

A Real-Time Analytics Approach To System Testing

Applying industry big data techniques to building science satellites

The Problem

- One-off satellite **integration and test** efforts can last for years and require marching armies of cross-discipline scientists and engineers to complete.
- During this time, two questions are answered: does the satellite **function** as needed, does the satellite **perform** as needed.
 - **Massive amounts of data** are collected: telemetry, metrics, engineering, and science, in order to answer the above questions.

A Current Approach

- A ground system is selected to operate the satellite and orchestrate ground tests. It sends commands (**control**), stores and displays telemetry (**status**), processes binary telemetry into engineering units (**converts**), flags out-of-bounds conditions (**alerts**).
- Functional requirements are tested in real-time through **pass/fail test scripts** executed by the ground system. Performance requirements are verified offline through batch data retrieval and **post-processing**, typically executed by desktop applications like Python, MATLAB, and Excel.

Limitations of Current Approach

- Offline data processing informs **after the fact decision making**
- User desktop applications **do not scale** for processing larger data sets
- Data inquiries become **a limited resource**

A New Approach

Build a real-time science data processing infrastructure that allows science data performance analysis to occur alongside functional pass/fail testing. This will not just change how testing is done, but what types of tests are even possible.