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Dialogflow

Andrea Aguilar Ibáñez

Outline

- Google-owned developer of human-computer interaction technologies based on natural language conversations
- Works on NLP and backed by ML
- Text-based and voice interactions throw conversational interfaces (voice apps and chatbots), powered by AI
- Lets build conversational interfaces on top of products and services by providing a powerful natural language understanding (NLU) engine to process and understand natural language input

Basic concepts

Agents

- Natural Language Understanding modules

Intents

- Recognize what users want

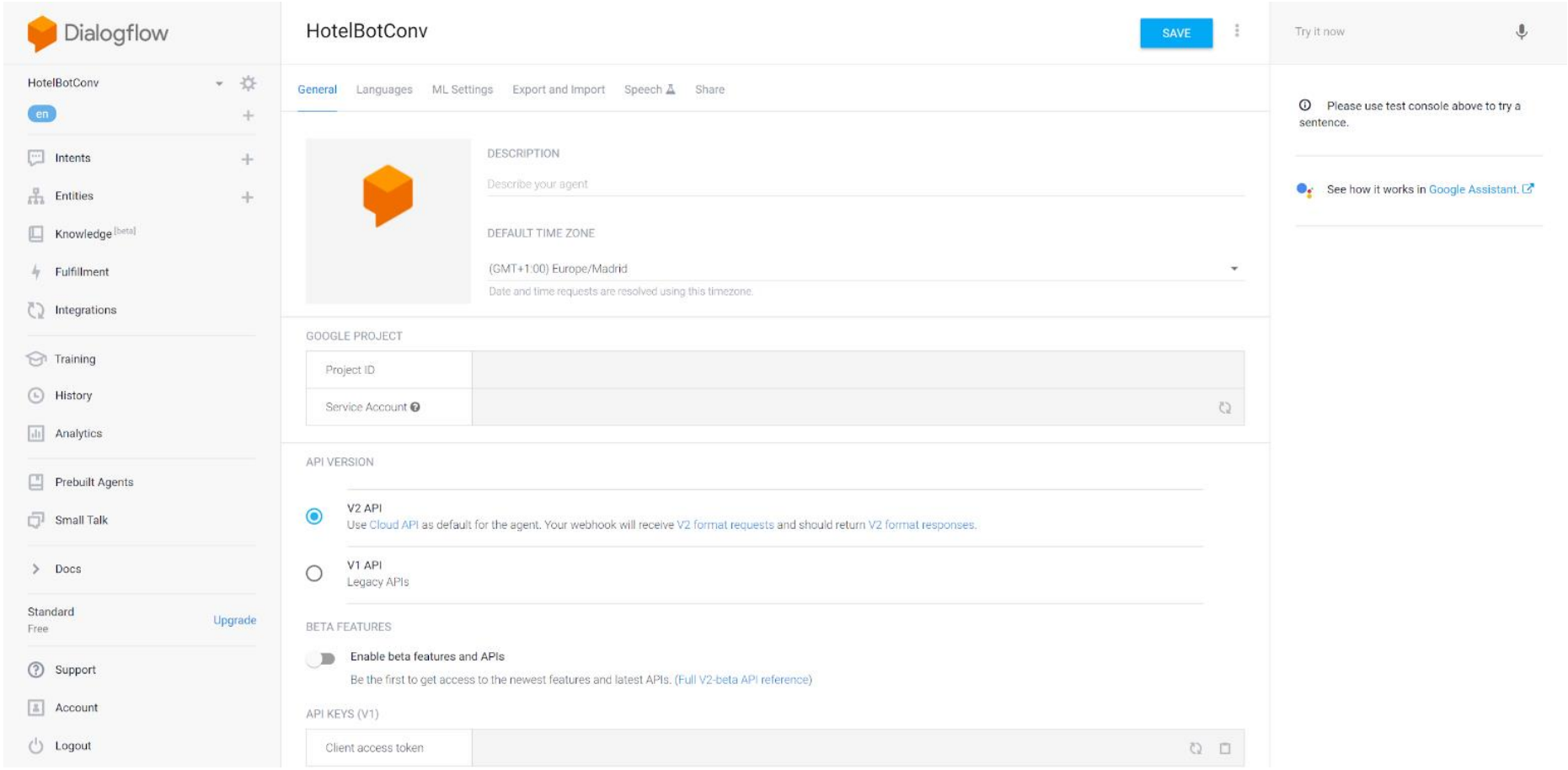
Entities

- Extract information that users mention

Dialog control

- Shape the flow of your conversation

Basic concepts - Agents



Basic concepts - Intents

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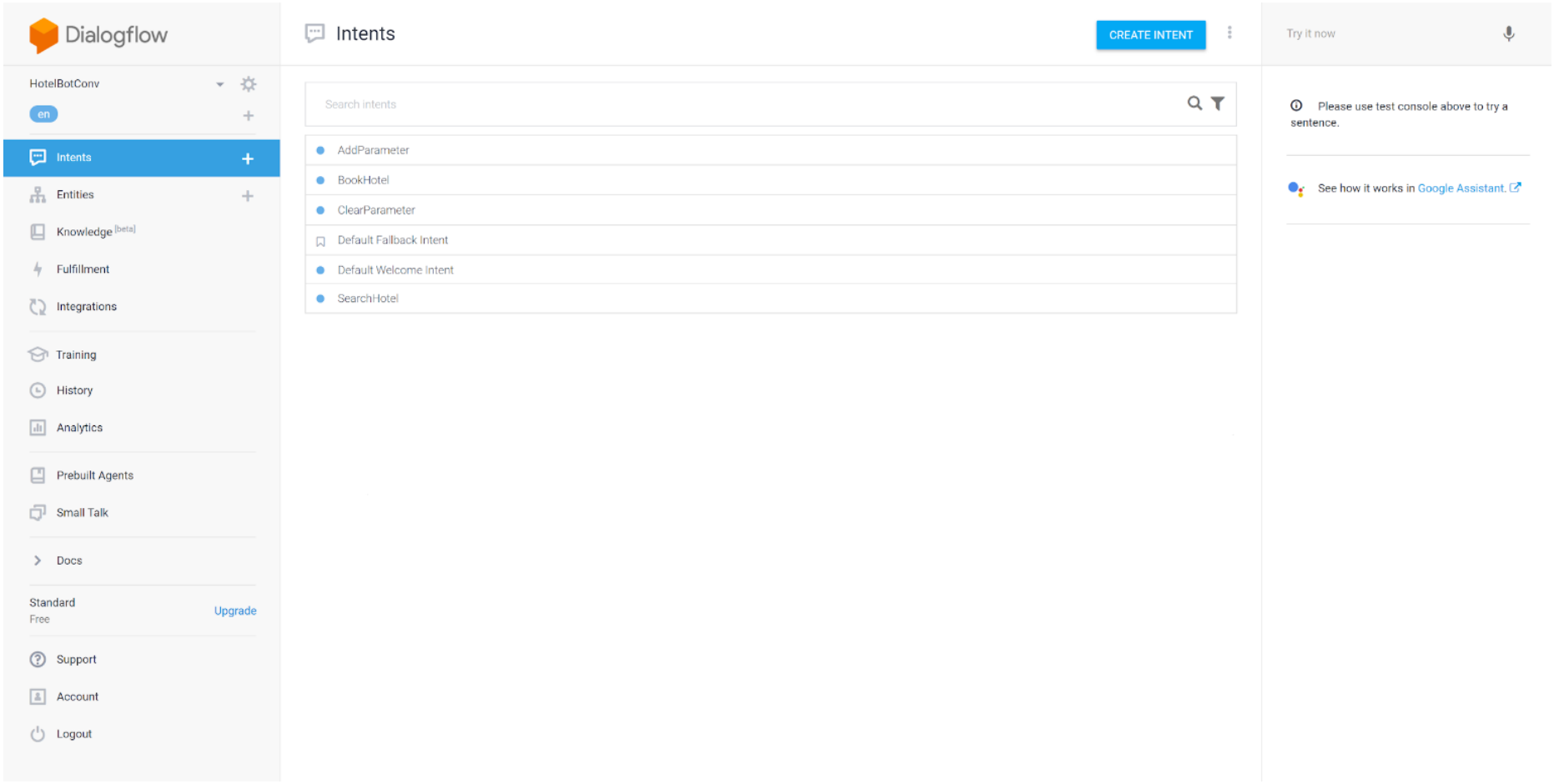
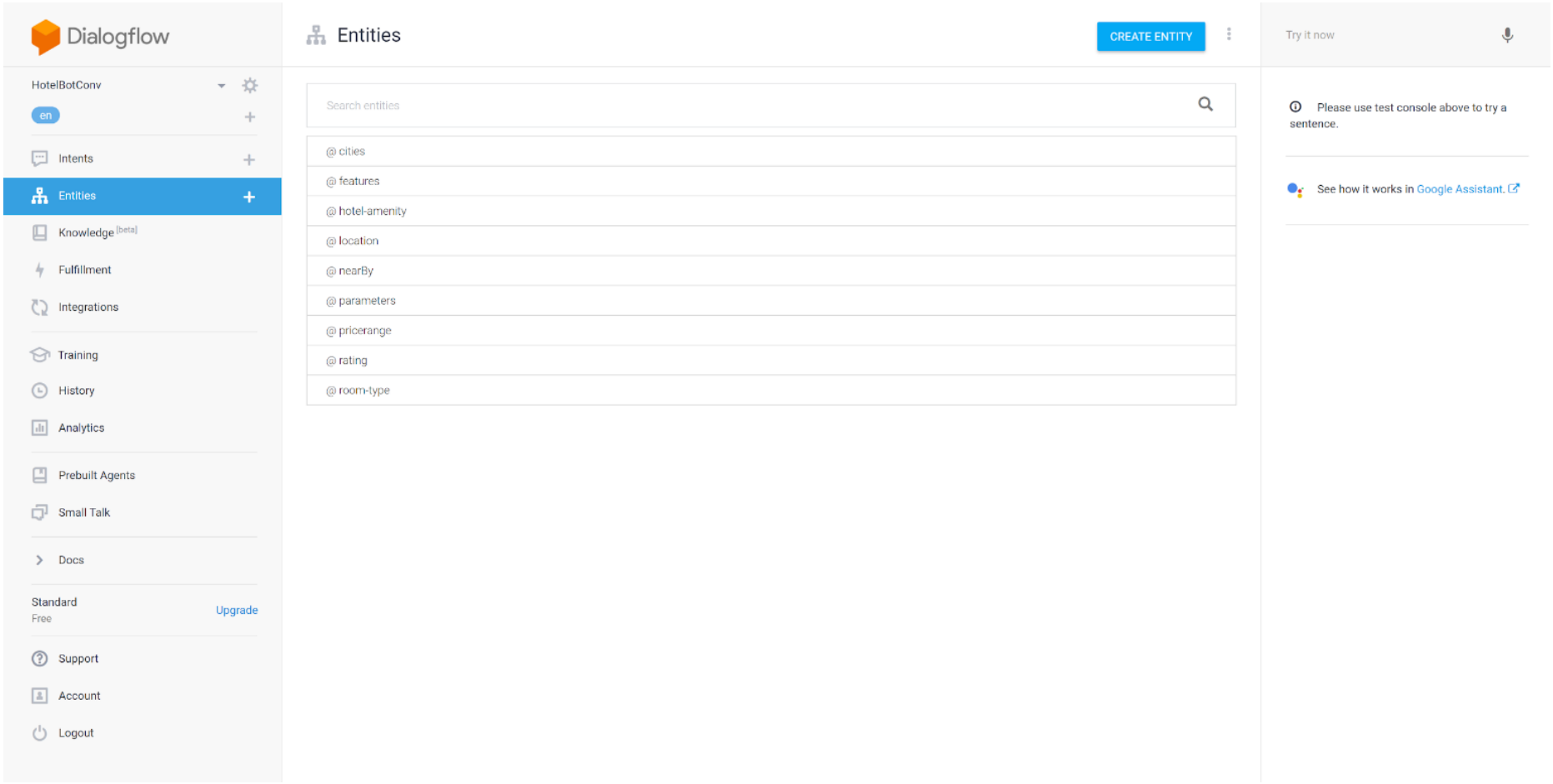


