Elektrobit

Virtual IVI Development for Android™ by Elektrobit

Getting started on AWS

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Legal notice

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Please see EB-Click-Through - virtual IVI Eval License-Terms-Conditions

Do not forget that this is only a development tool for developers to emulate the Android Automotive OS (i.e. the cloud emulator will not run in the car or on production servers). There could still be errors and we are always open to improve the tool further. If you encounter any issue, please check the "Troubleshooting" section in User Guide first. Feel free to contact us with any further issues.

Introduction

The Virtual IVI Development for Android is a full digital twin for cockpit systems. It allows you to develop and debug Android-based target applications on a digital twin with full compatibility to hardware deployments.

For more information see also: Virtual IVI Development for Android™ – Elektrobit.

About this document

This guide will explain how to setup the Cloud Emulator on AWS. It is available on the AWS Marketplace as an AMI (Amazon Machine Image): Virtual IVI Development for Android™

This document only explains the initial setup of the EC2 instance. You can find usage and administration instructions in the running EC2 instance when you visit the web page and click on the *Documentation* link.

Before you start

In the following we will assume that:

- you already have an AWS account setup
- you are generally familiar with AWS and EC2
- and you know how to start, connect to and use a plain Ubuntu EC2 instance on AWS
- you already have an account at https://elektrobit.cloud
  - if not, you can create one for free

If you are looking for more help on any AWS topics, please check the AWS documentation:

- https://aws.amazon.com
- https://docs.aws.amazon.com/
- https://docs.aws.amazon.com/ec2/

Deploying the Cloud Emulator requires the following AWS services:

- Amazon Elastic Compute Cloud (Amazon EC2), for basic EC2 configuration
- Amazon Elastic Block Storage (Amazon EBS), for configuring the EC2 instance storage
- Amazon Virtual Private Cloud (Amazon VPC), for configuring an internet-facing subnet and a security group

When following this guide you may incur cost for any of these services and any supporting service that needs to be used. Check the AWS pricing pages for details.

Depending your exact AWS setup, it is possible you will use additional services.

Requirements and limitations

To run the Cloud Emulator on AWS, you need to use bare metal instances, because AWS does not support nested virtualization. Please make sure your AWS account is able to use bare metal instances and your quota is sufficient to run them.

Currently the Cloud Emulator only supports x86.

Additionally to access the Cloud Emulator, you will need to expose it publicly (see section Security Group setup). It is likely also possible to only expose it on a private VPN that is bridged with your local network. However this requires configuring a custom domain name and is not verified to work.

Viewing the screen of the emulator only works reliably when using Google Chrome (or a Chromium based browser). It may work in other browsers, but we recommend using Google Chrome when accessing the emulator.

Setup a Key Pair

NOTE

This is only necessary if you don't already have a key pair setup. Each user should have their own key pair that only they can use.

Make sure you have created a key pair in your AWS account. See the AWS documentation for how to do this: https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/create-key-pairs.html

We recommend creating the key pair locally and importing it into AWS. That way it should automatically be picked up by you ssh-agent when you run the `ssh` command later. If you generate the key pair in AWS and download the key, you later need to specify the file when you connect to the EC2 instance. E.g.

Replace the variables accordingly

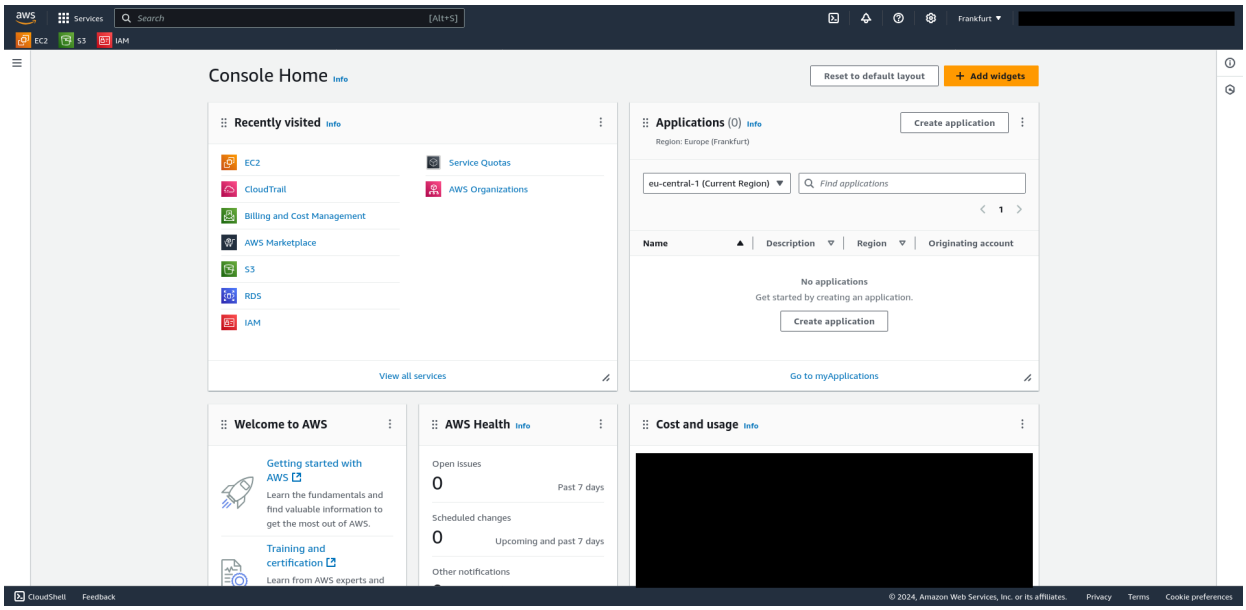
```
$ ssh -i ${path_to_key_pem} ubuntu@${public_ipv4_dns_name}
```

