



Chapter I

Database High Availability: An Extended Survey

Moh'd A. Radaideh, Abu Dhabi Police – Ministry of Interior,
United Arab Emirates

Hayder Al-Ameed, United Arab Emirates University, United Arab Emirates

Abstract

With the advancement of computer technologies and the World Wide Web, there has been an explosion in the amount of available e-services, most of which represent database processing. Efficient and effective database performance tuning and high availability techniques should be employed to insure that all e-services remain reliable and available all times. To avoid the impacts of database downtime, many corporations have taken interest in database availability. The goal for some is to have continuous availability such that a database server never fails. Other companies require their content to be highly available. In such cases, short and planned downtimes would be allowed for maintenance purposes. This chapter is meant to present the definition, the background, and the typical measurement factors of high availability. It also demonstrates some approaches to minimize a database server's shutdown time.

Introduction

High availability of software systems has become very critical due to several factors that are related to the environment, processes and development strategies, hardware complexity, and the amount of dollars and human resources invested in the system. High availability cannot be achieved by just implementing a given service level or solution. Systems should be designed such that all factors that may lead the system to go down should be well-treated, if not eliminated.

In today's competitive business landscape, 24/7 operations become the standard, especially for the e-services-driven areas (e.g., e-commerce, e-government, e-learning, etc.) Downtime of applications, systems, or networks typically translates into significant revenue loss. Industry experts and analysts agreed on that in order to support e-service applications, typical network availability must reach 99.999%. In other words, networks must be at the "5-Nines" availability level (Providing Open Architecture, 2001). Reaching this level of availability requires careful planning and comprehensive end-to-end strategy. To demonstrate the impact of not being at the "5-Nines" availability level, a system with 97% availability will incur approximately 263 hours (6.6 days) of downtime per year. With 99 percent availability, downtime will be 88 hours (2.2 days) per year. Table 1 summarizes the impact of service downtime according to the availability ratings.

High Availability is not achieved through a single product or process. It is the result of an end-to-end analysis and reengineering of the entire service chain including the combination of people, processes, and technological factors (Otey & Otey, 2005). Every device or circuit in the path between client and server is a link in this service chain, and each must be considered separately. A chain is only as strong as its weakest link. As more applications are delivered via Web browsers, the emphasis for high availability is spreading from back-

Table 1. Downtime measurements at various availability rates

Availability Percentage	Downtime Percentage	Service Downtime (Minutes/Year)
95%	5%	50000
97%	3%	15840
98%	2%	10512
99%	1%	3168
99.5%	0.5%	2640
99.8%	0.2%	1050
99.9%	0.1%	528
99.95%	0.05%	240
99.99%	0.01%	53
99.999%	0.001%	5
99.9999%	0.0001%	0.51
99.99999%	0.00001%	0.054

31 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/database-high-availability/5214

Related Content

Social Research Methods Used in Moving the Traditional Usability Approach Towards a User-Centered Design Approach

Horia D. Pitariu, Daniela M. Andrei and Adriana M. Guran (2009). *International Journal of Information Technology and Web Engineering* (pp. 36-53).

www.irma-international.org/article/social-research-methods-used-moving/40343

A Modern Web Architecture

(2023). *Architectural Framework for Web Development and Micro Distributed Applications* (pp. 144-161).

www.irma-international.org/chapter/a-modern-web-architecture/322150

Productivity Evaluation of Self-Adaptive Software Model Driven Architecture

Basel Magablehand and Stephen Barrett (2013). *Network and Communication Technology Innovations for Web and IT Advancement* (pp. 191-210).

www.irma-international.org/chapter/productivity-evaluation-self-adaptive-software/72762

eHealth Adoption on Patients' Pre-Consultation Waiting Time: A Comparative Assessment of Two District Hospitals in Abuja, Nigeria

Iniobong Ekong, Oluwaseun Esan, Emeka Chukwu and Mohammed Kawu (2020). *International Journal of Information Technology and Web Engineering* (pp. 102-113).

www.irma-international.org/article/ehealth-adoption-on-patients-pre-consultation-waiting-time/252857

Research on O2O Platform and Promotion Algorithm of Sports Venues Based on Deep Learning Technique

Kaiyan Han and Qin Wang (2018). *International Journal of Information Technology and Web Engineering* (pp. 73-84).

www.irma-international.org/article/research-on-o2o-platform-and-promotion-algorithm-of-sports-venues-based-on-deep-learning-technique/204360