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Data Center Management: Viewing Racks in the Network through Dot net platform

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Abstract*: **Data Center Infrastructure Management (DCIM) captures detailed real-time information about energy use across our data centers and operational facilities, enabling us to measure, trend, alert, and take action. DCIM also helps us visualize our data center environment in 3D and manages the power space and cooling capacity of your environment to better meet our business objectives. The baseline is being provided from the solution through which one can measure cost savings, improvements in operational reliability performance, cost savings as well as help to deliver continuous information for ongoing improvement. It enables data collection from multiple protocols and systems which further reduces manual efforts and thus provides visibility into power and space utilization, allowing for real-time decision making in a smart way. The proposed work utilizes dot net technologies to help us to perform the DCIM tasks. We have successfully deployed an application for the task and the report further signifies the importance of DCIM. The racks are visible in the network where and how they are connected which helps to monitor, and regulate their capacities improving cloud computing services of DCIM. We propose to develop state of the art technology and further initiate research and development work in cloud associated services.***

Keywords: *: Data center, dot net, DCIM, Cloud computing, cloud services, racks and virtualization.*

1. Introduction

There is acceleration in both the growth and the complexity of data centers due to growth in Big data, virtualization and cloud services. This makes data center infrastructure management more important than ever. The analysts continue to forecast significant growth in the number of connected users, to more than five billion by 2015, also affecting the growth tremendously instructured data, semi-structured, and unstructured data such as emails, system-generated activity logs, videos, and photos. The forecasts continue to say that the amount of information doubles every two years, and a 15times increase in mobile data traffic by 2015 is expected. Intel projects there will be 20 billion connected devices including notebooks and desktops, smart phones, tablets, cars. According to Pike Research, a market research and consulting firm, datacenters worldwide consumed 201.8 terawatt hours (TWh) in 2010 and energy spending reached USD23.3 billion. This is the amount of enough electricity to power 19 million average homes in the U.S. The fastest-growing data center like CIOs and CxOs are concerned for energy costs, heat generation, and carbon footprint. The reports suggest that servers that are owned by a company's IT organization consume highest amounts of energy. This takes IT under pressure to invest heavily in innovative technologies to help keep up with the good growth in users, devices, traffic and data. Data center infrastructure management (DCIM) is a way to do this.

The concept of DCIM is defined by Gartner as the integration of information technology and facility management disciplines to centralize management, intelligent capacity planning of a data center's critical systems and monitoring. It can be achieved by deploying or building a specialized software, hardware, and related sensors. DCIM technologies give IT organizations the ability to monitor and manage all interdependent systems across entire IT. This helps to build infrastructures in real time, avoiding interruptions and unexpected service downtimes caused by the infrastructure itself.

We must find new ways to improve the power space and density to build an IT infrastructure that can meet the requirements of today's businesses efficiently. In case if we are not being able to monitor and manage the interdependencies of data center equipment, then it can lead to unexpected problems and failures of both the power and cooling infrastructure and the servers. Issues can include overloads, loss of redundancy and overheating. This is why it is essential to measure and predict power use and temperature at the rack enclosure level.

1. **The problem statement:-** Data centers are frequently challenged by space and capacity limitations. Therefore in this paper we focused on developing technology to acknowledge the racks in a network using Dot net platform. Once we develop rack viewing technology for data centers we can easily monitor and manage the power and space capacities. Cooling and Power constraints limit the ability to deliver on new business requirements. Availability and Uptime are lowered when power is not reliable. SLAs and Service Quality(QoS) are at risk. The lack of detailed insight into consumption leads to unnecessary costs.
2. **Availability and Uptime are** at risk especially when power systems are not reliable. They may tend to fail due to power crashes or other power-related faults. The agility is reduced when the staff has limited insight into cooling and power in their data center. SLAs are not met and the systems may experience downtime and even may not respond accurately.

3. **Capacity limitations:** These capacity limitations for data center power, cooling and space and the Staff doesn't know which systems and devices are generating the load and it is not clear where spare capacity exists in the datacenter or where greater efficiency is possible. New and expensive data centers are to be built in spite existing spare capacity, or even IT services are outsourced. This problem can be settled once the rack viewing is possible, through dot net technologies that we propose to develop through this paper.
4. **Increasing operational:** The costs due to energy consumption increase in electricity bills with limited insight into the cause. This substantially increases operational costs if IT pays the bill.
5. **Differentiation among service providers and the provision of new and innovative services:** Managed service providers often seek to create differentiation between their cloud and co-location services and those of their competitors. Energy is an area of innovation and differentiation, but traditional approaches to energy chargeback and energy insight are limited and labor-intensive.

2. Literature survey

The definition of a data center:

In Pre-1990: Large computer rooms where computer bugs were actually bugs inside of large computers.
1990 - 2000: The advent of client-server computing and the Internet began the definition for what a data center was.

2000 - 2007: Data centers in large cities fulfilled communication needs as a central place where networks exchanged critical information. The financial services with high-speed trading software herd the need for a central place for networks to interconnect, that was also milliseconds (and later microseconds) away from financial districts.
Businesses that farmed out had growing footprints within colocation amenities and desired to take back some control over the security and financial elasticity to support their expanding business and IT needs.

