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Title   **:**   **Measuring the security intensity of a software system using a security metrics**

Abstract

Software systems have penetrated deep into our day to day lives. Since the users are so much dependent on these software systems, it is very important to have secure software systems. The users are conscious and understand the importance of security in software systems. That is a reason which has made security an important part of the software development lifecycle. The software development lifecycles have now been modified into secure software development lifecycles in almost all organizations. Besides doing so much into incorporating security into every phase of software, still the users are not confident in using these secure systems. The prime reason for this is that security attribute is not yet quantified. Thus there was a need felt to measure security which could give that confidence level to the users.

This study was mainly around measuring the security intensity of the software systems. Till date we can suggest a system to be secure but 'how secure' is still an unanswered question. Though research is going around security measurement but there are no standard methods or metrics or frameworks available which could emphasize on security measurement. After a thorough review a standard metric was proposed to quantify the security intensity. This metrics could be applied to various parameters which contribute to the overall security intensity of a software system. This led to identifying various parameters in a software system which contributed to the overall

security. Thus a security model was prepared on which we could apply the security metrics to derive the security intensity of any software system under investigation.

There was a need to develop an overall framework which could define the application of the security metrics to the parameters. A security framework, CIAAAN was developed as part of this study which looked into the integrities of security in a very detailed manner. The framework analyzed the finest details of the software system keeping the security aspect in mind. It applied the security metrics and evaluated the overall security intensity. This framework required a good amount of input from a team of people who are thoroughly involved in the software system at different phases and understand the security integrities of the software system. These inputs are then processed to finally obtain the security intensity of the software system.

The next phase of this study was to implement this framework so that it could be tested in a live environment. To enable the implementation of the framework, a security tool, SecureSight was designed which gave the complete insight of the security intensity of the software system. This tool did the basic work of evaluating the security intensity very efficiently and quickly. It also analyzed the software system further to perform a gap analysis and gave reasons which pulled down the software system under investigation from reaching the highest level of security. The tool was used to evaluate the security intensity of various projects in a sample set of 25 software systems.

The study further defined various security levels in which the software systems can be classified based on the security intensity achieved. There was a methodology proposed and applied to the sample set for defining the scale to classify the software systems under different security levels. The results obtained were very satisfactory. Though the framework was implemented and tested on a sample set of a particular domain but it could be extended to a larger sample set and various other domains.