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[4]   International conference on Emerging Trends & Contemporary Practices (ICETCP-2022) "The Sustainable Energy Conservation Designed for Data Center Infrastructure Development Using Machine Learning Model", Atmiya University

FDP:

[1]   One day faculty development program "Structural Equation Modelling".

[2]   Two weeks online faculty development program on "hands on writing and publishing research paper for reputed journals".

[3]   International Faculty Development Programme (FDP) on Data Analytics and Machine Learning.

Workshop:

[1]   Atmiya University, Lincoln University, "Writing effective empirical research paper".

[2]   Rest Society for Research International, "One Week Workshop on Copyright, Patent Filing and Journal Indexing".

Webinar: 5 online webinar attended to helpful in my research work

Certificate: 26 Online Certificate course are completed to help full and update my Knowledge to my research work.

Publications

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Analytical Comparison of Cloud Data Centre Services and Cost

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Analytical Comparison of Cloud Data Centre Services and Cost

H Rayjada[1] and P Shukla[2]

[1]Research Scholar, Atmiya University, Rajkot, India.
[2]Research Supervisor, Atmiya University, Rajkot, India.

E-mail: hrdk003@gmail.com

Abstract. Comparing with the traditional data centre, cloud computing makes it easier for enterprises to scale their services and lowers the cost of access for smaller companies. The cost comparison between cloud computing and the old-style data centre is an important issue of concern. In this paper, the cost roles traditional cloud data centre and server room are settled up, the performance of the data centre and cloud computing were tested based on the compared with the data centre with low workload intensity strength. More than a few data centre have a primary backup of data and servers. The cloud data centre provider like Amazon, Google Facebook data centre are called Availability zones. The availability zones are a within the same region, distinct colocation centre is connected to Virtual Private Cloud network. This research discovering new network architectures for the data centre. In this paper, we considerate the among different data centre charges and network architectures. the comparison on cost using current and predicted trends in data centre cost and power consumption.

Keywords: Data centre cost, Hardware, Cloud Services, VPN.

1. Introduction

The data centre is replacing server rooms to design a modern type and managed by IT staff. The world moves on the cloud, shifting their focus from following old-style private customers to the needs of large cloud service and data storage providers Wenders like AWS, Google, and Microsoft. This paper presents comparison of the clod server services costs namely, AWS, Google, Microsoft, NIC, Ctrls. A minimum services cost calculation approach is used, each of this information of data center costs are evaluated from price compare to physical server's components available on the market. Our 2019 Data Center Marketplace statistical Report emphases on the supply and growth of requests of usage on data center across. The cloud data center is a hybrid, and environments data center in this article, we'll improve in on the largest data center services, staffs and compare customer size, storage and apply trends across them. The results of reveal data center that taken economic savings in each architecture the data center size and design that depend on of data center. The most cost-efficient planning is offers low costs for large server size data centers. In all considered set-ups it has been practical data center scenario.

2. Basic Server Requirement

2.1. Virtualization Software

Virtualization has revolutionized computing and IT, VM take convert an important part of computing, cloud computing, business and also Small Industry who's not afford mor then especially one server. Still, virtualization is rather then similarly offered to home based users as well small industry. Virtualization software tolerates more than one operating system using virtualization only one Server. The concept of Information technology is use minimum hardware resources that masks the physical nature and limitations of users. VMware provides cloud data center computing and virtualization software [6]. VMW Require Hardware for Workspace ONE Assist Server CPUs 2.4 GHz Processors, 4 Logical Processors, 2 CPUs, 2 Core 2x2 or 4 physicals depending on machine type, virtual machine, or physical, Memory 16 GB, Hard Drive IOPS-200, Hard Drive Space 100 GB for OS drive, Bandwidth 1 MB/per minute [1].

2.2. Windows Server hardware Require

Windows Server Essentials 2012/16/19 64-bit server software operating system. Defines the recommended minimum hardware provisions designed for Windows Server hardware System requirements CPU socket 3 GHz (64-bit processor) or faster for multi-core (two core), Memory (RAM) 4 GB, Hard disk available for systems operating systems storage space 60 GB [2]
Real hardware requirements will be situated based on system configuration, requests and structures select to installation.

2.3. SAP HANA hardware requirements

The SAP HANA hardware requirements is depending on the of SAP HANA version. HANA in installing and Configure to additional features adding and sizing the database storage capacity. ERP SAP HANA requirements hardware CPU core 8 cores, memory RAM 128 GB, Hard disk for storage 20 GB, Network 10 GB/ second backbone connectivity, Bandwidth 1MB/ per minutes [3].

2.4. Standard ERP Systems Requirement

Standard ERP will typically be installed on core Server or Virtual software for ERP system in a business, the core ERP system is combined to on-line front-end server. The serious part of software in business is an ERP. The ERP software cost and unavailable installation is consequently usually very high. The employers expected regular users in a typical system using the Sales, Purchase and Nominal Ledgers, Logistics and CRM. Standard ERP Recommended Server Hardware CPU Core 2.5 GHz 4core, Memory RAM 16 GB, Hard Disk 20 GB, internet 1Gb/s [4].

2.5. SQL Database minimum hardware requirements

The SQL data base Server on 2019 support on the Windows, Linux and Mac operating system. SQL Database minimum hardware configuration requirements to installation. CPU 2Ghz speed, 2 Core processor, RAM 2 GB, Hard Disk space 6 GB.[8]. This is a minimum recommended Hardware for ERP system. CPU core and RAM not major change for up gradation, HDD based on OS and ERP Calculate actual Storage depend on Data base. In addition, configuration RAID server then requires plus storage.
The Small and medium Industries require minimum Software Capable Hardware, Table 1 Calculate to bunch of software require to Small and medium Industries ERP require Server Hardware configuration.

Table 1. Minimum Server Hardware requirement to each complete server solution.

Software	CPU	RAM	Storage
VMWare + Windows Server + ERP SAP HANA + SQL DB Server	16 Core	152 Gb	186 Gb
VMWare + Windows Server + Standard ERP + SQL DB Server	12 Core	40 Gb	186 Gb
Windows Server + ERP SAP HANA + SQL DB Server	12 Core	136 Gb	86 Gb

2

| Windows Server + Standard ERP + SQL DB Server | 8 Core | 24 Gb | 86 Gb |

3. Cloud Data Centre Services

3.1. Amazon Web Services (AWS) Data Centre:

The Amazon Data center is are provide to this statement includes a total cost of ownership (TCO) among running Amazon Web Services plan on-premises or colocation infrastructure in Amazon Web Services. The on premises and colocation set-up is built on the account provided in the online portal. The Amazon Web Services colocation infrastructure is an evaluation of the infrastructure defined. These calculations use third-party estimates and expectations. The monthly charge will be based on actual usage of Amazon Web Services differ from the estimates the cost has provided. This online calculator provides a valuation of usage charges for Amazon Web Services created on online support and information on condition that [5]. AWS three years total cost of ownership On-Premises cost is 15116079 and AWS cloud cost is 3604389.his provide just price not more technical details in online quote.

