Build Your Own Chatbot

Arun Gupta @arungupta

Amazon Web Services

aws

Docker Captain
Java Champion
JavaOne Rock Star (4 years)
NetBeans Dream Team
Silicon Valley JUG Leader
Author
Runner
Lifelong learner

Tell me a Yoda quote

Developer challenges

Automated Speech Recognition

Scalability

Business Logic

Dialog Manager

Authentication

Availability

Testing

Natural Language Understanding

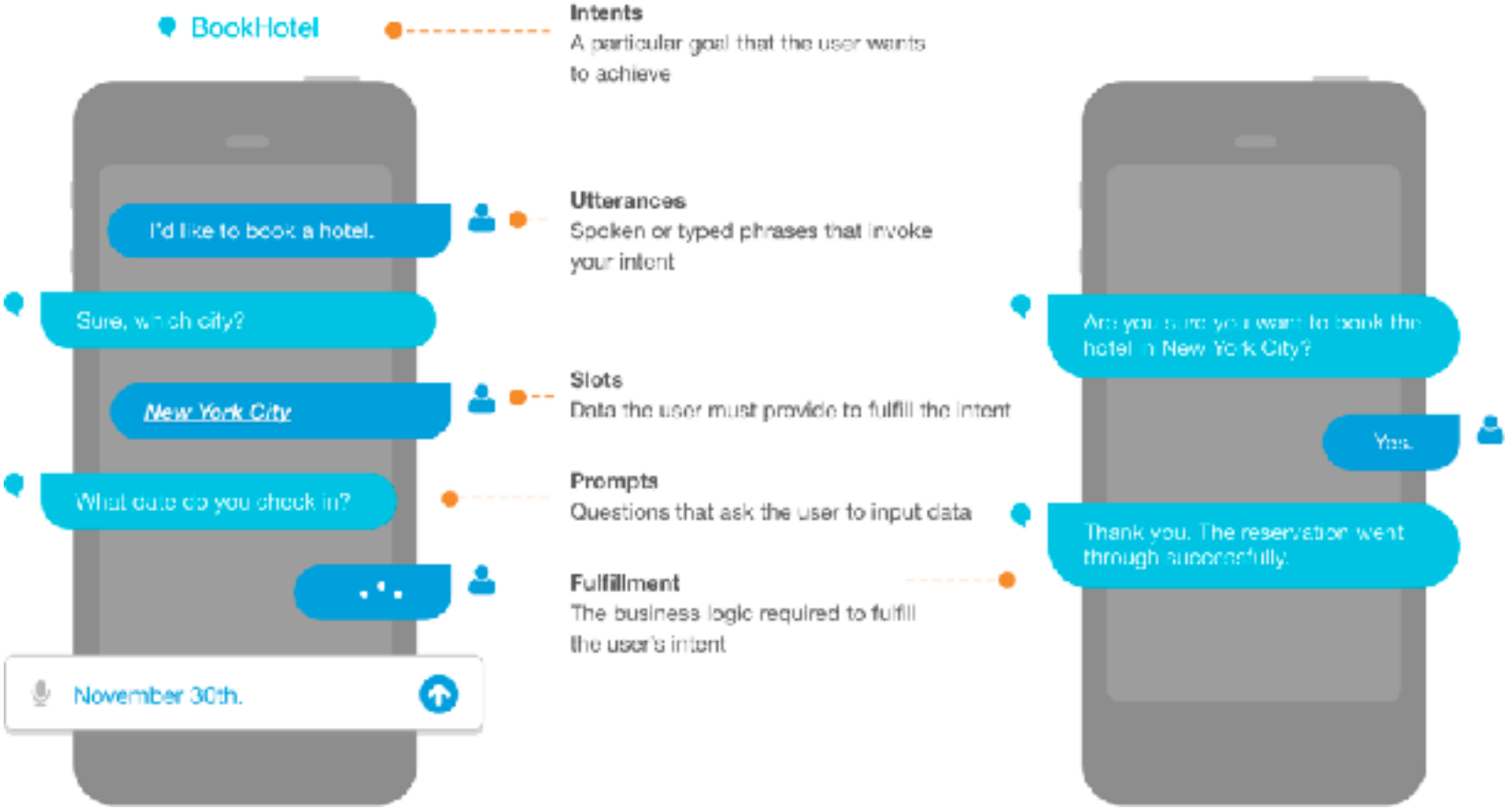
Mobile

Disparate Systems

CHATBOT
Components

User Interface	ASR/NLU	Fulfillment	Database
Voice	API.ai	Node.js	MongoDB
SMS	Wit.ai	AngularJS	MySQL
Chat	Watson	Flask	Amazon Relational Data Service
Web	Lex/Polly	Java	
Email	Amazon Rekognition	Grails Serverless	Amazon DynamoDB
	Alexa Skills Kit		

Logging	ELK, EFK, Amazon CloudWatch
Monitoring	Newrelic, Datadog, AWS X-Ray
CI/CD	Jenkins, CircleCI, AWS CodePipeline



Intents
A particular goal that the user wants to achieve

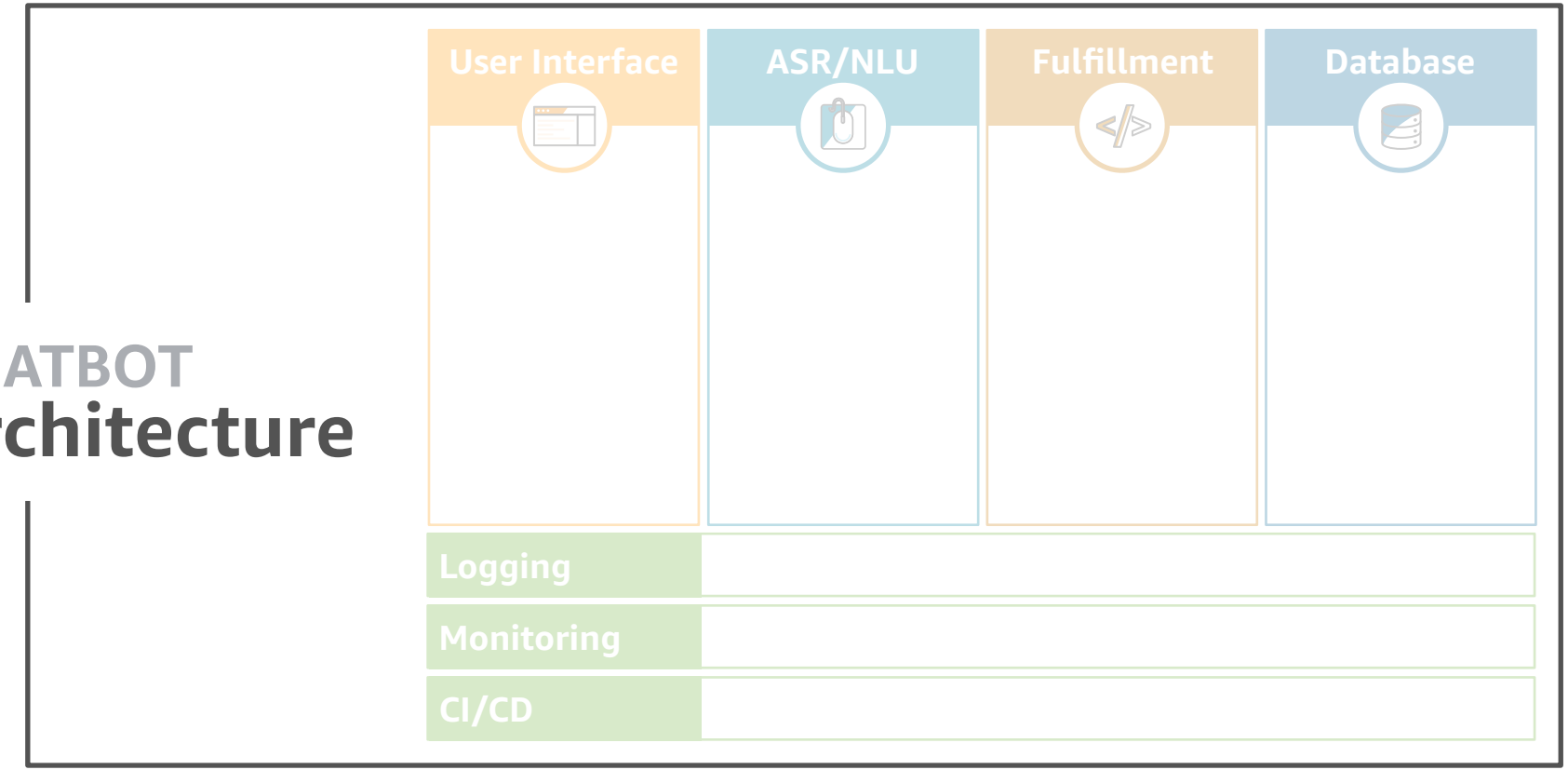
Utterances
Spoken or typed phrases that invoke your intent

