IT8303
AI & HUMAN INTERFACE

Lab 7: Build Chatbots in Dialogflow with Intent and Entity

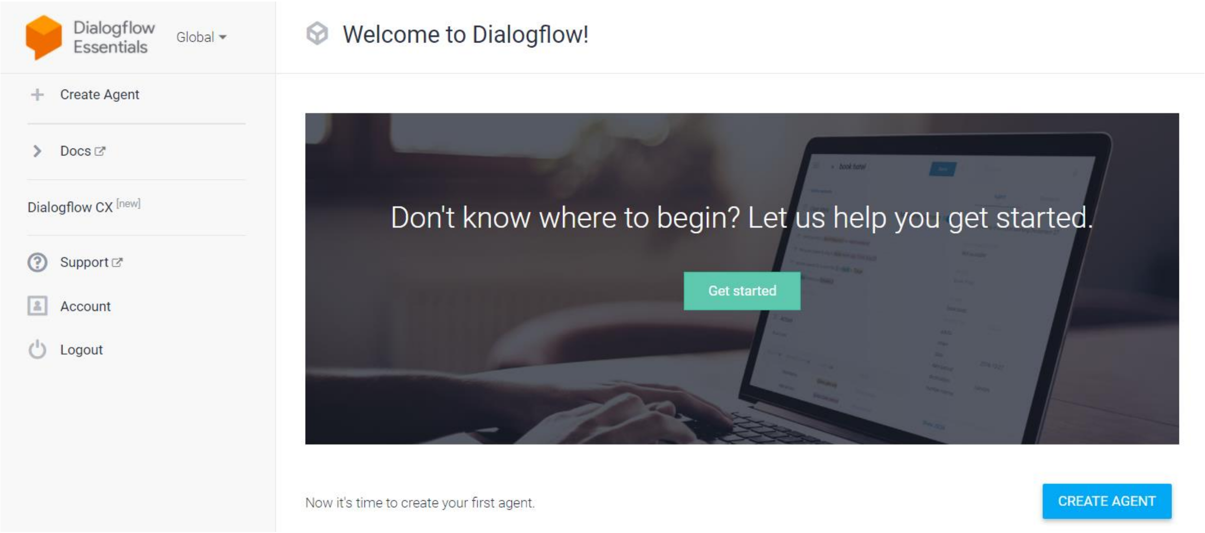
In this exercise, you'll build a simple chatbot with Dialogflow and integrate it with the web through one-click integration.

The exercises are ordered as follows:

1. Create a Dialogflow agent.
2. Create intents.
3. Create entities.
4. Integrate the chatbot to Google Assistant

Exercise 1-1: Create a Dialogflow Agent

1. Go to the Dialogflow console at https://console.dialogflow.com/api-client/ and log in with your Google account.
2. Sign in. If you're a first-time user, then use your email to sign up.
3. Accept the terms and conditions, and you'll be in the Dialogflow console.



Welcome to Dialogflow!

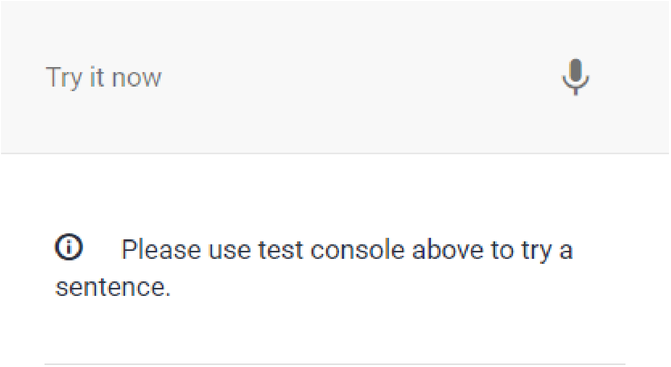
Don't know where to begin? Let us help you get started.

Now it's time to create your first agent.

4. Click “Create Agent”, Enter "AppointmentScheduler" as the **Agent name**.
5. Click **Create**.

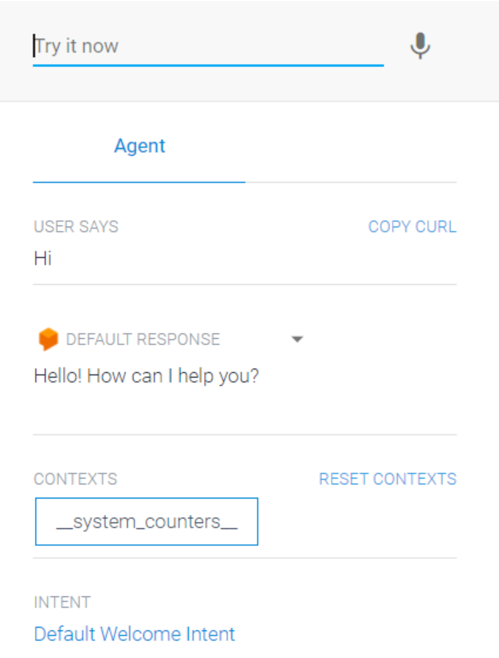
Test the agent

In the Dialogflow console, find the testing panel that looks like this:



Please use test console above to try a sentence.

To test the agent, type "Hi" where it says **Try it now**. The agent should respond with the default greeting defined in the default welcome intent. It should say, "Hello! How can I help you?" You can modify the response.



Try it now

Agent

USER SAYS

COPY CURL

Hi

DEFAULT RESPONSE

Hello! How can I help you?

