Overview

It is the team’s responsibility to analyze the contents of the case for relevant information and develop a system to address the business needs. The general due dates for the system can be found in the course syllabus; intermediate assignments will be made throughout the course. Proper spelling and good grammar are mandatory in all writing assignments. For the format of the proposal, see the Sample System Proposal under Course Documents on Blackboard. Design materials are to be included in the appendix of your proposal in the order they appear in the sample.

Your team has been assigned the task of developing the system to facilitate the reengineering of purchase order generation and invoice processing.

The Business

Your Company is one of the following:

* manufacturer: true manufacturer or assembler of parts (with inventory)
* reseller of goods, services, or information (again, with inventory even if it is digital)

The type of business is inconsequential for your purposes. You select the type of business based on your own preferences (be creative!). Various business types of organization and processes including your own are being evaluated for reengineering to streamline the business, better serve your customers, and reduce costs.

Presently, there are 2 people working in Invoice Approval. In purchasing, there are 4 people generating purchase orders (POs). POs, on average, cost $75 to generate and require as many as 4 weeks to fill even when material is not backordered. This is due partially to the slow mail delivery. Another cause is thought to be a lack of contractual arrangements with vendors for material deliveries. Slow filling of orders results in production delays and downtime. Backordered material delivery may be difficult to control with any current vendor; if we were able to determine which vendors missed delivery targets and with what frequency, we could work toward a solution or move to another vendor. We are also unable to take advantage of invoice discount terms for quick payment due to the time required to verify receipt of goods and the transfer of paperwork. Many of these procedures are manual.

**Company Demographics**:

Your Company, Inc., has two production facilities and five sales offices. The production facilities are located in Evansville, Indiana and Mexico. Three of the Sales Offices are located in St. Louis, MO., Los Angeles, CA., and Baltimore, MD. The other two offices are located outside the US. Your task does not involve the offshore sales offices or production site. Your project will be expanded later by another group and integrated with the international components.

The Los Angeles sales office staff consists of 2 salespersons and an administrative assistant. The sales office in St. Louis consists of 3 sales persons and 1 administrative assistant, and Baltimore houses 4 sales persons and 1 administrative assistant. Production facilities personnel consist of 256 hourly employees, 38 clerical, and 22 salaried employees.

**Technology**:

Current systems are on a mainframe to which the primary interface devices are dumb terminals. The new system, which you are to develop, will be a Client/Server-based model in order to take advantage of new technologies and begin moving the company toward new computer technologies. Interfacing with systems on the mainframe is not a consideration for your system at this time.

Another system is being developed concurrently with your system that controls inventory of materials. Your team must develop an interface to the Inventory System.

Once again, your team has been assigned the task of developing the system to facilitate the reengineering of purchase order generation and invoice processing. Upper levels of management mandated that the database for these systems will reside on the new client/server system, and backups shall be the responsibility of the database administrator. The database administrator will interact with your team as a consultant in the database design.

A reengineering project that will impact your systems design is also in process. Contracts are being negotiated with all approved vendors. These contracts include agreements on delivery time for ordered material. This information is used by the purchasing department to develop order points and quantities that will minimize your inventory levels and assure your production department of an adequate supply of raw materials.

A consultant has suggested automatic purchase order generation with a manual interface for special material orders. This consultant has also suggested that invoice payment be made upon receipt of an invoice-not after delivery of the merchandise has been confirmed. Your team, then, has the task of developing the system to facilitate the reengineering of purchase order generation and invoice processing.

While not an integral part of the system, the new company-wide network that will support your project as well as the Inventory project and currently unknown future projects must be designed. Demographics for the company have been provided to enable you to determine the network requirements and construction. Technology is also to be described in terms of software, hardware, and communication technology. For purposes of the proposal, it is not necessary to address great detail. You are concerned with gross dollar figures. Communications may use Windows 2008/2012, Linux, or other appropriate technology. Programming language/s to be used in the system and why they were chosen should be identified, but the physical design scope of the system will not include programs.

