Lesson 3

Objective

- Provide links to next steps you can take based on your goals

Agenda

1. Learn the cFS

2. Build and run the cFS details

3. Use the cFS GitHub app exchange

4. Write new apps

5. Control a remote target

6. Build Raspberry Pi projects

Space Steps Website

Space Steps https://spacesteps.com/ provides educational material covering space careers in general and also contains cFS specific material including Basecamp's hands-on projects
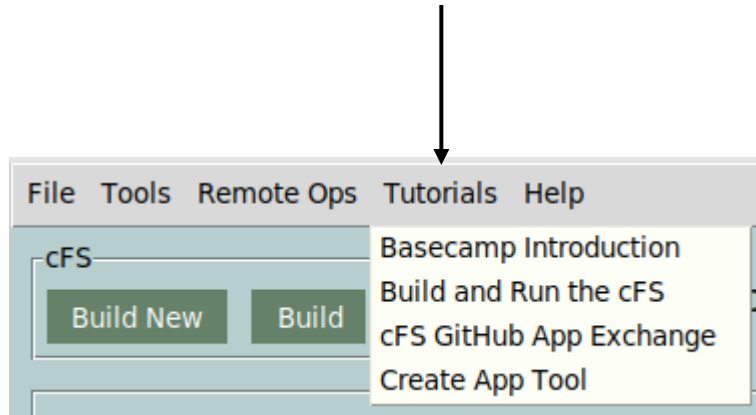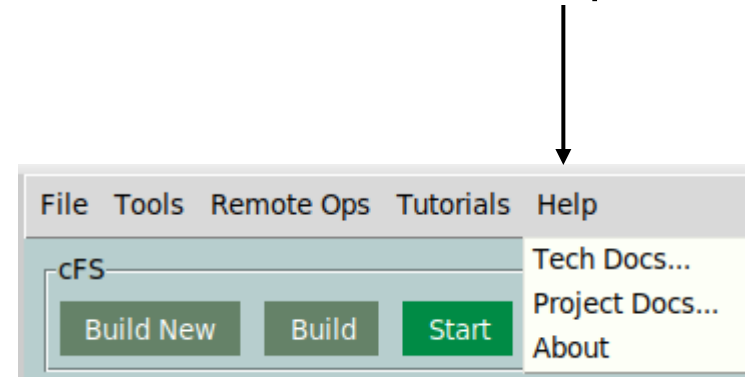
Learn the cFS