Slots
Data the user must provide to fulfill the intent

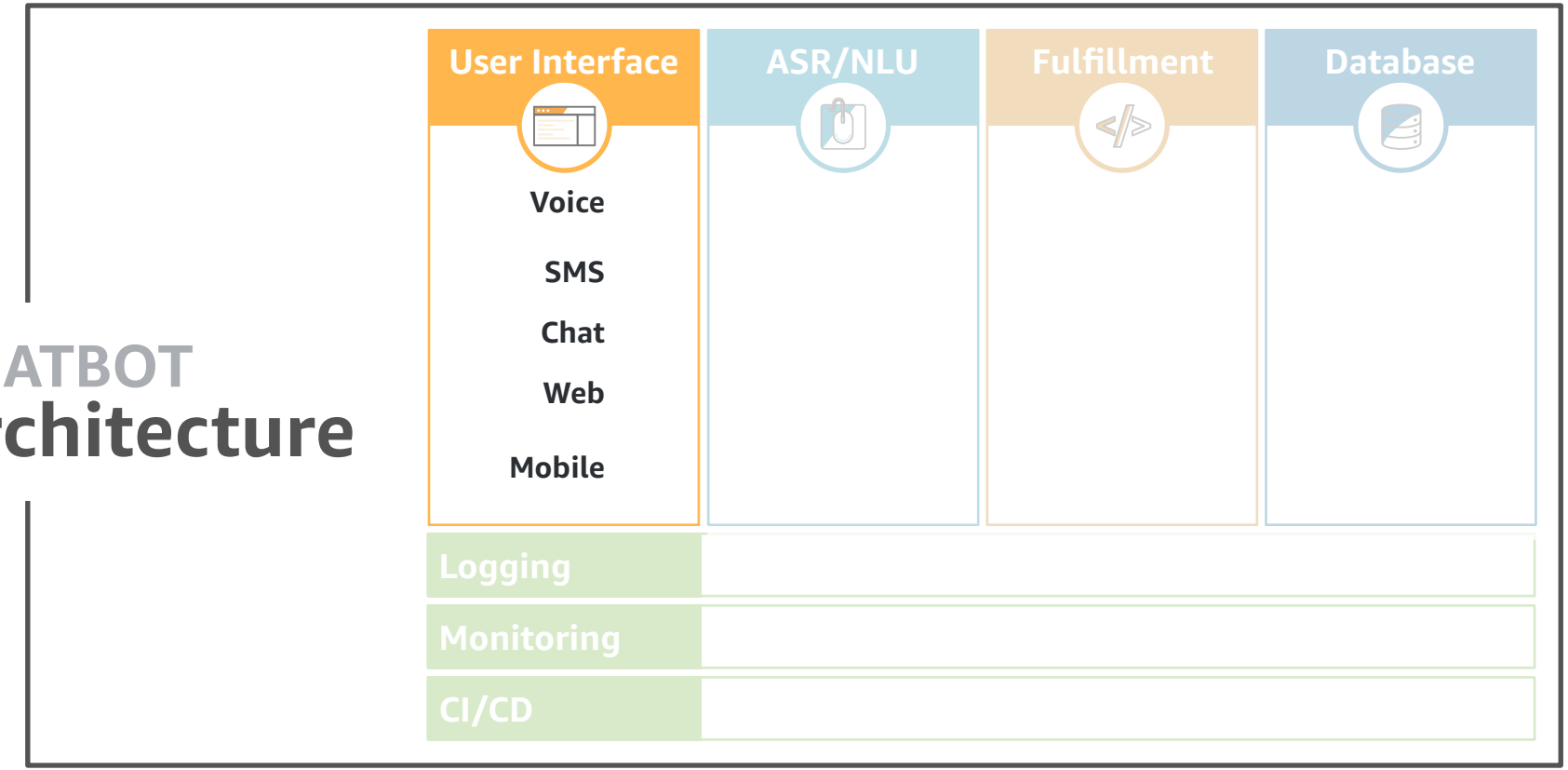
Prompts
Questions that ask the user to input data

Fulfillment
The business logic required to fulfill the user's intent

CHATBOT
Architecture



CHATBOT
Architecture



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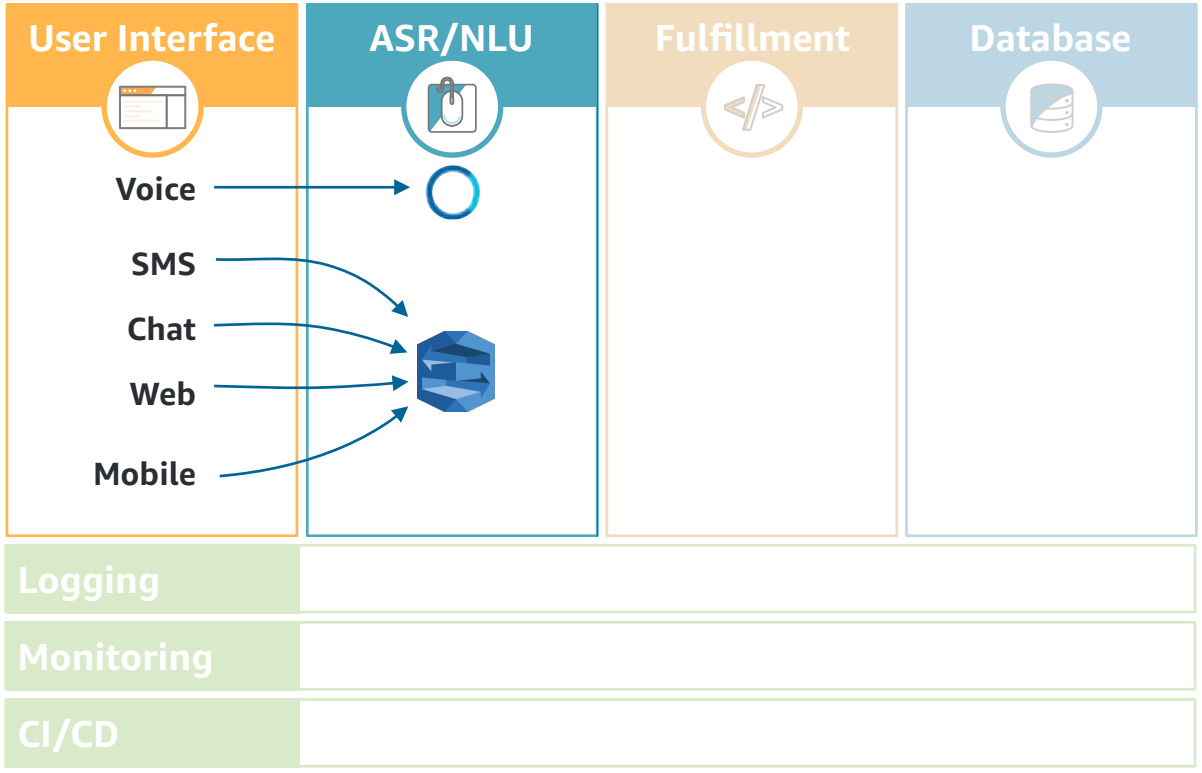
Architecture



