Swami Keshvanand Institute of Technology, Management & Gramothan,
Ramnagaria, Jagatpura, Jaipur-302017, INDIA
Approved by AICTE, Ministry of HRD, Government of India
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A

LAB MANUAL

On

(DATABASE LAB)

Programme:B.Tech(CSE)

Semester: IV

Session: 2023-24

Dr. kajal Mathur (Assistant Professor)

Mr. Harpreet Singh Gill(Associate Professor)

Mr. Kailash Soni(Associate Professor)

Ms. Mamta Sakpal(Associate Professor)

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Lab Manual

Database Management System Lab

4CS4-22/4CAI4-22/4CDS4-22/4CIT4-04

Session 2023-24

	Author/ Owner	Reviewed By	Approved By
Name			
Designation			
Signature			

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Vision and Mission of Institute

Vision: "To promote higher learning in advanced technology, management skills and industrial research to make ourcountry a global player."

Mission: "To promote quality education, training and research in the field of engineering & management by establishingeffective interface with industry and to encourage faculty to undertake industry sponsored projects for students."

Quality Policy

We are committed to **'achievement of quality'** as an integral part of our institutional policy by continuous self-evaluationand striving to improve ourselves.

Institute would pursue quality in

- All its endeavours like admissions, teaching- learning processes, examinations, extra and co-curricular activities,industry institution interaction, research & development, continuing education, and consultancy.
- Functional areas like teaching departments, Training & Placement Cell, library, administrative office, accountsoffice, hostels, canteen, security services, transport, maintenance section and all other services."

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Vision of CSE Department

Vision of CSE department is to:

V1: Produce quality computer engineers trained in latest tools and technologies.

V2: Be a leading department in the region and country by imparting in-depth knowledge to the students in emergingtechnologies in computer science & engineering.

Mission of CSE Department

Mission of the program

Deliver resources in IT enable domain through:

M1: Effective Industry interaction and project-based learning.

M2: Motivating our students for employability, entrepreneurship, research and higher education.

M3: Providing excellent engineering skills in a state-of-the art infrastructure.

Program Educational Objectives of CSE department

The graduates of CSE program will be:

PEO1: Prepared to be employed in IT industries and be engaged in learning, understanding, and applying new ideas.

PEO2: Prepared to be responsible professionals in their domain of interest.

PEO3: Able to apply their technical knowledge as practicing professionals or engaged in higher education.

PEO4: Able to work efficiently as an individual

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Program Outcomes/Program Specific Outcomes – Indicators - Competencies

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Program Outcomes/Program Specific Outcomes – Indicators - Competencies

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.	
Competency	**Indicators**
1.1 Demonstrate competence in mathematical modelling.	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems.
	1.1.2 Apply the concepts of probability, statistics and queuing theory in modelling of computer-based system, data and network protocols.
1.2 Demonstrate competence in basic sciences.	1.2.1 Apply laws of natural science to an engineering problem.
1.3 Demonstrate competence in engineering fundamentals.	1.3.1 Apply engineering fundamentals.
1.4 Demonstrate competence in specialized engineering knowledge to the program.	1.4.1 Apply theory and principles of computer science and engineering to solve an engineering problem.
PO 2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
Competency	**Indicators**
2.1 Demonstrate an ability to identify and formulate complex engineering problem	2.1.1 Evaluate problem statements and identifies objectives.
	2.1.2 Identify processes/modules/algorithms of a computer-based system and parameters to solve a problem.
	2.1.3 Identify mathematical algorithmic knowledge that applies to a given problem.
2.2 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.1 Reframe the computer-based system into interconnected subsystems.
	2.2.2 Identify functionalities and computing resources.
	2.2.3 Identify existing solution/methods to solve the problem, including forming justified approximations and assumptions.
	2.2.4 Compare and contrast alternative solution/ methods to select the best methods.
	2.2.5 Compare and contrast alternative solution processes to select the best process.
2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance.
	2.3.2 Identify design constraints for required performance criteria.
2.4 Demonstrate an ability to execute a	2.4.1 Apply engineering mathematics to implement the

solution process and analyze results	solution.
	2.4.2 Analyze and interpret results using contemporary tools.
	2.4.3 Identify the limitations of the solution and sources/ causes.
	2.4.4 Arrive at conclusions with respect to the objectives.
PO 3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.	
Competency	**Indicators**
3.1 Demonstrate an ability to define a complex/ open-ended problem in engineering terms	3.1.1 Able to define a precise problem statement with objectives and scope.
	3.1.2 Able to identify and document system requirements from stake- holders.
	3.1.3 Able to review state-of-the-art literature to synthesize system requirements.
	3.1.4 Able to choose appropriate quality attributes as defined by ISO/IEC/IEEE standard.
	3.1.5 Explore and synthesize system requirements from larger social and professional concerns.
	3.1.6 Able to develop software requirement specifications (SRS).
3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Able to explore design alternatives.
	3.2.2 Able to produce a variety of potential design solutions suited to meet functional requirements.
	3.2.3 Identify suitable non-functional requirements for evaluation of alternate design solutions.
3.3 Demonstrate an ability to select an optimal design scheme for further development	3.3.1 Able to perform systematic evaluation of the degree to which several design concepts meet the criteria.
	3.3.2 Consult with domain experts and stakeholders to select candidate engineering design solution for further development.
3.4 Demonstrate an ability to advance an engineering design to defined end state	3.4.1 Able to refine architecture design into a detailed design within the existing constraints.
	3.4.2 Able to implement and integrate the modules.
	3.4.3 Able to verify the functionalities and validate the design.
PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	
Competency	**Indicators**
4.1 Demonstrate an ability to conduct investigations of technical issues	4.1.1 Define a problem for purposes of investigation, its scope and importance.

consistent with their level of knowledge and understanding.	4.1.2 Able to choose appropriate procedure/algorithm, dataset and test cases.
	4.1.3 Able to choose appropriate hardware/software tools to conduct the experiment.
4.2 Demonstrate an ability to design experiments to solve open-ended problems.	4.2.1 Design and develop appropriate procedures/methodologies based on the study objectives.
4.3 Demonstrate an ability to analyze data and reach a valid conclusion.	4.3.1 Use appropriate procedures, tools and techniques to collect and analyze data.
	4.3.2 Critically analyze data for trends and correlations, stating possible errors and limitations.
	4.3.3 Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions.
	4.3.4 Synthesize information and knowledge about the problem from the raw data to reach appropriate conclusions.
PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	
Competency	Indicators
5.1 Demonstrate an ability to identify/ create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering, techniques and resources for engineering activities.
	5.1.2 Create/adapt/modify/extend tools and techniques to solve engineering problems.
5.2 Demonstrate an ability to select and apply discipline- specific tools, techniques and resources	5.2.1 Identify the strengths and limitations of tools for (i) acquiring information, (ii) modelling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs.
	5.2.2 Demonstrate proficiency in using discipline-specific tools.
5.3 Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	5.3.1 Discuss limitations and validate tools, techniques and resources.
	5.3.2 Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	
Competency	**Indicators**
6.1 Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare	6.1.1 Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at the global, regional and local level.
6.2 Demonstrate an understanding of professional engineering regulations, legislation and standards	6.2.1 Interpret legislation, regulations, codes, and standards relevant to your discipline and explain its contribution to the protection of the public.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.	
Competency	**Indicators**
7.1 Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts	7.1.1 Identify risks/impacts in the life-cycle of an engineering product or activity.
	7.1.2 Understand the relationship between the technical, socio-economic and environmental dimensions of sustainability.
7.2 Demonstrate an ability to apply principles of sustainable design and development	7.2.1 Describe management techniques for sustainable development.
	7.2.2 Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to the discipline.
PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	
Competency	**Indicators**
8.1 Demonstrate an ability to recognize ethical dilemmas	8.1.1 Identify situations of unethical professional conduct and propose ethical alternatives.
8.2 Demonstrate an ability to apply the Code of Ethics	8.2.1 Identify tenets of the ASME/IEEE/CSI/ACM professional code of ethics.
	8.2.2 Examine and apply moral & ethical principles to known case studies.
PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	
Competency	**Indicators**
9.1 Demonstrate an ability to form a team and define a role for each member	9.1.1 Recognize a variety of working and learning preferences; appreciate the value of diversity on a team.
	9.1.2 Implement the norms of practice (e.g. rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
9.2 Demonstrate effective individual and team operations- communication, problem- solving, conflict resolution and leadership skills.	9.2.1Demonstrate effective communication, problem-solving, conflict resolution and leadership skills.
	9.2.2 Treat other team members respectfully.
	9.2.3 Listen to other members.
	9.2.4Maintain composure in difficult situations.
9.3 Demonstrate success in a team-based project	9.3.1 Present results as a team, with smooth integration of contributions from all individual efforts.
PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	
Competency	**Indicators**
10.1 Demonstrate an ability to comprehend technical literature and document project work	10.1.1 Read, understand and interpret technical and non-technical information.
	10.1.2 Produce clear, well-constructed, and well-supported written engineering documents.
	10.1.3 Create flow in a document or presentation - a

	logical progression of ideas so that the main point is clear.
10.2 Demonstrate competence in listening, speaking, and presentation	10.2.1 Listen to and comprehend information, instructions, and viewpoints of others.
	10.2.2 Deliver effective oral presentations to technical and non-technical audiences.
10.3 Demonstrate the ability to integrate different modes of communication	10.3.1 Create engineering-standard figures, reports and drawings to complement writing and presentations.
	10.3.2 Use a variety of media effectively to convey a message in a document or a presentation.
PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	
Competency	**Indicators**
11.1 Demonstrate an ability to evaluate the economic and financial performance of an engineering activity	11.1.1 Describe various economic and financial costs/benefits of an engineering activity.
	11.1.2 Analyze different forms of financial statements to evaluate the financial status of an engineering project.
11.2 Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity	11.2.1 Analyze and select the most appropriate proposal based on economic and financial considerations.
11.3 Demonstrate an ability to plan/manage an engineering activity within time and budget constraints	11.3.1 Identify the tasks required to complete an engineering activity, and the resources required to complete the tasks.
	11.3.2 Use project management tools to schedule an engineering project, so it is completed on time and on budget.
PO 12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	
Competency	**Indicators**
12.1 Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps	12.1.1 Describe the rationale for the requirement for continuing professional development.
	12.1.2 Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap.
12.2 Demonstrate an ability to identify changing trends in engineering knowledge and practice	12.2.1 Identify historic points of technological advance in engineering that required practitioners to seek education in order to stay current.
	12.2.2 Recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in your field.
12.3 Demonstrate an ability to identify and access sources for new information	12.3.1 Source and comprehend technical literature and other credible sources of information.
	12.3.2 Analyze sourced technical and popular information for feasibility, viability, sustainability, etc.
PSO 1: Core Engineering Skills: Exhibit fundamental concepts of Data Structures, Databases, Operating Systems, Computer Network, Theory of Computation, Advanced Programming and Software Engineering.	
PSO1.1.1	Possess the concepts of Data Structure and Database Management System.

