E R Diagrams

The following are hypothetical situations. For each given situation, draw the ER diagram and map it to the relational model. Normalize every relation you have specified to the 3NF. If you believe that you need to make additional assumptions, clearly state them:

1. Atibax Healthcare has around 214 beds today. But it supports 4500 admissions and 50000 outpatients annually. This has been made possible by their integrated information system which has been developed over a period of five years based on their data processing activities over that period. Now each division of the organization feeds a common database of information in a form which is meaningful to managers in other divisions. Several departments receive scheduled reports or can request then as needed. All patient data is entered by patient number and assigned to the proper cumulative record file. All patient care personnel can access laboratory and clinical data immediately following patient examination through the terminals available in treatment areas. This leads to more timely and accurate patient data and gives the patient's faster turnaround time and less frustration. The system also provides statistical, operating and management reports, including appointment scheduling and room availability. This permits better staff and facility utilization while using less administrative time. In order to record cost incurred expenses, the system also indentifies all patient charges.

2. A hospital has a large number of registered physicians. Attributes of physicians include physicianID and specialty. Patients are admitted to the hospital by physicians. Attributes of patient include patientID and patientName. Any patient who is admitted must have exactly one admitting physician. A physician may optionally admit any number of patients. Once admitted, a given patient must be treated by at least one physician. A particular physician may treat any number of patients; or may not treat any patient. Whenever a patient is treated by a physician, the hospital wishes to record the details of the treatment including the date, time and result of the treatment.

3. A laboratory has several chemists who work on one or more projects. Chemists also may use certain kinds of equipment on each project. Attributes of CHEMIST include Employee-ID (identifier), Name, and phone-No. Attributes of PROJECT include Project-ID (identifier) and Start- Date. Attributes of EQUIPMENT include Serial-No and Cost. The organization wishes to record Assign-Date, that is, the data when a given equipment item was assigned to a particular chemist working on a specified project. A chemist must be assigned to at least one project and one equipment item. Given equipment item

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need not be assigned, and a given project need not be assigned either to a chemist or an equipment item.

4. Stillwater Antiques buys and sells one-of-a-kind antiques of all kinds. Each item is uniquely indentified by an item number and is also characterized by a description, asking price, condition and open-ended comments. Stillwater works with many different individuals called clients, who sell items to and buy items from the store. Some clients only sell items to Stillwater, some only buy items, and some others both sell and buy. A client is identified by a client number and is also described by a client name and client address. When Stillwater sells an item in stock to a client, the owners want to record the commission paid, the actual selling price, sales tax, and date sold. When Stillwater buys an item from a client, the owners want to record the purchase cost, date purchased, and condition at time of purchase cost, date purchased, and condition at time of purchase.

5. The Assam School of Business operates international business programmes in 10 locations throughout Asia. The school had its first class of 1500 graduates in 1985. The school keeps track of each graduate student's number, name of a student country of birth, current country of citizenship, current name, current address and the name of each major the student completed (each student has one or two majors). In order to maintain strong ties with its alumni, the school holds various events around the world. Events have a title, date, location and type (for example, reception, dinner or seminar). The school needs to keep track of which graduates have attended which events. For an attendance by a graduate at an event, a comment is recorded about the information which the school officials learned from that graduate at that event. The school also keeps in contact with graduates by mail, e-mail, telephone and fax interactions. As with events, the school records information learned from the graduate from each of these contacts. When a school official knows that he or she will be meeting or talking to a graduate, a report is produced showing the latest information about that graduate and the information learned during the previous two years from that graduate from all contacts and events which the graduate had attended.

6. A movie production house wants to computerize its operations for which it is building a database. The production house has various departments like marketing, hiring, distribution, logistics, etc. manned by its employees. Once it decides to produce a movie, it hires additional people like director, actors, etc. for the particular movie. The hired people are not employees of the production house.

7. RBI maintains a database of all banks operating in India along with their branches. It keeps track of all accounts opened in the branches including loan accounts. The details of the Branch Managers are also kept for regulatory issues.

8. 'The Bikers', a bicycle shop located at Guwahati, is a reputed dealer of all the major bicycle manufacturers of the country. It now wants to computerize its operations for which it is building an information system. As part of the IS, a database is being designed.

References:
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- Modern Database Management:: *Jeffrey A. Hoffer, Mary B. Prescott, Fred R. McFadden,* Pearson
- Management Information Systems – Conceptual Foundations, Structure and Development, 2nd Edition, *G B Davis, M H Olson*, Tata McGraw Hill