

AI 620 Emerging Topics in Artificial Intelligence

HOS05A Contact Organizer Application

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Before You Start

- The directory path shown in screenshots may be different from yours.
- Some steps are not explained in the tutorial. If you are not sure what to do:
 1. Consult the resources listed below.
 2. If you cannot solve the problem after a few tries, ask the courses student worker for help.

Learning Outcomes

Students will be able to learn:

- Introduction to Amazon Lex
- Setting up Contact Assistant Architecture

Resources

- Tripuraneni, S., & Song, C. (2019). *Hands-on artificial intelligence on amazon web services: Decrease the time to market for AI and ML applications with the power of AWS* (1st ed.). Packt.

Introduction to Amazon Lex

Amazon Lex is a development platform for building intelligent assistants or chatbots. With Amazon Lex, we are building our own custom intelligent assistant capabilities. Lex itself provides many AI capabilities, including Automatic Speech Recognition (ASR) and Natural Language

Understanding (NLU), that are useful for building conversational interfaces. However, developers must follow Lex's development constructs, conventions, and norms to leverage these underlying AI capabilities.

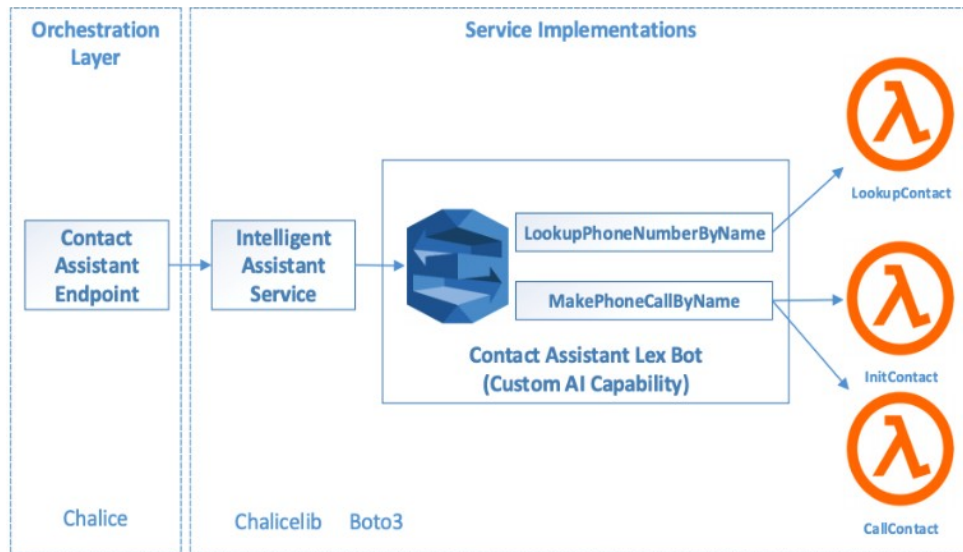
These Amazon Lex conversational interfaces are built from Lex's specific building blocks:

- **Bot:** A Lex bot can perform a set of related tasks through the custom conversational interfaces. A bot organizes the related tasks into a unit for development, deployment, and execution.
- **Intent:** An intent represents an automated task the users want to perform. An intent belongs to a specific AWS account rather than specific bot and can be used by different bots in the same AWS account.
- **Sample utterance:** An utterance is a typed or spoken phrase in natural language that the user might say to invoke an automated task. Amazon Lex encourages developers to provide multiple utterances to make the conversational interfaces more flexible for the users.
- **Slot type:** Each slot has a type, and it restricts input space and simplifies verification to make the conversational interface more user friendly
- **Prompt and response:** A prompt is a question in which Lex asks the users to either provide input to a slot, or to confirm the input provided.
- **Session attributes:** Amazon Lex provides mechanisms to keep contextual data that can be shared across intents in the same session data that can be shared across intents in the same session.

