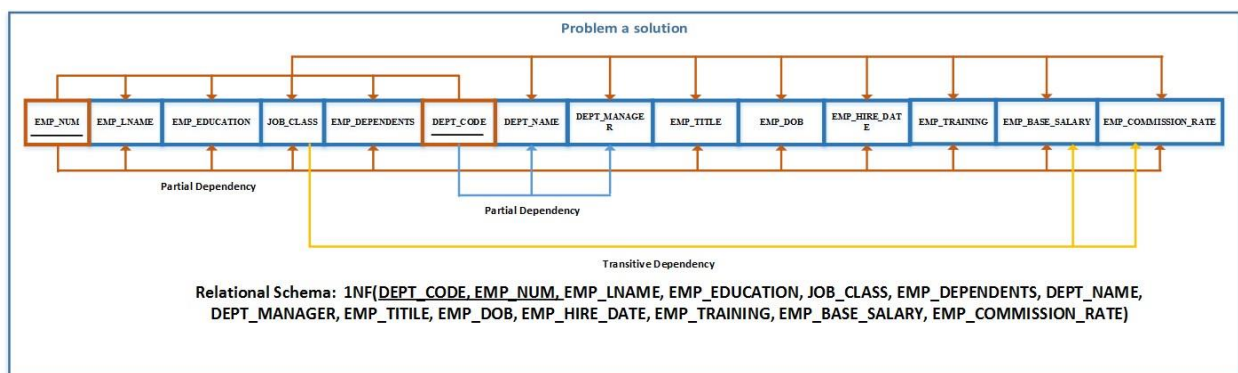# 60-615 - Advanced Database Topics
Assignment 2

The table structure shown in Table P6.6 contains many unsatisfactory components and characteristics. For example, there are several multivalued attributes, naming conventions are violated, and some attributes are not atomic.
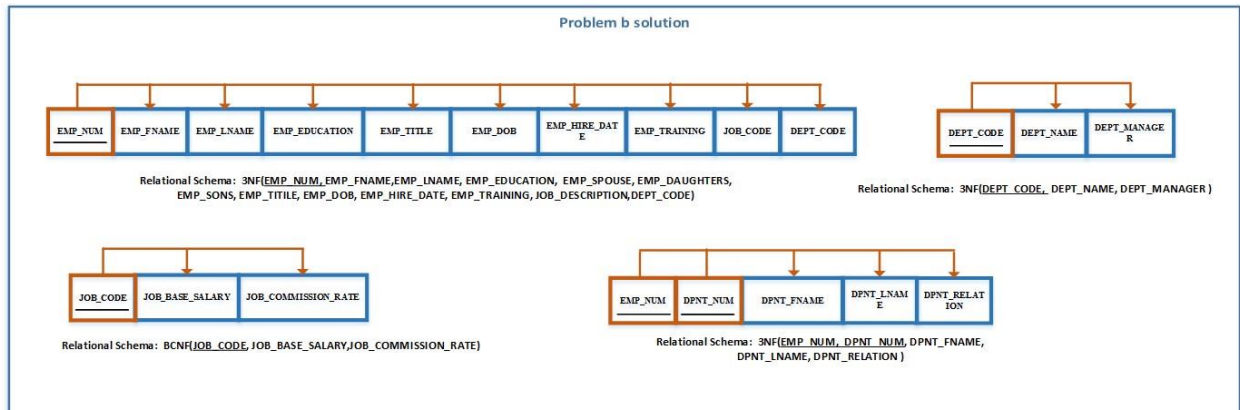
Table P6.6 Sample EMPLOYEE Records

Attribute Name	Sample Value	Sample Value	Sample Value	Sample Value
EMP_NUM	1003	1018	1019	1023
EMP_LNAME	Willaker	Smith	McGuire	McGuire
EMP_EDUCATION	BBA, MBA	BBA		BS, MS, Ph.D.
JOB_CLASS	SLS	SLS	JNT	DBA
EMP_DEPENDENTS	Gerald (spouse), Mary (daughter), John (son)		JoAnne (spouse)	George (spouse) Jill (daughter)
DEPT_CODE	MKTG	MKTG	SVC	INFS
DEPT_NAME	Marketing	Marketing	General Service	Info. Systems
DEPT_MANAGER	Jill H. Martin	Jill H. Martin	Hank B. Jones	Carlos G. Ortez
EMP_TITLE	Sales Agent	Sales Agent	Janitor	DB Admin
EMP_DOB	23-Dec-1968	28-Mar-1979	18-May-1982	20-Jul-1959
EMP_HIRE_DATE	14-Oct-1997	15-Jan-2006	21-Apr-2003	15-Jul-1999
EMP_TRAINING	L1, L2		L1	L1, L3, L8, L15
EMP_BASE_SALARY	$38,255.00	$30,500.00	$19.750.00	$127,900.00
EMP_COMMISSION_RATE	0.015	0.010		

