SNS Topics

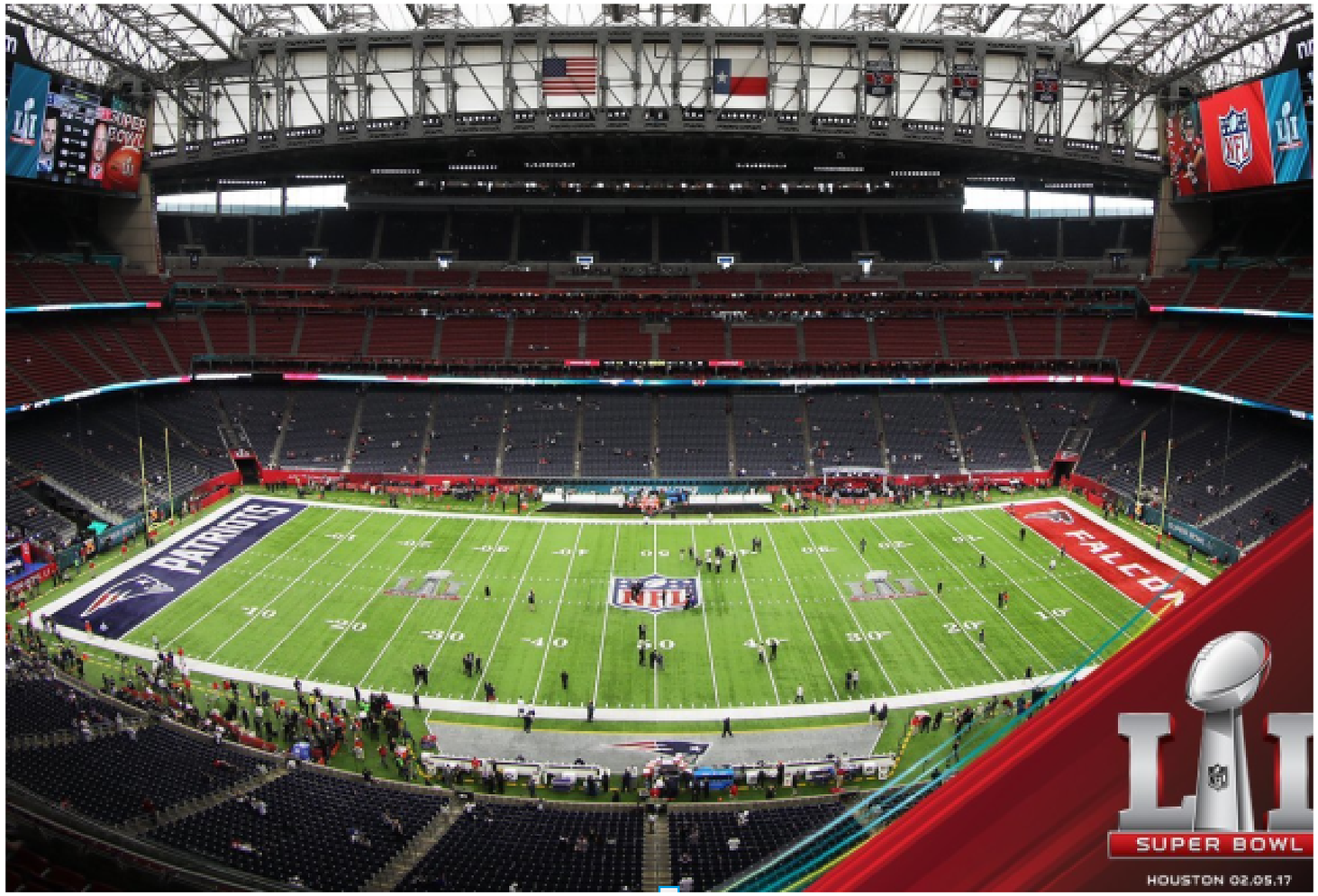
INTRODUCTION TO AWS BOTO IN PYTHON

Maksim Pecherskiy
Data Engineer!

SNS


Publisher
Publishers send messages from distributed systems, microservices, and other AWS services
Amazon SNS
SNS Topic
Topics decouple message publishers from subscribers
Push notifications
Text messages
Email
Subscribers
Subscribers can include mobile apps, mobile phone numbers, and email addresses