PSO1.1.2	Possess the concepts of core engineering subjects including Operating System, Computer Networks and Software Engineering.
PSO1.1.3	Apply basic programming skills to solve real world problems.
PSO 2: Standard Software Engineering practices: Demonstrate an ability to design, develop, test, debug, deploy, analyze, troubleshoot, maintain, manage and secure a software.	
PSO2.1.1	Apply fundamental software engineering concepts to solve real world problem.
PSO2.1.2	Possess conceptual knowledge for designing, analysing and testing a software.
PSO2.1.3	Estimate and evaluate the cost related to a Software.
PSO 3: Future Endeavours: Recognize the need to have knowledge of higher education institutions/ organizations/ companies related to computer science & engineering.	
PSO3.1.1	Explore the need of current technology being practised by computer science industry/ institutions.
PSO3.1.2	Identify the requirement of continuing education through post graduation like M.Tech., MS, MBA etc.
PSO3.1.3	List various higher education institutes and organizations related to computer science & engineering.

Bloom's Taxonomy (Revised)

Level	Descriptor	Level of Attainment	Keywords
1	Remembering	Recalling from memory	List, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
2	Understanding	Explaining ideas or concepts	Describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss.
3	Applying	Using information in another familiar situation	Calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
4	Analysing	Breaking information into part to explore understandings and relationships	Classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select.
5	Evaluating	Justifying a decision or course of action	Assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate.
6	Creating	Generating new ideas, products or views to do things	Design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate.

** It may be noted that some of the verbs in the above table are associated with multiple Bloom's Taxonomy level. These verbs are actions that could apply to different activities. We need to keep in mind that it's the skill, action or activity we need out students to demonstrate that will determine the contextual meaning of the verb used in the assessment question.

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UNIVERSITY SYLLABUS

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

II Year-IV Semester: B.Tech. Computer Science and Engineering

4CS4-22/CAI/CDS/CIT: Database Management System Lab

Credit: 1.5 **Max. Marks: 100(IA:60, ETE:40)**
0L+0T+3P

List of Experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER,UPDATE and DELETE.
4. Write the queries to implement the joins.
5. Write the query for implementing the following functions: MAX (), MIN (), AVG ()and COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion , updation and deletion
10. Using the referential integrity constraints.
11. Write the query for creating the users and their role.

Data Base Designing Project:

For better understanding students (group of 3-4 students) should design data base for any data base project, understand the requirement and design methodology of project by its own.

Some example of data base design project like:

College management system, Inventory management system and Hospital management system.

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Course Outcomes (COs)

Programme: B.Tech. (Computer Science &Engineering)
Semester: IV
Course Name (Course Code):DATABASE MANAGEMENT SYSTEM (4CAI4-22)

Upon successful completion of the course, the students will be able to:

CO1	Design a database schema for a given problem domain.
CO2	Employ SQL DDL/DML commands to create, secure, populate, maintain, and query a database.
CO3	Employ integrity constraints on a database design.
CO4	Explore advanced database concepts such as stored procedures, triggers, and views, and implement them to automate tasks and enhance database functionality.
CO5	Apply referential integrity constraints, including cascading updates and deletes, to maintain the consistency and integrity of relational data across related tables.
CO6	Create database users and assign appropriate roles and privileges, ensuring secure access and data protection within the database environment

Faculty:

Verified by Course Coordinator

Name:

Verified by Verification and Validation Committee, DPAQIC

Name:

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Programme: B.Tech. (Computer Science &Engineering)
Semester: IV
Course Name (Course Code):DATABASE MANAGEMENT SYSTEM (4CAI4-22)

Course Outcomes		Bloom's Level	PO Indicators	PSO Indicators
Upon successful completion of this course, students should be able to:				
4CAI4-22.1	Design a database schema for a given problem domain.	6	1.2.1,1.3.1,1.4.1,2.1.1, 2.2.1, 2.2.2,2.2.3,2.2.4,2.3.1, 2.3.2,2.4.3,2.4.4, 3.1.1,3.1.2, 3.1.6, 3.2.1,3.2.2,3.3.2,3.4.1,3.4.2,3.4.3, 4.1.1,4.2.1, 5.1.1,5.1.2,, 10.1.1, 12.1.1	1.1.1, 1.1.2
4CAI4-22.2	Employ SQL DDL/DML commands to create, secure, populate, maintain, and query a database.	3	1.2.1, 1.3.1,1.4.1,2.1.1,2.1.2,2.1.3,2.2.2,2.3.1, 2.4.2, 2.4.4,4.1.1, 4.2.1, 4.3.1,4.3.3,4.3.4, 5.1.2,5.2.1, 5.2.2	1.1.1, 1.1.3
4CAI4-22.3	Employ integrity constraints on a database design.	3	1.1.1, 1.3.1,1.4.1,2.1.1,2.1.2, 2.1.3, 2.2.2,2.3.1,2.4.2, 4.1.1,4.2.1, 4.3.1, 4.3.3, 4.3.4,5.1.1,5.2.1,5.2.2	1.1.1, 1.1.3
4CAI4-22.4	Explore advanced database concepts such as stored procedures, triggers, and views, and implement them to automate tasks and enhance database functionality.	4	1.1.1, 1..3.1,1.4.1,2.1.1,2.1.2, 2.1.3,2.2.1, 2.2.2, 2.2.4,2.3.1, 2.4.2,3.1.6, 3.2.3,4..1.1,4.2.1,4.3.1, 4.3.3,4.3.4, 5.1.2, 5.2.1,5.2.2	1.1.1, 1.1.3
4CAI4-22.5	Apply referential integrity constraints, including cascading updates and deletes, to maintain the consistency and integrity of relational data across related tables.	3	1.1.1, 1.3.1,1.4.1,2.1.1,2.1.2,2.1.3,2.2.1,2.2.2,2.2.4,2.3.1, 2.4.2, 3.1.6,3.2.3,4.1.1,4.2.1,4.3.1,4.3.3,4.3.4,5.1.2,5.2.1,5.2.2	1.1.1, 1.1.3
4CAI4-22.6	Create database users and assign appropriate roles and privileges, ensuring secure access and data protection within the database environment	6	1.2.1,1.3.1,1.4.1,2.1.1, 2.2.1, 2.2.2,2.2.3,2.2.4,2.3.1, 2.3.2,2.4.3,2.4.4, 3.1.1,3.1.2, 3.1.6, 3.2.1,3.2.2,3.3.2,3.4.1,3.4.2,3.4.3, 4.1.1,4.2.1, 5.1.1,5.1.2,, 10.1.1, 12.1.1	1.1.1,1.1.3

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CO-PO/PSO Mapping: Formulation and Justification

The CO-PO/PSO mapping is based on the correlation of course outcome (CO) with Program Outcome Indicators. These indicators are the breakup statements of broad Program Outcome statement.

The correlation is calculated as number of correlated indicators of a PO/PSO mapped with CO divided by total indicators of a PO/PSO. The calculated value represents the correlation level between a CO & PO/PSO. Detailed formulation and mathematical representation can be seen below in equation 1:

Input: CO_i: *The* i^{th} *course outcome of the course*

PO_j: *The* j^{th} *Program Outcome*

Ij_k: *The* k^{th} *indicator of the* j^{th} *Program Outcome*

□ (I_{jk}, CO_i): *level of CO-PO mapping*

$$=1, \text{ if, } 0<\square<0.33$$
$$=2, \text{ if, } 0.33\geq\square<0.66$$
$$=3, \text{ if, } 0.66\geq\square<1$$

$$\alpha(I_{jk}, CO_i) = \frac{count(\lambda(I_{jk}, CO_i))}{count(I_k, PO_j)}$$

□: *Degree of correlation*

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CO-PO/PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3	2	1	2					1		1	2		
CO2	2	2		2	2								2		
CO3	2	2		2	2								2		
CO4	2	2	1	2	2								2		
CO5	2	2	1	2	2								2		
WEIGHTED AVG	2	2	1	2	2					1		1	2		

Faculty

Verified by Course Coordinator

Name:

Verified by Verification and Validation Committee, DPAQIC

Name

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Course Overview

Database management has evolved from a specialized computer application to a central component of a modern computing environment and as a result knowledge about database system has become an essential part of computer science. The course serves as a visual guide to the material presented during our lectures.

The aim of this course is to provide an introduction to Database management system, with an emphasis on foundational material. DBMS is a computer application software that provides a way to manage data. The requirement of modern days is to have an automated system that manages, modifies, and updates data perfectly. This is accomplished by a DBMS in robust, accurate, and non-redundant way. Consequently, Oracle, Sybase, Microsoft SQL Server, etc. have emerged as prominent commercial systems while MySQL, PostgreSQL etc. lead as open source software.

