ERODE SENGUNTHAR
ENGINEERING COLLEGE
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PERUNDURAI-638 057,TAMILNADU, INDIA

INSTITUTION'S INNOVATION COUNCIL (Ministry of HRD Initiative)

DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

Innovative Teaching Practice

Name of the Subject with Code	: 21CS401 – DATABASE MANAGEMENT SYSTEMS
Course Coordinator	: Ms S Kiruthika, Assistant Professor/M.Tech CSE
Academic Year	: 2023-2024 Even Semester
Year/Semester	: II Year / IV Semester
`Branch	: M.Tech Computer Science and Engineering

Index

ERODE SENGUNTHAR ENGINEERING COLLEGE AUTONOMOUS ERODE 638 057

Dr. V.VENKATACHALAM, M.S.,M.Tech.,Ph.D.,
PRINCIPAL
Erode Sengunthar Engineering College,
(Autonomous)
Thudupathi, Perundurai, Erode -638 057.

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PERUNDURAI -638 057, TAMILNADU, INDIA.

DEPARTMENT OF M.TECH - COMPUTER SCIENCE AND ENGINEERING

LESSON PLAN

Name of the Subject with Code	:	21CS401 – DATABASE MANAGEMENT SYSTEMS
Course Coordinator	:	Ms S.Kiruthika, AP /M.TECH CSE
Academic Year	:	2023-2024 / EVEN Semester
Year/ Semester	:	II / IV Semester
Branch	:	M.TECH - Computer Science and Engineering

Course Objective(s):

- Learn data modeling using the entity-relationship and developing database designs.
- Understand the use of Structured Query Language (SQL) and learn SQL syntax.
- Apply normalization techniques to normalize the database understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access

Course outcomes:

CO1: Describe the fundamental elements of relational database management systems

CO2: Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

CO3: Design ER-models to represent simple database application scenarios

CO4: Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

CO5: Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

S. No.	Planned Date	Actually conducted date	Topics to be covered	Key terms	Objectives	Methodology adopted	ICT Tools used	No. of periods
UNIT- I INTRODUCTION								
1	26.02.24	26/02/24	Course Orientation PPT	Web Resources, Assessment, Scope	To know the syllabus and scope in the job market	Lecture	Power point	1
2	27.02.24	27/02/24	Introduction to DBMS	Redundancy, integrity	To understand Purpose of Database System	Lecture	Power point	1

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3	28.02.24	28/02/24	History and motivation for Database System	Data isolation, data inconsistency	To understand Purpose of Database System	Lecture	Power point	1
4	29.02.24	29/02/24	File Processing and Disadvantage of file processing	Files, database	To understand File concepts and its disadvantage	Lecture	Power point	1
5	29.02.24	29/02/24	Components of DBMS	Query processor, File manager, Data Dictionary manager, Database manager	To understand about the components of DBMS	Lecture	Power point	1
6	05.03.24	05/03/24	DBMS Functions	Functions, Data dependency and independency	To understand about the Functions and Data independency	Lecture	Smart Board	1
7	06.03.24	06/03/24	Database Architecture • Query processor • File manager	Database architecture, Storage manager, Query processor,	To provide the services like data catalog, transaction, concurrency, recovery	Lecture	Black Board	1
8	07.03.24	07/03/24	Database Architecture • DML Pre processor	Database user and Administrator	To provide the services for Manipulating the data	Lecture	Black Board	1
9	07.03.24	12/03/24	Database Architecture • DDL compiler	Database architecture, Storage manager, Query processor,	To provide the services like data catalog, transaction, concurrency	Lecture	Black Board	1
10	12.03.24	13/03/24	• Data Dictionary manager • Database manager	Database user and Administrator	To provide the services like security and storage management	Lecture	Power point	1

