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Cooling Guideline for Datacenter

By

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Abstract

The requirements for reliability and availability put together extreme demands on datacenters, this research is an attempt to provide a comprehensive guideline for datacenter cooling best practices. A survey has been conducted to classify datacenters in Sudan, and after collecting data related to the datacenter cooling and management from 25 institutions, all data centers resulted to 100% downtime because of air-condition failure during last year 2015, besides 44% they didn't have a cooling plan .A comprehensive guideline has been proposed. The compare of the guideline on two data center proved the effectiveness of the guideline. This guideline will help datacenter administrators implement best practices when it comes to datacenter cooling.
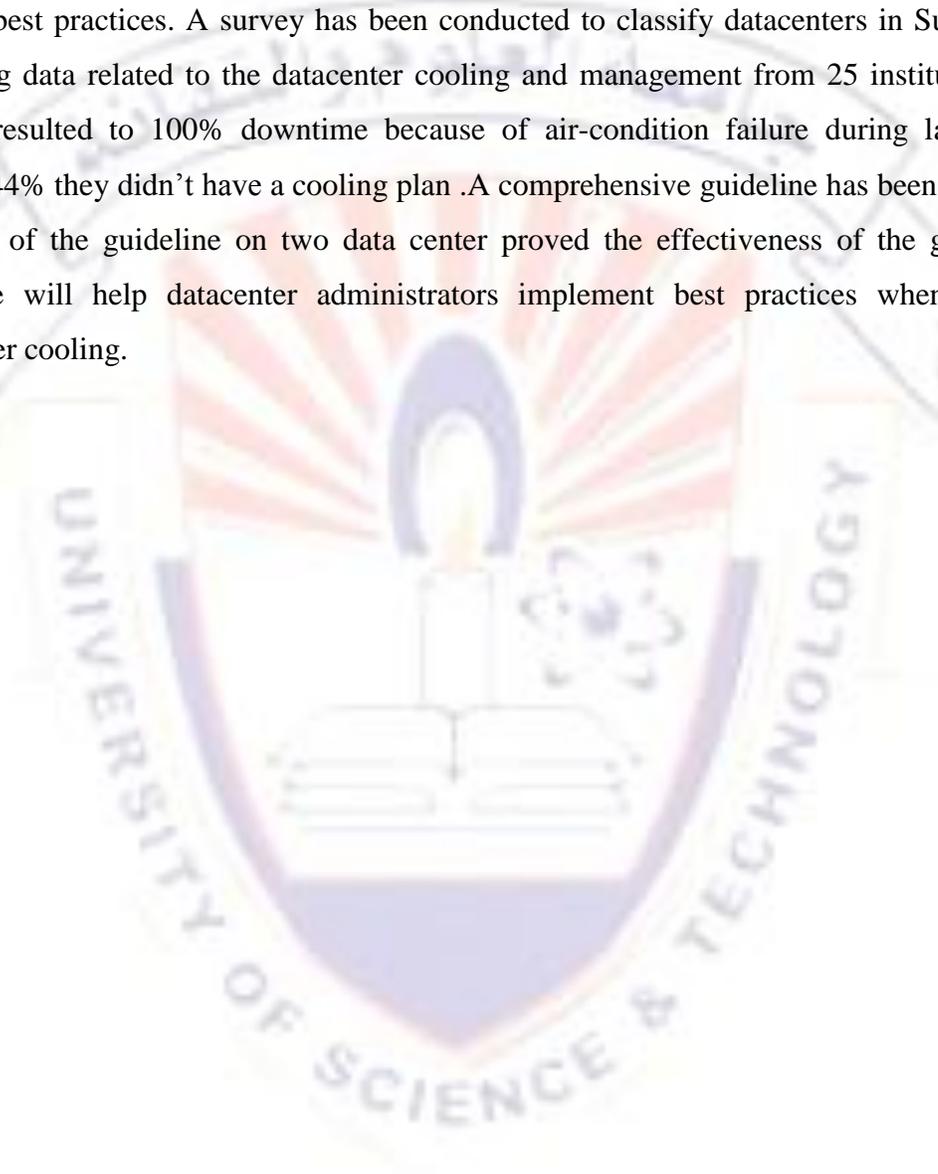
المستخلص

