



The logo for AWS re:Invent features the words "AWS" and "re:Invent" stacked vertically. "AWS" is in a smaller, sans-serif font above "re:Invent", which is in a larger, bold, sans-serif font. The entire logo is white against a red-to-purple gradient background.

LFS304 - i

Building IoT Devices for Regulated Industries

Chris McCurdy
Principal Solutions Architect
Healthcare and Life Sciences
AWS

Rich Ridolfo
Sr. Director Operations &
Infrastructure IT
Philips

Agenda

- Why are we here?
- Let's make some SOUP
- Now, let's walk through some use-cases
- Finally, Philips experience with AWS IoT

Related breakouts

Tuesday, November 27

HLC302-S-i - Automating Compliance on AWS
1:00 p.m.-2:00 p.m.

Wednesday, November 28

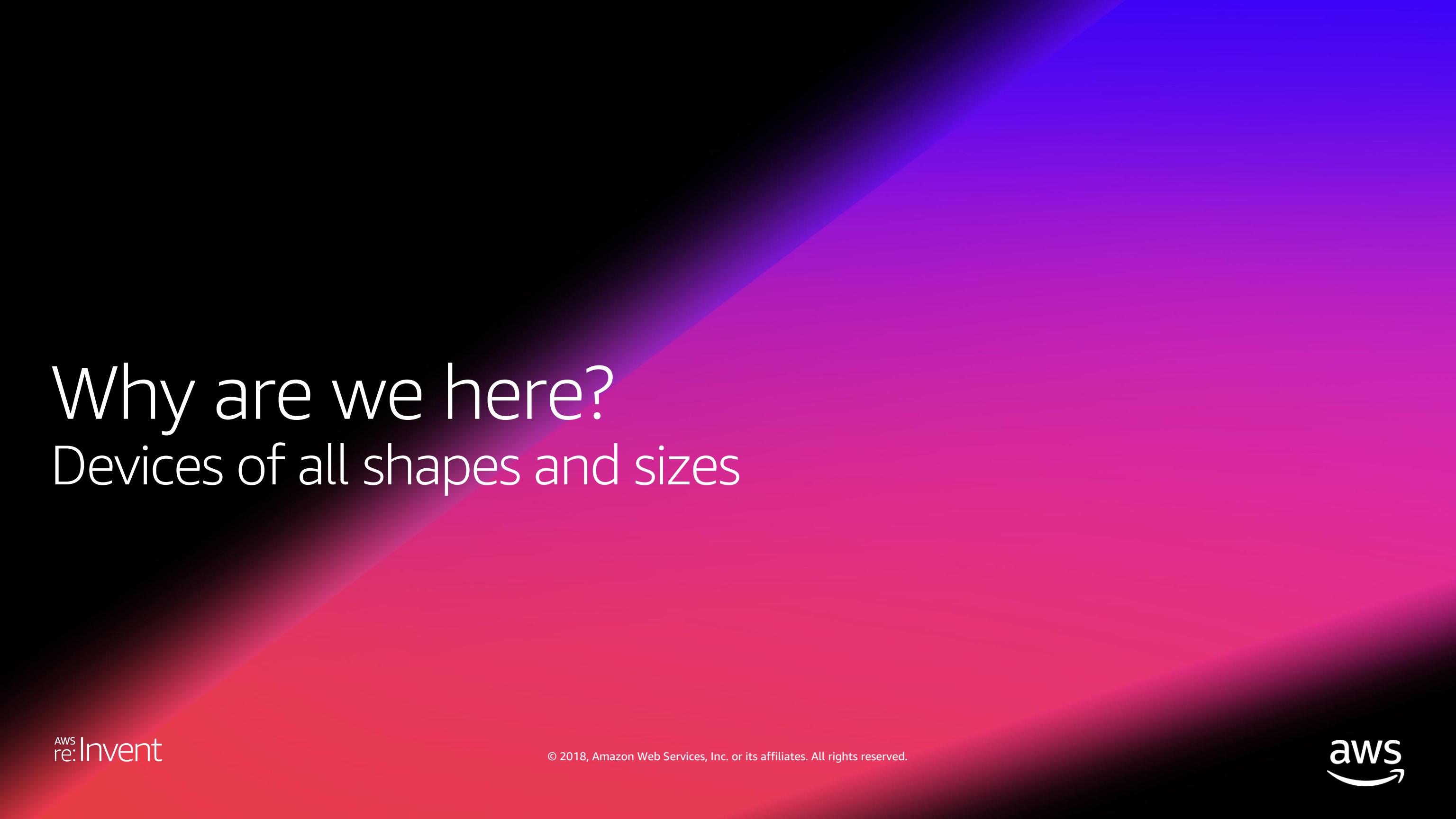
SEC205 - Confidently Execute Your Cloud Audit: Expert Advice (Chalk Talk)
11:30–12:30 p.m. | MGM

Thursday, November 29

IOT211 - Build an End-to-End IoT Example with AWS IoT Core
1:00–2:00 p.m. | Aria West

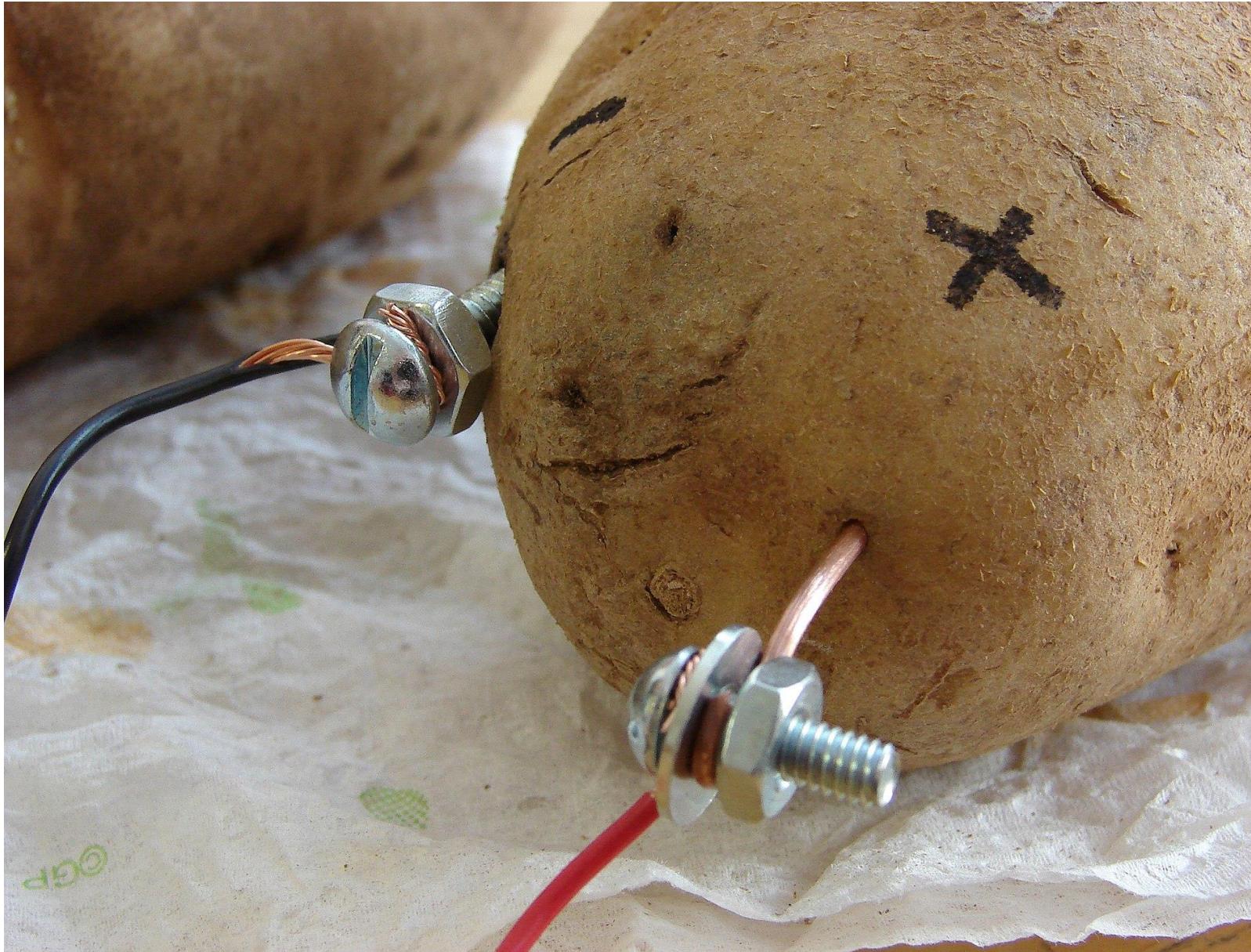
Thursday, November 29

SEC330 - Automating Compliance Certification with Automated Mathematical Proof
1:45–2:45 p.m. | Aria West



Why are we here?
Devices of all shapes and sizes

Not just small potatoes



Across all industries (including regulated!)



Consumer Goods

Across all industries (including regulated!)



Consumer goods



Factories

Across all industries (including regulated!)



Consumer goods



Factories



Research

Use-case:
Stop the (tablet) presses!

What we could measure/control:

- Motor on/off
- Speed
- Head size
- Punch shank
- Output size
- Output shape
- And other things



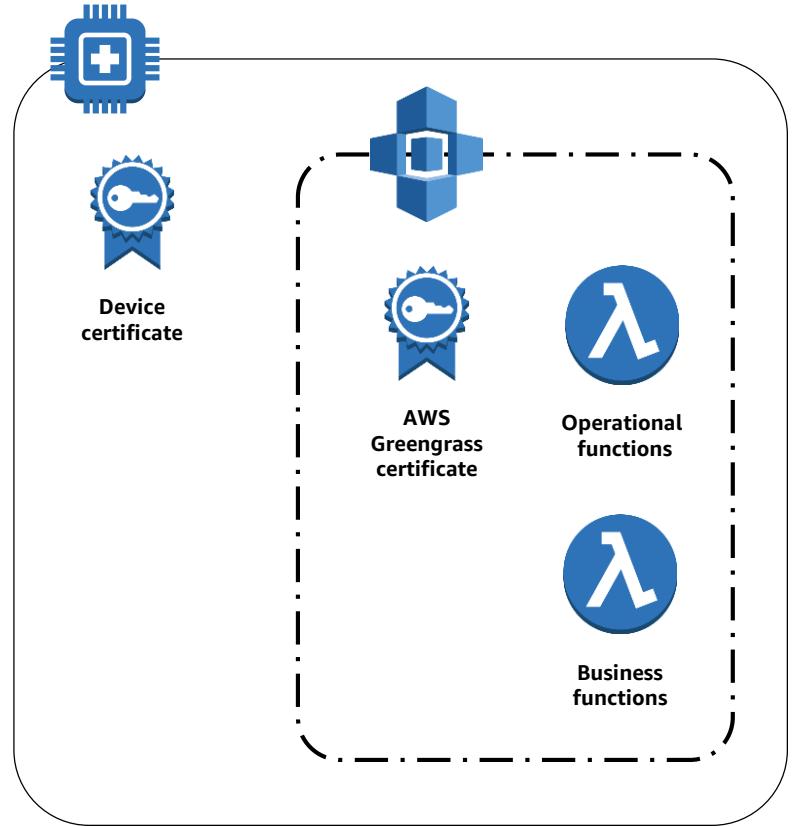
Use-case:
Stop the (tablet) presses!

