جامعة الإسراء
Isra University

Design and implementation of security solutions for mobile applications using security design patterns

By

Saif Muhannad Maher

Supervisor

Dr.Adi Abdelhalim Maaita

This Thesis is Submitted in Partial Fulfillment of the Requirements for

the Master Degree in Software Engineering

Isra University

Amman, Jordan

May, 2017

AUTHORIZATION STATEMENT

I, Saif Muhannd, authorize Isra University to provide hard copies or soft copies of my thesis to libraries, institutions or individuals upon their request.

Name: **Saif Muhannad Maher**

Signature:

Data:

إقرار تفويض

أناسيف مهند، أفوض جامعة الاسراء للدراسات العليا بتزويد نسخ من رسالتي ورقياً وإلكترونياً للمكتبات أو المنظمات أو الهيئات والمؤسسات المعنية بالأبحاث والدراسات العليا عند طلبها.

الاسم : سيف مهند ماهر

التوقيع:

التاريخ:

Examination Committee Decision

This is to certify that the thesis entitled **Design and implementation of security solutions for mobile applications using security design patterns** was successfully defended and approved on

Examination Committee Members Signature

Dr.Adi Abdelhalim Maaita

(Head of the Committee and Supervisor)

Prof. Dr. Mohammad Ahmed Al-Fauomi

(Internal Committee Members)

Prof. Dr.Bassim Mohammad Al-Hadedee

(External Committee Members)

ACKNOWLEDGMENTS

Thanks to God I have completed this thesis praise and thanks for his

blessings.

I would like to thank Dr.Adi Abdelhalim Maaita for his guidance and

assistance through valuable information for the completion of this thesis.

Dedication

I start my words with the name of God, as he was the reason to the place I have reached today; I thank him for what came to me...

"To my first Role model...

"To the one who taught me success and patience...

"To the one whom I carry my name with all pride...

"To the one who I miss to face difficulties and to have his tenderness...

My beloved father, may God have mercy on him

"To my angel in life...

"To the smile of life and the secret of existence...

"To the meaning of love, compassion and dedication...

"To the one whom her prayers were the secret of my success and her tenderness to heal my wounds ...

"Who taught me and suffered the difficulties to get me to what I am now...

My Dearest mother

"To whom I knew the meaning of life...

"To those closer to me than my soul...

"To the glowing jewels and the shining Diamonds...

"To those whom their presence gave me strength and boundless love...

My sisters

"To the owner of the good heart and sincere intentions...

"To the one who stood beside me and planted optimism in my path and gave me assistance...

My Brother and friend Harith Abdullah

"To the roses and closest to the heart that with them the life gets sweet...

My Nephews Muhannad and Anas

TABLE OF CONTENTS

LIST OF FIGURES

List Of Abbreviations

Abbreviations	Meaning
ASP.NET	Application service provider
ECP	The Environmentally Conscious Product
GPS	Global Positioning System
GSM	Global System for Mobile
GUI	Graphical user interface
HTTPS	Hyper Text Transfer Protocol Secure
ICT	The information-communication-technology
IOS	IPhone Operating System
KLP	Key Lime Pie
MDS	Model-Driven Security
MVC	Model View Controller
PHP	Personal Home Page
RAM	Random Access Memory
SoSPa	System of Security design Patterns
SQL	Structured Query Language
SSL	Secure Sockets Layer
TLS	Transport Layer Security
UI	User Interface
UML	Unified Modeling Language

Abstract

Design patterns represent the best methods used by object-oriented software developers; it's defined as of repeatable solution to a commonly occurring problem in software design. It typically described regarding several aspects, such as intent, structure, behavior, and sample code. It can accelerate the development process by providing tested, proven development paradigms.

Recently, design pattern approach evolved to be a widely used for solving general problems and facilitating reuse. One computing domain where design patterns can serve an important role is software security. This can be achieved by creating new patterns to solve existing security problems.

The patterns were derived by generalizing current best security design practices. Security Pattern is utilized for describing a particular repeated security problem that arises in a software system and presents an appropriate approach for its solution. It categorized according to patterns names such as Single Access Point, Check Point, Roles, Session, Full View with Errors, Limited View, and Secure Access Layer.

This thesis focused on Check Point pattern which organizing security checks and their repercussions; it analyzes the Check Point pattern's structure and investigates requests about programs to the pattern and the relation between security and design patterns. Finally attempted presented some of the intuitive requirements when the user requirement found inaccurate or false.

الخلاصة

تمثل أنماط التصميم أفضل الطرق التي يستخدمها المطورون بواسطة البرمجة الموجهة؛ يتم تعريفه على أنه الحل القابل للتكرار في تصميم البرمجيات لمشكلة شائعة. وعادة ما يتم وصفها بعدة جوانب، مثل النية، والبنية، والسلوك، وجزء من برنامج. فإنه من خلال توفير الاختبار يمكن تسريع عملية التنمية ، أثبتت نماذج التنمية.

وفي الآونة الأخيرة، تطور نهج نمط التصميم ليكون مستخدم على نطاق واسع لحل المشاكل العامة وتسهيل إعادة الاستخدام. مجال حاسوبي هو واحد حيث أنماط التصميم تستطيع أن يكون لها دورا هاما في أمن البرمجيات. يمكن تحقيق ذلك بإنشاء أنماط جديدة لحل المشاكل الأمنية القائمة.

تكونت الأنماط من خلال تعميم أفضل الممارسات الحالية لتصميم الأمن. يستخدم نمط الأمن لوصف مشكلة أمنية متكررة معينة تنشأ في نظام البرمجيات وتقدم نهجا مناسبا لحلها. يتم تصنيفها وفقا لأسماء أنماط مثل نقطة وصول واحدة، نقطة الاختيار، والأدوار، جلسة، عرض كامل مع أخطاء، عرض محدود، وطبقة الوصول الآمن.

وركزت هذه الرسالة على نمط نقاط التحقق التي تنظم عمليات التفتيش الأمنية وتداعياتها؛ ويحلل هيكل نمط نقطة التحقق ويحقق في الطلبات المتعلقة بالبرامج إلى النمط والعلاقة بين أنماط الأمن والتصميم. وأخيرا حاولت تقديم بعض المتطلبات بديهية عندما وجدت متطلبات المستخدم غير دقيقة أو خاطئة.

Chapter ONE

Introduction