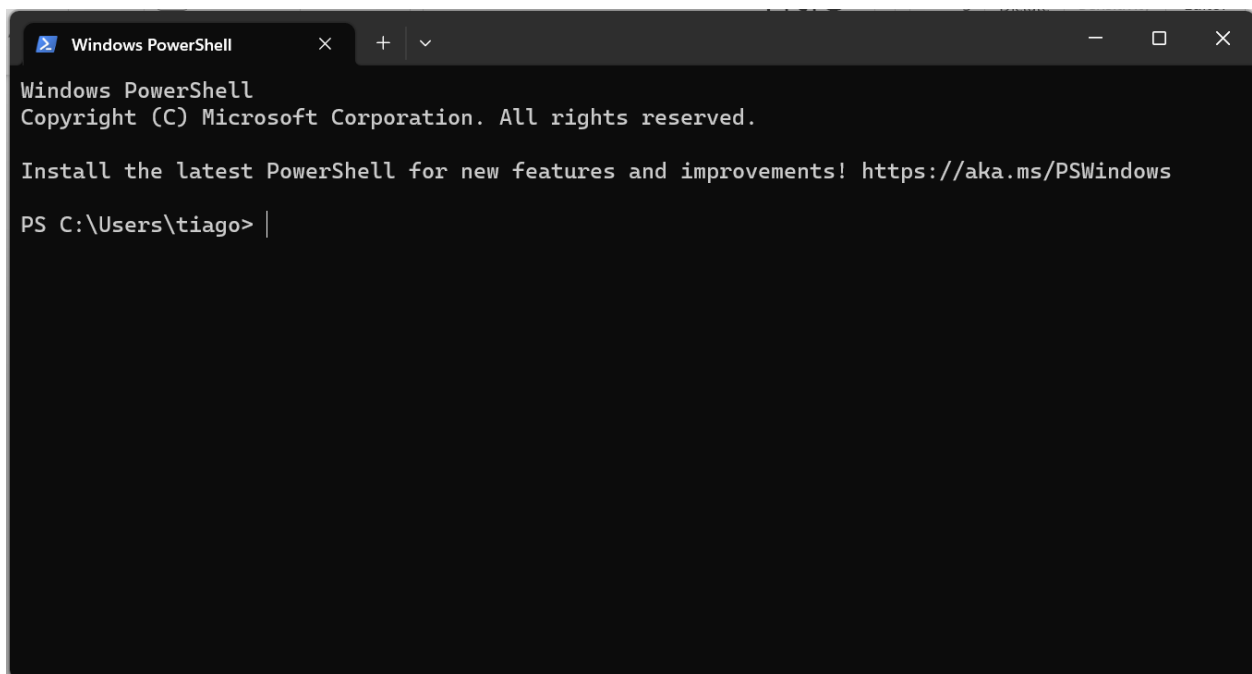


Running image processing script on server

Installation

1. First, you need to download the models and scripts by downloading all files at this [link](#) into your computer. Keep all files into a single zip folder. Then proceed with the installation instructions below.
2. Open PowerShell in Windows, or terminal in Mac:

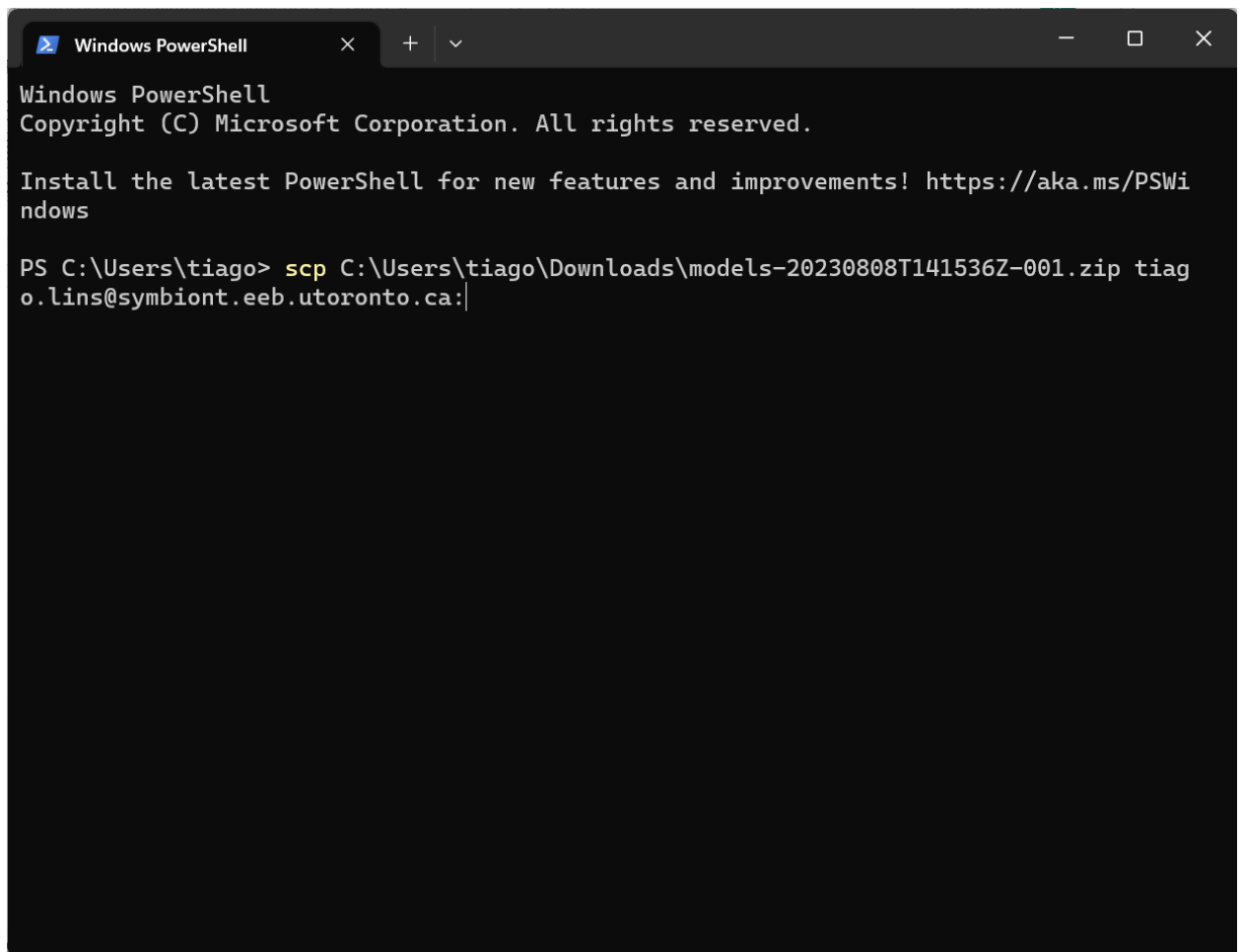
A screenshot of a Windows PowerShell terminal window. The title bar at the top says "Windows PowerShell" with standard window controls (close, maximize, minimize). The terminal text shows the PowerShell version and copyright information, followed by a message to install the latest PowerShell for new features and improvements, with a link to https://aka.ms/PSWindows. The prompt "PS C:\Users\tiago>" is visible at the bottom, followed by a vertical bar indicating the cursor is ready for input.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\tiago> |
```

3. Copy the address of the zip folder you just downloaded. Mine is "C:\Users\tiago\Downloads\models-20230808T141536Z-001.zip"
4. On the terminal, write the following "scp <file address> <USERNAME>@symbiont.eeb.utoronto.ca:"