Basic concepts - Entities



Basic concepts - Dialog control

Linear dialog

- Slot filling

Non-linear dialog

- Contexts
- Fulfillment and back-end modifications

Agents – How do agents work

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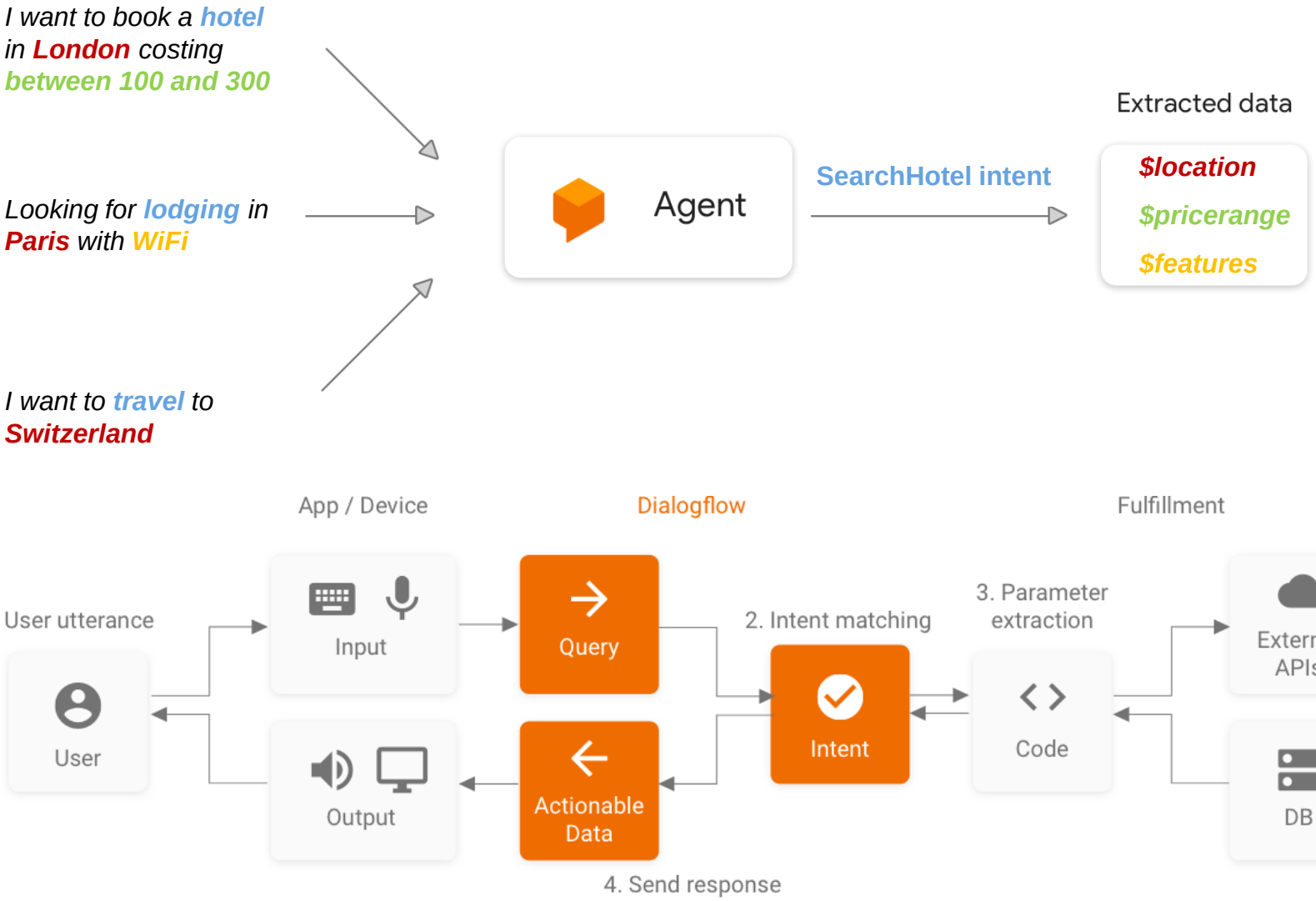

Agents - How to match user utterance

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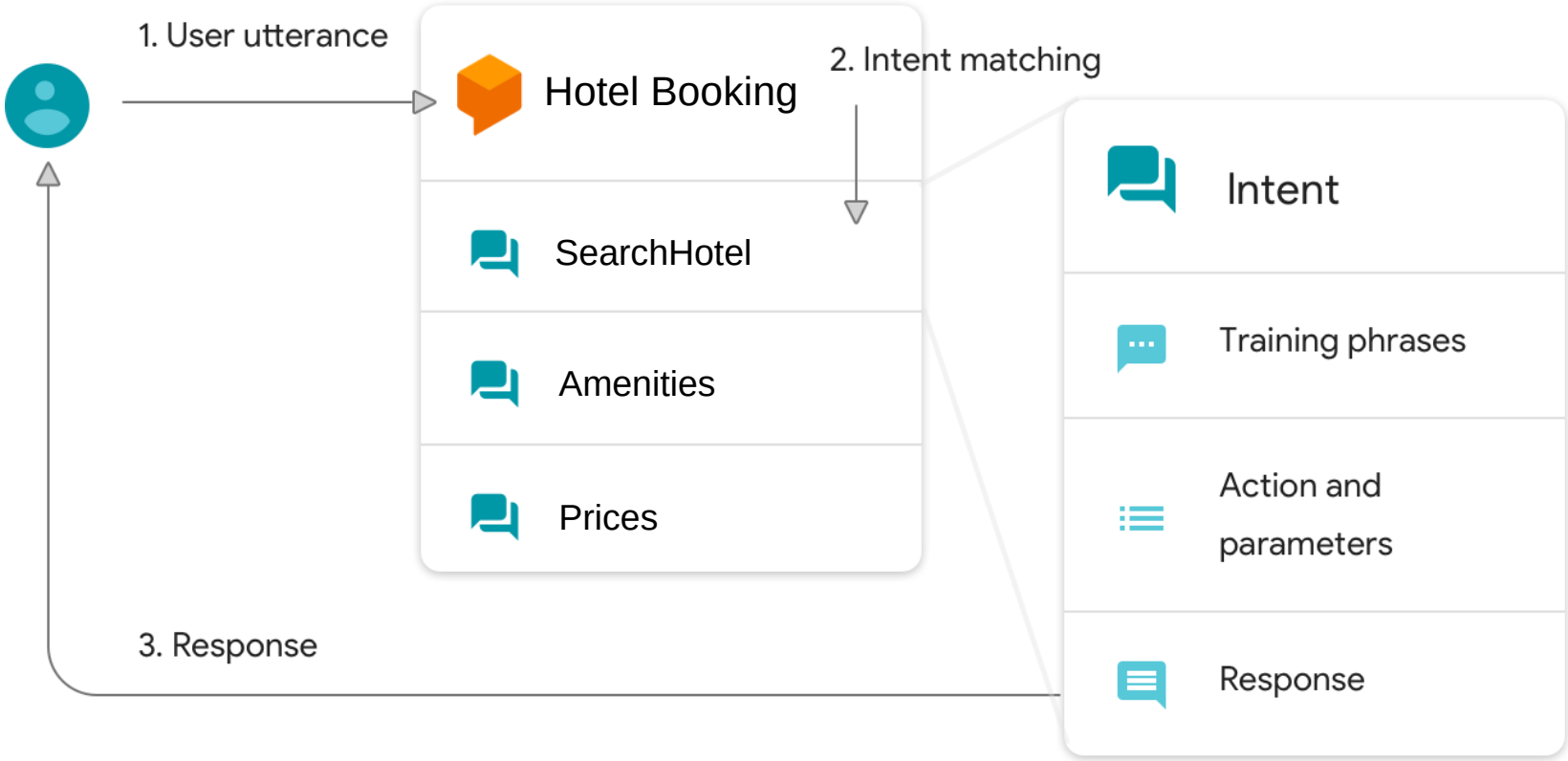

