CLIENT SERVER APPLICATION FOR SERVER FARM PERFORMANCE MONITORING

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"Dedicated to my beloved family and friends, without their understanding, supports, and most of all love, the completion of this work would not have been possible."

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ABSTRACT

Workstation/PC server farms have become a cost-effective solution for high performance computing. Server farm or server cluster is a collection of computer servers usually maintained by an enterprise to accomplish server needs far beyond the capability of one machine. Server farms often have backup servers, which can take over the function of primary servers in the event of a primary server failure. It is critical and important to monitor, control, and manage servers and various resources. To address this issue, it needs present a performance monitoring tool used for such cluster-based on client server systems, which can monitor resources such as CPU utilization, memory usage, disk utilization and network bandwidth from time to time. The design of the monitoring tool enables certain flexibility and extensibility to scale up. Information of server resource and performance will be displayed in the format of charts, and will be refreshed within specified interval. Experiments based on a prototype system demonstrate that the tool can measure and collect necessary data as needed and then visualize them by certain charts, exhibiting feasibility and good usability.

ABSTRAK

Stesen kerja atau ladang pelayan telah menjadi penyelesaian yang kos efektif untuk pengkomputeran yang berprestasi tinggi. Ladang pelayan atau pelayan berkelompok adalah gabungan pelayan komputer yang biasanya dikendalikan oleh syarikat untuk mencapai keperluan pelayan jauh di luar kemampuan sebsah mesin. Ladang pelayan sering mempunyai salinan pelayan dimana ia boleh mengambil alih fungsi pelayan utama apabila pelayan utama mengalami kerosakan. Ia adalah kritikal dan penting untuk memantau, mengawal dan menguruskan pelayan dan sumber-sumber yang lain. Untuk menangani masalah ini, ia memerlukan system aplikasi pemantauan prestasi yang digunakan kepada sekelompok pelayan, yang boleh memantau pelbagai sumber seperti penggunaan CPU, penggunaan cakera dan rangkaian lebar dari semasa ke semasa. Rekabentuk sistem aplikasi pemantauan prestasi ini membolehkan flesibiliti dan kebolehpanjangan skala meningkat. Maklumat akan dipapar dalam format carta dan akan disegarkan dalam selang masa tertentu. Eksperimen berdasarkan kepada sistem prototaip yang menggambarkan system aplikasi ini boleh menilai dan mengumpul data yang berkaitan dan digambarkan ke dalam bentuk carta dan menunjukkan kebolehgunaan yang baik.

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CHAPTER 1

PROJECT OVERVIEW

1.1   Introduction

Now days every business linked to the Internet and also managing and organizing e-business within each application, these applications are often prepared within server farm. Server farm is a collection of servers or clusters in a secure; who an internet seats vital needs on servers, to perform a solid reliable well-organized service to clients. Servers must be flexible to failures, also able to hold significant numbers of requests, and able to answer those needs fast. A server farm also known as group of computers that helps the needs of organization that are not easily met by single computer. These computers are placed in single house or housed different in locations(Heo *et al*., 2011).

In 1980s can improve the performance of the computer by creating more capable processors and quicker believed by several computer scientists. But in 1990s, the concept of clustering was challenging this idea (Buyya, 2000), which fundamentally means interconnecting two or more computers to achieve shared functions as a single system. Actually the computers are extremely connected to each other and collectively support the server needs and handle additional load that is placed on the server. This additional load is distributed among the different farm computers and different server components. So, it provides computing power for advanced needs

However most of server farms contain a primary and back-up system so that if the main server goes down then the back-up system will prevent shutting down your companies services (Hai Huang, 2009).

Early time server farms were used mostly in academic and research services but has changed. But know universities and all companies are using server farms. Though a mainframe can house up more than hundreds of virtual machines and eat less energy. They are also easy to manage and maintain when it use server farms an experts needs to fix physical problems while the mainframes is mostly likely a software issues. However a large server farm wants a lot of cooling systems and extremely large amount of power. For this reason, server farm is measured by performance per watt rather than performance per processor.

A server farm present several advantages such as the following:

i. Delivery data is very fast and reliable
ii. The capacity is high
iii. Flexibility and scalability
iv. Cost effective physical placement and simplified
v. Secure remote management
vi. No single point of failure Redundancy

The goal is to give up server farm infrastructure (hardware, software, or both) to the expectations of many computers and a single system Thus, back users can use without knowing the computer that really works. Monitor a daunting task and difficult since the workstations are designed to work as a typical stand-alone and not part of a workstation. Can be facilitated by software systems that hold up the watching of the whole systems at various levels by providing a graphical user interface and integrated interface.