Example architectures

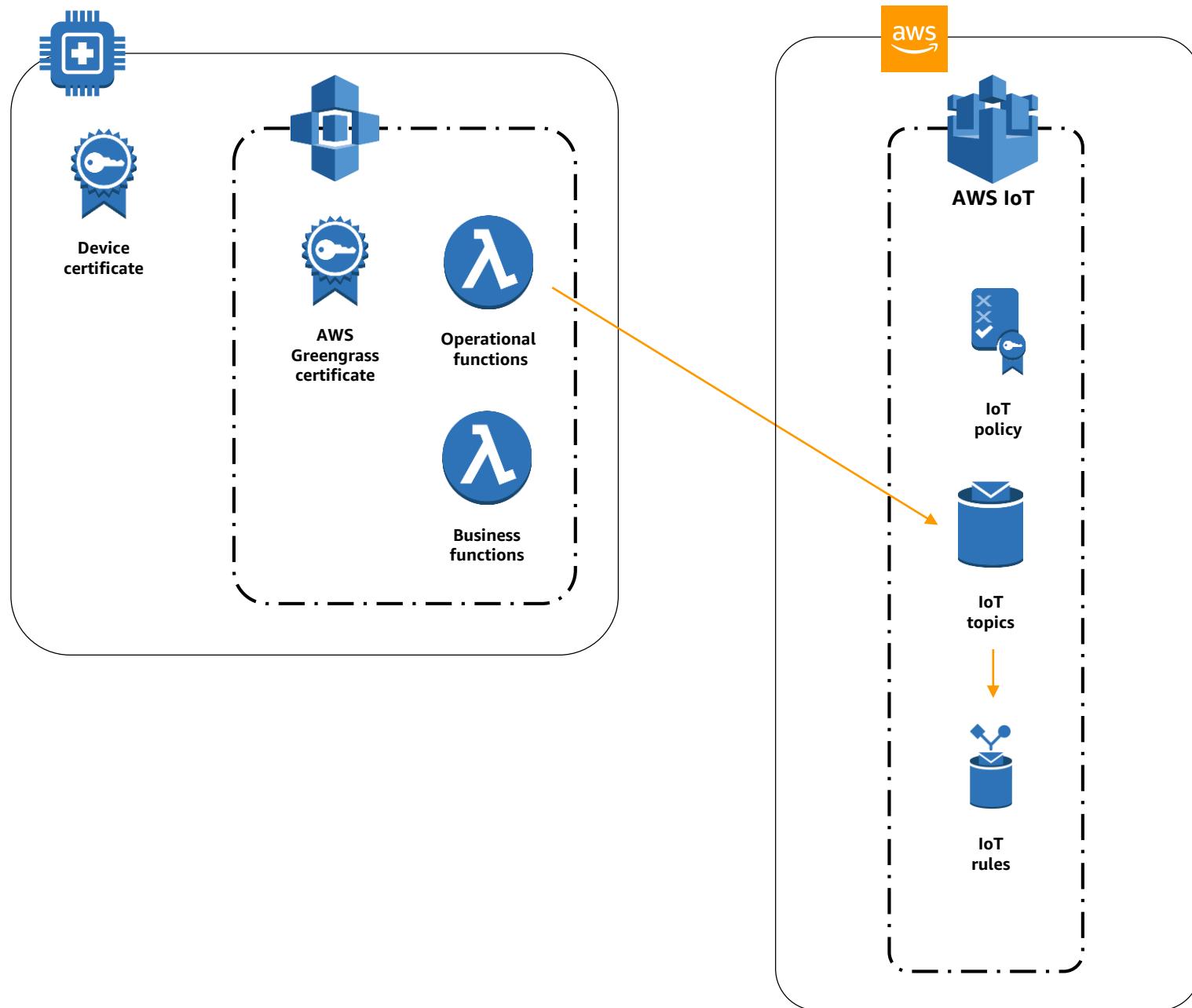
- **Operational activities**
 - Anomaly detection



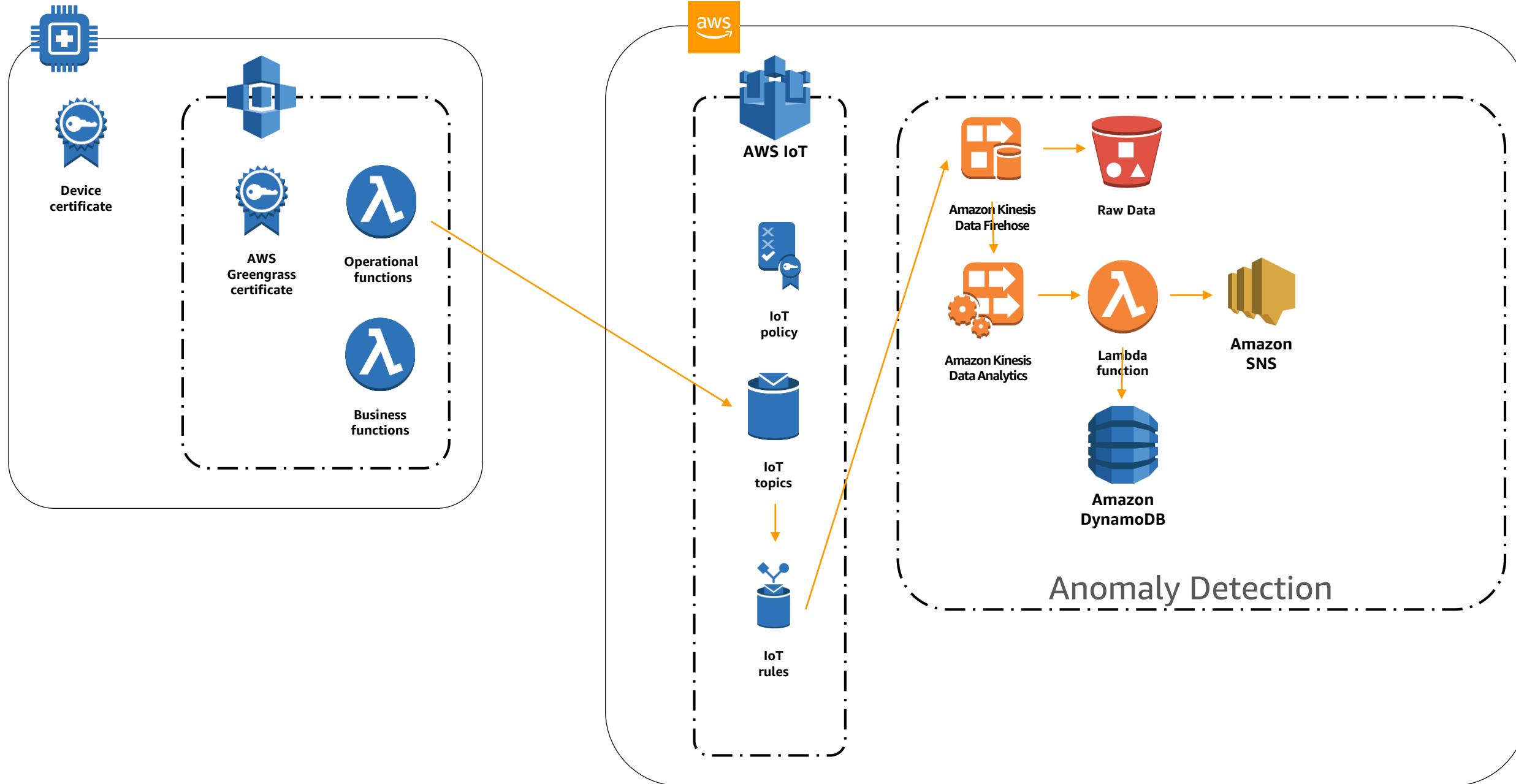
Anomaly detection



Anomaly detection



Anomaly detection



Off the shelf

AWS makes commercial cloud infrastructure software products and office productivity applications that are user-configurable, general purpose in nature, and delivered to commercial IT standards like ISO, NIST, SOC, and others.

This is similar to other general purpose IT products and services such as database engines, operating systems, programming languages, internet service providers, and others. Many organizations categorize AWS products as **commercial-off-the-shelf (COTS)** infrastructure software products, which is consistent with the US federal government's use of AWS Products as a COTS item through a federal procurement program called FedRAMP.

"Using AWS in GxP Systems" AWS Whitepaper

AWS
re:Invent



Soup!



Soup!

Software
Of
Unknown
Provenance (or Pedigree)



IEC 62304

"SOFTWARE ITEM that is already developed and generally available and that has not been developed for the purpose of being incorporated in the MEDICAL DEVICE (also known as "off-the-shelf software") or software previously developed for which adequate records of the development PROCESSES are not available"



IEC 62304

“SOFTWARE ITEM that is already developed and generally available and that has not been developed for the purpose of being incorporated in the MEDICAL DEVICE (also known as “off-the-shelf software”) OR software previously developed for which adequate records of the development PROCESSES are not available”



Clear soup

In the context of IEC
62304:2006-

“It is **not prohibited** to use SOUP but **additional controls are needed** and the risk needs to be taken into account.”

