LUIS: Language Understanding Intelligent Service

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Key Concepts

Utterance

- Textual input from the user that your app needs to interpret
- Example: "Book me a ticket to Paris", "Booking", "Paris flight“

Intents

- An intent is an action the user wants to perform
- Verbs/Goal expressed in a user's input
- Example: "booking a flight", "paying a bill", "finding a news article“
- Define a set of named intents:
  - “Book me a ticket to Paris” -> BookFlight

Key Concepts

Entities

- A class of object that is relevant to a user's intent
- Nouns
- Example: "Book me a ticket to Paris" -> "Paris"
- Pick the actions to fulfill an intent

Classes of similar objects

- Names
- Locations
- Time Expressions
- Money Expressions

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Types of Entities

Type	Description
Prebuilt	Built-in types that represent common concepts like dates, times, and geography
List	Variations, synonyms, same concept
Simple	A simple entity is a generic entity that describes a single concept
Hierarchical	A hierarchical entity defines a category and its members For example, in a travel agent app, you could add hierarchical entities like these: • $Location, including $FromLocation and $ToLocation as child entities that represent origin and destination locations • $TravelClass, including $First, $Business, and $Economy as child entities that represent the travel class
Composite	A composite entity is made up of other entities that form parts of a whole

Prebuilt Entities

Entity	en-US	fr-FR	it-IT	es-ES	zh-CN	de-DE	pt-BR	ja-JP	ko-kr
Datetime	Y	Y	Y	Y	Y	Y	Y	Y	-
Number	Y	Y	Y	Y	Y	Y	Y	Y	-
Percentage	Y	Y	Y	Y	Y	Y	Y	Y	-
Temperature	Y	Y	Y	Y	Y	Y	Y	Y	-
Dimension	Y	Y	Y	Y	Y	Y	Y	Y	-
Money	Y	Y	Y	Y	Y	Y	Y	Y	-
Age	Y	Y	Y	Y	Y	Y	Y	Y	-
Geography	Y	-	-	-	-	-	-	-	-
Encyclopedia	Y	-	-	-	-	-	-	-	-
URL	Y	-	-	-	-	-	-	-	-
Email	Y	-	-	-	-	-	-	-	-
Phone number	Y	-	-	-	-	-	-	-	-

Examples of Prebuilt Entities

Pre-built entity	Example Utterance	JSON
builtin.number	ten	{ "type": "builtin.number", "entity": "ten" }
builtin.number	3.1415	{ "type": "builtin.number", "entity": "3 . 1415" }
builtin.ordinal	first	{ "type": "builtin.ordinal", "entity": "first" }
builtin.ordinal	10th	{ "type": "builtin.ordinal", "entity": "10th" }
builtin.temperature	10 degrees celcius	{ "type": "builtin.temperature", "entity": "10 degrees celcius" }
builtin.temperature	78 F	{ "type": "builtin.temperature", "entity": "78 f" }
builtin.dimension	2 miles	{ "type": "builtin.dimension", "entity": "2 miles" }

Example of Intent

Example intent	Example utterances
BookFlight	Book me a flight to Rio next week Fly me to Rio on the 24th I need a plane ticket next Sunday to Rio de Janeiro
Greeting	Hi Hello Good morning
CheckWeather	What's the weather like in Boston? Show me the forecast for this weekend
None	Get me a cookie recipe

- All applications come with the predefined intent, "None"

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How do Intents Relate to Entities?

Example intent	Entity	Entity in example utterances
CheckWeather	{ "type": "location", "entity": "seattle" }	What's the weather like in Seattle?
CheckWeather	{ "type": "date_range", "entity": "this weekend" }	Show me the forecast for this weekend

Features

- Features are not intents or entities
- Features might provide examples of related terms, or a pattern to recognize in related terms

Type	Description
Phrase list	A phrase list includes a group of values (words or phrases) that belong to the same class
Pattern	A pattern specifies a regular expression to help LUIS recognize regular patterns that are frequently used in your application's domain

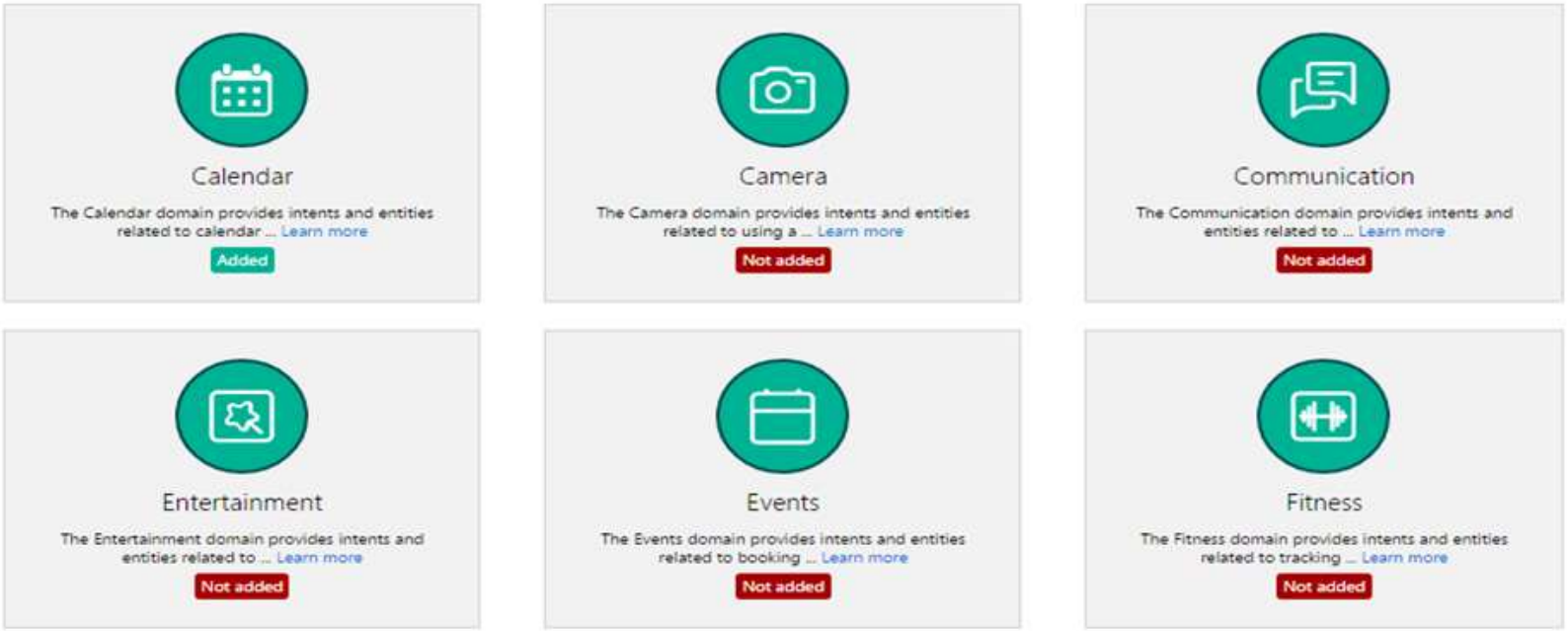
Types of Features - Patterns

- A pattern feature includes regular expression or regex
- Example: To recognize KnowledgeBaseArticle, the regex can be "kb\d+" for identifying knowledge base article IDs
  - Kb8732827
  - Kb3333337
- Enter some utterances and label the entity

