ARCHERY SCORING SYSTEM EHANCEMENT: OYLMPIC ROUND MODULE

WONG JIAN JUN

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS TESIS*

JUDUL: _____

SESI PENGAJIAN: _____

Saya_____

(HURUF BESAR)

mengaku membenarkan tesis (PSM/Sarjana/Doktor Falsafah) ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. ** Sila tandakan (/)

_____ SULIT	SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTARAHSIA RASMI 1972)
_____ TERHAD	(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
_____ TIDAK TERHAD	

_____ _____

(TANDATANGAN PENULIS) (TANDATANGAN PENYELIA)

Alamat tetap: _____ _____

_____ Nama Penyelia

_____

Tarikh: _____ Tarikh: _____

CATATAN: * Tesis dimaksudkan sebagai Laporan Akhir Projek Sarjana Muda (PSM)

** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa.

ARCHERY SCORING SYSTEM ENHANCEMENT: OLYMPIC ROUND MODULE

WONG JIAN JUN

This report is submitted in partial fulfilment of the requirements for the Bachelor of Computer Science (Software Development)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DECLARATION

I hereby declare that this project report entitled

ARCHERY SCORING SYSTEM EHANCEMENT:

OLYMPIC ROUND MODULE

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT : _____ Date: _____

(WONG JIAN JUN)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Computer Science (Software Development) With Honours.

SUPERVISOR : _____ Date: _____

(MOHD HARIZ BIN NAIM MOHAYAT)

DEDICATION

This project is fully dedicated to my beloved mother, Mrs Low Sow Chee and my dedicated supervisor, Mr Mohd Hariz bin Naim Mohayat.

To feed without teaching, is the father's fault.
To teach without severity, is the teacher's laziness.
(Verse 5, Paragraph 1, Sanzi Jing)

ACKNOWLEDGEMENTS

I express my heartfelt gratitude to my faculty, Faculty of Information and Communication Technology for providing me a chance to take this subject and complete such interesting project.

I am very thankful to my respected project Supervisor, Mr Mohd Hariz bin Naim Mohayat for the confidence he had one me throughout project. I respect his continuous motivation, support and guidance, with which I am able to complete this project.

I am also grateful to Malacca Archery Association for having me as part of their organiser during their national level archery competition. This is an extremely extraordinary opportunity which has helped me to gain lots of useful information and experience regarding to the archery competition.

It would be really unfair without the mention of our friends and families. Their immense and moral support behind us is the force driving us to keep moving until the completion. They are truly giving us unmeasurable force.

ABSTRACT

Application of Information Technology such as electronic scoring system has been commonly seen and deployed in wide range of sport competition. Archery Scoring System is a web-based archery scoring system designed to make full use of the optimised performance and low error rate of the computer in processing high amount of calculation, complicated analysis and comparison of large set of rules. This project aims to enhance the current scoring system by redesigning a new graphical user interface and adding Olympic Round bracket module. This is a web-based project which is based on server-client interaction architecture. User is the client to request the services or data to the server and the server works in the back end to respond and fulfil the request, then giving back the response or processed data to the client. User has to input necessary data to set up competition and the result of the hundreds of archers can be produced in few seconds. Generating bracket can be completed in seconds which is few times faster than doing it manually as all the complicated matching rules, drawing process and large amount of calculations are fully handled by the computer after gathering sufficient data from the user. This greatly saves the organiser times in generating score report and bracket after each round of match. Thus, this system also shortens the total length of time of the competition and helps the athletes to earn more rest time for the following days of competition. This system can bring significances not only to competition organiser but also athletes, crews and spectators by leading every archery competition to its success.

