

Google Cloud Hosting

Web Development
Foundations



Setting up Google Cloud Hosting

Google Cloud Hosting

Google offers various website and web application hosting solutions via their [Google Cloud web hosting](#) platform.

They have an extensive selection of options that are well documented both through [Google's internal guides](#) and many users' guides across the web.

Google Cloud web hosting

Host static and dynamic websites in the cloud with Click to Deploy or customized solutions.

[Go to console](#)

Website basics

Don't have a domain name or website? Secure your domain name, get a business email address, build your website without code, and set up online ads.



Click to Deploy solutions

Deploy a complete web-serving stack with solutions from the Google Cloud Marketplace. Choose from over 100 Click to Deploy solutions.



Pricing

Pricing depends on the product you choose for web hosting and your usage. You can view individual product pricing on the pricing list page.



Cloud web hosting services

SOLUTION TYPE

PRODUCTS OR SERVICES

USE CASES

Preconfigured and Click to Deploy

 [WordPress on Compute Engine](#)

Deploy Wordpress, a website creation and publishing platform, to Google Cloud with a range of hosting options.

[View pricing](#)

 [LAMP stack on Compute Engine](#)

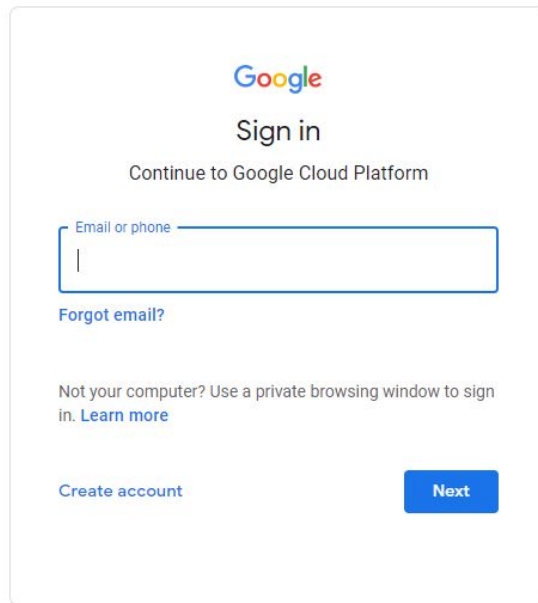
- ✔ Blogs
- ✔ Simple websites
- ✔ Best for low to medium traffic
- ✔ Open-source content management system

✔ Linux, Apache HTTP Server, MySQL, and PHP

Getting Started

Firstly, you'll need a Google account. Start a Google Cloud web hosting trial by clicking [here](#) (the “Get started for free” button on the last slide.) It will ask you to sign in—or up—with a Google account if you aren't already signed in.

If you have your CCID and an associated Google account via the University of Alberta, you should have no problem using that account while following along in this exercise.



The image shows a Google sign-in interface. At the top is the Google logo. Below it is the text "Sign in" and "Continue to Google Cloud Platform". There is a text input field labeled "Email or phone" with a cursor inside. Below the input field is a link "Forgot email?". Further down is a message "Not your computer? Use a private browsing window to sign in." followed by a link "Learn more". At the bottom left is a link "Create account" and at the bottom right is a blue button labeled "Next".

Google

Sign in

Continue to Google Cloud Platform

Email or phone


[Forgot email?](#)

Not your computer? Use a private browsing window to sign in. [Learn more](#)

[Create account](#) [Next](#)

Create your Google Account

For personal use, or if you do not yet have access to your Google Workspace features via the University of Alberta, you may make a new Google Account as per normal.



Create your Google Account

Continue to Google Cloud Platform

First name
uofa

Last name
student

Your email address
i.am.a.uofa.student@gmail.com


Password

Confirm

Use 8 or more characters with a mix of letters, numbers & symbols

☐ Show password

[Sign in instead](#)[Next](#)



One account. All of Google working for you.

Try Google Cloud Platform for free

Step 1 of 2



Uofa Student

i.am.a.university.of.alberta.student@gmail.com

[SWITCH ACCOUNT](#)

Country

Canada

Terms of Service

- ☒ I agree to the [Google Cloud Platform Terms of Service](#), and the terms of service of [any applicable services and APIs](#). I have also read and agree to the [Google Cloud Platform Free Trial Terms of Service](#).

Required to continue

Email updates

- ☐ I would like to receive periodic emails on news, product updates and special offers from Google Cloud and Google Cloud Partners.

CONTINUE

Access to all Cloud Platform Products

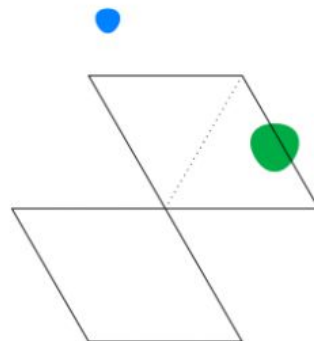
Get everything you need to build and run your apps, websites and services, including Firebase and the Google Maps API.

\$300 credit for free

Put Google Cloud to work with \$300 in credit to spend over the next 90 days.

No autocharge after free trial ends



We ask you for your credit card to make sure you are not a robot. You won't be charged unless you manually upgrade to a paid account.




Step 2 of 2

Your payment information helps us reduce fraud and abuse. You won't be charged unless you turn on automatic billing.

Customer info

 Account type ⓘ 

Business

 Name and address ⓘ

Business name

Name



Uofa Student

Address line 1

Address line 2

City

Province Postal code ⓘ


 Primary contact ⓘ 

Uofa Student

+1 7806165254


i.am.a.university.of.alberta.student@gmail.com

How you pay

 Monthly automatic payments

You pay for this service on a regular monthly basis, via an automatic charge when your payment is due.

Payment method ⓘ

 Add credit or debit card

Card details

☒ Credit or debit card address is same as above

START MY FREE TRIAL

Access to all Cloud Platform Products

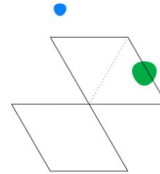
Get everything you need to build and run your apps, websites and services, including Firebase and the Google Maps API.

\$300 credit for free

Put Google Cloud to work with \$300 in credit to spend over the next 90 days.

No autocharge after free trial ends

We ask you for your credit card to make sure you are not a robot. You won't be charged unless you manually upgrade to a paid account.



Pay Attention to Billing and Policies

Pay attention to their billing policies and settings, terms of service, privacy policy, and any other stipulations/notices, as **we are not responsible if you set up a payment plan, choose non-free options, or for any data sharing or consequences that arise from your Google account or the Google Cloud platform.**



Welcome Uofa!

Thanks for signing up. Your free trial includes \$300 in credit to spend over the next 90 days. If you run out of credit, don't worry — you won't be billed unless you [turn on automatic billing](#).

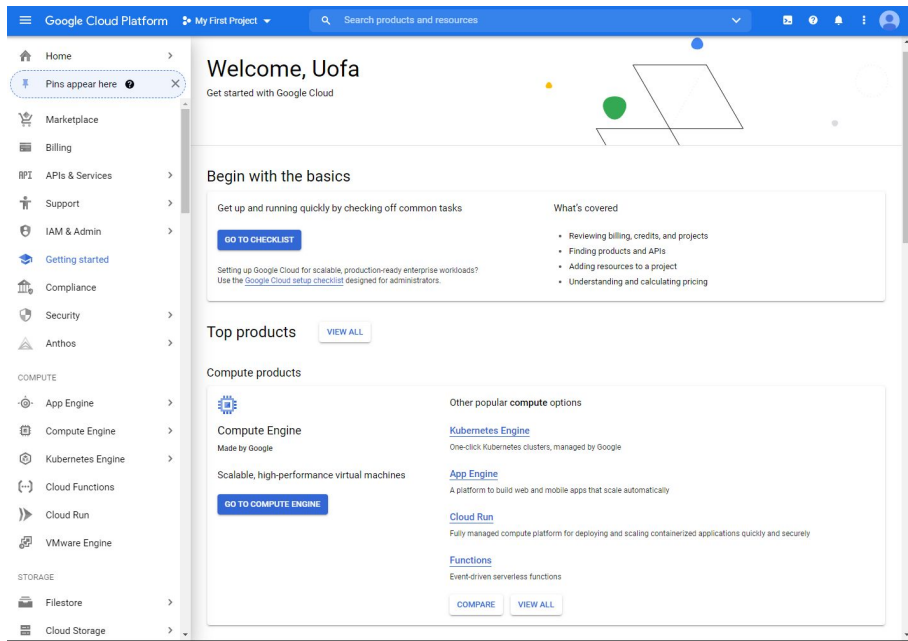
GOT IT

The Dashboard

You'll be greeted with the Google Cloud Platform dashboard!

From here, you have a wide array of options to choose from... we'll be focusing on a few that will help get you started with a basic web server.

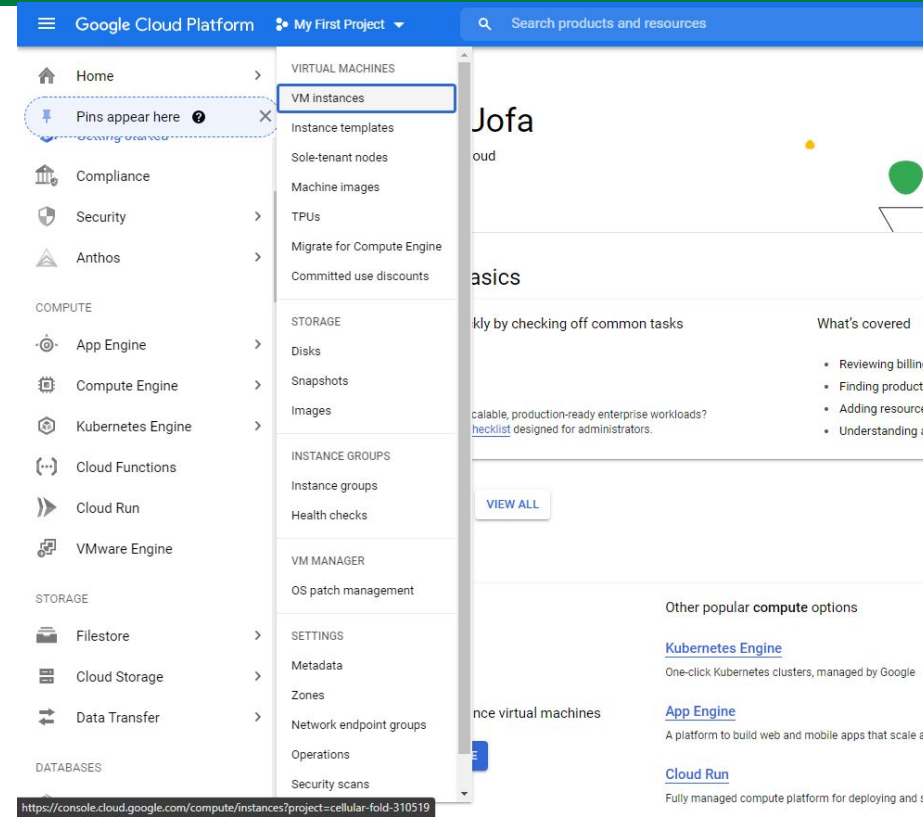
At the time of this writing, it is free to carry forth with these steps.



