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**BACHELOR OF SCIENCE IN COMPUTER SCIENCE/ COMPUTER
ENGINEERING/ SOFTWARE ENGINEERING**

GROUP PROJECT IN SOFTWARE DEVELOPMENT

PROJECT MANUAL FOR SUPERVISORS AND STUDENTS

Introduction

1. This document concerns guidelines to help candidates attempting the CS2993 Unit get up to speed quickly in project development.
2. You should be reminded that even though the manual here has been designed it; be as comprehensive as possible, it does not in any way supplant your Supervisor. Your project supervisor will be providing additional information in the form of guidelines, instructions, requirements as you undertake your eight-month development.
3. A number of chapters are presented in this guide:
 - **Requirements for a Pass in Project:** this chapter describes the unit objective and three key requirements for a pass in CS2993.
 - **Getting Yourself Started;** this chapter describes the general order of events that would take place on the first lesson of CS2993.
 - **Project Scope and Tools:** this chapter defines what information systems constitute, and proposes some suggested guidelines as to what would constitute good 2nd year projects.
 - **Consultations:** this chapter describes the first of the three components of project assessment, namely the formal project consultations between the project group and supervisor.
 - **Documentation and Document Contents;** these two chapters describe the second component of project assessment, essentially project documentation.
 - **Project Demonstration:** this chapter describes the method of assessment for the third component of project assessment.
 - **Group Communication:** this chapter presents some of the guidelines involved in solving communication problems within members of a group.
 - **Timing Factor:** this chapter presents some of the observations regarding the timeliness of submission and general peak periods in the project cycle.

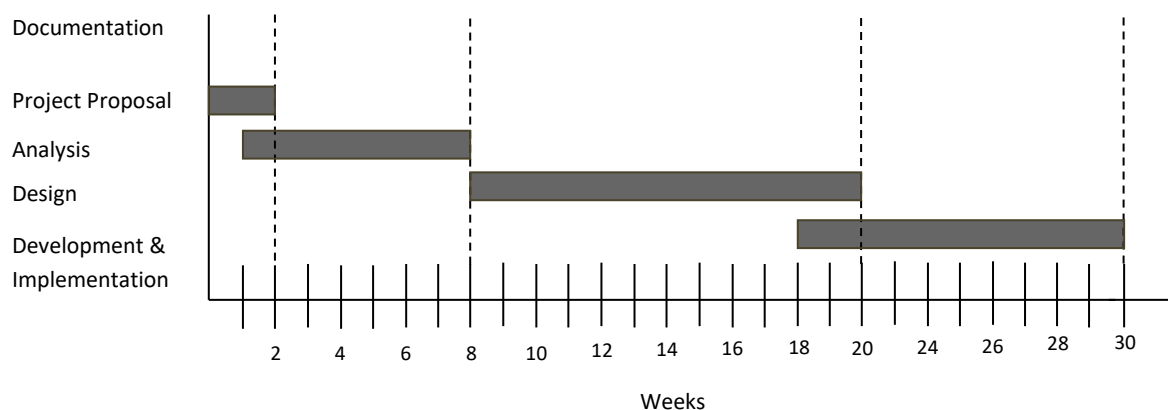
CS2993 Overview

1. The basic overall objective of the 2nd year group project should be stated as follows:

The objective of the unit is to require students to undertake a full-fledged systems development, with the emphasis being placed on the development of practical skills of development. Specifically, students of the unit will work in groups over an eight month period, and undertake development of an information-based system with the use of the System Development life-cycle.

2. The CS2993 Project is two terms (or about 30 weeks) student assignment. Within these two terms, each class will be assigned a Project Supervisor. Under normal circumstances, your project supervisor will be seeing through your entire project group (and all groups in the class) for the entire development effort.
3. The project development is divided into three major phases: analysis phase, design phase, design phase and development & implementation phase, with stipulated deadlines for the submission of documentation for each phase.
4. A basic timetable for the eight months can be said to be as follows:

Diagram: schedule for project documentation submissions



- Analysis phase is to be completed, and the documentation of its findings is to be submitted by the **8th week**.
- Design phase is to be completed, with the documentation compiled and submitted by the **20th week**.
- The whole project (i.e. Development & Implementation phase) is to be concluded, Documented and submitted by the **30th week**.

5. Your group should undertake careful planning to ensure that these deadlines are met **fully**. Apart from the strict nature of assessment regarding the submission of late documentation, your 8 months development, under normal circumstances, is sufficient time for you to complete your project, but you should be careful in ensuring that you do not take longer than necessary to complete some milestone or documentation.

