
AWS
re:Invent

DOP404

Turbocharge the AWS CDK with AWS Solutions Constructs

Ryan Hayes

Solutions Developer

AWS

AWS re:Invent

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Real-world example

A power utility wants to aggregate real-time usage metrics to better serve its customers.

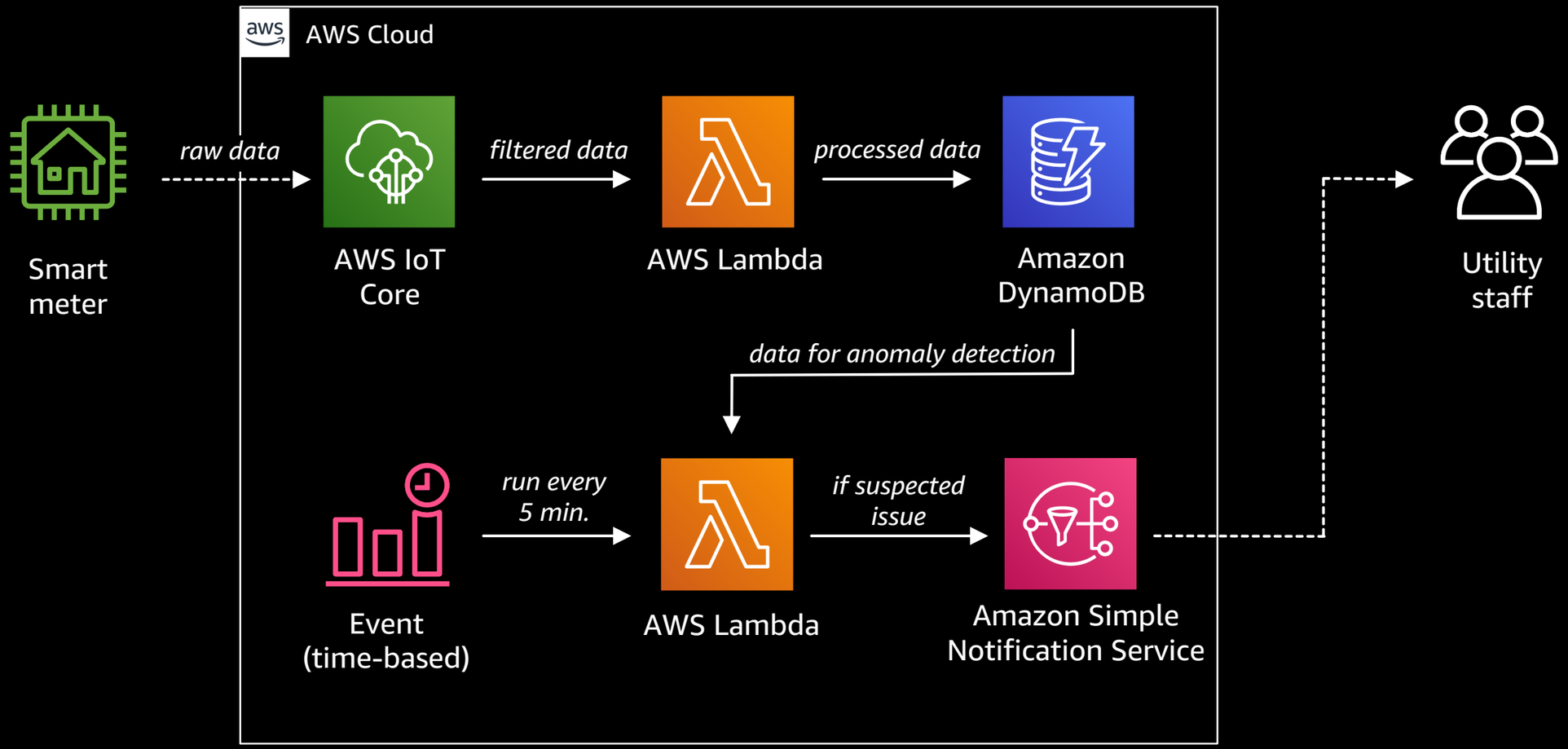
Goals

- Better planning for capacity and demand
- Proactive problem detection and early response



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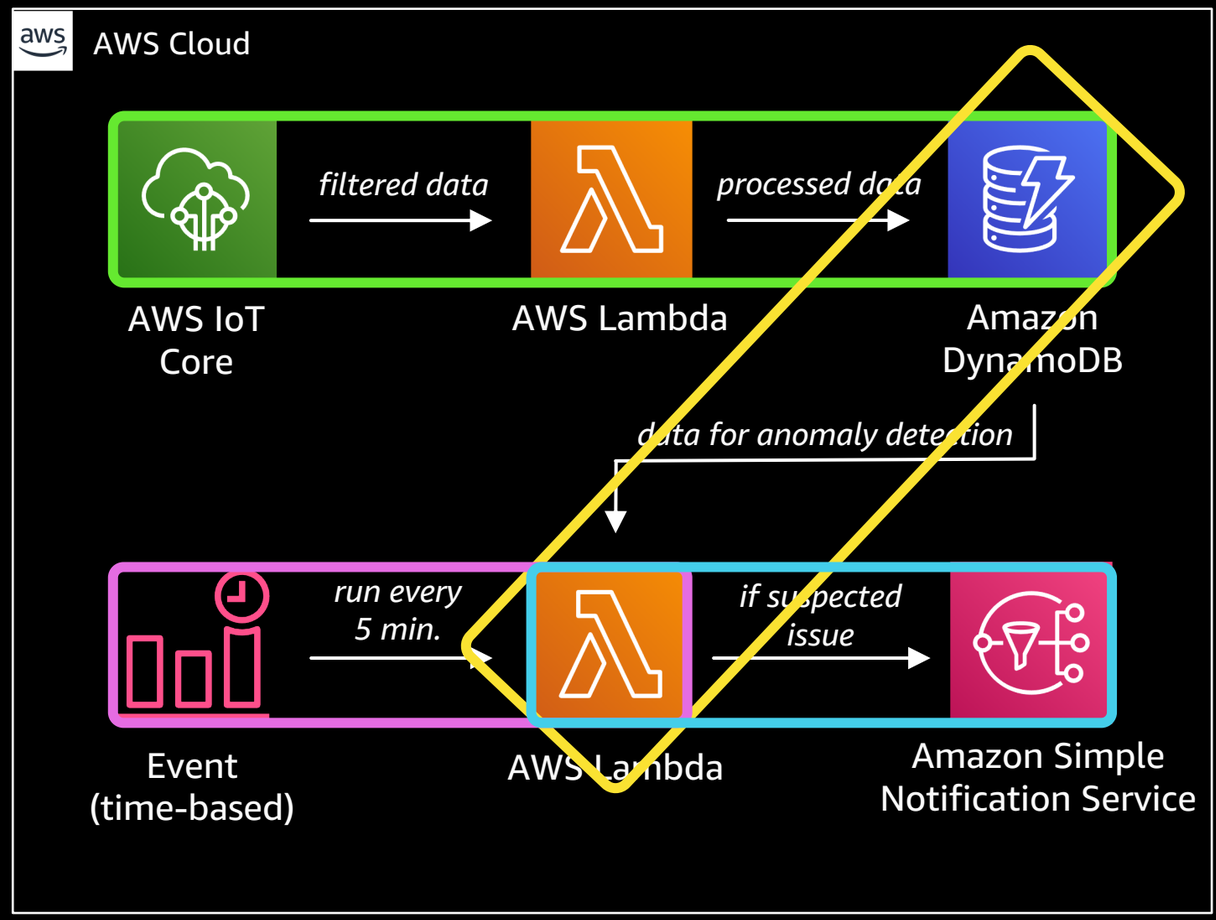
Real-world example



Real-world example with Solutions Constructs

Solutions Constructs library

- aws-sns-lambda
- aws-lambda-sagemaker
- aws-sqs-lambda
- aws-iot-lambda-dynamodb
- aws-apigateway-sqs
- aws-lambda-s3
- aws-lambda-dynamodb
- aws-sns-sqs
- aws-events-rule-sns
- aws-events-rule-lambda
- aws-cloudfront-s3
- aws-s3-lambda
- aws-lambda-sns
- *and many more!*



AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

dop404-reinvent-demo
architecture.png
README.md

Welcome

Developer Tools

AWS Cloud9

Welcome to your development environmer

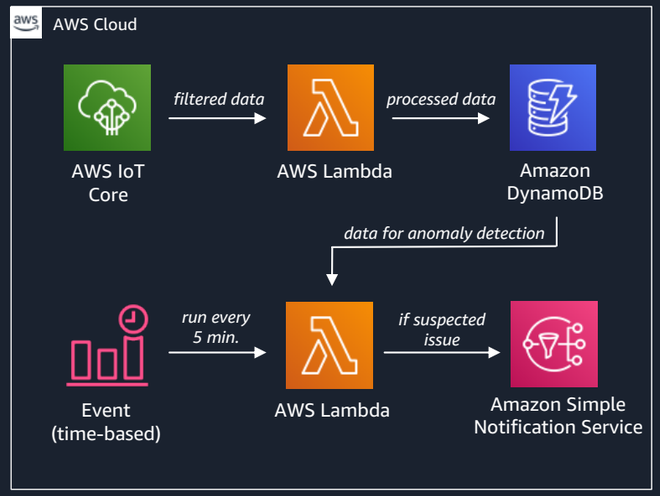
AWS Cloud9 allows you to write, run, and debug your code with just a browser. You can tour the IDE, write code for AWS Lambda and Amazon API Gateway, share your IDE with others in real time, and much more.

