5-20-2020

Alexa, Ask My Library: How Do I Build a Custom Skill to Extend Reference Services?

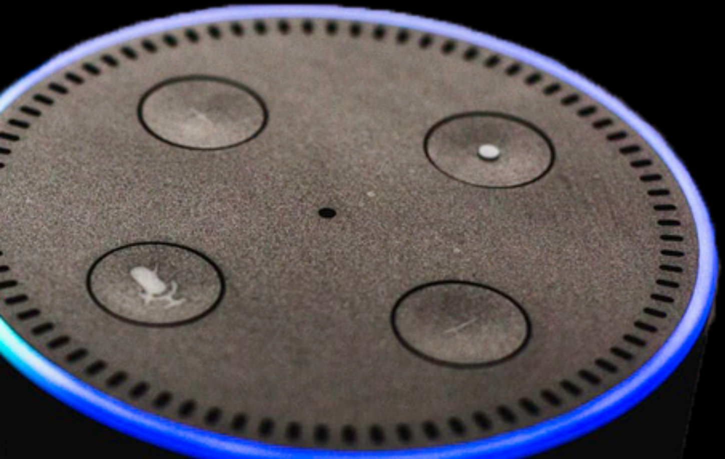
Christopher M. Jimenez
Florida International University, jimenezc@fiu.edu

Recommended Citation

Jimenez, Christopher M., "Alexa, Ask My Library: How Do I Build a Custom Skill to Extend Reference Services?" (2020). *Works of the FIU Libraries*. 99.
https://digitalcommons.fiu.edu/glworks/99

Alexa, Ask My Library

How Do I Build a Custom Skill to Extend Reference Services?



Alexa, who is the presenter?

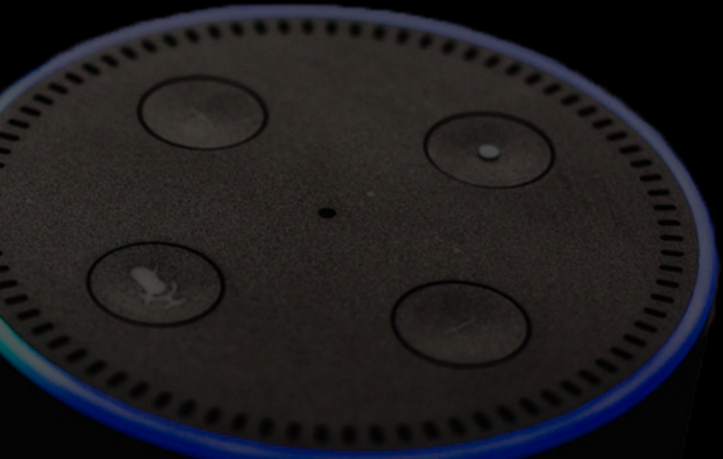
Christopher M. Jimenez

Web Services Librarian
Florida International University

Christopher.Jimenez@fiu.edu

@cjmnz8

github.com/cjmnz8/Echo-Show-Tell



Learning Objectives

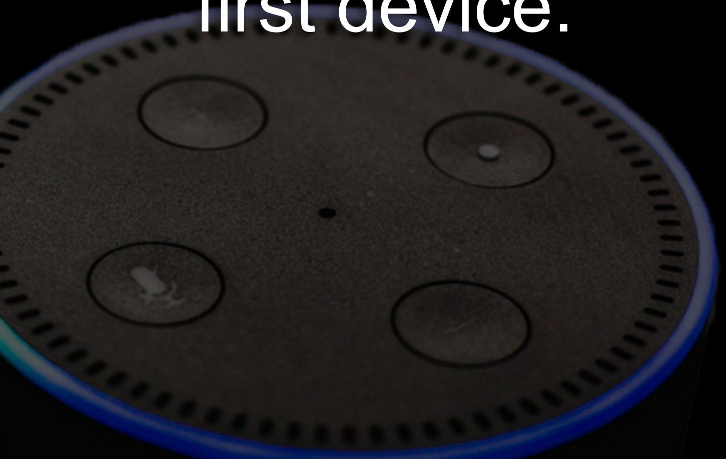
1. Describe the major smart speakers in the industry in order to discern the best option for the project.
2. Identify several factors to consider when beginning a voice recognition project in order to incorporate a UX-First design.
3. Develop an Alexa Skill by training the AI model to recognize utterances, querying LibAnswers for information retrieval, and display responses to the end user.

Define…

…a voice-first device.

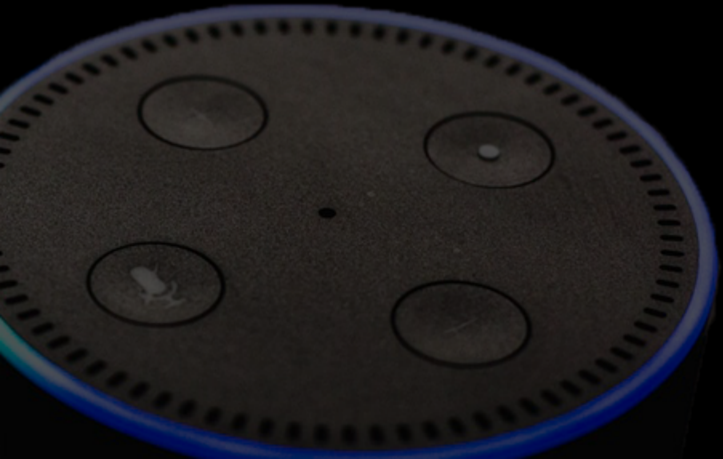
…the software that runs on a voice-first device.

…the application that the voice-assistant launches on your voice-first device.



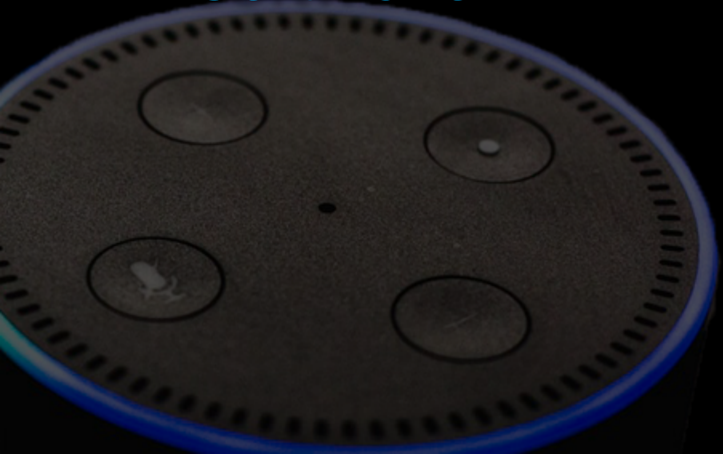
Voice-First Device

"An always-on, intelligent piece of hardware where the primary interface is voice, both input and output"



Software that runs on a Voice-First Device

"A Voice Assistant is a digital assistant that uses voice recognition, natural language processing and speech synthesis to provide aid to users through phones and voice recognition software."

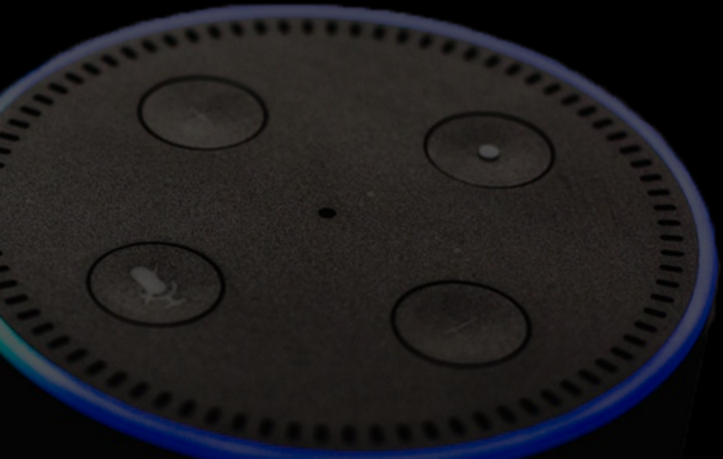


Application the voice-assistant launches on your voice-first device

Alexa = Skill

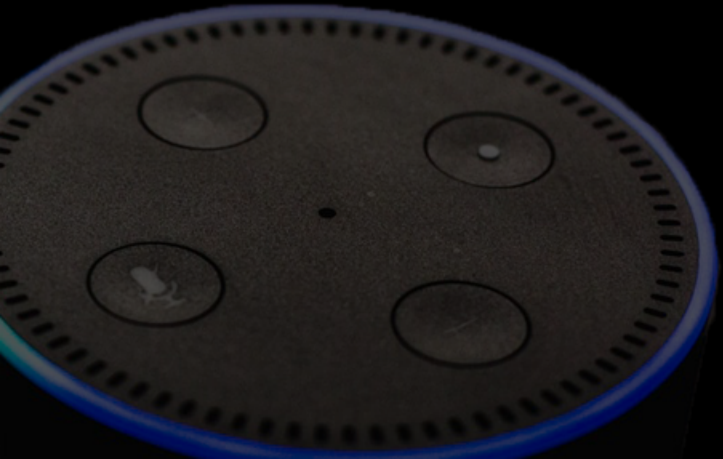
Google = Action

Siri = Hands off to iPhone



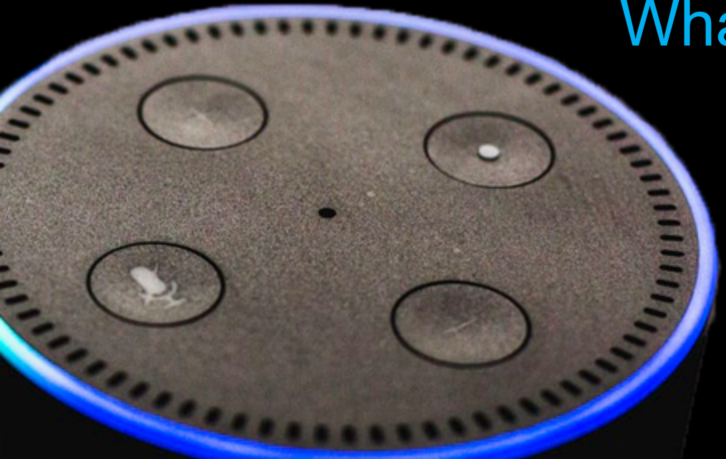
Summary

VF Device	Voice Assistant	Application
Amazon Echo	Alexa	Skill
Google Home	Google Assistant	Action
Apple Home Pod	Siri	Handoff

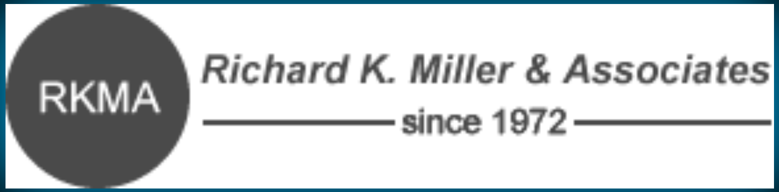


Alexa, Ask my library

What does the voice-first device market look like today?



