Basic Databases – Report02

Wroclaw University of Technology, Date: October 26, 2018

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This task consists of 2 problems. If you cannot solve a problem, try to give at least a partial answer or partial solution. Remember to write your name, and identifier.

Problem 1

Based on the developed conceptual data model "Books" in previous lab classes:

1. Define the structure of the database (tables, constraints: PRIMARY KEY, FOREIGN KEYS, CHECK - domain constraints
2. Introduce sample records to check the correctness of defined constraints

Solution:

```
CREATE TABLE Author(
              id INT NOT NULL IDENTITY(1,1)
              CONSTRAINT pk_Author PRIMARY KEY,
              firstName VARCHAR(255) not null,
              lastName VARCHAR(255) not null,
              CONSTRAINT uq_Author UNIQUE(firstName, lastName)
);

CREATE TABLE Publisher(
              id int not null IDENTITY(1,1)
              CONSTRAINT pk_Publisher PRIMARY KEY,
              name VARCHAR(255) not null,
              CONSTRAINT uq_Publisher UNIQUE(name)
);

CREATE TABLE Formats(
              id INT not null IDENTITY(1,1)
              CONSTRAINT pk_Formats PRIMARY KEY,
              name VARCHAR(255) not null,
              CONSTRAINT uq_Formats UNIQUE(name)
);

CREATE TABLE Book(
              isbn CHAR(13) NOT NULL
              CONSTRAINT pk_BookB PRIMARY KEY,
              rating DECIMAL(2,1),
              rated INT,
              published DATE NOT NULL,
              pages INT NOT NULL,
              title VARCHAR(255) NOT NULL,
```

```
            publisherId int NOT NULL
            CONSTRAINT fk_BookB FOREIGN KEY REFERENCES Publisher(id),
            CONSTRAINT uq_Book UNIQUE(title, publisherId)
);

CREATE TABLE Author_Writes(
            id INT NOT NULL IDENTITY(1,1)
            CONSTRAINT pk_AW PRIMARY KEY,
            authorId INT NOT NULL,
            bookISBN CHAR(13) NOT NULL,
            CONSTRAINT uq_AW UNIQUE(authorId, bookISBN)
);

CREATE TABLE Book_Belongs(
            id INT NOT NULL IDENTITY(1,1)
            CONSTRAINT pk_BB PRIMARY KEY,
            formatId INT NOT NULL,
            bookISBN CHAR(13) NOT NULL,
            CONSTRAINT uq_BB UNIQUE(formatId, bookISBN)
);


INSERT INTO Publisher VALUES('Brush Education');
INSERT INTO Publisher VALUES('Pubisher #2');

INSERT INTO Book VALUES('9781110717779', 4.6, 1, '2016-05-10', 56, 'A Short Introduction
to Databases', 1);
INSERT INTO Book VALUES('1089930596779', 3.8, 891, '2010-10-11', 356, 'The Complete
Canadian Book Editor', 1);
INSERT INTO Book VALUES('8000630596029', 2.7, 87, '2005-5-2', 607, 'Great Enciclopedia',
2);

INSERT INTO Author VALUES('Gary B.', 'Shelly'),
       ('Joy L.', 'Starks'),
       ('Joe', 'Smith');


INSERT INTO Author_Writes VALUES(2,'1089930596779'),
       (1, '9781110717779'),
       (3, '8000630596029'),
       (1, '8000630596029');

INSERT INTO Book_Belongs VALUES(1,'1089930596779'),
       (3,'1089930596779'),
       (4,'1089930596779'),
       (1,'9781110717779'),
       (2,'9781110717779'),
       (3,'8000630596029');


INSERT INTO Formats VALUES('PDF'),
       ('ePub'),
       ('TXT'),
       ('fb2');
```

```
SELECT * FROM Author;
```

id	firstName	lastName
1	Gary B.	Shelly
3	Joe	Smith
2	Joy L.	Starks

```
SELECT * FROM Book;
```

isbn	rating	rated	published	pages	title	publisherId
1089930596779	3.8	891	2010-10-11	356	The Complete Canadian Book Editor	1
8000630596029	2.7	87	2005-05-02	607	Great Enciclopedia	2
9781110717779	4.6	1	2016-05-10	56	A Short Introduction to Databases	1

```
SELECT * FROM Publisher;
```

id	name
1	Brush Education
2	Pubisher #2

```
SELECT * FROM Formats;
```

id	name
2	ePub
4	fb2
1	PDF
3	TXT

```
SELECT * FROM Author_Writes;
```

id	authorId	bookISBN
6	1	8000630596029
2	1	9781110717779
1	2	1089930596779
5	3	8000630596029