Compute Engine

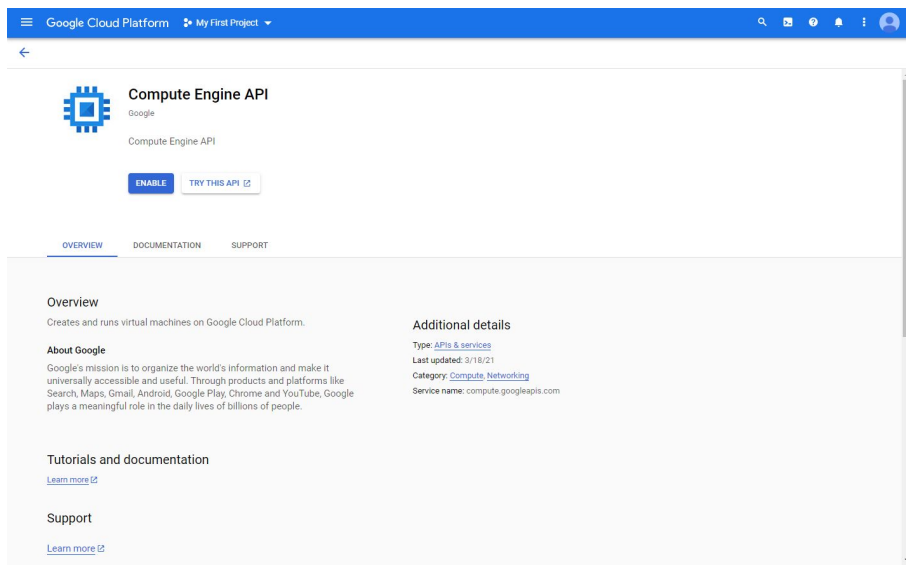
Firstly, we will need a [virtual machine](#) space for our server programs and processes to run in.

Navigate to “Compute Engine” → “VM Instances.”



Enable Compute Engine


Enable the “Compute Engine API” feature.



The screenshot shows the Google Cloud Platform console interface. At the top, a blue header bar contains the text "Google Cloud Platform" and "My First Project" with a dropdown arrow. To the right of the header are icons for search, notifications, and user profile. Below the header, a left sidebar shows a back arrow and a list of services. The main content area displays the "Compute Engine API" page. It features a blue gear icon, the text "Compute Engine API" and "Google", and two buttons: "ENABLE" and "TRY THIS API". Below this are tabs for "OVERVIEW", "DOCUMENTATION", and "SUPPORT". The "OVERVIEW" tab is active, showing a description of the API, an "About Google" section, and "Additional details" such as type, last updated date, category, and service name. At the bottom, there are sections for "Tutorials and documentation" and "Support", each with a "Learn more" link.

Google Cloud Platform My First Project

←

 **Compute Engine API**
Google
Compute Engine API

[ENABLE](#) [TRY THIS API](#)

[OVERVIEW](#) [DOCUMENTATION](#) [SUPPORT](#)

Overview
Creates and runs virtual machines on Google Cloud Platform.

About Google
Google's mission is to organize the world's information and make it universally accessible and useful. Through products and platforms like Search, Maps, Gmail, Android, Google Play, Chrome and YouTube, Google plays a meaningful role in the daily lives of billions of people.

Additional details
Type: [APIs & services](#)
Last updated: 5/18/21
Category: [Compute](#) [Networking](#)
Service name: compute.googleapis.com

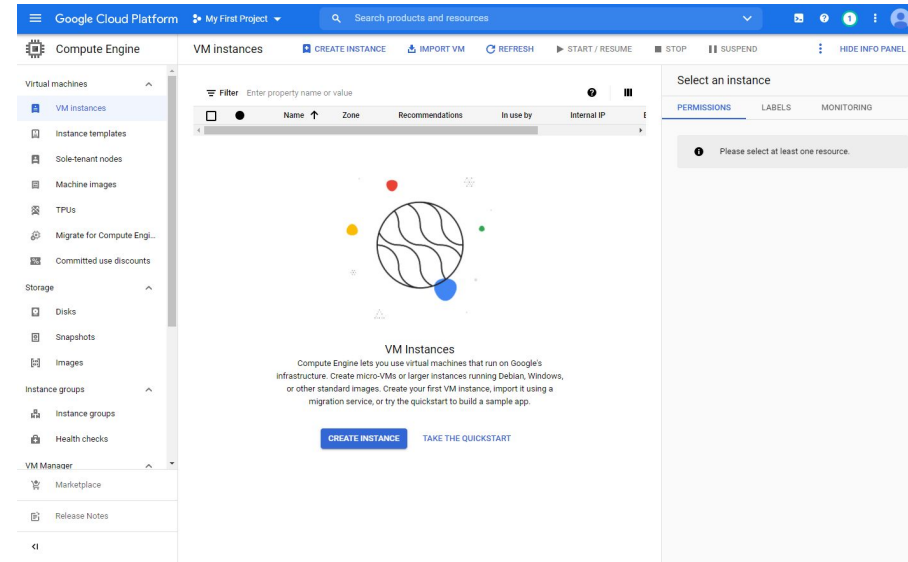
Tutorials and documentation
[Learn more](#)

Support
[Learn more](#)

Create Instance

Click the “Create Instance” button. This will open a page and dialogue regarding a virtual machine configuration.

There are many options available to you, but again we will be focused on a light and free hosting option today.



Beginning to Configure your Instance

Fill in a name for your virtual machine instance.

Select the E2 series.

For Machine type, select the micro option under “Shared core.”

These options should be within the free tier.

The screenshot shows the Google Cloud Platform interface for creating a new VM instance. The left sidebar lists four options: 'New VM instance' (selected), 'New VM instance from template', 'New VM instance from machine image', and 'Marketplace'. The main area is titled 'Create an instance' and contains the following configuration details:

- Name:** my-first-website
- Labels:** (Optional)
- Region:** us-central1 (Iowa)
- Zone:** us-central1-a
- Machine family:** General-purpose (selected), Compute-optimized, Memory-optimized, GPU
- Machine types for common workloads, optimized for cost and flexibility**
- Series:** Custom (selected), Shared core (selected), e2-micro (selected), e2-small, e2-medium, e2-medium
- Standard:** e2-standard-2, e2-standard-4, e2-standard-8, e2-standard-16

On the right, a summary box shows the total cost: \$7.12/month. Below this, a table lists the estimated costs for the instance's components:

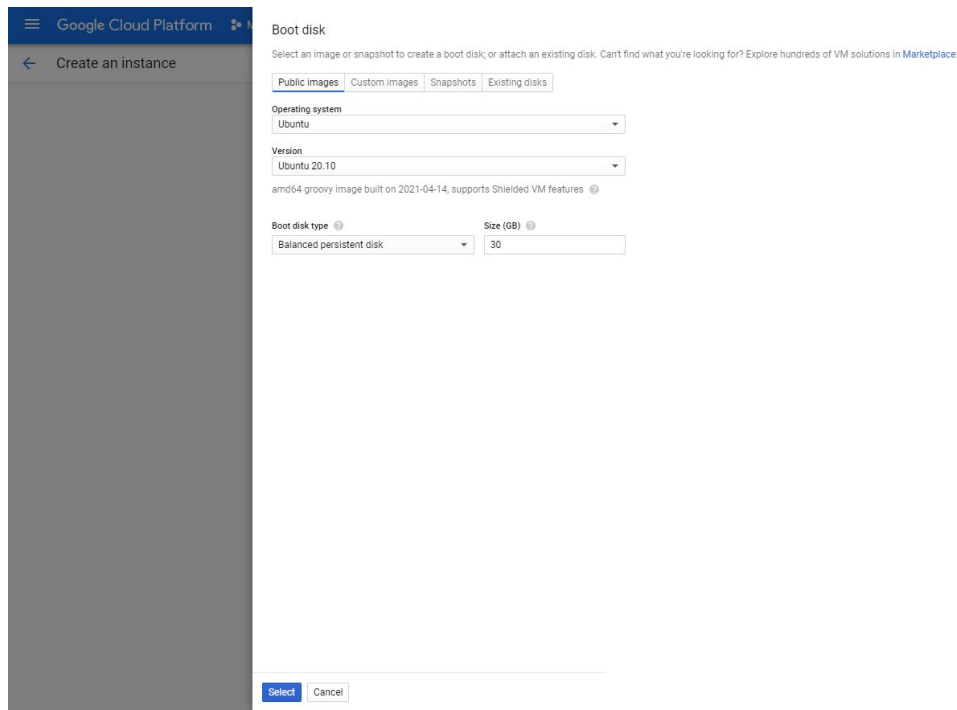
Item	Estimated costs
1 shared vCPU + 1 GB memory	\$6.12/month
10 GB balanced persistent disk	\$1.00/month
Sustained use discount	-\$0.00/month
Total	\$7.12/month

Select a Boot Disk

Click the “Change” button under the “Boot Disk” heading.

For our example, we’ll be using Ubuntu 20.10 as our operating system. Keep in mind there are other popular options for web hosting like CentOS that may be good to look into.

“Boot disk type” can be set up to 30GB, and remain free (the default may be ten, so it is recommended you increase it if this will be the only instance on your account).



The screenshot shows the 'Create an instance' dialog in the Google Cloud Platform console. The 'Boot disk' section is active, showing options to select an image or snapshot. The 'Operating system' is set to 'Ubuntu' and the 'Version' is 'Ubuntu 20.10'. Below this, it states 'amd64 groovy image built on 2021-04-14, supports Shielded VM features'. The 'Boot disk type' is set to 'Balanced persistent disk' and the 'Size (GB)' is set to '30'. At the bottom, there are 'Select' and 'Cancel' buttons.

Google Cloud Platform

Create an instance

Boot disk

Select an image or snapshot to create a boot disk, or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#).

