Building User Interfaces

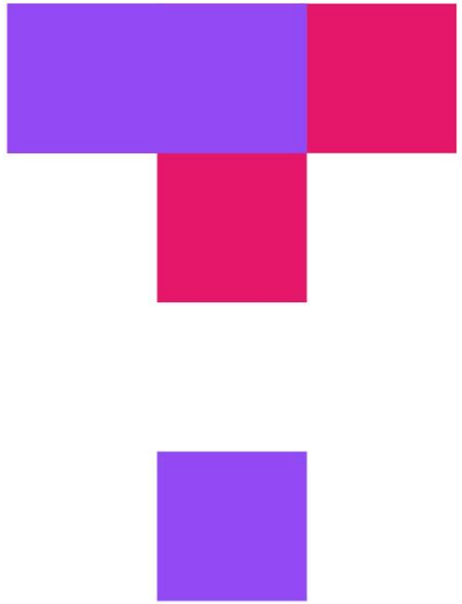
# Dialogflow 1
# An Introduction

Professor Bilge Mutlu

# What we will learn today?

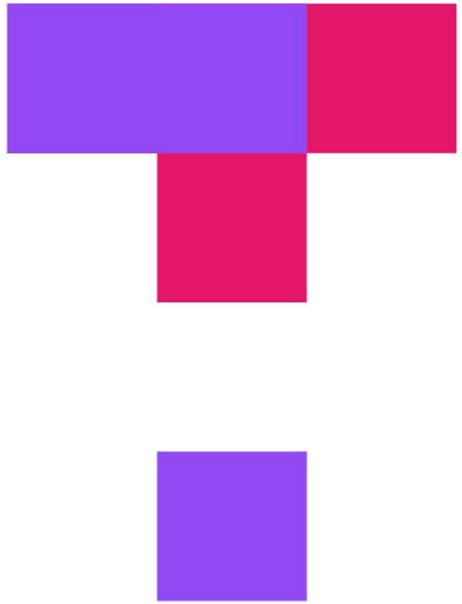
- Introduction to Conversational Interfaces
- Introduction to Dialogflow
- Dialogflow Building Blocks, Part 1
- Let's Make an Agent
- Assignment Preview

# TopHat Attendance



TOP HAT

# TopHat Questions



TOP HAT

# Introduction to Conversational Interfaces

# What is a conversational interface?

**Definition:** "Technology that supports conversational interaction with these VPAs [virtual personal assistants] by means of speech and other modalities."[1]

[1] McTear et al., 2016, *The Conversational Interface*

# Components of Conversational Interfaces[2]

Conversational interfaces integrate a number of technologies:

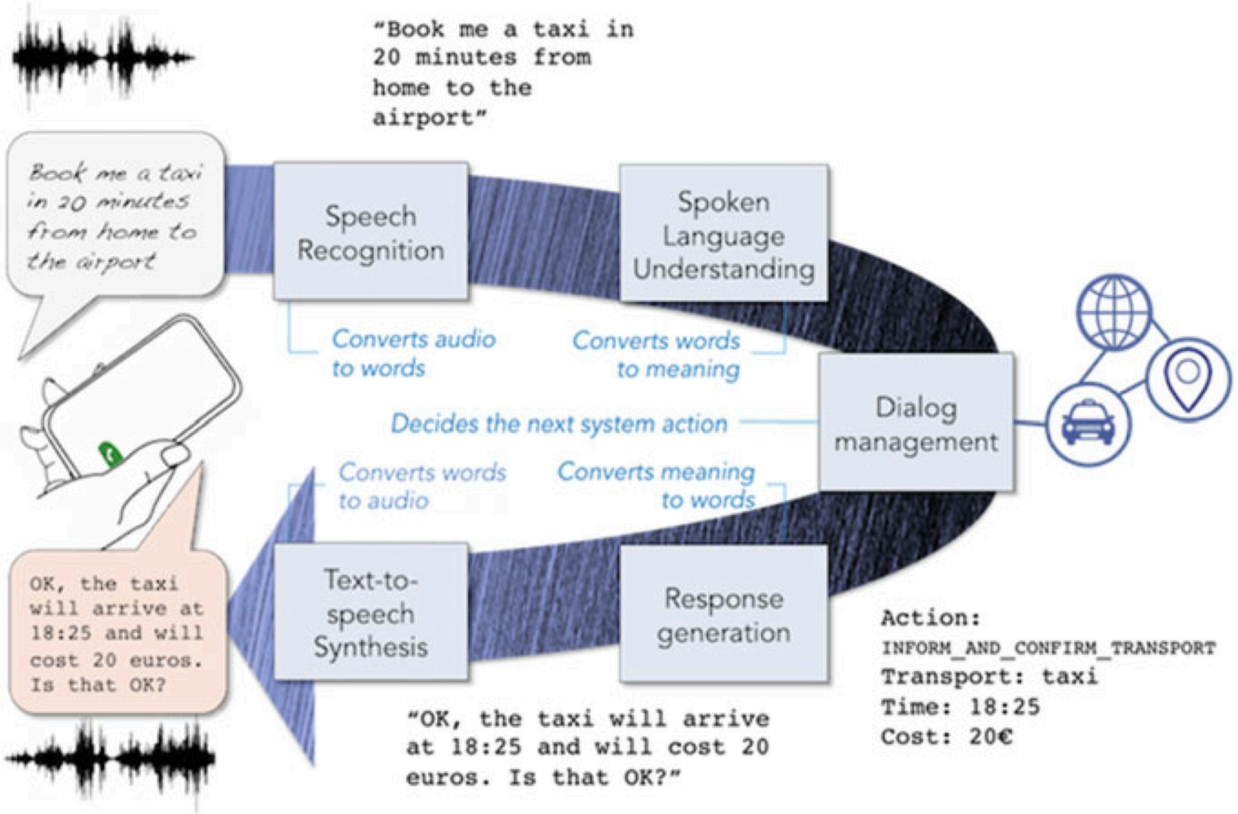
» Speech recognition

» Spoken language understanding

» Dialog management

» Response generation

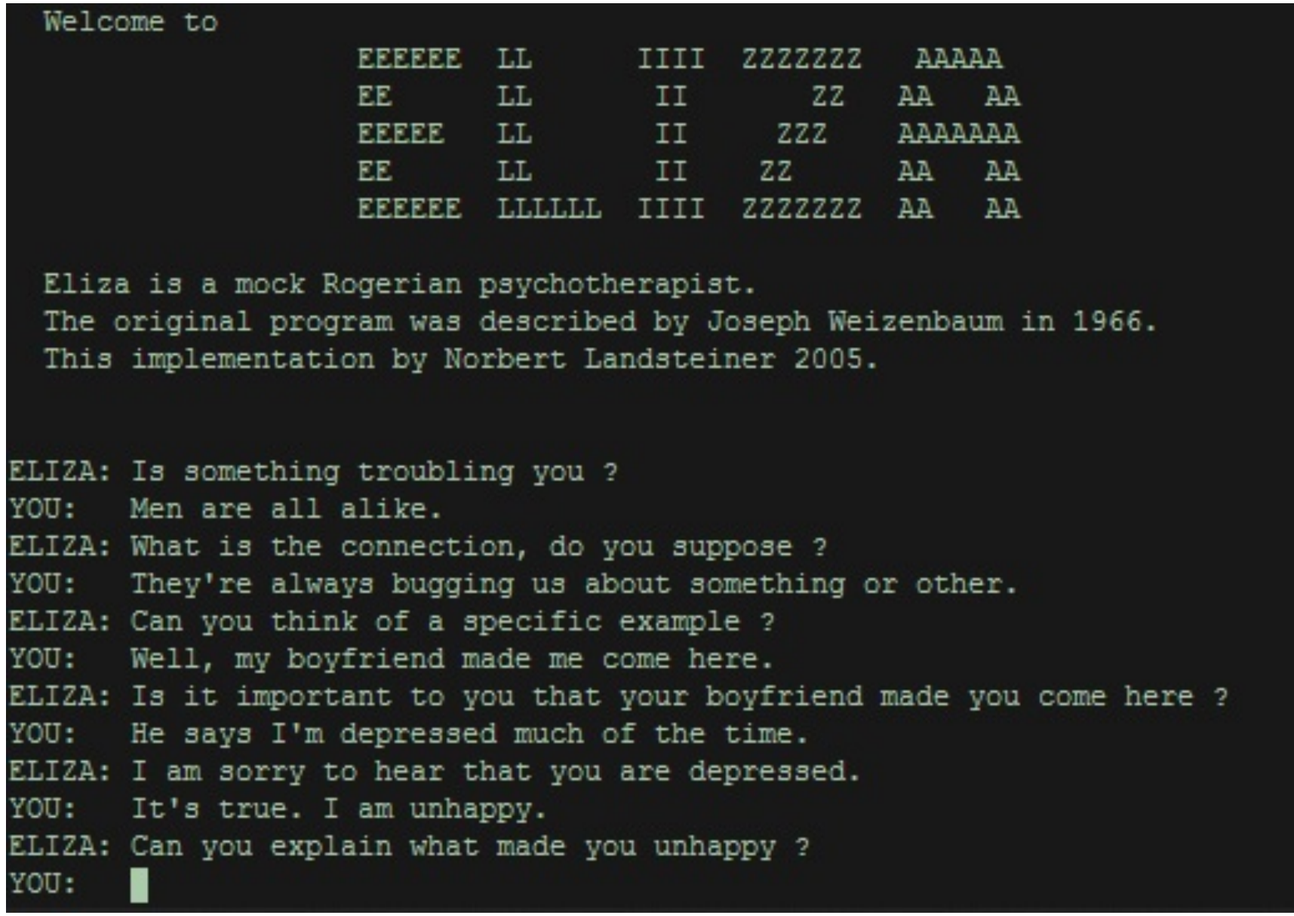
» Text-to-speech synthesis




[2] Image source: McTear et al., 2016, *The Conversational Interface*

# The First Conversational Interface[3]

ELIZA was the first conversational interface developed by Joseph Weizenbaum at the MIT Artificial Intelligence Laboratory in 1964-1966.