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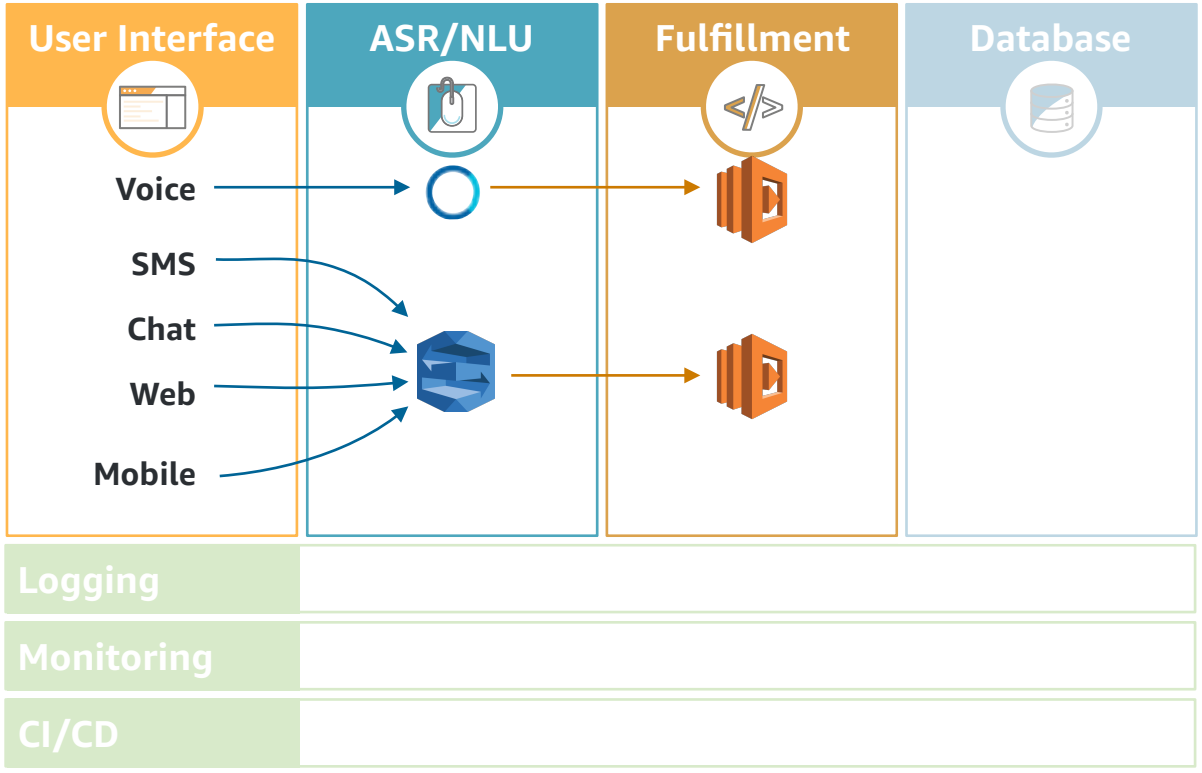

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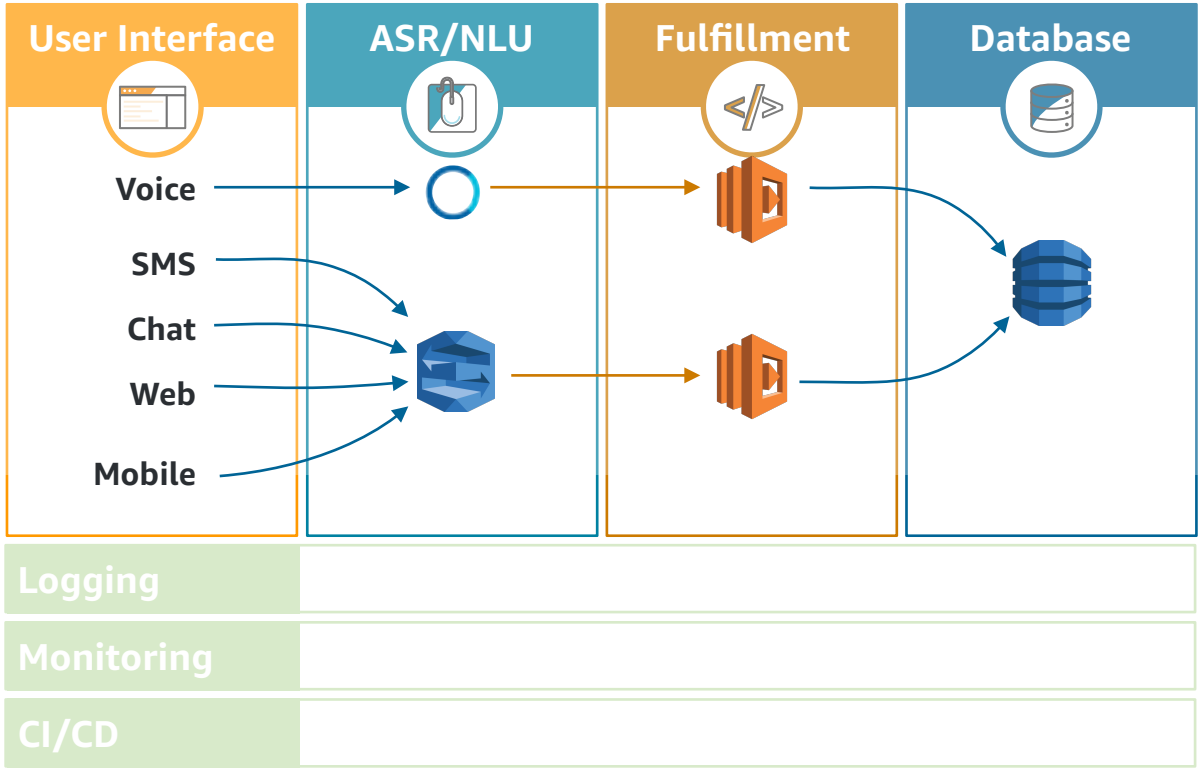

