Chapter 1

Introduction to Data Centre

1.1 Introduction

The term data center is a physical space, a facility that contains computer systems and related components. They can include power supply, backup services that provide redundancy, or communication equipment. All of these are kept in a controlled and secure environment. Companies are using data centers to perform more laborious tasks like data security, providing virtual servers, cloud computing, hosting, load balancing, storage, and more.

In 1946 probably the first data center was built in the USA 1946, and it was called ENIAC (Electronic Numerical Integrator and Computer). The American army used it for storing defined codes [1]. This computer was still not using transistors. Instead, it had almost 18 thousand vacuum tubes, 7200 crystal diodes, and 10000 capacitors. The thing was huge 167.2 square meters (1 800 square feet) [2]. 1960's During the 60s, vacuum tubes were replaced with transistors. The company that put the strongest effort at that time was IBM, with their System series of mainframes. During that time, virtualization technology was invented, and the mainframes started to multitask. In 1964, the first supercomputer got introduced. It was the CDC 6600, with the performance of 1 MFlops and a peak at 3 MFlops. 1970s the 70s started exciting with the introduction of Intel's 4004 processor (1971) [1]. It was the first general-purpose programmable processor that became the "brain" of different customized software. Two years later, Xerox Alto got into the market and presented the first graphical UI. This computer was way ahead of its time and it even came with a 3-button mouse.

In 1977, the Chase Manhattan Bank applied the first LAN ARCnet. It supported up to 255 computers and a data rate of 2.5 Mbps. a year later, the American multinational software company SunGard established the first commercial disaster recovery [1]. 1980's the massive and expensive mainframes were dying. They were replaced with cheaper and easier to maintain PCs. The American computer manufacturer Sun Microsystems created the network file system protocol. With it, the client computers were able to access files over the network in a similar way to accessing internal storage [2]. The 1990s was a time of the.COM boom. Internet usage was rapidly increasing, and so was the demand for better connectivity. Due to that demand, data centers also

gained popularity. There were new and larger centers emerging. The service model of the data centers became common for many companies.

2000-2018 At the beginning of the period, power efficiency was beginning to cause maintenance issues. The current generation of data centers was consuming too much power. This started a trend to improve efficiency, build better cooling systems, and reduce consumption. In 2002, Amazon started its web services AWS, which include cloud computing, storage, and more [1]. Ten years later, 38% of the business was already in the cloud. Today, the data center is driving to a new model (client-server) based on subscription. Companies choose this model to reduce their costs. They don't need to purchase expensive hardware and constantly upgrade it. Instead, they use cloud services, where a third party is responsible for the hardware resources and often for the IT support as well. The future consists of low-power, long-lasting client devices that connect to the cloud (data centers) where all of the processing is done.

As GLIA METODA no competition increases among data centre colocation providers, so not require more value-added services and facilities. The Centre of Excellence in These might include conference rooms, offices, and access to office equipment. The basic elements of town data centre requirements are there like power, space, network, and remote hands. Size, shape, and geological quality of the land and building, Availability of sufficient and extendable power supply, Availability of good communication network, Local prices for electricity, water, and network access, Availability of sufficient space for future extensions of the data centre, Possibilities for use of free-cooling and/or reuse of hot water, Proximity of R&D environment, Easy access for deliveries and visitors, Limitations due to local building, fire and security codes, Limitations due to the protection of local fauna, flora, water, etc.

1.2 The Objective of the Study

- Our objective is to design a data centre for small industries or users to the nearest geographic location and provide a connection Fibber Optical Cable or Wireless Connection network architecture plan to all units' direct connection to the data center. Data centre design and architecture to near industrial areas and provide services to Small and medium industries. Proposed the data centre model to Industrial Unit is strong bonding and trust to users his data security and Stable/Reliable connection to the server.

