AWS SDK for JavaScript

Developer Guide for SDK version 2.119.0

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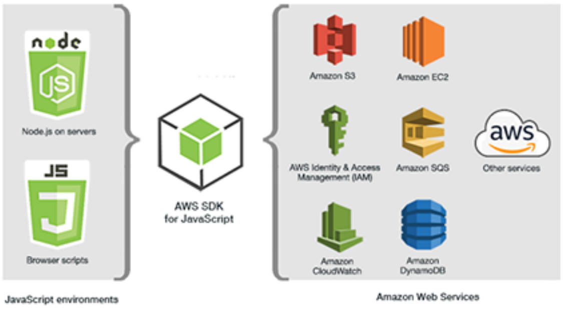
What Is the AWS SDK for JavaScript?

The AWS SDK for JavaScript provides a JavaScript API for AWS services you can use to build applications for Node.js or the browser. The JavaScript API lets developers build libraries or applications that make use of AWS services.



Not all services are immediately available in the SDK. To find out which services are currently supported by the AWS SDK for JavaScript, see https://github.com/aws/aws-sdk-js/blob/master/SERVICES.md

Using the SDK with Node.js

Node.js a cross-platform runtime for running server-side JavaScript applications. You can set up Node.js on an Amazon EC2 instance to run on a server. You can also use Node.js to write on-demand AWS Lambda functions.

Using the SDK for JavaScript for Node.js differs from using it for JavaScript in a web browser in the way you load the SDK and in how you obtain the credentials needed to access specific web services. When use of particular APIs differs between Node.js and the browser, those differences will be called out.

Using the SDK with Web Browsers

All major web browsers support execution of JavaScript. JavaScript code running in a web browser is often called client-side JavaScript.

Using the SDK for JavaScript in a web browser differs from using it for Node.js in the way you load the SDK and in how you obtain the credentials needed to access specific web services. When use of particular APIs differs between Node.js and the browser, those differences will be called out.

For a list of browsers supported by the AWS SDK for JavaScript, see Web Browsers Supported (p. 11).

Common Use Cases

Using the SDK for JavaScript in browser scripts makes it possible to realize a number of compelling use cases. Here are several ideas for things you can build in a browser application using the SDK for JavaScript to access different web services.

- Building a custom console to AWS services in which you access and combine features across regions and services to best meet your organizational or project needs.
- Using Amazon Cognito Identity to enable authenticated user access to your browser applications and websites, including use of third-party authentication from Facebook and others.
- Using Amazon Kinesis to process click streams or other marketing data in real time.
- Using Amazon DynamoDB for serverless data persistence such as individual user preferences for visitors of your website or application users.
- Using AWS Lambda to encapsulate proprietary logic that you can invoke from browser scripts without downloading and revealing your intellectual property to users.

Getting Started with the AWS SDK for JavaScript

The AWS SDK for JavaScript provides access to web services in either browser scripts or Node.js. This section has two getting started exercises that show you how to work with the SDK for JavaScript in each of these JavaScript environments.

Topics

Getting Started in a Browser Script

To start using the SDK for JavaScript in browser scripts, create a simple browser-based app that authenticates users using Amazon Cognito Identity and Facebook login. After logging in, the user gets temporary AWS credentials and assumes the pre-specified AWS Identity and Access Management (IAM) role. The role policy allows uploading and listing objects in Amazon Simple Storage Service (Amazon S3).

For information about downloading and installing the AWS SDK for JavaScript, see Installing the SDK for JavaScript (p. 11).

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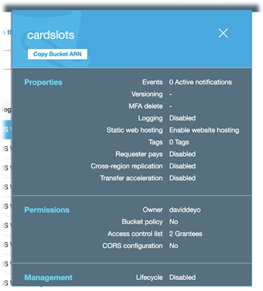
Step 1: Creating and Configuring an Amazon S3 Bucket

In this exercise, you will use an Amazon S3 bucket both to store the objects you upload in the application and to host the HTML page of the application itself. Cross-origin resource sharing, or CORS, must be configured on the Amazon S3 bucket to be accessed directly from JavaScript in the browser. For more information about CORS, see Cross-Origin Resource Sharing (CORS) (p. 35).

To create and configure the Amazon S3 bucket

1. Sign in to the AWS Management Console and open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose **Create bucket**. Give the bucket a unique name. Note the bucket name and region for later use. Choose **Next**.
3. In the **Set properties** panel under **Manage public permissions**, choose **Grant public read access to this bucket**. Choose **Next**.
4. Choose **Create bucket**. Choose the new bucket in the console.
5. In the pop-up-dialog, choose **Permissions**

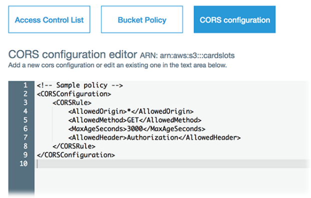


Properties
Events 0 Active notifications
Versioning -
MFA delete -
Logging Disabled
Static web hosting Enable website hosting
Tags 0 Tags
Requester pays Disabled
Cross-region replication Disabled
Transfer acceleration Disabled

Permissions
Owner daviddeyo
Bucket policy No
Access control list 2 Grantees
CORS configuration No

Management
Lifecycle Disabled

6. In the **Permissions** tab, choose **CORS Configuration**. The console displays the **CORS configuration editor**.



CORS configuration editor ARN: arn:aws:s3:::cardslots
Add a new cors configuration or edit an existing one in the text area below.

```
<!-- Sample policy -->
<CORSConfiguration>
    <CORSRule>
        <AllowedOrigin>*</AllowedOrigin>
        <AllowedMethod>GET</AllowedMethod>
        <MaxAgeSeconds>3000</MaxAgeSeconds>
        <AllowedHeader>Authorization</AllowedHeader>
    </CORSRule>
</CORSConfiguration>
```

7. Copy the following XML into the **CORS Configuration Editor** and then choose **Save**.

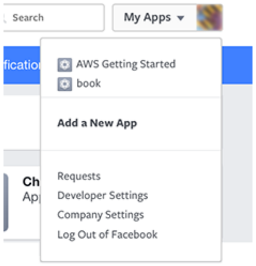
```
<?xml version="1.0" encoding="UTF-8"?>
<CORSConfiguration xmlns="http://s3.amazonaws.com/doc/2006-03-01">
   <CORSRule>
      <AllowedOrigin>*</AllowedOrigin>
      <AllowedMethod>GET</AllowedMethod>
      <AllowedMethod>PUT</AllowedMethod>
      <AllowedMethod>POST</AllowedMethod>
      <AllowedMethod>DELETE</AllowedMethod>
      <AllowedHeader>*</AllowedHeader>
   </CORSRule>
</CORSConfiguration>
```

Step 2: Creating the Facebook App and Getting the App ID

To complete this project, you must first obtain a Facebook App ID to use for Facebook login with Amazon Cognito Identity.

To obtain a Facebook App ID

1. Go to https://developers.facebook.com and log in with your Facebook account.
2. From the **My Apps** drop-down menu, choose **Add a New App**.



3. Configure the Facebook app settings to specify the app display name and your contact email. Note the app ID provided by Facebook, which you will include in the browser script later.
4. On the Facebook **Products** page, select **Facebook Login** then **Set Up**. Choose **Web** for the platform where the application will run.
5. To specify the **Site URL**, type `https://YOUR-BUCKET-NAME.s3.amazonaws.com/`. Then choose **Save**.

For more information about adding Facebook Login to a website, see https://developers.facebook.com/docs/facebook-login.

Step 3: Creating an IAM Role to Assign Users

To prevent users from overwriting or changing other users' objects, users are authenticated using Facebook Login. Each user who logs in has a unique identity that becomes part of the Amazon S3 key assigned to uploaded objects. To protect objects uploaded by other users, use an IAM role assigned user-specific write permissions at the prefix level with an IAM role policy. For more information on IAM roles, see Creating a Role to Delegate Permissions to an AWS Service in the IAM User Guide.

To create the IAM role and assign users

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. In the navigation pane, choose **Policies** and then choose **Create Policy**. For **Create Your Own Policy**, choose **Select**.
3. Name your policy (for example `JavaScriptSample`) and then copy the following JSON policy to the **Policy Document** text box. Replace the two instances of *`YOUR_BUCKET_NAME`* with your actual bucket name and then choose **Create Policy**.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Action": [
            "s3:PutObject",
            "s3:PutObjectAcl"
         ],
         "Resource": [
             "arn:aws:s3:::YOUR_BUCKET_NAME/facebook-${graph.facebook.com:id}/*"
         ],
         "Effect": "Allow"
      },
      {
         "Action": [
            "s3:ListBucket"
         ],
         "Resource": [
            "arn:aws:s3:::YOUR_BUCKET_NAME"
         ],
         "Effect": "Allow",
         "Condition": {
            "StringEquals": {
               "s3:prefix": "facebook-${graph.facebook.com:id}"
             }
          }
       }
    ]
}
```

4. In the IAM console navigation pane, choose **Roles** and then choose **Create New Role**.
5. Choose **Role for identity provider access** and select **Grant access to web identity providers**.
6. For **Identity Provider**, choose **Facebook**. For **Application ID**, type your app ID and then choose **Next Step**.
7. On the **Verify Role Trust** page, choose **Next Step**.
8. On the **Attach Policy** page, choose the policy you just created and then choose **Next Step**.
9. Enter a role name and choose **Create Role**.

Step 4: Creating the HTML Page and Browser Script

The sample app consists of a single HTML page that contains the user interface and browser script. Create an HTML document and copy the following contents into it.

```
<!DOCTYPE html>
<html>
<head>
    <title>AWS SDK for JavaScript - Sample Application</title>
    <meta charset="utf-8">
    <script src="https://sdk.amazonaws.com/js/aws-sdk-2.119.0.min.js"></script>
</head>

<body>
    <input type="file" id="file-chooser" />
    <button id="upload-button" style="display:none">Upload to S3</button>
    <div id="results"></div>
    <div id="fb-root"></div>
    <script type="text/javascript">
        var appId = 'YOUR_APP_ID';
        var roleArn = 'YOUR_ROLE_ARN';
        var bucketName = 'YOUR_BUCKET_NAME';
        AWS.config.region = 'YOUR_BUCKET_REGION';

        var fbUserId;
        var bucket = new AWS.S3({
            params: {
                Bucket: bucketName
            }
        });

        var fileChooser = document.getElementById('file-chooser');
        var button = document.getElementById('upload-button');
        var results = document.getElementById('results');

        button.addEventListener('click', function () {
            var file = fileChooser.files[0];
            if (file) {
                results.innerHTML = '';
                //Object key will be facebook-USERID#/FILE_NAME
                var objKey = 'facebook-' + fbUserId + '/' + file.name;
                var params = {
```

```
            Key: objKey,
            ContentType: file.type,
            Body: file,
            ACL: 'public-read'
        };

        bucket.putObject(params, function (err, data) {
            if (err) {
                results.innerHTML = 'ERROR: ' + err;
            } else {
                listObjs();
            }
        });
    } else {
        results.innerHTML = 'Nothing to upload.';
    }
}, false);

function listObjs() {
    var prefix = 'facebook-' + fbUserId;
    bucket.listObjects({
        Prefix: prefix
    }, function (err, data) {
        if (err) {
            results.innerHTML = 'ERROR: ' + err;
        } else {
            var objKeys = "";
            data.Contents.forEach(function (obj) {
                objKeys += obj.Key + "<br>";
            });
            results.innerHTML = objKeys;
        }
    });
}
/*!
 * Login to your application using Facebook.
 * Uses the Facebook SDK for JavaScript available here:
 * https://developers.facebook.com/docs/javascript/quickstart/
 */

window.fbAsyncInit = function () {
    FB.init({
        appId: appId
    });

    FB.login(function (response) {
        bucket.config.credentials = new AWS.WebIdentityCredentials({
            ProviderId: 'graph.facebook.com',
            RoleArn: roleArn,
            WebIdentityToken: response.authResponse.accessToken
        });
        fbUserId = response.authResponse.userID;
        button.style.display = 'block';
    })
};

 // Load the Facebook SDK asynchronously
(function (d, s, id) {
    var js, fjs = d.getElementsByTagName(s)[0];
    if (d.getElementById(id)) {
        return;
    }
    js = d.createElement(s);
    js.id = id;
    js.src = "https://connect.facebook.net/en_US/all.js";
    fjs.parentNode.insertBefore(js, fjs);
```

```
        }(document, 'script', 'facebook-jssdk'));
    </script>
</body>
</html>
```

Before you can run the example, replace `YOUR_APP_ID`, `YOUR_ROLE_ARN`, `YOUR_BUCKET_NAME`, and `YOUR_BUCKET_REGION` with the actual values for the Facebook app ID, IAM role ARN, Amazon S3 bucket name, and bucket region. You can find the Amazon Resource Name (ARN) of your IAM role in the IAM console by selecting the role and then choosing the **Summary** tab.

Step 5: Running the Sample

To run the sample app, type the following URL into a web browser.

```
https://YOUR-BUCKET-NAME.s3.amazonaws.com/index.html
```

Getting Started in Node.js

node JS	This example consists of a Node.js package that: • Creates an Amazon Simple Storage Service (Amazon S3) service object. • Creates an Amazon S3 bucket. • Uploads an object to the created bucket.	

For more information on Node.js packages, see Packages and Modules at the npm (the Node.js package manager) website. For information about downloading and installing the AWS SDK for JavaScript, see Installing the SDK for JavaScript (p. 11).

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Step 1: Downloading the Sample Project

You can download the sample package from GitHub with the following command. You must have Git installed.

```
git clone https://github.com/awslabs/aws-nodejs-sample.git
```

Step 2: Installing the SDK and Dependencies

You install the SDK for JavaScript package using the npm (the Node.js package manager). From the `aws-nodejs-sample` directory in the package, type the following at the command line.

```
npm install
```

Step 3: Configuring the Access Keys

Create your credentials file at ~/.aws/credentials (C:\Users\USER_NAME\.aws\credentials for Windows users) and then add the following lines. Replace `YOUR_ACCESS_KEY_ID` and `YOUR_SECRET_ACCESS_KEY` with the actual values from your account. For more information about how to obtain your credentials, see Getting Your Credentials (p. 19).

```
[default]
aws_access_key_id = YOUR_ACCESS_KEY_ID
aws_secret_access_key = YOUR_SECRET_ACCESS_KEY
```

Step 4: Running the Sample

Type the following command to run the sample.

```
node sample.js
```

Setting Up the SDK for JavaScript

The topics in this section explain how to install the SDK for JavaScript for use in web browsers and with Node.js. It also shows how to load the SDK so you can access the web services supported by the SDK.

Topics

Prerequisites

Before you use the AWS SDK for JavaScript, determine whether your code needs to run in Node.js or web browsers. After that, do the following:

- For Node.js, install Node.js on your servers if it is not already installed.
- For web browsers, identify the browser versions you need to support.

Topics

Setting Up an AWS Node.js Environment

To set up an AWS Node.js environment in which you can run your application, use any of the following methods:

- Choose an Amazon Machine Image (AMI) with Node.js pre-installed and create an Amazon EC2 instance using that AMI. When creating your Amazon EC2 instance, choose your AMI from the AWS Marketplace. Search the AWS Marketplace for Node.js and choose an AMI option that includes a version of Node.js (32-bit or 64-bit) pre-installed.
- Create an Amazon EC2 instance and install Node.js on it. For more information about how to install Node.js on an Amazon Linux instance, see Tutorial: Setting Up Node.js on an Amazon EC2 Instance (p. 172).

- Create a serverless environment using AWS Lambda to run Node.js as a Lambda function. For more information about using Node.js within a Lambda function, see Programming Model (Node.js) in the *AWS Lambda Developer Guide*.
- Deploy your Node.js application to AWS Elastic Beanstalk. For more information on using Node.js with Elastic Beanstalk, see Deploying Node.js Applications to AWS Elastic Beanstalk in the *AWS Elastic Beanstalk Developer Guide*.
- Create a Node.js application server using AWS OpsWorks. For more information on using Node.js with AWS OpsWorks, see Creating Your First Node.js Stack in the *AWS OpsWorks User Guide*.

Web Browsers Supported

The SDK for JavaScript supports all modern web browsers, including these minimum versions:

Browser	Version
Google Chrome	28.0+
Mozilla Firefox	26.0+
Opera	17.0+
Microsoft Edge	25.10+
Windows Internet Explorer	10+
Apple Safari	5+
Android Browser	4.3+

Installing the SDK for JavaScript

Whether and how you install the AWS SDK for JavaScript depends whether the code executes in Node.js modules or browser scripts.

Not all services are immediately available in the SDK. To find out which services are currently supported by the AWS SDK for JavaScript, see https://github.com/aws/aws-sdk-js/blob/master/SERVICES.md

Node

> The preferred way to install the AWS SDK for JavaScript for Node.js is to use npm, the Node.js package manager. To do so, type this at the command line.

```
npm install aws-sdk
```

Browser

> You don't have to install the SDK to use it in browser scripts. You can load the hosted SDK package directly from Amazon Web Services with a script in your HTML pages. The hosted SDK package supports the subset of AWS services that enforce cross-origin resource sharing (CORS). For more information, see Loading the SDK for JavaScript (p. 12).
>
> You can create a custom build of the SDK in which you select the specific web services and versions that you want to use. You then download your custom SDK package for local development and host it for your application to use. For more information about creating a custom build of the SDK, see Building the SDK for Browsers (p. 32).

You can download minified and non-minified distributable versions of the current AWS SDK for JavaScript from GitHub at:

https://github.com/aws/aws-sdk-js/tree/master/dist

Installing Using Bower

Bower is a package manager for the web. After you install Bower, you can use it to install the SDK. To install the SDK using Bower, type the following into a terminal window:

```
bower install aws-sdk-js
```

Loading the SDK for JavaScript

How you load the SDK for JavaScript depends on whether you are loading it to run in a web browser or in Node.js.

Not all services are immediately available in the SDK. To find out which services are currently supported by the AWS SDK for JavaScript, see https://github.com/aws/aws-sdk-js/blob/master/SERVICES.md

Node.js

After you install the SDK, you can load the AWS package in your node application using `require`.

```
var AWS = require('aws-sdk');
```

React Native

To use the SDK in a React Native project, first install the SDK using npm:

```
npm install aws-sdk
```

In your application, to reference the React Native compatible version of the SDK with the following code

```
var AWS = require('aws-sdk/dist/aws-sdk-react-native');
```

Browser

The quickest way to get started with the SDK is to load the hosted SDK package directly from Amazon Web Services. To do this, add the following script tag to your HTML pages:

```
<script src="https://sdk.amazonaws.com/js/aws-sdk-2.119.0.min.js"></script>
```

After the SDK loads in your page, the SDK is available from the global variable `AWS` (or `window.AWS`).

If you bundle your code and module dependencies using browserify, you load the SDK using `require`, just as you do in Node.js.

Upgrading the SDK for JavaScript from Version 1

The following notes help you upgrade the SDK for JavaScript from version 1 to version 2.

Automatic Conversion of Base64 and Timestamp Types on Input/Output

The SDK now automatically encodes and decodes base64-encoded values, as well as timestamp values, on the user's behalf. This change affects any operation where base64 or timestamp values were sent by a request or returned in a response that allows for base64-encoded values.

User code that previously converted base64 is no longer required. Values encoded as base64 are now returned as buffer objects from server responses and can also be passed as buffer input. For example, the following version 1 `SQS.sendMessage` parameters:

```
var params = {
   MessageBody: 'Some Message',
   MessageAttributes: {
      attrName: {
         DataType: 'Binary',
         BinaryValue: new Buffer('example text').toString('base64')
      }
   }
};
```

Can be rewritten as follows.

```
var params = {
   MessageBody: 'Some Message',
   MessageAttributes: {
      attrName: {
         DataType: 'Binary',
         BinaryValue: 'example text'
      }
   }
};
```

Here is how the message is read.

```
sqs.receiveMessage(params, function(err, data) {
  // buf is <Buffer 65 78 61 6d 70 6c 65 20 74 65 78 74>
  var buf = data.Messages[0].MessageAttributes.attrName.BinaryValue;
  console.log(buf.toString()); // "example text"
});
```

Moved response.data.RequestId to response.requestId

The SDK now stores request IDs for all services in a consistent place on the `response` object, rather than inside the `response.data` property. This improves consistency across services that expose request IDs in different ways. This is also a breaking change that renames the `response.data.RequestId` property to `response.requestId` (`this.requestId` inside a callback function).

In your code, change the following:

```
svc.operation(params, function (err, data) {
console.log('Request ID:', data.RequestId);
});
```

To the following:

```
svc.operation(params, function () {
console.log('Request ID:', this.requestId);
});
```

Exposed Wrapper Elements

If you use `AWS.ElastiCache`, `AWS.RDS`, or `AWS.Redshift`, you must access the response through the top-level output property in the response for some operations.

For example, the `RDS.describeEngineDefaultParameters` method used to return the following.

```
{ Parameters: [ ... ] }
```

It now returns the following.

```
{ EngineDefaults: { Parameters: [ ... ] } }
```

The list of affected operations for each service are shown in the following table.

Client Class	Operations
`AWS.ElastiCache`	`authorizeCacheSecurityGroupIngress`, `createCacheCluster`, `createCacheParameterGroup`, `createCacheSecurityGroup`, `createCacheSubnetGroup`, `createReplicationGroup`, `deleteCacheCluster`, `deleteReplicationGroup`, `describeEngineDefaultParameters`, `modifyCacheCluster`, `modifyCacheSubnetGroup`, `modifyReplicationGroup`, `purchaseReservedCacheNodesOffering`, `rebootCacheCluster`, `revokeCacheSecurityGroupIngress`
`AWS.RDS`	`addSourceIdentifierToSubscription`, `authorizeDBSecurityGroupIngress`, `copyDBSnapshot`, `createDBInstance`, `createDBInstanceReadReplica`, `createDBParameterGroup`, `createDBSecurityGroup`, `createDBSnapshot`, `createDBSubnetGroup`, `createEventSubscription`, `createOptionGroup`, `deleteDBInstance`, `deleteDBSnapshot`, `deleteEventSubscription`, `describeEngineDefaultParameters`, `modifyDBInstance`, `modifyDBSubnetGroup`, `modifyEventSubscription`, `modifyOptionGroup`, `promoteReadReplica`, `purchaseReservedDBInstancesOffering`, `rebootDBInstance`, `removeSourceIdentifierFromSubscription`, `restoreDBInstanceFromDBSnapshot`, `restoreDBInstanceToPointInTime`, `revokeDBSecurityGroupIngress`

Client Class	Operations
AWS.Redshift	authorizeClusterSecurityGroupIngress, authorizeSnapshotAccess, copyClusterSnapshot, createCluster, createClusterParameterGroup, createClusterSecurityGroup, createClusterSnapshot, createClusterSubnetGroup, createEventSubscription, createHsmClientCertificate, createHsmConfiguration, deleteCluster, deleteClusterSnapshot, describeDefaultClusterParameters, disableSnapshotCopy, enableSnapshotCopy, modifyCluster, modifyClusterSubnetGroup, modifyEventSubscription, modifySnapshotCopyRetentionPeriod, purchaseReservedNodeOffering, rebootCluster, restoreFromClusterSnapshot, revokeClusterSecurityGroupIngress, revokeSnapshotAccess, rotateEncryptionKey

Dropped Client Properties

The `.Client` and `.client` properties have been removed from service objects. If you use the `.Client` property on a service class or a `.client` property on a service object instance, remove these properties from your code.

The following code used with version 1 of the SDK for JavaScript:

```
var sts = new AWS.STS.Client();
// or
var sts = new AWS.STS();

sts.client.operation(...);
```

Should be changed to the following code.

```
var sts = new AWS.STS();
sts.operation(...)
```

Configuring the SDK for JavaScript

Before you use the SDK for JavaScript to invoke web services using the API, you must configure the SDK. At a minimum, you must configure these settings:

- The *region* in which you will request services.
- The *credentials* that authorize your access to SDK resources.

In addition to these settings, you may also have to configure permissions for your AWS resources. For example, you can limit access to an Amazon S3 bucket or restrict an Amazon DynamoDB table for read-only access.

The topics in this section describe various ways to configure the SDK for JavaScript for Node.js and JavaScript running in a web browser.

Topics

Using the Global Configuration Object

There are two ways to configure the SDK:

- Set the global configuration using `AWS.Config`.
- Pass extra configuration information to a service object.

Setting global configuration with `AWS.Config` is often easier to get started, but service-level configuration can provide more control over individual services. The global configuration specified by `AWS.Config` provides default settings for service objects that you create subsequently, simplifying their configuration. However, you can update the configuration of individual service objects when your needs vary from the global configuration.

Setting Global Configuration

After you load the SDK, use the global variable, `AWS`, to access the SDK. You use this global access variable with the JavaScript API to interact with individual services. The SDK includes a global configuration object, `AWS.Config`, that you use to specify the SDK configuration settings required by your application.

Set your SDK configuration using `AWS.Config` by setting its properties according to your application needs. The following table summarizes `AWS.Config` properties commonly used to set the configuration of the SDK.

Configuration Options	Description
`credentials`	**Required.** Specifies the credentials used to determine access to services and resources.
`region`	**Required.** Specifies the region in which requests for services are made.
`maxRetries`	Optional. Specifies the maximum number of times a given request is retried.
`logger`	Optional. Specifies a logger object to which debugging information is written.
`update`	Optional. Updates the current configuration with new values.

For more information about the configuration object, see Class: AWS.Config in the API Reference.

Global Configuration Examples

Two properties of `AWS.Config` you must set to use the SDK are those that specify the region to use and the credentials that authorize your access to services. You can set these properties as part of the `AWS.Config` constructor, as shown in the following browser script example:

```
var myCredentials = new
 AWS.CognitoIdentityCredentials({IdentityPoolId:'IDENTITY_POOL_ID'});
var myConfig = new AWS.Config({
  credentials: myCredentials, region: 'us-west-2'
});
```

You can also set these properties after creating `AWS.Config` using the `update` method, as shown in the following example that updates the region:

```
myConfig = new AWS.Config();
myConfig.update({region: 'us-east-1'});
```

Setting Configuration Per Service

Each service that you use in the SDK for JavaScript is accessed through a service object that is part of the API for that service. For example, to access the Amazon S3 service you create the Amazon S3 service object. You can specify configuration settings that are specific to a service as part of the constructor for that service object. When you set configuration values on a service object, the constructor takes all of the configuration values used by `AWS.Config`, including credentials.

For example, if you need to access Amazon EC2 objects in multiple regions, create an EC2 service object for each region and then set the region configuration of each service object accordingly.

```
var ec2_regionA = new AWS.EC2({region: 'ap-southeast-2', maxRetries: 15, apiVersion:
 '2014-10-01'});
var ec2_regionB = new AWS.EC2({region: 'us-east-1', maxRetries: 15, apiVersion:
 '2014-10-01'});
```

You can also set configuration values specific to a service when configuring the SDK with `AWS.Config`. The global configuration object supports many service-specific configuration options. For more information about service-specific configuration, see Class: AWS.Config in the AWS SDK for JavaScript API Reference.

Immutable Configuration Data

Global configuration changes apply to requests for all newly created service objects. Newly created service objects are configured with the current global configuration data first and then any local configuration options. Updates you make to the global `AWS.config` object don't apply to previously created service objects.

Existing service objects must be manually updated with new configuration data or you must create and use a new service object that has the new configuration data. The following example creates a new Amazon S3 service object with new configuration data:

```
s3 = new AWS.S3(s3.config);
```

Setting the Region

A region is a named set of AWS resources in the same geographical area. An example of a region is `us-east-1`, which is the US East (N. Virginia). You specify a region when configuring the SDK for JavaScript so the SDK accesses the resources in that region. Some services are only available in some regions.

The SDK for JavaScript doesn't select a region by default. To set the region, update the `AWS.Config` global configuration object as shown in the following example:

```
AWS.config.update({region: 'us-east-1'});
```

For more information about current regions and available services in each region, see AWS Regions and Endpoints.

Getting Your Credentials

When you create an AWS account, your account is provided with root credentials. Those credentials consist of two access keys:

- Access key ID
- Secret access key

For more information on your access keys, see Understanding and Getting Your Security Credentials in the *AWS General Reference*.

To get the access key ID and secret access key for an IAM user

Access keys consist of an access key ID and secret access key, which are used to sign programmatic requests that you make to AWS. If you don't have access keys, you can create them from the AWS Management Console. We recommend that you use IAM access keys instead of AWS account root user access keys. IAM lets you securely control access to AWS services and resources in your AWS account.

The only time that you can view or download the secret access keys is when you create the keys. You cannot recover them later. However, you can create new access keys at any time. You must also have permissions to perform the required IAM actions. For more information, see Granting IAM User Permission to Manage Password Policy and Credentials in the *IAM User Guide*.

1. Open the IAM console.
2. In the navigation pane, choose **Users**.
3. Choose your IAM user name (not the check box).
4. Choose the **Security credentials** tab and then choose **Create access key**.
5. To see the new access key, choose **Show**. Your credentials will look something like this:
    - Access key ID: AKIAIOSFODNN7EXAMPLE
    - Secret access key: wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
6. To download the key pair, choose **Download .csv file**. Store the keys in a secure location.

    Keep the keys confidential in order to protect your account, and never email them. Do not share them outside your organization, even if an inquiry appears to come from AWS or Amazon.com. No one who legitimately represents Amazon will ever ask you for your secret key.

Related topics

- What Is IAM? in the *IAM User Guide*
- AWS Security Credentials in *AWS General Reference*

Setting Credentials

AWS uses credentials to identify who is calling services and whether access to the requested resources is allowed. In AWS, these credentials are typically the access key ID and the secret access key that were created along with your account.

Whether running in a web browser or in a Node.js server, your JavaScript code must obtain valid credentials before it can access services through the API. Credentials can be set globally on the configuration object, using `AWS.Config`, or per service, by passing credentials directly to a service object.

There are several ways to set credentials that differ between Node.js and JavaScript in web browsers. The topics in this section describe how to set credentials in Node.js or web browsers. In each case, the options are presented in recommended order.

Best Practices for Credentials

Properly setting credentials ensures that your application or browser script can access the services and resources needed while minimizing exposure to security issues that may impact mission critical applications or compromise sensitive data.

An important principle to apply when setting credentials is to always grant the least privilege required for your task. It's more secure to provide minimal permissions on your resources and add further permissions as needed, rather than provide permissions that exceed the least privilege and, as a result, be required to fix security issues you might discover later. For example, unless you have a need to read and write individual resources, such as objects in an Amazon S3 bucket or a DynamoDB table, set those permissions to read only.

For more information on granting the least privilege, see Best Practices in the *IAM User Guide*.

> **Warning**
> While it is possible to do so, we recommend you not hard code credentials inside an application or browser script. Hard coding credentials poses a risk of exposing your access key ID and secret access key.

For more information about how to manage your access keys, see Best Practices for Managing AWS Access Keys in the AWS General Reference.

Setting Credentials in Node.js

There are several ways in Node.js to supply your credentials to the SDK. Some of these are more secure and others afford greater convenience while developing an application. When obtaining credentials in Node.js, be careful about relying on more than one source such as an environment variable and a JSON file you load. You can change the permissions under which your code runs without realizing the change has happened.

Here are the ways you can supply your credentials in order of recommendation:

1. Loaded from AWS Identity and Access Management (IAM) roles for Amazon EC2 (if running on Amazon EC2)
2. Loaded from the shared credentials file (`~/.aws/credentials`)
3. Loaded from environment variables
4. Loaded from a JSON file on disk

> **Warning**
> While it is possible to do so, we do not recommend hard-coding your AWS credentials in your application. Hard-coding credentials poses a risk of exposing your access key ID and secret access key.

The topics in this section describe how to load credentials into Node.js.

Topics

Loading Credentials in Node.js from IAM Roles for EC2

If you run your Node.js application on an Amazon EC2 instance, you can leverage IAM roles for Amazon EC2 to automatically provide credentials to the instance. If you configure your instance to use IAM roles, the SDK automatically selects the IAM credentials for your application, eliminating the need to manually provide credentials.

For more information on adding IAM roles to an Amazon EC2 instance, see IAM Roles for Amazon EC2.

Loading Credentials for a Node.js Lambda Function

When you create an AWS Lambda function, you must create a special IAM role that has permission to execute the function. This role is called the *execution role*. When you set up a Lambda function, you must specify the IAM role you created as the corresponding execution role.

The execution role provides the Lambda function with the credentials it needs to run and to invoke other web services. As a result, you do not need to provide credentials to the Node.js code you write within a Lambda function.

For more information about creating a Lambda execution role, see Manage Permissions: Using an IAM Role (Execution Role) in the *AWS Lambda Developer Guide*.

Loading Credentials in Node.js from the Shared Credentials File

You can keep your AWS credentials data in a shared file used by SDKs and the command line interface. The SDK for JavaScript automatically searches the shared credentials file for credentials when loading. Where you keep the shared credentials file depends on your operating system:

- Linux users: `~/.aws/credentials`
- Windows users: `C:\Users\USER_NAME\.aws\credentials`

If you do not already have a shared credentials file, you can create one in the designated directory. Add the following text to the credentials file, replacing *`<YOUR_ACCESS_KEY_ID>`* and *`<YOUR_SECRET_ACCESS_KEY>`* values:

```
[default]
aws_access_key_id = <YOUR_ACCESS_KEY_ID>
aws_secret_access_key = <YOUR_SECRET_ACCESS_KEY>
```

The `[default]` section heading specifies a default profile and associated values for credentials. You can create additional profiles in the same shared configuration file, each with its own credential information. The following example shows a configuration file with the default profile and two additional profiles:

```
[default] ; default profile
aws_access_key_id = <DEFAULT_ACCESS_KEY_ID>
aws_secret_access_key = <DEFAULT_SECRET_ACCESS_KEY>
```

```
[personal-account] ; personal account profile
aws_access_key_id = <PERSONAL_ACCESS_KEY_ID>
aws_secret_access_key = <PERSONAL_SECRET_ACCESS_KEY>

[work-account] ; work account profile
aws_access_key_id = <WORK_ACCESS_KEY_ID>
aws_secret_access_key = <WORK_SECRET_ACCESS_KEY>
```

By default, the SDK checks the `AWS_PROFILE` environment variable to determine which profile to use. If the `AWS_PROFILE` variable is not set in your environment, the SDK uses the credentials for the `[default]` profile. To use one of the additional profiles, change the value of the `AWS_PROFILE` environment variable. In the previous example, to use the credentials from the work account, set `AWS_PROFILE=work-account`.

After setting the environment variable, to run a `script.js` file that uses the SDK, type the following at the command line:

```
$ AWS_PROFILE=work-account node script.js
```

You can also explicitly select the profile used by the SDK, either by setting `process.env.AWS_PROFILE` before loading the SDK, or by selecting the credential provider as shown in the following example:

```
var credentials = new AWS.SharedIniFileCredentials({profile: 'work-account'});
AWS.config.credentials = credentials;
```

Loading Credentials in Node.js from Environment Variables

The SDK automatically detects AWS credentials set as variables in your environment and uses them for SDK requests, eliminating the need to manage credentials in your application. The environment variables that you set to provide your credentials are:

- `AWS_ACCESS_KEY_ID`
- `AWS_SECRET_ACCESS_KEY`
- `AWS_SESSION_TOKEN` (optional)

Loading Credentials in Node.js from a JSON File

You can load configuration and credentials from a JSON document on disk using `AWS.config.loadFromPath`. The path specified is relative to the current working directory of your process. For example, to load credentials from a `'config.json'` file with the following content:

```
{ "accessKeyId": <YOUR_ACCESS_KEY_ID>, "secretAccessKey": <YOUR_SECRET_ACCESS_KEY>,
 "region": "us-east-1" }
```

Use the following command:

```
AWS.config.loadFromPath('./config.json');
```

> **Note**
> Loading configuration data from a JSON document resets all existing configuration data. Add additional configuration data after using this technique. Loading credentials from a JSON document is not supported in browser scripts.

Setting Credentials in a Web Browser

There are several ways to supply your credentials to the SDK from browser scripts. Some of these are more secure and others afford greater convenience while developing a script. Here are the ways you can supply your credentials in order of recommendation:

1. Using Amazon Cognito Identity to authenticate users and supply credentials
2. Using web federated identity
3. Hard coded in the script

> **Warning**
> We do not recommend hard coding your AWS credentials in your scripts. Hard coding credentials poses a risk of exposing your access key ID and secret access key.

Topics

Using Amazon Cognito Identity to Authenticate Users

The recommended way to obtain AWS credentials for your browser scripts is to use the Amazon Cognito Identity credentials object, `AWS.CognitoIdentityCredentials`. Amazon Cognito enables authentication of users through third-party identity providers.

To use Amazon Cognito Identity, you must first create an identity pool in the Amazon Cognito console. An identity pool represents the group of identities that your application provides to your users. The identities given to users uniquely identify each user account. Amazon Cognito identities are not credentials. They are exchanged for credentials using web identity federation support in AWS Security Token Service (AWS STS).

Amazon Cognito helps you manage the abstraction of identities across multiple identity providers with the `AWS.CognitoIdentityCredentials` object. The identity that is loaded is then exchanged for credentials in AWS STS.

Configuring the Amazon Cognito Identity Credentials Object

If you have not yet created one, create an identity pool to use with your browser scripts in the Amazon Cognito console before you configure `AWS.CognitoIdentityCredentials`. Create and associate both authenticated and unauthenticated IAM roles for your identity pool.

Unauthenticated users do not have their identity verified, making this role appropriate for guest users of your app or in cases when it doesn't matter if users have their identities verified. Authenticated users log in to your application through a third-party identity provider that verifies their identities. Make sure you scope the permissions of resources appropriately so you don't grant access to them from unauthenticated users.

After you configure an identity pool with identity providers attached, you can use `AWS.CognitoIdentityCredentials` to authenticate users. To configure your application credentials to use `AWS.CognitoIdentityCredentials`, set the `credentials` property of either `AWS.Config` or a per-service configuration. The following example uses `AWS.Config`:

```
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
  IdentityPoolId: 'us-east-1:1699ebc0-7900-4099-b910-2df94f52a030',
  Logins: { // optional tokens, used for authenticated login
```

```
    'graph.facebook.com': 'FBTOKEN',
    'www.amazon.com': 'AMAZONTOKEN',
    'accounts.google.com': 'GOOGLETOKEN'
  }
});
```

The optional Logins property is a map of identity provider names to the identity tokens for those providers. How you get the token from your identity provider depends on the provider you use. For example, if Facebook is one of your identity providers, you might use the FB.login function from the Facebook SDK to get an identity provider token:

```
FB.login(function (response) {
  if (response.authResponse) { // logged in
    AWS.config.credentials = new AWS.CognitoIdentityCredentials({
      IdentityPoolId: 'us-east-1:1699ebc0-7900-4099-b910-2df94f52a030',
      Logins: {
        'graph.facebook.com': response.authResponse.accessToken
      }
    });

    s3 = new AWS.S3; // we can now create our service object

    console.log('You are now logged in.');
  } else {
    console.log('There was a problem logging you in.');
  }
});
```

Switching Unauthenticated Users to Authenticated Users

Amazon Cognito supports both authenticated and unauthenticated users. Unauthenticated users receive access your resources even if they aren't logged in with any of your identity providers. This degree of access is useful to display content to users prior to logging in. Each unauthenticated user has a unique identity in Amazon Cognito even though they have not been individually logged in and authenticated.

Initially Unauthenticated User

Users typically start with the unauthenticated role, for which you set the credentials property of your configuration object without a Logins property. In this case, your default configuration might look like the following:

```
// set the default config object
var creds = new AWS.CognitoIdentityCredentials({
 IdentityPoolId: 'us-east-1:1699ebc0-7900-4099-b910-2df94f52a030'
});
AWS.config.credentials = creds;
```

Switch to Authenticated User

When an unauthenticated user logs in to an identity provider and you have a token, you can switch the user from unauthenticated to authenticated by calling a custom function that updates the credentials object and adds the Logins token:

```
// Called when an identity provider has a token for a logged in user
function userLoggedIn(providerName, token) {
creds.params.Logins = {};
creds.params.Logins[providerName] = token;

// Expire credentials to refresh them on the next request
creds.expired = true;
}
```

You can also Create `CognitoIdentityCredentials` object. If you do, you must reset the credentials properties of existing service objects you created. Service objects read from the global configuration only on object initialization.

For more information about the `CognitoIdentityCredentials` object, see AWS.CognitoIdentityCredentials in the AWS SDK for JavaScript API Reference.

Using Web Federated Identity to Authenticate Users

You can directly configure individual identity providers to access AWS resources using web identity federation. AWS currently supports authenticating users using web identity federation through several identity providers:

- Login with Amazon
- Facebook Login
- Google Sign-in

You must first register your application with the providers that your application supports. Next, create an IAM role and set up permissions for it. The IAM role you create is then used to grant the permissions you configured for it through the respective identity provider. For example, you can set up a role that allows users who logged in through Facebook to have read access to a specific Amazon S3 bucket you control.

After you have both an IAM role with configured privileges and an application registered with your chosen identity providers, you can set up the SDK to get credentials for the IAM role using helper code, as follows:

```
AWS.config.credentials = new AWS.WebIdentityCredentials({
   RoleArn: 'arn:aws:iam::<AWS_ACCOUNT_ID>/:role/<WEB_IDENTITY_ROLE_NAME>',
   ProviderId: 'graph.facebook.com|www.amazon.com', // this is null for Google
   WebIdentityToken: ACCESS_TOKEN
});
```

The value in the `ProviderId` parameter depends on the specified identity provider. The value in the `WebIdentityToken` parameter is the access token retrieved from a successful login with the identity provider. For more information on how to configure and retrieve access tokens for each identity provider, see the documentation for the identity provider.

Step 1: Registering with Identity Providers

To begin, register an application with the identity providers you choose to support. You will be asked to provide information that identifies your application and possibly its author. This ensures that the identity providers know who is receiving their user information. In each case, the identity provider will issue an application ID that you use to configure user roles.

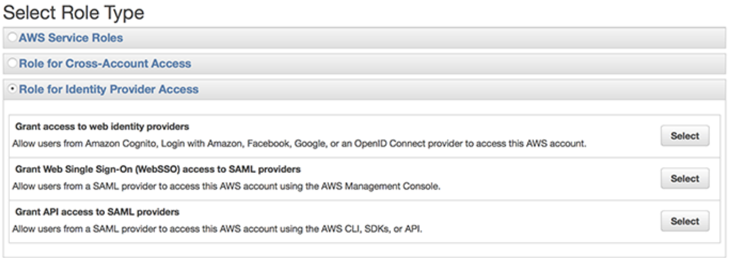
Step 2: Creating an IAM Role for an Identity Provider

After you obtain the application ID from an identity provider, go to the IAM console at https://console.aws.amazon.com/iam/ to create a new IAM role.

To create an IAM role for an identity provider

1. Go to the **Roles** section of the console and then choose **Create New Role**.
2. Type a name for the new role that helps you keep track of its use, such as **`facebookIdentity`**, and then choose **Next Step**.
3. In **Select Role Type**, choose **Role for Identity Provider Access**.

4. For **Grant access to web identity providers**, choose **Select**.



Select Role Type

○ AWS Service Roles

○ Role for Cross-Account Access

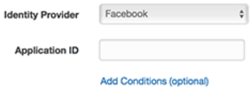
● Role for Identity Provider Access

Grant access to web identity providers
Allow users from Amazon Cognito, Login with Amazon, Facebook, Google, or an OpenID Connect provider to access this AWS account.

Grant Web Single Sign-On (WebSSO) access to SAML providers
Allow users from a SAML provider to access this AWS account using the AWS Management Console.

Grant API access to SAML providers
Allow users from a SAML provider to access this AWS account using the AWS CLI, SDKs, or API.

5. From the **Identity Provider** list, choose the identity provider that you want to use for this IAM role.



Identity Provider: Facebook

Application ID:

6. Type the application ID provided by the identity provider in **Application ID** and then choose **Next Step**.
7. Configure permissions for the resources you want to expose, allowing access to specific operations on specific resources. For more information about IAM permissions, see Overview of AWS IAM Permissions in the *IAM User Guide*. Review and, if needed, customize the role's trust relationship, and then choose **Next Step**.
8. Attach additional policies you need and then choose **Next Step**. For more information about IAM policies, see Overview of IAM Policies in the *IAM User Guide*.
9. Review the new role and then choose **Create Role**.

You can provide other constraints to the role, such as scoping it to specific user IDs. If the role grants write permissions to your resources, make sure you correctly scope the role to users with the correct privileges, otherwise any user with an Amazon, Facebook, or Google identity will be able to modify resources in your application.

For more information on using web identity federation in IAM, see About Web Identity Federation in the *IAM User Guide*.

Step 3: Obtaining a Provider Access Token After Login

Set up the login action for your application by using the identity provider's SDK. You can download and install a JavaScript SDK from the identity provider that enables user login, using either OAuth or OpenID. For information on how to download and set up the SDK code in your application, see the SDK documentation for your identity provider:

- Login with Amazon
- Facebook Login
- Google Sign-in

Step 4: Obtaining Temporary Credentials

After your application, roles, and resource permissions are configured, add the code to your application to obtain temporary credentials. These credentials are provided through the AWS Security Token Service using web identity federation. Users log in to the identity provider, which returns an access token. Set up the `AWS.WebIdentityCredentials` object using the ARN for the IAM role you created for this identity provider:

```
AWS.config.credentials = new AWS.WebIdentityCredentials({
    RoleArn: 'arn:aws:iam::<AWS_ACCOUNT_ID>:role/<WEB_IDENTITY_ROLE_NAME>',
    ProviderId: 'graph.facebook.com|www.amazon.com', // Omit this for Google
    WebIdentityToken: ACCESS_TOKEN // Access token from identity provider
});
```

Service objects that are created subsequently will have the proper credentials. Objects created before setting the `AWS.config.credentials` property won't have the current credentials.

You can also create `AWS.WebIdentityCredentials` before retrieving the access token. This allows you to create service objects that depend on credentials before loading the access token. To do this, create the credentials object without the `WebIdentityToken` parameter:

```
AWS.config.credentials = new AWS.WebIdentityCredentials({
  RoleArn: 'arn:aws:iam::<AWS_ACCOUNT_ID>:role/<WEB_IDENTITY_ROLE_NAME>',
  ProviderId: 'graph.facebook.com|www.amazon.com' // Omit this for Google
});

// Create a service object
var s3 = new AWS.S3;
```

Then set `WebIdentityToken` in the callback from the identity provider SDK that contains the access token:

```
AWS.config.credentials.params.WebIdentityToken = accessToken;
```

Web Federated Identity Examples

Here are a few examples of using web federated identity to obtain credentials in browser JavaScript. These examples must be run from an http:// or https:// host scheme to ensure the identity provider can redirect to your application.

Login with Amazon Example

The following code shows how to use Login with Amazon as an identity provider.

```
<a href="#" id="login">
  <img border="0" alt="Login with Amazon"
    src="https://images-na.ssl-images-amazon.com/images/G/01/lwa/btnLWA_gold_156x32.png"
    width="156" height="32" />
</a>
<div id="amazon-root"></div>
<script type="text/javascript">
  var s3 = null;
  var clientId = 'amzn1.application-oa2-client.1234567890abcdef'; // client ID
  var roleArn = 'arn:aws:iam::<AWS_ACCOUNT_ID>:role/<WEB_IDENTITY_ROLE_NAME>';

  window.onAmazonLoginReady = function() {
    amazon.Login.setClientId(clientId); // set client ID

    document.getElementById('login').onclick = function() {
      amazon.Login.authorize({scope: 'profile'}, function(response) {
        if (!response.error) { // logged in
          AWS.config.credentials = new AWS.WebIdentityCredentials({
            RoleArn: roleArn,
            ProviderId: 'www.amazon.com',
            WebIdentityToken: response.access_token
          });

          s3 = new AWS.S3();

          console.log('You are now logged in.');
        } else {
          console.log('There was a problem logging you in.');
        }
      });
    };
  };

  (function(d) {
    var a = d.createElement('script'); a.type = 'text/javascript';
    a.async = true; a.id = 'amazon-login-sdk';
    a.src = 'https://api-cdn.amazon.com/sdk/login1.js';
    d.getElementById('amazon-root').appendChild(a);
  })(document);
</script>
```

Facebook Login Example

The following code shows how to use Facebook Login as an identity provider:

```
<button id="login">Login</button>
<div id="fb-root"></div>
<script type="text/javascript">
var s3 = null;
var appId = '1234567890'; // Facebook app ID
var roleArn = 'arn:aws:iam::<AWS_ACCOUNT_ID>:role/<WEB_IDENTITY_ROLE_NAME>';

window.fbAsyncInit = function() {
  // init the FB JS SDK
  FB.init({appId: appId});

  document.getElementById('login').onclick = function() {
    FB.login(function (response) {
      if (response.authResponse) { // logged in
        AWS.config.credentials = new AWS.WebIdentityCredentials({
          RoleArn: roleArn,
          ProviderId: 'graph.facebook.com',
          WebIdentityToken: response.authResponse.accessToken
        });

        s3 = new AWS.S3;

        console.log('You are now logged in.');
      } else {
        console.log('There was a problem logging you in.');
      }
    });
  };
};

// Load the FB JS SDK asynchronously
(function(d, s, id){
   var js, fjs = d.getElementsByTagName(s)[0];
   if (d.getElementById(id)) {return;}
   js = d.createElement(s); js.id = id;
   js.src = "//connect.facebook.net/en_US/all.js";
   fjs.parentNode.insertBefore(js, fjs);
 }(document, 'script', 'facebook-jssdk'));
</script>
```

Google+ Sign-in Example

The following code shows how to use Google+ Sign-in as an identity provider. The access token used for web identity federation from Google is stored in `response.id_token` instead of `access_token` like other identity providers.

```
<span
  id="login"
  class="g-signin"
  data-height="short"
  data-callback="loginToGoogle"
  data-cookiepolicy="single_host_origin"
  data-requestvisibleactions="http://schemas.google.com/AddActivity"
  data-scope="https://www.googleapis.com/auth/plus.login">
</span>
<script type="text/javascript">
  var s3 = null;
  var clientID = '1234567890.apps.googleusercontent.com'; // Google client ID
  var roleArn = 'arn:aws:iam::<AWS_ACCOUNT_ID>:role/<WEB_IDENTITY_ROLE_NAME>';

  document.getElementById('login').setAttribute('data-clientid', clientID);
  function loginToGoogle(response) {
    if (!response.error) {
      AWS.config.credentials = new AWS.WebIdentityCredentials({
        RoleArn: roleArn, WebIdentityToken: response.id_token
      });

      s3 = new AWS.S3();

      console.log('You are now logged in.');
    } else {
      console.log('There was a problem logging you in.');
    }
  }

  (function() {
    var po = document.createElement('script'); po.type = 'text/javascript'; po.async =
 true;
    po.src = 'https://apis.google.com/js/client:plusone.js';
    var s = document.getElementsByTagName('script')[0]; s.parentNode.insertBefore(po, s);
  })();
 </script>
```

Locking API Versions

AWS services have API version numbers to keep track of API compatibility. API versions in AWS services are identified by a `YYYY-mm-dd` formatted date string. For example, the current API version for Amazon S3 is `2006-03-01`.

We recommend locking the API version for a service if you rely on it in production code. This can isolate your applications from service changes resulting from updates to the SDK. If you don't specify an API version when creating service objects, the SDK uses the latest API version by default. This could cause your application to reference an updated API with changes that negatively impact your application.

To lock the API version that you use for a service, pass the `apiVersion` parameter when constructing the service object. In the following example, a newly created `AWS.DynamoDB` service object is locked to the `2011-12-05` API version:

```
var dynamodb = new AWS.DynamoDB({apiVersion: '2011-12-05'});
```

You can globally configure a set of service API versions by specifying the `apiVersions` parameter in `AWS.Config`. For example, to set specific versions of the DynamoDB and Amazon EC2 APIs along with the current Amazon Redshift API, set `apiVersions` as follows:

```
AWS.config.apiVersions = {
```

```
dynamodb: '2011-12-05',
ec2: '2013-02-01',
redshift: 'latest'Best Practices for Managing AWS Access Keys
};
```

Node.js Considerations

Although Node.js code is JavaScript, using the AWS SDK for JavaScript in Node.js can differ from using the SDK in browser scripts. Some API methods work in Node.js but not in browser scripts, as well as the other way around. And successfully using some APIs depends on your familiarity with common Node.js coding patterns, such as importing and using other Node.js modules like the `File System (fs)` module.

Using Built-In Node.js Modules

Node.js provides a collection of built-in modules you can use without installing them. To use these modules, create an object with the `require` method to specify the module name. For example, to include the built-in HTTP module, use the following.

```
var http = require('http');
```

Invoke methods of the module as if they are methods of that object. For example, here is code that reads an HTML file.

```
var fs = require('fs'); // include File System module
   // Invoke readFile method of fs module
   fs.readFile('index.html', function(err, data) {
      if (err) {
         throw err;
      } else {
         // Successful file read
});
```

For a complete list of all built-in modules that Node.js provides, see Node.js v6.11.1 Documentation on the Node.js website.

Using NPM Packages

In addition to the built-in modules, you can also include and incorporate third-party code from npm, the Node.js package manager. This is a repository of open source Node.js packages and a command-line interface for installing those packages. For more information about npm and a list of currently available packages, see https://www.npmjs.com. You can also learn about additional Node.js packages you can use here on GitHub.

One example of an npm package you can use with the AWS SDK for JavaScript is `browserify`. For details, see Building the SDK as a Dependency with Browserify (p. 34). Another example is `webpack`. For details, see Bundling Applications with Webpack (p. 37).

Other Considerations

The following topics describe other special considerations for using the SDK for JavaScript in Node.js projects.

Configuring maxSockets in Node.js

In Node.js, you can set the maximum number of connections per origin. If `maxSockets` is set, the low-level HTTP client queues requests and assigns them to sockets as they become available.

This lets you set an upper bound on the number of concurrent requests to a given origin at a time. Lowering this value can reduce the number of throttling or timeout errors received. However, it can also increase memory usage because requests are queued until a socket becomes available.

The following example shows how to set `maxSockets` for all service objects you create. This example allows up to 25 concurrent connections to each service endpoint.

```
var AWS = require('aws-sdk');
var https = require('https');
var agent = new https.Agent({
   maxSockets: 25
});

AWS.config.update({
   httpOptions:{
      agent: agent
   }
});
```

The same can be done per service.

```
var AWS = require('aws-sdk');
var https = require('https');
var agent = new https.Agent({
   maxSockets: 25
});

var dynamodb = new AWS.DynamoDB({
   apiVersion: '2012-08-10'
   httpOptions:{
      agent: agent
   }
});
```

When using the default of `https`, the SDK takes the `maxSockets` value from the `globalAgent`. If the `maxSockets` value is not defined or is `Infinity`, the SDK assumes a `maxSockets` value of 50.

For more information about setting `maxSockets` in Node.js, see the Node.js online documentation.

Configuring Proxies for Node.js

If you can't directly connect to the internet, the SDK for JavaScript supports use of HTTP or HTTPS proxies through a third-party HTTP agent, such as proxy-agent. To install proxy-agent, type the following at the command line.

```
npm install proxy-agent --save
```

To use this proxy in your application, you must set the `httpOptions` property of `AWS.Config` as follows.

```
var proxy = require('proxy-agent');

    AWS.config.update({
      httpOptions: { agent: proxy('http://internal.proxy.com') }
    });
```

For more information about other proxy libraries, see npm, the Node.js package manager.

Registering Certificate Bundles in Node.js

The default trust stores for Node.js include the certificates needed to access AWS services. In some cases, it might be preferable to include only a specific set of certificates.

In this example, a specific certificate on disk is used to create an `https.Agent` that rejects connections unless the designated certificate is provided. The newly created `https.Agent` is then used to update the SDK configuration.

```
var fs = require('fs');
    var https = require('https');
    var fs = require('fs');

    var certs = [
      fs.readFileSync('/path/to/cert.pem')
    ];

    AWS.config.update({
      httpOptions: {
        agent: new https.Agent({
          rejectUnauthorized: true,
          ca: certs
        })
      }
    });
```

Browser Script Considerations

The following topics describe special considerations for using the AWS SDK for JavaScript in browser scripts.

Topics

- Building the SDK for Browsers (p. 32)
- Cross-Origin Resource Sharing (CORS) (p. 35)

Building the SDK for Browsers

The SDK for JavaScript is provided as a JavaScript file with support included for a default set of services. This file is typically loaded into browser scripts using a `<script>` tag that references the hosted SDK package. However, you may need support for services other than the default set or otherwise need to customize the SDK.

If you work with the SDK outside of an environment that enforces CORS in your browser and if you want access to all services provided by the SDK for JavaScript, you can build a custom copy of the SDK locally by cloning the repository and running the same build tools that build the default hosted version of the SDK. The following sections describe the steps to build the SDK with extra services and API versions.

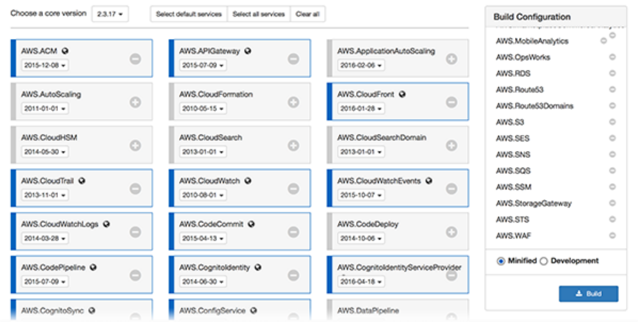
Topics

- Using the SDK Builder to Build the SDK for JavaScript (p. 33)
- Using the CLI to Build the SDK for JavaScript (p. 33)

- Building Specific Services and API Versions (p. 34)
- Building the SDK as a Dependency with Browserify (p. 34)

Using the SDK Builder to Build the SDK for JavaScript

The easiest way to create your own build of the AWS SDK for JavaScript is to use the SDK builder web application at https://sdk.amazonaws.com/builder/js. Use the SDK builder to specify services, and their API versions, to include in your build.



Choose a core version 2.3.17

AWS.ACM 2015-12-08
AWS.APIGateway 2015-07-09
AWS.ApplicationAutoScaling 2016-02-06
AWS.AutoScaling 2011-01-01
AWS.CloudFormation 2010-05-15
AWS.CloudFront 2016-01-28
AWS.CloudHSM 2014-05-30
AWS.CloudSearch 2013-01-01
AWS.CloudSearchDomain 2013-01-01
AWS.CloudTrail 2013-11-01
AWS.CloudWatch 2010-08-01
AWS.CloudWatchEvents 2015-10-07
AWS.CloudWatchLogs 2014-03-28
AWS.CodeCommit 2015-04-13
AWS.CodeDeploy 2014-10-06
AWS.CodePipeline 2015-07-09
AWS.CognitoIdentity 2014-06-30
AWS.CognitoIdentityServiceProvider 2016-04-18
AWS.CognitoSync
AWS.ConfigService
AWS.DataPipeline

Build Configuration

AWS.MobileAnalytics
AWS.OpsWorks
AWS.RDS
AWS.Route53
AWS.Route53Domains
AWS.S3
AWS.SES
AWS.SNS
AWS.SQS
AWS.SSM
AWS.StorageGateway
AWS.STS
AWS.WAF

● Minified ○ Development

Choose **Select all services** or choose **Select default services** as a starting point from which you can add or remove services. Choose **Development** for more readable code or choose **Minified** to create a minified build to deploy. After you choose the services and versions to include, choose **Build** to build and download your custom SDK.

Using the CLI to Build the SDK for JavaScript

To build the SDK for JavaScript using the AWS CLI, you first need to clone the Git repository that contains the SDK source. You must have Git and Node.js installed on your computer.

First, clone the repository from GitHub and change directory into the directory:

```
git clone git://github.com/aws/aws-sdk-js
cd aws-sdk-js
```

After you clone the repository, download the dependency modules for both the SDK and build tool:

```
npm install
```

You can now build a packaged version of the SDK.

Building from the Command Line

The builder tool is in `dist-tools/browser-builder.js`. Run this script by typing:

```
node dist-tools/browser-builder.js > aws-sdk.js
```

This command builds the aws-sdk.js file. This file is uncompressed. By default this package includes only the standard set of services.

Minifying Build Output

To reduce the amount of data on the network, JavaScript files can be compressed through a process called *minification*. Minification strips comments, unnecessary spaces, and other characters that aid in human readability but that do not impact execution of the code. The builder tool can produce uncompressed or minified output. To minify your build output, set the `MINIFY` environment variable:

```
MINIFY=1 node dist-tools/browser-builder.js > aws-sdk.js
```

Building Specific Services and API Versions

You can select which services to build into the SDK. To select services, specify the service names, delimited by commas, as parameters. For example, to build only Amazon S3 and Amazon EC2, use the following command:

```
node dist-tools/browser-builder.js s3,ec2 > aws-sdk-s3-ec2.js
```

You can also select specific API versions of the services build by adding the version name after the service name. For example, to build both API versions of Amazon DynamoDB, use the following command:

```
node dist-tools/browser-builder.js dynamodb-2011-12-05,dynamodb-2012-08-10
```

Service identifiers and API versions are available in the service-specific configuration files at https://github.com/aws/aws-sdk-js/tree/master/apis.

Building All Services

You can build all services and API versions by including the `all` parameter:

```
node dist-tools/browser-builder.js all > aws-sdk-full.js
```

Building Specific Services

To customize the selected set of services included in the build, pass the `AWS_SERVICES` environment variable to the Browserify command that contains the list of services you want. The following example builds the Amazon EC2, Amazon S3, and DynamoDB services.

```
$ AWS_SERVICES=ec2,s3,dynamodb browserify index.js > browser-app.js
```

Building the SDK as a Dependency with Browserify

Node.js has a module-based mechanism for including code and functionality from third-party developers. This modular approach is not natively supported by JavaScript running in web browsers. However, with a tool called Browserify, you can use the Node.js module approach and use modules written for Node.js in the browser. Browserify builds the module dependencies for a browser script into a single, self-contained JavaScript file that you can use in the browser.

You can build the SDK as a library dependency for any browser script by using Browserify. For example, the following Node.js code requires the SDK:

```
var AWS = require('aws-sdk');
var s3 = new AWS.S3();
s3.listBuckets(function(err, data) { console.log(err, data); });
```

This example code can be compiled into a browser-compatible version using Browserify:

```
$ browserify index.js > browser-app.js
```

The application, including its SDK dependencies, is then made available in the browser through `browser-app.js`.

For more information about Browserify, see the Browserify website.

Cross-Origin Resource Sharing (CORS)

Cross-origin resource sharing, or CORS, is a security feature of modern web browsers. It enables web browsers to negotiate which domains can make requests of external websites or services. CORS is an important consideration when developing browser applications with the AWS SDK for JavaScript because most requests to resources are sent to an external domain, such as the endpoint for a web service. If your JavaScript environment enforces CORS security, you must configure CORS with the service.

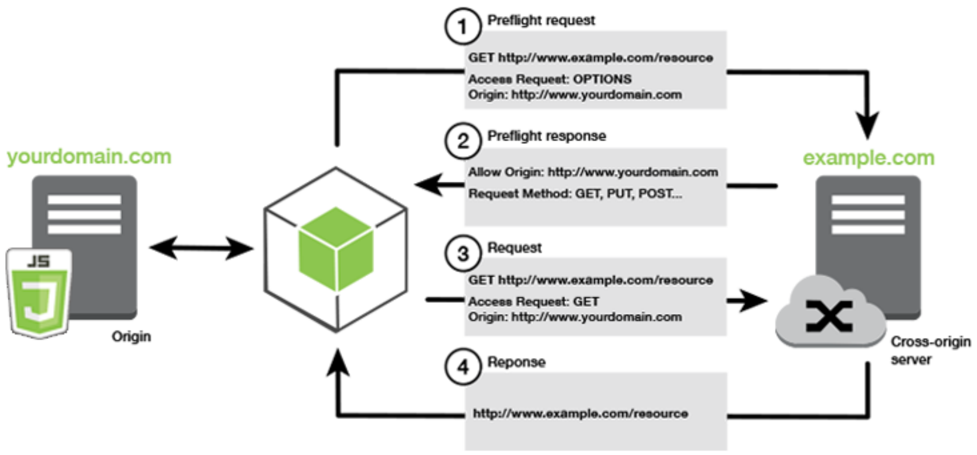
CORS determines whether to allow sharing of resources in a cross-origin request based on:

- The specific domain that makes the request
- The type of HTTP request being made (GET, PUT, POST, DELETE and so on)

How CORS Works

In the simplest case, your browser script makes a GET request for a resource from a server in another domain. Depending on the CORS configuration of that server, if the request is from a domain that's authorized to submit GET requests, the cross-origin server responds by returning the requested resource.

If either the requesting domain or the type of HTTP request is not authorized, the request is denied. However, CORS makes it possible to preflight the request before actually submitting it. In this case, a preflight request is made in which the `OPTIONS` access request operation is sent. If the cross-origin server's CORS configuration grants access to the requesting domain, the server sends back a preflight response that lists all the HTTP request types that the requesting domain can make on the requested resource.


1 Preflight request
GET http://www.example.com/resource
Access Request: OPTIONS
Origin: http://www.yourdomain.com
2 Preflight response
Allow Origin: http://www.yourdomain.com
Request Method: GET, PUT, POST...
3 Request
GET http://www.example.com/resource
Access Request: GET
Origin: http://www.yourdomain.com
4 Reponse
http://www.example.com/resource
yourdomain.com
JS
Origin
example.com
Cross-origin server

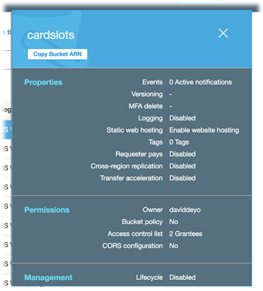
Is CORS Configuration Required

Amazon S3 buckets require CORS configuration before you can perform operations on them. In some JavaScript environments CORS may not be enforced and therefore configuring CORS is unnecessary. For example, if you host your application from an Amazon S3 bucket and access resources from `*.s3.amazonaws.com` or some other specific endpoint, your requests won't access an external domain. Therefore, this configuration doesn't require CORS. In this case, CORS is still used for services other than Amazon S3.

Configuring CORS for an Amazon S3 Bucket

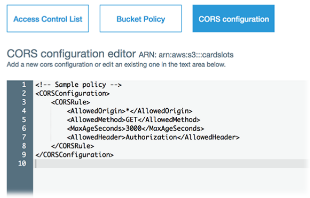
You can configure an Amazon S3 bucket to use CORS in the Amazon S3 console.

1. In the Amazon S3 console, choose the bucket you want to configure.
2. In the pop-up-dialog, choose **Permissions**



Properties	Events	0 Active notifications
	Versioning	-
	MFA delete	-
	Logging	Disabled
	Static web hosting	Enable website hosting
	Tags	0 Tags
	Requester pays	Disabled
	Cross-region replication	Disabled
	Transfer acceleration	Disabled
Permissions	Owner	daviddeyo
	Bucket policy	No
	Access control list	2 Grantees
	CORS configuration	No
Management	Lifecycle	Disabled

3. In the **Permission** tab, choose **CORS Configuration**.
4. Type your CORS configuration in the **CORS Configuration Editor** and then choose **Save**.



CORS configuration editor ARN: arn:aws:s3:::cardslots
Add a new cors configuration or edit an existing one in the text area below.