Intents

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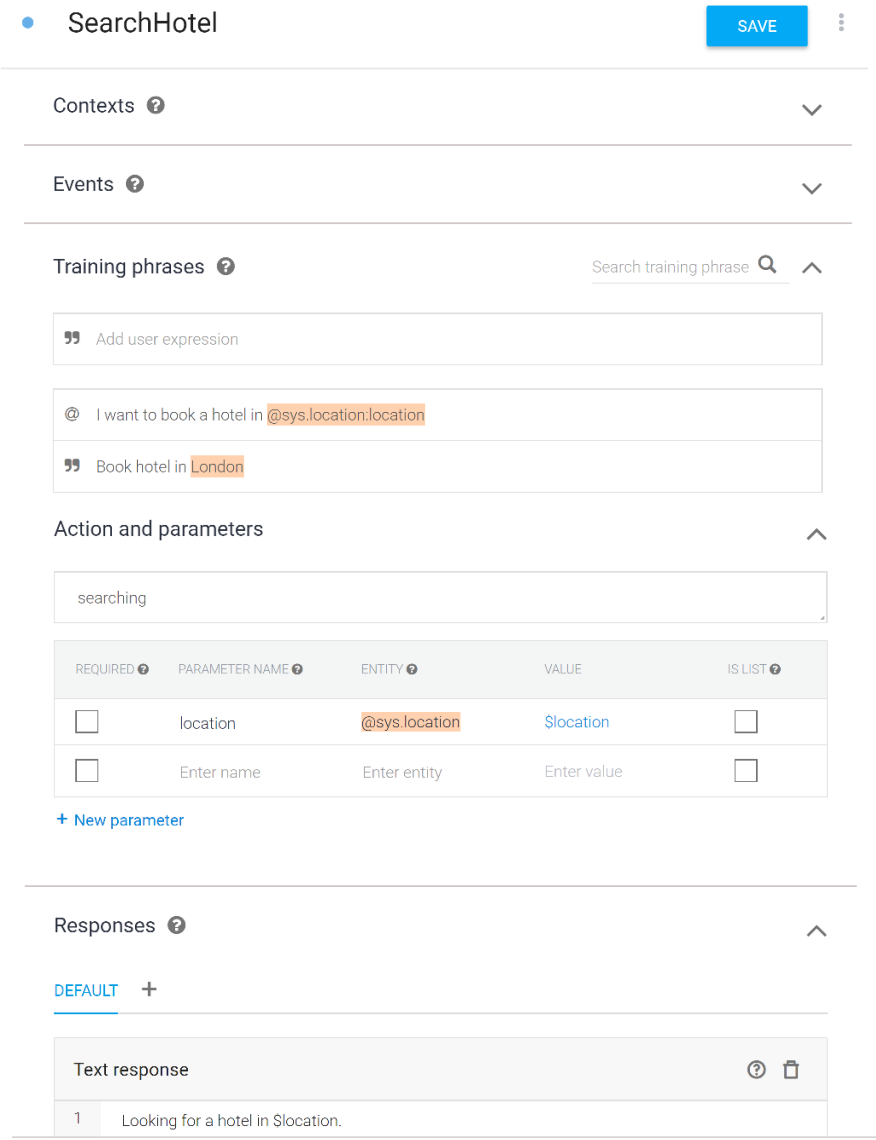
- Intent name
- Training phrases
  - What a user might say to the agent
  - Automatically expanded to match similar user utterances (Dialogflow's built-in machine learning)
- Actions and parameters
  - Defines how relevant information (parameters) are extracted from user utterances
- Responses
  - $location
  - #searching.location



Intents - Priority

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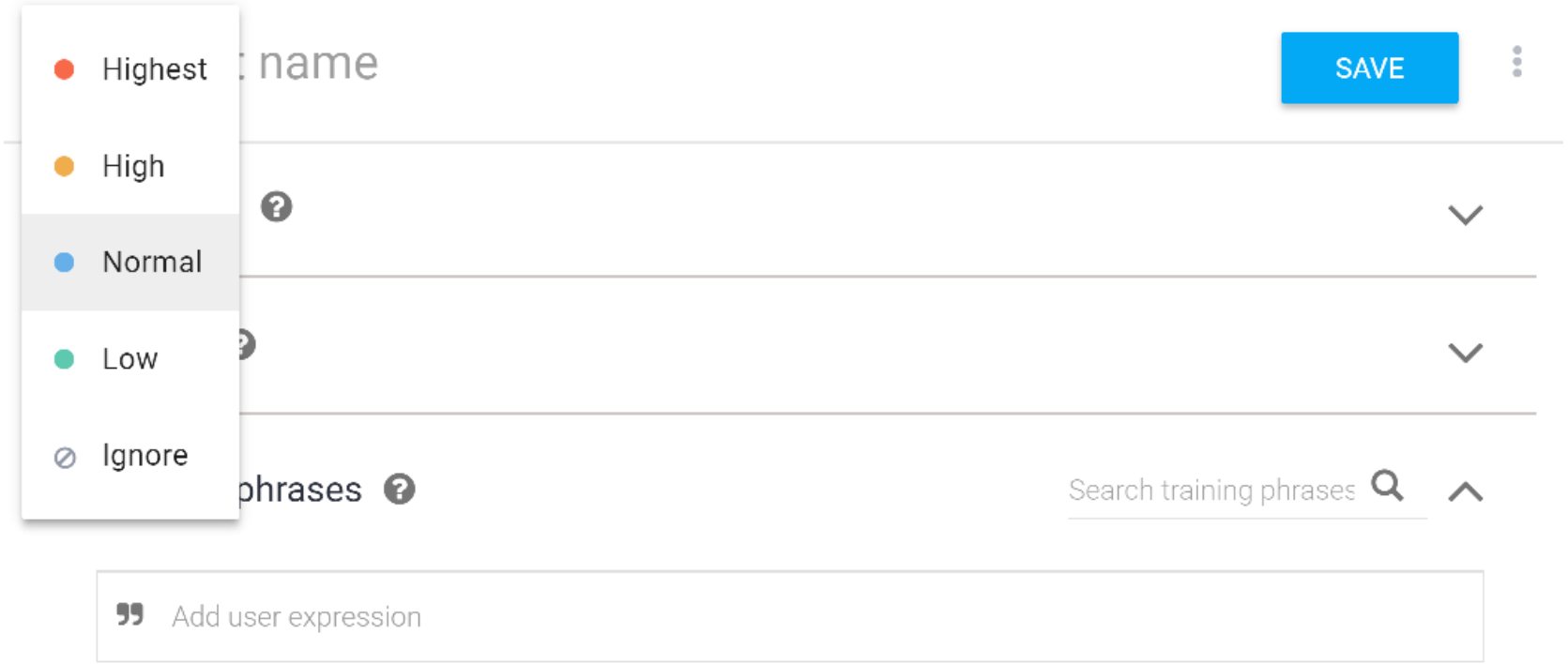

