Chapter 12
Data Center Technology Roadmap

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ABSTRACT

Data centers have been in existence all over the world for the past several decades. In today's dynamic world, especially with most of the businesses being heavily dependent on Information Technology, interconnecting various systems within the organization and the outside world is a mandatory requirement for the success of any business. Data centers all around the world perform this role to some level of satisfaction. Since data centers started to play a significant factor in any organization's success, companies realize the value of having a data center oriented strategy as one of the strategic initiatives for the success of their organization. Despite the agreement that the value of having such an initiative for data centers is important, there is a lack of clarity in terms of the technical know-how involved in data centers. The author's objective here in this study is to fill that gap in the Industry. They wanted to portray the different facets of data centers in terms of how can they be classified, what are the underlying technologies, are the current challenges faced by the industry and where the industry is headed in the next 10 years. They illustrate the evolution of the data center industry in the last decade and how it is going to continue in the next 10 years graphically in the form of a Technology Roadmap. They based their research on going through existing industry literature, analyze challenges and develop a technology roadmap for data center industry with emphasis on energy efficiency and cost reduction. The wide audience for this roadmap would include IT professionals, data center managers, company strategists, the Government as well as environmentalists. They intention is to present the audience with a single-
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stop snap shot of the data center industry on how the industry has evolved over the time and where it is heading in the future. The authors present their findings based on analyzing the data obtained from literature research and expert knowledge. The key research areas of our study were challenges, market trends, technological innovation, energy efficiency, cost reduction and government involvement.

In this chapter, they take you through the general roadmap architecture starting with market drivers, products, technology and its components followed by their recommendations and inference from the study.

INTRODUCTION

The 1980’s were the years that the computer industry saw the boom of the microcomputers, as an article by Amy Nutt on the ‘History of the datacenter’ suggests. Computers were installed everywhere and little or no thought was given to the environmental or the operating requirements. Lack of knowledge regarding organization of information and lost data were major stumbling blocks.

The 1990’s saw an increase in the complexity of information and a demand for a more controlled environment for the IT systems. Client-Server Computing became the buzz word and the servers for these started replacing the old computers. Hierarchical design with much easier access to inexpensive networking equipment and better industrial standards for network cabling gave rise to the new look at data center concepts.

The latter half of the 1990’s and the early 2000’s saw the dot com bubble’s growth and the companies realized the need for their presence on the internet. Fast and reliable internet connectivity, coupled with highly available applications and infrastructure, became the need of the hour at that time. This morphed into construction of extremely large data facilities – internet data centers that revolutionized technologies and operating practices within the industry. The physical space, equipment requirements, and highly-trained staff made these large data centers extremely expensive and sometimes impractical.

The evolution continued and private data centers were born that allow small businesses to have access to the benefits of the large Internet data centers without the expense of upkeep and the sacrifice of valuable physical space.

Currently, the field of construction and the operation of the data centers have evolved to be a widely recognized industry in itself. New standards and metrics for documentation, evaluation and control, have added a layer of consistency in the data center design. Security including disaster recovery and business continuity frameworks has tried ensuring reliability and availability of the data centers.

Managed hosting providers, a fast emerging sect in the data center industry, have started delivering “higher level” of managed IT services for deploying and hosting e-business, security, disaster recovery, and business continuity solutions for the mission-critical applications.

The future is probably that the data center industry and the consumers of the data center services are more likely to place more emphasis on Green IT infrastructure and applications that would be hosted and support Green IT. This would go a long way to reduce the IT costs, but also ensure sustainability and green IT practices including the hardware roots like the on demand and energy efficient chips.

LITERATURE REVIEW

The literature review spanned a wide variety of documents - white papers from the industry partners including the Government to determine what are the market drivers, what are the categories
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