DTS-E2E ICD

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Purpose

This document specifies interfaces and requirements for the Data Transport System (DTS) to interact with the NOAO End to End Science Archive System (hereafter in this document the "E2E SYSTEM". The purpose of this document is to serve as a guide to designers, developers and testers who are responsible for incorporating the DTS within the current E2E SYSTEM. Specifically, it addresses the interfaces between the DTS and existing E2E SYSTEM components internal to NOAO.

Scope

This document contains a complete description of the interfaces between the current E2E system and the DTS as it relates to Dark Energy Camera (DECam) data only. It describes the communication (inputs and outputs) and monitoring requirements between the DTS and E2E system as it relates to DECam data transport and ingest onto the NOAO data stores and searchable Archive.

This document will not discuss the data content and format requirements which have been addressed in "DECam Community Pipeline - E2E Interface Control Document" (DCP-E2E-ICD) [1].

Overview

The current NOAO E2EV16 system:

The current NOAO E2E system as of Version 1.6 (hearafter in this document referred to as E2EV16) is a collection of physical systems and distributed services that collect, store and move astronomical data between NOAO data sources (mountain tops, pipelines) and data stores (physical and logical). Both data sources and stores are geographically distributed. Data enter the system through Save-the-Bits (iSTB) either at the mountain caches or pipeline caches in Tucson. iSTB relies on the BSD UNIX line printer daemon (lpd) to provide queued network data transfers from instruments in the various NOAO and affiliated telescopes and pipelines located in Tucson. iSTB adds some additional keywords to the FITS headers to insure that data origin and ownership are recorded in the raw (source) data FITS headers. Once this metadata has been added, iSTB passes the file to the Integrated Data Cache Initiative (iDCI). The iDCI ingests metadata about each file (filesize, md5sum and physical location) into a local database. The data are then copied to 2 data centers (La Serena, Chile and Tucson, Arizona) and one tape copy at the National Center for Supercomputing Applications (NCSA) in Urbana, Illinois. The iDCI is a Perl wrapper around iRODS [2] icommands and is used for transport and file repository management in La Serena and Tucson, and off-site storage at

NCSA. iSTB and iDCI together provide a fully automated data transport and file repository management system.

Incorporating the DTS within the NOAO E2EV16 system:

The DTS as described in the DECam DES/SISPI ICD [3], was designed to handle interfaces to the E2E system and external projects. The DTS as described in [3] is primarily a delivery mechanism for DES components that receive and transport data from the DECam instrument. This 'initial focus' is described in the SDM Program Plan 2009 [4]:

"*The initial focus will be for use with the DECam instrument data transfers, both for the Dark Energy Survey (DES) and DECam Community data. The expected data volume and constraints on timely delivery require the implementation of a replacement for the current DTS system to make better use of the available bandwidth. Later phases of the project have the potential to replace the existing DTS used in other aspects of the SDM E2E system.*"

The '*current DTS*' is referring to the transport portion of the current E2EV16 system. The DTS as described in [3] cannot easily be 'dropped into' the current E2EV16 system for the following reasons:

1. The DTS is a collection of tasks designed primarily to provide fast efficient data transport and monitoring. The transport method in E2EV16 is a simple iRODS [2] 'iget'.

2. The DTS messaging system is based on XML-RPC. The E2EV16 message system based on the TCP server daemon.

3. With the DTS *queued* transport, data are placed in a named data queue that defines the route of the data through the DTS system, files are delivered to each of the sites in the named queue that are "*downstream*" of the DTS submission site only (i.e. the data flows in one direction). The E2EV16 uses two queues to accomplish the "downstream" delivery of data:

    a. Data are queued for transport from the instrument to the iSTB cache using LPR;

    b. Data are queued for transport from the iSTB cache the nearest NOAO data center cache using a perl wrapper around iRODS (*iget*).

4. The DTS queued transport allows multi-site delivery in one queue. The E2EV16 uses a Point2Point (P2P) messaging system, each message has only one consumer.

5. The DTS definition of PUSH and PULL is different than E2EV16. In E2EV16 all data are PULLED from the source host to a destination host.

6. The iDCI is a collection of Perl wrapper scripts around IRODS icommands. The current E2EV16 does most of what the DTS proposes and more:

a. manages the physical resources at each E2EV16 cache;

b. provides a virtual file system for API to interface to the physical data store;

c. provides parallel and threaded data transport for efficiency;

d. bundles small files into larger tar files to optimize transfer;

e. insures data integrity by monitoring data flow and reports missing or corrupted files downstream from the original source.

f. post file transfer rates to a central web site for Operations monitoring.

To fully incorporate the DTS into the current E2E as deployed in E2EV16 would take a major re-write of the iDCI or perhaps a new design altogether.

Proposed hybrid system for E2EV17:

The DTS is scheduled to be used by the E2EV17 system for delivery of DECam data, both DES and Community source (raw) data. Source data from other NOAO instruments will continue to use the existing mechanism found in the current E2EV16 system. A diagram of this hybrid system is shown in Figure 1 DTS-E2E Data Flow