

**MEETING ROOM RESERVATION SYSTEM FOR  
HOSPITAL WANITA DAN KANAK-KANAK  
SABAH**

**CHENG FONG WENG**

**FACULTY OF COMPUTING AND INFORMATICS  
UNIVERSITI MALAYSIA SABAH**

**2015**

**MEETING ROOM RESERVATION SYSTEM FOR  
HOSPITAL WANITA DAN KANAK-KANAK  
SABAH**

**CHENG FONG WENG**

**THESIS SUBMITTED IN PARTIAL FULFILMENT  
OF THE REQUIREMENT FOR THE DEGREE OF  
BACHELOR OF SOFTWARE ENGINEERING**

**FACULTY OF COMPUTING AND INFORMATICS  
UNIVERSITI MALAYSIA SABAH**

**2015**

## **DECLARATION**

I hereby declare that the material in this thesis is my own except for quotations, excerpts, equations, summaries and references, which have been duly acknowledged.

This thesis may be made available within the university library and may be loaned or photocopied to other libraries for the purpose of consultation.

20 Jun 2015

CHENG FONG WENG

**CERTIFIED BY**

---

**DR. MOHD HANAFI AHMAD HIJAZI**  
**SUPERVISOR**

## **ACKNOWLEDGEMENT**

I would like to express special thanks of gratitude to my lecturers, Dr. Mohd Hanafi Ahmad Hijazi and Dr. Norazlina Khamis for guiding me to do this project. They helped me along the way and I came to know about so many new things when doing this project. Secondly I would like to thank my family members and my friends who helped me a lot in finalizing this project within the limited time frame.

## **ABSTRACT**

A project to build a meeting room reservation system for Hospital Wanita Dan Kanak-Kanak Sabah (HWKKS) is presented in this report. The system developed in this project is called B-META system. This system is needed in the first place for HWKKS because the existing system, B-MEET has the limitation to solve meeting room reservation problems of HWKKS which is no recurrence booking can be performed. Thus, B-META system is needed to overcome the weaknesses of the B-MEET system. The aim of this project is to identify, design and develop the additional features that are necessary for B-META system to solve the room reservation problems of HWKKS. The advantage by using B-META system is user can choose weekly or monthly booking style for recurring their booking entries. The methodology used is rapid application development. The quality assessment of validation and verification proved that B-META system is the product that is highly applicable. The feedback from user acceptance testing show that the end users are satisfied with B-META system. B-META system is ready to be deployed after the closure of this project.

## **ABSTRAK**

*Pembinaan sistem tempahan bilik mesyuarat untuk Hospital Wanita Dan Kanak-Kanak Sabah telah diperkenalkan dalam projek ini. Sistem yang berkembang dalam projek ini dipanggil sistem B-META. Sistem ini amat diperlukan untuk HWKKS kerana B-MEET sistem yang sedia ada mempunyai kelemahan untuk menyelesaikan masalah tempahan bilik mesyuarat di HWKKS iaitu pengulangan entri tempahan tidak dapat dijalankan. Oleh itu, pembangunan sistem B- META perlu dijalankan untuk mengatasi kelemahan sistem B-MEET. Tujuan projek ini adalah untuk mengenal pasti, mereka bentuk dan membina modul-modul tambahan yang diperlukan untuk sistem B-META untuk menyelesaikan masalah tempahan bilik mesyuarat. Kelebihan menggunakan system B-META ialah pengguna boleh memilih gaya tempahan minggu atau bulanan untuk memproseskan pengulangan entri tempahan. Pembinaan aplikasi pesat merupakan metodologi yang digunakan dalam projek ini. Penilaian kualiti dalam proses penentuan dan pengesahan telah membuktikan bahawa sistem B-META adalah produk yang sesuai digunakan dalam sistem tempahan bilik. Pembalasan daripada ujian penerimaan menunjukkan bahawa pengguna berpuas hati dengan sistem B- META. Sistem B-META ini sedia digunakan selepas projek ini diluluskan.*

