Data Management Assignment 2 – (E)ER Modelling and Normalization

**Student Name:** Stefan Rudvin

**Student ID:** 51549217

**Email:** o.rudvin.15@aberdeen.ac.uk

**MySQL Login:** u01osr15\_swim

**MySQL Password:** swimswim

Question 1

../../../../Downloads/DataManagement.png

Annotations:

In this (E)ER diagram, I added some steps to keep data integrity a priority. The multiplicity constraints take into account null or unavailable data. For example, a new instructor might not be assigned to a training session, so the constraint is set to 0..\*. This is also applied in the training teams, supervisors, Trainees & courses etc. I used an approach to use more tables instead of relationship attributes in the ER diagram- in the relational model for example, I make the ‘Supervisors’ table an attribute of the ‘Instructs’ relationship. I made sure to have as many relationships as possible e.g. connecting Instructors directly to Courses so that an SQL query can use the data directly instead of asking data from many tables. For designing the relational stage, one could consider for example dividing the ‘TrainingSession’ table.

Question 2

../../../../Downloads/DataManagement%20(1).png

In this ER relational model, I attempted to keep tables small. For example, I divided the training sessions table from the EER diagram into 3 tables, ‘SessionTrainees’, ‘SessionInstructors’ and ‘TrainingSessions’. This makes SQL queries much easier to create and understand, although it might lead to more tables being used. This is also why I left out the multiplicity constraints, since the tables are all essentially linked anyways. I also kept the database in the third normal form. For example, since the courseName and the courseID are the same attribute in different forms, I created a new table just for CourseName.

View SQL (For good measure)

Named as transaction 1,2,3 etc.

**List all the trainees in a given training session**

SELECT \* FROM TrainingSessionTrainees

WHERE sessionID = 'S0001';

**List all the instructors on a given training team**

SELECT \* FROM `TrainingTeams` WHERE teamID = 'T0001'

**List all the courses a given instructor teaches**

SELECT instructorID, courseID

FROM Courses AS C, TrainingTeams AS T

WHERE T.instructorID = 'L0001'

and C.teamID = T.teamID

**List the phone number of a given instructor**

SELECT instructorID,phoneNumber

FROM Instructors

WHERE instructorID = 'L0001'

**List all the training sessions for a given instructor on a given date**

SELECT instructorID,S.sessionID,T.date

FROM TrainingSession AS T,TrainingSessionInstructors as S

WHERE T.date = '2016-11-24'

AND S.instructorID = 'L0001'

Question 3

Full SQL Export (Also included as .sql file)

-- phpMyAdmin SQL Dump

-- version 3.5.1

-- http://www.phpmyadmin.net

--

-- Host: mysql.abdn.ac.uk:3306

-- Generation Time: Nov 11, 2016 at 03:26 PM

-- Server version: 5.5.21-log

-- PHP Version: 5.6.25

SET SQL\_MODE="NO\_AUTO\_VALUE\_ON\_ZERO";

SET time\_zone = "+00:00";

/\*!40101 SET @OLD\_CHARACTER\_SET\_CLIENT=@@CHARACTER\_SET\_CLIENT \*/;

/\*!40101 SET @OLD\_CHARACTER\_SET\_RESULTS=@@CHARACTER\_SET\_RESULTS \*/;

/\*!40101 SET @OLD\_COLLATION\_CONNECTION=@@COLLATION\_CONNECTION \*/;

/\*!40101 SET NAMES utf8 \*/;

--

-- Database: `u01osr15\_swim`

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-- --------------------------------------------------------

--

-- Table structure for table `courseName`

--

CREATE TABLE IF NOT EXISTS `courseName` (

`courseID` varchar(6) NOT NULL,

`courseName` varchar(30) NOT NULL,

PRIMARY KEY (`courseID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `courseName`

--

INSERT INTO `courseName` (`courseID`, `courseName`) VALUES

('C0001', 'beginner'),

('C0002', 'intermediate'),

('C0003', 'advanced'),

('C0004', 'olympic');

