CSC4005 Tutorial 5

Oct 14, 2021

This tutorial will cover...

- Stress something about the cluster
- What is GUI
- Running GUI on the server
- Writing GUI with ImGui*
- Testing GUI without X Server

* Optional

Cluster Usage

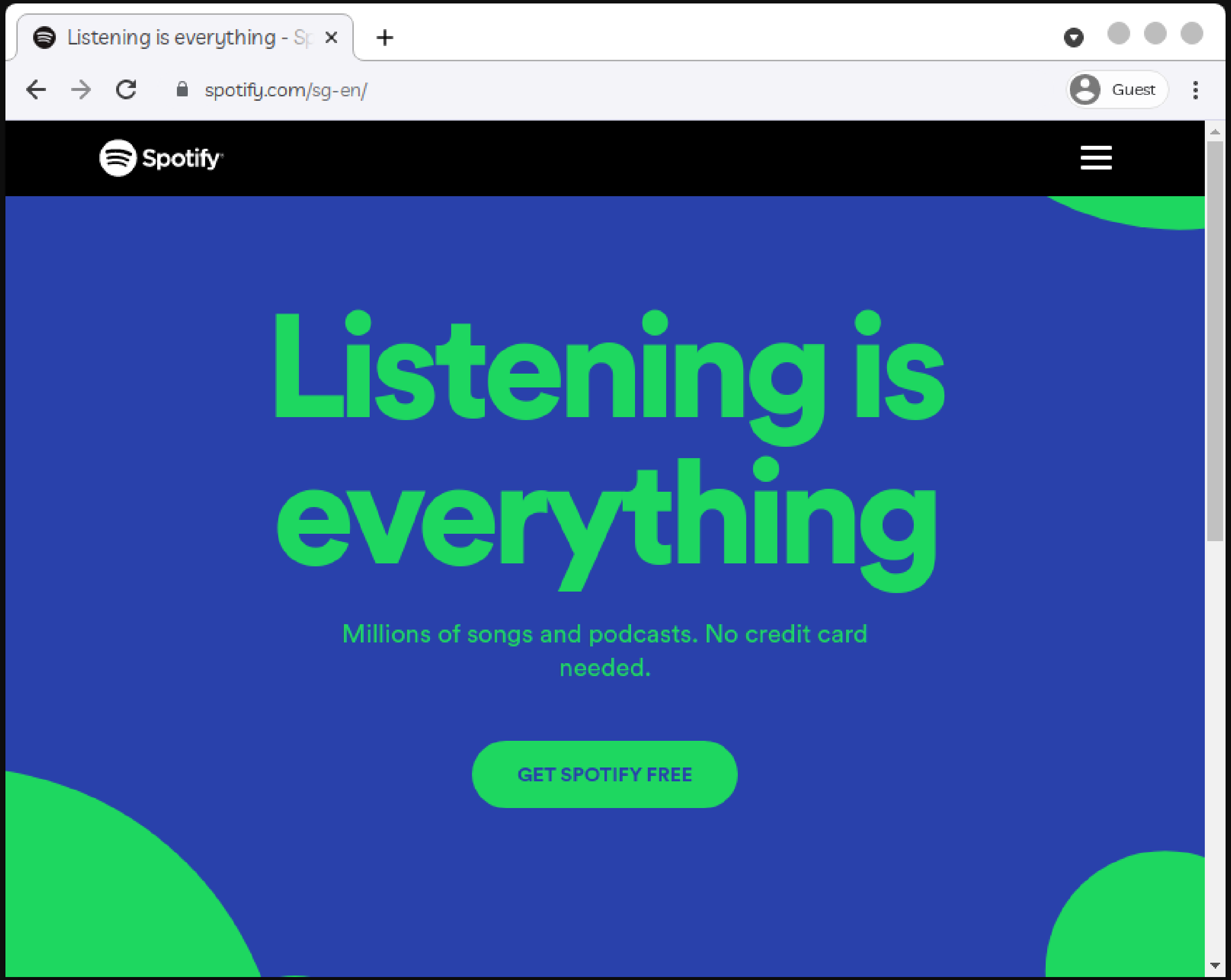
- Check "Cluster Usage FAQ" (on Blackboard) for common problems
- Limits on using `sbatch` / `salloc`
- Pending reasons
    - 🔴 Bad: PartitionNodeLimit, PartitionTimeLimit, QOSMaxCpuPerJobLimit, QOSMaxCpuMinutesPerJobLimit etc.
    - 🟢 Normal: Priority, Resources