The *Tutorial* menu provides tutorials that guide users through topics with hand-on exercises and the *Help* menu provides access to reference documents.
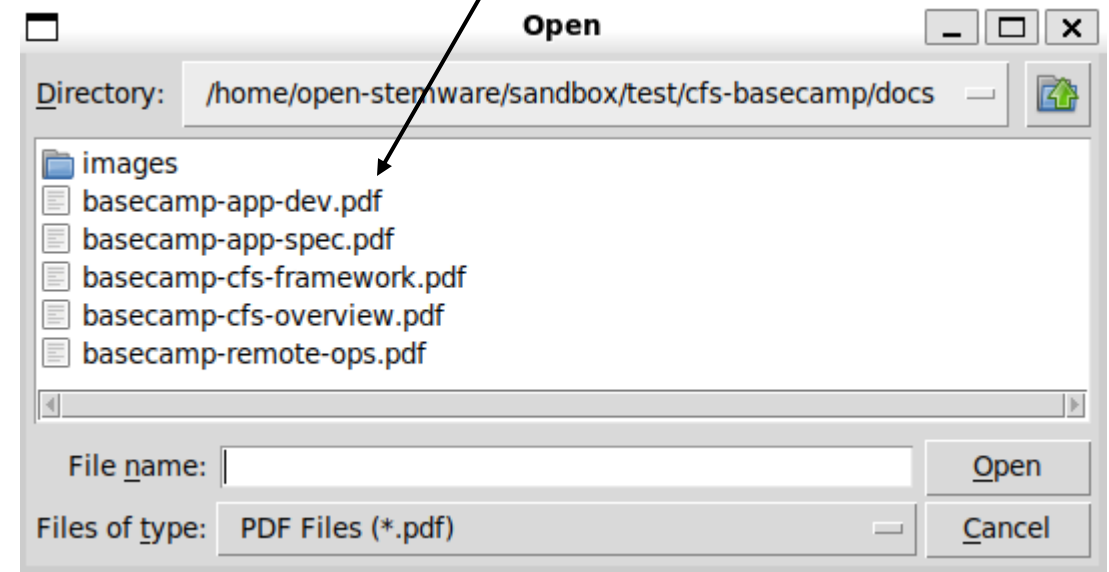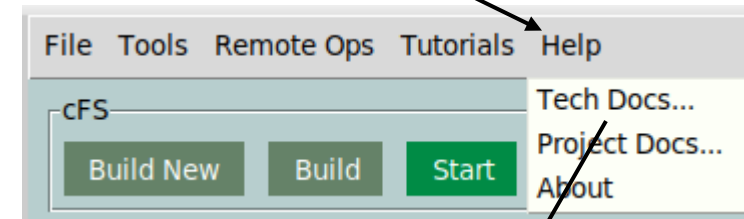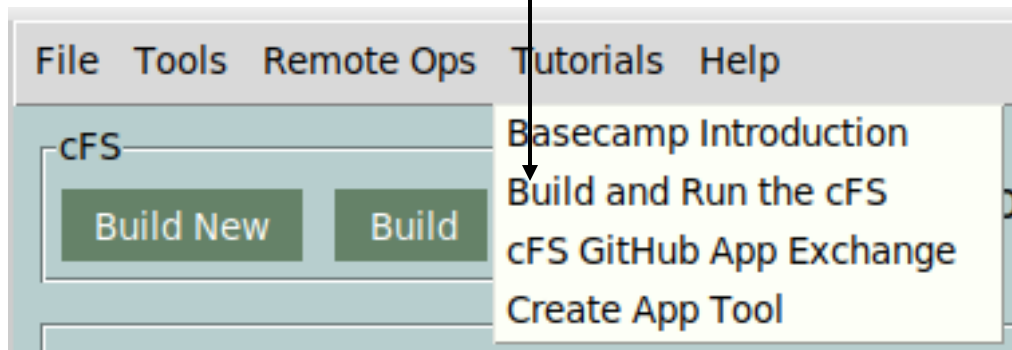
Tutorials
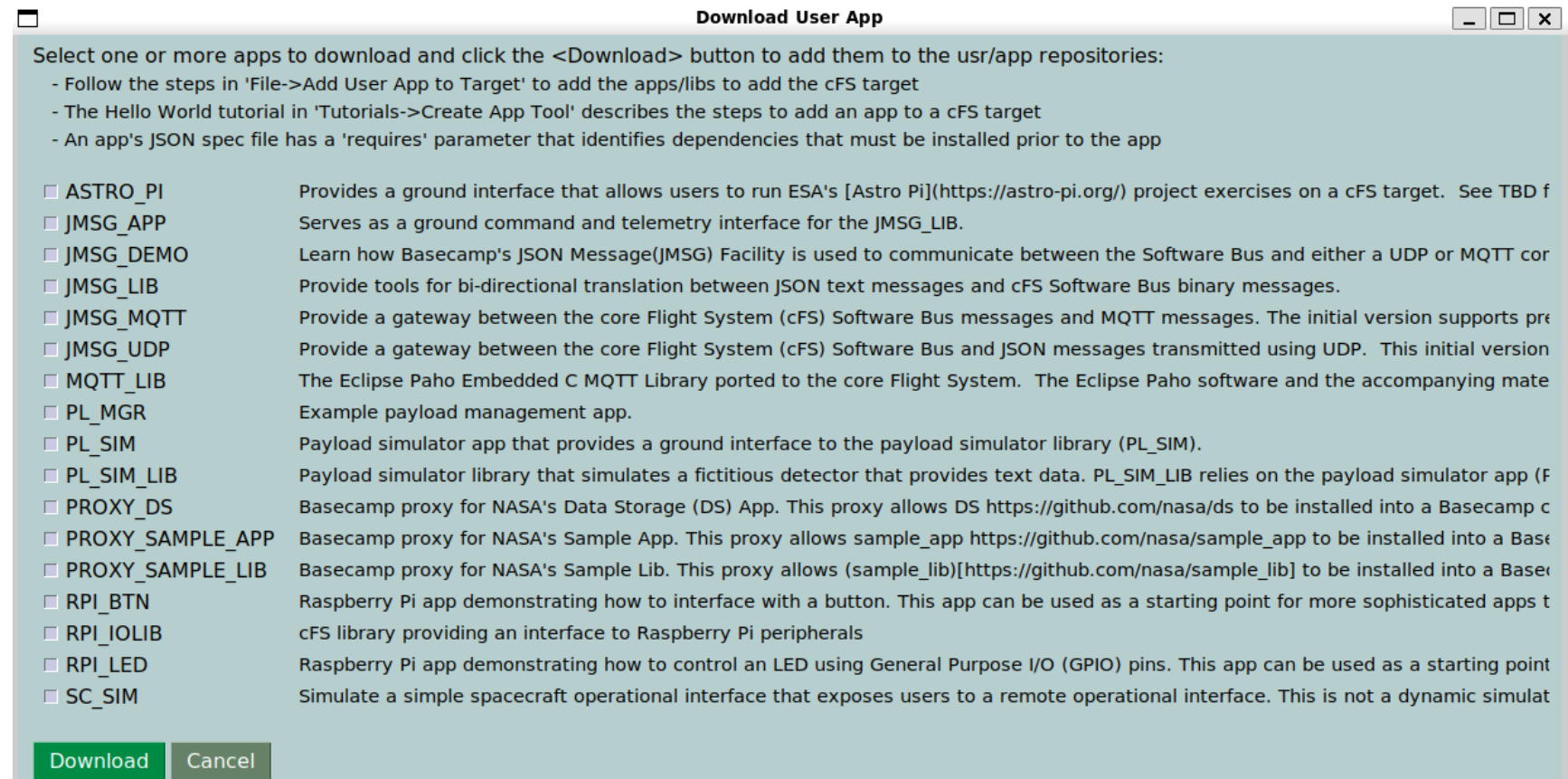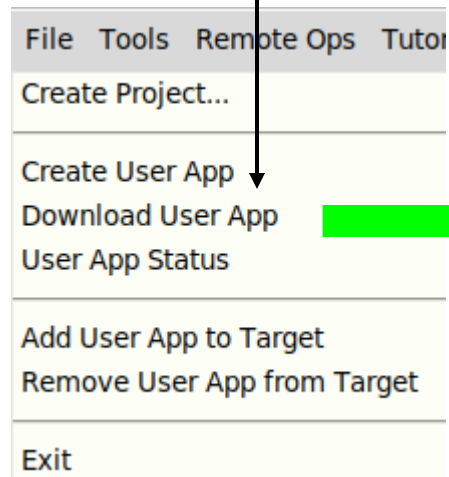
Help

