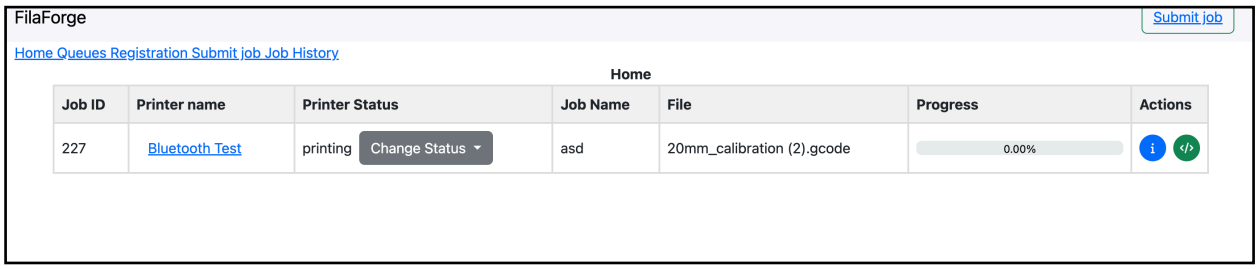
Initial Testing: User's Manual

3/18/24 Forge Queueing Software

Todo: Quickstart how to submit job

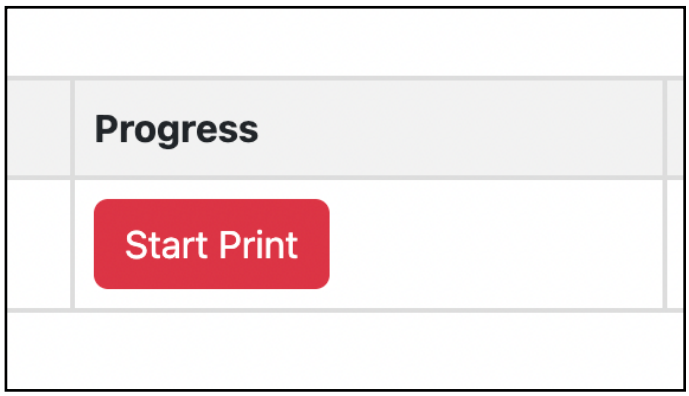
Main View

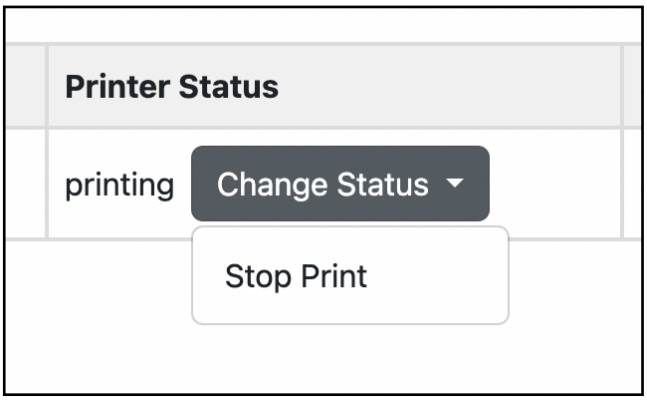


List of possible printer statuses:

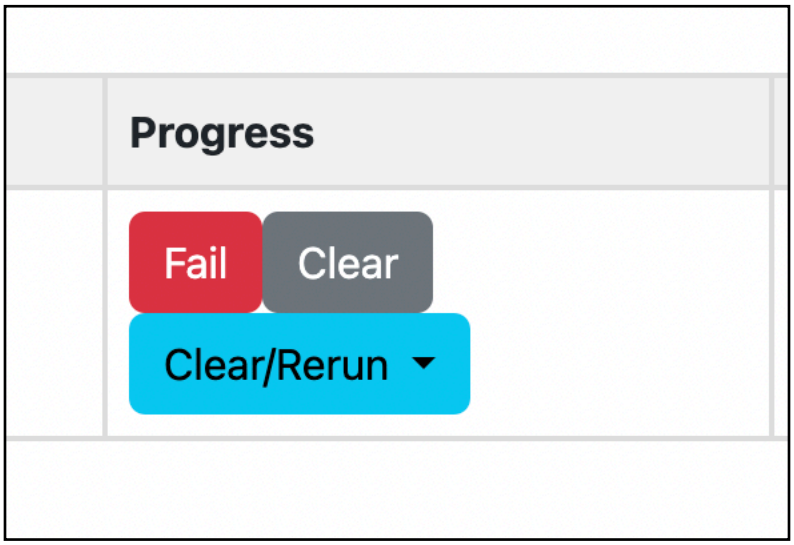
- **Configuring**
  - Upon registration, the printer status is “configuring.” Once the user sets the status to “ready,” it can accept prints.
- **Offline**
  - When the printer is offline, the software will halt communication with the printer. The printer itself will remain on, but nothing in the printer’s queue will get sent to the printer.
- **Ready**
  - The printer can only accept new prints if the status is set to “ready.”
- **Error**
  - The printer can not accept new prints if the status is **error.** The printer will error only when a job is sent to the printer and something goes wrong (i.e. timeout error, serial communication error, hardware error, etc). In this case, the job will be removed from the queue and its status is also set to **error.** However, the job can still be located and rerun from ***Job History View.*** When the error is resolved, the user may change the status of the printer from **error** to **ready** manually.
- **Printing**

- Once the printer status is set to “ready,” the first job in the printer’s queue will get sent to the printer, and the printer status will get set to **printing.** However, the user must still select “start print” for communication to begin. If this job was submitted as a mistake, the user has the opportunity to cancel the job. This will set the printer status to **complete** and the job status to **cancelled.**





- **Complete**
  - When the status of the printer is **complete,** the printer has been fully disconnected and the user may remove the print from the build plate. The printer will have a status of **complete** when 1) the print has fully completed, or 2) the user cancelled the job from the software.
  - Additionally, when the print is complete, the user can click one of these three buttons. All buttons will remove the job from the printer’s queue and update the job status in Job History. Descriptions of button functionality below.



Fail button

The *fail* button sets the status of the printer to **error** and the status of the job to **error.** The printer will not accept new prints.

Clear button

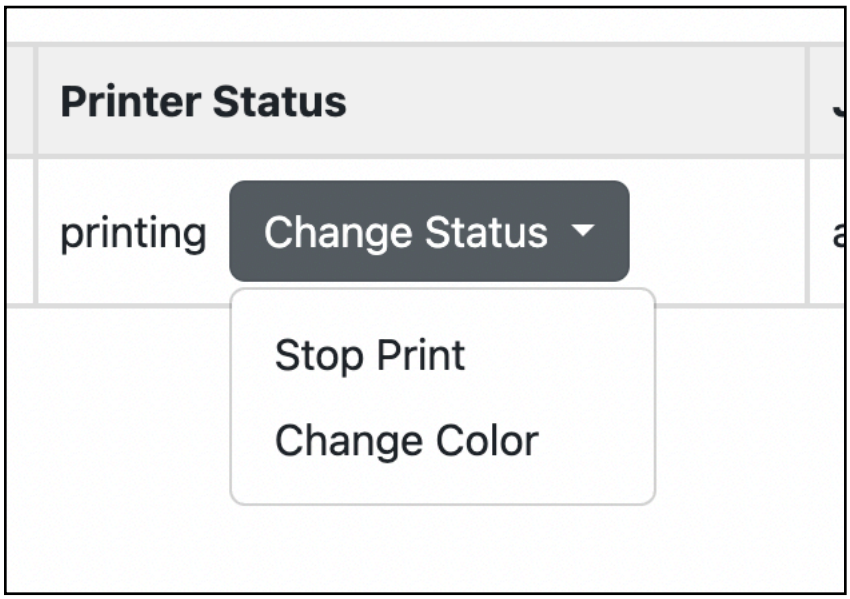
The *clear* button sets the status of the printer to **ready** and the status of the job to **complete.** After a 2 second delay, ***Main View*** will display the following job in the print queue.