JSON response after matching intent

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```
{
  "responseId": "dac7a747-9f65-4953-aa2a-a95d4e41c0c6",
  "queryResult": {
    "queryText": "excellent rated",
    "action": "rating",
    "parameters": {
      "pricerange": {
        "higher": 300,
        "lower": 100
      },
      "location": {
        "city": "London"
      },
      "nearBy": {
        "place": "Big Ben"
      },
      "rating": "excellent",
      "hotel-amenity1": "restaurant",
      "hotel-amenity": "WiFi"
    },
    "allRequiredParamsPresent": true,
    "fulfillmentText": "Adding rating",
    "fulfillmentMessages": [
            ...
    "outputContexts": [
      {
        "name": "projects/hotelbotconv/agent/sessions/a1cbfd04-6131-b4ca-56be-349f1b70d611
          /contexts/searching",
        "lifespanCount": 1,
        "parameters": {
              ...
    "intent": {
      "name": "projects/hotelbotconv/agent/intents/c63a5155-fddf-4190-aafe-40db516851ca",
      "displayName": "Rating"
    },
    "intentDetectionConfidence": 1,
    "diagnosticInfo": {
      "webhook_latency_ms": 284
    },
    "languageCode": "en"
  }
```

Entities

- System entities
  - Pre-built entities provided by Dialogflow
  - @sys.geo-city, @sys.any, @sys.time, @sys.number
- Developer entities
  - Entities created by our own
  - @hotel-amenity, @pricerange, @nearby, @rating
- Session entities

Entities - Define

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features

SAVE

Define synonyms | Allow automated expansion

wifi	wifi, WiFi, internet
restaurant	restaurant, Restaurant
gym	gym, fitness
pool	pool, swimming pool, swimming, swimmingpool
conference	conference, conference room, meeting room
jacuzzi	jacuzzi
pet	pet, pet friendly
breakfast	breakfast, breakfast included
	Click here to edit entry

+ Add a row

Entities - Developer composite

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pricerange

Define synonyms Allow automated expansion