This Course permits students to apply the conceptual design model to construct the real-world problems. Course provides familiarity of Database Concepts so that students can analyze the various different constraints to populate the database and examine different DBMS concepts to deduce the most suitable pattern of documentation. DBMS lab with mini project targets at practicing and accomplishing this aim by using MySQL as well as gain proficiency to design database and its hierarchical structure for given real world application

Objectives

At the end of the course students should

1. have a good understanding of how several fundamental algorithms work,particularly those concerned with creation and updating of tables.
2. have a good understanding of the fundamental DBMS used in computerscience
3. be able to understand various queries and their execution.
4. be able to design new database and modify existing ones for new applications and reason about the efficiency of the result

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Software and Hardware Requirements

Software Required:

1. ORACLE and/or DB2
2. MS SQL SERVER 2000 OR ABOVE

Hardware Required:

Processor

Pentium IIIRAM : 128 MB

Hard Disk : 40 GB

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List of Experiments mapped with Cos

S.No.	Content		CO MAPPING
4	Lab-Assignment – 1	Concept Design With E-R Model	CO1
	Lab-Assignment – 2	Introduction to SQL,data types in SQL & Exercise on Data Definition Language Commands	CO2
5	Lab-Assignment – 3	Introduction & Exercise on Data Manipulation Language and transaction control commands.	CO2
6	Lab-Assignment – 4	Introduction &Exercise on Types of Data Constraints.	CO3,CO5
7	Lab-Assignment – 5	Exercise on different functions (aggregate, math and string,numeric,date) and on group-by clause, Having clause, Auto increment	CO2
8	Lab-Assignment – 6	Exercise on Joins (single-table or multi-table)	CO2,CO3
9	Lab-Assignment – 7	Exercise on different types of sub queries.	CO4
10	Lab-Assignment – 8	Introduction to PL/SQL, Procedures and view	CO5
11	Lab-Assignment – 9	Introduction to triggers and cursors.	CO5
12	Lab-Assignment –10	Creating Database Table Space Managing Users: Create User, Delete User, Managing roles:-Grant, Revoke.	CO6
13	Lab-Assignment – 11	Mini projects(Beyond)	CO1,CO2,CO3,CO4,CO5,CO6

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Instructions

Before Entering the Lab

- All the students are supposed to prepare the theory regarding the next program
- Students are supposed to bring the practical file
- Previous program should be written in the practical file
- Any student not following these instructions will be denied entry in the lab

While working in the Lab

- Adhere to experimental schedule as instructed by the lab in-charge
- Get the previously executed program signed by the instructor
- Get the output of current program checked by the instructor
- Each student should work on his/her assigned computer at each turn of the lab
- Take responsibility of valuable accessories
- Concentrate on the assigned practical and don't play games

Lab Assessment Criteria

An estimated 10 lab classes are conducted in a semester for each lab course. These lab classes are assessed continuously. Each lab experiment is evaluated based on 5 assessment criteria as shown in following table. Assessed performance in each experiment is used to compute CO attainment as well as internal marks in the lab course.

Marking/Assessment System
Total Marks – 100

Internal Assessment Marks Distribution

Lab Performance	File Work	Attendance	Total
12	6	6	60

External Assessment Marks Distribution

Lab Performance	External Viva	Total
20	20	40

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LAB EXPERIMENTS

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INTRODUCTION

Relational Database Management System

RDBMS is acronym for Relation Database Management System. Dr. E. F. Codd first introduced the Relational Database Model in 1970. The Relational model allows data to be represented in a simple row-column. Each data field is considered as a column and each record is considered as a row. Relational Database is more or less similar to Database Management System. In relational model there is relation between their data elements. Data is stored in tables. Tables have columns, rows and names. Tables can be related to each other if each has a column with a common type of information. The most famous RDBMS packages are Oracle, Sybase and Informix.

Simple example of Relational model is as follows :

Student Details Table

Roll_no	Sname	S_Address
1	Rahul	Satelite
2	Sachin	Ambawadi
3	Saurav	Naranpura

Student Marksheet Table

Rollno	Sub1	Sub2	Sub3
1	78	89	94
2	54	65	77
3	23	78	46

Here, both tables are based on students details. Common field in both tables is Rollno. So we can say both tables are related with each other through Rollno column.

Degree of Relationship

One to One (1:1)

One to Many or Many to One (1:M / M: 1) Many to Many (M: M)

The Degree of Relationship indicates the link between two entities for a specified occurrence of each.

Norm, One student can enroll in one course at a time however, in one course, there can be more than one student.For one occurrence of the first entity there can exist many related occurrences of the second entity and

for every occurrence of the second entity there exists only one associated occurrence of the first.

Many to Many Relationship: (M:M) M M
Students Appears Tests
The major disadvantage One to One Relationship : (1:1) 1 1
Student Has Roll No.
One student has only one Rollno. For one occurrence of the first entity, there can be, at the most one related occurrence of the second entity, and vice-versa.
One to Many or Many to One Relationship: (1:M/M: 1) 1 M

E. F. Codd Rules

1. **The Information Rule**

All information must be store in table as data values.

2. **The Rule of Guaranteed Access**

Every item in a table must be logically addressable with the help of a table name.

3. **The Systematic Treatment of Null Values**

The RDBMS must be taken care of null values to represent missing or inapplicable information.

4. **The Database Description Rule**

A description of database is maintained using the same logical structures with which data was defined by the RDBMS.

5. **Comprehensive Data Sub Language**

According to the rule the system must support data definition, view definition, data manipulation, integrity constraints, authorization and transaction management operations.

6. **The View Updating Rule**

All views that are theoretically updateable are also updateable by the system.

7. **The Insert and Update Rule**

This rule indicates that all the data manipulation commands must be operational on sets of rows having a relation rather than on a single row.

8. **The Physical Independence Rule**

Application programs must remain unimpaired when any changes are made in storage representation or access methods.

9. **The Logical Data Independence Rule**

The changes that are made should not affect the user's ability to work with the data.The change can be splitting table into many more tables.

10. The Integrity Independence Rule

The integrity constraints should store in the system catalog or in the database.

11. The Distribution Rule

The system must be access or manipulate the data that is distributed in other systems.

12. The Non-subversion Rule

If a RDBMS supports a lower level language then it should not bypass any integrity constraints defined in the higher level.

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Experiment No. 1

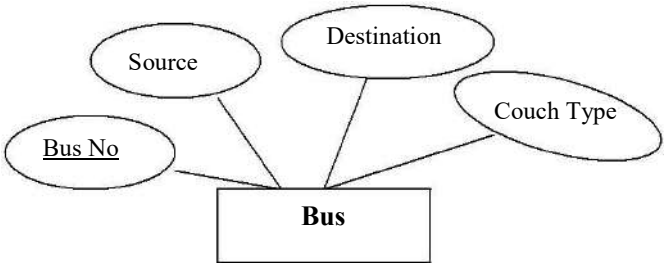
AIM: Analyze the problem for bus reservation system and come with the entities in it. Identify what Data has to bepersisted in the databases.

The Following are the entities:

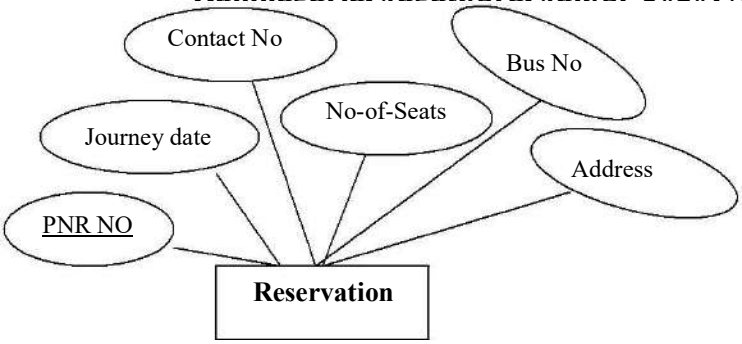
1 .Bus

2. Reservation
3. Ticket
4. Passenger
5. Cancellation

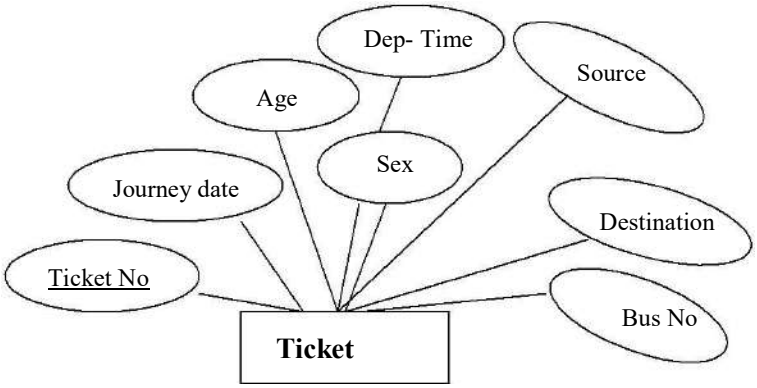
The attributes in the Entities:Bus:(Entity)



Reservation (Entity)



Ticket :(Entity)



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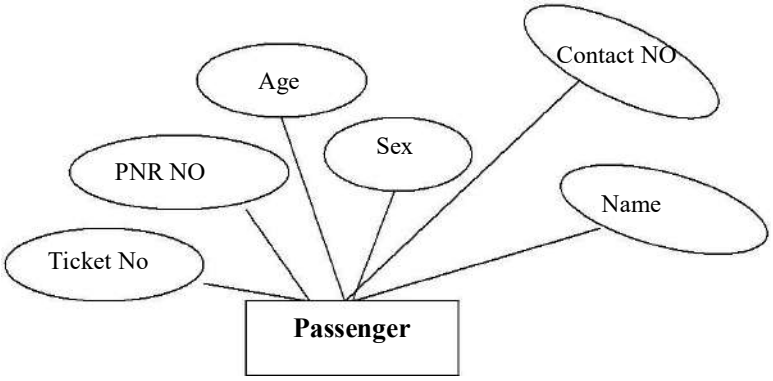
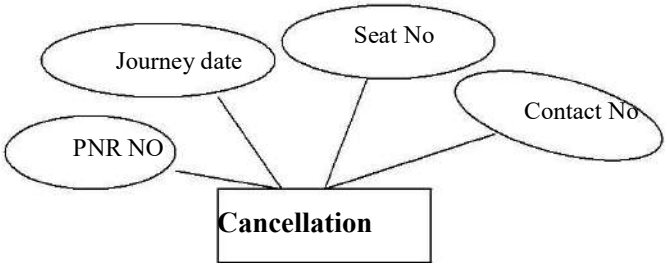
Passenger:



Cancellation (Entity)



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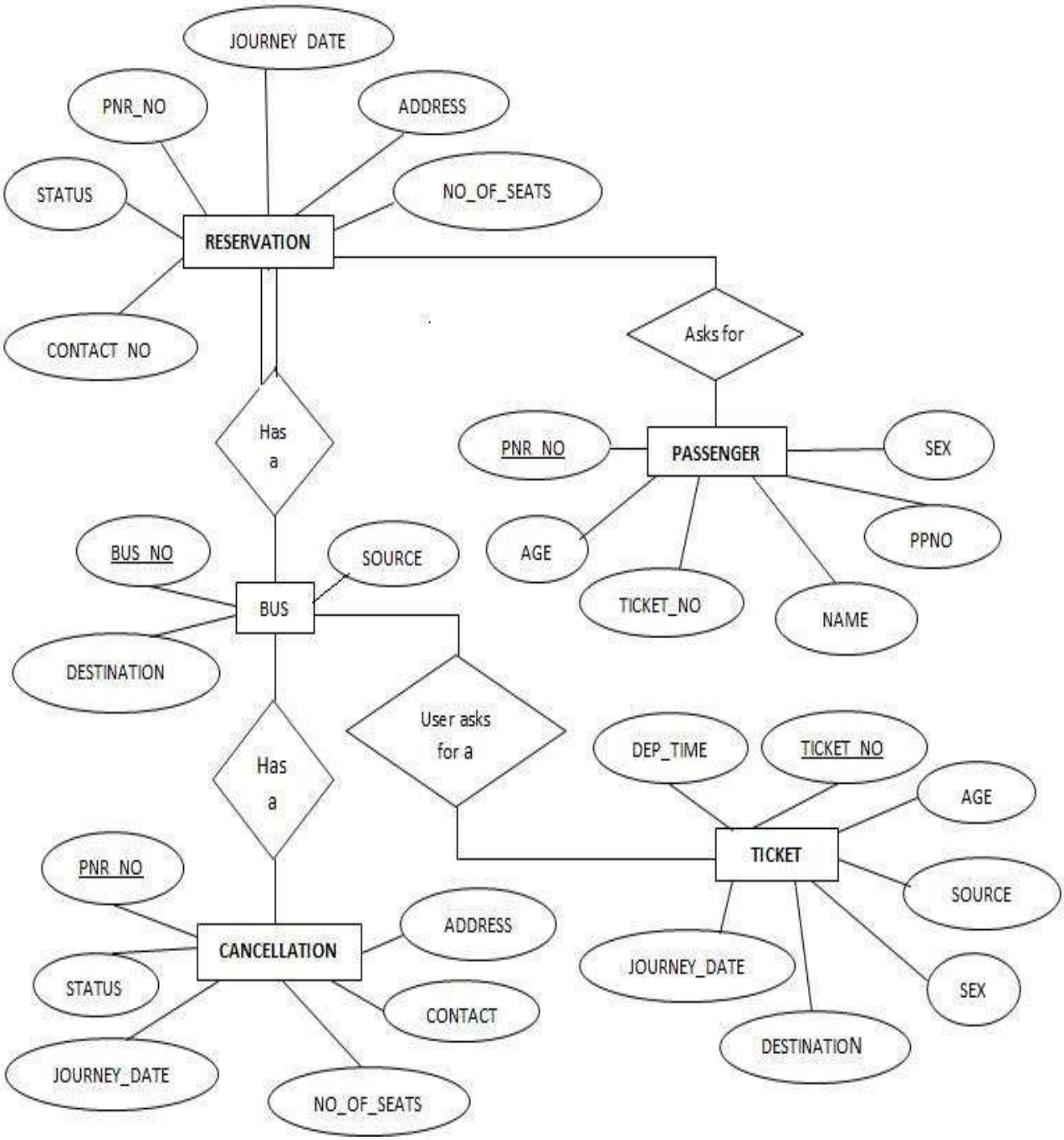
Concept design with E-R Model:



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Experiment No. 2

AIM:: Introduction to SQL, an exercise on data types in SQL & Data Definition Language commands

Theory & Concepts:

Introduction about SQL-

SQL (Structured Query Language) is a nonprocedural language, you specify what you want, not how to get it. A block structured format of English key words is used in this Query language. It has the following components.

DDL (Data Definition Language)-

The SQL DDL provides command for defining relation schemas, deleting relations and modifying relation schema.

DML (DATA Manipulation Language)-

It includes commands to insert tuples into, delete tuples from and modify tuples in the database.

View definition-

The SQL DDL includes commands for defining views.
Transaction Control- SQL includes for specifying the beginning and ending of transactions.

Embedded SQL and Dynamic SQL-

Embedded and Dynamic SQL define how SQL statements can be embedded with in general purpose programming languages, such as C, C++, JAVA, COBOL, Pascal and Fortran.

Integrity-

The SQL DDL includes commands for specifying integrity constraints that the datastored in the database must specify. Updates that violate integrity constraints are allowed.

Authorization-

The SQL DDL includes commands for specifying access rights to relations and views.

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Data Definition Language-

The SQL DDL allows specification of not only a set of relations but also information about each relation, including-

- Schema for each relation
- The domain of values associated with each attribute.
- The integrity constraints.
- The set of indices to be maintained for each relation.
- The security and authorization information for each relation.
- The physical storage structure of each relation on disk.

Domain types in SQL-

The SQL standard supports a variety of built in domain types, including-

- Char (n)- A fixed length character length string with user specified length .
- Varchar (n)- A variable character length string with user specified maximum length n.
- Int- An integer.
- Small integer- A small integer.
- Numeric (p, d)-A Fixed point number with user defined precision.
- Real, double precision- Floating point and double precision floating point numbers with machine dependent precision.
- Float (n)- A floating point number, with precision of at least n digits.
- Date- A calendar date containing a (four digit) year, month and day of the month.
- Time- The time of day, in hours, minutes and seconds Eg. Time '09:30:00'.
- Number- Number is used to store numbers (fixed or floating point).

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DDL statement for creating a table-

Syntax-

Create table tablename (columnname datatype(size), columnname datatype(size));

Creating a table from a table-

Syntax-

CREATE TABLE TABLENAME
[(columnname, columnname, ……)]
AS SELECT columnname, columnname ..... FROM tablename;

Insertion of data into tables-

Syntax-

INSERT INTO tablename
[(columnname, columnname, ……)]
Values(expression, expression);

Inserting data into a table from another table:

Syntax-

INSERT INTO tablename
SELECT columnname, columnname, …….
FROM tablename;

Insertion of selected data into a table from another table:

Syntax-

INSERT INTO tablename
SELECT columnname, columnname……..
FROM tablename
WHERE columnname= expression;

Retrieving of data from the tables-

Syntax-
SELECT * FROM tablename;

The retrieving of specific columns from a table-

Syntax-
SELECT columnname, columnname, ….
FROM tablename;

Elimination of duplicates from the select statement-

Syntax-
SELECT DISTINCT columnname, columnname
FROM tablename;

Selecting a data set from table data-

Syntax-
SELECT columnname, columnnameFROM tablename
WHERE searchcondition;

Syntax: ALTER TABLE relation_name ADD (new field_1 data_type(size), new field_2 data_type(size),..);

Example: SQL>ALTER TABLE std ADD (Address CHAR(10));

ALTER TABLE...MODIFY...: This is used to change the width as well as datatype of fields of existing relations.

Syntax: ALTER TABLE relation_name MODIFY (field_1 newdata_type(Size), field_2 newdata_type(Size),... field_newdata_type(Size));

Example:SQL>ALTER TABLE student MODIFY(sname VARCHAR(10),class VARCHAR(5));

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ALTER TABLE..DROP This is used to remove any field of existing relations.

Syntax: ALTER TABLE relation_name DROP COLUMN (field_name);

Example:SQL>ALTER TABLE student DROP column (sname);

ALTER TABLE..RENAME...: This is used to change the name of fields inexisting relations.

Syntax: ALTER TABLE relation_name RENAME COLUMN (OLD field_name) to(NEW field_name);

Example: SQL>ALTER TABLE student RENAME COLUMN sname to stu_name;

DROP TABLE: This is used to delete the structure of a relation. It permanently deletesthe records in the table.

Syntax: DROP TABLE relation_name;

Example: SQL>DROP TABLE std;

RENAME: It is used to modify the name of the existing database object.***Syntax:***
RENAME TABLE old_relation_name TO new_relation_name; ***Example:***
SQL>RENAME TABLE std TO std1;

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Assignment No.1

Q1. Create the following tables:

i) client_master

columnname	datatype	size
client_no	varchar2	6
name	varchar2	20
address1	varchar2	30
address2	varchar2	30
city	varchar2	15
state	varchar2	15
pincode	number	6
bal_due	number	10,2

ii) Product_master

Columnname	datatype	size
Product_no	varchar2	
Description	varchar2	
Profit_percent	number	
Unit_measure	varchar2	
Qty_on_hand	number	
Reoder_lvl	number	
Sell_price	number	
Cost_price	number	

Q2- Insert the following data into their respective tables:

Q3:- On the basis of above two tables answer the following Questionries:

i) Find out the names of all the clients.
ii) Retrieve the list of names and cities of all the clients.
iii) List the various products available from the product_master table.
iv) List all the clients who are located in Bombay.
v) Display the information for client no 0001 and 0002.
vi) Find the products with description as '1.44 drive' and '1.22 Drive'.
vii) Find all the products whose sell price is greater then 5000.
viii) Find the list of all clients who stay in in city 'Bombay' or city 'Delhi' or 'Madras'.
ix) Find the product whose selling price is greater than 2000 and less than or equal to 5000.
x) List the name, city and state of clients not in the state of 'Maharashtra'.