3.2. Google Cloud Data Centre

Google Data Center Policy is a supplier of processing assets for conveying and working applications on the Cloud. His claim to fame is giving a spot to people and undertakings to assemble and run programming, and it utilizes the web to associate with the clients of that product. Google cloud has a massive network of computers optimized for storing objects on the Internet. pay Google the storage and bandwidth costs for storing that object on their servers and letting people access it whenever [6]
1 x sw, total 730 hours per month, VM class regular, Instance type n1-standard-8 (8 Core, 30 GB RAM), Region: Mumbai, Paid OS Cost: INR 89,396.34, GCE Instance Cost: INR 17,457.42, Total accessible local SSD storage space 6x375 GB, Continuous Use Discount is 30%, Effective Hourly Rate INR 168.524/-, Probable Component Cost INR 123022/- per one month, Total Estimated Cost INR 123,022/- per one month. n1- standard and 730 hrs. per month total 3 years const is 4392828.

3.3. Microsoft Azure Data Centre

Microsoft Azure cloud data center earlier known as Windows Azure, is Microsoft's public distributed computing stage. It gives a scope of cloud administrations, including figure, examination, and stockpiling and systems administration. Sky blue is a public distributed computing stage with arrangements including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) that can be utilized for administrations, investigation, virtual processing, stockpiling, and systems administration [7]. Region India, Operating System Windows, Tier Standard, License SQL Enterprise, D4 v2, one Virtual, 8 Core, 28GB RAM, 400 GB Temporary storage, 2 TB SSD. 3 years plane is 6592356.

3.4. CTRLs Data Centre

On date of   we generate query and send mail to Ctrls Data center for minimum requirement for Data center services and storage. Ctrls Data centers was set up in October 2007. At Ctrls cloud data center is more prominent significance to us than keeping applications on the cloud and web and information secure. Our pledge to taking all out responsibility for has brought about an advantageous customer portfolio, including probably the most famous brands in Indian industry. Ctrls data center is likewise the best option for the new generation business visionary whose trust on Cloud programming needs secure, ceaseless facilitating. The Ctrls data center also 3 years total approximate cost is 3518712 included all type of assets like ip, firewall, bandwidth.

3.5. WebWerks Data Centre

Webwerks cloud Data Centers are front-runners in India for the past two years. Each of our facility is a High-density, Hyper-scale and Artificial Intelligence-powered infrastructure, offering best-in-class service support and uptime. We aim to maintain and keep raising these standards with new Data Centers across India to ensure that our clients achieve business efficiency by addressing all concerns regarding their Data Center needs with unprecedented ease. 3 years estimated plane 2028960

3.6. National Informatics Centre (NIC) Data Centre

National Informatics Center (NIC) was set up in India 1976, and has ridiculous involvement in Cloud Data Center with giving ICT and e-Governance backing to the Government throughout the previous forty years. NIC initiated "Informatics-Led-Development". The Central Government, 37 State in India Governments/Union Territories, and about 720+ District Administrations of India. Government of India has set out upon an aspiring activity "GI Cloud" which has been named as "MeghRaj". The design vision of GI Cloud incorporates a lot of discrete distributed computing situations spread over various areas, based on existing or new (increased) framework, rules and norms gave by the Government of India. Approximately 3 years cost is 2778264.

Table 2. Comparative Table for Hardware

Tech. Details	Google	Azure	AWS	CTRLs	NIC	Webwerks
Core	8 Core	8 Core	8 Core	8 Core	8 Core	8 Core
RAM	30 RAM	28 RAM	24 RAM	24 RAM	24 RAM	32 RAM
Storage	2 TB	2 TB	2 TB	2 TB	2 TB	6 TB
Per Month	123023	183121	100122	97742	77174	56360
3 Years	4392828	6592356	3604389	3518712	2778264	2028960

4. On Premises Server Cost

The on premises server setup with basic configuration is with 3 years hardware support 287289 it's for reference cost but above all price and technical configuration are based on reference actual charges required bittered bill.

5. Virtual Private Network

The Virtual Private Network creating a secure network tunnel connection to data center network over the Internet. The virtual tunnel works by encapsulating data in an encrypted data packet. The performance of driving the message into the packet address is equivalent to encapsulation and data on the Internet, create a virtual tunnel.
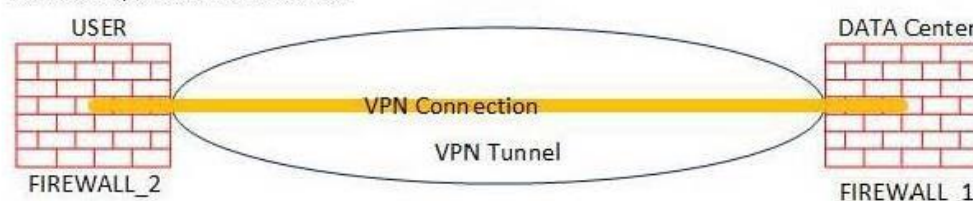

Figure 1. Virtual Private Network Tunnel

The common challenge that all companies' aspect as soon as they outsource their Internet hosting providers is will connect their Company, offices, stores and remote employees to their outsourced hosting set-up in the data center. It is important to inspired and untrustworthy networks after accessing company applications running in the data center.

5.1. Site to Site VPN Connection

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The Site to Site virtual Internet connection is the call remote connection data center, connect these VPN locations is the data center is established working through the Internet is lowest charge option. VPN capability to the secure and configure into firewall appliances power before now have the equipment needed. In the intervening time.

5.2. Point to Point VPN Connection
Point to Point Connection is company network and the data center network may be the method to go virtual network. The main advantage of the wireless capability is built into the air connection to main site to data center, is that don't requirement a wired connection at company location. this air connectivity option for the data center locations that do not have ready access to any Internet Service Provider.

5.3. Third Party Connection
The third-party worker is possible and capacity this result is another method of the point to point connection in its area. The company could use any third-party through air connectivity its solutions provider to get a point to point connection between company locations and the data center.

The data center Virtual private network via third-party Service providers has charges mentioned in table3

Table 3. VPN Service Cost Comparative

Description	AWS	CTRLs	Azure
VPN Site to Site per month price	5491	12600	1737
1000 GB Data usage in month	4576	5000	5948
Price per month	10067	17600	7685
Price 3 Years	362412	633600	276660

Conclusion
I was identified at early stage the Small and Medium industry use on premises server room. Small and medium enterprise businesses can't afford Cloud Data center. Medium and private company firing up business, and associate with workers in a server farm.

Client can't be able to choose what equipment is being utilized for worker stacks. Monetary weight associated with framework and upkeep for an on-location worker can be critical, Each Small and Medium Enterprise or company has different needs, and his Small ERP or SAP HANA works for company is basic need not necessarily working to cloud solution.

