

**SICHUAN UNIVERSITY**

本科生毕业设计（学术论文）

Undergraduate Graduation Project

(Academic Thesis)



1

题 目  **Web application for bookkeeping**

学 院  **软件学院**

专 业  **软件工程专业**

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Title **Web Application for bookkeeping**

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**ABSTRACT**

Software Engineering

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This report describes the project development of the Bookkeeping web application, "Quentin" that was developed to manage the daily transactions and manage the clients, inventories, sales and accounts more efficiently. This application is mainly used by the clerks, managers and the CEO of the company. A clerk is able to manage the suppliers, inventories, production, sales and financial transactions in the company as well as the factory itself. Besides that, the application allows the user to generate various kinds of reports such as client information, historical reports plus reliable forecasts to help the entrepreneurs make better decisions.

The methodology I used to develop this system is waterfall model. Thus, the report's chapters include system planning, requirement analysis, system design, programming, system testing, and evolution of the project. For the system planning, the outcomes are the project objectives and project aim as well as to define the project scope. Requirement analysis is a stage to gather the user requirements such as functional requirements and non-functional requirements. Next the system design is mainly used to design the user interface and the database design. The next stage after system design is programming stage. This is the stage for coding. After completion of the coding part, I proceeded to the system testing to minimize the bugs in the systems.

Compared to the existing manual methods used by the target company, this system has many strengths and fairly small amount of weaknesses such as requirement of general computer literacy. In the future, we can enhance the system with smart technologies to make it better.

**[Key Words]** Bookkeeping, Accounting, Management, Small Business, Web Application

**目 录**

[1 绪 论 Error! Bookmark not defined.](#_Toc136444182)

[1.1 引言 **Error! Bookmark not defined.**](#_Toc136444183)

[1.2 研究或技术现状 **Error! Bookmark not defined.**](#_Toc136444184)

[1.3 本人主要工作 **Error! Bookmark not defined.**](#_Toc136444185)

[1.4 论文组织与结构 5](#_Toc136444186)

[2 算法基础或背景知识简介 Error! Bookmark not defined.](#_Toc136444187)

[2.1 本章写作说明 **Error! Bookmark not defined.**](#_Toc136444188)

[2.2 论文写作补充说明 **Error! Bookmark not defined.**](#_Toc136444189)

[2.2.1 表和论文主要格式(此节示范表和论文主要格式) **Error! Bookmark not defined.**](#_Toc136444190)

[2.2.2 图和目录的生成（此节示范图和目录格式） **Error! Bookmark not defined.**](#_Toc136444191)

[2.2.3 公式（此节示范公式格式） **Error! Bookmark not defined.**](#_Toc136444192)

[2.3 本章小结 7](#_Toc136444193)

[3 算法或系统分析设计 Error! Bookmark not defined.](#_Toc136444194)

[3.1 原算法介绍（或实际问题分析） **Error! Bookmark not defined.**](#_Toc136444195)

[3.2 算法分析，存在问题（或总体设计） **Error! Bookmark not defined.**](#_Toc136444196)

[3.3算法步骤（详细设计） 8](#_Toc136444197)

[3.4 本章小结 8](#_Toc136444198)

[4 算法或系统实现 Error! Bookmark not defined.](#_Toc136444199)

[4.1 实现工具简要说明 **Error! Bookmark not defined.**](#_Toc136444200)

[4.2 各程序模块 **Error! Bookmark not defined.**](#_Toc136444201)

[4.3 系统运行 9](#_Toc136444202)

[4.4 本章小结 9](#_Toc136444202)

[5 算法或系统测试 Error! Bookmark not defined.](#_Toc136444203)

[5.1 测试环境 **Error! Bookmark not defined.**](#_Toc136444204)

[5.2 测试步骤 **Error! Bookmark not defined.**](#_Toc136444205)

[5.3 测试结果 **Error! Bookmark not defined.**](#_Toc136444206)

[5.4 测试分析 **Error! Bookmark not defined.**](#_Toc136444207)

[5.5 本章小结 10](#_Toc136444208)

[6 工作总结和心得体会 Error! Bookmark not defined.](#_Toc136444209)

[6.1 工作总结 **Error! Bookmark not defined.**](#_Toc136444210)

[6.2 心得体会 **Error! Bookmark not defined.**](#_Toc136444211)

[致 谢 Error! Bookmark not defined.](#_Toc136444212)