Clear & Rerun Button

This button sets the status of the printer to **ready** and the status of the job to **complete.** It duplicates the current job and adds it to the *front* of the selected printer's queue.

Functionality to be added: We will be editing this functionality so "rerun" takes you to the ***Submit Job*** *view with the job name, file, and printer auto-filled so the user has more control over whether they want the rerun job to be in the front or back of the queue.*

Changing Status During Print



Stop Print

DO NOT STOP FROM LCD SCREEN. Not only will this not stop the print, but it will stop the fans and cause the printer to overheat. If you do this, you must click resume from the LCD screen.

While the printer is printing, the user can choose to stop the print. This will set the status of the printer to **complete** and the status of the job to **cancelled.** A loading icon will appear in the *progress* column while the printer is completing its ending sequence (*Turn off temperature, turn off heatbed, turn off fan, park, wait, reset LA, reset heartbreak target temp, disable motors).* Then, the three buttons will display: *fail, clear, clear & rerun.*

Change color

This button will send the GCode line to the printer ***M600.*** The user must follow the instructions on the printer's LCD screen to change the filament. Once this is done, the print will resume normally. There is no need to release anything software-side.

Queue View

Deleting Jobs

The user can delete a job from the queue by selecting a box and clicking the *Remove from queue* button.

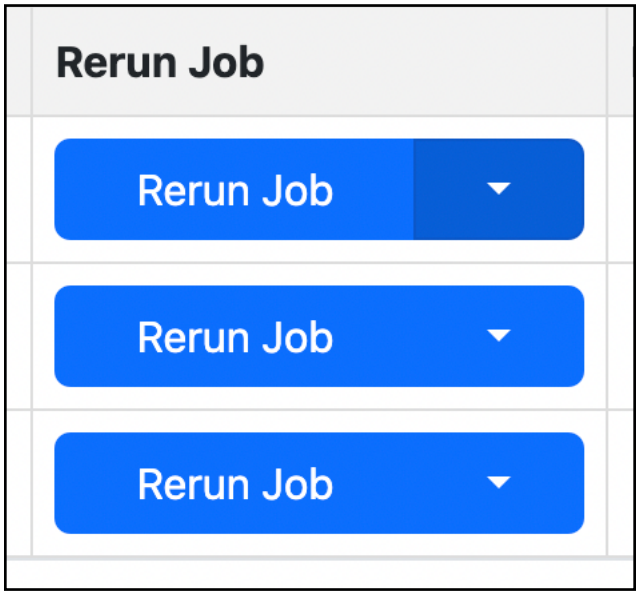
Deleting a job from queue view **will not** delete the job from the database. Job will still be visible in ***Job History View.*** Effects of deleting a job from the queue view are as follows:

- If Job Status == **printing:**

- **The job will not be removed from the queue.** The status of the printer will get set to **complete** and the status of the job will get set to **cancelled.** The printer will initiate its ending sequence. The job will only be removed from the queue when it is released on ***Main View.***

- If Job Status == **inqueue:**
  - The job **will be** removed from the queue. The printer status does not change and the job status will be set to **cancelled.**