Build and Run cFS Details

The *Build and Run the cFS* tutorial and the *App Dev Guide* (Technical Document) describe the details of building and running Basecamp's cFS target
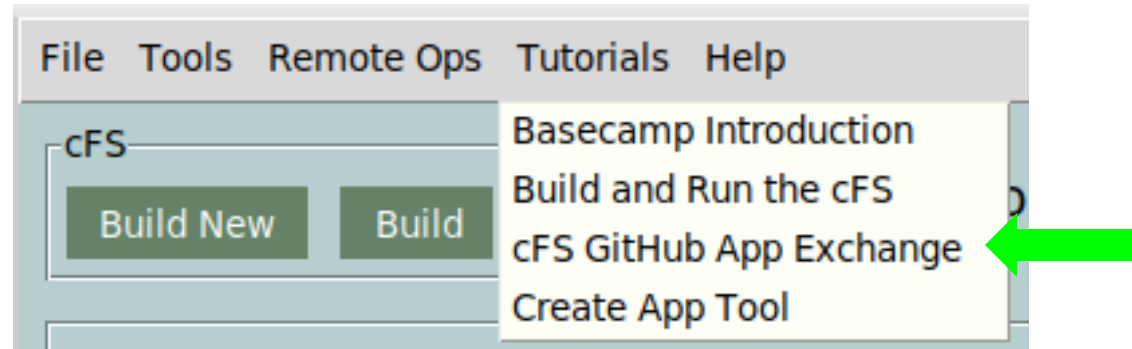
Use the cFS Github App Exchange (1 of 2)

