Department: Computer Engineering & Applications	**Set:** I
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Verbal requirement for Property Rental Database

Property rentals are arranged by our organization for both residential and commercial property owners. Every property owner is given a special owner number that serves as a means of identification. We also keep track of each owner's name, email address, and phone number, as well as the property's address, which includes the street, street number, town or city, and province. We keep track of a company's owner's business type (description). Each property has a special property number, and we keep track of its address and kind. It is possible to use a property in many advertising. Such advertisements could appear in several publications on various dates. The names of the newspapers are distinctive. The term renterrefers to a private person or a business who signed a rental agreement for a property.

Each such rental agreement is identified in our database by a unique rental number. We record the date of the singing of the rental agreement, the starting and ending date of the rental agreement. A renter can rent many properties. A renter, prior to accepting the rental agreementmay view the property repeatedly and we record the date of viewing. For each renter, we record its address, its name, its email address and phone numbers. Each renter has a unique renter number in our database.

Our agency is organized into branches and every staff member is allocated to exactly one branch. Each branch has one manager who is a member of the staff. In our database, we identify the staff by a unique staff number. For each staff member we record address, name, email address, phone numbers, sex, position, and salary. Each property is in care of one ofour branches. Each renter refers to the branch that is in care of the property it rents. Each property is overseen by a unique staff member. Each branch has an address, phone number, and a unique branch number.

For the following case study in order to get the required outcome follow below given necessary steps.

Steps:

(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Required Outcomes from the Database

1. List each employee's staff number who earns more than $5,000 annually. Please arrange them according to staff number.
2. Provide the renter number for each renter with a viewing history. Please refrain from duplicating.
3. List the publication dates for each advertisement that appeared in THE GLOBE AND MAIL in 2005. Please refrain from duplications.
4. Provide each private renter with their email address and renter number. Please arrange them according to tenant number.
5. Locate the homes that have been marketed but have not yet found atenant. Please refrain from duplications.
6. Give the names and the branch numbers of all the staff members working in the branch which is located in Hamilton. The names should be listed in an alphabetic order (by last, then by first, then bymiddle names).
7. Give the staff numbers and the names of all the workers who live on the same street, city, and province as their manager. The names should be listed in an alphabetic order (by last, then by first, then bymiddle names).
8. Find the branch number and the average salary of the branch that has the highest average salary. Please, call the branch number as branch_no and the average salary as avg_salary.
9. Find the owners and renters who have 2 or more phone numbers. Call the owner/renter number as customer_no, set the value of type_of_customer to 'owner' if the customer is an owner, and to 'renter' if he/she is a renter. Please, only list the customer_no andtype_of_customer.
10. Assuming that each advertisement costs 100 dollars, give the branch number and the amount spent on the advertisements for eachbranch. Name the branch number as branch_no, and the amount as ad_cost.

Department: Computer Engineering & Applications	**Set:** II
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Verbal description for Warehouse System

Each warehouse in our organization is identified by a distinct four-letter symbol (by "letter", we mean between a and z). Numerous bins in each warehouse are uniquely designated by numbers (unsigned integers), i.e.,each warehouse contains bins 0, 1, 2, 3, and so on. There is a specific capacity for each bin. We keep components in our warehouses—morespecifically, in the bins in our warehouses. Each part has its own part number, which consists of a five-symbol sequence of numerals and characters. Several parts together can form another part. We call such apart "assembly".

In the warehouses we store only the constituent parts, but we record the assemblies in our database as it were a part. Assemblies cannot be parts of other assemblies. A part can be a constituent part in at most in one assembly parts arrive in batches. Each batch for a particular part has a unique batch number (unsigned integer) and arrives on a particular date. Each batch has a size, i.e. the number of items in the batch. All items from the same batch are stored together in the same bin (no batch is stored in more than 1 bin). Each item in a batch has a unique item number (unsigned integer). For example: part A1, batch 27, item 1 or part A1, batch 23, item 1 etc. A batch's date-in is noted as it arrives. The database must reflect the fact that a certain manager confirms its arrival.

Some parts may be backordered. A part can be backordered only by a manager. The manager, the date of the backorder are recorded, and alsothe quantity backordered. When a backorder shipment arrives, the backorder's remaining quantity is updated (the number of items arrived is subtracted from the remaining quantity), and if it is less or equal to 0, the backorder is deleted, but must be kept for record. There may be only a single current (active) backorder for any parts. Assemblies cannot be backordered, only their constituent parts. When an item is shipped out of the warehouse, its date-out is recorded together with the employee who checked its shipping.

