Hacking with Amazon Alexa
Welcome to
MLH Localhost: Hacking with Alexa!

Wifi Network:
[eduroam]
[UB_Secure]

Event Hashtag:
#MLHLocalhost

Twitter Handle:
@MLHacks
Event Sign In Form

https://tinyurl.com/yd5nqhmt
Using your Web Browser, Open this URL & Fill out the Form:
http://mlhlocal.host/checkin

Afterwards, Check your Email to Find:

- Setup Instructions
- An Invite to the MLH Slack
- The Code Samples
- A Workshop FAQ
- These Workshop Slides
- More Learning Resources
Welcome! My name is Aniruddha Nandi.

1. I’m will be leading this session to help you learn something new today

2. I’m a Junior in CS & Lead of Project AI in the Robotics Club

3. Things I love to do include globetrotting, aerial photography and hacking
Our Mission is to Empower Hackers.

We hope you learn something awesome today!

Find more resources: http://mlh.io/
What will you learn today?

1. Understand Voice User Interfaces & what you can build using them.

2. Meet Alexa, an intelligent personal assistant developed by Amazon.

3. Create your first voice powered app with Amazon Alexa.
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What is Alexa?

Alexa is a Voice User Interface (VUI), that lets you *speak* commands, instead of clicking buttons or typing on your keyboard.

Alexa listens to spoken input, uses it to execute tasks or skills in the cloud, and then returns output -- just like a JavaScript function.
Why do Voice UIs Matter?

Instead of typing, clicking, or tapping - we can physically separate ourselves from our devices and speak commands naturally.

Voice UIs can run code in the cloud and communicate with IoT devices, making them ideal for homes, cars, & more.
What can you build with Alexa?

Alexa, ask Lyft for a Lyft Line to work.
What can you build with Alexa?

“Alexa, ask Capital One, what did I spend?”

Alexa, ask Capital One, what did I spend?
What can you build with Alexa?

Your afternoon pick-me-up.

“Alexa, tell Starbucks to start my order.”

Get started

Alexa, tell Starbucks start my order.
Alexa has Skills. Lots of them.

Companion app for device setup, skills, remote control, and more.

alexa.amazon.com
It’s LIVE Demo Time!

Try these commands:

“Alexa, tell me a joke!”

“Alexa, what is Major League Hacking?”

Don’t have an Alexa device? Head to: echosim.io
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Why build an Alexa Skill?

1. Alexa, Amazon's voice service, is already integrated into Echo devices and can perform hundreds of skills.

2. Your skill can reach millions of customers with Alexa enabled devices.

3. Building with Alexa is free, easy, & fun!
Alexa Skills are made of 2 parts:

1. **Front End** - The Alexa Voice UI handles text to speech, converting the audio into something our app can use, etc.

2. **Back End** - The logic code that actually powers our app. Usually this is written on a service called AWS Lambda.
Speech Recognition is Hard.

You said: *for tē tīmz*. But, what did you mean?

1. Forty Times?
2. For Tea Times?
3. For Tee Times?
4. Four Tee Times?
Parts of Speech Recognition

Automatic Speech Recognition (ASR)

Enables the recognition and translation of spoken language into text by computers.

1. Traditional phonetics-based using HMM’s (Hidden Markov Models)
2. Deep feedforward neural network or RNN (recurrent neural nets) based
Parts of Speech Recognition

Natural Language Understanding (NLU)

Deals with how to best handle unstructured inputs that are governed by poorly defined, flexible rules and convert them into a structured form that a machine can understand. It is an AI-hard problem.

“I need a flight and hotel in Miami from October 4 to 10”

need:flight {intent} / need:hotel {intent} / Miami {city} / Oct 4 {date} / Oct 10 {date} / sentiment: 0.5723 (neutral)
Parts of Speech Recognition

Text to Speech (TTS)

Converts text back to human-understandable speech
Alexa uses Sample Utterances for Training.

In order to **map user input** to a behavior, we provide **training data**, for each intent.

