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# Amazon Cognito

## Developer Guide



## **Amazon Cognito: Developer Guide**

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# What Is Amazon Cognito?

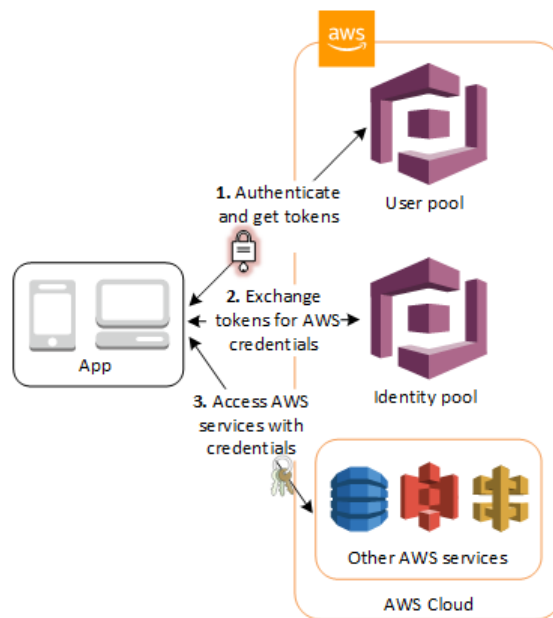
Amazon Cognito provides authentication, authorization, and user management for your web and mobile apps. Your users can sign in directly with a user name and password, or through a third party such as Facebook, Amazon, or Google.

The two main components of Amazon Cognito are user pools and identity pools. User pools are user directories that provide sign-up and sign-in options for your app users. Identity pools enable you to grant your users access to other AWS services. You can use identity pools and user pools separately or together.

## An Amazon Cognito user pool and identity pool used together

See the diagram for a common Amazon Cognito scenario. Here the goal is to authenticate your user, and then grant your user access to another AWS service.

1. In the first step your app user signs in through a user pool and receives user pool tokens after a successful authentication.
2. Next, your app exchanges the user pool tokens for AWS credentials through an identity pool.
3. Finally, your app user can then use those AWS credentials to access other AWS services such as Amazon S3 or DynamoDB.



For more examples using identity pools and user pools, see [Common Amazon Cognito Scenarios \(p. 6\)](#).

Amazon Cognito is compliant with SOC 1-3, PCI DSS, ISO 27001, and is HIPAA-BAA eligible. For more information, see [AWS Services in Scope](#). See also [Regional Data Considerations \(p. 4\)](#).

## Topics

- [Features of Amazon Cognito \(p. 2\)](#)
- [Getting Started with Amazon Cognito \(p. 2\)](#)

- [Pricing for Amazon Cognito \(p. 3\)](#)
- [Using the Amazon Cognito Console \(p. 3\)](#)
- [Regional Data Considerations \(p. 4\)](#)

## Features of Amazon Cognito

### User pools

A user pool is a user directory in Amazon Cognito. With a user pool, your users can sign in to your web or mobile app through Amazon Cognito, or federate through a third-party identity provider (IdP). Whether your users sign in directly or through a third party, all members of the user pool have a directory profile that you can access through an SDK.

User pools provide:

- Sign-up and sign-in services.
- A built-in, customizable web UI to sign in users.
- Social sign-in with Facebook, Google, and Login with Amazon, and through SAML and OIDC identity providers from your user pool.
- User directory management and user profiles.
- Security features such as multi-factor authentication (MFA), checks for compromised credentials, account takeover protection, and phone and email verification.
- Customized workflows and user migration through AWS Lambda triggers.

For more information about user pools, see [Getting Started with User Pools \(p. 14\)](#) and the [Amazon Cognito User Pools API Reference](#).

### Identity pools

With an identity pool, your users can obtain temporary AWS credentials to access AWS services, such as Amazon S3 and DynamoDB. Identity pools support anonymous guest users, as well as the following identity providers that you can use to authenticate users for identity pools:

- Amazon Cognito user pools
- Social sign-in with Facebook, Google, and Login with Amazon
- OpenID Connect (OIDC) providers
- SAML identity providers
- Developer authenticated identities

To save user profile information, your identity pool needs to be integrated with a user pool.

For more information about identity pools, see [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\) \(p. 219\)](#) and the [Amazon Cognito Identity Pools API Reference](#).

## Getting Started with Amazon Cognito

For a guide to top tasks and where to start, see [Getting Started with Amazon Cognito \(p. 5\)](#).

For videos, articles, documentation, and sample apps, see [Amazon Cognito Developer Resources](#).

To use Amazon Cognito, you need an AWS account. For more information, see [Using the Amazon Cognito Console \(p. 3\)](#).



# Pricing for Amazon Cognito

For information about Amazon Cognito pricing, see [Amazon Cognito Pricing](#).

## Using the Amazon Cognito Console

You can use the [Amazon Cognito console](#) to create and manage user pools and identity pools.

### To use the Amazon Cognito console

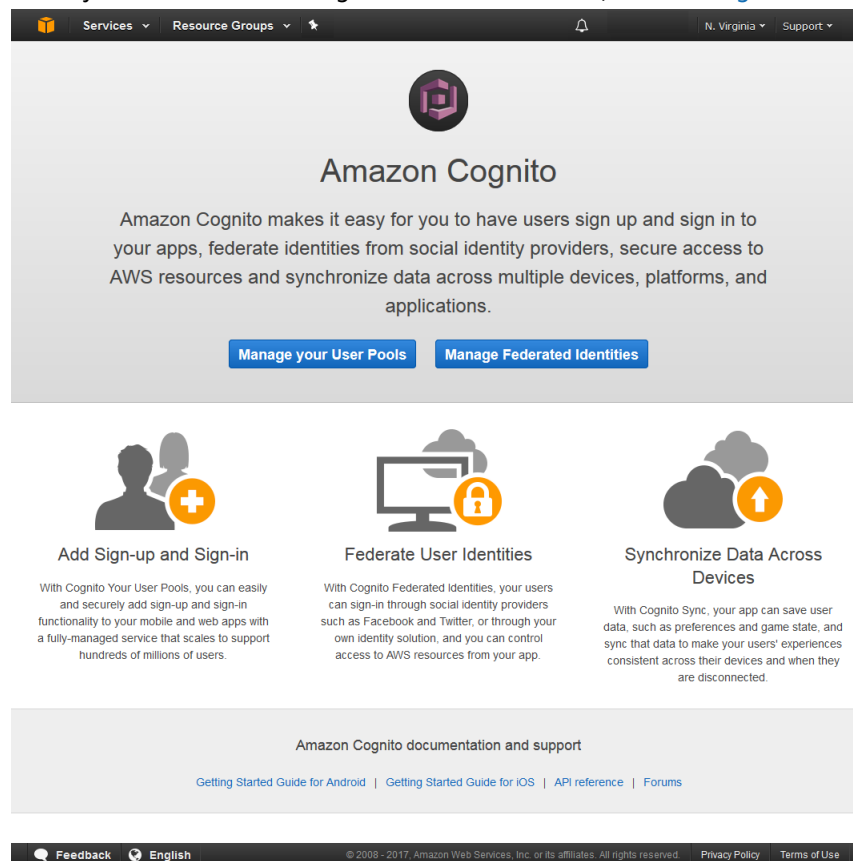
1. To use Amazon Cognito, you need to [sign up for an AWS account](#).
2. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
3. To create or edit a user pool, choose **Manage your User Pools**.

For more information, see [Getting Started with User Pools \(p. 14\)](#).

4. To create or edit an identity pool, choose **Manage Federated Identities**.

For more information, see [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\) \(p. 219\)](#).

The Amazon Cognito console is a part of the AWS Management Console, which provides information about your account and billing. For more information, see [Working with the AWS Management Console](#).



## Regional Data Considerations

Amazon Cognito user pools are each created in one AWS Region, and they store the user profile data only in that region. They can send user data to a different AWS Region, depending on how optional features are configured.

- If the default no-reply@verificationemail.com email address setting is used for routing verification of emails addresses with Amazon Cognito user pools, emails are routed through the US West (Oregon) Region.
- If a different email address is used to configure Amazon Simple Email Service (Amazon SES) with Amazon Cognito user pools, that email address is routed through the AWS Region associated with the email address in Amazon SES.
- SMS messages from Amazon Cognito user pools are routed through the closest AWS Region that's supported by Amazon SNS worldwide SMS delivery.
- If Amazon Pinpoint analytics are used with Amazon Cognito user pools, the event data is routed to the US East (N. Virginia) Region.

# Getting Started with Amazon Cognito

This section describes the top Amazon Cognito tasks and where to start. For an overview of Amazon Cognito, see [What Is Amazon Cognito? \(p. 1\)](#).

The two main components of Amazon Cognito are user pools and identity pools. User pools are user directories that provide sign-up and sign-in options for your web and mobile app users. Identity pools provide AWS credentials to grant your users access to other AWS services. You can use user pools and identity pools separately or together.

Top Tasks and Where to Start
Add Sign-up and Sign-in with a User Pool
<ol style="list-style-type: none"><li>1. <a href="#">Create a user directory with a user pool.</a></li><li>2. <a href="#">Add an app to enable the hosted UI.</a></li><li>3. <a href="#">Add social sign-in to a user pool.</a></li><li>4. <a href="#">Add sign-in through SAML-based identity providers (IdPs) to a user pool.</a></li><li>5. <a href="#">Add sign-in through OpenID Connect (OIDC) IdPs to a user pool.</a></li><li>6. <a href="#">Install a user pool SDK.</a></li><li>7. <a href="#">Customize the built-in hosted web UI sign-in and sign-up pages.</a></li><li>8. <a href="#">Configure user pool security features.</a></li><li>9. <a href="#">Customize user pool workflows with Lambda triggers.</a></li><li>10. <a href="#">Gather data and target campaigns with Amazon Pinpoint analytics.</a></li></ol>
Manage Users in a User Pool
<ul style="list-style-type: none"><li>• <a href="#">Sign up and confirm user accounts.</a></li><li>• <a href="#">Create user accounts as administrator.</a></li><li>• <a href="#">Manage and search user accounts.</a></li><li>• <a href="#">Add groups to a user pool.</a></li><li>• <a href="#">Import users into a user pool.</a></li></ul>
Access Resources
Common Amazon Cognito scenarios: <ul style="list-style-type: none"><li>• <a href="#">Authenticate with a user pool.</a></li><li>• <a href="#">Access backend resources through a user pool.</a></li><li>• <a href="#">Access API Gateway and Lambda through a user pool.</a></li><li>• <a href="#">Access AWS services with a user pool and an identity pool.</a></li><li>• <a href="#">Access AWS services through a third party and an identity pool.</a></li><li>• <a href="#">Access AWS AppSync resources through a user pool or an identity pool.</a></li></ul>

# Common Amazon Cognito Scenarios

This topic describes six common scenarios for using Amazon Cognito.

The two main components of Amazon Cognito are user pools and identity pools. User pools are user directories that provide sign-up and sign-in options for your web and mobile app users. Identity pools provide AWS credentials to grant your users access to other AWS services.

A user pool is a user directory in Amazon Cognito. Your app users can sign in either directly through a user pool, or federate through a third-party identity provider (IdP). The user pool manages the overhead of handling the tokens that are returned from social sign-in through Facebook, Google, and Amazon, and from OpenID Connect (OIDC) and SAML IdPs. Whether your users sign in directly or through a third party, all members of the user pool have a directory profile that you can access through an SDK.

With an identity pool, your users can obtain temporary AWS credentials to access AWS services, such as Amazon S3 and DynamoDB. Identity pools support anonymous guest users, as well as federation through third-party IdPs.

## Topics

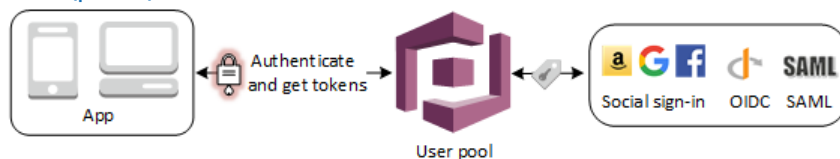
- [Authenticate with a User Pool \(p. 6\)](#)
- [Access Your Server-side Resources with a User Pool \(p. 6\)](#)
- [Access Resources with API Gateway and Lambda with a User Pool \(p. 7\)](#)
- [Access AWS Services with a User Pool and an Identity Pool \(p. 8\)](#)
- [Authenticate with a Third Party and Access AWS Services with an Identity Pool \(p. 8\)](#)
- [Access AWS AppSync Resources with Amazon Cognito \(p. 9\)](#)

## Authenticate with a User Pool

You can enable your users to authenticate with a user pool. Your app users can sign in either directly through a user pool, or federate through a third-party identity provider (IdP). The user pool manages the overhead of handling the tokens that are returned from social sign-in through Facebook, Google, and Amazon, and from OpenID Connect (OIDC) and SAML IdPs.

After a successful authentication, your web or mobile app will receive user pool tokens from Amazon Cognito. You can use those tokens to retrieve AWS credentials that allow your app to access other AWS services, or you might choose to use them to control access to your server-side resources, or to the Amazon API Gateway.

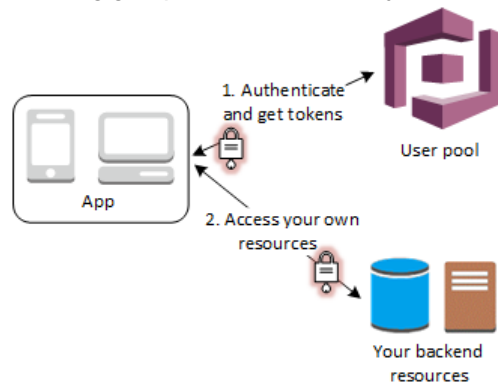
For more information, see [User Pool Authentication Flow \(p. 182\)](#) and [Using Tokens with User Pools \(p. 186\)](#).



## Access Your Server-side Resources with a User Pool

After a successful user pool sign-in, your web or mobile app will receive user pool tokens from Amazon Cognito. You can use those tokens to control access to your server-side resources. You can also create

user pool groups to manage permissions, and to represent different types of users. For more information on using groups to control access your resources see [Adding Groups to a User Pool \(p. 165\)](#).



Once you configure a domain for your user pool, Amazon Cognito provisions a hosted web UI that allows you to add sign-up and sign-in pages to your app. Using this OAuth 2.0 foundation you can create your own resource server to enable your users to access protected resources. For more information see [Defining Resource Servers for Your User Pool \(p. 87\)](#).

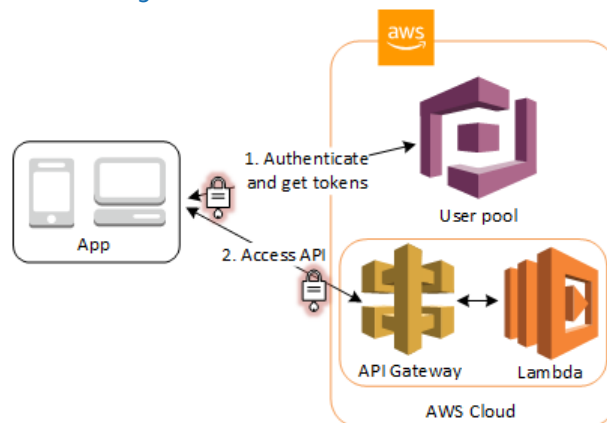
For more information about user pool authentication see [User Pool Authentication Flow \(p. 182\)](#) and [Using Tokens with User Pools \(p. 186\)](#).

## Access Resources with API Gateway and Lambda with a User Pool

You can enable your users to access your API through API Gateway. API Gateway validates the tokens from a successful user pool authentication, and uses them to grant your users access to resources including Lambda functions, or your own API.

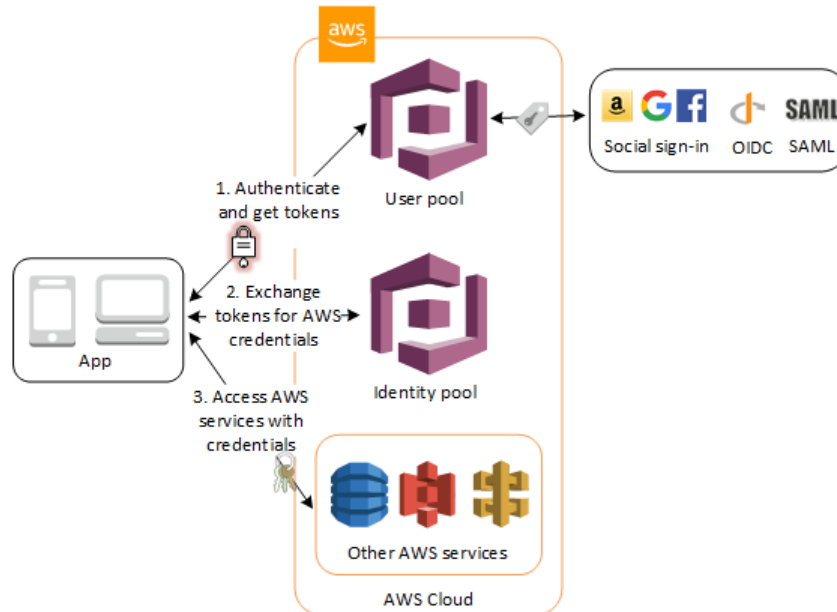
You can use groups in a user pool to control permissions with API Gateway by mapping group membership to IAM roles. The groups that a user is a member of are included in the ID token provided by a user pool when your app user signs in. For more information on user pool groups See [Adding Groups to a User Pool \(p. 165\)](#).

You can submit your user pool tokens with a request to API Gateway for verification by an Amazon Cognito authorizer Lambda function. For more information on API Gateway, see [Using API Gateway with Amazon Cognito User Pools](#).



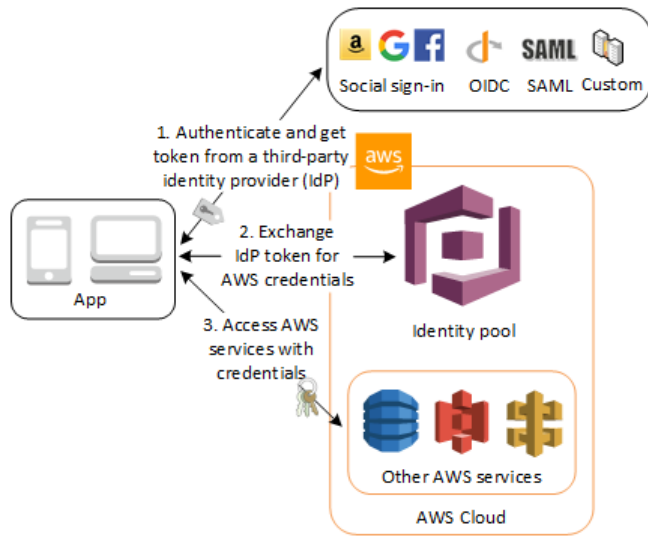
## Access AWS Services with a User Pool and an Identity Pool

After a successful user pool authentication, your app will receive user pool tokens from Amazon Cognito. You can exchange them for temporary access to other AWS services with an identity pool. For more information, see [Accessing AWS Services Using an Identity Pool After Sign-in](#) (p. 194) and [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\)](#) (p. 219).



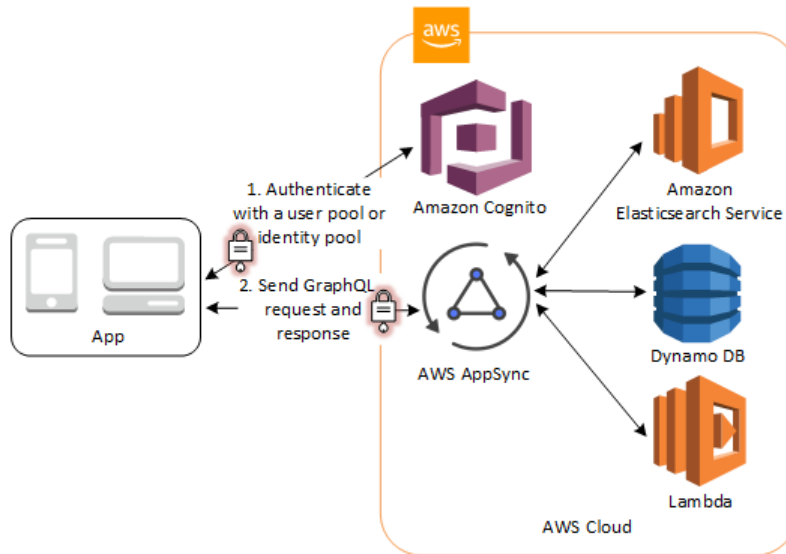
## Authenticate with a Third Party and Access AWS Services with an Identity Pool

You can enable your users access to AWS services through an identity pool. An identity pool requires an IdP token from a user that's authenticated by a third-party identity provider (or nothing if it's an anonymous guest). In exchange, the identity pool grants temporary AWS credentials that you can use to access other AWS services. For more information, see [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\)](#) (p. 219).



## Access AWS AppSync Resources with Amazon Cognito

You can grant your users access to AWS AppSync resources with tokens from a successful Amazon Cognito authentication (from a user pool or an identity pool). For more information, see [Access AWS AppSync and Data Sources with User Pools or Federated Identities](#).



# Amazon Cognito Tutorials

The two main components of Amazon Cognito are user pools and identity pools. User pools are user directories that provide sign-up and sign-in options for your web and mobile app users. Identity pools provide AWS credentials to grant your users access to other AWS services.

## Topics

- [Tutorial: Creating a User Pool \(p. 10\)](#)
- [Tutorial: Creating an Identity Pool \(p. 10\)](#)
- [Tutorial: Cleaning Up Your AWS Resources \(p. 11\)](#)
- [Tutorial: Adding a Web or Mobile App to a User Pool \(p. 11\)](#)

## Tutorial: Creating a User Pool

With a user pool, your users can sign in to your web or mobile app through Amazon Cognito.

### To create a user pool

1. Go to the [Amazon Cognito console](#). You may be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose **Create a User Pool**.
4. Provide a name for your user pool and choose **Review Defaults** to save the name.
5. On the **Review** page, choose **Create pool**.

## Related Resources

For more information on user pools, see [Amazon Cognito User Pools \(p. 13\)](#).

See also [User Pool Authentication Flow \(p. 182\)](#) and [Using Tokens with User Pools \(p. 186\)](#).

## Tutorial: Creating an Identity Pool

With an identity pool, your users can obtain temporary AWS credentials to access AWS services, such as Amazon S3 and DynamoDB.

### To create an identity pool

1. Go to the [Amazon Cognito console](#). You may be prompted for your AWS credentials.
2. Choose **Manage Federated Identities**.
3. Choose **Create new identity pool**.
4. Enter a name for your identity pool.
5. To enable unauthenticated identities select **Enable access to unauthenticated identities** from the **Unauthenticated identities** collapsible section.
6. Choose **Create Pool**.
7. You will be prompted for access to your AWS resources.



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.

8. Make a note of your identity pool Id number. You will use it to set up policies allowing your app users to access other AWS services such as Amazon Simple Storage Service or DynamoDB

## Related Resources

For more information on identity pools, see [Amazon Cognito Identity Pools \(Federated Identities\)](#) (p. 219).

For an S3 example using an identity pool see [Uploading Photos to Amazon S3 from a Browser](#).

## Tutorial: Cleaning Up Your AWS Resources

### To delete an identity pool

1. Go to the [Amazon Cognito console](#). You may be prompted for your AWS credentials.
2. Choose **Manage Federated Identities**.
3. Choose the name of the identity pool that you want to delete. The **Dashboard page** for your identity pool appears.
4. In the top-right corner of the Dashboard page, choose **Edit identity pool**. The **Edit identity pool** page appears.
5. Scroll down and choose **Delete identity pool** to expand it.
6. Choose **Delete identity pool**.
7. Choose **Delete pool**.

### To delete a user pool

1. Go to the [Amazon Cognito console](#). You may be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose the user pool you created in the previous step.
4. On the **Domain name** page under **App integration** select **Delete domain**.
5. Choose **Delete domain** when prompted to confirm.
6. Go to the **General Settings** page.
7. Select **Delete pool** in the upper right corner of the page.
8. Enter **delete** and choose **Delete pool** when prompted to confirm.

## Tutorial: Adding a Web or Mobile App to a User Pool

Add a web or mobile app to your user pool with these tutorials for JavaScript, Android, and iOS.

- [Tutorial: Integrating User Pools for JavaScript Apps](#) (p. 24).
- [Tutorial: Integrating User Pools for Android Apps](#) (p. 41).

- [Tutorial: Integrating User Pools for iOS Apps \(p. 60\)](#).

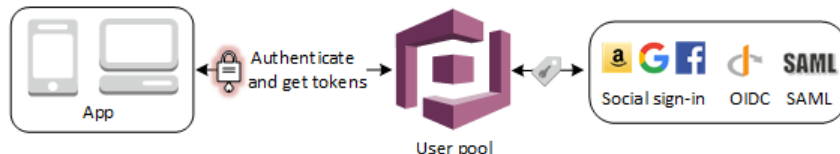
# Amazon Cognito User Pools

A user pool is a user directory in Amazon Cognito. With a user pool, your users can sign in to your web or mobile app through Amazon Cognito. Your users can also sign in through social identity providers like Facebook or Amazon, and through SAML identity providers. Whether your users sign in directly or through a third party, all members of the user pool have a directory profile that you can access through an SDK.

User pools provide:

- Sign-up and sign-in services.
- A built-in, customizable web UI to sign in users.
- Social sign-in with Facebook, Google, and Login with Amazon, as well as sign-in with SAML identity providers from your user pool.
- User directory management and user profiles.
- Security features such as multi-factor authentication (MFA), checks for compromised credentials, account takeover protection, and phone and email verification.
- Customized workflows and user migration through AWS Lambda triggers.

After successfully authenticating a user, Amazon Cognito issues JSON web tokens (JWT) that you can use to secure and authorize access to your own APIs, or exchange for AWS credentials.



Amazon Cognito provides token handling through the Amazon Cognito User Pools Identity SDKs for JavaScript, Android, and iOS. See [Getting Started with User Pools \(p. 14\)](#) and [Using Tokens with User Pools \(p. 186\)](#).

The two main components of Amazon Cognito are user pools and identity pools. Identity pools provide AWS credentials to grant your users access to other AWS services. To enable users in your user pool to access AWS resources, you can configure an identity pool to exchange user pool tokens for AWS credentials. For more information see [Accessing AWS Services Using an Identity Pool After Sign-in \(p. 194\)](#) and [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\) \(p. 219\)](#).

## Topics

- [Getting Started with User Pools \(p. 14\)](#)
- [Adding a Web or Mobile App to Amazon Cognito User Pools \(p. 23\)](#)
- [Using the Built-in Sign-up and Sign-in Webpages \(p. 74\)](#)
- [Adding User Pool Sign-in Through a Third Party \(p. 89\)](#)
- [Managing Security for Amazon Cognito User Pools \(p. 108\)](#)
- [Customizing User Pool Workflows with Lambda Triggers \(p. 119\)](#)
- [Using Amazon Pinpoint Analytics with Amazon Cognito User Pools \(p. 156\)](#)
- [Managing Users in User Pools \(p. 157\)](#)

- [Authentication with a User Pool \(p. 180\)](#)
- [Accessing Resources After a Successful User Pool Authentication \(p. 193\)](#)
- [User Pools Reference \(AWS Management Console\) \(p. 197\)](#)

## Getting Started with User Pools

These steps describe setting up and configuring a user pool with the [Amazon Cognito console](#). For a guide for where to start with Amazon Cognito, see [Getting Started with Amazon Cognito \(p. 5\)](#).

### Topics

- [Prerequisite: Sign Up for an AWS Account \(p. 14\)](#)
- [Step 1. Create a User Directory with a User Pool \(p. 14\)](#)
- [Step 2. Add an App to Enable the Hosted Web UI \(p. 15\)](#)
- [Step 3. Add Social Sign-in to a User Pool \(Optional\) \(p. 17\)](#)
- [Step 4. Add Sign-in with a SAML Identity Provider to a User Pool \(Optional\) \(p. 20\)](#)
- [Step 5. Install an Amazon Cognito User Pools SDK \(p. 22\)](#)
- [Next Steps \(p. 23\)](#)

## Prerequisite: Sign Up for an AWS Account

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 <https://aws.amazon.com/>, and then choose **Create an AWS Account**.

#### Note

This might be unavailable in your browser if you previously signed into the AWS Management Console. In that case, choose **Sign in to a different account**, and then choose **Create a new 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.

## Next Step

[Step 1. Create a User Directory with a User Pool \(p. 14\)](#)

## Step 1. Create a User Directory with a User Pool

By using an Amazon Cognito user pool, you can create and maintain a user directory, and add sign-up and sign-in to your mobile app or web application.

### To create a user pool

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.

3. In the top-right corner of the page, choose **Create a User Pool**.
4. Provide a name for your user pool, and choose **Review Defaults** to save the name.
5. On the **Attributes** page, choose **Email address or phone number** and **Allow email addresses**.
6. At the bottom of the page, choose **Next Step** to save the attribute.
7. On the navigation bar on the left-side of the page, choose **Review**.
8. On the bottom of the **Review** page, choose **Create pool**.

## Next Step

[Step 2. Add an App to Enable the Hosted Web UI \(p. 15\)](#)

## Step 2. Add an App to Enable the Hosted Web UI

After you create a user pool, you can create an app to use the built-in webpages for signing up and signing in your users.

### To create an app in your user pool

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the navigation bar on the left-side of the page, choose **App clients** under **General settings**.
5. Choose **Add an app client**.
6. Give your app a name.
7. Clear the option **Generate client secret** for the purposes of this getting started exercise, as it would not be secure to send it on the URL using client-side JavaScript. The client secret is used by applications that have a server-side component that can secure the client secret.
8. Choose **Create app client**.
9. Note the **App client ID**.
10. Choose **Return to pool details**.
11. **Configure the app.**
  - a. Choose **App client settings** from the navigation bar on the left-side of the console page.
  - b. Select **Cognito User Pool** as one of the **Enabled Identity Providers**.

#### Note

To sign in with external identity providers (IdPs), such as Facebook, Amazon, or Google, as well as through OpenID Connect (OIDC) or SAML IdPs, first configure them as described next, and then return to the **App client settings** page to enable them.

- c. Type a callback URL for the Amazon Cognito authorization server to call after users are authenticated. For a web app, the URL should start with `https://`, such as `https://www.example.com`.

For an iOS or Android app, you can use a callback URL such as `myapp://`.

- d. Select **Authorization code grant** to return an authorization code that is then exchanged for user pool tokens. Because the tokens are never exposed directly to an end user, they are less likely to become compromised. However, a custom application is required on the backend to exchange the authorization code for user pool tokens. For security reasons, we recommend that you use the authorization code grant flow, together with see [Proof Key for Code Exchange \(PKCE\)](#), for mobile apps.

Under **Allowed OAuth Flows**, select **Implicit grant** to have user pool JSON web tokens (JWT) returned to you from Amazon Cognito. You can use this flow when there's no backend available to exchange an authorization code for tokens. It's also helpful for debugging tokens.

You can enable both the **Authorization code grant** and the **Implicit code grant**, and then use each grant as needed.

Unless you specifically want to exclude one, select the check boxes for all of the **Allowed OAuth scopes**.

**Note**

Select **Client credentials** only if your app needs to request access tokens on its own behalf, not on behalf of a user.

- e. Choose **Save changes**.

**12. Configure a user pool domain.**

- a. On the **Domain name** page, type a domain prefix that's available.
- b. Make a note of the complete domain address.
- c. Choose **Save changes**.

**To view your sign-in page**

You can view the hosted UI sign-in webpage with the following URL. Note the `response_type`. In this case, **response\_type=code** for the authentication code grant.

```
https://your_domain/login?  
response_type=code&client_id=your_app_client_id&redirect_uri=your_callback_url
```

You can view the hosted UI sign-in webpage with the following URL for the implicit code grant where **response\_type=token**. After a successful sign-in, Amazon Cognito returns user pool tokens to your web browser's address bar.

```
https://your_domain/login?  
response_type=token&client_id=your_app_client_id&redirect_uri=your_callback_url
```

You can find the JSON web token (JWT) identity token after the `#idtoken=` parameter in the response.

Here's a sample response from an implicit grant request. Your identity token string will be much longer.

```
https://www.example.com/  
#id_token=123456789tokens123456789&expires_in=3600&token_type=Bearer
```

You can decode and verify user pool tokens using AWS Lambda, see [Decode and verify Amazon Cognito JWT tokens](#) on the AWS GitHub website.

Amazon Cognito user pools tokens are signed using an RS256 algorithm.

You might have to wait a minute to refresh your browser before changes you made in the console appear.

Your domain is shown on the **Domain name** page. Your app client ID and callback URL are shown on the **App client settings** page.

## Next Step

[Step 3. Add Social Sign-in to a User Pool \(Optional\) \(p. 17\)](#)

# Step 3. Add Social Sign-in to a User Pool (Optional)

You can enable your app users to sign in through a social identity provider (IdP) such as Facebook, Google, and Login with Amazon. Whether your users sign in directly or through a third party, all users have a profile in the user pool. Skip this step if you don't want to add sign in through a social sign-in identity provider.

## Step 1: Register with a Social IdP

Before you create a social IdP with Amazon Cognito, you must register your application with the social IdP to receive a client ID and client secret.

### To register an app with Facebook

1. Create a [developer account with Facebook](#).
2. [Sign in](#) with your Facebook credentials.
3. From the **My Apps** menu, choose **Create New App**.
4. Give your Facebook app a name and choose **Create App ID**.
5. On the left navigation bar, choose **Settings** and then **Basic**.
6. Note the **App ID** and the **App Secret**. You will use them in the next section.
7. Choose **+ Add Platform** from the bottom of the page.
8. Choose **Website**.
9. Under **Website**, type your user pool domain with the `/oauth2/idpresponse` endpoint into **Site URL**.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

10. Choose **Save changes**.
11. Type your user pool domain into **App Domains**.

```
https://<your-user-pool-domain>
```

12. Choose **Save changes**.
13. From the navigation bar choose **Products** and then **Set up** from **Facebook Login**.
14. From the navigation bar choose **Facebook Login** and then **Settings**.

Type your redirect URL into **Valid OAuth Redirect URIs**. It will consist of your user pool domain with the `/oauth2/idpresponse` endpoint.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

15. Choose **Save changes**.

### To register an app with Amazon

1. Create a [developer account with Amazon](#).

2. [Sign in](#) with your Amazon credentials.
3. You need to create an Amazon security profile to receive the Amazon client ID and client secret.  
  
Choose **Apps and Services** from navigation bar at the top of the page and then choose **Login with Amazon**.
4. Choose **Create a Security Profile**.
5. Type in a **Security Profile Name**, a **Security Profile Description**, and a **Consent Privacy Notice URL**.
6. Choose **Save**.
7. Choose **Client ID** and **Client Secret** to show the client ID and secret. You will use them in the next section.
8. Hover over the gear and choose **Web Settings**, and then choose **Edit**.
9. Type your user pool domain into **Allowed Origins**.

```
https://<your-user-pool-domain>
```

10. Type your user pool domain with the **/oauth2/idpresponse** endpoint into **Allowed Return URLs**.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

11. Choose **Save**.

#### To register an app with Google

1. Create a [developer account with Google](#).
2. [Sign in](#) with your Google credentials.
3. Choose **CONFIGURE A PROJECT**.
4. Type in a project name and choose **NEXT**.
5. Type in your product name and choose **NEXT**.
6. Choose **Web browser** from the **Where are you calling from?** drop-down list.
7. Type your user pool domain into **Authorized JavaScript origins**.

```
https://<your-user-pool-domain>
```

8. Choose **CREATE**. You will not use the **Client ID** and **Client Secret** from this step.
9. Choose **DONE**.
10. [Sign in](#) to the Google Console.
11. On the left navigation bar, choose **Credentials**.
12. Create your OAuth 2.0 credentials by choosing **OAuth client ID** from the **Create credentials** drop-down list.
13. Choose **Web application**.
14. Type your user pool domain into **Authorized JavaScript origins**.

```
https://<your-user-pool-domain>
```

15. Type your user pool domain with the **/oauth2/idpresponse** endpoint into **Authorized Redirect URIs**.



```
https://<your-user-pool-domain>/oauth2/idpresponse
```

16. Choose **Create** twice.
17. Note the **OAuth client ID** and **client secret**. You will need them for the next section.
18. Choose **OK**.

## Step 2: Add a Social IdP to Your User Pool

In this section, you configure a social IdP in your user pool using the client ID and client secret from the previous section.

### To configure a user pool social identity provider with the AWS Management Console

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the left navigation bar, choose **Identity providers**.
5. Choose a social identity provider: **Facebook**, **Google**, or **Login with Amazon**.
6. Type the app client ID and app client secret that you received from the social identity provider in the previous section.
7. Type the names of the scopes that you want to authorize. Scopes define which user attributes (such as name and email) you want to access with your app. For Facebook, these should be separated by commas. For Google and Login with Amazon, they should be separated by spaces.

Social identity provider	Example scopes
Facebook	public_profile, email
Google	profile email openid
Login with Amazon	profile postal_code

Your app user is asked to consent to providing these attributes to your app. For more information about their scopes, see the documentation from Google, Facebook, and Login with Amazon.

8. Choose **Enable** for the social identity provider that you're configuring.
9. Choose **App client settings** from the navigation bar.
10. Select your social identity provider as one of the **Enabled Identity Providers** for your user pool app.
11. Type your callback URL into **Callback URL(s)** for your user pool app. This is the URL of the page where your user will be redirected after a successful sign-in.

```
https://www.example.com
```

12. Choose **Save changes**.
13. On the **Attribute mapping** tab, add mappings for at least the required attributes, typically email, as follows:
  - a. Select the check box to choose the Facebook, Google, or Amazon attribute name. You can also type the names of additional attributes that aren't listed in the Amazon Cognito console.
  - b. Choose the destination user pool attribute from the drop-down list.
  - c. Choose **Save changes**.

- d. Choose **Go to summary**.

## Step 3: Test Your Social IdP Configuration

You can create a login URL by using the elements from the previous two sections. Use it to test your social IdP configuration.

```
https://your_user_pool_domain/login?  
response_type=code&client_id=your_client_id&redirect_uri=https://www.example.com
```

You can find your domain on the user pool **Domain name** console page. The client\_id is on the **App client settings** page. Use your callback URL for the **redirect\_uri** parameter. The callback URL address will be different from your user pool domain.

## Next Step

[Step 4. Add Sign-in with a SAML Identity Provider to a User Pool \(Optional\) \(p. 20\)](#)

## Step 4. Add Sign-in with a SAML Identity Provider to a User Pool (Optional)

You can enable your app users to sign in through a SAML identity provider (IdP). Whether your users sign in directly or through a third party, all users have a profile in the user pool. Skip this step if you don't want to add sign in through a SAML identity provider.

You need to update your SAML identity provider and configure your user pool. See the documentation for your SAML identity provider for information about how to add your user pool as a relying party or application for your SAML 2.0 identity provider.

You also need to provide an assertion consumer endpoint to your SAML identity provider. Configure this endpoint for SAML 2.0 POST binding in your SAML identity provider:

```
https://<yourDomainPrefix>.auth.<region>.amazoncognito.com/saml2/idpresponse
```

You can find your domain prefix and the region value for your user pool on the **Domain name** tab of the [Amazon Cognito console](#).

For some SAML identity providers, you also need to provide the SP urn / Audience URI / SP Entity ID, in the form:

```
urn:amazon:cognito:sp:<yourUserPoolID>
```

You can find your user pool ID on the **App client settings** tab in the [Amazon Cognito console](#).

You should also configure your SAML identity provider to provide attribute values for any attributes that are required in your user pool. Typically, email is a required attribute for user pools. In that case, the SAML identity provider should provide an email value (claim) in the SAML assertion.

Amazon Cognito user pools support SAML 2.0 federation with post-binding endpoints. This eliminates the need for your app to retrieve or parse SAML assertion responses, because the user pool directly receives the SAML response from your identity provider via a user agent.

### To configure a SAML 2.0 identity provider in your user pool

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the left navigation bar, choose **Identity providers**.
5. Choose **SAML** to open the SAML dialog.
6. Under **Metadata document** upload a metadata document from your SAML IdP. You can also enter a URL that points to the metadata document. For more information, see [Integrating Third-Party SAML Identity Providers with Amazon Cognito User Pools \(p. 99\)](#).

#### Note

We recommend that you provide the endpoint URL if it is a public endpoint, rather than uploading a file, because this allows Amazon Cognito to refresh the metadata automatically. Typically metadata refresh happens every 6 hours or before the metadata expires, whichever is earlier.

7. Enter your SAML **Provider name**. For more information on SAML naming see [Choosing SAML Identity Provider Names \(p. 96\)](#).
8. Enter any optional SAML **Identifiers** you want to use.
9. Select **Enable IdP sign out flow** if you want your user to be logged out from the SAML IdP when logging out from Amazon Cognito.

Enabling this flow sends a signed logout request to the SAML IdP when the [LOGOUT Endpoint \(p. 322\)](#) is called.

Configure this endpoint for consuming logout responses from your IdP. This endpoint uses post binding.

```
https://<yourDomainPrefix>.auth.<region>.amazoncognito.com/saml2/logout
```

#### Note

If this option is selected and your SAML identity provider expects a signed logout request, you will also need to configure the signing certificate provided by Amazon Cognito with your SAML IdP.

The SAML IdP will process the signed logout request and logout your user from the Amazon Cognito session.

10. Choose **Create provider**.
11. On the **Attribute mapping** tab, add mappings for at least the required attributes, typically `email`, as follows:
  - a. Type the SAML attribute name as it appears in the SAML assertion from your identity provider. If your identity provider offers sample SAML assertions, that might help you to find the name. Some identity providers use simple names, such as `email`, while others use names similar to this:

```
http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress
```

- b. Choose the destination user pool attribute from the drop-down list.
12. Choose **Save changes**.
  13. Choose **Go to summary**.

For more information, see [Adding SAML Identity Providers to a User Pool \(p. 94\)](#).

## Next Step

[Step 5. Install an Amazon Cognito User Pools SDK \(p. 22\)](#)

## Step 5. Install an Amazon Cognito User Pools SDK

Amazon Cognito offers two user pool SDKs, which complement each other.

The **Amazon Cognito Identity SDK** is the core user pools library. Install it to interact with the user management and authentication functions in the Amazon Cognito User Pools API.

The **Amazon Cognito Auth SDK** leverages the built-in hosted UI webpages. Install it to add webpages to your app for the following: sign-up, sign-in, confirmation, multi-factor authentication (MFA), and sign-out.

### JavaScript

User Pool SDK	Sample Code	Documentation
Identity SDK for JavaScript	<a href="#">Identity SDK samples</a> <a href="#">AWS Mobile React starter kit</a>	<a href="#">Adding a JavaScript App to Amazon Cognito User Pools (p. 24)</a>  <a href="#">AWS Amplify Library</a>
Auth SDK for JavaScript	<a href="#">Auth SDK sample app</a>	<a href="#">Amazon Cognito User Pools Auth API Reference (p. 312)</a>

### Android

User Pool SDK	Sample Code	Documentation
Identity SDK for Android	<a href="#">Identity SDK samples</a> <a href="#">Mobile SDK for Android samples</a>	<a href="#">Adding an Android App to Amazon Cognito User Pools (p. 39)</a>  <a href="#">Mobile SDK for Android Documentation</a>
Auth SDK for Android	<a href="#">Auth SDK Sample app</a>	<a href="#">Amazon Cognito User Pools Auth API Reference (p. 312)</a>

### iOS

User Pool SDK	Sample Code	Documentation
Identity SDK for iOS	<a href="#">Identity SDK samples</a> <a href="#">Mobile SDK for iOS samples</a>	<a href="#">Adding an iOS App to Amazon Cognito User Pools (p. 59)</a>  <a href="#">AWS Mobile SDK for iOS Documentation</a>

User Pool SDK	Sample Code	Documentation
Auth SDK for iOS is included in the <a href="#">Mobile SDK for iOS</a> .	<a href="#">Auth SDK sample app</a>	<a href="#">Amazon Cognito User Pools Auth API Reference (p. 312)</a>

## Other AWS SDKs

For other SDKs and documentation, see [AWS SDKs](#).

## Next Steps

Now that you've created a user pool and installed an SDK, here are some places to go next.

See how to set up Amazon Cognito with your JavaScript, Android, and iOS apps:

- [Adding a JavaScript App to Amazon Cognito User Pools \(p. 24\)](#)
- [Adding an Android App to Amazon Cognito User Pools \(p. 39\)](#)
- [Adding an iOS App to Amazon Cognito User Pools \(p. 59\)](#)

Dive deep into these user pool features:

- [Customizing the Built-in Sign-in and Sign-up Webpages \(p. 83\)](#)
- [Adding Multi-Factor Authentication \(MFA\) to a User Pool \(p. 108\)](#)
- [Adding Advanced Security to a User Pool \(p. 111\)](#)
- [Customizing User Pool Workflows with Lambda Triggers \(p. 119\)](#)
- [Using Amazon Pinpoint Analytics with Amazon Cognito User Pools \(p. 156\)](#)

For an overview of Amazon Cognito authentication and authorization cases, see [Common Amazon Cognito Scenarios \(p. 6\)](#).

To access other AWS services after a successful user pool authentication, see [Accessing AWS Services Using an Identity Pool After Sign-in \(p. 194\)](#).

In addition to the AWS Management Console and the user pool SDKs mentioned previously in this section, you can also interact with your user pool profiles by using the [AWS Command Line Interface](#).

# Adding a Web or Mobile App to Amazon Cognito User Pools

With Amazon Cognito user pools, you can enable your web and mobile app users to sign up and sign in. You can change passwords for authenticated users and initiate forgotten password flows for unauthenticated users.

Amazon Cognito User Pools provides an Identity SDK for JavaScript, Android, and iOS. With it you can store and manage the signed JSON web tokens (JWT) returned to you by Amazon Cognito after a successful user pool authentication. To learn more about tokens see [Using Tokens with User Pools \(p. 186\)](#).

### Topics

- [Adding a JavaScript App to Amazon Cognito User Pools \(p. 24\)](#)

- [Adding an Android App to Amazon Cognito User Pools \(p. 39\)](#)
- [Adding an iOS App to Amazon Cognito User Pools \(p. 59\)](#)

## Adding a JavaScript App to Amazon Cognito User Pools

With Amazon Cognito user pools, you can enable your web and mobile app users to sign up and sign in. You can change passwords for authenticated users and initiate forgotten password flows for unauthenticated users. The following section provides setup information and examples so you can use the [Amazon Cognito Identity Provider](#) to retrieve and update user pool profiles.

Add user pools to your JavaScript-based web applications with the AWS Amplify Library for Web which includes the Amazon Cognito Identity Provider. For more information see [Set Up the AWS Amplify Library for Web](#). See also the [AWS Amplify Library Authentication Guide](#).

### Note

The [Amazon Cognito Identity SDK for JavaScript](#) is now part of the [AWS Amplify Library](#).

### Topics

- [Tutorial: Integrating User Pools for JavaScript Apps \(p. 24\)](#)
- [Examples: Using the JavaScript SDK \(p. 28\)](#)
- [Example: Authenticate and Set a New Password for a User Created with the AdminCreateUser API in the SDK for JavaScript \(p. 37\)](#)
- [Example: Migrating JavaScript Users with a Lambda Trigger \(p. 38\)](#)

## 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 \(p. 24\)](#)
- [Step 2: Creating a User Pool Object in Your App \(p. 25\)](#)
- [Step 3: Signing up Users for Your App \(p. 25\)](#)
- [Step 4: Confirming Users for Your App \(p. 26\)](#)
- [Step 5: Signing Users in to Your App \(p. 26\)](#)
- [Step 6: Getting User Details \(p. 27\)](#)
- [Step 7: Getting Credentials to Access AWS Resources for an App User \(p. 27\)](#)
- [Next Steps \(p. 28\)](#)

### 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 [User Pools Reference \(AWS Management Console\) \(p. 197\)](#).

#### 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.

```
var poolData = {
  UserPoolId : '...', // your user pool id here
  ClientId : '...' // your app client id here
};
var userPool =
new AmazonCognitoIdentity.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 AmazonCognitoIdentity.CognitoUserAttribute(dataEmail);
  var attributePhoneNumber =
  new AmazonCognitoIdentity.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 \(p. 186\)](#). 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 AmazonCognitoIdentity.AuthenticationDetails(authenticationData);
```



```
var cognitoUser =
new AmazonCognitoIdentity.CognitoUser(userData);
cognitoUser.authenticateUser(authenticationDetails, {
  onSuccess: function (result) {
    var accessToken = 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. 221). 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_XXXXXXXX':
    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](#).

## 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.

```
var poolData = { UserPoolId : 'us-east-1_TcoKGbf7n',  
                  ClientId : '4pe2usejqcdmhi0a25jp4b5sh3'  
};  
var userPool = new AmazonCognitoIdentity.CognitoUserPool(poolData);  
  
var attributeList = [];  
  
var dataEmail = {  
  Name : 'email',  
  Value : 'email@mydomain.com'  
};  
var dataPhoneNumber = {  
  Name : 'phone_number',  
  Value : '+15555555555'  
};  
var attributeEmail = new AmazonCognitoIdentity.CognitoUserAttribute(dataEmail);  
var attributePhoneNumber = new  
AmazonCognitoIdentity.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 : '12345du353sm7khj1q'
    };
    var userPool = new AmazonCognitoIdentity.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.

