

ASSIGNMENT COVERSHEET

REMARKS

STUDENT DETAILS

STUDENT NAME	Sparsh Shrestha	YEAR ENROLLED	
REG. NUMBER		SECTION	
ISMt EMAIL	kca22.5ss@ismt.edu.np		

ASSIGNMENT DETAILS

MODULE NAME	Database Management System		
MODULE CODE	H/615/1622	SEMESTER	First
ASSIGNMENT TITLE	Record Keeping System of College		
MODULE TUTOR	Dhananjaya Kafle	DUE DATE	July 13 th 2022

PROGRAMME DETAILS

QUALIFICATION	BTECH HND IN COMPUTING
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STAFF ONLY (IV)

IV - ASSESSOR	
GRADE	

By signing this, I declare that:

- This assignment meets all the requirements of the subject as detailed in the relevant subject outline, which I have studied.
 - This assessment is entirely my work, except where I have included fully-documented references to the work of others (*citation and references*).
 - The material contained in this assessment has not previously been submitted for assessment.
- I acknowledge that:
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 - If required to do so, I will produce an e-Copy of this assessment.
- I am aware that late submission without an authorised extension from the Faculty Program Head and Module Tutor may incur a penalty.

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SUBMISSION DETAILS

HAND IN DATE

STUDENT
SIGNATURE

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STUDENT ASSESSMENT SUBMISSION AND DECLARATION

When submitting evidence for assessment, each student must sign a declaration confirming that the work is their own.

Student Name	Sparsh Shrestha	Assessor Name	Dhananjaya Kafle
Issue Date	13 th May 2022	Submission Date	27 th July, 2022
Programme	BSc.IT		
Unit Name	Database Management System		
Assignment Title	Record Keeping System of College		

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downloaded from the Internet. Please consult the relevant unit lecturer or your course tutor if you need any further advice.

Student Declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student signature:

Date:



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Higher Education Qualifications

INTERNATIONAL SCHOOL OF MANAGEMENT AND TECHNOLOGY

KATHMANDU, NEPAL

Qualification		Unit Number & Title	
BTEC HND IN COMPUTING		H/615/1622 – Unit 4: Database Design & Development Systems	
Student Name		Assessor Name	
Sparsh Shrestha		Dhanajaya Kafle	
Assignment Launch Date	Due Date		Completion Date
13 May 2022	12 July 2022		
Session/Year	2021/2022	Assignment Number	1/1
Assignment Title		Record Keeping System of College	

Assignment submission format

Each student has to submit their assignment as guided in the assignment brief. The students are guided what sort of information is to produce to meet the criteria targeted. You are required to make use of headings, paragraphs and subsections as appropriate, and all work must be supported with research and referenced using the Harvard referencing system.

Important:

- **Read the plagiarism notice and requirements at Page 5**
- **Word-limit- 8000 words** (*excludes cover page, table of content, figures, graphs, reference list, appendix, and logbook*)
- **Accepted Sources: Research Papers** (*Journal Articles, Conference Proceedings, Thesis, Textbooks, Governmental Data, Websites (only a registered organization, an educational institution, government agency)*)
- **Information taken from unreliable sources will not be accepted**
- **Must follow Harvard Reference Style**

Learning outcomes covered

- LO1. Use an appropriate design tool to design a relational database system for a substantial problem.
- LO2. Develop a fully functional relational database system, based on an existing system design.
- LO3. Test the system against user and system requirements.
- LO4. Produce technical and user documentation.

Scenario

International School of Management and Technology is a new international university college which conducts different education programs such as Higher National Diplomas, Bachelors and Masters Programs. They have set of student councilors who register students for the programs. Once a student registered, following details would be considered. Registration Number, Student Name, Contact Details (Home, Mobile and Email), Address, and academic details. Same student can register for multiple programs and a new registration number would be issued based on registering batch and program. Batch would have a Batch Number, Relevant Program, Starting Date, End Date and Number of Students.

Once students are registered, the respective student counselors' 'employee no' should be recorded for further reference. Usually, programs are conducted in both full time and part time and should be finished within a given time period and payment amount. Each Program have modules and modules would include Module Number, Name, Credit Value, No of Sessions and Module leader Employee Number. Module leader is a lecturer.

The employee data should be recorded appropriately within a centralized database. And Each employee is assigned to different departments such as Academics, Marketing, Accounts, etc.

For reporting you have to create some stored procedures as follows:

- List of Student names of a particular Batch
- List of Batch details and relevant student councilor information
- List of Program details with relevant modules that they relate to

International school of management and Technology is willing to enhance their information system and to have a properly designed Relational Database Management System. Assume that you have been assigned as the Database Designer and Administrator to prepare a fully functional Database for a purposed system.

You need to demonstrate the following skills and understanding.

- Use an appropriate design tool to design a relational database system for a substantial
- Develop a fully functional relational database system, based on an existing system
- Test the system against user and system requirements.
- Produce technical and user documentation

Assignment Task

Based on the context above, complete the followings.

Part 1

Produce a Report (*that includes*)

- The design of the relational database system using appropriate design tools and techniques. It should contain at least four interrelated tables and clear statements of user and system requirements.
- Produce a more detailed document, so you will produce a comprehensive design for a fully functional system which will include interface and output designs, data validations and cover data normalization and assess the effectiveness of design in relation to user and system requirements.

Part 2

Once the designs are accepted, you have to develop the database system using evidence of user interface, output and data validations and querying across multiple tables.

- You want to include more than just the basics so you will implement a fully functional database system which will include system security and database maintenance features.
- You have decided to implement a query language into the relational database system.

Further:

1. Assessing whether meaningful data has been extracted through the use of query tools to produce appropriate management information.
2. Evaluating the effectiveness of the database solution in relation to user and system requirements and suggest improvements.

Once the system has been developed:

1. You will test the system against the user and the system requirements.
2. You will produce a brief report assessing the effectiveness of the testing, including an explanation of the choice of test data used.

Part 3

Produce technical and user documentation.

Provide some graphical representations for ease of reference in the technical guide, so you have decided to produce technical and user documentation for a fully functional system, including diagrams showing movement of data through the system, and flowcharts describing how the system works.