ABSTARK

Aplikasi teknologi maklumat seperti sistem pemarkahan elektronik telah biasa dilihat dan digunakan dalam pelbagai pertandingan sukan. *Archery Scoring System* (ASS) merupakan sistem memanah pemarkahan berasaskan web yang dibangun untuk menggunakan prestasi optimum dan kadar kesilapan rendah komputer dalam memproseskan jumlah pengiraan yang tinggi, analisis yang rumit dan perbandingan set peraturan. Projek ini bertujuan untuk meningkatkan sistem pemarkahan semasa dengan mengemaskini reka bentuk skrin yang baru dan menambah modul *Olympic Round bracket*. ASS ialsh satu projek berasaskan web yang berasaskan *server-client interaction architecture*. Pengguna ialah *client* yang meminta perkhidmatan atau data daripada *server* dan *server* yang bekerja di bahagian belakang akan bertindak balas dan memenuhi permintaan, kemudian menghantar semula maklum balas atau data yang telah diproses kepada *client*. Pengguna perlu memasukkan data yang diperlukan ke dalam sistem and sistem menghasilkan keputusan beratus-ratus pemanah dalam beberapa saat. Menjana *Olympic Round bracket* boleh disiapkan dalam masa beberapa saat dan adalah beberapa kali lebih cepat daripada melakukannya secara manual kerana semua peraturan yang rumit, proses lakaran dan jumlah pengiraan yang tinggi telak dikendalikan sepenuhnya oleh komputer selepas mengumpul data yang mencukupi daripada pengguna. ASS amat menjimatkan masa penganjur dalam menjana laporan skor dan *Olympic Round bracket* selepas setiap pusingan perlawanan. Oleh itu, sistem ini juga memendekkan jumlah panjang masa pertandingan dan membantu atlet untuk mendapatkan lebih banyak masa rehat untuk persaingan dalam hari-hari berikut. Sistem ini boleh membawa kepentingan bukan sahaja kepada penganjur pertandingan tetapi juga atlet, krew dan penonton dengan membawa setiap pertandingan memanah menuju ke arah kejayaan.

TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	DECLARATION	I
	DEDICATION	II
	ACKNOWLEDGEMENTS	III
	ABSTRACT	VI
	ABSTRAK	V
	TABLE OF CONTENTS	IV
	LIST OF TABLES	XVIII
	LIST OF FIGURES	XXII
	LIST OF ABBREVIATION	XXVI
CHAPTER I	**INTRODUCTION**	1
	1.1 Introduction	1
	1.2 Problem Statement	1
	1.3 Objective	2
	1.4 Scope	3
	1.5 Project Significance	4
	1.6 Expected Output	4
	1.7 Conclusion	5
CHAPTER II	**LITERATURE REVIEW**	6
	2.1 Introduction	6
	2.2 Facts and Findings	6
	2.2.1 Web Application	7

2.2.1.1 Introduction of Web Application	7
2.2.1.2 Common Web Application Functions	7
2.2.1.3 Benefits of Web Application	8
2.2.2 Application of Information Technology in Sport	9
2.2.2.1 Live Stream with Internet	9
2.2.2.2 IT systems in Sport Management; Administration and Infrastructure	10
2.2.2.3 IT Equipment in Competition	11
2.2.2.4 Computer Technology in Athlete Training	11
2.2.3 Target Archery Competition	12
2.2.3.1 Introduction of Target Archery	12
2.2.3.1.1 Scoring in Target Archery	13
2.2.3.1.2 Outdoor Target Archery	13
2.2.3.1.3 Indoor Target Archery	15
2.2.3.1.4 Recording of Scoring	16
2.2.3.2 Olympic Round	18
2.2.3.2.1 Qualification Round	18
2.2.3.2.2 Elimination Rounds	18

2.2.3.2.2.1 Individual Competition Format 19
2.2.3.2.2.2 Team and Mixed team Competition Format 19
2.2.3.2.3 Finals Rounds 20
2.2.4 Existing System 21
2.2.4.1 Screenshots of Products Interfaces 22
2.2.4.1.1 ArcheryEvents (AE) 22
2.2.4.2 Comparison between Golden Arrow (GA), Archery Events (AE) & Archery Scoring System (ASS) 26
2.3 Project Methodology 28
2.3.1 Activities in Waterfall Model 31
2.3.1.1 Planning 31
2.3.1.2 Requirement Gathering and Analysis 32
2.3.1.3 System Design 34
2.3.1.4 Implementation 35
2.3.1.5 Testing 35
2.3.1.6 Deployment 36
2.3.2 Benefits of Waterfall Model 36
2.3.3 Disadvantages of Waterfall Model 38
2.4 Project Requirements 39
2.4.1 Software Requirements 39
2.4.2 Hardware Requirements 39
2.4.3 Other Requirements 39

