

# Improving the Security of Storage Systems: Bahrain Case Study

*Wasan Shaker Awad, Ahlia University, Manama, Bahrain*

*Hanin Mohammed Abdullah, University of Bahrain, Sakheer, Bahrain*

---

## ABSTRACT

*Developing security systems to protect the storage systems are needed. The main objective of this paper is to study the security of file storage server of an organization. Different kinds of security threats and a number of security techniques used to protect information will be examined. Thus, in this paper, an assessment plan for evaluating cyber security of local storage systems in organizations is proposed. The assessment model is based on the idea of cyber security domains and risk matrix. The proposed assessment model has been implemented on two prestigious and important organizations in the Kingdom of Bahrain. Storage systems of the assessed organizations found to have cyber security risks of different scales. This conclusion gives certainty to the fact that organizations are not capable of following the cyber security evolution and secure their storage systems from cyber security vulnerabilities and breaches. Organizations with local storage systems can improve the cyber security of their storage systems by applying certain techniques.*

*Keywords:* Attacks, Cyber Security, Risk Assessment, Risk Matrix, Storage Systems, Threats

---

## INTRODUCTION

In the old days, organizations and enterprises have had almost always a file server that is located in a corner without being used because employees were relying on their local disk drives. Nowadays everything has changed and storage systems are of high importance and of different applications and formations. Storage Systems is becoming a specialization by itself and companies acquire hardware and software storage specialists. The decision of choosing a particular storage system over another for a specific application and the way the system is managed after commissioning is not straight

forward and depends on a lot of factors one of which is the cyber security which is the area of research and concern in this paper.

Cyber Security of systems is becoming a major issue worldwide and it is being discussed on the highest level of decision makers. Having this said, the security of important systems which affects the performance of organizations should be assessed and improved. One of these systems is the storage system which has currently a lot of breaches and vulnerabilities in most of the organizations. Some of those vulnerabilities are the lack of access control, weak password policies and ineffective firewall rules.

DOI: 10.4018/IJMCMC.2014070104

This study is motivated by the mentioned factors to assess the traditional storage servers from security point of view, and finds a solution to the threats found. In addition, using cloud storage services instead of the traditional storage server is studied from cyber security point of view as well. A model is proposed in conclusion for organizations to consider.

The main objective of this paper to study the security of file storage server of an organization. Different kinds of security threats and a number of security techniques used to protect information will be examined. Thus, this paper is to answer the following questions regarding the cyber security of the current storage system:

1. What are the current challenges in the current locally hosted storage servers?
2. What are the security threats of storage servers used in Bahrain?
3. What are the security techniques which can mitigate these threats?
4. How the security techniques can be integrated in a one secure system design?

The big transition which has happened in the last decade from paperwork to electronic work and from manual operations to automatic is because of the heuristic magnificent development in computerized systems. Nowadays, a lot of computerized systems and components are a must for any organizational operations. Examples of such systems are: Databases Server, Mail Server, Web Server and Storage Server. Storage systems which are systems of interest in the research of this paper are one of the most important, if not the most, because the whole data that other systems are dependent on resides in it. For this reason storage systems has evolved rapidly in terms of storage medium, architecture, communication protocols, encryption ...etc.

Storage systems attracted many authors; they studied their evolution, types, features, access techniques, and architecture (Richeard, 1977; Skondric, Konjicija, 2011; Tripathi, Mishra, 2011; Peng, Zhu, Luo, 2012;). Moreover, securing the storage system is one of the important issues which have been studied by

many researches, because of various security attacks and threats (Richardson, 2010; Ateeq, 2012). Therefore, developing security systems to protect the storage systems are needed. A number of researchers have studied the security of storage systems and they proposed different solutions to solve the problems of securing storage systems (Miller, Long, Freeman, Reed, 2001; Niu, et. al., 2007; Stanton, 2004; Xu, Jiang, 2009).

In order to improve the security of a system, we have to assess the current security system. Stambulin 2011 (Stambul, 2011) has suggested an assessment model for information security. Authors concluded that the model they have suggested can be used by organizations to assess the level of maturity of the cyber security framework of the organization. Another paper (Vonsolms, Thomson, Maninjwa, 2011) has suggested a policy architecture that can be used for complete control and better governance of cyber security. In (Riedel, Kallahalla, Swaminathan, 2002), they proposed methodology for evaluating storage systems based upon certain cyber security aspects is presented. For this reason, two axes have been the basis of the evaluation: performance axes and security axes.

In this study, the traditional storage systems is assessed and audited from security point of view, by identifying clearly the current security threats and risks. After that, different techniques and solutions which are needed to harden the security of the server and close the vulnerabilities available are studied.

## STORAGE SYSTEMS BACKGROUND

Storage in computer systems is normally referred to as a set of computer components and media that forms a technology that is able to keep digital data. This technology nowadays is of different forms, one of which is a functionality form that is core in all of computerized systems. All computer systems need to boot from a memory into which the main boot program is stored (Ahmadi, Maleki, 2010).

29 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/article/improving-the-security-of-storage-systems/130482](http://www.igi-global.com/article/improving-the-security-of-storage-systems/130482)

## Related Content

---

### Network Forensics: Fundamentals

(2019). *Mobile Network Forensics: Emerging Research and Opportunities* (pp. 1-18).

[www.irma-international.org/chapter/network-forensics/216747](http://www.irma-international.org/chapter/network-forensics/216747)

### Exploration and Development of the JPEG Compression for Mobile Communications System

Andik Setyono, Md. Jahangir Alamand C. Eswaran (2013). *International Journal of Mobile Computing and Multimedia Communications* (pp. 25-46).

[www.irma-international.org/article/exploration-development-jpeg-compression-mobile/76394](http://www.irma-international.org/article/exploration-development-jpeg-compression-mobile/76394)

### Ubiquitous and Pervasive Application Design

M. Bakhouyaand J. Gaber (2007). *Encyclopedia of Mobile Computing and Commerce* (pp. 954-959).

[www.irma-international.org/chapter/ubiquitous-pervasive-application-design/17201](http://www.irma-international.org/chapter/ubiquitous-pervasive-application-design/17201)

### Threat and Risk-Driven Security Requirements Engineering

Holger Schmidt (2011). *International Journal of Mobile Computing and Multimedia Communications* (pp. 35-50).

[www.irma-international.org/article/threat-risk-driven-security-requirements/51660](http://www.irma-international.org/article/threat-risk-driven-security-requirements/51660)

### Training for Mobile Journalism

Maurice M. "Mo" Krochmal (2016). *Handbook of Research on Mobile Learning in Contemporary Classrooms* (pp. 336-362).

[www.irma-international.org/chapter/training-for-mobile-journalism/157988](http://www.irma-international.org/chapter/training-for-mobile-journalism/157988)