The architecture for the contact assistant project includes the following:

- An organization layer
- A service implementation layer

The contact assistant bot will be able to perform two tasks, `LookupPhoneNumberByName` and `MakePhoneCallByName`. This bot leverages Amazon Lex's underlying AI capabilities to interpret the user's verbal commands, and then performs the tasks using AWS Lambda functions. These Lambda functions implement the fulfillment of the tasks, looking up phone numbers and making phone calls.



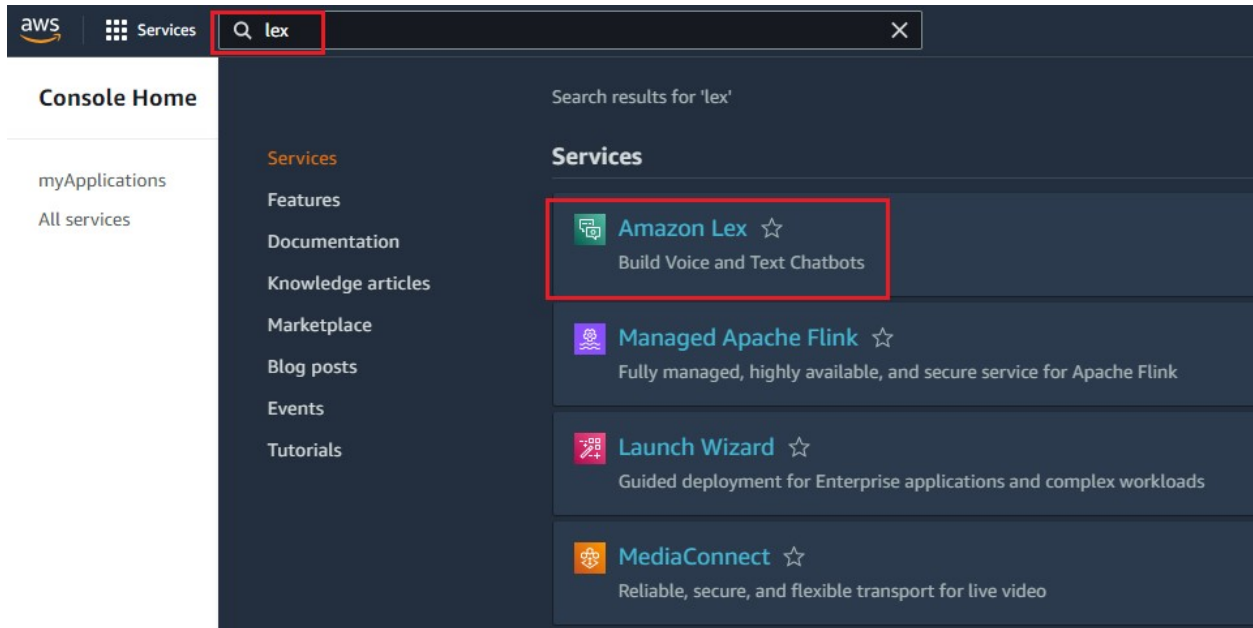
The contact assistant architecture includes the following:

- In the orchestration layer, we will build a **Contact Assistant Endpoint** that provides a RESTful interface to access our contact assistant's capabilities.
- In the service implementation layer, we will build a service, called the **intelligent assistant service**, that shields implementation details of our custom AI capability, including its Amazon Lex implementation details. This way, when we want to reimplement the contact assistant bot with a different chatbot technology, only the intelligent assistant service needs to be modified.

