APPLIED NATURAL LANGUAGE PROCESSING BOOK STORE CHATBOT DEVELPOMENT

PART III: Conversational AI System: Implementation and Development

Deploying a Conversational AI system for a bookstore involves several key steps, from testing to implementation. Here is a general guide:

Testing Phase:
Functionality Testing:
Ensure that the AI system understands and responds appropriately to user queries related to ordering books, opening hours, location, and other relevant information.

User Experience Testing:
Test the conversational flow to ensure a smooth and intuitive interaction. Check for natural language understanding and generation to make sure the system comprehends user input accurately and provides coherent responses.

Integration Testing:
Verify the integration of the conversational AI system with other platforms or systems the bookstore might use, such as a website, mobile app, or social media channels.

Multi-Channel Testing:
Test the AI system's performance across various channels, such as website chat, social media messaging, or dedicated apps.

Error Handling Testing:

Assess how the system handles unexpected or incorrect user inputs. Implement effective error messages or fallback mechanisms.

Deployment Phase:

Please take note of the following steps:

1. Choose a Deployment Channel: Decide where you want to integrate the conversational AI system - on your bookstore website, through a dedicated mobile app, or on social media platforms.

2. Integrate with Existing Systems: Integrate the AI system with other bookstore systems, such as inventory management, order processing, or customer relationship management tools.

3. Implement Security Measures: Implement security protocols to protect user data and ensure secure transactions, especially if the AI system involves handling sensitive information.

4. Plan for Scalability: Plan for scalability, considering potential increases in user interactions. Ensure that the system can handle higher loads during peak times.

5. Set up Continuous Monitoring: Set up monitoring tools to keep track of the AI system's performance and user interactions. This helps identify and address issues promptly.

6. Implement a User Feedback Mechanism: Implement a feedback mechanism to gather user input on the AI system's performance. Use this feedback to make continuous improvements.

7. Regular Updates: Ensure that the AI system is up to date with regular updates.

Compliance: It is important to ensure that the deployment adheres to relevant data protection regulations and industry standards.

Training for Staff: The bakery staff should be trained to assist customers who may prefer human interaction or encounter issues with the AI system.

Marketing and Promotion: Developing a marketing strategy is crucial to promote the new AI system and encourage customers to use it for a better overall customer experience.

Creating a new virtual retail agent for G-Records using Dialogflow CX involves setting up a project in Google Cloud Console, enabling the Dialogflow API, and creating a new CX agent.
New Dialogflow CX agent creation-
Open the Dialogflow CX Console first to create a new Dialogflow CX agent.
Select the Google Cloud project that was already created.
Select the Create agent button.

- ➢ We can choose any display name.so here I create my display name as record-retailers.
- ➢ Choose us-central1 as location.
- ➢ Select your preferred time zone.
- ➢ Select en - English as default language.
- ➢ Finally, click on the create option.

New Project

⚠   You have 7 projects remaining in your quota. Request an increase or
    delete projects. Learn more ⧉

    MANAGE QUOTAS ⧉

┌─ Project name * ───┐
│ Bookstore   ❓ │
└──┘
Project ID: bookstore-407304. It cannot be changed later.   EDIT

┌─ Location * ───┐
│ ⊞ No organisation   BROWSE   │
└──┘
Parent organisation or folder

CREATE   CANCEL

≡   🔷 Dialogflow CX   ┌─ Project ──────────┐   ❓ 👤⁶
                          │ bookstore   ▾ │
                          └────────────────────┘

Agents

┌─ Location ──────────────┐
│ us-central1 (Iowa, USA) ▾│   **Location settings**   **Use pre-built agents**   **Create agent**
└─────────────────────────┘

🔍 **Search** Search agents by ID or display name

Display Name	Default language	Region ↑	
Bookstore	en	us-central1 (Iowa, USA)	⋮

Next, complete the steps to add the flows to the conversational AI
system.
Creating Flows:
- Creating flows in Dialogflow CX is an important step in
  designing your conversational agent. Each flow represents a
  part of the conversation that handles specific user interactions
  or topics. Here are the steps to create the flows you
  mentioned:

Create the "Book Recommendation" Flow:
- In Dialogflow CX, click on the "+" icon (usually located in the left
  sidebar) to create a new flow.

This will create your first flow, "

Create the "Order Management" Flow:

- Similarly, create a new flow by clicking the "+" icon.
- Specify the name as "Order Management" and hit enter.

Create the "Membership Services" Flow:
- Create another flow by clicking the "+" icon.
- Specify the name as "Membership Services" and hit enter.

Create the "General Enquiry" Flow:
- Once again, create a new flow using the "+" icon.
- Specify the name as "Customer Care" and hit enter.

By following these steps, you'll create the four flows: "Book Recommendation Menu", "Order Management"," Membership services", "General Enquiry" in Dialogflow CX. These flows represent different sections of your conversational agent and will be used to organize and manage the conversation with users.

