UNIVERSITY OF BRIDGEPORT

Burger Buddy Bot: Tasty Times on Web and App

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ABSTRACT

This project focuses on developing an engaging chatbot called 'Burger Buddy, using Amazon Lex.' The chatbot is designed to offer a lively and interactive experience for users. By seamlessly integrating with Slack, Burger Buddy becomes readily available on this popular messaging platform, ensuring a delightful user experience.

Fig1: LOGO

To further enhance accessibility, we've created a user-friendly web page. This webpage serves as an additional platform for users to conveniently interact with Burger Buddy. Whether chatting via Slack or exploring the web page, users can easily engage with the chatbot, making it a versatile and user-friendly solution.

The integration of Amazon Lex provides dynamic conversational abilities to Burger Buddy, making interactions more natural and enjoyable. With a focus on simplicity and interactivity, this project aims to bring the joy of communication and information access through a chatbot, accessible on both Slack and a user-friendly web page.

1. INTRODUCTION

Amazon Lex allows developers to create conversational interfaces for a wide range of applications, including customer service bots, virtual agents, interactive voice response (IVR) systems, and more. It provides the tools and infrastructure necessary to build, test, and deploy chatbots that can understand and respond to natural language input from users.

Fig2: How Amazon Lex Works

With Amazon Lex, developers can design conversation flows, define intents and entities, and specify prompts and responses to guide users through interactions. The service supports both voice and text input, making it versatile for various use cases and channels, such as web applications, mobile apps, messaging platforms, and voice-enabled devices.

1.1 BACKGROUND OF THE PROJECT:

Amazon Lex emerged from Amazon's internal efforts to develop Alexa, the voice-controlled virtual assistant used in Amazon Echo devices and other smart speakers. Alexa relies on sophisticated natural language understanding algorithms to interpret user requests and perform tasks such as playing music, providing weather forecasts, setting reminders, and ordering products online.

Recognizing the potential of this technology beyond consumer devices, Amazon introduced Amazon Lex as a standalone service within AWS. By leveraging the same underlying technology stack as Alexa, Amazon Lex empowers developers to integrate conversational interfaces into their own applications and services.

Amazon Lex incorporates advanced machine learning techniques, including deep learning models and natural language processing (NLP) algorithms, to understand and interpret user input accurately. It supports multiple languages and dialects, enabling developers to create chatbots that cater to diverse audiences worldwide.

In today's digital age, the demand for innovative and interactive solutions to enhance user experiences is ever-growing. Chatbots have emerged as one such solution, offering a convenient and engaging way for

users to interact with businesses, services, and brands. Recognizing this trend, our project sets out to develop an engaging chatbot named ‘Burger Buddy’ using Amazon Lex, a powerful tool for building conversational interfaces.

The inspiration for Burger Buddy stemmed from the desire to provide users with a seamless and enjoyable experience while engaging with a chatbot. We observed a gap in the market for a chatbot specifically tailored to the food industry, particularly focusing on burger enthusiasts. To bridge this gap, Burger Buddy was conceptualized to offer users a lively and interactive platform for exploring burger-related information, recommendations, and more.

The choice of Amazon Lex as the underlying technology for Burger Buddy was driven by its advanced natural language processing capabilities and seamless integration options. Amazon Lex provides the foundation for building sophisticated conversational interfaces, allowing Burger Buddy to understand user inputs, interpret intents, and respond in a human-like manner. This enables dynamic and engaging interactions, enhancing the overall user experience.

To maximize accessibility and reach, Burger Buddy is designed to seamlessly integrate with Slack, a popular messaging platform widely used in both personal and professional settings. By integrating with Slack, Burger Buddy becomes readily available to users within their existing communication channels, eliminating the need for additional installations or interfaces. This integration ensures that users can access Burger Buddy conveniently and effortlessly, enhancing user engagement and satisfaction.

In addition to Slack integration, we have developed a user-friendly web page to further enhance accessibility and usability. This web page serves as an additional platform for users to interact with Burger Buddy, providing a familiar and intuitive interface for engaging with the chatbot. Whether users prefer chatting via Slack or exploring the web page, Burger Buddy offers a versatile and user-friendly solution to cater to diverse user preferences and needs.

The integration of Amazon Lex, coupled with the user-friendly interfaces of Slack and the web page, positions Burger Buddy as a dynamic and versatile chatbot capable of delivering an engaging and interactive experience to users. With a focus on simplicity and interactivity, Burger Buddy aims to bring the joy of communication and information access to burger enthusiasts and food lovers alike. Through seamless integration with Slack and a user-friendly web page, Burger Buddy aims to revolutionize the way users interact with chatbots in the food industry, setting new standards for convenience, accessibility, and user satisfaction.

1.2 OBJECTIVE:

The objective of the Burger Buddy chatbot using Amazon Lex and Lambda function could be to provide an interactive and user-friendly interface for customers to place orders for burgers from different franchises. Here's a breakdown of the objectives:

Facilitate Ordering Process: The primary goal of the Burger Buddy chatbot is to streamline the process of ordering burgers by providing users with a conversational interface. Instead of navigating a traditional website or app, users can interact with the chatbot using natural language, making the ordering process more intuitive and convenient.

Provide Menu Selection: The chatbot should allow users to select from a variety of burger sizes, franchises, and types. By presenting menu options in a conversational format, the chatbot helps users navigate the available choices and make selections that suit their preferences.

Handle Custom Orders: In addition to standard menu items, the chatbot should be capable of handling custom orders. Users may have specific preferences or dietary restrictions, and the chatbot should be able to accommodate these requests by allowing users to specify custom toppings, substitutions, or special instructions.

Validate Orders: To ensure accuracy and completeness, the chatbot should validate user inputs at each step of the ordering process. This includes verifying selected options such as burger size, franchise, and type, as well as ensuring that all required information is provided before proceeding to the next step.

Provide Feedback and Assistance: Throughout the interaction, the chatbot should provide feedback and assistance to users as needed. This includes confirming user selections, offering suggestions or recommendations based on user preferences, and addressing any questions or concerns that arise during the ordering process.

Integrate with Backend Systems: Behind the scenes, the chatbot should integrate with backend systems to process orders, handle payments, and coordinate with fulfillment services. This integration ensures a seamless end-to-end experience for users, from placing their order through to receiving their burgers.

Optimize User Experience: Ultimately, the objective of the Burger Buddy chatbot is to optimize the user experience for ordering burgers. By leveraging conversational interfaces, natural language understanding, and backend integrations, the chatbot aims to make the ordering process efficient, engaging, and enjoyable for users.

1.3 SCOPE OF THE PROJECT:

The scope of the Burger Buddy chatbot project using Amazon Lex and Lambda function encompasses various aspects related to its development, implementation, and deployment. Here's an outline of the project scope:

Functional Requirements:

User Interaction: Define how users will interact with the chatbot to place orders, including the supported commands and conversational flow.

Order Management: Specify the functionality for managing orders, including order creation, modification, cancellation, and status tracking.

Menu Options: Determine the menu options available to users, including burger sizes, franchises, and types, as well as any customization options.

Validation and Error Handling: Implement mechanisms to validate user inputs, handle errors, and provide appropriate feedback to users.

Integration with Backend Systems: Integrate the chatbot with backend systems for order processing, payment handling, and fulfillment coordination.

Non-Functional Requirements:

Performance: Define performance targets for the chatbot in terms of response times, concurrency, and scalability.

Reliability: Ensure the chatbot is reliable and available, with mechanisms for monitoring, logging, and error recovery.

Security: Implement security measures to protect user data, prevent unauthorized access, and comply with relevant regulations.

User Experience: Prioritize user experience by designing intuitive conversational flows, providing helpful prompts and suggestions, and ensuring consistency in interactions.

Platform and Technology Selection:

Choose Amazon Lex as the platform for building the chatbot, leveraging its natural language understanding capabilities and integration with AWS services.

Utilize AWS Lambda functions to implement the backend logic for processing user requests, managing orders, and interfacing with external systems.

Consider additional AWS services for features such as authentication, database storage, and notification management, depending on project requirements.

2. LITERATURE REVIEW

2.1 OVERVIEW OF CHATBOT:

A chatbot is a computer program or AI-based application designed to simulate conversation with human users, either through text or speech. Chatbots are built to understand natural language inputs from users and provide appropriate responses based on predefined rules, machine learning algorithms, or a combination of both.

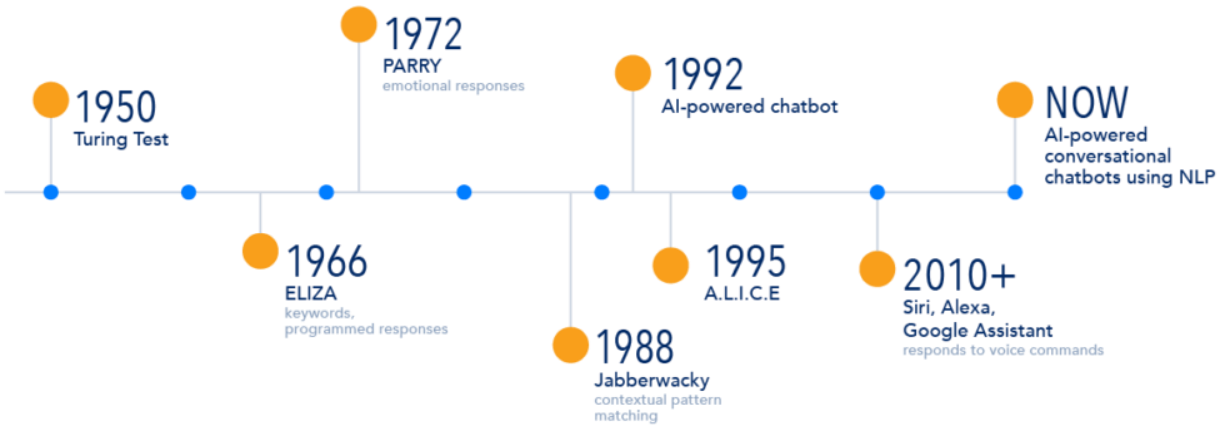


Fig 3: Evolution of Chatbot

2.1.1 Functionality: The primary function of a chatbot is to engage in conversation with users, helping, providing information, or performing tasks based on user queries or commands. Depending on its design and capabilities, a chatbot can perform a wide range of functions, including:

- Answering frequently asked questions
- Assisting with customer support inquiries
- Providing product recommendations
- Facilitating online transactions and bookings
- Delivering personalized content or notifications
- Conducting surveys or gathering feedback

2.1.2 Use Cases: Chatbots are deployed across various industries and sectors to automate processes, improve efficiency, and enhance user experiences. Some common use cases include:

- Customer service and support: Resolving inquiries, troubleshooting issues, and providing assistance 24/7.
- E-commerce and retail: Helping users find products, make purchases, and track orders.
- Healthcare: Answering medical queries, scheduling appointments, and providing health-related information.
- Finance: Assisting with banking transactions, managing accounts, and providing financial advice.

- Education: Offering tutoring, delivering course materials, and answering student queries.
- Entertainment: Recommending movies, music, or games, and providing entertainment content

2.1.3 Key Components: A chatbot typically consists of several components that work together to enable conversation with users:

- Natural Language Processing (NLP): Allows the chatbot to understand and interpret user inputs, including intent, entities, and context.
- Dialog Management: Controls the flow of conversation and manages the interaction between the user and the chatbot.
- Backend Integration: Interfaces with backend systems, databases, APIs, or external services to fulfill user requests and perform actions.
- User Interface: Provides the interface through which users interact with the chatbot, such as a messaging platform, website widget, or voice-enabled device.
- Analytics and Monitoring: Tracks user interactions, performance metrics, and user feedback to analyze usage patterns and improve the chatbot over time.

Overall, chatbots play a crucial role in enabling automated, personalized interactions between businesses and users, enhancing customer engagement, and driving operational efficiency in various domains.

2.2 AMAZON LEX

Powered by the same technology as Alexa, Amazon Lex provides you with the tools to tackle challenging deep learning problems, such as speech recognition and language understanding, through an easy-to-use fully managed service. Amazon Lex integrates with AWS Lambda which you can use to easily trigger functions for execution of your back-end business logic for data retrieval and updates. Once built, your bot can be deployed directly to chat platforms, mobile clients, and IoT devices. You can also use the reports provided to track metrics for your bot. Amazon Lex provides a scalable, secure, easy to use, end-to-end solution to build, publish and monitor your bots.

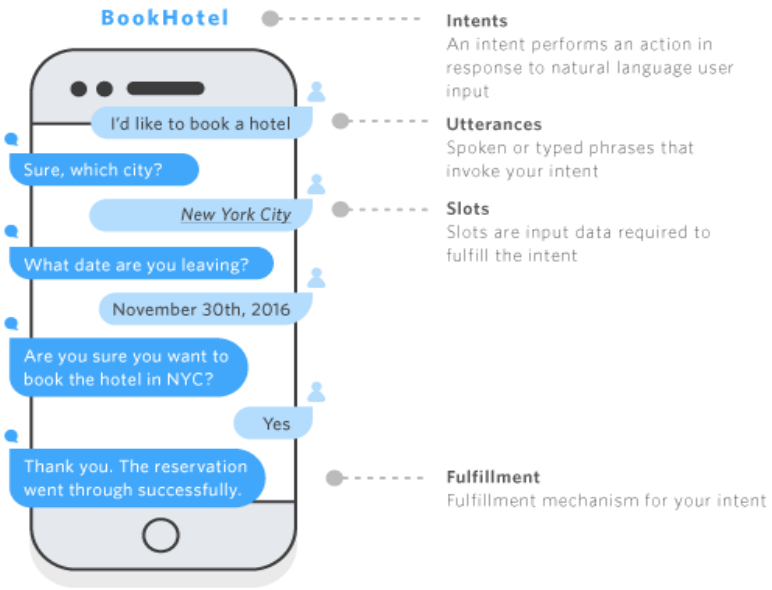


Fig 4: Components of Amazon Lex

Features and Capabilities:

Amazon Lex, a service provided by Amazon Web Services (AWS), offers a wide range of features and capabilities for building conversational interfaces, or chatbots. Here are some of the key features and capabilities of Amazon Lex:

Natural Language Understanding (NLU):

Amazon Lex employs advanced NLU techniques to understand and interpret user input in the form of text or speech. It can identify the intent behind user requests and extract relevant entities, such as dates, numbers, locations, or custom parameters.

Intent and Entity Recognition:

Developers can define intents, which represent the actions or tasks that users want to perform. Entities are used to represent specific pieces of information within user input, such as product names, dates, or categories. Amazon Lex automatically recognizes intents and entities based on training data provided by developers, allowing for more accurate understanding of user queries.

Conversation Management:

Amazon Lex manages the flow of conversation between users and chatbots, guiding users through interactions and prompting for required information. It supports context-aware conversations, allowing chatbots to maintain state and remember previous interactions to provide more personalized responses.

Integration with AWS Services:

Amazon Lex seamlessly integrates with other AWS services, enabling developers to build end-to-end solutions that leverage various cloud services. Integration with AWS Lambda allows developers to execute custom business logic in response to user requests, enabling interaction with backend systems, databases, or external APIs.

Multi-Language Support:

Amazon Lex supports multiple languages and dialects, allowing developers to create chatbots that cater to diverse audiences worldwide. Language-specific models and resources are available to optimize understanding and processing of user input in different languages.

Scalability and Reliability:

As part of AWS, Amazon Lex benefits from the scalability, reliability, and security of the AWS cloud infrastructure. It automatically scales to handle varying levels of traffic and ensures high availability and performance for chatbot deployments.

Built-in Slot Types:

Amazon Lex provides built-in slot types for common data types, such as dates, numbers, and addresses, making it easier to capture and validate user input. Custom slot types can be defined to represent domain-specific entities and improve recognition accuracy for specialized use cases.

Voice and Text Input:

Amazon Lex supports both voice and text input, allowing users to interact with chatbots via voice commands or typed messages. Integration with Amazon Polly enables chatbots to generate natural-sounding speech responses for voice-based interactions.

Analytics and Insights:

Amazon Lex provides metrics and analytics to track chatbot usage, monitor performance metrics, and gain insights into user behavior. Developers can leverage these analytics to optimize chatbot performance, identify usage patterns, and improve user experiences over time. Overall, Amazon Lex offers a comprehensive set of features and capabilities for building sophisticated chatbots that can understand, respond to, and engage with users in natural and meaningful ways.

3. METHODOLOGY AND IMPLEMENTATION

3.1 DESIGNING THE BURGER BUDDY CHATBOT

Amazon Lex is a service for building conversational interfaces into any application using voice and text. Here's an overview of the system architecture of Amazon Lex:

Client Application:

This is the application or device where users interact with the chatbot. It can be a web application, mobile application, messaging platform, or any other interface that supports communication with Amazon Lex.

AWS Management Console:

Developers use the AWS Management Console to create, configure, and manage Amazon Lex resources such as bots, intents, and slots.

Amazon Lex:

The core component of the architecture, Amazon Lex, is a fully managed service that enables developers to build conversational interfaces using natural language understanding (NLU) and speech recognition capabilities. It processes user input (both text and voice) and generates appropriate responses based on the configured bot logic.

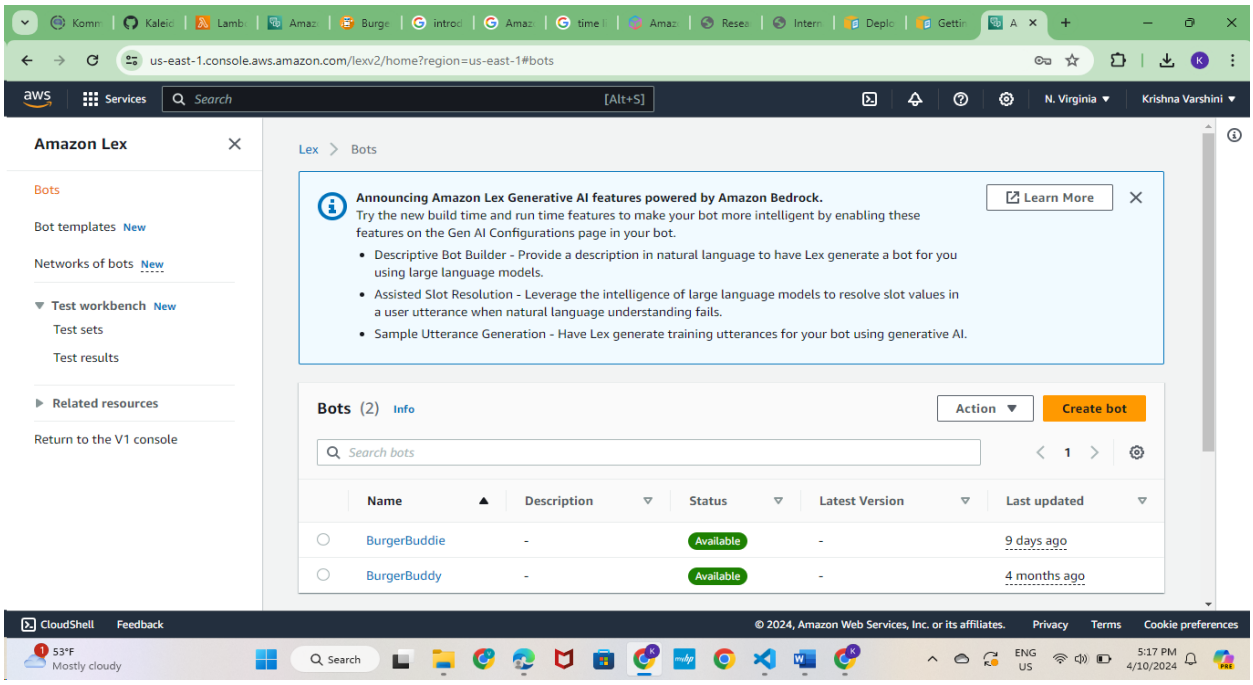


Fig 5: BurgerBuddy Chatbot in Amazon Lex

Bot:

A bot is a conversational interface built using Amazon Lex. It defines the overall structure, behavior, and responses of the chatbot. Developers can create and configure bots using the Amazon Lex console or programmatically using the AWS SDK.

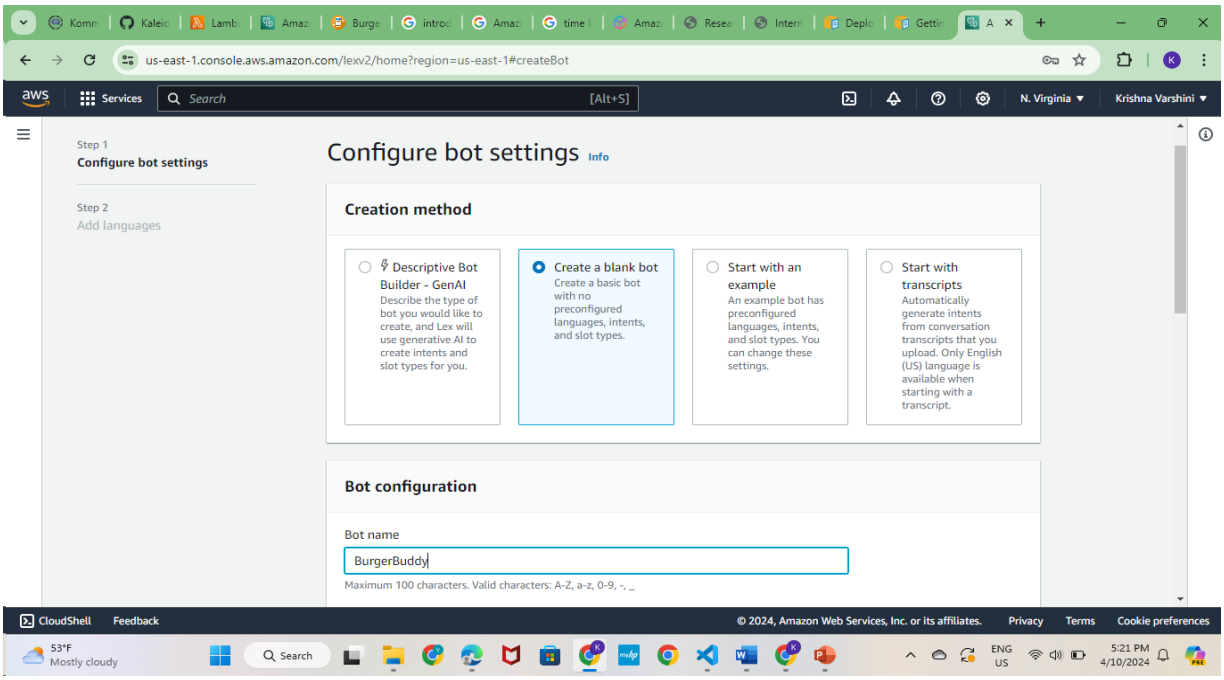
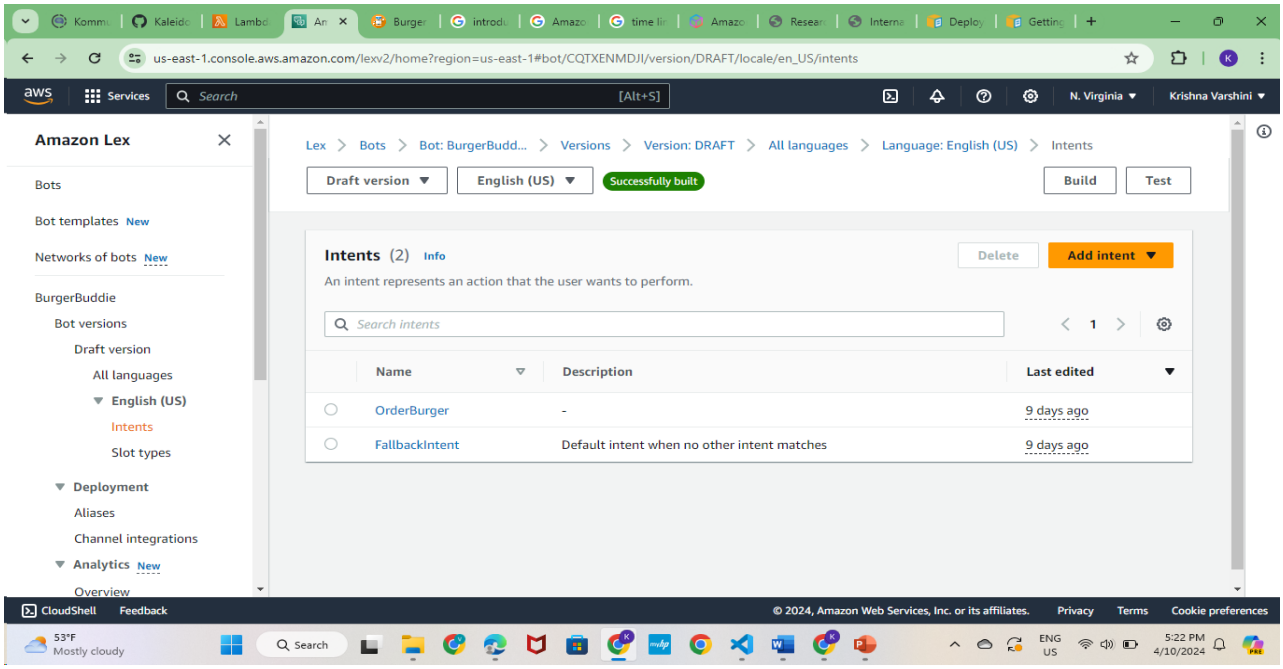


Fig 6: Chatbot Creation

Intents:

Intents represent the actions or tasks that users can perform with the chatbot. Each intent is associated with a set of sample utterances (user inputs) and corresponding responses. Developers define intents based on the expected user interactions and business logic of the application.

