BUS210 Database Design and Management

Outlines

Instructor Name

Kennebec valley community college

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# Class 1

1. Introduction both personal and to the class
2. Syllabus review
   1. Methods to communicate with instructor – [email], [text] and [phone]
   2. Office Hours – I will be on campus until around 2:00pm every day for the months January and February due to being part of a robotics team. After this time period I will be on campus longer and will notify the class. I am always available by phone, text, and email otherwise.
   3. Textbook - Database Systems: Design, Implementation, & Management 11th Edition
   4. Course Description, Objectives, and Content
   5. Grading
   6. Attendance – attendance will be recorded both in class and using video tracking software for the online students, more on this later.
   7. Course Requirements
      1. Assignments – one assignment a week and are usually application based. You have a full week to complete. All assignments are posted online.
      2. Exams – There are a few exams during this class and like the assignments will require you to apply the information that you have learned up to that point. They will all be open book because of this. You will have a week for normal exams and two weeks for the final.
      3. Project – There is a large project that will extend the entire course. You are tasked with examining a business and planning/designing a database system.
      4. Other bits and pieces
3. Blackboard demonstration and exploration
4. Lecture capture
   1. All classes will be recorded and placed online within hours of class.
   2. When video is ready for viewing an email will be sent out.
   3. Videos will require the inputting of your email address before viewing. This will allow tracking of your views of the video and will be used for attendance purposes.
   4. Screen casts will be done for any demonstrations that are made during class and posted in a similar fashion.
5. What is the point of this class?
   1. We live in the age of big data where most aspects of our lives are being cataloged and stored in some business database or online repository. We are collecting all of this data however in itself it is not useful and it needs to be organized and turned into information for us to really benefit from it. This process needs to start in the planning stage with the structure of the database being designed from the ground up to fit the needs of the organization. From there special care needs to be placed to manage and control the data so that it is functional and supports the needs of the business. This class will teach you how to design and manage a database as well as your options when selecting the overall structure.
6. Why you should be excited.
   1. We use databases everyday but often do not understand how they function. This understanding can allow you to better know the underpinnings and will facilitate your ability to pull out the information from the data.
   2. This will class will allow you to extend the knowledge from BUS205 and provide you an option to apply many of those concepts.
   3. Your understanding of these data structures and how organizations use data will allow you to protect your personal and professional information.
   4. Data can help illustrate the big picture of your business and can be used to allow for better decision making. The other side of this however is if the information is poor it can have a negative impact.
   5. As with most things you have options as to what systems you use and the field of databases is not different. You will learn about relational databases with a focus on SQL and other types such as NOSQL.
   6. If we accept that we use these systems in our work and personal lives then we eventually have to determine how to manage them. You could have the best data in the world but if it is not accessible then it is not useful.

# Class 2

1. Assignment 1
2. Introduction to databases
   1. Why do we need databases?
3. Data VS. Information
   1. Data - Raw Facts
   2. Information - Processing data to reveal its meaning
   3. Knowledge age
      1. "Data are the foundation of information, which is the bedrock of knowledge"
   4. Summary
      1. Data constitutes the building blocks of information
      2. Information is produced by processing data
      3. Information is used to reveal the meaning of data
      4. Accurate, relevant, and timely information is key to good decision making
      5. Good decision making is the key to organizational survival in a global environment
4. Database
   1. End user data
   2. Metadata
   3. DBMS - Database Management System
      1. Advantages
         1. Improved data sharing
         2. Improved data security
         3. Better data integration
         4. Minimized data inconsistencies
         5. Improved data access
         6. Improved decision making
         7. Increased End-User productivity
   4. Types of databases
      1. Single user database
         1. Desktop Database
      2. Multiuser Database
         1. Workgroup - less than 50 users
         2. Enterprise - more than 50 users
      3. Centralized
      4. Distributed
      5. Cloud Database
      6. General Purpose
      7. Discipline Specific
      8. Operational/Online Transaction Processing/Transactional/Production
      9. Analytical
      10. Data warehouse
      11. Online Analytical Processing
      12. Business Intelligence
      13. Unstructured Data
      14. Structured Data
      15. Semi-Structured Data
      16. Extensible Markup Language XML
      17. Social Media
          1. NoSQL
5. Why database design is important

