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Pethuru Raj · Anupama Raman

Software-Defined Cloud Centers

Operational and Management Technologies
and Tools

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Foreword

The Present-Day IT Landscape is abuzz with the new concept of the “Software-Defined Data Center,” or SDDC. SDDC supports all cloud capabilities which are required for enterprises. The key differentiator between SDDC and traditional data center is the replacement of physical assets with virtualized components which will lead to several types of optimization like cost optimization, space optimization, power optimization, performance optimization to name a few top of the mind items. SDDC opens avenues for several new use cases which include managing, deploying, storing, computing, and networking a plethora of business applications in a cloud environment. It is a huge leap in the IT world as it marks the transition of computing to an era where data center components are abstracted from the underlying hardware. There is virtualization in every aspect starting from compute to network to storage. This had led to a new dimension in infrastructure components like software-defined compute, software-defined network, and software-defined storage. All these software-defined infrastructure components form the basis of software-defined data center.

By 2020, Gartner predicts that the programmatic capabilities of an SDDC will be considered a core requirement for 75 percent of Global 2000 enterprises that have plans to either implement a DevOps approach or a hybrid cloud model. This prediction throws light on the importance of SDDC in the years to come. Authors of this book have undoubtedly chosen a topic which is the need of the day to write a book. I have gone through this book and it beautifully articulates the various components of SDDC like:

- Software-Defined Compute
- Software-Defined Network
- Software-Defined Storage

Some aspects which are critical for any SDDC are orchestration and service management as these are the core aspects pertaining to cloud capabilities. It is vital to ensure that there is seamless management of components within an SDDC to deliver upon the agreed terms of quality of service and service-level agreement.

Authors have beautifully articulated these concepts, and they have given in-depth coverage of orchestration and cloud service management in an SDDC.

Last but not least, security is the most important concern when it comes to any form of cloud capability and the same applies to SDDC as well. The diverse types of security concerns and the steps that could be taken to protect the SDDC from those security threats are articulated well in this book.

My concluding remarks the book is “This book provides a bird’s eye view of SDDC and is a must to read for any practitioner, architect or engineer who wants to setup or use a SDDC.”

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Preface

Without an iota of doubt, it has been an incredible and inspiring journey for the cloud phenomenon thus far. Worldwide institutions, innovators, and individuals are showing unprecedented interest and involvement in consciously absorbing and adopting various proven and potential cloud technologies and tools to be ahead of their competitors and to retain the edge gained. The cloud concept is bringing in a variety of delectable advancements toward highly optimized and organized IT. Further on, the cloud paradigm opens up hitherto unknown possibilities and opportunities for solid innovations and improvisations in IT operations and delivery. There are a bevy of cloud-induced automation, acceleration, and augmentation, and these are being meticulously imbibed and imbedded to set up and sustain lean, green, and clean IT. The cloud-empowered IT, in turn, fervently lays down a stimulating and sustainable foundation for envisioning and ensuring better and bigger business capabilities with less IT investment and infrastructures. The IT wastage is being carefully pinpointed and plugged. New deployment and service models are being thought through and implemented in the IT landscape to cater emerging and evolving business needs. And the resulting savings are being routed back to bring forth fresh competencies in IT and business. The business agility, autonomy, adaptability, and affordability are being easily and quickly realized with the realization of cloud-enabled IT efficiency and elegance.

New business models are being framed to simplify and streamline various business offerings. The business productivity goes up significantly while the business operations are extremely and elegantly automated. The scores of cloud-sponsored advancements and accomplishments in the IT domain have direct and decisive impacts on business verticals. The mesmerizing implications of the cloud paradigm on IT and subsequently on business enterprises are to continue relentlessly in the days ahead due to the innate wherewithal of the cloud idea. Precisely speaking, the cloud conundrum has been making waves and penetrating into newer territories. The cloudification is being touted as the most overwhelming and game-changing process that has definitely and deftly disrupted and transformed the struggling IT field. As IT is the direct and greatest enabler of businesses, the cloud-inspired IT is to result in radical business enablement. This book is produced in order to tell all that

are silently happening in the cloud space and how they are succulently and smartly utilized to bring pioneering and people-centric IT.

