

CPSC 3131 / MISM 4135 - Assignment 2

Use the database shown in Figure 1 to work Problems 1–4.

Database name: Ch03_BeneCo

Table name: EMPLOYEE

EMP_CODE	EMP_LNAME	JOB_CODE
14	Rudell	2
15	McDade	1
16	Ruellardo	1
17	Smith	3
20	Smith	2

Table name: BENEFIT

EMP_CODE	PLAN_CODE
15	2
15	3
16	1
17	1
17	3
17	4
20	3

Table name: JOB

JOB_CODE	JOB_DESCRIPTION
1	Clerical
2	Technical
3	Managerial

Table name: PLAN

PLAN_CODE	PLAN_DESCRIPTION
1	Term life
2	Stock purchase
3	Long-term disability
4	Dental

Figure 1 – The Ch03_BeneCo database tables

Note that the database is composed of four tables that reflect these relationships:

- An EMPLOYEE has only one JOB_CODE, but a JOB_CODE can be held by many EMPLOYEEs.
- An EMPLOYEE can participate in many PLANS, and any PLAN can be assigned to many EMPLOYEEs.

Note also that the M:N relationship has been broken down into two 1:M relationships for which the BENEFIT table serves as the composite or bridge entity.

Problem 1: For each table in the database, identify the primary key and the foreign key(s). If a table does not have a foreign key, write *None* in the space provided. (5 pts)

TABLE	PRIMARY KEY	FOREIGN KEY(S)
EMPLOYEE		
BENEFIT		
JOB		
PLAN		

Problem 2: Create the ERD to show the relationships among EMPLOYEE, BENEFIT, JOB, and PLAN. (5 pts)

Problem 3: Do the tables exhibit entity integrity? Answer yes or no, and then explain your answer. (5 pts)

TABLE	ENTITY INTEGRITY	EXPLANATION
EMPLOYEE		
BENEFIT		
JOB		
PLAN		

Problem 4: Do the tables exhibit referential integrity? Answer yes or no, and then explain your answer. Write NA (Not Applicable) if the table does not have a foreign key. (5 pts)

TABLE	REFERENTIAL INTEGRITY	EXPLANATION
EMPLOYEE		
BENEFIT		
JOB		
PLAN		

Table name: CHARTER

Database name: Ch03_AviaCo

CHAR_TRIP	CHAR_DATE	CHAR_PILOT	CHAR_COPILOT	AC_NUMBER	CHAR_DESTINATION	CHAR_DISTANCE	CHAR_HOURS_FLOWN	CHAR_HOURS_WAIT	CHAR_FUEL_GALLONS	CHAR_OIL_QTS	CUS_CODE
10001	05-Feb-14	104		2289L	ATL	936.0	5.1	2.2	354.1	1	10011
10002	05-Feb-14	101		2778V	BNA	320.0	1.6	0.0	72.6	0	10016
10003	05-Feb-14	105	109	4278Y	GMV	1574.0	7.8	0.0	339.8	2	10014
10004	06-Feb-14	106		1484P	STL	472.0	2.9	4.9	87.2	1	10019
10005	06-Feb-14	101		2289L	ATL	1023.0	5.7	3.5	387.7	2	10011
10006	06-Feb-14	109		4278Y	STL	472.0	2.6	5.2	117.1	0	10017
10007	06-Feb-14	104	105	2778V	GMV	1574.0	7.9	0.0	348.4	2	10012
10008	07-Feb-14	106		1484P	TYS	844.0	4.1	0.0	140.8	1	10014
10009	07-Feb-14	105		2289L	GMV	1574.0	6.6	23.4	459.9	0	10017
10010	07-Feb-14	109		4278Y	ATL	996.0	6.2	3.2	279.7	0	10016
10011	07-Feb-14	101	104	1484P	BNA	352.0	1.9	5.3	88.4	1	10012
10012	08-Feb-14	101		2778V	MOB	884.0	4.8	4.2	215.1	0	10010
10013	08-Feb-14	105		4278Y	TYS	844.0	3.9	4.5	174.3	1	10011
10014	09-Feb-14	106		4278Y	ATL	936.0	6.1	2.1	302.6	0	10017
10015	09-Feb-14	104	101	2289L	GMV	1845.0	8.7	0.0	459.5	2	10016
10016	09-Feb-14	109	105	2778V	MOY	312.0	1.5	0.0	67.2	0	10011
10017	10-Feb-14	101		1484P	STL	506.0	3.1	0.0	105.5	0	10014
10018	10-Feb-14	105	104	4278Y	TYS	844.0	3.8	4.5	167.4	0	10017

