JFrog Connect Demo

Nick Ristuccia
Developer Advocate at JFrog

https://jfrog.com/connect/

JFrog
The Liquid Software Company

Trickle-Up Scenario: Agriculture

- Nurture and engage individual developers
- Developers influence company decisions
- What industries and use-cases?
- Offer fun demos, be prepared for industry perspective

Request from Sonnetopolis

Sonnetopolis sends a desperate greeting. Our humble culture finds its fate fleeting. Man does not live on bread alone. But we cannot feed our people with a poem. We need **potash** to make our land fertile. Please find a trading nation to help with this hurtle.

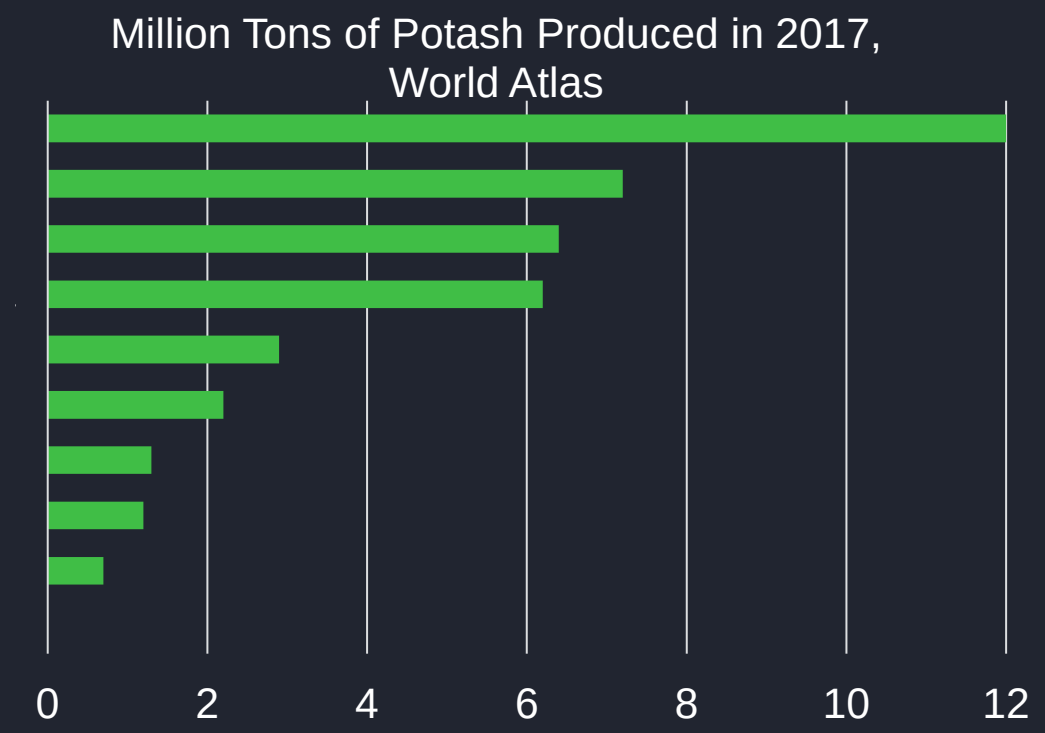
About Sonnetopolis:

- Population: 4,000,000
- Exports: Poetry
- Natural Resources: Very limited
- Agriculture: Grows its own food but relies heavily on imports to make fertilizer

About Potash:

- Potassium salt compounds (KCl, K_2SO_4, KNO_3)

Who is a Good Trading Partner?



Top Potash Producing Countries:

Belarus	Canada	Chile
China	Germany	Israel
Jordan	Russia	Spain

Canada
Everyone loves Canadian potash! Other countries are outbidding us and driving up the price. We can only get 25% of the potash we need.

Russia, Belarus
Pariah states created a war zone. Other trading partners will punish us.

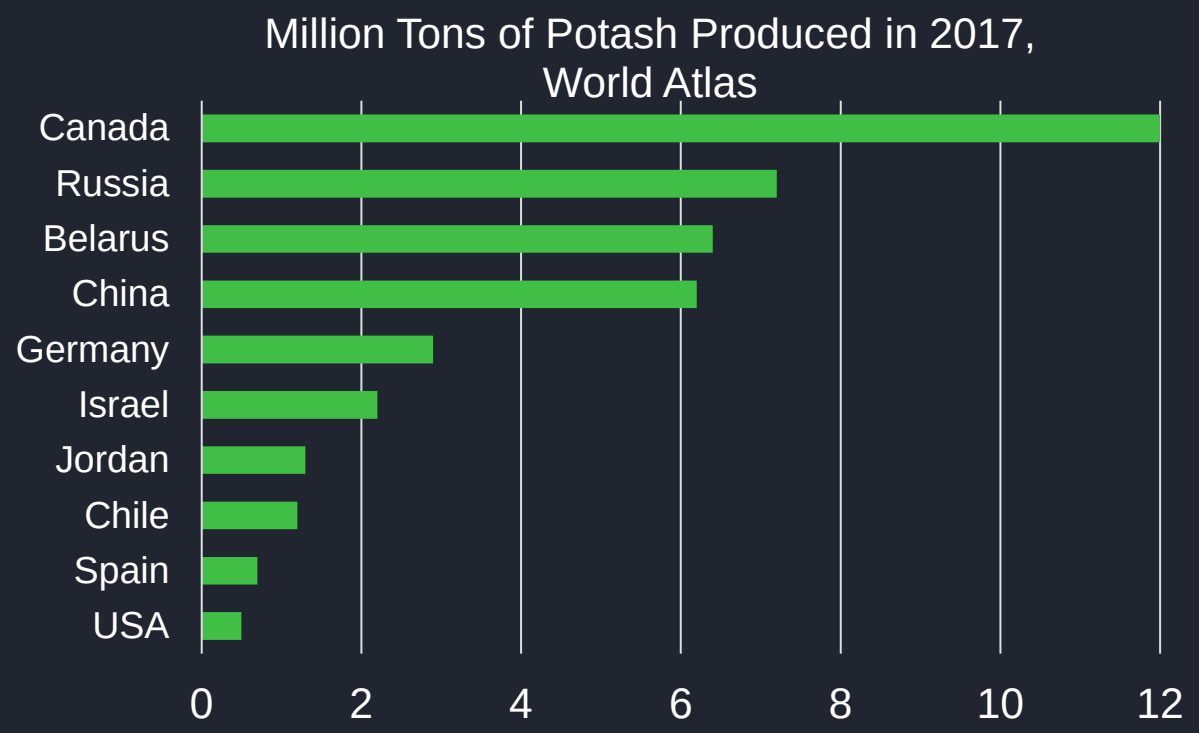
China
Phosphate exports were banned. Potash is next.

