AWS re:Invent

ALX318

DevOps your Alexa skill: Why testing and automation matter

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AWS re:Invent

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aws

"Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning."

Albert Einstein

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Agenda

Why testing and automation matter

Types of tests for Alexa skills

Cloud-native tooling for building, testing, and deployment



Why should you test your Alexa skill?

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"It is not allowing me to sign in or create another account."

"At first it worked great. i enjoyed it. now the screen has gone black and the pictures are gone. very sad."

Add new stories plz!

The skill doesn't work with Canadian zip codes.

This game only allows me to answer the first question and then it doesn't understand or accept my 2nd answer.

"This skill is terrible, it even goes on endless loops with 'what do u want?' regardless of what you ask."

"It randomly forgets my address."

"Notification does not work."

"Fix the volume."

I got answer right but it said i was wrong.

Where can friction come from?

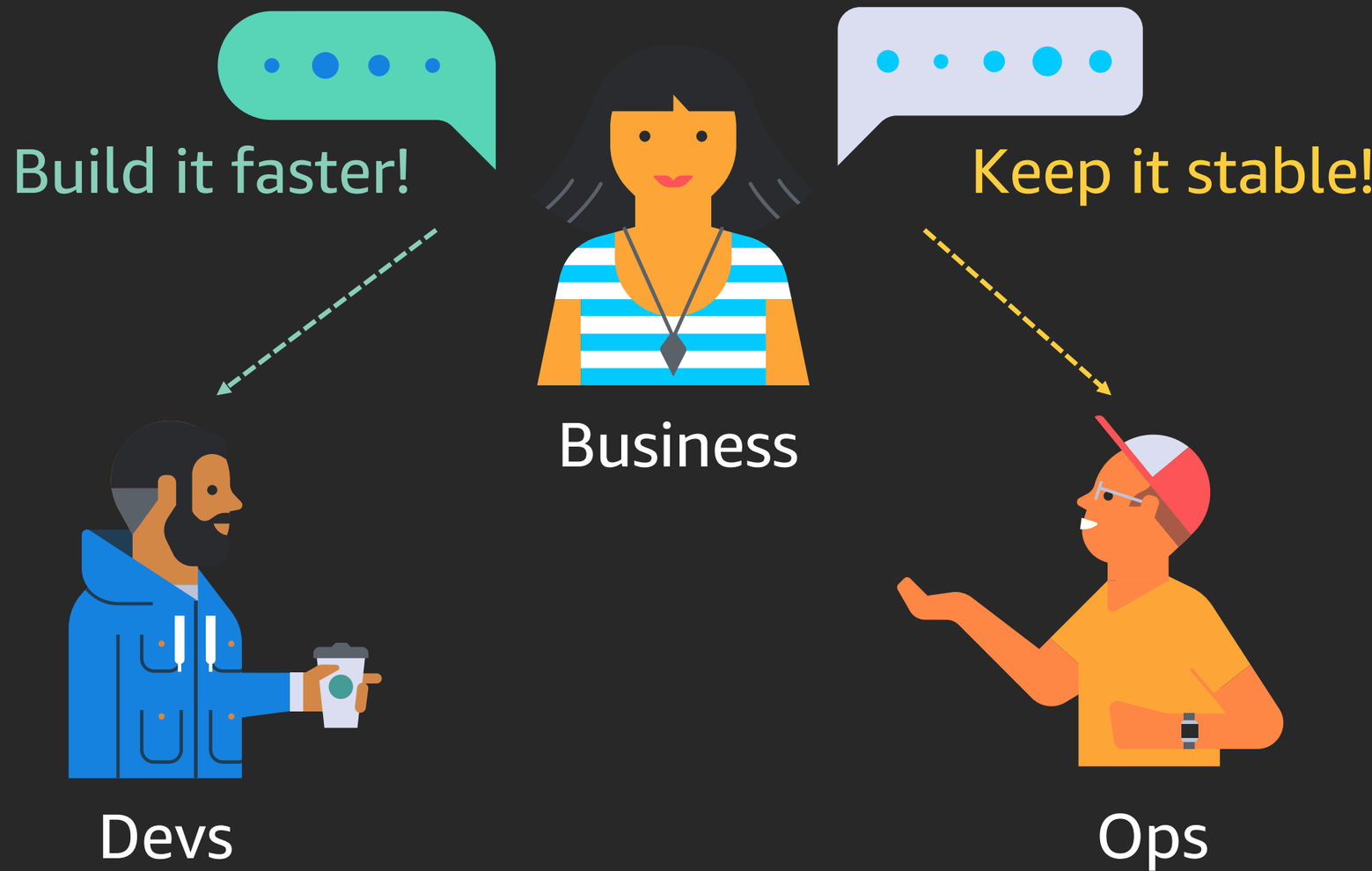
- Syntactic errors
- Out-of-sync language models
- Dialog NLU errors
- Error handling
- External API connectivity issues
- Confusing prompts or responses
- Overly verbose prompts or responses