Understanding SNS



Understanding SNS

Understanding SNS

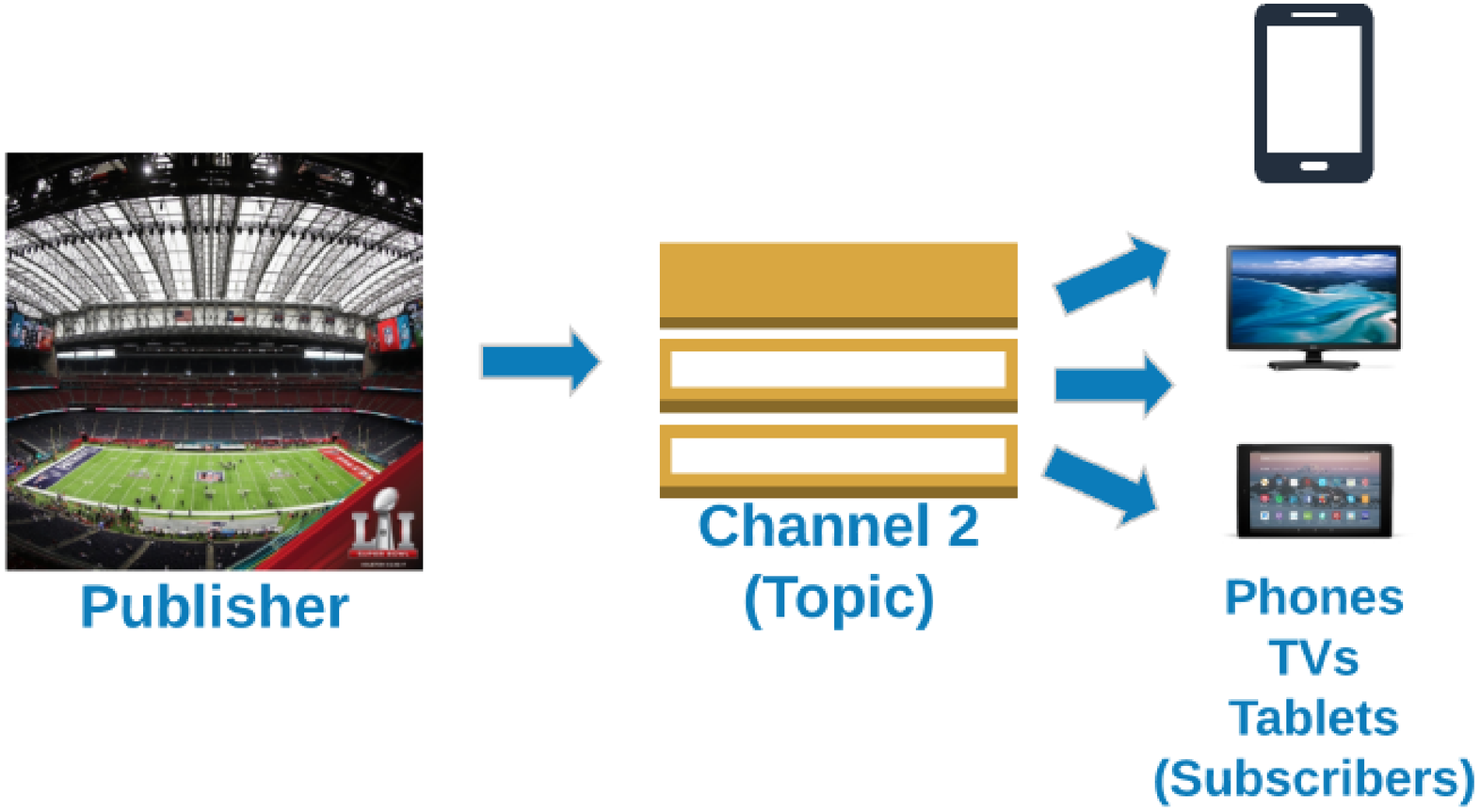
Publisher

Understanding SNS

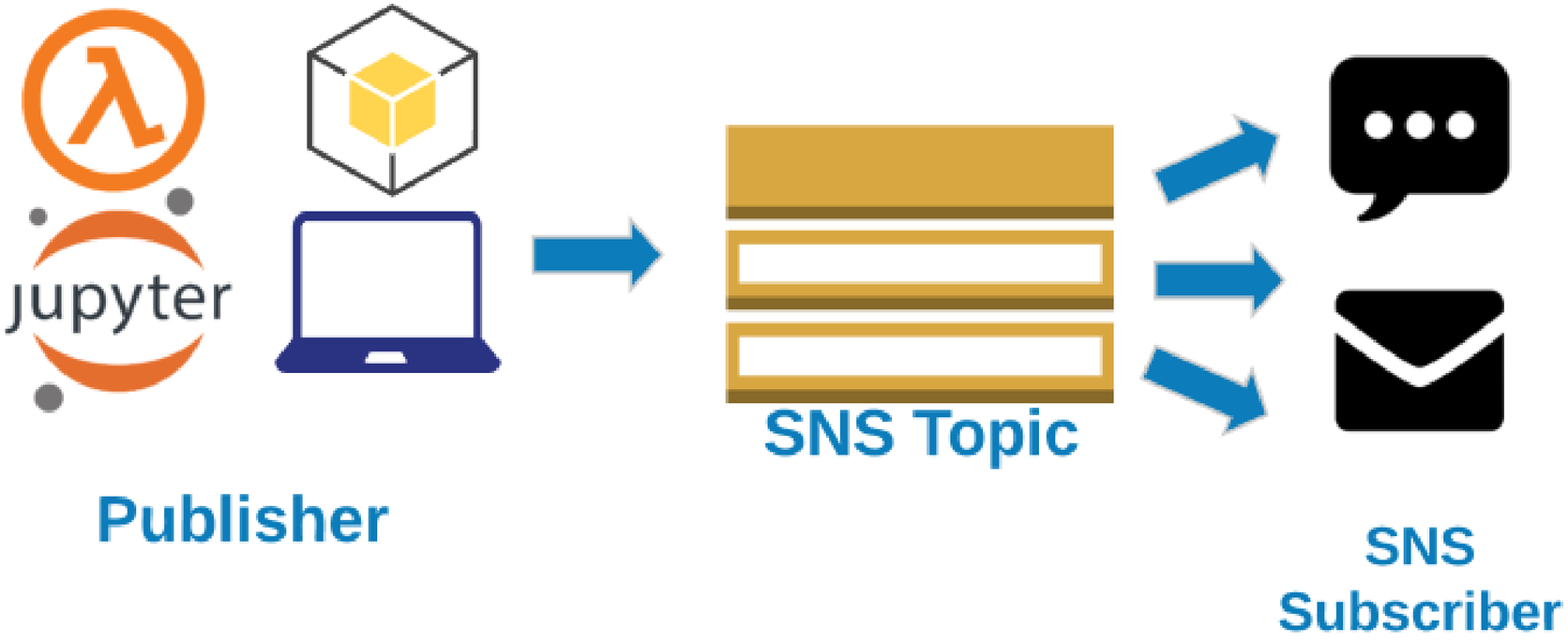
Publisher

Channel 2
(Topic)

