Amazon Cognito

Developer Guide

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Amazon Cognito: Developer Guide

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What is Amazon Cognito?

Welcome to the Amazon Cognito Developer Guide. Amazon Cognito is a service that enables you to create unique identities for your users and authenticate them using either your own user pools or by using federated identity providers. You can save mobile user data, such as app preferences or game state, in the AWS Cloud without writing any back-end code or managing any infrastructure.

Topics

Are You a First-Time Amazon Cognito User?

If you are a first-time user of Amazon Cognito, we recommend that you begin by reading the following sections:

- Setting Up Amazon Cognito (p. 3)
- Identity Pools (p. 106)
- Setting up User Pools (p. 11)

Features of Amazon Cognito

Amazon Cognito Your User Pools: You can create and maintain a user directory and add sign-up and sign-in to your mobile app or web application using user pools. User pools scale to hundreds of millions of users and provide simple, secure, and low-cost options for you as a developer. For more information, see Creating and Managing User Pools (p. 10).

Amazon Cognito Federated Identities: Amazon Cognito Identity enable you to create unique identities for your users and authenticate them with federated identity providers. With a federated identity, you can obtain temporary, limited-privilege AWS credentials to synchronize data with Amazon Cognito Sync, or directly access other AWS services. Amazon Cognito Federated Identities support federated identity providers—including Amazon, Facebook, Google, and SAML identity providers—as well as unauthenticated identities. This feature also supports developer authenticated identities, which let you register and authenticate users via your own back-end authentication process.

Amazon Cognito Sync: Amazon Cognito Sync is an AWS service and client library that enables cross-device syncing of application-related user data. You can use it to synchronize user profile data across mobile devices and the web without requiring your own back end. The client libraries cache data locally so your app can read and write data regardless of device connectivity status. When the device is online, you can synchronize data, and if you set up push sync, notify other devices immediately that an update is available.

Accessing Amazon Cognito

Amazon Cognito can be accessed using the Amazon Cognito console, the AWS Command Line Interface, and the Amazon Cognito APIs.

- The Amazon Cognito Your User Pool APIs are documented in the User Pools API Reference.
- The Amazon Cognito Federated Identities APIs are documented in the Amazon Cognito Identity API Reference.
- The Amazon Cognito Sync APIs are documented in the Amazon Cognito Sync APIs.

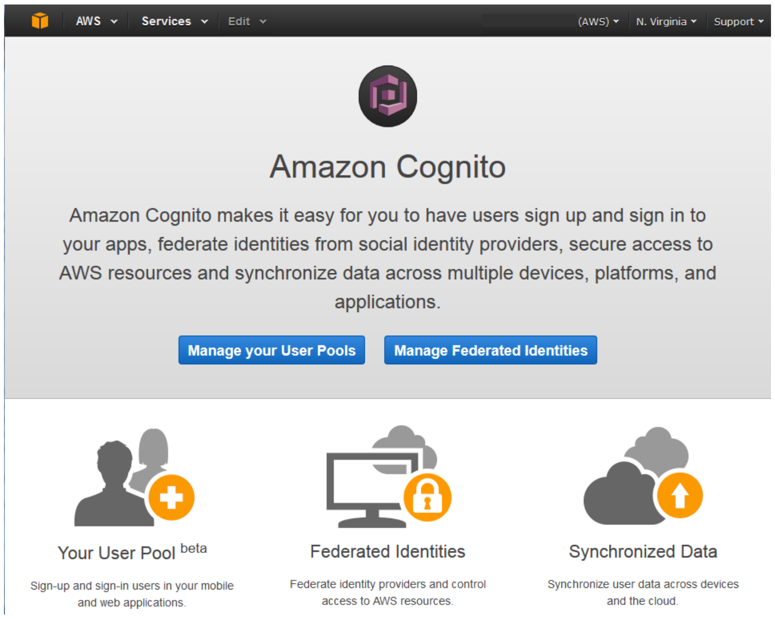
Pricing for Amazon Cognito

For information on Amazon Cognito pricing, see https://aws.amazon.com/cognito/pricing/.

Getting Started

For information on getting started with Amazon Cognito user pools or federated identities, see the following sections.

Topics



Amazon Cognito

Amazon Cognito makes it easy for you to have users sign up and sign in to your apps, federate identities from social identity providers, secure access to AWS resources and synchronize data across multiple devices, platforms, and applications.

Your User Pool beta

Sign-up and sign-in users in your mobile and web applications.

Federated Identities

Federate identity providers and control access to AWS resources.

Synchronized Data

Synchronize user data across devices and the cloud.

Setting Up Amazon Cognito

You can obtain an identity, get credentials, and start syncing data or interacting with other AWS services from your app with a few steps.

Topics

Sign Up for AWS

To use Amazon Cognito, you need an AWS account. If you don't already have one, use the following procedure to sign up:

To sign up for an AWS account

1. Open http://aws.amazon.com/, and then choose **Create an AWS Account**.
2. Follow the online instructions.

   Part of the sign-up procedure involves receiving a phone call and entering a PIN using the phone keypad.

Creating a Pool in Amazon Cognito

You must create a user pool or an identity pool to obtain AWS credentials using Amazon Cognito Identity as your credential provider. Using a credential provider allows your application to access AWS services without having to embed your private credentials in your application. This also allows you to set permissions to control which AWS services your users have access to.

Amazon Cognito offers two options for managing user credentials: you can create **Your User Pool** using Amazon Cognito Identity, or you can create an identity pool using **Federated Identities**, such as a Facebook or Google login provider.

User pools use Amazon Cognito Identity to scale to hundreds of millions of users and provide simple, secure, and low-cost options for you as a developer. For more information see Creating and Managing User Pools (p. 10).

To create a new user pool for your application

1. Sign in to the Amazon Cognito console and choose **Manage your User Pools**.
2. Follow the steps in the wizard.

   For more information, see Creating and Managing User Pools (p. 10).

Identity pools use external identity providers such as Facebook, Amazon.com, Google, or Twitter/ Digits. An identity pool is a store of user identity data specific to your account. Every identity pool has configurable IAM roles that you can use to specify which AWS services your application's users can access. Typically, a developer will use one identity pool per application. For more information, see Identity Pools (p. 106).

To create a new identity pool for your application

1. Sign in to the Amazon Cognito console, choose **Manage Federated Identities**, and then choose **Create new identity pool**.
2. Type a name for your identity pool, select **Enable access to unauthenticated identities**, and then choose **Create Pool**.
3. Choose **Allow** to create the two default roles associated with your identity pool–one for unauthenticated users and one for authenticated users. These default roles provide your identity

pool access to Amazon Cognito Sync. You can modify the roles associated with your identity pool in the IAM console. For additional instructions on working with the Amazon Cognito console, see Using the Amazon Cognito Console (p. 202).

After you have set up your identity pool, see Amazon Cognito Identity: Using Federated Identities (p. 106).

Install the Mobile SDK

To use Amazon Cognito, you must install and configure the AWS Mobile SDK. For more information, see the following topics:

- Set Up the AWS Mobile SDK for Android
- Set Up the AWS Mobile SDK for iOS
- Set Up the AWS SDK for JavaScript
- Set Up the AWS Mobile SDK for Unity
- Set Up the AWS Mobile SDK for Xamarin

Step 1: Obtain AWS Credentials

Android

Initialize the credentials provider:

```
CognitoCachingCredentialsProvider credentialsProvider = new
 CognitoCachingCredentialsProvider(
  getApplicationContext(), // Context
  "IDENTITY_POOL_ID", // Identity Pool ID
  Regions.US_EAST_1 // Region
);
```

iOS - Objective-C

Import the Amazon Cognito header files:

```
#import <AWSCore/AWSCore.h>
#import <AWSCognito/AWSCognito.h>
```

Then initialize the credentials provider:

```
AWSCognitoCredentialsProvider *credentialsProvider =
 [[AWSCognitoCredentialsProvider alloc]
 initWithRegionType:AWSRegionUSEast1
 identityPoolId:@"IDENTITY_POOL_ID"];

AWSServiceConfiguration *configuration = [[AWSServiceConfiguration alloc]
 initWithRegion:AWSRegionUSEast1 credentialsProvider:credentialsProvider];

[AWSServiceManager defaultServiceManager].defaultServiceConfiguration =
 configuration;
```

iOS - Swift

Import the Amazon Cognito header files:

```
#import <AWSCore/AWSCore.h>
#import <AWSCognito/AWSCognito.h>
```

Then initialize the credentials provider:

```
let credentialsProvider = AWSCognitoCredentialsProvider(regionType:
 AWSRegionType.USEast1, identityPoolId: "IDENTITY_POOL_ID")
let configuration = AWSServiceConfiguration(region: AWSRegionType.USEast1,
 credentialsProvider: credentialsProvider)
AWSServiceManager.defaultServiceManager().defaultServiceConfiguration =
 configuration
```

JavaScript

Initialize the credentials provider:

```
AWS.config.region = 'us-east-1';
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
    IdentityPoolId: 'IDENTITY_POOL_ID',
});
```

Unity

Obtain AWS credentials:

```
CognitoAWSCredentials credentials = new CognitoAWSCredentials (
  "IDENTITY_POOL_ID", // Identity Pool ID
  RegionEndpoint.USEast1 // Region
);
```

Xamarin

Obtain AWS credentials:

```
CognitoAWSCredentials credentials = new CognitoAWSCredentials (
  "IDENTITY_POOL_ID", // Identity Pool ID
  RegionEndpoint.USEast1 // Region
);
```

Step 2: Store and Sync Data

Android

Initialize the Amazon Cognito Sync client:

```
CognitoSyncManager syncClient = new CognitoSyncManager(
    getApplicationContext(), // Context
    Regions.US_EAST_1, // Region
    credentialsProvider
);
```

Then, create a dataset, add a record, and synchronize it with the server:

```
Dataset dataset = syncClient.openOrCreateDataset("myDataset");
dataset.put("myKey", "myValue");
dataset.synchronize(new DefaultSyncCallback() {
  @Override
  public void onSuccess(Dataset dataset, List newRecords) {
      //Your handler code here
  }
});
```

iOS - Objective-C

Initialize the Amazon Cognito Sync client:

```
AWSCognito *syncClient = [AWSCognito defaultCognito];
```

Then, create a dataset, add a record, and synchronize it with the server:

```
AWSCognitoDataset *dataset = [syncClient openOrCreateDataset:@"myDataset"];
[dataset setString:@"myValue" forKey:@"myKey"];
[[dataset synchronize] continueWithBlock:^id(AWSTask *task) {
    // Your handler code here
    return nil;
}];
```

iOS - Swift

Initialize the Amazon Cognito Sync client:

```
let syncClient = AWSCognito.defaultCognito()
```

Then, create a dataset, add a record, and synchronize it with the server:

```
let dataset = syncClient.openOrCreateDataset("myDataset")
dataset.setString("myValue", forKey: "myKey")
dataset.synchronize().continueWithBlock {(task: AWSTask!) -> AnyObject! in
    //Your handler code here
    return nil
}
```

JavaScript

Download the Amazon Cognito Sync Manager library from GitHub and include it in your project. Then, initialize the Amazon Cognito Sync client:

```
AWS.config.credentials.get(function(){
var syncClient = new AWS.CognitoSyncManager();
syncClient.openOrCreateDataset('myDataset', function(err, dataset) {
   dataset.put('myKey', 'myValue', function(err, record){
   dataset.synchronize({
     onSuccess: function(data, newRecords) {
         // Your handler code here
     }
    });
   });
  });
});
```

Unity

Initialize the Amazon Cognito Sync client:

```
CognitoSyncManager syncManager = new CognitoSyncManager (
      credentials,
      new AmazonCognitoSyncConfig {
          RegionEndpoint = RegionEndpoint.USEast1 // Region
      }
    );
```

Then, create a dataset, add a record, and synchronize it with the server:

```
Dataset dataset = syncManager.OpenOrCreateDataset("myDataset");
dataset.OnSyncSuccess += SyncSuccessCallback;
dataset.Put("myKey", "myValue");
dataset.Synchronize();

void SyncSuccessCallback(object sender, SyncSuccessEvent e) {
  // Your handler code here
}
```

Xamarin

Initialize the Amazon Cognito Sync client:

```
Dataset dataset = syncManager.OpenOrCreateDataset("myDataset");
dataset.OnSyncSuccess += SyncSuccessCallback;
dataset.Put("myKey", "myValue");
dataset.Synchronize();

void SyncSuccessCallback(object sender, SyncSuccessEvent e) {
    // Your handler code here
}
```

Then, create a record in a dataset and synchronize it with the server:

```
Dataset dataset = syncManager.OpenOrCreateDataset("myDataset");
dataset.OnSyncSuccess += SyncSuccessCallback;
dataset.Put("myKey", "myValue");
dataset.SynchronizeAsync();

void SyncSuccessCallback(object sender, SyncSuccessEvent e) {
    // Your handler code here
}
```

Creating and Managing User Pools

Create and maintain a user directory and add sign-up and sign-in to your mobile app or web application using user pools. User pools scale to hundreds of millions of users and are designed to provide simple, secure, and low-cost options for you as a developer.

You can use user pools to add user registration and sign-in features to your apps. Instead of using external identity providers (p. 122) such as Facebook, Google, or Twitter, you can use user pools to let users register with or sign in to an app using an email address, phone number, or a user name. You can also create custom registration fields and store that metadata in your user directory. You can verify email addresses and phone numbers, recover passwords, and enable multi-factor authentication (MFA) with just a few lines of code.

User pools are for mobile and web app developers who want to handle user registration and sign-in directly in their apps. Previously, you needed to implement your own user directory to create user accounts, store user profiles, and implement password recovery flows to support user registration and sign-in.

User pools integrate easily with the existing Amazon Cognito functionality for anonymous and social identities. In addition, a user can start as an anonymous user and then either sign in using a social identity or using user pools to register and sign in using email, phone number, or user name.

You can get started with user pools by using the AWS Management Console, the AWS Command Line Interface, or the APIs provided in one of our SDKs. For more information, see Setting up User Pools (p. 11).

To learn more about user pool settings, such as attributes, policies, multi-factor authentication, and triggers, see Getting Started: Step Through Amazon Cognito User Pool Settings in the AWS Management Console (p. 13).

Topics

Setting up User Pools

To create a new user pool for Amazon Cognito, you can use the AWS Management Console, the AWS CLI, or the Amazon Cognito API.

Creating a New User Pool Using the Console

You can create a new user pool by choosing **Create new pool** from the Amazon Cognito console and following the instructions. For a step-by-step walkthrough, see Quickstart: Using the Console to Create a New User Pool (p. 11).

Creating a New User Pool Using the AWS CLI

You can create a new user pool using the create-user-pool command in the AWS CLI.

For more information, see the Amazon Cognito Identity AWS CLI Reference.

Creating a New User Pool Using the API

You can create a new user pool using the `CreateUserPool()` API. For more information, see CreateUserPool.

You can also use one of the following SDKs to create and manage new user pools:

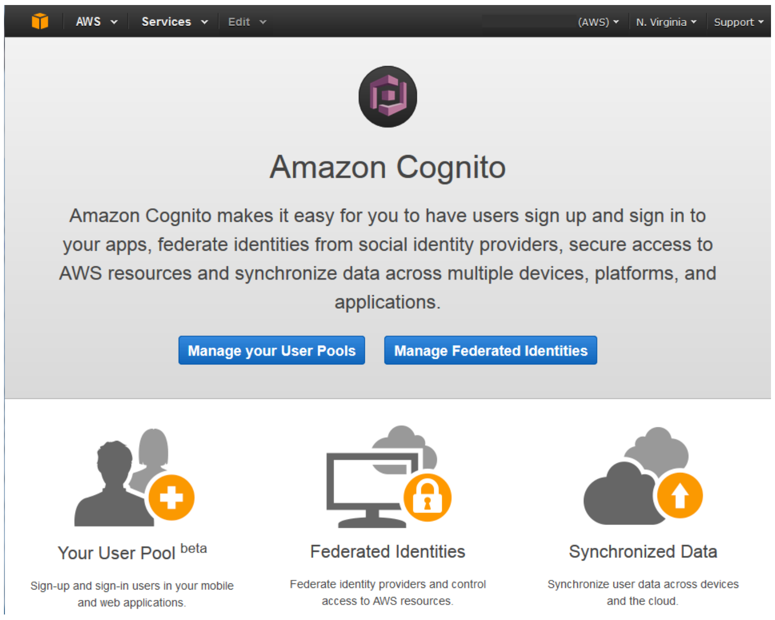
- Setting Up the AWS Mobile SDK for Android to Work with User Pools (p. 22)
- Setting Up the AWS Mobile SDK for iOS to Work with User Pools (p. 37)
- Setting up the AWS SDK for JavaScript (p. 48)

Quickstart: Using the Console to Create a New User Pool

The following procedure shows how to create a new user pool using the AWS Management Console.

To create a new user pool using the AWS Management Console

1. Open the Amazon Cognito console.
2. On the Amazon Cognito home page, choose **Manage your User Pools**.



Amazon Cognito

Amazon Cognito makes it easy for you to have users sign up and sign in to your apps, federate identities from social identity providers, secure access to AWS resources and synchronize data across multiple devices, platforms, and applications.

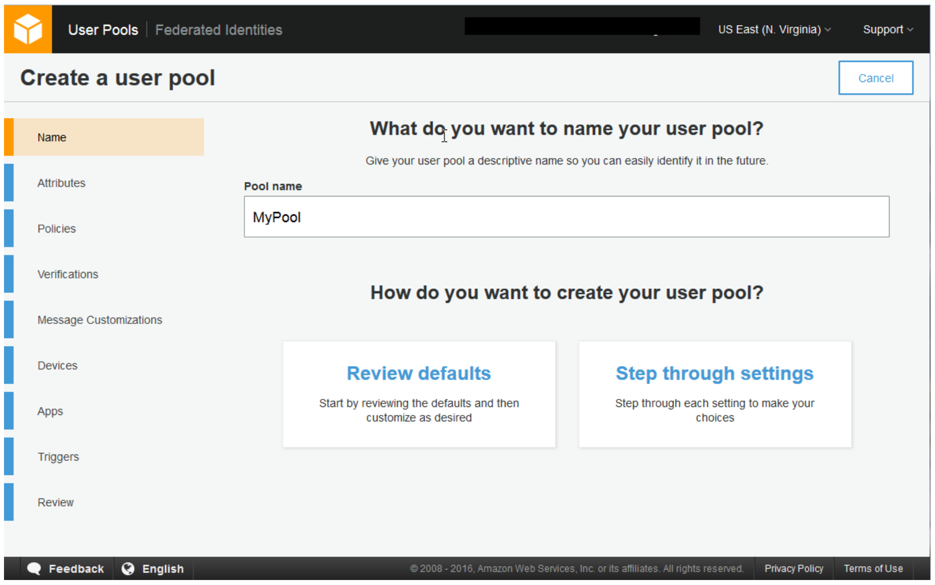
Sign-up and sign-in users in your mobile and web applications.

Federate identity providers and control access to AWS resources.

Synchronize user data across devices and the cloud.

3. Choose **Create a User Pool** to get started.
4. Specify a **Pool name**.

   Pool names must be between one and 128 characters long. They can contain uppercase and lowercase letters (a-z, A-Z), numbers (0-9), and the following special characters: + = , . @ and -.
5. Next, decide how you want to create your user pool.



Create a user pool

What do you want to name your user pool?

Give your user pool a descriptive name so you can easily identify it in the future.

Pool name: MyPool

How do you want to create your user pool?

Start by reviewing the defaults and then customize as desired

Step through each setting to make your choices

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   To create a user pool with the default settings, choose **Review defaults**, and then choose **Create pool**. You can still customize settings from the default values.

   To step through each setting to make your choices, choose **Step through settings** and go to the next step. For more information, see Getting Started: Step Through Amazon Cognito User Pool Settings in the AWS Management Console (p. 13).
6. Review your user pool configuration in the next step, and then choose **Create pool**.

Getting Started: Step Through Amazon Cognito User Pool Settings in the AWS Management Console

You can customize the user pool settings to the needs of your app. This topic describes each category of settings and gives you detailed information about attributes, policies, email and phone verification, multi-factor authentication, apps, triggers, and trusted devices.

Topics

Specifying a User Pool Name

You must specify a **Pool Name** for your Amazon Cognito user pool in the AWS Management Console. The name cannot be changed after the user pool is created.

Pool names must be between one and 128 characters long. They can contain uppercase and lowercase letters (a-z, A-Z), numbers (0-9), and the following special characters: + = , . @ and -.

Specifying User Pool Attribute Settings

You can add standard or custom attributes to your user pool definition in the AWS Management Console. This topic describes those attributes in detail and gives you tips on how to set up your user pool.

Attributes are pieces of information that help you identify individual users, such as name, email, and phone number.

Not all information about your users should be stored in attributes. For example, user data that changes frequently, such as usage statistics or game scores, should be kept in a separate data store, such as Amazon DynamoDB.

Standard attributes

There are 16 standard attributes for all users in a user pool:

- address
- birthdate
- email
- family name
- gender
- given name
- locale
- middle name

- name
- nickname
- phone number
- picture
- preferred username
- profile
- timezone
- website

These attributes will be available as optional attributes for all users. To make an attribute required, select the check box next to the attribute.

> **Note**
> When a standard attribute is marked required, a user cannot register unless a value for the attribute is provided. An attribute cannot be switched between required or not required after a user pool has been created.

Standard attribute names are between one and 32 characters long.

Standard attribute values can be any string up to 2048 characters by default, but some attribute values have formatting restrictions. Only **email** and **phone** can be verified. For more information about attributes, see the OpenID Connect specification.

> **Note**
> In the specification, attributes are called *members*.

Here are some additional notes regarding some of the above fields.

email
: Email address values can be verified.

phone
: A phone number will automatically be required if multi-factor authentication (MFA) is enabled. For more information, see Multi-factor Authentication (MFA) (p. 17).

  Phone number values can be verified.

  An administrator with proper AWS account permissions can change the user's phone number.

  > **Important**
  > Phone numbers must follow these formatting rules: A phone number must start with a plus (**+**) sign, followed immediately by the country code. A phone number can only contain the **+** sign and digits. You must remove any other characters from a phone number, such as parentheses, spaces, or dashes (**-**) before submitting the value to the service. For example, a United States-based phone number must follow this format: **`+14325551212`**.

preferred_username
: The **preferred_username** cannot be selected as both required and as an alias. If **preferred_username** is an alias, a user can update the attribute once he or she is confirmed.

To edit standard attributes

1. On the **Attributes** tab, choose the attributes you will require for user registration. If an attribute is required and a user doesn't provide the required attribute, the user cannot register.

   > **Important**
   > You will not be able to change these requirements after the user pool is created. For more information, see Specifying User Pool Attribute Settings (p. 13).

2. To create an alias for email, phone number, address, or preferred username, choose **Alias**. For more information on aliases, see Using Aliases to Simplify User Sign-Up and Sign-In (p. 15).
3. Choose **Save changes** or move on to create Custom Attributes (p. 16).

Usernames and Preferred Usernames

The **username** value is a separate attribute and not the same as the **name** attribute. A **username** is always required to register a user, and it cannot be changed after a user is created.

> **Note**
> Developers can use the **preferred_username** attribute to give users a username that they can change. For more information, see Using Aliases to Simplify User Sign-Up and Sign-In (p. 15).

You do not have to ask users to provide a **username**, and your app can create one for them if, for example, you want users to register and sign in with an email address and password. For more information, see Using Aliases to Simplify User Sign-Up and Sign-In (p. 15).

The **username** must be unique within a user pool. A **username** can be reused, but only after it has been deleted and is no longer in use.

Using Aliases to Simplify User Sign-Up and Sign-In

By using aliases, you can customize your app's sign-in experience to suit the needs of your users.

By default, users sign in with their username and password. The username is a fixed value that users cannot change. If you mark an attribute as an alias, your users can sign in using that attribute in place of the username. The email address, phone number, and preferred username attributes can be marked as aliases.

For example, if email and phone are selected as aliases for a user pool, users in that user pool can sign in using their username, email address, or phone number along with their password.

If email is selected as an alias, a username cannot match a valid email format. Similarly, if phone number is selected as an alias, a username that matches a valid phone number pattern will not be accepted by the service for that user pool.

> **Note**
> Alias values must be unique in a user pool. If an alias is configured for an email address or phone number, the value provided can be in a verified state in only one account. During sign-up, if an email address or phone number is supplied as an alias from a different account that has already been used, registration succeeds. Nevertheless, when a user tries to confirm the account with this email (or phone number) and enters the valid code, an `AliasExistsException` error is thrown. The error indicates to the user that an account with this email (or phone number) already exists. At this point, the user can abandon the new account creation and can try to reset the password for the old account. If the user chooses to continue creating the new account, your app should call the `ConfirmSignUp` API with the `forceAliasCreation` option. This moves the alias from the previous account to the newly created account, and it also marks the attribute unverified in the previous account.

Phone numbers and email addresses only become active aliases for a user after the phone numbers and email addresses have been verified. We therefore recommend that you choose automatic verification of email addresses and phone numbers if you choose to use them as aliases.

The **preferred_username** attribute is included so that users can have the experience of changing their username, when in fact the actual username value for a user is not changeable.

If you want to allow users to have the experience of a changeable username, submit their new "username" value as a **preferred_username** and choose **preferred_username** as an alias. Then they can log in with the new value they have entered.

If **preferred_username** is selected as an alias, the value can be provided only when an account is confirmed and it cannot be provided during registration.

Custom Attributes

You can add up to 25 custom attributes. These custom attributes can be defined as strings or numbers. You can specify a minimum and/or maximum length for the custom attributes. However, the maximum length can be no more than 2048 characters.

Custom attributes cannot be required.

Custom attribute names can be any string from one to 20 characters.

Custom attributes cannot be removed or changed after you create a user pool.

To add a custom attribute

1. If you want to add custom attributes, open the **Do you want to use custom attributes?** section and choose **Add custom attribute**.
2. Provide properties for each custom attribute, such as the data **Type** (string or number), the **Name**, **Min length**, and **Max length**.
3. If you want to allow the user to change the value of a custom attribute after the value has been provided by the user, choose **Mutable**.
4. To add more attributes, choose **Add another attribute**.
5. Choose **Save changes**

Attribute Permissions and Scopes

You can set per-app read and write permissions for each user attribute. This gives you the ability to control which applications can see and/or modify each of the attributes that are stored for your users. For example, you could have a custom attribute that indicates whether a user is a paying customer or not. Your apps could see this attribute but could not modify it directly. Instead, you would update this attribute using an administrative tool or a background process. Permissions for user attributes can be set from the Amazon Cognito console, API, or CLI.

Attributes can be marked as readable or writable for each app. This is true for both standard and custom attributes. An app can read an attribute that is marked as readable and can write an attribute that is marked as writable. If an app tries to update an attribute that is not writable, the app gets a `NotAuthorizedException` exception. An app calling GetUser only receives the attributes that are readable for that app. The ID token issued post-authentication only contains claims corresponding to the readable attributes. Required attributes on a user pool are always writable. If you, using CLI or the admin API, set a writable attribute and do not provide required attributes, then an `InvalidParameterException` exception is thrown.

Specifying User Pool Policy Settings

You can specify the following password requirements in the AWS Management Console:

- **Minimum length**, which must be at least 6 characters but fewer than 99 characters
- **Require numbers**
- **Require special character**, which includes the following set:

```
^ $ * . [ ] { } ( ) ? - " ! @ # % & / , > < ' : ; | _ ~ `
```

- **Require uppercase letters**
- **Require lowercase letters**

Tip
Specifying a minimum password length of at least 8 characters, as well as requiring uppercase, numeric, and special characters, increases password complexity for users in your user pool. The increased complexity helps protect users from the security risks of guessing attacks or common-pattern attacks. It is generally considered a best practice to require users to create strong passwords by using these options.

Specifying User Pool MFA Setting and Email and Phone Verification Settings

In the **Verifications** tab, you can choose settings for multi-factor authentication (MFA) and for email and phone verification.

Note
SMS for MFA or for verifying phone numbers is charged separately. (There is no charge for sending verification codes to email addresses.) For information about Amazon SNS pricing, see Worldwide SMS Pricing. For the current list of countries where SMS messaging is available, see Supported Regions and Countries.

Multi-factor Authentication (MFA)

Multi-factor authentication (MFA) increases security for your app by requiring the user to receive and enter an authorization code when signing in to your app, in addition to their username (or alias) and password.

The following MFA settings are available:

- **Required**: All users must use MFA. This setting can only be specified when the user pool is created.
- **Optional**: Individual users can choose whether to enable MFA for their own user accounts.
- **Off**: MFA is disabled for all users.

When MFA is required on a user pool, the phone number attribute is automatically required.

When a user signs in with MFA turned on, he or she first enters and submits his or her username and password. The client app will receive a `getMFA` response indicating where the authorization code was sent. The client app should tell the user where to look for the code (such as which phone number the code was sent to), provide a form for entering the code, and then submit the code to complete the sign-in process. The destination is masked (e.g., only last 4 digits of the phone number are displayed).

The authorization code is valid for 3 minutes.

If a user no longer has access to his or her device where MFA codes are sent, he or she will need to request help from your customer service office. An administrator with necessary AWS account permissions can change the user's phone number. The administrator can use the console, the AWS Command Line Interface, or the API.

Requiring Email and Phone Number Verification

Verification requires users to retrieve a code from their email or phone to confirm ownership. Verification of a phone or email is necessary to automatically confirm users and enable recovery from forgotten passwords.

Amazon Cognito can automatically verify email addresses and mobile phone numbers by sending a verification code. For email addresses, the code is sent in an email message. For phone numbers, it is sent in an SMS text message.

The verification code is valid for 24 hours.

If verification is selected as required for email or phone, the verification code is automatically sent when a user signs up.

> **Note**
> The ForgotPassword flow requires both of the following:
>
> - Auto-verification must be enabled for email or phone numbers.
> - The user's email or phone number must be verified.

> **Note**
> If a user signs up with both a phone number and an email address, and your user pool settings require verification of both attributes, a verification code is sent via SMS to the phone. *The email address is not verified.* Your app can call GetUser to see if an email address is awaiting verification. If it is, the app should call GetUserAttributeVerificationCode to initiate the email verification flow and then submit the verification code by calling VerifyUserAttribute.

Authorizing Amazon Cognito to Send SMS Messages on Your Behalf

To send SMS messages to your users on your behalf, Amazon Cognito needs your permission. To grant that permission, you need to create an AWS Identity and Access Management (IAM) role.

To create an IAM role for SMS verification

1. In the **Verifications** tab of the **Create a User Pool** wizard, choose **Phone number** under **Do you want to require verification of emails or phone numbers?**.
2. Choose **Create role** to create the role.

Customizing SMS and Email Verification Messages and User Invitation Messages

In the **Message Customizations** tab, you can customize:

- Your SMS and email verification messages
- Your user invitation messages
- Your email address

> **Note**
> The SMS and email verification message templates will only appear if you have chosen to require phone number and email verification in the **Verifications** tab.

Customizing SMS Verification Messages

You can customize the SMS message for phone number verifications by editing the template under the **Do you want to customize your SMS verification messages?** heading.

> **Important**
> Your custom message must contain the `{####}` placeholder, which is replaced with the verification code before the message is sent.

The maximum length for the message is 2048 UTF-8 characters, including the verification code.

Customizing Email Verification Messages

You can customize the email subject and message for email address verifications by editing the template under the **Do you want to customize your email verification messages?** heading.

Important
Your custom message must contain the `{####}` placeholder, which is replaced with the verification code before the message is sent.

The maximum length for the message is 2048 UTF-8 characters, including the verification code.

Customizing User Invitation Messages

You can customize the user invitation message that Amazon Cognito sends to new users via SMS or email by editing the templates under the **Do you want to customize your user invitation messages?** heading.

Important
Your custom message must contain the `{username}` and `{####}` placeholders, which are replaced with the user's username and password before the message is sent.

For SMS, the maximum length is 140 UTF-8 characters, including the verification code. For email, the maximum length for the message is 2048 UTF-8 characters, including the verification code.

Customizing Your Email Address

By default the email messages that Amazon Cognito sends to users in your user pools come from **no-reply@verificationemail.com**. You can specify custom FROM email addresses and REPLY-TO email addresses to be used instead of **no-reply@verificationemail.com**.

To customize the FROM email address, choose **Add custom FROM address** and follow the instructions to verify your Amazon Simple Email Service identity. Choose an AWS region and an Amazon SES verified identity. Learn more about Verifying Email Addresses and Domains in Amazon SES.

To customize the REPLY-TO email address, choose **Add custom REPLY-TO address** and enter a valid email address.

Authorizing Amazon Cognito to Send Amazon SES Email on Your Behalf (from a Custom FROM Email Address)

If you want to send email from a custom FROM email address instead of the default, Amazon Cognito needs your permission to send email messages to your users on behalf of your Amazon SES verified identity. To grant that permission, create a sending authorization policy. For more information, see Using Sending Authorization with Amazon SES.

The following is an example of an Amazon SES sending authorization policy for Amazon Cognito User Pools. For more examples, see Amazon SES Sending Authorization Policy Examples.

Note
In this example, the "Sid" value is an arbitrary string that uniquely identifies the statement. For more information about policy syntax, see Amazon SES Sending Authorization Policies.

```
{
    "Version": "2008-10-17",
    "Statement": [
        {
            "Sid": "stmnt1234567891234",
            "Effect": "Allow",
            "Principal": {
                "Service": "cognito-idp.amazonaws.com"
            },
            "Action": [
                "ses:SendEmail",
                "ses:SendRawEmail"
            ],
            "Resource": "<your SES identity ARN>"
        }
    ]
}
```

Specifying User Pool Device Tracking Settings

As a way of providing additional security, you can track devices that users have logged in to. This topic describes how to add device tracking to your Amazon Cognito user pool in the AWS Management Console.

Setting Up Remembered Devices

With Amazon Cognito Your User Pools, you can choose to have Amazon Cognito remember devices used to access your application and associate these remembered devices with your application's users in a user pool. You can also choose to use remembered devices to stop sending codes to your users when you have set up multi-factor authentication (MFA).

When setting up the remembered devices functionality through the Cognito console, you have three options: **Always**, **User Opt-In**, and **No**.

- **No** (default) – Devices are not remembered.
- **Always** – Every device used by your application's users is remembered.
- **User Opt-In** – Your user's device is only remembered if that user opts to remember the device.

If either **Always** or **User Opt-In** is selected, a device identifier (key and secret) will be assigned to each device the first time a user signs in with that device. This key will not be used for anything other than identifying the device, but it will be tracked by the service.

If you select **Always**, Amazon Cognito will use the device identifier (key and secret) to authenticate the device on every user sign-in with that device as part of the user authentication flow.

If you select **User Opt-In**, you will have the ability to remember devices only when your application's users opt to do so. When a user signs in with a new device, the response from the request to initiate tracking will indicate whether the user should be prompted about remembering their device. You must create the user interface to prompt users. If the user opts to have the device remembered, the device status will be updated with a 'remembered' state.

The AWS Mobile SDKs have additional APIs to see remembered devices (ListDevices, GetDevice), mark a device as remembered or not remembered (UpdateDeviceStatus), and stop tracking a device (ForgetDevice). In the REST API, there are additional administrator versions of these APIs that have elevated privileges and work on any user. They have API names such as AdminListDevices, AdminGetDevice, and so on. They are not exposed through the SDKs.

Using Remembered Devices to Suppress Multi Factor Authentication (MFA)

If you have selected either **Always** or **User Opt-In**, you also have the option of suppressing MFA challenges on remembered devices for the users of your application. To use this feature, you must enable MFA for your user pool. For more information, see Multi-factor Authentication (MFA) (p. 17).

Specifying User Pool App Settings

An app is an entity within a user pool that has permission to call unauthenticated APIs (APIs that do not have an authenticated user), such as APIs to register, sign in, and handle forgotten passwords. To call these APIs, you need an app client ID and an optional client secret. It is the developer's responsibility to secure any app client IDs or secrets so that only authorized client apps can call these unauthenticated APIs.

You can create multiple apps for a user pool, and generally an app corresponds to the platform of an app. For example, you may create an app for a server-side application and a different Android app. Each app will have its own app client ID.

When you create an app, you can optionally choose to create a secret for that app. If a secret is created for the app, the secret must be provided to use the app. Browser-based applications written in JavaScript may not need an app with a secret.

Secrets cannot be changed after an app is created. You can create a new app with a new secret if you want to rotate the secret that you are using. You can also delete an app to block access from apps that use that app client ID.

To create an app

1. On the **Apps** tab in **Create a user pool**, choose **Add an app**.
2. Specify an **App name**.
3. Specify the app's **Refresh token expiration (days)**. The default value is 30. You can change it to any value between 1 and 3650.
4. By default, Amazon Cognito User Pools will generate a client secret for your app. If you don't want that to happen, clear **Generate client secret**.
5. If your app is a server app that requires developer credentials (using Signature Version 4) and doesn't use Secure Remote Protocol (SRP) authentication, check **Enable sign-in API for server-based authentication (ADMIN_NO_SRP_AUTH)** to enable server-side authentication. For more information, see Admin Authentication Flow (p. 99).
6. By default, Amazon Cognito User Pools will allow your app to read all attributes and write only the **email** attribute. If you want to set different permissions for your app, perform the following steps.

   1. Choose **Set attribute read and write permissions**.
   2. You can set read and write permissions in both of the following ways:

      • By choosing one or more scopes. Each scope is a set of standard attributes. For more information, see the list of standard OIDC scopes.
      • By choosing individual standard or custom attributes.
7. Choose **Create app**.
8. If you want to create another app, choose **Add an app**.
9. Once you've created all the apps you want, choose **Save changes**.

You can change attribute permissions and scopes after you have created your user pool.

You can also use the CLI commands **create-user-pool-client** and **update-user-pool-client** to set and change permissions on a user pool.

Specifying User Pool Lambda Trigger Settings

You can use AWS Lambda triggers to customize workflows and the user experience with Amazon Cognito. You can create the following Lambda triggers: **Pre sign-up**, **Pre authentication**, **Custom message**, **Post authentication**, **Post confirmation**, **Define Auth Challenge**, **Create Auth Challenge**, and **Verify Auth Challenge Response**. For examples of each Lambda trigger, see Customizing User Pool Workflows by Using AWS Lambda Triggers (p. 64).

> **Note**
> The **Custom message** AWS Lambda trigger is an advanced way to customize messages for email and SMS. For more information, see Customizing User Pool Workflows by Using AWS Lambda Triggers (p. 64).

Reviewing Your User Pool Settings

Before you create your user pool, you can review the different settings and edit them in the AWS Management Console. Amazon Cognito will validate the user pool settings and warn you if something needs to be changed. For example:

> **Warning**
> This user pool does not have an IAM role defined to allow Amazon Cognito to send SMS messages, so it will not be able to confirm phone numbers or for MFA after August 31, 2016. You can define the IAM role by selecting a role on the **Verifications** panel.

If you see a message, follow the instructions to fix them before choosing **Create pool**.

Setting Up the AWS Mobile SDK for Android to Work with User Pools

In this walkthrough, you will set up the SDK and learn more about the operations provided in the API. You can use the APIs to register users, confirm user registration, authenticate users, and more.

The main classes available are:

- `CognitoUserPool`
- `CognitoUser`
- `CognitoUserSession`
- `CognitoUserDetails`
- `CognitoUserAttributes`
- `CognitoUserSettings`

Most of the methods require callback handlers. All functions that need to perform a network operation or interact with the Amazon Cognito Identity Provider service have two different methods. One of the methods runs the network operations in the current thread (e.g., `foo()`) for use in apps where these methods are called in a background thread. The other method (which ends with `InBackground`, e.g., `fooInBackground()`) performs the task in the background but calls the callback methods in the thread where `fooInBackground()` was invoked.

The Mobile SDK for Android caches the last successfully authenticated user and tokens locally on the device (in `SharedPreferences`), and provides methods to get the last successfully authenticated user.

Dependencies

Add the **aws-android-sdk-core-2.2.8.jar** as a dependency library to your project. If you already had a Gradle dependency on the AWS core `.jar` from your project, comment it out.

Key Concepts

The following objects are key to understanding the user pool API.

CognitoUserPool

Represents an abstraction of the developer's user pool. Allows the following operations: register a new user, create a new `CognitoUser` object.

Callback handlers used with the `CognitoUserPool` class: `SignUpHandler`, used to implement this interface and pass as a parameter to the sign-in method.

CognitoUser
: Represents a single user, created from the `CognitoUserPool` class. This class offers all possible operations on a user, including `confirmSignUp`, `resendConfirmationCode`, and many more.

CognitoUserSession
: Encapsulates the Amazon Cognito tokens (ID tokens, access tokens, and refresh token). This object provides methods to access and read ID and access tokens.

CognitoUserDetails
: Encapsulates `CognitoUserAttributes` and `CognitoUserSettings`.

CognitoUserAttributes
: Encapsulates all user attributes and provides methods to read and write attributes.

CognitoUserSettings
: Encapsulates all user settings and provides methods to read and write attributes.

Examples of Using User Pools with the Mobile SDK for Android

This topic provides code examples that perform basic tasks using the Mobile SDK for Android. Since the SDK makes network calls, all API calls should be made from a non-activity thread.

Create a CognitoUserPool

```
CognitoUserPool userPool = new CognitoUserPool(context, userPoolId, clientId,
 clientSecret);

// user pool can also be created with client app configuration:
CognitoUserPool userPool = new CognitoUserPool(context, userPoolId, clientId,
 clientSecret, clientConfiguration);
```

Register a New User

```
// create a handler for registration
SignUpHandler handler = new SignUpHandler() {
    @Override
    public void onSuccess(CognitoUser user, CognitoUserCodeDeliveryDetails
 codeDeliveryDetails) {
        // If the sign up was successful, "user" is a CognitoUser object of
 the user who was signed up.
        // "codeDeliveryDetails" will contain details about where the
 confirmation codes will be delivered.
}

    @Override
    public void onFailure(Exception exception) {
        // Sign up failed, code check the exception for cause and perform
 remedial actions.
    }
}
```

Get the Cached User

```
CognitoUser user = userPool.getCurrentUser();
```

Create a User Object with a UserId

```
CognitoUser user = userPool.getUser(userId);
```

Confirm a User

```
// create a callback handler for confirm
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // User was successfully confirmed!
    }
    @Override
    public void onFailure(Exception exception) {
        // Confirmation failed, probe exception for details
    }
}

user.confirmSignUp(code, handler);
```

Request a Confirmation Code

```
// create a callback handler for the confirmation code request
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Confirmation code was successfully sent!
    }
    @Override
    public void onFailure(Exception exception) {
        // Confirmation code request failed, probe exception for details
    }
}

user.resendConfirmationCode(handler);
```

Forgot Password: Get Code to Set New Password

```
ForgotPasswordHandler handler = new ForgotPasswordHandler {
    @Override
    public void onSuccess() {
        // Forgot password process completed successfully, new password has
 been successfully set

    }

    @Override
    public void getResetCode(ForgotPasswordContinuation continuation) {
        // A code will be sent, use the "continuation" object to continue
 with the forgot password process

        // This will indicate where the code was sent
        String codeSentHere = continuation.getParameters();

        // Code to get the code from the user - user dialogs etc.

        // If the program control has to exit this method, take the
 "continuation" object.
        // "continuation" is the only possible way to continue with the
 process



        // When the code is available

        // Set the new password
        continuation.setPassword(newPassword);

        // Set the code to verify
        continuation.setVerificationCode(code);

        // Let the forgot password process proceed
        continuation.continueTask();

    }

    /**
     * This is called for all fatal errors encountered during the password
 reset process
     * Probe {@exception} for cause of this failure.
     * @param exception
     */
    public void onFailure(Exception exception) {
        // Forgot password processing failed, probe the exception for cause
    }
}

user.forgotPassword(handler);
```

Authentication Handler: Get Tokens

```
// Implement authentication handler,
AuthenticationHandler handler = new AuthenticationHandler {
    @Override
    public void onSuccess(CognitoUserSession userSession) {
        // Authentication was successful, the "userSession" will have the
 current valid tokens
        // Time to do awesome stuff
    }

    @Override
    public void getAuthenticationDetails(final AuthenticationContinuation
 continuation, final String userID) {
        // User authentication details, userId and password are required to
 continue.
        // Use the "continuation" object to pass the user authentication
 details

        // After the user authentication details are available, wrap them in
 an AuthenticationDetails class
```

```
        // Along with userId and password, parameters for user pools for
 Lambda can be passed here
        // The validation parameters "validationParameters" are passed in as
 a Map<String, String>
        AuthenticationDetails authDetails = new AuthenticationDetails(userId,
 password, validationParameters);

        // Now allow the authentication to continue
        continuation.setAuthenticationDetails(authDetails);
        continuation.continueTask();
    }

    @Override
    public void getMFACode(final MultiFactorAuthenticationContinuation
 continuation) {
        // Multi-factor authentication is required to authenticate
        // A code was sent to the user, use the code to continue with the
 authentication


        // Find where the code was sent to
        String codeSentHere = continuation.getParameter()[0];

        // When the verification code is available, continue to authenticate
        continuation.setMfaCode(code);
        continuation.continueTask();
    }

    @Override
    public void authenticationChallenge(final ChallengeContinuation
 continuation) {
        // A custom challenge has to be solved to authenticate

        // Set the challenge responses

        // Call continueTask() method to respond to the challenge and
 continue with authentication.
    }



    @Override
    public void onFailure(final Exception exception) {
        // Authentication failed, probe exception for the cause

    }
};
user.getSession(handler);
```

Get User Details

```
GetDetailsHandler handler = new GetDetailsHandler {
    @Override
    public void onSuccess(final CognitoUserDetails list) {
        // Successfully retrieved user details
    }

    @Override
    public void onFailure(final Exception exception) {
        // Failed to retrieve the user details, probe exception for the cause
    }
};
user.getDetails(handler);
```

Get Attribute Verification Code

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Attribute verification code was successfully sent!
    }

    @Override
    public void onFailure(Exception exception) {
        // Attribute verification code request failed, probe exception for
 details
    }
};
user.getAttibuteVerificationCode(attributeName, handler);
```

Verify Attribute

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Attribute verification was successful!
    }

    @Override
    public void onFailure(Exception exception) {
        // Attribute verification failed, probe exception for details
    }
};
user.verifyAttribute(attributeName, code, handler);
```

Delete Attribute

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Attribute deletion was successful!
    }

    @Override
    public void onFailure(Exception exception) {
        // Attribute deletion failed, probe exception for details
    }
};
user.deleteAttribute(attributeName, handler);
```

Change Password

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Password change was successful!
    }

    @Override
    public void onFailure(Exception exception) {
        // Password change failed, probe exception for details
    }
};
user.changePassword(oldPassword, newPassword, handler);
```

Change or Set User Settings

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Successfully changed settings!
    }

    @Override
    public void onFailure(Exception exception) {
        // Change failed, probe exception for details
    }
};

// userSettings is an object of the type CognitoUserSettings,
CognitoUserSettings userSettings = new CognitoUserSettings();

// Set the user settings
userSettings.setSettings(settingName, settingValue);

// Now update the new settings to the Amazon Cognito Identity Provider
 Service
user.setUserSettings(userSettings, handler);
```

Delete User

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Delete was successful!
    }

    @Override
    public void onFailure(Exception exception) {
        // Delete failed, probe exception for details
    }
};
```

```
user.deleteUser(handler);
```

Sign Out User

```
// This has cleared all tokens and this user will have to go through the
 authentication process to get tokens.
user.signOut();
```

Get Access and ID Tokens from CognitoUserSession

```
// Session is an object of the type CognitoUserSession
String accessToken = session.getAccessToken().getJWT();
String idToken = session.getIdToken().getJWTToken();
```

List All Devices for a User

```
DevicesHandler devicesHandler = new DevicesHandler() {
    @Override
    public void onSuccess(List<CognitoDevice> devices) {
        // devices will contain a list of all remembered devices
    }

    @Override
    public void onFailure(Exception e) {
        // List devices failed, probe exception for details

    }
};
user.listDevicesInBackground(10, null, devicesHandler);
```

Remember a Device

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Successful!
    }

    @Override
    public void onFailure(Exception exception) {
        // Failed, probe exception for details
    }
};
cognitoDevice.rememberThisDeviceInBackground(handler)
```

Do Not Remember a Device

```
GenericHandler handler = new GenericHandler {

    @Override
    public void onSuccess() {
        // Successful!
    }

    @Override
    public void onFailure(Exception exception) {
        // Failed, probe exception for details
    }
};
cognitoDevice.doNotRememberThisDeviceInBackground(handler)
```

Example: Handling Users Created Using the AdminCreateUser API in the Mobile SDK for Android

Amazon Cognito Your User Pools allows administrators to create new users and invite the users to sign in. The user must set his or her password during the first sign-in. Also during the first sign-in, the user must provide values for any required attributes that don't already have values.

The Mobile SDK for Android (version 2.3.2 and later) supports this feature. To support this feature in your apps, you must implement the `AuthenticationChallenge` callback method. The user authentication process for these users has not changed. However, after the initial password verification, the SDK invokes the `AuthenticationChallenge` callback, which you can implement to read the new password from the user. You can then allow the user to set required attributes and change user attributes that were already set by the administrator.

The continuation object passed to the `AuthenticationChallenge` callback method is of the type `NewPasswordContinuation`. The `NewPasswordContinuation` class is a child of `ChallengeContinuation`. The `ChallengeContinuation` class provides easier access to the challenge attributes.

When the `AuthenticationChallenge` callback is invoked during the user authentication process, first check the `Challenge name`. The challenge name, `NEW_PASSWORD_REQUIRED`, indicates that the user is trying to sign in for the first time after the administrator created the user's account. To get the challenge name, call `continuation.getChallengeName`.

To complete the sign-in process, the user must set a new password and provide any missing values for user attributes that were marked as required when the user pool was created or updated. To get the list of all required attributes, call `continuation.getRequiredAttributes`. To get the attributes and the values that were already set by the administrator, call `continuation.getCurrentUserAttributes`.

Call `continuation.setPassword` and `continuation.setUserAttribute`, respectively, to set the user's new password and attributes (including required attributes).

Call `continuation.continueTask` to complete the sign-in process.