### Note

If the user was created by the administrator in the console, and not through the preceding JavaScript examples, see [Example: Handling Users Created Using the AdminCreateUser API in the Mobile SDK for Android \(p. 57\)](#) and [Creating User Accounts as Administrator \(p. 162\)](#).

```
var authenticationData = {
    Username : 'username',
    Password : 'password',
};
var authenticationDetails = new
AmazonCognitoIdentity.AuthenticationDetails(authenticationData);
var poolData = { UserPoolId : 'us-east-1_TcoKGbf7n',
    ClientId : '4pe2usejqcdmhi0a25jp4b5ssh3'
};
var userPool = new AmazonCognitoIdentity.CognitoUserPool(poolData);
var userData = {
    Username : 'username',
    Pool : userPool
};
var cognitoUser = new AmazonCognitoIdentity.CognitoUser(userData);
cognitoUser.authenticateUser(authenticationDetails, {
    onSuccess: function (result) {
        var accessToken = result.getAccessToken().getJwtToken();

        /* Use the idToken for Logins Map when Federating User Pools with identity
        pools or when passing through an Authorization Header to an API Gateway Authorizer*/
        var 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 AmazonCognitoIdentity.CognitoUserPool(data);
```

## Sign Up For the Application

```
var attribute = {
    Name : 'email',
    Value : 'email@mydomain.com'
};

var attributeEmail = new AmazonCognitoIdentity.CognitoUserAttribute(attribute);
var attributeList = [];

attributeList.push(attributeEmail);
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 AmazonCognitoIdentity.CognitoUser(userData);

var authenticationData = {
```

```
        Username : 'username',
        Password : 'password',
    };

    var authenticationDetails = new
    AmazonCognitoIdentity.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);
        }
    });
```

## Update Attributes

The following example updates user attributes for an authenticated user.

```
var attributeList = [];
var attribute = {
    Name : 'nickname',
    Value : 'joe'
};
var attribute = new AmazonCognitoIdentity.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: function() {
    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', true, 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.

```
if (cognitoUser != null) {  
  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 AmazonCognitoIdentity.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 AmazonCognitoIdentity.CognitoUserPool(poolData);
var userData = {
  Username : 'username',
  Pool : userPool
};

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

## Select the MFA Method and Authenticate Using TOTP MFA

The following example selects the MFA method and authenticates using TOTP.

```
var authenticationData = {
  Username : 'username',
  Password : 'password',
};
var authenticationDetails = new
AmazonCognitoIdentity.AuthenticationDetails(authenticationData);
var poolData = {
  UserPoolId : '...', // Your user pool id here
  ClientId : '...' // Your client id here
};
var userPool = new AmazonCognitoIdentity.CognitoUserPool(poolData);
var userData = {
  Username : 'username',
  Pool : userPool
};
var cognitoUser = new AmazonCognitoIdentity.CognitoUser(userData);

cognitoUser.authenticateUser(authenticationDetails, {
  onSuccess: function (result) {
    var accessToken + ' ' + result.getAccessToken().getJwtToken();
  },

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

  mfaSetup: function(challengeName, challengeParameters) {
    cognitoUser.associateSoftwareToken(this);
  },
});
```

```
associateSecretCode : function(secretCode) {
    var challengeAnswer = prompt('Please input the TOTP code.' , '');
    cognitoUser.verifySoftwareToken(challengeAnswer, 'My TOTP device', this);
},

selectMFAType : function(challengeName, challengeParameters) {
    var mfaType = prompt('Please select the MFA method.', '');
    cognitoUser.sendMFASelectionAnswer(mfaType, this);
},

totpRequired : function(secretCode) {
    var challengeAnswer = prompt('Please input the TOTP code.' , '');
    cognitoUser.sendMFACode(challengeAnswer, this, 'SOFTWARE_TOKEN_MFA');
}
});
```

## Enable and Set SMS MFA as the Preferred MFA Method for the User

The following example enables and sets SMS MFA as the preferred MFA method for the user.

```
smsMfaSettings = {
    PreferredMfa : true,
    Enabled : true
};
cognitoUser.setUserMfaPreference(smsMfaSettings, null, function(err, result) {
    if (err) {
        alert(err);
    }
    console.log('call result ' + result)
});
```

## Enable and Set TOTP Software Token MFA as the Preferred MFA Method for the User

The following example enables and sets TOTP software token MFA as the preferred MFA method for the user.

```
totpMfaSettings = {
    PreferredMfa : true,
    Enabled : true
};
cognitoUser.setUserMfaPreference(null, totpMfaSettings, function(err, result) {
    if (err) {
        alert(err);
    }
    console.log('call result ' + result)
});
```

## Example: Authenticate and Set a New Password for a User Created with the AdminCreateUser API in the SDK for JavaScript

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)
  }
});
```

## Example: Migrating JavaScript Users with a Lambda Trigger

A user migration Lambda trigger allows easy migration of users from your existing user management system into your user pool without a password reset.

### Set Up a User Migration Lambda Trigger

Before making changes in your JavaScript app, set up a user migration Lambda for your user pool.

To learn more about Lambda triggers see [Customizing User Pool Workflows with Lambda Triggers](#) (p. 119).

For more information about migrating users with a Lambda trigger see [Importing Users into User Pools With a User Migration Lambda Trigger](#) (p. 170).

### JavaScript App Changes

Update your [AWSCognitoIdentityProvider JavaScript SDK](#) to version 2.0.2 or above.

#### Authentication Flow for User Migration

You can authenticate your users and validate their passwords against your legacy system and seamlessly migrate their profiles into your user pool. However, the service needs the legacy password to avoid a password reset.

The default authentication flow in the SDK implements the secure remote password (SRP) protocol where no password is actually sent over the wire. To enable user migration on your app, use the `USER_PASSWORD_AUTH` authentication flow which sends your password to the service over an encrypted SSL connection during authentication. After user migration, use the default SRP authentication flow.

Set the authentication flow type to `USER_PASSWORD_AUTH`.

```
cognitoUser.setAuthenticationFlowType('USER_PASSWORD_AUTH');

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(verificationCode, this);
  }
});
```

## Adding an Android App to Amazon Cognito User Pools

With Amazon Cognito user pools, you can enable your web and mobile app users to sign up and sign in. You can change passwords for authenticated users and initiate forgotten password flows for unauthenticated users. The following section provides setup information and examples so you can use the [Amazon Cognito Identity Provider](#) to retrieve and update user pool profiles. These instructions are written for Android application development in Android Studio.

To get started see [AWS Mobile SDK for Android](#) and the [Mobile SDK for Android documentation](#).

If you are a React Native developer then add user pools to your React Native applications with the AWS Amplify Library for React Native which includes the Amazon Cognito Identity Provider. For more information see [Set Up the AWS Amplify Library for React Native](#). See also [AWS Amplify Library Authentication Guide](#).

## Gradle Dependencies

Add these dependencies to your app's Gradle file:

- **AWS Android Core SDK (`aws-android-sdk-core-x.x.x.jar`):** Add the latest version of the AWS Android Core as the `aws-android-sdk-core-2.2.8.jar` as a dependency library to your project's build Gradle.
- **AWS Cognito Identity Provider Android SDK (`aws-android-sdk-cognitoidentityprovider:2.3.8.jar`):** Add the latest version of the Android SDK for Cognito Identity Provider in your app's build Gradle.

## Network Permissions

To allow your app to make network calls to talk to the AWS Cognito Identity Provider, you need to enable your app to perform network operations.

Include the following permissions in your app's manifest file:

```
<uses-permission android:name="android.permission.INTERNET" />  
<uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
```

### Topics

- [Using the Mobile SDK for Android \(p. 40\)](#)
- [Tutorial: Integrating User Pools for Android Apps \(p. 41\)](#)
- [Examples of Using User Pools with the Mobile SDK for Android \(p. 50\)](#)
- [Example: Handling Users Created Using the AdminCreateUser API in the Mobile SDK for Android \(p. 57\)](#)
- [Example: Migrating Android Users with a Lambda Trigger \(p. 58\)](#)

## Using the Mobile SDK for Android

In this section, you will learn about using the Mobile SDK for Android to use Amazon Cognito user pools in your apps. This SDK provides APIs to register (sign up), confirm, and authenticate users, and more.

### Key Concepts

#### Executing in the Current Thread or a Background Thread

All APIs that perform network calls to interact with the Amazon Cognito Identity Provider service have two methods. One of these methods executes the task and the network operations in the current thread (e.g., `signUp()`) and the other method (postfixed with `InBackground`, e.g., `signUpInBackground()`), executes the task in a background thread but invokes the callback methods in the thread where the `InBackground` method was invoked.

#### Caching

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

#### App Id and App Secret

The App ID (also called Client ID) and App Secret (also called Client Secret) are generated at the Amazon Cognito User Pools console. App ID is necessary to use the Mobile SDK for Android. The App Secret is optional. However, if an App ID has an associated App Secret, then you must use the App ID and App Secret in the SDK.

### Main Classes

#### CognitoUserPool

Represents an abstraction of a user pool. Provides methods to register a new user and create a new instance `CognitoUser` for a user belonging to this pool.

#### CognitoUser

Represents a single user in a user pool. Through this class you can perform all possible operations on a user, including authentication (Sign-In), managing user attributes and settings, and much more. You can create an instance of this class from the `CognitoUserPool` object.

#### CognitoUserSession

Encapsulates the tokens issued by Amazon Cognito (ID , access, and refresh token) and provides methods to read ID and access tokens.

### **CognitoUserDetails**

Encapsulates `CognitoUserAttributes` and `CognitoUserSettings`.

### **CognitoUserAttributes**

Encapsulates all user attributes and provides methods to read and write attributes. For more information about attributes, see [Configuring User Pool Attributes \(p. 199\)](#)

### **CognitoUserSettings**

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

## **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 \(p. 41\)](#)
- [Step 2: Creating a User Pool Instance \(p. 42\)](#)
- [Step 3: Signing up Users for Your App \(p. 42\)](#)
- [Step 4: Confirming Users for Your App \(p. 43\)](#)
- [Step 5: Resolving Alias Value Conflicts \(p. 44\)](#)
- [Step 6: Signing Users in to Your App \(p. 44\)](#)
- [Step 7: Getting User Details \(p. 45\)](#)
- [Step 8: Getting Credentials to Access AWS Resources for an App User \(p. 45\)](#)
- [Step 9: Setting IAM Permissions to Enable Access to AWS Resources \(p. 46\)](#)
- [Step 10: Set up New Multi-Factor Authentication Mechanisms for Your Users \(p. 46\)](#)

## **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 [User Pools Reference \(AWS Management Console\) \(p. 197\)](#).

### **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. Keep **Generate app 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**, **Pool ARN**, **App client ID**, and **App 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 Instance

To create an instance of a user pool object, you need the user pool ID, client ID, client secret, and AWS region. The following example shows how to create a `CognitoUserPool` instance. It 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`.

The region parameter is a valid AWS region from the Mobile SDK for Android enum [Regions](#).

```
/* Create a CognitoUserPool instance */
CognitoUserPool userPool = new CognitoUserPool(context, userPoolId, clientId, clientSecret,
cognitoRegion);
```

## 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 AWS Management Console and open the 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**.

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

## Step 10: Set up New Multi-Factor Authentication Mechanisms for Your Users

Starting with the Amazon Cognito SDK version 2.6.8, you can set up new MFA mechanisms for your users. You can administer the user pool level MFA settings in the **MFA and verifications** tab on the Amazon Cognito user pools console.

To be able to register a new MFA method, it should first be enabled for your user pool.

### Configure Software Token (TOTP) MFA

Amazon Cognito supports the Time-based One-Time Password algorithm (TOTP) multi-factor authentication (MFA) mechanism.

### The TOTP configuration process consists of two steps:

1. Associate software token: This starts the process by requesting that the Amazon Cognito service add TOTP MFA for your user. This over-writes any TOTP MFA that is already set up for your user. In response to this request, the service generates a *secret key*, which should be securely stored and used to generate the TOTP codes for MFA validation.
2. Verify software token: Complete the MFA setup using the *TOTP code* generated from the *secret key*. Use the `VerifyMfaContinuation` object returned by the Amazon Cognito SDK to complete this step.

```
// Create a callback handler.
RegisterMfaHandler registerMFAHandler = new RegisterMfaHandler() {
    @Override
    public void onSuccess(final String sessionToken) {
        // Success, new MFA setup is complete.
    }

    @Override
    public void onVerify(VerifyMfaContinuation continuation) {
        // Get the secret key from Continuation.
        String secretKey = continuation.getParameters().get("secretKey");

        // Store the secret key in a TOTP code generator and verify using
        // the generated TOTP code.
        String verificationCode = storeAndGetTotpVerificationCode(secretKey);

        // Set a user friendly name to remember the TOTP generator.
        String friendlyName = "the best TOTP generator";

        // Complete the registration by verifying the TOTP code.
        continuation.setVerificationResponse(verificationCode, friendlyName);
        continuation.continueTask();
    }

    @Override
    public void onFailure(Exception exception) {
        closeWaitDialog();
        showDialogMessage("TOTP MFA registration failed",
            AppHelper.formatException(exception), false);
    }
};
// Use the CognitoUser to register a new Software Token MFA.
associateSoftwareTokenInBackground(sessionToken, registerMFAHandler);
```

#### Note

Only one TOTP software token MFA association with your app is allowed per user. Associating a new MFA software token over-writes the current one.

Your user must be authenticated, with a valid access token, to associate a TOTP MFA software token. When an unauthenticated user is required to associate a new TOTP MFA software token, you can use an Amazon Cognito generated `sessionToken` to associate the new TOTP MFA software token.

### Configure MFA with a Session Token

Amazon Cognito User Pools now support multiple MFA types. You can enable the MFA types that are allowed in your user pool on the Amazon Cognito console. You can also choose to make the enabled MFA type **Optional** or **Required**.

If MFA is set to **Optional**, users in the pool can, depending on their preference, choose to register and enable one or more of the MFA methods.

If MFA is set as **Required** for the user pool, users must register and enable at least one MFA type. If MFA is required, users who do not have at least one of the MFA methods set up are presented with an `MFA_SETUP` challenge. The user must set up at least one MFA type to continue to authenticate.

To allow users to register a new MFA method at this stage, Amazon Cognito returns a *Session Token* along with the challenge. This session token can be used in the SDK to register an MFA type and then to continue to authenticate. The session token is a one-time use token that can only be used to register a new MFA type.

### MFA\_SETUP Challenge

When an `MFA_SETUP` challenge is thrown, the user is required to set up an MFA method. The Amazon Cognito SDK will return `RegisterMFAContinuation`. You can use this continuation to get the list of MFA types the user can set up and then continue to authenticate.

```
AuthenticationHandler authHandler = new AuthenticationHandler() {

    @Override
    public void onSuccess(CognitoUserSession cognitoUserSession) {
        // ...
    }

    @Override
    public void getAuthenticationDetails(AuthenticationContinuation
authenticationContinuation, String userId) {
        // ...
    }

    @Override
    public void getMFACode(MultiFactorAuthenticationContinuation
multiFactorAuthenticationContinuation) {
        // ...
    }

    @Override
    public void authenticationChallenge(ChallengeContinuation continuation) {
        // This challenge is invoked for MFA_SETUP Challenge
        RegisterMFAContinuation regMFAContinuation =
        (RegisterMFAContinuation) continuation;

        // Register the new MFA.
        registerMfa(regMFAContinuation);
    }

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

// Register a new MFA.
public void registerMfa(RegisterMFAContinuation regMFAContinuation) {
    // Get the list of MFA's to setup.
    List<String> mfaOptions = continuation.getMfaOptions();

    // Get the session token to register an MFA.
    final String sessionToken = continuation.getSessionToken();

    // ...

    // Use the sessionToken to register MFA.
    associateSoftwareTokenInBackground(sessionToken, registerMFAHandler);
}
```

```
RegisterMfaHandler registerMFAHandler = new RegisterMfaHandler() {
    @Override
    public void onSuccess(final String sessionToken) {
        // Success, new MFA setup is complete.
        // Use the sessionToken to continue to authenticate.
        regMFAContinuation.setSessionToken(sessionToken);
    }

    @Override
    public void onVerify(VerifyMfaContinuation continuation) {
        // ...
    }

    @Override
    public void onFailure(Exception exception) {
        // ...
    }
};
```

### Enable and Disable MFA Mechanisms

Use the API `setUserMfaSettings` to enable or disable an MFA method and to set an MFA type as *preferred* for a user.

```
GenericHandler updatesMFASettingsHandler = new GenericHandler() {
    @Override
    public void onSuccess() {
        // Update complete.
    }

    @Override
    public void onFailure(Exception exception) {
        // Failed update, check exception for details.
    }
};

// Enable SMS MFA and set preferred state
void enableSmsMfa(boolean preferred) {
    CognitoMfaSettings smsMfaSettings = new CognitoMfaSettings(CognitoMfaSettings.SMS_MFA);
    smsMfaSettings.setEnabled(true);
    smsMfaSettings.setPreferred(preferred);
    List<CognitoMfaSettings> settings = new ArrayList<CognitoMfaSettings>();
    settings.add(smsMfaSettings);
    cognitoUser.setUserMfaSettingsInBackground(settings, updateSettingHandler);
}
```

### Choose the MFA challenge

When a user has multiple MFA types enabled and none of them set as preferred, Amazon Cognito presents a `SELECT_MFA_TYPE` challenge to allow the user to pick an MFA method to authenticate.

```
AuthenticationHandler authHandler = new AuthenticationHandler() {

    @Override
    public void onSuccess(CognitoUserSession cognitoUserSession) {
        // ...
    }
}
```

```
@Override
public void getAuthenticationDetails(AuthenticationContinuation
authenticationContinuation, String userId) {
    // ...
}

@Override
public void getMFACode(MultiFactorAuthenticationContinuation
multiFactorAuthenticationContinuation) {
    // ...
}

@Override
public void authenticationChallenge(ChallengeContinuation continuation) {
    ChooseMfaContinuation mfaOptionsContinuation = (ChooseMfaContinuation)
continuation;
    // Get the list of MFA's to choose from
    List<String> mfaOptions = mfaOptionsContinuation.getMfaOptions();

    // ...

    // Set the MFA option and continue to authenticate.
    mfaOptionsContinuation.setMfaOption(option);
    mfaOptionsContinuation.continueTask();
}
@Override
public void onFailure(Exception exception) {
    // Sign-in failed, check exception for the cause
}
};
```

## 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, CognitoDevice newDevice) {
        // 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.getAttributeVerificationCode(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)
```

## Amazon Pinpoint Analytics

The following procedure describes how to integrate Amazon Pinpoint into your Android Amazon Cognito application. You will also need to configure your Amazon Cognito User Pool to use Amazon Pinpoint. For more information about integration with Amazon Pinpoint, see [Using Amazon Pinpoint Analytics with Amazon Cognito User Pools \(p. 156\)](#). For more information about Amazon Pinpoint, see the [Amazon Pinpoint documentation](#).

### Include the Amazon Pinpoint project ID when creating the CognitoUserPool instance

1. Sign in to the AWS Management Console and open the Amazon Pinpoint console at <https://console.aws.amazon.com/pinpoint/>.
2. If you do not already have one, create an Amazon Pinpoint project. Make a note of the Amazon Pinpoint project ID.

#### Note

The same Amazon Pinpoint project ID must also be configured for the Amazon Cognito User Pool. For more information see [Configuring User Pool Analytics \(p. 211\)](#).

3. In your Android Amazon Cognito app, when you instantiate your Amazon Cognito user pools instance, provide an `AWSCognitoIdentityUserPoolConfiguration` and use the Amazon Pinpoint app ID from the previous step to set the `pinpointAppId`.

```
CognitoUserPool pool = new CognitoUserPool(context, userPoolId, clientId, clientSecret,
cognitoRegion, pinpointAppId);
```

### Dependencies in the Android app

Use the AWS Mobile SDK for Android for Amazon Cognito Identity Provider version 2.6.3 or later to enable analytics in your Android apps.

If you are using Gradle build, add the following line in your app's build.gradle file.

```
dependency {
    compile 'com.amazonaws:aws-android-sdk-cognitoidentityprovider:2.6.3'
}
```

After this setup is done, the analytics for the user pool will be available in the Amazon Pinpoint project console on the **Users** tab.

## 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.
}
```

## Example: Migrating Android Users with a Lambda Trigger

A user migration Lambda trigger allows easy migration of users from your existing user management system into your user pool without a password reset.

### Set Up a User Migration Lambda Trigger

Before making changes in your Android app, set up a user migration Lambda for your user pool.

To learn more about Lambda triggers see [Customizing User Pool Workflows with Lambda Triggers \(p. 119\)](#).

For more information about migrating users with a Lambda trigger see [Importing Users into User Pools With a User Migration Lambda Trigger \(p. 170\)](#).

### Android App Changes

Update your AWSIdentityProvider Android SDK to version 2.6.15 or above.

#### Authentication Flow for User Migration

You can authenticate your users and validate their passwords against your legacy system and seamlessly migrate their profiles into your user pool. However, the service needs the legacy password to avoid a password reset.

The default authentication flow in the SDK implements the secure remote password (SRP) protocol where no password is actually sent over the wire. To enable user migration on your app, use the



USER\_PASSWORD authentication flow which sends your password to the service over an encrypted SSL connection during authentication. After user migration, use the default SRP authentication flow.

Set the authentication type to USER\_PASSWORD.

```
authenticationDetails.setAuthenticationType("USER_PASSWORD");
```

The authentication type is set in the `getAuthenticationDetails()` callback handler.

```
AuthenticationHandler authenticationHandler = new AuthenticationHandler() {  
    @Override  
    public void onSuccess(CognitoUserSession cognitoUserSession, CognitoDevice device) {  
        // Successful authentication.  
    }  
  
    @Override  
    public void getAuthenticationDetails(AuthenticationContinuation authContinuation,  
    String username) {  
        // Get user password.  
        String password = getUserPassword();  
  
        // Add user credentials to Authentication Details.  
        AuthenticationDetails authenticationDetails = new AuthenticationDetails(username,  
        password, validationData);  
  
        // Set the authentication type to use USER_PASSWORD flow.  
        authenticationDetails.setAuthenticationType("USER_PASSWORD");  
  
        // Continue with authentication.  
        authContinuation.setAuthenticationDetails(authenticationDetails);  
        authContinuation.continueTask();  
    }  
  
    @Override  
    public void getMFACode(MultiFactorAuthenticationContinuation  
    multiFactorAuthenticationContinuation) {  
        // ...  
    }  
  
    @Override  
    public void onFailure(Exception e) {  
        // ...  
    }  
  
    @Override  
    public void authenticationChallenge(ChallengeContinuation continuation) {  
        // ...  
    }  
};
```

## Adding an iOS App to Amazon Cognito User Pools

With Amazon Cognito user pools, you can enable your web and mobile app users to sign up and sign in. You can change passwords for authenticated users and initiate forgotten password flows for unauthenticated users. The following section provides setup information and examples so you can use the [Amazon Cognito Identity Provider](#) to retrieve and update user pool profiles.

To get started see [AWS Mobile SDK for iOS](#) and [Mobile SDK for iOS documentation](#).

You can import the Mobile SDK for iOS into your existing project using these frameworks:

- CocoaPods

Add the CocoaPods pod **AWSCognitoIdentityProvider** to your PodSpec and add `#import AWSCognitoIdentityProvider.h` to the classes where you will be using it.

See the [Mobile SDK for iOS CocoaPods setup instructions](#).

Learn more about [CocoaPods](#).

- Frameworks

Add the Frameworks **AWSCognitoIdentityProvider.framework** and add `#import <AWSCognitoIdentityProvider/AWSCognitoIdentityProvider.h>` to the classes where you will be using it.

See the [Mobile SDK for iOS Frameworks setup instructions](#).

Learn more about [Frameworks](#).

- Carthage

See the [Mobile SDK for iOS Carthage setup instructions](#).

Learn more about [Carthage](#).

- React Native

Add user pools to your React Native applications with the AWS Amplify Library for React Native which includes the Amazon Cognito Identity Provider.

For more information see [Set Up the AWS Amplify Library for React Native](#). See also [AWS Amplify Library Authentication Guide](#).

Learn more about [React Native](#).

You should use one of these environments to import the AWS Mobile SDK but not more than one. Importing the SDK in multiple ways loads duplicate copies of the SDK into the project causing errors.

### Topics

- [Tutorial: Integrating User Pools for iOS Apps \(p. 60\)](#)
- [Examples: Using User Pools with the iOS SDK \(p. 64\)](#)
- [Example: Migrating iOS Users with a Lambda Trigger \(p. 72\)](#)

## 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 \(p. 61\)](#)
- [Step 2: Creating a UserPool Object \(p. 61\)](#)
- [Step 3: Signing up Users for Your App \(p. 61\)](#)
- [Step 4: Confirming Users for Your App \(p. 62\)](#)
- [Step 5: Authenticating Users for Your App \(p. 62\)](#)
- [Step 6: Getting User Details \(p. 63\)](#)
- [Step 7: Getting Credentials to Access AWS Resources For an App User \(p. 63\)](#)
- [Next Steps \(p. 64\)](#)

## 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 [User Pools Reference \(AWS Management Console\)](#) (p. 197).

### 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](#), or the [Swift sample on Github](#).

## 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.

#### Note

The `credentialsProvider` is set to `nil`. You do not need a credentials provider or AWS credentials to interact with this service.

```
//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: Sign up a User

Use `pool.signUp:password:userAttributes:validationData` to sign up 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";

//sign up 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 user credentials are needed via a delegate.

To sign in explicitly, use the following:

```
[[user getSession:@"username" password:@"password" validationData:nil scopes:nil]
continueWithSuccessBlock:^(id _Nullable(AWSTask<AWSCognitoIdentityUserSession *> * _Nonnull
task) {
    //success, task.result has user session
    return 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
    AWSIdentityMultiFactorAuthentication 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
    AWSIdentityNewPasswordRequired protocol
    return newPasswordRequiredController;
}

//set up ui to prompt end user to setup a software MFA
//this is optional and only necessary if you have software MFA enabled and MFA is required
//on your pool
-(id<AWSIdentitySoftwareMfaSetupRequired>) startSoftwareMfaSetupRequired {
    //write code to instantiate your software token setup required ui if it wasn't
    created here
    dispatch_async(dispatch_get_main_queue(), ^{
        //write code to display your ui
    });

    //return your software mfa setup required ui which implements the
    AWSIdentitySoftwareMfaSetupRequired protocol
    return softwareMfaSetupController;
}

//set up ui to prompt end user to select which MFA they want for this authentication
//this is optional and only necessary if you have users can have multiple MFAs setup on the
//pool
-(id<AWSIdentitySelectMfa>) startSelectMfa {
    //write code to instantiate your select MFA ui if it wasn't created here
    dispatch_async(dispatch_get_main_queue(), ^{
        //write code to display your ui
    });

    //return your select MFA ui which implements the AWSIdentitySelectMfa protocol
    return selectMfaController;
}

//set up ui to drive a custom authentication flow
//this is optional and only necessary if you have custom authentication lambdas configured
//on your pool
-(id<AWSIdentityCustomAuthentication>) startCustomAuthentication {
    //write code to instantiate your custom authentication ui if it wasn't created here
    dispatch_async(dispatch_get_main_queue(), ^{
        //write code to display your ui
    });

    //return your custom authentication ui which implements the
    AWSIdentityCustomAuthentication protocol
    return customAuthenticationController;
}
```



```
}
```

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;
    //newPasswordRequiredInput 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;
```

If you support software MFA, you can implement the **AWSCognitoIdentitySoftwareMfaSetupRequired** protocol.

```
-(void) getSoftwareMfaSetupDetails: (AWSCognitoIdentitySoftwareMfaSetupRequiredInput
    *) softwareMfaSetupInput softwareMfaSetupRequiredDetails:
(AWSTaskCompletionSource<AWSCognitoIdentitySoftwareMfaSetupRequiredDetails *> *)
softwareMfaSetupRequiredCompletionSource{
    //keep a handle to the completion, you'll need it continue once you get the inputs
    from the end user
    self.softwareMfaSetupRequiredCompletionSource =
softwareMfaSetupRequiredCompletionSource;
    // softwareMfaSetupInput has details about the secret code the end user needs to
    register with their TOTP application.
}
```

```
-(void) didCompleteMfaSetupStepWithError:(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 the current code from their software token app, set the result on `softwareMfaSetupRequiredCompletionSource`.

```
AWSCognitoIdentitySoftwareMfaSetupRequiredDetails *details =
[[AWSCognitoIdentitySoftwareMfaSetupRequiredDetails alloc] initWithUserCode: @"User Code"
friendlyDeviceName:@"Friendly Name"
];
self.newPasswordRequiredCompletionSource.result = details;
```

If you support multiple MFA types, you can implement the `AWSCognitoIdentitySelectMfa` protocol.

```
-(void) getSelectMfaDetails: (AWSCognitoIdentitySelectMfaInput *) selectMfaInput
selectMfaCompletionSource: (AWSTaskCompletionSource<AWSCognitoIdentitySelectMfaDetails *>
*) selectMfaCompletionSource
{
    //keep a handle to the completion, you'll need it continue once you get the inputs
    from the end user
    self.selectMfaCompletionSource = selectMfaCompletionSource;
    // selectMfaInput has details about what MFAS are available to select.
}

-(void) didCompleteMfaSetupStepWithError:(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 selected the MFA, set the result on `selectMfaCompletionSource`.

```
AWSCognitoIdentitySoftwareMfaSetupRequiredDetails *details =
[[AWSCognitoIdentitySelectMfaDetails
alloc] initWithSelectedMfa: @"Selected MFA"
];
self.selectMfaCompletionSource.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;
}]];
```

## Example: Amazon Pinpoint Analytics

The following procedure describes how to integrate Amazon Pinpoint into your iOS Amazon Cognito application.

1. Sign in to the AWS Management Console and open the Amazon Pinpoint console at <https://console.aws.amazon.com/pinpoint/>.
2. Create an Amazon Pinpoint application. Make a note of the Amazon Pinpoint app ID.
3. In your Amazon Cognito app, when you instantiate your Amazon Cognito user pools instance, provide an `AWSCognitoIdentityUserPoolConfiguration` and use the Amazon Pinpoint app ID from the previous step to set the `pinpointAppId`.

### Objective-C:

```
AWSCognitoIdentityUserPoolConfiguration * poolConfiguration
= [[AWSCognitoIdentityUserPoolConfiguration alloc]
initWithClientId:@"YOUR_APP_CLIENT_ID"

                                clientSecret:@"YOUR_OPTIONAL_APP_CLIENT_SECRET"

                                poolId:@"YOUR_USER_POOL_ID"

                                shouldProvideCognitoValidationData:YES

                                pinpointAppId:@"YOUR_PINPOINT_APP_ID"];
```

### Swift:

```
let poolConfiguration = AWSCognitoIdentityUserPoolConfiguration(clientId:
"YOUR_APP_CLIENT_ID",
                                                                clientSecret:
"YOUR_OPTIONAL_APP_CLIENT_SECRET",
                                                                poolId:
"YOUR_USER_POOL_ID",
                                                                shouldProviderCognitoValidationData: YES,
                                                                pinpointAppId:
"YOUR_PINPOINT_APP_ID")
```

## 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 SMS 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;
}];
```

## Authenticated Example: Turning on Software MFA

```
//start by calling associateSoftwareToken to get a secret code for end user to register
[[self.user associateSoftwareToken] continueWithSuccessBlock:^id
_Nullable(AWSTask<AWSCognitoIdentityUserAssociateSoftwareTokenResponse *> * _Nonnull t) {
    dispatch_async(dispatch_get_main_queue(), ^{
        UIAlertController *alert = [UIAlertController alertControllerWithTitle:@"Associate
Software MFA" message:t.result.secretCode preferredStyle:UIAlertControllerStyleAlert];
        [alert addAction:[UIAlertAction actionWithTitle:@"Verify"
style:UIAlertActionStyleDefault handler:^(UIAlertAction * _Nonnull action) {
            //verify the software token by having end user input current code
            [[self.user verifySoftwareToken:alert.textFields[0].text
friendlyDeviceName: @"My Software Token"] continueWithSuccessBlock:^id
_Nullable(AWSTask<AWSCognitoIdentityUserVerifySoftwareTokenResponse *> * _Nonnull t) {
                //now the software token is configured, but not enabled, enable it
                AWSCognitoIdentityUserMfaPreferences * mfaPreferences =
[AWSCognitoIdentityUserMfaPreferences new];
                mfaPreferences.softwareTokenMfa = [[AWSCognitoIdentityUserMfaType alloc]
initWithEnabled:YES preferred:NO];
                [[self.user setUserMfaPreference:mfaPreferences]
continueWithSuccessBlock:^id
_Nullable(AWSTask<AWSCognitoIdentityUserSetUserMfaPreferenceResponse *> * _Nonnull t) {
                    return t;
                }];
                return nil;
            }];
        }];
    }];
    [alert addTextFieldWithConfigurationHandler:^(UITextField *textField) {
        textField.placeholder = @"User Code:";
    }];
    [self presentViewController:alert animated:YES completion:nil];
}];
return nil;
}];
```

## Example: Migrating iOS Users with a Lambda Trigger

A user migration Lambda trigger allows easy migration of users from your existing user management system into your user pool without a password reset.

### Set Up a User Migration Lambda Trigger

Before making changes in your iOS app, set up a user migration Lambda for your user pool.

To learn more about Lambda triggers see [Customizing User Pool Workflows with Lambda Triggers \(p. 119\)](#).

For more information about migrating users with a Lambda trigger see [Importing Users into User Pools With a User Migration Lambda Trigger \(p. 170\)](#).

### iOS App Changes

1. Update your SDK

Update your AWSCognitoIdentityProvider iOS SDK to version 2.6.12 or above.

2. Enable Migration

If you are using Info.plist to configure your user pool:

Add a Boolean `MigrationEnabled` key with the value `YES`. If you *Open As->Source Code* your Info.plist, it should look something like this:

```
<key>AWS</key>
<dict>
  <key>CognitoUserPool</key>
  <dict>
    <key>Default</key>
    <dict>
      <key>AppClientId</key>
      <string>YOUR_APP_CLIENT_ID</string>
      <key>PoolId</key>
      <string>region_YOUR_USER_POOL_ID </string>
      <key>Region</key>
      <string>us-west-2</string>
      <key>MigrationEnabled</key>
      <true/>
    </dict>
  </dict>
</dict>
```

### Authentication Flow for User Migration

You can authenticate your users and validate their passwords against your legacy system and seamlessly migrate their profiles into your user pool. However, the service needs the legacy password to avoid a password reset. So, if explicitly enabled in the authentication flow, the SDK will send your users' passwords to the service in text over an encrypted SSL connection.

If you are using `AWSCognitoIdentityUserPoolConfiguration` to configure your user pool, change your initializer to one that supports the `migrationEnabled` flag.

#### Objective-C

```
AWSCognitoIdentityUserPoolConfiguration * poolConfiguration
= [[AWSCognitoIdentityUserPoolConfiguration alloc]
  initWithClientId:@"YOUR_APP_CLIENT_ID"

               clientSecret:@"YOUR_OPTIONAL_APP_CLIENT_SECRET"

               poolId:@"YOUR_USER_POOL_ID"

  shouldProvideCognitoValidationData:YES

               pinpointAppId:@"YOUR_OPTIONAL_PINPOINT_APP_ID"

               migrationEnabled:YES];
```

#### Swift

```
let poolConfiguration = AWSCognitoIdentityUserPoolConfiguration(clientId:
  "YOUR_APP_CLIENT_ID",
                                                                clientSecret:
  "YOUR_OPTIONAL_APP_CLIENT_SECRET",
                                                                poolId:
  "YOUR_USER_POOL_ID",
```

```
                                shouldProviderCognitoValidationData: YES,  
                                pinpointAppId:  
"YOUR_OPTIONAL_PINPOINT_APP_ID",  
                                migrationEnabled: YES)
```

## Using the Built-in Sign-up and Sign-in Webpages

You can create an app in your user pool to use the built-in webpages available for signing up and signing in your users. Amazon Cognito's hosted UI is the foundation for other features such as the ability to sign in directly to your user pool through Facebook, Amazon, and Google, as well as through OpenID Connect (OIDC) and SAML identity providers.

### Topics

- [Adding an App Client \(AWS Management Console\) \(p. 74\)](#)
- [Configuring a User Pool App Client \(p. 76\)](#)
- [Configuring a User Pool Domain \(p. 79\)](#)
- [Customizing the Built-in Sign-in and Sign-up Webpages \(p. 83\)](#)
- [Defining Resource Servers for Your User Pool \(p. 87\)](#)

## Adding an App Client (AWS Management Console)

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the navigation bar on the left-side of the page, choose **App clients** under **General settings**.
5. Choose **Add an app client**.
6. Give your app a name.
7. Unless required by your authorization flow, clear the option **Generate client secret**. The client secret is used by applications that have a server-side component that can secure the client secret.
8. Choose **Create app client**.
9. Note the **App client ID**.
10. Choose **Return to pool details**.
11. **Configure the app.**
  - a. Choose **App client settings** from the navigation bar on the left-side of the console page.
  - b. Select **Cognito User Pool** as one of the **Enabled Identity Providers**.

### Note

To sign in with external identity providers (IdPs), such as Facebook, Amazon, or Google, as well as through OpenID Connect (OIDC) or SAML IdPs, first configure them as described next, and then return to the **App client settings** page to enable them.

- c. Type a callback URL for the Amazon Cognito authorization server to call after users are authenticated. For a web app, the URL should start with `https://`, such as `https://www.example.com`.

For an iOS or Android app, you can use a callback URL such as `myapp://`.

- d. Select **Authorization code grant** to return an authorization code that is then exchanged for user pool tokens. Because the tokens are never exposed directly to an end user, they are less likely to become compromised. However, a custom application is required on the backend to exchange



the authorization code for user pool tokens. For security reasons, we recommend that you use the authorization code grant flow, together with see [Proof Key for Code Exchange \(PKCE\)](#), for mobile apps.

Under **Allowed OAuth Flows**, select **Implicit grant** to have user pool JSON web tokens (JWT) returned to you from Amazon Cognito. You can use this flow when there's no backend available to exchange an authorization code for tokens. It's also helpful for debugging tokens.

You can enable both the **Authorization code grant** and the **Implicit code grant**, and then use each grant as needed.

Unless you specifically want to exclude one, select the check boxes for all of the **Allowed OAuth scopes**.

**Note**

Select **Client credentials** only if your app needs to request access tokens on its own behalf, not on behalf of a user.

- e. Choose **Save changes**.

**12. Configure a domain.**

- a. On the **Domain name** page, type a domain prefix that's available.
- b. Make a note of the complete domain address.
- c. Choose **Save changes**.

**To view your sign-in page**

You can view the hosted UI sign-in webpage with the following URL. Note the `response_type`. In this case, **response\_type=code** for the authentication code grant.

```
https://<your_domain>/login?  
response_type=code&client_id=<your_app_client_id>&redirect_uri=<your_callback_url>
```

You can view the hosted UI sign-in webpage with the following URL for the implicit code grant where **response\_type=token**. After a successful sign-in, Amazon Cognito returns user pool tokens to your web browser's address bar.

```
https://<your_domain>/login?  
response_type=token&client_id=<your_app_client_id>&redirect_uri=<your_callback_url>
```

You can find the JSON web token (JWT) identity token after the `#idtoken=` parameter in the response.

Here's a sample response from an implicit grant request. Your identity token string will be much longer.

```
https://www.example.com/  
#id_token=123456789tokens123456789&expires_in=3600&token_type=Bearer
```

You can decode and verify user pool tokens using AWS Lambda, see [Decode and verify Amazon Cognito JWT tokens](#) on the AWS GitHub website.

Amazon Cognito user pools tokens are signed using an RS256 algorithm.

You might have to wait a minute to refresh your browser before changes you made in the console appear.

Your domain is shown on the **Domain name** page. Your app client ID and callback URL are shown on the **App client settings** page.

**Note**

The Amazon Cognito hosted sign-in web page does not support the custom authentication flow.

## Configuring a User Pool App Client

After you create a user pool, you can create an app client to use the built-in webpages for signing up and signing in your users. To add an app client and an Amazon Cognito hosted domain with the AWS Management Console, see [Adding an App to Enable the Hosted Web UI](#).

## App Client Settings Overview

### Enabled Identity Providers

You can choose your identity provider (IdP) to authenticate your users. This service can be performed by your user pool, or by a third party such as Facebook. Before you can use an IdP, you need to enable it. You can enable multiple IdPs, but you must enable at least one. For more information on using external IdPs see [Adding User Pool Sign-in Through a Third Party \(p. 89\)](#).

### Callback URL(s)

A callback URL indicates where the user is to be redirected after a successful sign-in. Choose at least one callback URL, and it should:

- Be an absolute URI.
- Be pre-registered with a client.
- Not include a fragment component.

See [OAuth 2.0 - Redirection Endpoint](#).

Amazon Cognito requires HTTPS over HTTP except for `http://localhost` for testing purposes only.

App callback URLs such as `myapp://example` are also supported.

### Sign out URL(s)

A sign-out URL indicates where your user is to be redirected after signing out.

### Allowed OAuth Flows

The **Authorization code grant** flow initiates a code grant flow, which provides an authorization code as the response. This code can be exchanged for access tokens with the [TOKEN Endpoint \(p. 316\)](#). Because the tokens are never exposed directly to an end user, they are less likely to become compromised. However, a custom application is required on the backend to exchange the authorization code for user pool tokens.

**Note**

For security reasons, we highly recommend that you use only the **Authorization code grant** flow, together with [PKCE](#), for mobile apps.

The **Implicit grant** flow allows the client to get the access token (and, optionally, ID token, based on scopes) directly from the [AUTHORIZATION Endpoint \(p. 312\)](#). Choose this flow if your app cannot initiate the **Authorization code grant** flow. For more information, see the [OAuth 2.0 specification](#).

You can enable both the **Authorization code grant** and the **Implicit code grant**, and then use each grant as needed.

The **Client credentials** flow is used in machine-to-machine communications. With it you can request an access token to access your own resources. Use this flow when your app is requesting the token on its own behalf, not on behalf of a user.

**Note**

Since the client credentials flow is not used on behalf of a user, only custom scopes can be used with this flow. A custom scope is one that you define for your own resource server. See [Defining Resource Servers for Your User Pool \(p. 87\)](#).

**Allowed OAuth Scopes**

Choose one or more of the following OAuth scopes to specify the access privileges that can be requested for access tokens.

- The `phone` scope grants access to the `phone_number` and `phone_number_verified` claims. This scope can only be requested with the `openid` scope.
- The `email` scope grants access to the `email` and `email_verified` claims. This scope can only be requested with the `openid` scope.
- The `openid` scope returns all user attributes in the ID token that are readable by the client. The ID token is not returned if the `openid` scope is not requested by the client.
- The `aws:cognito.signin.user.admin` scope grants access to [Amazon Cognito User Pool API operations](#) that require access tokens, such as [UpdateUserAttributes](#) and [VerifyUserAttribute](#).
- The `profile` scope grants access to all user attributes that are readable by the client.

**Allowed Custom Scopes**

A custom scope is one that you define for your own resource server in the **Resource Servers**. The format is `resource-server-identifier/scope`. See [Defining Resource Servers for Your User Pool \(p. 87\)](#).

For more information about OAuth scopes, see the list of [standard OIDC scopes](#).

## To Configure an App Client (AWS Management Console)

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage User Pools**.
3. Choose the user pool you want to edit.
4. Choose **App client settings** from the navigation bar on the left-side of the console page.
5. Select **Cognito User Pool** as one of the **Enabled Identity Providers** to include it as one of your IdPs. Enable at least one IdP.

**Note**

To sign in with external identity providers (IdPs), such as Facebook, Amazon, or Google, as well as through OpenID Connect (OIDC) or SAML IdPs, configure them first and then return to the **App client settings** page to enable them. For more information see [Adding User Pool Sign-in Through a Third Party \(p. 89\)](#).

6. In the **Sign in and sign out URLs** section, type your **Callback URLs**, separated by commas.

For a web app, the URL should start with `https://`, such as `https://www.example.com`.

For an iOS or Android app, you can use a callback URL such as `myapp://`.

**Note**

You must register the callback and sign out URLs, either in the console or by using the CLI or API, before you can use them with your user pool app client.

7. Type your optional **Sign out URLs**, separated by commas.
8. Select your **OAuth 2.0** options:

- Authorized code grant
- Implicit grant
- Client credentials

Choosing client credentials will clear the other options, and the standard scopes will not be available.

9. a. For the code grant and implicit grant options, select your scopes from **Allowed OAuth Scopes**. Each scope is a set of one or more standard attributes. For more information, see [App Client Settings Overview \(p. 76\)](#).  
b. For the client credentials flow, the standard scopes are not available. Since the client credentials flow is not used on behalf of a user, only custom scopes can be used. A custom scope is one that you define for your own resource server. See [Defining Resource Servers for Your User Pool \(p. 87\)](#).
10. Choose **Save changes**.

## To Configure an App Client (AWS CLI and AWS API)

You can use the AWS CLI to update, create, describe, and delete your user pool app client.

Replace "MyUserPoolID" and "MyAppClientID" with your user pool and app client ID values in these examples. Likewise, your parameter values might be different than those used in these examples.

### Note

Use JSON format for callback and logout URLs to prevent the CLI from treating them as remote parameter files:

```
--callback-urls '["https://example.com"]'  
--logout-urls '["https://example.com"]'
```

## Updating a User Pool App Client (AWS CLI and AWS API)

```
aws cognito-idp update-user-pool-client --user-pool-id "MyUserPoolID" --client-id  
"MyAppClientID" --allowed-o-auth-flows-user-pool-client --allowed-o-auth-flows "code"  
"implicit" --allowed-o-auth-scopes "openid" --callback-urls '["https://example.com"]' --  
supported-identity-providers '["MySAMLIdP", "LoginWithAmazon"]'
```

If the command is successful, the AWS CLI returns a confirmation:

```
{  
  "UserPoolClient": {  
    "ClientId": "MyClientId",  
    "SupportedIdentityProviders": [  
      "LoginWithAmazon",  
      "MySAMLIdP"  
    ],  
    "CallbackURLs": [  
      "https://example.com"  
    ],  
    "AllowedOAuthScopes": [  
      "openid"  
    ],  
    "ClientName": "Example",  
    "AllowedOAuthFlows": [  
      "implicit",  
      "code"  
    ],  
    "RefreshTokenValidity": 30,  
    "CreationDate": 1524628110.29,  
  }  
}
```

```
"AllowedOAuthFlowsUserPoolClient": true,  
"UserPoolId": "MyUserPoolID",  
"LastModifiedDate": 1530055177.553  
}
```

See the AWS CLI command reference for more information: [update-user-pool-client](#).

AWS API: [UpdateUserPoolClient](#)

### Creating a User Pool App Client (AWS CLI and AWS API)

```
aws cognito-idp create-user-pool-client --user-pool-id MyUserPoolID --client-name myApp
```

See the AWS CLI command reference for more information: [create-user-pool-client](#)

AWS API: [CreateUserPoolClient](#)

### Getting Information about a User Pool App Client (AWS CLI and AWS API)

```
aws cognito-idp describe-user-pool-client --user-pool-id MyUserPoolID --client-id  
MyClientID
```

See the AWS CLI command reference for more information: [describe-user-pool-client](#).

AWS API: [DescribeUserPoolClient](#)

### Listing All App Client Information in a User Pool (AWS CLI and AWS API)

```
aws cognito-idp list-user-pool-clients --user-pool-id "MyUserPoolID" --max-results 3
```

See the AWS CLI command reference for more information: [list-user-pool-clients](#).

AWS API: [ListUserPoolClients](#)

### Deleting a User Pool App Client (AWS CLI and AWS API)

```
aws cognito-idp delete-user-pool-client --user-pool-id "MyUserPoolID" --client-id  
"MyAppClientID"
```

See the AWS CLI command reference for more information: [delete-user-pool-client](#)

AWS API: [DeleteUserPoolClient](#)

## Configuring a User Pool Domain

After setting up an app client, you can configure the address of your sign-up and sign-in webpages. You can use an Amazon Cognito hosted domain and choose an available domain prefix, or you can use your own web address as a custom domain.

To add an app client and an Amazon Cognito hosted domain with the AWS Management Console, see [Adding an App to Enable the Hosted Web UI](#).

#### Topics

- [Using the Hosted User Pool Domain \(p. 80\)](#)

- [Adding a Custom Domain to a User Pool \(p. 81\)](#)

## Using the Hosted User Pool Domain

After setting up an app client, you can configure the address of your sign-up and sign-in webpages. You can use the hosted Amazon Cognito domain with your own domain prefix.

To add an app client and an Amazon Cognito hosted domain with the AWS Management Console, see [Adding an App to Enable the Hosted Web UI](#).

### Topics

- [Prerequisites \(p. 80\)](#)
- [Step 1: Configure a Hosted User Pool Domain \(p. 80\)](#)
- [Step 2: Verify Your Sign-in Page \(p. 81\)](#)

## Prerequisites

Before you begin, you need:

- A user pool with an app client. For more information, see [Getting Started with User Pools \(p. 14\)](#).

## Step 1: Configure a Hosted User Pool Domain

### To configure a hosted user pool domain (AWS Management Console)

You can use the AWS Management Console to configure a user pool domain.

#### To configure a Amazon Cognito hosted domain

1. Sign in to the [Amazon Cognito console](#).
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. Choose the **Domain name** tab.
4. Type the domain prefix you want to use in the **Prefix domain name** box.
5. Choose **Check availability** to confirm the domain prefix is available.
6. Choose **Save changes**.

### To configure a hosted user pool domain (AWS CLI and AWS API)

Use the following commands to create a domain prefix and assign it to your user pool.

#### To configure a user pool domain

- AWS CLI: `aws cognito-idp create-user-pool-domain`

Example: `aws cognito-idp create-user-pool-domain --user-pool-id <user_pool_id> --domain <domain_name>`

- AWS API: [CreateUserPoolDomain](#)

#### To get information about a domain

- AWS CLI: `aws cognito-idp describe-user-pool-domain`

Example: `aws cognito-idp describe-user-pool-domain --domain <domain_name>`

- AWS API: [DescribeUserPoolDomain](#)

### To delete a domain

- AWS CLI: `aws cognito-idp delete-user-pool-domain`

Example: `aws cognito-idp delete-user-pool-domain --domain <domain_name>`

- AWS API: [DeleteUserPoolDomain](#)

## Step 2: Verify Your Sign-in Page

- Verify that the sign-in page is available from your Amazon Cognito hosted domain.

```
https://your_domain/login?  
response_type=code&client_id=your_app_client_id&redirect_uri=your_callback_url
```

Your domain is shown on the **Domain name** page of the Amazon Cognito console. Your app client ID and callback URL are shown on the **App client settings** page.