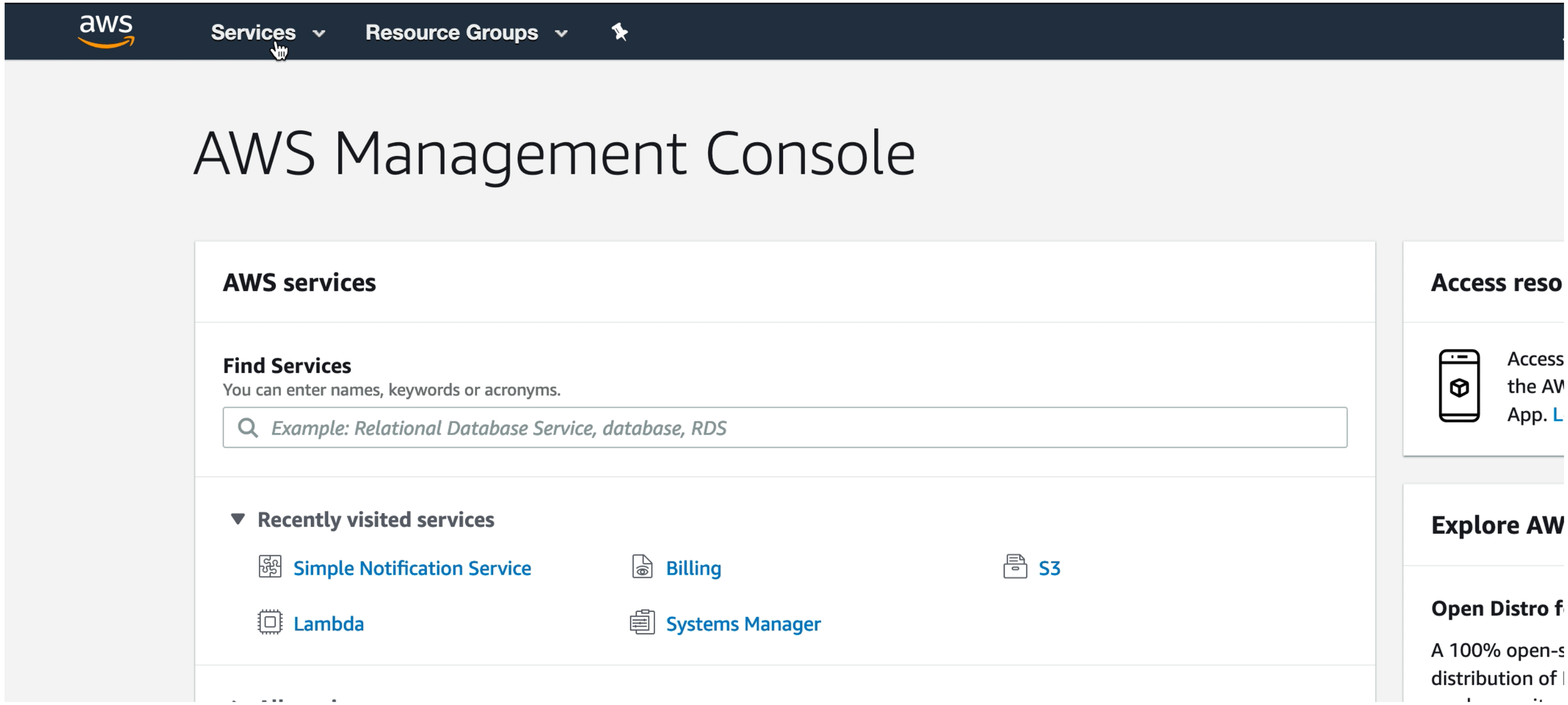
Understanding SNS



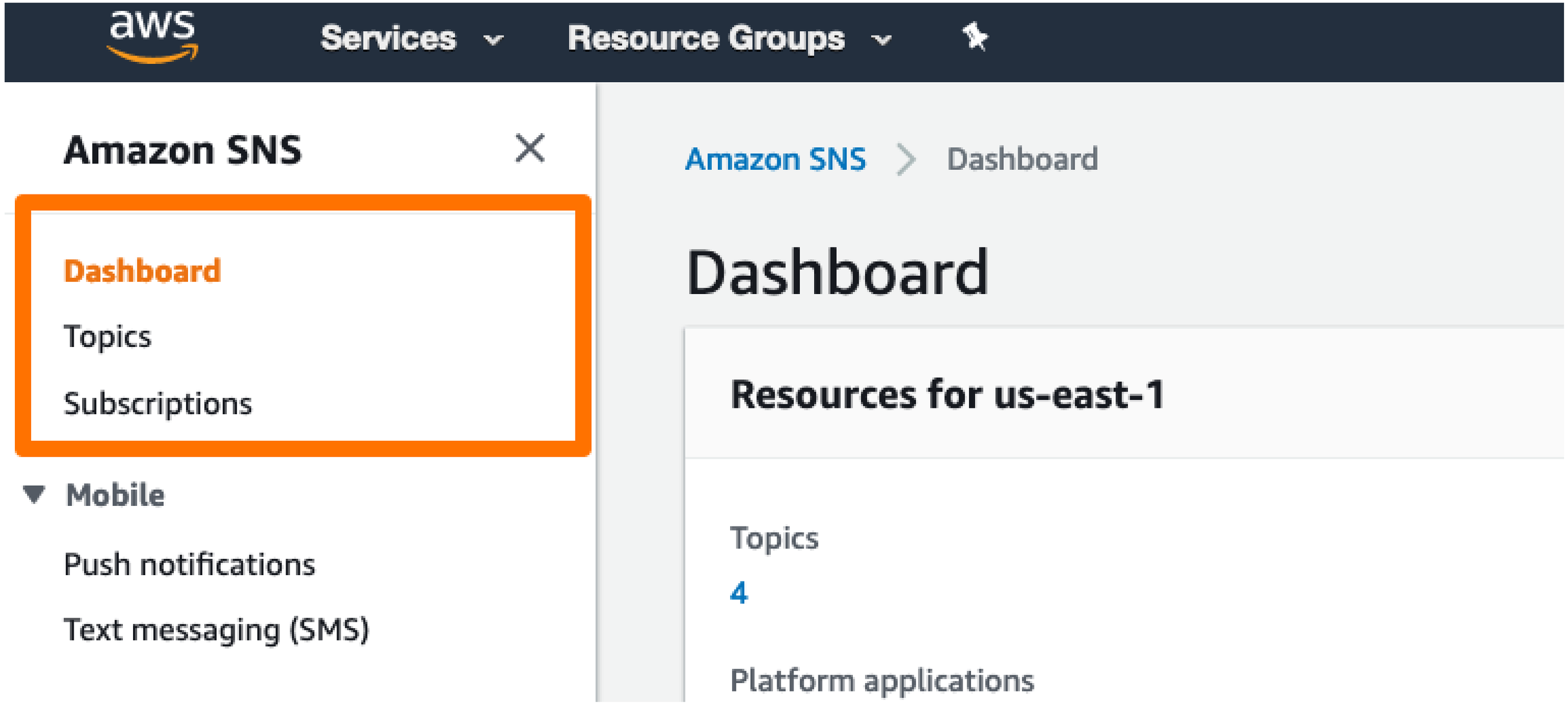
Understanding SNS



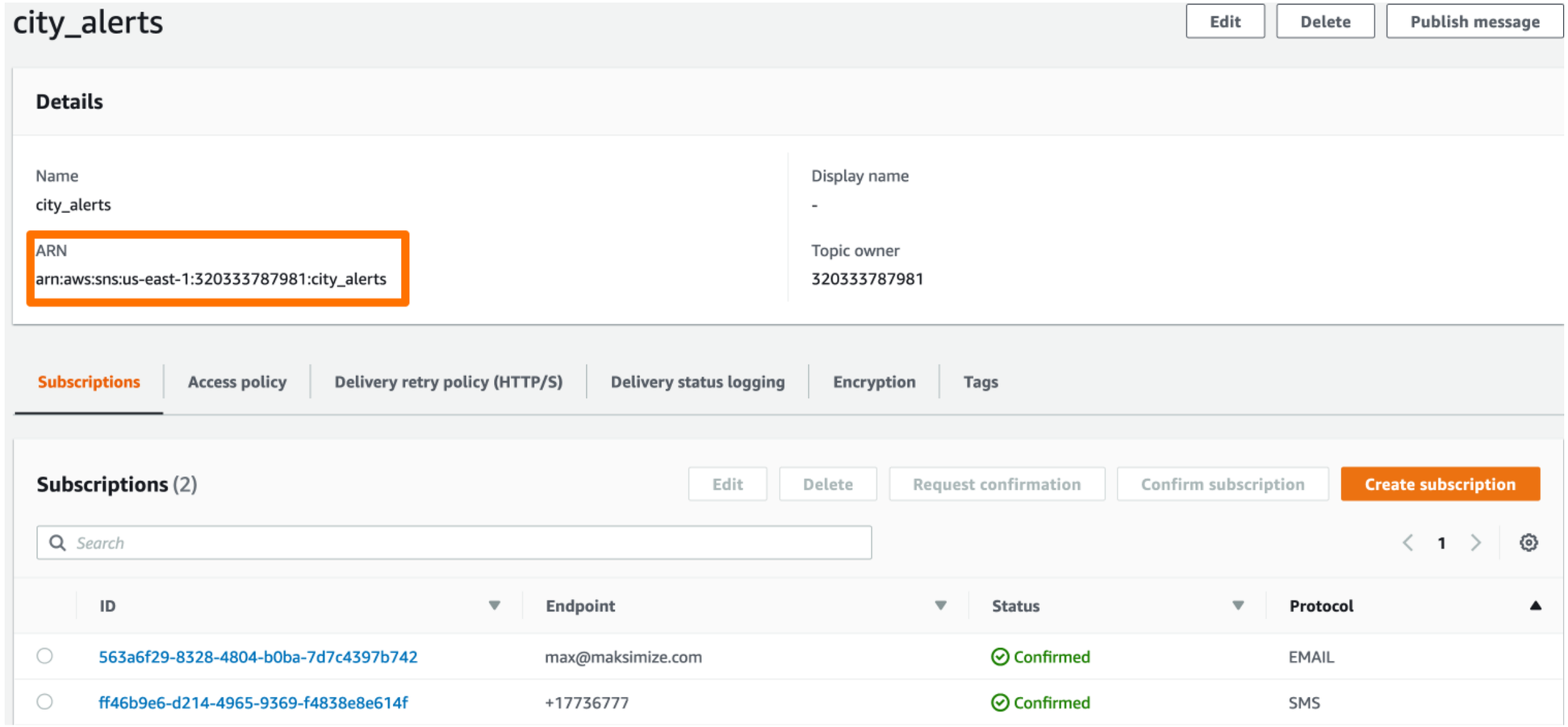
Accessing SNS



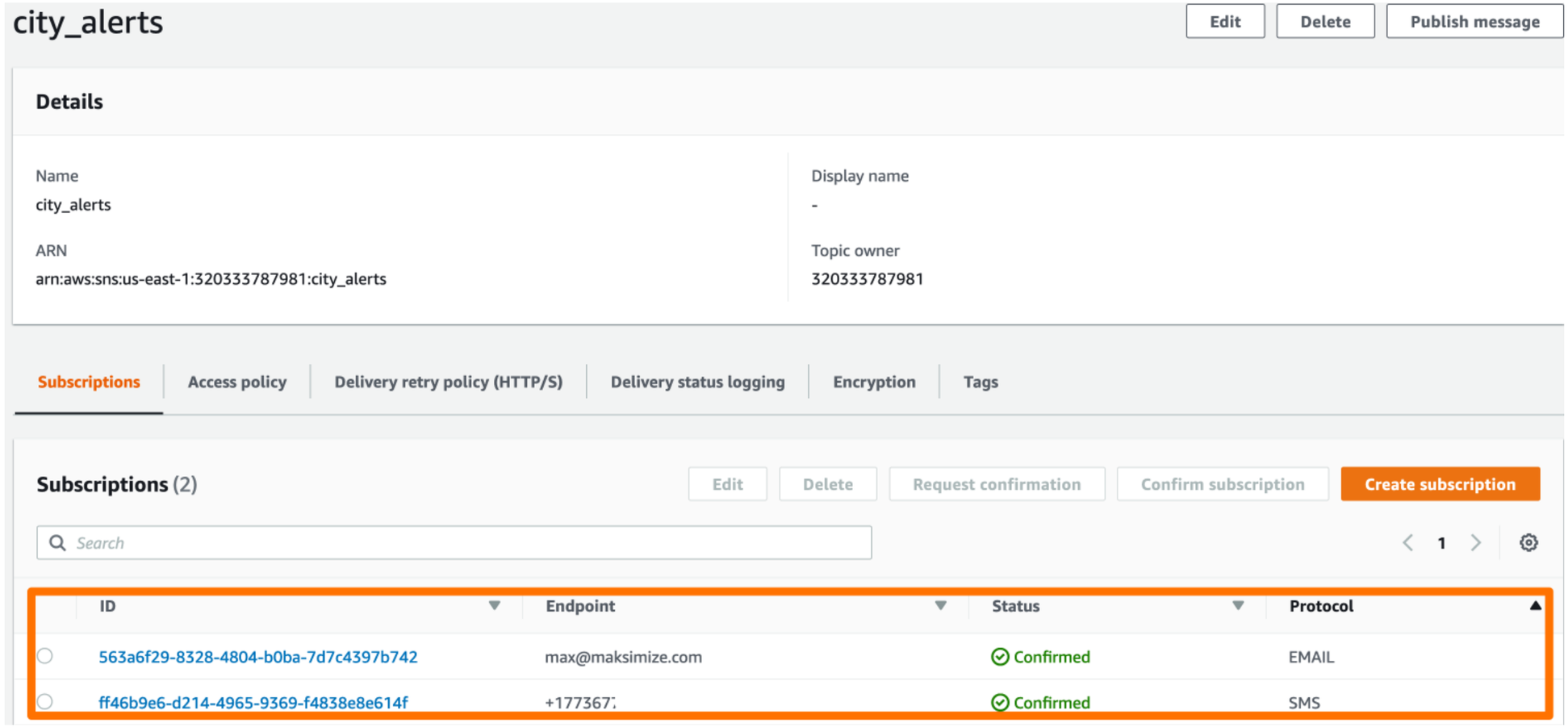
SNS Dashboard



SNS Topics


city_alerts
Edit
Delete
Publish message
Details
Name
city_alerts
ARN
arn:aws:sns:us-east-1:320333787981:city_alerts
Display name
-
Topic owner
320333787981
Subscriptions
Access policy
Delivery retry policy (HTTP/S)
Delivery status logging
Encryption
Tags
Subscriptions (2)
Edit
Delete
Request confirmation
Confirm subscription
Create subscription
Search
1
ID
Endpoint
Status
Protocol
563a6f29-8328-4804-b0ba-7d7c4397b742
max@maksimize.com
Confirmed
EMAIL
ff46b9e6-d214-4965-9369-f4838e8e614f
+17736777
Confirmed
SMS

SNS Topics


city_alerts
Edit
Delete
Publish message
Details
Name
city_alerts
Display name
-
ARN
arn:aws:sns:us-east-1:320333787981:city_alerts
Topic owner
320333787981
Subscriptions
Access policy
Delivery retry policy (HTTP/S)
Delivery status logging
Encryption
Tags
Subscriptions (2)
Edit
Delete
Request confirmation
Confirm subscription
Create subscription
Search
1
ID
Endpoint
Status
Protocol
563a6f29-8328-4804-b0ba-7d7c4397b742
max@maksimize.com
Confirmed
EMAIL
ff46b9e6-d214-4965-9369-f4838e8e614f
+177367
Confirmed
SMS

Creating an SNS Topic

```
sns = boto3.client('sns',
                   region_name='us-east-1',
                   aws_access_key_id=AWS_KEY_ID,
                   aws_secret_access_key=AWS_SECRET)
```

Creating an SNS Topic

```
response = sns.create_topic(Name='city_alerts')
```

Creating an SNS Topic

```
{'TopicArn': 'arn:aws:sns:us-east-1:320333787981:city_alerts',
 'ResponseMetadata': {
   'RequestId': '1cf4a178-1d1e-54fa-b270-f408645e1000',
   'HTTPStatusCode': 200,
   'HTTPHeaders': {
     'x-amzn-requestid': '1cf4a178-1d1e-54fa-b270-f408645e1000',
     'content-type': 'text/xml',
     'content-length': '318',
     'date': 'Tue, 04 Jun 2019 13:49:52 GMT'
   },
  'RetryAttempts': 0
 }}
```

