

## Lab 10: Explore Context Variables

By now you know the essentials of chatbot building. There are however more advanced concepts that will enable you to create better and smarter chatbots.

I could list them all here at once, but I think it makes more sense to organically introduce them as their need arises in the process of improving our chatbot.

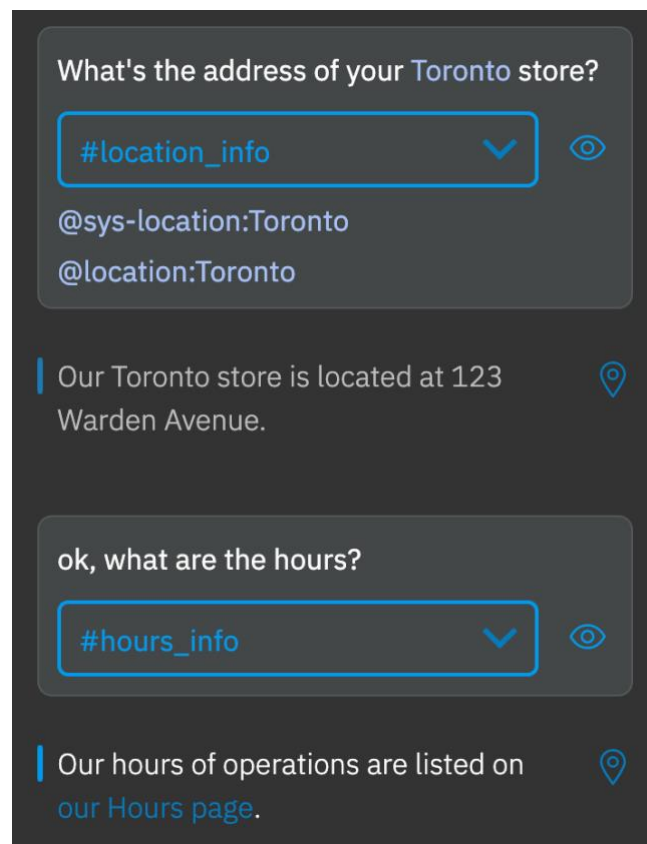
Keep in mind that some of these concepts are tougher to get, particularly if you have no prior programming experience. So, don't be discouraged if you don't fully get everything right away.

You can try things out, test to see if they work, and if they don't, try something else. That's why the *Try it out* panel is so useful. It allows you to build chatbots one feature at the time. Stick with it, and if you practice, you'll quickly become familiar with the advanced concepts as well.

### Exercise 1: Remember the city with context variables

Whenever a user enters a new input, the intent and entities that are detected don't stick around for the rest of the conversation. They exist in the moment, for the current input, and are forgotten once the user types more questions.

This is generally fine, but it limits the chatbot ability to appear smarter and remembering the context of the conversation so far. For example, consider the following interaction.



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A human customer care agent responding to the second question would have inferred that the user is asking about the hours of operation for the city they just inquired about in the previous question (i.e., Toronto). However, the entity detected in the first input only lives for the duration of that input, so our chatbot has no memory of it when the user enters a second question.

How can we store this information so that it's available for the duration of the conversation? Enter the concept of context variables, which allows us to do just that. As we go about collecting information from the user, we can store them in the *Context* and then reuse it when it makes sense.

One way to achieve this is to create a passthrough node that checks for the *@location* entity and sets it to the *\$city* context variable if one is detected. It then jumps to the next node in the dialog and hands off the execution to the rest of the nodes as if this node didn't exist.

Keep in mind that this is not necessarily the best approach, but it allows us to demonstrate a couple of things:

1. The passthrough node technique which can come in handy in complex chatbots;
2. How context variables work.

So, let's see how this would work in practice.

### Creating a passthrough node

1. In the *Dialog* section of your skill, select the *Welcome* node more option menu, and **click Add node below** to create a sibling node underneath (as a reminder, all nodes must be contained between the *Welcome* and the *Anything else* node).
2. Call the node Assign *City* or something similar. **Set the condition to *@location*. Delete the response by clicking on the trash can icon in the response area**, as we don't want this node to issue the response, only to set the variable in the context.
3. Next click on the more option menu to the right of *Assistant responds* and **select Open context editor**.
4. You'll be offered the ability to set one or more context variables whenever this node is executed. **Enter *\$city* for the variable name, and *@location* for the value**, as shown in the figure below.