Use Prebuilt Domains in LUIS Apps

Prebuilt domain	Description
Camera	Taking pictures and recording videos
Communication	Sending messages and making phone calls
Entertainment	Handling queries related to music, movies, and TV
Places	Handling queries related to places like businesses, institutions, restaurants, public spaces and addresses
Utilities	Handling requests that are common in many domains, like "help", "repeat", "start over"

Use Prebuilt Domains in LUIS Apps



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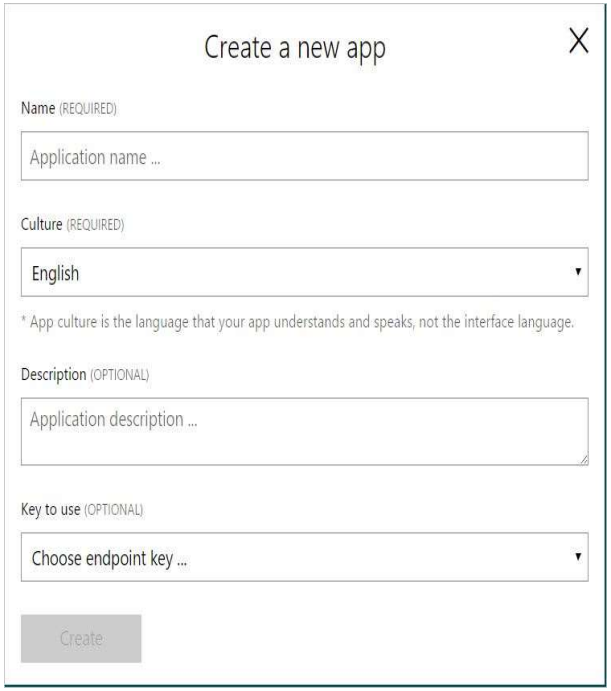
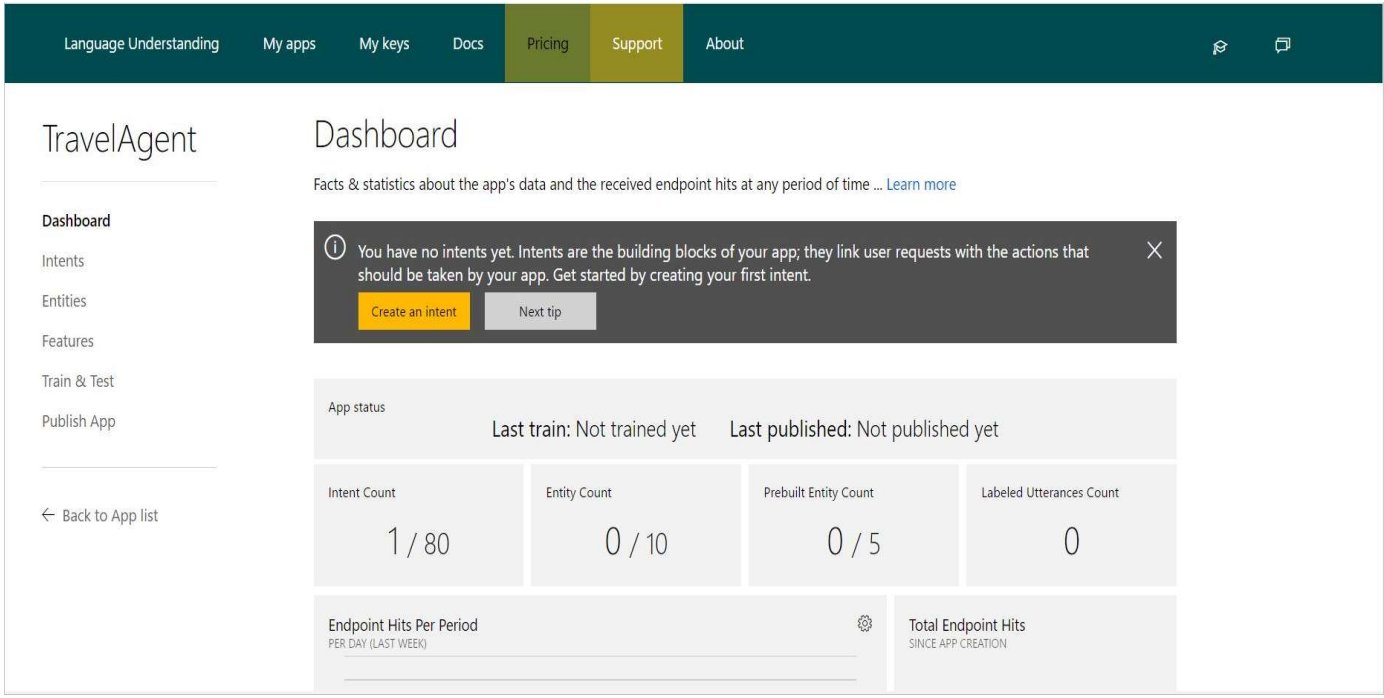
Create a New App





Add and Train Intents

- All applications come with the predefined intent - None

- Train the app to recognize user statements that are irrelevant to the app

- Example:
  "Get me a great cookie recipe" in a travel agent app, label that utterance with the None intent

