

Basic printing/slicing

By Friend

Pre-workshop

- Watch: 3D printing overview
<https://www.youtube.com/watch?v=f5fBwppxtkI>
- Watch: Fused Deposition Modelling (FDM) Process
<https://www.youtube.com/watch?v=J4OQQ9bA6g0>
- Watch: Original Prusa i3 MK3 guide for a new user
<https://www.youtube.com/watch?v=GE-lrRbU124>

Pre-workshop

- Download and install:
 - Cura
<https://ultimaker.com/en/products/ultimaker-cura-software>
 - Github Desktop <https://desktop.github.com>

If there's a word you don't understand in
the slide, let me know and I'll add it here

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Agenda

- 3D printing overview
- Slicing
- Starting a print on the printer
- Cleaning the bed / sanding
- General good practice
- First layer importance
- Printed solid
- Troubleshooting



Part 1: on the computer



Quiz #1

(to get over the boring stuff)

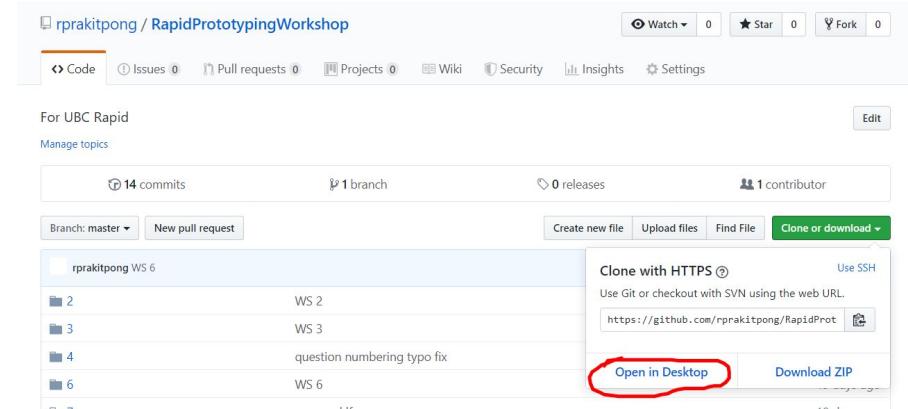
- What is 3D printing?
- What is FDM?
- What is slicing?

Answer #1

- 3D printing is rapid prototyping method, mostly used in industry to save time and money
- FDM is a way to 3D print, by layering plastic on top of each other
- Slicing cuts a 3D model into a set of 2D layers for FDM

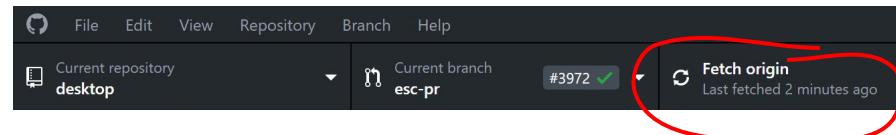
Get repo

- There's two repo I want you to get today
 - <https://github.com/UBC-Rapid/Cura-settings>
 - <https://github.com/rprakitpong/RapidPrototypingWorkshop>
- Click on the green button -> [Open in Desktop]
- Github Desktop should pop up and you can click along to get download the whole repository to your laptop



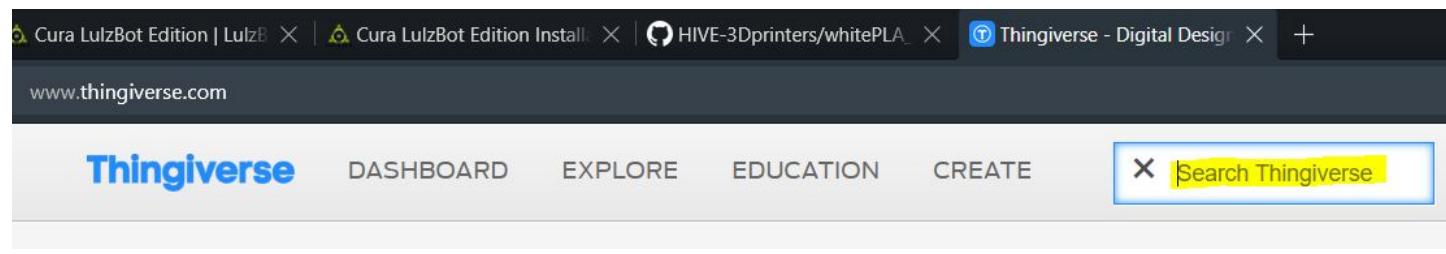
Get repo

- These repos act exactly like normal folders and files to you
- I encourage you to read ahead on workshops if you have time
- Click [Fetch Origin] occasionally to update your local repos