[3] Image source: Wikipedia: ELIZA

# Types of Conversational Interfaces

- Spoken dialog systems
- Voice user interfaces
- Embodied conversational agents
- Social robots
- Chatbots

# Platforms for Building Conversational Interfaces

In this course, we will be using Dialogflow by Google.

However, there are alternatives:

» Amazon Lex (Commercial)

» Mycroft (Open Source)

» CoreNLP (Academic)

# Introduction to Dialogflow

# What is Dialogflow?

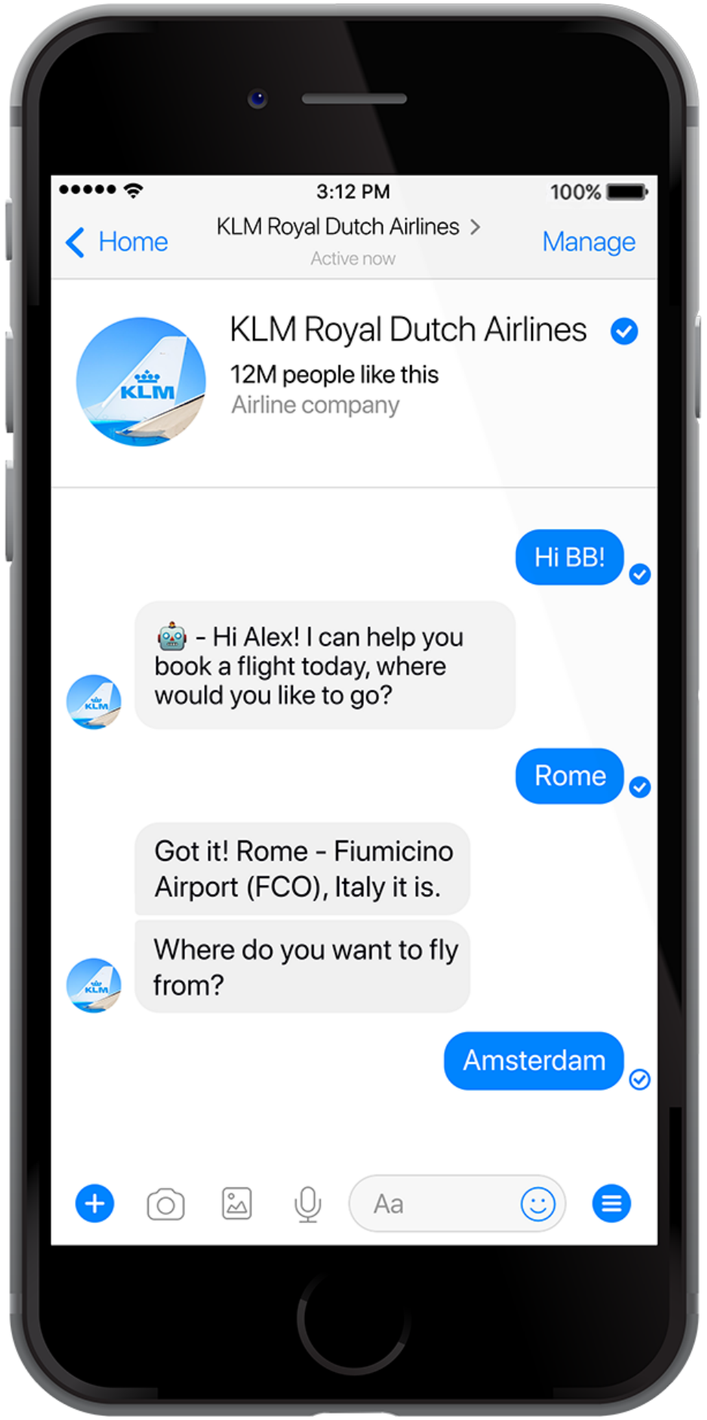
*Dialogflow* is an end-to-end, build-once deploy-everywhere development suite for conversational interfaces for websites, mobile applications, and IoT devices (e.g., smart speakers).


ource Youtube

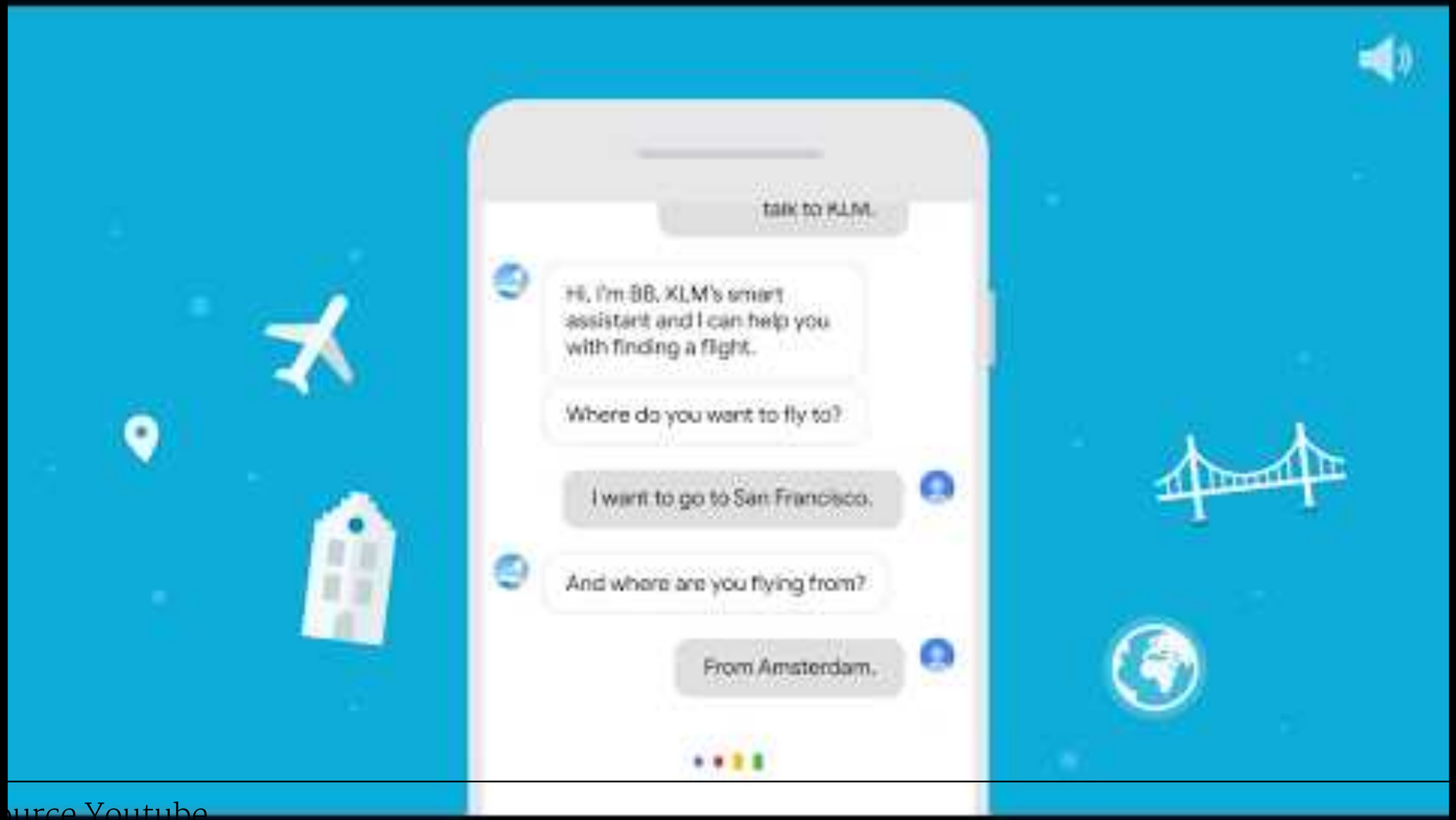
# Case Study: KLM BB[5]

KLM used Dialogflow to create an agent to purchase travel as well as travel preparation.

Let's see how the KLM BB works…




[5] Image source Dialogflow



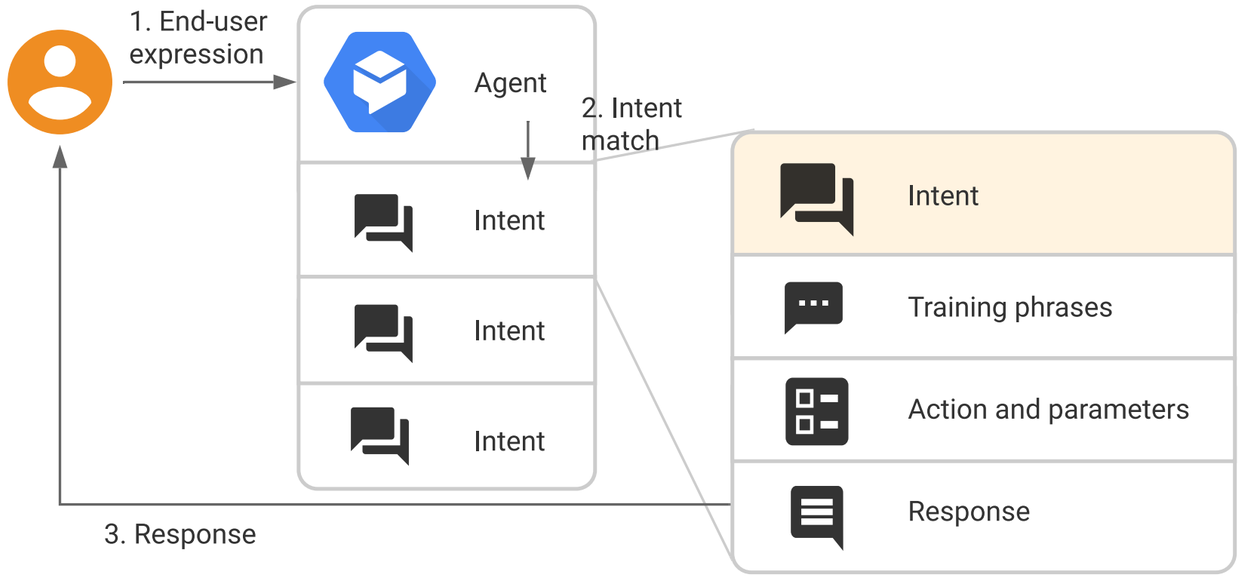

urce Youtube


ource

# How does Dialogflow work?[8]

The process within Dialogflow involves:

1. User expression
2. Intent matching
3. System response




[8] Image source

# What is an *agent*?

**Definition:** A Dialogflow agent is a virtual agent that handles conversations with users (similar to a human call agent).