CONTEXTS

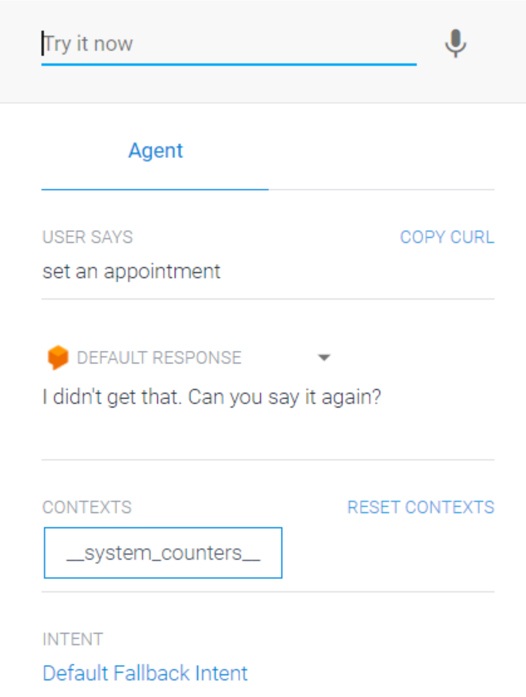
RESET CONTEXTS

__system_counters__

INTENT

Default Welcome Intent

Now, if you enter "set an appointment," the agent doesn't know what to do, so it initiates the default **fallback intent**. That's because you haven't created any intent to catch that particular question!



Try it now

Agent

USER SAYS

COPY CURL

set an appointment

DEFAULT RESPONSE

I didn't get that. Can you say it again?

CONTEXTS

RESET CONTEXTS

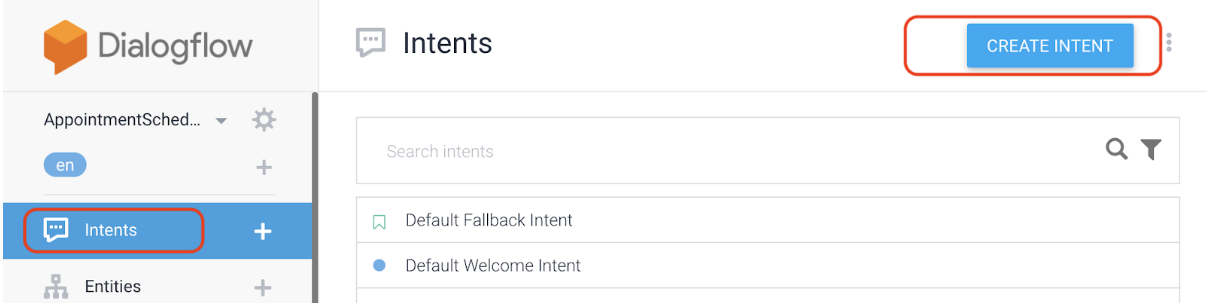
__system_counters__

INTENT

Default Fallback Intent

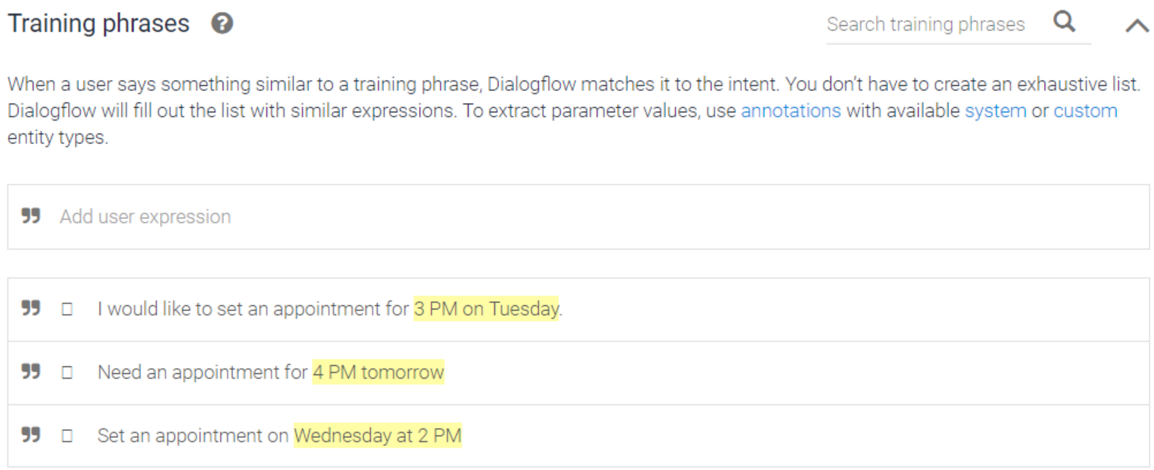
Exercise 1-2: Create Intent

1. To create the intent, click on **Intents** > **Create Intent**. Enter "Schedule Appointment" as the **Intent name**.



2. Click **Training phrases -> Add Training Phrases** and enter the following phrases.
   - Set an appointment on Wednesday at 2 PM
   - Need an appointment for 4 PM tomorrow
   - I would like to set an appointment for 3 PM on Tuesday.

As you enter the phrases, you'll see time and date are automatically highlighted as system entities **@sys.date-time**.