# Class 3

1. Review
2. Evolution of database systems
   1. Manual file systems
   2. Computerized filing
      1. Data Processing Specialist DP
      2. Descriptors
         1. Data
         2. Field
         3. Record
         4. File
   3. Perspectives
      1. DP - Manual Files
      2. Users - felt separated from the data
   4. File system redux
   5. Problems with file systems
      1. Purposes
         1. Understand database development
         2. If problems are not known they can find their way into database
      2. Problems
         1. Lengthy development times
         2. Difficulty of getting quick answers
         3. Complex system administration
         4. Lack of security
         5. Extensive programming
            1. Example pg 19
   6. Structural and data dependence
   7. Data redundancy
      1. Problems
         1. Poor data security
         2. Data inconsistency
            1. Integrity
         3. Data entry errors
         4. Data delivery errors
         5. Data anomalies
            1. Update anomalies
            2. Insertion anomalies
            3. Deletion anomalies
   8. Lack of design and data modeling skills
3. Database systems
   1. DBMS
      1. Components
         1. Hardware
         2. Software
         3. People
         4. Procedures
         5. Data
      2. Functions
         1. Data dictionary management
         2. Data storage management
         3. Data transformation and presentation
         4. Security management
         5. Multiuser access control
         6. Backup and recovery management
         7. Data integrity management
         8. Database access language and application programming interface
         9. Database communication interfaces
4. Managing the database system
5. Preparing for your career

# Class 4

1. Structural and data dependence
2. Data redundancy
   1. Problems
      1. Poor data security
      2. Data inconsistency
         1. Integrity
      3. Data entry errors
      4. Data delivery errors
      5. Data anomalies
         1. Update anomalies
         2. Insertion anomalies
         3. Deletion anomalies
3. Lack of design and data modeling skills
4. Database systems
5. DBMS
   1. Components
      1. Hardware
      2. Software
      3. People
      4. Procedures
      5. Data
   2. Functions
      1. Data dictionary management
      2. Data storage management
      3. Data transformation and presentation
      4. Security management
      5. Multiuser access control
      6. Backup and recovery management
      7. Data integrity management
      8. Database access language and application programming interface
      9. Database communication interfaces
6. Managing the database system
7. Preparing for your career

# Class 5

1. Assignment 2
2. Career overview
3. Database design - Focus on how will be used
   1. Database modeling
      1. Data model
         1. A description of the data structure that will store the end user data
         2. A set of enforceable rules to guarantee integrity
         3. A data manipulation methodology to support real world data transformations
4. Importance of data models
   1. I created this business, I worked with this business for years, and this is the first time I’ve really understood how all the pieces really fit together.
   2. Perception/needs
      1. Blind man and the elephant
5. Data model building blocks
   1. Entity
   2. Attribute
   3. Relationship
      1. One to Many - 1:M 1..\*
      2. Many to Many - M:N \*..\*
      3. One to One - 1:1 1..1
   4. Constraints
6. Business Rules
7. Obtaining business rules
   1. Importance
      1. Standardize company's view if data
      2. Communication tool between users and designers
      3. Designer can understand the nature, role, and scope of the data
      4. Designer can understand business processes
      5. Designer can develop correct relationship participation rules and their constraints
8. Translating business rules into data models
   1. Noun - entity
   2. Verb - relationship between
9. Naming Conventions