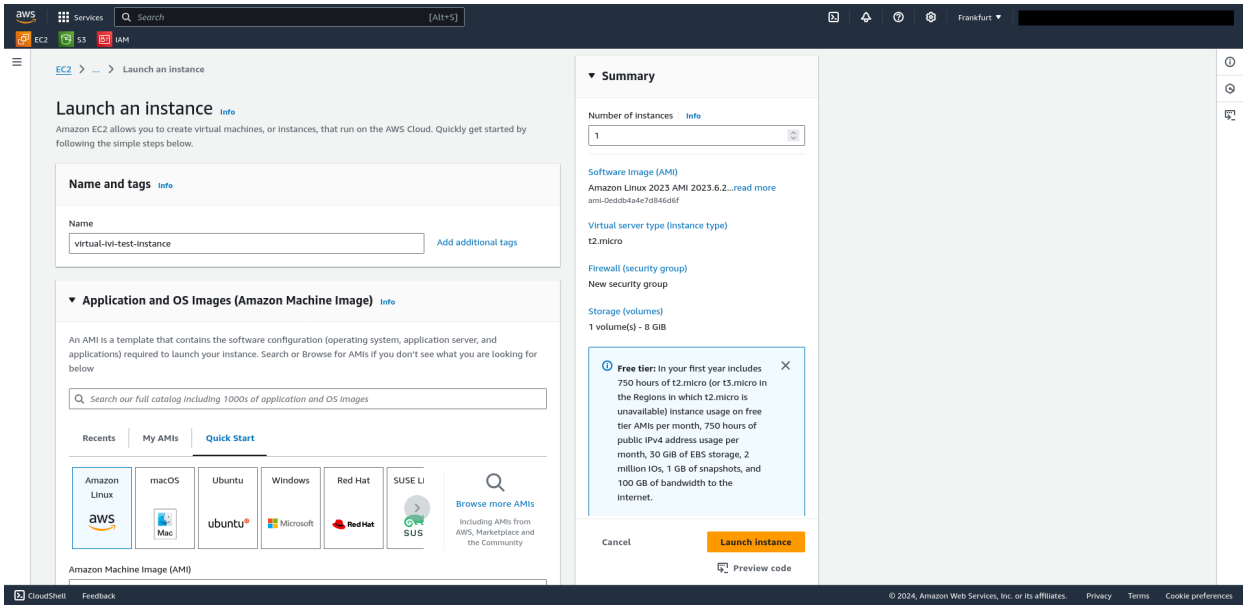
Setup the EC2 instance

NOTE

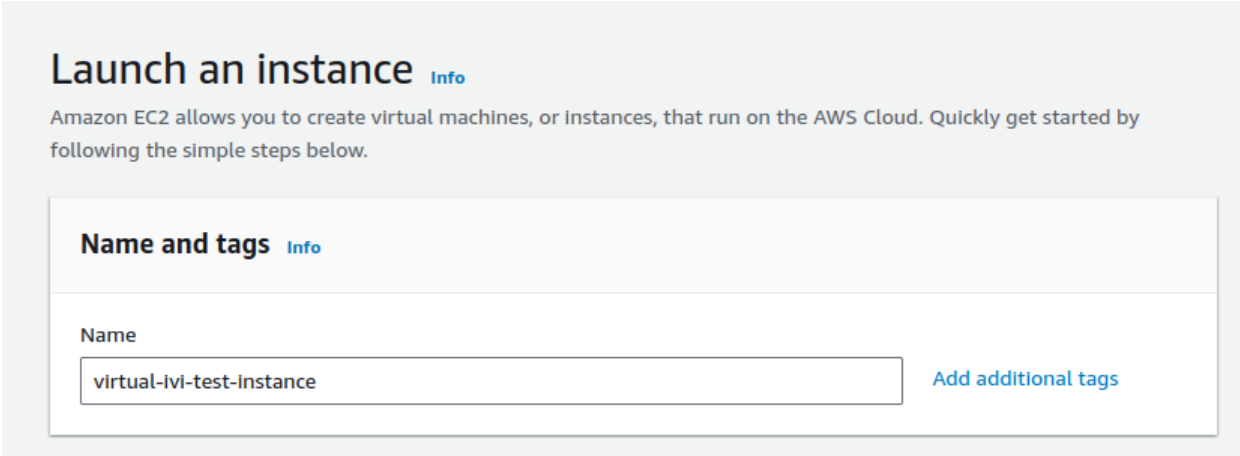
It is also possible to start this process through the AWS marketplace page. In that case the configuration pages look a bit different and you may need to complete some steps in a different order. But you still need to configure the same settings as explained below.

1. In the AWS Console page, open the *EC2 Dashboard* and click on the [**Launch instance**] button to start the "Launch an instance" dialog



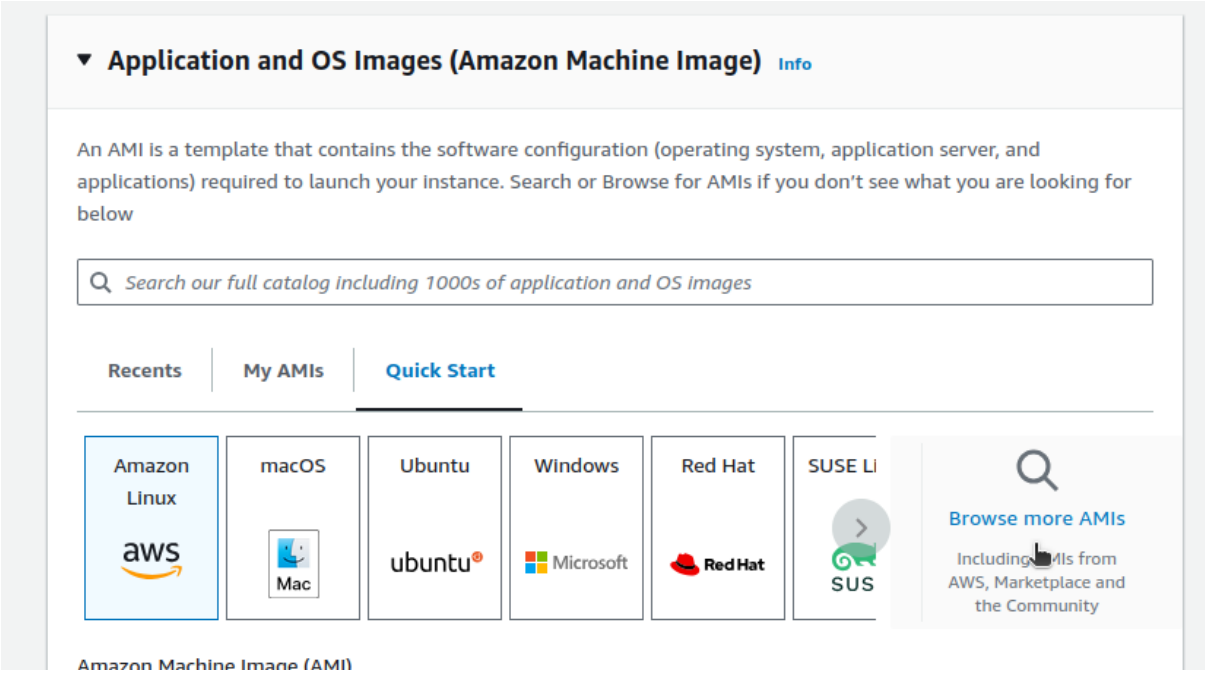


2. Under *Name and tags*: Set an appropriate name (and optionally tags) so you can later find the instance again



3. Under *Application and OS Images*: Select the Cloud Emulator AMI

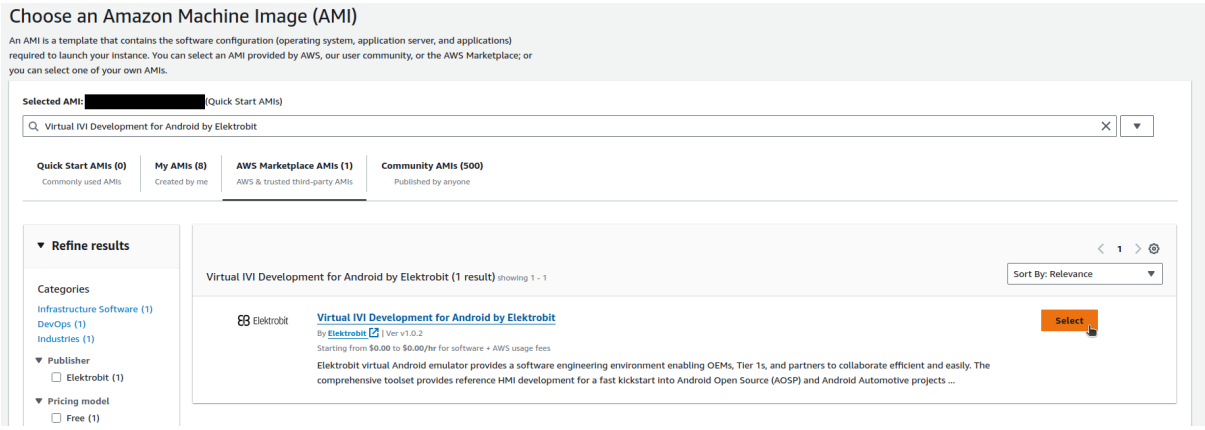
   a. Click on the [**Browse more AMIs**] button



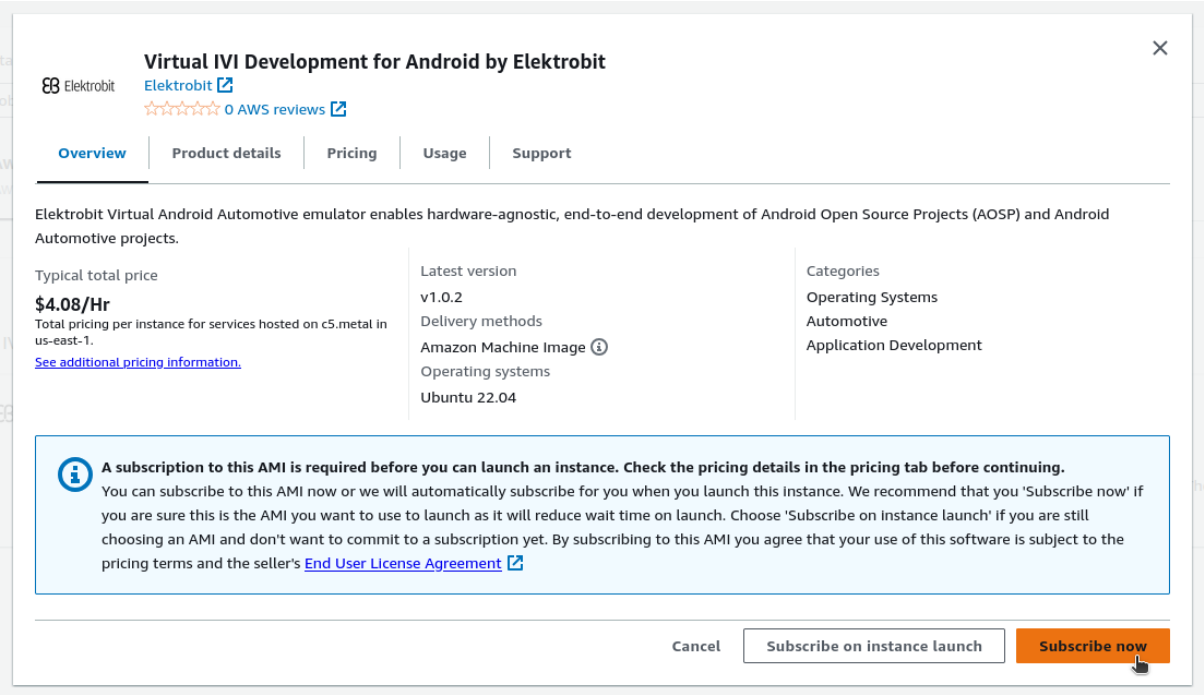
   b. Select the [**AWS Marketplace AMIs**] tab

