Day # 1 Assignments

Concept: Identifying Entities, Relationships and Cardinalities figuring out the pictorial solution of the problem.

Objective: At the end of the assignments, participants will be able to do problem analysis, identify Entities, apply Relation amongst them and map the cardinalities.

Task / Problems:

Level I:

1.) Draw E-R Diagram for the following:

1. The company is organized into departments. Each department has a unique name, a unique number and a particular employee who manages the department. A department may have several locations.
2. A department controls a number of projects, each of which has a unique name, a unique number and a single location.
3. We store each employee's name, social security number, address, salary, sex and birth date and age. An employee is assigned to one department but may work on several projects, which are not necessarily controlled by the same department. We keep track of the number of hours per week that an employee works on each project. We also keep track of the direct supervisor for each employee.
4. We want to keep track of the dependents of each employee for insurance purposes. We keep each dependent's first name, sex, birthdate and relationship to the employee.

2) Consider the following set of requirements for a university database that is used to keep track of student's transcripts.

1. The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone number, birthdate, sex, class(freshman, sophomore, graduate), major department, minor department (if any), and degree program (B.A., B.S., Ph.D.). Some user applications need to refer to the city, state, and zip code of the student's permanent address and to the student's last name. Both student number and social security number have unique values for each student.

2. Each department is described by a name, department code office number, office phone, and college. Both name and code have unique values for each department.
3. Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of course number is unique for each course.
4. A grade report has a student, course, and numeric grade (0, 1, 2, 3 or 4)

Level II:

1) Draw E-R diagram for the following scenario

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.

2) Draw E-R diagram for the following scenario

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications. A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with one editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject.

3) Design a database for keeping track of information of voters for the Lok Sabha Election.

The database needs to keep track of each Indian state's name, number of constituencies in the state, name of each constituency, geographical area of the constituency, total number of voters in the constituency.

Each constituency has a number of voters, where each voter should have the details – voter id, name, address, gender, date of birth, age.
Again each political party has candidates for each of the constituency. Any political party has a name, symbol and a president while a candidate has name, address, qualification, gender and caste

4) The University Housing Office receives many applications from graduate and married students requesting an apartment on campus. The housing villages are sited in five different locations and each village has about 500 apartments. Each apartment falls into one of the apartment categories. An apartment category is determined based on: village location, whether the apartment has: dish washer or not, a single or double bedroom, central or window unit air conditioner, furniture or not.

Housing office keeps the following information about the current residents: the SSN of the family head, name, address, telephone number, marital status, the name of the major college and department in which the family head is enrolled in.

Housing office keeps the following information about the students that have applied for in campus housing, but have not been assigned to an apartment yet: SSN of the applicant, name, address, telephone number, marital status, the name of the major college and department in which the family head is enrolled in, the preference about the apartment category.

Draw an E-R diagram for the University Housing Office database. State any assumptions you need to make in order to develop a compete diagram.

Concept: E-R to relational Mapping Normalization

FNF identification, elimination rules for redundancy in FNF SNF , Concept of Functional dependency
TNF , Transitive dependency,

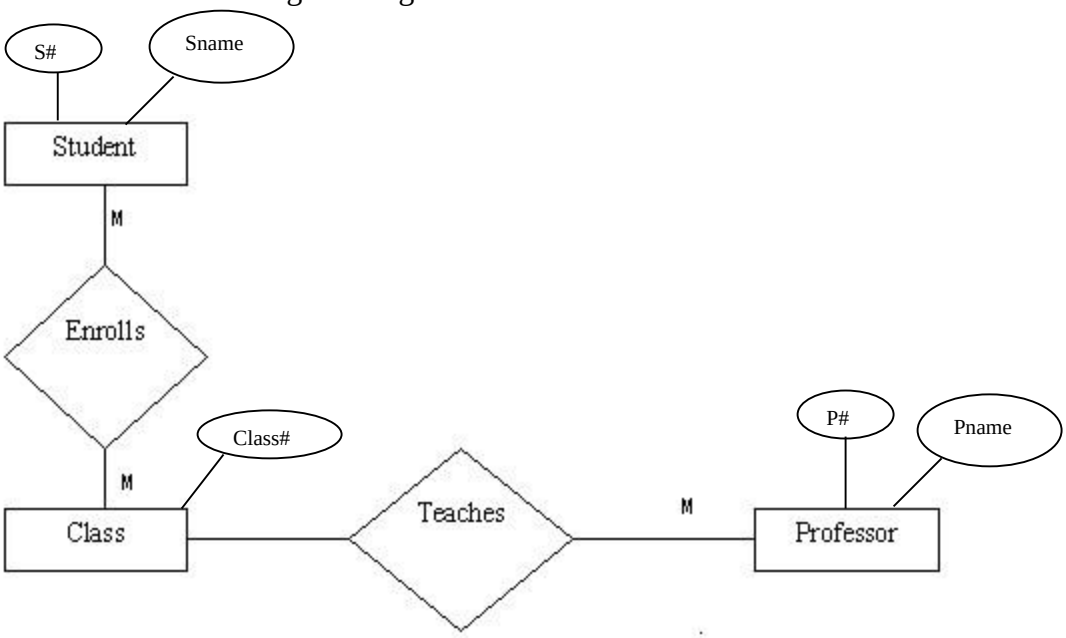
Objective: At the end of the assignments, participants will be map E- R model to Relational model also able to apply all the rules to normalize, unnormalised data into FNF, SNF, and TNF respectively.