- You can add up to 80 intents in a single LUIS app

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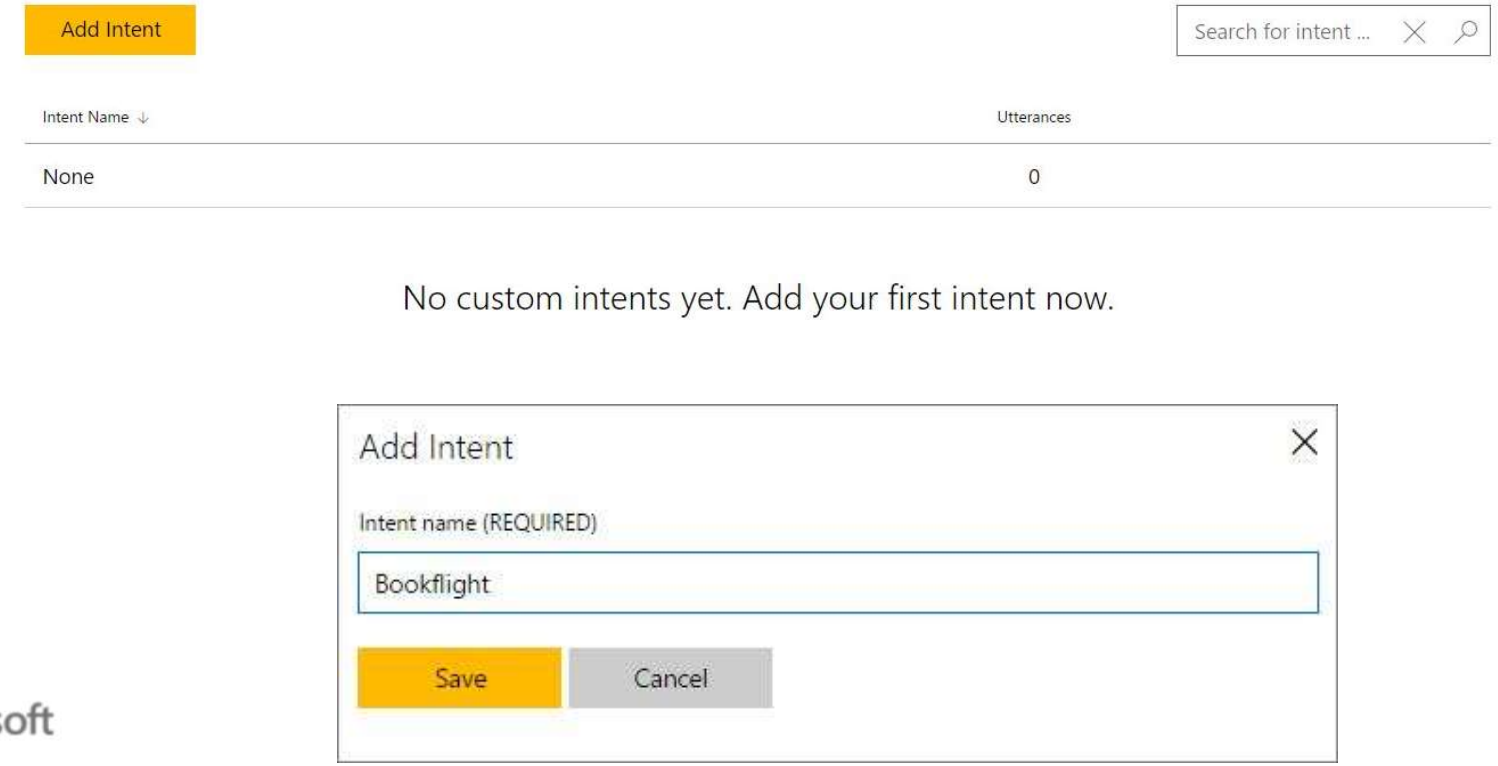
Add Intents

- Adding BookFlight Intent



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Add Example Utterances

- LUIS learns from utterances

- By constantly adding more utterances and labeling them, you are enhancing your application's language learning experience

- The more relevant and diverse examples you add to the intent, the better intent prediction you get from your app

- For example,
  - "book me a flight to Paris"
  - "Reserve me a flight to Paris"
  - "book me a ticket to Paris"
  - "Get me a ticket to Paris"
  - "Fly me to Paris"
  - "Take me on a flight to Paris"

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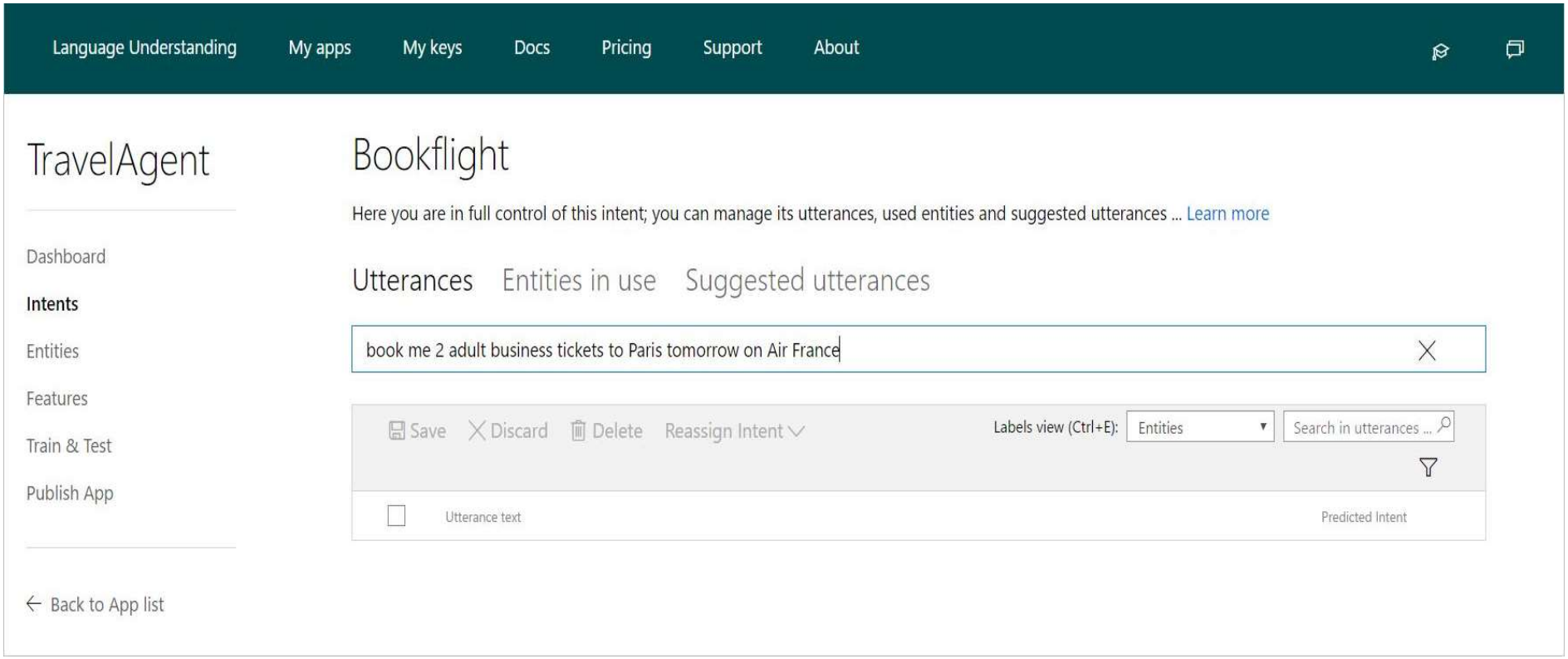
To Add an Utterance