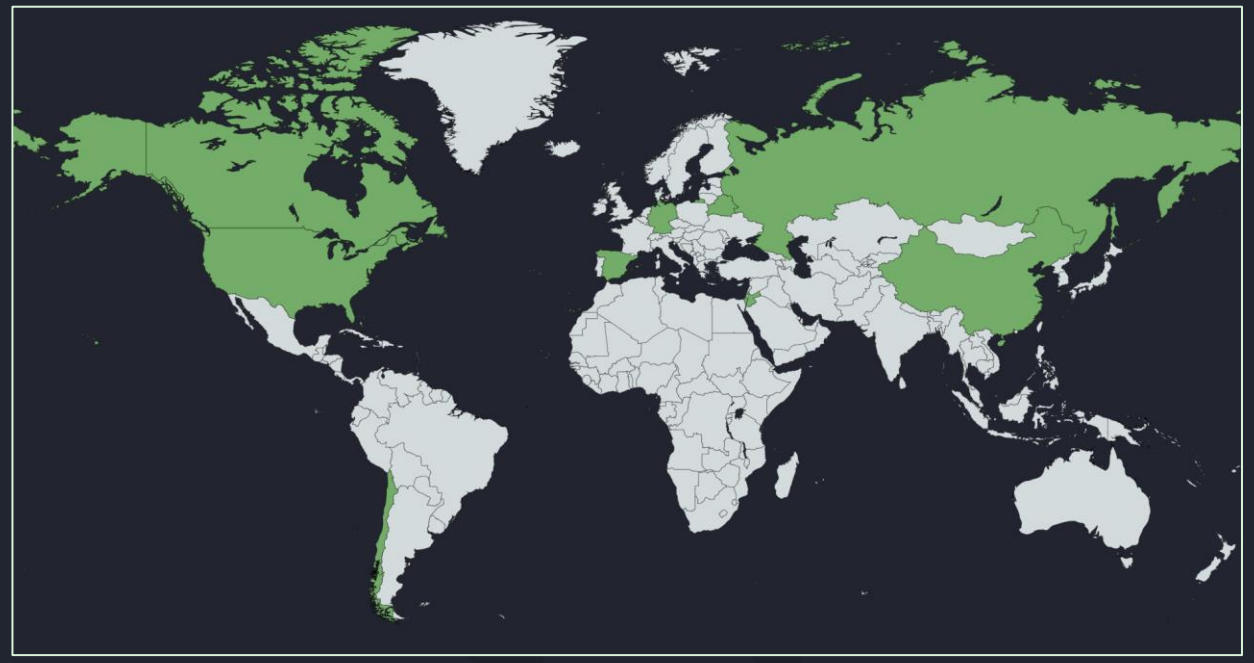
Germany
They won't trade for poems... only liquified natural gas or other forms of energy.

Israel
They can offer 10% of what we need.

Jordan, Chile, Spain
None to spare. What's produced is consumed.

The Agriculture Takeaway





Fertilizer and its ingredients come from a small number of countries. They're susceptible to supply chain disruptions and geopolitics (https://www.cnbc.com/2022/03/22/fertilizer-prices-are-at-record-highs-heres-what-that-means.html)

The Liquid Software Company

Help From AI and IoT Farming

- **Double crop yields**
- Consume only **a quarter of the inputs**
- Sensors monitor crop rows and detect the optimal time to introduce inputs
- According to geopolitical strategist Peter Zeihan (https://www.youtube.com/watch?v=LzipwDQBUyc, @51:20)

John, a Sonnetopolis arable farmer, uses smart devices in his fields which monitor soil moisture, analyze this data, and use it to regulate irrigation. However, the application that has been shipped with those devices has a fault that sporadically stops the irrigation on hot days. The consequences of this software bug are potentially devastating: his entire crop could be lost.

Updating Devices

Manual updates:

- Take an SD card or flash drive to each device
- Are devices in inconvenient locations or inaccessible?
- Did you miss a device?
- This process does not scale well

JFrog CONNECT

OTA updates:

- Reach many devices at once
- Fail-safe (Rollback if necessary)
- Division between different types and models
- Monitor devices' health

Device requirements:

- Linux
- Network connection
- Install the Connect Agent

The Liquid Software Company

Readying a Raspberry Pi

Required Hardware

1. Raspberry Pi
2. Power adapter
3. SD Card
4. HDMI Cable
5. Monitor
6. USB keyboard
7. Wifi adapter or ethernet connection

Our setup includes a Raspberry Pi 1 Model B, 4GB SD card, and NetGear wifi adapter A6150. Older RPi models like this don't include built-in wifi support.

The Liquid Software Company

Flash a Linux Image

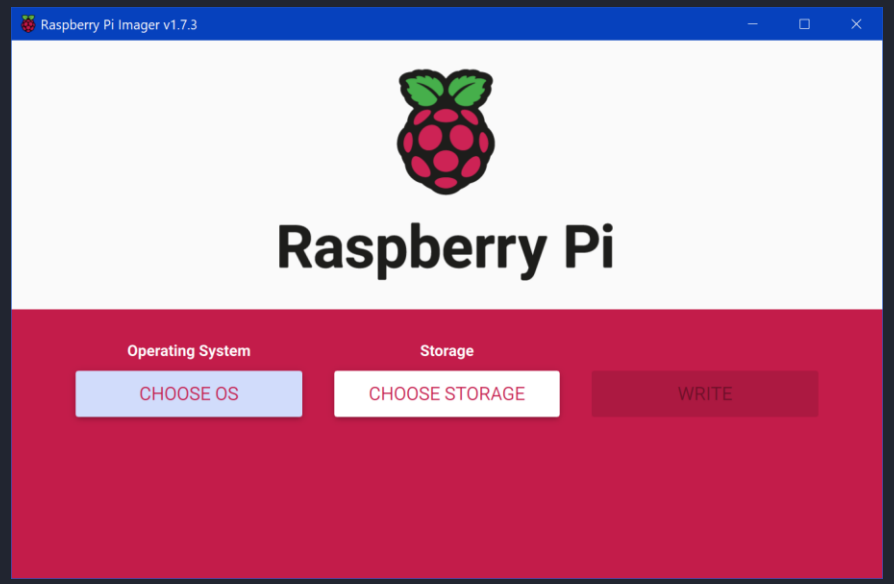
1. Download and run the Raspberry Pi Imager: https://www.raspberrypi.com/software/
2. Choose a Raspberry Pi OS. These are all Debian Linux variants. Your choice will depend on your SD card size and Raspberry Pi model:

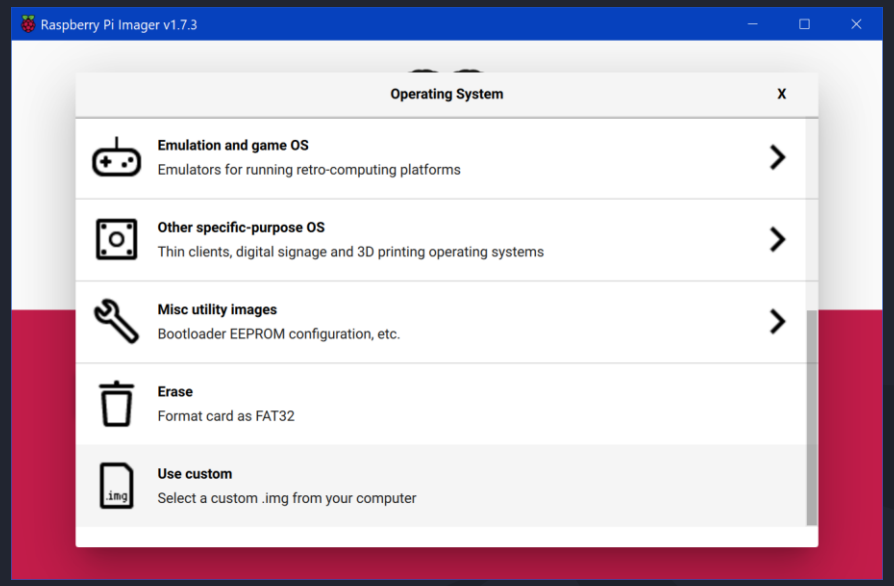
   - For smaller SD cards, choose options with no desktop environment

   - For older RPi models with no built-in wifi, choose an older OS. These are more likely to have available wifi adapter drivers.