# Class 6

1. Importance of data models
   1. I created this business, I worked with this business for years, and this is the first time I’ve really understood how all the pieces really fit together.
   2. Perception/needs
      1. Blind man and the elephant
2. Data model building blocks
   1. Entity
   2. Attribute
   3. Relationship
      1. One to Many - 1:M 1..\*
      2. Many to Many - M:N \*..\*
      3. One to One - 1:1 1..1
   4. Constraints
3. Business Rules
4. Obtaining business rules
   1. Importance
      1. Standardize company's view of data
      2. Communication tool between users and designers
      3. Designer can understand the nature, role, and scope of the data
      4. Designer can understand business processes
      5. Designer can develop correct relationship participation rules and their constraints
5. Translating business rules into data models
   1. Noun - entity
   2. Verb - relationship between
6. Naming Conventions
7. The evolution of data models
   1. The hierarchical model
      1. Upside down tree
      2. Segments
      3. Parent
      4. Child
      5. One to Many
   2. The network model
      1. More than one parent
      2. Terminology
         1. Schema
         2. Subschema
         3. Data manipulation language DML
         4. Data definition language DDL
   3. The Relational Model
      1. Relation/table
      2. Row/Tuple/Record
      3. Columns - attributes
      4. RDBMS
      5. Relational diagram
      6. Query Language
         1. SQL
            1. The end-user interface
            2. A collection of tables
            3. SQL engine
   4. Entity Relationship Model
      1. ERD
      2. ER Model
         1. Entity
            1. Instance/occurrence
            2. Set
         2. Attributes
         3. Relationships
      3. Notations
         1. Chen
         2. Crow's Foot
         3. Class diagram/UML
   5. Object Oriented Model
      1. Objects
      2. Semantic data model
      3. Classes
      4. Methods
      5. Class hierarchy
      6. Inheritance
      7. UML
   6. Object/Relational and XML
      1. ERDM extended relational data model
      2. XML

# Class 7

1. Object Oriented Model
   1. Objects
   2. Semantic data model
   3. Classes
   4. Methods
   5. Class hierarchy
   6. Inheritance
   7. UML
2. Object/Relational and XML
   1. ERDM extended relational data model
   2. XML
3. Big Data and NoSQL
   1. Big Data
      1. 3 V's
         1. Volume
         2. Velocity
         3. Variety
   2. One size fits all
   3. Technologies
      1. Hadoop
         1. Hadoop Distributed File System
            1. Name Node
            2. Data Node
            3. Client Node
      2. MapReduce
      3. NoSQL
         1. Characteristics
            1. Not base on relations or SQL
            2. Support distributed database structures
            3. High scalability, high availability, and fault tolerance
            4. Large volumes of sparse data
            5. Geared towards performance not transaction consistency
         2. Key-Value
4. Data Models
   1. Characteristics
      1. Conceptual simplicity
      2. Representation of behavior must be aligned with the data model
   2. Degrees of data abstraction
      1. ANSI - American National Standards Institute
      2. Models
         1. External Model - end Users View
            1. External schema
         2. Conceptual Model - global view of the database
            1. Conceptual schema
            2. Software Independence
            3. Hardware Independence
            4. Logical Design
         3. Internal Model - maps conceptual to DBMS
            1. Internal schema
            2. Logical independence
         4. Physical Model - physical storage
            1. Physical independence

# Class 8

1. Relational Database model
   1. E.F. Codd
      1. Predicate Logic
      2. Set Theory
      3. Components
         1. Logical data structure represented by relations
         2. Set of integrity rules
         3. Set of operations that define data manipulation
   2. Logical view
      1. Logical vs Physical
      2. Tables/Relations
         1. Entity occurrences
         2. Entity set
         3. Tuple
         4. Data types
            1. Numeric
            2. Character
            3. Date
            4. Logical
         5. Domain
   3. Keys
      1. Key definition - one or more attributes that determine other characteristics
      2. Primary Key
      3. Determination
         1. Functional dependence
            1. Determinant/key
            2. Dependent
            3. Full functional dependence
      4. Types of keys
         1. Composite
            1. Key attribute
         2. Superkey
            1. Trivial
            2. Candidate/Minimal
         3. Primary Key Entity Integrity
            1. Primary Key requirements

Must be unique

Cannot be Null

Nulls

* + - 1. Foreign Key
         1. Referential integrity
      2. Secondary Key
  1. Integrity Rules
     1. Entity
     2. Referential
     3. Flags
     4. Others
        1. Not Null
        2. Unique