2008 - 2011: In recent years there have been many innovations in power and cooling technologies and management of abilities. Efficacies have been integrated into every aspect of the data center and building enterprise, covering everything from foxholes to chicken coop design and mobile data centers to using the building as an air handler. Green tools and environmental awareness have also been a large part of the industry in the past 3 years.

DCIM is a web-based centralized solution for monitoring cooling environmental factors and power across facilities and IT systems in the data center as well as managing the use of space and lifecycle of estates which make up the data center infrastructure and set ups. DCIM covers three critical areas:

- Capacity, inventory and rack development
- Power and cooling
- IT management and cloud services.

DCIM captures power and cooling information in real-time, and helps in management and inventory physical assets for operational management. It also helps manage the logical layer of applications and services to help you better deliver IT management and business services that are business-relevant.
Put up on a proven and scalable platform, DCIM aggregates data from thousands of devices and hundreds of locations and display dashboards and trend charts to support smart decisions on improving data center efficiency. With DCIM you can collect data from highly diverse devices and systems exploiting SNMP or other protocols such as BACnet or Modbus and easily track assets within the data center and provide powerful 3D visualization.

The data center paradigm has been evolutional all through the last several decades.

All databases, including website, emails, and data are simultaneously updated to a plethora of servers. We utilize snapshot backups service for VPS to deal with emergencies using the built in rack technology of dot net platform.

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3. Key benefits/results

- It enables data collection from multiple systems and protocols, reducing the manual efforts.
- It provides monitoring and alarming for facilities, with visualization of power, space and cooling data for analysis, control and insight.
- It enables space and capacity management for more effective use of data center infrastructure monitoring and planning.
- It provides visibility into space and power utilization, allowing for smart, real-time decision making.

Data Center Infrastructure Management (DCIM) captures detailed real-time information about energy usage across the data centers and operational facilities, enabling us to measure, trend, alert, and take action. DCIM also helps you visualize your data center environment in 3D and manage the space, cooling capacity and power of your atmosphere to better meet your business objectives.
Change is the law of nature. The business climate, business models, Information Technology changes, and so the datacenters change. Wait –Do data centers change?

Yes, the view that the data center is just a room or facility that is a large capital venture and built every 10 to 15 years, has changed. This doesn't mean toss more money into it with greater frequency; it means approaching it in new ways and making smart and intellectual decisions about the data center. The strategy is just as crucial the IT approach it protect sand provides for and the business strategy that both empowers, allow and authorize.

A data center strategy is anything but a remedy. It must address the exclusive requirements of the business and take special consideration for the growing intricacy of choices available. Strategic forecasting is not an attempt to jettison risk or to forecast what the data center will look like in fifteen years, it is taking action to understand what risks to take and what paths will bring in to line with the business.

Decision Process is the foundation for Information Technology. To formulate a data center strategy in the past was upwards of 15 years. The business and IT strategies, as these were stuck and unable to align its goals, so an IT strategy was brought combined with the technologies and business planning.

Virtualization
Virtualization has contributed more to data center strategies, more than any other available strategies. Virtualization became a part of the larger cloud computing concept, which engulfs many technology and business aspects. With the advent of technology innovations, there came an increased pre-requisite of the data center facilities that were to support them. These data center set ups faced a similarly multi faced environment as it adjusted to not only ensuring consistency, but also responding to cumulative power and cooling demands. There were many assumptions that brought about traditional IT environments that had followed the data center for years, were now being challenged and data center technology saw advances like no other time in the history.

This paper explores the idea to build racks and view them in the directory, so as to facilitate the ease of monitoring data centers using the above concepts.

RESULTS: We successfully developed on the dot net platform, the tool to view the racks in the network. The prevue of screen shot of the tool can be very well seen in the images given.

Figure 1

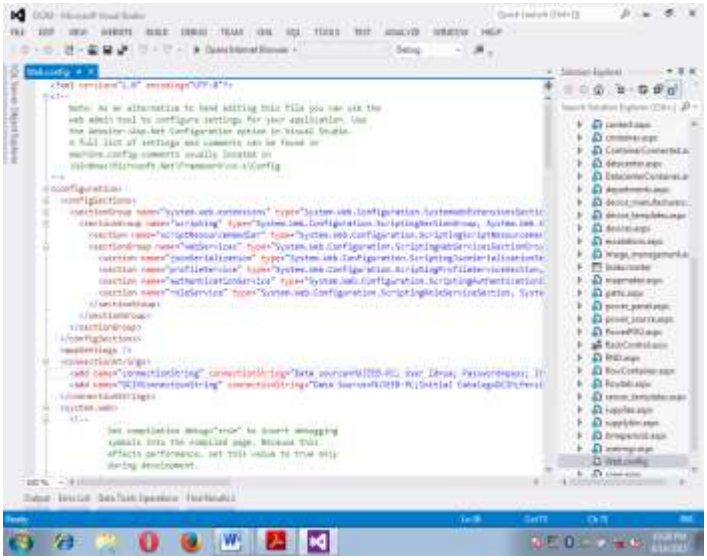

Figure 2

4. CONCLUSION

Hence we can now easily locate the racks and develop data center in a much flexible way. We propose to have further developments in the tool developed by us.

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