When medium and small user comes to the local Server Room or Data center there are a many factor to consider, many of which come down to individual preferences. The best way to make server room decision is to determining. The ERP required a simple server to SME database solution is very straightforward.

server room and data center and normalization things in this article is as per require meant and after calculation the local server room is suggestible to SME. In both scenario in this comparative services research paper. Server room and Data center working functionality both same but on premises data center is cost effective.

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ANALYTICAL RESEARCH OF DATA CENTER SECURITY IMPLEMENTATIONS AND CYBER ATTACKS

Hardiksinh Rayjada, Dr.Vaishali Parsania
(PhD. Scholar, Department of Computer Science, Atmiya University, Rajkot, (Gujarat), INDIA)
Assistant Professor, Department of Computer Science, Atmiya University, Rajkot, (Gujarat), INDIA)

Abstract— As the Internet is not secure; data center security can be at a threat due to any anonymous attacks. The Physical Security setup on the data center is the set of protocols within the data center facilities. Virtual security is a very hard task to handle, as there exist many ways and confidentiality Datacenter. Standard attacks are daily threats for the data centers. WAN, LAN, and HOST security require server implementing security more than seven tins to protect server attack from a virus, Hacker, and human. Data centers maintain multiple levels of security on a 24*7*365Days, Network protection, inside and outside security Firewalls, and data protection is a major critical area for security break. Servers implementing security can have more safety data.

Index Terms— Physical Security, Virtual Security, Firewall Security, server security, Network Security, common attack, Inside and outside data center security, data privacy, security issues. WAN, LAN, HOST Protection

1 INTRODUCTION

Data center security is important features of the data center, mission-critical infrastructure, Data breaches, cyberattacks are a growing threat for any data center. Datacenter security is mentions to the physical and virtual security used to protect a data center from external risks and attacks. Data centers consider physical, technical, environmental hazards, natural disasters. Data centers maintain multiple levels of security on a 24*7*365 Days. In order to enter the premises, first, be given permission to pass through a gate entrance on a wall surrounding the property. Walking through the front entrance, which a guard protects, requires additional permission by an individual. Security levels heighten the closer you get to the core of the data, the servers, and networking areas. The entrance into the core done via a turnstile that opens with the badge and biometric permissions. Once actually in the core workspace, intrusion detection systems are in place to ensure that through all the levels of security, no unauthorized entry individuals are present. Multi-levels security to keep data safe.

Datacenter security is the established rules, or set of policy protections and practices for restrict unauthorized administration access of data center resources avoid. A data center security is system critical Theft of confidential information, data alteration, and data loss are

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common security problems.

2 WAN SECURITY

WAN (Wide Area Network) a wide area network (WAN) is a wide geographically distributed private telecommunications network that interconnects multiple local area networks connect cities, states, or even countries. WAN connect to a company's headquarters, branch offices, colocation facilities, cloud services and other facilities. A router multifunction device is use to connect a LAN to a WAN. WANs are not restricted to the same geographical location as a LAN. A LAN can be setup in any number of geographical areas and connected to a WAN. WAN is not constrained to one specific location.

Man-in-the-middle attacks the attacker wants to intercept a communication between person A and person B. Person A sends their public key to person B, but the attacker intercepts it and sends a forged message to person B, representing themselves as A, but instead it has the attackers public key. B believes that the message comes from person A and encrypts the message with the attackers public key, sends it back to A, but attacker again intercepts this message, opens the message with private key, possibly alters it, and re-encrypts it using the public key that was firstly provided by person A. Again, when the message is transferrin back to person a, they believe it comes from person B, and this way, we have an attacker in the middle that eavesdrops the communication between two targets. Here are just some of the types of MITM attacks: DNS spoofing, HTTPS spoofing, IP spoofing, ARP spoofing, SSL hijacking, and Wi-Fi hacking

2.1 VIRTUAL SECURITY

Virtual security is measures placed in data centers to prevent remote unauthorized access that will affect the truthfulness, availability, or confidentiality of data stored on servers. Virtual security is a hard task to handle as there exist many ways it could be attacker. The wickedest part of it is attacker could decide to use a malware or similar make use of in order to bypass the multiple firewalls is access to the data. Old systems put security at risk, as they do not contain modern methods of data security.

Vulnerabilities	Firewalls	Databases	Application	Physical Security	Insecure Wireless	VPN	Total Score
Threats							
Password Attacks	9	3	9	9	9	3	42
Insider Attacks	3	3	3	9	3	1	22
DDoS	9	0	9	1	3	3	25
Theft of Hardware	1	1	1	9	3	1	16

Data encryption during heavy data transfer 256-bit SSL encryption for web applications. 1024-bit RSA public keys for data transfers. AES 256-bit encryption for files and databases. Logs auditing activities of all users with Secured usernames and passwords Encrypted via

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256-bit SSL, for complex passwords scheduled expirations of the prevention password reused. Access based password on the level clearance AD and LDAP integration to control based IP addresses. Encryption based session ID creates cookies in order to identify each unique user and Two-factor authentication availability. Third party penetration testing performed annually, Malware prevention through firewalls and automated scanner. Today mostly attack endpoints, many hackers know that users implement firewalls and set many policies, so it is very hard and only one way to enter the network, but the endpoint target is easy to inserts into a network. Today many users use social site Emails and download multimedia, so the backside of all-think's vires placed and sent them after end node restart or specific time to trigger the virus to run and expand to all networks. Strongly secure end-user and then security get strong end network switch also use an only manageable switch and place some security policy.

2.2 FIREWALLS SECURITY

The web server's requirement to tolerate access website runs on public services can access this web services incognito on the internet. Private web services used when dealing with a database control panel and the number of selected user requires access to the webserver. Authorized to login into accounts with special privileges the servers.

Internal services are that it had better never be expos to the internet or outside world. They are reachable from the server and connections of internet and firewall policy is to allow or restrict access according to the service-authorized user for Configure the firewall to restrict all services except for your server. A firewall is a sophisticated internet data-filtering device that separates LAN and WAN segments, giving each segment a different security policy that applies to a different level and establishing a security parameter. The traffic flow controls between segments and Firewalls are most commonly deploy at the Internet Control, where they performed as a boundary to the internal networks.

The firewall is to separate secured and unsecured areas of the network. Firewall Performance is becoming a natural design factor in ensuring that the firewall meets the particular requirements. Firewalls are work as a primary traffic path potentially exposed to large volumes of data. The firewall to control and protect a particular application or protocol application support is an important aspect. The connectivity is Telnet, SSH FTP, and HTTPS. The firewall is work to understand application-level packet exchanges and determine whether the packets move the application behavior and deny the traffic: the firewalls Filtering, Packet, Proxy, Stately, Hybrid information packet processing based on application-level capabilities.

2.3 COMMON ATTACKS

Scanning or Probing One of a probe or port scan-based attack is a port scanning requests a range of server port addresses to host are used to find an active port and then cause and effect harm via a known vulnerability of that service. This reconnaissance activity frequently precedes an attack. Its goal is to user access by discovering information about a system or network.