The destinations are indicated by standard three-letter airport codes. For example,
STL = St. Louis, MO **ATL** = Atlanta, GA **BNA** = Nashville, TN

Table name: AIRCRAFT

AC_NUMBER	MOD_CODE	AC_TTAF	AC_TTEL	AC_TTER
1484P	PA23-250	1833.1	1633.1	101.8
2289L	C-90A	4243.8	768.9	1123.4
2778V	PA31-350	7992.9	1513.1	789.5
4278Y	PA31-350	2147.3	622.1	243.2

AC-TTAF = Aircraft total time, airframe (hours)
AC-TTEL = Total time, left engine (hours)
AC-TTER = Total time, right engine (hours)

In a fully developed system, such attribute values would be updated by application software when the CHARTER table entries were posted.

Table name: MODEL

MOD_CODE	MOD_MANUFACTURER	MOD_NAME	MOD_SEATS	MOD_CHG_MILE
C-90A	Beechcraft	KingAir	8	2.67
PA23-250	Piper	Aztec	6	1.93
PA31-350	Piper	Navajo Chieftain	10	2.35

Customers are charged per round-trip mile, using the MOD_CHG_MILE rate. The MOD_SEATS column lists the total number of seats in the airplane, including the pilot and copilot seats. Therefore, a PA31-350 trip that is flown by a pilot and a copilot has eight passenger seats available.

Table name: PILOT

Database name: Ch03_AviaCo

EMP_NUM	PIL_LICENSE	PIL_RATINGS	PIL_MED_TYPE	PIL_MED_DATE	PIL_PT135_DATE
101	ATP	ATP/SEL/MEL/Instr/CFII	1	20-Jan-14	11-Jan-14
104	ATP	ATP/SEL/MEL/Instr	1	18-Dec-13	17-Jan-14
105	COM	COMM/SEL/MEL/Instr/CFI	2	05-Jan-14	02-Jan-14
106	COM	COMM/SEL/MEL/Instr	2	10-Dec-13	02-Feb-14
109	COM	ATP/SEL/MEL/SES/Instr/CFII	1	22-Jan-14	15-Jan-14

The pilot licenses shown in the PILOT table include ATP = Airline Transport Pilot and COMM = Commercial Pilot. Businesses that operate on-demand air services are governed by Part 135 of the Federal Air Regulations (FARs), which are enforced by the Federal Aviation Administration (FAA). Such businesses are known as "Part 135 operators." Part 135 operations require that pilots successfully complete flight proficiency checks every six months. The "Part 135" flight proficiency check date is recorded in PIL_PT135_DATE. To fly commercially, pilots must have at least a commercial license and a second-class medical certificate (PIL_MED_TYPE = 2).

The PIL_RATINGS include:

SEL = Single Engine, Land
SES = Single Engine, Sea
CFI = Certified Flight Instructor

MEL = Multiengine, Land
Instr. = Instrument
CFII = Certified Flight Instructor, Instrument

Table name: EMPLOYEE

EMP_NUM	EMP_TITLE	EMP_LNAME	EMP_FNAME	EMP_INITIAL	EMP_DOB	EMP_HIRE_DATE
100	Mr.	Kolmycz	George	D	15-Jun-42	15-Mar-88
101	Ms.	Lewis	Rhonda	G	19-Mar-65	25-Apr-86
102	Mr.	Vandam	Rhett		14-Nov-58	18-May-93
103	Ms.	Jones	Anne	M	11-May-74	26-Jul-99
104	Mr.	Lange	John	P	12-Jul-71	20-Aug-90
105	Mr.	Williams	Robert	D	14-Mar-75	19-Jun-03
106	Mrs.	Duzak	Jeanine	K	12-Feb-68	13-Mar-89
107	Mr.	Diante	Jorge	D	01-May-75	02-Jul-97
108	Mr.	Wiesenbach	Paul	R	14-Feb-66	03-Jun-93
109	Ms.	Travis	Elizabeth	K	18-Jun-61	14-Feb-06
110	Mrs.	Genkazi	Leighla	W	19-May-70	29-Jun-90