1. Relational Algebra
   1. Relvar
   2. Operations
      1. Select/Restrict
      2. Project
      3. Union
      4. Intersect
      5. Difference
      6. Product
      7. Join
         1. Natural Join
         2. Equijoin
         3. Theta Join
         4. Left outer join
         5. Right outer join
      8. Divide

# Class 9

1. Relational Algebra
   1. Relvar
   2. Operations
      1. Select/Restrict
      2. Project
      3. Union
      4. Intersect
      5. Difference
      6. Product
      7. Join
         1. Natural Join
         2. Equijoin
         3. Theta Join
         4. Left outer join
         5. Right outer join
      8. Divide
2. The data dictionary
   1. System Catalog
   2. Homonyms
   3. Synonym
3. Relationships
   1. 1:M
   2. 1:1
   3. M:N
      1. Linking Table
4. Data Redundancy
   1. Controlled
   2. Historical Accuracy
5. Indexes
   1. Index Key
   2. Unique Index
6. Codd's Rules

# Class 10

1. Relationships
   1. 1:M
   2. 1:1
   3. M:N
      1. Linking Table
2. Data Redundancy
   1. Controlled
   2. Historical Accuracy
3. Indexes
   1. Index Key
   2. Unique Index
4. Codd's Rules

Chapter 4

1. Entity relationship model
   1. ERD
      1. Entities/Objects
      2. Attributes
      3. Relationships
      4. Notations
         1. Chen
         2. Crow's Feet
         3. UML
   2. Entities
      1. Entity set
      2. Entity instance/occurrence
   3. Attributes
      1. Required Attribute
      2. Optional Attribute
      3. Domains
      4. Identifiers
         1. Primary Keys
         2. Relational schema
      5. Composite identifier
      6. Composite attribute
      7. Simple Attribute
      8. Single Valued attributes
      9. Multi Valued attributes
         1. Implementing
            1. New attributes
            2. New entity
      10. Derived/computed attribute

# Class 11

1. Attributes
   1. Required Attribute
   2. Optional Attribute
   3. Domains
   4. Identifiers
      1. Primary Keys
      2. Relational schema
   5. Composite identifier
   6. Composite attribute
   7. Simple Attribute
   8. Single Valued attributes
   9. Multi Valued attributes
      1. Implementing
         1. New attributes
         2. New entity
   10. Derived/computed attribute
2. Relationships
   1. Participants
   2. Active or Passive Verb
   3. Bidirectional
   4. Connectivity
      1. Examples
   5. Cardinality
      1. Examples
   6. Relation to business rules
   7. Existence dependence
      1. Example
   8. Existence independent
      1. Strong/Regular
      2. Example
   9. Relationship Strength
      1. Weak/Non identifying
      2. Strong/identifying
      3. Weak entity
         1. Existence dependent
         2. Primary key that is partially or totally from parent
   10. Relationship participation
       1. Optional
       2. Mandatory
       3. Crows Foot Symbols
       4. Distinctions/Examples
   11. Relationship Degree
       1. Unary/Recursive
       2. Binary
       3. Ternary
       4. More

# Class 12

1. Relationships
   1. Participants
   2. Active or Passive Verb
   3. Bidirectional
   4. Connectivity
      1. Examples
   5. Cardinality
      1. Examples
   6. Relation to business rules
   7. Existence dependence
      1. Example
   8. Existence independent
      1. Strong/Regular
      2. Example
   9. Relationship Strength
      1. Weak/Non identifying
      2. Strong/identifying
      3. Weak entity
         1. Existence dependent
         2. Primary key that is partially or totally from parent
   10. Relationship participation
       1. Optional
       2. Mandatory
       3. Crows Foot Symbols
       4. Distinctions/Examples
   11. Relationship Degree
       1. Unary/Recursive
       2. Binary
       3. Ternary
       4. More
   12. Recursive Relationships
   13. Associative/Composite Entities
   14. Developing an ER Diagram
       1. Iterative Process
          1. Create a detailed narrative of the organizations description of operations
          2. Identify the business rules based on the description of operations
          3. Identify the main entities and relationships from the business rules
          4. Develop the initial ERD
          5. Identify the attributes and the primary keys that adequately describe the entities
          6. Revise and review the ERD
       2. 1TO1 relationship sidebar
   15. Database Design Challenges - Conflicting Goals
       1. Design Standards
       2. Processing speed
       3. Information requirements
       4. Example