Hobbs, Chris (2011-11-01). "[Device makers can take COTS, but only with clear SOUP](#)". *Medical Design.*





DIY



Soup

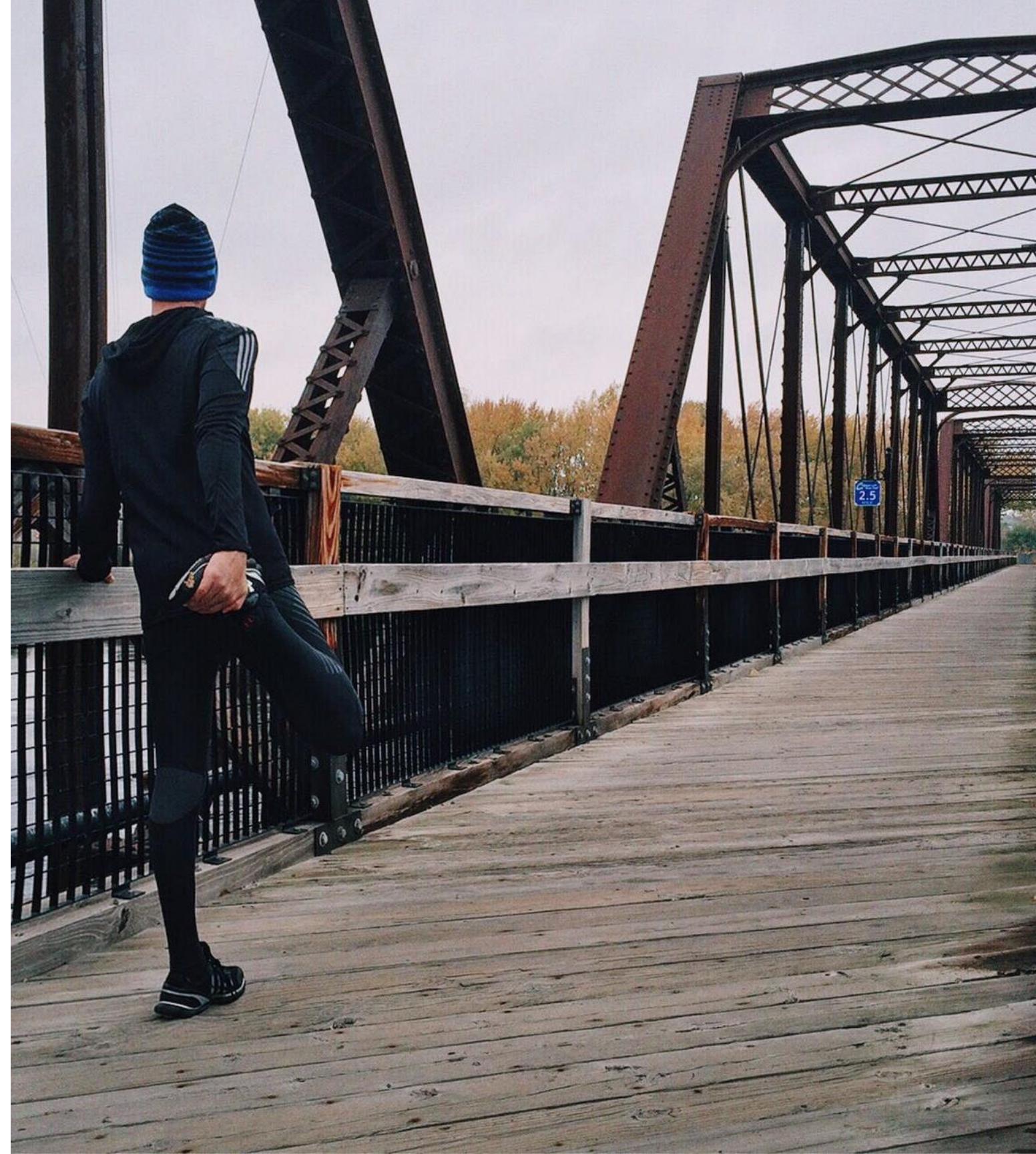


Clear Soup

Let's deploy a glucose meter

Use-case: Glucose meter

1. Gather our regulatory documents
2. Register 200,000 things
3. Searching and reporting
4. Analyze the data flow
5. Auditing your AWS environment
6. Where to go for help if you have an external audit



1. Gather the documentation

- Your compliance team
- AWS certifications, attestations and frameworks
- AWS Artifact
- AWS Architectures and Quick Starts
- AWS Whitepapers
- AWS online-documentation
- AWS Partners
- AWS Professional Services



But, it is a shared responsibility!



AWS Delivers
Security of the Cloud

Expert guidelines and resources to assist customers with compliant application development



Customer Responsibility
Security in the Cloud

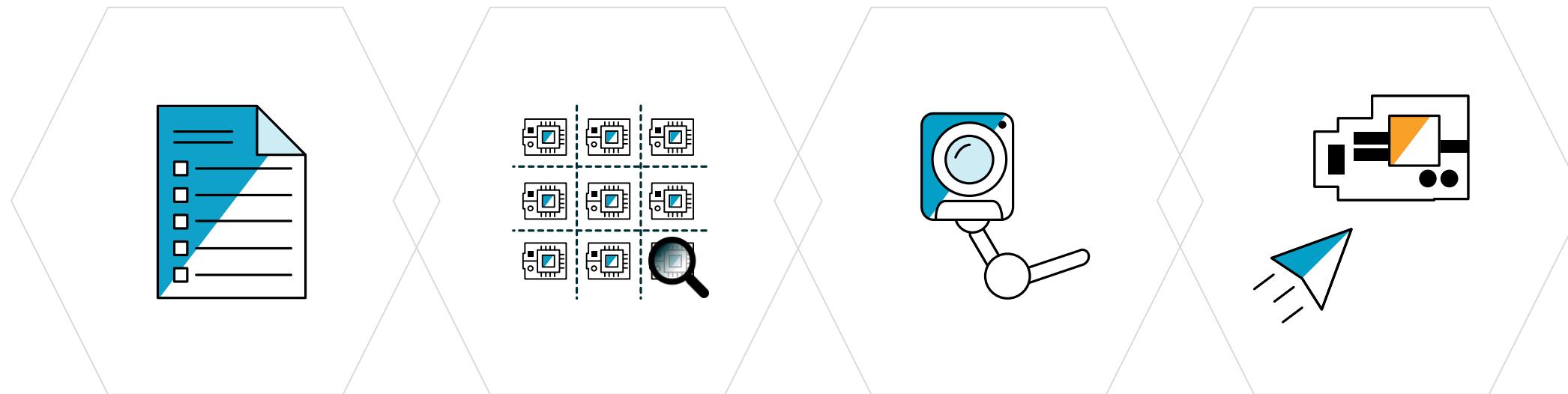
Develop, validate, and secure applications based on due diligence and expert consultation



AWS IoT Device Management

Device Management Service

AWS IoT Device Management helps you onboard, organize, monitor, and remotely manage your growing number of connected devices.



Batch Fleet
Provisioning

Real-time
Fleet Index & Search

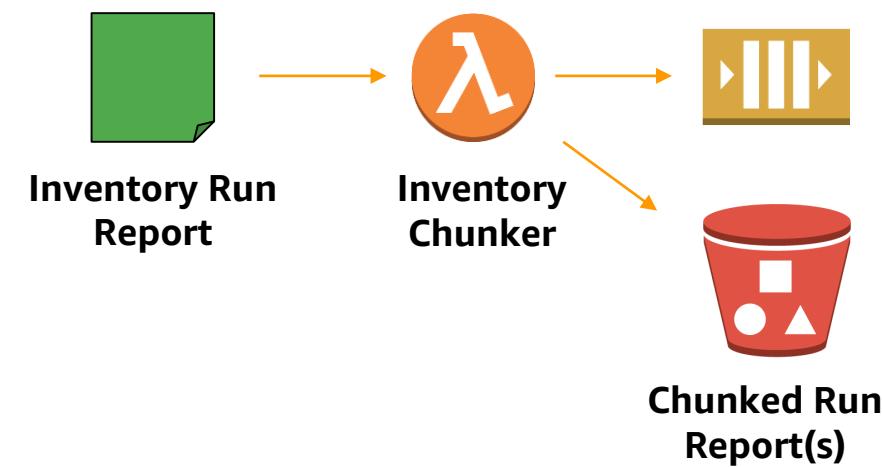
Fine Grained
Device Logging
& Monitoring