## Adding a Custom Domain to a User Pool

After setting up an app client, you can configure the address of your sign-up and sign-in webpages. With a custom user pool domain, you can enable your users to sign in to Amazon Cognito using your own web address.

### Topics

- [Prerequisites \(p. 81\)](#)
- [Step 1: Choose a Custom Domain Name \(p. 82\)](#)
- [Step 2: Add an Alias Target and Subdomain \(p. 82\)](#)
- [Step 3: Verify Your Sign-in Page \(p. 83\)](#)

## Prerequisites

Before you begin, you need:

- A user pool with an app client. For more information, see [Getting Started with User Pools \(p. 14\)](#).
- A web domain that you own. Its root must have a valid **A record** in DNS. For more information see [Domain Names](#).
- A subdomain for your custom domain. We recommend using **auth** as the subdomain. For example: `auth.example.com`.

### Note

You might need to obtain a new certificate for your custom domain's subdomain if you don't have a [wildcard certificate](#).

- A Secure Sockets Layer (SSL) certificate managed by [AWS Certificate Manager](#). You must change the AWS region to US East (N. Virginia) in the ACM console before you request or import a certificate.
- To set up a custom domain name or to update its certificate, you must have permission to update Amazon CloudFront distributions. You can do so by attaching the following IAM policy statement to an IAM user, group, or role in your AWS account:

```
{
```

```
"Version": "2012-10-17",
"Statement": [
  {
    "Sid": "AllowCloudFrontUpdateDistribution",
    "Effect": "Allow",
    "Action": [
      "cloudfront:updateDistribution"
    ],
    "Resource": [
      "*"
    ]
  }
]
```

See [Using Identity-Based Policies \(IAM Policies\) for CloudFront](#).

## Step 1: Choose a Custom Domain Name

### To choose your custom domain name from AWS Certificate Manager

1. Sign in to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. On the navigation bar on the left-side of the page, choose **Domain name**.
4. Choose **Use your domain**.
5. Type your custom domain name. You can form domain names from the set of alphanumeric ASCII characters (a-z, A-Z, 0-9). The hyphen (U+002D) is also permitted, but not as the first or last character of a domain name.
6. Choose **AWS-managed certificate** from **Amazon Certificate Manager**. This certificate is managed by AWS, including its creation and renewal for a given custom domain.

If your certificate doesn't appear in the list, you can get one by choosing **Provision certificates** from <https://console.aws.amazon.com/acm/>.

7. Choose **Save changes**.
8. Note the **Alias target**. Instead of an IP address or a domain name, the **Alias target** is an alias resource record set that points to an Amazon CloudFront distribution.

## Step 2: Add an Alias Target and Subdomain

In this step, you set up an alias through your Domain Name Server (DNS) service provider that points back to the alias target from the previous step. If you are using Amazon Route 53 for DNS address resolution, choose the section **To add an alias target and subdomain using Route 53**.

### To add an alias target and subdomain to your current DNS configuration

- If you aren't using Route 53 for DNS address resolution, then you need to have your DNS service provider add the alias target from the previous step as an alias for your user pool custom domain. Your DNS provider will also need to set up the subdomain for your custom domain.

### To add an alias target and subdomain using Route 53

1. Sign in to the [Route 53 console](#). You might be prompted for your AWS credentials.
2. If you don't have a hosted zone in Route 53, set one up. Otherwise, skip this step.
  - a. Choose **Create Hosted Zone**.



- b. Choose your custom domain from the **Domain Name** list.
  - c. For **Comment**, type an optional comment about the hosted zone.
  - d. Choose **Create**.
3. On the **Hosted Zones** page, choose the name of your hosted zone.
4. Choose **Create Record Set**.
5. Select **Yes** for the **Alias** option.
6. Type the alias target name that you noted in a previous step into **Alias Target**.
7. Choose **Create**.

**Note**

Your new records take time to propagate to the Route 53 DNS servers. Currently, the only way to verify that changes have propagated is to use the Route 53 [GetChange](#) API method. Changes generally propagate to all Route 53 name servers within 60 seconds.

8. Add a subdomain in Route 53 by using the alias target.
  - a. On the **Hosted Zones** page, choose the name of your hosted zone.
  - b. Choose **Create Record Set** and enter the following values:
    - i. For **Name**, type your preferred subdomain name. For example, if the subdomain you're attempting to create is `auth.example.com`, type `auth`.
    - ii. For **Type**, choose **A - IPv4 address**.
    - iii. Select **Yes** for the **Alias** option.
    - iv. Type the alias target name that you noted in a previous step in **Alias Target**.
  - c. Choose **Create**.

**Note**

Alternatively, you can create a new hosted zone to hold the records that are associated with your subdomain. You can also create a delegation set in the parent hosted zone that refers clients to the subdomain hosted zone. This method offers more flexibility when you're managing the hosted zones (for example, restricting who can edit the zones). You can only use this method for public hosted zones, because adding NS records to private hosted zones isn't currently supported. For more information, see [Creating a subdomain for a domain hosted through Amazon Route 53](#).

### Step 3: Verify Your Sign-in Page

- Verify that the sign-in page is available from your custom domain.

Sign in with your custom domain and subdomain by entering this address into your browser. This is an example URL of a custom domain `example.com` with the subdomain `auth`:

```
https://auth.example.com/login?
response_type=code&client_id=<your_app_client_id>&redirect_uri=<your_callback_url>
```

## Customizing the Built-in Sign-in and Sign-up Webpages

You can use the AWS Management Console, or the AWS CLI or API, to specify customization settings for the built-in app UI experience. You can upload a custom logo image to be displayed in the app. You can also choose many CSS customizations.

You can specify app UI customization settings for a single client (with a specific `clientId`) or for all clients (by setting the `clientId` to `ALL`). If you specify `ALL`, the default configuration will be used for every client that has no UI customization set previously. If you specify UI customization settings for a particular client, it will no longer fall back to the `ALL` configuration.

**Note**

To use this feature, your user pool must have a domain associated with it.

## Specifying a Custom Logo for the App

The maximum allowable size for a logo image file is 100 KB.

## Specifying CSS Customizations for the App

You can customize the CSS for the hosted app pages, with the following restrictions:

- The CSS class names can only be from the following list:
  - `background-customizable`
  - `banner-customizable`
  - `errorMessage-customizable`
  - `idpButton-customizable`
  - `idpButton-customizable: hover`
  - `inputField-customizable`
  - `inputField-customizable: focus`
  - `label-customizable`
  - `legalText-customizable`
  - `logo-customizable`
  - `submitButton-customizable`
  - `submitButton-customizable: hover`
  - `textDescription-customizable`
- Property values cannot contain HTML, `@import`, `@supports`, `@page`, or `@media` statements or Javascript.

You can customize the following CSS properties.

### Labels

- **font-weight** is a multiple of 100 from 100 to 900.

### Input fields

- **width** is the width as a percentage of the containing block.
- **height** is the height of the input field in pixels (px).
- **color** is the text color. It can be any standard CSS color value.
- **background-color** is the background color of the input field. It can be any standard color value.
- **border** is a standard CSS border value that specifies the width, transparency, and color of the border of your app window. Width can be any value from 1px to 100px. Transparency can be solid or none. Color can be any standard color value.

### Text descriptions

- **padding-top** is the amount of padding above the text description.
- **padding-bottom** is the amount of padding below the text description.
- **display** can be `block` or `inline`.

- **font-size** is the font size for text descriptions.

#### **Submit button**

- **font-size** is the font size of the button text.
- **font-weight** is the font weight of the button text: `bold`, `italic`, or `normal`.
- **margin** is a string of 4 values indicating the top, right, bottom, and left margin sizes for the button.
- **font-size** is the font size for text descriptions.
- **width** is the width of the button text in percent of the containing block.
- **height** is the height of the button in pixels (px).
- **color** is the button text color. It can be any standard CSS color value.
- **background-color** is the background color of the button. It can be any standard color value.

#### **Banner**

- **padding** is a string of 4 values indicating the top, right, bottom, and left padding sizes for the banner.
- **background-color** is the banner's background color. It can be any standard CSS color value.

#### **Submit button hover**

- **color** is the foreground color of the button when you hover over it. It can be any standard CSS color value.
- **background-color** is the background color of the button when you hover over it. It can be any standard CSS color value.

#### **Identity provider button hover**

- **color** is the foreground color of the button when you hover over it. It can be any standard CSS color value.
- **background-color** is the background color of the button when you hover over it. It can be any standard CSS color value.

#### **Password check not valid**

- **color** is the text color of the "Password check not valid" message. It can be any standard CSS color value.

#### **Background**

- **background-color** is the background color of the app window. It can be any standard CSS color value.

#### **Error messages**

- **margin** is a string of 4 values indicating the top, right, bottom, and left margin sizes.
- **padding** is the padding size.
- **font-size** is the font size.
- **width** is the width of the error message as a percentage of the containing block.
- **background** is the background color of the error message. It can be any standard CSS color value.
- **border** is a string of 3 values specifying the width, transparency, and color of the border.
- **color** is the error message text color. It can be any standard CSS color value.
- **box-sizing** is used to indicate to the browser what the sizing properties (width and height) should include.

#### **Identity provider buttons**

- **height** is the height of the button in pixels (px).
- **width** is the width of the button text as a percentage of the containing block.
- **text-align** is the text alignment setting. It can be `left`, `right`, or `center`.
- **margin-bottom** is the bottom margin setting.

- **color** is the button text color. It can be any standard CSS color value.
- **background-color** is the background color of the button. It can be any standard color value.
- **border-color** is the color of the button border. It can be any standard color value.

#### Identity provider descriptions

- **padding-top** is the amount of padding above the description.
- **padding-bottom** is the amount of padding below the description.
- **display** can be `block` or `inline`.
- **font-size** is the font size for descriptions.

#### Legal text

- **color** is the text color. It can be any standard CSS color value.
- **font-size** is the font size.

#### Logo

- **max-width** is the maximum width as a percentage of the containing block.
- **max-height** is the maximum height as a percentage of the containing block.

#### Input field focus

- **border-color** is the color of the input field. It can be any standard CSS color value.
- **outline** is the border width of the input field, in pixels.

#### Social button

- **height** is the height of the button in pixels (px).
- **text-align** is the text alignment setting. It can be `left`, `right`, or `center`.
- **width** is the width of the button text as a percentage of the containing block.
- **margin-bottom** is the bottom margin setting.

#### Password check valid

- **color** is the text color of the "Password check valid" message. It can be any standard CSS color value.

## Specifying App UI Customization Settings for a User Pool (AWS Management Console)

You can use the AWS Management Console to specify UI customization settings for your app.

#### Note

You can view the hosted UI with your customizations by constructing the following URL, with the specifics for your user pool, and typing it into a browser: `https://<your_domain>/login?response_type=code&client_id=<your_app_client_id>&redirect_uri=<your_callback_url>`

You may have to wait up to one minute to refresh your browser before changes made in the console appear.

Your domain is shown on the **Domain name** tab. Your app client ID and callback URL are shown on the **App client settings** tab.

#### To specify app UI customization settings

1. Sign in to the [Amazon Cognito console](#).
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. Choose the **UI customization** tab.
4. Under **App client to customize**, choose the app you want to customize from the dropdown menu of app clients that you previously created in the **App clients** tab.

5. To upload your own logo image file, choose **Choose a file** or drag a file into the **Logo (optional)** box.
6. Under **CSS customizations (optional)**, you can customize the appearance of the app by changing various properties from their default values.

## Specifying App UI Customization Settings for a User Pool (AWS CLI and AWS API)

Use the following commands to specify app UI customization settings for your user pool.

### To get the UI customization settings for a user pool's built-in app UI

- AWS CLI: `aws cognito-idp get-ui-customization`
- AWS API: [GetUICustomization](#)

### To set the UI customization settings for a user pool's built-in app UI

- AWS CLI: `aws cognito-idp set-ui-customization --user-pool-id <your-user-pool-id> --client-id <your-app-client-id> --image-file <path-to-logo-image-file> --css ".label-customizable{ color: <color>;}"`
- AWS API: [SetUICustomization](#)

## Defining Resource Servers for Your User Pool

Once you configure a domain for your user pool, the Amazon Cognito service automatically provisions a hosted web UI that allows you to add sign-up and sign-in pages to your app. For more information see [Step 2. Add an App to Enable the Hosted Web UI \(p. 15\)](#).

A *resource server* is a server for access-protected resources. It handles authenticated requests from an app that has an access token. Typically the resource server provides a [CRUD](#) API for making these access requests. This API can be hosted in Amazon API Gateway or outside of AWS. The app passes the access token in the API call to the resource server. The app should treat the access token as opaque when it passes the token in the access request. The resource server inspects the access token to determine if access should be granted.

### Note

Your resource server must verify the access token signature and expiration date before processing any claims inside the token. For more information about verifying and using user pool tokens, see [this blog post](#). Amazon API Gateway is a good option for inspecting access tokens and protecting your resources. For more about API Gateway custom authorizers, see [Use API Gateway Custom Authorizers](#).

A *scope* is a level of access that an app can request to a resource. For example, if you have a resource server for photos, it might define two scopes: one for read access to the photos and one for write/delete access. When the app makes an API call to request access and passes an access token, the token will have one or more scopes embedded in it.

### Overview

Amazon Cognito allows app developers to create their own OAuth2.0 resource servers and define custom scopes in them. Custom scopes can then be associated with a client, and the client can request them in OAuth2.0 authorization code grant flow, implicit flow, and client credentials flow. Custom scopes are added in the *scope* claim in the access token. A client can use the access token against its resource server, which makes the authorization decision based on scopes present in the token. For more information about access token scope, see [Using Tokens with User Pools \(p. 186\)](#).

**Note**

Your resource server must verify the access token signature and expiration date before processing any claims inside the token.

**Note**

An app client can only use the client credentials flow if the app client has a client secret.

**Managing the Resource Server and Custom Scopes**

When creating a resource server, you must provide a resource server name and a resource server identifier. For each scope you create in the resource server, you must provide the scope name and description.

Example:

- **Name:** a friendly name for the resource server, such as `Weather API` or `Photo API`.
- **Identifier:** Unique identifier for the resource server. This could be an HTTPS endpoint where your resource server is located. For example, `https://my-weather-api.example.com`
- **Scope Name:** The scope name. For example, `weather.read`
- **Scope Description:** A brief description the scope. For example, `Retrieve weather information.`

When a client app requests a custom scope in any of the OAuth2.0 flows, it must request the full identifier for the scope, which is `resourceServerIdentifier/scopeName`. For example, if the resource server identifier is `https://myphotosapi.example.com` and the scope name is `photos.read`, the client app must request `https://myphotosapi.example.com/photos.read` at runtime.

Deleting a scope from a resource server does not delete its association with all clients; deleting the scope makes it inactive. So if a client app requests the deleted scope at runtime, the scope is ignored and is not included in the access token. If the scope is re-added later, then it is again included in the access token.

If a scope is removed from a client, the association between client and scope is deleted. If a client requests a disallowed scope at runtime, this results in an error, and an access token is not issued.

You can use the AWS Management Console, API, and CLI to define resource servers and scopes for your user pool.

## Defining a Resource Server for Your User Pool (AWS Management Console)

You can use the AWS Management Console to define a resource server for your user pool.

**To define a resource server**

1. Sign in to the [Amazon Cognito console](#).
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. Choose the **Resource servers** tab.
4. Choose **Add a resource server**.
5. Enter the name of your resource server, for example, `Photo Server`.
6. Enter the identifier of your resource server, for example, `com.example.photos`.
7. Enter the names of the custom scopes for your resources, such as `read` and `write`.
8. For each of the scope names, enter a description, such as `view your photos and update your photos`.

9. Choose **Save changes**.

Each of the custom scopes that you define appears on the **App client settings** tab, under **OAuth2.0 Allowed Custom Scopes**; for example `com.example.photos/read`.

## Defining a Resource Server for Your User Pool (AWS CLI and AWS API)

Use the following commands to specify resource server settings for your user pool.

### To create a resource server

- AWS CLI: `aws cognito-idp create-resource-server`
- AWS API: [CreateResourceServer](#)

### To get information about your resource server settings

- AWS CLI: `aws cognito-idp describe-resource-server`
- AWS API: [DescribeResourceServer](#)

### To list information about all resource servers for your user pool

- AWS CLI: `aws cognito-idp list-resource-servers`
- AWS API: [ListResourceServers](#)

### To delete a resource server

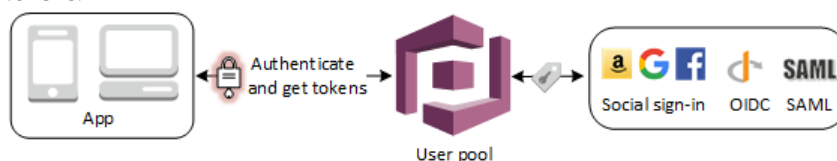
- AWS CLI: `aws cognito-idp delete-resource-server`
- AWS API: [DeleteResourceServer](#)

### To update the settings for a resource server

- AWS CLI: `aws cognito-idp update-resource-server`
- AWS API: [UpdateResourceServer](#)

## Adding User Pool Sign-in Through a Third Party

Your app users can sign in either directly through a user pool, or federate through a third-party identity provider (IdP). The user pool manages the overhead of handling the tokens that are returned from social sign-in through Facebook, Google, and Amazon, and from OpenID Connect (OIDC) and SAML IdPs. With the built-in hosted web UI, Amazon Cognito provides token handling and management for authenticated users from all identity providers, so your backend systems can standardize on one set of user pool tokens.



**Note**

Sign-in through a third party (federation) is available in Amazon Cognito user pools. This feature is independent of federation through Amazon Cognito identity pools (federated identities).

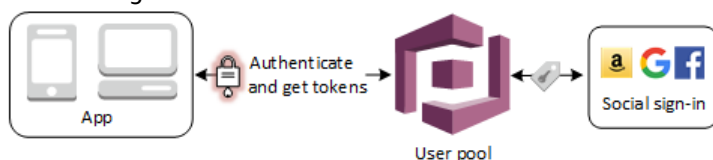
**Topics**

- [Adding Social Identity Providers to a User Pool \(p. 90\)](#)
- [Adding SAML Identity Providers to a User Pool \(p. 94\)](#)
- [Adding OIDC Identity Providers to a User Pool \(p. 101\)](#)
- [Specifying Identity Provider Attribute Mappings for Your User Pool \(p. 106\)](#)

## Adding Social Identity Providers to a User Pool

Your web and mobile app users can sign in through social identity providers (IdP) like Facebook, Google, and Amazon. With the built-in hosted web UI, Amazon Cognito provides token handling and management for all authenticated users, so your backend systems can standardize on one set of user pool tokens.

You can add a social identity provider in the AWS Management Console, with the AWS CLI, or using Amazon Cognito API calls.

**Note**

Sign-in through a third party (federation) is available in Amazon Cognito user pools. This feature is independent of federation through Amazon Cognito identity pools (federated identities).

**Topics**

- [Prerequisites \(p. 90\)](#)
- [Step 1: Register with a Social IdP \(p. 90\)](#)
- [Step 2: Add a Social IdP to Your User Pool \(p. 92\)](#)
- [Step 3: Test Your Social IdP Configuration \(p. 93\)](#)

## Prerequisites

Before you begin, you need:

- A user pool with an application client and a user pool domain. For more information, see [Create a user pool](#).
- A social identity provider.

## Step 1: Register with a Social IdP

Before you create a social IdP with Amazon Cognito, you must register your application with the social IdP to receive a client ID and client secret.

### To register an app with Facebook

1. Create a [developer account with Facebook](#).



2. [Sign in](#) with your Facebook credentials.
3. From the **My Apps** menu, choose **Create New App**.
4. Give your Facebook app a name and choose **Create App ID**.
5. On the left navigation bar, choose **Settings** and then **Basic**.
6. Note the **App ID** and the **App Secret**. You will use them in the next section.
7. Choose **+ Add Platform** from the bottom of the page.
8. Choose **Website**.
9. Under **Website**, type your user pool domain with the `/oauth2/idpresponse` endpoint into **Site URL**.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

10. Choose **Save changes**.
11. Type your user pool domain into **App Domains**.

```
https://<your-user-pool-domain>
```

12. Choose **Save changes**.
13. From the navigation bar choose **Products** and then **Set up** from **Facebook Login**.
14. From the navigation bar choose **Facebook Login** and then **Settings**.

Type your redirect URL into **Valid OAuth Redirect URIs**. It will consist of your user pool domain with the `/oauth2/idpresponse` endpoint.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

15. Choose **Save changes**.

### To register an app with Amazon

1. Create a [developer account with Amazon](#).
2. [Sign in](#) with your Amazon credentials.
3. You need to create an Amazon security profile to receive the Amazon client ID and client secret.

Choose **Apps and Services** from navigation bar at the top of the page and then choose **Login with Amazon**.

4. Choose **Create a Security Profile**.
5. Type in a **Security Profile Name**, a **Security Profile Description**, and a **Consent Privacy Notice URL**.
6. Choose **Save**.
7. Choose **Client ID** and **Client Secret** to show the client ID and secret. You will use them in the next section.
8. Hover over the gear and choose **Web Settings**, and then choose **Edit**.
9. Type your user pool domain into **Allowed Origins**.

```
https://<your-user-pool-domain>
```

10. Type your user pool domain with the `/oauth2/idpresponse` endpoint into **Allowed Return URLs**.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

11. Choose **Save**.

### To register an app with Google

1. Create a [developer account with Google](#).
2. [Sign in](#) with your Google credentials.
3. Choose **CONFIGURE A PROJECT**.
4. Type in a project name and choose **NEXT**.
5. Type in your product name and choose **NEXT**.
6. Choose **Web browser** from the **Where are you calling from?** drop-down list.
7. Type your user pool domain into **Authorized JavaScript origins**.

```
https://<your-user-pool-domain>
```

8. Choose **CREATE**. You will not use the **Client ID** and **Client Secret** from this step.
9. Choose **DONE**.
10. [Sign in](#) to the Google Console.
11. On the left navigation bar, choose **Credentials**.
12. Create your OAuth 2.0 credentials by choosing **OAuth client ID** from the **Create credentials** drop-down list.
13. Choose **Web application**.
14. Type your user pool domain into **Authorized JavaScript origins**.

```
https://<your-user-pool-domain>
```

15. Type your user pool domain with the **/oauth2/idpresponse** endpoint into **Authorized Redirect URIs**.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

16. Choose **Create** twice.
17. Note the **OAuth client ID** and **client secret**. You will need them for the next section.
18. Choose **OK**.

## Step 2: Add a Social IdP to Your User Pool

In this section, you configure a social IdP in your user pool using the client ID and client secret from the previous section.

### To configure a user pool social identity provider with the AWS Management Console

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.

3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the left navigation bar, choose **Identity providers**.
5. Choose a social identity provider: **Facebook**, **Google**, or **Login with Amazon**.
6. Type the app client ID and app client secret that you received from the social identity provider in the previous section.
7. Type the names of the scopes that you want to authorize. Scopes define which user attributes (such as name and email) you want to access with your app. For Facebook, these should be separated by commas. For Google and Login with Amazon, they should be separated by spaces.

Social identity provider	Example scopes
Facebook	public_profile, email
Google	profile email openid
Login with Amazon	profile postal_code

Your app user is asked to consent to providing these attributes to your app. For more information about their scopes, see the documentation from Google, Facebook, and Login with Amazon.

8. Choose **Enable** for the social identity provider that you're configuring.
9. Choose **App client settings** from the navigation bar.
10. Select your social identity provider as one of the **Enabled Identity Providers** for your user pool app.
11. Type your callback URL into **Callback URL(s)** for your user pool app. This is the URL of the page where your user will be redirected after a successful authentication.

```
https://www.example.com
```

12. Choose **Save changes**.
13. On the **Attribute mapping** tab, add mappings for at least the required attributes, typically email, as follows:
  - a. Select the check box to choose the Facebook, Google, or Amazon attribute name. You can also type the names of additional attributes that aren't listed in the Amazon Cognito console.
  - b. Choose the destination user pool attribute from the drop-down list.
  - c. Choose **Save changes**.
  - d. Choose **Go to summary**.

## Step 3: Test Your Social IdP Configuration

You can create a login URL by using the elements from the previous two sections. Use it to test your social IdP configuration.

```
https://<your_user_pool_domain>/login?
response_type=code&client_id=<your_client_id>&redirect_uri=https://www.example.com
```

You can find your domain on the user pool **Domain name** console page. The client\_id is on the **App client settings** page. Use your callback URL for the **redirect\_uri** parameter. This is the URL of the page where your user will be redirected after a successful authentication.

## Adding SAML Identity Providers to a User Pool

You can enable your web and mobile app users to sign in through a SAML identity provider (IdP) such as [Microsoft Active Directory Federation Services \(ADFS\)](#), or [Shibboleth](#). Choose a SAML identity provider that supports the [SAML 2.0 standard](#).

With the built-in hosted web UI, Amazon Cognito provides token handling and management for all authenticated users, so your backend systems can standardize on one set of user pool tokens. You can create and manage a SAML IdP in the AWS Management Console, with the AWS CLI, or using Amazon Cognito API calls. To get started with the console see [Adding sign-in through SAML-based identity providers to a user pool with the AWS Management Console](#).



### Note

Sign-in through a third party (federation) is available in Amazon Cognito user pools. This feature is independent of federation through Amazon Cognito identity pools (federated identities).

You need to update your SAML identity provider and configure your user pool to support it. See the documentation for your SAML identity provider for information about how to add your user pool as a relying party or application for your SAML 2.0 identity provider.

You also need to provide an assertion consumer endpoint to your SAML identity provider. Configure this endpoint for SAML 2.0 POST binding in your SAML identity provider:

```
https://<yourDomainPrefix>.auth.<region>.amazoncognito.com/saml2/idpresponse
```

You can find your domain prefix and the region value for your user pool on the **Domain name** tab of the [Amazon Cognito console](#).

For some SAML identity providers, you also need to provide the SP urn / Audience URI / SP Entity ID, in the form:

```
urn:amazon:cognito:sp:<yourUserPoolID>
```

You can find your user pool ID on the **App client settings** tab in the [Amazon Cognito console](#).

You should also configure your SAML identity provider to provide attribute values for any attributes that are required in your user pool. Typically, `email` is a required attribute for user pools. In that case, the SAML identity provider should provide an `email` value (claim) in the SAML assertion.

Amazon Cognito user pools support SAML 2.0 federation with post-binding endpoints. This eliminates the need for your app to retrieve or parse SAML assertion responses, because the user pool directly receives the SAML response from your identity provider via a user agent. Your user pool acts as a service provider (SP) on behalf of your application. Amazon Cognito supports SP-initiated single sign-on (SSO) as described in section 5.1.2 of the [SAML V2.0 Technical Overview](#).

### Topics

- [SAML User Pool IdP Authentication Flow \(p. 95\)](#)

- [Choosing SAML Identity Provider Names \(p. 96\)](#)
- [Creating and Managing a SAML Identity Provider for a User Pool \(AWS Management Console\) \(p. 96\)](#)
- [Creating and Managing a SAML Identity Provider for a User Pool \(AWS CLI and AWS API\) \(p. 98\)](#)
- [Integrating Third-Party SAML Identity Providers with Amazon Cognito User Pools \(p. 99\)](#)

## SAML User Pool IdP Authentication Flow

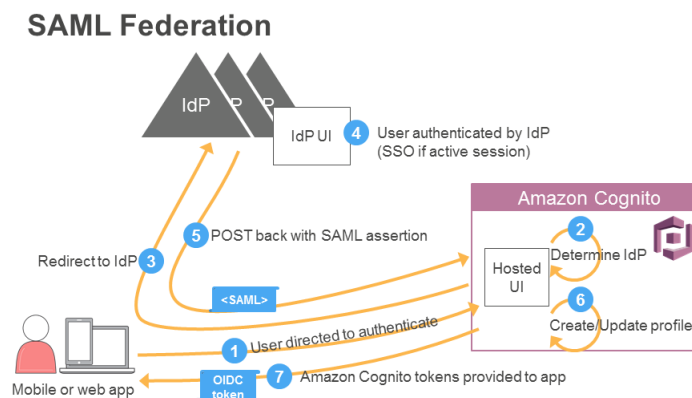
You can integrate SAML-based IdPs directly from your user pool.

1. The app starts the sign-up and sign-in process by directing your user to the UI hosted by AWS. A mobile app can use web view to show the pages hosted by AWS.
2. Typically your user pool determines the identity provider for your user from that user's email address.

Alternatively, if your app gathered information before directing the user to your user pool, it can provide that information to Amazon Cognito through a query parameter.

3. Your user is redirected to the identity provider.
4. The IdP authenticates the user if necessary. If the IdP recognizes that the user has an active session, the IdP skips the authentication to provide a single sign-in (SSO) experience.
5. The IdP POSTs the SAML assertion to the Amazon Cognito service.
6. The user's profile can be created or updated in the AWS Management Console, with the AWS CLI, or using Amazon Cognito API calls.
7. After verifying the SAML assertion and collecting the user attributes (claims) from the assertion, Amazon Cognito returns OIDC tokens to the app for the now signed-in user.

The following diagram shows the authentication flow for this process:



When a user authenticates, the user pool returns ID, access, and refresh tokens. The ID token is a standard OIDC token for identity management, and the access token is a standard [OAuth 2.0](#) token. The ID and access tokens expire after one hour, but your app can use the refresh token to get new tokens without having the user re-authenticate. As a developer, you can choose the expiration time of refresh tokens, and therefore how frequently users need to reauthenticate. If the user has authenticated through an external IdP (i.e., they are a federated user), your app still uses the Amazon Cognito tokens with the refresh token to determine how long until the user reauthenticates, regardless of when the external IdP's token expires. The user pool automatically uses the refresh token to get new ID and access tokens when they expire. If the refresh token has also expired, the server automatically initiates authentication through the pages in your app that are hosted by AWS.

## Choosing SAML Identity Provider Names

You need to choose names for your SAML providers. The string format is `[\w\s+=.@-]+` and can be up to 40 characters long.

You can also optionally choose identifiers for your SAML providers. An identifier uniquely resolves to an identity provider associated with your user pool. Typically each identifier corresponds to a domain that belongs to the company that the SAML IdP represents. For a multitenant app that can be used by different companies, identifiers can be used to redirect users to the correct IdP. Since there can be multiple domains owned by the same company, you can provide multiple identifiers.

You can associate up to 50 identifiers with each SAML provider. Identifiers must be unique across the identity provider.

For example, suppose that you built an app that can be used by employees of two different companies, A and B. Company A owns `domainA.com` and `domainA.co.uk`; Company B owns `domainB.com`. Suppose further that you set up two IdPs, one for each company:

- For IdP A, you can define identifiers `DomainA.com` and `DomainA.co.uk`.
- For IdP B, you can define identifier `DomainB.com`.

In your application, you can prompt users to enter their email addresses. By deriving the domain from the email address, you can redirect the user to the correct IdP by providing the domain in the `IdPIdentifier` in the call to the `/authorize` endpoint. For example, if a user enters `bob@domain1.co.uk`, the user is redirected to IdP A.

The sign-in page hosted by Amazon Cognito parses the email address automatically to derive the information. It parses the email domain from email and uses it as `IdPIdentifier` when calls the `/authorize` endpoint.

- If you have multiple SAML IdPs and you specify an `IdPIdentifier` value for any one of them, you will see a box to enter an email address on the hosted page.
- If you have multiple IdPs, and you do not specify an `IdPIdentifier` value for any of them, the hosted page will show a list of IdPs.

If you're building your own UI, you should parse the domain name so that it matches the `IdPIdentifiers` that are provided during the IdP setup. For more information about IdP setup, see [Configuring Identity Providers for Your User Pool \(p. 214\)](#).

## Creating and Managing a SAML Identity Provider for a User Pool (AWS Management Console)

You can use the AWS Management Console to create and delete SAML identity providers.

Before you create a SAML identity provider, you need the SAML metadata document that you get from the third-party identity provider (IdP). For instructions on how to get or generate the required SAML metadata document, see [Integrating Third-Party SAML Identity Providers with Amazon Cognito User Pools \(p. 99\)](#).

### To configure a SAML 2.0 identity provider in your user pool

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the left navigation bar, choose **Identity providers**.
5. Choose **SAML** to open the SAML dialog.

- Under **Metadata document** upload a metadata document from your SAML IdP. You can also enter a URL that points to the metadata document. For more information, see [Integrating Third-Party SAML Identity Providers with Amazon Cognito User Pools \(p. 99\)](#).

**Note**

We recommend that you provide the endpoint URL if it is a public endpoint, rather than uploading a file, because this allows Amazon Cognito to refresh the metadata automatically. Typically metadata refresh happens every 6 hours or before the metadata expires, whichever is earlier.

- Enter your SAML **Provider name**. For more information on SAML naming see [Choosing SAML Identity Provider Names \(p. 96\)](#).
- Enter any optional SAML **Identifiers** you want to use.
- Select **Enable IdP sign out flow** if you want your user to be logged out from the SAML IdP when logging out from Amazon Cognito.

Enabling this flow sends a signed logout request to the SAML IdP when the [LOGOUT Endpoint \(p. 322\)](#) is called.

Configure this endpoint for consuming logout responses from your IdP. This endpoint uses post binding.

```
https://<yourDomainPrefix>.auth.<region>.amazoncognito.com/saml2/logout
```

**Note**

If this option is selected and your SAML identity provider expects a signed logout request, you will also need to configure the signing certificate provided by Amazon Cognito with your SAML IdP.

The SAML IdP will process the signed logout request and logout your user from the Amazon Cognito session.

- Choose **Create provider**.
- On the **Attribute mapping** tab, add mappings for at least the required attributes, typically email, as follows:
  - Type the SAML attribute name as it appears in the SAML assertion from your identity provider. If your identity provider offers sample SAML assertions, that might help you to find the name. Some identity providers use simple names, such as email, while others use names similar to this:

```
http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress
```

- Choose the destination user pool attribute from the drop-down list.
- Choose **Save changes**.
  - Choose **Go to summary**.

**Note**

If you see `InvalidParameterException` while creating a SAML identity provider with an HTTPS metadata endpoint URL, for example, "Error retrieving metadata from `<metadata endpoint>`," make sure that the metadata endpoint has SSL correctly set up and that there is a valid SSL certificate associated with it.

### To set up the SAML IdP to add a user pool as a relying party

- The user pools service provider URN is: `urn:amazon:cognito:sp:<user_pool_id>`. Amazon Cognito issues the `AuthnRequest` to SAML IdP to issue a SAML assertion with audience restriction

to this URN. Your IdP uses the following POST binding endpoint for the IdP-to-SP response message: `https://<domain_prefix>.auth.<region>.amazoncognito.com/saml2/idpresponse`.

- Make sure your SAML IdP populates `NameID` and any required attributes for your user pool in the SAML assertion. `NameID` is used for uniquely identifying your SAML federated user in the user pool. Use persistent SAML Name ID format.

### To set up the SAML IdP to add a signing certificate

- To get the certificate containing the public key which will be used by the identity provider to verify the signed logout request, choose **Show signing certificate** under **Active SAML Providers** on the **SAML** dialog under **Identity providers** on the **Federation** console page.

### To delete a SAML provider

1. Sign in to the [Amazon Cognito console](#).
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. Choose **Identity providers** from the **Federation** console page.
4. Choose **SAML** to display the SAML identity providers.
5. Select the check box next to the provider to be deleted.
6. Choose **Delete provider**.

## Creating and Managing a SAML Identity Provider for a User Pool (AWS CLI and AWS API)

Use the following commands to create and manage a SAML provider.

### To create an identity provider and upload a metadata document

- AWS CLI: `aws cognito-idp create-identity-provider`

Example with metadata file: `aws cognito-idp create-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1 --provider-type SAML --provider-details file:///details.json --attribute-mapping email=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

Where `details.json` contains:

```
{
  "MetadataFile": "<SAML metadata XML>"
}
```

#### Note

If the `<SAML metadata XML>` contains any quotations (`"`), they must be escaped (`\`).

Example with metadata URL: `aws cognito-idp create-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1 --provider-type SAML --provider-details MetadataURL=<metadata_url> --attribute-mapping email=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

- AWS API: [CreateIdentityProvider](#)



### To upload a new metadata document for an identity provider

- AWS CLI: `aws cognito-idp update-identity-provider`

Example with metadata file: `aws cognito-idp update-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1 --provider-details file:///details.json --attribute-mapping email=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

Where `details.json` contains:

```
{
  "MetadataFile": "<SAML metadata XML>"
}
```

#### Note

If the `<SAML metadata XML>` contains any quotations (`"`), they must be escaped (`\`).

Example with metadata URL: `aws cognito-idp update-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1 --provider-details MetadataURL=<metadata_url> --attribute-mapping email=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

- AWS API: [UpdateIdentityProvider](#)

### To get information about a specific identity provider

- AWS CLI: `aws cognito-idp describe-identity-provider`

`aws cognito-idp describe-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1`

- AWS API: [DescribeIdentityProvider](#)

### To list information about all identity providers

- AWS CLI: `aws cognito-idp list-identity-providers`

Example: `aws cognito-idp list-identity-providers --user-pool-id <user_pool_id> --max-results 3`

- AWS API: [ListIdentityProviders](#)

### To delete an IdP

- AWS CLI: `aws cognito-idp delete-identity-provider`

`aws cognito-idp delete-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1`

- AWS API: [DeleteIdentityProvider](#)

## Integrating Third-Party SAML Identity Providers with Amazon Cognito User Pools

To configure third-party SAML 2.0 identity provider solutions to work with federation for Amazon Cognito User Pools, you must enter a redirect or sign-in URL, which is

`https://<yourDomainPrefix>.auth.<region>.amazoncognito.com/saml2/idpresponse`. You can find your domain prefix and the region value for your user pool on the **Domain name** console page of the [Amazon Cognito console](#).

**Note**

Any SAML identity providers that you created in a user pool during the public beta before August 10, 2017 have redirect URLs of `https://<yourDomainPrefix>.auth.<region>.amazoncognito.com/login/redirect`. If you have one of these SAML identity providers from the public beta in your user pool, you must either:

- Replace it with a new one that uses the new redirect URL.
- Update the configuration in your SAML identity provider to accept both the old and new redirect URLs.

All SAML identity providers in Amazon Cognito will switch to the new URLs, and the old ones will stop working on October 31, 2017.

For some SAML Identity providers you must provide the urn / Audience URI / SP Entity ID, in the form `urn:amazon:cognito:sp:<yourUserPoolID>`. You can find your user pool ID on the **App client settings** tab in the Amazon Cognito console.

You must also configure your SAML identity provider to provide attributes values for any attributes required in your user pool. Typically, `email` is a required attribute for user pools, and in that case the SAML identity provider will need to provide an `email` value (claim) in the SAML assertion.

The following links help you configure third-party SAML 2.0 identity provider solutions to work with federation for Amazon Cognito User Pools.

**Note**

Identity provider support is built in to Amazon Cognito, so you only need to go to the following provider sites to get the SAML metadata document. You may see further instructions on the provider website about integrating with AWS, but you won't need those.

Solution	More information
Microsoft Active Directory Federation Services (AD FS)	You can download the SAML metadata document for your ADFS federation server from the following address: <code>https://&lt;yourservername&gt;/FederationMetadata/2007-06/FederationMetadata.xml</code> .
Okta	Once you have configured your Amazon Cognito User Pool as an application in Okta, you can find the metadata document in the <b>Admin</b> section of the Okta dashboard. Choose the application, select the <b>Sign On</b> section, and look under the <b>Settings for SAML</b> . The URL should look like <code>https://&lt;app-domain&gt;.oktapreview.com/app/&lt;application-ID&gt;/sso/saml/metadata</code> .
Auth0	The metadata download document is obtained from the Auth0 dashboard. Choose <b>Clients</b> , and then choose <b>Settings</b> . Scroll down, choose <b>Show Advanced Settings</b> , and then look for your <b>SAML Metadata</b>

Solution	More information
	<b>URL.</b> It should look like <code>https://&lt;your-domain-prefix&gt;.auth0.com/samlp/metadata/&lt;your-Auth0-client-ID&gt;</code> .
Ping Identity	For PingFederate, you can find instructions for downloading a metadata XML file in <a href="#">Provide general SAML metadata by file</a> .

## Adding OIDC Identity Providers to a User Pool

You can enable your users who already have accounts with [OpenID Connect \(OIDC\)](#) identity providers (IdPs) (like [Salesforce](#) or [Ping Identity](#)) to skip the sign-up step—and sign in to your application using an existing account. With the built-in hosted web UI, Amazon Cognito provides token handling and management for all authenticated users, so your backend systems can standardize on one set of user pool tokens.



### Note

Sign-in through a third party (federation) is available in Amazon Cognito user pools. This feature is independent of federation through Amazon Cognito identity pools (federated identities).

You can add an OIDC IdP to your user pool in the AWS Management Console, with the AWS CLI, or by using the user pool API method [CreateIdentityProvider](#).

### Topics

- [Prerequisites](#) (p. 101)
- [Step 1: Register with an OIDC IdP](#) (p. 101)
- [Step 2: Add an OIDC IdP to Your User Pool](#) (p. 103)
- [Step 3: Test Your OIDC IdP Configuration](#) (p. 105)
- [OIDC User Pool IdP Authentication Flow](#) (p. 105)

## Prerequisites

Before you begin, you need:

- A user pool with an application client and a user pool domain. For more information, see [Create a user pool](#).
- An OIDC IdP.

## Step 1: Register with an OIDC IdP

Before you create an OIDC IdP with Amazon Cognito, you must register your application with the OIDC IdP to receive a client ID and client secret.

### To register with an OIDC IdP

1. Create a developer account with the OIDC IdP.

### Links to OIDC IdPs

OIDC IdP	How to Install	OIDC Discovery URL
Salesforce	<a href="#">Install a Salesforce identity provider</a>	<a href="https://login.salesforce.com">https://login.salesforce.com</a>
Ping Identity	<a href="#">Install a Ping Identity identity provider</a>	<a href="https://Your Ping domain address:9031/idp/userinfo.openid">https://Your Ping domain address:9031/idp/userinfo.openid</a>  For example: <a href="https://pf.company.com:9031/idp/userinfo.openid">https://pf.company.com:9031/idp/userinfo.openid</a>
Okta	<a href="#">Install an Okta identity provider</a>	<a href="https://Your Okta subdomain.oktapreview.com">https://Your Okta subdomain.oktapreview.com</a>  or <a href="https://Your Okta subdomain.okta.com">https://Your Okta subdomain.okta.com</a>
Microsoft Azure Active Directory (Azure AD)	<a href="#">Install a Microsoft Azure AD identity provider</a>	<a href="https://login.windows.net/common">https://login.windows.net/common</a>
Google	<a href="#">Install a Google identity provider</a>	<a href="https://accounts.google.com">https://accounts.google.com</a>  <b>Note</b> Amazon Cognito offers Google as an integrated social sign-in IdP. We recommend that you use the integrated IdP. See <code>endterm="cognito-user-pools-social-idp.title"</code> <code>linkend="cognito-user-pools-social-idp/"</code> >.

2. Register your user pool domain URL with the `/oauth2/idpresponse` endpoint with your OIDC IdP. This ensures that the OIDC IdP later accepts it from Amazon Cognito when it authenticates users.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

3. Register your callback URL with your OIDC IdP. This is the URL of the page where your user will be redirected after a successful authentication.

```
https://www.example.com
```

4. Select your [scopes](#). The scope **openid** is required. The **email** scope is needed to grant access to the **email** and **email\_verified** [claims](#).
5. The OIDC IdP provides you with a client ID and a client secret. You'll use them when you set up an OIDC IdP in your user pool.

### Example: Use Salesforce as an OIDC IdP with your user pool

You use an OIDC identity provider when you want to establish trust between an OIDC-compatible IdP such as Salesforce and your user pool.

1. [Create an account](#) on the Salesforce Developers website.
2. [Sign in](#) through your developer account that you set up in the previous step.
3. Look at the top of your Salesforce page.
  - If you're using Lightning Experience, choose the Setup gear icon, then choose **Setup Home**.
  - If you're using Salesforce Classic and you see **Setup** in the user interface header, choose it.
  - If you're using Salesforce Classic and you don't see **Setup** in the header, choose your name from the top navigation bar, and choose **Setup** from the drop-down list.
4. On the left navigation bar, choose **Company Settings**.
5. On the navigation bar, choose **Domain**, type a domain, and choose **Create**.
6. On the left navigation bar, go to **Platform Tools** and choose **Apps**.
7. Choose **App Manager**.
8.
  - a. Choose **new connected app**.
  - b. Fill out the required fields.

Under **Start URL**, type your user pool domain URL with the `/oauth2/idpresponse` endpoint.

```
https://<your-user-pool-domain>/oauth2/idpresponse
```

- c. Enable **OAuth settings** and, type your callback URL into **Callback URL**. This is the URL of the page where your user will be redirected after a successful sign-in.

```
https://www.example.com
```

9. Select your [scopes](#). The scope **openid** is required. The **email** scope is needed to grant access to the **email** and **email\_verified** [claims](#).

Scopes are separated by spaces.

10. Choose **Create**.

In Salesforce, the client ID is called a **Consumer Key**, and the client secret is a **Consumer Secret**. Note your client ID and client secret. You will use them in the next section.

## Step 2: Add an OIDC IdP to Your User Pool

In this section, you configure your user pool to process OIDC-based authentication requests from an OIDC IdP.

### To add an OIDC IdP (Amazon Cognito console)

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the left navigation bar, choose **Identity providers**.
5. Choose **OpenId Connect**.
6. Type a unique name into **Provider name**.

7. Type the OIDC IdP's client ID from the previous section into **Client ID**.
8. Type the client secret from the previous section into **Client secret**.
9. In the drop-down list, choose the HTTP method (either GET or POST) that's used to fetch the details of the user from the **userinfo** endpoint into **Attributes request method**.
10. Type the names of the scopes that you want to authorize. Scopes define which user attributes (such as name and email) that you want to access with your application. Scopes are separated by spaces, according to the [OAuth 2.0](#) specification.

Your app user is asked to consent to providing these attributes to your application.

11. Type the URL of your IdP and choose **Run discovery**.

For example, Salesforce uses this URL:

```
https://login.salesforce.com
```

**Note**

The URL should start with `https://`, and shouldn't end with a slash `/`.

- If **Run discovery** isn't successful, then you need to provide the **Authorization endpoint**, **Token endpoint**, **Userinfo endpoint**, and **Jwks uri** (the location of the [JSON Web Key](#)).
12. Choose **Create provider**.
  13. On the left navigation bar, choose **App client settings**.
  14. Select the OIDC provider that you set up in the previous step as one of the **Enabled Identity Providers**.
  15. Type a callback URL for the Amazon Cognito authorization server to call after users are authenticated. This is the URL of the page where your user will be redirected after a successful authentication.

```
https://www.example.com
```

16. Under **Allowed OAuth Flows**, enable both the **Authorization code grant** and the **Implicit code grant**.

Unless you specifically want to exclude one, select the check boxes for all of the **Allowed OAuth scopes**.

17. Choose **Save changes**.
18. On the **Attribute mapping** tab on the left navigation bar, add mappings of OIDC claims to user pool attributes.
  - a. As a default, the OIDC claim **sub** is mapped to the user pool attribute **Username**. You can map other OIDC [claims](#) to user pool attributes. Type in the OIDC claim, and choose the corresponding user pool attribute from the drop-down list. For example, the claim **email** is often mapped to the user pool attribute **Email**.
  - b. In the drop-down list, choose the destination user pool attribute.
  - c. Choose **Save changes**.
  - d. Choose **Go to summary**.

### To add an OIDC IdP (AWS CLI)

- See the parameter descriptions for the [CreateIdentityProvider](#) API method.

```
aws cognito-idp create-identity-provider
```

```
--user-pool-id string
--provider-name string
--provider-type OIDC
--provider-details map

--attribute-mapping string
--idp-identifiers (list)
--cli-input-json string
--generate-cli-skeleton string
```

Use this map of provider details:

```
{
  "client_id": "string",
  "client_secret": "string",
  "authorize_scopes": "string",
  "attributes_request_method": "string",
  "oidc_issuer": "string",

  "authorize_url": "string",
  "token_url": "string",
  "attributes_url": "string",
  "jwks_uri": "string"
}
```

## Step 3: Test Your OIDC IdP Configuration

You can create the authorization URL by using the elements from the previous two sections, and using them to test your OIDC IdP configuration.

