UNIVERZITET U BANJALUCI

PRIRODNO-MATEMATIČKI FAKULTET

Dragan M. Korać

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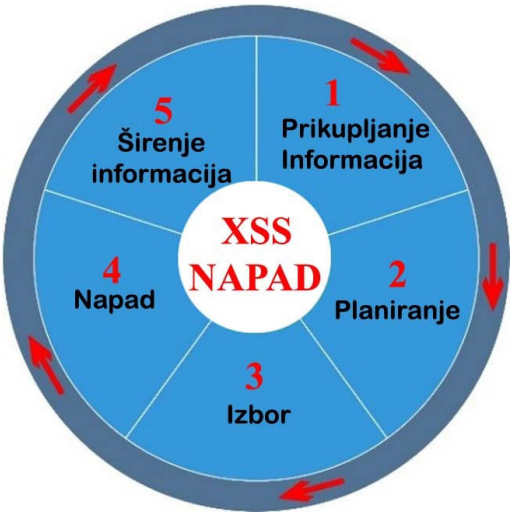
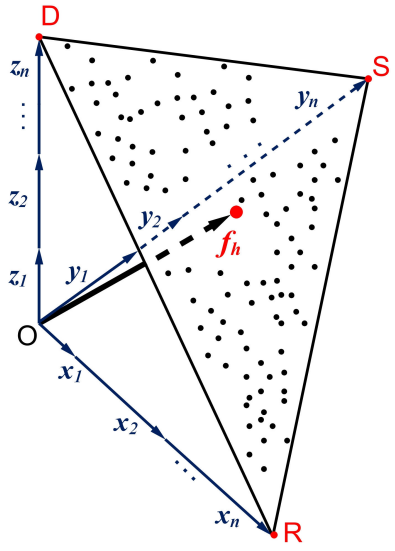
Naučna monografija





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UNIVERSITY OF BANJA LUKA

FACULTY OF NATURAL SCIENCES AND MATHEMATICS

Dragan M. Korać

INFORMATION SECURITY IN FRAME OF IDENTITY AND ACCESS MANAGEMENT SYSTEMS

Scientific monograph

Banja Luka, 2022

Zaštita informacija u okviru sistema menadžmenta idetiteta i upravljanja pristupom

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Mojoj familiji
Familiji moje sestre
Mojim roditeljima, posebno majci znajući koliko bi ona bila ponosna

Predgovor

Posljednjih godina, zaštita informacija u okviru sistema menadžmenta identiteta i upravljanja pristupom (IAM) se izdiferencirala kao poseban izazov. Prije svega, izazov je povezan sa fundamentalnim istraživačkim ciljevima usmjerenim na osnovne modele zaštite infomacija, alate zaštite u okruženjima e-učenja, kao i prijetnje i posljedice od sajber napada kao što je Cross Site Scripting (XSS). Sadržaj monografije integriše važnost u pojmu teorije i primjene i kao takav treba da bude jednako zanimljiv istraživačima i praktičarima.

Pored brojnih razvijenih modela zaštite informacija, napadači iznova pronalaze praznine u aspektu zaštite stvarajući nove i sve opasnije sajber prijetnje. Mnogo je faktora koji ukazuju da do sada nema lakih i konkretnih odgovora sa kojima bi se to spriječilo, a vjerojatno ih nikada neće ni moguće dobiti. Jedna od najvećih sajber prijetnji je XSS napad sa kojima napadači mogu da uspješno zaobiđu postojeća tehnička rješenja. Treba naglasiti da su XSS napadi obično pod vanjskom kontrolom (napadača) i često se izvode upotrebom dodatnih tehnika, dok je provođenje zaštite pod unutrašnjom kontrolom (sistema). Dakle, centralni problem ove monografije je usmjeren na analizu postojećih modela zaštite informacija s ciljem stvaranja bezbjednijeg sajber okruženja.

Područje zaštite informacija je ogromno i nije moguće da se pokrije u pojedinačnom opsegu. Međutim, napravljen je napor da se uključe radovi koji su pristupačni ka opštem čitaocu, ali koji takođe imaju dovoljnu dubinu za istraživače iz ove oblasti. To je urađeno s nadom da većina čitalaca bude u stanju da mnogo lakše shvati i upotrijebi informacije predstavljene u različitim sekcijama.

Materijal ove monografije je organizovan u 10 međusobno povezanih cjelina.

Prvi dio monografije započinje sa "Zašto istraživati zaštitu informacija u okviru IAM sistema". U nastavku, problemi su definisani sa detaljnom elaboracijom svih otvorenih pitanja prisutnih u okviru IAM sistema.

Drugi dio monografije daje detaljni uvid u prethodna referentna istraživanja u ovoj oblasti.

Treći dio monografije daje pregled i definicije osnovnih pojmova u aspektu zaštite informacija u okviru IAM sistema obuhvatajući pojmove informacije i zaštite, principe i kontrolu zaštite informacija, pregled i opis osnovnih korisničkih faktora, tipove kolačića, kao i učesnika u XSS napadima.

Četvrti dio monografije je posvećen IAM sistemima sa jasnim pregledom i detaljnim opisom njegovih bazičnih komponenti i funkcija. Na ovaj način, struktuirani uvod u metode autentifikacija je obezbijeđen.

Peti dio monografije daje detaljan pregled i analizu bazičnih metoda autentifikacija. Ovaj dio definiše višestruke autentifikacione mehanizme (MFA), njihove prednosti odnosno ograničenja u pogledu višefaktorskog integrisanja.