Fig 7: Intent Creation



Utterances:

Utterances are examples of phrases or sentences that users might say or type when interacting with the chatbot. Developers provide sample utterances for each intent to train the natural language understanding (NLU) model of Amazon Lex.

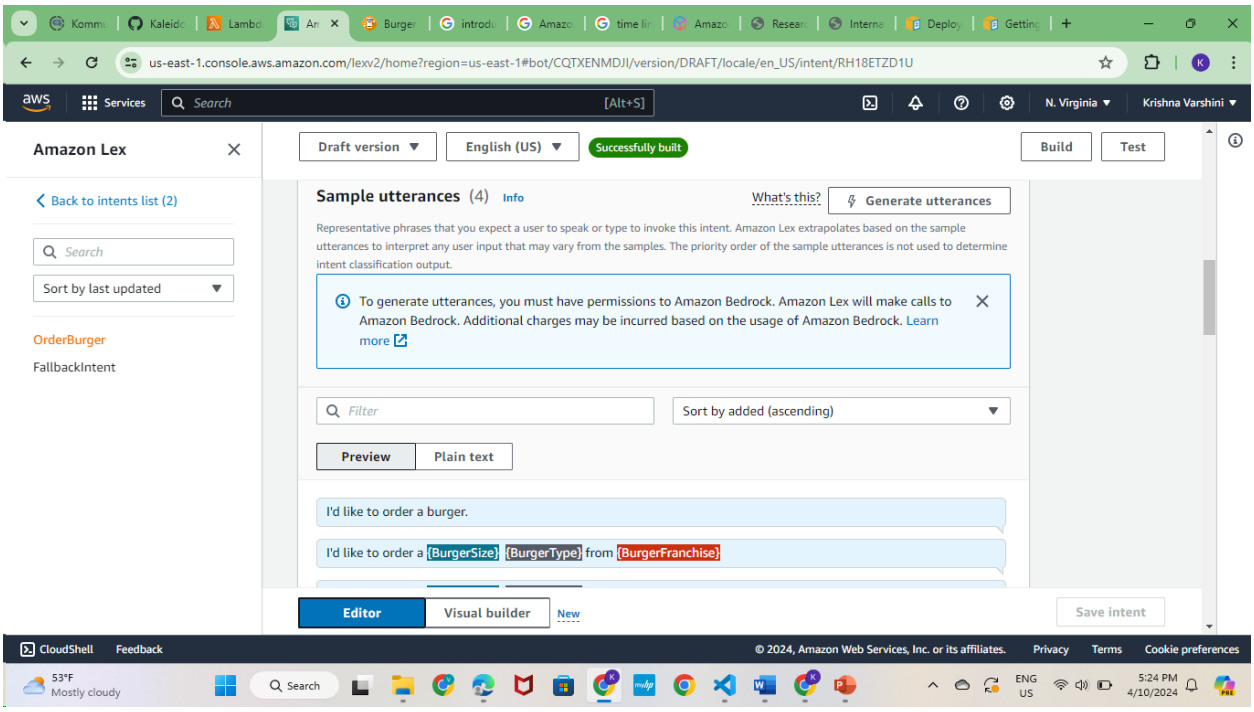
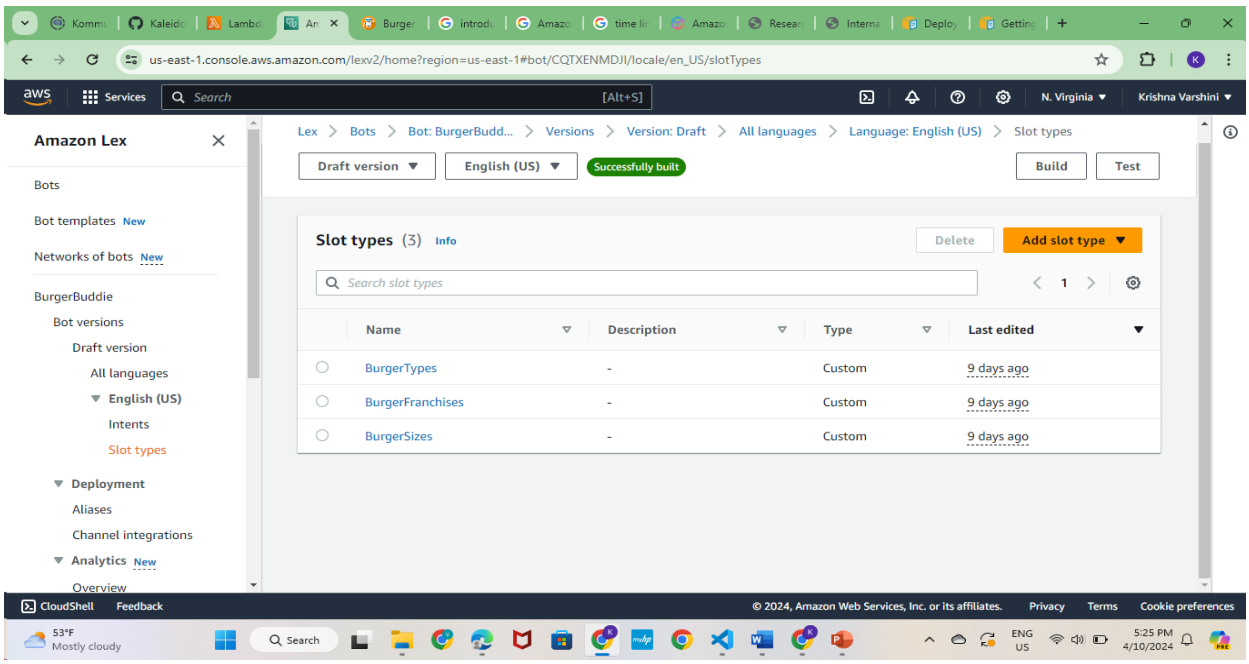


Fig 8: Creation of Utterances

Slots:

Slots are placeholders for specific types of information within user utterances. They represent variables such as dates, numbers, names, or custom entities relevant to the conversation. Developers define slots within intents to extract and process user-provided data.

Fig 9: Creation of Slots



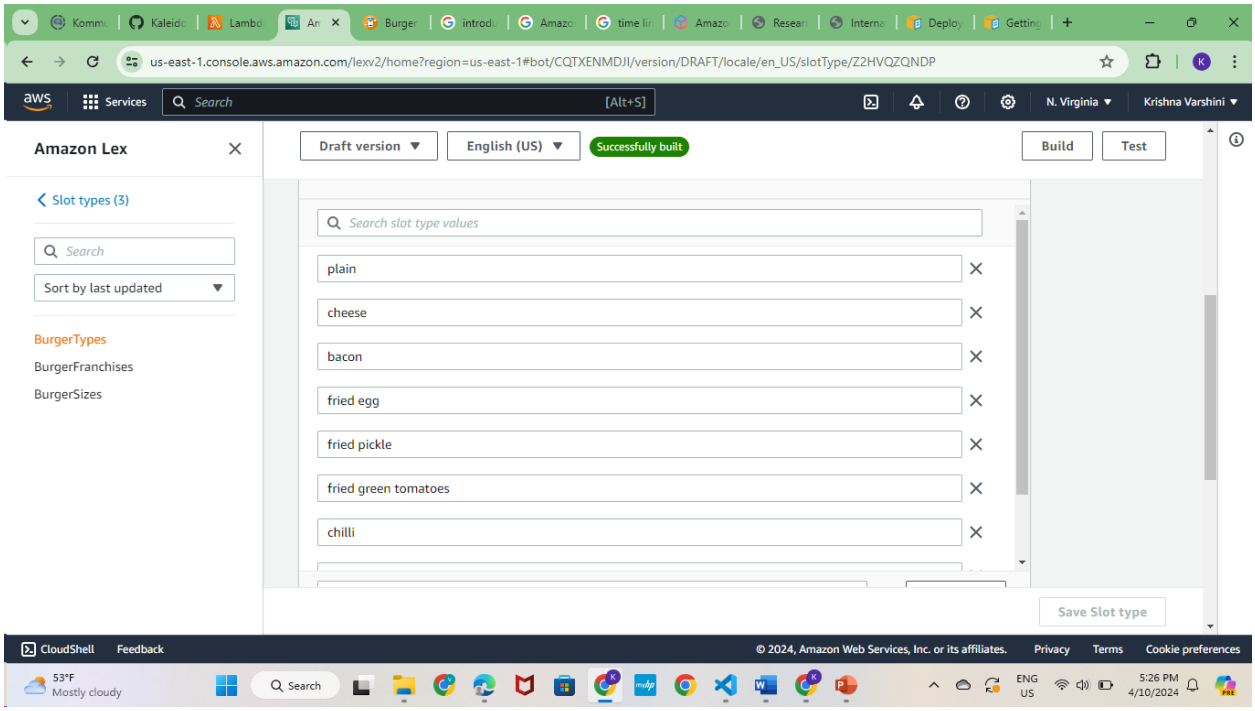


Fig 10: Slot Type

Fulfillment:

Fulfillment refers to the backend logic that handles user requests and generates responses beyond simple text-based replies. Developers can integrate Amazon Lex with other AWS services or custom backend systems to perform actions such as querying databases, invoking APIs, or executing business processes.

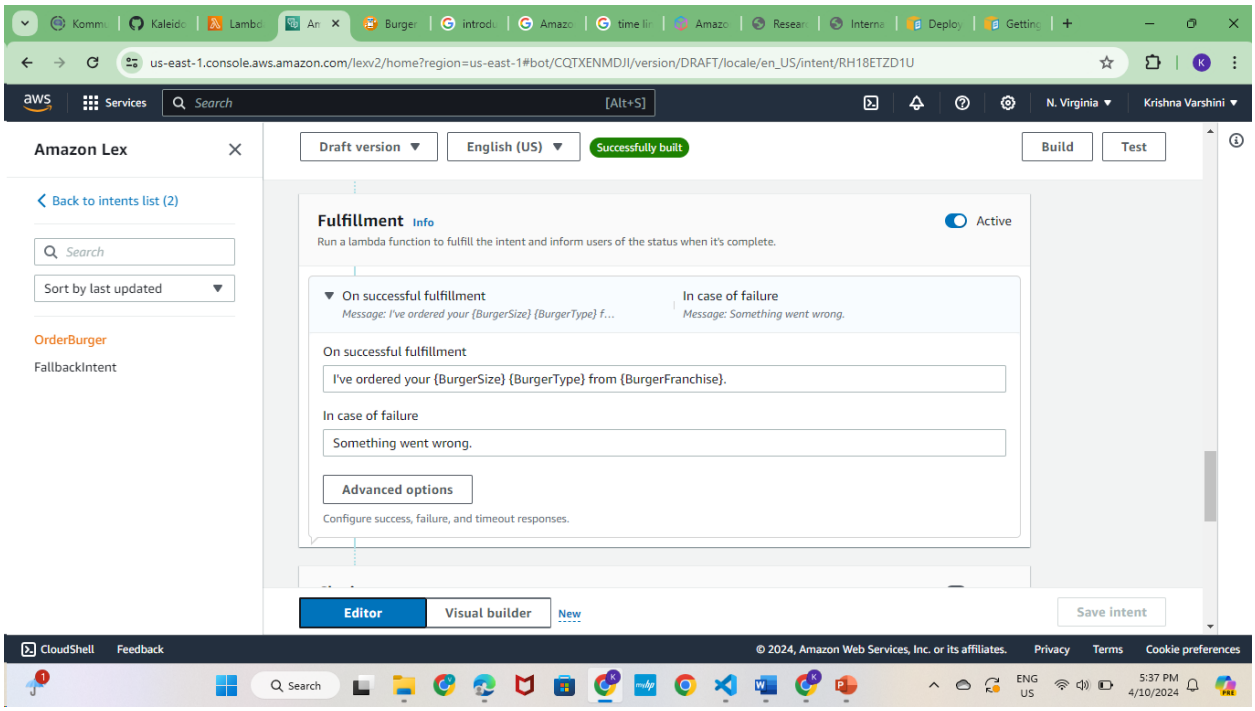


Fig 11: Creation of Fulfillment

AWS Lambda:

AWS Lambda is commonly used as a fulfillment mechanism in Amazon Lex. Developers can write Lambda functions to process user inputs, perform business logic, and generate dynamic responses. Lambda functions are serverless and scale automatically, making them well-suited for handling conversational workloads.

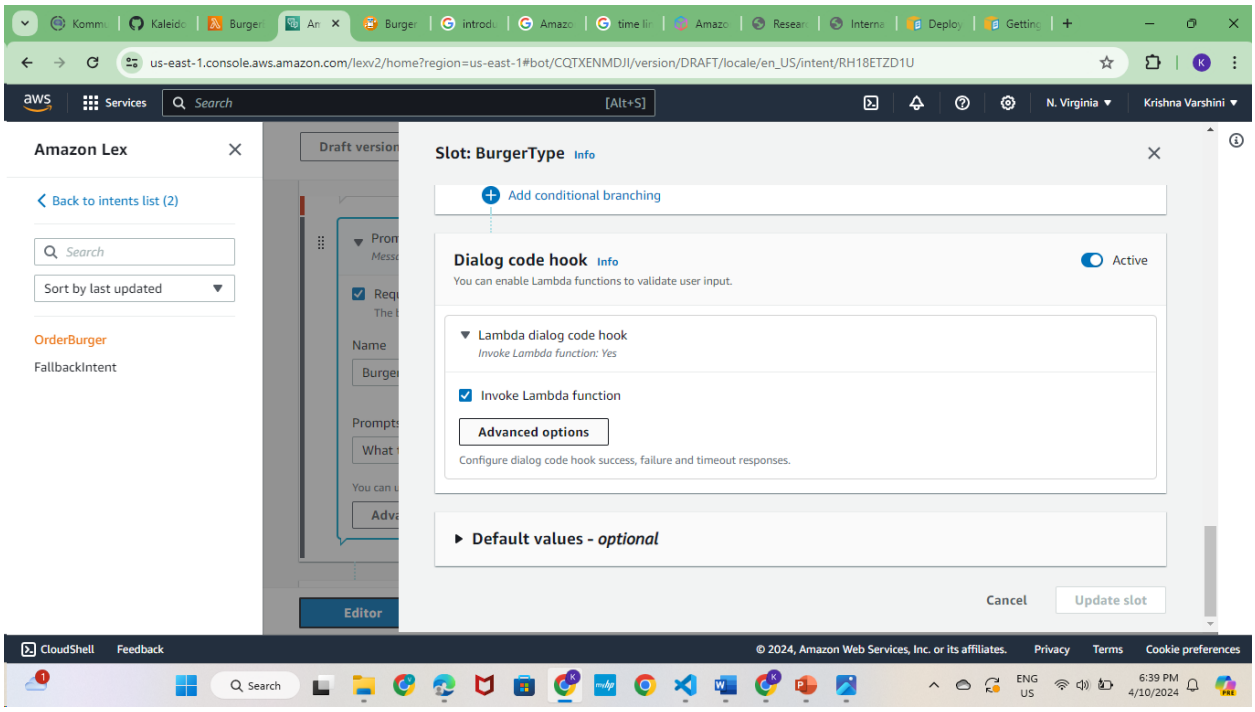


Fig 12: Enabling Lambda Function

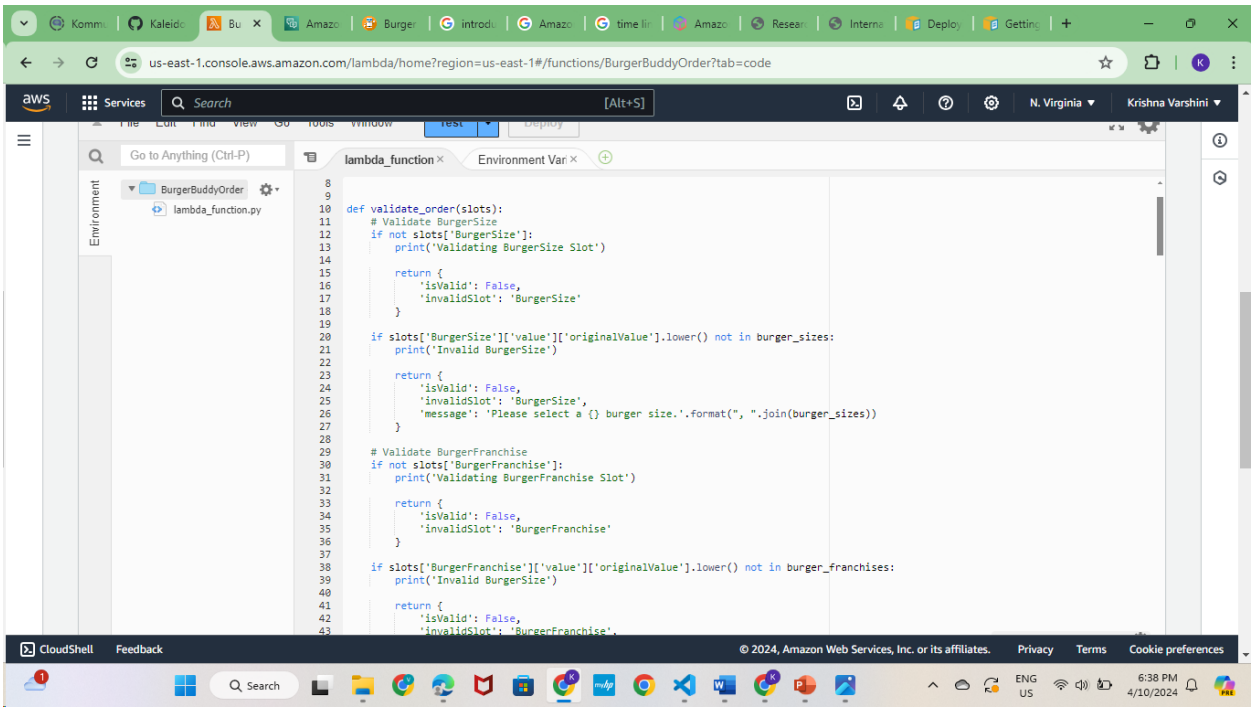


Fig 13: Lambda Function

Integration Channels:

Amazon Lex supports integration with various communication channels, including messaging platforms like Facebook Messenger, Slack, and Twilio, as well as voice-enabled devices such as Amazon Echo. Developers can configure these integration channels to enable seamless interaction between users and the chatbot across different platforms.

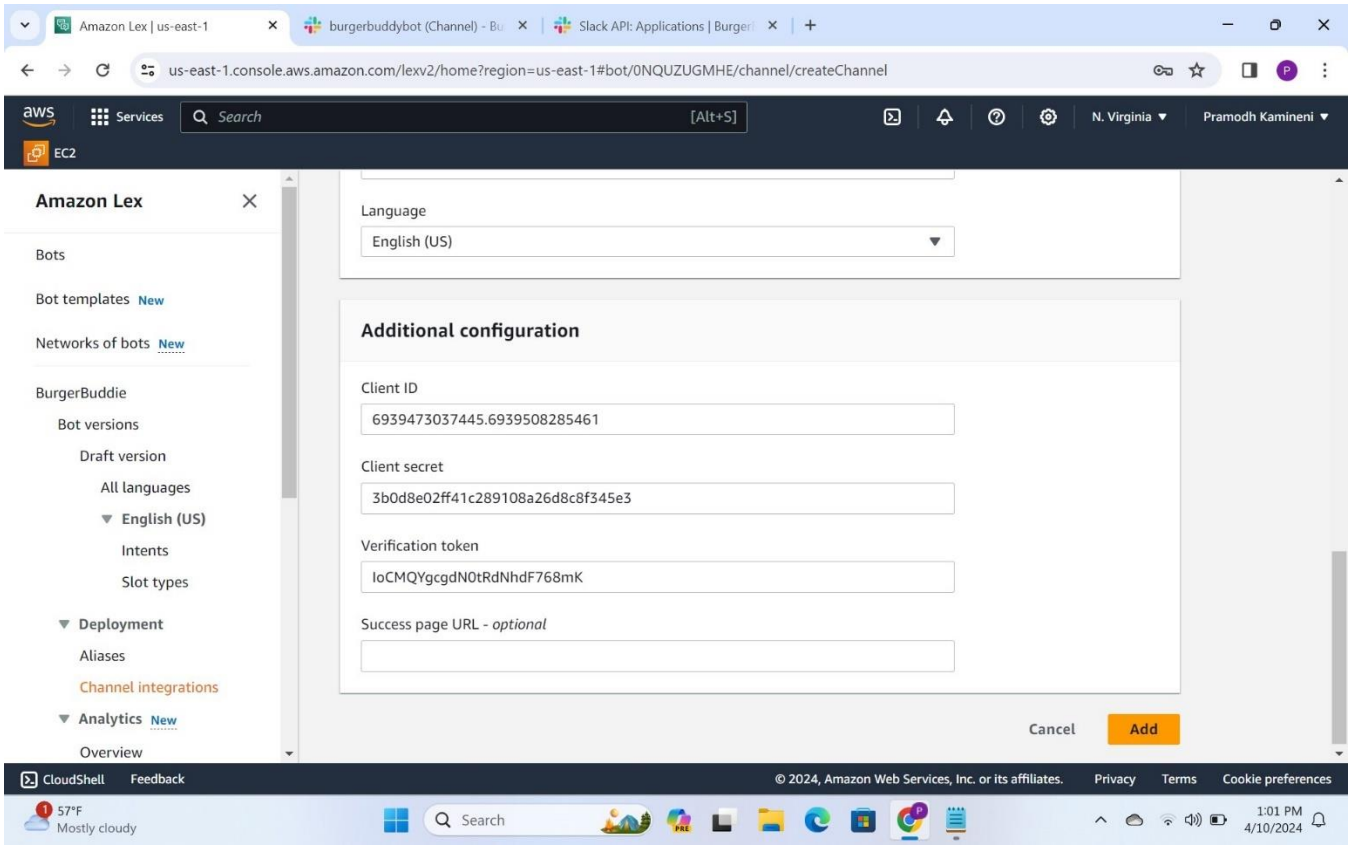


Fig 14: Channel Integration with slack API

Analytics and Monitoring:

Amazon Lex provides built-in analytics and monitoring capabilities to track usage metrics, monitor performance, and identify trends in user interactions. Developers can use these insights to optimize the chatbot's behavior and improve the overall user experience over time.