a. Given the structure shown in Table P6.6, write the relational schema and draw its dependency diagram. Label all transitive and/or partial dependencies.

Problem a solution

EMP_NUM · EMP_LNAME · EMP_EDUCATION · JOB_CLASS · EMP_DEPENDENTS · DEPT_CODE · DEPT_NAME · DEPT_MANAGER · EMP_TITLE · EMP_DOB · EMP_HIRE_DATE · EMP_TRAINING · EMP_BASE_SALARY · EMP_COMMISSION_RATE

Partial Dependency

Partial Dependency

Transitive Dependency

Relational Schema: 1NF(DEPT_CODE, EMP_NUM, EMP_LNAME, EMP_EDUCATION, JOB_CLASS, EMP_DEPENDENTS, DEPT_NAME, DEPT_MANAGER, EMP_TITILE, EMP_DOB, EMP_HIRE_DATE, EMP_TRAINING, EMP_BASE_SALARY, EMP_COMMISSION_RATE)

b. **Draw the dependency diagrams that are in 3NF. (*Hint*: You might have to create a few new attributes. Also make sure that the new dependency diagrams contain attributes that meet proper design criteria; that is, make sure there are no multivalued attributes, that the naming conventions are met, and so on.)**

Problem b solution

| EMP_NUM | EMP_FNAME | EMP_LNAME | EMP_EDUCATION | EMP_TITLE | EMP_DOB | EMP_HIRE_DATE | EMP_TRAINING | JOB_CODE | DEPT_CODE |

Relational Schema: 3NF(EMP_NUM, EMP_FNAME,EMP_LNAME, EMP_EDUCATION, EMP_SPOUSE, EMP_DAUGHTERS, EMP_SONS, EMP_TITILE, EMP_DOB, EMP_HIRE_DATE, EMP_TRAINING, JOB_DESCRIPTION,DEPT_CODE)

| DEPT_CODE | DEPT_NAME | DEPT_MANAGER |

Relational Schema: 3NF(DEPT_CODE, DEPT_NAME, DEPT_MANAGER)

| JOB_CODE | JOB_BASE_SALARY | JOB_COMMISSION_RATE |

Relational Schema: BCNF(JOB_CODE, JOB_BASE_SALARY,JOB_COMMISSION_RATE)

| EMP_NUM | DPNT_NUM | DPNT_FNAME | DPNT_LNAME | DPNT_RELATION |

Relational Schema: 3NF(EMP_NUM, DPNT_NUM, DPNT_FNAME, DPNT_LNAME, DPNT_RELATION)

c. **Draw the relational diagram.**

Problem C solution

EMPLOYEE

DEPENDENT

| EMP_NUM |
| EMP_FNAME |
| EMP_LNAME |
| EMP_EDUCATION |
| EMP_TITLE |
| EMP_DOB |
| EMP_HIRE_DATE |
| EMP_TRAINING |
| JOB_CODE |
| DEPT_CODE |