```
@Override
    public void authenticationChallenge(final ChallengeContinuation
 continuation) {
        // Check the challenge name
 if("NEW_PASSWORD_REQUIRED".equals(continuation.getChallengeName()) {
  // A new user is trying to sign in for the first time after
  // admin has created the user’s account

  // Cast to NewPasswordContinuation for easier access to challenge
 parameters
  NewPasswordContinuation newPasswordContinuation = (NewPasswordContinuation)
 continuation;
  // Get the list of required parameters
  List<String> requiredAttributes =
 newPasswordContinuation.getRequiredAttributes()

  // Get the current user attributes
  Map<String, String> currUserAttributes =
 newPasswordContinuation.getCurrentUserAttributes();

  // Prompt user to set a new password and values for required attributes

  // Set new user password
  newPasswordContinuation.setPassword();

  // Set user attributes
  newPasswordContinuation.setUserAttribute(attributeName, attributeValue);

  // Set user attributes
  newPasswordContinuation.setUserAttribute(anotherAttribute,
 valueOfAnotherAttribute);

  // Allow the sign-in to complete
  newPasswordContinuation.continueTask();
 }
        // Set the challenge responses

        // Call continueTask() method to respond to the challenge and
 continue with authentication.
    }
```

Tutorial: Integrating User Pools for Android Apps

This tutorial outlines the key steps to integrate Amazon Cognito Your User Pools with an Android application. For a complete sample application that shows how to use user pools in your application, see the Amazon Cognito Your User Pools sample on the GitHub website.

Topics

Step 1: Creating a User Pool for Your App by Using the Console

The following procedure describes how to create a user pool and use it in your app. This procedure creates a pool ID, an app client ID, and an app client secret using default settings. For information on customizing these settings, see Getting Started: Step Through Amazon Cognito User Pool Settings in the AWS Management Console (p. 13).

To create a user pool for your app

1. Sign in to the Amazon Cognito console
2. Choose **Manage your User Pools**.
3. Choose **Create a User Pool**.
4. In **Pool name**, type a name for the pool and then choose **Review defaults**. This creates the pool with the default settings.
5. From the left navigation pane, choose **Attributes** to specify which attributes are required and which attributes to use as aliases. After you set the following attributes and after users in the pool verify their email addresses, they can sign in with their usernames or email addresses.

   a. For **email**, choose **Required** and **Alias**.
   b. For **phone number**, choose **Required** and **Alias**.
   c. For **given name**, choose **Required**.
6. From the left navigation pane, choose **Policies** to specify the password policy. For this tutorial, use the default settings.
7. From the left navigation pane, choose **Verifications**. On this page, you can customize the messages that are sent to the users in your pool to deliver verification codes. For this tutorial, use the default settings.
8. From the left navigation pane, choose **Apps** and then choose **Add an app**. You can create multiple app clients for a user pool and you can create one app per platform.
9. For **App name**, type a name for your app. Keep **Generate client secret** selected, and then choose **Set attribute read and write permissions**. Select the attributes that require write permissions. Required attributes always have write permissions.
10. Choose **Create app** and then choose **Save changes**.
11. From the left navigation bar, choose **Review** and then choose **Create pool**.
12. Note the pool ID, client ID, and the client secret. You can find the app client ID and app client secret under **Apps** on the left navigation bar. To view the client secret, choose **Show details**.

Step 2: Creating a User Pool Object

To create a user pool object, you need the pool ID, client ID, and client secret. The following example shows how to create a `ClientConfiguration` object and a `CognitoUserPool` object. The `CognitoUserPool` object is the entry point for all interactions with your user pool from your application. In the sample application the `userPool` is created in `AppHelper.java`.

```
ClientConfiguration clientConfiguration = new ClientConfiguration();

// Create a CognitoUserPool object to refer to your user pool
CognitoUserPool userPool = new CognitoUserPool(context, poolId, clientId,
 clientSecret, clientConfiguration);
```

Step 3: Signing up Users for Your App

The following steps describe how to sign up users for your app.

To sign up users for your app

1. Collect the following information from the user:

   • user-id: This is used by the user to log in and must be unique within the pool.
   • password: This is the user's password.

- user attributes: You must specify the required attributes (email, given name, and phone number) for your pool.

2. Use the pool instance to sign up the user.

```
// Create a CognitoUserAttributes object and add user attributes
CognitoUserAttributes userAttributes = new CognitoUserAttributes();

// Add the user attributes. Attributes are added as key-value pairs
// Adding user's given name.
// Note that the key is "given_name" which is the OIDC claim for given
 name
userAttributes.addAttribute("given_name", userGivenName);

// Adding user's phone number
userAttributes.addAttribute("phone_number", phoneNumber);

// Adding user's email address
userAttributes.addAttribute("email", emailAddress);
```

3. Create a callback handler for sign-up. The `onSuccess` method is called when the sign-up is successful.

```
SignUpHandler signupCallback = new SignUpHandler() {

    @Override
    public void onSuccess(CognitoUser cognitoUser, boolean userConfirmed,
 CognitoUserCodeDeliveryDetails cognitoUserCodeDeliveryDetails) {
        // Sign-up was successful

        // Check if this user (cognitoUser) needs to be confirmed
        if(!userConfirmed) {
            // This user must be confirmed and a confirmation code was
 sent to the user
            // cognitoUserCodeDeliveryDetails will indicate where the
 confirmation code was sent
            // Get the confirmation code from user
        }
        else {
            // The user has already been confirmed
        }
    }

    @Override
    public void onFailure(Exception exception) {
        // Sign-up failed, check exception for the cause
    }
};
```

4. Call the sign-up API.

```
userPool.signUpInBackground(userId, password, userAttributes, null,
 signupCallback);
```

Step 4: Confirming Users for Your App

Users may need to be confirmed after they sign up before they can sign in. Users can confirm through email or phone. After a successful sign-up, if the user needs to be confirmed, a confirmation code is sent to the user's email address or phone number. You can also automatically confirm a user after sign-up by using Lambda triggers.

If a user provides an email address or phone number during sign-up, and you selected automatic verification for your user pool, a confirmation code is sent to the user's phone number as a text message or to the user's email address. The `cognitoUserCodeDeliveryDetails` object, which was delivered to the callback handler after successful sign-up, indicates where this confirmation code was sent. You can use this to let the user know how he or she will get confirmation code.

The following steps describe how to confirm user information before users can sign in to your app.

To confirm a user for your app

1. Create a callback handler to confirm the user. This callback handler is used by the SDK to communicate the results of the confirmation API call.

```
 // Callback handler for confirmSignUp API
GenericHandler confirmationCallback = new GenericHandler() {

    @Override
    public void onSuccess() {
    // User was successfully confirmed
    }

    @Override
    public void onFailure(Exception exception) {
    // User confirmation failed. Check exception for the cause.
    }
};
```

2. When a new user is confirmed, the user's attribute through which the confirmation code was sent (email address or phone number) is marked as verified. If this attribute is also set to be used as an alias, then the user can sign in with that attribute (email address or phone number) instead of the username.

Step 5: Resolving Alias Value Conflicts

Alias values must be unique in a pool. When you confirm a new user, if that user's email address or phone number are used as an alias, and that email or phone number are already in use for an existing user in the pool, you must resolve this conflict. To ensure uniqueness, you can do either of the following:

- Set the `forcedAliasCreation` parameter to false. This resolves the conflict by allowing the user confirmation to fail. The attribute remains verified for the existing user and continues to be an alias for the existing user. The new user remains un-confirmed, as shown in the following example.

```

 // This will cause confirmation to fail if the user attribute has been
 verified for another user in the same pool
boolean forcedAliasCreation = false;
```

```
// Call API to confirm this user
cognitoUser.confirmSignUpInBackground(confirmationCode, forcedAliasCreation,
 confirmationCallback);
```

- Setting the `forcedAliasCreation` parameter to true resolves the conflict by marking the attribute (email or phone number) as verified for the new user, and consequently marking it as not-verified for the existing user. This attribute is no longer an alias for the existing user.

All confirmed users can sign in. On successful sign-in, access and ID tokens are returned. These tokens are in a `CognitoUserSession` object.

Step 6: Signing Users in to Your App

To sign a user in to your app, you must first create a callback handler for authentication. The following example shows how the SDK interacts with your application through this callback handler.

```
// Callback handler for the sign-in process
AuthenticationHandler authenticationHandler = new AuthenticationHandler() {

    @Override
    public void onSuccess(CognitoUserSession cognitoUserSession) {
        // Sign-in was successful, cognitoUserSession will contain tokens for
 the user
    }

    @Override
    public void getAuthenticationDetails(AuthenticationContinuation
 authenticationContinuation, String userId) {
        // The API needs user sign-in credentials to continue
        AuthenticationDetails authenticationDetails = new
 AuthenticationDetails(userId, password, null);

        // Pass the user sign-in credentials to the continuation

 authenticationContinuation.setAuthenticationDetails(authenticationDetails);

        // Allow the sign-in to continue
        authenticationContinuation.continueTask();
    }

    @Override
    public void getMFACode(MultiFactorAuthenticationContinuation
 multiFactorAuthenticationContinuation) {
        // Multi-factor authentication is required; get the verification code
 from user

 multiFactorAuthenticationContinuation.setMfaCode(mfaVerificationCode);
        // Allow the sign-in process to continue
        multiFactorAuthenticationContinuation.continueTask();
    }

    @Override
    public void onFailure(Exception exception) {
        // Sign-in failed, check exception for the cause
    }
};
```

```
// Sign in the user
cognitoUser.getSessionInBackground(authenticationHandler);
```

Step 7: Getting User Details

After authenticating a user, you can retrieve other information about the user in the user pool, as shown in the following example.

```
// Implement callback handler for getting details
GetDetailsHandler getDetailsHandler = new GetDetailsHandler() {
    @Override
    public void onSuccess(CognitoUserDetails cognitoUserDetails) {
        // The user detail are in cognitoUserDetails
    }

    @Override
    public void onFailure(Exception exception) {
        // Fetch user details failed, check exception for the cause
    }
};

// Fetch the user details
cognitoUser.getDetailsInBackground(getDetailsHandler);
```

Step 8: Getting Credentials to Access AWS Resources for an App User

To get credentials to access AWS resources for your user, first create an identity pool and associate your user pool with that identity pool.

To get AWS credentials to access AWS resources

1. Sign in to the Amazon Cognito console.
2. Choose **Manage Federated Identities**.
3. Choose **Create new identity pool**. Type a name for your identity pool in **Identity pool name**.
4. Expand the **Authentication providers** section. On the **Cognito** tab, type the **User Pool ID** and the **App Client ID** for the user pool you just created.
5. Choose **Create Pool**.
6. In your application code, add the ID tokens, received after successful authentication, to your credentials provider, as follows.

```
// Get id token from CognitoUserSession.
   String idToken = cognitoUserSession.getIdToken().getJWTToken();

// Create a credentials provider, or use the existing provider.
   CognitoCachingCredentialsProvider credentialsProvider = new
CognitoCachingCredentialsProvider(context, IDENTITY_POOL_ID, REGION);

// Set up as a credentials provider.
   Map<String, String> logins = new HashMap<String, String>();
   logins.put("cognito-idp.us-east-1.amazonaws.com/us-east-1_123456678",
cognitoUserSession.getIdToken().getJWTToken());
```

```
    credentialsProvider.setLogins(logins);
```

7. Use the credentials provider to access AWS resources, such as a Amazon DynamoDB table, as follows.

```
AmazonDynamoDBClient ddbClient = new
AmazonDynamoDBClient(credentialsProvider);
```

Step 9: Setting IAM Permissions to Enable Access to AWS Resources

When you create an identity pool, Amazon Cognito creates two IAM roles: `Cognito`*`<identity pool name>`*`Auth_Role` and `Cognito`*`<identity pool name>`*`Unauth_Role`. By default, these roles only allow access to Amazon Cognito Identity and Amazon Cognito Sync. To allow your application to access AWS services such as Amazon DynamoDB, you must attach the appropriate managed policy to the role. For example, if your application needs to read and write to a DynamoDB database you must attach the `AmazonDynamoDBFullAccess` managed policy to the role, as described in the following procedure.

To set IAM permissions to enable access to AWS resources

1. Sign in to the Identity and Access Management (IAM) console at https://console.aws.amazon.com/iam/.
2. Choose the authenticated role for your policy from the list of roles, and then choose **Attach Policy**.
3. Choose the required policy for the list of managed policies (**AmazonDynamoDBFullAccess**, for example), and then choose **Attach Policy**.

You application can now perform create, read, update, and delete operations in DynamoDB.

Setting Up the AWS Mobile SDK for iOS to Work with User Pools

Amazon Cognito Identity provides a Mobile SDK for iOS. The following topic provides set-up instructions and examples for common tasks while working with user pools.

Installing the AWS Mobile SDK for iOS

The following procedure describes how to set up the SDK.

To set up the Mobile SDK for iOS

1. Follow the instructions here: Set Up the Mobile SDK for iOS.
2. If you are using CocoaPods, add pod **AWSCognitoIdentityProvider** to your PodSpec and `#import AWSCognitoIdentityProvider.h` in the classes you want to use it in.
3. If you are using Frameworks, add **AWSCognitoIdentityProvider.framework** and `#import <AWSCognitoIdentityProvider/AWSCognitoIdentityProvider.h>` into the classes you want to use it.

Examples: Using User Pools with the iOS SDK

This topic provides details about registering, confirming, and authenticating users, as well as getting user attributes, when using user pools with the AWS Mobile SDK for iOS.

Creating an AWSCognitoIdentityUserPool Object

The following procedure describes how to create an **AWSCognitoIdentityUserPool** object to interact with.

1. Set up your service config.

```
//setup service config
AWSServiceConfiguration *serviceConfiguration = [[AWSServiceConfiguration
 alloc] initWithRegion:AWSRegionUSEast1 credentialsProvider:nil];
```

2. Create a user pool configuration.

```
//create a pool
AWSCognitoIdentityUserPoolConfiguration *configuration
 = [[AWSCognitoIdentityUserPoolConfiguration alloc]
 initWithClientId:@"CLIENT_ID"

                                   clientSecret:@"CLIENT_SECRET"

                                         poolId:@"USER_POOL_ID"];
[AWSCognitoIdentityUserPool
 registerCognitoIdentityUserPoolWithConfiguration:serviceConfiguration
 userPoolConfiguration:configuration forKey:@"UserPool"];
AWSCognitoIdentityUserPool *pool = [AWSCognitoIdentityUserPool
 CognitoIdentityUserPoolForKey:@"UserPool"];
```

Example: Register a User

Use **pool.signUp:password:userAttributes:validationData** to register a user.

```
AWSCognitoIdentityUserAttributeType * phone =
 [AWSCognitoIdentityUserAttributeType new];
phone.name = @"phone_number";
//phone number must be prefixed by country code
phone.value = @"+15555555555";
AWSCognitoIdentityUserAttributeType * email =
 [AWSCognitoIdentityUserAttributeType new];
email.name = @"email";
email.value = @"email@mydomain.com";

//register the user
[[pool signUp:@"username" password:@"password"
 userAttributes:@[email,phone] validationData:nil] continueWithBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserPoolSignUpResponse *> * _Nonnull
 task) {
    dispatch_async(dispatch_get_main_queue(), ^{
        if(task.error){
            [[[UIAlertView alloc]
 initWithTitle:task.error.userInfo[@"__type"]
 message:task.error.userInfo[@"message"]
                                          delegate:self
                                 cancelButtonTitle:@"Ok"
                                 otherButtonTitles:nil] show];
        }else {
            AWSCognitoIdentityUserPoolSignUpResponse * response =
 task.result;
            if(!response.userConfirmed){
                //need to confirm user using user.confirmUser:
            }
        }});
    return nil;
}];
```

Example: Get a User

You can either get a user by registering or by using one of these methods on the pool.

```
//get the last logged in user
[pool currentUser];

//get a user without a username
[pool getUser];

//get a user with a specific username
[pool getUser:@"username"];
```

Example: Sign in a User

There are two ways to sign in: explicitly or when credentials are needed via a delegate.

To sign in explicitly, use the following:

```
[user getSession:@"username" password:@"password" validationData:nil
 scopes:nil];
```

To implement the delegate, implement **AWSCognitoIdentityInteractiveAuthenticationDelegate** and set the delegate on the pool:

```
pool.delegate = self;
```

In your implementation, write code to instantiate your authentication user interfaces if they weren't created and display them.

```
//set up password authentication ui to retrieve username and password from
 the user
-(id) startPasswordAuthentication {
      //write code to instantiate your sign in ui if it wasn't created here
      dispatch_async(dispatch_get_main_queue(), ^{
            //write code to display your ui
      });

      //return your sign in ui which implements the
 AWSCognitoIdentityPasswordAuthentication protocol
```

```
      return signInViewController;
}

//set up mfa ui to retrieve mfa code from end user
//this is optional and only necessary if you turn on multifactor
 authentication on your pool
-(id) startMultiFactorAuthentication {
      //write code to instantiate your multifactor authentication ui if it
 wasn't created here
      dispatch_async(dispatch_get_main_queue(), ^{
            //write code to display your ui
      });

      //return your sign in ui which implements the
 AWSCognitoIdentityMultiFactorAuthentication protocol
      return mfaViewController;
}

//set up new password required ui to retrieve new password and any required
 user profile from end user
//this is optional and only necessary if you use the AdminCreateUser feature
 on the pool
-(id) startNewPasswordRequired {
      //write code to instantiate your new password required ui if it wasn't
 created here
      dispatch_async(dispatch_get_main_queue(), ^{
            //write code to display your ui
      });

      //return your new password required ui which implements the
 AWSCognitoIdentityNewPasswordRequired protocol
      return newPasswordRequiredController;
}
```

In your password authentication UI, implement the **AWSCognitoIdentityPasswordAuthentication** protocol.

```
-(void) getPasswordAuthenticationDetails:
 (AWSCognitoIdentityPasswordAuthenticationInput *)
 authenticationInput  passwordAuthenticationCompletionSource:
 (AWSTaskCompletionSource<AWSCognitoIdentityPasswordAuthenticationDetails *>
 *) passwordAuthenticationCompletionSource {
    //keep a handle to the completion, you'll need it continue once you get
 the inputs from the end user
    self.passwordAuthenticationCompletion =
 passwordAuthenticationCompletionSource;
    //authenticationInput has details about the last known username if you
 need to use it
}

-(void) didCompletePasswordAuthenticationStepWithError:(NSError*) error {
    dispatch_async(dispatch_get_main_queue(), ^{
        //on completion, either display the error or dismiss the ui
        if(error){
            [[[UIAlertView alloc] initWithTitle:error.userInfo[@"__type"]
                                        message:error.userInfo[@"message"]
                                       delegate:nil
                              cancelButtonTitle:nil
                              otherButtonTitles:@"Retry", nil] show];
        }else{
            [self dismissViewControllerAnimated:YES completion:nil];
        }
    });
}
```

When the end user has entered his or her username and password, set the result on **passwordAuthenticationCompletion**.

```
self.passwordAuthenticationCompletion.result =
 [[AWSCognitoIdentityPasswordAuthenticationDetails alloc]
 initWithUsername:@"Username" password:@"Password"];
```

If you support multi-factor authentication (MFA), you can implement the **AWSCognitoIdentityMultiFactorAuthentication** protocol.

```
-(void) getMultiFactorAuthenticationCode:
 (AWSCognitoIdentityMultifactorAuthenticationInput )authenticationInput
 mfaCodeCompletionSource: (AWSTaskCompletionSource<NSString > *)
 mfaCodeCompletionSource {
//keep a handle to the completion, you'll need it continue once you get the
 inputs from the end user
self.mfaCodeCompletion = mfaCodeCompletionSource;
//authenticationInput has details about where the mfa code was sent if you
 need to display them in your ui
}
-(void) didCompleteMultifactorAuthenticationStepWithError:(NSError*) error {
dispatch_async(dispatch_get_main_queue(), ^{
//on completion, either display the error or dismiss the ui
if(error){
[[[UIAlertView alloc] initWithTitle:error.userInfo[@"__type"]
message:error.userInfo[@"message"]
delegate:nil
cancelButtonTitle:nil
otherButtonTitles:@"Retry", nil] show];
}else{
[self dismissViewControllerAnimated:YES completion:nil];
}
});
}
```

When the end user has entered his or her code, set the result on **mfaCodeCompletion**.

```
self.mfaCodeCompletion.result = @"mfaCodeFromUser";
```

If you support sign-up using **AdminCreateUser**, you can implement the **AWSCognitoIdentityNewPasswordRequired** protocol.

```
-(void) getNewPasswordDetails: (AWSCognitoIdentityNewPasswordRequiredInput
         *) newPasswordRequiredInput
         newPasswordRequiredCompletionSource:
(AWSTaskCompletionSource<AWSCognitoIdentityNewPasswordRequiredDetails *> *)
 newPasswordRequiredCompletionSource {
     //keep a handle to the completion, you'll need it continue once you get
 the inputs from the end user
```

```
      self.newPasswordRequiredCompletionSource =
 newPasswordRequiredCompletionSource;
      //AWSCognitoIdentityNewPasswordRequiredDetails has details about the
 existing user attributes and required fields if you need to display them in
 your ui
}

-(void) didCompleteNewPasswordStepWithError:(NSError* _Nullable) error {
      dispatch_async(dispatch_get_main_queue(), ^{
            //on completion, either display the error or dismiss the ui
            if(error){
                  [[[UIAlertView alloc]
 initWithTitle:error.userInfo[@"__type"]
                  message:error.userInfo[@"message"]
                  delegate:nil
                  cancelButtonTitle:nil
                  otherButtonTitles:@"Retry", nil] show];
            }else{
                  [self dismissViewControllerAnimated:YES completion:nil];
            }
      });
}
```

When the end user has entered their proposed password and any required attributes, set the result on **newPasswordRequiredCompletionSource**.

```
NSDictionary<NSString *, NSString *> *userAttributes = @{@"name":@"My new
 name", @"email":@"mynewemail@myemail.com"};
AWSCognitoIdentityNewPasswordRequiredDetails *details =
 [[AWSCognitoIdentityNewPasswordRequiredDetails alloc]
 initWithProposedPassword:@"newPassword" userAttributes:userAttributes];
self.newPasswordRequiredCompletionSource.result = details;
```

Example: Forgot Password

```
[[user forgotPassword] continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserForgotPasswordResponse*> * _Nonnull
 task) {
    //success
    return nil;
}];

[[user confirmForgotPassword:@"code" password:@"newPassword"]
 continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserConfirmForgotPasswordResponse *> *
 _Nonnull task) {
    //success
    return nil;
}];
```

Authenticated Example: Get User Attributes

```
[[user getDetails] continueWithBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserGetDetailsResponse *> * _Nonnull
 task) {
    dispatch_async(dispatch_get_main_queue(), ^{
        if(task.error){
            [[[UIAlertView alloc]
 initWithTitle:task.error.userInfo[@"__type"]

 message:task.error.userInfo[@"message"]
                                      delegate:self
                             cancelButtonTitle:nil
                             otherButtonTitles:@"Retry", nil] show];
        }else{
            AWSCognitoIdentityUserGetDetailsResponse *response = task.result;
            //do something with response.userAttributes
        }
    });
    return nil;
}];
```

Authenticated Example: Verify User Attributes

```
[[user getAttributeVerificationCode:@"phone_number"]
 continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserGetAttributeVerificationCodeResponse
 *> * _Nonnull task) {
    //success
    return nil;
}];

[[user verifyAttribute:@"phone_number"code:@"code"]
 continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserVerifyAttributeResponse *> *
 _Nonnull task) {
    //success
    return nil;
}];
```

Authenticated Example: Update User Attributes

```
AWSCognitoIdentityUserAttributeType * attribute =
 [AWSCognitoIdentityUserAttributeType new];
attribute.name = @"name";
attribute.value = @"John User";
[[user updateAttributes:@[attribute]] continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserUpdateAttributesResponse *> *
 _Nonnull task) {
    //success
    return nil;
}];
```

Authenticated Example: Change Password

```
[[user changePassword:@"currentPassword"
 proposedPassword:@"proposedPassword"] continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserChangePasswordResponse *> * _Nonnull
 task) {
        //success
        return nil;
}];
```

Authenticated Example: Turning on MFA

```
AWSCognitoIdentityUserSettings * settings = [AWSCognitoIdentityUserSettings
 new];
AWSCognitoIdentityUserMFAOption * mfaOptions =
 [AWSCognitoIdentityUserMFAOption new];
mfaOptions.attributeName = @"phone_number";
mfaOptions.deliveryMedium = AWSCognitoIdentityProviderDeliveryMediumTypeSms;
settings.mfaOptions = @[mfaOptions];
[[user setUserSettings:settings] continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserSetUserSettingsResponse *> *
 _Nonnull task) {
    //success
    return nil;
}];
```

Tutorial: Integrating User Pools for iOS Apps

This tutorial helps you get started with user pools.

Topics

Step 1: Creating a User Pool for Your App by Using the Console

The following procedure describes how to create a user pool and use it in your app. This procedure creates a pool ID, an app client ID, and an app client secret using default settings. For information on customizing these settings, see Getting Started: Step Through Amazon Cognito User Pool Settings in the AWS Management Console (p. 13).

To create a user pool for your app

1. Sign in to the Amazon Cognito console
2. Choose **Manage your User Pools**.
3. Choose **Create a User Pool**.
4. In **Pool name**, type a name for the pool and then choose **Review defaults**.
5. From the left navigation bar, choose **Apps** and then choose **Add an app**. You can create multiple app clients for a user pool and you can create one app per platform.
6. For **App name**, type a name for your app. Keep **Generate client secret** selected, choose **Create app**, and then choose **Save changes**.

7. From the left navigation bar, choose **Review** and then choose **Create pool**.
8. Note the pool ID. You can find the app client ID and app client secret under **Apps** on the left navigation bar.

Step 2: Creating a UserPool Object

You must create a `UserPool` object for your client app. Using the user pool ID, app client ID, and app client secret you obtained in step 1, create an `AWSCognitoIdentityUserPool`.

```
  //setup service config
  AWSServiceConfiguration *serviceConfiguration = [[AWSServiceConfiguration
 alloc] initWithRegion:AWSRegionUSEast1 credentialsProvider:nil];

  //create a pool
  AWSCognitoIdentityUserPoolConfiguration *configuration
 = [[AWSCognitoIdentityUserPoolConfiguration alloc]
 initWithClientId:@"CLIENT_ID"

                                clientSecret:@"CLIENT_SECRET"

                                      poolId:@"USER_POOL_ID"];
  [AWSCognitoIdentityUserPool
 registerCognitoIdentityUserPoolWithConfiguration:serviceConfiguration
 userPoolConfiguration:configuration forKey:@"UserPool"];
  AWSCognitoIdentityUserPool *pool = [AWSCognitoIdentityUserPool
 CognitoIdentityUserPoolForKey:@"UserPool"];
```

Step 3: Signing up Users for Your App

To sign up users, your app's registration UI must collect information from users and call `signUp`.

```
NSMutableArray * attributes = [NSMutableArray new];

//Set user attributes by retrieving them from your UI.  These values are
 hardcoded for this example
AWSCognitoIdentityUserAttributeType * phone =
 [AWSCognitoIdentityUserAttributeType new];

phone.name = @"phone_number";
//All phone numbers require +country code as a prefix
phone.value = @"+15555555555";

AWSCognitoIdentityUserAttributeType * email =
 [AWSCognitoIdentityUserAttributeType new];
email.name = @"email";
email.value = @"email@mydomain.com";

[attributes addObject:phone];
[attributes addObject:email];

//set username and password by retrieving them from your UI.  They are
 hardcoded in this example.
AWSCognitoIdentityUser *user = [[pool signUp:@"username" password:@"password"
 userAttributes:attributes validationData:nil] continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUser *> * _Nonnull task) {
    NSLog(@"Successfully registered user: %@",task.result.username);
    return nil;
}];
```

Step 4: Confirming Users for Your App

Users are confirmed when either their email address or phone number is verified. In the following example, users receive a verification code at their email address or via SMS on their mobile phone during the registration flow and must input the code to complete sign-up. After obtaining the verification code from your end user, call `confirmSignUp`.

```
//replace VERIFICATION_CODE with the value the user inputs
[[user confirmSignUp:@"VERIFICATION_CODE"] continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityProviderConfirmSignUpResponse *> *
 _Nonnull task) {
    NSLog(@"Successfully confirmed user: %@",user.username);
    return nil;
}];
```

Step 5: Authenticating Users for Your App

To authenticate the confirmed user, implement the `AWSCognitoIdentityInteractiveAuthenticationDelegate` protocol, as shown next, and set the delegate for the pool. This protocol manages your custom login UI and accepts username and password information from your end user. The protocol's methods are only invoked if the user has never authenticated, if the user has signed out, or if the user's refresh token (which is valid for 30 days) has expired.

```
    //This code goes in your AppDelegate
    pool.delegate = self;

    -(id<AWSCognitoIdentityPasswordAuthentication>)
 startPasswordAuthentication{
        //implement code to instantiate and display login UI here
    //return something that implements the
 AWSCognitoIdentityPasswordAuthentication protocol
    return loginUI;
    }

    //This code goes in your Login UI
    -(void) getPasswordAuthenticationDetails:
 (AWSCognitoIdentityPasswordAuthenticationInput *) authenticationInput
 passwordAuthenticationCompletionSource: (AWSTaskCompletionSource *)
 passwordAuthenticationCompletionSource {
        //using inputs from login UI create an
 AWSCognitoIdentityPasswordAuthenticationDetails object.
        //These values are hardcoded for this example.
        AWSCognitoIdentityPasswordAuthenticationDetails * result
 = [[AWSCognitoIdentityPasswordAuthenticationDetails alloc]
 initWithUsername:@"USERNAME" password:@"PASSWORD"];
        //set the result to continue the sign-in process
        passwordAuthenticationDetails.result = result;
    };

    -(void) didCompletePasswordAuthenticationStepWithError:(NSError*) error {
    dispatch_async(dispatch_get_main_queue(), ^{
        //present error to end user
        if(error){
            [[[UIAlertView alloc] initWithTitle:error.userInfo[@"__type"]
                                        message:error.userInfo[@"message"]
                                       delegate:nil
                              cancelButtonTitle:nil
                              otherButtonTitles:@"Ok", nil] show];
        }else{
            //dismiss view controller
            [self dismissViewControllerAnimated:YES completion:nil];
        }
    });
}
```

Step 6: Getting User Details

To get user details, call `getDetails`, as shown next.

```
[[user getDetails] continueWithSuccessBlock:^id
 _Nullable(AWSTask<AWSCognitoIdentityUserGetDetailsResponse *> * _Nonnull
 task) {
     AWSCognitoIdentityUserGetDetailsResponse *response = task.result;
     for (AWSCognitoIdentityUserAttributeType *attribute in
 response.userAttributes) {
         //print the user attributes
         NSLog(@"Attribute: %@ Value: %@", attribute.name, attribute.value);
     }
     return nil;
 }];
```

Step 7: Getting Credentials to Access AWS Resources For an App User

To get credentials to access AWS resources for your user, first associate your user pool with an identity pool, and then provide `AWSCognitoIdentityUserPool` to your `AWSCognitoCredentialsProvider`. The following procedure describes how to get an identity pool.

To create an identity pool

1. Sign in to the Amazon Cognito console.
2. Choose **Manage Federated Identities**.
3. Choose **Create new identity pool**. Type a name for your identity pool in **Identity pool name**.
4. Expand the **Authentication providers** section.
5. On the Cognito tab, specify your **User Pool ID** and **App Client ID**.
6. After you configure the identity pool association, get AWS credentials into your app by providing `AWSCognitoIdentityUserPool` to your `AWSCognitoCredentialsProvider`.

```
AWSCognitoCredentialsProvider *credentialsProvider
 = [[AWSCognitoCredentialsProvider alloc]
 initWithRegionType:AWSRegionUSEast1 identityPoolId:@"IDENTITY_POOL_ID"
 identityProviderManager:pool];
AWSServiceConfiguration *defaultServiceConfiguration =
 [[AWSServiceConfiguration alloc] initWithRegion:AWSRegionUSEast1
        credentialsProvider:credentialsProvider];
AWSServiceManager.defaultServiceManager.defaultServiceConfiguration =
 defaultServiceConfiguration;
```

Next Steps

For a working example demonstrating the functionality described in this tutorial, see the Objective-C sample on Github.

Setting up the AWS SDK for JavaScript

Amazon Cognito provides a JavaScript SDK. The following topic provides setup instructions and examples for common tasks while working with user pools.

The Amazon Cognito Identity SDK for JavaScript allows JavaScript-enabled applications to register users, authenticate users, view, delete, and update user attributes within the Amazon Cognito Identity service. Other functionality includes password changes for authenticated users and initiating and completing forgotten password flows for unauthenticated users.

Installing the SDK for JavaScript

The following procedure describes how to set up the SDK for JavaScript.

To set up the SDK for JavaScript

1. Create an app for your user pool.

   Important
   The **Generate client secret** box must be unchecked because the JavaScript SDK doesn't support apps that have a client secret.
2. Download and include the Amazon Cognito AWS SDK for JavaScript from GitHub.

   Note
   The Amazon Cognito AWS SDK for JavaScript is a variant of the AWS SDK for JavaScript named `AWSCognito` instead of `AWS`. It references only the Amazon Cognito Identity service. Similar to the SDK for JavaScript, the **config.credentials** property needs to be populated (either globally for `AWSCognito` or per-service).
3. Configure your credentials per the instructions in Getting Your Credentials.
4. Download and include the Amazon Cognito Identity SDK for JavaScript from GitHub.
5. Include the JavaScript BN library for BigInteger computations from here.
6. Include the Stanford JavaScript Crypto Library from here.

   Note
   By default the Stanford JavaScript Crypto Library doesn't include the bytes codec that the SDK uses, so it must be included with the `--with-codecBytes` option when configuring the Stanford JavaScript Crypto Library (see sjlc README/INSTALL). It is known to build on Linux and requires a Java runtime.
7. Include Moment.js, a JavaScript library used for date manipulation from here.
8. Optionally, you can download and include the AWS SDK for JavaScript to use other AWS services. The SDK is necessary if you wish to use `AWS.CognitoIdentityCredentials`.

```
<script src="/path/to/jsbn.js"></script>
<script src="/path/to/jsbn2.js"></script>
<script src="/path/to/sjcl.js"></script>
<script src="/path/to/moment.min.js"></script>
<script src="/path/to/aws-cognito-sdk.min.js"></script>
<script src="/path/to/amazon-cognito-identity.min.js"></script>
<script src="/path/to/aws-sdk-2.3.5.js"></script>
```

Network Configuration

The Amazon Cognito Identity JavaScript SDK will make requests to the following endpoints:

- For Amazon Cognito Identity request handling: "https://cognito-idp.us-east-1.amazonaws.com"

  Note
  This endpoint may change based on the region in which you created your Identity Pool.

For most frameworks, you can whitelist all AWS endpoints with "*.amazonaws.com" to whitelist the domain.

Random Numbers

To authenticate with Amazon Cognito Identity, the client app needs to generate a random number as part of the Secure Remote Password (SRP) protocol. For more information, see The Stanford SRP Homepage.

Note
In some Web browsers such as Internet Explorer 8, Internet Explorer 9, or versions 4.2 and 4.3 of the Android Browser, a default paranoia of 0 passed to the Stanford JavaScript Crypto Library generates weak random numbers that might compromise client data. You should be careful when using the library in such an environment and call the `sjcl.random.startCollectors()` function before starting the Amazon Cognito authentication flow to collect the entropy required for random number generation. Paranoia level should also be increased. See discussion here.

Paranoia levels can be set through the constructor:

```
    var poolData = {
        UserPoolId : 'us-east-1_TcoKGbf7n',
        ClientId : '4pe2usejqcdmhi0a25jp4b5sh3',
        Paranoia : 7
    };

    var userPool = new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(poolData);
    var userData = {
        Username : 'username',
        Pool : userPool
    };

    var cognitoUser = new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUser(userData);
```

You can also call the object method:

```
userPool.setParanoia(7);
```

Examples: Using the JavaScript SDK

Register a User with the Application

You need to create a `CognitoUserPool` object by providing a `UserPoolId` and a `ClientId`, and registering by using a username, password, attribute list, and validation data.

```
   AWSCognito.config.region = 'us-east-1'; //This is required to derive the
endpoint

   var poolData = { UserPoolId : 'us-east-1_TcoKGbf7n',
       ClientId : '4pe2usejqcdmhi0a25jp4b5sh3'
   };
   var userPool = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(poolData);

   var attributeList = [];

   var dataEmail = {
       Name : 'email',
       Value : 'email@mydomain.com'
   };
   var dataPhoneNumber = {
       Name : 'phone_number',
       Value : '+15555555555'
   };
   var attributeEmail = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUserAttribute(dataEmail);
   var attributePhoneNumber = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUserAttribute(dataPhoneNumber);

   attributeList.push(attributeEmail);
   attributeList.push(attributePhoneNumber);

   userPool.signUp('username', 'password', attributeList, null,
function(err, result){
       if (err) {
           alert(err);
           return;
       }
       cognitoUser = result.user;
       console.log('user name is ' + cognitoUser.getUsername());
   });
```

Delete an Authenticated User

```
   cognitoUser.deleteUser(function(err, result) {
       if (err) {
           alert(err);
           return;
       }
       console.log('call result: ' + result);
   });
```

Retrieve the current user from local storage

```
   var data = { UserPoolId : 'us-east-1_Iqc12345',
       ClientId : '12345du353sm7khjj1q'
   };
   var userPool = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(data);
   var cognitoUser = userPool.getCurrentUser();
```

```
    if (cognitoUser != null) {
        cognitoUser.getSession(function(err, session) {
            if (err) {
                alert(err);
                return;
            }
            console.log('session validity: ' + session.isValid());
        });
    }
```

Authenticate a User

The following example authenticates a user and establishes a user session with the Amazon Cognito service.

```
    var authenticationData = {
        Username : 'username',
        Password : 'password',
    };
    var authenticationDetails = new
 AWSCognito.CognitoIdentityServiceProvider.AuthenticationDetails(authenticationData);
    var poolData = { UserPoolId : 'us-east-1_TcoKGbf7n',
        ClientId : '4pe2usejqcdmhi0a25jp4b5sh3'
    };
    var userPool = new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(poolData);
    var userData = {
        Username : 'username',
        Pool : userPool
    };
    var cognitoUser = new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUser(userData);
    cognitoUser.authenticateUser(authenticationDetails, {
        onSuccess: function (result) {
            console.log('access token + ' +
 result.getAccessToken().getJwtToken());
            /*Use the idToken for Logins Map when Federating User Pools with
 Cognito Identity or when passing through an Authorization Header to an API
 Gateway Authorizer*/
            console.log('idToken + ' + result.idToken.jwtToken);
        },

        onFailure: function(err) {
            alert(err);
        },

    });
```

Enable MFA for a User Pool

The following example enables multi-factor authentication (MFA) for a user pool that has an optional MFA setting for an authenticated user.

```
    cognitoUser.enableMFA(function(err, result) {
        if (err) {
            alert(err);
            return;
        }
        console.log('call result: ' + result);
    });
```

Disable MFA for a User Pool

The following example disables multi-factor authentication (MFA) for a user pool that has an optional MFA setting for an authenticated user.

```
    cognitoUser.disableMFA(function(err, result) {
        if (err) {
            alert(err);
            return;
        }
        console.log('call result: ' + result);
    });
```

Create a User Pool Object

```
    var data = { UserPoolId : 'us-east-1_q2Y6U8uuY',
                 ClientId : '224kjog47ojnt9ov773erj7qn9'
    };

    var userPool = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(data);
```

Sign Up For the Application

```
            var attribute = {
                Name : 'phone_number',
                Value : '+12245657777'
            };

            var attribute = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUserAttribute(attribute);
            var attributeList = [];

            attributeList.push(attribute);
            var cognitoUser;

            userPool.signUp('username', 'password', attributeList, null,
function(err, result) {
                if (err) {
                    alert(err);
                    return;
                }
                cognitoUser = result.user;
            });
```

Sign in With MFA Enabled

```
            var userData = {
                Username : 'username',
                Pool : userPool
            };

            cognitoUser = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUser(userData);

            var authenticationData = {
                Username : 'username',
                Password : 'password',
            };

            var authenticationDetails = new
AWSCognito.CognitoIdentityServiceProvider.AuthenticationDetails(authenticationData);

            cognitoUser.authenticateUser(authenticationDetails, {
                onSuccess: function (result) {
                    alert('authentication successful!')
                },

                onFailure: function(err) {
                    alert(err);
                },

                mfaRequired: function(codeDeliveryDetails) {
                    var verificationCode = prompt('Please input verification
code' ,'');
                    cognitoUser.sendMFACode(verificationCode, this);
                }

            });
```

Sign Out

```
            if (cognitoUser != null) {
               cognitoUser.signOut();
            }
```

Update Attributes

The following example updates user attributes for an authenticated user.

```
    var attributeList = [];
    var attribute = {
        Name : 'nickname',
        Value : 'joe'
    };
    var attribute = new
AWSCognito.CognitoIdentityServiceProvider.CognitoUserAttribute(attribute);
    attributeList.push(attribute);

    cognitoUser.updateAttributes(attributeList, function(err, result) {
        if (err) {
            alert(err);
            return;
        }
        console.log('call result: ' + result);
    });
```

Delete Attributes

The following example deletes user attributes for an authenticated user.