Market Research



RKMA Richard K. Miller & Associates

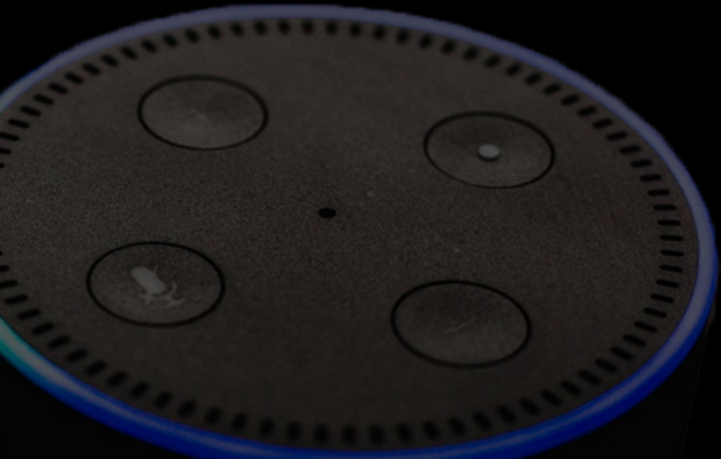
since 1972

THE INFINITE DIAL®

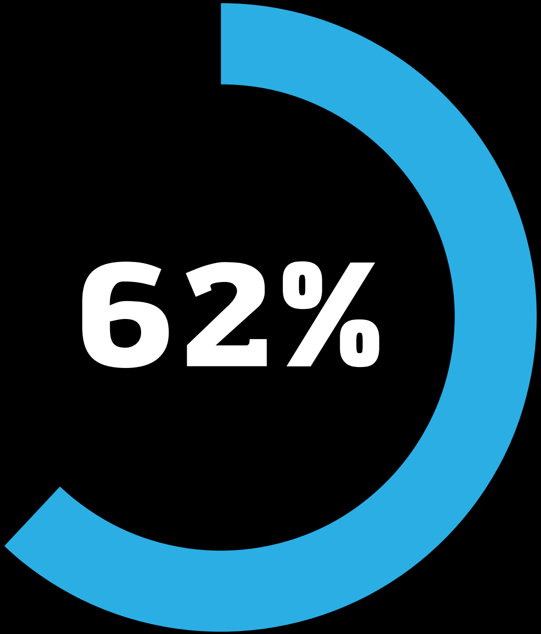
edison research TRITON

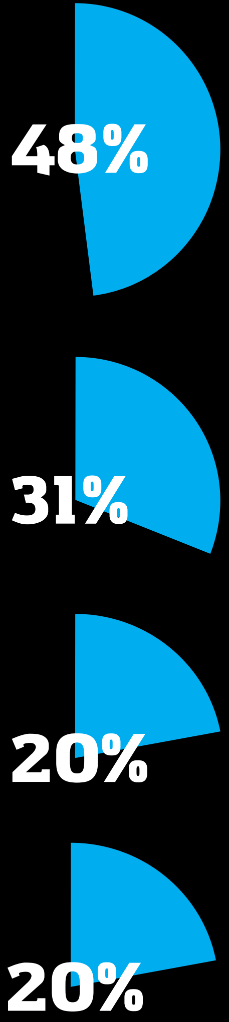
THE smart audio REPORT

npr | edison research



Infinite Dial: Use of Voice Assistants



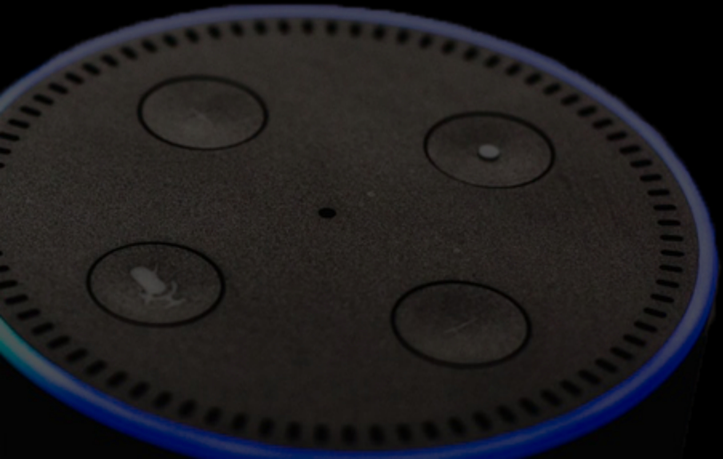


Smartphone

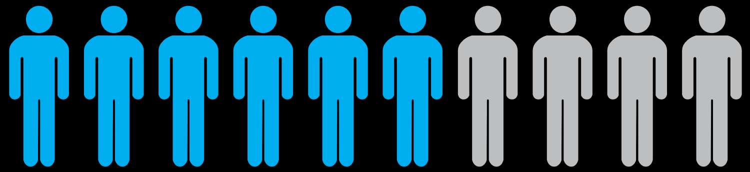
Computer

Smart Speaker

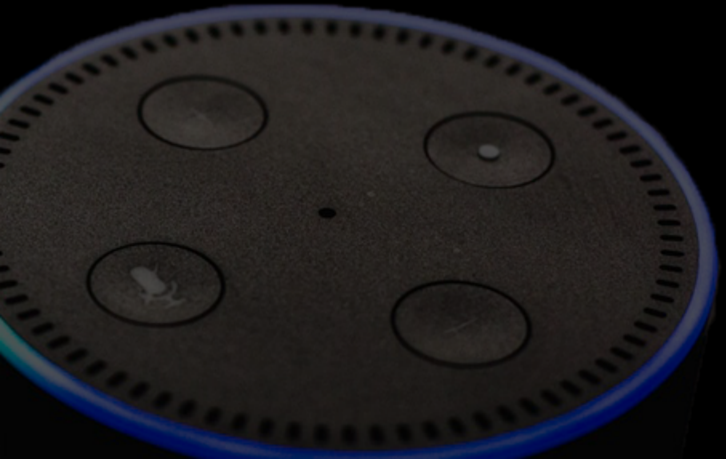
Tablet: 20%



NPR: Conversion Rate



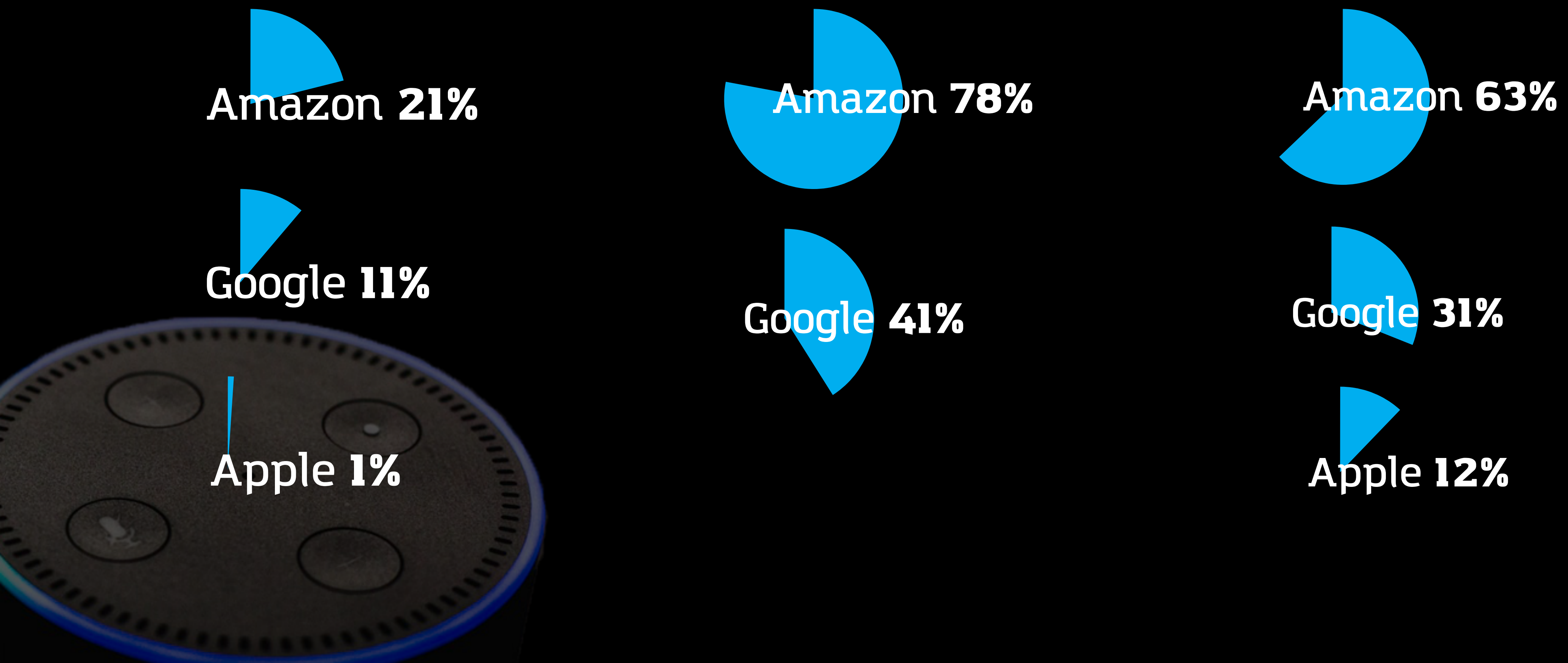
Among non-owners of smart speakers, those who currently use voice assistants are 60% more likely than those who don't to purchase a smart speaker in the next six months



Market Penetration

Infinite Dial	7% 2017	18% 2018	23% 2019	27% 2020
Smart Audio	21% 2019	24% 2020		

Which Device?



Infinite Dial

Amazon **21%**

Google **11%**

Apple **1%**

Smart Audio

Amazon **78%**

Google **41%**

RKMA (2019)

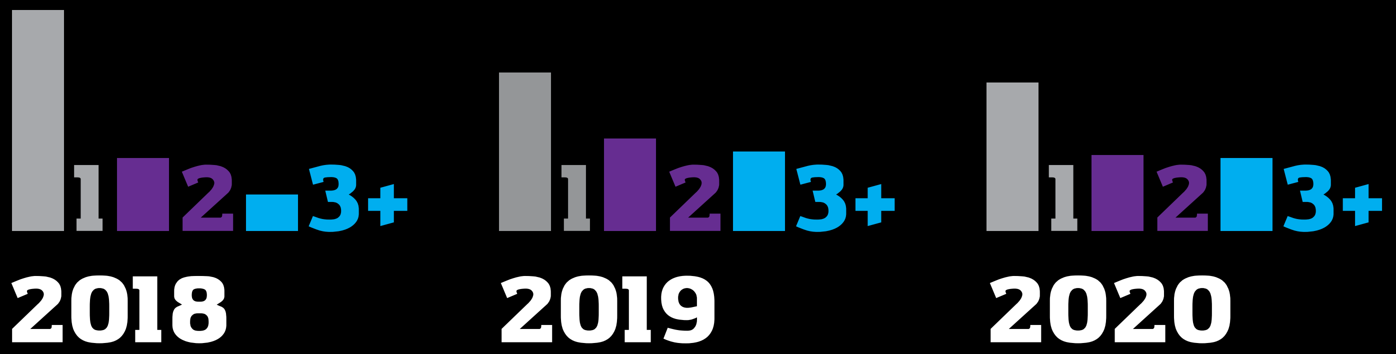
Amazon **63%**

Google **31%**

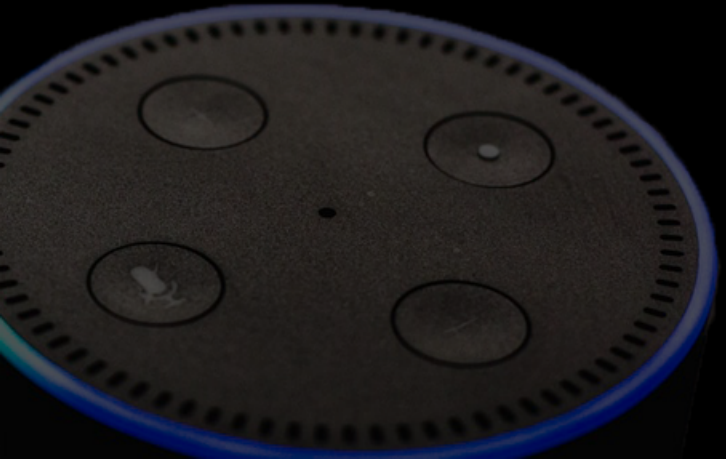
Apple **12%**

How Many Devices?