Getting started

Create File

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31

Immediate (Java

```
Admin:~/environment $
```

Collaborate Outline AWS Resources Debugger

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Go to Anything (⌘ P)

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dop404-reinvent-demo
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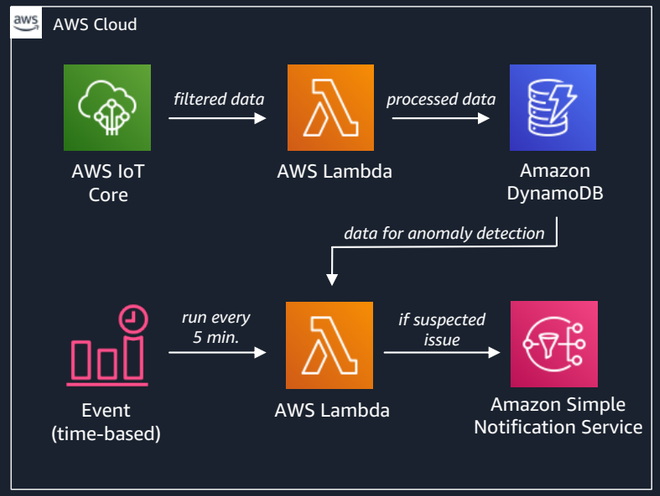
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Getting started

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bash - "ip-172-31

Immediate (Java

```
Admin:~/environment $ npm i -g aws-cdk@1.69.0
/home/ec2-user/.nvm/versions/node/v10.22.1/bin/cdk -> /home/ec2-user/.nvm/versions/node/v10.22.1/lib/node_modules/aws-cdk/bin/cdk
+ aws-cdk@1.69.0
updated 1 package in 2.088s
Admin:~/environment $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Environment

Go to Anything (⌘ P)

- dop404-reinvent-demo
  - real-time-power-insights
  - architecture.png
  - README.md

Welcome

Developer Tools

AWS Cloud9

Welcome to your development environmer

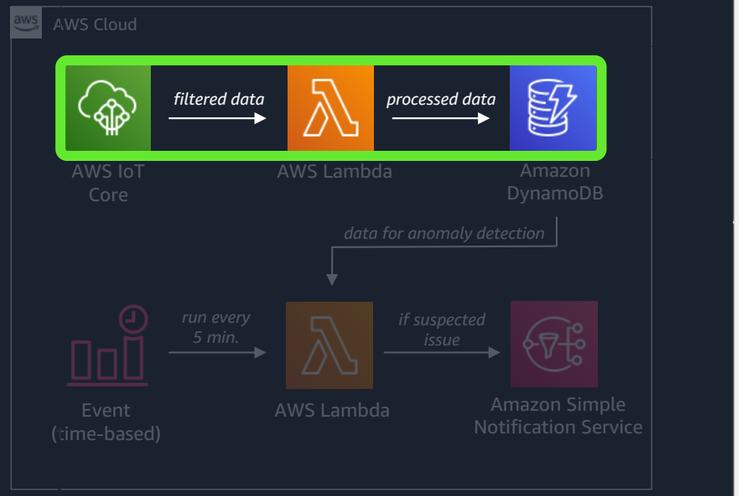
AWS Cloud9 allows you to write, run, and debug your code with just a browser. You can tour the IDE, write code for AWS Lambda and Amazon API Gateway, share your IDE with others in real time, and much more.

Getting started

Create File

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bash - "ip-172-31

Immediate (Java

```
Initializing a new git repository...
Executing npm install...
npm WARN deprecated request-promise-native@1.0.9: request-promise-native has been deprecated because it extends the now deprecated request package, see https://github.com/request/request/issues/3142
npm WARN deprecated request@2.88.2: request has been deprecated, see https://github.com/request/request/issues/3142
npm WARN deprecated har-validator@5.1.5: this library is no longer supported
npm WARN deprecated resolve-url@0.2.1: https://github.com/lydell/resolve-url#deprecated
npm WARN deprecated urix@0.1.0: Please see https://github.com/lydell/urix#deprecated
npm notice created a lockfile as package-lock.json. You should commit this file.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@^2.1.2 (node_modules/jest-haste-map/node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.

 All done!
Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

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Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
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    - package.json
    - README.md
    - tsconfig.json
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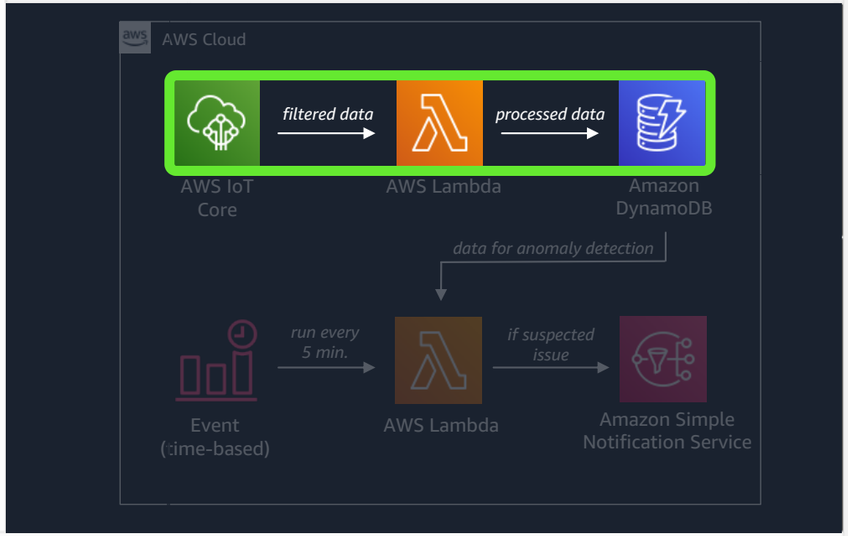
Welcome | real-time-power-i

```
1  import * as cdk from '@aws-cdk/core';
2
3  export class RealTimePowerInsightsStack extends cdk.Stack {
4    constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
5      super(scope, id, props);
6
7      // The code that defines your stack goes here
8    }
9  }
10
```

1:1 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



npm - "ip-172-31· | Immediate (Java

```
All done!
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-solutions-constructs/aws-iot-lambda-dynamodb@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-solutions-constructs/aws-iot-lambda-dynamodb@1.69.0
added 75 packages from 41 contributors and audited 823 packages in 11.027s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
    - package-lock.json
    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

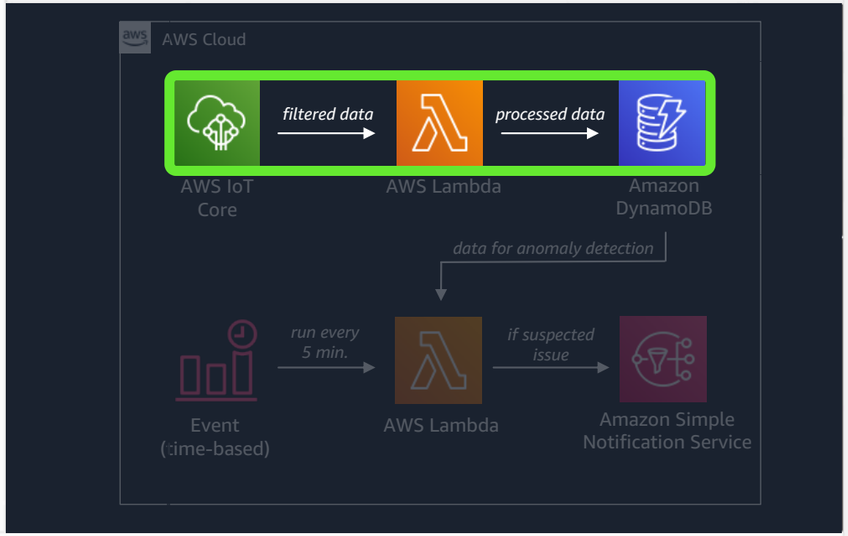
Welcome | real-time-power-i

