

Abstract

Virtualization is considered the most demanding topic in today's era. The increasing speed and capabilities of Hardware (processor, memory, HD, etc...) have made virtualization possible. It improved efficiency and manageability, reduced hardware and software cost and Virtual Application Cluster on a single server and allows consolidation. In addition to the time reduction used to deploy new database installations. Virtualization is a term used liberally within computing. In its broadest sense, virtualization is used to define any technology solution where a level of abstraction is applied to separate the consumers of resources from the compute resources themselves.

It is also, used in grid computing, and Application Cluster which is correctly identified as a virtualization technology in its own right.

Based on this concept, virtualization has been adapted in Database Application Cluster to enable a number of separate physical servers to appear as if it were single database to database resource consumers.

On the other hand, this poses new challenges, including choosing the right virtualization technology and consolidation configuration for a particular set of applications. Similarly, choosing virtualization architectures is not only a complex issue, but also the performance of the whole environment may go down on wrong judgment. Rather than doing scientific analysis on these matters, usually decisions are made on general discussion and perception. Along this thesis, a study of performance for Clustered Databases in logical and physical virtualization is performed. Due to virilities of products in Virtualization, have selected Oracle VM Server (XEN) as Physical Virtualization, VMware Workstation as Logical virtualization and Oracle Real Application Clusters (RAC) for database, as it is the

only product that supports clustered computing and a data sharing system. Used LMBench in this study to measure latency and bandwidths of both environments so as to compare the results of process, file system and memory performance test. Network performance measures by using Iperf and Netperf. The Swingbench workload used was Order Entry. The Order Entry (PL/SQL) workload models the classic order entry stress test have a profile similar to the TPC-C benchmark. A comparison of the performance of clustered databases systems has been performed through an evaluation on two stages: First an evaluation of the operating system and network performance has been carried out in both environments focusing on the latency and bandwidth, due to the direct dependency of the system performance and the network. Second a lot of experiments are carried out on the clustered database for measuring the performance, the availability and workload in both virtualization environments. The results of these two evaluations show that the performance of the clustered database realized better performance in the physical virtualization environment.

المستخلص

إن التطور الهائل في المكونات المادية لأجهزة الحاسوب أدى لإمكانية العمل بكثير من التقنيات وكان من أهمها البيئة الافتراضية (التخليقية) التي أصبحت محل اهتمام كثير من الباحثين وذلك لدورها الفعال في تحسين وتطوير مراكز المعلومات. حيث أصبح من السهل جداً دمج عدد من الخوادم في جهاز واحد (Server Consolidation). كما كان لها الدور الفعال في تحسين الأداء وسهولة الإدارة وتقليل الميزانية المنصرفة لشراء أجهزة وبرامج لتوسيع مراكز البيانات. كما أتاح لمهندسي النظم بناء تطبيقات عنقودية على جهاز حاسوب واحد. ووفّرت هذه التقنية كثيراً من الوقت والجهد في بناء الأنظمة وتهيئتها و إعدادها مثل نظم قواعد البيانات التي كانت تأخذ كثيراً من الوقت. وتوجد طريقتان أساسيتان لبناء البيئة الافتراضية الأولى: أن يتم تحميل Virtual Machine Manager على جهاز الحاسوب مباشرة دون أن تكون هنالك حاجة لنظام تشغيل؛ ويسمى هذا النوع بالبيئة الافتراضية الفيزيائية، والثانية أن يتم تحميله على نظام التشغيل ويطلق عليها البيئة الافتراضية المنطقية.

في هذا البحث تم عمل مقارنة عن أداء نظم إدارة قواعد البيانات العنقودية في البيئة الافتراضية الفيزيائية والمنطقية. وتم اختيار نظام إدارة قواعد البيانات اوراكل لبناء قاعدة بيانات عنقودية حيث أنه النظام الوحيد الذي يسمح ببناء قواعد البيانات العنقودية بمشاركة كل البيانات والملفات.

تمت مقارنة الأداء لنظم قواعد البيانات العنقودية بإجراء تقييم على مرحلتين: الأولى تم تقييم أداء نظام تشغيل الشبكات في كلا البيئتين من ناحية زمن التأخير والانتاجية (The latency and The bandwidth) لأن أداء أي نظام يعتمد اعتماداً مباشراً على أداء نظام التشغيل وكذلك الشبكة التي يعمل فيها. وفي المرحلة الثانية تم إجراء سلسلة من التجارب لقاعدة البيانات العنقودية لقياس الأداء والإتاحية والتحمل في كلا البيئتين الافتراضية.

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البيئة الافتراضية الفيزيائية.

DEDICATION

To my parents, brothers, sisters and my wife
for their unlimited support. To my dear
daughter Ruaa

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