	2.5 Project schedule and Milestones	40
	2.6 Conclusions	41
CHAPTER III	**ANALYSIS**	42
	3.1 Introduction	42
	3.2 Problem Analysis	42
	3.3 Requirement Analysis	44
	3.3.1 Data Requirement	44
	3.3.1.1 Data Dictionary	45
	3.3.2 Functional Requirement	54
	3.3.2.1 Data Flow diagram	56
	3.3.2.1.1 Context Diagram	56
	3.3.2.1.2 Level DFD	58
	3.3.2.2 Generate Olympic Round Bracket	60
	3.3.2.2.1 Individual Match Bracket	60
	3.3.2.2.2 Team Match Bracket	63
	3.3.3 Non-functional Requirement	67
	3.3.4 Other Requirement	68
	3.4 Conclusion	68
CHAPTER IV	**DESIGN**	69
	4.1 Introduction	69
	4.2 High-Level Design	69
	4.2.1 System Architecture	70
	4.2.2 User Interface Design	72
	4.2.2.1 Navigation Design	72
	4.2.2.2 Input Design	73
	4.2.2.2.1 Module 1.1: Manage Team & Module 1.2: Manage Bow Category	74

4.2.2.2.2 Module 1.3: Manage Player 75
4.2.2.2.3 Module 1.4: Assign Archer Number 77
4.2.2.2.4 Module 2.0: Range Configuration 78
4.2.2.2.5 Module 3.0: Scoring 79
4.2.2.2.6 Module 4.1: Generate Individual Report 80
4.2.2.2.7 Module 5.1: Login 81
4.2.2.2.8 Module 6.1: Generate individual Bracket 82
4.2.2.2.9 Module 6.2: Generate Team Bracket 83
4.2.2.2.10 Module 6.3: Score Entry for Individual Olympic Round 84
4.2.2.2.11 Module 6.4: Score Entry for Team Olympic Round 85
4.2.2.2.12 Module 7.0: Archive and Restore Database 86
4.2.2.3 Output Design 87
4.2.2.3.1 Module 1.5: Display List of Archer Information 87
4.2.2.3.2 Module 3.0: Scoring 88

4.2.2.3.3 Module 4.1: Generate Individual Report 89
4.2.2.3.4 Module 4.2: Generate Team Report 90
4.2.2.3.5 Module 6.1: Generate Individual Bracket 91
4.2.2.3.6 Module 6.2: Generate Team Bracket 92
4.2.2.3.7 Module 7.0: Archive and Restore Database 93
4.2.3 Database Design 94
4.2.3.1 Conceptual Database Design 94
4.2.3.2 Logical Database Design 97
4.3 Detailed Design 98
4.3.1 Physical Database Design 98
4.3.2 Software Design 99
4.3.2.1 Level 2,3,4 DFD 99
4.3.2.1.1 Module 1.0: Player Management 100
4.3.2.1.1.1 Sub-Model 1.1: Manage Team 101
4.3.2.1.1.2 Sub-Model 1.2: Manage Bow Category 102
4.3.2.1.1.3 Sub-Model 1.3: Manage Player 103

4.3.2.1.1.4 Sub-Model 1.4: Assign Archer Number 104
4.3.2.1.1.5 Sub-Model 1.5: Display List of Archer Information 104
4.3.2.1.2 Module 2.0: Range Configuration 105
4.3.2.1.3 Module 3.0: Scoring 106
4.3.2.1.4 Module 4.0: Report 107
4.3.2.1.4.1 Sub-Module 4.1: Generate Individual Score Report 108
4.3.2.1.4.2 Sub-Module 4.2: Generate Team Score Report 109
4.3.2.1.5 Module 5.0: Authentication 109
4.3.2.1.5.1 Sub-Module 5.1: Login 110
4.3.2.1.5.2 Sub-Module 5.2: Logout 111
4.3.2.1.6 Module 6: Olympic Round 111
4.3.2.1.6.1 Sub-Module 6.1: 112

Generate Individual Bracket
4.3.2.1.6.2 Sub-Module 6.2: Generate Team Bracket 113
4.3.2.1.6.3 Sub-Module 6.3: Score Entry for Individual Olympic Round 114
4.3.2.1.6.4 Sub-Module 6.4: Score Entry for Team Olympic Round 115
4.3.2.1.7 Module 7.0: Archive and Restore Database 116
4.3.2.1.7.1 Sub-Module 7.1: Archive Database 116
4.3.2.1.7.2 Sub-Module 7.2: Restore Database 117
4.3.2.2 Olympic Round Module 118
4.4 Conclusion 119
CHAPTER V **IMPLEMENTATION** 120
5.1 Introduction 120
5.2 Software Development Environment Setup 120
5.3 Software Configuration Management 121
5.3.1 Configuration Environment Setup 121
5.3.1.1 Installation of WampServer 122