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11	13.03.24	13/03/24	Data Independence	Level of Database , Schema	To understand about Non Dependency of data	Peer group learning	-	1
12	14.03.24	14/03/24	Content Beyond the Syllabus: • 4G Environment	Various Generations	To understand the concepts of various generations of Environment	Lecture	Power point	1
UNIT- II DATA MODELING								
13	14.03.24	14/03/24	Data Models: • Entity relationship model	Entity, relationship, table	To understand Data Models	Lecture	Black Board	1
14	19.03.24	19/03/24	Data Models: • Relational model	Tree, graph, object,	To understand Relational Models	Lecture	Power point	1
15	20.03.24	20/03/24	Data model: • Hierarchical database model • Network model	Entity, Attributes, Entity identifiers,	To provide unified view of overall structure of the database	Lecture	Power point	1
16	21.03.24	21/03/24	Data model: • Object-oriented database model	Instances of entities, Composite entities, Entity list	To provide communicati on tool during database design	Lecture	Smart Board	1
17	21.03.24	21/03/24	Database query languages: SQL • Data types • Commands	Varchar, int, date, DDL, DML	To understand SQL fundamental	Lecture	Black Board	1
18	27.03.24	27/03/24	Database query languages: SQL • Data types • Commands	Varchar, int, date, DDL, DML	To understand SQL fundamental	Lecture	Black Board	1
19	28.03.24	28/03/24	Database query languages: SQL • Data types • Commands	Varchar, int, date, DDL, DML	To understand SQL fundamental	Lecture	Black Board	1
20	28.03.24	28/03/24	Query Processing Overview: • Parsing and translation.	Query, data, statistics, evaluation engine	To understand Query Processing Overview	Lecture	Power point	1
21	02.04.24	02/04/24	Query Processing	Evaluation Primitives	To understand	Lecture	Power point	1

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			Overview: • Optimization • Evaluation		Optimization of query			
22	03.04.24	04/04/24	4th-generation environments and introduction to Object Query Language	Environment, Object query	To understand about the query language	Quiz	Google Form	1
23	04.04.24	04/04/24	Content Beyond Syllabus: • Aggregation, sub, super class, union	Higher level, inheritance, participation	To understand aggregation concept	Lecture	Power point	1
UNIT III RELATIONAL DATABASES								
24	04.04.24	10/04/24	Mapping conceptual schema to a relational schema	Schema	To implement the database mapping in schema	Lecture	Power point	1
25	10.04.24	16/04/24	Entity and Referential integrity	Entity, Referential integrity	To understand Integrity Constraint	Lecture	Power point	1
26	16.04.24	17/04/24	Introduction to relational databases: • Basics concepts • Relational Model	Table, tuple, field, constraints, stored procedure	To understand Introduction to relational databases	Lecture	Power point	1
27	17.04.24	18/04/24	Relational Algebra: • Basic Operations	Union, Cartesian product, select, project, join	To understand Relational Algebra	Lecture	Black Board	1
28	18.04.24	23/04/24	Relational Algebra: • Additional operation	Select, project, union, rename	To understand Relational Algebra	Lecture	Black Board	1
29	18.04.24	24/04/24	Relational Calculus	Various operations	To understand Relational calculus	Lecture	Black Board	1
30	23.04.24	25/04/24	Relational database design: Database design	Database design	To develop and familiar with Database design	Lecture	Power point	1

31	24.04.24	25/04/24	Functional Dependencies: • Trivial Functional Dependency • Non-Trivial Functional Dependency	Depends, subset, good and bad database	To understand Functional Dependencies	Video Lecturing	NPTEL Website	1
32	25.04.24	30/04/24	First, Second, Third Normal Forms: • First Normal Form • Second Normal Form • Third Normal Form • Boyce/Codd Normal Form	Atomic values, partial, transitive dependency	To understand First, Second, Third Normal Forms	Lecture	Smart Board	1
33	25.04.24	02/05/24	Multi valued dependency; join dependency; representation theory	Strictly remove transitive dependency	To understand Boyce/Codd Normal Form	Video Lecturing	NPTEL Website	1
34	02.05.24	07/05/24	Content Beyond Syllabus: • Extended relational algebra operation	Aggregate, outer join	To understand extended relational operations	PPT	Power point	1
UNIT IV TRANSACTION PROCESSING								
35	02.05.24	08/05/24	Introduction to Transaction Processing	Transaction	To understand Transaction Concepts	Lecture	Power point	1
36	07.05.24	09/05/24	Transaction Concepts • Transactions • ACID Properties	Atomicity, consistency, isolation, durability	To understand the properties of Transaction	Lecture	Power point	1
37	08.05.24	10/05/24	Concurrency Control: • Concurrency control	More than one transaction	To understand Concurrency Control	Lecture	Power point	1
38	09.05.24	14/05/24	Need for Concurrency: • Throughput	Throughput, resource utilization	To understand Need for	Lecture	Power point	1

