Revamp of High Energy Physics Laboratory's Computer Systems: Milestone 5

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Contents

1 High Energy Physics (HEP) Senior Design

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2 Faculty Sponsor

Eraldo Ribeiro - eribeiro@fit.edu

3 Client

Marcus Hohlmann - hohlmann@fit.edu
Head of the Florida Institute of Technology HEP group

4 Meeting with Faculty Sponsor

- 18 March 2019

5 Meeting with Client

- 11 February 2019
- 18 February 2019
- 25 February 2019
- 11 March 2019

6 Progress of current Milestone

Task	Progress	Notes
Continue to Care for Existing MTS	40%	
Compile Instructions for MTS Operation	50%	improve upon provided instructions
Prepare Development MTS Machine	50%	coax AMORE into building
Integrate Nodes into Cluster	100%	NAS-0 and SE still must be included
Assist Researchers	100%	helping out with general problems as they arise

7 Discussion - Current Milestone

7.1 Existing MTS Progress

The existing MTS continues to suffer from its hardware ailments. While we were able to get new firmware for the FEC, it did not fix the FEC. Although the firmware was able to be installed onto the FEC, the firmware is not working properly. Additionally, the ethernet port of a second FEC has suddenly stopped working.

7.2 Development MTS Computer Progress

We have been provided with the source repository for AMORE! We have cloned the repository onto the development MTS machine and tried to make it. However, all documentation on AMORE states that this is not the recommended way of building AMORE, and so there is very little documentation on the process for building AMORE via its source. When `make` was run in the root of the repository, it, of course, ran into some issues. A path variable was incorrectly configured in one of the internal make files, so we had to overwrite it so that it pointed to the correct directory. After that was fixed, it complained that it could not find a particular ROOT file that was not on the machine. Fortunately, however, the existing MTS has that file, so we copied it over, and it stopped complaining. Our next hurdle is figuring out how to deal with some type errors in yet another file.

7.3 Computing Cluster

The nodes have been integrated into the cluster! Turns out their boot order was messed up; the correct order is PXE network boot, CD, then HDD. With PXE networking booting enabled and set to the highest priority, the nodes will automatically listen for kickstart files from the CE on boot. This allowed the CE to send over all the files necessary to install ROCKS 7 and incorporate the nodes into the cluster!

This victory is not without its pitfalls, however. A couple of the nodes were rather uncooperative, and it took us some time to get them sorted out. Additionally, we are unable to run all the nodes simultaneously due to issues with the UPSs powering the nodes; if seven nodes are turned on at the same time, the UPS's breaker is tripped and it shuts off. Until we can solve this problem, the nodes will be operated on in two groups of ten nodes each, five for each UPS.

Since the nodes have been brought into the cluster, we began trying to incorporate some other components; we started with NAS-0. There are `insert-ethers` options for NASs, so the process is very similar to that of the nodes. We modified NAS-0's boot order in the same manner as the nodes, and it successfully requested its kickstart file from the CE to begin the ROCKS 7 installation. Unfortunately, NAS-0's OS drive was not seen by the installer; only the data storage drives appeared.

7.4 GEM Machines

8 Parts Worked On

8.1 Josef Bostik

- building AMORE on the MTS Development Machine

8.2 Eric Pereira

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8.3 Ryan Wojtyla

- integrating cluster components
- building AMORE on the MTS Development Machine

9 Task Matrix - Next Milestone

Task	Josef	Eric	Ryan
Polish Cluster Documentation	10%	10%	80%
Polish MTS Documentation	40%	20%	40%
Create MTS Automation Script	60%	10%	20%
Integrate Remainder of Cluster Components	10%	10%	80%
Run Jobs on Cluster	10%	10%	80%

10 Discussion - Next Milestone

10.1 Existing MTS

The future for the existing MTS looks to be quite grim. Our continuing inability to repair its vital data collection hardware means we may not be able to repair the machine in time. Despite this, however, we should be able to make strides in developing the software to run it once it is eventually repaired.

10.2 Development MTS Computer

As it stands we are somewhat stuck with the development MTS. We may be able to find a way to create the makefile for the source of root, or we may need to find another method of building AMORE. Since AMORE may not be fixed in time, while working on AMORE, we will begin creating the MTS usage script using operation instructions provided to us by the researchers using the MTS.

In addition to working on the machine itself, we will be compiling a detailed document detailing our work on the MTS Development Machine. This document will enable future research teams to understand how the machine is put together so that they may more effectively build upon our work.

10.3 Computing Cluster

Once the issues surrounding NAS-0's incorporation are solved and the SE is brought into the cluster, we will create the cluster's job submission environment by configuring HTCondor and any other software we need along the way. Additionally, we will be compiling a document detailing our journey rebuilding the cluster. Not only will such a document better prepare future system administrators for cluster work, but they will have a detailed reference manual for performing future system updates.

10.4 GEM Machines

11 Sponsor Feedback

11.1 Existing MTS

11.2 Development MTS Machine

11.3 Computing Cluster

11.4 GEM Computers

11.5 Sponsor Signature

Sponsor Signature

Date

12 Sponsor Evaluation

Josef Bostik	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Eric Pereira	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Ryan Wojtyla	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10