-- --------------------------------------------------------

--

-- Table structure for table `Courses`

--

CREATE TABLE IF NOT EXISTS `Courses` (

`courseID` varchar(6) NOT NULL,

`teamID` varchar(6) NOT NULL

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `Courses`

--

INSERT INTO `Courses` (`courseID`, `teamID`) VALUES

('C0001', 'T0001'),

('C0002', 'T0002'),

('C0003', 'T0003'),

('C0004', 'T0004');

-- --------------------------------------------------------

--

-- Table structure for table `Instructors`

--

CREATE TABLE IF NOT EXISTS `Instructors` (

`instructorID` varchar(6) NOT NULL,

`firstName` varchar(30) NOT NULL,

`lastName` varchar(30) NOT NULL,

`phoneNumber` int(10) NOT NULL,

PRIMARY KEY (`instructorID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `Instructors`

--

INSERT INTO `Instructors` (`instructorID`, `firstName`, `lastName`, `phoneNumber`) VALUES

('L0001', 'Lil', 'Wayne', 707654321),

('L0002', 'Sir', 'Lancelot', 701234568),

('L0003', 'Sir', 'Lancelot', 701234568),

('L0004', 'Donald', 'Trump', 701234568),

('L0005', 'Ariana', 'Grande', 701234569),

('L0006', 'Ted', 'Mosby', 701234569),

('L0007', 'Alice', 'Cooper', 701234569),

('L0008', 'Michael', 'Jackson', 701234569),

('L0009', 'Mahatma', 'Gandhi', 701234567),

('L0010', 'Sir', 'Lancelot', 701234568),

('L0011', 'Mahatma', 'Gandhi', 701234567),

('L0013', 'Lil', 'Wayne', 707654321),

('L0014', 'Hillary', 'Clinton', 408998775),

('L0015', 'Hillary', 'Clinton', 408998775);

-- --------------------------------------------------------

--

-- Table structure for table `JoinDate`

--

CREATE TABLE IF NOT EXISTS `JoinDate` (

`traineeID` varchar(6) NOT NULL,

`date` date NOT NULL,

PRIMARY KEY (`traineeID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `JoinDate`

--

INSERT INTO `JoinDate` (`traineeID`, `date`) VALUES

('T0001', '2016-11-02'),

('T0002', '2016-11-02'),

('T0003', '2016-11-02'),

('T0004', '2016-11-02'),

('T0005', '2016-11-02'),

('T0006', '2016-11-02'),

('T0007', '2016-11-02'),

('T0008', '2016-11-02'),

('T0009', '2016-11-02'),

('T0010', '2016-11-02');

-- --------------------------------------------------------

--

-- Table structure for table `Supervisors`

--

CREATE TABLE IF NOT EXISTS `Supervisors` (

`instructorID` varchar(6) NOT NULL,

`sessionID` varchar(6) NOT NULL,

PRIMARY KEY (`instructorID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `Supervisors`

--

INSERT INTO `Supervisors` (`instructorID`, `sessionID`) VALUES

('L0001', 'S0001'),

('L0002', 'S0002'),

('L0003', 'S0003'),

('L0004', 'S0004'),

('L0005', 'S0005'),

('L0006', 'S0006'),

('L0007', 'S0007');

-- --------------------------------------------------------

--

-- Table structure for table `Trainees`

--

CREATE TABLE IF NOT EXISTS `Trainees` (

`traineeID` varchar(6) NOT NULL,

`firstName` varchar(30) NOT NULL,

`lastName` varchar(30) NOT NULL,

`phoneNumber` int(10) NOT NULL,

PRIMARY KEY (`traineeID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `Trainees`

--

INSERT INTO `Trainees` (`traineeID`, `firstName`, `lastName`, `phoneNumber`) VALUES

('T0001', 'Lil', 'Wayne', 707654321),

('T0002', 'Sir', 'Lancelot', 701234568),

('T0003', 'Lil', 'Wayne', 707654321),

('T0004', 'Donald', 'Trump', 701234568),

('T0005', 'Ariana', 'Grande', 701234569),

('T0006', 'Ted', 'Mosby', 701234569),

('T0007', 'Alice', 'Cooper', 701234569),

('T0008', 'Michael', 'Jackson', 701234569),

('T0009', 'Mahatma', 'Gandhi', 701234567),

('T0010', 'Sir', 'Lancelot', 701234568);