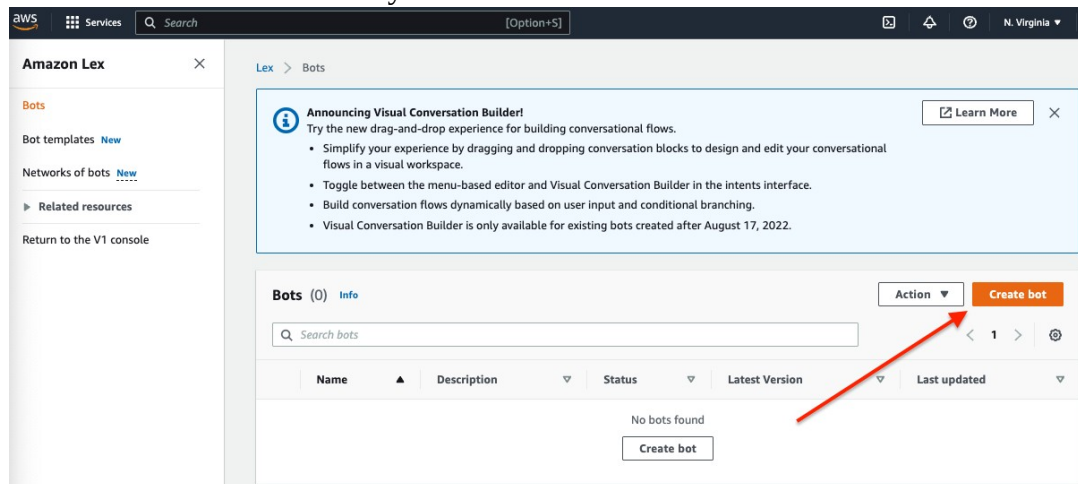
Setting up the contact assistant bot

Note: For submission, take the screenshot for all steps and save it in your local repository along with your code.

1. Sign in to your AWS Console. In the search box, type "lex" and navigate to the Amazon Lex under Services.



2. Click on the Create bot to create your own bot.



3. Enter the following information:

- Creation method: Traditional > Create a blank bot
- Bot name: **ContactAssistant**
- IAM permission: **Create a role with basic Amazon Lex permissions**
- Children's Online Privacy Protection Act (COPPA): **No**
- Idle session timeout: **5 minute(s)**.

Then select the **Next** button.

Configure bot settings [Info](#)

Creation method

☒ Traditional
 ☐ Generative AI

☒ Create a blank bot
 Create a basic bot with no preconfigured languages, intents, and slot types.

☐ Start with an example
 An example bot has preconfigured languages, intents, and slot types. You can change these settings.

☐ Start with transcripts
 Automatically generate intents from conversation transcripts that you upload. Only English (US) language is available when starting with a transcript.

Bot configuration

Bot name

Maximum 100 characters. Valid characters: A-Z, a-z, 0-9, -, _

Description - optional
This description appears on bot list page. It can help you identify the purpose of your bot.

Maximum 200 characters.

IAM permissions [Info](#)

IAM roles are used to access other services on your behalf.

Runtime role

Choose a role that defines permissions for your bot. To create a custom role, use the IAM console.

☒ Create a role with basic Amazon Lex permissions.
 ☐ Use an existing role.

ⓘ Creating a role takes a few minutes. Don't delete the role or edit the trust or permissions policies in this role until we've finished creating it.

New role

Amazon Lex creates a runtime role with permission to upload to Amazon CloudWatch Logs.

AWSServiceRoleForLexV2Bots_PJ5QCRWOLQA

Children's Online Privacy Protection Act (COPPA) [Info](#)

Is use of your bot subject to the [Children's Online Privacy Protection Act \(COPPA\)](#) ⓘ?

☐ Yes
 ☒ No

Idle session timeout

You can configure how long a session is maintained when the user does not provide any input and the session is idle. Amazon Lex retains context information until a session ends.

Session timeout

By default, session duration is 5 minutes, but you can specify any duration between 1 and 1440 minutes (24 hours).

4. In the Add language to bot section:

- Select language: [English \(US\)](#)
- Voice interaction: [Joanna](#). Currently, Lex only supports US English

Then select **Done**.

Lex > Bots > Create bot

Step 1
Configure bot settings

Step 2
Add languages

Add language to bot Info

▼ Language: English (US)

Select language
English (US)

Description - optional

Maximum 200 characters.

Voice interaction
The text-to-speech voice that your bot uses to interact with users.
Joanna

Voice sample
Hello, my name is Joanna. Let me know how I can assist you. Play

Intent classification confidence score threshold
0.40
Min: 0.00, max: 1.00.

Cancel Add another language Done

Once the bot is created successfully, you will create an intent for the bot. Follow the next section to create a new intent.

