Official Textbooks for Huawei ICT Academy

CLOUD COMPUTING TECHNOLOGY

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Preface

The sudden outbreak of novel coronavirus pneumonia (2019-nCoV) in 2020 has greatly affected people's lives. During the severe epidemic, everyone was quarantined at home and in the community, unable to go to work and school as usual. As a university teacher, the editor originally worried that normal teaching could not be carried out. Fortunately, with the help of the Internet and cloud services, even when the campus is closed, teaching and work in the university can still continue, teachers can teach online, and students can learn online. Cloud computing technology plays an important role in the information technology that has made a major contribution to the fight against the epidemic. As far as teaching is concerned, the communication between teachers and students is through the cloud: the teacher uploads the slides and teaching materials into the cloud, and the students obtain the materials from the cloud. The teaching cloud platform provides various functions such as sign-in, study, homework, and test. The communication among teachers and between teachers and students is through instant messaging software such as WeChat and QQ (the backend of these software is the cloud), and the meeting is through cloud conference systems such as Zoom, Tencent Meeting, and Webex. With the help of cloud computing technology, we can still teach and work normally during the epidemic, and this book can be completed.

Cloud computing technology has changed people's lifestyles, helped improve people's convenience and quality of life, and made a better future. Its emergence is a realistic portrayal of "technology changes life and changes the future." However, cloud computing technology itself integrates a variety of information technologies and is relatively complex. It is still difficult for beginners to have a more complete understanding of cloud computing technology. With regard to this reason, East China Normal University cooperated with Huawei to write this book on the basis of Huawei's certified cloud computing series of training materials.

There are eight chapters in this book. Chapter 1 introduces an overview of cloud computing. It includes common cloud computing scenarios in life. The characteristics, definition, origin and development of cloud computing, as well as advantages and classification of cloud computing are discussed in this chapter. It also mentioned

various types of supporting technologies for cloud computing and three perspectives on comprehending the business model, computing model and implementation of cloud computing. It also presents the state-of-art open source approach in cloud computing. Chapter 2 introduces the cloud computing system, starting from the four aspects of cloud infrastructure mechanism, cloud management mechanism, cloud security mechanism, and basic cloud architecture, and discusses some of the main technical mechanisms for building cloud technology architecture. Chapter 3 introduces virtualization technology, focusing on server virtualization technology, including its basic knowledge and supporting technologies, and discusses some actual virtualization products or applications based on theoretical knowledge, such as open-source virtual machine software KVM, Huawei FusionCompute cloud operating system, and desktop cloud. Chapter 4 introduces the basic knowledge of network in cloud computing, including an overview of computer networks, basic principles of computer networks, network interconnection equipment, network virtualization and software-defined networks, etc., so that readers can better understand some important concepts of computer networks, principles, equipment, and new network technologies supporting cloud computing. Chapter 5 introduces the basic knowledge of storage in cloud computing and also introduces storage in cloud computing in detail from the basic knowledge of storage, basic storage units, network storage, storage reliability technology, storage virtualization, distributed storage, etc. Chapter 6 starts from practice, introduces the popular open-source cloud operating system framework OpenStack, analyzes various components of OpenStack, discusses its operating mechanism, and enables readers to master the skills of implementing and managing OpenStack. Chapter 7 introduces the container technology that is widely concerned in cloud computing. It introduces the knowledge of container technology and container orchestration from the aspects of platform architecture, basic core functions, network, security, and resource management in a theoretical as well as practical model, which is convenient for readers to have a comprehensive understanding of Docker and Kubernetes ecosystem. Chapter 8 introduces the development status of cloud computing at home and abroad, analyzes and predicts its development trend, and discusses and analyzes the relationship between the Internet of Things, big data, artificial intelligence, 5G and other popular cutting-edge technologies, and cloud computing. It also introduces additional emerging technologies, such as edge computing and fog computing, microservices, and serverless computing.

This book was edited by Huawei Technologies Co., Ltd. The specific authors are as follows: Wang Wei formulated the outline and was responsible for the overall draft of the book, Zheng Kai was responsible for the main review, and Yang Lei provided training handouts. Chapters 1, 2, 4, and 8 are written by Zheng Kai. Chapters 3 and 5 are written by Huang Libo, and Chaps. 6 and 7 are written by Xu Yanjun.

In the process of writing this book, the editors have referred to and cited many works or papers by colleagues at home and abroad (see references for details), and I would like to express my gratitude to them. At the same time, I sincerely thank the training teachers and engineers of Huawei for their help and support.

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Contents