Book me 2 adult business tickets to Paris tomorrow on Air France

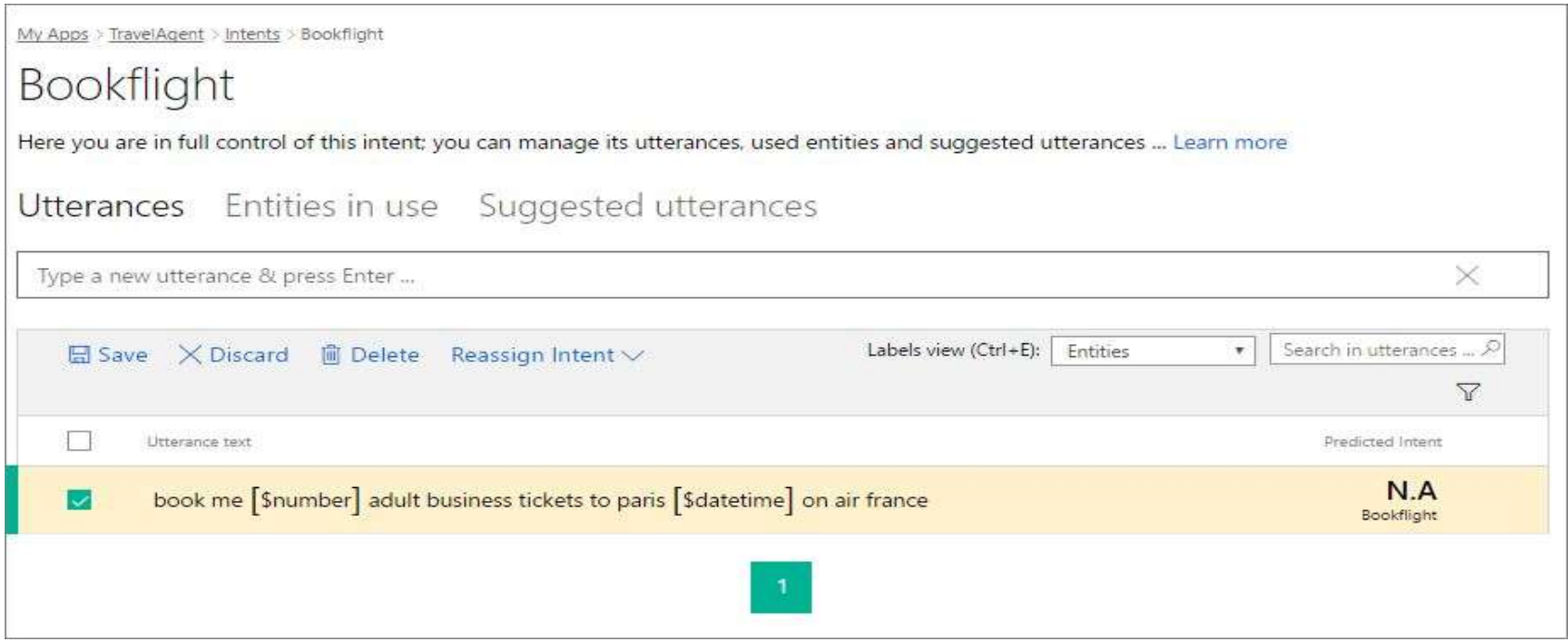


Label Utterances

- After adding utterances, we need to label them
- Utterances are labeled in terms of intents and entities
- Adding an utterance in an intent page means that it is labeled under this intent
- You only need to label custom entities, because prebuilt entities are detected and labeled automatically by your app

Label Utterances - Example

- *"book me 2 adult business tickets to Paris tomorrow on Air"*
- *number* and *datetime* are identified automatically from the example text
- *2* is labeled as *number* and "tomorrow" as *datetime*



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Label Custom Entities

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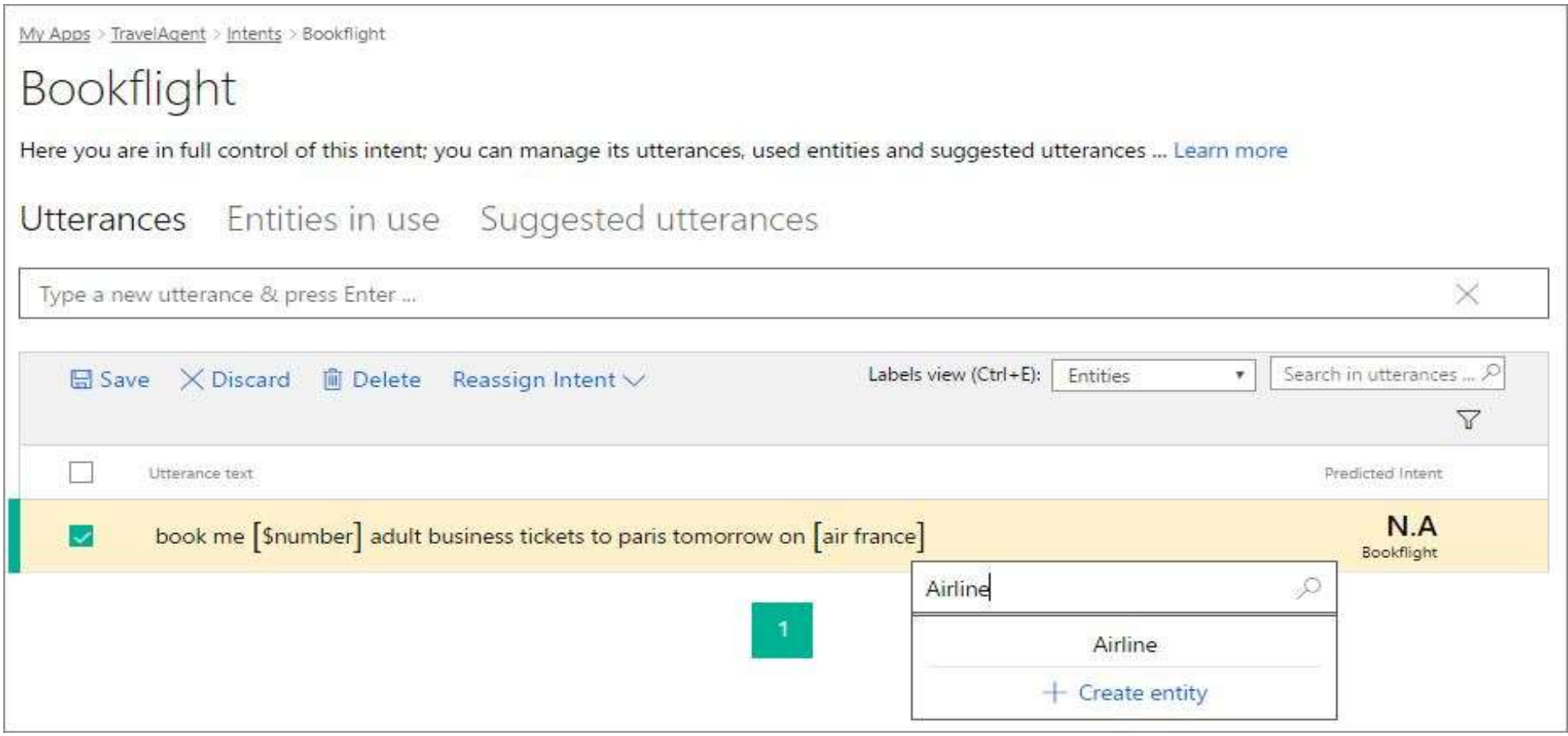