DoS (Denial of service): A denial of service attack when authorize users are unable to access systems, devices, and other network resources due to malicious cyber threat actors. This type of attack generates large data volume of intentionally consume limited internet resources as internet bandwidth and CPU utilization and blocks memory. Distributed Denial of Service: DDoS type of attack is a particular case use of DoS command a large number of systems are

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connected to a network and compromised used as source network or traffic on a synchronized dos attack. The hacker does not use this type of attack, only one IP address but thousands of them. Unauthorized access uses privileges associated with a compromised account to access restricted resources using a valid account or a backdoor. Etymologically, Eavesdropping Secretly listen to a conversation. Inside the networking is an unauthorized interception of information using usernames and passwords that progresses to network. Users can use logons to credential find.

Viruses and Worms when executed produce undesired results; there is malicious code that Worms are self-replicating malware, whereas viruses, which also can replicate, need some kind of human action to cause damage. Internet Infrastructure Attacks: This attack targets the critical components of the Internet infrastructure, preferably use separate network systems. Trust Exploitation: These type attacks exploit the trust relationships to computer systems ant connect to communicate that. Session Hijacking: cookie hijacking it is a Consists of stealing a legitimate session established between a target and a trusted host. Cookie hijacking the attacker intercepts the session and makes the target believe it is communicating with the trusted host. Buffer Overflow Attacks: the program allocates memory on buffer space. Behind the reserved results in a memory, corruption in the memory areas that were affecting the data stored overflowed. Layer 2 Attacks: This layer 2 type attack utilize the vulnerabilities of data link layer protocols on layer 2 switching platforms and implementations. SQL injection: code injection is inputs to a data entry form due to incomplete data validation and allows entering harmful input that causes harmful instructions to execute.
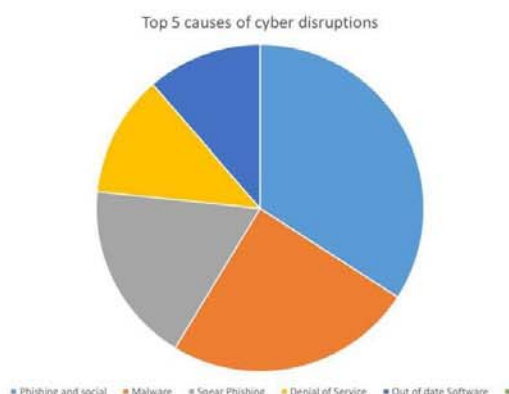
Cyber Disruptions, 50% of the organizations reportedly affected in 2017, this is top 5 causes of cyber disruptions

3 LAN SECURITY

LAN is a group of computers and network devices, which are all, connect to each other, a short geographical distance. A local area network is a small area Local LAN Network of computer network. LAN is limited to a single office and building or one LAN can be connect to other LANs. LANs connected in this way is a wide-area network. There are few different ways to provide security for local LAN networks. The common types of hardware and computer that used Local LAN Network setups. One common policy is to apply security is install a firewall it is also proper to use specific security protocols like WPA or WPA2 for

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password encryption on traffic coming in from the internet. The network administrators filter traffic using a detailed information of trusted network parts, authentication policies of network traffic inspected to network prevent different kinds of unauthorized user access. The TUNNEL technologies VPN, control packets through different layers of the OSI model. LANs normally need internal security strategies to routers, manage switches, antivirus, firewall that serve different parts of the network security. Anti-virus or anti-malware end user security is hacking functions are introduce to networks through user activity. Snooping viruses and malicious programs operate a user to opening an email, downloading a file from a banned site and source or otherwise opening the internal LAN to exterior threats are loopholes and prevent as many vulnerabilities as possible.

3.1 NETWORK INFRASTRUCTURE SECURITY

Access Control List is filtering machines clearly defined based on packet header information to permit or deny traffic on specific interfaces. Access Control List is use in multiple locations within the Data Center, the Edge of the Internet, and the intranet server farm. This standard and extended access lists.

Standard Access Control List the simplest type of ACL filtering traffic simply created on source IP addresses. Standard Access Control List is typically deploy to control access to network devices for network management or remote access. Configure a standard Access Control List in a router to specify which systems are allow to Telnet to it. Standard Access Control List is not the recommended option for traffic filtering due to their lack of granularity. Standard ACLs are configure with a number. Extended Access Control List filtering decisions are the source and destination IP addresses based on Layer 4 protocols ports ICMP message type and code, type of service, and precedence. Define extended Access Control List by name or by a number.

3.2 SERVER IMPLEMENTING SECURITY

Hackers are all times active and look out for server and network vulnerabilities. It is our responsibility to confirm our data is safe and secure. Curtail risks and be confident our data is safe and secure on server's implementing security. We deployed security features on our data center servers.

3.2.1 Password Requirements

The first step is to apply a password with complexity length, require policy rules, a password passphrase I love! ToEatPizzaAt1676MainSt is longer than a normal password, not allow empty or default passwords. Do not store passwords. Set Password Expiration Policy establishing requirements for users every week or month. It contains upper case and lower case letters, digits, numbers, and unique characters. Considerable easier to remember a passphrase than randomly letters. Use 49 characters. It is more difficult to crack. Remember password, do not write any paper, and hide any place in the office. Not to use personal information, mobile number, birthday date, hometown number, pet names these are easy to guess people know personally. The same password does not use multiple accounts.

3.2.2 Secure Server Connectivity

The SSH (Secure Shell) Remote server connection is important Protocol to provide a secure channel communication in establishes a protected connection. Telnet and SSH access encrypts protocols are all the data transmitted and exchange. Install SSH Client SSH protocol uses port 22 every one hackers change port numbers between 1024 and 32767.

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3.2.3 SSH Keys Authentication

SSH authenticates in the server is using SSH keys pair, the SSH keys carry bits password and they are uncrack able RSA 2048-bit encryption is equal to a 617-digit password. The key pair change to a public key and private key. The public key shared with users and leftovers on the server. The private key can read this data. The data do not share by anyone and saved secure. The server requests the user have the private key before allowing privileged login access.

3.2.4 File Transfer Protocol

File Transfer Protocol Secure (FTPS) as a FileZilla server work without danger of hackers compromising or stealing encrypts data files and authentication information. File Transfer Protocol Secure uses a command channel and a data channel. The files protect encrypt during transfer. They reach the server and the data is no longer encrypt.

3.2.5 Secure Sockets Layer Certificates

Secure Socket Layer (SSL) that protect administration areas and forms information are pass between two systems connected to the internet. Secure Socket Layer can used individually in server to the client and in server-to-server communication.

3.2.6 Private Networks and VPNs

Private and virtual private networks (VPNs), Private networks use a private IP to establish isolated communication between servers and the user. Without exchange information and data exposure to a public network. Virtual Private Network (VPN) is just like a LAN. We provide VPN Connection to All users is more secure to the internet.