Employee has a unique employee number (a 6-digit number), phone number(s) (it consists of a 3-digit area code and a 6-digit number an employee can have 0 to many

phone numbers), name(s) (it consists of an up=to-10-characters fist name, an up-to-10-characters middle name, and an up-to-20-characters last name, an employee can have 1 to many names), address(s) (it consists of an up-to-6-characters street number, an up-to-20 characters street name, an up-to-20-characters city name, and a 2-character abbreviation of the province, an employee can have 1 to many address). Some of the employees are managers. Every employee who is not a manager works under supervision of a single manager. Managers do not work under other managers.

For the following case study in order to get the required outcome follow below given necessary steps.

Steps:
(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Required Outcome for Warehouse System

1. Give all employee_no for all the workers that work under manager with the first name Tony7 and the last name Tona7 with no middle name.
2. Give all the names and employee_no for all the workers the names should be listed in an alphabetic order (by last, then by first, then bymiddle)
3. Give all the phones and employee_no for all the managers.
4. List all parts that are assemblies they should be listed in a lexicographicorder.
5. For each manager, list all current backorders done by the manager.
6. For each manager, list all current and old backorders done by the manager. For each backorder you have to list the part_no, backorder date, and fulfilled date. For current backorders, list a phony fulfilled date '2000-01-01'.
7. For each warehouse bin, give the remaining capacity of the bin. Call the remaining capacity remaining_capacity.
8. Give employee_no and number of workers managed for all the managers with The smallest number of workers managed.

Department: Computer Engineering & Applications	**Set:** III
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

University System Informal Description

ABC University is a large institution with several campuses. Each campus has a different name, address, distance to the city center and the only bus running to the campus. Each campus has one club. The name of the club, the building in which the club is located, the phone number of the club and the multiple sports which club offers, should all be recorded.

The University consists of a number of faculties, such as the Art Faculty, the Science Faculty, and so on. Each faculty has a name, dean and building. A faculty may be divided into a number of schools, for example, the Science Faculty has a School of Physics and a School of Chemistry. Each school belongs to one faculty only and is located on just one campus, but one campus maybe the location of many schools.

Every school has name and a building assigned to. Each school offers different programmes and each programme can be offered by only one school. Each programme has a unique code, title, level and duration. Each programme comprises several courses, different programmes have different courses. Each course has a unique code and course title. Some courses may have one or more prerequisite courses and one course can be the prerequisite course of some other courses.

Each of the students is enrolled in a single programme of study which involves a fixed core of courses specific to that programme as well as a number of electives taken from other programmes. Students work on courses and are awarded a grade in any course if he/she passes the course. Otherwise the student has to re-take the failed course. The system needs to record the year and term in which the course was taken and the grade awarded to the student. Every student has a unique ID. The system also keeps the student name, birthday and the year he/she enrolled in the course.

The school employs lecturers to teach the students. A lecturer is allowed to work

for one school only. Each lecturer is assigned an ID which is unique across the whole university. The system keeps the lecturer's name, title and the office room. A supervisor maybe in charge of several lecturers, but a lecturer, however reports to only one supervisor. A lecturer can teach many different courses. A course may also have been taught by many different lecturers.

The university is operated by committees. Each faculty has to have a number of committees with the same titles across the university, such as the Faculty Executive, the Post Graduate Studies Committee, the Health and Sanity Committee, and so on. The committees meet regularly, such as weekly or monthly. The frequency is determined by the faculty involved. A committee's members are all lecturers. A lecturer may be a member of several committees.

For the following case study in order to get the required outcome follow below given necessary steps.

Steps:
(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

University System Interactive Queries

1. List all the schools are located in 'Toronto Campus', and sort them by school name.
2. List all the programmes provided by 'science faculty'.
3. Give all the names of the lecturers who are the members of the committee and sort by their name.
4. List all supervisor's name and the name of the lecturer they manage. Please sort by supervisor name and lecturer name.
5. Give all the lecturers who are not the member of the committee.
6. Give the total number of courses for each programme.
7. Give all the lecturers with the courses they are teaching. Sort by lecturer name.
8. Give all the course titles and their corresponding prerequisite course titles.
9. Give the top 5 courses which have more students involved.
10. Give any of the prerequisite courses was not took by any of the students who enrolled into the university in 2010, and were taking the courses in 2011.