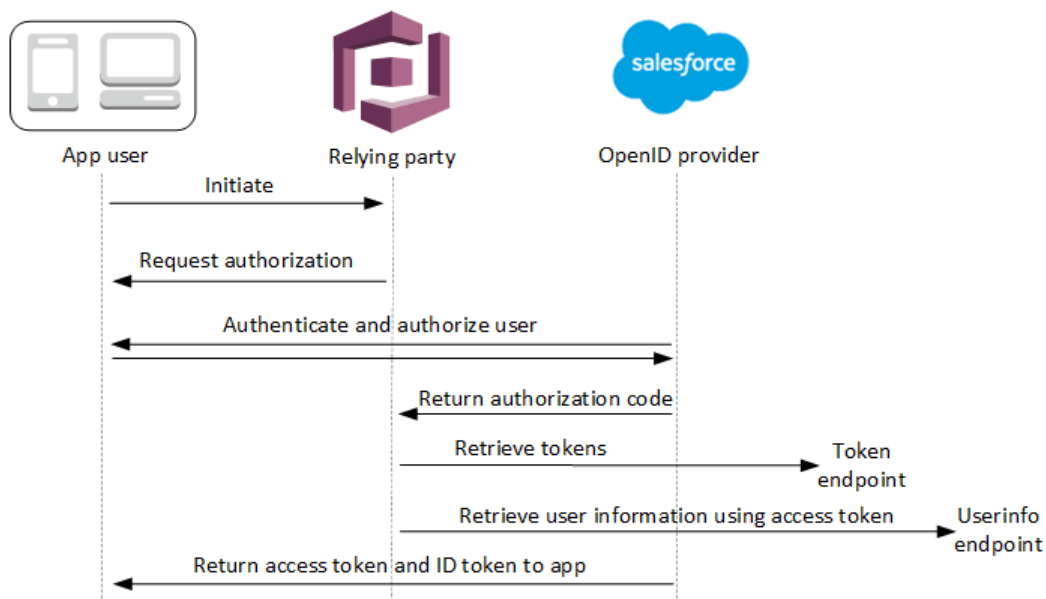
```
https://<your_user_pool_domain>/oauth2/authorize?
response_type=code&client_id=<your_client_id>&redirect_uri=https://www.example.com
```

You can find your domain on the user pool **Domain name** console page. The `client_id` is on the **App client settings** page. Use your callback URL for the **redirect\_uri** parameter. This is the URL of the page where your user will be redirected after a successful authentication.

## OIDC User Pool IdP Authentication Flow

When your user signs in to your application using an OIDC IdP, this is the authentication flow.

1. Your user lands on the Amazon Cognito built-in sign-in page, and is offered the option to sign in through an OIDC IdP such as Salesforce.
2. Your user is redirected to the OIDC IdP's authorization endpoint.
3. After your user is authenticated, the OIDC IdP redirects to Amazon Cognito with an authorization code.
4. Amazon Cognito exchanges the authorization code with the OIDC IdP for an access token.
5. Amazon Cognito creates or updates the user account in your user pool.
6. Amazon Cognito issues your application bearer tokens, which might include identity, access, and refresh tokens.



OIDC is an identity layer on top of OAuth 2.0, which specifies JSON-formatted (JWT) identity tokens that are issued by IdPs to OIDC client apps (relying parties). See the documentation for your OIDC IdP for information about to add Amazon Cognito as an OIDC relying party.

When a user authenticates, the user pool returns ID, access, and refresh tokens. The ID token is a standard [OIDC](#) token for identity management, and the access token is a standard [OAuth 2.0](#) token.

## Specifying Identity Provider Attribute Mappings for Your User Pool

You can use the AWS Management Console, or the AWS CLI or API, to specify attribute mappings for your user pool's identity providers.

### Specifying Identity Provider Attribute Mappings for Your User Pool (AWS Management Console)

You can use the AWS Management Console to specify attribute mappings for your user pool's identity providers.

#### Note

Currently, only the Facebook `id`, Google `sub`, Login with Amazon `user_id`, and OIDC `sub` attributes can be mapped to the Amazon Cognito user pools `username` attribute.

#### Note

Make sure the attribute in the Amazon Cognito user pool is large enough to fit the values of the mapped identity provider attributes, or an error occurs when users sign in. Custom attributes should be set to the maximum 2048 character size if mapped to identity provider tokens. Make sure you create mappings for any attributes that are required for your user pool.

#### To specify a social identity provider attribute mapping

1. Sign in to the [Amazon Cognito console](#).
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. Choose the **Attribute mapping** tab.



4. Choose the **Facebook**, **Google**, or **Amazon** tab.
5. For each attribute you need to map, perform the following steps:
  - a. Select the **Capture** check box.
  - b. For **User pool attribute**, in the drop-down list, choose the user pool attribute you want to map to the social identity provider attribute.
  - c. If you need more attributes, choose **Add Facebook attribute** (or **Add Google attribute** or **Add Amazon attribute**) and perform the following steps:
    - i. In the **Facebook attribute** (or **Google attribute** or **Amazon attribute**) field, enter the name of the attribute to be mapped.
    - ii. In the **User pool attribute** field, choose the user pool attribute to map the social identity provider attribute to from the drop-down list.
  - d. Choose **Save changes**.

### To specify a SAML provider attribute mapping

1. Sign in to the [Amazon Cognito console](#).
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. Choose the **Attribute mapping** tab.
4. Choose the **SAML** tab.
5. Select the **Capture** box for all attributes for which you want to capture values. If you clear the **Capture** box for an attribute and save your changes, that attribute's mapping is removed.
6. Choose the identity provider from the drop-down list.
7. For each attribute you need to map, perform the following steps:
  - a. Choose **Add SAML attribute**.
  - b. In the **SAML attribute** field, enter the name of the SAML attribute to be mapped.
  - c. In the **User pool attribute** field, choose the user pool attribute to map the SAML attribute to from the drop-down list.
8. Choose **Save changes**.

## Specifying Identity Provider Attribute Mappings for Your User Pool (AWS CLI and AWS API)

Use the following commands to specify identity provider attribute mappings for your user pool.

### To specify attribute mappings at provider creation time

- AWS CLI: `aws cognito-idp create-identity-provider`

Example with metadata file: `aws cognito-idp create-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1 --provider-type SAML --provider-details file:///details.json --attribute-mapping email=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

Where `details.json` contains:

```
{
  "MetadataFile": "<SAML metadata XML>"
}
```

#### Note

If the `<SAML metadata XML>` contains any quotations ("), they must be escaped (\").

Example with metadata URL: `aws cognito-idp create-identity-provider --user-pool-id <user_pool_id> --provider-name=SAML_provider_1 --provider-type SAML --provider-details MetadataURL=<metadata_url> --attribute-mapping email=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

- AWS API: [CreateIdentityProvider](#)

#### To specify attribute mappings for an existing identity provider

- AWS CLI: `aws cognito-idp update-identity-provider`

Example: `aws cognito-idp update-identity-provider --user-pool-id <user_pool_id> --provider-name <provider_name> --attribute-mapping email=http://schemas.xmlsoap.org/ws/2005/05/identity/claims/emailaddress`

- AWS API: [UpdateIdentityProvider](#)

#### To get information about attribute mapping for a specific identity provider

- AWS CLI: `aws cognito-idp describe-identity-provider`

Example: `aws cognito-idp describe-identity-provider --user-pool-id <user_pool_id> --provider-name <provider_name>`

- AWS API: [DescribeIdentityProvider](#)

## Managing Security for Amazon Cognito User Pools

You can add multi-factor authentication (MFA) to a user pool to protect the identity of your users. MFA adds a second authentication method that doesn't rely solely on user name and password. You can choose to use SMS text messages, or time-based one-time (TOTP) passwords as second factors in signing in your users. You can also use adaptive authentication with its risk-based model to predict when you might need another authentication factor. It's part of the user pool advanced security features, which also include protections against compromised credentials.

#### Topics

- [Adding Multi-Factor Authentication \(MFA\) to a User Pool \(p. 108\)](#)
- [Adding Advanced Security to a User Pool \(p. 111\)](#)

## Adding Multi-Factor Authentication (MFA) to a User Pool

Multi-factor authentication (MFA) increases security for your app by adding another authentication method, and not relying solely on user name and password. You can choose to use SMS text messages, or time-based one-time (TOTP) passwords as second factors in signing in your users.

With adaptive authentication, you can configure your user pool to require second factor authentication in response to an increased risk level. To add adaptive authentication to your user pool, see [Adding Advanced Security to a User Pool \(p. 111\)](#).

#### Topics

- [Prerequisites \(p. 109\)](#)
- [Configuring Multi-Factor Authentication \(p. 109\)](#)
- [SMS Text Message MFA \(p. 110\)](#)
- [TOTP Software Token MFA \(p. 110\)](#)

## Prerequisites

Before you begin, you need:

- You can only choose MFA as **Required** when you initially create a user pool.
- Phone numbers must be verified if MFA is enabled and **SMS text message** is chosen as a second factor.
- Advanced security features require that MFA is enabled, and set as optional in the Amazon Cognito user pool console. For more information, see [Adding Advanced Security to a User Pool \(p. 111\)](#).

## Configuring Multi-Factor Authentication

To configure MFA in the Amazon Cognito console

1. From the left navigation bar, choose **MFA and verifications**.
2. Choose whether MFA is **Off**, **Optional**, or **Required**.

3. Choose **Optional** to enable MFA on a per-user basis, or if you are using the risk-based adaptive authentication. For more information on adaptive authentication, see [Adding Advanced Security to a User Pool \(p. 111\)](#).
4. Your users can use **SMS text message** or **Time-based One-time Password** as a second factor. Choose which second factors to support in your app.
5. If you're using SMS text messages as a second factor and you don't have an IAM role defined with this permission, then you can create one in the console. Choose **Create role** to create an IAM role to allow Amazon Cognito to send SMS messages to your users on your behalf. For more information, see [IAM Roles](#).

6. Choose **Save changes**.

## SMS Text Message MFA

When a user signs in with MFA turned on, they first enter and submit their user name and password. The client app receives a `getMFAResponse` response that indicates where the authorization code was sent. The client app should indicate to 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 (only the last 4 digits of the phone number are displayed). If an app is using the Amazon Cognito hosted UI, it shows a page for the user to enter the MFA code.

The SMS text message authorization code is valid for 3 minutes.

If a user no longer has access to their device where the SMS text message MFA codes are sent, they must request help from your customer service office. An administrator with necessary AWS account permissions can change the user's phone number, but only through the AWS CLI or the API.

When a user successfully goes through the SMS text message MFA flow, their phone number is also marked as verified.

### Note

SMS for MFA 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](#).

### Important

To ensure that SMS messages are sent to verify phone numbers and for SMS text message MFA, you must request an increased spend limit from Amazon SNS.

Amazon Cognito uses Amazon SNS for sending SMS messages to users. The number of SMS messages Amazon SNS delivers is subject to spend limits. Spend limits can be specified for an AWS account and for individual messages, and the limits apply only to the cost of sending SMS messages.

The default spend limit per account (if not specified) is 1.00 USD per month. If you want to raise the limit, submit an [SNS Limit Increase case](#) in the AWS Support Center. For **New limit value**, enter your desired monthly spend limit. In the **Use Case Description** field, explain that you're requesting an SMS monthly spend limit increase.

To add MFA to your user pool, see [Adding Multi-Factor Authentication \(MFA\) to a User Pool \(p. 108\)](#).

## TOTP Software Token MFA

Your user is challenged to complete authentication using a time-based one-time (TOTP) password after their user name and password have been verified when TOTP software token MFA is enabled. If your app is using the Amazon Cognito hosted UI to sign in users, the UI shows a second page for your user to enter the TOTP password after they submit their user name and password.

You can enable TOTP MFA for your user pool in the Amazon Cognito console, through the Amazon Cognito hosted UI, or using Amazon Cognito APIs. At the user pool level, you can configure MFA and enable TOTP MFA by calling [SetUserPoolMfaConfig](#).

### Note

If TOTP software token MFA isn't enabled for the user pool, users can't associate or verify with the token. They receive a `SoftwareTokenMFANotFoundException` exception, as follows:  
"Software Token MFA has not been enabled by the userPool."

Configuring TOTP for your user is a multi-step process where your user receives a secret code that they validate by entering a one-time password. Next, you can enable TOTP MFA for your user or set TOTP as the preferred MFA method for your user.

To add MFA to your user pool, see [Adding Multi-Factor Authentication \(MFA\) to a User Pool \(p. 108\)](#).

## Associate the TOTP Token

1. When your user chooses TOTP software token MFA, call [AssociateSoftwareToken](#) to return a unique generated shared secret key code for the user account. The request for this API method takes an access token or a session string, but not both. As a convenience, you can distribute the secret key as a quick response (QR) code.
2. The key code or QR code appears on your app and your user needs to enter it into a TOTP-generating app such as Google Authenticator.
3. Your user enters the key code into the TOTP-generating app to associate a new account with your client app.

## Verify the TOTP Token

1. After a new TOTP account is associated with your app, it generates a temporary password.
2. Your user enters the temporary password into your app, which responds with a call to [VerifySoftwareToken](#). On the Amazon Cognito service server, a TOTP code is generated and compared with your user's temporary password. If they match, then the service marks it as verified.
3. If the code is correct, check that the time used is in the range and within the maximum number of retries. If your user passes all of the steps, the verification is complete.

Or, if the code is wrong, the verification cannot be finished and your user can either try again or cancel. We recommend that your user sync the time of their TOTP-generating app.

## Sign in with TOTP MFA

1. Your user enters their user name and password to sign in to your client app.
2. The TOTP MFA challenge is invoked and your user is prompted by your app to enter a temporary password.
3. Your user gets the temporary password from an associated TOTP-generating app.
4. Your user enters the TOTP code into your client app. Your app notifies the Amazon Cognito service to verify it. For each sign-in, [RespondToAuthChallenge](#) should be called to get a response to the new TOTP authentication challenge.
5. If the token is verified by Amazon Cognito, the sign-in is successful and your user continues with the authentication flow.

## Remove the TOTP Token

1. Your app should allow your user to remove the TOTP token.
2. Your client app should ask your user to enter their password.
3. If the password is correct, remove the TOTP token.

### Note

A delete TOTP software token operation is not currently available in the API. This functionality is planned for a future release. Use [SetUserMFAPreference](#) to disable TOTP MFA for an individual user.

# Adding Advanced Security to a User Pool

After you create your user pool, you have access to **Advanced security** on the navigation bar in the Amazon Cognito console. You can turn the user pool advanced security features on, and customize the

actions that are taken in response to different risks. Or you can use audit mode to gather metrics on detected risks without taking action. In audit mode, the advanced security features publishes metrics to Amazon CloudWatch. See [Viewing Advanced Security Metrics \(p. 117\)](#).

**Note**

Additional pricing applies for Amazon Cognito advanced security features. See the [Amazon Cognito pricing page](#).

**Topics**

- [Prerequisites \(p. 112\)](#)
- [Configuring Advanced Security Features \(p. 112\)](#)
- [Checking for Compromised Credentials \(p. 114\)](#)
- [Using Adaptive Authentication \(p. 114\)](#)
- [Viewing Advanced Security Metrics \(p. 117\)](#)
- [Enabling User Pool Advanced Security from Your App \(p. 118\)](#)

## Prerequisites

Before you begin, you need:

- A user pool with an app client. For more information, see [Getting Started with User Pools \(p. 14\)](#).
- Set multi-factor authentication (MFA) to **Optional** in the Amazon Cognito console to use the risk-based adaptive authentication feature. For more information, see [Adding Multi-Factor Authentication \(MFA\) to a User Pool \(p. 108\)](#).
- If you're using email for notifications, go to the [Amazon SES console](#) to configure and verify an email address or domain to use with your notification emails. For more information about Amazon SES, see [Verifying Identities in Amazon SES](#).

## Configuring Advanced Security Features

**To configure advanced security for a user pool**

1. From the left navigation bar, choose **Advanced security**.
2. For **Do you want to enable advanced security features for this user pool?**, choose **Yes** to enable advanced security. Or choose **Audit only** to gather information, and send user pool data to Amazon CloudWatch.

We recommend keeping the advanced security features in audit mode for two weeks before enabling actions. This allows Amazon Cognito to learn the usage patterns of your app users.

3. From the drop-down list, choose **What app client do you want to customize settings for?**. The default is to leave your settings as global for all app clients.
4. For **Which action do you want to take with the compromised credentials?**, choose **Allow** or **Block use**.
5. Choose **Customize when compromised credentials are blocked** to select which events should trigger compromised credentials checks:
  - Sign-in
  - Sign-up
  - Password change
6. Choose how to respond to malicious sign-in attempts under **How do you want to use adaptive authentication for sign-in attempts rated as low, medium and high risk?**. You can allow or block the sign-in attempt, or require additional challenges before allowing the sign-in.

To send email notifications when anomalous sign-in attempts are detected, choose **Notify users**.

### How do you want to use adaptive authentication for sign-in attempts rated as low, medium and high risk?

You can use adaptive authentication to add protections against sign-in attempts that are rated as higher risk such as coming from a new device or location. For more information, see [adaptive authentication](#).

	Allow	Optional MFA	Require MFA	Block	Notify users
Low risk	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Medium risk	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>
High risk	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>

Choosing allow will still log all attempted sign-ins rated as higher risk to [AWS Cloudwatch](#).

- If you chose **Notify users** in the previous step, then you can customize the email notification messages by using the **Notification message customization** form:

#### Notification message customization

Customize the email user notification messages sent to users after sign-in attempts with risks detected. Enter your settings below for the Amazon SES region and email address you want to use for notifications (SES).

##### SES Region

US East (Virginia)

##### Source ARN

arn:aws:ses:us-east-1:123456789012:identity/janedoe@example.com

You must verify your email address with Amazon SES before you can select it. [Verify an SES identity](#).

##### FROM email address

example@example.com

##### REPLY-TO email address

example@example.com

Adaptive authentication notification messages [Customize...](#)

- Choose **Customize** to customize adaptive authentication notifications with both HTML and plaintext email versions. To learn more about email templates, see [Message Templates](#) (p. 206).
- Type any IP addresses that you want to **Always allow**, or **Always block**, regardless of the advanced security risk assessment. Specify the IP address ranges in [CIDR notation](#) (e.g., 192.168.100.0/24).
- Choose **Save changes**.

## Checking for Compromised Credentials

Amazon Cognito can detect if a user's credentials (user name and password) have been compromised elsewhere. This can happen when users reuse credentials at more than one site, or when they use passwords that are easy to guess.

From the **Advanced security** page in the Amazon Cognito console, you can choose whether to allow, or block the user if compromised credentials are detected. Blocking requires users to choose another password. Choosing **Allow** publishes all attempted uses of compromised credentials to Amazon CloudWatch. For more information, see [Viewing Advanced Security Metrics \(p. 117\)](#).

You can also choose whether Amazon Cognito checks for compromised credentials during sign-in, sign-up, and password changes.

### Which action do you want to take with the compromised credentials?

You can detect and protect your users from using credentials that have been exposed through breaches of other websites. [Learn more about compromised credentials](#)

☐ Allow ☒ Block use

Blocking use will require users to choose a different password. Choosing allow will still log all attempted uses of compromised credentials to [AWS Cloudwatch](#). [↗](#)

### Which events should trigger compromised credentials checks?

☒ Sign in ☒ Sign up ☒ Password change

At least one event must be selected.

#### Note

Currently, Amazon Cognito doesn't check for compromised credentials for sign-in operations with Secure Remote Password (SRP) flow, which doesn't send the password during sign-in. Sign-ins that use the [AdminInitiateAuth](#) API with ADMIN\_NO\_SRP\_AUTH flow and the [InitiateAuth](#) API with USER\_PASSWORD\_AUTH flow are checked for compromised credentials.

To add compromised credentials protections to your user pool, see [Adding Advanced Security to a User Pool \(p. 111\)](#).

## Using Adaptive Authentication

With adaptive authentication you can configure your user pool to block suspicious sign-ins, or require second factor authentication in response to an increased risk level. For each sign-in attempt, Amazon Cognito generates a risk score for how likely the sign-in request is to be from a compromised source. This risk score is based on many factors, including whether it detects a new device, user location, or IP address.

Amazon Cognito publishes sign-in attempts, their risk levels, and failed challenges to Amazon CloudWatch. For more information, see [Viewing Advanced Security Metrics \(p. 117\)](#).

To add adaptive authentication to your user pool, see [Adding Advanced Security to a User Pool \(p. 111\)](#).

#### Topics

- [Adaptive Authentication Overview \(p. 115\)](#)
- [Creating a Device Fingerprint \(p. 115\)](#)
- [Viewing User Event History \(p. 115\)](#)
- [Providing Event Feedback \(p. 117\)](#)
- [Sending Notification Messages \(p. 117\)](#)



## Adaptive Authentication Overview

From the **Advanced security** page in the Amazon Cognito console, you can choose settings for adaptive authentication, including what actions to take at different risk levels and customization of notification messages to users.

**For each risk level, you can choose from the following options:**

Option	Action
Allow	The sign-in attempt is allowed without an additional factor.
Optional MFA	Users who have MFA configured are required to complete a second factor challenge to sign in. Users who don't have MFA configured are allowed to sign in without an additional factor.
Require MFA	Users who have MFA configured are required to complete a second factor challenge to sign in. Users who don't have MFA configured are blocked from signing in.
Block	All sign-in attempts at that risk level are blocked.

## Creating a Device Fingerprint

When you call the Amazon Cognito authentication APIs, such as [AdminInitiateAuth](#) or [AdminRespondToAuthChallenge](#) from your server, you need to pass the source IP of the user in the `ContextData` parameter. This is in addition to your server name, server path, and encoded-device fingerprinting data, which are collected by using the Amazon Cognito context data collection library.

For information on enabling advanced security from your web or mobile app, see [Enabling User Pool Advanced Security from Your App \(p. 118\)](#).

Collect user context data from the client side when your app is calling Amazon Cognito from your server. The following is an example that uses the JavaScript SDK method `getData`.

```
var encodedData = AmazonCognitoAdvancedSecurityData.getData(username, userPoolId,
  clientId);
```

### Note

We recommend incorporating the latest Amazon Cognito SDK into your app. This enables adaptive authentication to collect device fingerprinting information—such as device ID, model, and time zone. For more information about Amazon Cognito SDKs, see [Install a user pool SDK](#).

## Viewing User Event History

You can choose a user in the Amazon Cognito console from **Users and groups** to see the sign-in history for that user. User event history is retained for two years by Amazon Cognito.

Date (UTC)	Event	Result	Risk level	Risk decision	Challenge	IP	Device
Jan 23, 2018 11:43:05 PM	Sign In	Pass	-	No Risk	Password:Success	52.94.36.11	Chrome, Windows 10
Jan 23, 2018 11:42:14 PM	Sign In	Pass	-	No Risk	Password:Success	52.94.36.11	Chrome, Windows 10
Jan 18, 2018 9:21:21 PM	Sign In	Fail	High	Account Takeover	Password:Success	67.132.130.174	Chrome Mobile, Android Mobile
Jan 18, 2018 9:20:28 PM	Sign In	In Progress	High	Account Takeover	Password:Success	67.132.130.174	Chrome Mobile, Android Mobile
Jan 18, 2018 9:18:18 PM	Sign In	Pass	-	No Risk	Password:Success	67.132.130.174	Chrome Mobile, Android Mobile

Each sign-in event has an event ID, context data such as location, device details, and risk detection results associated with it.

Jan 23, 2018 11:42:14 PM Sign In event

Event ID

09da6736-0097-11e8-9495-0dba8a248f46

Event risk

-

Event type

Sign In

Risk decision

No Risk

Event date (UTC)

Jan 23, 2018 11:42:14 PM

Event response

Pass

IP address

52.94.36.11

Feedback

-

Device

Chrome, Windows 10

Feedback date

-

Time zone

-

Feedback provider

-

City

London

Country

United Kingdom

Challenge response

Password:Success

Mark event as valid

Mark event as invalid

You can correlate the event id to the token issued as well. The issued token, such as the ID token and access token, carries this event ID in its payload. Even using the refresh token persists the original event ID. The original event ID can be traced back to the event ID of the sign-in event that resulted in issuing the Amazon Cognito tokens. This enables you to trace usage of a token within your system to a particular authentication event.

## Providing Event Feedback

Event feedback affects risk evaluation in real time, and improves the risk evaluation algorithm over time. You can provide feedback on the validity of sign-in attempts through the Amazon Cognito console and APIs.

In the console, on the **Users and groups** tab, the sign-in history is listed, and if you click an entry, you can mark the event as valid or invalid. You can also provide feedback through the user pool API method [AdminUpdateAuthEventFeedback](#), and through the AWS CLI command [admin-update-auth-event-feedback](#).

## Sending Notification Messages

With advanced security protections, Amazon Cognito can notify your users of sign-in attempts, prompt them to click links to indicate if the sign-in was valid or invalid, and use their feedback to improve the risk detection accuracy for your user pool.

In the **How do you want to use adaptive authentication for sign-in attempts rated as low, medium and high risk?** section choose **Notify Users** for the low, medium, and high-risk cases.

### How do you want to use adaptive authentication for sign-in attempts rated as low, medium and high risk?

You can use adaptive authentication to add protections against sign-in attempts that are rated as higher risk such as coming from an untrusted IP address or device. For more information, see [adaptive authentication](#).

	Allow	Optional MFA	Require MFA	Block	Notify users
Low risk	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Medium risk	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>
High risk	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>

Choosing allow will still log all attempted sign-ins rated as higher risk to [AWS Cloudwatch](#). [↗](#)

You can customize notification emails, and provide both plaintext and HTML versions. Choose **Customize** from **Adaptive authentication notification messages** to customize your email notifications. To learn more about email templates, see [Message Templates \(p. 206\)](#).

## Viewing Advanced Security Metrics

Amazon Cognito publishes metrics for advanced security features to your account in Amazon CloudWatch. The advanced security metrics are grouped together by risk level and also by request level.

### To view metrics by using the CloudWatch console

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. In the navigation pane, choose **Metrics**.
3. Choose Amazon Cognito.
4. Choose a group of aggregated metrics, such as **By Risk Classification**.
5. The **All metrics** tab displays all metrics for that choice. You can do the following:
  - To sort the table, use the column heading.
  - To graph a metric, select the check box next to the metric. To select all metrics, select the check box in the heading row of the table.

- To filter by resource, choose the resource ID, and then choose **Add to search**.
- To filter by metric, choose the metric name, and then choose **Add to search**.

Metric	Description	Metric Dimensions
CompromisedCredentialsRisk	Requests where Amazon Cognito detected compromised credentials.	Operation: The type of operation such as PasswordChange, SignIn, or SignUp.  UserPoolId: The identifier of the user pool.  RiskLevel: high (default), medium, or low.
AccountTakeOverRisk	Requests where Amazon Cognito detected account take-over risk.	RiskLevel: high, medium, or low.
OverrideBlock	Requests that Amazon Cognito blocked because of the configuration provided by the developer.	RiskLevel: high (default), medium, or low.
Risk	Requests that Amazon Cognito marked as risky.	Operation: The type of operation such as PasswordChange, SignIn, or SignUp.  UserPoolId: The identifier of the user pool.
NoRisk	Requests where Amazon Cognito did not identify any risk.	Operation: The type of operation such as PasswordChange, SignIn, or SignUp.  UserPoolId: The identifier of the user pool.

Amazon Cognito offers you two predefined groups of metrics for ready analysis in CloudWatch. **By Risk Classification** identifies the granularity of the risk level for requests that Amazon Cognito identified as risky, and the **By Request Classification** reflects metrics aggregated by request level.

Aggregated Metrics Group	Description
By Risk Classification	Requests that Amazon Cognito identified as risky.
By Request Classification	Metrics aggregated by request.

## Enabling User Pool Advanced Security from Your App

After you configure the advanced security features for your user pool, you need to enable them in your web or mobile app.

For more information about adding a web or mobile app to Amazon Cognito, see [Adding a Web or Mobile App to Amazon Cognito User Pools](#) (p. 23).

#### To use advanced security with JavaScript

1. You might need to update your Amazon Cognito SDK to the latest version. For more information about Amazon Cognito SDKs, see [Install a user pool SDK](#).
2. To use the Auth SDK to enable the hosted UI, see the [CognitoAuth JavaScript sample app](#).
3. Set `AdvancedSecurityDataCollectionFlag` to `true`. Also, set `UserPoolId` to your user pool ID.
4. In your application replace `<region>` with your AWS region such as `us-east-1`, and add this source reference to your JavaScript file:

```
<script src="https://amazon-cognito-assets.<region>.amazoncognito.com/amazon-cognito-advanced-security-data.min.js"></script>
```

For more information, see [Sample for Amazon Cognito Auth SDK for JavaScript](#).

#### To use advanced security with Android

1. You might need to update your Amazon Cognito SDK to the latest version. For more information about Amazon Cognito SDKs, see [Install a user pool SDK](#).
2. To use the Auth SDK to enable the hosted UI, see the [CognitoAuth Android sample app](#).
3. Use `{ transitive = true; }` while importing `aws-android-sdk-cognitoauth` via maven in gradle.

Include this as a dependency in your `build.gradle` file:

```
compile "com.amazonaws:aws-android-sdk-cognitoidentityprovider-asf:1.0.0"
```

For more information, see [AWS SDK for Android - Amazon Cognito Identity Provider ASF](#).

#### To use advanced security with iOS

1. You might need to update your Amazon Cognito SDK to the latest version. For more information about Amazon Cognito SDKs, see [Install a user pool SDK](#).
2. To use the Auth SDK to enable the hosted UI, see the [CognitoAuth iOS sample app](#).
3. To configure the Auth SDK by using `Info.plist`, add the `PoolIdForEnablingASF` key to your Amazon Cognito user pool configuration, and set it to your user pool ID.

To configure the Auth SDK using `AWSCognitoAuthConfiguration`, use [this initializer](#) and specify your user pool ID as `userPoolIdForEnablingASF`.

For more information, see [AWSCognitoIdentityProviderASF](#).

## Customizing User Pool Workflows with Lambda Triggers

You can create an AWS Lambda function and then trigger that function during user pool operations such as user sign-up, confirmation, and sign-in (authentication) with a Lambda trigger. You can add authentication challenges, migrate users, and customize verification messages.

## Topics

- [Adding a User Pool Lambda Trigger](#) (p. 120)
- [User Pool Lambda Trigger Event](#) (p. 120)
- [User Pool Lambda Trigger Common Parameters](#) (p. 121)
- [User Pool Lambda Trigger Sources](#) (p. 121)
- [Pre Sign-up Lambda Trigger](#) (p. 123)
- [Post Confirmation Lambda Trigger](#) (p. 128)
- [Pre Authentication Lambda Trigger](#) (p. 131)
- [Post Authentication Lambda Trigger](#) (p. 134)
- [Custom Authentication Challenge Lambda Triggers](#) (p. 137)
- [Pre Token Generation Lambda Trigger](#) (p. 145)
- [Migrate User Lambda Trigger](#) (p. 149)
- [Custom Message Lambda Trigger](#) (p. 152)

# Adding a User Pool Lambda Trigger

## To add a user pool Lambda trigger with the console

1. Create a Lambda function using the [Lambda console](#). For more information on Lambda functions, see the [AWS Lambda Developer Guide](#).
2. Navigate to the [Amazon Cognito console](#), choose **Manage User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. In your user pool, choose the **Triggers** tab from the navigation bar.
5. Choose a Lambda trigger such as **Pre sign-up** or **Pre authentication** and choose your Lambda function from the **Lambda function** drop-down list.
6. Choose **Save changes**.
7. You can log your Lambda function using CloudWatch in the Lambda console. For more information see [Accessing CloudWatch Logs for Lambda](#).

### Important

Amazon Cognito invokes Lambda functions synchronously. When called, your Lambda function must respond within 5 seconds. If it does not, Amazon Cognito retries the call. After 3 unsuccessful attempts, the function times out. This 5-second timeout value cannot be changed. For more information see the [Lambda programming model](#).

# User Pool Lambda Trigger Event

Amazon Cognito passes event information to your Lambda function which returns the same event object back to Amazon Cognito with any changes in the response. This event shows the Lambda trigger common parameters:

JSON

```
{
  "version": number,
  "triggerSource": "string",
  "region": AWSRegion,
  "userPoolId": "string",
  "userName": "string",
  "callerContext":
    {
```

```
        "awsSdkVersion": "string",
        "clientId": "string"
    },
    "request": {
        "userAttributes": {
            "string": "string",
            ....
        }
    },
    "response": {}
}
```

## User Pool Lambda Trigger Common Parameters

### **version**

The version number of your Lambda function.

### **triggerSource**

The name of the event that triggered the Lambda function. For a description of each triggerSource see [User Pool Lambda Trigger Sources \(p. 121\)](#).

### **region**

The AWS Region, as an `AWSRegion` instance.

### **userPoolId**

The user pool ID for the user pool.

### **userName**

The username of the current user.

### **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 in the response depend on the triggering event.

## User Pool Lambda Trigger Sources

This section describes each Amazon Cognito Lambda triggerSource parameter, and its triggering event.

### Sign-up, confirmation, and sign-in (authentication) triggers

Trigger	triggerSource value	Triggering event
Pre sign-up	PreSignUp_SignUp	Pre sign-up.
Pre sign-up	PreSignUp_AdminCreateUser	Pre sign-up when an admin creates a new user.
Post confirmation	PostConfirmation_ConfirmSignUp	Post sign-up confirmation.
Post confirmation	PostConfirmation_ConfirmForgotPassword	Post Forgot Password confirmation.
Pre authentication	PreAuthentication_Authentication	Pre authentication.
Post authentication	PostAuthentication_Authentication	Post authentication.

### Custom authentication challenge triggers

Trigger	triggerSource value	Triggering event
Define auth challenge	DefineAuthChallenge_Authentication	Define Auth Challenge.
Create auth challenge	CreateAuthChallenge_Authentication	Create Auth Challenge.
Verify auth challenge	VerifyAuthChallengeResponse_Authentication	Verify Auth Challenge Response.

### Pre token generation triggers

Trigger	triggerSource value	Triggering event
Pre token generation	TokenGeneration_HostedAuth	Called during authentication from the Amazon Cognito hosted UI sign-in page.
Pre token generation	TokenGeneration_Authentication	Called after user authentication flows have completed.
Pre token generation	TokenGeneration_NewPassword	Called after the user is created by an admin. This flow is invoked when the user has to change a temporary password.
Pre token generation	TokenGeneration_Authentication	Called at the end of the authentication of a user device.
Pre token generation	TokenGeneration_RefreshToken	Called when a user tries to refresh the identity and access tokens.

### Migrate user triggers

Trigger	triggerSource value	Triggering event
User migration	UserMigration_Authentication	User migration at the time of sign in.



Trigger	triggerSource value	Triggering event
User migration	UserMigration_ForgotPassword	User migration during the forgot-password flow.

### Custom message triggers

Trigger	triggerSource value	Triggering event
Custom message	CustomMessage_SignUp	Custom message – To send the confirmation code post sign-up.
Custom message	CustomMessage_AdminCreateUser	Custom message – To send the temporary password to a new user.
Custom message	CustomMessage_ResendCode	Custom message – To resend the confirmation code to an existing user.
Custom message	CustomMessage_ForgotPassword	Custom message – To send the confirmation code for Forgot Password request.
Custom message	CustomMessage_UpdateUserAttributes	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.
Custom message	CustomMessage_VerifyUserAttributes	Custom message – This trigger sends a verification code to the user when they manually request it for a new email or phone number.
Custom message	CustomMessage_Authentication	Custom message – To send MFA code during authentication.

## Pre Sign-up Lambda Trigger

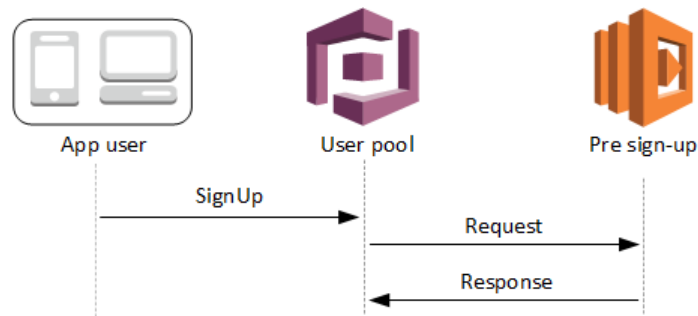
The pre sign-up Lambda function is triggered just before Amazon Cognito signs up a new user. It allows you to perform custom validation to accept or deny the registration request as part of the sign-up process.

### Topics

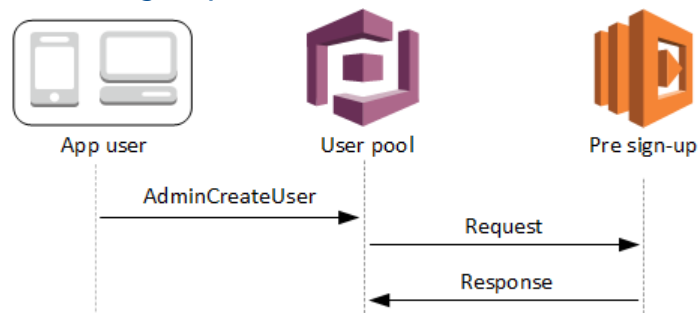
- [Pre Sign-up Lambda Flows \(p. 124\)](#)
- [Pre Sign-up Lambda Trigger Parameters \(p. 124\)](#)
- [Sign-up Tutorials \(p. 125\)](#)
- [Pre Sign-up Example: Auto-Confirm Users from a Registered Domain \(p. 126\)](#)
- [Pre Sign-up Example: Auto-Confirm and Auto-Verify all Users \(p. 127\)](#)

## Pre Sign-up Lambda Flows

### Client Sign-up Flow



### Server Sign-up Flow



The request includes validation data from the client which comes from the `validationData` values passed to the user pool `SignUp` and `AdminCreateUser` API methods.

## Pre Sign-up Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

```
{
  "request": {
    "userAttributes": {
      "string": "string",
      ....
    },
    "validationData": [
      {
        "Name": "string",
        "Value": "string",
      }
      ...
    ],
  },
  "response": {
    "autoConfirmUser": "boolean",
    "autoVerifyPhone": "boolean",
    "autoVerifyEmail": "boolean"
  }
}
```

## Pre Sign-up Request Parameters

### **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.

## Pre Sign-up Response Parameters

In the response, you can set `autoConfirmUser` to `true` if you want to auto-confirm the user. You can set `autoVerifyEmail` to `true` to auto-verify the user's email. You can set `autoVerifyPhone` to `true` to auto-verify the user's phone number.

### **autoConfirmUser**

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

### **autoVerifyEmail**

Set to `true` to set as verified the email of a user who is signing up, or `false` otherwise. If `autoVerifyEmail` is set to `true`, the `email` attribute must have a valid, non-null value. Otherwise an error will occur and the user will not be able to complete sign-up.

If the `email` attribute is selected as an alias, an alias will be created for the user's email when `autoVerifyEmail` is set. If an alias with that email already exists, the alias will be moved to the new user and the previous user's email will be marked as unverified. For more information, see [Overview of Aliases \(p. 201\)](#).

### **autoVerifyPhone**

Set to `true` to set as verified the phone number of a user who is signing up, or `false` otherwise. If `autoVerifyPhone` is set to `true`, the `phone_number` attribute must have a valid, non-null value. Otherwise an error will occur and the user will not be able to complete sign-up.

If the `phone_number` attribute is selected as an alias, an alias will be created for the user's phone number when `autoVerifyPhone` is set. If an alias with that phone number already exists, the alias will be moved to the new user and the previous user's phone number will be marked as unverified. For more information, see [Overview of Aliases \(p. 201\)](#).

## Sign-up Tutorials

The pre sign-up Lambda function is triggered before user sign-up. See these Amazon Cognito sign-up tutorials for JavaScript, Android, and iOS.

Platform	Tutorial
JavaScript Identity SDK	<a href="#">Sign up users with JavaScript</a>
Android Identity SDK	<a href="#">Sign up users with Android</a>
iOS Identity SDK	<a href="#">Sign up users with iOS</a>

## Pre Sign-up Example: Auto-Confirm Users from a Registered Domain

With the pre sign-up Lambda trigger, You can add custom logic to validate new users signing up for your user pool. This is a sample JavaScript program that demonstrates how to sign up a new user. It will invoke a pre sign-up Lambda trigger as part of the authentication.

### JavaScript

```
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 dataEmailDomain = {  
  Name: "custom:domain",  
  Value: "example.com"  
}  
}  
var attributeEmail =  
new AmazonCognitoIdentity.CognitoUserAttribute(dataEmail);  
var attributePhoneNumber =  
new AmazonCognitoIdentity.CognitoUserAttribute(dataPhoneNumber);  
var attributeEmailDomain =  
new AmazonCognitoIdentity.CognitoUserAttribute(dataEmailDomain);  
  
attributeList.push(attributeEmail);  
attributeList.push(attributePhoneNumber);  
attributeList.push(attributeEmailDomain);  
  
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());  
});
```

This is a sample Lambda trigger called just before sign-up with the user pool pre sign-up Lambda trigger. It uses a custom attribute **custom:domain** to automatically confirm new users from a particular email domain. Any new users not in the custom domain will be added to the user pool, but not automatically confirmed.

### Node.js

```
exports.handler = (event, context, callback) => {  
  // Set the user pool autoConfirmUser flag after validating the email domain  
  event.response.autoConfirmUser = false;  
  
  // Split the email address so we can compare domains  
  var address = event.request.userAttributes.email.split("@")  
  
  // This example uses a custom attribute "custom:domain"
```

```
if (event.request.userAttributes.hasOwnProperty("custom:domain")) {
    if ( event.request.userAttributes['custom:domain'] === address[1]) {
        event.response.autoConfirmUser = true;
    }
}

// Return to Amazon Cognito
callback(null, event);
};
```

#### Python

```
def lambda_handler(event, context):
    # It sets the user pool autoConfirmUser flag after validating the email domain
    event['response']['autoConfirmUser'] = False

    # Split the email address so we can compare domains
    address = event['request']['userAttributes']['email'].split('@')

    # This example uses a custom attribute 'custom:domain'
    if 'custom:domain' in event['request']['userAttributes']:
        if event['request']['userAttributes']['custom:domain'] == address[1]:
            event['response']['autoConfirmUser'] = True

    # Return to Amazon Cognito
    return event
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

#### JSON

```
{
  "request": {
    "userAttributes": {
      "email": "testuser@example.com",
      "custom:domain": "example.com"
    }
  },
  "response": {}
}
```

## Pre Sign-up Example: Auto-Confirm and Auto-Verify all Users

This example confirms all users and sets the user's `email` and `phone_number` attributes to verified if the attribute is present. Also, if aliasing is enabled, aliases will be created for `phone_number` and `email` when auto-verify is set.

#### Note

If an alias with the same phone number already exists, the alias will be moved to the new user, and the previous user's `phone_number` will be marked as unverified. The same is true for email addresses. To prevent this from happening, you can use the user pools [ListUsers API](#) to see if there is an existing user who is already using the new user's phone number or email address as an alias.

### Node.js

```
exports.handler = (event, context, callback) => {  
  
    // Confirm the user  
    event.response.autoConfirmUser = true;  
  
    // Set the email as verified if it is in the request  
    if (event.request.userAttributes.hasOwnProperty("email")) {  
        event.response.autoVerifyEmail = true;  
    }  
  
    // Set the phone number as verified if it is in the request  
    if (event.request.userAttributes.hasOwnProperty("phone_number")) {  
        event.response.autoVerifyPhone = true;  
    }  
  
    // Return to Amazon Cognito  
    callback(null, event);  
};
```

### Python

```
def lambda_handler(event, context):  
    # Confirm the user  
    event['response']['autoConfirmUser'] = True  
  
    # Set the email as verified if it is in the request  
    if 'email' in event['request']['userAttributes']:  
        event['response']['autoVerifyEmail'] = True  
  
    # Set the phone number as verified if it is in the request  
    if 'phone_number' in event['request']['userAttributes']:  
        event['response']['autoVerifyPhone'] = True  
  
    # Return to Amazon Cognito  
    return event
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

### JSON

```
{  
  "request": {  
    "userAttributes": {  
      "email": "user@example.com",  
      "phone_number": "+12065550100"  
    }  
  },  
  "response": {}  
}
```

## Post Confirmation Lambda Trigger

Amazon Cognito invokes this trigger after a new user is confirmed, allowing you to send custom messages or to add custom logic. For example, you could use this trigger to gather new user data.

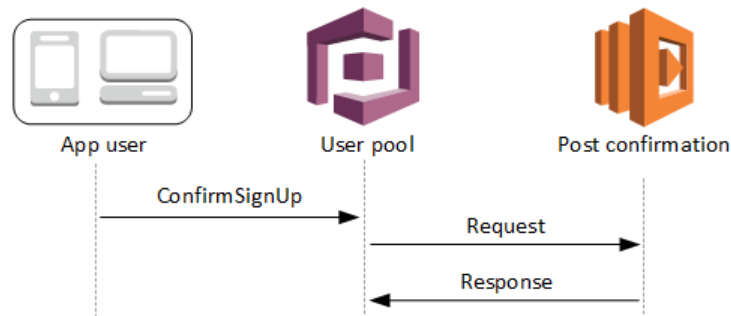
The request contains the current attributes for the confirmed user.

### Topics

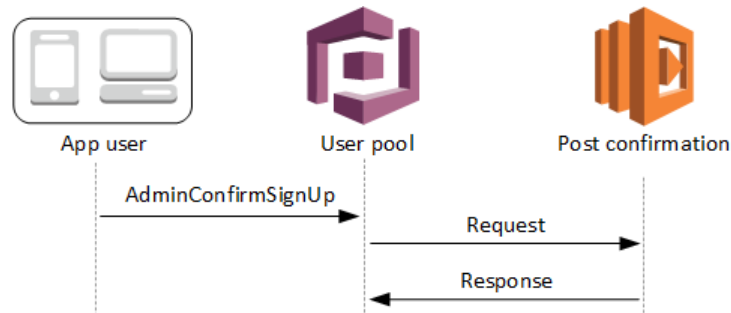
- [Post Confirmation Lambda Flows \(p. 129\)](#)
- [Post Confirmation Lambda Trigger Parameters \(p. 129\)](#)
- [User Confirmation Tutorials \(p. 130\)](#)
- [Post Confirmation Example \(p. 130\)](#)

## Post Confirmation Lambda Flows

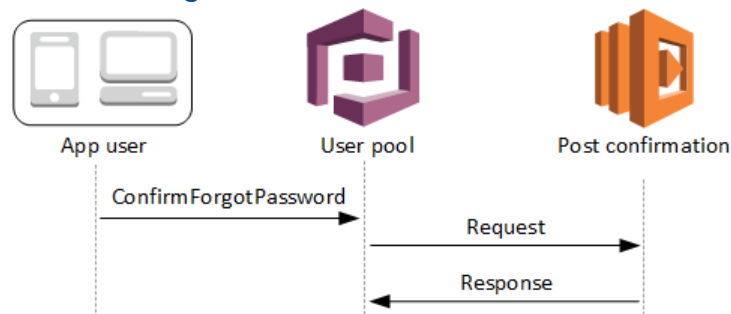
### Client Confirm Sign-up Flow



### Server Confirm Sign-up Flow



### Confirm Forgot Password Flow



## Post Confirmation Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

## JSON

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

## Post Confirmation Request Parameters

### userAttributes

One or more name-value pairs representing user attributes.

## Post Confirmation Response Parameters

No additional return information is expected in the response.

## User Confirmation Tutorials

The post confirmation Lambda function is triggered just after Amazon Cognito confirms a new user. See these user confirmation tutorials for JavaScript, Android, and iOS.

Platform	Tutorial
JavaScript Identity SDK	<a href="#">Confirm users with JavaScript</a>
Android Identity SDK	<a href="#">Confirm users with Android</a>
iOS Identity SDK	<a href="#">Confirm users with iOS</a>

## Post Confirmation Example

This example Lambda function sends a confirmation email message to your user using Amazon SES. For more information see [Amazon Simple Email Service Developer Guide](#).

### Node.js

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

var ses = new aws.SES();

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

  if (event.request.userAttributes.email) {
    sendEmail(event.request.userAttributes.email, "Congratulations " +
    event.userName + ", you have been confirmed: ", function(status) {

      // Return to Amazon Cognito
      callback(null, event);
    });
  }
}
```



```
    });  
  } else {  
    // Nothing to do, the user's email ID is unknown  
    callback(null, event);  
  }  
};  
  
function sendEmail(to, body, completedCallback) {  
  var eParams = {  
    Destination: {  
      ToAddresses: [to]  
    },  
    Message: {  
      Body: {  
        Text: {  
          Data: body  
        }  
      },  
      Subject: {  
        Data: "Cognito Identity Provider registration completed"  
      }  
    },  
  
    // Replace source_email with your SES validated email address  
    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");  
};
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

JSON

```
{  
  "request": {  
    "userAttributes": {  
      "email": "user@example.com",  
      "email_verified": true  
    }  
  },  
  "response": {}  
}
```

## Pre Authentication Lambda Trigger

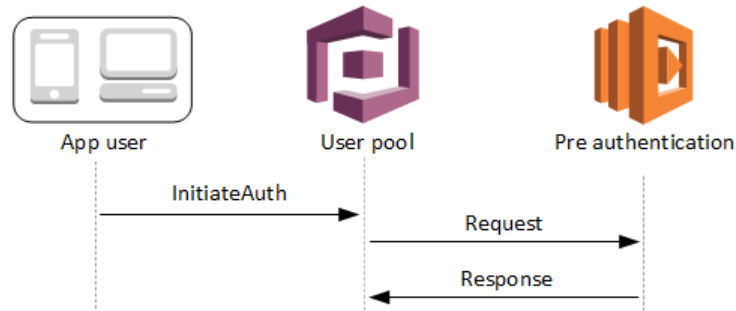
Amazon Cognito invokes this trigger when a user attempts to sign in, allowing custom validation to accept or deny the authentication request.

## Topics

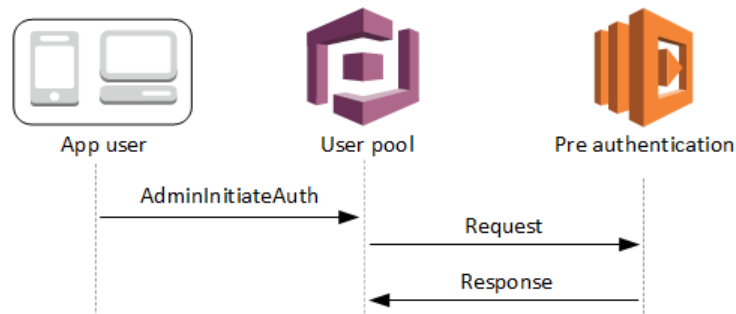
- [Pre Authentication Lambda Flows \(p. 132\)](#)
- [Pre Authentication Lambda Trigger Parameters \(p. 132\)](#)
- [Authentication Tutorials \(p. 133\)](#)
- [Pre Authentication Example \(p. 133\)](#)

## Pre Authentication Lambda Flows

### Client Authentication Flow



### Server Authentication Flow



The request includes validation data from the client which comes from the `ClientMetadata` values passed to the user pool `InitiateAuth` and `AdminInitiateAuth` API methods.