**IMPORTANT: If you get an error when entering *\$city*, simply enter city without the \$ sign.**

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If assistant recognizes

@location  

Then set context



| VARIABLE | VALUE       |   |
|----------|-------------|---|
| \$ city  | "@location" |  |

Add variable 

In the *Then assistant should* section we don't want to wait for the user input (they already gave us input to process) we just want to jump to the rest of the nodes as if nothing happened. To do so **select *Jump to from the drop-down list***. You'll be asked to specify which node to jump to. **Select the first node just below the current one** (i.e., *Hours of Operation*).

You'll then be asked to specify what to do after the jump. Wait for the user input? No. Respond directly? No. **Select *is If assistant recognizes (condition)*** so that this node can be evaluated as it normally would.

To recap, our node detects if there is a *@location* specified in the input. If there is, we execute the node which does nothing but set the context variable *\$city* to the entity value (e.g., Vancouver). Then we jump to evaluating the condition of the first node beneath us so that the flow is the same as if this context variable assigning node wasn't there. If that node's condition is successful it will be executed. If not, the nodes beneath will be evaluated in their order of appearance. If none of the nodes satisfy the current input, we hit the fallback *Anything else* node as usual.

Your *Assign City* node should look as shown in the image below.

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The screenshot shows the Dialogflow console interface. On the left, a flow diagram highlights the 'Assign City' node. The right-hand panel is titled 'Assign City' and shows the configuration for this node. It includes a condition 'If assistant recognizes' with '@location' as the entity. Below this, the 'Then set context' section contains a table with one row: the variable '\$city' is set to the value '@location'. There are also buttons for 'Add variable' and 'Add response type'.

| VARIABLE | VALUE       |
|----------|-------------|
| \$city   | "@location" |

5. Head over to the *Try it out panel* and ask **What are your hours of operation?**

Click on *Manage Context* at the top of the panel to see the content of the *Context* (i.e., its variables). The *\$timezone* variable will already be set for you automatically, but because we didn't specify a location, the *Assign City* node was not executed, and therefore no *\$city* context variable was set.

6. Close the context and now **try entering What are your hours of operation in Montreal?** in input. Next, click on *Manage Context* again. You'll notice that this time the *\$city* context variable has been set to the entity value (i.e., the string *"Montreal"*).

The screenshot shows the 'Context variables' panel. It has a title bar with an information icon and a close button. Below the title is a search bar labeled '\$Enter variable name'. The panel lists two variables: '\$timezone' with the value '"America/Vancouver"' and '\$city' with the value '"Montreal"'. Each variable entry has a minus icon to its right.

| Variable Name | Value               |
|---------------|---------------------|
| \$timezone    | "America/Vancouver" |
| \$city        | "Montreal"          |

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We'll have access to this variable for the entire duration of the conversation with the user (or until we set its value to something else). It's worth noting that pressing *Clear* in the *Try it out* panel starts a new conversation, and so context variables are cleared as well. Go ahead and close the context manager again.

7. We want to make sure that *\$city* variable is set whether it was specified along with a request for hours information (as we already did) or for location addresses. So as a sanity check, **try where is your Calgary store?**. You should see that the city in the context now changes to the string "*Calgary*".

8. Alright, we now store city in our trusty *\$city* context variable. To make use of it, we'll need to change our *Our Locations* child nodes under the *Hours of Operation* and *Location Information* parent nodes. There is an easy way to do this. **Simply replace *@location* with *\$city* for every occurrence** in the two *Our Locations* child nodes as I did in the image below.

