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| Information Systems and Data Modeling  –    IT1090    **Assignment**     |  |  | | --- | --- | | Title: Online Teacher Trainer | | | Batch Number: 11.1 | Group Number: MLB\_11.1\_09 | | Declaration:  We hold a copy of this assignment that we can produce if the original is lost or damaged. We hereby certify that no part of this assignment has been copied from any other group’s work or from any other source. No part of this assignment has been written / produced for our group by another person except where such collaboration has been authorized by the subject lecturer/tutor concerned.        Group Members:    A picture containing text, handwriting, drawing, graffiti  Description automatically generatedIT22102782 Afzal Ahamed A H …………………………  signature  A close up of a name  Description automatically generated with low confidence    IT22149626 Chandrasiri G A S D ….......................................  signature      A close up of a sign  Description automatically generated with low confidenceIT22150448 Kaushalya W M D S …………………………  signature      A close up of a signature  Description automatically generated with low confidenceIT22144430 Liyanage N S …………………………  signature      A close up of a logo  Description automatically generated with low confidenceIT22153654 Piranavan S …………………………  signature  **Submitted on: 28/05/2023** | |   **Table of contents**   * Introduction * Hypothetical Scenario * Requirements Analysis   i) Main requirements of The System  ii) Data Requirements of The System   * Entity Relational (ER) Diagram * Relational Schema * SQL Queries to Create the Database * Performance Considerations * Security Requirements * Contribution of Project |
| **Introduction**  An online teacher trainer system is the most recent development in teacher training.  Since you may access as many courses as you like and expand your knowledge whenever and wherever you like. Every day, we upgrade our system. Our Edu Teach online teacher trainer is made especially for trainers and students who are eager to acquire new material and gain better management skills for cutting-edge information technology tools. There is also a customer support system that is available 24/7. We ensure that every component is understood by our users as the internationally revised online teacher trainer system.  It also helps with instruction at esteemed universities. It helps educators accomplish their objectives. Your strain of finding reliable research is lessened by our new expert.  A variety of technologies must be explored and understood to develop an online teacher trainer website. Programming languages (such as HTML, CSS, and JavaScript) and relational databases were among them (Such as My SQL).  A database must be able to manage a wide range of data. A database is required because managing a computer-based stored data system is easier than managing written or typed documents. Customers and administrators save time and effort because of this. Furthermore, since the data is stored in a database, there is no risk of losing it. The system's users are the only ones who can control it. Collecting requirements and doing requirement analysis while building a database is vital The functional and nonfunctional specifications, as well as the data requirements, can then be determined.  **Hypothetical Scenario**  A web-based learning management system (LMS) is named the Online Trainer System (OTS). This system caters to two main user groups: Trainee Teachers and Lecturers. Both user groups have access to view the system's content.  When an unregistered user visits the system, they are presented with a form that they can fill out. In this scenario, the form is then reviewed by an administrator who assesses the information provided. If the administrator finds the form suitable, the unregistered user is then granted registered user status. The registered user can be either a Trainee Teacher or a Lecturer.  