Šesti dio monografije daje detaljnu analizu osnovnih modela zaštite informacija. Ovaj dio započinje pregledom i opisom osnovnih modela zaštite naglašavajući posebno njihova ograničenja. U nastavku dijela, zbog značaja i važnosti koji imaju u zaštiti informacija posebno su izdiferencirani i analizirani Model digitalnog identiteta (MDI) i Fishbone model.

Sedmi dio monografije daje primjere implementacije MDI i Fishbone modela. Ovaj dio započinje primjerom implementacije MDI u formi alata zaštite u Moodle LMS dok je u nastavku dat primjer implementacije Fishbone modela zasnovanog na primjeni Fazi ekspertnog sistema (FES) alata za MFA.

Osmi dio monografije je posvećen sajber zaštiti u pogledu krađe i budućnosti identiteta. Ovaj dio se bavi elaboracijom fenomena krađe identiteta u pogledu zloupotrebe kolačića. Izdiferencirane su prijetnje u formi XSS napada kao jedan od najopasnijih napada sa kojima je to moguće učiniti. Osim toga, pregled i opis postojećih osnovnih metoda zaštite od tih prijetnji je takođe dat.

Deveti dio monografije daje kritički osvrt u pogledu diskusije koja prati fundamentalni istraživački izazov ove studije. Takođe, diskutovani su pravci daljeg istraživanja.

Deseti dio monografije daje zaključna razmatranja sublimirajući ih kroz zaključke koji prate tri ključna istraživačka pravca.

Za realizaciju ove monografije, dodatni napor je uložen kako bi se tekst učinio mnogo čitljivijim u rednom redoslijedu, ali čitalac treba da bude svjestan da dublje razumijevanje ove studije vjerovatno zahtijeva da se prate povezane cjeline naprijed i unazad. Stoga čitalac treba uvijek biti svjestan unutrašnjih poteškoća koje treba savladati. Ova monografije može biti namijenjena studentima diplomskih i postdiplomskih studija, kao i svim drugima koji se bave zaštitom informacija posebno u aspektu IAM sistema.

Banja Luka, septembar, 2022. Autor

Preface

In the last years, the information security in systems for identity and access management is differentiated itself as a special challenge. First off all, the challenge is related to fundamental research goals focused on basic information security models, security tools in e-learning environments, as well as threats and consequences from cyberattacks such as Cross Site Scripting (XSS). The content of the monograph integrates importance in term of theory and application, and as such it should be equally interesting to both researchers and practitioners.

Besides, the numerous developed information security, attackers are repeatedly finding gaps in the security aspect, creating new and increasingly dangerous cyber threats. There are many factors that indicate that there are no easy and concrete answers so far to prevent this, and it will probably never be possible to get them. One of the biggest cyber threats is the XSS attack, with which attackers can successfully bypass the existing technical solutions. It should be emphasized that XSS attacks are usually under external control (the attacker) and they are often carried out using additional techniques, while the enforcement of security is under internal control (the system). Therefore, the central problem of this monograph is to analyze the existing models of information security with the aim of creating a safer cyber environment.

The field of information security is huge and it is not possible to cover it in a single scope. However, an effort has been made to include manuscripts that are accessible to the general reader, but that have sufficient depth for research from this field. It is done with the hope that most readers will be able to much more easily understand and use the information presented in the various sections.

The material of this monograph is organized into 10 interconnected units.

The first part of the monograph begins with "Why research information security in frame of the IAM system". In the following, the problems are defined with a detailed elaboration of all open questions present in the framework of IAM system.

The second part of the monograph provides a detailed insight into previous reference research in this area.

The third part of the monograph gives an overview and definitions of basic terms in the aspect of information security in the IAM system, including the terms information and security, principles and control of information security, an overview and a description of basic user factors, types of cookies, as well as participants in XSS attacks.

The fourth part of the monograph is devoted to IAM systems with a clear overview and a detailed description of its basic components and functions. In this way, a structured introduction in authentication methods is provided.

The fifth part of the monograph gives a detailed overview and analysis of basic authentication methods. This part defines multiple authentication mechanisms (MFA), their advantages and limitations in terms of multi-factor integration.

The sixth part of the monograph provides a detailed analysis of the basic models of information security. This part begins with an overview and a description of the basic security models, emphasizing in particular their limitations. In the following section, because of their significance and importance in information security, the Model of Digital Identity (MDI) and the Fishbone model are specifically differentiated and analyzed.

The seventh part of the monograph gives examples of the implementation of MDI and Fishbone model. This part begins with an example of the implementation of MDI in the form of a security tool in Moodle LMS, hereafter an example of implementation of the Fishbone model based on application of the Fuzzy Expert System (FES) tool for MFA is given.

The eighth part of the monograph is dedicated to cyber security regarding identity theft and the future of identity. This part deals with the elaboration of phenomenon of identity theft with regard to the misuse of cookies. Threats in the form of XSS attacks are differentiated as one of the most dangerous attacks with which it is possible to do it. Moreover, an overview and a description of existing basic methods of security against these threats is also given.

The ninth part of the monograph gives a critical review regarding the discussion that follows the fundamental research challenge of this study. Also, directions for further research are discussed.

The tenth part of the monograph gives concluding considerations, sublimating them through conclusions that follow three key research directions.

For the realization of this monograph, the extra effort has been made to make the text much more readable in sequential order, but the reader should be aware that a deeper understanding of this study probably requires following the connected units forwards and backwards. Therefore, the reader should always be aware of the internal difficulties that need to be overcome. This monograph can be intended for undergraduate and postgraduate students, as well as for all others who deal with information security, especially in the aspect of the IAM system.

Banja Luka, September, 2022. Author

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