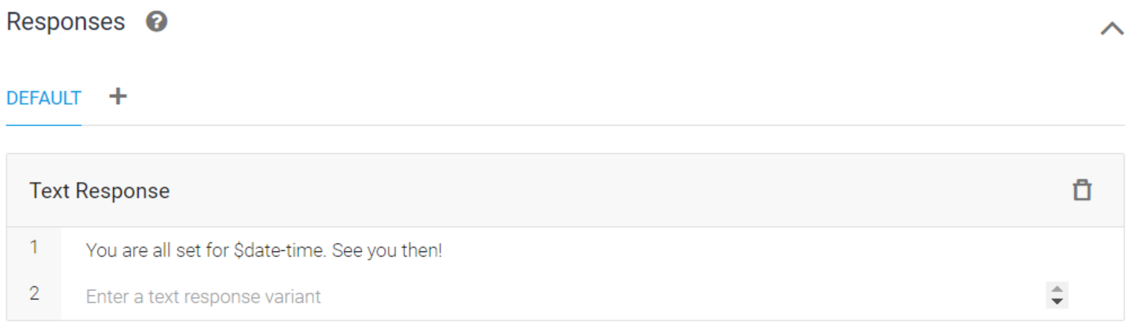


Training phrases

When a user says something similar to a training phrase, Dialogflow matches it to the intent. You don't have to create an exhaustive list. Dialogflow will fill out the list with similar expressions. To extract parameter values, use annotations with available system or custom entity types.

- I would like to set an appointment for 3 PM on Tuesday.
- Need an appointment for 4 PM tomorrow
- Set an appointment on Wednesday at 2 PM

3. Scroll to **Responses**, enter "You are all set. See you then!" as a response or you could make it more interesting and enter "You are all set for $date-time. See you then!" (Dollar($) sign here helps you access the entity values.) Click **Add Responses**.



1 You are all set for $date-time. See you then!

2 Enter a text response variant

4. Click **Save** and test the agent with "set an appointment for 4 PM on Thursday." As expected, you get the response with the correct date and time.

Slot filling

Now, test "set an appointment." That's not very specific and you haven't handled that scenario, so it should be handled by the default fallback intent. To support that, you can use something called slot filling.

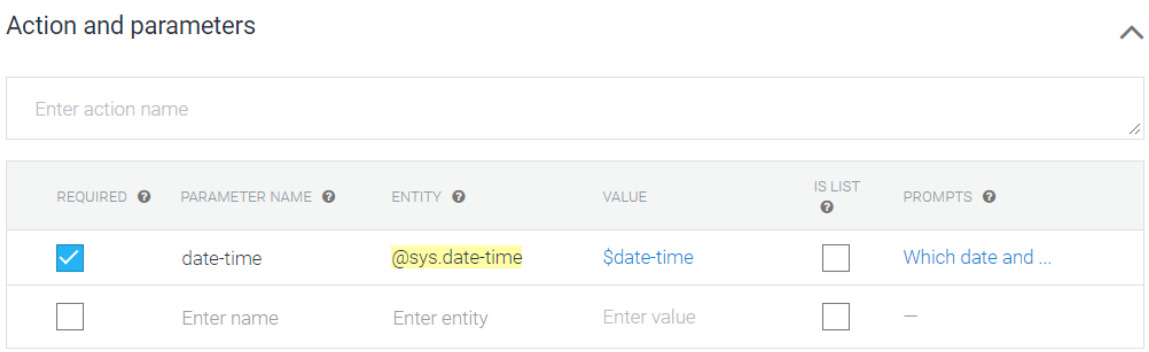
Slot filling allows you to design a conversation flow for parameter-value collection in a single intent. It's useful when an action can't be completed without a specific set of parameter values.

Next, set up slot filling.

Click **Actions and parameters**. Make the entities as required, and click **Define prompts.**

For date-time, enter "What date and time would you like to come in?"

Click **Save**.



Action and parameters

Enter action name

REQUIRED	PARAMETER NAME	ENTITY	VALUE	IS LIST	PROMPTS
☑	date-time	@sys.date-time	$date-time	□	Which date and ...
□	Enter name	Enter entity	Enter value	□	–

Exercise 1-3: Test your chatbot

At this point, the Dialogflow should be set up. Enter the following conversation in the Dialogflow console where it says Try it now:

User: "Hi"

User: "Set an appointment"

Chatbot: "What date and time would you like to come in?"

User: "I would like to come at 3pm next Tuesday"

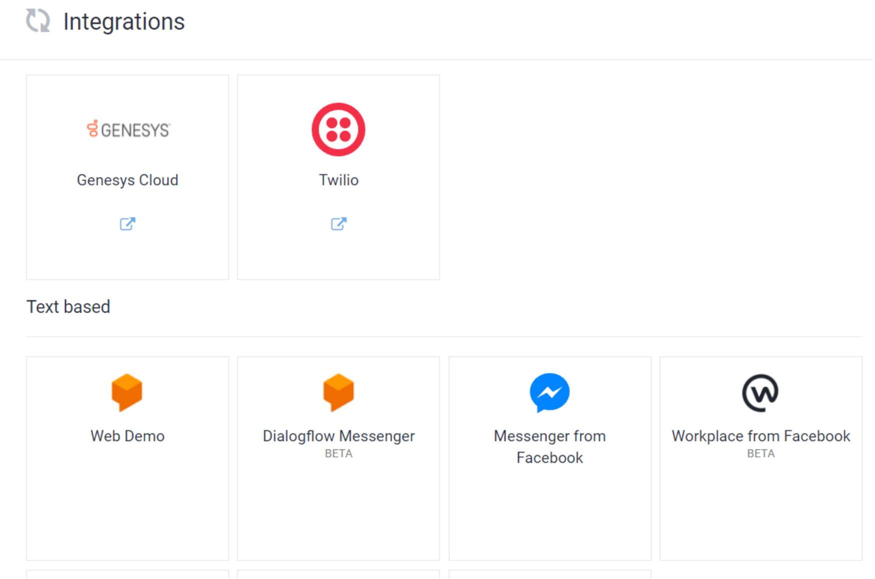
Chatbot: " You are all set for 2021-11-23 15:00:00. See you then! "

Exercise 1-4: Enable one-click web integration

Dialogflow provides many types of integration for your chatbot. Take a look at a sample web user interface for the chatbot.