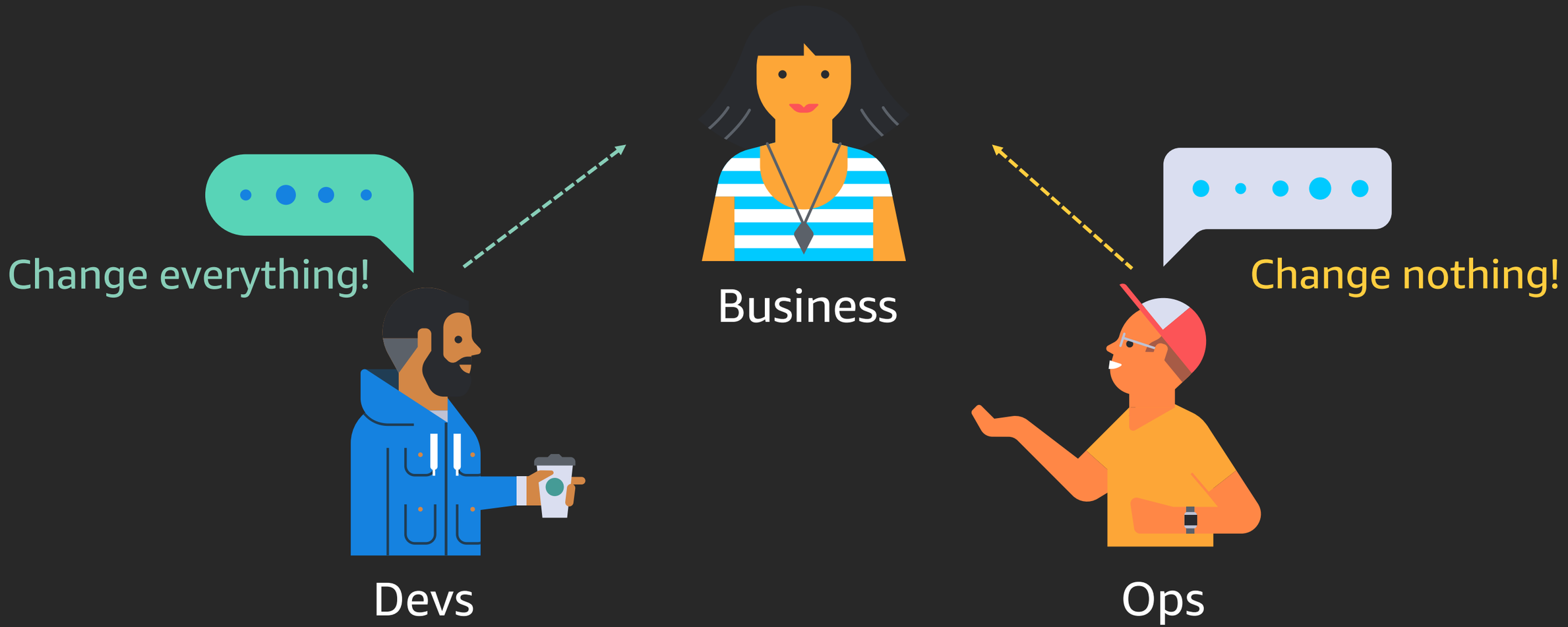




Innovation vs. stability



Innovation vs. stability



DevOps practices

- Infrastructure as code (IaC)
- Application and infrastructure version management
- CI/CD – Continuous integration/continuous deployment
- Build, test, release automation
- Observability – Monitoring and logging