Chapter 1: Requirements for a Pass in Project

1. All of the following requirements must be met in order for a pass in the project to be awarded.

- a) A working software program at the end of the cycle.*
- b) An attendance of at least six consultations over the course of the eight months. This is an individual requirement for each student.*
- c) A pass in the overall mark awarded for all parts of the project.*

2. First off, project groups need to remember that all of these requirements are requisites for a pass in the project. In other words, excellent documentation but with a program that completely fails to work will not result in a pass in the unit.
3. The definition of a working program is 100% functionality. Although this may sound harsh, in practice, nearly all groups have generally been able to meet close to this requirement, if not the full requirement" Based on your actual group composition and ability level, and how the development effort turns out, your project supervisor has been instructed to make use of his or her full discretion in adjusting the degree of required functionality to your group.
4. As a failure in project is a serious proposition, you will be given sufficient feedback by your supervisor as to the progress of your group, and whether your group has been consistently below expectations.

In this sense, your project supervisor has been advised to issue warning letter to project groups or a member that does not perform up to expectations. Generally, only one warning letter will be issued, and signed by the project supervisor, department team manager, and the centre manager. The receipt of this letter will be acknowledged by the project group. , such a letter does not indicate that the project group will fail the unit- rather that the project group needs to seriously reorganize itself and ensure that all members contribute properly to the effort.

Chapter 2: Getting Yourself Started

Preparation and Start

1. Each student attempting the CS2993 unit will be given this Project unit study guide that will serve as a constant document instructing them on the basic requirements of documentation, stipulated deadlines and so on. You are strongly advised to read through the document and be thoroughly familiar with its contents.
2. The actual structure of how your first week of projects will differ from supervisor to supervisor. But some of the events that could take place (to your supervisor's discretion) could as follows:

Table: week 1: Suggested activities to be completed, (in order)

<i>Activity</i>	<i>Description</i>
Self-Introduction	This could take place if the project class comprises of students that are not yet familiar with each other
Formation of Groups	Generally, groups would have been formed before the class started, but there's a separate section in this manual that will discuss this aspect of project
The Initial Proposal	Your class may then be broken up and each newly formed project group will briefly brainstorm on some initial ideas on what project they would like to attempt. Typically, a project group already formed would have thought about what they would like to undertake.

3. Usually, the first (and second if needed) weeks of the project development would thus be concerned more with project group administration and briefing of requirements. Once the project group have been formed and finalized, the class will then be broken up. And from that point onwards, your project group will be speaking to the supervisor on an individual group consultation basis, and no longer as a class.

Forming Groups

1. From nearly all experiences of your project supervisors the formation of groups can be one of the more difficult tasks in your undertaking of this unit, as any eventual discontent that the project group may encounter later on will often find its roots here. Generally speaking, a project group dynamics problem, as opposed to a group that has been sloppily formed without forethought.
2. In smaller project classes, your project supervisor may require the entire class to attempt individual project. By and large however, a normal class in excess of 20 students will typically be broken into groups.

Getting Started: The Project Proposal

1. The first two weeks of software development will be devoted to the creation of the project proposal which in effect is an initial recommendation to the customer of whom the project group has been nominated to serve. In a practical sense, the customer will then decide the actual scope of the project.
2. *The most common projects taken up by previous project groups have been systems simulating a computerized Car Rental System., Cinema - Ticketing System, Payroll System, Student Registration System, Tour Packaging System, Leave Application System, etc. Needless to say, these projects have been literally done to death, and your project supervisor has been instructed to strongly advise your project group to not put up proposals like these as first choice.*

The Proposal

1. In some ways, the Project Proposal can be thought of as a "watered-down" or briefly-summarized version of the Analysis Report. Keep in mind that this proposal is simply an initial recommendation that will help the customer to only decide whether they are interested in commissioning the project group to undertake an in-depth study of the current system.

In other words, *the Project Proposal does not attempt to provide enough information for the customer to decide whether to go ahead with the actual implementation of such a system.*

2. Although the precise contents of the proposal may be altered to suit your project group and its selected project type, typically, the proposal should at least contain the following sections:
 - A short introduction to the organization: history, turnover
 - A description of the current system, or the "current way of doing things'.

- A section explaining the basic problems and limitations as faced by the customer's point of view.
- A proposal of the new system, containing the objectives of the new system (should be made relevant to the basic problems and limitations of the current system), and a description of the new system, with an identification of the major modules of 'the new system.
- The initial new system requirements (also known as the Initial Specifications). This in effect is preliminary statement in precise terms what exactly the project team recommends the proposed system be able to do.
- A work distribution of the new system.
- A section explaining the benefits of the implementation of such a system.
- The hardware and software equipment to be used in the development, and. Also hardware and software equipment also the target platform as used by the system.
- A cost/benefit study. The cost/benefit study should not simply be a theoretical presentation but preferably contain a breakdown of monetary costs and expected benefits of the proposed system, payback periods and Return of Investment (ROI).
- A Gantt chart indicating the planned progress for the project group. The Gantt chart should be reasonably detailed, and not simply a carbon copy of the Gantt chart proposed here in the student's manual. The Gantt chart in the proposal should be broken into a week by week basis. For example, the Analysis phase can be broken into the following sub-activities:

- ❖ Decide project topic
- ❖ Division of investigation tasks
- ❖ Collection of relative information
- ❖ Interview phase
- ❖ Observation phase
- ❖ Consolidation of information
- ❖ Analysis of information
- ❖ Preparation of process flow diagrams
- ❖ Preparation of diagram
- ❖ Submission of Analysis documentation

3. All in all, the project proposal should generally be about 10 to 12 pages long.

Chapter 3: Project Ideas and Tools

A System

1. As your project unit is primarily focused upon the development of a system, the following definition of an information system can be adopted:

An information system is designed, built, operated and maintained through the coordinated functioning of people, procedures and equipment to capture, store, retrieve, and manipulate information.