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EXPERIMENT NO.– 3

Aim: Exercise on Data Manipulation Language and transaction control commands

DML (Data Manipulation Language) Data manipulation is

- The retrieval of information stored in the database.
- The insertion of new information into the database.
- The deletion of information from the database.
- The modification of information stored by the appropriate data model. There are basically two types.

(i) **Procedural DML**:- require a user to specify what data are needed and howto get those data.

(ii) **Non Procedural DML** : require a user to specify what data are needed without specifying how to get those data.

Updating the content of a table:

In creation situation we may wish to change a value in table without changing all valuesin the tuple . For this purpose the update statement can be used.

Update table name
Set columnname = expression, columnname =expression……
Where columnname = expression;

Deletion Operation:-

A delete query is expressed in much the same way as Query. We can delete whole tuple (rows) we can delete values on only particulars attributes.

Deletion of all rows

Syntax:
Delete from tablename :

Deletion of specified number of rowsSyntax:

Delete from table name
Where search condition ;

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Computation in expression lists used to select data

+ Addition	- Subtraction
* multiplication	** exponentiation
/ Division	() Enclosed operation

Renaming columns used with Expression Lists: - The default output column names canbe renamed by the user if required

Syntax:

```
Select column name      result_columnname,
       Columnname       result_columnname,
From table name;
```

Logical Operators:

The logical operators that can be used in SQL sentenced are

AND	all of must be included
OR	any of may be included
NOT	none of could be included

Range Searching: Between operation is used for range searching.

Pattern Searching:

The most commonly used operation on string is pattern matching using the operation 'like' we describe patterns by using two special characters.

- Percent (%) ; the % character matches any substring we consider the following examples.
- 'Perry %' matches any string beginning with perry
- '% idge % matches any string containing' idge as substring.
- ' - - - ' matches any string exactly three characters.

' - - - % matches any string of at least of three characters

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Assignment No. 2

Question.1 Using the table client master and product master answer the following Questionnaires.

i. Change the selling price of '1.44 floppy drive to Rs.1150.00
ii. Delete the record with client 0001 from the client master table.
iii. Change the city of client_no'0005' to Bombay.
iv. Change the bal_due of client_no '0001, to 1000.
v. Find the products whose selling price is more than 1500 and also find the new selling price as original selling price *15.
vi. Find out the clients who stay in a city whose second letter is a.
vii. Find out the name of all clients having 'a' as the second letter in their names.
viii. List the products in sorted order of their description.
ix. Count the total number of orders
x. Calculate the average price of all the products.
xi. Calculate the minimum price of products.
xii. Determine the maximum and minimum prices . Rename the tittle as 'max_price' and min_price respectively.
xiii. Count the number of products having price greater than or equal to 1500.

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EXPERIMENT NO 4

AIM :- To Implement the restrictions Data constraint on the table.

Data constraints: Besides the cell name, cell length and cell data type there are other parameters i.e. other data constrains that can be passed to the DBA at check creation time. The constraints can either be placed at column level or at the table level.

i. **Column Level Constraints:** If the constraints are defined along with the column definition, it is called a column level constraint.
ii. **Table Level Constraints:** If the data constraint attached to a specify cell in a table reference the contents of another cell in the table then the user will have to use table level constraints.

Null Value Concepts:- while creating tables if a row locks a data value for particular column that value is said to be null . Column of any data types may contain null values unless the column was defined as not null when the table was created

Syntax:

Create table tablename
(columnname data type (size) not null ……)

Primary Key: primary key is one or more columns is a table used to uniquely identity each row in the table. Primary key values must not be null and must be unique across the column. A multicolumn primary key is called composite primary key.

Syntax: primary key as a column constraint

Create table tablename
(columnname datatype (size) primary key,….)

Primary key as a table constraint

Create table tablename
(columnname datatype (size), columnname datatype(size)…
Primary key (columnname,columnname));

Default value concept: At the line of cell creation a default value can be assignedto it. When the user is loading a record with values and leaves this cell empty, the DBA will automatically load this cell with the default value specified. The data type of the default value should match the data type of the column

Syntax:

Create table tablename
(columnname datatype (size) default value

Foreign Key Concept : Foreign key represents relationship between tables. A foreign key is column whose values are derived from the primary key of the same of some other table . the existence of foreign key implies that the table with foreign key is related to the primary key table from which the foreign key is derived .A foreign key must have corresponding primary key value in the primary key table to have meaning.
Foreign key as a column constraint

Syntax :
Create table table name
(columnname datatype (size) references another table name);

Foreign key as a table constraint:

Syntax :
Create table name (columnname
datatype (size)….primary key
(columnname);
foreign key (columnname)references table name);

Check Integrity Constraints: Use the check constraints when you need to enforce integrity rules that can be evaluated based on a logical expression following are a few examples of appropriate check constraints.

- A check constraints name column of the client_master so that the name is entered in upper case.
- A check constraint on the client_no column of the client _master so that no client_no value starts with 'c'

Syntax:

Create table tablename
(columnname datatype (size) CONSTRAINT constraintname)
Check (expression));

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ASSIGNMENT NO 3

Question.2 Create the following tables:

i. Sales_master

Columnname	**Datatype**	**Size**	**Attributes**
Salesman_no	varchar2	6	Primary key/first letter
			must start with 's'
Sal_name	varchar2	20	Not null
Address	varchar2		Not null
City	varchar2	20	
State	varchar2	20	
Pincode	Number	6	
Sal_amt	Number	8,2	Not null, cannot be 0
Tgt_to_get	Number	6,2	Not null, cannot be 0
Ytd_sales	Number	6,2	Not null, cannot be 0
Remarks	Varchar2	30	

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I. Sales_order_details

Column	Datatype	Size	Attributes
S_order_no	Varchar2	6	Primary key/foreign key references s_order_no of sales_order
Product_no	Varchar2	6	Primary key/foreign key references product_no of product_master
Qty_order	Number	8	
Qty_disp	Number	8	
Product_rate	Number	10,2	

i. Sales_order

Columnname	Datatype	Size	Attributes
S_order_no	varchar2	6	Primary/first letter must be 0
S_order_date	Date	6	Primary key reference clientno of client_master table
Client_no	Varchar2	25	
Dely_add	Varchar2	6	
Salesman_no	Varchar2	6	Foreign key references salesman_no of salesman_master table
Dely_type	Char	1	Delivery part(p)/full(f),default f
Billed_yn	Char	1	
Dely_date	Date		Can not be lessthan s_order_date
Order_status	Varchar2	10	Values (‘in process’;’fulfilled’;back order’;’canceled

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EXPERIMENT NO 5

Aim: Exercise on different functions (aggregate, math and string)

- Number Function
- Aggregate Function
- Character Function
- Conversion Function
- Date Function

NUMBER FUNCTION:

Abs(n) :Select abs(-15) from dual; Exp(n): Select exp(4) from dual; Power(m,n): Select power(4,2) from dual;Mod(m,n): Select mod(10,3) from dual; Round(m,n): Select round(100.256,2) from dual; Trunc(m,n): ;Select trunc(100.256,2) from dual; Sqrt(m,n);Select sqrt(16) from dual;

Develop aggregate plan strategies to assist with summarization of several data entries.

Aggregative operators: In addition to simply retrieving data, we often want to perform some computation or summarization. SQL allows the use of arithmetic expressions. We now consider a powerful class of constructs for computing aggregate values such as MIN and SUM.

1. Count: COUNT following by a column name returns the count of tuple in that column. If DISTINCT keyword is used then it will return only the count of unique tuple in the column. Otherwise, it will return count of all the tuples (including duplicates) count (*) indicates all the tuples of the column.

Syntax: COUNT (Column name)

Example: SELECT COUNT (Sal) FROM emp;

2. SUM: SUM followed by a column name returns the sum of all the values in that column.

Syntax: SUM (Column name)

Example: SELECT SUM (Sal) From emp;

3. AVG: AVG followed by a column name returns the average value of that column values.

Syntax: AVG (n1, n2...)

Example: Select AVG (10, 15, 30) FROM DUAL;

4. MAX: MAX followed by a column name returns the maximum value of that column.

Syntax: MAX (Column name)

Example: SELECT MAX (Sal) FROM emp;

SQL> select deptno, max(sal) from emp group by deptno;

DEPTNO	MAX (SAL)
10	5000
20	3000
30	2850

SQL> select deptno, max (sal) from emp group by deptno having max(sal)<3000;

DEPTNO	MAX(SAL)
30	2850

5. MIN: MIN followed by column name returns the minimum value of that column.

Syntax: MIN (Column name)

Example: SELECT MIN (Sal) FROM emp;

SQL>select deptno,min(sal) from emp group by deptno having min(sal)>1000;

DEPTNO	MIN (SAL)
10	1300

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CHARACTER FUNCTION:

initcap(char) : select initcap("hello") from dual; lower

(char): select lower ('HELLO') from dual;upper

(char) :select upper ('hello') from dual;

ltrim (char,[set]): select ltrim ('cseit', 'cse') from dual;rtrim

(char,[set]): select rtrim ('cseit', 'it') from dual;

replace (char,search): select replace('jack and jue','j','bl') from dual;

CONVERSION FUNCTIONS:

To_char: TO_CHAR (number) converts n to a value of VARCHAR2 data type, using the optional number format fmt. The value n can be of type NUMBER, BINARY_FLOAT, or BINARY_DOUBLE.

SQL>select to_char(65,'RN')from dual;LXV

To_number : TO_NUMBER converts expr to a value of NUMBER data type.