			increased • Waiting time reduced		Concurrency			
39	14.05.24	15/05/24	Failure and Recovery	Log Based Recovery, System Logs	To understand about database failure and recovery	Lecture	Smart Board	1
40	15.05.24	16/05/24	Failure and Recovery	Log Based Recovery, System Logs	To understand about database failure and recovery	Lecture	Power point	1
41	16.05.24	21/05/24	Locking Protocols • Two Phase Locking • Strict two phase	Lock, unlock, share, exclusive, growing, shrinking phase, commit	To understand Locking Protocols, Two Phase Locking	Lecture	Power point	1
42	16.05.24	22/05/24	Two Phase Commit Protocol	Commit, Rollback, Transaction	To understand about the concept of Two phase commit protocol	(Student Seminar)	Power point	1
43	21.05.24	23/05/24	Save Points & isolation levels: • Transaction control	Rollback, save point, phantoms	To understand Save Points & isolation levels	Lecture	Power point	1
44	22.05.24	23/05/24	SQL Facilities for Concurrency and Recovery: • Commit • Rollback	Redo, undo, consistency, atomicity	To understand SQL Facilities for Concurrency and Recovery	Role play	-	1
45	23.05.24	29/05/24	Content beyond syllabus: • Recoverability	Irrevocable, cascading, cascadeless, strict	To understand about recoverability	Lecture	Power point	1
UNIT V PHYSICAL DATABASE DESIGN								
46	23.05.24	30/05/24	Overview of Physical Storage Media – Magnetic Disks-Tertiary Storage	File Organization, Records in Files	To access the data from file based on certain characteristics	Lecture	Power point	1

47	29.05.24	30|05|24	Indexing • Introduction • Factors	Access types, time, space overhead	To understand Indexing.	Lecture	Power point	1
48	30.05.24	18|06|24	Hashing: • Introduction • Factors	Bucket, Record, Actual data	To understand Hashing.	Lecture	Power point	1
49	30.05.24	19|06|24	Hashing: • Static Hashing	Bucket, overflow chaining	To understand Static Hashing.	Lecture	Power point	1
50	05.06.24	20|06|24	Hashing: • Dynamic Hashing	Bucket, overflow, data records	To understand Dynamic Hashing.	Lecture	Power point	
51	06.06.24	25|06|24	B+ tree & B-Tree Index Files: • Example • Operations	Balanced key, insertion, deletion	To understand B+ & B tree Index Files	Lecture	Smart Board	1
52	06.06.24	26|06|24	Files with dense index	Files	To be familiar with files with dense index	Role play	-	1
53	11.06.24	26|06|24	Files with dense index	Files	To be familiar with files with dense index	Lecture	Power point	
54	06.06.24	27|06|24	Files with variable length records;	File, Record	To implement with files with variable length	Lecture	Power point	1
55	12.06.24	27|07|24	Database and Tuning	Tuning efficiency	To understand about Database efficiency	Student Seminar	Power point	1
56	12.06.24	02|07|24	Content beyond syllabus: • Dynamic programming • Left deep trees	Join, cost, sort orders	To understand dynamic programming	Lecture	Power point	1
Total No. of. hours planned								56
No. of. hours prescribed in the syllabus								45

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TENTATIVE DATES OF EVENTS:

Reopening Date	: 26.02.2024
Continuous Assessment Test – 1	: 25.03.2024
Continuous Assessment Test – 2	: 24.04.2024
Continuous Assessment Test – 3	: 27.05.2024
Model Examination	: 12.06.2024
Last Working Day	: 25.06.2024

TEXT BOOKS:

1. A. Silberschatz, H. F. Korth & S. Sudershan, Database systemconcepts, McGraw Hill, 6th Edition
2010.
2. C. J. Date, An introduction to database systems, Addison Wesley, 8 th Edition, 2003.

REFERENCES:

1. R. Elmasri & S. B. Navathe, Fundamentals of database systems, Addison Wesley, 6th Edition, 2011.
2. H. Garcia et al., Database system implementation, Prentice Hall, 2000

WEB LEARNING RESOURCES:

[1] http://cfd.annauniv.edu/nptel.htm
[2] http://cfd.annauniv.edu/nptel/cse/dbms/lec.htm

COURSE COORDINATOR **HoD/M.TECH - CSE** **PRINCIPAL**

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DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

INNOVATIVE TEACHING PRACTICES

2023-2024 Even Semester

1. Name of subject with course code : 21CS401 – DATABASE MANAGEMENT SYSTEMS
2. Class / Year/ Branch : II Year / IV Semester / M.Tech Computer Science and Engineering
3. Name of The Course Coordinator : Ms S.Kiruthika, AP /M.TECH CSE
4. Date and Hour : 13.03.2024 and 3rd Hour
5. Topics of the class : Data Independence
6. Title of Innovative teaching learning process : Peer Group Learning
7. Objective : Student can able to understand how to separate the data from the application programs and ensure that changes made to one layer of the database do not affect other layers.