Lastly, Evaluate the database in terms of improvements needed to ensure the continued effectiveness of the system.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Use an appropriate design tool to design a relational database system for a substantial problem		D1 Evaluate the effectiveness of the design in relation to user and system requirements
P1 Design a relational database system using appropriate design tools and techniques, containing at least four interrelated tables, with clear statements of user and system requirements.	M1 Produce a comprehensive design for a fully functional system which includes interface and output designs, data validations and data normalisation.	
LO2 Develop a fully functional relational database system, based on an existing system design		LO2 and LO3 D2 Evaluate the effectiveness of the database solution in relation to user and system requirements, and suggest improvements.
P2 Develop the database system with evidence of user interface, output and data validations, and querying across multiple tables.	M2 Implement a fully functional database system which includes system security and database maintenance.	
P3 Implement a query language into the relational database system.	M3 Assess whether meaningful data has been extracted through the use of query tools to produce appropriate management information.	
LO3 Test the system against user and system requirements		
P4 Test the system against user and system requirements.	M4 Assess the effectiveness of the testing, including an explanation of the choice of test data used.	

LO4 Produce technical and user documentation		
P5 Produce technical and user documentation.	M5 Produce technical and user documentation for a fully functional system, including diagrams showing movement of data through the system, and flowcharts describing how the system works.	D3 Evaluate the database in terms of improvements needed to ensure the continued effectiveness of the system.

Grades Achieved

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Note: Refer the unit details provided in your handbook when responding all the tasks above. Make sure that you have understood and developed your response that matches the highlighted key words in each task.

Plagiarism Notice

You are reminded that there exist **Academic Misconduct Policy and Regulation** concerning **Cheating and Plagiarism**.

Extracts from the Policy:

Section 3.4.1: Allowing others to do assignments / Copying others assignment is an offence

Section 3.4.2: Plagiarism, using the views, opinion or insights / paraphrasing of another person's original phraseology without acknowledgement

Requirements

- It should be the student's own work – **Plagiarism is unacceptable**.
- Clarity of expression and structure are important features.
- Your work should be submitted as a **well presented**, word-processed document with headers and footers, and headings and subheadings.
- You are expected to undertake research on this subject using books from the Library, and resources available on the Internet.
- Any sources of information should be **listed as references** at the end of your document and these sources should be referenced within the text of your document using **Harvard Referencing Style**
- Your report should be illustrated with screen-prints, images, tables, charts and/or graphics.
- All assignments must be typed in **Times New Roman, font size 12, 1^{1/2} spacing**.

The center policy is that you must submit your work within due date to achieve “Merit” and “Distinction”. Late submission automatically eliminates your chance of achieving “Merit and Distinction”. Also, 80% attendance is required to validate this assignment.

I declare that all the work submitted for this assignment is my own work and I understand that if any part of the work submitted for this assignment is found to be plagiarised, none of the work submitted will be allowed to count towards the assessment of the assignment.

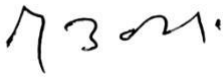
Assignment Prepared By Dhanajaya Kafle	Signature	Date 02 May 2022
Brief Checked By Dhruba Babu Joshi	Signature 	Date 05 May 2022

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Database

The Database is an essential part of our life. As we encounter several activities that involve our interaction with databases, for example in the bank, in the railway station, in school, in a grocery store, etc. These are the instances where we need to store a large amount of data in one place and fetch these data easily.

A database is a collection of data that is organized, which is also called structured data. It can be accessed or stored in a computer system. It can be managed through a Database Management System (DBMS), a software used to manage data. Database refers to related data in a structured form.

In a database, data is organized into tables consisting of rows and columns and it is indexed so data can be updated, expanded, and deleted easily. Computer databases typically contain file records data like transactions money in one bank account to another bank account, sales and customer details, fee details of students, and product details. There are different kinds of databases, ranging from the most prevalent approach, the relational database, to a distributed database, cloud database. (GeeksforGeeks, 2021)

- **Relational Database:** A relational database is made up of a set of tables with data that fits into a predefined category.
- **Distributed Database:** A distributed database is a database in which portions of the database are stored in multiple physical locations, and in which processing is dispersed or replicated among different points in a network.
- **Cloud Database:** A cloud database is a database that typically runs on a cloud computing platform. Database service provides access to the database. Database services make the underlying software-stack transparent to the user. (GeeksforGeeks, 2021)

The example of Data

Here, are some types platform of Database

MySQL

An open-source relational database which runs on a number of different platforms such as windows, Linux, etc. is known as MySQL.

Platform that are used in MySQL: Linux, Windows and Mac.

Language that are used in MySQL: C, Java, C++, SQL, Python, PHP, etc.

Cloud version: It support Cloud Version.

Features

- MySQL is open-source database tool that provides both scalability and flexibility.
- It is free SQL database tool which has web and data warehouse strengths.
- It also provides high performance.
- MySQL is free database server software for windows 10 that has Robust Transactional support.

Oracle

Oracle Database is an Oracle Corporation relational database management system (RDBMS). This article will provide a thorough explanation of the Oracle database, including its features, history, and several editions. We must first understand the database before we can explain the oracle.

Platform that are used in Oracle: Windows and Linux. It is not available for Mac.

Language: It support C++, COBOL, Java, PL/SQL and Visual Basic.

Cloud Version: It also support Cloud version.

Features:

- It is optimized for high-performance database workloads and streaming workloads.
- We can easily migrate to the cloud.
- It is free SQL software provides the services based on how you like to operate.

MongoDB

MongoDB is a cross-platform document-oriented database application that is open source. MongoDB is a NoSQL database application that works with JSON-like documents and optional schemas. MongoDB was created by MongoDB Inc. and is distributed under the Server-Side Public License, which is considered non-free by a number of distributions.

Platform that are used in MongoDB: Cross-platform

Language: It support C#, C, Java, Scala Ruby, etc.

Cloud Version: It also support Cloud version.

