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Oracle RAC (Real Application Cluster) application scalability, experience with PVSS and methodology

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Database applications increasingly demand higher performance. This is especially true in the context of the LHC accelerator, LHC experiments, and LHC Computing Grid projects at CERN. Oracle RAC (Real Application Cluster) is a cluster solution which allows a database to be served by several nodes, and is a technology that is being exploited successfully at CERN and at LCG Tier1 sites. Database applications often have initially low scalability, with a growing number of cluster nodes. This paper describes a methodology and innovative ideas developed in order to obtain almost linear scalability for some of the typical database workloads.

This paper describes, amongst others, the work which has been performed on the PVSS "Oracle archiver"(the controls software used for LHC and its experiments), where the performance of the event archiving module has been increased from 1000 to 150000 event changes per second (x150). This has been achieved with several architectural changes (core program separation from the data manipulation, data loading techniques, and database schema). The result is also a near-linear scalability between the number of nodes in the cluster and the performance.

Based on the experience gathered on many database projects, guidelines and tips are provided in order to help with the creation of scalable database applications, or to achieve scalability improvements for already designed database applications.

Summary

This paper describes a methodology and ideas for achieving Oracle cluster (RAC) application for typical HEP workloads. An example is given with the PVSS (controls system used for LHC and LHC experiments) Oracle archiver scalability increase (x150 gain with a 6 nodes RAC).

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