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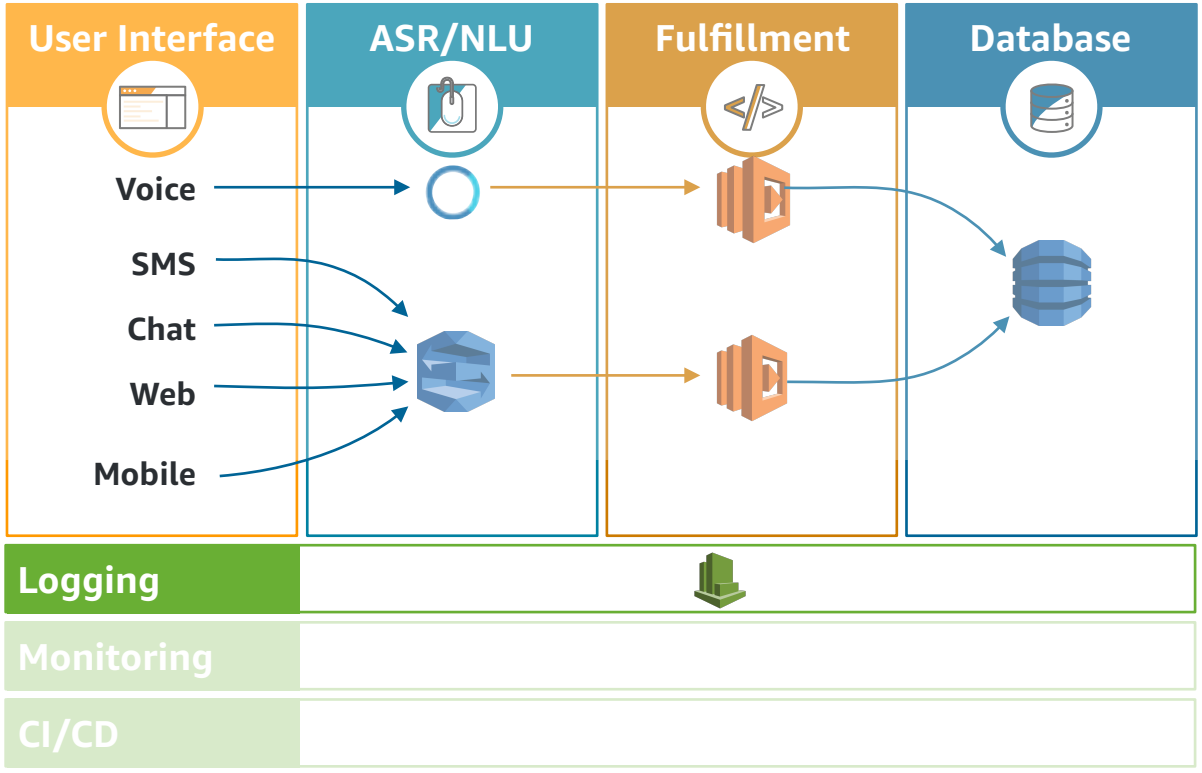
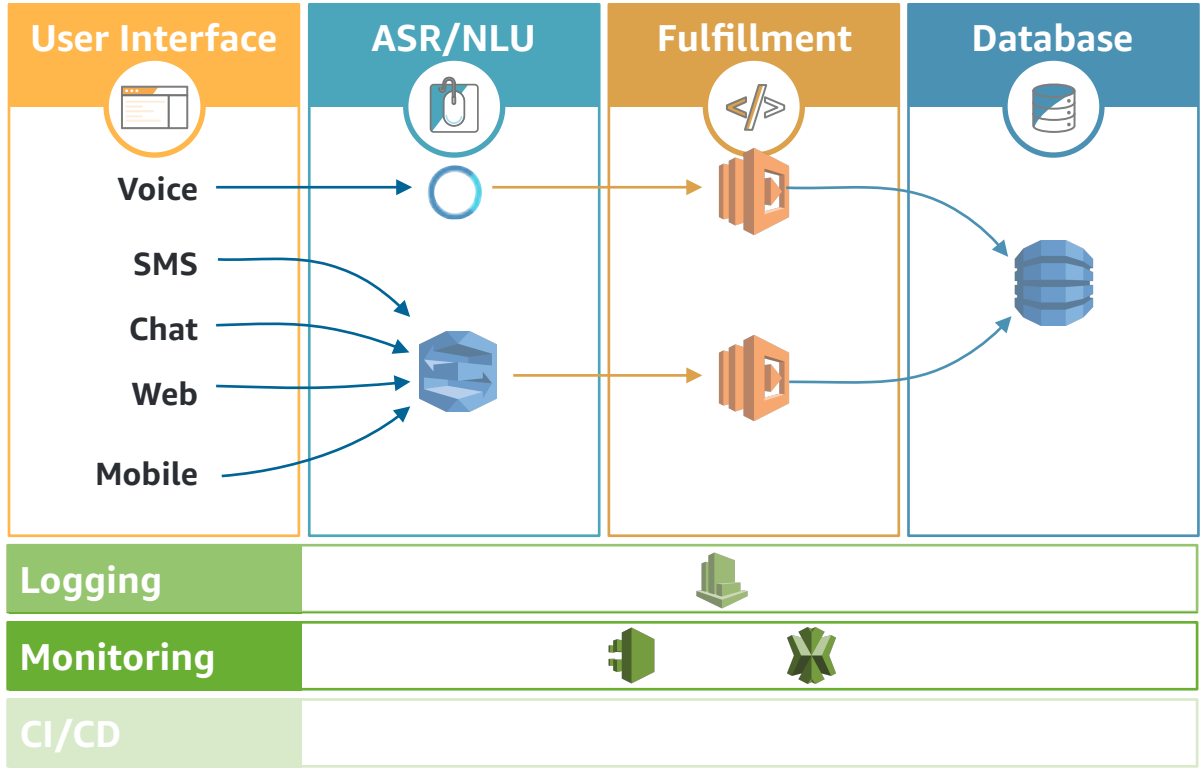


CHATBOT
Architecture



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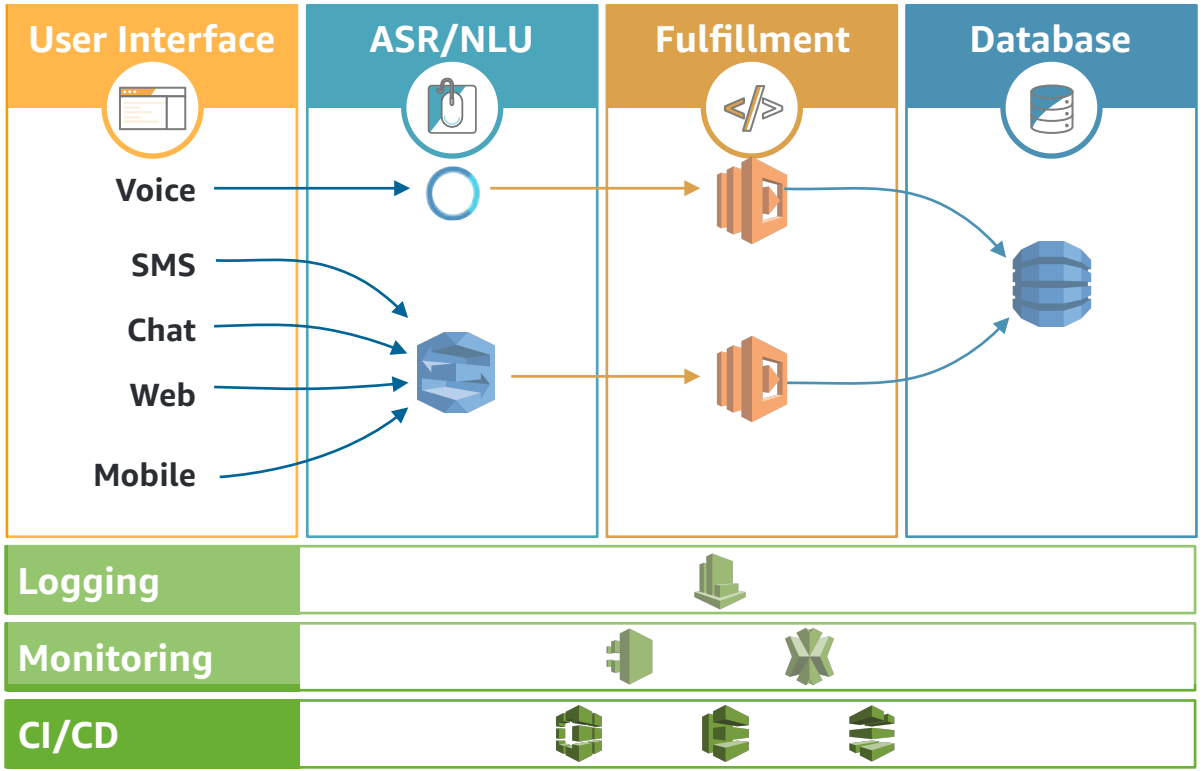