Infinite Dial

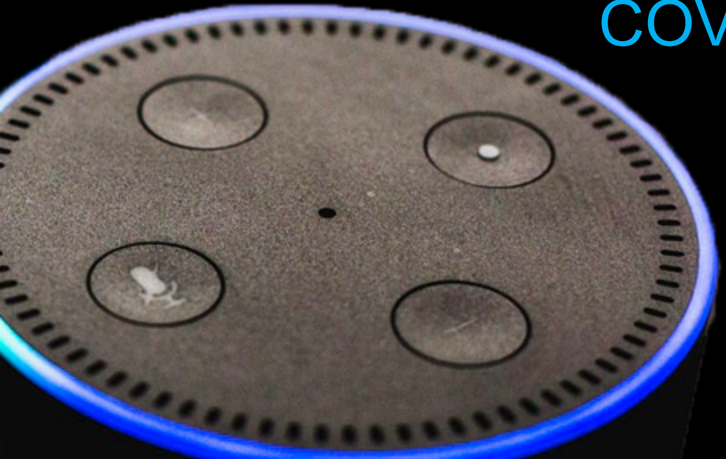


Mean # 1.7 2.0 2.2



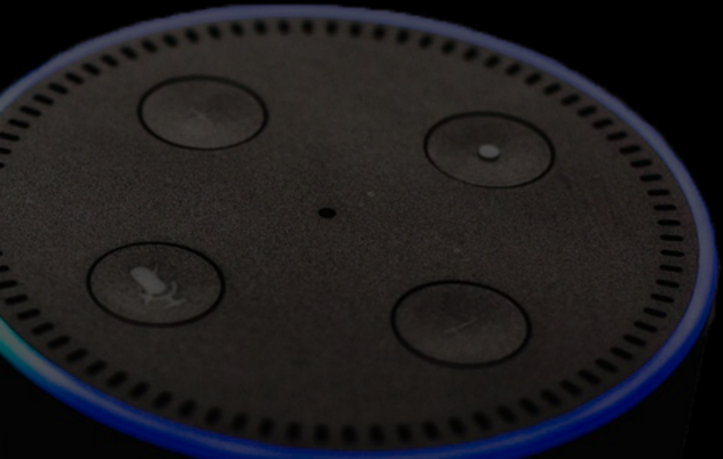
NPR #SmartAudio Report

COVID-19 Related Behaviors



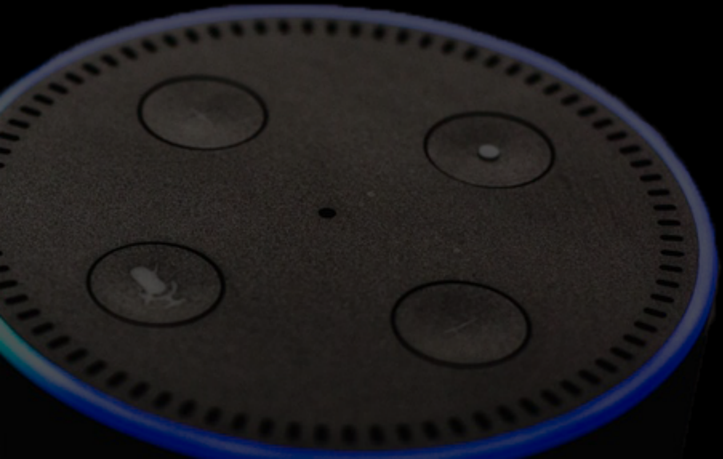
COVID-19 Related Behaviors

Three-quarters of Americans 18+ say their routines have changed due to COVID-19



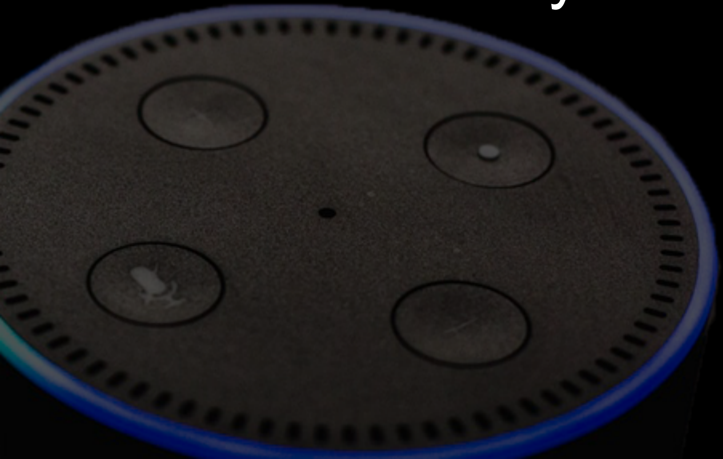
COVID-19 Related Behaviors

52% of voice-assistant users say they use voice tech several times a day or nearly every day, compared to 46% before the outbreak.



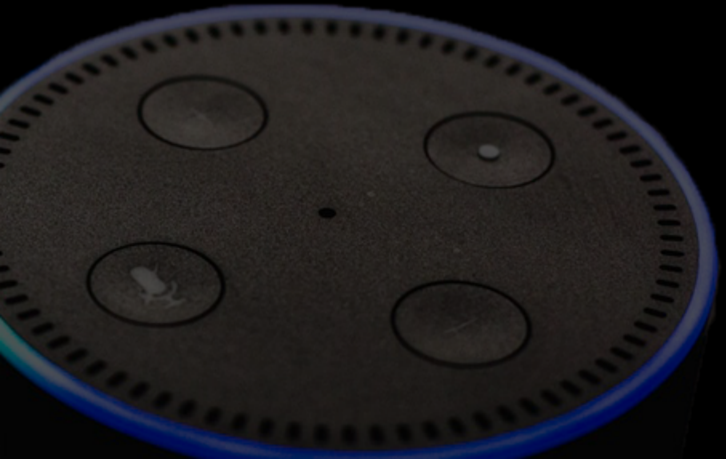
COVID-19 Related Behaviors

36% of U.S. adult smart speaker owners say they are using their device more to listen to music and entertainment since the outbreak, and 52% of 18-34-year-olds say the same.



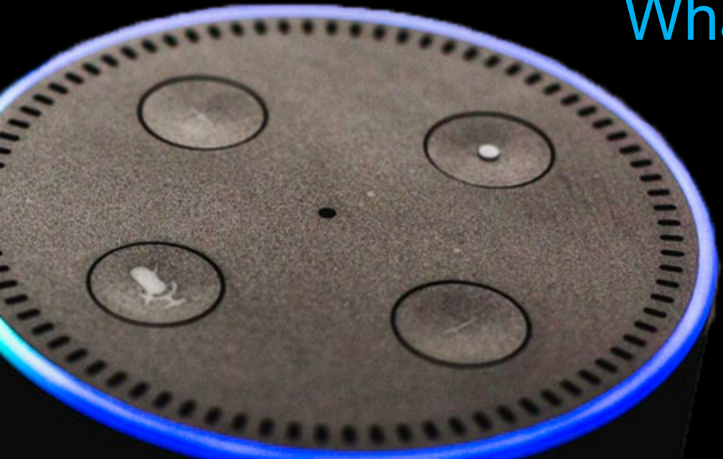
COVID-19 Related Behaviors

71% want to buy another smart speaker to entertain children in more rooms of the house. (Up 24% from Spring 2019)



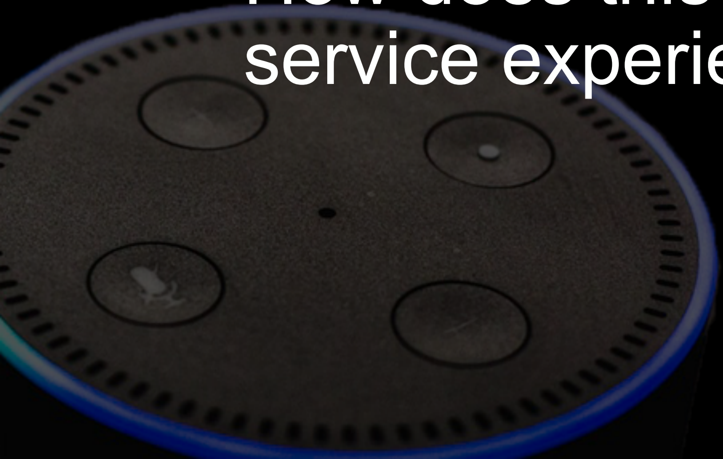
Alexa, Ask my library

What should my skill do?



What should my skill do?

- What is in demand?
- How will a user use this skill?
- Where will the user use this skill?
- How does this experience fit with the library’s current customer service experience?



FIU Libraries' RefTech Statement

The team at FIU Libraries seeks to harness the popularity and sophistication of voice recognition technology and couple it with Springshare's robust knowledge base software in order to create a powerful reference tool.

We are doing this by pairing the Information and Research Services Department's most Frequently Asked Questions with an Alexa Skill using the LibAnswers API, and preloading that skill onto our Alexa Show devices for use in strategic places at our library service points.

FIU Libraries’ RefTech Statement

1. We chose Amazon Echo Show devices because Amazon was the market leader.
2. We wanted to recycle information and minimize the maintenance burden.
3. We evaluated our most useful FAQ Entries and programmed the skill to answer those questions first.
4. The skill was developed for use inside the library.

Customer Service

Current Service Model:

- Face-to-Face support
- Phone support
- Chat support
- FAQ Knowledge Bank / Email support

Use your data

User-Supplied Data

- FAQ Views
- Chat Transcripts
- Query Spy

Self-Reported Data

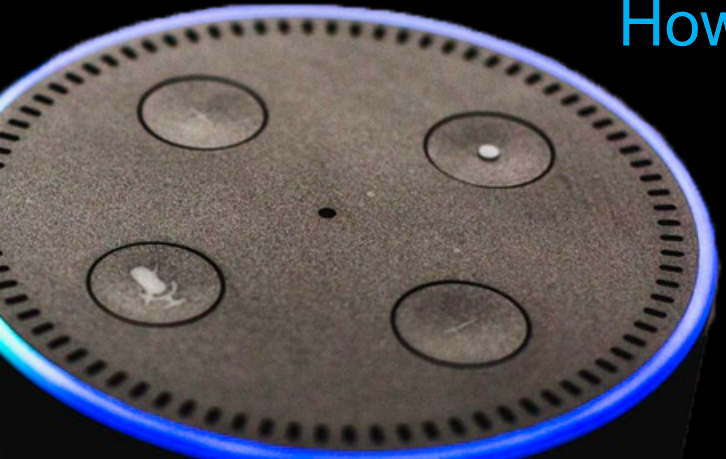
- Reference Stats
- Anecdotal Evidence

How will a user use this skill?

- What is the scope of your project?
- What do you hope to accomplish?
- What are the overarching principles that govern what is included in your project and what is excluded from your project?

Alexa, Ask my library

How do I code this skill myself?



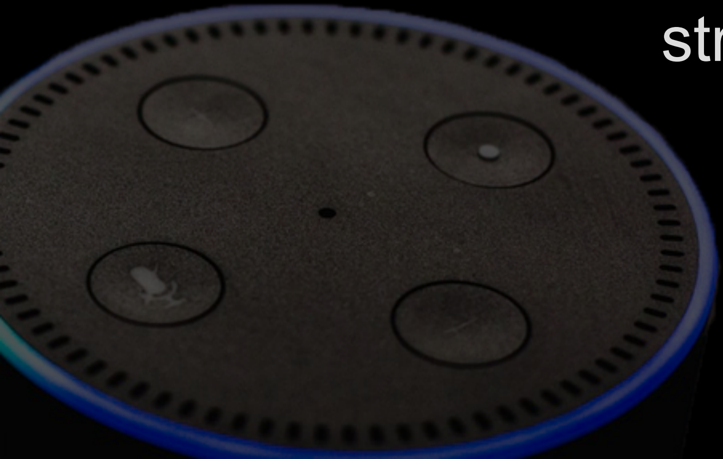
Two Parts to Skill Development

Front End

- Train the AI
- Use reference interview strategies

Back End

- Programming that fulfills the request made by a user



Front End: Getting Started

- Developer Portal (https://developer.amazon.com/)
    - User Interface: walks you through training your skill to tie utterances to intents.

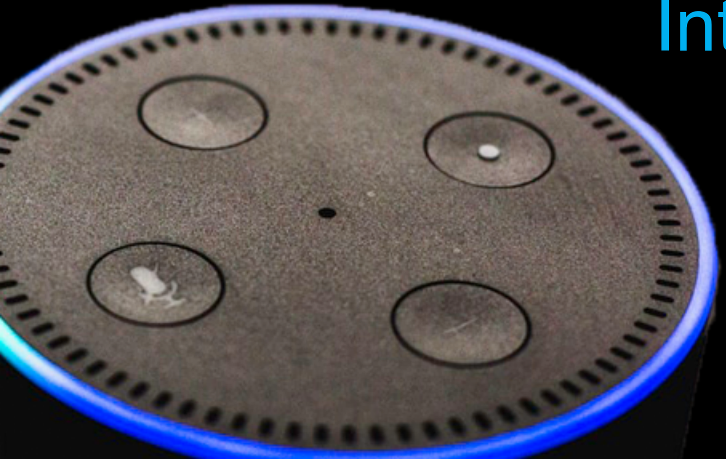
- What you will do in the Developer Portal
    - Name your skill (2 or 3 word invocation name)
    - Train your skill to recognize questions

Front End: Step-by-Step

1. Name your skill
2. Create intents
3. Describe utterances
4. Define & assign slots (Optional: Interaction Model)
5. Evaluate the model

Terminology

Intents, Utterances, & Slots



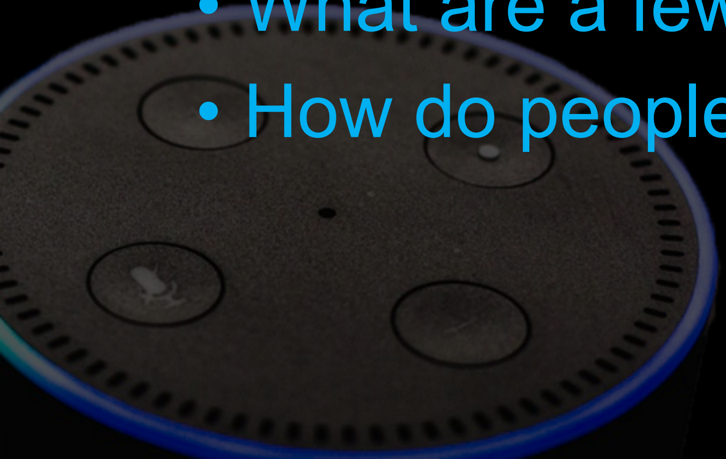
Intent

“An *intent* represents an action that fulfills a user's spoken request. Intents can optionally have arguments called *slots*. Intents are specified in a JSON structure called the *intent schema*.”

- What is the user actually trying to get the device to do?
- What is the end goal?

Utterance

“A set of likely spoken phrases mapped to the intents. This should include as many representative phrases as possible.”

