Prototyping and Test of the Single-Phase protoDUNE Buffer Farm

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Abstract

The requirements for a XRootD-based data buffer between the single-phase protoDUNE detector DAQ and central CERN computing are given. Plans are made to create a data source emulator equivalent to the protoDUNE DAQ, and also emulate several elements of the CERN computing environment in order to prototype the raw data management system for protoDUNE. This work shall be done at Brookhaven National Lab. A proposal for a system design to be built at CERN is presented. Finally, a functional test of the Fermilab File Transfer System is described within the context of the protoDUNE raw data management.

Contents

1 Overview

1.1 Under Construction!

We will fill in this document as we do the work. Right now it is just an outline.

1.2 the protoDUNE program

The description of the protoDUNE experimental program can be found in (provide quotes).

2 Requirements and Assumptions

This section will give:

- data rates based on the data taking "scenarios" spread sheet
- CERN requirements (eg, 3 days buffer)
- assumptions about various bandwidths (eg network and disk)
- ...

3 DAQ and Environment Model

We will develop a simple, functionally equivalent emulation for the SP DAQ data source and implement a model of the network environment from DAQ to EOS.

4 Results

We will look at:

- scaling as a function of number of concurrent writes
- forced different bottlenecks at NIC and disk.
- effect of simultaneous reads/writes to same box, bus, disk.
- ...

This test will be done at BNL, probably on existing RACF LBNE nodes. For it we have identified 3 interactive nodes and 7 pure-batch nodes with an existing round-robin XRootD installation.

5 Design

Based on results this section will provide

- design for hardware (number of nodes, disk speeds, RAM, etc)
- configuration
- any limitations (eg, on number of simultaneous reads+writes)

6 FTS Testing

There are three parts to this testing.

1. Buffer farm → "EOS"
2. "EOS" → FNAL
3. FNAL → "OSG"

The quotes are used as "EOS" will be emulated with a simple storage node at BNL and "OSG" will simply again be nodes at BNL. The goal is a functional tests of all these types of transfers if not a performance one.

More information about FTS is in the document "Design of the Data Management System for the protoDUNE Experiment").

7 References

References