**COM280 Final Project**

**Case Description**

The Reliable Pharmaceutical Service is a privately held company incorporated in 1975 in Albuquerque, New Mexico. It provides pharmacy services to health-care delivery orga­nizations that are too small to have their own in-house pharmacy. Reliable grew rapidly in its first decade, and by the late 1980s its clients included two dozen nursing homes, three residential rehabil­itation facilities, two small psychiatric hospitals, and four small spe­cialty medical hospitals. In 1990, Reliable expanded its Albuquerque service area to include Santa Fe and started two new service areas in Las Cruces and Gallup.

Reliable accepts pharmacy orders for patients in client facilities and delivers the orders in locked cases every 12 hours. In the Albuquerque and Santa Fe service area, Reliable employs approxi­mately 12 delivery personnel, 20 pharmacist's assistants (PAs), 6 li­censed pharmacists, and 10 office and clerical staff. Another 15 employees work in the Las Cruces and Gallup service areas. The man­agement team includes another six people, mainly company owners.

Personnel at each health-care facility submit patient prescription orders by telephone. Many prescriptions are standing orders, which are filled during every delivery cycle until specifically canceled. Orders are logged into a computer as they are received. At the start of each 12-hour shift, the computer generates case manifests for each floor or wing of each client facility. A case manifest identifies each patient and the drugs he or she has been prescribed, including when and how often the drugs should be administered. The shift supervisor assigns the case manifests to pharmacists who, in turn, assign tasks to pharmacy assistants (PAs). Pharmacists supervise and coordinate the PAs' work.

All drugs for a single patient are collected in one plastic drawer of a locking case. Each case is marked with the institution's name, floor number, and wing number (if applicable). Each drawer is marked with the patient's name and room number. Dividers are in­serted within a drawer to separate multiple prescriptions for the same patient. When all of the individual components of an order have been assembled, a pharmacist makes a final check of the con­tents, signs each page of the manifest, and places two copies of the manifest in the bottom of the case, one copy in a file cabinet in the assembly area, and the final copy in a mail basket for billing. When all of the cases have been assembled, they are loaded onto *a* truck and delivered to the health-care facilities.

Order-entry, billing, and inventory-management procedures are a hodgepodge of manual and computer-assisted methods. Reliable uses a combination of Excel spreadsheets, an Access database, and antiquated custom-developed billing software running on personal computers. Pharmacy assistants use the custom-developed billing software to enter orders received by telephone and to produce case manifests. The system has become increasingly unwieldy as facility contracts and Medicare and Medicaid reimbursement procedures have become more complex. Some costs are billed to the health­care facilities, some to insurance companies, some to Medicare and Medicaid, and some directly to patients. The company that devel­oped and maintained the billing software has gone out of business, and the office staff has had to work around software shortcomings and limitations with cumbersome procedures. Inventory manage­ment is done manually.

In 1999 Reliable's revenues leveled off at $40 million, and prof­its plateaued at $5.5 million. By 2003, revenue was declining approximately 4 percent per year, and profit was declining at over 8 percent per year. Several reasons for the decline included the following:

* Price controls in both Medicare and Medicaid reimburse­ments and contracts with facilities managed by health maintenance organizations (HMOs) and large national health-care companies
* Increasing competition from national retail pharmacy chains such as Walgreens and in-house pharmacies at large local  
  hospitals
* Inefficient operating procedures, which haven't received a comprehensive review or overhaul in almost two decades

Reliable's management team spent most of the last year devel­oping a strategic plan, the key element of which is a major effort to streamline operations to improve service and reduce costs. Managers see this effort as their only hope of surviving in a future dominated by large health-care companies that can dictate price and outsource pharmaceutical services to whomever they choose. They plan a significant expansion into neighboring states after the system is up and running, to recoup its costs and increase economies of scale. The problem faced by the organization is it needs an integrated set of information systems to support its operations and management.

**Project Requirement**

Use the previous descriptions as well as the follow­ing, additional description of the case, to develop object-oriented re­quirements models.

**Company processes (for use case development).** There are sev­eral points in the order-fulfillment process where information must be recorded in the system. Obviously, new orders must be recorded. Case manifests must be printed at the start of each shift. In fact, since a prescription itself may take a fairly long time to be completely used as in the case of long-standing prescriptions, each time a medication is sent out (prescription fulfillment), information must be entered into the system, noting the quantity of medication that was sent and which pharmacist filled the prescription for that shift.

**Information requirements (for class diagram requirements).** Reliable needs to know about the patients, the nursing home, and the nursing-home unit where each patient resides. Each nursing home has at least one but possibly many units. A patient is assigned to a specific unit.

Prescriptions are rather complex. They contain basic information, such as ID number, original date of order, drug, unit of dosage (pill, teaspoon, suppository), size of dosage (milligrams, number of tea­spoons), frequency or period of dosage (daily, twice a day, every other day, every four hours), and special considerations (take with food, take before meals). In addition, there are several types of prescrip­tions, each with unique characteristics. Some orders are for a single, one-time-only prescription. Some orders are for a certain number of dosages (pills). Some orders are for a time period (start date, end date). Information about the prescription order must be maintained. An order occurs when the nursing home phones in the needed pre­scriptions. An order consists of one or more prescriptions, each for one specific drug and for one specific patient. An order, there­fore, consists of prescriptions for more than one patient. Since prescriptions may last for an extended period of time, a prescription is a separate entity from the order itself. The system records what employee accepted and entered the original order.

The system also has basic data about all drugs. Each drug has generic information, such as name, chemical, and manufacturer. However, more detailed information for each type of dosage, such as the size of each pill, is also kept. A single drug may have many different dosage sizes and types.

In addition, information about the fulfillment of orders must also be maintained. For example, on a prescription for a number of pills, each time a pill or a number of pills is dispensed, the system must keep a record of that fact. A record is also maintained of which pharmacist or assistant fulfilled the order. Assume all pre­scriptions are dispensed only as needed for a 12-hour shift.

Basic data are kept about prescription payers, such as name, address, and contact person.

Based on the description here, do the following:

1. Develop a use case diagram.
2. Develop an activity diagram for each use case related to en­tering new orders, creating case manifests, and fulfilling orders. You should have at least three activity diagrams.
3. Develop a design phase system sequence diagram for each use case you developed.
4. Develop a design phase domain class diagram.
5. Develop a statechart for an order.

25 points

Due date: Tuesday, July 30, 2013 12:00 noon PDT.