```
1  import * as cdk from '@aws-cdk/core';
2
3  export class RealTimePowerInsightsStack extends cdk.Stack {
4    constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
5      super(scope, id, props);
6
7      // The code that defines your stack goes here
8    }
9  }
10
```

1:1 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-lambda@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-cdk/aws-lambda@1.69.0
updated 1 package and audited 824 packages in 7.168s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
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    - package.json
    - README.md
    - tsconfig.json
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  - README.md

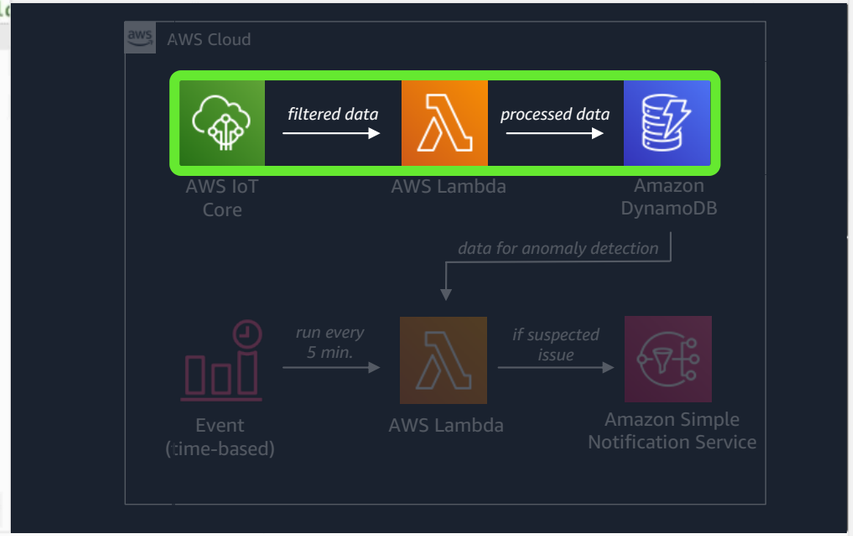
Welcome | real-time-power-i

```
1  import * as cdk from '@aws-cdk/core';
2  import { IotToLambdaToDynamoDB, IotToLambdaToDynamoDBProps } from '@aws-solutions-constructs/aws-iot-l
3
4  export class RealTimePowerInsightsStack extends cdk.Stack {
5    constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
6      super(scope, id, props);
7
8      // The code that defines your stack goes here
9    }
10 }
11
```

3:1 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-lambda@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
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+ @aws-cdk/aws-lambda@1.69.0
updated 1 package and audited 824 packages in 7.168s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

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Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
    - package-lock.json
    - package.json
    - README.md
    - tsconfig.json
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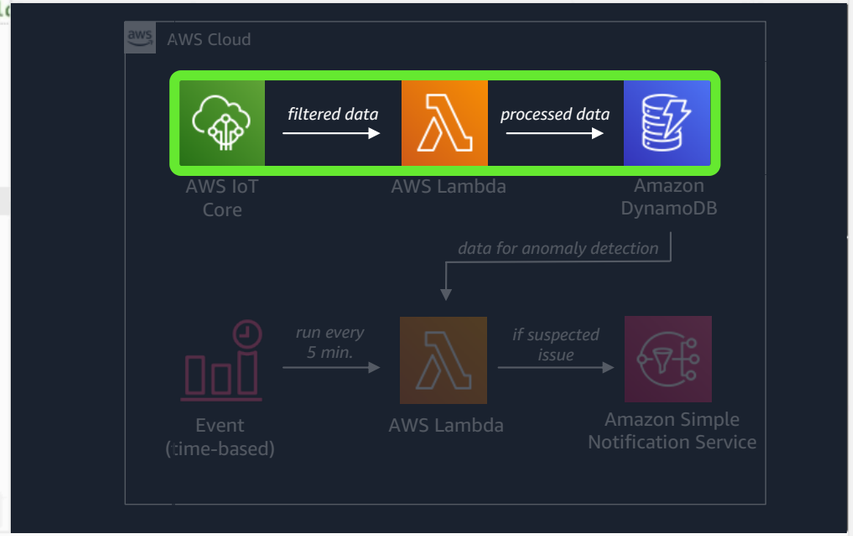
Welcome | real-time-power-i

```
1  import * as cdk from '@aws-cdk/core';
2  import { IotToLambdaToDynamoDB, IotToLambdaToDynamoDBProps } from '@aws-solutions-constructs/aws-iot-l
3  import * as lambda from '@aws-cdk/aws-lambda';
4
5  export class RealTimePowerInsightsStack extends cdk.Stack {
6    constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
7      super(scope, id, props);
8
9      // The code that defines your stack goes here
10   }
11 }
12
```

9:50 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-lambda@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
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+ @aws-cdk/aws-lambda@1.69.0
updated 1 package and audited 824 packages in 7.168s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Environment

Go to Anything (⌘ P)

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - real-time-power-insights
    - node_modules
    - test
    - cdk.json
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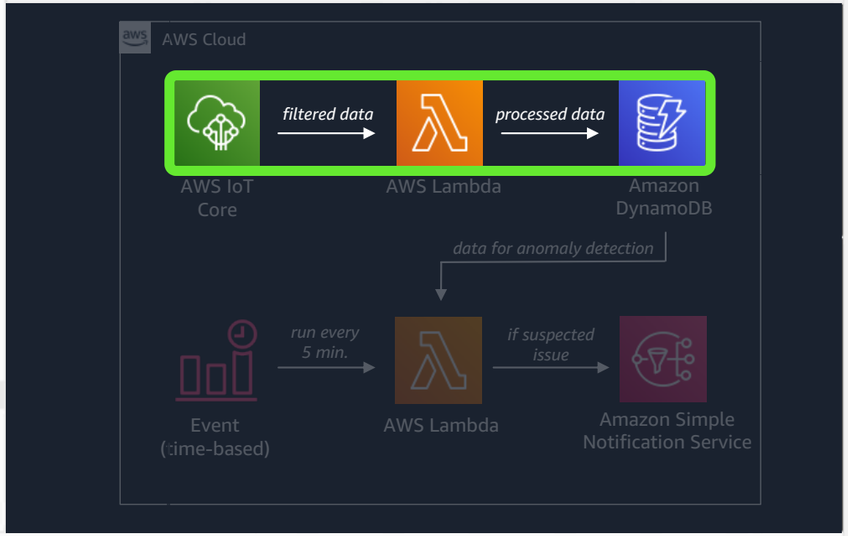
Welcome | real-time-power-i

```
7    super(scope, id, props);
8
9    // The code that defines your stack goes here
10   const iotLambdaDdb = new IotToLambdaToDynamoDB(this, 'data-processing', {
11     lambdaFunctionProps: {
12       code: lambda.Code.asset(`${__dirname}/lambda/processing`),
13       runtime: lambda.Runtime.NODEJS_12_X,
14       handler: 'index.handler'
15     },
16     iotTopicRuleProps: {
17       topicRulePayload: {
18         ruleDisabled: false,
19         description: 'Topic for ingesting and filtering real-time data',
20         sql: "SELECT * FROM 'general/#'",
21         actions: []
22       }
23     }
24   })
25 }
26 }
```

22:10 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-lambda@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
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found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - lambda
        - processing
          - index.js
        - real-time-power-insights
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    - cdk.json
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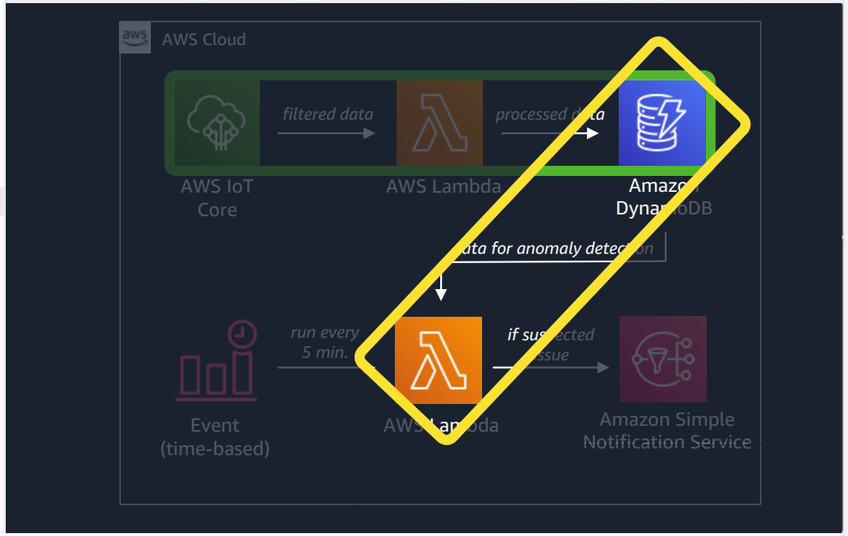
Welcome | real-time-power-i | index.js