Chapter 1 illustrates the various trends and transitions happening in the IT space. This chapter explains how the incarnation of cloud-attached IT is to be the cynosure of IT experts, evangelists, and exponents for hosting and running analytical, operational, and transactional workloads. This chapter also details how the ensuing era of IoT, blockchain, and cognitive analytics is to be achieved through the bunch of evolutionary and revolutionary technologies in the cloud IT space.

Chapter 2 is describing the cloud 2.0 version. That is, how the new innovation of software-defined cloud environments is bringing in the right and relevant automation in traditional cloud centers. I have talked about software-defined compute, storage, and networking and how these three transitions collectively work in unison to produce the next-generation cloud centers, which are more tuned toward modern enterprises.

Chapter 3 is software-defined storage (SDC) for storage virtualization. Data center of present-day organization is facing lot of challenges to accommodate the huge amounts of unstructured data which is created from various sources. So it is the need of the day to devise techniques which will help them to optimize storage device usage. This is where storage virtualization technique comes into picture. The various aspects of storage virtualization which form a part of software-defined storage like cloud storage, storage tiering, deduplication are covered in detail in this chapter. Some of the technological advancements in the field of big data storage which are used extensively in data centers like Google File System, HDFS are also covered in this chapter.

Chapter 4 is software-defined networking (SDN) for network virtualization. This chapter focuses exclusively on techniques which are used for network optimization in data center. The core technological foundation of all these technologies is network virtualization. Hence, the concept of network virtualization is covered in detail in this chapter. The other network virtualization topics which are covered in detail in this chapter are software-defined networking and network functions virtualization.

Chapter 5 is about the hybrid cloud formation. Typically, bridging private and public clouds results in hybrid clouds. There are certain requirements, scenarios, and use cases mandating for hybrid clouds. This chapter is specially allocated for digging deep and describing about the various qualities and benefits of hybrid clouds. How some of the concerns and challenges of public and private clouds are being surmounted by establishing a beneficial synchronization between private and public cloud environments are explained in this chapter.

Chapter 6 is security management of a software-defined data center. The software-defined data center infrastructure in its entirety contains a wide gamut of technologies like cloud, big data, mobile devices, and Internet of things. Each of these technological components is susceptible to several types of security vulnerabilities and threats which can render them ineffective. It is very important to ensure that the infrastructure components are adequately safeguarded from various security breaches. The crux of the lesson is the techniques to be adopted for

securing the platforms and technologies which form a part of the software-defined data center ecosystem.

Chapter 7 is cloud service management. Organizations across the world are now moving toward a model in which they are using a combination of on-premise and cloud-based services to manage their infrastructure and application components. This has led to evolution of a new paradigm which is called hybrid IT. In this chapter, we propose a framework which can be used by organizations for managing their hybrid IT infrastructure components. Some of the key characteristics which need to be kept in mind while designing such frameworks are also discussed in this chapter. We also cover the various aspects of cloud management platforms (CMPs) and some leading cloud management platforms which are available in the market.

Chapter 8 details about multi-cloud environments and how they are being managed through automated tools. Having understood the strategic significance of multi-cloud strategy and projects, enterprises across the world are jumping into the multi-cloud bandwagon. However, the multi-cloud management is a tough affair. There are a few cloud management platforms being presented as the best-in-class solution for multi-cloud management and maintenance. This chapter has a lot of useful details for our esteemed readers to gather and gain immeasurably.

Chapter 9 is for describing the new software product in the growing cloud landscape. The cloud ecosystem continuously expands with multiple and different services. The cloud service and resource providers are journeying in their own ways utilizing heterogeneous technologies and tools. The cloud service registry and repository is growing steadily. The service charges are also varying hugely. For cloud consumers, clients, customers, and consultants, the tasks of minutely and dynamically gathering and visualizing consolidated information and other decision-enabling and value-adding details such as service quality, the compliance, the costs from cloud and communication service providers are tough and time-consuming job. The emergence of cloud broker, a highly smart and sophisticated software solution and organizations providing cloud brokerage services, comes handy for cloud users toward simplified and streamlined cloud access, use, and composition.

Chapter 10 is for expressing the latest advancements and accomplishments in cloud orchestration, which is a hard nut to crack with traditional methods and tools. We need state-of-the-art solutions and platforms for automating most of the cloud operations. This chapter tells the importance of cloud and container orchestration in order to automate the end-to-end application integration, testing, infrastructure provisioning, software deployment, configuration, and delivery.

Bangalore, India

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Anupama Raman

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Anupama Raman

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