```
<!-- Sample policy -->
<CORSConfiguration>
    <CORSRule>
        <AllowedOrigin>*</AllowedOrigin>
        <AllowedMethod>GET</AllowedMethod>
        <MaxAgeSeconds>3000</MaxAgeSeconds>
        <AllowedHeader>Authorization</AllowedHeader>
    </CORSRule>
</CORSConfiguration>

```

A CORS configuration is an XML file that contains a series of rules within a `<CORSRule>`. A configuration can have up to 100 rules. A rule is defined by one of the following tags:

- `<AllowedOrigin>`, which specifies domain origins that you allow to make cross-domain requests.
- `<AllowedMethod>`, which specifies a type of request you allow (GET, PUT, POST, DELETE, HEAD) in cross-domain requests.
- `<AllowedHeader>`, which specifies the headers allowed in a preflight request.

For sample configurations, see How Do I Configure CORS on My Bucket? in the *Amazon Simple Storage Service Developer Guide*.

CORS Configuration Example

The following CORS configuration sample allows a user to view, add, remove, or update objects inside of a bucket from any external domain, though it is recommended that you scope the `<AllowedOrigin>` to the domain of your website. You can specify `"*"` to allow any origin.

```
<?xml version="1.0" encoding="UTF-8"?>
<CORSConfiguration xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
  <CORSRule>
    <AllowedOrigin>https://example.org</AllowedOrigin>
    <AllowedMethod>HEAD</AllowedMethod>
    <AllowedMethod>GET</AllowedMethod>
    <AllowedMethod>PUT</AllowedMethod>
    <AllowedMethod>POST</AllowedMethod>
    <AllowedMethod>DELETE</AllowedMethod>
    <AllowedHeader>*</AllowedHeader>
    <ExposeHeader>ETag</ExposeHeader>
    <ExposeHeader>x-amz-meta-custom-header</ExposeHeader>
  </CORSRule>
</CORSConfiguration>
```

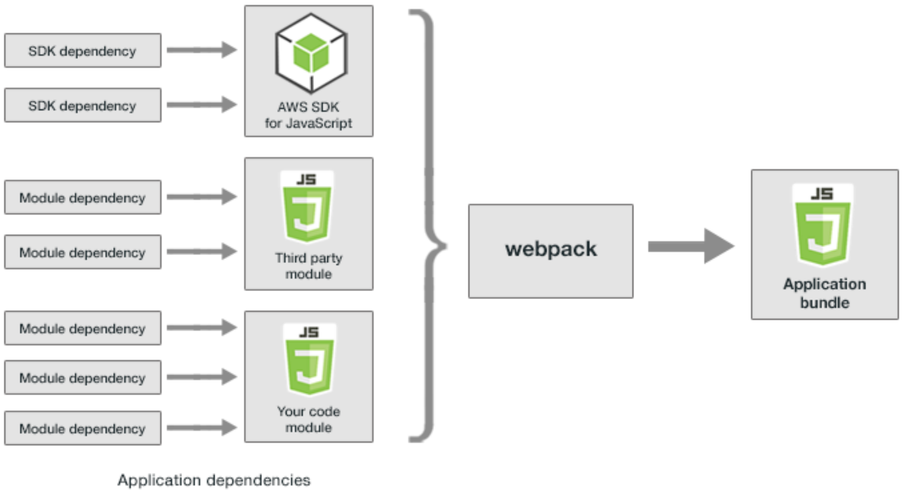
This configuration does not authorize the user to perform actions on the bucket. It enables the browser's security model to allow a request to Amazon S3. Permissions must be configured through bucket permissions or IAM role permissions.

You can use `ExposeHeader` to let the SDK read response headers returned from Amazon S3. For example, if you want to read the `ETag` header from a `PUT` or multipart upload, you need to include the `ExposeHeader` tag in your configuration, as shown in the previous example. The SDK can only access headers that are exposed through CORS configuration. If you set metadata on the object, values are returned as headers with the prefix `x-amz-meta-`, such as `x-amz-meta-my-custom-header`, and must also be exposed in the same way.

Bundling Applications with Webpack

Web applications in browser scripts or Node.js use of code modules creates dependencies. These code modules can have dependencies of their own, resulting in a collection of interconnected modules that your application requires to function. To manage dependencies, you can use a module bundler like webpack.

The webpack module bundler parses your application code, searching for `import` or `require` statements, to create bundles that contain all the assets your application needs so that the assets can be easily served through a webpage. The SDK for JavaScript can be included in webpack as one of the dependencies to include in the output bundle.



For more information about webpack, see the webpack module bundler on GitHub.

Installing Webpack

To install the webpack module bundler, you must first have npm, the Node.js package manager, installed. Type the following command to install the webpack CLI and JavaScript module.

```
npm install webpack
```

You may also need to install a webpack plugin that allows it to load JSON files. Type the following command to install the JSON loader plugin.

```
npm install json-loader
```

Configuring Webpack

By default, webpack searches for a JavaScript file named `webpack.config.js` in your project's root directory. This file specifies your configuration options. Here is an example of a `webpack.config.js` configuration file.

```
// Import path for resolving file paths
var path = require('path');
module.exports = {
  // Specify the entry point for our app.
  entry: [
    path.join(__dirname, 'browser.js')
  ],
  // Specify the output file containing our bundled code
  output: {
    path: __dirname,
    filename: 'bundle.js'
  },
  module: {
    /**
      * Tell webpack how to load 'json' files.
      * When webpack encounters a 'require()' statement
      * where a 'json' file is being imported, it will use
      * the json-loader.
      */
    loaders: [
      {
        test: /\.json$/,
        loaders: ['json']
      }
    ]
  }
}
```

In this example, `browser.js` is specified as the entry point. The *entry point* is the file webpack uses to begin searching for imported modules. The file name of the output is specified as `bundle.js`. This output file will contain all the JavaScript the application needs to run. If the code specified in the entry point imports or requires other modules, such as the SDK for JavaScript, that code is bundled without needing to specify it in the configuration.

The configuration in the `json-loader` plugin that was installed earlier specifies to webpack how to import JSON files. By default, webpack only supports JavaScript but uses loaders to add support for importing other file types. Because the SDK for JavaScript makes extensive use of JSON files, webpack throws an error when generating the bundle if `json-loader` isn't included.

Running Webpack

To build an application to use webpack, add the following to the `scripts` object in your `package.json` file.

```
"build": "webpack"
```

Here is an example `package.json` that demonstrates adding webpack.

```
{
  "name": "aws-webpack",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1",
    "build": "webpack"
  },
  "author": "",
  "license": "ISC",
  "dependencies": {
    "aws-sdk": "^2.6.1"
  },
  "devDependencies": {
    "json-loader": "^0.5.4",
    "webpack": "^1.13.2"
  }
}
```

To build your application, type the following command.

```
npm run build
```

The webpack module bundler then generates the JavaScript file you specified in your project's root directory.

Using the Webpack Bundle

To use the bundle in a browser script, you can incorporate the bundle using a `<script>` tag as shown in the following example.

```
<!DOCTYPE html>
<html>
    <head>
        <title>AWS SDK with webpack</title>
    </head>
    <body>
        <div id="list"></div>
        <script src="bundle.js"></script>
    </body>
</html>
```

Importing Individual Services

One of the benefits of webpack is that it parses the dependencies in your code and bundles only the code your application needs. If you are using the SDK for JavaScript, bundling only the parts of the SDK actually used by your application can reduce the size of the webpack output considerably.

Consider the following example of the code used to create an Amazon S3 service object.

```
// Import the AWS SDK
var AWS = require('aws-sdk');

// Set credentials and region
// This can also be done directly on the service client
AWS.config.update({region: 'us-west-1', credentials: {YOUR_CREDENTIALS}});

var s3 = new AWS.S3({apiVersion: '2006-03-01'});
```

The `require()` function specifies the entire SDK. A webpack bundle generated with this code would include the full SDK but the full SDK is not required when only the Amazon S3 client class is used. The size of the bundle would be substantially smaller if only the portion of the SDK you require for the Amazon S3 service was included. Even setting the configuration doesn't require the full SDK because you can set the configuration data on the Amazon S3 service object.

Here is what the same code looks like when it includes only the Amazon S3 portion of the SDK.

```
// Import the Amazon S3 service client
var S3 = require('aws-sdk/clients/s3');

// Set credentials and region
var s3 = new S3({
    apiVersion: '2006-03-01',
    region: 'us-west-1',
    credentials: {YOUR_CREDENTIALS}
  });
```

Bundling for Node.js

You can use webpack to generate bundles that run in Node.js by specifying it as a target in the configuration.

```
target: "node"
```

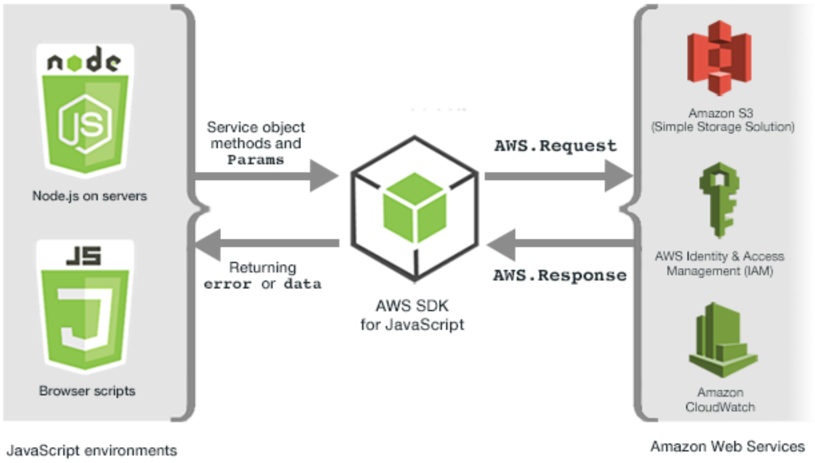
This is useful when running a Node.js application in an environment where disk space is limited. Here is an example `webpack.config.js` configuration with Node.js specified as the output target.

```
// Import path for resolving file paths
var path = require('path');
module.exports = {
  // Specify the entry point for our app
  entry: [
    path.join(__dirname, 'node.js')
  ],
  // Specify the output file containing our bundled code
  output: {
    path: __dirname,
    filename: 'bundle.js'
  },
  // Let webpack know to generate a Node.js bundle
  target: "node",
  module: {
    /**
      * Tell webpack how to load JSON files.
      * When webpack encounters a 'require()' statement
      * where a JSON file is being imported, it will use
      * the json-loader
      */
    loaders: [
      {
        test: /\.json$/,
        loaders: ['json']
      }
    ]
  }
}
```

Working with Services in the SDK for JavaScript

The AWS SDK for JavaScript provides access to services that it supports through a collection of client classes. From these client classes, you create service interface objects, commonly called *service objects*. Each supported AWS service has one or more client classes that offer low-level APIs for using service features and resources. For example, Amazon DynamoDB APIs are available through the `AWS.DynamoDB` class.

The services exposed through the SDK for JavaScript follow the request-response pattern to exchange messages with calling applications. In this pattern, the code invoking a service submits an HTTP/HTTPS request to an endpoint for the service. The request contains parameters needed to successfully invoke the specific feature being called. The service that is invoked generates a response that is sent back to the requestor. The response contains data if the operation was successful or error information if the operation was unsuccessful.



Invoking an AWS service includes the full request and response lifecycle of an operation on a service object, including any retries that are attempted. A request is encapsulated in the SDK by the `AWS.Request` object. The response is encapsulated in the SDK by the `AWS.Response` object, which is provided to the requestor through one of several techniques, such as a callback function or a JavaScript promise.

Topics

Creating and Calling Service Objects

The JavaScript API supports most available AWS services. Each service class in the JavaScript API provides access to every API call in its service. For more information on service classes, operations, and parameters in the JavaScript API, see the API reference.

When using the SDK in Node.js, you add the SDK package to your application using `require`, which provides support for all current services.

```
var AWS = require('aws-sdk');
```

When using the SDK with browser JavaScript, you load the SDK package to your browser scripts using the AWS-hosted SDK package. To load the SDK package, add the following script tag.

```
<script src="https://sdk.amazonaws.com/js/aws-sdk-2.119.0.min.js"></script>
```

The default hosted SDK package provides support for a subset of the available AWS services. For a list of the default services in the hosted SDK package for the browser, see Supported Services in the API Reference. You can use the SDK with other services if CORS security checking is disabled. In this case, you can build a custom version of the SDK to include the additional services you require. For more information on building a custom version of the SDK, see Building the SDK for Browsers (p. 32).

Requiring Individual Services

Requiring the SDK for JavaScript as shown previously includes the entire SDK into your code. Alternately, you can choose to require only the individual services used by your code. Consider the following code used to create an Amazon S3 service object.

```
// Import the AWS SDK
var AWS = require('aws-sdk');

// Set credentials and region
// This can also be done directly on the service client
AWS.config.update({region: 'us-west-1', credentials: {YOUR_CREDENTIALS}});

var s3 = new AWS.S3({apiVersion: '2006-03-01'});
```

In the previous example, the `require` function specifies the entire SDK. The amount of code to transport over the network as well as the memory overhead of your code would be substantially smaller if only the portion of the SDK you require for the Amazon S3 service was included. To require an individual service, call the `require` function as shown, including the service constructor in all lower case.

```
require('aws-sdk/clients/SERVICE');
```

Here is what the code to create the previous Amazon S3 service object looks like when it includes only the Amazon S3 portion of the SDK.

```
// Import the Amazon S3 service client
```

```
var S3 = require('aws-sdk/clients/s3');

// Set credentials and region
var s3 = new S3({
    apiVersion: '2006-03-01',
    region: 'us-west-1',
    credentials: {YOUR_CREDENTIALS}
  });
```

You can still access the global AWS namespace without every service attached to it.

```
require('aws-sdk/global');
```

This is a useful technique when applying the same configuration across multiple individual services, for example to provide the same credentials to all services. Requiring individual services should reduce loading time and memory consumption in Node.js. When done along with a bundling tool such as Browserify or webpack, requiring individual services results in the SDK being a fraction of the full size. This helps with memory or disk-space constrained environments such as an IoT device or in a Lambda function.

Creating Service Objects

To access service features through the JavaScript API, you first create a *service object* through which you access a set of features provided by the underlying client class. Generally there is one client class provided for each service; however, some services divide access to their features among multiple client classes.

To use a feature, you must create an instance of the class that provides access to that feature. The following example shows creating a service object for DynamoDB from the `AWS.DynamoDB` client class.

```
var dynamodb = new AWS.DynamoDB({apiVersion: '2012-08-10'});
```

By default, a service object is configured with the global settings also used to configure the SDK. However, you can configure a service object with runtime configuration data that is specific to that service object. Service-specific configuration data is applied after applying the global configuration settings.

In the following example, an Amazon EC2 service object is created with configuration for a specific region but otherwise uses the global configuration.

```
var ec2 = new AWS.EC2({region: 'us-west-2', apiVersion: '2014-10-01'});
```

In addition to supporting service-specific configuration applied to an individual service object, you can also apply service-specific configuration to all newly created service objects of a given class. For example, to configure all service objects created from the Amazon EC2 class to use the US West (Oregon) (`us-west-2`) Region, add the following to the `AWS.config` global configuration object.

```
AWS.config.ec2 = {region: 'us-west-2', apiVersion: '2016-04-01'};
```

Locking the API Version of a Service Object

You can lock a service object to a specific API version of a service by specifying the `apiVersion` option when creating the object. In the following example, a DynamoDB service object is created that is locked to a specific API version.

```
var dynamodb = new AWS.DynamoDB({apiVersion: '2011-12-05'});
```

For more information about locking the API version of a service object, see Locking API Versions (p. 29).

Specifying Service Object Parameters

When calling a method of a service object, pass parameters in JSON as required by the API. For example, in Amazon S3, to get an object for a specified bucket and key, pass the following parameters to the `getObject` method. For more information about passing JSON parameters, see Working with JSON (p. 54).

```
s3.getObject({Bucket: 'bucketName', Key: 'keyName'});
```

For more information about Amazon S3 parameters, see Class: AWS.S3 in the API reference.

In addition, you can bind values to individual parameters when creating a service object using the `params` parameter. The value of the `params` parameter of service objects is a map that specifies one or more of the parameter values defined by the service object. The following example shows the `Bucket` parameter of an Amazon S3 service object being bound to a bucket named `myBucket`.

```
var s3bucket = new AWS.S3({params: {Bucket: 'myBucket'}, apiVersion: '2006-03-01' });
```

By binding the service object to a bucket, the `s3bucket` service object treats the `myBucket` parameter value as a default value that no longer needs to be specified for subsequent operations. Any bound parameter values are ignored when using the object for operations where the parameter value isn't applicable. You can override this bound parameter when making calls on the service object by specifying a new value.

```
var s3bucket = new AWS.S3({ params: {Bucket: 'myBucket'}, apiVersion: '2006-03-01' });
s3bucket.getObject({Key: 'keyName'});
// ...
s3bucket.getObject({Bucket: 'myOtherBucket', Key: 'keyOtherName'});
```

Details about available parameters for each method are found in the API reference.

Calling Services Asychronously

All requests made through the SDK are asynchronous. This is important to keep in mind when writing browser scripts. JavaScript running in a web browser typically has just a single execution thread. After making an asynchronous call to an AWS service, the browser script continues running and in the process can try to execute code that depends on that asynchronous result before it returns.

Making asynchronous calls to an AWS service includes managing those calls so your code doesn't try to use data before the data is available. The topics in this section explain the need to manage asynchronous calls and detail different techniques you can use to manage them.

Topics

- Requests With a Node.js Stream Object (p. 52)

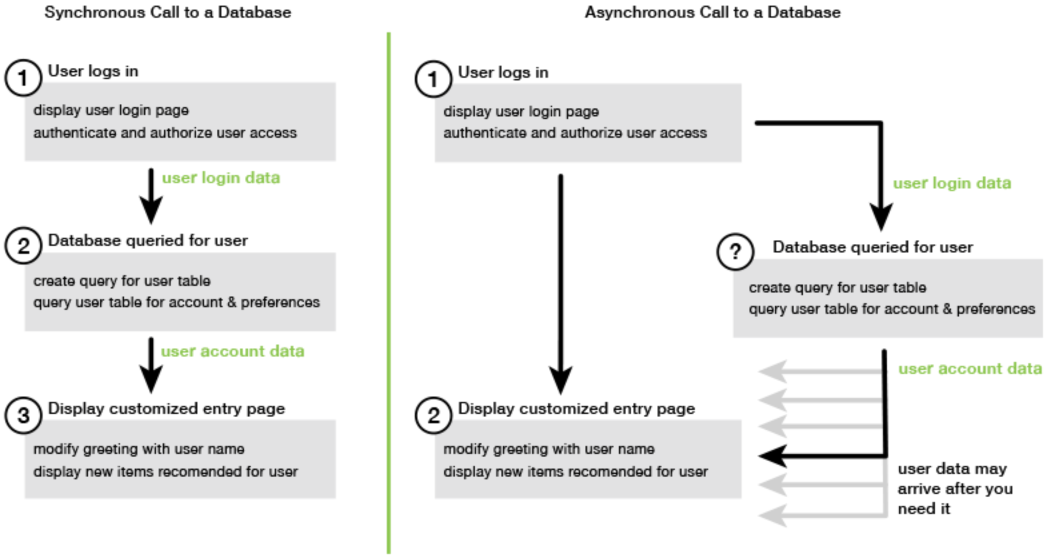
Managing Asychronous Calls

For example, the home page of an e-commerce website lets returning customers sign in. Part of the benefit for customers who sign in is that, after signing in, the site then customizes itself to their particular preferences. To make this happen:

1. The customer must log in and be validated with their user name and password.
2. The customer's preferences are requested from a customer database.
3. The database provides the customer's preferences that are used to customize the site before the page loads.

If these tasks execute synchronously, then each must finish before the next can start. The web page would be unable to finish loading until the customer preferences return from the database. However, after the database query is sent to the server, receipt of the customer data can be delayed or even fail due to network bottlenecks, exceptionally high database traffic, or a poor mobile device connection.

To keep the website from freezing under those conditions, call the database asychronously. After the database call executes, sending your asynchronous request, your code continues to execute as expected. If you don't properly manage the response of an asynchronous call, your code can attempt to use information it expects back from the database when that data isn't available yet.


Synchronous Call to a Database
1 User logs in
display user login page
authenticate and authorize user access
user login data
2 Database queried for user
create query for user table
query user table for account & preferences
user account data
3 Display customized entry page
modify greeting with user name
display new items recomended for user
Asynchronous Call to a Database
1 User logs in
display user login page
authenticate and authorize user access
user login data
? Database queried for user
create query for user table
query user table for account & preferences
user account data
2 Display customized entry page
modify greeting with user name
display new items recomended for user
user data may arrive after you need it

Using an Anonymous Callback Function

Each service object method that creates an `AWS.Request` object can accept an anonymous callback function as the last parameter. The signature of this callback function is:

```
function(error, data) {
    // callback handling code
}
```

This callback function executes when either a successful response or error data returns. If the method call succeeds, the contents of the response are available to the callback function in the `data` parameter. If the call doesn't succeed, the details about the failure are provided in the `error` parameter.

Typically the code inside the callback function tests for an error, which it processes if one is returned. If an error is not returned, the code then retrieves the data in the response from the `data` parameter. The basic form of the callback function looks like this example.

```
function(error, data) {
    if (error) {
        // error handling code
        console.log(error);
    } else {
        // data handling code
        console.log(data);
    }
}
```

In the previous example, the details of either the error or the returned data are logged to the console. Here is an example that shows a callback function passed as part of calling a method on a service object.

```
new AWS.EC2({apiVersion: '2014-10-01'}).describeInstances(function(error, data) {
  if (error) {
    console.log(error); // an error occurred
  } else {
    console.log(data); // request succeeded
  }
});
```

Accessing the Request and Response Objects

Within the callback function, the JavaScript keyword `this` refers to the underlying `AWS.Response` object for most services. In the following example, the `httpResponse` property of an `AWS.Response` object is used within a callback function to log the raw response data and headers to help with debugging.

```
new AWS.EC2({apiVersion: '2014-10-01'}).describeInstances(function(error, data) {
  if (error) {
    console.log(error); // an error occurred
    // Using this keyword to access AWS.Response object and properties
    console.log("Response data and headers: " + JSON.stringify(this.httpResponse));
  } else {
    console.log(data); // request succeeded
  }
});
```

In addition, because the `AWS.Response` object has a `Request` property that contains the `AWS.Request` that was sent by the original method call, you can also access the details of the request that was made.

Using a Request Object Event Listener

If you do not create and pass an anonymous callback function as a parameter when you call a service object method, the method call generates an `AWS.Request` object that must be manually sent using its `send` method.

To process the response, you must create an event listener for the `AWS.Request` object to register a callback function for the method call. The following example shows how to create the `AWS.Request` object for calling a service object method and the event listener for the successful return.

```
// create the AWS.Request object
var request = new AWS.EC2({apiVersion: '2014-10-01'}).describeInstances();
```

```
// register a callback event handler
request.on('success', function(response) {
  // log the successful data response
  console.log(response.data);
});

// send the request
request.send();
```

After the `send` method on the `AWS.Request` object is called, the event handler executes when the service object receives an `AWS.Response` object.

For more information about the `AWS.Request` object, see Class: AWS.Request in the API Reference. For more information about the `AWS.Response` object, see Using the Response Object (p. 52) or Class: AWS.Response in the API Reference.

Chaining Multiple Callbacks

You can register multiple callbacks on any request object. Multiple callbacks can be registered for different events or the same event. Also, you can chain callbacks as shown in the following example.

```
request.
  on('success', function(response) {
    console.log("Success!");
  }).
  on('error', function(response) {
    console.log("Error!");
  }).
  on('complete', function() {
    console.log("Always!");
  }).
  send();
```

Request Object Completion Events

The `AWS.Request` object raises these completion events based on the response of each service operation method:

- `success`
- `error`
- `complete`

You can register a callback function in response to any of these events. For a complete list of all request object events, see Class: AWS.Request in the API Reference.

The success Event

The `success` event is raised upon a successful response received from the service object. Here is how you register a callback function for this event.

```
request.on('success', function(response) {
  // event handler code
});
```

The response provides a `data` property that contains the serialized response data from the service. For example, the following call to the `listBuckets` method of the Amazon S3 service object

```
s3.listBuckets.on('success', function(response) {
  console.log(response.data);
}).send();
```

returns the response and then prints the following `data` property contents to the console.

```
{ Owner: { ID: '...', DisplayName: '...' },
  Buckets:
   [ { Name: 'someBucketName', CreationDate: someCreationDate },
     { Name: 'otherBucketName', CreationDate: otherCreationDate } ],
  RequestId: '...' }
```

The error Event

The `error` event is raised upon an error response received from the service object. Here is how you register a callback function for this event.

```
request.on('error', function(error, response) {
  // event handling code
});
```

When the `error` event is raised, the value of the response's `data` property is `null` and the `error` property contains the error data. The associated `error` object is passed as the first parameter to the registered callback function. For example, the following code:

```
s3.config.credentials.accessKeyId = 'invalid';
s3.listBuckets().on('error', function(error, response) {
  console.log(error);
}).send();
```

returns the error and then prints the following error data to the console.

```
{ code: 'Forbidden', message: null }
```

The complete Event

The `complete` event is raised when a service object call has finished, regardless of whether the call results in success or error. Here is how you register a callback function for this event.

```
request.on('complete', function(response) {
  // event handler code
});
```

Use the `complete` event callback to handle any request cleanup that must execute regardless of success or error. If you use response data inside a callback for the `complete` event, first check the `response.data` or `response.error` properties before attempting to access either one, as shown in the following example.

```
request.on('complete', function(response) {
  if (response.error) {
    // an error occurred, handle it
  } else {
    // we can use response.data here
  }
}).send();
```

Request Object HTTP Events

The `AWS.Request` object raises these HTTP events based on the response of each service operation method:

- `httpHeaders`
- `httpData`
- `httpUploadProgress`
- `httpDownloadProgress`
- `httpError`
- `httpDone`

You can register a callback function in response to any of these events. For a complete list of all request object events, see Class: AWS.Request in the API Reference.

The httpHeaders Event

The `httpHeaders` event is raised when headers are sent by the remote server. Here is how you register a callback function for this event.

```
request.on('httpHeaders', function(statusCode, headers, response) {
  // event handling code
});
```

The `statusCode` parameter to the callback function is the HTTP status code. The `headers` parameter contains the response headers.

The httpData Event

The `httpData` event is raised to stream response data packets from the service. Here is how you register a callback function for this event.

```
request.on('httpData', function(chunk, response) {
  // event handling code
});
```

This event is typically used to receive large responses in chunks when loading the entire response into memory is not practical. This event has an additional `chunk` parameter that contains a portion of the actual data from the server.

If you register a callback for the `httpData` event, the `data` property of the response contains the entire serialized output for the request. You must remove the default `httpData` listener if you don't have the extra parsing and memory overhead for the built-in handlers.

The httpUploadProgress and httpDownloadProgress Events

The `httpUploadProgress` event is raised when the HTTP request has uploaded more data. Similarly, the `httpDownloadProgress` event is raised when the HTTP request has downloaded more data. Here is how you register a callback function for these events.

```
request.on('httpUploadProgress', function(progress, response) {
  // event handling code
})
.on('httpDownloadProgress', function(progress, response) {
  // event handling code
});
```

The `progress` parameter to the callback function contains an object with the loaded and total bytes of the request.

The httpError Event

The `httpError` event is raised when the HTTP request fails. Here is how you register a callback function for this event.

```
request.on('httpError', function(error, response) {
  // event handling code
});
```

The `error` parameter to the callback function contains the error that was thrown.

The httpDone Event

The `httpDone` event is raised when the server finishes sending data. Here is how you register a callback function for this event.

```
request.on('httpDone', function(response) {
  // event handling code
});
```

Using JavaScript Promises

The `AWS.Request.promise` method provides a way to call a service operation and manage asynchronous flow instead of using callbacks. In Node.js and browser scripts, an `AWS.Request` object is returned when a service operation is called without a callback function. You can call the request's `send` method to make the service call.

However, `AWS.Request.promise` immediately starts the service call and returns a promise that is either fulfilled with the response `data` property or rejected with the response `error` property.

```
var request = new AWS.EC2({apiVersion: '2014-10-01'}).describeInstances();

// create the promise object
var promise = request.promise();

// handle promise's fulfilled/rejected states
promise.then(
  function(data) {
    /* process the data */
  },
  function(error) {
    /* handle the error */
  }
);
```

The next example returns a promise that's fulfilled with a `data` object, or rejected with an `error` object. Using promises, a single callback isn't responsible for detecting errors. Instead, the correct callback is called based on the success or failure of a request.

```
var s3 = new AWS.S3({apiVersion: '2006-03-01', region: 'us-west-2'});
var params = {
  Bucket: 'bucket',
  Key: 'example2.txt',
  Body: 'Uploaded text using the promise-based method!'
};
var putObjectPromise = s3.putObject(params).promise();
putObjectPromise.then(function(data) {
  console.log('Success');
}).catch(function(err) {
  console.log(err);
});
```

Coordinating Multiple Promises

In some situations, your code must make multiple asynchronous calls that require action only when they have all returned successfully. If you manage those individual asynchronous method calls with promises, you can create an additional promise that uses the `all` method. This method fulfills this umbrella promise if and when the array of promises that you pass into the method are fulfilled. The callback function is passed an array of the values of the promises passed to the `all` method.

In the following example, an AWS Lambda function must make three asynchronous calls to Amazon DynamoDB but can only complete after the promises for each call are fulfilled.

```
Promise.all([firstPromise, secondPromise, thirdPromise]).then(function(values) {

  console.log("Value 0 is " + values[0].toString);
  console.log("Value 1 is " + values[1].toString);
  console.log("Value 2 is " + values[2].toString);

  // return the result to the caller of the Lambda function
  callback(null, values);
});
```

Browser and Node.js Support for Promises

Support for native JavaScript promises (ECMAScript 2015) depends on the JavaScript engine and version in which your code executes. To help determine the support for JavaScript promises in each environment where your code needs to run, see the ECMAScript Compatability Table on GitHub.

Using Other Promise Implementations

In addition to the native promise implementation in ECMAScript 2015, you can also use third-party promise libraries, including:

- bluebird
- RSVP
- Q

These optional promise libraries can be useful if you need your code to run in environments that don't support the native promise implementation in ECMAScript 5 and ECMAScript 2015.

To use a third-party promise library, set a promises dependency on the SDK by calling the `setPromisesDependency` method of the global configuration object. In browser scripts, make sure to load the third-party promise library before loading the SDK. In the following example, the SDK is configured to use the implementation in the bluebird promise library.

```
AWS.config.setPromisesDependency(require('bluebird'));
```

To return to using the native promise implementation of the JavaScript engine, call `setPromisesDependency` again, passing a `null` instead of a library name.

Requests With a Node.js Stream Object

You can create a request that streams the returned data directly to a Node.js `Stream` object by calling the `createReadStream` method on the request. Calling `createReadStream` returns the raw HTTP stream managed by the request. The raw data stream can then be piped into any Node.js `Stream` object.

This technique is useful for service calls that return raw data in their payload, such as calling `getObject` on an Amazon S3 service object to stream data directly into a file, as shown in this example.

```
var s3 = new AWS.S3({apiVersion: '2006-03-01'});
var params = {Bucket: 'myBucket', Key: 'myImageFile.jpg'};
var file = require('fs').createWriteStream('/path/to/file.jpg');
s3.getObject(params).createReadStream().pipe(file);
```

When you stream data from a request using `createReadStream`, only the raw HTTP data is returned. The SDK does not post-process the data.

Because Node.js is unable to rewind most streams, if the request initially succeeds, then retry logic is disabled for the rest of the response. In the event of a socket failure while streaming, the SDK won't attempt to retry or send more data to the stream. Your application logic needs to identify such streaming failures and handle them.

Using the Response Object

After a service object method has been called, it returns an `AWS.Response` object by passing it to your callback function. You access the contents of the response through the properties of the `AWS.Response` object. There are two properties of the `AWS.Response` object you use to access the contents of the response:

- `data` property
- `error` property

When using the standard callback mechanism, these two properties are provided as parameters on the anonymous callback function as shown in the following example.

```
function(data, error) {
    if (error) {
        // error handling code
        console.log(error);
    } else {
        // data handling code
        console.log(data);
    }
}
```

Accessing Data Returned in the Response Object

The `data` property of the `AWS.Response` object contains the serialized data returned by the service request. When the request is successful, the `data` property contains an object that contains a map to the data returned. The `data` property can be null if an error occurs.

Here is an example of calling the `getItem` method of a DynamoDB table to retrieve the file name of an image file to use as part of a game.