   c. Search for the Marketplace product "Virtual IVI Development for Android by Elektrobit"

   d. Click on the [**Select**] button

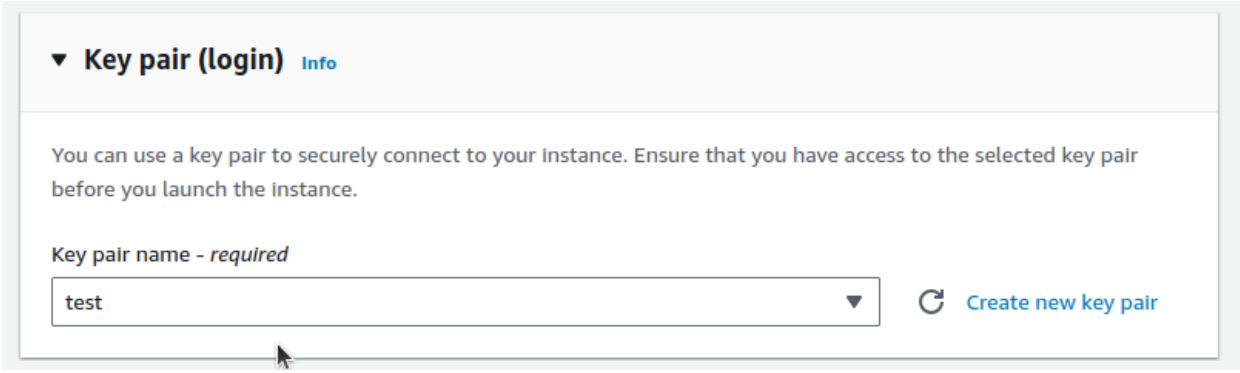


Click on either the [**Subscribe now**] or [**Subscribe on instance launch**]



f. You are now taken back to the "Launch an instance dialog" and most of the details should be filled out now

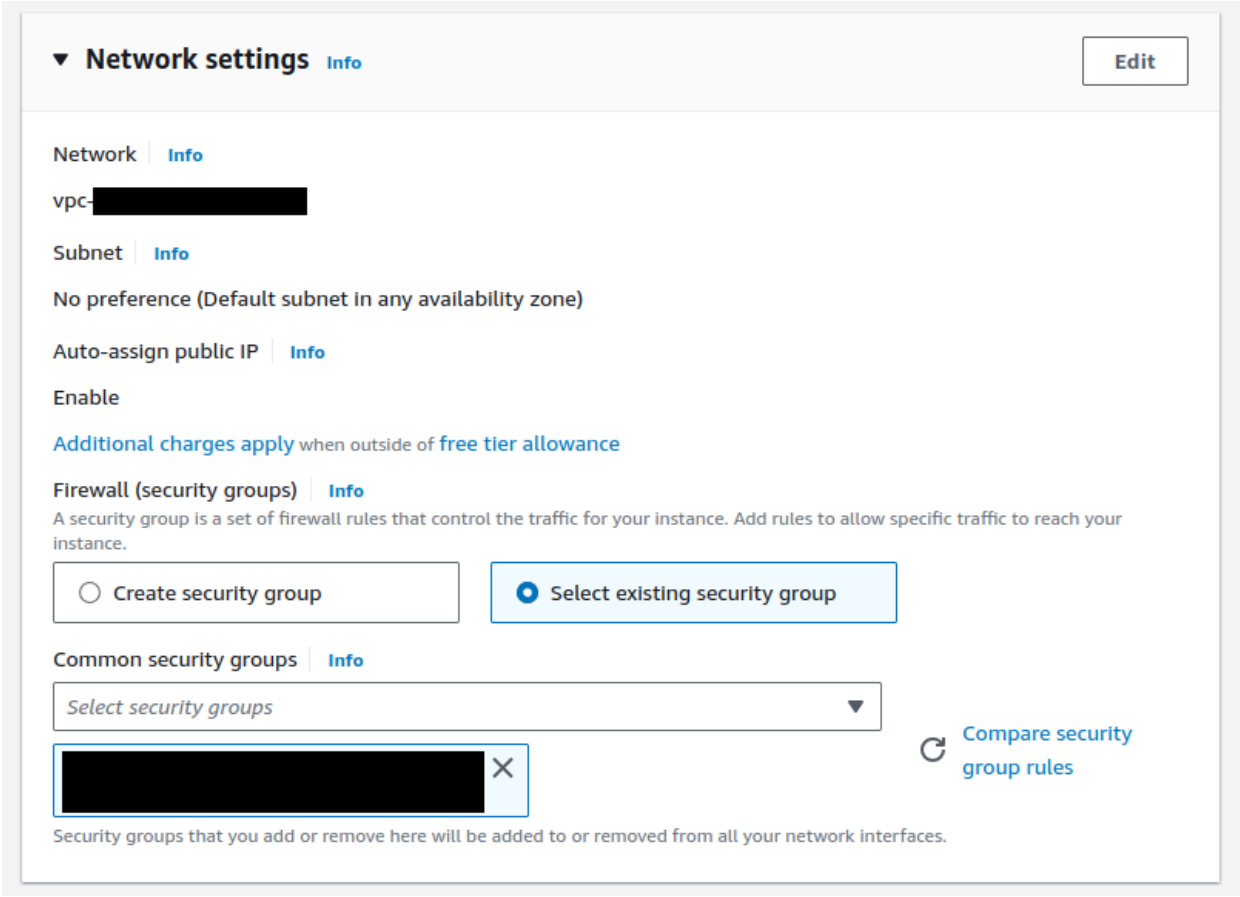
4. (Optionally) under *Instance type*: Select the one you want to use
   - You are required to use a bare metal x86 instance type. This is required because AWS does not allow nested virtualization and we need that to run an emulator.
   - Recommended and verified instance type is *c5.metal*
5. Under *Key pair (login)*: Select the key pair you previously created



NOTE

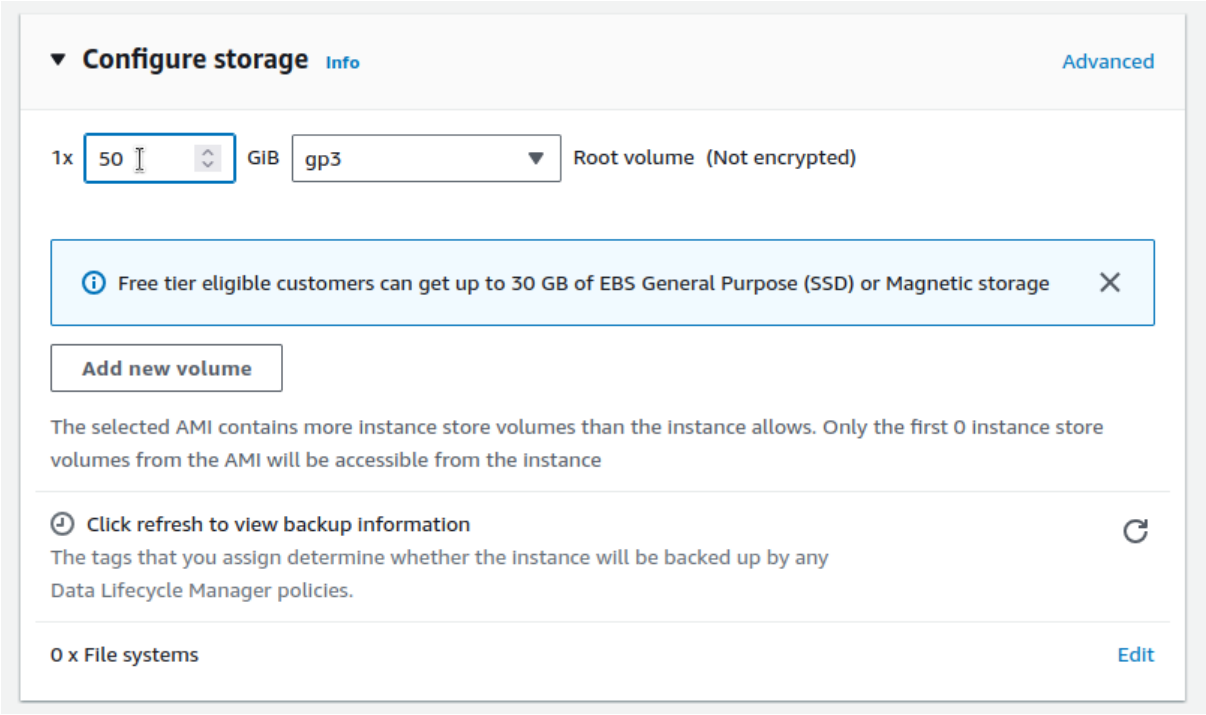
If you select the wrong key pair, you will later not be able to connect to the EC2 instance through ssh. Which means you can't complete the setup.

