Virtual University/eLearning

# Database Design

Version 1.0 02/19/2024

Project report for CSC422 by Team Member Names: Nathan Mollica, Peter Momsen, John Padworski, Brandon Perez-Lee

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## Introduction

Overview:

The database design and modeling are centered around developing a solution for a university campus to have and grant access to an eLearning platform that manages eBooks and eCourses. These eBooks and eCourses are to be used by both university staff and students to facilitate accomplishing required course work as well as for personal research. It is expected that Staff members have full access to all desired eLearning software eBooks and eCourses, while students have an intermediary purchase process that manages their access to all available material. Students are required to maintain their payment information up to date by ensuring the university has the latest information. The eLearning software company will expect payments from the university upon student transaction requests being processed. The University receives the bill directly from the eLearning provider and pays them directly. The university then handles the bill via the student’s payment information. Upon completion of the payment transaction, a request access authorization is approved and released to the requesting student to gain access to the desired eBook and/or eCourse as required. The request authorization access exposes the material directly and the student then has access to use the material as required. This may be limited to a predetermined authorization time frame or may be granted persistently depending on the student’s request type. The student can request a rental or purchase request at the time of request submittal and pay the required pricing upon receiving the bill from the university. The eLearning platform also manages access levels to material via an electronic membership sign up process. The university as an educational entity, staff members, and students each have different forms of access that must meet the eLearning platform requirements for access to ensure proper authorization of material. Each student’s rental or purchase requests are used by the eLearning management system to query the system’s library directly. This query is then process by the library entity to search its inventory for the eCourse or eBook. This query process verifies material integrity and presence within the system. eBooks track according to their ISBNs and also hold other pertinent version information to include its publisher, rental cost, purchase cost, edition, genre, and author information. eCourse entities will hold unique identification numbers, course cost information, electronic content, which instructors are teaching the course, and the number of students who are currently enrolled in the course.

## Assumptions/Constraints/Risks/Tasks

### Assumptions

**eLearning Campus Library Business Rules**

1. Students and instructors can have a single eLearning Membership to their University’s eLearning system used for renting and purchasing eBooks.
2. The eLearning system can have many student or instructor memberships.
3. Each electronic library has access to many libraries that each have a single library inventory system that contains many eBooks. Libraries can be used by various eLearning platforms.
4. Each eBook has a unique identifier using the book’s ISBN, a purchase price, a rental price, author information, and publication information. There can be one or more authors for a single eBook. There can be a single publisher for a single eBook.
5. Students can purchase or rent many eBooks within the eLearning system.
6. Students can be enrolled zero or many courses.
7. Instructors can teach one or many courses. Courses can have one or more instructors.
8. Courses have student count limitations of between 1 and 30 students for enrollment.
9. The University has an agreement with the eLearning system that students can rent eBooks at a discounted price for those who are enrolled in course(s) that require specific eBooks. The eLearning system will adjust the eLearning system bill for this case. The eBooks can only be rented for the duration of the course in this case.
10. The eLearning library inventory will place constraints on the number of eBook rentals that are used in conjunction with course enrollment. This limit is based on the course’s student enrollment count.
11. Students can generate many eBook requests that produce a single Rental or Purchase record further specifying the request for use by eLearning system processing.
12. If the student indicates eBook is for current course enrollment, the University validates this prior to confirming with eLearning system for discount. The eLearning system updates the final bill total for the student transaction prior to their payment.
13. eBook rentals are limited to either course enrollment period or 60 days for normal rentals.

### Constraints

* Courses are limited to a constraint of 1 to 30 students.
* Students are limited in course related rentals by the length of the course OR 60-day default.
* Universities will use only one eLearning System.
* Instructors and Students are allowed only one membership to the eLearning System.
* Each electronic library used by the eLearning system has only one inventory system.
* Only a single purchase or rental record can be produced from a student request.

### Risks

* Payment information is present within the DBMS between the student’s enrolled at the university between them and the university, and within transaction records between the university and the eLearning company.
* Controlling access to the eLearning course and book materials requires a tight membership infrastructure that needs to be consistently up to date to mitigate loss of time spent simply trying to gain access to the material.
* The payment settling option is the weak point between customer satisfaction with time to retrieve the material following the transaction and database transactions need to be consistent and update smoothly.