BYOC

Build Your Own Chatbot

Build a Amazon Lex bot

Voice User Interface (VUI)

Define intent, utterances, slot types, slots, prompts

Write Lambda function for business logic (intent → database)

Prepare database, setup indexes

Integrate with Twilio/SMS, Slack, Facebook, Web, mobile

Build an Alexa skill

(optional)

Export Lex bot configuration

Write Lambda function for business logic (intent → database)

Amazon DynamoDB

Fast, fully-managed NoSQL database service

Both key/value and document

Capable of handling any amount of data

Durable and highly available

All SSD storage

Simple and cost effective

FREE Tier: 200 million requests/month
25GB indexed data storage

JSON Document

```
{
  "dead": true,
  "force-sensitive": true,
  "force-side": "light",
  "id": 1,
  "lightsaber": "green",
  "planet": "Dagobah",
  "quotes": [
    "When nine hundred years old you reach, look as good you will not.",
    "Truly wonderful, the mind of a child is",
    "A Jedi uses the Force for knowledge and defense, never for attack",
    "That is why you fail.",
    "Adventure. Excitement. A Jedi craves not these things.",
    "Judge me by my size, do you?",
    "Fear is the path to the dark side",
    "Wars not make one great",
    "Do, or do not. There is no try",
    "Size matters not",
    "The dark side clouds everything",
    "Impossible to see the future is",
    "Clear your mind must be",
    "Much to learn you still have ... my old padawan"
  ],
  "weapon": "lightsaber",
  "whoami": "yoda"
}
```

Amazon Lex

Service for building conversational interfaces using voice and text

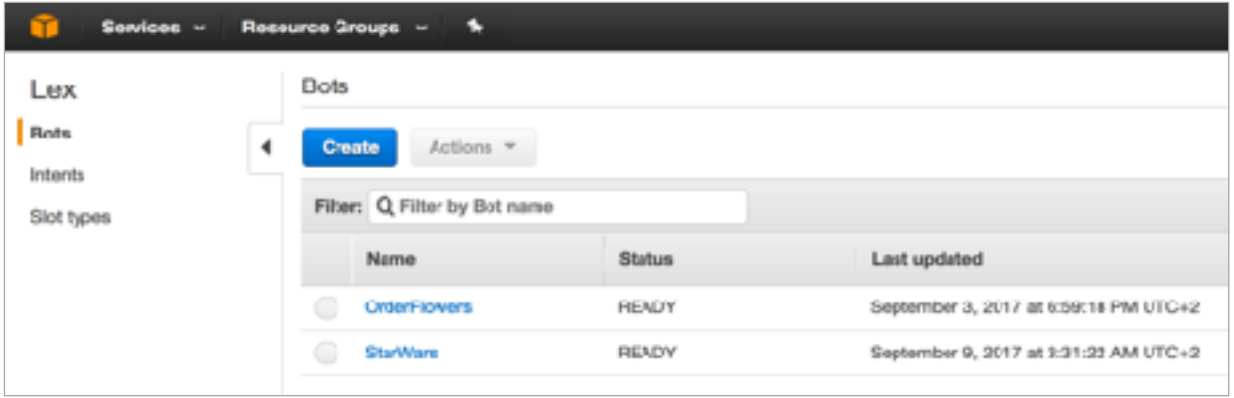
Provides

Automatic Speech Recognition (ASR): speech → text
Natural Language Understanding (NLU): text →intent

Powered by the same deep learning technologies as Alexa

http://aws.amazon.com/lex

Build a Amazon Lex Bot



Amazon Lex and Twilio

SMS INTEGRATION

Twilio: Build software that communicates with everyone in the world

Create a Twilio SMS endpoint

Specify Twilio credentials in Amazon Lex bot

Create a Twilio SMS endpoint (phone #)

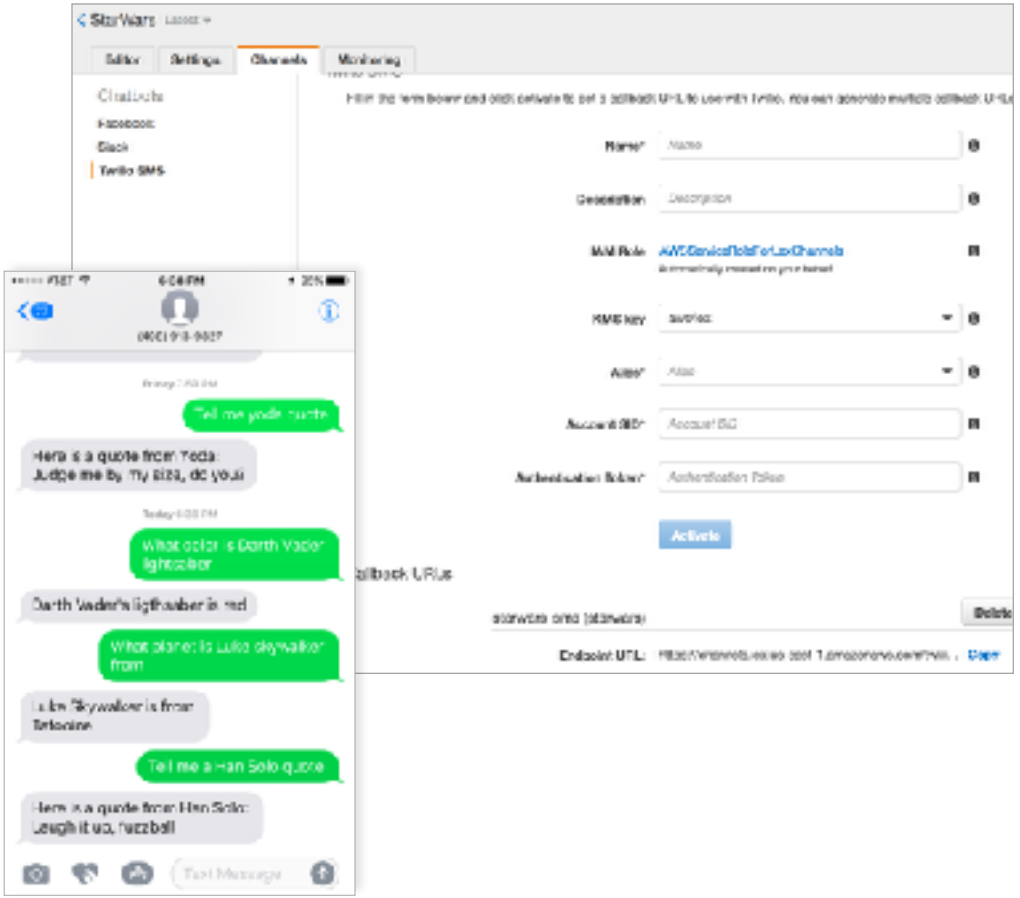
Set Callback URL in Messaging of Twilio SMS endpoint