6. (Optionally) under *Network settings*:

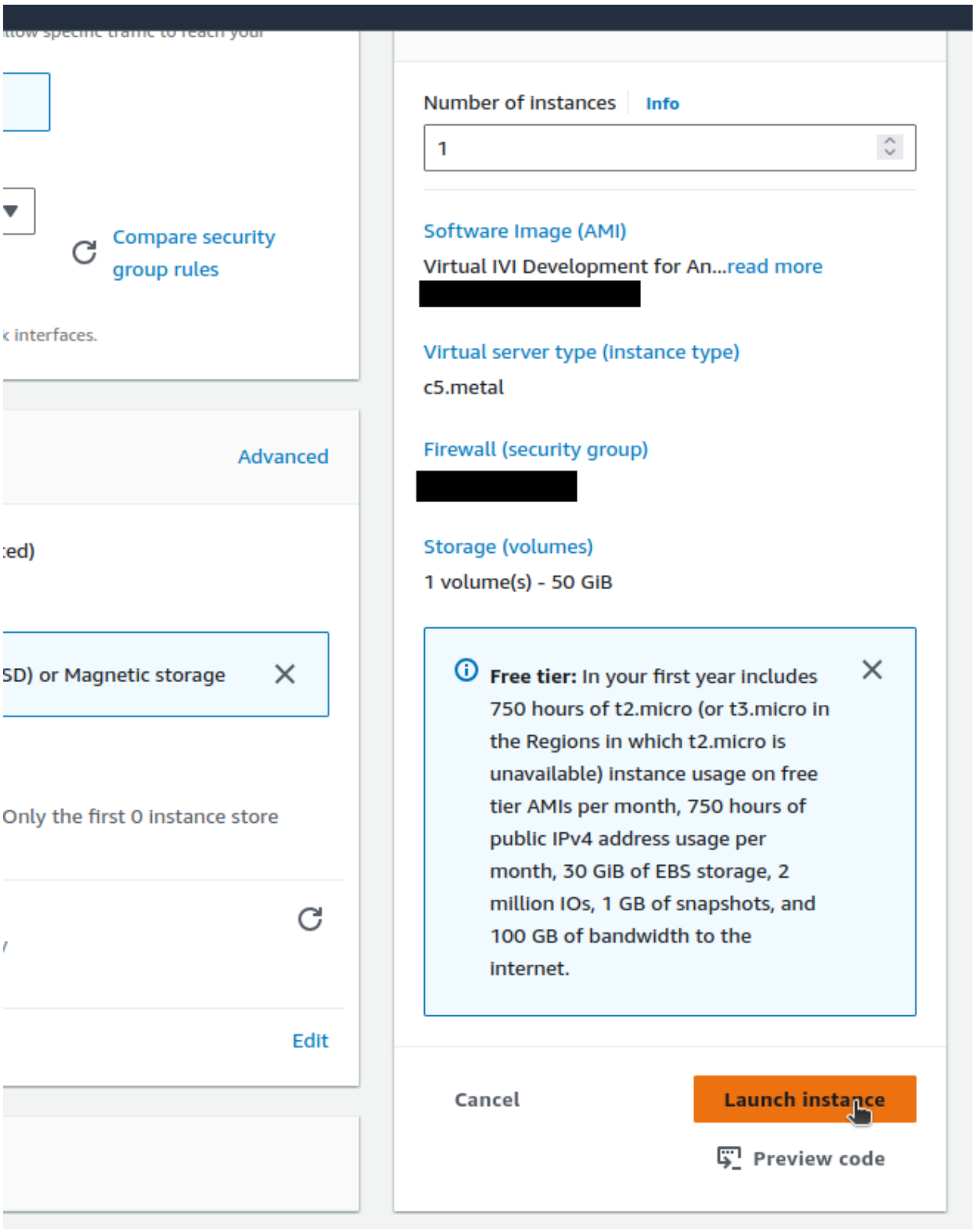


- If you have previously already created a security group, you can reuse it. For this click on [**Select existing security group**] and select the existing security group.
- If you have not created a security group before, you can simply keep the defaults. You can also update these settings later. See also section Security Group setup.
- If you want to use a direct ADB connection to the emulator, you need to allow access to more ports than are configured by default. See section Security Group setup.
- Note that if you have a more sophisticated network setup in your AWS account (e.g. a private VPN bridged to your local network) you will likely need to make changes to the network configuration here. Please contact the administrator of your AWS account for support.

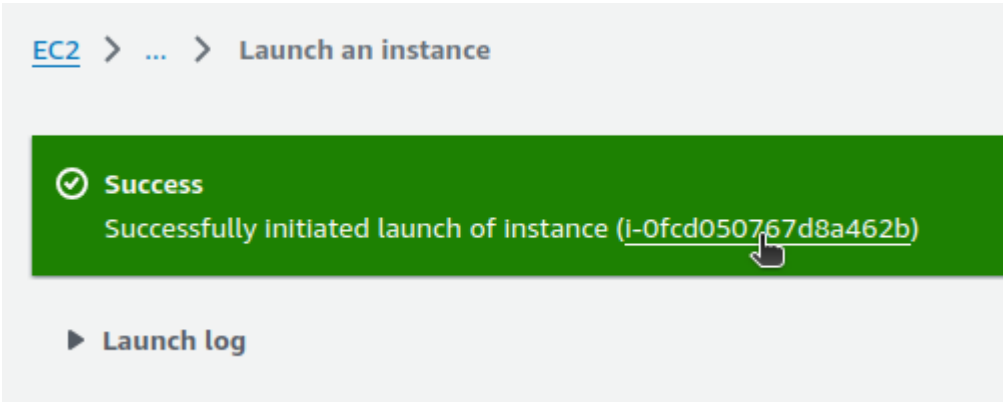
7. Under *Configure storage*: Do not leave this at the default! Set an appropriate amount of storage for the root volume.
   - If you are just trying out the Cloud Emulator for yourself, we recommend using at least 50 GB.
   - If you intend to setup the EC2 instance for multiple users, we recommend 1000 GB or more.
   - See section Storage setup for more information.



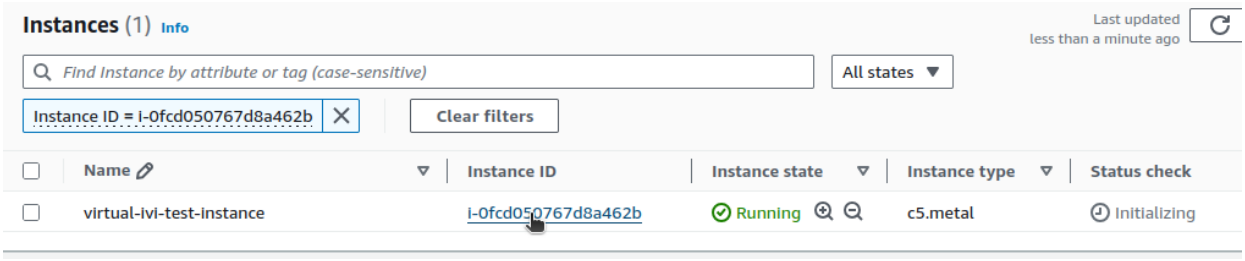
8. (Optionally) under *Advanced details*: Configure other settings as necessary by your AWS setup. Normally you don't need to make any more changes here.
9. On the right side, confirm the settings again and click on [**Launch instance**]



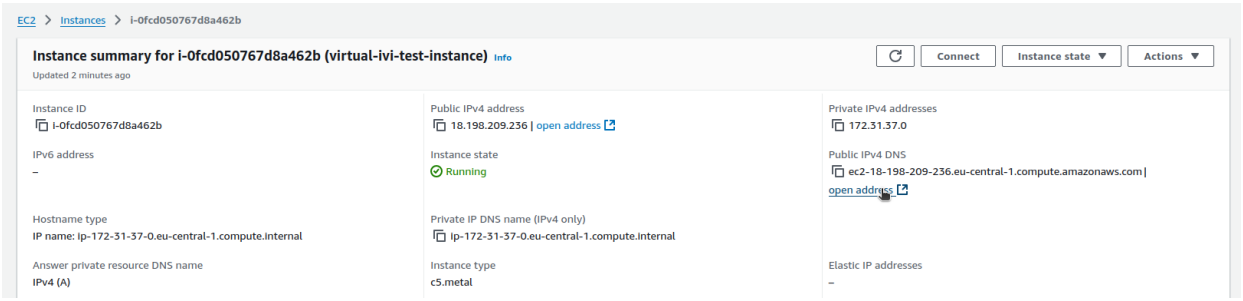
10. AWS will now start an EC2 instance for you, when it was successful it will show a link to the instance details.