Over the
Air Updates

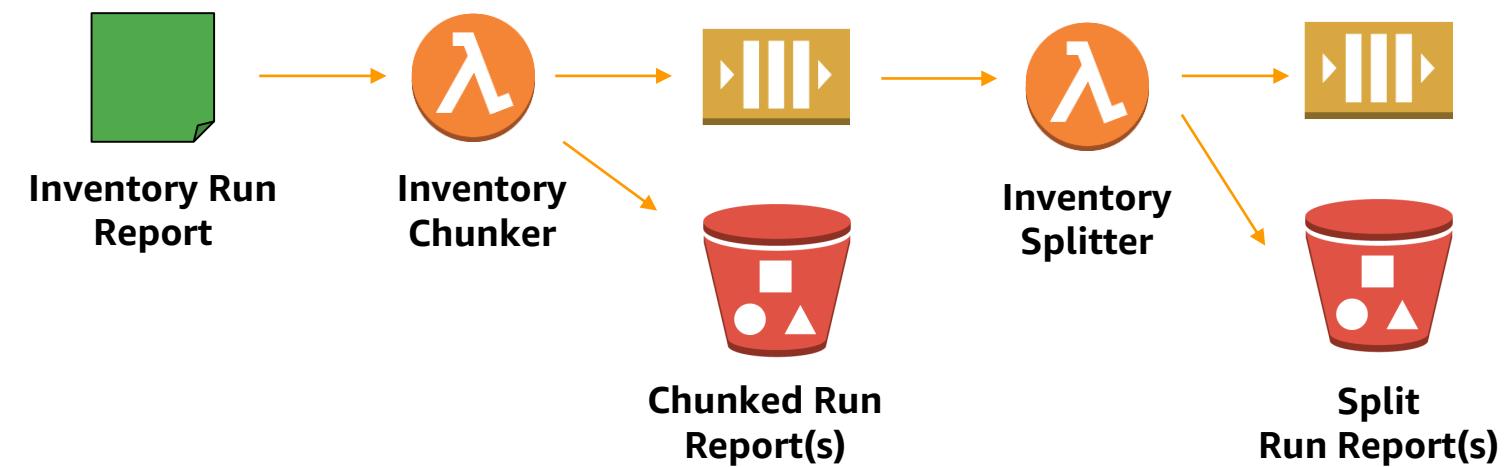
2. Register 200,000 things



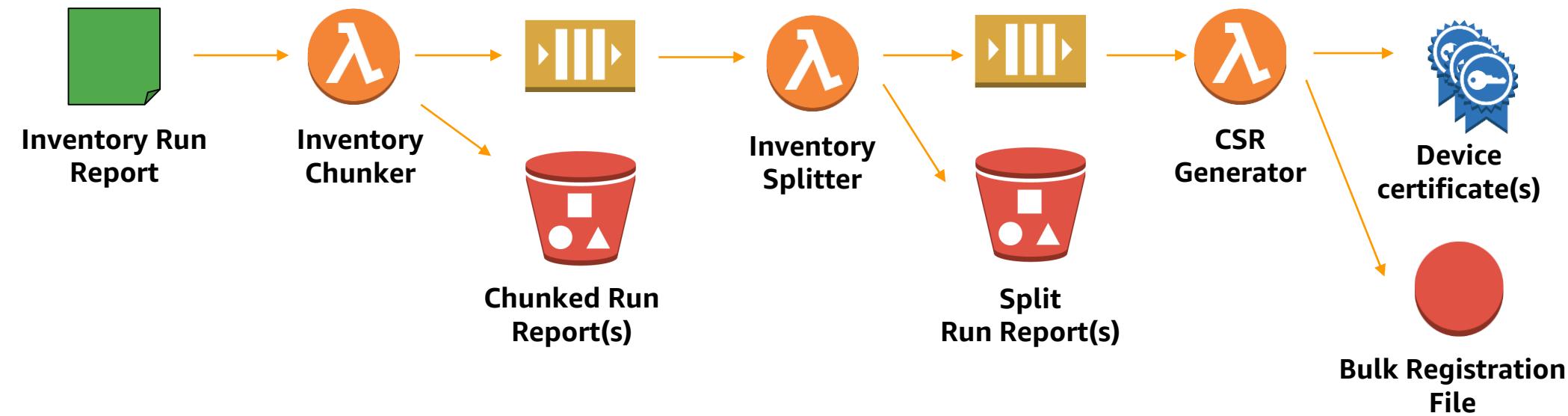
2. Register 200,000 things



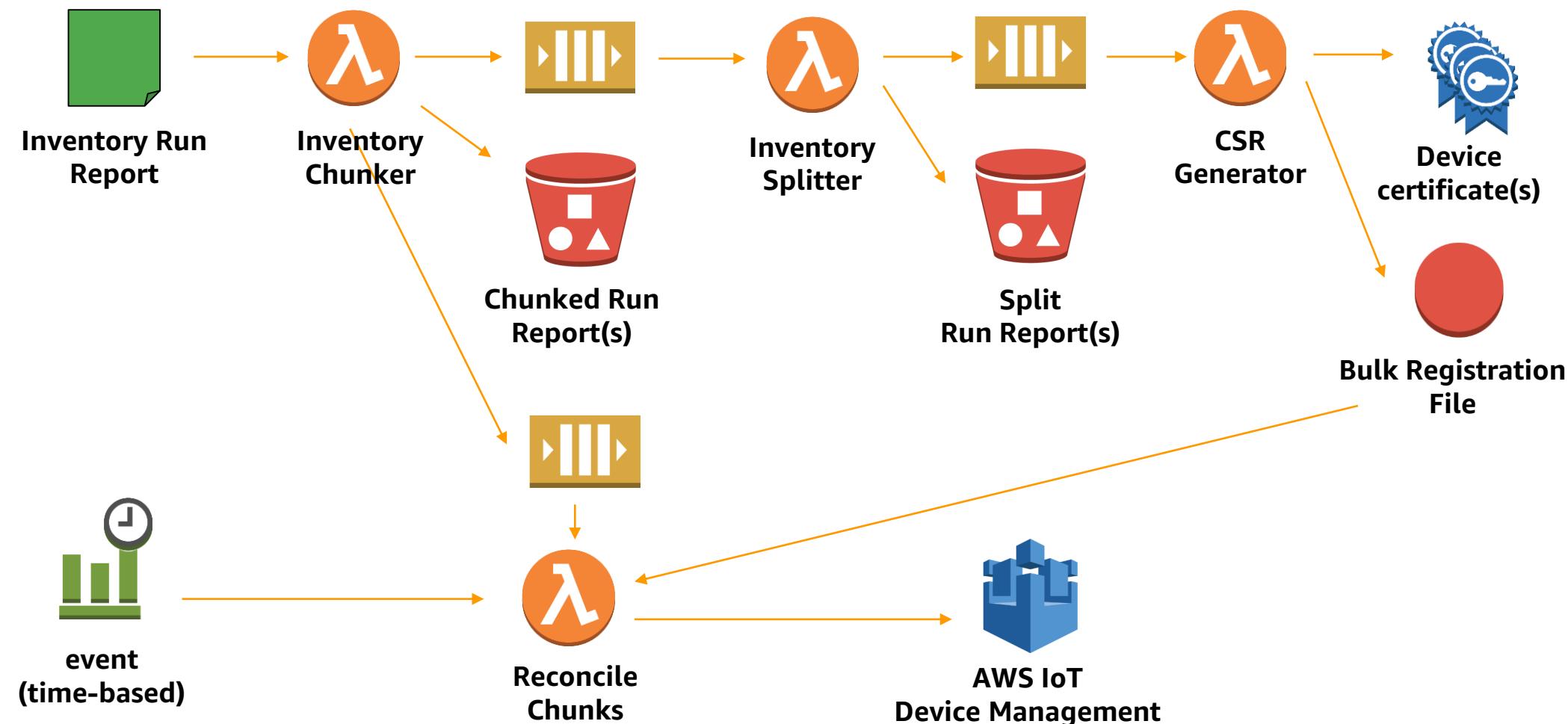
2. Register 200,000 things



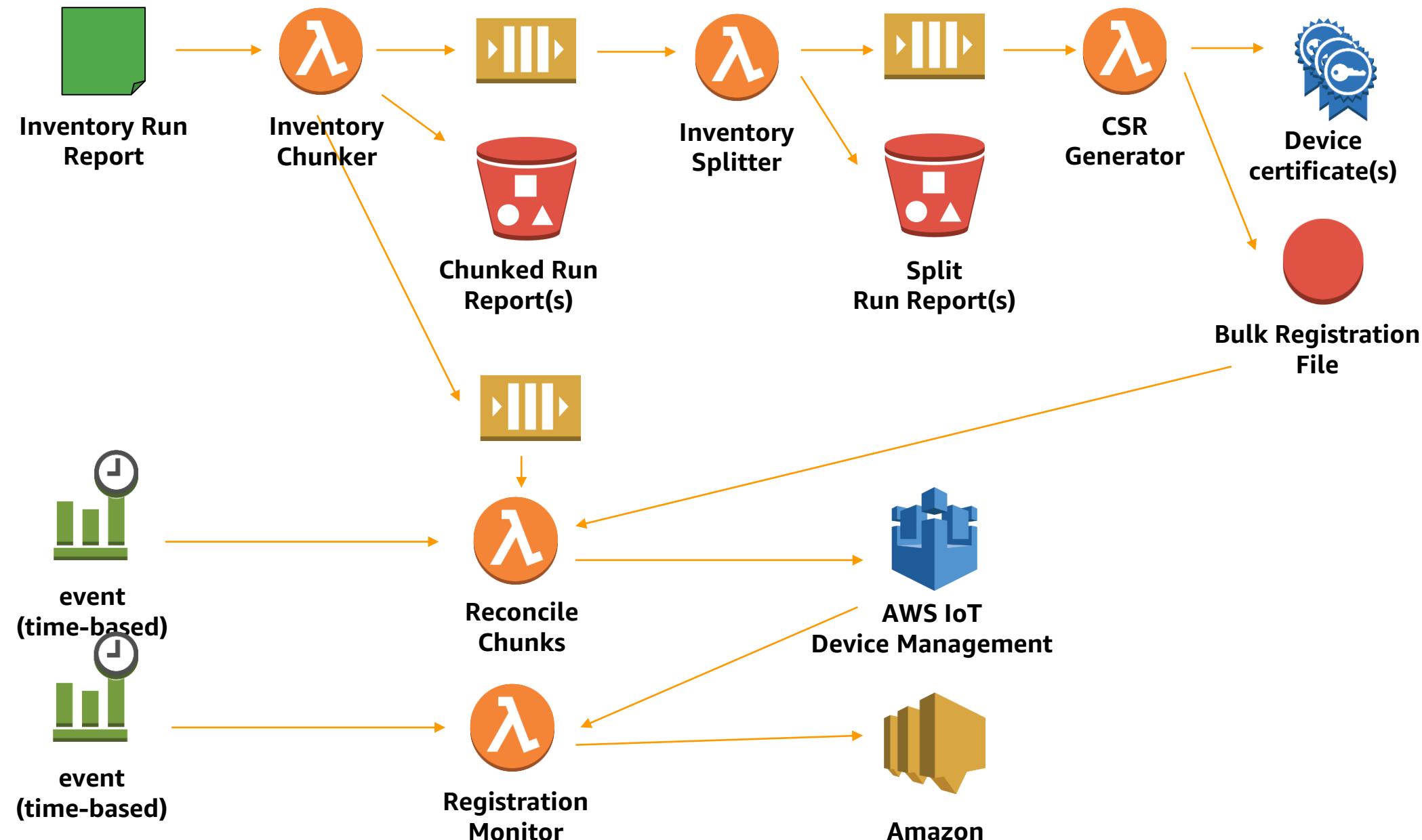
2. Register 200,000 things



2. Register 200,000 things



2. Register 200,000 things



2. Register 200,000 things

Lambda Job	Invocations	Memory	Price (per 100ms)	Dur	Price Total
Inventory Chunker	1	512GB	0.000000834	90s	\$0.0007506
Inventory Splitter	211	512GB	0.000000834	60s	\$0.1055844
CSR Generator	200,000/25/10 = 800	1535GB	0.000002501	33s	\$0.660264
Reconcile Chunks	211	512GB	0.000000834	22s	\$0.03871428
Registration Monitor	211	128GB	0.000000208	1s	\$0.000043888

2. Register 200,000 things

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S3 Storage	Total Storage	Price Total
Objects	50MB	\$0.0134765
S3 Get Requests		\$0.08

2. Register 200,000 things

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IoT Job	Things	Price total
Bulk Registration	200,000	Free

2. Register 200,000 things

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S3 Storage	Total Storage	Price Total
Objects	50MB	\$0.0134765
S3 Get Requests		\$0.08

IoT Job	Things	Price total
Bulk Registration	200,000	Free

Grand Total
±\$0.81 

2. Register 200,000 things

Building the template

```
{  
  "Parameters": {  
    "ThingName": {  
      "Type": "String"  
    },  
    "serial_number": {  
      "Type": "String"  
    },  
    "firmware_version": {  
      "Type": "String"  
    },  
    "CSR": {  
      "Type": "String"  
    }  
  }  
  ...  
}
```

2. Register 200,000 things

Building the template

{...

```
"Resources": {  
    "thing": {  
        "Type": "AWS::IoT::Thing",  
        "Properties": {  
            "ThingName": {  
                "Ref": "ThingName"  
            },  
            "AttributePayload": {  
                "version": "1",  
                "serial_number": {  
                    "Ref": "serial_number"  
                },  
                "firmware_version": {  
                    "Ref": "firmware_version"  
                }  
            }  
        }  
    }...  
}
```

2. Register 200,000 things

Building the template

{...

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"Resources": {  
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        "Properties": {  
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                "Ref": "ThingName"  
            },  
            "AttributePayload": {  
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                "serial_number": {  
                    "Ref": "serial_number"  
                },  
                "firmware_version": {  
                    "Ref": "firmware_version"  
                }  
            }  
        }  
    }...  
}
```

2. Register 200,000 things

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{...

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                "Ref": "ThingName"  
            },  
            "AttributePayload": {  
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                "serial_number": {  
                    "Ref": "serial_number"  
                },  
                "firmware_version": {  
                    "Ref": "firmware_version"  
                }  
            }  
        }...  
    }  
}
```

2. Register 200,000 things

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                    "Ref": "firmware_version"  
                }  
            }  
        }  
    }...  
}
```

2. Register 200,000 things

Building the template

{...

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            },  
            "AttributePayload": {  
                "version": "1",  
                "serial_number": {  
                    "Ref": "serial_number"  
                },  
                "firmware_version": {  
                    "Ref": "firmware_version"  
                }  
            }  
        }...  
    }  
}
```

2. Register 200,000 things

Building the template

{...

```
"certificate": {  
    "Type": "AWS::IoT::Certificate",  
    "Properties": {  
        "CertificateSigningRequest": {  
            "Ref": "CSR"  
        },  
        "Status": "ACTIVE"  
    }  
},  
"policy": {  
    "Type": "AWS::IoT::Policy",  
    "Properties": {  
        "PolicyDocument": "{\"Version\": \"2012-10-17\", \"Statement\": [{\"Effect\": \"Allow\", \"Action\": [\"iot:Publish\"], \"Resource\": [\"*\"]}]}"  
    }  
}
```

2. Register 200,000 things

Building the template

{...

