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NASA AMMOS MULTI-CENTER OPEN-SOURCE MISSION CONTROL COLLABORATION

Abstract

The National Aeronautics and Space Administration (NASA) Science Mission Directorate (SMD) sponsors the Advanced Multi-Mission Operations System (AMMOS), which is a set of tools and services that provide reliable, reusable, and repeatable space operation capabilities to as many NASA missions as possible. AMMOS supports NASA's goal of achieving greater science at lower costs. To that end, the NASA Jet Propulsion Laboratory's (JPL) Multimission Ground Systems and Services (MGSS) Program, which manages AMMOS, aims to achieve wider adoption of AMMOS across the different NASA centers and partners in order to achieve better economy of scale for NASA.

Mission control software in space operations ground systems is one area in which MGSS intends to establish a better agency-wide presence for AMMOS. Presently, the different NASA centers and partners each use their own, unique mission control solutions: JPL uses the AMMOS Mission Data Processing and Control System (AMPCS), NASA Goddard Space Flight Center (GSFC) uses the Integrated Test and Operations System (ITOS) and the Advanced Spacecraft Integration and System Test (ASIST), Johns Hopkins University Applied Physics Laboratory (APL) uses L3Harris' InControl, and NASA Ames Research Center's recent Volatiles Investigating Polar Exploration Rover (VIPER) mission uses the Yet Another Mission Control System (YAMCS). Each center and partner implementing, maintaining, and continuously investing in their own mission control solution when much of the functionalities overlap ultimately results in inefficient use of resources. In early 2023, MGSS Program kicked off a much-needed inter-center (and partner) collaborative effort between JPL, GSFC, APL, and Ames, called the Multi-Center Open-Source Mission Control (MCOSMC) Collaboration, to study the current open source mission control software space and determine if there is an ideal solution that can satisfy the operational concepts and requirements of the four different space operation centers and their future missions.

This paper will share the approach of this trade study, its findings, and the conclusions of MCOSMC. The information can potentially benefit other space organizations endeavoring to establish a new or updated mission control solution for their own space operations ground systems, and serve as lessons learned for future inter-center and -partner collaboration within NASA.