Later in your lab, you will set up page state handlers to define the visual structure of your flows, ensuring that the conversation flows smoothly as intended for your retail virtual agent.
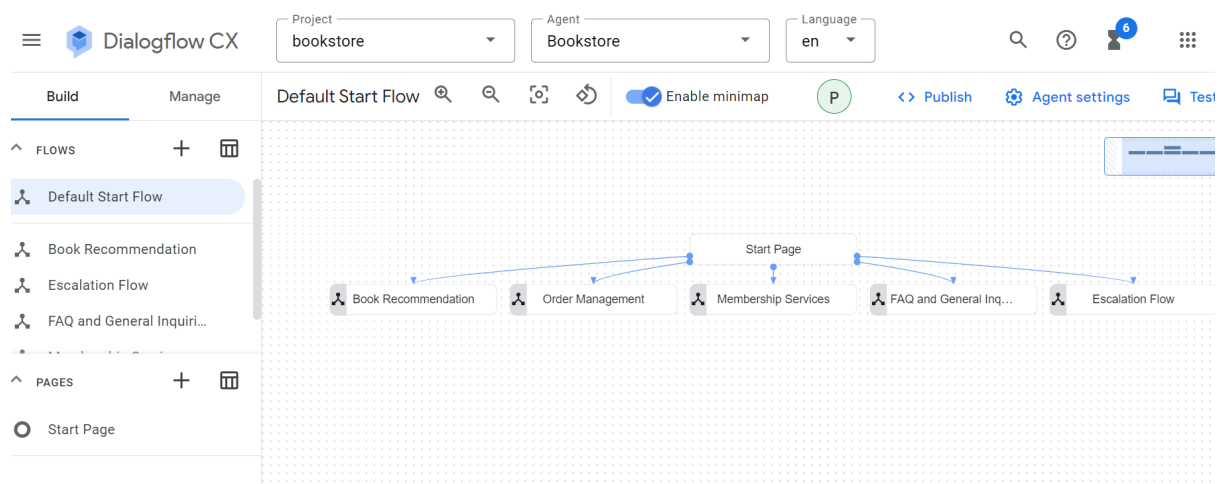
We will set page state handlers later in this experiment to ensure that the visualization will finally appear as follows:
- The built-in simulator allows us to test the virtual agent on the right side of the Dialogflow CX Console. We have the option of testing the dialogue from the beginning or from a certain flow.

- In the upper right corner of the screen, choose the Test Agent button.

Default Start Flow

- To set up the Default Start Flow in Dialogflow CX and configure the welcome message with quick reply to buttons or suggestion chips, follow these steps:

Configure the Start Page:

- On the Start page, you will see the "Start" tree node automatically selected. This is the entry point for your conversation.

In the "Start > Routes" section, click on the "Default Welcome Intent."

- Let's modify this default welcome text.
- Let's begin by establishing an Intent Route that will be activated as soon as you meet the virtual agent.
- Select the Start tree node by clicking on the Default Start Flow link in the left Build > Flows sidebar.
- The Start page will then be shown. In the Build > Pages sidebar area, the Start page was automatically chosen.
- Click on the Default Welcome Intent under Start > Routes.
- An end user's desire for one conversational turn is classified by an intent. Intents in Dialogflow CX may be used in a state handler to direct users to the following active page or fulfillment.
- Substitute the following new text for all the Agent says entries.
- Click on Add dialogue option > Custom payload and use the below code snippet.
- Use the below code snippet as a Custom payload and click save.
- Add Quick Reply Buttons (Suggestion Chips):
- To provide quick reply to buttons or suggestion chips, click on "Add dialogue option" > "Custom payload."
- {
- "suggestions": [

```
    {
      "reply": "Book Recommendation"
    },
    {
      "reply": "Order Management"
    },
    {
      "reply": "General Enquires"
    },
    {
      "reply": "Escalation"
    },
    {
      "reply": "Membership services"
    }


  ]
}
```
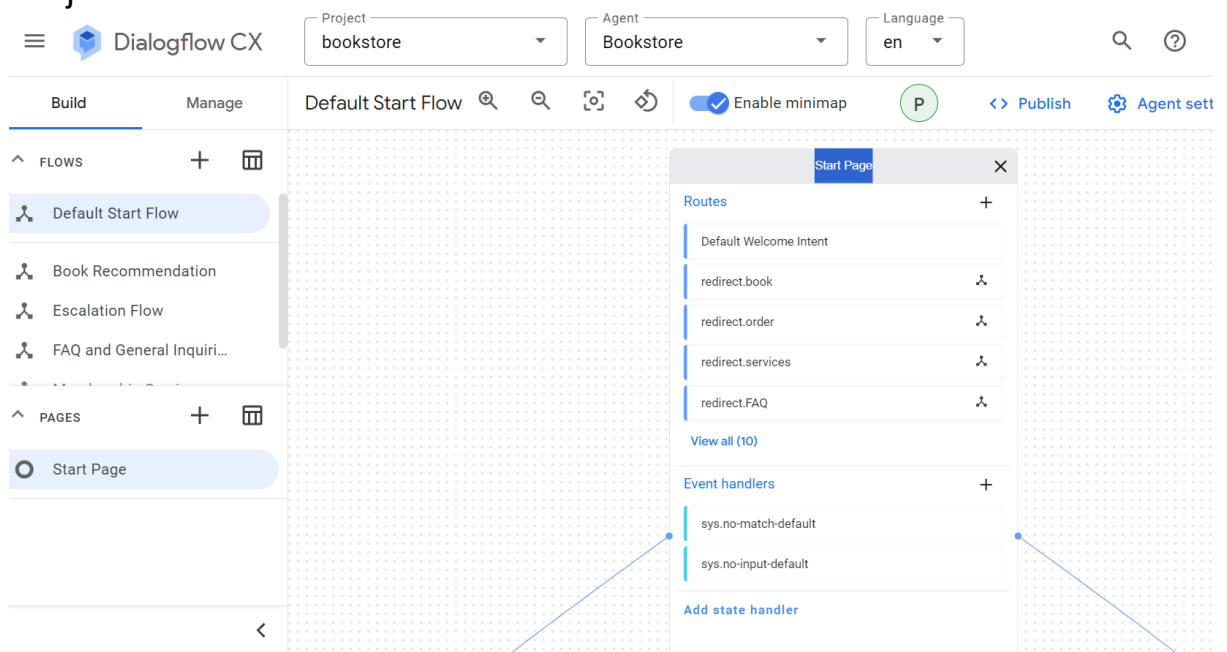

Creating Entities

create an entity named "Menu" in Dialogflow. Entities help the chatbot or virtual agent understand and extract specific pieces of information from user inputs. Here are the steps

Create the "Menu" entity.
- In the left sidebar, click on "Manage."