Rerun Jobs



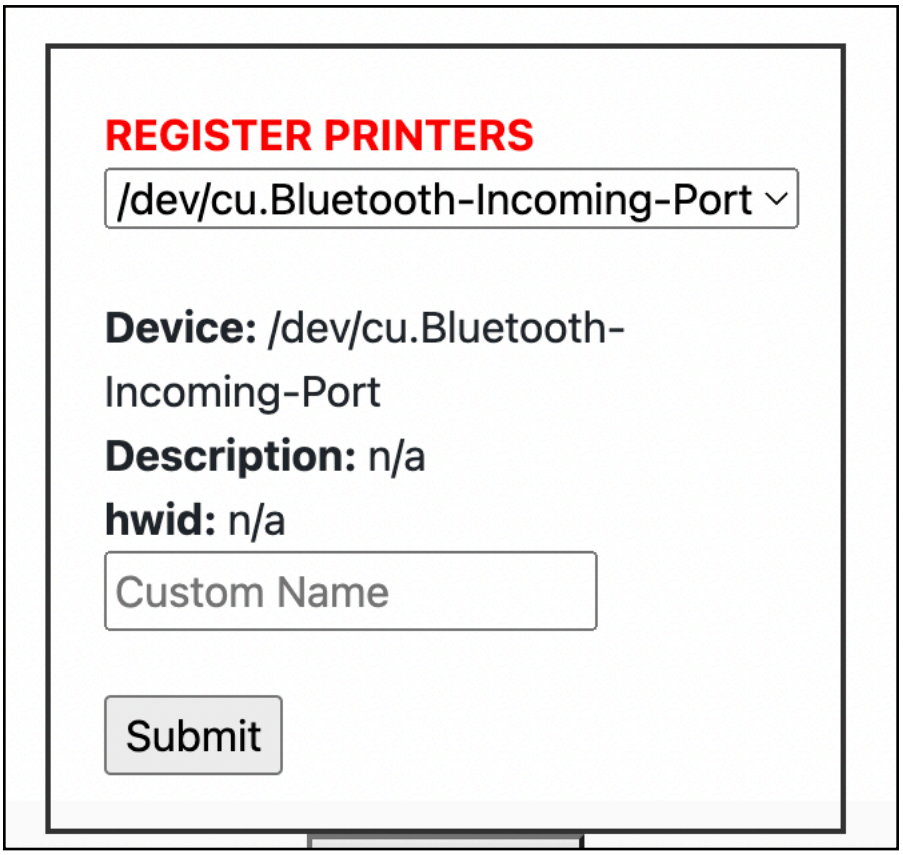
Rerun jobs is a split button. Click the left portion to duplicate the job on the current printer. Click the arrow dropdown to duplicate the job on another printer's queue. *Functionality to be added: We will be editing this functionality so "rerun" takes you to the* ***Submit Job*** *view with the job name, file, and printer auto-filled so the user has more control over whether they want the rerun job to be in the front or back of the queue.*