```
    var attributeList = [];
    attributeList.push('nickname');

    cognitoUser.deleteAttributes(attributeList, function(err, result) {
        if (err) {
            alert(err);
            return;
        }
        console.log('call result: ' + result);
    });
```

Verify an Attribute

The following example verifies user attributes for an authenticated user.

```
    cognitoUser.getAttributeVerificationCode('email', {
        onSuccess: function (result) {
            console.log('call result: ' + result);
        },
        onFailure: function(err) {
            alert(err);
        },
        inputVerificationCode() {
            var verificationCode = prompt('Please input verification code:
' ,'');
            cognitoUser.verifyAttribute('email', verificationCode, this);
        }
    });
```

Retrieve Attributes

The following example retrieves user attributes for an authenticated user.

```
    cognitoUser.getUserAttributes(function(err, result) {
        if (err) {
            alert(err);
            return;
        }
        for (i = 0; i < result.length; i++) {
            console.log('attribute ' + result[i].getName() + ' has value ' +
result[i].getValue());
        }
    });
```

Resend a Confirmation Code

The following example resends a confirmation code via SMS that confirms the registration for an unauthenticated user.

```
            cognitoUser.resendConfirmationCode(function(err, result) {
                if (err) {
                    alert(err);
                    return;
                   }
                   alert(result);
            });
```

Confirm Registration

```
            cognitoUser.confirmRegistration('123456', function(err, result) {
                if (err) {
                    alert(err);
                    return;
                }
                alert(result);
            });
```

Change a Password

The following example changes the current password of an authenticated user.

```
    cognitoUser.changePassword('oldPassword', 'newPassword', function(err,
 result) {
        if (err) {
            alert(err);
            return;
        }
        console.log('call result: ' + result);
    });
```

Forgotten Password Flow

The following example starts and completes a forgotten password flow for an unauthenticated user.

```
    cognitoUser.forgotPassword({
        onSuccess: function (result) {
            console.log('call result: ' + result);
        },
        onFailure: function(err) {
            alert(err);
        },
        inputVerificationCode() {
            var verificationCode = prompt('Please input verification code
 ' ,'');
            var newPassword = prompt('Enter new password ' ,'');
            cognitoUser.confirmPassword(verificationCode, newPassword, this);
        }
    });
```

Delete a User

The following example deletes an authenticated user.

```
    cognitoUser.deleteUser(function(err, result) {
        if (err) {
            alert(err);
            return;
        }
        console.log('call result: ' + result);
    });
```

Sign a User Out

The following example signs the current user out from the application.

```
    cognitoUser.signOut();
```

Sign a User Out Globally

The following example signs the current user out globally by invalidating all issued tokens.

```
    cognitoUser.globalSignOut();
```

Get the Current User

The following example retrieves the current user from local storage.

```
    var data = {
        UserPoolId : '...', // Your user pool id here
        ClientId : '...' // Your client id here
    };
    var userPool = new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(data);
    var cognitoUser = userPool.getCurrentUser();

    if (cognitoUser != null) {
        cognitoUser.getSession(function(err, session) {
            if (err) {
               alert(err);
                return;
            }
            console.log('session validity: ' + session.isValid());

            AWS.config.credentials = new AWS.CognitoIdentityCredentials({
                IdentityPoolId : '...' // your identity pool id here
                Logins : {
                    // Change the key below according to the specific region
 your user pool is in.
                    'cognito-idp.<region>.amazonaws.com/
<YOUR_USER_POOL_ID>' : session.getIdToken().getJwtToken()
                }
            });

            // Instantiate aws sdk service objects now that the credentials
 have been updated.
            // example: var s3 = new AWS.S3();
        });
    }
```

Integrate a User in a User Pool with an Identity Pool

The following example integrates the current user in a user pool with the specified identity pool.

```
    var cognitoUser = userPool.getCurrentUser();

    if (cognitoUser != null) {
        cognitoUser.getSession(function(err, result) {
            if (result) {
                console.log('You are now logged in.');

                // Add the User's Id Token to the Cognito credentials login
 map.
                AWS.config.credentials = new AWS.CognitoIdentityCredentials({
                    IdentityPoolId: 'YOUR_IDENTITY_POOL_ID',
                    Logins: {
                        'cognito-idp.<region" .amazonaws.com/
<YOUR_USER_POOL_ID" ': result.getIdToken().getJwtToken()
                    }
                });
            }
        });
    }
    //call refresh method in order to authenticate user and get new temp
 credentials
    AWS.config.credentials.refresh((error) => {
        if (error) {
            console.error(error);
        } else {
            console.log('Successfully logged!');
        }
        });
```

List All Devices for a User

The following example lists all devices for an authenticated user. In this case, we need to pass a limit on the number of devices retrieved at a time. In the first call, the pagination token should be null. The first call returns a pagination token, which should be passed in all subsequent calls.

```
    cognitoUser.listDevices(limit, paginationToken, {
        onSuccess: function (result) {
            console.log('call result: ' + result);
        },
        onFailure: function(err) {
            alert(err);
        }
    });
```

List Device Information

The following example lists information about the current device.

```
    cognitoUser.listDevices(limit, paginationToken, {
        onSuccess: function (result) {
            console.log('call result: ' + result);
        },
        onFailure: function(err) {
            alert(err);
        }
    });
```

Remember a Device

The following example remembers a device.

```
    cognitoUser.setDeviceStatusRemembered({
        onSuccess: function (result) {
            console.log('call result: ' + result);
        },
        onFailure: function(err) {
            alert(err);
        }
    });
```

Do Not Remember a Device

The following example marks a device as not to be remembered.

```
    cognitoUser.setDeviceStatusNotRemembered({
        onSuccess: function (result) {
            console.log('call result: ' + result);
        },
    onFailure: function(err) {
            alert(err);
        }
    });
```

Do Not Remember a Device

The following example forgets the current device.

```
    cognitoUser.forgetDevice({
        onSuccess: function (result) {
            console.log('call result: ' + result);
        },
        onFailure: function(err) {
            alert(err);
        }
    });
```

Confirm a Registered, Unauthenticated User

The following example confirms a registered, unauthenticated user using a confirmation code received via SMS message.

```
    var poolData = {
        UserPoolId : 'us-east-1_TcoKGbf7n',
        ClientId : '4pe2usejqcdmhi0a25jp4b5sh3'
    };

    var userPool = new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(poolData);
    var userData = {
        Username : 'username',
        Pool : userPool
    };

    var cognitoUser = new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUser(userData);
    cognitoUser.confirmRegistration('123456', true, function(err, result) {
        if (err) {
            alert(err);
            return;
        }
        console.log('call result: ' + result);
    });
```

Sign Out from the Application

```
    cognitoUser.signOut();
```

Example: Authenticate and Set a New Password for a User Created Using the AdminCreateUser API

To support the user sign-in flow for users created by administrators (using the `AdminCreateUser` API), implement a `newPasswordRequired` callback method to set the new password when the user first signs in. The user first attempts to sign in with the temporary password he or she received in the invitation and the SDK calls your `newPasswordRequired` callback. Gather the required inputs, including the new password and required attributes, and then call the `completeNewPasswordChallenge` method, which is available in the `CognitoUser` class.

The `newPasswordRequired` callback takes two parameters: `userAttributes` and `requiredAttributes`.

```
cognitoUser.authenticateUser(authenticationDetails, {
        onSuccess: function (result) {
            // User authentication was successful
        },

        onFailure: function(err) {
            // User authentication was not successful
        },

        mfaRequired: function(codeDeliveryDetails) {
            // MFA is required to complete user authentication.
            // Get the code from user and call
            cognitoUser.sendMFACode(mfaCode, this)
        },
        newPasswordRequired: function(userAttributes, requiredAttributes) {
            // User was signed up by an admin and must provide new
            // password and required attributes, if any, to complete
            // authentication.

            // userAttributes: object, which is the user's current profile.
It will list all attributes that are associated with the user.
            // Required attributes according to schema, which don’t have any
values yet, will have blank values.
            // requiredAttributes: list of attributes that must be set by the
user along with new password to complete the sign-in.


            // Get these details and call
            // newPassword: password that user has given
            // attributesData: object with key as attribute name and value
that the user has given.
            cognitoUser.completeNewPasswordChallenge(newPassword,
attributesData, this)
        }
    });
```

Tutorial: Integrating User Pools for JavaScript Apps

This tutorial helps you use the Amazon Cognito SDK for JavaScript to get started with user pools.

Topics

Step 1: Creating a User Pool for your JavaScript App by Using the Console

The following procedure describes how to create a user pool and use it in your app. This procedure creates a user pool ID and an app client ID. For information on customizing these settings, see Getting Started: Step Through Amazon Cognito User Pool Settings in the AWS Management Console (p. 13).

To create a user pool for your app

1. Sign in to the Amazon Cognito console
2. Choose **Manage your User Pools**.
3. Choose **Create a User Pool**.
4. In **Pool name**, type a name for the pool and then choose **Review defaults**. This creates the pool with the default settings.

5. From the left navigation pane, choose **Attributes** to specify which attributes are required and which attributes to use as aliases. After you set the following attributes and after users in the pool verify their email addresses, they can sign in with their usernames or email addresses.

   a. For **email**, choose **Required** and **Alias**.
   b. For **phone number**, choose **Required** and **Alias**.
   c. For **given name**, choose **Required**.
   d. Choose **Save changes**.
6. From the left navigation pane, choose **Policies** to specify the password policy. For this tutorial, use the default settings.
7. From the left navigation pane, choose **Verifications**. On this page, you can customize the messages that are sent to the users in your pool to deliver verification codes. For this tutorial, use the default settings.
8. From the left navigation pane, choose **Apps** and then choose **Add an app**. You can create multiple app clients for a user pool and you can create one app per platform.
9. For **App name**, type a name for your app. Ensure that the **Generate client secret** check box is cleared, and then choose **Set attribute read and write permissions**. Select the attributes that require write permissions. Required attributes always have write permissions.

   Note
   The Amazon Cognito JavaScript SDK does not use the app client secret. If you configure your user pool app client with an app client secret, the SDK will throw exceptions.
10. Choose **Create app** and then choose **Save changes**.
11. From the left navigation bar, choose **Review** and then choose **Create pool**.
12. Note the pool ID and client ID. You can find the app client ID under **Apps** on the left navigation bar.

Step 2: Creating a User Pool Object in Your App

To create a user pool object, you need the user pool ID and client ID that you obtained in step 1. The following example shows how to create a `CognitoUserPool` object. The JavaScript SDK does not support the app client secret. If you configure your user pool app client with an app client secret, the SDK will throw exceptions.

```
AWSCognito.config.region = 'us-east-1';

var poolData = {
    UserPoolId : '...', // your user pool id here
    ClientId : '...' // your app client id here
};
var userPool =
new AWSCognito.CognitoIdentityServiceProvider.CognitoUserPool(poolData);
var userData = {
    Username : '...', // your username here
    Pool : userPool
};
```

Step 3: Signing up Users for Your App

After creating a user pool object, users can be signed up for the app. The user's information can be collected through the web UI and used to populate `CognitoUserAttribute` objects that are passed in the `signUp` call.

```
var attributeList = [];
var dataEmail = {
    Name : 'email',
    Value : '...' // your email here
};
var dataPhoneNumber = {
    Name : 'phone_number',
    Value : '...' // your phone number here with +country code and no
 delimiters in front
};
var attributeEmail =
new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUserAttribute(dataEmail);
var attributePhoneNumber =
new
 AWSCognito.CognitoIdentityServiceProvider.CognitoUserAttribute(dataPhoneNumber);

attributeList.push(attributeEmail);
attributeList.push(attributePhoneNumber);

var cognitoUser;
userPool.signUp('username', 'password', attributeList, null, function(err,
 result){
    if (err) {
        alert(err);
        return;
    }
    cognitoUser = result.user;
    console.log('user name is ' + cognitoUser.getUsername());
});
```

Step 4: Confirming Users for Your App

After signing up, the user confirms the sign-up by entering a code sent either through SMS or email (based on the user pool settings). Alternatively, you can use a `PreSignUp` AWS Lambda function to automatically confirm your users. To confirm sign-up, you must collect the code ('123456' in the following example) received by the user and use it as follows.

```
 cognitoUser.confirmRegistration('123456', true, function(err, result) {
    if (err) {
        alert(err);
        return;
    }
    console.log('call result: ' + result);
});
```

The registration code can be resent by using the `resendConfirmationCode` method of a `cognitoUser` object. This is an unauthenticated call and only the username, the client ID, and the user pool information are needed.

Step 5: Signing Users in to Your App

A confirmed user signs in to obtain a session. The session contains an ID token that contains user claims, an access token that is used internally to perform authenticated calls, and a refresh token that is used internally to refresh the session after it expires each hour. For more information about tokens, see Using Tokens with User Pools (p. 102). If sign in is successful, the `onSuccess` callback is called.

If sign in fails, the `onFailure` callback is called. If sign in requires MFA, the `mfaRequired` callback is called and you must invoke `sendMFACode` on the `cognitoUser` object. The verification code that is received must be passed and the user is then signed in.

```
    var authenticationData = {
        Username : '...', // your username here
        Password : '...', // your password here
    };
    var authenticationDetails =
new
 AWSCognito.CognitoIdentityServiceProvider.AuthenticationDetails(authenticationData);

    var cognitoUser =
new AWSCognito.CognitoIdentityServiceProvider.CognitoUser(userData);
    cognitoUser.authenticateUser(authenticationDetails, {
        onSuccess: function (result) {
            console.log('access token + ' +
 result.getAccessToken().getJwtToken());
        },

        onFailure: function(err) {
            alert(err);
        },
        mfaRequired: function(codeDeliveryDetails) {
            var verificationCode = prompt('Please input verification
 code' ,'');
            cognitoUser.sendMFACode(verificationCode, this);
        }
    });
```

Step 6: Getting User Details

After signing in, a user can perform authorized operations such as retrieving user attributes, verifying user attributes (such as an unverified email address), deleting user attributes, updating user attributes, changing the user password, and deleting the user account. For user pools that have an optional MFA setting, users can enable or disable MFA for themselves. Signing out from the app clears the local user session and the user must sign in again to establish a new session.

If users forget their passwords, they can initiate a forgotten password flow. A code will be sent to the user. The user uses this code together with a new password to complete the flow. The relevant call is `forgotPassword` on a `cognitoUser` object that is unauthenticated; the relevant callbacks are shown in the following example.

```
cognitoUser.forgotPassword({
    onSuccess: function (result) {
        console.log('call result: ' + result);
    },
    onFailure: function(err) {
        alert(err);
    },
    inputVerificationCode() {
        var verificationCode = prompt('Please input verification code ' ,'');
        var newPassword = prompt('Enter new password ' ,'');
        cognitoUser.confirmPassword(verificationCode, newPassword, this);
    }
});
```

Step 7: Getting Credentials to Access AWS Resources for an App User

If you want to work with other AWS services, you must first create an Amazon Cognito identity pool (p. 106). After you create this identity pool, you can get AWS credentials by passing the identity pool ID and the ID token (which were obtained earlier) when signing in the user. The following example shows how to populate `IdentityPoolId` and pass the ID token through the `Logins` map.

```
 AWS.config.credentials = new AWS.CognitoIdentityCredentials({
    IdentityPoolId: 'us-east-1:XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXX',
    Logins: {
        'cognito-idp.us-east-1.amazonaws.com/us-east-1_XXXXXXXXX':
 result.getIdToken().getJwtToken()
    }
});

AWS.config.credentials.get(function(err){
    if (err) {
        alert(err);
    }
});
```

Next Steps

For more examples and an overview of the code used in this tutorial, see the Amazon Cognito Identity JavaScript GitHub repository.

Customizing User Pool Workflows by Using AWS Lambda Triggers

You can use AWS Lambda triggers with Amazon Cognito user pools to customize workflows at various stages in the lifecycle of a user account. For more information, see the *AWS Lambda Developer Guide*. The following Lambda triggers are available for you to implement:

Pre sign-up
: Amazon Cognito invokes this trigger when a user attempts to register (sign up), allowing you to perform custom validation to accept or deny the registration request.

Pre authentication
: Amazon Cognito invokes this trigger when a user attempts to authenticate (sign in), allowing you to perform custom validation to accept or deny the authentication request.

Custom message
: Amazon Cognito invokes this trigger before sending an email or phone verification message or a multi-factor authentication (MFA) code, allowing you to customize the message dynamically. Static custom messages can be edited in the **Message Customizations** tab of the Amazon Cognito console.

Post authentication
: Amazon Cognito invokes this trigger after authenticating a user, allowing you to add custom logic.

Post confirmation
: Amazon Cognito invokes this trigger after a user is confirmed, allowing you to send custom messages or to add custom logic. For example, you may want to implement analytics in your app.

Define Auth Challenge
: Amazon Cognito invokes this trigger to initiate the custom authentication flow.

Create Auth Challenge
Amazon Cognito invokes this trigger after **Define Auth Challenge** if a custom challenge has been specified as part of the **Define Auth Challenge** trigger.

Verify Auth Challenge Response
Amazon Cognito invokes this trigger to verify if the response from the end user for a custom Auth Challenge is valid or not.

Creating an AWS Lambda Trigger for a Stage

You can create an AWS Lambda function and then associate that function with one of the user account life cycle stages to create a Lambda trigger.

To add a Lambda function to a user stage

1. If you haven't done so already, create a Lambda function using the Lambda console.
2. Navigate to the Amazon Cognito console, choose **Manage User Pools**, and then choose the user pool to add the Lambda function to.
3. In your user pool, choose the **Triggers** tab.
4. Associate a user stage with a Lambda function by choosing the function from the drop-down menu for that stage, and then save your changes.

AWS Lambda Trigger Request and Response Parameters

This section describes the AWS Lambda trigger request and response parameters.

Topics

AWS Lambda Trigger Common Parameters

The event information passed to the invoked Lambda function contains the parameters that were passed from the Amazon Cognito service. The general format of the event is shown next. The request and the response parameters depend on the Lambda trigger.

```
{
    "version": number,
    "triggerSource": "string",
    "region": AWSRegion,
    "userPoolId": "string",
    "callerContext":
        {
            "awsSdkVersion": "string",
            "clientId": "string"
        },
    "request":
        {
            "userAttributes": {
                "string": "string",
                ....
            }
        },
    "response": {}
}
```

version
: The version number of your Lambda function.

triggerSource
: The name of the event that triggered the Lambda function. The following table shows the `triggerSource` values and the triggering event for each value.

`triggerSource` value	Triggering event
`PreSignUp_SignUp`	Pre-sign up
`PostConfirmation_ConfirmSignUp`	Post confirmation
`PreAuthentication_Authentication`	Pre authentication
`PostAuthentication_Authentication`	Post authentication
`CustomMessage_SignUp`	Custom message – To send confirmation code post sign-up
`CustomMessage_ResendCode`	Custom message – To resend confirmation code to an existing user
`CustomMessage_ForgotPassword`	Custom message – To send confirmation code for Forgot Password request
`CustomMessage_UpdateUserAttribute`	Custom message – When a user's email or phone number is changed, this trigger sends a verification code automatically to the user. Cannot be used for other attributes.
`CustomMessage_VerifyUserAttribute`	Custom message – This trigger sends a verification code to the user when the they manually request it for a new email or phone number.
`CustomMessage_Authentication`	Custom message – To send MFA code during authentication
`DefineAuthChallenge_Authentication`	Define Auth Challenge
`CreateAuthChallenge_Authentication`	Create Auth Challenge
`VerifyAuthChallengeResponse_Authentication`	Verify Auth Challenge Response

region
: The AWS Region, as an `AWSRegion` instance.

userPoolId
: The user pool ID for the user pool.

callerContext
: The caller context, which consists of the following:

  awsSdkVersion
  : The AWS SDK version number.

  clientId
  : The ID of the client associated with the user pool.

request
: The request from the Amazon Cognito service. This request must include:

  userAttributes
  : One or more pairs of user attribute names and values. Each pair is in the form "*`name`*": "*`value`*".

response
: The response from your Lambda trigger. The return parameters depend on the triggering event.

Pre Sign-up Lambda Parameters

The request includes validation data from the client.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    },
    "validationData": {<validation data as key-value (String,
                String) pairs, from the client>}
}
```

userAttributes
: One or more name-value pairs representing user attributes. The attribute names are the keys.

validationData
: One or more name-value pairs containing the validation data in the request to register a user. The validation data is set and then passed from the client in the request to register a user.

In the response, you can set `autoConfirmUser` to `true` if you want to auto-confirm the user.

```
"response": {
    "autoConfirmUser": boolean
}
```

autoConfirmUser
: Set to `true` to auto-confirm the user, or `false` otherwise.

Pre-Authentication Lambda Parameters

The request includes validation data from the client.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    },
    "validationData": {<validation data as key-value (String,
                String) pairs, from the client>}
}
```

userAttributes
: One or more name-value pairs representing user attributes.

validationData
: One or more key-value pairs containing the validation data in the user's sign-in request.

No return information is expected in the response.

```
"response": {
}
```

Custom Message Lambda Parameters

The request includes *codeParameter*, which is a string that acts as a placeholder for the code that's being delivered to the user. Insert the *codeParameter* string into the message body, at the position where you want the verification code to be inserted. On receiving this response, the Amazon Cognito service replaces the *codeParameter* string with the actual verification code.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    },
    "codeParameter": "string"
}
```

userAttributes
: One or more name-value pairs representing user attributes.

codeParameter
: A string for you to use as the placeholder for the verification code in the custom message.

In the response, you specify the custom text to use in messages to your users.

```
"response": {
    "smsMessage": "string",
    "emailMessage": "string",
    "emailSubject": "string";
}
```

smsMessage
: The custom SMS message to be sent to your users. Must include the `codeParameter` value received in the request.

emailMessage
: The custom email message to be sent to your users. Must include the `codeParameter` value received in the request.

emailSubject
The subject line for the custom message.

Post-Authentication Lambda Parameters

The request includes a flag to indicate if the user has signed in on a new device. This flag is set only if remembered devices functionality was enabled for the user pool by setting the remembered devices value to **Always** or **User Opt-In**.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    },
    "newDeviceUsed": boolean
}
```

userAttributes
One or more name-value pairs representing user attributes.

validationData
One or more key-value pairs containing the validation data in the request to register a user.

No return information is expected in the response.

```
"response": {
}
```

Post-Confirmation Lambda Parameters

The request contains the current attributes for the confirmed user.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    }
}
```

userAttributes
One or more name-value pairs representing user attributes.

No return information is expected in the response.

```
"response": {
}
```

Define Auth Challenge Lambda Parameters

The request contains `session`, which is an array containing all of the challenges that are presented to the user in the authentication process that is underway, along with the corresponding result. The challenge details (`ChallengeResult`) are stored in chronological order in the `session` array, with `session[0]` representing the first challenge that is presented to the user.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    },
    "session": {
        [
            ChallengeResult
        ]
    }
}
```

userAttributes
One or more name-value pairs representing user attributes.

session
The session element is an array of `ChallengeResult` elements, each of which contains the following elements:

challengeName
The challenge type. One of: `"CUSTOM_CHALLENGE"`, `"PASSWORD_VERIFIER"`, `"SMS_MFA"`, `"DEVICE_SRP_AUTH"`, `"DEVICE_PASSWORD_VERIFIER"`, or `"ADMIN_NO_SRP_AUTH"`.

challengeResult
Set to `true` if the user successfully completed the challenge, or `false` otherwise.

challengeMetaData
Your name for the custom challenge. Used only if `challengeName` is "CUSTOM_CHALLENGE".

In the response you can return the next stage of the authentication process.

```
"response": {
    "challengeName": "string",
    "issueTokens": boolean,
    "failAuthentication": boolean
}
```

challengeName
A string containing the name of the next challenge. If you want to present a new challenge to your user, specify the challenge name here.

issueTokens
Set to `true` if you determine that the user has sufficiently authenticated by completing the challenges, or `false` otherwise.

failAuthentication
Set to `true` if you want to terminate the current authentication process, or `false` otherwise.

Create Auth Challenge Lambda Parameters

This Lambda trigger is invoked to create a challenge to present to the user. The request for this Lambda trigger includes the `challengeName` and `session`. The `challengeName` is a string and is the name of the next challenge to the user. The value of this attribute is set in the Define Auth Challenge Lambda trigger.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    },
    "challengeName": "string",
    "session": {
        [
            ChallengeResult
        ]
    }
}
```

userAttributes
One or more name-value pairs representing user attributes.

challengeName
The name of the new challenge.

session
The session element is an array of `ChallengeResult` elements, each of which contains the following elements:

challengeName
The challenge type. One of: "CUSTOM_CHALLENGE", "PASSWORD_VERIFIER", "SMS_MFA", "DEVICE_SRP_AUTH", "DEVICE_PASSWORD_VERIFIER", or "ADMIN_NO_SRP_AUTH".

challengeResult
Set to `true` if the user successfully completed the challenge, or `false` otherwise.

challengeMetaData
Your name for the custom challenge. Used only if `challengeName` is "CUSTOM_CHALLENGE".

The challenge parameters for the new challenge are added to the response.

```
"response": {
    "publicChallengeParameters": {
        "string": "string",
        ....
    },
    "privateChallengeParameters": {
        "string": "string",
        ....
    },
    "challengeMetadata": "string"
}
```

publicChallengeParameters
One or more key-value pairs for the client app to use in the challenge to be presented to the user. This parameter should contain all of the necessary information to accurately present the challenge to the user.

privateChallengeParameters
This parameter is only used by the Verify Auth Challenge Response Lambda trigger. This parameter should contain all of the information that is required to validate the user's response to the challenge. In other words, the `publicChallengeParameters` parameter contains the question that is presented to the user and `privateChallengeParameters` contains the valid answers for the question.

challengeMetadata
Your name for the custom challenge, if this is a custom challenge.

Verify Auth Challenge Response Lambda Parameters

The request for this trigger contains the `privateChallengeParameters` and `challengeAnswer` parameters. The `privateChallengeParameters` values are returned by the Create Auth Challenge Lambda trigger and will contain the expected response from the user. The `challengeAnswer` parameter contains the user's response for the challenge.

```
"request": {
    "userAttributes": {
        "string": "string",
        ....
    },
    "privateChallengeParameters": {
        "string": "string",
        ....
    },
    "challengeAnswer": {
        "string": "string",
        ....
    }
}
```

userAttributes
One or more name-value pairs representing user attributes.

privateChallengeParameters
This parameter is only used by the Verify Auth Challenge Response Lambda trigger. This parameter should contain all of the information that is required to validate the user's response to the challenge. In other words, the `publicChallengeParameters` parameter contains the question that is presented to the user and `privateChallengeParameters` contains the valid answers for the question.

challengeAnswer
The answer in the user's response to the challenge.

The response contains the `answerCorrect` attribute, which is set to `true` if the user successfully completed the challenge, or `false` otherwise.

```
"response": {
    "answerCorrect": boolean
}
```

answerCorrect
Set to `true` if the user has successfully completed the challenge, or `false` otherwise.

AWS Lambda Trigger Examples

This section gives code examples for each type of AWS Lambda trigger.

Topics

Pre Sign-up Example

The following example initializes just before the service starts the new user registration process. With this Lambda function, you can add custom logic to validate, filter, or restrict the types of user accounts that can be registered. For example, you may only want to allow users to register if they have been invited to join the service. This example uses the `autoConfirmUser` flag to indicate whether to auto-confirm a user to the user pool.

```
exports.handler = function(event, context) {
    // This Lambda function returns a flag to indicate if a user should be
 auto-confirmed.

    // Perform any necessary validations.

    // Impose a condition that the minimum length of the username of 5 is
 imposed on all user pools.
    if (event.userName.length < 5) {
        var error = new Error('failed!');
        context.done(error, event);
    }

    // Access your resource which contains the list of emails of users who
 were invited to sign up

    // Compare the list of email IDs from the request to the approved list
    if(event.userPoolId === "yourSpecialUserPool") {
        if (event.request.userAttributes.email in listOfEmailsInvited) {
                event.response.autoConfirmUser = true;
        }
    }
    // Return result to Cognito
    context.done(null, event);
};


{
  "version": 1,
  "triggerSource": "PreSignUp_SignUp",
  "region": "<region>",
  "userPoolId": "<userPoolId>",
  "userName": "<userName>",
  "callerContext": {
      "awsSdk": "<calling aws sdk with version>",
      "clientId": "<apps client id>",
      ...
  },
  "request": {
      "userAttributes": {
          "email": "<email>",
          "phone_number": "<phone_number>",
          ...
        },
       "validationData": {
           "k1": "v1",
           "k2": "v2",
           ...
        }
  },
  "response": {
      "autoConfirmUser": false
  }
}
```

Pre Authentication Example

This sample function restricts users from a specific app client ID from authenticating.

```
exports.handler = function(event, context) {
    if (event.callerContext.clientId === "<client id to be blocked>") {
        var error = new Error('Cannot authenticate users from this client');
        context.done(error, event);
    }
    context.done(null, event);
};
```

Sample event parameter:

```
{
  "version": 1,
  "triggerSource": "PreAuthentication_Authentication",
  "region": "<region>",
  "userPoolId": "<userPoolId>",
  "userName": "<userName>",
  "callerContext": {
      "awsSdkVersion": "<calling AWS sdk with version>",
      "clientId": "<apps client id>",
      ...
  },
  "request": {
      "userAttributes": {
          "phone_number_verified": false,
          "email_verified": false,
          ... // All custom attributes
      },
      "validationData": {
          "k1": "v1",
          "k2": "v2",
          ...
       }
  },
  "response": {}
}
```

Custom Message Example

This Lambda function is invoked when the service requires an app to send a verification code to the user. This function is used to customize the messages that are sent to deliver the code.

This Lambda trigger is invoked at multiple points: post-registration; resending a verification code; forgotten password; or verifying a user attribute. The response includes messages for both SMS and email. The message must include the code parameter, `{####}`, which is the placeholder for the verification code that is delivered to the user.

For email, the maximum length for the message is 2048 UTF-8 characters, including the verification code. For SMS, the maximum length is 140 UTF-8 characters, including the verification code.

```
exports.handler = function(event, context) {
    //
    if(event.userPoolId === "theSpecialUserPool") {
        // Identify why was this function invoked
        if(event.triggerSource === "CustomMessage_SignUp") {
            // Ensure that your message contains event.request.codeParameter.
 This is the placeholder for code that will be sent
            event.response.smsMessage = "Welcome to the service. Your
 confirmation code is " + event.request.codeParameter;
            event.response.emailSubject = "Welcome to the service";
            event.response.emailMessage = "Thank you for signing up. " +
 event.request.codeParameter + " is your verification code";
        }
        // Create custom message for other events
    }
    // Customize messages for other user pools

    //

    // Return result to Cognito
    context.done(null, event);
};
```

Sample event parameter:

```
{
  "version": 1,
  "triggerSource": "CustomMessage_SignUp/CustomMessage_ResendCode/
CustomMessage_ForgotPassword/CustomMessage_VerifyUserAttribute",
  "region": "<region>",
  "userPoolId": "<userPoolId>",
  "userName": "<userName>",
  "callerContext": {
      "awsSdk": "<calling aws sdk with version>",
      "clientId": "<apps client id>",
      ...
  },
  "request": {
      "userAttributes": {
          "phone_number_verified": false,
          "email_verified": true,
           ...
      },
      "codeParameter": "####"
  },
  "response": {
      "smsMessage": "<custom message to be sent in the message with code
 parameter>"
      "emailMessage": "<custom message to be sent in the message with code
 parameter>"
```

```
        "emailSubject": "<custom email subject>"
    }
}
```

Post Authentication Example

This function is invoked after a user is successfully authenticated. This sample function logs in to the console after a user is authenticated.

```
exports.handler = (event, context, callback) => {
    console.log('User authenticated: User-Pool', event.userPoolId+", UserId:"
 + event.userName);
    // Return result to Amazon Cognito
    context.done(null, event);
};
```

Sample event parameter:

```
{
  "version": 1,
  "triggerSource": "PostAuthentication_Authentication",
  "region": "<region>",
  "userPoolId": "<userPoolId>",
  "userName": "<userName>",
  "callerContext": {
      "awsSdk": "<calling aws sdk with version>",
      "clientId": "<apps client id>",
      ...
  },
  "request": {
      "userAttributes": {
          "phone_number_verified": true,
          "email_verified": true,
          ... //all custom attributes
      }
  },
  "response": {}
};
```

Post Confirmation Example

The example sends an email message to inform the user that he or she has been confirmed.

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

var ses = new aws.SES();

exports.handler = function(event, context) {
    console.log(event);

    if (event.request.userAttributes.email) {
            sendEmail(event.request.userAttributes.email, "Congratulations
 "+event.userName+", you have been confirmed: ", function(status) {
            context.done(null, event);
        });
    } else {
        // Nothing to do, the user's email ID is unknown
        context.done(null, event);
    }
};

function sendEmail(to, body, completedCallback) {
    var eParams = {
        Destination: {
            ToAddresses: [to]
        },
        Message: {
            Body: {
                Text: {
                    Data: body
                }
            },
            Subject: {
                Data: "Cognito Identity Provider registration completed"
            }
        },
        Source: "<source_email>"
    };

    var email = ses.sendEmail(eParams, function(err, data){
        if (err) {
            console.log(err);
        } else {
            console.log("===EMAIL SENT===");
        }
        completedCallback('Email sent');
    });
    console.log("EMAIL CODE END");
};
```

Sample event parameter:

```
{
  "version": 1,
  "triggerSource": "PostConfirmation_ConfirmSignUp",
  "region": "<region>",
  "userPoolId": "<userPoolId>",
  "userName": "<userName>",
  "callerContext": {
      "awsSdk": "<calling aws sdk with version>",
      "clientId": "<apps client id>",
      ...
  },
  "request": {
      "userAttributes" : {
          "email": "<email>",
          "phone_number": "<phone_number>",
          ...
      }
  },
  "response": {}
}
```

Define Auth Challenge Example

This example defines a series of challenges for authentication and issues tokens only if all of the challenges are successfully completed.

```
exports.handler = function(event, context) {
    if (event.request.session.length == 1 &&
 event.request.session[0].challengeName == 'SRP_A') {
        event.response.issueTokens = false;
        event.response.failAuthentication = false;
        event.response.challengeName = 'PASSWORD_VERIFIER';
    } else if (event.request.session.length == 2 &&
 event.request.session[1].challengeName == 'PASSWORD_VERIFIER' &&
 event.request.session[1].challengeResult == true) {
        event.response.issueTokens = false;
        event.response.failAuthentication = false;
        event.response.challengeName = 'CUSTOM_CHALLENGE';
    } else if (event.request.session.length == 3 &&
 event.request.session[2].challengeName == 'CUSTOM_CHALLENGE' &&
 event.request.session[2].challengeResult == true) {
        event.response.issueTokens = true;
        event.response.failAuthentication = false;
    } else {
        event.response.issueTokens = false;
        event.response.failAuthentication = true;
    }
    context.done(null, event);
}
```

Create Auth Challenge Example

A CAPTCHA is created as a challenge to the user. The URL for the CAPTCHA image is added to the public challenge parameters as "`captchaUrl`", and the expected answer is added to the private challenge parameters.

```
exports.handler = function(event, context) {
    if (event.request.challengeName == 'CUSTOM_CHALLENGE') {
        event.response.publicChallengeParameters = {};
        event.response.publicChallengeParameters.captchaUrl = 'url/123.jpg'
        event.response.privateChallengeParameters = {};
        event.response.privateChallengeParameters.answer = '5';
        event.response.challengeMetadata = 'CAPTCHA_CHALLENGE';
    }

    context.done(null, event);
}
```

Verify Auth Challenge Response Example

In this example, the Lambda function checks whether the user's response to a challenge matches the expected response. The `answerCorrect` parameter is set to `true` if the user's response matches the expected response.

```
exports.handler = function(event, context) {
    if (event.request.privateChallengeParameters.answer ==
 event.request.challengeAnswer) {
        event.response.answerCorrect = true;
    } else {
        event.response.answerCorrect = false;
    }

    context.done(null, event);
}
```

Creating User Accounts in the AWS Management Console and with the Amazon Cognito User Pools API

After you create your user pool, you can create users using the AWS Management Console, as well as the AWS Command Line Interface or the Amazon Cognito API. You can create a profile for a new user in a user pool and send a welcome message with sign-up instructions to the user via SMS or email.

Developers and administrators can perform the following tasks:

- Create a new user profile by using the AWS Management Console or by calling the `AdminCreateUser` API.
- Specify the temporary password or allow Amazon Cognito to automatically generate one.
- Specify whether provided email addresses and phone numbers are marked as verified for new users.
- Specify custom SMS and email invitation messages for new users via the AWS Management Console or a Custom Message Lambda trigger. For more information, see Customizing User Pool Workflows by Using AWS Lambda Triggers (p. 64).
- Specify whether invitation messages are sent via SMS, email, or both.
- Resend the welcome message to an existing user by calling the `AdminCreateUser` API, specifying `RESEND` for the *`MessageAction`* parameter.

  Note
  This action cannot currently be performed using the AWS Management Console.
- Suppress the sending of the invitation message when the user is created.
- Specify an expiration time limit for the user account (up to 90 days).
- Allow users to sign themselves up or require that new users only be added by the administrator.

For code examples, see the following topics:

- Example: Handling Users Created Using the AdminCreateUser API in the Mobile SDK for Android (p. 30)
- Examples: Using User Pools with the iOS SDK (p. 38)
- Example: Authenticate and Set a New Password for a User Created Using the AdminCreateUser API (p. 59)

Authentication Flow for Users Created by Administrators or Developers

The authentication flow for these users includes the extra step to submit the new password and provide any missing values for required attributes. The steps are outlined next; steps 5, 6, and 7 are specific to these users.

1. The user starts to sign in for the first time by submitting the username and password provided to him or her.
2. The SDK calls `InitiateAuth(Username, USER_SRP_AUTH)`.
3. Amazon Cognito returns the `PASSWORD_VERIFIER` challenge with Salt & Secret block.
4. The SDK performs the SRP calculations and calls `RespondToAuthChallenge(Username, <SRP variables>, PASSWORD_VERIFIER)`.
5. Amazon Cognito returns the `NEW_PASSWORD_REQUIRED` challenge along with the current and required attributes.
6. The user is prompted and enters a new password and any missing values for required attributes.
7. The SDK calls `RespondToAuthChallenge(Username, New password, User attributes)`.
8. If the user requires a second factor for MFA, Amazon Cognito returns the SMS_MFA challenge and the code is submitted.
9. After the user has successfully changed his or her password and optionally provided attributed values or completed MFA, the user is signed in and tokens are issued.

When the user has satisfied all challenges, the Amazon Cognito service marks the user as confirmed and issues ID, access, and refresh tokens for the user. For more information, see Using Tokens with User Pools (p. 102).

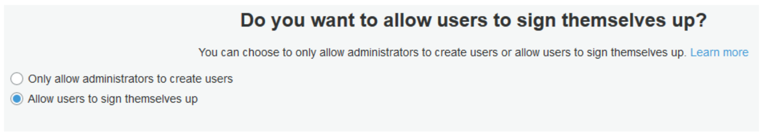
Creating a New User in the AWS Management Console

The Amazon Cognito console for managing user pools has been updated to support this feature, as shown next.

Policies Tab

The **Policies** tab has these related settings:

• Specify whether to allow users to sign themselves up. This option is set by default.

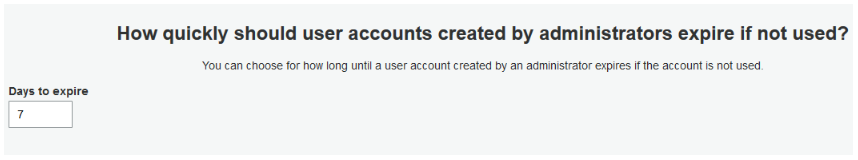


Do you want to allow users to sign themselves up?

You can choose to only allow administrators to create users or allow users to sign themselves up. Learn more

Only allow administrators to create users [✓ Allow users to sign themselves up]

• Specify user account expiration time limit (in days). The default setting is 7 days, measured from the time when the user account is created. The maximum setting is 90 days. After the account expires, the user cannot use the account until the administrator updates the user's profile.


How quickly should user accounts created by administrators expire if not used?

You can choose for how long until a user account created by an administrator expires if the account is not used.

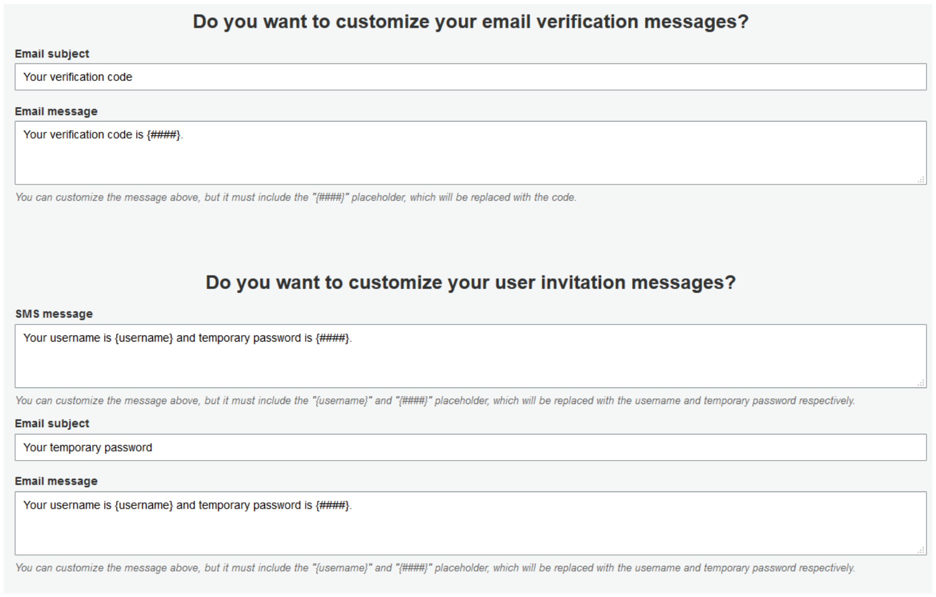
Days to expire: 7

Message Customizations Tab

The **Message Customizations** tab includes templates for specifying custom email verification messages and custom user invitation messages.

For email (verification messages or user invitation messages), the maximum length for the message is 2048 UTF-8 characters, including the verification code or temporary password. For SMS, the maximum length is 140 UTF-8 characters, including the verification code or temporary password.

Verification codes are valid for 24 hours.


Do you want to customize your email verification messages?

Email subject: Your verification code

Email message: Your verification code is {####}.

You can customize the message above, but it must include the "{####}" placeholder, which will be replaced with the code.

Do you want to customize your user invitation messages?

SMS message: Your username is {username} and temporary password is {####}.

You can customize the message above, but it must include the "{username}" and "{####}" placeholder, which will be replaced with the username and temporary password respectively.

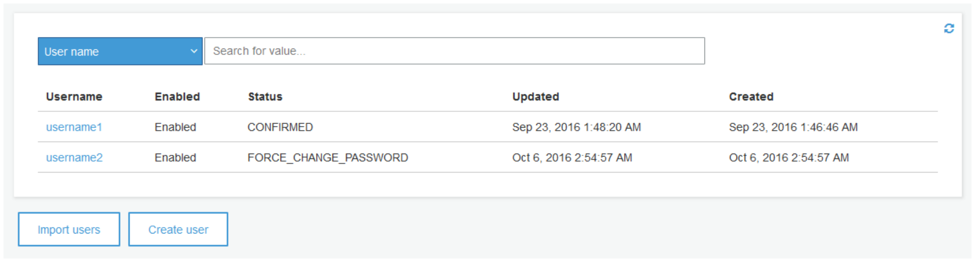
Email subject: Your temporary password

Email message: Your username is {username} and temporary password is {####}.

You can customize the message above, but it must include the "{username}" and "{####}" placeholder, which will be replaced with the username and temporary password respectively.

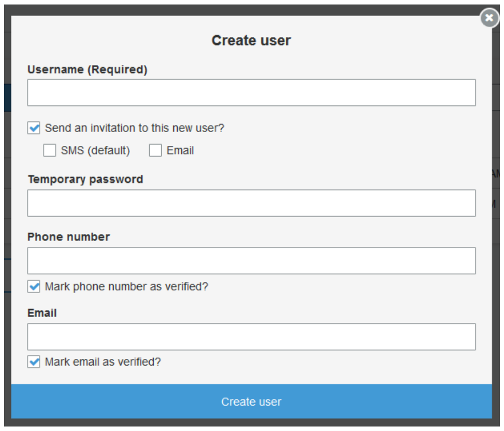
Users Tab

The **Users** tab has a **Create user** button.



Username	Enabled	Status	Updated	Created
username1	Enabled	CONFIRMED	Sep 23, 2016 1:48:20 AM	Sep 23, 2016 1:46:46 AM
username2	Enabled	FORCE_CHANGE_PASSWORD	Oct 6, 2016 2:54:57 AM	Oct 6, 2016 2:54:57 AM

When you choose **Create user**, a **Create user** form appears, which you can use to enter information about the new user. Only the **Username** field is required.



Create user

Username (Required)

[✓] Send an invitation to this new user?

[ ] SMS (default) [ ] Email

Temporary password

Phone number

[✓] Mark phone number as verified?

Email

[✓] Mark email as verified?

Importing Users into Your User Pools

You can import users into an Amazon Cognito user pool. The user information is imported from a specially formatted .csv file. The import process sets values for all user attributes except **password**. Password import is not supported, because security best practices require that passwords are not available as plain text, and we don't support importing hashes. This means that your users must change their passwords the first time they sign in. The creation date for each user is the time when that user was imported into the user pool. (Creation date is not one of the imported attributes.)

The basic steps are:

1. Create an Amazon CloudWatch Logs role in the AWS Identity and Access Management (IAM) console.
2. Create the user import .csv file.
3. Create and run the user import job.
4. Upload the user import .csv file.
5. Start and run the user import job.
6. Use CloudWatch to check the event log.
7. Require the imported users to reset their passwords.

Creating the CloudWatch Logs IAM Role

If you're using the Amazon Cognito CLI or API, then you need to create a CloudWatch IAM role. The following procedure describes how to enable Amazon Cognito to record information in CloudWatch Logs about your user pool import job.

Note
You don't need to use this procedure if you are using the Amazon Cognito console, because the console creates the role for you.

To create the CloudWatch Logs IAM Role for user pool import

1. Sign in to the Identity and Access Management (IAM) console at https://console.aws.amazon.com/iam/.
2. Choose **Roles**.

3. Choose **Create New Role**.
4. Type a role name and choose **Next Step**.
5. In **Select Role Type**, choose **Amazon EC2**. You can choose any role type; you'll change this setting in a later step. This is because you can't create an IAM role from scratch; you can only use an existing IAM role as a template and overwrite it to make the role you need.
6. In **Attach Policy**, choose **Next Step**.
7. In **Review**, choose **Create Role**.
8. In **Roles**, choose the role you just created.
9. In **Summary**, choose **Permissions**.
10. On the **Permissions** tab, choose **Inline Policies**, and then choose **click here**.
11. In **Set Permissions**, choose **custom policy**, and then choose **select**.
12. In **Review Policy**, type a policy name (no spaces) and copy/paste the following text as your role access policy, replacing any existing text:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "logs:CreateLogGroup",
                "logs:CreateLogStream",
                "logs:DescribeLogStreams",
                "logs:PutLogEvents"
            ],
            "Resource": [
                "arn:aws:logs:REGION:ACCOUNT:log-group:/aws/cognito/*"
            ]
        }
    ]
}
```

13. Choose **Apply Policy**.
14. In **Summary**, choose the **Trust Relationships** tab.
15. Choose **Edit Trust Relationship**.
16. Copy/paste the following trust relationship text into the **Policy Document** text box, replacing any existing text:

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

17. Choose **Update Trust Policy**. You are now finished creating the role.
18. Note the role ARN. You need this later when you're creating an import job.