```
1  exports.handler = async (event, context) => {
2      console.log('Received event:', JSON.stringify(event, null, 2));
3
4      return {
5          statusCode: 200,
6          headers: { 'Content-Type': 'text/plain' },
7          body: 'Hello!'
8      }
9  };
```

9:3 JavaScript Spaces: 4

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-lambda@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
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28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

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Go to Anything (⌘ P)

Environment

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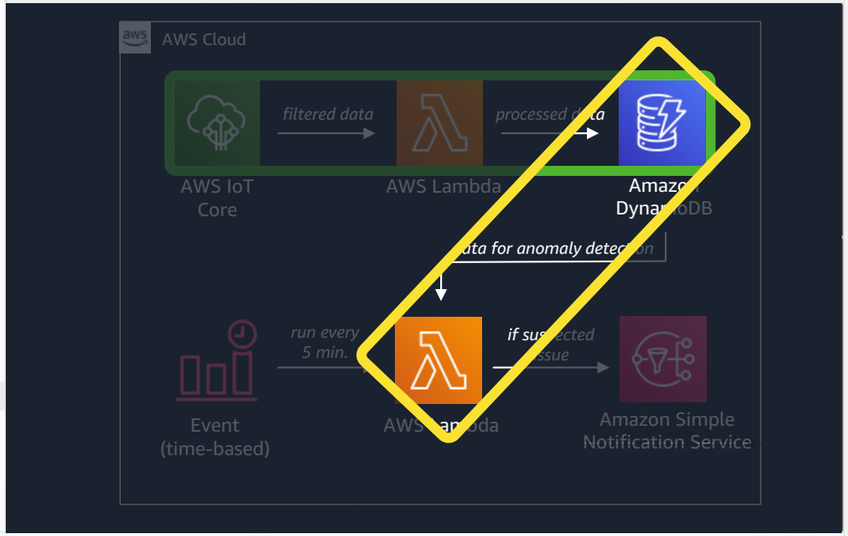
Welcome | real-time-power-i | index.js

```
7    super(scope, id, props);
8
9    // The code that defines your stack goes here
10   const iotLambdaDdb = new IotToLambdaToDynamoDB(this, 'data-processing', {
11     lambdaFunctionProps: {
12       code: lambda.Code.asset(`${__dirname}/lambda/processing`),
13       runtime: lambda.Runtime.NODEJS_12_X,
14       handler: 'index.handler'
15     },
16     iotTopicRuleProps: {
17       topicRulePayload: {
18         ruleDisabled: false,
19         description: 'Topic for ingesting and filtering real-time data',
20         sql: "SELECT * FROM 'general/#'",
21         actions: []
22       }
23     }
24   })
25 }
26 }
```

22:10 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



npm - "ip-172-31- | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-solutions-constructs/aws-lambda-dynamodb@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-solutions-constructs/aws-lambda-dynamodb@1.69.0
updated 1 package and audited 825 packages in 8.709s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

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  - README.md

Welcome | real-time-power-i | index.js

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2  import { IotToLambdaToDynamoDB, IotToLambdaToDynamoDBProps } from '@aws-solutions-constructs/aws-iot-la
3  import * as lambda from '@aws-cdk/aws-lambda';
4  import { LambdaToDynamoDB } from '@aws-solutions-constructs/aws-lambda-dynamodb';
5
6  export class RealTimePowerInsightsStack extends cdk.Stack {
7    constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
8      super(scope, id, props);
9
10     // The code that defines your stack goes here
11     const iotLambdaDdb = new IotToLambdaToDynamoDB(this, 'data-processing', {
12       lambdaFunctionProps: {
13         code: lambda.Code.asset(`${__dirname}/lambda/processing`),
14         runtime: lambda.Runtime.NODEJS_12_X,
15         handler: 'index.handler'
16       },
17       iotTopicRuleProps: {
18         topicRulePayload: {
19           ruleDisabled: false,
20           description: 'Topic for ingesting and filtering real-time data',
21           sql: "SELECT * FROM 'general/#'"
```

8:29 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
This is a blank project for TypeScript development with CDK.

The `cdk.json` file tells the CDK Toolkit how to execute your app.

## Useful commands

 * `npm run build`   compile typescript to js
 * `npm run watch`   watch for changes and compile
 * `npm run test`    perform the jest unit tests
 * `cdk deploy`      deploy this stack to your default AWS account/region
 * `cdk diff`        compare deployed stack with current state
 * `cdk synth`       emits the synthesized CloudFormation template

Initializing a new git repository...
Executing npm install...
npm WARN deprecated request-promise-native@1.0.9: request-promise-native has been deprecated because it extends the now deprecated request package, see https://github.com/request/
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - lambda
        - processing
          - index.js
        - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
    - package-lock.json
    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

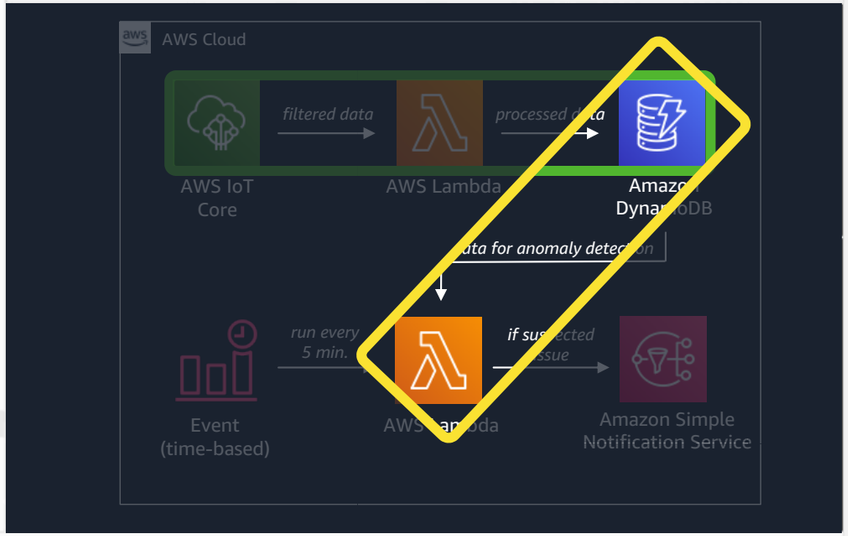
Welcome | real-time-power-i | index.js

```
17      iotTopicRuleProps: {
18        topicRulePayload: {
19          ruleDisabled: false,
20          description: 'Topic for ingesting and filtering real-time data',
21          sql: "SELECT * FROM 'general/#'",
22          actions: []
23        }
24      }
25    })
26
27    const insightsFunction = new LambdaToDynamoDB(this, 'insights-function', {
28      lambdaFunctionProps: {
29        code: lambda.Code.asset(`${__dirname}/lambda/insights`),
30        runtime: lambda.Runtime.NODEJS_12_X,
31        handler: 'index.handler'
32      },
33      existingTableObj: iotLambdaDdb.dynamoTable
34    })
35  }
36 }
```

33:49 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
This is a blank project for TypeScript development with CDK.

The `cdk.json` file tells the CDK Toolkit how to execute your app.