A screenshot of a Windows PowerShell terminal window. The window has a dark background and a title bar that says "Windows PowerShell". The text inside the terminal reads: "Windows PowerShell", "Copyright (C) Microsoft Corporation. All rights reserved.", "Install the latest PowerShell for new features and improvements! <https://aka.ms/PSWindows>", and "PS C:\Users\tiago> scp C:\Users\tiago\Downloads\models-20230808T141536Z-001.zip tiago.lins@symbiont.eeb.utoronto.ca:". The command is partially entered, with the cursor at the end of the line.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\tiago> scp C:\Users\tiago\Downloads\models-20230808T141536Z-001.zip tiago.lins@symbiont.eeb.utoronto.ca:
```

5. Enter your password when prompted
6. Wait until the file is uploaded

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\tiago> scp C:\Users\tiago\Downloads\models-20230808T141536Z-001.zip tiago.lins@symbiont.eeb.utoronto.ca:
tiago.lins@symbiont.eeb.utoronto.ca's password:
models-20230808T141536Z-001.zip          100%  55MB  8.0MB/s   00:06
PS C:\Users\tiago> |
```

7. Now connect to the server “ssh <USERNAME>@ symbiont.eeb.utoronto.ca”
8. Enter password when prompted
9. Once connected, type “unzip <file name> -d models” to unzip the contents of the folder

```
(base) [tiago.lins@esc3055m-srv-frederickson ~]$ unzip models-20230808T141536Z-001.zip -d models
```

You will only need to do installation once. Now you can run the script following the instructions below.