Create a New Entity Type:
- Under the "Manage" section, click on "Entity Types."

Create the "Menu" Entity:
- Click the "+ Create" button to create a new entity.

Configure the "Menu" Entity:
- In the "Display Name" field, enter "Menu."
  The entity list contains genre, confirmation, entity, theme, book-title, author, Order-ID
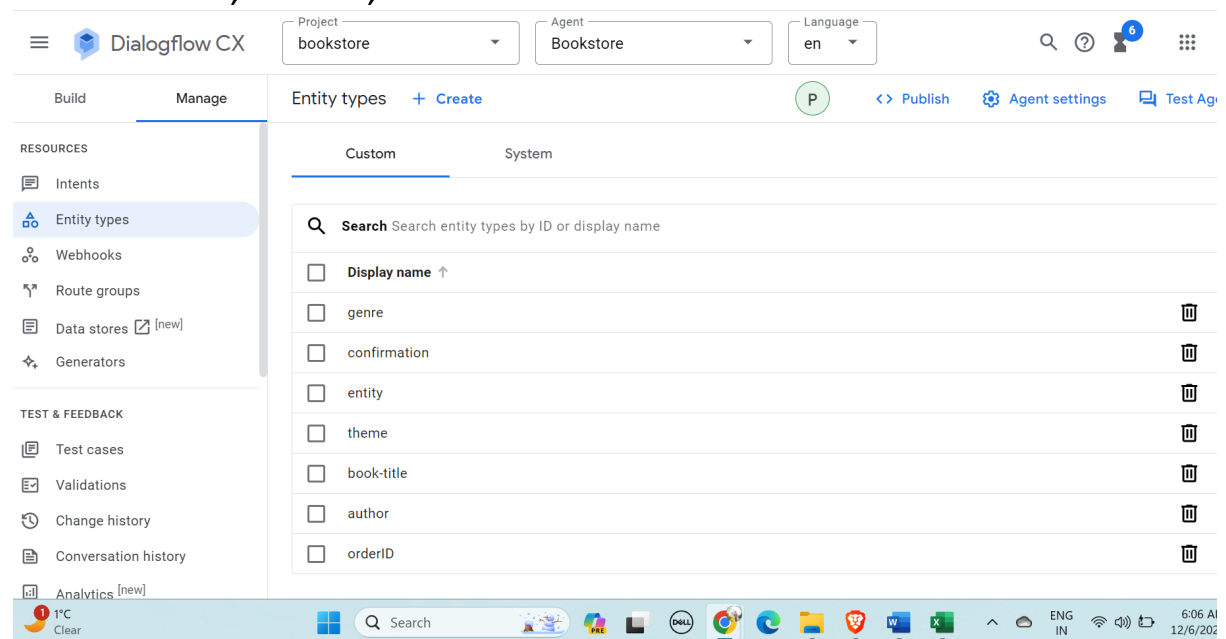
Advanced Options:
- Click on "Advanced options."
- Check the "Fuzzy Matching" option. This will allow Dialogflow to match similar variations of the band names, even if they are misspelled.
- Check the "Redact in log" option. This will ensure that even if a band name is misspelled, the correct name will be logged.

Save the Entity:

- After configuring the entity and advanced options, click the "Save" button to save the "Menu" entity.

Certainly, here are the steps to create a "Bookstore" entity with the specified items and synonyms in Dialogflow:

Navigate to Entity Types:
- In the left sidebar, click on "Manage."

Create a New Entity Type:
- Under the "Manage" section, click on "Entity Types."

Genre:

Step:2

Navigate to Entity Types:

- In the left sidebar, click on "Manage."
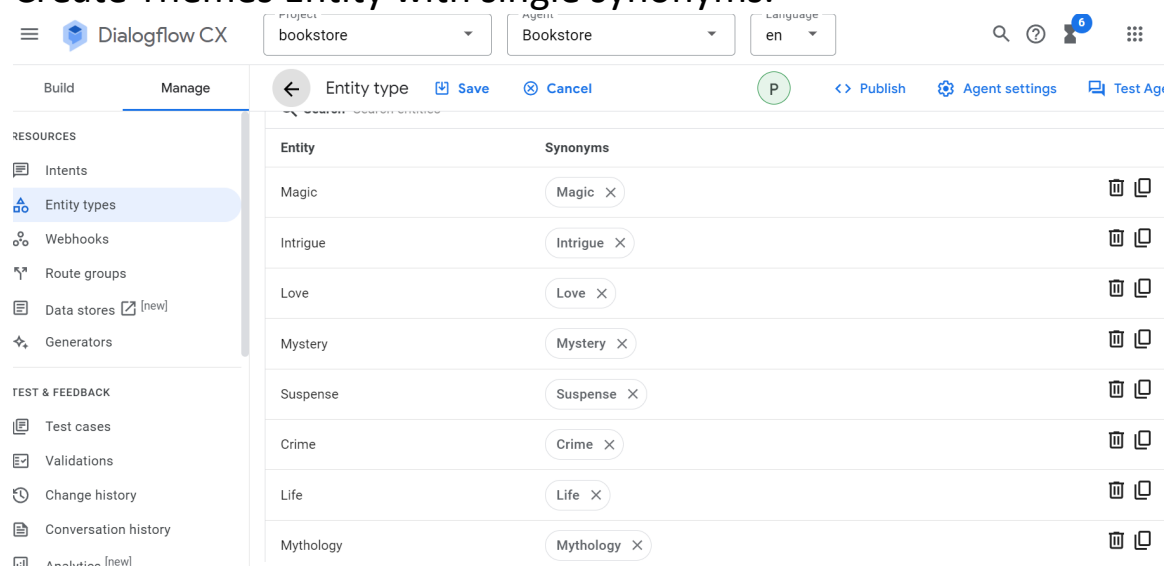
Create a New Entity Type:

- Under the "Manage" section, click on "Entity Types."