Public images Custom images Snapshots Existing disks

Operating system
Ubuntu

Version
Ubuntu 20.10

amd64 groovy image built on 2021-04-14, supports Shielded VM features

Boot disk type Size (GB)

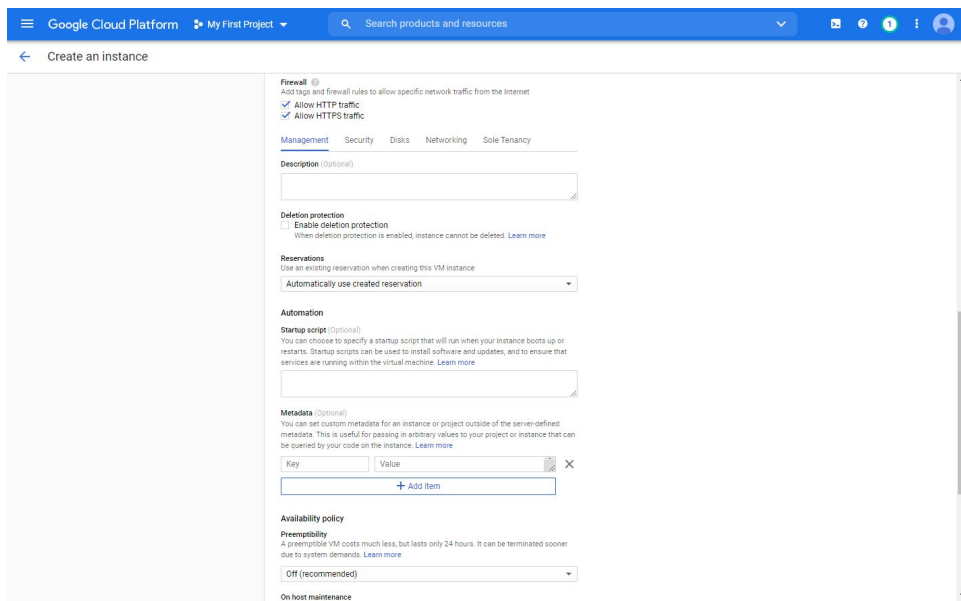
Balanced persistent disk 30

Select Cancel

Other Settings

If you'd like the public to be able to view files from the server, and have easier access to it outside of your Google control panels, check the HTTP and HTTPS traffic boxes.

Make note of the Startup script box under the “Automation” heading. As you become a more advanced user these can be used to immediately run certain commands when your virtual machine boots.



The screenshot shows the 'Create an instance' page in the Google Cloud Platform console. The 'Automation' section is expanded, showing the 'Startup script' field. The 'Startup script' field is currently empty. The 'Automation' section also includes a 'Startup script (Optional)' heading and a description: 'You can choose to specify a startup script that will run when your instance boots up or restarts. Startup scripts can be used to install software and updates, and to ensure that services are running within the virtual machine. [Learn more](#)'. Below the 'Startup script' field is a 'Metadata (Optional)' section with a description: 'You can set custom metadata for an instance or project outside of the server-defined metadata. This is useful for passing in arbitrary values to your project or instance that can be queried by your code on the instance. [Learn more](#)'. The 'Metadata' section includes a table with 'Key' and 'Value' columns and an '+ Add item' button. Below the 'Metadata' section is an 'Availability policy' section with a 'Preemptibility' dropdown set to 'Off (recommended)' and an 'On host maintenance' dropdown.

Google Cloud Platform My First Project Search products and resources

Create an instance

Firewall ⓘ
Add tags and firewall rules to allow specific network traffic from the internet

- ✓ Allow HTTP traffic
- ✓ Allow HTTPS traffic

Management Security Disks Networking Sole Tenancy

Description (Optional)

Deletion protection
☐ Enable deletion protection
When deletion protection is enabled, instance cannot be deleted. [Learn more](#)

Reservations
Use an existing reservation when creating this VM instance
Automatically use created reservation

Automation

Startup script (Optional)
You can choose to specify a startup script that will run when your instance boots up or restarts. Startup scripts can be used to install software and updates, and to ensure that services are running within the virtual machine. [Learn more](#)

Metadata (Optional)
You can set custom metadata for an instance or project outside of the server-defined metadata. This is useful for passing in arbitrary values to your project or instance that can be queried by your code on the instance. [Learn more](#)

Key	Value
+ Add item	

Availability policy

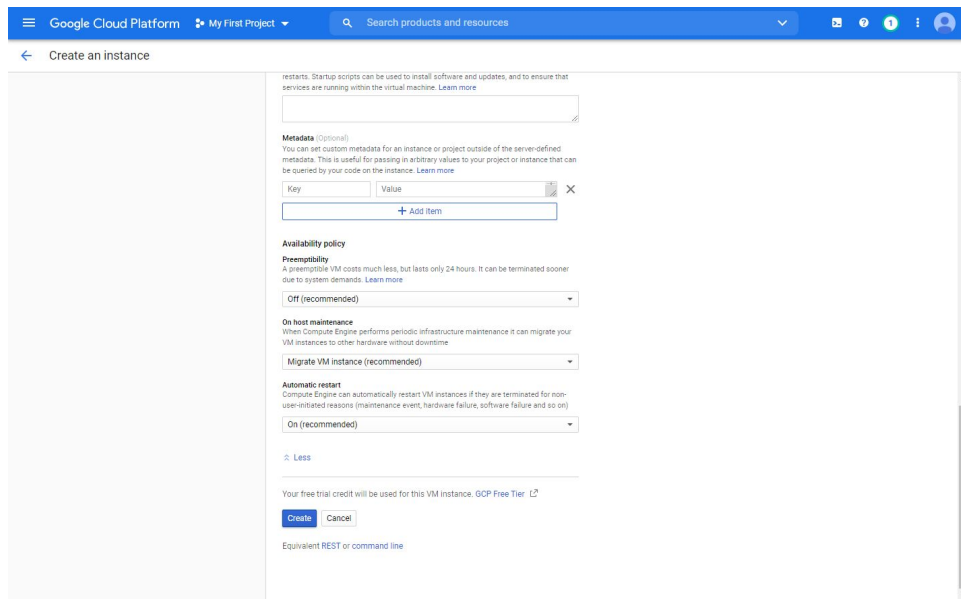
Preemptibility
A preemptible VM costs much less, but lasts only 24 hours. It can be terminated sooner due to system demands. [Learn more](#)

Off (recommended)

On host maintenance

Creating the Instance

Before clicking “Create,” read the [GCP Free Tier guidelines](#) to ensure you’re following current policy and restrictions.



The screenshot shows the 'Create an instance' page in the Google Cloud Platform console. The page is divided into several sections for configuring the VM instance. At the top, there's a navigation bar with 'Google Cloud Platform', 'My First Project', and a search bar. Below this, the page title is 'Create an instance'. The main content area includes a 'Metadata' section with a text input field and a table for key-value pairs. The 'Availability policy' section contains three dropdown menus: 'Preemptibility' (set to 'Off (recommended)'), 'On host maintenance' (set to 'Migrate VM instance (recommended)'), and 'Automatic restart' (set to 'On (recommended)'). At the bottom, there's a note about the free trial credit and two buttons: 'Create' and 'Cancel'.

Google Cloud Platform My First Project Search products and resources

← Create an instance

restarts. Startup scripts can be used to install software and updates, and to ensure that services are running within the virtual machine. [Learn more](#)

Metadata (Optional)
You can set custom metadata for an instance or project outside of the server-defined metadata. This is useful for passing in arbitrary values to your project or instance that can be queried by your code on the instance. [Learn more](#)

Key	Value
+ Add item	

Availability policy

Preemptibility
A preemptible VM costs much less, but lasts only 24 hours. It can be terminated sooner due to system demands. [Learn more](#)

Off (recommended)

On host maintenance
When Compute Engine performs periodic infrastructure maintenance it can migrate your VM instances to other hardware without downtime.

Migrate VM instance (recommended)

Automatic restart
Compute Engine can automatically restart VM instances if they are terminated for non-user-initiated reasons (maintenance event, hardware failure, software failure and so on).

On (recommended)

[Less](#)

Your free trial credit will be used for this VM instance. GCP Free Tier ^{L2}

[Create](#) [Cancel](#)

Equivalent REST or command line

Getting Familiar with the Dashboard

Once the instance is created, you'll be directed to the “VM instances” page. Here you'll see a list of the instances you have under your account. If you've been following along, the one we just made should appear there.

You can scroll from left to right to see the entirety of the table—note the options available on the right-end of the table.

Note the “External IP” address, as this is what you can use in your web browser address bar to access the website once we set it up.

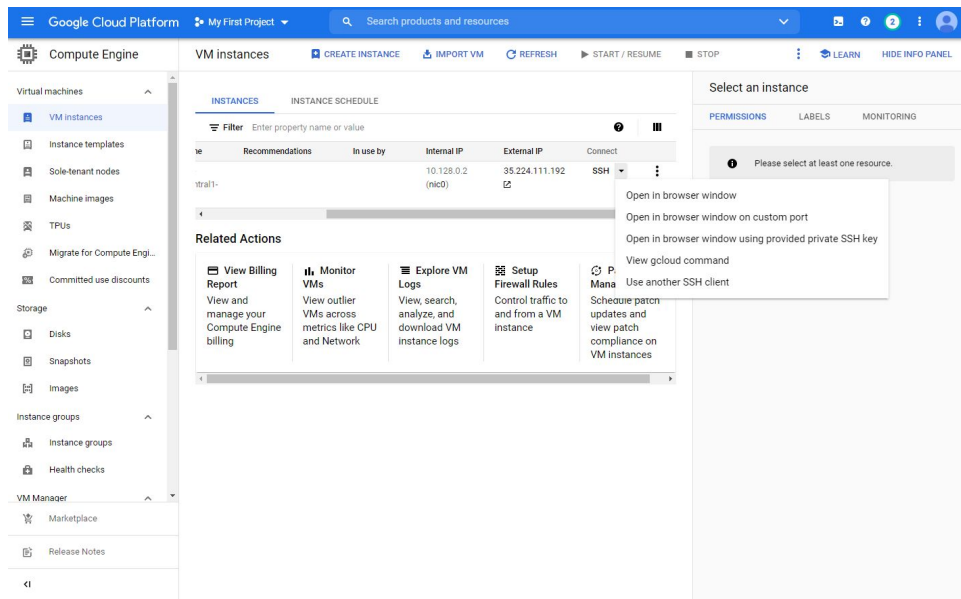
The screenshot shows the Google Cloud Platform interface for VM instances. The top navigation bar includes the Google Cloud logo, the project name "My First Project", and a search bar. The left sidebar lists various services under "Virtual machines", with "VM instances" selected. The main content area displays a table of VM instances. The table has columns for "Recommendations", "In use by", "Internal IP", "External IP", and "Connect". A single instance is listed with an internal IP of 10.128.0.2 (nbd) and an external IP of 35.224.111.192. To the right of the table, there are tabs for "INSTANCES" and "INSTANCE SCHEDULE". Below the table, a "Related Actions" section provides links for "View Billing Report", "Monitor VMs", "Explore VM Logs", "Setup Firewall Rules", and "Patch Management". On the far right, a "Select an instance" panel shows tabs for "PERMISSIONS", "LABELS", and "MONITORING", with a message "Please select at least one resource." A context menu is open over the instance row, showing options like "Start / Resume", "Stop", "Suspend", "Reset", "Delete", "View network details", "Create new machine image", "View logs", and "View monitoring".