- The Proposed Town data centre Design is aimed at Hardware and Technology architecture, Power supply, Air condition design, and Capacity planning for data centre storage to provide reliable and cost-effective services.
- We proposed to design a data centre for Centre of Excellence or in a bit win to VAGUDAD village, METODA GIDC and NYARIDEM, this Design a multi-story data centre. All units get Optical Fiber Cables connection to provide reliable data transfer speed. All small units connect with the data centre and get a Secure, Reliable, and Cost Effective Data Centre Facility. Provide High-speed Fibber connectivity to end users and secure with VPN or Port Security.
- Today many data centers all over the world provide services based on the cloud. Over objective is to design is a data centre for the local level which includes all services needed by the local industrial area. With Fibber Connectivity or Wireless Connectivity to cover Geographical all METODA GIDC Industrial areas.
- A research objective is to provide this local data centre that facilitated services like ERP, SAP, Networking, Backup & Recovery, and Wed site Support, cost-effective to the local industrial area.
- This research shows how a realistic data centre model can help to provide cost-effective and low latency connection services to a small industrial area.

1.3 Statement of the Problem

GIDC Lodhika Industrial Association-GLIA METODA Industrial area Rajkot has more than a thousand Industrial units. Out of thousands, 100 industrial units have their data centre deployed. But data centre work is not satisfactory. Data Security, Hardware Issues, Networking Issues, Data Backup, Cyber-attack, in time solution, depends on third-party services and support. Many industries units are medium or small, it does not afford to own a data centre they just use ERP for normal functions & routine tasks. His not migrated cloud-based services because of server cost, and Internet cost, and due to that, they cannot get better performance. They can't trust any cloud-based services and also, he requires one employee for a cloud solution or third-party support. Many industries use local ERP only for uses SAP or International standard Production Software. The local industry has many other things regarding data centre such as Data Security issues, Server Host and Storage Costs, Local ISP Bandwidth costs, and Dependency on Bandwidth.

The industrial users' basic questions like Where is Cloud Data Centre?, if my data is lost or I can't renew for the same so the cloud services are stopped and when we recall the server the charges and data security are more issues. All connection depends on the Internet services provider and he needs one technical person who continues monitoring or troubles the same.

1.4 Need for the Proposed Research

Today all industries are using IT facilities and Software, in comparison to GIDC industrial; Users' requirements are limited with limited software or application like Tally, miracle, Shree, SAP/ HANA, User management systems, etc. manufacturing applications. The industries prefer on-premises or Local server, internet, and Maintenance related services providers.

GLIA Industrial Units requirements to On-Premise Data centre or Local Data centre with Security and Cost-effective as well as technical support. The town Data Centre site is nearest to an Industries Unit or organization. The users who wish to visit the centre or supervise the on-site staff from a Data centre are required. The data centre location in nears GIDC is Security and trusted bonding.

While there is currently a shortage of technology experts across Rajkot City, Ahmedabad city are educated employees with computer talent and expertise. With the influx of technology jobs appearing in Rajkot city smaller markets have seen an increase in the number of technical experts are increase. But not secure jobs are provided in Rajkot city the technical expert moves to Ahmedabad.

Always-Available Technical Expertise In the building's physical amenities, technical experts will be available around the clock. Having readily available support at any moment can be a major differentiator. When trained technical staff is available, a data centre location would become more than a facility. They would also become a trusted advisor, giving access to leverage their depth of expertise.

1.5 Limitation of Study

The limitation of the study is we propose the model of the Data center, its design to deploy the nearest Industrial area and provide data centre connection throw Optical fibre cable or wireless connection. In the current scenario, the industries are using on-premises data centre or server rooms, or cloud services. The industry’s core work in his area and it related no more Knowledge that time the present proposed data centre idea understanding is very difficult.

This data centre model is proposed and the real-time design and deploy model is very costly so practical and difficult if any cloud company or government gets funds for prototype model design in the practical scenario so very help full in our research. In it, industries the demo and practical output are very important to engage the user or customer. We have only proposed the architect and design of a data centre so very difficult to convey without any demo to industry users.

