

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

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	<p>A hierarchical entity defines a category and its members</p> <p>For example, in a travel agent app, you could add hierarchical entities like these:</p> <ul style="list-style-type: none">• \$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"

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

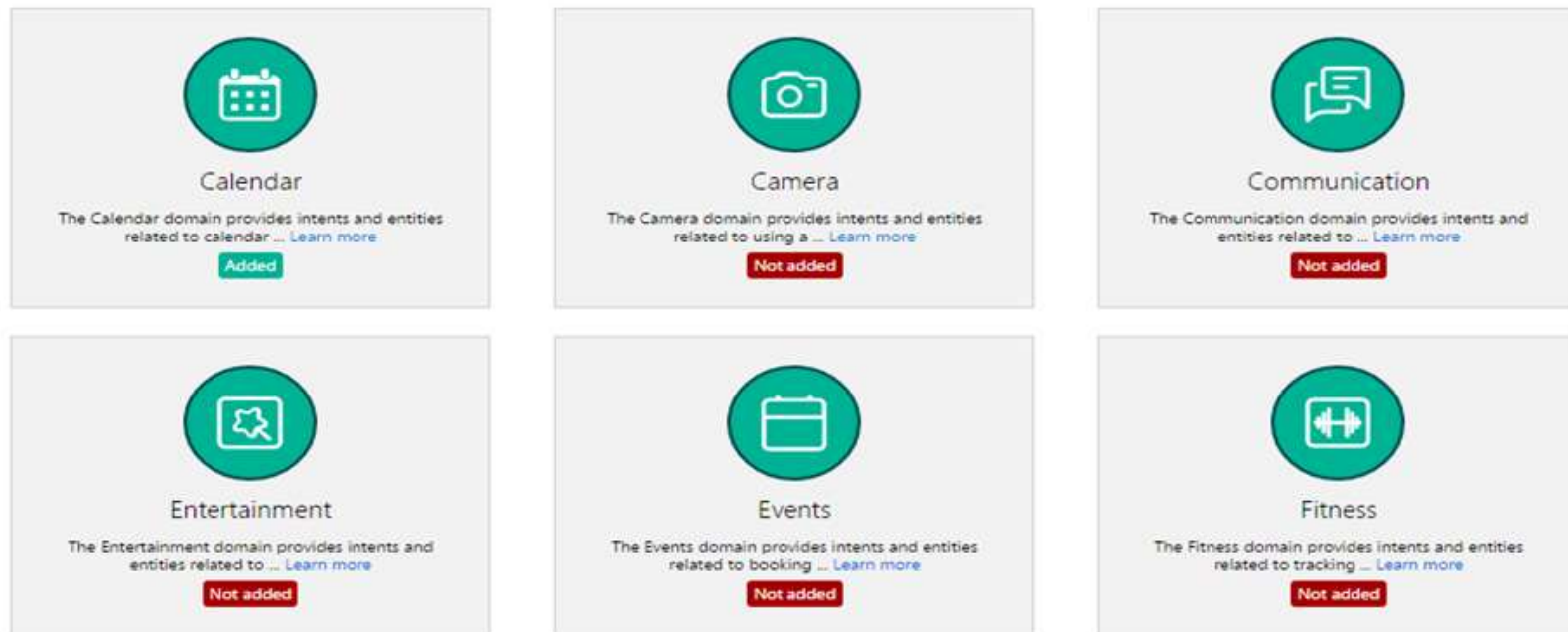
Types of Features - Patterns

- 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



Create a New App



Create a new app

Name (REQUIRED)

Application name ...

Culture (REQUIRED)

English

* App culture is the language that your app understands and speaks, not the interface language.

Description (OPTIONAL)

Application description ...

Key to use (OPTIONAL)

Choose endpoint key ...

Create

Language UnderstandingMy appsMy keysDocsPricingSupportAbout

TravelAgent

Dashboard

Facts & statistics about the app's data and the received endpoint hits at any period of time ... [Learn more](#)

You have no intents yet. Intents are the building blocks of your app; they link user requests with the actions that should be taken by your app. Get started by creating your first intent.

Create an intentNext tip

App status

Last train: Not trained yetLast published: Not published yet

Intent Count

Entity Count

Prebuilt Entity Count

Labeled Utterances Count

1 / 800 / 100 / 50

Endpoint Hits Per Period

PER DAY (LAST WEEK)

Total Endpoint Hits

SINCE APP CREATION

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

Add Intents

- Adding BookFlight Intent

Add Intent

Search for intent ... ✕ 🔍

Intent Name ↓	Utterances
None	0

No custom intents yet. Add your first intent now.

Add Intent ✕

Intent name (REQUIRED)

Bookflight

Save

Cancel

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"

To Add an Utterance



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

[Language Understanding](#) [My apps](#) [My keys](#) [Docs](#) [Pricing](#) [Support](#) [About](#)

TravelAgent

Dashboard

Intents

Entities

Features

Train & Test

Publish App

Bookflight

Here you are in full control of this intent; you can manage its utterances, used entities and suggested utterances ... [Learn more](#)

Utterances Entities in use Suggested utterances

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

Save Discard Delete Reassign Intent

Labels view (Ctrl+E): Entities Search in utterances ...

Utterance text

Predicted Intent

[← Back to App list](#)

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*

My Apps > TravelAgent > Intents > Bookflight

Bookflight

Here you are in full control of this intent; you can manage its utterances, used entities and suggested utterances ... [Learn more](#)

Utterances Entities in use Suggested utterances

Type a new utterance & press Enter ...