3.2.7 Login Attempts

Login attempts is to protect the server against to brute force attacks. These brute force attacks is automated attacks script use a trial-and-error method. Attempting to every thinkable combination of password with letters, digit and numbers to access to the server or nod. Software oversees all log files and detects suspicious login attempts. The user attempts numbers of time login then exceed the set norm, and software blocks the IP address.

3.2.8 Manage Users

Every user only roots the login server has a root user who can execute any root command; it falls into the wrong hands is hazardous to the server. Disable the root login in SSH. Hackers focus their attention to crack the root password. Create a limited user account and do not the same authority to perform administrative tasks using root commands

3.2.9 Update software regularly

Regularly updating and upgrade the software is the first line of defense. A server is a crucial step it safe from hackers. Automatic updating software in background and examine how the update and performs in a test environment. Update plugins, and security patches to check fix security issues.

3.2.10 Turn off All Unnecessary Services

This cybersecurity term mentions to install and maintain bare minimum requirements for running services. Server operating system installation necessary programs listed. Firewall allow only specific ports and deny all other port.

3.2.11 Hide Server Information

Provide less information about the underlying infrastructure as possible, hide the version numbers of any software installed on the server. We are deleting HTTP header.

3.2.12 Integrated Defense Security

Intrusion detection system detects any unauthorized activities, monitors processes running on a server. Check day-to-day operations. IDS Solutions are real-time systems that can detect

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intruders and suspicious activities and report them to a monitoring system. They are configure to block or reduce interruptions in progress and eventually immunize the systems from future attacks. They have two fundamental components.

3.2.13 File and Service Auditing

File and service auditing is an additional way to find out annoying users changes in system records of all the features of systems healthy. Service auditing discovers running protocols on the server, their protocols are which ports they use communicating from side to side.

3.2.14 Back-Up Server

Store encrypted back-ups of critical data offsite or use a cloud solution. Schedule an automated backup or manually, make a sure routine of this precautionary measure. Test complete back-up testing. This administrator user or even end-users can verify that data recovery process is correct.

3.2.15 Multi-server Environments

Multi server Environments can separate database servers and web application servers is a standard security practice. Isolation is one of the types of server protection separate database server's secure sensitive information and system files from hackers. That manage to advantage access to administrative accounts. Isolation system administrators to separately configure the web application security and minimize the attack web firewalls.

3.2.16 Virtual Isolated Environments

Full isolation server does not afford to virtual isolate execution environments. Virtualization isolated server set up is another option for isolation and security measures.

Major Cyber Crime Registered in Gujarat

Name of Crime	Ration
Cheating	99
Identity Theft	46
Online Fraud	42
ATM Fraud	41
Explicit Material	36
Fake Profile	16
Cyber staffing	15
OTP Fraud	14

4 DATA CENTER OUTSIDES SECURITY

Physical Security Matters is typically protecting systems restricted to unauthorized persons for entering the data center. Protected with highly secure and fast working access control systems swipe cards, RFID, Biometric systems, server locked cages, and require additional CCTV Surveillance and Monitoring systems. Unauthorized use of computing resources Outsides of a data center. Application software and protocol errors, coding errors, and incomplete testing Configuration use, default configuration, and elements incorrectly use to outside attack.

5 DATA CENTER INSIDES SECURITY

Internal attacks are more damaging because of the variety and amount of information

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available inside organizations. Network Security, incoming and outgoing data center traffics, monitoring on the firewall, anti-virus endpoint security, application security for the data center is a control to insider users, and staff to use internal attacks. Many users use Portable IT Gadgets outside the infected network, with a virus and then use inside the data center and infected the same.

6 DATA PROTECTION

The importance of data protection is the process of safeguarding important information. The data amount created and stored continues to increases data variability. The tolerance for downtime that can make it impossible to access important information. Ministry of Electronics and Information Technology in Indian IT Act 2008, Section 43, corporate dealing or handling any sensitive individual data processing or information in a computer resource. It controls or works is negligent in implementing, maintaining, and reasonable security practices that can perform procedures. There causes wrongful loss or wrongful gain to any person that such body corporate shall be liable to pay the penalty or damages by way of compensation to the person so affected.

Computer virus are one of the most common threats to cybersecurity approximately 33% of household computers are affect with malware. Computer viruses are pieces of software that are design to spread from one computer to another. They frequently sent as email attachments or downloaded from specific websites with the intent to infect your computer. In addition, other computers on your contact list using systems on your network. Viruses are send to spam, disable your security settings and corrupt and steal data from your computer including personal information such as passwords, delete everything on your hard drive.
Rogue security software is malicious software that mislead users to trust a computer virus installed on their computer. Their security measures are not up to date and then offer to install or update users' security settings to ask you to download their program to remove the alleged viruses, or to pay for a tool. Both cases lead to actual malware installed on your computer.
Trojan horse is a malicious bit of attacking code or software that tricks users into running it willingly tricking someone into inviting an attacker into a securely protected area. They spread frequently via email it may perform click on the email and its included attachment. Immediately downloaded malware to your computer. Trojans also spread when click on a false announcement. Once inside your computer a Trojan horse can record passwords by logging keystrokes, hijacking webcam, and stealing any sensitive data on computer.
Adware and spyware software that designed to track data of browsing and, pop-ups. Adware collects data with permission and is even a genuine source of income for companies that allow users to try their software free, But with advertisements showing while using the software. The adware clause is often hidden in related User Agreement docs, but it can be checked by carefully reading anything accept while installing software. The presence of adware on computer is noticeable only in those pop-ups, and sometimes it can slow down computer's processor and internet connection speed. Adware is download without agreement it is consider to malicious.

Spyware works similarly to adware but is install on computer without information. It can contain key loggers that record personal information including email addresses, passwords, credit card numbers, it dangerous of the high risk of identity theft. Computer worm Computer worms are pieces of malware programs that replicate quickly and spread from one computer

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to another. A worm computer sending data itself to all local network computers and then immediately contacts to the other computers. Activated firewall, WPA2 encryption, Guest Network, Physically secure network hardware, higher-quality routers, MAC address filtering, network up-to-date, VLANs to segregate traffic, 802.1X encryption authentication

7 PHYSICAL SECURITY

Data centers use to prevent physical attack techniques. The physical data center security is the set of protocols to build data centers secure physical damage to the machines storing the data. The protocols should be able to handle everything ranging from natural disasters to corporate espionage to terrorist attacks.

7.1 Staff Training

Each staff to given one weak Training for How to follows Rules and working style of a data center. Anti-pass-back turnstile gate Only One Person to enter his have Identity Card and go to Parking are or Reception Area. Reception area auditing for staff and user and then Entry for the related specific area. Every floor and room locked with RFID Security. Staff entry with Biometrics Finger Authentication and Face recognized.

7.2 RFID Tracking Systems

RFID Tracking systems central work and track CARD where to move and access Authentication use or unauthorized access. User Access Point, CCTV video recording, RFID Card Location Tracking are store back-up 90 Day storage available. Take actions and keeping their credentials safe by monitoring systems. Traffic control through dedicated data halls, suites, and cages staff — monitoring of Temperature and humidity of Datacenter entire Building and each equipment.

