Preface

Cloud computing is a continually evolving subject in both industry and academic research. This handbook is an original and comprehensive reference handbook and aims at covering major aspects of end-to-end architectural design and implementation of cloud computing. Topics range from cloud computing reference architectures, different cloud models, cloud system build methodologies, architectural and industrial patterns, workload and application cloud migration, service management and brokerage of cloud service, to security, risk and cost of cloud system and service. This handbook will be of broad interest to both industrial and research communities.

CLOUD COMPUTING ARCHITECTURE DESIGN

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. In terms of deployment models, Cloud can be typically defined as three different types, i.e. Public Cloud, Private Cloud and Hybrid Cloud.

Although the current cloud computing model has established some elements for cloud system build and cloud services, IT people are facing a number of real major challenges on the end-to-end architecture design and implementation to provide appropriated enterprise cloud systems and services. These challenging areas include: evolving reference architecture of cloud computing; selecting appropriate cloud models for enterprises; developing end to end cloud system build methodology; developing and choosing the best practice of architectural and industrial patterns; the risk and security management of cloud system; service management and brokerage of cloud services; and workload and application migration to clouds. This handbook aims to cover and address these challenging topics through the latest industrial and research practice.
OBJECTIVES

The main purpose of this handbook is to provide an end-to-end deep dive and systemic study on architecture design and implementation of cloud computing. It offers a reference handbook of state of the art industrial and research knowledge concerning the key issues surrounding current and future challenges associated with the cloud computing.

To achieve this goal, this handbook contains a collection of contributions from leading experts in the world aiming at:

1. Presenting current industrial and research results on cloud computing reference architecture, cloud computing model, cloud system build, service management in cloud and application cloud migration;
2. Providing a comprehensive description and deep dive of some leading-edge industrial and research practice that related to cloud computing models, builds, services, securities and cost;
3. Offering an overview of the current well-defined architectural design and the emergent trends in areas of cloud computing.

CONTRIBUTION

This handbook provides an excellent contribution to industry and research by making the best industrial practice and research results available in an area where there is a clear industrial and research gap for the architectural design and implementation of cloud computing. The theme of this handbook is strategic, and of central importance in establishing end to end architecture design, implementation and systemic study for the emerging cloud computing technology.

This book provides an end-to-end deep dive and a systemic study on architecture design and implementation of cloud computing systems and services. It provides and highlights the latest industrial practices and research studies of cloud computing from architecture design models to implementation technologies, from cloud system builds to cloud services managements, and from strategic reference architectures and models to detailed cloud build patterns and application migration methods.

This handbook provides unique values in the following areas:

As one key challenge of cloud computing research, there is no one book published to study the design and implementation of cloud computing from the end to end approach. This handbook studies and presents the end to end architecture design and implementation of the cloud computing, from designing and building of cloud systems, provisioning service management and orchestration, developing cloud pattern, to migrations methods and models for cloud applications and workloads, risk and security consideration, and financial analysis of using cloud system and service.

This handbook provides deep dive studies of cloud computing, especially in a number of areas that are facing challenges in the current cloud computing research such as the best practice of industrial patterns for cloud builds, service management and brokerage over hybrid clouds, orchestration and integration model across hybrid clouds and legacy environments, and migration methodologies and models for cloud workloads, applications and data.
Preface

This handbook also addresses the needs to have a publication for the systemic study on all important perspectives of cloud systems and services, from industrial standard open stack architecture and reference architectures in cloud computing to the best practice of architecture designs, solutions and implementations in using and evolving Infrastructure/platform/Software/Business Process as the Service models.

AUDIENCE

This handbook is intended for people interested in the architecture design, implementation, operation, and management of cloud computing systems and cloud applications at all levels, including: IT professionals, IT architects, researchers, scientists, practitioners, managers, educators and students who are looking for the state-of-the-art information in cloud computing trends and development for architecture design and implementation, and require access to current information in this emerging field. The audience can learn industrial standard and reference architecture of cloud computing, and find the best practices in designing and implementing cloud systems and service management, and applications. The audience can learn architecture design and implement of the major areas of cloud computing systematically and in depth, and form an end to end view of cloud computing. In particular, technology innovators can take advantage of the leading-edge research ideas, results and case studies described in this handbook. The combination of theoretical and practical content will enable a broader audience to take advantage of this handbook and apply received knowledge in their own cloud projects.

CONTENT

Firstly, This handbook studies the architectural design and implement of both cloud systems and cloud services in private, public and hybrid clouds; presents cloud computing reference architecture; studies open stack architecture as one of industrial open standards in cloud computing; explores the design and implementation how computer nodes, storage, network, security, software and business applications can be provisioned and consumed in Infrastructure/Platform/Software/Business Process As A Service models.

Secondly, this handbook presents the design and implementation of the management perspectives of cloud systems and services. It studies service management and service brokerage in cloud computing for a range of ITIL service management functions. Especially, the book explores how system and service orchestration, integration and aggregation can be designed and achieved in hybrid clouds.

In addition, the handbook studies the cloud computing from the data and application perspectives. It explores the method of analyzing the applications and workloads for the fits of different cloud models and introduces available migration methods and tools for the application migration to cloud environments.

Chapter 1, 2, 3, 4 & 5 focus on the studies of enterprise reference architecture, different cloud models for private, public, hybrid and community clouds, and the architectural and industrial patterns in cloud systems.
Chapter 6, 7, 8, 9 & 10 explore every aspect and component involved in the design and implementation of the end to end cloud system build such as IaaS/PaaS/SaaS models, end to end build methodology, VM placement, security compliance and data storage.

Chapter 11 & 12 provide the transition and transformation strategy, method and tool to migrate data, applications and workloads into cloud environments.

Chapter 13, 14, 15, 16, 17 & 18 present the design and implementation of the management, governance, brokerage and financial management of cloud service and systems.

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