Running script

1. Now, activate the environment by typing “cd /symbiont/apps/miniconda3/condabin/”
2. Then write “conda activate TF1”
3. The environment is now activated (you will see *TF1* instead of *base* in every line):

```
(base) [tiago.lins@esc3055m-srv-frederickson ~]$ cd /symbiont/apps/miniconda3/condabin/
(base) [tiago.lins@esc3055m-srv-frederickson condabin]$ conda activate TF1
(TF1) [tiago.lins@esc3055m-srv-frederickson condabin]$ |
```

4. Now type “cd” command
5. Then “cd/models/models” to access the models and scripts for processing the images
6. Then type “python run_all_files.py” to run the script

```
(TF1) [tiago.lins@esc3055m-srv-frederickson ~]$ cd models/models
(TF1) [tiago.lins@esc3055m-srv-frederickson models]$ python run_all_files.py
```

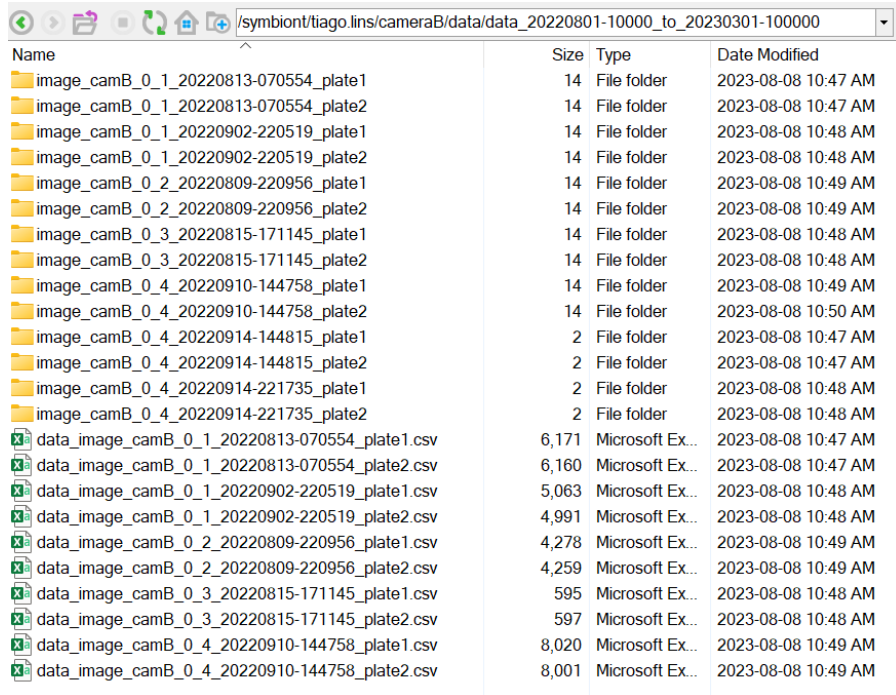
7. Several warnings will show up. Wait until prompted to provide input

8. You will be asked the following questions. Enter the answer one by one as follows:

- Please enter the directory name: [enter the path of where the image are stored in the server. For me, it is /symbiont/tiago.lins/cameraA]
- Please enter the start date as `yyyymmdd-hhmmss` (i.e. 20230705-100000 for July 5th, 2023 at 10 am): [Each image file should have a date on its name. Enter the earliest date you want to be processed using a format like this: 20220801-100000]
- Please enter the end date as `yyyymmdd-hhmmss` (i.e. 20230705-120000 for July 12th, 2023 at 10 am): Enter the latest date you want to be processed using a format like this: 20230301-100000]
- Override plate identifier? (No, 96, 24, 12, 6): [In case you want the script to identify the plate type, write "no"; otherwise write the desired plate type. Note that 12 is not yet supported]

```
Please enter the directory name: /symbiont/tiago.lins/cameraB
Please enter the start date as yyyymmdd-hhmmss (i.e. 20230705-100000 for July 5th, 2023 at 10 am): 20220801-100000