In order to participate in courses, attend lectures, and take tests, Trainee Teachers are required to make payments for enrollment. Upon successful completion of the course and passing the exams, Trainee Teachers are awarded certificates to acknowledge their accomplishment. On the other hand, Lecturers are responsible for delivering lectures, adding lecture materials to the system, and are compensated for their services. The course structure consists of multiple modules, each of which includes lectures and several exams.  In this hypothetical scenario, the system's development, security, error handling, and updates are overseen by an administrator and coordinator. They ensure that the system functions smoothly and remains up-to-date.  **Requirements Analysis**  **Functional requirements**  Functional requirements mean how registered users interact with the system. Online teacher training system also includes a set of main Functional requirements**.** There are as follows.  The website can be accessed by System Administrator, Registered Lectures, and Registered training teachers.  **System Administrator –**   * System Administrator has access to the both lectures side and training teacher side of the system * System Administrator can view and manage data. * System Administrator can edit the database. * System Administrator can manage registered user profiles. * System Administrator is responsible for maintaining the security of the system * System Administrator is responsible for verifying the privacy of registered users.   **Lecture –**   * Lecturehas access to the lectures side of the system. * Lecture can manage a learning environment to train teachers. * Lecture can update lecture notes to training teachers. * Lecture can plan learning schedules for training teachers. * Lecture can upload online tests to training teachers. * Lecture can mark the answer sheets of training teachers. * Lecture can upload marking scheme and result sheet.   **Training Teacher –**   * Training Teacherhas access to the training teacher side of the system. * Training Teacher has access to the system. * Training Teacher can view learning schedules. * Training Teacher can download the lecture notes. * Training Teacher can answer online tests. * Training Teacher can upload the answer sheets. * Training Teacher can download the marking scheme and Result sheet.   **Nonfunctional requirements**  Non-functional requirements are a set of specifications that describe the operational capabilities of the system. And it further means that NFRS can be defined as a quality attribute. Functional requirements as well as non-functional requirements are important for the system and its functionality.  **Availability**   * The system should be available 24 hours for users.   **Speed**  The website’s load time should not be more than 03 seconds for users.  **Security**   * The system’s information should be accessible to only registered users. * The system’s special information should not be accessible to unregistered users. * Data of the system should be stored in a protective method. * The privacy of the registered users should be verified.   **Scalability**   * More than 2000 registered users should have accessible at a time.   **Usability**   * The system should be simple and understandable to the registered users.   **Data Requirements**  **Unregistered User**   * NIC * Name (First name and Last name) * Email * Password * Mobile No   **Registered User**   * Reg\_no * Name (First name and Last name) * Email * Password * Mobile No   **Trainee Teacher**   * T\_No * Name (First name and Last name) * Email * Password * Mobile No   **Lecturer**   * L\_No * Name (First name and Last name) * Email * Password * Mobile No   **Course**   * C\_ID * Name * Duration   **Module**   * M\_ID * Name * Credit   **Lecture**   * Lec\_No * Name * Type * Duration   **Exam**   * E\_no * Name * Duration   **Payment**   * Payment\_ID * Amount * Receipt No * Description   **Certificate**   * Certificate\_No * Description   **Entity Relation Diagram**    **Relational Schema**    --Unregister User Table--  CREATE TABLE Unregister\_User(  NIC VARCHAR(12),  First\_Name VARCHAR(50),  Last\_Name VARCHAR(50),  Email VARCHAR(50),  Password VARCHAR(20),  Mobile\_NO INT,  constraint PK\_UU primary key(NIC)  );  --Register User Table--  CREATE TABLE Register\_User(  Reg\_No CHAR(5),  First\_Name VARCHAR(50),  Last\_Name VARCHAR(50),  Email VARCHAR(50),  Password VARCHAR,  Mobile\_NO INT,  NIC VARCHAR(12),  constraint PK\_RU primary key(Reg\_No),  constraint FK\_RU foreign key(NIC) references Unregister\_User(NIC),  constraint Register\_User\_Reg\_No\_CK check (Reg\_No like '[r\R][0-9][0-9][0-9][0-9]')  );  --Course Table--  CREATE TABLE Course(  C\_ID CHAR(5),  Name VARCHAR (5),  Duration VARCHAR(30),  constraint PK\_C primary key(C\_ID),  constraint Course\_C\_No\_CK check (C\_ID like '[t\T][0-9][0-9][0-9][0-9]')  );  --Trainee Teacher Table--  CREATE TABLE Trainee\_Teacher(  T\_No CHAR(5),  Reg\_No CHAR (5),  C\_ID CHAR(5),  constraint PK\_TT primary key(T\_No),  constraint FK\_TT foreign key(Reg\_No) references Register\_User(Reg\_No),  constraint Trainee\_Teacher\_T\_No\_CK check (T\_No like '[t\T][0-9][0-9][0-9][0-9]'),  constraint Trainee\_Teacher\_Reg\_No\_CK check (Reg\_No like '[r\R][0-9][0-9][0-9][0-9]'),  constraint Trainee\_Teacher\_C\_ID\_CK check (C\_ID like '[c\C][0-9][0-9][0-9][0-9]')  );  --Lecturer Table--  CREATE TABLE Lecturer(  L\_No CHAR(5),  Reg\_No CHAR (5),  constraint PK\_L primary key(L\_No),  constraint FK\_L foreign key(Reg\_No) references Register\_User(Reg\_No),  constraint Lecturer\_L\_No\_CK check (L\_No like '[l\L][0-9][0-9][0-9][0-9]'),  constraint Lecturer\_Reg\_No\_CK check (Reg\_No like '[r\R][0-9][0-9][0-9][0-9]')  );  --Modules Table--  CREATE TABLE Modules(  M\_ID CHAR(5),  Name VARCHAR(50),  Credit int,  C\_ID CHAR(5),  constraint PK\_M primary key(M\_ID),  constraint FK\_M foreign key(C\_ID) references Course(C\_ID),  constraint Modules\_M\_No\_CK check (M\_ID like '[m\M][0-9][0-9][0-9][0-9]'),  constraint Modules\_C\_ID\_CK check (C\_ID like '[r\R][0-9][0-9][0-9][0-9]')  );  --Lecturer\_Module Table--  CREATE TABLE Lecturer\_Module(  L\_No CHAR(5),  M\_ID CHAR(5),  constraint PK\_LM primary key(L\_No,M\_ID),  constraint FK\_LM1 foreign key(L\_No) references Lecturer(L\_No),  constraint FK\_LM2 foreign key(M\_ID) references Modules(M\_ID),  constraint Lecturer\_Module\_L\_No\_CK check (L\_No like '[l\L][0-9][0-9][0-9][0-9]'),  constraint Lecturer\_Module\_M\_ID\_CK check (M\_ID like '[m\M][0-9][0-9][0-9][0-9]')  );  --Lecture Table--  CREATE TABLE Lecture(  Lec\_No CHAR(5),  Name VARCHAR(50),  Duration VARCHAR(50),  Type VARCHAR(50),  M\_ID char(5),  L\_No char(5),  constraint PK\_Lec primary key(Lec\_No),  constraint FK\_Lec1 foreign key(M\_ID) references Modules(M\_ID),  constraint FK\_Lec2 foreign key(L\_No) references Lecturer(L\_No),  constraint Lecture\_Lec\_No\_CK check (Lec\_No like '[LEC\Lec\lec][0-9][0-9][0-9][0-9]'),  constraint Lecture\_M\_ID\_CK check (M\_ID like '[m\M][0-9][0-9][0-9][0-9]'),  );  --Atten\_Lecture Table--  CREATE TABLE Atten\_Lecture(  Lec\_No CHAR(5),  T\_No CHAR (5),  constraint PK\_AL primary key(Lec\_No,T\_No),  constraint FK\_AL1 foreign key(Lec\_No) references Lecture(Lec\_No),  constraint FK\_AL2 foreign key(T\_No) references Trainee\_Teacher(T\_No),  constraint Atten\_Lecture\_Lec\_No\_CK check (Lec\_No