```
// Initialize parameters needed to call DynamoDB
var slotParams = {
    Key : {'slotPosition' : {N: '0'}},
    TableName : 'slotWheels',
    ProjectionExpression: 'imageFile'
};

// prepare request object for call to DynamoDB
var request = new AWS.DynamoDB({region: 'us-west-2', apiVersion:
 '2012-08-10'}).getItem(slotParams);
// log the name of the image file to load in the slot machine
request.on('success', function(response) {
    // logs a value like "cherries.jpg" returned from DynamoDB
    console.log(response.data.Item.imageFile.S);
});
// submit DynamoDB request
request.send();
```

For this example, the DynamoDB table is a lookup of images that show the results of a slot machine pull as specified by the parameters in `slotParams`.

Upon a successful call of the `getItem` method, the `data` property of the `AWS.Response` object contains an `Item` object returned by DynamoDB. The returned data is accessed according to the request's `ProjectionExpression` parameter, which in this case means the `imageFile` member of the `Item` object. Because the `imageFile` member holds a string value, you access the file name of the image itself through the value of the `S` child member of `imageFile`.

Paging Through Returned Data

Sometimes the contents of the `data` property returned by a service request span multiple pages. You can access the next page of data by calling the `response.nextPage` method. This method sends a new request. The response from the request can be captured either with a callback or with success and error listeners.

You can check to see if the data returned by a service request has additional pages of data by calling the `response.hasNextPage` method. This method returns a boolean to indicate whether calling `response.nextPage` returns additional data.

```
s3.listObjects({Bucket: 'bucket'}).on('success', function handlePage(response) {
    // do something with response.data
    if (response.hasNextPage()) {
        response.nextPage().on('success', handlePage).send();
    }
}).send();
```

Accessing Error Information from a Response Object

The `error` property of the `AWS.Response` object contains the available error data in the event of a service error or transfer error. The error returned takes the following form.

```
{ code: 'SHORT_UNIQUE_ERROR_CODE', message: 'a descriptive error message' }
```

In the case of an error, the value of the `data` property is `null`. If you handle events that can be in a failure state, always check whether the `error` property was set before attempting to access the value of the `data` property.

Accessing the Originating Request Object

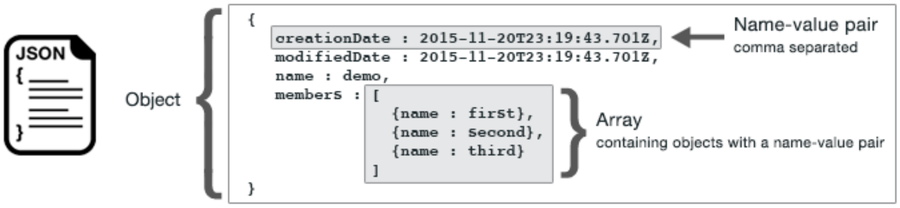
The `request` property provides access to the originating `AWS.Request` object. It can be useful to refer to the original `AWS.Request` object to access the original parameters it sent. In the following example, the `request` property is used to access the `Key` parameter of the original service request.

```
s3.getObject({Bucket: 'bucket', Key: 'key'}).on('success', function(response) {
   console.log("Key was", response.request.params.Key);
}).send();
```

Working with JSON

JSON is a format for data exchange that is both human and machine-readable. While the name JSON is an acronym for *JavaScript Object Notation*, the format of JSON is independent of any programming language.

The SDK for JavaScript uses JSON to send data to service objects when making requests and receives data from service objects as JSON. For more information about JSON, see json.org.



```
{
  creationDate : 2015-11-20T23:19:43.701Z,
  modifiedDate : 2015-11-20T23:19:43.701Z,
  name : demo,
  members : [
             {name : first},
             {name : second},
             {name : third}
            ]
}
```

JSON represents data in two ways:

- An *object*, which is an unordered collection of name-value pairs. An object is defined within left (`{`) and right (`}`) braces. Each name-value pair begins with the name, followed by a colon, followed by the value. Name-value pairs are comma separated.
- An *array*, which is an ordered collection of values. An array is defined within left (`[`) and right (`]`) brackets. Items in the array are comma separated.

Here is an example of a JSON object that contains an array of objects in which the objects represent cards in a card game. Each card is defined by two name-value pairs, one that specifies a unique value to identify that card and another that specifies a URL that points to the corresponding card image.

```
var cards = [{"CardID":"defaultname", "Image":"defaulturl"},
  {"CardID":"defaultname", "Image":"defaulturl"},
  {"CardID":"defaultname", "Image":"defaulturl"},
  {"CardID":"defaultname", "Image":"defaulturl"},
  {"CardID":"defaultname", "Image":"defaulturl"}];
```

JSON as Service Object Parameters

Here is an example of simple JSON used to define the parameters of a call to a Lambda service object.

```
var pullParams = {
   FunctionName : 'slotPull',
   InvocationType : 'RequestResponse',
   LogType : 'None'
};
```

The pullParams object is defined by three name-value pairs, separated by commas within the left and right braces. When providing parameters to a service object method call, the names are determined by the parameter names for the service object method you plan to call. When invoking a Lambda function, FunctionName, InvocationType, and LogType are the parameters used to call the invoke method on a Lambda service object.

When passing parameters to a service object method call, provide the JSON object to the method call, as shown in the following example of invoking a Lambda function.

```
lambda = new AWS.Lambda({region: 'us-west-2', apiVersion: '2015-03-31'});
// create JSON object for service call parameters
var pullParams = {
   FunctionName : 'slotPull',
   InvocationType : 'RequestResponse',
   LogType : 'None'
};
// invoke Lambda function, passing JSON object
lambda.invoke(pullParams, function(err, data) {
   if (err) {
      console.log(err);
   } else {
      console.log(data);
   }
});
```

Returning Data as JSON

JSON provides a standard way to pass data between parts of an application that need to send several values at the same time. The methods of client classes in the API commonly return JSON in the data parameter passed to their callback functions. For example, here is a call to the getBucketCors method of the Amazon S3 client class.

```
// call S3 to retrieve CORS configuration for selected bucket
s3.getBucketCors(bucketParams, function(err, data) {
  if (err) {
    console.log(err);
  } else if (data) {
    console.log(JSON.stringify(data));
  }
});
```

The value of data is a JSON object, in this example JSON that describes the current CORS configuration for a specified Amazon S3 bucket.

```
{
   "CORSRules": [
      {
          "AllowedHeaders":["*"],
          "AllowedMethods":["POST","GET","PUT","DELETE","HEAD"],
          "AllowedOrigins":["*"],
          "ExposeHeaders":[],
          "MaxAgeSeconds":3000
      }
   ]
}
```

SDK for JavaScript Code Examples

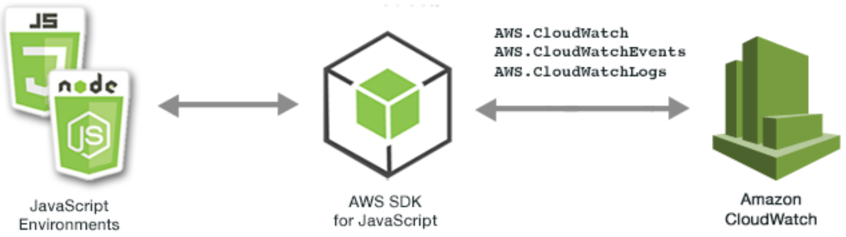
The topics in this section contain examples of how to use the AWS SDK for JavaScript with the APIs of various services to carry out common tasks.

You can find the sample code for these examples in addition to others in the AWS documentation sample repository on GitHub.

Topics

Amazon CloudWatch Examples

Amazon CloudWatch (CloudWatch) is a web service that monitors your Amazon Web Services (AWS) resources and applications you run on AWS in real time. You can use CloudWatch to collect and track metrics, which are variables you can measure for your resources and applications. CloudWatch alarms send notifications or automatically make changes to the resources you are monitoring based on rules that you define.



The JavaScript API for CloudWatch is exposed through the `AWS.CloudWatch`, `AWS.CloudWatchEvents`, and `AWS.CloudWatchLogs` client classes. For more information about using the CloudWatch client classes, see Class: AWS.CloudWatch, Class: AWS.CloudWatchEvents, and Class: AWS.CloudWatchLogs in the API reference.

Topics

Creating Alarms in Amazon CloudWatch

	This Node.js example shows you how to: • Retrieve basic information about your CloudWatch alarms. • Create and delete a CloudWatch alarm.	

The Scenario

An alarm watches a single metric over a time period you specify, and performs one or more actions based on the value of the metric relative to a given threshold over a number of time periods.

In this example, a series of Node.js modules are used to create alarms in CloudWatch. The Node.js modules use the SDK for JavaScript to create alarms using these methods of the `AWS.CloudWatch` client class:

- `describeAlarms`
- `putMetricAlarm`
- `deleteAlarms`

For more information about CloudWatch alarms, see Creating Amazon CloudWatch Alarms in the *Amazon CloudWatch User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Describing Alarms

Create a Node.js module with the file name `cw_describealarms.js`. Be sure to configure the SDK as previously shown. To access CloudWatch, create an `AWS.CloudWatch` service object. Create a JSON object to hold the parameters for retrieving alarm descriptions, limiting the alarms returned to those with a state of `INSUFFICIENT_DATA`. Then call the `describeAlarms` method of the `AWS.CloudWatch` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatch service object
var cw = new AWS.CloudWatch({apiVersion: '2010-08-01'});

cw.describeAlarms({StateValue: 'INSUFFICIENT_DATA'}, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    // List the names of all current alarms in the console
    data.MetricAlarms.forEach(function (item, index, array) {
       console.log(item.AlarmName);
    });
  }
});
```

To run the example, type the following at the command line.

```
node cw_describealarms.js
```

This sample code can be found here on GitHub.

Creating an Alarm for a CloudWatch Metric

Create a Node.js module with the file name `cw_putmetricalarm.js`. Be sure to configure the SDK as previously shown. To access CloudWatch, create an `AWS.CloudWatch` service object. Create a JSON object for the parameters needed to create an alarm based on a metric, in this case the CPU utilization of an Amazon EC2 instance. The remaining parameters are set so the alarm triggers when the metric exceeds a threshold of 70 percent. Then call the `describeAlarms` method of the `AWS.CloudWatch` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatch service object
var cw = new AWS.CloudWatch({apiVersion: '2010-08-01'});

var params = {
  AlarmName: 'Web_Server_CPU_Utilization',
  ComparisonOperator: 'GreaterThanThreshold',
  EvaluationPeriods: 1,
  MetricName: 'CPUUtilization',
  Namespace: 'AWS/EC2',
  Period: 60,
  Statistic: 'Average',
  Threshold: 70.0,
  ActionsEnabled: false,
  AlarmDescription: 'Alarm when server CPU exceeds 70%',
  Dimensions: [
    {
      Name: 'InstanceId',
      Value: 'INSTANCE_ID'
    },
  ],
  Unit: 'Seconds'
};

cw.putMetricAlarm(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node cw_putmetricalarm.js
```

This sample code can be found here on GitHub.

Deleting an Alarm

Create a Node.js module with the file name `cw_deletealarms.js`. Be sure to configure the SDK as previously shown. To access CloudWatch, create an `AWS.CloudWatch` service object. Create a JSON object to hold the names of the alarms you want to delete. Then call the `deleteAlarms` method of the `AWS.CloudWatch` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatch service object
var cw = new AWS.CloudWatch({apiVersion: '2010-08-01'});

cw.deleteAlarms({AlarmNames: ['Web_Server_CPU_Utilization']}, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node cw_deletealarms.js
```

This sample code can be found here on GitHub.

Using Alarm Actions in Amazon CloudWatch

	This Node.js example shows you how to change the state of your Amazon EC2 instances automatically based on a CloudWatch alarm.	

The Scenario

Using alarm actions, you can create alarms that automatically stop, terminate, reboot, or recover your Amazon EC2 instances. You can use the stop or terminate actions when you no longer need an instance to be running. You can use the reboot and recover actions to automatically reboot those instances.

In this example, a series of Node.js modules are used to define an alarm action in CloudWatch that triggers the reboot of an Amazon EC2 instance. The Node.js modules use the SDK for JavaScript to manage Amazon EC2 instances using these methods of the `CloudWatch` client class:

- `enableAlarmActions`
- `disableAlarmActions`

For more information about CloudWatch alarm actions, see Create Alarms to Stop, Terminate, Reboot, or Recover an Instance in the *Amazon CloudWatch User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create an IAM role whose policy grants permission to describe, reboot, stop, or terminate an Amazon EC2 instance. For more information about creating an IAM role, see Creating a Role to Delegate Permissions to an AWS Service in the *IAM User Guide*.

Use the following role policy when creating the IAM role.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "cloudwatch:Describe*",
            "ec2:Describe*",
            "ec2:RebootInstances",
            "ec2:StopInstances*",
            "ec2:TerminateInstances"
         ],
         "Resource": [
            "*"
         ]
      }
   ]
}
```

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Creating and Enabling Actions on an Alarm

Create a Node.js module with the file name `cw_enablealarmactions.js`. Be sure to configure the SDK as previously shown. To access CloudWatch, create an `AWS.CloudWatch` service object.

Create a JSON object to hold the parameters for creating an alarm, specifying `ActionsEnabled` as `true` and an array of ARNs for the actions the alarm will trigger. Call the `putMetricAlarm` method of the `AWS.CloudWatch` service object, which creates the alarm if it does not exist or updates it if the alarm does exist.

In the callback function for the `putMetricAlarm`, upon successful completion create a JSON object containing the name of the CloudWatch alarm. Call the `enableAlarmActions` method to enable the alarm action.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatch service object
var cw = new AWS.CloudWatch({apiVersion: '2010-08-01'});

var params = {
  AlarmName: 'Web_Server_CPU_Utilization',
  ComparisonOperator: 'GreaterThanThreshold',
  EvaluationPeriods: 1,
  MetricName: 'CPUUtilization',
  Namespace: 'AWS/EC2',
  Period: 60,
  Statistic: 'Average',
  Threshold: 70.0,
  ActionsEnabled: true,
  AlarmActions: ['arn:aws:swf:us-west-2:{CUSTOMER_ACCOUNT}:action/actions/
AWS_EC2.InstanceId.Reboot/1.0'], /* This is a workflow */
  AlarmDescription: 'Alarm when server CPU exceeds 70%',
  Dimensions: [
    {
      Name: 'InstanceId',
      Value: 'INSTANCE_ID'
    },
  ],
  Unit: 'Seconds'
};

cw.putMetricAlarm(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Alarm action added", data);
    var paramsEnableAlarmAction = {
      AlarmNames: [paramsUpdateAlarm.AlarmName]
    };
    cw.enableAlarmActions(paramsEnableAlarmAction, function(err, data) {
      if (err) {
        console.log("Error", err);
      } else {
        console.log("Alarm action enabled", data);
      }
    });
  }
});
```

To run the example, type the following at the command line.

```
node cw_enablealarmactions.js
```

This sample code can be found here on GitHub.

Disabling Actions on an Alarm

Create a Node.js module with the file name `cw_disablealarmactions.js`. Be sure to configure the SDK as previously shown. To access CloudWatch, create an `AWS.CloudWatch` service object. Create a JSON object containing the name of the CloudWatch alarm. Call the `disableAlarmActions` method to disable the actions for this alarm.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatch service object
var cw = new AWS.CloudWatch({apiVersion: '2010-08-01'});

cw.disableAlarmActions({AlarmNames: ['Web_Server_CPU_Utilization']}, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node cw_disablealarmactions.js
```

This sample code can be found here on GitHub.

Getting Metrics from Amazon CloudWatch

	This Node.js example shows you how to: • Retrieve a list of published CloudWatch metrics.	

	• Publish data points to CloudWatch metrics.	

The Scenario

Metrics are data about the performance of your systems. You can enable detailed monitoring of some resources, such as your Amazon EC2 instances, or your own application metrics.

In this example, a series of Node.js modules are used to get metrics from CloudWatch. In this example, a series of Node.js modules are used to send events to Amazon CloudWatch Events. The Node.js modules use the SDK for JavaScript to get metrics from CloudWatch using these methods of the `CloudWatch` client class:

- `listMetrics`
- `putMetricData`

For more information about CloudWatch metrics, see Using Amazon CloudWatch Metrics in the *Amazon CloudWatch User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Listing Metrics

Create a Node.js module with the file name `cw_listmetrics.js`. Be sure to configure the SDK as previously shown. To access CloudWatch, create an `AWS.CloudWatch` service object. Create a JSON object containing the parameters needed to list metrics within the `AWS/Logs` namespace. Call the `listMetrics` method to list the `IncomingLogEvents` metric.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatch service object
var cw = new AWS.CloudWatch({apiVersion: '2010-08-01'});
var params = {
  Dimensions: [
    {
      Name: 'LogGroupName',
    },
  ],
  MetricName: 'IncomingLogEvents',
  Namespace: 'AWS/Logs'
};

cw.listMetrics(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Metrics", JSON.stringify(data.Metrics));
  }
});
```

To run the example, type the following at the command line.

```
node cw_listmetrics.js
```

This sample code can be found here on GitHub.

Submitting Custom Metrics

Create a Node.js module with the file name `cw_putmetricdata.js`. Be sure to configure the SDK as previously shown. To access CloudWatch, create an `AWS.CloudWatch` service object. Create a JSON object containing the parameters needed to submit a data point for the `PAGES_VISITED` custom metric. Call the `putMetricData` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatch service object
var cw = new AWS.CloudWatch({apiVersion: '2010-08-01'});

// Create parameters JSON for putMetricData
var params = {
  MetricData: [
    {
      MetricName: 'PAGES_VISITED',
      Dimensions: [
        {
          Name: 'UNIQUE_PAGES',
          Value: 'URLS'
        },
      ],
      Unit: 'None',
      Value: 1.0
    },
  ],
  Namespace: 'SITE/TRAFFIC'
};

cw.putMetricData(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node cw_putmetricdata.js
```

This sample code can be found here on GitHub.

Sending Events to Amazon CloudWatch Events

	This Node.js example shows you how to: • Create and update a rule used to trigger an event. • Define one or more targets to respond to an event. • Send events that are matched to targets for handling.	

The Scenario

CloudWatch Events delivers a near real-time stream of system events that describe changes in Amazon Web Services (AWS) resources to any of various targets. Using simple rules, you can match events and route them to one or more target functions or streams.

In this example, a series of Node.js modules are used to send events to CloudWatch Events. The Node.js modules use the SDK for JavaScript to manage instances using these methods of the `CloudWatchEvents` client class:

- `putRule`
- `putTargets`
- `putEvents`

For more information about CloudWatch Events, see Adding Events with PutEvents in the *Amazon CloudWatch Events User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create a Lambda function using the **hello-world** blueprint to serve as the target for events. To learn how, see Step 1: Create an AWS Lambda function in the *Amazon CloudWatch Events User Guide*.
- Create an IAM role whose policy grants permission to CloudWatch Events and that includes `events.amazonaws.com` as a trusted entity. For more information about creating an IAM role, see Creating a Role to Delegate Permissions to an AWS Service in the *IAM User Guide*.

Use the following role policy when creating the IAM role.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Sid": "CloudWatchEventsFullAccess",
         "Effect": "Allow",
         "Action": "events:*",
         "Resource": "*"
      },
      {
         "Sid": "IAMPassRoleForCloudWatchEvents",
         "Effect": "Allow",
         "Action": "iam:PassRole",
         "Resource": "arn:aws:iam::*:role/AWS_Events_Invoke_Targets"
      }
   ]
}
```

Use the following trust relationship when creating the IAM role.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Principal": {
            "Service": "events.amazonaws.com"
         },
         "Action": "sts:AssumeRole"
      }
   ]
}
```

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Creating a Scheduled Rule

Create a Node.js module with the file name `cwe_putrule.js`. Be sure to configure the SDK as previously shown. To access CloudWatch Events, create an `AWS.CloudWatchEvents` service object. Create a JSON object containing the parameters needed to specify the new scheduled rule, which include the following:

- A name for the rule
- The ARN of the IAM role you created previously
- An expression to schedule triggering of the rule every five minutes

Call the `putRule` method to create the rule. The callback returns the ARN of the new or updated rule.

```
// Load the AWS SDK for Node.js
```

```
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatchEvents service object
var cwevents = new AWS.CloudWatchEvents({apiVersion: '2015-10-07'});

var params = {
  Name: 'DEMO_EVENT',
  RoleArn: 'IAM_ROLE_ARN',
  ScheduleExpression: 'rate(5 minutes)',
  State: 'ENABLED'
};

cwevents.putRule(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.RuleArn);
  }
});
```

To run the example, type the following at the command line.

```
node cwe_putrule.js
```

This sample code can be found here on GitHub.

Adding a Lambda Function Target

Create a Node.js module with the file name `cwe_puttargets.js`. Be sure to configure the SDK as previously shown. To access CloudWatch Events, create an `AWS.CloudWatchEvents` service object. Create a JSON object containing the parameters needed to specify the rule to which you want to attach the target, including the ARN of the Lambda function you created. Call the `putTargets` method of the `AWS.CloudWatchEvents` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatchEvents service object
var cwevents = new AWS.CloudWatchEvents({apiVersion: '2015-10-07'});

var params = {
  Rule: 'DEMO_EVENT',
  Targets: [
    {
      Arn: 'LAMBDA_FUNCTION_ARN',
      Id: 'myCloudWatchEventsTarget',
    }
  ]
};

cwevents.putTargets(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node cwe_puttargets.js
```

This sample code can be found here on GitHub.

Sending Events

Create a Node.js module with the file name `cwe_putevents.js`. Be sure to configure the SDK as previously shown. To access CloudWatch Events, create an `AWS.CloudWatchEvents` service object. Create a JSON object containing the parameters needed to send events. For each event, include the source of the event, the ARNs of any resources affected by the event, and details for the event. Call the `putEvents` method of the `AWS.CloudWatchEvents` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create CloudWatchEvents service object
var cwevents = new AWS.CloudWatchEvents({apiVersion: '2015-10-07'});

var params = {
  Entries: [
    {
      Detail: '{ \"key1\": \"value1\", \"key2\": \"value2\" }',
      DetailType: 'appRequestSubmitted',
      Resources: [
        'RESOURCE_ARN',
      ],
      Source: 'com.company.myapp'
    }
  ]
};

cwevents.putEvents(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.Entries);
  }
});
```

To run the example, type the following at the command line.

```
node cwe_putevents.js
```

This sample code can be found here on GitHub.

Using Subscription Filters in Amazon CloudWatch Logs

	This Node.js example shows you how to create and delete filters for log events in CloudWatch Logs.	

The Scenario

Subscriptions provide access to a real-time feed of log events from CloudWatch Logs and deliver that feed to other services, such as an Amazon Kinesis stream or AWS Lambda, for custom processing, analysis, or loading to other systems. A subscription filter defines the pattern to use for filtering which log events are delivered to your AWS resource.

In this example, a series of Node.js modules are used to list, create, and delete a subscription filter in CloudWatch Logs. The destination for the log events is a Lambda function. The Node.js modules use the SDK for JavaScript to manage subscription filters using these methods of the `CloudWatchLogs` client class:

- `putSubscriptionFilters`
- `describeSubscriptionFilters`
- `deleteSubscriptionFilter`

For more information about CloudWatch Logs subscriptions, see Real-time Processing of Log Data with Subscriptions in the *Amazon CloudWatch Logs User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create a Lambda function as the destination for log events. You will need to use the ARN of this function. For more information about setting up a Lambda function, see Subscription Filters with AWS Lambda in the *Amazon CloudWatch Logs User Guide*.
- Create an IAM role whose policy grants permission to invoke the Lambda function you created and grants full access to CloudWatch Logs or apply the following policy to the execution role you create for the Lambda function. For more information about creating an IAM role, see Creating a Role to Delegate Permissions to an AWS Service in the *IAM User Guide*.

Use the following role policy when creating the IAM role.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "logs:CreateLogGroup",
            "logs:CrateLogStream",
            "logs:PutLogEvents"
         ],
         "Resource": "arn:aws:logs:*:*:*"
      },
      {
         "Effect": "Allow",
         "Action": [
            "lambda:InvokeFunction"
         ],
         "Resource": [
            "*"
         ]
      }
   ]
}
```

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Describing Existing Subscription Filters

Create a Node.js module with the file name `cwl_describesubscriptionfilters.js`. Be sure to configure the SDK as previously shown. To access CloudWatch Logs, create an `AWS.CloudWatchLogs` service object. Create a JSON object containing the parameters needed to describe your existing filters, including the name of the log group and the maximum number of filters you want described. Call the `describeSubscriptionFilters` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create the CloudWatchLogs service object
var cwl = new AWS.CloudWatchLogs({apiVersion: '2014-03-28'});

var params = {
  logGroupName: 'GROUP_NAME',
  limit: 5
};

cwl.describeSubscriptionFilters(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.subscriptionFilters);
  }
});
```

To run the example, type the following at the command line.

```
node cwl_describesubscriptionfilters.js
```

This sample code can be found here on GitHub.

Creating a Subscription Filter

Create a Node.js module with the file name `cwl_putsubscriptionfilter.js`. Be sure to configure the SDK as previously shown. To access CloudWatch Logs, create an `AWS.CloudWatchLogs` service object. Create a JSON object containing the parameters needed to create a filter, including the ARN of the destination Lambda function, the name of the filter, the string pattern for filtering, and the name of the log group. Call the `putSubscriptionFilters` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create the CloudWatchLogs service object
var cwl = new AWS.CloudWatchLogs({apiVersion: '2014-03-28'});

var params = {
  destinationArn: 'LAMBDA_FUNCTION_ARN',
  filterName: 'FILTER_NAME',
  filterPattern: 'ERROR',
  logGroupName: 'LOG_GROUP',
};

cwl.putSubscriptionFilter(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node cwl_putsubscriptionfilter.js
```

This sample code can be found here on GitHub.

Deleting a Subscription Filter

Create a Node.js module with the file name `cwl_deletesubscriptionfilters.js`. Be sure to configure the SDK as previously shown. To access CloudWatch Logs, create an `AWS.CloudWatchLogs` service object. Create a JSON object containing the parameters needed to delete a filter, including the names of the filter and the log group. Call the `deleteSubscriptionFilters` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create the CloudWatchLogs service object
var cwl = new AWS.CloudWatchLogs({apiVersion: '2014-03-28'});

var params = {
  filterName: 'FILTER',
  logGroupName: 'LOG_GROUP'
};

cwl.deleteSubscriptionFilter(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

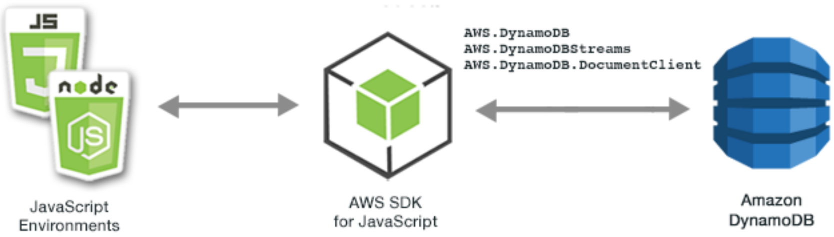
To run the example, type the following at the command line.

```
node cwl_deletesubscriptionfilter.js
```

This sample code can be found here on GitHub.

Amazon DynamoDB Examples

Amazon DynamoDB is a fully managed NoSQL cloud database that supports both document and key-value store models. You create schemaless tables for data without the need to provision or maintain dedicated database servers.



The JavaScript API for DynamoDB is exposed through the `AWS.DynamoDB`, `AWS.DynamoDBStreams`, and `AWS.DynamoDB.DocumentClient` client classes. For more information about using the DynamoDB client classes, see Class: AWS.DynamoDB, Class: AWS.DynamoDBStreams, and Class: AWS.DynamoDB.DocumentClient in the API reference.

Topics

Creating and Using Tables in DynamoDB

	This Node.js example shows you how to create and manage tables used to store and retrieve data from DynamoDB.	

The Scenario

Similar to other database systems, DynamoDB stores data in tables. A DynamoDB table is a collection of data that's organized into items that are analogous to rows. To store or access data in DynamoDB, you create and work with tables.

In this example, you use a series of Node.js modules to perform basic operations with a DynamoDB table. The code uses the SDK for JavaScript to create and work with tables by using these methods of the `AWS.DynamoDB` client class:

- `createTable`
- `listTables`
- `describeTable`
- `deleteTable`

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Creating a Table

Create a Node.js module with the file name `ddb_createtable.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to create a table, which in this example includes the name and data type for each attribute, the key schema, the name of the table, and the units of throughput to provision. Call the `createTable` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the DynamoDB service object
ddb = new AWS.DynamoDB({apiVersion: '2012-10-08'});

var params = {
  AttributeDefinitions: [
    {
      AttributeName: 'CUSTOMER_ID',
      AttributeType: 'N'
    },
    {
      AttributeName: 'CUSTOMER_NAME',
      AttributeType: 'S'
    }
  ],
  KeySchema: [
    {
      AttributeName: 'CUSTOMER_ID',
      KeyType: 'HASH'
    },
      AttributeName: 'CUSTOMER_NAME',
      AttributeType: 'RANGE'
  ],
  ProvisionedThroughput: {
    ReadCapacityUnits: 1,
    WriteCapacityUnits: 1
  },
  TableName: 'CUSTOMER_LIST',
  StreamSpecification: {
    StreamEnabled: false
  }
};

// Call DynamoDB to create the table
ddb.createTable(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.Table.KeySchema);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_createtable.js
```

This sample code can be found here on GitHub.

Listing Your Tables

Create a Node.js module with the file name `ddb_listtables.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to list your tables, which in this example limits the number of tables listed to 10. Call the `listTables` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the DynamoDB service object
ddb = new AWS.DynamoDB({apiVersion: '2012-10-08'});

// Call DynamoDB to retrieve the list of tables
ddb.listTables({Limit: 10}, function(err, data) {
  if (err) {
    console.log("Error", err.code);
  } else {
    console.log("Table names are ", data.TableNames);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_listtables.js
```

This sample code can be found here on GitHub.

Describing a Table

Create a Node.js module with the file name `ddb_describetable.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to describe a table, which in this example includes the name of the table provided as a command-line parameter. Call the `describeTable` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the DynamoDB service object
ddb = new AWS.DynamoDB({apiVersion: '2012-10-08'});

var params = {
  TableName: process.argv[2]
};

// Call DynamoDB to retrieve the selected table descriptions
ddb.describeTable(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.Table.KeySchema);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_describetable.js TABLE_NAME
```

This sample code can be found here on GitHub.

Deleting a Table

Create a Node.js module with the file name `ddb_deletetable.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to describe a table, which in this example includes the name of the table provided as a command-line parameter. Call the `deleteTable` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the DynamoDB service object
ddb = new AWS.DynamoDB({apiVersion: '2012-10-08'});

var params = {
  TableName: process.argv[2]
};

// Call DynamoDB to delete the specified table
ddb.deleteTable(params, function(err, data) {
  if (err && err.code === 'ResourceNotFoundException') {
    console.log("Error: Table not found");
  } else if (err && err.code === 'ResourceInUseException') {
    console.log("Error: Table in use");
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_deletetable.js TABLE_NAME
```

This sample code can be found here on GitHub.

Reading and Writing A Single Item in DynamoDB

	This Node.js example shows you how to add, retrieve, and delete a single item in a DynamoDB table.	

The Scenario

In this example, you use a series of Node.js modules to read and write one item in a DynamoDB table by using these methods of the `AWS.DynamoDB` client class:

- `putItem`
- `getItem`
- `deleteItem`

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create a DynamoDB table whose items you can access. For more information about creating a DynamoDB table, see Creating and Using Tables in DynamoDB (p. 72).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Writing an Item

Create a Node.js module with the file name `ddb_putitem.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to add an item, which in this example includes the name of the table and a map that defines the attributes to set and the values for each attribute. Call the `putItem` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the DynamoDB service object
ddb = new AWS.DynamoDB({apiVersion: '2012-10-08'});

var params = {
  TableName: 'TABLE',
  Item: {
    'CUSTOMER_ID' : {N: '001'},
    'CUSTOMER_NAME' : {S: 'Richard Roe'},
  }
};

// Call DynamoDB to add the item to the table
ddb.putItem(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_putitem.js
```

This sample code can be found here on GitHub.

Getting an Item

Create a Node.js module with the file name `ddb_getitem.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to add an item, which in this example includes the name of the table, the name and value of the key for the item you're getting, and a projection expression that identifies the item attribute you want to retrieve. Call the `getItem` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the DynamoDB service object
ddb = new AWS.DynamoDB({apiVersion: '2012-10-08'});

var params = {
  TableName: 'TABLE',
  Key: {
    'KEY_NAME' : {N: '001'},
  },
  ProjectionExpression: 'ATTRIBUTE_NAME'
};

// Call DynamoDB to read the item from the table
ddb.getItem(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.Item);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_getitem.js
```

This sample code can be found here on GitHub.

