Faculty of Computer Studies

Supplementary Material
Information Technologies and Computing : Level 2
Special Topics in Computer Science: Database Management Systems

CS490

October 2009 Offer Notes

Prepared by the Faculty of Computer Studies
Information Technology and Computing
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Contents

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1. Introduction

CS490 is a special topics course, where the selected topic can vary. Therefore, there could be several course guides for CS490, each specializing in a different selected topic. For each selected topic, there are several offer notes, one for each term the selected topic is on offer. The offer notes you are reading are for the **October 2009** offer of the Database Management Systems special topic.

The purpose of the **CS490 October 2009 Offer Notes** is to encapsulate all important material that is specific to the offering of the **first** term of the **2009/2010** academic year. This includes details of the software that will be used this term, the course calendar, the weekly study guides, the TMA and the project. It does not include the general course plan, its prerequisites, objectives, assessment details, or descriptions of the learning materials. This information is included in the **CS490 Course Guide.**

2. Software

Title: Oracle 9i ®
Category: Database Management System
Version: 9i (supported by workbook), or 10g or 10g express. The latter is the simplest one to install and use.
How it can be obtained: included with the course materials.
Documentation: included with the student copy of the Oracle 9i CD.

Title: Oracle Developer Suite ®
Category: Database Development Tools
Version: 10g.
How it can be obtained: Through Oracle Academy, (should be arranged by your branch and local course coordinator)
Documentation: included as online help

Title: Microsoft Excel ®
Category: Spreadsheet Program
Version: Any late version will do.
How it can be obtained: Purchased independently by the student.
Documentation: included with the software as a user manual and online help.

Title: Design feedback tool
Category: Database design training software
Version: latest as found in the website
How it can be obtained: from the author Website at http://jerrypost.com/dbdesign/ after obtaining a password form your instructor.
Documentation: included in the website and in Jerry Post, "Database Management Systems", 3rd Edition, McGraw Hill/Irwin, pp. 70-76.

Title: Microsoft Access ®
Category: Database Management System (as an alternative to Oracle and the Database Design feedback tool).
Version: latest available.
How it can be obtained: Purchased independently by the student.
Documentation: included with the software as a user manual and online help.

Title: Microsoft SQL Server ®
Category: Database Management System (used as an alternative to Oracle and the Access).
Version: latest available.
How it can be obtained: Purchased independently by the student.
Documentation: included with the software as a user manual and online help.

3. Course Calendar

Week	Start	Text Ch.	Text Readings	Pages			End-Of-Chapter HW			Assessment			
				from	to	total	Ch	Review Questions	Exercises	Item	Due	%	
Module 1: Introduction and System Design													
1	3 Oct	1	Introduction	1	25	25	**1**	**1, 2, 3, 7**	**9**	Included in TMA1			
2	10 Oct	2	Database Design + App.	29	76	42	**2**	**1, 4, 5**	**11**				
3	17 Oct	3	Data Normalization	77	105	29	**3**	**2, 3, 4**	**2**				
4	24 Oct	3	Data Normalization + App.	106	142	29	**3**	**5, 6**	**7**				
Module 2: Queries													
5	31 Oct	4	Queries	143	163	21	**4**	**1, 2, 4**	**8, 12, 15**				
6	7 Nov	4	Queries	163	181	19	**4**	**6, 10**	**18, 22**				
7	14 Nov	5	Advanced Queries	182	196	15	**5**	**1, 2, 3**	**6, 9**				
8	21 Nov	5	Advanced Queries + App.	197	220	19	**5**	**9, 10**	**15**		**Quiz1**	**Wk 8**	30%
Module 3: Applications													
9	28 Nov	6	Forms and Reports	221	247	27	**6**	**1, 3**	**23, 24**	Included in Project	**TMA1**	**28 Nov**	8%
10	5 Dec	6	Reports and Applications	247	262	16	**6**	**6, 7**	**28, 30**				
11	12 Dec	7	Transactions	265	281	17	**7**	**1, 2, 5**					
12	19 Dec	7	Transactions	281	294	14	**7**	**7, 13, 14**					
Module 4: Advanced Topics													
13	26 Dec	8-10	Data Warehouses & OLAP	329	356	28	**8**	**1, 2, 5, 8**	**4, 10**	Optional	**Project**	**26 Dec**	12%
			DB Administration	360	380	21	**9**	**1, 2, 4, 10**	**8**				
			Distributed DBs	380	393	14	**10**	**1, 2, 3, 4**	**8, 12**				
14	2 Jan	1-7	Study Period										
15	9-21Jan	----	Start of Final Exam Period								**Final**	**TBA**	**50%**