1.6 Advantages of the Study

The main advantage of this research is our proposed model for the data centre is designed as per the requirement of the town and a town using zero-latency connectivity and cost-effective data centre felicity with nearest to geography location. Town data centres are located closer to the end-user than the public cloud. They enable a wide range of next-generation applications and provide their customers with the benefit of lower latency, higher security, and greater control over their data [10]. Low cost data centre architect and design to provide local services geographically local data centre, Fibber optical cable connection connectivity, Wireless Connection to the industrial unit, minimum tier design data centre to the low-cost architect. The creates new and improved ways for industrial and enterprise-level businesses to maximize operational efficiency, improve performance and safety, automate all core business processes, and ensure "always on" availability.

In today's scenario, the ICT and Data centre is the basic need of every organization and industry without IT any routing task is not complete so small and medium organizations or industries are cant effort for cloud data centre or a premises data centre in this scenario the town data centre is provided as per user requirement with without and technical expert his getting the town data centre facility in budget. The major benefit of a town data centre is the quick delivery of services with minimal latency, thanks to the use of edge caching. Latency may be a big issue for organizations that have to work with the internet of things (IoT), big data, cloud, and streaming services [12].

Planning A design for building a standardized computer room is allows for easy manageability of single or multiple computer rooms. An advanced design strategy allows technology investments to support business requirements. At present cloud data centre do not sufficiently fulfil the demand of users and limitations categories vies data centre are required. Industries are require local data centre services for nearest industry or local data centre are given proper solutions for data centre. Cloud has preferred

website but standalone software is an upgrade to the web and industries are required to the local environment.

1.7 Scope of the Study

The Data centre may be a difficult area for the investor, here so many researchers have rethinking a data centre design to cost-effective and zero latency services.

- The Data Centres are the highest priority requirement in the IT domain, all small, medium, and large industries, education, corporate offices, etc. are required for data entre services.
- The present study is focused on the analysis of varieties of data centre strategies and costs for required end users.
- The data centre size is very big and more security and high-tier services are provided online/ virtually but it's not required for all users it depends on Users working style or services and functionality. We rethinking a data centre model as per the user's requirement functionality to decrease costs on both side data centre deployment and users services charges.
- In this study the Data centre industry is growing faster than the cloud, its cost-effective design compares to cloud data centre and services are trustable and cost-effective with zero latency. In this proposed model all small and medium as well as large industries are connected and get services to same.
- In the future government and IT, industries are initiated to develop a small data centre, the small data centre is cost-effective with a Green environment, and High-speed low latency connectivity.

1.8 Challenges of the Study

Our basic survey to the need of industries for data centre requirements is very hard to tack no one can understand or logical scenario of the requirement of a data centre. Very difficult to convey without and demo or practical scenario to industry users for the town data centre model.

The main parts of data centre design are changeability and extensibility, which include site, IT Infrastructure selection, floor design, electrical system design, automated design, and interchangeability. Data centre facilities rarely achieve the operational and capacity requirements specified in their initial designs. Some challenges in data centre all data centre administrators must consider risk management and protect both stored and distributed data across the network.

Hardware in the data centre, they do not always lower energy consumption. Despite being significantly more efficient, blade servers consume four to five times the energy of previous data storage technologies.

Power and cooling requirements are becoming more important as equipment requirements change. The data centre's cost-control concerns are special. Data centres are effective, creative, and elegant, but must also be mindful of cost control.

1.9 Organization of the Thesis

Chapter 1 Objective of the study and requirement of re-thinking of data centre services. Chapter 2 Introduces a literature review and studied current research on data center-related work. Chapter 3 Provides brief information about the current working data centre in India. Chapter 4 Extend my performance studies from an online survey and currently need or requirement of data centre services, and also visit one-to-one industries Units and data centre working functionality. Chapter 5 Designs a proposed town data centre to provide services to small industries. I also show that in reality data centre design is performance and cost-effectively. Chapter 6 Machine learning, recommendation algorithm used to propose town data centre statistical data analysis and propose prediction. Chapter 7 Conclusion and future expansion of the research work.

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