Find a model

- You'll get to print a small model today (yays!)
- Go to "thingiverse.com"
- Search for something you want
 - Some ideas: pen cap, loaded dice, lowpoly dog, low poly dog, utility knife, cable clip, cable wrapper



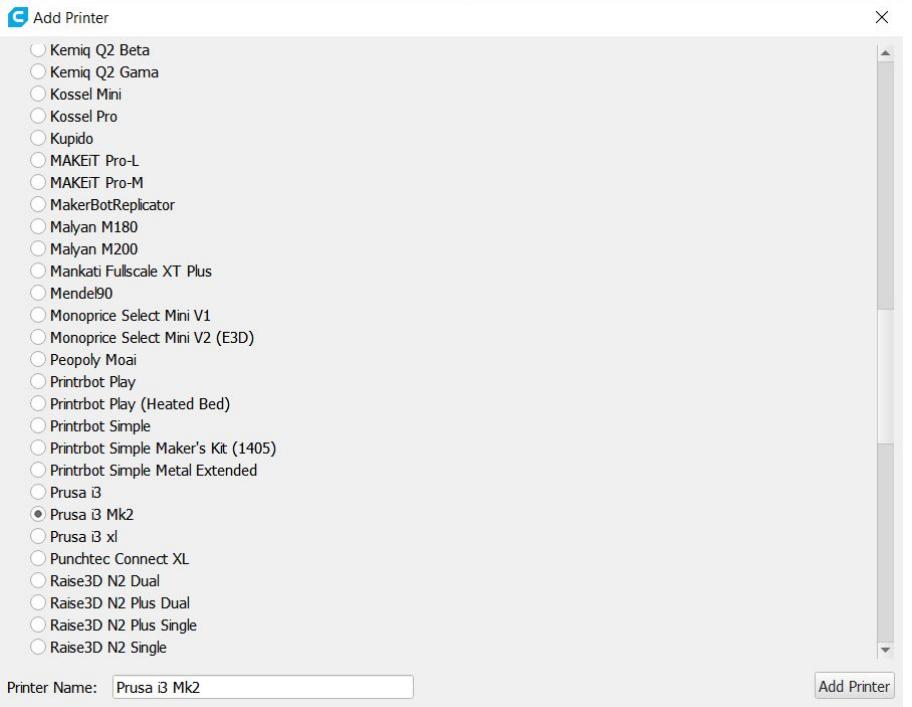
Find a model

- Once you click on the thing you want, scroll down and click on “Thing Files”
- Get just the model you want
 - Sometimes if you blindly download you’ll get a huge zip file with everything

The screenshot shows a web page for a 3D printed model named "#3DBenchy". At the top, there's a small image of the green boat model and some text: "CT #3DBenchy - The jolly 3D printing torture-test" and "by CreativeTools Apr 9, 2015". Below this is a larger image of a hand holding the physical green 3D-printed boat. Underneath the images are several small preview thumbnails. A navigation bar below the images includes "Thing Details" (with a blue star icon) and "Thing Files" (with a yellow folder icon). The "Thing Files" button is highlighted with a yellow box. On the right side of the page, there's a section titled "File Name" with two entries: "3DBenchy_Broschur... Last updated: 04-09-15" and "3DBenchy.stl Last updated: 04-09-15". The "3DBenchy.stl" entry is also highlighted with a yellow box.