4. Weekly study guides

All Weekly activities below are supposed to take place before the tutorial session meets. Also, you should complete study guide 0 before the first tutorial meeting.

Module 1: Introduction and System Design

Weekly Study Guides

Study Guide 0: Week 0 (before course starts)

Review	Ch. 1 pages 1-25, Key Terms and Review Questions
Start doing	Review questions 1,2,3,7 and exercise 9 of Chapter 1
Read	The Course Guide, the Oct. 09 Offer Notes and the Study Calendar
Make Sure	You have access to the e-learning system and all learning materials, and have secured all required software

Study Guide 1: Week 1

Must Read	Ch. 1 pages 1-25
Complete	Key Terms & Review Questions 1, 2, 3,7 & Exercise 9 of Chapter 1
Read	The Course Guide, the Oct. 09 Offer Notes and the Study Calendar
Install	Oracle ® or MSAccess ® Software and a spreadsheet program
Lab exercises	Ch.1 of the Oracle 9i workbook

Study Guide 2: Week 2

Must Read	Ch. 2 pages 29-63 and 70-76 and the TMA
Check	Your understanding of the key terms on page 63
Do	Review Questions1,4,5 on page 63 and Exercise 11 of Chapter 2
Lab exercises	Ch.2 of the Oracle 9i workbook

Study Guide 3: Week 3

Must Read	Ch. 3 pages 77-105
Check	Your understanding of the key terms covered on page 130
Do	Review questions 2,3,4 on page 130 and exercise 2 of Chapter 3
Start on	Form project team and start on Project
Lab exercises	Ch.3 of the Oracle 9i workbook

Study Guide 4: Week 4

Must Read	Ch. 3 pages 106-130 and 139-142
check	Your understanding of the key terms on page 130
Do	Review questions 5,6 on page 130 and Exercise 7 of chapter 3
Work on	Project
Lab exercises	Complete Ch.3 of the Oracle 9i workbook

Module 2: Queries

Weekly Study Guides

Study Guide 5: Week 5

Must Read	Ch. 4 pages 143-163
Check	Your understanding of the key terms covered on page 175
Do	Review questions 1,2,4 on page 175 & Exercises 8,12,15 of Ch. 4
Review	All materials related to Normalization
Work on	Project
Lab exercises	Ch. 4 of the Oracle 9i workbook

Study Guide 6: Week 6

Must Read	Ch. 4 pages 163-175 and 179-181. End-of-term project
Do	Review questions 6,10 and Exercises 18, 22 of Chapter 4
Work on	Project
Lab exercises	Complete Ch. 4 of the oracle 9i workbook

Study Guide 7: Week 7

Must Read	Ch. 5 pages 182-196
Check	Your understanding of the key terms you covered on page 206
Answer	Review questions 1,2,3 on page 206 and exercises 6,9 of Ch. 5
Prepare	For the Quiz
Work on	Project
Lab exercises	Ch. 5 of the oracle 9i workbook

Study Guide 8: Week 8

Must Read	Ch. 5 pages 197-205 and 211-220
Check	Your understanding of the remaining key terms on page 206
Answer	Review questions 9, 10 on page 206 and Exercises 15 of Ch. 5
Complete	TMA
Take	The Quiz
Work on	Project
Lab exercises	Complete Ch. 5 of the oracle 9i workbook