- between @sys.number:lower and @sys.number:higher
- more than @sys.number:lower
- below @sys.number:higher

Prices

SAVE

Training phrases

Search training phrase

Add user expression

costing between 100 and 500 CHF

PARAMETER NAME	ENTITY	RESOLVED VALUE
pricerange	@pricerange	between 100 and 500
currency-name	@sys.currency-name	CHF

Agent

USER SAYS COPY CURL

costing between 100 and 300 per night

DEFAULT RESPONSE

, , {'city': 'Zürich'}, {'lower': 100.0, 'higher': 300.0}, , , , What else should I consider?

CONTEXTS RESET CONTEXTS

searching

INTENT

Prices

rating	
hotel-amenity1	
hotel-amenity	
pricerange	{"higher":300,"lower":100}
geo-city	Zürich

Dialog control

- Contexts
  - Store parameter values from users' request
  - Allow your agent to carry information from one intent to another
  - When we apply context to an intent, Dialogflow will only consider that intent for matching if the context is active
  - Input and output
- Follow-up intents
  - Special intents nested under parent intents
- Fallback intents
  - Triggered if user input is not match to any of the available intents
  - Can be used to help guide the user in the right direction
- Contexts and fulfillment

Contexts

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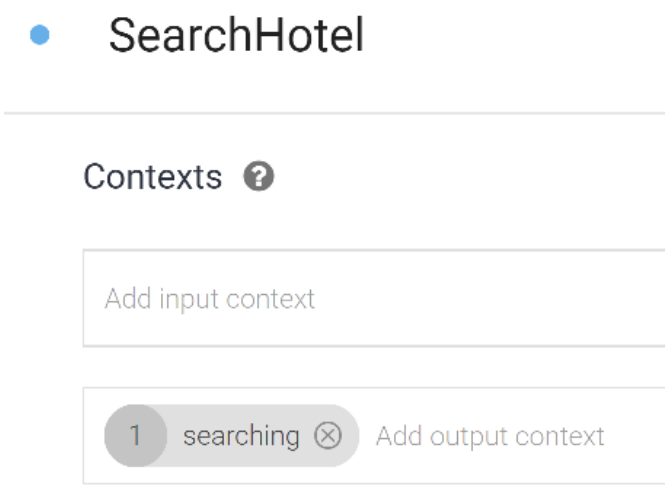

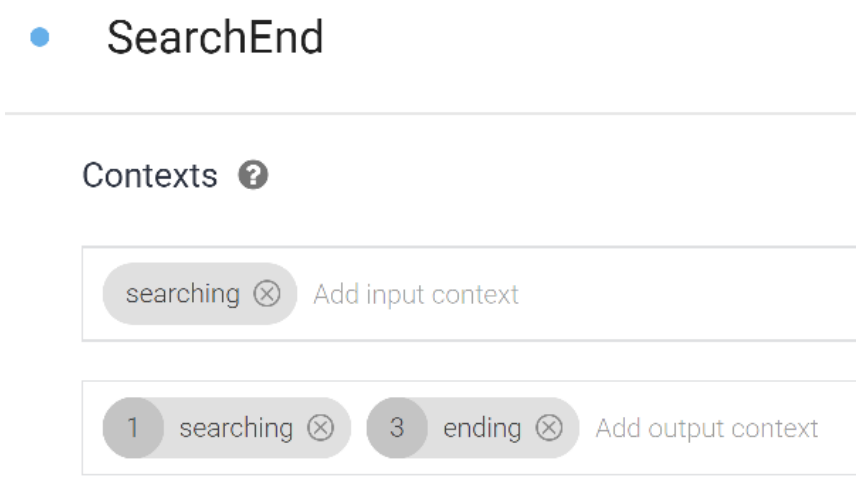

[U] "Book hotel in Zürich." – *searching* context is set and activated
[B] **"What else do you want to include?"** - Turn 1. Context is attached to *SearchEnd* intent
[U] "That's all." – *ending* context is set and activated, *searching* context is reactivated
[B] **"I found 72 results. What about including any feature?"** - Turn 1 of *ending*
[U] "With WiFi" - Turn 1
[B] **"I found 70 results. Would you like to specify any price range?"** - Turn 2 of *ending*
[U] "Costing between 100 and 280 per night" – Turn 2
[B] **"I found 11 results. How should the hotel be rated?"** – Turn 3 and context is removed