Aspects of testing and automation



Manual testing
Ensures basics of the skill are working



Unit testing
Ensures code works correctly

Continuous integration



End-to-end testing
Ensures entire skill works correctly

Continuous delivery



Continuous testing
Ensures skill behaves as expected 24/7

Monitoring

Testing

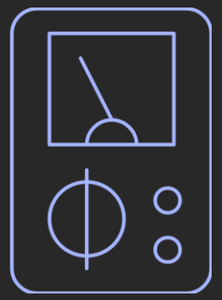
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Tools to create and manage skills

I’m building my first skill

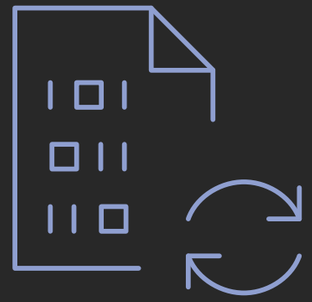


Alexa developer console



Alexa test simulator

I’m an experienced developer

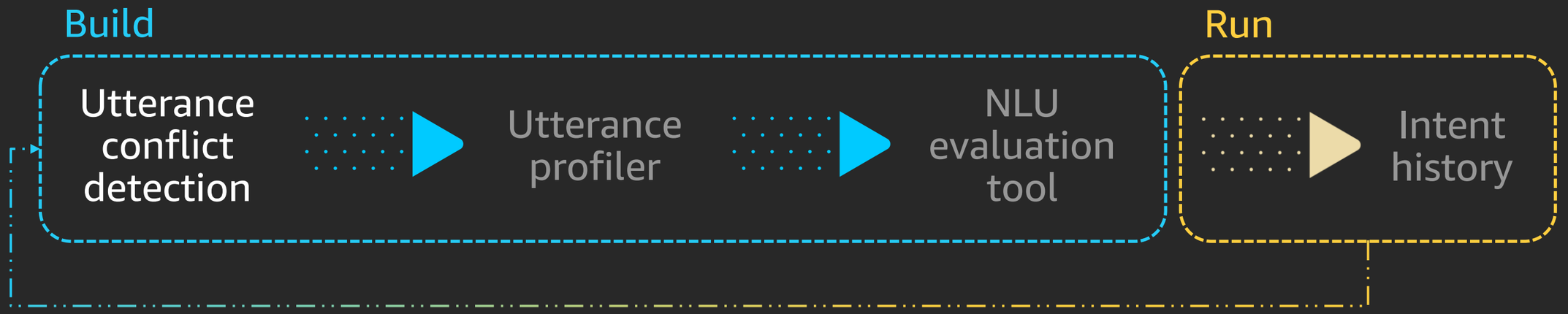


Alexa Skills Kit Command Line Interface (ASK CLI)



Alexa Skills Kit Skill Management API (ASK SMAPI)

Evaluate and test your interaction model




```
ask api get-conflicts –s <skill-id> -l <locale>
```

- Identify duplicate utterances and slots
- Triggered after a model full build
- Asynchronous job

Evaluate and test your interaction model




```
ask api nlu-profile --utterance "hello there" -s <skill-id> -l <locale>
```

- Test utterances resolution
- Multi-turn support
- No code needed

Evaluate and test your interaction model




```
ask api evaluate-nlu -a <annotation-id> -s <skill-id> -l <locale>
```

- Evaluate NLU accuracy (regression tests)
- Based on a predefined mapping of utterances vs. intents
- Asynchronous job

Evaluate and test your interaction model




```
ask api intent-requests-history -s <skill-id>
```

- Aggregated and anonymized utterances with resolved intents
- Categorized per confidence
- Feedback loop to improve model

Demo

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Test your skill's AWS Lambda code