Quiz Date: During Week 8
TMA1 Cut-off-Date: 28 Nov 2009

Module 3: Applications

Weekly Study Guides

Study Guide 9: Week 9

Must Read	Ch. 6 pages 221-247
Check	Your understanding of the key terms on page 262
Start on	Review questions 1,3 on page 262 and exercises 23,24 of Ch. 6
Hand-In	TMA
Work on	Project
Lab exercises	Ch. 6 of the oracle 9i workbook

Study Guide 10: Week 10

Must Read	Ch. 6 pages 247-262
Complete	Review questions 6,7 on page 262 and exercises 28,30 of Ch. 6
Work on	Project
Lab exercises	Complete Ch. 6 of the oracle 9i workbook

Study Guide 11: Week 11

Must Read	Ch. 7 pages 265- 281
Check	Your understanding of the key terms you covered on page 294
Answer	Review questions 1,2,5 on page 294 of Ch. 7
Complete	Project
Lab exercises	Ch. 7 of the oracle 9i workbook

Project Cut-off-Date: 26 Dec 2009

Study Guide 12: Week 12

Must Read	Ch. 7 pages 281 - 294
Check	Your understanding of the key terms covered on page 294
Answer	Review questions 7,13,14 of Chapter 7
Hand-In	Project
Prepare for	Final Examination

Module 4: Advanced Topics

Weekly Study Guides

Study Guide 13: Week 13

Skim	Ch. 8-10 pages 329-356, 360-380 and 380-393
Check	Your understanding of the key terms on pages 326, 356 & 393
Do	Optional Review questions and Exercises of chapters 8-10 (see calendar)
Prepare	For Final Examination
Lab exercises	Optional: Do Ch. 8-10 of the Oracle 9i workbook

5. Tutor Marked Assignment

This section includes the TMA that is assigned in this offering of the course. The TMA contains a series of exercises to be done according to the suggested schedule in the calendar and the weekly study guides. These exercises are to be done **individually by each student**. In solving the TMA, you may wish to keep a couple of points in mind:

- The suggested exercises represent a minimal set of problems to solve. You gain experience by solving as many problems as you can and discussing your solutions with your instructor and your colleagues. In most cases, you can test your answers using the appropriate course software. Try to solve more problems from the text.

- It will be very helpful to always check your understanding of the end-of-chapter key terms and to answer all end-of-chapter review questions.

Important Dates

Quiz Date: During Week 8
TMA Cut-off-Date: 28 Nov 2009
End-of-term Project: 26 Dec 2009

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Tutor Marked Assignment (TMA)

Cut-off date 28 Nov 2009, Total Marks 75, Weight: 15%.

IMPORTANT NOTE: You must submit your assignment electronically through the e-learning platform for the course. You should submit an **RTF main report** in addition to all the required implementation files for the exercises. Each exercise must have an entry in the .rtf main report and should refer to any exercise files included as required. Place all your files plus your .rtf main report in a single compressed directory.

Some of the assigned problems have been modified from those in the text. The version stated here will be the one used for marking purposes. The questions are based on **Chapters 1-5** of the text book. These exercises are also listed in the course calendar and divided among the weeks of the course. The marks allocated to each question are given in parentheses () and additional comments or clarifications of the problems are sometimes added between brackets [].

CHAPTER 1

Review question 1 (2 marks):
What are the advantages of the DBMS approach to application development?

Review question 2 (2 marks):

What are the basic components of a DBMS?

Review question 3 (2 marks):

Why is the relational database approach better than earlier methods?

Review question 7 (2 marks):

What is the purpose of a feasibility study?

Exercise 1.9 (4 marks):
Install the Pet Store database or find it on your local area network if it has already been installed. Print out (or write down) the list of the tables used in the database. Use the Help command to find the version number of Microsoft Access that you are using. [Hand in the .mdb file containing the database you just installed and write the version number in the .rtf main report]

CHAPTER 2

Review question 1 (2 marks)

How are business rules represented in class diagrams?

Review question 4 (2 marks)

What is a primary key?

Review question 5 (2 marks)

What is multiplicity and how is it shown on a class diagram?

Exercise 11 (4 marks):

Extend the class diagram for Sally's Pet Store by including the details needed to track the genealogy of the all of the animals.

