CS60 Project 2 2012 Fall

Due Monday 24 September at 11 pm

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The 4-table database below is to be used for problems 1-5. The database has these relationships:

• An EMPLOYEE has only one JOB\_CODE, but a JOB\_CODE can be held by many EMPLOYEEs.

• An EMPLOYEE can have many benefits, and any benefit can be assigned to many EMPLOYEEs.

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 |

**Problem 1.** For each table in the database, identify the primary key and foreign key(s). For each foreign key, name the table and primary key it references. If a table doesn’t have a foreign key, write None in the assigned space.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table** | **Primary Key** | **Foreign Key(s)** | **Table and columns of the primary key referenced by the foreign key (if any).** |
| EMPLOYEE | EMP\_CODE | JOB\_CODE |  |
| BENEFIT |  | PLAN\_CODE  EMP\_CODE |  |
| JOB | JOB\_CODE | NONE |  |
| PLAN | PLAN\_CODE | NONE |  |

**Problem 2.** Do the tables exhibit entity integrity? Answer Yes or No, then explain your answer.

|  |  |  |
| --- | --- | --- |
| **Table** | **Entity integrity** | **Explanation** |
| EMPLOYEE | YES | HAS UNIQUE, NOT NULL PRIMARY KEY |
| BENEFIT | NO | DOES NOT HAVE PRIMARY KEY |
| JOB | YES | HAS UNIQUE, NOT NULL PRIMARY KEY |
| PLAN | YES | HAS UNIQUE, NOT NULL PRIMARY KEY |

**Problem 3**. Do the tables exhibit REFERENTIAL integrity? Answer Yes or No, then explain your answer. Write *Not Applicable* if the table doesn’t have a foreign key. Remember that a foreign key can only reference a primary key or column(s) with a unique constraint.

|  |  |  |
| --- | --- | --- |
| **Table** | **Referential integrity** | **Explanation** |
| EMPLOYEE | YES | ALL VALUES HAVE PAIRS IN ALL COLUMNS |
| BENEFIT | YES | ALL VALUES HAVE PAIRS IN ALL COLUMNS |
| JOB | YES | ALL VALUES HAVE PAIRS IN ALL COLUMNS |
| PLAN | YES | ALL VALUES HAVE PAIRS IN ALL COLUMNS |

**Problem 4.** Draw the **entity relationship diagram** (ERD) to show the relationships among EMPLOYEE, BENEFIT, JOB, and PLAN. Include the connectivities and position the 1’s and M’s or N’s on the correct side. You can omit the ovals with attributes.

PLAN

**1**

BENEFIT

JOB

**M**

**M**

**1**

EMPLOYEE

**M**

**M**

**Problem 5.** Draw the **relational schema** to show the relationships among EMPLOYEE, BENEFIT, JOB, and PLAN. In the relational schema, each table has a name and columns are listed below. Primary keys are bolded or underlined. Draw your lines between tables so they show which columns connect the tables, and position your 1’s and ∞’s correctly.

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| **JOB** |
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| --- |
| **EMPLOYEE** |
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| **BENEFIT** |
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| **PLAN** |
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The following 3-table database is used for problems 6 and later.

**Table name: TRUCK**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| TRUCK\_NUM | BASE\_CODE | TYPE\_CODE | TRUCK\_MILES | TRUCK\_BUY\_DATE | TRUCK\_SERIAL\_NUM |
| 1001 | 501 | 1 | 32123.5 | 23-SEP-01 | W11 |
| 1002 | 502 | 1 | 76984.3 | 05-FEB-98 | 023 |
| 1003 | 501 | 2 | 12346.6 | 11-NOV-01 | Z99 |
| 1004 |  | 1 | 2894.3 | 06-JAN-02 | T34 |
| 1005 | 503 | 2 | 45673.1 | 01-MAR-02 | W12 |
| 1006 | 501 | 2 | 193245.7 | 15-JUL-95 | R45 |
| 1007 | 502 | 3 | 32012.3 | 17-OCT-99 | Z64 |
| 1008 | 502 | 3 | 44213.6 | 07-AUG-01 | D33 |
| 1009 | 503 | 2 | 10932.9 | 12-FEB-02 | E94 |

**Table name: BASE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| BASE\_CODE | BASE\_CITY | BASE\_STATE | BASE\_AREA\_CODE | BASE\_PHONE | BASE\_MANAGER |
| 501 | Murfreesboro | TN | 615 | 123-4567 | Andrew D. Gallager |
| 502 | Lexington | KY | 568 | 234-5678 | George H. Delarose |
| 503 | Cape Girardeau | MO | 456 | 345-6789 | Maria J. Talindo |
| 504 | Dalton | GA | 901 | 456-7890 | Peter F. McAvee |

**Table name: TYPE**

|  |  |
| --- | --- |
| TYPE\_CODE | TYPE\_DESCRIPTION |
| 1 | Single-box, double-axle |
| 2 | Single-box, single-axle |
| 3 | Tandem trailer, single-axle |

**Problem 6.** For each table in the database above, identify the primary key and the foreign key(s). If a table does not have a foreign key, write None in the assigned space.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table** | **Primary key** | **Foreign key(s)** | **Table and columns of the primary key referenced by the foreign key (if any).** |
| TRUCK | TRUCK\_NUM | BASE\_CODE  TYPE\_CODE |  |
| BASE | BASE\_CODE | None |  |
| TYPE | TYPE\_CODE | None |  |

**Problem 7.** Do the tables exhibit entity integrity? Answer Yes or No, then explain your answer.

|  |  |  |
| --- | --- | --- |
| **Table** | **Entity integrity** | **Explanation** |
| TRUCK | YES | ALL ROWS HAVE UNIQUE AND NOT NULL PRIMARY KEYS |
| BASE | YES | ALL ROWS HAVE UNIQUE AND NOT NULL PRIMARY KEYS |
| TYPE | YES | ALL ROWS HAVE UNIQUE AND NOT NULL PRIMARY KEYS |

**Problem 8**. Do the tables exhibit REFERENTIAL integrity? Answer Yes or No, then explain your answer. Write Not Applicable if the table does not have a foreign key.

|  |  |  |
| --- | --- | --- |
| **Table** | **Referential integrity** | **Explanation** |
| TRUCK | YES |  |
| BASE | NO |  |
| TYPE | YES |  |

**Problem 9.** Identify two of the TRUCK table’s candidate key(s). A candidate key is a unique identifier for a row, but one that cannot be reduced to fewer columns without losing uniqueness.

Answer: two candidate keys could be TRUCK\_NUM and TRUCK\_SERIAL\_NUM as these attributes are unique

**Problem 10.** Draw the **entity relationship diagram** for this database. Don’t forget the connectivities. You can omit the ovals for attributes if you want.

TRUCK

TYPE

BASE

1 M M 1

**Problem 11.** Draw the **relational schema** for this database.

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| **BASE** |
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| --- |
| **TYPE** |
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| **TRUCK**  ∞ |
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