[U] "Excellent"
[B] **"I found these 5 results……"**

Contexts

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- SearchStart

Contexts

Add input context

1 searching ⊗ Add output context

- Features

Contexts

Add input context

1 searching ⊗ Add output context

- SearchEnd

Contexts

searching ⊗ Add input context

1 searching ⊗ 4 ending ⊗ Add output context

- Results

Contexts

searching ⊗ Add input context

1 results ⊗ 1 searching ⊗ Add output context

Contexts

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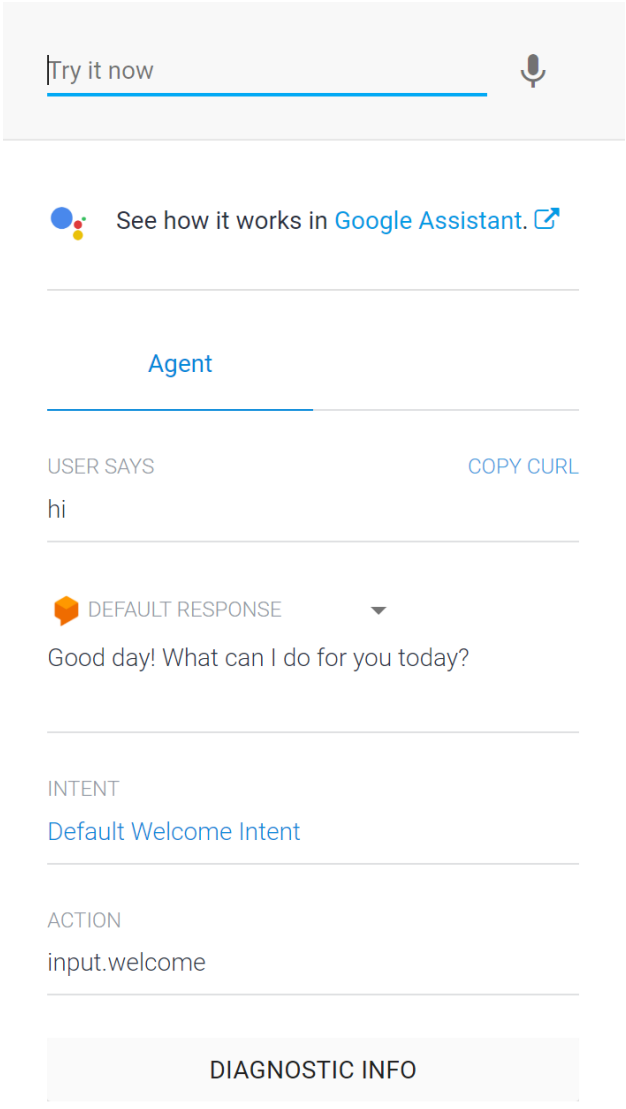

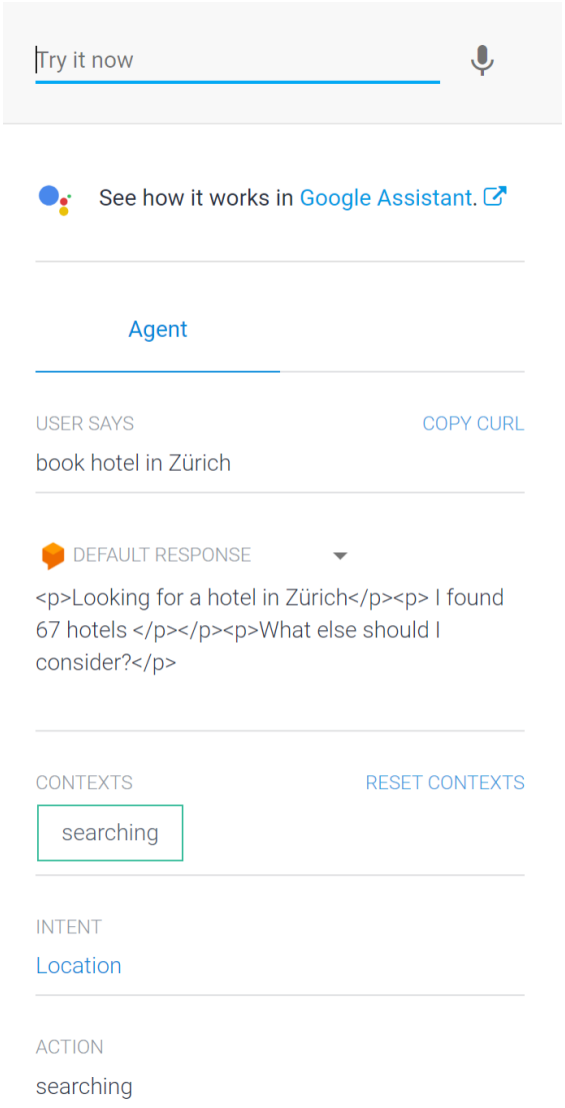

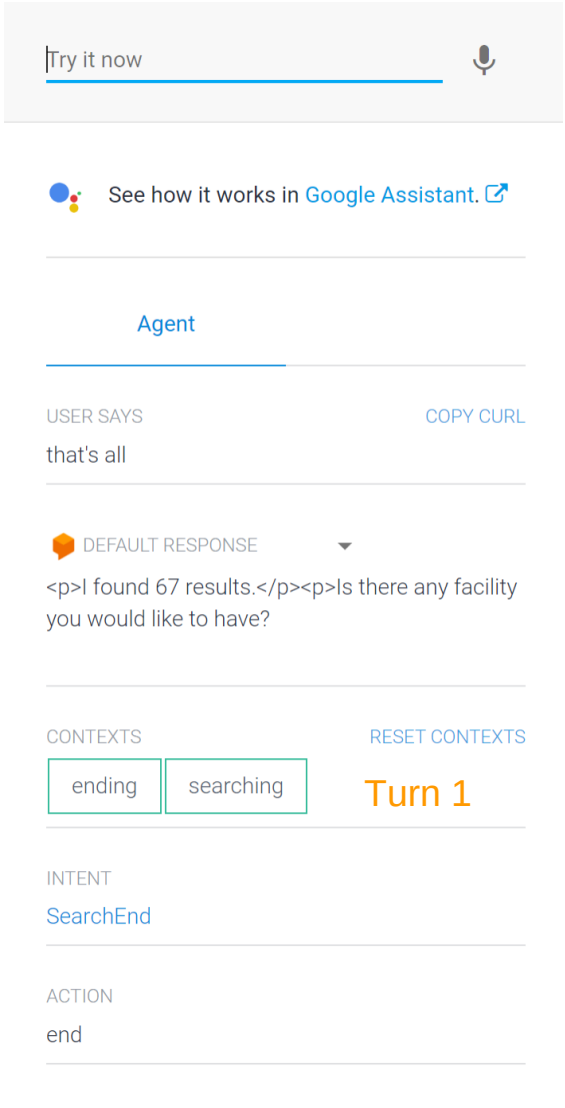

Contexts

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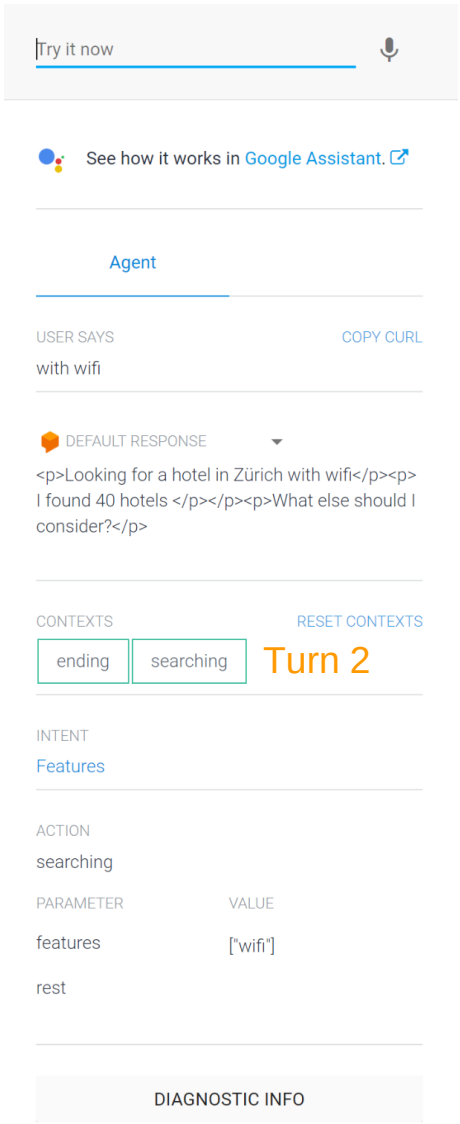

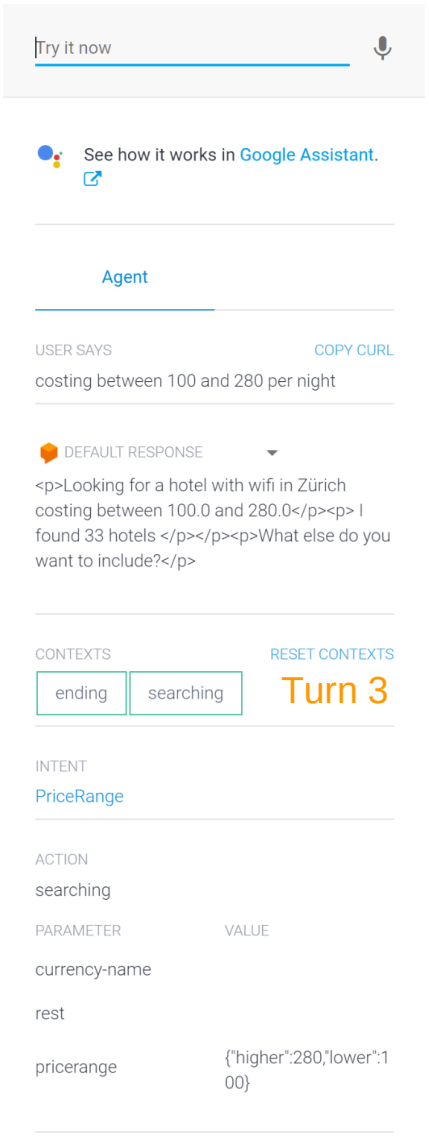

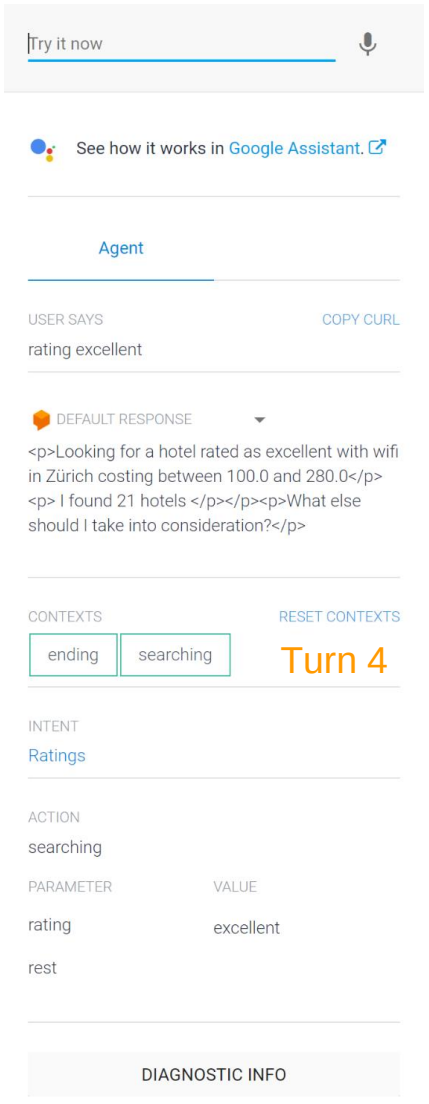

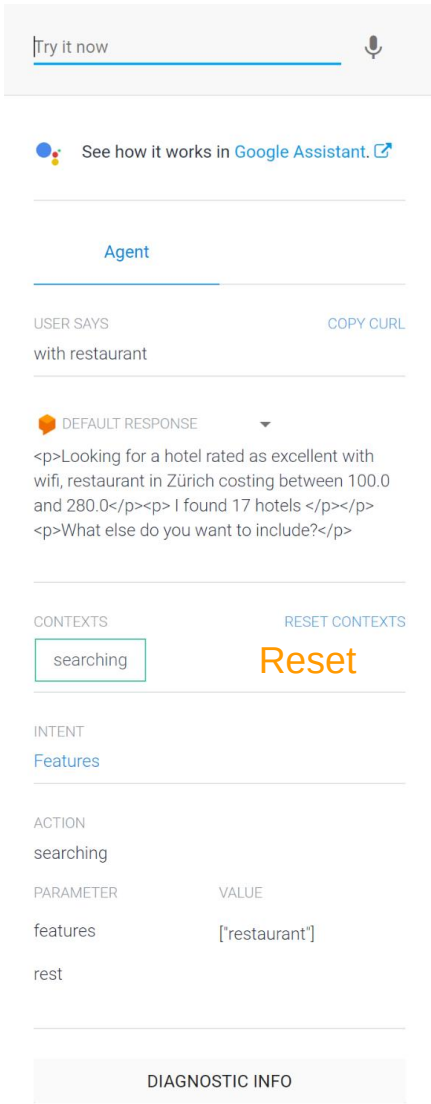

Follow-up intents

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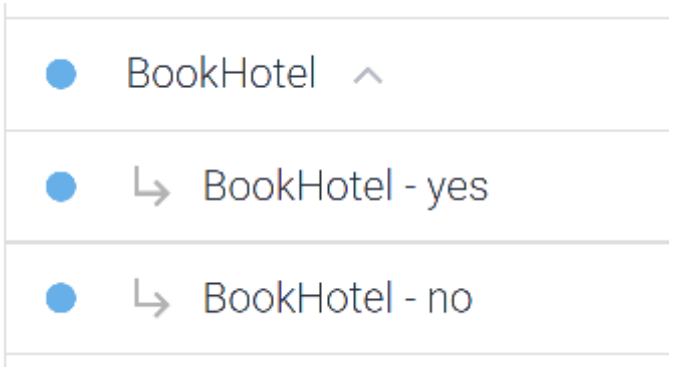
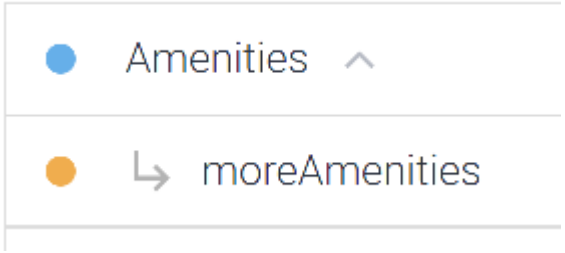
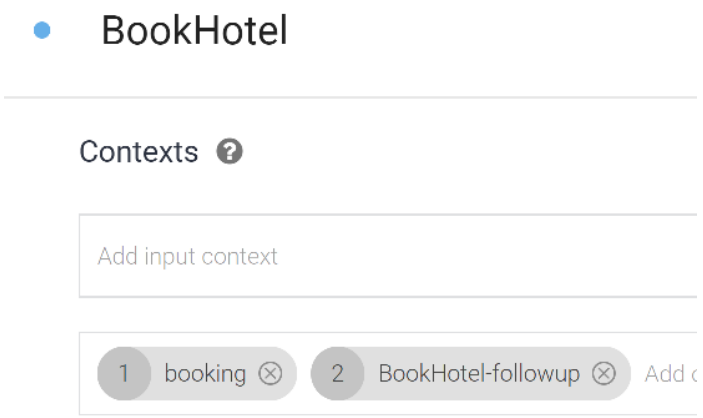
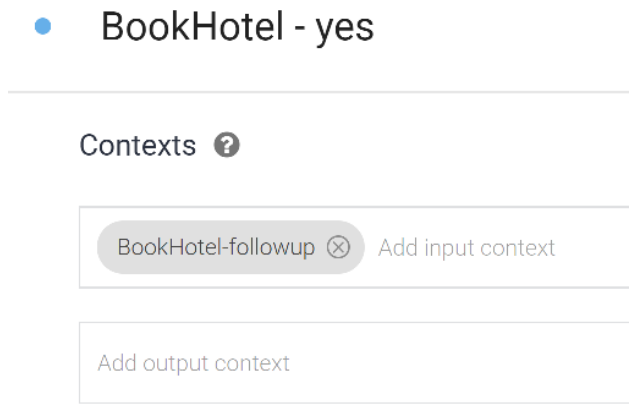
– A follow-up intent is matched only when the parent intent is matched in the previous conversational turn.









Fulfillment

- Fulfillment allows to use the information extracted by Dialogflow's natural language processing to generate dynamic responses or trigger actions on your back-end.
- To use fulfillment, you need to set up a webhook. A webhook is a web server endpoint that you create and host.
- Webhook request: When an intent with fulfillment enabled is matched, Dialogflow will make an HTTP POST request to your webhook with a JSON object containing information about the matched intent.
- Finally, your webhook should respond back with instructions for what Dialogflow should do next.

Fulfillment - When we used it

– To access and use the information extracted by Dialogflow's natural language processing