# Class 13

1. Developing an ER Diagram
   1. Iterative Process
      1. Create a detailed narrative of the organizations description of operations
      2. Identify the business rules based on the description of operations
      3. Identify the main entities and relationships from the business rules
      4. Develop the initial ERD
      5. Identify the attributes and the primary keys that adequately describe the entities
      6. Revise and review the ERD
   2. 1TO1 relationship sidebar
2. Database Design Challenges - Conflicting Goals
   1. Design Standards
   2. Processing speed
   3. Information requirements
   4. Example

Chapter 5

1. Extended Entity relationship
   1. EERD
2. Supertypes and Subtypes
   1. Why use types
      1. Unnecessary nulls
      2. Unique relationships
   2. Example
   3. Supertype
   4. Subtype
3. Specialization hierarchy
   1. Is-a relationship
      1. Support attribute inheritance
      2. Define a special supertype attribute known as subtype discriminator
      3. Define disjoint/overlapping constraints and complete/partial constraints
4. Inheritance
5. Subtype Discriminator
6. Disjoint and overlapping constraints
   1. Disjoint/nonoverlapping
   2. Overlapping
7. Completeness Constraint
   1. Partial
   2. Total
8. Specialization vs Generalization
9. Entity clustering
10. Selecting Primary keys
    1. Natural key/identifier
    2. Primary key guidelines
    3. Composite Primary Keys
    4. Surrogate key
11. Design Cases
    1. Implementing 1:1 Relationships
    2. Maintaining History of time-variant data
    3. Fan traps
    4. Redundant Relationships

# Class 14

1. Review
2. Inheritance
3. Subtype Discriminator
4. Disjoint and overlapping constraints
   1. Disjoint/nonoverlapping
   2. Overlapping
5. Completeness Constraint
   1. Partial
   2. Total
6. Specialization vs Generalization
7. Entity clustering
8. Selecting Primary keys
   1. Natural key/identifier
   2. Primary key guidelines
   3. Composite Primary Keys
   4. Surrogate key
9. Design Cases
   1. Implementing 1:1 Relationships
   2. Maintaining History of time-variant data
   3. Fan traps
   4. Redundant Relationships

Chapter 6

1. Normalization Introduction

# Class 15

1. Normalization - evaluating and correcting tables to minimize redundancy and anomalies
2. Levels
   1. 1NF
   2. 2NF
   3. 3NF
3. Denormalization
4. Terminology
   1. Tables/Relations
   2. Prime Attribute
   3. Nonprime Attribute/Nonkey
5. Examining the example data
   1. Problems
      1. Primary Key contains nulls
      2. Potential data inconsistencies
      3. Anomalies
         1. Update
         2. Insertion
         3. Deletion
      4. Entry problems
6. The normalization process
   1. Well-formed relations
      1. Each table represents a single subject
      2. No data item will be unnecessarily stored in more than one table
      3. All nonprime attributes in a table are dependent on the primary key
      4. No anomalies
   2. Normal forms
   3. Key Review
      1. Types of keys
         1. Primary
         2. Composite
         3. Super
         4. Candidate
7. Functional dependence
   1. Levels
   2. Dependency
      1. Partial
      2. Transitive
8. Conversion to 1NF
   1. Repeating groups
   2. Steps
      1. Eliminate the Repeating Groups
      2. Identify the Primary Key
      3. Identify all dependencies
         1. Dependency Diagram

# Class 16

1. Review
2. 1NF
3. 2NF
   1. Make New Tables to eliminate Partial Dependencies
   2. Reassign Corresponding dependent Attributes
   3. Requirements
4. 3NF
   1. Make New tables to eliminate Transitive Dependencies
   2. Reassign Corresponding Dependent Attributes
   3. Requirements
5. Improving the design
   1. Evaluate PK assignments
   2. Evaluate Naming Conventions
   3. Refine Attribute Atomicity
   4. Identify New Attributes
   5. Identify New Relationships
   6. Refine Primary Keys as required for Data Granularity
   7. Maintain Historical Accuracy
   8. Evaluate using Derived Attributes