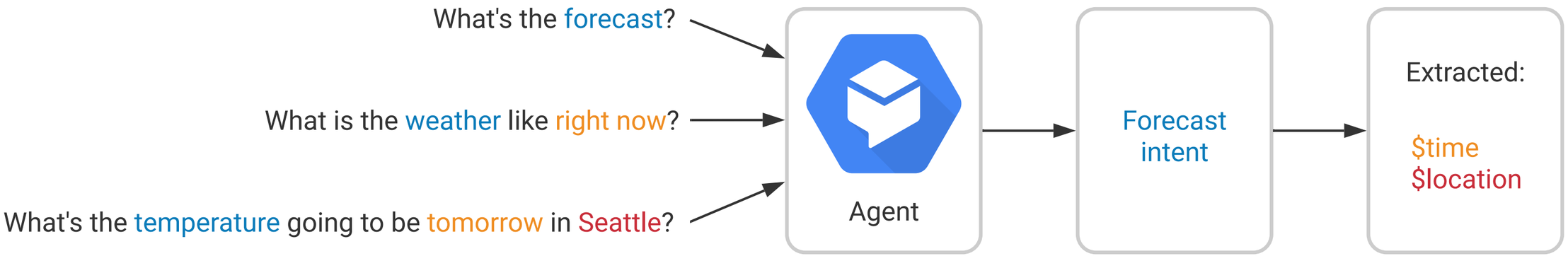



Image source

Agents are high-level containers for a number of building blocks:

- Agent settings
- Intents
- Entities
- Knowledge
- Integrations
- Fulfillment

# The End-to-end Dialogflow Workflow

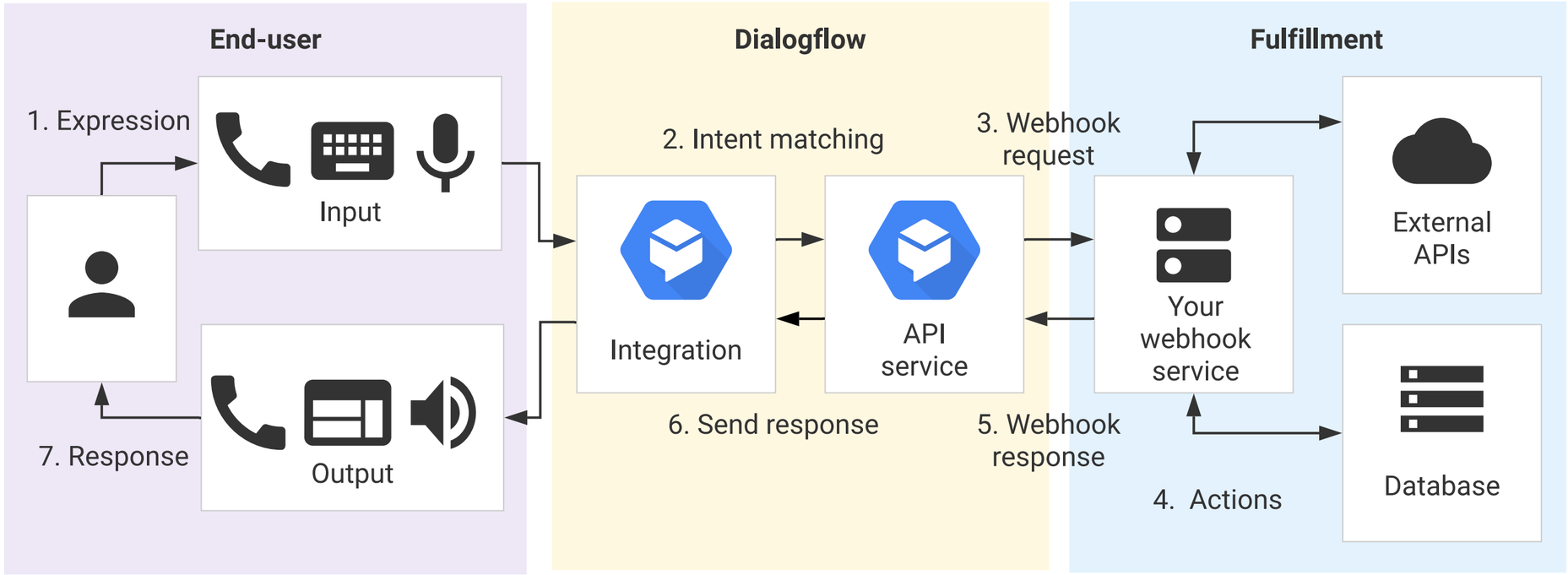
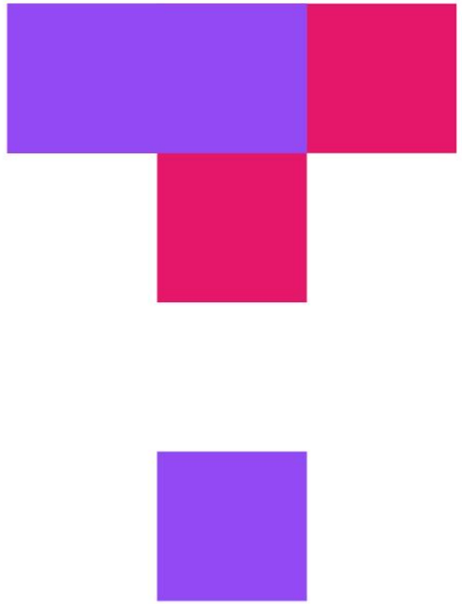



Image source

# TopHat Quiz



TOP HAT

# Dialogflow Building Blocks, Part 1

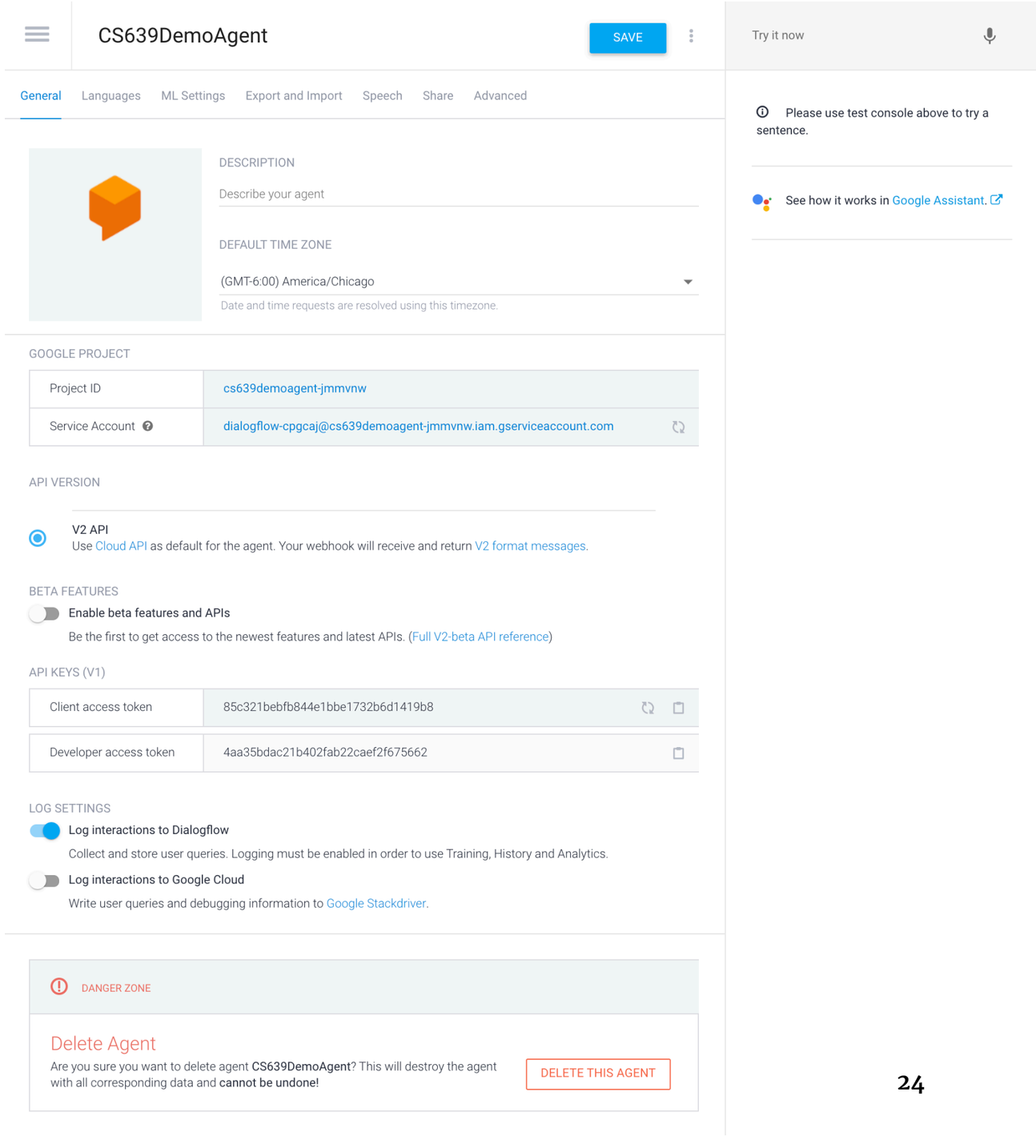
We will cover Part 2 in the next class.