Recommendations	In use by	Internal IP	External IP	Connect
		10.128.0.2 (nbd)	35.224.111.192	SSH

Accessing the Google Cloud Console

To access the console in your server to run commands in it, you can use the SSH button and/or dropdown in the instance table.

If you click “Open in browser window” you’ll be greeted with the following.



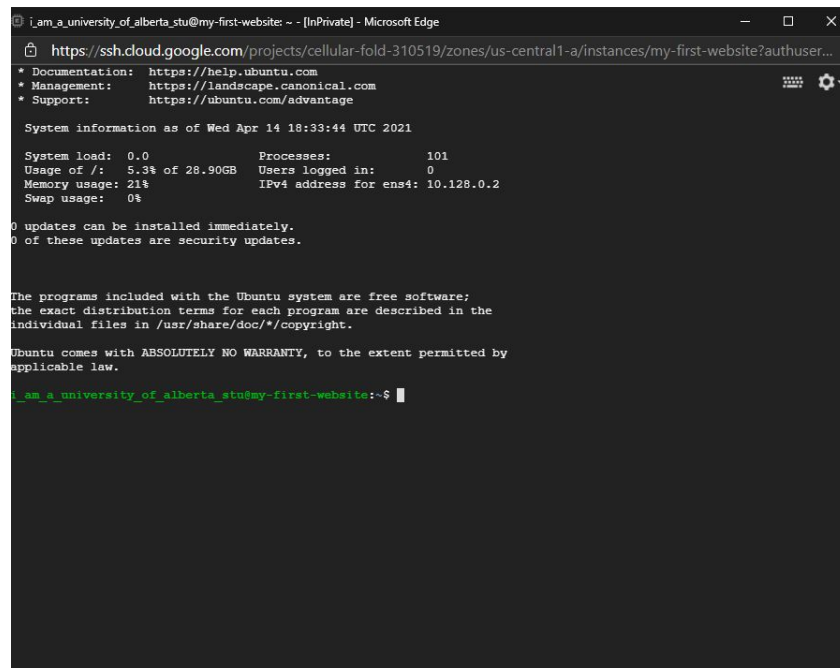
Google Cloud Console

Here in the Google Cloud Console, you have access to your server's Bash command-line interface.

You can run commands like you would in your own Bash terminal, but they will run on the server you are connected to.

Give it a try with a familiar command like "ls /" to see what's in the root directory!

```
i_am_a_university_of_alberta_stu@my-first-website:~$ ls /  
bin  dev  home  lib32  libx32  media  opt  root  sbin  srv  tmp  var  
boot  etc  lib  lib64  lost+found  mnt  proc  run  snap  sys  usr
```



```
i_am_a_university_of_alberta_stu@my-first-website: ~ - [InPrivate] - Microsoft Edge  
https://ssh.cloud.google.com/projects/cellular-fold-310519/zones/us-central1-a/instances/my-first-website?authuser...  
• Documentation: https://help.ubuntu.com  
• Management: https://landscape.canonical.com  
• Support: https://ubuntu.com/advantage  
  
System information as of Wed Apr 14 18:33:44 UTC 2021  
  
System load: 0.0          Processes:           101  
Usage of /:  5.3% of 28.90GB   Users logged in:    0  
Memory usage: 21%          IPv4 address for ens4: 10.128.0.2  
Swap usage:  0%  
  
0 updates can be installed immediately.  
0 of these updates are security updates.  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/*copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
i_am_a_university_of_alberta_stu@my-first-website:~$
```

Server-Side FTP Setup

FTP on Your Server

You can install an FTP ([File Transfer Protocol](#)) server software on your server to make it easier to transfer files to and from the server from your home or office computer.

To see if you have this installed on our setup, run:

```
sudo apt list --installed
```

See if “vsftpd” appears in the list.

If not, you can proceed with the installation:

```
sudo apt install vsftpd
```

Once installed, copy the default configuration file so that we can begin configuring as we need to.

```
sudo cp /etc/vsftpd.conf /etc/vsftpd.conf_default
```

This leaves the original configuration in case we ever need to refer to it or copy it again.

To run the service, run the following:

```
sudo systemctl start vsftpd
```

```
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo apt install vsftpd
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libnuma1
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  ssl-cert
Suggested packages:
  openssl-blacklist
The following NEW packages will be installed:
  ssl-cert vsftpd
0 upgraded, 2 newly installed, 0 to remove and 3 not upgraded.
Need to get 132 kB of archives.
After this operation, 402 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us-central1.gce.archive.ubuntu.com/ubuntu groovy/main amd64 ssl-cert all 1.0.39 [17.0 kB]
Get:2 http://us-central1.gce.archive.ubuntu.com/ubuntu groovy/main amd64 vsftpd amd64 3.0.3-12 [115 kB]
Fetched 132 kB in 0s (875 kB/s)
Preconfiguring packages ...
Selecting previously unselected package ssl-cert.
(Reading database ... 95881 files and directories currently installed.)
Preparing to unpack .../ssl-cert_1.0.39_all.deb ...
Unpacking ssl-cert (1.0.39) ...
Selecting previously unselected package vsftpd.
Preparing to unpack .../vsftpd_3.0.3-12_amd64.deb ...
Unpacking vsftpd (3.0.3-12) ...
Setting up ssl-cert (1.0.39) ...
Setting up vsftpd (3.0.3-12) ...
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /lib/systemd/system/vsftpd.service.
Processing triggers for man-db (2.9.3-2) ...
Processing triggers for systemd (246.6-1ubuntu1.3) ...
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo cp /etc/vsftpd.conf /etc/vsftpd.conf_default
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo systemctl start vsftpd
```

Enable FTP Writing

One easy way to access and edit the file is using “nano” which is pre-installed on many operating systems:

```
sudo nano /etc/vsftpd.conf
```

Open the configuration file, and uncomment the “write_enable” line so that it looks like the following:

```
write_enable=YES
```

To restrict access to local users, you can also adjust the “chroot_local_user” line like so:

```
chroot_local_user=YES
```

```
i am a university of alberta stu@my-first-website:~$ sudo nano /etc/vsftpd.conf
```

i_am_a_university_of_alberta_stu@my-first-website: ~ - [Private] - Microsoft Edge

<https://ssh.cloud.google.com/projects/cellular-fold-310519/zones/us-central1-a/instances/my-first-website?authuser...>

```
GNU nano 5.2 /etc/vsftpd.conf
# Example config file /etc/vsftpd.conf
#
# The default compiled in settings are fairly paranoid. This sample file
# loosens things up a bit, to make the ftp daemon more usable.
# Please see vsftpd.conf.5 for all compiled in defaults.
#
# READ THIS: This example file is NOT an exhaustive list of vsftpd options.
# Please read the vsftpd.conf.5 manual page to get a full idea of vsftpd's
# capabilities.
#
# Run standalone? vsftpd can run either from an inetd or as a standalone
# daemon started from an initscript.
listen=NO
#
# This directive enables listening on IPv6 sockets. By default, listening
# on the IPv6 "any" address (:::) will accept connections from both IPv6
# and IPv4 clients. It is not necessary to listen on "both" IPv4 and IPv6
# sockets. If you want that (perhaps because you want to listen on specific
# addresses) then you must run two copies of vsftpd with two configuration
# files.
listen_ipv6=YES
#
# Allow anonymous FTP? (Disabled by default).
anonymous_enable=NO
#
# Uncomment this to allow local users to log in.
local_enable=YES
#
# Uncomment this to enable any form of FTP write command.
write_enable=YES
#
# Default umask for local users is 077. You may wish to change this to 022,
# if your users expect that (022 is used by most other ftpd's)
local_umask=022
#
# Uncomment this to allow the anonymous FTP user to upload files. This only
# has an effect if the above global write enable is activated. Also, you will
# obviously need to create a directory writable by the FTP user.
```

⌘ Help ⌘ Write Out ⌘ Where Is ⌘ Cut ⌘ Execute
⌘ Exit ⌘ Read File ⌘ Replace ⌘ Paste ⌘ Justify
⌘ Location ⌘ Undo
⌘ Go To Line ⌘ Redo

i_am_a_university_of_alberta_stu@my-first-website: ~ - [Private] - Microsoft Edge

<https://ssh.cloud.google.com/projects/cellular-fold-310519/zones/us-central1-a/instances/my-first-website?authuser...>

```
GNU nano 5.2 /etc/vsftpd.conf
# recommended for security (the code is non-trivial). Not enabling it,
# however, may confuse older FTP clients.
#async_abor_enable=YES
#
# By default the server will pretend to allow ASCII mode but in fact ignore
# the request. Turn on the below options to have the server actually do ASCII
# mangling on files when in ASCII mode.
# Beware that on some FTP servers, ASCII support allows a denial of service
# attack (DoS) via the command "SIZE /big/file" in ASCII mode. vsftpd
# predicted this attack and has always been safe, reporting the size of the
# raw file.
# ASCII mangling is a horrible feature of the protocol.
#ascii_upload_enable=YES
#ascii_download_enable=YES
#
# You may fully customise the login banner string:
#ftpd_banner=Welcome to blah FTP service.
#
# You may specify a file of disallowed anonymous e-mail addresses. Apparently
# useful for combatting certain DoS attacks.
#deny_email_enable=YES
# (default follows)
#banned_email_file=/etc/vsftpd.banned_emails
#
# You may restrict local users to their home directories. See the FAQ for
# the possible risks in this before using chroot_local_user or
# chroot_list_enable.
chroot_local_user=YES
#
# You may specify an explicit list of local users to chroot() to their home
# directory. If chroot_local_user is YES, then this list becomes a list of
# users to NOT chroot().
# (Warning! chroot'ing can be very dangerous. If using chroot, make sure that
# the user does not have write access to the top level directory within the
# chroot)
#chroot_local_user=YES
#chroot_list_enable=YES
# (default follows)
#chroot_list_file=/etc/vsftpd.chroot_list
```