[参考文献 Error! Bookmark not defined.](#_Toc136444213)

[附录：(需详细罗列附录目录) Error! Bookmark not defined.](#_Toc136444214)

**Table of Contents**

[1. Preamble Error! Bookmark not defined.](#_Toc24756364)

[1.1 Introduction **Error! Bookmark not defined.**](#_Toc24756365)

[1.2 Current Studies or State of the Art **Error! Bookmark not defined.**](#_Toc24756366)

[1.3 Main Work of This Project **Error! Bookmark not defined.**](#_Toc24756367)

[1.4 Organization and Structure **Error! Bookmark not defined.**](#_Toc24756368)

[2. Introduction to the Basic Algorithm or Background Knowledge 3](#_Toc24756369)

[2.1 Writing Instructions of This Chapter **Error! Bookmark not defined.**](#_Toc24756370)

[2.2 Supplementary Instructions on Thesis Writing **Error! Bookmark not defined.**](#_Toc24756371)

[2.2.1 Major Format of Table and Thesis (this section demonstates the format of table and thesis) **Error! Bookmark not defined.**](#_Toc24756372)

[2.2.2 Generation of Figure and Table of Contents (this section demonstates the format of figure and table) **Error! Bookmark not defined.**](#_Toc24756373)

[2.2.3 Formula (this section demonstates the formula) **Error! Bookmark not defined.**](#_Toc24756374)

[2.3 Summary of This Chapter **Error! Bookmark not defined.**](#_Toc24756375)

[3 Algorithm or the Analysis and Design of System 7](#_Toc24756376)

[3.1 Analysis and Modeling of System Requirements (or Introduction to the Original Algorithm) 7](#_Toc24756377)

[3.2 System Design and Modeling (or Algorithm Analysis and Existing Problems) 7](#_Toc24756378)

[3.3 Detailed Design **Error! Bookmark not defined.**](#_Toc24756379)

[3.4 Summary of This Chapter **Error! Bookmark not defined.**](#_Toc24756380)

[4. Algorithm or System Implementation Error! Bookmark not defined.](#_Toc24756381)

[4.1 Brief Description about the Implementation Environment and Tools **Error! Bookmark not defined.**](#_Toc24756383)

[4.2 Description about the Main Program Module (Algorithm Implementation) **Error! Bookmark not defined.**](#_Toc24756384)

[4.3 System Operation **Error! Bookmark not defined.**](#_Toc24756385)

[4.4 Summary of This Chapter **Error! Bookmark not defined.**](#_Toc24756386)

[5. Algorithm or System Test Error! Bookmark not defined.](#_Toc24756387)

[5.1 Test Environment **Error! Bookmark not defined.**](#_Toc24756388)

[5.2 Test Program and Test Data Design **Error! Bookmark not defined.**](#_Toc24756389)

[5.3 Test Run and Test Records **Error! Bookmark not defined.**](#_Toc24756390)

[5.4 Test Result Analysis **Error! Bookmark not defined.**](#_Toc24756391)

[5.5 Summary of This Chapter **Error! Bookmark not defined.**](#_Toc24756392)

[6. Work Summary and Reflection Error! Bookmark not defined.](#_Toc24756393)

[6.1 Work Summary **Error! Bookmark not defined.**](#_Toc24756394)

[6.2 Reflection **Error! Bookmark not defined.**](#_Toc24756395)

[References Error! Bookmark not defined.](#_Toc24756396)

Appendices: to list the appendices in detail [12](#_Toc24756397)

# 1 绪 论

# 1. Preamble

# 1.1 引言

## 1.1 Introduction

介绍课题的研究领域、主要研究背景，选题的主要目的意义、范围，相关领域的知识、理论基础和分析，研究问题的描述，研究设想、研究方法和实验设计，预期结果和作者的新见解。

Introduce the research field, main research background, the research purpose, significance and scope, relevant knowledge, theoretical basis and analysis, description about the research problems, assumptions, methods and experimental design, expected results, as well as the author’s new ideas.

把自己拟做的毕业设计工作做个简要介绍。

Give a brief introduction of the graduation project that you intend to work at.

## 1.2 研究或技术现状

## 1.2 Current Studies or State of the Art

当前国际国内在相关领域的研究现状，要具体化，标题名字可以自己取。可以根据个人题目不同，分一个小节或两个小节介绍。把论文工作会涉及到的理论、技术情况给予综述。

Current studies in relevant fields at home and abroad. Be specific, and the heading can be named by yourself. Depending on topics, you can introduce in one or two sections. Give a general picture of the theories and technologies involved in the project.