Features:

- **Schema-less database:** It is a fantastic feature offered by MongoDB. A schema-less database means that different types of documents can be stored in the same collection. In other words, a single collection in the MongoDB database can hold numerous documents, each of which may have a different number of fields, content, and size. In contrast to relational databases, it is not necessary for one document to be similar to another. MongoDB gives databases a lot of flexibility because to this amazing feature.
- **Document oriented:** Like RDBMS, MongoDB stores all data in documents rather than tables. In these documents, data is stored in fields (key-value pairs) rather of rows and columns, making the data far more flexible than in a relational database management system. Each document also has its own unique object id.
- **Indexing:** In MongoDB database, every field in the documents is indexed with primary and secondary indices this makes easier and takes less time to get or search data from the pool of the data. If the data is not indexed, then database search each document with the specified query which takes lots of time and not so efficient.
- **Scalability:** MongoDB provides horizontal scalability with the help of sharding. Sharding means to distribute data on multiple servers, here a large amount of data is partitioned into data chunks using the shard key, and these data chunks are evenly distributed across shards that reside across many physical servers. It will also add new machines to a running database.
- **Replication:** MongoDB provides high availability and redundancy with the help of replication, it creates multiple copies of the data and sends these copies to a different server so that if one server fails, then the data is retrieved from another server.

SQL server

Microsoft's SQL Server is a relational database management system (RDBMS). It was created primarily to compete with the MySQL and Oracle databases. The standard SQL (Structured Query Language) language is supported by SQL Server. T-SQL, SQL Server's own version of the SQL language, is included (Transact-SQL).

Platform that are used in MongoDB: Docker Engine, Ubuntu, SUSE Linux Enterprise Server, and Red Hat Enterprise Linux.

Language: It support C#, C, Java, and C++.

Cloud Version: It also support Cloud version.

Features:

- With the strength of SQL Server and Spark, it allows you to integrate organized and unstructured data.
- Mission-critical, intelligent applications, data warehouses, and data lakes benefit from the tool's scalability, performance, and availability.
- It has excellent data security measures.
- To make a faster and better decision, access comprehensive, interactive Power BI reports.

MariaDB

MariaDB is a fork of the MySQL relational database management system (RDBMS) developed by the community and maintained commercially, with the goal of being free and open-source software under the GNU General Public License. Some of the original MySQL developers are in charge of development, which was formed in 2009 owing to worries over Oracle Corporation's acquisition of MySQL.

User and system requirement

- List of Student names of a particular Batch
- List of Batch details and relevant student councilor information
- List of Program details with relevant modules that they relate

System requirement

The configuration that a system must have in order for a hardware or software program to perform smoothly and efficiently is referred to as system requirements. If we are trying to install Windows 10 on a laptop or computer, on the back of the CD (compact disk) cover, there is a written system requirement of Windows 10 through which we can install it on the laptop or computer.

- The company requires a computer to run the database application. Employees should know how to keep a database up to date.

- The software requirement for SQL server is at least windows 10 is required and also there is need hard drive space of 8030 MB.
- In hardware requirement the initial disk space of 160 MB is required. The minimum space requirement for SQL server is 6 GB.

Relational Database

A relational database (RDB) is a collective set of multiple data sets organized by tables, records and columns. RDBs establish a well-defined relationship between database tables. (techopeida, 2017)

RDBs organize data in different ways. Each table is known as a relation, which contains one or more data category columns. Each table record (or row) contains a unique data instance defined for a corresponding column category. One or more data or record characteristics relate to one or many records to form functional dependencies. These are classified as follows:

- One to One: One table record relates to another record in another table.
 - One to Many: One table record relates to many records in another table.
 - Many to One: More than one table record relates to another table record.
 - Many to Many: More than one table record relates to more than one record in another table.
- (techopeida, 2017)

Data dictionary

A data dictionary is a file or a set of files that contains a database's metadata. The data dictionary contains records about other objects in the database, such as data ownership, data relationships to other objects, and other data. (techopedia, 2020)

The data dictionary is a crucial component of any relational database. It provides additional information about relationships between different database tables, helps to organize data in a neat and easily searchable way, and prevents data redundancy issues. (techopedia, 2020)

Entity relational diagram

An entity-relationship diagram (ERD) is a data modeling technique that graphically illustrates an information system's entities and the relationships between those entities. An ERD is a conceptual and representational model of data used to represent the entity framework infrastructure.

The elements of an ERD are:

- Entities
- Relationships
- Attributes (techopedia, 2017)

The use of entity relationship diagrams is:

- Database design
- Database troubleshooting

ERD (Entity Relationship diagram)

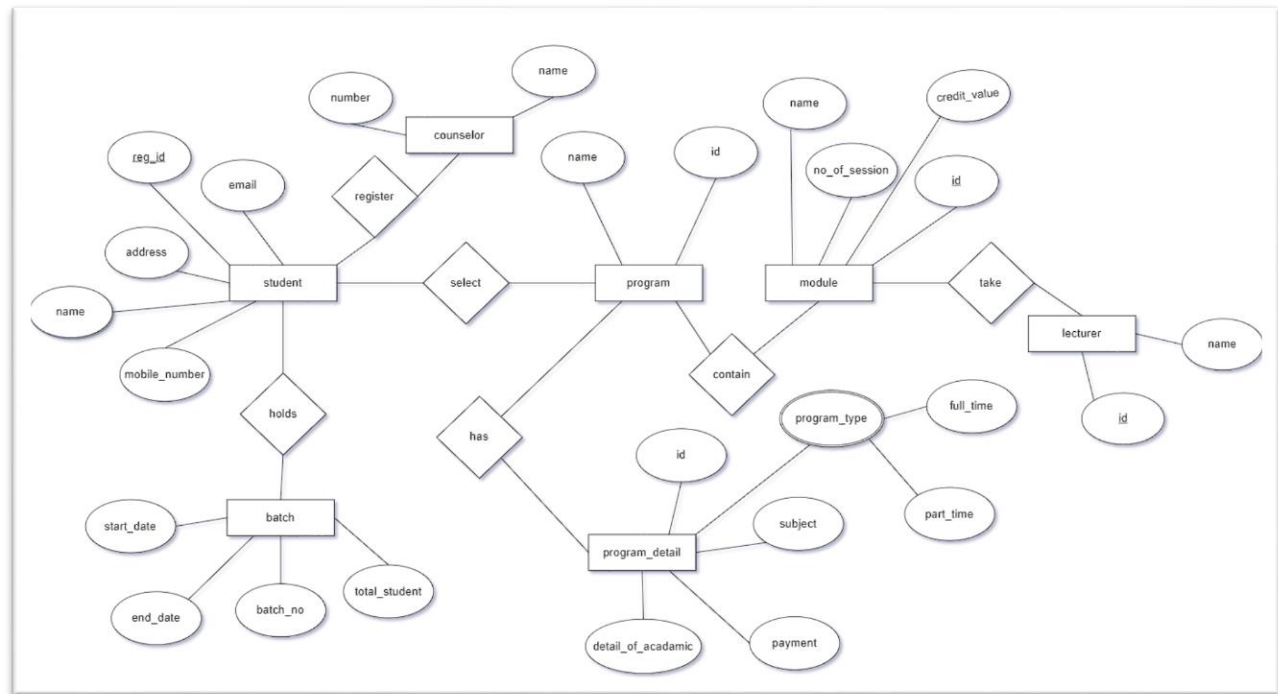
An entity relationship diagram is a type of flowchart that shows how “entities” in a system, such as objects, people, concepts, interacts with each other. In the table, I put two different values that are entity and attribute. In entity, I put student, batch, counselor, program, program_detail, lecturer, and module. In attributes, I put many things like reg_id name, mobile_number, email, batch_number, start_date, end_date, total_student, id, name, id, subject, payment, detail_of_academic, name, id, no_of_session, name, credit_value.