1.2 Problem Background

Building a server farm is not easy there are a lot of challenges. One of the most important issues is to make sure that the building is equipped with enough power to handle the load of all the new devices that are planned to be installed.

Not only does the power need to be present, but it need also to be tested to make sure that there are not frequent surges or sags which would cause the hardware to shut-down and restart. The result of this is loss of data and possibly ruined equipment. The data center is the core of every business that holds the assets and applications that are often subjected to electronic attacks. The result of attackers against a server farm will become losses of business for e-commerce that includes business to business applications. Data centers are the end point where malicious attacks take place. To protect the data center from Electronic attack is crucial for any business.

However electronic attack can influence an increasing number of data server centers and computers yearly, the issues of security in the server farms source of general concern for large and small businesses. Protecting assets and data effectively, the data centers will be free from malicious cyber attacks.

The basic types of security issues of the server farm is a denial of service (DoS), reconnaissance, intrusion attacks, and malicious code copies and worms. DOS Denial of service can influence all the data centers that will avoid the allowed users for finishing easy business.

An attacker such intrusion can steal sensitive information. While the misuse or abuse poll pirates steal and copy fingerprint server, this technique can be used once. A self-duplicating program which can externally damage called worms, May be left a denial of service and compromised servers for the risk of hackers with the form of the back door. Hackers can use the code for those who request copies decode

Passwords, select the files that hold secret information. Hackers who use code copying can issue commands, decipher passwords and locate files that contain confidential information.

The manageability also becomes principal important, while today in data centers usually consist of hundreds or even thousands of nodes. The high-performance systems differed significantly from today's heterogeneous machines from the earlier period and now countenance the similar set of issues, and those large spread systems. One of the main issues countenanced by high-performance systems and distributed non-observation of the system state.

Due to a great enough of the contract and the linked computational, applications placed I/O and network demands, failures in great scale systems turn into commonplace. Treating hub wear and to maintain or keep up the health of the system, the monitoring tool should be talented to fast identify errors so that it can be repaired either through out-of-band means (e.g. restart) or automatically. In large systems, the communication between a countless of computing nodes, it can be complex links, storage devices network and switches.

Data center needs monitoring tool that arrests a part of these connections and presented in ways that are interesting and often lead to a better understanding of the behavior of the macroscopic.

A high quality tool of monitoring can help here as well as long as a worldwide view of the system, which can be obliging in recognizing problems of performance and, eventually, supplementary planning capacity.

The priority for administrators is to provide IT resources and services when and where they're needed. The question is, how?

1.3   Problem Statement

Although server farm is a collection of servers or clusters, every server need to be managed individually and secured. The question is how to monitor large number of machines, it is critical and important to monitor and control servers and various resources. Of course there are several Monitoring Tools such as Ganglia, PARMON, Monit, Nagios and Card but they are all huge, which would consume a lot of system resource when running and their architecture is complex.

1.4   Project Aim

The aim of this project is to develop a prototype client server base of resource and performance monitoring tool for server farm. It can monitor and obtain information and the status of the underlying resources of each server in the server farm, such as CPU, Memory, disk utilization and network, and also visualize all those information through graphical user interface (GUI).

1.5   Objectives of the Project:

1. To analyze available tools of resource and performance monitoring for Server Farm.
2. To design and develop prototype of resource and performance monitoring for Server Farm.
3. To test prototype of resource and performance monitoring for Server Farm.

1.6   Scope of the Project

1. The analysis will be conducted mainly with tools about resource and performance monitoring for sever farm.
2. The prototype will focus on monitoring resources and performance of the servers such as such as CPU utilization, memory usage, disk utilization and network bandwidth from time to time on demand.
3. The prototype will be using as front end C# .

1.7   Organization of Report

This project consists of five chapters. These chapters are organized according to different works that involved in this study. The detailed organization of this project is described in following paragraphs. This section presents how this report is organize in different chapters.

Chapter 1 of this project consists of overview of the project, problem background, problem statement, objectives, scope and Aim of this project.

Chapter 2 of this report presents a review of the literature related to the area of management of server farm. It discusses monitoring tools in details that includes Ganglia, PARMON, Monit, Nagios and Card.

Chapter 3 consists of wide description on project methodology, which provides a full discussion about the flow of this project. This includes how the operational and experimental work has been carried out for the study.

Chapter 4 discussed architecture and designs of proposed prototype in detail. Designs include both the design of client-server system and the design of

performance monitoring tool which has four critical functions such as CPU utilization, memory usage, disk usage and network bandwidth.

Chapter 5 is the conclusion of overall chapters and future works in the related area of monitoring and controlling server farm performance will be discussed. This includes recommendations for further study.

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