请在查阅大量论文的基础上写作这部分，这是论文立意高低的关键之一，所谓站得高，看得远。

Please write this part on the basis of on extensive reading of papers. This is the key to the quality of conception of this thesis. As the saying goes, “the higher you stand, the farther you can see”.

## 1.3 论文主要工作

## 1.3 Main Work of This Project

简要说明毕业设计的主要工作内容。

Give a brief account of the main work of this project.

## 1.4 报告组织与结构

## 1.4 Organization and Structure

本论文主体部分由六部分组成，各部分作用分别为：

The body of this thesis is composed of six parts, and the function of each part is as follows:

第一部分：绪论。本章介绍本项目的研究背景，通过分析国内外已有的5个系统来陈述本项目相关的国内外研究现状，最后对本文的主要工作作出介绍。

Part I: introduction. This chapter introduces the research background of the project and describes current studies on this project at home and abroad by analyzing 5 existing systems at home and abroad. Finally, the main work of this project is presented.

第二部分：项目涉及的相关技术知识和技术。

Part II: technical knowledge and technologies involved in this project.

第三部分：系统概要设计。

Part III: preliminary design of the system.

第四部分：详细设计与实现。

Part IV: detailed design and implementation.

第五部分：讨论和体会。本章写出了项目整个开发过程中的感悟和反思。总结全过程，介绍项目开发过程体会、项目评价、项目成功用于实际意义的阐述以及未来工作。

Part V: discussion and reflection. This chapter shall tell the feeling and reflection during the whole development. Summarize the whole process, introduce reflection during the development, project evaluation, the practical implications of the success of the project and future work.

第六部分：小结。本章是对项目工作的总结。

Part VI: summary. This chapter gives a summary of the whole project.

为了方便读者更进一步了解本文设计的系统项目，也便于有兴趣的读者进行二次开发，本文附录部分给出了项目的需求规格说明书、设计文档、软件测试文档、用户文档说明书以及项目的所有源码。

To facilitate readers to further understand the system designed in this thesis and make it easy for interested readers to conduct secondary development, the appendixes herein shall present requirement specifications, design document, software test document, user manual and all source codes of the project.

# 2算法基础或背景知识简介

# 2. Introduction to the Basic Algorithm or Background Knowledge

## 2.1 本章写作说明

## 2.1 Writing Instructions of This Chapter

这部分内容放算法基础或背景知识的简要介绍，篇幅不宜过多，不能大量抄袭。应对相关知识加以综合后进行写作。这里的知识都应是和毕业设计内容密切相关，而且后面论文内容会引用或以之为基础的。

This part shall briefly introduce the basic algorithm or background knowledge, the length mustn’t be too long and no massive plagiarism is allowed. It is advised to write in a way that synthesizes relevant knowledge. All knowledge here should be closely related to the content of the project, quoted or based on in the following text.

本章写作没有一定之规，也不一定要放置背景知识。比如，如果是大家都很熟悉的内容，如某数据库系统设计，你又采取常规方法进行设计开发，完全可以省略这一章。

There is no rule to follow while writing this chapter. You don’t necessarily have to place the background knowledge here. If the content is familiar to all, for example, the system design of a database, and you design and develop with a conventional method, then this chapter is absolutely negligible.

一般地，不要对开发工具进行详细介绍，如C++、JAVA等，除非你采用了目前最新技术，尤其是现成课本上都没有的知识，才有必要专门写一章告诉读者这些新信息。

Generally speaking, don’t elaborate on the development tool, such as C++ and JAVA, etc., unless you employ the latest technology, especially knowledge not covered by existing textbooks. Only in this case is it necessary to writing a chapter to tell about the new information.

## 2.2 论文写作补充说明

## 2.2 Supplementary Instructions on Thesis Writing

### 2.2.1 表和论文主要格式

2.2.1 Major Format of Table and Thesis

论文主要格式如表2.1所示。

The major format of this thesis is shown in Table 2.1.

