NEW

Perihelion OS Lite Cubesat Operating System

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Quick Overview

Perihelion OS is based on the Linux kernel and the Debian distribution, chosen as the base for Perihelion due to their wide-ranging popularity and stability. It is designed to be highly portable between various manufacturers and existing commercial single-board computers. The system is trifurcated into the OS abstraction layer, a Core Flight Executive (cFE) derivation, and a custom built application layer.

DETAILS TAGS

The Lite (free) version of our Perihelion OS Cubesat Operating System. This is a full disk image in .img format ready to mount and burn.

Perihelion OS is based on the Linux kernel and the Debian distribution, chosen as the base for **Perihelion OS** due to its wide adoption in aerospace, stability, extensibility and security. It is designed to be highly portable between various manufacturers and existing commercial single-board computers. The system is trifurcated into the OS abstraction layer, a Core Flight Executive (cFE) derivation, and a custom built application layer. As NASA's CFS system is designed to be platform agnostic, work is on-going to further integrate it into the Linux system e.g. usage of native logging services. For (soft) real-time support, the PREMPT-RT system is employed to provide real-time services; however, usage of hardware based real-time support such as a PRU is still recommended for hard real-time demands.

The nature of satellite missions means security is a top priority. Many default services requiring networking are disabled out-of-the-box for the 0.0.1 release, so as to create a "whitelist applications only" security scenario. Unlike the Lite version, the default **Perihelion OS** installation would require applications installed from the Perihelion Store to be signed to further protect against malicious code. The usage of security patches such as Grsecurity is also currently under evaluation. As satellite systems are highly resource-constrained, conventional techniques such as usage of container-based sandboxing has been passed over in favor of a more user-centric approach.

The system provides a number of advantages to competing Cubesat operations systems, including:

- Common standards and tools across current NASA missions through Core Flight System integration
- Strong component layering (implementation of standard APIs) allows portable development with greatly reduced complexity
- Open application layer and ecosystem with full component level support by Aphelion hardware
- Developed based on high quality, flight-tested software with proven reliability
- Long term software support from Aphelion with the purchase on any hardware

Perihelion OS lays at the foundation of our vision for space access. We want to make building a satellite modular, simple, and integrated. This is why we are building the first integrated hardware and software platform for spacecraft.

The development of orbital flight hardware and software systems is a highly difficult task. Building a satellite requires a large intersectional body of knowledge, ranging from low-level software development to communication protocols to mechanical engineering. There is no reason that modular software cannot keep up with standardized, commercial-off-the-shelf hardware that is available to Cubesat mission planners today.

At Aphelion, we aim to streamline development for space applications. We bring together state-of-the-art flight control systems with reliable, flight-tested open source software to create the next generation of flight software systems. Based on a customized Linux kernel with real-time modifications and NASA'S Core Flight System, we have created an easy to use, dependable operating system that can be run across multiple computing platforms. With a custom integrated development environment and a software development kit (SDK), users simply create their satellite in a unified IDE. Our app store-style Perihelion OS package repository allows the easy sharing of applications and drag-and-drop software expansion that closely integrates with actual hardware. Imagine being able to test out your latest applications and ideas by uploading it onto the repository and allow someone with a satellite to test it out with a couple of clicks. Or to share the next generation of telemetry system based on your new revolutionary algorithm. Or import the new, energy efficient attitude control library for use with you ADCS board. With **Perihelion OS** this is now possible. Welcome to the future of space applications.

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