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Experience IoT through the use of AWS IoT Buttons

CETPA

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How are you using IoT?

Respond at **PollEv.com/sburt** Text **SBURT** to **37607** once to join, then **A, B, C, D, E...**

Facilities management	**A**
Classroom instruction	**B**
Transportation	**C**
Maintenance	**D**
Nothing (yet)	**E**
Other	**F**

Welcome

1. Introductions
2. About AWS in K12 education
3. The Internet of Things
4. How IoT is being used in education
5. AWS IoT Button
    a. Demo
    b. Schema
    c. Code snippets
6. How you can use AWS IoT Buttons
    a. Ideas, opportunities, and cost

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Presentation resources

www.k12blueprint.com/cetpa

About your presenters

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Benefits of Cloud in Education

Security

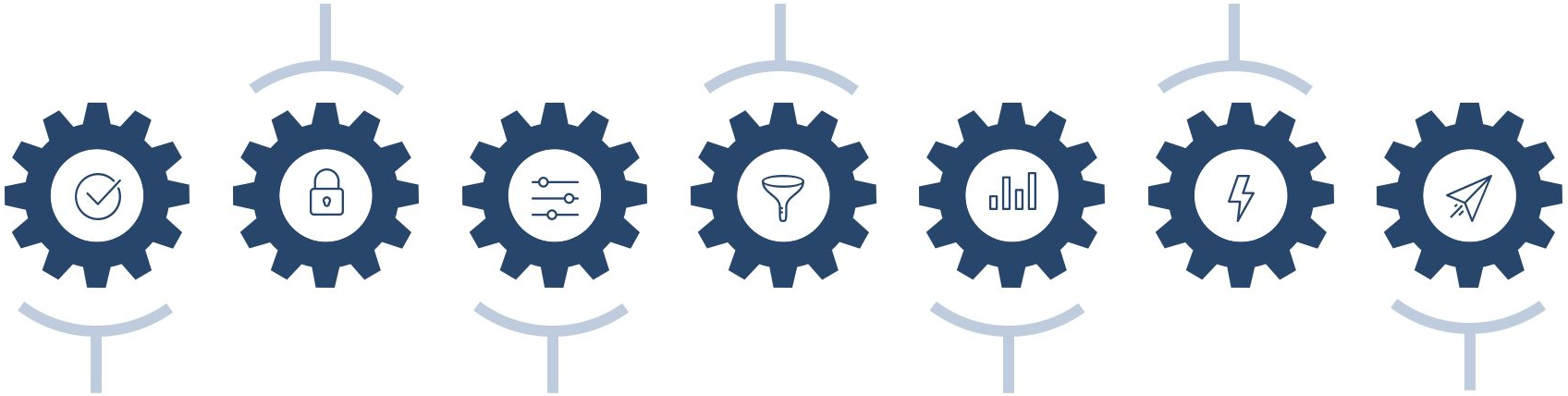
Highest levels of security developed for government & enterprise.

Simplification

Stop guessing at capacity.

Experimentation

Sandbox new services while minimizing risk.



Efficiency

Benefit from massive economies of scale.

Equity

Provide equal access to services for all.

Analytics

Democratize data for all stakeholders.

Agility

Increase speed and flexibility.

CoSN
LEADING EDUCATION INNOVATION

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AWS in K12 education

- **Lower costs** and reallocate resources so you can deliver more efficient and equitable solutions.
- **Innovate faster** and solidify your education services by merging agility with experience and resources.
- **Reduce risk** by focusing resources dedicated to security, compliance and availability to the most important areas of your district.
- **Customize services** by utilizing flexible offerings that provide just-in-time solutions for students, educators, and your community.
- **Improve equity** by leveraging data analytics, virtualization, and AI tools.

* aws.amazon.com/education/K12-primary-ed

The Internet of Things

"The interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data."