Deleting an Item

Create a Node.js module with the file name `ddb_deleteitem.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to add an item, which in this example includes the name of the table and both the key name and value for the item you're deleting. Call the `deleteItem` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the DynamoDB service object
ddb = new AWS.DynamoDB({apiVersion: '2012-10-08'});

var params = {
  TableName: 'TABLE',
  Key: {
    'KEY_NAME' : {S: 'VALUE'},
  }
};

// Call DynamoDB to delete the item from the table
ddb.deleteItem(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_deleteitem.js
```

This sample code can be found here on GitHub.

Reading and Writing Items in Batch in DynamoDB

	This Node.js example shows you how to read and write batches of items in a DynamoDB table.	

The Scenario

In this example, you use a series of Node.js modules to put a batch of items in a DynamoDB table as well as read a batch of items. The code uses the SDK for JavaScript to perform batch read and write operations using these methods of the DynamoDB client class:

- `batchGetItem`
- `batchWriteItem`

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create a DynamoDB table whose items you can access. For more information about creating a DynamoDB table, see Creating and Using Tables in DynamoDB (p. 72).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Reading Items in Batch

Create a Node.js module with the file name `ddb_batchgetitem.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to get a batch of items, which in this example includes the name of one or more tables from which to read, the values of keys to read in each table, and the projection expression that specifies the attributes to return. Call the `batchGetItem` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB service object
var ddb = new AWS.DynamoDB({apiVersion: '2012-08-10'});

var params = {
  RequestItems: {
    'TABLE_NAME': {
      Keys: [
        {'KEY_NAME': {N: 'KEY_VALUE_1'}},
        {'KEY_NAME': {N: 'KEY_VALUE_2'}},
        {'KEY_NAME': {N: 'KEY_VALUE_3'}}
      ],
      ProjectionExpression: 'KEY_NAME, ATTRIBUTE'
    }
  }
};

ddb.batchGetItem(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    data.Responses.TABLE_NAME.forEach(function(element, index, array) {
      console.log(element);
    });
  }
});
```

To run the example, type the following at the command line.

```
node ddb_batchgetitem.js
```

This sample code can be found here on GitHub.

Writing Items in Batch

Create a Node.js module with the file name `ddb_batchwriteitem.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to get a batch of items, which in this example includes the table into which you want to write items, the key(s) you want to write for each item, and the attributes along with their values. Call the `batchWriteItem` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB service object
var ddb = new AWS.DynamoDB({apiVersion: '2012-08-10'});

var params = {
  RequestItems: {
    "TABLE_NAME": [
       {
         PutRequest: {
           Item: {
             "KEY": { "N": "KEY_VALUE" },
               "ATTRIBUTE_1": { "S": "ATTRIBUTE_1_VALUE" },
               "ATTRIBUTE_2": { "S": "ATTRIBUTE_2_VALUE" }
           }
         },
         PutRequest: {
           Item: {
             "KEY": { "N": "KEY_VALUE" },
               "ATTRIBUTE_1": { "S": "ATTRIBUTE_1_VALUE" },
               "ATTRIBUTE_2": { "S": "ATTRIBUTE_2_VALUE" }
           }
         }
       }
    ]
  }
};

ddb.batchWriteItem(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node ddb_batchwriteitem.js
```

This sample code can be found here on GitHub.

Querying and Scanning a DynamoDB Table

node JS	This Node.js example shows you how to query and scan a DynamoDB table for items.	

The Scenario

Querying finds items in a table or a secondary index using only primary key attribute values. You must provide a partition key name and a value for which to search. You can also provide a sort key name and value, and use a comparison operator to refine the search results. Scanning finds items by checking every item in the specified table.

In this example, you use a series of Node.js modules to identify one or more items you want to retrieve from a DynamoDB table. The code uses the SDK for JavaScript to query and scan tables using these methods of the DynamoDB client class:

- `query`
- `scan`

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create a DynamoDB table whose items you can access. For more information about creating a DynamoDB table, see Creating and Using Tables in DynamoDB (p. 72).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');
```

```
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Querying a Table

This example queries a table that contains episode information about a video series, returning the episode titles and subtitles of second season episodes past episode 9 that contain a specified phrase in their subtitle.

Create a Node.js module with the file name `ddb_query.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to query the table, which in this example includes the table name, the `ExpressionAttributeValues` needed by the query, a `KeyConditionExpression` that uses those values to define which items the query returns, and the names of attribute values to return for each item. Call the `query` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB service object
var ddb = new AWS.DynamoDB({apiVersion: '2012-08-10'});

var params = {
  ExpressionAttributeValues: {
    ':s': {N: '2'},
    ':e' : {N: '09'},
    ':topic' : {S: 'PHRASE'}
   },
 KeyConditionExpression: 'Season = :s and Episode > :e',
 ProjectionExpression: 'Title, Subtitle',
 FilterExpression: 'contains (Subtitle, :topic)',
 TableName: 'EPISODES_TABLE'
};

ddb.query(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    data.Items.forEach(function(element, index, array) {
      console.log(element.Title.S + " (" + element.Subtitle.S + ")");
    });
  }
});
```

To run the example, type the following at the command line.

```
node ddb_query.js
```

This sample code can be found here on GitHub.

Scanning a Table

Create a Node.js module with the file name `ddb_scan.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB` service object. Create a JSON object containing the parameters needed to scan the table for items, which in this example includes the name of the table, the list of attribute values to return for each matching item, and an expression to filter the result set to find items containing a specified phrase. Call the `scan` method of the DynamoDB service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB service object
var ddb = new AWS.DynamoDB({apiVersion: '2012-08-10'});

var params = {
 ExpressionAttributeValues: {
  ":topic": {
    S: "PHRASE"
   }
 },
 FilterExpression: "contains (Subtitle, :topic)",
 ProjectionExpression: "Title, Subtitle",
 TableName: "EPISODES_TABLE"
};

ddb.scan(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    data.Items.forEach(function(element, index, array) {
      console.log(element.Title.S + " (" + element.Subtitle.S + ")");
    });
  }
});
```

To run the example, type the following at the command line.

```
node ddb_scan.js
```

This sample code can be found here on GitHub.

Using the DynamoDB Document Client

	This Node.js example shows you how to access a DynamoDB table using the document client.	

The Scenario

The DynamoDB document client simplifies working with items by abstracting the notion of attribute values. This abstraction annotates native JavaScript types supplied as input parameters, as well as converts annotated response data to native JavaScript types.

In this example, you use a series of Node.js modules to perform basic operations on a DynamoDB table using the document client. The code uses the SDK for JavaScript to query and scan tables using these methods of the DynamoDB document client class:

- `get`
- `put`
- `query`
- `delete`

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create a DynamoDB table whose items you can access. For more information about creating a DynamoDB table, see Creating and Using Tables in DynamoDB (p. 72).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Getting an Item from a Table

Create a Node.js module with the file name `ddbdoc_get.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB.DocumentClient` object. Create a JSON object containing the parameters needed get an item from the table, which in this example includes the name of the table, the name of the hash key in that table, and the value of the hash key for the item you want to get. Call the `get` method of the DynamoDB document client.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB document client
var docClient = new AWS.DynamoDB.DocumentClient({apiVersion: '2012-08-10'});

var params = {
 TableName: 'EPISODES_TABLE',
 Key: {'KEY_NAME': VALUE}
};

docClient.get(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.Item);
  }
});
```

To run the example, type the following at the command line.

```
node ddbdoc_get.js
```

This sample code can be found here on GitHub.

Putting an Item in a Table

Create a Node.js module with the file name `ddbdoc_put.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB.DocumentClient` object. Create a JSON object containing the parameters needed to write an item to the table, which in this example includes the name of the table and a description of the item to add or update that includes the hashkey and value as well as names and values for attributes to set on the item. Call the `put` method of the DynamoDB document client.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB document client
var docClient = new AWS.DynamoDB.DocumentClient({apiVersion: '2012-08-10'});

var params = {
  TableName: 'TABLE',
  Item: {
    'HASHKEY': VALUE,
    'ATTRIBUTE_1': 'STRING_VALUE',
    'ATTRIBUTE_2': VALUE_2
  }
};

docClient.put(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node ddbdoc_put.js
```

This sample code can be found here on GitHub.

Querying a Table

This example queries a table that contains episode information about a video series, returning the episode titles and subtitles of second season episodes past episode 9 that contain a specified phrase in their subtitle.

Create a Node.js module with the file name `ddbdoc_query.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB.DocumentClient` object. Create a JSON object containing the parameters needed to query the table, which in this example includes the table name, the `ExpressionAttributeValues` needed by the query, and a `KeyConditionExpression` that uses those values to define which items the query returns. Call the `query` method of the DynamoDB document client.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB document client
var docClient = new AWS.DynamoDB.DocumentClient({apiVersion: '2012-08-10'});
var params = {
  ExpressionAttributeValues: {
    ':s': 2,
    ':e': 9,
    ':topic': 'PHRASE'
   },
 KeyConditionExpression: 'Season = :s and Episode > :e',
 FilterExpression: 'contains (Subtitle, :topic)',
 TableName: 'EPISODES_TABLE'
};

docClient.query(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.Items);
  }
});
```

To run the example, type the following at the command line.

```
node ddbdoc_query.js
```

This sample code can be found here on GitHub.

Deleting an Item from a Table

Create a Node.js module with the file name `ddbdoc_delete.js`. Be sure to configure the SDK as previously shown. To access DynamoDB, create an `AWS.DynamoDB.DocumentClient` object. Create a JSON object containing the parameters needed to delete an item in the table, which in this example includes the name of the table as well as a the name and value of the hashkey of the item you want to delete. Call the `delete` method of the DynamoDB document client.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create DynamoDB document client
var docClient = new AWS.DynamoDB.DocumentClient({apiVersion: '2012-08-10'});

var params = {
  Key: {
    'HASH_KEY': VALUE
  },
  TableName: 'TABLE'
};

docClient.delete(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node ddbdoc_delete.js
```

This sample code can be found here on GitHub.

Amazon EC2 Examples

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides virtual server hosting in the cloud. It is designed to make web-scale cloud computing easier for developers by providing resizeable compute capacity.

JavaScript Environments
AWS SDK for JavaScript
AWS.EC2
Elastic Compute Cloud (EC2)

The JavaScript API for Amazon EC2 is exposed through the `AWS.EC2` client class. For more information about using the Amazon EC2 client class, see Class: AWS.EC2 in the API reference.

Topics

Creating an Amazon EC2 Instance

	This Node.js example shows you how to: • Create an Amazon EC2 instance from a public Amazon Machine Image (AMI) • Create and assign tags to the new Amazon EC2 instance	

The Scenario

In this example, you use a Node.js module to create an Amazon EC2 instance and assign tags to it. The code uses the SDK for JavaScript to create and tag an instance by using these methods of the Amazon EC2 client class:

- `runInstances`
- `createTags`

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Creating and Tagging an Instance

Create a Node.js module with the file name `ec2_createinstances.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Call the `runInstances`, method, and then call the `createTags` method of the Amazon EC2 service object.

The code adds a `Name` tag to a new instance, which the Amazon EC2 console recognizes and displays in the **Name** field of the instance list. You can add up to 50 tags to an instance, all of which can be added in a single call to the `createTags` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
   ImageId: 'ami-10fd7020', // amzn-ami-2011.09.1.x86_64-ebs
   InstanceType: 't1.micro',
   MinCount: 1,
   MaxCount: 1
};

// Create the instance
ec2.runInstances(params, function(err, data) {
   if (err) {
      console.log("Could not create instance", err);
      return;
   }
   var instanceId = data.Instances[0].InstanceId;
   console.log("Created instance", instanceId);
   // Add tags to the instance
   params = {Resources: [instanceId], Tags: [
      {
         Key: 'Name',
         Value: 'SDK Sample'
      }
   ]};
   ec2.createTags(params, function(err) {
      console.log("Tagging instance", err ? "failure" : "success");
   });
});
```

To run the example, type the following at the command line.

```
node ec2_createinstances.js
```

This sample code can be found here on GitHub.

Managing Amazon EC2 Instances

	This Node.js example shows you how to: • Retrieve basic information about your Amazon EC2 instances • Start and stop detailed monitoring of an Amazon EC2 instance • Start and stop an Amazon EC2 instance • Reboot an Amazon EC2 instance	

The Scenario

In this example, you use a series of Node.js modules to perform several basic instance management operations. The Node.js modules use the SDK for JavaScript to manage instances by using these Amazon EC2 client class methods:

- `describeInstances`
- `monitorInstances`
- `unmonitorInstances`
- `startInstances`
- `stopInstances`
- `rebootInstances`

For more information about the lifecycle of Amazon EC2 instances, see Instance Lifecycle in the *Amazon EC2 User Guide for Linux Instances*.

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create an Amazon EC2 instance. For more information about creating Amazon EC2 instances, see Amazon EC2 Instances in the *Amazon EC2 User Guide for Linux Instances* or Amazon EC2 Instances in the *Amazon EC2 User Guide for Windows Instances*.

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Describing Your Instances

Create a Node.js module with the file name `ec2_describeinstances.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Call the `describeInstances` method of the Amazon EC2 service object to retrieve a detailed description of your instances.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

// Call EC2 to retrieve the policy for selected bucket
ec2.describeInstances(params, function(err, data) {
  if (err) {
    console.log("Error", err.stack);
  } else {
    console.log("Success", JSON.stringify(data));
  }
});
```

To run the example, type the following at the command line.

```
node ec2_describeinstances.js
```

This sample code can be found here on GitHub.

Managing Instance Monitoring

Create a Node.js module with the file name `ec2_monitorinstances.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Add the instance IDs of the instances for which you want to control monitoring.

Based on the value of a command-line argument (`ON` or `OFF`), call either the `monitorInstances` method of the Amazon EC2 service object to begin detailed monitoring of the specified instances or call the `unmonitorInstances` method. Use the `DryRun` parameter to test whether you have permission to change instance monitoring before you attempt to change the monitoring of these instances.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
```

```
ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
  InstanceIds: ['INSTANCE_ID'],
  DryRun: true
};

if (process.argv[2].toUpperCase() === "ON") {
  // call EC2 to start monitoring the selected instances
  ec2.monitorInstances(params, function(err, data) {
    if (err && err.code === 'DryRunOperation') {
      params.DryRun = false;
      ec2.monitorInstances(params, function(err, data) {
          if (err) {
            console.log("Error", err);
          } else if (data) {
            console.log("Success", data.InstanceMonitorings);
          }
      });
    } else {
      console.log("You don't have permission to change instance monitoring.");
    }
  });
} else if (process.argv[2].toUpperCase() === "OFF") {
  // call EC2 to stop monitoring the selected instances
  ec2.unmonitorInstances(params, function(err, data) {
    if (err && err.code === 'DryRunOperation') {
      params.DryRun = false;
      ec2.unmonitorInstances(params, function(err, data) {
          if (err) {
            console.log("Error", err);
          } else if (data) {
            console.log("Success", data.InstanceMonitorings);
          }
      });
    } else {
      console.log("You don't have permission to change instance monitoring.");
    }
  });
}
```

To run the example, type the following at the command line, specifying `ON` to begin detailed monitoring or `OFF` to discontinue monitoring.

```
node ec2_monitorinstances.js ON
```

This sample code can be found here on GitHub.

Starting and Stopping Instances

Create a Node.js module with the file name `ec2_startstopinstances.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Add the instance IDs of the instances you want to start or stop.

Based on the value of a command-line argument (`START` or `STOP`), call either the `startInstances` method of the Amazon EC2 service object to start the specified instances, or the `stopInstances` method to stop them. Use the `DryRun` parameter to test whether you have permission before actually attempting to start or stop the selected instances.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
```

```
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
  InstanceIds: [process.argv[3]],
  DryRun: true
};

if (process.argv[2].toUpperCase() === "START") {
  // call EC2 to start the selected instances
  ec2.startInstances(params, function(err, data) {
    if (err && err.code === 'DryRunOperation') {
      params.DryRun = false;
      ec2.startInstances(params, function(err, data) {
          if (err) {
            console.log("Error", err);
          } else if (data) {
            console.log("Success", data.StartingInstances);
          }
      });
    } else {
      console.log("You don't have permission to start instances.");
    }
  });
} else if (process.argv[2].toUpperCase() === "STOP") {
  // call EC2 to stop the selected instances
  ec2.stopInstances(params, function(err, data) {
    if (err && err.code === 'DryRunOperation') {
      params.DryRun = false;
      ec2.stopInstances(params, function(err, data) {
          if (err) {
            console.log("Error", err);
          } else if (data) {
            console.log("Success", data.StoppingInstances);
          }
      });
    } else {
      console.log("You don't have permission to stop instances");
    }
  });
}
```

To run the example, type the following at the command line specifying `START` to start the instances or `STOP` to stop them.

```
node ec2_startstopinstances.js START INSTANCE_ID
```

This sample code can be found here on GitHub.

Rebooting Instances

Create a Node.js module with the file name `ec2_rebootinstances.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an Amazon EC2 service object. Add the instance IDs of the instances you want to reboot. Call the `rebootInstances` method of the `AWS.EC2` service object to reboot the specified instances. Use the `DryRun` parameter to test whether you have permission to reboot these instances before actually attempting to reboot them.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
```

```
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
  InstanceIds: ['INSTANCE_ID'],
  DryRun: true
};

// call EC2 to reboot instances
ec2.rebootInstances(params, function(err, data) {
  if (err && err.code === 'DryRunOperation') {
    params.DryRun = false;
    ec2.rebootInstances(params, function(err, data) {
        if (err) {
          console.log("Error", err);
        } else if (data) {
          console.log("Success", data);
        }
    });
  } else {
    console.log("You don't have permission to reboot instances.");
  }
});
```

To run the example, type the following at the command line.

```
node ec2_rebootinstances.js
```

This sample code can be found here on GitHub.

Working with Amazon EC2 Key Pairs

	This Node.js example shows you how to: • Retrieve information about your key pairs • Create a key pair to access an Amazon EC2 instance • Delete an existing key pair	

The Scenario

Amazon EC2 uses public–key cryptography to encrypt and decrypt login information. Public–key cryptography uses a public key to encrypt data, then the recipient uses the private key to decrypt the data. The public and private keys are known as a *key pair*.

In this example, you use a series of Node.js modules to perform several Amazon EC2 key pair management operations. The Node.js modules use the SDK for JavaScript to manage instances by using these methods of the Amazon EC2 client class:

- `createKeyPair`
- `deleteKeyPair`

- `describeKeyPairs`

For more information about the Amazon EC2 key pairs, see Amazon EC2 Key Pairs in the *Amazon EC2 User Guide for Linux Instances* or Amazon EC2 Key Pairs and Windows Instances in the *Amazon EC2 User Guide for Windows Instances*.

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Describing Your Key Pairs

Create a Node.js module with the file name `ec2_describekeypairs.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create an empty JSON object to hold the parameters needed by the `describeKeyPairs` method to return descriptions for all your key pairs. You can also provide an array of names of key pairs in the `KeyName` portion of the parameters to the `describeKeyPairs` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

// Retrieve key pair descriptions; no params needed
ec2.describeKeyPairs(function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Success", JSON.stringify(data.KeyPairs);
   }
});
```

To run the example, type the following at the command line.

```
node ec2_describekeypairs.js
```

This sample code can be found here on GitHub.

Creating a Key Pair

Each key pair requires a name. Amazon EC2 associates the public key with the name that you specify as the key name. Create a Node.js module with the file name `ec2_createkeypair.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create the JSON parameters to specify the name of the key pair, then pass them to call the `createKeyPair` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
   KeyName: 'KEY_PAIR_NAME'
};

// Create the key pair
ec2.createKeyPair(params, function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log(JSON.stringify(data));
   }
});
```

To run the example, type the following at the command line.

```
node ec2_createkeypair.js
```

This sample code can be found here on GitHub.

Deleting a Key Pair

Create a Node.js module with the file name `ec2_deletekeypair.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create the JSON parameters to specify the name of the key pair you want to delete. Then call the `deleteKeyPair` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
   KeyName: 'KEY_PAIR_NAME'
};

// Delete the key pair
ec2.deleteKeyPair(params, function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Key Pair Deleted");
```

```
    }
});
```

To run the example, type the following at the command line.

```
node ec2_deletekeypair.js
```

This sample code can be found here on GitHub.

Using Regions and Availability Zones with Amazon EC2

	This Node.js example shows you how to retrieve descriptions for regions and Availability Zones.	

The Scenario

Amazon EC2 is hosted in multiple locations worldwide. These locations are composed of regions and Availability Zones. Each *region* is a separate geographic area. Each region has multiple, isolated locations known as *Availability Zones*. Amazon EC2 provides the ability to place instances and data in multiple locations.

In this example, you use a series of Node.js modules to retrieve details about regions and Availability Zones. The Node.js modules use the SDK for JavaScript to manage instances by using the following methods of the Amazon EC2 client class:

- `describeAvailabilityZones`
- `describeRegions`

For more information about regions and Availability Zones, see Regions and Availability Zones in the *Amazon EC2 User Guide for Linux Instances* or Regions and Availability Zones in the *Amazon EC2 User Guide for Windows Instances*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about using a JSON file to provide your credentials, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');
```

```
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Describing Regions and Availability Zones

Create a Node.js module with the file name `ec2_describeregionsandzones.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create an empty JSON object to pass as parameters, which returns all available descriptions. Then call the `describeRegions` and `describeAvailabilityZones` methods.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {};

// Retrieves all regions/endpoints that work with EC2
ec2.describeRegions(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Regions: ", data.Regions);
  }
});

// Retrieves availability zones only for region of the ec2 service object
ec2.describeAvailabilityZones(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Availability Zones: ", data.AvailabilityZones);
  }
});
```

To run the example, type the following at the command line.

```
node ec2_describeregionsandzones.js
```

This sample code can be found here on GitHub.

Working with Security Groups in Amazon EC2

	This Node.js example shows you how to: • Retrieve information about your security groups • Create a security group to access an Amazon EC2 instance • Delete an existing security group	

The Scenario

An Amazon EC2 security group acts as a virtual firewall that controls the traffic for one or more instances. You add rules to each security group to allow traffic to or from its associated instances. You can modify the rules for a security group at any time; the new rules are automatically applied to all instances that are associated with the security group.

In this example, you use a series of Node.js modules to perform several Amazon EC2 operations involving security groups. The Node.js modules use the SDK for JavaScript to manage instances by using the following methods of the Amazon EC2 client class:

- `describeSecurityGroups`
- `authorizeSecurityGroupIngress`
- `createSecurityGroup`
- `describeVpcs`
- `deleteSecurityGroup`

For more information about the Amazon EC2 security groups, see Amazon EC2 Amazon Security Groups for Linux Instances in the *Amazon EC2 User Guide for Linux Instances* or Amazon EC2 Security Groups for Windows Instances in the *Amazon EC2 User Guide for Windows Instances*.

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials by using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for the webpage. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Describing Your Security Groups

Create a Node.js module with the file name `ec2_describesecuritygroups.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create a JSON object to pass as parameters, including the group IDs for the security groups you want to describe. Then call the `describeSecurityGroups` method of the Amazon EC2 service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

```
// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
  GroupIds: ['SECURITY_GROUP_ID']
};

// Retrieve security group descriptions
ec2.describeSecurityGroups(params, function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Success", JSON.stringify(data.SecurityGroups));
   }
});
```

To run the example, type the following at the command line.

```
node ec2_describesecuritygroups.js
```

This sample code can be found here on GitHub.

Creating a Security Group and Rules

Create a Node.js module with the file name `ec2_createsecuritygroup.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create a JSON object for the parameters that specify the name of the security group, a description, and the ID for the VPC. Pass the parameters to the `createSecurityGroup` method.

After you successfully create the security group, you can define rules for allowing inbound traffic. Create a JSON object for parameters that specify the IP protocol and inbound ports on which the Amazon EC2 instance will receive traffic. Pass the parameters to the `authorizeSecurityGroupIngress` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

// Variable to hold the ID of a VPC
var vpc = null;

// Retrieve the ID of a VPC
ec2.describeVpcs(function(err, data) {
   if (err) {
      console.log("Cannot retrieve a VPC", err);
   } else {
      vpc = data.Vpcs[0].VpcId;
   }
});

// Create JSON object parameters for creating the security group
var paramsSecurityGroup = {
   Description: 'DESCRIPTION',
   GroupName: 'SECURITY_GROUP_NAME',
   VpcId: vpc
};
```

```
// Create the security group
ec2.createSecurityGroup(paramsSecurityGroup, function(err, data) {
   if (err) {
      console.log("Error Creating Security Group", err);
   } else {
      var SecurityGroupId = data.GroupId;
      console.log("Security Group Created", SecurityGroupId);
      var paramsIngress = {
        GroupName: 'SECURITY_GROUP_NAME',
        IpPermissions:[
           { IpProtocol: "tcp",
             FromPort: 80,
             ToPort: 80,
             IpRanges: [{"CidrIp":"0.0.0.0/0"}]},
          { IpProtocol: "tcp",
             FromPort: 22,
             ToPort: 22,
             IpRanges: [{"CidrIp":"0.0.0.0/0"}]}
        ]
      };
      ec2.authorizeSecurityGroupIngress(paramsIngress, function(err, data) {
        if (err) {
          console.log("Error", err);
        } else {
          console.log("Ingress Successfully Set", data);
        }
     });
   }
});
```

To run the example, type the following at the command line.

```
node ec2_createsecuritygroup.js
```

This sample code can be found here on GitHub.

Deleting a Security Group

Create a Node.js module with the file name `ec2_deletesecuritygroup.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create the JSON parameters to specify the name of the security group to delete. Then call the `deleteSecurityGroup` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
   GroupId: 'SECURITY_GROUP_ID'
};

// Delete the security group
ec2.deleteSecurityGroup(params, function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Security Group Deleted");
   }
});
```

To run the example, type the following at the command line.

```
node ec2_deletesecuritygroup.js
```

This sample code can be found here on GitHub.

Using Elastic IP Addresses in Amazon EC2

node JS	This Node.js example shows you how to: • Retrieve descriptions of your Elastic IP addresses • Allocate and release an Elastic IP address • Associate an Elastic IP address with an Amazon EC2 instance	

The Scenario

An *Elastic IP address* is a static IP address designed for dynamic cloud computing. An Elastic IP address is associated with your AWS account. It is a public IP address, which is reachable from the Internet. If your instance does not have a public IP address, you can associate an Elastic IP address with your instance to enable communication with the Internet.

In this example, you use a series of Node.js modules to perform several Amazon EC2 operations involving Elastic IP addresses. The Node.js modules use the SDK for JavaScript to manage Elastic IP addresses by using these methods of the Amazon EC2 client class:

- `describeAddresses`
- `allocateAddress`
- `associateAddress`
- `releaseAddress`

For more information about Elastic IP addresses in Amazon EC2, see Elastic IP Addresses in the *Amazon EC2 User Guide for Linux Instances* or Elastic IP Addresses in the *Amazon EC2 User Guide for Windows Instances*.

Prerequisite Tasks

To set up and run this example, first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials by using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create an Amazon EC2 instance. For more information about creating Amazon EC2 instances, see Amazon EC2 Instances in the *Amazon EC2 User Guide for Linux Instances* or Amazon EC2 Instances in the *Amazon EC2 User Guide for Windows Instances*.

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, you use the JSON file you created to provide the credentials.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Describing Elastic IP Addresses

Create a Node.js module with the file name `ec2_describeaddresses.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create a JSON object to pass as parameters, filtering the addresses returned by those in your VPC. To retrieve descriptions of all your Elastic IP addresses, omit a filter from the parameters JSON. Then call the `describeAddresses` method of the Amazon EC2 service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var params = {
  Filters: [
     {Name: 'domain', Values: ['vpc']}
  ]
};

// Retrieve Elastic IP address descriptions
ec2.describeAddresses(params, function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Success", JSON.stringify(data.Addresses));
   }
});
```

To run the example, type the following at the command line.

```
node ec2_describeaddresses.js
```

This sample code can be found here on GitHub.

Allocating and Associating an Elastic IP Address with an Amazon EC2 Instance

Create a Node.js module with the file name `ec2_allocateaddress.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create a JSON object for the parameters used to allocate an Elastic IP address, which in this case specifies the `Domain` is a VPC. Call the `allocateAddress` method of the Amazon EC2 service object.

Upon success, the `data` parameter to the callback function has an `AllocationId` property that identifies the allocated Elastic IP address.

Create a JSON object for the parameters used to associate an Elastic IP address to an Amazon EC2 instance, including the `AllocationId` from the newly allocated address and the `InstanceId` of the Amazon EC2 instance. Then call the `associateAddresses` method of the Amazon EC2 service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var paramsAllocateAddress = {
   Domain: 'vpc'
};

// Allocate the Elastic IP address
ec2.allocateAddress(paramsAllocateAddress, function(err, data) {
   if (err) {
      console.log("Address Not Allocated", err);
   } else {
      console.log("Address allocated:", data.AllocationId);
      var paramsAssociateAddress = {
        AllocationId: data.AllocationId,
        InstanceId: 'INSTANCE_ID'
      };
      // Associate the new Elastic IP address with an EC2 instance
      ec2.associateAddress(paramsAssociateAddress, function(err, data) {
        if (err) {
          console.log("Address Not Associated", err);
        } else {
          console.log("Address associated:", data.AssociationId);
        }
      });
   }
});
```

To run the example, type the following at the command line.

```
node ec2_allocateaddress.js
```

This sample code can be found here on GitHub.

Releasing an Elastic IP Address

Create a Node.js module with the file name `ec2_releaseaddress.js`. Be sure to configure the SDK as previously shown. To access Amazon EC2, create an `AWS.EC2` service object. Create a JSON object for the parameters used to release an Elastic IP address, which in this case specifies the `AllocationId` for the Elastic IP address. Releasing an Elastic IP address also disassociates it from any Amazon EC2 instance. Call the `releaseAddress` method of the Amazon EC2 service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create EC2 service object
```

```
var ec2 = new AWS.EC2({apiVersion: '2016-11-15'});

var paramsReleaseAddress = {
   AllocationId: 'ALLOCATION_ID'
};

// Disassociate the Elastic IP address from EC2 instance
ec2.releaseAddress(paramsReleaseAddress, function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Address released");
   }
});
```

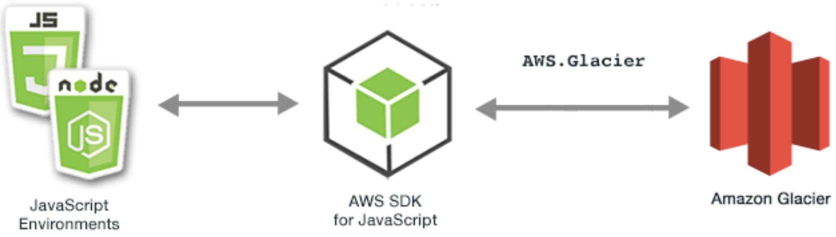
To run the example, type the following at the command line.

```
node ec2_releaseaddress.js
```

This sample code can be found here on GitHub.

Amazon Glacier Examples

Amazon Glacier is a secure cloud storage service for data archiving and long-term backup. The service is optimized for infrequently accessed data where a retrieval time of several hours is suitable.



The JavaScript API for Amazon Glacier is exposed through the `AWS.Glacier` client class. For more information about using the Amazon Glacier client class, see Class: AWS.Glacier in the API reference.

Topics

Creating an Amazon Glacier Vault

The following example creates a vault named `YOUR_VAULT_NAME` using the `createValue` method of the Amazon Glacier service object.

```
var glacier = new AWS.Glacier({apiVersion: '2012-06-01'});
glacier.createVault({vaultName: 'YOUR_VAULT_NAME'}, function(err) {
if (!err) console.log("Created vault!")
});
```

Uploading an Archive to Amazon Glacier

The following example uploads a single `Buffer` object as an entire archive using the `uploadArchive` method of the Amazon Glacier service object.

The example assumes you've already created a vault named `YOUR_VAULT_NAME`. The SDK automatically computes the tree hash checksum for the data uploaded, though you can override it by passing your own checksum parameter:

```
var glacier = new AWS.Glacier({apiVersion: '2012-06-01'}),
vaultName = 'YOUR_VAULT_NAME',
buffer = new Buffer(2.5 * 1024 * 1024); // 2.5MB buffer

var params = {vaultName: vaultName, body: buffer};
glacier.uploadArchive(params, function(err, data) {
if (err) console.log("Error uploading archive!", err);
else console.log("Archive ID", data.archiveId);
});
```

Doing a Multipart Upload to Amazon Glacier

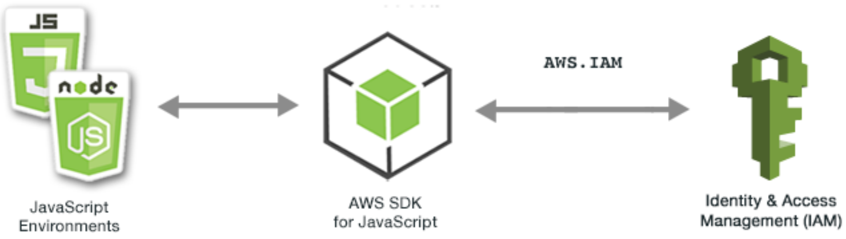
The following example creates a multipart upload out of 1 megabyte chunks of a `Buffer` object using the `initiateMultipartUpload` method of the Amazon Glacier service object.

The example assumes you have already created a vault named `YOUR_VAULT_NAME`. A complete SHA-256 tree hash is manually computed using the `computeChecksums` method.