# TABLE OF CONTENT

	Page
<b>DECLARATION</b>	i
<b>ACKNOWLEDGEMENT</b>	ii
<b>ABSTRACT</b>	iii
<b>ABSTRAK</b>	IV
<b>LIST OF TABLES</b>	ix
<b>LIST OF FIGURES</b>	xi
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 Chapter Overview	1
1.2 Problem Background	1
1.3 Problem Statement	2
1.4 Short Description of Project	3
1.5 Project Objectives	3
1.6 Project Scopes	4
1.7 Organization of Report	4
<b>CHAPTER 2: LITERATURE REVIEW</b>	
2.1 Chapter Overview	6
2.2 Review of Existing Room Booking System	6
2.2.1 Review of Available B-MEET system	7
2.2.2 Review of Available Room Booking System	10

2.2.3	Review of RobotBooker	20
2.2.4	Review of YArooms	25
2.2.5	Review of BookMeetingRoom	28
2.2.6	Review of Fleximation Room Booking and Scheduling Software	30
2.3	Comparison of Existing Room Booking System with B-MEET	32
2.4	Summary	34
<b>CHAPTER 3: METHODOLOGY</b>		
3.1	Chapter Overview	35
3.2	System Development Methodology	35
3.2.1	Planning Phase	37
3.2.2	Analysis Phase	38
3.2.3	Design Phase	40
3.2.4	Implementation Phase	41
3.2.5	Prototyping Phase	42
3.2.6	Testing Phase	42
3.3	Software and Hardware Requirement	43
3.4	Summary	44
<b>CHAPTER 4: SYSTEM ANALYSIS AND DESIGN</b>		
4.1	Chapter Overview	45
4.2	System Analysis	45
4.2.1	Requirement Gathering	46
4.2.2	Functional Requirement	47



4.2.3	Non - Functional Requirement	48
4.3	System Design	49
4.3.1	Context Diagram	50
4.3.2	Data Flow Diagram(DFD)	51
4.3.3	System Flowchart	58
4.4	User Interface Design	61
4.4.1	Interface Structure Diagram	61
4.4.2	Storyboard of User Interface	62
4.5	Database Design	65
4.5.1	Requirement Modeling	66
4.6	Summary	68
<b>CHAPTER 5: IMPLEMENTATION</b>		
5.1	Chapter Overview	69
5.2	Implementation of Database	69
5.3	Implementation of B-META System	75
5.3.1	Phased Development of B-META System	76
5.3.2	Prototyping of B-META System	77
5.4	Functioning of Modules in B-META System	79
5.5	Summary	98
<b>CHAPTER 6: TESTING</b>		
6.1	Chapter Overview	99
6.2	Test Strategy	99

6.3	Unit Testing	101
6.3.1	Test-First Approach for Prototyping	101
6.3.2	Equivalence Partitioning of Date and Time Module	111
6.3.3	Boundary Value Analysis of Date and Time Module	114
6.3.4	Equivalence Partitioning of Password Module	118
6.3.5	Boundary Value Analysis of Password Module	119
6.4	Integration Testing	120
6.4.1	Top Down Approach for Testing B-META System	121
6.5	System Testing	126
6.5.1	Use Case Testing for Functional Behavior of B-META System	126
6.6	Acceptance Testing	132
6.7	Test Closure	135
6.8	Summary	135
<b>CHAPTER 7: CONCLUSION</b>		
<b>REFERENCES</b>		142
<b>APPENDICES</b>		144

## LIST OF TABLES

Table No.	Page
2.1 Features comparison of existing room booking system	32
3.1 Hardware requirement	43
3.2 Software requirement	44
4.1 'booking' table	66
4.2 'room' table	66
4.3 'admin' table	67
4.4 'announcement ' table	67
4.5 'position' table	67
4.6 'department' table	68
5.1 Trace table of features from B-META prototypes	77
6.1 Test suite for unit testing	102
6.2 Test case 1.1 for normal booking module	103
6.3 Test case 1.2 for monthly booking module	104
6.4 Test case 1.3 for weekly booking module	105
6.5 Test case 2.1 for timeline module	106
6.6 Test case 3.1 for modified weekly booking module	107
6.7 Test case 3.2 for statistical bar chart feature	108
6.8 Test case 4.1 for personal booking management module	109
6.9 Test case 4.2 for admin registration module	110

6.10 Test case of equivalence partition of start booking date	116
6.11 Test case of equivalence partition of start booking time	117
6.12 Test case of equivalence partition of password	119
6.13 Module representation in top down diagram	121
6.14 Test case of integration A	123
6.15 Test case of integration B	123
6.16 Test case of integration C	124
6.17 Test case based on use case testing	127
7.1 Achievement of project objectives	139