   - We chose “Use custom” and downloaded the 2020-05-28 Debian Buster image: https://downloads.raspberrypi.org/raspios_lite_armhf/images/

3. Choose the SD card and write the image





The Liquid Software Company

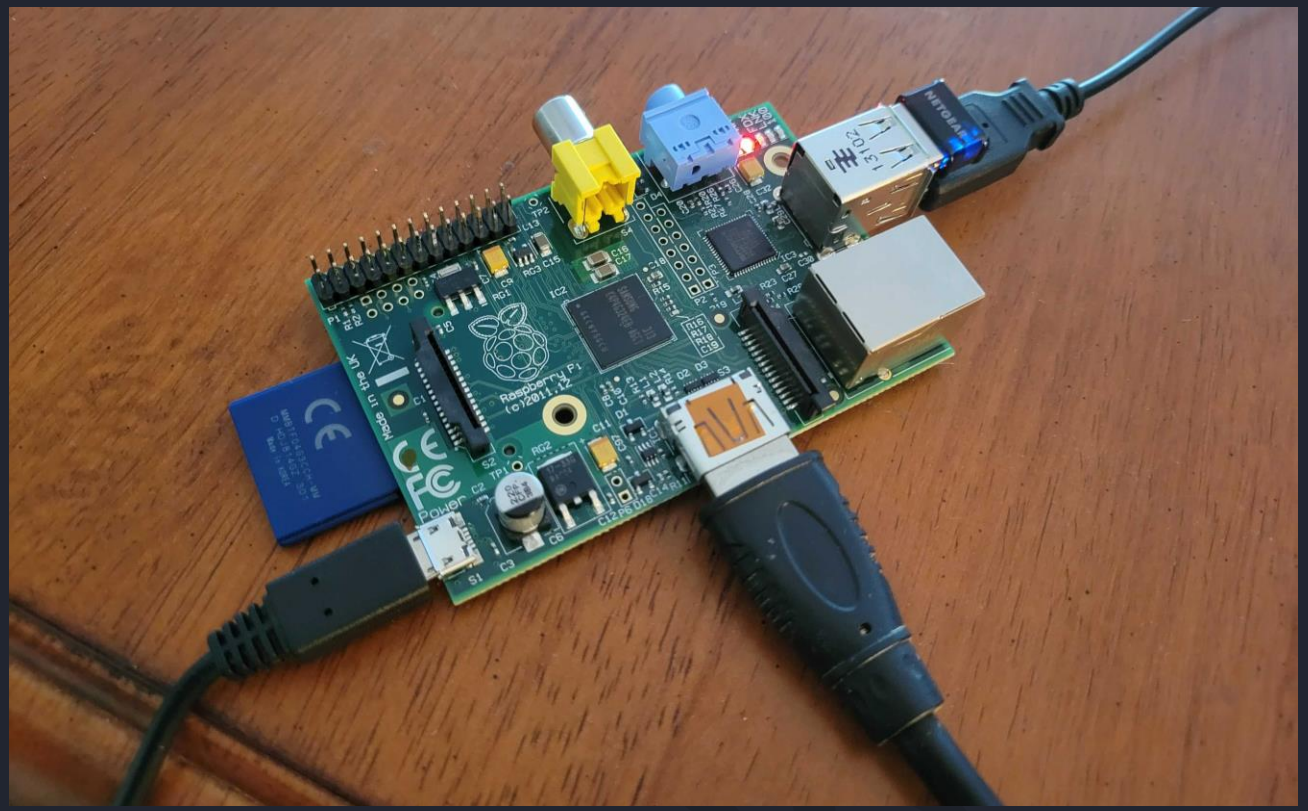
Power On

4. Insert the SD card in the RPi
5. Power on the RPi
6. Login

For older OS images, the default login may be:

- Username: pi

- Password: raspberry

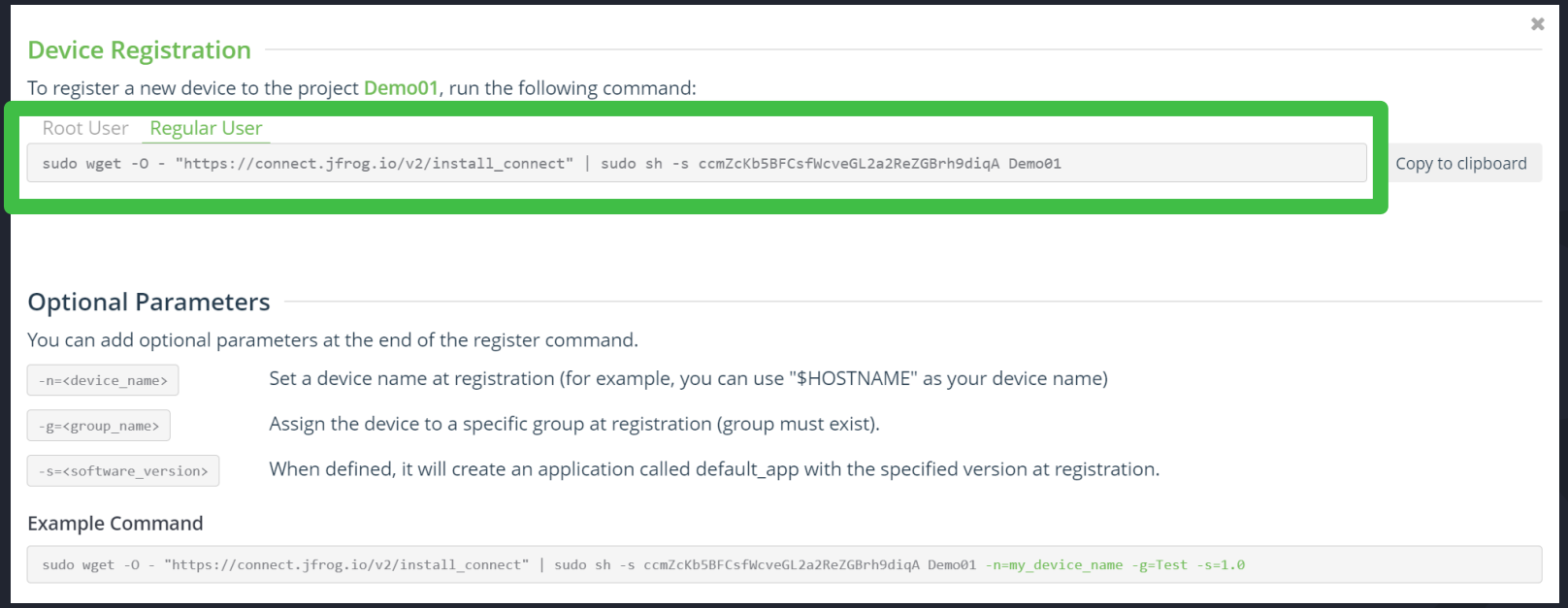


The Liquid Software Company

Download the Connect Agent

9. Log in to your JFrog Connect account or choose Start for Free: https://jfrog.com/connect/
10. Once you're logged in, select **Start with your device now** and name your project
11. Select **Register Device**
12. Enter either of the two statements shown into the RPi terminal.