### Scope Context

|  |
| --- |
| *Diagram  Description automatically generated* |

Figure 1. eLearning In-Process ERD 25MAR22.

## Design Decisions

Overview:

This section outlines the key factors that hold influence over database and

database management system design.

### Key Factors Influencing Design

* DBMS Determination – MS Access, SQL, or MySQL. Which one will provide longevity for the University in terms of relevant technology?
* Cost – What products best meet the University’s needs to accomplish consistent and safe student and staff access to required learning material.

### ITM440\_eLearningDB\_Build.sql

|  |
| --- |
| /\*  Create tables eLearning Database  Notes:  PW Reset for MySQL Server : $(brew --prefix mysql)/bin/mysqladmin -u root password NEWPASS  Start MySQL Server: > mysqld [ENTER]  Connecto MySQL Server: > mysql -u root -p  PW: `password`  Selecting DB to Use: USE <DB\_NAME>  Check SELECTED DB: SELECT DATABASE()  Delete TABLE: DROP TABLE <table\_name>;  Adding Column to TABLE:  ALTER TABLE <table\_name>  ADD [COLUMN] pub\_id INT AFTER auth\_id,  ADD CONSTRAINT fk\_publisher FOREIGN KEY (pub\_id) REFERENCES publisher(pub\_id)  \*/  -- CREATE AND SELECT eLEARNING DATABASE --  CREATE DATABASE IF NOT EXISTS `ITM440\_eLearning`;  USE ITM440\_eLearning;  -- BEGIN: eLEARNING DB TABLE CREATION (19 TABLES) --  CREATE TABLE IF NOT EXISTS `AUTHOR` (  `AUTH\_ID` INT NOT NULL PRIMARY KEY,  `AUTH\_FN` VARCHAR(300),  `AUTH\_LN` VARCHAR(300),  `AUTH\_FULLN` VARCHAR(300)  );  CREATE TABLE IF NOT EXISTS `PUBLISHER` (  `PUB\_ID` INT NOT NULL PRIMARY KEY,  `PUB\_NAME` VARCHAR(300),  `PUB\_ADDR` VARCHAR(300),  `PUB\_URL` TEXT(800)  );  CREATE TABLE IF NOT EXISTS `BOOK` (  `BK\_ISBN` INT NOT NULL PRIMARY KEY,  `BK\_INVID` INT NOT NULL UNIQUE KEY,  `BK\_REQID` INT NOT NULL UNIQUE KEY,  `AUTH\_ID` INT,  `PUB\_ID` INT,  `BK\_RENTCOST` DECIMAL,  `BK\_BUYCOST` DECIMAL,  `BK\_TITLE` VARCHAR(300),  `BK\_EDITION` INT,  `BK\_URL` TEXT(800),  `BK\_CATEGORY` VARCHAR(300)  );  CREATE TABLE IF NOT EXISTS `LIBRARY` (  `LIB\_ID` INT NOT NULL PRIMARY KEY,  `LIB\_QRESULTS` BIT NULL UNIQUE KEY,  `INV\_ID` INT,  `LIB\_URL` TEXT(800)  );  CREATE TABLE IF NOT EXISTS `LIB\_INVENTORY` (  `INV\_ID` INT NOT NULL PRIMARY KEY,  `BK\_INVID` INT,  `E\_INVID` INT,  `INV\_LASTUPDATE` DATETIME  );  CREATE TABLE IF NOT EXISTS `REQ\_AUTHORIZATION` (  `RAUTH\_ID` INT NOT NULL PRIMARY KEY,  `RAUTH\_COST\_CALC` DECIMAL NOT NULL UNIQUE KEY,  `SYS\_REQRESPONSE` BIT,  `LIB\_QRESULTS` BIT,  `BK\_REQID` INT,  `E\_REQID` INT  );  CREATE TABLE IF NOT EXISTS `REQ\_AUTH\_ACCESS` (  `AUTH\_ID` INT NOT NULL PRIMARY KEY,  `AUTH\_STUDCODE` VARCHAR(100) NOT NULL UNIQUE KEY,  `AUTH\_STAFFCODE` VARCHAR(100) NOT NULL UNIQUE KEY,  `E\_CONTENT` VARCHAR(300),  `BK\_ISBN` INT,  `BILL\_AUTHCODE` VARCHAR(300),  `AUTH\_DATE` DATETIME,  `AUTH\_START` DATETIME,  `AUTH\_END` DATETIME,  `AUTH\_STATUS` BIT  );  CREATE TABLE IF NOT EXISTS `E\_COURSE` (  `E\_CID` INT NOT NULL PRIMARY KEY,  `E\_REQID` INT NOT NULL UNIQUE KEY,  `E\_INVID` INT NOT NULL UNIQUE KEY,  `E\_CONTENT` VARCHAR(300) NOT NULL UNIQUE KEY,  `ECOURSE\_NAME` VARCHAR(300),  `ECOURSE\_START` DATETIME,  `ECOURSE\_END` DATETIME,  `E\_NUMOF\_STUD` INT  );  CREATE TABLE IF NOT EXISTS `eLEARNING` (  `SYS\_ID` INT NOT NULL PRIMARY KEY,  `SYS\_BILLING` VARCHAR(300) NOT NULL UNIQUE KEY,  `SYS\_REQRESPONSE` BIT NULL UNIQUE KEY,  `MEM\_SYSID` INT,  `REQ\_INFO` VARCHAR(300),  `LIB\_ID` INT,  `SYS\_URL` TEXT(800)  );  CREATE TABLE IF NOT EXISTS `E\_MEMBERSHIP` (  `MEM\_SYSID` INT NOT NULL PRIMARY KEY,  `MEM\_STUDID` INT NULL UNIQUE KEY,  `MEM\_STAFFID` INT NULL UNIQUE KEY,  `MEM\_UNIID` INT NULL UNIQUE KEY,  `SYS\_ID` INT,  `MEM\_ACTIVE` BIT,  `MEM\_START` DATETIME,  `MEM\_EXPIRATION` DATETIME,  `MEM\_TERMS` TEXT(800)  );  CREATE TABLE IF NOT EXISTS `UNIVERSITY` (  `UNI\_ID` INT NOT NULL PRIMARY KEY,  `UNI\_STUDID` INT NOT NULL UNIQUE KEY,  `UNI\_STAFFID` INT NOT NULL UNIQUE KEY,  `UNI\_PAYINFO` VARCHAR(300) NOT NULL UNIQUE KEY,  `UNI\_BILLINFO` VARCHAR(300) NOT NULL UNIQUE KEY,  `MEM\_UNIID` INT,  `PAY\_INFO` VARCHAR(300),  `UNI\_URL` TEXT(800),  `UNI\_NAME` VARCHAR(300),  `UNI\_ADDR` VARCHAR(300),  `UNI\_PHONE` VARCHAR(300),  `UNI\_EMAIL` VARCHAR(300)  );  CREATE TABLE IF NOT EXISTS `INSTRUCTOR` (  `INST\_ID` INT NOT NULL PRIMARY KEY,  `UNI\_STAFFID` INT,  `MEM\_STAFFID` INT,  `AUTH\_STAFFCODE` VARCHAR(100),  `INST\_FNAME` VARCHAR(300),  `INST\_LNAME` VARCHAR(300),  `INST\_PHONE` VARCHAR(300),  `INST\_EMAIL` VARCHAR(300)  );  CREATE TABLE IF NOT EXISTS `STUDENT` (  `STUD\_ID` INT NOT NULL PRIMARY KEY,  `UNI\_STUDID` INT,  `MEM\_STUDID` INT,  `AUTH\_STUDCODE` VARCHAR(100),  `RENT\_ID` INT,  `PURCH\_ID` INT,  `REQ\_AUTHSTATUS` BIT,  `STUD\_FNAME` VARCHAR(300),  `STUD\_LNAME` VARCHAR(300),  `STUD\_PHONE` VARCHAR(300),  `STUD\_EMAIL` VARCHAR(300)  );  CREATE TABLE IF NOT EXISTS `STUD\_PAYINFO` (  `PAY\_INFO` VARCHAR(300) NOT NULL PRIMARY KEY,  `STUD\_ID` INT  );  CREATE TABLE IF NOT EXISTS `REQUEST` (  `REQ\_ID` INT NOT NULL PRIMARY KEY,  `REQ\_INFO` VARCHAR(300) NOT NULL UNIQUE