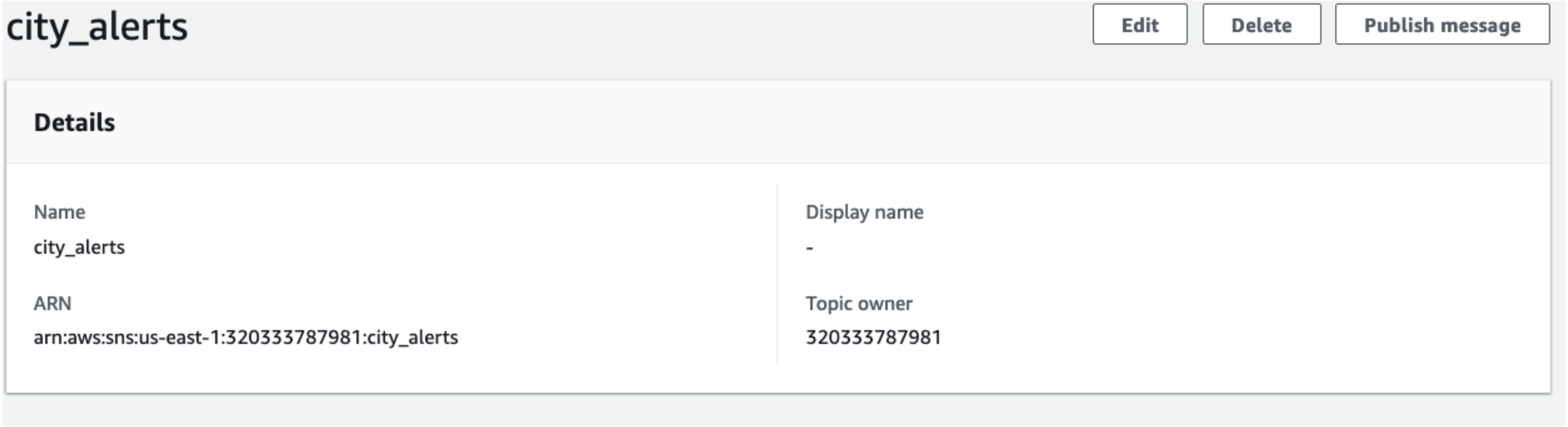
Creating an SNS Topic

```
topic_arn = response['TopicArn']
```

Or... a shortcut

```
sns.create_topic(Name='city_alerts')['TopicArn']
```

Creating an SNS Topic



Permissions

Summary

Delete user

User ARN arn:aws:iam::320333787981:user/datacampDemoUser2

Path /

Creation time 2019-04-03 16:48 PDT

Permissions | Groups | Tags | Security credentials | Access Advisor

Permissions policies (4 policies applied)

Add permissions

Add inline policy

Policy name	Policy type
Attached directly	
AmazonS3FullAccess	AWS managed policy
ComprehendFullAccess	AWS managed policy
AmazonRekognitionFullAccess	AWS managed policy
AmazonSNSFullAccess	AWS managed policy

Listing topics

```
response = sns.list_topics()
```

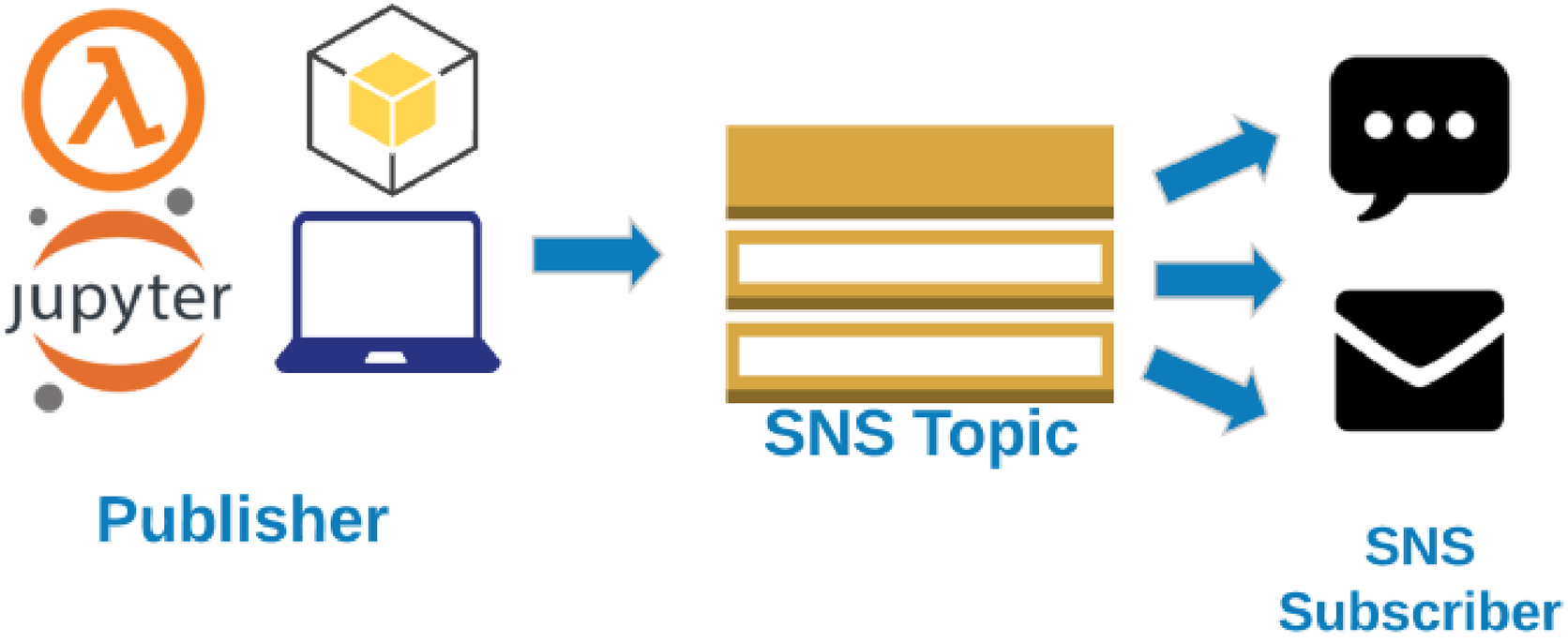
Listing topics

```
'Topics': [{'TopicArn': 'arn:aws:sns:us-east-1:320333787981:box_alerts'},
  {'TopicArn': 'arn:aws:sns:us-east-1:320333787981:city_alerts'},
  {'TopicArn': 'arn:aws:sns:us-east-1:320333787981:first_topic'},
  {'TopicArn': 'arn:aws:sns:us-east-1:320333787981:test_topic'}],
 'ResponseMetadata': {'RequestId': '7ed46745-aae4-5a97-b34f-3235d40a3109',
  'HTTPStatusCode': 200,
  'HTTPHeaders': {'x-amzn-requestid': '7ed46745-aae4-5a97-b34f-3235d40a3109',
   'content-type': 'text/xml',
   'content-length': '695',
   'date': 'Tue, 04 Jun 2019 14:14:06 GMT'},
```

Deleting topics

```
sns.delete_topic(TopicArn='arn:aws:sns:us-east-1:320333787981:city_alerts')
```

Review



Review

Create SNS Client

```
sns = boto3.client('sns',
                   region_name='us-east-1',
                   aws_access_key_id=AWS_KEY_ID,
                   aws_secret_access_key=AWS_SECRET)
```

Create a topic

```
response = sns.create_topic(Name='city_alerts')
topic_arn = response['TopicArn']
```

Review

List Topics

```
response = sns.list_topics()
topics = response['Topics']
```

Delete a topic

```
sns.delete_topic(TopicArn='arn:aws:sns:us-east-1:320333787981:city_alerts')
```

Let's practice!