* wikipedia.org/wiki/Internet_of_things

How IoT is being used in education

- Monitor hardware and reduce operational costs
- Improve building safety
- Enhance access to information
- Develop smart lesson plans such as using sensor gloves to teach sign language

* businessinsider.com/internet-of-things-education-2016-9

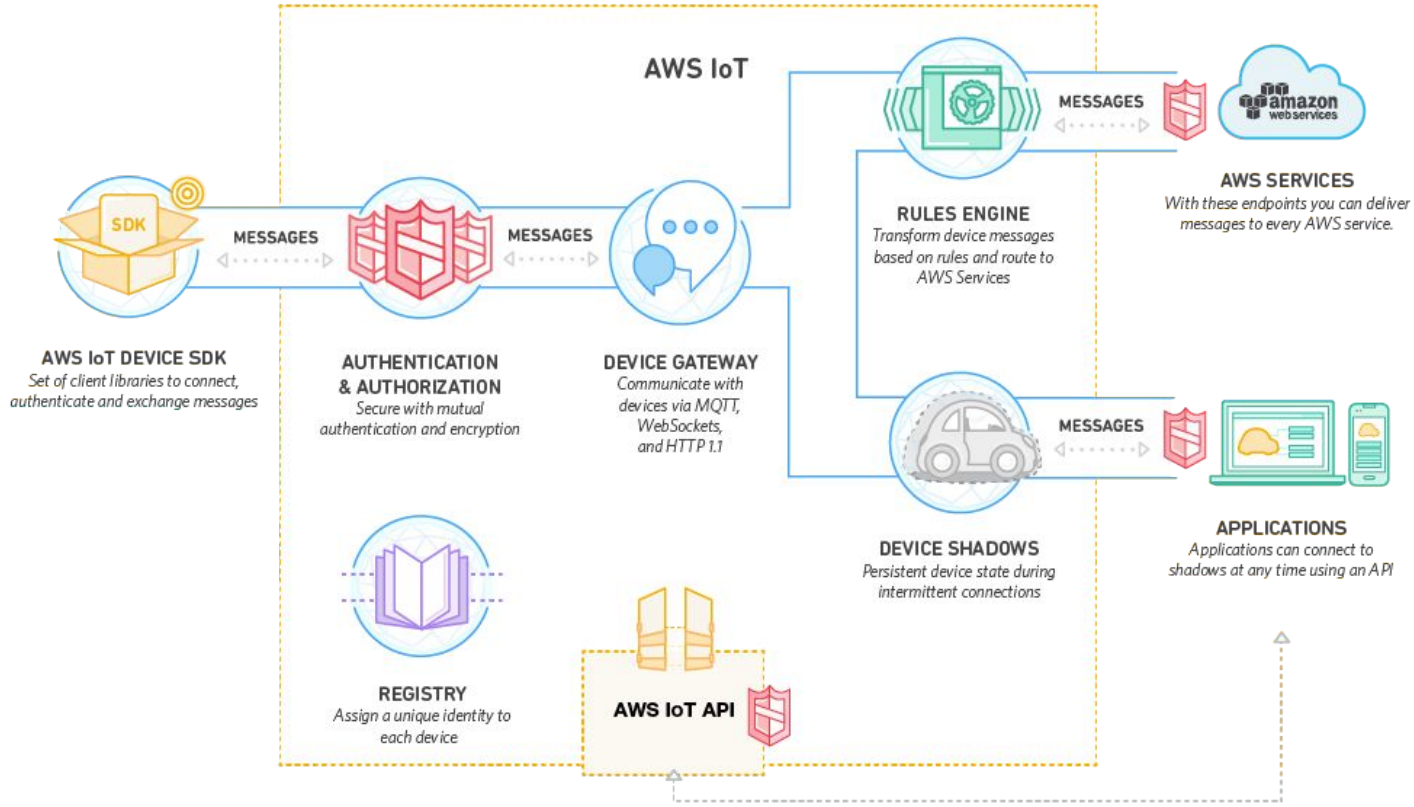
The AWS IoT Button

Programmable button
based on the Amazon Dash Button

- Easy to configure Wi-Fi device
- Count or track items
- Notify someone (email or text)
- Remote control for other hardware
- Integrate third-party APIs

* Learn more at aws.amazon.com/iotbutton

AWS IoT Platform



* aws.amazon.com/iot/

DEMO: SEL data collection

Social-Emotional skills education* is a growing trend, included in the ESSA act, and difficult to assess.

