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A HYBRID APPROACH TO REAL-TIME SPACECRAFT OPERATIONS IN THE GROUND SEGMENT

Abstract

Abstract: Information technology solutions, in the ground segment portion of spacecraft operations, are typically based around very basic reliable architectures. Physical network infrastructure, physical workstations, traditional data centers and isolated wide area networking to radio infrastructure. Mission Operations Centers staff and flight directors are reluctant to change historical approaches due to their proven reliability and heritage. In this paper we will examine a hybrid approach combining on premise and cloud infrastructures where and when appropriate. We examine performance, cost, management, organizational agility, and security. This paper will identify pros and cons to the various solutions as well as challenges and successes based on implementations at the Laboratory for Atmospheric Space Physics. We will narrow our discussion to solutions involving the critical link between commanding infrastructure and ground station radio infrastructure as implemented for the Emirates Mars Mission using the NASA JPL Deep Space Network and Amazon Web Services cloud.