7.3 Fire Safety

Fire prevention with a zoned dry-pipe sprinkler for any emergency for fire protections 24×7×365 on-site security guards, NOC Services, and technical team monitoring each activity. Natural disaster risk-free locations and Sensor Security Alert Message for any changes in Environmental. Datacenter room entering must be two persons for security reasons for data and staff. Metal Detection is a scanned entry gate, each floor entry gate, and Datacenter rooms. Each server and rack sensor-based security to measure temperature, track a user who accesses physical, and identify RFID Authentication.

7.4 Biometric Security

Access Control Systems & Biometric identification has become an increasingly high-security method. It does not depend on password or access cards. Biometrics visitors have given a card, password another person for access, integrating an extra layer of security within the facility. Human involving two separate doors with small space airlock having two interlocking doors. Only one door open at a time at data center authentication required for both doors first doors must close before the second door opens. Usually, this type of security used in banks, financial institutions, detention facilities, pawnshops and jewelry stores, and secured offices.

7.5 CCTV Security

CCTV Security Camera video recording records every location movement and trace to object. Surveillance security system to watch whose walking into a data center and walking out with a disk or any hardware containing. Keep a record of persons enter the facility, and critical areas are restricted to ensure unauthorized user access to the data center itself. It is very important that the building is secure and protected at all times. Cameras installed

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throughout the building at every entrance, exit, and access point.

7.6 Dress Code

Dress Code is very important to the data center. Any person passes any tools or hardware hide in clothes. Jeans, Teaser, and shoes are requiring to dress code. No one-wearer jacket or two-layer wearer it is easy to hide and unauthorized hardware or tools.

7.7 Redundancy Security

Redundancy data center increases security, providing an extra layer of equipment, staff, or storage is primary sources of failure. the generators, batteries, heating, ventilation, and air conditioning (HVAC), water, power, and telephone lines, basic equipment's and tools are all utilities that may be redundantly reinforced.

Staffs redundancy the visitors are present in the data center, and staff or employees help them and same time contractors or repair crews present in the building.

CONCLUSIONS

Data Center Physical Security is Basic one of the requirements meant for the data center. It protects local peoples and anonymous who damage the data center physically. Virtually security provides technical strong and hard to crack security outside. Physical and Virtual are interconnected and hard to crack the combination of this security. Every day hackers or any systems generated attacks fire on the network to damage server and data mining. Server secure to passphrase technology to strong password creation and protect server if any anonymous insert our network and try to access server, so it is very difficult to crack the password. Network Security work on Layer 2 and three security protocols, ARP Inspections, Private VLANs to protect LAN WAN Security. Firewall Protect Unauthorized user access Local LAN and WAN Network. Data Protection is the main task to secure data to any hack or mining data and leak important or legal information. Network traffic analyzes and identifies suspicious activities.

Datacenter security and data protection are not possible to anyone protocols implementation it requires possible security points to protect data and day-to-day update and upgrade security.

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A Study for Challenges and Site Selection Criteria of the Data Center

Hardiksinh H. Rayjada Research Scholar, Atmiya University, Rajkot, Gujrat

Dr. Parag C. Shukla Atmiya University, Rajkot, Gujrat

Abstract:
In this study paper for Data Center Site selection is very important and effect to data center Budget, future expansion and upgradation. Today the data center word has been a topic of discussion, research, study, analysis expected on the preceding period. in the upcoming years it will increase importance and new aspects will be discovered. The services of cloud services provided via different Data Centers. The data center Service Providers build their own data centers and get local government support. A possible geographical location to build data center planning to selection of selection process. Data center security mentions to the physical and virtual data security to protect a data center from external threats and cyberattacks. The data center moves in Malty-Story (Vertical) Data center. Data Center challenges is providing higher speed and trusted network connectivity to customers and Environment, cooling system, land cost and Data center site selection criteria. This paper focuses on what is a suitable location for building data centers and a challenge that is an essential part of data centers.
Keywords: Data center, Site Selection, Criteria, Challenges.

Introduction

Building a Datacenter in any City could be a challenge to make cost-effectively. In addition, complex needs to with success execute on our vision for a data center additional significant than wherever to find the information center. Datacenter must consider a nearly located by a city area. As of finding attractive Features of datacenter to avoided hazards Pollutions in environment. Select whether an environmentally controlled facility is a highly secure. Budget and Reliable remote location connection it is a factors selection of data center developers. Systematically evaluating a location property its one factors are important to the data center selection of site. Data centers are consuming three to four percentage electricity requiring usage Worldwide. A web server should have power redundancy and excellent power quality and scalable capability. Data centers and Power consumption in Focus to develop a business and ought to like a shot eliminate a website from thought.

SITE SELECTION CRITERIA

Information and technology Data Center are giant investment for companies. the site selection criteria are defined. Companies cannot make wrong decision to design data center building. The data center site selection location is outside of city [1]. The site is almost nearest to lack or dame so get water usage easily and weather also in average. Electrical power Availability and redundancy possible factors are not to reduce to electricity supplies redundant [2]. Natural disasters and weather risk Site selection possibly affected to flooding, earthquakes, Heavy Rain, Tsunami, storms, cyclones, and other natural risk. Educated organization and Human made risk is one of factors to manage. Quality construction and cost-effective Site location normal risk factors improvement the possible lowest price construction and Each web site has blessings and trade-offs to Low risks. Accommodate construction capabilities that can manage as wind speeds, tornado zone, physical threats, prepare for risk will be well prepared. Telecommunications and Network Availability in infrastructure telecommunications redundancy, Internet Leas Line and Network infrastructure is not negotiable. Location that do not own enough cable structure, Cable management is one of the selection processes. Quality of life for stability data center Crime control and Security supports are available near the data center. Skilled Employee and Man Power of Data centers require certified educated

and talented staff to work professionally. Professionally working style create data center standard and services. Professionally working support rise to the number of users and other critical factors outlined in site selection as importance of the. Geological Land and Site for Future expansion the data center has own free space to future expansion [4]. Water and free-cooling technology Possibilities for the reuse Data center servers generate central heat and increase temperate climates to control with cooling systems. Environments that require a higher mechanical cooling area unit fewer absorbing price. Cooling instrumentation running to Temperature reduce and cooling prices increase the operational cost. Easy to access for Transport, goods deliveries and visitors Location facility covers security, access, frequency for connectivity requires. City climate is wind and Eco-friendly environment are there. Factors to avoid High corporate taxes, high property prices, terrorism active or civil war zone, corrupt government system social or political instability, economic instability,

LOCAL GOVERNMENT SUPPORT

The Data center regularly generate revenues to provide server rental, bring with them fantastic opportunity and 24 by 7 consumption power usage that engaging to every government bodies. Businesses might be qualified and entitled to tax and property incentives. Reliable utility service is integral to the operation of a data center web site demand for lots of power, and utilities will considerably affect the data center local site choice demand. Indicate that centers need additional power than ever before, maybe the maximum amount as 200W to 300W per square measure, and knowledge center is potency commonly calculated the supported price per watt of electricity consumed. To create the correct website choice, known as the market transmission infrastructure to bring power [3]. The positioning and whether or not prospective to develop data center company is ready to upgrade after required. The Function of companies have begun collaborating with IT businesses to take data centers execution work. Looking for the business advantage of obtaining in data center to settle among their spot and many refined utilities may give required. The services together with researching data center sites selection and market value of demographics, generate overviews of market cap and native economic development to consultants, calculate infrastructure details, advising of reduction and incentive opportunities, providing keeper engineering, construction, procure and maintenance and even serving to with scientific discipline system visits [17]. Like all business venture, principal business and government partnerships generally increase efficiencies scale back prices, and contour approvals.