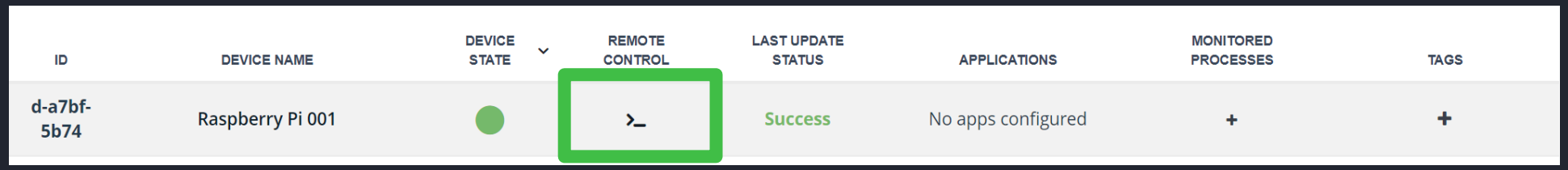
The RPi should be connected in a matter of seconds.



The Liquid Software Company

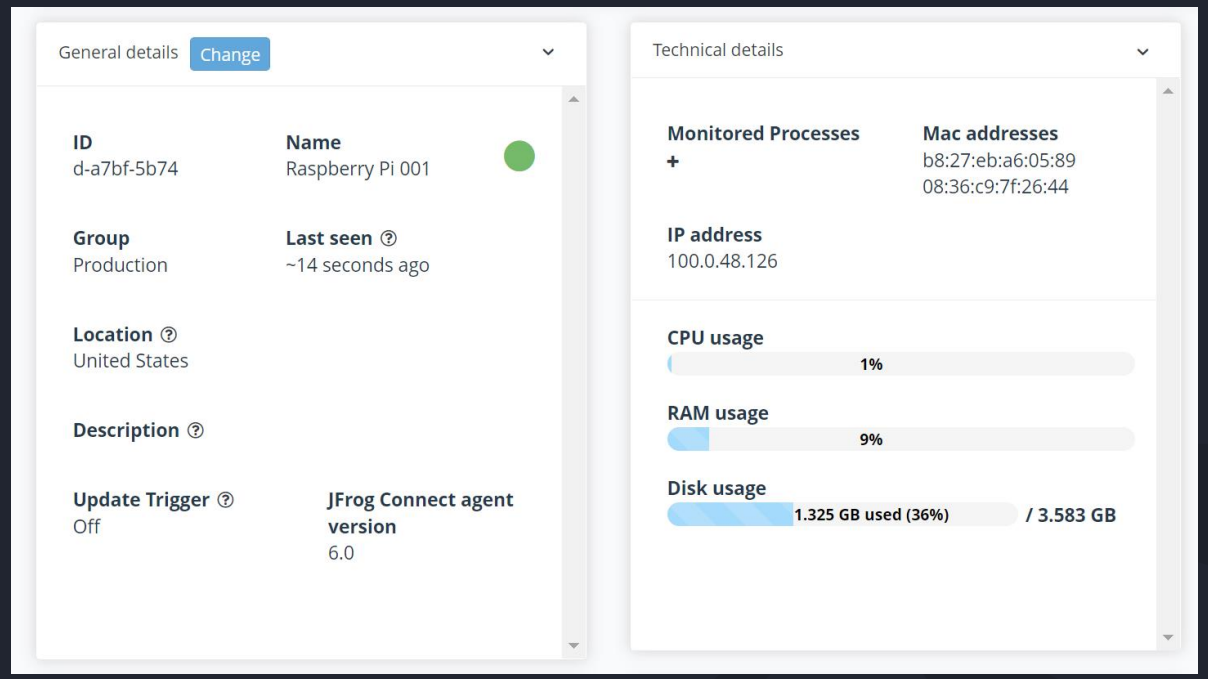
Test the Connection (Optional)

13. Click the button for remote control access to the device. Within a few seconds, a reverse SSH tunnel is created. Click **Connect**.



14. Enter `sudo reboot now` in the remote terminal. The actual RPi will reboot, and the remote terminal should close automatically. Rebooting the RPi isn't necessary. It's just an obvious action you can use to prove the connection works.

15. Scroll down in Connect. You should find modifiable general details about the device, as well as see technical details.



The Liquid Software Company

About the Agent

- Stealthy memory footprint:

  ~4MB of diskspace

  ~11MB of RAM

- Always on

  - Periodically checks with Connect servers

  - Every 15 seconds by default (in the trial version of Connect)

  - Period is changeable in **Settings**

  - Communicates client-side via port 443 (HTTPS) or 80 (HTTP)

  - Independent

The Liquid Software Company

Production Benefits

- Designed to support complex network environments
  https://docs.connect.jfrog.io/overview/architecture/agent
  - No Public IP
  - Behind double-nat
  - Under a firewall, cellular modem
  - Unstable wifi connection
- Register devices at scale
  https://docs.connect.jfrog.io/register/register-linux-devices-at-scale
  - Option A: Insert Connect service into a build of an image
  - Option B: Freeze image