For more information, see [User Pool Authentication Flow \(p. 182\)](#).

## Pre Authentication Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

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

```

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

## Pre Authentication Request Parameters

### **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.

## Pre Authentication Response Parameters

No additional return information is expected in the response.

## Authentication Tutorials

The pre authentication Lambda function is triggered just before Amazon Cognito signs in a new user. See these sign-in tutorials for JavaScript, Android, and iOS.

Platform	Tutorial
JavaScript Identity SDK	<a href="#">Sign in users with JavaScript</a>
Android Identity SDK	<a href="#">Sign in users with Android</a>
iOS Identity SDK	<a href="#">Sign in users with iOS</a>

## Pre Authentication Example

This sample function prevents users from a specific user pool app client to sign-in to the user pool.

### Node.js

```
exports.handler = (event, context, callback) => {
    if (event.callerContext.clientId === "<user pool app client id to be blocked>") {
        var error = new Error("Cannot authenticate users from this user pool app client");

        // Return error to Amazon Cognito
        callback(error, event);
    }

    // Return to Amazon Cognito
    callback(null, event);
};
```

### Python

```
def lambda_handler(event, context):
```

```
if event['callerContext']['clientId'] == "<user pool app client id to be blocked>":  
    raise Exception("Cannot authenticate users from this user pool app client")  
  
# Return to Amazon Cognito  
return event
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

JSON

```
{  
  "callerContext": {  
    "clientId": "<user pool app client id to be blocked>"  
  },  
  "response": {}  
}
```

## Post Authentication Lambda Trigger

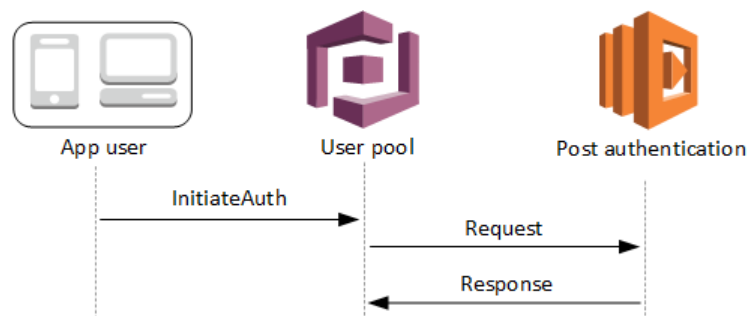
Amazon Cognito invokes this trigger after signing in a user, allowing you to add custom logic after authentication.

### Topics

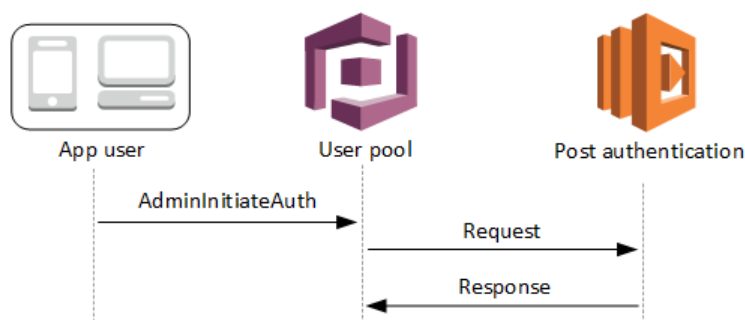
- [Post Authentication Lambda Flows \(p. 134\)](#)
- [Post Authentication Lambda Trigger Parameters \(p. 135\)](#)
- [Authentication Tutorials \(p. 135\)](#)
- [Post Authentication Example \(p. 136\)](#)

## Post Authentication Lambda Flows

### Client Authentication Flow



## Server Authentication Flow



For more information, see [User Pool Authentication Flow \(p. 182\)](#).

## Post Authentication Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

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

## Post Authentication Request Parameters

### **newDeviceUsed**

This flag indicates if the user has signed in on a new device. It is set only if the remembered devices value of the user pool is set to `Always` or `User Opt-In`.

### **userAttributes**

One or more name-value pairs representing user attributes.

## Post Authentication Response Parameters

No additional return information is expected in the response.

## Authentication Tutorials

The post authentication Lambda function is triggered just after Amazon Cognito signs in a new user. See these sign-in tutorials for JavaScript, Android, and iOS.

Platform	Tutorial
JavaScript Identity SDK	<a href="#">Sign in users with JavaScript</a>

Platform	Tutorial
Android Identity SDK	<a href="#">Sign in users with Android</a>
iOS Identity SDK	<a href="#">Sign in users with iOS</a>

## Post Authentication Example

This post authentication sample Lambda function sends data from a successful sign-in to CloudWatch Logs.

Node.js

```
exports.handler = (event, context, callback) => {

    // Send post authentication data to Cloudwatch logs
    console.log ("Authentication successful");
    console.log ("Trigger function =", event.triggerSource);
    console.log ("User pool = ", event.userPoolId);
    console.log ("App client ID = ", event.callerContext.clientId);
    console.log ("User ID = ", event.userName);

    // Return to Amazon Cognito
    callback(null, event);
};
```

Python

```
from __future__ import print_function
def lambda_handler(event, context):

    # Send post authentication data to Cloudwatch logs
    print ("Authentication successful")
    print ("Trigger function =", event['triggerSource'])
    print ("User pool = ", event['userPoolId'])
    print ("App client ID = ", event['callerContext']['clientId'])
    print ("User ID = ", event['userName'])

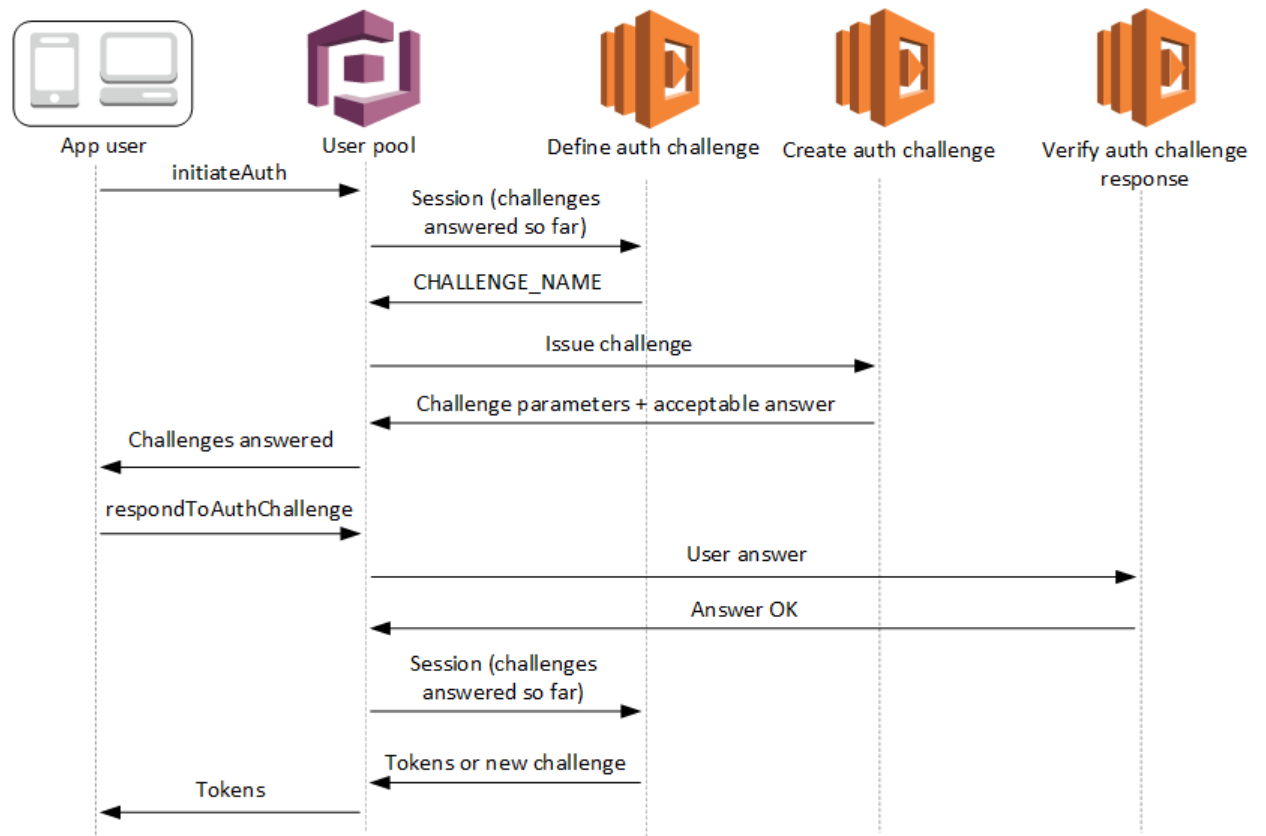
    # Return to Amazon Cognito
    return event
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

JSON

```
{
  "triggerSource": "testTrigger",
  "userPoolId": "testPool",
  "userName": "testName",
  "callerContext": {
    "clientId": "12345"
  },
  "response": {}
}
```

## Custom Authentication Challenge Lambda Triggers



These Lambda triggers issue and verify their own challenges as part of a user pool [custom authentication flow](#).

### 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** to create a custom challenge.

### Verify auth challenge response

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

You can incorporate new challenge types with these challenge Lambda triggers. For example, these challenge types might include CAPTCHAs or dynamic challenge questions.

You can generalize authentication into two common steps with the user pool `InitiateAuth` and `RespondToAuthChallenge` API methods.

In this flow, a user authenticates by answering successive challenges until authentication either fails or the user is issued tokens. These two API calls can be repeated to include different challenges.

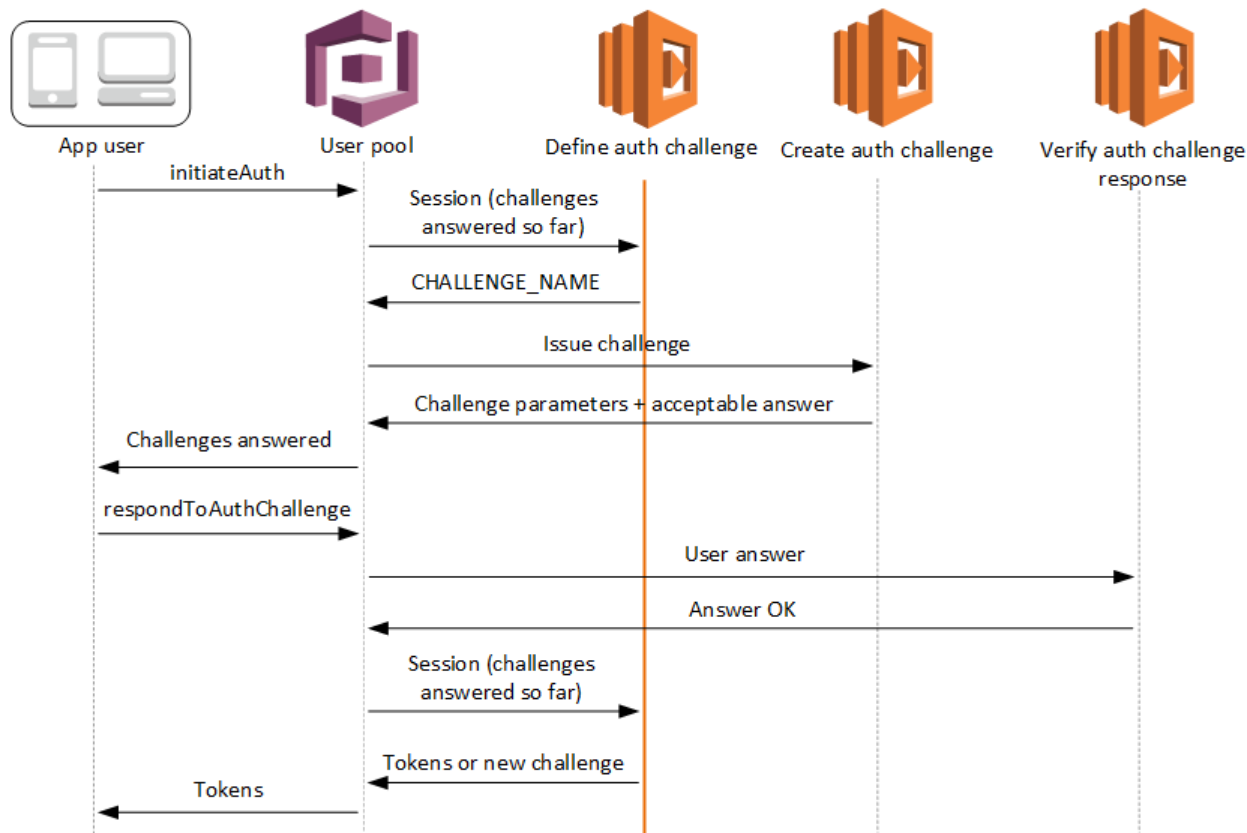
### Note

The Amazon Cognito hosted sign-in web page does not support the custom authentication flow.

## Topics

- [Define Auth Challenge Lambda Trigger \(p. 138\)](#)
- [Create Auth Challenge Lambda Trigger \(p. 141\)](#)
- [Verify Auth Challenge Response Lambda Trigger \(p. 143\)](#)

## Define Auth Challenge Lambda Trigger



### Define auth challenge

Amazon Cognito invokes this trigger to initiate the [custom authentication flow](#).

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.

The challenge loop will repeat until all challenges are answered.

## Topics

- [Define Auth Challenge Lambda Trigger Parameters \(p. 138\)](#)
- [Define Auth Challenge Example \(p. 140\)](#)

## Define Auth Challenge Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).



## JSON

```
{
  "request": {
    "userAttributes": {
      "string": "string",
      ....
    },
    "session": [
      ChallengeResult,
      ...
    ]
  },
  "response": {
    "challengeName": "string",
    "issueTokens": boolean,
    "failAuthentication": boolean
  }
}
```

## Define Auth Challenge Request Parameters

### **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".

## Define Auth Challenge Response Parameters

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

### **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.

## Define Auth Challenge Example

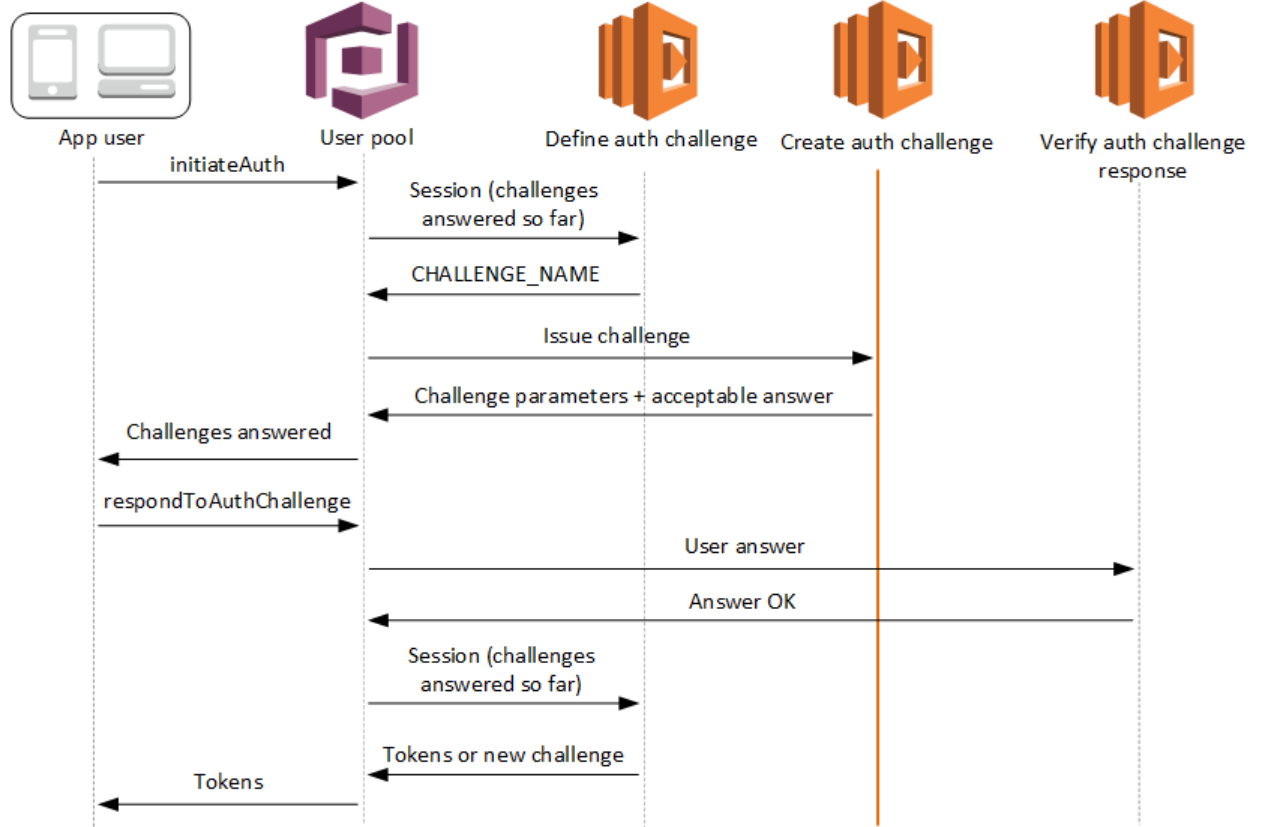
This example defines a series of challenges for authentication and issues tokens only if all of the challenges are successfully completed.

Node.js

```
exports.handler = (event, context, callback) => {
  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;
  }

  // Return to Amazon Cognito
  callback(null, event);
}
```

## Create Auth Challenge Lambda Trigger



### 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. It creates a [custom authentication flow](#).

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.

The challenge loop will repeat until all challenges are answered.

### Topics

- [Create Auth Challenge Lambda Trigger Parameters \(p. 141\)](#)
- [Create Auth Challenge Example \(p. 143\)](#)

## Create Auth Challenge Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

```
{
  "request": {
    "userAttributes": {
```

```
        "string": "string",
        ....
    }
    "challengeName": "string",
    "session": [
        ChallengeResult,
        ...
    ]
},
"response": {
    "publicChallengeParameters": {
        "string": "string",
        ....
    },
    "privateChallengeParameters": {
        "string": "string",
        ....
    },
    "challengeMetadata": "string"
}
```

## Create Auth Challenge Request Parameters

### **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".

## Create Auth Challenge Response Parameters

### **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.

## Create Auth Challenge Example

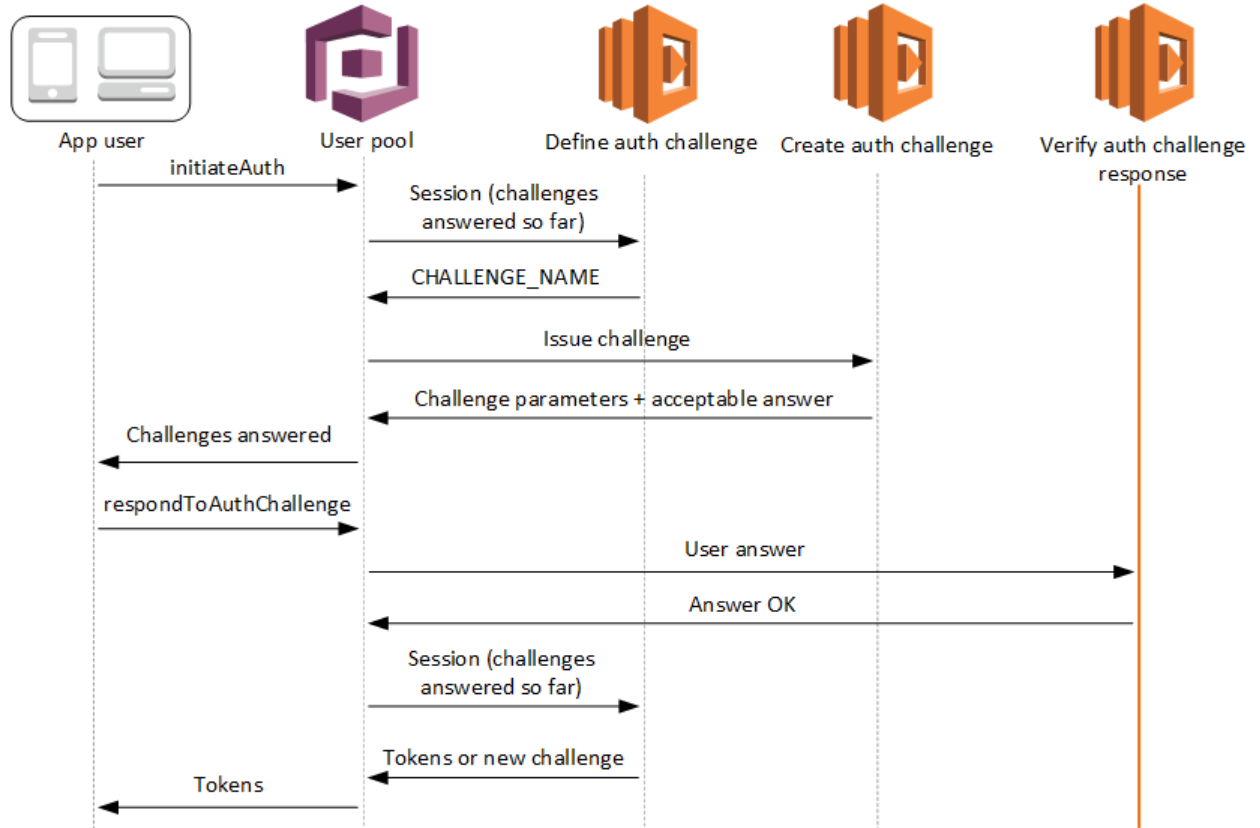
A CAPTCHA is created as a challenge to the user. The URL for the CAPTCHA image is added to the public challenge parameters as `"captchaUrl"`, and the expected answer is added to the private challenge parameters.

Node.js

```
exports.handler = (event, context, callback) => {
  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';
  }

  Return to Amazon Cognito
  callback(null, event);
}
```

## Verify Auth Challenge Response Lambda 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. It is part of a user pool [custom authentication flow](#).

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.

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

The challenge loop will repeat until all challenges are answered.

### Topics

- [Verify Auth Challenge Lambda Trigger Parameters \(p. 144\)](#)
- [Verify Auth Challenge Response Example \(p. 145\)](#)

## Verify Auth Challenge Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

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

### Verify Auth Challenge Request Parameters

#### **userAttributes**

One or more name-value pairs representing user attributes.

#### **privateChallengeParameters**

This parameter comes from the Create Auth Challenge trigger, and is compared against a user's **challengeAnswer** to determine whether the user passed the challenge.

This parameter is only used by the Verify Auth Challenge Response Lambda trigger. It should contain all of the information that is required to validate the user's response to the challenge. That includes

the `publicChallengeParameters` parameter which contains the question that is presented to the user, and `privateChallengeParameters` which contains the valid answers for the question.

#### **challengeAnswer**

The answer from the user's response to the challenge.

### Verify Auth Challenge Response Parameters

#### **answerCorrect**

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

### 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.

Node.js

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

  // Return to Amazon Cognito
  callback(null, event);
}
```

## Pre Token Generation Lambda Trigger

Amazon Cognito invokes this trigger before token generation allowing you to customize identity token claims.

This Lambda trigger allows you to customize an identity token before it is generated. You can use this trigger to add new claims, update claims, or suppress claims in the identity token. To use this feature, you can associate a Lambda function from the Amazon Cognito User Pools console or by updating your user pool through the AWS CLI.

There are some claims which cannot be modified. These include `acr`, `amr`, `aud`, `auth_time`, `azp`, `exp`, `iat`, `identities`, `iss`, `sub`, `token_use`, and `cognito:username`.

#### **Topics**

- [Pre Token Generation Lambda Trigger Sources \(p. 146\)](#)
- [Pre Token Generation Lambda Trigger Parameters \(p. 146\)](#)
- [Pre Token Generation Example: Add a New Claim and Suppress an Existing Claim \(p. 147\)](#)
- [Pre Token Generation Example: Modify the User's Group Membership \(p. 148\)](#)

## Pre Token Generation Lambda Trigger Sources

triggerSource value	Triggering event
TokenGeneration_HostedAuth	Called during authentication from the Amazon Cognito hosted UI sign-in page.
TokenGeneration_Authentication	Called after user authentication flows have completed.
TokenGeneration_NewPasswordChallenge	Called after the user is created by an admin. This flow is invoked when the user has to change a temporary password.
TokenGeneration_AuthenticateDevice	Called at the end of the authentication of a user device.
TokenGeneration_RefreshTokens	Called when a user tries to refresh the identity and access tokens.

## Pre Token Generation Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

```
{
  "request": {
    "userAttributes": {
      "string": "string",
      ....
    }
    "groupConfiguration": {
      "groupsToOverride": ["string", ....],
      "iamRolesToOverride": ["string", ....],
      "preferredRole": "string"
    },
  },
  "response": {
    "claimsOverrideDetails": {
      "claimsToAddOrOverride": {
        "string": "string",
        ....
      },
      "claimsToSuppress": ["string", ....],
      "groupOverrideDetails": {
        "groupsToOverride": ["string", ....],
        "iamRolesToOverride": ["string", ....],
        "preferredRole": "string"
      }
    }
  }
}
```



## Pre Token Generation Request Parameters

### **groupConfiguration**

The input object containing the current group configuration. It includes `groupsToOverride`, `iamRolesToOverride`, and `preferredRole`.

### **groupsToOverride**

A list of the group names that are associated with the user that the identity token is issued for.

### **iamRolesToOverride**

A list of the current IAM roles associated with these groups.

### **preferredRole**

A string indicating the preferred IAM role.

## Pre Token Generation Response Parameters

### **claimsToAddOrOverride**

A map of one or more key-value pairs of claims to add or override. For group related claims, use `groupOverrideDetails` instead.

### **claimsToSuppress**

A list that contains claims to be suppressed from the identity token.

#### **Note**

If a value is both suppressed and replaced, then it will be suppressed.

### **groupOverrideDetails**

The output object containing the current group configuration. It includes `groupsToOverride`, `iamRolesToOverride`, and `preferredRole`.

The `groupOverrideDetails` object is replaced with the one you provide. If you provide an empty or null object in the response, then the groups are suppressed. To leave the existing group configuration as is, copy the value of the request's `groupConfiguration` object to the `groupOverrideDetails` object in the response, and pass it back to the service.

## Pre Token Generation Example: Add a New Claim and Suppress an Existing Claim

This example uses the Pre Token Generation Lambda to add a new claim and suppresses an existing one.

Node.js

```
exports.handler = (event, context, callback) => {
  event.response = {
    "claimsOverrideDetails": {
      "claimsToAddOrOverride": {
        "attribute_key2": "attribute_value2",
        "attribute_key": "attribute_value"
      },
      "claimsToSuppress": ["email"]
    }
  };
};
```

```
// Return to Amazon Cognito
callback(null, event);
};
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

JSON

```
{
  "request": {},
  "response": {}
}
```

## Pre Token Generation Example: Modify the User's Group Membership

This example uses the Pre Token Generation Lambda to modify the user's group membership.

Node.js

```
exports.handler = (event, context, callback) => {
  event.response = {
    "claimsOverrideDetails": {
      "claimsToAddOrOverride": {
        "attribute_key2": "attribute_value2",
        "attribute_key": "attribute_value"
      },
      "claimsToSuppress": ["email"],
      "groupOverrideDetails": {
        "groupsToOverride": ["group-A", "group-B", "group-C"],
        "iamRolesToOverride": ["arn:aws:iam::XXXXXXXXXXXX:role/sns_callerA",
          "arn:aws:iam::XXXXXXXXXXXX:role/sns_callerB", "arn:aws:iam::XXXXXXXXXXXX:role/sns_callerC"],
        "preferredRole": "arn:aws:iam::XXXXXXXXXXXX:role/sns_caller"
      }
    }
  };

  // Return to Amazon Cognito
  callback(null, event);
};
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

JSON

```
{
  "request": {},
  "response": {}
}
```

## Migrate User Lambda Trigger

Amazon Cognito invokes this trigger when a user does not exist in the user pool at the time of sign-in with a password, or in the forgot-password flow. After the Lambda function returns successfully, Amazon Cognito creates the user in the user pool. For details on the authentication flow with the user migration Lambda trigger see [Importing Users into User Pools With a User Migration Lambda Trigger \(p. 170\)](#).

You can migrate users from your existing user directory into Amazon Cognito User Pools at the time of sign-in, or during the forgot-password flow with this Lambda trigger.

### Topics

- [Migrate User Lambda Trigger Sources \(p. 149\)](#)
- [Migrate User Lambda Trigger Parameters \(p. 149\)](#)
- [Example: Migrate a User with an Existing Password \(p. 151\)](#)

## Migrate User Lambda Trigger Sources

triggerSource value	Triggering event
UserMigration_Authentication	User migration at the time of sign in.
UserMigration_ForgotPassword	User migration during forgot-password flow.

## Migrate User Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

```
{
  "userName": "string",
  "request": {
    "password": "string"
  },
  "response": {
    "userAttributes": {
      "string": "string",
      ...
    },
    "finalUserStatus": "string",
    "messageAction": "string",
    "desiredDeliveryMediums": [ "string", ... ],
    "forceAliasCreation": boolean
  }
}
```

## Migrate User Request Parameters

### userName

The username entered by the user.

### password

The password entered by the user for sign-in. It is not set in the forgot-password flow.

## Migrate User Response Parameters

### userAttributes

This field is required.

It must contain one or more name-value pairs representing user attributes to be stored in the user profile in your user pool. You can include both standard and custom user attributes. Custom attributes require the `custom:` prefix to distinguish them from standard attributes. For more information see [Custom attributes](#).

#### Note

In order for users to reset their passwords in the forgot-password flow, they must have either a verified email or a verified phone number. Amazon Cognito sends a message containing a reset password code to the email or phone number in the user attributes.

Attributes	Requirement
Any attributes marked as required when you created your user pool	If any required attributes are missing during the migration, default values will be used.
username	Required if you have configured your user pool with email and/or preferred_username aliases in addition to username for sign-in, and the user has entered an email or phone number to sign-in.  Otherwise, it is optional and will be used as the username instead of the username entered by the user.  <b>Note</b> username must be unique in the user pool.
cognito:mfa_enabled	Required if MFA is configured as optional in the User Pool. This attribute specifies whether MFA is enabled for the user.

### finalUserStatus

During sign-in, this attribute can be set to `CONFIRMED`, or not set, to auto-confirm your users and allow them to sign-in with their previous passwords. This is the simplest experience for the user.

If this attribute is set to `RESET_REQUIRED`, the user is required to change his or her password immediately after migration at the time of sign-in, and your client app needs to handle the `PasswordResetRequiredException` during the authentication flow.

#### Note

The password policy for the new user pool should not be stronger than the password policy from your existing user directory.

### messageAction

This attribute can be set to `"SUPPRESS"` to suppress the welcome message usually sent by Amazon Cognito to new users. If this attribute is not returned, the welcome message will be sent.

### desiredDeliveryMediums

This attribute can be set to `"EMAIL"` to send the welcome message by email, or `"SMS"` to send the welcome message by SMS. If this attribute is not returned, the welcome message will be sent by SMS.

### forceAliasCreation

If this parameter is set to "true" and the phone number or email address specified in the UserAttributes parameter already exists as an alias with a different user, the API call will migrate the alias from the previous user to the newly created user. The previous user will no longer be able to log in using that alias.

If this attribute is set to "false" and the alias exists, the user will not be migrated, and an error is returned to the client app.

If this attribute is not returned, it is assumed to be "false".

## Example: Migrate a User with an Existing Password

This example Lambda function migrates the user with an existing password and suppresses the welcome message from Amazon Cognito.

Node.js

```
exports.handler = (event, context, callback) => {

    var user;

    if ( event.triggerSource == "UserMigration_Authentication" ) {

        // authenticate the user with your existing user directory service
        user = authenticateUser(event.userName, event.request.password);
        if ( user ) {
            event.response.userAttributes = {
                "email": user.emailAddress,
                "email_verified": "true"
            };
            event.response.finalUserStatus = "CONFIRMED";
            event.response.messageAction = "SUPPRESS";
            context.succeed(event);
        }
        else {
            // Return error to Amazon Cognito
            callback("Bad password");
        }
    }
    else if ( event.triggerSource == "UserMigration_ForgotPassword" ) {

        // Lookup the user in your existing user directory service
        user = lookupUser(event.userName);
        if ( user ) {
            event.response.userAttributes = {
                "email": user.emailAddress,
                // required to enable password-reset code to be sent to user
                "email_verified": "true"
            };
            event.response.messageAction = "SUPPRESS";
            context.succeed(event);
        }
        else {
            // Return error to Amazon Cognito
            callback("Bad password");
        }
    }
    else {
        // Return error to Amazon Cognito
        callback("Bad triggerSource " + event.triggerSource);
    }
}
```

```
}  
};
```

## Custom Message Lambda Trigger

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](#).

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.

### Note

A custom message Lambda function with the `CustomMessage_AdminCreateUser` trigger returns a user name and verification code and so the request must include both `request.usernameParameter` and `request.codeParameter`.

### Topics

- [Custom Message Lambda Trigger Sources \(p. 152\)](#)
- [Custom Message Lambda Trigger Parameters \(p. 153\)](#)
- [Custom Message for Sign Up Example \(p. 153\)](#)
- [Custom Message for Admin Create User Example \(p. 155\)](#)

## Custom Message Lambda Trigger Sources

triggerSource value	Triggering event
<code>CustomMessage_SignUp</code>	Custom message – To send the confirmation code post sign-up.
<code>CustomMessage_AdminCreateUser</code>	Custom message – To send the temporary password to a new user.
<code>CustomMessage_ResendCode</code>	Custom message – To resend the confirmation code to an existing user.
<code>CustomMessage_ForgotPassword</code>	Custom message – To send the confirmation code for Forgot Password request.
<code>CustomMessage_UpdateUserAttribute</code>	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.
<code>CustomMessage_VerifyUserAttribute</code>	Custom message – This trigger sends a verification code to the user when they manually request it for a new email or phone number.
<code>CustomMessage_Authentication</code>	Custom message – To send MFA code during authentication.

## Custom Message Lambda Trigger Parameters

These are the parameters required by this Lambda function in addition to the [common parameters](#).

JSON

```
{
  "request": {
    "userAttributes": {
      "string": "string",
      ...
    }
    "codeParameter": "###",
    "usernameParameter": "string"
  },
  "response": {
    "smsMessage": "string",
    "emailMessage": "string",
    "emailSubject": "string"
  }
}
```

### Custom Message Request Parameters

#### **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.

#### **username**

The username parameter. It is a required request parameter for the admin create user flow.

### Custom Message Response Parameters

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

#### **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.

## Custom Message for Sign Up Example

This Lambda function is invoked to customize an email or SMS message when the service requires an app to send a verification code to the user.

A Lambda trigger can be 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 20,000 UTF-8 characters, including the verification code. HTML tags can be used in these emails.

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

Node.js

```
exports.handler = (event, context, callback) => {
  //
  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 to Amazon Cognito
  callback(null, event);
};
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

JSON

```
{
  "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>"
}
}
```

## Custom Message for Admin Create User Example

A custom message Lambda function with the CustomMessage\_AdminCreateUser trigger returns a user name and verification code and so include both `request.usernameParameter` and `request.codeParameter` in the message body.

The code parameter value "####" is a placeholder for the temporary password and "username" is a placeholder for the username delivered to your user.

For email, the maximum length for the message is 20,000 UTF-8 characters, including the verification code. HTML tags can be used in these emails. For SMS, the maximum length is 140 UTF-8 characters, including the verification code.

The response includes messages for both SMS and email.

Node.js

```
exports.handler = (event, context, callback) => {
  //
  if(event.userPoolId === "theSpecialUserPool") {
    // Identify why was this function invoked
    if(event.triggerSource === "CustomMessage_AdminCreateUser") {
      // Ensure that your message contains event.request.codeParameter
      // event.request.usernameParameter. This is the placeholder for the code and username
      // that will be sent to your user.
      event.response.smsMessage = "Welcome to the service. Your user
      name is " + event.request.usernameParameter + " Your temporary password is " +
      event.request.codeParameter;
      event.response.emailSubject = "Welcome to the service";
      event.response.emailMessage = "Welcome to the service. Your user
      name is " + event.request.usernameParameter + " Your temporary password is " +
      event.request.codeParameter;
    }
    // Create custom message for other events
  }
  // Customize messages for other user pools

  // Return to Amazon Cognito
  callback(null, event);
};
```

Amazon Cognito passes event information to your Lambda function. The function then returns the same event object back to Amazon Cognito, with any changes in the response. In the Lambda console, you can set up a test event with data that's relevant to your Lambda trigger. The following is a test event for this code sample:

JSON

```
{
  "version": 1,
  "triggerSource": "CustomMessage_AdminCreateUser",
  "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": "####",
  "usernameParameter": "username"
},
"response": {
  "smsMessage": "<custom message to be sent in the message with code parameter and username parameter>"
  "emailMessage": "<custom message to be sent in the message with code parameter and username parameter>"
  "emailSubject": "<custom email subject>"
}
}
```

## Using Amazon Pinpoint Analytics with Amazon Cognito User Pools

Amazon Cognito User Pools are integrated with Amazon Pinpoint to provide analytics for Amazon Cognito user pools and to enrich the user data for Amazon Pinpoint campaigns. Amazon Pinpoint provides analytics and targeted campaigns to drive user engagement in mobile apps using push notifications. With Amazon Pinpoint analytics support in Amazon Cognito user pools, you can track user pool sign-ups, sign-ins, failed authentications, daily active users (DAUs), and monthly active users (MAUs) in the Amazon Pinpoint console. You can drill into the data for different date ranges or attributes, such as device platform, device locale, and app version.

You can also set up user attributes that are specific to your app using the AWS Mobile SDK for Android or AWS Mobile SDK for iOS. Those can then be used to segment your users on Amazon Pinpoint and send them targeted push notifications. If you choose **Share user attribute data with Amazon Pinpoint** in the **Analytics** tab in the Amazon Cognito console, additional endpoints are created for user email addresses and phone numbers.

## Specifying Amazon Pinpoint Analytics Settings (AWS Management Console)

### To specify analytics settings

1. Sign in to the [Amazon Cognito console](#).
2. In the navigation pane, choose **Manage your User Pools**, and choose the user pool you want to edit.
3. Choose the **Analytics** tab.
4. Choose **Add analytics and campaigns**.
5. Choose a **Cognito app client** from the list.
6. To map your Amazon Cognito app to an **Amazon Pinpoint project**, choose the Amazon Pinpoint project from the list.

**Note**

The Amazon Pinpoint project ID is a 32-character string that is unique to your Amazon Pinpoint project. It is listed in the Amazon Pinpoint console.

You can map multiple Amazon Cognito apps to a single Amazon Pinpoint project. However, each Amazon Cognito app can only be mapped to one Amazon Pinpoint project.

In Amazon Pinpoint, each project should be a single app. For example, if a game developer has two games, each game should be a separate Amazon Pinpoint project, even if both games use the same Amazon Cognito user pool.

7. Choose **Share user attribute data with Amazon Pinpoint** if you want Amazon Cognito to send email addresses and phone numbers to Amazon Pinpoint in order to create additional endpoints for users.

**Note**

An *endpoint* uniquely identifies a user device to which you can send push notifications with Amazon Pinpoint. For more information about endpoints, see [Adding Endpoints](#) in the *Amazon Pinpoint Developer Guide*.

8. Enter an **IAM role** that you already created or choose **Create new role** to create a new role in the IAM console.
9. Choose **Save changes**.
10. To specify additional app mappings, choose **Add another app mapping**.
11. Choose **Save changes**.

## Specifying Amazon Pinpoint Analytics Settings (AWS CLI and AWS API)

Use the following commands to specify Amazon Pinpoint analytics settings for your user pool.

**To specify the analytics settings for your user pool's existing client app at app creation time**

- AWS CLI: `aws cognito-idp create-user-pool-client`
- AWS API: [CreateUserPoolClient](#)

**To update the analytics settings for your user pool's existing client app**

- AWS CLI: `aws cognito-idp update-user-pool-client`
- AWS API: [UpdateUserPoolClient](#)

## Managing Users in User Pools

After you create a user pool, you can create, confirm, and manage users accounts. With Amazon Cognito User Pools groups you can manage your users and their access to resources by mapping IAM roles to groups.

You can import your users into a user pool with a user migration Lambda trigger. This approach enables seamless migration of users from your existing user directory to user pools when they sign in to your user pool for the first time.

**Topics**

- [Signing Up and Confirming User Accounts](#) (p. 158)
- [Creating User Accounts as Administrator](#) (p. 162)
- [Adding Groups to a User Pool](#) (p. 165)
- [Managing and Searching for User Accounts](#) (p. 167)

- [Importing Users into a User Pool \(p. 170\)](#)

## Signing Up and Confirming User Accounts

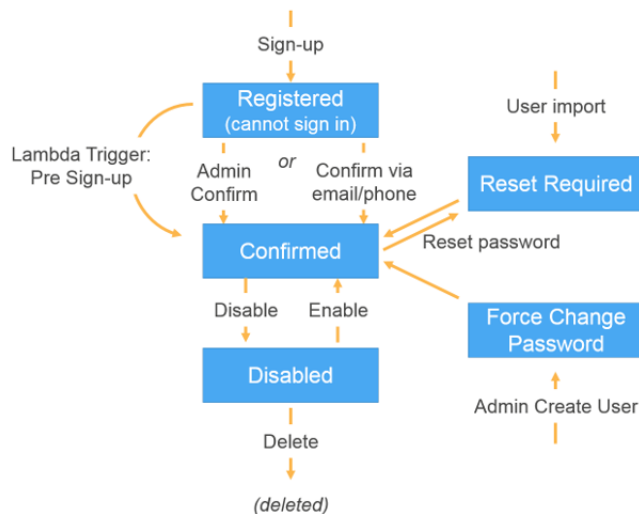
User accounts are added to your user pool in one of the following ways:

- 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 User Pools From a CSV File \(p. 171\)](#).
- 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 as Administrator \(p. 162\)](#).

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 (Unconfirmed)

The user has successfully signed up, but cannot sign in until the user account is confirmed. The user is enabled but not confirmed in this state.

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)—or, in the case of email, by clicking a confirmation link—that email or phone number is automatically verified. The code or link is valid for 24 hours.

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 request a code and reset his or her 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. The code is valid for 24 hours

### 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.

## Computing SecretHash Values

The following Amazon Cognito User Pools APIs have a `SecretHash` parameter:

- [ConfirmForgotPassword](#)
- [ConfirmSignUp](#)
- [ForgotPassword](#)
- [ResendConfirmationCode](#)
- [SignUp](#)

The `SecretHash` value is a Base 64-encoded keyed-hash message authentication code (HMAC) calculated using the secret key of a user pool client and username plus the client ID in the message. The following pseudocode shows how this value is calculated. In this pseudocode, `+` indicates concatenation, `HMAC_SHA256` represents a function that produces an HMAC value using `HmacSHA256`, and `Base64` represents a function that produces Base-64-encoded version of the hash output.

```
Base64 ( HMAC_SHA256 ( "Client Secret Key", "Username" + "Client Id" ) )
```

Alternatively, you can use the following code example in your server-side Java application code:

```
import javax.crypto.Mac;
import javax.crypto.spec.SecretKeySpec;

public static String calculateSecretHash(String userPoolClientId, String
    userPoolClientSecret, String userName) {
    final String HMAC_SHA256_ALGORITHM = "HmacSHA256";

    SecretKeySpec signingKey = new SecretKeySpec(
        userPoolClientSecret.getBytes(StandardCharsets.UTF_8),
        HMAC_SHA256_ALGORITHM);

    try {
        Mac mac = Mac.getInstance(HMAC_SHA256_ALGORITHM);
        mac.init(signingKey);
        mac.update(userName.getBytes(StandardCharsets.UTF_8));
        byte[] rawHmac = mac.doFinal(userPoolClientId.getBytes(StandardCharsets.UTF_8));
        return Base64.getEncoder().encodeToString(rawHmac);
    } catch (Exception e) {
        throw new RuntimeException("Error while calculating ");
    }
}
```

## 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.

You can also mark a user's email or phone number verified through this trigger.

### Note

While this approach is convenient for users when they're getting started, we recommend auto-verifying at least one of email or phone number. Otherwise the user can be left 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 and you don't auto-verify email and phone number in the Pre-Sign Up Lambda trigger, 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. If auto-verification was enabled for the attribute being updated, 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 with Lambda Triggers \(p. 119\)](#). 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 \(p. 163\)](#) in [Creating User Accounts as Administrator \(p. 162\)](#) and the Custom Message trigger in [Customizing User Pool Workflows with Lambda Triggers \(p. 119\)](#).

## 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 User Pools From a CSV File \(p. 171\)](#)) 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 first request a code by calling the `ForgotPassword` API and then create a password using the delivered code by calling `ConfirmForgotPassword` API before they sign in. For more information, see [Requiring Imported Users to Reset Their Passwords \(p. 180\)](#).

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.

## Creating User Accounts as Administrator

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 with Lambda Triggers](#) (p. 119).
- 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. 57)
- [Examples: Using User Pools with the iOS SDK](#) (p. 64)
- [Example: Authenticate and Set a New Password for a User Created with the AdminCreateUser API in the SDK for JavaScript](#) (p. 37)

## 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. 186).

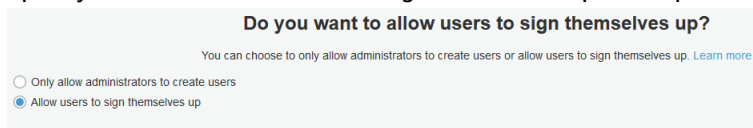
## Creating a New User in the AWS Management Console

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](#)

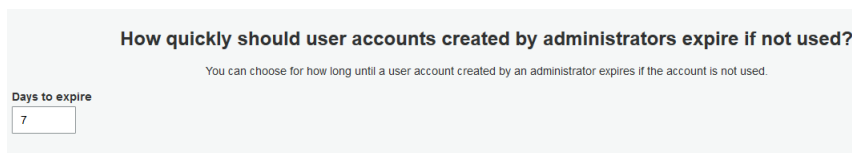
☐ Only allow administrators to create users

☒ Allow users to sign themselves up

- Specify user account expiration time limit (in days) for new accounts. 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 log in to the account until the administrator updates the user's profile.

#### Note

Once the user has logged in, the account never expires.



**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 in the **Users and groups** tab has a **Create user** button.

**Users** **Groups**

Import users

Create user

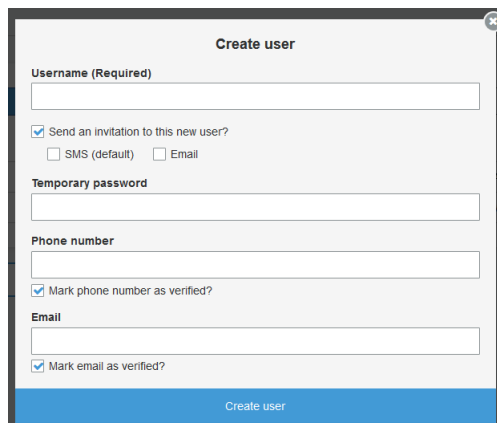
User name

Username	Enabled	Status	Updated	Created
<a href="#">username000001</a>	Enabled	FORCE_CHANGE_PASSWORD	Dec 4, 2016 1:17:54 AM	Dec 4, 2016 1:17:54 AM
<a href="#">username000002</a>	Enabled	FORCE_CHANGE_PASSWORD	Dec 4, 2016 1:18:33 AM	Dec 4, 2016 1:18:33 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.

### Note

For user accounts that you create by using the **Create user** form in the AWS Management Console, only the attributes shown in the form can be set in the AWS Management Console. Other attributes must be set by using the AWS Command Line Interface or the Amazon Cognito API, even if you have marked them as required attributes.



## Adding Groups to a User Pool

Support for groups in Amazon Cognito user pools enables you to create and manage groups, add users to groups, and remove users from groups. Use groups to create collections of users to manage their permissions or to represent different types of users. You can assign an AWS Identity and Access Management (IAM) role to a group to define the permissions for members of a group.

You can use groups to create a collection of users in a user pool, which is often done to set the permissions for those users. For example, you can create separate groups for users who are readers, contributors, and editors of your website and app. Using the IAM role associated with a group, you can also set different permissions for those different groups so that only contributors can put content into Amazon S3 and only editors can publish content through an API in Amazon API Gateway.

You can create and manage groups in a user pool from the AWS Management Console, the APIs, and the CLI. As a developer (using AWS credentials), you can create, read, update, delete, and list the groups for a user pool. You can also add users and remove users from groups.

There is no additional cost for using groups within a user pool. See [Amazon Cognito Pricing](#) for more information.

You can see this feature used in the [SpaceFinder](#) reference app.

## Assigning IAM Roles to Groups

You can use groups to control permissions to access your resources in AWS by assigning an IAM role for the users within a group. When you create a group, you can specify the IAM role for users in that group by providing a role ARN for the group. IAM roles have associated policies that define the resources and actions that are allowed and denied for users. IAM roles and their permissions are tied to the temporary AWS credentials that Amazon Cognito identity pools provide for authenticated users. Users in a group are automatically assigned the IAM role for the group when AWS credentials are provided by Amazon Cognito Federated Identities using the **Choose role from token** option.

Individual users can be in multiple groups. As a developer, you have the following options for automatically choosing the IAM role when a user is in multiple groups:

- You can assign precedence values to each group. The group with the better (lower) precedence will be chosen and its associated IAM role will be applied.
- Your app can also choose from among the available roles when requesting AWS credentials for a user through an identity pool, by specifying a role ARN in the [GetCredentialsForIdentity](#) `CustomRoleARN` parameter. The specified IAM role must match a role that is available to the user.

## Assigning Precedence Values to Groups

A user can belong to more than one group. In the user's ID token, the `cognito:groups` claim contains the list of all the groups a user belongs to. The `cognito:roles` claim contains the list of roles corresponding to the groups.

Because a user can belong to more than one group, each group can be assigned a precedence. This is a non-negative number that specifies the precedence of this group relative to the other groups that a user can belong to in the user pool. Zero is the top precedence value. Groups with lower precedence values take precedence over groups with higher or null precedence values. If a user belongs to two or more groups, it is the group with the lowest precedence value whose IAM role is applied to the `cognito:preferred_role` claim in the user's ID token.

Two groups can have the same precedence value. If this happens, neither group takes precedence over the other. If two groups with the same precedence value have the same role ARN, that role is used in the `cognito:preferred_role` claim in ID tokens for users in each group. If the two groups have different role ARNs, the `cognito:preferred_role` claim is not set in users' ID tokens.

## Using Groups to Control Permission with Amazon API Gateway

You can use groups in a user pool to control permission with Amazon API Gateway. The groups that a user is a member of are included in the ID token provided by a user pool when a user signs in. You can submit those ID tokens with requests to Amazon API Gateway, use a custom authorizer Lambda function to verify the token, and then inspect which groups a user belongs to. See this [blog post](#) for an example of using user pool tokens with an Amazon API Gateway custom authorizer.

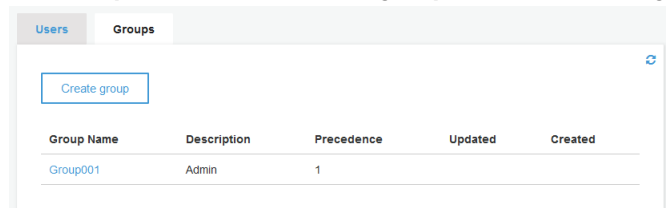
## Limitations on Groups

User groups are subject to the following limitations:

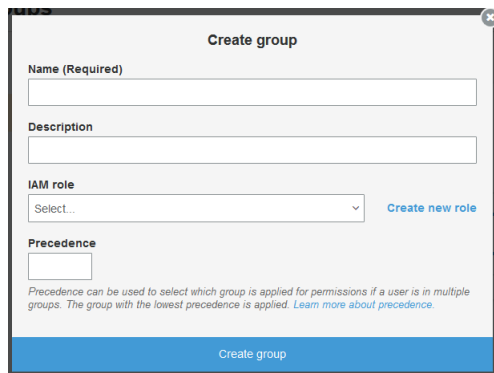
- You can create up to 25 groups per user pool.
- Groups cannot be nested.
- You cannot search for users in a group.
- You cannot search for groups by name, but you can list groups.
- Only groups with no members can be deleted.

## Creating a New Group in the AWS Management Console

The **Groups** tab in the **Users and groups** tab has a **Create group** button.



When you choose **Create group**, a **Create group** form appears. This form is where you enter information about the new group. Only the **Name** field is required. If you are integrating a user pool with an identity pool, the **IAM role** setting determines which role is assigned in the user's ID token if the identity pool is configured to choose the role from the token. If you don't have roles already defined, choose **Create new role**. If you have more than one group, and your users can be assigned to more than one group, you can set a **Precedence** value for each group. The precedence value can be any non-negative integer. Zero is the top precedence value.

The screenshot shows the 'Create group' form in the AWS Management Console. The form has a title 'Create group' at the top. Below the title are four input fields: 'Name (Required)', 'Description', 'IAM role' (a dropdown menu with 'Select...' as the current value), and 'Precedence'. To the right of the 'IAM role' dropdown is a blue link that says 'Create new role'. Below the 'Precedence' field is a small text block explaining that precedence is used to select which group is applied for permissions if a user is in multiple groups, and that the group with the lowest precedence is applied. At the bottom of the form is a blue button labeled 'Create group'.

## Managing and Searching for User Accounts

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 [User Pools Reference \(AWS Management Console\) \(p. 197\)](#).
- 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 and Groups** 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:
  - **Add user to group**
  - **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 and disables the user's current password by changing the user state to RESET\_REQUIRED. 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 1 hour. 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 **Status** in the Console) (case-insensitive)
- status (called **Enabled** in the Console) (case-sensitive)
- sub

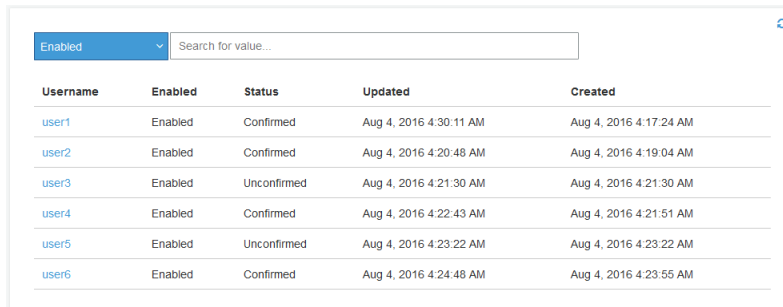
## Searching for Users Using the AWS Management Console

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.

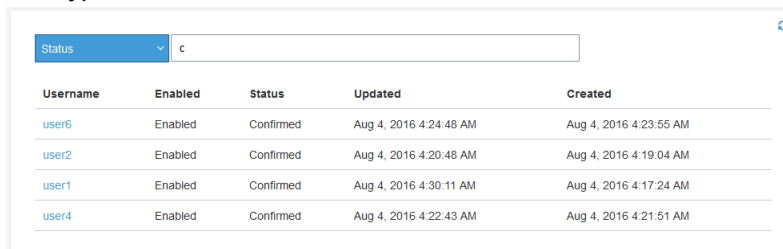
For example, if you want to list all users, leave the search box empty.



The screenshot shows the AWS Management Console interface for the 'Users' panel. At the top, there is a filter dropdown set to 'Enabled' and a search box containing 'Search for value...'. Below this is a table with five columns: Username, Enabled, Status, Updated, and Created. The table lists six users: user1, user2, user3, user4, user5, and user6. Each user's status is 'Enabled', and their 'Updated' and 'Created' timestamps are listed.

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."



The screenshot shows the AWS Management Console interface for the 'Users' panel. The filter dropdown is set to 'Status' and the search box contains the letter 'c'. The table below shows only the confirmed users: user6, user2, user1, and user4. Each user's status is 'Confirmed', and their 'Updated' and 'Created' timestamps are listed.

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**.

Username	Enabled	Status	Updated	Created
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"
}
```

## Importing Users into a User Pool

There are two ways you can import or migrate users from your existing user directory or user database into Amazon Cognito User Pools. You can migrate users when they sign-in using Amazon Cognito for the first time with a user migration Lambda trigger. With this approach, users can continue using their existing passwords and will not have to reset them after the migration to your user pool. Alternatively, you can migrate users in bulk by uploading a CSV file containing the user profile attributes for all users. The following sections describe both these approaches.