We developed a **data collection proof-of-concept** using the AWS IoT Button to demonstrate how SEL instruction can be measured.

* Learn more about SEL at casel.org/core-competencies/

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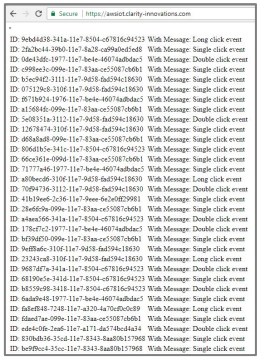
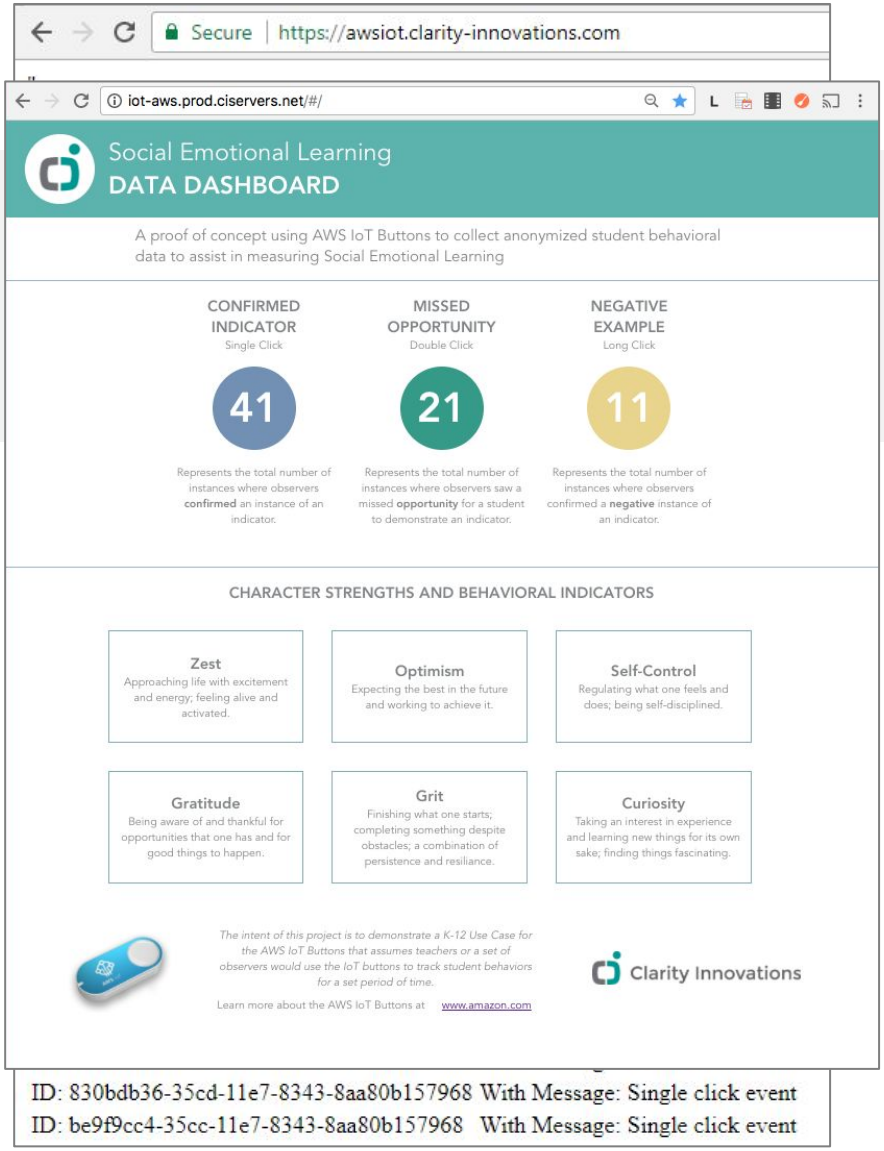
SEL and the AWS IoT Button