Add Entities

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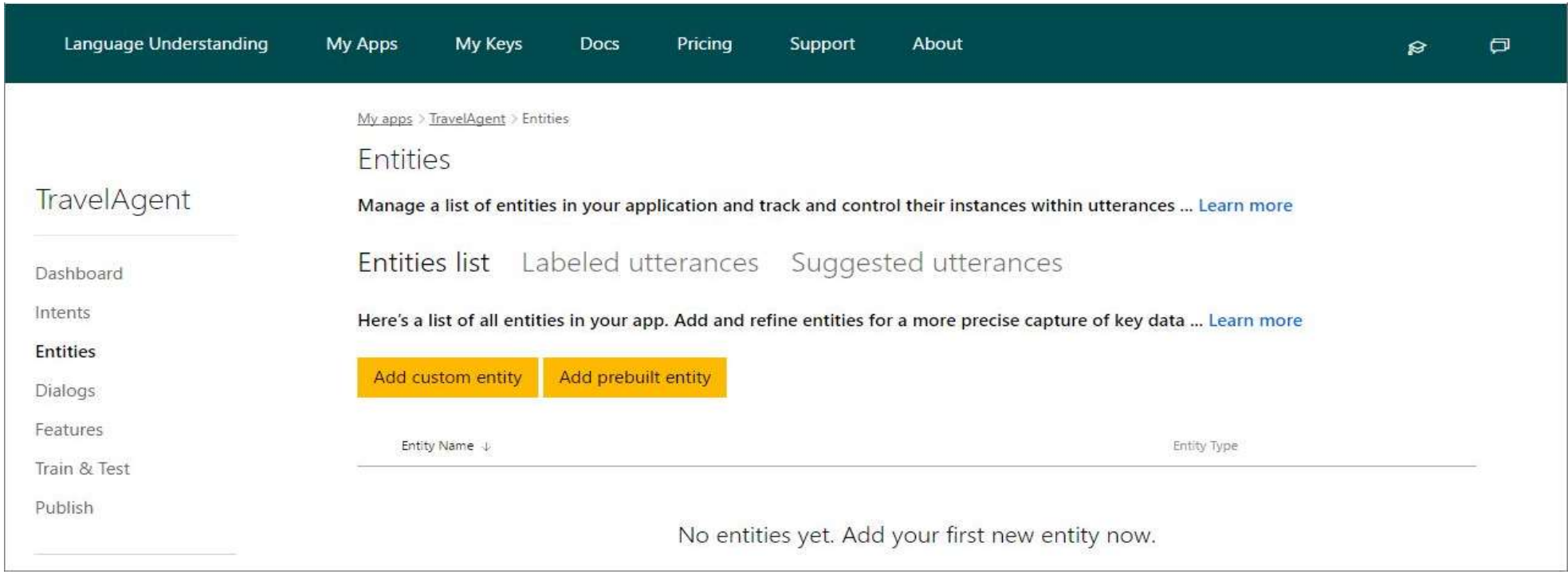
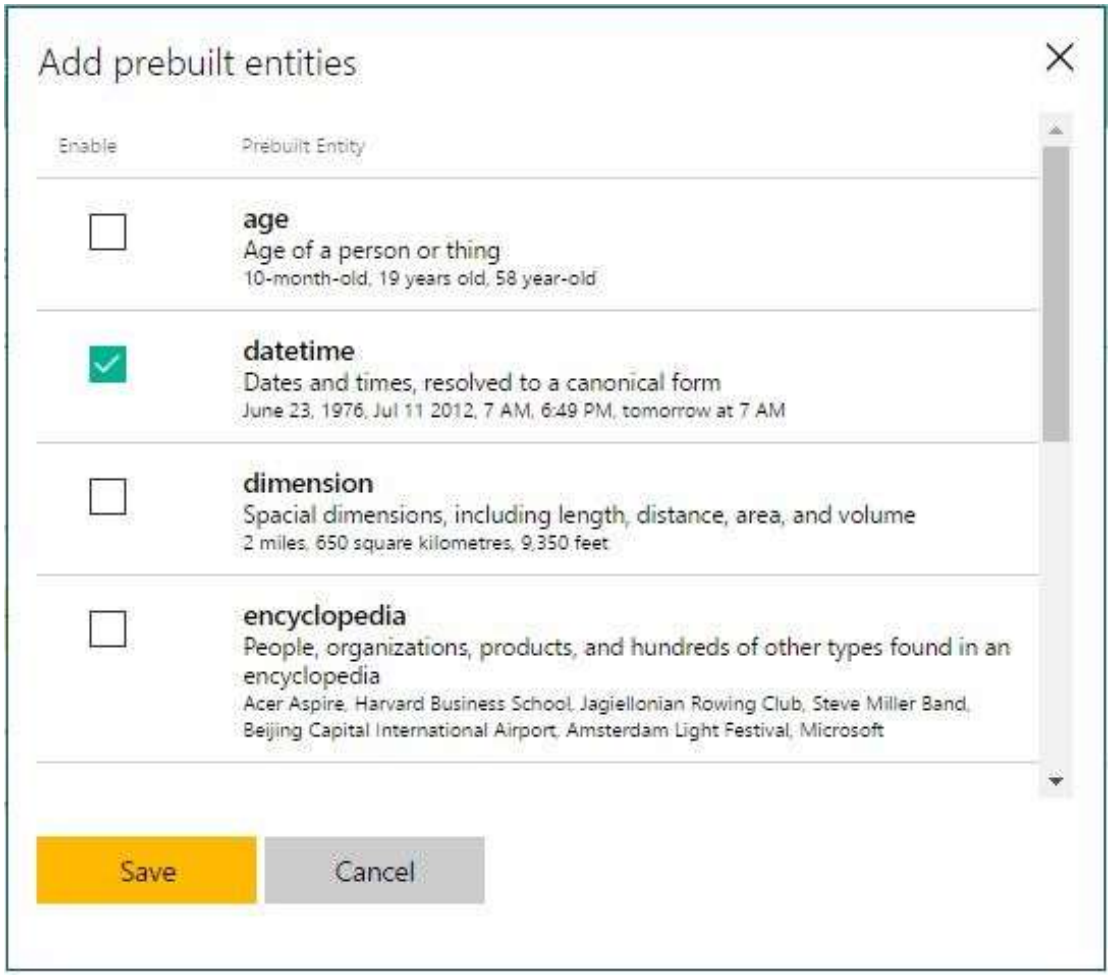
- You can add up to 30 entities in a single LUIS app
- Add prebuilt entities



