

IEM 5723

Data, Process and Object Modeling

Spring 2020 Term project

Phase I due 11:59 pm, Monday, 4/20/20 in Canvas

Phase II due 11:00 pm, Friday, 5/1/20 in Canvas

30-minute virtual demonstration/discussion/Q&A sessions during the week of 5/4/20

The purpose

The purpose of this term project is to give student teams experience in applying system development methodologies and logical modeling techniques to a realistic situation. The problem domain, namely, Maintenance, Repair, and Overhaul (MRO) systems, should be somewhat familiar to many graduate students. This ensures that the students have an opportunity to get a meaningful experience in a short period of time. The students should focus on the application of the methodologies and techniques covered in class and are expected to deliver the following (i) a clear description of the user requirements for the software application; and (ii) a database application implemented in MS Access.

Background and Preliminary Requirements

When end items that need repair are received by an MRO facility, they are disassembled into individual parts and the malfunctioning parts are then sent to various shops for different types of repair. After all the repairs are completed, a tracking system must be able to locate items in storage and facilitate their retrieval for assembly back into the refurbished end items. Keeping track of every item within MRO facility is a challenging task at both the managerial and operational levels. This task becomes even more complicated when the scope includes additional facilities like the different repair shops which are not owned by the MRO facility and extra transit processes such as transportation steps operated by carriers like UPS, USPS, and FedEx between the MRO facility and repair shops.

The MRO system consists of one MRO facility, multiple repair shops located across the United States, and carriers between the MRO facility and the repair shops. Inside the MRO facility assume that there are six stations/departments, namely receiving station to receive end items from customers or to receive repaired parts from repair shops, shipping station to send refurbished end items back to customers or to send defective parts to repair shops, disassembly station where end items are disassembled into parts, inspection station where part condition is determined, store station where racks, shelves, etc. are housed, and lastly reassembly station where repaired parts are assembled back into refurbished end items to be sent back to customers. As to repairs shops, assume each of them have a varying number of repair departments/processes. The protocols followed by the MRO facility and its associated repair shops are provided in the document titled "MRO System Protocols."

As mentioned earlier, keeping track of every part within the MRO system, which includes the MRO facility, the repair shops and transit processes is a challenging task. The purpose of this project is to design and develop a part tracking and repair progress reporting system called **MTrak**, which can effectively facilitate operational level requirements such as instant material tracking and reporting progress on repair tasks. The vision for the **MTrak** product is a web-based application with a back-end database hosted by a MS SQL Server. For the prototype, the key deliverable will be a standalone database application in MS Access.

Phase I

The objective of Phase I is to prepare a detailed user requirements statement and a description of important system concepts from a business perspective. The primary deliverables of this phase are as follows.

- A detailed user requirements statement of **MTrak** using UML. This primarily includes use case diagrams and narratives of representative use cases.

- A reasonably complete Domain Model using the UML class diagram notation. Note that the Domain Model is usually a starting for preliminary software design, which is not required as part of this exercise.

Prepare your submission in a (brief) report format that includes a formal statement of the project background, scope, and objectives, and a summary of the activities carried out in this phase. Refer to the deliverables at the appropriate places in your report. Include a list of references used – Web sites, sample use case narratives and diagrams, books, articles, etc. Acknowledge assistance received from other individuals including the instructor and TA.

Phase II

The objective of Phase II is to implement a stand-alone database application in MS Access to serve as a prototype for the back-end database of **MTrak** and to give the user an idea of the functionality that can be expected at the front-end. The primary deliverables of this phase are as follows.

- A blueprint - a fully attributed and normalized data model - of a prototype database that would support the back-end requirements.
- An implementation using MS Access is required. The prototype should be able to accept input from user; answer specific queries; and generate a representative set of “reports.” Use forms, queries, and reports to support the various I/O requirements.
- A brief report that summarizes the activities carried out in this phase and includes the following items.
- A complete set of the data models - context, key-based, and fully attributed - in IDEF1x notation.
- A user guide/manual to accompany the database application.

Be sure to include rationale to support your design decisions (entities, attributes, and relationships; queries and reports). Refer to the deliverables at the appropriate places in your report. Include a list of references used – Web sites, sample databases, books, articles, etc. Acknowledge assistance received from other individuals including the instructor and TA.

Virtual demonstration/discussion/Q&A Session (30 minutes)

Each team is required to demonstrate their Access implementation to the instructor, who will play the role of a user of **MTrak**. All team members must be present during this session. Teams can sign-up for a slot during the pre-finals week.

Peer Evaluations

Each team member must complete a peer evaluation form for each phase of the project and submit it Canvas. The contents of a completed peer evaluation form are considered confidential. Failure to submit a completed peer evaluation form will result in the loss of one letter grade for the student.