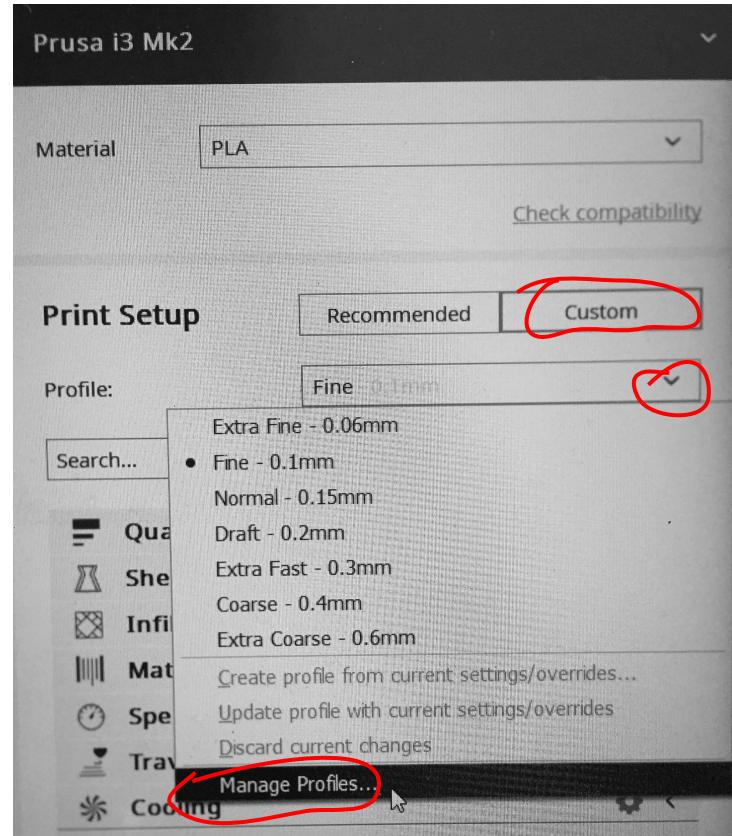
Cura

- Opening Cura for the first time should let you add a printer
- Select Prusa i3 Mk2



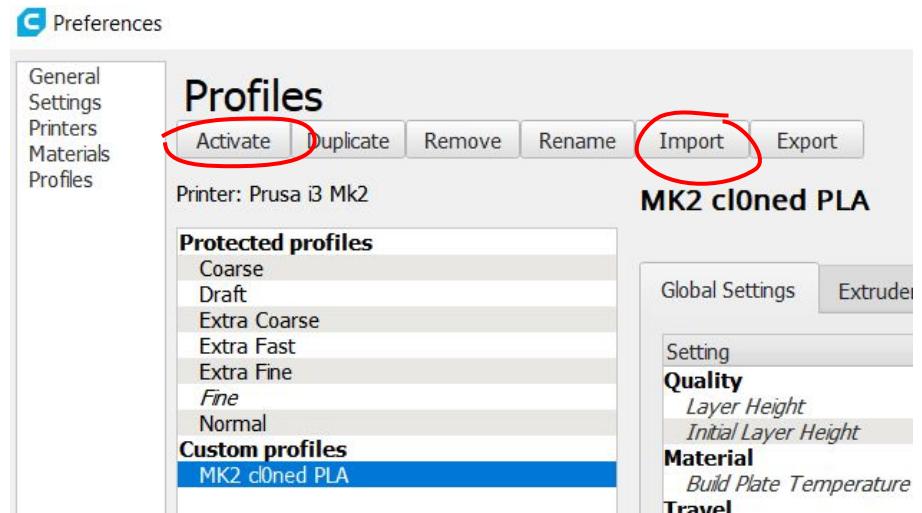
Cura

- We're going to change print profile to what the team has tested
- Click [Custom]
- Click [Profile] -> [Manage Profiles]



