gLite Porting to the Play Station 3 using ETICS for electronic High Throughput Screening (eHiTS)

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Since 2003 TCD has invested heavily in middleware porting, constantly engaging with the middlware development groups of the EU DataGrid (EDG), LHC computing Grid (LCG) and EGEE projects. In 2008, TCD ported gLite worker node to Yellow Dog Linux 6 on the Play Station 3, without data management. The node, built in ETICS, and tested in a production environment with gLite WMS job submissions were successfully submitted to it. The decrease in computational performance of porting the eHiTS software to the Grid is too expensive, so porting the Grid to other architectures such as the PS3 is important.

Detailed analysis

As a result of the accumulated expertise, TCD was invited in 2006 to join a new EGEE-II integration and testing activity (SA3) as the main portability partner for further development in this area, and then for EGEE-III, Trinity College Dublin handled the porting and multi-platform coordination.

It was found that applications running on hardware such as the Graphical Processor Unit (GPU) and the Synergistic Processing Element (SPE) will incur very large performance hits if ported to the Grid. In particular, electric drug screening software such as eHiTS is one such application.

The meta-package generation facility of ETICS was proposed as a method to quickly generate a minimal gLite worker node for the PS3 that would accept glite WMS job submission but would not support data movement. Producing such a solution first involved porting VDT globus to the PS3, something not done before. The addition of a number of no architecture RPMs and VOMS then allows the node to be contacted by a standard gLite computational element (CE). However, a separate queue is required per platform type to avoid confusion with other Linux platforms. A small cluster of 7 nodes is now running production jobs.

Conclusions and Future Work

An integrated build and test environment (including external projects such as dCache, VDT and gridsite) on a very large set of platform types will allow EGEE to produce sustainable gLite clients for worker nodes and user interfaces. This is ongoing work at TCD, PSNC and CERN.

The exploitation and support of MPI on multi-core technology has proven useful in recent years. However, the GPU and SPE are relatively

untouched at present, for highly parallelisable tasks in EGEE.

Impact

The impetus to move the VDT globus source code stack into ETICS to allow it to be ported to exotic platforms such as the PS3 and openSUSE has resulted in the ability to build and maintain a version of VDT globus in EGEE. This in itself is a useful achievement.

The more portable the EGEE Grid is, to platforms such as RedHat Linux, Debian Linux, Mac OS X, Windows and PPC Linux (such as the PS3), the more likely it is that users will use the Grid, since they will not have to port their applications to the Grid.

eHiTS Lightning's computational speed is 26-fold to 60-fold faster on the PowerPC Cell Broadband Engine (Cell B./E.) compared with the equivalent application on an Intel-based processor. Therefore porting the software to the Grid makes little sense from a purely economical point of view.

Moreover, this immediately points to the fact that there is a whole application space in existence for which the EGEE Grid could be used, but isn't exploiting due to its lack of portability.

The use of GPU's is becoming much more cost effective. EGEE should therefore pay close attention to the exploitation of such technologies in the future.

Keywords

PS3, portability, eHiTS, EGEE, SPE, Cell-Broadband, VDT, TCD, Grid

URL for further information

http://grid.ie/autobuild/etics/org.glite/WN-3.2.0/yellowdog6_ppc64_gcc411/

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