KEY,  `REQ\_AUTHSTATUS` BIT NOT NULL UNIQUE KEY,  `RAUTH\_ID` INT,  `RENT\_REQID` INT,  `PURCH\_REQID` INT,  `REQ\_DATE` DATETIME,  `REQ\_PURCHASE` BIT,  `REQ\_RENT` BIT  );  CREATE TABLE IF NOT EXISTS `RENTAL\_REQUEST` (  `RENT\_ID` INT NOT NULL PRIMARY KEY,  `RENT\_REQID` INT NULL UNIQUE KEY,  `RENT\_BILLING` DECIMAL NOT NULL UNIQUE KEY,  `RENT\_REQINFO` VARCHAR(300) NOT NULL UNIQUE KEY,  `RENT\_START` DATETIME,  `RENT\_END` DATETIME  );  CREATE TABLE IF NOT EXISTS `PURCHASE\_REQUEST` (  `PURCH\_ID` INT NOT NULL PRIMARY KEY,  `PURCH\_REQID` INT NULL UNIQUE KEY,  `PURCH\_BILLING` DECIMAL NOT NULL UNIQUE KEY,  `PURCH\_REQINFO` VARCHAR(300) NOT NULL UNIQUE KEY,  `PURCH\_DATE` DATETIME  );  CREATE TABLE IF NOT EXISTS `BILL` (  `BILL\_ID` INT NOT NULL PRIMARY KEY,  `BILL\_AUTHCODE` VARCHAR(100) NULL UNIQUE KEY,  `SYS\_BILLING` VARCHAR(300),  `UNI\_BILLINFO` VARCHAR(300),  `TRANS\_ID` INT,  `BILL\_DATE` DATETIME,  `BILL\_TOTAL` DECIMAL  );  CREATE TABLE IF NOT EXISTS `PAY\_TRANSACTION` (  `TRANS\_ID` INT NOT NULL PRIMARY KEY,  `PAY\_ID` INT,  `TRANS\_STATUS` BIT  );  CREATE TABLE IF NOT EXISTS `PAYMENT` (  `PAY\_ID` INT NOT NULL PRIMARY KEY,  `PAY\_AMOUNT` DECIMAL NOT NULL UNIQUE KEY,  `UNI\_PAYINFO` VARCHAR(300),  `TRANS\_ID` INT,  `PAY\_DATE` DATETIME  );  -- END: eLEARNING DB TABLE CREATION (19 TABLES) --  -- START: eLEARNING DB TABLE POPULATION --  -- AUTHOR --  INSERT INTO `AUTHOR` (`AUTH\_ID`, `AUTH\_FN`, `AUTH\_LN`, `AUTH\_FULLN`) VALUES  ('2123', 'Paul J.', 'Deitel', 'Paul J. Deitel'),  ('6544', 'Yashavant', 'Kanetkar', 'Yashavant Kanetkar'),  ('6198', 'Charles', 'Bukowski', 'Charles Bukowski'),  ('9879', 'Herbert', 'Schildt', 'Herbert Schildt');  -- PUBLISHER --  INSERT INTO `PUBLISHER` (`PUB\_ID`, `PUB\_NAME`, `PUB\_ADDR`, `PUB\_URL`) VALUES  ('00001','Prentice Hall','15 E Midland Ave Ste 502 Paramus, NJ 07652','https://www.pearson.com'),  ('00002','Tata Mcgraw','3310, 1st Floor 8th Cross, H.A.L. II Stage, Indiranagar, Bangalore 560038','https://www.mheducation.com'),  ('00003','BPB Publications','20 Ansari Rd Darya Ganj, New Delhi, NCT, India 110002','https://bpbonline.com'),  ('00004','Black Sparrow Press','Post Office Box 450, Jaffrey, NH 03452','https://godine.com');  -- BOOK --  INSERT INTO `BOOK` (`BK\_ISBN`,`BK\_INVID`,`BK\_REQID`,`AUTH\_ID`, `PUB\_ID`, `BK\_RENTCOST`,`BK\_BUYCOST`, `BK\_TITLE`, `BK\_EDITION`, `BK\_URL`,`BK\_CATEGORY`) VALUES  ('101','1011','2000001','2123','00001','38.59','122.54','Programming in Java - 101','12', 'https://elearning-itm440/prog-in-java-12', 