- 01 GetNewFactIntent a fact
- 02 GetNewFactIntent a Major League Hacking fact
- 03 GetNewFactIntent tell me a fact
- 04 GetNewFactIntent tell me a Major League Hacking fact
- 05 GetNewFactIntent give me a fact
- 06 GetNewFactIntent give me a Major League Hacking fact
- 07 GetNewFactIntent tell me trivia
- 08 GetNewFactIntent tell me a Major League Hacking trivia
- 09 GetNewFactIntent give me trivia
- 10 GetNewFactIntent give me a Major League Hacking trivia
- 11 GetNewFactIntent give me some information
- 12 GetNewFactIntent give me some Major League Hacking information
- 13 GetNewFactIntent tell me something
- 14 GetNewFactIntent give me something
Alexa Maps Speech Input to Intents.

Once Alexa figures out what Intent you wanted, you can easily map that back to code.

```
{
  "intents": [
    { "intent": "GetNewFactIntent" },
    { "intent": "AMAZON.HelpIntent" },
    { "intent": "AMAZON.StopIntent" },
    { "intent": "AMAZON.CancelIntent" }
  ]
}
```

"Tell me a Fact about MLH"  GetNewFactIntent
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Demo: About MLH Skill

Ask your Alexa:

“Alexa, open MLH Facts.”

“Alexa, ask MLH Facts for a fact.”

Don’t have an Alexa device? Head to: echosim.io
Steps to Build Your Skill:

To build your first skill, we’ll complete the following steps:

1. Write your skill code as an AWS Lambda function
2. Create an Alexa Skill in the Developer Portal
3. Connect Your Lambda Function to Your Skill
4. Test your Skill
5. Publish Your Skill
Sign into the AWS Console.

Navigate to:
mlhlocal.host/alexa-aws

Instructions
Click on “Sign in to Console” to get started.
Navigate to the Lambda Manager.

You can search for Lambda in the search box or find it on the list of available services.
Create your First Lambda Function.

Each AWS Lambda Function is responsible for one thing (like returning facts about you!).

Instructions
Click “Create a Function” to create your first function!
Choose a Blueprint.

Instructions

Select “alexa-skill-kit-sdk-factskill” from the options.
Set Basic Information.

Instructions
Enter a name, select “Create a custom role,” and name your role.
Create your IAM Role.

Instructions
Select "Create a new IAM Role" from dropdown menu. Role Name & policy will automatically populate.

Select “Allow” in the lower right corner and you will be returned to your Lambda function.
Create your IAM Role.

Notice that “lambda_basic_execution” is now in the “Existing Role*” field.
Step 1: Download the Sample Code

To get the sample code, head to this URL: mlhlocal.host/alexa-code

Step 2: Open Index.js

Unzip the directory and open src/index.js in your favorite code editor.
Customize your Facts

Instructions

Find the FACTS array inside index.js.
Replace the facts about MLH with facts of your choice!

```javascript
// TODO: replace with facts about yourself
const FACTS = [
  "Major League Hacking is commonly called MLH.",
  "Major League Hacking's mission is to empower hackers.",
  "Over 65,000 student hackers participated in Major League Hacking...",
  "Major League Hacking was founded in 2013 by Swift and Jon.",
  "Hackers created over 12,000 projects at MLH hackathons in 2016.",
  "Over 200 schools around the world hosted MLH hackathons in 2016.",
  "Major League Hacking is headquartered in New York City."
];
```
Hacking with Amazon Alexa

Code Review: The Handlers Object

The handlers object tells Alexa how to handle various actions. GetFact is the main logic of our application.

```javascript
var handlers = {
  'LaunchRequest': function() { this.emit('GetFact'); },
  'GetNewFactIntent': function() { this.emit('GetFact'); },
  'GetFact': function() {
    // Randomly select a fact from the array
    const factIndex = Math.floor(Math.random() * FACTS.length);
    const randomFact = FACTS[factIndex];
    // Create speech output
    const speechOutput = "Here's your fact: " + randomFact;
    this.emit(':tellWithCard', speechOutput, "MLH Facts", randomFact);
  }
};
```
Code Review: The Handler Function

The `handler` function tells Alexa how to route voice commands by passing a copy of the `handlers` object.

```javascript
// AWS Lambda calls this function every time Alexa uses our skill.
exports.handler = function(event, context, callback) {
  // Include the AWS Alexa Library.
  const Alexa = require("alexa-sdk");

  // Create an instance of the Alexa library & pass it the requested command.
  var alexa = Alexa.handler(event, context);

  // Give our Alexa instance handling instructions & execute the request.
  alexa.registerHandlers(handlers);
  alexa.execute();
};
```
Create your Function.