Task / Problems:

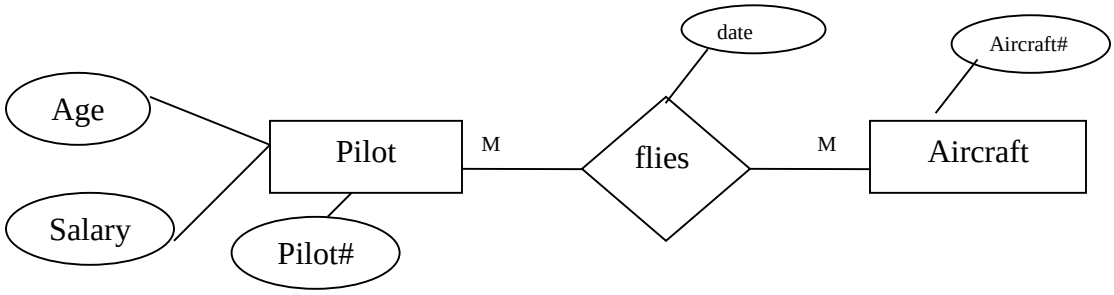
E-R to Relational Mapping:

Level I:

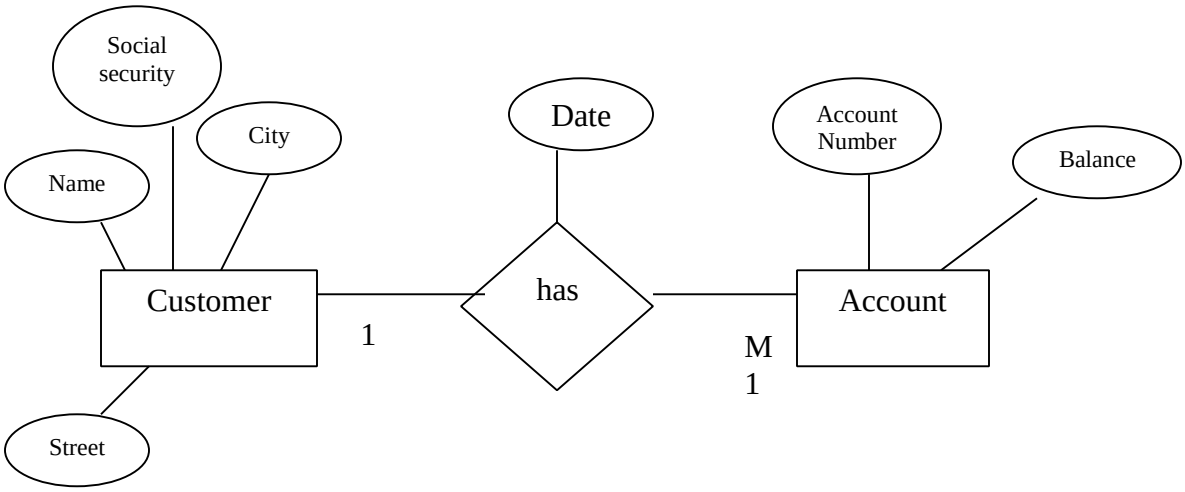
1. Convert the following ER diagrams into Relational Models