Raw data collected from AWS IoT buttons

- Single click
- Double click
- Long click



Presented using a custom user interface at iot-aws.prod.ciservers.net

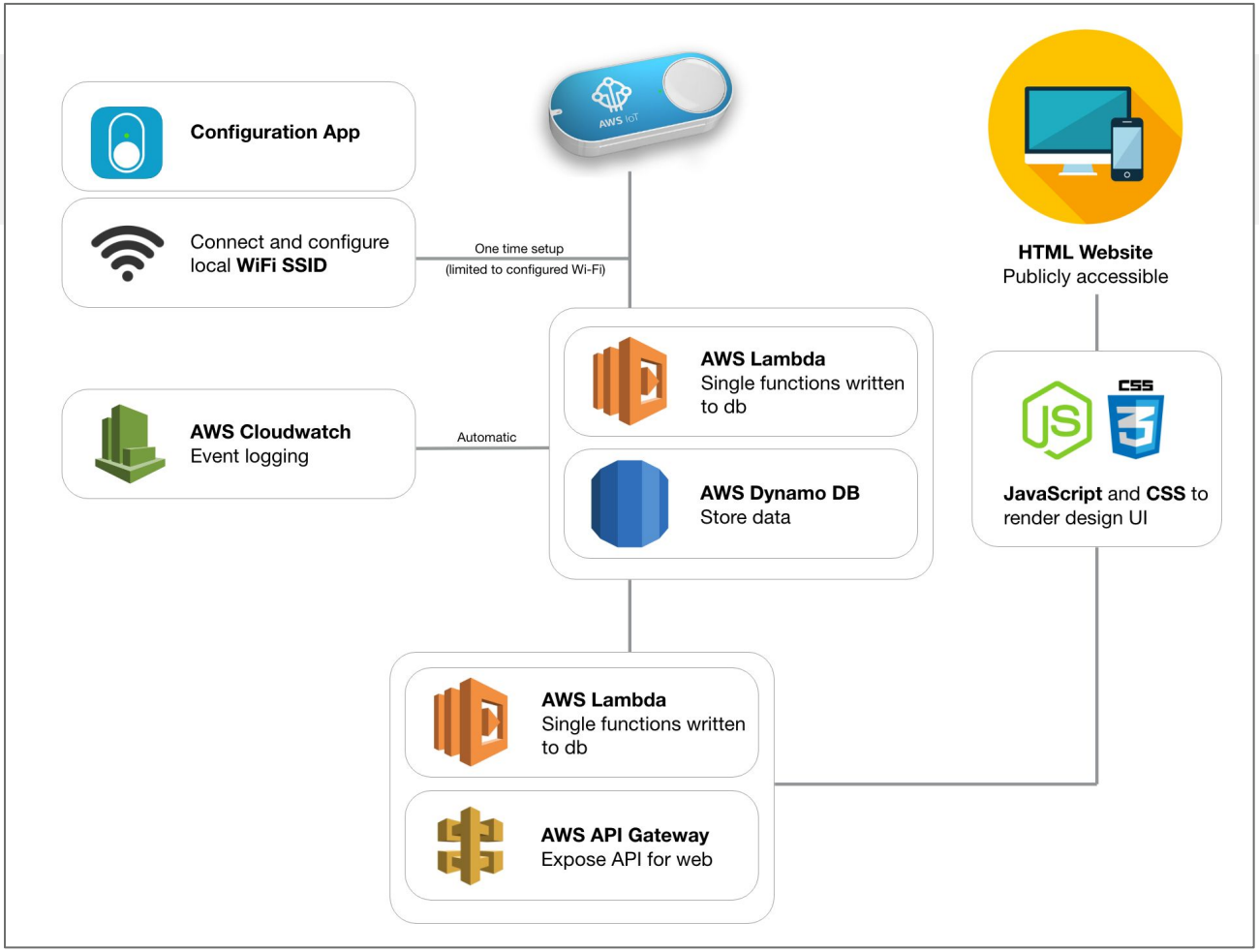


Schema

Services

- Lambda
- Dynamo DB
- API Gateway

- JavaScript
  CSS



