

FALL 2020

USMAN INSTITUTE OF TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE



Marks obtained:

CS311 - Introduction to Database Systems
Pre-Assigned Final Lab Exam Task
Section A

Attempt all questions.

Student name: _____ Roll. No: _____ Section: _____

Seat Number: _____

Marks:12

Submission Deadline: Friday 12th February 08:00 am

Deliverables:

1. An Evidence document (format: PDF)
2. Recorded video (format: mp4, max duration: 10 minutes)

Task: Design a normalized database for the given scenario.

J.K.Rowling (English and born on 31st July 1965) wrote seven parts for the famous Harry Potter series. The first book of this series: Harry Potter and the Philosopher's Stone was first published by Bloomsbury Children's Books in June 1997. The book was published in the US by Scholastic Publishers in 1998. Six further best-selling books followed.

Hogwarts School of Witchcraft and Wizardry (Scotland) is one of the boarding schools of magic for students and is the primary setting for the first six books in J. K. Rowling's Harry Potter series. Some other wizarding schools are:

1. *Beauxbatons Academy of Magic (France)*
2. *Castelobruxo (Central Brazil)*
3. *Durmstrang Institute (Northern Europe)*
4. *Ilvermorny (Eastern North America)*
5. *Mahoutokoro School of Magic (Japan)*

A wizarding school is described by its name, the number of houses that it has, current head and deputy head, and the region it is situated in. There are many Characters in the HP series. A character can be defined by at least his name and the books that it has appeared in. Being a school of magic, many subjects are taught at Hogwarts such as Transfiguration, Defense Against the Dark Arts, Charms, Potions, Astronomy, History of Magic, Herbology, Arithmancy, Muggle Studies, Divination, Study of Ancient Runes and Care of Magical Creatures. There are Professors, each specializing in a single subject. All professors are overseen by a school head (principle) who currently is Dumbledore and the deputy head who is Minerva McGonagall. Some of the other professors at Hogwarts, along with their specializations are mentioned below:

<i>Professors</i>	<i>Courses</i>
<i>Cuthbert Binns</i>	<i>History of Magic</i>
<i>Filius Flitwick</i>	<i>Charms</i>
<i>Rubeus Hagrid</i>	<i>Care of Magical Creatures</i>
<i>Remus Lupin</i>	<i>Defense Against the Dark Arts</i>
<i>Minerva McGonagall</i>	<i>Transfiguration</i>
<i>Severus Snape</i>	<i>Potions</i>
<i>Sybill Trelawney</i>	<i>Divination</i>

The OWL (Ordinary Wizarding Level) exams are taken at the end of a student's fifth year at the Hogwarts School of Witchcraft and Wizardry. OWLs are offered in the subjects a student takes in their first five years, and many consist of both written (theory) and practical tests. Courses in which OWLS are offered are Ancient Runes, Arithmancy, History of Magic, Muggle Studies, all of which have written sections only; Astronomy, Care of Magical Creatures, Charms, Defense Against the Dark Arts, Herbology, Potions, Transfiguration, all of which have theory and practical exams; and Divination, which has only a Practical section. Thus, for twelve available subjects, nineteen examination slots are required.

OWLs are graded using the following system:

<i>Passing Grades</i>	<i>Failing Grades</i>
<i>O - Outstanding</i>	<i>P - Poor</i>
<i>E - Exceeds Expectations</i>	<i>D - Dreadful</i>
<i>A - Acceptable</i>	<i>T - Troll</i>

The examiners for OWLs are not Hogwarts professors, but a group of independent examiners referred to as Wizarding Examinations Authority, who work in the Ministry of Magic. The Ministry of Magic is the government body of the wizarding world in Britain, headed by an official entitled the Minister for Magic. Employment with the Ministry can be obtained right after completion of a wizarding education, though different offices require different levels of education and sometimes specific exam results. The Ministry has physical offices in London, deep underground. The Atrium, which is a large, splendid area serves as primary point of entry and exit for wizard traffic in and out of the Ministry Headquarters in London, as well as functioning as a reception area for visitors. The lifts provide access to the other levels (floors) of the magical building, except the tenth level. Given below are the details of different levels in the ministry building along with the departments that are present on those levels.