11. Click on the EC2 instance ID to go to the details page.

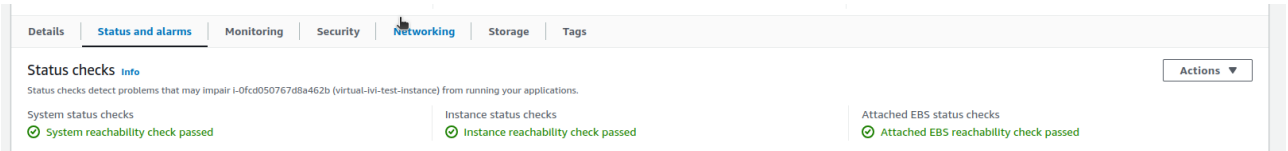


12. Using the "Public IPv4 DNS" name on the detail page, you can access the web page of the Cloud Emulator. There you will find more details on how to finish the setup.



NOTE

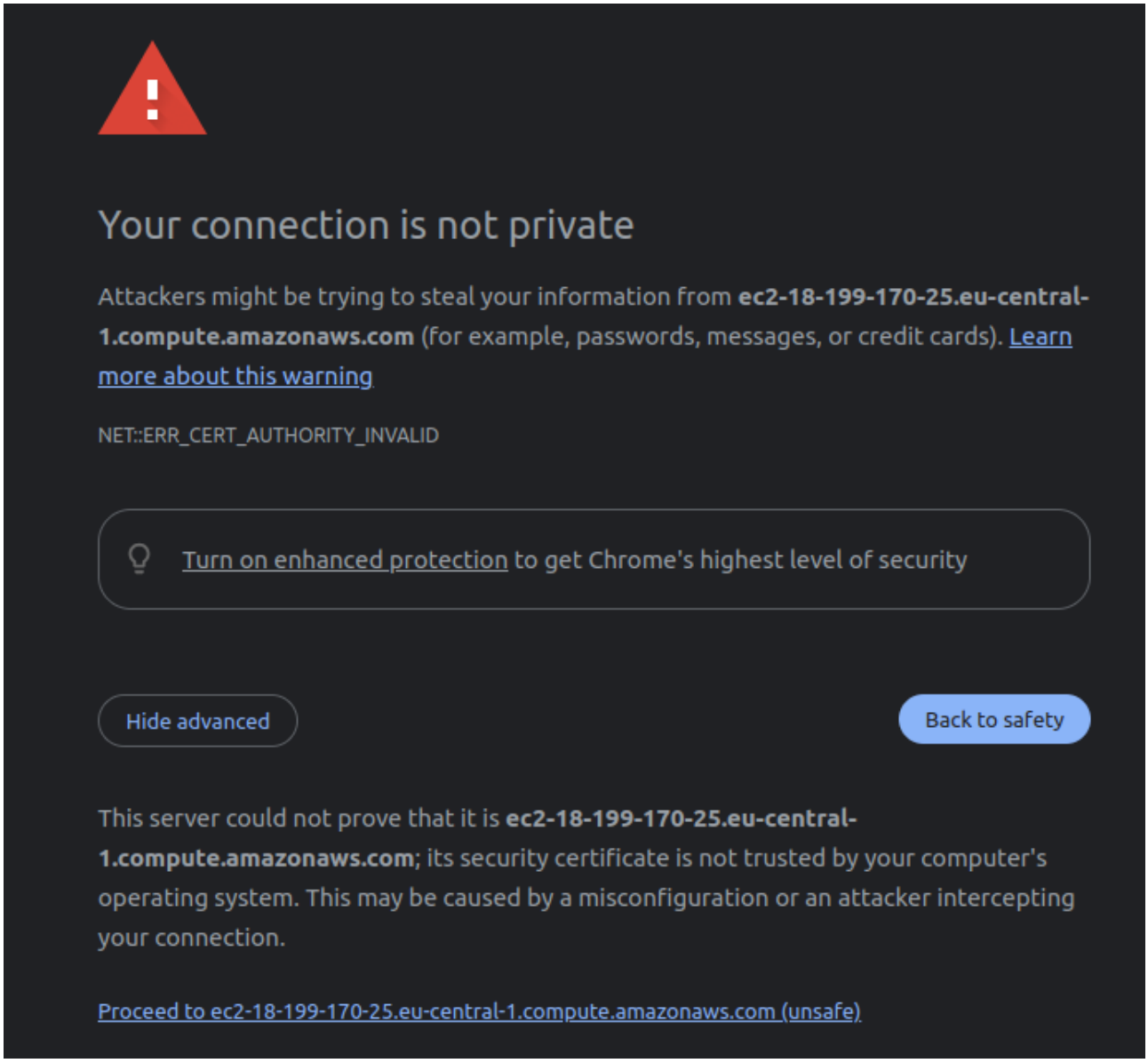
It usually takes a while after the EC2 instance start until the web page is accessible. If the "Instance status" shows "Running" and all "System checks" shows up green, you should be able to access the web page.



Initialize the Cloud Emulator

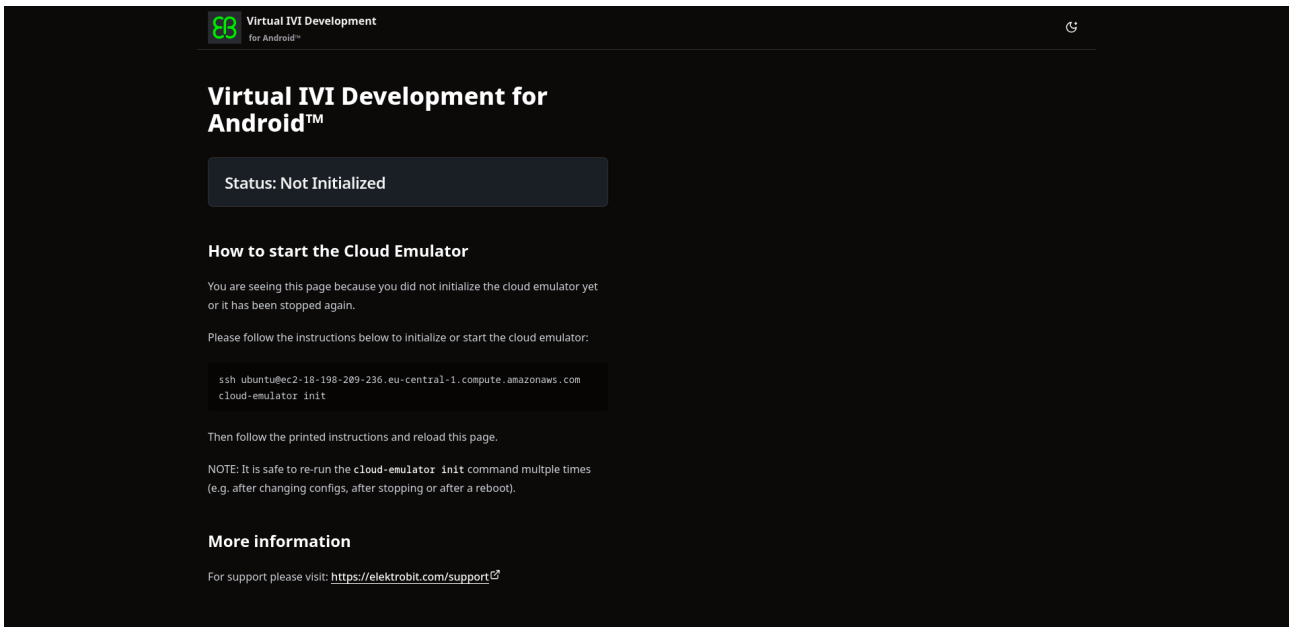
Once the EC2 instance is running, you can access the web page of the Cloud Emulator.

