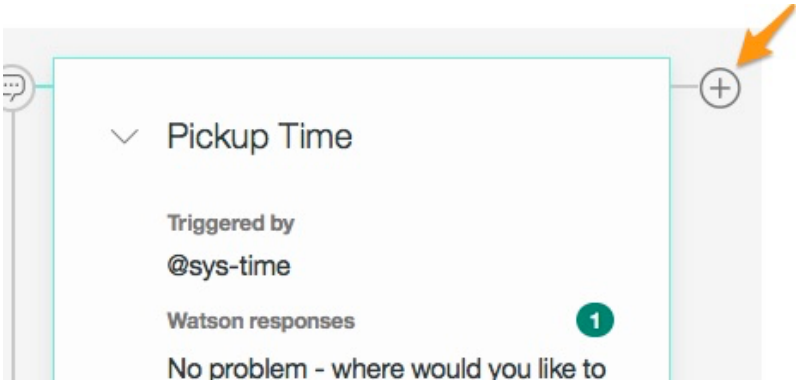
f. Click the **>** symbol in the **Taxi** node:



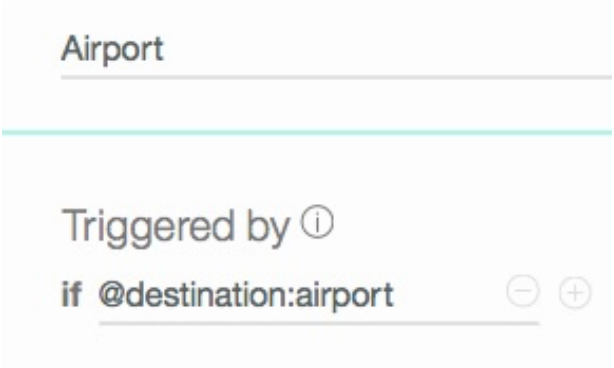
g. Click the **>** symbol in the **Pickup Time** node:



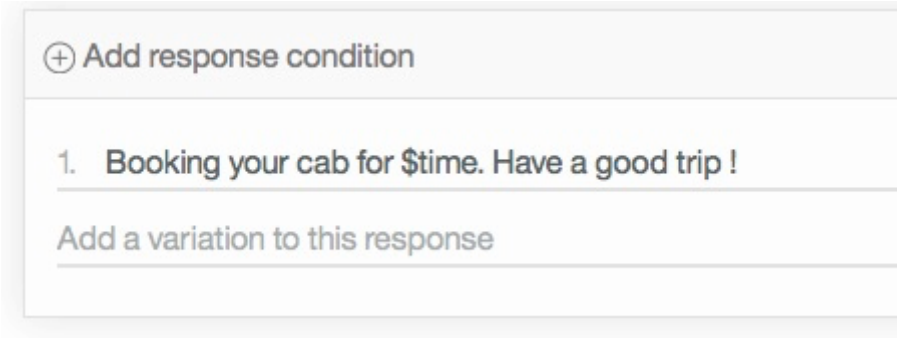
h. Click **Continue conversation**:



i. Name the new node **Airport**
j. In the **Triggered by** field, type `dest` and select **@destination:airport**



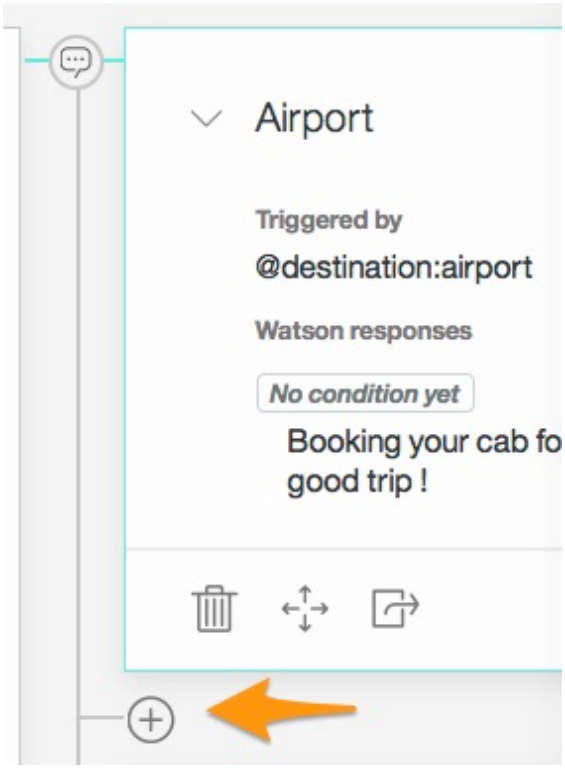
k. In the **Enter a response field**, type `Booking your cab for $time. Have a good trip !`