Create the "Size" Entity:

Click the "+ Create" button to create a new entity.

Create Themes Entity with single synonyms.

Step3:

Navigate to Entity Types:

- In the left sidebar, click on "Manage."

Create a New Entity Type:

- Under the "Manage" section, click on "Entity Types."

Create the "Size" Entity:

Click the "+ Create" button to create a new entity.

Book Titles:

Navigate to Entity Types:

- In the left sidebar, click on "Manage."

Create a New Entity Type:

- Under the "Manage" section, click on "Entity Types."

Create the "Size" Entity:

Click the "+ Create" button to create a new entity.

Create author names.

Author:

Save the Entity:

- After configuring the entity with the specified items and synonyms, click the "Save" button to save the "Author" entity.

By creating this "Themes" entity with synonyms, you enable your Dialogflow agent to recognize and extract information related to merchandise items, making it easier to understand user queries and provide appropriate responses, especially book store context.

Navigate to Entity Types:

- In the left sidebar, click on "Manage."

Create a New Entity Type:

- Under the "Manage" section, click on "Entity Types."

Create the "OrderNumber" Entity with Regular Expression:

- Click the "+ Create" button to create a new entity.

Configure the "OrderNumber" Entity:

- In the "Display Name" field, enter "OrderNumber."

Under "Regexp entities," add the following regular expression pattern for the entity:

- Entity: [A-Z]{1}[0-9]{6}

Save the Entity:

- After configuring the entity with the specified regular expression pattern, click the "Save" button to save the "OrderNumber" entity.

By creating this "OrderNumber" entity with a regular expression pattern, your Dialogflow agent will be able to recognize and extract order numbers that match the specified format (e.g., AB56123). This can be useful for handling order-related queries and tasks within your retail virtual agent.

Finally, complete the steps to add the intents for the conversation AI system.

Creating Intents
Navigate to Intents:
- In the left sidebar, click on "Manage."

- Under the "Manage" section, click on "Intents."
- To change an intent named "Default Welcome Intent" with the provided training phrases from above table in Dialogflow,
- Add Training Phrases:
- In the "Training Phrases" section of the intent, click inside the text box to add training phrases from above table. Based on your provided list, add the following training phrases:
- Save the Intent:
- After configuring the intent with the display name and training phrases, click the "Save" button to create the "Default Welcome Intent" intent.
- Explanation: The "redirect. Book Recommendation" intent is designed to handle user requests to specify Ice cream sizes when purchasing book. When users mention, this intent will be triggered. You can set up responses and fulfillment logic to understand and process the size information provided by the user, helping them choose the right size for their purchase.

Display name	Labels	# of Training phrases	Last modified
Default Welcome Intent		16	Dec 5, 2023 04:27 PM
Default Negative Intent		1	Dec 6, 2023 02:35 AM
authors		6	Dec 6, 2023 03:38 AM
theme		18	Dec 6, 2023 03:43 AM
redirect.services		10	Dec 6, 2023 12:46 AM
confrmation		2	Dec 6, 2023 05:09 AM
genre		10	Dec 6, 2023 03:22 AM
redirect.FAQ		10	Dec 6, 2023 12:47 AM
redirect.order		0	Dec 6, 2023 03:36 AM
title		7	Dec 6, 2023 03:49 AM

Navigate to Intents:
- In the left sidebar, click on "Manage."

- Under the "Manage" section, click on "Intents."
- To change an intent named "Author" with the provided training phrases from above table in Dialogflow,
- Add Training Phrases:
- In the "Training Phrases" section of the intent, click inside the text box to add training phrases from above table. Based on your provided list, add the following training phrases:
- Save the Intent:
- After configuring the intent with the display name and training phrases, click the "Save" button to create the "Authors" intent.
- Explanation: The "redirect. Book Recommendation" intent is designed to handle user. When users mention, this intent will be triggered. You can set up responses and fulfillment logic to understand and process the size information provided by the user, helping them choose the right size for their purchase.

Dialogflow CX	Project bookstore ▾	Agent Bookstore ▾	Language en ▾	🔍 ⑦

Build	Manage	← Intent	💾 Save	⊗ Cancel	P	<> Publish	⚙ Agent settings

RESOURCES

⚪ Skip auto annotation ⓘ

🔍 **Search** Search training phrases

	Training phrases	# words
📄 Intents	☐	
🔗 Entity types	☐ **Training phrases**	# words
🔀 Webhooks	☐ JK Rowling	2
🏷 Route groups	☐ Velvet Shadow Book	3
📄 Data stores ↗ [new]	☐ Seraphina	1
✨ Generators	☐ Oracle	1
	☐ Astral	1
TEST & FEEDBACK	☐ Celeste	1
📋 Test cases		
📝 Validations		
🕐 Change history		
📄 Conversation history		
📊 Analytics [new]		

Navigate to Intents:
- In the left sidebar, click on "Manage."
- Under the "Manage" section, click on "Intents."
- To change an intent named "redirect.order" with the provided training phrases from above table in Dialogflow,
- Add Training Phrases:

- In the "Training Phrases" section of the intent, click inside the text box to add training phrases from above table. Based on your provided list, add the following training phrases:
- Save the Intent:
- After configuring the intent with the display name and training phrases, click the "Save" button to create the "Authors" intent.
- Explanation: The "redirect. Book Recommendation" intent is designed to handle user. When users mention, this intent will be triggered. You can set up responses and fulfillment logic to understand and process the size information provided by the user, helping them choose the right size for their purchase.