Our Locations

Customize ⚙️ ×

\$city ×

+

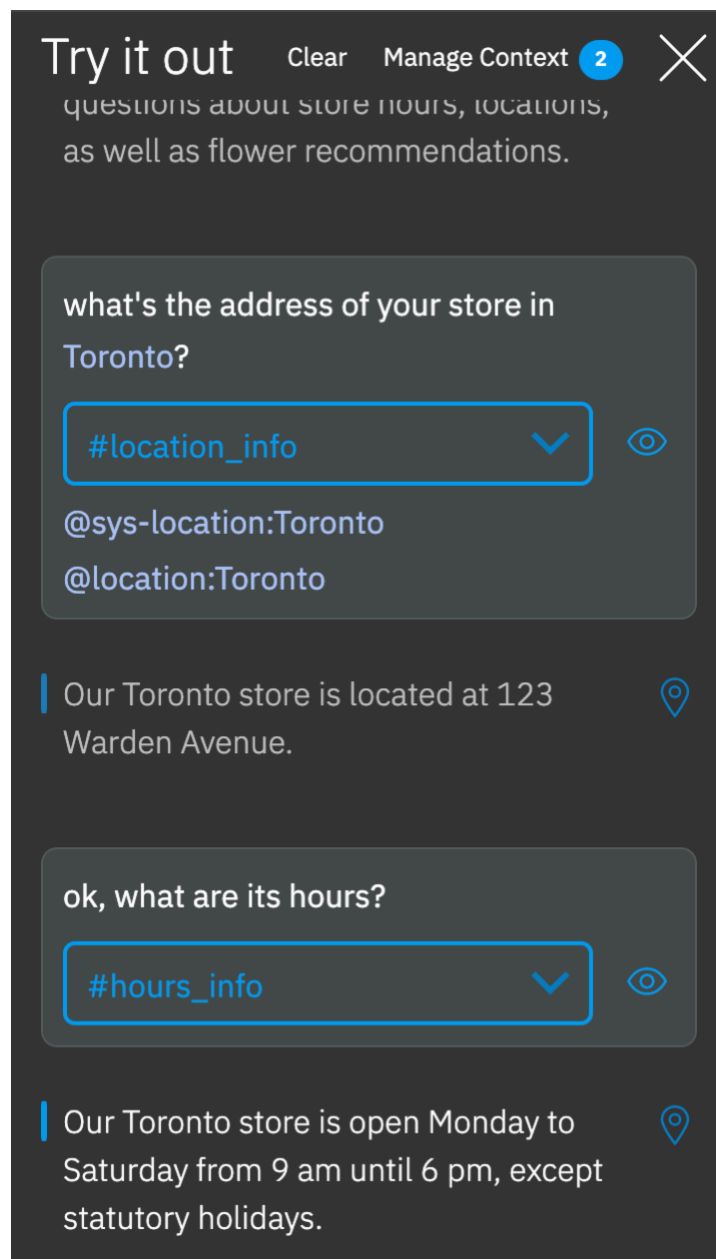
Assistant responds

|   | IF ASSISTANT RECOGNIZES | RESPOND WITH                        |    |    |
|---|-------------------------|-------------------------------------|----|----|
| 1 | \$city:Toronto          | Our Toronto store is open Monday to | ⚙️ | 🗑️ |
| 2 | \$city:Montreal         | Our Montreal store is open Monday t | ⚙️ | 🗑️ |
| 3 | \$city:Calgary          | Our Calgary store is open Monday to | ⚙️ | 🗑️ |
| 4 | \$city:Vancouver        | Our Vancouver store is open everyda | ⚙️ | 🗑️ |

**Make sure you repeat this process for both *Our Locations* child nodes.**

Please note that `$city:Vancouver` is just a shorthand for `$city == "Vancouver"`. If one of our cities contained a space, we'd be forced to use the `==` comparison (e.g., `$city == "Quebec City"`).

9. Next, test the original interaction again. As a reminder, you can save time by recalling previous input through the *Up* key on your keyboard, instead of retyping the same questions in. **Enter, what's the address of your store in Toronto?** followed by **ok, what are its hours?** You should now see a smarter response as shown in the image below!



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The chatbot definitely comes across as smarter and it's more useful to the end user.

10. But wait... now that we have the `$city` variable, can we use it to help our business even further? It would be a nice touch to tell the user we hope they'll visit our store when they wave us goodbye.

Simply **change the *Goodbyes* node responses to include the `$city` variable**. If it's set to a specific city, it will be shown. If it's not set, it will not be displayed. So, go ahead and change the first response for that node to:

Nice talking to you today. We hope you visit our `$city` store.

If the `$city` is set to, say, *Calgary*, the response to the user will be *Nice talking to you today. We hope you visit our Calgary store*. If no city is set, simply *Nice talking to you today. We hope you visit our store*. A small, but still nice touch that invites our customers to shop with us.

Go ahead and **test that it works in the *Try it out* panel**. Next, click on the *Clear* link at the top to clear your variables and try typing bye now that no context variable is set. You should see that the response still makes sense.

As a general rule, always clear the context whenever you are running a new test.

Context variables are quite useful, as I hope this small example allowed to illustrate.

### Exercise 2: Collect the user name with `<? input.text ?>`

Sometimes you'll see chatbots asking for the user name, so as to make the interaction more personable. We know that we'd want to store it in a context variable once we acquire it, so that we can refer to it throughout the conversation to sound more friendly. However, how would we go about collecting the name?

