

# Preface

## Overview

Cloud Computing is an attractive paradigm that allows consumers to self-provision cloud based software systems, application services, development platforms and virtualized infrastructures. Large enterprises can migrate their applications and data to cloud environments to achieve the benefits of scalability, availability and reduction in capital expenditure; small organisations and start-up ventures can realize benefits by leasing ready-made development environments and computing infrastructure on a pay-as-you-go basis; and general public can enjoy the use of cloud based application such as email systems and storage space, which are often freely available.

The benefits that the cloud paradigm promises are numerous and already proven. However, like any other emerging technology, the limitations, issues and barriers are also many. There are issues of security due to virtualisation and multi-tenant nature of cloud environments; concerns with respect to the loss of governance and control; legal and jurisdiction implications of entrusting private and confidential data to cloud providers; and concerns due to evolving cloud related standards. The lack of knowledge on the part of the cloud consumers is also resulting in vendor lock-ins and inappropriate service level agreements.

Notwithstanding the above, cloud consumers are becoming more knowledgeable and beginning to dictate what they require. Cloud providers are also learning from experience and beginning to provide what consumers actually need. Robust new technologies are appearing and standards organisations, in the process of developing the necessary controls, are keen to enforce the standards for the benefit of all. Other cloud related industries are also appearing to provide specialist services to support cloud providers as well as the cloud consumers. Alongside this, researchers, practitioners and R&D departments within the organisations are coming up with strategies and solutions to resolve the existing issues and remove the barriers. New areas being investigated include: cloud security, interoperability, service level agreements, identity and access management, cloud governance, big data analytics and broker services. New frameworks and methodologies are also being developed for construction, deployment and delivery of cloud services to benefit all.

This book, *Cloud Computing: Challenges, Limitations and R&D Solutions*, aims to present discussions on issues and limitations relating to the cloud computing paradigm and suggest latest research methodologies, emerging developments and R&D solutions to benefit the computing community. In this volume, 39 researchers and practitioners of international repute have presented latest research developments, current trends, state of the art reports, case studies and suggestions for further development of the cloud computing paradigm.

## Objectives

The aim of this text is to present the current research and R&D solutions to the limitations, barriers and issues that currently exist in the cloud computing paradigm. The key objectives include:

- Capturing the state-of-the-art research and practice relating to cloud computing issues
- Exploring limitations and barriers with respect to cloud provision and cloud environments
- Analyzing the implications of the new cloud paradigms for the benefit of consumers
- Discussing R&D solutions and strategies with respect to concerns relating to the cloud paradigm
- In general, advancing the understanding of the emerging new methodologies relevant to the cloud paradigm

## Organization

There are 14 chapters in *Cloud Computing: Challenges, Limitations and R&D Solutions*. These are organized in three parts, as follows:

- Part I: *Limitations and Challenges of Cloud Environments*. This section has a focus on issues and limitations of the cloud computing paradigm. There are three chapters in this section. The first chapter looks into the security issues of public clouds. The second contribution focuses on architectural choices for DBM Systems for cloud environment and the third chapter discusses the challenges and issues with respect to QoS and SLAs.
- Part II: *Current Developments and R&D Solutions*. This second part comprises six chapters. The first contribution discusses a methodology for cloud security management, while the second chapter suggests a framework for secure data storage and identity management in the cloud. The third contribution presents a simulation tool for energy aware cloud environments and the chapter, that follows, presents an efficient congestion control system for data center networks.

The fifth chapter is devoted to looking into energy aware VM consolidation in the IaaS provision. The last contribution in this section focuses on software defined networking for cloud related applications.

- Part III: *Advances in Cloud Technologies and Future Trends*: There are five chapters in this part. The first chapter discusses future developments with respect to virtualization and cloud security and the second contribution discusses recent trends in QoS data warehouses in relation to the selection of cloud based services. The next chapter focuses on cloud federation approaches. The forth contribution discusses the security aspects of database-as-a-service provision and the final chapter looks into the future to see how the next generation utility computing infrastructures will be designed.

## Target Audiences

The current volume is a reference text aimed to support a number of potential audiences, including the following:

- *Enterprise architects, business analysts and software developers* who are keen to adopt the newer approaches to developing and deploying cloud-based services, taking into account the current research.
- *IT infrastructure managers and business leaders* who need to have a clear understanding and knowledge of the limitations and issues that currently exist in the emerging cloud computing paradigm.
- *Students and lecturers* of cloud computing who have an interest in further enhancing the knowledge of the current developments and R&D solutions to the barriers, limitations and issues that currently exist.
- *Researchers* in this field who wish to have the up to date knowledge of the current practice, mechanisms and research developments relevant to the cloud paradigm to further develop the same.

Zaigham Mahmood  
University of Derby UK & North West University S Africa



<http://www.springer.com/978-3-319-10529-1>

Cloud Computing  
Challenges, Limitations and R&D Solutions  
Mahmood, Z. (Ed.)  
2014, XXI, 352 p. 100 illus., Hardcover  
ISBN: 978-3-319-10529-1