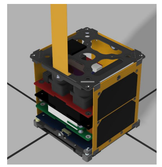
BeaverCube Software Architecture



Introduction to NASA cFS

- The NASA Core Flight System (cFS) is a set of mission independent, reusable, core flight software services, applications, and operating environment.
- Using a layered architecture, it can support a variety of hardware platforms.
- cFS has flight heritage and has flown since 2005..

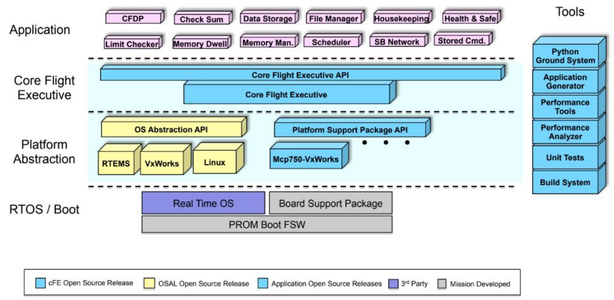


Photo credit: David McComas, NASA Goddard Spaceflight Center

cFS Architecture

- cFS consists of multiple abstraction layers.
- The system architecture contains tools including an application generator script and a ground system that allows for a graphical user interface to send commands between the ground and spacecraft.

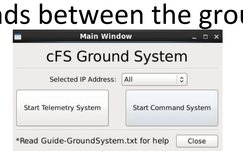
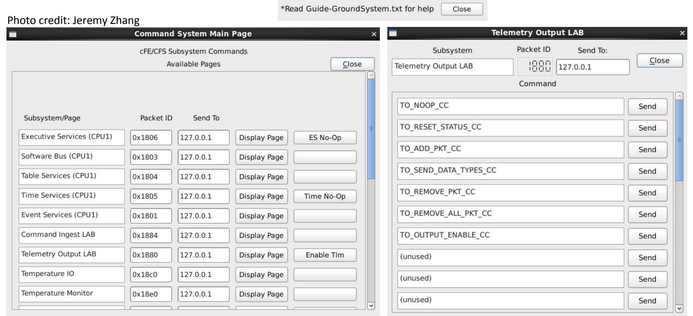


Photo credit: Jeremy Zhang



BeaverCube cFS Apps

- BeaverCube uses a unique suite of apps to fully carry out its mission and ensure spacecraft health.
- This unique suite of apps consists of a combination of apps written by NASA Goddard and original apps designed specifically for the mission.

System Block Diagram

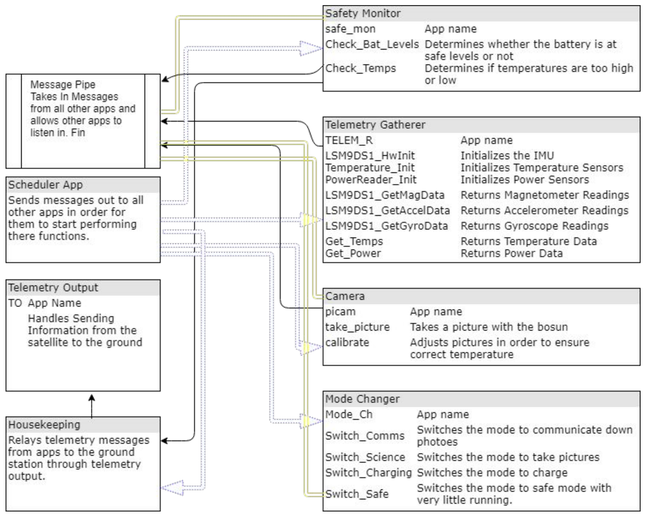


Photo credit: Austin Cosby, Jeremy Zhang

Camera App

- The camera app interfaces with the camera to perform camera calibration and take pictures.

Photo credit: FLIR systems

Telemetry Reader App

- The telemetry reader app receives scheduled commands from the event scheduler to read telemetry from sensors, such as the LSM9DS1 IMU.
- These telemetry points include magnetometer, accelerometer, and gyroscopic data in the X, Y, and Z axes.
- Data collected by the telemetry reader app is used to monitor spacecraft health and determine spacecraft attitude.
- Telemetry gathered by this app is sent to the ground every 45 minutes.

Photo credit: Digikey

Safety Monitor App

- The safety monitor app monitors critical telemetry onboard the spacecraft.
- Safe threshold values can be pre-set on the ground or updated on orbit via commands from the ground station.

Mode Changer App

- The mode changer app changes the current operating mode onboard the spacecraft.
- Commands to change the mode can be sent from a ground station or automatically onboard the spacecraft.

Board created by: Jeremy Zhang & Austin Cosby