This architecture enables developers to create powerful and scalable conversational interfaces using Amazon Lex, leveraging natural language understanding and speech recognition technologies to deliver intuitive and engaging user experiences.

3.2 WEBPAGE DEVELOPMENT FOR BURGER BUDDY CHATBOT

Developing a webpage with a chatbot integration using Lambda function, HTML, and Kommunicate app opens a realm of possibilities for businesses and organizations seeking to enhance their online presence and customer engagement. This innovative approach combines the power of serverless computing, frontend web development, and advanced communication technology to create a dynamic and interactive user experience.

At the heart of this solution lies the Lambda function, a serverless computer service provided by AWS. Lambda allows developers to run code without provisioning or managing servers, enabling seamless integration with web applications. By leveraging Lambda, developers can implement backend logic for handling chatbot interactions, such as processing user input, executing commands, and fetching data from external sources. This serverless architecture ensures scalability, flexibility, and cost-efficiency, as resources are dynamically allocated based on demand.

On the front end, HTML serves as the foundation for creating the webpage interface. HTML provides the structure and layout for displaying content, including text, images, buttons, and input fields. With HTML, developers can design a visually appealing and user-friendly interface that seamlessly integrates with the chatbot functionality. By incorporating responsive design principles, the webpage can adapt to different screen sizes and devices, ensuring a consistent experience across desktops, tablets, and smartphones.

The Kommunicate app serves as the bridge between the webpage and the chatbot backend. Kommunicate is a powerful customer support platform that offers chatbot integration, live chat support, and messaging automation features. By integrating Kommunicate into the webpage, developers can leverage its rich set of APIs and SDKs to easily deploy and manage chatbots, track user interactions, and personalize responses. Kommunicate provides a user-friendly dashboard for configuring chatbot settings, monitoring performance metrics, and analyzing user engagement data, empowering businesses to optimize their chatbot strategy and drive meaningful customer interactions.

Combining these technologies, developers can create a seamless and interactive chatbot experience for website visitors. Upon loading the webpage, users are greeted by the chatbot interface, which prompts them to engage in conversation or ask questions. The Lambda function processes user inputs in real-time, executing predefined commands or retrieving relevant information from external sources. The HTML interface dynamically updates to display chatbot responses, multimedia content, and interactive elements, creating a fluid and immersive user experience.

Furthermore, the integration of Lambda, HTML, and Kommunicate enables advanced features such as natural language processing (NLP), sentiment analysis, and multi-channel support. Developers can leverage NLP algorithms to understand and respond to user queries more intelligently, improving the accuracy and relevance of chatbot interactions. Sentiment analysis capabilities allow businesses to gauge customer satisfaction and sentiment in real-time, enabling proactive intervention and personalized support. Additionally, multi-channel support enables seamless communication across web, mobile, and social media platforms, ensuring a cohesive and omnichannel customer experience.

In conclusion, developing a webpage with a chatbot integration using Lambda function, HTML, and Kommunicate app offers a powerful solution for businesses looking to enhance customer engagement and streamline support operations. By combining serverless computing, frontend web development, and advanced communication technology, developers can create a dynamic and interactive user experience that drives meaningful interactions and fosters customer loyalty.

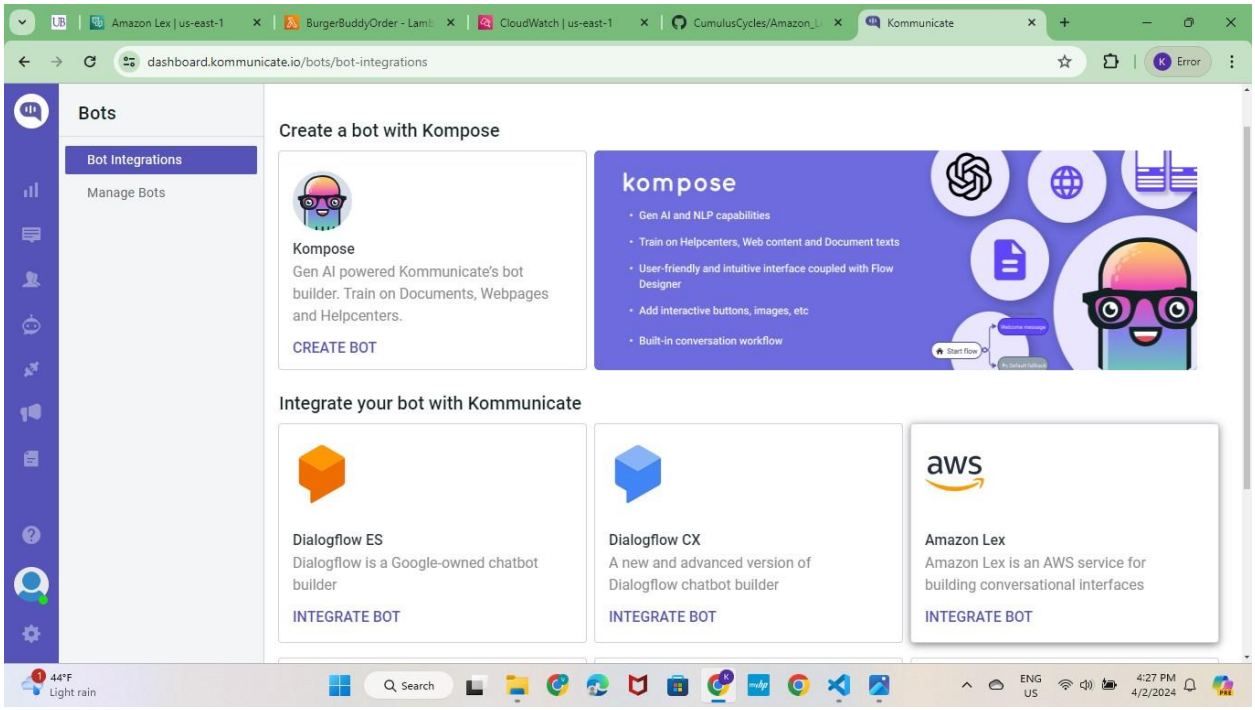


Fig 15: Kommunicate

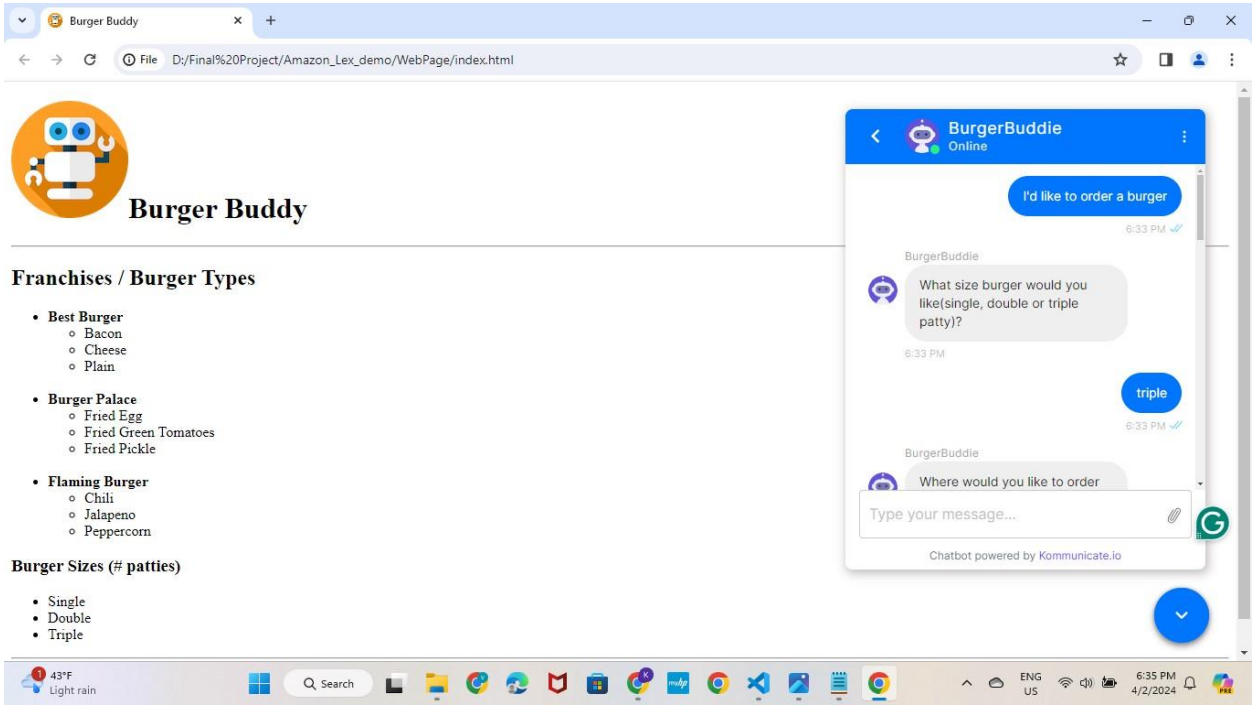


Fig 16: Integration of html webpage and Kommunicate in Amazon Lex bot

3.3 ADDING RESPONSE CARDS TO CHATBOT

Integrating response cards into Burger Buddy, the Amazon Lex-based chatbot, can significantly streamline the process of ordering food, enhancing user satisfaction and efficiency. By presenting users with predefined options in the form of response cards, ordering becomes more intuitive and straightforward.

When a user interacts with Burger Buddy to place an order, response cards can be dynamically generated based on the available menu items, customization options, and frequently ordered selections. For instance, response cards may include popular burger combinations, side dishes, beverages, and add-ons like sauces or toppings. Additionally, users could be presented with options for specifying their preferred cooking preferences, such as rare, medium, or well-done for burgers.

By presenting these response cards, users can simply click or tap on their desired selections, eliminating the need to type out specific orders or navigate complex menus manually. This not only reduces user effort but also minimizes the potential for errors or misunderstandings in the ordering process.

Furthermore, response cards can provide visual cues and descriptions for each option, helping users make informed decisions about their order without the need for extensive text-based interaction. This visual richness enhances the overall user experience and fosters engagement with the chatbot.

Overall, integrating response cards into Burger Buddy transforms the ordering experience into a seamless and intuitive interaction, ultimately enhancing user satisfaction and driving increased usage of the chatbot for food ordering purposes.

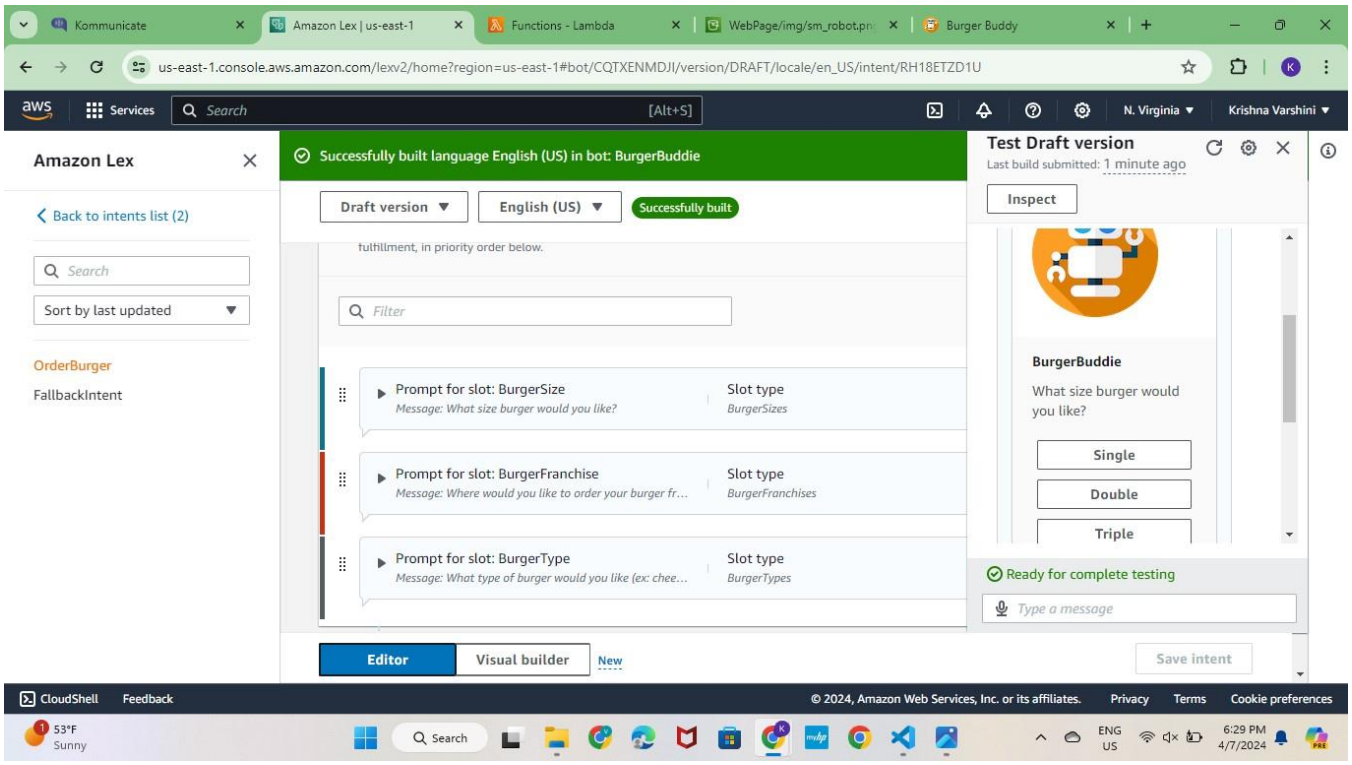


Fig 17: Response Cards

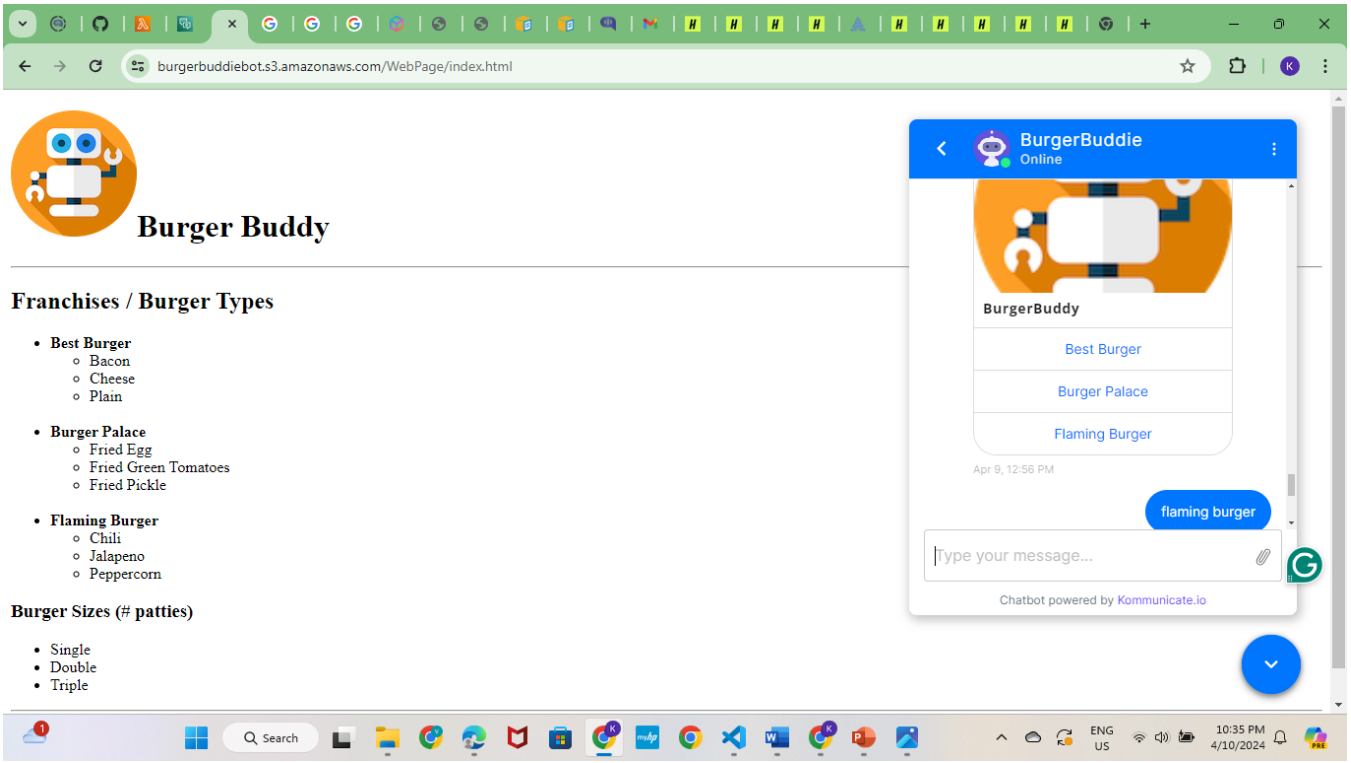


Fig 18: Response Card on the Webpage

3.4 AMAZON S3

Amazon S3 (Simple Storage Service) can indeed be utilized to host and deploy a webpage, providing a reliable and scalable solution for serving static website content. Here's a 200-word overview of how Amazon S3 can be used for this purpose.

Amazon S3 is a highly versatile cloud storage service offered by Amazon Web Services (AWS), commonly used for storing and retrieving any amount of data. When deploying a webpage using S3, developers first upload their webpage files, including HTML, CSS, JavaScript, images, and other assets, to an S3 bucket. These files are then made publicly accessible via a unique URL generated by S3.

To enable S3 to serve the webpage content as a website, developers configure the bucket for static website hosting. This involves specifying the index document (e.g., index.html) and error document (e.g., error.html) to be served when users access the root URL or encounter errors, respectively.

Once configured, the S3 bucket acts as a web server, serving the webpage content to visitors who access the designated URL. Developers can further enhance the web page's performance and security by leveraging additional features of AWS, such as CloudFront CDN (Content Delivery Network) integration for faster content delivery and IAM (Identity and Access Management) policies for access control.

Overall, deploying a webpage using Amazon S3 offers a cost-effective, scalable, and reliable solution for hosting static website content, suitable for a wide range of applications and use cases.

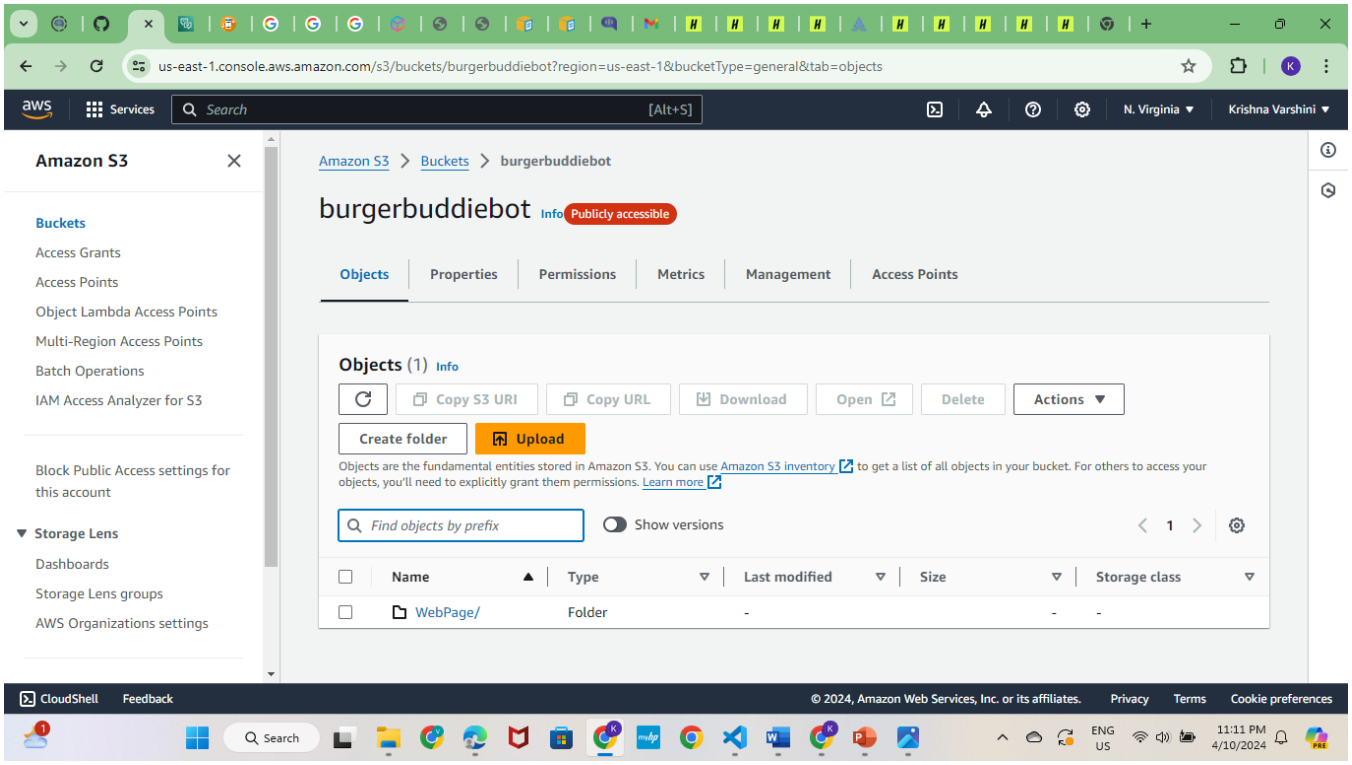


Fig 19: Deploying the folder of code in the s3 bucket.