When message comes in

https://docs.aws.amazon.com/lex/latest/dg/twilio-bot-association.html

Amazon Lex and Twilio

SMS INTEGRATION



Amazon Lex and Slack

INTEGRATION

Create a Slack application: api.slack.com

Add a Bot to the application

Always online

Enable interactive messages

Specify Slack credentials in Amazon Lex bot

Specify URLs in Slack application

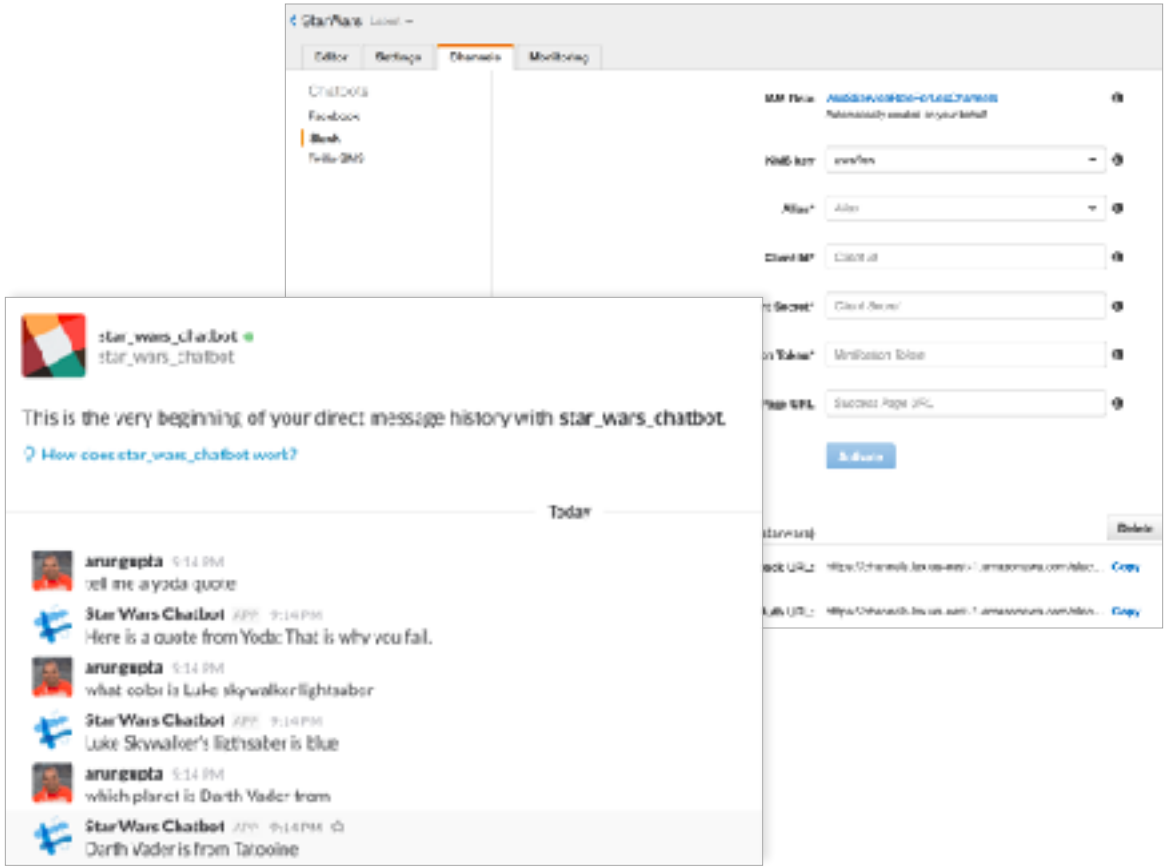
Postback: Amazon Lex bot's endpoint for Slack events

OAuth: Lex bot's handshake with Slack

https://docs.aws.amazon.com/lex/latest/dg/slack-bot-association.html

Amazon Lex and Slack

INTEGRATION



Amazon Lex and Facebook

INTEGRATION

Create a Facebook application

Specify application credentials in Amazon Lex bot

Gives Callback URL

Setup webhooks for Facebook application

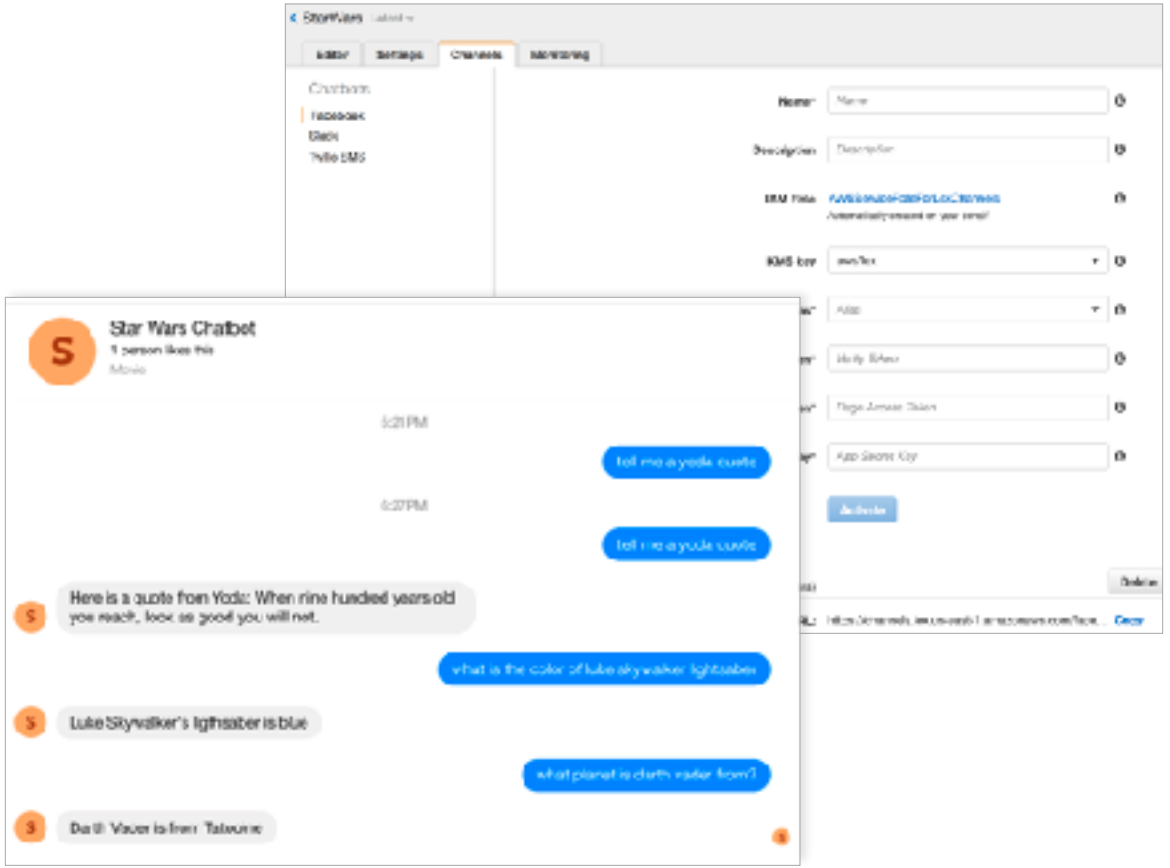
Specify Callback URL and enable subscription