In ER-Diagram (Entity Relationship Diagram), I had created table of Entities and field.

Entity	Attributes
student	<u>reg_id</u> name, mobile_number, email
batch	<u>batch_number</u> , start_date, end_date, total_student
counselor	name, number
program	<u>id</u> , name
program_detail	<u>id</u> , subject, payment, detail_of_academic
lecturer	name, <u>id</u>

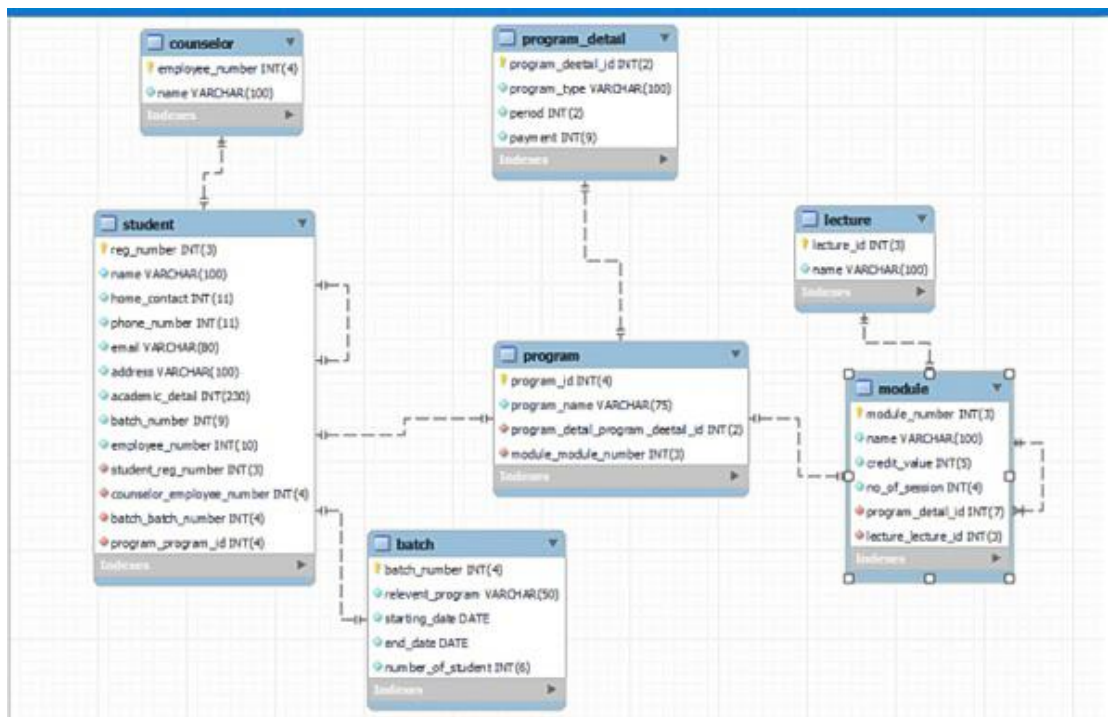
module

id, no_of_session, name, credit_value



Relational diagram

I had created relational diagram using workbench.



Data normalization

Data normalization is the process of arranging data in several database tables in order to reduce data redundancy such as duplication or repetition of data. This process was introduced by E.F. Codd (Edgar Frank “Ted” Codd). E.F. Codd also introduce three normal forms (1NF, 2NF, and 3NF).

Advantage of normalization

- It helps to reduce data redundancy i.e. duplication of data.
- Improve the performance of a system.
- It improves sorting and index constriction speed.
- It makes the complicated structure of tables easier to understand.

The most popular widely normal form is used

- First Normal Form (1NF).
- Second Normal Form (2NF).
- Third Normal Form (3NF).

1NF (First Normal Form)

If a relation contains a composite or multi-valued attribute, it violates the first normal form, or the relation is in first normal form if it does not contain any composite or multi-valued attribute. A relation is in first normal form if every attribute in that relation is singled valued attribute. (GreeksforGreeks, 2022)

Table in 1NF

- In 1NF there is only single valued attributes.
- There is no change in attribute domain.
- In 1NF there is a unique name for every attribute or column.