Navigate to Intents:
- In the left sidebar, click on "Manage."
- Under the "Manage" section, click on "Intents."
- To change an intent named "order.FAQ " with the provided training phrases from above table in Dialogflow,
- Add Training Phrases:
- In the "Training Phrases" section of the intent, click inside the text box to add training phrases from above table. Based on your provided list, add the following training phrases:
- Save the Intent:

- After configuring the intent with the display name and training phrases, click the "Save" button to create the "Authors" intent.
- Explanation: The "redirect. Book Recommendation" intent is designed to handle user. When users mention, this intent will be triggered. You can set up responses and fulfillment logic to understand and process the size information provided by the user, helping them choose the right size for their purchase.

Navigate to Intents:
- In the left sidebar, click on "Manage."
- Under the "Manage" section, click on "Intents."

- To change an intent named "order.service" with the provided training phrases from above table in Dialogflow,
- Add Training Phrases:
- In the "Training Phrases" section of the intent, click inside the text box to add training phrases from above table. Based on your provided list, add the following training phrases:
- Save the Intent:
- After configuring the intent with the display name and training phrases, click the "Save" button to create the "Authors" intent.
- Explanation: The "redirect. Book Recommendation" intent is designed to handle user. When users mention, this intent will be triggered. You can set up responses and fulfillment logic to understand and process the size information provided by the user, helping them choose the right size for their purchase.

To create an intent named "" with the provided training phrases from above table in Dialogflow,
Add Training Phrases:

In the "Training Phrases" section of the intent, click inside the text box to add training phrases from above table. Based on your provided list, add the following training phrases:
Save the Intent:
After configuring the intent with the display name and training phrases, click the "Save" button to create the "redirect.cancel" intent.
Explanation: The "redirect.order" intent is designed to handle user requests to cancel their orders. When users express their intention to cancel an order using phrases like those provided in the training phrases, this intent will be triggered. You can set up responses and fulfillment logic to guide users through the order cancellation process and address their requests.

Create a new intent with the display name "redirect.confirmation."
Add the following training phrases from the above table.
Save the intent.

Project
bookstore

Agent
Bookstore

Language
en

Build   Manage

RESOURCES

Intents

Entity types

Webhooks

Route groups

Data stores [new]

Generators

TEST & FEEDBACK

Test cases

Validations

Change history

← Intent   Save   Cancel   P   <> Publish   Agent settings

will fill out the list with similar expressions. To extract parameter values, use annotations with available system or custom entity types.

Type a training phrase and press 'Enter'

Skip auto annotation (i)

Search   Search training phrases
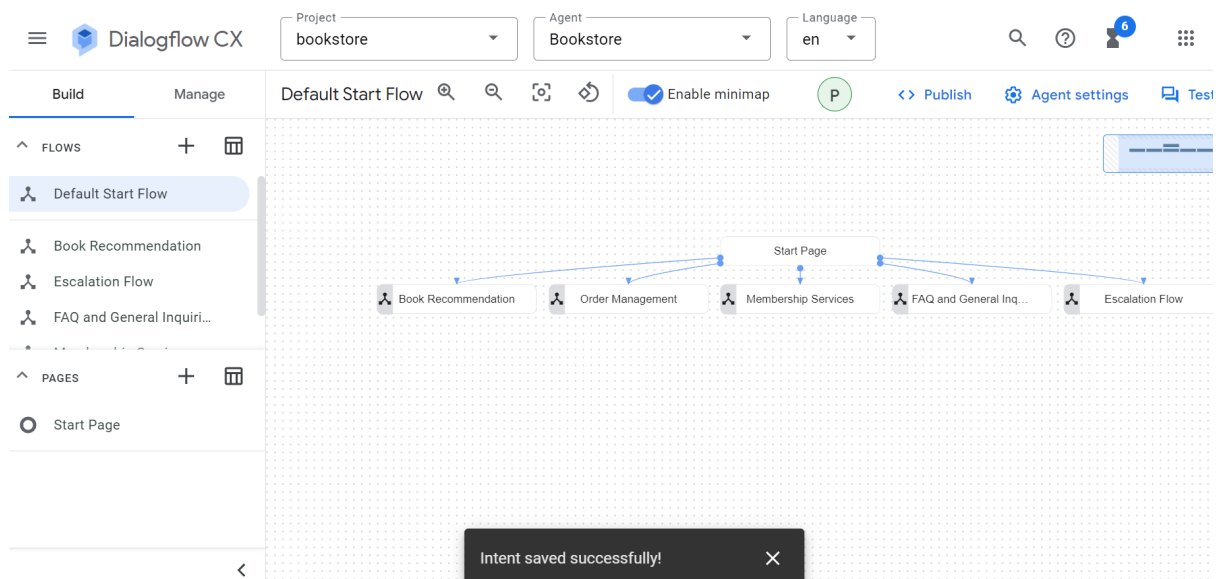
Training phrases	# words
no	1
yes	1

Parameter id   Entity type   Is list   Redact ir

The total Intent list to redirect to the specified the flow.

The start flow contains the redirected flows while ordering the book.

Creating Intents in start page

- Click Build > Default Start Flow
- Click the Start Page
- Click the + icon next to Routes.
- Add redirect.menu.overview

- Scroll down to *Transition*, and transition to the Catalog flow.
- Hit Save start page.
- Repeat the above steps for redirect.cake and the other rows from this table:

Page (In Flow)	Routes > Intent	Routes > Transition To
Start	Default Welcome Intent	
Start	redirect.order	Flow: Book recommendation
Start	redirect.author	Flow: Book recommendation
Start	redirect.theme	Flow: Book recommendation
Start	redirect.title	Flow: Book recommendation
Start	redirect.genre	Flow: Book recommendation
Start	redirect.escalation	Flow: Escalation service
Start	redirect.service	Flow: Membership service
Start	redirect.order	Flow: Order Management
Start	redirect.confirmation	Flow: Order Management
Start	redirect.my.order.status	Flow: Order Management
Start	redirect.end	Page: End Session

The Default Start Flow will work like an option menu works when calling a call center. However, in this virtual agent it is trained with Natural Language, with the training phrases in intents. Therefore, the interaction is driven by conversation and not by DTMF options and is more natural and human-like.