CHAPTER 3

Review question 2 (2 marks):

What is a composite key?

Review question 3 (2 marks):

What are the main rules for normalization?

Review question 4 (2 marks):

What problems do you encounter if data is not stored in normalized tables?

Review question 5 (2 marks):

Explain the phrase a column is dependent on another column.

Review question 6 (2 marks):

How are BCNF and 4NF different from 3NF?

Exercise 3.2 (6 marks):

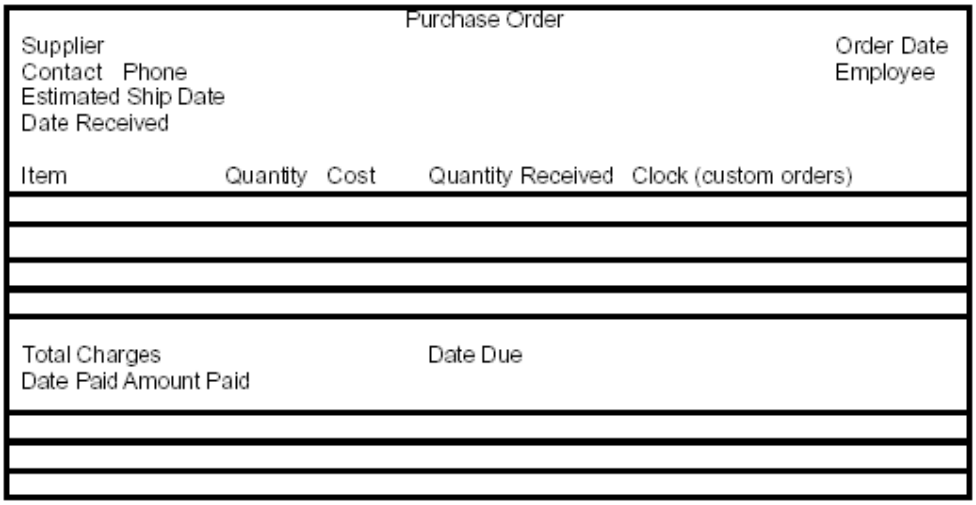
You have been hired to develop a small database for a company that wants to offer products for sale on the Internet. Create the class diagram and list of normalized tables for this case.

Date/Time		**Order Form**						
Customer			Credit Card			Internet		
Name Phone	Shipping Address City, State ZIP		Card #			E-mail		
			Expiration Date			IP Address		
			Bank			Referred From		
Items								
Item#	Name	Description	Quantity	List Price	Sale Price	Quantity Shipped	Back Order	Extended
						Item Total Shipping Tax Total Due		

Exercise 3.7 Creating a larger class diagram and normalized tables based on multiple user forms: (15 marks)

A small woodworking shop specializes in building grandfather clocks. The shop orders the wood, clockworks, and miscellaneous components from various suppliers. The wood panels are planed from rough wood, glued, shaped, and assembled. The ornate carvings for the top are purchased from a single supplier where they are hand carved. Some clocks are sold as custom orders where the client chooses options like the height and the clockwork. For regular production, the owner usually fills out a similar sheet just to keep track. The clocks are in high-demand, and the owner makes a deliberate effort to hold down production so prices stay high. Based on the purchase order and the sales forms, create the class diagram and list of normalized tables needed for this case. Note that the item total on the Sale form does not equal the total price, because the total price includes some overhead charges, but not the delivery charge. Although not displayed on the form, the owner also wants to track the date each clock was started and finished.

Sale					Employee
Order Date Estimated Delivery Date Actual Delivery Date					Customer Phone Address City, State, ZIP
Total Price Delivery Method	Payment Method Delivery Charge				
Item/Feature	Color	Quantity	Price	Subtotal	
				Item Total	



CHAPTER 4

Review question 1 (2 marks):

What are the four questions used to create a query?

Review question 2 (2 marks):

What is the basic structure of the SQL SELECT command?

Review question 4 (2 marks):

Why is it important to use parentheses in complex (Boolean) Where clauses?