l. Click X to close the editor

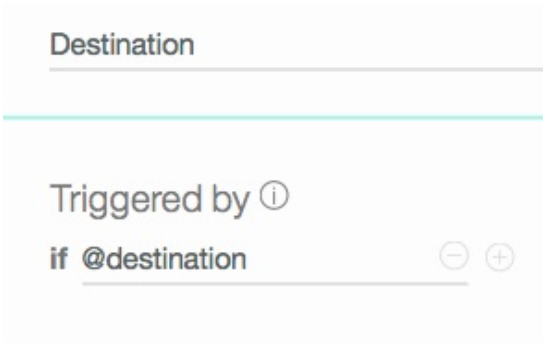
TIP: If the user is headed to the airport then the bot gives a simple response and ends the conversation

2. Add an alternative branch:
   a. Click Create alternative conversation:



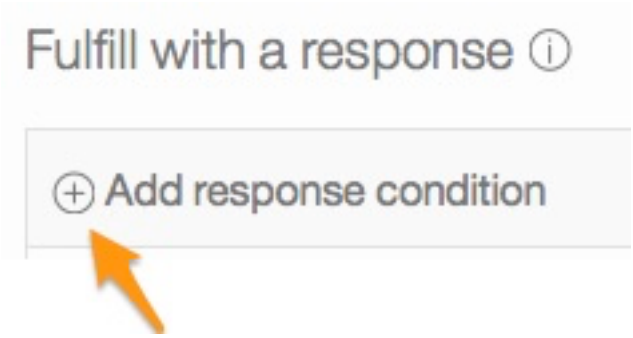
TIP: If the icon does not show, click > on the Airport node to collapse it and then click it again

   b. Name the new node **Other Destination**
   c. In the **Triggered by** field, type `dest` and select **@destination**



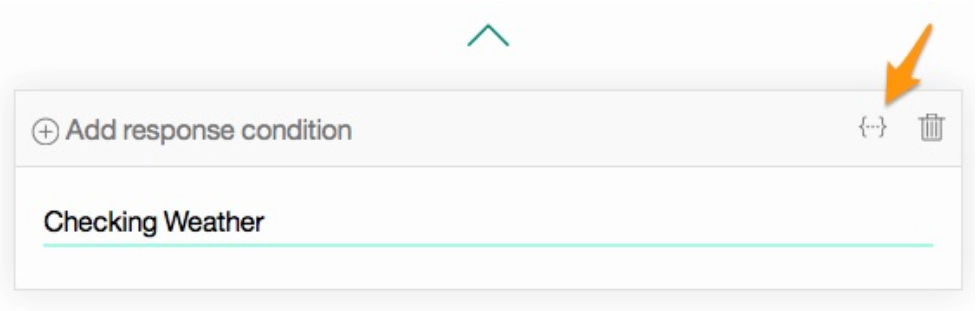
TIP: If the user is headed somewhere other than the airport, then your node-red application will 'check the weather' for the area and advise them whether they need to take an umbrella. Note that this is of course a simple example but will serve to illustrate how your bot can exchange information with a connected application.

d. In the **Fulfill with a response** section, click **Add response condition**:



e. In the **Enter a response field**, type `Checking Weather`

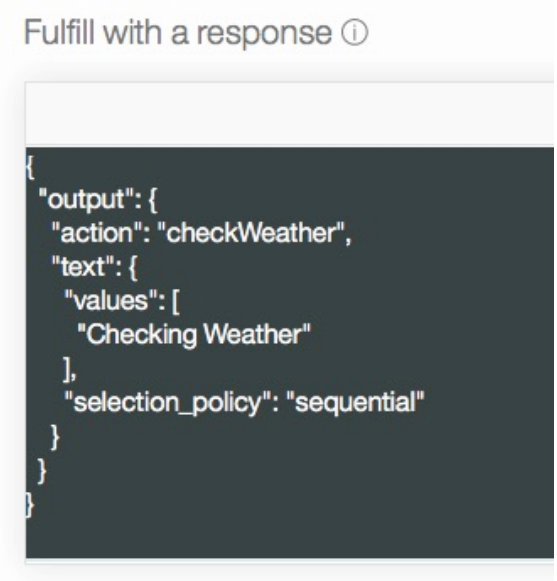
f. Click the advanced editor button **{...}**



g. Modify the JSON to add a new action attribute into the output – the full text is shown below with the modifications in bold:

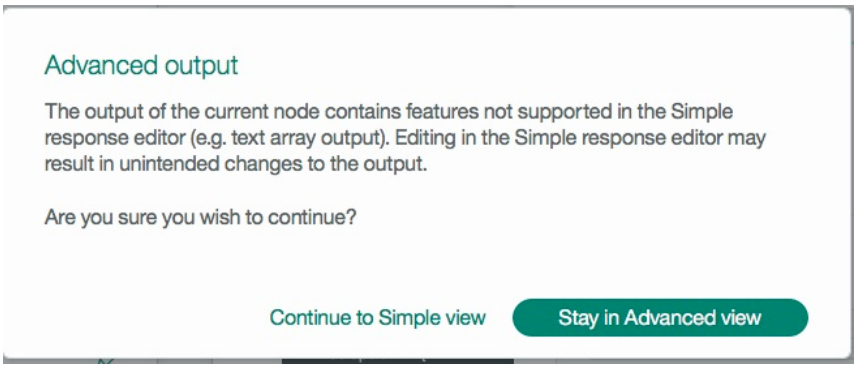
```
{
  "output": {
    "action": "checkWeather",
    "text": {
      "values": [
        "Checking Weather"
```

```
        ],
        "selection_policy": "sequential"
      }
    }
}
```



TIP: Note that context attributes persist – attributes in the output do not – this is useful for only triggering actions in the connected application at certain times in the conversation.

h. Click the **{...}** button to close the editor. Note that while you can switch back to the simple editor this could cause unexpected side effects:



TIP: In this case the changes we have made to the JSON are minimal and switching back to the simple view will not cause any problems.

i. Click **Continue to Simple View**

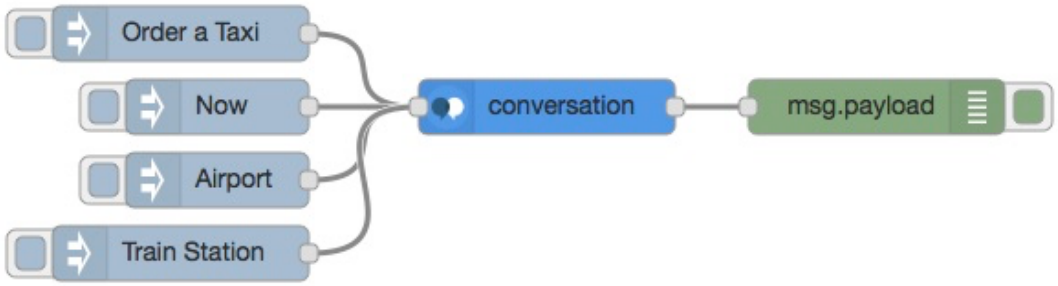
j. Click **X** to close the editor

3. Modify the Node-RED Flow:

a. Switch back to the Node-RED flow editor

b. Make a **copy** of one of the **Inject** nodes and modify it to send a payload of `Airport`

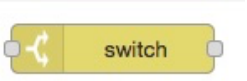
c. Make another **copy** of one of the **Inject** nodes and modify it to send a payload of `Train Station`
d. Connect the new nodes to the flow as shown below:



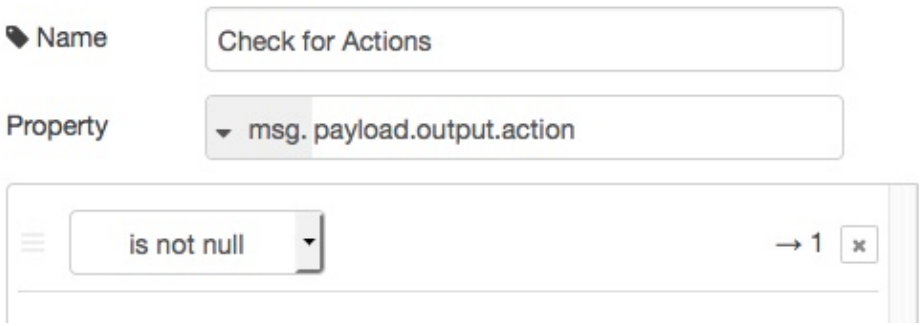
e. Click **Deploy**

4. Test the Flow:
   a. **Activate** the **Order a Taxi** inject node
   b. **Activate** the **Now** node
   c. **Activate** the **Train Station** node
   d. Note the output in the debug panel:

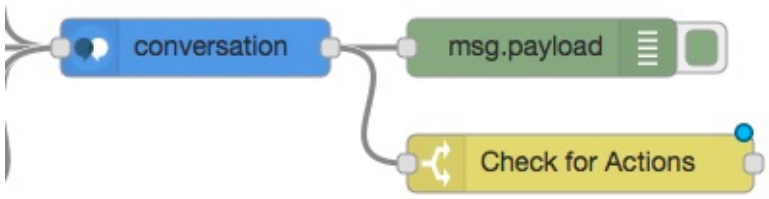
5. Handle Actions in the Flow:
   a. From the palette drag on a **switch** node:



   b. Double-click the new node to edit it
   c. In the **Name** field, type `Check for Actions`
   d. In the **Property** field, type `payload.output.action`
   e. In the comparator field, select **is not null**:

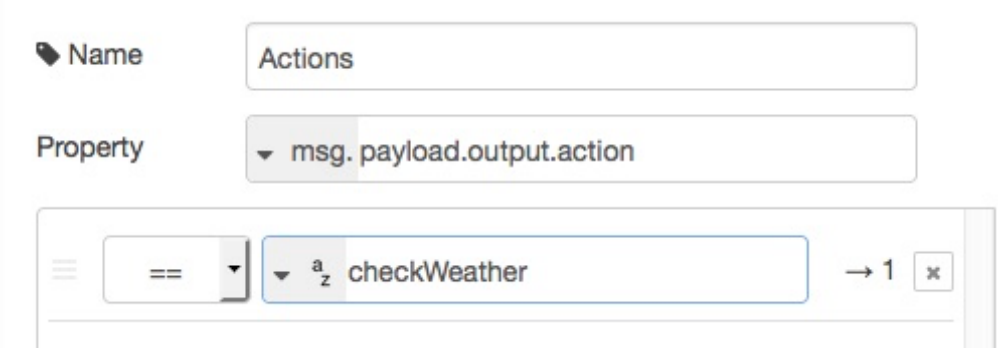


f. Click **Done**
g. Connect the switch node to the conversation output as shown below:

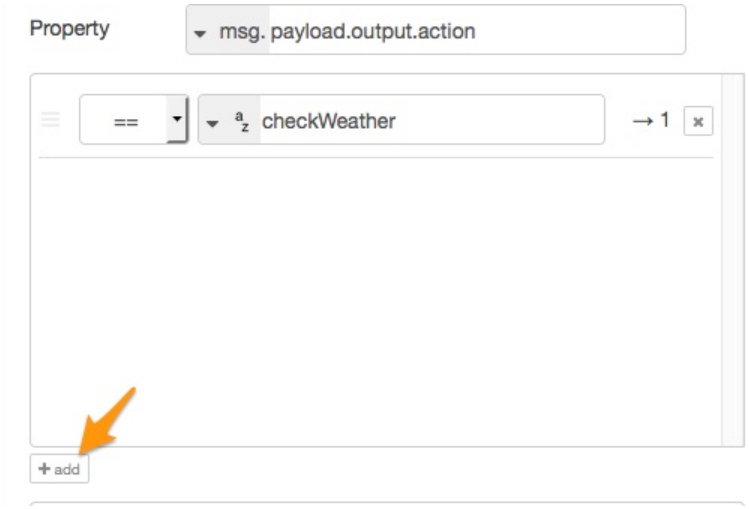


TIP: This part of the flow will only come into play if the bot includes an action in its response

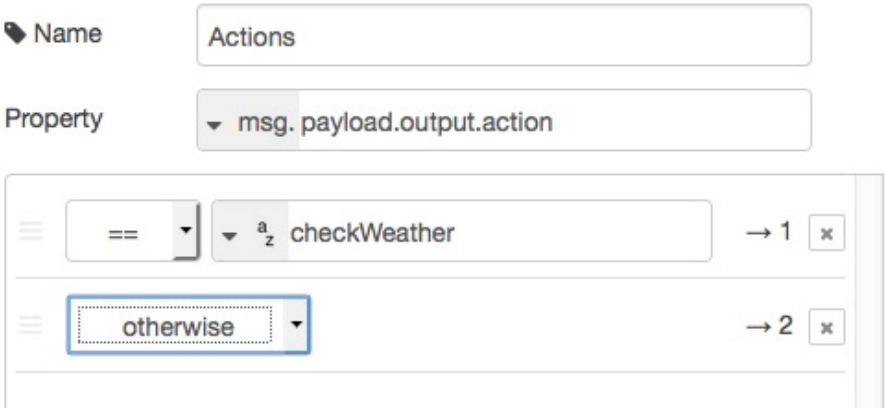
h. Make a copy of the switch node and double-click the new node to edit it
i. In the **Name** field, type `Actions`
j. In the comparator field, select **==** and type `checkWeather`



k. Click **add** to add a second condition:



l. In the **comparator** field, select **otherwise**:



m. Click **Done**

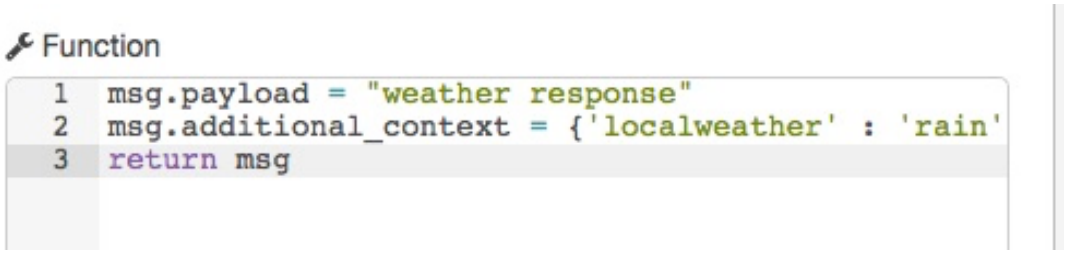
n. Connect the new switch to the existing switch as shown below:

6. Send a request with the weather data:

   a. From the palette, drag on a function node:

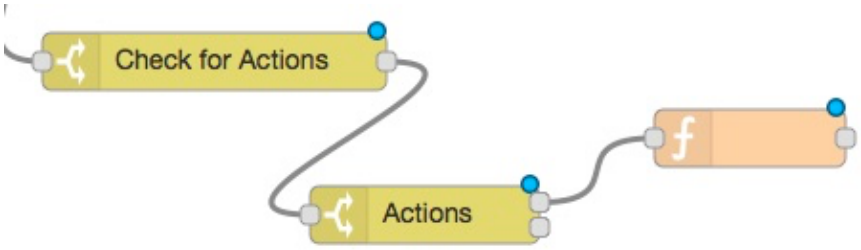
b. Double-click the new node to edit it
c. In the **Function** field, enter the following code:

```
msg.payload = "weather response"
msg.additional_context = {'localweather' : 'rain'}
return msg
```

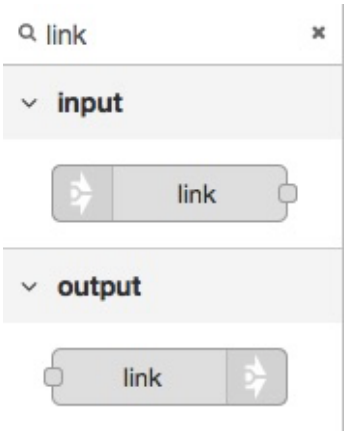


TIP: Although we are not actually making a request – and therefore do not need a payload – the conversation node requires it and will not work without some sort of payload. The bot you are about to modify however will ignore the payload and focus on the context attributes. The *additional_context* attribute allows you to insert new data into the context easily. In this case the node-red flow has added an attribute called **localweather** – you will modify the bot to recognize that attribute and deal with it.

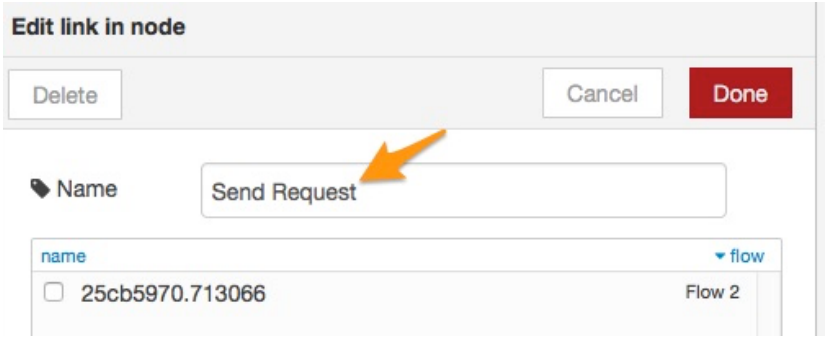
d. Click **Done**
e. Connect the function node to the first switch output:



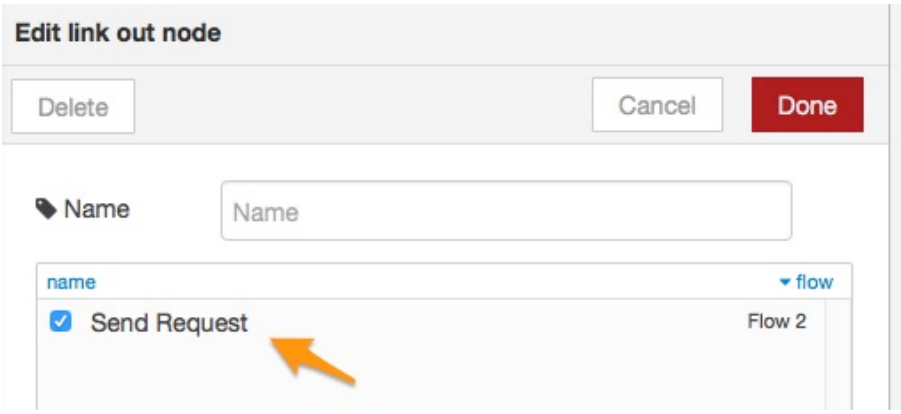
f. From the palette drag on an **input link** and an **output link**:



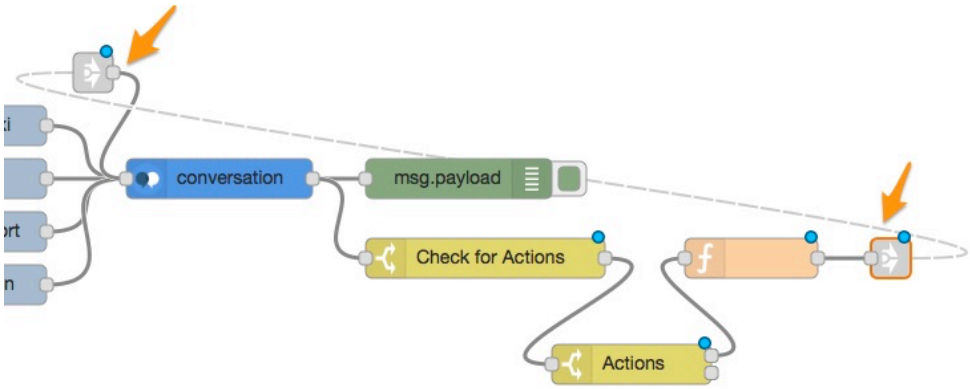
g. Double-click the **input link**
h. In the **Name** field, type `Send Request`



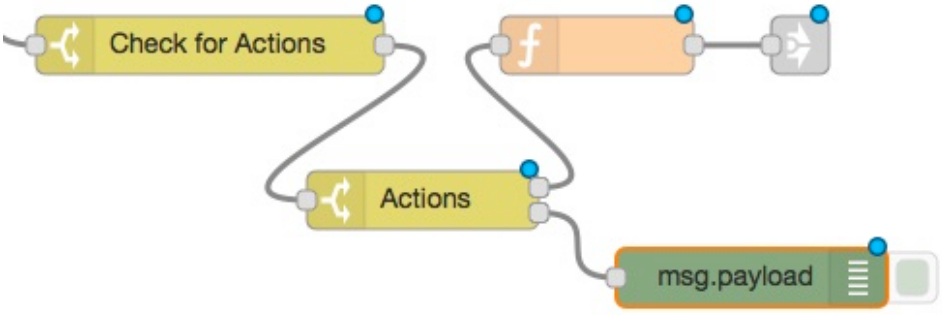
i. Click **Done**
j. Double-click the **output link**
k. **Select** the **Send Request** link:



l. Click **Done**
m. Connect the **input link** to the **conversation** node and the **output link** to the **function** node as shown below:



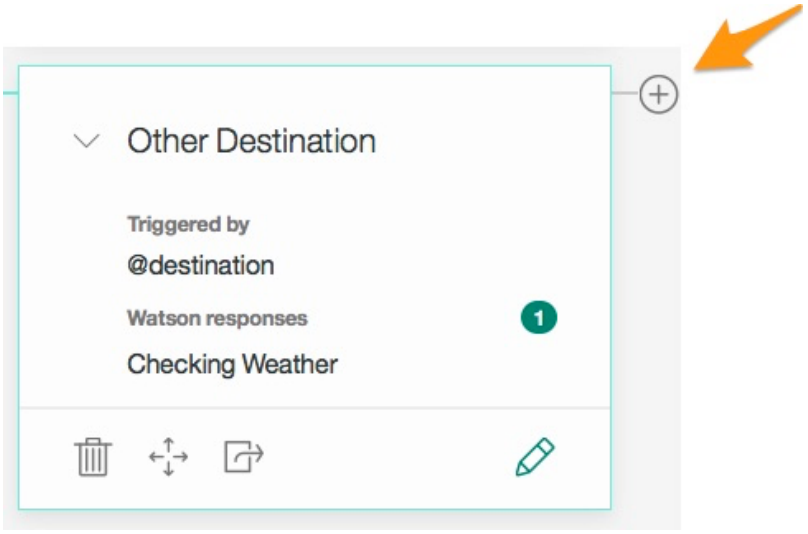
n. Drag on a **debug** node and connect it to the second switch output as shown below:



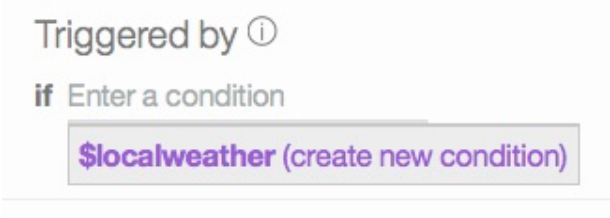
TIP: This allows you to recognize when actions come in that have not been accounted for in the flow

o. Click **Deploy**

7. Modify the Bot to Handle the Weather Data:
   a. Switch back to the Watson Conversation tab
   b. Click **Continue conversation** on the Other Destination node:

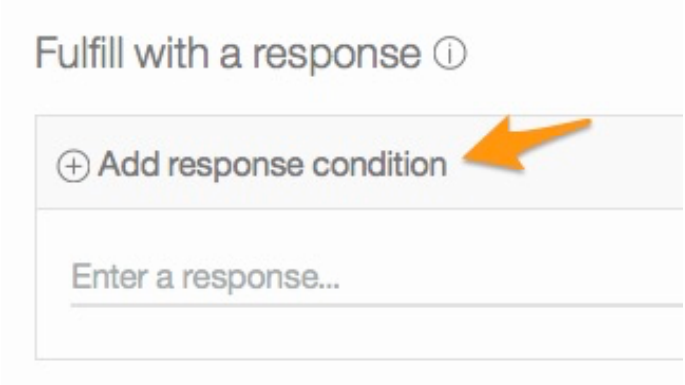


c. In the **Triggered by** field, type `$localweather` and select **$localweather (create new condition)**

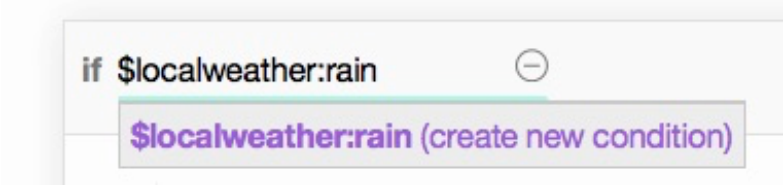


TIP: You cannot use auto-complete here since the localweather attribute is a context variable that is dynamically being added to the context by the Node-RED flow. The $ symbol refers to a context variable.

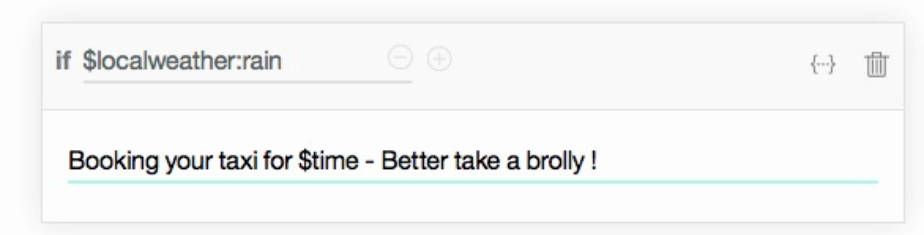
d. In the **Fulfill with a response** field, click **Add response condition**:



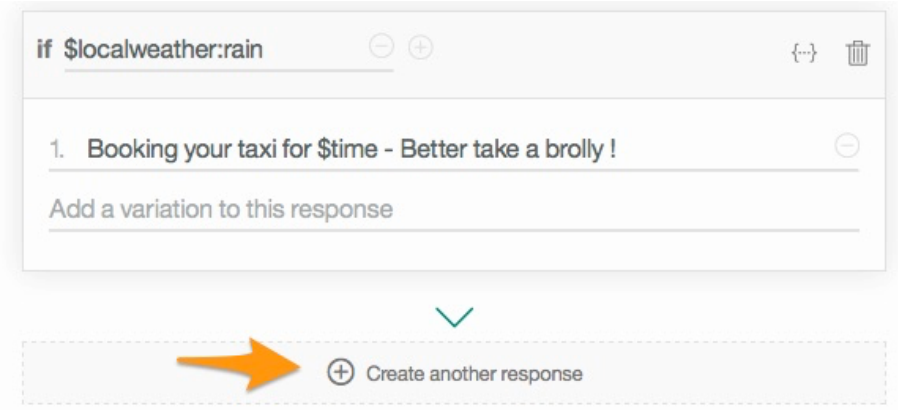
e. In the **Enter a condition** field, type `$localweather:rain` and select **$localweather:rain (create new condition)**