like '[l\L][0-9][0-9][0-9][0-9]'),  constraint Atten\_Lecture\_T\_No\_CK check (T\_No like '[t\T][0-9][0-9][0-9][0-9]')  );  --Payment Table--  CREATE TABLE Payment(  Payment\_ID CHAR(5),  Amount FLOAT,  Receipt\_No VARCHAR(50),  Description VARCHAR(100),  T\_NO CHAR (5),  L\_NO CHAR (5),  constraint PK\_P primary key(Payment\_ID),  constraint FK\_P1 foreign key(T\_NO) references Trainee\_Teacher(T\_NO),  constraint FK\_P2 foreign key(L\_NO) references Lecturer(L\_NO),  constraint Payment\_Payment\_ID\_CK check (Payment\_ID like '[p\P][0-9][0-9][0-9][0-9]'),  constraint Payment\_T\_NO\_CK check (T\_NO like '[t\T][0-9][0-9][0-9][0-9]'),  constraint Payment\_L\_NO\_CK check (L\_NO like '[l\L][0-9][0-9][0-9][0-9]')  );  --Exam Table--  CREATE TABLE Exam(  E\_No CHAR(5),  Name VARCHAR(50),  Duration VARCHAR(50),  M\_ID CHAR(5),  constraint PK\_E primary key(E\_No),  constraint FK\_E foreign key(M\_ID) references Modules(M\_ID),  constraint Exam\_E\_No\_CK check (E\_No like '[e\E][0-9][0-9][0-9][0-9]'),  constraint Exam\_M\_ID\_CK check (M\_ID like '[M\m][0-9][0-9][0-9][0-9]')  );  --Attept\_Exam Table--  CREATE TABLE Attept\_Exam(  E\_No CHAR(5),  T\_No CHAR (5),  constraint PK\_AE primary key(E\_No,T\_No),  constraint FK\_AE1 foreign key(E\_No) references Exam(E\_No),  constraint FK\_AE2 foreign key(T\_No) references Trainee\_Teacher(T\_No),  constraint Attept\_Exam\_E\_No\_CK check (E\_No like '[e\E][0-9][0-9][0-9][0-9]'),  constraint Attept\_Exam\_T\_No\_CK check (T\_No like '[t\T][0-9][0-9][0-9][0-9]')  );  --Certificate Table--  CREATE TABLE Certificate(  Certificate\_No CHAR(5),  Description VARCHAR(100),  T\_No CHAR (5),  constraint PK\_Certificate primary key(Certificate\_No),  constraint FK\_Certificate foreign key(T\_No) references Trainee\_Teacher(T\_No),  constraint Certificate\_T\_No\_CK check (T\_No like '[r\R][0-9][0-9][0-9][0-9]')  );  -- INSERTION OF SAMPLE DATA –  --Unregister\_User Table--  insert into Unregister\_User values(20021661045,'John ','Smith','johnsmith@example.com','Js12345',0765493157);  insert into Unregister\_User values(20021666045,'Emma ','Johnson','emmajohnson@example.com','Ej56789',0795468541);  insert into Unregister\_User values(20021661070,'Michael ','Williams','michaelwilliams@example.com','Mw98765',0725486148);  insert into Unregister\_User values(20021630045,'Sophia ','Brown','sophiabrown@example.com','Sb43210',0715489354);  insert into Unregister\_User values(20021881045,'Daniel ','Davis','danieldavis@example.com','Dd24680',0754863249);  insert into Unregister\_User values(20034661045,'Olivia ','Taylor','oliviataylor@example.com','Ot13579',0763548924);  insert into Unregister\_User values(20015666045,'David','Martinez','davidmartinez@example.com','Dm02468',0741239586);  insert into Unregister\_User values(20074461070,'Isabella ','Anderson','isabellaanderson@example.com','Ia75319',0759843258);  insert into Unregister\_User values(20025000045,'James','Wilson','jameswilson@example.com','Jw95162',0742158936);  insert into Unregister\_User values(20021121045,'Emily','Thompson','emilythompson@example.com','Et86420',0778965423);  --Register\_User Table--  insert into Register\_User values('R0001','John ','Smith','johnsmith@example.com','Js12345',0765493157,20021661045);  insert into Register\_User values('R0002','Emma ','Johnson','emmajohnson@example.com','Ej56789',0795468541,20021666045);  insert into Register\_User values('R0003','Michael ','Williams','michaelwilliams@example.com','Mw98765',0725486148,20021661070);  insert into Register\_User values('R0004','Sophia ','Brown','sophiabrown@example.com','Sb43210',0715489354,20021630045);  insert into Register\_User values('R0005','Daniel ','Davis','danieldavis@example.com','Dd24680',0754863249,20021881045);  insert into Register\_User values('R0006','Olivia ','Taylor','oliviataylor@example.com','Ot13579',0763548924,20034661045);  insert into Register\_User values('R0007','David','Martinez','davidmartinez@example.com','Dm02468',0741239586,20015666045);  insert into Register\_User values('R0008','Isabella ','Anderson','isabellaanderson@example.com','Ia75319',0759843258,20074461070);  insert into Register\_User values('R0009','James','Wilson','jameswilson@example.com','Jw95162',0742158936,20025000045);  insert into Register\_User values('R0010','Emily','Thompson','emilythompson@example.com','Et86420',0778965423,20021121045);  --Course Table--  insert into Course values ('C0001', 'Pedagogy and Classroom Management', '10 months');  insert into Course values ('C0002', 'Technology in Education', '12 months');  insert into Course values ('C0003', 'Differentiated Instruction', '5 months');  insert into Course values ('C0004', 'Special Education', '11 months');  insert into Course values ('C0005', 'Culturally Responsive Teaching', '6 months');  --Trainee\_Teacher Table--  insert into Trainee\_Teacher values('T0001','R0001','C0002');  insert into Trainee\_Teacher values('T0002','R0002','C0001');  insert into Trainee\_Teacher values('T0003','R0003','C0005');  insert into Trainee\_Teacher values('T0004','R0004','C0003');  insert into Trainee\_Teacher values('T0005','R0005','C0004');  --Lecturer Table--  insert into Lecturer values('L0001','R0006');  insert into Lecturer values('L0002','R0007');  insert into Lecturer values('L0003','R0008');  insert into Lecturer values('L0004','R0009');  insert into Lecturer values('L0005','R0010');  --Modules Table--  insert into Modules values('M0001', 'Introduction to Pedagogy', 2, 'C0001');  insert into Modules values('M0002', 'Digital Literacy and Citizenship', 4, 'C0002');  insert into Modules values('M0003', 'Understanding Learning Styles', 3, 'C0003');  insert into Modules values('M0004', 'Laws and Regulations in Special Education', 4, 'C0004');  insert into Modules values('M0005', 'Anti-Bias Education', 2, 'C0005');  --Lecturer\_Module Table--  insert into Lecturer\_Module values('L0001','M0001');  insert into Lecturer\_Module values('L0002','M0002');  insert into Lecturer\_Module values('L0003','M0003');  insert into Lecturer\_Module values('L0004','M0004');  insert into Lecturer\_Module values('L0005','M0005');  --Lecture Table--  insert into Lecture values('LEC0001', 'Introduction to Pedagogy', '1 hour', 'Classroom', 'M0001', 'L0001');  insert into Lecture values('LEC0002', 'Introduction to Educational Technology', '1 hour', 'Classroom', 'M0002', 'L0002');  insert into Lecture values('LEC0003', 'Introduction to Differentiated Instructionn', '1 hour', 'Classroom', 'M0003', 'L0003');  insert into Lecture values('LEC0004', 'Introduction to Special Education', '1 hour', 'Classroom', 'M0004', 'L0004');  insert into Lecture values('LEC0005', 'Introduction to Culturally Responsive Teaching', '1 hour', 'Classroom', 'M0005', 'L0005');  --Atten\_Lecture Table--  insert into Atten\_Lecture values ('LEC0001', 'T0001');  insert into Atten\_Lecture values ('LEC0002', 'T0002');  insert into Atten\_Lecture values ('LEC0003', 'T0003');  insert into Atten\_Lecture values ('LEC0004', 'T0004');  insert into Atten\_Lecture values ('LEC0005', 'T0005');  --Payment Table--  insert into Payment values ('P0001', 50000.00, 'RCPT001', 'Course fee', 'T0001', NULL);  insert into Payment values ('P0002', 60000.00, 'RCPT001', 'Salary', NULL, 'L0001');  insert into Payment values ('P0003', 40000.00, 'RCPT001', 'Course fee', 'T0002', NULL);  insert into Payment values ('P0004', 80000.00, 'RCPT001', 'Salary', NULL, 'L0002');  insert into Payment values ('P0005', 30000.00, 'RCPT001', 'Course fee', 'T0003', NULL);  --Exam Table--  insert into Exam values ('E0001', 'Final Exam', '2 hours', 'M0001');  