Changing position of jobs in the queue

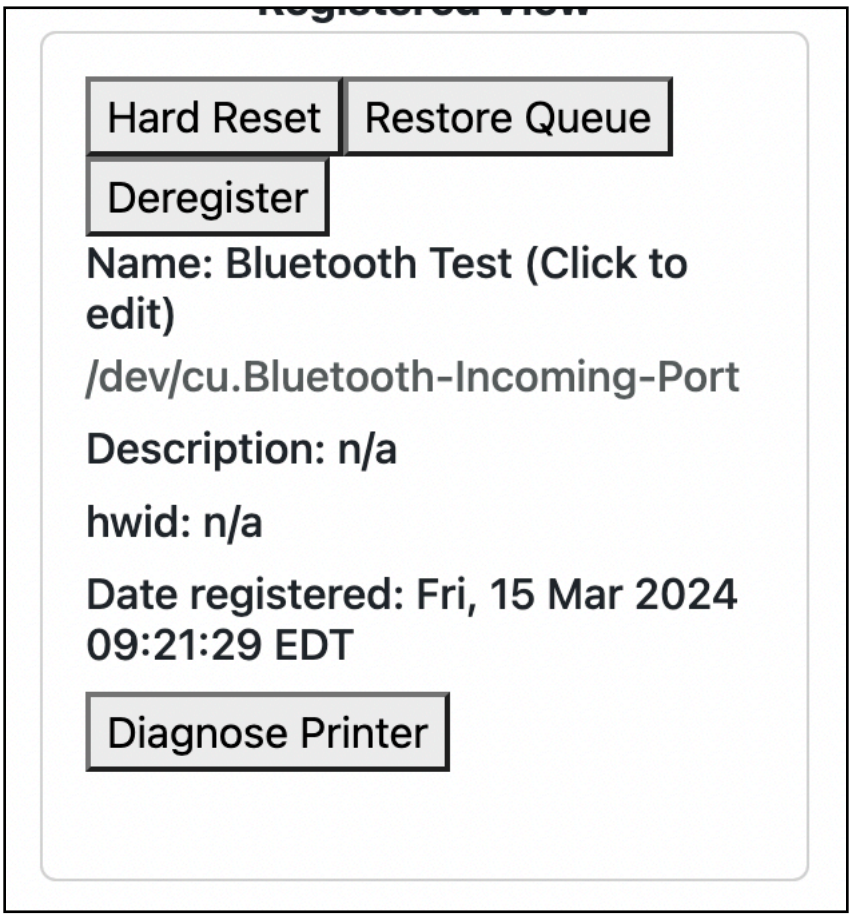
TBD

Registration View

Registering Printers

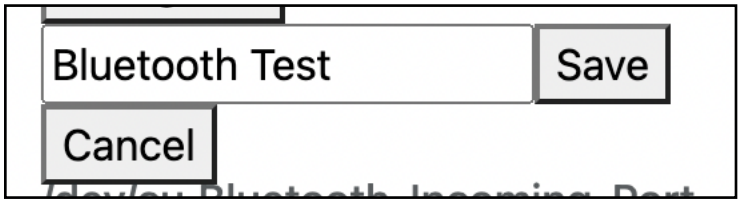


To register a printer, select a port from the dropdown menu. This will display the device, a description of the device, and the hardware ID. Name the printer and click “submit.”



Editing Name

To edit the name of the printer, click on the name and type in a new name. Click “save” to save or “cancel” to revert changes.



Hard Reset

A new **thread** is created for each registered printer. This allows multiple printers to access different parts of the same codebase at the same time. Each printer thread is stored in an **array** so the code can access the printer and printer queue separately based on the printer’s unique ID.

If a printer is unresponsive or the software communication seems to be off, it is possible the printer thread could be stuck somewhere. We tried our best to implement error handling mechanisms, but in case of emergency, this button will delete the thread from the array and create a brand-new one. This will break the printer out of any death-loop it may be in.

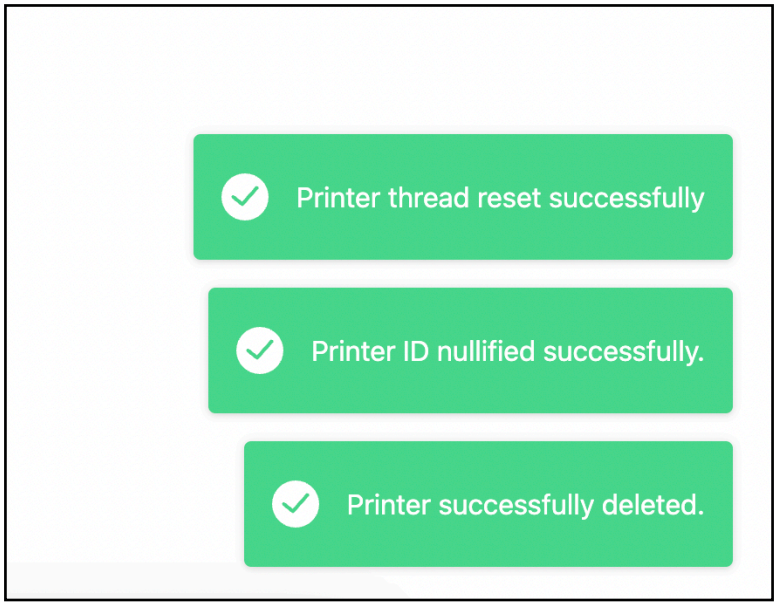
Doing this will remove all of the printer's jobs from the in-memory queue. This will not change the status of any jobs. The printer's status will be reset to **configuring.**