# Getting Started with Dialogflow

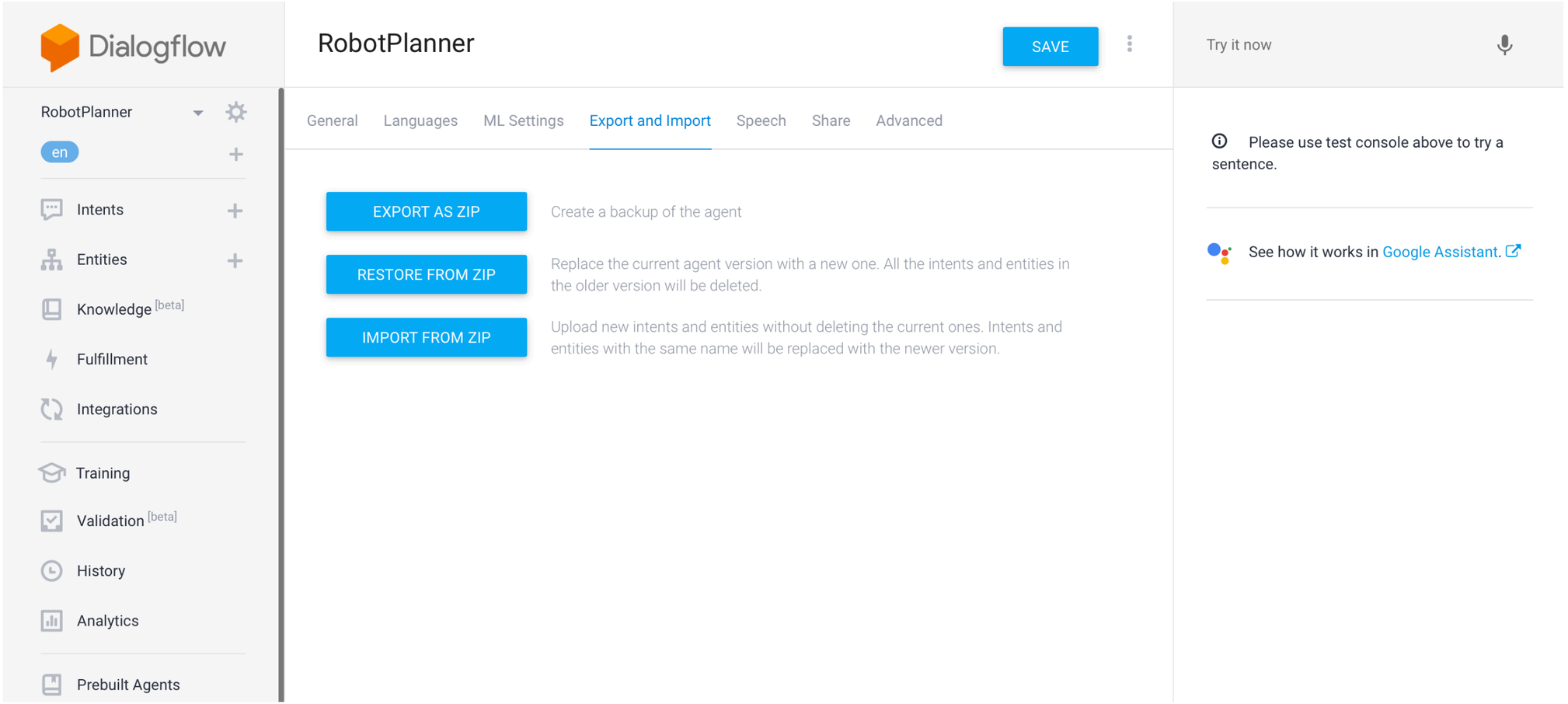
1. Login to the Dialogflow
2. Go to the Dialogflow console
3. Create a new *agent*

# Agent Settings

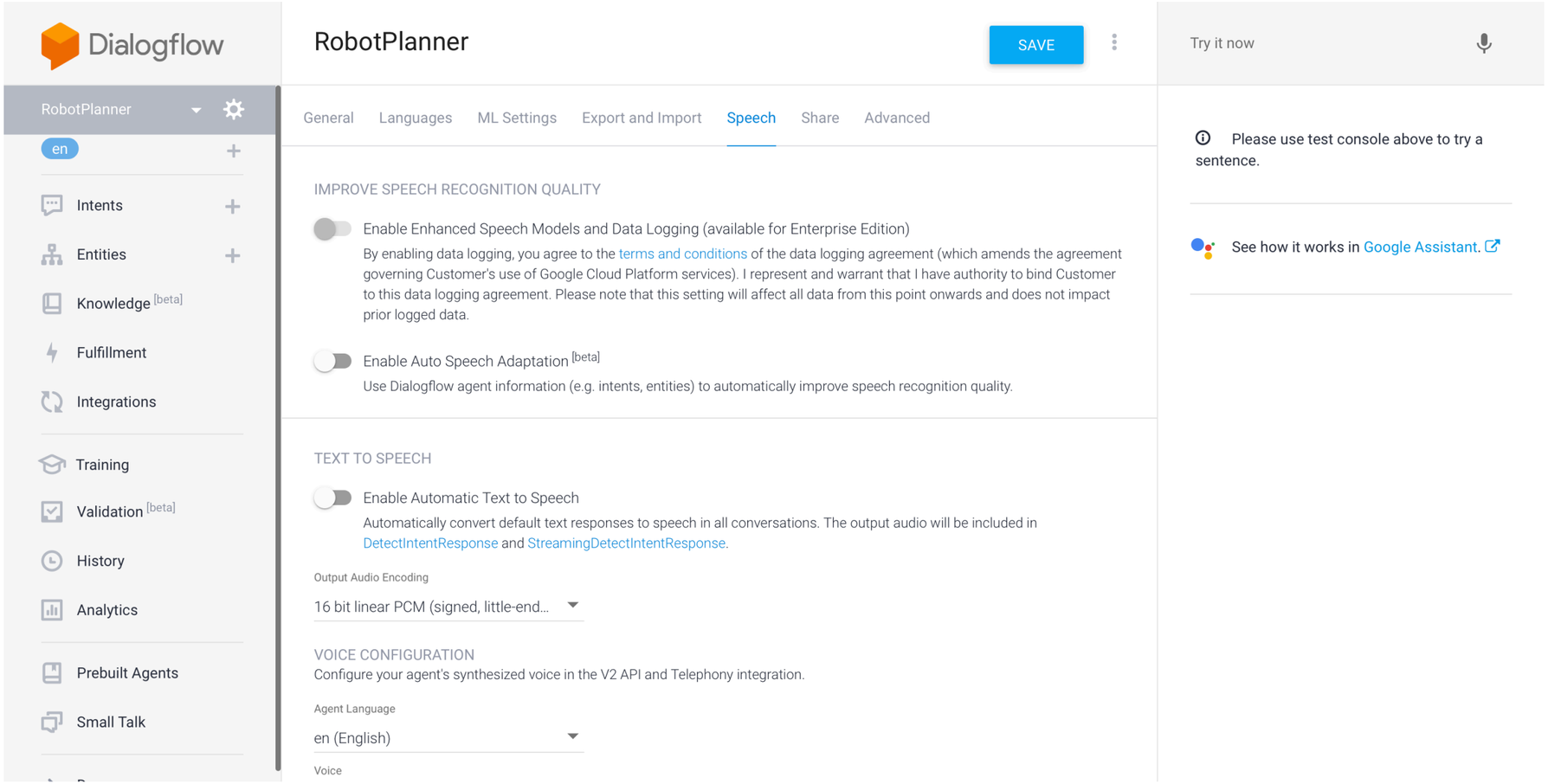
Get familiar with agent settings.



# Agent Exporting



# Agent Speech



# Intents

# What are intents?

Consider the following user requests:

» What is the weather like today?

» Will it rain sometime today?

What is the intent of these requests?

# What are intents?

**Definition:** Intents are the goals of the user that are expressed to the agent.

In the previous examples, despite their different framing, the user was expressing a desire to know what the weather will be.

That is their *intent*.