insert into Exam values ('E0002', 'Mid Exam', '2 hours', 'M0002');  insert into Exam values ('E0003', 'Final Exam', '2 hours', 'M0003');  insert into Exam values ('E0004', 'Mid Exam', '2 hours', 'M0004');  insert into Exam values ('E0005', 'Final Exam', '2 hours', 'M0005');  --Attept\_Exam Table--  insert into Attept\_Exam values ('E0001', 'T0001');  insert into Attept\_Exam values ('E0001', 'T0002');  insert into Attept\_Exam values ('E0003', 'T0001');  insert into Attept\_Exam values ('E0003', 'T0002');  insert into Attept\_Exam values ('E0005', 'T0003');  --Certificate Table--  insert into Certificate values ('00001', 'Certificate of Completion', 'T0001');  insert into Certificate values ('00002', 'Certificate of Completion', 'T0002');  insert into Certificate values ('00003', 'Certificate of Completion', 'T0003');  insert into Certificate values ('00004', 'Certificate of Completion', 'T0004');  insert into Certificate values ('00005', 'Certificate of Completion', 'T0005');  **Special Performance Considerations**   * **Scalability:**   + Design for handling a growing number of users and training sessions.   + Employ techniques like load balancing and horizontal scaling. * **Response Time:**   + Minimize latency issues for real-time interactions.   + Optimize network communication and processing time. * **Bandwidth Optimization:**   + Implement adaptive streaming to adjust video quality based on the user's internet connection.   + Reduce buffering for smoother playback. * **Compatibility and Accessibility:**   + Ensure compatibility across web browsers and operating systems.   + Adhere to accessibility standards for users with disabilities. * **Data Storage and Retrieval:**   + Design efficient mechanisms for storing and retrieving user profiles, training materials, and progress records.   + Utilize database indexing, caching, and data compression techniques. * **Security:**   + Implement robust security measures to protect sensitive information.   + Include encryption, user authentication, secure transmission protocols, and regular security audits. * **System Monitoring and Analytics:**   + Set up monitoring tools to track system performance and identify bottlenecks.   + Utilize real-time analytics for insights into user behavior and performance metrics. * **Usability and User Interface Design:**   + Create an intuitive and user-friendly interface for easy navigation.   + Optimize the user interface to minimize cognitive load and provide clear instructions.   **Special Security Requirements**  **User Authentication and Access Control**   * Strong password policies. * Two-factor authentication or biometric authentication. * Role-based access controls.   **Secure Data Transmission**   * Encryption using HTTPS (SSL/TLS).   **Data Encryption**   * Encryption of sensitive data at rest and in transit.   **Robust Authorization Mechanism**   * Well-defined access restrictions and permissions.   **Secure Infrastructure**   * Secure servers and networks. * Regular application of security patches and updates.   **Secure Coding Practices**   * Adherence to secure coding standards. * Regular security code reviews and testing.   **Regular Data Backups**   * Automated and secure data backup procedures.   **Logging and Monitoring**   * Comprehensive logging of user activities. * Monitoring of system logs, network traffic, and user behavior.   **Secure Third-Party Integrations**   * Validation of security practices of external services or APIs. * Secure API authentication and data encryption.   **Staff Training and Awareness**   * Security best practices education for administrators, developers, and users.   **Incident Response and Recovery**   * Incident response plan. * Reporting and responding to security breaches. * System restoration after an incident. |