SQL>Select to_number ('1234.64') from Dual;

1234.64

To_date:TO_DATE converts char of CHAR, VARCHAR2, NCHAR, or NVARCHAR2 data type to a value of DATE data type.

SQL>SELECT TO_DATE('January 15, 1989, 11:00 A.M.')FROM

DUAL;TO_DATE

15-JAN-89

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STRING FUNCTIONS:

Concat: CONCAT returns char1 concatenated with char2. Both char1 and char2 can be anyof the datatypes.

SQL>SELECT CONCAT('ORACLE','CORPORATION')FROM DUAL;

ORACLECORPORATION

Lpad: LPAD returns expr1, left-padded to length n characters with the sequence of characters in expr2.

SQL>SELECT LPAD('ORACLE',15,'*')FROM DUAL;

*********ORACLE

Rpad: RPAD returns expr1, right-padded to length n characters with expr2, replicated as many times as necessary.

SQL>SELECT RPAD ('ORACLE',15,'*')FROM DUAL;

ORACLE*********

Ltrim: Returns a character expression after removing leading blanks.

SQL>SELECT LTRIM('SSMITHSS','S')FROM DUAL;

MITHSS

Rtrim: Returns a character string after truncating all trailing blanks

SQL>SELECT RTRIM('SSMITHSS','S')FROM DUAL;

SSMITH

Lower: Returns a character expression after converting uppercase character data to lowercase.

SQL>SELECT LOWER('DBMS')FROM DUAL;

dbms

Upper: Returns a character expression with lowercase character data converted to uppercase

SQL>SELECT UPPER('dbms')FROM DUAL

Length: Returns the number of characters, rather than the number of bytes, of the given string expression, excluding trailing blanks.

SQL>SELECT LENGTH('DATABASE')FROM DUAL;8

Substr: Returns part of a character, binary, text, or image expression.

SQL>SELECT SUBSTR('ABCDEFGHIJ'3,4)FROM DUAL;
CDEF

Instr: The INSTR functions search string for substring. The function returns an integer indicating the position of the character in string that is the first character of this occurrence.

SQL>SELECT INSTR('CORPORATE FLOOR','OR',3,2)FROM DUAL;

DATE FUNCTIONS:

Sysdate:

SQL>SELECT SYSDATE FROM DUAL; 29-DEC-08

next_day:

SQL>SELECT NEXT_DAY(SYSDATE,'WED')FROM DUAL; 05-JAN-09

add_months:

SQL>SELECT ADD_MONTHS(SYSDATE,2)FROM DUAL; 28-FEB-09

last_day:

SQL>SELECT LAST_DAY(SYSDATE)FROM DUAL; 31-DEC-08

months_between:

SQL>SELECT MONTHS_BETWEEN(SYSDATE,HIREDATE)FROM EMP; 4

Least:

SQL>SELECT LEAST('10-JAN-07','12-OCT-07')FROM DUAL; 10-JAN-07

Greatest:

SQL>SELECT GREATEST('10-JAN-07','12-OCT-07')FROM DUAL; 10-JAN-07

Trunc:

SQL>SELECT TRUNC(SYSDATE,'DAY')FROM DUAL; 28-DEC-08

Round:

SQL>SELECT ROUND(SYSDATE,'DAY')FROM DUAL;

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ASSIGNMENT NO 4

Create a table EMPLOYEE with following schema:
(Emp_no, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id, Designation , Salary)

Write SQL statements for the following query.

1. List the E_no, E_name, Salary of all employees working for MANAGER.
2. Display all the details of the employee whose salary is more than the Sal of any IT PROFF..
3. List the employees in the ascending order of Designations of those joined after 1981.
4. List the employees along with their Experience and Daily Salary.
5. List the employees who are either 'CLERK' or 'ANALYST' .
6. List the employees who joined on 1-MAY-81, 3-DEC-81, 17-DEC-81,19-JAN-80 .
7. List the employees who are working for the Deptno 10 or20.
8. List the Enames those are starting with 'S' .
9. Dislay the name as well as the first five characters of name(s) starting with 'H'
10. List all the emps except 'PRESIDENT' & 'MGR" in asc order of Salaries.

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Experiment No: 6

AIM: Study & Implementation of

- Group by & Having Clause
- Order by Clause
- Indexing

Theory:

GROUP BY: This query is used to group to all the records in a relation together for each and every value of a specific key(s) and then display them for a selected set of fields the relation.

Syntax: SELECT <set of fields> FROM <relation_name>
GROUP BY <field_name>;

Example: SQL> SELECT EMPNO, SUM (SALARY) FROM EMP GROUP BYEMPNO;

GROUP BY-HAVING : The HAVING clause was added to SQL because the WHERE keyword could not be used with aggregate functions. The HAVING clause must follow theGROUP BY clause in a query and must also precede the ORDER BY clause if used.

Syntax: SELECT column_name, aggregate_function(column_name) FROM table_name
WHERE column_name operator value
GROUP BY column_name
HAVING aggregate_function(column_name) operator value;

Example **:** SELECT Employees.LastName, COUNT(Orders.OrderID) AS NumberOfOrders
FROM (Orders
INNER JOIN Employees
ON Orders.EmployeeID=Employees.EmployeeID) GROUP BY LastName
HAVING COUNT (Orders.OrderID) > 10;

JOIN using GROUP BY: This query is used to display a set of fields from two relations by matching a common field in them and also group the corresponding records for each and every value of a specified key(s) while displaying.

Syntax: SELECT <set of fields (from both relations)> FROM relation_1,relation_2
WHERE relation_1.field_x=relation_2.field_y GROUP BY field_z;

Example:

SQL> SELECT empno,SUM(SALARY) FROM emp,dept
WHERE emp.deptno =20 GROUP BY empno;

ORDER BY: This query is used to display a selected set of fields from a relation in anordered manner base on some field.

Syntax: SELECT <set of fields> FROM <relation_name>
ORDER BY <field_name>;

Example: SQL> SELECT empno, ename, job FROM emp ORDER BY job;

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ASSIGNMENT No. 5

Create a relation and implement the following queries.

1. Display total salary spent for each job category.
2. Display lowest paid employee details under each manager.
3. Display number of employees working in each department and their department name.
4. Display the details of employees sorting the salary in increasing order.
5. Show the record of employee earning salary greater than 16000 in each department.
6. Write queries to implement and practice the above cla

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Experiment No: 7

Title : Implementation of different types of Joins

- Inner Join
- Outer Join
- Natural Join..etc

Theory :

The SQL Joins **clause is used to combine records from two or more tables in a**

database. A JOIN is a means for combining fields from two tables by using values common to each.The join is actually performed by the 'where' clause which combines specified rows of tables.

Syntax:

```
SELECT column 1, column 2, column 3...
FROM table_name1, table_name2
WHERE table_name1.column name = table_name2.columnname;
```

Types of Joins :

2. Simple Join
3. Self Join
4. Outer Join

Simple Join:

It is the most common type of join. It retrieves the rows from 2 tables having acommon column and is further classified into

Equi-join :

A join, which is based on equalities, is called equi-join.

Example:

Select * from item, cust where item.id=cust.id;

In the above statement, item-id = cust-id performs the join statement. It retrieves rows from both the tables provided they both have the same id as specified by the where clause. Since the where clause uses the comparison operator (=) to perform a join, it is said to be equijoin. It combines the matched rows of tables. It can be used as follows:

- To insert records in the target table.
- To create tables and insert records in this table.
- To update records in the target table.
- To create views.

Non Equi-join:

It specifies the relationship between columns belonging to different tables bymaking use of relational operators other than'='.

Example:

Select * from item, cust where item.id<cust.id;

Table Aliases

Table aliases are used to make multiple table queries shorted and more readable. We givean alias name to the table in the 'from' clause and use it instead of the name throughout the query.

Self join:

Joining of a table to itself is known as self-join. It joins one row in a table to another. It can compare each row of the table to itself and also with other rows of the same table.

Example:

select * from emp x ,emp y where x.salary >= (select avg(salary) from x.emp where x. deptno =y.deptno);

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Outer Join:

It extends the result of a simple join. An outer join returns all the rows returned by simple join as well as those rows from one table that do not match any row from the table. The symbol(+) represents outer join.

- Left outer join
- Right outer join
- Full outer join

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ASSIGNMENT NO :6

Consider the following schema: Sailors

(sid, sname, rating, age)Boats (bid,

bname, color) Reserves (sid, bid,

day(date))

1. Find all information of sailors who have reserved boat number 101.
2. Find the name of boat reserved by Bob.
3. Find the names of sailors who have reserved a red boat, and list in the order of age.
4. Find the names of sailors who have reserved at least one boat.
5. Find the ids and names of sailors who have reserved two different boats on the sameday.
6. Find the ids of sailors who have reserved a red boat or a green boat.
7. Find the name and the age of the youngest sailor.
8. Count the number of different sailor names.
9. Find the average age of sailors for each rating level.
10. Find the average age of sailors for each rating level that has at least two sailors.

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EXPERIMENT NO 8

Aim:- To implement the concept of SubQueries.

SubQueries:- A subQuery is a form of an SQL statement that appears inside another SQL statement. It also termed as nested Query. The statement containing a subQuery called a parent statement. The rows returned by the subQuery are used by the following statement. It can be used by the following commands:

1. To insert records in the target table.
2. To create tables and insert records in this table.
3. To update records in the target table.
4. To create view.
5. To provide values for the condition in the WHERE , HAVING IN , SELECT,UPDATE, and DELETE statements.

Exam:-

Creating clientmaster table from oldclient_master, table

```
Create table client_master
AS SELECT * FROM oldclient_master;
```

Using the Union, Intersect and Minus Clause:

Union Clause:

The user can put together multiple Queries and combine their output using the union clause . The union clause merges the output of two or more Queries into a single set of rows and column. The final output of union clause will be

Output: = Records only in Query one + records only in Query two + A single set of records with is common in the both Queries.