'Computer Science'),  ('223','1022','2000002','6544','00002','44.58','150.30','Understand Transact-SQL','22', 'https://elearning-itm440/under-trans-sql-22','Computer Science'),  ('1201','1033','2000003','6198','00003','35.69','112.45','Where the Wild Things Are', NULL, 'https://elearning-itm440/fiction/wtwta','Childrens'),  ('0231','1044','2000004','9879','00004','65.99','250.69','Ham on Rye', NULL, 'https://elearning-itm440/fiction/ham-rye-bukowski','Classics');  -- eLEARNING --  INSERT INTO `eLEARNING` (`SYS\_ID`,`SYS\_BILLING`,`SYS\_REQRESPONSE`,`SYS\_URL`) VALUES  ('72345','eLEARNING BILL INFO', NULL,'https://elearning-itm440');  -- LIBRARY --  INSERT INTO `LIBRARY` (`LIB\_ID`,`LIB\_QRESULTS`,`LIB\_URL`) VALUES  ('666999', NULL, 'https://elearning-itm440/library');  -- LIB\_INVENTORY --  INSERT INTO `LIB\_INVENTORY` (`INV\_ID`,`INV\_LASTUPDATE`) VALUES  ('666999','2022-03-24 00:00:23');  -- E\_COURSE --  INSERT INTO `E\_COURSE` (`E\_CID`,`E\_REQID`,`E\_INVID`, `E\_CONTENT`, `ECOURSE\_NAME`, `ECOURSE\_START`,`ECOURSE\_END`, `E\_NUMOF\_STUD`) VALUES  ('262','2000001','2011','<JAVA\_CONTENT>','Programming in Java','2022-04-11 00:00:00','2022-04-29 12:00:00','16'),  ('440','2000002','2022','<DATABASE\_CONTENT>','Database Modeling & Design','2022-04-04 00:00:00','2022-04-29 12:00:00','22'),  ('261','2000003','2033','<C++\_CONTENT>','Programming in C++','2022-04-11 00:00:00','2022-04-29 12:00:00','31'),  ('220','2000004','2044','<PROPS\_STATS\_CONTENT>','Applied Probability & Statistics','2022-04-11 00:00:00','2022-04-29 12:00:00','29');  -- E\_MEMBERSHIP --  INSERT INTO `E\_MEMBERSHIP` (`MEM\_SYSID`,`MEM\_STUDID`, `MEM\_STAFFID`, `MEM\_UNIID`, `MEM\_ACTIVE`,`MEM\_START`,`MEM\_EXPIRATION`,`MEM\_TERMS`) VALUES  ('1','11','1011','6711',1,'2019-02-24 00:00:23','2025-02-24 00:00:23', NULL),  ('2','22','1022','6722',1,'2019-02-24 00:00:23','2024-07-24 00:00:23', NULL),  ('3','33','1033','6733',1,'2019-02-24 00:00:23','2025-04-24 00:00:23', NULL),  ('4','44','1044','6744',0,'2019-02-24 00:00:23','2026-04-24 00:00:23', NULL);  -- BEGIN: eLEARNING DB TABLE KEY CREATION --  ALTER TABLE `BOOK`  ADD FOREIGN KEY (`AUTH\_ID`) REFERENCES `AUTHOR`(`AUTH\_ID`),  ADD FOREIGN KEY (`PUB\_ID`) REFERENCES `PUBLISHER`(`PUB\_ID`);    ALTER TABLE `LIB\_INVENTORY`  ADD FOREIGN KEY (`BK\_INVID`) REFERENCES `BOOK`(`BK\_INVID`),  ADD FOREIGN KEY (`E\_INVID`) REFERENCES `E\_COURSE`(`E\_INVID`);  ALTER TABLE `LIBRARY`  ADD FOREIGN KEY (`INV\_ID`) REFERENCES `LIB\_INVENTORY`(`INV\_ID`);  ALTER TABLE `REQ\_AUTHORIZATION`  