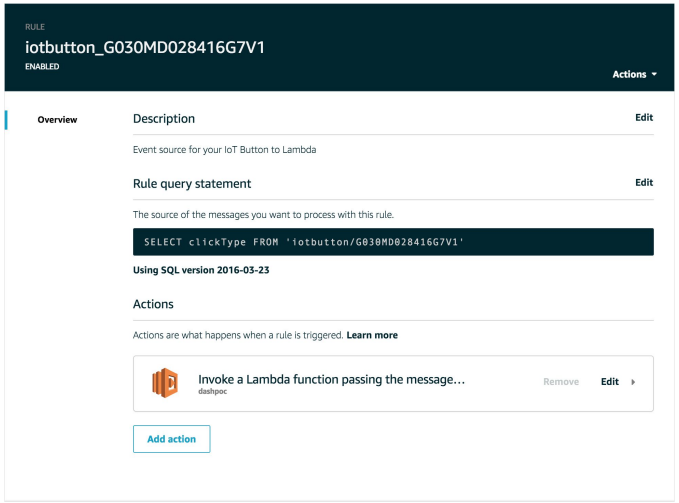
Architecture and Setup

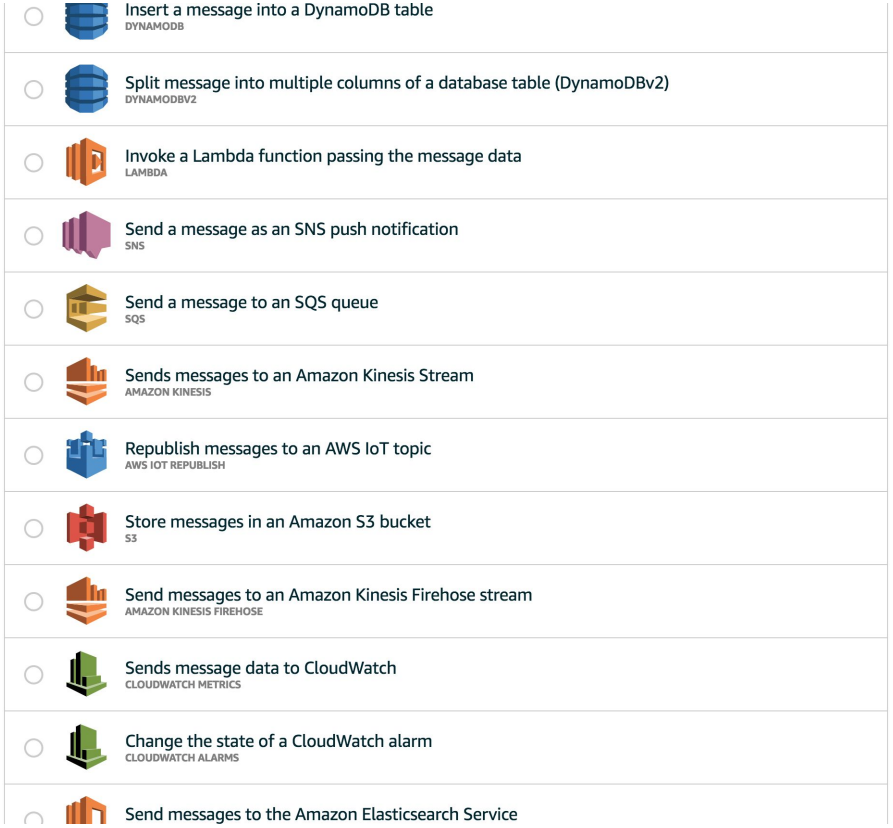
- About AWS services and dev-op tool
- About our app architecture

AWS Services

- Rule Engine
- Lambda
  - Dash
  - UI
  - Cleanup
- DynamoDB
- API Gateway
- Chalice