The *File->Download User App launches the Download User* App tool that allows users to download apps from Basecamp's github cfs-app.
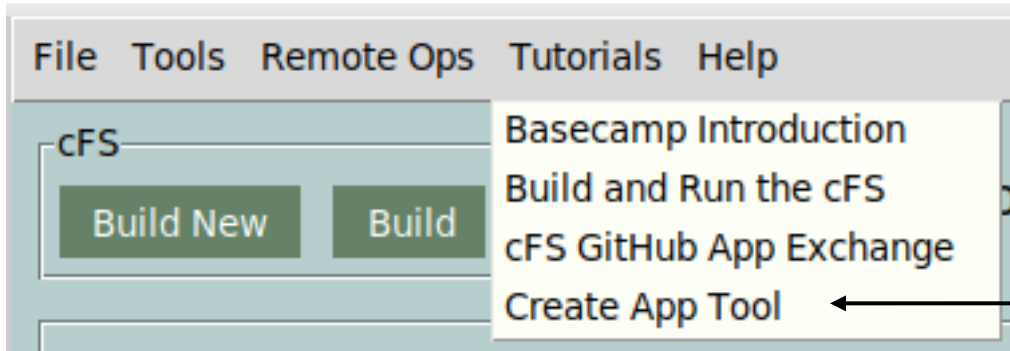
File Tools Remote Ops Tutor

Create Project...

Create User App
Download User App
User App Status

Add User App to Target
Remove User App from Target

Exit

Download User App

Select one or more apps to download and click the <Download> button to add them to the usr/app repositories:
  - Follow the steps in 'File->Add User App to Target' to add the apps/libs to add the cFS target
  - The Hello World tutorial in 'Tutorials->Create App Tool' describes the steps to add an app to a cFS target
  - An app's JSON spec file has a 'requires' parameter that identifies dependencies that must be installed prior to the app

☐ ASTRO_PI	Provides a ground interface that allows users to run ESA's [Astro Pi](https://astro-pi.org/) project exercises on a cFS target. See TBD f
☐ JMSG_APP	Serves as a ground command and telemetry interface for the JMSG_LIB.
☐ JMSG_DEMO	Learn how Basecamp's JSON Message(JMSG) Facility is used to communicate between the Software Bus and either a UDP or MQTT cor
☐ JMSG_LIB	Provide tools for bi-directional translation between JSON text messages and cFS Software Bus binary messages.
☐ JMSG_MQTT	Provide a gateway between the core Flight System (cFS) Software Bus messages and MQTT messages. The initial version supports pre
☐ JMSG_UDP	Provide a gateway between the core Flight System (cFS) Software Bus and JSON messages transmitted using UDP. This initial version
☐ MQTT_LIB	The Eclipse Paho Embedded C MQTT Library ported to the core Flight System. The Eclipse Paho software and the accompanying mate
☐ PL_MGR	Example payload management app.
☐ PL_SIM	Payload simulator app that provides a ground interface to the payload simulator library (PL_SIM).
☐ PL_SIM_LIB	Payload simulator library that simulates a fictitious detector that provides text data. PL_SIM_LIB relies on the payload simulator app (F
☐ PROXY_DS	Basecamp proxy for NASA's Data Storage (DS) App. This proxy allows DS https://github.com/nasa/ds to be installed into a Basecamp c
☐ PROXY_SAMPLE_APP	Basecamp proxy for NASA's Sample App. This proxy allows sample_app https://github.com/nasa/sample_app to be installed into a Base
☐ PROXY_SAMPLE_LIB	Basecamp proxy for NASA's Sample Lib. This proxy allows (sample_lib)[https://github.com/nasa/sample_lib] to be installed into a Base
☐ RPI_BTN	Raspberry Pi app demonstrating how to interface with a button. This app can be used as a starting point for more sophisticated apps t
☐ RPI_IOLIB	cFS library providing an interface to Raspberry Pi peripherals
☐ RPI_LED	Raspberry Pi app demonstrating how to control an LED using General Purpose I/O (GPIO) pins. This app can be used as a starting point
☐ SC_SIM	Simulate a simple spacecraft operational interface that exposes users to a remote operational interface. This is not a dynamic simulat