2. Convert the following ER diagrams into Relational Models

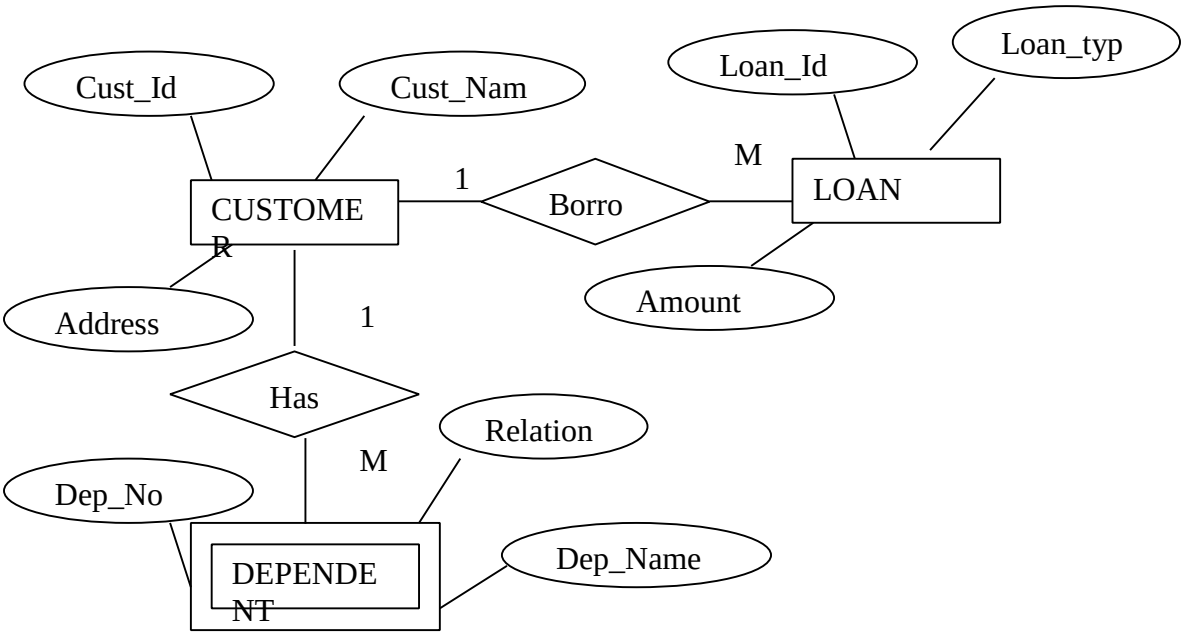


3. Convert the following ER diagrams into Relational Models

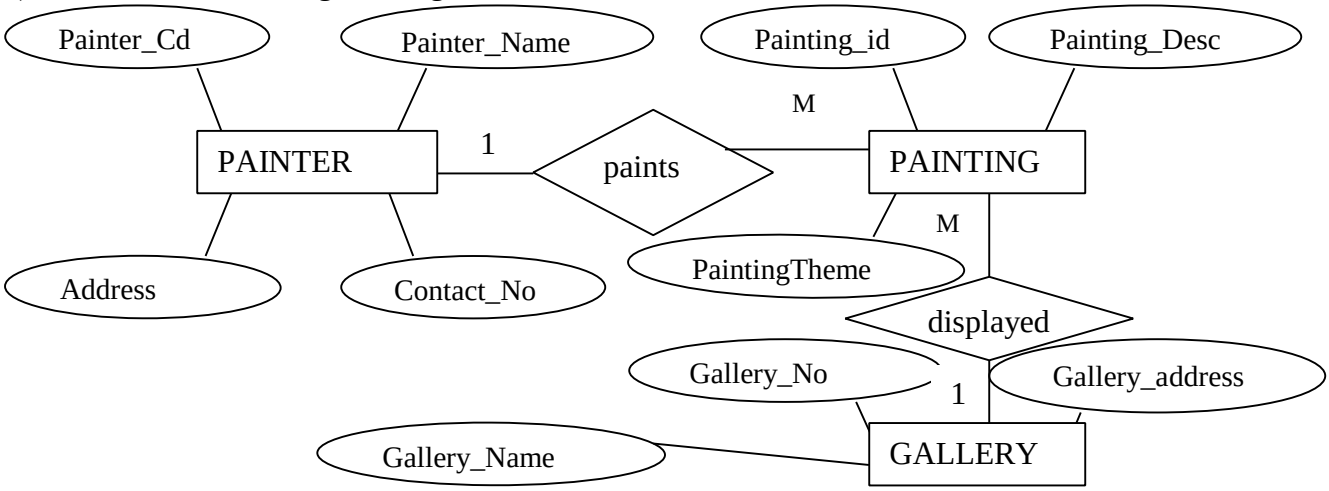


Level II:

1) Convert the following ER diagrams into Relational Models



2) Convert the following ER diagrams into Relational Models



Normalization:

Level I:

1) The table below shows an extract from a tour operator's data on travel agent bookings.

batchno	agentno	agent name	holiday code	cost	quantity booked	airport code	airport name
1	76	Bairns travel	B563	363	10	1	Luton
			B248	248	20	12	Edinburgh
			B428	322	18	11	Glasgow
2	142	Active Holidays	B563	363	15	1	Luton
			C930	568	2	14	Newcastle
			A270	972	1	14	Newcastle
			B728	248	5	12	Edinburgh
3	76	Bairns travel	C930	568	11	1	Luton
			A430	279	15	11	Glasgow

2) Show all the functional dependencies; identify the key for relation & also transitive dependency. Normalize the table to 3rd Normal form

Bill No	Bill Date	Cust_Id	Cust_Name	Prod_No	Prod_Name	Unit_Price	Qty
10001	31/8/06	c1	John	P01	Keyboard	25	10
10001	31/8/06	c1	John	P02	Mouse	30	5
10001	31/8/06	c1	John	P04	Mouse pad	20	12
10002	31/8/06	c2	Johny	P02	Mouse	50	4
10002	31/8/06	c2	Johny	P05	Keyboard	28	7
10003	31/8/06	c1	John	P01	Keyboard	12	10
10003	31/8/06	c1	John	P05	Keyboard	15	14

Level II:

1) Information of Banks in the City

Bank No	Bank Name	Branch Code	Customer Address	Total No. of A/C Customers	Branch No	Customer Name	type	Balance
B1	SBI	S01	Hosur Road	1000	111	Rajesh Lal	S	3,45,000
B2	ICICI	I01	M. G. Road	850	12	Vidya Raj	S	80,000
B1	SBI	S02	Motilal Street	1200	86	Meenal Sen	C	12,000
B4	Axis Bank	A04	Bima Nagar	430	192	Raima Choudhury	S	2,75,000
B2	ICICI	I01	M. G. Road	850	25	Naina Khetri	C	45,000
B5	Kotak Mahindra	K03	Karve Road	500	135	Roopa	S	1,20,000

Using the above report, convert it into suitable relations (initial normal form) and normalize them to third normal form.

2) Employee's Certification Details

EmployeeID	EmpName	EmpAddress	BirthDate	CourseId	CourseTitle	DateCompleted
101	Sumit	Delhi	12/12/81	1	C	15/1/2008
102	Sonu	Delhi	5/12/76	1	C	15/2/2008
103	Monika	Noida	5/2/79	2	Oracle	17/1/2008
101	Sumit	Delhi	12/12/81	4	Java	8/2/2008
101	Sumit	Delhi	12/12/81	5	J2EE	15/2/2008
104	Sanjana	Noida	8/3/78	2	Oracle	17/1/2008
101	Sumit	Delhi	12/12/81	1	C	15/1/2008
102	Sonu	Delhi	5/12/76	4	Java	28/3/2008
101	Sumit	Delhi	12/12/81	5	C++	17/3/2008

Normalize above data up to 3NF .Show every step.

3. Normalize the table to 3 NF

ClientNo	CName	PropertyNo	pAddress	rentStart	rentFinish	rent	OwnerNo	O_Name
CR76	Jay Mehta	PG4	6 East street Camp; Pune	1-Jul-00	31-Aug-01	350	CO40	Avinash Bhosale
		PG16	46,Senapati Bapat Rd, Pune	1-Sep-02	1-Sep-02	450	CO93	Sandesh Shinde
CR56	Bipasha	PG4	6 East street Camp; Pune	1-Sep-99	10-Jun-00	350	CO40	Avinash Bhosale
		PG36	61, BhelkeNagar, Kothrud;Pune	10-Oct-00	1-Dec-01	370	CO93	Sandesh Shinde
		PG16	46,Senapati Bapat Rd, Pune	1-Nov-02	1-Aug-03	450	CO93	Sandesh Shinde