# Class 17

1. Review
2. Examination of Normalized Tables
3. Surrogate Key Considerations
4. Higher Level Forms
   1. Boyce Codd Normal Form
      1. Candidate Keys
   2. 4NF
      1. Multivalued Attributes
      2. Rules
         1. All Attributes must be dependent on the primary key but they must be independent of each other
         2. No row may contain two or more multivalued facts about an entity.
5. Normalization and Database design
6. Denormalization
7. Data Modeling Checklist

# Class 18

1. Introduction to SQL
   1. History
      1. SEQUEL
   2. Standards
   3. Different Styles/Dialects
      1. MYSQL
      2. ORACLE
      3. Microsoft SQL Server
2. What SQL Is not
3. What SQL is
   1. The ideals
      1. Create structures
      2. Perform data management
      3. Complex queries
      4. Minimal user effort
      5. Easy to learn
      6. Is portable
   2. SQL Functions
      1. Data definition language DDL - Create DB objects
         1. Commands
      2. Data manipulation language DML - Manipulate data
         1. Commands
   3. SQL allows you to command "what" without knowing "how"
   4. Query - a spur of the moment question
      1. Questions
      2. Actions
4. Data definition commands
   1. Database model
      1. Business Rules
      2. Items from ERD
   2. Creating the Database
      1. Using the RDBMS
   3. Database Schema - logical group of database objects
   4. Data Types
      1. Numeric
      2. Character
      3. Date
   5. Creating Table Structure
   6. SQL Constraints

# Class 19

1. Data Types
   1. Numeric
   2. Character
   3. Date
2. Creating Table Structure
3. SQL Constraints
   1. Key Constraints
      1. Not Null
      2. Unique
      3. Default
   2. Check Command
   3. Column Constraint
   4. Table Constraint
4. SQL Indexes
   1. Create Index
   2. Integrating with constraints
   3. Dropping Index
5. Data Manipulation
   1. Adding Rows
      1. Insert
   2. Saving Changes
      1. Commit
   3. Listing Table Rows
      1. Select
         1. Wild Card \*
   4. Updating Table Rows
      1. Update
   5. Restoring Table Contents
      1. Rollback
   6. Deleting Table Rows
      1. Delete
   7. Subquery/nested query/Inner
6. Select Queries
   1. Set Oriented
   2. Where Clause
   3. Comparison Operators
      1. On Characters
      2. On Dates
      3. Computed Columns
   4. Arithmetic Operators
      1. Rules of Precedence
   5. Logical Operators
      1. And
      2. Or
      3. Not
   6. Special Operators
      1. Between
      2. Is Null
      3. Like
      4. In
      5. Exists

# Class 20

1. Review
2. Select Queries
   1. Set Oriented
   2. Where Clause
   3. Comparison Operators
      1. On Characters
      2. On Dates
      3. Computed Columns
   4. Arithmetic Operators
      1. Rules of Precedence
   5. Logical Operators
      1. And
      2. Or
      3. Not
   6. Special Operators
      1. Between
      2. Is Null
      3. Like
      4. In
      5. Exists
3. Additional Data Definition Commands
   1. Alter Table
      1. Changing Data Type on Column
      2. Changing Data Characteristics on Column
      3. Adding a Column
      4. Dropping a Column
   2. Advanced Data Updates
      1. Update Command
         1. Difference between Insert and Update
   3. Copying Parts of Tables
      1. Creating a Table and using Insert Into
      2. Creating a new table and Selecting from another
   4. Adding Primary and Foreign Key Designations
   5. Drop Table
4. Additional Select Query Keywords
   1. Order By
      1. Cascading Order Sequence
   2. Distinct
   3. Aggregate Functions
      1. Count
      2. Min
      3. Max
      4. Sum
      5. Avg
   4. Grouping Data
      1. Group By
         1. Having Clause
5. Joining Database Tables