Department: Computer Engineering & Applications	**Set:** IV
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Verbal Description Airline Reservation

There are 6 different airlines in 6 different countries: Canada – AirCan, USA - USAir, UK - BritAir, France - AirFrance, Germany - LuftAir, Italy - ItalAir. Their flightsinvolve the following 12 cities: Toronto and Montreal in Canada, New York and Chicago in US, London and Edinburgh in UK, Paris and Nice in France, Bonn and Berlin in Germany, Rome and Naples in Italy. In each of the 12 cities, there is a (single) booking office. You are going to design a central air-reservation database to be used by all booking offices. The flight has a unique flight number, airline code, business class indicator, smoking allowed indicator. Flight availability has flight number, date + time of departure, number of total seats available in business class, number of booked seats in business class, number of total seats available in economy class, and number of booked seats in economy class.

The customers may come from any country, not just the 6 above, and from any province/state, and from any city. Customer has first & last name, mailing address, zero or more phone numbers, zero or more fax numbers, and zero or more email addresses. Mailing address has street, city, province or state, postal code and country. Phone/fax number has country code, area code and local number. Email address has only one string, and no structure is assumed. A customer can book one or more flights. Two or more customers may have same mailing address and/or same phone number(s) and/or same fax number(s). But the email address is unique for each customer. First and last names do not have to be unique.

Booking has a unique booking number, booking city, booking date, flight number, date + time of departure (in local time, and time is always in hours and minutes), date + time of arrival (in local time), class indicator, total price (airport tax in origin + airport tax in destination + flight price – in local currency. The flight price for business class is 1.5 times of the listed flight price), status indicator (three types: booked. Canceled – the customer canceled the booking, scratched – the customer had not paid in full 30 days prior to the departure), customer who is responsible for payment, amount-paid-so far (in

local currency), outstanding balance (in local currency), the first & last names to be printedon the ticket. The airport taxes must be stored in local currencies (i.e. Canadian dollars, US dollars, British Pounds, French francs, German marks, and Italian Liras). Since the exchange rates change daily, they also must be stored for calculations of all prices involved. Though France, Germany, and Italy have had a common currency for a while, we used the names of their original currencies to involve in this exercise currency exchange rates and their changes.

For the following case study in order to get the required outcome follow below given necessary steps.

(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Required Outcome Airline Reservation

1. Give all the customers who lives in Canada and sort by customer_id.
2. List all different customers who made bookings.
3. Display all currency exchange rate is greater than 1. Please sort them by from_currency and to_currency.
4. List all the flight availabilities between Toronto (airport code is 'YYZ') and New York (airport code is 'JFK'). Please display flight_no, origin, destinatin, depature_time, and arrival_time.Please sort them by flight_no.
5. List all customers who did not place any booking. Please display customer_id only,and sort records by customer_id.
6. Display all customer's first_name, last_name, phone_no (format like 416-111-2222)and email. Please sort them by customer_id.
7. List all canceled booknngs. please display booking_no, customer_id, flight_no, origin, destination, class, status, and booking_city. Please also sort by booking_no,customer_id and flight_no.
8. List total_price, total_payment and total_balance for each city. Please exclude canceled bookings and sort records by city_name.
9. Calculate new total_price for each booking if origin airport tax increase by 0.01 and destination airport tax decrease by 0.005. Please display booking_no, origin, destination, flight_price, previous_total_price and new_total_price.
10. List number_of_bookings, number_of_emails, number_of_phones and number_of_faxs for each customer.

Department: Computer Engineering & Applications	**Set:** V
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Movie Rental Informal Description

The movies are rented out in stores and there are several stores. Each store has a unique distributor that supplies the store with tapes. A distributor may supply more than one store.Each distributor has a name, an address, and a phone number. Each store has a name, an address, and a phone number. For each employee we must keep the following information: working store, a name, a supervisor, an address, a phone number, SIN (social insurance number) and the date when the employee was hired. For each customer we have to keep the following information: a name, an address, and a phone number (if any).