- 1. Level 1: Office of Minister of Magic and Support Staff*
- 2. Level 2: Department of Magical Law Enforcement*
 - a. Improper Use of Magic Office*
 - b. Auror Headquarters Office*
 - c. Wizengamot Administration Services Office*
- 3. Level 3: Department of Magical Accidents and Catastrophes*
 - a. Accidental Magic Reversal Squad Office*
 - b. Obliviator Headquarters Office*
 - c. Muggle-Worthy Excuses Committee Office*
- 4. Level 4: Department for the Regulation and Control of Magical Creatures*
 - a. Beast, Being and Spirit Divisions Office*
 - b. Pest Advisory Bureau Office*
- 5. Level 5: Department of International Magical Cooperation*
 - a. International Magical Trading Standards Body Office*
 - b. International Magical Office of Law Office*
 - c. International Confederation of Wizards, British Seats Office*
- 6. Level 6: Department of Magical Transportation*
 - a. Floo Network Authority Office*
 - b. Broom Regulatory Control Office*
 - c. Portkey Office*
 - d. Apparition Test Center*
- 7. Level 7: Department of Magical Games and Sports*
 - a. British and Irish Quidditch League Headquarters Office*
 - b. Official Gobstones Club Office*
 - c. Ludicrous Patents Office*
- 8. Level 8: Atrium*
- 9. Level 9: Department of Mysteries*
- 10. Level 10: Courtrooms*

Each department is looked after by a single minister and every office within a single department is headed by a single office in charge. A maximum of only three employees could be working at any ministry office. A single employee may work in not more than two departments simultaneously.

1. Identify the entities, attributes, and the relations between them.
2. Design an ERD for the scenario.
3. Implement the ERD on ORACLE Apex, by translating it into a relational model.
4. Populate the database tables with at least 15 records for each entity. If 15 rows are not possible in some cases like that of the 'level' entity, then you may skip. (You **may** take reference for authentic scenario-based names and details from any cited internet resource.)
5. Formulate queries for the given questions and attach their retrieved results.
 - a. Identify the characters who have only appeared in the first book and never again.
 - b. Create a trigger for maintaining a log in another backup-table for the deletion of any value in the ministry's departments table.
 - c. Identify the course with the lowest number of student enrollments.
 - d. List the names of all departmental ministers at the Ministry of Magic along with their ages.
 - e. Identify the course at Hogwarts that has got the maximum count of students receiving a T grade in OWLs for the last three years.
 - f. Identify the offices in the ministry, who have a single employee working for them apart from the office in-charge. (The department name and the employee name are to be mentioned with the office as well)
 - g. Identify the total number of employees working on the third level of the ministry building, having received an O in Transfiguration course in their OWLs.
 - h. Identify those departments where employees who are simultaneously working in another department, are working.
 - i. Create a trigger that fires after a delete operation in student table and deletes all grades of the student in the grades table that belong to the deleted student.
6. Design at least 5 advanced SQL Queries (document along with their results) serving to find some meaningful insight from the database. **Must** include queries with creation of **view, subquery, complex joins, trigger, and stored procedure**.

Requirements:

You are instructed to turn in the evidence document which must include:

1. List of all the identified entities, their attributes, and the relations between them. Any assumptions made should be documented explicitly and should not violate in any way the given scenario's specifications.
2. A visual representation of the scenario through an ERD (include the details of the tool you have used to create this diagram e.g. Lucidchart) with list of all the functional dependencies.
3. Database schema and script with all the constraints.
4. The data set with which you have populated the tables.
5. Screenshots of all the queries that you have formulated for the given questions in Task-5 and their complete results also indicating the total number of rows retrieved.
6. Design and document at least 5 advanced SQL Queries (along with their results) serving to some purpose in the database.

Naming convention: Name_RollNumber_ED_CS311

Recorded video details:

You are instructed to record and turn-in a video of yourself narrating and explaining each attempted task and the workflow. The video should not exceed 10 minutes time duration.

Naming convention: Name_RollNumber_V_CS311

Note:

- **Viva shall be conducted on Friday 12th of February 2021, during the usual lab timings from 08:15 am till 11:30 am. All students have already been added to the meeting where you must ensure your presence at 08:15 am.**
 - **This is strictly an individual task and hence collaborated efforts, buying, stealing, borrowing any other's work are all forbidden and would result in serious repercussions.**
 - **+2 in viva for an additional designing of a web-app of the given scenario on ORACLE APEX. (Only iff all other requirements specified in this document HAVE been fulfilled, then you may redeem those bonus marks)**
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