Please enter the end date as yyyymmdd-hhmmss (i.e. 20230705-120000 for July 12th, 2023 at 10 am): 20230301-100000
Override plate identifier? (No, 96, 24, 12, 6): no
```

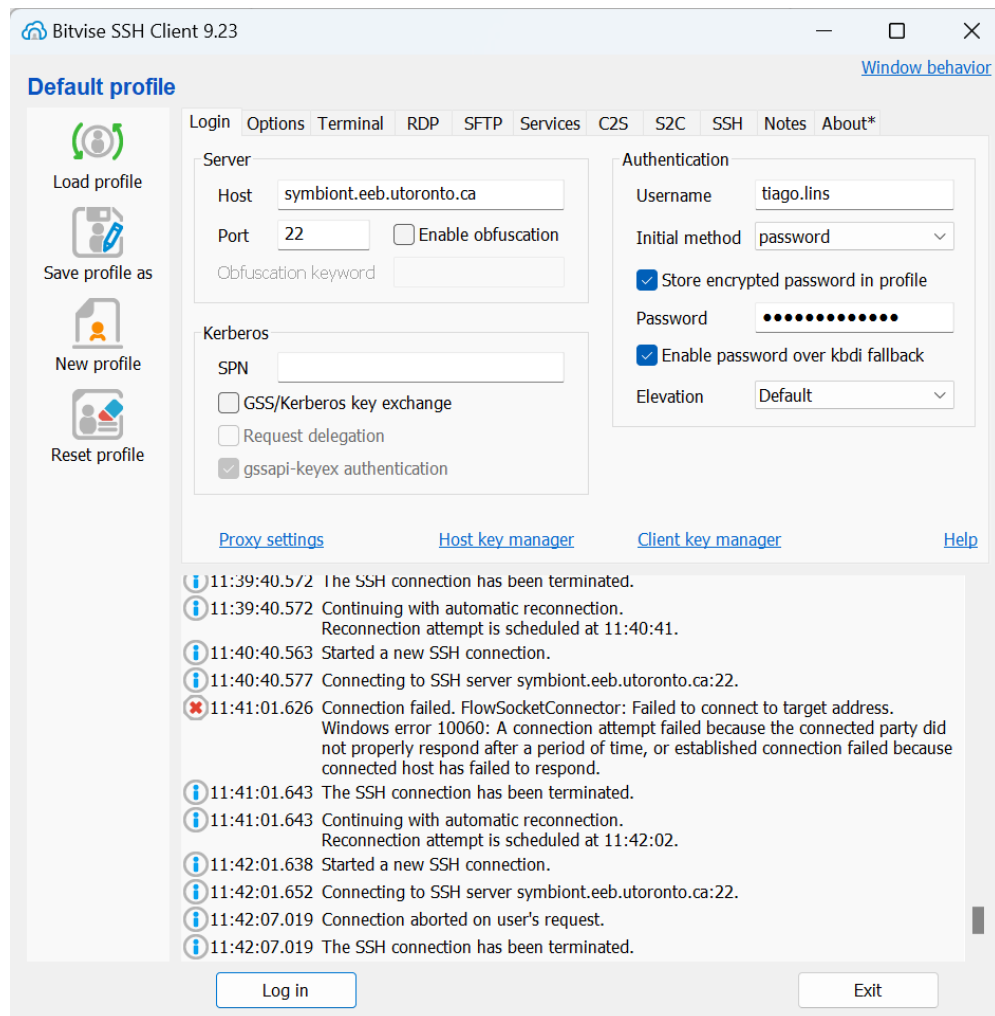
9. Once completed, hit enter/return key and wait as the script processes the images. A **data** folder will be created on the same directory as the images being processed. Within the data folder, there will be a **data_<date_start>_to_<date_end>** folder with the results for your run. To navigate through these directories, use "cd <directory>", "ls" commands to go to a new directory and to view the content in a directory, respectively. Alternatively, you can also use Bitvise (Windows only) to view the content in the server, as shown below:



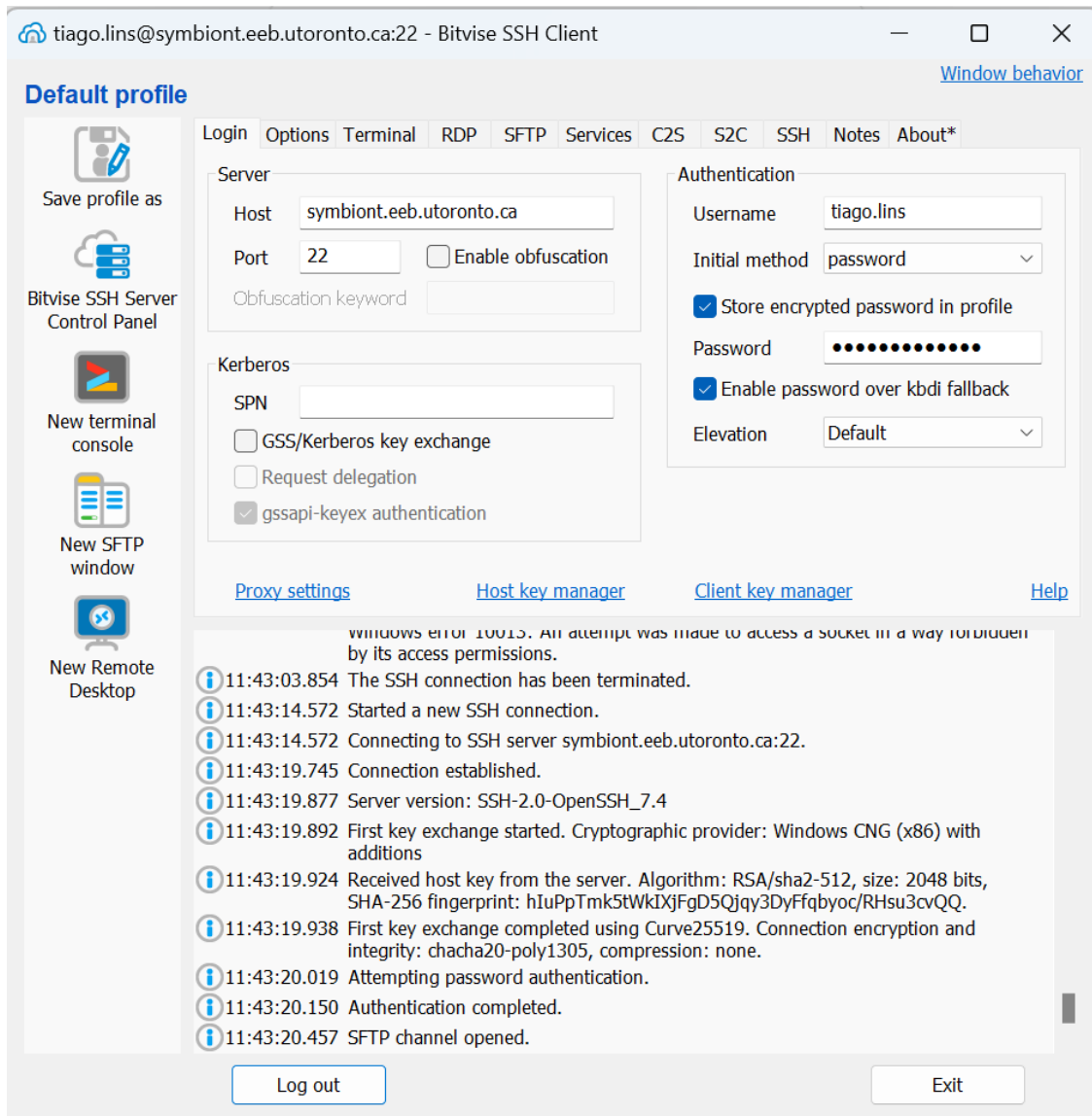
Name	Size	Type	Date Modified
image_camB_0_1_20220813-070554_plate1	14	File folder	2023-08-08 10:47 AM
image_camB_0_1_20220813-070554_plate2	14	File folder	2023-08-08 10:47 AM
image_camB_0_1_20220902-220519_plate1	14	File folder	2023-08-08 10:48 AM
image_camB_0_1_20220902-220519_plate2	14	File folder	2023-08-08 10:48 AM
image_camB_0_2_20220809-220956_plate1	14	File folder	2023-08-08 10:49 AM
image_camB_0_2_20220809-220956_plate2	14	File folder	2023-08-08 10:49 AM
image_camB_0_3_20220815-171145_plate1	14	File folder	2023-08-08 10:48 AM
image_camB_0_3_20220815-171145_plate2	14	File folder	2023-08-08 10:48 AM
image_camB_0_4_20220910-144758_plate1	14	File folder	2023-08-08 10:49 AM
image_camB_0_4_20220910-144758_plate2	14	File folder	2023-08-08 10:50 AM
image_camB_0_4_20220914-144815_plate1	2	File folder	2023-08-08 10:47 AM
image_camB_0_4_20220914-144815_plate2	2	File folder	2023-08-08 10:47 AM
image_camB_0_4_20220914-221735_plate1	2	File folder	2023-08-08 10:48 AM
image_camB_0_4_20220914-221735_plate2	2	File folder	2023-08-08 10:48 AM
data_image_camB_0_1_20220813-070554_plate1.csv	6,171	Microsoft Ex...	2023-08-08 10:47 AM
data_image_camB_0_1_20220813-070554_plate2.csv	6,160	Microsoft Ex...	2023-08-08 10:47 AM