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"certificate": {  
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        }  
    }  
}
```

2. Register 200,000 things

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{...

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"certificate": {  
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        "Properties": {  
            "PolicyDocument": "{\"version\": \"2012-10-  
17\", \"statement\": [{\"effect\": \"Allow\", \"action\":  
[\"iot:Publish\"], \"resource\": [\"*\"]}]}"  
        }  
    }  
}
```

re:Invent

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2. Register 200,000 things

Sample specification file

```
{"serial_number": "50000010", "firmware_version": "1.2.0.6", "ThingName":  
"NextGenerationGlucoseMeter_7e21a14d-57d4-4f36-840d-ff2fe95c59aa", "CSR": "-----BEGIN  
CERTIFICATE SNIP END CERTIFICATE REQUEST-----"}
```

```
{"serial_number": "50000009", "firmware_version": "1.2.0.6", "ThingName":  
"NextGenerationGlucoseMeter_924ca6a8-4e59-4d0e-8fa0-bd6e7c553873", "CSR": "-----BEGIN  
CERTIFICATE REQUEST----- snip END CERTIFICATE REQUEST-----"}
```

2. Register 200,000 things

Running the task

```
$ aws iot start-thing-registration-task --template-body file:///home/ec2-user/bulk.template --input-file-bucket clm-iotreinvent --input-file-key bulk_import.json --role-arn arn:aws:iam::123456789012:role/bulk_iot_import_role  
{  
    "taskId": "83f796b3-77e4-4f33-8405-d8d1fc0b27c3"  
}
```

2. Register 200,000 things

Running the task

```
$ aws iot start-thing-registration-task --template-body file:///home/ec2-user/bulk.template --input-file-bucket clm-iotreinvent --input-file-key bulk_import.json --role-arn arn:aws:iam::123456789012:role/bulk_iot_import_role
```

```
{
```

```
    "taskId": "83f796b3-77e4-4f33-8405-d8d1fc0b27c3"
```

```
}
```

2. Register 200,000 things

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{  
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}
```

2. Register 200,000 things

Running the task

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```

```
{
```

```
"taskId": "83f796b3-77e4-4f33-8405-d8d1fc0b27c3"
```

```
}
```

2. Register 200,000 things

Seeing the results

```
$aws iot describe-thing-registration-task --task-id 83f796b3-77e4-4f33-8405-d8d1fc0b27c3
```

```
{  
  "status": "Completed",  
  "successCount": 1000,  
  "creationDate": 1539349774.76,  
  "templateBody": "snip"  
  "lastModifiedDate": 1539349788.434,  
  "roleArn": "arn:aws:iam::123456789012:role/iot-bulk-provisioning-role",  
  "inputFileKey": "bulk_import.json",  
  "inputFileBucket": "clm-iotreinvent",  
  "taskId": "83f796b3-77e4-4f33-8405-d8d1fc0b27c3",  
  "failureCount": 0,  
  "percentageProgress": 100  
}
```

2. Register 200,000 things

Seeing the results

```
$aws iot describe-thing-registration-task --task-id 83f796b3-77e4-4f33-8405-d8d1fc0b27c3
```

```
{  
  "status": "Completed",  
  "successCount  "creationDate": 1539349774.76,  
  "templateBody": "snip"  
  "lastModifiedDate": 1539349788.434,  
  "roleArn": "arn:aws:iam::123456789012:role/iot-bulk-provisioning-role",  
  "inputFileKey": "bulk_import.json",  
  "inputFileBucket": "clm-iotreinvent",  
  "taskId": "83f796b3-77e4-4f33-8405-d8d1fc0b27c3",  
  "failureCount": 0,  
  "percentageProgress": 100  
}
```

2. Register 200,000 things

Seeing the results

```
$ aws iot list-thing-registration-task-reports --task-id eacb0860-e99a-1234-5678-f7a976fc2408 --report-type RESULTS
```

```
$ aws iot list-thing-registration-task-reports --task-id eacb0860-e99a-1234-5678-f7a976fc2408 --report-type ERRORS
```

```
{
```

```
  "resourceLinks": [
```

```
    "https://aws-iot-btp-prod-eu-west-1.s3.eu-west-1.amazonaws.com/123456789012/83f796b3-77e4-4f33-8405-d8d1fc0b27c3/failed/83f796b3-77e4-4f33-8405-d8d1fc0b27c3-1?X-Amz-Security-Token=...Snip" ],
```

```
  "reportType": "ERRORS"
```

```
}
```

2. Register 200,000 things

The screenshot shows a blog post from the AWS IoT Device Management Services blog. The post is titled "Deploy Fleets Easily with AWS IoT Device Management Services" and is authored by Chris Snowden on January 11, 2018. The post discusses the potential of the Internet of Things (IoT) and how AWS IoT Device Management Services simplify provisioning and managing connected things. It highlights the complexity of managing large fleets of devices and how the service enables bulk provisioning.

RELATED POSTS

New- AWS IoT Device Management	Connect your devices to AWS IoT using LoRaWAN	Configuring Cognito User Pools to Communicate with AWS IoT Core	AWS IoT Device Defender Now Available – Keep Your Connected Devices Safe	Can robots and humans work together? ProGlove CTO Valentin Sawadski says yes	Usin with Man
--------------------------------	---	---	--	--	---------------

The Internet of Things on AWS – Official Blog

Deploy Fleets Easily with AWS IoT Device Management Services

by Chris Snowden | on 11 JAN 2018 | in AWS IoT Device Management, Internet Of Things | Permalink | [Share](#)

Introduction

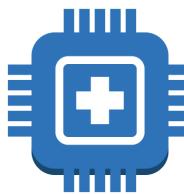
The Internet of Things (IoT) offers the potential for data acquisition and digital interaction in areas previously inaccessible at an unprecedented scale. The magnitude of this opportunity affects individuals, organizations, and governments in many different ways. In manufacturing, for example, many makers of existing products are racing to integrate connected features into their offerings and deliver these products to the market in substantial quantities. Startups and other organizations are creating completely new product lines built around connectability and cloud-based service integration.

In order to address the complexity of provisioning and managing connected things manufacturers need ways to simplify and automate tasks like provisioning device identities and providing those identities to the devices as they are being manufactured in a secure and repeatable fashion. Enabling this formidable task is a new feature from the AWS IoT Device Management service that enables bulk provisioning of connected things.

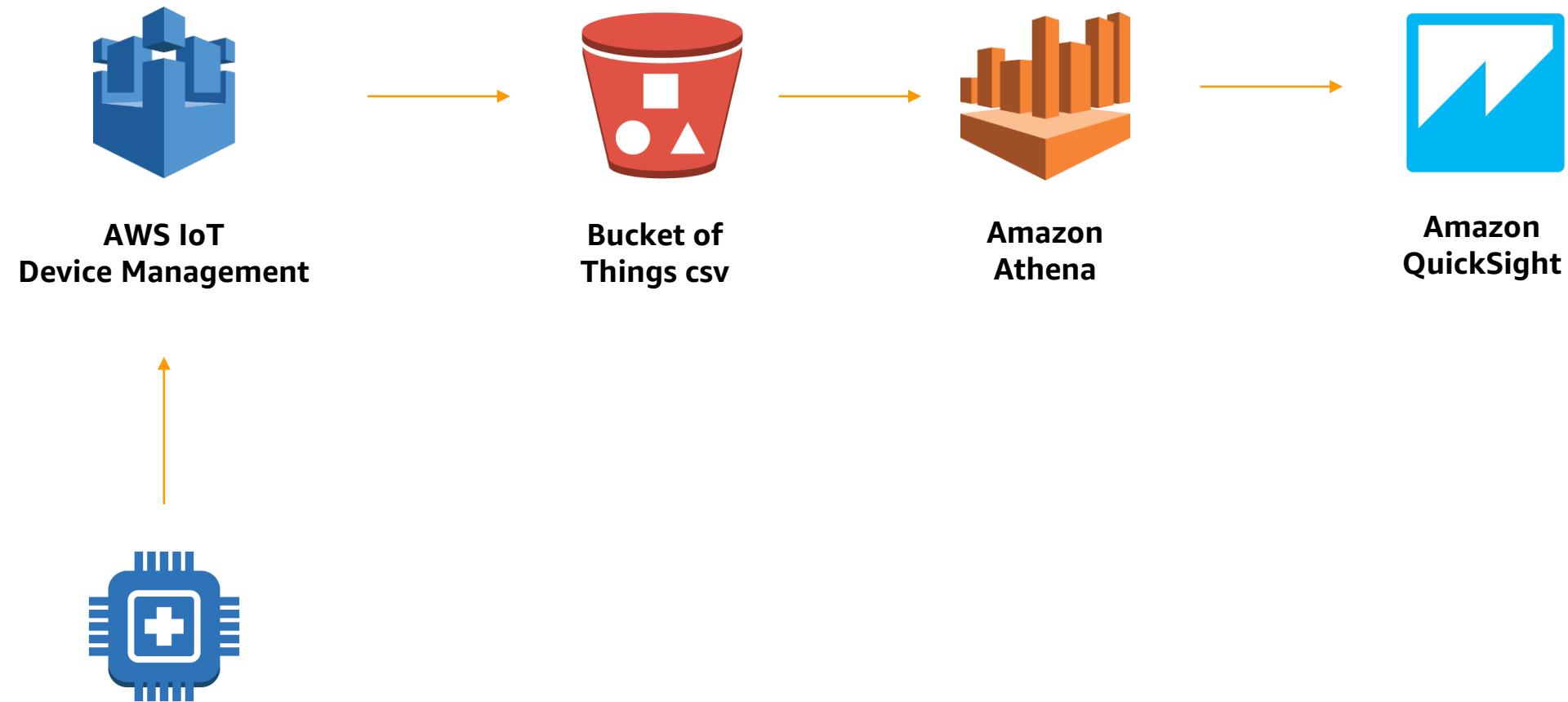
3. Searching and reporting



**AWS IoT
Device Management**



3. Searching and reporting



3. Searching and reporting

```
$ aws iot list-things --attribute-name "manufacturer" --attribute-value "ACME"  
  