Download Cancel

Use the cFS Github App Exchange

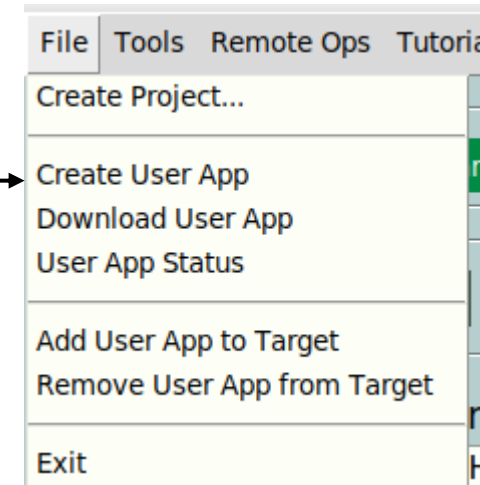The *cFS GitHub App Exchange* tutorial explains how to download and integrate apps into your cFS target.
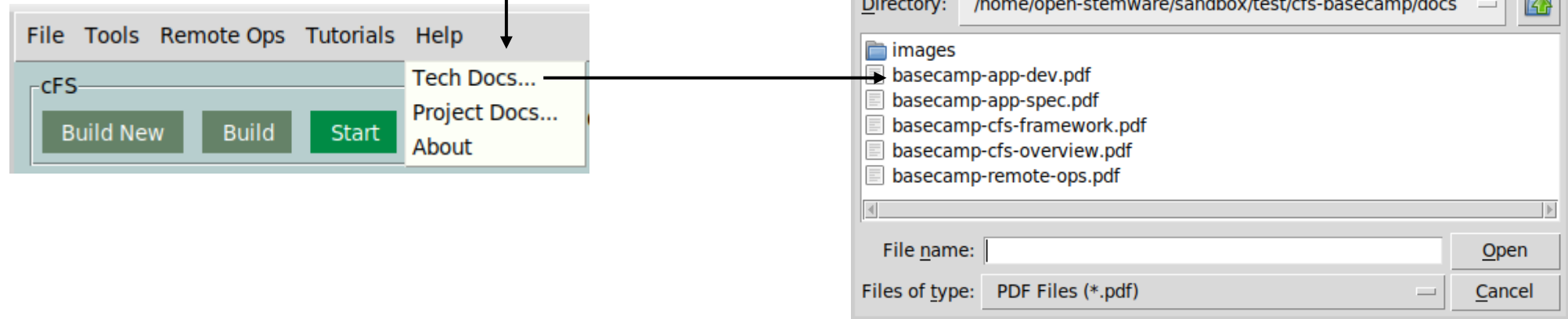
Write New Apps

The *Create App Tool* tutorial teaches you what the tool can do for you and how to use it

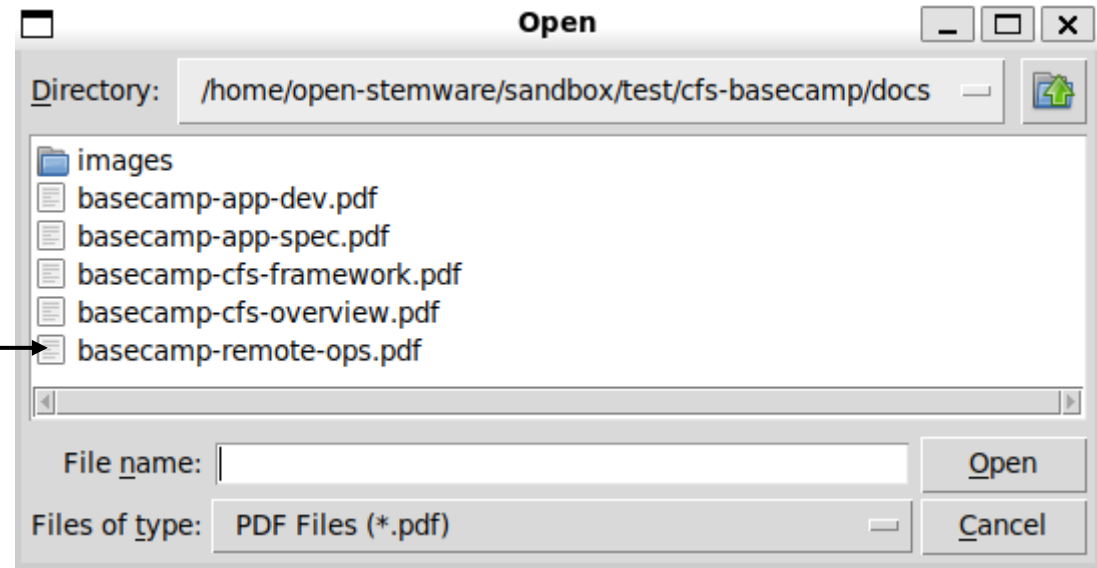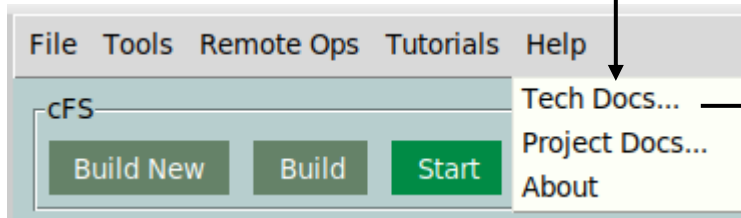*File->Create User App* launches the *Create App Tool* that presents you with a menu of apps that you can create.