For each rental, we must keep track of which employee served the customer, which movie and which copy (i.e. type) the customer rented, information about payment, the date and the time of the rental, the status (rented, returned_in_time, returned_late), the rate (i.e. the price), and if applicable, due date and overdue charges. About the payment we have to keep which of the employees accepted the payment (does not have to be the same employee who rented the tape), the type of payment (i.e. cash, check, credit card, direct debit – for each type you must provide for relevant information to be kept, e.g. credit card number if credit card is used), the amount of the payment, date + time of the payment, payment status (completed if cash or the money have been received, approved if debit or credit card go through, pending if the check has not cleared yet). About each tape we have to keep information in what condition the tape is and what movie is on the tape. About each movie we have to keep its title, director's name, simple description, the name of a (single) major star, the movie's rating (use numbers 1-5).

For the following case study in order to get the required outcome follow below given necessary steps.

Steps:

(i). Draw the ER diagram for below given description,

(ii). Convert the ER diagram into Relational Database.

(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Movie Rental Information Interactive Questions

1. Give all the customers who lives in Hamilton. Display customer_id and customer_name.
2. Display the total payment are received by each employee, and sort by empsin.
3. Display the total movies are rented out by each store, and sort by storeid.
4. Display all the tapes are never rented out in every store, and sort by movieid & tapeid.
5. Display all customers who did not rent any movie so far and sort by custid.
6. Display the total amount received by different payment type, and sort byptdesc.
7. Display the number of movies rented out based on the movie rating, and sort by rating.
8. Display top 5 customers based on their total payment, and sort their totalpayment decreased.
9. List all the movies customer rented. Please display the columns: movie_title, rental_status, rental_rate, rental_employee, the employ accept the payment, payment_type and payment_status.
10. List all the manager's name and the name of employee they manage. Please sort by managersin & employee sin.

Department: Computer Engineering & Applications	**Set:** VI
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Verbal Description Car Rental

Our company does car rental business and has several locations with different address (address consist of street or rural route with the number, city, province and postal code). The cars are classified as subcompacts, compacts, sedans, or luxury. Each car has a particular make, model, year made, and color. Each car has a unique identification numberand a unique license plate.

The cars rented in a particular location may be returned to a different location (so- called drop off). For every car we keep the odometer reading before it is rented and after it is returned. Since we trust our customers, we do not record the defect when the car is rent out and returned back. However, we rent the car with full tank and record the volume of gas in the tank when the car is returned, but we only indicate if the tank is empty, quarter full, half full, three quarters full, or full.

We keep track of which day a car was rented, but not of the time, similarly for car returning. If a customer requests a specific class (say sedan), we may rent the customer a higher-class car if we do not have the requested class in the stock, but we will price it at thelevel the customer requested (so-called upgrade). Each car class has its own pricing, but all cars in the same class are priced the same. We have rental policies for 1 day, 1 week, 2 weeks, and 1 month. Thus, if a customer rents a car for 8 days, it will be priced as 1 week + 1 day. The drop-off charge only depends on the class of the rented car, the location it was rented from and the location it is returned to.

About our customers, we keep their names, addresses, possibly all phone numbers, and the number of the driver's license (we assume a unique license per person). About our employees we keep the same information (we require that all our employees have a driver's license). We have several categories of workers, drivers, cleaners, clerks, and managers. Any of our employees can rent a car from our company for a 50% discount, if the rental is less than 2 weeks. However, for any

longer rental they must pay 90% of the regular price. Every employee works in one location only. We have headquarters in Hamilton. The people who work there are all classified as managers, one of them is the president, two of them are the vice-presidents, one for operation, the other for marketing).

For certain weeks we have promotional rentals that are usually 60% of the regularprice, but may be also of different percentage. They always affect only a single class of cars – i.e. we may have a promotion for subcompacts, but during that week we do not have any promotions for compacts, sedans or luxury cars. During some years we can have many promotions, in some we have none. The promotions cannot be applied to the employees.

For the following case study in order to get the requiredoutcome follow below given necessary steps.

Steps:
(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Car Rental Interactive Queries

1. Give last name of all customers who are now renting a car from our company.
2. Give make and color of all cars currently rented out.
3. For each completed rental, give the rental price and rental_id.
4. List last name of all managers.
5. List last and first names of all customers.
6. Give a query that answers the question "Is any of our employee also our customer"?
7. Does our president work in the headquarters?
8. Find rental_id of all shortest (completed) rentals.
9. Find the value of the cheapest (completed) rental. We will utilize query 3 as the innerquery.
10. Give makes of the cars that have never been rented.