Add Prebuilt Entities

- To add datetime



Custom Entities

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- Simple: a generic entity
- Hierarchical: a parent including children (sub-types) which are dependent on the parent
- Composite: a compound of two or more separate entities combined together forming a composite and treated as a single entity
- List: a customized list of entity values, to be used as keywords or identifiers to recognize the entity within utterances

Simple Entity

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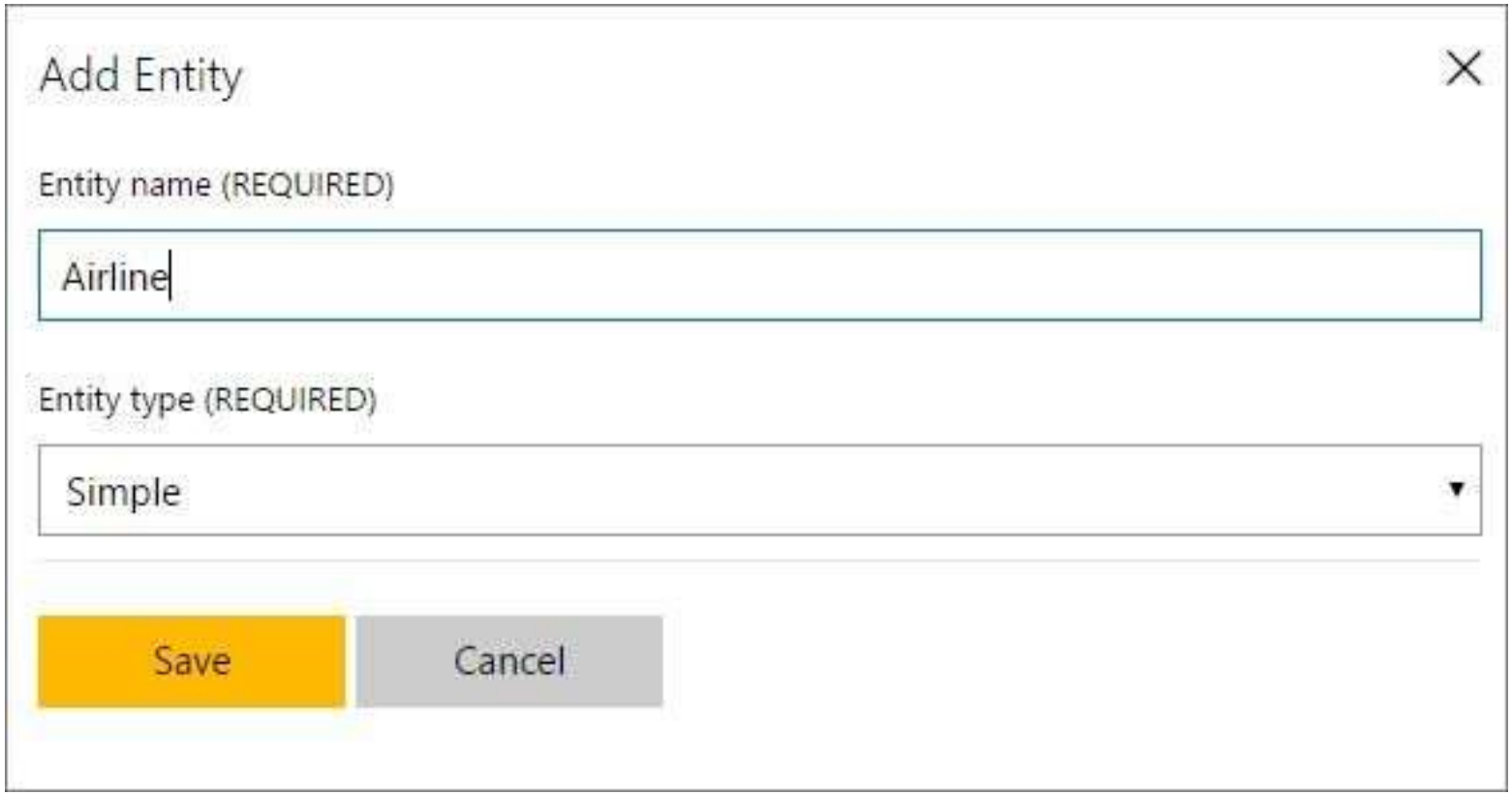

