# Introduction to Research Cloud Exercises Part A

This document guides you through the steps you need to complete in order to get your first workspaces running in SURF Research Cloud.

You can find the general user documentation here: https://servicedesk.surfsara.nl/wiki/x/HIKV

# 0. Onboarding

SURF Research Cloud relies on two external services to provide its own service. The two services are: SURF Research Access Management (SRAM), and our Central Budgeting and Accounting (CBA). You need to be properly set up in those before you can do anything in Research Cloud. We will do so in this section.

## 0.1 About SRAM

SURF Research Cloud revolves around a web portal. You can log in through a different service called SURF Research Access Management (or SRAM, for short). At the start of the online webinar you will be provided with a training account that is registered with the EduID Identity provider. This account has a wallet already linked so you can start using it directly.  You will be able to use this account for a week after this training, after which all workspaces and data will be deleted. If you will become a Research Cloud user in the future you will either use your own institute account or create an EDUid.nl account for logging in, after being invited to a CO that is linked to the service in SRAM.

## 0.2 Log in to the Research Cloud portal

1. Open the Research Cloud portal in your browser: https://portal.live.surfresearchcloud.nl
2. Click on the *Log In* button. A list of identity providers will show
3. Search and select the EduID (NL) identity provider
4. Fill in your username, and press on the "type a password" link. Enter your password and Login
5. Click *Continue* or *Next* until you reach the Research Cloud portal, where you are welcomed with the title: "Welcome to your SURF research cloud dashboard"

# Exercise 1. First steps in an Ubuntu workspace

Once you are on board (i.e.: set up in the external services), we will be creating a first workspace.

## 1.1 Create a workspace

This is the manual to create your workspace: https://servicedesk.surfsara.nl/wiki/x/kIKV .

Follow the instructions in the manual, and select the "Ubuntu 18.04 (SUDO enabled)" workspace type.

For completeness sake, that guide includes steps to delete the workspace. For the time being, make sure that you just follow the steps to create a workspace from that guide now. Or put differently: do NOT delete it yet.

## 1.2 Log in to your workspace

Once you have an Ubuntu-based workspace, you can log in by following our step-by-step guide here: https://servicedesk.surfsara.nl/wiki/x/koKV

Follow the steps for "Access a workspace with SSH".

## 1.3 Working in your workspace

After logging in into your workspace you can start working with it. You can take a look around and try some shell commands for example. Most of our catalog items give you 'sudo' rights in the workspace, this should be in the catalog item description or name.

Execute the following command:

```
echo "this is important data" > ~/valuable_data.txt
```

This command created a text file with the contents "this is important data".

Verify the contents of the file by running:

```
cat ~/valuable_data.txt
```

## 1.4 Delete your workspace

On the Dashboard section of the Research Cloud portal, you can see all workspaces in your Collaborative Organisations. You can also see logs and delete workspaces that belong to you. When you are running a workspace, your quota is ticking from your wallet.

Once you no longer need a workspace, you can best delete it to release resources that the workspace may be keeping busy. Let us do that now for the workspace that you created so far.

1. In your dashboard, locate your Ubuntu-based workspace
2. Click on the arrow to the right of your workspace line, so that you display the workspace's details
3. Click on the Delete button

**Question**: What happened to your "valuable_data.txt" file? Is there any way of retrieving back your data?

# Exercise 2. Working with persistent data

You may have guessed it: that file is gone and is irretrievable. One of the pitfalls in cloud computing is something called "ephemeral storage". Ephemeral storage is volatile storage that is attached to a virtual machine, and is usually there to host the operating system and local applications. Anything that you write to ephemeral storage will be permanently deleted once the VM is destroyed.

Luckily there are ways to save your data in a persistent matter. Research Cloud has a separate resource called "Volumes", which are external chunks of volumes that you can attach, detach and reattach to VMs. Let's see how that works.

## 2.1 Create a volume

1. On the dashboard, look for the "Create new storage" card, and click the *Create New* button.
2. Follow the wizard analogously to how you created a workspace in the past. Make sure to choose the small size.

Once you finish the wizard, back on the dashboard, under the Storage tab you can now see a new volume there that you are the owner of. Wait until it has the state "Available".

## 2.2 Attach a volume to a workspace

If you now follow the wizard to launch a workspace. Again choose the "Ubuntu 18.04 (SUDO enabled)" workspace. In step 5 you will be able to choose the volume that you created a moment ago. Select that volume and proceed to finalize your workspace.

Verify that your volume is now in the state "In use" in your overview of volumes.

Wait until the workspace shows to be running. Then you can connect to it (see Exercise 1).

Check that you can see the volume by running the following command:

```
df -hT /data/volume_2
```

That should deliver a result similar to this:

```
Filesystem Type Size Used Avail Use% Mounted on
udev devtmpfs 3.9G 0 3.9G 0% /dev
tmpfs tmpfs 798M 652K 798M 1% /run
/dev/sda1 ext4 15G 2.2G 13G 16% /
...
/dev/sda15 vfat 105M 3.6M 101M 4% /boot/efi
/dev/sdb xfs 250G 288M 250G 1% /data/volume_2
...
```

See that you have the volume mounted under /data/volume_2. Let us see if you can write there:

```
echo "this is important data" > /data/volume_2/valuable_data.txt
```

Then verify that you have written the time into that first.txt file:

```
cat /data/volume_2/valuable_data.txt
```

## 2.3 Upload data to a volume

Imagine you now want to upload some files from your laptop to this workspace into the persistent volume, so that you can process them later. Let us do that now.

1. On your laptop, open a new terminal
2. Create a new file called second.txt in your local home directory, which will contain the word "hello", like this:
   - `echo hello > ~/second.txt`
3. Now upload the file to your workspace, like this:
   - (note: pay attention to replacing `your_ssh_username` and `workspace_ip` with the right values, which you can get from your workspace's details! They are the same as the ones for your ssh connection)

     `scp ~/second.txt your_ssh_username@workspace_ip:/data/volume_2`

Now that you have uploaded a file (pretend that this was a large dataset), you can verify in the workspace that the file is actually there.

1. Go back to the original terminal, where you were connected to the workspace via SSH.
2. On the workspace, run the same command as before, but this time to show the contents of the second file:
   - `cat /data/volume_2/second.txt`

Can you see that the command returns the word "hello"? Congratulations! That proves that you have uploaded the right file!

## 2.4 Delete the workspace

You are now ready to delete the workspace. Do it as you did in previous exercises.

See that the volume is still there! Can you see that it is now back in state Available?

You can now launch a new workspace and attach the volume to it again. Can you verify the contents of /data/volume_2/valuable_data.txt?

Make sure to delete the workspace once you no longer need it.

## 2.5 Delete the volume

Following the same steps as for deleting workspaces, you can delete your data volumes. Delete now the volume you were playing with.