表2.1 主要格式（标题段后0.5行）

|  |  |
| --- | --- |
| 项目 | 主要格式 |
| 标题1 | 黑体 三号 加粗 居中 |
| 标题2 | 黑体 小三 |
| 标题3 | 黑体 四号 |
| 正文 | 中文：宋体小四  英文：Times New Roman小四 |
| 图编号和标题 | 宋体 五号 两级编号 在图正下方 |
| 表编号和标题 | 宋体 五号 两级编号 在表正上方 |
| …… | …… |

Table 2.1 Major Format (0.5 Lines after the Heading Paragraph)

|  |  |
| --- | --- |
| Item | Major Format |
| Heading 1 | Boldface, 3pt., bold, centered |
| Heading 2 | Boldface, 3pt. (Minor) |
| Heading 3 | Boldface, 4pt. |
| Body | Chinese: Song 4pt.(Minor)  English: Times New Roman, 4pt.(Minor) |
| Numbering and Heading of Figures | Song, 5 pt., numbered with two levels,  right below the figure |
| Numbering and Heading of Tables | Song, 5 pt., numbered with two levels,  right above the table |
| …… | …… |

...

...

这里是用上述例子说明表的格式。表格标题在表格正上方。

Here, the format of table is illustrated with the above example. The heading of table shall be right above the table.

提醒：论文中所有表格和图、公式要编号，编号为**两级**，包括章号和章内序号如表2.1，图2.2等，引用时这个编号是唯一的。

Tip: All of the tables, figures and formulas in this thesis shall be numbered with **two levels**, including the chapter number and the serial number within the chapter, such as Table 2.1 and Figure 2.2. This number is unique when referencing.

### 2.2.2 图和目录的生成

### 2.2.2 Generation of Figure and Table of Contents

目录采用自动生成的格式，选择Word菜单中的“插入-引用-索引和目录” 中的“目录”栏即可生成。在论文正文中，每一个章标题设置为标题1，小标题依次设置为标题2如1.1、1.2等、标题3如2.1.1、2.1.2等。设置为三级目录即可。

The table of contents can be generated automatically, by selecting “Table of Contents” in Insert> References> Indexes and Tables in the Microsoft Word menu. In the body of the paper, the heading of each chapter is set as Heading 1, and the sub-headings are set as Heading 2 (e.g. 1.1 and 1.2), and Heading 3 (e.g. 2.1.1 and 2.1.2), etc. After that, just set the table of contents as with three levels of headings

当你按本模板格式填充好相关正文章节内容后，跳到前面的目录，在目录区域的鼠标右键菜单中选择更新域，如图2.1所示。然后选择更新整个目录，如图2.2所示。

After filling the contents of relevant chapters as specified in the format of this template, jump to the preceding table of contents (TOC), select “Update domain” in the right-click menu within the TOC area, to update the domain, as shown in Figure 2.1. After that, select to update the entire table, as shown in Figure 2.2.

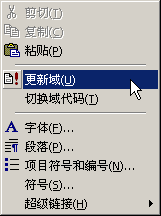


图2.1 更新目录域

Figure 2.1 Update the Domain



图2.2 更新整个目录

Figure 2.2 Update Entire Table

说明：图的标题在图的下方，需要上下一定间隔，保持视觉美观。你也可以采用图文框方式，让图形排列更紧凑。总之，注意美观。

Instruction: The heading of figure is right below the figure and there must be some spacing above and below, to make it look aesthetic. You may also choose an image-text box, to make the graph more compact. In a word, make it pleasant to eyes.

当你在程序系统测试时，需要截取界面时，可参考以上内容。

If you test a program system and need to capture the screens, refer to the above content.

### 2.2.3 公式

### 2.2.3 Formula

比如要写什么公式了，插入公式编辑器对象就可以。

If you need to write a formula, insert an object from the formula editor.

 (2.1)

注意了，公式2.1是按右边对齐排版的，这样非常漂亮和整齐。引用方法和编号方法同图表。

Note that Eq. 2.1 is flushed right and looks nice and neat that way. The referencing and numbering methods are the same as those of figures and tables.

## 2.3 本章小结

## 2.3 Summary of This Chapter

3算法或系统分析与设计

# 3 Algorithm or the Analysis and Design of System

对系统的概要设计进行分析和设计进行详细的文字描述和模型描述。

To analyze the preliminary design of the system, and give a detailed text description and model description.