**Instructions**

Click “Create Function” at the bottom of the page.
Copy & Paste your Code into the Lambda Editor

Instructions
Copy the entire contents of index.js and paste it over the code in the inline editor on the AWS Console.
Save your Code.

Instructions

Click the white “Save” button (not the orange one).
Configure your Trigger.

We need to setup a trigger to call our new Lambda Function *(in our case Alexa Skills Kit)*.

**Instructions**

Click “Triggers”

Click “+ Add Trigger”
Configure your Trigger.

**Instructions**

Click on the gray dash-lined box

Select “Alexa Skills Kit” from the dropdown menu
Configure your Trigger.

Instructions

Click “Submit.”
Test your Trigger.

Instructions

Click “Save and Test.”
Test your Trigger.

Instructions

Click “Hello World.”

Scroll down and select “Alexa Intent - GetNewFact.”
Test your Trigger.

We need to setup a trigger to call our new Lambda

Instructions

Name your test event.

Click “Create.”
Test your Trigger.

Instructions

Click “Test.”

Lambda ➔ Functions ➔ yourFunctionHere

yourFunctionHere

ARN - arn:aws:lambda:us-east-1:674783520507:function:yourFunctionHere

qualified ➔ Actions ➔ GetNewMLHFact ➔ Test

Execution result: succeeded (logs)

Details
Test your AWS Lambda Function

If it’s working, you can click “Details” to see output similar to the following:

```
{
    "version": "1.0",
    "response": {
        "shouldEndSession": true,
        "outputSpeech": {
            "type": "SSML",
            "ssml": "<speak> Here's your fact: Major League Hacking is headquartered in New York City. </speak>"
        },
        "card": {
            "type": "Simple",
            "title": "Major League Hacking, AWS Lambda Facts"
        }
    }
}
```
Note Down your Function’s ARN.

You’ll need it in a few steps, so either keep this tab open or save it in a file somewhere now.
Sign into the Amazon Developer Portal.

Head over to:
mlhlocal.host/alexa-portal
Create your account.

Instructions

Fill in this form.

Create account

Your name
Major League Hacker

Email
localhost@mlh.io

Password

Re-enter password

Create your Amazon Developer account

By creating an account, you agree to Amazon’s Conditions of Use and Privacy Notice.

Already have an account? Sign in
Create your Developer Profile.

Instructions

Fill out the registration form & agree to the terms of use.

<table>
<thead>
<tr>
<th>Registration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>* indicates a required field.</td>
<td></td>
</tr>
<tr>
<td>Country/Region *</td>
<td>United States</td>
</tr>
<tr>
<td>First name *</td>
<td>Local</td>
</tr>
<tr>
<td>Last name *</td>
<td>Host</td>
</tr>
<tr>
<td>Email address *</td>
<td><a href="mailto:localhost@mlh.ie">localhost@mlh.ie</a></td>
</tr>
<tr>
<td>Phone number *</td>
<td>212-555-1212</td>
</tr>
<tr>
<td>Fax number</td>
<td></td>
</tr>
<tr>
<td>Developer name or company name *</td>
<td>MLH LocalHost</td>
</tr>
<tr>
<td>Developer description</td>
<td>Major League Hacking (MLH) is the official student hackathon league. Each year, we power over 200 weekend-long Invention competitions that inspire innovation, cultivate communities, and teach compute science skills to more than 65,000 students around the world. MLH is an engaged and passionate maker community, consisting of the next generation of technologyolders and entrepreneurs.</td>
</tr>
<tr>
<td>Address 1 *</td>
<td>149 East 23rd St</td>
</tr>
<tr>
<td>Address 2</td>
<td>0438</td>
</tr>
<tr>
<td>City *</td>
<td>New York</td>
</tr>
<tr>
<td>State *</td>
<td>New York</td>
</tr>
<tr>
<td>Zip code/Postal code *</td>
<td>10159</td>
</tr>
<tr>
<td>Customer support email address</td>
<td></td>
</tr>
<tr>
<td>Customer support phone</td>
<td></td>
</tr>
<tr>
<td>Customer support website</td>
<td></td>
</tr>
</tbody>
</table>

Save and Continue
Create your Developer Profile.

Instructions

Fill out the registration form & agree to the terms of use.

Registration

1. Profile Information
2. App Distribution Agreement
3. Payments

* indicates a required field.