```
var glacier = new AWS.Glacier({apiVersion: '2012-06-01'}),
    vaultName = 'YOUR_VAULT_NAME',
    buffer = new Buffer(2.5 * 1024 * 1024), // 2.5MB buffer
    partSize = 1024 * 1024, // 1MB chunks,
    numPartsLeft = Math.ceil(buffer.length / partSize),
    startTime = new Date(),
    params = {vaultName: vaultName, partSize: partSize.toString()};

// Compute the complete SHA-256 tree hash so we can pass it
// to completeMultipartUpload request at the end
var treeHash = glacier.computeChecksums(buffer).treeHash;

// Initiate the multipart upload
console.log('Initiating upload to', vaultName);
glacier.initiateMultipartUpload(params, function (mpErr, multipart) {
    if (mpErr) { console.log('Error!', mpErr.stack); return; }
    console.log("Got upload ID", multipart.uploadId);

    // Grab each partSize chunk and upload it as a part
    for (var i = 0; i < buffer.length; i += partSize) {
        var end = Math.min(i + partSize, buffer.length),
            partParams = {
                vaultName: vaultName,
                uploadId: multipart.uploadId,
                range: 'bytes ' + i + '-' + (end-1) + '/*',
                body: buffer.slice(i, end)
            };

        // Send a single part
        console.log('Uploading part', i, '=', partParams.range);
        glacier.uploadMultipartPart(partParams, function(multiErr, mData) {
            if (multiErr) return;
            console.log("Completed part", this.request.params.range);
            if (--numPartsLeft > 0) return; // complete only when all parts uploaded

            var doneParams = {
                vaultName: vaultName,
                uploadId: multipart.uploadId,
                archiveSize: buffer.length.toString(),
                checksum: treeHash // the computed tree hash
            };

            console.log("Completing upload...");
            glacier.completeMultipartUpload(doneParams, function(err, data) {
                if (err) {
                    console.log("An error occurred while uploading the archive");
                    console.log(err);
                } else {
                    var delta = (new Date() - startTime) / 1000;
                    console.log('Completed upload in', delta, 'seconds');
                    console.log('Archive ID:', data.archiveId);
                    console.log('Checksum:  ', data.checksum);
                }
            });
        });
    }
});
```

AWS IAM Examples

AWS Identity and Access Management (IAM) is a web service that enables Amazon Web Services (AWS) customers to manage users and user permissions in AWS. The service is targeted at organizations with multiple users or systems in the cloud that use AWS products. With IAM, you can centrally manage users, security credentials such as access keys, and permissions that control which AWS resources users can access.



The JavaScript API for IAM is exposed through the `AWS.IAM` client class. For more information about using the IAM client class, see Class: AWS.IAM in the API reference.

Topics

Managing IAM Users

	This Node.js example shows you how to retrieve a list of IAM users, create and delete users, and update a user name.	

The Scenario

In this example, a series of Node.js modules are used to create and manage users in IAM. The Node.js modules use the SDK for JavaScript to create, delete, and update users using these methods of the `AWS.IAM` client class:

- `createUser`
- `listUsers`
- `updateUser`
- `getUser`
- `deleteUser`

For more information about IAM users, see IAM Users in the *IAM User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Creating a User

Create a Node.js module with the file name `iam_createuser.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed, which consists of the user name you want to use for the new user as a command-line parameter.

Call the `getUser` method of the `AWS.IAM` service object to see if the user name already exists. If the user name does not currently exist, call the `createUser` method to create it. If the name already exists, write a message to that effect to the console.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  UserName: process.argv[2]
};

iam.getUser(params, function(err, data) {
  if (err && err.code === 'NoSuchEntity') {
    iam.createUser(params, function(err, data) {
      if (err) {
        throw err;
      } else {
        console.log("Success", data);
      }
    });
  } else {
    console.log("User " + process.argv[2] + " already exists", data.User.UserId);
  }
});
```

To run the example, type the following at the command line.

```
node iam_createuser.js USER_NAME
```

This sample code can be found here on GitHub.

Listing Users in Your Account

Create a Node.js module with the file name `iam_listusers.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to list your users, limiting the number returned by setting the `MaxItems` parameter to 10. Call the `listUsers` method of the `AWS.IAM` service object. Write the first user's name and creation date to the console.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  MaxItems: 10
};

iam.listUsers(params, function(err, data) {
  if (err) {
    throw err;
  } else {
    var users = data.Users || [];
    users.forEach(function(user) {
      console.log("User " + user.UserName + " created", user.CreateDate);
    });
  }
});
```

To run the example, type the following at the command line.

```
node iam_listusers.js
```

This sample code can be found here on GitHub.

Updating a User's Name

Create a Node.js module with the file name `iam_updateuser.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to list your users, specifying both the current and new user names as command-line parameters. Call the `updateUser` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  UserName: process.argv[2],
  NewUserName: process.argv[3]
};

iam.updateUser(params, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line, specifying the user's current name followed by the new user name.

```
node iam_updateuser.js ORIGINAL_USERNAME NEW_USERNAME
```

This sample code can be found here on GitHub.

Deleting a User

Create a Node.js module with the file name `iam_deleteuser.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed, which consists of the user name you want to delete as a command-line parameter.

Call the `getUser` method of the `AWS.IAM` service object to see if the user name already exists. If the user name does not currently exist, write a message to that effect to the console. If the user exists, call the `deleteUser` method to delete it.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
```

```
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  UserName: process.argv[2]
};

iam.getUser(params, function(err, data) {
  if (err && err.code === 'NoSuchEntity') {
    console.error("User " + process.argv[2] + " does not exist.");
    throw err;
  } else {
    iam.deleteUser(params, function(err, data) {
      if (err) {
        throw err;
      } else {
        console.log("User " + process.argv[2] + " deleted.");
      }
    });
  }
});
```

To run the example, type the following at the command line.

```
node iam_deleteuser.js USER_NAME
```

This sample code can be found here on GitHub.

Working with IAM Policies

	This Node.js example shows you how to: • Create and delete IAM policies • Attach and detach IAM policies from roles	

The Scenario

You grant permissions to a user by creating a *policy*, which is a document that lists the actions that a user can perform and the resources those actions can affect. Any actions or resources that are not explicitly allowed are denied by default. Policies can be created and attached to users, groups of users, roles assumed by users, and resources.

In this example, a series of Node.js modules are used to manage policies in IAM. The Node.js modules use the SDK for JavaScript to create and delete policies as well as attaching and detaching role policies using these methods of the `AWS.IAM` client class:

- `createPolicy`
- `getPolicy`
- `listAttachedRolePolicies`
- `attachRolePolicy`
- `detachRolePolicy`

For more information about IAM users, see Overview of Access Management: Permissions and Policies in the *IAM User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create an IAM role to which you can attach policies. For more information about creating roles, see Creating IAM Roles in the *IAM User Guide*.

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Creating an IAM Policy

Create a Node.js module with the file name `iam_createpolicy.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create two JSON objects, one containing the policy document you want to create and the other containing the parameters needed to create the policy, which includes the policy JSON and the name you want to give the policy. Be sure to stringify the policy JSON object in the parameters. Call the `createPolicy` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var myManagedPolicy = {
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": "logs:CreateLogGroup",
            "Resource": "RESOURCE_ARN"
        },
        {
            "Effect": "Allow",
            "Action": [
                "dynamodb:DeleteItem",
                "dynamodb:GetItem",
                "dynamodb:PutItem",
                "dynamodb:Scan",
                "dynamodb:UpdateItem"
            ],
            "Resource": "RESOURCE_ARN"
        }
    ]
};

var params = {
  PolicyDocument: JSON.stringify(myManagedPolicy),
  PolicyName: 'myDynamoDBPolicy',
};

iam.createPolicy(params, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log("New Policy: ", data);
  }
});
```

To run the example, type the following at the command line.

```
node iam_createpolicy.js
```

This sample code can be found here on GitHub.

Getting an IAM Policy

Create a Node.js module with the file name `iam_getpolicy.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed retrieve a policy, which is the ARN of the policy you want to get. Call the `getPolicy` method of the `AWS.IAM` service object. Write the policy description to the console.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  PolicyArn: 'arn:aws:iam::aws:policy/AWSLambdaExecute'
};

iam.getPolicy(params, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log(params.PolicyArn + ' - ' + data.Policy.Description);
  }
});
```

To run the example, type the following at the command line.

```
node iam_getpolicy.js
```

This sample code can be found here on GitHub.

Attaching a Managed Role Policy

Create a Node.js module with the file name `iam_attachrolepolicy.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to get a list of managed IAM policies attached to a role, which consists of the name of the role. Provide the role name as a command-line parameter. Call the `listAttachedRolePolicies` method of the `AWS.IAM` service object, which returns an array of managed policies to the callback function.

Check the array members to see if the policy you want to attach to the role is already attached. If the policy is not attached, call the `attachRolePolicy` method to attach it.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var paramsRoleList = {
  RoleName: process.argv[2]
};

var policyName = 'AmazonDynamoDBFullAccess';
var policyArn = 'arn:aws:iam::aws:policy/AmazonDynamoDBFullAccess';

iam.listAttachedRolePolicies(paramsRoleList).eachPage(function(err, data) {
  if (err) {
    throw err;
  }
  if (data && data.AttachedPolicies) {
    data.AttachedPolicies.forEach(function(rolePolicy) {
      if (rolePolicy.PolicyName === policyName) {
        console.log(policyName + ' is already attached to this role.');
        process.exit();
      }
    });
  } else {
    // there are no more results when data is null
    var params = {
      PolicyArn: policyArn,
      RoleName: process.argv[2]
    };
    iam.attachRolePolicy(params, function(err, data) {
      if (err) {
        console.error('Unable to attach policy to role.');
        throw err;
      } else {
        console.log('Role attached successfully.');
      }
    });
  }
});
```

To run the example, type the following at the command line.

```
node iam_attachrolepolicy.js IAM_ROLE_NAME
```

Detaching a Managed Role Policy

Create a Node.js module with the file name `iam_detachrolepolicy.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to get a list of managed IAM policies attached to a role, which consists of the name of the role. Provide the role name as a command-line parameter. Call the `listAttachedRolePolicies` method of the `AWS.IAM` service object, which returns an array of managed policies in the callback function.

Check the array members to see if the policy you want to detach from the role is attached. If the policy is attached, call the `detachRolePolicy` method to detach it.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var paramsRoleList = {
  RoleName: process.argv[2]
};

var policyName = 'AmazonDynamoDBFullAccess';
var policyArn = 'arn:aws:iam::aws:policy/AmazonDynamoDBFullAccess';

iam.listAttachedRolePolicies(paramsRoleList).eachPage(function(err, data, done) {
  if (err) {
    throw err;
  }
  var foundPolicy = false;
  if (data && data.AttachedPolicies) {
    data.AttachedPolicies.forEach(function(rolePolicy) {
      if (rolePolicy.PolicyName !== policyName) {
        return;
      }
      foundPolicy = true;
      var params = {
        PolicyArn: policyArn,
        RoleName: process.argv[2]
      };
      iam.detachRolePolicy(params, function(err, data) {
        if (err) {
          console.error('Unable to detach policy from role.');
          throw err;
        } else {
          console.log('Policy detached from role successfully.');
          process.exit();
        }
      });
    });
    if (!foundPolicy) {
      done();
    }
  } else {
    console.log('Policy was not attached to the role.');
  }
});
```

To run the example, type the following at the command line.

```
node iam_detachrolepolicy.js IAM_ROLE_NAME
```

Managing IAM Access Keys

	This Node.js example shows you how to manage the access keys of your users.	

The Scenario

Users need their own access keys to make programmatic calls to AWS from the SDK for JavaScript. To fill this need, you can create, modify, view, or rotate access keys (access key IDs and secret access keys) for IAM users. By default, when you create an access key, its status is `Active`, which means the user can use the access key for API calls.

In this example, a series of Node.js modules are used manage access keys in IAM. The Node.js modules use the SDK for JavaScript to manage IAM access keys using these methods of the `AWS.IAM` client class:

- `createAccessKey`
- `listAccessKeys`
- `getAccessKeyLastUsed`
- `updateAccessKey`
- `deleteAccessKey`

For more information about IAM access keys, see Access Keys in the *IAM User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Creating Access Keys for a User

Create a Node.js module with the file name `iam_createaccesskeys.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to create new access keys, which includes IAM user's name. Call the `createAccessKey` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.createAccessKey({UserName: 'IAM_USER_NAME'}, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log("Success", data.AccessKey);
  }
});
```

To run the example, type the following at the command line. Be sure to pipe the returned data to a text file in order not to lose the secret key, which can only be provided once.

```
node iam_createaccesskeys.js > newuserkeys.txt
```

This sample code can be found here on GitHub.

Listing a User's Access Keys

Create a Node.js module with the file name `iam_listaccesskeys.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to retrieve the user's access keys, which includes IAM user's name and optionally the maximum number of access key pairs you want listed. Call the `listAccessKeys` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  MaxItems: 5,
  UserName: 'IAM_USER_NAME'
};

iam.listAccessKeys(params, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node iam_listaccesskeys.js
```

This sample code can be found here on GitHub.

Getting the Last Use for Access Keys

Create a Node.js module with the file name `iam_accesskeylastused.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to create new access keys, which is the access key ID for which you want the last use information. Call the `getAccessKeyLastUsed` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
```

```
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.getAccessKeyLastUsed({AccessKeyId: 'ACCESS_KEY_ID'}, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log("Last Access Key used: " + data.AccessKeyLastUsed);
  }
});
```

To run the example, type the following at the command line.

```
node iam_accesskeylastused.js
```

This sample code can be found here on GitHub.

Updating Access Key Status

Create a Node.js module with the file name `iam_updateaccesskey.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to update the status of an access keys, which includes the access key ID and the updated status. The status can be `Active` or `Inactive`. Call the `updateAccessKey` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  AccessKeyId: 'ACCESS_KEY_ID',
  Status: 'Active',
  UserName: 'USER_NAME'
};

iam.updateAccessKey(params, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log('Access Key updated.');
  }
});
```

To run the example, type the following at the command line.

```
node iam_updateaccesskey.js
```

This sample code can be found here on GitHub.

Deleting Access Keys

Create a Node.js module with the file name `iam_deleteaccesskey.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to delete access keys, which includes the access key ID and the name of the user. Call the `deleteAccessKey` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  AccessKeyId: 'ACCESS_KEY_ID',
  UserName: 'USER_NAME'
};

iam.deleteAccessKey(params, function(err, data) {
  if (err) {
    throw err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node iam_deleteaccesskey.js
```

This sample code can be found here on GitHub.

Working with IAM Server Certificates

node JS	This Node.js example shows you how to carry out basic tasks in managing server certificates for HTTPS connections.	

The Scenario

To enable HTTPS connections to your website or application on AWS, you need an SSL/TLS *server certificate*. To use a certificate that you obtained from an external provider with your website or application on AWS, you must upload the certificate to IAM or import it into AWS Certificate Manager.

In this example, a series of Node.js modules are used to handle server certificates in IAM. The Node.js modules use the SDK for JavaScript to manage server certificates using these methods of the `AWS.IAM` client class:

- `listServerCertificates`
- `getServerCertificate`
- `updateServerCertificate`
- `deleteServerCertificate`

For more information about server certificates, see Working with Server Certificates in the *IAM User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Listing Your Server Certificates

Create a Node.js module with the file name `iam_listservercerts.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Call the `listServerCertificates` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.listServerCertificates().eachPage(function(err, data) {
  if (err) {
    throw err;
  }
  if (data && data.ServerCertificateMetadataList) {
    data.ServerCertificateMetadataList.forEach(function(metadata) {
      console.log(metadata);
    });
  }
});
```

To run the example, type the following at the command line.

```
node iam_listservercerts.js
```

This sample code can be found here on GitHub.

Getting a Server Certificate

Create a Node.js module with the file name `iam_getservercert.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed get a certificate, which consists of the name of the server certificate you want. Call the `getServerCertificates` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.getServerCertificate({ServerCertificateName: 'CERTIFICATE_NAME'}, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log('Server Certificate:');
    console.log(data);
  }
});
```

To run the example, type the following at the command line.

```
node iam_getservercert.js
```

This sample code can be found here on GitHub.

Updating a Server Certificate

Create a Node.js module with the file name `iam_updateservercert.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to update a certificate, which consists of the name of the existing server certificate as well as the name of the new certificate. Call the `updateServerCertificate` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

var params = {
  ServerCertificateName: 'CERTIFICATE_NAME',
  NewServerCertificateName: 'NEW_CERTIFICATE_NAME'
};

iam.updateServerCertificate(params, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log('Server Certificate updated.');
  }
});
```

To run the example, type the following at the command line.

```
node iam_updateservercert.js
```

This sample code can be found here on GitHub.

Deleting a Server Certificate

Create a Node.js module with the file name `iam_deleteservercert.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to delete a server certificate, which consists of the name of the certificate you want to delete. Call the `deleteServerCertificates` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.deleteServerCertificate({ServerCertificateName: 'CERTIFICATE_NAME'}, function(err,
 data) {
  if (err) {
    throw err;
  } else {
    console.log('Server Certificate deleted.');
  }
});
```

To run the example, type the following at the command line.

```
node iam_deleteservercert.js
```

This sample code can be found here on GitHub.

Managing IAM Account Aliases

node JS	This Node.js example shows you how to manage alises for your AWS account ID.	

The Scenario

If you want the URL for your sign-in page to contain your company name or other friendly identifier instead of your AWS account ID, you can create an alias for your AWS account ID. If you create an AWS account alias, your sign-in page URL changes to incorporate the alias.

In this example, a series of Node.js modules are used to create and manage IAM account aliases. The Node.js modules use the SDK for JavaScript to manage alises using these methods of the `AWS.IAM` client class:

- `createAccountAlias`
- `listAccountAliases`
- `deleteAccountAlias`

For more information about IAM account aliases, see Your AWS Account ID and Its Alias in the *IAM User Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Creating an Account Alias

Create a Node.js module with the file name `iam_createaccountalias.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to create an account alias, which includes the alias you want to create. Call the `createAccountAlias` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.createAccountAlias({AccountAlias: process.argv[2]}, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log('Account alias ' + process.argv[2] + ' created.');
  }
});
```

To run the example, type the following at the command line.

```
node iam_createaccountalias.js ALIAS
```

This sample code can be found here on GitHub.

Listing Account Alises

Create a Node.js module with the file name `iam_listaccountalises.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to list account alises, which includes the maximum number of items to return. Call the `listAccountAlises` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.listAccountAliases({MaxItems: 10}, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log('Aliases: ' + data.AccountAliases.join(', '));
  }
});
```

To run the example, type the following at the command line.

```
node iam_listaccountalises.js
```

This sample code can be found here on GitHub.

Deleting an Account Alias

Create a Node.js module with the file name `iam_deleteaccountalias.js`. Be sure to configure the SDK as previously shown. To access IAM, create an `AWS.IAM` service object. Create a JSON object containing the parameters needed to delete an account alias, which includes the alias you want deleted. Call the `deleteAccountAlias` method of the `AWS.IAM` service object.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load the credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the IAM service object
var iam = new AWS.IAM({apiVersion: '2010-05-08'});

iam.deleteAccountAlias({AccountAlias: process.argv[2]}, function(err, data) {
  if (err) {
    throw err;
  } else {
    console.log('Account alias ' + process.argv[2] + ' deleted.');
  }
});
```

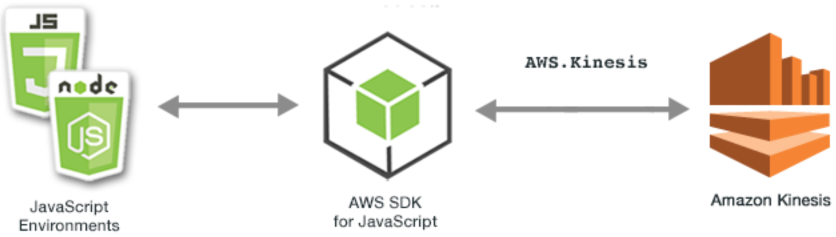
To run the example, type the following at the command line.

```
node iam_deleteaccountalias.js ALIAS
```

This sample code can be found here on GitHub.

Amazon Kinesis Example

Amazon Kinesis is a platform for streaming data on AWS, offering powerful services to load and analyze streaming data, and also providing the ability for you to build custom streaming data applications for specialized needs.



The JavaScript API for Kinesis is exposed through the `AWS.Kinesis` client class. For more information about using the Kinesis client class, see Class: AWS.Kinesis in the API reference.

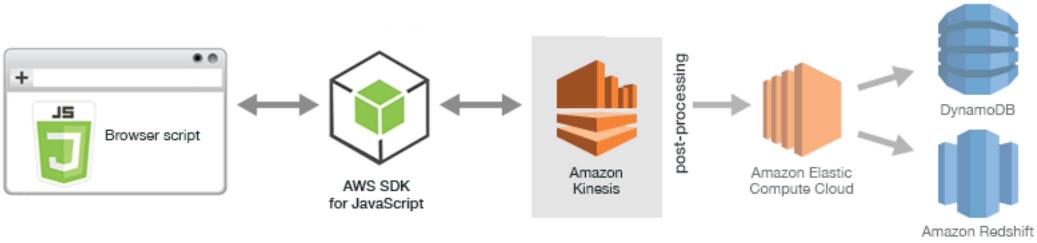
Topics

Capturing Web Page Scroll Progress with Amazon Kinesis

	This browser script example shows you how to capture scroll progress in a web page with Amazon Kinesis as an example of streaming page usage metrics for later analysis.	

The Scenario

In this example, a simple HTML page simulates the content of a blog page. As the reader scrolls the simulated blog post, the browser script uses the SDK for JavaScript to record the scroll distance down the page and send that data to Kinesis using the `putRecords` method of the Kinesis client class. The streaming data captured by Amazon Kinesis Streams can then be processed by Amazon EC2 instances and stored in any of several data stores including Amazon DynamoDB and Amazon Redshift.



Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Create an Kinesis stream. You need to include the stream's resource ARN in the browser script. For more information about creating Amazon Kinesis Streams, see Managing Kinesis Streams in the *Amazon Kinesis Streams Developer Guide*.
- Create an Amazon Cognito identity pool with access enabled for unauthenticated identities. You need to include the identity pool ID in the code to obtain credentials for the browser script. For more

information about Amazon Cognito identity pools, see Identity Pools in the *Amazon Cognito Developer Guide*.

- Create an IAM role whose policy grants permission to submit data to an Kinesis stream. For more information about creating an IAM role, see Creating a Role to Delegate Permissions to an AWS Service in the *IAM User Guide*.

Use the following role policy when creating the IAM role.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "mobileanalytics:PutEvents",
            "cognito-sync:*"
         ],
         "Resource": [
            "*"
         ]
      },
      {
         "Effect": "Allow",
         "Action": [
            "kinesis:Put*"
         ],
         "Resource": [
            "STREAM_RESOURCE_ARN"
         ]
      }
   ]
}
```

The Blog Page

The HTML for the blog page consists mainly of a series of paragraphs contained within a `<div>` element. The scrollable height of this `<div>` is used to help calculate how far a reader has scrolled through the content as they read. The HTML also contains a pair of `<script>` elements. One of these elements adds the SDK for JavaScript to the page and the other adds the browser script that captures scroll progress on the page and reports it to Kinesis.

```
<!DOCTYPE html>
<html>
    <head>
        <title>AWS SDK for JavaScript - Amazon Kinesis Application</title>
    </head>
    <body>
        <div id="BlogContent" style="width: 60%; height: 800px; overflow: auto;margin:
 auto; text-align: center;">
            <div>
                <p>
                Lorem ipsum dolor sit amet, consectetur adipiscing elit. Vestibulum
 vitae nulla eget nisl bibendum feugiat. Fusce rhoncus felis at ultricies luctus. Vivamus
 fermentum cursus sem at interdum. Proin vel lobortis nulla. Aenean rutrum odio in tellus
 semper rhoncus. Nam eu felis ac augue dapibus laoreet vel in erat. Vivamus vitae mollis
 turpis. Integer sagittis dictum odio. Duis nec sapien diam. In imperdiet sem nec ante
 laoreet, vehicula facilisis sem placerat. Duis ut metus egestas, ullamcorper neque et,
 accumsan quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per
 inceptos himenaeos.
                </p>
                <!-- Additional paragraphs in the blog page appear here -->
            </div>
        </div>
        <script src="https://sdk.amazonaws.com/js/aws-sdk-2.119.0.min.js"></script>
        <script src="kinesis-example.js"></script>
    </body>
</html>
```

Configuring the SDK

Obtain the credentials needed to configure the SDK by calling the `CognitoIdentityCredentials` method, providing the Amazon Cognito identity pool ID. Upon success, create the Kinesis service object in the callback function.

```
// Configure Credentials to use Cognito
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
    IdentityPoolId: 'IDENTITY_POOL_ID'
});

AWS.config.region = 'us-west-2';

// We're going to partition Amazon Kinesis records based on an identity.
// We need to get credentials first, then attach our event listeners.
AWS.config.credentials.get(function(err) {
    // attach event listener
    if (err) {
        alert('Error retrieving credentials.');
        console.error(err);
        return;
    }
    // create kinesis service object
    var kinesis = new AWS.Kinesis({
        apiVersion: '2013-12-02'
    });
```

Creating Scroll Records

Scroll progress is calculated using the `scrollHeight` and `scrollTop` properties of the `<div>` containing the content of the blog post. Each scroll record is created in an event listener function for the `scroll` event and then added to an array of records for periodic submission to Kinesis.

```
   var blogContent = document.getElementById('BlogContent');

   // Get Scrollable height
   var scrollableHeight = blogContent.clientHeight;

   var recordData = [];
   var TID = null;
   blogContent.addEventListener('scroll', function(event) {
        clearTimeout(TID);
        // Prevent creating a record while a user is actively scrolling
        TID = setTimeout(function() {
            // calculate percentage
            var scrollableElement = event.target;
            var scrollHeight = scrollableElement.scrollHeight;
            var scrollTop = scrollableElement.scrollTop;

            var scrollTopPercentage = Math.round((scrollTop / scrollHeight) * 100);
            var scrollBottomPercentage = Math.round(((scrollTop + scrollableHeight) /
 scrollHeight) * 100);
```

```
            // Create the Amazon Kinesis record
            var record = {
                Data: JSON.stringify({
                    blog: window.location.href,
                    scrollTopPercentage: scrollTopPercentage,
                    scrollBottomPercentage: scrollBottomPercentage,
                    time: new Date()
                }),
                PartitionKey: 'partition-' + AWS.config.credentials.identityId
            };
            recordData.push(record);
        }, 100);
    });
```

Submitting Records to Kinesis

Once each second, if there are records in the array, those pending records are sent to Kinesis.

```
    // upload data to Amazon Kinesis every second if data exists
    setInterval(function() {
        if (!recordData.length) {
            return;
        }
        // upload data to Amazon Kinesis
        kinesis.putRecords({
            Records: recordData,
            StreamName: 'NAME_OF_STREAM'
        }, function(err, data) {
            if (err) {
                console.error(err);
            }
        });
        // clear record data
        recordData = [];
    }, 1000);
});
```

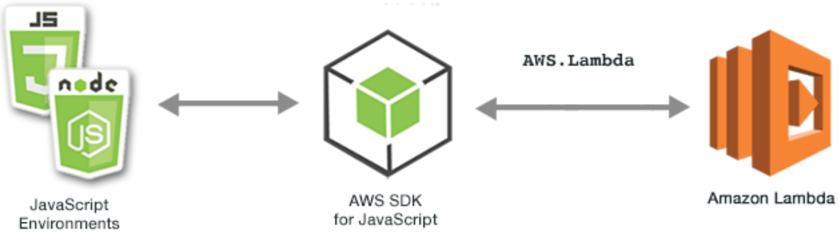
Capturing Web Page Scroll Progress Code

Here is the browser script code for the Kinesis capturing web page scroll progress example.

```
// Configure Credentials to use Cognito
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
    IdentityPoolId: 'IDENTITY_POOL_ID'
});

AWS.config.region = 'REGION';
// We're going to partition kinesis records based on an identity.
// We need to get credentials first, then attach our event listeners.
AWS.config.credentials.get(function(err) {
    // attach event listener
    if (err) {
        alert('Error retrieving credentials.');
        console.error(err);
        return;
    }
    // create kinesis client once
    var kinesis = new AWS.Kinesis({
        apiVersion: '2013-12-02'
    });
    var blogContent = document.getElementById('BlogContent');

    // Get Scrollable height
    var scrollableHeight = blogContent.clientHeight;

    var recordData = [];
    var TID = null;
    blogContent.addEventListener('scroll', function(event) {
        clearTimeout(TID);
        // Prevent creating a record while a user is actively scrolling
        TID = setTimeout(function() {
            // calculate percentage
            var scrollableElement = event.target;
            var scrollHeight = scrollableElement.scrollHeight;
            var scrollTop = scrollableElement.scrollTop;

            var scrollTopPercentage = Math.round((scrollTop / scrollHeight) * 100);
            var scrollBottomPercentage = Math.round(((scrollTop + scrollableHeight) /
 scrollHeight) * 100);

            // Create the kinesis record
            var record = {
                Data: JSON.stringify({
                    blog: window.location.href,
                    scrollTopPercentage: scrollTopPercentage,
                    scrollBottomPercentage: scrollBottomPercentage,
                    time: new Date()
                }),
                PartitionKey: 'partition-' + AWS.config.credentials.identityId
            };
            recordData.push(record);
        }, 100);
    });

    // upload data to kinesis every second if data exists
    setInterval(function() {
        if (!recordData.length) {
            return;
        }
        // upload data to kinesis
        kinesis.putRecords({
            Records: recordData,
            StreamName: 'blog_stats'
        }, function(err, data) {
            if (err) {
                console.error(err);
            }
        });
        // clear record data
        recordData = [];
    }, 1000);
});
```

AWS Lambda Examples

AWS Lambda is a service that provides on-demand compute capacity that runs in response to events without the need to provision or maintain a server. With Lambda, you code computing tasks as Lambda functions, which can be called as needed across the Internet. You can write Lambda functions using Node.js.



For more information about Node.js programming in Lambda, see Programming Model (Node.js) in the *AWS Lambda Developer Guide*.

Using Lambda in Web Pages

The JavaScript API for Lambda is exposed through the `AWS.Lambda` client class. For more information about using the Lambda client class, see Class: AWS.Lambda in the API reference. Create an instance of the `AWS.Lambda` class to give your browser script a service object that can invoke a Lambda function. Create the JSON parameters you must pass to the `AWS.Lambda.invoke` method, which calls the Lambda function.

Any data returned by the Lambda function is returned in the callback mechanism you use. See Calling Services Asychronously (p. 44) for details about different ways to set up a callback mechanism.

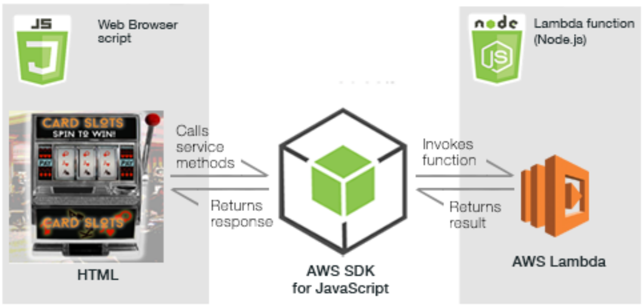
Topics

- Invoking a Lambda Function in a Browser Script (p. 129)
- Writing a Lambda Function in Node.js (p. 132)

Invoking a Lambda Function in a Browser Script

The Scenario

In this example, a simulated slot machine browser-based game invokes a Lambda function that generates the random results of each slot pull, returning those results as the file names of images used to display the result. The images are stored in an Amazon S3 bucket that is configured to function as a static web host for the HTML, CSS, and other assets needed to present the application experience.



Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Create an Amazon S3 bucket configured to serve as a static web host. The HTML page and application graphics are stored in the bucket.
- Create an Amazon Cognito identity pool with access enabled for unauthenticated identities. You need to include the identity pool ID in the code to obtain credentials for the browser script.
- Create an IAM role whose policy grants permission to invoke a Lambda function.
- Create the Lambda function called by the browser script that returns the result of each game spin.

Configuring the SDK

Here is the portion of the browser script that configures the SDK for JavaScript, using Amazon Cognito to obtain credentials.

```
AWS.config.update({region: 'REGION'});
AWS.config.credentials = new
 AWS.CognitoIdentityCredentials({IdentityPoolId: 'IdentityPool'});
```

Creating the Lambda Service Object

After configuring the SDK, this portion of the browser script creates a new Lambda service object, setting the region and API version. After creating the service object, the code creates a JSON object for passing the parameters that are needed to invoke a Lambda function with the service object. The code then creates a variable to hold the data returned by the Lambda function.

```
var lambda = new AWS.Lambda({region: REGION, apiVersion: '2015-03-31'});
// create JSON object for parameters for invoking Lambda function
var pullParams = {
  FunctionName : 'slotPull',
  InvocationType : 'RequestResponse',
  LogType : 'None'
};
// create variable to hold data returned by the Lambda function
var pullResults;
```

Invoking the Lambda Function

Later in the browser script, when the app is ready to request a random slot machine pull, the code calls the `invoke` method on the Lambda service object, passing the JSON object that holds the parameters that are needed to invoke the `slotPull` Lambda function.