INTRODUCTION TO AWS BOTO IN PYTHON

SNS Subscriptions

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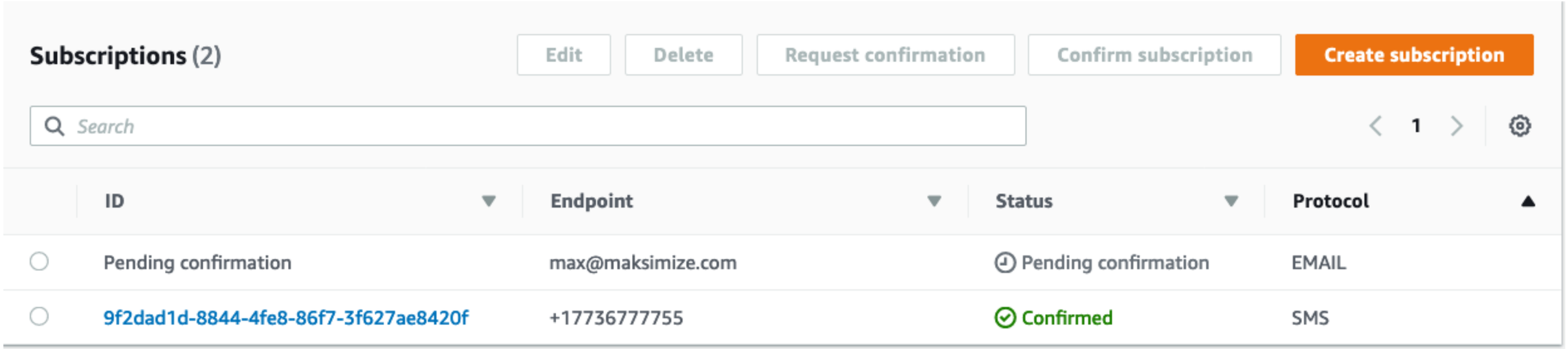
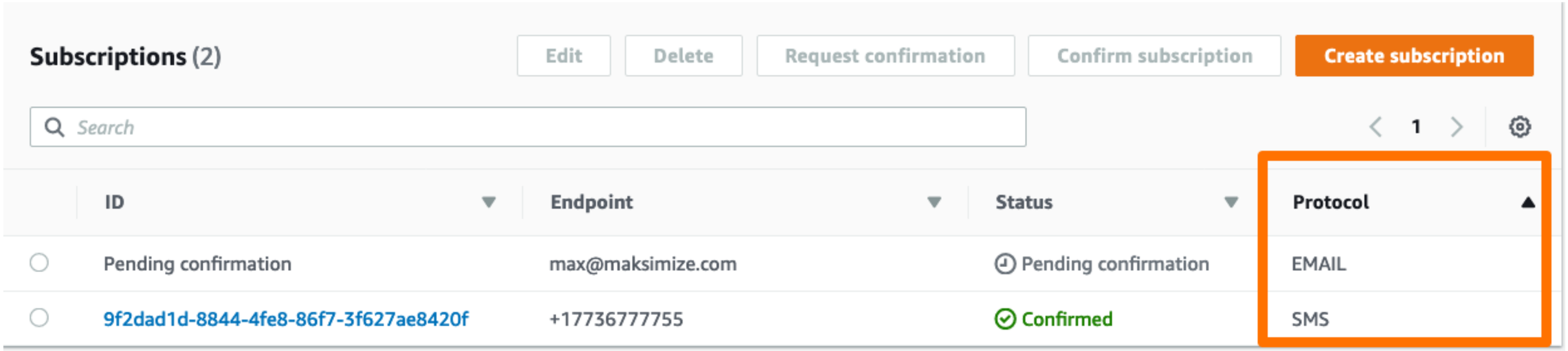
datacamp

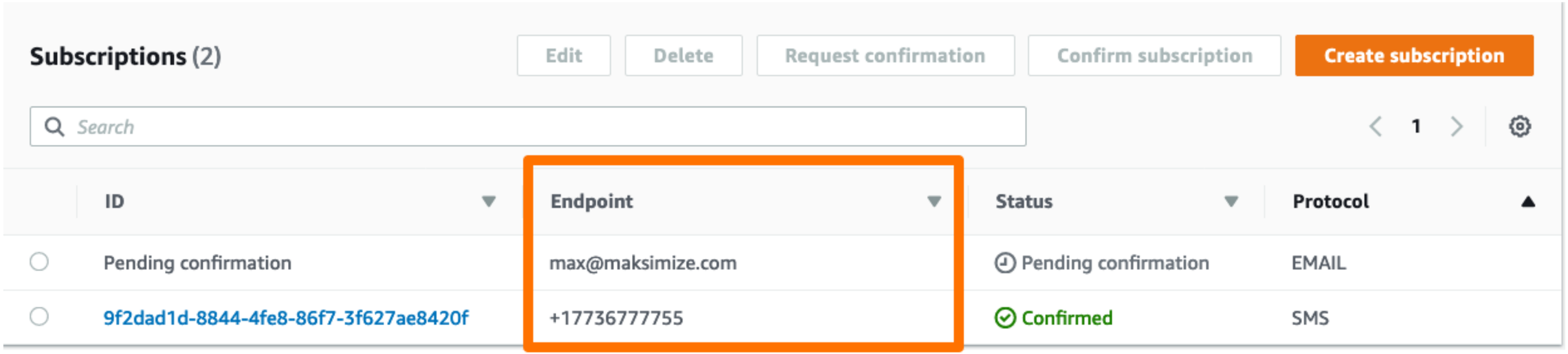
Subscription Listing



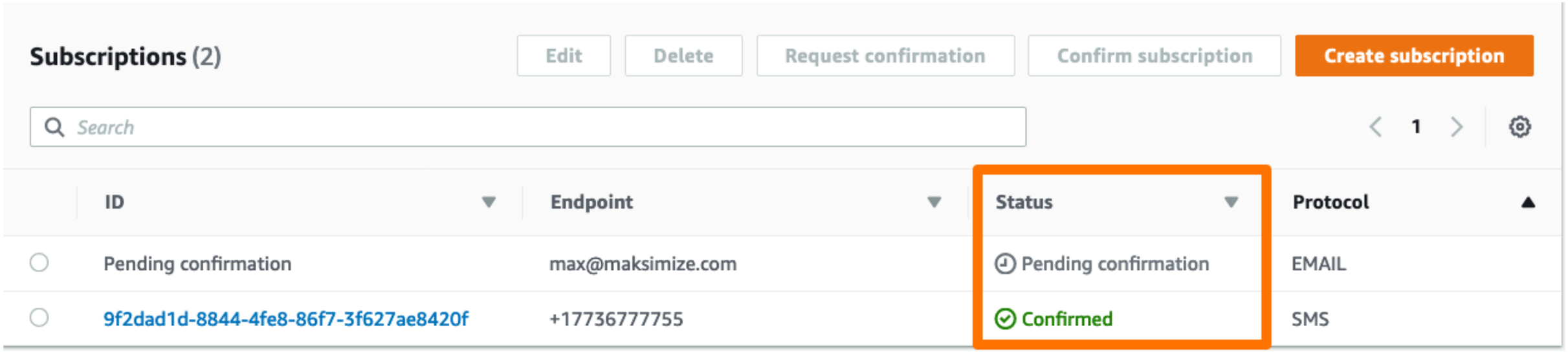
Subscription Listing



Subscription Listing



Subscription Listing



Creating an SMS subscription.

```
sns = boto3.client('sns',
                   region_name='us-east-1',
                   aws_access_key_id=AWS_KEY_ID,
                   aws_secret_access_key=AWS_SECRET)
```

```
response = sns.subscribe(
  TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
  Protocol = 'SMS',
  Endpoint = '+13125551123')
```

Create an SMS subscription.

```
{'SubscriptionArn': 'arn:aws:sns:us-east-1:320333787981:city_alerts:9f2dad1d-8844-
 'ResponseMetadata': {
   'RequestId': '9384ec7d-c9bc-5194-ace8-b90d46ce13d4',
   'HTTPStatusCode': 200,
   'HTTPHeaders': {'x-amzn-requestid': '9384ec7d-c9bc-5194-ace8-b90d46ce13d4',
   'content-type': 'text/xml',
   'content-length': '361',
   'date': 'Tue, 04 Jun 2019 15:24:33 GMT'},
  'RetryAttempts': 0}}
```

Creating an email subscription

```
response = sns.subscribe(
  TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
  Protocol='email',
  Endpoint='max@maksimize.com')
```

Creating an email subscription

```
{'SubscriptionArn': 'pending confirmation',
 'ResponseMetadata': {'RequestId': 'a41c8047-d512-508e-ab52-d53746e67556',
  'HTTPStatusCode': 200,
  'HTTPHeaders': {'x-amzn-requestid': 'a41c8047-d512-508e-ab52-d53746e67556',
   'content-type': 'text/xml',
   'content-length': '298',
   'date': 'Tue, 04 Jun 2019 15:43:48 GMT'},
  'RetryAttempts': 0}}
```

Creating an email subscription

AWS Notifications <no-reply@sns.amazonaws.com> 7:13 AM (1 hour ago)

to max

You have chosen to subscribe to the topic:
arn:aws:sns:us-east-1:320333787981:city_alerts

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):
Confirm subscription

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to sns-opt-out

Confirmed email address

○	d7b42c58-21d3-4e3c-b25d-96c23032eb2f	max@maksimize.com	Confirmed	EMAIL

Listing subscriptions by Topic

```
sns.list_subscriptions_by_topic(
  TopicArn='arn:aws:sns:us-east-1:320333787981:city_alerts')
```

Listing subscriptions

```
{'Subscriptions': [{'SubscriptionArn': 'PendingConfirmation',
   'Owner': '320333787981',
   'Protocol': 'email',
   'Endpoint': 'max@maksimize.com',
   'TopicArn': 'arn:aws:sns:us-east-1:320333787981:city_alerts'},
  {'SubscriptionArn': 'arn:aws:sns:us-east-1:320333787981:city_alerts:9f2dad1d-8844-
   'Owner': '320333787981',
   'Protocol': 'sms',
   'Endpoint': '+17736777755',
   'TopicArn': 'arn:aws:sns:us-east-1:320333787981:city_alerts'}],
 'ResponseMetadata': {'RequestId': '17fed597-17e7-5669-bf53-80e79c08dd7f',
```

Listing subscriptions

```
sns.list_subscriptions()['Subscriptions']
```

Deleting subscriptions

```
sns.unsubscribe(
  SubscriptionArn='arn:aws:sns:us-east-1:320333787981:city_alerts:9f2dad1d-8844-4fe8
)
```

Deleting multiple subscriptions

Get list of subscriptions

```
response = sns.list_subscriptions_by_topic(
  TopicArn='arn:aws:sns:us-east-1:320333787981:city_alerts')
subs = response['Subscriptions']
```

Unsubscribe SMS subscriptions

```
for sub in subs:
  if sub['Protocol'] == 'sms':
    sns.unsubscribe(sub['SubscriptionArn'])
```

Review

SMS

- `Protocol='sms'`
- `Endpoint='+13122334433'`
- `Status: 'confirmed'`

Email

- `Protocol='email'`
- `Endpoint='email@address.com'`
- `Status: 'confirmed'`
- `Status: 'pending confirmation'`

Review

Create a subscription

```
response = sns.subscribe(
  TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
  Protocol = 'sms',
  Endpoint = '+13125551123')
```

List subscriptions by topic

```
response = sns.list_subscriptions_by_topic(
  TopicArn='arn:aws:sns:us-east-1:320333787981:city_alerts')
subs = response['Subscriptions']
```

Review

List subscriptions

```
sns.list_subscriptions()['Subscriptions']
```

Delete a subscription

```
sns.unsubscribe(
  SubscriptionArn='arn:aws:sns:us-east-1:320333787981:city_alerts:9f2dad1d-8844-4fe8
)
```

Let's practice!

