

INCITE: Edge-based Traffic Processing & Service Inference for High-Performance Networks (LANL)

MAGNET+MUSE: Software Oscilloscope for Clusters & Grids

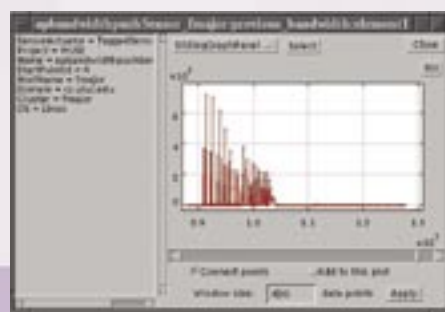
In the same way that large-scale integration made the development of complex electronic hardware possible, toolkits such as ClusterMatic and Globus have improved our ability to develop large-scale cluster and grid applications, respectively. However, the task of debugging and tuning grid applications is still difficult, particularly due to the inherently distributed nature of grid applications.

When a hardware engineer needs to diagnose a problem with a circuit, the tool of choice is often an oscilloscope. The utility of the oscilloscope lies in its ability to provide high-fidelity information and the ease with which the level of detail can be adjusted. An analogous tool—the “software oscilloscope”—is needed to simplify the development of cluster and grid applications.

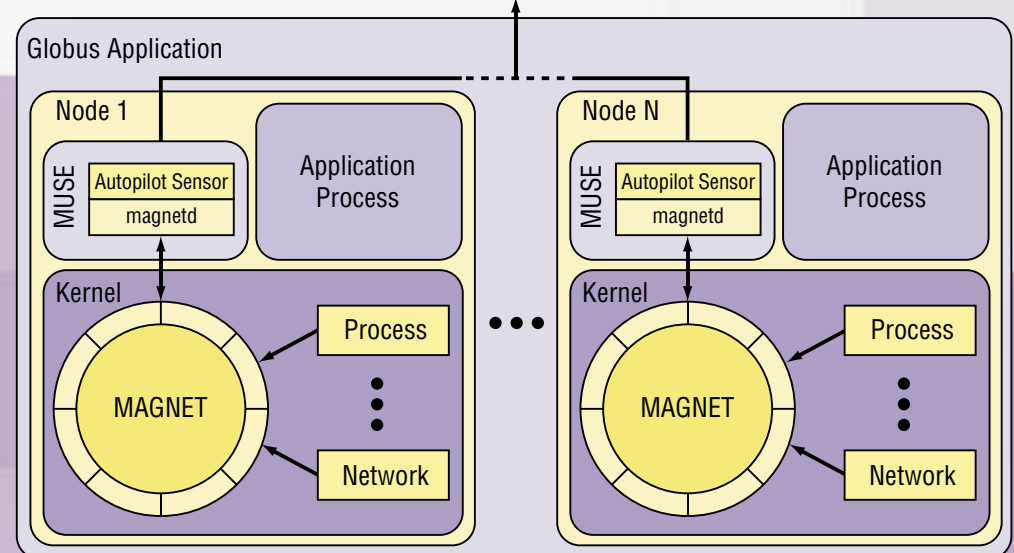
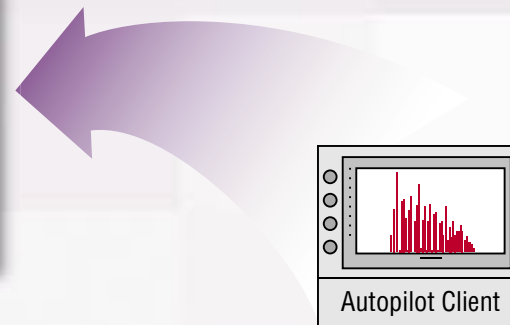
Together, **MAGNET (Monitoring Apparatus for General kerNel-Event Tracing)** and **MUSE (MAGNET User-Space Environment)** provide the basis for a software oscilloscope for clusters and grids. This software oscilloscope can be used at different levels of granularity in order to debug, tune, monitor, or even control applications running on clusters or grids.

MAGNET and MUSE provide this functionality with very low overhead and without having to re-link or modify the applications that are to be monitored.

In the context of MDS from the Globus Toolkit, **MAGNET+MUSE is currently being integrated with the following frameworks: Autopilot (University of Illinois), NetLogger (Lawrence Berkeley National Laboratory), TAU (University of Oregon), and Supermon (Los Alamos National Laboratory)** in order to more easily enable the monitoring of large-scale, distributed grid environments. Alternatively, **MAGNET+MUSE can also be used in a “standalone” configuration to monitor cluster environments or to enable reflective (resource-aware) computing.**



Autopilot Interface



A High-Fidelity Software Oscilloscope for Globus



The Need for a Software Oscilloscope

RELATED PUBLICATIONS

- S. Ayyorgun and W. Feng, *A Deterministic Characterization of Network Traffic for Average Performance Guarantees*, 38th Annual Conference on Information Sciences and Systems (CISS '04), Princeton, NJ, March 2004.
- M. Gardner, W. Deng, T. S. Markham, C. Mendes, W. Feng, and D. Reed, *A High-Fidelity Software Oscilloscope for Globus*, GlobusWORLD 2004, San Francisco, CA, January 2004.
- M. Gardner, W. Feng, M. Broxton, G. Hurwitz, and A. Engelhart, *Online Monitoring of Computing Systems with MAGNET*, 3rd IEEE/ACM Symposium on Cluster Computing and the Grid (CCGrid '03), Tokyo, Japan, May 2003.
- M. Gardner, M. Broxton, A. Engelhart, and W. Feng, *MUSE: A Software Oscilloscope for Clusters and Grids*, 17th IEEE International Parallel & Distributed Processing Symposium, Nice, France, April 2003.
- W. Feng, M. Gardner, and J. Hay, *The MAGNeT Toolkit: Design, Evaluation, and Implementation*, Journal of Supercomputing, Vol. 23, No. 1, August 2002.
- M. Gardner, W. Feng, and J. Hay, *Monitoring Protocol Traffic with a MAGNeT*, 3rd Passive & Active Measurement Workshop, Ft. Collins, CO, March 2002.
- E. Weigle and W. Feng, *TICKETing High-Speed Traffic with Commodity Hardware and Software*, 3rd Passive & Active Measurement Workshop, Ft. Collins, CO, March 2002.
- W. Feng, J. Hay, and M. Gardner, *MAGNeT: Monitor for Application-Generated Network Traffic*, 10th IEEE International Conference on Computer Communications and Networks (IC3N '01), Scottsdale, AZ, October 2001.

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