Creating the User Import .csv File

Before you can import your existing users into your user pool, you must create a .csv file that serves as the input. To do this, you download the user import .csv header information, and then you edit the file to match the formatting requirements outlined in Formatting the .csv File (p. 85).

Downloading the .csv File Header By Using the AWS Management Console

1. Navigate to the Amazon Cognito console, choose **Manage User Pools**, and then choose the user pool that you are importing the users into.
2. Choose the **Users** tab.
3. Choose **Import users**.
4. Choose **Download CSV header** to get a .csv file containing the header row that you must include in your .csv file.

Downloading the .csv File Header By Using the CLI

To get a list of the correct headers, run the following CLI command, where *USER_POOL_ID* is the user pool identifier for the user pool you'll import users into:

```
aws cognito-idp get-csv-header --user-pool-id "USER_POOL_ID"
```

Sample response:

```
{
    "CSVHeader": [
        "name",
        "given_name",
        "family_name",
        "middle_name",
        "nickname",
        "preferred_username",
        "profile",
        "picture",
        "website",
        "email",
        "email_verified",
        "gender",
        "birthdate",
        "zoneinfo",
        "locale",
        "phone_number",
        "phone_number_verified",
        "address",
        "updated_at",
        "cognito:mfa_enabled",
        "cognito:username"
    ],
    "UserPoolId": "USER_POOL_ID"
}
```

Formatting the .csv File

The downloaded user import .csv header file looks like this:

```
cognito:username,name,given_name,family_name,middle_name,nickname,preferred_username,profil
```

You'll need to edit your .csv file so that it includes this header and the attribute values for your users and is formatted according to the following rules.

> **Note**
> For more information about attribute values, such as proper format for phone numbers, see Specifying User Pool Attribute Settings (p. 13).

- The first line in the file is the downloaded header row that contains the user attribute names.
- The order of columns in the .csv file doesn't matter.
- Each line after the first line contains the attribute values for a user.
- All columns in the header must be present, but you don't need to provide values in every column.
- The following attributes are required:
  - **cognito:username**
  - **cognito:mfa_enabled**
  - **email_verified** or **phone_number_verified**
  - **email** (if **email_verified** is `true`)
  - **phone_number** (if **phone_number_verified** is `true`)
  - Any attributes that you marked as required when you created the user pool
- The user pool must have at least one auto-verified attribute, either **email_verified** or **phone_number_verified**. At least one of the auto-verified attributes must be `true` for each user. If the user pool has no auto-verified attributes, the import job will not start. If the user pool only has one auto-verified attribute, that attribute must be verified for each user. For example, if the user pool has only **phone_number** as an auto-verified attribute, the **phone_number_verified** value must be `true` for each user.

  > **Note**
  > In order for users to reset their passwords, they must have a verified email or phone number. Amazon Cognito sends a message containing a reset password code to the email or phone number specified in the .csv file. If the message is sent to the phone number, it is sent via SMS.
- Attribute values that are strings should *not* be in quotation marks.
- If an attribute value contains a comma, you must put a backslash (\) before the comma. This is because the fields in a .csv file are separated by commas.
- The .csv file contents should be in UTF-8 format without byte order mark.
- The **cognito:username** field is required and must be unique within your user pool. It can be any Unicode string. However, it cannot contain spaces or tabs.
- The **birthdate** values, if present, must be in the format *mm/dd/yyyy*. This means, for example, that a birthdate of February 1, 1985 must be encoded as 02/01/1985.
- The **cognito:mfa_enabled** field is required. If you've set multi-factor authentication (MFA) to be required in your user pool, this field must be `true` for all users. If you've set MFA to be off, this field must be `false` for all users. If you've set MFA to be optional, this field can be either `true` or `false`, but it cannot be empty.
- The maximum line length is 16,000 characters.

- The maximum .csv file size is 100 MB.
- The maximum number of lines (users) in the file is 100,000, not including the header.
- The **updated_at** field value is expected to be epoch time in seconds, for example: 1471453471.
- Any leading or trailing white space in an attribute value will be trimmed.

A complete sample user import .csv file looks like this:

```
cognito:username,name,given_name,family_name,middle_name,nickname,preferred_username,profil
John,,John,Doe,,,,,,,johndoe@example.com,TRUE,,02/01/1985,,,
+12345550100,TRUE,123 Any Street,,FALSE
Jane,,Jane,Roe,,,,,,,janeroe@example.com,TRUE,,01/01/1985,,,
+12345550199,TRUE,100 Main Street,,FALSE
```

Creating and Running the Amazon Cognito User Pool Import Job

This section describes how to create and run the user pool import job by using the Amazon Cognito console and the AWS Command Line Interface.

Topics

Importing Users from a .csv File By Using the Amazon Cognito Console

The following procedure describes how to import the users from the .csv file.

To import users from the .csv file by using the Amazon Cognito console

1. Choose **Create import job**.
2. Type a **Job name**. Job names can contain uppercase and lowercase letters (a-z, A-Z), numbers (0-9), and the following special characters: + = , . @ and -.
3. If this is your first time creating a user import job, the AWS Management Console will automatically create an IAM role for you. Otherwise, you can choose an existing role from the **IAM Role** list or let the AWS Management Console create a new role for you.
4. Choose **Upload CSV** and select the .csv file to import users from.
5. Choose **Create job**.
6. To start the job, choose **Start**.

Importing Users By Using the AWS CLI

The following CLI commands are available for importing users into a user pool:

- `create-user-import-job`
- `get-csv-header`
- `describe-user-import-job`

- `list-user-import-jobs`
- `start-user-import-job`
- `stop-user-import-job`

To get the list of command-line options for these commands, use the `help` command-line option. For example:

```
aws cognito-idp get-csv-header help
```

Creating a User Import Job

After you create your .csv file, create a user import job by running the following CLI command, where *`JOB_NAME`* is the name you're choosing for the job, *`USER_POOL_ID`* is the same user pool ID as before, and *`ROLE_ARN`* is the role ARN you received in Creating the CloudWatch Logs IAM Role (p. 82):

```
aws cognito-idp create-user-import-job --job-name "JOB_NAME" --user-pool-id
 "USER_POOL_ID" --cloud-watch-logs-role-arn "ROLE_ARN"
```

The *`PRE_SIGNED_URL`* returned in the response is valid for 15 minutes. After that time, it will expire and you must create a new user import job to get a new URL.

Sample response:

```
{
    "UserImportJob": {
        "Status": "Created",
        "SkippedUsers": 0,
        "UserPoolId": "USER_POOL_ID",
        "ImportedUsers": 0,
        "JobName": "JOB_NAME",
        "JobId": "JOB_ID",
        "PreSignedUrl": "PRE_SIGNED_URL",
        "CloudWatchLogsRoleArn": "ROLE_ARN",
        "FailedUsers": 0,
        "CreationDate": 1470957431.965
    }
}
```

Status Values for a User Import Job

In the responses to your user import commands, you'll see one of the following `Status` values:

- "Created" - The job was created but not started.
- "Pending" - A transition state. You have started the job, but it has not begun importing users yet.
- "InProgress" - The job has started, and users are being imported.
- "Stopping" - You have stopped the job, but the job has not stopped importing users yet.
- "Stopped" - You have stopped the job, and the job has stopped importing users.
- "Succeeded" - The job has completed successfully.
- "Failed" - The job has stopped due to an error.
- "Expired" - You created a job, but did not start the job within 24-48 hours. All data associated with the job was deleted, and the job cannot be started.

Uploading the .csv File

Use the following `curl` command to upload the .csv file containing your user data to the pre-signed URL that you obtained from the response of the `create-user-import-job` command.

```
curl -v -T "PATH_TO_CSV_FILE" -H
        "x-amz-server-side-encryption:aws:kms" "PRE_SIGNED_URL"
```

In the output of this command, look for the phrase `"We are completely uploaded and fine"`. This phrase indicates that the file was uploaded successfully.

Describing a User Import Job

To get a description of your user import job, use the following command, where *`USER_POOL_ID`* is your user pool ID, and *`JOB_ID`* is the job ID that was returned when you created the user import job.

```
aws cognito-idp describe-user-import-job --user-pool-id "USER_POOL_ID" --job-
id "JOB_ID"
```

Sample response:

```
{
    "UserImportJob": {
        "Status": "Created",
        "SkippedUsers": 0,
        "UserPoolId": "USER_POOL_ID",
        "ImportedUsers": 0,
        "JobName": "JOB_NAME",
        "JobId": "JOB_ID",
        "PreSignedUrl": "PRE_SIGNED_URL",
        "CloudWatchLogsRoleArn":"ROLE_ARN",
        "FailedUsers": 0,
        "CreationDate": 1470957431.965
    }
}
```

In the preceding sample output, the *`PRE_SIGNED_URL`* is the URL that you uploaded the .csv file to. The *`ROLE_ARN`* is the CloudWatch Logs role ARN that you received when you created the role.

Listing Your User Import Jobs

To list your user import jobs, use the following command:

```
aws cognito-idp list-user-import-jobs --user-pool-id "USER_POOL_ID" --max-
results 2
```

Sample response:

```
{
    "UserImportJobs": [
        {
            "Status": "Created",
            "SkippedUsers": 0,
            "UserPoolId": "USER_POOL_ID",
            "ImportedUsers": 0,
            "JobName": "JOB_NAME",
            "JobId": "JOB_ID",
            "PreSignedUrl":"PRE_SIGNED_URL",
            "CloudWatchLogsRoleArn":"ROLE_ARN",
            "FailedUsers": 0,
            "CreationDate": 1470957431.965
        },
        {
            "CompletionDate": 1470954227.701,
            "StartDate": 1470954226.086,
            "Status": "Failed",
            "UserPoolId": "USER_POOL_ID",
            "ImportedUsers": 0,
            "SkippedUsers": 0,
            "JobName": "JOB_NAME",
            "CompletionMessage": "Too many users have failed or been skipped
 during the import.",
            "JobId": "JOB_ID",
            "PreSignedUrl":"PRE_SIGNED_URL",
            "CloudWatchLogsRoleArn":"ROLE_ARN",
            "FailedUsers": 5,
            "CreationDate": 1470953929.313
        }
    ],
    "PaginationToken": "PAGINATION_TOKEN"
}
```

Jobs are listed in chronological order from last created to first created. The *PAGINATION_TOKEN* string after the second job indicates that there are additional results for this list command. To list the additional results, use the `--pagination-token` option as follows:

```
aws cognito-idp list-user-import-jobs --user-pool-id "USER_POOL_ID" --max-
results 10 --pagination-token "PAGINATION_TOKEN"
```

Starting a User Import Job

To start a user import job, use the following command:

```
aws cognito-idp start-user-import-job --user-pool-id "USER_POOL_ID" --job-id
 "JOB_ID"
```

Only one user import job can be active at a time for a given user pool.

Sample response:

```
{
    "UserImportJob": {
        "Status": "Pending",
        "StartDate": 1470957851.483,
        "UserPoolId": "USER_POOL_ID",
        "ImportedUsers": 0,
        "SkippedUsers": 0,
        "JobName": "JOB_NAME",
        "JobId": "JOB_ID",
        "PreSignedUrl":"PRE_SIGNED_URL",
        "CloudWatchLogsRoleArn": "ROLE_ARN",
        "FailedUsers": 0,
        "CreationDate": 1470957431.965
    }
}
```

Stopping a User Import Job

To stop a user import job while it is in progress, use the following command. After you stop the job, it cannot be restarted.

```
aws cognito-idp stop-user-import-job --user-pool-id "USER_POOL_ID" --job-id
 "JOB_ID"
```

Sample response:

```
{
    "UserImportJob": {
        "CompletionDate": 1470958050.571,
        "StartDate": 1470958047.797,
        "Status": "Stopped",
        "UserPoolId": "USER_POOL_ID",
        "ImportedUsers": 0,
        "SkippedUsers": 0,
        "JobName": "JOB_NAME",
        "CompletionMessage": "The Import Job was stopped by the developer.",
        "JobId": "JOB_ID",
        "PreSignedUrl":"PRE_SIGNED_URL",
        "CloudWatchLogsRoleArn": "ROLE_ARN",
        "FailedUsers": 0,
        "CreationDate": 1470957972.387
    }
}
```

Viewing the User Pool Import Results in the CloudWatch Console

You can view the results of your import job in the Amazon CloudWatch console.

Topics

Viewing the Results

The following steps describe how to view the user pool import results.

To view the results of the user pool import

1. Sign in to the AWS Management Console and open the CloudWatch console at https://console.aws.amazon.com/cloudwatch/.
2. Choose **Logs**.

3. Choose the log group for your user pool import jobs. The log group name is in the form `/aws/cognito/userpools/USER_POOL_ID/USER_POOL_NAME`.
4. Choose the log for the user import job you just ran. The log name is in the form *JOB_ID*/*JOB_NAME*. The results in the log refer to your users by line number. No user data is written to the log. For each user, a line similar to the following appears:
   - `[SUCCEEDED] Line Number 5956 - The import succeeded.`
   - `[SKIPPED] Line Number 5956 - The user already exists.`
   - `[FAILED] Line Number 5956 - The User Record does not set any of the auto verified attributes to true. (Example: email_verified to true).`

Interpreting the Results

Successfully imported users have their status set to "PasswordReset".

In the following cases, the user will not be imported, but the import job will continue:

- No auto-verified attributes are set to `true`.
- The user data doesn't match the schema.
- The user couldn't be imported due to an internal error.

In the following cases, the import job will fail:

- The Amazon CloudWatch Logs role cannot be assumed, doesn't have the correct access policy, or has been deleted.
- The user pool has been deleted.
- Amazon Cognito is unable to parse the .csv file.

Requiring Imported Users to Reset Their Passwords

The first time each imported user signs in, he or she is required to enter a new password as follows:

Requiring imported users to reset their passwords

1. The user attempts to sign in, providing username and password (via `GetAuthenticationDetails` or `InitiateAuth`).
2. Amazon Cognito returns `PasswordResetRequiredException`.
3. The app should direct the user into the `ForgotPassword` flow as outlined in the following procedure:
   1. The app calls `ForgotPassword(username)`.
   2. Amazon Cognito sends a code to the verified email or phone number (depending on what you have provided in the .csv file for that user) and indicates to the app where the code was sent in the response to the `ForgotPassword` request.

      Note
      For sending reset password codes, it is important that your user pool has phone number or email verification turned on.
   3. The app indicates to the user that a code was sent and where the code was sent, and the app provides a UI to enter the code and a new password.
   4. The user enters the code and new password in the app.
   5. The app calls `ConfirmForgotPassword(code, password)`, which, if successful, sets the new password.

6. The app should now direct the user to a sign-in page.

Signing Up and Confirming User Accounts

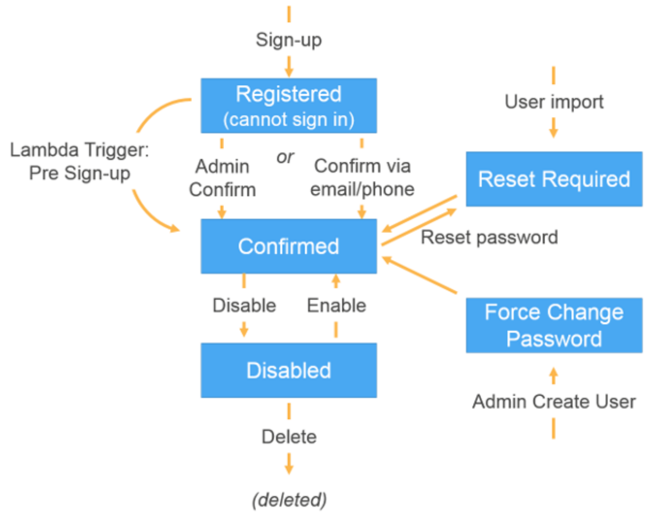
User accounts are added to your user pool in one of the following ways:

- The user signs up in your user pool's client app, which can be a mobile or web app.
- You can import the user's account into your user pool. For more information, see Importing Users into Your User Pools (p. 82).
- You can create the user's account in your user pool and invite the user to sign in. For more information, see Creating User Accounts in the AWS Management Console and with the Amazon Cognito User Pools API (p. 79).

Users who sign themselves up need to be confirmed before they can sign in. Imported and created users are already confirmed, but they need to create their password the first time they sign in. The following sections explain the confirmation process and email and phone verification.

Overview of User Account Confirmation

The following diagram illustrates the confirmation process:



A user account can be in any of the following states:

Registered
The user has successfully signed up, but cannot sign in until the user account is confirmed. This state is also called *enabled*.

New users who sign themselves up start in this state.

Confirmed
The user account is confirmed and the user can sign in. If the user confirmed the user account by entering a confirmation code that was received via email or phone (SMS), that email or phone number is automatically verified. If the user account was confirmed by the administrator or a Pre Sign-up Lambda trigger, there might not be a verified email or phone number associated with the account.

Password Reset Required
The user account is confirmed, but the user must create a password before he or she can sign in.

User accounts that are imported by an administrator or developer start in this state.

Force Change Password
The user account is confirmed and the user can sign in using a temporary password, but on first sign-in, the user must change his or her password to a new value before doing anything else.

User accounts that are created by an administrator or developer start in this state.

Disabled
Before a user account can be deleted, it must be disabled.

Allowing Users to Sign Up and Confirm Themselves and Verify Email or Phone

1. A user signs up in your app by entering a username, phone number and/or email address, and possibly other attributes.
2. The Amazon Cognito service receives the sign-up request from the app. After verifying that the request contains all attributes required for sign-up, the service completes the sign-up process and sends a confirmation code to the user's phone (via SMS) or email.

   Note
   If a user signs up with both a phone number and an email address, and your user pool settings require verification of both attributes, a verification code is sent via SMS to the phone. *The email address is not verified.* Your app can call GetUser to see if an email address is awaiting verification. If it is, the app should call GetUserAttributeVerificationCode to initiate the email verification flow and then submit the verification code by calling VerifyUserAttribute.
3. The service returns to the app that sign-up is complete and that the user account is pending confirmation. The response contains information about where the confirmation code was sent. At this point the user's account is in an unconfirmed state, and the user's email address and phone number are unverified.
4. The app can now prompt the user to enter the confirmation code. It is not necessary for the user to enter the code immediately. However, the user will not be able to sign in until after they enter the confirmation code.
5. The user enters the confirmation code in the app.
6. The app calls ConfirmSignUp to send the code to the Amazon Cognito service, which verifies the code and, if the code is correct, sets the user's account to the confirmed state. After successfully confirming the user account, the Amazon Cognito service automatically marks the attribute that was used to confirm (email or phone number) as verified. Unless the value of this attribute is changed, the user will not have to verify it again.
7. At this point the user's account is in a confirmed state, and the user can sign in.

Allowing Users to Sign Up in Your App but Confirming Them as Administrator

1. A user signs up in your app by entering a username, phone number and/or email address, and possibly other attributes.
2. The Amazon Cognito service receives the sign-up request from the app. After verifying that the request contains all attributes required for sign-up, the service completes the sign-up process and returns to the app that sign-up is complete, pending confirmation. At this point the user's account is in an unconfirmed state. The user cannot sign in until the account is confirmed.
3. The administrator confirms the user's account, either in the Amazon Cognito console (by finding the user account in the **Users** tab and choosing the **Confirm** button) or in the CLI (by using the

`admin-confirm-sign-up` command). Both the **Confirm** button and the `admin-confirm-sign-up` command use the AdminConfirmSignUp API to perform the confirmation.

4. At this point the user's account is in a confirmed state, and the user can sign in.

Confirming User Accounts Without Verifying Email or Phone Number

The Pre-Sign Up Lambda trigger can be used to auto-confirm user accounts at sign-up time, without requiring a confirmation code or verifying email or phone number. Users who are confirmed this way can immediately sign in without having to receive a code.

Note
While this approach is convenient for users when they're getting started, we don't recommend it, because it can leave the user unable to recover if they forget their password.

If you don't require the user to receive and enter a confirmation code at sign-up, you risk not having a verified email address or phone number for that user account. The user can verify the email address or phone number at a later time. However, if the user forgets his or her password and doesn't have a verified email address or phone number, the user is locked out of the account, because the Forgot Password flow requires a verified email or phone number in order to send a verification code to the user.

Verifying When Users Change Their Email or Phone Number

When a user changes his or her email address or phone number in your app, that attribute is marked as unverified, and the service immediately sends the user a message containing a verification code, which the user should enter to verify the change. You can use a Custom Message Lambda trigger to customize this message. For more information, see Customizing User Pool Workflows by Using AWS Lambda Triggers (p. 64). Whenever the user's email address or phone number is unverified, your app should display the unverified status and provide a button or link for users to verify their new email or phone number.

Confirmation and Verification Processes for User Accounts Created by Administrators or Developers

User accounts that are created by an administrator or developer are already in the confirmed state, so users aren't required to enter a confirmation code. The invitation message that the Amazon Cognito service sends to these users includes the username and a temporary password. The user is required to change the password before signing in. For more information, see the Message Customizations Tab (p. 81) in Creating User Accounts in the AWS Management Console and with the Amazon Cognito User Pools API (p. 79) and the Custom Message trigger in Customizing User Pool Workflows by Using AWS Lambda Triggers (p. 64).

Confirmation and Verification Processes for Imported User Accounts

User accounts that are created by using the user import feature in the AWS Management Console, CLI, or API (see Importing Users into Your User Pools (p. 82)) are already in the confirmed state, so users aren't required to enter a confirmation code. No invitation message is sent. However, imported user accounts require users to create a password the first time they sign in. For more information, see Requiring Imported Users to Reset Their Passwords (p. 91).

Either the user's email or phone number must be marked as verified when the user account is imported, so no verification is required when the user signs in.

Managing and Searching for User Accounts in the AWS Management Console and in the Amazon Cognito User Pools API

Once you create your user pool, you can view and manage users using the AWS Management Console, as well as the AWS Command Line Interface or the Amazon Cognito API. This topic describes how you can view and search for users using the AWS Management Console.

Viewing User Attributes

There are a number of operations you can perform in the AWS Management Console:

- You can view the **Pool details** and edit user pool attributes, password policies, MFA settings, apps, and triggers. For more information, see Getting Started: Step Through Amazon Cognito User Pool Settings in the AWS Management Console (p. 13).
- You can view the users in your user pool and drill down for more details.
- You can also view the details for an individual user in your user pool.
- You can also search for a user in your user pool.

To manage user pools using the AWS Management Console

1. From the Amazon Cognito home page in the AWS Management Console, choose **Manage your user identities**.
2. Choose your user pool from the **Your User Pools** page.
3. Choose **User** to view user information.
4. Choose a user name to show more information about an individual user. From this screen, you can perform any of the following actions:
   - **Reset user password**
   - **Confirm user**
   - **Enable or disable MFA**
   - **Delete user**

   The **Reset user password** action results in a confirmation code being sent to the user immediately. The **Enable MFA** action results in a confirmation code being sent to the user when the user tries to log in. The **Reset user password** code is valid for 24 hours. The MFA code is valid for 3 minutes.

Searching User Attributes

If you have already created a user pool, you can search from the **Users** panel in the AWS Management Console. You can also use the Amazon Cognito ListUsers API, which accepts a **Filter** parameter.

You can search for any of the following standard attributes. Custom attributes are not searchable.

- username (case-sensitive)
- email
- phone_number
- name
- given_name
- family_name
- preferred_username
- cognito:user_status (called **Enabled** in the Console) (case-sensitive)
- status (case-insensitive)

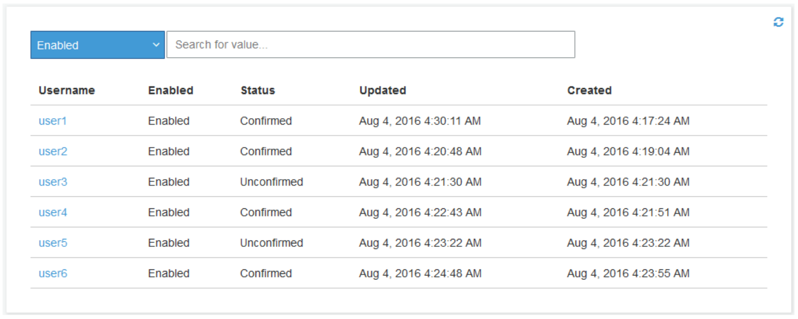
Searching for Users Using the AWS Management Console

If you have already created a user pool, you can search from the **Users** panel in the AWS Management Console.

AWS Management Console searches are always prefix ("starts with") searches.

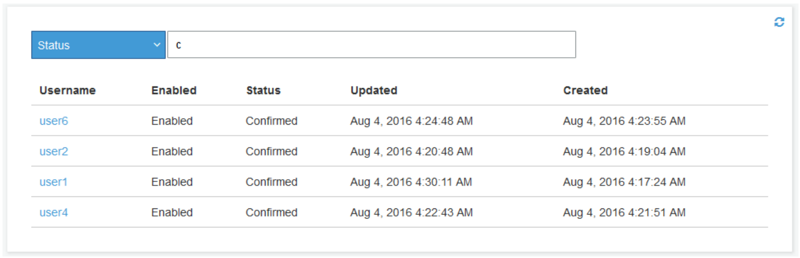
All of the following examples use the same user pool.

For example, if you want to list all users, leave the search box empty.



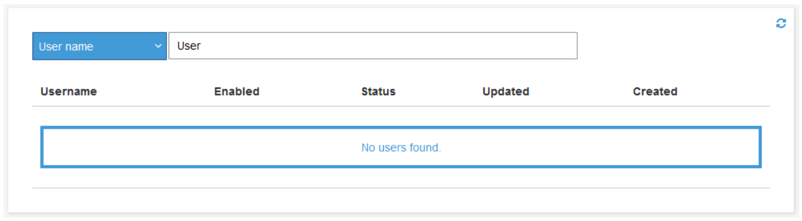
Username	Enabled	Status	Updated	Created
user1	Enabled	Confirmed	Aug 4, 2016 4:30:11 AM	Aug 4, 2016 4:17:24 AM
user2	Enabled	Confirmed	Aug 4, 2016 4:20:48 AM	Aug 4, 2016 4:19:04 AM
user3	Enabled	Unconfirmed	Aug 4, 2016 4:21:30 AM	Aug 4, 2016 4:21:30 AM
user4	Enabled	Confirmed	Aug 4, 2016 4:22:43 AM	Aug 4, 2016 4:21:51 AM
user5	Enabled	Unconfirmed	Aug 4, 2016 4:23:22 AM	Aug 4, 2016 4:23:22 AM
user6	Enabled	Confirmed	Aug 4, 2016 4:24:48 AM	Aug 4, 2016 4:23:55 AM

If you want to search for all confirmed users, choose **Status** from the drop-down menu. In the search box, type the first letter of the word "confirmed."



Username	Enabled	Status	Updated	Created
user6	Enabled	Confirmed	Aug 4, 2016 4:24:48 AM	Aug 4, 2016 4:23:55 AM
user2	Enabled	Confirmed	Aug 4, 2016 4:20:48 AM	Aug 4, 2016 4:19:04 AM
user1	Enabled	Confirmed	Aug 4, 2016 4:30:11 AM	Aug 4, 2016 4:17:24 AM
user4	Enabled	Confirmed	Aug 4, 2016 4:22:43 AM	Aug 4, 2016 4:21:51 AM

Note that some attribute values are case-sensitive, such as **User name**.



No users found.

Searching for Users Using the `ListUsers` API

To search for users from your app, use the Amazon Cognito ListUsers API. This API uses the following parameters:

- *`AttributesToGet`*: An array of strings, where each string is the name of a user attribute to be returned for each user in the search results. If the array is empty, all attributes are returned.
- *`Filter`*: A filter string of the form "*`AttributeName`* *`Filter-Type`* "*`AttributeValue`*"". Quotation marks within the filter string must be escaped using the backslash (`\`) character. For example, `"family_name = \"Reddy\""`. If the filter string is empty, `ListUsers` returns all users in the user pool.
  - *`AttributeName`*: The name of the attribute to search for. You can only search for one attribute at a time.

    Note
    You can only search for standard attributes. Custom attributes are not searchable. This is because only indexed attributes are searchable, and custom attributes cannot be indexed.
  - *`Filter-Type`*: For an exact match, use `=`, for example, `given_name = "Jon"`. For a prefix ("starts with") match, use `^=`, for example, `given_name ^= "Jon"`.
  - *`AttributeValue`*: The attribute value that must be matched for each user.
- *`Limit`*: Maximum number of users to be returned.
- *`PaginationToken`*: A token to get more results from a previous search.
- *`UserPoolId`*: The user pool ID for the user pool on which the search should be performed.

All searches are case-insensitive. Search results are sorted by the attribute named by the `AttributeName` string, in ascending order.

Examples of Using the `ListUsers` API

The following example returns all users and includes all attributes.

```
{
    "AttributesToGet": [],
    "Filter": "",
    "Limit": 10,
    "UserPoolId": "us-east-1_samplepool"
}
```

The following example returns all users whose phone numbers start with "+1312" and includes all attributes.

```
{
    "AttributesToGet": [],
    "Filter": "phone_number ^= \"+1312\"",
    "Limit": 10,
    "UserPoolId": "us-east-1_samplepool"
}
```

The following example returns the first 10 users whose family name is "Reddy". For each user, the search results include the user's given name, phone number, and email address. If there are more than 10 matching users in the user pool, the response includes a pagination token.

```
{
    "AttributesToGet": [
        "given_name", "phone_number", "email"
    ],
    "Filter": "family_name = \"Reddy\"",
    "Limit": 10,
    "UserPoolId": "us-east-1_samplepool"
}
```

If the previous example returns a pagination token, the following example returns the next 10 users that match the same filter string.

```
{
    "AttributesToGet": [
        "given_name", "phone_number", "email"
    ],
    "Filter": "family_name = \"Reddy\"",
    "Limit": 10,
    "PaginationToken": "pagination_token_from_previous_search",
    "UserPoolId": "us-east-1_samplepool"
}
```

Amazon Cognito User Pool Authentication Flow

Custom Authentication Flow

The custom authentication flow is designed to allow for a series of challenge and response cycles that can be customized to meet different requirements. The flow starts with a call to the **InitiateAuth** API that indicates the type of authentication that will be used and provides any initial authentication parameters. Amazon Cognito will respond to the **InitiateAuth** call with either:

- ID, access, and refresh tokens if the user is signed in
- A challenge for the user along with a session and parameters
- An error if the user fails to authenticate

If Amazon Cognito responds to the **InitiateAuth** call with a challenge, the app will gather more input and call the **RespondToAuthChallenge** API, providing the challenge responses and passing back the session. Amazon Cognito responds to the **RespondToAuthChallenge** call similarly to the **InitiateAuth** call, providing tokens if the user is signed in, another challenge, or an error. If another challenge is returned, the sequence repeats with the app calling **RespondToAuthChallenge** until the user is signed in or an error is returned. More details are provided in the API documentation for the **InitiateAuth** and **RespondToAuthChallenge** APIs.

Amazon Cognito has some built-in *AuthFlow* and *ChallengeName* values for a standard authentication flow to validate username and password through the Secure Remote Password (SRP) protocol. This flow is built into the iOS, Android, and JavaScript SDKs for Amazon Cognito. At a high level, the flow starts by sending `USER_SRP_AUTH` as the *AuthFlow* to **InitiateAuth** along with *USERNAME* and *SRP_A* values in **AuthParameters**. If the **InitiateAuth** call is successful, the response will include `PASSWORD_VERIFIER` as the *ChallengeName* and `SRP_B` in the challenge parameters. The app will then call **RespondToAuthChallenge** with the `PASSWORD_VERIFIER` *ChallengeName* and the necessary parameters in **ChallengeResponses**. If the call to **RespondToAuthChallenge** is successful and the user is signed in, the tokens will be returned. If multi-factor authentication (MFA) is enabled for the user, a *ChallengeName* of `SMS_MFA` will be returned, and the app can provide the necessary code through another call to **RespondToAuthChallenge**.

An app can initiate a custom authentication flow by calling **InitiateAuth** with `CUSTOM_AUTH` as the *Authflow*. With a custom authentication flow, the challenges and verification of the responses are controlled through three AWS Lambda triggers. The **DefineAuthChallenge** Lambda trigger takes as input a session array of previous challenges and responses and outputs the next challenge name and booleans indicating if the user is authenticated (and should be granted tokens) or if the authentication has failed. This Lambda trigger is a state machine that controls the user's path through the challenges. The **CreateAuthChallenge** Lambda trigger takes a challenge name as input and generates the challenge and parameters to evaluate the response. **CreateAuthChallenge** is called when **DefineAuthChallenge** returns `CUSTOM_CHALLENGE` as the next challenge, and the next type of challenge is passed in the challenge metadata parameter. The **VerifyAuthChallengeResponse** Lambda function evaluates the response and returns a boolean to indicate if the response was valid.

A custom authentication flow can also use a combination of built-in challenges such as SRP password verification and MFA via SMS, and custom challenges such as CAPTCHA or secret questions. If you want to include SRP in a custom authentication flow, you need to start with it. To initiate SRP password verification, the **DefineAuthChallenge** Lambda trigger returns `SRP_A` as the challenge name and `SRP_A` in the authentication parameters map. Once the password is verified the **DefineAuthChallenge** Lambda trigger will be called again with `PASSWORD_VERIFIER` in the previous challenges array. MFA will be done automatically if it is enabled for a user.

For more information about the Lambda triggers, including sample code, see Customizing User Pool Workflows by Using AWS Lambda Triggers (p. 64).

Admin Authentication Flow

The APIs described Custom Authentication Flow (p. 98) with the use of SRP for password verification is the recommended approach for authentication. The iOS, Android, and JavaScript SDKs are based on that approach and make it easy to use SRP. However, there is an alternative set of admin APIs designed for use on secure backend servers if you want to avoid the SRP calculations. For these back-end admin implementations, **AdminInitiateAuth** is used in place of **InitiateAuth**, and **AdminRespondToAuthChallenge** is used in place of **RespondToAuthChallenge**. When using these APIs, the password can be submitted as plain text so the SRP calculations are not needed. For example,

```
AdminInitiateAuth Request {
    "AuthFlow":"ADMIN_NO_SRP_AUTH",
    "AuthParameters":{
        "USERNAME":"<username>",
        "PASSWORD":"<password>"
        },
    "ClientId":"<clientId>",
    "UserPoolId":"<userPoolId>"
}
```

These admin authentication APIs require developer credentials and use the AWS Signature Version 4 (SigV4) signing process. These APIs are available in standard AWS SDKs including Node.js, which is convenient for use in Lambda functions. In order to use these APIs and have them accept passwords in plain text, you must enable them for the app in the console or by passing `ADMIN_NO_SRP_AUTH` for the *`ExplicitAuthFlow`* parameter in calls to **CreateUserPoolClient** or **UpdateUserPoolClient**. The `ADMIN_NO_SRP_AUTH` *`AuthFlow`* is not accepted for the **InitiateAuth** and **RespondToAuthChallenge** APIs.

Integrating User Pools with Amazon Cognito Identity

Amazon Cognito Identity user pools represent an identity provider that you manage. To enable users in your user pool to access AWS resources through your client apps, you must configure Amazon Cognito Identity to accept users that are federated with your user pool.

Setting Up a User Pool

Create an Amazon Cognito user pool and make a note of both the **User Pool ID** and the **App Client ID** for each of your client apps. For more information about creating user pools,, see Creating and Managing User Pools (p. 10). For more information about creating apps (to get app client IDs) for your client apps, see Specifying User Pool App Settings (p. 20).

You can create multiple user pools, and each user pool can have multiple apps.

Configuring Your Identity Pool Using the AWS Management Console

The following procedure describes how to configure your identity pool using the AWS Management Console. You will learn how to configure an identity pool to use Amazon Cognito as the identity provider.

To configure your identity pool

1. Open the Amazon Cognito console.
2. Choose **Manage Federated Identities**.
3. Choose the name of the identity pool for which you want to enable Amazon Cognito Identity user pools as a provider.
4. On the **Dashboard** page, choose **Edit identity pool**.
5. Expand the **Authentication providers** section.
6. Choose **Cognito**.
7. Type the **User Pool ID**.
8. Type the **App Client ID**. This must be the same client app ID that you received when you created the app in the **Your User Pools** section of the AWS Management Console for Amazon Cognito.
9. If you have additional apps, choose **Add Another Provider** and type the **User Pool ID** and **App Client ID** for each app.
10. If you have additional user pools, choose **Add Another Provider** and type the **User Pool ID** and **App Client ID** for each app in each user pool.
11. When you have no more apps or user pools to add, choose **Save changes**.

    If successful, you will see **Changes saved successfully.** on the **Dashboard** page.

Using Amazon Cognito Identity User Pools

Follow the instructions in Authentication Flow (p. 107) to authenticate users.

After the user is authenticated, add that user's identity token to the logins map in the credentials provider. The provider name will depend on your Amazon Cognito Identity user pool ID. It will have the following structure:

```
cognito-idp.<region>.amazonaws.com/<YOUR_USER_POOL_ID>
```

The value for *<region>* will be the same as the region in the **User Pool ID**. For example, `cognito-idp.us-east-1.amazonaws.com/us-east-1_123456789`.

iOS - Objective-C

```
AWSServiceConfiguration *serviceConfiguration = [[AWSServiceConfiguration
 alloc] initWithRegion:AWSRegionUSEast1 credentialsProvider:nil];
AWSCognitoIdentityUserPoolConfiguration *userPoolConfiguration
 = [[AWSCognitoIdentityUserPoolConfiguration alloc]
 initWithClientId:@"YOUR_CLIENT_ID"  clientSecret:@"YOUR_CLIENT_SECRET"
 poolId:@"YOUR_USER_POOL_ID"];
[AWSCognitoIdentityUserPool
 registerCognitoIdentityUserPoolWithConfiguration:serviceConfiguration
 userPoolConfiguration:userPoolConfiguration forKey:@"UserPool"];
AWSCognitoIdentityUserPool *pool = [AWSCognitoIdentityUserPool
 CognitoIdentityUserPoolForKey:@"UserPool"];
AWSCognitoCredentialsProvider *credentialsProvider =
 [[AWSCognitoCredentialsProvider alloc] initWithRegionType:AWSRegionUSEast1
 identityPoolId:@"YOUR_IDENTITY_POOL_ID" identityProviderManager:pool];
```

iOS - Swift

```
let serviceConfiguration = AWSServiceConfiguration(region: .USEast1,
 credentialsProvider: nil)
let userPoolConfiguration = AWSCognitoIdentityUserPoolConfiguration(clientId:
 "YOUR_CLIENT_ID", clientSecret: "YOUR_CLIENT_SECRET", poolId:
 "YOUR_USER_POOL_ID")
AWSCognitoIdentityUserPool.registerCognitoIdentityUserPoolWithConfiguration(serviceConfigur
 userPoolConfiguration: userPoolConfiguration, forKey: "UserPool")
let pool = AWSCognitoIdentityUserPool(forKey: "UserPool")
let credentialsProvider = AWSCognitoCredentialsProvider(regionType: .USEast1,
 identityPoolId: "YOUR_IDENTITY_POOL_ID", identityProviderManager:pool)
```

Android

```
cognitoUser.getSessionInBackground(new AuthenticationHandler() {
 @Override
 public void onSuccess(CognitoUserSession session) {
  String idToken = session.getIdToken().getJWTToken();

  Map<String, String> logins = new HashMap<String, String>();
  logins.put(cognito-idp.<region>.amazonaws.com/<YOUR_USER_POOL_ID>,
 session.getIdToken().getJWTToken());
```

```
  credentialsProvider.setLogins(logins);
 }

});
```

JavaScript

```
var cognitoUser = userPool.getCurrentUser();

if (cognitoUser != null) {
 cognitoUser.getSession(function(err, result) {
  if (result) {
   console.log('You are now logged in.');

   // Add the User's Id Token to the Cognito credentials login map.
   AWS.config.credentials = new AWS.CognitoIdentityCredentials({
    IdentityPoolId: 'YOUR_IDENTITY_POOL_ID',
    Logins: {
     'cognito-idp.<region>.amazonaws.com/<YOUR_USER_POOL_ID>':
 result.getIdToken().getJwtToken()
    }
   });
  }
 });
}
```

Using Tokens with User Pools

After successful authentication of a user, Amazon Cognito issues three tokens to the client:

- ID token
- Access token
- Refresh token

Important
We strongly recommended that you secure all three tokens in transit and storage in the context of your application.

Using the ID Token

The ID token is represented as a JSON Web Key Token (JWT). The token contains claims about the identity of the authenticated user. For example, it includes claims such as `name`, `family_name`, `phone_number`, etc. For more information about standard claims, see the OpenID Connect specification. A client app can use this identity information inside the application. The ID token can also be used against your resource servers or server applications. When an ID token is used outside of the application against your web APIs, you must verify the signature of the ID token before you can trust any claims inside the ID token.

The ID token expires one hour after the user authenticates. You should not process the ID token in your client or web API after it has expired.

Using the Access Token

The access token is also represented as a JSON Web Key Token (JWT). It contains claims about the authenticated user, but unlike the ID token, it does not include all of the user's identity information. The primary purpose of the access token is to authorize operations in the context of the user in the user pool. For example, you can use the access token against Amazon Cognito Identity to update or delete user attributes. The access token can also be used with any of your web APIs to make access control decisions and authorize operations in the context of the user. As with the ID token, you must first verify the signature of the access token in your web APIs before you can trust any claims inside the access token.

The access token expires one hour after the user authenticates. It should not be processed after it has expired.

Using the Refresh Token

The refresh token is a string that should only be used against Amazon Cognito to retrieve a new access token if the access token has expired.

By default, the refresh token expires 30 days after the user authenticates. When you create an app for your user pool, you can set the app's **Refresh token expiration (days)** to any value between 1 and 3650.

Structure of ID Tokens

ID tokens are JSON Web Key Tokens (JWT) and can be broken down into three parts: a header, a payload, and a signature.

Header

The header contains two pieces of information: the `kid` and the `alg`. A `kid` value is used to locate the public key. The public key should verify the ID token signature. The `alg` value represents the cryptographic algorithm used to secure `IdToken`. Currently, user pools only use RS256 as the cryptographic algorithm. For more information, see JSON Web Key Token (JWT).

For example, the header will look like this:

```
{

"alg" : "RS256",
"kid" : "samplekid****"

}
```

Payload

The payload contains claims as per the JWT specification. For more information, see RFC7519. The following are details of some specific claims:

- `iss` : The issuer. It has the following format: `https://cognito-idp.{region}.amazonaws.com/{userPoolId}`. For example, if you created a user pool in the `us-east-1` region and its ID is `u123456`, the ID token issued for users of your user pool have an `iss` claim value of `https://cognito-idp.us-east-1.amazonaws.com/u123456`.
- `sub` : The UUID of the authenticated user. This is not the same as `username`.
- `aud` : Contains the `client_id` with which the user authenticated.
- `token_use` : The intended purpose of this token. Its value is always `id` in the case of the ID token.

Additionally, the ID token contains standard claims defined in the OIDC Core spec, Section 5.1. It also contains the custom attributes that you define in your user pool. The custom attributes are always prefixed with the `custom:` prefix.

Signature

The signature of the ID token is calculated based on the header and payload of the ID token. When used outside of an application in your web APIs, you must always verify this signature before processing the ID token.

Structure of Access Tokens

Access tokens are also JSON Web Tokens (JWT) and can be broken down into three parts: a header, a payload, and a signature.

