

1. (10) You are given the following data definition:

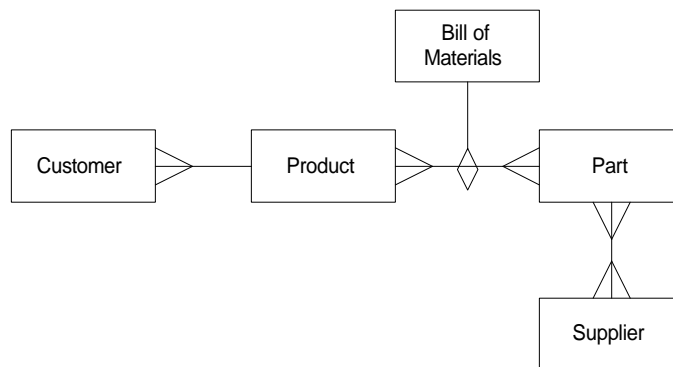
Student = { StudNo + Name + MajorCode + MajorDesc + CourseNo +
CourseDesc + Grade }

Assume: students have a single major,
students take more than one course,
students cannot repeat a course once the course has been completed.

Given this information,

- Identify the problems in the data definition (there are more than one).
- In response to these problems, show the corrections to the data definitions.

2. (12) You are given the following ER diagram:



You are also given the following information on each entity (sizes are in bytes and sizes do not include storage for foreign keys):

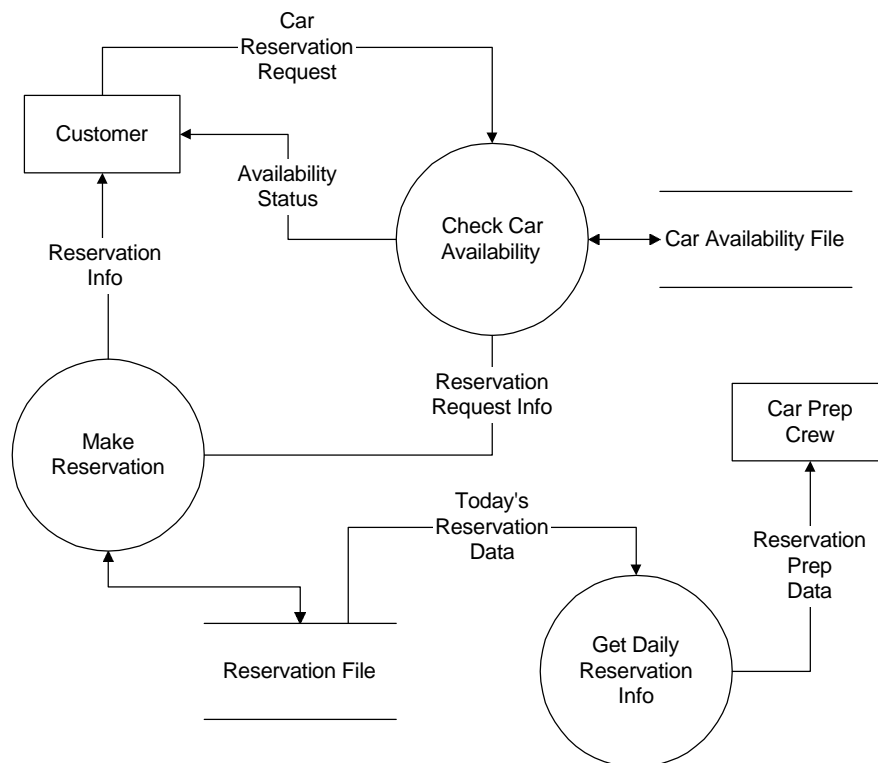
Entity	Size of Key	Size of "other"	Total Size	Number of Entities
Customer	10	70	80	100
Product	8	92	100	2,000
Part	12	48	60	8,000
Supplier	4	46	50	50

Finally, assume that each product has on average 10 parts, each part is supplied by an average 5 suppliers, and 10 bytes of additional information (beyond the key) are stored for Bill of Materials. Given this information, calculate the size of each database table. Show your work for partial credit.