1. Since we are dealing with names, **let's start by enabling the `@sys-person` entity** from the *System entities* section. Watson will start training (as expected).
2. Back in the *Dialog*, select the *Welcome* node. We need to change the prompt so that it asks for a name. **Enter, Hello. My name is Florence and I'm a chatbot. What name can I call you by?**
3. **We need a child node to actually collect the name** (the answer to our question, in other words). So, **go ahead and create a child node under *Welcome***. Call it *Collect Name*. For the condition, we want to detect that a `@sys-person` name was provided.
4. Click on the more options menu in the response section and **select *Open context editor*. Set the context variable `$name` to the value `@sys-person`**.

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5. Next, we want to reply to the user from this node, so **add the following response, Nice to meet you, \$name. How can I help you? You can ask me about our store hours, locations, or flower recommendations.**

The screenshot displays the IBM Watson Assistant interface. On the left, a tree view shows the workflow with nodes: Welcome, Collect Name, Assign City, Hours of Operation, Location Information, and Chitchat. The 'Collect Name' node is selected. The main panel on the right shows the configuration for this node. At the top, there's a 'Collect Name' header. Below it, a table lists context variables. The table has two columns: 'VARIABLE' and 'VALUE'. The first row shows '\$ name' under 'VARIABLE' and '@sys-person' under 'VALUE'. Below the table, there's a section titled 'Assistant responds' with a dropdown menu set to 'Text'. The response text is: 'Nice to meet you, \$name. How can I help you? You can ask me about our store hours, locations, or flower recommendations.'

| VARIABLE | VALUE       |
|----------|-------------|
| \$ name  | @sys-person |

Assistant responds

Text

Nice to meet you, \$name. How can I help you? You can ask me about our store hours, locations, or flower recommendations.

Use the *Try it out* panel to **test out the interaction**, as shown below. (Click *Clear* to start a brand-new conversation and see the new prompt.)

The screenshot shows the 'Try it out' panel. It displays a conversation with the chatbot. The first message from the chatbot is: 'Hello. My name is Florence and I'm a chatbot. What name can I call you by?'. Below this, there's a text input field with the name 'Antonio' entered. A dropdown menu is open, showing 'Irrelevant' as the selected option. Below the input field, the system prompt is visible: '@sys-person:Antonio'. The second message from the chatbot is: 'Nice to meet you, Antonio. How can I help you? You can ask me about our store hours, locations, or flower recommendations.'

Hello. My name is Florence and I'm a chatbot. What name can I call you by?

Antonio

Irrelevant

@sys-person:Antonio

Nice to meet you, Antonio. How can I help you? You can ask me about our store hours, locations, or flower recommendations.



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Nice! We are all set, right?

### We have a problem

Well, not so fast. You might have spotted the problem if you tested it with your own name (depending on how common it is). We live in a beautiful and diverse world, and people have a variety of names. If you try it with the name, Reyansh it won't detect it. Heck, if you try antonio with a lowercase a, it won't detect the name either. I fully believe this latter limitation will be lifted in the future, but the former is much harder to address.

So, we have something that sort of works, provided the name is common enough and properly capitalized. If that's not the case, the experience we provide is... poor at best, ending up with *I didn't understand* type of responses to the user's own name (the sweetest sound to their ears).

We have three possible approaches. All valid.

- Forget about collecting the name. We simply revert to the previous prompt, get rid of the child node, and that might be good enough for our chatbot.
- Collect the name in the node we created, if one is detected, as we currently have. Add a second child node that simply doesn't set the context variable and replies with a generic *Hello*, without a name.
- Collect the name in the node we created, if the name is detected. Add a second node that collects what the user enters verbatim. In other words, we are collecting whatever answer the user provides and storing it exactly as stated.

We'll take this third route as it's the most refined of the three and it's the one that allows me to teach you the most concepts. The only downside to this is that the user might say, *I don't want to tell you* and we'll end up saying, *Nice to meet you I don't want to tell you*. Which is amusing, but an argument could be made that the user asked for it. 😊

Technically, we could implement even more sophisticated logic to detect such responses (with an intent) and not store the name if we get a flippant reply from the user, but it might be overkill or a refinement for a much later version of our chatbot.

### Fixing the problem

As I mentioned, we'll take the third approach to fix this problem. If for no other reason than collecting the user's input exactly as provided is a useful notion you might need in future chatbots. The current *Collect Name* node works well for names detected by the system entity. However, we should **rename the node to something like Collect Sys-Person Name** to make it more descriptive.