Click **Integrations** in the Dialogflow console.

Click **Web Demo** and **Enable**.



Click the URL to launch **Web Demo**.

Start using the chat interface by typing where it says **Ask something**. Use the following conversation:

Enter "Hi" and the chatbot should respond as before.

Enter "set an appointment for 4 PM tomorrow" and the chatbot should respond by confirming the appointment.

Exercise 1-5: Challenge Exercise on Intents

In order to evaluate your knowledge on chatbot intents, you will be given the following tasks:

1. Create a new agent called “PizzaBot” in Dialogflow.

2. Create three intents as follows:
    a. address_info: customers ask about shop location
    b. hour_info: customers ask about opening hour
    c. offer_info: customers ask about special promotion

3. For each intents, add at least 5 training phrases, and one response.

Exercise 2-1 Enable and use system entities in Dialogflow

Entities are a mechanism in Dialogflow for identifying and extracting useful data from natural-language inputs. While intents allow your agent to understand the motivation behind a particular user input, entities are used to pick out specific pieces of information that your users mention—anything from street addresses to product names and amounts with units. Any important data that you want to get from a user's request will have a corresponding entity.

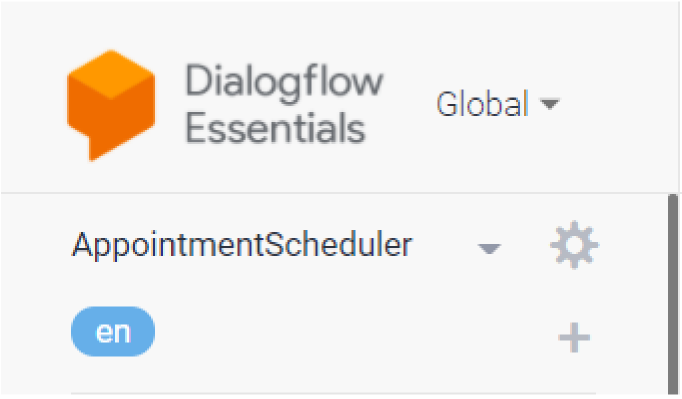
The following list explains the three types of entities:

System entities, which come with Dialogflow, allow agents to extract information about a wide range of concepts without any additional configuration. For example, system entities are available for extracting dates, times, and locations from natural-language inputs.

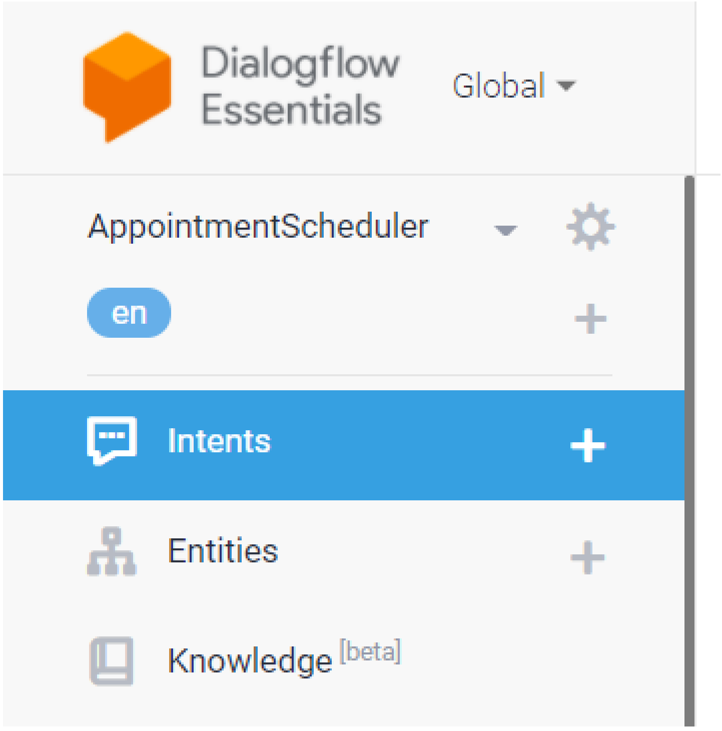
Developer entities, which you define, extract information about concepts beyond those covered by system entities. For example, a brand might create a developer entity to recognize its unique set of product names.

Session entities, which you also define, only apply to a specific conversation. For example, you might create a session entity to represent the time-sensitive options available to a particular user when making a booking.

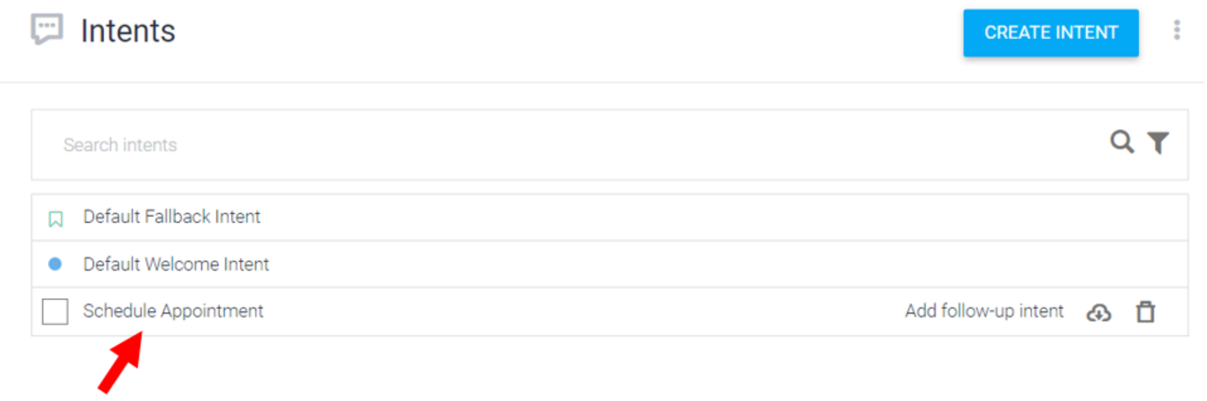
1. Navigate to the Dialogflow console at https://console.dialogflow.com/api-client/ and log in with your Google account.
2. Select the Appointment Scheduler agent that you previously created.