## LIST OF FIGURES

Figure No.	Page
2.1 Main page of Room Booking System	7
2.2 Announcement feature of B-MEET	8
2.3 Booking Form of B-MEET	9
2.4 Administration page of B-MEET	10
2.5 Color code features of Room Booking System	11
2.6 Recurring reservation features of Room Booking System	12
2.7 Statistic reviewing features of Room Booking System	13
2.8 Help desk features of Room Booking System	14
2.9 Feedback features of Room Booking System	14
2.10 User permission setting features of Room Booking System	15
2.11 Booking management features of Room Booking System	16
2.12 System configuration features of Room Booking System	16
2.13 Resources management features of Room Booking System	17
2.14 Booking record printing features of Room Booking System	18
2.15 Printing layout of Room Booking System	18
2.16 Admin home page of Room Booking System	19
2.17 Home page of RobotBooker	21
2.18 Month Calendar of RobotBooker	22
2.19 Booking history filter of RobotBooker	22

2.20 User statistic page of RobotBooker	23
2.21 Booking page of RobotBooker	24
2.22 Alternative home page of RobotBooker	25
2.23 Booking page of YARooms	26
2.24 Search engine of YARooms	26
2.25 Week schedule page of YARooms	27
2.26 Booking status of YARooms	28
2.27 Home page of BookMeetingRoom	29
2.28 Room booking features of BookMeetingRoom	30
2.29 Fleximation room booking and scheduling software	31
3.1 Phased development of Rapid Application Development	36
3.2 Prototyping of Rapid Application Development	37
4.1 Context diagram	50
4.2 Data flow diagram for process check room status	51
4.3 Data flow diagram for booking room process	52
4.4 Data flow diagram for check booking status	53
4.5 Data flow diagram for announcement management process	54
4.6 Data flow diagram for room management process	55
4.7 Data flow diagram for room booking management process	56
4.8 Data flow diagram for check statistical report and room usage	57
4.9 Flowchart of all process perform by user	58
4.10 Flowchart of all process perform by admin	59

4.11 Interface structure design of B-META system	61
4.12 Storyboard of B-META interface design for user	62
4.13 Storyboard of B-META interface design for admin	64
5.1 Implementation of the 'booking' table	70
5.2 Implementation of the 'admin' table	71
5.3 Implementation of the 'room' table	72
5.4 Implementation of the 'announcement' table	73
5.5 Implementation of the 'position' table	74
5.6 Implementation of the 'department' table	75
5.7 Homepage of B-META	79
5.8 Booking page of B-META	81
5.9 Monthly recurring booking	82
5.10 Booking result from monthly recurring process of booking	84
5.11 Weekly recurring booking	85
5.12 Booking result from weekly recurring process of booking	86
5.13 Check room availability	87
5.14 Check booking status	88
5.15 User updates personal information	89
5.16 User delete personal booking	90
5.17 Administrator login page	91
5.18 Administrator page	92
5.19 Booking update page from booking management table	93

5.20 Booking delete page from booking management table	94
5.21 Create announcement page	94
5.22 Create meeting room	95
5.23 Announcement list	96
5.24 Admin Registration	96
5.25 Total booking between 2015 and 2017 in horizontal bar chart	97
5.26 Monthly room usage on 2016 in vertical bar chart	98
6.1 Flowchart of testing strategy	100
6.2 Equivalence partition of start booking date	111
6.3 Equivalence partition of end booking date	112
6.4 Equivalence partition of start booking time	113
6.5 Equivalence partition of end booking time	114
6.6 Equivalence partition of password	118
6.7 Top down diagram	122
6.8 Use case diagram	126
6.9 Sample of user acceptance test checklist part1	133
6.10 Sample of user acceptance test checklist part2	134



# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Chapter Overview**

This chapter presents the introduction to the project. Section 1.2 describes the problem background, section 1.3 describes the problem statement and section 1.4 describes the short description of project. Section 1.5 describes the project objectives and section 1.6 describes the scopes. The last part of this chapter, section 1.7 describes the organization of project.