⌘ Help ⌘ Write Out ⌘ Where Is ⌘ Cut ⌘ Execute
⌘ Exit ⌘ Read File ⌘ Replace ⌘ Paste ⌘ Justify
⌘ Location ⌘ Undo
⌘ Go To Line ⌘ Redo

Enable a User Whitelist

We'll need to update one more area. See the following updates to "chroot_list_enable", "chroot_list_file", and "local_root":

```
chroot_list_enable=YES
```

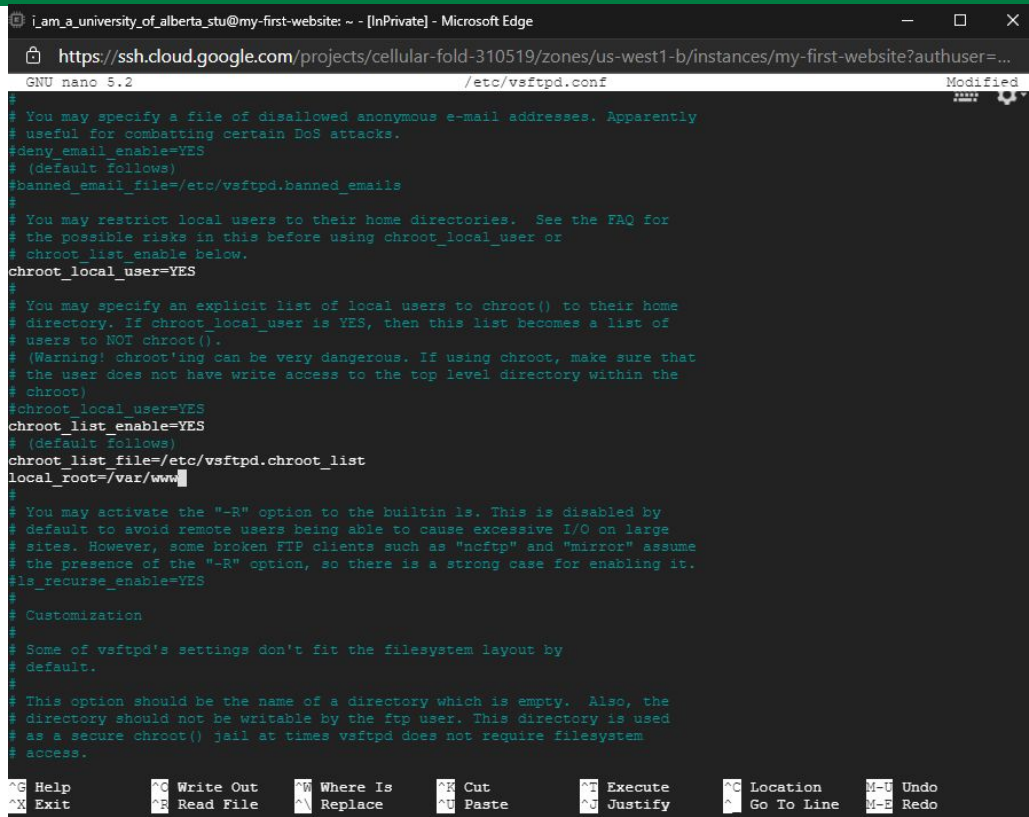
```
chroot_list_file=/etc/vsftpd.chroot_list
```

```
local_root=/var/www
```

Create and open a new file for the list of users allowed to :

```
sudo touch /etc/vsftpd.chroot_list
```

```
sudo nano /etc/vsftpd.chroot_list
```



```
i_am_a_university_of_alberta_stu@my-first-website: ~ - [InPrivate] - Microsoft Edge
https://ssh.cloud.google.com/projects/cellular-fold-310519/zones/us-west1-b/instances/my-first-website?authuser=...
GNU nano 5.2 /etc/vsftpd.conf
#
# You may specify a file of disallowed anonymous e-mail addresses. Apparently
# useful for combatting certain DoS attacks.
#deny_email_enable=YES
# (default follows)
#banned_email_file=/etc/vsftpd.banned_emails
#
# You may restrict local users to their home directories. See the FAQ for
# the possible risks in this before using chroot_local_user or
# chroot_list_enable below.
chroot_local_user=YES
#
# You may specify an explicit list of local users to chroot() to their home
# directory. If chroot_local_user is YES, then this list becomes a list of
# users to NOT chroot().
# (Warning! chroot'ing can be very dangerous. If using chroot, make sure that
# the user does not have write access to the top level directory within the
# chroot)
#chroot_local_user=YES
chroot_list_enable=YES
# (default follows)
chroot_list_file=/etc/vsftpd.chroot_list
local_root=/var/www
#
# You may activate the "-R" option to the builtin ls. This is disabled by
# default to avoid remote users being able to cause excessive I/O on large
# sites. However, some broken FTP clients such as "ncftp" and "mirror" assume
# the presence of the "-R" option, so there is a strong case for enabling it.
#ls_recurse_enable=YES
#
# Customization
#
# Some of vsftpd's settings don't fit the filesystem layout by
# default.
#
# This option should be the name of a directory which is empty. Also, the
# directory should not be writable by the ftp user. This directory is used
# as a secure chroot() jail at times vsftpd does not require filesystem
# access.
#G Help
#X Exit
#W Write Out
#R Read File
#I Where Is
#U Replace
#C Cut
#U Paste
#E Execute
#J Justify
#L Location
#G Go To Line
#U Undo
#E Redo
```

Add names to the List

In the file:

`/etc/vsftpd.userlist`

You can add a list of any users that should be granted access to your FTP-enabled folders and files.

```
i_am_a_university_of_alberta_stu@my-first-website: ~ - [InPrivate] - Microsoft Edge
https://ssh.cloud.google.com/projects/cellular-fold-310519/zones/us-central1-a/instances/my-first-website?authuser...
GNU nano 5.2 /etc/vsftpd.userlist Modified
myftpusername
```

Add an FTP User to your Server

To add a user by name, replace “myftpusername” with a name of your choice in the following command:

```
sudo useradd -m myftpusername
```

You can add a password for use of this account via the following, ensure you respond to the prompt with a **secure** password of your choice:

```
sudo passwd myftpusername
```

```
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo useradd -m myftpusername
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo passwd myftpusername
New password:
Retype new password:
passwd: password updated successfully
```

Your FTP setup may not be accessible if the Ubuntu firewall is blocking related FTP ports. To allow access via one of these ports, try using ufw ([Uncomplicated Firewall](#)):

```
sudo ufw allow OpenSSH
sudo ufw allow 20/tcp
sudo ufw allow 21/tcp
sudo ufw allow 990/tcp
sudo ufw allow 40000:50000/tcp
```

```
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo apt-get install ufw
Reading package lists... Done
Building dependency tree
Reading state information... Done
ufw is already the newest version (0.36-7).
ufw set to manually installed.
The following package was automatically installed and is no longer required:
  libnssm1
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo ufw allow OpenSSH
Rules updated
Rules updated (v6)
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo ufw allow 20/tcp
Rules updated
Rules updated (v6)
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo ufw allow 21/tcp
Rules updated
Rules updated (v6)
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo ufw allow 990/tcp
Rules updated
Rules updated (v6)
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo ufw allow 40000:50000/tcp
Rules updated
Rules updated (v6)
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo ufw enable
Command may disrupt existing ssh connections. Proceed with operation (y|n)? y
Firewall is active and enabled on system startup
```

Add Permissions to the User

Now that you have a user, we'll want to give it permissions to use and modify files and folders in our website:

```
sudo chown myftpusername /var/www/html
```

```
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo chown myftpusername /var/www/html
```

Restarting the Service

Once you have configured the FTP service and added a user, it is a good idea to restart the service. In doing this you can be sure that any changes will be noticed by the system and/or program.

Use the following command:

```
sudo systemctl restart vsftpd.service
```

```
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo systemctl restart vsftpd.service
```

Restarting the Server

To ensure all settings for everything take effect, it can be useful to restart the server operating system in its entirety. Try the following...

```
sudo reboot
```

After this command, you may have to wait a moment and reconnect to the VM when it has started again. Once restarted, the firewall we set up will be activated. Then try:

```
sudo systemctl start vsftpd
```

This will ensure once more that the FTP software is initialized and accepting connections.

Making FTP Secure

Create a Certificate

To encrypt traffic—that is to say, make it difficult or near-impossible to read your requests and web traffic when engaging with your server—we must have a certificate and enable [SSL/TLS](#) features on our server and in our FTP software.

So, first thing's first:

```
sudo openssl req -x509 -nodes -days 365 -newkey rsa:2048 -keyout /etc/ssl/private/vsftpd.pem -out /etc/ssl/private/vsftpd.pem
```

Here we are generating a key and file, using [OpenSSL](#), that will be used for encryption. Note that the number of days can be altered to your liking or requirements. 365 would be a 1 year period before expiration. For more details on the options available to you, visit the official documentation.