Header

The header for the access token will be the same structure as the ID token, but the `kid` will be different because different keys are used to sign ID tokens and access tokens.

Payload

The payload contains claims as per the JWT specification. For more information, see RFC7519. The following are details of some specific claims:

- `iss` : The issuer. It has the following format: `https://cognito-idp.{region}.amazonaws.com/{userPoolId}`. For example, if you created a user pool in the `us-east-1` region and its ID is `u123456`, the ID token issued for users of your user pool have an `iss` claim value of `https://cognito-idp.us-east-1amazonaws.com/u123456`.
- `client_id` : The client app that was issued this access token.
- `username` : The user name of the authenticated user.
- `sub` : The UUID of the authenticated user. This is not the same as `username`.
- `token_use` : The intended purpose of this token. Its value is always `access` in the case of the access token.

Signature

The signature of the access token is calculated based on the header and payload of the access token. You should always verify this signature if you use access tokens in your web APIs.

Using ID Tokens and Access Tokens in your Web APIs

Since both the ID token and the access token are JSON Web Tokens (JWT), you may use any of the available JWT libraries to decode the JWT and verify the signature. For example, if your platform is Java, you could use the Nimbus JOSE and JWT library. The following procedure describes the high level steps you must implement to process the ID token and the access token on the server side.

To verify a signature for ID and access tokens

1. Download and store the JSON Web Token (JWT) Set for your user pool. You can locate them at `https://cognito-idp.{region}.amazonaws.com/{userPoolId}/.well-known/jwks.json`.

   Each JWT should be stored against its `kid`.

   Note
   This is a one time step before your web APIs can process the tokens. Now you can perform the following steps each time the ID token or the access token are used against your web APIs.
2. Decode the token string into JWT format.
3. Check the `iss` claim. It should match your user pool. For example, a user pool created in the `us-east-1` region will have an `iss` value of `https://cognito-idp.us-east-1.amazonaws.com/{userPoolId}`.
4. Check the `token_use` claim.

   If you are only accepting the access token in your web APIs, its value must be `access`.

   If you are only using the ID token, its value must be `id`.

If you are using both tokens, the value is either `id` or `access`.

5. Get the `kid` from the JWT token header and retrieve the corresponding JSON Web Key that was stored in step 1.
6. Verify the signature of the decoded JWT token.
7. Check the `exp` claim and make sure the token is not expired.

   You can now trust the claims inside the token and use it as it fits your requirements.

Revoking All Tokens for a User

Users can sign out from all devices where they are currently signed in when you revoke all of the user's tokens by using the `GlobalSignOut` and `AdminUserGlobalSignOut` APIs. After the user has been signed out:

- The user's refresh token cannot be used to get new tokens for the user.
- The user's access token cannot be used against the user pools service.
- The user must reauthenticate to get new tokens.

An app can use the `GlobalSignOut` API to allow individual users to sign themselves out from all devices. Typically an app would present this option as a choice, such as **Sign out from all devices**. The app must call this method with the user's valid, nonexpired, nonrevoked access token. This method cannot be used to allow a user to sign out another user.

An administrator app can use the `AdminUserGlobalSignOut` API to allow administrators to sign out a user from all devices. The administrator app must call this method with AWS developer credentials and pass the user pool ID and the user's username as parameters. The `AdminUserGlobalSignOut` API can sign out any user in the user pool.

Amazon Cognito Identity: Using Federated Identities

Amazon Cognito Federated Identities enable you to create unique identities for your users and authenticate them with identity providers. With an identity, you can obtain temporary, limited-privilege AWS credentials to synchronize data with Amazon Cognito Sync, or directly access other AWS services. Amazon Cognito Identity supports public identity providers—Amazon, Facebook, Google, and SAML identity providers—as well as unauthenticated identities. It also supports developer authenticated identities, which let you register and authenticate users via your own backend authentication process.

For information about Amazon Cognito Identity Region availability, see AWS Service Region Availability.

For more information about Amazon Cognito Identity, see the following topics.

Identity Pools

To use Amazon Cognito in your app, you'll need to create an identity pool. An identity pool is a store of user identity data specific to your account. Using Amazon Cognito Sync (p. 161), you can retrieve the data across client platforms, devices, and operating systems, so that if a user starts using your app on a phone and later switches to a tablet, the persisted app information is still available for that user.

To create a new identity pool for your application:

1. Log in to the Amazon Cognito console and click **Create new identity pool**.

2. Enter a name for your identity pool, select the checkbox to enable access to unauthenticated identities, and then click **Create Pool**.
3. Click **Allow** to create the two default roles associated with your identity pool–one for unauthenticated users and one for authenticated users. These default roles provide your identity pool access to Amazon Cognito Sync. You can modify the roles associated with your identity pool in the IAM console.

For additional instructions on working with the Amazon Cognito console, see Using the Amazon Cognito Console (p. 202).

Authenticated and Unauthenticated Identities

Amazon Cognito identity pools support both authenticated and unauthenticated identities. Authenticated identities belong to users who are authenticated by a public login provider (Facebook, Amazon, Google, Twitter/Digits, or any OpenID Connect Providers) or a developer provider (your own backend authentication process). Unauthenticated identities typically belong to guest users.

- To configure authenticated identities with a public login provider, see External Identity Providers (p. 122).
- To configure your own backend authentication process, see Developer Authenticated Identities (p. 146).

User IAM Roles

An IAM role defines the permissions for your users to access AWS resources, like Amazon Cognito Sync (p. 161). Users of your application will assume the roles you create. You can specify different roles for authenticated and unauthenticated users. To learn more about IAM roles, see IAM Roles (p. 112).

Federated Identities Concepts

Amazon Cognito Identity enables you to create unique identities for your users and authenticate them with identity providers. With an identity, you can obtain temporary, limited-privilege AWS credentials to synchronize data with Amazon Cognito Sync, or directly access other AWS services. Amazon Cognito Identity supports public identity providers—Amazon, Facebook, and Google—as well as unauthenticated identities. It also supports developer authenticated identities, which let you register and authenticate users via your own back-end authentication process.

For information about Amazon Cognito Identity Region availability, see AWS Service Region Availability. For more information about Amazon Cognito Identity concepts, see the following topics.

Topics

Authentication Flow

Amazon Cognito helps you create unique identifiers for your end users that are kept consistent across devices and platforms. Amazon Cognito also delivers temporary, limited-privilege credentials to your application to access AWS resources. This page covers the basics of how authentication in Amazon Cognito works and explains the life cycle of an identity inside your identity pool.

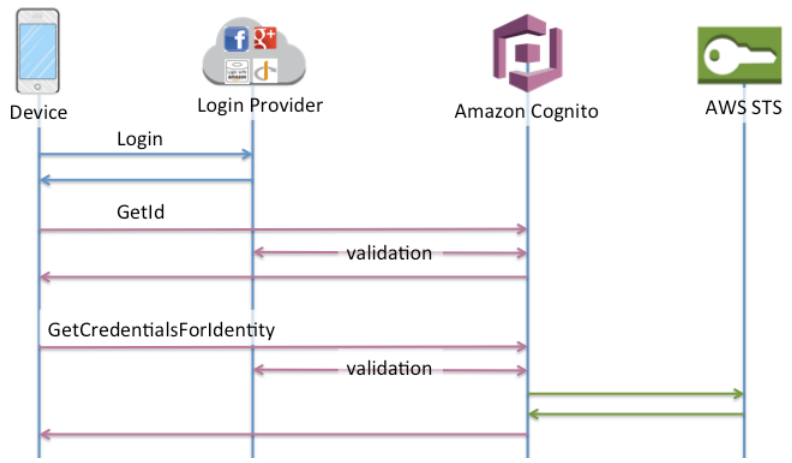
External Provider Authflow

A user authenticating with Amazon Cognito will go through a multi-step process to bootstrap their credentials. Amazon Cognito has two different flows for authentication with public providers: enhanced and basic.

Once you complete one of these flows, you can access other AWS services as defined by your role's access policies. By default, the Amazon Cognito console will create roles with access to the Amazon Cognito Sync store and to Amazon Mobile Analytics. For more information on how to grant additional access see IAM Roles (p. 112).

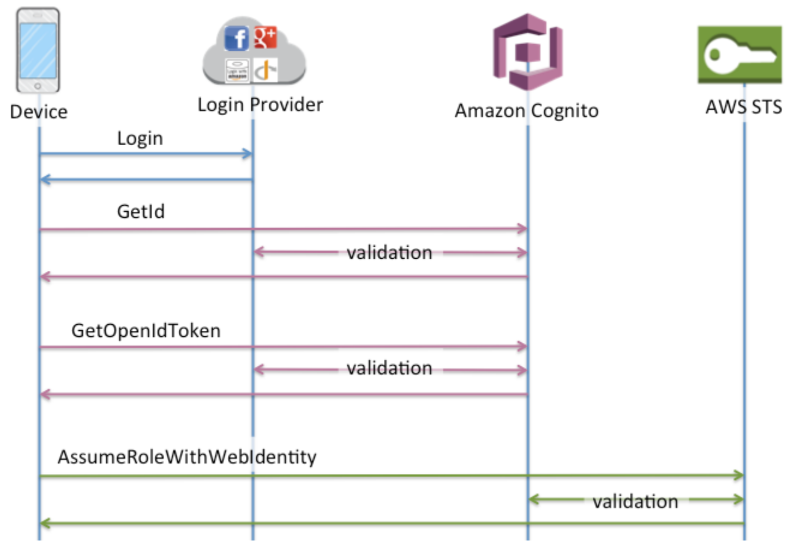
Enhanced (Simplified) Authflow

1. `GetId`
2. `GetCredentialsForIdentity`



Basic (Classic) Authflow

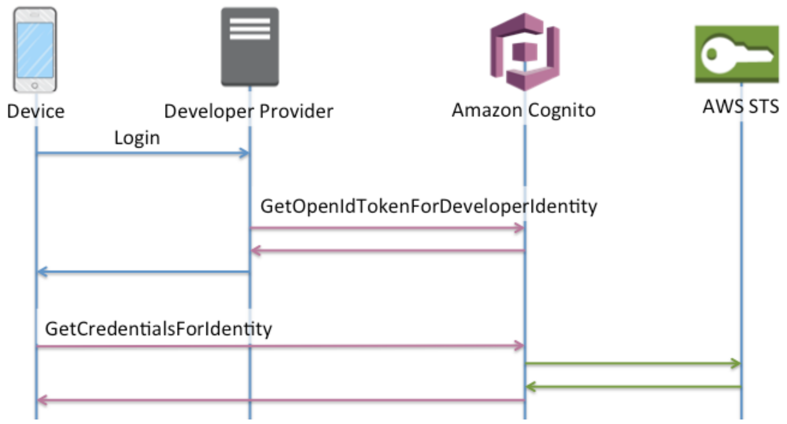
1. `GetId`
2. `GetOpenIdToken`
3. `AssumeRoleWithWebIdentity`



Developer Authenticated Identities Authflow

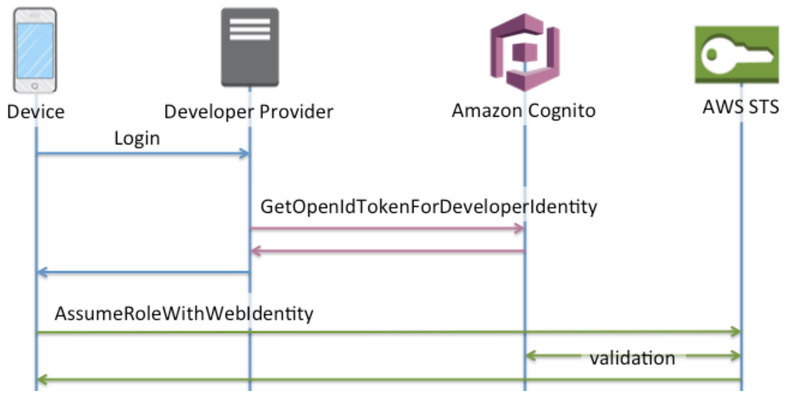
When using Developer Authenticated Identities (p. 146), the client will use a different authflow that will include code outside of Amazon Cognito to validate the user in your own authentication system. Code outside of Amazon Cognito is highlighted in italics.
Enhanced Authflow

1. Login via Developer Provider
2. Validate the user's login
3. GetOpenIdTokenForDeveloperIdentity
4. GetCredentialsForIdentity



Basic Authflow

1. Login via Developer Provider
2. Validate the user's login
3. GetOpenIdTokenForDeveloperIdentity
4. GetCredentialsForIdentity
5. AssumeRoleWithWebIdentity



Which Authflow Should I Use?

For most customers, the Enhanced Flow is the correct choice, as it offers many benefits over the Basic Flow:

- One fewer network call to get credentials on the device.

- All calls are made to Amazon Cognito, meaning it is also one less network connection.
- Roles no longer need to be embedded in your application, only an identity pool id and region are necessary to start bootstrapping credentials.

Since February 2015, the Amazon Cognito console displayed example code that used the Enhanced Flow. Additionally, the console will display a notification if your identity pool does not have the role association necessary to use the Enhanced Flow.

The following are the minimum SDK versions where the Enhanced Flow is supported:
SDK (Minimum Version)

- AWS SDK for iOS (2.0.14)
- AWS SDK for Android (2.1.8)
- AWS SDK for JavaScript (2.1.7)
- AWS SDK for Unity (1.0.3)
- AWS SDK for Xamarin (3.0.0.5)

You may still wish to use the Basic Flow if you want to use more than the two default roles configured when you create a new identity pool in the console.

API Summary

GetId

The GetId API call is the first call necessary to establish a new identity in Amazon Cognito.
Unauthenticated Access

Amazon Cognito has the ability to allow unauthenticated guest access in your applications. If this feature is enabled in your identity pool, users can request a new identity ID at any time via the GetId API. The application is expected to cache this identity ID to make subsequent calls to Amazon Cognito. The AWS Mobile SDKs as well as the AWS SDK for JavaScript in the Browser have credentials providers that handle this caching for you.
Authenticated Access

When you've configured your application with support for a public login provider (Facebook, Google +, Login with Amazon), users will also be able to supply tokens (OAuth or OpenID Connect) that identify them in those providers. When used in a call to GetId, Amazon Cognito will either create a new authenticated identity or return the identity already associated with that particular login. Amazon Cognito does this by validating the token with the provider and ensuring that:

- The token is valid and from the configured provider
- The token is not expired
- The token matches the application identifier created with that provider (e.g., Facebook app ID)
- The token matches the user identifier

GetCredentialsForIdentity

The GetCredentialsForIdentity API can be called after you establish an identity ID. This API is functionally equivalent to calling GetOpenIdToken followed by AssumeRoleWithWebIdentity.

In order for Amazon Cognito to call AssumeRoleWithWebIdentity on your behalf, your identity pool must have IAM roles associated with it. You can do this via the Amazon Cognito Console or manually via the SetIdentityPoolRoles operation (see the API reference)

Note: For additional security protection, Amazon Cognito uses a scope-down policy when assuming roles during a GetCredentialsForIdentity call. If the identity is unauthenticated, only AWS Services currently supported by the AWS Mobile SDKs are whitelisted in this scope down policy. If you need to use a service not currently supported, you must use the basic authflow.

GetOpenIdToken

The GetOpenIdToken API call is called after you establish an identity ID. If you have a cached identity ID, this can be the first call you make during an app session.

Unauthenticated Access

To obtain a token for an unauthenticated identity, you only need the identity ID itself. It is not possible to get an unauthenticated token for authenticated or disabled identities.

Authenticated Access

If you have an authenticated identity, you must pass at least one valid token for a login already associated with that identity. All tokens passed in during the GetOpenIdToken call must pass the same validation mentioned earlier; if any of the tokens fail, the whole call fails. The response from the GetOpenIdToken call also includes the identity ID. This is because the identity ID you pass in may not be the one that is returned.

Linking Logins

If you pass in a token for a login that is not already associated with any identity, the login is considered to be "linked" to the associated identity. You may only link one login per public provider. Attempts to link more than one login with a public provider will result in a ResourceConflictException. If a login is merely linked to an existing identity, the identity ID returned from GetOpenIdToken will be the same as what was passed in.

Merging Identities

If you pass in a token for a login that is not currently linked to the given identity, but is linked to another identity, the two identities are merged. Once merged, one identity becomes the parent/owner of all associated logins and the other is disabled. In this case, the identity ID of the parent/owner is returned. You are expected to update your local cache if this value differs (this is handled for you if you are using the providers in the AWS Mobile SDKs or AWS SDK for JavaScript in the Browser).

GetOpenIdTokenForDeveloperIdentity

The GetOpenIdTokenForDeveloperIdentity API replaces the use of GetId and GetOpenIdToken from the device when using developer authenticated identities. Because this API call is signed by your AWS credentials, Amazon Cognito can trust that the user identifier supplied in the API call is valid. This replaces the token validation Amazon Cognito performs with external providers.

The payload for this API includes a logins map which must contain the key of your developer provider and a value as an identifier for the user in your system. If the user identifier isn't already linked to an existing identity, Amazon Cognito will create a new identity and return the new identity id and an OpenId Connect token for that identity. If the user identifier is already linked, Amazon Cognito will return the pre-existing identity id and an OpenId Connect token.

Linking Logins

As with external providers, supplying additional logins that are not already associated with an identity will implicitly link those logins to that identity. It is important to note that if you link an external provider login to an identity, the user can use the external provider authflow with that provider, but they cannot use your developer provider name in the logins map when calling GetId or GetOpenIdToken.

Merging Identities

With developer authenticated identities, Amazon Cognito supports both implicit merging as well as explicit merging via the MergeDeveloperIdentities API. This explicit merging allows you to mark two identities with user identifiers in your system as a single identity. You simply supply the source and destination user identifiers and Amazon Cognito will merge them. The next time you request an OpenId Connect token for either user identifier, the same identity id will be returned.

AssumeRoleWithWebIdentity

Once you have an OpenID Connect token, you can then trade this for temporary AWS credentials via the AssumeRoleWithWebIdentity API call in AWS Security Token Service (STS). This call is no different than if you were using Facebook, Google+, or Login with Amazon directly, except that you are passing an Amazon Cognito token instead of a token from one of the other public providers.

Because there's no restriction on the number of identities that can be created, it's important to understand the permissions that are being granted to your users. We recommend having two different roles for your application: one for unauthenticated users, and one for authenticated users. The Amazon Cognito console will create these for you by default when you first set up your identity pool. The access policy for these two roles will be exactly the same: it will grant users access to Amazon Cognito Sync as well as to submit events to Amazon Mobile Analytics. You are welcome and encouraged to modify these roles to meet your needs.

Learn more about Role Trust and Permissions (p. 114).

IAM Roles

In the process of creating an identity pool, you'll be prompted to update the IAM roles that your users assume. IAM roles work like this: When a user logs in to your app, Amazon Cognito generates temporary AWS credentials for the user. These temporary credentials are associated with a specific IAM role. The IAM role lets you define a set of permissions to access your AWS resources.

By default, the Amazon Cognito Console creates IAM roles that provide access to Amazon Mobile Analytics and to Amazon Cognito Sync. Alternatively, you can choose to use existing IAM roles.

To modify IAM roles, thereby allowing or restricting access to other services, log in to the IAM Console. Then click Roles and select a role. The policies attached to the selected role are listed in the Permissions tab. You can customize an access policy by clicking the corresponding Manage Policy link. To learn more about using and defining policies, see Overview of IAM Policies. For Amazon Cognito to work, the IAM policy must at least enable access to the Amazon Cognito store for each identity, as in the following example:

```
{
  "Version": "2012-10-17",
  "Statement":[{
      "Effect":"Allow",
      "Action":"cognito-sync:*",
      "Resource":["arn:aws:cognito-sync:us-east-1:123456789012:identitypool/
${cognito-identity.amazonaws.com:aud}/identity/${cognito-
identity.amazonaws.com:sub}/*"]
      }]
  }
```

The following policy provides access to the entire Amazon Cognito Sync store:

```
{
  "Version": "2012-10-17",
  "Statement":[{
      "Effect":"Allow",
      "Action":"cognito-sync:*",
      "Resource":["arn:aws:cognito-sync:us-east-1:123456789012:identitypool/
*"]
      }]
  }
```

Role Trust and Permissions

Amazon Cognito leverages IAM roles to generate temporary credentials for your application's users. Access to permissions is controlled by a role's trust relationships. Learn more about role trust and permissions.

Reuse Roles Across Identity Pools

To reuse a role across multiple identity pools, because they share a common permission set, you can include multiple identity pools, like this:

```
"StringEquals": {
    "cognito-identity.amazonaws.com:aud": [
        "us-east-1:12345678-abcd-abcd-abcd-123456790ab",
        "us-east-1:98765432-dcba-dcba-dcba-123456790ab"
    ]
}
```

Limit Access to Specific Identities

To create a policy limited to a specific set of app users, check the value of `cognito-identity.amazonaws.com:sub`:

```
"StringEquals": {
    "cognito-identity.amazonaws.com:aud": "us-east-1:12345678-abcd-abcd-
abcd-123456790ab",
    "cognito-identity.amazonaws.com:sub": [
        "us-east-1:12345678-1234-1234-1234-123456790ab",
        "us-east-1:98765432-1234-1234-1243-123456790ab"
    ]
}
```

Limit Access to Specific Providers

To create a policy limited to users who have logged in with a specific provider (perhaps your own login provider), check the value of `cognito-identity.amazonaws.com:amr`:

```
"ForAnyValue:StringLike": {
    "cognito-identity.amazonaws.com:amr": "login.myprovider.myapp"
}
```

For example, an app that trusts only Facebook would have the following amr clause:

```
"ForAnyValue:StringLike": {
    "cognito-identity.amazonaws.com:amr": "graph.facebook.com"
}
```

Access Policies

The permissions attached to a role are effective across all users that assume that role. If you want to partition your users' access, you can do so via policy variables. Be careful when including your users' identity IDs in your access policies, particularly for unauthenticated identities as these may change if the user chooses to login.

S3 Prefix

You can give a user a specific prefix "folder" in an S3 bucket by mapping the prefix to the `${cognito-identity.amazonaws.com:sub}` variable:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": ["s3:ListBucket"],
      "Effect": "Allow",
      "Resource": ["arn:aws:s3:::mybucket"],
      "Condition": {"StringLike": {"s3:prefix": ["${cognito-
identity.amazonaws.com:sub}/*"]}}
    },
    {
      "Action": [
        "s3:GetObject",
        "s3:PutObject"
      ],
      "Effect": "Allow",
      "Resource": ["arn:aws:s3:::mybucket/${cognito-
identity.amazonaws.com:sub}/*"]
    }
  ]
}
```

Fine-Grained Access to Amazon DynamoDB

You can use Amazon Cognito variables to provide fine-grained access control to Amazon DynamoDB resources. Just grant access to items in DynamoDB by identity ID:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "dynamodb:GetItem",
        "dynamodb:BatchGetItem",
        "dynamodb:Query",
        "dynamodb:PutItem",
        "dynamodb:UpdateItem",
        "dynamodb:DeleteItem",
        "dynamodb:BatchWriteItem"
      ],
      "Resource": [
        "arn:aws:dynamodb:us-west-2:123456789012:table/MyTable"
      ],
      "Condition": {
        "ForAllValues:StringEquals": {
          "dynamodb:LeadingKeys":  ["${cognito-identity.amazonaws.com:sub}"]
        }
      }
    }
  ]
}
```

Role Trust and Permissions

The way these roles differ is in their trust relationships. Let's take a look at an example trust policy for an unauthenticated role:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Federated": "cognito-identity.amazonaws.com"
      },
      "Action": "sts:AssumeRoleWithWebIdentity",
      "Condition": {
        "StringEquals": {
          "cognito-identity.amazonaws.com:aud": "us-east-1:12345678-dead-
beef-cafe-123456790ab"
        },
        "ForAnyValue:StringLike": {
          "cognito-identity.amazonaws.com:amr": "unauthenticated"
        }
      }
    }
  ]
}
```

This policy defines that we want to allow federated users from `cognito-identity.amazonaws.com` (the issuer of the OpenID Connect token) to assume this role. Additionally, we make the restriction that the aud of the token, in our case the identity pool ID, matches our identity pool. Finally, we specify that the amr of the token contains the value unauthenticated.

When Amazon Cognito creates a token, it will set the `amr` of the token to be either "unauthenticated" or "authenticated" and in the authenticated case will include any providers used during authentication. This means you can create a role that trusts only users that logged in via Facebook, simply by changing the amr clause to look like the following:

```
"ForAnyValue:StringLike": {
  "cognito-identity.amazonaws.com:amr": "graph.facebook.com"
}
```

Be careful when changing your trust relationships on your roles, or when trying to use roles across identity pools. If your role is not configured to correctly trust your identity pool, you will see an exception from STS like the following:

```
AccessDenied -- Not authorized to perform sts:AssumeRoleWithWebIdentity
```

If you see this, double check that you are using an appropriate role for your identity pool and authentication type.

Getting Credentials

This section describes how to get credentials and how to retrieve an Amazon Cognito identity.

Android

You can use Amazon Cognito to deliver temporary, limited-privilege credentials to your application, so that your users can access AWS resources. Amazon Cognito supports both authenticated and unauthenticated identities. To provide AWS credentials to your app, follow the steps below.

1. In the Amazon Cognito console, create an identity pool and copy the starter code snippets.
2. If you haven't already done so, add the AWS Mobile SDK for Android to your project. For instructions, see Set Up the Mobile SDK for Android.
3. Include the following import statements:

```
import com.amazonaws.auth.CognitoCachingCredentialsProvider;
import com.amazonaws.regions.Regions;
```

4. Initialize the Amazon Cognito credentials provider using the code snippet generated by the Amazon Cognito console. The value for `IDENTITY_POOL_ID` will be specific to your account:

```
CognitoCachingCredentialsProvider credentialsProvider = new
 CognitoCachingCredentialsProvider(
  getApplicationContext(), // Context
  "IDENTITY_POOL_ID", // Identity Pool ID
  Regions.US_EAST_1 // Region
);
```

5. Pass the initialized Amazon Cognito credentials provider to the constructor of the AWS client to be used. The code required depends on the service to be initialized. The client will use this provider to get credentials with which it will access AWS resources.

   Note
   If you created your identity pool before February 2015, you will need to reassociate your roles with your identity pool in order to use this constructor without the roles as parameters. To do so, open the Amazon Cognito console, select your identity pool, click **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

Retrieving an Amazon Cognito Identity

You can retrieve a unique Amazon Cognito identifier (identity ID) for your end user immediately if you're allowing unauthenticated users or after you've set the login tokens in the credentials provider if you're authenticating users:

```
String identityId = credentialsProvider.getIdentityId();
Log.d("LogTag", "my ID is " + identityId);
```

Note
Do not call `getIdentityId()`, `refresh()`, or `getCredentials()` in the main thread of your application. As of Android 3.0 (API Level 11), your app will automatically fail and throw a NetworkOnMainThreadException if you perform network I/O on the main application thread. You will need to move your code to a background thread using `AsyncTask`. For more information, consult the Android documentation. You can also call `getCachedIdentityId()` to retrieve an ID, but only if one is already cached locally. Otherwise, the method will return null.

iOS - Objective-C

You can use Amazon Cognito to deliver temporary, limited-privilege credentials to your application, so that your users can access AWS resources. Amazon Cognito supports both authenticated and unauthenticated identities. To provide AWS credentials to your app, follow the steps below.

1. In the Amazon Cognito console, create an identity pool and copy the starter code snippets.
2. If you haven't already done so, add the AWS Mobile SDK for iOS to your project. For instructions, see Set Up the Mobile SDK for iOS.
3. In your source code, include the AWSCore header:

```
#import <AWSCore/AWSCore.h>
```

4. Initialize the Amazon Cognito credentials provider using the code snippet generated by the Amazon Cognito console. The value for `IDENTITY_POOL_ID` will be specific to your account:

```
AWSCognitoCredentialsProvider *credentialsProvider =
 [[AWSCognitoCredentialsProvider alloc]
initWithRegionType:AWSRegionUSEast1 identityPoolId:@"IDENTITY_POOL_ID"];
AWSServiceConfiguration *configuration = [[AWSServiceConfiguration alloc]
initWithRegion:AWSRegionUSEast1 credentialsProvider:credentialsProvider];
AWSServiceManager.defaultServiceManager.defaultServiceConfiguration =
 configuration;
```

Note
If you created your identity pool before February 2015, you will need to reassociate your roles with your identity pool in order to use this constructor without the roles as parameters. To do so, open the Amazon Cognito console, select your identity pool, click **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

Retrieving an Amazon Cognito Identity

You can retrieve a unique Amazon Cognito identifier (identity ID) for your end user immediately if you're allowing unauthenticated users or after you've set the login tokens in the credentials provider if you're authenticating users:

```
// Retrieve your Amazon Cognito ID
[[credentialsProvider getIdentityId] continueWithBlock:^id(AWSTask *task) {
    if (task.error) {
        NSLog(@"Error: %@", task.error);
    }
    else {
        // the task result will contain the identity id
        NSString *cognitoId = task.result;
    }
    return nil;
}];
```

Note
`getIdentityId` is an asynchronous call. If an identity ID is already set on your provider, you can call `credentialsProvider.identityId` to retrieve that identity, which is cached locally. However, if an identity ID is not set on your provider, calling `credentialsProvider.identityId` will return `nil`. For more information, consult the Mobile SDK for iOS API Reference.

iOS - Swift

You can use Amazon Cognito to deliver temporary, limited-privilege credentials to your application, so that your users can access AWS resources. Amazon Cognito supports both authenticated and unauthenticated identities. To provide AWS credentials to your app, follow the steps below.

1. In the Amazon Cognito console, create an identity pool and copy the starter code snippets.
2. If you haven't already done so, add the Mobile SDK for iOS to your project. For instructions, see Set Up the SDK for iOS.
3. In your source code, include the `AWSCore` header:

```
#import <AWSCore/AWSCore.h>
```

4. Initialize the Amazon Cognito credentials provider using the code snippet generated by the Amazon Cognito console. The value for `IDENTITY_POOL_ID` will be specific to your account:

```
let credentialsProvider = AWSCognitoCredentialsProvider(regionType:
 AWSRegionType.USEast1, identityPoolId: "IDENTITY_POOL_ID")
let configuration = AWSServiceConfiguration(region: AWSRegionType.USEast1,
 credentialsProvider: credentialsProvider)
AWSServiceManager.defaultServiceManager().defaultServiceConfiguration =
 configuration
```

Note
If you created your identity pool before February 2015, you will need to reassociate your roles with your identity pool in order to use this constructor without the roles as parameters. To do so, open the Amazon Cognito console, select your identity pool, click **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

Retrieving an Amazon Cognito Identity

You can retrieve a unique Amazon Cognito identifier (identity ID) for your end user immediately if you're allowing unauthenticated users or after you've set the login tokens in the credentials provider if you're authenticating users:

```
// Retrieve your Amazon Cognito ID
credentialsProvider.getIdentityId().continueWithBlock { (task: AWSTask!) ->
 AnyObject! in
    if (task.error != nil) {
        print("Error: " + task.error.localizedDescription)
    }
    else {
        // the task result will contain the identity id
        let cognitoId = task.result
    }
    return nil
}
```

Note
`getIdentityId` is an asynchronous call. If an identity ID is already set on your provider, you can call `credentialsProvider.identityId` to retrieve that identity, which is cached locally. However, if an identity ID is not set on your provider, calling `credentialsProvider.identityId` will return `nil`. For more information, consult the Mobile SDK for iOS API Reference.

JavaScript

You can use Amazon Cognito to deliver temporary, limited-privilege credentials to your application, so that your users can access AWS resources. Amazon Cognito supports both authenticated and unauthenticated identities. To provide AWS credentials to your app, follow the steps below.

```
// Set the region where your identity pool exists (us-east-1, eu-west-1)
AWS.config.region = 'us-east-1';

// Configure the credentials provider to use your identity pool
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
    IdentityPoolId: 'IDENTITY_POOL_ID',
});

// Make the call to obtain credentials
AWS.config.credentials.get(function(){

    // Credentials will be available when this function is called.
    var accessKeyId = AWS.config.credentials.accessKeyId;
    var secretAccessKey = AWS.config.credentials.secretAccessKey;
    var sessionToken = AWS.config.credentials.sessionToken;

});
```

Note
If you created your identity pool before February 2015, you will need to reassociate your roles with your identity pool in order to use this constructor without the roles as parameters. To do so, open the Amazon Cognito console, select your identity pool, click **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

Retrieving an Amazon Cognito Identity

You can retrieve a unique Amazon Cognito identifier (identity ID) for your end user immediately if you're allowing unauthenticated users or after you've set the login tokens in the credentials provider if you're authenticating users:

```
var identityId = AWS.config.credentials.identityId;
```

Unity

You can use Amazon Cognito to deliver temporary, limited-privilege credentials to your application, so that your users can access AWS resources. Amazon Cognito supports both authenticated and unauthenticated identities. To provide AWS credentials to your app, follow the steps below.

1. In the Amazon Cognito console, create an identity pool and copy the starter code snippets.
2. If you haven't already done so, download and import the AWS Mobile SDK for Unity package into your project. You can do so from the menu Assets > Import Package > Custom Package.
3. Paste the starter code snippet from the Console into the script you want to call Amazon Cognito from. The value for `IDENTITY_POOL_ID` will be specific to your account:

```
CognitoAWSCredentials credentials = new CognitoAWSCredentials (
      "IDENTITY_POOL_ID",    // Cognito Identity Pool ID
      RegionEndpoint.USEast1 // Region
```

```
    );
```

4. Pass the initialized Amazon Cognito credentials to the constructor of the AWS client to be used. The code required depends on the service to be initialized. The client will use this provider to get credentials with which it will access AWS resources.

    Note

    Note: If you created your identity pool before February 2015, you will need to reassociate your roles with your identity pool in order to use this constructor without the roles as parameters. To do so, open the Amazon Cognito console, select your identity pool, click **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

Retrieving an Amazon Cognito Identity

You can retrieve a unique Amazon Cognito identifier (identity ID) for your end user immediately if you're allowing unauthenticated users or after you've set the login tokens in the credentials provider if you're authenticating users:

```
credentials.GetIdentityIdAsync(delegate(AmazonCognitoIdentityResult<string>
 result) {
    if (result.Exception != null) {
        //Exception!
    }
    string identityId = result.Response;
});
```

Xamarin

You can use Amazon Cognito to deliver temporary, limited-privilege credentials to your application, so that your users can access AWS resources. Amazon Cognito supports both authenticated and unauthenticated identities. To provide AWS credentials to your app, follow the steps below.

1. In the Amazon Cognito console, create an identity pool and copy the starter code snippets.
2. If you haven't already done so, add the AWS Mobile SDK for Xamarin to your project. For instructions, see Set Up the SDK for Xamarin.
3. Include the following using statements:

```
using Amazon.CognitoIdentity;
```

4. Paste the starter code snippet from the Console into the script you want to call Amazon Cognito from. The value for `IDENTITY_POOL_ID` will be specific to your account:

```
CognitoAWSCredentials credentials = new CognitoAWSCredentials (
  "IDENTITY_POOL_ID",    // Cognito Identity Pool ID
  RegionEndpoint.USEast1 // Region
);
```

5. Pass the initialized Amazon Cognito credentials to the constructor of the AWS client to be used. The code required depends on the service to be initialized. The client will use this provider to get credentials with which it will access AWS resources.

Note

Note: If you created your identity pool before February 2015, you will need to reassociate your roles with your identity pool in order to use this constructor without the roles as parameters. To do so, open the Amazon Cognito console, select your identity pool, click **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

Retrieving an Amazon Cognito Identity

You can retrieve a unique Amazon Cognito identifier (identity ID) for your end user immediately if you're allowing unauthenticated users or after you've set the login tokens in the credentials provider if you're authenticating users:

```
var identityId = await credentials.GetIdentityIdAsync();
```

Accessing AWS Services

Once the Amazon Cognito credentials provider is initialized and refreshed, you can pass it directly to the initializer for an AWS client. For example, the following snippet initializes an Amazon DynamoDB client:

Android

```
// Create a service client with the provider
AmazonDynamoDB client = new AmazonDynamoDBClient(credentialsProvider);
```

The credentials provider communicates with Amazon Cognito, retrieving both the unique identifier for authenticated and unauthenticated users as well as temporary, limited privilege AWS credentials for the AWS Mobile SDK. The retrieved credentials are valid for one hour, and the provider refreshes them when they expire.

iOS - Objective-C

```
// create a configuration that uses the provider
AWSServiceConfiguration *configuration = [AWSServiceConfiguration
 configurationWithRegion:AWSRegionUSEast1 provider:credentialsProvider];

// get a client with the default service configuration
AWSDynamoDB *dynamoDB = [AWSDynamoDB defaultDynamoDB];
```

The credentials provider communicates with Amazon Cognito, retrieving both the unique identifier for authenticated and unauthenticated users as well as temporary, limited privilege AWS credentials for the AWS Mobile SDK. The retrieved credentials are valid for one hour, and the provider refreshes them when they expire.

iOS - Swift

```
// create a configuration that uses the provider
let configuration = AWSServiceConfiguration(region: AWSRegionType.USEast1,
 credentialsProvider: credentialsProvider)

// get a client with the default service configuration
let dynamoDB = AWSDynamoDB.defaultDynamoDB()
```

The credentials provider communicates with Amazon Cognito, retrieving both the unique identifier for authenticated and unauthenticated users as well as temporary, limited privilege AWS credentials for the AWS Mobile SDK. The retrieved credentials are valid for one hour, and the provider refreshes them when they expire.

JavaScript

```
// Create a service client with the provider
var dynamodb = new AWS.DynamoDB({region: 'us-west-2'});
```

The credentials provider communicates with Amazon Cognito, retrieving both the unique identifier for authenticated and unauthenticated users as well as temporary, limited privilege AWS credentials for the AWS Mobile SDK. The retrieved credentials are valid for one hour, and the provider refreshes them when they expire.

Unity

```
// create a service client that uses credentials provided by Cognito
AmazonDynamoDBClient client = new AmazonDynamoDBClient(credentials, REGION);
```

The credentials provider communicates with Amazon Cognito, retrieving both the unique identifier for authenticated and unauthenticated users as well as temporary, limited privilege AWS credentials for the AWS Mobile SDK. The retrieved credentials are valid for one hour, and the provider refreshes them when they expire.

Xamarin

```
// create a service client that uses credentials provided by Cognito
var client = new AmazonDynamoDBClient(credentials, REGION)
```

The credentials provider communicates with Amazon Cognito, retrieving both the unique identifier for authenticated and unauthenticated users as well as temporary, limited privilege AWS credentials for the AWS Mobile SDK. The retrieved credentials are valid for one hour, and the provider refreshes them when they expire.

External Identity Providers

Using the `logins` property, you can set credentials received from an identity provider. Moreover, you can associate an Amazon Cognito identity with multiple identity providers. For example, you could set both the Facebook and Google tokens in the `logins` property, so that the unique Amazon Cognito identity would be associated with both identity provider logins. No matter which account the end user uses for authentication, Amazon Cognito returns the same user identifier.

The instructions below guide you through authentication with the identity providers supported by Amazon Cognito.

Topics

Facebook

Amazon Cognito integrates with Facebook to provide federated authentication for your mobile application users. This section explains how to register and set up your application with Facebook as an identity provider.

Set Up Facebook

You need to register your application with Facebook before you can start authenticating Facebook users and interacting with Facebook APIs.

The Facebook Developers portal takes you through the process of setting up your application. If you haven't gone through that process yet, you'll need to do so before you can integrate Facebook in your Amazon Cognito Identity Pool:

To set up Facebook

1. At the Facebook Developers portal, log in with your Facebook credentials.
2. From the **Apps** menu, select **Add a New App**.
3. Select a platform and complete the quick start process.

Android

The Facebook Getting Started Guide provides additional information on integrating with Facebook Login.

iOS - Objective-C

The Facebook Getting Started Guide provides additional information about integrating with Facebook Login.

iOS - Swift

The Facebook Getting Started Guide provides additional information about integrating with Facebook Login.

JavaScript

The Facebook Getting Started Guide provides additional information about integrating with Facebook Login.

Unity

The Facebook Getting Started Guide provides additional information about integrating with Facebook Login.

Xamarin

To provide Facebook authentication, first follow the appropriate flow below to include and set up the Facebook SDK in your application. Amazon Cognito uses the Facebook access token to generate a unique user identifier that is associated to a Cognito Identity.

- Facebook iOS SDK by Xamarin
- Facebook Android SDK by Xamarin

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Facebook as an external provider. The **Dashboard page** for your identity pool appears.
2. In the top-right corner of the Dashboard page, click **Edit identity pool**. The **Edit identity pool** page appears.
3. Scroll down and click **Authentication providers** to expand it.
4. Click the Facebook tab.
5. Click **Unlock**.
6. Enter the Facebook App ID you obtained from Facebook, and then click **Save Changes**.

Using Facebook

Android

To provide Facebook authentication, first follow the Facebook guide to include their SDK in your application. Then add a "Login with Facebook" button to your Android user interface. The Facebook SDK uses a session object to track its state. Amazon Cognito uses the access token from this session object to authenticate the user, generate the unique identifier, and, if needed, grant the user access to other AWS resources.

Once you have authenticated your user with the Facebook SDK, add the session token to the Amazon Cognito credentials provider.

Facebook SDK 4.0 or later:

```
Map<String, String> logins = new HashMap<String, String>();
logins.put("graph.facebook.com",
 AccessToken.getCurrentAccessToken().getToken());
credentialsProvider.setLogins(logins);
```

Facebook SDK before 4.0:

```
Map<String, String> logins = new HashMap<String, String>();
logins.put("graph.facebook.com",
 Session.getActiveSession().getAccessToken());
credentialsProvider.setLogins(logins);
```

The Facebook login process initializes a singleton session in its SDK. The Facebook session object contains an OAuth token that Amazon Cognito uses to generate AWS credentials for your authenticated end user. Amazon Cognito also uses the token to check against your user database for the existence of a user matching this particular Facebook identity. If the user already exists, the API returns the existing identifier. Otherwise a new identifier is returned. Identifiers are automatically cached by the client SDK on the local device.

Note
After setting the logins map, you'll need to make a call to `refresh` or `get` to actually get the AWS credentials.

iOS - Objective-C

To add Facebook authentication, first follow the Facebook guide to integrate the Facebook SDK into your application. Then add a Login with Facebook button to your user interface. The Facebook SDK uses a session object to track its state. Amazon Cognito uses the access token from this session object to authenticate the user and bind them to a unique Amazon Cognito identity.

To provide the Facebook access token to Amazon Cognito, implement the AWSIdentityProviderManager protocol.

In the implementation of the `logins` method, return a dictionary containing `AWSIdentityProviderFacebook` as the key and the current access token from the authenticated Facebook user as the value, as shown in the following code example.

```
- (AWSTask<NSDictionary<NSString *, NSString *> *> *)logins {
    FBSDKAccessToken* fbToken = [FBSDKAccessToken currentAccessToken];
    if(fbToken){
        NSString *token = fbToken.tokenString;
        return [AWSTask taskWithResult: @{ AWSIdentityProviderFacebook :
 token }];
    }else{
            return [AWSTask taskWithError:[NSError errorWithDomain:@"Facebook
 Login"
                                                          code:-1

 userInfo:@{@"error":@"No current Facebook access token"}]];
    }
}
```

When you instantiate the `AWSCognitoCredentialsProvider`, pass the class that implements `AWSIdentityProviderManager` as the value of `identityProviderManager` in the constructor. For more information, go to the AWSCognitoCredentialsProvider reference page and choose **initWithRegionType:identityPoolId:identityProviderManager**.

iOS - Swift

To add Facebook authentication, first follow the Facebook guide to integrate the Facebook SDK into your application. Then add a Login with Facebook button to your user interface. The Facebook SDK uses a session object to track its state. Amazon Cognito uses the access token from this session object to authenticate the user and bind them to a unique Amazon Cognito identity.

To provide the Facebook access token to Amazon Cognito, implement the AWSIdentityProviderManager protocol.

In the implementation of the `logins` method, return a dictionary containing `AWSIdentityProviderFacebook` as the key and the current access token from the authenticated Facebook user as the value, as shown in the following code example.

```
class FacebookProvider: NSObject, AWSIdentityProviderManager {
    func logins() -> AWSTask<NSDictionary> {
        if let token = AccessToken.current?.authenticationToken {
            return AWSTask(result: [AWSIdentityProviderFacebook:token])
        }
        return AWSTask(error:NSError(domain: "Facebook Login", code: -1 ,
 userInfo: ["Facebook" : "No current Facebook access token"]))
    }
}
```

When you instantiate the `AWSCognitoCredentialsProvider`, pass the class that implements `AWSIdentityProviderManager` as the value of `identityProviderManager` in the constructor. For more information, go to the AWSCognitoCredentialsProvider reference page and choose **initWithRegionType:identityPoolId:identityProviderManager**.

JavaScript

To provide Facebook authentication, follow the Facebook Login for the Web to add the "Login with Facebook" button on your website. The Facebook SDK uses a session object to track its state. Amazon Cognito uses the access token from this session object to authenticate the user, generate the unique identifier, and, if needed, grant the user access to other AWS resources.

Once you have authenticated your user with the Facebook SDK, add the session token to the Amazon Cognito credentials provider.