# Class 21

1. Additional Select Query Keywords
   1. Order By
      1. Cascading Order Sequence
   2. Distinct
   3. Aggregate Functions
      1. Count
      2. Min
      3. Max
      4. Sum
      5. Avg
   4. Grouping Data
      1. Group By
         1. Having Clause
2. Joining Database Tables
   1. Review Chapter 3
   2. Linking through keys
   3. Running commands within join
   4. Using Aliases
   5. Recursive Joins

Chapter 8

1. SQL Joins Continued
   1. Types of Joins
      1. Have common values in common columns (Natural Join)
      2. Meet a given join condition (equality or inequality)
      3. Have common values in common columns or have no matching values (outer join)
   2. Example from chapter 7
      1. Points from example
   3. Inner Join - Traditional join where only rows matching criteria are selected
      1. Equality condition/Natural Join/Equijoin
      2. Inequality condition/Theta Join
   4. Outer Join - Returns not only the matching rows buy the rows with unmatched values as well
   5. Examination of table 8.1
   6. SQL new style of join the Cross Join
      1. Cartesian Product

# Class 22

1. SQL Demonstration
   1. Access
      1. Creating a Database
      2. Using SQL in Access
         1. Creating Tables
         2. Inserting Data
         3. Running Queries
   2. WAMP
      1. MYSQL
         1. Creating a Database
         2. Creating Tables
         3. Inserting Data
         4. Running Queries
      2. PHPMYADMIN
         1. Creating a Database
         2. Creating Tables
         3. Inserting Data
         4. Running Queries
   3. Open Office BASE
      1. Creating a database
      2. Using SQL in Base
         1. Creating Tables
         2. Inserting Data
         3. Running Queries

# Class 23

Chapter 8

1. Review on using SQL programs
   1. MYSQL Workbench
2. SQL Joins Continued
   1. Types of Joins
      1. Have common values in common columns (Natural Join)
      2. Meet a given join condition (equality or inequality)
      3. Have common values in common columns or have no matching values (outer join)
   2. Example from chapter 7
      1. Points from example
   3. Inner Join - Traditional join where only rows matching criteria are selected
      1. Equality condition/Natural Join/Equijoin
      2. Inequality condition/Theta Join
   4. Outer Join - Returns not only the matching rows buy the rows with unmatched values as well
   5. Examination of table 8.1
   6. SQL new style of join the Cross Join
      1. Cartesian Product
   7. Natural Join
   8. Using Clause
   9. Join on Clause
   10. Outer Joins
       1. Left
       2. Right
       3. Full
   11. Sub Queries
       1. Rules from chapter 7
       2. Examples
       3. Returns
          1. One Single Value
          2. A list of Values
          3. A virtual table
       4. Where
       5. In
       6. Having
       7. Any and All
       8. From
       9. Attribute List
   12. Correlated Subqueries
   13. SQL Functions
       1. DATE and TIME
       2. NUMERIC
       3. STRING
       4. CONVERSION

# Class 24

1. Sub Queries
   1. Rules from chapter 7
   2. Examples
   3. Returns
      1. One Single Value
      2. A list of Values
      3. A virtual table
   4. Where
   5. In
   6. Having
   7. Any and All
   8. From
   9. Attribute List
2. Correlated Subqueries
3. SQL Functions
   1. DATE and TIME
   2. NUMERIC
   3. STRING
   4. CONVERSION
4. Relational Set Operators
   1. UNION
   2. INTERSECT
   3. EXCEPT(MINUS)
   4. Set-oriented
   5. Union Compatible
   6. Commands
      1. Union
      2. Union All
      3. Intersect
      4. Except
      5. Alternatives
5. Virtual Tables/Views
   1. View
   2. Base tables
6. Updateable views
7. Oracle Sequences
8. Procedural SQL
   1. Persistent stored module PSM
   2. Procedural Language SQL PL/SQL
      1. Anonymous blocks
      2. Data Types