Information systems can be categorized into a number of sub-categories, two categories of which are generally more popular amongst students in project groups.

- **Transaction Processing Systems:** a computer based system captures, classifies, stores, maintains, updates and retrieves transaction data for record keeping and for input to other types of computer-based information systems.
- **Management Information Systems:** an organized set of processes that provides information to managers to support the operations and decision making within an organization.

There are other systems possible, for example an expert system. But these are typically more complicated and could be beyond the capability of most 2nd year project groups.

Ideas for Project Groups

1. The following are examples of projects that have been proposed in one centre in Singapore.

- ***Student Registration System:*** with web-based front-end, and cgi script-based database backend;
- ***Couple Match-Making System:*** where male and female participants in a database are match-made based on customizable preferences.
- ***Pseudo-expert system based on tour-packages:*** users of the multimedia based system will be asked a series of questions in natural language, and based on their answers, the system will propose a series of tour packages that meet these requirements.
- ***File Transfer and Chat communications program:*** this program was a rare instance where a prototyping-based approach was accepted. The program was developed in PASCAL, and had two major modules, a chat-based function and file-transfer function. Both parts were demonstrated to satisfaction with the use of two separate PCs connected with a serial link.
- ***Data Warehousing and Data Mining system:*** this real-life based system essentially featured two disparate databases, one catering to the sale and rental of apartment flats, condominiums and landed property, and the other a tuition agency. Given specific

company requirements, the system required a merging of both databases to eliminate redundancy.

- **Network Planner:** The system caters to small to medium sized enterprises in need of network solutions. The system analyses client needs and recommends appropriate intranet solutions. If the client accepts, the required components will be purchased from our suppliers and the actual implementation of the network will follow.
 - **ECA Points system:** this is a real-life system modeled after a current system in use at a university in Singapore. The Points Award scheme is used yearly for the computation of ECA (Extra-curricular Activity) points for students wanting to apply for hostel Accommodation. The system allowed for the complex calculation of ECA point for the various activities in the university, administration of student and ECA particulars, application/balloting of hostels and rooms, and the normal document generators.
 - **Vehicle Quota System:** this is another real-life system modeled after the vehicle quota system implemented in Singapore. The bidding of vehicle entitlements itself is a fairly complicated process. The system allowed for application and bidding of COEs (certificate of Entitlements), with the tor-J- report generation and database administration.
 - **Legalized Soccer Betting System:** this is a multi-use, system that catered for a number of functions. This includes the full implementation of legalized soccer betting, league and soccer profile database, acquisition and purchasing of soccer-related merchandise, fan-club registration and administration, and the sale of tickets for various matches.
2. It would also be important for your project group not to propose information systems that are nothing more than *passive* databases. In other words, an information system, e.g. a student database that serves as nothing more than a database of existing student records should be disallowed. Your project supervisor has been advised regarding this aspect, and will instruct you accordingly to change your project scope if you propose a project like this. In all 2nd year projects, there should be some existence of fairly intricate process flows involved, i.e. some manipulation of the information in a system, production of customizable reports for management purposes.
3. The following are additional examples of information systems:

News agent Database

Summary: The main objectives of this system are:

- To make delivery orders easier to implement;
- To allow paper price changes to be made quickly and easily;
- To allow data retrieval for a specific customer;
- To print a daily sheet for each paper delivery person specifying which papers are to be delivered to which customer;

- To make paper orders to Suppliers more accurate by calculating exactly the number of papers needed;
- To make a billing system that is both itemized and clear.

Amusement Park Management Program

Summary: the aim of this system is to aid the management of the amusement park by Supplying information about the popularity of the park at various times of the year, and. The relative popularity of each of the free and paying attractions,

4. The following would be generally unsuitable for 2nd year project:

- A project which consists of a passive database for simple storage purposes only. some useful management-based output should be included into the project to make it suitable.
- A web-based project that involves only the creation of Hypertext markup language (HTML) web pages with no interactivity to a back-end database; web pages today can be quickly created within the matter of hours using the appropriate software tools;
- Presentation programs that allowing for information to be presented in a multimedia format. These programs are typically created using multimedia packages, e.g. PowerPoint or Author ware. These projects are not systems in themselves, and thus should not constitute valid projects.