ADD FOREIGN KEY (`SYS\_REQRESPONSE`) REFERENCES `eLEARNING`(`SYS\_REQRESPONSE`),  ADD FOREIGN KEY (`LIB\_QRESULTS`) REFERENCES `LIBRARY`(`LIB\_QRESULTS`),  ADD FOREIGN KEY (`BK\_REQID`) REFERENCES `BOOK`(`BK\_REQID`),  ADD FOREIGN KEY (`E\_REQID`) REFERENCES `E\_COURSE`(`E\_REQID`);  ALTER TABLE `eLEARNING`  ADD FOREIGN KEY (`MEM\_SYSID`) REFERENCES `E\_MEMBERSHIP`(`MEM\_SYSID`),  ADD FOREIGN KEY (`REQ\_INFO`) REFERENCES `REQUEST`(`REQ\_INFO`),  ADD FOREIGN KEY (`LIB\_ID`) REFERENCES `LIBRARY`(`LIB\_ID`);  ALTER TABLE `STUDENT`  ADD FOREIGN KEY (`UNI\_STUDID`) REFERENCES `UNIVERSITY`(`UNI\_STUDID`),  ADD FOREIGN KEY (`MEM\_STUDID`) REFERENCES `E\_MEMBERSHIP`(`MEM\_STUDID`),  ADD FOREIGN KEY (`AUTH\_STUDCODE`) REFERENCES `REQ\_AUTH\_ACCESS`(`AUTH\_STUDCODE`),  ADD FOREIGN KEY (`RENT\_ID`) REFERENCES `RENTAL\_REQUEST`(`RENT\_ID`),  ADD FOREIGN KEY (`PURCH\_ID`) REFERENCES `PURCHASE\_REQUEST`(`PURCH\_ID`),  ADD FOREIGN KEY (`REQ\_AUTHSTATUS`) REFERENCES `REQUEST`(`REQ\_AUTHSTATUS`);  ALTER TABLE `STUD\_PAYINFO`  ADD FOREIGN KEY (`STUD\_ID`) REFERENCES `STUDENT`(`STUD\_ID`);  ALTER TABLE `UNIVERSITY`  ADD FOREIGN KEY (`MEM\_UNIID`) REFERENCES `E\_MEMBERSHIP`(`MEM\_UNIID`),  ADD FOREIGN KEY (`PAY\_INFO`) REFERENCES `STUD\_PAYINFO`(`PAY\_INFO`);  ALTER TABLE `INSTRUCTOR`  ADD FOREIGN KEY (`UNI\_STAFFID`) REFERENCES `UNIVERSITY`(`UNI\_STAFFID`),  ADD FOREIGN KEY (`MEM\_STAFFID`) REFERENCES `E\_MEMBERSHIP`(`MEM\_STAFFID`),  ADD FOREIGN KEY (`AUTH\_STAFFCODE`) REFERENCES `REQ\_AUTH\_ACCESS`(`AUTH\_STAFFCODE`);  ALTER TABLE `REQUEST`  ADD FOREIGN KEY (`RENT\_REQID`) REFERENCES `RENTAL\_REQUEST`(`RENT\_REQID`),  ADD FOREIGN KEY (`PURCH\_REQID`) REFERENCES `PURCHASE\_REQUEST`(`PURCH\_REQID`),  ADD FOREIGN KEY (`RAUTH\_ID`) REFERENCES `REQ\_AUTHORIZATION`(`RAUTH\_ID`);  ALTER TABLE `PAY\_TRANSACTION`  ADD FOREIGN KEY (`PAY\_ID`) REFERENCES `PAYMENT`(`PAY\_ID`);  ALTER TABLE `PAYMENT`  ADD FOREIGN KEY (`UNI\_PAYINFO`) REFERENCES `UNIVERSITY`(`UNI\_PAYINFO`);  ALTER TABLE `REQ\_AUTH\_ACCESS`  ADD FOREIGN KEY (`E\_CONTENT`) REFERENCES `E\_COURSE`(`E\_CONTENT`),  ADD FOREIGN KEY (`BK\_ISBN`) REFERENCES `BOOK`(`BK\_ISBN`),  ADD FOREIGN KEY (`BILL\_AUTHCODE`) REFERENCES `BILL`(`BILL\_AUTHCODE`);  ALTER TABLE `BILL`  ADD FOREIGN KEY (`SYS\_BILLING`) REFERENCES `eLEARNING`(`SYS\_BILLING`),  ADD FOREIGN KEY (`TRANS\_ID`) REFERENCES `PAY\_TRANSACTION`(`TRANS\_ID`),  ADD FOREIGN KEY (`UNI\_BILLINFO`) REFERENCES `UNIVERSITY`(`UNI\_BILLINFO`);  COMMIT;  -- END: eLEARNING DB TABLE KEY CONSTRAINT CREATION -- |