## Useful commands

 * `npm run build`   compile typescript to js
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Executing npm install...
npm WARN deprecated request-promise-native@1.0.9: request-promise-native has been deprecated because it extends the now deprecated request package, see https://github.com/request/
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

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        - insights
          - index.js
        - processing
          - index.js
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  - architecture.png
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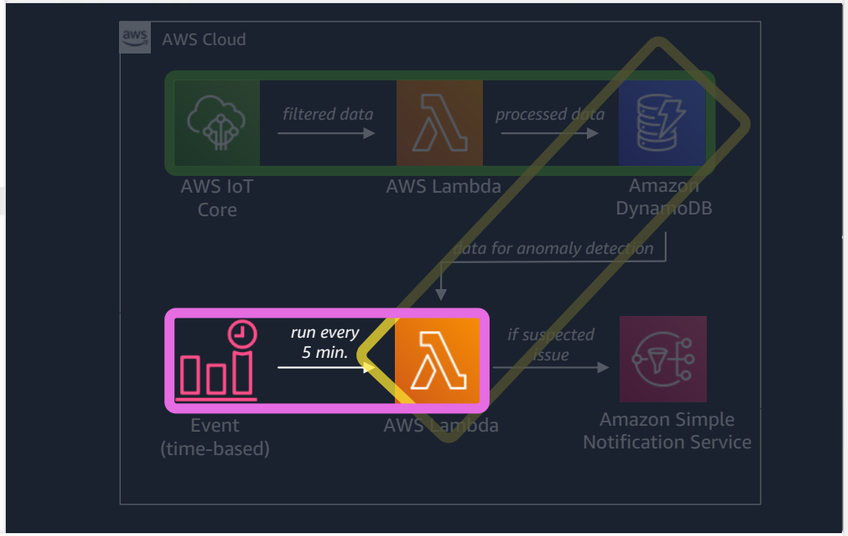
Welcome | real-time-power-i | index.js | index.js

```
1  exports.handler = async (event, context) => {
2      console.log('Received event:', JSON.stringify(event, null, 2));
3
4      return {
5          statusCode: 200,
6          headers: { 'Content-Type': 'text/plain' },
7          body: 'Hello!'
8      }
9  };
```

9:3 JavaScript Spaces: 4

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
This is a blank project for TypeScript development with CDK.

The `cdk.json` file tells the CDK Toolkit how to execute your app.

## Useful commands

 * `npm run build`   compile typescript to js
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npm WARN deprecated request-promise-native@1.0.9: request-promise-native has been deprecated because it extends the now deprecated request package, see https://github.com/request/
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

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          - index.js
        - real-time-power-insights
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    - jest.config.js
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    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

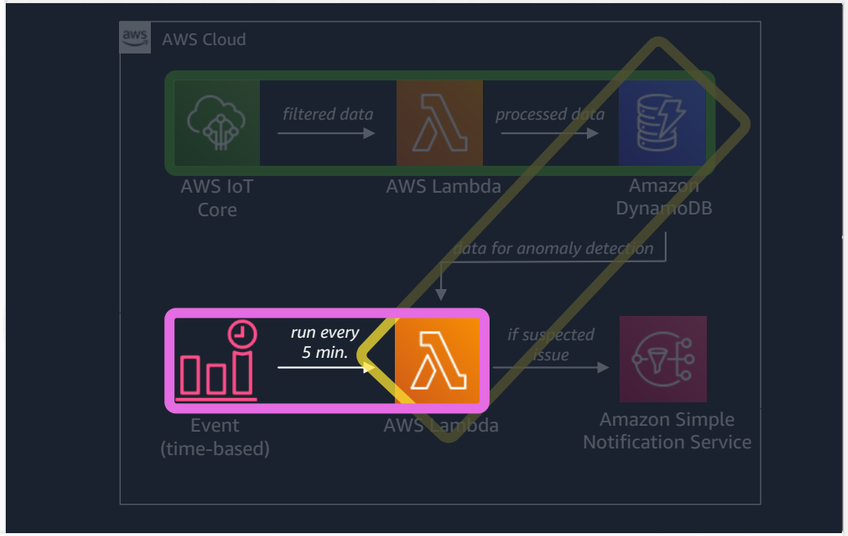
Welcome | real-time-power-i

```
27    const insightsFunction = new LambdaToDynamoDB(this, 'insights-function', {
28      lambdaFunctionProps: {
29        code: lambda.Code.asset(`${__dirname}/lambda/insights`),
30        runtime: lambda.Runtime.NODEJS_12_X,
31        handler: 'index.handler'
32      },
33      existingTableObj: iotLambdaDdb.dynamoTable
34    })
35  }
36 }
37
```

11:78 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-solutions-constructs/aws-events-rule-lambda@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-solutions-constructs/aws-events-rule-lambda@1.69.0
added 1 package from 1 contributor and audited 826 packages in 7.62s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - lambda
        - insights
          - index.js
        - processing
          - index.js
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    - node_modules
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    - package-lock.json
    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

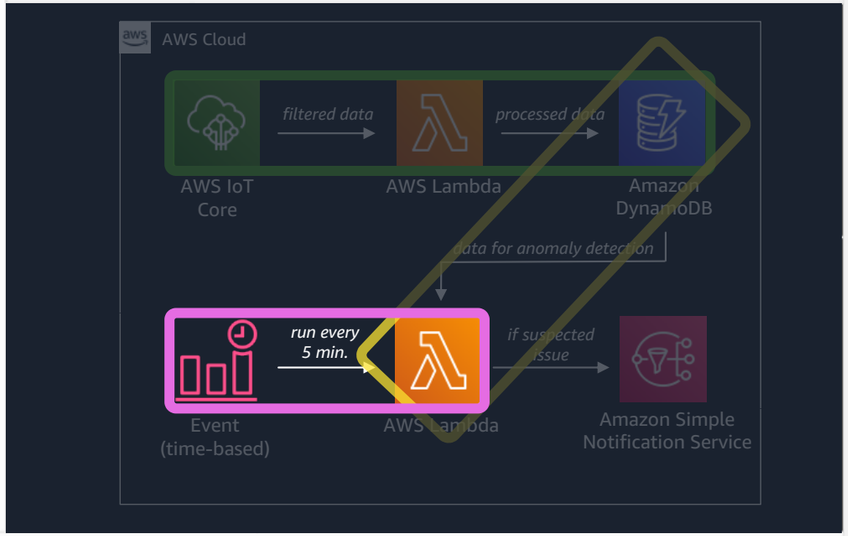
Welcome | real-time-power-i

```
28    const insightsFunction = new LambdaToDynamoDB(this, 'insights-function', {
29      lambdaFunctionProps: {
30        code: lambda.Code.asset(`${__dirname}/lambda/insights`),
31        runtime: lambda.Runtime.NODEJS_12_X,
32        handler: 'index.handler'
33      },
34      existingTableObj: iotLambdaDdb.dynamoTable
35    })
36  }
37 }
38
```

4:82 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-events@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-cdk/aws-events@1.69.0
updated 1 package and audited 827 packages in 7.896s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - lambda
        - insights
          - index.js
        - processing
          - index.js
      - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
    - package-lock.json
    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

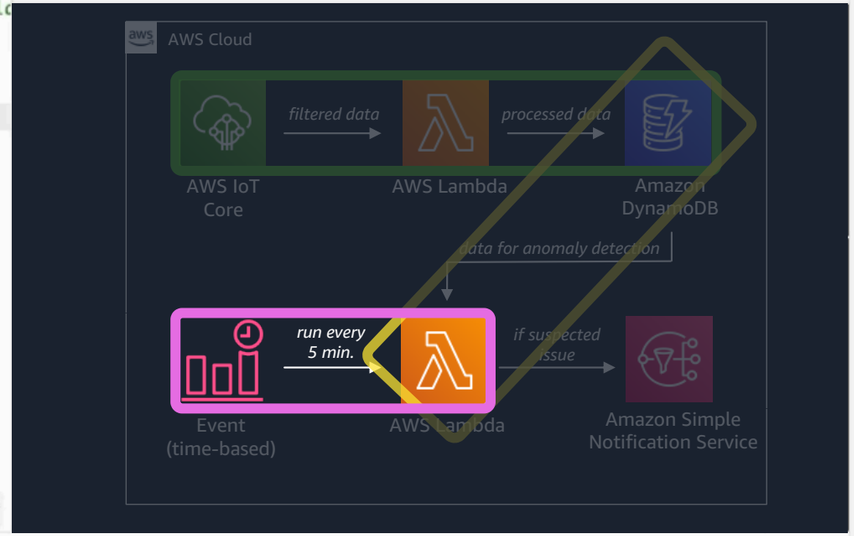
Welcome | real-time-power-i

```
1  import * as cdk from '@aws-cdk/core';
2  import { IotToLambdaToDynamoDB, IotToLambdaToDynamoDBProps } from '@aws-solutions-constructs/aws-iot-la
3  import * as lambda from '@aws-cdk/aws-lambda';
4  import { LambdaToDynamoDB } from '@aws-solutions-constructs/aws-lambda-dynamodb';
5  import { EventsRuleToLambda } from '@aws-solutions-constructs/aws-events-rule-lambda';
6
7  export class RealTimePowerInsightsStack extends cdk.Stack {
8    constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
9      super(scope, id, props);
10
11     // The code that defines your stack goes here
12     const iotLambdaDdb = new IotToLambdaToDynamoDB(this, 'data-processing', {
13       lambdaFunctionProps: {
14         code: lambda.Code.asset(`${__dirname}/lambda/processing`),
15         runtime: lambda.Runtime.NODEJS_12_X,
16         handler: 'index.handler'
17       },
18       iotTopicRuleProps: {
19         topicRulePayload: {
20           ruleDisabled: false,
21           description: 'Topic for ingesting and filtering real-time data'
```