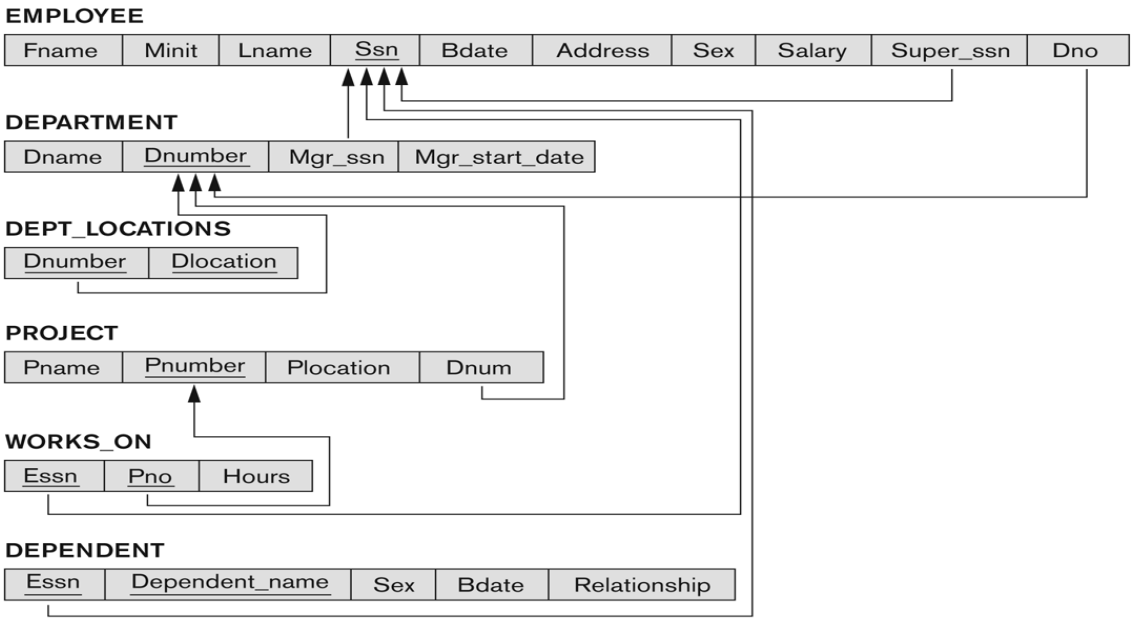
```
SELECT * FROM Book_Belongs;
```

id	formatId	bookISBN
1	1	1089930596779
6	1	9781110717779
7	2	9781110717779
2	3	1089930596779
8	3	8000630596029
3	4	1089930596779