```
lambda.invoke(pullParams, function(error, data) {
  if (error) {
    prompt(error);
  } else {
    pullResults = JSON.parse(data.Payload);
  }
});
```

Accessing the Returned Data

In the preceding code example, the call to the Lambda function uses an anonymous function as the callback in which the response is received. That response is automatically provided as the `data` parameter to the callback function. That parameter passes the `data` property of the `AWS.Response` object received by the SDK.

The `data` property contains the serialized data received from the Lambda function. In this example, the Lambda function returns the results of each spin in the game as JSON.

```
{
  isWinner: false,
  leftWheelImage : {S : 'cherry.png'},
  midWheelImage : {S : 'puppy.png'},
  rightWheelImage : {S : 'robot.png'}
}
```

To access the individual values contained within the `data` parameter, the following code turns the serialized data back into a JSON object by passing `data.Payload` to the `JSON.parse` function and then assigning the result to a variable.

```
pullResults = JSON.parse(data.Payload);
```

After that, you can access individual data values in the JSON object by using `pullResults`.

```
// check results to see if this spin is a winner
if (pullResults.isWinner) {
  prompt("Winner!");
}
```

Invoking a Lambda Function Code

Here is the complete HTML and browser script for the slot machine example.

```
<!doctype html>
<html>
<head>
<meta charset="UTF-8">
<title>Emoji Slots</title>
<link href="emojislots.css" rel="stylesheet" type="text/css">
<script src="https://sdk.amazonaws.com/js/aws-sdk-2.119.0.min.js"></script>
<script src="http://ajax.googleapis.com/ajax/libs/jquery/1.11.2/jquery.min.js"></script>
<script type="text/javascript">
   // Configure AWS SDK for JavaScript
   AWS.config.update({region: 'REGION'});
   AWS.config.credentials = new AWS.CognitoIdentityCredentials({IdentityPoolId:
 'IDENTITY_POOL_ID'});

   var pullReturned = null;
   var slotResults;
   var isSpinning = false;

   // Prepare to call Lambda function
   var lambda = new AWS.Lambda({region: 'REGION', apiVersion: '2015-03-31'});
   var pullParams = {
      FunctionName : 'slotPull',
      InvocationType : 'RequestResponse',
      LogType : 'None'
   };

   function pullHandle() {
      if (isSpinning == false) {
         // Show the handle pulled down
         slot_handle.src = "lever-dn.png";
      }
   }

   function initiatePull() {
      // Show the handle flipping back up
      slot_handle.src = "lever-up.png";
      // Set all three wheels "spinning"
      slot_L.src = "slotpullanimation.gif";
      slot_M.src = "slotpullanimation.gif";
      slot_R.src = "slotpullanimation.gif";
      // Set app status to spinning
      isSpinning = true;
      // Call the Lambda function to collect the spin results
      lambda.invoke(pullParams, function(err, data) {
         if (err) {
            prompt(err);
         } else {
            pullResults = JSON.parse(data.Payload);
            displayPull();
         }
      });
   }

   function displayPull() {
      isSpinning = false;
      if (pullResults.isWinner) {
         winner_light.visibility = visible;
      }
      $("#slot_L").delay(4000).attr("src", pullResults.leftWheelImage.file.S);
      $("#slot_M").delay(6500).attr("src", pullResults.midWheelImage.file.S);
      $("#slot_R").delay(9000).attr("src", pullResults.rightWheelImage.file.S);
   }

</script>
</head>
<body>
   <div id="appframe">

   <img id="slot_L" src="puppy.png" height="199" width="80" alt="slot wheel 1"/>
   <img id="slot_M" src="puppy.png" height="199" width="80" alt="slot wheel 2"/>
   <img id="slot_R" src="puppy.png" height="199" width="80" alt="slot wheel 3"/>
   <img id="winner_light" src="winner.png" height="48" width="247" alt="winner indicator"/>

   </div>
</body>
</html>
```

Writing a Lambda Function in Node.js

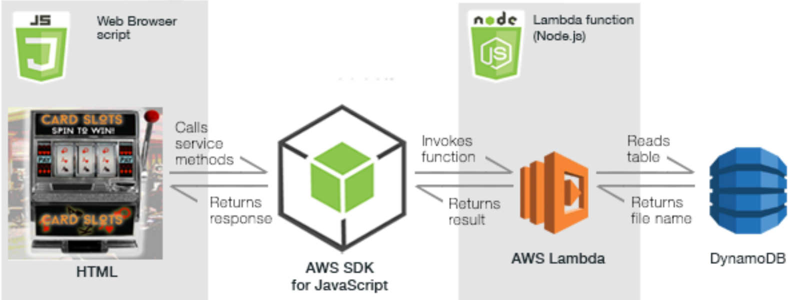
This Node.js example shows you how to:

- Prepare an object representation of data that the function returns to the browser.
- Create a service object used to access a DynamoDB table that stores the data values retrieved and returned by the Lambda function.

	• Return the requested data to the calling application as a JSON payload.	

The Scenario

In this example, a Lambda function supports a browser-hosted slot machine game. For the purposes of this example, we treat the JavaScript code running in the browser as a closed box. When a player pulls the slot machine lever, the browser code invokes the Lambda function to generate the random results of each spin. While this task is pretty simple, it illustrates one of the benefits of a Lambda function, which is that you can keep proprietary code hidden and separate from JavaScript code running in the browser.



The Lambda function, which uses Node.js 4.3, requests a randomly generated result for a browser-based slot machine game. Each time the function is invoked, a random number from 0 through 9, inclusive, is generated and used as the key to look up an image file from a DynamoDB table. The three random results are compared to each other and if all three match, the spin is flagged as a winner. The results of the spin are saved into a JSON object and returned to the browser script.

The asynchronous requests to DynamoDB use separate calls to the `getItem` method of the DynamoDB service object instead of making a single call to the `getBatchItem` method. The reason these are separate calls is because each of the three random results needed for each spin of the game can produce the same result. In fact, a winner is defined by all three results being identical. However the `getBatchItem` method returns an error if you request the same key from the table more than once in the same call.

Because it's necessary to make three separate asynchronous requests to DynamoDB, the Lambda function can only return its results after receiving the response from all three method calls.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Create an HTML page with browser script accessed in an Amazon S3 bucket acting as a static web host. The browser script invokes the Lambda function.
- Create a DynamoDB table with a single row containing ten columns, each containing the file name of a different graphic stored in the Amazon S3 bucket used by the browser portion of the game.
- Create an IAM execution role for the Lambda function..

Use the following role policy when creating the IAM role.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "logs:CreateLogGroup",
                "logs:CreateLogStream",
                "logs:PutLogEvents"
            ],
            "Resource": "arn:aws:logs:*:*:*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "lambda:InvokeFunction"
            ],
            "Resource": "arn:aws:lambda:*:*:*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "dynamodb:GetItem"
            ],
            "Resource": "arn:aws:dynamodb:*:*:*"
        }
    ]
}
```

Configuring the SDK

Here is the portion of the Lambda function that configures the SDK. The credentials are not provided in the code because they are supplied to a Lambda function through the required IAM execution role.

```
var AWS = require('aws-sdk');
AWS.config.update({region: 'us-west-2'});
```

Preparing JSON Objects

This Lambda function creates two different JSON objects. The first of these JSON objects packages the data sent as the response of the Lambda function after it has successfully completed. The second JSON object holds the parameters needed to call the `getItem` method of the DynamoDB service object. The name-value pairs of this JSON are determined by the parameters of `getItem`.

```
// define JSON used to format Lambda function response
var slotResults = {
  'isWinner' : false,
  'leftWheelImage' : {'file' : {S: ''}},
  'middleWheelImage' : {'file' : {S: ''}},
  'rightWheelImage' : {'file' : {S: ''}}
};

// define JSON for making getItem calls to the slotWheels DynamoDB table
var thisPullParams = {
    Key : {'slotPosition' : {N: ''}},
    TableName: 'slotWheels',
    ProjectionExpression: 'imageFile'
};
```

Calling DynamoDB

Each of the three calls to the `getItem` method of the DynamoDB service object is made and each response is managed using its own `Promise` object. All three of these `Promise` objects are identical except for the name used to keep track of which result is used for which result in the game.

The code generates a random number in the range 0 to 9, inclusive, and then assigns the number to the `Key` value in the JSON that is used to call DynamoDB. It then calls the `getItem` method on the DynamoDB service object, passing in the JSON with the completed set of parameters.

The Lambda function reads the `imageFile` column value returned by DynamoDB and concatenates that file name to a constant, forming the URL for an Amazon S3 bucket where the image files and the browser portion of the app are hosted. The callback then resolves the `Promise` object, passing the URL.

```
// create DynamoDB service object
var request = new AWS.DynamoDB({region: 'us-west-2', apiVersion: '2012-08-10'});

// set a random number 0-9 for the slot position
thisPullParams.Key.slotPosition.N = Math.floor(Math.random()*10).toString();
// call DynamoDB to retrieve the image to use for the Left slot result
var myLeftPromise = request.getItem(thisPullParams).promise().then(function(data) {return
 URL_BASE + data.Item.imageFile.S});

// set a random number 0-9 for the slot position
thisPullParams.Key.slotPosition.N = Math.floor(Math.random()*10).toString();
// call DynamoDB to retrieve the image to use for the Middle slot result
var myMiddlePromise = request.getItem(thisPullParams).promise().then(function(data) {return
 URL_BASE + data.Item.imageFile.S});

// set a random number 0-9 for the slot position
thisPullParams.Key.slotPosition.N = Math.floor(Math.random()*10).toString();
// call DynamoDB to retrieve the image to use for the Right slot result
var myRightPromise = request.getItem(thisPullParams).promise().then(function(data) {return
 URL_BASE + data.Item.imageFile.S});
```

Gathering and Sending the Response

The Lambda function can't send its response until all three of the asynchronous calls to DynamoDB have completed and returned their values. To track the resolution of all three `Promise` objects used to call DynamoDB, another `Promise` object is used. The callback of this `Promise` object is invoked by `Promise.all`, which takes an array of `Promise` objects as its parameters. So this `Promise` resolves only if all of the `Promise` objects in the array resolve. The callback receives an array holding the return values of resolved `Promise` objects as its parameter.

The URL values returned by the `Promise` objects in the array are then assigned into the JSON created to send back the response of the Lambda function. These three values are compared to determine if they are all identical. If they are all identical, the fourth value in the returned JSON is set to `true`.

After all four values in the returned JSON have been set, the JSON is passed to `callback`, which returns the results to the browser script and terminates the Lambda function.

```
Promise.all([myLeftPromise, myMiddlePromise, myRightPromise]).then(function(values) {
  // assign resolved promise values to returned JSON
  slotResults.leftWheelImage.file.S = values[0];
  slotResults.middleWheelImage.file.S = values[1];
  slotResults.rightWheelImage.file.S = values[2];
  // if all three values are identical, the spin is a winner
  if ((values[0] === values[1]) && (values[0] === values[2])) {
    slotResults.isWinner = true;
  }
  // return the JSON result to the caller of the Lambda function
  callback(null, slotResults);
});
```

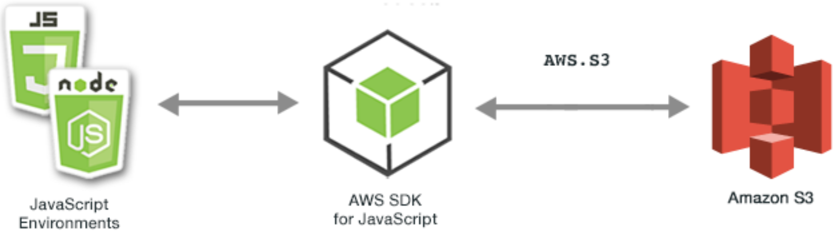
Writing a Lambda Function Code

Here is the Node.js code for the Lambda function example.

```
// Configuring the AWS SDK
var AWS = require('aws-sdk');
AWS.config.update({region: 'REGION'});

exports.handler = (event, context, callback) => {

const URL_BASE = "S3_BUCKET_URL";

// Define the object that will hold the data values returned
var slotResults = {
 'isWinner' : false,
 'leftWheelImage' : {'file' : {S: ''}},
 'middleWheelImage' : {'file' : {S: ''}},
 'rightWheelImage' : {'file' : {S: ''}}
};

// define parameters JSON for retrieving slot pull data from the database
var thisPullParams = {
    Key : {'slotPosition' : {N: ''}},
    TableName: 'slotWheels',
    ProjectionExpression: 'imageFile'
};

// create DynamoDB service object
var request = new AWS.DynamoDB({region: 'REGION', apiVersion: '2012-08-10'});

// set a random number 0-9 for the slot position
thisPullParams.Key.slotPosition.N = Math.floor(Math.random()*10).toString();
// call DynamoDB to retrieve the image to use for the Left slot result
var myLeftPromise = request.getItem(thisPullParams).promise().then(function(data) {return
 URL_BASE + data.Item.imageFile.S});

// set a random number 0-9 for the slot position
thisPullParams.Key.slotPosition.N = Math.floor(Math.random()*10).toString();
// call DynamoDB to retrieve the image to use for the Left slot result
var myMiddlePromise = request.getItem(thisPullParams).promise().then(function(data) {return
 URL_BASE + data.Item.imageFile.S});

// set a random number 0-9 for the slot position
thisPullParams.Key.slotPosition.N = Math.floor(Math.random()*10).toString();
// call DynamoDB to retrieve the image to use for the Left slot result
var myRightPromise = request.getItem(thisPullParams).promise().then(function(data) {return
 URL_BASE + data.Item.imageFile.S});


Promise.all([myLeftPromise, myMiddlePromise, myRightPromise]).then(function(values) {
    slotResults.leftWheelImage.file.S = values[0];
    slotResults.middleWheelImage.file.S = values[1];
    slotResults.rightWheelImage.file.S = values[2];
    // if all three values are identical, the spin is a winner
    if ((values[0] === values[1]) && (values[0] === values[2])) {
        slotResults.isWinner = true;
    }
    // return the JSON result to the caller of the Lambda function
    callback(null, slotResults);
});

};
```

Amazon S3 Examples

Amazon Simple Storage Service (Amazon S3) is a web service that provides highly scalable cloud storage. Amazon S3 provides easy to use object storage, with a simple web service interface to store and retrieve any amount of data from anywhere on the web.



The JavaScript API for Amazon S3 is exposed through the `AWS.S3` client class. For more information about using the Amazon S3 client class, see Class: AWS.S3 in the API reference.

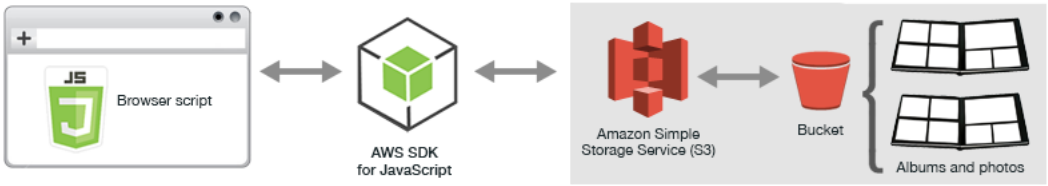
Topics

Uploading Photos to Amazon S3 from a Browser

JS	This browser script example shows you how to upload photos into albums stored in an Amazon S3 bucket.	

The Scenario

In this example, a simple HTML page provides a browser-based application for creating photo albums in an Amazon S3 bucket into which you can upload photos. The application lets you delete photos and albums that you add.



The browser script uses the SDK for JavaScript to interact with an Amazon S3 bucket. Use the following methods of the Amazon S3 client class to enable the photo album application:

- `listObjects`

- `headObject`
- `putObject`
- `upload`
- `deleteObject`
- `deleteObjects`

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Create an Amazon S3 bucket in the console that you will use to store the photos in the album. For more information about creating a bucket in the console, see Creating a Bucket in the *Amazon Simple Storage Service Console User Guide*. Add List permissions for **All Authorized AWS Users**.
- Create an Amazon Cognito identity pool using Federated Identities with access enabled for unauthenticated users. You need to include the identity pool ID in the code to obtain credentials for the browser script. For more information about Amazon Cognito Federated Identities, see Amazon Cognito Identity: Using Federated Identites in the *Amazon Cognito Developer Guide*.
- Create an IAM role whose policy grants permission to read and write to an Amazon S3 bucket. For more information about creating an IAM role, see Creating a Role to Delegate Permissions to an AWS Service in the *IAM User Guide*.

Use the following role policy when creating the IAM role.

```
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "s3:*"
         ],
         "Resource": [
            "arn:aws:s3:::BUCKET_NAME/*"
         ]
      }
   ]
}
```

Configuring CORS

Before the browser script can access the Amazon S3 bucket, you must first set up its CORS configuration as follows.

```
<?xml version="1.0" encoding="UTF-8"?>
<CORSConfiguration xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
    <CORSRule>
        <AllowedOrigin>*</AllowedOrigin>
        <AllowedMethod>POST</AllowedMethod>
        <AllowedMethod>GET</AllowedMethod>
        <AllowedMethod>PUT</AllowedMethod>
        <AllowedMethod>DELETE</AllowedMethod>
        <AllowedMethod>HEAD</AllowedMethod>
        <AllowedHeader>*</AllowedHeader>
    </CORSRule>
</CORSConfiguration>
```

The Web Page

The HTML for the photo upload application consists of a <div> element within which the browser script creates the upload user interface.

```
<!DOCTYPE html>
<html>
  <head>
    <script src="https://sdk.amazonaws.com/js/aws-sdk-2.119.0.min.js"></script>
    <script src="./app.js"></script>
    <script>
       function getHtml(template) {
          return template.join('\n');
       }
       listAlbums();
    </script>
  </head>
  <body>
    <h1>My Photo Albums App</h1>
    <div id="app"></div>
  </body>
</html>
```

Configuring the SDK

Obtain the credentials needed to configure the SDK by calling the `CognitoIdentityCredentials` method, providing the Amazon Cognito identity pool ID. Next, create an `AWS.S3` service object.

```
var albumBucketName = 'BUCKET_NAME';
var bucketRegion = 'REGION';
var IdentityPoolId = 'IDENTITY_POOL_ID';

AWS.config.update({
  region: bucketRegion,
  credentials: new AWS.CognitoIdentityCredentials({
    IdentityPoolId: IdentityPoolId
  })
});

var s3 = new AWS.S3({
  apiVersion: '2006-03-01',
  params: {Bucket: albumBucketName}
});
```

Nearly all of the rest of the code in this example is organized into a series of functions that gather and present information about the albums in the bucket, upload and display photos uploaded into albums, and delete photos and albums. Those functions are:

- `listAlbums`
- `createAlbum`
- `viewAlbum`
- `addPhoto`
- `deleteAlbum`
- `deletePhoto`

Listing Albums in the Bucket

The application creates albums in the Amazon S3 bucket as objects whose keys begin with a forward slash character, indicating the object functions as a folder. To list all the existing albums in the bucket, the application's `listAlbums` function calls the `listObjects` method of the `AWS.S3` service object while using `commonPrefix` so the call returns only objects used as albums.

The rest of the function takes the list of albums from the Amazon S3 bucket and generates the HTML needed to display the album list in the web page. It also enables deleting and opening individual albums.

```
function listAlbums() {
  s3.listObjects({Delimiter: '/'}, function(err, data) {
    if (err) {
      return alert('There was an error listing your albums: ' + err.message);
    } else {
      var albums = data.CommonPrefixes.map(function(commonPrefix) {
        var prefix = commonPrefix.Prefix;
        var albumName = decodeURIComponent(prefix.replace('/', ''));
        return getHtml([
          '<li>',
            '<span onclick="deleteAlbum(\'' + albumName + '\')">X</span>',
            '<span onclick="viewAlbum(\'' + albumName + '\')">',
              albumName,
            '</span>',
          '</li>'
        ]);
      });
      var message = albums.length ?
        getHtml([
          '<p>Click on an album name to view it.</p>',
          '<p>Click on the X to delete the album.</p>'
        ]) :
        '<p>You do not have any albums. Please Create album.';
      var htmlTemplate = [
        '<h2>Albums</h2>',
        message,
        '<ul>',
          getHtml(albums),
        '</ul>',
        '<button onclick="createAlbum(prompt(\'Enter Album Name:\'))">',
          'Create New Album',
        '</button>'
      ]
      document.getElementById('app').innerHTML = getHtml(htmlTemplate);
    }
  });
}
```

Creating an Album in the Bucket

To create an album in the Amazon S3 bucket, the application's `createAlbum` function first validates the name given for the new album to ensure it contains suitable characters. The function then forms an Amazon S3 object key, passing it to the `headObject` method of the Amazon S3 service object. This method returns the metadata for the specified key, so if it returns data, then an object with that key already exists.

If the album doesn't already exist, the function calls the `putObject` method of the `AWS.S3` service object to create the album. It then calls the `viewAlbum` function to display the new empty album.

```
function createAlbum(albumName) {
  albumName = albumName.trim();
  if (!albumName) {
    return alert('Album names must contain at least one non-space character.');
  }
  if (albumName.indexOf('/') !== -1) {
    return alert('Album names cannot contain slashes.');
  }
  var albumKey = encodeURIComponent(albumName) + '/';
  s3.headObject({Key: albumKey}, function(err, data) {
    if (!err) {
      return alert('Album already exists.');
    }
    if (err.code !== 'NotFound') {
      return alert('There was an error creating your album: ' + err.message);
    }
    s3.putObject({Key: albumKey}, function(err, data) {
      if (err) {
        return alert('There was an error creating your album: ' + err.message);
      }
      alert('Successfully created album.');
      viewAlbum(albumName);
    });
  });
}
```

Viewing an Album

To display the contents of an album in the Amazon S3 bucket, the application's `viewAlbum` function takes an album name and creates the Amazon S3 key for that album. The function then calls the `listObjects` method of the `AWS.S3` service object to obtain a list of all the objects (photos) in the album.

The rest of the function takes the list of objects (photos) from the album and generates the HTML needed to display the photos in the web page. It also enables deleting individual photos and navigating back to the album list.

```
function viewAlbum(albumName) {
  var albumPhotosKey = encodeURIComponent(albumName) + '//';
  s3.listObjects({Prefix: albumPhotosKey}, function(err, data) {
    if (err) {
      return alert('There was an error viewing your album: ' + err.message);
    }
    // `this` references the AWS.Response instance that represents the response
    var href = this.request.httpRequest.endpoint.href;
    var bucketUrl = href + albumBucketName + '/';

    var photos = data.Contents.map(function(photo) {
      var photoKey = photo.Key;
      var photoUrl = bucketUrl + encodeURIComponent(photoKey);
      return getHtml([
        '<span>',
          '<div>',
            '<img style="width:128px;height:128px;" src="' + photoUrl + '"/>',
          '</div>',
          '<div>',
            '<span onclick="deletePhoto(\'' + albumName + "','" + photoKey + '\')">',
              'X',
            '</span>',
            '<span>',
              photoKey.replace(albumPhotosKey, ''),
            '</span>',
          '</div>',
        '<span>',
      ]);
    });
    var message = photos.length ?
      '<p>Click on the X to delete the photo</p>' :
      '<p>You do not have any photos in this album. Please add photos.</p>';
    var htmlTemplate = [
      '<h2>',
        'Album: ' + albumName,
      '</h2>',
      message,
      '<div>',
        getHtml(photos),
      '</div>',
      '<input id="photoupload" type="file" accept="image/*">',
      '<button id="addphoto" onclick="addPhoto(\'' + albumName +'\')">',
        'Add Photo',
      '</button>',
      '<button onclick="listAlbums()">',
        'Back To Albums',
      '</button>',
    ]
    document.getElementById('app').innerHTML = getHtml(htmlTemplate);
  });
}
```

Adding Photos to an Album

To upload a photo to an album in the Amazon S3 bucket, the application's `addPhoto` function uses a file picker element in the web page to identify a file to upload. It then forms a key for the photo to upload from the current album name and the file name.

The function calls the `upload` method of the Amazon S3 service object to upload the photo. The `ACL` parameter is set to `public-read` so the application can fetch the photos in an album for display by their URL in the bucket. After uploading the photo, the function redisplays the album so the uploaded photo appears.

```
function addPhoto(albumName) {
  var files = document.getElementById('photoupload').files;
  if (!files.length) {
    return alert('Please choose a file to upload first.');
  }
  var file = files[0];
  var fileName = file.name;
  var albumPhotosKey = encodeURIComponent(albumName) + '//';

  var photoKey = albumPhotosKey + fileName;
  s3.upload({
    Key: photoKey,
    Body: file,
    ACL: 'public-read'
  }, function(err, data) {
    if (err) {
      return alert('There was an error uploading your photo: ', err.message);
    }
    alert('Successfully uploaded photo.');
    viewAlbum(albumName);
  });
}
```

Deleting a Photo

To delete a photo from an album in the Amazon S3 bucket, the application's `deletePhoto` function calls the `deleteObject` method of the Amazon S3 service object. This deletes the photo specified by the `photoKey` value passed to the function.

```
function deletePhoto(albumName, photoKey) {
  s3.deleteObject({Key: photoKey}, function(err, data) {
    if (err) {
      return alert('There was an error deleting your photo: ', err.message);
    }
    alert('Successfully deleted photo.');
    viewAlbum(albumName);
  });
}
```

Deleting an Album

To delete an album in the Amazon S3 bucket, the application's `deleteAlbum` function calls the `deleteObjects` method of the Amazon S3 service object.

```
function deleteAlbum(albumName) {
  var albumKey = encodeURIComponent(albumName) + '/';
  s3.listObjects({Prefix: albumKey}, function(err, data) {
    if (err) {
      return alert('There was an error deleting your album: ', err.message);
    }
    var objects = data.Contents.map(function(object) {
      return {Key: object.Key};
    });
    s3.deleteObjects({
      Delete: {Objects: objects, Quiet: true}
    }, function(err, data) {
      if (err) {
        return alert('There was an error deleting your album: ', err.message);
      }
      alert('Successfully deleted album.');
      listAlbums();
    });
  });
}
```

Uploading Photos to Amazon S3 Code

Here is the browser script code for the Amazon S3 photo album example.

```
var albumBucketName = 'BUCKET_NAME';
var bucketRegion = 'REGION';
var IdentityPoolId = 'IDENTITY_POOL_ID';

AWS.config.update({
  region: bucketRegion,
  credentials: new AWS.CognitoIdentityCredentials({
    IdentityPoolId: IdentityPoolId
  })
});

var s3 = new AWS.S3({
  apiVersion: '2006-03-01',
  params: {Bucket: albumBucketName}
});

function listAlbums() {
  s3.listObjects({Delimiter: '/'}, function(err, data) {
    if (err) {
      return alert('There was an error listing your albums: ' + err.message);
    } else {
      var albums = data.CommonPrefixes.map(function(commonPrefix) {
        var prefix = commonPrefix.Prefix;
        var albumName = decodeURIComponent(prefix.replace('/', ''));
        return getHtml([
          '<li>',
            '<span onclick="deleteAlbum(\'' + albumName + '\')">X</span>',
            '<span onclick="viewAlbum(\'' + albumName + '\')">',
              albumName,
            '</span>',
          '</li>'
        ]);
      });
      var message = albums.length ?
        getHtml([
          '<p>Click on an album name to view it.</p>',
          '<p>Click on the X to delete the album.</p>'
        ]) :
        '<p>You do not have any albums. Please Create album.';
      var htmlTemplate = [
        '<h2>Albums</h2>',
        message,
        '<ul>',
          getHtml(albums),
        '</ul>',
        '<button onclick="createAlbum(prompt(\'Enter Album Name:\'))">',
          'Create New Album',
        '</button>'
      ]
      document.getElementById('app').innerHTML = getHtml(htmlTemplate);
    }
  });
}

function createAlbum(albumName) {
  albumName = albumName.trim();
  if (!albumName) {
    return alert('Album names must contain at least one non-space character.');
  }
  if (albumName.indexOf('/') !== -1) {
    return alert('Album names cannot contain slashes.');
  }
  var albumKey = encodeURIComponent(albumName) + '/';
  s3.headObject({Key: albumKey}, function(err, data) {
    if (!err) {
      return alert('Album already exists.');
    }
    if (err.code !== 'NotFound') {
      return alert('There was an error creating your album: ' + err.message);
    }
    s3.putObject({Key: albumKey}, function(err, data) {
      if (err) {
        return alert('There was an error creating your album: ' + err.message);
      }
      alert('Successfully created album.');
      viewAlbum(albumName);
    });
  });
}

function viewAlbum(albumName) {
  var albumPhotosKey = encodeURIComponent(albumName) + '//';
  s3.listObjects({Prefix: albumPhotosKey}, function(err, data) {
    if (err) {
      return alert('There was an error viewing your album: ' + err.message);
    }
  // `this` references the AWS.Response instance that represents the response
  var href = this.request.httpRequest.endpoint.href;
  var bucketUrl = href + albumBucketName + '/';

  var photos = data.Contents.map(function(photo) {
   var photoKey = photo.Key;
   var photoUrl = bucketUrl + encodeURIComponent(photoKey);
   return getHtml([
    '<span>',
     '<div>',
      '<img style="width:128px;height:128px;" src="' + photoUrl + '"/>',
     '</div>',
     '<div>',
      '<span onclick="deletePhoto(\'' + albumName + "','" + photoKey + '\')">',
       'X',
      '</span>',
      '<span>',
       photoKey.replace(albumPhotosKey, ''),
      '</span>',
     '</div>',
    '<span>',
   ]);
  });
  var message = photos.length ?
   '<p>Click on the X to delete the photo</p>' :
   '<p>You do not have any photos in this album. Please add photos.</p>';
  var htmlTemplate = [
   '<h2>',
    'Album: ' + albumName,
   '</h2>',
   message,
   '<div>',
    getHtml(photos),
   '</div>',
   '<input id="photoupload" type="file" accept="image/*">',
   '<button id="addphoto" onclick="addPhoto(\'' + albumName +'\')">',
    'Add Photo',
   '</button>',
   '<button onclick="listAlbums()">',
    'Back To Albums',
   '</button>',
  ]
  document.getElementById('app').innerHTML = getHtml(htmlTemplate);
 });
}

function addPhoto(albumName) {
 var files = document.getElementById('photoupload').files;
 if (!files.length) {
  return alert('Please choose a file to upload first.');
 }
 var file = files[0];
 var fileName = file.name;
 var albumPhotosKey = encodeURIComponent(albumName) + '//';

 var photoKey = albumPhotosKey + fileName;
 s3.upload({
  Key: photoKey,
  Body: file,
  ACL: 'public-read'
 }, function(err, data) {
  if (err) {
   return alert('There was an error uploading your photo: ', err.message);
  }
  alert('Successfully uploaded photo.');
  viewAlbum(albumName);
  });
}

function deletePhoto(albumName, photoKey) {
  s3.deleteObject({Key: photoKey}, function(err, data) {
    if (err) {
      return alert('There was an error deleting your photo: ', err.message);
    }
    alert('Successfully deleted photo.');
    viewAlbum(albumName);
  });
}

function deleteAlbum(albumName) {
  var albumKey = encodeURIComponent(albumName) + '/';
  s3.listObjects({Prefix: albumKey}, function(err, data) {
    if (err) {
      return alert('There was an error deleting your album: ', err.message);
    }
    var objects = data.Contents.map(function(object) {
      return {Key: object.Key};
    });
    s3.deleteObjects({
      Delete: {Objects: objects, Quiet: true}
    }, function(err, data) {
      if (err) {
        return alert('There was an error deleting your album: ', err.message);
      }
      alert('Successfully deleted album.');
      listAlbums();
    });
  });
}
```

Creating and Using Amazon S3 Buckets

	This Node.js example shows you how to: • Obtain and display a list of Amazon S3 buckets in your account. • Create an Amazon S3 bucket. • Upload an object to a specified bucket.	

The Scenario

In this example, a series of Node.js modules are used to obtain a list of existing Amazon S3 buckets, create a bucket, and upload a file to a specified bucket. These Node.js modules use the SDK for JavaScript to get information from and upload files to an Amazon S3 bucket using these methods of the Amazon S3 client class:

- `listBuckets`
- `createBucket`
- `upload`

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Displaying a List of Amazon S3 Buckets

Create a Node.js module with the file name `s3_listbuckets.js`. Make sure to configure the SDK as previously shown. To access Amazon Simple Storage Service, create an `AWS.S3` service object. Call the `listBuckets` method of the Amazon S3 service object to retrieve a list of your buckets. The `data` parameter of the callback function has a `Buckets` property containing an array of maps to represent the buckets. Display the bucket list by logging it to the console.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

// Call S3 to list current buckets
s3.listBuckets(function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Bucket List", data.Buckets);
   }
});
```

To run the example, type the following at the command line.