Rule Engine


RULE
iotbutton_G030MD028416G7V1
ENABLED
Actions
Overview
Description
Edit
Event source for your IoT Button to Lambda
Rule query statement
Edit
The source of the messages you want to process with this rule.
SELECT clickType FROM 'iotbutton/G030MD028416G7V1'
Using SQL version 2016-03-23
Actions
Actions are what happens when a rule is triggered. Learn more
Invoke a Lambda function passing the message...
dashpoc
Remove
Edit
Add action


Insert a message into a DynamoDB table
DYNAMODB
Split message into multiple columns of a database table (DynamoDBv2)
DYNAMODBV2
Invoke a Lambda function passing the message data
LAMBDA
Send a message as an SNS push notification
SNS
Send a message to an SQS queue
SQS
Sends messages to an Amazon Kinesis Stream
AMAZON KINESIS
Republish messages to an AWS IoT topic
AWS IOT REPUBLISH
Store messages in an Amazon S3 bucket
S3
Send messages to an Amazon Kinesis Firehose stream
AMAZON KINESIS FIREHOSE
Sends message data to CloudWatch
CLOUDWATCH METRICS
Change the state of a CloudWatch alarm
CLOUDWATCH ALARMS
Send messages to the Amazon Elasticsearch Service

Lambda

```
22  def main(event, context = None):
23
24      # This is the python version of a switch case statement.
25      result = {
26          'SINGLE': lambda e: single_click(e),
27          'DOUBLE': lambda e: double_click(e),
28          'LONG': lambda e: long_click(e)
29      }.get(event['clickType'], lambda e: print('no click event was called'))(event)
30
31      return ''
32
33  if __name__ == '__main__':
34      main({'clickType': 'null'}, 'null')
35
36  # It would be good to replace this with a class that does this stuff.
37  def single_click(e):
38      now = decimal.Decimal(str(time.time()))
39      print(EventType[0])
40
41      dashpocdb.put_item(
42        Item = {
43          'id': str(uuid.uuid1()),
44          'date': now,
45          'eventType': EventType.single,
46          'created': now,
47          'updated': now,
48          'message': 'Single click event'
```

DynamoDB

id	date	created	eventType	message
9ebd4d38-341a	1494267459.51	1494267459.51	2	Long click event
2fa2bc44-39b0-	1494881453.43	1494881453.43	0	Single click event
0de43dfc-1977-	1491338478.3	1491338478.3	1	Double click event
c998ee3c-099e-	1489596324.98	1489596324.98	0	Single click event
b5ec94f2-3111-	1493933779.45	1493933779.45	0	Single click event
075129c8-310f-	1493932627.51	1493932627.51	0	Single click event
f671b924-1976-	1491338438.96	1491338438.96	0	Single click event
a15684fc-099e-	1489596257.44	1489596257.44	0	Single click event
5e08351a-3112-	1493934061.49	1493934061.49	1	Double click event
12678474-310f-	1493932646.1	1493932646.1	0	Single click event
8ef682f0-a933-'	1507142456.5	1507142456.5	0	Single click event
d77af266-b42f-'	1508350322.97	1508350322.97	0	Single click event
d68a8ad8-099e	1489596346.7	1489596346.7	0	Single click event