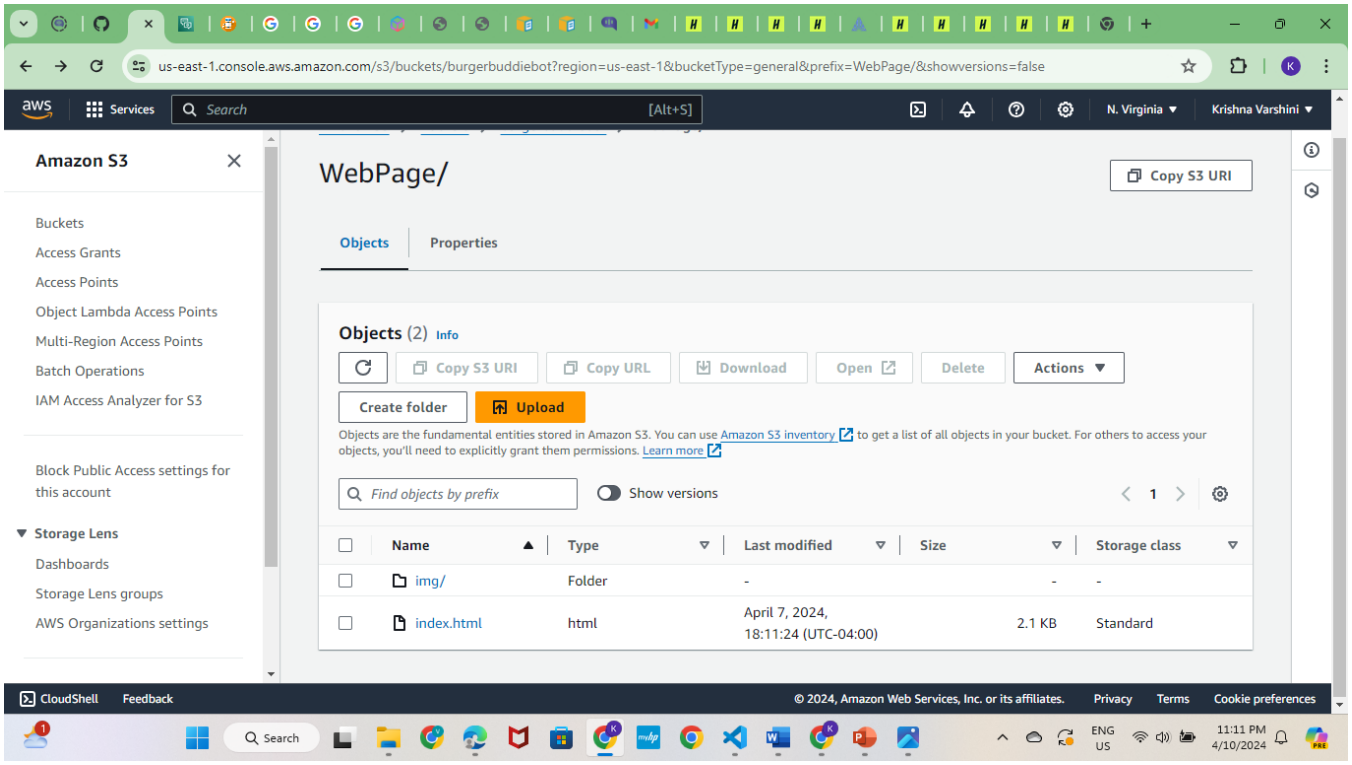


Fig 20: Bucket consists of html code and images

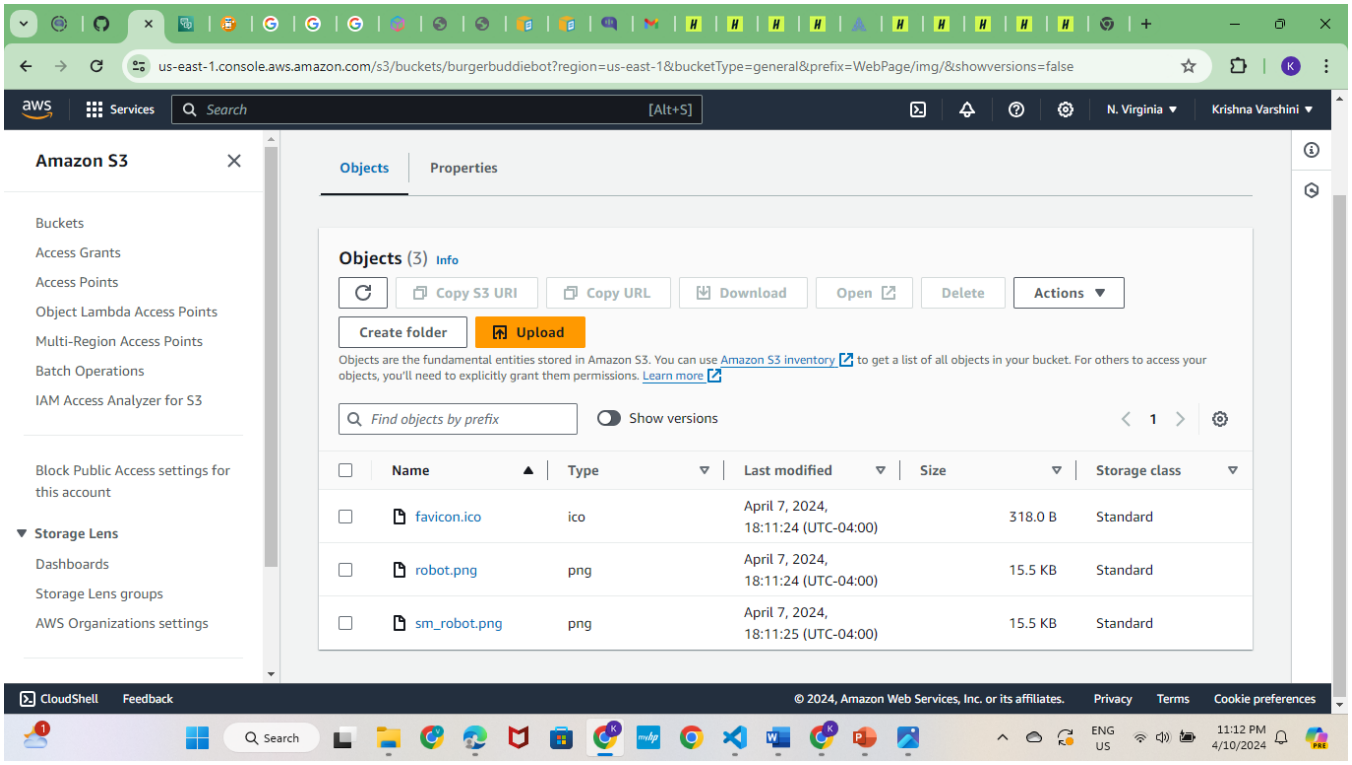


Fig 21: Image folder

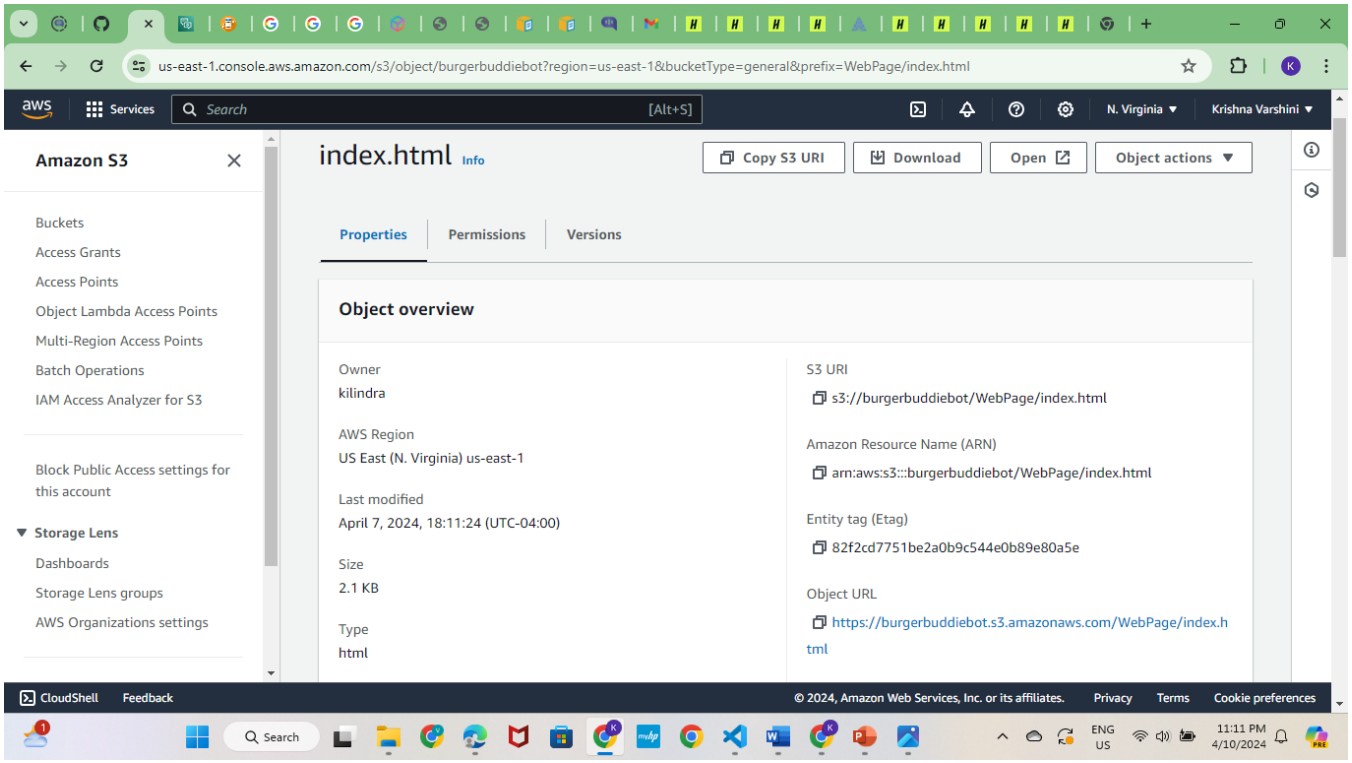


Fig 22: index.html object URL.

3.5 INTEGRATION WITH SLACK

Amazon Lex, AWS's conversational AI service, can be used to create a chatbot capable of understanding natural language input and responding with relevant actions or information. To integrate this chatbot with Slack, developers utilize the Slack API and AWS Lambda, a serverless compute service.

First, developers create a bot user in Slack and configure its permissions and settings. Then, they create a new Lex bot in the AWS Management Console, defining intents, utterances, and slots to capture user input and trigger appropriate responses.

Next, developers set up an AWS Lambda function to serve as the backend for the chatbot, implementing the business logic and integration with Slack. The Lambda function is configured to receive messages from Slack via the Slack API and communicate with the Lex bot to process user requests.

Once the integration is complete, team members can interact with the chatbot directly within Slack, initiating conversations, asking questions, and triggering actions using natural language commands. This seamless integration streamlines communication and workflow processes, empowering teams to collaborate more effectively and accomplish tasks more efficiently.