6:1 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-events@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-cdk/aws-events@1.69.0
updated 1 package and audited 827 packages in 7.896s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - lambda
        - insights
          - index.js
        - processing
          - index.js
        - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
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    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

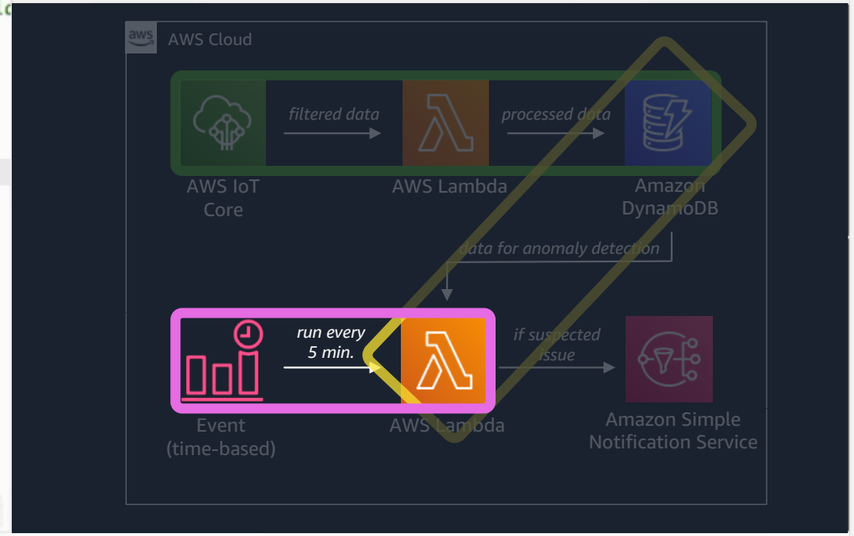
Welcome | real-time-power-i

```
1  import * as cdk from '@aws-cdk/core';
2  import { IotToLambdaToDynamoDB, IotToLambdaToDynamoDBProps } from '@aws-solutions-constructs/aws-iot-la
3  import * as lambda from '@aws-cdk/aws-lambda';
4  import { LambdaToDynamoDB } from '@aws-solutions-constructs/aws-lambda-dynamodb';
5  import { EventsRuleToLambda } from '@aws-solutions-constructs/aws-events-rule-lambda';
6  import * as events from '@aws-cdk/aws-events';
7
8  export class RealTimePowerInsightsStack extends cdk.Stack {
9    constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
10     super(scope, id, props);
11
12     // The code that defines your stack goes here
13     const iotLambdaDdb = new IotToLambdaToDynamoDB(this, 'data-processing', {
14       lambdaFunctionProps: {
15         code: lambda.Code.asset(`${__dirname}/lambda/processing`),
16         runtime: lambda.Runtime.NODEJS_12_X,
17         handler: 'index.handler'
18       },
19       iotTopicRuleProps: {
20         topicRulePayload: {
21           ruleDisabled: false
```

8:60 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-events@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-cdk/aws-events@1.69.0
updated 1 package and audited 827 packages in 7.896s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

Environment

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
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    - cdk.json
    - jest.config.js
    - package-lock.json
    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

Welcome | real-time-power-i

```
    }
  })

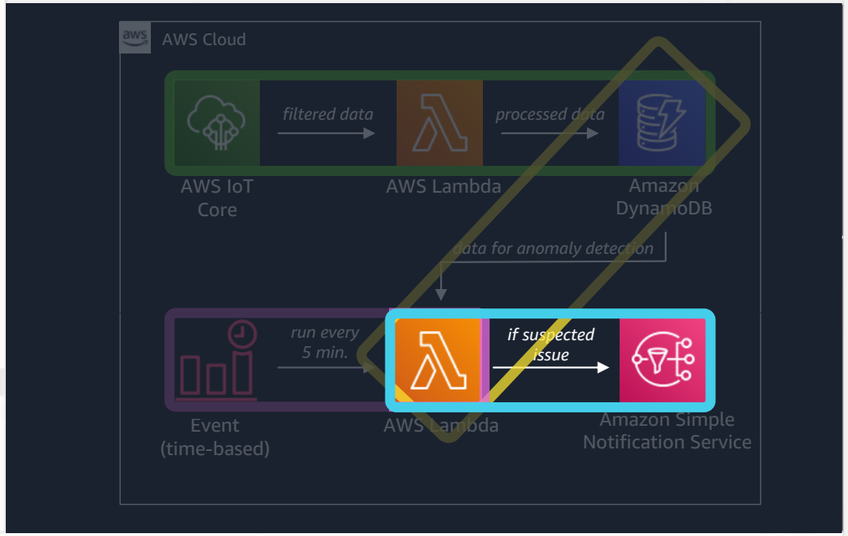
  const insightsFunction = new LambdaToDynamoDB(this, 'insights-function', {
    lambdaFunctionProps: {
      code: lambda.Code.asset(`${__dirname}/lambda/insights`),
      runtime: lambda.Runtime.NODEJS_12_X,
      handler: 'index.handler'
    },
    existingTableObj: iotLambdaDdb.dynamoTable
  })

  new EventsRuleToLambda(this, 'insights-function-scheduler', {
    existingLambdaObj: insightsFunction.lambdaFunction,
    eventRuleProps: {
      schedule: events.Schedule.expression('rate(5 minutes)')
    }
  })
 }
}
```

41:64 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-cdk/aws-events@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
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found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Go to Anything (⌘ P)

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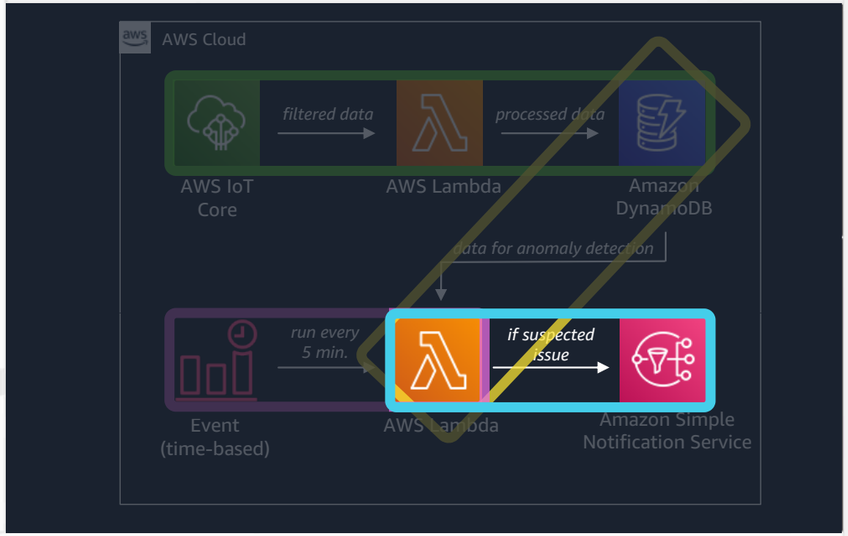
Welcome | real-time-power-i

```
27    })
28
29    const insightsFunction = new LambdaToDynamoDB(this, 'insights-function', {
30      lambdaFunctionProps: {
31        code: lambda.Code.asset(`${__dirname}/lambda/insights`),
32        runtime: lambda.Runtime.NODEJS_12_X,
33        handler: 'index.handler'
34      },
35      existingTableObj: iotLambdaDdb.dynamoTable
36    })
37
38    new EventsRuleToLambda(this, 'insights-function-scheduler', {
39      existingLambdaObj: insightsFunction.lambdaFunction,
40      eventRuleProps: {
41        schedule: events.Schedule.expression('rate(5 minutes)')
42      }
43    })
44  }
45 }
46
```

41:64 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



npm - "ip-172-31- | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-solutions-constructs/aws-lambda-sns@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-solutions-constructs/aws-lambda-sns@1.69.0
added 1 package from 1 contributor and audited 827 packages in 8.707s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Environment

Go to Anything (⌘ P)