DEPARTMENT

| DEPT_CODE |
| DEPT_NAME |
| DEPT_MANAGER |

| EMP_NUM |
| DPNT_NUM |
| DPNT_FNAME |
| DPNT_LNAME |
| DPNT_RELATION |

JOB_TREATMENT

| JOB_CODE |
| JOB_BASE_SALARY |
| JOB_COMMISSION_RATE |
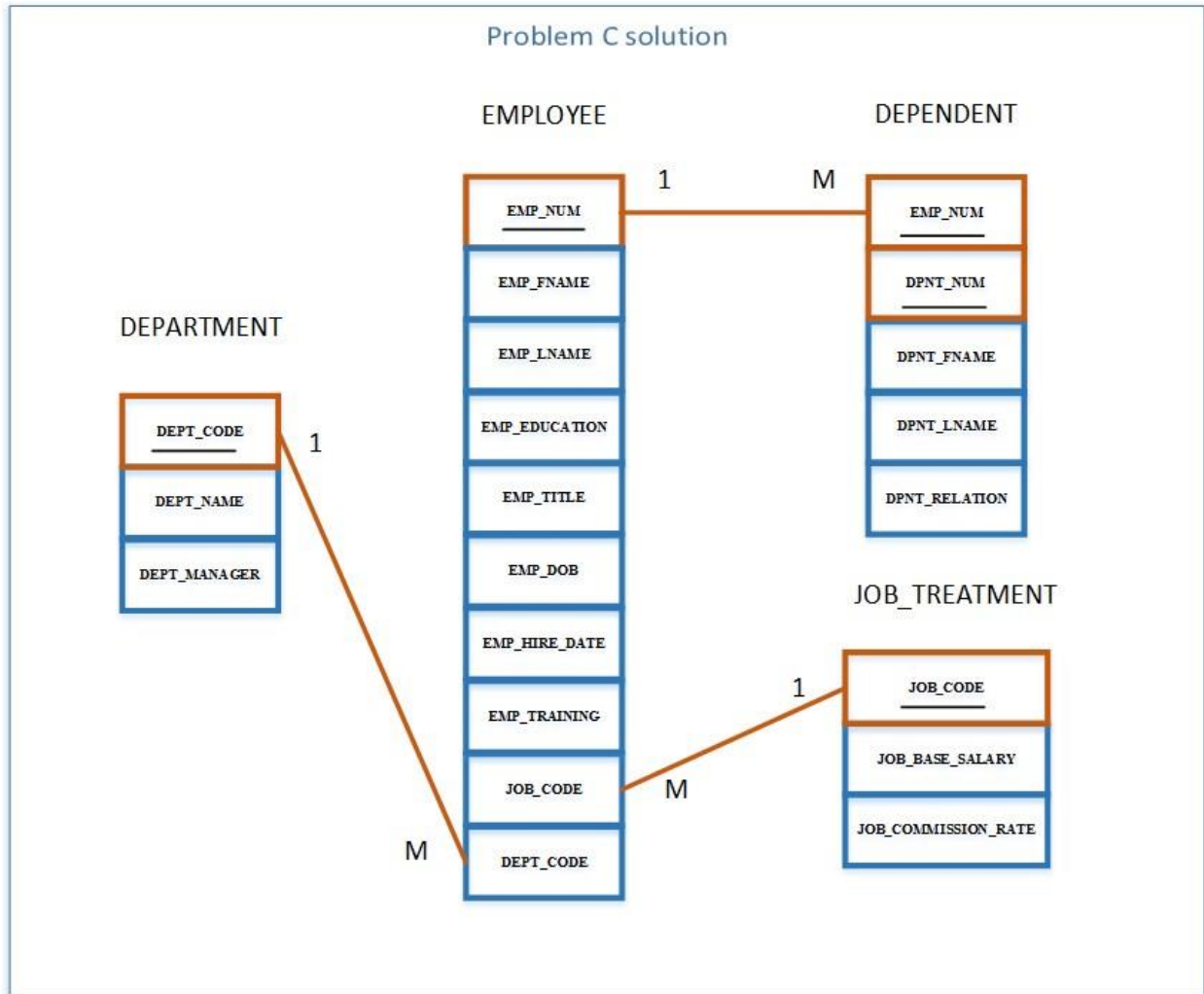
d. Draw the Crow's Foot ERD.

Problem D solution

DEPARTMENT

PK	DEPT_CODE
	DEPT_NAME
	DEPT_MANAGER

EMPLOYEE

PK	EMP_NUM
	EMP_FNAME
	EMP_LNAME
	EMP_EDUCATION
	EMP_TITLE
	EMP_DOB
	EMP_HIRE_DATE
	EMP_TRAINING
	JOB_CODE
	DEPT_CODE

DEPENDENT

PK	EMP_NUM
PK	DPNT_NUM
	DPNT_FNAME
	DPNT_LNAME
	DPNT_RELATION

JOB_TREATMENT

PK	JOB_CODE
	JOB_BASE_SALARY
	JOB_COMMISSION_RATE

DEPARTMENT — has — EMPLOYEE

EMPLOYEE — has — DEPENDENT

EMPLOYEE — subject to — JOB_TREATMENT