# More Intent Examples

Let's look at some more requests and identify their intents:

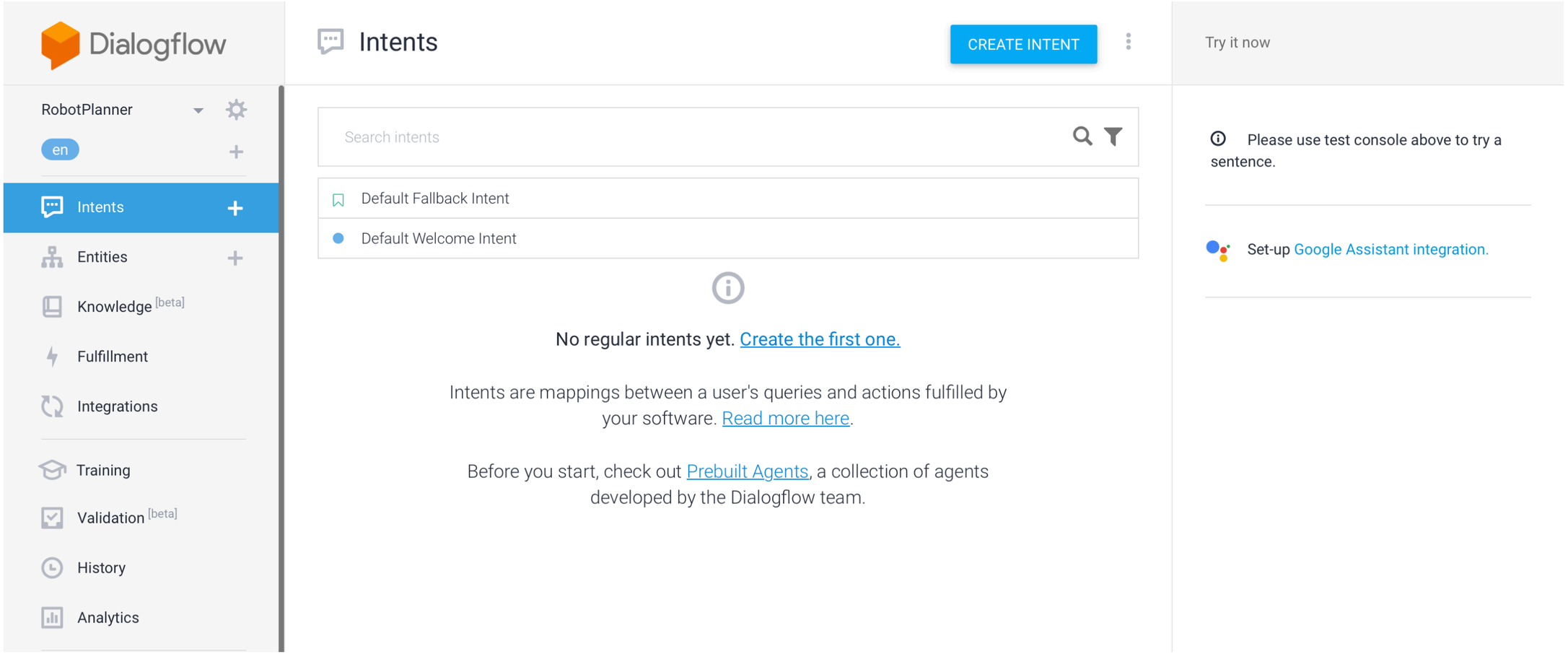
» How are you?

» How do I get to Middleton?

» What is the price of a basketball?

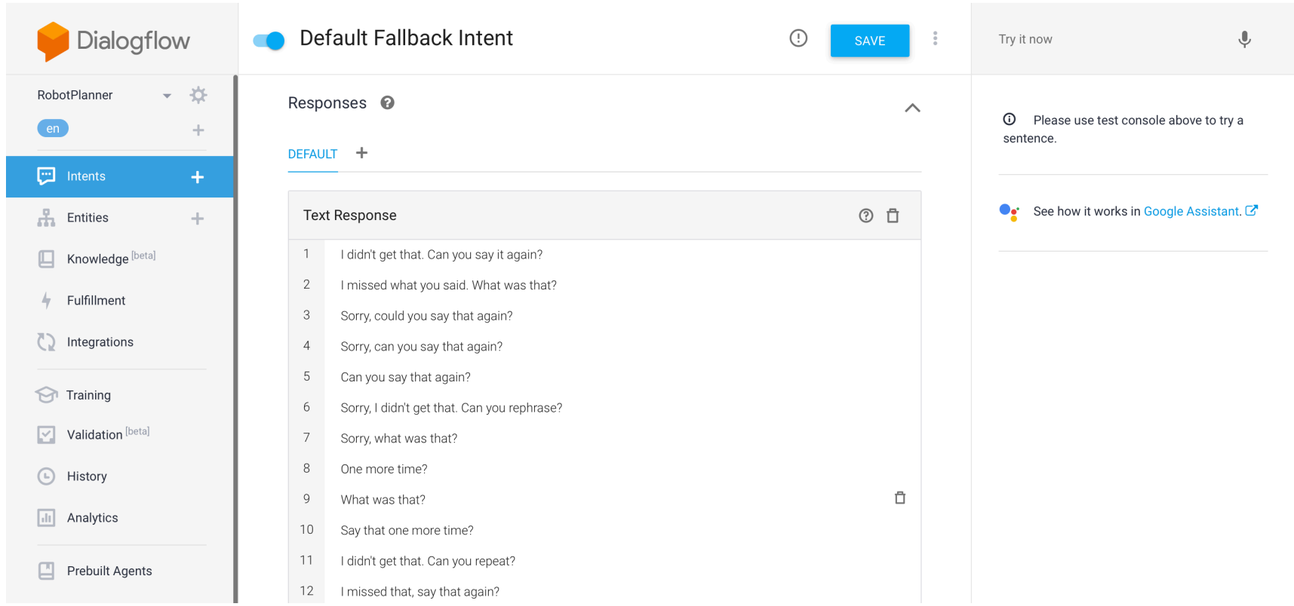
» Buy one box of tissues from Amazon.

# Intents In Dialogflow



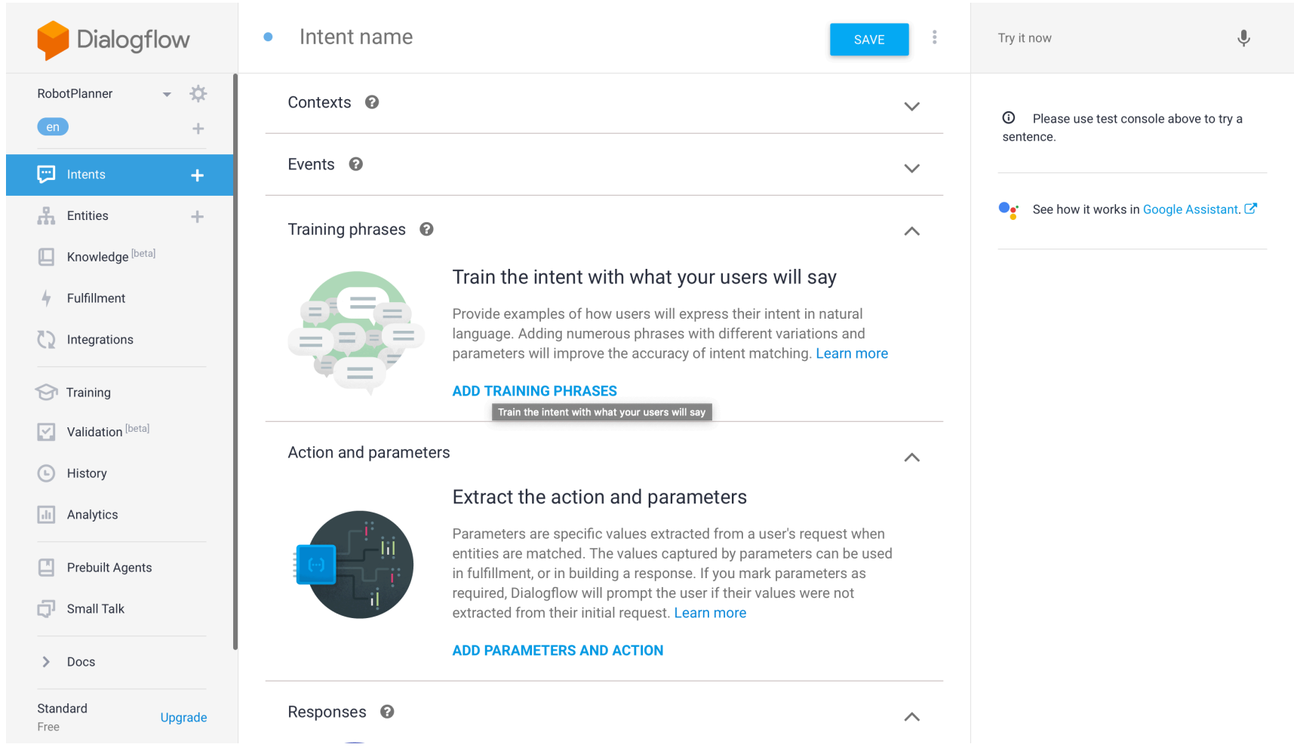
# Default Fallback Intents

- Engaged if no other intents are recognized.
- Could be a result of not being able to "hear" the user, or unable to parse what they said.
- Can provide training examples of things that will serve as negative examples for your desired intents.



# Creating Intents

- Allow the user to say that they want a robot to pick something up.
- We will start with training phrases.
- Should try to create at least 10.