Optionally, publish the application (for public consumption)

http://docs.aws.amazon.com/lex/latest/dg/fb-bot-association.html

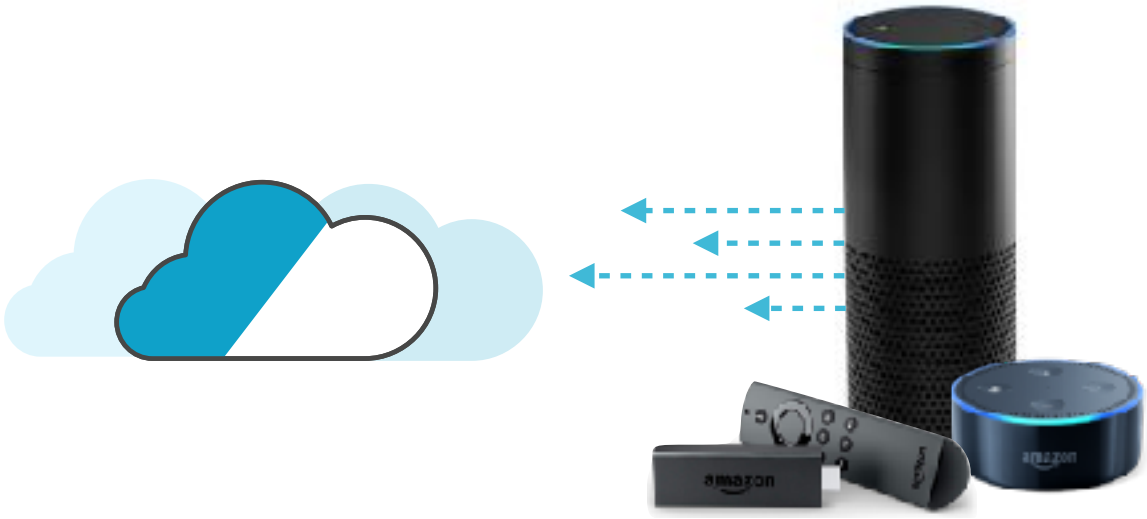
Amazon Lex and Facebook

INTEGRATION



amazon alexa

What is Alexa

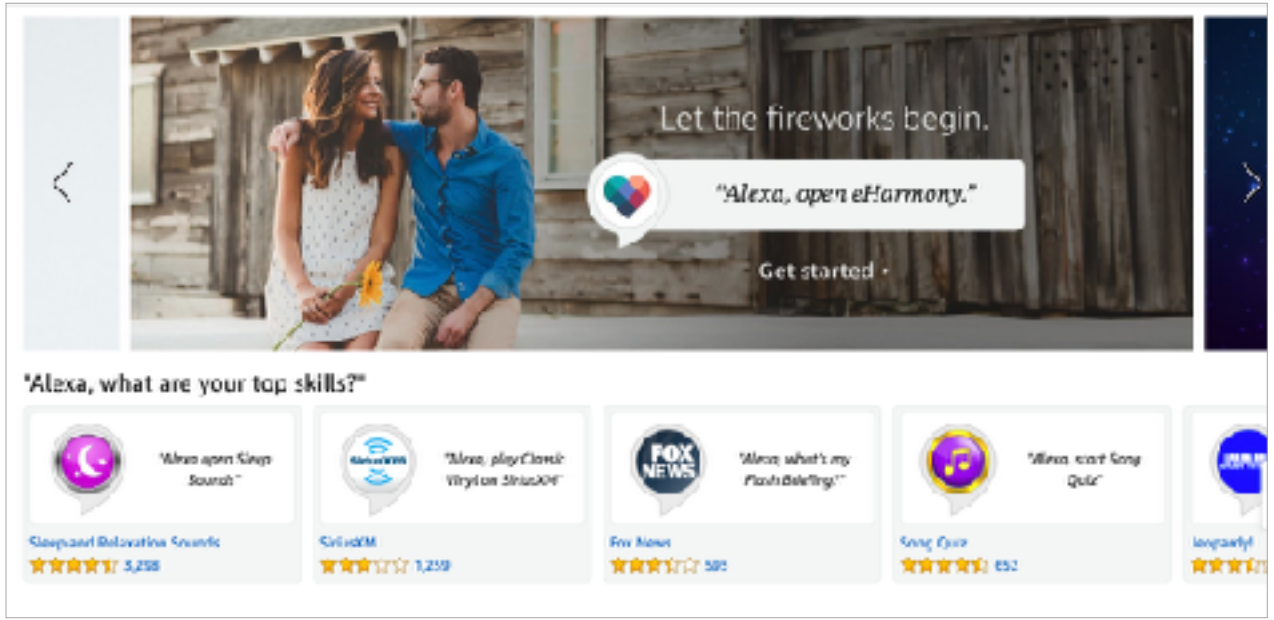


Alexa is a **cloud-based service** that can answer questions, play music, read the news and more

Echo is an **always-on always-connected hands-free device** that connects to Alexa

Alexa Has Skills

amazon.com/skills



Customer

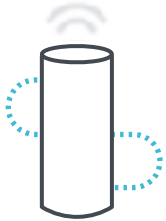
Alexa

Your Alexa Skill

1. Customer asks a question or gives a command

2. Alexa identifies your skill's name, analyzes and understands the customer's request, then sends your service a structured representation of the user's request

3. Your service processes the request and returns a text and graphical response



4a. Alexa converts the returned text to speech and streams it to the device

5a. Customer hears the response from Alexa's voice

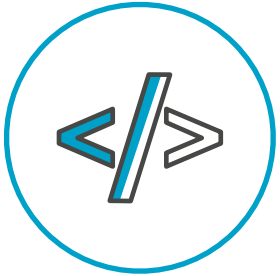
4b. Your graphical representation (if any) is rendered in the companion app

5b. Customer sees a graphical representation in the companion app

Two Sides of an Alexa Skill

Voice User Interface

+



Programming Logic

Two Sides of an Alexa Skill

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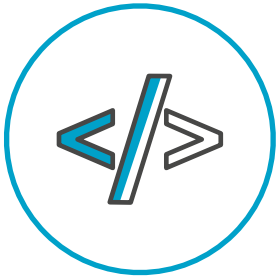