Creating intent "redirect." and Transition to flow: "Book Recommendation" in start page.
Follow the same steps to create above mentioned intents in Default start flow.

Connecting the pages in Book Recommendation

Select the catalog first.
- Click Build > Book Recommendation
- Click the Start Page
- Click the + icon next to Routes
- Add redirect.order
- Scroll down to *Transition*, select Page and choose: + new Page
- Use the page name: Menu Overview and hit Save
- Now let's finish the rest of the flow:
- The previous steps can be repeated with the following pages, intents and fulfillments. Take over this table. *Page* is the Page you will select in the flow, *Routes > Transition To* is the new flow or page you will create and transition to.

-

Page (In Flow)	Routes > Intent	Routes > Transition To

Book Recommendation	redirect.title	Title
Book Recommendation	author	Author
Book Recommendation	redirect.theme	Theme
Book Recommendation	redirect.genre	Genre
Book Recommendation	redirect.order	Order Management
Book Recommendation	redirect.end	End Session
Book Recommendation	redirect.cancel	End Flow
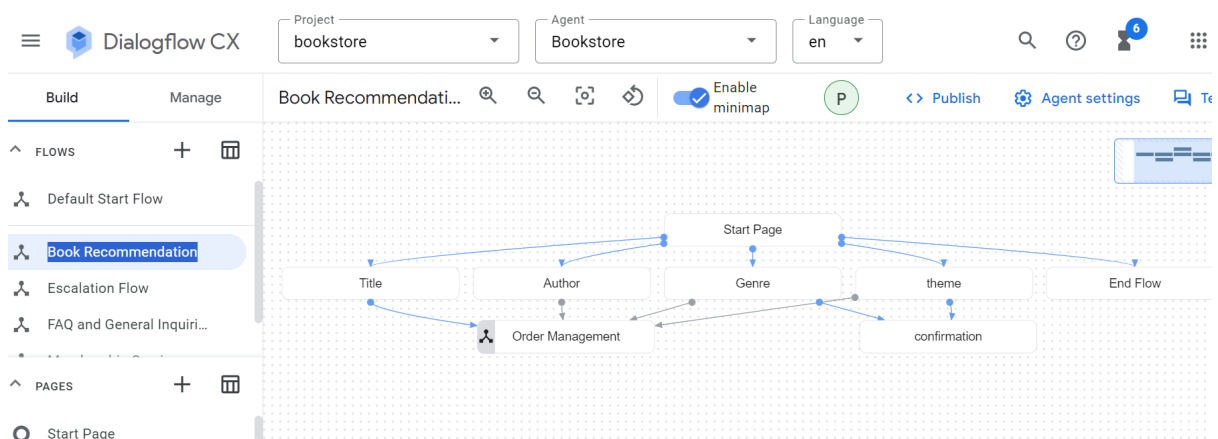
➢ Click the + in the Parameters block. Add the menu parameter:
- Display Name: Author
- Entity Type: @author
- Required: Check
- Redact in log: Check.

➢ Now we will add some custom parameter fulfillment messages. If the *author* parameter hasn't been collected by the virtual agent yet, the end user will get this agent response added to the response queue:

➢ Add a second dialogue option that provides rich suggestion chips.

➢ Scroll down to the Reprompt event handler's section.
➢ Click Add event handler and select the event: No-match default.
Use the following event static *text fulfillment*:
Click Save

➢ Click the + in the Parameters block. Add the menu parameter:
• Display Name: Title
• Entity Type: @title
• Required: Check
• Redact in log: Check.
➢ Now we will add some custom parameter fulfillment messages. If the *author* parameter hasn't been collected by the virtual
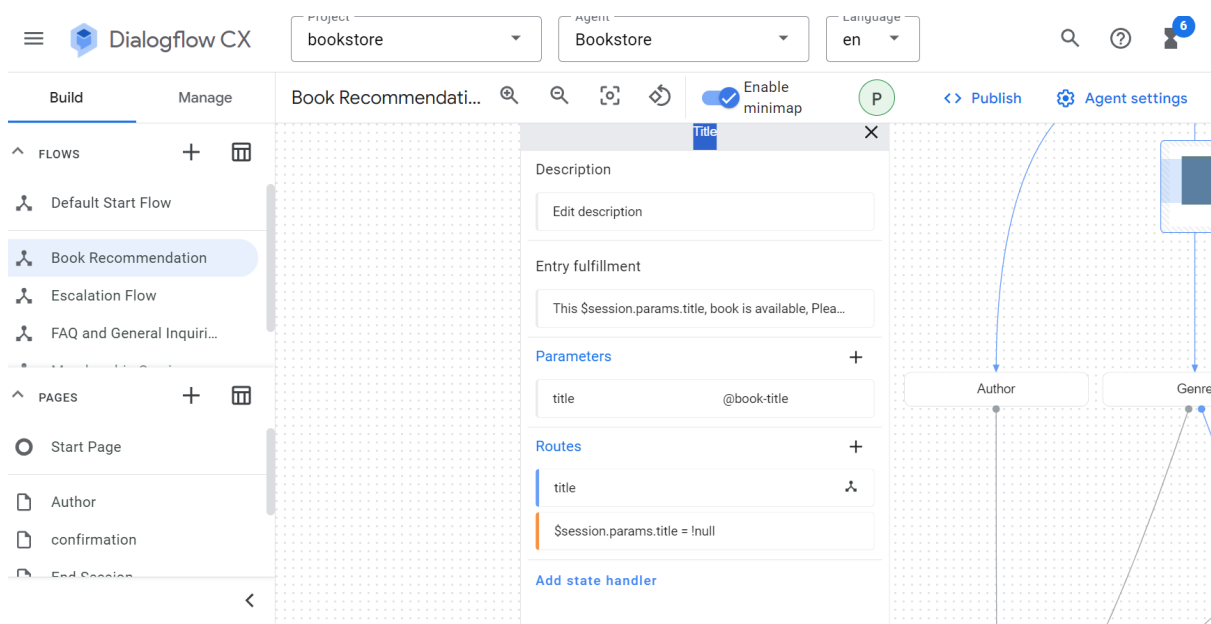
agent yet, the end user will get this agent response added to the response queue:

Add a second dialogue option that provides rich suggestion chips.

> ➢ Scroll down to the Reprompt event handler's section.
> ➢ Click Add event handler and select the event: No-match default.

Use the following event static *text fulfillment*:

Click Save

> ➢ Click the + in the Parameters block. Add the menu parameter:
- Display Name: Title
- Entity Type: @title
- Required: Check
- Redact in log: Check.
> ➢ Now we will add some custom parameter fulfillment messages. If the *author* parameter hasn't been collected by the virtual agent yet, the end user will get this agent response added to the response queue:

Add a second dialogue option that provides rich suggestion chips.

> ➢ Scroll down to the Reprompt event handler's section.

➢ Click Add event handler and select the event: No-match default.

Use the following event static *text fulfillment*:
  Click Save

➢ Click the + in the Parameters block. Add the menu parameter:
  • Display Name: Title
  • Entity Type: @title
  • Required: Check
  • Redact in log: Check.

➢ Now we will add some custom parameter fulfillment messages. If the *author* parameter hasn't been collected by the virtual agent yet, the end user will get this agent response added to the response queue:
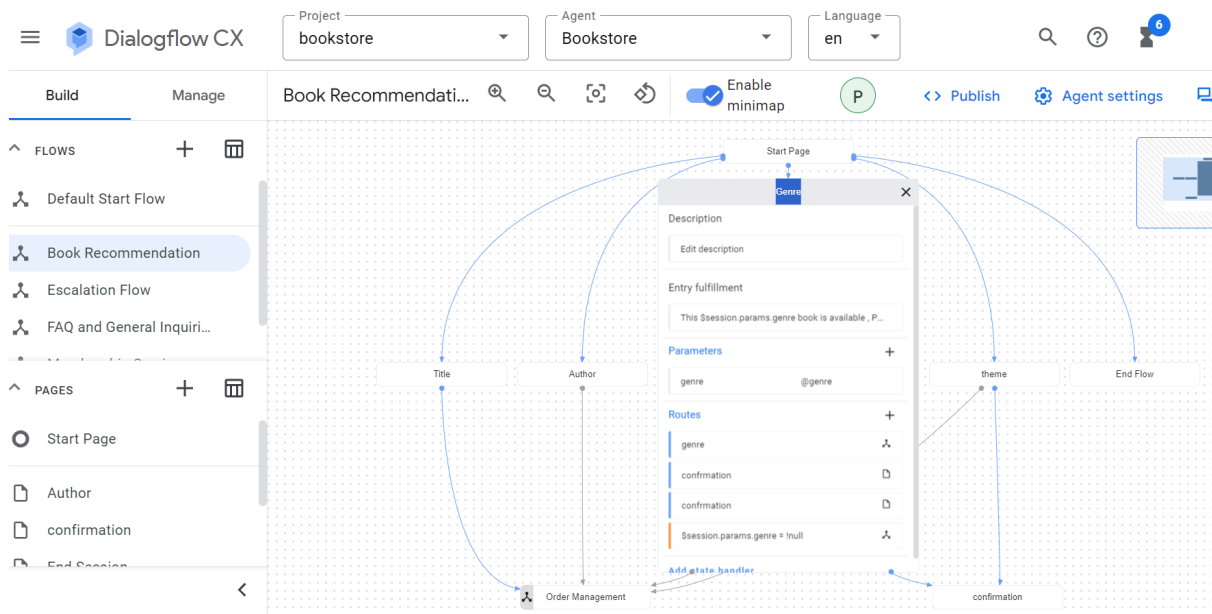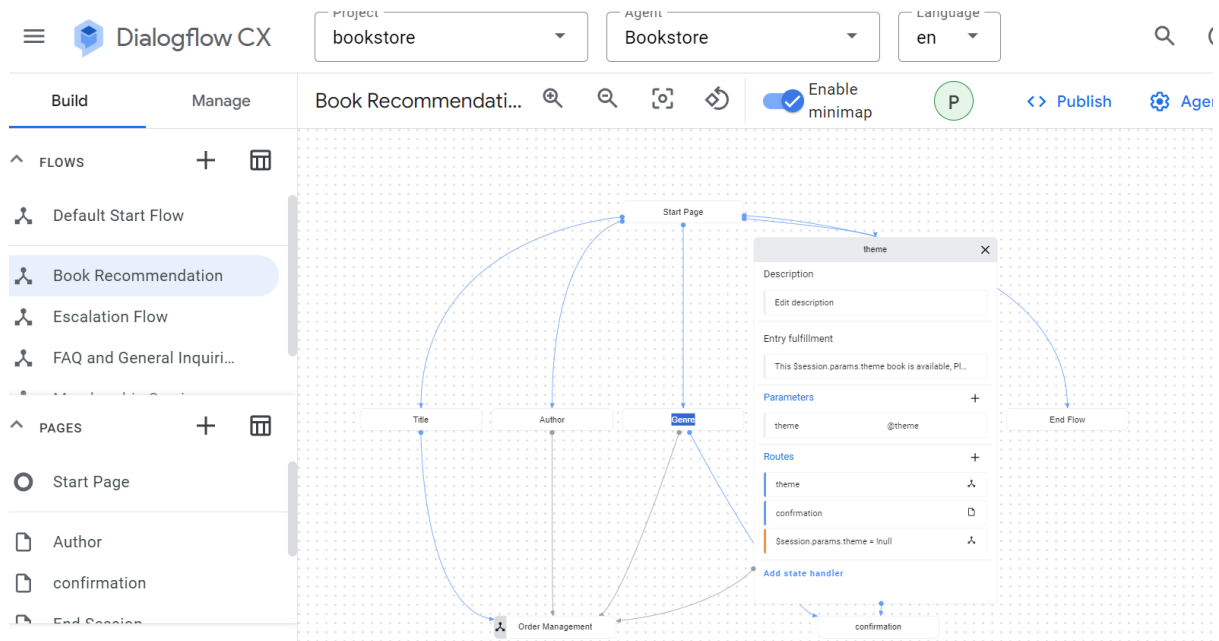
Add a second dialogue option that provides rich suggestion chips.
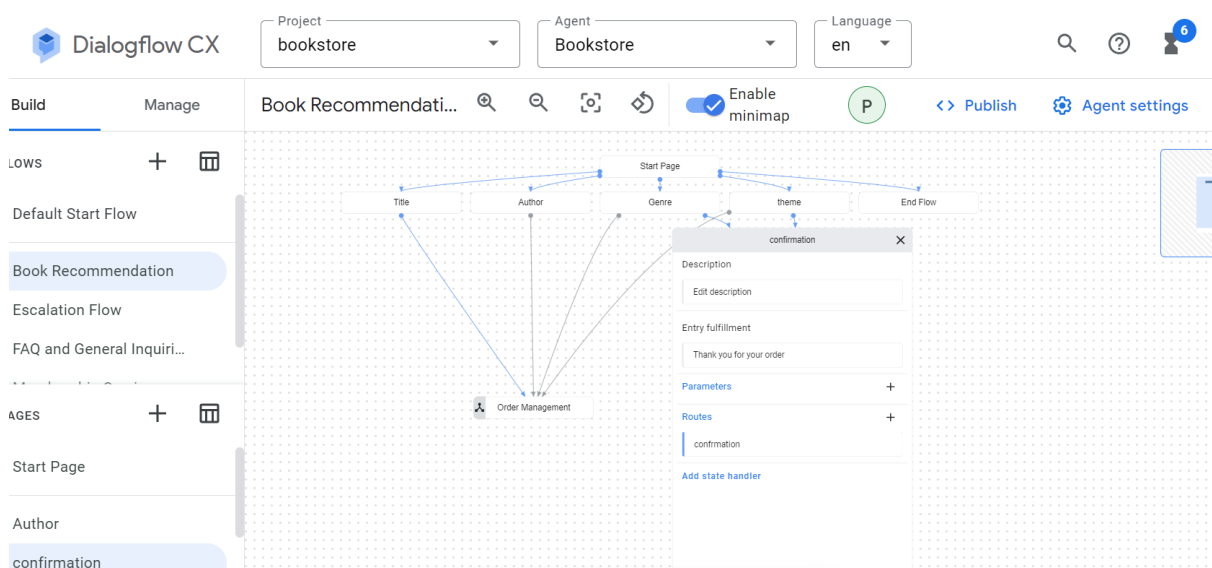
➢ Scroll down to the Reprompt event handler's section.
➢ Click Add event handler and select the event: No-match default.