3. Click **Intents**.

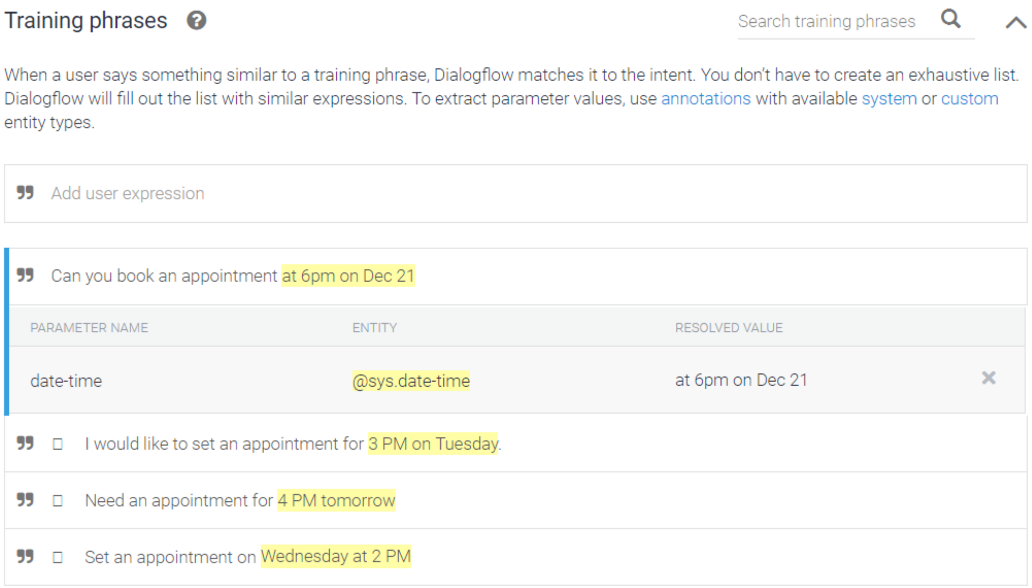


4. Click **Schedule Appointments** to open the intent settings.



- Default Fallback Intent
- Default Welcome Intent
- Schedule Appointment

You'll notice training phrases like "Set an appointment for 4 PM tomorrow," where Date and Time are automatically extracted as **@sys.date-time**. Feel free to add more training phrases to see how Dialogflow automatically extracts the system entities.



When a user says something similar to a training phrase, Dialogflow matches it to the intent. You don't have to create an exhaustive list. Dialogflow will fill out the list with similar expressions. To extract parameter values, use annotations with available system or custom entity types.

Can you book an appointment at 6pm on Dec 21

PARAMETER NAME	ENTITY	RESOLVED VALUE
date-time	@sys.date-time	at 6pm on Dec 21

I would like to set an appointment for 3 PM on Tuesday.

Need an appointment for 4 PM tomorrow

Set an appointment on Wednesday at 2 PM

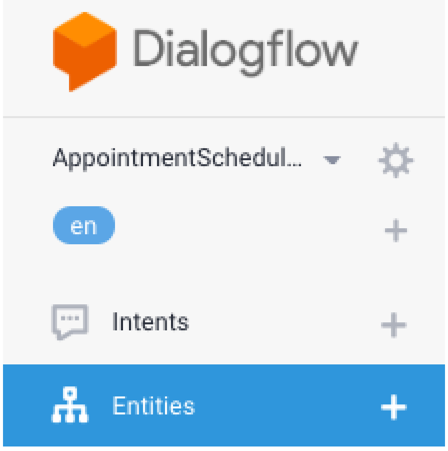
As you saw, **system entities** allow agents to extract information about a wide range of concepts without any additional configuration. Data like address, emails, currency, and phone numbers are some of the common examples of system entities. Find more, see System Entities at https://cloud.google.com/dialogflow/es/docs/reference/system-entities.

Exercise 2-2: Enable and use developer entities in Dialogflow

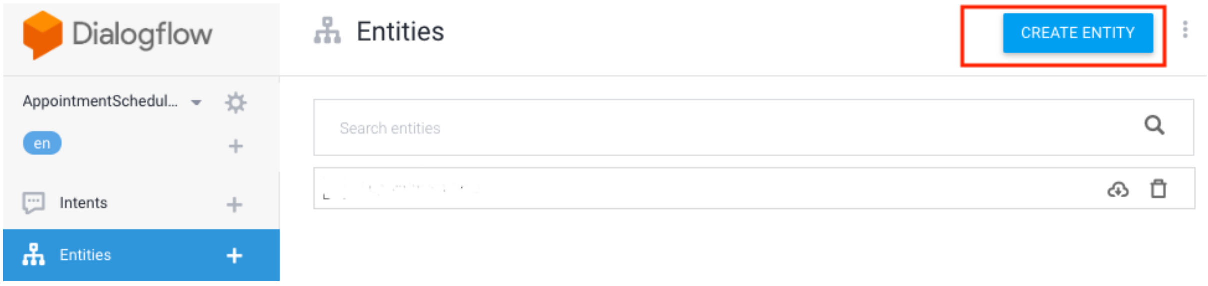
Create developer entities

So far, you addressed your appointment scheduler in a generic manner. Now, suppose that your scheduler is for a state's department of motor vehicles office, which mainly offers driver licenses and registration services. Create those entities.