Write New Apps

the *App Dev Guide* (Technical Document) provides
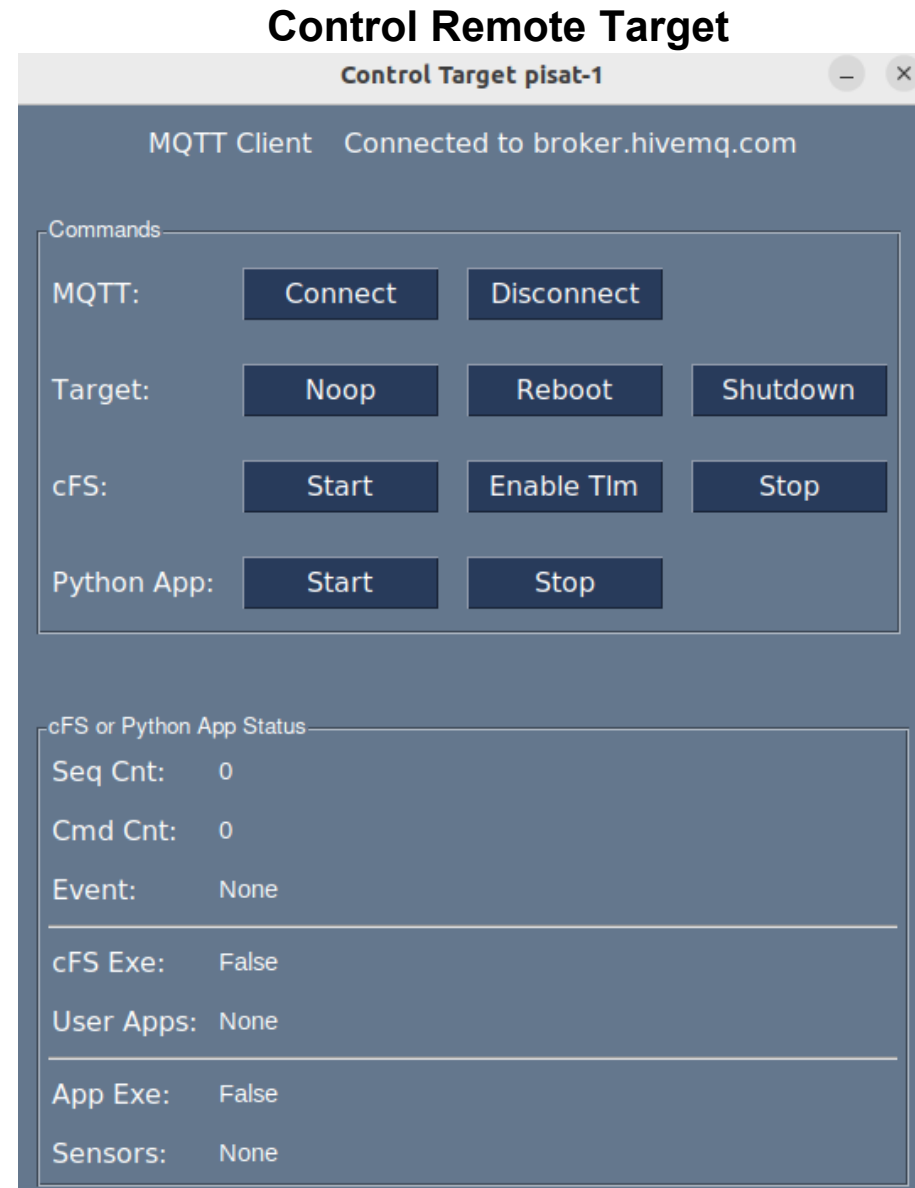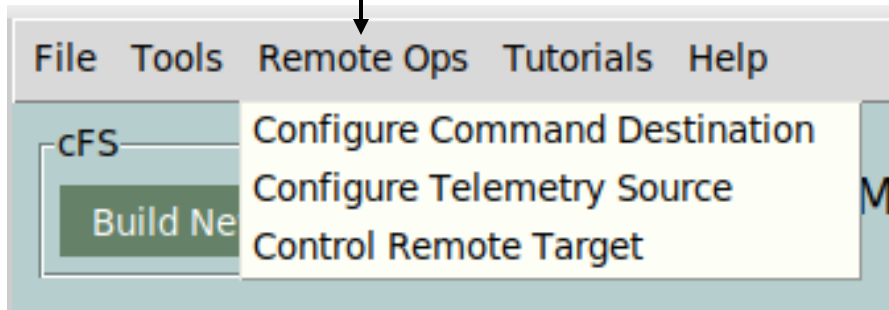in depth material for writing apps