Database Requirements

Your team will develop a database to support the application. Objectives for the database are:

1. **Identify and describe data entities** about which the new system must store data and document the relationships that exist between those data entities.
2. For each data entity, determine an **identifier** (one or more attributes) **that uniquely identifies** one and only one occurrence of that entity.
3. **Each data attribute will initially be mapped to one data entity. Foreign keys will subsequently map to additional entities.**
4. An Entity-Relationship diagram (ERD) is required. This requires that the entities be normalized. Normalize to 3rd NF.

A sample of required database documentation can be found in Course Documents of Blackboard. Go to the Example of System Proposal folder, then open the Sample System Proposal document and scroll down to Database Design (on or near p.17).

Database development includes normalizing the entities of your ERD. Each entity should be normalized to 3rd normal form. Normalization will result in the creation of additional entities. Such changes should be reflected in the ERD.

Suggestions for your database entries are:

1. Data entities should be named using singular nouns.
2. Data relationship names should describe the association between data entities and must be provided in both directions; e.g., an order contains order items, and order items appear in an order. In this example, order and order item are entities while “contains” and “appear in” are associations.
3. Attach whatever documentation is necessary to make your ERD understandable.
4. No repeating attributes or groups of attributes are allowed; e.g., month 1, month 2, etc. are not permissible. This is 1st normal form.
5. Adopt the following rule for normalizing to 3rd normal form: Every non-key attribute relates to the key, the whole key, and nothing but the key.

For example, a social security number can be used as a key attribute to uniquely identify an individual. The city the individual lives in is not key since millions of people may live in the city.

Process Modeling

Samples of the material for this section are available in the Data Flows folder of Course Documents on Blackboard.

They include a system structure chart (or decomposition diagram), a context diagram, and three Data Flow diagrams.

The purpose of process modeling is to identify the relationships between processes within this system and to other systems, when necessary. Your system will not only contain relationships within the system but will also interface or relate to the Inventory System. It will be necessary to write a brief description of your DFDs to help make them more understandable.

#### **General Expectations in Process Modeling**

Programs are needed to create and maintain inventory level information. These programs will interface with the Inventory Control System that is being developed concurrently by another team. Ordering will be done automatically when the order point (OP) is reached. The amount to be ordered will be the economic order quantity (EOQ). The values for these fields are determined by the Purchasing Department and entered through the Inventory Control System, so we merely have to reference these fields for their content.

Transactions should also be available for generating orders manually. While much of the purchasing function has been automated, purchasing is still responsible for selecting vendors, ordering materials for evaluation, etc. These orders must be initiated manually, but the information must be stored in the database to enable payment of invoices and receipt of products. The automatic ordering process is kicked off when an internal requisition of supplies reduces the quantity on hand to the OP level or below.

Partnerships have been established with all of your vendors that enable you to generate orders electronically using Internet technology and to pay invoices without having verified receipt of the material. Auditing procedures and reports verify the receipt of material after invoices have been paid. The partnerships have resulted in contracts for suppliers of various parts, so each part is identifiable to a vendor.

Invoices are paid upon receipt. This requires a transaction to create the invoice record and may be generated by an Internet transaction from the vendor. A batch program will copy the information to a payment record and generate the funds transfer. Where the payment mode is not Internet capable, checks will be generated.

The Receiving department will require a transaction to update the quantity received for an order item. Batch programs will verify that items are received for invoices paid and generate exception reports. Transactions will keep track of material returned. A batch program will also evaluate vendor's performance.

#### **Network Modeling**

Objectives:

1. Identify and document locations to which people, activities, and data must be distributed.
2. Create location connectivity diagrams that document business locations and the connections required between them.
3. Write a brief description of your location connectivity diagrams.

Requirements

1. Develop a location decomposition diagram for the system.
2. Develop a location connectivity diagram for the system.
3. Develop a legend and description to teach users how to read the diagrams.
4. Documentation for the proposed network configuration

###### Who will use what, where?

Why was the particular configuration selected?

