Distributed Systems

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PREFACE

udy of distributed systems is very popular in current research and practices of nternetworked enterprises. Distributed systems enable a loosely coupled ng agents/sites residing in several geographical areas to work together for ng common goals. This book describes the very essential features, the g theories, development methodology, and sample applications of uted systems. The target readers of this book can represent students, hers, IT practitioners, IT-Based system developers, or IT consultants.

ok consists of 8 chapters, each of which is provided with chapter summary. ucture flow of this book is organized as follows:

rl begins with the introductory part embracing definitions, characteristics, y, motivations of a distributed system. Chapter 2 describes various network ies connecting distributed sites, and provides comparisons among topologies. distributed sites inter-communicate, various communication techniques, and d communication protocol OSI (Open System Interconnection) are discussed pter 3. Chapter 4 discusses the distribution aspects: computation, data and task, alancing, synchronization, recovery and deadlock handling. Chapter 5 describes sign methods of developing a distributed system and provides example of some g systems. Chapter 6 discusses implementation issues of inter-process unications which are very vital to a distributed system. Chapter 7 provides ation of multiuser-tools that enable various sites to work together in ative modes. Finally Chapter 8 concludes the overall discussions of the ing chapters.

uthor is willing to thank and appreciate all helpful people involved in the and production of this book. Constructive and fruitful critics are sincerely me to improve the quality of this book in the future.

Bogor, August 2007

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Chapter 1

Distributed Systems

There are various definitions of a distributed system. These definitions result in a classification of distributed systems. This chapter discusses the principal working definition, characteristics, taxonomy, and motivations of distributed systems.

1.1 Definition

A distributed system is a set of autonomous interconnected computer systems which interact to perform computational activities cooperatively. This definition can be further expounded by considering what services a distributed system can provide and how they are provided. The terms *sites, nodes, hosts,* or *computers* are used to refer to the physical distribution of the autonomous computer systems. According to the studied literature [33, 10, 15, 34, 51, 58, 68, 7, 21], a distributed environment should support the following facilities.

Inter-site communication.
Resource and task distribution.
Concurrent computation.
Remote access.
Failure detection.
System security and protection.
Scalability.
Dynamic system configuration.

1.2 Characteristics

The characteristics of distributed systems can be identified as the following [33, 10, 15, 34, 51, 58, 68, 46, 21].

Autonomy. The local computer systems can operate autonomously without direct supervision of a master computer system.

Interconnection. A number of sites are connected to each other by a communication network that enables them to exchange information.