إن متطلبات المسؤولية وتوفير المعينات تشكلان الحاجة الماسة لمراكز المعلومات ، إذا أن هذا البحث هو محاولة لتقديم موجهات شاملة لمراكز المعلومات نحو أفضل الممارسات الخاصة بالتبريد .وبناء على ذلك إجريت مسحاً لتصنيف مراكز المعلومات في السودان بناء على نتائج الإستبيان ، وبعد تجميع المعلومات ذات الصلة بمراكز المعلومات و إداراتها من خمسة وعشرين مؤسسة ، أسفر المسح عن توقف تام بنسبة 100% بسبب أعطال في أجهزة التكييف خلال العام المنصرم 2015م، إضافة إلي أن 44% من هذه المؤسسات ليس لديها خطط للتبريد . لذلك فقد تم إقتراح موجهات شاملة وتم مقارنتها في إثنين من تلك المراكز إذ أثبت فاعلية هذه الموجهات التي تسهم في قيام إدارات مراكز المعلومات بتنفيذ أفضل الممارسات الخاصة بالتبريد.

.1 Introduction

Many IT organizations have turned to automation and automated management processes to provide the operational agility and efficiency required to better meet those demands. Traditional management methodologies are effective for a relatively small number of servers but no longer viable for achieving the efficiencies mandated by today's business requirements. In order for IT organizations to be effective, they must move away from manual management, and towards a unified IT model, combining automated management with specific operational best practices and processes.

The main components of an air-cooled data center are Computer Room Air Conditioner (CRAC) units and server racks. The server racks dissipate heat and need to be cooled in order to make sure that the electronics operate in the temperature range recommended by the manufacturer. Otherwise there is a risk of overheating, resulting in manufacturer or shut down to prevent hardware damages. This interruption is costly for business and needs to be prevented. It is therefore important to make sure that the data centers are sufficiently cooled while too much forced cooling leads to economical losses and a waste of energy. The CRAC units supply cold air into the data center. The cold air is supposed to enter through the front of the server racks and hot air will exit through the back. Depending on the distribution of CRAC units and server racks in the data center there is a risk that the cold air does not necessarily reach all the server racks to the desired extent. The cooling of data centers is therefore crucially dependent on the flow field of the air.[1]

1.2 Background And Motivation

To overcome overheating, systems can be equipped with cooling systems that help to regulate temperature within a unit thus maintaining efficient operation. This research examines the most common cooling technologies used today as well as a few that are currently in the early stages of research and development.

1.3 Research Problem

Sudan has a tropical climate, summer temperatures often exceed 43.3 degrees Celsius (about 110 degrees Fahrenheit), this higher degrees is affecting the operation of electronic devices and makes unstable processing of data centers situated in mentioned areas.

Dramatic and unpredictable critical load growth might levied a heavy burden on the cooling infrastructure of data center facilities making existence of clear guidelines for maintaining the availability of data centers is crucial which doesn't exist in must data centers in Sudan . The aim of this research is to establish a best practices guideline for cooling systems designed for data centers computer rooms.

1.4 Research Objectives

1. To provide comprehensive guideline about datacenters cooling and its best practices.

2. To compare an application of guideline on two data centers.

3. To Rank datacenters in Sudan according to common standards

1.5 Research Outline

This thesis is structured as follows: Chapter 2 provides background on datacenters and datacenter infrastructure management to set the context of our work. Chapter 3 describes the methodology used in this research in order to gather and analyze the appropriate information related to this subject. This is followed in Chapter 4 with the results, then chapter 5 is proposing a guideline that will help to cooling datacenters with the best practices and high efficiency, finally chapter 6 will end with a conclusion and recommendations for future work