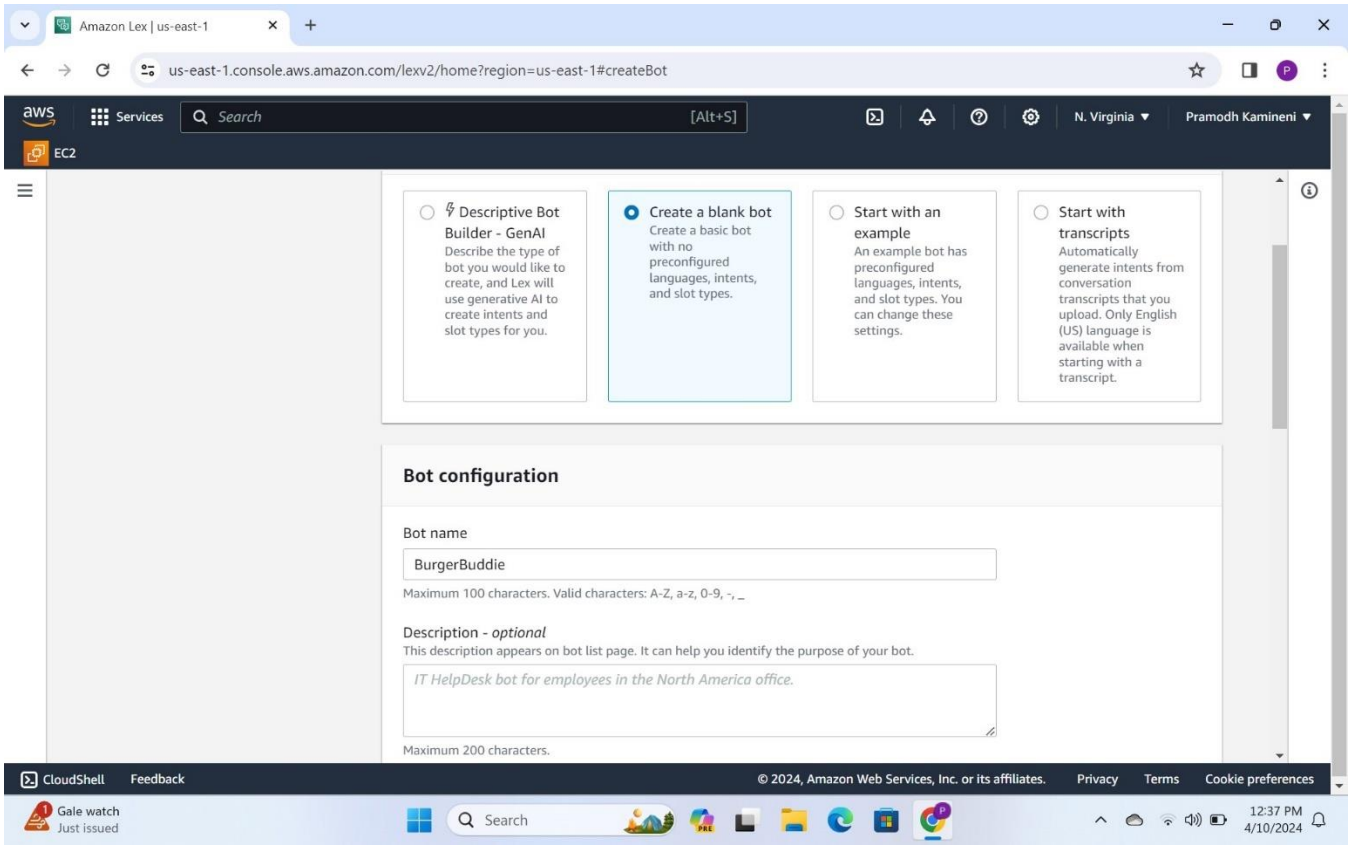


Fig 23: Chatbot Creation

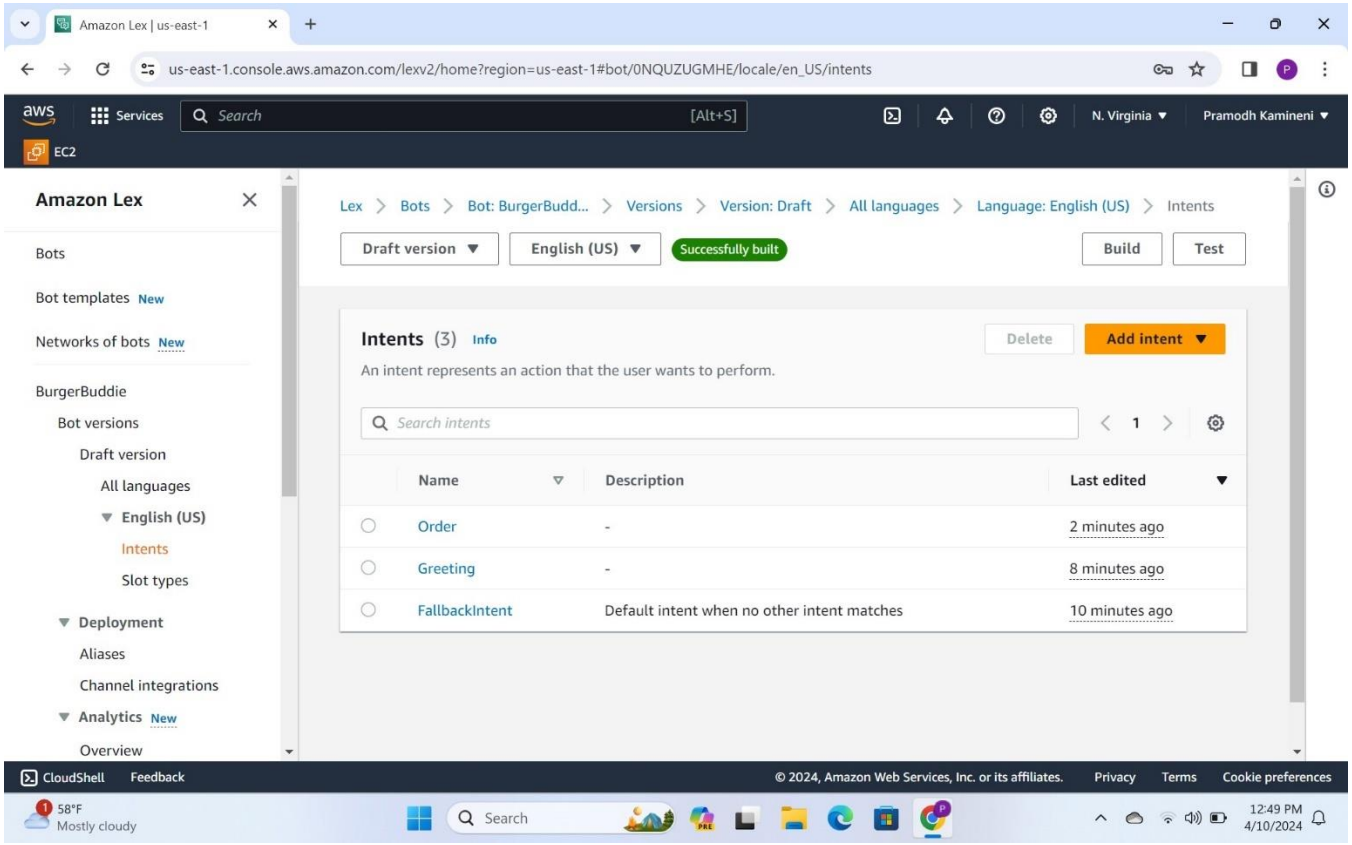


Fig 24: Intent Creation

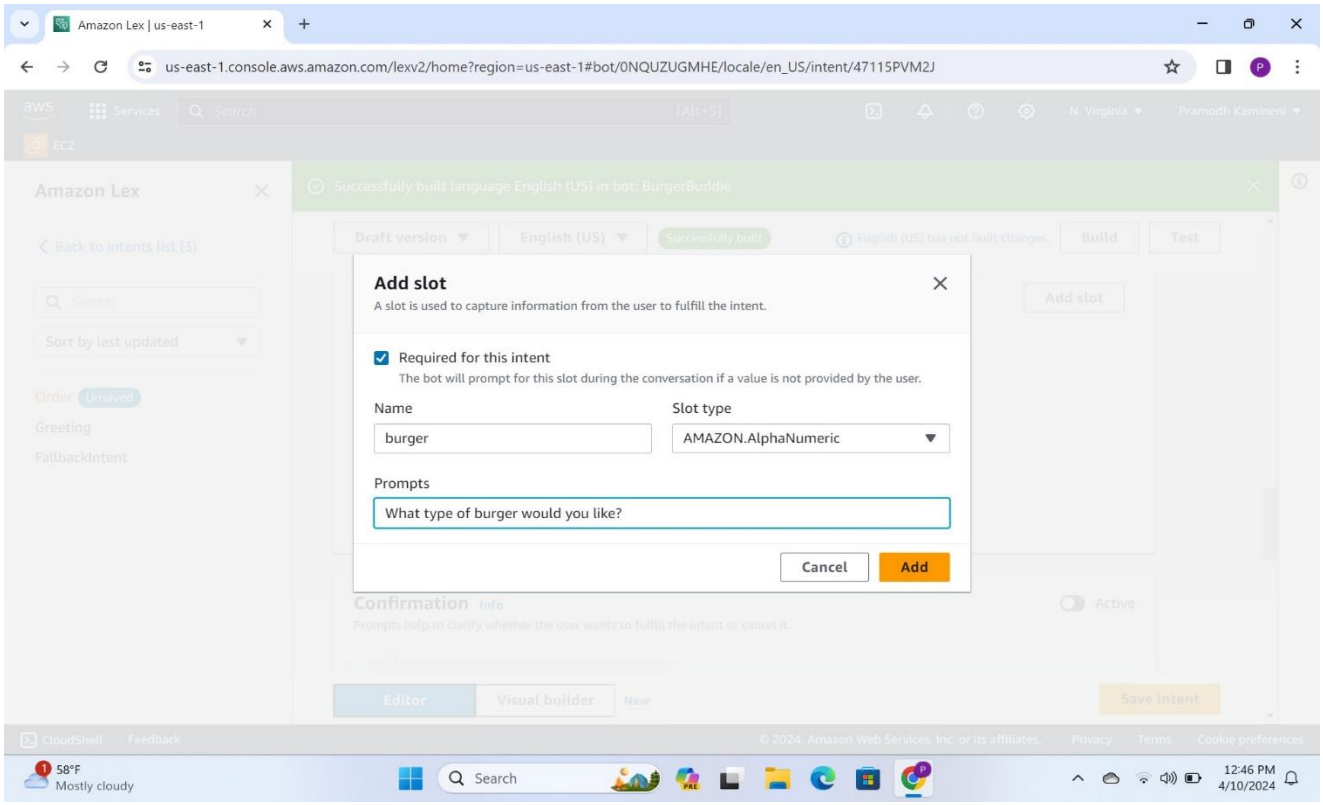


Fig 24: Slot Creation

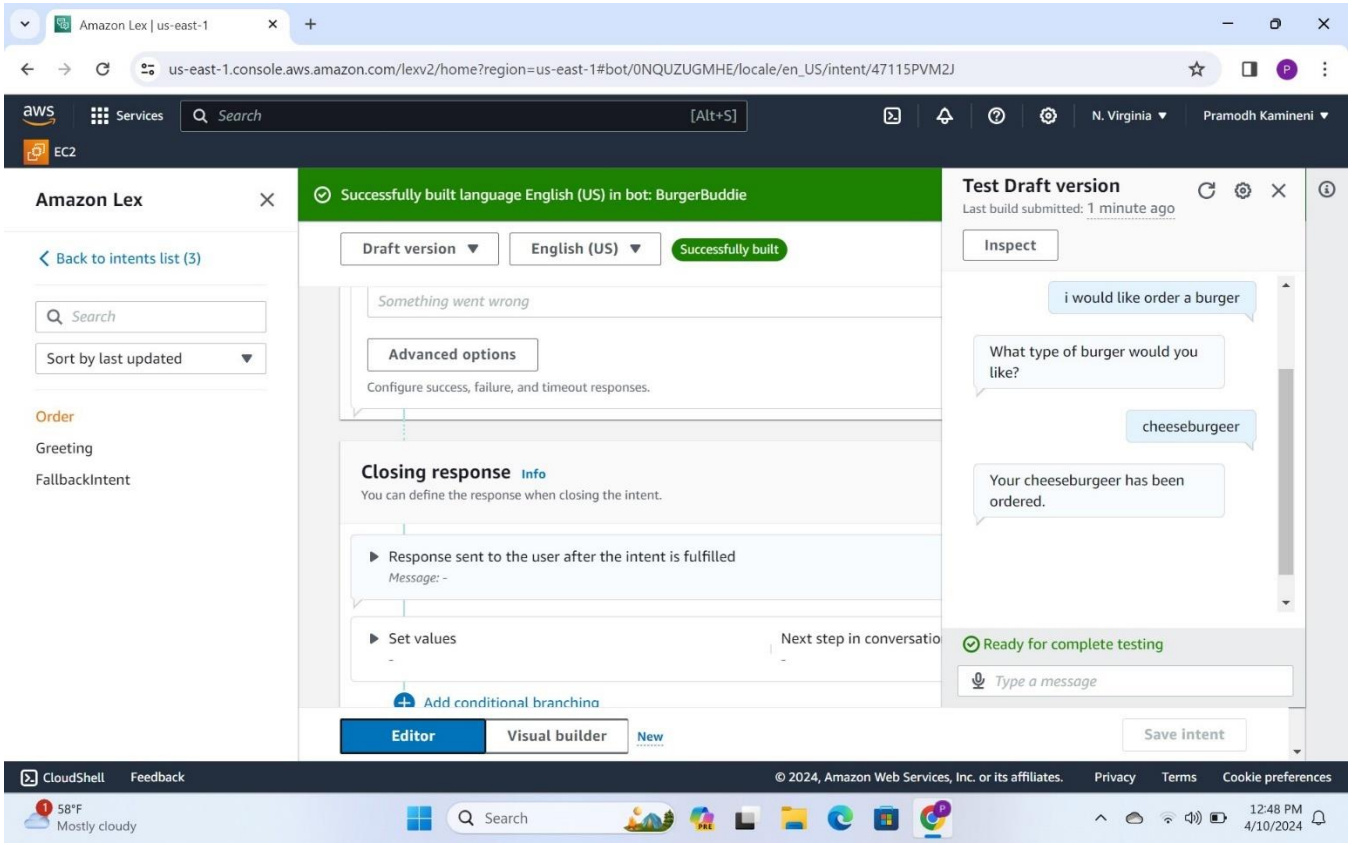


Fig 25: Bot Testing

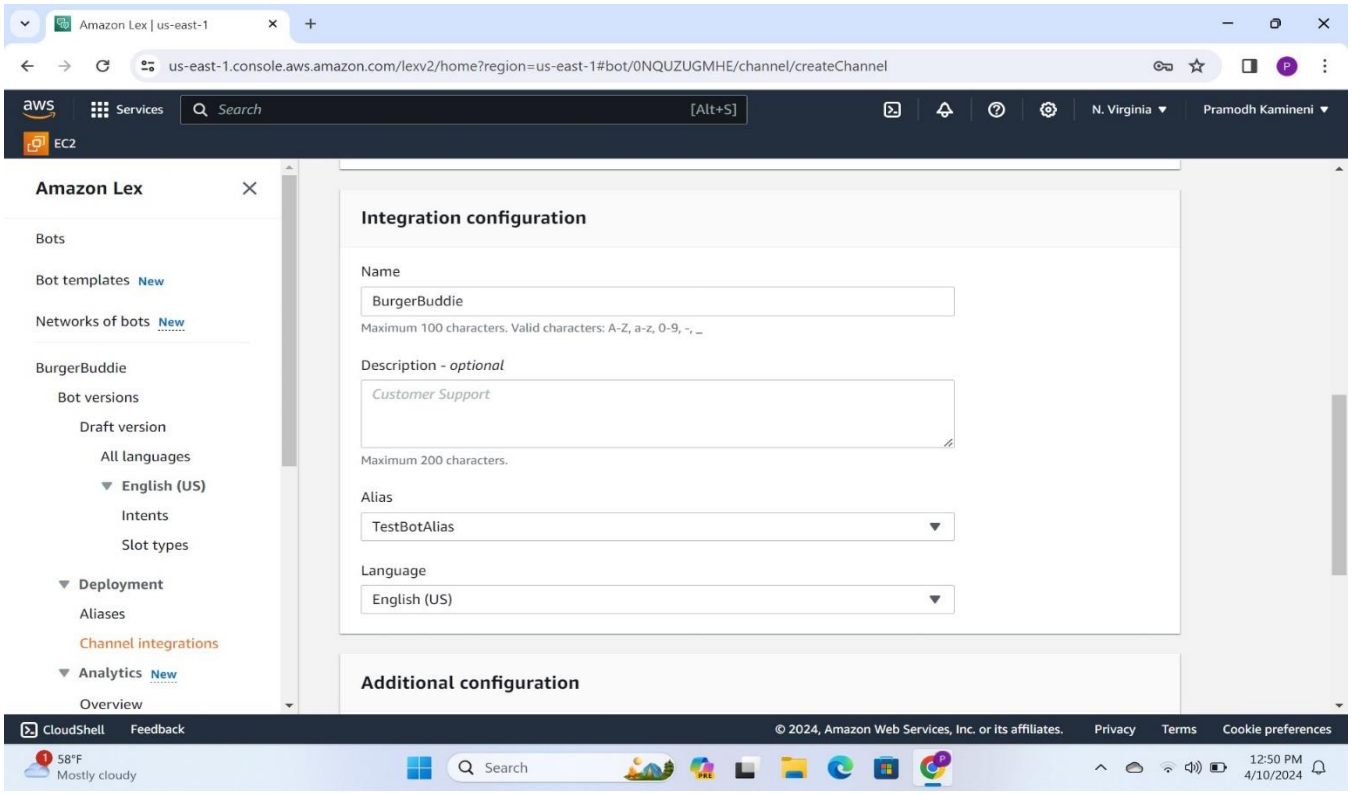


Fig 26: Channel Integration

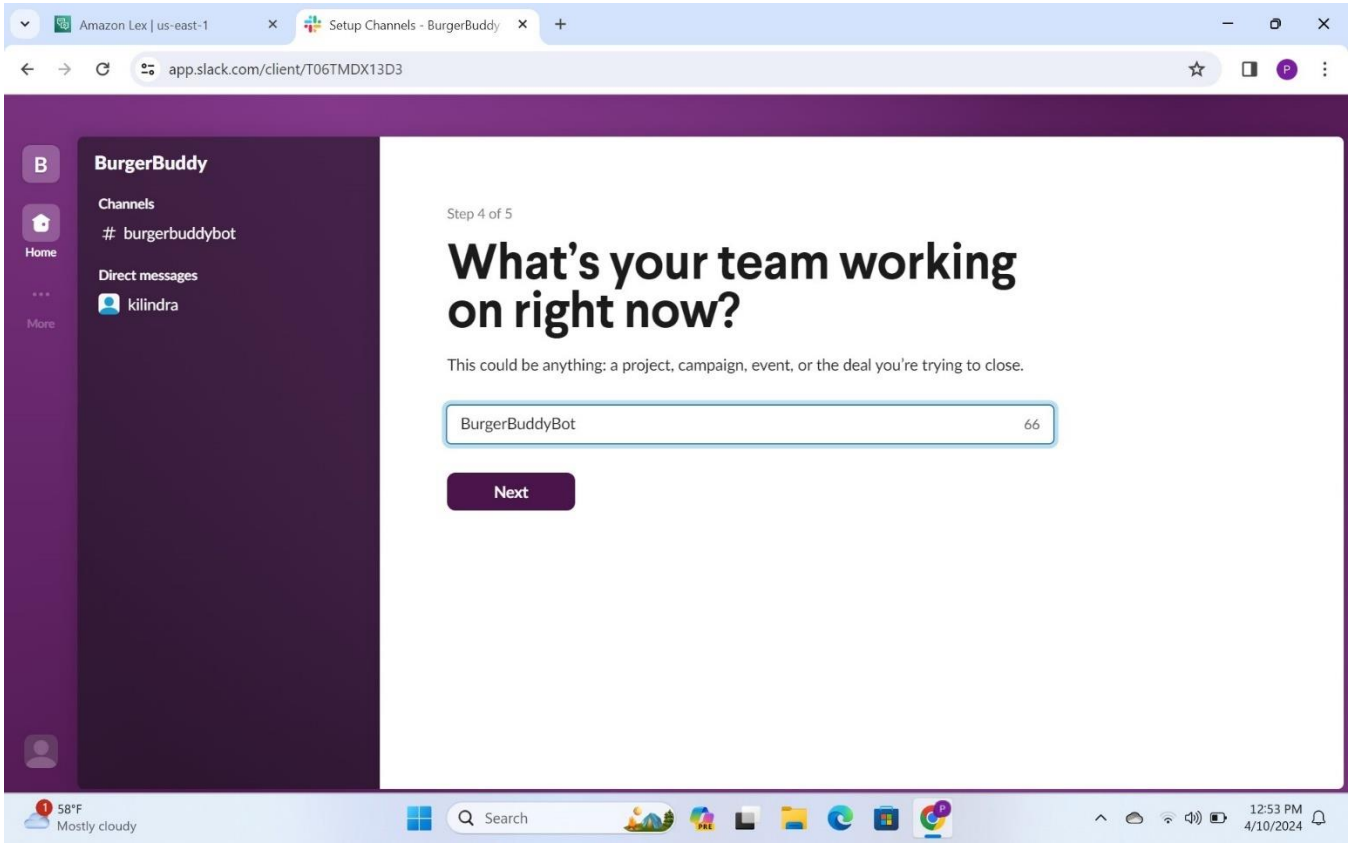


Fig 27: Slack Creation

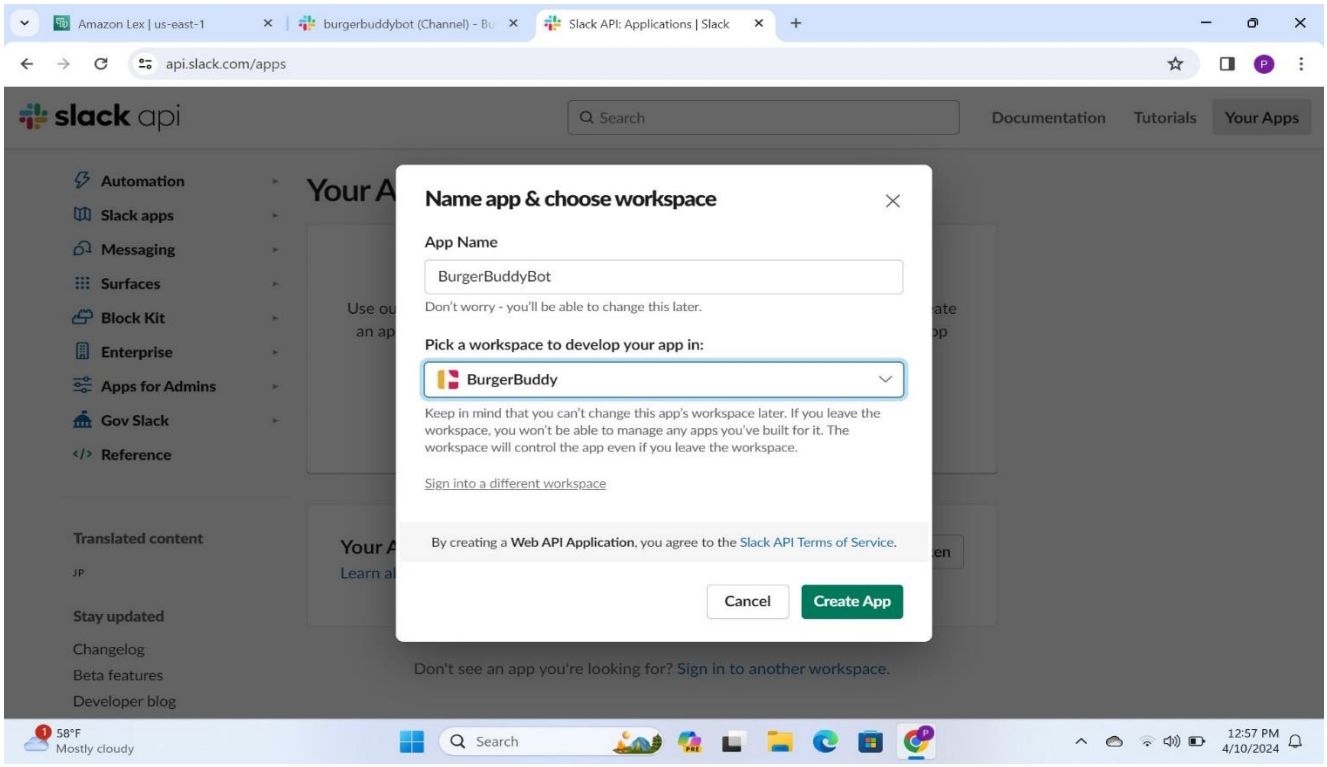


Fig 28: Slack API app creation

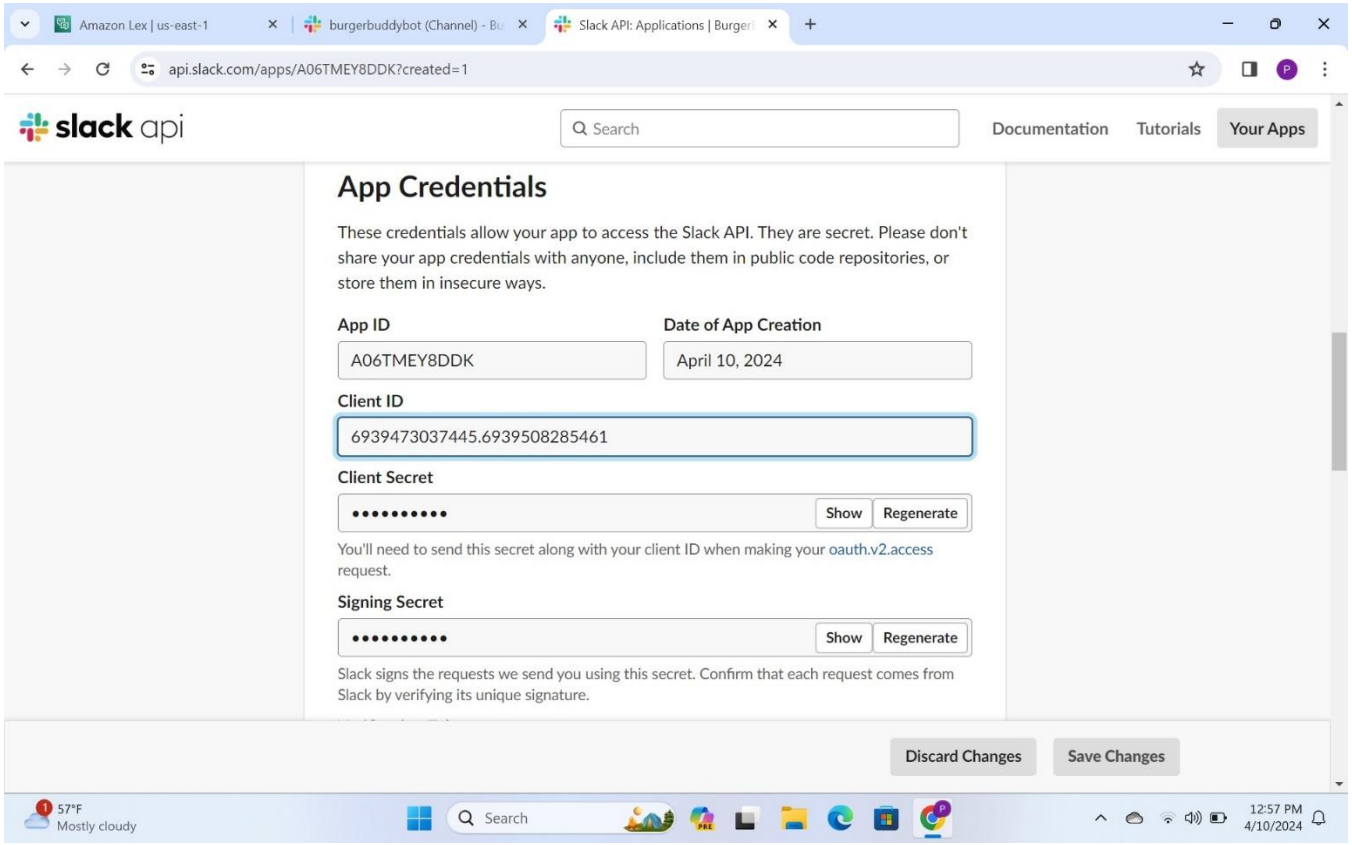


Fig 29: Slack API app credentials

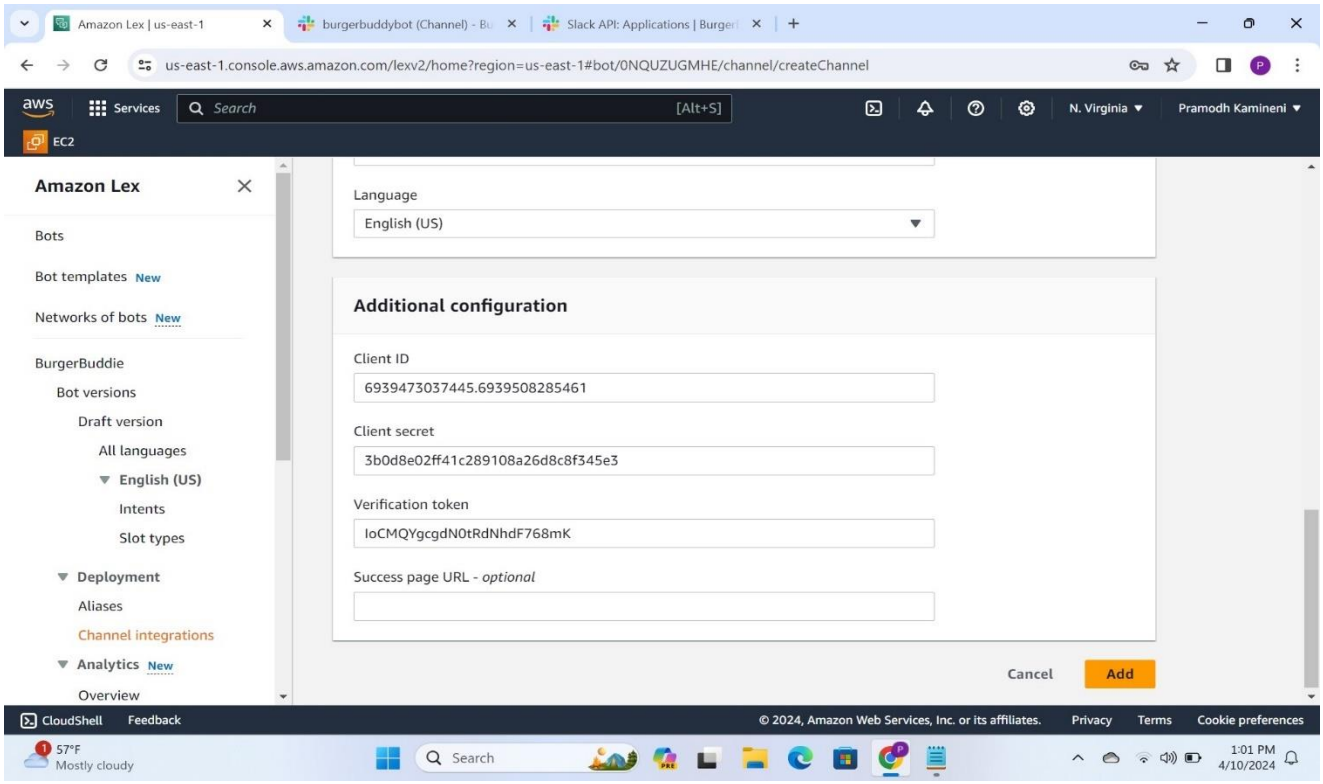


Fig 30: Integrating Slack API credentials in the amazon lex channel.