data_image_camB_0_1_20220902-220519_plate1.csv	5,063	Microsoft Ex...	2023-08-08 10:48 AM
data_image_camB_0_1_20220902-220519_plate2.csv	4,991	Microsoft Ex...	2023-08-08 10:48 AM
data_image_camB_0_2_20220809-220956_plate1.csv	4,278	Microsoft Ex...	2023-08-08 10:49 AM
data_image_camB_0_2_20220809-220956_plate2.csv	4,259	Microsoft Ex...	2023-08-08 10:49 AM
data_image_camB_0_3_20220815-171145_plate1.csv	595	Microsoft Ex...	2023-08-08 10:48 AM
data_image_camB_0_3_20220815-171145_plate2.csv	597	Microsoft Ex...	2023-08-08 10:48 AM
data_image_camB_0_4_20220910-144758_plate1.csv	8,020	Microsoft Ex...	2023-08-08 10:49 AM
data_image_camB_0_4_20220910-144758_plate2.csv	8,001	Microsoft Ex...	2023-08-08 10:49 AM

If you have a windows PC, a third-party software can also connect you to the server and run the script. One option is **Bitwise** (<https://www.bitwise.com/ssh-client-download>), which also offers SFTP connection that allows you to see the files in the server in a more user-friendly way as shown above.

To connect, simply fill out the client window with your information similar to what is shown below:



Click **Log in** and. Once you successfully logged into the server, click on **New SFTP window** (see below). This will allow you to drag and drop files from and to the server into and from your local computer.



To run the script, click on **New terminal console** to open the terminal and follow the same steps in [Running the script](#) below.

Raspberry Pi Board (when not in operation)

Installation

10. Open the terminal window by clicking on the icon on the upper left side



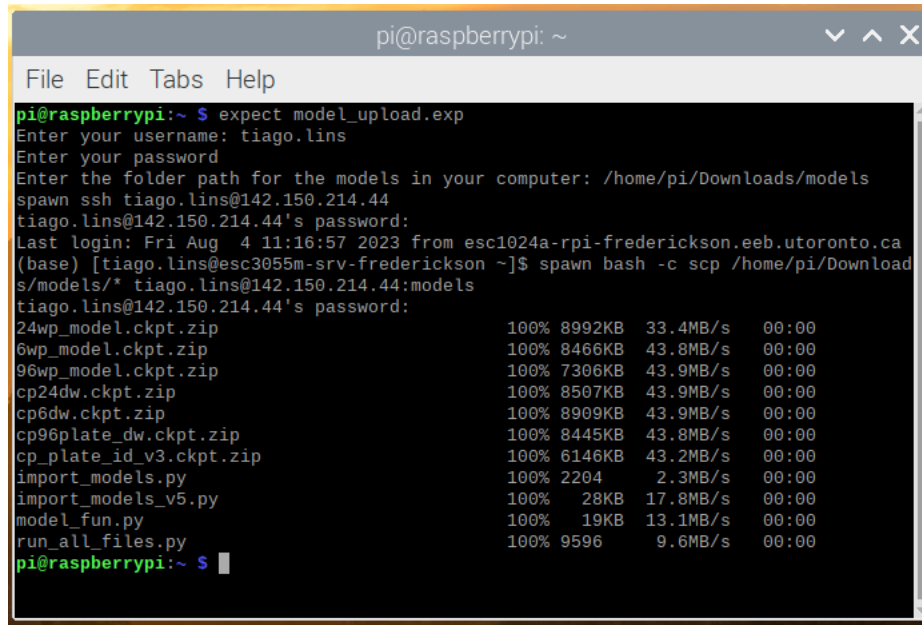
11. Once opened, write “expect model_upload.exp” as shown below, and click enter/return on your keyboard

A screenshot of a terminal window titled 'pi@raspberrypi: ~'. The window has a menu bar with 'File', 'Edit', 'Tabs', and 'Help'. The command prompt shows 'pi@raspberrypi:~ \$' followed by the text 'expect model_upload.exp' with a cursor at the end.