The Liquid Software Company

OTA Updates

Create an Update Flow

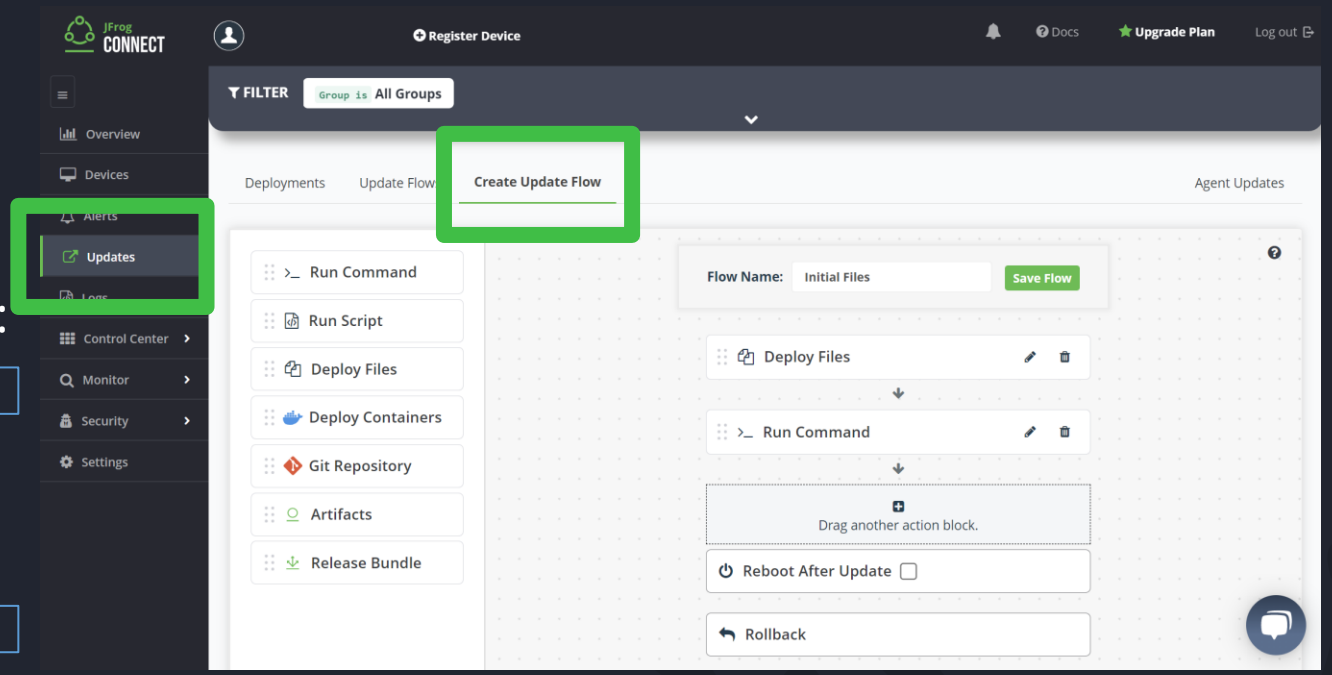
1. Navigate to **Updates** > **Create Update Flow**
2. Name the flow `Initial Files`
3. Drag the **Deploy Files** block into the flow and click the **pencil icon** to edit the block
   - Destination: /home/pi
   - Sample project files are available here:

```
git clone https://github.com/NickR2600/ConnectDemo01.git
```

Drag in the Run Command block and edit by adding this command:

```
runuser -l pi -c 'make && ls' > /dev/tty1
```

4. Click **Save Flow**
5. When asked about the General Rollback, select **Continue Anyway**



The Liquid Software Company

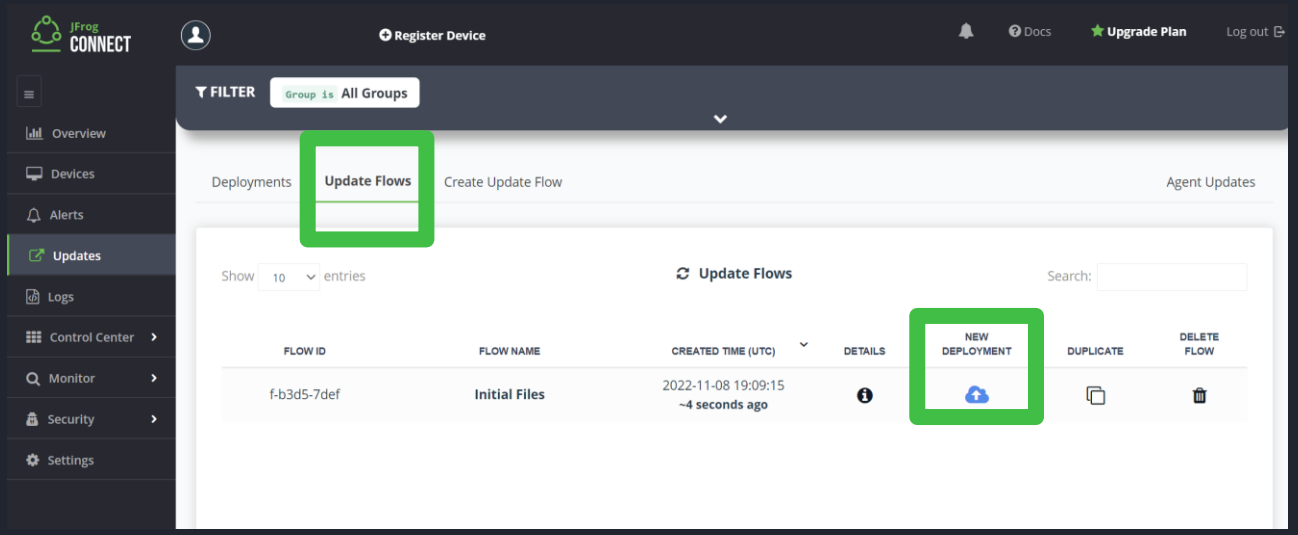
Deploy the Update Flow

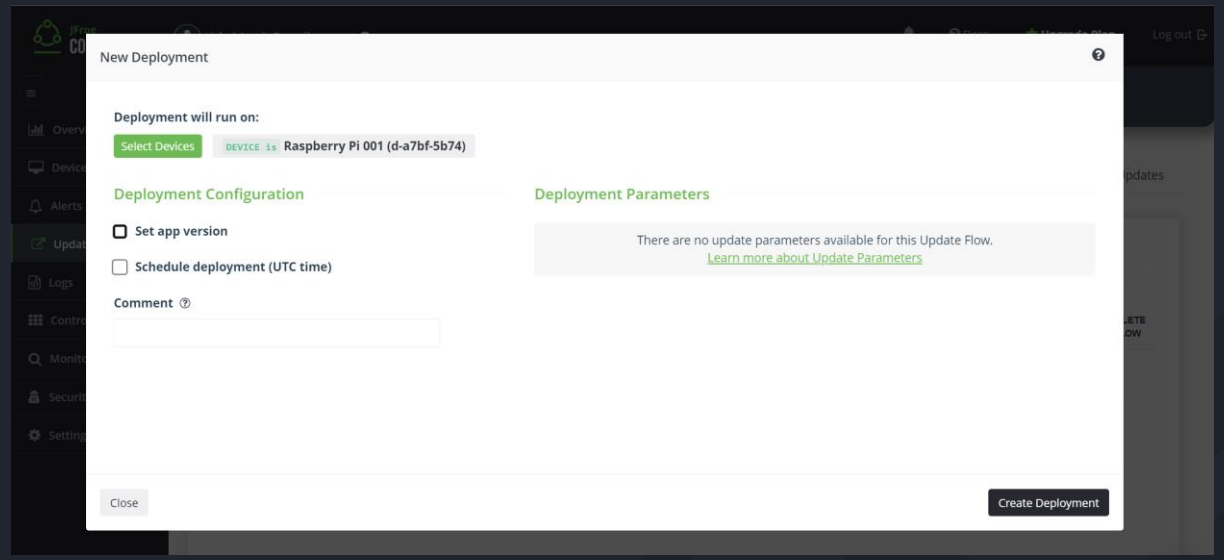
7. Navigate to **Updates** > **Update Flows**
8. Click the **New Deployment** cloud icon for the Initial Files update
9. Click the **Select Devices** button

