A STUDY OF DATA CENTER TIRES AND REQUIREMENTS

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ABSTRACT

Due to the emergent need of software usage there is tremendous increase of data storage day by day. The space requirement of it is a primary concern in cities. The volume of based on the types of the business and the quantity of data required for the business .Enough server space is required to store the data efficiently. Having tires in the datacenter will enhance the storage level and security of the data. In this paper the section one introduces about data center and its types and the section two introduces the about the features of the DC and critical elements of various tires based on the requirement. , the section three describes significance of different tires in data center based on the different requirement and the final section will show the security in data center for better integrity in using data centers.

Index Terms –tires in data center, Uptime institute, IoT Architecture, Virtualization, Green Data Centers

Abbreviations: Telecommunication Industry Association (TIA)
Software defined datacenter (SDDC)
Data center operating systems (DCOS)

1.0. INTRODUCTION

Now data centers where internet based data are handled from remote places. Data from different places is being entered,, processed backed up and in a specified. .many servers a placed in data center in compliance with standards Data center is a place where all these servers are gathered in compliance with art of technology. The service need to be maintained for the integrity of the server. Most of the organization irrespective of the types now prefer data outsourcing to avoid the maintenance cost.

1.1. Types of data center

Many different types of models and facilities of the DC exist all over the globe. Below are the various types mentioned [7]

(a) **In-House Data Center:** Several enterprises, mainly big institutions create their facilities as per there requirement. The colocation space will be provided to organization by cage „rack and cabinet. Different t types of organization can be benefit by these type of service. Here the maintenance of the organization hardware requirement which need for storage provisions be done by the customers and the protection will be given by the providers.

(b) **Wholesale Data Center:** The customers of whole sale dc is minimum and actually give the space for lease rather than going for colocation model. The space is built for single tenant.

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(c) Dedicated Hosting: The server used by these providers will not be shared to many customers. The operation and renting will be given to dedicated customers.

(d) Managed Hosting: Here, other than giving server to customers they will also take care of the facilities like operating system management, database administration, ,recovery of the databases, monitoring of the systems from remote location etc. the ownership of the hardware be by customer and the provider.

(e) Shared Hosting: Here the provider allow the customers to share server capacity. Go-Daddy Network Solutions are hosting companies..

2.0: Features of the modern data center: Data Center administrators to integrate new technologies and processes. Data Center apart providing security and storage of data ,now also providing different optimized tools and technologies as well as services and it is becoming a greater benefit to .some of the features of the data center are

Software Defined Data Centers (SDDC):

Rather than having physical systems in data center the virtual layer is having tremendous impact in the benefit.it is also provided to the customers as software defined services in all aspects as big mega scale dc are now transferring to software defined dc.

Data Center Operating Systems (DCOS). In order to have DCOS .we should adopt an operating system to manage chips to the cooling in the data center.

Infrastructure Optimization by Agnostic Data Center

The Data Centers will organized with layered management tools that can consolidate the requirement based on necessary workloads.. The Data Center will have infrastructure optimization, the management layer will be have depend on the kind of hardware deployed

Better Control Layers: Here every data center will be hosting different types of systems and so we should have diverse functional systems and with the help of application program interface

2.1 Critical elements of data center

(a) Environmental controls: A well controlled and reliable environment is the prime requirement of any data center. Entire system to be controlled other than cooling ,humidity control.

(b) Security: Keeping your systems under lock and key and providing entry only to authorized personnel goes hand and hand with permitting only the necessary access to servers, applications and data over the network.

(c) Accountability. Conducting Audit of network service ,application, file resources should be turned on. Last but not least, every system should have an identified owner, whether it is a server, a router, a data centre chiller, or an alarm system.

(d) Policies: policy behind it to help keep the environment maintained and managed. You need policies for system access and usage (for instance, only database administrators have SQL server Control.

(e) Redundancy: It is, more expensive, and highly critical, so we should have a separate tire for security separate tire. for example to have separate tire for mail servers, Internet service provider, data fiber links, or voice over IP (VOIP) phone system VMs.

(f) Monitoring: The uptime ,usage of bandwidth , and also well as energy required , storage needed, physical rack space required will traced out to perform the service in efficient manner.

(g) Scalability: If the company needs more servers today for an array of tasks including virtualization, redundancy, services, email, databases, and analytics they should make sure you have the appropriate sized needed with sufficient expansion capacity to increase power, network, physical space, and storage..

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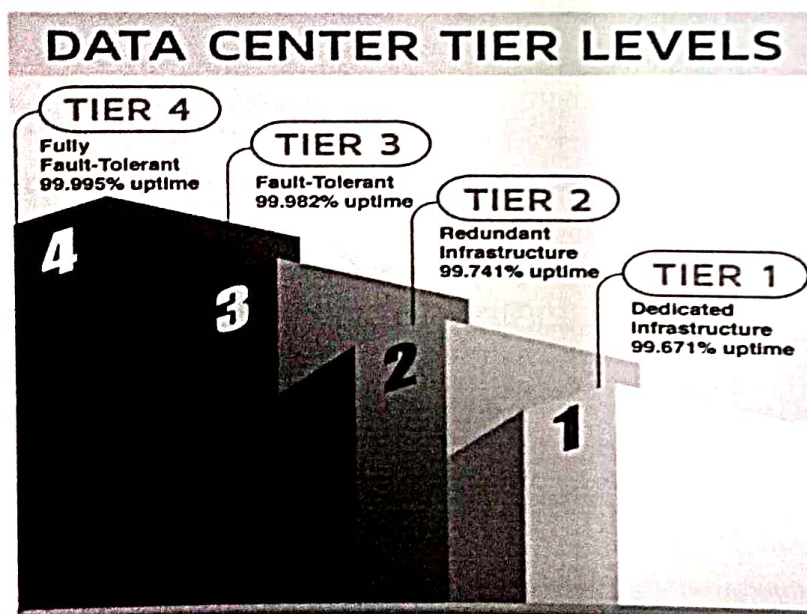
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3.0. Data center Tires: TIA standards classify Data Centers into 4 Tiers successive tire will have the facilities of the previous for example the fourth tire will have the infrastructure of all the three previous tires tire one, tire two, tire three tire[10].