12. You will be prompted to write your username, password and address of where the **models** folder is stored, as shown below (note that your password won't show up as you type). Click enter/return when done

A screenshot of a terminal window titled 'pi@raspberrypi: ~'. The window has a menu bar with 'File', 'Edit', 'Tabs', and 'Help'. The command prompt shows 'pi@raspberrypi:~ \$' followed by 'expect model_upload.exp'. Below this, three prompts are visible: 'Enter your username: tiago.lins', 'Enter your password', and 'Enter the folder path for the models in your computer: /home/pi/Downloads/models' with a cursor at the end.

13. The terminal will automatically upload the model files into the server under your account. Wait until all files are uploaded, as shown below:

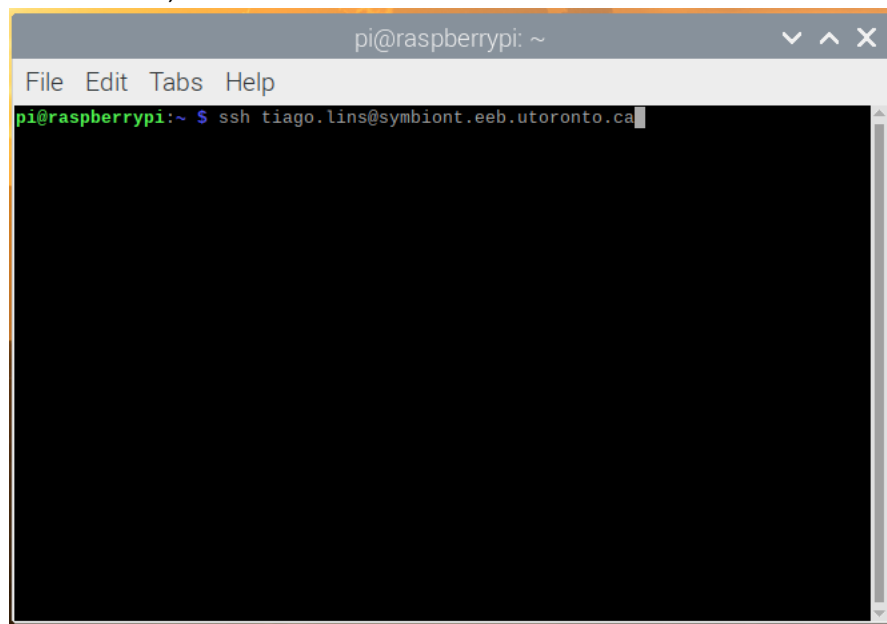


```
pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~ $ expect model_upload.exp
Enter your username: tiago.lins
Enter your password
Enter the folder path for the models in your computer: /home/pi/Downloads/models
spawn ssh tiago.lins@142.150.214.44
tiago.lins@142.150.214.44's password:
Last login: Fri Aug  4 11:16:57 2023 from esc1024a-rpi-frederickson.eeb.utoronto.ca
(base) [tiago.lins@esc3055m-srv-frederickson ~]$ spawn bash -c scp /home/pi/Downloads/models/* tiago.lins@142.150.214.44:models
tiago.lins@142.150.214.44's password:
24wp_model.ckpt.zip          100% 8992KB  33.4MB/s  00:00
6wp_model.ckpt.zip          100% 8466KB  43.8MB/s  00:00
96wp_model.ckpt.zip         100% 7306KB  43.9MB/s  00:00
cp24dw.ckpt.zip             100% 8507KB  43.9MB/s  00:00
cp6dw.ckpt.zip              100% 8909KB  43.9MB/s  00:00
cp96plate_dw.ckpt.zip       100% 8445KB  43.8MB/s  00:00
cp_plate_id_v3.ckpt.zip     100% 6146KB  43.2MB/s  00:00
import_models.py            100% 2204    2.3MB/s   00:00
import_models_v5.py         100% 28KB    17.8MB/s  00:00
model_fun.py                100% 19KB    13.1MB/s  00:00
run_all_files.py            100% 9596    9.6MB/s   00:00
pi@raspberrypi:~ $
```

Once installed into the server under your username, you don't need to repeat this step again, and simply run the script as described below

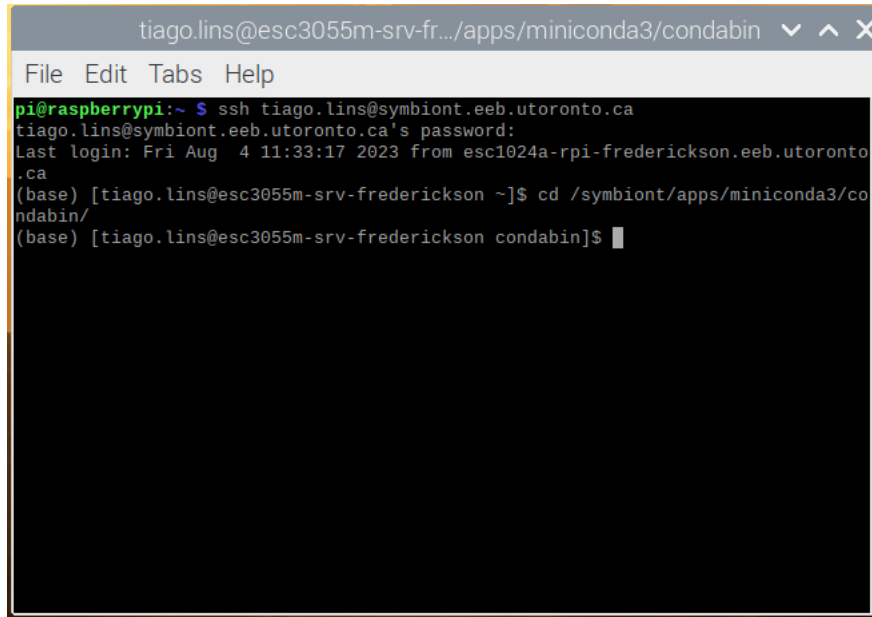