3. (12) Categorize each of the following as primarily a characteristic of the traditional SDLC or the prototyping development methodology. Circle your choice.

- | | | | |
|----|---|------|-------------|
| a. | Clear stages/responsibilities | SDLC | Prototyping |
| b. | Requirements determined dynamically | SDLC | Prototyping |
| c. | Extensive interaction with users | SDLC | Prototyping |
| d. | Good when requirements can be prespecified | SDLC | Prototyping |
| e. | Requires special software engineering tools | SDLC | Prototyping |
| f. | Good when requirements are stable | SDLC | Prototyping |

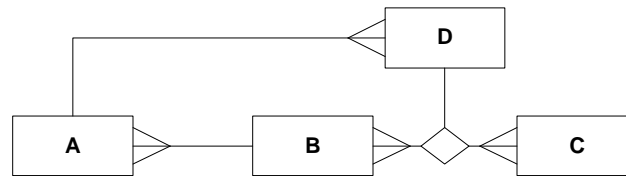
4. (8) You are given the following Dataflow Diagram (DFD). Identify the type of system (TPS, IRS, etc.) and the processing approach (batch versus online) described in the DFD.



5. (8) When trying to ensure data quality for a TPS, two of the control totals discussed in class include the quantitative total and the hash total.

Explain how these two controls can be used to identify different types of problems. Provide a problem scenario for each control where the control would provide an effective way to solve a potential problem.

6. (12) Consider the following ER diagram:



Create a Record Structure Diagram from this ER diagram. Identify keys as KeyA, KeyB, etc. Explicitly show all keys and foreign keys. Identify other fields simply as “other fields”. Connect keys and foreign keys with arrows as appropriate.

7. (10) You are given the following description of a consulting firm. Use this information to create an ER diagram.

A consulting firm engages in consulting projects with its clients. Each project is identified with a unique project number and includes other information such as a description and estimated completion date. A project is commissioned for a single client. A unique client number identifies this client. Other information on a client includes name, address, and phone number. Many clients represent repeat business and have engaged the consulting firm previously for other projects.

Each project has one or more project managers. Data about each project manager includes a unique project manager identifier plus other information. Some project managers are responsible for several projects.

Individual consultants are assigned to work on projects. A project may have one or more consultants assigned to it. Data stored about consultants includes a unique identifier plus name, office number, and phone number. Consultants work 100% for a given project but when the project is completed (and sometimes before that), they are assigned to a new project. The firm needs to keep track of the start/end dates a consultant was assigned to any given project.

8. (8) For each of the following scenarios, identify what type of DSS Analytical Modeling Process is being used. Write your answer in the space provided after each scenario. No justification is needed.
- A firm is trying to develop a five-year sales forecast. It wants to determine which assumptions impact this forecast the most.
 - A firm has a model that generates an income statement based on a number of assumptions. It wants to know what the impact on income will be if it increases its dividends per share.

- c. A firm has a model that forecasts income based on a number of assumptions including estimated sales. It wants to know how much sales have to be next year in the Western Region in order to have net income for the firm increase by 10%.
 - d. A firm uses a model to predict the future profitability of its products. This model includes a number of assumptions that are difficult to predict. The firm uses estimates for each assumption based on a variety of distributions to develop its profitability figures. The model uses a simulation to generate a number of different outcomes and summarizes these outcomes via probability distributions.
9. (8) Match each statement below with the appropriate area of feasibility (some areas of feasibility may be used more than once). Write your answer in the space provided below each statement.
 - a. A firm wants to determine if implementing a system will provide a large enough increase in sales to pay for the investment in the new system.
 - b. A firm needs to evaluate several ways to solve a problem keeping in mind that any solution must be in place by June 1, 1998.
 - c. A consulting firm has proposed a way to solve a specific business problem within the firm. Management of the firm is now debating whether the solution is compatible with management philosophy.
 - d. A solution to a business problem has been proposed that requires the creation of some new technology. The firm is now in the process of determining if the risk associated with this solution approach is worthwhile.
10. (12) When a company converts to a new system, two possible approaches it can use are the pilot approach and the phased approach.
 - a. How are these two approaches different?
 - b. How are these two approaches similar?