### Topics

- [Importing Users into User Pools With a User Migration Lambda Trigger \(p. 170\)](#)
- [Importing Users into User Pools From a CSV File \(p. 171\)](#)

## Importing Users into User Pools With a User Migration Lambda Trigger

This approach enables seamless migration of users from your existing user directory to user pools when they use your new Amazon Cognito-enabled app for the first time, either during their first sign-in or during the forgot-password process. This migration is enabled by a user migration Lambda function which you need to configure in your user pool. For details on this Lambda trigger including request and response parameters, and example code see [Migrate User Lambda Trigger Parameters \(p. 149\)](#).

Before starting the user migration process, create a user migration Lambda function in your AWS account, and configure your user pool to use this Lambda function ARN for the user migration trigger. Add an authorization policy to your Lambda function to enable only the Amazon Cognito service account principal ("cognito-idp.amazonaws.com") and your user pool's SourceARN to invoke it, to prevent any



other AWS customer's user pool from invoking your Lambda function. For more information, see [Using Resource-Based Policies for AWS Lambda \(Lambda Function Policies\)](#).

### Steps during sign-in

1. The user opens your app and signs-in with the native sign-in UI screens from your app using the Cognito Identity Provider APIs from an [AWS Mobile SDK](#), or using the hosted sign-in UI provided by Amazon Cognito that you leverage with the [Amazon Cognito Auth SDK](#).
2. Your app sends the username and password to Amazon Cognito. If your app has a native sign-in UI and uses the Cognito Identity Provider SDK, your app must use the `USER_PASSWORD_AUTH` flow, in which the SDK sends the password to the server (your app must not use the default `USER_SRP_AUTH` flow since the SDK does not send the password to the server in the SRP authentication flow). The `USER_PASSWORD_AUTH` flow is enabled by setting `AuthenticationDetails.authenticationType` to `"USER_PASSWORD"`.
3. Amazon Cognito checks if the username exists in the user pool, including as an alias for the user's email, phone number, or preferred\_username. If the user does not exist, Amazon Cognito calls your user migration Lambda function with parameters including the username and password, as detailed in [Migrate User Lambda Trigger Parameters \(p. 149\)](#).
4. Your user migration Lambda function should authenticate the user with your existing user directory or user database, by calling your existing sign-in service, and it should return user attributes to be stored in the user's profile in the user pool. If you would like users to continue to use their existing passwords, set the attribute `finalUserStatus` = `"CONFIRMED"` in the Lambda response. For the required attributes for the response see [Migrate User Lambda Trigger Parameters \(p. 149\)](#).

#### Important

Do not log the entire request event object in your user migration Lambda code (since that would include the password in the log record sent to the CloudWatch logs), and ensure you sanitize the logs so that passwords are not logged.

5. Amazon Cognito creates the user profile in your user pool, and returns tokens to your app client.
6. Your app client can now proceed with its normal functionality after sign-in.

After the user is migrated, we recommend that your native mobile apps use the `USER_SRP_AUTH` flow for sign-in. It authenticates the user using the Secure Remote Password (SRP) protocol without sending the password across the network, and provides security benefits over the `USER_PASSWORD_AUTH` flow used during migration.

In case of errors during migration, including client device or network issues, your app will get error responses from the Amazon Cognito User Pools API, and the user account might or might not have been created in your user pool. The user should then attempt sign-in again, and if that fails repeatedly, then attempt to reset his or her password using the forgot-password flow in your app.

The forgot-password flow works in a similar way, except that no password is provided to your user migration Lambda function, and your function only looks up the user in your existing user directory, and returns attributes to be stored in your user pool. Then Amazon Cognito sends the user a reset password code by email or SMS, and the user can then set a new password in your app. If your app has a native UI, it needs to provide screens for the forgot-password flow. If your app uses the Amazon Cognito hosted UI, then we provide the UI screens.

## Importing Users into User Pools From a CSV File

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. So, your users will be in a `RESET_REQUIRED` state when imported using this method.

**Note**

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 AWS Management Console and open the 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 \(p. 174\)](#).

### 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,profile,picture,website
```

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 [Configuring User Pool Attributes \(p. 199\)](#).

- 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 500,000, 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,profile,picture,we
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 \(p. 175\)](#)
- [Importing Users By Using the AWS CLI \(p. 176\)](#)

### 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 \(p. 172\)](#):

```
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  
    }  
  ]  
}
```

```
{
  "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 \(p. 179\)](#)
- [Interpreting the Results \(p. 180\)](#)

## 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:
  - a. The app calls `ForgotPassword(username)`.
  - b. 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

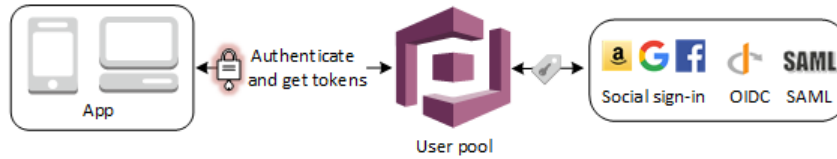
For sending reset password codes, it is important that your user pool has phone number or email verification turned on.

- c. 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.
- d. The user enters the code and new password in the app.
- e. The app calls `ConfirmForgotPassword(code, password)`, which, if successful, sets the new password.
- f. The app should now direct the user to a sign-in page.

# Authentication with a User Pool

Your app users can sign in either directly through a user pool, or federate through a third-party identity provider (IdP). The user pool manages the overhead of handling the tokens that are returned from social sign-in through Facebook, Google, and Amazon, and from OpenID Connect (OIDC) and SAML IdPs.

After successful authentication, Amazon Cognito returns user pool tokens to your app. You can use the tokens to grant your users access to your own server-side resources, or to the Amazon API Gateway. Or, you can exchange them for AWS credentials to access other AWS services.



User pool token handling and management for your web or mobile app is provided on the client side through Amazon Cognito SDKs. Likewise, the Mobile SDK for iOS and the Mobile SDK for Android automatically refresh your ID and access tokens if there is a valid (non-expired) refresh token present, and the ID and access tokens have a minimum remaining validity of 5 minutes. For information on the SDKs, and sample code for JavaScript, Android, and iOS see [Amazon Cognito User Pool SDKs](#).

After your app user successfully signs in, Amazon Cognito creates a session and returns an ID, access, and refresh token for the authenticated user.

### JavaScript

```
// Amazon Cognito creates a session which includes the id, access, and refresh tokens
// of an authenticated user.

var authenticationData = {
    Username : 'username',
    Password : 'password',
};
var authenticationDetails = new
AmazonCognitoIdentity.AuthenticationDetails(authenticationData);
var poolData = { UserPoolId : 'us-east-1_Example',
    ClientId : 'lexample23456789'
};
var userPool = new AmazonCognitoIdentity.CognitoUserPool(poolData);
var userData = {
    Username : 'username',
    Pool : userPool
};
var cognitoUser = new AmazonCognitoIdentity.CognitoUser(userData);
cognitoUser.authenticateUser(authenticationDetails, {
    onSuccess: function (result) {
        var accessToken = result.getAccessToken().getJwtToken();

        /* Use the idToken for Logins Map when Federating User Pools with identity
        pools or when passing through an Authorization Header to an API Gateway Authorizer */
        var idToken = result.idToken.jwtToken;
    },

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

### Android

```
// Session is an object of the type CognitoUserSession, and includes the id, access,
// and refresh tokens for a user.

String idToken = session.getIdToken().getJWTToken();
String accessToken = session.getAccessToken().getJWT();
```

### iOS - Swift

```
// AWSCognitoIdentityUserSession includes id, access, and refresh tokens for a user.
```

```
- (AWSTask<AWSCognitoIdentityUserSession *> *)getSession;
```

#### iOS - Objective-C

```
// AWSCognitoIdentityUserSession includes the id, access, and refresh tokens for a user.

[[user getSession:@"username" password:@"password" validationData:nil scopes:nil]
  continueWithSuccessBlock:^(id _Nullable(AWSTask<AWSCognitoIdentityUserSession *> *
    _Nonnull task) {
    // success, task.result has user session
    return nil;
  }];
```

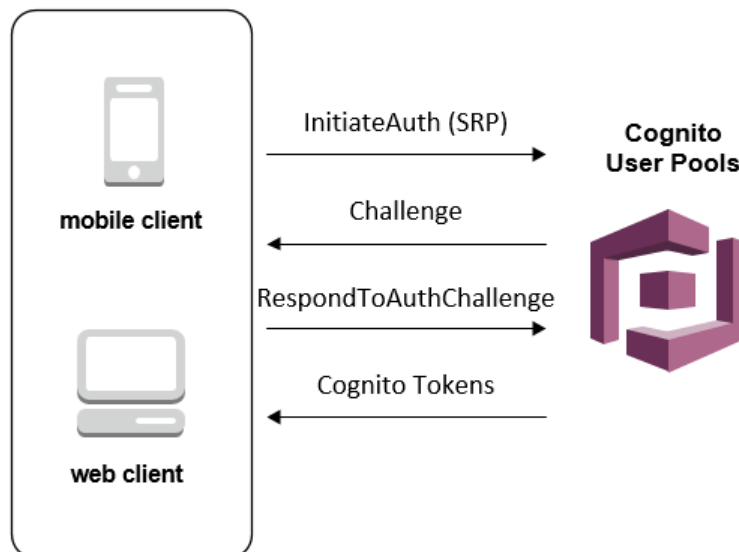
#### Topics

- [User Pool Authentication Flow \(p. 182\)](#)
- [Using Tokens with User Pools \(p. 186\)](#)

## User Pool Authentication Flow

Modern authentication flows incorporate new challenge types, in addition to a password, to verify the identity of users. We generalize authentication into two common steps, which are implemented through two APIs: `InitiateAuth` and `RespondToAuthChallenge`.

A user authenticates by answering successive challenges until authentication either fails or the user is issued tokens. With these two steps, which can be repeated to include different challenges, we can support any custom authentication flow.



You can customize your authentication flow with AWS Lambda triggers. These triggers issue and verify their own challenges as part of the authentication flow.

You can also use admin authentication flow for use on secure backend servers, and the user migration authentication flow to allow user migration without requiring your users to reset their passwords.

## Topics

- [Client Side Authentication Flow \(p. 183\)](#)
- [Server Side Authentication Flow \(p. 183\)](#)
- [Custom Authentication Flow \(p. 184\)](#)
- [Admin Authentication Flow \(p. 185\)](#)
- [User Migration Authentication Flow \(p. 185\)](#)

## Client Side Authentication Flow

Here's how user pool authentication works for end user client-side apps created with the [AWS Mobile SDK for Android](#), [AWS Mobile SDK for iOS](#), or [AWS SDK for JavaScript](#):

1. The user enters their username and password into the app.
2. The app calls the **InitiateAuth** method with the user's username and SRP details.

This method returns the authentication parameters.

### Note

The app generates the SRP details by using the Amazon Cognito SRP support in the Android, iOS, and JavaScript SDKs.

3. The app calls the **RespondToAuthChallenge** method. If the method call succeeds, it returns the user's tokens, and the authentication flow is complete.

If another challenge is required, no tokens are returned. Instead, the call to **RespondToAuthChallenge** returns a session.

4. If **RespondToAuthChallenge** returns a session, the app calls **RespondToAuthChallenge** again, this time with the session and the challenge response (for example, MFA code).

## Server Side Authentication Flow

If you don't have an end-user app, but instead you're using a Java, Ruby, or Node.js secure back end or server-side app, you can use the authenticated server-side API for Amazon Cognito user pools.

For server-side apps, user pool authentication is similar to that for client-side apps, except:

- The server-side app calls the **AdminInitiateAuth** API (instead of **InitiateAuth**). This method requires AWS admin credentials. This method returns the authentication parameters.
- Once it has the authentication parameters, the app calls the **AdminRespondToAuthChallenge** API (instead of **RespondToAuthChallenge**), which also requires AWS admin credentials.

The **AdminInitiateAuth** and **AdminRespondToAuthChallenge** API can't accept username-and-password user credentials for admin sign-in, unless you explicitly enable them to do so by doing one of the following:

- Pass `ADMIN_NO_SRP_AUTHENTICATION` for the `ExplicitAuthFlow` parameter in your server-side app's call to **CreateUserPoolClient** or **UpdateUserPoolClient**.
- Choose **Enable sign-in API for server-based authentication (ADMIN\_NO\_SRP\_AUTH)** in the **Apps** tab in **Create a user pool**. For more information, see [Configuring a User Pool App Client \(p. 210\)](#).

## Custom Authentication Flow

Amazon Cognito user pools also enable custom authentication flows, which can help you create a challenge/response-based authentication model using AWS Lambda triggers.

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 with Lambda Triggers \(p. 119\)](#).

### Note

The Amazon Cognito hosted sign-in web page does not support the custom authentication flow.

## Admin Authentication Flow

The APIs described [Custom Authentication Flow \(p. 184\)](#) 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.

In the **AdminInitiateAuth** response `ChallengeParameters`, the `USER_ID_FOR_SRP` attribute, if present, will contain the user's actual username, not an alias (such as email address or phone number). In your call to **AdminRespondToAuthChallenge**, in the `ChallengeResponses`, you'll need to pass this username in the `USERNAME` parameter.

### Note

Because it's designed for back-end admin implementations, admin authentication flow doesn't support device tracking. When device tracking is enabled, admin authentication succeeds, but any call to refresh the access token will fail.

## User Migration Authentication Flow

A user migration Lambda trigger allows easy migration of users from a legacy user management system into your user pool. To avoid making your users reset their passwords during user migration choose the `USER_PASSWORD_AUTH` authentication flow which sends your users' passwords to the service over an encrypted SSL connection during authentication.

When you have completed migrating all your users, we recommend switching flows to the more secure SRP flow which does not send any passwords over the network.

To learn more about Lambda triggers see [Customizing User Pool Workflows with Lambda Triggers \(p. 119\)](#).

For more information about migrating users with a Lambda trigger see [Importing Users into User Pools With a User Migration Lambda Trigger \(p. 170\)](#).

## Using Tokens with User Pools

After a successful authentication, Amazon Cognito returns user pool tokens to your app. You can use the tokens to grant your users access to your own server-side resources, or to the Amazon API Gateway. Or, you can exchange them for temporary AWS credentials to access other AWS services. See [Common Amazon Cognito Scenarios \(p. 6\)](#).



User pool token handling and management for your web or mobile app is provided on the client side through Amazon Cognito SDKs. For information on the SDKs, and sample code for JavaScript, Android, and iOS see [Amazon Cognito User Pool SDKs](#). If you need to manually process tokens for server-side API processing, or if you are using other programming languages, there are many good libraries for decoding and verifying a JWT. See the [OpenID Foundation list of libraries for working with JWT tokens](#).

Amazon Cognito user pools implements ID, access, and refresh tokens as defined by the OpenID Connect (OIDC) open standard:

- The [ID Token](#) contains claims about the identity of the authenticated user such as `name`, `email`, and `phone_number`.
- The [Access Token](#) grants access to authorized resources.
- The [Refresh Token](#) contains the information necessary to obtain a new ID or access token.

### Important

We strongly recommended that you secure all tokens in transit and storage in the context of your application.

For more information on OIDC see the [OpenID Connect \(OIDC\) specification](#).

### Topics

- [Using the ID Token \(p. 186\)](#)
- [Using the Access Token \(p. 188\)](#)
- [Using the Refresh Token \(p. 189\)](#)
- [Revoking All Tokens for a User \(p. 190\)](#)
- [Verifying a JSON Web Token \(p. 190\)](#)

## Using the ID Token

The ID token is a [JSON Web Token \(JWT\)](#) that contains claims about the identity of the authenticated user such as `name`, `email`, and `phone_number`. You can use this identity information inside your application. The ID token can also be used to authenticate users 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. See [Verifying a JSON Web Token \(p. 190\)](#).

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.

For more information about OIDC standard claims, see the [OIDC Standard Claims](#).



## ID Token Header

The header contains two pieces of information: the key ID (`kid`), and the algorithm (`alg`).

```
{
  "kid" : "1234example=",
  "alg" : "RS256",
}
```

### Key ID (`kid`)

The `kid` parameter is a hint indicating which key was used to secure the JSON Web Signature (JWS) of the token.

For more information about the `kid` parameter, see the [Key Identifier \(`kid`\) Header Parameter](#).

### Algorithm (`alg`)

The `alg` parameter represents the cryptographic algorithm used to secure the ID token. User pools use an RS256 cryptographic algorithm, which is an RSA signature with SHA-256.

For more information about the `alg` parameter, see [Algorithm \(`alg`\) Header Parameter](#).

## ID Token Payload

This is a sample payload from an ID token. It contains claims about the authenticated user. For more information about OIDC standard claims, see the [OIDC Standard Claims](#).

```
{
  "sub": "aaaaaaaa-bbbb-cccc-dddd-eeeeeeeeeeee",
  "aud": "xxxxxxxxxxxxexample",
  "email_verified": true,
  "token_use": "id",
  "auth_time": 1500009400,
  "iss": "https://cognito-idp.us-east-1.amazonaws.com/us-east-1_example",
  "cognito:username": "janedoe",
  "exp": 1500013000,
  "given_name": "Jane",
  "iat": 1500009400,
  "email": "janedoe@example.com"
}
```

### Subject (`sub`)

The `sub` claim is a unique identifier (UUID) for the authenticated user. It is not the same as the username which may not be unique.

### Issuer (`iss`)

The `iss` claim 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 user pool 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`.

### Audience (`aud`)

The `aud` claim contains the `client_id` used in the user authenticated.

### Token Use (token\_use)

The `token_use` claim describes the intended purpose of this token. Its value is always `id` in the case of the ID token.

### Authentication Time (auth\_time)

The `auth_time` claim contains the time when the authentication occurred. Its value is a JSON number representing the number of seconds from 1970-01-01T0:0:0Z as measured in UTC format until the date/time. On refreshes, it represents the time when the original authentication occurred, not the time when the token was issued.

The ID token can contain OpenID Connect (OIDC) standard claims defined in [OIDC Standard Claims](#). It can also contain custom attributes that you define in your user pool.

#### Note

User pool custom attributes are always prefixed with a `custom:` prefix.

## ID Token Signature

The signature of the ID token is calculated based on the header and payload of the JWT token. When used outside of an application in your web APIs, you must always verify this signature before accepting the token. See [Verifying a JSON Web Token \(p. 190\)](#).

## Using the Access Token

The user pool access token contains claims about the authenticated user, but unlike the ID token, it does not include identity information. The primary purpose of the access token is to authorize API operations in the context of the user in the user pool. For example, you can use the access token to grant your user access to add, change 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 for your users.

The access token is also represented as a JSON Web Token (JWT). The header for the access token will have the same structure as the ID token, but the key ID (`kid`) will be different because different keys are used to sign ID tokens and access tokens. As with the ID token, you must first verify the signature of the access token in your web APIs before you can trust any of its claims. See [Verifying a JSON Web Token \(p. 190\)](#).

The access token expires one hour after your user successfully authenticates. It should not be used after it has expired.

### Access Token Header

The header contains two pieces of information: the key ID (`kid`), and the algorithm (`alg`).

```
{
  "kid" : "1234example="
  "alg" : "RS256",
}
```

### Key ID (kid)

The `kid` parameter is a hint indicating which key was used to secure the JSON Web Signature (JWS) of the token.

For more information about the `kid` parameter, see the [Key Identifier \(kid\) Header Parameter](#).

### Algorithm (alg)

The `alg` parameter represents the cryptographic algorithm used to secure the access token. User pools use an RS256 cryptographic algorithm, which is an RSA signature with SHA-256.

For more information about the alg parameter, see [Algorithm \(alg\) Header Parameter](#).

## Access Token Payload

This is a sample payload from an access token. For more information, see [JWT Claims](#).

```
{
  "auth_time": 1500009400,
  "exp": 1500013000,
  "iat": 1500009400,
  "iss": "https://cognito-idp.us-east-1.amazonaws.com/us-east-1_example",
  "scope": "aws.cognito.signin.user.admin",
  "sub": "aaaaaaaa-bbbb-cccc-dddd-eeeeeeeeeeee",
  "token_use": "access",
  "username": "janedoe@example.com"
}
```

### Subject (sub)

The sub claim is a unique identifier (UUID) for the authenticated user. It is not the same as the username which may not be unique.

### Issuer (iss)

The iss claim has the following format:

`https://cognito-idp.{region}.amazonaws.com/{userPoolId}`.

### Token Use (token\_use)

The token\_use claim describes the intended purpose of this token. Its value is always access in the case of the access token.

### Authentication Time (auth\_time)

The auth\_time claim contains the time when the authentication occurred. Its value is a JSON number representing the number of seconds from 1970-01-01T0:0:0Z as measured in UTC format until the date/time. On refreshes, it represents the time when the original authentication occurred, not the time when the token was issued.

## Access Token Signature

The signature of the access token is calculated based on the header and payload of the JWT token. When used outside of an application in your web APIs, you must always verify this signature before accepting the token. See [Verifying a JSON Web Token \(p. 190\)](#).

## Using the Refresh Token

You can use the refresh token to retrieve new ID and access tokens.

By default, the refresh token expires 30 days after your app user signs in to your user pool. When you create an app for your user pool, you can set the app's refresh token expiration (in days) to any value between 1 and 3650.

The Mobile SDK for iOS and the Mobile SDK for Android automatically refresh your ID and access tokens if there is a valid (non-expired) refresh token present, and the ID and access tokens have a minimum remaining validity of 5 minutes. If the refresh token is expired, your app user must reauthenticate by signing in again to your user pool.

### Note

The Mobile SDK for Android offers the option to change the minimum validity period of the ID and access tokens to a value between 0 and 30 minutes. See the `setRefreshThreshold()` method of [CognitoIdentityProviderClientConfig](#) in the AWS Mobile SDK for Android API Reference.

Your user's account itself never expires, as long as the user has logged in at least once before the `UnusedAccountValidityDays` time limit for new accounts.

To use the refresh token to get new ID and access tokens with the user pool API, use the [AdminInitiateAuth](#) or [InitiateAuth](#) methods. Pass `REFRESH_TOKEN_AUTH` for the `AuthFlow` parameter. The authorization parameters, `AuthParameters`, are a key-value map where the key is "REFRESH\_TOKEN" and the value is the actual refresh token. Amazon Cognito responds with new ID and access tokens.

## 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.

## Verifying a JSON Web Token

These steps describe verifying a user pool JSON web token (JWT).

### Topics

- [Prerequisites](#) (p. 190)
- [Step 1: Confirm the Structure of the JWT](#) (p. 191)
- [Step 2: Validate the JWT Signature](#) (p. 191)
- [Step 3: Verify the Claims](#) (p. 192)

### Prerequisites

- This section describes tasks that might be already handled by your library, SDK, or software framework. For example, user pool token handling and management is provided on the client side through the Amazon Cognito SDKs. Likewise, the Mobile SDK for iOS and the Mobile SDK for Android automatically refresh your ID and access tokens if there is a valid (non-expired) refresh token present, and the ID and access tokens have a minimum remaining validity of 5 minutes. For information on the SDKs, and sample code for JavaScript, Android, and iOS see [Amazon Cognito User Pool SDKs](#).
- If you need to manually process tokens for server-side API processing, or if you are using other programming languages, there are many good libraries for decoding and verifying a JWT. See the [OpenID Foundation list of libraries for working with JWT tokens](#).

## Step 1: Confirm the Structure of the JWT

A JSON Web Token (JWT) includes three sections:

1. Header
2. Payload
3. Signature

```
11111111111.22222222222.33333333333
```

They are encoded as Base64url strings, and are separated by dot "." characters. If your JWT does not conform to this structure, consider it as invalid and do not accept it.

## Step 2: Validate the JWT Signature

The JWT signature is a hashed combination of the header and the payload. Amazon Cognito generates two pairs of RSA cryptographic keys for each user pool. One of the private keys is used to sign the token.

### To verify the signature of a JWT token

1. Decode the ID token.
  - a. You can use AWS Lambda to decode user pool JWTs. For more information see [Decode and verify Amazon Cognito JWT tokens using Lambda](#).
  - b. The OpenID Foundation also [maintains a list of libraries for working with JWT tokens](#).
2. Compare the local key ID (kid) to the public kid.
  - a. Download and store the corresponding public JSON Web Key (JWK) for your user pool. It is available as part of a JSON Web Key Set (JWKS). You can locate it at `https://cognito-idp.{region}.amazonaws.com/{userPoolId}/.well-known/jwks.json`.

For more information on JWK and JWK sets, see [JSON Web Key \(JWK\)](#).

#### Note

This is a one time step before your web APIs can process tokens. Now you can perform the following steps each time the ID token or the access token are used with your web APIs.

This is a sample jwks.json file:

```
{
  "keys": [{
    "kid": "1234example=",
    "alg": "RS256",
    "kty": "RSA",
    "e": "AQAB",
    "n": "1234567890",
    "use": "sig"
  }, {
    "kid": "5678example=",
    "alg": "RS256",
    "kty": "RSA",
    "e": "AQAB",
    "n": "987654321",
    "use": "sig"
  }]
}
```

```
}

```

#### Key ID (kid)

The `kid` is a hint indicating which key was used to secure the JSON web signature (JWS) of the token.

#### Algorithm (alg)

The `alg` header parameter represents the cryptographic algorithm used to secure the ID token. User pools use an RS256 cryptographic algorithm, which is an RSA signature with SHA-256. For more information on RSA see [RSA Cryptography](#).

#### Key Type (kty)

The `kty` parameter identifies the cryptographic algorithm family used with the key, such as "RSA" in this example.

#### RSA Exponent (e)

The `e` parameter contains the exponent value for the RSA public key. It is represented as a Base64urlUInt-encoded value.

#### RSA Modulus (n)

The `n` parameter contains the modulus value for the RSA public key. It is represented as a Base64urlUInt-encoded value.

#### Use (use)

The `use` parameter describes the intended use of the public key. For this example, the `use` value `sig` represents signature.

- b. Search the public JSON web key for a `kid` that matches the `kid` of your JWT.
3. Use the public key to verify the signature using your JWT library. You might need to convert the JWK to PEM format first. This example takes the JWT and JWK, and uses the Node.js library, `jsonwebtoken`, to verify the JWT signature:

Node.js

```
var jwt = require('jsonwebtoken');
var jwkToPem = require('jwk-to-pem');
var pem = jwkToPem(jwk);
jwt.verify(token, pem, { algorithms: ['RS256'] }, function(err, decodedToken) {
});
```

## Step 3: Verify the Claims

### To verify JWT claims

1. Verify that the token is not expired.
2. The audience (`aud`) claim should match the app client ID created in the Amazon Cognito user pool.
3. The issuer (`iss`) claim 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 ID and access tokens, the `token_use` claim must be either `id` or `access`.

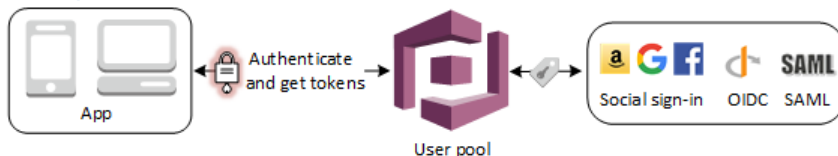
You can now trust the claims inside the token.

## Accessing Resources After a Successful User Pool Authentication

Your app users can sign in either directly through a user pool, or federate through a third-party identity provider (IdP). The user pool manages the overhead of handling the tokens that are returned from social sign-in through Facebook, Google, and Amazon, and from OpenID Connect (OIDC) and SAML IdPs. For more information see [Using Tokens with User Pools \(p. 186\)](#).

After a successful authentication, your app will receive user pool tokens from Amazon Cognito. You can use those tokens to retrieve AWS credentials that allow your app to access other AWS services, or you might choose to use them to control access to your own server-side resources, or to the Amazon API Gateway.

For more information, see [User Pool Authentication Flow \(p. 182\)](#) and [Using Tokens with User Pools \(p. 186\)](#).

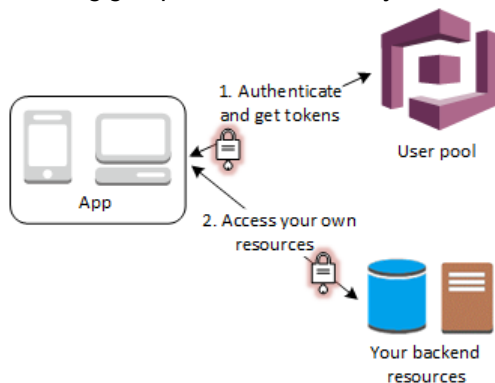


### Topics

- [Accessing Server-side Resources after Sign-in \(p. 6\)](#)
- [Accessing Resources with API Gateway and Lambda After Sign-in \(p. 194\)](#)
- [Accessing AWS Services Using an Identity Pool After Sign-in \(p. 194\)](#)

## Accessing Server-side Resources after Sign-in

After a successful authentication, your web or mobile app will receive user pool tokens from Amazon Cognito. You can use those tokens to control access to your server-side resources. You can also create user pool groups to manage permissions, and to represent different types of users. For more information on using groups to control access your resources see [Adding Groups to a User Pool \(p. 165\)](#).

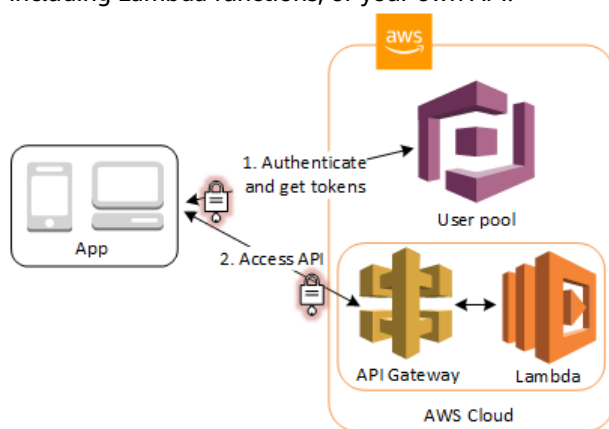


Once you configure a domain for your user pool, Amazon Cognito provisions a hosted web UI that allows you to add sign-up and sign-in pages to your app. Using this OAuth 2.0 foundation you can create your own resource server to enable your users to access protected resources. For more information see [Defining Resource Servers for Your User Pool \(p. 87\)](#).

For more information about user pool authentication see [User Pool Authentication Flow \(p. 182\)](#) and [Using Tokens with User Pools \(p. 186\)](#).

## Accessing Resources with API Gateway and Lambda After Sign-in

You can enable your users to access your API through API Gateway. API Gateway validates the tokens from a successful user pool authentication, and uses them to grant your users access to resources including Lambda functions, or your own API.



You can use groups in a user pool to control permissions with API Gateway by mapping group membership to IAM roles. The groups that a user is a member of are included in the ID token provided by a user pool when your web or mobile app user signs in. For more information on user pool groups See [Adding Groups to a User Pool \(p. 165\)](#).

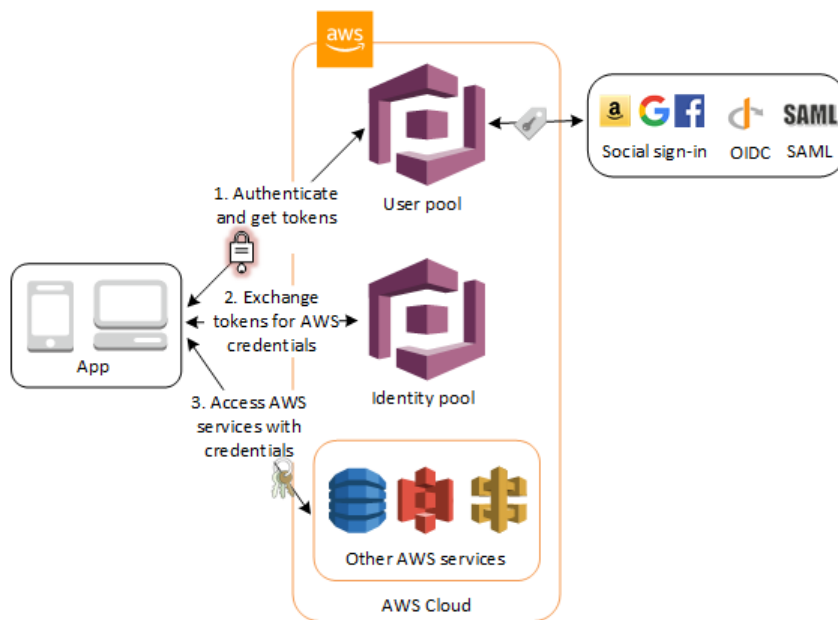
You can submit your user pool tokens with a request to API Gateway for verification by an Amazon Cognito authorizer Lambda function. For more information on API Gateway, see [Using API Gateway with Amazon Cognito User Pools](#).

## Accessing AWS Services Using an Identity Pool After Sign-in

You can enable your users to sign-in with a user pool, and then access AWS services using an identity pool.

After a successful authentication, your web or mobile app will receive user pool tokens from Amazon Cognito. You can use those tokens to retrieve AWS credentials that allow your app to access other AWS services. For more information, see [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\) \(p. 219\)](#).





For more information about using identity pools together with user pool groups to control access your AWS resources see [Adding Groups to a User Pool \(p. 165\)](#) and [Role-Based Access Control \(p. 234\)](#). See also [Identity Pools Concepts \(Federated Identities\) \(p. 225\)](#) for more information about identity pools and AWS Identity and Access Management.

## Setting Up a User Pool with the AWS Management Console

Create an Amazon Cognito user pool and make a note of the **User Pool ID** and **App Client ID** for each of your client apps. For more information about creating user pools, see [Getting Started with User Pools \(p. 14\)](#).

## Setting Up an Identity Pool with the AWS Management Console

The following procedure describes how to use the AWS Management Console to integrate an identity pool with one or more user pools and client apps.

### 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 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 or user pools, choose **Add Another Provider** and type the **User Pool ID** and **App Client ID** for each app in each user pool.
10. 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.

## Integrating a User Pool with an Identity Pool

After your app 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 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`.

### 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()
        }
      });
    }
  });
}
```

### 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);
    }
});
```

### 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(serviceConfiguration,  
userPoolConfiguration: userPoolConfiguration, forKey: "UserPool")  
let pool = AWSCognitoIdentityUserPool(forKey: "UserPool")  
let credentialsProvider = AWSCognitoCredentialsProvider(regionType: .USEast1,  
identityPoolId: "YOUR_IDENTITY_POOL_ID", identityProviderManager:pool)
```

## User Pools Reference (AWS Management Console)

You can customize the user pool settings to the needs of your app. This section 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.

- User pool name

[Adding a User Pool Name \(p. 198\)](#)

- Users and groups

[Importing and Creating Users and Groups \(p. 199\)](#)

- Attributes

[Configuring User Pool Attributes \(p. 199\)](#)

[Standard Attributes \(p. 199\)](#)

- Password Policy

[Adding User Pool Password Requirements \(p. 204\)](#)

- Admin Create User Policy

[Configuring an Admin Create User Policy \(p. 205\)](#)

- Verifications

[Configuring Email and Phone Verification \(p. 205\)](#)

- Multi-factor authentication

[Adding Multi-Factor Authentication \(MFA\) to a User Pool \(p. 108\)](#)

- Advanced security

[Adding Advanced Security to a User Pool \(p. 111\)](#)

- Message customizations

[Configuring SMS and Email Verification Messages and User Invitation Messages \(p. 206\)](#)

[Message Templates \(p. 206\)](#)

[Customizing the SMS Message \(p. 207\)](#)

[Customizing Email Verification Messages \(p. 207\)](#)

[Customizing User Invitation Messages \(p. 208\)](#)

[Customizing Your Email Address \(p. 208\)](#)

[Authorizing Amazon Cognito to Send Amazon SES Email on Your Behalf \(from a Custom FROM Email Address\) \(p. 208\)](#)

- Tags

[Adding Cost Allocation Tags to Your User Pool \(p. 209\)](#)

- Devices

[Specifying User Pool Device Tracking Settings \(p. 209\)](#)

- App clients

[Configuring a User Pool App Client \(p. 210\)](#)

- Triggers

[Configuring User Pool Lambda Triggers \(p. 211\)](#)

- Review settings

[Reviewing Your User Pool Creation Settings \(p. 211\)](#)

- Analytics

[Configuring User Pool Analytics \(p. 211\)](#)

- App client settings

[Configuring App Client Settings \(p. 212\)](#)

- Domain name

[Adding a Domain Name for Your User Pool \(p. 213\)](#)

- UI customization

[Customizing the Built-in App UI to Sign Up and Sign In Users \(p. 213\)](#)

- Resource servers

[Adding Resource Servers for Your User Pool \(p. 214\)](#)

- Identity providers

[Configuring Identity Providers for Your User Pool \(p. 214\)](#)

- Attribute mapping

[Configuring Attribute Mapping for Your User Pool \(p. 217\)](#)

## Adding 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 -.

## Importing and Creating Users and Groups

On the **Users and groups** tab, you can import users, create users, create groups and assign users to them, and search for users.

For more information, see:

- [Importing Users into User Pools From a CSV File \(p. 171\)](#)
- [Adding Groups to a User Pool \(p. 165\)](#)
- [Creating User Accounts as Administrator \(p. 162\)](#)

## Configuring User Pool Attributes

You get a set of default attributes, called "standard attributes," with all user pools. You can also add 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 Cognito Sync or Amazon DynamoDB.

### Standard Attributes

The following are the standard attributes for all users in a user pool. These are implemented following the [OpenID Connect specification](#).

- address
- birthdate
- email
- family\_name
- gender
- given\_name
- locale
- middle\_name
- name
- nickname
- phone\_number
- picture
- preferred\_username
- profile
- timezone
- updated\_at
- website

These attributes are 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 as required, a user cannot register unless a value for the attribute is provided. Administrators can create users without giving values for required attributes by using the [AdminCreateUser](#) API. An attribute cannot be switched between required and not required after a user pool has been created.

Custom attribute names are between one and 32 characters long.

Standard and custom attribute values can be any string up to 2048 characters by default, but some attribute values, such as `updated_at`, have formatting restrictions. Only **email** and **phone** can be verified.

**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.

An administrator with proper AWS account permissions can change the user's email and also mark it as verified. This can be done by using the [AdminUpdateUserAttributes](#) API or the [admin-update-user-attributes](#) CLI command to change the `email_verified` attribute to `true`.

**phone**

A phone number is required if SMS multi-factor authentication (MFA) is enabled. For more information, see [Adding Multi-Factor Authentication \(MFA\) to a User Pool \(p. 108\)](#).

Phone number values can be verified.

An administrator with proper AWS account permissions can change the user's phone number and also mark it as verified. This can be done by using the [AdminUpdateUserAttributes](#) API or the [admin-update-user-attributes](#) CLI command to change the `phone_verified` attribute to `true`.

**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 the `preferred_username` is an alias, a user can add the attribute value once he or she is confirmed by using the [UpdateUserAttributes](#) API.

## To edit standard attributes

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

**Important**

You cannot change these requirements after the user pool is created. For more information, see [Configuring User Pool Attributes \(p. 199\)](#).

2. To create an alias for email, phone number, address, or preferred username, choose **Alias**. For more information on aliases, see [Overview of Aliases \(p. 201\)](#).
3. Move on to create [Custom Attributes \(p. 203\)](#).

## Username and Preferred Username

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.

Developers can use the `preferred_username` attribute to give users a username that they can change. For more information, see [Overview of Aliases \(p. 201\)](#).

If your application does not require a username, you do not need to ask users to provide one. Your app can create a unique username for users in the background. This is useful if, for example, you want users to register and sign in with an email address and password. For more information, see [Overview of Aliases \(p. 201\)](#).

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.

## Overview of Aliases

You can allow your end users to sign in with multiple identifiers by using aliases.

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, 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 is not 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 continues 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 are verified. We therefore recommend that you choose automatic verification of email addresses and phone numbers if you use them as aliases. The `preferred_username` attribute provides users the experience of changing their username, when in fact the actual username value for a user is not changeable.

If you want to enable this user experience, submit the new username value as a `preferred_username` and choose `preferred_username` as an alias. Then users can sign in with the new value they entered.

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

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

In the **Attributes** console tab, you can choose whether to allow your user to sign up with an email address or phone number as their username.

### Note

This setting cannot be changed once the user pool is created.

### Topics

- [Option 1: User Signs Up with Username and Signs In with Username or Alias \(p. 202\)](#)
- [Option 2: User Signs Up and Signs In with Email or Phone Number Instead of Username \(p. 202\)](#)

### Option 1: User Signs Up with Username and Signs In with Username or Alias

In this case, the user signs up with a username. In addition, you can optionally allow users to sign in with one or more of the following aliases:

- a verified email address
- a verified phone number
- a preferred username

These aliases can be changed after the user signs up.

Use the following steps to configure your user pool in the console to allow sign-in with an alias.

#### To configure a user pool for sign-in with an alias

1. In the **Attributes** tab, under **How do you want your end users to sign-up and sign-in?**, select **Username**.
2. Choose one of the following options:
  - **Also allow sign in with verified email address:** This allows users to sign in with their email address.
  - **Also allow sign in with verified phone number:** This allows users to sign in with their phone number.
  - **Also allow sign in with preferred username:** This allows users to sign in with a preferred username. This is a username that the user can change.

### Option 2: User Signs Up and Signs In with Email or Phone Number Instead of Username

In this case, the user signs up with an email address or phone number as their username. You can choose whether to allow sign-up with only email addresses, only phone numbers, or either one.

The email or phone number must be unique, and it must not already be in use by another user. It does not have to be verified. After the user has signed up using an email or phone number, the user cannot create a new account with the same email or phone number; the user can only reuse the existing account (and reset the password if needed). However, the user can change the email or phone number to a new email or phone number; if it is not already in use, it becomes the new username.

### Note

If users sign up with an email address as their username, they can change the username to another email address; they cannot change it to a phone number. If they sign up with a phone



number, they can change the username to another phone number; they cannot change it to an email address.

Use the following steps to configure your user pool in the console to allow sign-up and sign-in with email or phone number.

### To configure a user pool for sign-up and sign-in with email or phone number

1. In the **Attributes** tab, under **How do you want your end users to sign-up and sign-in?**, select **Email address or phone number**.
2. Choose one of the following options:
  - **Allow email addresses:** This allows your user to sign up with email as the username.
  - **Allow phone numbers:** This allows your user to sign up with phone number as the username.
  - **Allow both email addresses and phone number (users can choose one):** This allows your user to use either an email address or a phone number as the username during sign-up.

#### Note

You do not need to mark email or phone number as required attributes for your user pool.

### To implement option 2 in your app

1. Call the `CreateUserPool` API to create your user pool. Set the `UserNameAttributes` parameter to `phone_number`, `email`, or `phone_number | email`.
2. Call the `SignUp` API and pass an email address or phone number in the `username` parameter of the API. This API does the following:
  - If the `username` string is in valid email format, the user pool automatically populates the `email` attribute of the user with the `username` value.
  - If the `username` string is in valid phone number format, the user pool automatically populates the `phone_number` attribute of the user with the `username` value.
  - If the `username` string format is not in email or phone number format, the `SignUp` API throws an exception.
  - The `SignUp` API generates a persistent UUID for your user, and uses it as the immutable username attribute internally. This UUID has the same value as the `sub` claim in the user identity token.
  - If the `username` string contains an email address or phone number that is already in use, the `SignUp` API throws an exception.