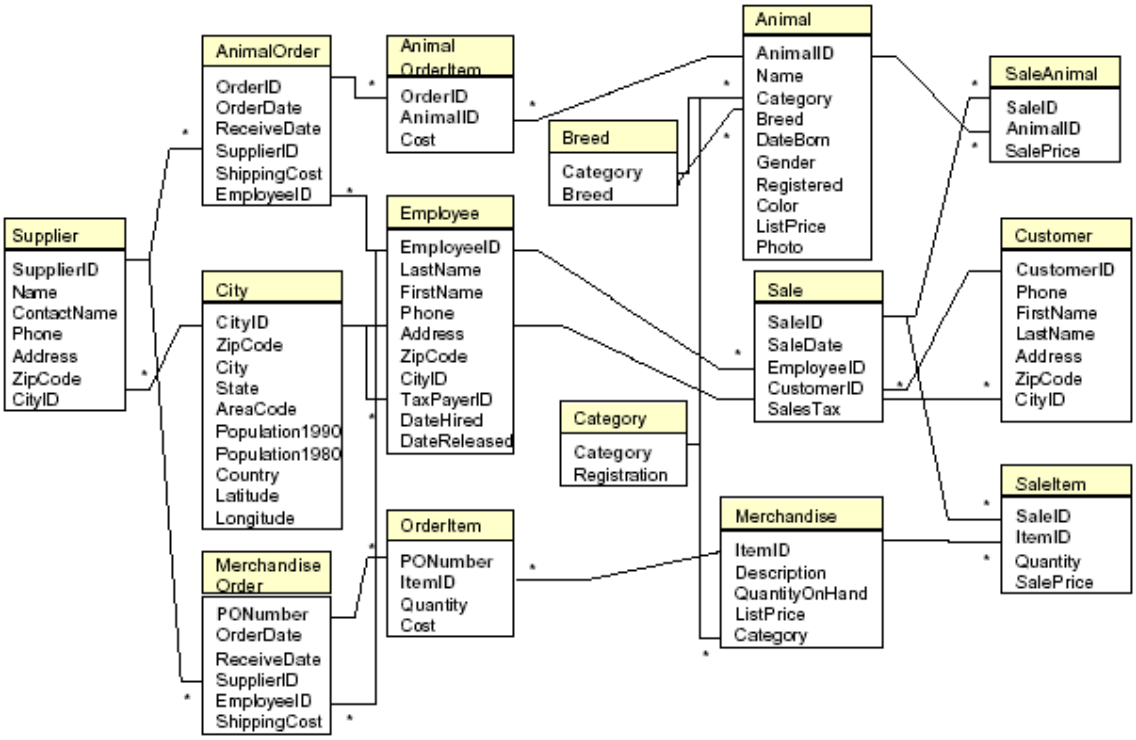
Review question 6 (2 marks):

What is the difference between the ORDER BY and GROUP BY commands?

Review question 10 (2 marks):

What is the difference between the WHERE and HAVING clauses? Give an example of how each would be used.

Use the following schema to answer the remaining questions. Include all answers as queries in a database file (.mdb in MS access ® or appropriate Oracle ® reports):



Exercise 4.8 (3 marks):

How many cats were sold in October?

Exercise 4.12 (3 marks)

Which state holds most of our customers? (2 marks)

Exercise 4.15 (3 marks)

List the customers who have purchased cats from Gibson. (2 marks)

Exercise 4.18 (3 marks)

List the registered dogs sold in January with white in their color. (2 marks)

Exercise 4.22 (3 marks)

Which animals sold for less than their cost?

CHAPTER 5

Review question 1 (2 marks):

What is a subquery and in what situations is it useful?

Review question 2 (2 marks):

What is a correlated subquery and why does it present problems?

Review question 3 (2 marks):

How do you find items that are not in a list - such as customers who have not placed orders recently?

Review question 9 (2 marks):

What is a reflexive join? Give an example of when it might be used.

Review question 10 (2 marks):

What is the purpose of the SQL CASE function?

Exercise 5.6 (4 marks)

On average, which supplier charges the highest shipping cost as a percent of the merchandise order total? (3 marks)

Exercise 5.9 (4 marks) Using IN and Sub query

List the customers who bought dogs in the first quarter and also bought dog food in the fourth quarter.