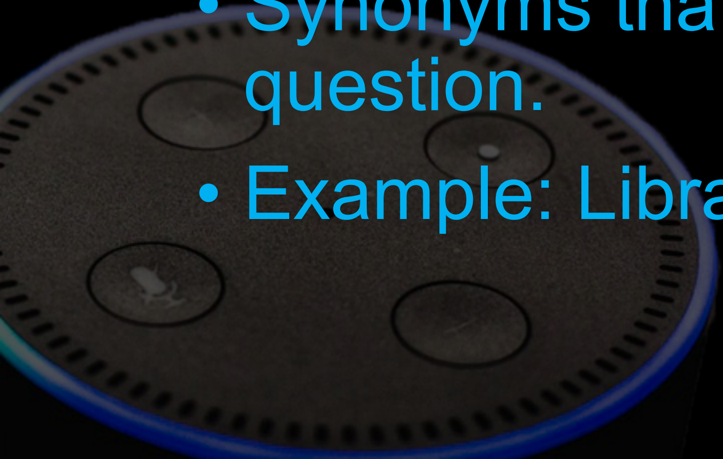


- What are a few examples of how users voice their questions?
- How do people express themselves?

Slots

“A representative list of possible values for a slot. Custom slot types are used for lists of items that are not covered by one of Amazon's built-in slot types.”

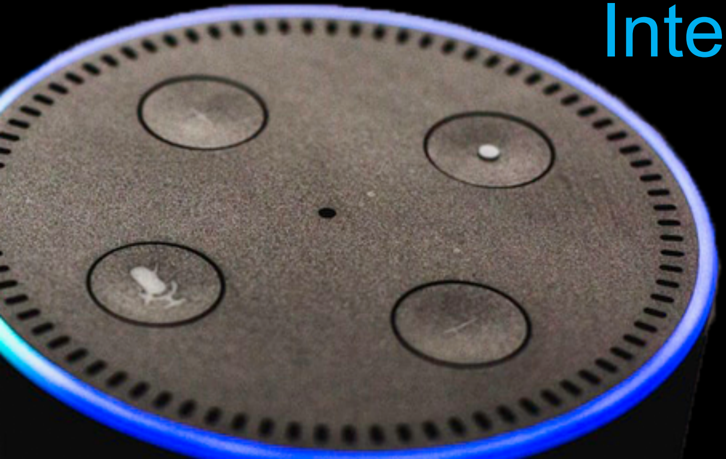
- Synonyms that might be used to replace key terms in a question.
- Example: Library



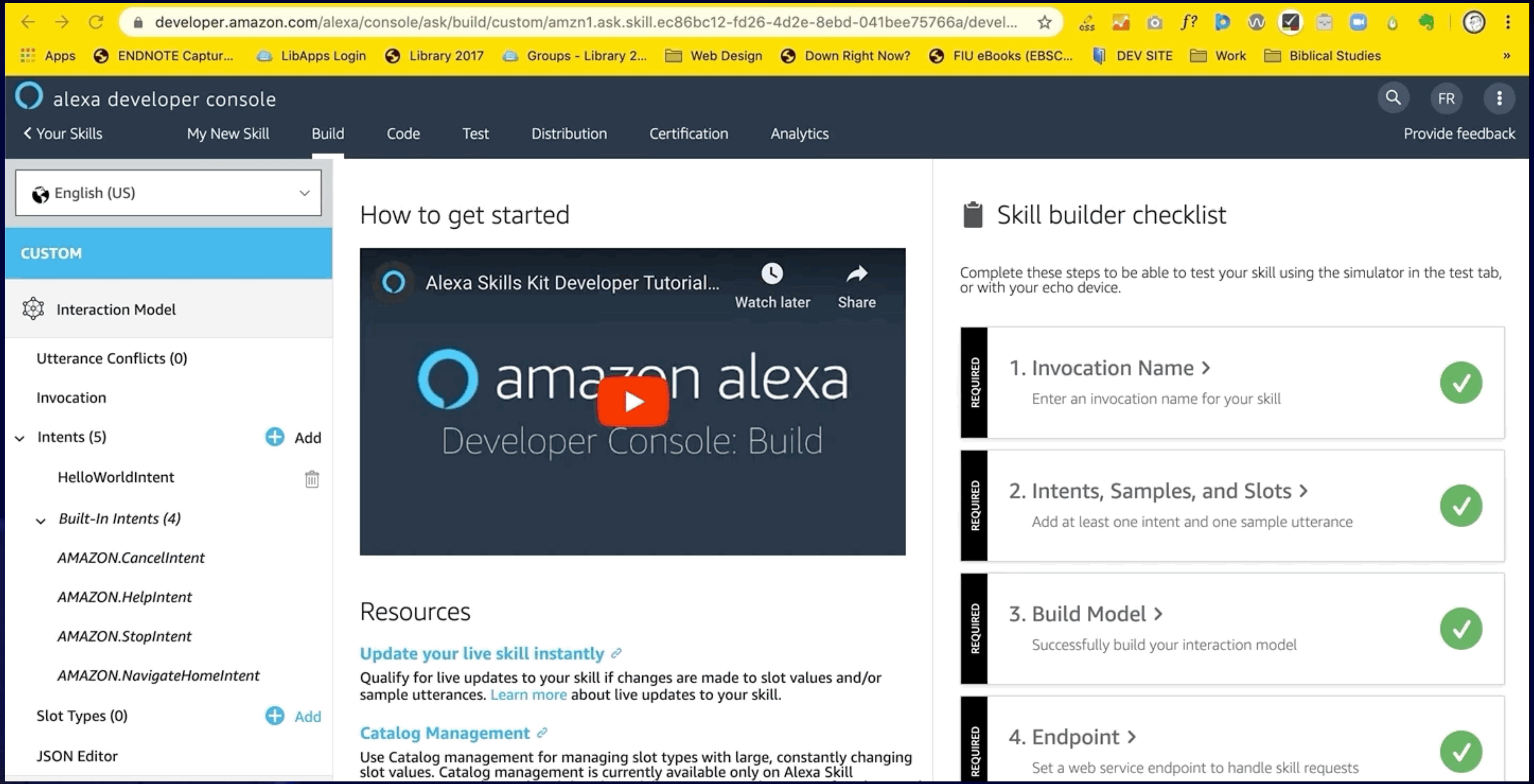
Let’s Build!

Intents, Utterances, & Slots

+ Evaluate the Model



Create an Intent



How to get started

Resources

Update your live skill instantly

Qualify for live updates to your skill if changes are made to slot values and/or sample utterances. Learn more about live updates to your skill.

Catalog Management

Use Catalog management for managing slot types with large, constantly changing slot values. Catalog management is currently available only on Alexa Skill

Skill builder checklist

Complete these steps to be able to test your skill using the simulator in the test tab, or with your echo device.

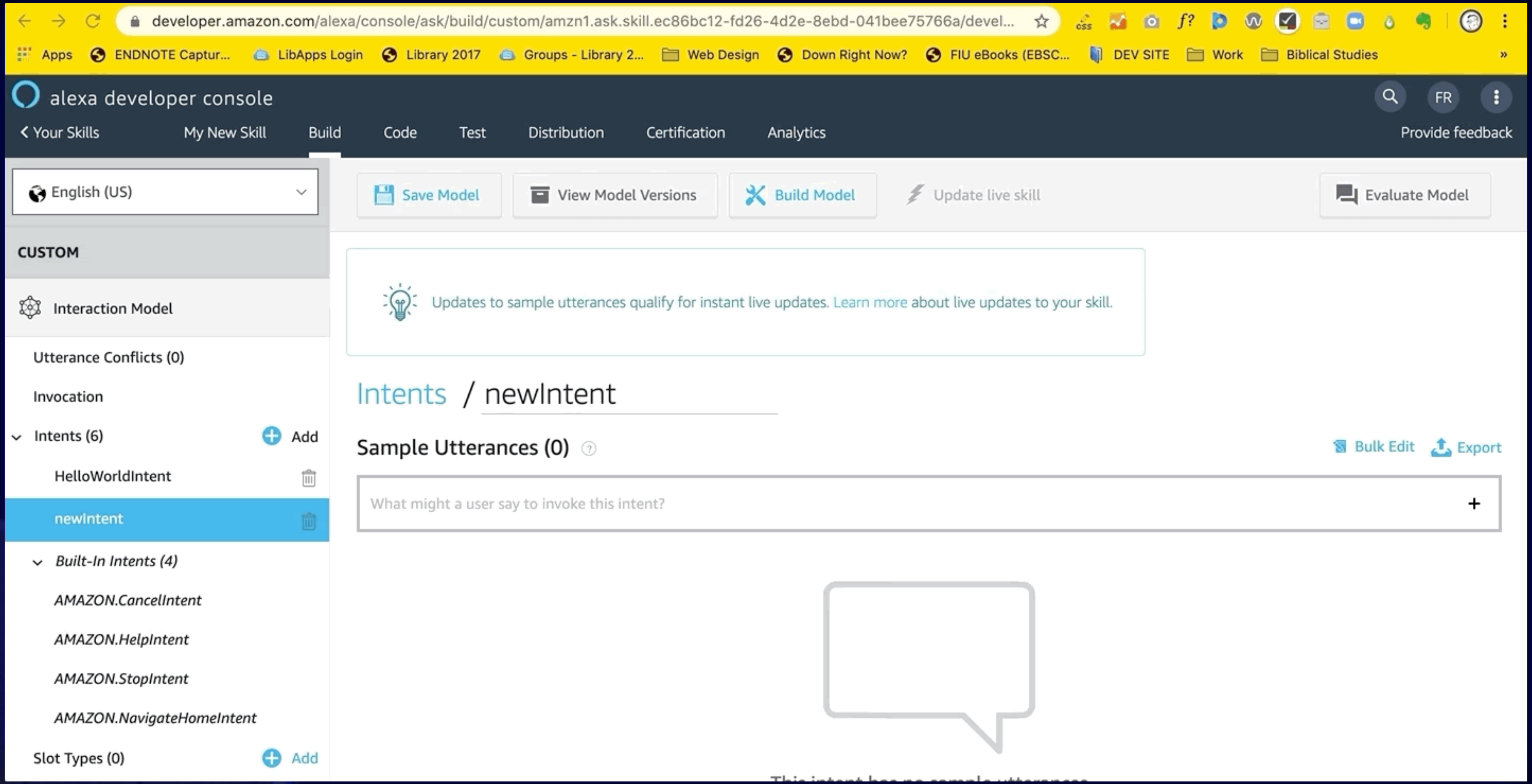
1. Invocation Name ✓
   Enter an invocation name for your skill

2. Intents, Samples, and Slots ✓
   Add at least one intent and one sample utterance

3. Build Model ✓
   Successfully build your interaction model

4. Endpoint ✓
   Set a web service endpoint to handle skill requests

Add Utterances



developer.amazon.com/alexa/console/ask/build/custom/amzn1.ask.skill.ec86bc12-fd26-4d2e-8ebd-041bee75766a/devel...

Updates to sample utterances qualify for instant live updates. Learn more about live updates to your skill.

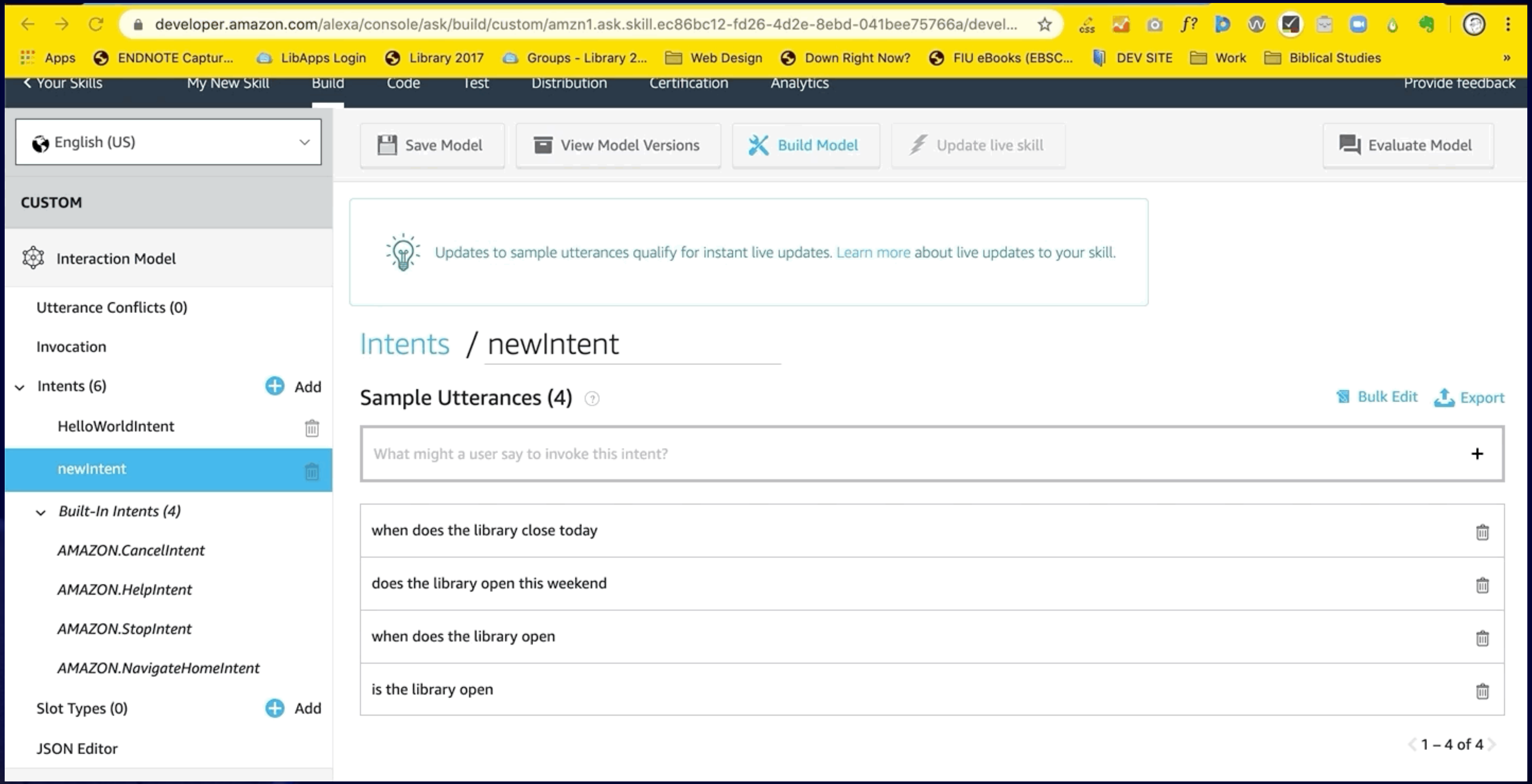
Intents / newIntent

Sample Utterances (0)

What might a user say to invoke this intent?