DATA CENTER TIER LEVELS

TIER 4 — Fully Fault-Tolerant 99.995% uptime
TIER 3 — Fault-Tolerant 99.982% uptime
TIER 2 — Redundant Infrastructure 99.741% uptime
TIER 1 — Dedicated Infrastructure 99.671% uptime

(i) Tier 1 Data Centers: The Companies who doesn't keep server in office will require a dedicated infrastructure for storing data will have first Tier 1 center. The protection during critical time is less in tire1.[11]

Fundamental requirement of Tire 1: IT require non redundant capacity components.it require a specified area for IT systems like uninterrupted power supply, dedicated cooling systems, as well as on-site power production .

Performance confirmation of Tire1 will require most or all of the site infrastructure systems to need to be shut down by that will end .

Impact due to the operational issues of Tire 1 : Can occur in the site due to both planned and unplanned activities. The site must

completely shut down on annual basis to repair the work.

(ii)**Tier 2 Data Centers:** Tier 2 level will be used by organization to use the processing without any down time. This gives the customers more reliability against disruptions.

Fundamental requirement of Tire 2: tire 2 has a non-redundant capacity component .it also require extra onsite power production example engine generator fuel cell etc.it also require twelve hours of onsite fuel storage from onsite power production.

Impact due to the operational issues of Tire2:. If in case failure to regularly perform maintenance it can be done by shutting down the system will significantly increases the risk of severity of consequent failure.

(iii)**Tier 3 Data Centers:** Organization who want to deliver the service real time such as health care industry will utilize a Tier 3 level data center without disrupting service to the customer repair and maintenance and repairs can be performed.

Fundamental requirement of Tire : . Every IT requirements used is dual powered and installed properly to the compactible with the topology of the site architecture. Twelve hours of onsite fuel storage for N capacity is required.

Performance confirmation of Tire3: All the capacity components and element in the distribution path can be removed from service without impacting the critical environment.

Impact due to the operational issues of Tire3: During maintenance activities the risk disruption be elevated.

(iv) **Tier 4 Data Centers:** Have all the four tires with an added layer by merely adding new layer of fault tolerance. Power control, maintaining cooling and storage are all independently dual-powered. down time is least.

Fundamental requirement of Tire 4: Here the systems are separated physically and that have components of diverse multiple distribution paths IT requirements need a dual power fault tolerant systems .complementary systems must be physically compartmentalized .continuous cooling required for the systems.

Table (a). Application and uptime of tires

Tier Level	Applications	Hours allowed	uptime
1	Utilized by small businesses	1,729.224 minutes/ 28:817 hours allowed	99.671% uptime
2	Utilized by medium businesses	1,361.304 minutes/ 22.688 hours allowed	94.741% uptime
3	Utilized by larger businesses	94.608 minutes/1.5768 hours allowed	99.982% uptime
4	Utilized by Enterprise corporations	26.28 min/ 0.438 hrs allowed	99.995% uptime

Performance confirmation of Tire4: Failure in one capacity system will not affect the critical environment Infrastructure autonomous response to failure sufficient capacity to meet the user needs any defect must be capable of being detected, isolate and contained while servicing the critical load.

Impact due to the operational issues of Tire4: The services can be using redundant capacity components .operation of a fire alarm ,fire suppression or emergency power off(EPO) may create disruption in data center.

4.0. DATA CENTER OUTSOURCING ADVANTAGE AND DISADVANTAGES:

ADVANTAGE: When the data is Outsourced in the data centers ,the business people will achieve major economic benefits as well as other related benefits .Also the efficient running of a business while reaping other related benefits[10]

DISADVANTAGES: Due to lack of face to face communication with clients .potential risk Security related issues can arise due to increased dependence on the data center provider..There is no guarantee in technology we have to prevent our data center from natural disasters .[10]

5.0.Improvements in DATA center :the

methodology to improve the every resource in the data center updated day by day.The key questions here are mentioned below..

(i) Improve the efficiency of data center technology through Artificial Iintelligence: Now through AI, We have a refrigerator which can facilities tp check the item in the shelf at home, similarly we can have data center hardware to perform to control and monitor other devices in the data center.

(ii)Collecting Operational Data: By using Internet of things based monitoring of DC components will allow as to compare the expected output with the actual performance.The different data points are temperature requirement,times of data retrival,and usage of power.

6.0 CONCLUSION AND FUTURE SCOPE

A detailed discussion of a variety of issues faced by data centers as well as the requirement in the data center are discussed,. We also discussed a variety of challenges to be solved in the areas of data center storage, networking, management and power/thermal issues. It is hoped that the article will provide researchers many interesting avenues to explore in realizing the vision of highly scalable, well managed and energy efficient, distributed virtualized data centers of the future.

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