Answer Key

1. a. Two transitive dependencies:

MajorCode \Rightarrow MajorDesc and CourseNo \Rightarrow CourseDesc

Repeat group (course info)

- b. { StudNo + Name + MajorCode }

{ MajorCode + MajorDesc }

{ StudNo + CourseNo + Grade }

{ CourseNo + CourseDesc }

2. Customer = $(80 + 8) \times 100 = 8,800$ bytes

Product = $100 \times 2,000 = 200,000$ bytes

Part = $60 \times 8,000 = 480,000$ bytes

Supplier = $50 \times 50 = 2,500$ bytes

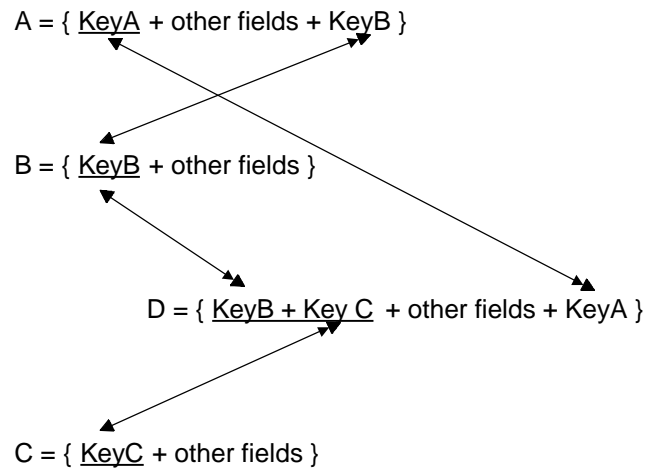
BOM = $(8 + 12 + 10) \times 2,000 \times 10 = 600,000$ bytes

Part/Supplier Correlation Table = $(4 + 12) \times 8,000 \times 5 = 640,000$ bytes

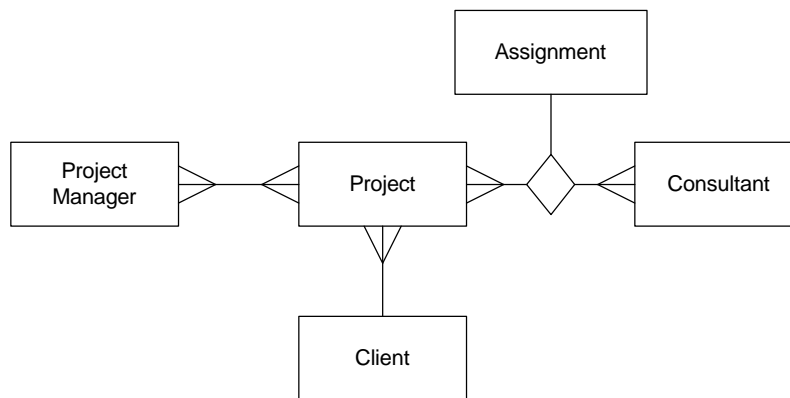
3. a. SDLC
b. Prototyping
c. Prototyping
d. SDLC
e. Prototyping
f. SDLC
4. The system is a TPS. "Reservation" part is online and "car prep" part could be either batch or online.
5. A quantitative total sums a field across transactions where the sum has a meaning in the application (such as the sum of hours worked). This type of control total can be used to detect a change in this field (such as someone trying to be paid for more hours than they actually worked).

A hash total sums a field across transactions where the sum is meaningless in the application (like the sum of invoice numbers). This type of control can be used to detect a change such as someone trying to insert an invalid invoice into the batch.

6.



7.



8. a. Sensitivity Analysis
b. What if
c. Goal Seek
d. Risk Analysis

9. a. Economic
b. Schedule
c. Organizational (Political)
d. Technical

10. a. The two approaches differ in that the pilot approach implements the whole system on a subset of the organization while the phased approach implements a subset of the system on the whole organization.

Exam 2

- b. The two approaches are similar in that they provide a way of converting to a new system without either the high risk of the direct approach or the high cost of the parallel approach.