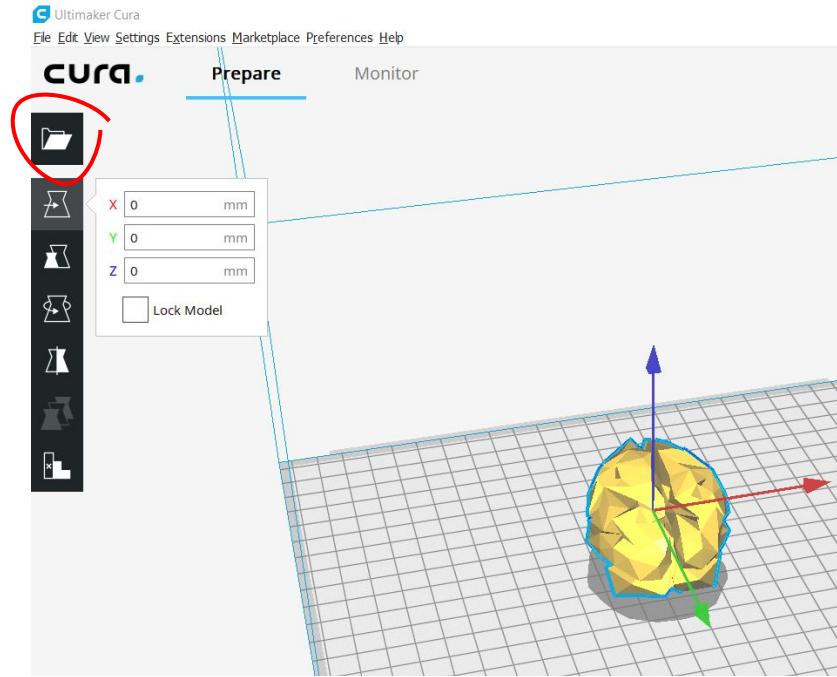
Cura

- Click [Import]
- Find the profile “MK2 Cl0ned PLA” and import it
 - Or profile for other printer
 - I’ll tell you which profile to import
- Select the profile and click [Activate]



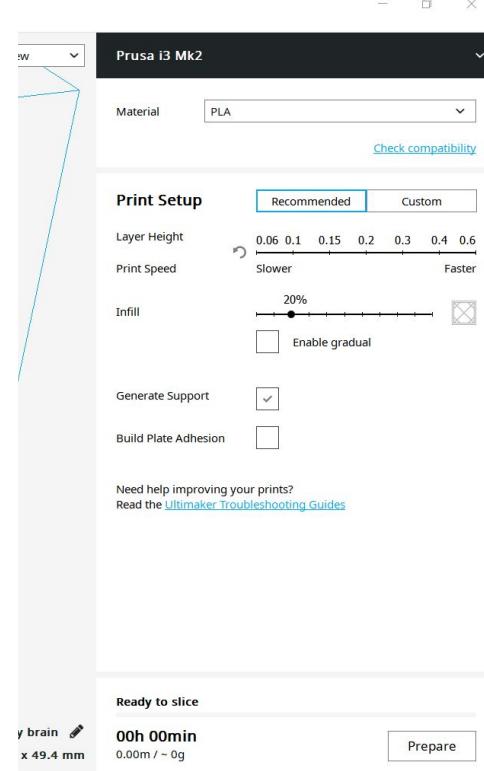
Cura

- Click on the folder icon on top left to import a model
- Select the model you downloaded earlier
- Right mouse drag to rotate camera, middle mouse drag to translate camera
- Click on the model to select it for manipulation
- Below folder icon are the tools to manipulate the model
- Try out a few of them
 - It's too simple for me to go over them



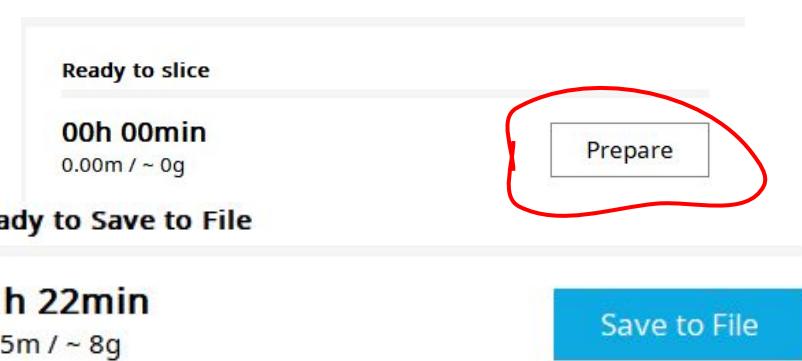
Cura

- Switch back to recommended print setup
- Stick to recommended for now since it's all preset by the profile you just import
- I highly encourage you to look at the custom settings and see what you can customize for the printer through software



Cura

- Click [Prepare] to slice the model
- Make sure the model you've found doesn't exceed 15g
 - Don't be wasteful!
- You can hover over time and material use to see in depth stats
- Cura likes to give underestimate for time though
 - Do that time multiplied by 1.25 as a ballpark
- Click [Save to File] to save it to an SD card
 - I'll pass one around



Quiz #1.5

- If you increase length by twice, and the model is uniformly scaled, by how much does the volume increase?