LookupPhoneNumberByName intent

Our first intent allows the user to look up a contact phone number by stating the contact's first and last names. This intent is essentially a search feature built on top of the contact store, but with a conversational interface.

The [LookupPhoneNumberByName](#) intent has very focused inputs and outputs, but we can build many related intents, such as [LookupAddressByName](#), and [LookupContactNamesByState](#). Even though we can consider the [LookupPhoneNumberByName](#) intent as a search feature to a data source, it requires a different design thinking.

1. Change the Intent name to [LookupPhoneNumberByName](#)

Lex > Bots > Bot: ContactAssistant > Versions > Version: Draft > All languages > Language: English (US) > Intents > Intent: NewIntent

Draft version ▼

English (US) ▼

Not built

Intent: NewIntent [Info](#)

An intent represents an action that fulfills a user's request. Intents can have arguments called slots that represent variable information.

We've added an intent to get you started.

► Conversation flow [Info](#)

▼ Intent details [Info](#)

Intent name

LookupPhoneNumberByName

Maximum 100 characters. Valid characters: A-Z, a-z, 0-9, -, _

Intent and utterance generation description

Describe the purpose of your intent. This will also be used when generating utterances for your intent.

Maximum 200 characters.

2. Scroll down to Slots section. Add {FirstName} and {LastName} to look up a phone number.

For **LookupPhoneNumberByName**, we need both the **{FirstName}** and **{LastName}** to look up a phone number as they are both required.

▼ Slots (2) - optional [Info](#)

Information that a bot needs to fulfill the intent. The bot prompts for slots required for intent fulfillment, in priority order below.

Filter

Add slot

For slot FirstName:

- Name: FirstName
- Slot type: AMAZON.FirstName
- Prompts: What's the contact's first name?

For slot LastName:

- Name: LastName
- Slot type: AMAZON. LastName
- Prompts: What's the {FirstName}'s last name?

The screenshot shows two prompts in the Amazon Lex console:

- Prompt for slot: FirstName**
Message: *What's the contact's first name?*
Slot type: *AMAZON.FirstName*
- Prompt for slot: LastName**
Message: *What's the {FirstName}'s last name?*
Slot type: *AMAZON.LastName*

3. Let's extract the following contact information to leverage Amazon Comprehend.

Sample utterances are phrases that invoke the intent to perform an automated task.

Scroll up a bit to the Sample utterances. Add the following sample utterances for our **LookupPhoneNumberByName** intent:

The screenshot shows the 'Sample utterances' section for the **LookupPhoneNumberByName** intent. It includes a filter, sort options, and a 'Generate utterances' button. Below the list, there is a message: 'No sample utterances. Try generating utterances to get started.' At the bottom, there is a text input field with the placeholder 'Type the sample utterances here' and a button labeled 'Add utterance'.

Sample utterances (0) Info What's this? Generate utterances

Representative phrases that you expect a user to speak or type to invoke this intent. Amazon Lex extrapolates based on the sample utterances to interpret any user input that may vary from the samples. The priority order of the sample utterances is not used to determine intent classification output.

Info To generate utterances, you must have permissions to Amazon Bedrock. Amazon Lex will make calls to Amazon Bedrock. Additional charges may be incurred based on the usage of Amazon Bedrock. [Learn more](#)

Sort by added (ascending)

Preview Plain text

No sample utterances
Try generating utterances to get started
Generate utterances

Type the sample utterances here Click to add

Add utterance

Maximum 500 characters.

Your sample utterances should look like this:

Sample utterances (3) [Info](#)

Representative phrases that you expect a user to speak or type to invoke this intent. Amazon Lex extrapolates based on the sample utterances to interpret any user input that may vary from the samples. The priority order of the sample utterances is not used to determine intent classification output.