EXCELLENT DATA CENTER SITES

Multiple communication service suppliers that provide reliable conveyance and latency through optical fiber network. Firms can recognize the power and knowledge lines exist in and around the property and whether are not over one station or installation will provender into the potential info center that might be offer an additional layer of redundancy [5]. Maybe to a lesser extent, however, still of nice importance. A green Data center atmosphere is important to scale back possibility. The common measurement of these sites is set in non-urban areas where the danger is low for Associate in nursing activity, which may interfere with the data center processes. This contains not for natural disasters, also earthquakes, High wind, water floods, and tornedo, hurricanes, are that though conjointly near unsafe locations, like airports, oil and gas pipelines, and cargo rail lines. Sites all have favorable unstable to ratings that change from it ought to be not those human-made risks can affect a risk to data center. A radical analysis of these sites has determined a low-level risk for this type of interference because of, usually speaking, situated faraway from giant population areas, coastal areas, or centers of presidency.

Multiple roads access to a data center site. This alleviates any problems over possible human made or natural disasters, unexpectedly block access. If associate degree emergency chances, the situation imperative that emergency service vehicles will reach the positioning with expedience. IT infrastructure exaggerated data processor access may well be an uncertain steel since larger physical access suggests that extra major challenge manage data center, to achieving high physical security levels.
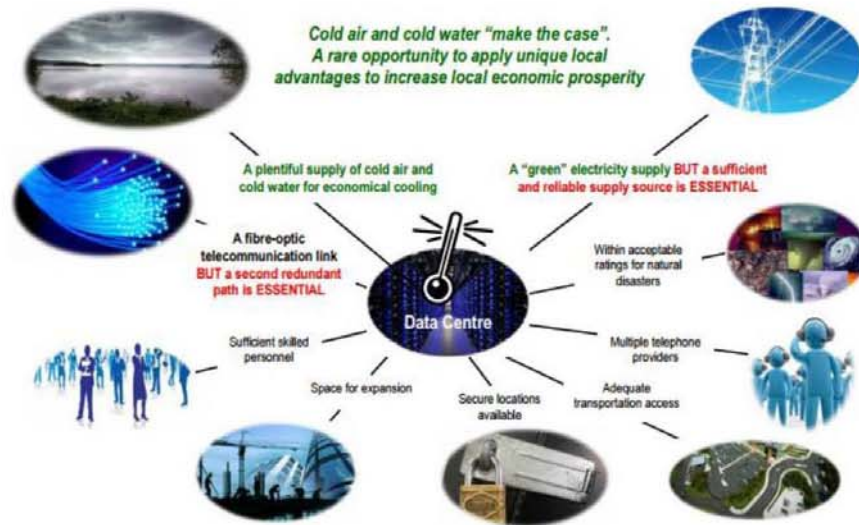
Overview of factors and results of analyses [18]

Recent trends of data center purpose to the security is fact that a location's to secure ability to draw in prime IT location with talent to figure at the flexibleness is of growing importance. As several data center co-locate site is their facilities, conveyance to IT staff, vendors to supply materials, and server's experts on near to easy building road access and public transportation very important factors in success [6].

Perhaps one in each of the foremost financially satisfying characteristics of an achievable data center computing machine is the ability to slice back operational costs through free cooling. A cooler less wet and open wind technology to climate makes it gettable and green for data centers to use outside air for cooling functions. This reduces electrical costs and minimizes the damage data center, tear and cooling systems are control to temperature. Fortunately, the sites legendary rack area unit placed in an exceedingly very temperate weather, making them to cooling opportunities.

Very high Sensitivity to data center physical resources and equipment like servers and rack at a potential electronic computer is crucial [7]. Some sites could also be experiencing electricity or water shortages. Others could also be sensitive to associate geographical services, region and world not like a business to attract voters to the outskirts of the city limits. City services, like trash, hearth protection, and sewage, may not be already be stretched to the boundaries. Nevertheless, Near River or Village, Natural Airflow for free cooling purposes and Wetter storage issues are solve and compare to Urban Land the lowest price. It is critical to integrate native state, and national government rules, in addition as building and sectionalizing is requirements to rules and regulation of data center. Every data center is across the country is require ordinances and government rules even the tiniest detail a data center builds associated maintains. However, compare to urban area some approval and Proses very easy and fast [12].

SITE SELECTION PROCESS

The data center that built from all-time low up will normally have a reduced amount of points to access, that robotically supports the protection of virtual security, IT and the building compared to adding more cost and facility [9]. Data center similarly makes it cooling redundancy to build in multiple levels of air-cooling. The electrical and cooling demands of new Information Technology and infrastructure is well equipped and future expansion plans. A mutual with a possible planned location it provides confidence that expertise more service interruptions to easier alleviate, ought to occur. Although data centers often require personnel.

A best possible geographical location to build data center is not an easy task. Before planning to selection

of site the details of these issues to categorize the type of issues.

Site Selection Process
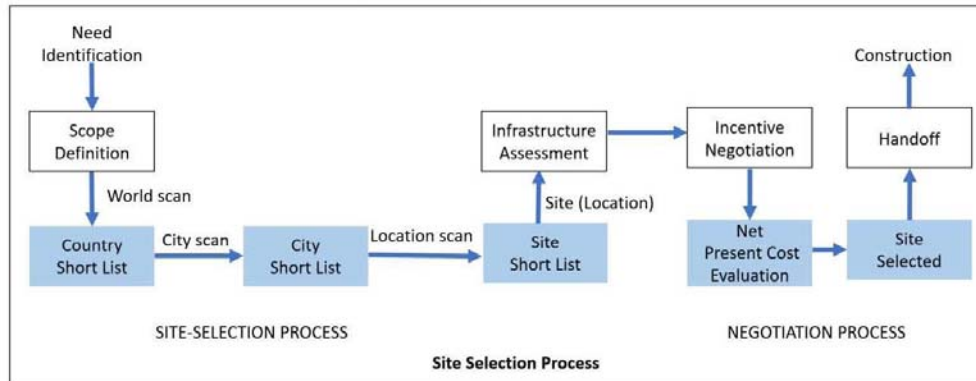
Site selection process criteria [19]

Although their area unit several complexities related to calculating to possible the data center locations is still potential and identify sites to provide a unique combination of data center characteristics. The associate urban area provides excellent access to a reliable and accessible power supply needed. A data center settled in an exceedingly rural site, typically purposeful, regularly co-developed with utility suppliers to verify durable power supply and Expandable property but is additionally preoccupied from a traditional center. In making its recommendations, Questline cites the findings of two freelance companies to World Health Organization were commission to conduct in-depth web site evaluations for knowledge center suitableness. Select the near or Border area of Urban and Villages.