5.3.1.2 Create a MySQL Database with WampServer 125
5.3.1.3 Import Existing Database File 127
5.3.1.4 Shut Down WampServer 128
5.3.2 Version Control Procedure 130
5.3.2.1 GitHub 130
5.3.2.2 OneDrive Backup 132
5.4 Implementation Status 133
Score Entry for Individual Olympic Round 134
Score Entry for Team Olympic Round 134
5.5 Conclusion 134
CHAPTER VI **TESTING** 135
6.1 Introduction 135
6.2 Test Plan 135
6.2.1 Test Organization 135
6.2.2 Test Environment 136
6.2.3 Test Schedule 136
6.3 Test Strategy 138
6.3.1 Classes of Tests 139
6.4 Test Design 139
6.4.1 Test Description 139
6.4.1.1 Test Case Module 1.1 Manage Team 140
6.4.1.2 Test Case: Module 1.2 Manage Bow Category 141
6.4.1.3 Test Case: Module 1.3 Manage Player 142
6.4.1.4 Test Case: Sub-Module 1.4 Assign Archer Number 143
6.4.1.5 Test Case: Sub-Module 1.5 Display List of Archer Information 143

6.4.1.6 Test Case: Module 2.0 Range Configuration 144
6.4.1.7 Test Case: Module 3.0: Scoring 145
6.4.1.8 Test Case: Sub-Module 4.1 Generate Individual Score Report 146
6.4.1.9 Test Case: Sub-Module 4.2 Generate Team Score Report 146
6.4.1.10 Test Case: Module 5.1 Login 146
6.4.1.11 Test Case: Sub-Module 5.2 Logout 147
6.4.1.12 Test Case: Sub-Module 6.1 Generate Individual Bracket 149
6.4.1.13 Test Case: Sub-Module 6.2 Generate Team Bracket 149
6.4.1.14 Test Case: Sub-Module 6.3 Score Entry for Team Olympic Round 150
6.4.1.15 Test Case: Sub-Module 6.4 Score Entry for Team Olympic Round 153
6.4.1.16 Test Case: Sub-Module 7.1 Archive Database 158
6.4.1.17 Test Case: Sub-Module 7.2 Restore Database 159
6.4.2 Test Data 160
6.4.2.1 Test Data: Module 1.1 Manage Team 160
6.4.2.2 Test Data: Module 1.2 Manage Bow Category 160
6.4.2.3 Test Data: Sub-Module 1.3 Manage Player 161

6.4.2.4 Test Data: Sub-Module 1.4 Assign Archer Number 162
6.4.2.5 Test Data: Sub-Module 1.5 Display List of Archer Information 162
6.4.2.6 Test data: Module 2.0 Range Configuration 162
6.4.2.7 Test Data: Module 3.0 Scoring 163
6.4.2.8 Test Data: Sub-Module 4.1 Generate Individual Score Report 163
6.4.2.9 Test Data: Sub-Module 4.2 Generate team Score Report 164
6.4.2.10 Test Data: Module 5.1 Login 164
6.4.2.11 Test Data: Module 5.2 Logout 164
6.4.2.12 Test Data: Sub-Module 6.1 Generate Individual Bracket 165
6.4.2.13 Test Data: Sub-Module 6.2 Generate Team Bracket 166
6.4.2.14 Test Data: Sub-Module 6.3 Score Entry for Individual Olympic Round 167
6.4.2.15 Test Data: Sub-Module 6.4 Score Entry for Team Olympic Round 169
6.4.2.16 Test Data: Sub-Module 7.1 Archive Database 171
6.4.2.17 Test Data: Sub-Module 7.2 Restore Database 171
6.5 Test Results and Analysis 172
6.6 Conclusion 172

CHAPTER VII	**CONCLUSION**	172
	7.1 Introduction	173
	7.2 Propositions for Improvement	173
	7.3 Project Contribution	175
	7.4 Conclusion	176
	REFERENCES	177
	BIBLIOGRPAHY	180
	APPENDICES	181