8. Student name list:

Sl.No	Reg. Number	Name of the Students	Sl.No	Reg. Number	Name of the Students
1	730422553002	Akilan P R	22	730422553024	Komala V
2	730422553003	Anesha M .P	23	730422553025	Lingeshwaran M
3	730422553004	Balachandar T	24	730422553026	Logeshwaran S
4	730422553007	Dharaneswaran S	25	730422553027	Maheshwaran D
5	730422553008	Felix Royson A	26	730422553028	Mangaiyarkarasi R
6	730422553009	Franklin R	27	730422553029	Manimaran P
7	730422553010	Ganesh C	28	730422553030	Manirathinam R
8	730422553011	Gokula Priya G	29	730422553031	Mathan S
9	730422553012	Harini K	30	730422553032	Mohamad Anas M
10	730422553013	Hariprasanth S	31	730422553033	Mohammed Meezan
11	730422553014	Harish Kumar R	32	730422553034	Monika S
12	730422553015	Haritha A	33	730422553035	Mugunthan A
13	730422553016	Hemaa S	34	730422553036	Narashimman M
14	730422553017	Jeevitha K	35	730422553037	Naveen Kumar S L
15	730422553018	Jothika S	36	730422553038	Nithish D
16	730422553019	Kabilan U R	37	730422553039	Pavithra D
17	730422553020	Kamalathidhyen K K	38	730422553040	Pavithra R
18	730422553021	Kavin S	39	730422553041	Pradeep M
19	730422553022	Keerthika S	40	730422553042	Praveen Kumar R
20	730422553023	Kishore P	41	730422553043	Preethimeena M

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Sl.No	Reg. Number	Name of the Students
42	730422553044	Raghava Simhan S
43	730422553045	Samyuktha N
44	730422553046	Sanjai G
45	730422553047	Santha Kumar K
46	730422553048	Santhakumar S
47	730422553049	Sasidharan .N
48	730422553050	Sasiganesan .S
49	730422553052	Shahilulla .S
50	730422553053	Sorna Mahi S .A
51	730422553054	Sowmiya .T
52	730422553055	Sri Madhumitha S
53	730422553056	Sri Vasanth R
54	730422553057	Thendral Siva S
55	730422553058	Thillaiarasan P
56	730422553059	Vasanth B
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9. Geo-Tagged Photos:

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2023-2024 Even Semester

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3. Name of The Course Coordinator : Ms S.Kiruthika, AP /M.TECH CSE
4. Date and Hour : 23.05.2024 and 3rd Hour
5. Topics of the class : SQL Facilities for Concurrency and Recovery
6. Title of Innovative teaching learning process : Role Play
7. Objective : Student can able to understand how to ensure reliability, consistency and efficiency of database transactions in a multi-user environment.

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53	730422553056	Sri Vasanth R
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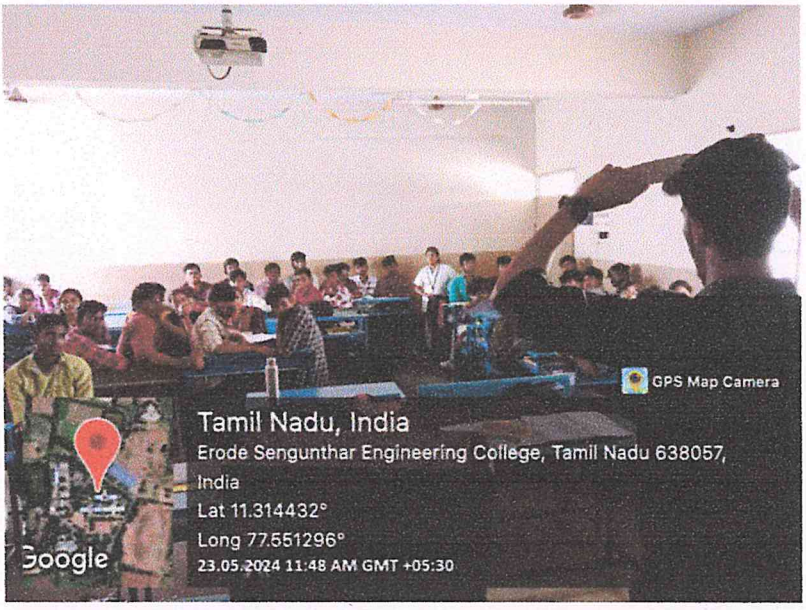
9. Geo-Tagged Photos:



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DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING

INNOVATIVE TEACHING PRACTICES

2023-2024 Even Semester

1. Name of subject with course code : 21CS401 – DATABASE MANAGEMENT SYSTEMS
2. Class / Year/ Branch : II Year / IV Semester / M.Tech Computer Science and Engineering
3. Name of The Course Coordinator : Ms S.Kiruthika, AP /M.TECH CSE
4. Date and Hour : 26.06.2024 and 6th Hour
5. Topics of the class : Files with dense index
6. Title of Innovative teaching learning process : Role Play
7. Objective : Student can able to optimize the process of searching, retrieving, and managing data in a file-based storage system.

8. Student name list:

Sl.No	Reg. Number	Name of the Students	Sl.No	Reg. Number	Name of the Students
1	730422553002	Akilan P R	22	730422553024	Komala V
2	730422553003	Anesha M .P	23	730422553025	Lingeshwaran M
3	730422553004	Balachandar T	24	730422553026	Logeshwaran S
4	730422553007	Dharaneswaran S	25	730422553027	Maheshwaran D
5	730422553008	Felix Royson A	26	730422553028	Mangaiyarkarasi R
6	730422553009	Franklin R	27	730422553029	Manimaran P
7	730422553010	Ganesh C	28	730422553030	Manirathinam R
8	730422553011	Gokula Priya G	29	730422553031	Mathan S
9	730422553012	Harini K	30	730422553032	Mohamad Anas M
10	730422553013	Hariprasanth S	31	730422553033	Mohammed Meezan
11	730422553014	Harish Kumar R	32	730422553034	Monika S
12	730422553015	Haritha A	33	730422553035	Mugunthan A
13	730422553016	Hemaa S	34	730422553036	Narashimman M
14	730422553017	Jeevitha K	35	730422553037	Naveen Kumar S L
15	730422553018	Jothika S	36	730422553038	Nithish D
16	730422553019	Kabilan U R	37	730422553039	Pavithra D
17	730422553020	Kamalathidhyen K K	38	730422553040	Pavithra R
18	730422553021	Kavin S	39	730422553041	Pradeep M
19	730422553022	Keerthika S	40	730422553042	Praveen Kumar R
20	730422553023	Kishore P	41	730422553043	Preethimeena M

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Sl.No	Reg. Number	Name of the Students
42	730422553044	Raghava Simhan S
43	730422553045	Samyuktha N
44	730422553046	Sanjai G
45	730422553047	Santha Kumar K
46	730422553048	Santhakumar S
47	730422553049	Sasidharan .N
48	730422553050	Sasiganesan .S
49	730422553052	Shahilulla .S
50	730422553053	Sorna Mahi S .A
51	730422553054	Sowmiya .T
52	730422553055	Sri Madhumitha S
53	730422553056	Sri Vasanth R
54	730422553057	Thendral Siva S
55	730422553058	Thillaiarasan P
56	730422553059	Vasanth B
57	730422553060	Vasudevan S
58	730422553061	Vedhamithran E
59	730422553062	Vengadeshwaran K
60	730422553063	Yukeshwaran N
61	730422553064	Bhuvaneshwaran R