Project Tools

1. The type of project development tools should be generally left to the decision of students. However, very common tools that have been used to create systems at the 2nd year include:
 - 3rd Generation Procedural Languages: e.g. C, PASCAL
 - 3rd Generation Procedural Languages dialects: e.g. Borland C++, Visual C++
 - Pseudo Procedural Languages; e.g. Visual Basic, JavaScript, Java, C#, .NET
 - Database driven languages: e.g. ACCESS, SQL
 - Internet Web site development platforms: e.g. Microsoft ASP, ColdFusion, HTML
2. That project groups should take note however that the exclusive use of program generators to develop the system is strictly disallowed (see above).

Internet Projects

1. Given the advent of the Internet, it has become increasingly common for project groups to want to develop systems that either have a strong Internet component, or have at least some relation to it.
2. Examples of these systems at the 2nd year typically fall into these groups:
 - A system that is run predominantly on the Internet (e.g. an online purchasing system for DVDs)
 - A system that is still run on a local machine, but may have a simple web front end.

Internet Project Scope

1. The very common examples of Internet projects attempted by students under my charge in the last several years have been as such:
 - Online purchasing systems.
 - **Online Super mart:** one of my project groups attempted this project in 2001, and functionally this system would allow for a person to register an account with the super mart web site, and proceed to make purchases, with automatic billing using secure transaction systems. On the backend, the system would keep track of the amount of quantity left in the stock, and also raise warnings when stock quantity becomes low.
 - **Cinema Ticketing System:** similar to the above type of system. Here, customers can view the currently screening shows at a selection of cinemas and read brief synopsis or reviews of the show. The prospective customer then books the tickets online (seats are automatically allocated) with the standard billing function in place. On the backend the System keeps track of the cinema screening time so that once a show has been started, the ticketing system should be disabled for that show; and stop booking when all tickets are sold for a show.
 - Online bidding systems
 - **Car bidding system:** the project group in question completed an online car bidding system where prospective buyer can look at current available cars for sale. There was functionality for minimal bids, bid increment, time to bid end etc.; and the completed system was very similar to the functionality found on bidding seen on the Internet, for example <http://www.ehay.com>.
 - Online query systems
 - **Tourism Package system:** this system completed by a project -group was actually a localized system but with an Internet component. Users can browse the currently available tour packages available with the company, and proceed

to make reservations (filling in details like person making the booking, number of reservations) and then proceed to the actual company premises to confirm the booking, make payment etc.

2. It should be important to note that the most common type is online purchasing systems, since there are readily available software packages that automate a good part of the creation of these systems. Because of this, project groups should particularly take note that online systems that can be so automated in development that it no longer constitutes 8 months of work will not be allowed try your supervisor.
3. In addition, project groups should take note not to propose online systems that are in reality devices to display passively information, e.g. product information only. These systems, though may be made highly interactive through the use of script languages or Java, are in reality very similar to systems created on multimedia packages like Author ware. There will minimally have to be a major database component in the online system.

Internet Project Demonstration

1. The demonstration of Internet projects introduces a somewhat different situation than that of normal projects. To put the additional requirement simplistically, Internet project are to be demonstrated online. ***In other words, the ability of the system to function online in an Internet project will be treated as critical by your supervisor.***
2. Project groups should put their completed systems onto a host server and in their submissions, include the web site URL (and mirror sites if possible) and login Ids passwords to allow their work to be accessed by the external moderators later on. Project groups should take note that this is an important requirement; as-it is not possible to correctly evaluate your completed online system simply by running it off a CDROM. An Internet project will need to be reviewed in an online manner.

Chapter 4: Consultations

Consultation Proceedings: Attendance

1. Once your proposal has been accepted, the project group will start development. The official "meeting-ups" with your project supervisor are generally known as Project Consultations. Attendance in arranged consultations is important, as a minimum of 15 consultations is necessary as a pre-requisite for a pass in project. Generally, it would be true to also say that your project supervisor will place more attention on the weaker groups. Hence, your own group may be required to undertake more than six formal consultations.

2. You are required to undertake preparation work for such a formal consultation, and also to ensure punctuality for this consultation. Your project supervisor has been advised to grade your project group strictly in this area. In addition, the missing of a consultation is a serious issue, as students who miss two consultations consecutively without acceptable reason will be faulted heavily. A possible action that your supervisor has been instructed to take will be the issuing of one written warning only to the student who misses two consultations consecutively. After that, the student will be awarded a failure in CS2993 without further notice.

Consultation Proceedings: Progress Report

1. Project consultations will be mutually arranged between the group and supervisor. A possible time frame for the period between these formal consultations could be as such: one consultation every 2-3 weeks for the first phase, and 3-4 weeks in the second and third phases. This will give each group seven to eight consultations in the entire development. Some room for tolerance in the event that a member in the group misses a consultation.