INTRODUCTION TO AWS BOTO IN PYTHON

Sending messages

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Data engineer

datacamp

Publishing to a Topic

```
response = sns.publish(
  TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
  Message = 'Body text of SMS or e-mail',
  Subject = 'Subject Line for Email'
)
```

SMS

email

Publishing to a Topic

```
response = client.publish(
   TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
   Message = 'Body text of SMS or e-mail',
   Subject = 'Subject Line for Email'
)
```

SMS

email

Publishing to a Topic

```
response = client.publish(
   TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
   Message = 'Body text of SMS or e-mail',
   Subject = 'Subject Line for Email'
)
```

email

Sending custom messages

```
num_of_reports = 137


response = client.publish(
  TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
  Message = 'There are {} reports outstanding'.format(num_of_reports),
  Subject = 'Subject Line for Email'
)
```

Sending a single SMS

```
response = sns.publish(
  PhoneNumber = '+13121233211',
  Message = 'Body text of SMS or e-mail'
)
```

Not a good long term practice

- One-off texts = getting stuff done
- Topics and subscribers = maintenability

Publish to Topic vs Single SMS

Publish to a topic

- Have to have a topic
- Our topic has to have subscriptions
- Better for multiple receivers
- Easier list management

Send a single SMS

- Don't need a topic
- Don't need subscriptions
- Just sends a message to a phone number
- Email option not available

Review

Publish to a topic

```
response = sns.publish(
  TopicArn = 'arn:aws:sns:us-east-1:320333787981:city_alerts',
  Message = 'Body text of SMS or e-mail',
  Subject = 'Subject Line for Email'
)
```

Send a single SMS

```
response = sns.publish(
  PhoneNumber = '+13121233211',
  Message = 'Body text of SMS or e-mail'
)
```

Let's practice!

INTRODUCTION TO AWS BOTO IN PYTHON

Case Study: Building a notification system

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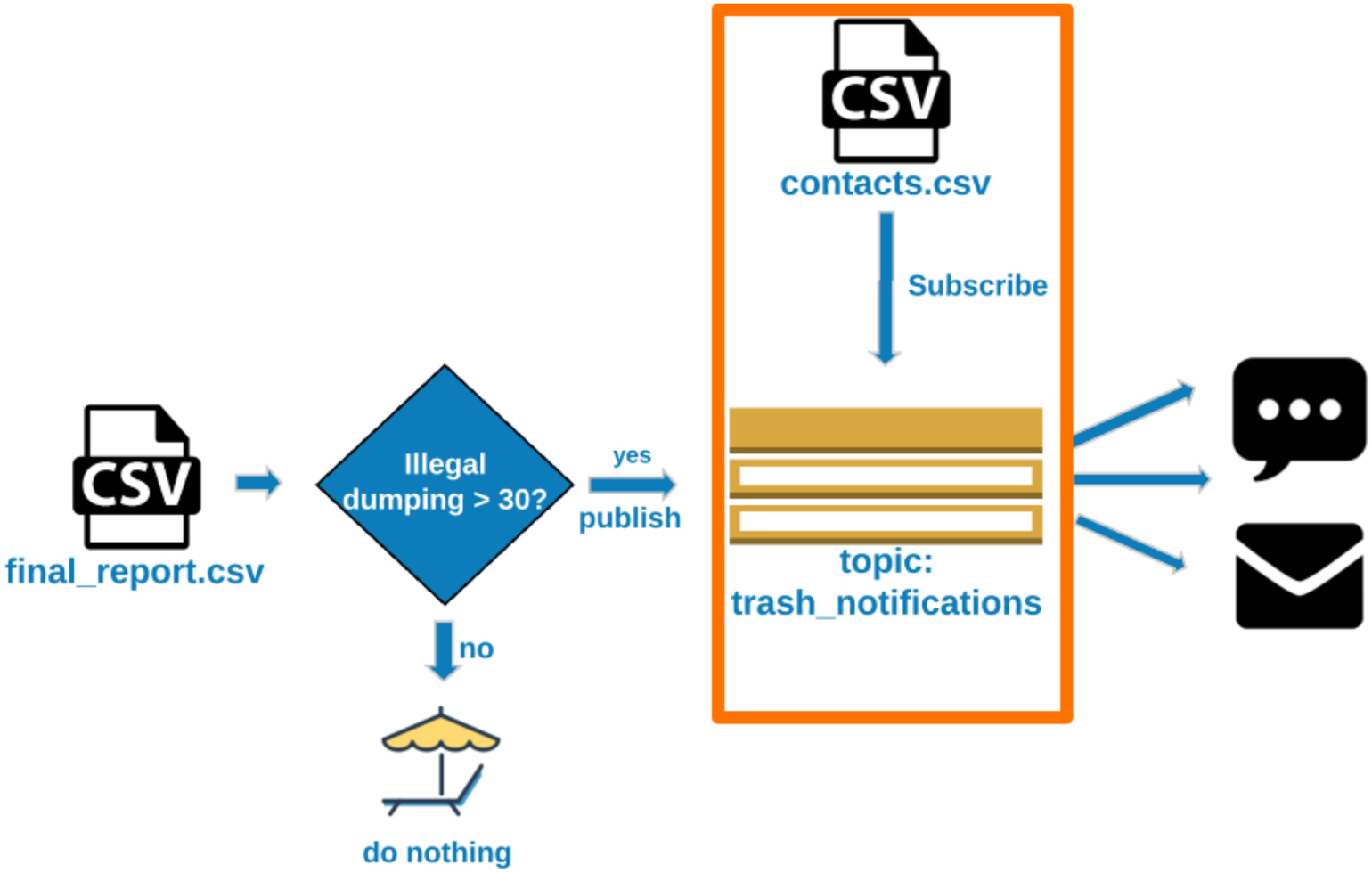
Data Engineer