# Creating Intents

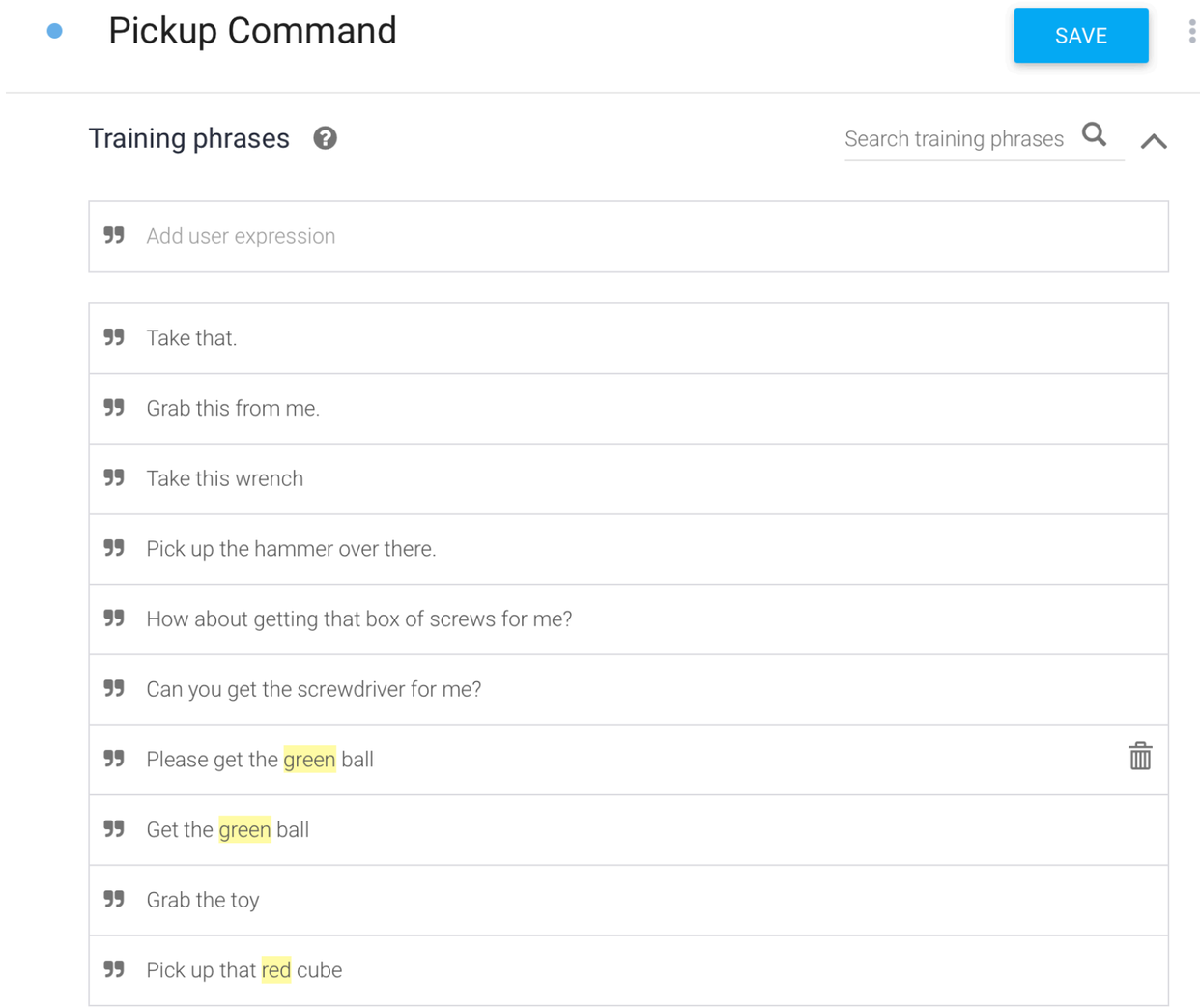
» Can you get the screwdriver for me?

» Please get the green ball.

» Pick up that red cube.

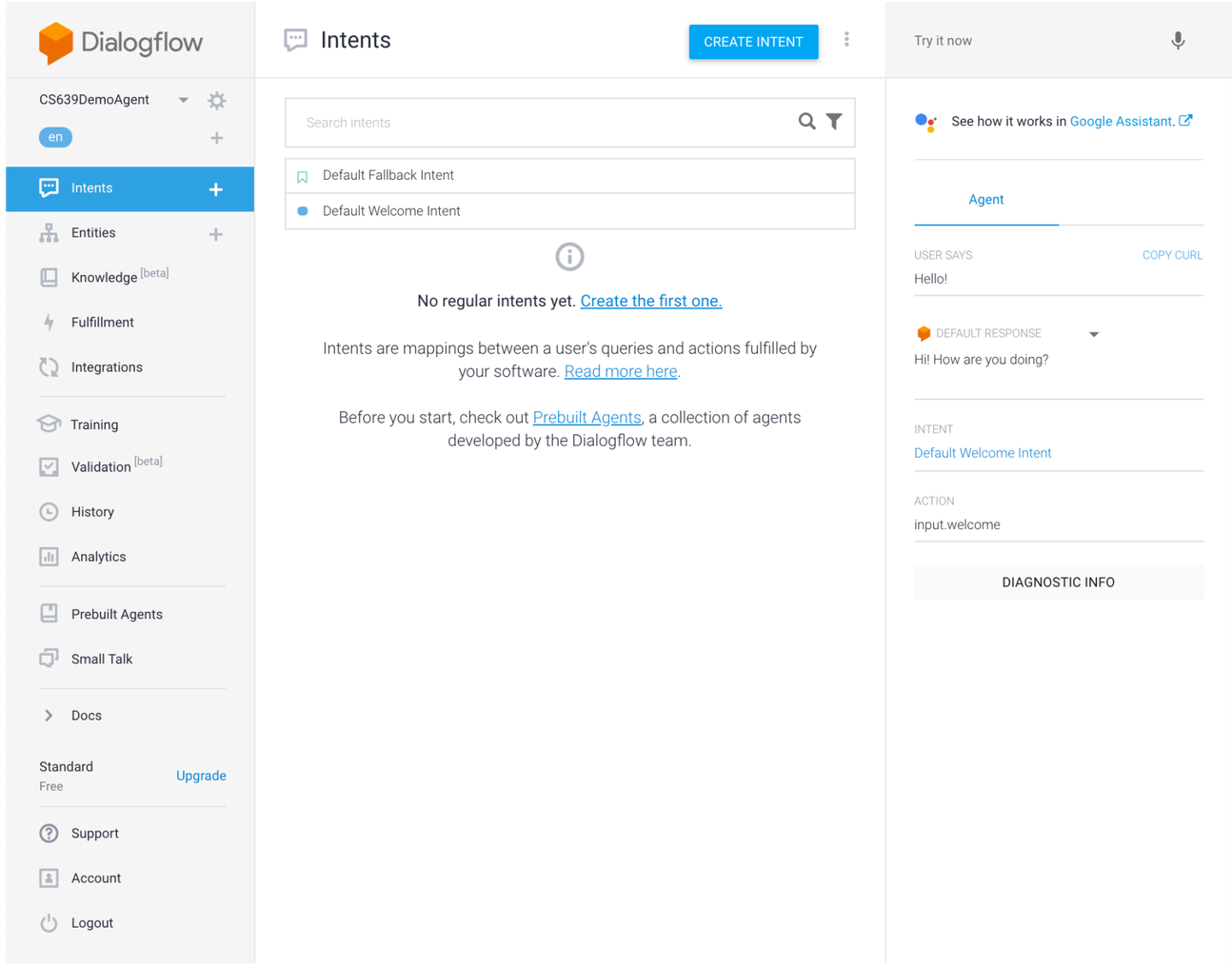
» etc.

Notice how the color is highlighted? More on that next.



# Test

Test your agent using the *Default Welcome Intent*



# Entities

# What are entities?

Let's consider those requests again.

» How do I get to *Middleton*?

» What is the price of a *basketball*?

» Buy *one* box of *tissues* from *Amazon*.

# What are entities?

Sometimes, users' intents are more specific, and have an intent based around a certain item or *entity*.

**Definition:** Entities allow for more specificity of requests, without exploding the intent space.

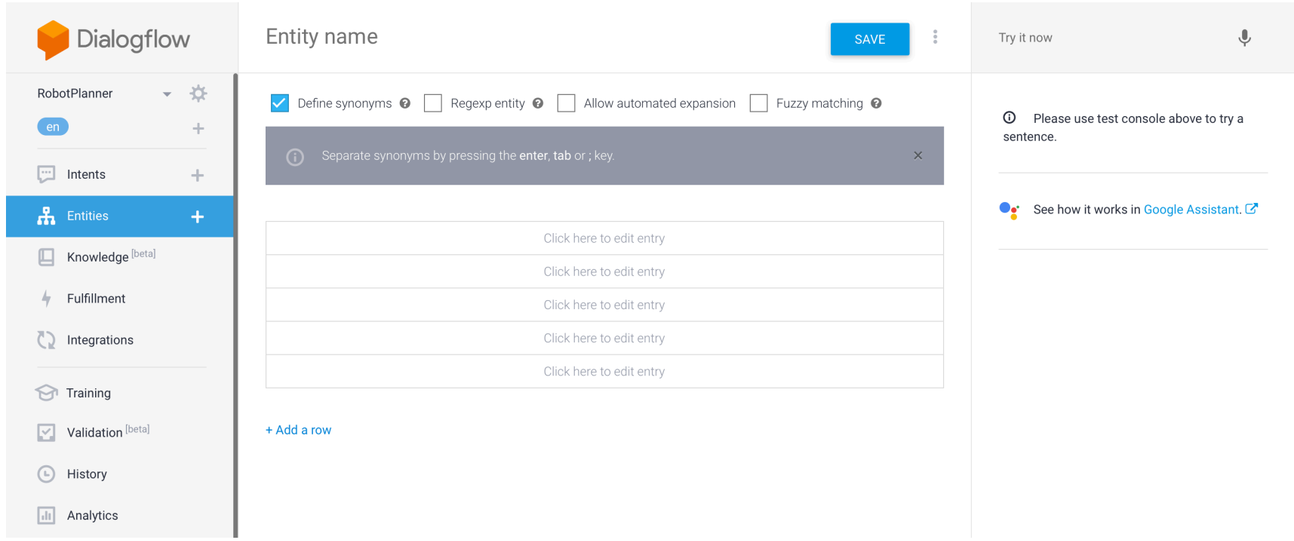
Thus, if the request was:

*What is the weather like today in Seattle?*

The *intent*: weather inquiry; *entity*: Seattle

# Entities in Dialogflow

Let's define some things that the robot can pick up.