Control a Remote Target (1 of 2)

The *Remote Operations Guide* describes how to configure and control a remote target from the Basecamp GUI
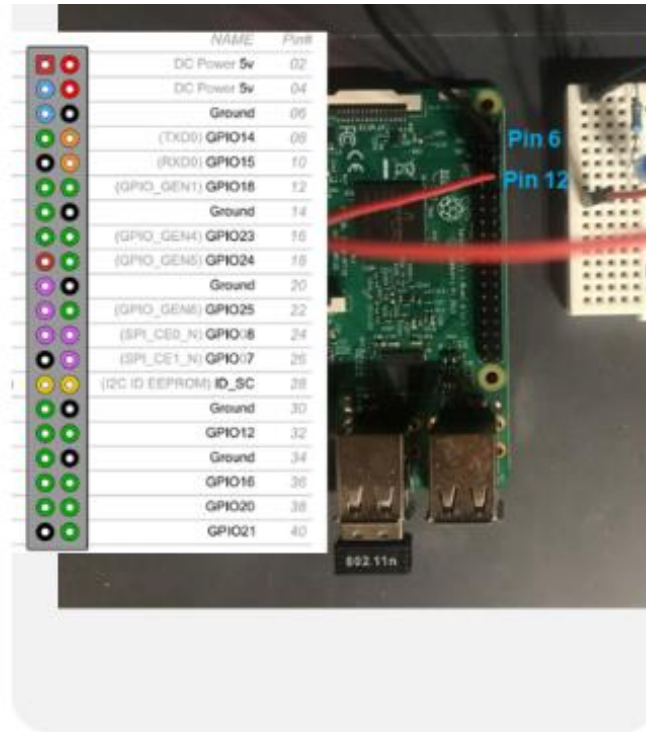
Control a Remote Target (2 of 2)

The *Remote Ops* menu provides tools to configure & control remote target interfaces

Control Remote Target

cFS-Based Projects

- Search for "projects" on the Space Steps https://spacesteps.com/ website to get a list of available projects

- These projects use Basecamp's App Exchange so users can easily create new cFS targets for the project

cFS Raspberry Pi LED Control

Oct 12, 2024 — by Dave McComas in Projects

In this project you will connect an LED to a Raspberry Pi's General-Purpose Input/Output (GPIO) header and control the LED using a cFS app. It helps cFS developers gain experience with using a library and an app to interface and control an external hardware component using low-cost materials.

cFS Payload Manager App

Oct 12, 2024 — by Dave McComas in Projects

This project helps answer the common cFS question, "How should I design a cFS app to manage a science payload?" There are multiple approaches towards solving this problem. This project is not intended to provide a survey of designs, rather it shows a specific design that you can evaluate within the context of your situation.