LIST OF TABLES

TABLE	TITLE	PAGE
2.1	Comparison of Features among GA, AE & ASS	26
2.2	Comparison of Features among GA, AE & ASS	27
2.3	Comparison of System Type, Compatibility and Pricing among GA, AE & ASS	28
2.4	Activities and Outcomes in Requirement Gathering and Analysis	32
2.5	Activities and Outcomes in Requirement Gathering and Analysis	34
2.6	Activities and Outcomes in Requirement Implementation	35
2.7	Activities and Outcomes in Testing	36
2.8	Project Schedule	40
2.9	Weekly Basis Project Milestones	40
3.1	staff Entity	45
3.2	team Entity	45
3.3	bowcategory Entity	45
3.4	rangecategory Entity	46
3.5	player Entity	47
3.6	scoring Entity	48
3.7	teamscores Entity	50
3.8	individualscoresor Entity	51
3.9	teamscoresor Entity	52
3.10	Colour Indicator for Primary & Foreign Keys	53

3.11	**Functional Requirements of ASS**	**54**
3.12	**Matched Archer Pairs in Bracket Size of 64**	**61**
3.13	**Location of Archer Pairs in Bracket Size of 64**	**61**
3.14	**Matched Pairs of 60 Archers in Bracket Size of 64**	**62**
3.15	**Location of Matches Pairs of 60 Archers in Bracket Size of 64**	**62**
3.16	**Matched Archer Pairs in Bracket Size of 32**	**63**
3.17	**Location of Archer Pairs in Bracket Size of 32**	**64**
3.18	**Matched Archer Pairs in Bracket Size of 16**	**64**
3.19	**Matched Pairs of 12 Teams in Bracket Size of 16**	**65**
3.20	**Matched Team Pairs in Bracket Size of 8**	**66**
3.21	**Non-functional Requirements of ASS**	**67**
5.1	**Server and Database Configuration in Development Environment**	**121**
5.2	**Implementation Status of Main Modules & Sub Modules**	**133**
6.1	**Test Schedule**	**137**
6.2	**Test Case Module 1.1 Manage Team**	**140**
6.3	**Test Case: Module 1.2 Manage Bow Category**	**141**
6.4	**Test Case: Module 1.3 Manage Player**	**142**
6.5	**Test Case: Sub-Module 1.4 Assign Archer Number**	**143**
6.6	**6.4.1.5 Test Case: Sub-Module 1.5 Display List of Archer Information**	**143**
6.7	**Test Case: Module 2.0 Range Configuration**	**144**
6.8	**Test Case: Module 3.0: Scoring**	**145**
6.9	**Test Case: Sub-Module 4.1 Generate Individual Score Report**	**146**
6.10	**Test Case: Sub-Module 4.2 Generate Team Score Report**	**146**
6.11	**Test Case: Module 5.1 Login**	**146**
6.12	**Test Case: Sub-Module 5.2 Logout**	**147**

6.13	**Test Case: Sub-Module 6.1 Generate Individual Bracket**	**148**
6.14	**Test Case: Sub-Module 6.2 Generate Team Bracket**	**150**
6.15	**Test Case: Sub-Module 6.3 Score Entry for Team Olympic Round**	**152**
6.16	**Test Case: Sub-Module 6.4 Score Entry for Team Olympic Round**	**155**
6.17	**Test Case: Sub-Module 7.1 Archive Database**	**157**
6.18	**Test Case: Sub-Module 7.2 Restore Database**	**158**
6.19	**Test Data: Module 1.1 Manage Team**	**159**
6.20	**Test Data: Module 1.2 Manage Bow Category**	**159**
6.21	**Test Data: Sub-Module 1.3 Manage Player**	**160**
6.22	**Test Data: Sub-Module 1.4 Assign Archer Number**	**161**
6.23	**Test Data: Sub-Module 1.5 Display List of Archer Information**	**161**
6.24	**Test data: Module 2.0 Range Configuration**	**161**
6.35	**Test Data: Module 3.0 Scoring**	**162**
6.26	**Test Data: Sub-Module 4.1 Generate Individual Score Report**	**162**
6.27	**Test Data: Sub-Module 4.2 Generate team Score Report**	**163**
6.28	**Test Data: Module 5.1 Login**	**163**
6.29	**Test Data: Module 5.2 Logout**	**163**
6.30	**Test Data: Sub-Module 6.1 Generate Individual Bracket**	**164**
6.31	**Test Data: Sub-Module 6.2 Generate Team Bracket**	**165**
6.32	**Test Data: Sub-Module 6.3 Score Entry for Individual Olympic Round**	**166**
6.33	**Test Data: Sub-Module 6.4 Score Entry for Team Olympic Round**	**169**

6.34	**Test Data: Sub-Module 7.1 Archive Database**	**171**
6.35	**Test Data: Sub-Module 7.2 Restore Database**	**171**