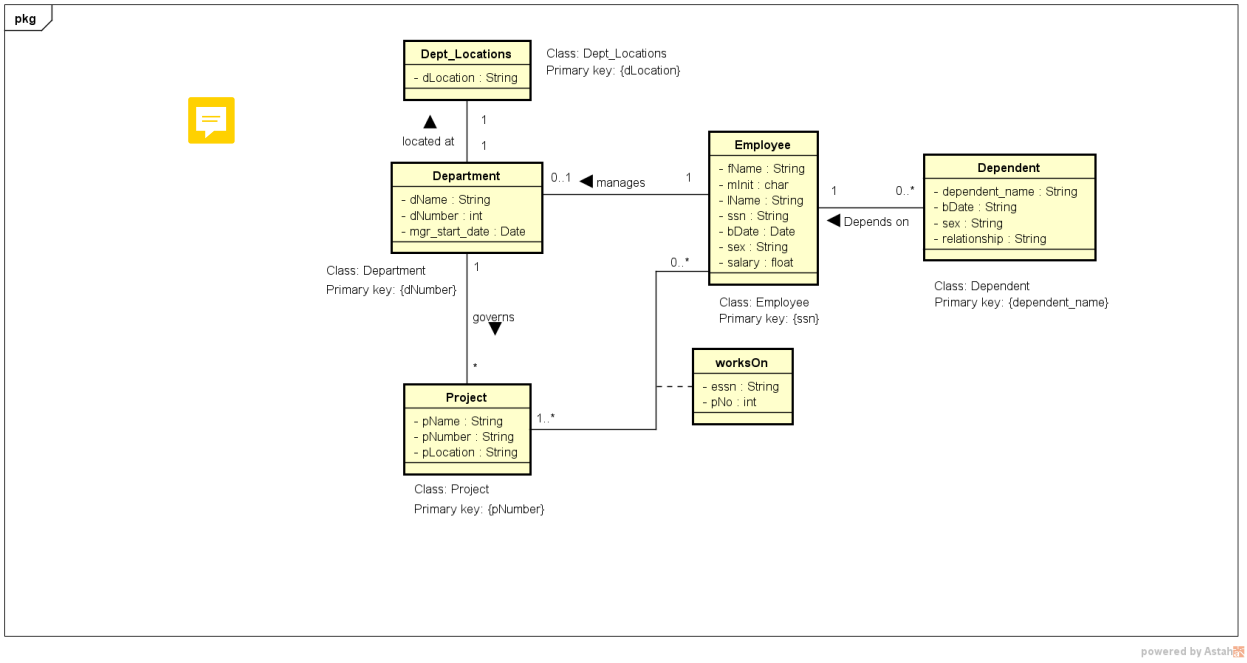
Problem 2

1. Define conceptual data model based on the following relational database schema (Company relational data model) using UML
2. Implement the Company relational database in MS SQL 2017

Figure 5.7
Referential integrity constraints displayed on the COMPANY relational database schema.