```
FB.login(function (response) {

  // Check if the user logged in successfully.
  if (response.authResponse) {

    console.log('You are now logged in.');

    // Add the Facebook access token to the Cognito credentials login map.
    AWS.config.credentials = new AWS.CognitoIdentityCredentials({
      IdentityPoolId: 'IDENTITY_POOL_ID',
      Logins: {
        'graph.facebook.com': response.authResponse.accessToken
      }
    });

    // Obtain AWS credentials
    AWS.config.credentials.get(function(){
        // Access AWS resources here.
    });

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

});
```

The Facebook SDK obtains an OAuth token that Amazon Cognito uses to generate AWS credentials for your authenticated end user. Amazon Cognito also uses the token to check against your user database for the existence of a user matching this particular Facebook identity. If the user already exists, the API returns the existing identifier. Otherwise a new identifier is returned. Identifiers are automatically cached by the client SDK on the local device.

Note
After setting the logins map, you need to make a call to `refresh` or `get` to get the AWS credentials. For a code example, see "Use Case 17, Integrating User Pools with Cognito Identity," in the JavaScript README file.

Unity

To provide Facebook authentication, first follow the Facebook guide to include and set up their SDK in your application. Amazon Cognito uses the Facebook access token from the 'FB' object to generate a unique user identifier that is associated to a Cognito Identity.

Once you have authenticated your user with the Facebook SDK, add the session token to the Amazon Cognito credentials provider:

```
void Start()
{
    FB.Init(delegate() {
        if (FB.IsLoggedIn) { //User already logged in from a previous session
            AddFacebookTokenToCognito();
        } else {
            FB.Login ("email", FacebookLoginCallback);
        }
    });
}

void FacebookLoginCallback(FBResult result)
{
    if (FB.IsLoggedIn)
    {
        AddFacebookTokenToCognito();
    }
    else
    {
        Debug.Log("FB Login error");
    }
}

void AddFacebookTokenToCognito()
{
    credentials.AddLogin ("graph.facebook.com",
 AccessToken.CurrentAccessToken.TokenString);
}
```

You should make sure to call `FB.Login()` and that `FB.IsLoggedIn` is true before using `FB.AccessToken`.

Xamarin

Xamarin for Android:

```
public void InitializeFacebook() {
    FacebookSdk.SdkInitialize(this.ApplicationContext);
    callbackManager = CallbackManagerFactory.Create();
    LoginManager.Instance.RegisterCallback(callbackManager, new
 FacebookCallback &lt; LoginResult &gt; () {
      HandleSuccess = loginResult = &gt; {
        var accessToken = loginResult.AccessToken;
        credentials.AddLogin("graph.facebook.com", accessToken.Token);
        //open new activity
      },
      HandleCancel = () = &gt; {
        //throw error message
      },
      HandleError = loginError = &gt; {
        //throw error message
      }
    });
    LoginManager.Instance.LogInWithReadPermissions(this, new List &lt; string
 &gt; {
      "public_profile"
    });
  }
```

Xamarin for iOS:

```
public void InitializeFacebook() {
  LoginManager login = new LoginManager();
  login.LogInWithReadPermissions(readPermissions.ToArray(),
 delegate(LoginManagerLoginResult result, NSError error) {
    if (error != null) {
      //throw error message
    } else if (result.IsCancelled) {
      //throw error message
    } else {
      var accessToken = loginResult.AccessToken;
      credentials.AddLogin("graph.facebook.com", accessToken.Token);
      //open new view controller
    }
  });
}
```

Amazon

Amazon Cognito integrates with Login with Amazon to provide federated authentication for your mobile application users. This section explains how to register and set up your application with Amazon as an identity provider.

Android

Setting Up Amazon

To enable Login with Amazon, you'll need to create an Application ID in the Amazon App Console. The Login with Amazon guide takes you through the process of setting up Login with Amazon in your application, downloading the client SDK, and declaring your application on the Amazon developer platform. Copy the App ID, as you'll need it when you create a Amazon Cognito identity pool, as described in Getting Started.

Note
If you registered your application with developer.amazon.com, the terminology will differ. What is here called an App ID will be called a Security Profile ID, though they are the same.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.

4. Click the Amazon tab.
5. Click Unlock.
6. Enter the Amazon App ID you obtained from Amazon, and then click Save Changes.

Use Amazon

Once you've implemented Amazon login, you can pass the token to the Amazon Cognito credentials provider in the onSuccess method of the TokenListener interface. The code looks like this:

```
@Override
public void onSuccess(Bundle response) {
    String token = response.getString(AuthzConstants.BUNDLE_KEY.TOKEN.val);
    Map<String, String> logins = new HashMap<String, String>();
    logins.put("www.amazon.com", token);
    credentialsProvider.setLogins(logins);
}
```

iOS - Objective-C

Setting Up Amazon

To enable Login with Amazon, you'll need to create an Application ID in the Amazon App Console. The Login with Amazon guide takes you through the process of setting up Login with Amazon in your application, downloading the client SDK, and declaring your application on the Amazon developer platform. Copy the App ID, as you'll need it when you create a Amazon Cognito identity pool, as described in Getting Credentials.

> Note: If you registered your application with developer.amazon.com, the terminology will differ. What is here called an App ID will be called a Security Profile ID, though they are the same.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Click the Amazon tab.
5. Click Unlock.
6. Enter the Amazon App ID you obtained from Amazon, and then click Save Changes.

Use Amazon

Once you've implemented Amazon login, you can pass the token to the Amazon Cognito credentials provider in the requestDidSucceed method of the AMZNAccessTokenDelegate:

```
- (void)requestDidSucceed:(APIResult \*)apiResult {
    if (apiResult.api == kAPIAuthorizeUser) {
        [AIMobileLib getAccessTokenForScopes:[NSArray
 arrayWithObject:@"profile"] withOverrideParams:nil delegate:self];
    }
    else if (apiResult.api == kAPIGetAccessToken) {
        credentialsProvider.logins =
 @{ @(AWSCognitoLoginProviderKeyLoginWithAmazon): apiResult.result };
    }
}}
```

iOS - Swift

Setting Up Amazon

To enable Login with Amazon, you'll need to create an Application ID in the Amazon App Console. The Login with Amazon guide takes you through the process of setting up Login with Amazon in your application, downloading the client SDK, and declaring your application on the Amazon developer platform. Copy the App ID, as you'll need it when you create a Amazon Cognito identity pool, as described in Getting Started.

> Note: If you registered your application with developer.amazon.com, the terminology will differ. What is here called an App ID will be called a Security Profile ID, though they are the same.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Click the Amazon tab.
5. Click Unlock.
6. Enter the Amazon App ID you obtained from Amazon, and then click Save Changes.

Use Amazon

Once you've implemented Amazon login, you can pass the token to the Amazon Cognito credentials provider in the `requestDidSucceed` method of the `AMZNAccessTokenDelegate`:

```
func requestDidSucceed(apiResult: APIResult!) {
    if apiResult.api == API.AuthorizeUser {
        AIMobileLib.getAccessTokenForScopes(["profile"], withOverrideParams:
 nil, delegate: self)
    } else if apiResult.api == API.GetAccessToken {
        credentialsProvider.logins =
 [AWSCognitoLoginProviderKey.LoginWithAmazon.rawValue: apiResult.result]
    }
}
```

JavaScript

Setting Up Amazon

To enable Login with Amazon, you'll need to create an Application ID in the Amazon App Console. The Login with Amazon guide takes you through the process of setting up Login with Amazon in your application, downloading the client SDK, and declaring your application on the Amazon developer platform. Copy the App ID, as you'll need it when you create a Amazon Cognito identity pool, as described in Getting Started.

> Note: If you registered your application with developer.amazon.com, the terminology will differ. What is here called an App ID will be called a Security Profile ID, though they are the same.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Choose the Amazon tab.
5. Choose **Unlock**.
6. Enter the Amazon App ID you obtained from Amazon, and then choose **Save Changes**.

Use Amazon

After the user authenticates with Amazon and is redirected back to your website, the Amazon access_token is provided in the query string. Pass that token into the credentials login map.

```
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
   IdentityPoolId: 'IDENTITY_POOL_ID',
   Logins: {
        'www.amazon.com': 'Amazon Access Token'
   }
});
```

Unity

Amazon integration is not natively supported on the Unity platform. Integration currently requires the use of a web view to go through the browser sign in flow. To learn how Amazon integration works with other SDKs, please select another platform.

Xamarin

Setting Up Amazon

To enable Login with Amazon, you'll need to create an Application ID in the Amazon App Console. Then, follow the Xamarin Getting Started Guide to integrate Login with Amazon into your Xamarin application.

> Note: If you registered your application with developer.amazon.com, the terminology will differ. What is here called an App ID will be called a Security Profile ID, though they are the same.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.

2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Choose the Amazon tab.
5. Choose **Unlock**.
6. Enter the Amazon App ID you obtained from Amazon, and then choose **Save Changes**.

Use AmazonXamarin for Android:

```
AmazonAuthorizationManager manager = new AmazonAuthorizationManager(this,
 Bundle.Empty);

var tokenListener = new APIListener {
  Success = response => {
    // Get the auth token
    var token = response.GetString(AuthzConstants.BUNDLE_KEY.Token.Val);
    credentials.AddLogin("www.amazon.com", token);
  }
};

// Try and get existing login
manager.GetToken(new[] {
  "profile"
}, tokenListener);
```

Xamarin for iOS:

In AppDelegate.cs, insert the following:

```
public override bool OpenUrl (UIApplication application, NSUrl url, string
 sourceApplication, NSObject annotation)
{
    // Pass on the url to the SDK to parse authorization code from the url
    bool isValidRedirectSignInURL = AIMobileLib.HandleOpenUrl (url,
 sourceApplication);
    if(!isValidRedirectSignInURL)
        return false;

    // App may also want to handle url
    return true;
}
```

Then, in ViewController.cs, do the following:

```
public override void ViewDidLoad ()
{
    base.LoadView ();

    // Here we create the Amazon Login Button
    btnLogin = UIButton.FromType (UIButtonType.RoundedRect);
    btnLogin.Frame = new RectangleF (55, 206, 209, 48);
    btnLogin.SetTitle ("Login using Amazon", UIControlState.Normal);
    btnLogin.TouchUpInside += (sender, e) => {
        AIMobileLib.AuthorizeUser (new [] { "profile"}, new
 AMZNAuthorizationDelegate ());
```

```
    };
    View.AddSubview (btnLogin);
}

// Class that handles Authentication Success/Failure
public class AMZNAuthorizationDelegate : AIAuthenticationDelegate
{
  public override void RequestDidSucceed(ApiResult apiResult)
    {
      // Your code after the user authorizes application for requested scopes
      var token = apiResult["access_token"];
      credentials.AddLogin("www.amazon.com",token);
    }

    public override void RequestDidFail(ApiError errorResponse)
    {
      // Your code when the authorization fails
      InvokeOnMainThread(() => new UIAlertView("User Authorization Failed",
 errorResponse.Error.Message, null, "Ok", null).Show());
    }
}
```

Google

Amazon Cognito integrates with Google to provide federated authentication for your mobile application users. This section explains how to register and set up your application with Google as an identity provider.

Android

NOTE: If your app uses Google and will be available on multiple mobile platforms, you should configure it as an OpenID Connect Provider, adding all created client IDs as additional audience values to allow for better integration. To learn more about Google's cross-client identity model, see Cross-client Identity.

Set Up Google

To enable Google+ Sign-in for Android, you will need to create a Google Developers console project for your application.

1. Go to the Google Developers console and create a new project.
2. Under **APIs and auth > APIs > Social APIs**, enable the Google+ API.
3. Under **APIs and auth > Credentials > OAuth consent screen**, create the dialog that will be shown to users when your app requests access to their private data.
4. Under **Credentials > Add Credentials**, create an OAuth 2.0 client ID for Android. You will need a client ID for each platform you intend to develop for (e.g. web, iOS, Android).
5. Under Credentials > Add Credentials, create a Service Account. The console will alert you that a new public/private key has been created.

For additional instructions on using the Google Developers console, see Managing projects in the Developers Console.

For additional instructions on integrating Google+ into your Android app, see the Google documentation for Android.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Click the Google tab.
5. Click Unlock.
6. Enter the Google Client ID you obtained from Google, and then click Save Changes.

Use Google

To enable login with Google in your application, follow the Google+ documentation for Android. Successful authentication results in an OpenID Connect authentication token, which Amazon Cognito uses to authenticate the user and generate a unique identifier.

The following sample code shows how to retrieve the authentication token from the Google Play Service:

```
GooglePlayServicesUtil.isGooglePlayServicesAvailable(getApplicationContext());
AccountManager am = AccountManager.get(this);
Account[] accounts =
 am.getAccountsByType(GoogleAuthUtil.GOOGLE_ACCOUNT_TYPE);
String token = GoogleAuthUtil.getToken(getApplicationContext(),
 accounts[0].name,
        "audience:server:client_id:YOUR_GOOGLE_CLIENT_ID");
Map<String, String> logins = new HashMap<String, String>();
logins.put("accounts.google.com", token);
credentialsProvider.setLogins(logins);
```

iOS - Objective-C

Note
If your app uses Google and will be available on multiple mobile platforms, you should configure it as an OpenID Connect Provider, adding all created client IDs as additional audience values to allow for better integration. To learn more about Google's cross-client identity model, see Cross-client Identity.

To enable Google+ Sign-in for iOS, you will need to create a Google Developers console project for your application.

Set Up Google

1. Go to the Google Developers console and create a new project.
2. Under **APIs and auth > APIs > Social APIs**, enable the Google+ API.
3. Under **APIs and auth > Credentials > OAuth consent screen**, create the dialog that will be shown to users when your app requests access to their private data.
4. Under **Credentials > Add Credentials**, create an OAuth 2.0 client ID for iOS. You will need a client ID for each platform you intend to develop for (e.g. web, iOS, Android).
5. Under Credentials > Add Credentials, create a Service Account. The console will alert you that a new public/private key has been created.

For additional instructions on using the Google Developers console, see Managing projects in the Developers Console.

For additional instructions on integrating Google+ into your iOS app, see the Google documentation for iOS.

From the Amazon Cognito Console home page:

Configure the External Provider in the Amazon Cognito Console

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Click the Google tab.
5. Click Unlock.
6. Enter the Google Client ID you obtained from Google, and then click Save Changes.

Use Google

To enable login with Google in your application, follow the Google+ documentation for iOS. Successful authentication results in an OpenID Connect authentication token, which Amazon Cognito uses to authenticate the user and generate a unique identifier.

Successful authentication results in a GTMOAuth2Authentication object which contains an id_token, which Amazon Cognito uses to authenticate the user and generate a unique identifier:

```
- (void)finishedWithAuth: (GTMOAuth2Authentication *)auth error: (NSError *)
 error {
        NSString *idToken = [auth.parameters objectForKey:@"id_token"];
        credentialsProvider.logins = @{ @(AWSCognitoLoginProviderKeyGoogle):
 idToken };
    }
```

iOS - Swift

Note
If your app uses Google and will be available on multiple mobile platforms, you should configure it as an OpenID Connect Provider, adding all created client IDs as additional audience values to allow for better integration. To learn more about Google's cross-client identity model, see Cross-client Identity.

To enable Google+ Sign-in for iOS, you will need to create a Google Developers console project for your application.

Set Up Google

1. Go to the Google Developers console and create a new project.
2. Under **APIs and auth > APIs > Social APIs**, enable the Google+ API.
3. Under **APIs and auth > Credentials > OAuth consent screen**, create the dialog that will be shown to users when your app requests access to their private data.
4. Under **Credentials > Add Credentials**, create an OAuth 2.0 client ID for iOS. You will need a client ID for each platform you intend to develop for (e.g. web, iOS, Android).
5. Under Credentials > Add Credentials, create a Service Account. The console will alert you that a new public/private key has been created.

For additional instructions on using the Google Developers console, see Managing projects in the Developers Console.

For additional instructions on integrating Google+ into your iOS app, see the Google documentation for iOS.

From the Amazon Cognito Console home page:

Configure the External Provider in the Amazon Cognito Console

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Click the Google tab.
5. Click Unlock.
6. Enter the Google Client ID you obtained from Google, and then click Save Changes.

Use Google

To enable login with Google in your application, follow the Google+ documentation for iOS. Successful authentication results in an OpenID Connect authentication token, which Amazon Cognito uses to authenticate the user and generate a unique identifier.

Successful authentication results in a `GTMOAuth2Authentication` object which contains an `id_token`, which Amazon Cognito uses to authenticate the user and generate a unique identifier:

```
func finishedWithAuth(auth: GTMOAuth2Authentication!, error: NSError!) {
    if error != nil {
      print(error.localizedDescription)
    }
    else {
      let idToken = auth.parameters.objectForKey("id_token")
      credentialsProvider.logins =
 [AWSCognitoLoginProviderKey.Google.rawValue: idToken!]
    }
}
```

JavaScript

NOTE: If your app uses Google and will be available on multiple mobile platforms, you should configure it as an OpenID Connect Provider, adding all created client IDs as additional audience values to allow for better integration. To learn more about Google's cross-client identity model, see Cross-client Identity.

Set Up Google

To enable Google+ Sign-in for your web application, you will need to create a Google Developers console project for your application.

1. Go to the Google Developers console and create a new project.
2. Under **APIs and auth > APIs > Social APIs**, enable the Google+ API.
3. Under **APIs and auth > Credentials > OAuth consent screen**, create the dialog that will be shown to users when your app requests access to their private data.

4. Under **Credentials > Add Credentials**, create an OAuth 2.0 client ID for your web application. You will need a client ID for each platform you intend to develop for (e.g. web, iOS, Android).
5. Under Credentials > Add Credentials, create a Service Account. The console will alert you that a new public/private key has been created.

For additional instructions on using the Google Developers console, see Managing projects in the Developers Console.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Click the Google tab.
5. Click Unlock.
6. Enter the Google Client ID you obtained from Google, and then click Save Changes.

Use Google

To enable login with Google in your application, follow the Google+ documentation for Web.

Successful authentication results in a response object which contains an `id_token`, which Amazon Cognito uses to authenticate the user and generate a unique identifier:

```
function signinCallback(authResult) {
  if (authResult['status']['signed_in']) {

     // Add the Google access token to the Cognito credentials login map.
     AWS.config.credentials = new AWS.CognitoIdentityCredentials({
        IdentityPoolId: 'IDENTITY_POOL_ID',
        Logins: {
           'accounts.google.com': authResult['id_token']
        }
     });

     // Obtain AWS credentials
     AWS.config.credentials.get(function(){
        // Access AWS resources here.
     });
  }
}
```

Unity

Set Up Google

To enable Google+ Sign-in for your web application, you will need to create a Google Developers console project for your application.

1. Go to the Google Developers console and create a new project.
2. Under **APIs and auth > APIs > Social APIs**, enable the Google+ API.

3. Under **APIs and auth > Credentials > OAuth consent screen**, create the dialog that will be shown to users when your app requests access to their private data.
4. For Unity, you need to create a total of three IDs: two for Android and one for iOS. Under **Credentials > Add Credentials**:
   - Android: Create an OAuth 2.0 client ID for Android and an OAuth 2.0 client ID for a web application.
   - iOS: Create an OAuth 2.0 client ID for iOS.
5. Under Credentials > Add Credentials, create a Service Account. The console will alert you that a new public/private key has been created.

Create an OpenID Provider in the IAM Console

1. Next, you will need to create an OpenID Provider in the IAM Console. For instructions on how to set up an OpenID Provider, see Using OpenID Connect Identity Providers.
2. When prompted for your Provider URL, enter `"https://accounts.google.com"`.
3. When prompted to enter a value in the **Audience** field, enter any one of the three client IDs your created in the previous steps.
4. After creating the provider, click on the provider name and add two more audiences, providing the two remaining client IDs.

Configure the External Provider in the Amazon Cognito Console

From the Amazon Cognito Console home page:

1. Click the name of the identity pool for which you want to enable Amazon as an external provider. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Authentication providers to expand it.
4. Click the Google tab.
5. Click Unlock.
6. Enter the Google Client ID you obtained from Google, and then click Save Changes.

Install the Unity Google Plugin

1. Add the Google Play Games plugin for Unity to your Unity project.
2. In Unity, from the **Windows** menu, configure the plugin using the three IDs for the Android and iOS platforms.

Use Google

The following sample code shows how to retrieve the authentication token from the Google Play Service:

```
void Start()
{
  PlayGamesClientConfiguration config = new
 PlayGamesClientConfiguration.Builder().Build();
  PlayGamesPlatform.InitializeInstance(config);
  PlayGamesPlatform.DebugLogEnabled = true;
  PlayGamesPlatform.Activate();
  Social.localUser.Authenticate(GoogleLoginCallback);
}

void GoogleLoginCallback(bool success)
{
  if (success)
  {
    string token = PlayGamesPlatform.Instance.GetIdToken();
    credentials.AddLogin("accounts.google.com", token);
  }
  else
  {
    Debug.LogError("Google login failed. If you are not running in an actual
 Android/iOS device, this is expected.");
  }
}
```

Xamarin

Note: Google integration is not natively supported on the Xamarin platform. Integration currently requires the use of a web view to go through the browser sign in flow. To learn how Google integration works with other SDKs, please select another platform.

To enable login with Google in your application, you will need to authenticate your users and obtain an OpenID Connect token from them. Amazon Cognito uses this token to generate a unique user identifier that is associated to a Cognito Identity. Unfortunately, the Google SDK for Xamarin doesn't allow you to retrieve the OpenID Connect token, so you will need to use an alternative client or the web flow in a web view.

Once you have the token, you can set it in your `CognitoAWSCredentials`:

```
credentials.AddLogin("accounts.google.com", token);
```

NOTE: If your app uses Google and will be available on multiple mobile platforms, you should configure it as an OpenID Connect Provider, adding all created client IDs as additional audience values to allow for better integration. To learn more about Google's cross-client identity model, see Cross-client Identity.

Twitter/Digits

Android

Amazon Cognito integrates with Twitter and Digits to provide federated authentication for your mobile application users. This section explains how to register and set up your application with Twitter and Digits as an identity provider.
Set Up Twitter/Digits

You will need to integrate the TwitterKit SDK in your application. Twitter offers Fabric as a mechanism for enabling various functionality in your application.

Once you've integrated TwitterKit into your application, you get the following values from the Fabric console:

- Consumer Key
- Consumer Secret

You must enter these values in the Amazon Cognito Console to configure your identity pool for Twitter/ Digits integration.

Using Twitter

Using the TwitterKit SDK login functionality, we need to simply capture the result of the completion handler and pass the appropriate fields to Amazon Cognito.

Twitter sessions contain two important values:

- User token
- User secret

Amazon Cognito expects these values to be stored in a single value in `logins` with the key `api.twitter.com`, concatenated with a single semicolon (`;`) delimiter.

```
loginButton = (TwitterLoginButton) findViewById(R.id.login_button);
loginButton.setCallback(new Callback<TwitterSession>() {
   @Override
   public void success(Result<TwitterSession> result) {
       TwitterSession session = result.data;
       TwitterAuthToken authToken = session.getAuthToken();
       String value = authToken.token + ";" + authToken.secret;
       Map<String, String> logins = new HashMap<String, String>();
       logins.put("api.twitter.com", value);
       // Note: This overrides any existing logins
       credentialsProvider.setLogins(logins);
   }

   @Override
   public void failure(TwitterException exception) {
       // Do something on failure
   }
});
```

Using Digits

Digits support is handled through a separate call in the Fabric SDK, but the session returned is essentially the same as with Twitter login. You just need to concatenate the token and secret from the session using a single semicolon (`;`) delimiter and store in `logins` with the key of `www.digits.com`.

```
DigitsAuthButton digitsButton = (DigitsAuthButton)
 findViewById(R.id.auth_button);
digitsButton.setCallback(new AuthCallback() {
   @Override
   public void success(DigitsSession session, String phoneNumber) {
       TwitterAuthToken authToken = (TwitterAuthToken)
 session.getAuthToken();
       String value = authToken.token + ";" + authToken.secret;
       Map<String, String> logins = new HashMap<String, String>();
       logins.put("www.digits.com", value);
       // Note: This overrides any existing logins
       credentialsProvider.setLogins(logins);
   }

   @Override
   public void failure(DigitsException exception) {
       // Do something on failure
```

```
    }
});
```

iOS

Amazon Cognito integrates with Twitter and Digits to provide federated authentication for your mobile application users. This section explains how to register and set up your application with Twitter and Digits as an identity provider.

Set Up Twitter/Digits

You will need to integrate the TwitterKit SDK in your application. Twitter offers Fabric as a mechanism for enabling various functionality in your application.

Once you've integrated TwitterKit into your application, you get the following values from the Fabric console:

- Consumer Key
- Consumer Secret

You must enter these values in the Amazon Cognito Console to configure your identity pool for Twitter/ Digits integration.

Using Twitter

Using the TwitterKit SDK login functionality, we need to simply capture the result of the completion handler and pass the appropriate fields to Amazon Cognito.

Twitter sessions contain two important values:

- User token
- User secret

Amazon Cognito expects these values to be stored in a single value in `logins` with the key `api.twitter.com`, concatenated with a single semicolon (`;`) delimiter.

Objective-C

```
[[Twitter sharedInstance] logInWithCompletion:^
            (TWTRSession *session, NSError *error) {
  if (session) {
      NSString value = [NSString stringWithFormat:@"%@;%@",
 session.authToken, session.authTokenSecret];
      // Note: This overrides any existing logins
      credentialsProvider.logins = @{@"api.twitter.com", value};
  } else {
      NSLog(@"error: %@", [error localizedDescription]);
  }
}];
```

Swift

```
Twitter.sharedInstance().logInWithCompletion {
                (session, error) -> Void in
    if (session != nil) {
        var value = session.authToken + ";" + session.authTokenSecret
        // Note: This overrides any existing logins
        credentialsProvider.logins = ["api.twitter.com": value]
    } else {
        println("error: (error.localizedDescription)")
    }
}
```

Using Digits

Digits support is handled through a separate call in the Fabric SDK, but the session returned is essentially the same as with Twitter login. You just need to concatenate the token and secret from the session using a single semicolon (`;`) delimiter and store in `logins` with the key of `www.digits.com`.
Objective-C

```
[[Digits sharedInstance] authenticateWithCompletion:^
            (DGTSession* session, NSError *error) {
    if (session) {
        NSString value = [NSString stringWithFormat:@"%@;%@",
 session.authToken, session.authTokenSecret];
      // Note: This overrides any existing logins
      credentialsProvider.logins = @{@"www.digits.com", value};
    }
}];
```

Swift

```
let digits = Digits.sharedInstance()
digits.authenticateWithCompletion { (session, error) in
    if (session != nil) {
        var value = session.authToken + ";" + session.authTokenSecret
        // Note: This overrides any existing logins
        credentialsProvider.logins = ["www.digits.com": value]
    }
}
```

JavaScript

Amazon Cognito integrates with Twitter and Digits to provide federated authentication for your mobile application users. This section explains how to register and set up your application with Twitter and Digits as an identity provider.

Note
We do not yet have documentation for integrating Twitter/Digits with the JavaScript SDK. To learn how Twitter/Digits integration works with other SDKs, select a different platform.

External Resources

- Sign in with Twitter
- Sign in with Digits

Unity

Amazon Cognito integrates with Twitter and Digits to provide federated authentication for your mobile application users. This section explains how to register and set up your application with Twitter and Digits as an identity provider.

Note
We do not yet have documentation for integrating Twitter/Digits with the Unity SDK. To learn how Twitter/Digits integration works with other SDKs, select a different platform.

External Resources

- Twitter Kit Fabric plugin for Unity

Xamarin

Twitter integration is not natively supported on the Xamarin platform. Integration currently requires the use of a web view to go through the browser sign in flow. To learn how Twitter/Digits integration works with other SDKs, please select another platform.

External Resources

- Browser sign in flow for Twitter

Open ID Connect Providers

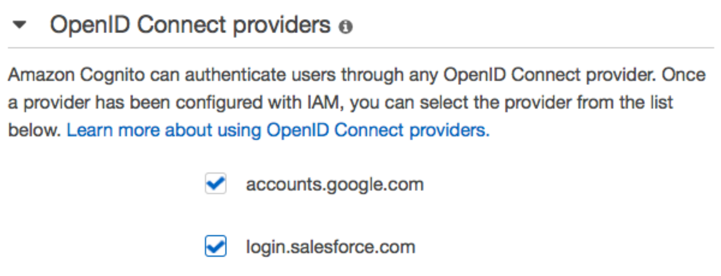
OpenID Connect is an open standard for authentication that is supported by a number of login providers. Amazon Cognito supports linking of identities with OpenID Connect providers that are configured through AWS Identity and Access Management.

Adding an OpenID Connect Provider

For information on how to create an OpenID Connect Provider, see the IAM documentation.

Associating a Provider to Amazon Cognito

Once you've created an OpenID Connect provider in the IAM Console, you can associate it to an identity pool. All configured providers will be visible in the Edit Identity Pool screen in the Amazon Cognito Console under the OpenID Connect Providers header.


▾ OpenID Connect providers

Amazon Cognito can authenticate users through any OpenID Connect provider. Once a provider has been configured with IAM, you can select the provider from the list below. Learn more about using OpenID Connect providers.

✓ accounts.google.com

✓ login.salesforce.com

You can associate multiple OpenID Connect providers to a single identity pool.

Using OpenID Connect

Refer to your provider's documentation for how to login and receive an ID token.

Once you have a token, simply add the token to the logins map, using the URI of your provider as the key.

Android

```
Map<String, String> logins = new HashMap<String, String>();
logins.put("login.provider.com", token);
credentialsProvider.setLogins(logins);
```

iOS - Objective-C

```
credentialsProvider.logins = @{ "login.provider.com": token }
```

iOS - Swift

```
credentialsProvider.logins = ["login.provider.com": token]
```

JavaScript

```
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
 IdentityPoolId: 'IDENTITY_POOL_ID',
 Logins: {
    'login.provider.com': token
 }
});
```

Unity

```
credentials.AddLogin("login.provider.com", token);
```

Xamarin

```
credentials.AddLogin("login.provider.com", token);
```

Validating an OpenID Connect Token

When first integrating with Amazon Cognito, you may receive an `InvalidToken` exception. It is important to understand how Amazon Cognito validates OpenID Connect tokens.

1. The **iss** parameter must match the key used in the logins map (e.g. login.provider.com).
2. The signature must be valid. The signature must be verifiable via an RSA public key.
3. The fingerprint of the certificate hosting the public key matches what's configured on your OpenId Connect Provider.
4. If the **azp** parameter is present, check this value against listed client IDs in your OpenId Connect provider.
5. If the **azp** parameter is not present, check the aud parameter against listed client IDs in your OpenId Connect provider.

The website jwt.io is a valuable resource for decoding tokens to verify these values.

SAML Identity Provider

Amazon Cognito supports authentication with identity providers through Security Assertion Markup Language 2.0 (SAML 2.0). You can use an identity provider that supports SAML with Amazon Cognito to provide a simple onboarding flow for your users. Your SAML-supporting identity provider specifies the IAM roles that can be assumed by your users so that different users can be granted different sets of permissions.

Configuring Your Identity Pool for a SAML Provider

The following steps describe how to configure your identity pool to use a SAML-based provider.

Note
Before configuring your identity pool to support a SAML provider, you must first configure the SAML identity provider in the IAM console. For more information, see Integrating third-party SAML solution providers with AWS in the *IAM User Guide*.

To configure your identity pool to support a SAML provider

1. Sign in to the Amazon Cognito console, choose **Manage Federated Identities**, and choose **Create new identity pool**.
2. In the **Authentication providers** section, choose the **SAML** tab.
3. Choose the ARN of the SAML provider and then choose **Create Pool**.

Configuring Your SAML Identity Provider

After you create the SAML provider, configure your SAML identity provider to add relying party trust between your identity provider and AWS. Many identity providers allow you to specify a URL from which the identity provider can read an XML document that contains relying party information and certificates. For AWS, you can use https://signin.aws.amazon.com/static/saml-metadata.xml. The next step is to configure the SAML assertion response from your identity provider to populate the claims needed by AWS. For details on the claim configuration, see Configuring SAML assertions for authentication response.

Customizing Your User Role with SAML

Using SAML with Amazon Cognito Identity allows the role to be customized for the end user. Only the enhanced flow (p. 107) is supported with the SAML-based identity provider. You do not need to specify an authenticated or unauthenticated role for the identity pool to use a SAML-based identity provider. The `https://aws.amazon.com/SAML/Attributes/Role` claim attribute specifies one or more pairs of comma delimited role and provider ARN. These are the roles that the user is allowed to assume. The SAML identity provider can be configured to populate the role attributes based on the user attribute information available from the identity provider. If multiple roles are received in the SAML assertion, the optional `customRoleArn` parameter should be populated while calling `getCredentialsForIdentity`. The input role received in the parameter will be assumed by the user if it matches a role in the claim in the SAML assertion.

Authenticating Users with a SAML Identity Provider

To federate with the SAML-based identity provider, you must determine the URL that is being used to initiate the login. AWS federation uses IdP-initiated login. In AD FS 2.0 the URL takes the form of `https://<fqdn>/adfs/ls/IdpInitiatedSignOn.aspx?loginToRp=urn:amazon:webservices`.

To add support for your SAML identity provider in Amazon Cognito, you must first authenticate users with your SAML identity provider from your iOS or Android app. The code for integrating and authenticating with the SAML identity provider is specific to SAML providers. After your user is authenticated, you can provide the resulting SAML assertion to Amazon Cognito Identity using Amazon Cognito APIs.

Android

If you are using the Android SDK you can populate the logins map with the SAML assertion as follows.

```
Map logins = new HashMap();
logins.put("arn:aws:iam::aws account id:saml-provider/name", "base64 encoded
 assertion response");
// Now this should be set to CognitoCachingCredentialsProvider object.
CognitoCachingCredentialsProvider credentialsProvider = new
 CognitoCachingCredentialsProvider(context, identity pool id, region);
credentialsProvider.setLogins(logins);
// If SAML assertion contains multiple roles, resolve the role by setting the
 custom role
credentialsProvider.setCustomRoleArn("arn:aws:iam::aws account id:role/
customRoleName");
// This should trigger a call to Cognito service to get the credentials.
credentialsProvider.getCredentials();
```

iOS

If you are using the iOS SDK you can provide the SAML assertion in `AWSIdentityProviderManager` as follows.

```
- (AWSTask<NSDictionary<NSString*,NSString*> *> *) logins {
    //this is hardcoded for simplicity, normally you would asynchronously go
 to your SAML provider
    //get the assertion and return the logins map using a
 AWSTaskCompletionSource
    return [AWSTask taskWithResult:@{@"arn:aws:iam::aws account id:saml-
provider/name":@"base64 encoded assertion response"}];
}

// If SAML assertion contains multiple roles, resolve the role by setting the
 custom role.
// Implementing this is optional if there is only one role.
- (NSString *)customRoleArn {
    return @"arn:aws:iam::accountId:role/customRoleName";
}
```

Developer Authenticated Identities

Amazon Cognito supports developer authenticated identities, in addition to web identity federation through Facebook (p. 123), Google (p. 133), and Amazon (p. 128). With developer authenticated identities, you can register and authenticate users via your own existing authentication process, while still using Amazon Cognito to synchronize user data and access AWS resources. Using developer authenticated identities involves interaction between the end user device, your backend for authentication, and Amazon Cognito. For more details, please read our blog.

Understanding the Authentication Flow

For information on the developer authenticated identities authflow and how it differs from the external provider authflow, see Authentication Flow (p. 107).

Associate Developer Provider

To use developer authenticated identities, you'll need an identity pool associated with your developer provider. To do so, follow these steps:

1. Log in to the Amazon Cognito Console.
2. Create a new identity pool and, as part of the process, provide a developer provider name.
3. Alternatively, edit an existing identity pool and add a developer provider.

Note: Once the provider name has been set, it cannot be changed.

For additional instructions on working with the Amazon Cognito Console, see Using the Amazon Cognito Console (p. 202).

Implement an Identity Provider

Android

To use developer authenticated identities, implement your own identity provider class which extends `AWSAbstractCognitoIdentityProvider`.

Below is a simple example of an identity provider which is used in our sample app:

```
public class DeveloperAuthenticationProvider extends
 AWSAbstractCognitoDeveloperIdentityProvider {

  private static final String developerProvider =
 "<Developer_provider_name>";

  public DeveloperAuthenticationProvider(String accountId, String
 identityPoolId, Regions region) {
    super(accountId, identityPoolId, region);
    // Initialize any other objects needed here.
  }

  // Return the developer provider name which you choose while setting up the
  // identity pool in the &COG; Console

  @Override
  public String getProviderName() {
    return developerProvider;
  }

  // Use the refresh method to communicate with your backend to get an
  // identityId and token.

  @Override
  public String refresh() {

    // Override the existing token
    setToken(null);

    // Get the identityId and token by making a call to your backend
    // (Call to your backend)

    // Call the update method with updated identityId and token to make sure
    // these are ready to be used from Credentials Provider.

    update(identityId, token);
    return token;

  }

  // If the app has a valid identityId return it, otherwise get a valid
  // identityId from your backend.

  @Override
  public String getIdentityId() {

    // Load the identityId from the cache
    identityId = cachedIdentityId;

    if (identityId == null) {
       // Call to your backend
    } else {
       return identityId;
    }

  }
}
```

To use this identity provider, you have to pass it into `CognitoCachingCredentialsProvider`. Here's an example:

```
DeveloperAuthenticationProvider developerProvider = new
 DeveloperAuthenticationProvider( null, "IDENTITYPOOLID", context,
 Regions.USEAST1);
CognitoCachingCredentialsProvider credentialsProvider = new
 CognitoCachingCredentialsProvider( context, developerProvider,
 Regions.USEAST1);
```

iOS - Objective-C

To use developer authenticated identities, implement your own identity provider class which extends AWSCognitoCredentialsProviderHelper.

```
@implementation DeveloperAuthenticatedIdentityProvider
/*
 * Use the token method to communicate with your backend to get an
 * identityId and token.
 */

- (AWSTask <NSString*>) token {
    //Write code to call your backend:
    //Pass username/password to backend or some sort of token to authenticate
 user
    //If successful, from backend call getOpenIdTokenForDeveloperIdentity
 with logins map
    //containing "your.provider.name":"enduser.username"
    //Return the identity id and token to client
    //You can use AWSTaskCompletionSource to do this asynchronously

    // Set the identity id and return the token
    self.identityId = response.identityId;
    return [AWSTask taskWithResult:response.token];
}

@end
```

To use this identity provider, pass it into `AWSCognitoCredentialsProvider` as shown in the following example:

```
DeveloperAuthenticatedIdentityProvider * devAuth
 = [[DeveloperAuthenticatedIdentityProvider alloc]
 initWithRegionType:AWSRegionYOUR_IDENTITY_POOL_REGION

 identityPoolId:@"YOUR_IDENTITY_POOL_ID"
                                               useEnhancedFlow:YES
                                       identityProviderManager:nil];
AWSCognitoCredentialsProvider *credentialsProvider =
 [[AWSCognitoCredentialsProvider alloc]

 initWithRegionType:AWSRegionYOUR_IDENTITY_POOL_REGION

 identityProvider:devAuth];
```

If you want to support both unauthenticated identities and developer authenticated identities, override the `logins` method in your `AWSCognitoCredentialsProviderHelper` implementation.

```
- (AWSTask<NSDictionary<NSString *, NSString *> *> *)logins {
    if(/*logic to determine if user is unauthenticated*/) {
        return [AWSTask taskWithResult:nil];
    }else{
        return [super logins];
    }
}
```

If you want to support developer authenticated identities and social providers, you must manage who the current provider is in your `logins` implementation of `AWSCognitoCredentialsProviderHelper`.

```
- (AWSTask<NSDictionary<NSString *, NSString *> *> *)logins {
    if(/*logic to determine if user is unauthenticated*/) {
        return [AWSTask taskWithResult:nil];
    }else if (/*logic to determine if user is Facebook*/){
        return [AWSTask taskWithResult: @{ AWSIdentityProviderFacebook :
 [FBSDKAccessToken currentAccessToken] }];
    }else {
        return [super logins];
    }
}
```

iOS - Swift

To use developer authenticated identities, implement your own identity provider class which extends AWSCognitoCredentialsProviderHelper.

```
import AWSCore
```

```
/*
 * Use the token method to communicate with your backend to get an
 * identityId and token.
 */
class DeveloperAuthenticatedIdentityProvider :
 AWSCognitoCredentialsProviderHelper {
    override func token() -> AWSTask<NSString> {
    //Write code to call your backend:
    //pass username/password to backend or some sort of token to authenticate
 user, if successful,
    //from backend call getOpenIdTokenForDeveloperIdentity with logins map
 containing "your.provider.name":"enduser.username"
    //return the identity id and token to client
    //You can use AWSTaskCompletionSource to do this asynchronously

    // Set the identity id and return the token
    self.identityId = resultFromAbove.identityId
    return AWSTask(result: resultFromAbove.token)
}
```

To use this identity provider, pass it into `AWSCognitoCredentialsProvider` as shown in the following example:

```
let devAuth =
 DeveloperAuthenticatedIdentityProvider(regionType: .YOUR_IDENTITY_POOL_REGION,
 identityPoolId: "YOUR_IDENTITY_POOL_ID", useEnhancedFlow: true,
 identityProviderManager:nil)
let credentialsProvider =
 AWSCognitoCredentialsProvider(regionType: .YOUR_IDENTITY_POOL_REGION,
 identityProvider:devAuth)
let configuration =
 AWSServiceConfiguration(region: .YOUR_IDENTITY_POOL_REGION,
 credentialsProvider:credentialsProvider)
AWSServiceManager.default().defaultServiceConfiguration = configuration
```

If you want to support both unauthenticated identities and developer authenticated identities, override the `logins` method in your `AWSCognitoCredentialsProviderHelper` implementation.

```
override func logins () -> AWSTask<NSDictionary> {
    if(/*logic to determine if user is unauthenticated*/) {
        return AWSTask(result:nil)
    }else {
        return super.logins()
    }
}
```

If you want to support developer authenticated identities and social providers, you must manage who the current provider is in your `logins` implementation of `AWSCognitoCredentialsProviderHelper`.

```
override func logins () -> AWSTask<NSDictionary> {
    if(/*logic to determine if user is unauthenticated*/) {
        return AWSTask(result:nil)
    }else if (/*logic to determine if user is Facebook*/){
        if let token = AccessToken.current?.authenticationToken {
            return AWSTask(result: [AWSIdentityProviderFacebook:token])
        }
        return AWSTask(error:NSError(domain: "Facebook Login", code: -1 ,
 userInfo: ["Facebook" : "No current Facebook access token"]))
    }else {
        return super.logins()
    }
}
```

JavaScript

Once you obtain an identity ID and session token from your backend, you will to pass them into the `AWS.CognitoIdentityCredentials` provider. Here's an example:

```
AWS.config.credentials = new AWS.CognitoIdentityCredentials({
   IdentityPoolId: 'IDENTITY_POOL_ID',
   IdentityId: 'IDENTITY_ID_RETURNED_FROM_YOUR_PROVIDER',
   Logins: {
      'cognito-identity.amazonaws.com': 'TOKEN_RETURNED_FROM_YOUR_PROVIDER'
   }
});
```

Unity

To use developer-authenticated identities you have to extend `CognitoAWSCredentials` and override the `RefreshIdentity` method to retrieve the user identity id and token from your backend and return them. Below is a simple example of an identity provider that would contact a hypothetical backend at 'example.com':

```
using UnityEngine;
using System.Collections;
using Amazon.CognitoIdentity;
using System.Collections.Generic;
using ThirdParty.Json.LitJson;
using System;
using System.Threading;

public class DeveloperAuthenticatedCredentials : CognitoAWSCredentials
{
    const string PROVIDER_NAME = "example.com";
    const string IDENTITY_POOL = "IDENTITY_POOL_ID";
    static readonly RegionEndpoint REGION = RegionEndpoint.USEast1;

    private string login = null;

    public DeveloperAuthenticatedCredentials(string loginAlias)
        : base(IDENTITY_POOL, REGION)
    {
        login = loginAlias;
    }

    protected override IdentityState RefreshIdentity()
    {
        IdentityState state = null;
        ManualResetEvent waitLock = new ManualResetEvent(false);
        MainThreadDispatcher.ExecuteCoroutineOnMainThread(ContactProvider((s)
 =>
        {
            state = s;
            waitLock.Set();
        }));
        waitLock.WaitOne();
        return state;
    }

    IEnumerator ContactProvider(Action<IdentityState> callback)
    {
        WWW www = new WWW("http://example.com/?username="+login);
        yield return www;
        string response = www.text;

        JsonData json = JsonMapper.ToObject(response);

        //The backend has to send us back an Identity and a OpenID token
        string identityId = json["IdentityId"].ToString();
        string token = json["Token"].ToString();

        IdentityState state = new IdentityState(identityId, PROVIDER_NAME,
 token, false);
        callback(state);
    }
}
```

The code above uses a thread dispatcher object to call a coroutine. If you don't have a way to do this in your project, you can use the following script in your scenes:

```
using System;
using UnityEngine;
using System.Collections;
using System.Collections.Generic;

public class MainThreadDispatcher : MonoBehaviour
{
    static Queue<IEnumerator> _coroutineQueue = new Queue<IEnumerator>();
    static object _lock = new object();

    public void Update()
    {
        while (_coroutineQueue.Count > 0)
        {
            StartCoroutine(_coroutineQueue.Dequeue());
        }
    }

    public static void ExecuteCoroutineOnMainThread(IEnumerator coroutine)
    {
        lock (_lock) {
            _coroutineQueue.Enqueue(coroutine);
        }
    }
}
```

Xamarin

To use developer-authenticated identities you have to extend `CognitoAWSCredentials` and override the `RefreshIdentity` method to retrieve the user identity id and token from your backend and return them. Below is a simple example of an identity provider that would contact a hypothetical backend at 'example.com':

```
public class DeveloperAuthenticatedCredentials : CognitoAWSCredentials
{
    const string PROVIDER_NAME = "example.com";
    const string IDENTITY_POOL = "IDENTITY_POOL_ID";
    static readonly RegionEndpoint REGION = RegionEndpoint.USEast1;
    private string login = null;

    public DeveloperAuthenticatedCredentials(string loginAlias)
        : base(IDENTITY_POOL, REGION)
    {
        login = loginAlias;
    }

    protected override async Task<IdentityState> RefreshIdentityAsync()
    {
        IdentityState state = null;
        //get your identity and set the state
        return state;
    }
}
```

Updating the Logins Map (Android and iOS only)

Android

Once the user is authenticated, update the logins map with the developer provider name and a developer user identifier, which is an alphanumeric string that uniquely identifies a user in your authentication system. Be sure to call the `refresh` method after updating the logins map as the `identityId` might have changed:

```
HashMap<String, String> loginsMap = new HashMap<String, String>();
loginsMap.put(developerAuthenticationProvider.getProviderName(),
 developerUserIdentifier);

credentialsProvider.setLogins(loginsMap);
credentialsProvider.refresh();
```

iOS - Objective-C

The iOS SDK only calls your `logins` method to get the latest logins map if there are no credentials or they have expired. If you want to force the SDK to obtain new credentials (e.g., your end user went from unauthenticated to authenticated and you want credentials against the authenticated user), call `clearCredentials` on your `credentialsProvider`.