Do you plan to monetize your digital content, such as charging for apps or games or selling in-app items or in-game items, or by receiving cash rewards for your skills? *

- No
- Yes

Do you plan to monetize apps by displaying ads from the Amazon Mobile Ad Network or Mobile Associates? *

- No
- Yes

Note: You may still monetize later if you select "No" by entering payment and tax information from the Settings menu.
Create a New Alexa Skill.

Instructions

Navigate to the Alexa tab.
Create a New Alexa Skill

Instructions

Click on "Getting Started" under “Alexa Skills Kit.”
Click “Add a New Skill” in the top right.
What is the Invocation Name?

This is a **1-3 word phrase** that users will say out loud to launch your skill.

*Alexa, open MLH facts.*

- Wake Word
- Launch
- Skill Invocation Name
Name your Skill

Instructions

1. Select “Custom Interaction Model” for Skill Type
2. Enter a Name for your Skill.
3. Enter an Invocation Name for your Skill.
4. Select the "No" option under Audio Player and click “Next”.

![Image showing the interface for naming a skill]

- **Skill Type**: Define a custom interaction model or use one of the predefined skill APIs. Learn more
- **Language**: English (U.S.)
- **Name**: Major League Hacking (MLH) Facts
- **Invocation Name**: MLH Facts

[Invocation Name Guidelines]
Grab the Intent Schema JSON

There’s a file called `SpeechAssets/IntentSchema.json` inside the code you downloaded earlier with the following JSON:

```json
{
  "intents": [
    {
      "intent": "GetNewFactIntent"
    },
    {
      "intent": "AMAZON.HelpIntent"
    },
    {
      "intent": "AMAZON.StopIntent"
    },
    {
      "intent": "AMAZON.CancelIntent"
    }
  ]
}
```

This code tells Alexa which code to trigger in our Lambda Function and some basic defaults like “STOP” and “HELP”. 
Paste the JSON into the Intent Schema Box

Instructions

Copy the code you found in `SpeechAssets/IntentSchema.json` into the box on the Alexa Developer dashboard.

```json
{
  "intents": [
    { "intent": "GetNewFactIntent" },
    { "intent": "AMAZON.HelpIntent" },
    { "intent": "AMAZON.StopIntent" },
    { "intent": "AMAZON.CancelIntent" }
  ]
}
```
Customize your Utterances

Instructions

Open up SpeechAssets/SampleUtterances.txt and replace “Major League Hacking” with your name:

01 GetNewFactIntent a fact
02 GetNewFactIntent a Major League Hacking fact
03 GetNewFactIntent tell me a fact
04 GetNewFactIntent tell me a Major League Hacking fact
05 GetNewFactIntent give me a fact
06 GetNewFactIntent give me a Major League Hacking fact
07 GetNewFactIntent tell me trivia
08 GetNewFactIntent tell me a Major League Hacking trivia
09 GetNewFactIntent give me trivia
10 GetNewFactIntent give me a Major League Hacking trivia
11 GetNewFactIntent give me some information
12 GetNewFactIntent give me some Major League Hacking information
13 GetNewFactIntent tell me something
14 GetNewFactIntent give me something
Paste your Custom Utterances into the Sample Utterances Box

Instructions

Copy your customized SpeechAssets/SampleUtterances.txt into the box on the Alexa Developer dashboard.

Sample Utterances

These are what people say to interact with your skill. Type or paste in all the ways that people can invoke the intents. Learn more

Up to 3 of these will be used as Example Phrases, which are hints to users.

<table>
<thead>
<tr>
<th></th>
<th>GetNewFactIntent a fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>GetNewFactIntent a Major League Hacking fact</td>
</tr>
<tr>
<td>3</td>
<td>GetNewFactIntent tell me a fact</td>
</tr>
<tr>
<td>4</td>
<td>GetNewFactIntent tell me a Major League Hacking fact</td>
</tr>
<tr>
<td>5</td>
<td>GetNewFactIntent give me a fact</td>
</tr>
<tr>
<td>6</td>
<td>GetNewFactIntent give me a Major League Hacking fact</td>
</tr>
<tr>
<td>7</td>
<td>GetNewFactIntent tell me trivia</td>
</tr>
<tr>
<td>8</td>
<td>GetNewFactIntent tell me a Major League Hacking trivia</td>
</tr>
<tr>
<td>9</td>
<td>GetNewFactIntent give me trivia</td>
</tr>
<tr>
<td>10</td>
<td>GetNewFactIntent give me a Major League Hacking trivia</td>
</tr>
<tr>
<td>11</td>
<td>GetNewFactIntent give me some information</td>
</tr>
</tbody>
</table>
Save your Interaction Model and Continue.