Next, **add a peer/sibling node below it to handle the common case** where the user reply is not detected as a valid name. We'll want this second node to be executed every time the first child

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node (i.e., *Collect Sys-Person Name*) fails its condition, so **set the condition for this node to true** (it's essentially our fallback node in the *Welcome* tree). You can **call this second child node Collect Other Names** or something equally descriptive.

Watson stores the current user input in `input.text`. So open the context editor for this new node and **set the \$name context variable to `<? input.text ?>`**. The reason why we need the special syntax is that we don't want to literally say *Nice to meet you input.text*. but rather we are asking Watson to give us the actual value of the variable.

Doing so will collect the user input and assign it to the name. For the response, you can **use the same response as the node above**:

Nice to meet you, \$name. How can I help you? You can ask me about our store hours, locations, or flower recommendations.

If you want to always capitalize the name, so that antonio is stored as Antonio, you can use a bit of code and **replace `<? input.text ?>` with**:

**`<? input.text.substring(0, 1).toUpperCase() + input.text.substring(1) ?>`**

This will capitalize the first letter of the user reply for you.

If you are not a programmer, don't worry too much about the details. Simply know that it capitalizes the input text and you can copy and paste it whenever you have such a need in your chatbots. The image below shows what the node should look like.

The screenshot displays the IBM Watson Assistant interface. On the left, a flowchart shows the 'Collect Other Names' node (true) as a child of the 'Collect Sys-Person Name' node. The main panel shows the configuration for the 'Collect Other Names' node. The condition is set to 'true'. The 'Then set context' section shows a table with one variable, '\$name', and its value, '<? input.text.substring(0, 1).toUpperCase() + input.text.substring(1) ?>'. The 'Assistant responds' section shows a text response: 'Nice to meet you, \$name. How can I help you? You can ask me about our store hours, locations, or flower recommendations.'

| VARIABLE | VALUE  |
|----------|--|
| \$name   | "<? input.text.substring(0, 1).toUpperCase() + input.text.substring(1) ?>" |

Assistant responds

Text

Nice to meet you, \$name. How can I help you? You can ask me about our store hours, locations, or flower recommendations.

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Finally, test out a complete conversation with the chatbot (entering these one at the time):

(enter your name after the prompt)

What are you hours of operation of your Toronto store?

Where is it?

Thank you

Goodbye

Pretty neat, right?

[Help! It didn't work.](#)

|   |
|---|
| You can skip this section if the conversation above worked well for your chatbot. |
|---|

If the conversation above didn't work well for your chatbot, it's likely because some mistake (or happy little accidents as Bob Ross would have called them) was made in the process of following the instructions.

If that's the case, no worries, you can import [this JSON file](#) with the current chatbot we built so far. As usual, you might have to save the file if it opens up in your browser instead of automatically downloading it (feel free to call it `skill-Flower-Shop-Skill.json` or something like that).

You can then click on the *Assistants* section of your Watson Assistant instance. There you'll find your assistants. Click on *Flower Shop Chatbot*. Now that you're inside of your chatbot, you should see its dialog skill. Click on the more options menu and then select *Swap Skill*.

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< Assistants

### Flower Shop Chatbot

A chatbot to assist our flower shop customers.

#### Skill

A dialog skill provides specific responses you've created. Choose one for your assistant. [Learn more](#)

##### Dialog

###### Flower Shop Skill

| LANGUAGE:    | TRAINED DATA:                            | VERSION:    | CREATED:                 |
|--------------|--|-------------|--------------------------|
| English (US) | 5 Intents   5 Entities   25 Dialog Nodes | Development | Nov 21, 2019 1:21 PM PST |

UPDATED:  
Dec 10, 2019 4:00 PM PST

LINKED ASSISTANTS (1): Flower Shop Chatbot

#### Integrations

Choose a channel to deploy your Assistant.

Add integration

Preview Link

1. [Menu Icon]

2. [Swap skill]

This enables you to replace the current skill with a different one. As you click that, a new page will appear allowing you to create a new skill, use a sample one, or importing a skill. Select the *Import Skill* tab, upload the JSON file you just downloaded (by clicking on *Choose JSON File*) and then click *Import*.

## Swap Dialog Skill

Create a new skill, swap for a sample, or import one

Create skill   Use sample skill   **Import skill**

Select the JSON file for the dialog skill with the data you want to import.

Choose JSON File

skill-Flower-Shop-Skill.json

Import

Once the import is done, you'll have the skill we developed so far linked to your assistant. A successful notification will appear. Try the conversation again and this time it should work for you.