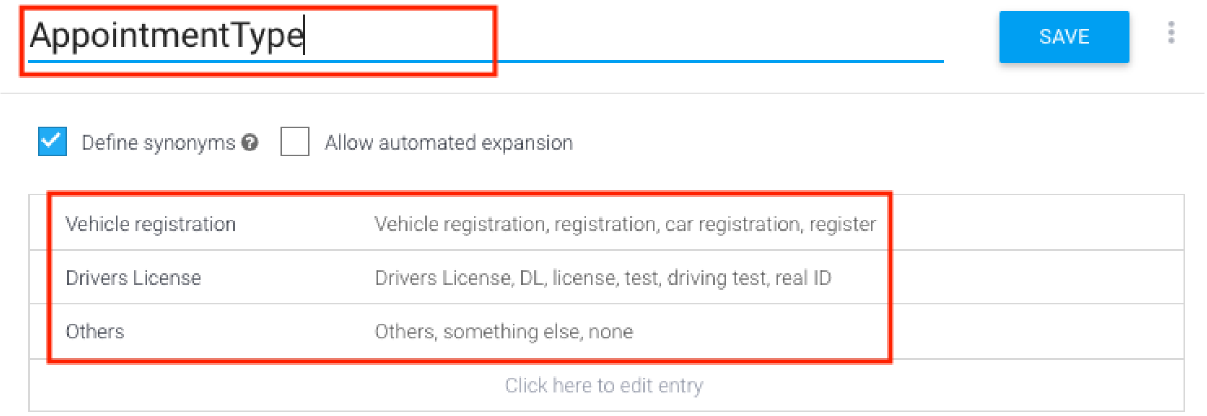
1. Click **Entities**.



2. Click **Create Entity**.



3. Enter "AppointmentType" as the **Entity name**, then add "Vehicle registration" and "Driver license" as the two reference values with a few synonyms as seen in the following image. Click Save.



AppointmentType

☑ Define synonyms ? □ Allow automated expansion

Vehicle registration	Vehicle registration, registration, car registration, register
Drivers License	Drivers License, DL, license, test, driving test, real ID
Others	Others, something else, none

Click here to edit entry

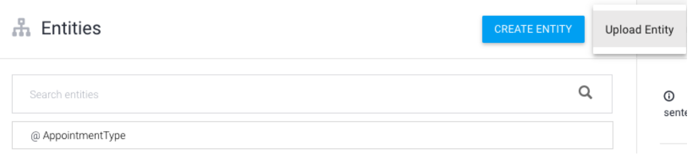
You can add more rows with more services as entity types.

Note: You can select the Allow automated expansion checkbox to automatically add more entities. Automated expansion of developer entities allows an agent to recognize values that haven't been explicitly listed in the entity. If a user's request includes an item that isn't listed in the entity, automatic expansion recognizes the undefined item as a parameter in the entity. The agent sees the user's request is similar to the examples provided, so it can derive what the item is in the request.

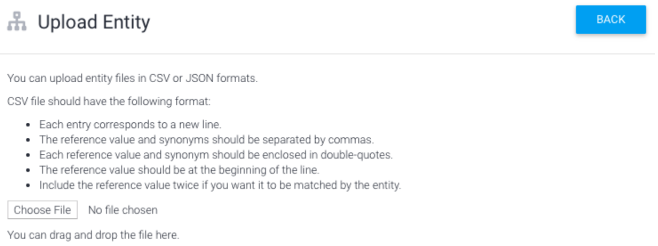
Note: You can upload or download entities in bulk with the following steps:

Click ... next to **Create Entity**.

Click **Upload Entity**.



Choose a CSV or JSON file.



You can upload entity files in CSV or JSON formats.

CSV file should have the following format:

- Each entry corresponds to a new line.
- The reference value and synonyms should be separated by commas.
- Each reference value and synonym should be enclosed in double-quotes.
- The reference value should be at the beginning of the line.
- Include the reference value twice if you want it to be matched by the entity.

Choose File No file chosen

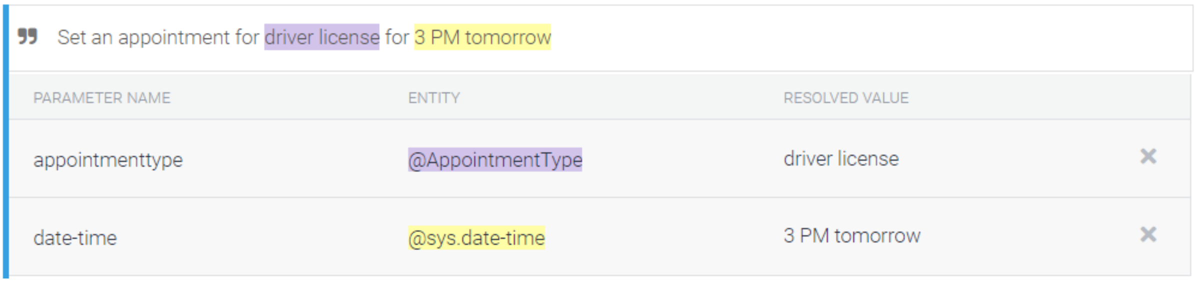
You can drag and drop the file here.