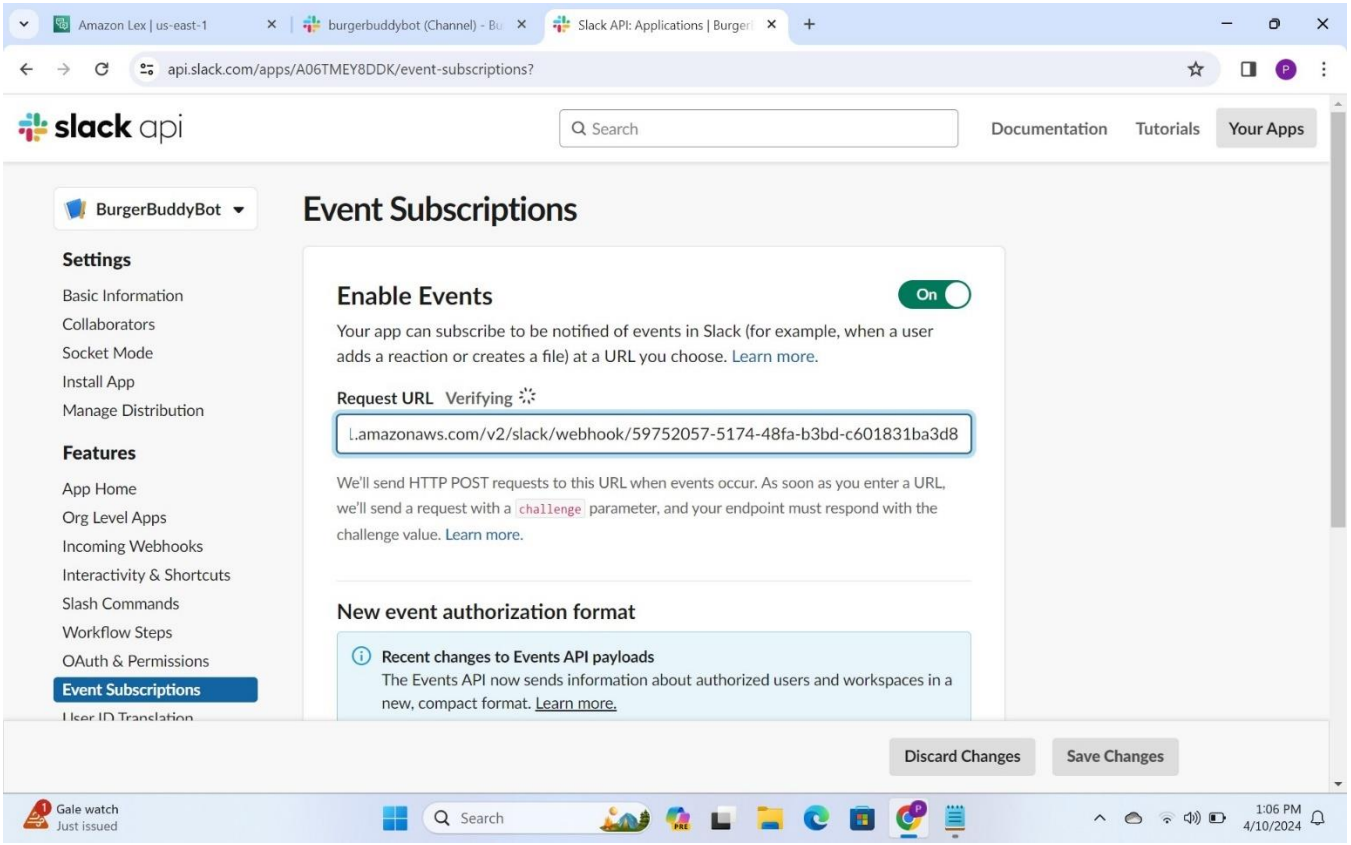


Fig 31: Slack API Event Subscription

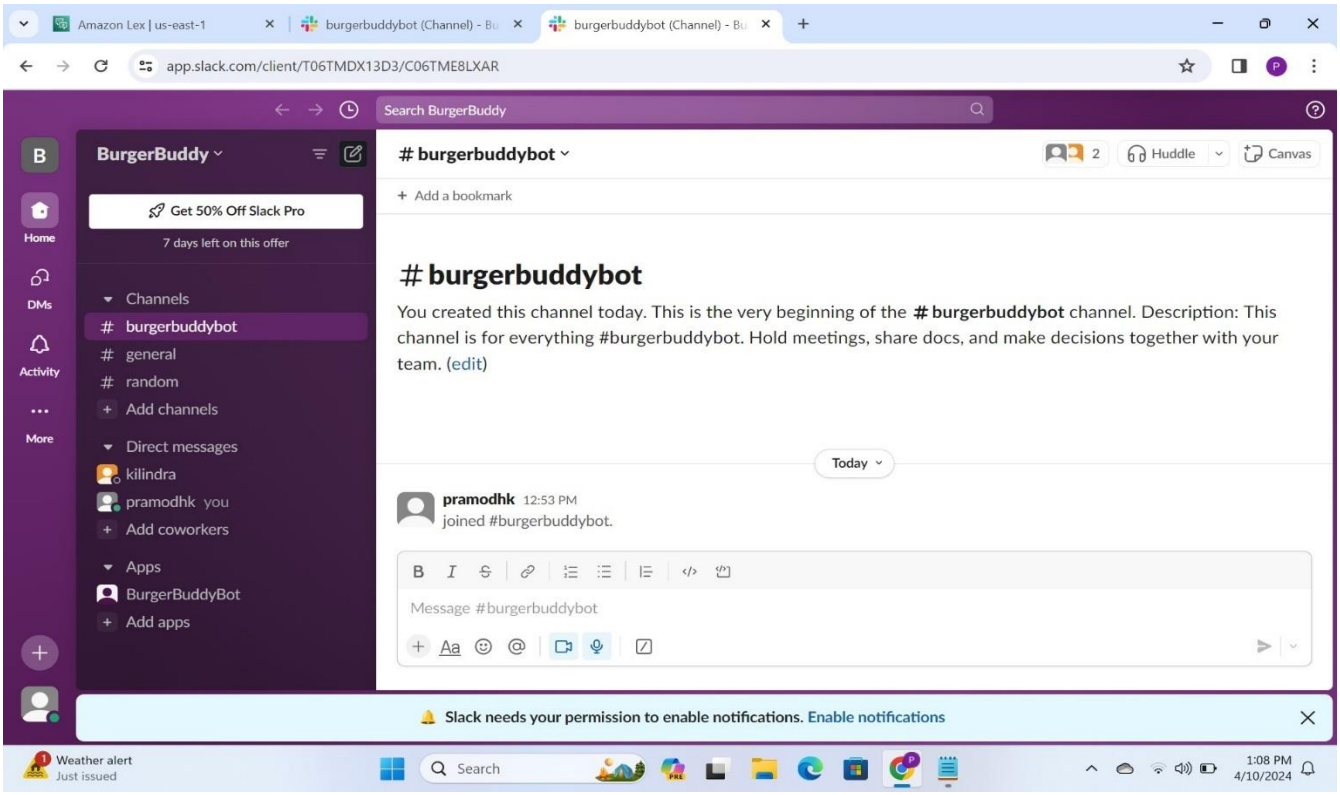


Fig 32: Slack App Creation

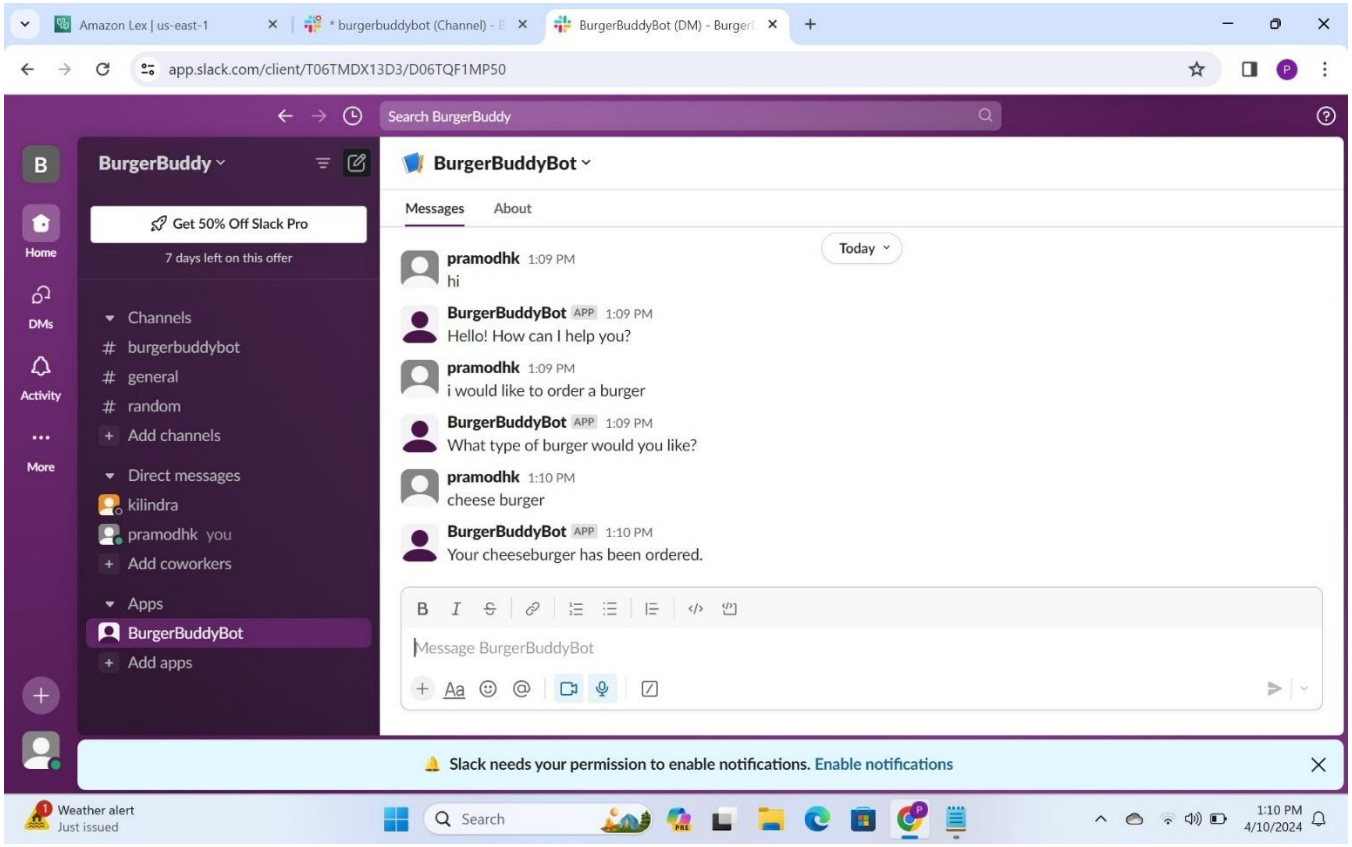


Fig 33: Output of BurgerBuddyBot App

4. APPENDICES

4.1 CODE SNIPPET

index.html:

```
<!DOCTYPE html>
<html lang="en">

<head>
   <meta charset="utf-8" />
   <meta name="viewport" content="width=device-width, initial-scale=1" />
   <title>Burger Buddy</title>
   <link rel="icon" type="image/x-icon" href="img/favicon.ico" />
   <script type="text/javascript">
      (function(d, m){
         var kommunicateSettings =

{"appId":"b93979aad156d01a5e21f1f17f09a8bc","popupWidget":true,"automaticChatOpenOnNavigation":true};
         var s = document.createElement("script"); s.type = "text/javascript"; s.async = true;
         s.src = "https://widget.kommunicate.io/v2/kommunicate.app";
         var h = document.getElementsByTagName("head")[0]; h.appendChild(s);
         window.kommunicate = m; m._globals = kommunicateSettings;
      })(document, window.kommunicate || {});
   /* NOTE : Use web server to view HTML files as real-time update will not work if you directly open the
HTML file in the browser. */
   </script>
</head>

<body>
   <h1><img src="img/robot.png" alt="Burger Buddy" />Burger Buddy</h1>
   <hr />

   <h2>Franchises / Burger Types</h2>
   <ul>
      <li>
         <b>Best Burger</b>
         <ul>
            <li>Bacon</li>
            <li>Cheese</li>
            <li>Plain</li>
         </ul>
      </li>
      <br />
      <li>
         <b>Burger Palace</b>
         <ul>
            <li>Fried Egg</li>
            <li>Fried Green Tomatoes</li>
            <li>Fried Pickle</li>
         </ul>
      </li>
```

```
        <br />
        <li>
            <b>Flaming Burger</b>
            <ul>
                <li>Chili</li>
                <li>Jalapeno</li>
                <li>Peppercorn</li>
            </ul>
        </li>
    </ul>

    <h3>Burger Sizes (# patties)</h3>
    <ul>
        <li>Single</li>
        <li>Double</li>
        <li>Triple</li>
    </ul>

    <hr />
    <a href="https://www.flaticon.com/free-icons/robot" title="robot icons" target="new">Robot icons created by
Freepik
        -Flaticon</a>
</body>

</html>
```

lambda_handler_For_Response_Cards.py

```
import json

burger_sizes = ['single', 'double', 'triple']
burger_franchises = ['best burger', 'burger palace', 'flaming burger']
best_burger_types = ['plain', 'cheese', 'bacon']
burger_palace_types = ['fried egg', 'fried pickle', 'fried green tomatoes']
flaming_burger_types = ['chili', 'jalapeno', 'peppercorn']


def validate_order(slots):
    # Validate BurgerSize
    if not slots['BurgerSize']:
        print('Validating BurgerSize Slot')

        return {
            'isValid': False,
            'invalidSlot': 'BurgerSize'
        }

    if slots['BurgerSize']['value']['originalValue'].lower() not in burger_sizes:
        print('Invalid BurgerSize')
```

```
    return {
        'isValid': False,
        'invalidSlot': 'BurgerSize',
        'message': 'Please select a {} burger size.'.format(", ".join(burger_sizes))
    }

# Validate BurgerFranchise
if not slots['BurgerFranchise']:
    print('Validating BurgerFranchise Slot')

    return {
        'isValid': False,
        'invalidSlot': 'BurgerFranchise'
    }

if slots['BurgerFranchise']['value']['originalValue'].lower() not in burger_franchises:
    print('Invalid BurgerSize')

    return {
        'isValid': False,
        'invalidSlot': 'BurgerFranchise',
        'message': 'Please select from {} burger franchises.'.format(", ".join(burger_franchises))
    }

# Validate BurgerType
if not slots['BurgerType']:
    print('Validating BurgerType Slot')

    return {
        'isValid': False,
        'invalidSlot': 'BurgerType',
        'invalidFranchise': ''
    }

# Validate BurgerType for BurgerFranchise
if slots['BurgerFranchise']['value']['originalValue'].lower() == 'best burger':
    if slots['BurgerType']['value']['originalValue'].lower() not in best_burger_types:
        print('Invalid BurgerType for Best Burger')

        return {
            'isValid': False,
            'invalidSlot': 'BurgerType',
            'invalidFranchise': 'best_burger',
            'message': 'Please select a Best Burger type of {}.'.format(", ".join(best_burger_types))
        }

if slots['BurgerFranchise']['value']['originalValue'].lower() == 'burger palace':
    if slots['BurgerType']['value']['originalValue'].lower() not in burger_palace_types:
        print('Invalid BurgerType for Burger Palace')

        return {
            'isValid': False,
            'invalidSlot': 'BurgerType',
```

```
            'invalidFranchise': 'burger_palace',
            'message': 'Please select a Burger Palace type of {}.'.format(", ".join(burger_palace_types))
        }

    if slots['BurgerFranchise']['value']['originalValue'].lower() == 'flaming burger':
        if slots['BurgerType']['value']['originalValue'].lower() not in flaming_burger_types:
            print('Invalid BurgerType for Flaming Burger')

            return {
                'isValid': False,
                'invalidSlot': 'BurgerType',
                'invalidFranchise': 'flaming_burger',
                'message': 'Please select a Flaming Burger type of {}.'.format(", ".join(flaming_burger_types))
            }

    # Valid Order
    return {'isValid': True}


def lambda_handler(event, context):
    print(event)

    bot = event['bot']['name']
    slots = event['sessionState']['intent']['slots']
    intent = event['sessionState']['intent']['name']

    order_validation_result = validate_order(slots)
    print(order_validation_result)

    if event['invocationSource'] == 'DialogCodeHook':
        if not order_validation_result['isValid']:
            response_message = 'BurgerBuddy'
            if 'message' in order_validation_result:
                response_message = order_validation_result['message']

            response_card_sub_title = ''
            response_card_buttons = []

            best_burger_sub_title = 'Please select a Best Burger type'
            best_burger_buttons = [
                {
                    "text": "Plain",
                    "value": "plain"
                },
                {
                    "text": "Cheese",
                    "value": "cheese"
                },
                {
                    "text": "Bacon",
                    "value": "bacon"
                }
            ]
```

```
burger_palace_sub_title = 'Please select a Burger Palace type'
burger_palace_buttons = [
    {
        "text": "Fried Egg",
        "value": "fried egg"
    },
    {
        "text": "Fried Pickle",
        "value": "fried pickle"
    },
    {
        "text": "Fried Green Tomatoes",
        "value": "fried green tomatoes"
    }
]

flaming_burger_sub_title = 'Please select a Flaming Burger type'
flaming_burger_buttons = [
    {
        "text": "Chili",
        "value": "chili"
    },
    {
        "text": "Jalapeno",
        "value": "jalapeno"
    },
    {
        "text": "peppercorn",
        "value": "Peppercorn"
    }
]

if order_validation_result['invalidSlot'] == "BurgerSize":
    response_card_sub_title = "Please select a Burger size"
    response_card_buttons = [
        {
            "text": "Single",
            "value": "single"
        },
        {
            "text": "Double",
            "value": "double"
        },
        {
            "text": "Triple",
            "value": "triple"
        }
    ]

if order_validation_result['invalidSlot'] == "BurgerFranchise":
    response_card_sub_title = "Please select a Burger Franchise"
    response_card_buttons = [
        {
            "text": "Best Burger",
```

```
            "value": "best burger"
        },
        {
            "text": "Burger Palace",
            "value": "burger palace"
        },
        {
            "text": "Flaming Burger",
            "value": "flaming burger"
        }
    ]

if order_validation_result['invalidSlot'] == "BurgerType":
    if order_validation_result['invalidFranchise'] == "best_burger":
        response_card_sub_title = 'Please select a Best Burger type'
        response_card_buttons = best_burger_buttons
    elif order_validation_result['invalidFranchise'] == "burger_palace":
        response_card_sub_title = 'Please select a Burger Palace type'
        response_card_buttons = burger_palace_buttons
    elif order_validation_result['invalidFranchise'] == "flaming_burger":
        response_card_sub_title = 'Please select a Flaming Burger type'
        response_card_buttons = flaming_burger_buttons
    else:
        response_card_sub_title = 'Please select a burger type'
        response_card_buttons = [
            {
                "text": "Plain",
                "value": "plain"
            },
            {
                "text": "Cheese",
                "value": "cheese"
            },
            {
                "text": "Bacon",
                "value": "bacon"
            }
            ,
            {
                "text": "Fried Pickle",
                "value": "fried pickle"
            },
            {
                "text": "Chili",
                "value": "chili"
            }
        ]

response = {
    "sessionState": {
        "dialogAction": {
            "slotToElicit": order_validation_result['invalidSlot'],
            "type": "ElicitSlot"
        },
```

```
            "intent": {
                "name": intent,
                "slots": slots,
            }
        },
        "messages": [
            {
                "contentType": "ImageResponseCard",
                "content": response_message,
                "imageResponseCard": {
                    "title": "BurgerBuddy",
                    "subtitle": response_card_sub_title,
                    "imageUrl": "https://burgerbuddiebot.s3.amazonaws.com/WebPage/img/sm_robot.png",
                    "buttons": response_card_buttons
                }
            }
        ]
    }
else:
    response = {
        "sessionState": {
            "dialogAction": {
                "type": "Delegate"
            },
            "intent": {
                'name': intent,
                'slots': slots
            }
        }
    }

if event['invocationSource'] == 'FulfillmentCodeHook':
    response = {
        "sessionState": {
            "dialogAction": {
                "type": "Close"
            },
            "intent": {
                "name": intent,
                "slots": slots,
                "state": "Fulfilled"
            }
        },
        "messages": [
            {
                "contentType": "PlainText",
                "content": "I've placed your order."
            }
        ]
    }

print(response)
return response
```

lambda_handler.py

```
import json
burger_sizes = ['single', 'double', 'triple']
burger_franchises = ['best burger', 'burger palace', 'flaming burger']
best_burger_types = ['plain', 'cheese', 'bacon']
burger_palace_types = ['fried egg', 'fried pickle', 'fried green tomatoes']
flaming_burger_types = ['chili', 'jalapeno', 'peppercorn']


def validate_order(slots):
    # Validate BurgerSize
    if not slots['BurgerSize']:
        print('Validating BurgerSize Slot')

        return {
            'isValid': False,
            'invalidSlot': 'BurgerSize'
        }

    if slots['BurgerSize']['value']['originalValue'].lower() not in burger_sizes:
        print('Invalid BurgerSize')

        return {
            'isValid': False,
            'invalidSlot': 'BurgerSize',
            'message': 'Please select a {} burger size.'.format(", ".join(burger_sizes))
        }

    # Validate BurgerFranchise
    if not slots['BurgerFranchise']:
        print('Validating BurgerFranchise Slot')

        return {
            'isValid': False,
            'invalidSlot': 'BurgerFranchise'
        }

    if slots['BurgerFranchise']['value']['originalValue'].lower() not in burger_franchises:
        print('Invalid BurgerSize')

        return {
            'isValid': False,
            'invalidSlot': 'BurgerFranchise',
            'message': 'Please select from {} burger franchises.'.format(", ".join(burger_franchises))
        }

    # Validate BurgerType
    if not slots['BurgerType']:
        print('Validating BurgerType Slot')

        return {
            'isValid': False,
```

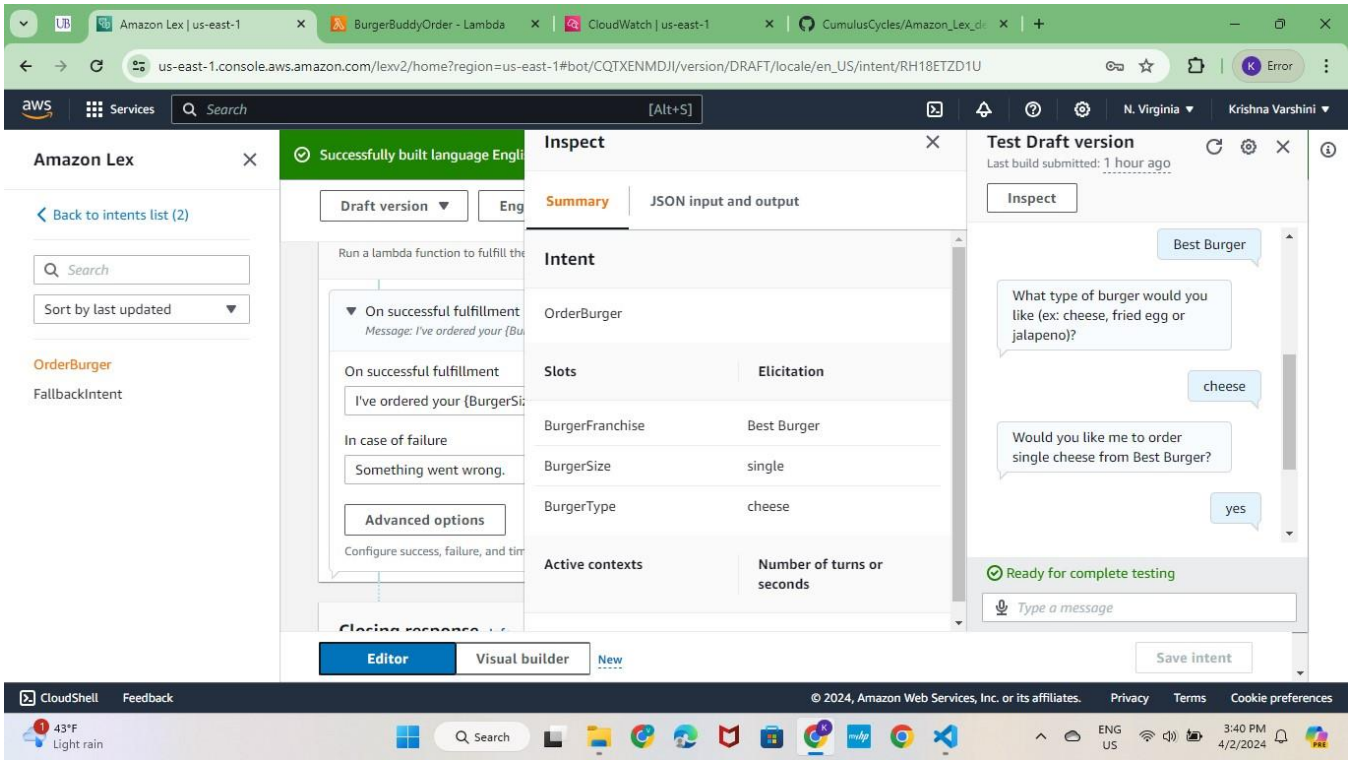
```
            'invalidSlot': 'BurgerType'
        }

    # Validate BurgerType for BurgerFranchise
    if slots['BurgerFranchise']['value']['originalValue'].lower() == 'best burger':
        if slots['BurgerType']['value']['originalValue'].lower() not in best_burger_types:
            print('Invalid BurgerType for Best Burger')

            return {
                'isValid': False,
                'invalidSlot': 'BurgerType',
                'message': 'Please select a Best Burger type of {}.'.format(", ".join(best_burger_types))
            }

    if slots['BurgerFranchise']['value']['originalValue'].lower() == 'burger palace':
        if slots['BurgerType']['value']['originalValue'].lower() not in burger_palace_types:
            print('Invalid BurgerType for Burger Palace')

            return {
                'isValid': False,
                'invalidSlot': 'BurgerType',
                'message': 'Please select a Burger Palce type of {}.'.format(", ".join(burger_palace_types))
            }

    if slots['BurgerFranchise']['value']['originalValue'].lower() == 'flaming burger':
        if slots['BurgerType']['value']['originalValue'].lower() not in flaming_burger_types:
            print('Invalid BurgerType for Flaming Burger')

            return {
                'isValid': False,
                'invalidSlot': 'BurgerType',
                'message': 'Please select a Flaming Burger type of {}.'.format(", ".join(flaming_burger_types))
            }

    # Valid Order
    return {'isValid': True}


def lambda_handler(event, context):
    print(event)

    bot = event['bot']['name']
    slots = event['sessionState']['intent']['slots']
    intent = event['sessionState']['intent']['name']

    order_validation_result = validate_order(slots)

    if event['invocationSource'] == 'DialogCodeHook':
        if not order_validation_result['isValid']:
            if 'message' in order_validation_result:
                response = {
                    "sessionState": {
                        "dialogAction": {
                            "slotToElicit": order_validation_result['invalidSlot'],
```

