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Implementing a Condor pool using a Green-IT policy

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ABSTRACT

High Throughput Computing (HTC) systems are designed to utilise available resources on a network of idle machines in an institution or organization by cycle stealing. It provides an additional “free” resource from the existing computing and networking infrastructure for modelling and simulation requiring a large number of small jobs, such as applications from biology, chemistry, physics, and digital signal processing. At the University of Huddersfield, there are thousands of idle laboratory machines that could be used to run serial/parallel jobs by cycle stealing. Our HTC system, implemented in Condor, is part of the Queensgate Campus Grid (QGG) that consists of a number of dedicated departmental and university computer clusters.

Condor is an excellent HTC tool that excels in cycle stealing and job scheduling on idle machines. However, only idle powered machines can be used from a networked pool. Many organizations deploy power saving mechanisms to try to reduce energy consumption in their systems, and power down idle resources, using rigid and inflexible power management policies. Condor supports some form of power management, but they are not widely used because they are not easily configurable.

Our research and development work is focused on implementing a HTC system using Condor to work within a “green IT” policy, of a higher education institutions that conform to green IT challenges for a multiplatform, multidiscipline user/ resource base. This system will allow Condor to turn on machines that may have gone to sleep due to lack of usage when there is a large queue of pending jobs. The decision to utilise dormant resources will be made on a variety of factors such as job priority, job requirements, user priority, time of day, flocking options, queue conditions etc. Good practice scheduling policies would need to be devised that would work within this “green IT” pool.

Condor is a cross platform tool that can run on Windows, Linux and Macintosh operating systems. Most of the University of Huddersfield computer laboratories are running Windows 7. Some of the serial applications that currently run on the QGG Eridani cluster have been ported into Windows and run successfully. However, a number of applications still run natively in Linux, supporting the multiplatform, multi-discipline research community. By using Condor we are making more efficient use of the current computing resources distributed across the University of Huddersfield to support our growing research community.

Keywords Condor, HTC, Job Scheduling, Computer Clusters, cycle stealing, Flocking