# Class 25

1. Final Exam Review
2. Final Project Review
3. SQL Functions
   1. DATE and TIME
   2. NUMERIC
   3. STRING
   4. CONVERSION
4. Relational Set Operators
   1. UNION
   2. INTERSECT
   3. EXCEPT(MINUS)
   4. Set-oriented
   5. Union Compatible
   6. Commands
      1. Union
      2. Union All
      3. Intersect
      4. Except
      5. Alternatives
5. Virtual Tables/Views
   1. View
   2. Base tables
6. Updateable views
7. Oracle Sequences
8. Procedural SQL
   1. Persistent stored module PSM
   2. Procedural Language SQL PL/SQL
      1. Anonymous blocks
      2. Data Types
9. Triggers
   1. What is a trigger
   2. Remember
      1. Invoked before or after a data row is inserted, updated, or deleted
      2. Associated with a database table
      3. Each table can have more than one trigger
      4. Is executed as part of the transaction that triggered it
   3. Parts
      1. Triggering Timing
         1. Before
         2. After
      2. Triggering Event
      3. Triggering Level
         1. Statement
         2. Row level
      4. Triggering Action

# Class 26

1. Information systems and databases
2. Information for decision making
   1. Database design and implementation
   2. Application design and implementation
   3. Administrative Procedures
3. SDLC
   1. Planning
      1. Should the existing system be continued
      2. Should the existing system be modified
      3. Should the existing system be replaced
      4. Feasibility
         1. Technical Aspects
         2. The system cost
         3. The operational cost
   2. Analysis
      1. What are the requirements of the end users?
      2. Do those requirements fit into the overall information requirements
   3. Detailed systems design
   4. Implementation
   5. Maintenance
      1. Corrective
      2. Adaptive
      3. Perfective
4. DBLC
   1. Database Initial Study
      1. Analyze the company situation
      2. Define Problems and Constraints
      3. Define Objectives
      4. Define Scope and Boundaries
   2. Database design
   3. Implementation and loading
      1. Install the DBMS
      2. Create the database
      3. Load or convert the data
   4. Testing and evaluation
   5. Operation
   6. Maintenance and evolution

# Class 27

1. Review
2. Conceptual Design
   1. Minimal data rule
   2. Steps
      1. Data analysis and requirements
         1. Information needs
         2. Information users
         3. Information sources
         4. Information constitution
      2. ERM and Normalization
      3. Data Model Verification
         1. Module
      4. Distributed Database design
   3. DBMS Selection
      1. Cost
      2. Features and tools
      3. Underlying Model
      4. Portability
      5. DBMS hardware requirements
3. Logical Design
   1. Map conceptual model to logical
   2. Validate using normalization
   3. Validate using integrity constraints
   4. Validate against user requirements
4. Physical design
   1. Define data storage
   2. Integrity and security
   3. Performance measurements
5. Design strategies
   1. Top down
   2. Bottom up
6. Centralized vs decentralized

# Class 28

1. Relational Set Operators
   1. UNION
   2. INTERSECT
   3. EXCEPT(MINUS)
   4. Set-oriented
   5. Union Compatible
   6. Commands
      1. Union
      2. Union All
      3. Intersect
      4. Except
      5. Alternatives
2. Virtual Tables/Views
   1. View
   2. Base tables
3. Updateable views
4. Oracle Sequences
5. Procedural SQL
   1. Persistent stored module PSM
   2. Procedural Language SQL PL/SQL
      1. Anonymous blocks
      2. Data Types
6. Triggers
   1. What is a trigger
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      1. Invoked before or after a data row is inserted, updated, or deleted
      2. Associated with a database table
      3. Each table can have more than one trigger
      4. Is executed as part of the transaction that triggered it
   3. Parts
      1. Triggering Timing
         1. Before
         2. After
      2. Triggering Event
      3. Triggering Level
         1. Statement
         2. Row level
      4. Triggering Action
7. Stored Procedure
   1. Passing Values
8. Cursors
   1. Implicit - automatically created when SQL statement returns only one value
   2. Explicit - created to hold output of SQL statement with more than one row
9. Stored Function
10. Embedded SQL
    1. Static
    2. Dynamic

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