Hierarchical Entity

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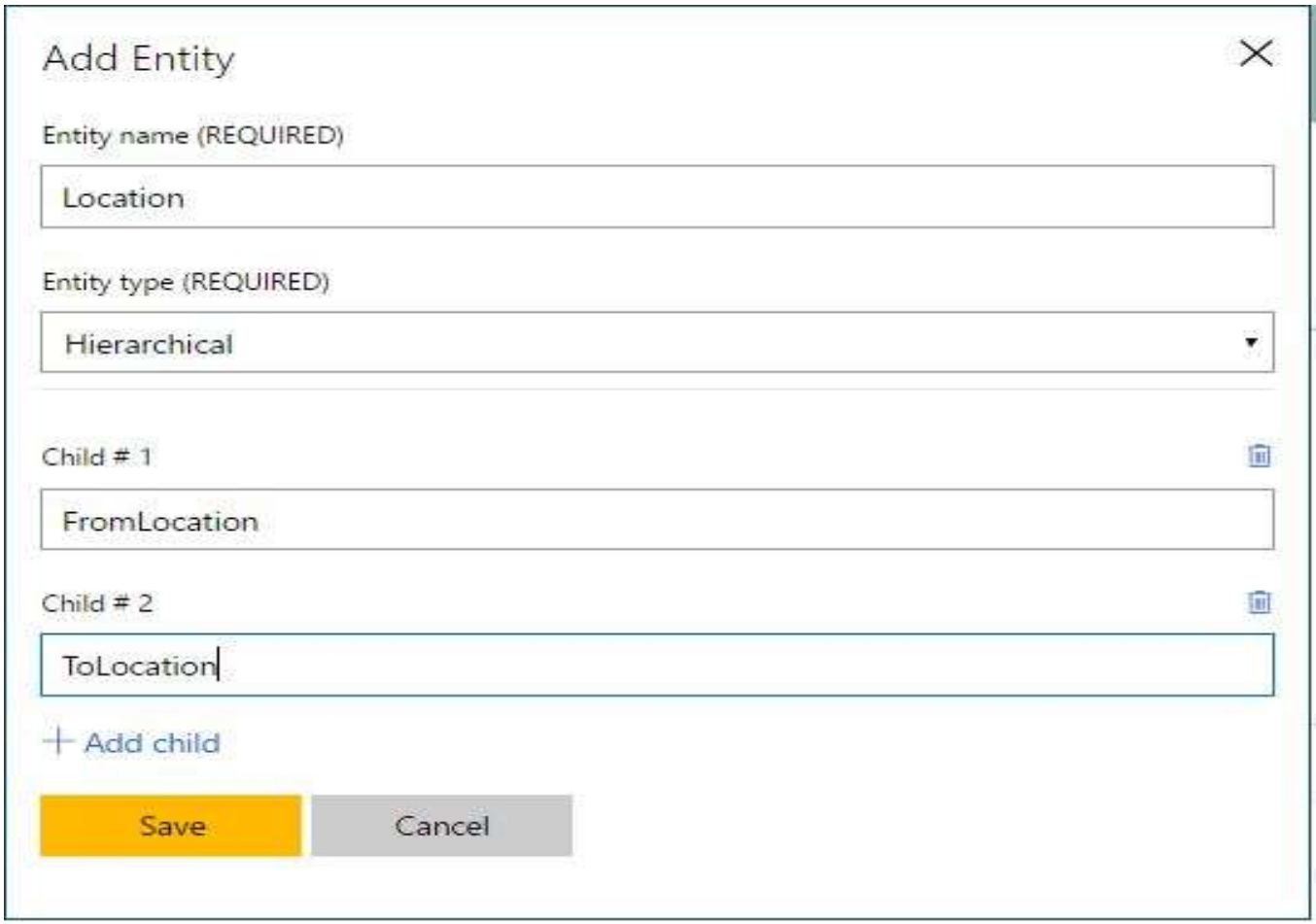
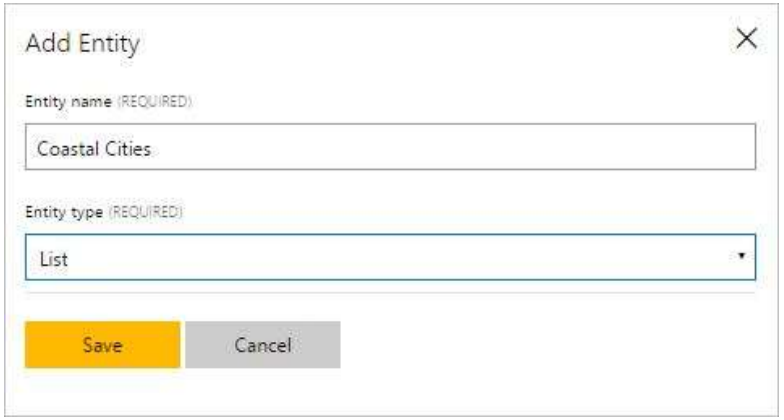
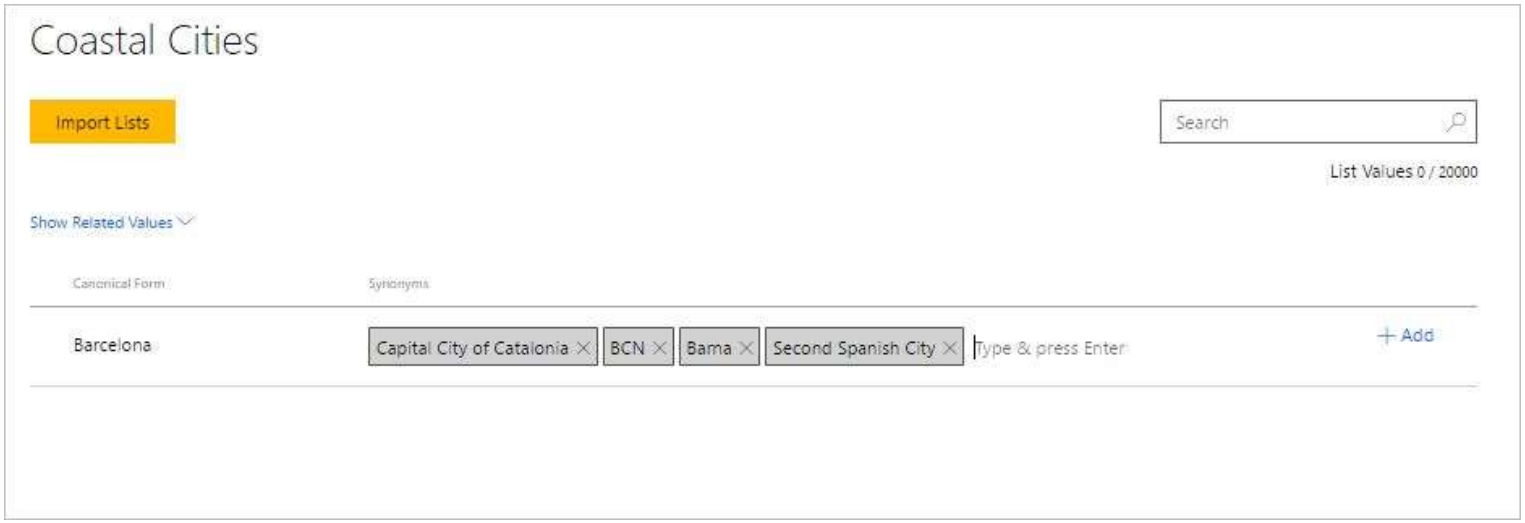


List Entity

- Manually add lists
- Import list from file





Train and Test Your App

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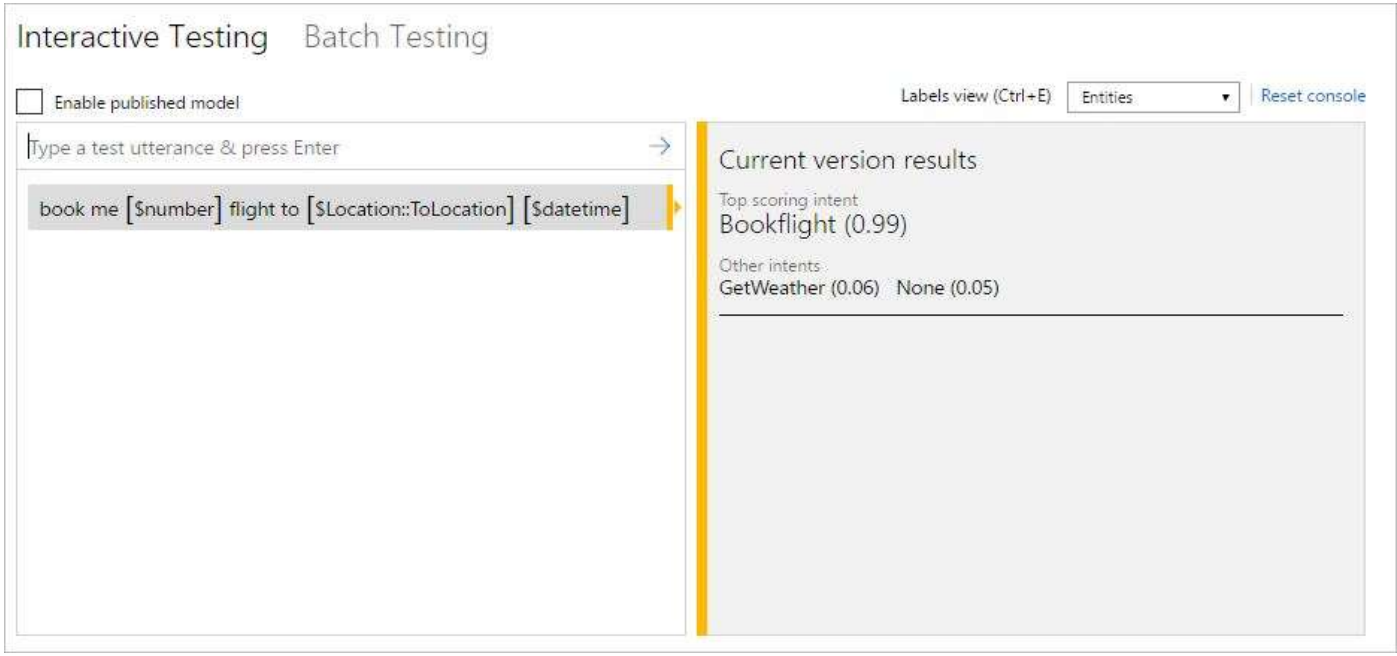
- Interactive testing
- Batch testing:
  - Large number of test utterances in a batch file
  - JSON format
  - <1000 utterances
- Validation Visualization