Table of 1NF

Reg_no	Student name	Mobile number	Program_id	Name	Batch_number	Relevant_program
1	Brock	65748933	01	Bachelor	1	BCA
2	Oliver	62738893	02	Diploma	2	Diploma in computer engineering

Normalized form

Reg_no	Student name	Mobile number	Program_id	Name	Batch_number	Relevant_program
1	Brock	65748933	01	Bachelor	1	BCA
1	brock	65748933	01	Bachelor	1	BCA
2	Oliver	62738893	02	Diploma	2	Diploma in computer engineering
2	Oliver	62738893	02	Diploma	2	Diploma in computer engineering

2NF (Second Normal Form)

Second Normal Form (2NF) is based on the concept of full functional dependency. Second Normal Form applies to relations with composite keys, that is, relations with a primary key composed of two or more attributes. A relation with a single-attribute primary key is automatically in at least 2NF. A relation that is not in 2NF may suffer from the update anomalies. (GeeksforGeeks, 2019)

To be in second normal form, a relation must be in first normal form and relation must not contain any partial dependency. A relation is in 2NF if it has No Partial Dependency, i.e., no non-prime attribute (attributes which are not part of any candidate key) is dependent on any proper subset of any candidate key of the table. (GeeksforGeeks, 2019)

Unnormalized Form

Reg_no	Student name	Mobile number	Program_id	Name	Batch_number	Relevant_program
1	Brock	65748933	01	Bachelor	1	BCA
2	Oliver	62738893	02	Diploma	2	Diploma in computer engineering

Table 1

Reg_no	Student name	Mobile number
1	Brock	65748933
2	Oliver	62738893

3NF (Third Normal Form)

Rule 1: Be in 2NF.

Rule 2: it has no transitive functional dependencies.

Reg_no	Student name	Mobile number	Program_id	Name	Batch_number	Relevant_program
1	Brock	65748933	01	Bachelor	1	BCA
2	Oliver	62738893	02	Diploma	2	Diploma in computer engineering

Normalized Form

Table 1 student table

Reg_no	Student name	Mobile number
1	Brock	65748933
2	Oliver	62738893

Table 2 program table

Program_id	Name
1	Bachelor
2	Diploma

Table 3 batch table

Batch number	Relevant program
1	BCA
2	Diploma in computer engineering

HTML

The full form of HTML is (Hyper Text Markup Language). HTML was invented in 1990. The name of scientist who create HTML was “Tim Berners-Lee”. HTML also make scientists easier at different universities to gain access to each other’s for research documents. HTML is a type of markup language, the most basic form of which is “Standard Generalized Markup Language” (SGML). Because SGML was too complicated, HTML was created as a straightforward technique

to create webpage that browser could easily access. HTML is also special case of SGML. HTML is also consisting of tags and data.

Benefit of HTML

- HTML is a simple and easy to learn and use but it is powerful language.
- HTML is supported by all browser such as Chrome, Edge, Opera and many more.
- It is free any one can use it.
- It is basic of all programming language.

Types of tags that are used in HTML

- HTML Tag
- HEAD and TITLE Tag
- BODY Tag
- META Tag

Data Validation

The process of checking the data entered into the database to ensure that it is correct, is called data validation. Data Validation is a technique for reducing the number of mistakes that occur during the data entry process. It is also method of comparing input data to set of validation rules.

There are many methods of Data Validation that are:

- **Types:** In this method, we can make a specific field numeric then it will not allow you to input any letters of other non-numeric characters.
- **Presence:** It is also called sometimes Allow Blank or Mandatory. This style of validation forces the user to fill up the required field with information.
- **Ranger Check:** Ranger check is a type of validation that can be used or numeric fields.
- **Drop down list:** Drop down list in HTML is an important element for from building purpose or for showing the selection list which the user can select one or multiple values.

Example:

```
<select>
<option value="bike">"Bike"</option>
<option value="cycle">"Cycle"</option>
<option value="car">"Car"</option>
```

- **Option Button:** Option buttons are also called Radio Button, and user are force to choosing only one item in the list, such as male or female, chrome or firefox option.

Example:

```
<input type= "Radio" name= "gender" value= "male">Male<input type=
"Radio" name= "gender" value= "female">female
```

Benefits of data validation

- It cost is effective because it saves the right amount of money and time through the collection of datasets.
- It is compatible process and easy to use because it helps to remove duplication from the complete dataset.
- It is made up of a data-efficient structure that provides standard database and cleansed dataset data.

Effectiveness of Database

1. Increased Data Security and Sharing

Effective database management systems promote organizational accessibility to data, enabling end users to disseminate the information across the business quickly and efficiently.

A management system aids in obtaining quick answers to database queries, resulting in quicker and more accurate data access. Salespeople and other end users will have better access to the data, allowing for a quicker sales cycle and more informed decision-making.

2) Effective Integration of Data

An integrated view of an organization's operations is promoted by the use of a data management system. You can gain enhanced insight into the integrated systems in your tech stack by seeing how data activities in one silo affect the rest of your database.

3) Reliable and Standardized Data

When the same data is present in various locations throughout an organization, there are inconsistencies in the data. Process silos and siloed data are frequently at blame for this. You may be certain that an entire, singular, unified view of your data is provided throughout your business by utilizing an appropriate management system and data quality management tools.

4) Data that complies with regulations

Data privacy and security policies can be more effectively implemented with the help of database management systems. Better transparency and less danger of breaking the law result from more efficient management. With a system in place that controls personal profiles and records inside of a database, honoring email opt-outs becomes considerably simpler.

5) Increase in productivity of the end user

Any organization that implements a database management system will see an increase in user productivity. Data management systems give end users the ability to take prompt, well-informed decisions that, in the long run, can determine whether an organization succeeds or fails

6) Quicker decision making

Higher quality information will be produced through effective data management systems and practices. which in turn aids your staff in making quicker, smarter decisions during routine tasks.

7) Cleaner more actionable data

Database management systems make it easier for your data quality initiatives to be adopted and ultimately succeed. These systems contribute to the framework that supports activities for improving the quality of the data, such as data cleansing, data validation, enrichment, and data protection.

SQL constraints

The rules that can be applied to the different types of data in a table is known as SQL constraint. It can be applied at the column or table level. The table level constraints are applied to the entire table, but the column level constraints are only applied to one column.

Here, are the following most commonly used SQL constraints are

- Primary key
- Foreign key
- NOT NULL

Primary key

A primary key is a unique identifier for each table record in a relational database field (or set of columns). Primary key is also used as a unique identifier to quickly parse data within the table. It is a unique identifier, such as contact, email, driving license, student ID, doctor ID, record number, registration number, etc. In relational database, primary key is depending on the preference of the administrator.