You can use an email address or phone number as an alias in place of the username in all APIs except the `ListUsers` API. When you call `ListUsers`, you can search by the `email` or `phone_number` attribute; if you search by `username`, you must supply the actual username, not an alias.

## Custom Attributes

You can add up to 25 custom attributes to your user pool. You can specify a minimum and/or maximum length for custom attributes. However, the maximum length for any custom attribute can be no more than 2048 characters.

#### Each custom attribute:

- Can be defined as a string or a number.
- Can have a name that is a string from one to 32 characters long.
- Cannot be required.
- Cannot be removed or changed once added to the user pool.

### Note

In your code and in rules settings for [Role-Based Access Control \(p. 234\)](#), custom attributes require the `custom:` prefix to distinguish them from standard attributes.

### To add a custom attribute using the console

1. From the navigation bar on the left choose **Attributes**.
2. For each new attribute:
  - a. Choose **Add another attribute** under **Do you want to add custom attributes?**.
  - b. Choose the properties for each custom attribute, such as the data **Type** (string or number), the **Name**, **Min length**, and **Max length**.
  - c. If you want to allow the user to change the value of a custom attribute after the value has been provided by the user, select **Mutable**.

## 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. By default any new custom attributes will not be available until you set read and write permissions for them.

### To set or change attribute permissions using the console

1. From the navigation bar on the left choose **App clients**.
2. Choose **Show Details** for the app client you want update.
3. Choose **Set the attribute read and write permissions for each attribute**.
4. Choose **Save app client changes**.

Repeat these steps for each app client using the custom attribute.

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.

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

## Adding User Pool Password Requirements

Specifying a minimum password length of at least 8 characters, as well as requiring uppercase, numeric, and special characters, creates strong passwords for your app users. Complex passwords are harder to guess, and we recommend them as a security best practice.

These characters are allowed in passwords:

- uppercase and lowercase letters

- numbers
- the equals sign "="
- the plus sign "+"
- the special characters listed in the next section

## Creating a Password Policy

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 a special character** from this set:

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

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

## Configuring an Admin Create User Policy

You can specify the following policies for Admin Create User:

- Specify whether to allow users to sign themselves up. This option is set by default. If it is not set, only administrators can create users in this pool and calls to the [SignUp](#) API fail with `NotAuthorizedException`.
- Specify the user account expiration time limit (in days) for new accounts. 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 log in to the account until the administrator updates the user's profile by updating an attribute or by resending the password to the user.

### Note

Once the user has logged in, the account never expires.

## Configuring Email and Phone Verification

You can choose settings for email and phone verification in the **MFA and verifications** tab.

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

Verification of a phone or email is necessary to automatically confirm users and enable recovery from forgotten passwords. Alternatively, you can automatically confirm users with the pre-sign up Lambda trigger or by using the [AdminConfirmSignUp](#) API. For more information, see [Signing Up and Confirming User Accounts](#) (p. 158).

### Note

Use of SMS text messaging for verifying phone numbers is charged separately by Amazon SNS. (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](#).

The verification code or link is valid for 24 hours.

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

**Note**

The forgotten password flow requires either the user's email or the user's phone number to be verified.

**Important**

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, so your app needs to 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 can create an AWS Identity and Access Management (IAM) role in the **MFA and verifications** tab of the Amazon Cognito console by choosing **Create role**.

## Configuring SMS and Email Verification Messages and User Invitation Messages

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

- Your SMS text message MFA message
- Your SMS and email verification messages
- The verification type for email—code or link
- Your user invitation messages
- From and Reply-To email addresses for emails going through your user pool

**Note**

The SMS and email verification message templates only appear if you have chosen to require phone number and email verification in the **Verifications** tab. Similarly, the SMS MFA message template only appears if the MFA setting is REQUIRED or OPTIONAL.

## Message Templates

Message templates allow you to insert a field into your message using a placeholder that will be replaced with the corresponding value.

### Template placeholders

Description	Token
Verification code	{####}
Temporary password	{####}
User name	{username}

You can use advanced security template placeholders to:

- Include specific details about an event such as IP address, city, country, login time, and device name, for analysis by Amazon Cognito advanced security features.
- Verify whether a one-click link is valid.
- Build your own one-click link using event ID, feedback token, and username.

### Advanced security template placeholders

Description	Token
IP address	{ip-address}
City	{city}
Country	{country}
Login time	{login-time}
Device name	{device-name}
One click link is valid	{one-click-link-valid}
One click link is invalid	{one-click-link-invalid}
Event ID	{event-id}
Feedback token	{feedback-token}

## Customizing the SMS Message

You can customize the SMS message for MFA authentication by editing the template under the **Do you want to customize your SMS messages?** heading.

### Important

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

The maximum length for the message is 140 UTF-8 characters, including the authentication code.

## 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 140 UTF-8 characters, including the verification code.

## Customizing Email Verification Messages

You can choose the verification type for email verifications: code or link.

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

If you have chosen code as the verification type, 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 20,000 UTF-8 characters, including the verification code (if present). HTML tags can be used in these emails.

## 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 20,000 UTF-8 characters, including the verification code. HTML tags can be used in these emails.

## 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. For more information, see [Verifying Email Addresses and Domains in Amazon SES](#) in the *Amazon Simple Email Service Developer Guide*.

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](#) in the *Amazon Simple Email Service Developer Guide*.

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](#) in the *Amazon Simple Email Service Developer Guide*.

### 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](#) in the *Amazon Simple Email Service Developer Guide*.

```
{
  "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>"  
  }  
]  
}
```

The Amazon Cognito console adds this policy for you when you select an Amazon SES identity from the drop-down menu. If you use the CLI or API to configure the user pool, you must attach this policy to your Amazon SES Identity.

## Adding Cost Allocation Tags to Your User Pool

In the **Tags** tab, you can add cost allocation tags to categorize and track your AWS costs. When you apply tags to your AWS resources (such as Amazon Cognito User Pools), your AWS cost allocation report includes usage and costs aggregated by tags. You can apply tags that represent business categories (such as cost centers, application names, and owners) to organize your costs across multiple services. For more information, see [Using Cost Allocation Tags](#) in the *AWS Billing and Cost Management User Guide*.

To add a tag, choose **Add tag**. Specify a **Tag key** and **Tag value**, following the restrictions listed in [Tag Restrictions](#). Choose **Save changes** to save your tag.

### Important

In order for tags to appear on your billing reports, you must activate your applied tags in the billing console. For more information, see [Activating User-Defined Cost Allocation Tags](#) in the *AWS Billing and Cost Management User Guide*.

## 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 Pools in the AWS Management Console.

### Setting Up Remembered Devices

With Amazon Cognito 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 Amazon 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 can 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 indicates 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 is 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 can suppress 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 [Adding Multi-Factor Authentication \(MFA\) to a User Pool](#) (p. 108).

### Note

If the device remembering feature is set to **Always** and **Do you want to use a remembered device to suppress the second factor during multi-factor authentication (MFA)?** is set to **Yes**, then the MFA settings for medium/high risks in risk-based MFA are ignored.

## Configuring a User Pool App Client

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 your 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 has 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 client**.
2. Specify an **App client 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, user pools 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](#), select **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. 185).
6. By default, user pools allow your app to read and write all attributes. If you want to set different permissions for your app, perform the following steps.
  - a. Choose **Set attribute read and write permissions**.



- b. 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.

**Note**

You cannot remove required attributes from write permissions in any app.

7. Choose **Create app client**.
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 also use the CLI commands, **create-user-pool-client** and **update-user-pool-client**, and the APIs, [CreateUserPoolClient](#) and [UpdateUserPoolClient](#), to create and update app clients on a user pool.

## Configuring User Pool Lambda Triggers

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**, **Verify Auth Challenge Response**, and **User Migration**.

A user migration Lambda trigger allows easy migration of users from your existing user management system into your user pool.

For examples of each Lambda trigger, see [Customizing User Pool Workflows with Lambda Triggers \(p. 119\)](#).

**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 with Lambda Triggers \(p. 119\)](#).

## Reviewing Your User Pool Creation Settings

Before you create your user pool, you can review the different settings and edit them in the AWS Management Console. Amazon Cognito validates the user pool settings and warns 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**.

## Configuring User Pool Analytics

**Note**

The **Analytics** tab appears only when you're editing an existing user pool.

Using Amazon Pinpoint Analytics, you can track Amazon Cognito User Pools sign-ups, sign-ins, failed authentications, daily active users (DAUs), and monthly active users (MAUs). You can also set up user attributes specific to your app using the AWS Mobile SDK for Android or AWS Mobile SDK for iOS. Those can then be used to segment your users in Amazon Pinpoint and send them targeted push notifications.

In the **Analytics** tab, you can specify an Amazon Pinpoint project for your Amazon Cognito app client. For more information, see [Using Amazon Pinpoint Analytics with Amazon Cognito User Pools \(p. 156\)](#).

### To add analytics and campaigns

1. Choose **Add analytics and campaigns**.
2. Choose a **Cognito app client** from the list.
3. To map your Amazon Cognito app to an **Amazon Pinpoint project**, choose the Amazon Pinpoint project from the list.

#### Note

The Amazon Pinpoint project ID is a 32-character string that is unique to your Amazon Pinpoint project. It is listed the Amazon Pinpoint console.

You can map multiple Amazon Cognito apps to a single Amazon Pinpoint project. However, each Amazon Cognito app can only be mapped to one Amazon Pinpoint project.

In Amazon Pinpoint, each project should be a single app. For example, if a game developer has two games, each game should be a separate Amazon Pinpoint project, even if both games use the same Amazon Cognito User Pools.

4. Choose **Share user attribute data with Amazon Pinpoint** if you want Amazon Cognito to send email addresses and phone numbers to Amazon Pinpoint in order to create additional endpoints for users.

#### Note

An *endpoint* uniquely identifies a user device to which you can send push notifications with Amazon Pinpoint. For more information about endpoints, see [Adding Endpoints](#) in the *Amazon Pinpoint Developer Guide*.

5. Enter an **IAM role** that you already created or choose **Create new role** to create a new role in the IAM console.
6. Choose **Save changes**.
7. To specify additional app mappings, choose **Add app mapping**.
8. Choose **Save changes**.

## Configuring App Client Settings

#### Note

The **App client settings** tab appears only when you're editing an existing user pool.

On the **App client settings** tab, you must configure at least one identity provider (IdP) for your apps if you want to use the built-in hosted pages to sign up and sign in users or you want to use OAuth2.0 flows. For more information, see [Configuring a User Pool App Client \(p. 76\)](#).

### To specify app client settings for your user pool

1. In **Enabled Identity Providers**, select the identity providers you want for the apps that you configured in the **App Clients** tab.
2. Enter the **Callback URLs** you want, separated by commas. These URLs apply to all of the selected identity providers.

#### Note

You must register the URLs in the console, or by using the CLI or API, before you can use them in your app.

3. Enter the **Sign out URLs** you want, separated by commas.

#### Note

You must register the URLs in the console, or by using the CLI or API, before you can use them in your app.

4. Under **OAuth 2.0**, select the from the following options. For more information, see [App Client Settings Overview \(p. 76\)](#) and the [OAuth 2.0 specification](#).
  - For **Allowed OAuth Flows**, select **Authorized code grant** and **Implicit grant**. Select **Client credentials** only if your app needs to request access tokens on its own behalf, not on behalf of a user.
  - For **Allowed OAuth Scopes**, select the scopes you want. Each scope is a set of one or more standard attributes.
  - For **Allowed Custom Scopes**, select the scopes you want from any custom scopes that you have defined. Custom scopes are defined in the **Resource Servers** tab. For more information, see [Defining Resource Servers for Your User Pool \(p. 87\)](#).

## Adding a Domain Name for Your User Pool

### Note

The **Domain name** tab appears only when you're editing an existing user pool.

On the **Domain name** tab, you can enter your own prefix domain name. The domain for your app is `https://<domain_prefix>.auth.<region>.amazoncognito.com`.

The full URL for your app will look like this example: `https://example.auth.us-east-1.amazoncognito.com/login?redirect_uri=https://www.google.com&response_type=code&client_id=<client_id_value>`

For more information, see [Configuring a User Pool Domain \(p. 79\)](#).

### Important

Before you can access the URL for your app, you must specify app client settings such as callback and redirect URLs. For more information, see [Configuring App Client Settings \(p. 212\)](#).

### To specify a domain name for your user pool

1. Enter the domain name you want in the **Prefix domain name** box.
2. Choose **Check availability** as needed.
3. Choose **Save changes**.

## Customizing the Built-in App UI to Sign Up and Sign In Users

### Note

The **UI customization** tab appears only when you're editing an existing user pool.

On the **UI customization** tab, you can add your own customizations to the default app UI.

For detailed information about each of the customization fields, see [Customizing the Built-in Sign-in and Sign-up Webpages \(p. 83\)](#).

### Note

You can view the hosted UI with your customizations by constructing the following URL, with the specifics for your user pool, and typing it into a browser: `https://<your_domain>/login?response_type=code&client_id=<your_app_client_id>&redirect_uri=<your_callback_url>`  
You may have to wait up to one minute to refresh your browser before changes made in the console appear.  
Your domain is shown on the **Domain name** tab. Your app client ID and callback URL are shown on the **App client settings** tab.

### To customize the built-in app UI

1. Under **App client to customize**, choose the app you want to customize from the dropdown menu of app clients that you previously created in the **App clients** tab.
2. To add a logo to the default app UI, choose **Choose a file** or drag a file onto the **Logo** box.
3. Under **CSS customizations (optional)**, you can customize the appearance of the app by changing various properties from their default values.
4. Choose **Save changes**.

## Adding Resource Servers for Your User Pool

### Note

The **Resource Servers** tab appears only when you're editing an existing user pool.

A *resource server* is a server for access-protected resources. It handles authenticated requests from an app that has an access token. A *scope* is a level of access that an app can request to a resource.

In the **Resource Servers** tab, you can define custom resource servers and scopes for your user pool. For more information, see [Defining Resource Servers for Your User Pool \(p. 87\)](#).

### To define a custom resource server

1. Choose **Add a resource server**.
2. Enter the name of your resource server, for example, `Photo Server`.
3. Enter the identifier of your resource server, for example, `com.example.photos`.
4. Enter the names of the custom scopes for your resources, such as `read` and `write`.
5. For each of the scope names, enter a description, such as `view your photos` and `update your photos`.

Each of the custom scopes that you define appears on the **App client settings** tab, under **OAuth2.0 Allowed Custom Scopes**; for example `com.example.photos/read`.

## Configuring Identity Providers for Your User Pool

### Note

The **Identity providers** tab appears only when you're editing an existing user pool.

In the **Identity providers** tab, you can specify identity providers (IdPs) for your user pool. For more information, see [Adding User Pool Sign-in Through a Third Party \(p. 89\)](#).

### Topics

- [Allowing Users to Sign in Using a Social Identity Provider \(p. 214\)](#)
- [Allowing Users to Sign in Using an OpenID Connect \(OIDC\) Identity Provider \(p. 215\)](#)
- [Allowing Users to Sign in Using SAML \(p. 216\)](#)

## Allowing Users to Sign in Using a Social Identity Provider

You can use federation for Amazon Cognito User Pools to integrate with social identity providers such as Facebook, Google, and Login with Amazon.

To add a social identity provider, you first create a developer account with the identity provider. Once you have your developer account, you register your app with the identity provider. The identity provider

creates an app ID and an app secret for your app, and you configure those values in your Amazon Cognito User Pools.

Here are links to help you get started with social identity providers:

- [Google Identity Platform](#)
- [Facebook for Developers](#)
- [Login with Amazon](#)

### To allow users to sign in using a social identity provider

1. Choose a social identity provider such as **Facebook**, **Google**, or **Login with Amazon**.
2. For the Facebook (or Google or Amazon) app ID, enter the app ID that you received when you created your Facebook, Google, or Login with Amazon client app.
3. For **App secret**, enter the app secret that you received when you created your client app.
4. For **Authorize scopes**, enter the names of the social identity provider scopes that you want to map to user pool attributes. Scopes define which user attributes (such as name and email) you want to access with your app. For Facebook, these should be separated by commas (for example, `public_profile, email`). For Google and Login with Amazon, they should be separated by spaces. (Google example: `profile email openid`. Login with Amazon example: `profile postal_code`.)

The end-user is asked to consent to providing these attributes to your app. For more information about their scopes, see the documentation from Google, Facebook, and Login with Amazon.

5. Choose **Enable Facebook** (or **Enable Google** or **Enable Login with Amazon**).

For more information on Social IdPs see ??? (p. 90).

## Allowing Users to Sign in Using an OpenID Connect (OIDC) Identity Provider

You can enable your users to sign in through an OIDC identity provider (IdP) such as Salesforce or Ping Identity.

1. Go to the [Amazon Cognito console](#). You might be prompted for your AWS credentials.
2. Choose **Manage your User Pools**.
3. Choose an existing user pool from the list, or [create a user pool](#).
4. On the left navigation bar, choose **Identity providers**.
5. Choose **OpenId Connect**.
6. Type a unique name into **Provider name**.
7. Type the OIDC IdP's client ID into **Client ID**.
8. Type the OIDC IdP's client secret into **Client secret**.
9. In the drop-down list, choose the HTTP method (either GET or POST) that's used to fetch the details of the user from the **userinfo** endpoint into **Attributes request method**.
10. Type the names of the scopes that you want to authorize. Scopes define which user attributes (such as name and email) that you want to access with your application. Scopes are separated by spaces, according to the [OAuth 2.0](#) specification.

Your app user is asked to consent to providing these attributes to your application.

11. Type the URL of your IdP and choose **Run discovery**.

For example, Salesforce uses this URL:

`https://login.salesforce.com`

**Note**

The URL should start with `https://`, and shouldn't end with a slash `/`.

- If **Run discovery** isn't successful, then you need to provide the **Authorization endpoint**, **Token endpoint**, **Userinfo endpoint**, and **Jwks uri** (the location of the [JSON Web Key](#)).
12. Choose **Create provider**.
  13. On the left navigation bar, choose **App client settings**.
  14. Select your OIDC provider as one of the **Enabled Identity Providers**.
  15. Type a callback URL for the Amazon Cognito authorization server to call after users are authenticated. This is the URL of the page where your user will be redirected after a successful sign-in.

`https://www.example.com`

16. Under **Allowed OAuth Flows**, enable both the **Authorization code grant** and the **Implicit code grant**.  
  
Unless you specifically want to exclude one, select the check boxes for all of the **Allowed OAuth scopes**.
17. Choose **Save changes**.
18. On the **Attribute mapping** tab on the left navigation bar, add mappings of OIDC claims to user pool attributes.
  - a. As a default, the OIDC claim **sub** is mapped to the user pool attribute **Username**. You can map other OIDC [claims](#) to user pool attributes. Type in the OIDC claim, and choose the corresponding user pool attribute from the drop-down list. For example, the claim **email** is often mapped to the user pool attribute **Email**.
  - b. In the drop-down list, choose the destination user pool attribute.
  - c. Choose **Save changes**.
  - d. Choose **Go to summary**.

For more information on OIDC IdPs see [Adding OIDC Identity Providers to a User Pool \(p. 101\)](#).

## Allowing Users to Sign in Using SAML

You can use federation for Amazon Cognito User Pools to integrate with a SAML identity provider (IdP). You supply a metadata document, either by uploading the file or by entering a metadata document endpoint URL. For information about obtaining metadata documents for third-party SAML IdPs, see [Integrating Third-Party SAML Identity Providers with Amazon Cognito User Pools \(p. 99\)](#).

### To allow users to sign in using SAML

1. Choose **SAML** to display the SAML identity provider options.
2. To upload a metadata document, choose **Select file**, or enter a metadata document endpoint URL. The metadata document must be a valid XML file.
3. Enter your SAML **Provider name**, for example, "SAML\_provider\_1", and any **Identifiers** you want. The provider name is required; the identifiers are optional. For more information, see [Adding SAML Identity Providers to a User Pool \(p. 94\)](#).
4. Select **Enable IdP sign out flow** when you want your user to be logged out from a SAML IdP when logging out from Amazon Cognito.

Enabling this flow sends a signed logout request to the SAML IdP when the [LOGOUT Endpoint \(p. 322\)](#) is called.

**Note**

If this option is selected and your SAML identity provider expects a signed logout request, you will also need to configure the signing certificate provided by Amazon Cognito with your SAML IdP.

The SAML IdP will process the signed logout request and logout your user from the Amazon Cognito session.

5. Choose **Create provider**.
6. To create additional providers, repeat the previous steps.

**Note**

If you see `InvalidParameterException` while creating a SAML identity provider with an HTTPS metadata endpoint URL, for example, "Error retrieving metadata from *<metadata endpoint>*," make sure that the metadata endpoint has SSL correctly set up and that there is a valid SSL certificate associated with it.

**To set up the SAML IdP to add a signing certificate**

- To get the certificate containing the public key which will be used by the identity provider to verify the signed logout request, choose **Show signing certificate** under **Active SAML Providers** on the **SAML** dialog under **Identity providers** on the **Federation** console page.

For more information on SAML IdPs see [Adding SAML Identity Providers to a User Pool \(p. 94\)](#).

## Configuring Attribute Mapping for Your User Pool

**Note**

The **Attribute mapping** tab appears only when you're editing an existing user pool.

On the **Attribute mapping** tab, you can map identity provider (IdP) attributes or assertions to user pool attributes. For more information, see [Specifying Identity Provider Attribute Mappings for Your User Pool \(p. 106\)](#).

**Note**

Currently, only the Facebook `id`, Google `sub`, and Login with Amazon `user_id` attributes can be mapped to the Amazon Cognito User Pools `username` attribute.

**Note**

The attribute in the user pool must be large enough to fit the values of the mapped identity provider attributes, or an error occurs when users sign in. Custom attributes should be set to the maximum 2048 character size if mapped to identity provider tokens.

You must create mappings for any attributes that are required for your user pool.

**To specify a social identity provider attribute mapping for your user pool**

1. Choose the **Facebook**, **Google**, or **Amazon** tab.
2. For each attribute you need to map, perform the following steps:
  - a. Choose the **Capture** check box.
  - b. In the **User pool attribute** field, choose the user pool attribute to map the social identity provider attribute to from the drop-down list.
  - c. If you need more attributes, choose **Add Facebook attribute** (or **Add Google attribute** or **Add Amazon attribute**) and perform the following steps:

- i. In the **Facebook attribute** (or **Google attribute** or **Amazon attribute**) field, enter the name of the attribute to be mapped.
- ii. For **User pool attribute**, choose the user pool attribute you want to map to the social identity provider attribute to from the drop-down list.
- d. Choose **Save changes**.

#### **To specify a SAML provider attribute mapping for your user pool**

1. Choose the **SAML** tab.
2. For each attribute you need to map, perform the following steps:
  - a. Choose **Add SAML attribute**.
  - b. In the **SAML attribute** field, enter the name of the SAML attribute to be mapped.
  - c. For **User pool attribute**, choose the user pool attribute you want to map to the SAML attribute from the drop-down list.
  - d. Choose **Save changes**.



# Amazon Cognito Identity Pools (Federated Identities)

Amazon Cognito identity pools (federated identities) enable you to create unique identities for your users and federate them with identity providers. With an identity pool, you can obtain temporary, limited-privilege AWS credentials to access other AWS services. Amazon Cognito identity pools support the following identity providers:

- Public providers: [Login with Amazon \(Identity Pools\) \(p. 251\)](#), [Facebook \(Identity Pools\) \(p. 246\)](#), [Google \(Identity Pools\) \(p. 254\)](#).
- [Amazon Cognito User Pools \(p. 13\)](#)
- [Open ID Connect Providers \(Identity Pools\) \(p. 260\)](#)
- [SAML Identity Providers \(Identity Pools\) \(p. 262\)](#)
- [Developer Authenticated Identities \(Identity Pools\) \(p. 263\)](#)

For information about Amazon Cognito identity pools region availability, see [AWS Service Region Availability](#).

For more information about Amazon Cognito identity pools, see the following topics.

## Topics

- [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\) \(p. 219\)](#)
- [Using Identity Pools \(Federated Identities\) \(p. 221\)](#)
- [Identity Pools Concepts \(Federated Identities\) \(p. 225\)](#)
- [Role-Based Access Control \(p. 234\)](#)
- [Getting Credentials \(p. 238\)](#)
- [Accessing AWS Services \(p. 244\)](#)
- [Identity Pools \(Federated Identities\) External Identity Providers \(p. 245\)](#)
- [Developer Authenticated Identities \(Identity Pools\) \(p. 263\)](#)
- [Switching Unauthenticated Users to Authenticated Users \(Identity Pools\) \(p. 274\)](#)

## Getting Started with Amazon Cognito Identity Pools (Federated Identities)

Amazon Cognito identity pools enable you to create unique identities and assign permissions for users. Your identity pool can include:

- Users in an Amazon Cognito user pool
- Users who authenticate with external identity providers such as Facebook, Google, or a SAML-based identity provider
- Users authenticated via your own existing authentication process

With an identity pool, you can obtain temporary AWS credentials with permissions you define to directly access other AWS services or to access resources through Amazon API Gateway.

## Topics

- [Sign Up for an AWS Account](#) (p. 220)
- [Create an Identity Pool in Amazon Cognito](#) (p. 220)
- [Install the Mobile or JavaScript SDK](#) (p. 220)
- [Integrate the Identity Providers](#) (p. 221)
- [Get Credentials](#) (p. 221)

## Sign Up for an AWS Account

To use Amazon Cognito identity pools, 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 <https://aws.amazon.com/>, and then choose **Create an AWS Account**.

#### Note

This might be unavailable in your browser if you previously signed into the AWS Management Console. In that case, choose **Sign in to a different account**, and then choose **Create a new 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.

## Create an Identity Pool in Amazon Cognito

You can create an identity pool through the Amazon Cognito console, or you can use the AWS Command Line Interface (CLI) or the Amazon Cognito APIs.

### To create a new identity pool in the console

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.
3. To enable unauthenticated identities select **Enable access to unauthenticated identities** from the **Unauthenticated identities** collapsible section.
4. If desired, configure an authentication provider in the **Authentication providers** section.
5. Choose **Create Pool**.

#### Note

At least one identity is required for a valid identity pool.

6. You will be prompted for access to your AWS resources.

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.

## Install the Mobile or JavaScript SDK

To use Amazon Cognito identity pools, you must install and configure the AWS Mobile or JavaScript 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 .NET and Xamarin](#)

## Integrate the Identity Providers

Amazon Cognito identity pools (federated identities) support user authentication through Amazon Cognito user pools, federated identity providers—including Amazon, Facebook, Google, and SAML identity providers—as well as unauthenticated identities. This feature also supports [Developer Authenticated Identities \(Identity Pools\)](#) (p. 263), which lets you register and authenticate users via your own back-end authentication process.

To learn more about using an Amazon Cognito user pool to create your own user directory, see [Amazon Cognito User Pools](#) (p. 13) and [Accessing AWS Services Using an Identity Pool After Sign-in](#) (p. 194).

To learn more about using external identity providers, see [Identity Pools \(Federated Identities\) External Identity Providers](#) (p. 245).

To learn more about integrating your own back-end authentication process, see [Developer Authenticated Identities \(Identity Pools\)](#) (p. 263).

## Get Credentials

Amazon Cognito identity pools provide temporary AWS credentials for users who are guests (unauthenticated) and for users who have authenticated and received a token. With those AWS credentials your app can securely access a back end in AWS or outside AWS through Amazon API Gateway. See [Getting Credentials](#) (p. 238).

## Using Identity Pools (Federated Identities)

Amazon Cognito identity pools provide temporary AWS credentials for users who are guests (unauthenticated) and for users who have been authenticated and received a token. An identity pool is a store of user identity data specific to your account.

### To create a new identity pool in the console

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.
3. To enable unauthenticated identities select **Enable access to unauthenticated identities** from the **Unauthenticated identities** collapsible section.
4. If desired, configure an authentication provider in the **Authentication providers** section.
5. Choose **Create Pool**.

#### Note

At least one identity is required for a valid identity pool.

6. You will be prompted for access to your AWS resources.

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 \(p. 3\)](#).

## User IAM Roles

An IAM role defines the permissions for your users to access AWS resources, like [Amazon Cognito Sync \(p. 277\)](#). 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 \(p. 230\)](#).

## Authenticated and Unauthenticated Identities

Amazon Cognito identity pools support both authenticated and unauthenticated identities. Authenticated identities belong to users who are authenticated by any supported identity provider. Unauthenticated identities typically belong to guest users.

- To configure authenticated identities with a public login provider, see [Identity Pools \(Federated Identities\) External Identity Providers \(p. 245\)](#).
- To configure your own backend authentication process, see [Developer Authenticated Identities \(Identity Pools\) \(p. 263\)](#).

## Enable or disable unauthenticated identities

Amazon Cognito Identity Pools 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 [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\) \(p. 219\)](#).

Choose **Manage Federated Identities** from the [Amazon Cognito console](#):

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**.

## Change the role associated with an identity type

Identity pools define two types of identities: authenticated and unauthenticated. Every identity in your identity pool is either authenticated or unauthenticated. Authenticated identities belong to users who are authenticated by a public login provider (Amazon Cognito user pools, Facebook, Amazon, Google, SAML, 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 change which role is associated with an identity type using the Amazon Cognito identity pool (federated identities) console. Choose **Manage Federated Identities** from the [Amazon Cognito console](#):

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 edit authentication providers

If you allow your users to authenticate using public identity providers (e.g. Amazon Cognito user pools, Facebook, Amazon), you can specify your application identifiers in the Amazon Cognito identity pools (federated identities) console. This associates the application ID (provided by the public login provider) with your identity pool.

You can also configure authentication rules for each provider from this page. Each provider allows up to 25 rules. The rules are applied in the order you save for each provider. For more information, see [Role-Based Access Control](#) (p. 234).

### Warning

Changing the application ID to which an identity pool is linked will disable existing users from authenticating with that identity pool. Learn more about [Identity Pools \(Federated Identities\)](#) [External Identity Providers](#) (p. 245).

Choose **Manage Federated Identities** from the [Amazon Cognito console](#):

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.

## Delete an Identity Pool

Choose **Manage Federated Identities** from the [Amazon Cognito console](#):

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

Choose **Manage Federated Identities** from the [Amazon Cognito console](#):

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**.

## Managing Datasets

If you have implemented Amazon Cognito Sync functionality in your application, the Amazon Cognito Identity Pools 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 Identity Pools 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**. The data being synchronized from other devices for individual identities will be visible once you refresh the list datasets page for a particular identity.

### Create a Dataset for an Identity

Choose **Manage Federated Identities** from the Amazon Cognito Identity Pools [Amazon Cognito console](#) :

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

Choose **Manage Federated Identities** from the [Amazon Cognito console](#):

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**.

## Bulk Publish Data

Bulk publish can be used to export data already stored in your Amazon Cognito Sync store to a Kinesis stream. For instructions on how to bulk publish all of your streams, see [Amazon Cognito Streams \(p. 303\)](#).

## 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. Choose **Manage Federated Identities** from the [Amazon Cognito console](#):

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 Streams

Amazon Cognito Streams gives developers control and insight into their data stored in Amazon Cognito Sync. Developers can now configure a Kinesis stream to receive events as data. Amazon Cognito can push each dataset change to a 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 \(p. 303\)](#).

## Set Up Amazon Cognito Events

Amazon Cognito Events allows you to execute an AWS Lambda function in response to important events in Amazon Cognito Sync. Amazon Cognito Sync 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 \(p. 305\)](#).

To learn more about AWS Lambda, see [AWS Lambda](#).

## Identity Pools Concepts (Federated Identities)

Amazon Cognito identity pools 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 access other AWS services. Amazon Cognito identity pools support 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 pools Region availability, see [AWS Service Region Availability](#). For more information about Amazon Cognito identity pools concepts, see the following topics.

#### Topics

- [Identity Pools \(Federated Identities\) Authentication Flow](#) (p. 226)
- [IAM Roles](#) (p. 230)
- [Role Trust and Permissions](#) (p. 234)

## Identity Pools (Federated Identities) 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.

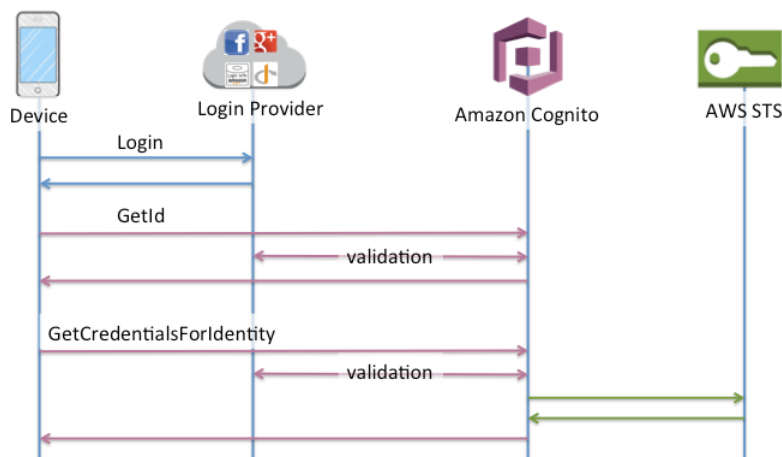
### External Provider Authflow

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. 230).

### Enhanced (Simplified) Authflow

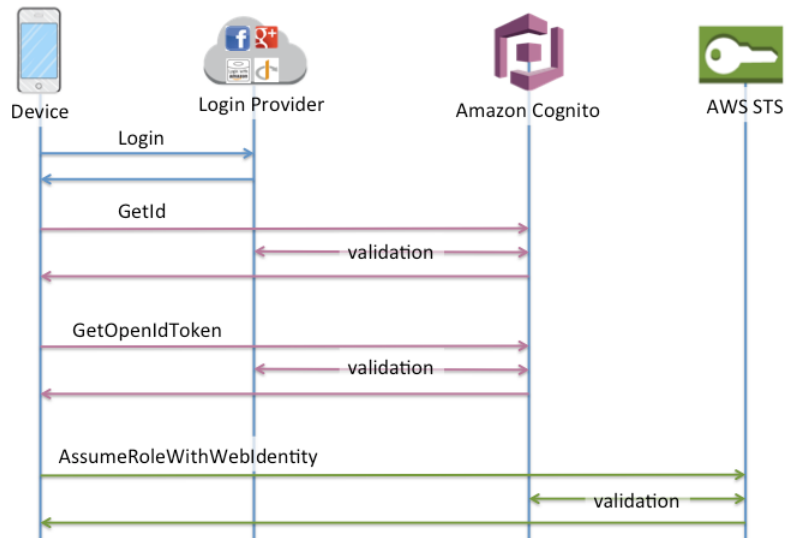
1. `GetId`
2. `GetCredentialsForIdentity`





### Basic (Classic) Authflow

1. `GetId`
2. `GetOpenIdToken`
3. `AssumeRoleWithWebIdentity`

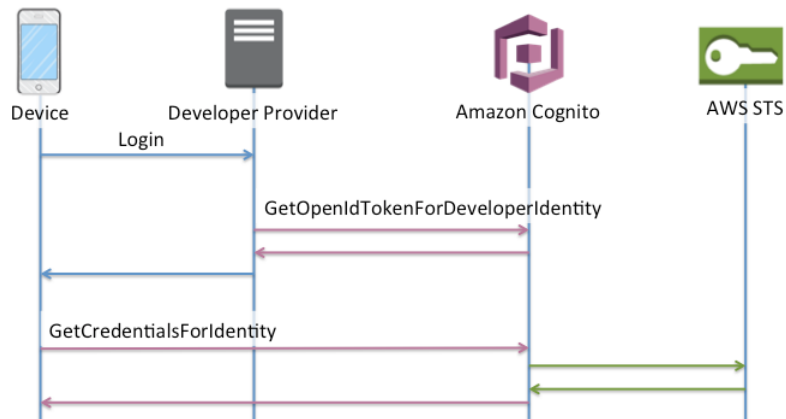


### Developer Authenticated Identities Authflow

When using [Developer Authenticated Identities \(Identity Pools\)](#) (p. 263), 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 indicated as such.

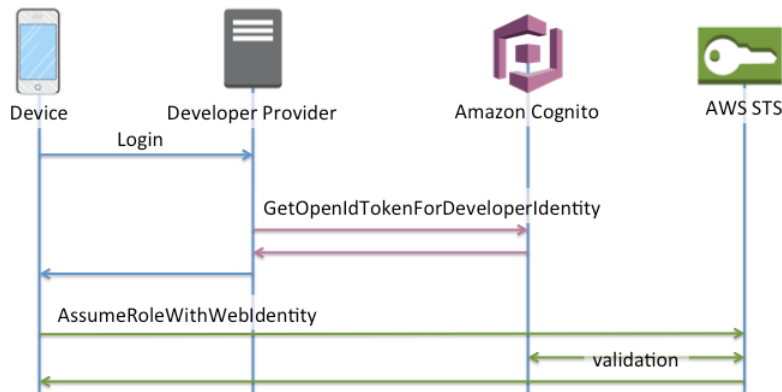
### Enhanced Authflow

1. Login via Developer Provider (code outside of Amazon Cognito)
2. Validate the user's login (code outside of Amazon Cognito)
3. `GetOpenIdTokenForDeveloperIdentity`
4. `GetCredentialsForIdentity`



### Basic Authflow

1. Login via Developer Provider (code outside of Amazon Cognito)
2. Validate the user's login (code outside of Amazon Cognito)
3. [GetOpenIdTokenForDeveloperIdentity](#)
4. [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)

### **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 \(p. 234\)](#).

## **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.

You can specify default IAM roles for authenticated and unauthenticated users. In addition, you can define rules to choose the role for each user based on claims in the user's ID token. For more information, see [Role-Based Access Control \(p. 234\)](#).

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 \(p. 234\)](#).

### 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.

For additional security protection, Amazon Cognito applies a scope-down policy to credentials vended by `GetCredentialForIdentity` to prevent access to services other than these to your unauthenticated users:

- CloudWatch
- Amazon Cognito Identity
- Amazon Cognito Sync
- DynamoDB
- Amazon Kinesis Data Firehose
- GameLift
- AWS IoT
- Amazon Kinesis Data Streams
- AWS KMS
- AWS Lambda
- Amazon Lex
- Amazon Machine Learning
- Amazon Mobile Analytics
- Amazon Polly
- Amazon Rekognition
- Amazon S3
- Amazon SimpleDB
- Amazon SES
- Amazon SNS

- Amazon SQS

If you need access to something other than these services for your unauthenticated users, you must use the basic authentication flow. If you are getting `NotAuthorizedException` and you have enabled access to the service in your unauthenticated role policy, this is likely the reason.

### 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.

## Role-Based Access Control

Amazon Cognito identity pools assign your authenticated users a set of temporary, limited privilege credentials to access your AWS resources. The permissions for each user are controlled through [IAM roles](#) that you create. You can define rules to choose the role for each user based on claims in the user's ID



token. You can define a default role for authenticated users. You can also define a separate IAM role with limited permissions for guest users who are not authenticated.

## Creating Roles for Role Mapping

It is important to add the appropriate trust policy for each role so that it can only be assumed by Amazon Cognito for authenticated users in your identity pool. Here is an example of such a trust policy:

```
{
  "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": "authenticated"
        }
      }
    }
  ]
}
```

This policy allows federated users from `cognito-identity.amazonaws.com` (the issuer of the OpenID Connect token) to assume this role. Additionally, the policy restricts the `aud` of the token, in this case the identity pool ID, to match the identity pool. Finally, the policy specifies that the `amr` of the token contains the value `authenticated`.

## Granting Pass Role Permission

To allow an IAM user to set roles with permissions in excess of the user's existing permissions on an identity pool, you grant that user `iam:PassRole` permission to pass the role to the `set-identity-pool-roles` API. For example, if the user cannot write to Amazon S3, but the IAM role that the user sets on the identity pool grants write permission to Amazon S3, the user can only set this role if `iam:PassRole` permission is granted for the role. The following example policy shows how to allow `iam:PassRole` permission.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "Stmt1",
      "Effect": "Allow",
      "Action": [
        "iam:PassRole"
      ],
      "Resource": [
        "arn:aws:iam::123456789012:role/myS3WriteAccessRole"
      ]
    }
  ]
}
```

In this policy example, the `iam:PassRole` permission is granted for the `myS3WriteAccessRole` role. The role is specified using the role's ARN. You must also attach this policy to your IAM user or role to which your user belongs. For more information, see [Working with Managed Policies](#).

**Note**

Lambda functions use resource-based policy, where the policy is attached directly to the Lambda function itself. When creating a rule that invokes a Lambda function, you do not pass a role, so the user creating the rule does not need the `iam:PassRole` permission. For more information about Lambda function authorization, see [Manage Permissions: Using a Lambda Function Policy](#).

## Using Tokens to Assign Roles to Users

For users who log in via Amazon Cognito Your User Pools, roles can be passed in the ID token that was assigned by the user pool. The roles appear in the following claims in the ID token:

- The `cognito:preferred_role` claim is the role ARN.
- The `cognito:roles` claim is a comma-separated string containing a set of allowed role ARNs.

The claims are set as follows:

- The `cognito:preferred_role` claim is set to the role from the group with the best (lowest) `Precedence` value. If there is only one allowed role, `cognito:preferred_role` is set to that role. If there are multiple roles and no single role has the best precedence, this claim is not set.
- The `cognito:roles` claim is set if there is at least one role.

When using tokens to assign roles, if there are multiple roles that can be assigned to the user, Amazon Cognito identity pools (federated identities) chooses the role as follows:

- Use the [GetCredentialsForIdentity](#) `CustomRoleArn` parameter if it is set and it matches a role in the `cognito:roles` claim. If this parameter doesn't match a role in `cognito:roles`, deny access.
- If the `cognito:preferred_role` claim is set, use it.
- If the `cognito:preferred_role` claim is not set, the `cognito:roles` claim is set, and `CustomRoleArn` is not specified in the call to `GetCredentialsForIdentity`, then the **Role resolution** setting in the console or the `AmbiguousRoleResolution` field (in the `RoleMappings` parameter of the [SetIdentityPoolRoles](#) API) is used to determine the role to be assigned.

## Using Rule-Based Mapping to Assign Roles to Users

Rules allow you to map claims from an identity provider token to IAM roles.

Each rule specifies a token claim (such as a user attribute in the ID token from an Amazon Cognito user pool), match type, a value, and an IAM role. The match type can be `Equals`, `NotEqual`, `StartsWith`, or `Contains`. If a user has a matching value for the claim, the user can assume that role when the user gets credentials. For example, you can create a rule that assigns a specific IAM role for users with a `custom:dept` custom attribute value of `Sales`.

**Note**

In the rule settings, custom attributes require the `custom:` prefix to distinguish them from standard attributes.

Rules are evaluated in order, and the IAM role for the first matching rule is used, unless `CustomRoleArn` is specified to override the order. For more information about user attributes in Amazon Cognito user pools, see [Configuring User Pool Attributes](#) (p. 199).

You can set multiple rules for an authentication provider in the identity pool (federated identities) console. Rules are applied in order. You can drag the rules to change their order. The first matching rule takes precedence. If the match type is `NotEqual` and the claim doesn't exist, the rule is not evaluated. If no rules match, the **Role resolution** setting is applied to either **Use default Authenticated role** or **DENY**.

In the API and CLI, you can specify the role to be assigned when no rules match in the `AmbiguousRoleResolution` field of the [RoleMapping](#) type, which is specified in the `RoleMappings` parameter of the [SetIdentityPoolRoles](#) API.

For each user pool or other authentication provider configured for an identity pool, you can create up to 25 rules. If you need more than 25 rules for a provider, please open a [Service Limit Increase](#) support case.

## Token Claims to Use in Rule-Based Mapping

### Amazon Cognito

An Amazon Cognito ID token is represented as a JSON Web Token (JWT). The token contains claims about the identity of the authenticated user, such as `name`, `family_name`, and `phone_number`. For more information about standard claims, see the [OpenID Connect specification](#). Apart from standard claims, the following are the additional claims specific to Amazon Cognito:

- `cognito:groups`
- `cognito:roles`
- `cognito:preferred_role`

### Amazon

The following claims, along with possible values for those claims, can be used with Login with Amazon:

- `iss`: `www.amazon.com`
- `aud`: App Id
- `sub`: `sub` from the Login with Amazon token

### Facebook

The following claims, along with possible values for those claims, can be used with Facebook:

- `iss`: `graph.facebook.com`
- `aud`: App Id
- `sub`: `sub` from the Facebook token

### Google

A Google token contains standard claims from the [OpenID Connect specification](#). All of the claims in the OpenID token are available for rule-based mapping. See Google's [OpenID Connect](#) site to learn about the claims available from the Google token.

### OpenID

All of the claims in the Open Id Token are available for rule-based mapping. For more information about standard claims, see the [OpenID Connect specification](#). Refer to your OpenID provider documentation to learn about any additional claims that are available.

### SAML

Claims are parsed from the received SAML assertion. All the claims that are available in the SAML assertion can be used in rule-based mapping.

## Best Practices for Role-Based Access Control

### Important

If the claim that you are mapping to a role can be modified by the end user, any end user can assume your role and set the policy accordingly. Only map claims that cannot be directly set by the end user to roles with elevated permissions. In an Amazon Cognito user pool, you can set per-app read and write permissions for each user attribute.

### Important

If you set roles for groups in an Amazon Cognito user pool, those roles are passed through the user's ID token. To use these roles, you must also set **Choose role from token** for the authenticated role selection for the identity pool.

You can use the **Role resolution** setting in the console and the `RoleMappings` parameter of the [SetIdentityPoolRoles](#) API to specify what the default behavior is when the correct role cannot be determined from the token.

## Getting Credentials

You can use Amazon Cognito to deliver temporary, limited-privilege credentials to your application, so that your users can access AWS resources. This section describes how to get credentials and how to retrieve an Amazon Cognito identity from an identity pool.

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

Amazon Cognito identities are not credentials. They are exchanged for credentials using web identity federation support in the AWS Security Token Service (AWS STS). The recommended way to obtain AWS credentials for your app users is to use `AWS.CognitoIdentityCredentials`. The identity in the credentials object is then exchanged for credentials using AWS STS.

### 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 the `AWS.CognitoIdentityCredentials` constructor without the roles as parameters. To do so, open the [Amazon Cognito console](#), choose **Manage Federated Identities**, select your identity pool, choose **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

## 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. Choose **Manage Federated Identities** from 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](#), choose **Manage Federated Identities**, select your identity pool, and choose **Edit Identity Pool**, specify your authenticated and unauthenticated roles, and save the changes.

### Retrieving an Amazon Cognito Identity

If you're allowing unauthenticated users, you can retrieve a unique Amazon Cognito identifier (identity ID) for your end user immediately. If you're authenticating users, you can retrieve the identity ID after you've set the login tokens in the credentials provider:

```
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 identity pools support both authenticated and unauthenticated identities. To provide AWS credentials to your app, follow the steps below.

1. Choose **Manage Federated Identities** from 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](#), choose **Manage Federated Identities**, select your identity pool, choose **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:^(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. Choose **Manage Federated Identities** from 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
```

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: .USEast1,
  identityPoolId: "IDENTITY_POOL_ID")
let configuration = AWSServiceConfiguration(region: .USEast1, credentialsProvider:
  credentialsProvider)
AWSServiceManager.default().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](#), choose **Manage Federated Identities**, select your identity pool, choose **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().continueWith(block: { (task) -> AnyObject? in
  if (task.error != nil) {
    print("Error: " + task.error!.localizedDescription)
  }
  else {
    // the task result will contain the identity id
    let cognitoId = task.result!
    print("Cognito id: \(cognitoId)")
  }
  return task;
})
```

### 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

If you have not yet created one, create an identity pool in the [Amazon Cognito console](#) before using `AWS.CognitoIdentityCredentials`.

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

```
// 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',
  Logins: { // optional tokens, used for authenticated login
    'graph.facebook.com': 'FBTOKEN',
```

```

        'www.amazon.com': 'AMAZONTOKEN',
        'accounts.google.com': 'GOOGLETOKEN'
    });

// 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;

});

```

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

```

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

        console.log('You are now logged in.');
```

```

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

```

    }
});

```

### 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. Choose **Manage Federated Identities**, from 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

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](#), choose **Manage Federated Identities**, select your identity pool, choose **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. Choose **Manage Federated Identities**, from 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](#), choose **Manage Federated Identities**, select your identity pool, choose **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

```
// get a client with the default service configuration
let dynamoDB = AWSDynamoDB.default()

// get a client with a custom configuration
AWSDynamoDB.register(with: configuration!, forKey: "USWest2DynamoDB");
let dynamoDBCustom = AWSDynamoDB(forKey: "USWest2DynamoDB")
```

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.

# Identity Pools (Federated Identities) External Identity Providers

Using the `logins` property, you can set credentials received from an identity provider. Moreover, you can associate an identity pool 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 identity pools.

### Topics

- [Facebook \(Identity Pools\) \(p. 246\)](#)
- [Login with Amazon \(Identity Pools\) \(p. 251\)](#)
- [Google \(Identity Pools\) \(p. 254\)](#)
- [Open ID Connect Providers \(Identity Pools\) \(p. 260\)](#)

- [SAML Identity Providers \(Identity Pools\) \(p. 262\)](#)

## Facebook (Identity Pools)

Amazon Cognito identity pools integrate 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 identity pools use 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 Federated Identities Console

Choose **Manage Federated Identities** from the [Amazon Cognito console home page](#):

1. Choose **Manage Federated Identities**.
2. Choose 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.
3. In the top-right corner of the **Dashboard** page, choose **Edit identity pool**. The **Edit identity pool** page appears.
4. Scroll down and choose **Authentication providers** to expand it.
5. Choose the **Facebook** tab.
6. Choose **Unlock**.
7. Enter the Facebook App ID you obtained from Facebook, and then choose **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 pools (federated identities).

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 pools (federated identities).

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 <LoginResult> () {
        HandleSuccess = loginResult = <LoginResult> {
            var accessToken = loginResult.AccessToken;
            credentials.AddLogin("graph.facebook.com", accessToken.Token);
            //open new activity
        },
        HandleCancel = () = <LoginResult> {
            //throw error message
        },
        HandleError = loginError = <LoginResult> {
            //throw error message
        }
    });
    LoginManager.Instance.LoginWithReadPermissions(this, new List <string> {
        "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
            }
        }
    );
}
```



```
});  
}
```

## Login with Amazon (Identity Pools)

Amazon Cognito integrates with Login with Amazon to provide federated authentication for your mobile application and web application users. This section explains how to register and set up your application using Login with Amazon as an identity provider.