2. The group collectively will also need to prepare a combined report for the consultation, known as the Progress Report. The format of this report will vary according to the needs of your supervisor and group, but you should minimally put down the following information in this Consultation report:

- a) *An updated* Gantt chart, indicating the current status *and* work completed.
- b) A report on the status of each member. This part can be further broken down into module levels if each member is handling multiple modules. The length of the status report for each member is generally around 1 page. With each person's report, the work done and a forecast of the work to be done should be included.
- c) Any supporting information gathered produced during the period of work. For example, diagrams, charts, interview results, minutes of the meetings conducted during the period of work, or module code. This information is not part of the main progress Report document, but should be included in the appendix.

3. Your project group should also take care not to falsify any information in the report. Each Project group should report their progress as it is, indicating any problems they may have faced. Your project supervisor can then advise the group on how best to deal with any possible delays or problems encountered.

4. You should also remember that the assessment during the consultation will be on an individual basis. Thus, each member of the group will need to be adequately prepared to present verbal status report, in addition to the formal Progress Report.

Chapter 5: Documentation

Documents

1. There will be a total of four official documents submitted: the Project Proposal (2nd to 3rd week), Analysis Report (8th week), Design Report (20th week), and the Development and Implementation Report (30th week).
2. As the Project Proposal will be subjected to constant revision during the 2nd to 3rd week, a finalized copy will be required in your Analysis Report. The finalized copy of the Proposal will be the Proposal that has been examined and marked by the supervisor. This marked copy should be included into the Analysis Report.
3. In the case where your group proposes to remove sections and chapters in their entirety from their reports, the group should clarify and seek approval from the project supervisor first before doing so. Conversely, there may be additions to the required content and structure of the report that your supervisor may require in your group's report.
4. Each member in the group will need to contribute to the writing of the report. In the following layout of the report, sections that should be individually written or written as a group collectively have been highlighted. As a general rule, parts of the report that are module or function specific should be written individually by each member of the group. Under no circumstances, however, should documentation effort be divided based on diagramming, printing, or tasks like these {e.g. one person does all the typing, one person does all the typing, and one person does all the diagrams).
5. The following guidelines should be made compulsory to all project groups:
 - Each of the three major reports are to be divided into a "main document" and "appendix".
 - Each of the three main documents- or essentially the most important contents of the document- should be about 50 pages.
 - The appendix can be of an unlimited length (within reason), and should grow incrementally with each major phase; i.e. the appendix of the first analysis report can be put together with the appendix of the second design report.
 - The **total "main" substantive** of the three major reports, plus proposal and executive summary, is to be about 100 pages in total.

As to what precisely should go into the main document, this should be generally left to the discretion of the group, although your project supervisor may want to exercise stricter control on the weaker groups. However, it goes, project groups should keep in mind that management (simulated by the supervisor) will need to be adequately informed as to the contents of the report, or "What you're trying to say" by reading the main document only. A

possible arrangement would be put in only the essential information, for example key diagrams, main descriptions, and overall results into the main document. Additional information, for example, other related diagrams, detailed statistical lists and interview results can be inserted into the appendix.

Document Submission

As the deadlines for project document submission are announced well before hand, there is little reason for any possible late submission. In the event that a group submits their reports after the designated deadline, it will only serve to indicate that they are not of practicing proper time management.

Your project supervisor has been instructed to indicate clearly to project groups that the late submissions of the various reports will **not** be acceptable. And even in the event that extremely valid reasons are presented, there will still be some penalty imposed on the mark awarded for the late documents, the penalty being awarded based on the severity of lateness or legitimacy of reason.

Chapter 6: Document Contents

1. Enclosed here is the general content of each document in your report. A general indication to the weight of each part has been indicated as well. Remember to always check with your Supervisor whether he or she will like to insert in additional sections, as and when necessary.
2. There is also an indication for each item as to whether the item should be written collectively, or on an individual part basis for each member. Hence, for example, the Management Proposal is a document that will be a collective effort. The Description of the current system for the Analysis Document will be in parts on a module by module basis, written by members taking charge of the module.
3. Lastly, a suggested number of pages have been included in each section of the report as well (on the assumption that single spaced, font size 10-11 text is used.)

Proposal (20 marks)

Documentation Preamble Items		Member		
		1	2	3
1.	Description of the proposed System (10 marks)			
2.	Rationale for the Proposed System (5 marks)			
3.	Quality of Initial Specification (5 marks)			

Documentation Preamble (10 marks)

Documentation Preamble Items		Member		
		1	2	3
1.	Table of contents	No marks		
2.	Executive Summary (10 marks)			

Documentation Preamble should be submitted together with the last report in the development cycle, i.e. Development and Implementation Report.

- **Table of Contents:** contents of main document and appendices. As this is a required item, documents without a table of contents should have 5% deduction of their total mark awarded.
- **Executive Summary:** to be completed at the end of the development, and consists of a concise report of the entire development effort for management purpose. This part should be approximately 1000 words (i.e. 2 to 3 pages).