Foreign key

A foreign key is a column or set of columns in relational database table that connects data from two other tables. It's a column that refers to another table's column (usually the primary key). While a primary key might exist on its own, a foreign key must always make some sort of reference to a primary key.

Not null

The NOT NULL prevents a column from accepting NULL values, so we can't insert or modify a record without giving it a value.

The example of not null is:

```
CREATE TABLE persons (
    ID int NOT NULL,
    LastName Varchar (255) NOT NULL,
    FirstName Varchar (255) NOT NULL,
    Age int
);
```

DDL

DDL or Data Definition Language actually consists of the SQL commands that can be used to define the database schema. It simply deals with descriptions of the database schema and is used to create and modify the structure of database objects in the database. DDL is a set of SQL commands used to create, modify, and delete database structures but not data. These commands are normally not used by a general user, who should be accessing the database via an application. (GeeksforGeeks, 2021)

The list of DDL commands:

CREATE: this command is used to create database like table, index, function, etc.

DROP: this command helps to delete objects from the database.

ALTER: this command is used to alter the structure in database.

COMMENT: This command helps to add comments to the data dictionary.

RENAME: This command is used to rename an object in the database.

TRUNCATE: This command is used to remove all records from table in database.

DML (Data Manipulation Language)

The SQL commands that deals with the manipulation of data present in the database belong to DML or Data Manipulation Language and this includes most of the SQL statements. It is the component of the SQL statement that controls access to data and to the database. Basically, DCL statements are grouped with DML statements. (GeeksforGeeks, 2021)

The commands of DML

INSERT: this command is used to insert data into a table.

UPDATE: this command is used to update existing data into a table.

DELETE: this command helps to delete record or data from table.

LOCK: It is used to control table concurrency.

Entity

An entity is a distinguishable real-world 'object' that exists. An object should not be considered as an 'entity' until it can be easily identified from all other objects of the real world. In a database,

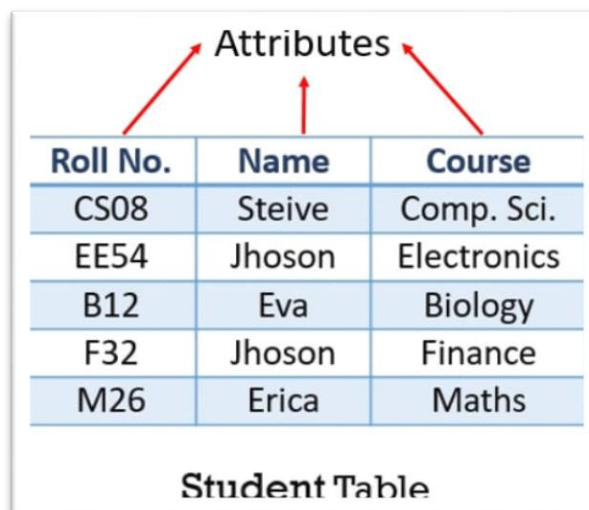
Roll No.	Name	Course	
CS08	Steive	Comp. Sci.	→ Entity 1
EE54	Jhoson	Electronics	→ Entity 2
B12	Eva	Biology	→ Entity 3
F32	Jhoson	Finance	→ Entity 4
M26	Erica	Maths	→ Entity 5

Student Table

only that ‘thing’ or ‘object’ is considered as an entity about which data can be stored or retrieved. As if you are not able to store data about some object or if you are not going to retrieve data about some object then there is no point in creating that entity in a database. (T, 2019)

Attribute

Attributes describe the characteristics or properties of an entity in a database table. An entity in a database table is defined with the ‘fixed’ set of attributes. For example, if we have to define a student entity then we can define it with the set of attributes like roll number, name, course. The attribute values, of each student entity, will define its characteristics in the table. (T, 2019)

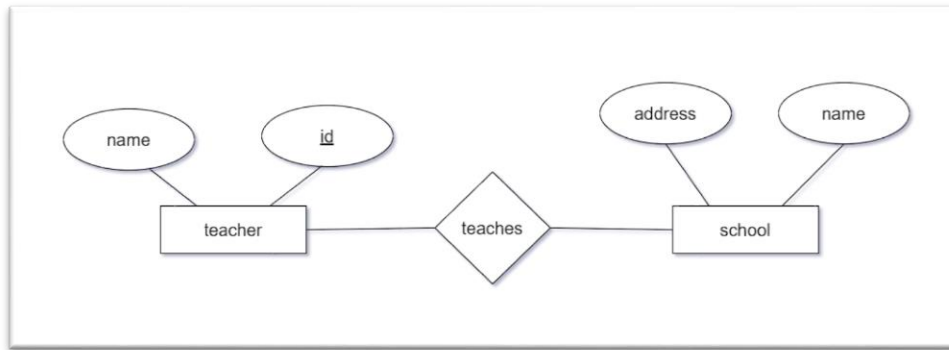


Attributes		
Roll No.	Name	Course
CS08	Steive	Comp. Sci.
EE54	Jhoson	Electronics
B12	Eva	Biology
F32	Jhoson	Finance
M26	Erica	Maths

Student Table

Relationship

The term relationship is used to describe the connection between two or more entities. For example, a teacher **teaches** at school, a student **register** for a college. Here, teaches and register are relationships.



There are three types of relationship in DBMS (Database Management System)

- One to one
- One to many
- Many to many

User interface

In this project, I have created a user interface by the help of HTML. I had created small User Interface. It includes Lecture Form, Student Registration Form, Program Detail Form, Module Form, Batch Form, and Counselor Form.

First form:

Lecture Form

lecture_id

lecture_name

module_leader_number

Second form:

Student Registration Form

Student Name

Registration Number

Address

Email

Home Contact

Mobile Number

Academic Detail

Batch Number

Program ID

Employee Number

Third form:

Program_detail_form

program_type
☒ full time
☐ part time

payment

time_period

program_id

Forth form:

Module Form

name

module_number

credit_value

module_leader_number

no_of_session

Fifth form:

Batch Form

relevent_numbeber

 starting_date

 end_date

 no_of_student

Sixth form:

Counselor Form

employee_name

 employee_number

MySQL

An open-source relational database management system is also known as MySQL. Like, other relational database, MySQL stores data in tables made up of rows and columns. By the help of structured query language (SQL) users can define, manipulation, control and query data. The combination of MySQL is “My”, the name of MySQL was created by Michael Wideness’s daughter, and “SQL”. MySQL is a flexible and powerful program, it is also most open source database system in the world.