{"things": [ {  
  
    "thingTypeName": "GlucoseMeter",  
  
    "thingArn": "arn:aws:iot:...:thing/NextGenerationGlucoseMeter_..d6c4b",  
  
    "thingName": "NextGenerationGlucoseMeter_20ffe7e2-4df3-4765-b173-db99819d6c4b",  
  
    "attributes": {  
  
        "firmware_signature": "019217bbeefdf69a9b16dd59f9d265e5",  
  
        "firmware_version": "1.2.0.4",  
  
        "manufacturer": "ACME"  
    } } ] }
```

3. Searching and reporting

The screenshot shows the AWS IoT Query interface. At the top, there are two tabs: "New query 1" and "New query 2" (which is selected, indicated by an orange border). Below the tabs is a code editor containing the following SQL-like query:

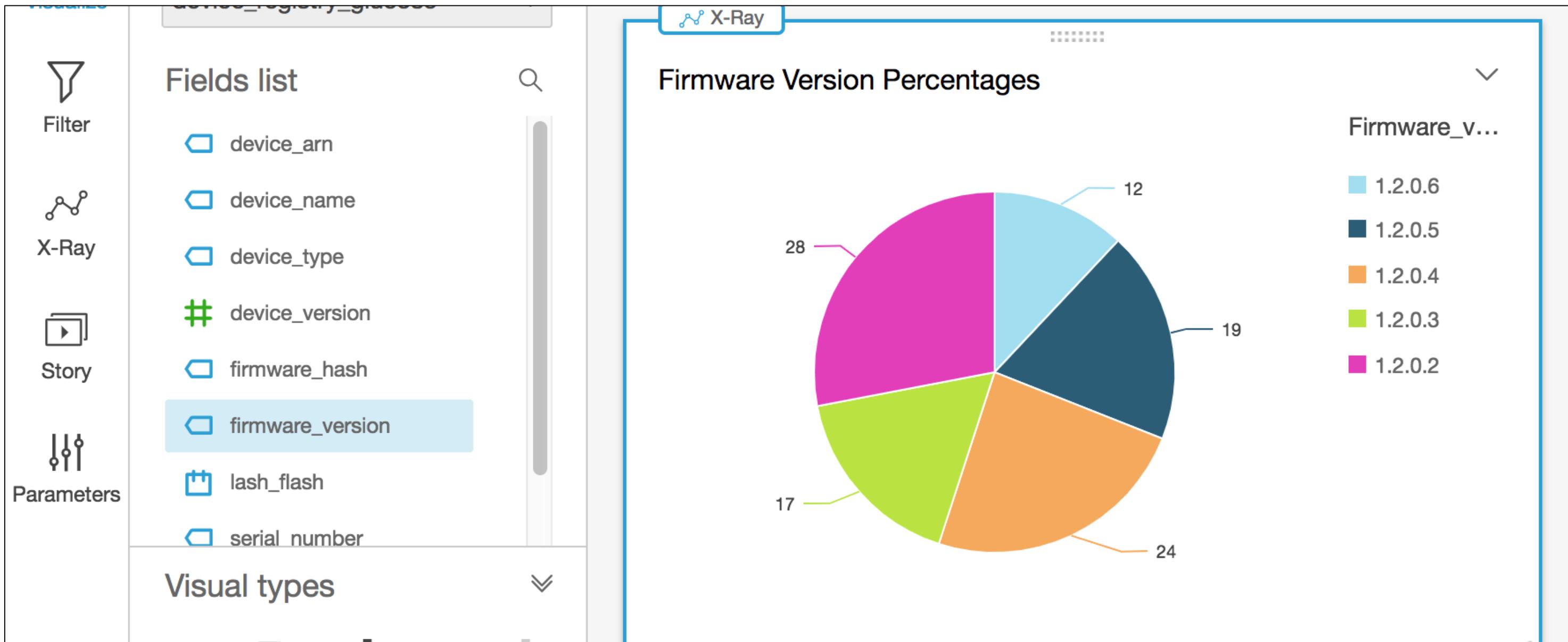
```
1 select device_arn, serial_number from device_registry_glucose where firmware_version like '1.2.0.4'
```

Below the code editor are several buttons: "Run query" (highlighted in blue), "Save as", "Create view from query", "(Run time: 1.72 seconds, Data scanned: 27.12KB)", "Format query", and "Clear". A note below the buttons says "Use Ctrl + Enter to run query, Ctrl + Space to autocomplete".

The main area is titled "Results" and contains a table with two columns: "device_arn" and "serial_number". The results are listed as follows:

device_arn	serial_number
1 arn:aws:iot:eu-west-1:789539825478:thing/NextGenerationGlucoseMeter_0a164749-7014-44ec-9cb3-c8ee580a3271	3341061988387490000
2 arn:aws:iot:eu-west-1:789539825478:thing/NextGenerationGlucoseMeter_14d70883-86d4-42ac-9e3e-5603b50c4538	3188163829542750000
3 arn:aws:iot:eu-west-1:789539825478:thing/NextGenerationGlucoseMeter_17896b5e-1c81-404c-b4ff-c50f479e1e70	3271762875009260000
4 arn:aws:iot:eu-west-1:789539825478:thing/NextGenerationGlucoseMeter_27acf81d-46ad-4e2a-85f4-e4a9ea52028a	2069138410306270000
5 arn:aws:iot:eu-west-1:789539825478:thing/NextGenerationGlucoseMeter_3783dc77-0cb2-4d6b-bdf6-e18fcf640055	6067094750898310000
6 arn:aws:iot:eu-west-1:789539825478:thing/NextGenerationGlucoseMeter_3bca6fb4-d728-41fb-93a6-7dedbcfe793	2144789115412910000

3. Searching and reporting



4. Analyzing data flow (with Amazon CloudWatch logs)

Broker

- Connect / Disconnect
- Subscribe
- Publish-in / Publish-out

Shadow

- Get/Update/DeleteThingShadow

Rules

- RuleMatch
- StartExecution
- RuleExecution

Job

- Start/Update/Describe
- ReportFinalJobExecutionCount



4. Analyzing data flow

CloudWatch logs

```
{  
  "timestamp": "2017-08-10 15:39:30.961",  
  "logLevel": "INFO",  
  "traceId": "672ec480-31ce-fd8b-b5fb-22e3ac420699",  
  "accountId": "123456789012",  
  "status": "Success",  
  "eventType": "Publish-In",  
  "protocol": "MQTT",  
  "topicName": "$aws/things/NextGenerationGlucoseMeter_...-db99819d6c4b/shadow/get",  
  "clientId": "NextGenerationGlucoseMeter_20ffe7e2...-db99819d6c4b",  
  "principalId": "145179c40e2219e18a909d896a5340b74cf97a39641beec2fc3eeafc5a932167",  
  "sourceIp": "205.251.233.181",  
  "sourcePort": 13490  
}
```

4. Analyzing data flow

CloudWatch logs

```
{  
  "timestamp": "2017-08-10 15:39:30.961",  
  "logLevel": "INFO",  
  "traceId": "672ec480-31ce-fd8b-b5fb-22e3ac420699",  
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  "principalId": "145179c40e2219e18a909d896a5340b74cf97a39641beec2fc3eeafc5a932167",  
  "sourceIp": "205.251.233.181",  
  "sourcePort": 13490  
}
```

Tracing through CloudWatch logs

```
{  
  "timestamp": "2017-08-10 16:32:46.002",  
  "logLevel": "INFO",  
  "traceId": "30aa7ccc-1d23-0b97-aa7b-76196d83537e",  
  "accountId": "123456789012",  
  "status": "Success",  
  "eventType": "RuleMatch",  
  "clientId": "NextGenerationGlucoseMeter_20ffe7e2...-db99819d6c4b",  
  "topicName": "rules/myRuleTopic",  
  "ruleName": "MyImportantBusinessRule",  
  "principalId": "145179c40e2219e18a909d896a5340b74cf97a39641beec2fc3eeafc5a932167"  
}
```

Tracing through CloudWatch logs

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{  
  "timestamp": "2017-08-10 16:32:46.002",  
  "logLevel": "INFO",  
  "traceId": "30aa7ccc-1d23-0b97-aa7b-76196d83537e",  
  "accountId": "123456789012",  
  "status": "Success",  
  "eventType": "RuleMatch",  
  "clientId": "NextGenerationGlucoseMeter_20ffe7e2..-db99819d6c4b",  
  "topicName": "rules/myRuleTopic",  
  "ruleName": "MyImportantBusinessRule",  
  "principalId": "145179c40e2219e18a909d896a5340b74cf97a39641beec2fc3eeafc5a932167"  
}
```

Tracing through CloudWatch logs

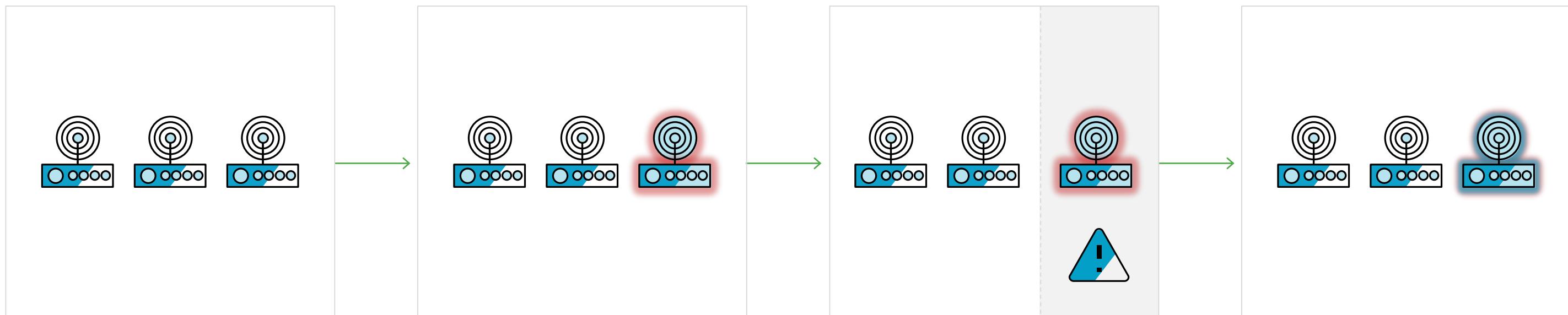
```
{  
  "timestamp": "2017-08-10 16:32:46.002",  
  "logLevel": "INFO",  
  "traceId": "30aa7ccc-1d23-0b97-aa7b-76196d83537e",  
  "accountId": "123456789012",  
  "status": "Success",  
  "eventType": "RuleMatch",  
  "clientId": "NextGenerationGlucoseMeter_20ffe7e2...-db99819d6c4b",  
  "topicName": "rules/myRuleTopic",  
  "ruleName": "MyImportantBusinessRule",  
  "principalId": "145179c40e2219e18a909d896a5340b74cf97a39641beec2fc3eeafc5a932167"  
}
```



AWS IoT Device Defender

Keep Your Fleet Secure

AWS IoT Device Defender is a fully managed IoT security service that enables you to secure your fleet of connected devices on an ongoing basis



Audit device configurations, define and monitor device behavior
AWS re:Invent

Identify drifts in security settings and detect device anomalies

Generate alerts

Patch security vulnerabilities

5. Audit your AWS Environment (starting with your IoT estate)

An AWS IoT Device Defender audit looks at account and device-related settings and policies to ensure security measures are in place

CREATE AN AUDIT
Create a new audit

Checks

Don't see an audit check? It may not yet be enabled in the service. You can enable additional checks in the Check settings panel.