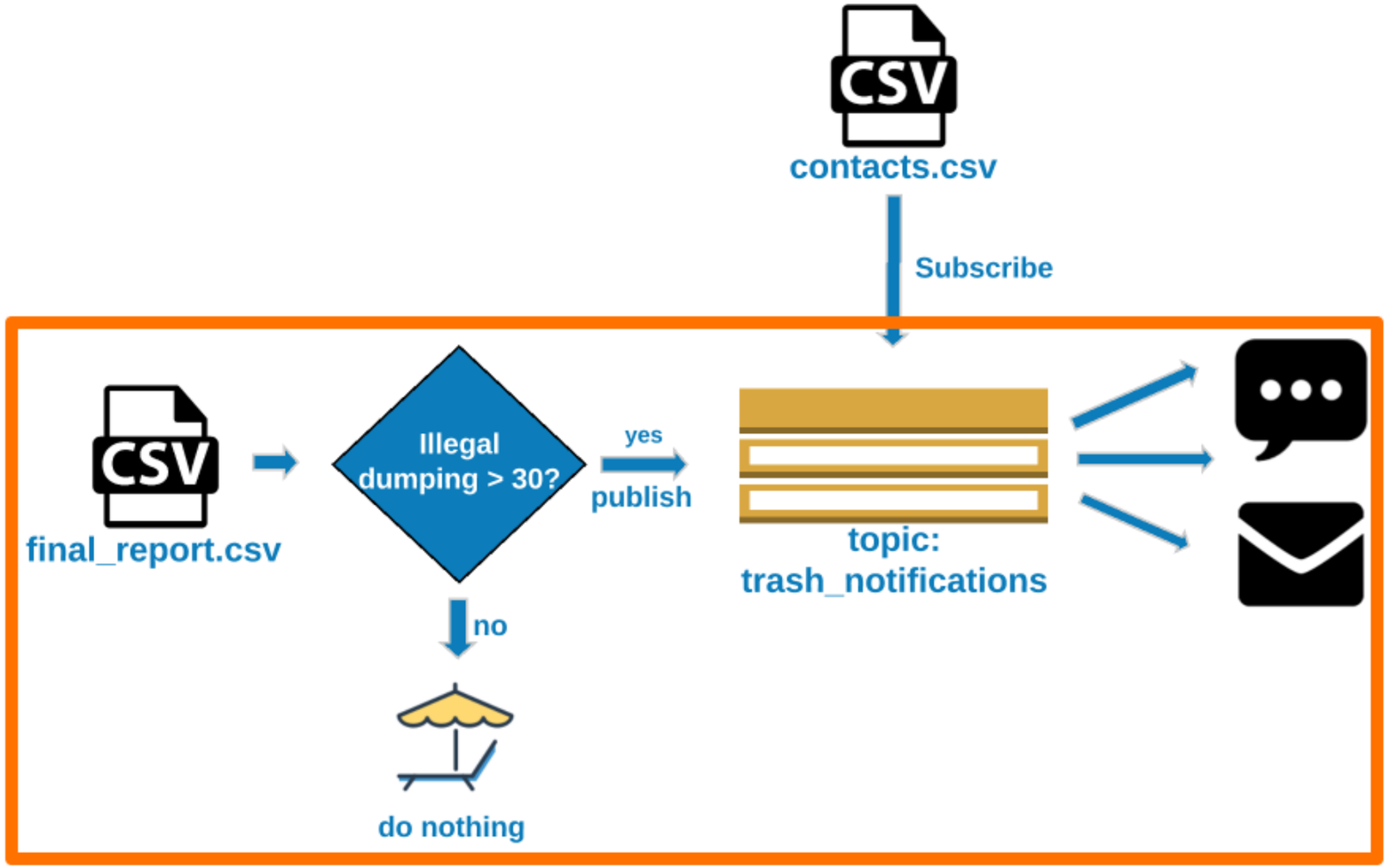
datacamp

Final product

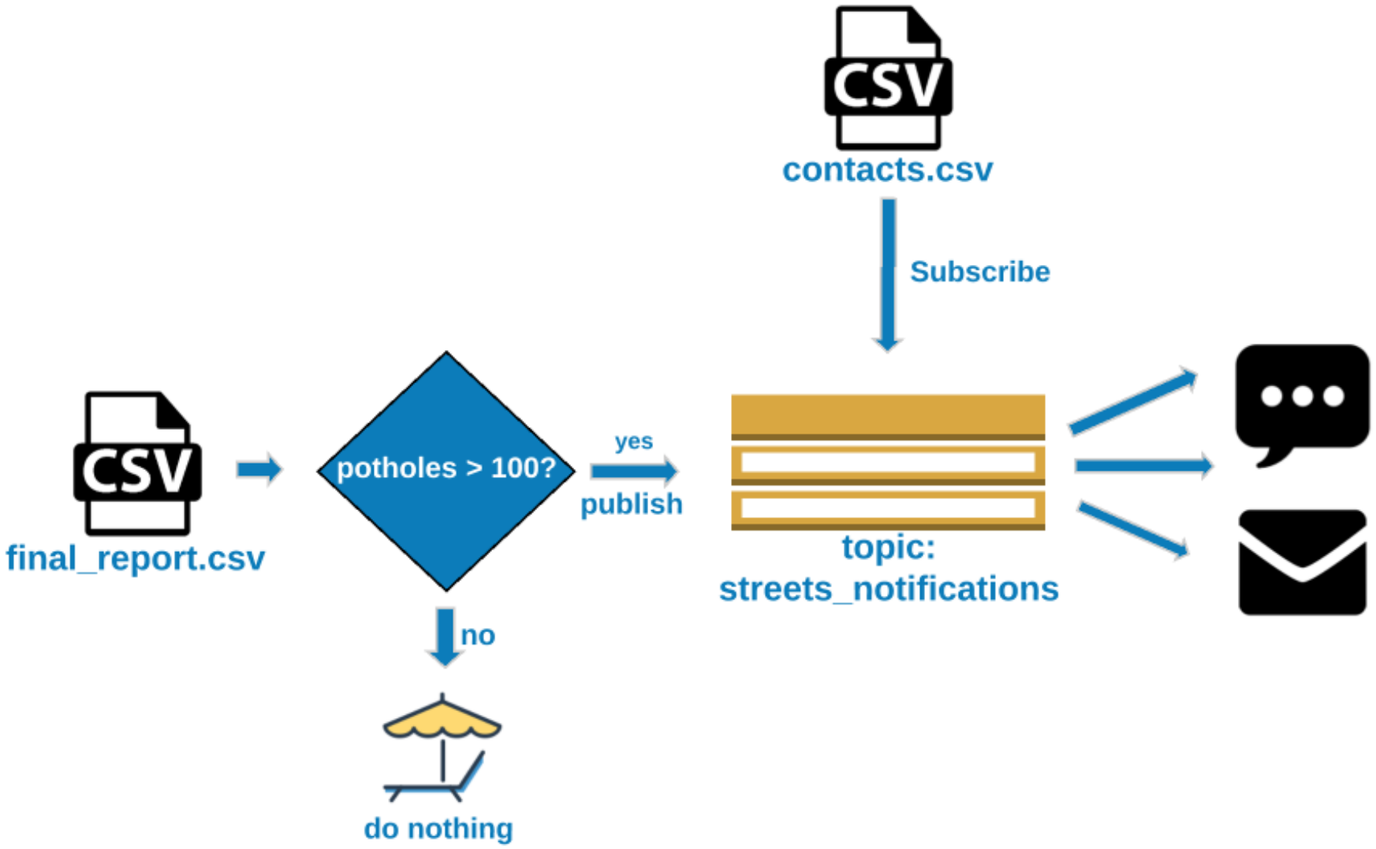
Final product



Final product



Final product



Building the notification system

Topic Set Up

- Create the topic
- Download the contact list csv
- Create topics for each service
- Subscribe the contacts to their respective topics

Building the notification system

Get the aggregated numbers

- Download the monthly get it done report
- Get the count of Potholes
- Get the count of Illegal dumping notifications

Send Alerts

- If potholes exceeds 100, send alert
- If illegal dumping exceeds 30, send alert

Topic set up

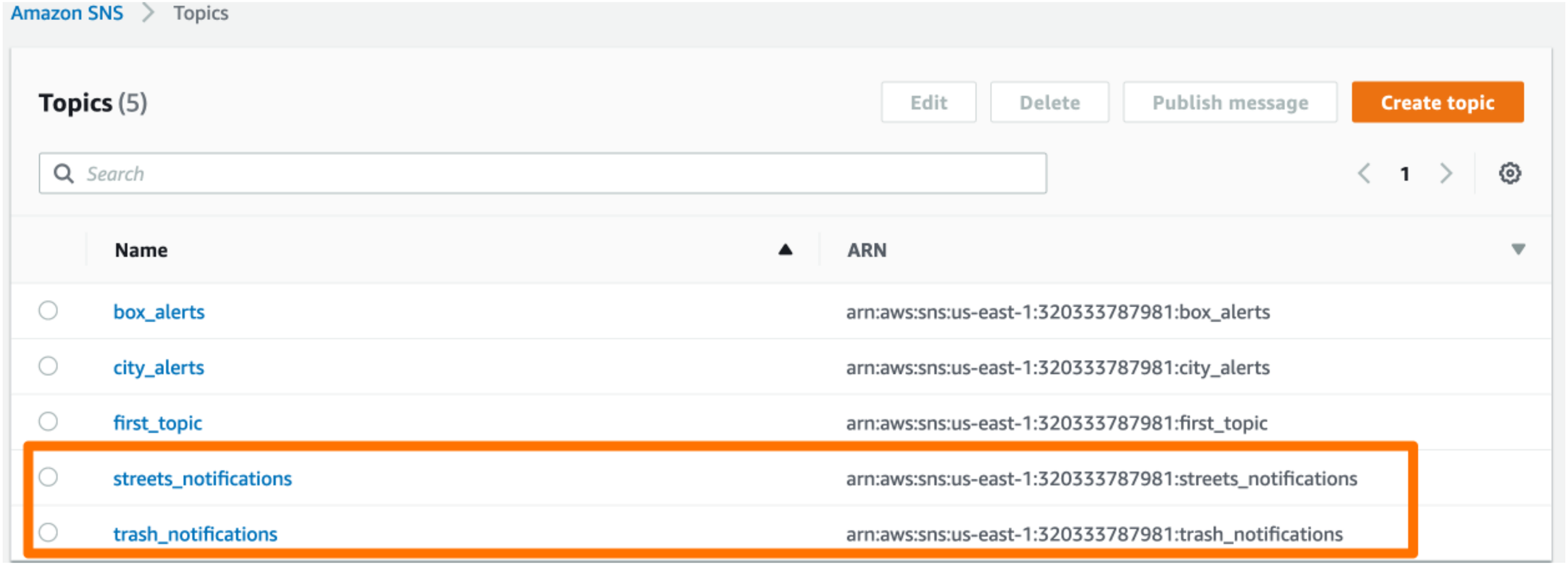
Initialize SNS client

```
sns = boto3.client('sns',
                   region_name='us-east-1',
                   aws_access_key_id=AWS_KEY_ID,
                   aws_secret_access_key=AWS_SECRET)
```

Create topics and store their ARNs

```
trash_arn = sns.create_topic(Name="trash_notifications")['TopicArn']
streets_arn = sns.create_topic(Name="streets_notifications")['TopicArn']
```

Topic set up


Amazon SNS
Topics
Topics (5)
Edit
Delete
Publish message
Create topic
Search
1
Name
ARN
box_alerts
arn:aws:sns:us-east-1:320333787981:box_alerts
city_alerts
arn:aws:sns:us-east-1:320333787981:city_alerts
first_topic
arn:aws:sns:us-east-1:320333787981:first_topic
streets_notifications
arn:aws:sns:us-east-1:320333787981:streets_notifications
trash_notifications
arn:aws:sns:us-east-1:320333787981:trash_notifications