   - Filter for, and select your specific device

   - Select **Apply**, **Next**, **Finish**

10. In this case, unselect **Set app version**
11. Click **Create Deployment** and run the deployment



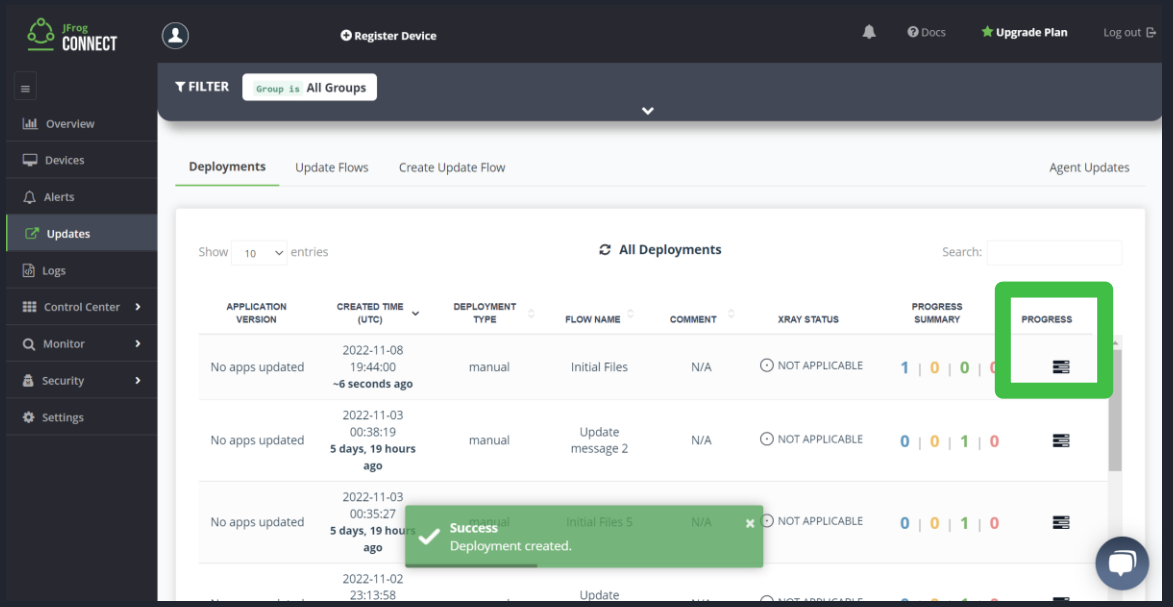


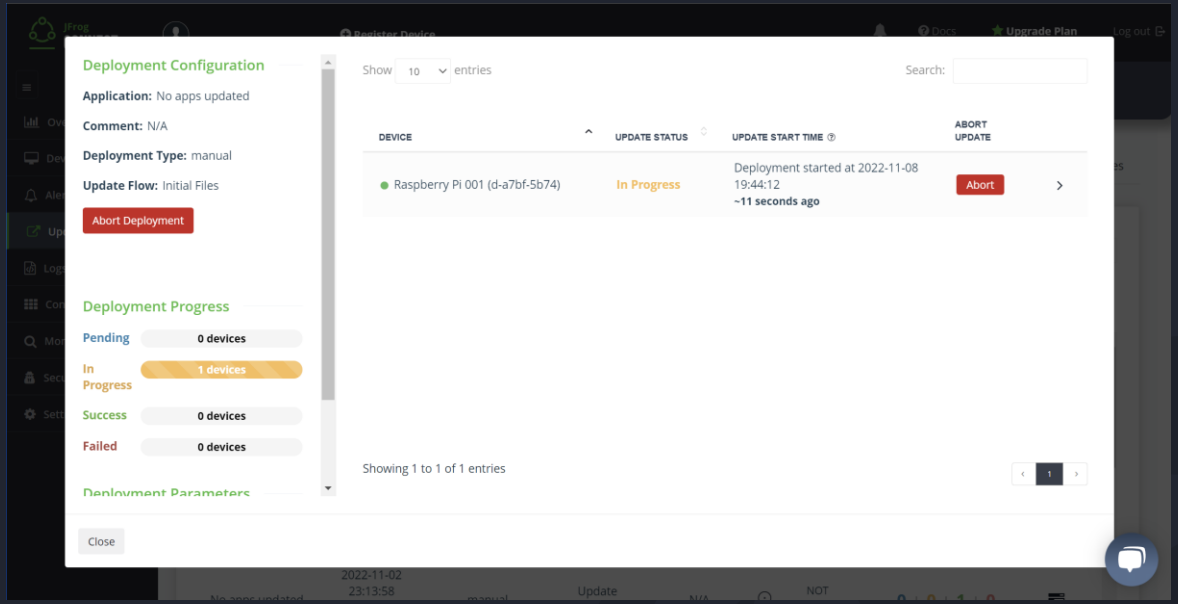
The Liquid Software Company

Observe the Update

12. Navigate to **Updates** > **Deployments**
13. For the update you just created, click the **progress** icon
14. Observe the progress in the dialog box and the monitor attached to your RPi
15. After the deployment succeeds, enter `./demo` on the keyboard connected to the RPi to run the program.

    - If you don't have a RPi, do this in a remote terminal for the device created by Connect