Running the script

14. Now, connect directly to the server in the terminal by typing "ssh <USERNAME>@symbiont.eeb.utoronto.ca", where you should replace <USERNAME> with your assigned username, as shown below:



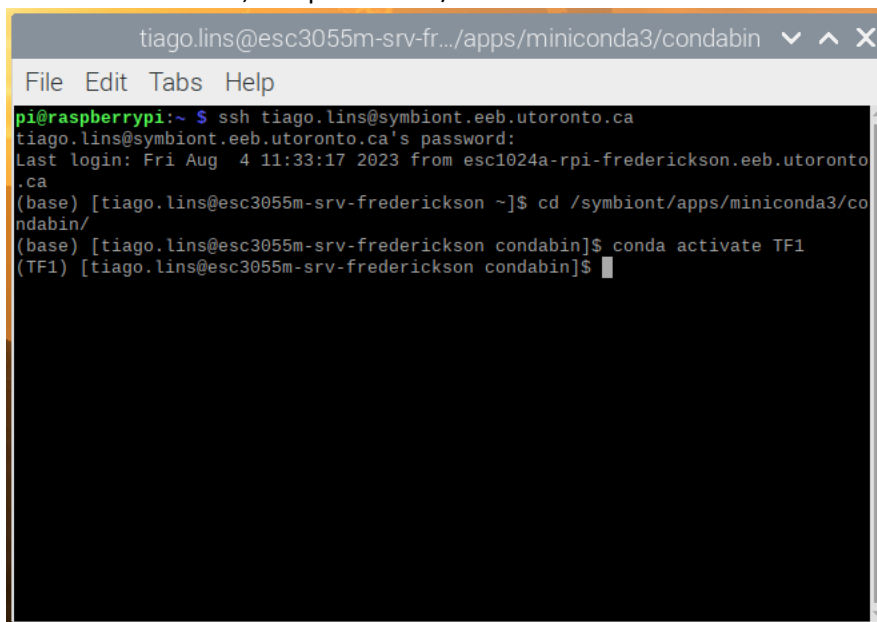
```
pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~ $ ssh tiago.lins@symbiont.eeb.utoronto.ca
```

15. Now, we need to activate the environment with the required libraries. To do this, first type “cd /symbiont/apps/miniconda3/condabin/” and press enter/return key



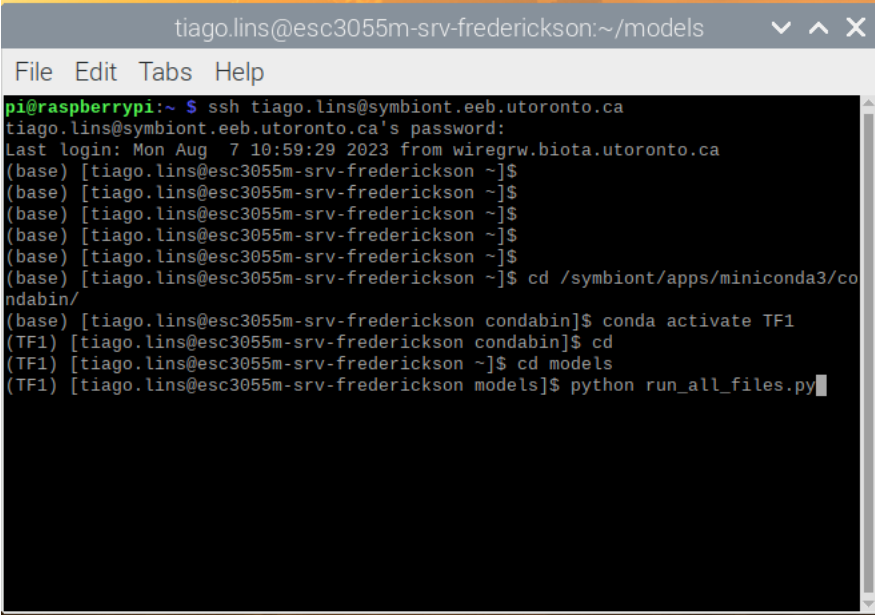
```
tiago.lins@esc3055m-srv-fr.../apps/miniconda3/condabin  ▾ ▴ ✕
File Edit Tabs Help
pi@raspberrypi:~ $ ssh tiago.lins@symbiont.eeb.utoronto.ca
tiago.lins@symbiont.eeb.utoronto.ca's password:
Last login: Fri Aug  4 11:33:17 2023 from esc1024a-rpi-frederickson.eeb.utoronto.ca
(base) [tiago.lins@esc3055m-srv-frederickson ~]$ cd /symbiont/apps/miniconda3/condabin/
(base) [tiago.lins@esc3055m-srv-frederickson condabin]$
```

16. Then type “conda activate TF1”, and press enter/return



```
tiago.lins@esc3055m-srv-fr.../apps/miniconda3/condabin  ▾ ▴ ✕
File Edit Tabs Help
pi@raspberrypi:~ $ ssh tiago.lins@symbiont.eeb.utoronto.ca
tiago.lins@symbiont.eeb.utoronto.ca's password:
Last login: Fri Aug  4 11:33:17 2023 from esc1024a-rpi-frederickson.eeb.utoronto.ca
(base) [tiago.lins@esc3055m-srv-frederickson ~]$ cd /symbiont/apps/miniconda3/condabin/
(base) [tiago.lins@esc3055m-srv-frederickson condabin]$ conda activate TF1
(TF1) [tiago.lins@esc3055m-srv-frederickson condabin]$
```

17. Now, type “cd” and press enter/return
18. Then type “cd models” and press enter/return
19. Now, to run the script, type “python run_all_files.py” and press enter/return key

A terminal window titled 'tiago.lins@esc3055m-srv-frederickson:~/models' with a menu bar (File, Edit, Tabs, Help). The terminal shows a user logging in via SSH from a Raspberry Pi. The user enters their password, and the system displays the last login time. The user then runs a series of commands: they enter the base prompt, then the conda environment 'TF1', then change to the 'models' directory, and finally run 'python run_all_files.py'.