This command will ask you for some information that will be attached to the key(s) in question, fill it in as you see fit.


```
i_am_a_university_of_alberta_stu@my-first-website:~$ sudo openssl req -x509 -nodes -days 365 -newkey rsa:2048 -keyo
ut /etc/ssl/private/vsftpd.pem -out /etc/ssl/private/vsftpd.pem
Generating a RSA private key
.....
.....+++++
.....
.....+++++
writing new private key to '/etc/ssl/private/vsftpd.pem'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:CA
State or Province Name (full name) [Some-State]:Alberta
Locality Name (eg, city) []:Edmonton
Organization Name (eg, company) [Internet Widgits Pty Ltd]:UofA Student
Organizational Unit Name (eg, section) []:
Common Name (e.g. server FQDN or YOUR name) []:MFW
Email Address []:i.am.a.university.of.alberta.student@gmail.com
```

Update your VSFTPD Configuration

We will need to let our FTP server software know where the new certificate and key is! Open up the configuration file using Nano once more:

```
sudo nano /etc/vsftpd.conf
```

Update the “rsa_cert_file” and “rsa_private_key_file” values with the locations of the respective files:

```
rsa_cert_file=/etc/ssl/private/vsftpd.pem  
rsa_private_key_file=/etc/ssl/private/vsftpd.pem
```

Enable the SSL featureset in the software by uncommenting the “ssl_enable” line:

```
ssl_enable=YES
```

Add the following as well, to ensure SSL is enforced. This prevents anonymous users and will force you to connect securely—this way you know future server interactions will be difficult or near-impossible to interpret if your requests are intercepted.

```
allow_anon_ssl=NO  
force_local_data_ssl=YES  
force_local_logins_ssl=YES  
ssl_tlsv1=YES  
ssl_sslv2=NO  
ssl_sslv3=NO  
require_ssl_reuse=NO  
ssl_ciphers=HIGH
```

Restart the FTP Service

```
i am a university of alberta stu@my-first-website:~$ sudo nano /etc/vsftpd.conf
i am a university of alberta stu@my-first-website: ~ - [Private] - Microsoft Edge
https://ssh.cloud.google.com/projects/cellular-fold-310519/zones/us-west1-b/instances/my-first-website?authuser=...
GNU nano 3.2 /etc/vsftpd.conf
local_root=/var/www
#
# You may activate the "-R" option to the builtin ls. This is disabled by
# default to avoid remote users being able to cause excessive I/O on large
# disks. However, some broken FTP clients such as "ncftp" and "mirror" assume
# the presence of the "-R" option, so there is a strong case for enabling it.
#ls_recurse_enable=YES
#
# Customization
#
# Some of vsftpd's settings don't fit the filesystem layout by
# default.
#
# This option should be the name of a directory which is empty. Also, the
# directory should not be writable by the ftp user. This directory is used
# as a secure chroot() jail at times vsftpd does not require filesystem
# access.
secure_chroot_dir=/var/run/vsftpd/empty
#
# This string is the name of the PAM service vsftpd will use.
pam_service_name=vsftpd
#
# This option specifies the location of the RSA certificate to use for SSL
# encrypted connections.
rsa_cert_file=/etc/ssl/private/vsftpd.pem
rsa_private_key_file=/etc/ssl/private/vsftpd.pem
ssl_enable=YES
#Added for TLS / SSL configuration
allow anon ssl=NO
force_local_data_ssl=YES
force_local_logins_ssl=YES
ssl_tlsv1=YES
ssl_sslv2=NO
ssl_sslv3=NO
require_ssl_reuse=NO
ssl_ciphers=HIGH
#
# Uncomment this to indicate that vsftpd use a utf8 filesystem.
utf8_filesystem=YES
^G Help      ^O Write Out  ^W Where Is   ^T Cut        ^E Execute    ^C Location   ^U Undo
^X Exit      ^R Read File  ^M Replace    ^_ Paste      ^J Justify    ^G Go To Line ^R Redo
```

Once you've made the necessary changes and additions, restart the server FTP service:

```
sudo systemctl restart vsftpd.service
```

```
i am a university of alberta stu@my-first-website:~$ sudo systemctl restart vsftpd.service
```

Install PuTTY



Navigate to the [PuTTY website](#) and install the PuTTY program. This will come with tools for generating keys for [SSH](#) access to your server.

PuTTY: a free SSH and Telnet client

[Home](#) | [FAQ](#) | [Feedback](#) | [Licence](#) | [Updates](#) | [Mirrors](#) | [Keys](#) | [Links](#) | [Team](#)
Download: [Stable](#) · [Pre-release](#) · [Snapshot](#) | [Docs](#) | [Changes](#) | [Wishlist](#)

PuTTY is a free implementation of SSH and Telnet for Windows and Unix platforms, along with an `xterm` terminal emulator. It is written and maintained primarily by [Simon Tatham](#).

The latest version is 0.74. [Download it here](#).

LEGAL WARNING: Use of PuTTY, PSCP, PSFTP and Plink is illegal in countries where encryption is outlawed. We believe it is legal to use PuTTY, PSCP, PSFTP and Plink in England and Wales and in many other countries, but we are not lawyers, and so if in doubt you should seek legal advice before downloading it. You may find useful information at [cryptolaw.org](#), which collects information on cryptography laws in many countries, but we can't vouch for its correctness.

Use of the Telnet-only binary (PuTTYtel) is unrestricted by any cryptography laws.

Latest news

2021-04-18 Pre-releases of 0.75 now available

We're working towards a 0.75 release. Pre-release builds are [available](#), and we'd appreciate people testing them and reporting any issues.

0.75 will be a feature release. The biggest changes all relate to Pageant and/or SSH public keys. User-visible behaviour changes include:

- Pageant now allows you to load a key without decrypting it, in which case it will wait until you first use it to ask for the passphrase.
- We've switched to the modern OpenSSH-style SHA-256 style of key fingerprint.

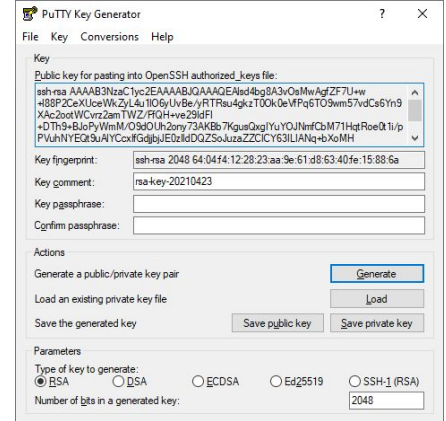
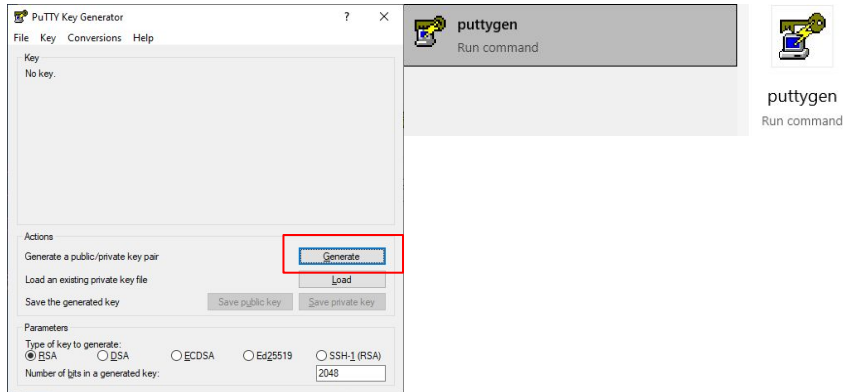
Back-end changes that affect compatibility:

- We've added support for the `rsa-sha2-256` and `rsa-sha2-512` signature methods, which some servers now require in order to use RSA keys.
- We've introduced a new version of the PPK format for private key files, to remove weak crypto and improve password-guessing resistance.
- We've introduced a new method for applications to talk to Pageant on Windows, based on the same named-pipe system used by connection sharing instead of window messages.

Generate Keys

When you install PuTTY, it comes with a key generator. Open the “puttygen” program (it should show up in a Windows program search in your Start menu now.)

Click the “Generate” button. It may ask you to move your mouse cursor in the “Key” fieldset square to assist in randomizing the key data.



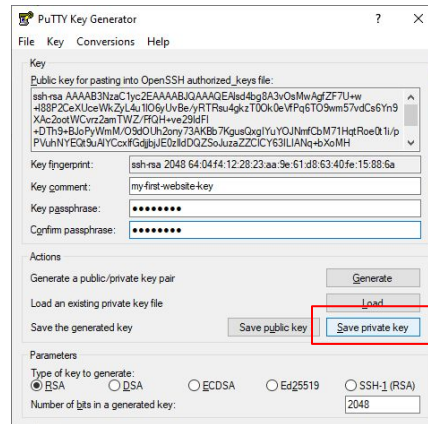
Save the Private Key

Feel free to modify the Key comment to help describe what the key is or what it is for.

Add a password to improve the security in using this key pair.

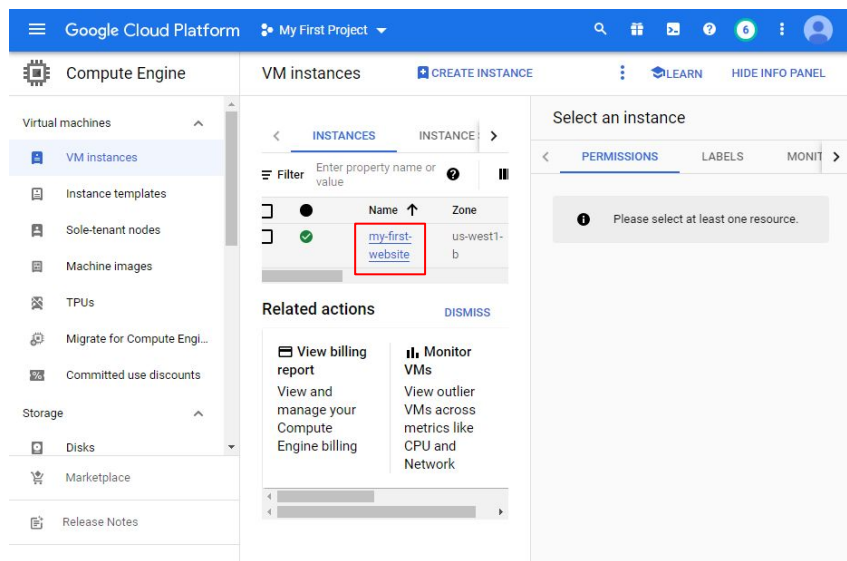
Save the private key to a folder on your computer. Make note of where you save this, as we will need it to sign in to your server later.

Leave the PuTTY Key Generation application open for the next steps.

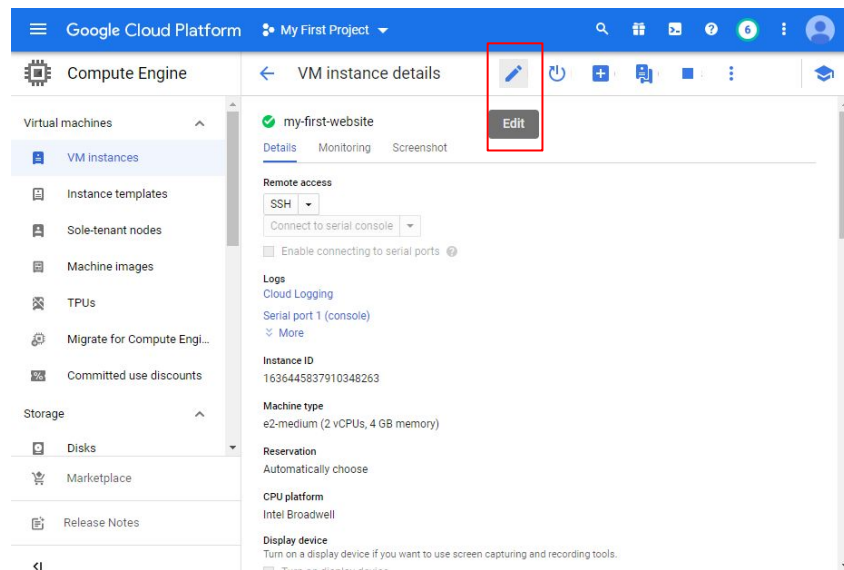


Navigate to your VM Instance Edit Screen

Navigate to your VM instance in your Google Cloud dashboard.