Documentation: Analysis (55 marks)

Documentation Analysis Items		Member		
		1	2	3
1.	Introduction (5 marks)			
2.	Fact Finding (15 marks)			
	<ul style="list-style-type: none"> Justification of fact-finding techniques used (5 marks) 			
	<ul style="list-style-type: none"> Completeness and quality of fact-finding, and analysis of information gathered. (10 marks) 			
3.	Description of Current System (25 marks)			
	<ul style="list-style-type: none"> Narrative (5 marks) 			
	<ul style="list-style-type: none"> Illustrations supporting narrative (5 marks) 			
	<ul style="list-style-type: none"> Process flows (5 marks) 			
	<ul style="list-style-type: none"> Problems and limitations of current system (5 marks) 			
	<ul style="list-style-type: none"> Scope and constraints (5 marks) 			
4.	Requirements Specification for New System (10 marks)			

- **Introduction:** a broad introduction pertaining to the relevance, initiation of the project, brief description of the organization in question. This should also be completed at the end of the development [2 pages].
- **Fact- Finding:** this section should be minimally graded based on the following items. The lack of any one of these minimal items should result in generally lower marks awarded for the section.
 - Justification-of fact-finding techniques used: the justification should be made relevant to the organization and/or system characteristics, and not be based on general fact-finding technique characteristics. [2 pages]
 - Completeness and quality of fact-finding: this section awards marks based on the thoroughness and depth of fact-finding performed. For example, number of persons interviewed, quality of question asked,

sampling sizes, appropriateness of observation noted. Copies of the fact-finding documentation, i.e. interview sheets, must be included into the appendix of this document. Analysis of results: this is concerned with the production of conclusive observations supported with the raw data obtained from fact-finding. This could include consolidation of disparate information into something consistent and generally representative of the persons interviewed. [6 pages]

- **Description of the Current System:** this section is concerned with a detailed description of the system as it is- This section should be minimally graded based on following items:
 - Narrative supported by diagrams, charts, tables etc. Examples of diagram presented here include system breakdown, organizational charts indicating roles and responsibilities. Items of information presented in the narrative should include inputs, outputs and processes. [5 pages]
 - Detailed process flow diagram (i.e. data flow diagrams) of adequate depth, i.e. up to at least 2nd level data flow diagrams. Normally the context and the 1st level diagrams are placed in the main document; with level 2 details and beyond in the appendix. [3 pages + appendix]
 - Problems and limitations of the current system: this is a fairly detailed study, and as a consequence giving rise to the request for development. [3 pages]
 - Scope and constraints: this section should clearly explain the rational for Identifying that subset of the system. Constraints would include items like budgetary, technological or other resources constraints [2 pages].
- **Requirements Specification:** this section is concerned with a detailed description of what the proposed system would be required to fulfill. The requirements should be presented as an *enumerated* list of requirements in fairly precise language. An example of this is as follows:

Module 1: "Database Administration Module"

- 1.1: Able to create and save new employee records
- 1.2: Able to delete new employee records
- 1.8: Able to edit new employee records
- 1.4: Able to search employee records using query function

Module 2: "Pay slip Generation Module"

- 2.1: Able to generate pay slip monthly.
- 2.2: Able to retrieve onscreen employee's pay slip details. (etc...) [4 pages]

Documentation: Design (60 marks)

Documentation Design Items		Members		
1	Description of new system (15 marks)	1	2	3
	• Narrative (5 marks)			
	• Illustrations supporting narrative (5 marks)			
	• Process flows (5 marks)			
2	Detailed design (40 marks)			
	• Data Design (10 marks)			
	• Architectural Design (5 marks)			
	• Procedural Design (10 marks)			
	• Interface Design (10 marks)			
3	Hardware and Software selection (5 marks)			
	• Explanation/justification of development and Implementation hardware and software equipment (5 marks)			

- **Description of New System:** as above. [8 pages + appendix]
- **Detailed Design:** this section should be contained the following four aspects of design:
 - **Data Design:** key design representations like the data dictionary, Entity-Relationship diagram, normalization, should be presented here in the main document, with associated supporting explanations. Diagrams should be explained or elaborated upon. Detailed representation (e.g. data element dictionary) should be placed into the appendix. [4 pages + appendix]
 - **Architectural Design:** program structure information should be presented here, for example the breakdown of a system into its sub-component parts and modules associated explanation, control relationship and information exchange between modules. [4 pages + appendix]
 - **Procedural Design:** based on the program structure, procedural information for each module should be presented here. The procedural information presented her can be based on pseudo-code or flowcharting techniques. Project groups should take note that this section is not a blind listing of procedural code- the detailed procedural code should be put into the appendix, with only key procedural details (and supporting explanations) in the main document. [4 pages +appendix]