-- --------------------------------------------------------

--

-- Table structure for table `TrainingSession`

--

CREATE TABLE IF NOT EXISTS `TrainingSession` (

`sessionID` varchar(6) NOT NULL,

`date` date NOT NULL,

`courseID` varchar(6) NOT NULL,

PRIMARY KEY (`sessionID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `TrainingSession`

--

INSERT INTO `TrainingSession` (`sessionID`, `date`, `courseID`) VALUES

('S0001', '2016-11-22', 'C0001'),

('S0002', '2016-11-24', 'C0001'),

('S0003', '2016-11-26', 'C0002'),

('S0004', '2016-11-28', 'C0002'),

('S0005', '2016-11-22', 'C0003'),

('S0006', '2016-11-23', 'C0003'),

('S0007', '2016-11-27', 'C0004');

-- --------------------------------------------------------

--

-- Table structure for table `TrainingSessionInstructors`

--

CREATE TABLE IF NOT EXISTS `TrainingSessionInstructors` (

`instructorID` varchar(6) NOT NULL,

`sessionID` varchar(6) NOT NULL,

`teamID` varchar(6) NOT NULL,

PRIMARY KEY (`instructorID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `TrainingSessionInstructors`

--

INSERT INTO `TrainingSessionInstructors` (`instructorID`, `sessionID`, `teamID`) VALUES

('L0001', 'S0002', 'T0001'),

('L0002', 'S0004', 'T0002'),

('L0003', 'S0001', 'T0001'),

('L0004', 'S0003', 'T0002'),

('L0005', 'S0006', 'T0003'),

('L0006', 'S0005', 'T0003'),

('L0007', 'S0005', 'T0003'),

('L0008', 'S0003', 'T0002'),

('L0009', 'S0007', 'T0004'),

('L0010', 'S0007', 'T0004'),

('L0011', 'S0001', 'T0001'),

('L0013', 'S0002', 'T0001'),

('L0014', 'S0004', 'T0002'),

('L0015', 'S0006', 'T0003');

-- --------------------------------------------------------

--

-- Table structure for table `TrainingSessionTrainees`

--

CREATE TABLE IF NOT EXISTS `TrainingSessionTrainees` (

`traineeID` varchar(6) NOT NULL,

`sessionID` varchar(6) NOT NULL,

PRIMARY KEY (`traineeID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `TrainingSessionTrainees`

--

INSERT INTO `TrainingSessionTrainees` (`traineeID`, `sessionID`) VALUES

('T0001', 'S0001'),

('T0002', 'S0002'),

('T0003', 'S0003'),

('T0004', 'S0004'),

('T0005', 'S0005'),

('T0006', 'S0006'),

('T0007', 'S0007'),

('T0008', 'S0001'),

('T0009', 'S0002'),

('T0010', 'S0003');

-- --------------------------------------------------------

--

-- Table structure for table `TrainingTeams`

--

CREATE TABLE IF NOT EXISTS `TrainingTeams` (

`instructorID` varchar(6) NOT NULL,

`teamID` varchar(6) NOT NULL,

PRIMARY KEY (`instructorID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--

-- Dumping data for table `TrainingTeams`

--

INSERT INTO `TrainingTeams` (`instructorID`, `teamID`) VALUES

('L0001', 'T0001'),

('L0002', 'T0002'),

('L0003', 'T0001'),

('L0004', 'T0002'),

('L0005', 'T0003'),

('L0006', 'T0003'),

('L0007', 'T0003'),

('L0008', 'T0002'),

('L0009', 'T0004'),

('L0010', 'T0004'),

('L0011', 'T0001'),

('L0013', 'T0001'),

('L0014', 'T0002'),

('L0015', 'T0003');

-- --------------------------------------------------------

--

-- Stand-in structure for view `Transaction1`

--

CREATE TABLE IF NOT EXISTS `Transaction1` (

`traineeID` varchar(6)

,`sessionID` varchar(6)

);