- Unit test Alexa request vs. your Lambda code

```
ask api invoke-skill -s <skill-id> -f <file> -e <endpoint-region>
```

- Simulate NLU and Lambda code in one turn

```
ask simulate –text "hello there" -l <locale>
```

- Simulate a multi-turn dialog (full session)

```
ask dialog -l <locale>
```

Unit testing

- During dev, quickly identify bugs
- Tests without dependencies or deployment
- Allow for code coverage and continuous integration

index.test.yaml

Bespoken

```yaml
---
configuration:
  locale: en-US

---
- test: "Sequence 01. Test scenario: launch request"
- LaunchRequest:
  - response.outputSpeech.ssml: "Here's your fact"
  - response.card.type: "Simple"
  - response.card.title: "Space Facts"
  - response.card.content: "/.*/"

---
- test: "Sequence 02. Test scenario: GetNewFactIntent"
- GetNewFactIntent:
  - response.outputSpeech.ssml: "/here's your fact.*/i"
  - response.card.type: "Simple"
  - response.card.title: "Space Facts"
  - response.card.content: "*"
```

Demo

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End-to-end testing

- Allows for speech recognition and AI testing
- Tests entire system, from frontend to external services
- Ensures properly constructed interaction models

index.test.yaml

Bespoken

```yaml
---
configuration:
  locale: en-US
  voiceId: Joey

---
- test: "Sequence 01. Test scenario: GetNewFactIntent"
- open fact skill:
- "give me a fact":
  - prompt: "/here's your fact.*/i"
  - card.type: "Simple"
  - card.title: "Space Facts"
  - card.content: "*"

---
- test: "Sequence 02. Test scenario: Help"
- open fact skill:
- help:
  - prompt: "Here's your fact"
  - response.card:  undefined
  - reprompt: "What can I help you with ? »
- stop:
  - prompt: "Goodbye!"
```

Orchestrate your CI/CD toolchain

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Continuous integration

Source



AWS CodeCommit

Build



AWS CodeBuild

Test

ASK CLI



Third-party tooling

ASK SMAPI

buildspec.yaml

```
1  version: 0.2
2
3  phases:
4    install:
5      runtime-versions:
6        nodejs: 10
7    build:
8      commands:
9        - pip install --upgrade awscli
10       - npm install --prefix lambda/custom/
11       # Run test using a Unit Test Framework (Mocha, Chai, Jest, ...)
12       - npm test
13       # OR Run Bespoken Unit Tests
14       - npm install bespoken-tools -g
15       - bst test
16       - aws cloudformation package --template template.yml --s3-
17 bucket $S3_BUCKET --output-template template-export.yml
18
19 artifacts:
20   type: zip
21   files:
22     - template-export.yml
23     - template-configuration.json
```