Queue Restore

If the system goes down and the in-memory queue is wiped, the queue restore button will, restore the queue. Hence the name. All jobs in **Job History View** that have a status of **inqueue** associated with the specified printer are placed in the printer's queue. Any jobs associated with the specified printer with a status of **printing** will have their statuses changed back to **inqueue.**

Note: restoring the queue will not preserve the initial order. The oldest jobs will be placed at the beginning of the queue.

Deregister Printer



When you deregister a printer, do not be alarmed when you get three pop-up banners. Deregistering a printer does three things:

1. Deletes the printer's thread from in-memory so it is no longer visible on the user interface.
2. All jobs in the ***Job History View*** that have a foreign key pointing to the specified printer will have that key set to 0. In ***Job History View,*** the name of the printer associated with a job will get set to *None.* The user will be able to filter by *Deregistered Printers.*

3. The printer's data will be removed from the database entirely.

Diagnose Printer

Note: This will be better formatted in future iterations.

When the user initially registers a printer, the following data is stored in the database:

- Printer name (user generated)
- Printer port
- Port description

- Hardware ID (hwid)
- Date registered

Let's say this sequence of events happen:

1. User plugs in Printer 1.
2. User plugs in Printer 2.
3. User registers Printer 1 under port ACM1.
4. User registers Printer 2 under port ACM2.
5. For whatever reason, both printers get unplugged.
6. User plugs in **Printer 2 first.**
7. User plugs in **Printer 1 second.**
8. **The system orders the ports in the order they are plugged in.** So now, Printer 1 is registered under ACM0, but in reality, it is now connected to port ACM1. Printer 2 is registered under ACM1, but is connected to port ACM0.
9. The user submits a print to Printer 1, **but the print begins printing on Printer 2!**

Diagnosing test:

This printer is registered under port /dev/cu.Bluetooth-Incoming-Port.

The system has found a matching port with the following details:

Device: /dev/cu.Bluetooth-Incoming-Port,
Description: n/a,
HWID: n/a

Device /dev/cu.Bluetooth-Incoming-Port is registered with the following details:

Name: test
Device: /dev/cu.Bluetooth-Incoming-Port,
Description: n/a,
HWID: n/a

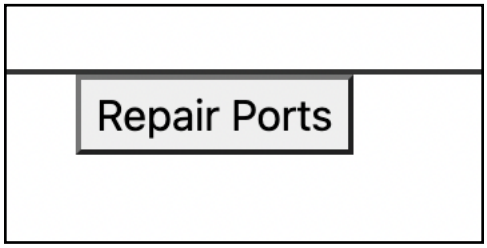
If the ports are swapped, Diagnose Printer will return information that looks like this:

- Printer 1 is registered under ACM0. *(Tells the user how the printer is registered inside of the database).*

- The system has found a matching port with the following details:
- Device: Printer 2, description n/a, hwid: printer2hwid
- Device ACM0 is registered with the following details:
- Name: Printer2, device: ACM1, description: n/a, hwid: printer2hwid