Quires

A query is a request for data or information from a database table or combination of tables. This data may be generated as results returned by Structured Query Language (SQL) or as pictorials, graphs or complex results, e.g., trend analyses from data-mining tools. In SQL there are 3 different types of queries they are:

Data Definition Language (DDL)

Query	Function
CREATE	It is used to create a new database
ALTER	It is used to alter the structure of database

DROP	It is used to delete records of database
TRUNCATE	It is used to remove all data from a table

Data Manipulation Language

Query	Function
SELECT	It is used to retrieve data from a database
INSERT	It is used to insert data into a table
DELETE	It is used to delete records of table
UPDATE	It is used to update data in a table

Data Control Language (DCL)

Query	Function
GRANT	It is used to allow access to data base
REVOKE	It is used to withdraw access permission to a database

Transaction Control Language (TCL)

Query	Function
COMMIT	It is used to permanently save transaction in a database
ROLLBACK	It used to restore the database from the last committed state
SAVEPOINT	It is used to temporarily save a transaction in a database

Tables

Tables	Field Names	Data type	Length
student	Reg_no	int	11
	name	varchar	245
	Home_contact	int	11
	Mobile_number	int	11
	email	int	100
	address	varchar	245

	Academic_detail	varchar	245
Program_detail	Program_detail_id	int	11
	Program_type	varchar	245
	Time_period	varchar	245
	payment	varchar	245
program	Program_id	Int	11
	name	varchar	245
module	Module_no	int	11
	Name	varchar	245
	Credit_value	varchar	245
	No_of_session	varchar	245
	Mod_leader_emp_no	int	11
lecturer	Lecturer_emp_no	int	11
	Lecturer_name	Varchar	245
consular	Employee_no	int	11
	Employee_name	varchar	245
Batch	Batch_no	Int	11
	Relevant_program	Varchar	245
	Start_date	Date	
	End-date	Date	
	No_of_std	int	11

Creating the database using MySQL workbench

Creating program table:

Queries:

```
CREATE TABLE `program` (
  `program_id` int(11) NOT NULL AUTO_INCREMENT,
  `program_name` varchar(254) NOT NULL,
  PRIMARY KEY (`program_id`)
) ENGINE=InnoDB AUTO_INCREMENT=102 DEFAULT CHARSET=utf8mb4
```



```
1 CREATE TABLE `program` (  
2   `program_id` int(11) NOT NULL AUTO_INCREMENT,  
3   `program_name` varchar(254) NOT NULL,  
4   PRIMARY KEY (`program_id`)  
5 ) ENGINE=InnoDB AUTO_INCREMENT=102 DEFAULT CHARSET=utf8mb4
```

Creating student table:

Queries:

```
CREATE TABLE student (  
  reg_no int(11) NOT NULL AUTO_INCREMENT,  
  student_name varchar(254) NOT NULL,  
  mobile_number int(11) NOT NULL,  
  home_contact int(11) NOT NULL,  
  address varchar(254) NOT NULL,  
  academic_detail int(11) NOT NULL,  
  email varchar(254) NOT NULL,  
  program-id int(11) NOT NULL,  
  batch_number int(11) NOT NULL,  
  employee-number int(11) NOT NULL,  
  PRIMARY KEY (reg_no),  
  KEY program-id fk (program-id),  
  KEY batch_number fk (batch_number),  
  KEY employee-number fk (employee-number),  
  CONSTRAINT employee-number fk FOREIGN KEY (employee-number) REFERENCES  
  student (reg_no)  
) ENGINE=InnoDB AUTO_INCREMENT=102 DEFAULT CHARSET=utf8mb4
```

```

1 CREATE TABLE `student` (
2   `reg_no` int(11) NOT NULL AUTO_INCREMENT,
3   `student_name` varchar(254) NOT NULL,
4   `mobile_number` int(11) NOT NULL,
5   `home_contact` int(11) NOT NULL,
6   `address` varchar(254) NOT NULL,
7   `academic_detail` int(11) NOT NULL,
8   `email` varchar(254) NOT NULL,
9   `program-id` int(11) NOT NULL,
10  `batch_number` int(11) NOT NULL,
11  `employee-number` int(11) NOT NULL,
12  PRIMARY KEY (`reg_no`),
13  KEY `program-id fk` (`program-id`),
14  KEY `batch_number fk` (`batch_number`),
15  KEY `employee-number fk` (`employee-number`),
16  CONSTRAINT `employee-number fk` FOREIGN KEY (`employee-number`) REFERENCES `student` (`reg_no`)
17 ) ENGINE=InnoDB AUTO_INCREMENT=102 DEFAULT CHARSET=utf8mb4

```

Creating program detail table

Queries:

```

CREATE TABLE `program_detail` (
  `program_detail_id` int(11) NOT NULL AUTO_INCREMENT,
  `program_type` varchar(254) NOT NULL,
  `payment` varchar(254) NOT NULL,
  `time_period` varchar(254) NOT NULL,
  `program_id` int(11) NOT NULL,
  PRIMARY KEY (`program_detail_id`),
  KEY `prpgram_id fk` (`program_id`),
  CONSTRAINT `prpgram_id fk` FOREIGN KEY (`program_id`) REFERENCES
`program_detail` (`program_detail_id`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

```

1 CREATE TABLE `program_detail` (
2   `program_detail_id` int(11) NOT NULL AUTO_INCREMENT,
3   `program_type` varchar(254) NOT NULL,
4   `payment` varchar(254) NOT NULL,
5   `time_period` varchar(254) NOT NULL,
6   `program_id` int(11) NOT NULL,
7   PRIMARY KEY (`program_detail_id`),
8   KEY `prpgram_id fk` (`program_id`),
9   CONSTRAINT `prpgram_id fk` FOREIGN KEY (`program_id`) REFERENCES `program_detail` (`program_detail_id`)
10  ) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