Department: Computer Engineering & Applications	**Set:** VII
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Short Summary for the Course

In our college, students need to register for courses before new semester start. All of programs in our college take four years to finish. Each course has a unique designation, title, description, year (in which year of study the course is to be taken, for instance 2nd year course), and classroom. A course can have no or many tutorial sections, and no or many lab sections. Each course is taught by exactly one instructor. Each instructor has a unique id, name, departmental affiliation, office room, phone extension, and a unique email address. Each student has a unique id, name, and the year of his/her study.

A student cannot be an instructor. A course can have zero or many tutorial sections unique to the course (i.e. tutorial sections are not shared by different courses). Each tutorial section has exactly one TA assigned. A TA can tutor more than one tutorial section for the same course, and any number of tutorials for different courses. A TA cannot be an instructor; however, a student can work as a TA (in that case his/her student id is used as TA id). A course can have zero or many lab sections unique to the course (i.e. lab sections are not shared by different courses). Each lab section has exactly one LA assigned. An LA can oversee more than one lab section for the same course, and any number of labs for different courses.

An LA cannot be an instructor; however, a student can work as a LA (in which case his/her student id is used as the LA id). In fact, a student can work as a TA and an LA simultaneously. Thus, a TA may or may not be a student, an LA may or may not be a student. A person can work as both, a TA and a LA. TA has the same attributes as instructor, the same goes for LA.

Each course has zero to many courses designated as its prerequisites and zero to many courses designated as its anti-requisites. Prerequisite courses are of the same or lower year, anti-requisite courses are of the same year. In the system we keep information of what courses a student has taken and what courses the student is registering. All

courses are either Pass or Fail. A student can register a course only if he/she has passed all the prerequisites and has not passed any or is not registered in any of the anti-requisites. A student can only register a course of the appropriate year, i.e. a student in year X of study can only register and take course of year X.

For the following case study in order to get the required outcome follow below given necessary steps.

Steps:
(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Queries for Course Registration

1. List all triples (student name, course designation, status) of courses taken or registered by students with id '0000041' and '0000042'. status is the status of each course (i.e. 'P' for passed, 'F' for failed, 'R' for registered).
2. List names of all students in year 1.
3. Names of all instructors for year one courses should be listed.
4. List designation of all courses that have tutorials. No designation can repeat.
5. List designation of all courses that have labs with more than 1 section. No designation can repeat.
6. List names of instructors that teach at least one course with multiple sections labs. No name can repeat.
7. List names of instructors that teach only courses with single-sections labs or no labs.
8. No name can repeat.

Department: Computer Engineering & Applications	**Set:** VIII
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Short Summary for the Software Project

Software projects are managed on our website for user downloading. Every software project has an individual project id that is 8 characters long, may be given one or more categories (the categories are A, B, C, and D), has a status (D or P), and has a description (a text field with a maximum word count of 256). Some projects may depend on other projects and we keep track of the dependency. Each project is created, owned, and submitted to our website in one or more transactions by a single developer (who is also a subscriber).

Our users are identified by name (at most 20 characters), email (at most 20 characters), and a unique user id (8 characters long). They can be either guest users or subscribed users (subscribers for short). The subscribers have passwords (at most 8 characters) and we keep the date of the subscription. They need the password to access ourwebsite to file bug reports or upload software projects or update patches. A user can download any project, the number of downloads per user per project is recorded. The subscribers can file bug reports for any project. Every bug identified has an id (a positive integer) and a description (text of at most 256 characters). The bug id's must be unique for all bugs concerning the same project. The date of filing of a bug report is recorded. Each bug report deals with a single project and can report a single bug. Each bug report is made by a single subscriber.

Our subscribers include some programmers. They create software projects for their own projects as well as software upgrades. Each update for a project has an id (8 characters long), a name (at most 20 characters), a status (P or U), a description (text of at most 256 characters), and is assigned a particular type (the type are 1, 2 and 3). Every update for a project is made by the same developer who started it in the first place. Each patch for an update is transferred to our website in a single operation. Each transaction contains a six-character id and a date on which it occurred. For all transactions involving the same project, the transaction ids must be distinct.

