

MAUS Group Report from MICE Running 22-03-2012

Chris Rogers, Gene Kafka, Durga Rajaram, Paul Smith, Victoria Blackmore, Pierrick Hanlet

Aim

From March 22nd through to March 25th, MAUS was run successfully online in the MICE Local Control Room. A number of items had changed since the previous running in December, and this run was intended to test those items.

- Recent upgrades to the online system to provide improvements in the web interface, multiple simultaneous outputs and improved configuration handling.
- New Cerenkov online reconstruction and plotting.
- Automated offline batch production system for Monte Carlo and offline reconstruction.
- Replication of the online system to the MICE webserver.

Run Summary

Below is a summary of the operation of the MICE experiment from a software perspective.

Software Upgrade

MAUS v0.2.0, intended for use during the run, was released on Monday 19th March. Deployment to the control room stalled as the old software installation from December 2011 no longer functioned. Investigation by Yordan Karadzhov at first focussed on the unpacking libraries. Subsequently it was discovered that there had been a failure in MICERAID2, which hosted the data unpacker. A simultaneous failure occurred on MICERAID1, the backup system. The only operational storage device was now the system partition of MICERAID1, so the DAQ system was set up to operate on the system partition of MICERAID1. This installation was completed on Thursday evening, resulting in the final installation of MAUS occurring on the Friday morning as the run was due to commence.

MAUS Operation

It was intended to install and test MAUS prior to running but this was not in the end possible, so installation and testing was performed on Friday morning. Unfortunately, the documentation in the operations/shifter documentation list was out of date. In the end, up to date documentation was found in the MAUS wiki following some hurried emails, although this was too advanced for regular shifter use.

Once MAUS was running, it was found that the TOF histograms were empty and were not displayed by the web front end. It turns out this was user error – confusion between an old MAUS installation, which had not been cleaned out, and the new MAUS installation. Even once this confusion was cleared up, there was some issue with TOF space point reconstruction resulting in no TOF space points being plotted. This was resolved by the Software On-Call expert late Saturday.

Finally, the code was updated to include the most recent changes, especially the new Cerenkov online reconstruction. This was exercised late on Friday. New shifter documentation was written up prior to the run on Saturday and with some bug fixes online operation resumed on Saturday morning.

Run Summary

The run was overall successful. The Cerenkov was reconstructed online and pion/muon discrimination was observed in online plots. The distributed execution of the code was successful.

Several potential improvements were identified in the online operation of the code.

- There was insufficient shifter documentation for MAUS online.
- The start up procedure is pretty complicated and error prone. Could this be concatenated into one or two shell scripts?
- The online histogram (reducer) buffer was not cleared at the end of each run. Histograms need to have their bin contents cleared between runs (or reinitialise the reducers).
- The online histogram update could be a bit unstable because the browser was attempting to render thumbnails before they had finished being generated.
- Online histograms need to be copied to a folder for output to the data mover at the end of each run.
- There was insufficient documentation plot by plot. (i.e. what do the plots mean?)
- We need some better presentation of the histograms. At the moment, the histograms are displayed as a long list, we really need something else. (e.g. need one click per histogram to review the information, for about 15 histograms => they don't get checked).
- The installation in the control room was based on personal code branches rather than the main development trunk.
- We still don't have a scalars reducer or view in the web front end.
- Debugging of the online system was hampered by insufficient testing. We were trying to simultaneously debug hardware and software issues.

Additionally:

- Automatic execution of the offline reconstruction was not ready for the user run.
- The geometry was not uploaded prior to the run. This was due to the non-availability of the MAUS installation, including geometry code, in the control room prior to the run.

Despite these shortcomings, overall the run was successful and the code executed correctly.

- The distributed processing framework operated with multiple reducers running in parallel.
- The new search functionality for the web front end operated correctly.
- The Cerenkov plots operated correctly. Pion muon discrimination was visible in online plots of light yield vs time of flight.
- Despite multiple simultaneous hardware failures, the DAQ and MAUS-DAQ interface operated correctly.
- Most of the control room code was successfully pushed to bzc. Some code was not pushed before the online recon machines were taken off following the power outage.