- dop404-reinvent-demo
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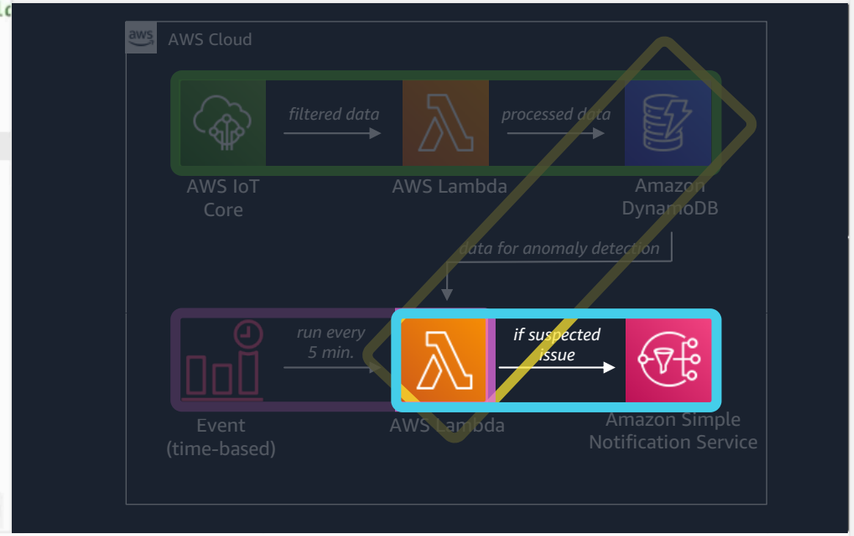
Welcome | real-time-power-i

```
1  import * as cdk from '@aws-cdk/core';
2  import { IotToLambdaToDynamoDB, IotToLambdaToDynamoDBProps } from '@aws-solutions-constructs/aws-iot-la
3  import * as lambda from '@aws-cdk/aws-lambda';
4  import { LambdaToDynamoDB } from '@aws-solutions-constructs/aws-lambda-dynamodb';
5  import { EventsRuleToLambda } from '@aws-solutions-constructs/aws-events-rule-lambda';
6  import * as events from '@aws-cdk/aws-events';
7  import { LambdaToSns } from '@aws-solutions-constructs/aws-lambda-sns';
8
9  export class RealTimePowerInsightsStack extends cdk.Stack {
10   constructor(scope: cdk.Construct, id: string, props?: cdk.StackProps) {
11     super(scope, id, props);
12
13     // The code that defines your stack goes here
14     const iotLambdaDdb = new IotToLambdaToDynamoDB(this, 'data-processing', {
15       lambdaFunctionProps: {
16         code: lambda.Code.asset(`${__dirname}/lambda/processing`),
17         runtime: lambda.Runtime.NODEJS_12_X,
18         handler: 'index.handler'
19       },
20       iotTopicRuleProps: {
```

7:72 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



npm - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-solutions-constructs/aws-lambda-sns@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-solutions-constructs/aws-lambda-sns@1.69.0
added 1 package from 1 contributor and audited 827 packages in 8.707s

28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

AWS Cloud9 File Edit Find View Go Run Tools Window Support Preview Run Share

Environment

Go to Anything (⌘ P)

- dop404-reinvent-demo
  - real-time-power-insights
    - bin
    - lib
      - lambda
        - insights
          - index.js
        - processing
          - index.js
        - real-time-power-insights
    - node_modules
    - test
    - cdk.json
    - jest.config.js
    - package-lock.json
    - package.json
    - README.md
    - tsconfig.json
  - architecture.png
  - README.md

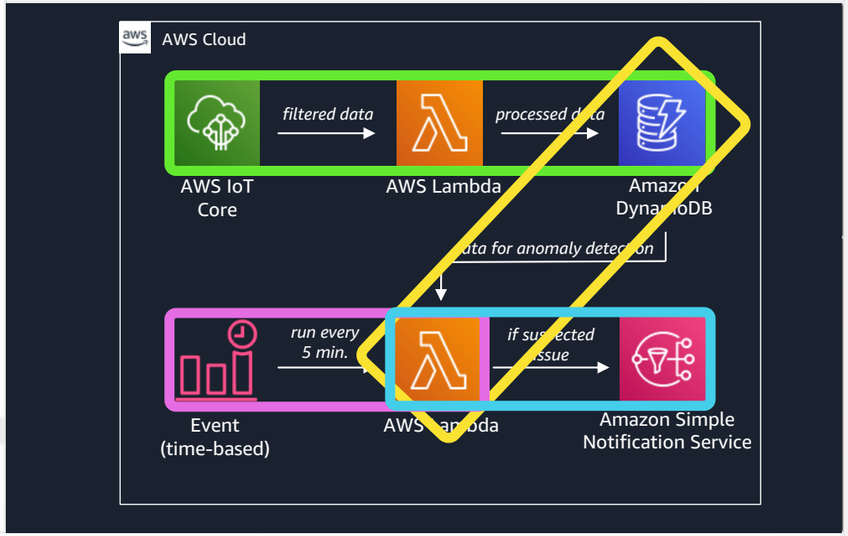
Welcome | real-time-power-i

```
34        handler: 'index.handler'
35      },
36      existingTableObj: iotLambdaDdb.dynamoTable
37    })
38
39    new EventsRuleToLambda(this, 'insights-function-scheduler', {
40      existingLambdaObj: insightsFunction.lambdaFunction,
41      eventRuleProps: {
42        schedule: events.Schedule.expression('rate(5 minutes)')
43      }
44    })
45
46    new LambdaToSns(this, 'insights-notification-service', {
47      existingLambdaObj: insightsFunction.lambdaFunction
48    })
49  }
50 }
51
```

50:2 Typescript Spaces: 2

architecture.png

Resize Crop Rotate 90° Left Rotate 90° Right FlipH FlipV 50%



bash - "ip-172-31 | Immediate (Java

```
Admin:~/environment/real-time-power-insights (master) $ npm i @aws-solutions-constructs/aws-lambda-sns@1.69.0
npm WARN real-time-power-insights@0.1.0 No repository field.
npm WARN real-time-power-insights@0.1.0 No license field.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.3 (node_modules/fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.3: wanted {"os":"darwin","arch":"any"} (current: {"os":"linux","arch":"x64"})

+ @aws-solutions-constructs/aws-lambda-sns@1.69.0
added 1 package from 1 contributor and audited 827 packages in 8.707s

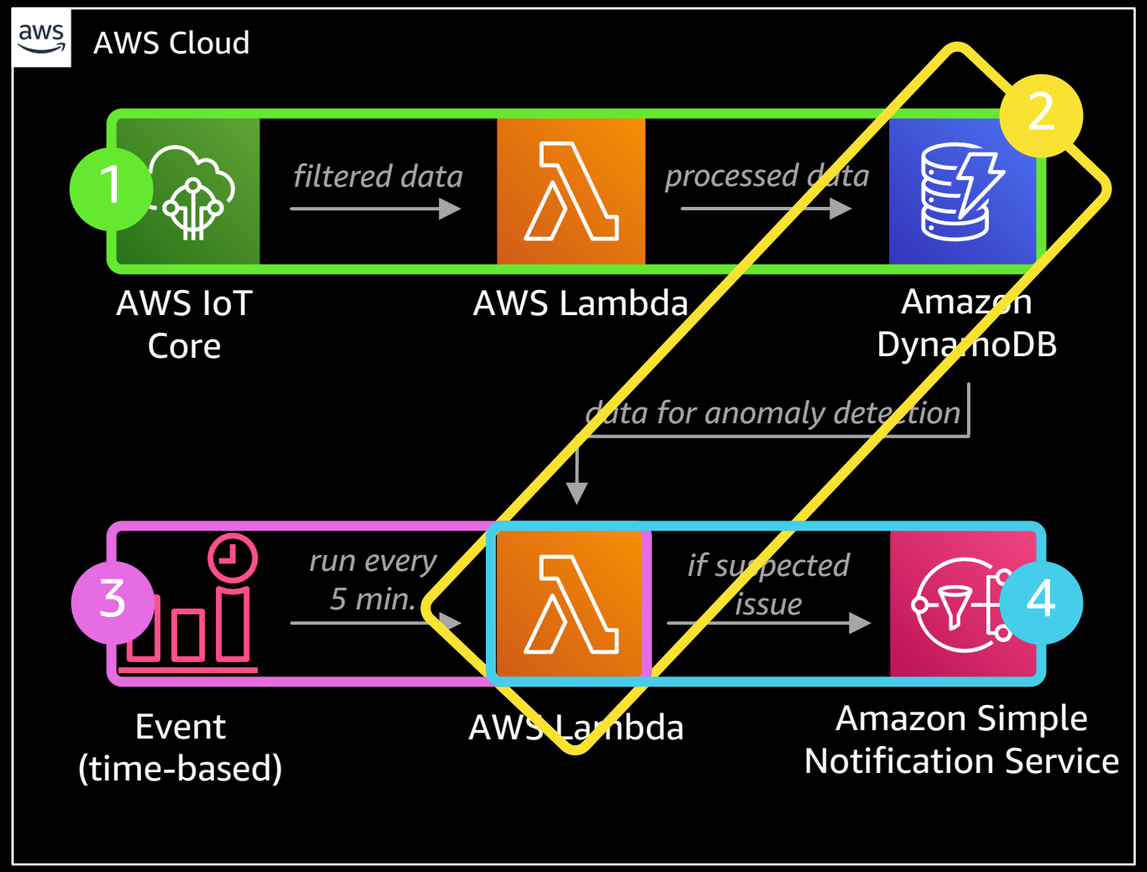
28 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Admin:~/environment/real-time-power-insights (master) $
```