```
tiago.lins@esc3055m-srv-frederickson:~/models
File Edit Tabs Help
pi@raspberrypi:~$ ssh tiago.lins@symbiont.eeb.utoronto.ca
tiago.lins@symbiont.eeb.utoronto.ca's password:
Last login: Mon Aug  7 10:59:29 2023 from wiregrw.biota.utoronto.ca
(base) [tiago.lins@esc3055m-srv-frederickson ~]$
(base) [tiago.lins@esc3055m-srv-frederickson ~]$
(base) [tiago.lins@esc3055m-srv-frederickson ~]$
(base) [tiago.lins@esc3055m-srv-frederickson ~]$
(base) [tiago.lins@esc3055m-srv-frederickson ~]$
(base) [tiago.lins@esc3055m-srv-frederickson ~]$ cd /symbiont/apps/miniconda3/condaabin/
(base) [tiago.lins@esc3055m-srv-frederickson condaabin]$ conda activate TF1
(TF1) [tiago.lins@esc3055m-srv-frederickson condaabin]$ cd
(TF1) [tiago.lins@esc3055m-srv-frederickson ~]$ cd models
(TF1) [tiago.lins@esc3055m-srv-frederickson models]$ python run_all_files.py
```

20. Several warnings will show up as you upload the models into the server. This is normal. Wait until all models are uploaded and you are prompted to enter your inputs

21. You will be asked the following questions. Enter the answer one by one.

- Please enter the directory name: [enter the path of where the image are stored in the server. For me, it is /symbiont/tiago.lins/cameraA]
- Please enter the start date as yyyyymmdd-hhmmss (i.e. 20230705-100000 for July 5th, 2023 at 10 am): [Each image file should have a date on its name. Enter the earliest date you want to be processed using a format like this: 20220801-100000]
- Please enter the end date as yyyyymmdd-hhmmss (i.e. 20230705-120000 for July 12th, 2023 at 10 am): Enter the latest date you want to be processed using a format like this: 20220801-100000]
- Override plate identifier? (No, 96, 24, 12, 6): [In case you want the script to identify the plate type, write "no"; otherwise write the desired plate type]

```
tiago.lins@esc3055m-srv-frederickson:~/models
File Edit Tabs Help
WARNING:tensorflow:No training configuration found in save file, so the model wa
s *not* compiled. Compile it manually.
WARNING:tensorflow:No training configuration found in save file, so the model wa
s *not* compiled. Compile it manually.
WARNING:tensorflow:No training configuration found in save file, so the model wa
s *not* compiled. Compile it manually.
WARNING:tensorflow:No training configuration found in save file, so the model wa
s *not* compiled. Compile it manually.
WARNING:tensorflow:No training configuration found in save file, so the model wa
s *not* compiled. Compile it manually.
WARNING:tensorflow:No training configuration found in save file, so the model wa
s *not* compiled. Compile it manually.
Please enter the directory name: /symbiont/tiago.lins/cameraA
Please enter the start date as yyymmdd-hhmmss (i.e. 20230705-100000 for July 5t
h, 2023 at 10 am): 20220801-100000
Please enter the end date as yyymmdd-hhmmss (i.e. 20230705-120000 for July 12th
, 2023 at 10 am): 20230301-100000
Override plate identifier? (No, 96, 24, 12, 6): No
#####
processing image_camA_0_1_20220829-143151
2023-08-07 11:36:14.770555: I tensorflow/compiler/mlir/mlir_graph_optimization_p
ass.cc:185] None of the MLIR Optimization Passes are enabled (registered 2)
identified plate as 6-well plate
```

Once you press enter, the script will start processing the images. A **data** folder will be created on the same folder. Within the data folder, there will be a **data_<date_start>_to_<date_end>** folder with the results for your run. To navigate through these directories, use “cd <directory>”, “ls” commands to go to a new directory and to view the content in a directory, respectively.