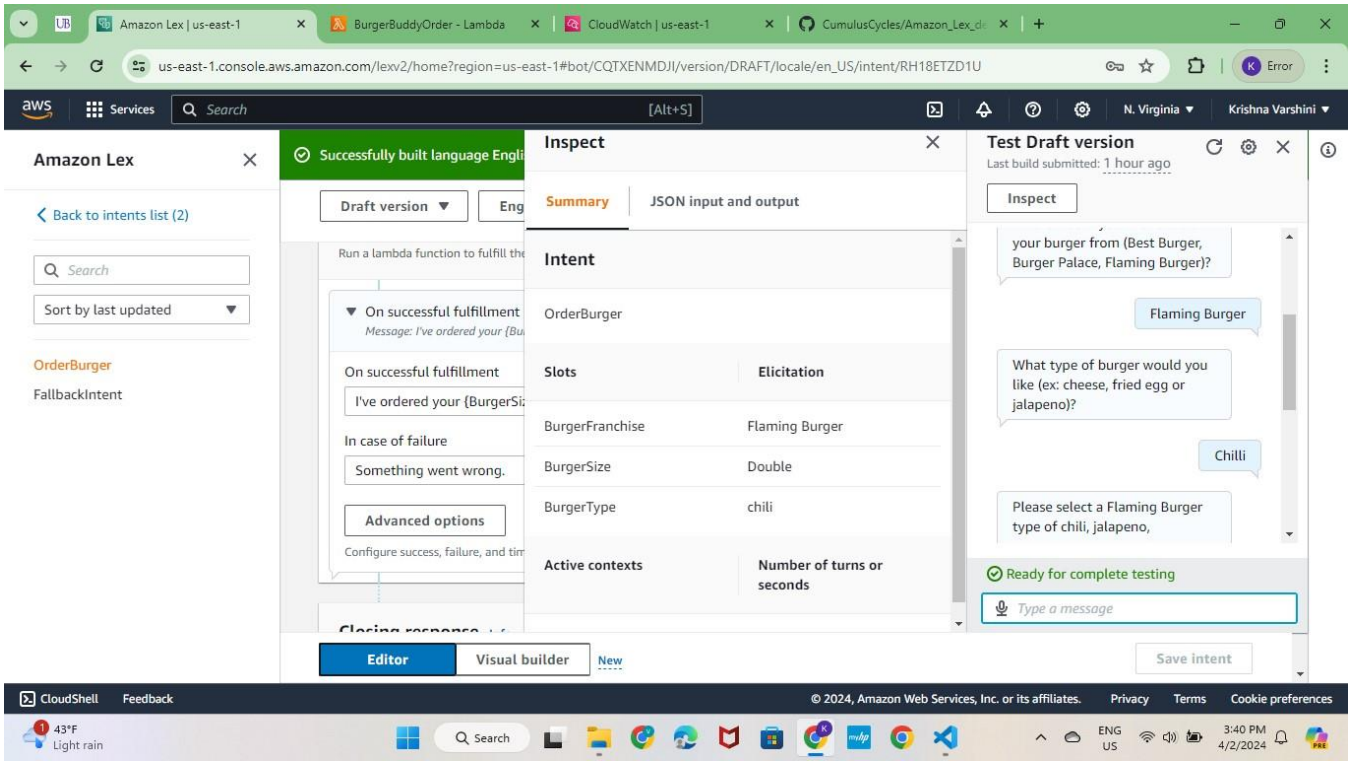
```
                    "type": "ElicitSlot"
                },
                "intent": {
                    "name": intent,
                    "slots": slots
                }
            },
            "messages": [
                {
                    "contentType": "PlainText",
                    "content": order_validation_result['message']
                }
            ]
        }
    else:
        response = {
            "sessionState": {
                "dialogAction": {
                    "slotToElicit": order_validation_result['invalidSlot'],
                    "type": "ElicitSlot"
                },
                "intent": {
                    "name": intent,
                    "slots": slots
                }
            }
        }
else:
    response = {
        "sessionState": {
            "dialogAction": {
                "type": "Delegate"
            },
            "intent": {
                'name': intent,
                'slots': slots
            }
        }
    }

if event['invocationSource'] == 'FulfillmentCodeHook':
    response = {
        "sessionState": {
            "dialogAction": {
                "type": "Close"
            },
            "intent": {
                "name": intent,
                "slots": slots,
                "state": "Fulfilled"
            }

        },
        "messages": [
```

```
            {
                "contentType": "PlainText",
                "content": "I've placed your order."
            }
        ]
    }

print(response)
return response
```

4.2 OUTPUT SCREENSHOTS

AWS Lambda integration




Amazon Lex | us-east-1
BurgerBuddyOrder - Lambda
CloudWatch | us-east-1
us-east-1.console.aws.amazon.com/lexv2/home?region=us-east-1#bot/CQTXENMDJI/version/DRAFT/locale/en_US/intent/RH18ETZD1U
Amazon Lex
Back to intents list (2)
Search
Sort by last updated
OrderBurger
FallbackIntent
Successfully built language Engli
Draft version
Inspect
Summary
JSON input and output
Intent
OrderBurger
Slots
Elicitation
BurgerFranchise
Flaming Burger
BurgerSize
Double
BurgerType
chili
Active contexts
Number of turns or seconds
On successful fulfillment
I've ordered your {BurgerSi
In case of failure
Something went wrong.
Advanced options
Test Draft version
Last build submitted: 1 hour ago
Inspect
your burger from (Best Burger, Burger Palace, Flaming Burger)?
Flaming Burger
What type of burger would you like (ex: cheese, fried egg or jalapeno)?
Chilli
Please select a Flaming Burger type of chili, jalapeno,
Ready for complete testing
Type a message
Editor
Visual builder
New
Save intent
CloudShell
Feedback
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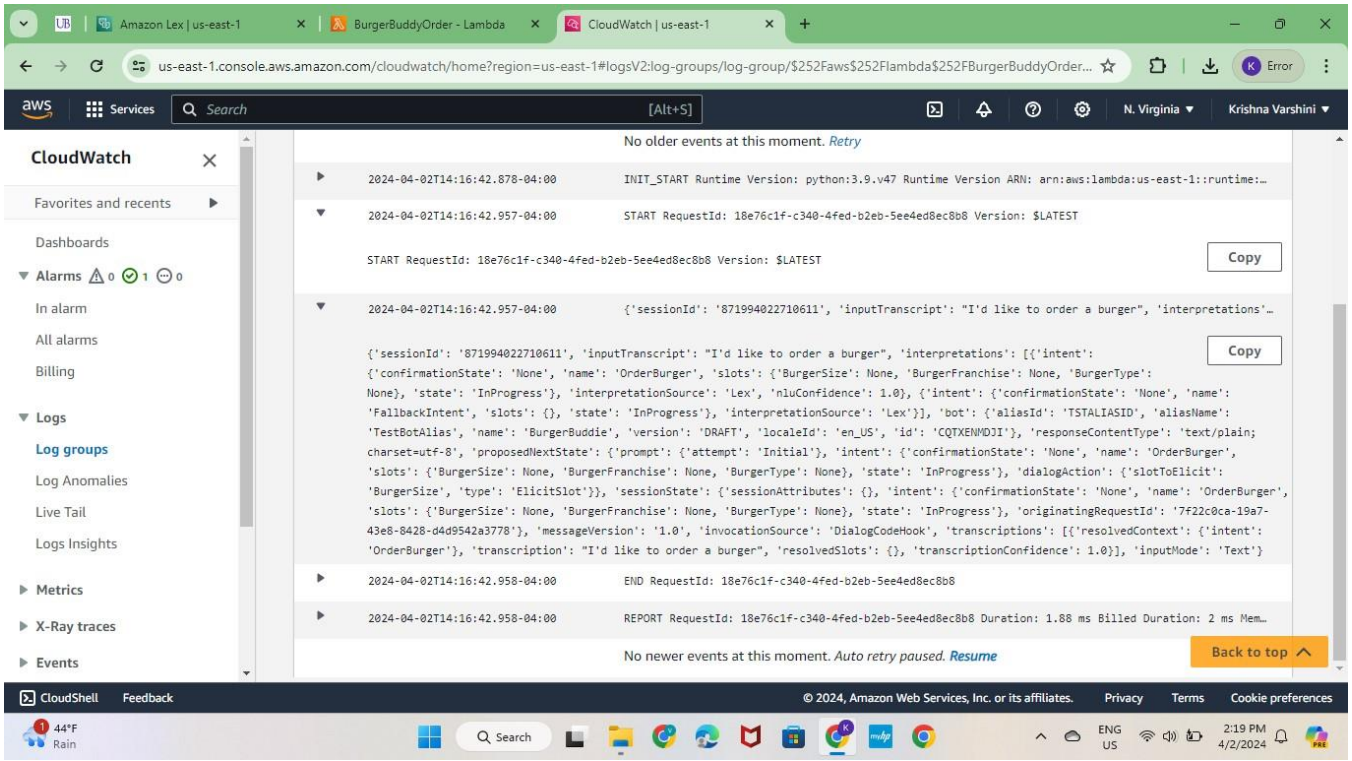
Terms
Cookie preferences


CloudWatch
Favorites and recents
Dashboards
Alarms
In alarm
All alarms
Billing
Logs
Log groups
Log Anomalies
Live Tail
Logs Insights
Metrics
X-Ray traces
Events
No older events at this moment. Retry
2024-04-02T14:16:42.878-04:00 INIT_START Runtime Version: python:3.9.v47 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:…
2024-04-02T14:16:42.957-04:00 START RequestId: 18e76c1f-c340-4fed-b2eb-5ee4ed8ec8b8 Version: $LATEST
START RequestId: 18e76c1f-c340-4fed-b2eb-5ee4ed8ec8b8 Version: $LATEST
Copy
2024-04-02T14:16:42.957-04:00 {'sessionId': '871994022710611', 'inputTranscript': "I'd like to order a burger", 'interpretations'…
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2024-04-02T14:16:42.958-04:00 END RequestId: 18e76c1f-c340-4fed-b2eb-5ee4ed8ec8b8
2024-04-02T14:16:42.958-04:00 REPORT RequestId: 18e76c1f-c340-4fed-b2eb-5ee4ed8ec8b8 Duration: 1.88 ms Billed Duration: 2 ms Mem…
No newer events at this moment. Auto retry paused. Resume
Back to top
CloudShell
Feedback
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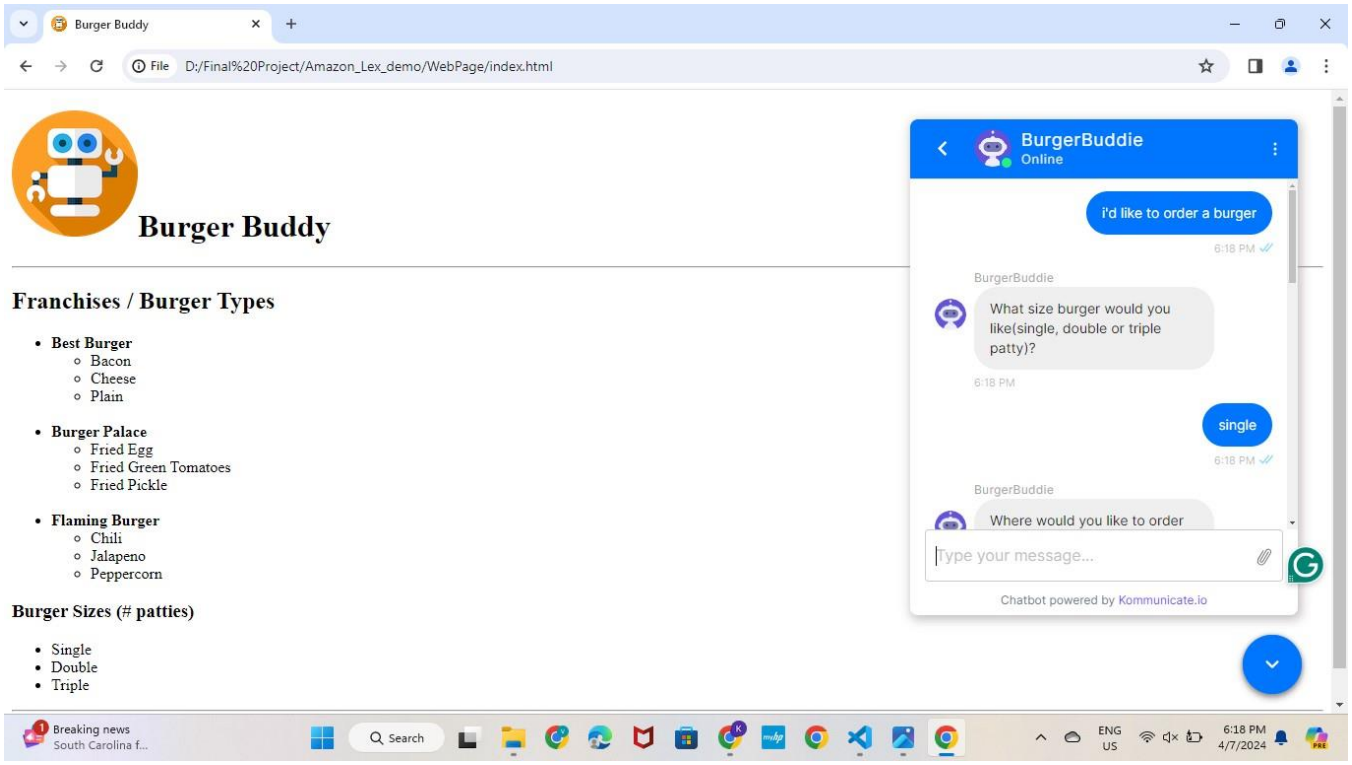
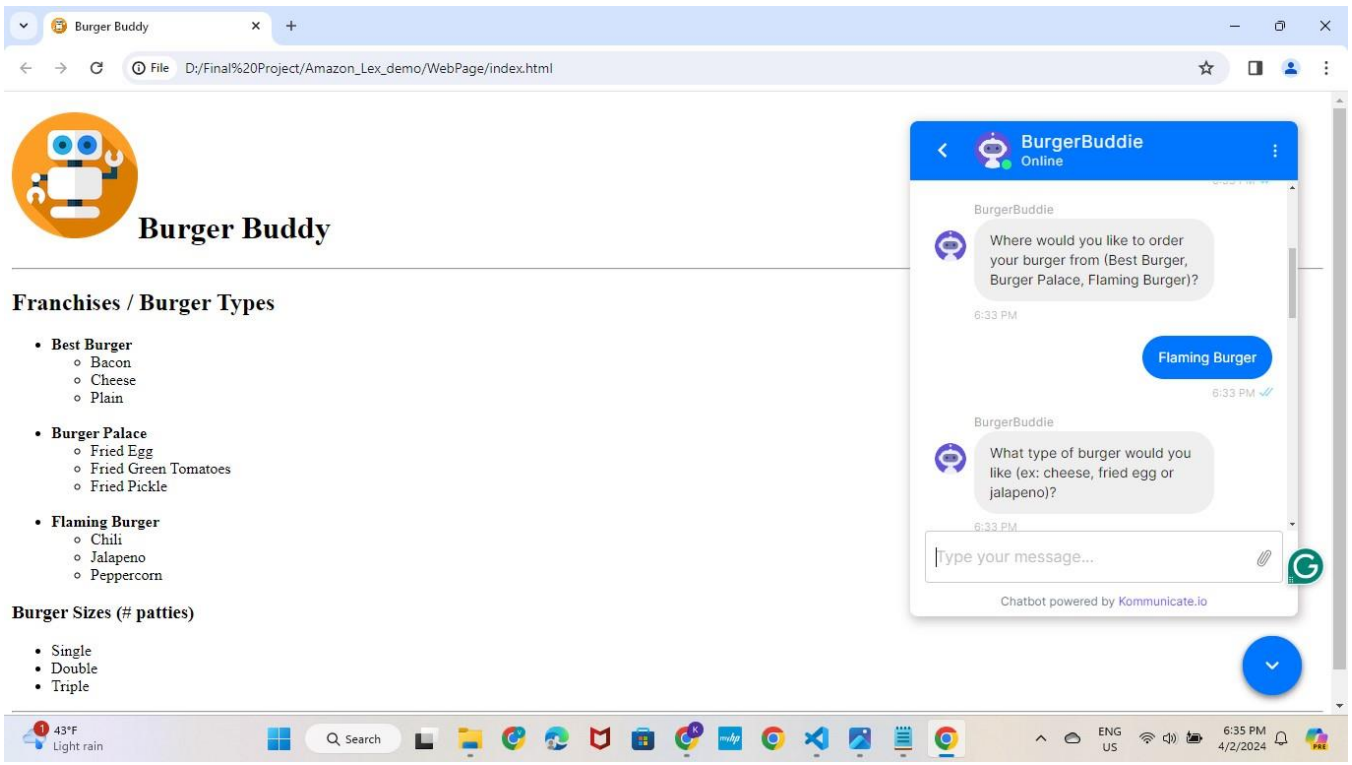
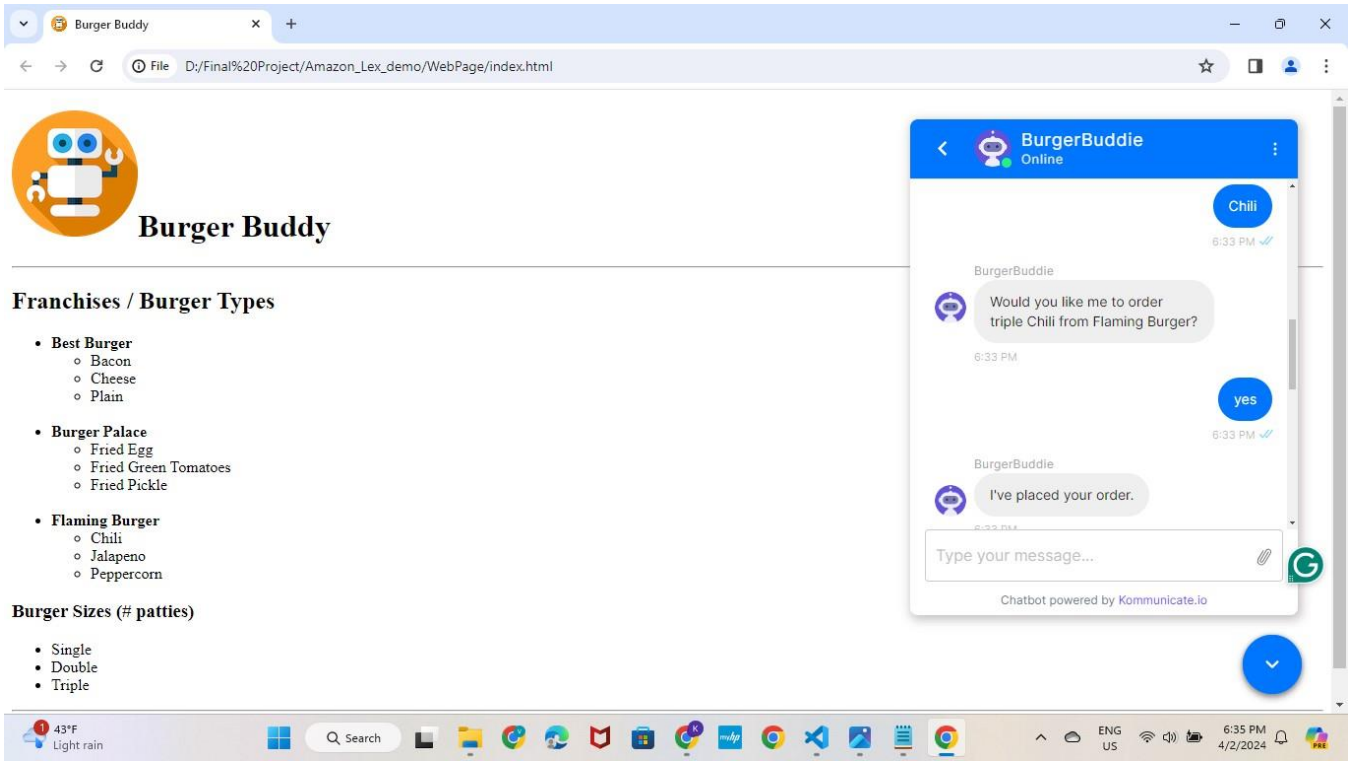
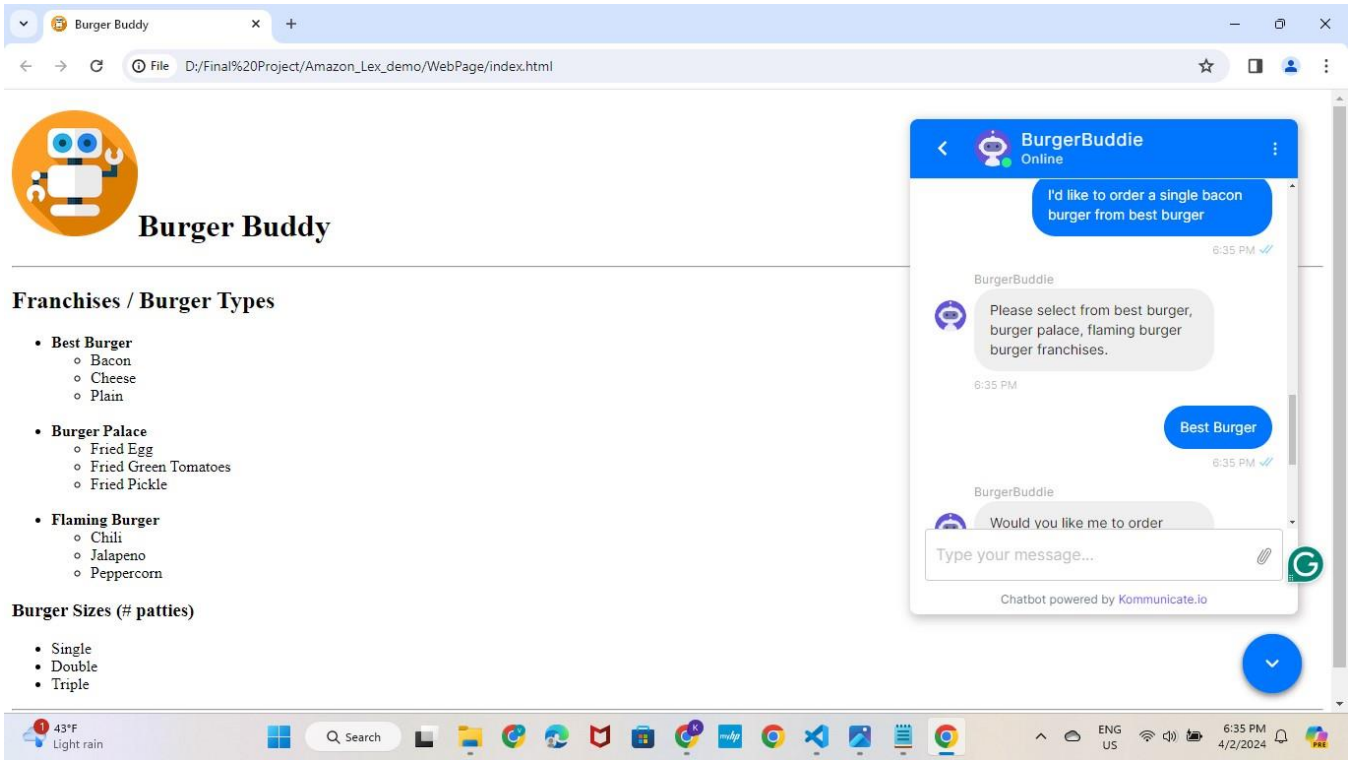
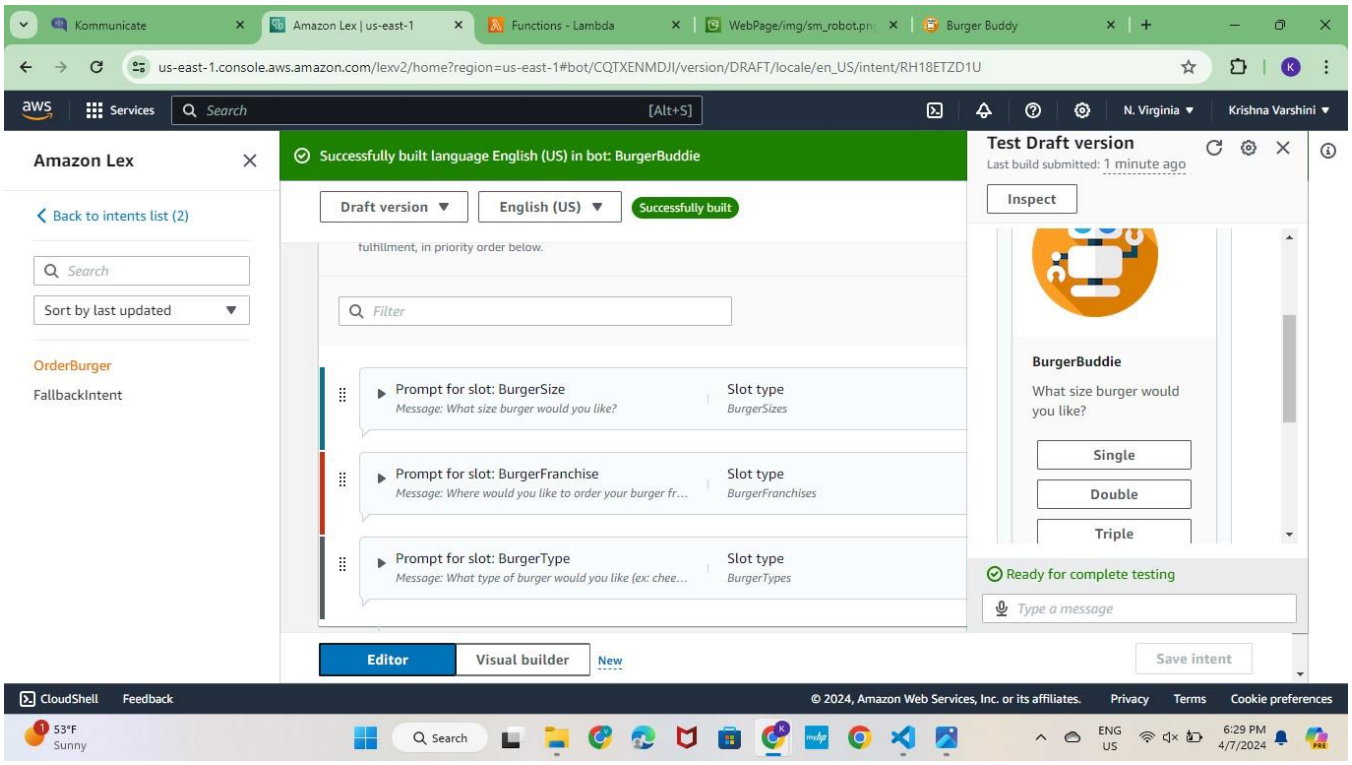