This intent has no sample utterances

Define Slots



Updates to sample utterances qualify for instant live updates. Learn more about live updates to your skill.

Intents / newIntent

Sample Utterances (4)

What might a user say to invoke this intent?

when does the library close today

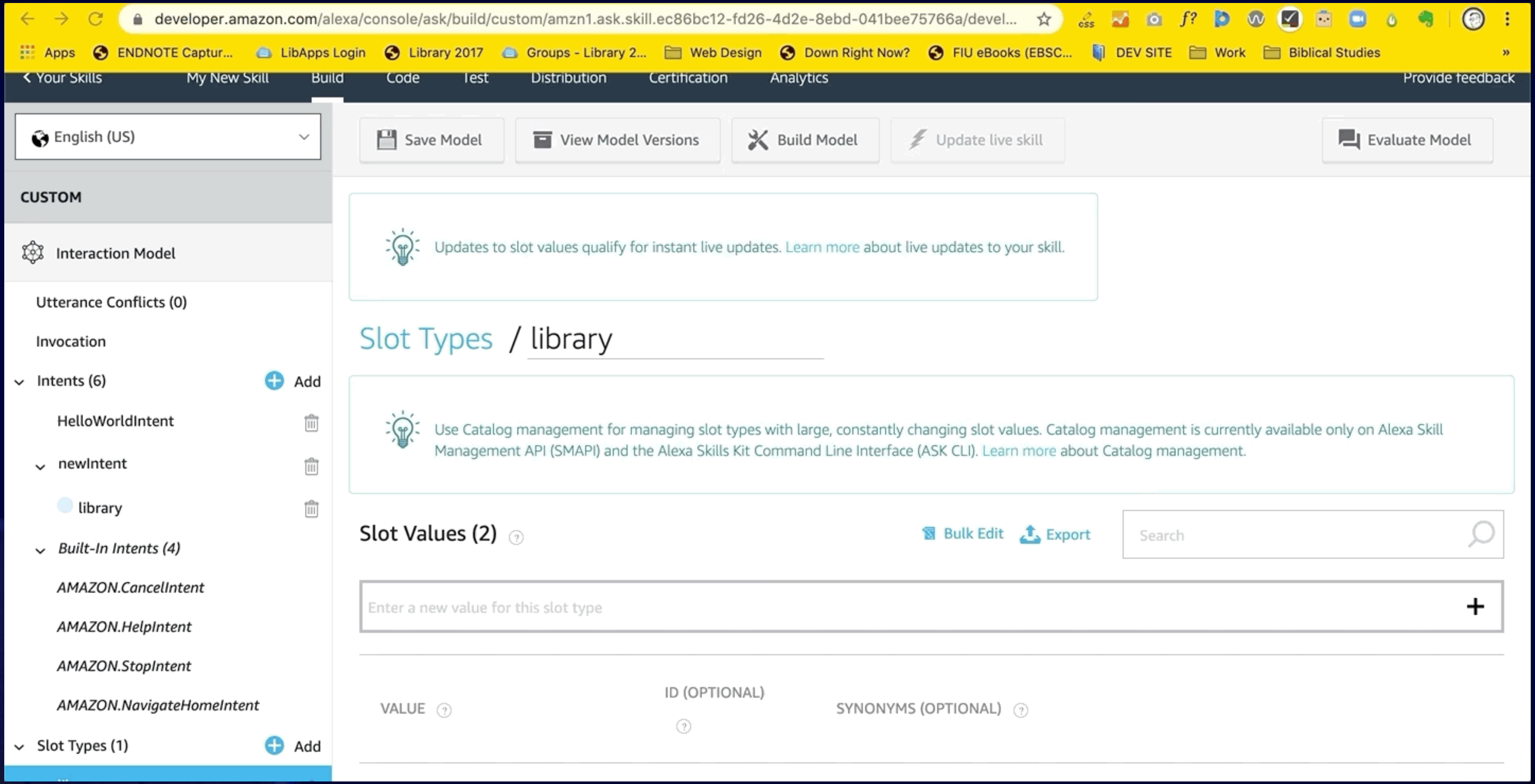
does the library open this weekend

when does the library open

is the library open

1 – 4 of 4

Assign Slots



Updates to slot values qualify for instant live updates. Learn more about live updates to your skill.

Slot Types / library

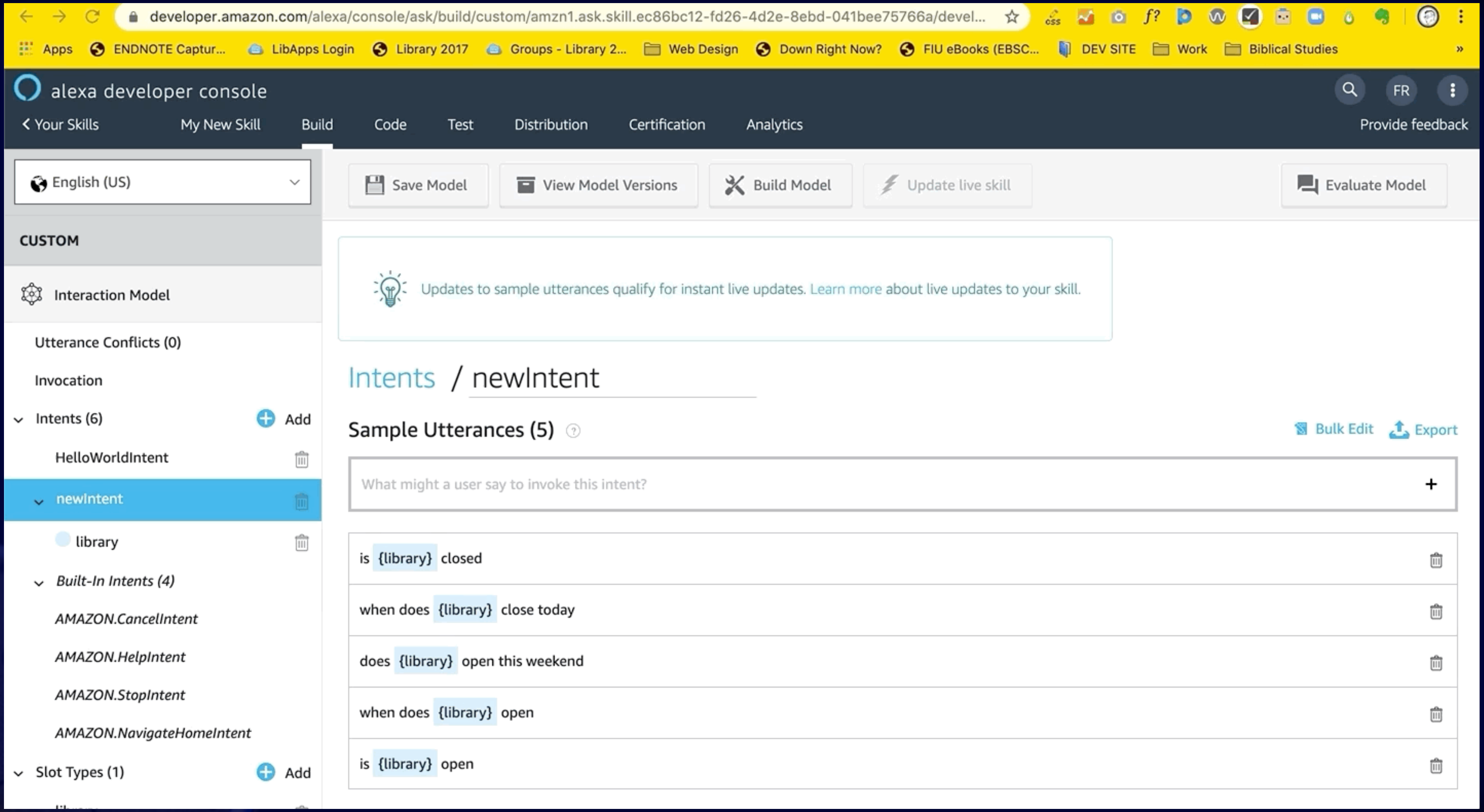
Use Catalog management for managing slot types with large, constantly changing slot values. Catalog management is currently available only on Alexa Skill Management API (SMAPI) and the Alexa Skills Kit Command Line Interface (ASK CLI). Learn more about Catalog management.

Slot Values (2)

Enter a new value for this slot type

VALUE	ID (OPTIONAL)	SYNONYMS (OPTIONAL)

Evaluate the model



Updates to sample utterances qualify for instant live updates. Learn more about live updates to your skill.

Intents / newIntent

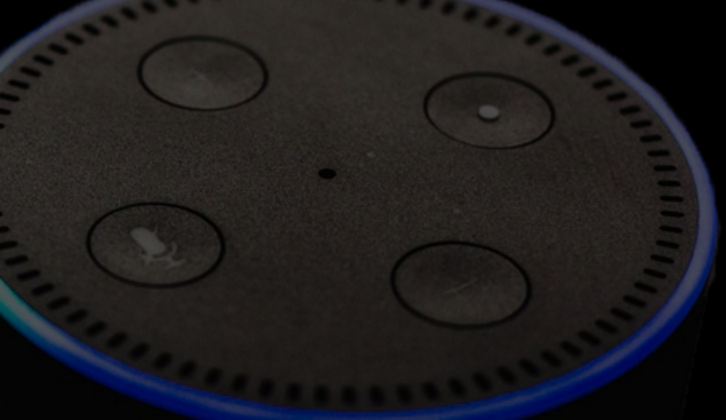
Sample Utterances (5)

What might a user say to invoke this intent?

- is {library} closed
- when does {library} close today
- does {library} open this weekend
- when does {library} open
- is {library} open

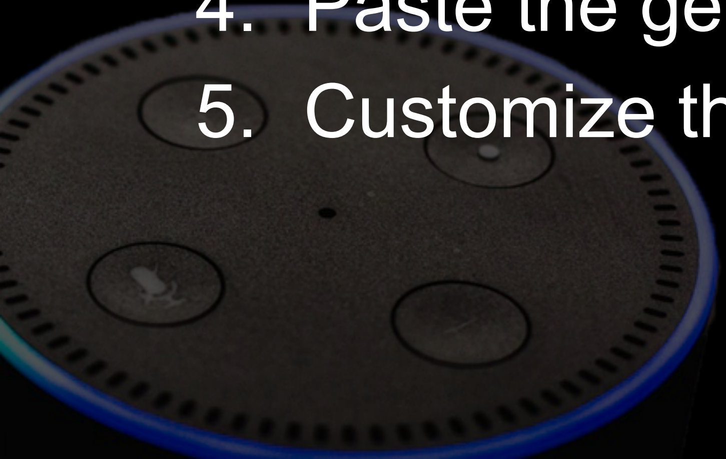
Back End: Getting Started

- Developer Portal: https://developer.amazon.com/
- Alexa Skill Code Generator: https://s3.amazonaws.com/webappvui/skillcode/v2/index.html
- Lambda Console: https://console.aws.amazon.com/lambda