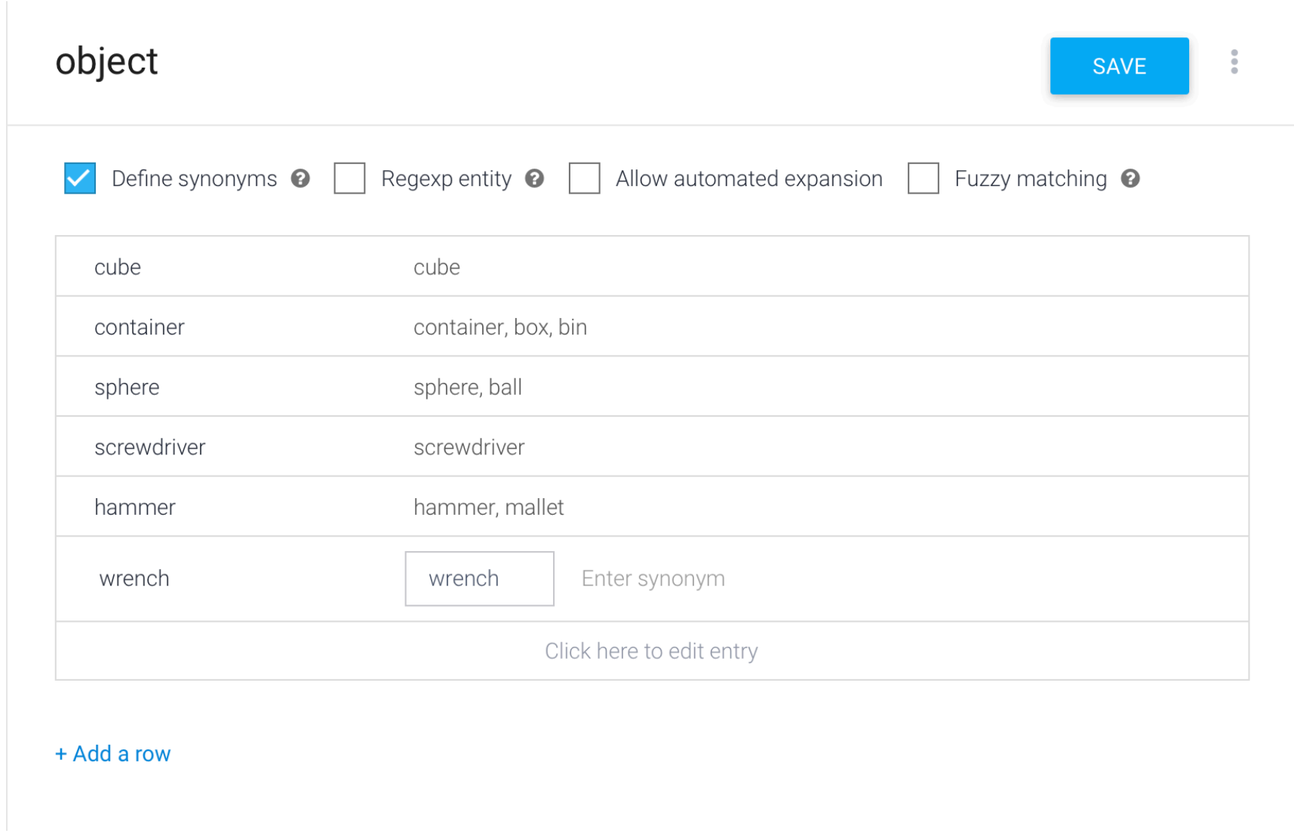
# Entities in Dialogflow

Remember I mentioned some objects when creating my intents. Let's add those here.

- Cube
- Sphere
- Screwdriver
- etc.

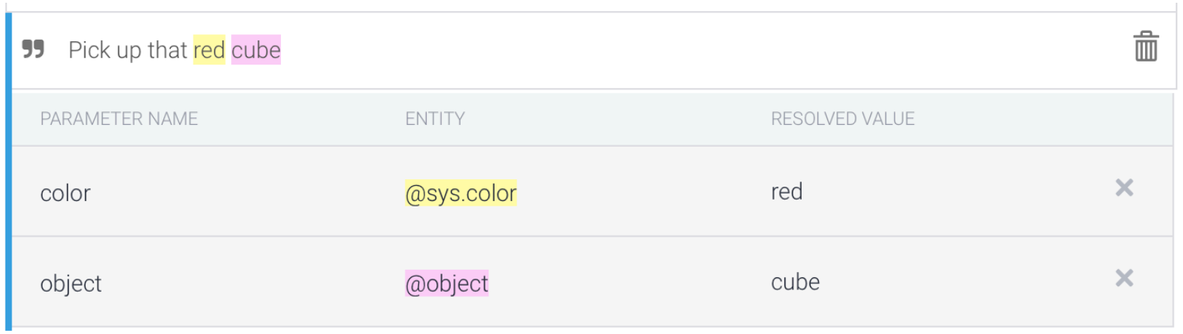
# Entity Entries and Synonyms

- Cube (Box)
- Container (Box, Bin)
- Sphere (Ball)
- Screwdriver



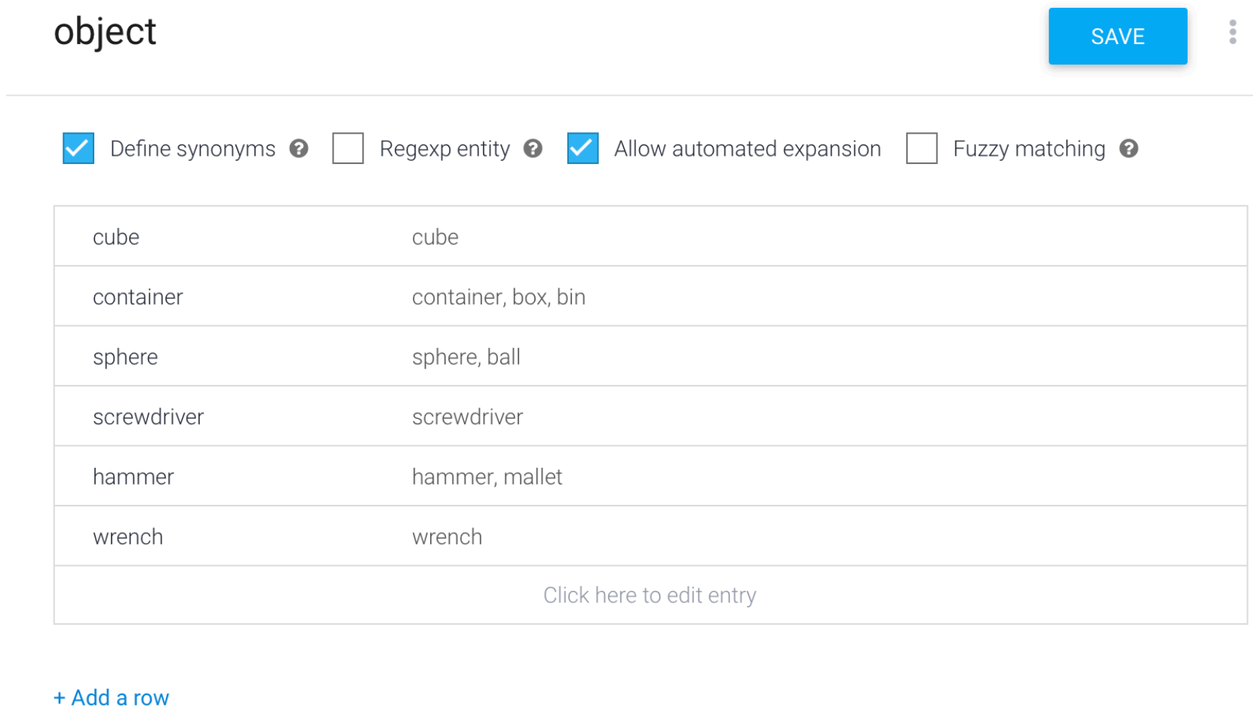
# Tagging Entities in Intents

Entities can be explicitly tagged in intents, if they are not automatically detected.