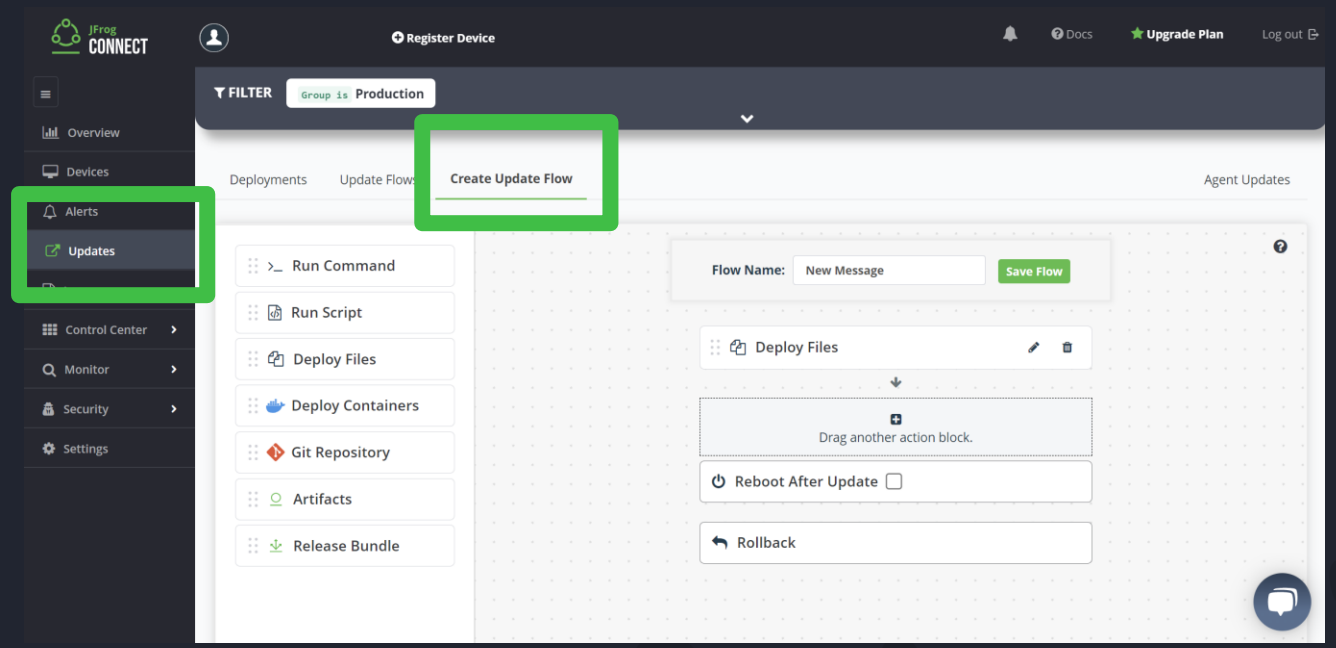
The Liquid Software Company

Notes about the Update

- Step 15 is necessary this time because this is a TTY program. Other programs, like those that drive a kiosk, can be started from step 4
- Other blocks exist to accommodate other actions, sources, and types:
  - Run a script
  - Deploy artifacts from Github
  - Deploy artifacts from Artifactory
  - Deploy a Docker Container
- Rollbacks prevent bad updates from bricking devices
  - Rollback to the previous stable state
  - Ability to specify actions when a particular step fail

Update the Message

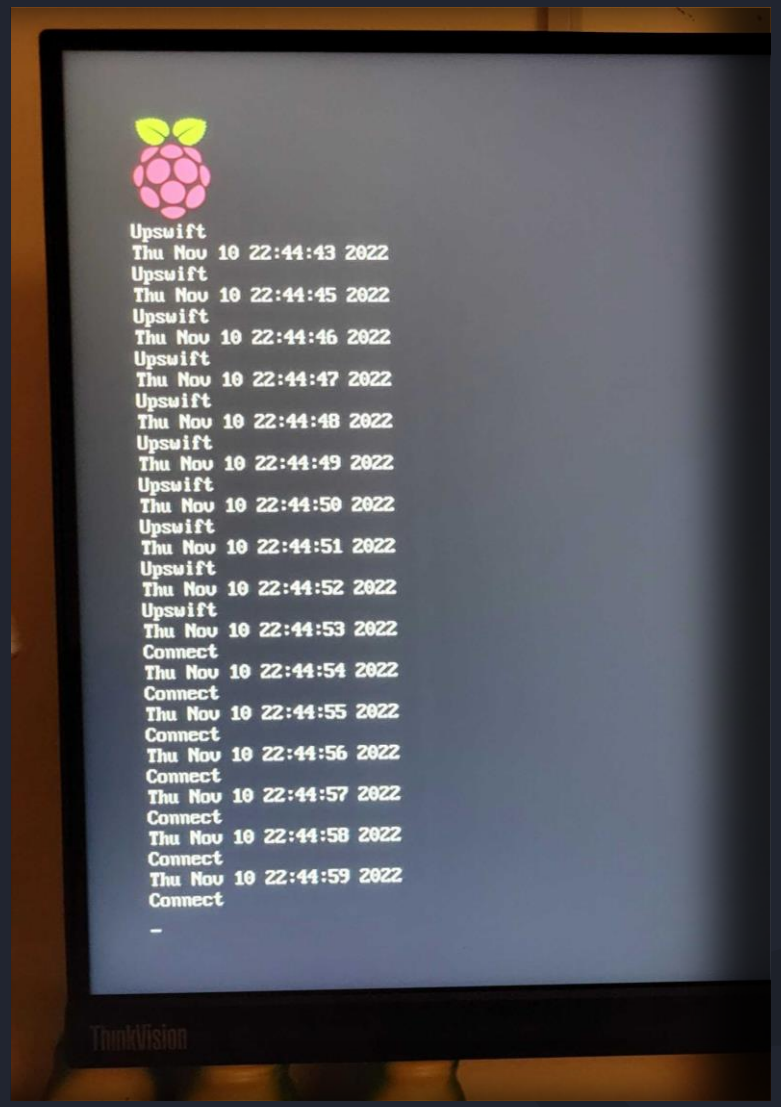
1. Ensure the program is still running on the RPi
2. Modify message.txt to read `Connect` instead of `Upswift`
3. Navigate to **Updates** > **Create Update Flow**
4. Name the flow `New Message`
5. Drag the **Deploy Files** block into the flow and click the **pencil icon** to edit the block
   - Destination: /home/pi
   - Specify the updated message.txt
6. Click **Save Flow**
7. When asked about the General Rollback, select **Continue Anyway**



The Liquid Software Company

Deploy the Update Flow

8. Navigate to **Updates** > **Update Flows**
9. Click the **New Deployment** cloud icon for the New Message update
10. Click the **Select Devices** button
    - Filter for, and select your specific device
    - Select **Apply**, **Next**, **Finish**
11. In this case, unselect **Set app version**
12. Click **Create Deployment** and run the deployment
13. Observe the new message in the running program!
    - If you don't have a RPi, open a remote terminal and observe the new output when you run `./demo` again