```
[credentialsProvider clearCredentials];
```

iOS - Swift

The iOS SDK only calls your `logins` method to get the latest logins map if there are no credentials or they have expired. If you want to force the SDK to obtain new credentials (e.g., your end user went from unauthenticated to authenticated and you want credentials against the authenticated user), call `clearCredentials` on your `credentialsProvider`.

```
credentialsProvider.clearCredentials()
```

Getting a Token (Server Side)

All platforms

You obtain a token by calling GetOpenIdTokenForDeveloperIdentity. This API must be invoked from your backend uaing AWS developer credentials. It must not be invoked from the client SDK. The API receives the Cognito identity pool ID; a logins map containing your identity provider name as the key and identifier as the value; and optionally a Cognito identity ID (i.e., you are making an unauthenticated user authenticated). The identifier can be the username of your user, an email address, or a numerical value. The API responds to your call with a unique Cognito ID for your user and an OpenID Connect token for the end user.

A few things to keep in mind about the token returned by `GetOpenIdTokenForDeveloperIdentity`:

- You can specify a custom expiration time for the token so you can cache it. If you don't provide any custom expiration time, the token is valid for 15 minutes.
- The maximum token duration you can set is 24 hours.
- Be mindful of the security implications of increasing the token duration. If an attacker obtains this token, they can exchange it for AWS credentials for the end user for the token duration.

The following Java snippet shows how to initialize a Amazon Cognito client and retrieve a token for a developer authenticated identity.

```
// authenticate your end user as appropriate
// ....

// if authenticated, initialize a cognito client with your AWS developer
 credentials
AmazonCognitoIdentity identityClient = new AmazonCognitoIdentityClient(
  new BasicAWSCredentials("access_key_id", "secret_access_key")
);

// create a new request to retrieve the token for your end user
GetOpenIdTokenForDeveloperIdentityRequest request =
  new GetOpenIdTokenForDeveloperIdentityRequest();
request.setIdentityPoolId("YOUR_COGNITO_IDENTITY_POOL_ID");

request.setIdentityId("YOUR_COGNITO_IDENTITY_ID"); //optional, set this if
 your client has an
                                                   //identity ID that you
 want to link to this
                                                   //developer account

// set up your logins map with the username of your end user
HashMap<String,String> logins = new HashMap<>();
logins.add("YOUR_IDENTITY_PROVIDER_NAME","YOUR_END_USER_IDENTIFIER");
request.setLogins(logins);

// optionally set token duration (in seconds)
request.setTokenDuration(60 * 15l);
GetOpenIdTokenForDeveloperIdentityResult response =
  identityClient.getOpenIdTokenForDeveloperIdentity(request);
```

```
// obtain identity id and token to return to your client
String identityId = response.getIdentityId();
String token = response.getToken();

//code to return identity id and token to client
//...
```

Following the steps above, you should be able to integrate developer authenticated identities in your app. If you have any issues or questions please feel free to post in our forums.

Connect to an Existing Social Identity

All linking of providers when you are using developer authenticated identities must be done from your backend. To connect a custom identity to a user's social identity (Facebook, Google, or Amazon), add the identity provider token to the logins map when you call GetOpenIdTokenForDeveloperIdentity. To make this possible, when you call your backend from your client SDK to authenticate your end user, additionally pass the end user's social provider token.

For example, if you are trying to link a custom identity to Facebook, you would add the Facebook token in addition to your identity provider identifier to the logins map when you call `GetOpenIdTokenForDeveloperIdentity`.

```
logins.add("YOUR_IDENTITY_PROVIDER_NAME","YOUR_END_USER_IDENTIFIER");
logins.add("www.facebook.com","END_USERS_FACEBOOK_ACCESSTOKEN");
```

Supporting Transition Between Providers

Android

Your application might require supporting unauthenticated identities or authenticated identities using public providers (Login with Amazon, Facebook or Google) along with developer authenticated identities. The essential difference between developer authenticated identities and other identities (unauthenticated identities and authenticated identities using public provider) is the way the identityId and token are obtained. For other identities the mobile application will interact directly with Amazon Cognito instead of contacting your authentication system. So the mobile application should be able to support two distinct flows depending on the choice made by the app user. For this you will have to make some changes to the custom identity provider.

The `refresh` method should check the logins map, if the map is not empty and has a key with developer provider name, then you should call your backend; otherwise just call the getIdentityId method and return null.

```
public String refresh() {

   setToken(null);

   // If the logins map is not empty make a call to your backend
   // to get the token and identityId
   if (getProviderName() != null &&
      !this.loginsMap.isEmpty() &&
      this.loginsMap.containsKey(getProviderName())) {

      /**
       * This is where you would call your backend
```

```
         **/

        // now set the returned identity id and token in the provider
        update(identityId, token);
        return token;

    } else {
        // Call getIdentityId method and return null
        this.getIdentityId();
        return null;
    }
}
```

Similarly the `getIdentityId` method will have two flows depending on the contents of the logins map:

```
public String getIdentityId() {

    // Load the identityId from the cache
    identityId = cachedIdentityId;

    if (identityId == null) {

        // If the logins map is not empty make a call to your backend
        // to get the token and identityId

        if (getProviderName() != null && !this.loginsMap.isEmpty()
            && this.loginsMap.containsKey(getProviderName())) {

            /**
              * This is where you would call your backend
             **/

            // now set the returned identity id and token in the provider
            update(identityId, token);
            return token;

        } else {
            // Otherwise call &COG; using getIdentityId of super class
            return super.getIdentityId();
        }

    } else {
        return identityId;
    }

}
```

iOS - Objective-C

Your application might require supporting unauthenticated identities or authenticated identities using public providers (Login with Amazon, Facebook or Google) along with developer authenticated identities. To do this, override the AWSCognitoCredentialsProviderHelper `logins` method to be able to return the correct logins map based on the current identity provider. This example shows you how you might pivot between unauthenticated, Facebook and developer authenticated.

```
- (AWSTask<NSDictionary<NSString *, NSString *> *> *)logins {
    if(/*logic to determine if user is unauthenticated*/) {
        return [AWSTask taskWithResult:nil];
    }else if (/*logic to determine if user is Facebook*/){
        return [AWSTask taskWithResult: @{ AWSIdentityProviderFacebook :
 [FBSDKAccessToken currentAccessToken] }];
    }else {
        return [super logins];
    }
}
```

When you transition from unauthenticated to authenticated, you should call `[credentialsProvider clearCredentials];` to force the SDK to get new authenticated credentials. When you switch between two authenticated providers and you aren't trying to link the two providers (i.e. you are not providing tokens for multiple providers in your logins dictionary), you should call `[credentialsProvider clearKeychain];`. This will clear both the credentials and identity and force the SDK to get new ones.

iOS - Swift

Your application might require supporting unauthenticated identities or authenticated identities using public providers (Login with Amazon, Facebook or Google) along with developer authenticated identities. To do this, override the AWSCognitoCredentialsProviderHelper `logins` method to be able to return the correct logins map based on the current identity provider. This example shows you how you might pivot between unauthenticated, Facebook and developer authenticated.

```
override func logins () -> AWSTask<NSDictionary> {
    if(/*logic to determine if user is unauthenticated*/) {
        return AWSTask(result:nil)
    }else if (/*logic to determine if user is Facebook*/){
        if let token = AccessToken.current?.authenticationToken {
            return AWSTask(result: [AWSIdentityProviderFacebook:token])
        }
        return AWSTask(error:NSError(domain: "Facebook Login", code: -1 ,
 userInfo: ["Facebook" : "No current Facebook access token"]))
    }else {
        return super.logins()
    }
}
```

When you transition from unauthenticated to authenticated, you should call `credentialsProvider.clearCredentials()` to force the SDK to get new authenticated credentials. When you switch between two authenticated providers and you aren't trying to link the two providers (i.e. you are not providing tokens for multiple providers in your logins dictionary), you should call `credentialsProvider.clearKeychain()`. This will clear both the credentials and identity and force the SDK to get new ones.

Unity

Your application might require supporting unauthenticated identities or authenticated identities using public providers (Login with Amazon, Facebook or Google) along with developer authenticated identities. The essential difference between developer authenticated identities and other identities (unauthenticated identities and authenticated identities using public provider) is the way the identityId and token are obtained. For other identities the mobile application will interact directly with Amazon Cognito instead of contacting your authentication system. So the mobile application should be able to support two distinct flows depending on the choice made by the app user. For this you will have to make some changes to the custom identity provider.

The recommended way to do it in Unity is to extend your identity provider from AmazonCognitoEnhancedIdentityProvide instead of AbstractCognitoIdentityProvider, and call the parent RefreshAsync method instead of your own in case the user is not authenticated with your own backend. If the user is authenticated, you can use the same flow explained before.

Xamarin

Your application might require supporting unauthenticated identities or authenticated identities using public providers (Login with Amazon, Facebook or Google) along with developer authenticated identities. The essential difference between developer authenticated identities and other identities (unauthenticated identities and authenticated identities using public provider) is the way the identityId and token are obtained. For other identities the mobile application will interact directly with Amazon Cognito instead of contacting your authentication system. So the mobile application should be able to support two distinct flows depending on the choice made by the app user. For this you will have to make some changes to the custom identity provider.

Switching Identities

Android

Users can begin their life in an application as unauthenticated guests. Eventually they may decide to log in using one of the supported identity providers. Amazon Cognito will ensure that an old identity retains the same unique identifier as the new one, and the profile data will be merged automatically.

Your application is informed of a profile merge through the `IdentityChangedListener` interface. Implement the `identityChanged` method in the interface to receive these messages:

```
@override
public void identityChanged(String oldIdentityId, String newIdentityId) {
    // handle the change
}
```

iOS - Objective-C

Users can begin their life in an application as unauthenticated guests. Eventually they may decide to log in using one of the supported identity providers. Amazon Cognito will ensure that an old identity retains the same unique identifier as the new one, and the profile data will be merged automatically.

`NSNotificationCenter` informs your application of a profile merge:

```
[[NSNotificationCenter defaultCenter] addObserver:self

 selector:@selector(identityIdDidChange:)

 name:AWSCognitoIdentityIdChangedNotification
                                      object:nil];

-(void)identityDidChange:(NSNotification*)notification {
    NSDictionary *userInfo = notification.userInfo;
    NSLog(@"identity changed from %@ to %@",
        [userInfo objectForKey:AWSCognitoNotificationPreviousId],
        [userInfo objectForKey:AWSCognitoNotificationNewId]);
}
```

iOS - Swift

Users can begin their life in an application as unauthenticated guests. Eventually they may decide to log in using one of the supported identity providers. Amazon Cognito will ensure that an old identity retains the same unique identifier as the new one, and the profile data will be merged automatically.

`NSNotificationCenter` informs your application of a profile merge:

```
[NSNotificationCenter.defaultCenter().addObserver(observer: self
   selector:"identityDidChange"
   name:AWSCognitoIdentityIdChangedNotification
   object:nil)

func identityDidChange(notification: NSNotification!) {
  if let userInfo = notification.userInfo as? [String: AnyObject] {
    print("identity changed from:
 \(userInfo[AWSCognitoNotificationPreviousId])
    to: \(userInfo[AWSCognitoNotificationNewId])")
  }
}
```

JavaScript

Users can begin their life in an application as unauthenticated guests. Eventually they may decide to log in using one of the supported identity providers. Amazon Cognito will ensure that an old identity retains the same unique identifier as the new one, and the profile data will be merged automatically.

Unity

Users can begin their life in an application as unauthenticated guests. Eventually they may decide to log in using one of the supported identity providers. Amazon Cognito will ensure that an old identity retains the same unique identifier as the new one, and the profile data will be merged automatically.

You can subscribe to the `IdentityChangedEvent` to be notified of profile merges:

```
credentialsProvider.IdentityChangedEvent += delegate(object sender,
 CognitoAWSCredentials.IdentityChangedArgs e)
{
    // handle the change
    Debug.log("Identity changed from " + e.OldIdentityId + " to " +
 e.NewIdentityId);
};
```

Xamarin

Users can begin their life in an application as unauthenticated guests. Eventually they may decide to log in using one of the supported identity providers. Amazon Cognito will ensure that an old identity retains the same unique identifier as the new one, and the profile data will be merged automatically.

```
credentialsProvider.IdentityChangedEvent += delegate(object sender,
 CognitoAWSCredentials.IdentityChangedArgs e){
    // handle the change
    Console.WriteLine("Identity changed from " + e.OldIdentityId + " to " +
 e.NewIdentityId);
};
```

Amazon Cognito Sync

Amazon Cognito Sync is an AWS service and client library that enables cross-device syncing of application-related user data. You can use it to synchronize user profile data across mobile devices and the web without requiring your own backend. The client libraries cache data locally so your app can read and write data regardless of device connectivity status. When the device is online, you can synchronize data, and if you set up push sync, notify other devices immediately that an update is available.

For information about Amazon Cognito Identity region availability, see AWS Service Region Availability.

To learn more about Amazon Cognito Sync, see the following topics.

Topics

Synchronizing Data

Amazon Cognito lets you save end user data in datasets containing key-value pairs. This data is associated with an Amazon Cognito identity, so that it can be accessed across logins and devices. To sync this data between the Amazon Cognito service and an end user's devices, invoke the synchronize method. Each dataset can have a maximum size of 1 MB. You can associate up to 20 datasets with an identity.

The Amazon Cognito Sync client creates a local cache for the identity data. Your app talks to this local cache when it reads and writes keys. This guarantees that all of your changes made on the device are immediately available on the device, even when you are offline. When the synchronize method is called, changes from the service are pulled to the device, and any local changes are pushed to the service. At this point the changes are available to other devices to synchronize.

Initializing the Amazon Cognito Sync Client

To initialize the Amazon Cognito Sync client, you first need to create a credentials provider. The credentials provider acquires temporary AWS credentials to enable your app to access your AWS resources. You'll also need to import the required header files. Use the following steps to initialize the Amazon Cognito Sync client.

Android

1. Create a credentials provider, following the instructions at Step 1: Obtain AWS Credentials (p. 5).
2. Import the Amazon Cognito package: `import com.amazonaws.mobileconnectors.cognito.*;`
3. Initialize Amazon Cognito Sync, passing in the Android app context, the identity pool ID, an AWS region, and an initialized Amazon Cognito credentials provider:

```
CognitoSyncManager client = new CognitoSyncManager(
    getApplicationContext(),
    Regions.YOUR_REGION,
    credentialsProvider);
```

iOS - Objective-C

1. Create a credentials provider, following the instructions at Step 1: Obtain AWS Credentials (p. 5).
2. Import `AWSCore` and `Cognito`, and initialize `AWSCognito`:

```
#import <AWSiOSSDKv2/AWSCore.h>
#import <AWSCognitoSync/Cognito.h>

AWSCognito *syncClient = [AWSCognito defaultCognito];
```

3. If you're using CocoaPods, replace `<AWSiOSSDKv2/AWSCore.h>` with `AWSCore.h` and follow the same syntax for the Amazon Cognito import.

iOS - Swift

1. Create a credentials provider, following the instructions at Step 1: Obtain AWS Credentials (p. 5).
2. Import `AWSCore` and `Cognito`, and initialize `AWSCognito`:

```
#import <AWSiOSSDKv2/AWSCore.h>
#import <AWSCognitoSync/Cognito.h>

let syncClient = AWSCognito.defaultCognito()
```

3. If you're using CocoaPods, replace `<AWSiOSSDKv2/AWSCore.h>` with `AWSCore.h` and follow the same syntax for the Amazon Cognito import.

JavaScript

1. Download the Amazon Cognito Sync Manager for JavaScript.
2. Include the Sync Manager library in your project.
3. Create a credentials provider, following the instructions at Step 1: Obtain AWS Credentials (p. 5).
4. Initialize the Sync Manager:

```
var syncManager = new AWS.CognitoSyncManager();
```

Unity

1. You will need to first create an instance of `CognitoAWSCredentials`, following the instructions at Step 1: Obtain AWS Credentials (p. 5).
2. Create an instance of `CognitoSyncManager`, passing the `CognitoAwsCredentials` object and a `AmazonCognitoSyncConfig` with, at least, the region set:

```
AmazonCognitoSyncConfig clientConfig = new AmazonCognitoSyncConfig
 { RegionEndpoint = REGION };
CognitoSyncManager syncManager = new CognitoSyncManager(credentials,
 clientConfig);
```

Xamarin

1. You will need to first create an instance of `CognitoAWSCredentials`, following the instructions at Step 1: Obtain AWS Credentials (p. 5).
2. Create an instance of `CognitoSyncManager`, passing the `CognitoAwsCredentials` object and a `AmazonCognitoSyncConfig` with, at least, the region set:

```
AmazonCognitoSyncConfig clientConfig = new AmazonCognitoSyncConfig
 { RegionEndpoint = REGION };
CognitoSyncManager syncManager = new CognitoSyncManager(credentials,
 clientConfig);
```

Understanding Datasets

With Amazon Cognito, end user profile data is organized into datasets. Each dataset can contain up to 1MB of data in the form of key-value pairs. A dataset is the most granular entity on which you can perform a sync operation. Read and write operations performed on a dataset only affect the local store until the synchronize method is invoked. A dataset is identified by a unique string. You can create a new dataset or open an existing one as shown in the following.

Android

```
Dataset dataset = client.openOrCreateDataset("datasetname");
```

To delete a dataset, first call the method to remove it from local storage, then call the `synchronize` method to delete the dataset from Amazon Cognito:

```
dataset.delete();
dataset.synchronize(syncCallback);
```

iOS - Objective-C

```
AWSCognitoDataset *dataset = [syncClient openOrCreateDataset:@"myDataSet"];
```

To delete a dataset, first call the method to remove it from local storage, then call the `synchronize` method to delete the dataset from Amazon Cognito:

```
[dataset clear];
[dataset synchronize];
```

iOS - Swift

```
let dataset = syncClient.openOrCreateDataset("myDataSet")
```

To delete a dataset, first call the method to remove it from local storage, then call the `synchronize` method to delete the dataset from Amazon Cognito:

```
dataset.clear()
dataset.synchronize()
```

JavaScript

```
syncManager.openOrCreateDataset('myDatasetName', function(err, dataset) {
   // ...
});
```

Unity

```
string myValue = dataset.Get("myKey");
dataset.Put("myKey", "newValue");
```

You can use `Remove` to delete a key from a dataset:

```
dataset.Remove("myKey");
```

Xamarin

```
Dataset dataset = syncManager.OpenOrCreateDataset("myDatasetName");
```

To delete a dataset, first call the method to remove it from local storage, then call the `synchronize` method to delete the dataset from Amazon Cognito:

```
dataset.Delete();
dataset.SynchronizeAsync();
```

Reading and Writing Data in Datasets

Amazon Cognito datasets function as dictionaries, with values accessible by key. The keys and values of a dataset can be read, added, or modified just as if the dataset were a dictionary. The following shows an example.

Android

```
String value = dataset.get("myKey");
dataset.put("myKey", "my value");
```

iOS - Objective-C

```
[dataset setString:@"my value" forKey:@"myKey"];
NSString *value = [dataset stringForKey:@"myKey"];
```

iOS - Swift

```
dataset.setString("my value", forKey:"myKey")
let value = dataset.stringForKey("myKey")
```

JavaScript

```
dataset.get('myKey', function(err, value) {
  console.log('myRecord: ' + value);
});

dataset.put('newKey', 'newValue', function(err, record) {
  console.log(record);
});

dataset.remove('oldKey', function(err, record) {
  console.log(success);
});
```

Unity

```
string myValue = dataset.Get("myKey");
dataset.Put("myKey", "newValue");
```

Xamarin

```
//obtain a value
string myValue = dataset.Get("myKey");

// Create a record in a dataset and synchronize with the server
dataset.OnSyncSuccess += SyncSuccessCallback;
dataset.Put("myKey", "myValue");
dataset.SynchronizeAsync();

void SyncSuccessCallback(object sender, SyncSuccessEventArgs e) {
  // Your handler code here
}
```

Android

You can use the `remove` method to remove keys from a dataset:

```
dataset.remove("myKey");
```

iOS - Objective-C

You can use `removeObjectForKey` to delete a key from a dataset:

```
[dataset removeObjectForKey:@"myKey"];
```

iOS - Swift

You can use `removeObjectForKey` to delete a key from a dataset:

```
dataset.removeObjectForKey("myKey")
```

Unity

You can use `Remove` to delete a key from a dataset:

```
dataset.Remove("myKey");
```

Xamarin

You can use `Remove` to delete a key from a dataset:

```
dataset.Remove("myKey");
```

Note that values written to a dataset only affect the local cached copy of the data until you call the synchronize method.

Synchronizing Local Data with the Sync Store

Android

The `synchronize` method compares local cached data to the data stored in the Amazon Cognito Sync store. Remote changes are pulled from the Amazon Cognito Sync store; conflict resolution is invoked if any conflicts occur; and updated values on the device are pushed to the service. To synchronize a dataset, call its `synchronize` method:

```
dataset.synchronize(syncCallback);
```

The `synchronize` method receives an implementation of the `SyncCallback` interface, discussed below.

The `synchronizeOnConnectivity()` method attempts to synchronize when connectivity is available. If connectivity is immediately available, `synchronizeOnConnectivity()` behaves like `synchronize()`. Otherwise it monitors for connectivity changes and performs a sync once connectivity is available. If `synchronizeOnConnectivity()`is called multiple times, only the last synchronize request is kept, and only the last callback will fire. If either the dataset or the callback is garbage-collected, this method won't perform a sync, and the callback won't fire.

To learn more about dataset synchronization and the different callbacks, see Handling Callbacks (p. 168).

iOS - Objective-C

The `synchronize` method compares local cached data to the data stored in the Amazon Cognito Sync store. Remote changes are pulled from the Amazon Cognito Sync store; conflict resolution is invoked if any conflicts occur; and updated values on the device are pushed to the service. To synchronize a dataset, call its `synchronize` method:

The `synchronize` method is asynchronous and returns an `AWSTask` object to handle the response:

```
[[dataset synchronize] continueWithBlock:^id(AWSTask *task) {
    if (task.isCancelled) {
        // Task cancelled.
    } else if (task.error) {
        // Error while executing task.
    } else {
        // Task succeeded. The data was saved in the sync store.
    }
    return nil;
}];
```

The `synchronizeOnConnectivity` method attempts to synchronize when the device has connectivity. First, `synchronizeOnConnectivity` checks for connectivity and, if the device is online, immediately invokes synchronize and returns the `AWSTask` object associated with the attempt.

If the device is offline, `synchronizeOnConnectivity` 1) schedules a synchronize for the next time the device comes online and 2) returns an `AWSTask` with a nil result. The scheduled synchronize is only valid for the lifecycle of the dataset object. The data will not be synchronized if the app is exited before connectivity is regained. If you want to be notified when events occur during the scheduled synchronize, you must add observers of the notifications found in `AWSCognito`.

To learn more about dataset synchronization and the different callbacks, see Handling Callbacks (p. 168).

iOS - Swift

The `synchronize` method compares local cached data to the data stored in the Amazon Cognito Sync store. Remote changes are pulled from the Amazon Cognito Sync store; conflict resolution is invoked if any conflicts occur; and updated values on the device are pushed to the service. To synchronize a dataset, call its `synchronize` method:

The `synchronize` method is asynchronous and returns an `AWSTask` object to handle the response:

```
dataset.synchronize().continueWithBlock {(task) -> AnyObject! in
    if task.cancelled {
        // Task cancelled.
    } else if task.error != nil {
        // Error while executing task
    } else {
        // Task succeeded. The data was saved in the sync store.
    }
    return nil
}
```

The `synchronizeOnConnectivity` method attempts to synchronize when the device has connectivity. First, `synchronizeOnConnectivity` checks for connectivity and, if the device is online, immediately invokes `synchronize` and returns the `AWSTask` object associated with the attempt.

If the device is offline, `synchronizeOnConnectivity` 1) schedules a synchronize for the next time the device comes online and 2) returns an `AWSTask` object with a nil result. The scheduled synchronize is only valid for the lifecycle of the dataset object. The data will not be synchronized if the app is exited before connectivity is regained. If you want to be notified when events occur during the scheduled synchronize, you must add observers of the notifications found in `AWSCognito`.

To learn more about dataset synchronization and the different callbacks, see Handling Callbacks (p. 168).

JavaScript

The `synchronize` method compares local cached data to the data stored in the Amazon Cognito Sync store. Remote changes are pulled from the Amazon Cognito Sync store; conflict resolution is invoked if any conflicts occur; and updated values on the device are pushed to the service. To synchronize a dataset, call its `synchronize` method:

```
dataset.synchronize();
```

To learn more about dataset synchronization and the different callbacks, see Handling Callbacks (p. 168).

Unity

The synchronize method compares local cached data to the data stored in the Amazon Cognito Sync store. Remote changes are pulled from the Amazon Cognito Sync store; conflict resolution is invoked if any conflicts occur; and updated values on the device are pushed to the service. To synchronize a dataset, call its `synchronize` method:

```
dataset.Synchronize();
```

Synchronize will run asynchronously and will end up calling one of the several callbacks you can specify in the Dataset.

To learn more about dataset synchronization and the different callbacks, see Handling Callbacks (p. 168).

Xamarin

The `synchronize` method compares local cached data to the data stored in the Amazon Cognito Sync store. Remote changes are pulled from the Amazon Cognito Sync store; conflict resolution is invoked if any conflicts occur; and updated values on the device are pushed to the service. To synchronize a dataset, call its `synchronize` method:

```
dataset.SynchronizeAsync();
```

To learn more about dataset synchronization and the different callbacks, see Handling Callbacks (p. 168).

Handling Callbacks

This section describes how to handle callbacks.

Android

SyncCallback Interface

By implementing the `SyncCallback` interface, you can receive notifications on your app about dataset synchronization. Your app can then make active decisions about deleting local data, merging unauthenticated and authenticated profiles, and resolving sync conflicts. You should implement the following methods, which are required by the interface:

- `onSuccess()`
- `onFailure()`
- `onConflict()`
- `onDatasetDeleted()`
- `onDatasetsMerged()`

Note that, if you don't want to specify all the callbacks, you can also use the class `DefaultSyncCallback` which provides default, empty implementations for all of them.

onSuccess

The `onSuccess()` callback is triggered when a dataset is successfully downloaded from the sync store.

```
@Override
public void onSuccess(Dataset dataset, List<Record> newRecords) {
}
```

onFailure

onFailure() is called if an exception occurs during synchronization.

```
@Override
public void onFailure(DataStorageException dse) {
}
```

onConflict

Conflicts may arise if the same key has been modified on the local store and in the sync store. The `onConflict()` method handles conflict resolution. If you don't implement this method, the Amazon Cognito Sync client defaults to using the most recent change.

```
@Override
public boolean onConflict(Dataset dataset, final List<SyncConflict>
 conflicts) {
    List<Record> resolvedRecords = new ArrayList<Record>();
    for (SyncConflict conflict : conflicts) {
        /* resolved by taking remote records */
        resolvedRecords.add(conflict.resolveWithRemoteRecord());

        /* alternately take the local records */
        // resolvedRecords.add(conflict.resolveWithLocalRecord());

        /* or customer logic, say concatenate strings */
        // String newValue = conflict.getRemoteRecord().getValue()
        //     + conflict.getLocalRecord().getValue();
        // resolvedRecords.add(conflict.resolveWithValue(newValue);
    }
    dataset.resolve(resolvedRecords);

    // return true so that synchronize() is retried after conflicts are
 resolved
    return true;
}
```

onDatasetDeleted

When a dataset is deleted, the Amazon Cognito client uses the `SyncCallback` interface to confirm whether the local cached copy of the dataset should be deleted too. Implement the `onDatasetDeleted()` method to tell the client SDK what to do with the local data.

```
@Override
public boolean onDatasetDeleted(Dataset dataset, String datasetName) {
    // return true to delete the local copy of the dataset
    return true;
}
```

onDatasetMerged

When two previously unconnected identities are linked together, all of their datasets are merged. Applications are notified of the merge through the `onDatasetsMerged()` method:

```
@Override
public boolean onDatasetsMerged(Dataset dataset, List<String> datasetNames) {
    // return false to handle Dataset merge outside the synchronization
 callback
    return false;
}
```

iOS - Objective-C

Sync Notifications

The Amazon Cognito client will emit a number of `NSNotification` events during a synchronize call. You can register to monitor these notifications via the standard `NSNotificationCenter`:

```
[NSNotificationCenter defaultCenter]
  addObserver:self
  selector:@selector(myNotificationHandler:)
  name:NOTIFICATION_TYPE
  object:nil];
```

Amazon Cognito supports five notification types, listed below.

AWSCognitoDidStartSynchronizeNotification

Called when a synchronize operation is starting. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized.

AWSCognitoDidEndSynchronizeNotification

Called when a synchronize operation completes (successfully or otherwise). The `userInfo` will contain the key dataset which is the name of the dataset being synchronized.

AWSCognitoDidFailToSynchronizeNotification

Called when a synchronize operation fails. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized and the key error which will contain the error that caused the failure.

AWSCognitoDidChangeRemoteValueNotification

Called when local changes are successfully pushed to Amazon Cognito. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized and the key keys which will contain an NSArray of record keys that were pushed.

AWSCognitoDidChangeLocalValueFromRemoteNotification

Called when a local value changes due to a synchronize operation. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized and the key keys which will contain an NSArray of record keys that changed.

Conflict Resolution Handler

During a sync operation, conflicts may arise if the same key has been modified on the local store and in the sync store. If you haven't set a conflict resolution handler, Amazon Cognito defaults to choosing the most recent update.

By implementing and assigning an AWSCognitoRecordConflictHandler you can alter the default conflict resolution. The AWSCognitoConflict input parameter conflict contains an AWSCognitoRecord object for both the local cached data and for the conflicting record in the sync store. Using the AWSCognitoConflict you can resolve the conflict with the local record: [conflict resolveWithLocalRecord], the remote record: [conflict resolveWithRemoteRecord] or a brand new value: [conflict resolveWithValue:value]. Returning nil from this method prevents synchronization from continuing and the conflicts will be presented again the next time the sync process starts.

You can set the conflict resolution handler at the client level:

```
client.conflictHandler = ^AWSCognitoResolvedConflict* (NSString *datasetName,
 AWSCognitoConflict *conflict) {
    // always choose local changes
    return [conflict resolveWithLocalRecord];
};
```

Or at the dataset level:

```
dataset.conflictHandler = ^AWSCognitoResolvedConflict* (NSString
 *datasetName, AWSCognitoConflict *conflict) {
    // override and always choose remote changes
    return [conflict resolveWithRemoteRecord];
};
```

Dataset Deleted Handler

When a dataset is deleted, the Amazon Cognito client uses the `AWSCognitoDatasetDeletedHandler` to confirm whether the local cached copy of the dataset should be deleted too. If no `AWSCognitoDatasetDeletedHandler` is implemented, the local data will be purged automatically. Implement an `AWSCognitoDatasetDeletedHandler` if you wish to keep a copy of the local data before wiping, or to keep the local data.

You can set the dataset deleted handler at the client level:

```
client.datasetDeletedHandler = ^BOOL (NSString *datasetName) {
    // make a backup of the data if you choose
    ...
    // delete the local data (default behavior)
    return YES;
};
```

Or at the dataset level:

```
dataset.datasetDeletedHandler = ^BOOL (NSString *datasetName) {
    // override default and keep the local data
    return NO;
};
```

Dataset Merge Handler

When two previously unconnected identities are linked together, all of their datasets are merged. Applications are notified of the merge through the `DatasetMergeHandler`. The handler will receive the name of the root dataset as well as an array of dataset names that are marked as merges of the root dataset.

If no `DatasetMergeHandler` is implemented, these datasets will be ignored, but will continue to use up space in the identity's 20 maximum total datasets.

You can set the dataset merge handler at the client level:

```
client.datasetMergedHandler = ^(NSString *datasetName, NSArray *datasets) {
    // Blindly delete the datasets
    for (NSString *name in datasets) {
        AWSCognitoDataset *merged = [[AWSCognito defaultCognito]
 openOrCreateDataset:name];
       [merged clear];
       [merged synchronize];
    }
};
```

Or at the dataset level:

```
dataset.datasetMergedHandler = ^(NSString *datasetName, NSArray *datasets) {
    // Blindly delete the datasets
    for (NSString *name in datasets) {
        AWSCognitoDataset *merged = [[AWSCognito defaultCognito]
 openOrCreateDataset:name];
        // do something with the data if it differs from existing dataset
        ...
        // now delete it
        [merged clear];
        [merged synchronize];
    }
};
```

iOS - Swift

Sync Notifications

The Amazon Cognito client will emit a number of `NSNotification` events during a synchronize call. You can register to monitor these notifications via the standard `NSNotificationCenter`:

```
NSNotificationCenter.defaultCenter().addObserver(observer: self,
   selector: "myNotificationHandler",
   name:NOTIFICATION_TYPE,
   object:nil)
```

Amazon Cognito supports five notification types, listed below.

AWSCognitoDidStartSynchronizeNotification

Called when a synchronize operation is starting. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized.

AWSCognitoDidEndSynchronizeNotification

Called when a synchronize operation completes (successfully or otherwise). The `userInfo` will contain the key dataset which is the name of the dataset being synchronized.

AWSCognitoDidFailToSynchronizeNotification

Called when a synchronize operation fails. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized and the key error which will contain the error that caused the failure.

AWSCognitoDidChangeRemoteValueNotification

Called when local changes are successfully pushed to Amazon Cognito. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized and the key keys which will contain an NSArray of record keys that were pushed.

AWSCognitoDidChangeLocalValueFromRemoteNotification

Called when a local value changes due to a synchronize operation. The `userInfo` will contain the key dataset which is the name of the dataset being synchronized and the key keys which will contain an NSArray of record keys that changed.

Conflict Resolution Handler

During a sync operation, conflicts may arise if the same key has been modified on the local store and in the sync store. If you haven't set a conflict resolution handler, Amazon Cognito defaults to choosing the most recent update.

By implementing and assigning an `AWSCognitoRecordConflictHandler` you can alter the default conflict resolution. The `AWSCognitoConflict` input parameter conflict contains an `AWSCognitoRecord` object for both the local cached data and for the conflicting record in the sync store. Using the `AWSCognitoConflict` you can resolve the conflict with the local record: [conflict resolveWithLocalRecord], the remote record: [conflict resolveWithRemoteRecord] or a brand new value: [conflict resolveWithValue:value]. Returning nil from this method prevents synchronization from continuing and the conflicts will be presented again the next time the sync process starts.

You can set the conflict resolution handler at the client level:

```
client.conflictHandler = {
    (datasetName: String!, conflict: AWSCognitoConflict!) ->
 AWSCognitoResolvedConflict! in
    return conflict.resolveWithLocalRecord()
}
```

Or at the dataset level:

```
dataset.conflictHandler = {
    (datasetName: String!, conflict: AWSCognitoConflict!) ->
 AWSCognitoResolvedConflict! in
    return conflict.resolveWithLocalRecord()
}
```

Dataset Deleted Handler

When a dataset is deleted, the Amazon Cognito client uses the `AWSCognitoDatasetDeletedHandler` to confirm whether the local cached copy of the dataset should be deleted too. If no `AWSCognitoDatasetDeletedHandler` is implemented, the local data will be purged automatically. Implement an `AWSCognitoDatasetDeletedHandler` if you wish to keep a copy of the local data before wiping, or to keep the local data.

You can set the dataset deleted handler at the client level:

```
client.datasetDeletedHandler = {
      (datasetName: String!) -> Bool in
      // make a backup of the data if you choose
      ...
      // delete the local data (default behaviour)
      return true
}
```

Or at the dataset level:

```
dataset.datasetDeletedHandler = {
      (datasetName: String!) -> Bool in
      // make a backup of the data if you choose
      ...
      // delete the local data (default behaviour)
      return true
}
```

Dataset Merge Handler

When two previously unconnected identities are linked together, all of their datasets are merged. Applications are notified of the merge through the `DatasetMergeHandler`. The handler will receive the name of the root dataset as well as an array of dataset names that are marked as merges of the root dataset.

If no `DatasetMergeHandler` is implemented, these datasets will be ignored, but will continue to use up space in the identity's 20 maximum total datasets.

You can set the dataset merge handler at the client level:

```
client.datasetMergedHandler = {
    (datasetName: String!, datasets: [AnyObject]!) -> Void in
    for nameObject in datasets {
        if let name = nameObject as? String {
            let merged =
 AWSCognito.defaultCognito().openOrCreateDataset(name)
            merged.clear()
            merged.synchronize()
        }
    }
}
```

Or at the dataset level:

```
dataset.datasetMergedHandler = {
    (datasetName: String!, datasets: [AnyObject]!) -> Void in
    for nameObject in datasets {
        if let name = nameObject as? String {
            let merged =
 AWSCognito.defaultCognito().openOrCreateDataset(name)
            // do something with the data if it differs from existing dataset
              ...
              // now delete it
            merged.clear()
            merged.synchronize()
        }
    }
}
```

JavaScript

Synchronization Callbacks

When performing a synchronize() on a dataset, you can optionally specify callbacks to handle each of the following states:

```
dataset.synchronize({

   onSuccess: function(dataset, newRecords) {
      //...
   },

   onFailure: function(err) {
      //...
   },

   onConflict: function(dataset, conflicts, callback) {
      //...
   },

   onDatasetDeleted: function(dataset, datasetName, callback) {
      //...
   },

  onDatasetMerged: function(dataset, datasetNames, callback) {
      //...
  }

});
```

onSuccess()

The `onSuccess()` callback is triggered when a dataset is successfully updated from the sync store. If you do not define a callback, the synchronization will succeed silently.

```
onSuccess: function(dataset, newRecords) {
   console.log('Successfully synchronized ' + newRecords.length + ' new
 records.');
}
```

onFailure()

`onFailure()` is called if an exception occurs during synchronization. If you do not define a callback, the synchronization will fail silently.

```
onFailure: function(err) {
   console.log('Synchronization failed.');
   console.log(err);
}
```

onConflict()

Conflicts may arise if the same key has been modified on the local store and in the sync store. The `onConflict()` method handles conflict resolution. If you don't implement this method, the synchronization will be aborted when there is a conflict.

```
onConflict: function(dataset, conflicts, callback) {

   var resolved = [];

   for (var i=0; i<conflicts.length; i++) {

      // Take remote version.
      resolved.push(conflicts[i].resolveWithRemoteRecord());

      // Or... take local version.
      // resolved.push(conflicts[i].resolveWithLocalRecord());

      // Or... use custom logic.
      // var newValue = conflicts[i].getRemoteRecord().getValue() +
 conflicts[i].getLocalRecord().getValue();
      // resolved.push(conflicts[i].resovleWithValue(newValue);

   }

   dataset.resolve(resolved, function() {
      return callback(true);
   });

   // Or... callback false to stop the synchronization process.
   // return callback(false);

}
```

onDatasetDeleted()

When a dataset is deleted, the Amazon Cognito client uses the `onDatasetDeleted()` callback to decide whether the local cached copy of the dataset should be deleted too. By default, the dataset will not be deleted.

```
onDatasetDeleted: function(dataset, datasetName, callback) {
   // Return true to delete the local copy of the dataset.
   // Return false to handle deleted datasets outside the synchronization
 callback.

   return callback(true);

}
```

onDatasetMerged()

When two previously unconnected identities are linked together, all of their datasets are merged. Applications are notified of the merge through the `onDatasetsMerged()` callback.

```
onDatasetMerged: function(dataset, datasetNames, callback) {

   // Return true to continue the synchronization process.
   // Return false to handle dataset merges outside the synchroniziation
 callback.

   return callback(false);

}
```

Unity

After you open or create a dataset, you can set different callbacks to it that will be triggered when you use the Synchronize method. This is the way to register your callbacks to them:

```
dataset.OnSyncSuccess += this.HandleSyncSuccess;
dataset.OnSyncFailure += this.HandleSyncFailure;
dataset.OnSyncConflict = this.HandleSyncConflict;
dataset.OnDatasetMerged = this.HandleDatasetMerged;
dataset.OnDatasetDeleted = this.HandleDatasetDeleted;
```

Note that `SyncSuccess` and `SyncFailure` use += instead of = so you can subscribe more than one callback to them.

OnSyncSuccess

The `OnSyncSuccess` callback is triggered when a dataset is successfully updated from the cloud. If you do not define a callback, the synchronization will succeed silently.

```
private void HandleSyncSuccess(object sender, SyncSuccessEvent e)
{
    // Continue with your game flow, display the loaded data, etc.
}
```

OnSyncFailure

`OnSyncFailure` is called if an exception occurs during synchronization. If you do not define a callback, the synchronization will fail silently.

```
private void HandleSyncFailure(object sender, SyncFailureEvent e)
```

```
{
    Dataset dataset = sender as Dataset;
    if (dataset.Metadata != null) {
        Debug.Log("Sync failed for dataset : " +
 dataset.Metadata.DatasetName);
    } else {
        Debug.Log("Sync failed");
    }
    // Handle the error
    Debug.LogException(e.Exception);
}
```

OnSyncConflict

Conflicts may arise if the same key has been modified on the local store and in the sync store. The `OnSyncConflict` callback handles conflict resolution. If you don't implement this method, the synchronization will be aborted when there is a conflict.

```
private bool HandleSyncConflict(Dataset dataset, List < SyncConflict >
 conflicts)
{
  if (dataset.Metadata != null) {
    Debug.LogWarning("Sync conflict " + dataset.Metadata.DatasetName);
  } else {
    Debug.LogWarning("Sync conflict");
  }
  List < Amazon.CognitoSync.SyncManager.Record > resolvedRecords = new List <
 Amazon.CognitoSync.SyncManager.Record > ();
  foreach(SyncConflict conflictRecord in conflicts) {
    // SyncManager provides the following default conflict resolution
 methods:
    //      ResolveWithRemoteRecord - overwrites the local with remote
 records
    //      ResolveWithLocalRecord - overwrites the remote with local records
    //      ResolveWithValue - to implement your own logic
    resolvedRecords.Add(conflictRecord.ResolveWithRemoteRecord());
  }
  // resolves the conflicts in local storage
  dataset.Resolve(resolvedRecords);
  // on return true the synchronize operation continues where it left,
  //      returning false cancels the synchronize operation
  return true;
}
```

OnDatasetDeleted

When a dataset is deleted, the Amazon Cognito client uses the `OnDatasetDeleted` callback to decide whether the local cached copy of the dataset should be deleted too. By default, the dataset will not be deleted.

```
private bool HandleDatasetDeleted(Dataset dataset)
  {
      Debug.Log(dataset.Metadata.DatasetName + " Dataset has been deleted");
      // Do clean up if necessary
      // returning true informs the corresponding dataset can be purged in
 the local storage and return false retains the local dataset
      return true;
  }
```

OnDatasetMerged

When two previously unconnected identities are linked together, all of their datasets are merged. Applications are notified of the merge through the `OnDatasetsMerged` callback.

```
public bool HandleDatasetMerged(Dataset localDataset, List<string>
 mergedDatasetNames)
{
    foreach (string name in mergedDatasetNames)
    {
        Dataset mergedDataset = syncManager.OpenOrCreateDataset(name);
        //Lambda function to delete the dataset after fetching it
        EventHandler<SyncSuccessEvent> lambda;
        lambda = (object sender, SyncSuccessEvent e) => {
            ICollection<string> existingValues =
 localDataset.GetAll().Values;
            ICollection<string> newValues = mergedDataset.GetAll().Values;

            //Implement your merge logic here

            mergedDataset.Delete(); //Delete the dataset locally
            mergedDataset.OnSyncSuccess -= lambda; //We don't want this
 callback to be fired again
            mergedDataset.OnSyncSuccess += (object s2, SyncSuccessEvent e2)
 => {
                localDataset.Synchronize(); //Continue the sync operation
 that was interrupted by the merge
            };
            mergedDataset.Synchronize(); //Synchronize it as deleted, failing
 to do so will leave us in an inconsistent state
        };
        mergedDataset.OnSyncSuccess += lambda;
        mergedDataset.Synchronize(); //Asnchronously fetch the dataset
    }

    // returning true allows the Synchronize to continue and false stops it
    return false;
}
```

Xamarin

After you open or create a dataset, you can set different callbacks to it that will be triggered when you use the Synchronize method. This is the way to register your callbacks to them:

```
dataset.OnSyncSuccess += this.HandleSyncSuccess;
dataset.OnSyncFailure += this.HandleSyncFailure;
dataset.OnSyncConflict = this.HandleSyncConflict;
dataset.OnDatasetMerged = this.HandleDatasetMerged;
dataset.OnDatasetDeleted = this.HandleDatasetDeleted;
```

Note that `SyncSuccess` and `SyncFailure` use += instead of = so you can subscribe more than one callback to them.

OnSyncSuccess

The `OnSyncSuccess` callback is triggered when a dataset is successfully updated from the cloud. If you do not define a callback, the synchronization will succeed silently.