Creating Counselor table:

Queries:

```

CREATE TABLE `counseior` (
  `employee_number` int(11) NOT NULL AUTO_INCREMENT,
  `employee_name` varchar(254) NOT NULL,
  PRIMARY KEY (`employee_number`)
) ENGINE=InnoDB AUTO_INCREMENT=2 DEFAULT CHARSET=utf8mb4

```

```

1 CREATE TABLE `counseior` (
2   `employee_number` int(11) NOT NULL AUTO_INCREMENT,
3   `employee_name` varchar(254) NOT NULL,
4   PRIMARY KEY (`employee_number`)
5   ) ENGINE=InnoDB AUTO_INCREMENT=2 DEFAULT CHARSET=utf8mb4

```

Creating batch Table:

Queries:

```

CREATE TABLE `batch` (
  `batch_number` int(11) NOT NULL AUTO_INCREMENT,
  `relevent_number` varchar(254) NOT NULL,
  `starting_date` date NOT NULL,
  `end_date` date NOT NULL,
  `no_of_student` varchar(254) NOT NULL,
  PRIMARY KEY (`batch_number`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

```

1 CREATE TABLE `batch` (
2   `batch_number` int(11) NOT NULL AUTO_INCREMENT,
3   `relevent_number` varchar(254) NOT NULL,
4   `starting_date` date NOT NULL,
5   `end_date` date NOT NULL,
6   `no_of_student` varchar(254) NOT NULL,
7   PRIMARY KEY (`batch_number`)
8 ) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

Creating lecturer table

Queries:

```

CREATE TABLE `lecturer` (
  `lecture_id` int(11) NOT NULL AUTO_INCREMENT,
  `lecturer_name` varchar(254) NOT NULL,
  `module_leader_number` int(11) NOT NULL,
  PRIMARY KEY (`lecture_id`),
  KEY `module_leader_number` (`module_leader_number`),
  CONSTRAINT `module_leader_number` FOREIGN KEY (`module_leader_number`)
REFERENCES `lecturer` (`lecture_id`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

```

1 CREATE TABLE `lecturer` (
2   `lecture_id` int(11) NOT NULL AUTO_INCREMENT,
3   `lecturer_name` varchar(254) NOT NULL,
4   `module_leader_number` int(11) NOT NULL,
5   PRIMARY KEY (`lecture_id`),
6   KEY `module_leader_number` (`module_leader_number`),
7   CONSTRAINT `module_leader_number` FOREIGN KEY (`module_leader_number`) REFERENCES `lecturer` (`lecture_id`)
8 ) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

Creating module table

Queries:

```

CREATE TABLE `module` (
  `module_number` int(11) NOT NULL AUTO_INCREMENT,
  `name` varchar(254) NOT NULL,
  `credit_value` varchar(254) NOT NULL,
  `module_leader_number` varchar(254) NOT NULL,

```

```

`no_of_session` varchar(254) NOT NULL,
`program_detail_id` int(11) NOT NULL,
PRIMARY KEY (`module_number`),
KEY `program_detail_id fk` (`program_detail_id`),
CONSTRAINT `program_detail_id fk` FOREIGN KEY (`program_detail_id`) REFERENCES
`module` (`module_number`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

```

1 CREATE TABLE `module` (
2   `module_number` int(11) NOT NULL AUTO_INCREMENT,
3   `name` varchar(254) NOT NULL,
4   `credit_value` varchar(254) NOT NULL,
5   `module_leader_number` varchar(254) NOT NULL,
6   `no_of_session` varchar(254) NOT NULL,
7   `program_detail_id` int(11) NOT NULL,
8   PRIMARY KEY (`module_number`),
9   KEY `program_detail_id fk` (`program_detail_id`),
10  CONSTRAINT `program_detail_id fk` FOREIGN KEY (`program_detail_id`) REFERENCES `module` (`module_number`)
11 ) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4

```

Database testing

After successful creating database and the user interface of Record Keeping System of College now I am going to testing the system against different methods to check the system meets the user or not.

Unit testing

Unit testing is a software development process in which the smallest testable parts of an application, called units, are individually and independently scrutinized for proper operation. This testing methodology is done during the development process by the software developers and sometimes QA staff. The main objective of unit testing is to isolate written code to test and determine if it works as intended. (Contributor, 2019)

Integration testing

Integration testing -- also known as integration and testing (I&T) -- is a type of software testing in which the different units, modules or components of a software application are tested as a combined entity. However, these modules may be coded by different programmers. (Awati, 2022)

Testing case

Test Case ID	Test scenario	Test steps	Input Test Data	Expected Results	Actual Results	Pass or fail
TC-1	Student registration activities Check with Valid data	<ol style="list-style-type: none"> 1. Open web browser like chrome, opera and go to student registration activities 2. Fill form with valid data. 3. Click on submit button 	<ol style="list-style-type: none"> 1. Name: Sparsh Shrestha 2. Student contact: 9810084875 3. Parent contact: 9861117593 4. Address: Imadol, Lalitpur 5. Select program: bachelor 6. Select counselor: Sidhant Bhandari 7. Select batch: 2022 	Student must be registered and redirected to list of student page	Student got registered and got redirected to student page	pass
TC-2		<ol style="list-style-type: none"> 4. Open web browser of your computer and go to the program detail activities 5. Fill up form with valid data 6. Click on submit icon 	<ol style="list-style-type: none"> 8. Program type: full time 9. Payment: 80000 10. Time period: three years 	Student must be registered and redirected to list of program page		pass

Technical and user documentation

While working on this report, I had developed a Record Keeping System of College form which capable of receiving data from the user and starting it in the database. The form itself can insert

new records and update records, which it makes easier for the user to modify and manipulate the system.

Technical documentation

The developed of Record Keeping System of College form indulges the users to obtain and store the information of the student, batch, programs, consoler, module. People can also access these records in the database system and perform actions like inserting a new records and update or delete records.

User documentation

User documentation, also known as end user manuals, end user guides, instruction manuals, etc., is the information you give end users to make their experience with your good or service more successful.

The form that I had created using MySQL workbench that is capable to managing and handling all the data.

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