- **Interface Design:** screen design information should be presented here. Project groups should be clearly distinguished what is screen layout and the actual screen. All too often, project groups have presented pages of screen captures in this section. Without really understanding that this screen captures must be preceded by a section explaining the design of screens. In other words, representations like screen layout (e.g. way the menu bar or icons is being used in this particular system, color scheme, font sizes) similar to that of SD206 should be elaborated upon. The emphasis in this section here should be correct and rational justification of screen layout and design, and not by the volume of screen captures presented. The main document here should only include the key template(s) that all screens are derived from; with the detailed or specific templates in the appendix [4 pages + appendix]
- **Hardware and software Selection:** here the following two aspects should be presented.
- **Development hardware and software equipment:** an explanation of the equipment that would be used to develop the software portion of the system. Again, explanation and justification is required for the equipment proposed.
- **Implementation hardware and software equipment:** an explanation of the equipment that users would need to possibly acquire in order to make use of the completed system. Some explanation and justification is necessary for the equipment proposed, and a simple itemized list without elaboration should not be awarded any marks. [4 pages]

Documentation: Development and Implementation (50 marks)

Documentation Development/Implementation Items		Member		
1	Software Development: Testing (20 marks)	1	2	3
	<ul style="list-style-type: none"> • Justification of testing technique; Choice and justification of test cases (10 marks) 			
	<ul style="list-style-type: none"> • Test logs (10 marks) 			
2	Implementation: Conversion and Training Plan (10 marks)			
	<ul style="list-style-type: none"> • Justification of conversion technique, schedule and plan (10 marks) 			

3	Implementation: User Guide (10 marks)			
4	Critical Appraisal: combined (5 marks)			
5	Critical Appraisal: individual (5 marks)			

- **Software Development: testing:** this section here should have contained the following sections:
 - **Justification of testing technique:** some explanation should be presented with regards to the type of testing adopted, as made relevant to the system at hand. Project groups that simply present theoretical information of advantages/ Disadvantages of the testing technique without making them relevant to the system should not be awarded marks. Examples of testing techniques are boundary value analysis, equivalence partitioning, integration testing etc. [3 pages]
 - **Test Case:** information relating to the choice and design of test cases should be presented here. Again, some explanation relating to the choice and design of test cases should be presented, e.g. why a certain range of data values are chosen for testing in this particular function. [2 pages]
 - **Test logs:** a table containing the following information should be presented here for each test case:
 - Test case description: data values, module and function under test;
 - Test case result;
 - Test case conclusion: whether the test case was successful, and the action to be taken (e.g. debugging) to be taken.

The test logs themselves should be in the appendix.

Implementation: Conversion Plan:

- ***Justification of conversion technique:*** project groups should justify the choice of the conversion techniques (e.g. pilot, phase) in use, with a strong and clear relation to the system under implementation. Documentation presenting theoretical justification of the conversion technique without relation is to be awarded no marks.
- ***Schedule and planning for conversion:*** Gantt charts presenting the schedule for implementation should be presented here, and supported with narrative descriptions of the resources (e.g. who, what, where, when, how) required for implementation. [4 pages]

- **Implementation: User Guide:** a user guide containing installation instructions, operating instructions, description of main functions and general error-handling should be presented. [10 pages]

Critical Appraisal: this portion should present an overall macro-perspective of the completed system, and contain information pertaining to overall problems faced during the development, and possible future enhancements to the system. The group appraisal should cover broad aspects of the system, whereas the individual appraisal should be more focused on the individual modules under each member charge [5 pages]

Chapter 7: Project Demonstration

1. The primary area of assessment in the project demonstration of your completed project is the quality of the completed software, and also your project group's awareness in being able to explain the design and implementation aspects of your system. Project supervisors will actively ask questions during the demonstration, especially queries pertaining to workflow, design features, and implementation aspects of the program.
2. Each project member will be individually assessed and asked to explain his or her contribution to the software development during the demonstration. Typically, the following style of demonstration will be adopted by your supervisor:

The program demonstration is divided into two main phases: individual assessment, group assessment, and an optional final appraisal from the supervisor.

- a) Individual assessment: each member of your group will be interviewed in isolation and required to demonstrate functionality of the module he or she has been placed in charge of. During this 10-minute demonstration, the group member will be required to demonstrate full understanding of module functionality **and** development aspects. The group member will be expected to demonstrate competence in both these areas for a pass in the demonstration.
- b) After the individual demonstration, the group will then be examined together. Here your supervisor will ask general questions as to overall functionality, whether the project was completed to satisfaction, future enhancements and so on.
- c) Your supervisor may then give your group a final appraisal and general feedback for the entire 8 months effort.

Chapter 8: Group Communication

1. All project groups will need to keep in mind that the whole business of having a group project attempting a systems development is that *anybody* can work alone- but not everybody can work with a group. Hence, it would be perfectly natural for your project group to run into communication problems along the way. What is important is that your project group keep in mind that it has a common purpose- even if your group members hate working with each other.

In the real sense, we rarely get to choose the people we like to work with. The project group is only formed for 8 months- not for life- and it has the common goal of wanting to complete the system development above all else. That involves a certain measure of commitment from each person in the group.