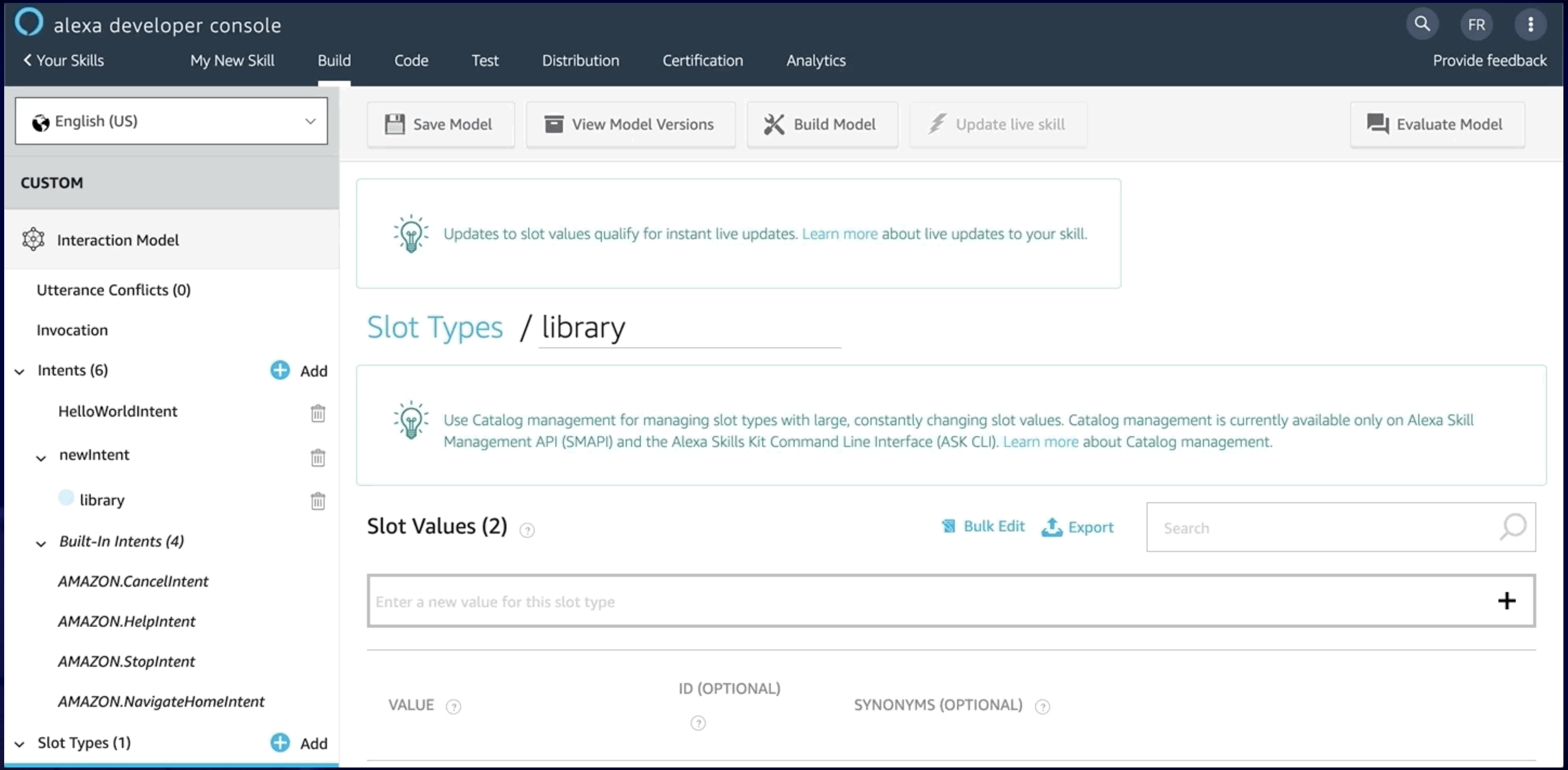


Back End: Step-by-Step

1. Export JSON / Generate js code
2. Create serverless repository on the Lambda Console
3. Associate serverless repository to your skill using the Amazon Resource Name (ARN)
4. Paste the generated code(Working Alexa Skill)
5. Customize the code



Export JSON / Generate js code



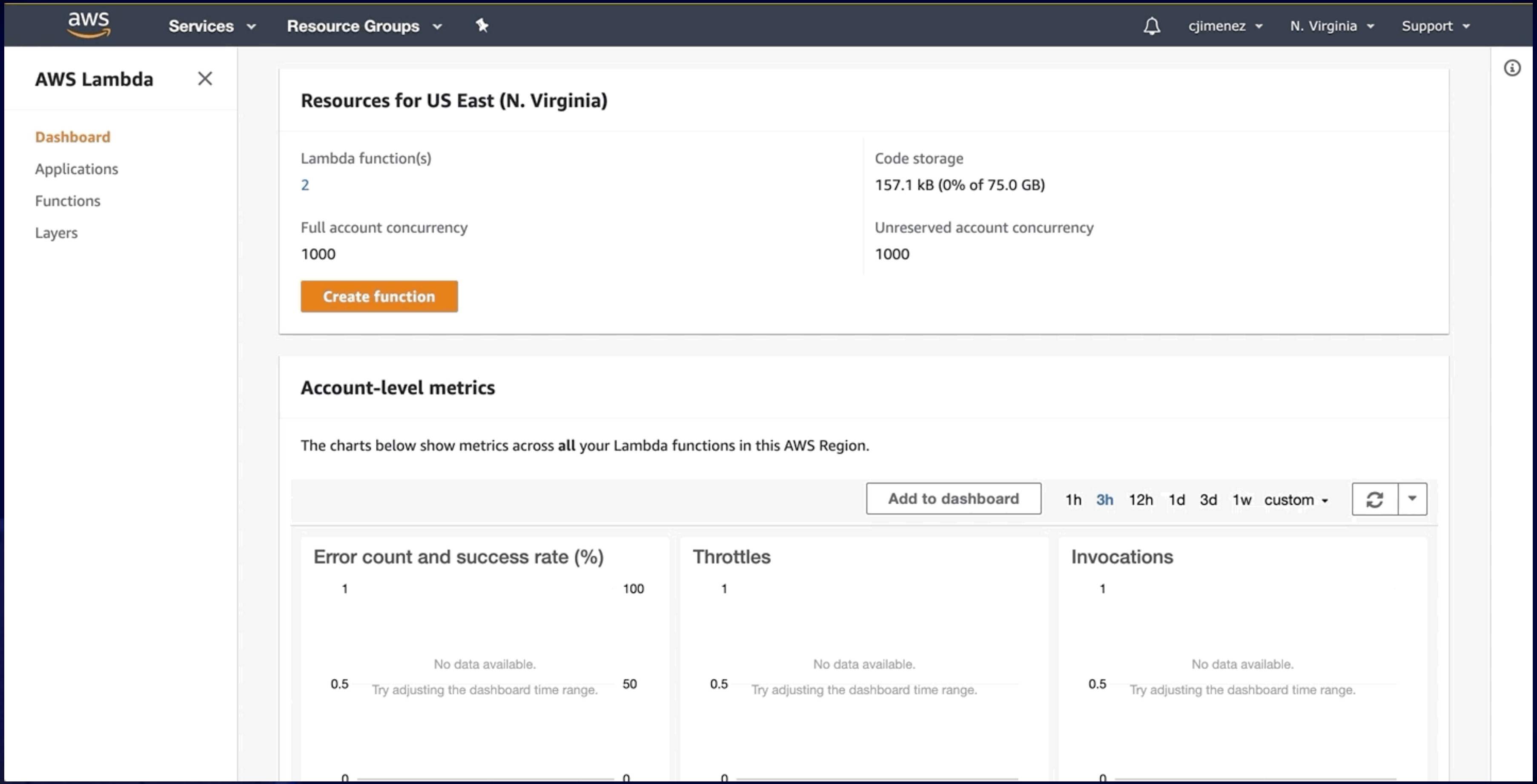
Updates to slot values qualify for instant live updates. Learn more about live updates to your skill.

Slot Types / library

Use Catalog management for managing slot types with large, constantly changing slot values. Catalog management is currently available only on Alexa Skill Management API (SMAPI) and the Alexa Skills Kit Command Line Interface (ASK CLI). Learn more about Catalog management.

Slot Values (2)

Create Serverless Repository



Resources for US East (N. Virginia)

Lambda function(s)
2

Code storage
157.1 kB (0% of 75.0 GB)

Full account concurrency
1000

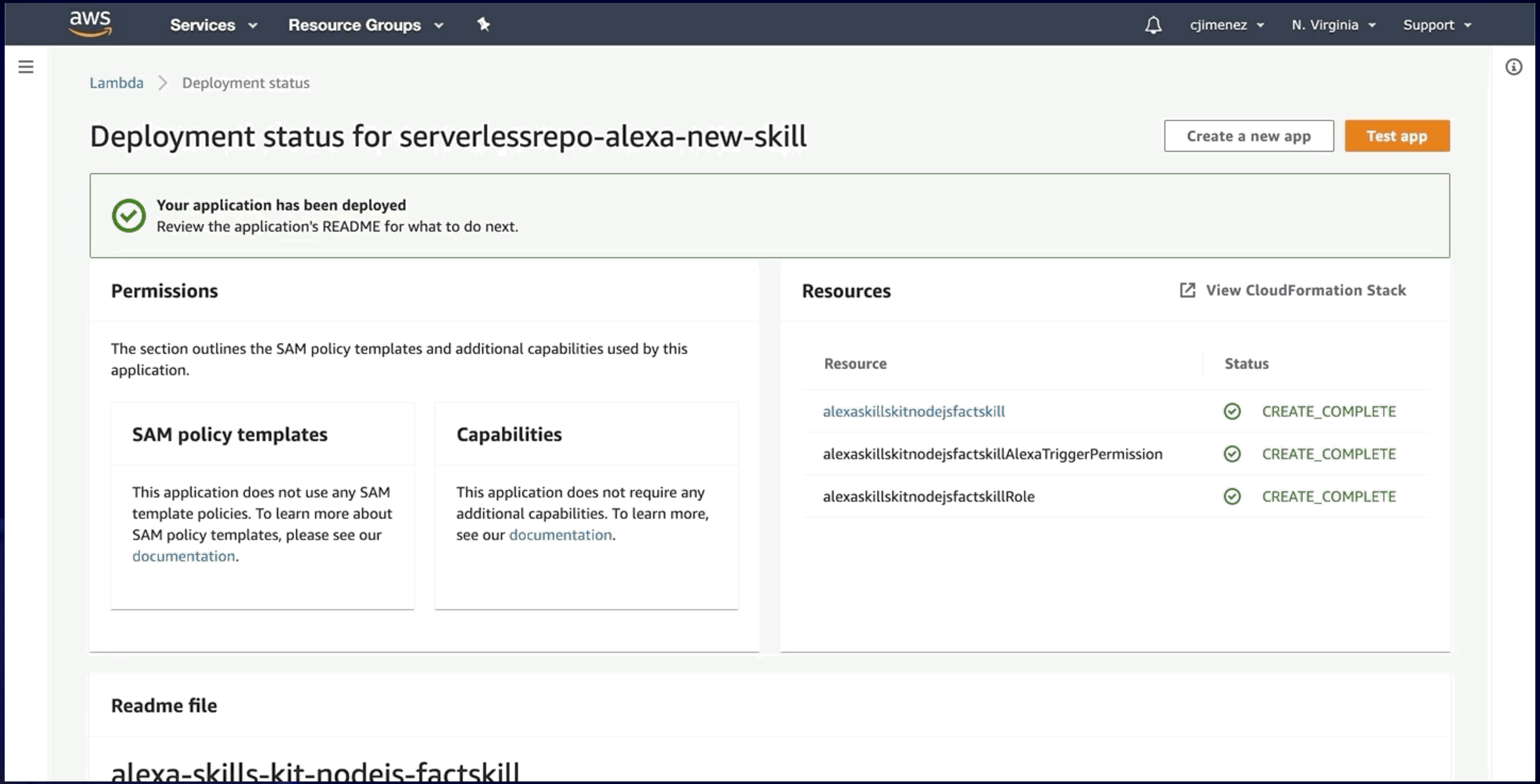
Unreserved account concurrency
1000

Account-level metrics

The charts below show metrics across **all** your Lambda functions in this AWS Region.

Add to dashboard
1h
3h
12h
1d
3d
1w
custom
Error count and success rate (%)
1
100
0.5
50
0
0
No data available.
Try adjusting the dashboard time range.
Throttles
1
0.5
0
No data available.
Try adjusting the dashboard time range.
Invocations
1
0.5
0
No data available.
Try adjusting the dashboard time range.

Associate the Repository to Your Skill



Deployment status for serverlessrepo-alexa-new-skill

Your application has been deployed
Review the application's README for what to do next.

Permissions

The section outlines the SAM policy templates and additional capabilities used by this application.

SAM policy templates

This application does not use any SAM template policies. To learn more about SAM policy templates, please see our documentation.

Capabilities

This application does not require any additional capabilities. To learn more, see our documentation.