### **1.2 Problem Background**

During my internship in HWKKS, the Head of Information Communication and Technology (ICT) of Hospital Wanita Dan Kanak-Kanak (HWKKS), En. Hasmarizwan Bin Umar has proposed a new project which was requested by the Deputy Director of HWKKS, Pn. Christni Alus in purpose to ease the process of meeting room reservation. The name of the proposed system is B-MEET, which is the short form of

“Bilik Meeting e-Tempah”. This system can only using by staff in Hospital Wanita Dan Kanak – Kanak Sabah via intranet. [3]

The B-MEET system have many limitation. One of the weakness is B-MEET system can only assign one booking entry in one booking process. The booking process is lacking in term of friendly user because it doesn't have recurrence booking features such as weekly or monthly booking. There are also many limitation for admin to do booking management and scheduling by using B-MEET system. Thus, I proposed a new upgrading version of existing system to HWKKS for overcome the limitation of B-MEET. The new upgrading version of B-MEET is called B-META (Bilik Mesyuarat e-Tempahan), which provide several additional features to improve the processes of meeting room reservation and management.

### **1.3 Problem Statement**

The problems that are to be addressed by the proposed B-META are based on the B-MEET as follow:

- Not convenient to register a booking because the validation checking cannot scanning all the invalid input by once time.
- No calendar can be viewed in the system.
- No timeline to show booking schedule.
- No recurring booking can be performed.
- No statistical report of the room usage.

## **1.4 Short Description of Project**

- The user does not need to create any registration account by using this system.
- For booking process, user need to fill in their personal information and also booking information in the booking form.
- After booking, the system will assign booking reference number for user to check their booking status later.
- The system can display availability of every seminar room in color code description box and also timeline.
- Each color code description box of seminar room have display room basic information such as room capacity, room location and also equipment provided in the seminar room.
- The notification and announcement are display on the home page.
- The system can use recurrence system to reserve a room.
- The timeline on homepage can display the availability of seminar room in each timeslot.
- The system consist monthly and yearly statistics record of room usage.

## **1.5 Project Objectives**

Three objectives have been identified:

- (i). To identify the additional features that are necessary for B-META System.
- (ii). To design and develop the B-META System with features as identified in (i).
- (iii). To validate and verify the functionality of the B-META System.

## **1.6 Project Scopes**

- (i). B-META System focus on developing a system of meeting room reservation only for Hospital Wanita Dan Kanak-Kanak Sabah (HWKKS).
- (ii). B-META System will be developed only for the user those worked in Hospital Wanita Dan Kanak-Kanak Sabah (HWKKS).
- (iii). B-META System will be published on a server and the hospital's staff may access through the intranet of HWKKS only (B-META system do not have user account system, so intranet of web based is more secure as specified by HWKKS IT officers).

## **1.7 Organization of Report**

This section summarizes all the content of each chapter included in this project.

For this project, chapter 1 present the introduction, problem background, problem statement, short description of the new proposed system, project objectives and project scopes.

Chapter 2 presents the literature review. Review of the existing systems and also comparison of existing system is given in this chapter.

In chapter 3 discusses the methodology used in this project. This include the user requirement acquisition, every phase of the system development cycle and also software and hardware requirements for the whole project.

Chapter 4 conclude this report. The summary and overview of the whole project is highlighted in this chapter.

Chapter 5 discussed the implementation in this project. Development phase and prototyping phase are highlighted in this chapter.

Chapter 6 discussed the testing in this project. This chapter include unit testing, integration testing, system testing and acceptance testing.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Chapter Overview**

This chapter presents the literature review of project. Section 2.2 presents reviews of existing systems. Section 2.3 describes the comparison between existing systems and the B-MEET system. The reviewing of existing systems only chooses some suitable example and all related to online (web based) meeting room booking. In this chapter, comparison the common and different properties between each system and also B-MET is also discussed. Section 2.4 summarize the chapter.

#### **2.2 Review of Existing Room Booking System**

In this chapter, 6 system available system are selected for review. The 6 systems are B-MEET, Room Booking System, RobotBooker, YArooms, BookMeetingRoom and also Fleximation room booking and scheduling software.

## 2.2.1 Review of Available B-MEET system

The user interface of B-MEET system is simple and precise, it contains page navigations on the column of table. The majority of color use in B-MEET interface is pale green which is comfortable to look. The features of B-MEET are:

- Check Availability of room – The top left side of the B-MEET interface shown in figure 2.1 is a group of selection box to let user choose the date and time for check room availability.
- Check Booking Status – Below the banner of B-MEET interface (shown in figure 2.1) is a input box to let user insert their booking references number (will be given in every successful booking process) for check booking status.