2. The importance of fostering good communication and understanding thus cannot be understated in a full systems development project like the CS2993 module. As such, each member in the group will need to exercise some discretion and good common sense in working with each other. As a matter of speaking, the Project Group leader has the greatest responsibility in this area, as he would be the person generally calling for project meetings, and ensuring that each person keeps up with his or her designated responsibility.

3 As the project group will be working over an eight-month period, it would be inevitable that arguments will arise now and then within the development period. Generally, it is perfectly okay for the project group to meet, and subsequently have to take time to thrash out these problems. What is more important is that the project group should remember that the problem *must* be resolved eventually.

4. Your project instructor has been advised that the breaking up of groups are only allowed in very extreme circumstances. For example, where two students in the group discontinue the unit/course simultaneously, making it impractical for one person to complete the project, or when one member of the group threatens to render bodily harm to another member. Reasons that will not be acceptable are, for example, failure to communicate effectively, misunderstandings, or other. "He's not working and living up to his responsibility" situations.

5. Typically, in the event that your project supervisor feels that the project group is suffering frequently from the same problem, i.e. turning chronic, the supervisor may step into the picture and resolve the problem.

Chapter 9: Timing Factor

1. The peak periods for the unit are generally, around the -report submission deadlines, and in the last three weeks of the eight months when the program demonstration is due.

2. Generally, there is more than adequate time to fully complete the reports and program. However, groups often find the timing extremely rushed because of slow start. Do pay Attention to the following points in order to ensure project groups balances between its own work commitments, other subjects, and the deadline of the submission of documents.

- a) The group will need to delineate responsibilities clearly, and “push” the slower members in the group. One common reason in the inability of group to meet deadline is when one member slackens, it often causes the entire group’s schedule of work to overrun. If you are also the project group leader, the responsibility that all members contribute to expectations will fall onto you.
- b) Your project group will need to forecast their own work commitments and other needs ahead of time. The exam periods that will clash with the project will take place whilst the group is in the preparation of the design report and in the preparation of the program demo. Specifically, for the former, your group may need, to temporarily stop work on the design phase close to the exam, and thereafter immediately pick up straightaway after the exam. For the latter, traditionally, the preparation of the program demo and Implementation Report have always taxed all but the very best project groups, as it clashes headlong with the exam season as well.

In order to counter this problem, your group may need to cut program development several days before the program demo, and spend the last few days solely on debugging and polishing up the program. Moet importantly, the project group needs to keep in mind that the assessment of CS2993 is mutually exclusive from other units, i.e. reasons of other subject workloads resulting in poor reports or a program are very poor reasons for not doing the project properly.

- c) In order to be able to adequately use the development platform and language that the project group intends your group is strongly advised to start picking up the language *early* in the project development. This also makes it possible to change the proposed development language later, e.g. late in the Design phase, as some groups often discover that the chosen programming language is not as easy to learn as they thought it to be. The best time to pick up the language will be in the Analysis phase. As a gauge, the project group should have mastered the language to the level required for the program development *by the end of the design phase*. Any time after this indicates a strong likelihood that the project development will overrun beyond its stipulated time period.

Chapter 10: Submission of Projects to Supervisor

Format of Project Samples Submission

When sending reports to the supervisor, project groups should ensure of the following are met:

- **File spine:** the following should be correctly indicated on the spine of the report file:
 - Project Title;
 - Project Group Number (if relevant);
 - Centre, and semester/Year
- **Cover Page:** this is to be attached as the first page of the project file. It is to contain the following;
 - Project Title;
 - Project Group Number (if relevant);
 - Project Group Members Names and Ids and Centre
 - Project Supervisor name.
 - Project Time frame (e.g. April to December 2001)-
- **Main Documents:** The documents of the project file are to be organized in this order:
 - Project Executive Summary (2-3 pages)
 - Project Proposal (L0-12 pages)
 - Analysis Report (25 pages)
 - Design Report (26 pages)
 - Implementation and Development Report (25 pages)
 - Appendix (no limit, but normally about 70 to 100 pages)
- **Program Executable:** this is the media of the completed program submission:
 - Non-Internet Projects: media is ideally to be on CDROM, with all library files included and/or source code included¹.
 - Internet Projects: The Internet web site URL that hosts the completed system is to be specified on the Cover Page of the report.
 - Where possible, the completed Internet system should have hosted on more than one web server; and in these instances, both web site URLs should be specified on the Cover Page.
 - Password protected, or Login enabled systems: login IDs and Passwords are to be *clearly indicated* on either the Cover Page or on the CDROM itself.

Chapter 11: Summary Assessment of Project

Overall Assessment

1. The breakdown in weight of each area of assessment should be as follows:
 - a) Regular Consultation Scores = 20%
 - b) Documentation = 50%
 - c) Project Demonstration = 30%
2. Keep in mind that this assessment component affects the overall grade, and takes into account whether the other prerequisites have been met. In other words, your project group will still need to undertake at least six consultations, and fulfill the 100% program functionality requirement before this project assessment component is considered.