Publish Your App

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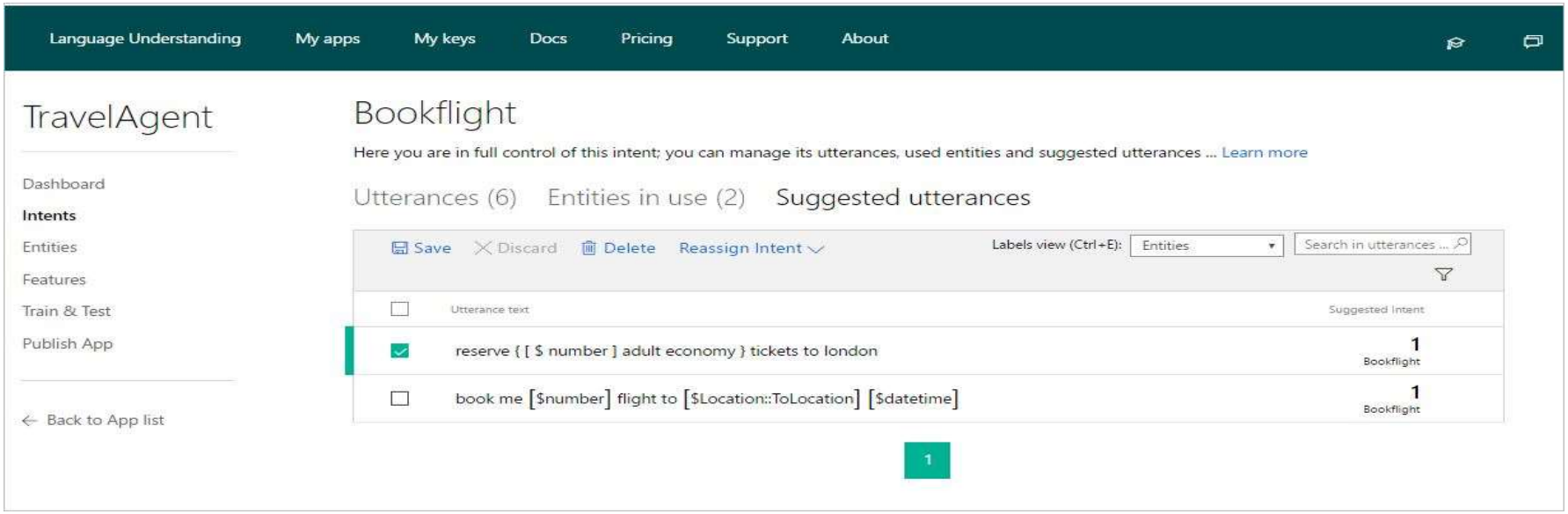
- Publish the app as a web service on Azure
- Get an HTTP endpoint
- Production Slot: Publish your app directly to the Production Slot where end users can access and use your model
- Staging Slot: Publish your app to the Staging Slot where you can iteratively test your app to validate changes before publishing to the production slot

Suggested Utterances

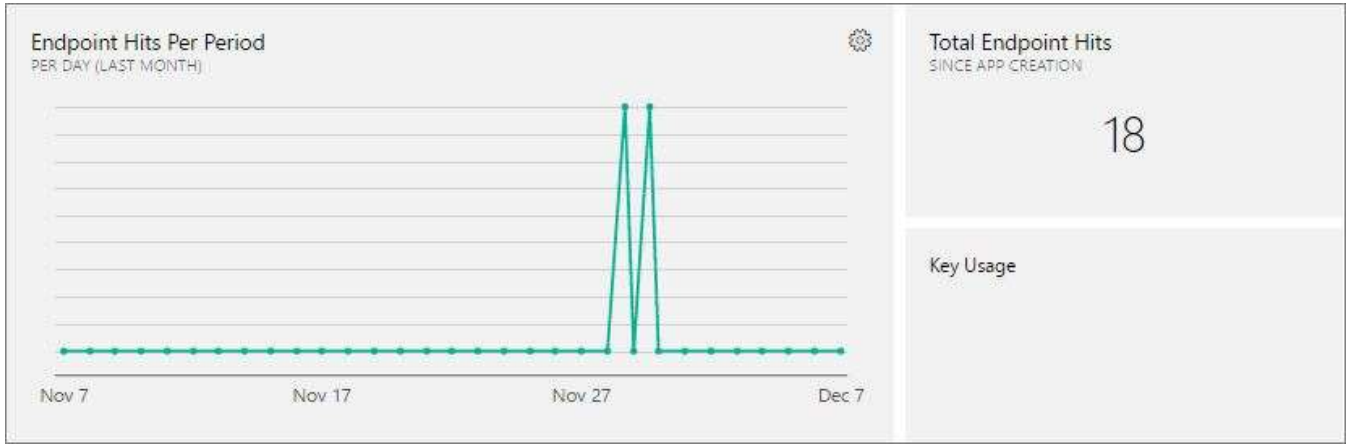
- Suggested utterances are from end-user queries on the application's HTTP endpoint
- If the app is not published or has not received hits yet, you will not have any suggested utterances
- You will not get suggested utterances for an intent/entity if no endpoint hits are received on this intent/entity



Monitor your App

- The app dashboard is a visualized reporting tool which enables you to monitor your app at a single glance
- Displays significant data compiled from multiple app pages
- Model Data Statistics

- Endpoint Hits



Monitor your App

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