GUI

- GUI = **G**raphic **U**ser **I**nterface

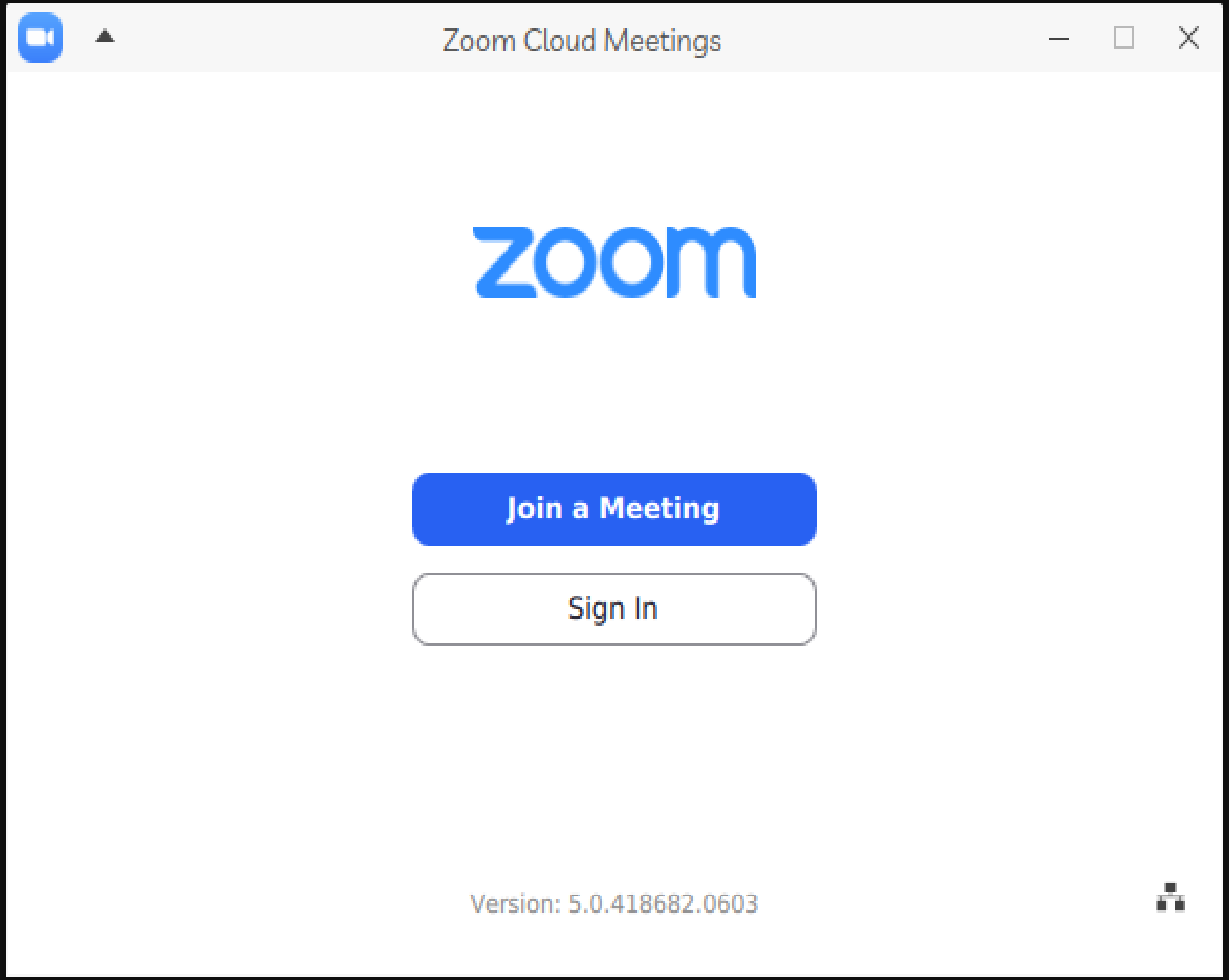
Examples of GUI

- Browsers, Zoom, Chat Apps
- File explorer, Desktop etc.



Listening is everything

Millions of songs and podcasts. No credit card needed.



GUI needs X Server on Linux*

- From Windows: VcXsrv/WSLg
- From macOS: XQuartz
- From the Linux VM: it already has a X Server running
- Also, `ssh -Y` is required

* Well, we know there are Wayland or so...