[Save](#) [Discard](#) [Delete](#) [Reassign Intent](#) Labels view (Ctrl+E): Entities Search in utterances ...

<input type="checkbox"/>	Utterance text	Predicted Intent
<input checked="" type="checkbox"/>	book me [\$number] adult business tickets to paris [\$datetime] on air france	N.A Bookflight

1

Label Custom Entities



My Apps > TravelAgent > Intents > Bookflight

Bookflight

Here you are in full control of this intent; you can manage its utterances, used entities and suggested utterances ... [Learn more](#)

Utterances Entities in use Suggested utterances

Type a new utterance & press Enter ...

Save Discard Delete Reassign Intent

Labels view (Ctrl+E): Entities Search in utterances ...

<input type="checkbox"/>	Utterance text	Predicted Intent
<input checked="" type="checkbox"/>	book me [\$number] adult business tickets to paris tomorrow on [air france]	N.A Bookflight

1

Airline

Airline

+ Create entity

Add Entities



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

The screenshot shows the Microsoft LUIS portal interface. At the top is a dark green navigation bar with links: Language Understanding, My Apps, My Keys, Docs, Pricing, Support, and About. On the right of this bar are icons for a notification bell and a chat bubble. Below the navigation bar is a breadcrumb trail: [My apps](#) > [TravelAgent](#) > [Entities](#).

The main content area has a left sidebar for the 'TravelAgent' app with links: Dashboard, Intents, **Entities** (highlighted), Dialogs, Features, Train & Test, and Publish. The main content area is titled 'Entities' and includes a description: 'Manage a list of entities in your application and track and control their instances within utterances ... [Learn more](#)'. Below this are three tabs: 'Entities list' (selected), 'Labeled utterances', and 'Suggested utterances'. A message states: 'Here's a list of all entities in your app. Add and refine entities for a more precise capture of key data ... [Learn more](#)'. Two yellow buttons are present: 'Add custom entity' and 'Add prebuilt entity'. Below these is a table header with 'Entity Name' (with a dropdown arrow) and 'Entity Type'. The table body is empty, and a message at the bottom says: 'No entities yet. Add your first new entity now.'

Add Prebuilt Entities



- To add datetime

Add prebuilt entities

Enable

Prebuilt Entity

☐

age
Age of a person or thing
10-month-old, 19 years old, 58 year-old

☒

datetime
Dates and times, resolved to a canonical form
June 23, 1976, Jul 11 2012, 7 AM, 6:49 PM, tomorrow at 7 AM

☐

dimension
Spacial dimensions, including length, distance, area, and volume
2 miles, 650 square kilometres, 9,350 feet

☐

encyclopedia
People, organizations, products, and hundreds of other types found in an encyclopedia
Acer Aspire, Harvard Business School, Jagiellonian Rowing Club, Steve Miller Band, Beijing Capital International Airport, Amsterdam Light Festival, Microsoft

Save

Cancel

Custom Entities



- **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



Add Entity

Entity name (REQUIRED)

Airline

Entity type (REQUIRED)

Simple

Save

Cancel

Hierarchical Entity



Add Entity

Entity name (REQUIRED)

Entity type (REQUIRED)

Child # 1

Child # 2

+ Add child

Save

Cancel

List Entity



- Manually add lists
- Import list from file

Add Entity

Entity name (REQUIRED)

Coastal Cities

Entity type (REQUIRED)

List

Save

Cancel

Coastal Cities

Import Lists

Search

List Values 0 / 20000

Show Related Values

Canonical Form

Synonyms

Barcelona

Capital City of Catalonia

BCN

Bama

Second Spanish City

Type & press Enter

+ Add

Train and Test Your App



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

Interactive Testing

Batch Testing

☐ Enable published model

Type a test utterance & press Enter

→

book me [\$number] flight to [\$Location::ToLocation] [\$datetime]

▶

Labels view (Ctrl+E)

Entities

Reset console

Current version results

Top scoring intent

Bookflight (0.99)

Other intents:

GetWeather (0.06) · None (0.05)

Publish Your App



- 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

The screenshot shows the Microsoft Azure Language Understanding portal. The top navigation bar includes links for Language Understanding, My apps, My keys, Docs, Pricing, Support, and About. The left sidebar shows the 'TravelAgent' app with a menu for Dashboard, Intents, Entities, Features, Train & Test, and Publish App. The main content area is for the 'Bookflight' intent, with a subtitle: 'Here you are in full control of this intent; you can manage its utterances, used entities and suggested utterances ... [Learn more](#)'. Below this, there are tabs for 'Utterances (6)', 'Entities in use (2)', and 'Suggested utterances'. The 'Suggested utterances' tab is active, showing a table with two rows of suggested utterances. The first row is 'reserve { [\$ number] adult economy } tickets to london' with a 'Suggested Intent' of 'Bookflight' and a count of '1'. The second row is 'book me [\$number] flight to [\$Location::ToLocation] [\$datetime]' with a 'Suggested Intent' of 'Bookflight' and a count of '1'. Above the table, there are buttons for 'Save', 'Discard', 'Delete', and 'Reassign Intent', along with a 'Labels view (Ctrl+E)' dropdown and a search bar. A green box with the number '1' is located at the bottom right of the screenshot.

Utterance text	Suggested Intent
reserve { [\$ number] adult economy } tickets to london	Bookflight 1
book me [\$number] flight to [\$Location::ToLocation] [\$datetime]	Bookflight 1

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

