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YAMCS AND EUROSIM FOR THE DREAM CHASER CRS2 MISSION SIMULATION

Abstract

This presentation aims to share with the Yamcs community the recent achievement and capabilities improvement in terms of AIT (Assembly Integration and Test) and mission simulations. The case of the deployment for the Dream Chaser CRS2 mission simulator is taken as an illustration.

Originally, Yamcs (which stands for "Yet Another Mission Control System") was designed to complement the standard Mission Control System (MCS) at B.USOC for International Space Station (ISS) operations. Over the years an open source tool suite has been gradually added to offer a complete end-to-end Mission Control System solution. It remained loyal to its core values of being lightweight, scalable, reliable and open source.

Yamcs has been used in a variety of missions in Low Earth Orbit including the operations of a variety of ISS payloads and the monitoring of the European Robotic Arm.

In order to support complex AIT activities and mission simulations Yamcs has been integrated with the Eurosim simulator. The Dream Chaser mission simulator is built on this architecture. A number of enhancements and new features have been implemented in Yamcs. An area of improvement has been on the performance of the Yamcs data archive to allow the ingestion and processing of telemetry of high data rates. The architecture, advantages and performance measurements of the new parameter archive back-filler are described in this article. Additionally a key enhancement for Yamcs for AIT activities is the control of test support equipment via the SCPI protocol. This new capability allows to fully automate a test sequence with hardware in the loop, controlling both hardware under test via the control of power supplies and other equipment and then simulation execution. The integration with Eurosim allows Yamcs to control the simulation models via the reading and manipulation of internal variables of the simulation. Telemetry and telecommands of the spacecraft under test are handled by classic Yamcs monitoring and control functionalities. Simulation sessions are automated and orchestrated via a collection of python scripts or structured procedures such as SPELL procedures and are interfaced via the Yamcs API. The simulation capabilities allow to drive simulations, from validation of the flight software with software models in the loop, validation of flight computers with integration of hardware in the loop, mission simulations and operators training.