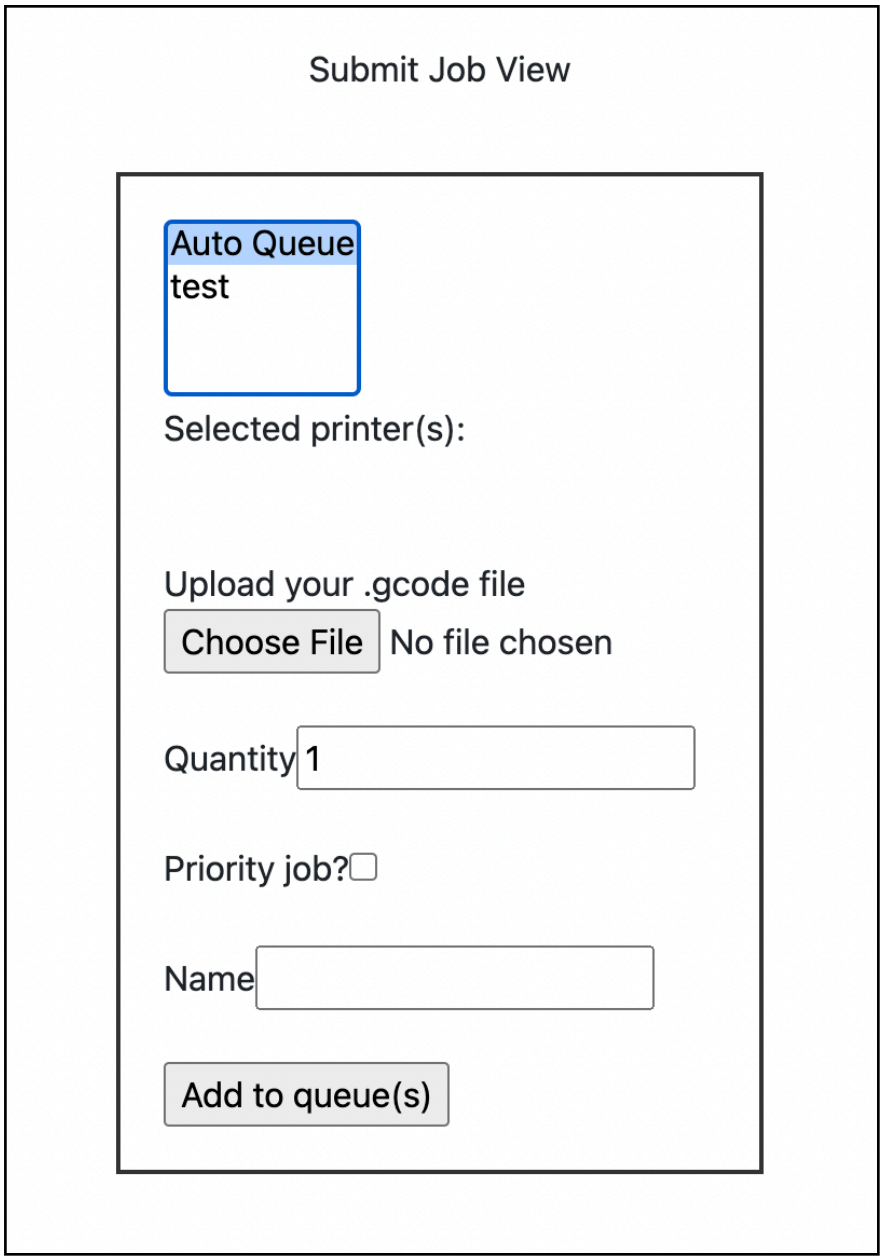
In essence, if the ports are swapped, Diagnose Printer will say, this printer is registered under this port, but this port is returning this other printer, which is registered under some other port.

Repair Ports



Main function: this button will internally swap the ports registered with each printer. If Printer 1 is registered under ACM0 but is now connected to ACM1 and Printer 2 is registered under ACM1 but now connected to ACM0, the ports will be updated accordingly so the user does not have to re-register the printers or unplug/replug.

Submit Job View



Auto Queue

If the user does not specify a printer, the job will be added to the printer with the shortest queue. If the user specifies a quantity > 1, the job will get sent to multiple printers.

Selecting multiple printers

If the user selects multiple printers, the specified quantity must be greater than the number of printers selected.

The load will be evenly distributed amongst the specified printers.

Choosing a file

A user can only upload files with the extension .gcode. The user can only submit job names with a length <50 characters (including the extension).

Priority Job

Selecting this button will send the job to the front of the queue.