-- --------------------------------------------------------

--

-- Stand-in structure for view `Transaction2`

--

CREATE TABLE IF NOT EXISTS `Transaction2` (

`instructorID` varchar(6)

,`teamID` varchar(6)

);

-- --------------------------------------------------------

--

-- Stand-in structure for view `Transaction3`

--

CREATE TABLE IF NOT EXISTS `Transaction3` (

`instructorID` varchar(6)

,`courseID` varchar(6)

);

-- --------------------------------------------------------

--

-- Stand-in structure for view `Transaction4`

--

CREATE TABLE IF NOT EXISTS `Transaction4` (

`instructorID` varchar(6)

,`phoneNumber` int(10)

);

-- --------------------------------------------------------

--

-- Stand-in structure for view `Transaction5`

--

CREATE TABLE IF NOT EXISTS `Transaction5` (

`instructorID` varchar(6)

,`sessionID` varchar(6)

,`date` date

);

-- --------------------------------------------------------

--

-- Structure for view `Transaction1`

--

DROP TABLE IF EXISTS `Transaction1`;

CREATE ALGORITHM=UNDEFINED DEFINER=`u01osr15\_swim`@`%.abdn.ac.uk` SQL SECURITY DEFINER VIEW `Transaction1` AS select `TrainingSessionTrainees`.`traineeID` AS `traineeID`,`TrainingSessionTrainees`.`sessionID` AS `sessionID` from `TrainingSessionTrainees` where (`TrainingSessionTrainees`.`sessionID` = 'S0001');

-- --------------------------------------------------------

--

-- Structure for view `Transaction2`

--

DROP TABLE IF EXISTS `Transaction2`;

CREATE ALGORITHM=UNDEFINED DEFINER=`u01osr15\_swim`@`%.abdn.ac.uk` SQL SECURITY DEFINER VIEW `Transaction2` AS select `TrainingTeams`.`instructorID` AS `instructorID`,`TrainingTeams`.`teamID` AS `teamID` from `TrainingTeams` where (`TrainingTeams`.`teamID` = 'T0001');

-- --------------------------------------------------------

--

-- Structure for view `Transaction3`

--

DROP TABLE IF EXISTS `Transaction3`;

CREATE ALGORITHM=UNDEFINED DEFINER=`u01osr15\_swim`@`%.abdn.ac.uk` SQL SECURITY DEFINER VIEW `Transaction3` AS select `T`.`instructorID` AS `instructorID`,`C`.`courseID` AS `courseID` from (`Courses` `C` join `TrainingTeams` `T`) where ((`T`.`instructorID` = 'L0001') and (`C`.`teamID` = `T`.`teamID`));

-- --------------------------------------------------------

--

-- Structure for view `Transaction4`

--

DROP TABLE IF EXISTS `Transaction4`;

CREATE ALGORITHM=UNDEFINED DEFINER=`u01osr15\_swim`@`%.abdn.ac.uk` SQL SECURITY DEFINER VIEW `Transaction4` AS select `Instructors`.`instructorID` AS `instructorID`,`Instructors`.`phoneNumber` AS `phoneNumber` from `Instructors` where (`Instructors`.`instructorID` = 'L0001');

-- --------------------------------------------------------

--

-- Structure for view `Transaction5`

--

DROP TABLE IF EXISTS `Transaction5`;

CREATE ALGORITHM=UNDEFINED DEFINER=`u01osr15\_swim`@`%.abdn.ac.uk` SQL SECURITY DEFINER VIEW `Transaction5` AS select `S`.`instructorID` AS `instructorID`,`S`.`sessionID` AS `sessionID`,`T`.`date` AS `date` from (`TrainingSession` `T` join `TrainingSessionInstructors` `S`) where ((`T`.`date` = '2016-11-24') and (`S`.`instructorID` = 'L0001'));

/\*!40101 SET CHARACTER\_SET\_CLIENT=@OLD\_CHARACTER\_SET\_CLIENT \*/;

/\*!40101 SET CHARACTER\_SET\_RESULTS=@OLD\_CHARACTER\_SET\_RESULTS \*/;

/\*!40101 SET COLLATION\_CONNECTION=@OLD\_COLLATION\_CONNECTION \*/;