Figure 5-1: MySQL DB Creation SQL Commands

## Detailed Database Design

Overview:

This section outlines the finer details of the MySQL database design to

include transaction, e-Material requests, and Instructor interactions.

### Logical Database Model

|  |
| --- |
| Diagram  Description automatically generated |

Figure 4. eLearning Entity Relationship Diagram (Lucid)

## Database Administration and Monitoring

### Roles and Responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| **Job Role** | **MySQL Privilege Req.** | **Description** | **Applicable To:** |
| System Administrators | CREATE TEMPORARY TABLES  CREATE USER  CREATE VIEW  EVENT  PROCESS  SELECT  SHOW VIEW  SHUTDOWN | Can create users, monitor MySQL server processes, export logs, and create/update DB views. | University’s IT Department System Administrators |
| Database Administrators | ALTER  ALTER ROUTINE  CREATE  DELETE  DROP  EVENT  EXECUTE  FILE  INDEX  INSERT  LOCK TABLES  PROCESS  REFERENCES  RELOAD  REPLICATION CLIENT  REPLICATION SLAVE  SELECT  SHOW DATABASES  SHOW VIEW  SHUTDOWN  TRIGGER  UPDATE | Limited non-Root permission Database administrative access rights. | University’s IT Department Database System Administrators |
| Database Designers | ALL PRIVILEGES | Create, Alter, and Delete all Database System Databases, and Database Tables | ITM440 – Design Team |
| Data Analysts | CREATE TEMPORARY TABLES  CREATE VIEW  EVENT  SELECT  SHOW VIEW | Create session limited DB tables, monitor/create/update views, perform simple lookup queries for data collection. | University’s IT Department Data Scientists and Financial & Education Department Analysts |
| End Users | N/A (Web Application Account Registration) | User DB for organization’s daily operations | University’s Enrolled Staff & Students |

Table 5-1: University DBMS User Roles and Privileges

### System Information

Outline:

Outlines specific Database design characteristics for University

eLearning Database and Database Management System.

#### Database Management System Configuration

|  |
| --- |
| Calendar  Description automatically generated with medium confidence |

Figure 5: DBMS Table Summary

-- APPENDICES --

Appendix A: ITM440\_eLearning MySQL ERD Diagram

Diagram

Description automatically generated

Figure A-1. eLearning Final Entity Relation Diagram (MySQL)

Appendix B: Record of Changes

| Version Number | Date | Author/Owner | Description of Change |
| --- | --- | --- | --- |
| 001 | 27MAR22 | Nathan Mollica | Initial Submittal |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Table 3 - Record of Changes

Appendix E: Referenced Documents

| Document Name | Document Location and/or URL | Issuance Date |
| --- | --- | --- |
| Database Answers | https://dev.mysql.com/doc/refman/8.0/en/ | 2022-03-27 (Revision: 72499) |
| Database Programming: An Intermediate MySQL Tutorial – Scripting, Data Types, Examples | https://www3.ntu.edu.sg/home/ehchua/programming/sql/MySQL\_Intermediate.html#zz-5.1 | October, 2012 |
| W3Schools – SQL FOREIGN KEY Constraint | https://www.w3schools.com/sql/sql\_foreignkey.asp | Accessed on 27MAR22 |

### Table 6 - Referenced Documents

### Appendix E: APA References List

Oracle Corporation (2022, March 19). *The Main Features of MySQL*. MySQL.

https://dev.mysql.com/doc/refman/8.0/en/features.html.

Oracle Corporation (2022, March 19). *What is MySQL?*. MySQL.

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Oracle Corporation (2022, March 19). *Commercial License for OEMs, ISVs, and VARs*. MySQL.

https://www.mysql.com/about/legal/licensing/oem/.

Microsoft (n.d.). Retrieved March 19, 2022, from https://www.microsoft.com/en-us/microsoft

-365/business/compare-all-microsoft-365-business-products#compare-all-plans-table.

Microsoft (n.d.). Retrieved March 19, 2022, from https://support.microsoft.com/en

-us/office/access-specifications-0cf3c66f-9cf2-4e32-9568-98c1025bb47c.

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*systems worldwide 2022*. Statista. <https://www.statista.com/statistics/809750/worldwide-popularity-ranking>

-database-management- systems/#:~:text=As%20of%20January%202022%2C%20the,rounded%20out%2

0the%20top%20three.