```
private void HandleSyncSuccess(object sender, SyncSuccessEventArgs e)
{
    // Continue with your game flow, display the loaded data, etc.
}
```

OnSyncFailure

`OnSyncFailure` is called if an exception occurs during synchronization. If you do not define a callback, the synchronization will fail silently.

```
private void HandleSyncFailure(object sender, SyncFailureEventArgs e)
{
    Dataset dataset = sender as Dataset;
    if (dataset.Metadata != null) {
        Console.WriteLine("Sync failed for dataset : " +
 dataset.Metadata.DatasetName);
    } else {
        Console.WriteLine("Sync failed");
    }
}
```

OnSyncConflict

Conflicts may arise if the same key has been modified on the local store and in the sync store. The `OnSyncConflict` callback handles conflict resolution. If you don't implement this method, the synchronization will be aborted when there is a conflict.

```
private bool HandleSyncConflict(Dataset dataset, List < SyncConflict >
 conflicts)
{
  if (dataset.Metadata != null) {
    Console.WriteLine("Sync conflict " + dataset.Metadata.DatasetName);
  } else {
    Console.WriteLine("Sync conflict");
  }
  List < Amazon.CognitoSync.SyncManager.Record > resolvedRecords = new List <
 Amazon.CognitoSync.SyncManager.Record > ();
  foreach(SyncConflict conflictRecord in conflicts) {
    // SyncManager provides the following default conflict resolution
 methods:
    //      ResolveWithRemoteRecord - overwrites the local with remote
 records
    //      ResolveWithLocalRecord - overwrites the remote with local records
    //      ResolveWithValue - to implement your own logic
    resolvedRecords.Add(conflictRecord.ResolveWithRemoteRecord());
  }
  // resolves the conflicts in local storage
  dataset.Resolve(resolvedRecords);
  // on return true the synchronize operation continues where it left,
  //      returning false cancels the synchronize operation
  return true;
}
```

OnDatasetDeleted

When a dataset is deleted, the Amazon Cognito client uses the `OnDatasetDeleted` callback to decide whether the local cached copy of the dataset should be deleted too. By default, the dataset will not be deleted.

```
private bool HandleDatasetDeleted(Dataset dataset)
{
    Console.WriteLine(dataset.Metadata.DatasetName + " Dataset has been
 deleted");
    // Do clean up if necessary
    // returning true informs the corresponding dataset can be purged in the
 local storage and return false retains the local dataset
    return true;
}
```

OnDatasetMerged

When two previously unconnected identities are linked together, all of their datasets are merged. Applications are notified of the merge through the `OnDatasetsMerged` callback.

```
public bool HandleDatasetMerged(Dataset localDataset, List<string>
 mergedDatasetNames)
{
    foreach (string name in mergedDatasetNames)
    {
        Dataset mergedDataset = syncManager.OpenOrCreateDataset(name);

            //Implement your merge logic here

        mergedDataset.OnSyncSuccess += lambda;
        mergedDataset.SynchronizeAsync(); //Asnchronously fetch the dataset
    }

    // returning true allows the Synchronize to continue and false stops it
    return false;
}
```

Push Sync

This section describes how to use push sync.

Android

Amazon Cognito automatically tracks the association between identity and devices. Using the push sync feature, you can ensure that every instance of a given identity is notified when identity data changes. Push sync ensures that, whenever the sync store data changes for a particular identity, all devices associated with that identity receive a silent push notification informing them of the change.

Set Up Your Account for Push Sync
Create an Amazon Simple Notification Service (Amazon SNS) App

Create and configure an Amazon SNS app for your supported platforms, as described in the SNS Developer Guide.
Enable Push Sync in the Amazon Cognito console

You can enable Push Sync via the Amazon Cognito console. From the console home page:

1. Click the name of the identity pool for which you want to enable Push Sync. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Push synchronization to expand it.
4. In the Service role dropdown menu, select the IAM role that grants Cognito permission to send an SNS notification. Click Create role to create or modify the roles associated with your identity pool in the AWS IAM Console.
5. Select a platform application, and then click Save Changes.
6. Grant SNS Access to Your Application

In the IAM console, configure your IAM roles to have full SNS access, or create a new role that trusts cognito-sync and has full SNS access. To learn more about IAM roles, see Roles (Delegation and Federation).

Use Push Sync in Your App

Your application will need to import the Google Play services. You can download the latest version of the Google Play SDK via the Android SDK manager. Follow the Android documentation on implementing a GCM client to register your app and receive a registration ID from GCM. Once you have the registration ID, you need to register the device with Amazon Cognito, as shown in the snippet below:

```
String registrationId = "MY_GCM_REGISTRATION_ID";
try {
    client.registerDevice("GCM", registrationId);
} catch (RegistrationFailedException rfe) {
    Log.e(TAG, "Failed to register device for silent sync", rfe);
} catch (AmazonClientException ace) {
    Log.e(TAG, "An unknown error caused registration for silent sync to
 fail", ace);
}
```

You can now subscribe a device to receive updates from a particular dataset:

```
Dataset trackedDataset = client.openOrCreateDataset("myDataset");
if (client.isDeviceRegistered()) {
    try {
        trackedDataset.subscribe();
    } catch (SubscribeFailedException sfe) {
        Log.e(TAG, "Failed to subscribe to datasets", sfe);
    } catch (AmazonClientException ace) {
        Log.e(TAG, "An unknown error caused the subscription to fail", ace);
    }
}
```

To stop receiving push notifications from a dataset, simply call the unsubscribe method. To subscribe to all datasets (or a specific subset) in the `CognitoSyncManager` object, use `subscribeAll()`:

```
if (client.isDeviceRegistered()) {
    try {
        client.subscribeAll();
    } catch (SubscribeFailedException sfe) {
        Log.e(TAG, "Failed to subscribe to datasets", sfe);
    } catch (AmazonClientException ace) {
        Log.e(TAG, "An unknown error caused the subscription to fail", ace);
    }
}
```

In your implementation of the Android BroadcastReceiver object, you can check the latest version of the modified dataset and decide if your app needs to synchronize again:

```
@Override
public void onReceive(Context context, Intent intent) {

    PushSyncUpdate update = client.getPushSyncUpdate(intent);

    // The update has the source (cognito-sync here), identityId of the
    // user, identityPoolId in question, the non-local sync count of the
    // data set and the name of the dataset. All are accessible through
    // relevant getters.

    String source = update.getSource();
    String identityPoolId = update.getIdentityPoolId();
    String identityId = update.getIdentityId();
    String datasetName = update.getDatasetName;
    long syncCount = update.getSyncCount;

    Dataset dataset = client.openOrCreateDataset(datasetName);

    // need to access last sync count. If sync count is less or equal to
    // last sync count of the dataset, no sync is required.

    long lastSyncCount = dataset.getLastSyncCount();
    if (lastSyncCount < syncCount) {
        dataset.synchronize(new SyncCallback() {
            // ...
        });
    }}

}
```

The following keys are available in the push notification payload:

- `source`: cognito-sync. This can serve as a differentiating factor between notifications.
- `identityPoolId`: The identity pool ID. This can be used for validation or additional information, though it's not integral from the receiver's point of view.
- `identityId`: The identity ID within the pool.
- `datasetName`: The name of the dataset that was updated. This is available for the sake of the openOrCreateDataset call.
- `syncCount`: The sync count for the remote dataset. You can use this as a way to make sure that the local dataset is out of date, and that the incoming synchronization is new.

iOS - Objective-C

Amazon Cognito automatically tracks the association between identity and devices. Using the push sync feature, you can ensure that every instance of a given identity is notified when identity data changes. Push sync ensures that, whenever the sync store data changes for a particular identity, all devices associated with that identity receive a silent push notification informing them of the change.

Set Up Your Account for Push Sync
Create an Amazon Simple Notification Service(Amazon SNS) App

Create and configure an Amazon SNS app for your supported platforms, as described in the SNS Developer Guide.
Enable Push Sync in the Amazon Cognito console

You can enable Push Sync via the Amazon Cognito console. From the console home page:

1. Click the name of the identity pool for which you want to enable Push Sync. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Push synchronization to expand it.
4. In the Service role dropdown menu, select the IAM role that grants Amazon Cognito permission to send an SNS notification. Click Create role to create or modify the roles associated with your identity pool in the AWS IAM Console.
5. Select a platform application, and then click Save Changes.
6. Grant SNS Access to Your Application.

In the IAM console, configure your IAM roles to have full SNS access, or create a new role that trusts cognito-sync and has full SNS access. To learn more about IAM roles, see Roles (Delegation and Federation).

Use Push Sync in Your App

To obtain a device token for your app, follow the Apple documentation on Registering for Remote Notifications. Once you've received the device token as an NSData object from APNs, you'll need to register the device with Amazon Cognito using the `registerDevice:` method of the sync client, as shown below:

```
AWSCognito *syncClient = [AWSCognito defaultCognito];
    [[syncClient registerDevice: devToken] continueWithBlock:^id(AWSTask
 *task) {
        if(task.error){
            NSLog(@"Unable to registerDevice: %@", task.error);
        } else {
            NSLog(@"Successfully registered device with id: %@",
 task.result);
        }
        return nil;
    ];
```

In debug mode, your device will register with the APNs sandbox; in release mode, it will register with APNs. To receive updates from a particular dataset, use the `subscribe` method:

```
[[[syncClient openOrCreateDataset:@"MyDataset"] subscribe]
 continueWithBlock:^id(AWSTask *task) {
        if(task.error){
            NSLog(@"Unable to subscribe to dataset: %@", task.error);
        } else {
            NSLog(@"Successfully subscribed to dataset: %@", task.result);
        }
        return nil;
    ];
```

To stop receiving push notifications from a dataset, simply call the `unsubscribe` method:

```
[[[syncClient openOrCreateDataset:@”MyDataset”] unsubscribe]
 continueWithBlock:^id(AWSTask *task) {
        if(task.error){
            NSLog(@"Unable to unsubscribe from dataset: %@", task.error);
        } else {
            NSLog(@"Successfully unsubscribed from dataset: %@",
 task.result);
        }
        return nil;
    }];
```

To subscribe to all datasets in the `AWSCognito` object, call `subscribeAll`:

```
[[syncClient subscribeAll] continueWithBlock:^id(AWSTask *task) {
        if(task.error){
            NSLog(@"Unable to subscribe to all datasets: %@", task.error);
        } else {
            NSLog(@"Successfully subscribed to all datasets: %@",
 task.result);
        }
        return nil;
    }];
```

Before calling `subscribeAll`, be sure to synchronize at least once on each dataset, so that the datasets exist on the server.

To react to push notifications, you need to implement the `didReceiveRemoteNotification` method in your app delegate:

```
- (void)application:(UIApplication *)application
 didReceiveRemoteNotification:(NSDictionary *)userInfo
    {
        [[NSNotificationCenter defaultCenter]
 postNotificationName:@"CognitoPushNotification" object:userInfo];
    }
```

If you post a notification using notification handler, you can then respond to the notification elsewhere in the application where you have a handle to your dataset. If you subscribe to the notification like this ...

```
[[NSNotificationCenter defaultCenter] addObserver:self
 selector:@selector(didReceivePushSync:)
    name: :@"CognitoPushNotification" object:nil];
```

...you can act on the notification like this:

```
- (void)didReceivePushSync:(NSNotification*)notification
    {
        NSDictionary * data = [(NSDictionary *)[notification object]
 objectForKey:@"data"];
        NSString * identityId = [data objectForKey:@"identityId"];
        NSString * datasetName = [data objectForKey:@"datasetName"];
        if([self.dataset.name isEqualToString:datasetName] &&
 [self.identityId isEqualToString:identityId]){
```

```
            [[self.dataset synchronize] continueWithBlock:^id(AWSTask *task)
{
                if(!task.error){
                    NSLog(@"Successfully synced dataset");
                }
                return nil;
            }];
        }
    }
```

The following keys are available in the push notification payload:

- `source`: cognito-sync. This can serve as a differentiating factor between notifications.
- `identityPoolId`: The identity pool ID. This can be used for validation or additional information, though it's not integral from the receiver's point of view.
- `identityId`: The identity ID within the pool.
- `datasetName`: The name of the dataset that was updated. This is available for the sake of the `openOrCreateDataset` call.
- `syncCount`: The sync count for the remote dataset. You can use this as a way to make sure that the local dataset is out of date, and that the incoming synchronization is new.

iOS - Swift

Amazon Cognito automatically tracks the association between identity and devices. Using the push sync feature, you can ensure that every instance of a given identity is notified when identity data changes. Push sync ensures that, whenever the sync store data changes for a particular identity, all devices associated with that identity receive a silent push notification informing them of the change.

Set Up Your Account for Push Sync
Create an Amazon Simple Notification Service(Amazon SNS) App

Create and configure an Amazon SNS app for your supported platforms, as described in the SNS Developer Guide.
Enable Push Sync in the Amazon Cognito Console

You can enable Push Sync via the Amazon Cognito console. From the console home page:

1. Click the name of the identity pool for which you want to enable Push Sync. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Push synchronization to expand it.
4. In the Service role dropdown menu, select the IAM role that grants Cognito permission to send an SNS notification. Click Create role to create or modify the roles associated with your identity pool in the AWS IAM console.
5. Select a platform application, and then click Save Changes.
6. Grant SNS Access to Your Application.

In the IAM console, configure your IAM roles to have full SNS access, or create a new role that trusts cognito-sync and has full SNS access. To learn more about IAM roles, see Roles (Delegation and Federation).

Use Push Sync in Your App

To obtain a device token for your app, follow the Apple documentation on Registering for Remote Notifications. Once you've received the device token as an NSData object from APNs, you'll need to register the device with Amazon Cognito using the registerDevice: method of the sync client, as shown below:

```
let syncClient = AWSCognito.defaultCognito()
syncClient.registerDevice(devToken).continueWithBlock { (task: AWSTask!) ->
 AnyObject! in
    if (task.error != nil) {
        print("Unable to register device: " +
 task.error.localizedDescription)

    } else {
        print("Successfully registered device with id: \(task.result)")
    }
    return nil
}
```

In debug mode, your device will register with the APNs sandbox; in release mode, it will register with APNs. To receive updates from a particular dataset, use the `subscribe` method:

```
syncClient.openOrCreateDataset("MyDataset").subscribe().continueWithBlock
 { (task: AWSTask!) -> AnyObject! in
  if (task.error != nil) {
      print("Unable to subscribe to dataset: " +
 task.error.localizedDescription)

  } else {
      print("Successfully subscribed to dataset: \(task.result)")
  }
  return nil
}
```

To stop receiving push notifications from a dataset, simply call the `unsubscribe` method:

```
syncClient.openOrCreateDataset("MyDataset").unsubscribe().continueWithBlock
 { (task: AWSTask!) -> AnyObject! in
  if (task.error != nil) {
      print("Unable to unsubscribe to dataset: " +
 task.error.localizedDescription)

  } else {
      print("Successfully unsubscribed to dataset: \(task.result)")
  }
  return nil
}
```

To subscribe to all datasets in the `AWSCognito` object, call `subscribeAll`:

```
syncClient.openOrCreateDataset("MyDataset").subscribeAll().continueWithBlock
 { (task: AWSTask!) -> AnyObject! in
  if (task.error != nil) {
      print("Unable to subscribe to all datasets: " +
 task.error.localizedDescription)

  } else {
      print("Successfully subscribed to all datasets: \(task.result)")
  }
  return nil
}
```

Before calling `subscribeAll`, be sure to synchronize at least once on each dataset, so that the datasets exist on the server.

To react to push notifications, you need to implement the `didReceiveRemoteNotification` method in your app delegate:

```
func application(application: UIApplication, didReceiveRemoteNotification
 userInfo: [NSObject : AnyObject],
  fetchCompletionHandler completionHandler: (UIBackgroundFetchResult) ->
 Void) {

 NSNotificationCenter.defaultCenter().postNotificationName("CognitoPushNotification",
 object: userInfo)
})
```

If you post a notification using notification handler, you can then respond to the notification elsewhere in the application where you have a handle to your dataset. If you subscribe to the notification like this ...

```
NSNotificationCenter.defaultCenter().addObserver(observer:self,
   selector:"didReceivePushSync:",
   name:"CognitoPushNotification",
   object:nil)
```

...you can act on the notification like this:

```
func didReceivePushSync(notification: NSNotification) {
    if let data = (notification.object as! [String: AnyObject])["data"] as?
 [String: AnyObject] {
        let identityId = data["identityId"] as! String
        let datasetName = data["datasetName"] as! String

        if self.dataset.name == datasetName && self.identityId == identityId
 {
          dataset.synchronize().continueWithBlock {(task) -> AnyObject! in
              if task.error == nil {
                print("Successfully synced dataset")
              }
              return nil
          }
        }
    }
}
```

The following keys are available in the push notification payload:

- `source`: cognito-sync. This can serve as a differentiating factor between notifications.
- `identityPoolId`: The identity pool ID. This can be used for validation or additional information, though it's not integral from the receiver's point of view.
- `identityId`: The identity ID within the pool.

- `datasetName`: The name of the dataset that was updated. This is available for the sake of the `openOrCreateDataset` call.
- `syncCount`: The sync count for the remote dataset. You can use this as a way to make sure that the local dataset is out of date, and that the incoming synchronization is new.

JavaScript

Amazon Cognito automatically tracks the association between identity and devices. Using the push sync feature, you can ensure that every instance of a given identity is notified when identity data changes. Push sync ensures that, whenever the sync store data changes for a particular identity, all devices associated with that identity receive a silent push notification informing them of the change.

Note
Push sync is not supported by the JavaScript SDK. To learn how push sync works with other SDKs, please select another platform.

Unity

Amazon Cognito automatically tracks the association between identity and devices. Using the push sync feature, you can ensure that every instance of a given identity is notified when identity data changes. Push sync ensures that, whenever the sync store data changes for a particular identity, all devices associated with that identity receive a silent push notification informing them of the change.

Note
Push sync is not supported by the Unity SDK. To learn how push sync works with other SDKs, please select another platform.

Xamarin

Amazon Cognito automatically tracks the association between identity and devices. Using the push sync feature, you can ensure that every instance of a given identity is notified when identity data changes. Push sync ensures that, whenever the sync store data changes for a particular identity, all devices associated with that identity receive a silent push notification informing them of the change.

Note
Push sync is not supported by the Xamarin SDK. To learn how push sync works with other SDKs, please select another platform.

Amazon Cognito Streams

Amazon Cognito Streams gives developers control and insight into their data stored in Amazon Cognito. Developers can now configure an Amazon Kinesis stream to receive events as data is updated and synchronized. Amazon Cognito can push each dataset change to an Amazon Kinesis stream you own in real time.

Using Amazon Cognito Streams, you can move all of your Sync data to Amazon Kinesis, which can then be streamed to a data warehouse tool such as Amazon Redshift for further analysis. To learn more about Amazon Kinesis, see Getting Started Using Amazon Kinesis.

Configuring Streams

You can set up Amazon Cognito Streams in the Amazon Cognito console. To enable Amazon Cognito Streams in the Amazon Cognito console, you need to select the Amazon Kinesis stream to publish to and an IAM role that grants Amazon Cognito permission to put events in the selected stream.

From the console home page:

1. Click the name of the identity pool for which you want to set up Amazon Cognito Streams. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Cognito Streams to expand it.
4. In the Stream name dropdown menu, select the name of an existing Kinesis stream. Alternatively, click Create stream to create one, entering a stream name and the number of shards. To learn about shards and for help on estimating the number of shards needed for your stream, see the Amazon Kinesis Developer Guide.
5. In the Publish role dropdown menu, select the IAM role that grants Amazon Cognito permission to publish your stream. Click Create role to create or modify the roles associated with your identity pool in the AWS IAM Console.
6. In the Stream status dropdown menu, select Enabled to enable the stream updates. Click Save Changes.

After you've successfully configured Amazon Cognito streams, all subsequent updates to datasets in this identity pool will be sent to the stream.

Stream Contents

Each record sent to the stream represents a single synchronization. Here is an example of a record sent to the stream:

```
{
    "identityPoolId": "Pool Id",
    "identityId": "Identity Id",
    "dataSetName": "Dataset Name",
    "operation": "(replace|remove)",
    "kinesisSyncRecords": [
        {
            "key": "Key",
            "value": "Value",
            "syncCount": 1,
            "lastModifiedDate": 1424801824343,
            "deviceLastModifiedDate": 1424801824343,
            "op": "(replace|remove)"
        },
        ...
    ],
    "lastModifiedDate": 1424801824343,
    "kinesisSyncRecordsURL": "S3Url",
    "payloadType": "(S3Url|Inline)",
    "syncCount": 1
}
```

For updates that are larger than the Amazon Kinesis maximum payload size of 50 KB, a presigned Amazon S3 URL will be included that contains the full contents of the update. Now that you have updates to your data streaming, what about your existing data?

Bulk Publishing

Once you have configured Amazon Cognito streams, you will be able to execute a bulk publish operation for the existing data in your identity pool. After you initiate a bulk publish operation, either via the console or directly via the API, Amazon Cognito will start publishing this data to the same stream that is receiving your updates.

Amazon Cognito does not guarantee uniqueness of data sent to the stream when using the bulk publish operation. You may receive the same update both as an update as well as part of a bulk publish. Keep this in mind when processing the records from your stream.

To bulk publish all of your streams, follow steps 1-6 under Configuring Streams and then click Start bulk publish. You are limited to one ongoing bulk publish operation at any given time and to one successful bulk publish request every 24 hours.

Amazon Cognito Events

Amazon Cognito Events allows you to execute an AWS Lambda function in response to important events in Amazon Cognito. Amazon Cognito raises the Sync Trigger event when a dataset is synchronized. You can use the Sync Trigger event to take an action when a user updates data. The function can evaluate and optionally manipulate the data before it is stored in the cloud and synchronized to the user's other devices. This is useful to validate data coming from the device before it is synchronized to the user's other devices, or to update other values in the dataset based on incoming data such as issuing an award when a player reaches a new level.

The steps below will guide you through setting up a Lambda function that executes each time a Amazon Cognito Dataset is synchronized.

Creating a Function in AWS Lambda

To integrate Lambda with Amazon Cognito, you first need to create a function in Lambda. To do so:

Selecting the Lambda Function in Amazon Cognito

1. Open the Lambda console.
2. Click Create a Lambda function.
3. On the Select blueprint screen, search for and select "cognito-sync-trigger."
4. On the Configure event sources screen, leave the Event source type set to "Cognito Sync Trigger" and select your identity pool. Click Next.
5. On the Configure function screen, enter a name and description for your function. Leave Runtime set to "Node.js." Leave the code unchanged for our example. The default example makes no changes to the data being synced. It only logs the fact that the Amazon Cognito Sync Trigger event occurred. Leave Handler name set to "index.handler." For Role, select an IAM role that grants your code permission to access AWS Lambda. To modify roles, see the IAM console. Leave Advanced settings unchanged. Click Next.
6. On the Review screen, review the details and click Create function. The next page displays your new Lambda function.

Now that you have an appropriate function written in Lambda, you need to choose that function as the handler for the Amazon Cognito Sync Trigger event. The steps below walk you through this process.

From the console home page:

Now, your Lambda function will be executed each time a dataset is synchronized. The next section explains how you can read and modify the data in your function as it is being synchronized.

1. Click the name of the identity pool for which you want to set up Amazon Cognito Events. The Dashboard page for your identity pool appears.
2. In the top-right corner of the Dashboard page, click Edit identity pool. The Edit identity pool page appears.
3. Scroll down and click Cognito Events to expand it.

4. In the Sync Trigger dropdown menu, select the Lambda function that you want to trigger when a Sync event occurs.
5. Click Save Changes.

Writing a Lambda Function for Sync Triggers

Sync triggers follow the service provider interface programming paradigm. Amazon Cognito will provide input in the following JSON format to your Lambda function.

```
{
  "version": 2,
  "eventType": "SyncTrigger",
  "region": "us-east-1",
  "identityPoolId": "identityPoolId",
  "identityId": "identityId",
  "datasetName": "datasetName",
  "datasetRecords": {
    "SampleKey1": {
      "oldValue": "oldValue1",
      "newValue": "newValue1",
      "op": "replace"
    },
    "SampleKey2": {
      "oldValue": "oldValue2",
      "newValue": "newValue2",
      "op": "replace"
    },..
  }
}
```

Amazon Cognito expects the return value of the function in the same format as the input. A complete example is provided below.

Some key points to keep in mind when writing functions for the Sync Trigger event:

- When your Lambda function is invoked during UpdateRecords, it must respond within 5 seconds. If it does not, the Amazon Cognito Sync service throws a `LambdaSocketTimeoutException` exception. It is not possible to increase this timeout value.
- Amazon Cognito will provide all the records present in the dataset as input to the function.
- Records updated by the app user will have the 'op' field set as “replace” and the records deleted will have 'op' field as "remove".
- You can modify any record, even if it is not updated by the app user.
- All the fields except the datasetRecords are read only and should not be changed. Changing these fields will result in a failure to update the records.
- To modify the value of a record, simply update the value and set the 'op' to "replace".
- To remove a record, either set the ‘op’ to remove or set the value to null.
- To add a record, simply add a new record to the datasetRecords array.
- Any omitted record in the response will be ignored for the update.

Sample Lambda Function

Here is a sample Lambda function showing how to access, modify and remove the data.

```
console.log('Loading function');
```

```
exports.handler = function(event, context) {
    console.log(JSON.stringify(event, null, 2));

    //Check for the event type
    if (event.eventType === 'SyncTrigger') {

        //Modify value for a key
        if('SampleKey1' in event.datasetRecords){
            event.datasetRecords.SampleKey1.newValue = 'ModifyValue1';
            event.datasetRecords.SampleKey1.op = 'replace';
        }

        //Remove a key
        if('SampleKey2' in event.datasetRecords){
            event.datasetRecords.SampleKey2.op = 'remove';
        }

        //Add a key
        if(!('SampleKey3' in event.datasetRecords)){
            event.datasetRecords.SampleKey3={'newValue':'ModifyValue3',
 'op' : 'replace'};
        }

    }
    context.done(null, event);
};
```

Logging Amazon Cognito API Calls with AWS CloudTrail

Amazon Cognito is integrated with AWS CloudTrail, a service that captures specific API calls and delivers log files of the calls to an S3 bucket that you specify. CloudTrail captures API calls made from the Amazon Cognito console or from your code to the Amazon Cognito APIs. With the information collected by CloudTrail, you can determine which request was made to Amazon Cognito, the IP address from which the request was made, who made the request, when it was made, and so on.

To learn more about CloudTrail, including how to configure and enable it, see the *AWS CloudTrail User Guide*.

You can also create Amazon CloudWatch alarms for specific CloudTrail events. For example, you can set up CloudWatch to trigger an alarm if an identity pool configuration is changed. For more information, see Creating CloudWatch Alarms for CloudTrail Events: Examples.

Amazon Cognito Information in CloudTrail

When CloudTrail logging is enabled in your AWS account, API calls made to specific Amazon Cognito actions are tracked in CloudTrail log files, where they are written with other AWS service records. CloudTrail determines when to create and write to a new file based on a time period and file size.

The following actions are supported:

Amazon Cognito Your User Pools

- AddCustomAttributes
- CreateUserImportJob
- CreateUserPool
- CreateUserPoolClient
- DeleteUserPool
- DeleteUserPoolClient
- DescribeUserImportJob
- DescribeUserPool
- DescribeUserPoolClient
- GetCSVHeader

- ListUserImportJobs
- ListUserPoolClients
- ListUserPools
- StartUserImportJob
- StopUserImportJob
- UpdateUserPool
- UpdateUserPoolClient

Amazon Cognito Federated Identities

- CreateIdentityPool
- DeleteIdentityPool
- DescribeIdentityPool
- GetIdentityPoolRoles
- ListIdentityPools
- SetIdentityPoolRoles
- UpdateIdentityPool

Amazon Cognito Sync

- BulkPublish
- DescribeIdentityPoolUsage
- GetBulkPublishDetails
- GetCognitoEvents
- GetIdentityPoolConfiguration
- ListIdentityPoolUsage
- SetCognitoEvents
- SetIdentityPoolConfiguration

Every log entry contains information about who generated the request. The user identity information in the log helps you determine whether the request was made with root or AWS Identity and Access Management (IAM) user credentials, with temporary security credentials for a role or federated user, or by another AWS service. For more information, see the CloudTrail userIdentity Element.

You can store log files in your S3 bucket for as long as you want, but you can also define Amazon Simple Storage Service (Amazon S3) lifecycle rules to archive or delete log files automatically. By default, your log files are encrypted by using Amazon S3 server-side encryption (SSE).

If you want to take quick action upon log file delivery, you can have CloudTrail publish Amazon Simple Notification Service (Amazon SNS) notifications when new log files are delivered. For more information, see Configuring Amazon SNS Notifications.

You can also aggregate Amazon Cognito log files from multiple AWS regions and multiple AWS accounts into a single S3 bucket. For more information, see Receiving CloudTrail Log Files From Multiple Regions.

Understanding Amazon Cognito Log File Entries

CloudTrail log files contain one or more log entries, where each entry lists multiple JSON-formatted events. A log entry represents a single request from any source and includes information about the requested operation, including the date and time of the operation, request parameters, and so on. Log entries are not an ordered stack trace of the public API calls, so they do not appear in any specific order.

The following example is a log entry for a request for the `CreateIdentityPool` action. The request was made by an IAM user named Alice.

```
{
         "eventVersion":"1.03",
         "userIdentity":{
            "type":"IAMUser",
            "principalId":"PRINCIPAL_ID",
            "arn":"arn:aws:iam::123456789012:user/Alice",
            "accountId":"123456789012",
            "accessKeyId":"['EXAMPLE_KEY_ID']",
            "userName":"Alice"
         },
         "eventTime":"2016-01-07T02:04:30Z",
         "eventSource":"cognito-identity.amazonaws.com",
         "eventName":"CreateIdentityPool",
         "awsRegion":"us-east-1",
         "sourceIPAddress":"127.0.0.1",
         "userAgent":"USER_AGENT",
         "requestParameters":{
            "identityPoolName":"TestPool",
            "allowUnauthenticatedIdentities":true,
            "supportedLoginProviders":{
               "graph.facebook.com":"000000000000000"
            }
         },
         "responseElements":{
            "identityPoolName":"TestPool",
            "identityPoolId":"us-
east-1:1cf667a2-49a6-454b-9e45-23199EXAMPLE",
            "allowUnauthenticatedIdentities":true,
            "supportedLoginProviders":{
               "graph.facebook.com":"000000000000000"
            }
         },
         "requestID":"15cc73a1-0780-460c-91e8-e12ef034e116",
         "eventID":"f1d47f93-c708-495b-bff1-cb935a6064b2",
         "eventType":"AwsApiCall",
         "recipientAccountId":"123456789012"
      }
```

Limits in Amazon Cognito

The following tables describe limits within Amazon Cognito. For information about limits that can be changed, see AWS Service Limits.

Limits in Amazon Cognito User Pools

Max number of apps per user pool	25
Max number of user pools per account	60
Max characters per attribute	2048 bytes
Max character length for custom attribute name	20

Limits in Cognito Identity

Max number of identity pools per account	60
Max number of identities per identity pool	Unlimited
Max character length for identity pool name	128 bytes
Max character length for login provider name	2048 bytes
Max number of results from a single List/Lookup API call	60

Limits in Cognito Sync

Max number of datasets per identity	20
Max number of records per dataset	1024
Max size of a single dataset	1 MB
Max character length for dataset name	128 bytes

Minimum waiting time for a bulk publish after a successful request	24 hours

Resource Permissions

This article covers restricting access to Amazon Cognito resources via IAM. If you are trying to define access permissions for your application's users, please refer to the Federated Identities Concepts (p. 107) for further details.

Amazon Resource Names

Identity

For Amazon Cognito Identity, it is possible to restrict an IAM user's access to a specific identity pool, using the Amazon Resource Name (ARN) format:

Identity Pool

```
arn:aws:cognito-identity:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID
```

The identity pool id will also include a region prefix, meaning an ARN for an identity pool in the US (N. Virginia) region will have the format:

```
arn:aws:cognito-identity:us-east-1:0123456789:identitypool/us-
east-1:1a1a1a1a-ffff-1111-9999-12345678
```

Sync

For Amazon Cognito Sync, customers can also restrict access by the identity pool, and by other resources as well.

Identity Pool

When accessing Amazon Cognito Sync, the ARN for the identity pool will have a slightly different format:

```
arn:aws:cognito-sync:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID
```

Identity

For APIs that operate on a single identity (for instance RegisterDevice), you can refer to the individual identity by the following ARN:

```
arn:aws:cognito-sync:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID/
identity/IDENTITY_ID
```

Dataset

For APIs that operate datasets (for instance UpdateRecords and ListRecords), you can refer to the individual dataset by the following ARN:

```
arn:aws:cognito-sync:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID/
identity/IDENTITY_ID/dataset/DATASET_NAME
```

Example Policies

Restricting Console Access to a Specific Identity Pool

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "cognito-identity:ListIdentityPools"
      ],
      "Resource": "*"
    },
    {
      "Effect": "Allow",
      "Action": [
        "cognito-identity:*"
      ],
      "Resource": "arn:aws:cognito-identity:us-
east-1:0123456789:identitypool/us-east-1:1a1a1a1a-ffff-1111-9999-12345678"
    },
    {
      "Effect": "Allow",
      "Action": [
        "cognito-sync:*"
      ],
      "Resource": "arn:aws:cognito-sync:us-east-1:0123456789:identitypool/us-
east-1:1a1a1a1a-ffff-1111-9999-12345678"
    }
  ]
}
```

Allow Access to Specific Dataset for All Identities in a Pool

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "cognito-sync:ListRecords",
        "cognito-sync:UpdateRecords"
      ],
      "Resource": "arn:aws:cognito-sync:us-east-1:0123456789:identitypool/us-
east-1:1a1a1a1a-ffff-1111-9999-12345678/identity/*/dataset/UserProfile"
    }
  ]
}
```

Managed Policies

A number of policies are available via the IAM Console that customers can use to grant access to Amazon Cognito:

- AmazonCognitoPowerUser - Permissions for accessing and managing all aspects of your identity pools.
- AmazonCognitoReadOnly - Permissions for read only access to your identity pools.
- AmazonCognitoDeveloperAuthenticatedIdentities - Permissions for your authentication system to integrate with Amazon Cognito.

These policies are maintained by the Amazon Cognito team, so even as new APIs are added your IAM users will continue to have the same level of access.

Signed v. Unsigned APIs

APIs that are signed with AWS credentials are capable of being restricted via an IAM policy. The following Cognito APIs are unsigned, and therefor cannot be restricted via an IAM policy:

- `GetId`
- `GetOpenIdToken`
- `GetCredentialsForIdentity`
- `UnlinkIdentity`

Using the Amazon Cognito Console

This guide provides a short introduction to working with the Amazon Cognito console.

What is the Amazon Cognito Console?

You can use the Amazon Cognito console to manage your application's interaction with Amazon Cognito. The console provides an intuitive user interface for performing many Amazon Cognito tasks, such as creating and managing identity pools, browsing the identities of your users, viewing the number of data syncs for your application, and so on.

The Amazon Cognito console is a part of the AWS Management Console, which provides information about your account and about billing. For more information on using the AWS Management Console, see Working with the AWS Management Console.

Delete an Identity Pool

From the Console home page:

1. Click the name of the identity pool that you want to delete. The **Dashboard page** for your identity pool appears.
2. In the top-right corner of the Dashboard page, click **Edit identity pool**. The **Edit identity pool** page appears.
3. Scroll down and click **Delete identity pool** to expand it.
4. Click **Delete identity pool**.
5. Click **Delete pool**.

Warning
When you click the delete button, you will permanently delete your identity pool and all the user data it contains. Deleting an identity pool will cause applications and other services utilizing the identity pool to stop working.

Delete an Identity from an Identity Pool

From the Console home page:

1. Click the name of the identity pool that contains the identity that you want to delete. The **Dashboard page** for your identity pool appears.
2. In the left-hand navigation on the Dashboard page, click **Identity browser**. The **Identities** page appears.
3. On the **Identities** page, enter the identity ID that you want to delete and then click **Search**.
4. On the **Identity details** page, click the **Delete identity** button, and then click **Delete**.

Enable or edit authentication providers

If you allow your users to authenticate using public identity providers (e.g. Facebook, Twitter, Amazon), you can specify your application identifiers in the Amazon Cognito Console. This associates the application ID (provided by the public login provider) with your identity pool.

> **Warning**
> Changing the application ID to which your identity pool is linked will disable existing users from authenticating with Amazon Cognito. Learn more about External Identity Providers (p. 122).

From the Console home page:

1. Click the name of the identity pool for which you want to enable the external provider. The **Dashboard page** for your identity pool appears.
2. In the top-right corner of the Dashboard page, click **Edit identity pool**. The **Edit identity pool** page appears.
3. Scroll down and click **Authentication providers** to expand it.
4. Click the tab for the appropriate provider and enter the required information associated with that authentication provider.

Change the role associated with an identity type

Amazon Cognito defines two types of identities: authenticated and unauthenticated. Every identity in your identity pool is either authenticated and unauthenticated. Authenticated identities belong to users who are authenticated by a public login provider (Facebook, Amazon, Google, Twitter/Digits, or any OpenID Connect Providers) or a developer provider (your own backend authentication process). Unauthenticated identities typically belong to guest users.

For each identity type, there is an assigned role. This role has a policy attached to it which dictates which AWS services that role can access. When Amazon Cognito receives a request, the service will determine the identity type, determine the role assigned to that identity type, and use the policy attached to that role to respond. By modifying a policy or assigning a different role to an identity type, you can control which AWS services an identity type can access. To view or modify the policies associated with the roles in your identity pool, see the AWS IAM Console.

You can easily change which role is associated with an identity type using the Amazon Cognito Console. From the Console home page:

1. Click the name of the identity pool for which you want to modify roles. The **Dashboard page** for your identity pool appears.
2. In the top-right corner of the Dashboard page, click **Edit identity pool**. The **Edit identity pool** page appears.
3. Use the dropdown menus next to **Unauthenticated role** and **Authenticated role** to change roles. Click **Create new role** to create or modify the roles associated with each identity type in the AWS IAM console. For more information, see IAM Roles.

Enable or disable unauthenticated identities

Amazon Cognito can support unauthenticated identities by providing a unique identifier and AWS credentials for users who do not authenticate with an identity provider. If your application allows users who do not log in, you can enable access for unauthenticated identities. To learn more, see Identity Pools (p. 106).

From the Console home page:

1. Click the name of the identity pool for which you want to enable or disable unauthenticated identities. The **Dashboard page** for your identity pool appears.
2. In the top-right corner of the Dashboard page, click **Edit identity pool**. The **Edit identity pool** page appears.
3. Scroll down and click **Unauthenticated identities** to expand it.
4. Select the checkbox to enable or disable access to unauthenticated identities.
5. Click **Save Changes**.

Managing Datasets in the Amazon Cognito Console

If you have implemented Amazon Cognito Sync functionality in your application, the Amazon Cognito console enables you to manually create and delete datasets and records for individual identities. Any change you make to an identity's dataset or records in the Amazon Cognito console will not be saved until you click Synchronize in the console and will not be visible to the end user until the identity calls synchronize.

Create a Dataset for an Identity

From the Amazon Cognito console home page:

1. Click the name of the identity pool that contains the identity for which you want to create a dataset. The **Dashboard page** for your identity pool appears.
2. In the left-hand navigation on the Dashboard page, click **Identity browser**. The **Identities** page appears.
3. On the **Identities** page, enter the identity ID for which you want to create a dataset, and then click **Search**.
4. On the **Identity details** page for that identity, click the **Create dataset** button, enter a dataset name, and then click **Create and edit dataset**.
5. On the **Current dataset** page, click **Create record** to create a record to store in that dataset.
6. Enter a key for that dataset, the valid JSON value or values to store, and then click **Format as JSON** to prettify the value you entered and to confirm that it is well-formed JSON. When finished, click **Save Changes**.
7. Click **Synchronize** to synchronize the dataset. Your changes will not be saved until you click Synchronize and will not be visible to the user until the identity calls synchronize. To discard unsynchronized changes, select the change you wish to discard, and then click **Discard changes**.

Delete a Dataset Associated with an Identity

From the Amazon Cognito console home page:

1. Click the name of the identity pool that contains the identity for which you want to delete a dataset. The **Dashboard page** for your identity pool appears.
2. In the left-hand navigation on the Dashboard page, click **Identity browser**. The **Identities** page appears.
3. On the **Identities** page, enter the identity ID containing the dataset which you want to delete, and then click **Search**.
4. On the **Identity details** page, select the checkbox next to the dataset or datasets that you want to delete, click **Delete selected**, and then click **Delete**.

Set Up Amazon Cognito Streams

Amazon Cognito Streams gives developers control and insight into their data stored in Amazon Cognito. Developers can now configure an Amazon Kinesis stream to receive events as data. Amazon Cognito can push each dataset change to an Amazon Kinesis stream you own in real time. For instructions on how to set up Amazon Cognito Streams in the Amazon Cognito console, see Amazon Cognito Streams (p. 189).

Bulk Publish Data

Bulk publish can be used to export data already stored in your Amazon Cognito Sync store to an Amazon Kinesis stream. For instructions on how to bulk publish all of your streams, see Amazon Cognito Streams (p. 189).

Enable Push Synchronization

Amazon Cognito automatically tracks the association between identity and devices. Using the push sync feature, you can ensure that every instance of a given identity is notified when identity data changes. Push sync ensures that, whenever the sync store data changes for a particular identity, all devices associated with that identity receive a silent push notification informing them of the change.

You can enable Push Sync via the Amazon Cognito console. From the console home page:

1. Click the name of the identity pool for which you want to enable Push Sync. The **Dashboard page** for your identity pool appears.
2. In the top-right corner of the Dashboard page, click **Edit identity pool**. The **Edit identity pool** page appears.
3. Scroll down and click **Push synchronization** to expand it.
4. In the **Service role** dropdown menu, select the IAM role that grants Amazon Cognito permission to send an SNS notification. Click **Create role** to create or modify the roles associated with your identity pool in the AWS IAM console.
5. Select a platform application, and then click **Save Changes**.

Set Up Amazon Cognito Events

Amazon Cognito Events allows you to execute an AWS Lambda function in response to important events in Amazon Cognito. Amazon Cognito raises the Sync Trigger event when a dataset is synchronized. You can use the Sync Trigger event to take an action when a user updates data. For instructions on setting up Amazon Cognito Events from the console, see Amazon Cognito Events (p. 191).

To learn more about AWS Lambda, see AWS Lambda.

Document History for Amazon Cognito

The following table describes the documentation for this release of Amazon Cognito.

- **API versions:**

  Amazon Cognito Your User Pools: 2016-04-18

  Amazon Cognito Identity: 2014-06-30

  Amazon Cognito Sync: 2014-06-30
- **Latest documentation update:** November 18, 2016

Change	Description	Date
Documentation update	Updated iOS code examples in Developer Authenticated Identities (p. 146).	November 18, 2016
Documentation update	Added information about confirmation flow for user accounts. For more information, see Signing Up and Confirming User Accounts (p. 92).	November 9, 2016
Create user accounts feature	Added administrative capability to create user accounts through the Amazon Cognito console and the API. For more information, see Creating User Accounts in the AWS Management Console and with the Amazon Cognito User Pools API (p. 79).	October 6, 2016
Documentation update	Updated examples that show how to use AWS Lambda triggers with user pools. For more information, see	September 27, 2016

Change	Description	Date
	Customizing User Pool Workflows by Using AWS Lambda Triggers (p. 64).	
User import feature	Added bulk import capability for Your User Pools. Use this feature to migrate users from your existing identity provider to an Amazon Cognito user pool. For more information, see Importing Users into Your User Pools (p. 82).	September 1, 2016
General availability of Your User Pools	Added the Your User Pools feature. Use this feature to create and maintain a user directory and add sign-up and sign-in to your mobile app or web application using user pools. For more information, see Creating and Managing User Pools (p. 10).	July 28, 2016
SAML support	Added support for authentication with identity providers through Security Assertion Markup Language 2.0 (SAML 2.0). For more information, see SAML Identity Provider (p. 144).	June 23, 2016
CloudTrail integration	Added integration with AWS CloudTrail. For more information, see Logging Amazon Cognito API Calls with AWS CloudTrail (p. 194).	February 18, 2016
Twitter support	Provides support for Twitter as an external identity provider. For more information, see External Identity Providers (p. 122).	April 30, 2015
Integration of events with Lambda	Enables you to execute an AWS Lambda function in response to important events in Amazon Cognito. For more information, see Amazon Cognito Events (p. 191).	April 9, 2015
Data stream to Amazon Kinesis	Provides control and insight into your data streams. For more information, see Amazon Cognito Streams (p. 189).	March 4, 2015

Change	Description	Date
Push synchronization	Enables support for silent push synchronization. For more information, see Amazon Cognito Sync (p. 161).	November 6, 2014
OpenID connect support	Enables support for OpenID Connect providers. For more information, see External Identity Providers (p. 122).	October 23, 2014
Developer-authenticated identities support added	Enables developers who own their own authentication and identity management systems to be treated as an identity provider in Amazon Cognito. For more information, see Developer Authenticated Identities (p. 146).	September 29, 2014
Amazon Cognito general availability		July 10, 2014

AWS Glossary

For the latest AWS terminology, see the AWS Glossary in the *AWS General Reference*.