Exercise 5.15 Using Outer Join and a two step query (4 marks)

Which dog breeds have never been sold at the Pet Store? Use an OUTER JOIN to answer the question.

6. Project

This section includes the Project that is assigned in this offering of the course. In doing the project, you may wish to keep a couple of points in mind:

- The task assigned to each group member should be clearly identified.
- The Project requires time, so start early.

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End-of-term Project

Cut-off date 26 Dec 2009, Total Marks 100, Weight: 20%.

This Project consists of two questions: Question 1 is to answer 10 review questions from chapters 6 and 7 and question 2 is a group project.

Question 1: Hand in your answers to the following review questions and exercises from the textbook (20 marks, 5-8 hours)

CHAPTER 6

Review Question 1 (2 marks)

Which human factors are important to consider when designing forms?

Review Question 3 (2 marks)

What are the primary form types?

Review Question 6 (2 marks)

What is the purpose of subforms?

Review Question 7 (2 marks)

What are the main report types?

Exercise 8 (5 marks)

Create the tables and build an initial form for the database described by exercise 2 in chapter 3 (Web sales)

Exercise 13 (5 marks)

Create the tables and build an initial 2 initial forms for the database described by exercise 7 in chapter 3 (Clock builder)

CHAPTER 7

Review question 1 (2 marks):

Why would you need a procedural language when SQL is available?

Review question 2 (2 marks):

What is the purpose of data triggers?

Review question 5 (2 marks):

What are some of the main form events?

Review question 7 (2 marks):

How do you start and finish a transaction?

Review Question 10 (2 marks)

What is an ACID transaction?

Question 2: Group Database Project (90 marks, 20-40 hours)

This project is based on Chapters 1-7 of the text book and Chapters 1-7 of the workbook.

Preliminary Comments:

The purpose of this question is to give you real training in database design, normalization and implementation of a complete case. You will read and understand all the aspects of the scenario given below, and then will produce a database design for it. A complete database implementation is also required; Students are required to create all the components of a complete application in Oracle or Access, including all its tables, forms and reports. A complete and correct design in the form of a UML class diagram and a set of normalized tables, form, and reports is expected of the students. Students should be able to complete all parts of this project once they have completed chapters 1-7 of the textbook and have done all the exercises in chapters 1-7 of the Oracle 9i workbook that accompanies the text. Access users should refer to the user manual and on-line help that come with the system.

An important advice: Designing and implementing a database system is an error-prone activity and it is takes lots of TIME and active discussions to come up with a good final design, and to implement it, supply it with sample data, and test it. You should keep this in consideration and budget enough time to allow to the design to evolve. Do not put the project off until the week before the deadline. To have any chance at completing this part of the TMA, most students will have to put in 10 to 20 hours of time.

Class projects are slightly different from real-world applications, but they have many features in common. One of the most challenging aspects is that any project contains a level of uncertainty and ambiguity. When you start a real-life project, you never know exactly what the project is going to involve. As you talk with users, you encounter contradictions, uncertainty, and confusion over terms and goals. In real-life, you resolve these problems through experience and discussions with managers. With class projects, you do not have direct access to the managers and users. The instructor can answer some questions, but students will need to make their own interpretations, assumptions and decisions.

When you first read the case, try to focus on the big picture. Identify the environment, goals, and objectives of the proposed system. You should take notes on the company and jot down additional questions. Additional research of the industry and similar firms will help identify terms, goals, and potential problems. When you begin to make a list of all the forms and reports the company might use, you need to identify the overall purpose of each form and report. You should be able to describe the purpose of each form and report in one sentence. Give a name for each form and report, but avoid using its title — describe its purpose in your own words. You should make this list and keep it handy so you always remember the overall purpose of the application.

Remember that you will have to rework the normalization several times before the project is complete. Every time you change the primary keys, you first have to delete relationships. Try to develop a good normalized list before you begin creating forms and reports, but leave yourself enough time to go back and change the tables if you find problems. In many cases it pays to start small and add tables and features slowly. Start with an initial set of tables and keys that you are certain are correct. Add columns and tables as you need them. If your initial tables are correct, you should be able to add new columns and tables without altering the existing design.