4. Click **Save**.

Edit intent to accommodate the newly created developer entity

1. Click **Intent.**
2. Enter "Set an appointment for driver license for 3 PM tomorrow" into the schedule appointment intent.

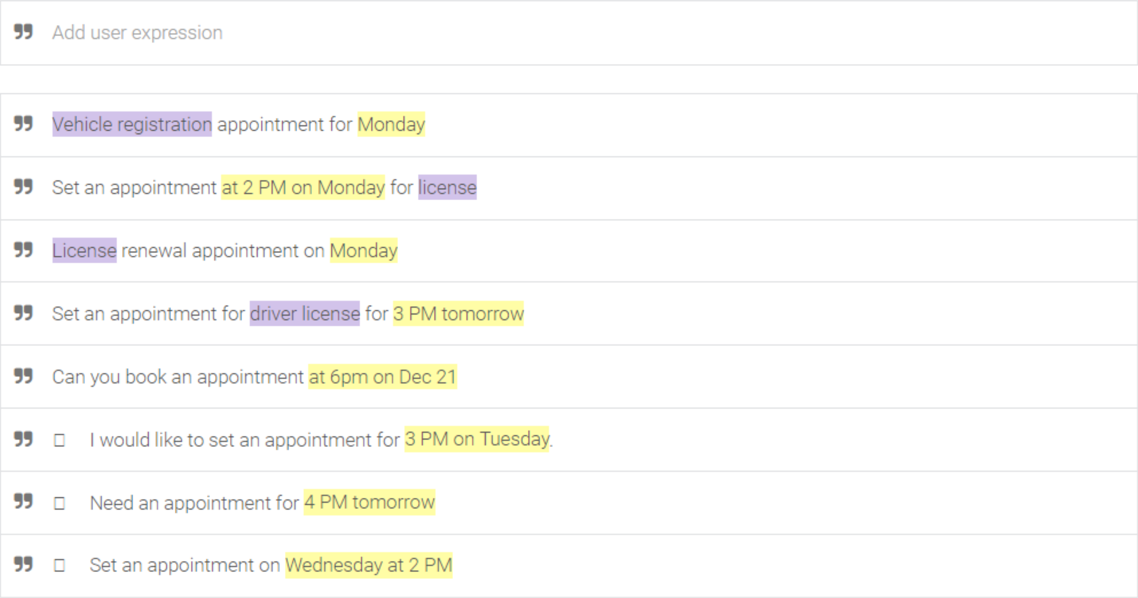
You'll see the automatic recognition of **drivers license, at 3 PM tomorrow** as developer and system entities.



❞ Set an appointment for driver license for 3 PM tomorrow

PARAMETER NAME	ENTITY	RESOLVED VALUE	
appointmenttype	@AppointmentType	driver license	×
date-time	@sys.date-time	3 PM tomorrow	×

3. Enter the following training phrases:
   - License renewal appointment on Monday
   - Set an appointment at 2 PM on Monday for license
   - Vehicle registration appointment for Monday



Add user expression

Vehicle registration appointment for Monday

Set an appointment at 2 PM on Monday for license

License renewal appointment on Monday

Set an appointment for driver license for 3 PM tomorrow

Can you book an appointment at 6pm on Dec 21

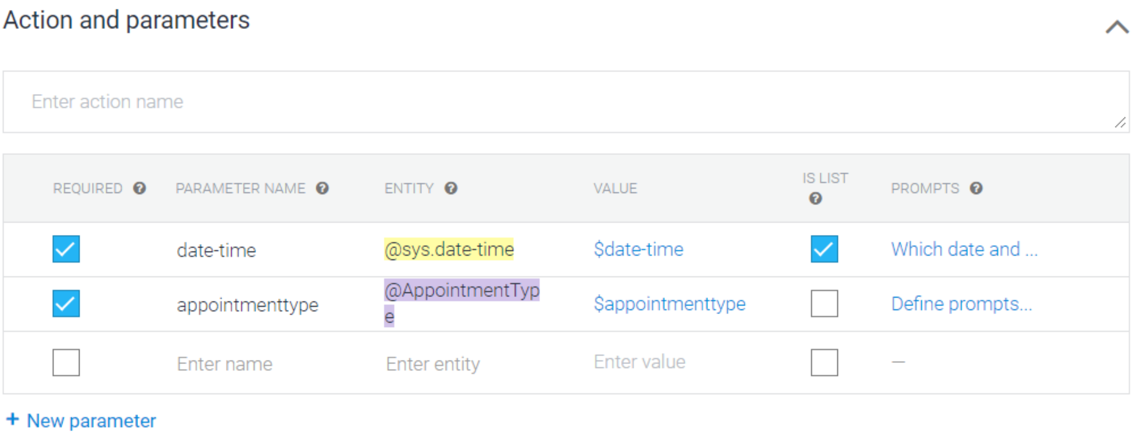
□ I would like to set an appointment for 3 PM on Tuesday.

□ Need an appointment for 4 PM tomorrow

□ Set an appointment on Wednesday at 2 PM

Note: You need all pieces of information—appointment type, date, and time. If the user only provided one or two pieces of information, then Dialogflow will ask for the leftover information before it acts on the response. That feature is called slot filling.

4. You need to make **AppointmentType** a required field, similar to time and date. To do so, go to **Actions and Parameters**, then select the checkbox in the **AppointmentType** row.