Voice User Interface

developer.amazon.com

Programming Logic

aws.amazon.com

Build an Alexa Skill

Design a **Voice User Interface**

Setup the Skill in the Developer Portal

Can be done using ASK CLI or REST API

Use the Voice Design to **Build Your Interaction Model**

Intents, sample utterances, and the dialog model

Write and Test the Code for your Skill

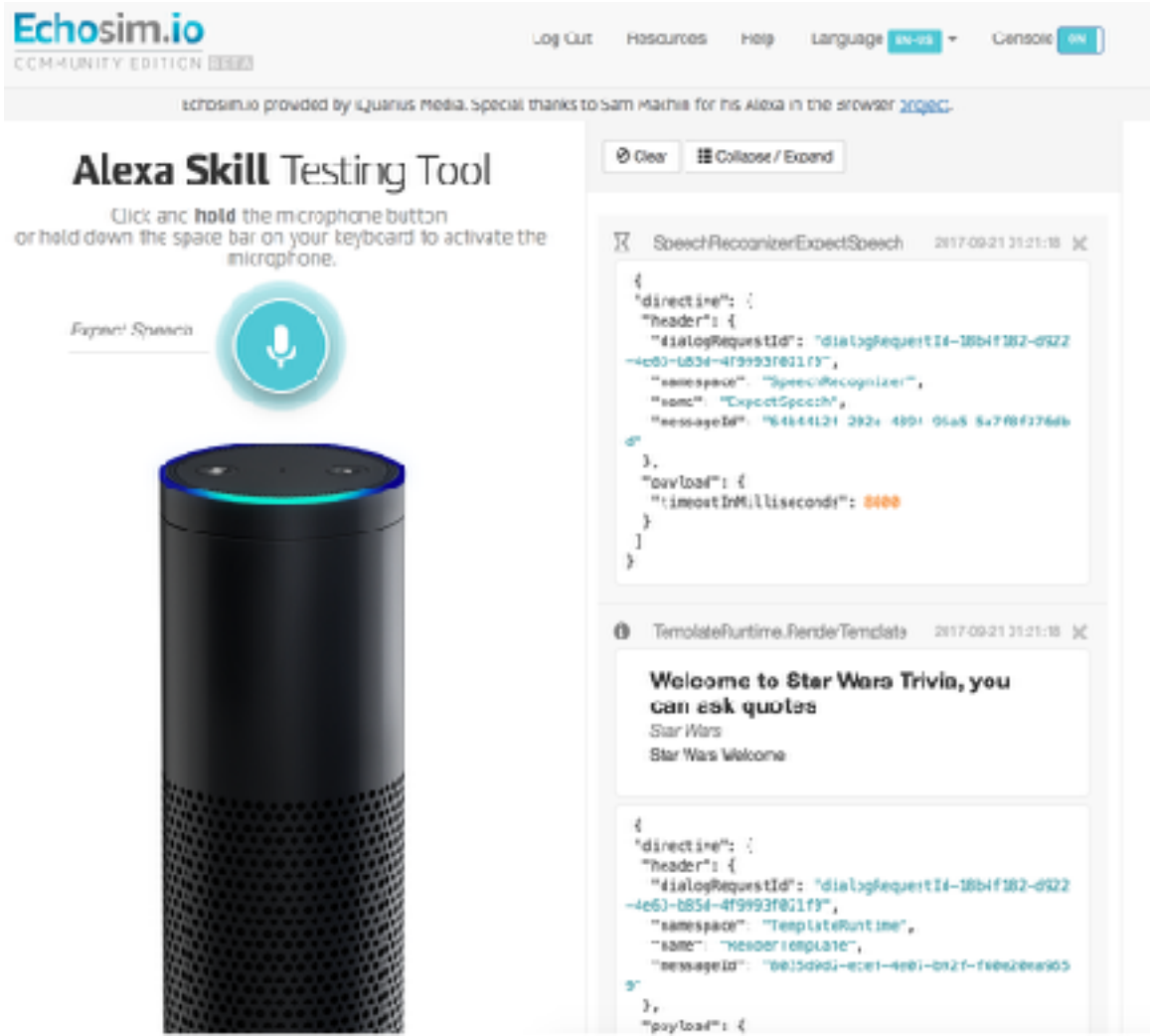
AWS Lambda of web service on any cloud provider

Beta Test your Skill

Submit your Skill for **Certification**

Alexa Skills Kit

```
<dependency>
    <groupId>com.amazon.alexa</groupId>
    <artifactId>alexa-skills-kit</artifactId>
    <version>1.4.0</version>
    <scope>compile</scope>
</dependency>
```



echosim.io

Alexa is now in the Amazon app

amazon alexa

LOGGING

Amazon CloudWatch

Monitoring service for AWS cloud resources and applications

Visibility into resource utilization and operational performance with metrics and logs

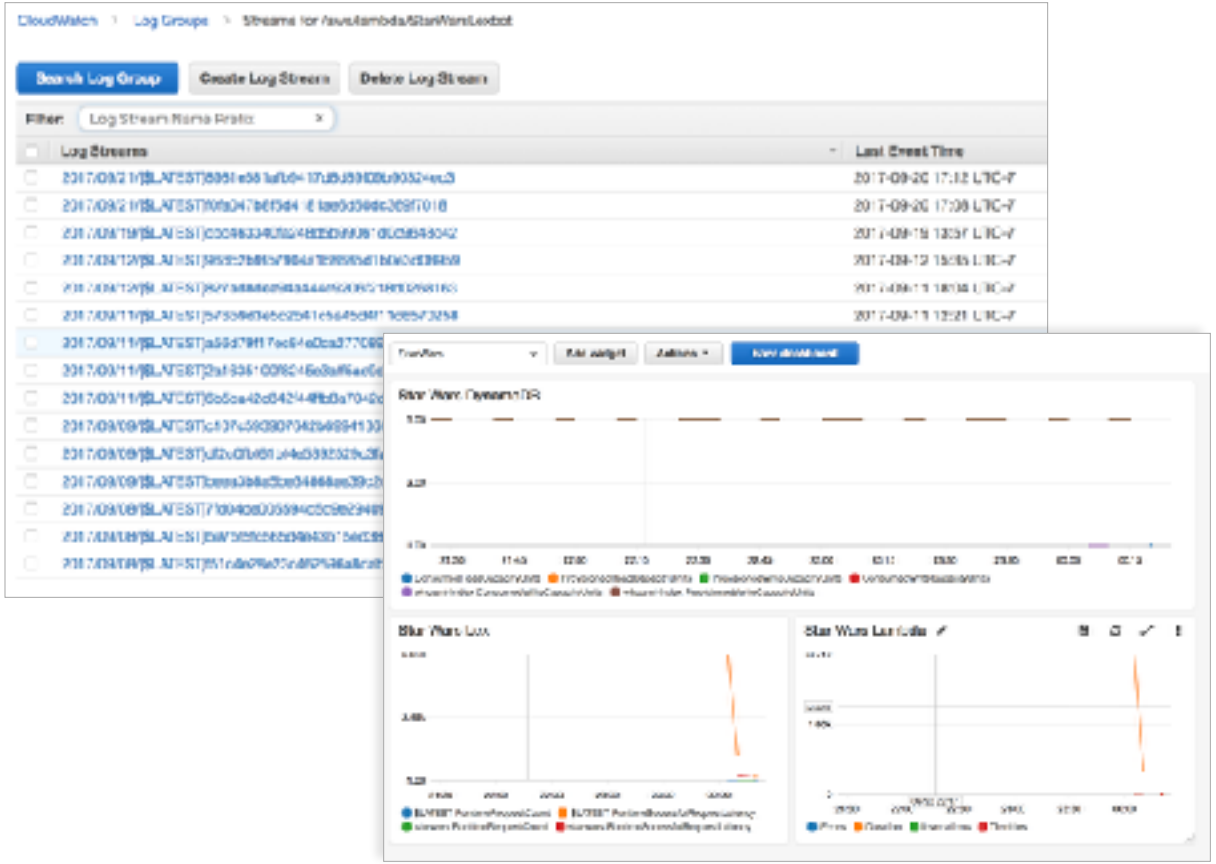
Set alarm thresholds to send notifications or trigger Auto Scaling

Log aggregation, monitoring and troubleshooting with CloudWatch Logs

Support for custom metrics

LOGGING

Amazon CloudWatch



Maven Plugin

```
<groupId>com.github.seanroy</groupId>
<artifactId>lambda-maven-plugin</artifactId>
<version>2.2.3</version>
```

References

Amazon Lex
aws.amazon.com/lex

Developer Portal
developer.amazon.com

Slides & code
github.com/arun-gupta/chatbot