Syntax:

SELECT columnname, columname
FROM tablename 1
UNION
SELECT columnname, columnname
From tablename2;

Intersect Clause: The use can put together multiple Queries and their output using the interest clause. The final output of the interest clause will be :

Output =A single set of records which are common in both Queries
Syntax:

SELECT columnname, columnname
FROM tablename 1
INTERSECT
SELECT columnname, columnname
FROM tablename 2;

MINUS CLAUSE:- The user can put together multiple Queries and combine their output
= records only in Query one
Syntax:
SELECT columnname, columnname
FROM tablename ;
MINUS
SELECT columnname, columnname
FROM tablename ;

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Assignment NO.7

Objective: Answer the following Queries:

Question.

1. Find the product_no and description of non- moving products.
2. Find the customer name, address, city and pincode for the client who has placed order no "019001"
3. Find the client names who have placed order before the month of may 96.
4. Find out if product "1.44 Drive" is ordered by only client and print the client_no name to whom it was sold.
5. find the names of client who have placed orders worth Rs.10000 or more.
6. Select the orders placed by 'Rahul Desai"
7. Select the names of persons who are in Mr. Pradeep's department and who have also worked on an inventory control system.
8. Select all the clients and the salesman in the city of Bombay.
9. Select salesman name in "Bombay" who has atleast one client located at "Bombay"
10. Select the product_no, description, qty_on-hand,cost_price of non_moving itemsin the product_master table.

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Experiment No. 9

AIM:- To implement the concept of Indexes and views.

Indexes- An index is an ordered list of content of a column or group of columns in a table. An index created on the single column of the table is called simple index. When multiple table columns are included in the index it is called composite index.

Creating an Index for a table:-

Syntax (Simple)

```
CREATE INDEX index_nam  ON tablename(column
name);
```

Composite Index:-

```
CREATE INDEX index_name
ON tablename(columnname,columnname);
```

Creating an UniQuestion Index:-

```
CREATE UNIQUESTION INDEX indexfilenameON
tablename(columnname);
```

Dropping Indexes:-

An index can be dropped by using DROP INDEX

SYNTAX:-

```
DROP INDEX indexfilename;
```

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Views:-

Logical data is how we want to see the current data in our database. Physical datais how this data is actually placed in our database.
Views are masks placed upon tables. This allows the programmer to develop amethod via which we can display predetermined data to users according to our desire.

Views may be created fore the following reasons:

1. The DBA stores the views as a definition only. Hence there is no duplication of data.
2. Simplifies Queries.
3. Can be Queried as a base table itself.
4. Provides data security.
5. Avoids data redundancy.

Creation of Views:-

Syntax:-

CREATE VIEW viewname AS SELECT columnname,columnnameFROM tablename
WHERE columnname=expression_list;

Destroying a view-

Syntax:-

DROP VIEW viewname;

Selecting a data set from a view-

Syntax:-

CREATE VIEW viewname ASSELECT newcolumnname…. FROM tablename
WHERE columnname=expression_list;

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Syntax:-

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Assignment No 8

Objective : Answer the following Questions

Q1. Create an index on the table client_master, field client_no.

Q2. Create an index on the sales_order, field s_order_no.

Q3. Create an composite index on the sales_order_details table for the columns s_order_no and product_no.

Q4. Create an composite index ch_index on challan_header table for the columns challan no and s_order_no.

Q5. Create an uniQuestion index on the table salesman_master, field salesman_no.

Q6. Drop index ch_index on table challan_header.

Q7. Create view on salesman_master whose sal_amt is less than 3500.

Q8. Create a view client_view on client_master and rename the columns as name, add1, add2, city, pcode, state respectively.

Q9. Select the client names from client_view who lives in city ‘Bombay’.

Q10. Drop the view client_view.

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Experiment No 10

Objective:- To implement the concept of Cursor and Trigger.

Cursor– We have seen how oracle executes an SQL statement. Oracle DBA uses a work area for its internal processing. This work area is private to SQL's operation and is called a **cursor.**
The data that is stored in the cursor is called the **Active Data set.** The size of the cursor in memory is the size required to hold the number of rows in the Active Data Set.

Explicit Cursor- You can explicitly declare a cursor to process the rows individually. A cursor declared by the user is called **Explicit Cursor.** For Queries that return morethan one row, You must declare a cursor explicitly.
The data that is stored in the cursor is called the **Active Data set.** The size of the cursor in memory is the size required to hold the number of rows in the Active

Why use an Explicit Cursor- Cursor can be used when the user wants to processdata one row at a time.

Explicit Cursor Management- The steps involved in declaring a cursor andmanipulating data in the active data set are:-

- Declare a cursor that specifies the SQL select statement that you want to process.
- Open the Cursor.
- Fetch the data from the cursor one row at a time.
- Close the cursor.

Explicit Cursor Attributes- Oracle provides certain attributes/ cursor variables to control the execution of the cursor. Whenever any cursor(explicit or implicit) is opened and used Oracle creates a set of four system variables via which Oracle keeps track of the'Current' status of the cursor. You

- Declare a cursor that specifies the SQL select statement that you want to process.
- Open the Cursor.
- Fetch the data from the cursor one row at a time.
- Close the cursor.

How to Declare the Cursor:-

The General Syntax to create any particular cursor is as follows:-
Cursor <Cursorname> is Sql Statement

How to Open the Cursor:-

The General Syntax to Open any particular cursor is as follows:-
Open Cursorname;

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Experiment No.11

Objective:- To implement the basics of PL/SQL.

Introduction – PL/SQL bridges the gap between database technology and procedural programming languages. It can be thought of as a development tool that extends the facilities of Oracles SQL database language. Via PL/SQL you can insert, delete, update and retrieve table data as well as writing loops or branching to another block of code.

PL/SQL Block structure-

DECLARE
Declarations of memory variables used later
BEGIN
SQL executable statements for manipulating table data.
EXCEPTIONS
SQL and/or PL.SQL code to handle errors.
END;

Displaying user Messages on the screen – Any programming tool requires amethod through which messages can be displayed to the user.

dbms_output is a package that includes a number of procedure and functions that accumulate information in a buffer so that it can be retrieved later. These functions can also be used to display message to the user.
put_line: put a piece of information in the buffer followed by a end of line marker. It can also be used to display message to the user.
Setting the server output on:

SET SERVER OUTPUT ON:

Example: Write the following code in the PL/SQL block to display message to user
DBMS_OUTPUT.PUT_LINE('Display user message');

Conditional control in PL/SQL-

Syntax:

IF <condition> THEN
<Action>
ELSEIF<condition>
<Action>

ELSE
<Action>
ENDIF;

The WHILE LOOP:

Syntax:

WHILE <condition>
LOOP
<Action>
END LOOP;

The FOR LOOP statement:

Syntax:

FOR variable IN [REVERSE] start—end
LOOP
<Action>
END LOOP;

The GOTO statement: The goto statement allows you to change the flow of control within a PL/SQL Block.

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Assignment No. 8

Q1. WAP in PL/SQL for addition of two numbers.

Q2. WAP in PL/SQL for addition of 1 to 100 numbers.

Q3. WAP in PL/SQL to check the given number is even or odd.

Q4. WAP in PL/SQL to inverse a number, eg. Number 5639 when inverted must bedisplay output 9365.

Q5. WAP in PL/SQL for changing the price of product 'P00001' to 4000 if the price is less than 4000 in product_master table. The change is recorded in the old_price_table along with

product_no and the date on which the price was ch

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Experiment No: 12

Title: Creating Database/ Table Space

- Managing Users: - Create User, Delete User
- Managing Passwords
- Managing roles: - Grant , Revoke

:

DATABASE is collection of coherent data.

To create database we have :

Syntax: CREATE DATABASE <database_name>

Example : CREATE DATABASE my_db;

TABLESPACE:

The oracle database consists of one or more logical storage units called *tablespaces.* Each tablespace in an Oracle database consists of one or more files called *datafiles,* which are physical structures that confirm to the operating system in which Oracle is running.

Syntax:

CREATE<tablespace name> DATAFILE'C:\oraclexe\app\oracle\product\10.2.0\ server \<file name.dbf 'SIZE 50M;

Example:

Create tablespace te_cs DATAFILE 'C:\oraclexe\app\oracle\product\10.2.0\ server\usr.dbf 'SIZE 50M;

CREATE USER:

The DBA creates user by executing CREATE USER statement.

The user is someone who connects to the database if enough privilege is granted.

Syntax:

SQL> CREATE USER < *username*> -- (name of user to be created)
IDENTIFIED BY <*password*> -- (specifies that the user must login with this password)

SQL> user created

Eg: create user *James* identified by *bob*;

(The user does not have privilege at this time, it has to be granted.These privileges determine what user can do at database level.)

PRIVILEGES:

A privilege is a right to execute an SQL statement or to access another user's object.In Oracle, there are two types of privileges

- System Privileges
- Object Privileges
- ***System Privileges :*** are those through which the user can manage the performance of database actions. It is normally granted by DBA to users.

Eg: Create Session,Create Table,Create user etc..

- ***Object Privileges :*** allow access to objects or privileges on object, i.e. tables, table columns. tables,views etc..It includes alter,delete,insert,select update etc.

(After creating the user, DBA grant specific system privileges to user)

GRANT:

The DBA uses the GRANT statement to allocate system privileges to other user.

Syntax:

SQL> GRANT privilege [privilege…. …]
TO USER ;

SQL> Grant succeeded

Eg: Grant create session, create table, create view to James;

Object privileges vary from object to object.An owner has all privilege or specific privilegeson object.

SQL> GRANT object_priv [(column)]

ON object

TO user;

SQL>GRANT *select, insert* ON emp TO James;

SQL>GRANT *select ,update (e_name,e_address)*

ON emp TO James;

CHANGE PASSWORD:

The DBA creates an account and initializes a password for every user.You can change password by using ALTER USER statement.