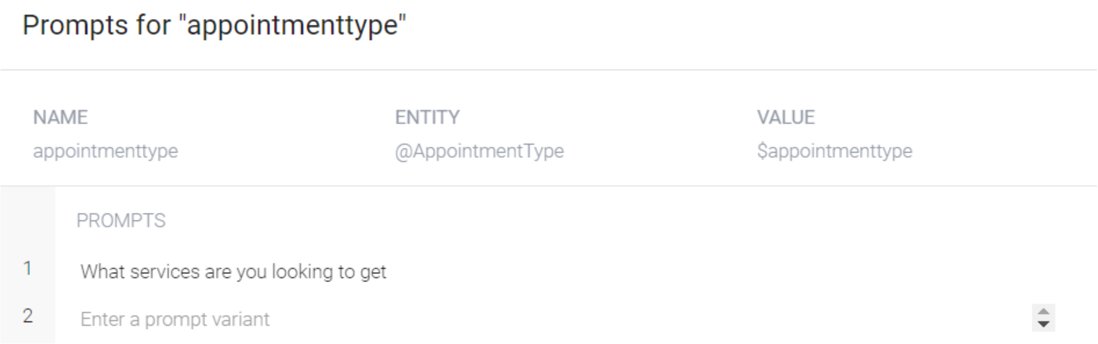
Action and parameters

Enter action name

REQUIRED	PARAMETER NAME	ENTITY	VALUE	IS LIST	PROMPTS
☑	date-time	@sys.date-time	$date-time	☑	Which date and ...
☑	appointmenttype	@AppointmentType	$appointmenttype	□	Define prompts...
□	Enter name	Enter entity	Enter value	□	–

+ New parameter

5. Add a prompt, such as "What services are you looking to get? DMV offers driver's license and vehicle registration services." If the user doesn't provide an appointment type, then the prompt will be used.



Prompts for "appointmenttype"

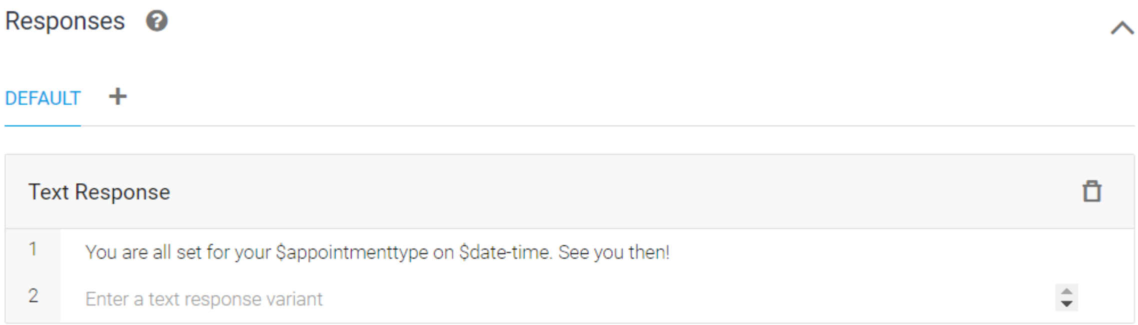
NAME	ENTITY	VALUE
appointmenttype	@AppointmentType	$appointmenttype

PROMPTS

1 What services are you looking to get

2 Enter a prompt variant

6. Go to **Responses**, modify your Text Response as: You are all set for your $appointmenttype on $date-time. See you then!



Text Response

1 You are all set for your $appointmenttype on $date-time. See you then!

2 Enter a text response variant

7. Click **Save**.

Exercise 2-3: Test your chatbot

You can test your chatbot in the Actions simulator, or use the web or Google Home integration that you previously learned.

Test case 1

In this case, the user only asks to set an appointment without the three pieces of information, so Dialogflow asks for the date, time, and appointment type using the slot-filling prompts that you set.

User: "Set an appointment."

Chatbot: "What date?"

User: "May 23."

Chatbot: "What time would you like to come in?"

User: "10 AM"

Chatbot: "What services are you looking to get? DMV offers driver's license and vehicle registration services."

User: "License."

Chatbot: "You are all set for your vehicle registration appointment on 2019-05-23 at 10:00:00. See you then!"

Test case 2

In this case, the user asks to set an appointment with partial information, so Dialogflow asks for the date, time, and appointment type using the slot-filling prompts that you set.

User: "Need an appointment for 4 PM tomorrow."

Chatbot: "What services are you looking to get? DMV offers driver's license and vehicle registration services."

User: "License."

Chatbot: "You are all set for your drivers license appointment on 2019-04-24 at 16:00:00. See you then!"

Test case 3

In this case, the user provides all the information. Dialogflow processes the information and provides a response with appointment confirmation.

User: "Set an appointment for vehicle registration at 2 PM tomorrow."

Chatbot: "You are all set for your vehicle registration appointment on 2019-04-24 at 14:00:00. See you then!"

Exercise 2-4: Challenge Exercise on Entities

In order to evaluate your knowledge on chatbot entities, you will be given the following tasks:

1. Continue to use the PizzaBot that we created previously.

2. Create an entity called “location”, and add three values to this entity: “Dover”, “Bedok”, “Chinatown”

3. Modify your intents to integrate with the entity “location”, and your chatbot should be able to handle the conversation as below:

   - User: Hello!
   - Agent: Good day! What can I do for you today?
   - User: Where is your shop?
   - Agent: Which shop are you referring to?
   - User: The Chinatown outlet
   - Agent: You can find our Chinatown shop in: www.pizzashop.com/info