Answer #1.5

- 8 times (2^3)

Part 2: on the printer

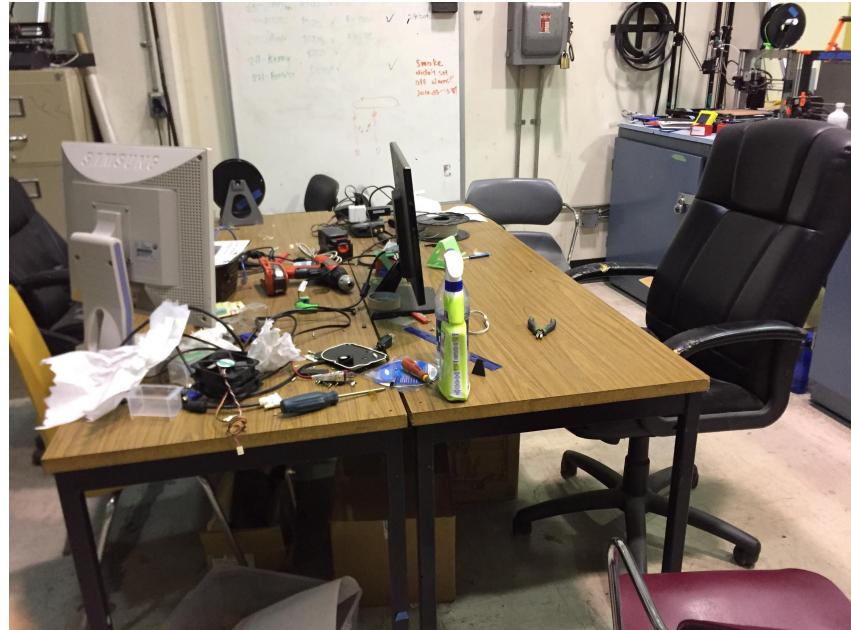
Space tour

- Team desktop
- There's Cura with all the settings on here



Space tour

- Work bench
- Make sure it's clean after you use it
 - So not looking like this lol



Space tour

- Our printers
- You're free to use it for your own personal projects
- You'll use them throughout the workshops
- You can keep things in cabinets
 - Ask for passcode from execs



Space tour

- Tools cabinet
- Put things back when you're done

Note

- Wear PPE
- Don't eat in the space
- Clean up after yourself

Quiz #2

(to get over the boring stuff)

- How do you measure the proper gap between first layer and printer bed?
- What type of alcohol do you clean the bed with?

Answer #2

- A sheet of paper
- Isopropyl alcohol

Using the printer

- Turn it on
- Clean bed as needed
- Put in SD card
- Scroll to your gcode file
- Preheat (or auto preheat)
- Calibrate (or auto calibrate)
- Watch until the first layer is done
- No point in explaining more, I'll show you once and let you do your own

Your turn

- Before the next workshop or right after this workshop is done, I'll let you into this space to print the model you sliced
- You'll clean bed/print successfully without my help
- You can use online references though
 - Prusa Mk3 Guide video I made you watch before this workshop is a good resource

Troubleshooting

- You'll learn as you use the printer more
- Simply: if it sounds unusual, if it vibrates, if something pops off, turn off the printer (red power switch) because something's wrong
- Google is your friend, but know when to stop
- If it's getting too complicated, put the issue on Slack, and ask senior members to help you with it
 - Examples of issue getting too much: you have to get inside control box to fix, takes more than a day, you need power tools, etc.
 - Doesn't mean you're off the hook, it just means you need to ask for help
- Don't break things too much
 - You'll be that senior member fixing stuff newbies break

Some further readings

- By the time this workshop ends, I'll have put up a list of active projects and who the lead on that is
- Use the project name as keywords and Google about it
- As a member you'll take part in projects, so it's good to think a bit ahead
- Take a brief look at the projects ideas slides in this repository
- You'll do a short project / work on a Rapid project at the end of workshops, so it's good to see ahead and know what type of project you'll do for which workshop you like