Syntax:

Alter USER <*some user name*>

IDENTIFIED BY<*New password*>

Eg: ALTER USER James

IDENTIFIED BY sam

REVOKE:

REVOKE statement is used to remove privileges granted to other users.The privileges you specify are revoked from the users.

Syntax:

REVOKE [*privilege..* …]

ON *object*

FROM *user*

Eg:

- REVOKE create session,create table from James;
- REVOKE select ,insert

ON emp

FROM James

ROLE:

A role is a named group of related privileges that can be granted to user.In other words, roleis a predefined collection of previleges that are grouped together,thus privileges are easier to assign user.

SQL> Create role *custom*;

SQL> Grant create table, create view TO *custom*;

SQL> Grant select, insert ON emp TO *custom*;

Eg: Grant *custom* to James, Steve;

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ASSIGNMENT No:-9

1. Create user and implement the following commands on relation (Emp and Dept).
2. Develop a query to grant all privileges of employees table into departments table.
3. Develop a query to grant some privileges of employees table into departments table.
4. Develop a query to revoke all privileges of employees table from departments table.
5. Develop a query to revoke some privileges of employees table from departments table.

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VIVA VOCE QUESTIONS & ANSWERS

1. **What is a database?**
   A DBMS is a complex software system that is used to manage, store and manipulate data andmetadata used to describe the data.
2. **What is DBMS?**
   It is a collection of programs that enables user to create and maintain a database. In other words it is general-purpose software that provides the users with the processes of defining, constructing andmanipulating the database for various applications.
3. **What is a Database system?**
   The database and DBMS software together is called as Database system.
4. **Advantages of DBMS.**
   Ø Redundancy is controlled.
   Ø Unauthorised access is restricted. Ø Providing multiple user interfaces.Ø Enforcing integrity constraints.
   Ø Providing backup and recovery.
5. **Disadvantage in File Processing System**
   Ø Data redundancy & inconsistency.Ø Difficult in accessing data.
   Ø Data isolation.Ø Data integrity.
   Ø Concurrent access is not possible.Ø Security Problems.
6. **What is a key? what are different keys in database?**
   A Key is nothing but a attribute or group of attributes. They are used to perform some specific operation depending on their operation. The keys are classified into primary key, secondary key,alternative key, super key, candidate key, compound or concatenated or composite key.
7. **What is a primary key?**
   A primary key is an attribute to identify a record uniquely is considered to be primary key. for egin the student table student_no is the primary key because it can be used to identify unique recordor unique student.
8. **What is a secondary key?**
   An attribute used to identify a group of records satisfying a given condition is said to be a secondary key. In the employee table, designation is a secondary key because more than oneemployee can have the same designation.
9. **What is a candidate key?**
   Register no usually allotted in the exams is also unique for each student in that case for identifyinga student uniquely either student_no or register_no can be used. Here

two different candidates are contesting for primary key post. Any of them can be selected as primary key.

10.What is an alternate key?

If any one of the candidate keys among the different candidate keys available is selected asprimary key then remaining keys are called alternate key.

11.What is a super key?

With primary key if any other attribute is added then that combination is called super key. In otherwords, primary key is the minimum possible super key. In the student table student_no + student_name is one of the super key.

12.What is a composite key?

If the primary key is combination of more than one key then it is called the composite key. In thetable called marks student_no + subject is the composite key.

13.What is a relation?

A Relation consists of a homogeneous set of tuples.

14.What is a table?

it is the representation of a relation having records as rows and attributes as columns.

15.What is an attribute?

An object or entity is characterized by its properties or attributes. In relational database systemsattributes corresponds to fields.

16.What is a domain?

The set of allowable value for the attribute is the domain of the attribute.

17.What is a tuple?

Tuples are the members of a relation. An entity type having attributes can be represented by set ofthese attributes called tuple.

18.What is a selection?

An operation that selects only some of the tuples in the relation is known as selection operation.The selection operation yields a horizontal subset of a given relation.

19.what is a join operation?

The join operation allows the combination of two relations to form a new relation

20.What are base operations in relational algebra?

Union: - The term of the relation as performed by combining the tuples from one relation with those of a second relation to produce a third relation. Duplicate tuples are eliminated. The relationmust be union compatible.

Difference: - The difference of two relations is a third relation having tuples that occur in the firstrelation but not in the second relation.

Intersection: - The intersection operation selects the common tuples from the two relations. **cartesian product:** - The cartesian product of two relations is the concatenation of tuples belonging to the two relations. A new resultant scheme is created consisting of concatenation of allpossible combination of tuples.

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21. What are different DBMS facilities? How many types of facilities are provided by a DBMS?

1) The data definition facility or data definition language(DDL)
2) The data manipulation facility or data manipulation language(DML)
3) The data control facility(DCL)

22. What is Data Definition Language?

Data scheme is specified by a set of definitions which are expressed b a special language called aDDL.

23. What is Data Dictionary?

A Data Dictionary is a file that contains metadata i.e data about data. This file is consulted beforeactual is read or modified in the database system.

24. What is a DML?

A DML is a language that enables users to access or manipulate data as organized by the appropriate data model. There are basically two types:

1) procedural DML require a user to specify what data is needed and how to get it.
2) non procedural DML require a user to specify what data is needed without specifying how to get it.

25. What is a query?

A query is a statement requesting the retrieval of information.

26. What is a query language?

The portion of DML that involves information retrieval is called a query language.

27. What are the advantages of DBMS?

Reduction of redundancies, Integrity, Security, Conflict resolution, Data independence, shareddata, Data quality enhanced.

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28.What is a SQL?

Structured query language(sql) originated in 1974 at IBM.SQL is the data definition andmanipulation language.

29.What are the features of SQL?

Portability, client server architecture, dynamic data definition, multiple views of data, completedata base language, interactive, high level structure and SQL standards.

30.How SQL organizes the data?

SQL organizes data as databases, tables, indexes, views.

31.What is data definition?

SQL lets a user to define the data structure and relationship at the stored data.

32.What is data retrieval?

Allows a user or an application program to retrieve the stored data.

33.What is data sharing?

Data can be shared by more than one user.

34.What is a view?

It is an object of SQL. A query can be defined, stored and named. This is called view.

35.What is normalization?

It is a process of analysing the given relation schemas based on their Functional Dependencies(FDs) and primary key to achieve the properties

Ø Minimizing redundancy

Ø Minimizing insertion, deletion and update anomalies.

36.What is a first normal form?

A relation which contains no multi valued attributes.

37.What is a second normal form?

A relation is in second normal form for if it is first normal form and every non key attribute is fullyfunctionally dependent on primary key.

38.What is a third normal form?

A relation is in third normal form if for every functional dependency F :x->y is aDkey.

39.What is BCNF?

Boyce-code normal form.

40.What is fifth normal form?

A relation which eliminates join dependencies.

41.What is Functional Dependency?

A Functional dependency is denoted by X Y between two sets of attributes X and Y that are subsetsof R specifies a constraint on the possible tuple that can form a relation state r of R. The constraintis for any two tuples t1 and t2 in r if t1[X] = t2[X] then they have t1[Y] = t2[Y]. This means the value of X component of a tuple uniquely determines the value of component Y.

42.What is Lossless join property?

It guarantees that the spurious tuple generation does not occur with respect to relation schemasafter decomposition.

43.What are the commands to delete, modify and insert a record in the table?

DELETE, UPDATE, INSERT INTO.

44.What is time stamping?

In the time stamping based method, a serial order is created among the concurrent transactions by assigning to each transaction a unique non decreasing numbers .you will be allocating fixed time for each transaction.

45.What is data base schema?

It is the description of the database i.e its data structure and not the detail.

46.What is a self join?

Joining the table to the same table.

47.What are the different aggregate functions in SQL?

AVG(), MIN(), MAX(), COUNT(), SUM().

48.What is data integrity?

Data must satisfy the integrity constraints of the system.

49.What is data independence?

Data independence means that "the application is independent of the storage structure and access strategy of data". In other words, The ability to modify the schema definition in one level should not affect the schema definition in the next higher level.

Two types of Data Independence:

Ø Physical Data Independence: Modification in physical level should not affect the logical level. Ø Logical Data Independence: Modification in logical level should affect the view level.

NOTE: Logical Data Independence is more difficult to achieve

50.What is dead locking?

It is the situation where two transactions are waiting for other to release a lock on an item.

51.What is decryption?

Taking encoded text and converting it into text that you are able to read.

52.What is a distributed database?

A Database in which the datails contained within a number of separate subsystems usually indifferent locations.

53.What is an entity?

it represents a real world object.

54.What is a conceptual data model?

A conceptual data model is concerned with the general description of the database without concernfor how the data may be organized.

55.What is two phase locking?

It is a most common mechanism that is used to control concurrency in two phases for achieving theserializability. The two phases are Growing and Shrinking.

1) A transaction acquires locks on data items it will need to complete the transaction. This is calledgrowing phase. A transaction may obtain lock but may not release any lock.

2) One lock is released no other lock may be acquired. This is called shrinking process. Atransaction may release locks but may not obtain any new locks.

56.What is projection?

The projection of a relation is defined as projection of all its tuples over a set of attributes. it yieldsvertical subset of the relation. The projection operation is used to trim the number of attributes in the resultant relation or to reorder attributes.

57. What are the different phases of transaction?

Different
phases are
Ø Analysis
phase
Ø Redo
Phase
Ø

Undo
phase

58.. What is Relational Algebra?

It is procedural query language. It consists of a set of operations that take one or two relations asinput and produce a new relation.

59.What is Relational Calculus?

It is an applied predicate calculus specifically tailored for relational databases proposed by E.F.Codd. E.g. of languages based on it are DSL ALPHA, QUEL.

60. . How does Tuple-oriented relational calculus differ from domain-oriented relational calculus The tuple-oriented calculus uses a tuple variables i.e., variable whose only permittedvalues are tuples of that relation. E.g. QUEL

The domain-oriented calculus has domain variables i.e., variables that range over the underlyingdomains instead of over relation. E.g. ILL, DEDUCE.