There are two ways to set up Login with Amazon to work with Amazon Cognito. If you're not sure which one to use, or if you need to use both, see "Setting Up Login with Amazon" in the [Login with Amazon FAQ](#).

- Through the [Amazon Developer Portal](#). Use this method if you want to let your end users authenticate with Login with Amazon, but you don't have a Seller Central account.
- Through Seller Central using <http://login.amazon.com/>. Use this method if you are a retail merchant that uses Seller Central.

### Note

For Xamarin, follow the [Xamarin Getting Started Guide](#) to integrate Login with Amazon into your Xamarin application.

### Note

Login with 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.

## Setting Up Login with Amazon

To implement Login with Amazon, do one of the following:

- Create a Security Profile ID for your application through the [Amazon Developer Portal](#). Use this method if you want to let your end users authenticate with Amazon, but you don't have a Seller Central account. The Developer Portal [Login with Amazon](#) documentation 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. Make a note of the Security Profile ID, as you'll need to enter it as the Amazon App ID when you create an Amazon Cognito identity pool, as described in [Getting Credentials](#).
- Create an Application ID for your application through Seller Central using <http://login.amazon.com/>. Use this method if you are a retail merchant that uses Seller Central. The Seller Central [Login with Amazon](#) documentation 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. Make a note of the Application ID, as you'll need to enter it as the Amazon App ID when you create an Amazon Cognito identity pool, as described in [Getting Credentials](#).

## Configure the External Provider in the Amazon Cognito Console

Choose **Manage Federated Identities** from the [Amazon Cognito console home page](#):

1. Click the name of the identity pool for which you want to enable Login with 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 Login with Amazon: Android

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);
}
```

## Use Login with Amazon: iOS - Objective-C

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 };
    }
}
```

## Use Login with Amazon: iOS - Swift

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]
    }
}
```

## Use Login with Amazon: JavaScript

After the user authenticates with Login with Amazon and is redirected back to your website, the Login with 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'
    }
});
```

```
    }  
});
```

## Use Login with Amazon: Xamarin

### Xamarin 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 CGRect (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 : IAAuthenticationDelegate  
{  
    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 (Identity Pools)

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 more information on integrating Google into your Android app, see the [Google documentation for Android](#).

#### Configure the External Provider in the Amazon Cognito Console

Choose **Manage Federated Identities** from the [Amazon Cognito Console home page](#):

1. Click the name of the identity pool for which you want to enable Google 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 more information on integrating Google into your iOS app, see the [Google documentation for iOS](#).

Choose **Manage Federated Identities** 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 Google 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 more information on integrating Google into your iOS app, see the [Google documentation for iOS](#).

Choose **Manage Federated Identities** 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 Google 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

Choose **Manage Federated Identities** from the [Amazon Cognito Console home page](#):

1. Click the name of the identity pool for which you want to enable Google 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

Choose **Manage Federated Identities** from the [Amazon Cognito Console home page](#):

1. Click the name of the identity pool for which you want to enable Google 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](#).

## Open ID Connect Providers (Identity Pools)

[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, add the token to the logins map, using the URI of your provider as the key.

### 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](https://jwt.io) is a valuable resource for decoding tokens to verify these values.

## 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

To provide the OIDC id token to Amazon Cognito, implement the `AWSSignInProviderManager` protocol.

In the implementation of the `logins` method, return a dictionary containing the OIDC provider name you configured as the key and the current id token from the authenticated user as the value, as shown in the following code example.

```
class OIDCProvider: NSObject, AWSSignInProviderManager {
    func logins() -> AWSTask<NSDictionary> {
        let completion = AWSTaskCompletionSource<NSString>()
        getToken(tokenCompletion: completion)
        return completion.task.continueOnSuccessWith { (task) -> AWSTask<NSDictionary>? in
            //login.provider.name is the name of the OIDC provider as setup in the Cognito
            console
                return AWSTask(result:["login.provider.name":task.result!])
            } as! AWSTask<NSDictionary>
    }

    func getToken(tokenCompletion: AWSTaskCompletionSource<NSString>) -> Void {
        //get a valid oidc token from your server, or if you have one that hasn't expired
        cached, return it

        //TODO code to get token from your server
        //...

        //if error getting token, set error appropriately
        tokenCompletion.set(error:NSError(domain: "OIDC Login", code: -1 , userInfo:
["Unable to get OIDC token" : "Details about your error"]))
        //else
        tokenCompletion.set(result:"result from server id token")
    }
}
```

When you instantiate the `AWSCognitoCredentialsProvider`, pass the class that implements `AWSSignInProviderManager` as the value of `signInProviderManager` in the constructor. For more information, go to the [AWSCognitoCredentialsProvider](#) reference page and choose `initWithRegionType:identityPoolId:signInProviderManager`.

## 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);
```

# SAML Identity Providers (Identity Pools)

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. 226) 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 `AWSSignInManager` 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 (Identity Pools)

Amazon Cognito supports developer authenticated identities, in addition to web identity federation through [Facebook \(Identity Pools\) \(p. 246\)](#), [Google \(Identity Pools\) \(p. 254\)](#), and [Login with Amazon](#)

([Identity Pools](#)) (p. 251). 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 [Identity Pools \(Federated Identities\) Authentication Flow](#) (p. 226).

## Define a Developer Provider Name and Associate it with an Identity Pool

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, define a developer provider name in the **Custom** tab in **Authentication Providers**.
3. Alternatively, edit an existing identity pool and define a developer provider name in the **Custom** tab in **Authentication Providers**.

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. 3).

## Implement an Identity Provider

### Android

To use developer authenticated identities, implement your own identity provider class which extends `AWSAbstractCognitoDeveloperIdentityProvider`. Your identity provider class should return a response object containing the token as an attribute.

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](#). Your identity provider class should return a response object containing the token as an attribute.

```
@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](#). Your identity provider class should return a response object containing the token as an attribute.

```
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 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

After successfully authenticating the user with your authentication system, 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)

You obtain a token by calling [GetOpenIdTokenForDeveloperIdentity](#). This API must be invoked from your backend using 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 an 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 * 151);
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("graph.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 `AmazonCognitoEnhancedIdentityProvider` 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 Unauthenticated Users to Authenticated Users (Identity Pools)

Amazon Cognito identity pools support both authenticated and unauthenticated users. Unauthenticated users receive access to your AWS resources even if they aren't logged in with any of your identity providers (IdPs). This degree of access is useful to display content to users before they log in. Each unauthenticated user has a unique identity in the identity pool, even though they haven't been individually logged in and authenticated.

This section describes the case where your user chooses to switch from logging in with an unauthenticated identity to using an authenticated identity.

## Android

Users can log in to your application as unauthenticated guests. Eventually they might decide to log in using one of the supported IdPs. Amazon Cognito makes sure that an old identity retains the same unique identifier as the new one, and that the profile data is 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 log in to your application as unauthenticated guests. Eventually they might decide to log in using one of the supported IdPs. Amazon Cognito makes sure that an old identity retains the same unique identifier as the new one, and that the profile data is 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 log in to your application as unauthenticated guests. Eventually they might decide to log in using one of the supported IdPs. Amazon Cognito makes sure that an old identity retains the same unique identifier as the new one, and that the profile data is 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

### Initially Unauthenticated User

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

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

## Switch to Authenticated User

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

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

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

You can also create a `CognitoIdentityCredentials` object. If you do, you must reset the credentials properties of any existing service objects to reflect the updated credentials configuration information. See [Using the Global Configuration Object](#).

For more information about the `CognitoIdentityCredentials` object, see [AWS.CognitoIdentityCredentials](#) in the AWS SDK for JavaScript API Reference.

## Unity

Users can log in to your application as unauthenticated guests. Eventually they might decide to log in using one of the supported IdPs. Amazon Cognito makes sure that an old identity retains the same unique identifier as the new one, and that the profile data is merged automatically.

You can subscribe to the `IdentityChangedEvent` to be notified of profile merges:

```
credentialsProvider.IdentityChangedEvent += delegate(object sender,
    CognitoAWSCredentials.IdentityChangedEventArgs e)
{
    // handle the change
    Debug.log("Identity changed from " + e.OldIdentityId + " to " + e.NewIdentityId);
};
```

## Xamarin

Users can log in to your application as unauthenticated guests. Eventually they might decide to log in using one of the supported IdPs. Amazon Cognito makes sure that an old identity retains the same unique identifier as the new one, and that the profile data is merged automatically.

```
credentialsProvider.IdentityChangedEvent += delegate(object sender,
    CognitoAWSCredentials.IdentityChangedEventArgs e){
    // handle the change
    Console.WriteLine("Identity changed from " + e.OldIdentityId + " to " +
        e.NewIdentityId);
};
```

# Amazon Cognito Sync

## Note

If you're new to Amazon Cognito Sync, use [AWS AppSync](#). Like Amazon Cognito Sync, AWS AppSync is a service for synchronizing application data across devices.

It enables user data like app preferences or game state to be synchronized. It also extends these capabilities by allowing multiple users to synchronize and collaborate in real time on shared data.

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

- [Getting Started with Amazon Cognito Sync \(p. 277\)](#)
- [Synchronizing Data \(p. 278\)](#)
- [Handling Callbacks \(p. 285\)](#)
- [Push Sync \(p. 297\)](#)
- [Amazon Cognito Streams \(p. 303\)](#)
- [Amazon Cognito Events \(p. 305\)](#)

## Getting Started with Amazon Cognito Sync

## Note

If you're new to Amazon Cognito Sync, use [AWS AppSync](#). Like Amazon Cognito Sync, AWS AppSync is a service for synchronizing application data across devices.

It enables user data like app preferences or game state to be synchronized. It also extends these capabilities by allowing multiple users to synchronize and collaborate in real time on shared data.

Amazon Cognito Sync is an AWS service and client library that enable cross-device syncing of application-related user data. You can use it to synchronize user profile data across mobile devices and web applications. 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.

## Sign Up for an AWS Account

To use Amazon Cognito Sync, 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 <https://aws.amazon.com/>, and then choose **Create an AWS Account**.

#### Note

This might be unavailable in your browser if you previously signed into the AWS Management Console. In that case, choose **Sign in to a different account**, and then choose **Create a new 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.

## Set Up an Identity Pool in Amazon Cognito

Amazon Cognito Sync requires an Amazon Cognito identity pool to provide user identities. Thus you need to first set up an identity pool before using Amazon Cognito Sync. Follow the [Getting Started with Amazon Cognito Identity Pools \(Federated Identities\) \(p. 219\)](#) guide to create an identity pool and install the SDK.

## Store and Sync Data

Once you have set up your identity pool and installed the SDK, you can start storing and syncing data between devices. See [Synchronizing Data \(p. 278\)](#) for more information.

## Synchronizing Data

#### Note

If you're new to Amazon Cognito Sync, use [AWS AppSync](#). Like Amazon Cognito Sync, AWS AppSync is a service for synchronizing application data across devices.

It enables user data like app preferences or game state to be synchronized. It also extends these capabilities by allowing multiple users to synchronize and collaborate in real time on shared 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 in [Getting Credentials \(p. 238\)](#).
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 in [Getting Credentials \(p. 238\)](#).
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 in [Getting Credentials \(p. 238\)](#).
2. Import and initialize `AWSCognito`:

```
import AWSCognito  
let syncClient = AWSCognito.default()!
```

## 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 in [Getting Credentials \(p. 238\)](#).
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 in [Getting Credentials \(p. 238\)](#).

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 in [Getting Credentials \(p. 238\)](#).
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.

Note that values written to a dataset only affect the local cached copy of the data until you call the `synchronize` method.

## 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");
```

# 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. 285).

## 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 \(p. 285\)](#).

## 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().continueWith(block: { (task) -> AnyObject? in

    if task.isCancelled {
        // Task cancelled.
    } else if task.error != nil {
        // Error while executing task
    } else {
        // Task succeeded. The data was saved in the sync store.
    }
    return task
})
```

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 \(p. 285\)](#).

## 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 \(p. 285\)](#).

## 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 \(p. 285\)](#).

## 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 \(p. 285\)](#).

# Handling Callbacks

### Note

If you're new to Amazon Cognito Sync, use [AWS AppSync](#). Like Amazon Cognito Sync, AWS AppSync is a service for synchronizing application data across devices.

It enables user data like app preferences or game state to be synchronized. It also extends these capabilities by allowing multiple users to synchronize and collaborate in real time on shared data.

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.');
```

### **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 synchronization 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(); //Asynchronously 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

### Note

If you're new to Amazon Cognito Sync, use [AWS AppSync](#). Like Amazon Cognito Sync, AWS AppSync is a service for synchronizing application data across devices.

It enables user data like app preferences or game state to be synchronized. It also extends these capabilities by allowing multiple users to synchronize and collaborate in real time on shared data.

Amazon Cognito automatically tracks the association between identity and devices. Using the push synchronization, or 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 for JavaScript, Unity, or Xamarin.

Before you can use push sync, you must first set up your account for push sync and enable push sync in the Amazon Cognito console.

## 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 **Manage Federated Identities**. The **Federated Identities** 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: Android

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.

## Use Push Sync in Your App: iOS - Objective-C

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.

## Use Push Sync in Your App: iOS - Swift

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.default()
syncClient.registerDevice(devToken).continueWith(block: { (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 task
})
```

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().continueWith(block: { (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 task
})
```

To stop receiving push notifications from a dataset, call the `unsubscribe` method:

```
syncClient.openOrCreateDataset("MyDataset").unsubscribe().continueWith(block: { (task:
AWSSTask!) -> AnyObject! in
    if (task.error != nil) {
        print("Unable to unsubscribe to dataset: " + task.error.localizedDescription)

    } else {
        print("Successfully unsubscribed to dataset: \(task.result)")
    }
    return task
})
```

To subscribe to all datasets in the `AWSCognito` object, call `subscribeAll`:

```
syncClient.openOrCreateDataset("MyDataset").subscribeAll().continueWith(block: { (task:
AWSSTask!) -> 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 task
})
```

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) {

    NotificationCenter.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 ...

```
NotificationCenter.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.

## Amazon Cognito Streams

### Note

If you're new to Amazon Cognito Sync, use [AWS AppSync](#). Like Amazon Cognito Sync, AWS AppSync is a service for synchronizing application data across devices.

It enables user data like app preferences or game state to be synchronized. It also extends these capabilities by allowing multiple users to synchronize and collaborate in real time on shared data.

Amazon Cognito Streams gives developers control and insight into their data stored in Amazon Cognito. Developers can now configure a Kinesis stream to receive events as data is updated and synchronized. Amazon Cognito can push each dataset change to a Kinesis stream you own in real time.

Using Amazon Cognito Streams, you can move all of your Sync data to Kinesis, which can then be streamed to a data warehouse tool such as Amazon Redshift for further analysis. To learn more about 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 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 **Manage Federated Identities**. The Manage Federated Identities 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 [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 Kinesis maximum payload size of 50 KB, a presigned Amazon S3 URL will be included that contains the full contents of the update.

After you have configured Amazon Cognito streams, if you delete the Kinesis stream or change the role trust permission so that it can no longer be assumed by Amazon Cognito Sync, Amazon Cognito streams will be disabled. You will need to either recreate the Kinesis stream or fix the role, and then you will need to reenable the stream.

### 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

### Note

If you're new to Amazon Cognito Sync, use [AWS AppSync](#). Like Amazon Cognito Sync, AWS AppSync is a service for synchronizing application data across devices.

It enables user data like app preferences or game state to be synchronized. It also extends these capabilities by allowing multiple users to synchronize and collaborate in real time on shared data.

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.

### Note

When using Amazon Cognito events, you can only use the credentials obtained from Amazon Cognito Identity. If you have an associated Lambda function, but you call `updateRecords` with AWS account credentials (developer credentials), your Lambda function will not be invoked.

### 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:

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 Manage Federated Identities. The Manage Federated Identities 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.

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.

### 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.
- If you get a `LambdaThrottledException` exception, you should retry the sync operation (update records).
- 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);
};
```

# Limits in Amazon Cognito

The following tables provide the soft (default) limits for Amazon Cognito, which are limits that can be changed. For information about these limits and how to change them, see [AWS Service Limits](#).

## Soft Limits in Amazon Cognito User Pools

Resource	Default Limit
Maximum number of apps per user pool	25
Maximum number of user pools per account	60
Maximum number of user import jobs per user pool	50
Maximum number of groups per user pool	25
Maximum number of identity providers per user pool	25
Maximum number of resource servers per user pool	25

API Limits (requests per second)	Default Limit
AdminInitiateAuth	20
AdminRespondToAuthChallenge	20
<ul style="list-style-type: none"><li>AdminAddUserToGroup</li><li>AdminRemoveUserFromGroup</li><li>AdminListGroupsForUser</li></ul>	10
User authentication operations such as SignUp, InitiateAuth (sign in), and ForgotPassword.	10
Create, Update and Delete APIs for: <ul style="list-style-type: none"><li>UserPool</li><li>UserPoolClient</li><li>UserImportJob</li><li>UserPoolDomain</li><li>IdentityProvider</li><li>ResourceServer</li></ul>	1
Describe APIs for: <ul style="list-style-type: none"><li>UserPool</li><li>UserPoolClient</li><li>UserImportJob</li><li>UserPoolDomain</li></ul>	5

API Limits (requests per second)	Default Limit
List APIs for: <ul style="list-style-type: none"><li>UserPool</li><li>UserPoolClients</li><li>UserImportJobs</li><li>Users</li></ul>	5
SetUICustomization, AddCustomAttributes	1
Admin APIs not listed above.	5

**Soft Limits in Amazon Cognito Identity Pools (Federated Identities)**

Resource	Default Limit
Maximum number of identity pools per account	60
Maximum Amazon Cognito user pool providers per identity pool	10
Maximum number of rules for role-based access control (RBAC)	25

**Soft Limits in Amazon Cognito Sync**

Resource	Default Limit
Maximum number of datasets per identity	20
Maximum number of records per dataset	1024
Maximum size of a single dataset	1 MB

The following tables describe Amazon Cognito hard limits, which are limits that cannot be changed.

**Hard Limits in Amazon Cognito User Pools**

Resource	Limit
Maximum number of custom attributes per user pool	25
Maximum characters per attribute	2048 bytes
Maximum character length for custom attribute name	20
Min/max password policy length	Between 6 and 99, inclusive
Maximum characters in email subject	140
Maximum character in email message	20,000

Resource	Limit
Maximum characters in SMS verification message	140
Maximum characters in password	256
Maximum character length for identity provider name	40
Maximum identifiers per identity provider	50
Maximum callback URLs per identity provider	100
Maximum logout URLs per identity provider	100
Maximum number of scopes per resource server	60
Maximum number of custom domains per account	4

**Hard Limits on Token Validity in Amazon Cognito User Pools**

Resource	Limit
ID token	1 hour
Refresh token	Between 1 day and 3650 days, inclusive

**Hard Limits on Code Validity in Amazon Cognito User Pools**

Resource	Limit
Sign-up confirmation code	24 hours
User attribute verification code validity	24 hours
Multi-factor authentication code	3 minutes
Forgot password code	1 hour

**Hard Limits in Amazon Cognito Identity Pools (Federated Identities)**

Resource	Limit
Maximum number of identities per identity pool	Unlimited
Maximum character length for identity pool name	128 bytes
Maximum character length for login provider name	2048 bytes
Maximum number of results from a single List/ Lookup API call	60

**Hard Limits in Amazon Cognito Sync**

Resource	Limit
Maximum character length for dataset name	128 bytes
Minimum waiting time for a bulk publish after a successful request	24 hours

# Amazon Cognito API References

For information about Amazon Cognito API references, see the following topics:

## Topics

- [Amazon Cognito User Pools API Reference \(p. 312\)](#)
- [Amazon Cognito User Pools Auth API Reference \(p. 312\)](#)
- [Amazon Cognito Identity Pools \(Federated Identities\) API Reference \(p. 323\)](#)
- [Amazon Cognito Sync API Reference \(p. 323\)](#)

## Amazon Cognito User Pools API Reference

With Amazon Cognito user pools, you can enable your web and mobile app users to sign up and sign in. You can change passwords for authenticated users and initiate forgotten password flows for unauthenticated users. For more information, see [User Pool Authentication Flow \(p. 182\)](#) and [Using Tokens with User Pools \(p. 186\)](#).

For a complete user pool API reference see [Amazon Cognito User Pools API Reference](#).

## Amazon Cognito User Pools Auth API Reference

Once a domain has been configured for your user pool, Amazon Cognito hosts an authentication server that allows you to add sign-up and sign-in webpages to your app. For more information see [Add an app to enable the hosted UI](#).

This section contains the HTTPS contract to the Amazon Cognito authentication server from a user pool client, including sample requests and responses. It describes the expected behavior from the authentication server for positive and negative conditions.

In addition to the server contract REST API, Amazon Cognito also provides Auth SDKs for Android, iOS, and JavaScript that make it easier to form requests and interact with the server. Learn more about the [Amazon Cognito SDKs](#).

For more information on the specification see [OpenID Connect 1.0](#) and [OAuth 2.0](#).

## Topics

- [AUTHORIZATION Endpoint \(p. 312\)](#)
- [TOKEN Endpoint \(p. 316\)](#)
- [USERINFO Endpoint \(p. 320\)](#)
- [LOGIN Endpoint \(p. 321\)](#)
- [LOGOUT Endpoint \(p. 322\)](#)

## AUTHORIZATION Endpoint

The `/oauth2/authorize` endpoint signs the user in.

## GET /oauth2/authorize

The /oauth2/authorize endpoint only supports `HTTPS GET`. The user pool client typically makes this request through a browser. Web browsers include Chrome or Firefox. Android browsers include Custom Chrome Tab. iOS browsers include Safari View Control.

The authorization server requires `HTTPS` instead of `HTTP` as the protocol when accessing the authorization endpoint. For more information on the specification see [Authorization Endpoint](#).

### Request Parameters

#### *response\_type*

The response type. Must be `code` or `token`. Indicates whether the client wants an authorization code (authorization code grant flow) for the end user or directly issues tokens for end user (implicit flow).

Required

#### *client\_id*

The Client ID.

Must be a pre-registered client in the user pool and must be enabled for federation.

Required

#### *redirect\_uri*

The URL to which the authentication server redirects the browser after authorization has been granted by the user.

A redirect URI must:

- Be an absolute URI.
- Be pre-registered with a client.
- Not include a fragment component.

See [OAuth 2.0 - Redirection Endpoint](#).

Amazon Cognito requires `HTTPS` over `HTTP` except for `http://localhost` for testing purposes only.

App callback URLs such as `myapp://example` are also supported.

Required

#### *state*

An opaque value the clients adds to the initial request. The authorization server includes this value when redirecting back to the client.

This value must be used by the client to prevent [CSRF](#) attacks.

Optional but strongly recommended.

#### *identity\_provider*

Used by the developer to directly authenticate with a specific provider.

- For social sign-in the valid values are **Facebook**, **Google**, and **LoginWithAmazon**.
- For Amazon Cognito user pools, the value is **COGNITO**.

- For other identity providers this would be the name you assigned to the IdP in your user pool.

Optional

*idp\_identifier*

Used by the developer to map to a provider name without exposing the provider name.

Optional

*scope*

Can be a combination of any system-reserved scopes or custom scopes associated with a client. Scopes must be separated by spaces. System reserved scopes are `openid`, `email`, `phone`, `profile`, and `aws:cognito.signin.user.admin`. Any scope used must be preassociated with the client or it will be ignored at runtime.

If the client doesn't request any scopes, the authentication server uses all scopes associated with the client.

An ID token is only returned if `openid` scope is requested. The access token can be only used against Amazon Cognito User Pools if `aws:cognito.signin.user.admin` scope is requested. The `phone`, `email`, and `profile` scopes can only be requested if `openid` scope is also requested. These scopes dictate the claims that go inside the ID token.

Optional

*code\_challenge\_method*

The method used to generate the challenge. The [PKCE RFC](#) defines two methods, S256 and plain; however, Amazon Cognito authentication server supports only S256.

Optional

*code\_challenge*

The generated challenge from the `code_verifier`.

Required only when the `code_challenge_method` is specified.

## Examples Requests with Positive Responses

### Authorization Code Grant

#### Sample Request

```
GET https://mydomain.auth.us-east-1.amazoncognito.com/oauth2/authorize?
response_type=code&
client_id=ad398u21ijw3s9w3939&
redirect_uri=https://YOUR_APP/redirect_uri&
state=STATE&
scope=openid+profile+aws:cognito.signin.user.admin
```

#### Sample Response

The Amazon Cognito authentication server redirects back to your app with the authorization code and state. The code and state must be returned in the query string parameters and not in the fragment. A query string is the part of a web request that appears after a '?' character; the string can contain one or more parameters separated by '&' characters. A fragment is the part of a web request that appears after a '#' character to specify a subsection of a document.



```
HTTP/1.1 302 Found
Location: https://YOUR_APP/redirect_uri?code=AUTHORIZATION_CODE&state=STATE
```

## Authorization Code Grant with PKCE

### Sample Request

```
GET https://mydomain.auth.us-east-1.amazoncognito.com/oauth2/authorize?
response_type=code&
client_id=ad398u21ijw3s9w3939&
redirect_uri=https://YOUR_APP/redirect_uri&
state=STATE&
scope=aws.cognito.signin.user.admin&
code_challenge_method=S256&
code_challenge=CODE_CHALLENGE
```

### Sample Response

The authentication server redirects back to your app with the authorization code and state. The code and state must be returned in the query string parameters and not in the fragment.

```
HTTP/1.1 302 Found
Location: https://YOUR_APP/redirect_uri?code=AUTHORIZATION_CODE&state=STATE
```

## Token grant without openid scope

### Sample Request

```
GET https://mydomain.auth.us-east-1.amazoncognito.com/oauth2/authorize?
response_type=token&
client_id=ad398u21ijw3s9w3939&
redirect_uri=https://YOUR_APP/redirect_uri&
state=STATE&
scope=aws.cognito.signin.user.admin
```

### Sample Response

The Amazon Cognito authorization server redirects back to your app with access token. Since openid scope was not requested, an ID token is not returned. A refresh token is never returned in this flow. Token and state are returned in the fragment and not in the query string.

```
HTTP/1.1 302 Found
Location: https://YOUR_APP/
redirect_uri#access_token=ACCESS_TOKEN&token_type=bearer&expires_in=3600&state=STATE
```

## Token grant with openid scope

### Sample Request

```
GET https://mydomain.auth.us-east-1.amazoncognito.com/oauth2/
authorize?
response_type=token&
client_id=ad398u21ijw3s9w3939&
redirect_uri=https://YOUR_APP/redirect_uri&
state=STATE&
```

```
scope=aws.cognito.signin.user.admin+openid+profile
```

### Sample Response

The authorization server redirects back to your app with access token and ID token (because openid scope was included).

```
HTTP/1.1 302 Found
Location: https://YOUR_APP/
redirect_ur#id_token=ID_TOKEN&access_token=ACCESS_TOKEN&token_type=bearer&expires_in=3600&state=STATE
```

## Examples of Negative Responses

The following are examples of negative responses:

- If `client_id` and `redirect_uri` are valid but there are other problems with the request parameters (for example, if `response_type` is not included; if `code_challenge` is supplied but `code_challenge_method` is not supplied; or if `code_challenge_method` is not 'S256'), the authentication server redirects the error to client's `redirect_uri`.

```
HTTP 1.1 302 Found Location: https://client_redirect_uri?
error=invalid_request
```

- If the client requests 'code' or 'token' in `response_type` but does not have permission for these requests, the Amazon Cognito authorization server should return `unauthorized_client` to client's `redirect_uri`, as follows:

```
HTTP 1.1 302 Found Location: https://client_redirect_uri?
error=unauthorized_client
```

- If the client requests invalid, unknown, malformed scope, the Amazon Cognito authorization server should return `invalid_scope` to the client's `redirect_uri`, as follows:

```
HTTP 1.1 302 Found Location: https://client_redirect_uri?error=invalid_scope
```

- If there is any unexpected error in the server, the authentication server should return `server_error` to client's `redirect_uri`. It should not be the HTTP 500 error displayed to the end user in the browser, because this error doesn't get sent to the client. The following error should return:

```
HTTP 1.1 302 Found Location: https://client_redirect_uri?error=server_error
```

## TOKEN Endpoint

The `/oauth2/token` endpoint gets the user's tokens.

### POST /oauth2/token

The `/oauth2/token` endpoint only supports `HTTPS POST`. The user pool client makes requests to this endpoint directly and not through the system browser.

For more information on the specification see [Token Endpoint](#).

### Request Parameters in Header

#### Authorization

If the client was issued a secret, the client must pass its `client_id` and `client_secret` in the authorization header through Basic HTTP authorization. The secret is [Basic](#) `Base64Encode(client_id:client_secret)`.

### *Content-Type*

Must always be 'application/x-www-form-urlencoded'.

## Request Parameters in Body

### *grant\_type*

Grant type.

Must be `authorization_code` or `refresh_token` or `client_credentials`.

Required

### *client\_id*

Client ID.

Must be a preregistered client in the user pool. The client must be enabled for Amazon Cognito federation.

Required if the client is public and does not have a secret.

### *scope*

Can be a combination of any custom scopes associated with a client. Any scope requested must be preassociated with the client or it will be ignored at runtime. If the client doesn't request any scopes, the authentication server uses all custom scopes associated with the client.

Optional. Only used if the `grant_type` is `client_credentials`.

### *redirect\_uri*

Must be the same `redirect_uri` that was used to get `authorization_code` in `/oauth2/authorize`.

Required only if `grant_type` is `authorization_code`.

### *refresh\_token*

The refresh token.

#### **Note**

The refresh token is defined in the specification, but is not currently implemented to be returned from the [Token Endpoint](#).

### *code*

Required if `grant_type` is `authorization_code`.

### *code\_verifier*

The proof key.

Required if `grant_type` is `authorization_code` and the authorization code was requested with PKCE.

## Examples Requests with Positive Responses

### Exchanging an Authorization Code for Tokens

#### Sample Request

```
POST https://mydomain.auth.us-east-1.amazonaws.com/oauth2/token&
```

```
Content-Type='application/x-www-form-urlencoded'&
Authorization=Basic aSdx892iujendek328uedj
```

```
grant_type=authorization_code&
client_id=djc98u3jiedmi283eu928&
code=AUTHORIZATION_CODE&
redirect_uri=com.myclientapp://myclient/redirect
```

### Sample response

```
HTTP/1.1 200 OK
Content-Type: application/json
```

```
{
  "access_token": "eyJz9sdfsd fsdfsd",
  "refresh_token": "dn43ud8uj32nk2je",
  "id_token": "dmcxd329ujdmkemkd349r",
  "token_type": "Bearer",
  "expires_in": 3600
}
```

### Note

The refresh token is defined in the specification, but is not currently implemented to be returned from the [Token Endpoint](#).

## Exchanging Client Credentials for an Access Token

### Sample Request

```
POST https://mydomain.auth.us-east-1.amazonaws.com/oauth2/token >
Content-Type='application/x-www-form-urlencoded'&
Authorization=Basic aSdx892iujendek328uedj

grant_type=client_credentials&
scope={resourceServerIdentifier1}/{scope1} {resourceServerIdentifier2}/{scope2}
```

### Sample response

```
HTTP/1.1 200 OK
Content-Type: application/json
```

```
{
  "access_token": "eyJz9sdfsd fsdfsd",
  "token_type": "Bearer",
  "expires_in": 3600
}
```

## Exchanging an Authorization Code Grant with PKCE for Tokens

### Sample Request

```
POST https://mydomain.auth.us-east-1.amazonaws.com/oauth2/token
Content-Type='application/x-www-form-urlencoded'&
Authorization=Basic aSdx892iujendek328uedj

grant_type=authorization_code&
client_id=djc98u3jiedmi283eu928&
code=AUTHORIZATION_CODE&
code_verifier=CODE_VERIFIER&
redirect_uri=com.myclientapp://myclient/redirect
```

### Sample response

```
HTTP/1.1 200 OK
Content-Type: application/json

{
  "access_token": "eyJz9sdfsdfsdfs",
  "refresh_token": "dn43ud8uj32nk2je",
  "id_token": "dmcxd329ujdmkemkd349r",
  "token_type": "Bearer",
  "expires_in": 3600
}
```

#### Note

The refresh token is defined in the specification, but is not currently implemented to be returned from the [Token Endpoint](#).

### Exchanging a Refresh Token for Tokens

#### Sample Request

```
POST https://mydomain.auth.us-east-1.amazonaws.com/oauth2/token >
Content-Type='application/x-www-form-urlencoded'
Authorization=Basic aSdx892iujendek328uedj

grant_type=refresh_token&
client_id=djc98u3jiedmi283eu928&
refresh_token=REFRESH_TOKEN
```

#### Sample Response

```
HTTP/1.1 200 OK
Content-Type: application/json

{
  "access_token": "eyJz9sdfsdfsdfs",
  "refresh_token": "dn43ud8uj32nk2je",
  "id_token": "dmcxd329ujdmkemkd349r",
  "token_type": "Bearer",
  "expires_in": 3600
}
```

#### Note

The refresh token is defined in the specification, but is not currently implemented to be returned from the [Token Endpoint](#).

### Examples of Negative Responses

#### Sample Error Response

```
HTTP/1.1 400 Bad Request
Content-Type: application/json; charset=UTF-8

{
  "error": "invalid_request|invalid_client|invalid_grant|unauthorized_client|
  unsupported_grant_type|"
}
```

#### *invalid\_request*

The request is missing a required parameter, includes an unsupported parameter value (other than `unsupported_grant_type`), or is otherwise malformed. For example, `grant_type` is `refresh_token` but `refresh_token` is not included.

#### *invalid\_client*

Client authentication failed. For example, when the client includes `client_id` and `client_secret` in the authorization header, but there's no such client with that `client_id` and `client_secret`.

#### *invalid\_grant*

Refresh token has been revoked.

Authorization code has been consumed already or does not exist.

#### *unauthorized\_client*

Client is not allowed for code grant flow or for refreshing tokens.

#### *unsupported\_grant\_type*

Returned if `grant_type` is anything other than `authorization_code` or `refresh_token`.

## USERINFO Endpoint

The `/oauth2/userInfo` endpoint returns information about the authenticated user.

### GET `/oauth2/userInfo`

The user pool client makes requests to this endpoint directly and not through a browser.

For more information see [UserInfo Endpoint](#) in the OpenID Connect (OIDC) specification.

#### Topics

- [Request Parameters in Header](#) (p. 320)
- [Sample Request](#) (p. 320)
- [Sample Positive Response](#) (p. 320)
- [Sample Negative Responses](#) (p. 321)

## Request Parameters in Header

**Authorization:** Bearer `<access_token>`

Pass the access token using the authorization header field.

Required

## Sample Request

```
GET https://<your-user-pool-domain>/oauth2/userInfo
Authorization: Bearer <access_token>
```

## Sample Positive Response

```
HTTP/1.1 200 OK
```

```
Content-Type: application/json;charset=UTF-8
{
  "sub": "248289761001",
  "name": "Jane Doe",
  "given_name": "Jane",
  "family_name": "Doe",
  "preferred_username": "j.doe",
  "email": "janedoe@example.com"
}
```

For a list of OIDC claims see [Standard Claims](#).

## Sample Negative Responses

### Invalid Request

```
HTTP/1.1 400 Bad Request
WWW-Authenticate: error="invalid_request",
  error_description="Bad OAuth2 request at UserInfo Endpoint"
```

#### *invalid\_request*

The request is missing a required parameter, includes an unsupported parameter value, or is otherwise malformed.

### Invalid Token

```
HTTP/1.1 401 Unauthorized
WWW-Authenticate: error="invalid_token",
  error_description="Access token is expired, disabled, or deleted, or the user has globally signed out."
```

#### *invalid\_token*

The access token is expired, revoked, malformed, or invalid.

## LOGIN Endpoint

The `/login` endpoint signs the user in. It loads the login page and presents the authentication options configured for the client to the user.

### GET `/login`

The `/login` endpoint only supports `HTTPS GET`. The user pool client makes this request through a system browser. System browsers for JavaScript include Chrome or Firefox. Android browsers include Custom Chrome Tab. iOS browsers include Safari View Control.

### Request Parameters

#### *client\_id*

The app client ID for your app. To obtain an app client ID, register the app in the user pool. For more information, see [Configuring a User Pool App Client \(p. 210\)](#).

Required

#### *redirect\_uri*

The URI where the user is redirected after a successful authentication. It should be configured on `response_type` of the specified `client_id`.

Required

#### *response\_type*

The OAuth response type, which can be `code` for code grant flow and `token` for implicit flow.

Required

#### *state*

An opaque value the client adds to the initial request. The value is then returned back to the client upon redirect.

This value must be used by the client to prevent [CSRF](#) attacks.

Optional but strongly recommended.

#### *scope*

Can be a combination of any system-reserved scopes or custom scopes associated with a client. Scopes must be separated by spaces. System reserved scopes are `openid`, `email`, `phone`, `profile`, and `aws.cognito.signin.user.admin`. Any scope used must be preassociated with the client or it is ignored at runtime.

If the client doesn't request any scopes, the authentication server uses all scopes associated with the client.

An ID token is only returned if an `openid` scope is requested. The access token can only be used against Amazon Cognito user pools if an `aws.cognito.signin.user.admin` scope is requested. The `phone`, `email`, and `profile` scopes can only be requested if an `openid` scope is also requested. These scopes dictate the claims that go inside the ID token.

Optional

### Sample Request: Prompt the User to Sign in

This example displays the login screen.

```
GET https://mydomain.auth.us-east-1.amazonaws.com/login?
response_type=code&
client_id=ad398u21ijw3s9w3939&
redirect_uri=https://YOUR_APP/redirect_uri&
state=STATE&
scope=openid+profile+aws.cognito.signin.user.admin
```

## LOGOUT Endpoint

The `/logout` endpoint signs the user out.

### GET /logout

The `/logout` endpoint only supports `HTTPS GET`. The user pool client typically makes this request through the system browser, which would typically be Custom Chrome Tab in Android and Safari View Control in iOS.



## Request Parameters

*client\_id*

The app client ID for your app. To obtain an app client ID, you must register the app in the user pool. For more information, see [Configuring a User Pool App Client \(p. 210\)](#).

Optional

*logout\_uri*

A sign-out URL that you registered for your client app. For more information, see [Configuring a User Pool App Client \(p. 76\)](#).

Optional

## Sample Requests

### Example #1: Logout and Redirect Back to Client

This example clears out the existing session and redirects back to the client. Both parameters are required.

```
GET https://mydomain.auth.us-east-1.amazoncognito.com/logout?
client_id=ad398u21ijw3s9w3939&
logout_uri=com.myclientapp://myclient/logout
```

### Example #2: Logout and Prompt the User to Sign In As Another User

This example clears out the existing session and shows the login screen, using the same parameters as for GET /oauth2/authorize.

```
GET https://mydomain.auth.us-east-1.amazoncognito.com/logout?
response_type=code&
client_id=ad398u21ijw3s9w3939&
redirect_uri=https://YOUR_APP/redirect_uri&
state=STATE&
scope=openid+profile+aws.cognito.signin.user.admin
```

# Amazon Cognito Identity Pools (Federated Identities) API Reference

With an Amazon Cognito identity pool, your web and mobile app users can obtain temporary, limited-privilege AWS credentials enabling them to access other AWS services.

For a complete identity pools (federated identities) API reference see [Amazon Cognito API Reference](#).

## Amazon Cognito Sync API Reference

[Amazon Cognito Sync API Reference](#)

# Logging Amazon Cognito API Calls with AWS CloudTrail

Amazon Cognito is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in Amazon Cognito. CloudTrail captures a subset of API calls for Amazon Cognito as events, including calls from the Amazon Cognito console and from code calls to the Amazon Cognito APIs. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for Amazon Cognito. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in **Event history**. Using the information collected by CloudTrail, you can determine the request that was made to Amazon Cognito, the IP address from which the request was made, who made the request, when it was made, and additional details.

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

CloudTrail is enabled on your AWS account when you create the account. When supported event activity occurs in Amazon Cognito, that activity is recorded in a CloudTrail event along with other AWS service events in **Event history**. You can view, search, and download recent events in your AWS account. For more information, see [Viewing Events with CloudTrail Event History](#).

For an ongoing record of events in your AWS account, including events for Amazon Cognito, create a trail. A trail enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all regions. The trail logs events from all regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see:

- [Overview for Creating a Trail](#)
- [CloudTrail Supported Services and Integrations](#)
- [Configuring Amazon SNS Notifications for CloudTrail](#)
- [Receiving CloudTrail Log Files from Multiple Regions](#) and [Receiving CloudTrail Log Files from Multiple Accounts](#)

Amazon Cognito supports logging the following actions as events in CloudTrail log files:

### Amazon Cognito User Pools

- [AddCustomAttributes](#)
- [CreateUserImportJob](#)
- [CreateUserPool](#)
- [CreateUserPoolClient](#)
- [DeleteUserPool.html](#)
- [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 event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or IAM user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.
- Whether the request was made by another AWS service.

For more information, see the [CloudTrail userIdentity Element](#).

## **Example: Amazon Cognito Log File Entries**

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from

any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files 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": "0000000000000000"
    }
  },
  "responseElements": {
    "identityPoolName": "TestPool",
    "identityPoolId": "us-east-1:1cf667a2-49a6-454b-9e45-23199EXAMPLE",
    "allowUnauthenticatedIdentities": true,
    "supportedLoginProviders": {
      "graph.facebook.com": "0000000000000000"
    }
  },
  "requestID": "15cc73a1-0780-460c-91e8-e12ef034e116",
  "eventID": "f1d47f93-c708-495b-bff1-cb935a6064b2",
  "eventType": "AwsApiCall",
  "recipientAccountId": "123456789012"
}
```

# Resource Permissions

This section covers restricting access to Amazon Cognito resources via AWS Identity and Access Management (IAM). For more information about using identity pools together with user pool groups to control access your AWS resources see [Adding Groups to a User Pool \(p. 165\)](#) and [Role-Based Access Control \(p. 234\)](#). See [Identity Pools Concepts \(Federated Identities\) \(p. 225\)](#) for more information about identity pools and IAM.

## Amazon Resource Names (ARNs)

### ARNs for Amazon Cognito Federated Identities

In Amazon Cognito identity pools (federated identities), it is possible to restrict an IAM user's access to a specific identity pool, using the Amazon Resource Name (ARN) format, as in the following example. For more information about ARNs, see [IAM Identifiers](#).

```
arn:aws:cognito-identity:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID
```

### ARNs for Amazon Cognito Sync

In Amazon Cognito Sync, customers can also restrict access by the identity pool ID, identity ID, and dataset name.

For APIs that operate on an identity pool, the identity pool ARN format is the same as for Amazon Cognito Federated Identities, except that the service name is `cognito-sync` instead of `cognito-identity`:

```
arn:aws:cognito-sync:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID
```

For APIs that operate on a single identity, such as `RegisterDevice`, you can refer to the individual identity by the following ARN format:

```
arn:aws:cognito-sync:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID/identity/IDENTITY_ID
```

For APIs that operate on datasets, such as `UpdateRecords` and `ListRecords`, you can refer to the individual dataset using the following ARN format:

```
arn:aws:cognito-sync:REGION:ACCOUNT_ID:identitypool/IDENTITY_POOL_ID/identity/IDENTITY_ID/  
dataset/DATASET_NAME
```

### ARNs for Amazon Cognito Your User Pools

For Amazon Cognito Your User Pools, it is possible to restrict an IAM user's access to a specific user pool, using the following ARN format:

```
arn:aws:cognito-idp:REGION:ACCOUNT_ID:userpool/USER_POOL_ID
```

## 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"
    }
  ]
}
```

#### Allowing 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.

**Note**

Because creating a new identity pool also requires creating IAM roles, any IAM user you want to be able to create new identity pools with must have the admin policy applied as well.

## Signed versus 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 therefore cannot be restricted via an IAM policy:

### Amazon Cognito Federated Identities

- `GetId`
- `GetOpenIdToken`
- `GetCredentialsForIdentity`
- `UnlinkIdentity`

### Amazon Cognito Your User Pools

- `ChangePassword`
- `ConfirmDevice`
- `ConfirmForgotPassword`
- `ConfirmSignUp`
- `DeleteUser`
- `DeleteUserAttributes`
- `ForgetDevice`
- `ForgotPassword`
- `GetDevice`
- `GetUser`
- `GetUserAttributeVerificationCode`
- `GlobalSignOut`
- `InitiateAuth`
- `ListDevices`
- `ResendConfirmationCode`
- `RespondToAuthChallenge`
- `SetUserSettings`
- `SignUp`
- `UpdateDeviceStatus`
- `UpdateUserAttributes`
- `VerifyUserAttribute`

# Document History for Amazon Cognito

The following table describes the documentation for this release of Amazon Cognito.

- **Original API versions:**

Amazon Cognito User Pools: 2016-04-18

Amazon Cognito Federated Identities: 2014-06-30

Amazon Cognito Sync: 2014-06-30

- **Latest documentation update:** June 14, 2018

Change	Description	Date
Amazon Cognito Advanced Security	Added new security features to enable developers to protect their apps and users from malicious bots, secure user accounts against compromised credentials, and automatically adjust the challenges required to sign in based on the calculated risk of the sign in attempt.	June 14, 2018
Custom Domains for Amazon Cognito Hosted UI	Allow developers to use their own fully custom domain for the hosted UI in Amazon Cognito User Pools.	June 4, 2018
Amazon Cognito User Pools OIDC Identity Provider	Added user pool sign-in through an OpenID Connect (OIDC) identity provider such as Salesforce or Ping Identity.	May 17, 2018
Amazon Cognito Developer Guide Update	Added top level "What is Amazon Cognito" and "Getting Started with Amazon Cognito". Also added common scenarios and reorganized the user pools TOC. Added a new "Getting Started with Amazon Cognito User Pools" section.	April 6, 2018
Amazon Cognito Lambda Migration Trigger	Added pages covering the Lambda Migration Trigger feature	February 8, 2018
Amazon Cognito Advanced Security Beta	Added new security features to enable developers to protect their apps and users from	November 28, 2017



Change	Description	Date
	malicious bots, secure user accounts against credentials in the wild that have been compromised elsewhere on the internet, and automatically adjust the challenges required to sign in based on the calculated risk of the sign in attempt.	
Amazon Pinpoint integration	Added the ability to use Amazon Pinpoint to provide analytics for your Amazon Cognito User Pools apps and to enrich the user data for Amazon Pinpoint campaigns. For more information, see <a href="#">Using Amazon Pinpoint Analytics with Amazon Cognito User Pools</a> (p. 156).	September 26, 2017
Federation and built-in app UI features of Amazon Cognito User Pools	Added the ability to allow your users to sign in to your user pool through Facebook, Google, Login with Amazon, or a SAML identity provider. Added a customizable built-in app UI and OAuth 2.0 support with custom claims.	August 10, 2017
HIPAA and PCI compliance-related feature changes	Added the ability to allow your users to use a phone number or email address as their user name.	July 6, 2017
User groups and role-based access control features	Added administrative capability to create and manage user groups. Administrators can assign IAM roles to users based on group membership and administrator-created rules. For more information, see <a href="#">Adding Groups to a User Pool</a> (p. 165) and <a href="#">Role-Based Access Control</a> (p. 234).	December 15, 2016
Documentation update	Updated iOS code examples in <a href="#">Developer Authenticated Identities (Identity Pools)</a> (p. 263).	November 18, 2016
Documentation update	Added information about confirmation flow for user accounts. For more information, see <a href="#">Signing Up and Confirming User Accounts</a> (p. 158).	November 9, 2016

Change	Description	Date
Create user accounts feature	Added administrative capability to create user accounts through the Amazon Cognito console and the API. For more information, see <a href="#">Creating User Accounts as Administrator (p. 162)</a> .	October 6, 2016
Documentation update	Updated examples that show how to use AWS Lambda triggers with user pools. For more information, see <a href="#">Customizing User Pool Workflows with Lambda Triggers (p. 119)</a> .	September 27, 2016
User import feature	Added bulk import capability for Cognito User Pools. Use this feature to migrate users from your existing identity provider to an Amazon Cognito user pool. For more information, see <a href="#">Importing Users into User Pools From a CSV File (p. 171)</a> .	September 1, 2016
General availability of Cognito User Pools	Added the Cognito 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 <a href="#">Amazon Cognito User Pools (p. 13)</a> .	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 <a href="#">SAML Identity Providers (Identity Pools) (p. 262)</a> .	June 23, 2016
CloudTrail integration	Added integration with AWS CloudTrail. For more information, see <a href="#">Logging Amazon Cognito API Calls with AWS CloudTrail (p. 324)</a> .	February 18, 2016
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 <a href="#">Amazon Cognito Events (p. 305)</a> .	April 9, 2015

Change	Description	Date
Data stream to Amazon Kinesis	Provides control and insight into your data streams. For more information, see <a href="#">Amazon Cognito Streams (p. 303)</a> .	March 4, 2015
Push synchronization	Enables support for silent push synchronization. For more information, see <a href="#">Amazon Cognito Sync (p. 277)</a> .	November 6, 2014
OpenID Connect support	Enables support for OpenID Connect providers. For more information, see <a href="#">Identity Pools (Federated Identities) External Identity Providers (p. 245)</a> .	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 <a href="#">Developer Authenticated Identities (Identity Pools) (p. 263)</a> .	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*.