Subscribing users to topics

```
contacts = pd.read_csv('http://gid-staging.s3.amazonaws.com/contacts.csv')
```

Subscribing users to topics

contacts.csv

?Name	Email	Phone	Department
John Smith	js@fake.com	+11224567890	trash
Fanny Mae	fannyma3@fake.com	+11234597890	trash
Janessa Goldsmith	whoami@fake.com	+11534567890	streets
Evelyn Monroe	Evely@fake.com	+11234067890	streets
Max Pe	max@maksimize.com	+11234517890	streets

Subscribing users to topics

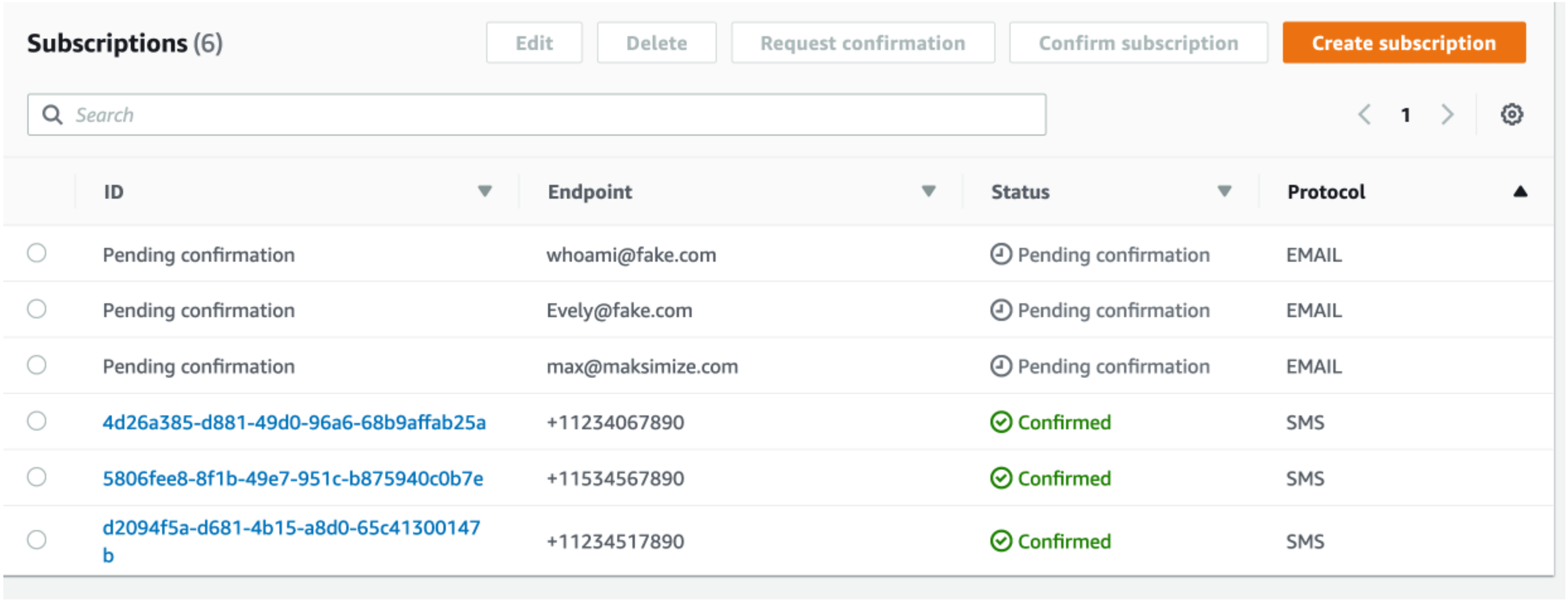
Create subscribe_user method

```
def subscribe_user(user_row):
    if user_row['Department'] == 'trash':
        sns.subscribe(TopicArn = trash_arn, Protocol='sms', Endpoint=str(user_row['Phone']))
        sns.subscribe(TopicArn = trash_arn, Protocol='email', Endpoint=user_row['Email'])
    else:
        sns.subscribe(TopicArn = streets_arn, Protocol='sms', Endpoint=str(user_row['Phone']))
        sns.subscribe(TopicArn = streets_arn, Protocol='email', Endpoint=user_row['Email'])
```

Apply the subscribe_user method to every row

```
contacts.apply(subscribe_user, axis=1)
```

Subscribing users to topics



Get the aggregated numbers

Load January's report into a DataFrame

```
df = pd.read_csv('http://gid-reports.s3.amazonaws.com/2019/feb/final_report.csv')
```

Get the aggregated numbers

service_name	count
Illegal Dumping	2580
Potential Missed Collection	150
Pothole	1170
Traffic Sign - Maintain	210
Traffic Signal Head Turned	60
Traffic Signal Light Out	120

Get the aggregated numbers

Set the index so we can access counts by service name directly

```
df.set_index('service_name', inplace=True)
```

Get the aggregated numbers

```
trash_violations_count = df.at['Illegal Dumping', 'count']
streets_violations_count = df.at['Pothole', 'count']
```

Send Alerts

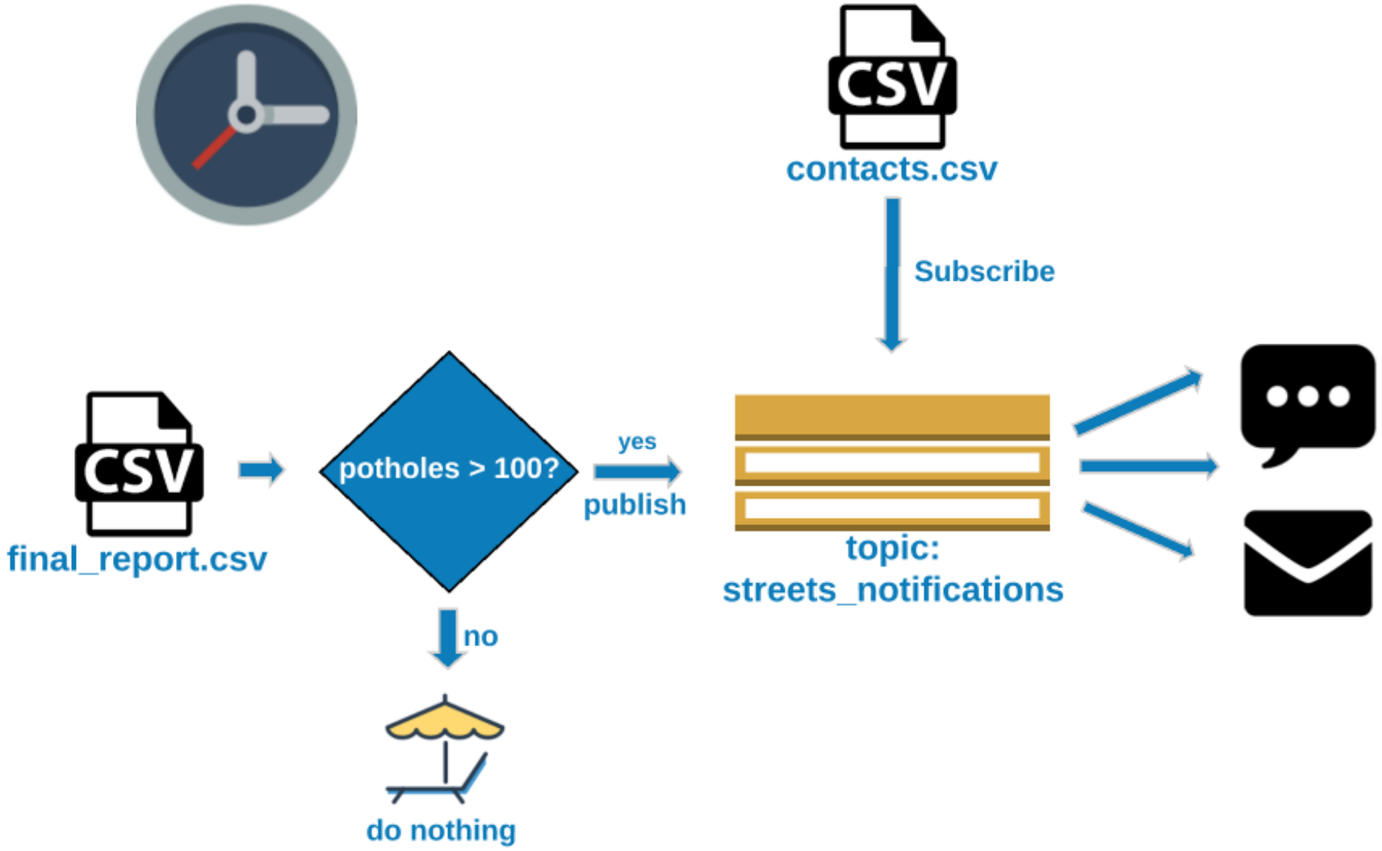
```
if trash_violations_count > 100:
  # Construct the message to send
    message = "Trash violations count is now {}".format(trash_violations_count)
    # Send message
    sns.publish(TopicArn = trash_arn,
                Message = message,
                Subject = "Trash Alert")
```

Send alerts

```
if streets_violations_count > 30:

    # Construct the message to send
    message = "Streets violations count is now {}".format(streets_violations_count)
    # Send message
    sns.publish(TopicArn = streets_arn,
                Message = message,
                Subject = "Streets Alert")
```

Final Result



Let's practice!

INTRODUCTION TO AWS BOTO IN PYTHON