## 3.1 系统需求分析与建模（或原算法介绍）

## 3.1 Analysis and Modeling of System Requirements (or Introduction to the Original Algorithm)

３．１．１系统需求概述

３．１．２系统数据分析（要求有Ｅ－Ｒ图）

３．１．３系统功能分析（要求有用例图、序列图、活动图等）

３．１．４系统行为分析（运行环境）分析（要求有系统状态图等）

３．１．５系统性能分析

3.1.1 Overview of System Requirements

3.1.2 Analysis of System Data (an E-R diagram is required)

3.1.3 Analysis of System Function (a use case diagram, a sequence diagram and an activity diagram, etc. are required)

3.1.4 Analysis of System Behavior (and the Operating Environment) (a system state diagram, etc. are required)

3.1.5 Analysis of System Performance

## 3.2 系统设计与建模（或算法分析，存在问题）

## 3.2 System Design and Modeling (or Algorithm Analysis and Existing Problems)

３．２．１　系统设计概述

３．２．２　系统数据（库）设计（要求有数据库模式，或数据类图）

３．２．３　系统软件架构设计（要求有构件图、部署图等）

３．２．４　系统用户界面设计（要求有界面原型图）

３．２．５　系统构件级设计（要求有类图等）

3.2.1 Overview of System Design

3.2.2 Design of System Data (Database) (a database schema or a data class diagram is required)

3.2.3 Design of System Software Architecture (a component diagram and a deployment diagram, etc.)

3.2.4 Design of System User Interface (an interface prototype figure is required)

3.2.5 Component-level Design of the System (a class diagram, etc. are required)

**3.3 详细设计**

## 3.3 Detailed Design

**3.4 本章小结**

## 3.4 Summary of This Chapter

# 4算法或系统实现

# 4. Algorithm or System Implementation

此章仅为示范，章节标题和内容都可以根据个人情况进行更改。

This chapter is an exemplification only. The heading and content of the chapter can be modified according to your personal circumstances.

## 4.1实现环境与工具的简要说明

## 4.1 Brief Description about the Implementation Environment and Tools

可用流程图或伪码等方式说明个人编程工作。

The individual programming work can be described using a flowchart or pseudo codes, etc.

根据模块不同，可分多个小节。

Divide into several sections, depending on different modules.

## 4.2主要程序模块描述（算法实现）

## 4.2 Description about the Main Program Module (Implementation of Algorithm)

可用流程图或伪码等方式说明个人编程工作。

The individual programming work can be described using a flowchart or pseudo codes, etc.

根据模块不同，可分多个小节。

Divide into several sections, depending on different modules.

## 4.3系统运行

## 4.3 System Operation

给出系统运行的效果图。

Give an effect diagram of system operation.

## 4.4 本章小结

## 4.4 Summary of This Chapter

# 5 算法或系统测试

# 5 Algorithm or System Test

此章仅为示范，章节标题和内容都可以根据个人情况进行更改。

This chapter is an exemplification only. The heading and content of the chapter can be modified according to your personal circumstances.

## 5.1 测试环境

## 5.1 Test Environment

说明测试硬件、软件等必要环境。

Explain the necessary environment for the testing of hardware and software, etc.

## 5.2 测试程序和测试数据设计

## 5.2 Test Program and Test Data Design

说明测试方法，步骤，测试用例等

Explain the test methods, procedures and cases used in the test, etc.

## 5.3 测试运行和测试记录

## 5.3 Test Run and Test Record

给出测试结果，推荐用图、表方式。

Present the test results, preferably in the form of figures and tables.

比如，软件设计的界面运行图，算法对比的结果数据表等，要形式丰富多样，便于读者理解个人工作。

For example, the operation interface of software design, and the datasheet of results of algorithm comparison, etc. The forms should be rich and diversified, to facilitate the readers to understand your individual work.

一般而已，对软件开发，需要给出界面效果图（总体、子系统等必要部分）；对算法研究，需要给出详细测试数据。

Generally, for software development, an interface rendering (the whole system, subsystems and other necessary parts) should be presented. For algorithm research, the detailed test data should be presented.

测试应分多角度进行，如运行正常的效果或正确性、算法对比、速度等。

The test should be performed from multiple perspectives, such as the effect or correctness of normal operation, algorithm comparison and speed, etc.

不要编造数据，实事求是。

Do not fabricate data, but be realistic.

