

SQL injection attacks countermeasures assessments

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ABSTRACT

SQL injections attacks have been rated as the most dangerous vulnerability of web-based systems over more than a decade by OWASP top ten. Though different static, runtime and hybrid approaches have been proposed to counter SQL injection attacks, no single approach guarantees flawless prevention/ detection for these attacks. Hundreds of components of open source and commercial software products are reported to be vulnerable for SQL injection to CVE repository every year. In this mapping study, we identify different existing approaches in terms of the cost of computation and protection offered. We found that most of the existing techniques claim to offer protection based on the testing on a very small or limited scale. This study dissects each proposed approach and highlights their strengths and weaknesses and categorizes them based on the underlying technology used to detect or counter the injection attacks.

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1. INTRODUCTION

In recent years SQL injections have emerged as one of the most dangerous types of attacks to web-based systems and are ranked number one among the Open Web Application Security Project's (OWASP) top ten vulnerabilities [1]. SQL injection attacks (SQLIAs) are launched by entering malicious characters into the input fields of web applications resulting in a modified SQL query. There has not been a long history of SQL injection attacks. During the early days of the Internet, most content was static and not prone to injection attacks. The first large scale SQL injection attack was launched in Feb 2002 on Guess.com customers' database permitting the attacker to retrieve more than 200,000 customer names, credit card numbers, and expiration dates. More recently, the National Vulnerability Database (NVD) reports that 7 percent of the total reported incidents in 2011 were caused by SQL injections [2]. Moreover, it was discovered that an average of 71 SQL injection attacks is attempted every hour [3].

SQLIAs are used by attackers to gain access to confidential information in a database. SQLIAs can result in a financial loss as well as a damaged reputation for the impacted organization. There is no sound technique or combination of techniques that fully protects against all types of SQLIAs [4]. To help protect confidential data from being illegally accessed by attackers using SQLIA, the effectiveness of different techniques and combinations of techniques need to be evaluated to determine a robust set of combined techniques to lessen the impact SQLIAs have on an organization. Our strategy for determining which techniques and combinations of techniques are most effective consists of performing a systematic mapping study on the subject of SQLIA mitigation strategies. By analyzing the effectiveness of various techniques, we will be able to identify the best protection mechanisms that also consume the least human and computing

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