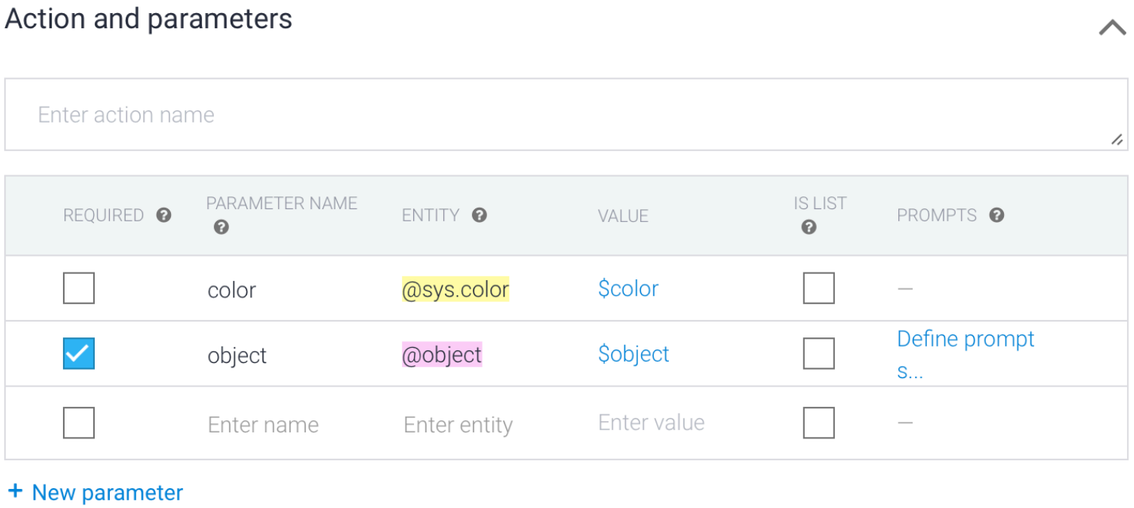
# Automated expansion

Allows dialogflow to extrapolate to new objects



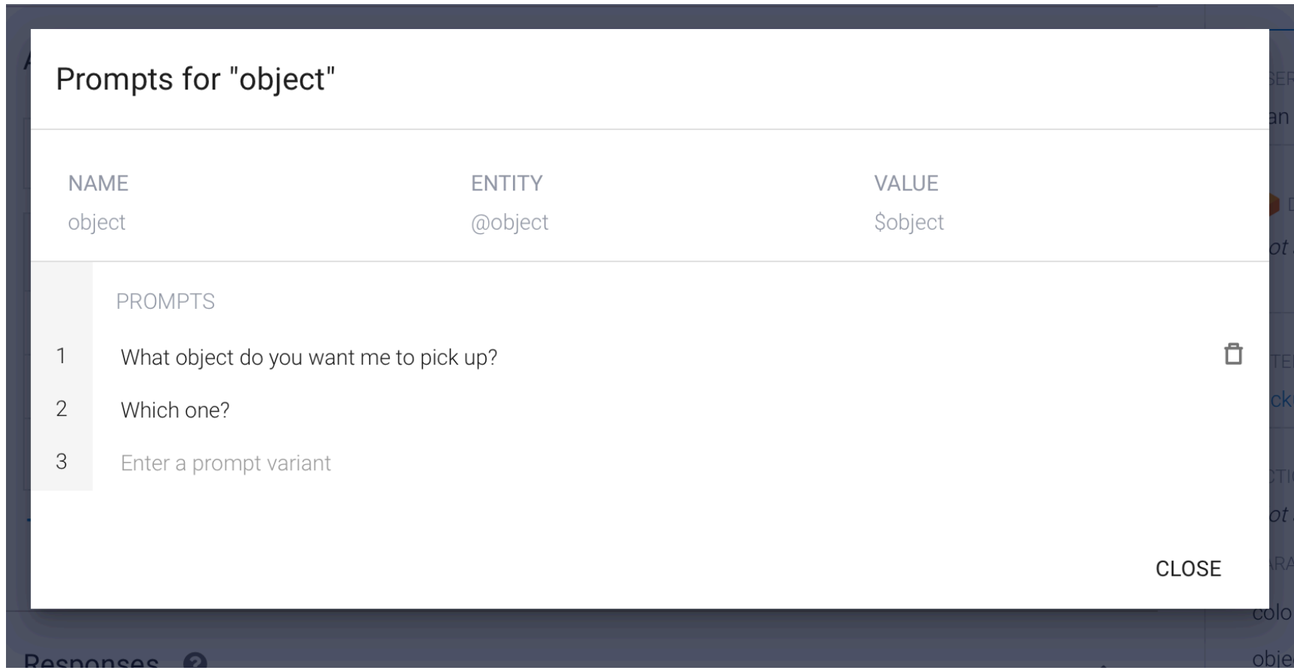
# Required Entities

Suppose you want to require the user provide some entity. You can make it required, and specify how you want the agent to respond if it isn't provided.



# Specifying prompts

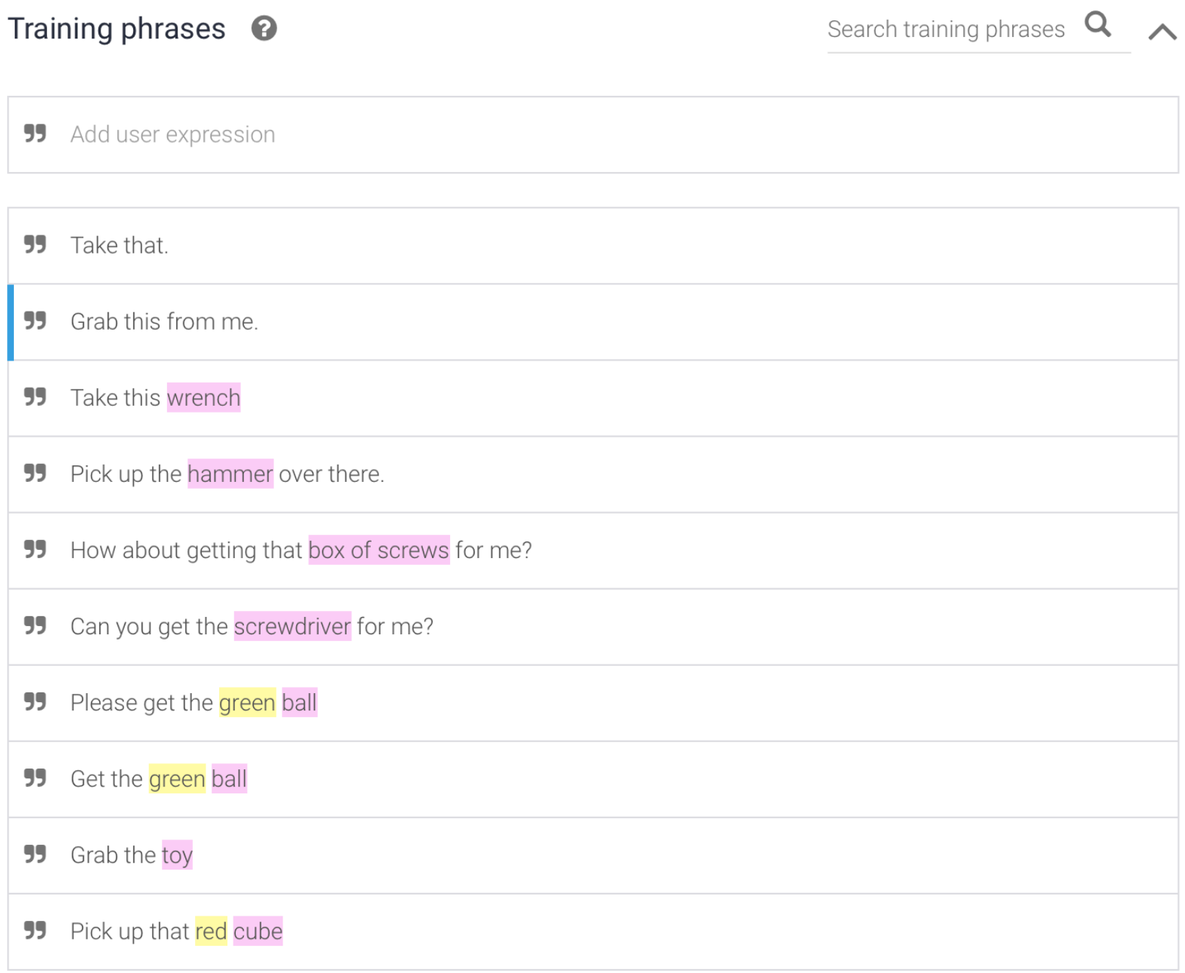
Specify in the modal what prompts to use to query the required entity.



# Tweaking your intents for required entities

Remove the entity from the prompt if it was too general. Then the agent will inquire if it gets that prompt.

Note: This could also be handled by context, which will be discussed next build class.



# Dialogflow Documentation

Full Documentation

# Assignment Preview

# Assignment Overview

- Available 11/25
- Due 12/13 (Last possible day to submit 12/20)
- 10 points (No intermediate assignments)
- GUI code will be available on GitHub

# Assignment Goals (1/3)

» Create a voice agent that allows a user to navigate a visual shopping interface.

» Allow the user to navigate from anywhere back to home, or to their cart.

» Allow the user to return to the previous page.

# Assignment Goals (2/3)

- Allow the user to specify the category of items they want to look at.
- Allow the user to specify attributes/tags to search in.
- Allow the user to navigate to product pages.

# Assignment Goals (3/3)

» Allow the user to add items (when on that product page) to their cart.

» Allow the user to go to checkout and complete the process.

# Server API

| Route | Auth Required | Token Required | Get | Post | Put | Delete |
|---|---|---|---|---|---|---|
| /login | ✔ | | ✔ | | | |
| /users | | | | ✔ | | |
| /users/ `<username>` | | ✔ | ✔ | ✔ | ✔ | ✔ |
| /tags | | | ✔ | | | |
| /categories | | | ✔ | | | |
| /products | | | ✔ | | | |
| /products/ `<product_id>` | | | ✔ | | | |
| /products/ `<product_id>` /tags | | | ✔ | | | |
| /products/ `<product_id>` /reviews | | | ✔ | | | |
| /products/ `<product_id>` /reviews/ `<review_id>` | | | ✔ | | | |
| /application | | ✔ | ✔ | | ✔ | |
| /application/tags | | ✔ | ✔ | | | ✔ |
| /application/tags/ `<tag_value>` | | ✔ | | ✔ | | ✔ |
| /application/messages | | ✔ | ✔ | ✔ | | ✔ |
| /application/messages/ `<message_id>` | | ✔ | ✔ | | ✔ | ✔ |
| /application/products | | ✔ | ✔ | | | ✔ |
| /application/products/ `<product_id>` | | ✔ | | ✔ | | ✔ |

# Pages

home
category:<category>
product:<product>
cart-current
cart-review
cart-confirmed

# Tips

There is no deliverable, but we suggest you start looking at the API and figuring out what your entities and intents need to be. Next build class we will look into how you use these intents and entities to modify the application state.

# Other Notes:

There will be no clinic hours on Wednesday, November 27. Please come Monday or Tuesday if you need assistance!

# What have we learned today?

- Introduction to Conversational Interfaces
- Introduction to Dialogflow
- Dialogflow Building Blocks, Part 1
- Let's Make an Agent
- Assignment Preview