需要截取界面图，有多种工具可以采用，比如SnagIt这个软件，很好用，如图2.1和2.2截取的画面，热键启动，直接截取窗口，非常方便。千万不要屏幕硬拷贝哦，太落伍了。

If you need to capture a screen, there are a variety of tools to resort to. For example, the software SnagIt is very handy. For example, to capture Figures 2.1 and 2.2, you can start the hot-key and directly capture the window, which is very convenient. Never try to make a hard copy of screen, which is rather out-of-fashion.

## 5.4 测试结果分析

## 5.4 Test Result Analysis

把测试结果进行全面分析，说明优点、缺点。

Make an overall analysis of the test results and explain the merits and shortcomings.

## 5.5 本章小结

## 5.5 Summary of This Chapter

# 6 工作总结和心得体会

# 6. Work Summary and Reflection

## 6.1 工作总结

## 6.1 Work Summary

全面介绍毕业设计期间的工作情况，总结全过程，进度安排，出现问题及其解决，取得成果，下一步工作打算（如算法改进、系统功能增加）等等。

Give an overall description about the work you have done during the project, summarize the whole process, the schedule, problems, solutions, achievement and future plan (e.g. the improvement of algorithm and increase of system functions) and so on.

内容分多段写。

This section is to be written in multiple paragraphs.

## 6.2 心得体会

## 6.2 Reflection

毕业设计期间取得的认识和收获，也可以对大学学习生涯有简短的总结。请结合论文工作，写出自己的真实想法。

The knowledge and harvest that you have achieved during the project, or a brief summary of your university life. Please write your true feelings, in combination with the project.

# 参考文献

# References

# （10 ~ 20篇）

# (10~20 references)

**声** **明**

**Statement**

本人声明所呈交的学位论文是本人在导师指导下进行的研究工作及取得的研究成果。据我所知，除了文中特别加以标注和致谢的地方外，论文中不包含其他人已经发表或撰写过的研究成果，也不包含为获得四川大学或其他教育机构的学位或证书而使用过的材料。与我一同工作的同志对本研究所做的任何贡献均已在论文中作了明确的说明并表示谢意。

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I also hereby declare that the results of this academic thesis are achieved under the guidance of my adviser, during my study in Sichuan University and they are owned by Sichuan University.

学位论文作者（签名）

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论文指导教师（签名）

Thesis Advisor (Signature)

年 月 日

(mm) (dd), (yyyy)

**致 谢**

**Acknowledgement**

感谢设计过程中涉及到的教师和指导人士，包括同学的相互帮助。这是毕业设计阶段的感谢词。

Express thanks to the teachers and instructors involved in the design, including students who offered help to you. These are words of gratitude for the design stage.

感谢大学四年学习过程中给你印象深刻的教师、同学、朋友，感谢父母的培养等，这是整个大学生涯的感谢词。

Express thanks to teachers, classmates and friends that impressed you deeply during four years of college study, as well as the fostering and support of parents. These are words of gratitude for the whole college life.

注意：请勿抄袭你能找到的模板文字，用自己的语言写作，感情真挚即可。特别地，勿用词过于“肉麻”，呵呵。

Note: Don’t copy the template that you can find, but write in your own words. Just be sincere. Don’t use too “fawning” words in particular.

文体可以正式，也可以个性化。个性化在整篇论文的写作中，只有两个地方可以采纳，一是这里的致谢，二是最后一章总结中的“心得体会”。其余地方请用科技写作的正式文体，尽量避免说“我”和一些口语化的用词。

The style can be either formal or personal. During the writing of the whole paper, you can only use a personal style in two places, one is the acknowledgment here, and the other is the “reflection” in the last chapter. For the rest, write with a formal style of technical writing, and avoid using “I” or some colloquial words, as far as possible.

**附录1 任务申请书**

**附录2 可行性研究报告书**

**附录3 项目开发计划书**

**附录4 需求说明书**

**附录5 用户使用说明书**

**附录6 概要设计说明书**

**附录7 数据库设计说明书**

**附录8 详细设计说明书**

**附录9 模块开发说明书**

**附录10 单元测试报告**

**附录11 单元测试报告**

**Appendix 1 Task Request**

**Appendix 2 Feasibility Study Report**

**Appendix 3 Development Proposal of the Project**

**Appendix 4 Requirements Specifications**

**Appendix 5 User Manual**

**Appendix 6 Description about Preliminary Design**

**Appendix 7 Description about Database Design**

**Appendix 8 Description about Detailed Design**

**Appendix 9 Description about Module Development**

**Appendix 10 Unit Test Report**

**Appendix 11 Unit Test Report**