By default the Cloud Emulator uses a self signed certificate, so you will get a security warning in the browser when you access the page for the first time. You can safely ignore this, by clicking on the button [**Advanced**] and the on the link "Proceed to ...". The screenshot shows Google Chrome. On other browsers the page may look a bit different.



You usually only have to do this once. But you will need to do it again if the domain changes (e.g. after you stop and start the EC2 instance again).

It is also possible to configure a proper domain name with properly signed certificates. See the administration documentation. This is available on the web page of a running EC2 instance.



This web page will show you how to finish the setup. These steps are also explained here with a bit more detail than.

1. Connect to the EC2 instance via SSH
   a. Username: ubuntu
   b. Depending on how you setup your key pair, you need to use different SSH commands (replace the values in `<brackets>`):

      Replace the variables accordingly

      ```
      $ ssh ubuntu@${public_ipv4_dns_name}
      $ ssh -i ${path_to_key_pem} ubuntu@${public_ipv4_dns_name}
      ```

      ```
      $ ssh ubuntu@ec2-18-196-253-177.eu-central-1.compute.amazonaws.com
      The authenticity of host 'ec2-18-196-253-177.eu-central-1.compute.amazonaws.com (18.196.253.177)' can't be established.
      ED25519 key fingerprint is SHA256:uZuLpcLLDaOVnH190IgxNV9yPt7/tQhL+EODFaauAo4.
      This key is not known by any other names
      Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
      Warning: Permanently added 'ec2-18-196-253-177.eu-central-1.compute.amazonaws.com' (ED25519) to the list of known hosts.
      Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 6.5.0-1024-aws x86_64)

       * Documentation:  https://help.ubuntu.com
       * Management:     https://landscape.canonical.com
       * Support:        https://ubuntu.com/pro

       System information as of Tue Nov 12 08:15:56 UTC 2024

        System load:  1.7               Processes:               1118
        Usage of /:   18.0% of 48.27GB  Users logged in:          0
        Memory usage: 0%                IPv4 address for enp125s0: 172.31.42.50
        Swap usage:   0%


      Expanded Security Maintenance for Applications is not enabled.

      0 updates can be applied immediately.

      17 additional security updates can be applied with ESM Apps.
      Learn more about enabling ESM Apps service at https://ubuntu.com/esm


      The list of available updates is more than a week old.
      To check for new updates run: sudo apt update

      ================================================================================
      Cloud-emulator by Elektrobit installed but was not initialized. Run 'cloud-emulator init'
      ================================================================================

      To run a command as administrator (user "root"), use "sudo <command>".
      See "man sudo_root" for details.

      ubuntu@ip-172-31-42-50:~$
      ```

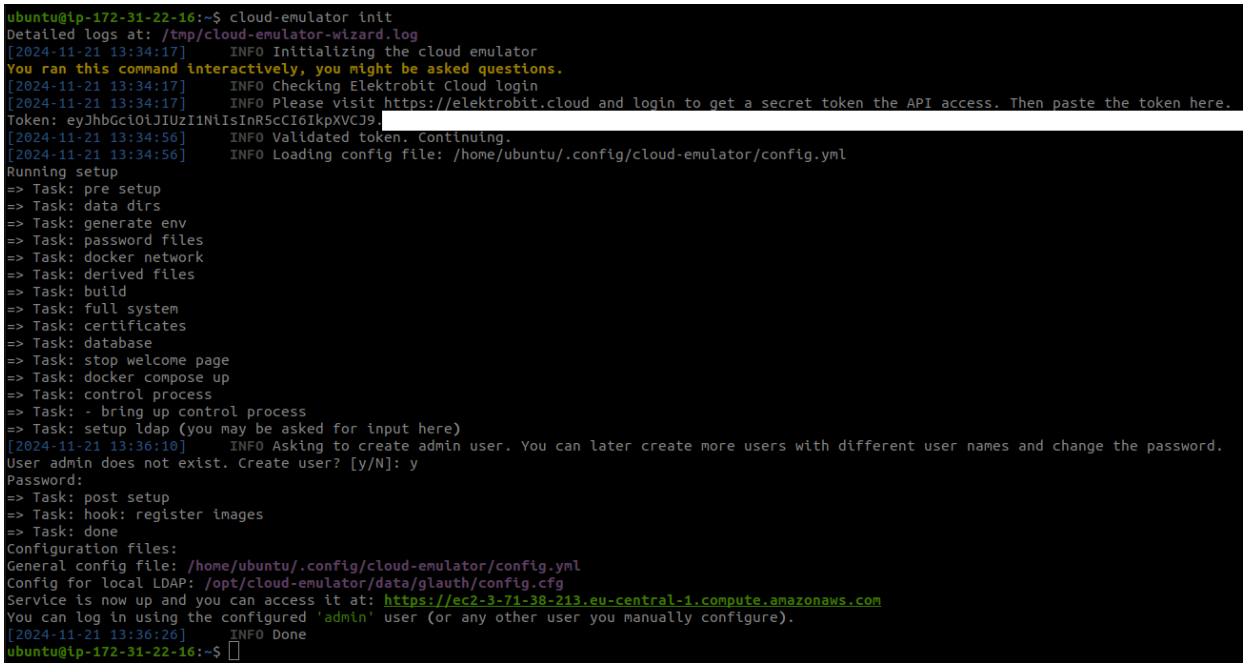
WARNING 

Please make sure to only use the user `ubuntu` when running any `cloud-emulator` commands. Using any other user will likely result in unrecoverable errors.

2. On the EC2 instance run the following command:

```
$ cloud-emulator init
```

This will initialize the Cloud Emulator and is the last step to finish the setup.

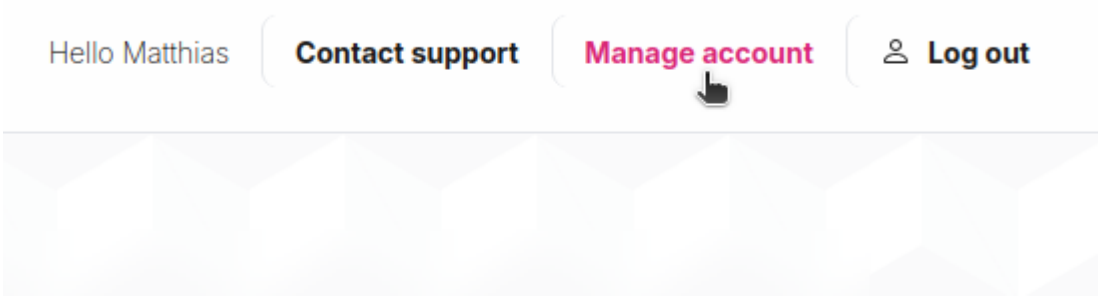


During the init process you will be asked for two things: a. an API token from https://elektrobit.cloud and b. if you want to create an admin user and what the password should be.

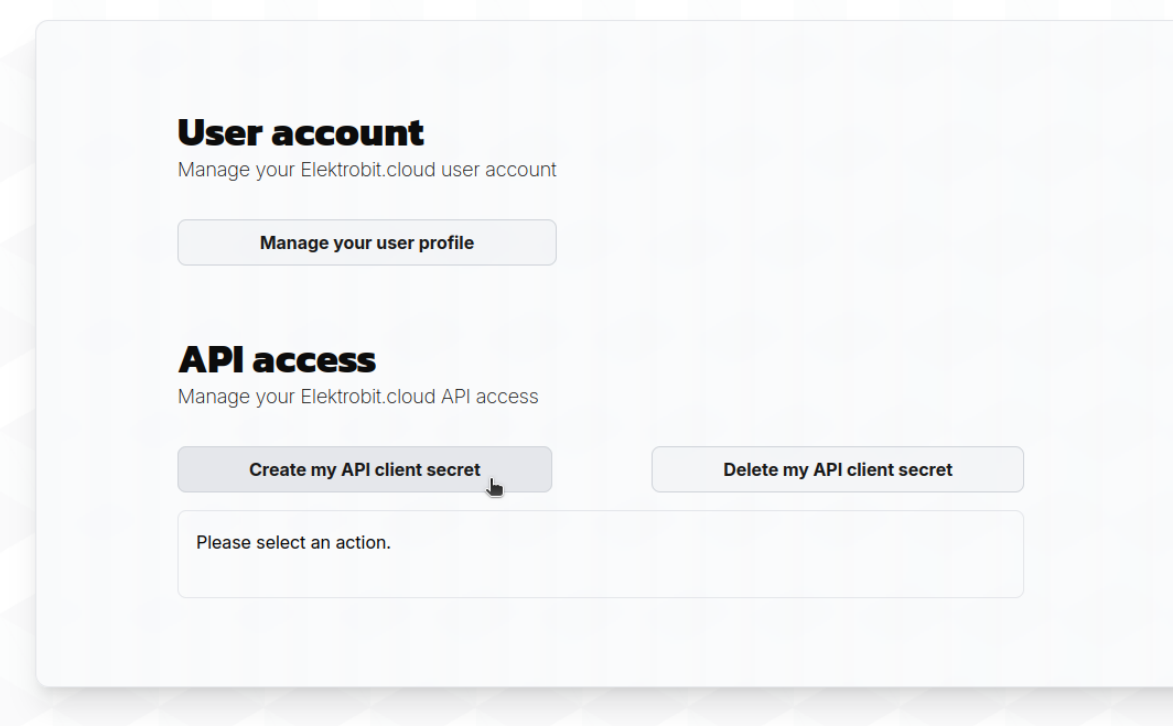
a. **API Token:** If you already have a token, you can simply paste it when you are prompted. If you don't yet have a token, follow these steps:

   i. Head over to https://elektrobit.cloud and login at the top right

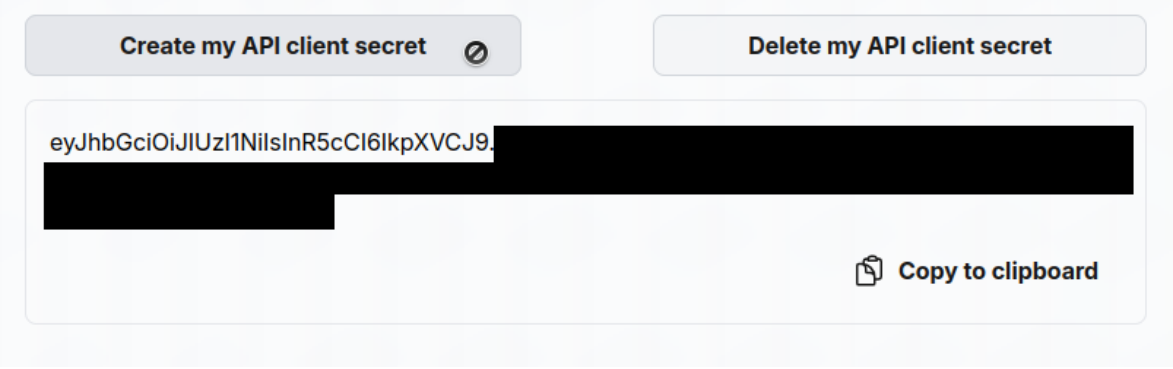
   ii. Then click on "Manage account" in the top right corner

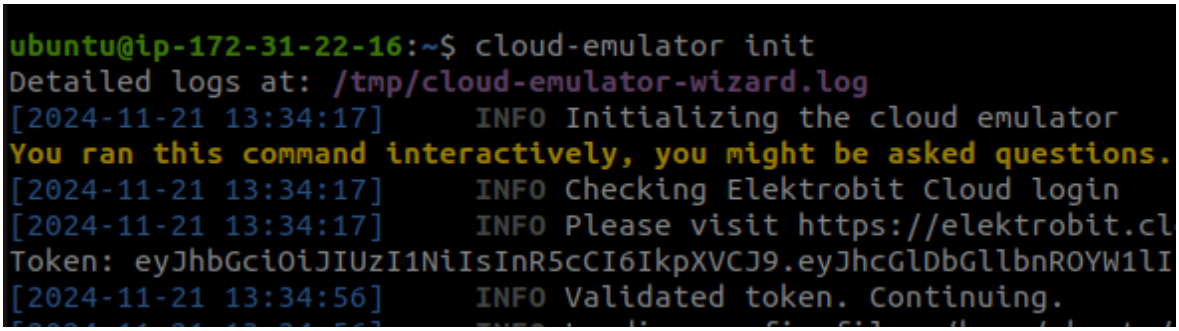


   iii. And under "API access" click on the button [**Create my API client secret**]. This will generate a new token and show it in the box below.



iv. Copy the token and paste it in the init command prompt and press enter.





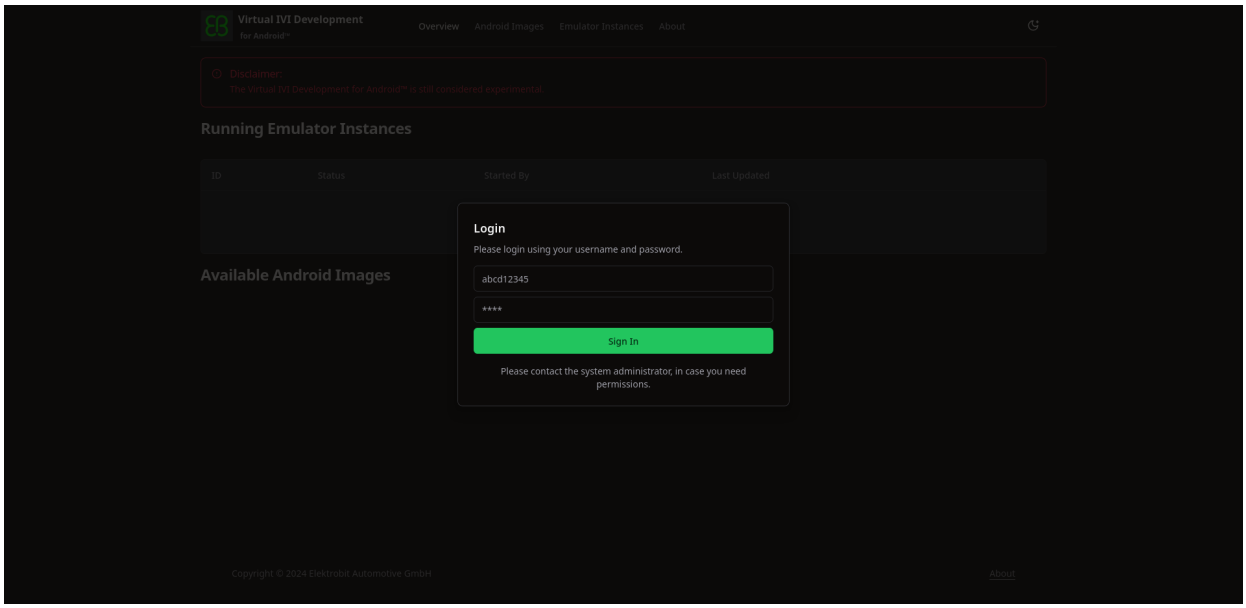
NOTE

You may also want to keep the token, so you can reuse it later. You can no longer see your token at elektrobit.cloud once you close the page.

b. **Admin user:** To later log in to the cloud emulator web interface, you need (at least) one user account. By default the cloud emulator will ask if you which to create an admin user. You can simply confirm this by typing `y` and `Enter` and then enter a password.

You can always change the password again later or add new users. See the administration documentation. This is available from web page of the cloud emulator.

3. After the command is finished, you can access the web page again using the public IPv4 DNS name. This should now show a login dialog.



4. Login with the username "admin" and the password you created.
5. You can now use the cloud emulator.

NOTE

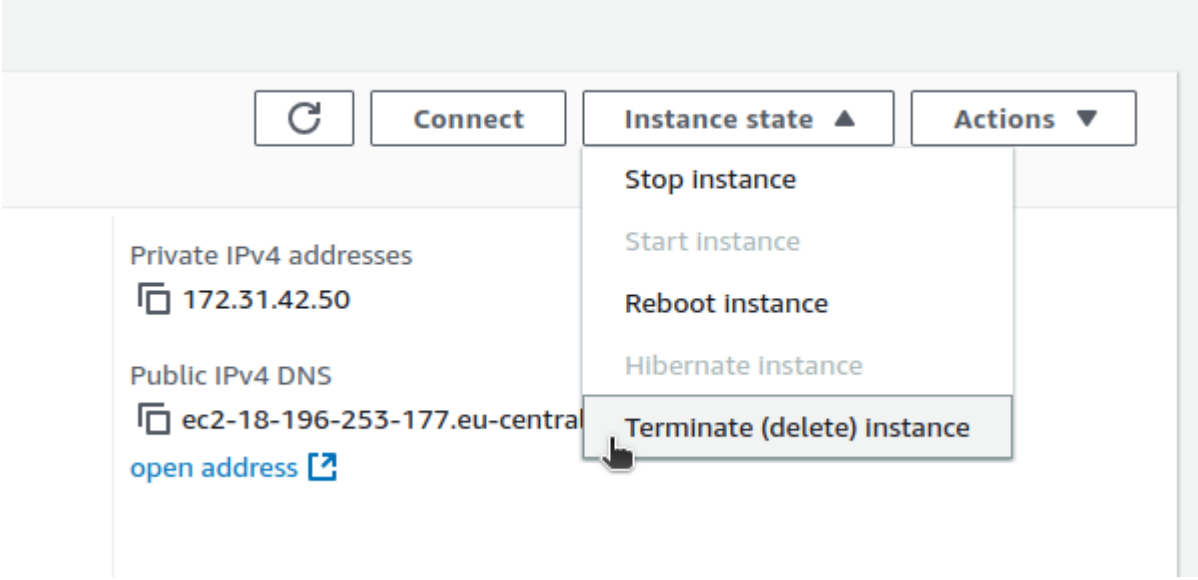
The very first emulator start after creating the EC2 instance will be slow. Any subsequent emulator starts should be much faster.