Use the following event static *text fulfillment*:
  Click Save

Need to confirm the order with going order management to pre check the book engagement of requests.

Price Page:

Let's also fix the Price TODOs. The price information will be static for now. Click on the Price Page in the *Book recommendation*, and use the following entry fulfillment:

- Delete the Agent Says entry fulfillment.

- Create a new Conditional Response:

```
if $session.params.title != null
 Any book cost $30
else
book price $10
endif
```


The bookstore chatbot's book flow begins with the start Flow block, serving as the entry point for the user's interaction. This block can be triggered by various events, such as a user clicking a button on a website or sending a message to the chatbot.

Initiating from the start Flow block, the flow diverges into two distinct paths: Book Recommendation and Escalation Flow. The Book Recommendation path is the primary trajectory, offering users the ability to explore and receive book recommendations based on their preferences. Conversely, the Escalation Flow path handles errors and exceptional cases.

Commencing the Book Recommendation path is the Start Page block, presenting users with a list of options. Users can choose to browse

books by genre, theme, or author. Alternatively, they can opt for a book recommendation tailored to their preferences.

If a user opts to browse books by genre or theme, the flow navigates to the relevant block. For instance, selecting the option to browse books by genre leads to the Genre block, which displays a list of genres for the user to choose from.

In the case of a user choosing to receive a book recommendation, the flow progresses to the Book Recommendation block. Here, the chatbot poses a series of questions about the user's preferences, such as favored genres and themes. Following the user's responses, the flow generates a personalized book recommendation.

The Book Recommendation block not only provides details about the recommended book, including title, author, genre, and theme, but also offers the option for the user to choose whether to read the recommended book or explore other options.

In the event of user queries or issues, they have the option to trigger the Escalation Flow path by clicking the Help button. This path seamlessly connects the user with a human agent capable of aiding.

In summary, the bookstore chatbot's book flow, depicted in the provided image, is a thoughtfully designed and comprehensive experience. It empowers users to effortlessly browse and receive book recommendations based on their preferences, while also providing an avenue for human assistance in the case of inquiries or concerns. The flow ensures a user-friendly and informative interaction, facilitating well-informed decisions about the books they wish to explore.