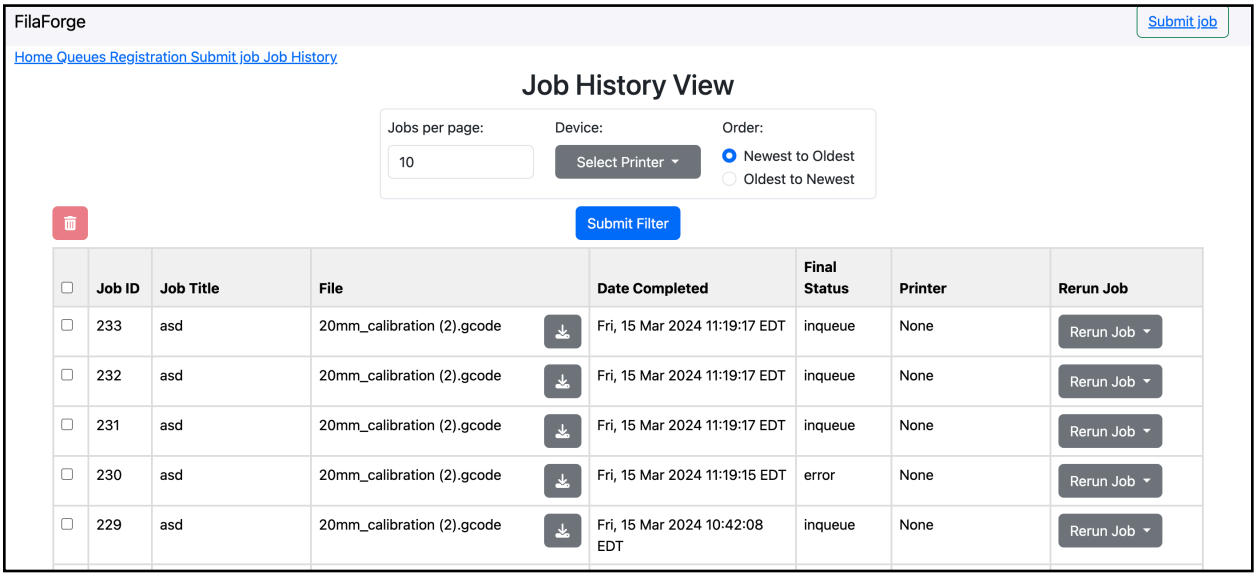
Name

Title of job. This is different from the file name.

Add to queue button

The job will appear in the queue of the specified printer(s) in ***Queue View*** and also in ***Job History View.***

Job History View



Deleting Jobs

Select the checkbox and click the trashcan to delete jobs from the database. Select the box at the top to select all jobs. This selection will be cleared if you change the page.

Filtering Options

The user may specify the number of jobs per page, the order of submission, and the printer printed on.

Download File

The user may click the download button to download the file. This button will be disabled if the file was cleared (see: Clear Space).

Printer Column

This column will display the name of the printer the job was printed on. However, this field will display *None* if the printer the job was printed on was deregistered. The user is able to filter by “deregistered printers.”

Clear Space

This button **will not** remove jobs from the database. This button nulls out the **file** field of jobs that are > 6 months old **except for favorited prints.**

Remaining Tasks

Multiple pages

- Make prettier / more user-friendly
- Rerun Job auto-fills Submit Job page instead of getting automatically sent to queue
- Decouple frontend/backend for multi-user environment
- Loading feedback for queue restore, job submission, job deletion
- Help Mode (gives descriptions of what buttons do)

Main View

- GCode preview
- UI feedback when filament runs out

Registered View

- When registering a printer: “move head” button so a user can tell which port is connected to which printer before registering it

Job History View

- Edit job name
- “Clear Space” button will not delete files from favorited prints
- Search by file name / job name
- Favorited prints

Comments, requests, & bug* identification

* You probably won't need to say anything about this part.