Sort by added (ascending) ▼

Preview

Plain text

I would like to a book a flight

What's {FirstName} {LastName} phone number

What's the phone number for {FirstName} {LastName}

Add utterance

Maximum 250 characters

4. Create confirmation prompt and response for LookupPhoneNumberByName.
A confirmation prompt is an opportunity to inform the user about the action about to be taken.
 - Activate the Confirmation section
 - Add the following prompts:
 - Confirmation prompt: Would you like me to call {FirstName} {LastName}?
 - Decline response: Okay, I will not start the call.

Confirmation [Info](#)

Prompts help to clarify whether the user wants to fulfill the intent or cancel it.

Activate the confirmation → ☒ Active

Prompts to confirm the intent	Responses sent when the user declines the intent
<p>Message: Would you like me to call {FirstName} {LastName}?</p>	<p>Message: Okay, I will not start the call.</p>

Confirmation prompt
What will the bot say to prompt the user to confirm this intent.

Would you like me to call {FirstName} {LastName}?

Decline response
What will the bot say if the user says NO to the confirmation prompt.

Okay, I will not start the call.

Advanced options

Configure confirmation prompts and decline responses.

← Add the prompts

- Once the above steps are completed, press **Save intent** button in the down right corner. Then build your bot using the Build option on the top right of the screen.

Lex > ... > Versions > Version: Draft > All languages > Language: English (US) > Intents > Intent: LookupPhoneNumberByN...

Draft version ▼ English (US) ▼ Not built English (US) has not built changes. Build Test

Intent: LookupPhoneNumberByName [Info](#)

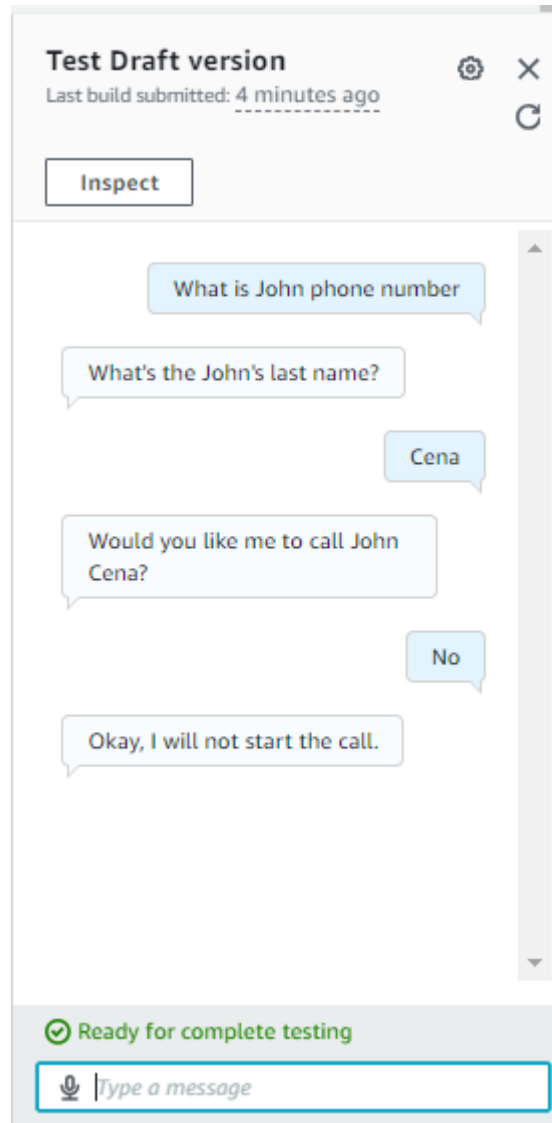
- Once the bot is successfully built, use the Test option on the top of the screen to test the bot you just built.

✓ Successfully built language English (US) in bot: ContactAssistant

Lex > ... > Versions > Version: Draft > All languages > Language: English (US) > Intents > Intent: LookupPhoneNumberByN...

Draft version ▼ English (US) ▼ Successfully built Build Test

Testing the bot

**HOS submission instructions:**

1. Please install the GitHub Desktop: https://cityuseattle.github.io/docs/git/github_desktop/
2. Clone, organize, and submit your work through GitHub Desktop: <https://cityuseattle.github.io/docs/hoporhos>