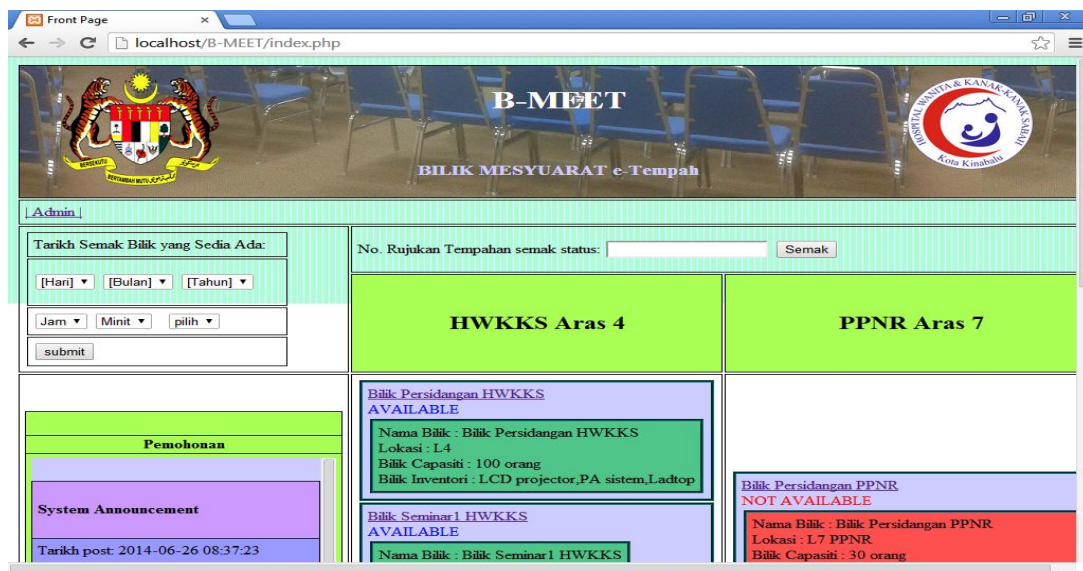
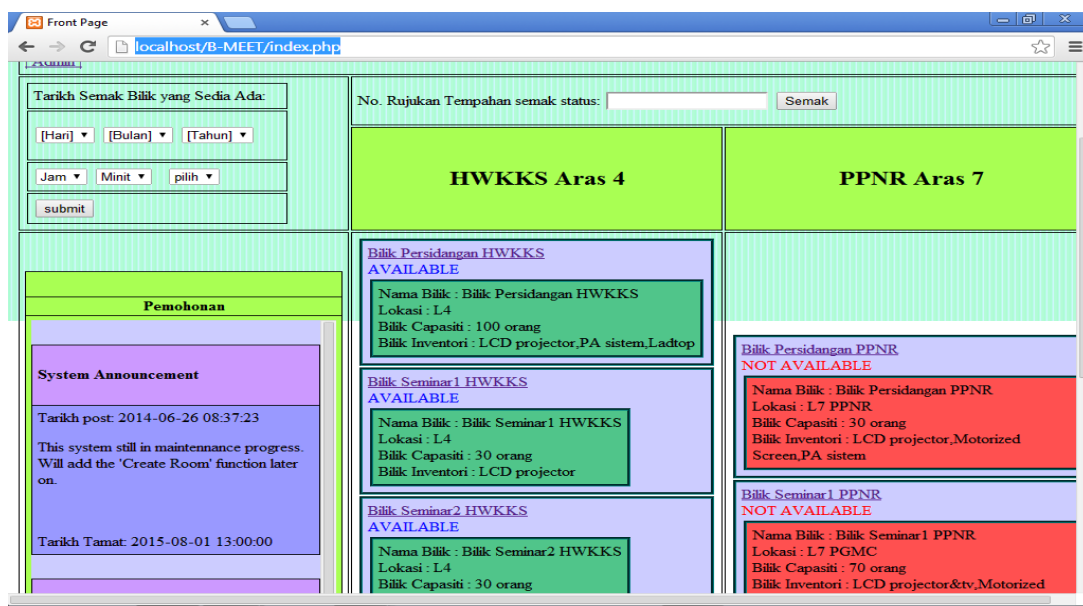


Figure 2.1 Main page of Room Booking System

- All Rooms Description in One Page – The room description contain name, location, room capacity and also room inventory. User can overview all the room description in one page.
- Notification – The notification or announcement will show on the left side of main page (see figure 2.2). The purple box is the title of announcement, the announcement, post date and expiry date display at blue color box.