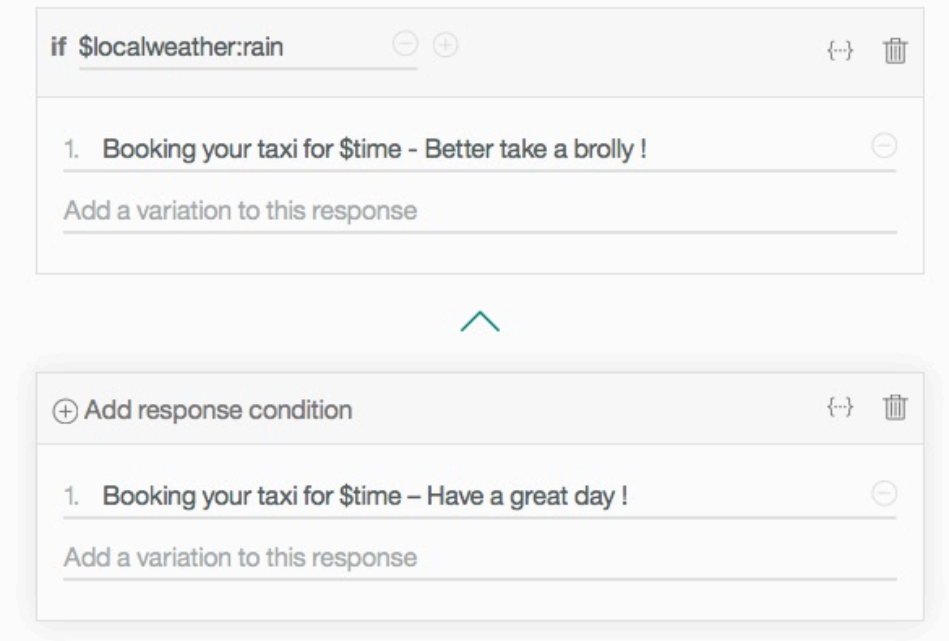
f. In the **Enter a response field**, type `Booking your taxi for $time - Better take a brolly !`



8. Add another response:
   a. Click **Create another response**:



b. In the **Enter a response field**, type `Booking your taxi for $time – Have a great day !`



c. Click **X** to close the editor

9. Test the application:
   a. Switch back to the Node-RED Flow Editor

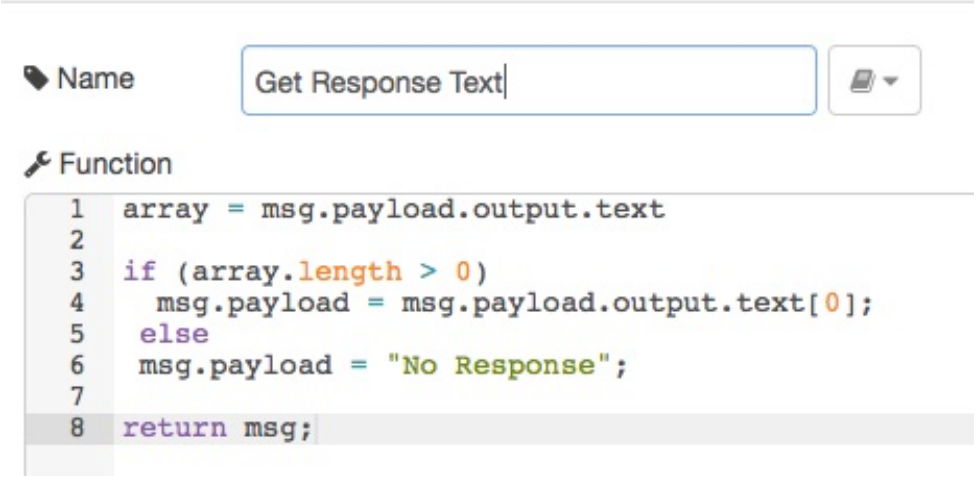
TIP: To make life simpler you will now modify the flow to extract only the bot responses

   b. From the palette, drag on a function node
   c. Double click the new node to edit it
   d. In the **Name** field, type `Get Response Text`
   e. In the **Function** field, enter the following code:

```
array = msg.payload.output.text

if (array.length > 0)
  msg.payload = msg.payload.output.text[0];
 else
 msg.payload = "No Response";

return msg;
```



f. Click **Done**
g. Drag on a new Debug node and connect the nodes together as shown below:

h. Click **Deploy**
i. Activate the Inject Nodes to have a conversation with the bot

Task 8. Add a User Interface

In this unguided task, you will build a chat interface to let the user interact with the bot using speech or a text interface.

Tips:

- To input speech, use the node-red extension `node-red-contrib-browser-utils` which has a microphone node and use Watson speech to text to convert it
- Add node-red-dashboard for a user interface and audio out nodes

If you want to get clever – add Watson language translation and add the option into the bot to change languages ☺