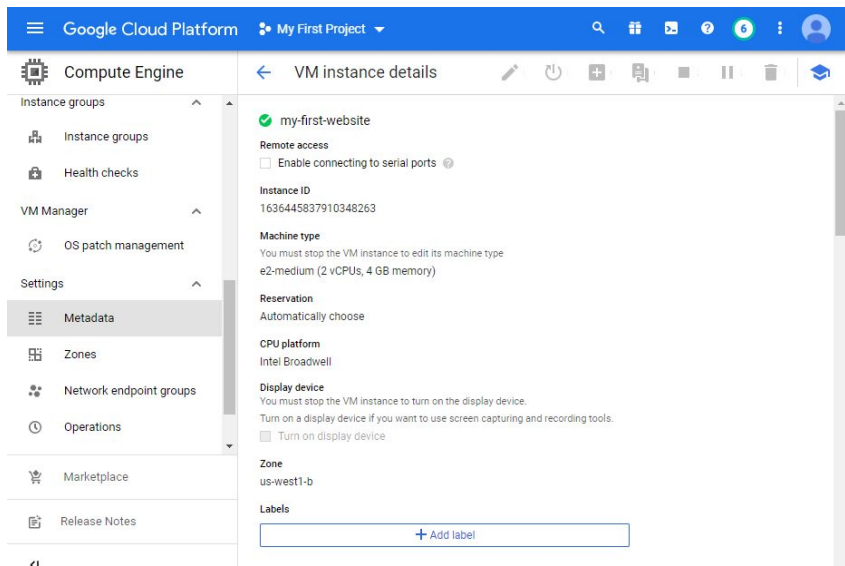


Click the “Edit” button, so that we may update our instance configuration.



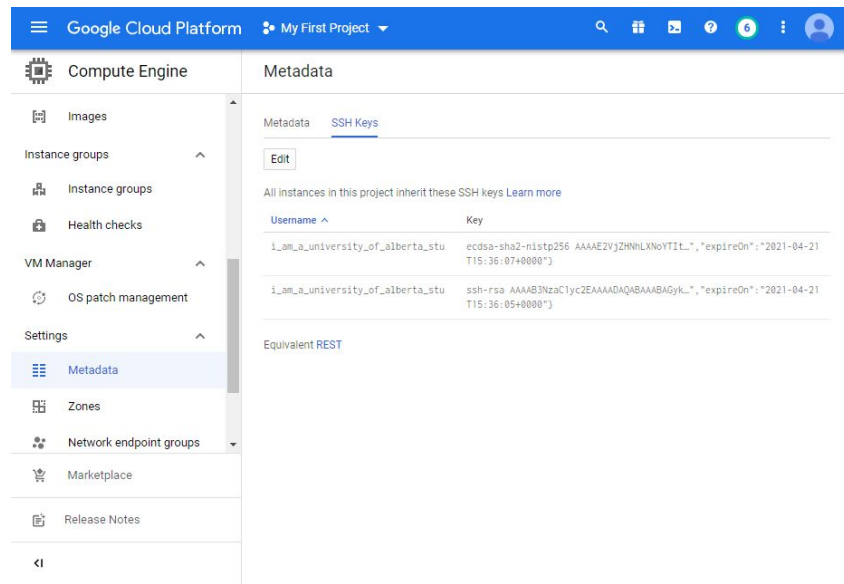
Configure Google Cloud with an SSH Key

Navigate to the “Metadata” settings.



The screenshot shows the Google Cloud Platform interface. The top navigation bar includes the Google Cloud Platform logo, the project name "My First Project", and a search icon. The left sidebar shows the "Compute Engine" section expanded, with "Instance groups" and "Health checks" listed. The "VM Manager" section is also expanded, showing "OS patch management" and "Settings". The "Settings" section is further expanded, showing "Metadata" selected. The main content area displays the "VM instance details" for an instance named "my-first-website". The "Remote access" section shows a checkbox for "Enable connecting to serial ports" which is unchecked. The "Instance ID" is 1636445837910348263. The "Machine type" is e2-medium (2 vCPUs, 4 GB memory). The "Reservation" is set to "Automatically choose". The "CPU platform" is "Intel Broadwell". The "Display device" is set to "Turn on display device". The "Zone" is "us-west1-b". The "Labels" section has a "+ Add label" button.

Click the “SSH Keys” tab there.



The screenshot shows the Google Cloud Platform interface. The top navigation bar includes the Google Cloud Platform logo, the project name "My First Project", and a search icon. The left sidebar shows the "Compute Engine" section expanded, with "Instance groups" and "Health checks" listed. The "VM Manager" section is also expanded, showing "OS patch management" and "Settings". The "Settings" section is further expanded, showing "Metadata" selected. The main content area displays the "Metadata" settings for an instance named "my-first-website". The "SSH Keys" tab is selected. The "Edit" button is visible. The text "All instances in this project inherit these SSH keys [Learn more](#)" is shown. The table lists the SSH keys for the instance:

Username	Key
i_am_a_university_of_alberta_stu	ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItL...T15:36:07+0000*)
i_am_a_university_of_alberta_stu	ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQgK...T15:36:05+0000*)

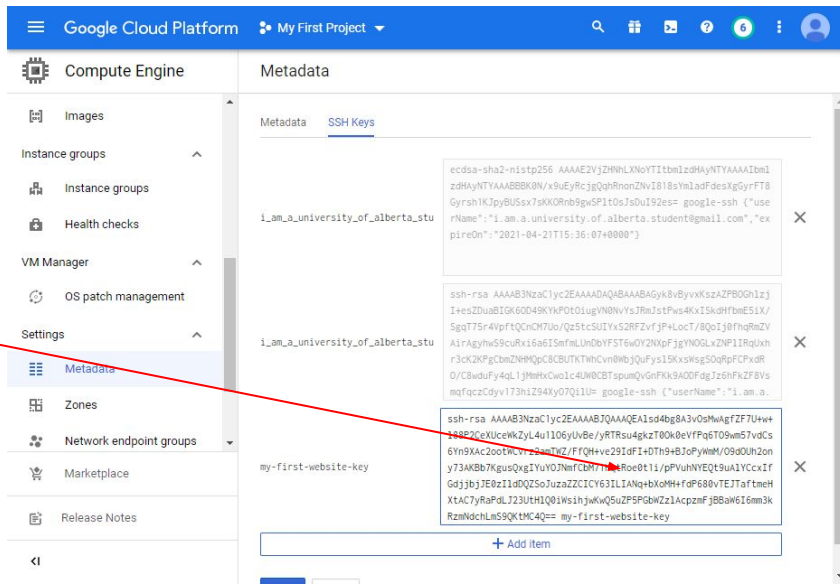
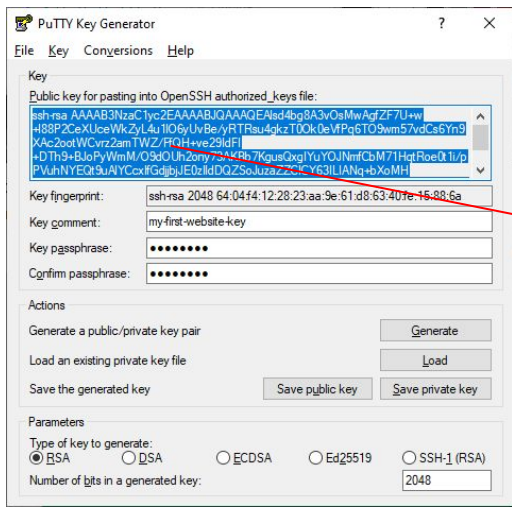
The "Equivalent REST" link is also visible.

Add the Public Key to the Server

Click the “Add item” button to add a new textarea field that you can add information to.

Don’t forget to click “Save” when you’re done, for these changes to be recorded!

Paste the public key data into the new field.

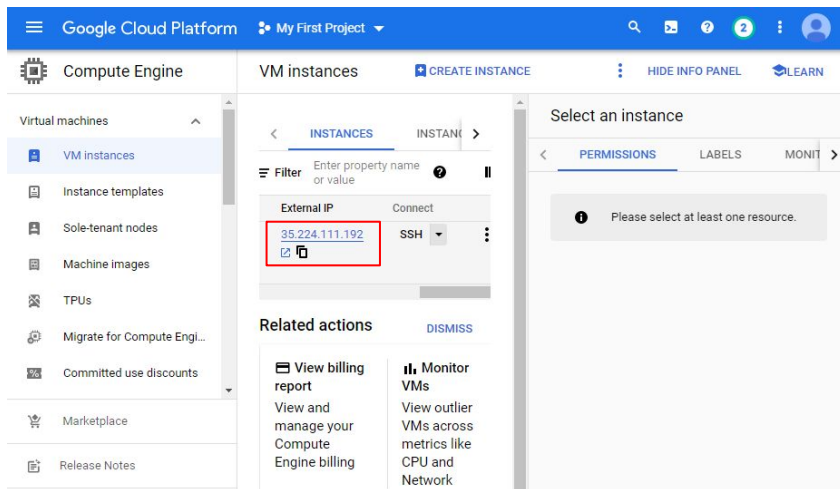


Connect to an
FTP-Enabled Server using
FileZilla

Gather Required Information

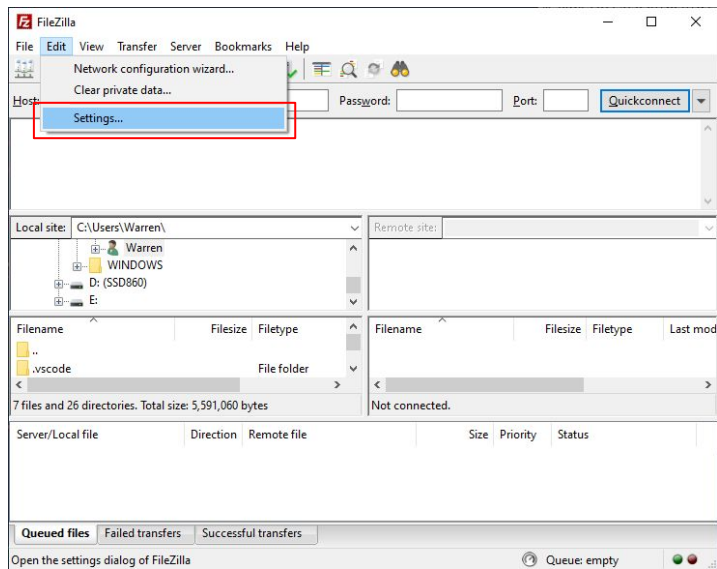
You'll need the address of the website server.
Unless, or until, you have a domain name setup for the server—this will be the **external IP address**.