For the following case study in order to get the required outcome follow below given necessary steps.

Steps:
(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Queries for Software Project

1. Give a user ID and name to each developer in charge of a project.
2. Project ids are required for any projects with more than two update patches.
3. For each project, give the number of all update patches and the number of all downloads.
4. Give the project id of the projects with the most downloads.
5. Give the project id of the projects with the most update patches.
6. For each project, give project id of all projects that the project depends on.
7. Give project id of all projects that do not depend on any other project.
8. Give the project identifier of the projects that rely on other projects the most.
9. Give description, bug id, and project id of all bug reports for all projects that have most bug reports.
10. Provide the user ID of the developer who has received the fewest bug reports.

Department: Computer Engineering & Applications	**Set:** IX
Programme: B. Tech.	**Branch:** CSE/CSED/AIML/DA/CCV/IIOT
Subject Name: Database Management System	**Subject Code:** BCSC1003
Year: II	**Semester:** III

Short Summary for Warehouse System

Our company has a number of warehouses, and each one is identified by a distinct four- letter symbol (by letter, we mean a..z and A..Z). Each warehouse has a number of bins that are uniquely recognized by numbers (unsigned integers), such as bins 0, 1, 2, 3,... Each container has a specific capacity. We keep parts in our warehouses, or more properly, in the bins in our warehouses. Each part is identified by a specific part number, which is a five-symbol combination of digits and letters. A part can be created by joining several pieces together. This kind of component is referred to as "assembly". We just keep the individual components in the warehouses, but we record the assemblies in our database as if they were individual components. Assemblies cannot be parts of other assemblies. A part can be a constituent part in at most in one assembly parts arrive in batches. Each batch for a particular part has a unique batch number (unsigned integer) and arrives on a particular date. Each batch has a size, i.e. the number of items in the batch. All items from the same batch are stored together in the same bin (no batch is stored in more than 1 bin). Each item in a batch has a unique item number (unsigned integer). For example: part A1, batch 27, item 1 or part A1, batch 23, item 1 etc.

A specific manager must validate a batch's arrival and the database must reflect this information before the batch's date-in can be logged. Several parts might be on backorder. Only a manager has the authority to backorder a part. The manager, the date of the backorder are recorded, and also the quantity backordered. When a backorder shipment arrives, the backorder's remaining quantity is updated (the number of items arrived is subtracted from the remaining quantity), and if it is less or equal to 0, the backorder is deleted, but must be kept for record. There may be only a single current (active) backorder for any parts. Assemblies cannot be backordered, only their constituent parts. When an item departs the warehouse, the employee who verified its shipping andthe date-out is also noted.

Employee has a unique employee number (a 6-digit number), phone number(s) (it

consists of a 3-digit area code and a 6-digit number an employee can have 0 to many phone numbers), name(s) (it consists of an up=to-10-characters fist name, an up-to-10-characters middle name, and an up-to-20-characters last name, an employee can have 1 tomany names), address(s) (it consists of an up-to-6-characters street number, an up-to-20- characters street name, an up-to-20-characters city name, and a 2-character abbreviation of the province, an employee can have 1 to many address). There are managers among the staff members. One manager is responsible for overseeing all employees who are not managers. Managers are not subordinates to other managers.

For the following case study in order to get the required outcome follow below given necessary steps.

Steps:
(i). Draw the ER diagram for below given description,
(ii). Convert the ER diagram into Relational Database.
(iii). Remove any functional dependencies (if any).
(iv). Implement in MySQL and give the required outcome as query results.

Queries for Warehouse System

1. Give all employee_no to every employee who works for the boss and has the first namesTony7 and Tona7 without a middle name.
2. Give all the names and employee_no for all the workers the names should be listed inan alphabetic order (by last, then by first, then by middle)
3. Give all the phones and employee_no for all the managers.
4. List all parts that are assemblies they should be listed in a lexicographic order.
5. For each manager, list all current backorders done by the manager.
6. For each manager, list all current and old backorders done by the manager. For eachbackorder you have to list the part_no, backorder date, and fulfilled date. For currentbackorders, list a phony fulfilled date '2000-01-01'.
7. For each warehouse bin, give the remaining capacity of the bin. Call the remaining capacity remaining_capacity.
8. Give employee_no and number of workers managed for all the managers withThe smallest number of workers managed.