Continuous delivery

Provision



AWS CloudFormation

Skill deploy

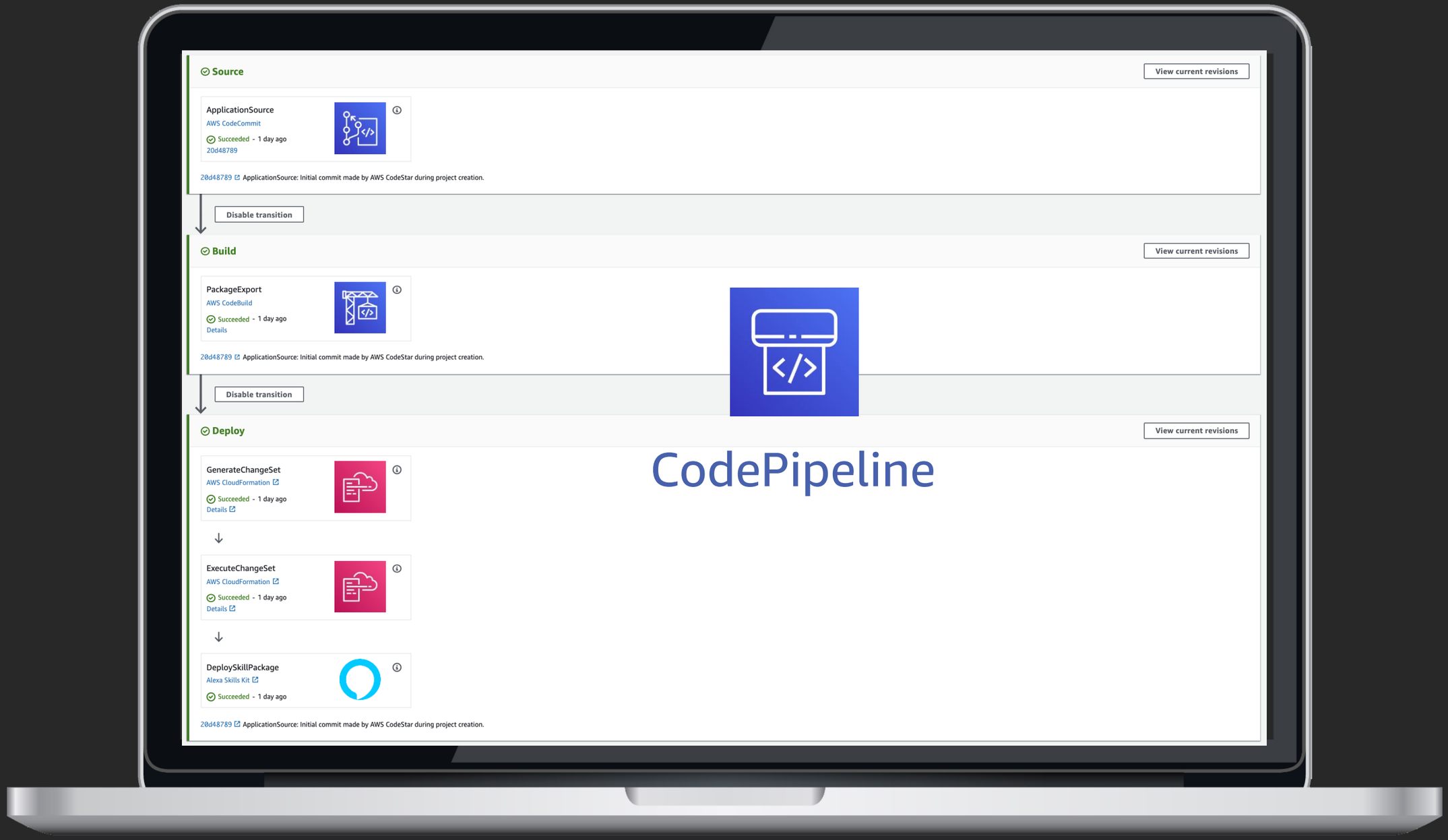


AWS CodePipeline

template.yaml

```yaml
AWSTemplateFormatVersion: 2010-09-09
Transform:
- AWS::Serverless-2016-10-31
Resources:
  CustomDefaultFunction:
    Type: AWS::Serverless::Function
    Properties:
      CodeUri: s3://testBucket/mySourceCode.zip
      Handler: index.handler
      Runtime: nodejs10.x
      Role: !GetAtt LambdaExecutionRole.Arn
      Events:
        AlexaSkillEvent:
          Type: AlexaSkill
      AutoPublishAlias: live
      DeploymentPreference:
        Type: Canary10Percent5Minutes
        Alarms: # A list of alarms that you want to monitor
          - !Ref AliasErrorMetricGreaterThanZeroAlarm
          - !Ref LatestVersionErrorMetricGreaterThanZeroAlarm
        Hooks: # Validation Lambdas before & after traffic shifting
          PreTraffic: !Ref PreTrafficLambdaFunction
          PostTraffic: !Ref PostTrafficLambdaFunction
```

Automate the workflow



Infrastructure as code

- Provision all skill artifacts in one CloudFormation stack
- Allows orderly and predictable provisioning, decommissioning, and updating of resources
- Based on Skill Package API