API Gateway

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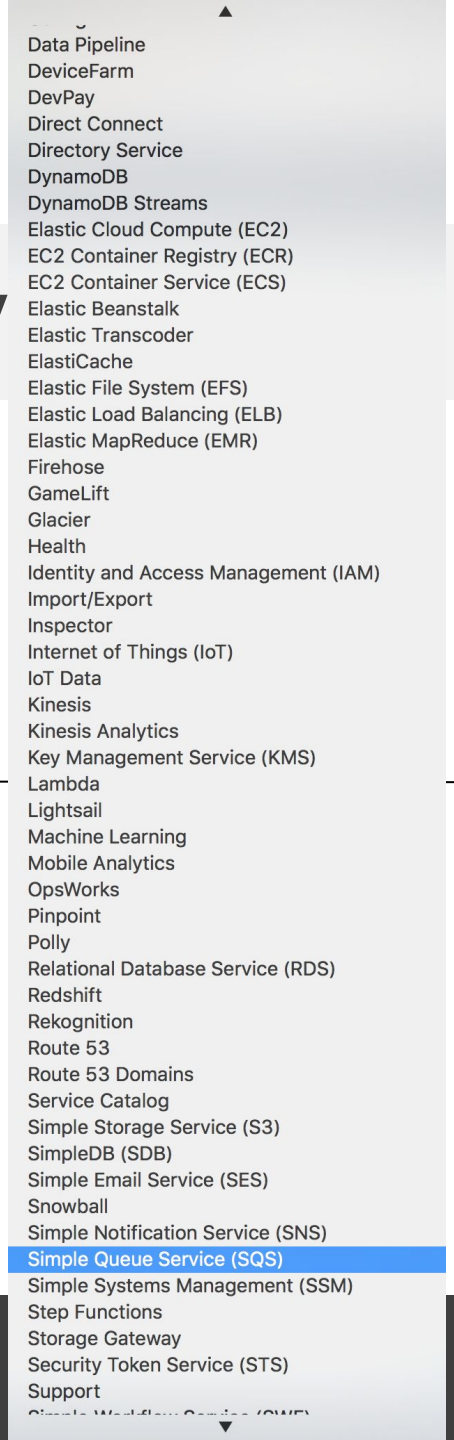
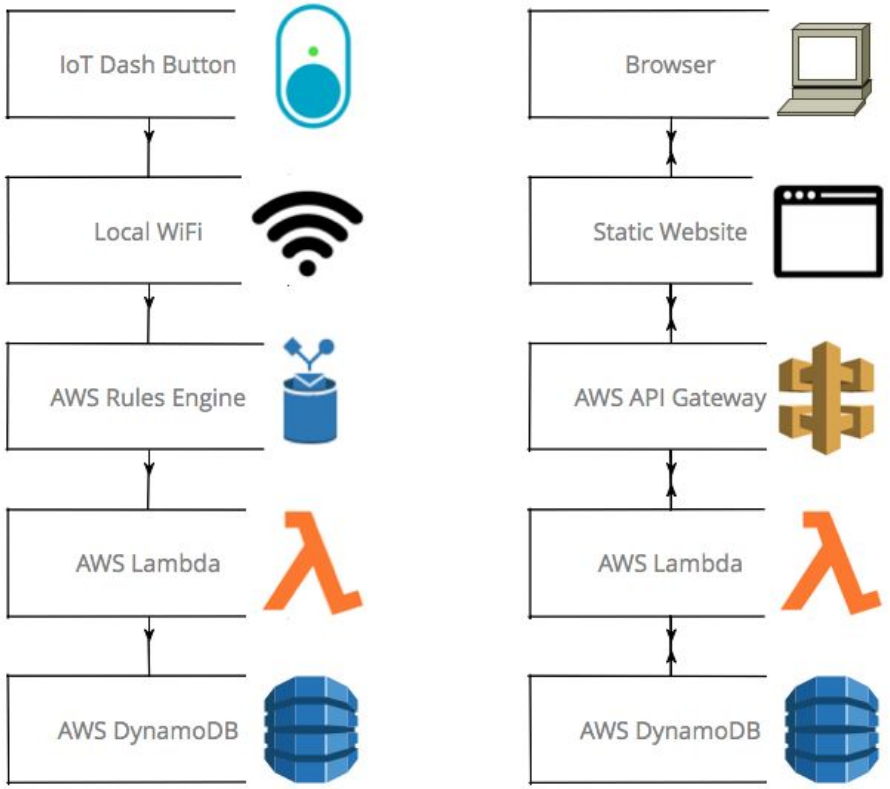
API Gateway



Chalice

Architecture



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Other AWS IoT Button ideas

Cafeteria

At the return station

(1) Trays and utensils returned
(2) Partially returned

Facilities

In a custodial closet

(1) Supplies running low
(2) Re-order supplies
(3) Equipment damaged

Transportation

On board a bus

(1) Poor student behavior
(2) Discipline referral
(3) Send assistance immediately

Discussion

- How do you think you could use an AWS IoT Button?
- What IoT implementations are you considering?
- What concerns or questions do you have?

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Thank you

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Standard Consulting Partner

About your presenters

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