Table name: CUSTOMER

CUS_CODE	CUS_LNAME	CUS_FNAME	CUS_INITIAL	CUS_AREACODE	CUS_PHONE	CUS_BALANCE
10010	Ramas	Alfred	A	615	844-2573	0.00
10011	Dunne	Leona	K	713	894-1238	0.00
10012	Smith	Kathy	W	615	894-2285	896.54
10013	Olowski	Paul	F	615	894-2180	1285.19
10014	Orlando	Myron		615	222-1672	673.21
10015	O'Brian	Amy	B	713	442-3381	1014.56
10016	Brown	James	G	615	297-1228	0.00
10017	Williams	George		615	290-2556	0.00
10018	Farriss	Anne	G	713	382-7185	0.00
10019	Smith	Olette	K	615	297-3809	453.98

Cengage Learning © 2015

Figure 2 - The Ch03_AviaCo database tables

Use the database shown in Figure 2 (previous page) to work Problems 5–6. ROBCOR is an aircraft charter company that supplies on-demand charter flight services using a fleet of four aircraft. Aircraft are identified by a unique registration number. Therefore, the aircraft registration number is an appropriate primary key for the AIRCRAFT table.

The nulls in the CHARTER table's CHAR_COPILOT column indicate that a copilot is not required for some charter trips or for some aircraft. Federal Aviation Administration (FAA) rules require a copilot on jet aircraft and on aircraft having a gross take-off weight over 12,500 pounds. None of the aircraft in the AIRCRAFT table is governed by this requirement; however, some customers may require the presence of a copilot for insurance reasons. All charter trips are recorded in the CHARTER table.

Problem 5: For each table, where possible, identify: (10 pts)

- a) The primary key.
- b) A superkey.
- c) A candidate key.
- d) The foreign key(s).
- e) A secondary key.

Problem 6: Create the ERD. (Hint: Look at the table contents. You will discover that an AIRCRAFT can fly many CHARTER trips but that each CHARTER trip is flown by one AIRCRAFT, that a MODEL references many AIRCRAFT but that each AIRCRAFT references a single MODEL, etc.) (10 pts)

Problem 7: Create an ERD based on the Crow's Foot model, using the following requirements: (10 pts)

- An INVOICE is written by a SALESREP. Each sales representative can write many invoices, but each invoice is written by a single sales representative.
- The INVOICE is written for a single CUSTOMER. However, each customer can have many invoices.
- An INVOICE can include many detail lines (LINE), each of which describes one product bought by the customer.
- The product information is stored in a PRODUCT entity.
- The product's vendor information is found in a VENDOR entity.

NOTE: The ERD must reflect business rules that you are free to define (within reason). Make sure that your ERD reflects the conditions you require. Finally, make sure that you include the attributes that would permit the model to be successfully implemented.

Problem 8: Using the Crow's Foot methodology, create an ERD that can be implemented for a medical clinic, using at least the following business rules: (10 pts)

- a) A patient can make many appointments with one or more doctors in the clinic, and a doctor can accept appointments with many patients. However, each appointment is made with only one doctor and one patient.
- b) Emergency cases do not require an appointment. However, for appointment management purposes, an emergency is entered in the appointment book as "unscheduled."
- c) If kept, an appointment yields a visit with the doctor specified in the appointment. The visit yields a diagnosis and, when appropriate, treatment.
- d) With each visit, the patient's records are updated to provide a medical history
- e) Each patient visit creates a bill. Each patient visit is billed by one doctor, and each doctor can bill many patients.
- f) Each bill must be paid. However, a bill may be paid in many installments, and a payment may cover more than one bill.
- g) A patient may pay the bill directly, or the bill may be the basis for a claim submitted to an insurance company.
- h) If the bill is paid by an insurance company, the deductible is submitted to the patient for payment.

---- End ----