Skill manifest
Skill models
Assets
In-skill products

template.yaml

```yaml
AWSTemplateFormatVersion: 2010-09-09

Resources:
  AlexaSkill:
    Type: Alexa::ASK::Skill
    Properties:
      VendorId: "1234"
      AuthenticationConfiguration:
        ClientId: amzn1.application-oa2-client.1234
        ClientSecret: 1234
        RefreshToken: Atzr|1234
      SkillPackage:
        Overrides:
          Manifest:
            apis:
              custom:
                endpoint:
                  uri: !GetAtt LambdaSkillFunction.Arn
        S3Bucket: my-skill-package-bucket
        S3Key: skill_package.zip
        S3BucketRole: !GetAtt AlexaS3ReadRole.Arn
  LambdaSkillFunction:
    Type: AWS::Serverless::Function
```

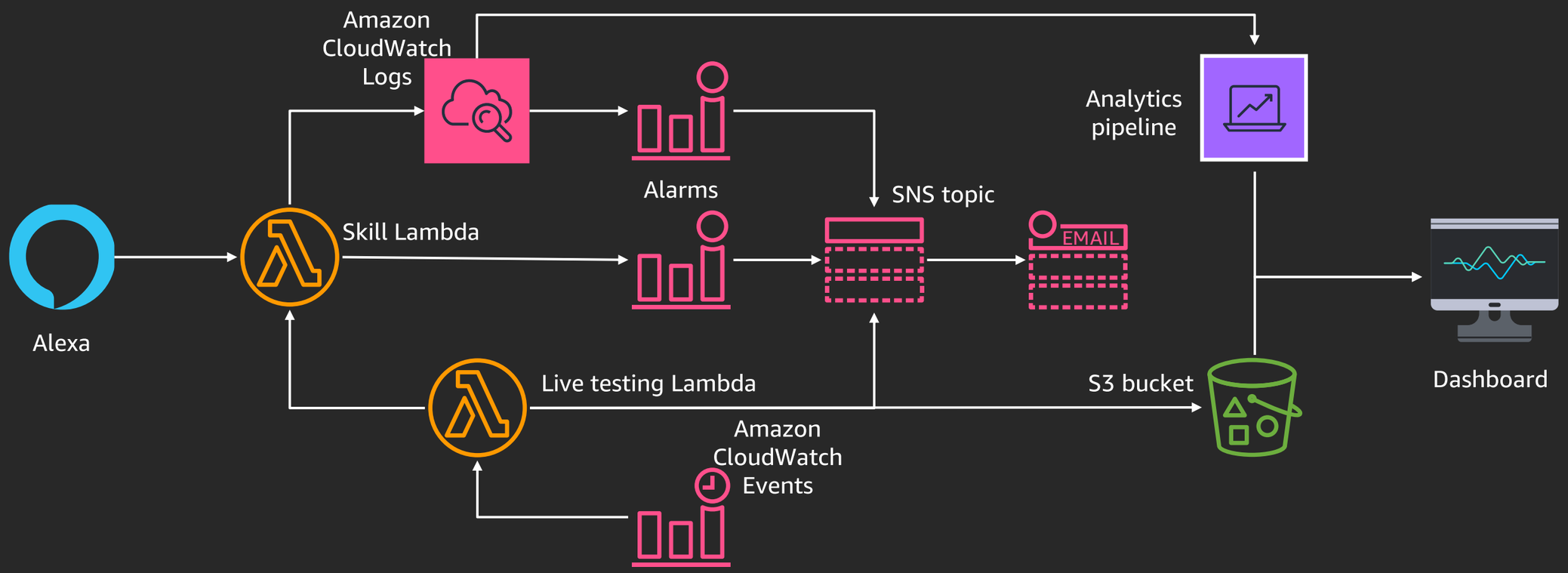
Continuous testing

Monitor



Amazon CloudWatch

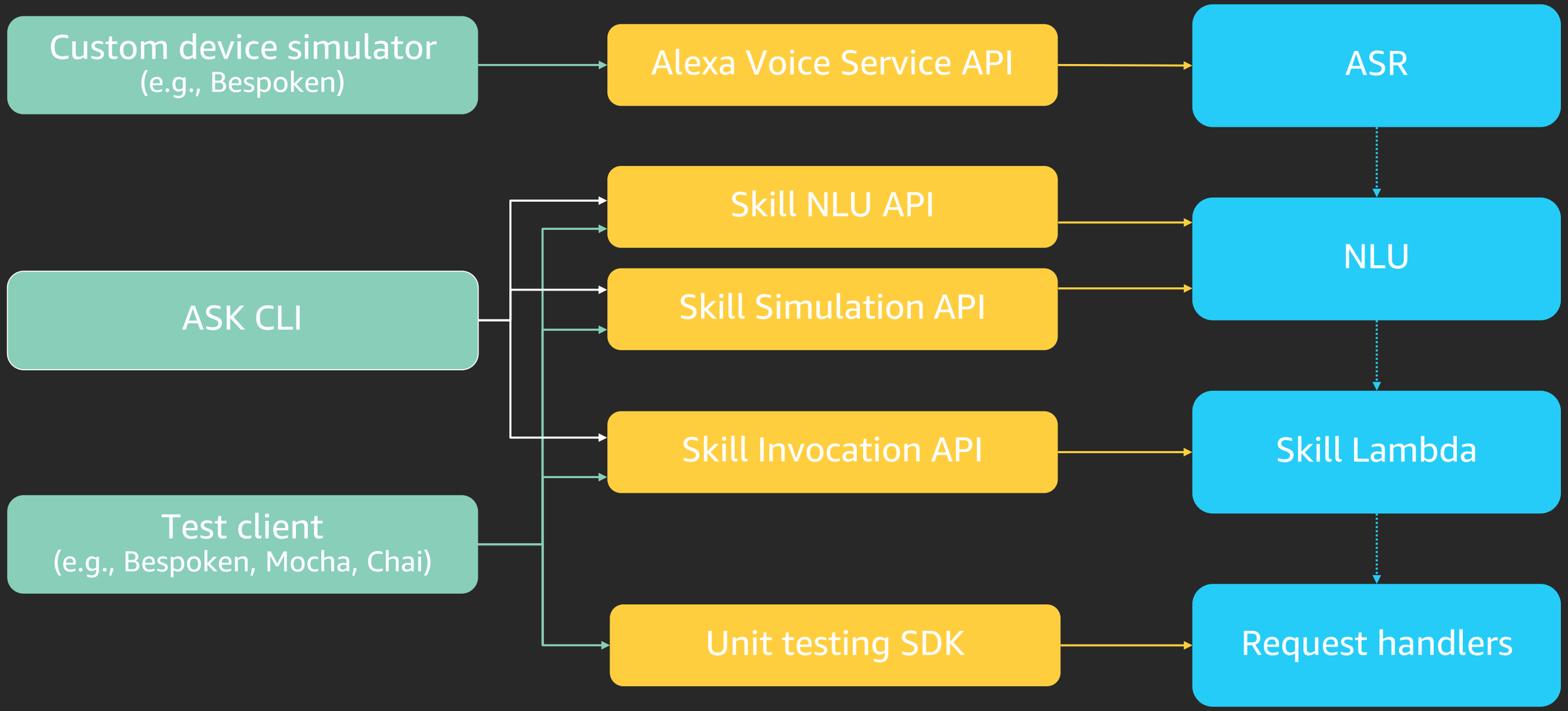
- Monitor your skill on a regular basis once live
- Get alerts whenever there are issues
- Have confidence that everything is working correctly