Available checks

Check name	Severity	Resource type
Authenticated Cognito role overly permissive ?	Critical	Cognito pool
CA certificate revoked but device certificates still active (Critical)		CA certificate
Device certificate shared ?	Critical	Device certificate
IoT policies overly permissive ?	Critical	Policy
Unauthenticated Cognito role overly permissive ?	Critical	Cognito pool
Device identity shared ?	High	Client ID
CA certificate expiring ?	Medium	CA certificate
Device certificate expiring ?	Medium	Device certificate
Revoked device certificate still active ?	Medium	Device certificate
Logging disabled ?	Low	Account settings

Set schedule

You can run a one time audit or schedule a recurring one depending on your needs.

Recurrence [?](#)

Run audit daily

Name

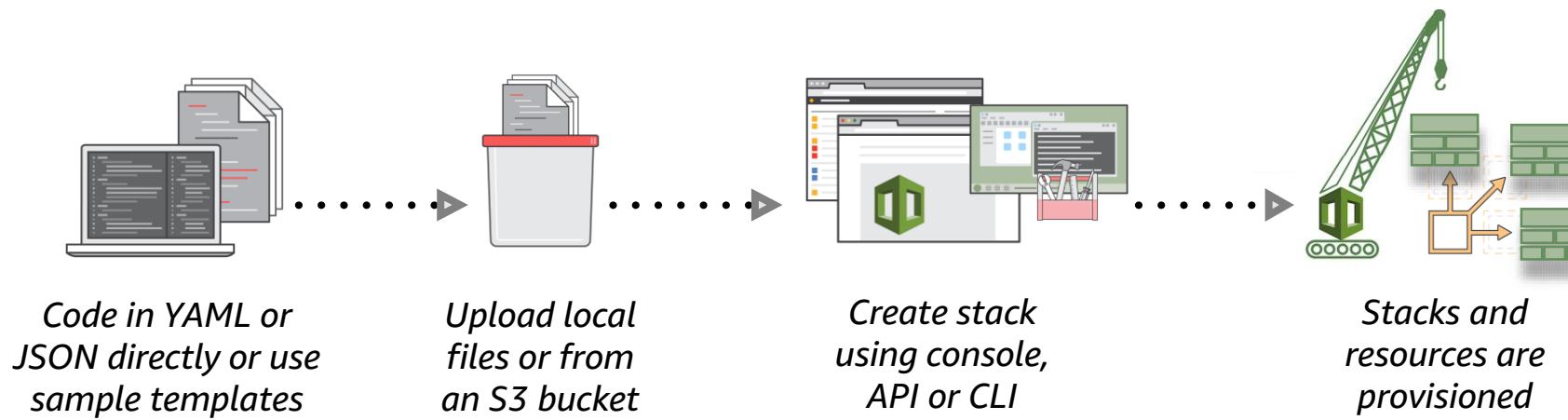
Enter an Audit name



AWS CloudFormation

Infrastructure as Code

AWS CloudFormation provides a common language for you to describe and provision all the infrastructure resources in your cloud environment

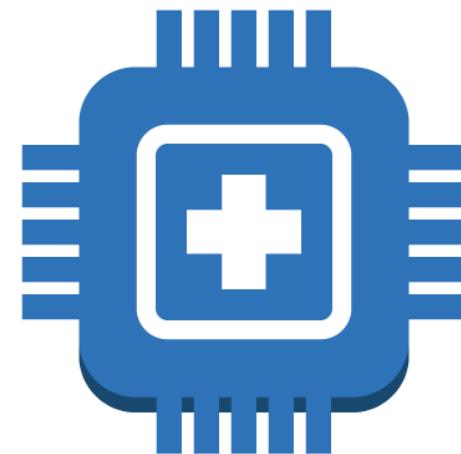




AWS Config

Maintain Visibility

With AWS Config, assess, audit, and evaluate the configurations of your AWS resources



5. Using AWS services to maintain level of compliance across the AWS estate

AWS logo

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[AWS Security Blog](#)

How to Automate HIPAA Compliance (Part 1): Use the Cloud to Protect the Cloud

by Christopher Crosbie | on 15 FEB 2016 | in [Compliance, How-To](#) | [Permalink](#) | [Comments](#) | [Share](#)

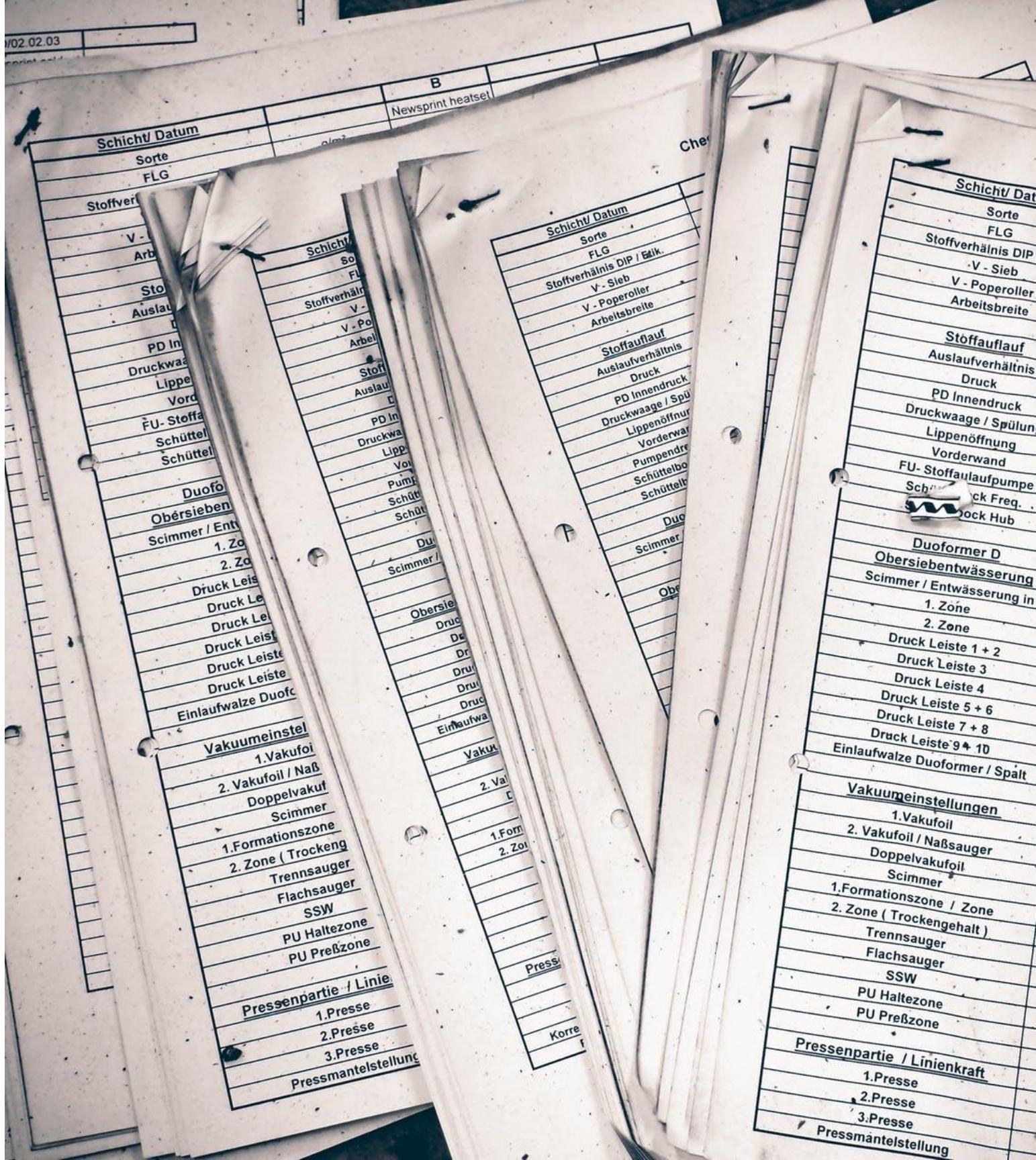


The United States healthcare ecosystem is highly complex. It is composed of review boards, regulating bodies, government agencies, pharmaceutical companies, insurance payers, and a mix of public and private provider entities, all of which intersect and overlap. Underlying this system lies highly sensitive patient data, which is governed by the [U.S. Health Insurance Portability and Accountability Act \(HIPAA\)](#). This law and its implementing regulations, much like the system they protect, can be complex. Automating and improving a typical HIPAA compliance process can improve the security, speed, and reliability of an entity's application of the healthcare rules.

Where, though, should you start with such process improvements? As AWS Principal Security Consultant Hart Rossman said at AWS re:Invent 2015 during the breakout session, [Architecting for End-to-End Security in the Enterprise](#): "You've

6. Where to go for help if you have an external audit

- Reach out to your AWS Account Team
- Audit support from AWS Professional Services



In summary

- IoT is growing rapidly across all industries
- Most industries classify AWS as **COTS** or **Clear Soup**
- There are many tools to help provide clarity across your AWS environment
- It's easy to get started (even at large scale in a regulated environment)

Philips experience with AWS IoT

Philips HealthSuite Digital Platform



11M IoT devices
connected via HSDP
30+ products on HSDP
from Philips and 3rd parties

Philips HealthSuite Digital Platform

Regulatory Domains & Certifications

US

- Medical Device Quality System Regulation (QS regulation) - 21 CFR Part 820
- HIPAA Rules - 45 CFR Part 164 - Security and Privacy (HHS Regulation under HIPAA) - United States
- California Consumer Protection Act

EU

- Medical Device Regulation – updated 2018
- General Data Protection Regulation

China:

- China's Cybersecurity law ("CSL") and data localization
- [Law of the People's Republic of China on Protection of Consumer Rights and Interests](#)