That aside, you'll need to make ensure you know the FTP account **username** and **password** that you set up earlier.

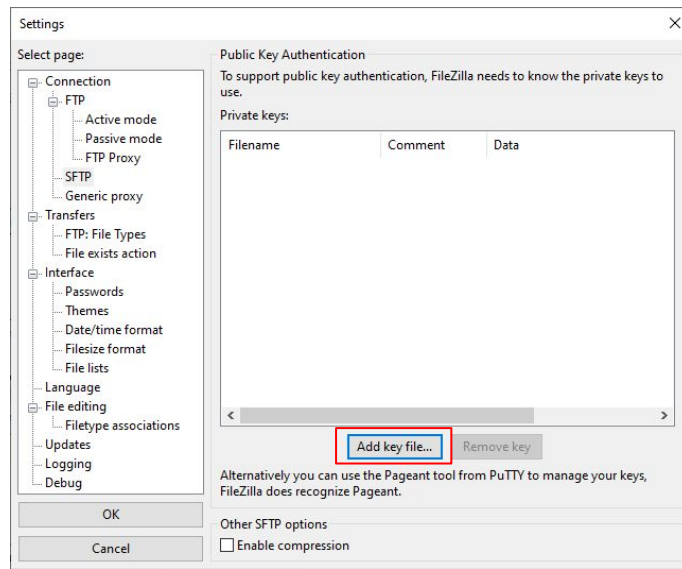


Add the Private Key to your Filezilla

In FileZilla, click the “Edit” dropdown and then the “Settings” option.



Navigate to “Connection→SFTP” page. Click the “Add key file...” button and find the key file(s) saved earlier. Click “OK” when done.



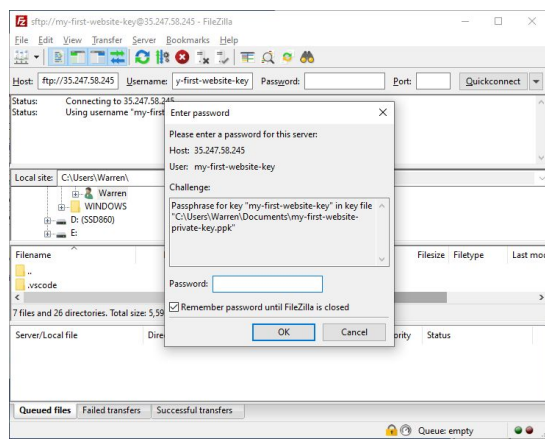
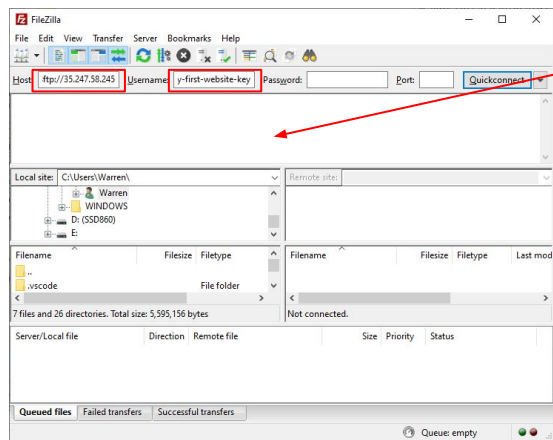
Enter the SSH Information

Enter “sftp://” into the “Host” field (sans quotations), followed by the external IP address of the server.

The Username should be the name of your key (as seen in your Google Cloud VM Instance “Metadata” SSH tab.)

It will ask for a password to connect to the server—use the password we associated with your key in this field.

Pay attention to the logging pane to see if the connection is successful.



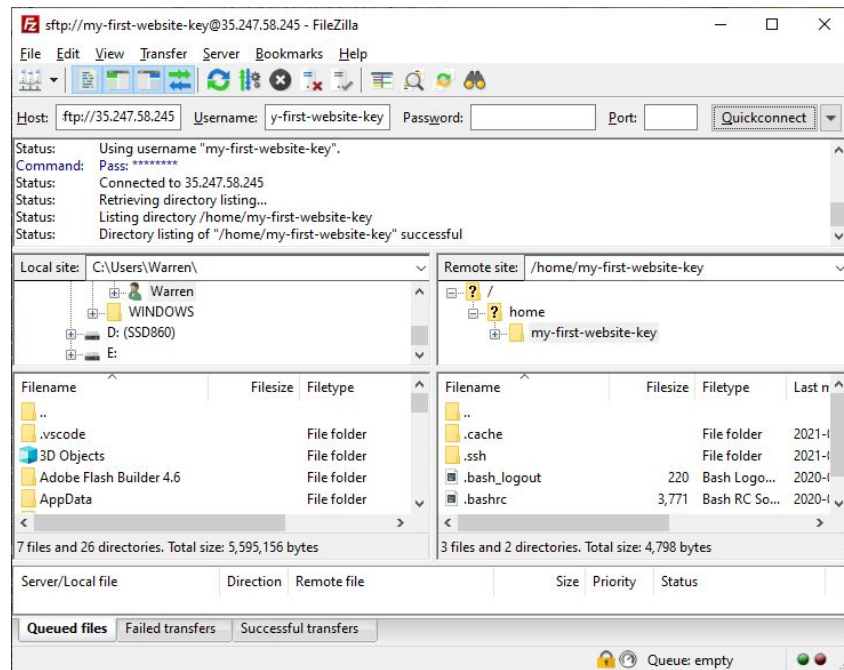
Practice Navigating in FileZilla

If all went well, you'll gain access to the filesystem on the server.

Note the left pane contains the files and folders on your computer, and the pane on the right contains the files and folders on the server.

You can click through the folders on the server, much like you would on your own PC using File Explorer.

***Beware:** Double-clicking or pressing the enter key on a file will transfer the file in the current pane to the open directory in the other pane, it will not open the file!



Setting up Apache (Preparing the Server for Web Traffic)

Installing Apache

First, install Apache:

```
sudo apt update
```

```
sudo apt install apache2
```

```
sudo systemctl start apache2
```

The default installation should come with a publicly available folder; its contents are served to web browser clients making requests to this server.

The public folder is where you can place HTML, CSS, JavaScript, and multimedia files for consumption by users via the internet.

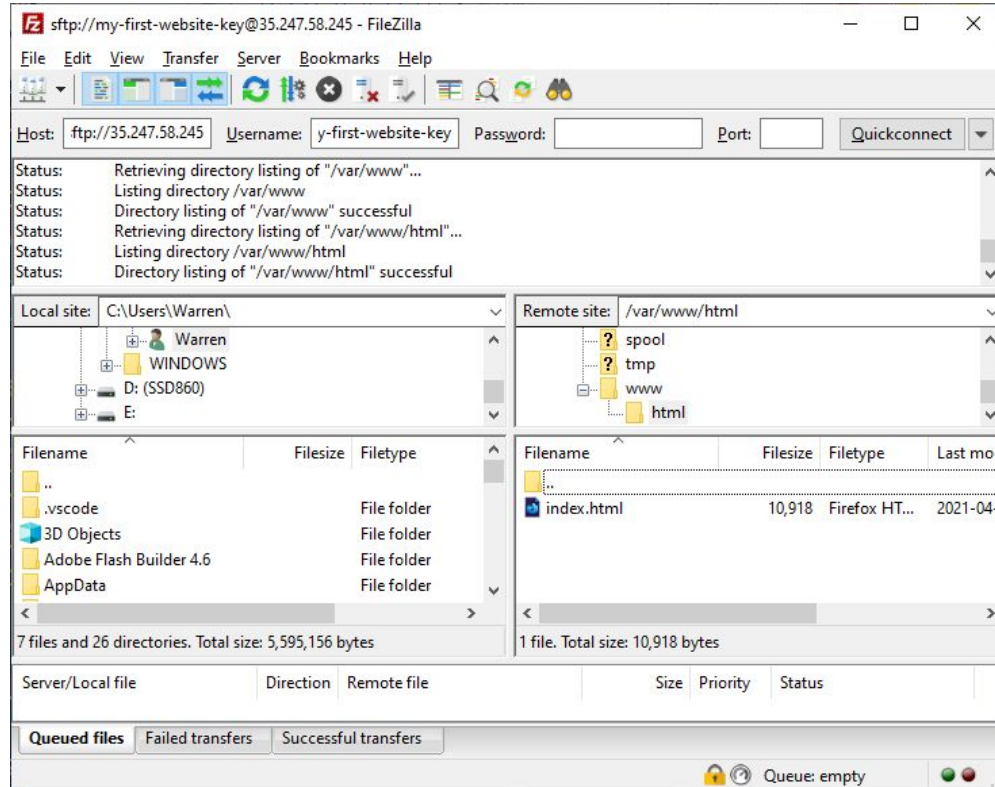
Typically, the directory in question can be found in...

```
/var/www/html
```

A simple test you can place in here might be a file titled “index.html” with the following contents:

```
<!DOCTYPE html>
<html>
  <head><title>Hello, World!</title></head>
  <body><h1>Hello, World!</h1></body>
</html>
```

If you navigate to the /var/www/html folder in FileZilla, you can drag files into the server pane to upload them. Replace the default “index.html” file.



Helpful Tutorials and Documentation

Ensure you familiarise yourself with the documentation for the tools offered by Google (or any other host you try out) as you'll likely need to refer to these if you want to try new things, forget steps you've carried out before, or want to explore what the product is capable of.

Some articles good to keep on hand to get started with include...

- [All pricing](#)
- [Connecting using third-party tools](#)
- [gcloud compute](#) (command-line tool)
- [Using IAP for TCP forwarding](#)
- [Google Cloud Free Program](#)
- [Free Tier usage limits](#)
- [Google Cloud Pricing Calculator](#)
- [Get started with Google Cloud](#)
- [Install and Setup FTP on Ubuntu \(Hostinger\)](#)
- [Install Apache on Ubuntu](#)

Recommended Readings

If you'd like a more in-depth look at hosting and configuration:

- [Geewax, J. J. \(September 2018\). Google Cloud Platform in Action. Manning Publications.](#)