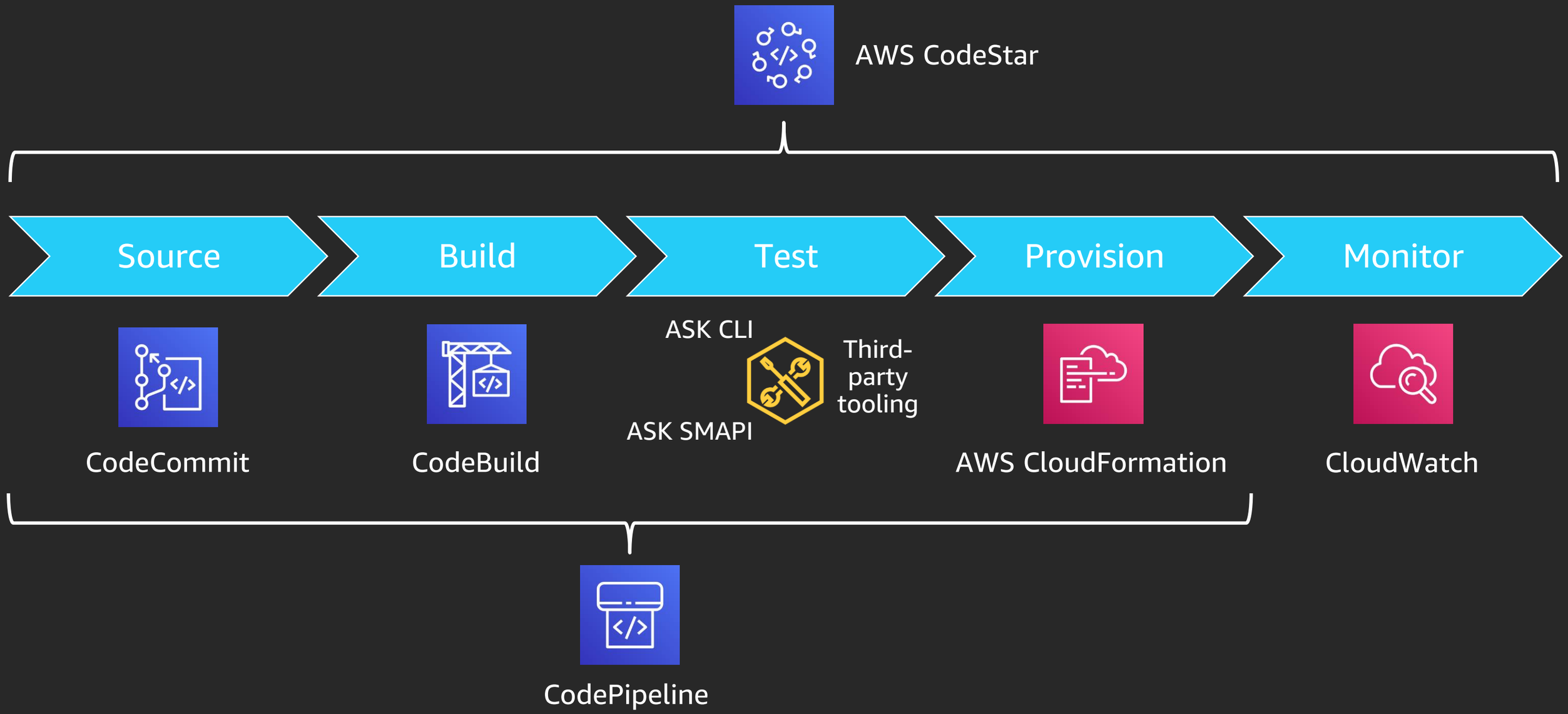
Wrap-up

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Automated testing



Deployment


AWS CodeStar
Source
Build
Test
Provision
Monitor
ASK CLI
Third-party tooling
ASK SMAPI
CodeCommit
CodeBuild
AWS CloudFormation
CloudWatch
CodePipeline

“Dance like nobody’s watching.
Test and automate like everyone
is.”

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Next steps

Go test!

- Install VS Code
- Install ASK CLI
  - alexa.design/cli
  - alexa.design/smapi
- Install Bespoken tools
  - read.bespoken.io

Go DevOps!

- Create your first Alexa skill CI/CD pipeline using AWS CodeStar
  - aws.amazon.com/codestar
  - github.com/awslabs/serverless-application-model
- Try AWS Cloud Development Kit (AWS CDK)

  github.com/aws/aws-cdk

Related sessions

ALX201 – How developers can build natural, extensible voice conversations

ALX202 – Alexa, what can I do now?

ALX302 – Build an engaging Alexa skill with Cake Walk

ALX313 – Developer tools for Alexa

ALX401 – Learn how to handle data in your Alexa skills

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Thank you!

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