Run GUI application from the server

1. Setup your X Server environment

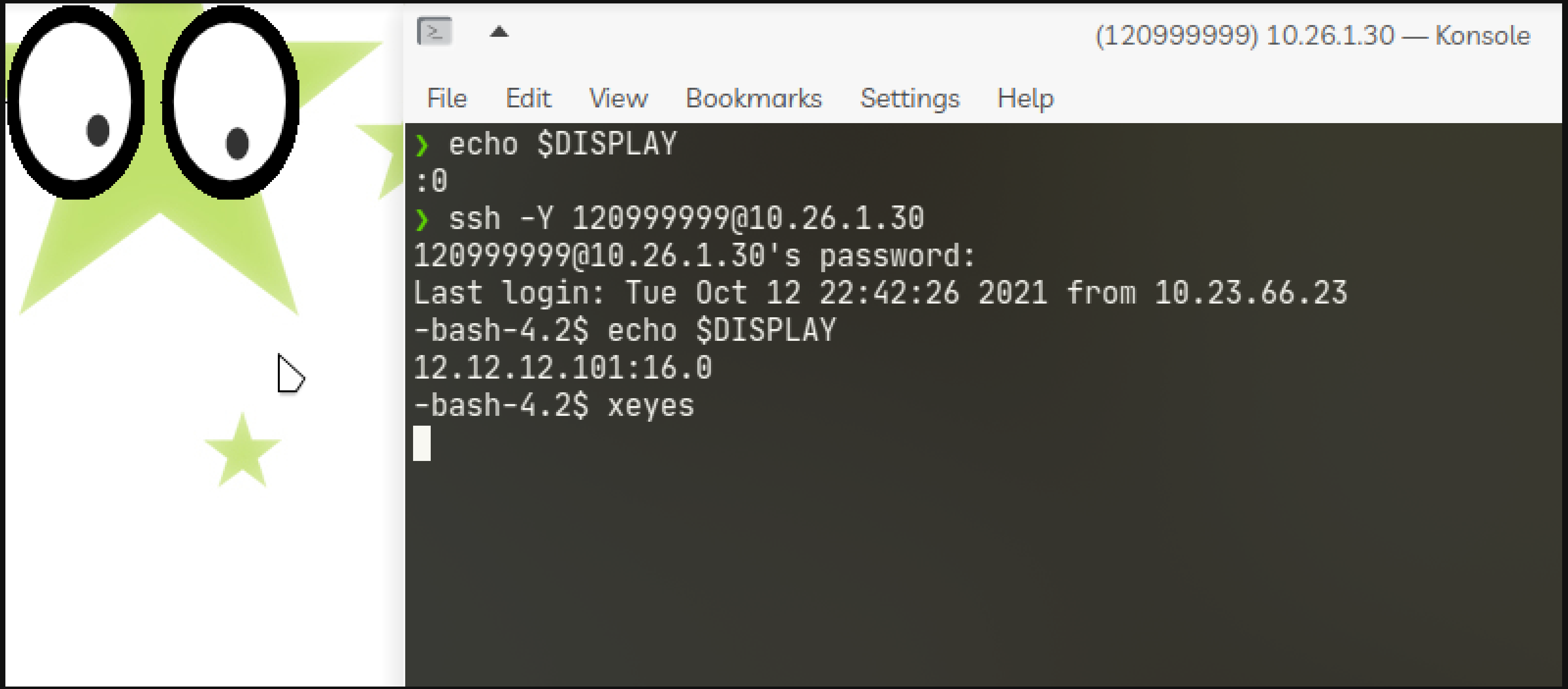
```
# To test if it is properly setup:
echo $DISPLAY # something like :0
```

2. `ssh -Y [student_id]@[server_ip]`

```
# To test if it is properly setup:
echo $DISPLAY # something like 12.12.12.101:15.0
```

3. Try to run `xeyes` as a test

Have a test!



```
❯ echo $DISPLAY
:0
❯ ssh -Y 120999999@10.26.1.30
120999999@10.26.1.30's password:
Last login: Tue Oct 12 22:42:26 2021 from 10.23.66.23
-bash-4.2$ echo $DISPLAY
12.12.12.101:16.0
-bash-4.2$ xeyes
```

Check your $DISPLAY if...

For ImGui:

```
terminate called after throwing an instance of 'graphic::GraphicException'
```

For Qt:

```
qt.qpa.xcb: could not connect to display
qt.qpa.plugin: Could not load the Qt platform plugin "xcb" in "" even though it
 was found.
This application failed to start because no Qt platform plugin could be initial
ized. Reinstalling the application may fix this problem.

Available platform plugins are: eglfs, linuxfb, minimal, minimalegl, offscreen,
 vnc, wayland-egl, wayland, wayland-xcomposite-egl, wayland-xcomposite-glx, xcb.
```

On the GUI Assignments

- The following assignments will (mostly) be GUI-related
- We'll provide templates that handle drawing for you
- You only need to fill in some data (e.g. an array)
- The template will be with ImGui
    - You can also use GTK, xlib and (probably) Qt instead, if you like

Writing GUI with ImGui*

This part will be helpful if you want to:

- Add sliders / buttons for debugging purposes
- Display debugging data etc.

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* Optional

Why ImGui?

- Relatively easy to use, compared to GTK and xlib
- Relatively simple to write, compared to Qt

Examples on ImGui

1. A sample to consult if you want to implement something (main_1)
2. A sample GUI program (main_2)
3. Interaction between GUI and whatever outside GUI (main_3)
4. Make it available with no GUI available (main_4)

`main_1`: The GUI demo

- Contains many examples for reference if you want to modify the GUI
- Read ImGui's demo for more examples

`main_2`: A simple GUI program

- A few code to draw something on GUI

`main_3`: GUI/non-GUI interaction

1. Respond to GUI events
2. Make changes outside GUI
3. Accept input from GUI
4. Display values from outside GUI

`main_4`: GUI without X Server

- We need no GUI sometimes:
  - Running tests
  - Unattended (e.g. in `sbatch`)
  - Performance metric on computing
- Remember to somehow tell your program to run automatically

xvfb-run: Run GUI without X Server

```
xvfb-run ./main_4 y
```

With MPI:

```
xvfb-run mpirun -n 4 ./main_4 y
```

Done for now!

Check out the slides & code on:

- Blackboard, or
- https://csc4005-tut-slides.netlify.app/05/, or
- https://csc4005-tut-slides.pages.dev/05/