```
@app.route('/get_hotel_detail', methods=['POST'])
def get_hotel_detail():
    data = request.get_json(silent=True)
    parameters = data['queryResult']['parameters']
    rest = parameters['rest'] if 'rest' in parameters else ''
    action = data['queryResult']['action']
    intent = data['queryResult']['intent']['displayName']
    query = data['queryResult']
    project_id = os.getenv('DIALOGFLOW_PROJECT_ID')
    session_client = dialogflow.SessionsClient()
    session = session_client.session_path(project_id, "unique")
```

Fulfillment - When we used it

– To modify the responses given by the chatbot

```
def booking_hotel(data, hotel_found):
    number_hotels = len(hotel_found)
    response = ''
    if number_hotels == 1:
        response = "Here is the link to your selection: " \
                   + '<a href="%s">%s</a> ''' % (hotel_found[0]['url'], hotel_found[0]['url'])
    else:
        if data['queryResult']['parameters']['selection'] != '':
            selection = data['queryResult']['parameters']['selection']
        else:
            selection = data['queryResult']['parameters']['numericSelect']
        name = data['queryResult']['parameters']['name']
        if selection != "":
            index = int(selection) - 1
            response = "Here is the link to your selection: " \
                       + '<a href="%s">%s</a> ''' % (hotel_found[index]['url'], hotel_found[index]['url'])
        if name != "" and "last" not in name:
            for hotel in hotel_found:
                if hotel['hotel_name'] == name:
                    response = "Here is the link to your selection: " \
                               + '<a href="%s">%s</a> ''' % (hotel['url'], hotel['url'])
        if name != "" and "last" in name:
            response = "Here is the link to your selection: " \
                       + '<a href="%s">%s</a> ''' % (hotel_found[-1]['url'], hotel_found[-1]['url'])
    return response
```

Limitations

- Can only match one intent per user input → recursion and multiple access instead of including all combinations

- SearchStart

Training phrases

Add user expression

I want a hotel
hotel in @sys.any:rest
I want to go to a hotel @sys.any:rest
stay in a hotel @sys.any:rest
to a hotel @sys.any:rest
I want to go to @sys.any:rest
looking for hotels @sys.any:rest
i want it @sys.any:rest

- Location

Training phrases

Add user expression

at @location:location @sys.any:rest
at Madrid
@location:location @sys.any:rest
@location:location
in London
in @location:location @sys.any:rest