What are the gross costs associated the network? How do the benefits justify the cost?

* Identify any LAN requirements. Identify WAN connectivity requirements; i.e., T1, partial T1, T3, POTS, etc.
* These are high-level diagrams. Only major connections need be represented. The costs you report are gross numbers-not researched. For convenience sake, PCs cost $700 each with any operating system, Servers cost $3,000 each, Storage Area Network Servers (SANs) cost $15,000 each, and T-1 lines cost $1,000 monthly. You can come up with other hardware costs, both one-time and continuing. Include server operating systems and the licensing as a one-time or initial cost (do not be concerned with the number of Microsoft Client Access Licenses (CALs) available with your chosen server package). Other initial IT considerations involve the hosting of Intranet, Extranet, and Internet material.

Project Schedule

A Gantt chart is required and should reflect the processes that are to be completed during the semester on a realistic timetable. Those elements of the system that will not be completed during the semester should be projected for their estimated completion dates and resources required. The team will be required to provide all materials to the instructor at several points during the semester. Targeted material MUST be available.

Supporting documentation will be included with the Project Schedule.

System Proposal

A Sample System Proposal can be found in the Example System Proposal folder under Course Documents on Blackboard. You should use this as a skeleton or a model. Your proposal will be expected to have a similar format.

Part of the project grade will be based on professionalism and grammar. Informal notes are not allowed. Be consistent in form usage; for example, “I will be reading and grading . . .” as opposed to “I will be reading and have graded . . .”

Presentation

You presentation will be the process of presenting your system proposal to management. Remember that you are trying to sell your system to a company. They are not interested in the process you followed in coming to conclusions. They are interested in conclusions. The manager will want to know the bottom-line dollar benefit to the company—how much the company will realize in dollars-per-year.

Each team member will present part of the proposal, focusing on her or his primary area(s) of contribution. Individuals’ contributions to the project will be partially evaluated on subject knowledge, preparation, etc. PowerPoint usage is required.

**Beware of:**

* Scope creep: Developers have a tendency to create something beyond what has been asked for. If something is not clearly within the scope of the system, leave it out. If you are not sure, ask the instructor.
* Your job includes designing the database—not populating it. You do not have to gather information about elements that will exist in the database; for example, you do not need to know that the database will contain widget with a particular unit of measure, price of $3, or from whom it is purchased. You have to design a database that will support the information that needs to be stored in it.

**Suggestions**:

Analyze this paper for system requirements. You may wish to use different colored highlighters to designate the relevance of items. What elements are required? What elements provide information to the system design? What elements provide information supporting the network design? What, if anything, appears to be filler, providing no value to the project?

Use a top-down approach to the system design. Start with a **context** diagram. This diagram will consist of a single square representing the system and multiple external entities that will interface with the system. These may be one-way or two-way interfaces. There are two key areas of the project, two requirements. The context diagram will explode into a diagram with nothing less than these two processes. What other high-level processes are necessary to satisfy the requirements of this system? Explode this diagram into the next level diagram. Two diagrams are required at this level.

The **structure chart** or decomposition diagram helps keep the DFDs aligned mentally. The top level of the decomposition diagram is the equivalent of the context diagram. The next level shows the next level breakdown—at least the two key areas of the project. It is unlikely that you will be able to design this system without at least one additional process at this level.

In designing the database, ask what data elements or records are required to implement this system. Start with the obvious. Part of this system deals with purchasing; thus, one record that is needed is a Purchase-Order record. Now, what information is necessary for a purchase order? “Who are we buying from?” is one element of data. Your database will also have flags; for example, if we have already reached order point in inventory, then an order has already been placed. A flag should make it known to subsequent requisitions that, even though the parts are below order point, you do not need to order. The flag will be reset when the order is received. Hmmm! It looks like you may have to interface with receiving, but this flag could be handled through the inventory system (not yours) interfacing with receiving to reset this flag. Not only do people have to work together, but systems must also work together.