Collaborate Outline AWS Resources Debugger

Demo review



Build Steps

1. Build data ingress / processing / storage
2. Build anomaly detection app
3. Build anomaly detection scheduler
4. Build notification service

Solutions Constructs

- aws-iot-lambda-dynamodb
- aws-lambda-dynamodb
- aws-events-rule-lambda
- aws-lambda-sns

Let’s talk about

What are AWS Solutions Constructs?

Comparing constructs

Getting started

Key benefits

Success stories

Now and next



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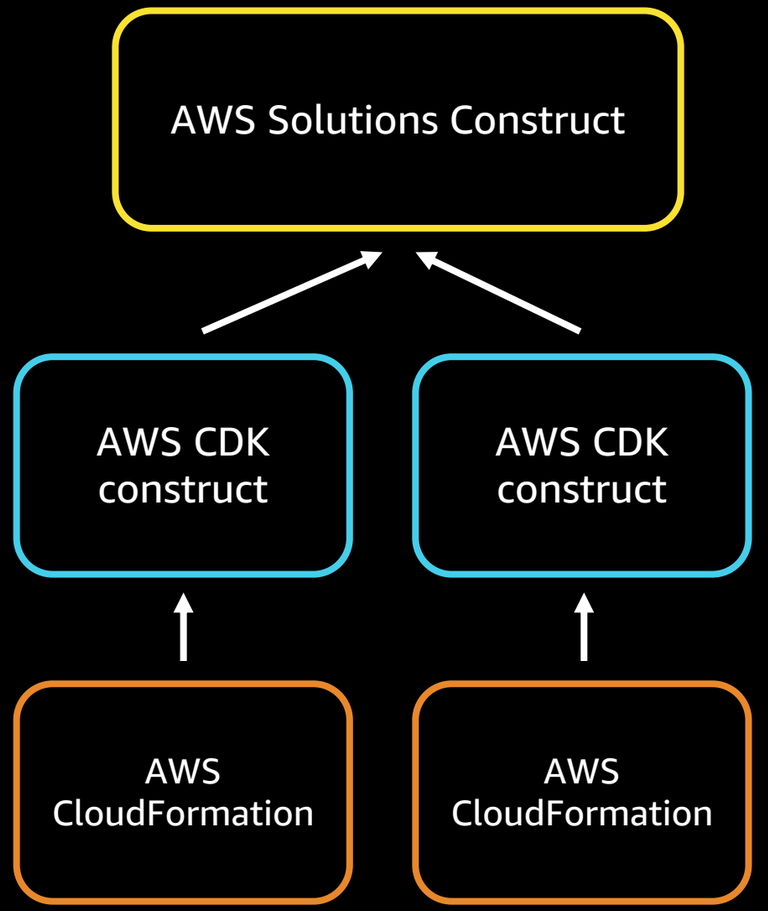
What are AWS Solutions Constructs?

- Higher-level abstractions of AWS CDK constructs
- Common, repeatable architecture patterns
- Each pattern:
  - Groups two or more CDK constructs together
  - Comes preconfigured with best-practice defaults
  - Works seamlessly with CDK constructs

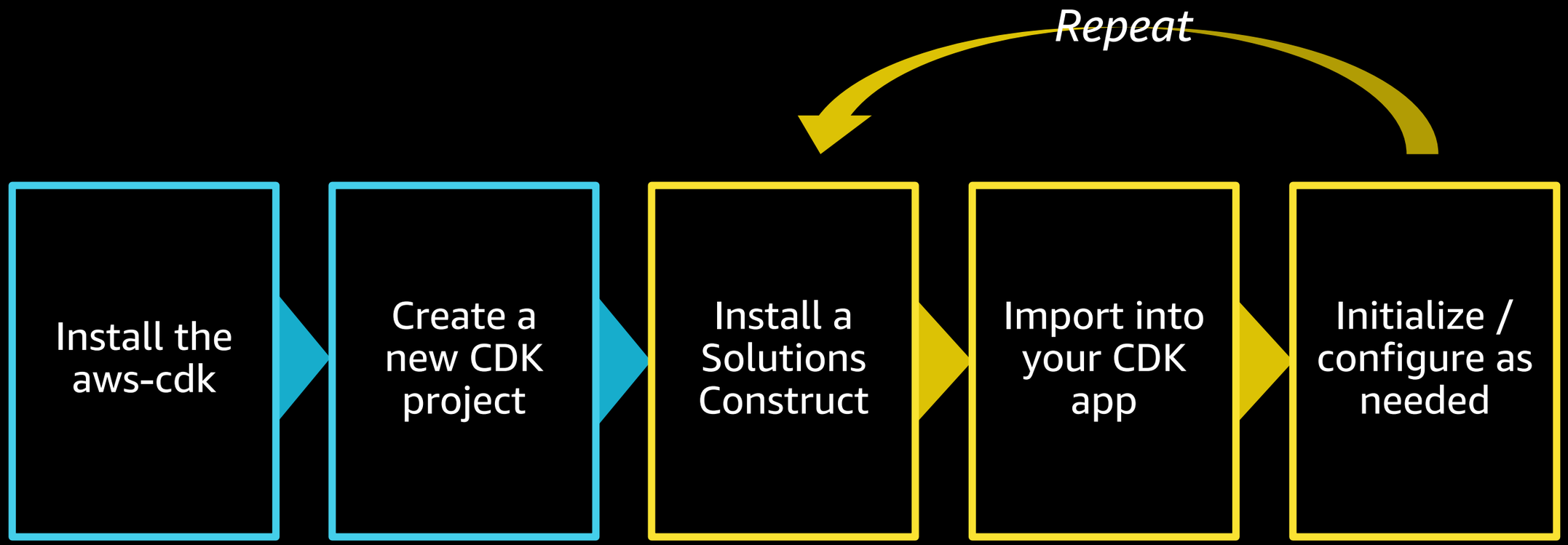


Comparing constructs

- AWS CDK constructs are single-service
  - e.g., **aws-lambda.Function**
    - AWS Lambda function
    - Any additional default resources
- Solutions Constructs are multi-service
  - e.g., **aws-iot-lambda-dynamodb**
    - AWS IoT topic rule
    - AWS Lambda function
    - Amazon DynamoDB table
    - Any additional default resources



Getting started



Key benefits

Accelerated delivery

Best-practice alignment

Quality assurance

Maintainability

Success stories

- AWS Serverless Image Handler
  - Part of the AWS Solutions Implementation portfolio
  - Constructs
    - aws-cloudfront-apigateway-lambda
    - aws-cloudfront-s3
  - Outcomes
    - Reduced code density
    - Improved quality assurance
    - Greater maintainability

Now and next

NOW

- Growing library of architecture patterns
  - Currently 30+ patterns available
- Open-source project (GitHub)
  - Submit pattern ideas, feature requests, and bug fixes
  - Automated build feedback for pull requests
  - View pattern roadmap

NEXT

- Expansion into additional technology categories
  - Machine learning, CI / CD, etc.

Check us out

ONLINE RESOURCES

- AWS Solutions Constructs
  https://aws.amazon.com/solutions/constructs/
- AWS Solutions Constructs on GitHub
  https://github.com/awslabs/aws-solutions-constructs
- AWS CDK documentation
  https://docs.aws.amazon.com/cdk

OTHER RE:INVENT SESSIONS

ARC308 - Get it right the first time: Production-ready prototypes

Thank you!



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