MySQL (/sql/docs/mysql/connect-external-app) | **PostgreSQL** | SQL Server

This page describes how to establish a
connection to Cloud SQL from an application running outside of Google Cloud.

For information about the various options for connecting to Cloud SQL, see Connection options for external applications (/sql/docs/postgres/external-connection-methods). For information about configuring public IP, see Configuring public IP (/sql/docs/postgres/configure-ip).

If you are connecting from within Google Cloud, use the instructions for your service:

Connecting from App Engine (/sql/docs/postgres/connect-app-engine)

Connecting from Compute Engine (/sql/docs/compute-engine-access)

Connecting from Google Kubernetes Engine (/sql/docs/postgres/connect-container-engine)

Database connections consume resources on the server and the connecting application. Always use good connection management practices to minimize your application's footprint and reduce the likelihood of exceeding Cloud SQL connection limits (/sql/docs/postgres/quotas#fixed-limits). For more information, see Managing database connections (/sql/docs/postgres/manage-connections).

Granting access to an application does not automatically enable a database user account to connect to the instance. Before you can connect to an instance, you must have a database user account you can connect with. For new instances, this means you must have configured the default user account. Learn more (/sql/docs/postgres/create-manage-users).

You can connect to a Cloud SQL instance using the following methods:

- By using the proxy (#proxy)
- By configuring access for one or more public IP addresses (#appaccessIP)
- By using the JDBC Socket Factory (#java) (for the Java programming language)
- By using the Cloud SQL Proxy library (#go) (for the Go programming language)

If you are setting up the Cloud SQL Proxy for a local test environment (not for production), you can use the Proxy Quickstart (/sql/docs/postgres/quickstart-proxy-test) instead of these instructions.

If you are using the Java or Go programming languages, you have some alternatives to using the Cloud SQL Proxy. Learn more (#languages).

Enable the Cloud SQL Admin API.

Enable the API (https://console.cloud.google.com/flows/enableapi?apiid=sqladmin&redirect=https://console.cloud.google.com)

If your operating system isn't included here, you can also compile the proxy from source (http://github.com/GoogleCloudPlatform/cloudsql-proxy).

Learn more about proxy authentication options (/sql/docs/postgres/sql-proxy#authentication-options).

To create a service account with the required permissions, you must have **resourcemanager.projects.setIamPolicy** permiss
ermission is included in the Project Owner, Project IAM Admin, and Organization Administrator roles.
ust also have enabled the Cloud SQL Admin API.

When you use a service account to provide the credentials for the proxy, you must create it with sufficient permissions. If you are using the finer-grained Identity Access and Management (IAM) roles to manage your Cloud SQL permissions, you must give the service account a role that includes the cloudsql.instances.connect permission. The predefined Cloud SQL roles that include this permission are:

- Cloud SQL Client
- Cloud SQL Editor
- Cloud SQL Admin

If you are using the legacy project roles (Viewer, Editor, Owner), the service account must have at least the Editor role.

1. Go to the **Service accounts** page of the Google Cloud Console.

   Go to the Service accounts page (https://console.cloud.google.com/iam-admin/serviceaccounts/)

2. Select the project that contains your Cloud SQL instance.
3. Click **Create service account**.
4. In the **Create service account** dialog, provide a descriptive name for the service account.
5. For **Role**, select one of the following roles:

   - **Cloud SQL > Cloud SQL Client**
   - **Cloud SQL > Cloud SQL Editor**
   - **Cloud SQL > Cloud SQL Admin**

   Alternatively, you can use the primitive Editor role by selecting **Project > Editor**, but the Editor role includes permissions across Google Cloud.

   If you do not see these roles, your Google Cloud user might not have the `resourcemanager.projects.setIamPolicy` permission. You can check your permissions by going to the IAM page (https://console.cloud.google.com/iam-admin) in the Google Cloud Console and searching for your user id.

6. Change the **Service account ID** to a unique, easily recognizable value.
7. Click **Furnish a new private key** and confirm that the key type is `JSON`.
8. Click **Create**.

   The private key file is downloaded to your machine. You can move it to another location. Keep the key file secure.

Learn more about proxy instance specification options (/sql/docs/postgres/sql-proxy#instances-options).

The options you pass to the proxy depend on the authentication and instance specification options you chose previously.

Depending on your language and environment, you can start the proxy using either TCP sockets or Unix sockets.

The exact code statement required to use the proxy to connect to your Cloud SQL instance depends on the language and framework you are using.

You connect to the proxy the same way you would to a TCP or Unix socket (depending on how you invoked the proxy):

Need help? For help troubleshooting the proxy, see Troubleshooting Cloud SQL Proxy connections (/sql/docs/postgres/sql-proxy#troubleshooting). Or, see our Cloud SQL Support page (/sql/docs/postgres/support).

You can connect to the proxy from any language that enables you to connect to a Unix or TCP socket. Below are a few sample proxy invocation and connection statements to help you understand how they work together in your application.

You can grant any application access to a Cloud SQL instance by authorizing the public IP addresses (/sql/docs/postgres/configure-ip#add) that the application uses to connect.

You can not specify a private network (https://en.wikipedia.org/wiki/Private_network) (for example, 10.x.x.x) as an authorized network.

PostgreSQL instances support only IPv4 addresses. They are automatically configured with a static IP address.

To configure access over IP connections:

Need help? For help troubleshooting the proxy, see Troubleshooting Cloud SQL Proxy connections (/sql/docs/postgres/sql-proxy#troubleshooting). Or, see our Cloud SQL Support page (/sql/docs/postgres/support).

Some applications need to connect to your Cloud SQL instance using a dynamically assigned, or ephemeral, IP address. This is the case for Platform as a Service (Paas) applications, among others.

In these cases, you must use the Cloud SQL Proxy (/sql/docs/postgres/sql-proxy).

You can use the psql client to test your ability to connect from your local environment. For more information, see Connecting the psql client using IP addresses (/sql/docs/postgres/connect-admin-ip) and Connecting the psql client using the Cloud SQL Proxy (/sql/docs/postgres/connect-admin-proxy).

Need help? For help troubleshooting the proxy, see Troubleshooting Cloud SQL Proxy connections (/sql/docs/postgres/sql-proxy#troubleshooting). Or, see our Cloud SQL Support page (/sql/docs/postgres/support).

To determine the IP address of a computer running your application so you can authorize access to your Cloud SQL instance from that address, use one of the following options:

- If the computer is not behind a proxy, log in to the computer and use this link (http://ipv4.whatismyv6.com/) to determine its IP address.
- If the computer is behind a proxy, log in to the computer and use a tool or service like whatismyipaddress.com (https://www.whatismyip.com/proxy-check/) to determine its true IP address.

If the computer running your application is assigned an IP address that can change over time (it is dynamically assigned), see uring access for applications with dynamically assigned IP addresses (#dynamicIP).

- Learn about managing database connections in your application (/sql/docs/postgres/manage-connections).
- Learn about options for connecting external applications (/sql/docs/postgres/external-connection-methods).
- Learn about connecting using a psql client (/sql/docs/postgres/connect-admin-ip).
- Learn about configuring IP connectivity (/sql/docs/postgres/configure-ip).
- Learn about the proxy (/sql/docs/postgres/sql-proxy).
- Learn about options for support (/sql/docs/postgres/support).