The Liquid Software Company

JFrog

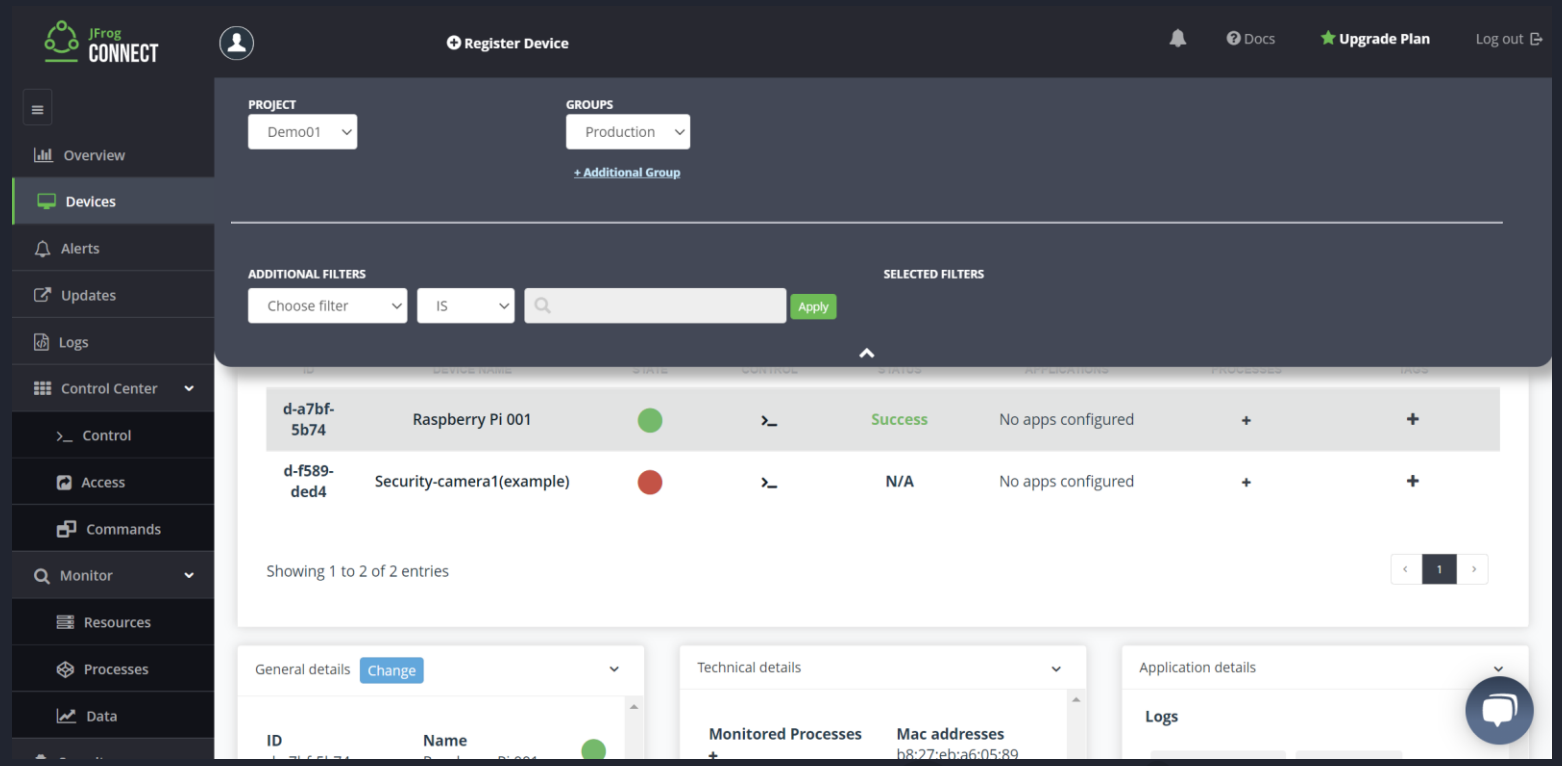
The Liquid Software Company

At Scale

Tips for Managing Devices at Scale

Filtering through devices:

- Use the **Filter Bar**
- Create groups
- Tag devices
- Create app/version numbers
  - When Deploying a Flow
  - In the Devices Tab



Recommendation:

- Get it right on one device before rolling out to entire fleet

The Liquid Software Company

Things You May Not Have Noticed

- C++ is platform-dependent

  - We generated a device-specific binary (the executable)

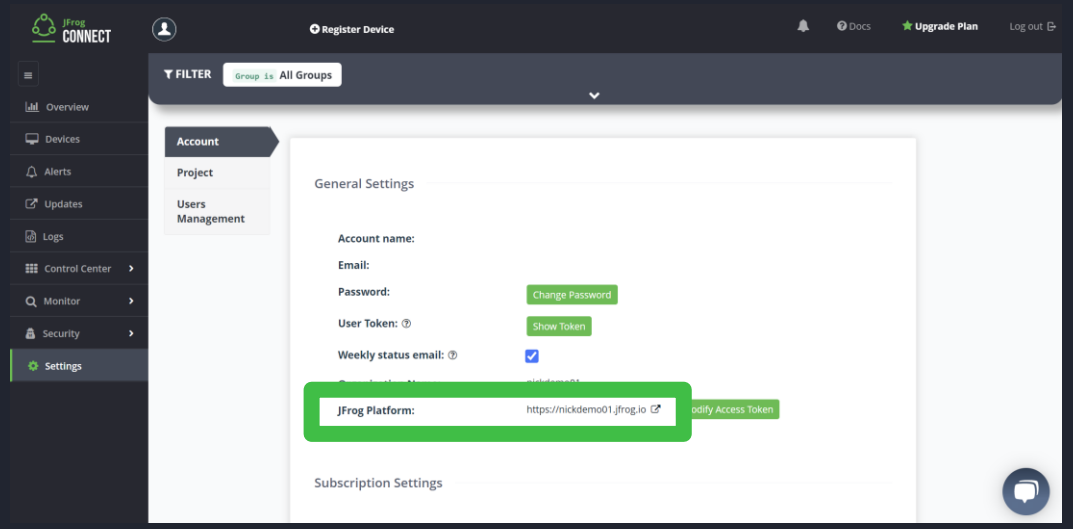
  - That binary and message.txt are all we need to push to devices

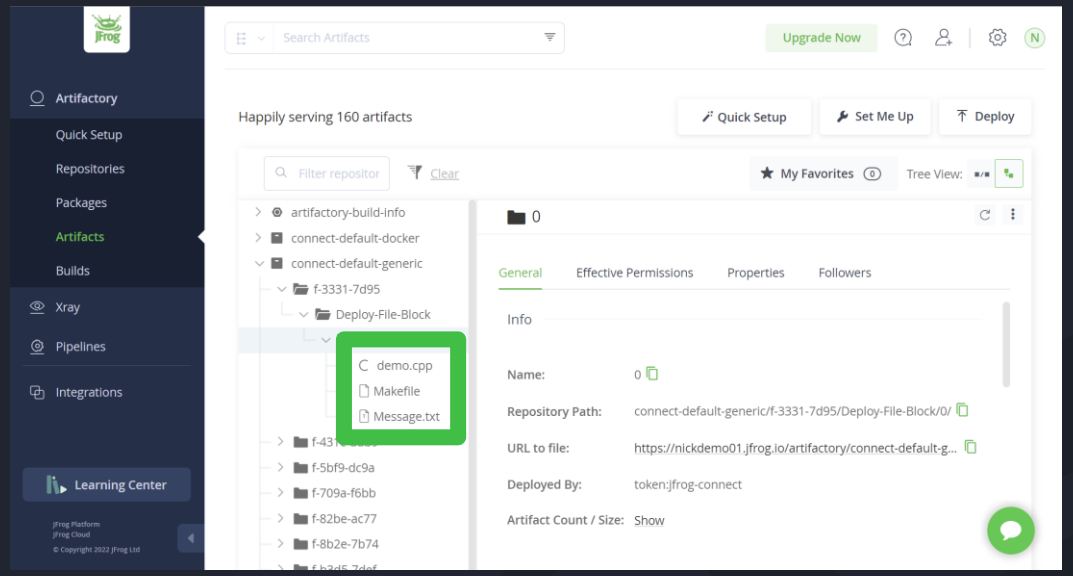
- A new Connect instance comes with a new instance of Artifactory

  - Files you upload via Connect are stored automatically in your Artifactory instance

  - Find your Artifactory/JFrog Platform instance under the Connect **Settings** tab

  - You can specify another Artifactory instance in the Artifacts block of Create Update Flow





The Liquid Software Company

The Liquid Software Company

Thank you!

Nick Ristuccia
Developer Advocate at JFrog

https://jfrog.com/connect/