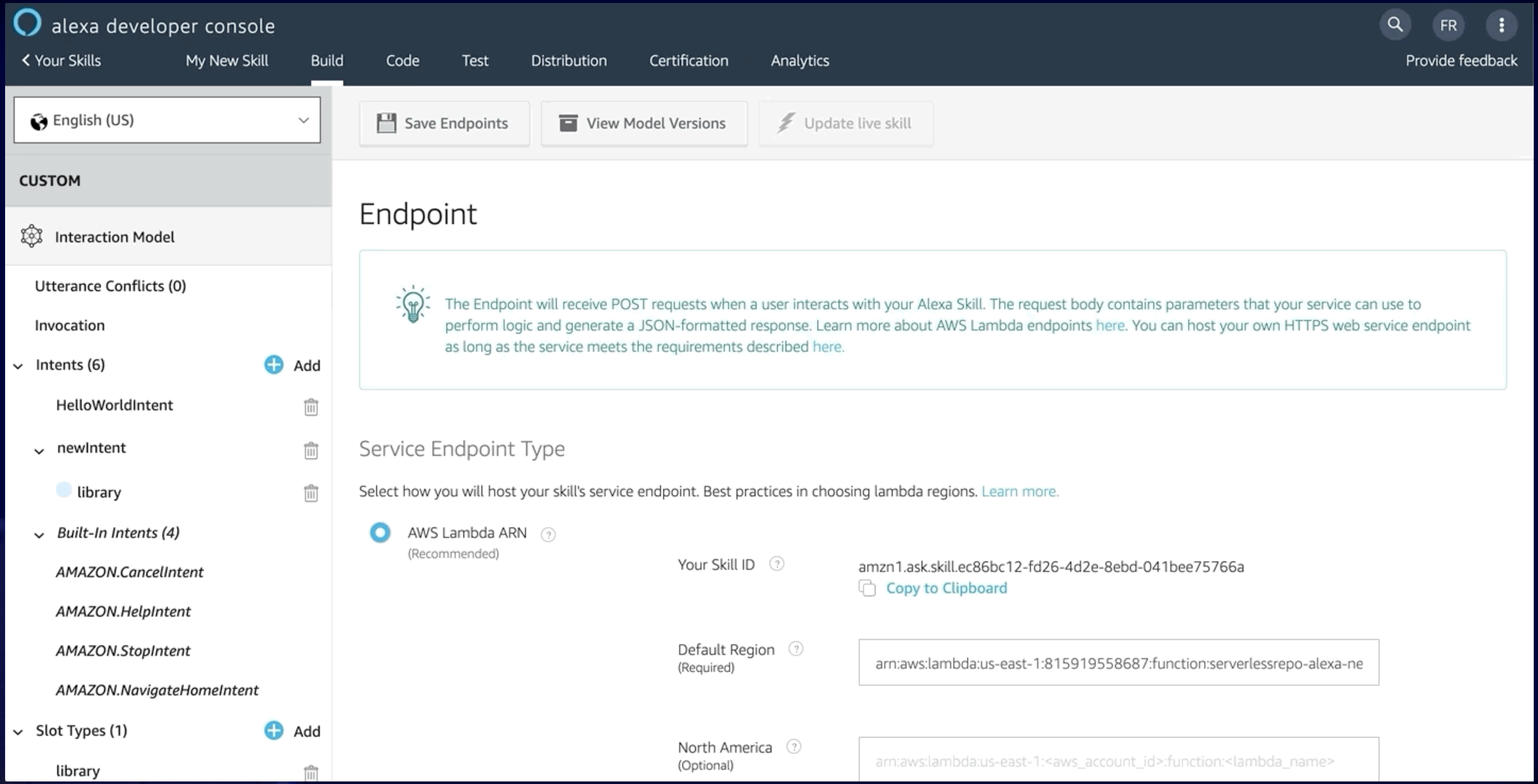
Resources

Resource	Status
alexaskillskitnodejsfactskill	✓ CREATE_COMPLETE
alexaskillskitnodejsfactskillAlexaTriggerPermission	✓ CREATE_COMPLETE
alexaskillskitnodejsfactskillRole	✓ CREATE_COMPLETE

Readme file

alexa-skills-kit-nodejs-factskill

Paste your generated code



Endpoint

The Endpoint will receive POST requests when a user interacts with your Alexa Skill. The request body contains parameters that your service can use to perform logic and generate a JSON-formatted response. Learn more about AWS Lambda endpoints here. You can host your own HTTPS web service endpoint as long as the service meets the requirements described here.

Service Endpoint Type

Select how you will host your skill's service endpoint. Best practices in choosing lambda regions. Learn more.

● AWS Lambda ARN (Recommended)

Your Skill ID: amzn1.ask.skill.ec86bc12-fd26-4d2e-8ebd-041bee75766a

Copy to Clipboard

Default Region (Required): arn:aws:lambda:us-east-1:815919558687:function:serverlessrepo-alexa-ne

North America (Optional): arn:aws:lambda:us-east-1:<aws_account_id>:function:<lambda_name>

Custom Code: LibAnswers API

https://ask.springshare.com/libanswers/faq/1669

- GET faqs/:id
- https://libanswers.../api/1.0/faqs/:id

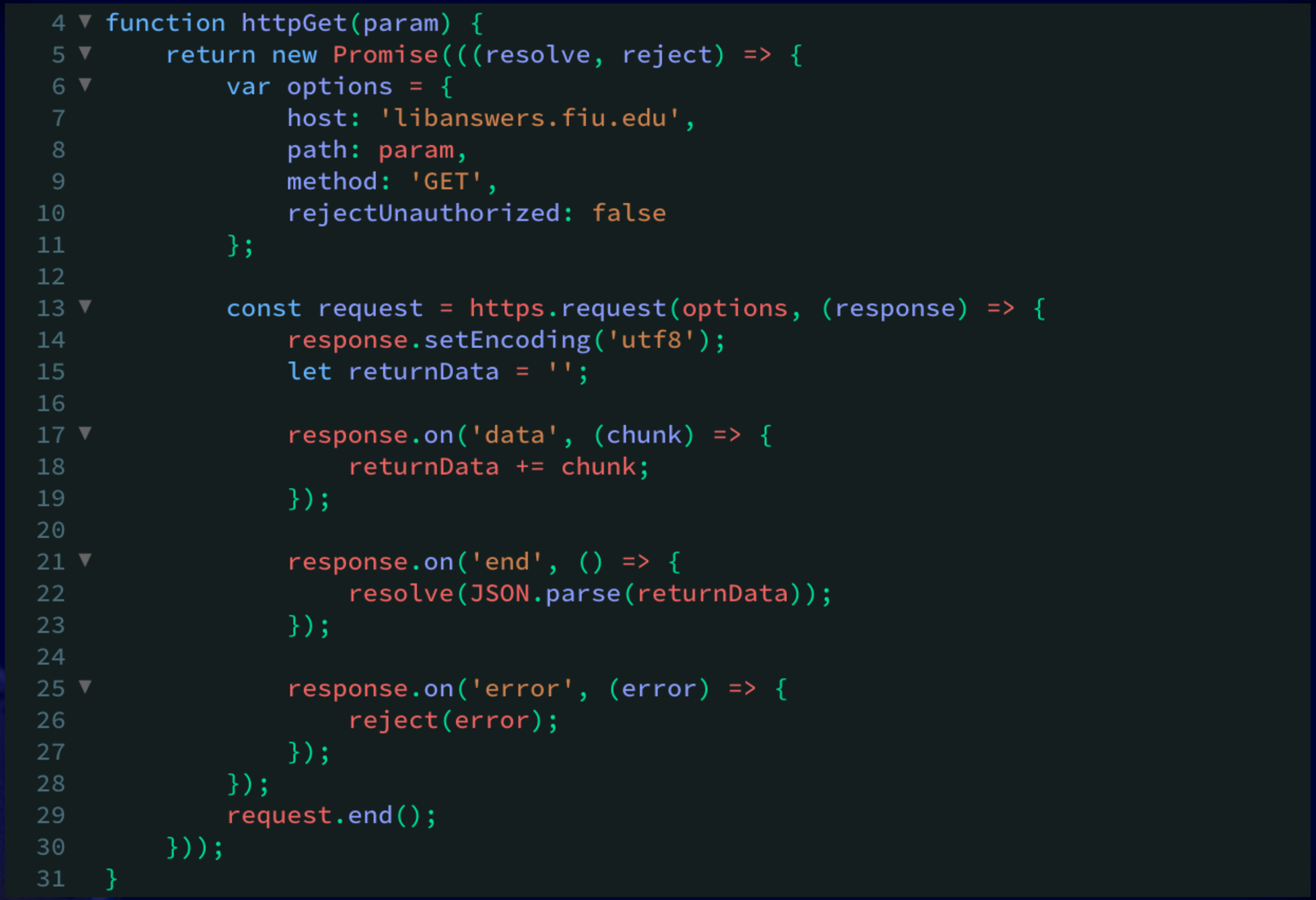
HOST: 'https://libanswers.../api ’

Stable content in the HTTPGET function

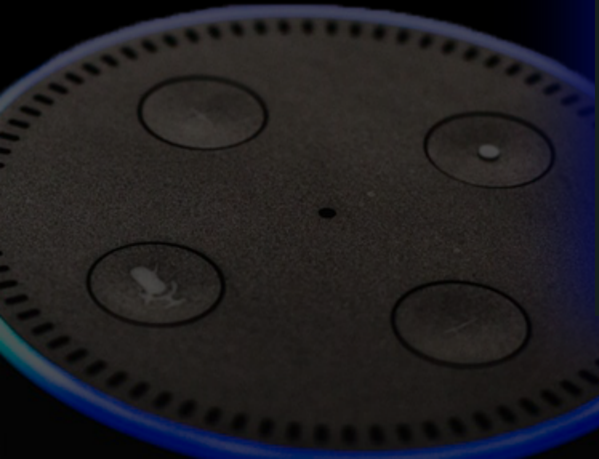
PARAM: '/1.0/faqs/' + answerId + '?group_id=000&iid=000’

Variable content in the INTENT function

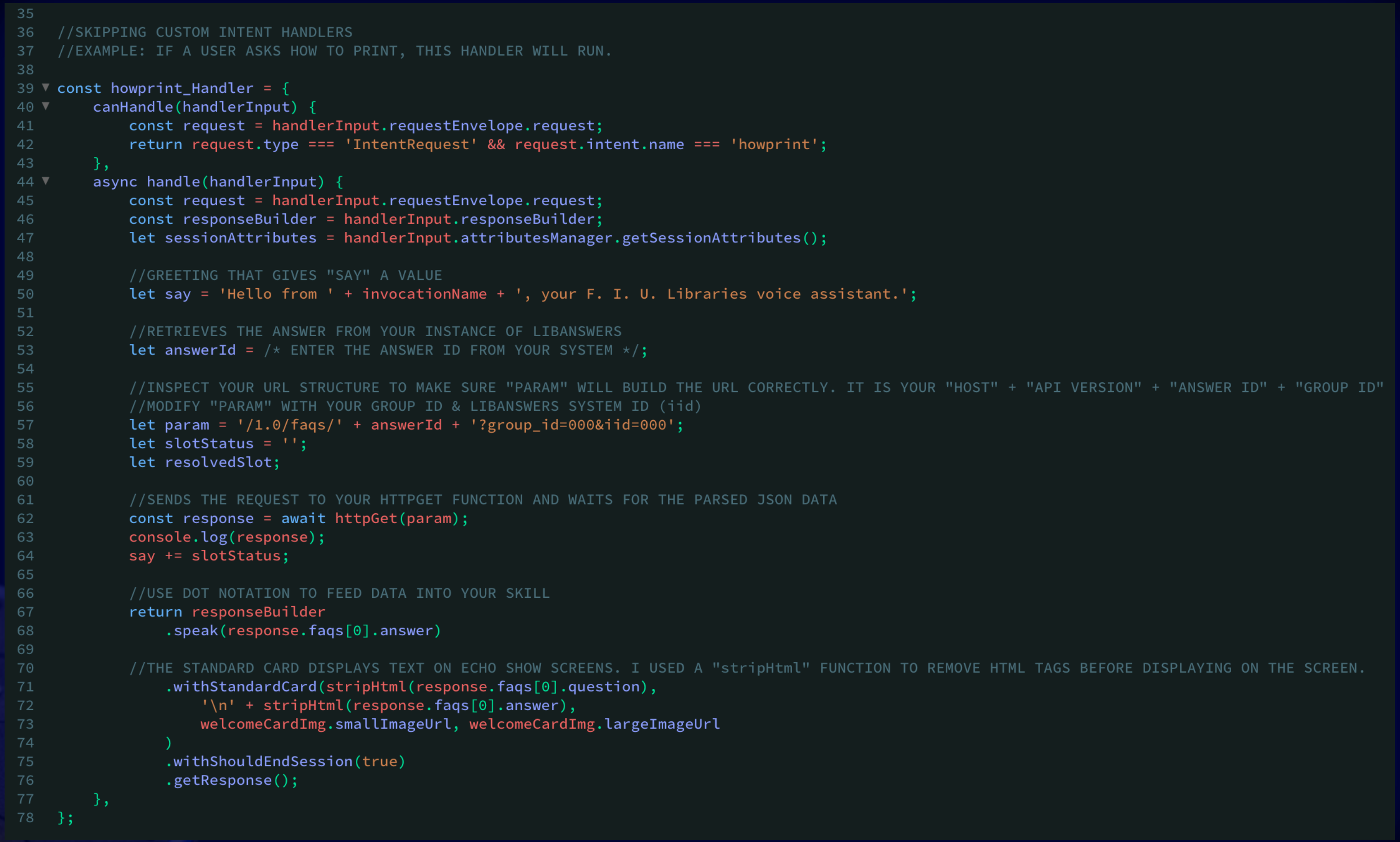
Custom Code: HTTPGET



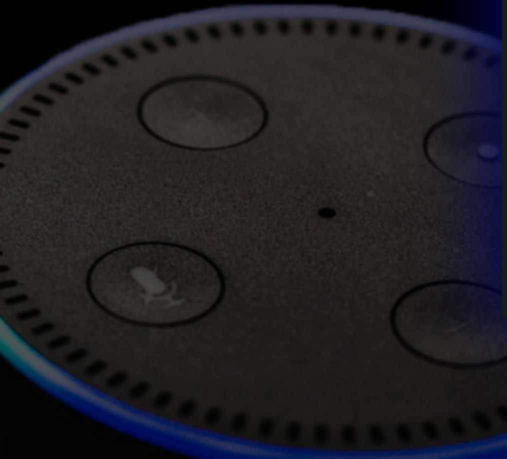
```
function httpGet(param) {
    return new Promise(((resolve, reject) => {
        var options = {
            host: 'libanswers.fiu.edu',
            path: param,
            method: 'GET',
            rejectUnauthorized: false
        };

        const request = https.request(options, (response) => {
            response.setEncoding('utf8');
            let returnData = '';

            response.on('data', (chunk) => {
                returnData += chunk;
            });

            response.on('end', () => {
                resolve(JSON.parse(returnData));
            });

            response.on('error', (error) => {
                reject(error);
            });
        });
        request.end();
    }));
}
```