```
node s3_listbuckets.js
```

This sample code can be found here on GitHub.

Creating an Amazon S3 Bucket

Create a Node.js module with the file name `s3_createbucket.js`. Make sure to configure the SDK as previously shown. Create an `AWS.S3` service object. The module will take a single command-line argument to specify a name for the new bucket.

Add a variable to hold the parameters used to call the `createBucket` method of the Amazon S3 service object, including the name for the newly created bucket. The callback function logs the new bucket's location to the console after Amazon S3 successfully creates it.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the parameters for calling createBucket
var bucketParams = {
   Bucket : process.argv[2]
};

 // Call S3 to create the bucket
s3.createBucket(bucketParams, function(err, data) {
   if (err) {
      console.log("Error", err);
   } else {
      console.log("Success", data.Location);
   }
});
```

To run the example, type the following at the command line.

```
node s3_createbucket.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Uploading a File to an Amazon S3 Bucket

Create a Node.js module with the file name `s3_upload.js`. Make sure to configure the SDK as previously shown. Create an `AWS.S3` service object. The module will take two command-line arguments, the first one to specify the destination bucket and the second to specify the file to upload.

Create a variable with the parameters needed to call the `upload` method of the Amazon S3 service object. Provide the name of the target bucket in the `Bucket` parameter. The `Key` parameter is set to the name of the selected file, which you can obtain using the Node.js `path` module. The `Body` parameter is set to the contents of the file, which you can obtain using `createReadStream` from the Node.js `fs` module.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

// call S3 to retrieve upload file to specified bucket
var uploadParams = {Bucket: process.argv[2], Key: '', Body: ''};
var file = process.argv[3];

var fs = require('fs');
var fileStream = fs.createReadStream(file);
fileStream.on('error', function(err) {
  console.log('File Error', err);
});
uploadParams.Body = fileStream;

var path = require('path');
```

```
uploadParams.Key = path.basename(file);

// call S3 to retrieve upload file to specified bucket
s3.upload (uploadParams, function (err, data) {
  if (err) {
    console.log("Error", err);
  } if (data) {
    console.log("Upload Success", data.Location);
  }
});
```

To run the example, type the following at the command line.

```
node s3_upload.js BUCKET_NAME FILE_NAME
```

This sample code can be found here on GitHub.

Configuring Amazon S3 Buckets

node JS	This Node.js example shows you how to configure the cross-origin resource sharing (CORS) permissions for a bucket.	

The Scenario

In this example, a series of Node.js modules are used to list your Amazon S3 buckets and to configure CORS and bucket logging. The Node.js modules use the SDK for JavaScript to configure a selected Amazon S3 bucket using these methods of the Amazon S3 client class:

- `getBucketCors`
- `putBucketCors`

For more information about using CORS configuration with an Amazon S3 bucket, see Cross-Origin Resource Sharing (CORS) in the *Amazon Simple Storage Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
```

```
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Retrieving a Bucket CORS Configuration

Create a Node.js module with the file name `s3_getcors.js`. The module will take a single command-line argument to specify the bucket whose CORS configuration you want. Make sure to configure the SDK as previously shown. Create an `AWS.S3` service object.

The only parameter you need to pass is the name of the selected bucket when calling the `getBucketCors` method. If the bucket currently has a CORS configuration, that configuration is returned by Amazon S3 as the `CORSRules` property of the `data` parameter passed to the callback function.

If the selected bucket has no CORS configuration, that information is returned to the callback function in the `error` parameter.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

// set the parameters for S3.getBucketCors
var bucketParams = {Bucket: process.argv[2]};

// call S3 to retrieve CORS configuration for selected bucket
s3.getBucketCors(bucketParams, function(err, data) {
  if (err) {
    console.log(err);
  } else if (data) {
    console.log(JSON.stringify(data.CORSRules));
  }
});
```

To run the example, type the following at the command line.

```
node s3_getcors.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Setting a Bucket CORS Configuration

Create a Node.js module with the file name `s3_setcors.js`. The module takes multiple command-line arguments, the first of which specifies the bucket whose CORS configuration you want to set. Additional arguments enumerate the HTTP methods (POST, GET, PUT, PATCH, DELETE, POST) you want to allow for the bucket. Configure the SDK as previously shown.

Create an `AWS.S3` service object. Next create a JSON object to hold the values for the CORS configuration as required by the `putBucketCors` method of the `AWS.S3` service object. Specify `"Authorization"` for the `AllowedHeaders` value and `"*"` for the `AllowedOrigins` value. Set the value of `AllowedMethods` as empty array initially.

Specify the allowed methods as command line parameters to the Node.js module, adding each of the methods that match one of the parameters. Add the resulting CORS configuration to the array of configurations contained in the `CORSRules` parameter. Specify the bucket you want to configure for CORS in the `Bucket` parameter.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

// Create initial parameters JSON for putBucketCors
var thisConfig = {
  AllowedHeaders:["Authorization"],
  AllowedMethods:[],
  AllowedOrigins:["*"],
  ExposeHeaders:[],
  MaxAgeSeconds:3000
};

// Create array of allowed methods parameter based on command line parameters
var allowedMethods = [];
process.argv.forEach(function (val, index, array) {
  if (val.toUpperCase() === "POST") {allowedMethods.push("POST")};
  if (val.toUpperCase() === "GET") {allowedMethods.push("GET")};
  if (val.toUpperCase() === "PUT") {allowedMethods.push("PUT")};
  if (val.toUpperCase() === "PATCH") {allowedMethods.push("PATCH")};
  if (val.toUpperCase() === "DELETE") {allowedMethods.push("DELETE")};
  if (val.toUpperCase() === "HEAD") {allowedMethods.push("HEAD")};
});

// create CORS params
thisConfig.AllowedMethods = allowedMethods;
var corsRules = new Array(thisConfig);
var corsParams = {Bucket: process.argv[2], CORSConfiguration: {CORSRules: corsRules}};

// set the new CORS configuration on the selected bucket
s3.putBucketCors(corsParams, function(err, data) {
  if (err) {
    // display error message
    console.log("Error", err);
  } else {
    // update the displayed CORS config for the selected bucket
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line including one or more HTTP methods as shown.

```
node s3_setcors.js BUCKET_NAME get put
```

This sample code can be found here on GitHub.

Managing Amazon S3 Bucket Access Permissions

	This Node.js example shows you how to retrieve or set the access control list for an Amazon S3 bucket.	

The Scenario

In this example, a Node.js module is used to display the bucket access control list (ACL) for a selected bucket and apply changes to the ACL for a selected bucket. The Node.js module uses the SDK for JavaScript to manage Amazon S3 bucket access permissions using these methods of the Amazon S3 client class:

- `getBucketAcl`
- `putBucketAcl`

For more information about access control lists for Amazon S3 buckets, see Managing Access with ACLs in the *Amazon Simple Storage Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Retrieving the Current Bucket Access Control List

Create a Node.js module with the file name `s3_getbucketacl.js`. The module will take a single command-line argument to specify the bucket whose ACL configuration you want. Make sure to configure the SDK as previously shown.

Create an `AWS.S3` service object. The only parameter you need to pass is the name of the selected bucket when calling the `getBucketAcl` method. The current access control list configuration is returned by Amazon S3 in the `data` parameter passed to the callback function.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

var bucketParams = {Bucket: process.argv[2]};
// call S3 to retrieve policy for selected bucket
s3.getBucketAcl(bucketParams, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else if (data) {
    console.log("Success", data.Grants);
  }
});
```

To run the example, type the following at the command line.

```
node s3_getbucketacl.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Working with Amazon S3 Bucket Policies

	This Node.js example shows you how to: • Retrieve the bucket policy of an Amazon S3 bucket. • Add or update the bucket policy of an Amazon S3 bucket. • Delete the bucket policy of an Amazon S3 bucket.	

The Scenario

In this example, a series of Node.js modules are used to retrieve, set, or delete a bucket policy on an Amazon S3 bucket. The Node.js modules use the SDK for JavaScript to configure policy for a selected Amazon S3 bucket using these methods of the Amazon S3 client class:

- `getBucketPolicy`
- `putBucketPolicy`
- `deleteBucketPolicy`

For more information about bucket policies for Amazon S3 buckets, see Using Bucket Policies and User Policies in the *Amazon Simple Storage Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Retrieving the Current Bucket Policy

Create a Node.js module with the file name `s3_getbucketpolicy.js`. The module takes a single command-line argument that specifies the bucket whose policy you want. Make sure to configure the SDK as previously shown.

Create an `AWS.S3` service object. The only parameter you need to pass is the name of the selected bucket when calling the `getBucketPolicy` method. If the bucket currently has a policy, that policy is returned by Amazon S3 in the `data` parameter passed to the callback function.

If the selected bucket has no policy, that information is returned to the callback function in the `error` parameter.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

var bucketParams = {Bucket: process.argv[2]};
// call S3 to retrieve policy for selected bucket
s3.getBucketPolicy(bucketParams, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else if (data) {
    console.log("Success", data.Policy);
  }
});
```

To run the example, type the following at the command line.

```
node s3_getbucketpolicy.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Setting a Simple Bucket Policy

Create a Node.js module with the file name `s3_setbucketpolicy.js`. The module takes a single command-line argument that specifies the bucket whose policy you want to apply. Configure the SDK as previously shown.

Create an `AWS.S3` service object. Bucket policies are specified in JSON. First, create a JSON object that contains all of the values to specify the policy except for the `Resource` value that identifies the bucket.

Format the `Resource` string required by the policy, incorporating the name of the selected bucket. Insert that string into the JSON object. Prepare the parameters for the `putBucketPolicy` method, including the name of the bucket and the JSON policy converted to a string value.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
```

```
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

var readOnlyAnonUserPolicy = {
  Version: "2012-10-17",
  Statement: [
    {
      Sid: "AddPerm",
      Effect: "Allow",
      Principal: "*",
      Action: [
        "s3:GetObject"
      ],
      Resource: [
        ""
      ]
    }
  ]
};

// create selected bucket resource string for bucket policy
var bucketResource = "arn:aws:s3:::" + process.argv[2] + "/*";
readOnlyAnonUserPolicy.Statement[0].Resource[0] = bucketResource;

// convert policy JSON into string and assign into params
var bucketPolicyParams = {Bucket: process.argv[2], Policy:
 JSON.stringify(readOnlyAnonUserPolicy)};

// set the new policy on the selected bucket
s3.putBucketPolicy(bucketPolicyParams, function(err, data) {
   if (err) {
     // display error message
     console.log("Error", err);
   } else {
     console.log("Success", data);
   }
});
```

To run the example, type the following at the command line.

```
node s3_setbucketpolicy.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Deleting a Bucket Policy

Create a Node.js module with the file name `s3_deletebucketpolicy.js`. The module takes a single command-line argument that specifies the bucket whose policy you want to delete. Configure the SDK as previously shown.

Create an `AWS.S3` service object. The only parameter you need to pass when calling the `deleteBucketPolicy` method is the name of the selected bucket.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});
```

```
var bucketParams = {Bucket: process.argv[2]};
// call S3 to delete policy for selected bucket
s3.deleteBucketPolicy(bucketParams, function(error, data) {
  if (error) {
    console.log("Error", err);
  } else if (data) {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node s3_deletebucketpolicy.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Using an Amazon S3 Bucket as a Static Web Host

node JS	This Node.js example shows you how to set up an Amazon S3 bucket as a static web host.	

The Scenario

In this example, a series of Node.js modules are used to configure any of your buckets to act as a static web host. The Node.js modules use the SDK for JavaScript to configure a selected Amazon S3 bucket using these methods of the Amazon S3 client class:

- `getBucketWebsite`
- `putBucketWebsite`
- `deleteBucketWebsite`

For more information about using an Amazon S3 bucket as a static web host, see Hosting a Static Website on Amazon S3 in the *Amazon Simple Storage Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');
```

```
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Retrieving the Current Bucket Website Configuration

Create a Node.js module with the file name `s3_getbucketwebsite.js`. The module takes a single command-line argument that specifies the bucket whose website configuration you want. Configure the SDK as previously shown.

Create an `AWS.S3` service object. Create a function that retrieves the current bucket website configuration for the bucket selected in the bucket list. The only parameter you need to pass is the name of the selected bucket when calling the `getBucketWebsite` method. If the bucket currently has a website configuration, that configuration is returned by Amazon S3 in the `data` parameter passed to the callback function.

If the selected bucket has no website configuration, that information is returned to the callback function in the `err` parameter.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

var bucketParams = {Bucket: process.argv[2]};
// call S3 to retrieve policy for selected bucket
s3.getBucketWebsite(bucketParams, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else if (data) {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node s3_getbucketwebsite.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Setting a Bucket Website Configuration

Create a Node.js module with the file name `s3_setbucketwebsite.js`. Make sure to configure the SDK as previously shown. Create an `AWS.S3` service object.

Create a function that applies a bucket website configuration. The configuration allows the selected bucket to serve as a static web host. Website configurations are specified in JSON. First, create a JSON object that contains all the values to specify the website configuration, except for the `Key` value that identifies the error document, and the `Suffix` value that identifies the index document.

Insert the values of the text input elements into the JSON object. Prepare the parameters for the `putBucketWebsite` method, including the name of the bucket and the JSON website configuration.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

```
// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

// Create JSON for setBucketWebsite parameters
var staticHostParams = {
  Bucket: '',
  WebsiteConfiguration: {
    ErrorDocument: {
      Key: ''
    },
    IndexDocument: {
      Suffix: ''
    },
  }
};

// Insert specified bucket name index and error documents into params JSON
// from command line arguments
staticHostParams.Bucket = process.argv[2];
staticHostParams.WebsiteConfiguration.IndexDocument.Suffix = process.argv[3];
staticHostParams.WebsiteConfiguration.ErrorDocument.Key = process.argv[4];

// set the new policy on the selected bucket
s3.putBucketWebsite(staticHostParams, function(err, data) {
  if (err) {
    // display error message
    console.log("Error", err);
  } else {
    // update the displayed policy for the selected bucket
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node s3_setbucketwebsite.js BUCKET_NAME INDEX_PAGE ERROR_PAGE
```

This sample code can be found here on GitHub.

Deleting a Bucket Website Configuration

Create a Node.js module with the file name `s3_deletebucketwebsite.js`. Make sure to configure the SDK as previously shown. Create an `AWS.S3` service object.

Create a function that deletes the website configuration for the selected bucket. The only parameter you need to pass when calling the `deleteBucketWebsite` method is the name of the selected bucket.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create S3 service object
s3 = new AWS.S3({apiVersion: '2006-03-01'});

var bucketParams = {Bucket: process.argv[2]};
// call S3 to delete policy for selected bucket
s3.deleteBucketWebsite(bucketParams, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else if (data) {
    console.log("Success", data);
  }
});
```

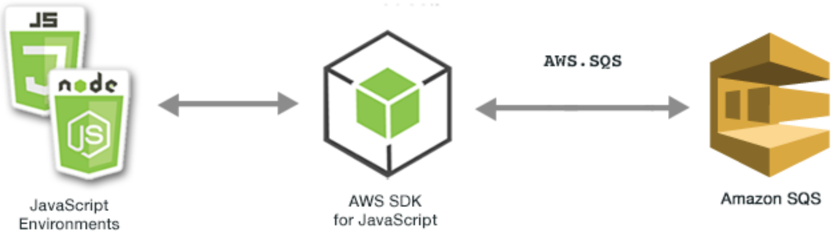
To run the example, type the following at the command line.

```
node s3_deletebucketwebsite.js BUCKET_NAME
```

This sample code can be found here on GitHub.

Amazon SQS Examples

Amazon Simple Queue Service (SQS) is a fast, reliable, scalable, fully managed message queuing service. Amazon SQS lets you decouple the components of a cloud application. Amazon SQS includes standard queues with high throughput and at-least-once processing, and FIFO queues that provide FIFO (first-in, first-out) delivery and exactly-once processing.



The JavaScript API for Amazon SQS is exposed through the `AWS.SQS` client class. For more information about using the CloudWatch client class, see Class: AWS.SQS in the API reference.

Topics

Using Queues in Amazon SQS

	This Node.js example shows you how to: • Get a list of all of your message queues • Obtain the URL for a particular queue • Create and delete queues	

The Scenario

In this example, a series of Node.js modules are used to work with queues. The Node.js modules use the SDK for JavaScript to use queues using these methods of the `AWS.SQS` client class:

- `listQueues`
- `createQueue`
- `getQueueUrl`
- `deleteQueue`

For more information about Amazon SQS messages, see How Queues Work in the *Amazon Simple Queue Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials by using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Listing Your Queues

Create a Node.js module with the file name `sqs_listqueues.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to list your queues, which by default is an empty object. Call the `listQueues` method to retrieve the list of queues. The callback returns the URLs of all queues.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create an SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var params = {};

sqs.listQueues(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.QueueUrls);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_listqueues.js
```

This sample code can be found here on GitHub.

Creating a Queue

Create a Node.js module with the file name `sqs_createqueue.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to list your queues, which must include the name for the queue created. The parameters can also contain attributes for the queue, such as the number of seconds for which message delivery is delayed or the number of seconds to retain a received message. Call the `createQueue` method. The callback returns the URL of the created queue.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create an SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var params = {
  QueueName: 'SQS_QUEUE_NAME',
  Attributes: {
    'DelaySeconds': '60',
    'MessageRetentionPeriod': '86400'
  }
};

sqs.createQueue(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.QueueUrl);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_createqueue.js
```

This sample code can be found here on GitHub.

Getting the URL for a Queue

Create a Node.js module with the file name `sqs_getqueueurl.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to list your queues, which must include the name of the queue whose URL you want. Call the `getQueueUrl` method. The callback returns the URL of the specified queue.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create an SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});
var params = {
  QueueName: 'SQS_QUEUE_NAME'
};

sqs.getQueueUrl(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.QueueUrl);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_getqueueurl.js
```

This sample code can be found here on GitHub.

Deleting a Queue

Create a Node.js module with the file name `sqs_deletequeue.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to delete a queue, which consists of the URL of the queue you want to delete. Call the `deleteQueue` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create an SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var params = {
  QueueUrl: 'SQS_QUEUE_URL'
 };

sqs.deleteQueue(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_deletequeue.js
```

This sample code can be found here on GitHub.

Sending and Receiving Messages in Amazon SQS

	This Node.js example shows you how to send, receive, and delete messages in a queue.	

The Scenario

In this example, a series of Node.js modules are used to send and receive messages. The Node.js modules use the SDK for JavaScript to send and receive messages by using these methods of the `AWS.SQS` client class:

- `sendMessage`
- `receiveMessage`
- `deleteMessage`

For more information about Amazon SQS messages, see Sending a Message to an Amazon SQS Queue and Receiving and Deleting a Message from an Amazon SQS Queue in the *Amazon Simple Queue Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create an Amazon SQS queue. For an example of creating a queue, see Using Queues in Amazon SQS (p. 159).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided by using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Sending a Message to a Queue

Create a Node.js module with the file name `sqs_sendmessage.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed for your message, including the URL of the queue to which you want to send this message. In this example, the message provides details about a book on a list of fiction best sellers including the title, author, and number of weeks on the list.

Call the `sendMessage` method. The callback returns the unique ID of the message.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create an SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});
var params = {
 DelaySeconds: 10,
 MessageAttributes: {
  "Title": {
    DataType: "String",
    StringValue: "The Whistler"
   },
  "Author": {
    DataType: "String",
    StringValue: "John Grisham"
   },
  "WeeksOn": {
    DataType: "Number",
    StringValue: "6"
   }
 },
 MessageBody: "Information about current NY Times fiction bestseller for week of
 12/11/2016.",
 QueueUrl: "SQS_QUEUE_URL"
};

sqs.sendMessage(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.MessageId);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_sendmessage.js
```

This sample code can be found here on GitHub.

Receiving and Deleting Messages from a Queue

Create a Node.js module with the file name `sqs_receivemessage.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed for your message, including the URL of the queue from which you want to receive messages. In this example, the parameters specify receipt of all message attributes, as well as receipt of no more than 10 messages.

Call the `receiveMessage` method. The callback returns an array of `Message` objects from which you can retrieve `ReceiptHandle` for each message that you use to later delete that message. Create another JSON object containing the parameters needed to delete the message, which are the URL of the queue and the `ReceiptHandle` value. Call the `deleteMessage` method to delete the message you received.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create an SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var queueURL = "SQS_QUEUE_URL";

var params = {
 AttributeNames: [
    "SentTimestamp"
 ],
 MaxNumberOfMessages: 1,
 MessageAttributeNames: [
    "All"
 ],
 QueueUrl: queueURL,
 VisibilityTimeout: 0,
 WaitTimeSeconds: 0
};

sqs.receiveMessage(params, function(err, data) {
  if (err) {
    console.log("Receive Error", err);
  } else {
    var deleteParams = {
      QueueUrl: queueURL,
      ReceiptHandle: data.Messages[0].ReceiptHandle
    };
    sqs.deleteMessage(deleteParams, function(err, data) {
      if (err) {
        console.log("Delete Error", err);
      } else {
        console.log("Message Deleted", data);
      }
    });
  }
});
```

To run the example, type the following at the command line.

```
node sqs_receivemessage.js
```

This sample code can be found here on GitHub.

Managing Visibility Timeout in Amazon SQS

	This Node.js example shows you how to specify the time interval during which messages received by a queue are not visible.	

The Scenario

In this example, a Node.js module is used to manage visibility timeout. The Node.js module uses the SDK for JavaScript to manage visibility timeout by using this method of the `AWS.SQS` client class:

- `changeMessageVisibility`

For more information about Amazon SQS visibility timeout, see Visibility Timeout in the *Amazon Simple Queue Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.

- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create an Amazon SQS queue. For an example of creating a queue, see Using Queues in Amazon SQS (p. 159).
- Send a message to the queue. For an example of sending a message to a queue, see Sending and Receiving Messages in Amazon SQS (p. 162).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided by using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');
```

Changing the Visibility Timeout

Create a Node.js module with the file name `sqs_changingvisibility.js`. Be sure to configure the SDK as previously shown. To access Amazon Simple Queue Service, create an `AWS.SQS` service object. Receive the message from the queue.

Upon receipt of the message from the queue, create a JSON object containing the parameters needed for setting the timeout, including the URL of the queue containing the message, the `ReceiptHandle` returned when the message was received, and the new timeout in seconds. Call the `changeMessageVisibility` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set the region from the JSON file
AWS.config.loadFromPath('./config.json');

// Create the SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var queueURL = "SQS_QUEUE_URL";

var params = {
 AttributeNames: [
    "SentTimestamp"
 ],
 MaxNumberOfMessages: 1,
 MessageAttributeNames: [
    "All"
 ],
 QueueUrl: queueURL
};

sqs.receiveMessage(params, function(err, data) {
  if (err) {
    console.log("Receive Error", err);
  } else {
    var visibilityParams = {
      QueueUrl: queueURL,
      ReceiptHandle: data.Messages[0].ReceiptHandle,
   VisibilityTimeout: 36000 // 10 hour timeout
  };
  sqs.changeMessageVisibility(visibilityParams, function(err, data) {
   if (err) {
    console.log("Delete Error", err);
   } else {
    console.log("Timeout Changed", data);
   }
  });
 }
});
```

To run the example, type the following at the command line.

```
node sqs_changingvisibility.js
```

This sample code can be found here on GitHub.

Enabling Long Polling in Amazon SQS

This Node.js example shows you how to enable long polling in Amazon SQS in one of these ways:

- For a newly created queue
- For an existing queue
- Upon receipt of a message

The Scenario

Long polling reduces the number of empty responses by allowing Amazon SQS to wait a specified time for a message to become available in the queue before sending a response. Also, long polling eliminates false empty responses by querying all of the servers instead of a sampling of servers. To enable long polling, you must specify a non-zero wait time for received messages. You can do this by setting the `ReceiveMessageWaitTimeSeconds` parameter of a queue or by setting the `WaitTimeSeconds` parameter on a message when it is received.

In this example, a series of Node.js modules are used to enable long polling. The Node.js modules use the SDK for JavaScript to enable long polling using these methods of the `AWS.SQS` client class:

- `setQueueAttributes`
- `receiveMessage`
- `createQueue`

For more information about Amazon SQS long polling, see Long Polling in the *Amazon Simple Queue Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');

// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Enabling Long Polling When Creating a Queue

Create a Node.js module with the file name `sqs_longpolling_createqueue.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to create a queue, including a non-zero value for the `ReceiveMessageWaitTimeSeconds` parameter. Call the `createQueue` method. Long polling is then enabled for the queue.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var params = {
  QueueName: 'SQS_QUEUE_NAME',
  Attributes: {
    'ReceiveMessageWaitTimeSeconds': '20',
  }
};

sqs.createQueue(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data.QueueUrl);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_longpolling_createqueue.js
```

This sample code can be found here on GitHub.

Enabling Long Polling on an Existing Queue

Create a Node.js module with the file name `sqs_longpolling_existingqueue.js`. Be sure to configure the SDK as previously shown. To access Amazon Simple Queue Service, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to set the attributes of queue, including a non-zero value for the `ReceiveMessageWaitTimeSeconds` parameter and the URL of the queue. Call the `setQueueAttributes` method. Long polling is then enabled for the queue.

```
// Load the AWS SDK for Node.js
```

```
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var params = {
 Attributes: {
  "ReceiveMessageWaitTimeSeconds": "20",
 },
 QueueUrl: "SQS_QUEUE_URL"
};

sqs.setQueueAttributes(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_longpolling_existingqueue.js
```

This sample code can be found here on GitHub.

Enabling Long Polling on Message Receipt

Create a Node.js module with the file name `sqs_longpolling_receivemessage.js`. Be sure to configure the SDK as previously shown. To access Amazon Simple Queue Service, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to receive messages, including a non-zero value for the `WaitTimeSeconds` parameter and the URL of the queue. Call the `receiveMessage` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var queueURL = "SQS_QUEUE_URL";

var params = {
 AttributeNames: [
    "SentTimestamp"
 ],
 MaxNumberOfMessages: 1,
 MessageAttributeNames: [
    "All"
 ],
 QueueUrl: queueURL,
 WaitTimeSeconds: 20
};

sqs.receiveMessage(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_longpolling_receivemessage.js
```

This sample code can be found here on GitHub.

Using Dead Letter Queues in Amazon SQS

	This Node.js example shows you how to use a queue to receive and hold messages from other queues that the queues can't process.	

The Scenario

A dead letter queue is one that other (source) queues can target for messages that can't be processed successfully. You can set aside and isolate these messages in the dead letter queue to determine why their processing did not succeed. You must individually configure each source queue that sends messages to a dead letter queue. Multiple queues can target a single dead letter queue.

In this example, a Node.js module is used to route messages to a dead letter queue. The Node.js module uses the SDK for JavaScript to use dead letter queues using this method of the `AWS.SQS` client class:

- `setQueueAttributes`

For more information about Amazon SQS dead letter queues, see Using Amazon SQS Dead Letter Queues in the *Amazon Simple Queue Service Developer Guide*.

Prerequisite Tasks

To set up and run this example, you must first complete these tasks:

- Install Node.js. For more information about installing Node.js, see the Node.js website.
- Create a JSON file named `config.json` with your credentials and the region setting. For more information about providing your credentials using a JSON file, see Loading Credentials in Node.js from a JSON File (p. 22).
- Create an Amazon SQS queue to serve as a dead letter queue. For an example of creating a queue, see Using Queues in Amazon SQS (p. 159).

Configuring the SDK

Configure the SDK for JavaScript by creating a global configuration object, setting the region, and providing credentials for your code. In this example, the credentials are provided using the JSON file you created.

```
// Load the SDK for JavaScript
var AWS = require('aws-sdk');
```

```
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');
```

Configuring Source Queues

After you create a queue to act as a dead letter queue, you must configure the other queues that route unprocessed messages to the dead letter queue. To do this, specify a redrive policy that identifies the queue to use as a dead letter queue and the maximum number of receives by individual messages before they are routed to the dead letter queue.

Create a Node.js module with the file name `sqs_deadletterqueue.js`. Be sure to configure the SDK as previously shown. To access Amazon SQS, create an `AWS.SQS` service object. Create a JSON object containing the parameters needed to update queue attributes, including the `RedrivePolicy` parameter that specifies both the ARN of the dead letter queue, as well as the value of `maxReceiveCount`. Also specify the URL source queue you want to configure. Call the `setQueueAttributes` method.

```
// Load the AWS SDK for Node.js
var AWS = require('aws-sdk');
// Load credentials and set region from JSON file
AWS.config.loadFromPath('./config.json');

// Create the SQS service object
var sqs = new AWS.SQS({apiVersion: '2012-11-05'});

var params = {
 Attributes: {
  "RedrivePolicy": "{\"deadLetterTargetArn\":\"DEAD_LETTER_QUEUE_ARN\",\"maxReceiveCount\":
\"10\"}",
 },
 QueueUrl: "SOURCE_QUEUE_URL"
};

sqs.setQueueAttributes(params, function(err, data) {
  if (err) {
    console.log("Error", err);
  } else {
    console.log("Success", data);
  }
});
```

To run the example, type the following at the command line.

```
node sqs_deadletterqueue.js
```

This sample code can be found here on GitHub.

Tutorials

The following tutorials show you how to perform different tasks related to using the AWS SDK for JavaScript.

Topics

Tutorial: Setting Up Node.js on an Amazon EC2 Instance

A common scenario for using Node.js with the SDK for JavaScript is to set up and run a Node.js web application on an Amazon Elastic Compute Cloud (Amazon EC2) instance. In this tutorial, you will create a Linux instance, connect to it using SSH, and then install Node.js to run on that instance.

Prerequisites

This tutorial assumes that you have already launched a Linux instance with a public DNS name that is reachable from the Internet and to which you are able to connect using SSH. For more information, see Step 1: Launch an Instance in the *Amazon EC2 User Guide for Linux Instances*.

You must also have configured your security group to allow `SSH` (port 22), `HTTP` (port 80), and `HTTPS` (port 443) connections. For more information about these prerequisites, see Setting Up with Amazon EC2 in the *Amazon EC2 User Guide for Linux Instances*.

Procedure

The following procedure helps you install Node.js on an Amazon Linux instance. You can use this server to host a Node.js web application.

To set up Node.js on your Linux instance

1. Connect to your Linux instance as `ec2-user` using SSH.
2. Install node version manager (nvm) by typing the following at the command line.

```
curl -o- https://raw.githubusercontent.com/creationix/nvm/v0.32.0/install.sh | bash
```

We will use nvm to install Node.js because nvm can install multiple versions of Node.js and allow you to switch between them.

3. Activate nvm by typing the following at the command line.

```
. ~/.nvm/nvm.sh
```

4. Use nvm to install the version of Node.js you intend to use by typing the following at the command line.

```
nvm install 4.4.5
```

Installing Node.js also installs the Node Package Manager (npm) so you can install additional modules as needed.

5. Test that Node.js is installed and running correctly by typing the following at the command line.

```
node -e "console.log('Running Node.js ' + process.version)"
```

This should display the following message that confirms the installed version of Node.js running.

```
Running Node.js v4.4.5
```

Creating an Amazon Machine Image

After you install Node.js on an Amazon EC2 instance, you can create an Amazon Machine Image (AMI) from that instance. Creating an AMI makes it easy to provision multiple Amazon EC2 instances with the same Node.js installation. For more information about creating an AMI from an existing instance, see Creating an Amazon EBS-Backed Linux AMI in the *Amazon EC2 User Guide for Linux Instances*.

Related Resources

For more information about the commands and software used in this topic, see the following web pages:

- node version manager (nvm): see nvm repo on GitHub.
- node package manager (npm): see npm website.

JavaScript API Reference

The API Reference topics for version 2.119.0 of the SDK for JavaScript are found at

http://docs.aws.amazon.com/AWSJavaScriptSDK/latest/index.html.

SDK Changelog on GitHub

The changelog for releases from version 2.4.8 and later is found at

https://github.com/aws/aws-sdk-js/blob/master/CHANGELOG.md.

Additional Resources

The following links provide additional resources you can use with the SDK for JavaScript.

JavaScript SDK Forum

You can find questions and discussions on matters of interest to users of the SDK for JavaScript in the JavaScript SDK Forum.

JavaScript SDK Issues on GitHub

You can find discussion of current SDK for JavaScript issues and their status in the SDK repo on GitHub.

JavaScript SDK on Gitter

You can also find questions and discussions about the SDK for JavaScript in the JavaScript SDK community on Gitter.

Document History for AWS SDK for JavaScript

The following table describes the documentation for this release of the AWS SDK for JavaScript.

- **SDK version:** v2.118.0
- **Latest documentation update:** August 9, 2017

Change	Description	Date
Usability Improvements	Based on recent usability testing, a number of changes have been made to improve documentation usability. • Code samples are more clearly identified as targeted either for browser or Node.js execution. • TOC links no longer jump immediately to other web content, including the API Reference. • Includes more linking in Getting Started section to details on obtaining AWS credentials. • Provides more information about common Node.js features needed to use the SDK. For more information, see Node.js Considerations (p. 30).	August 9, 2017
New DynamoDB Code Examples	The section with SDK code examples has been updated	June 21, 2017

Change	Description	Date
	to re-write the two previous examples as well as add three brand new examples for working with DynamoDB. For more information about these code examples, see Amazon DynamoDB Examples (p. 72).	
New IAM Code Examples	The section with SDK code examples has been updated to include five new examples for working with IAM. For more information about these code examples, see AWS IAM Examples (p. 106).	December 23, 2016
New CloudWatch and Amazon SQS Code Examples	The section with SDK code examples has been updated to include new examples for working with CloudWatch and with Amazon SQS. For more information about these code examples, see Amazon CloudWatch Examples (p. 56) and Amazon SQS Examples (p. 159).	December 20, 2016
New Amazon EC2 Code Examples	The section with SDK code examples has been updated to include five new examples for working with Amazon EC2. For more information about these code examples, see Amazon EC2 Examples (p. 87).	December 15, 2016
List of supported browsers made more visible	The list of browsers supported by the SDK for JavaScript, which was previously found in the topic on Prerequisites, has been given its own topic to make it more visible in the table of contents.	November 16, 2016
Initial publication of the new Developer Guide	The previous Developer Guide is now deprecated. The new Developer Guide has been reorganized to make information easier to find. When either Node.js or browser JavaScript scenarios present special considerations, those are identified as appropriate. The guide also provides additional code examples that are better organized to make them easier and faster to find.	October 28, 2016