Security & Privacy Regulatory Requirements: a constantly shifting landscape

Inconsistent regulations region-to-region

Changing rules for existing data

Increasingly Mobile Population

Withdrawal of consent

Conflicts between Security & Privacy Regulations Rules

Regulated IoT Use Cases in Healthcare

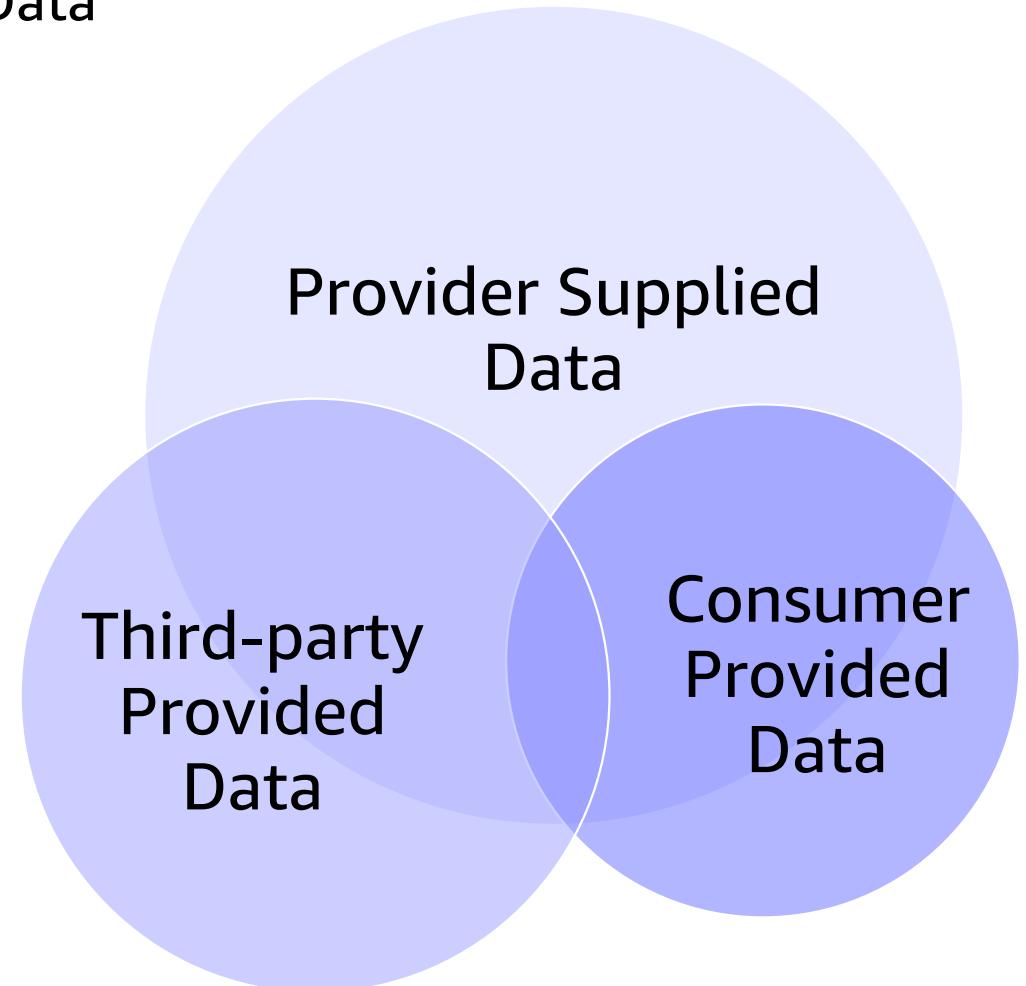
Collecting & Analyzing a Mobile Users Health & Wellness Data

- Smartwatches
- Wearable Sensors
- User Provided Data (Manual Entry)

Combined Use of Clinical and Consumer Provided Data

- Provider Supplied Data -> Permanent Record
- Consumer Provided Data -> Conditional Consent

Withdrawal of Consent -> Right to Forget



Key Controls for Regulated IoT Data

Tracking Consent & Context in IoT

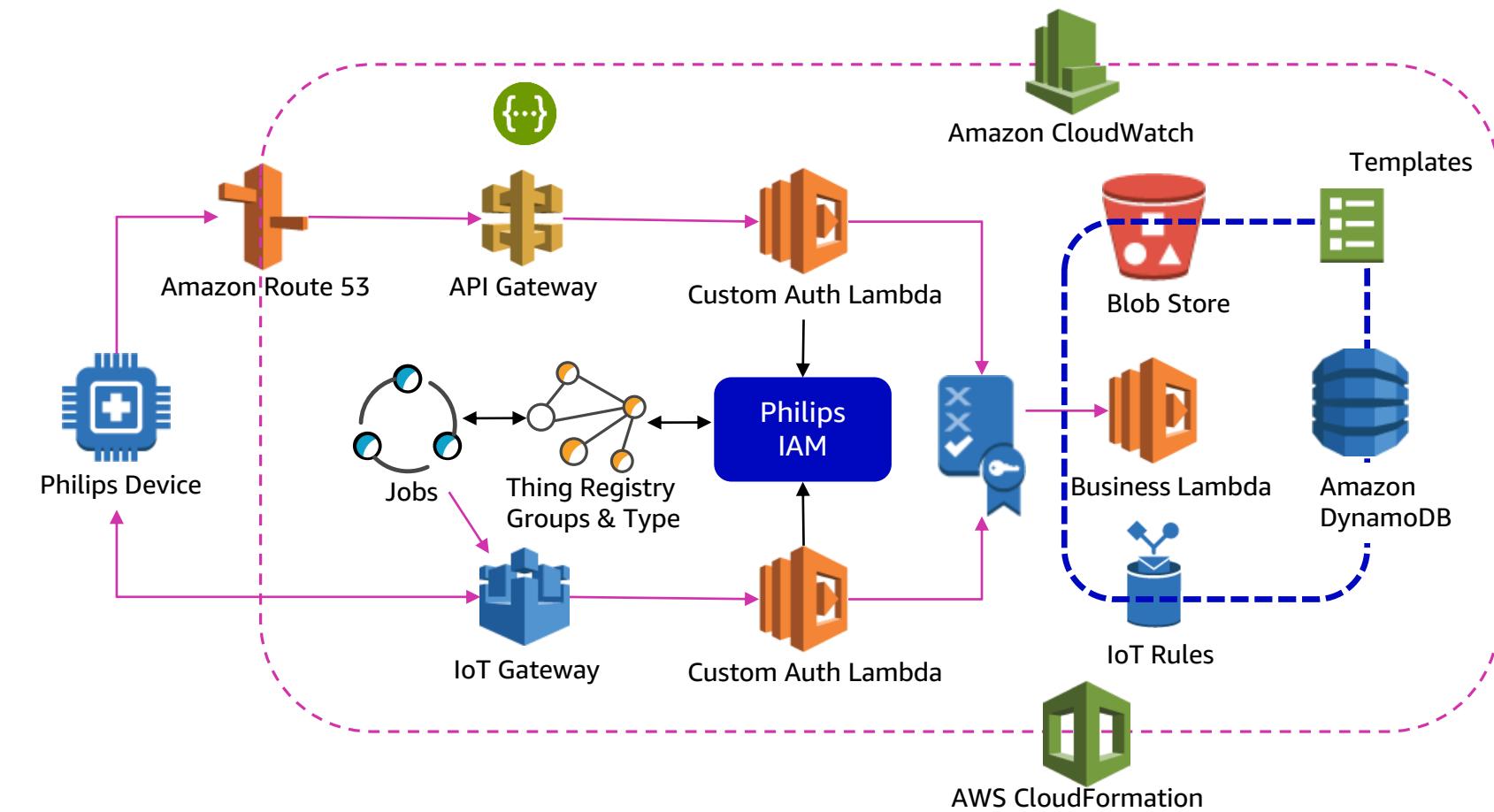
- Locale
- Time
- Condition

Preventing Data Leakage

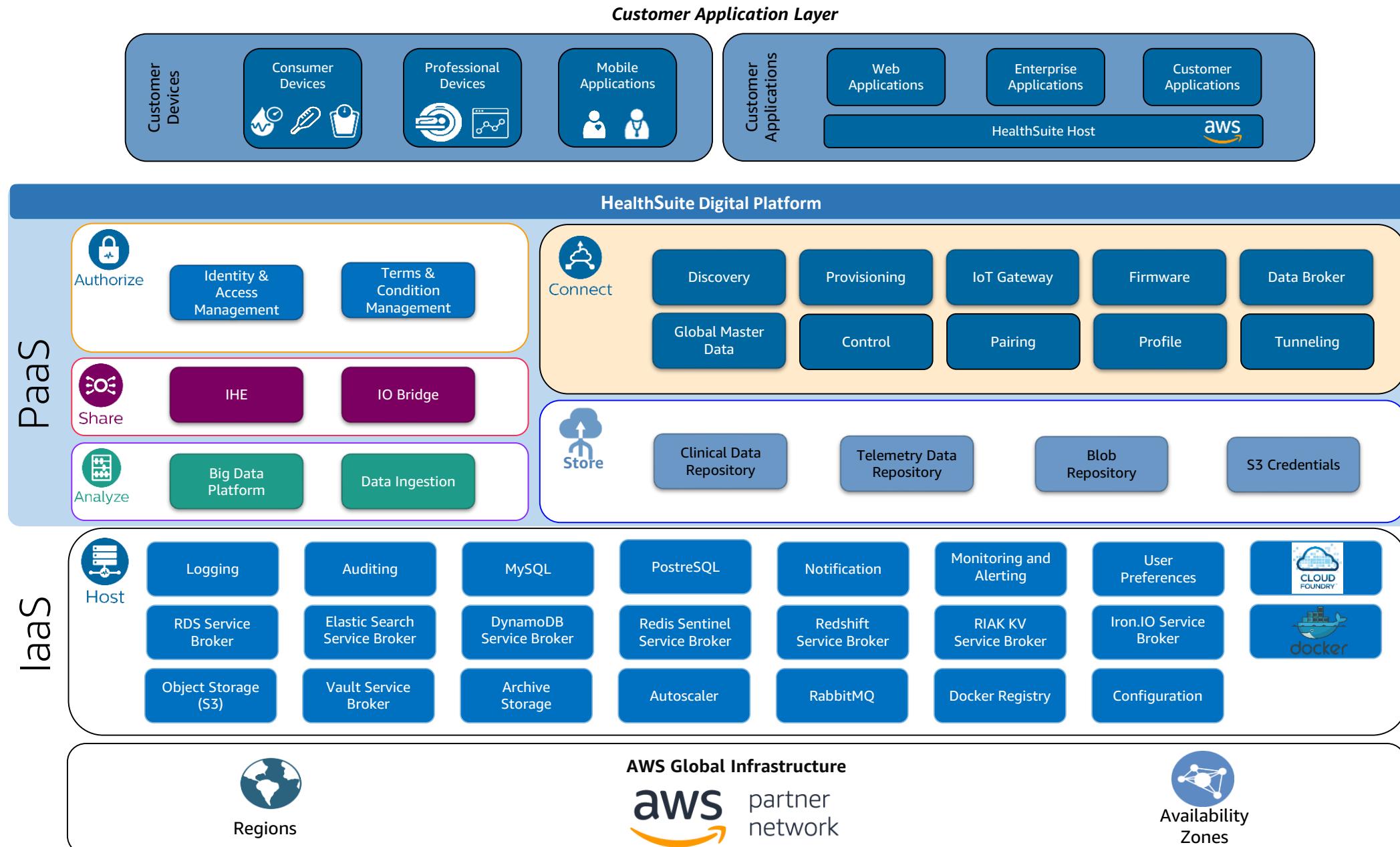
- Reduce the need for export
- Track every access
- Restrict Access
- Eliminate what you don't need

Object Level Controls

- Retroactive Control Updates
- Fine Grained Policy Mechanisms



Philips HealthSuite Digital Platform



Thank you!



Please complete the session
survey in the mobile app.