Site Prospectus making it potential to assess every location employing a wide selection of necessary metrics. The trouble to come up with every prospectus need to average, visit every website, in addition to engineering, layout, design, research, writing, and piece of paper, and follow-up with team members, native contacts. It is predictable that every prospectus needed.

DATA CENTER SECURITY

Data center security is one of the most important parts of the data center. Data center Mission-critical infrastructure, Data breaches, cyberattacks are a growing threat of data center. Data center security discussions to the physical and virtual security to protect a data center from outside and online threats of cyberattacks [10]. Data centers consider physical, technical, environmental hazards, natural disasters. Data centers maintain multiple levels of security on a 24*7*365 Days. Datacenter security is the established rules, or set of policy protections and practices for restrict unauthorized administration access of data center resources avoid. The Data center security structure is serious Break-in of confidential of digital information, a data modification and data loss are communal security problems.

PHYSICAL SECURITY. Data centers use to prevent physical attack techniques. The physical data center security is the set of protocols to secure build a data center. Staff Training given one weak Training for How to follows Rules and working style of a data center [11]. RFID Tracking systems central work and track CARD where to move and access Authentication use or unauthorized access. Fire prevention with a zoned dry-pipe sprinkler for any emergency for fire protections 24×7×365 on-site security guards, NOC Services, and technical team monitoring each activity. Biometric identification systems have become an Access Control Systems to increasingly high-security method. It does not depend security code or access cards. Biometrics visitors have given a card or password to another person for access, integrating an extra layer of security within the data center facility [12]. CCTV Security Camera video recording records every location movement and trace to object. Dress Code is very important to the data center. Any person passes any tools or hardware hide in clothes. Jeans, Teaser, and shoes are requiring to dress code. No one-wearer jacket or two-layer wearer it is easy to hide and unauthorized hardware or tools.

VIRTUAL ECURITY. Virtual security of data center is a hard task to handle, are many ways to cyber-attacks on could data center. Virtual security is heart of data center to protect data. Prevent remote unauthorized access that is affect the reliability, availability, or confidentiality of data stored on servers [13]. The common attacks in internet are daily infected to network and very common and stick to use hack network and get data. The Scanning or Probing is one of a probe or port scan-based attack is a port scanning requests a series of open server port addresses to host user used to find an active port and then root and effect attack to susceptibility of that service. This scanning action continues precedes an attack network. Its attack is to user access by realizing data about a system or network [14].

Access Control List is filtering packet header information to permit or deny traffic on specific interfaces. The web servers need to allow access website runs public services. Anyone can access these web services anonymously on the internet. Private web services used secure connection dealing with a database control panel and the number of users requires access to the webserver connection. Authorized user login into accounts with special privileges connection to the servers.

OUTSIDES SECURITY. Physical Security Matters is typically protecting systems restricted to unauthorized persons for entering the data center. Protected with highly secure and fast access control system, swipe cards, RFID, Biometric systems, server locked cages, and require additional CCTV Surveillance and Monitoring systems. Unauthorized use of computing resources Outsides of a data center [15]. Application software and protocol errors, coding errors, and incomplete testing Configuration use, default configuration, and elements incorrectly use to outside attack.

INSIDES SECURITY. Data center internal attacks are more harmful because of the variety and amount of security information available inside staff and organizations. Network Security, incoming and outgoing data center traffics, monitoring on the firewall, anti-virus endpoint security, application security for the data center is a control to insider users, and staff to use internal attacks. Many users use Portable IT Gadgets outside the data center infected with a virus and then use inside the data center, and infected the same.

THE VERTICAL DESIGN

A Data Center Site information land development becomes limited in vibrant markets. Multi-story styles that look to form the primary of land. The political economy of vertical data center construction will be difficult.

Multi-Story Data Center [8]

The present demand for speedy training of hyper-scale facilities desires that developers place confidence. The impact of multi-story construction is effect to price on transfer schedules equally as construction. The land cost, construction cost and accessibility of land is that the mother of invention; Land is a restricted resource is requiring future expanse so it is very difficult or costly. The user demand of data centers is not anytime in short time. If the demand continues, reserve land nearest to multi story data center and future

requirement data center expansion then use multi story or nearest land use. Simply the native trade space. whereas the shift to multi-story buildings won't appear as if a hot asset today trend, it's a replacement of direction for data center construction, that many years research and sturdy to single-story data center and focus to develop multi story cement strong hold.

The distinctive quality of data centers is that the number of infrastructures provide dedicated power supply and cooling systems, supplementary require as power, UPS backup systems, DG backup generators, air flow handlers, and cooling infrastructure [16]. In an extremely single-story data center is a spacious property to use land, designers have many decisions for plan stroke the instrumentation and data halls for servers and rack installation and storage. This could be a vital thought, because of the design ought to suppose. About the length of electrical wiring, network cabling, and air ducts require longer runs for cabling, conduit, and cooling bring expense. Multi-story buildings on close-fitting properties put together ought to shift some infrastructure into the building or roof, rather than Associate in treatment contiguous instrumentation yard.

CONCLUSION

Data center Location Selection mother criteria is an urban area and nearest river or dame and also Open-Air Environment. DC located on Riverfront it is accessible water for Fire situation control. Urban location environmental Conditions are pollution free its benefit to employee health and develop working strength and get solar energy direct to Solar energy to make Regenerate Energy for Green Data Center. Enormous supply of cold air and cold water for economical cooling systems and reusable a green electricity supply. Acceptable rating for natural disasters and no any hazards effects and Suitable transportation access. Infrastructure Building develop Vertical multi-story data center its cost-effective infrastructure. Multi-Story data center benefits are getting more airflow and solar light. Data Center Security is most important one of the requirements for the data center. It protects local peoples and anonymous who damage the data center physically. Virtually security provides technical strong and hard to crack security outside. Physical and Virtual are interconnected and hard to crack the combination of this security. Every day hackers or any systems generated attacks fire on the network to damage server and data mining. we also consider site-level criteria and socioeconomic, workforce, and governmental criteria. while no site is perfect, our well-defined site-selection process and a quantitative analysis of factors and trade-offs result in a site choice that preconstruction throughout the life of the data center.

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Dr. Piyush Mehta	Dr. Sandeep Poddar	Dr. Vishal Khasgiwala	Prof. Datin Dr. Hafizah Che Hassan	Dr. P. Santhanakrishnan
Atmiya University, India	Lincoln University College, Malaysia	Atmiya University, India	Lincoln University College, Malaysia	Atmiya University, India
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