**Figure 2.2 Announcement feature of B-MEET**

- Booking Form – The booking form is shown in figure 2.3 is very precise of input statements which is friendly user. The user can click “Semak” button (below page) to check the date and time availability. The table of booking record of every user for this specific room will appear after click the “Semak” button.



## REFERENCES

- [1] Conferences and meeting room management online. 2014. Retrieved 14 October 2014 from <http://www.bookmeetingroom.com>
- [2] Explore YArooms awesome features. 2012. Retrieved 14 October, 2014 from <http://www.yarooms.com>
- [3] Laman Web Unit Teknologi Maklumat HWKKS. 2013. Retrieved 30 September 2014 from <http://hwkks.moh.gov.my>
- [4] Overview Features of system Room Booking Features. 2014. Retrieved 14 October 2014 from [www.roombookingsystem.co.uk](http://www.roombookingsystem.co.uk)
- [5] Step for take to Outlook Room Booking. 2012. Retrieved 14 October 2014 from <http://flexnetsoftware.com>
- [6] Why you should use the RobotBooker booking system. 2010. Retrieved 14 October, 2014 from <http://www.robotbooker.com>
- [7] Abraham, Silberschatz, Henry F.Korth and S. Sudarshan. 2010. *Database System Concepts* (6<sup>th</sup> edition). New York: McGraw-Hill.
- [8] Blaxter L., Hughes C. & Tight M. (2001) How to research. Buckingham: Open University.
- [9] Bob Hughes and Mike Cotterell. 2006. *Software Project Management* (10<sup>th</sup> edition). New York: McGraw-Hill Companies.
- [10] Cem Kaner & Florida Tech. 2003. *An Introduction to Scenario Testing*. Software Testing & Quality Engineering (STQE) magazine.
- [11] Dennis, Wixom & Roth. 2003. *System Analysis and Design*. (3<sup>rd</sup> edition). United State: John Wiley & Sons,Inc.
- [12] FitzGerald, Dennis. 2009. *Business Data Communication and Networking* (10<sup>th</sup> edition). USA: John Wiley & Sons Inc.
- [13] Harold Kerzner. 2009. *Project Management: A Systems Approach to Planning, Scheduling, and Controlling* (10<sup>th</sup> edition). USA: John Wiley & Sons.
- [14] Jack T.Marchewka, 2010. *Information Technology Project Management*. (3<sup>rd</sup> edition).USA: John Wiley and Sons.
- [15] Satzinger, J.W., Jackson, R.B. & Burd & S.D. 2004. *System Analysis and Design in a Change World* (3<sup>rd</sup> edition). Boston: Thomson.
- [16] Silberschatz, Galvin & Gagne. 2009. *Operating System Concepts*. (8<sup>th</sup> edition). USA: John Wiley & Sons Inc.

- [17] Stallings W. 2010. *Computer Organization and Architecture: Designing for Performance*. (10<sup>th</sup> edition). New Jersey: Pearson Prentice Hall.
- [18] Taylor D. & Procter M. (2008). The literature review: a few tips of conducting it. Health Services Writing Centre: University of Toronto. 2014. Retrieved 10 October 2014 from <http://www.utoronto.ca/writing/litrev.html>
- [19] Alan Dix. 2004. *Human Computer Interaction*. (3<sup>rd</sup> edition). Europe: Pearson Prentice Hall.
- [20] David Benyon. 2010. *Human Designing Interactive Systems*. (2<sup>nd</sup> edition). England: Pearson Prentice Hall.
- [21] Thomas Muller. 2011. *ISTQB References Book 1 version 4.1*. USA: Rex Black.
- [22] Marcus S. Fisher. 2006. *Software Verification and Validation: An Engineering and Scientific Approach*. Springer.
- [23] Aristides Dasso. 2006. *Verification, Validation and Testing in Software Engineering*. IGI Global.
- [24] William E. Lewis. 2008. *Software Testing and Continuous Quality Improvement*. (3<sup>rd</sup> edition). AUERBACH.
- [25] Paul Ammann & Jeff Offutt. 2008. *Introduction to Software Testing*. Cambridge University Press.
- [26] Ron Patton. 2006. *Software Testing*. (2<sup>nd</sup> edition). Sams Publishing.