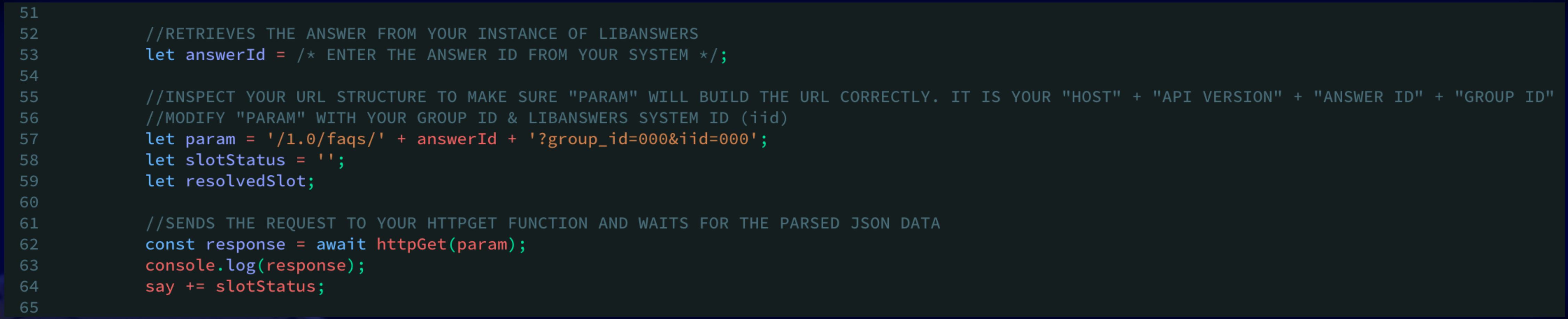
Customize Node.js: Intent Overview



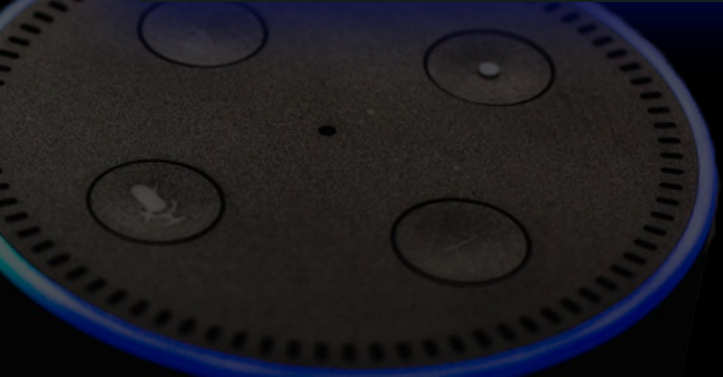
```
//SKIPPING CUSTOM INTENT HANDLERS
//EXAMPLE: IF A USER ASKS HOW TO PRINT, THIS HANDLER WILL RUN.

const howprint_Handler = {
    canHandle(handlerInput) {
        const request = handlerInput.requestEnvelope.request;
        return request.type === 'IntentRequest' && request.intent.name === 'howprint';
    },
    async handle(handlerInput) {
        const request = handlerInput.requestEnvelope.request;
        const responseBuilder = handlerInput.responseBuilder;
        let sessionAttributes = handlerInput.attributesManager.getSessionAttributes();

        //GREETING THAT GIVES "SAY" A VALUE
        let say = 'Hello from ' + invocationName + ', your F. I. U. Libraries voice assistant.';

        //RETRIEVES THE ANSWER FROM YOUR INSTANCE OF LIBANSWERS
        let answerId = /* ENTER THE ANSWER ID FROM YOUR SYSTEM */;

        //INSPECT YOUR URL STRUCTURE TO MAKE SURE "PARAM" WILL BUILD THE URL CORRECTLY. IT IS YOUR "HOST" + "API VERSION" + "ANSWER ID" + "GROUP ID"
        //MODIFY "PARAM" WITH YOUR GROUP ID & LIBANSWERS SYSTEM ID (iid)
        let param = '/1.0/faqs/' + answerId + '?group_id=000&iid=000';
        let slotStatus = '';
        let resolvedSlot;

        //SENDS THE REQUEST TO YOUR HTTPGET FUNCTION AND WAITS FOR THE PARSED JSON DATA
        const response = await httpGet(param);
        console.log(response);
        say += slotStatus;

        //USE DOT NOTATION TO FEED DATA INTO YOUR SKILL
        return responseBuilder
            .speak(response.faqs[0].answer)

        //THE STANDARD CARD DISPLAYS TEXT ON ECHO SHOW SCREENS. I USED A "stripHtml" FUNCTION TO REMOVE HTML TAGS BEFORE DISPLAYING ON THE SCREEN.
            .withStandardCard(stripHtml(response.faqs[0].question),
                '\n' + stripHtml(response.faqs[0].answer),
                welcomeCardImg.smallImageUrl, welcomeCardImg.largeImageUrl
            )
            .withShouldEndSession(true)
            .getResponse();
    },
};
```



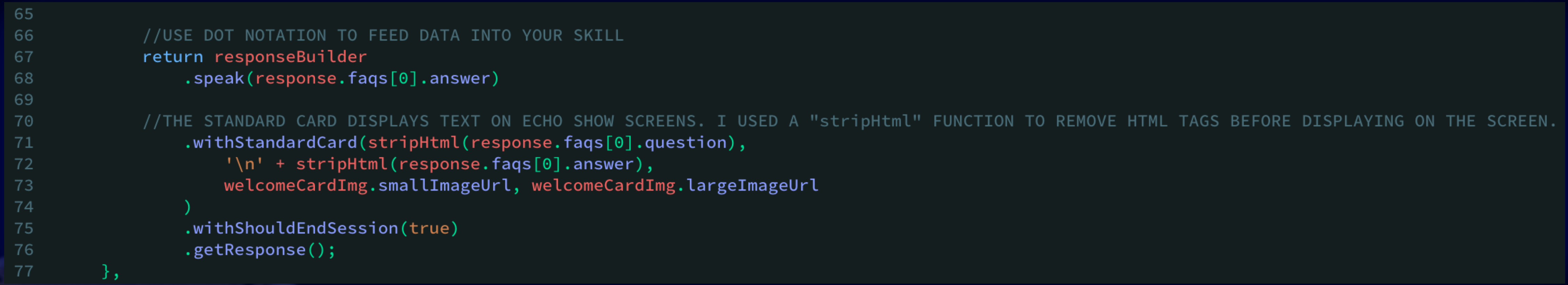
Customize Node.js: param



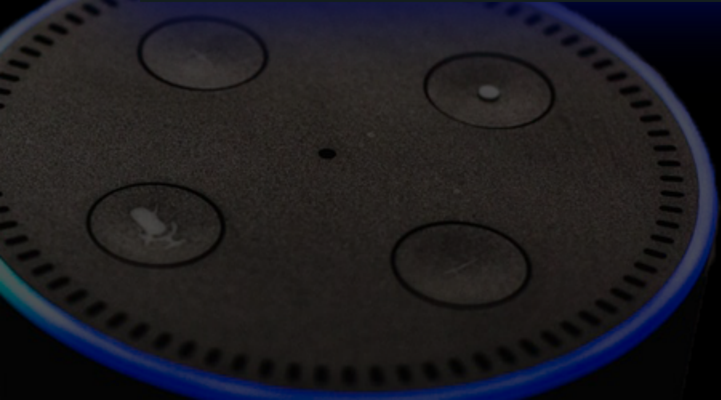
```
        //RETRIEVES THE ANSWER FROM YOUR INSTANCE OF LIBANSWERS
        let answerId = /* ENTER THE ANSWER ID FROM YOUR SYSTEM */;

        //INSPECT YOUR URL STRUCTURE TO MAKE SURE "PARAM" WILL BUILD THE URL CORRECTLY. IT IS YOUR "HOST" + "API VERSION" + "ANSWER ID" + "GROUP ID"
        //MODIFY "PARAM" WITH YOUR GROUP ID & LIBANSWERS SYSTEM ID (iid)
        let param = '/1.0/faqs/' + answerId + '?group_id=000&iid=000';
        let slotStatus = '';
        let resolvedSlot;

        //SENDS THE REQUEST TO YOUR HTTPGET FUNCTION AND WAITS FOR THE PARSED JSON DATA
        const response = await httpGet(param);
        console.log(response);
        say += slotStatus;
```



Customize Node.js: responseBuilder

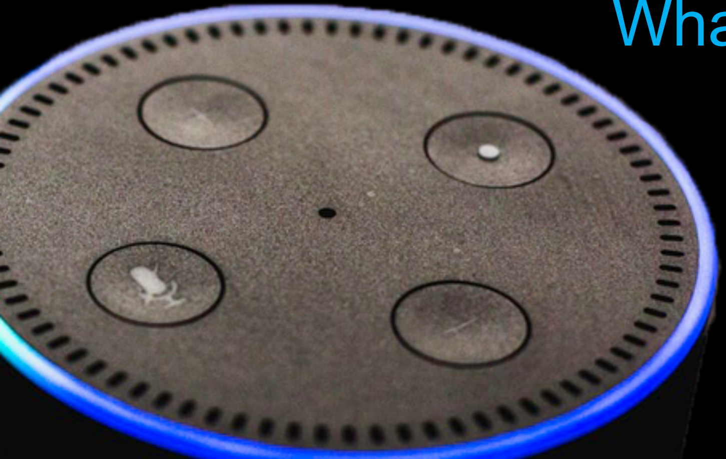


```

        //USE DOT NOTATION TO FEED DATA INTO YOUR SKILL
        return responseBuilder
            .speak(response.faqs[0].answer)

        //THE STANDARD CARD DISPLAYS TEXT ON ECHO SHOW SCREENS. I USED A "stripHtml" FUNCTION TO REMOVE HTML TAGS BEFORE DISPLAYING ON THE SCREEN.
            .withStandardCard(stripHtml(response.faqs[0].question),
                '\n' + stripHtml(response.faqs[0].answer),
                welcomeCardImg.smallImageUrl, welcomeCardImg.largeImageUrl
            )
            .withShouldEndSession(true)
            .getResponse();
    },
```



Alexa, Ask my library

What did we learn today?



Alexa, Ask my library

Voice First Market: This is a major emerging market.

UX-First Design: Consider how voice-first tech might fit into your customer service model.

Coding: One way to program a skill to communicate with LibAnswers.

Alexa, show me the references.

Hennig, N. (2018). *Siri, Alexa, and other digital assistants : the librarian's quick guide*.

The Infinite Dial 2020 - Edison Research. (2020). Retrieved from https://www.edisonresearch.com/the-infinite-dial-2020/

Miller, R., & Washington, K. (2017). *Consumer Use of the Internet and Mobile Web 2020-2021*. Retrieved from http://www.rkma.com.ezproxy.library.wisc.edu/wisc/cuim16/

NPR. (2020). The Smart Audio Report. Retrieved from https://www.nationalpublicmedia.com/insights/reports/smart-audio-report/

Alexa, are there any questions?

Christopher M. Jimenez

Web Services Librarian
Florida International University

Christopher.Jimenez@fiu.edu

@cjmnz8

github.com/cjmnz8/Echo-Show-Tell