**Instructions**

Once you’ve defined your intent schema & sample utterances, hit “next” in the bottom corner to move on.
Go get your Lambda Function’s ARN

Instructions

Remember the ARN we noted down earlier?
Time to put it to use, go grab it now!

ARN - arn:aws:lambda:us-east-1:674783520507:function:yourFunctionHere
Connect Your Lambda Function to Your Skill.

**Instructions**

Select AWS Lambda ARN and the Region closest to you. Paste the ARN from your function in the text box.
## Test your Skill

### Instructions

Type one of your sample utterances into the service simulator to see how Alexa would respond.

**Service Simulator**

Use Service Simulator to test your lambda function: amzn1.ask.skill.2f6b3b6

Note: Service Simulator does not currently support testing audio player directives and customer account linking.

### Lambda Request

<table>
<thead>
<tr>
<th>Lambda Request</th>
<th>Lambda Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;session&quot;: {</td>
<td>1</td>
</tr>
<tr>
<td>&quot;sessionId&quot;: &quot;SessionId.8c3da1e1-6bbd-4fe6-</td>
<td></td>
</tr>
<tr>
<td>&quot;application&quot;: {</td>
<td>2</td>
</tr>
<tr>
<td>&quot;applicationId&quot;: &quot;amzn1.ask.skill.2f6b3b6</td>
<td></td>
</tr>
<tr>
<td>&quot;attributes&quot;: {},</td>
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</tr>
<tr>
<td>&quot;user&quot;: {},</td>
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<td>&quot;userId&quot;: &quot;amzn1.ask.account.AEWPW623SWYI</td>
<td></td>
</tr>
<tr>
<td>&quot;new&quot;: true</td>
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</tr>
<tr>
<td>&quot;request&quot;: {</td>
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</tr>
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<td>&quot;type&quot;: &quot;IntentRequest&quot;,</td>
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</tr>
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<td>&quot;intentId&quot;: &quot;EdwRequestId.c3ba9723-8da3-45</td>
<td></td>
</tr>
<tr>
<td>&quot;locale&quot;: &quot;en-US&quot;,</td>
<td>8</td>
</tr>
</tbody>
</table>

Hear what Alexa would say by clicking “Listen”.
Try out Your Skill!

Head to EchoSim.io to try out your fact.

“Alexa, open [Your Invocation Name].”

If you want to try your skill on an Alexa Device, pair it with your account first!
Troubleshooting Your Skill

If you aren't getting a valid response, check the following:

1. Do you have the right ARN copied from your Developer Portal/Skill into your Lambda function?
2. Are you calling the right invocation name?
3. Are you saying launch, start or open?
4. Are you sure you have no other skills in your accounts with the same invocation name?
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Let’s recap quickly...

1. Voice User Interfaces allow us to physically separate ourselves from devices.

2. Amazon Alexa makes it easy for you to create apps (skills) that utilize Voice User Interfaces.

3. Alexa takes care of speech recognition and context so you can focus on making a great app.
What did you learn today?

We created a fun quiz to test your knowledge and see what you learned from this workshop.

http://mlhlocal.host/quiz
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Get credit & freebies from Amazon!

http://mlhlocal.host/alexa-promo

Our friends at Amazon Web Services run promotions in certain areas to reward hackers for making skills for the Amazon Alexa Platform.

Fill this out to get credit!
Next Steps: Publish your Skill!

You have a working skill, the next step is to publish it on the Alexa Skill Marketplace.

Instructions

1. Complete the “Publishing Information” and “Privacy and Compliance” sections on the developer portal.

2. Ensure that your skill meets the basic requirements.
Next Steps: Use Slots to Customize Further

Slots enable you to pass additional data to your Lambda function. Use slots to return a fact in a specific category (Ex. “facts about my education”).

**Instructions**

1. Read up about Slots and how to use them to pass data to your function.
2. Categorize your facts into a handful of groups.
3. Customize your function to return a fact based on the user specified category
Learning shouldn’t stop when the workshop ends...

Check your email for access to:

- These workshop slides
- Practice problems to keep learning
- Deeper dives into key topics
- Instructions to join the community
- More opportunities from MLH!
Hacking with Amazon Alexa