Adam's Online Custom Clothes

Adam wants to develop a new online database system to automate his successful custom clothes business and to attract new customers. In addition to keeping track of his catalog and the customer orders, he also wants to automate the supply and inventory operations.

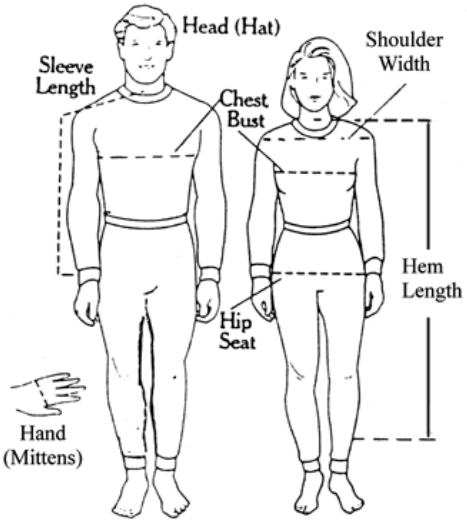
Supply: Adam deals with many stores in order to acquire all the required raw materials at the best quality and lowest prices possible. The system needs to keep track of all the suppliers in the database. For each supplier, the system needs to keep the supplier name, the contact person, the contact information (phone, address, email, etc.). Each time there is an order, the date of the order, needs to be kept along with the name of the employee who made the order, the order date, the receive date, shipping cost and the list of all materials and quantities ordered and their prices.

Inventory: Adam needs to keep track of all quantities of raw materials and finished products on hand.

Products catalog: The online catalog provides information for the user about what types of garments can be ordered. For type available, there are pictures in the catalog for it. There is also a color index, from which the customer can choose his/her favorite colors. Each color index consists either of single colors or of a combination of colors that any garment can be ordered. Examples of color index entries are shown below:

Brown Black/Red/Yellow Olive/Green/Salmon Violet/Pink/Purple

Customer orders: After customers choose the type of garment desired and decide on the desired color index, they need to take their own measurements and then fill the online order form. The measurements need to be taken according to the following measurements guide:



The prices should be shown to the user as he enters his order and the applicable taxes should also appear to the customer depending on the location from which the customer is ordering. Finally the shipping charges will also vary according to the total weight of the shipment and the location to which it is shipped. Currently, the shop uses the following paper form to take customer orders.

Customer Info.						
First Name		Middle Name		Last name		
Address		City		State/Province		
Country		Postal code				
Daytime Phone No:		Mobile		Email		
Method of Payment						
Check		Money order				
Credit Card		Card Type				
Credit Card Number						
Expiration date	Month		Year			
Measurements						
Bust/Chest		Hip		Sleeve		
Hem Length		Head		Shoulder Width		
Order Details						
	Catalog No.	**Description**	**Color Index**	**Unit Price**	**Quantity**	**Total Price**
				Taxes		
				Shipping charges		
				Total		

Tasks:

Task	Check
1. State all you assumptions, limitations, and business rules that you will be using.	
2. In addition to the customer form, create a list of all the forms and reports that the company might use.	
3. Create a normalized list of tables for each form and report.	
4. Create an integrated list of normalized tables for the entire application.	
5. Draw the corresponding class diagram, indicating all keys and multiplicities.	
6. Create the tables in your DBMS	
7. Complete all the needed relationships and integrity constraints in the database	
8. Enter Sample data into the tables and test your design	
9. Design the overall structure of the application. Outline the overall structure and the primary forms. Select a design scheme, including layouts, effects and colors.	
10. Build three initial input forms and three initial reports	
11. Improve the forms and reports to make them easier to use	
12. Test your forms and reports with sample users	
13. Build additional forms and reports. Improve all of them. Test all of them.	
14. Connect all the forms and reports into an application. Test all the links. Check for consistency.	
15. Arrange your deliverables in a well structured report according to required tasks & deliverables.	

Notes