Solution:




```
CREATE TABLE Employee(
                    fName VARCHAR(100) NOT NULL,
                    mInit CHAR(1),
                    lName VARCHAR(100) NOT NULL,
                    ssn CHAR(10) NOT NULL
                    CONSTRAINT pk_Employee PRIMARY KEY,
                    bDate DATE,
```

```
                    address VARCHAR(100),
                    sex CHAR(6),
                    salary DECIMAL(8,2),
                    super_ssn char(10)
                    CONSTRAINT fk_Employee REFERENCES Employee(ssn)
);


CREATE TABLE Department(
                    dName VARCHAR(100) NOT NULL
                    CONSTRAINT uq_dName_Department UNIQUE,
                    dNumber INT NOT NULL
                    CONSTRAINT pk_Department PRIMARY KEY,
                    CONSTRAINT uq_Department UNIQUE (dNumber)
);


CREATE TABLE Employee_Manages(
                    dNo INT NOT NULL
                    CONSTRAINT fk_Employee_Manages FOREIGN KEY REFERENCES
                           Department(DNumber),
                    essn CHAR(10) NOT NULL
                    CONSTRAINT fk2_Employee_Manages FOREIGN KEY REFERENCES Employee(ssn),
                    mgr_start_date DATE NOT NULL,
                    CONSTRAINT uq_Employee_Manages UNIQUE(dNo, essn),
                    CONSTRAINT uq2_Employee_Manages UNIQUE(essn)
);


CREATE TABLE Dept_Locations(
                    dNumber INT NOT NULL
                    CONSTRAINT fk_Dept_Locations FOREIGN KEY REFERENCES
                           Department(dNumber),
                    dLocation VARCHAR(255) NOT NULL,
                    CONSTRAINT pk_Dept_Locations PRIMARY KEY(dNumber, dLocation)
);


CREATE TABLE Project(
                    pName VARCHAR(100) NOT NULL
                    CONSTRAINT uq_pName_Project UNIQUE,
                    pNumber INT NOT NULL
                    CONSTRAINT pk_Project PRIMARY KEY,
                    pLocation VARCHAR(255) NOT NULL,
                    CONSTRAINT uq_Project UNIQUE (pName, pNumber),
                    dNumber INT NOT NULL
                    CONSTRAINT fk_Project FOREIGN KEY REFERENCES Department(dNumber)
);


CREATE TABLE Works_On(
                    essn CHAR(10) NOT NULL
                    CONSTRAINT fk_Works_On FOREIGN KEY REFERENCES Employee(ssn),
                    pNo INT NOT NULL
```

```
                    CONSTRAINT fk2_Works_On FOREIGN KEY REFERENCES Project(pNumber),
                    hours INT NOT NULL,
                    CONSTRAINT pk_Works_On PRIMARY KEY(essn, pNo)
);


CREATE TABLE Dependent(
                    essn CHAR(10) NOT NULL
                    CONSTRAINT fk_Dependent FOREIGN KEY REFERENCES Employee(ssn),
                    dependent_Name VARCHAR(100) NOT NULL,
                    CONSTRAINT pk_Dependent PRIMARY KEY (essn, dependent_Name),
                    bDate DATE,
                    sex CHAR(6),
                    relationship VARCHAR(10)
);

INSERT INTO Dependent VALUES ('653298653', 'Dependent #1', '1980-9-1', 'Male', 'rel_1'),
                                        ('653298653', 'Dependent #2', '1995-10-14',
'Female', 'rel_2');

INSERT INTO Works_On VALUES ('653298653', 3325810, 32),
                                        ('653298653', 2999035, 100),
                                        ('173200653', 2999035, 10);

INSERT INTO Project VALUES ('Project #1', 3325810, '638 Voss, Houston, TX', 2579),
                                        ('Project #2', 2999035, '975 Fire Oak, Humble,
TX', 256879);

INSERT INTO Dept_Locations VALUES (256879, '975 Fire Oak, Humble, TX'),
                                        (2579, '638 Voss, Houston, TX');


INSERT INTO Employee VALUES ( 'Richard', 'K', 'Marini', '653298653', '1962-12-30', '98 Oak
Forest, Katy, TX', 'M', 37000, '653298653');
INSERT INTO Employee (Fname, Lname, Ssn) VALUES ('John', 'Smith', '173200653');


INSERT INTO Employee_Manages VALUES (256879, '653298653', '5-11-1990'),
                                        (2579, '173200653','2008-11-25');


INSERT INTO Department VALUES ('Science Department', 256879),
                                        ('Department #2', 1139),
                                        ('Science Department #2', 2579);

SELECT E.fName, E.mInit, E.lName, E.ssn, D.dName, DL.dLocation
FROM Employee AS E, Department AS D, Dept_Locations AS DL, Employee_Manages AS EM
WHERE E.ssn = EM.essn AND EM.dNo = DL.dNumber AND DL.dNumber = D.dNumber;
```

fName	mInit	lName	ssn	dName	dLocation
John	NULL	Smith	173200653	Science Department #2	638 Voss, Houston, TX
Richard	K	Marini	653298653	Science Department	975 Fire Oak, Humble, TX

```
SELECT E.fName, E.mInit, E.lName, E.ssn, P.pName, P.pLocation
FROM Employee AS E, Project AS P, Works_On AS WO
WHERE WO.essn = E.ssn AND P.pNumber = WO.pNo;
```

fName	mInit	lName	ssn	pName	pLocation

John	**NULL**	**Smith**	**173200653**	**Project #2**	**975 Fire Oak, Humble, TX**
Richard	**K**	**Marini**	**653298653**	**Project #2**	**975 Fire Oak, Humble, TX**
Richard	**K**	**Marini**	**653298653**	**Project #1**	**638 Voss, Houston, TX**

Conclusions:

Based on the developed conceptual data model "Books" in previous lab classes our first problem was to define the structure of the database and then to implement the relational database in MS SQL Server 2017. The second problem was to create a conceptual model in UML, based on the relational database schema "Company", and then implement this relational database in MS SQL. We did those tasks and the results are presented above.

Please do not forget about the conclusions being a summary of considered problems and proposed solutions!

Remarks:

1. **Students' reports (as one package) should be sent by the leader of the group via e-mail before the next lab**
2. **The rule of naming student's file report is defined below**

Name of the file: **Rep01-StudId-Last name.pdf**	Example: **Rep01-1951355-Turan.pdf**