Burger Buddy
File D:/Final%20Project/Amazon_Lex_demo/WebPage/index.html
Burger Buddy
Franchises / Burger Types
Best Burger
Bacon
Cheese
Plain
Burger Palace
Fried Egg
Fried Green Tomatoes
Fried Pickle
Flaming Burger
Chili
Jalapeno
Peppercorn
Burger Sizes (# patties)
Single
Double
Triple
BurgerBuddie
Online
i'd like to order a burger
6:18 PM
BurgerBuddie
What size burger would you like(single, double or triple patty)?
6:18 PM
single
6:18 PM
BurgerBuddie
Where would you like to order
Type your message...
Chatbot powered by Kommunicate.io
Breaking news
South Carolina f...
Search
ENG
US
6:18 PM
4/7/2024

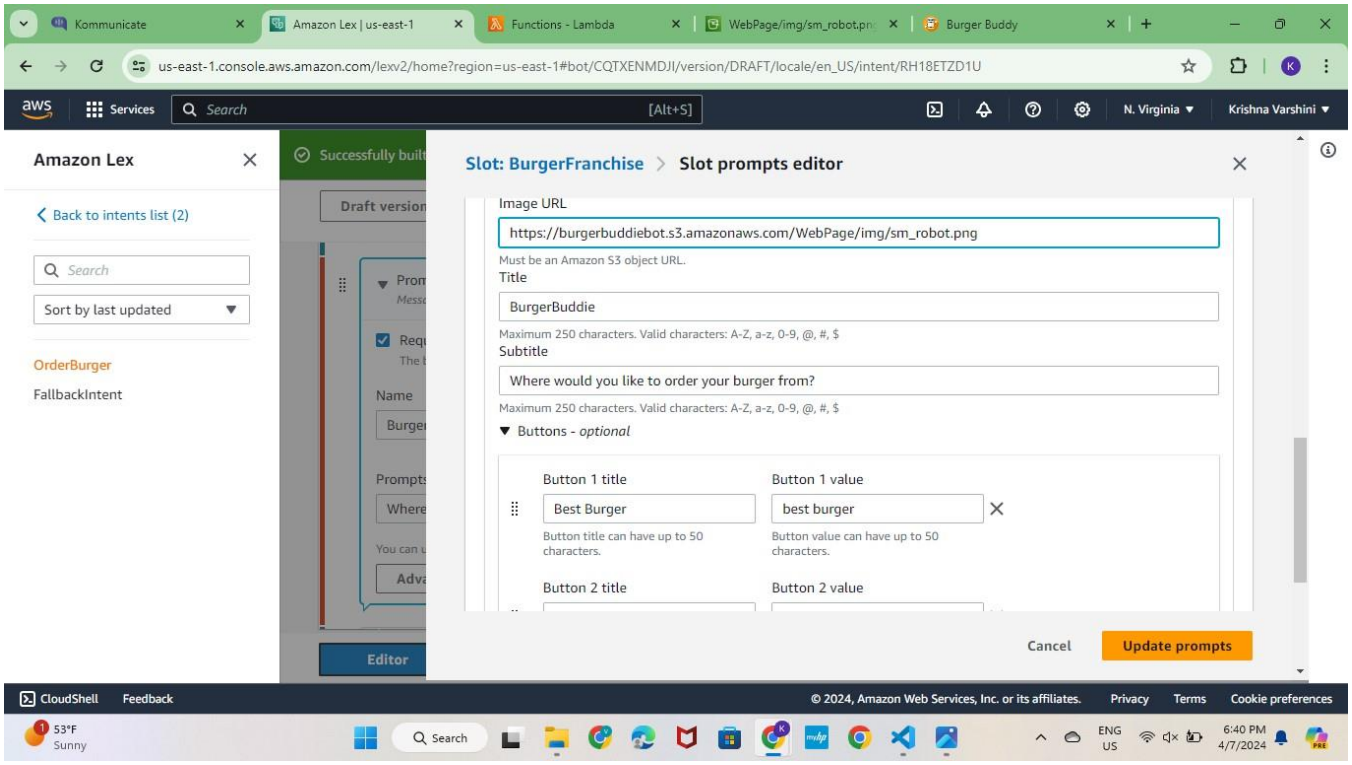

Burger Buddy
File D:/Final%20Project/Amazon_Lex_demo/WebPage/index.html
Burger Buddy
Franchises / Burger Types
Best Burger
Bacon
Cheese
Plain
Burger Palace
Fried Egg
Fried Green Tomatoes
Fried Pickle
Flaming Burger
Chili
Jalapeno
Peppercorn
Burger Sizes (# patties)
Single
Double
Triple
BurgerBuddie
Online
BurgerBuddie
Where would you like to order your burger from (Best Burger, Burger Palace, Flaming Burger)?
6:33 PM
Flaming Burger
6:33 PM
BurgerBuddie
What type of burger would you like (ex: cheese, fried egg or jalapeno)?
6:33 PM
Type your message...
Chatbot powered by Kommunicate.io
43°F
Light rain
Search
ENG
US
6:35 PM
4/2/2024

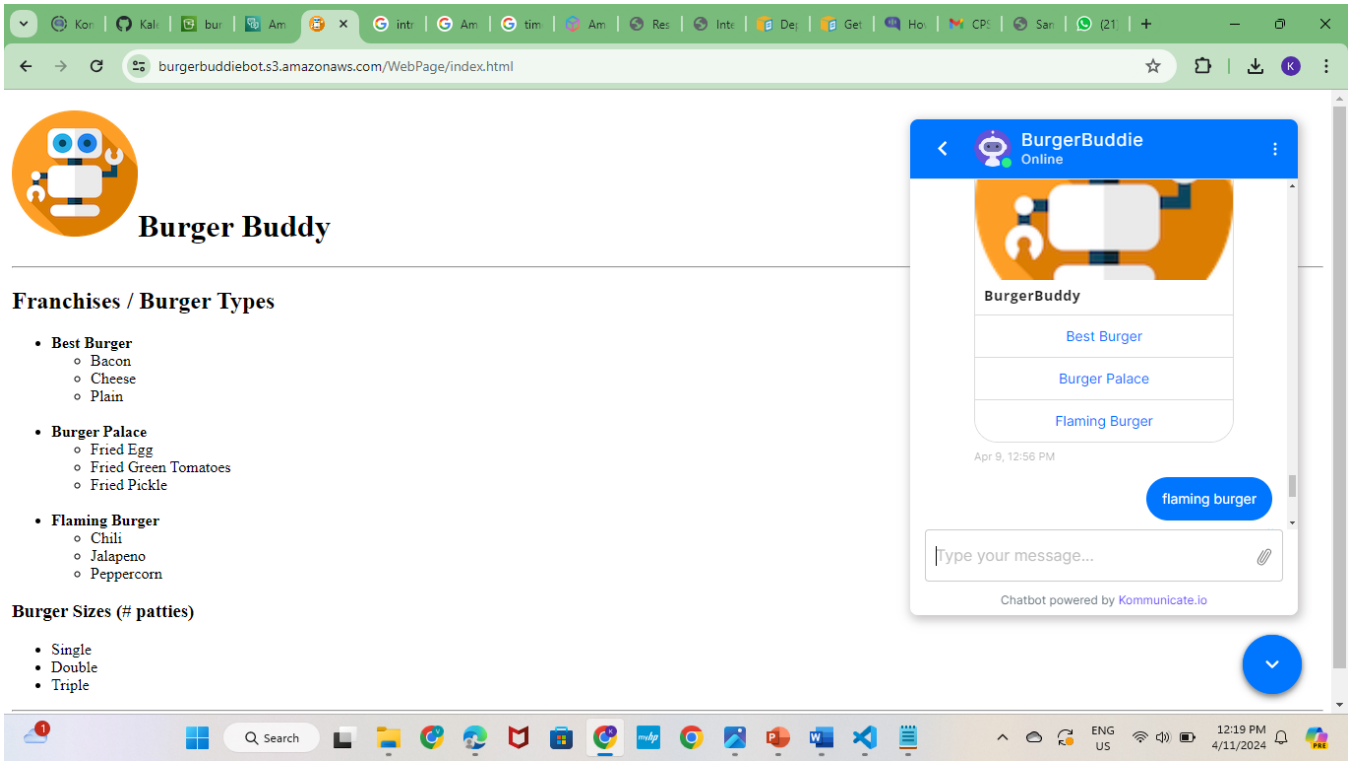

Burger Buddy
File D:/Final%20Project/Amazon_Lex_demo/WebPage/index.html
Burger Buddy
Franchises / Burger Types
Best Burger
Bacon
Cheese
Plain
Burger Palace
Fried Egg
Fried Green Tomatoes
Fried Pickle
Flaming Burger
Chili
Jalapeno
Peppercorn
Burger Sizes (# patties)
Single
Double
Triple
BurgerBuddie
Online
Chili
6:33 PM
BurgerBuddie
Would you like me to order triple Chili from Flaming Burger?
6:33 PM
yes
6:33 PM
BurgerBuddie
I've placed your order.
Type your message...
Chatbot powered by Kommunicate.io
43°F
Light rain
Search
ENG
US
6:35 PM
4/2/2024


Burger Buddy
File D:/Final%20Project/Amazon_Lex_demo/WebPage/index.html
Burger Buddy
Franchises / Burger Types
Best Burger
Bacon
Cheese
Plain
Burger Palace
Fried Egg
Fried Green Tomatoes
Fried Pickle
Flaming Burger
Chili
Jalapeno
Peppercorn
Burger Sizes (# patties)
Single
Double
Triple
BurgerBuddie
Online
I'd like to order a single bacon burger from best burger
6:35 PM
BurgerBuddie
Please select from best burger, burger palace, flaming burger burger franchises.
6:35 PM
Best Burger
6:35 PM
BurgerBuddie
Would you like me to order
Type your message...
Chatbot powered by Kommunicate.io
43°F
Light rain
Search
ENG
US
6:35 PM
4/2/2024

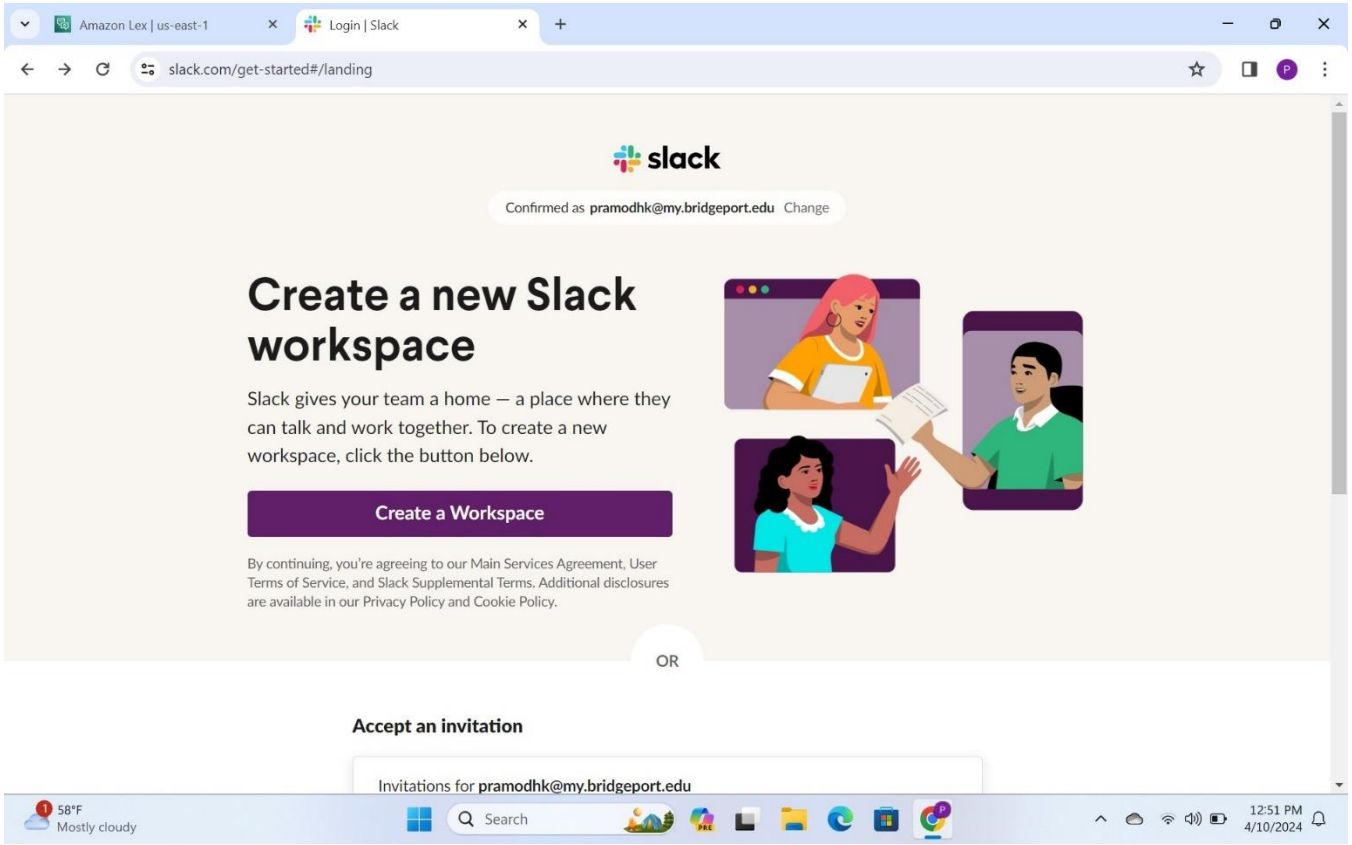
Response Cards:

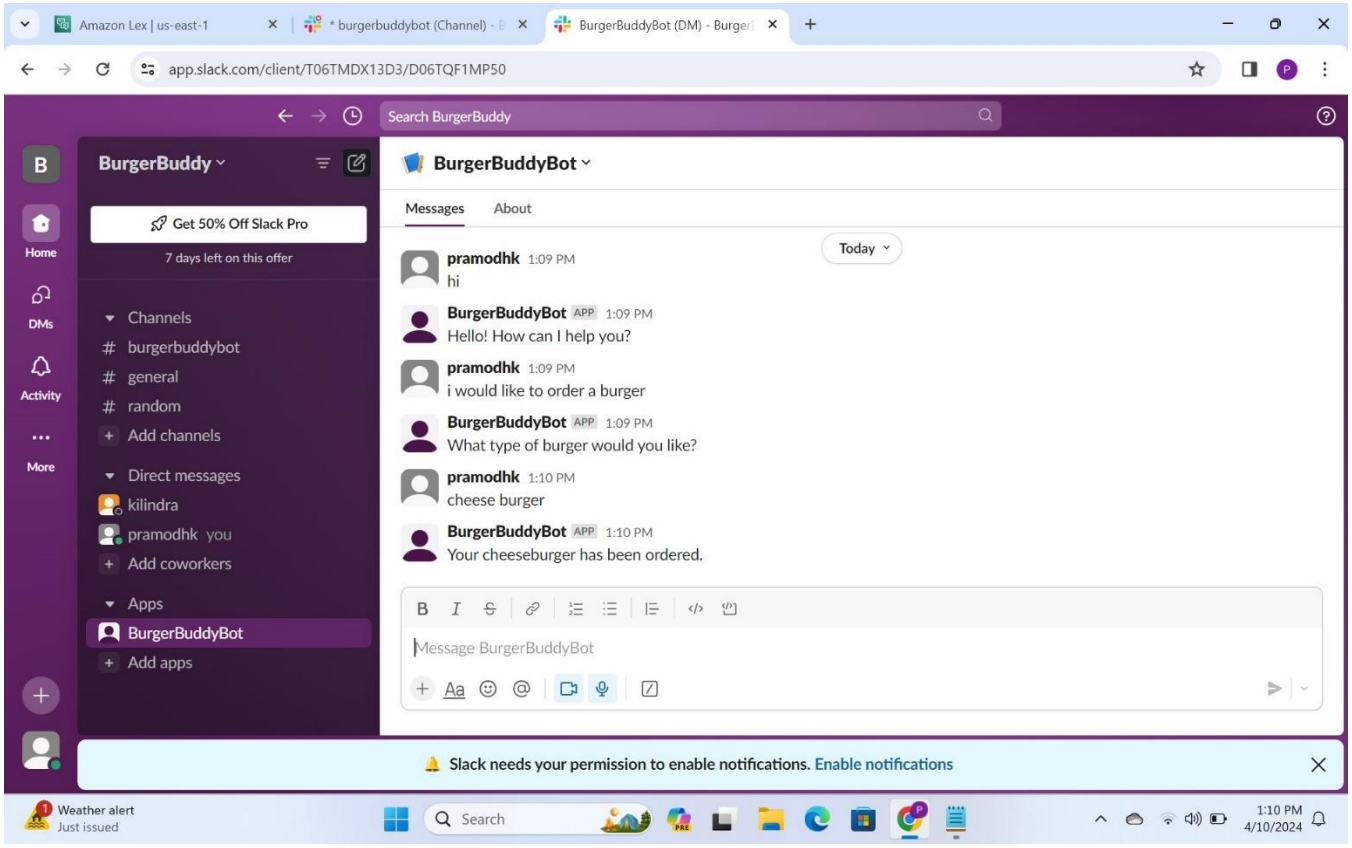






Slack Integration:




Amazon Lex | us-east-1
* burgerbuddybot (Channel) - E
BurgerBuddyBot (DM) - Burger
app.slack.com/client/T06TMDX13D3/D06TQF1MP50
Search BurgerBuddy
BurgerBuddy
Get 50% Off Slack Pro
7 days left on this offer
Home
DMs
Activity
More
Channels
burgerbuddybot
general
random
Add channels
Direct messages
kilindra
pramodhk you
Add coworkers
Apps
BurgerBuddyBot
Add apps
BurgerBuddyBot
Messages
About
Today
pramodhk 1:09 PM
hi
BurgerBuddyBot APP 1:09 PM
Hello! How can I help you?
pramodhk 1:09 PM
i would like to order a burger
BurgerBuddyBot APP 1:09 PM
What type of burger would you like?
pramodhk 1:10 PM
cheese burger
BurgerBuddyBot APP 1:10 PM
Your cheeseburger has been ordered.
Message BurgerBuddyBot
Slack needs your permission to enable notifications. Enable notifications
Weather alert
Just issued
Search
1:10 PM
4/10/2024

5. CONCLUSION AND FUTURE ENHANCEMENT

Expanding my bot to support multiple languages and integrating voice interaction are fantastic enhancements that can significantly increase its accessibility and usability across diverse regions and demographics. Here's a roadmap I might consider for implementing these features:

1. **Language Support:**

- **Research**: Identify the languages you want to support based on your target audience and regions. Consider factors like user demographics, market demand, and potential growth opportunities.
- **Translation**: Collaborate with professional translators or use machine translation services to translate your bot's content, including dialogues, prompts, responses, and error messages, into the selected languages.
- **Localization:** Adapt your bot's content to suit cultural nuances, preferences, and local norms of each target language and region. This may involve adjusting vocabulary, tone, and imagery.
- **Testing:** Conduct thorough testing to ensure linguistic accuracy, cultural appropriateness, and functional integrity across all supported languages. Solicit feedback from native speakers to identify and address any issues.

2. **Voice Interaction**:

- **Speech Recognition:** Integrate a speech recognition system to accurately transcribe spoken input from users into text. You can leverage existing speech recognition APIs or develop a custom solution depending on your requirements.
- **Natural Language Understanding (NLU):** Implement a natural language understanding system to analyze and interpret user queries and commands expressed in spoken language. This involves extracting intents, entities, and context from the transcribed text to understand user intent accurately.
- **Text-to-Speech (TTS):** Utilize text-to-speech technology to convert bot responses into natural-sounding speech output. Choose high-quality TTS engines that support multiple languages and accents for a seamless user experience.
- **Voice User Interface (VUI)**: Design intuitive voice user interfaces that guide users through interactions with the bot using spoken prompts, feedback, and prompts. Ensure clarity, simplicity, and consistency in VUI design to facilitate easy navigation and comprehension.
- **Testing:** Conduct extensive testing of the voice interaction capabilities under various conditions, including different accents, speech patterns, and environmental noise levels. Use automated testing tools and manual evaluation to validate accuracy, responsiveness, and overall user satisfaction.

By incorporating these enhancements, my bot will become more inclusive and versatile, enabling users from diverse backgrounds to interact with it naturally and effectively. Additionally, it opens up opportunities for broader adoption and engagement, driving greater value and impact for your bot's users.

6. REFERENCES

[1] Varia, Jinesh, and Sajee Mathew. "Overview of amazon web services." Amazon Web Services 105 (2014).

[2] Soni, Radhika & Thapar, Radhika. (2019). Acceptance of Chatbots by Millennial Consumers.

[3] AWS Documentation - https://docs.aws.amazon.com

[4] Amazon Lex Documentation - https://docs.aws.amazon.com/lex

[5] AWS Lex - https://aws.amazon.com/lex

[6] Pizza Ordering Chatbot Demo - https://youtu.be/6iLgN_1e4DU

[7] The Complete Guide To The Pizza Ordering Chatbot - https://youtu.be/FHbXSo95S7A

[8] GitHub Repository - https://github.com/Amey-Thakur/AWS-CERTIFIED-CLOUD-PRACTITIONER-CLF-C01