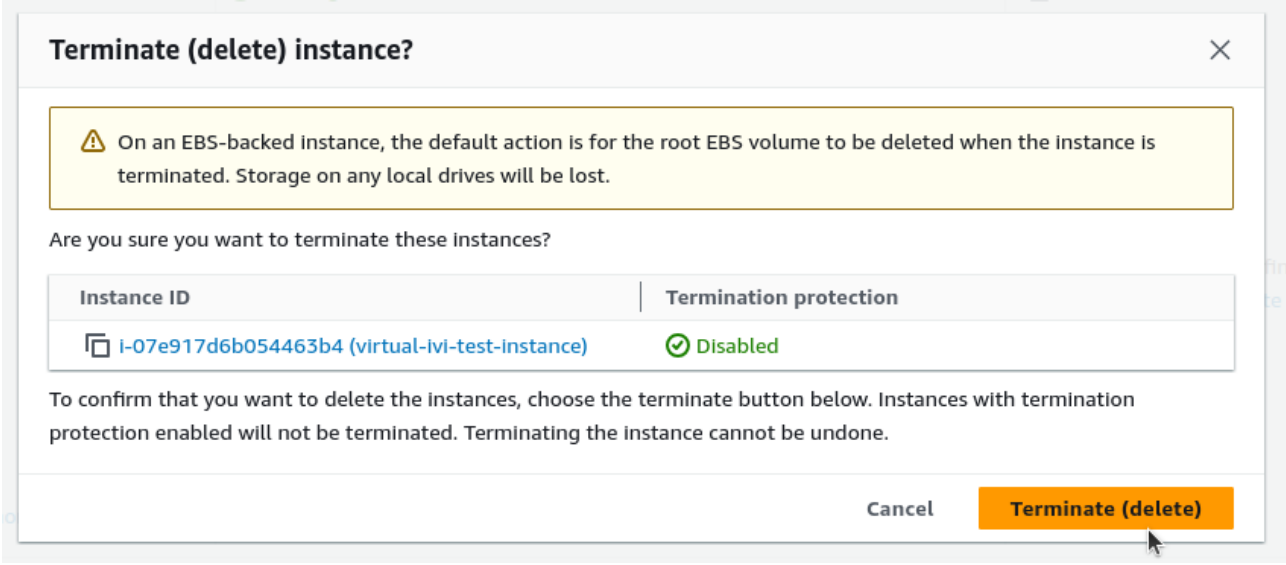
Further documentation about usage and administration is provided in the running EC2 instance. You can view it by clicking on the "Documentation" link on the dashboard.

Stopping the EC2 instance again

If you are done using the Cloud Emulator, you can stop (and delete) the EC2 instance again in the AWS console. To only stop the instance use the button [**Instance state > Stop instance**]. This will preserve the instance configuration and the disk and allow you to later start the instance again.

You can also click on the button [**Instance state > Terminate instance**] if you know you don't need the EC2 instance anymore. This will completely delete the EC2 instance and the disk. If you later want to use the Cloud Emulator again, you need to set up a new instance from scratch.





More details

Security Group setup

The security group specifies the firewall settings in AWS. I.e. it defines which ports are accessible.

For the Cloud Emulator we use the following ports:

- tcp 22 for ssh
- tcp 443 for https of the web page
- (optionally) 80 for http of the web page. The web page auto redirects http to https, but that only works if the port it not blocked by the firewall.
- tcp and udp 3478 for TURN for WebRTC. This is required to show the device screen in the web UI of the emulator.
- (optionally) tcp 32768-49151 for ADB access (every emulator instance is assigned a random ADB port). If you want to `adb connect` to an emulator instance, you need access to this port. Alternatively to allowing this port, you could use `ssh` to forward the ADB port locally. But that requires ssh access to the EC2 instance for every user.

When configuring the security group, you can also restrict the allowed IP addresses to the public IP of your machine.

Storage setup

The Cloud Emulator uses only the root volume. That data that needs to be stored includes:

- the software used to run the system (including docker images, etc.)
- images for the emulator
- workspaces for the emulator instances

If you are just trying out the Cloud Emulator for yourself, it should be enough to use 50 GB for the disk size.

If you intend to run the Cloud Emulator for longer and for multiple users, we recommend using a large disk size (e.g. 1000 GB). The reason for this is that the emulator workspaces can take up a significant about of storage. Especially if the emulators are kept running for a long period of time. If the disk fills up completely the Cloud Emulator will likely break. See section Troubleshooting.

Resize the storage of your instance

Our provided AMI has a disc size of 50 GB by default. However, if you need to increase the storage of your instance, you can do so by following the steps provided in the official AWS documentation. In summary, the steps would be:

1. Stop the instance.
2. Modify the instance to increase the size of the volume.
3. Restart the instance.
4. Connect to your instance (via ssh or cli) and resize the file system. Please follow the part of the documentation, which refers to "Linux instances".

Please refer to the AWS documentation for detailled instructions:

https://docs.aws.amazon.com/ebs/latest/userguide/ebs-modify-volume.html

Troubleshooting

There could be some known issues / problems which users have experienced before. Please benefit from solution that might help on your issues.

- Having access problems to the web pages?
  - Please double check the setup of the security groups in AWS and any local firewall on your network that may interfere.
  - Directly after booting the EC2 instance may be slow, so have a little patience when first trying to use the web pages or emulator.
  - Most issues with the Cloud Emulator dashboard can be fixed by connecting to the EC2 instance via SSH and running the init command again:

    ```
    $ cloud-emulator init
    ```

- Having issues with the emulator screen or the emulator is not responding anymore?
  - If you have intermittent issues, please make sure you have a stable network connection sharing and try to not reload the emulator page frequently. There also may be issues if multiple people are using the same emulator at once.
  - If the screen never showed up in the first place, please double check the setup of the security groups in AWS and any local firewall on your network that may interfere.
- Emulator screen is flickering or slowing down. The screen sharing is very latency sensitive.
  - Make sure you selected the correct region in AWS while deploying the EC2 instance. Please try to pick a region that is close to your location.
  - Make sure you have a stable network connection and try to not refresh the emulator page frequently.
  - It will take a while after starting the emulator before the screen shows up.
  - Limit the number of users that use the same emulator at once.
  - It is possible that the screen can be become sluggish or appear stuck after some inactivity. In this case please don't refresh the page. Instead try to produce a screen update by clicking on some button or swiping and wait patiently for the screen to become responsive again.
  - In general if you can still see the screen of the emulator, do not refresh the page. It should automatically correct itself. If you see only a black screen or the page shows an error message, you can try to fix the issue by refreshing the page once. Please do not refresh the page repeatedly.
- I left my emulator alone for a longer time and now the screen is slow to respond
  - After some inactivity the emulator screen can be become sluggish or appear stuck. In this case please don't refresh the page. Instead try to produce a screen update by clicking on some button or swiping and wait patiently for the screen to become responsive again.
- I see a black emulator screen or the page shows an error message that the connection could not be established
  - Please make sure you are using Chrome or a Chromium based browser. Other browsers will likely not work.
  - In this case please refresh the page once. But please do not repeatedly refresh the page. That will break the emulator screen sharing.
  - If that does not fix the issue, please stop the emulator instance and start a new one.
- If you're still having some problems, please reach out to us with your issues. Please provide logs and as much information as possible so we can investigate your issue further.

Document Version History

Table 1. Document Version History

Version	Release Date	Changes
1.0	2024-12-06	Initial release
1.1	2025-03-21	added section "Resize the storage of your instance"