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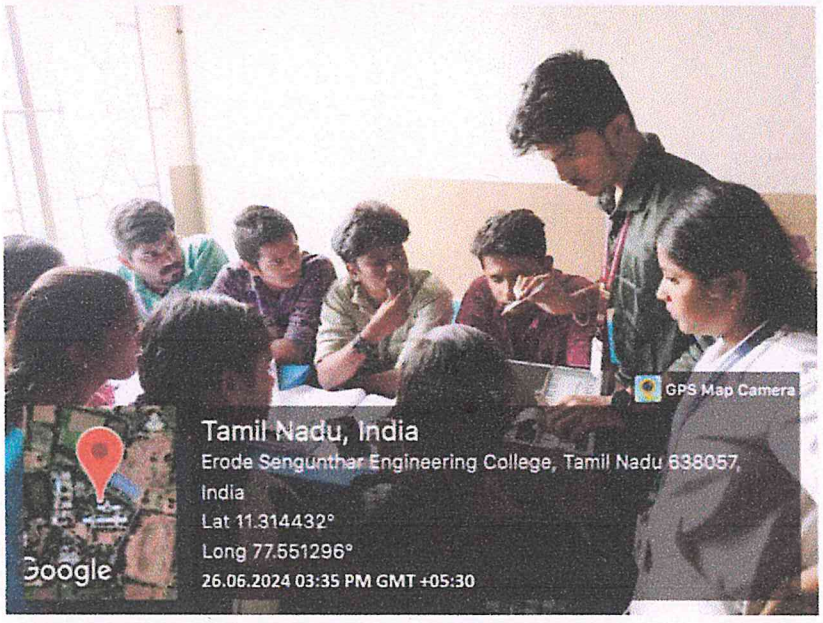
9. Geo-Tagged Photos:



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PARTICULARS OF PORTIONS COVERED

Semester : IV Branch/Class : M.Tech CSE Course : 21CS40

Date	Time	Topic	Sign.	Remark
		Unit - 1		
		Introduction.		
26.02.24		Course Orientation PPT	S.k	
27.02.24		Introduction to DBMS.	S.k	
28.02.24		History and motivation for Database System	S.k	
29.02.24		File Processing and Disadvantage of file Processing.	S.k	
29.02.24		Components of DBMS.	S.k	
5.3.24		DBMS Functions.	S.k	
6.3.24		Database Architecture. Query Processor.		
		File Manager.	S.k	
7.3.24		Database Architecture. DML-Pre Processor	S.k	
9.3.24		Database Architecture DDL-Compiler.	S.k	
12.3.24		Data Dictionary. Data manager.	S.k	
13.3.24		Data Independence.		
13.3.24		Content Beyond Syllabus: 4G Environment	S.k	

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ESEC /M.Tech/ Class Record / 05

PARTICULARS OF PORTIONS COVERED

Semester : IV   Branch/Class : M.Tech CSE   Course : 21CS401

Date	Time	Topic	Sign.	Remarks
		Unit-2		
		Data Modeling.		
14.3.24	4	Data Models: Entity,	S.k	
		Relationship models,		
14.3.24	7	Relational models.	S.k	
19.3.24	2	Hierarchical data		
		base model,	S.k	
		Network model.		
20.3.24	5	Object Oriented	S.k	
		database models.		
21.3.24	4	Database query	S.k	
		Language: SQL,		
21.3.24	7	Datatypes, Commands	S.k	
22.3.24	5	Query processing	S.k	
		Overview.		
28.3.24	4	parsing and	S.k	
		Translations.		
2.4.24	2	Optimization,	S.k	
		Evaluations.		
3.4.24	5	4th generation	S.k	
		Environments.		
4.4.24	4	CBS:	S.k	
		Aggregations, Sub,		
		Super class, Union.		
4.4.24	6,7	CAT-1-6,7.		

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ESEC M.Tech / Class Record / 05

PARTICULARS OF PORTIONS COVERED

Semester : IV Branch/Class : M.Tech CSE Course : 21ES407

Date	Time	Topic	Sign.	Remarks
		Unit-3		
		Relational Database (AT-2)		
10.4.24	5	Mapping Conceptual schema to a relational (map) Schema.	S.k	
16.4.24	2	Entity & Referential Integrity.	S.k	
17.4.24	5	Introduction to relational database	S.k	
18.4.24	4	Relational Algebra Basic operations.	S.k	
23.4.24	2	Additional operations (ns) Relational Calculus.	S.k	
24.4.24	5	Relational database design,	S.k	
25.4.24	4	Functional dependencies (cies) Trivial,	S.k	
25.4.24	7	First, Second,	S.k	
30.4.24	2	Third Normal Forms.		
2.5.24	4	Multi-valued dependency.	S.k	
7.5.24	7	CBS: Extended Relational Algebra Operations.	S.k	

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PARTICULARS OF PORTIONS COVERED

Semester : IV Branch/Class : M.Tech CSE Course : 21CS401

Date	Time	Topic	Sign.	Remarks
		Unit - 4		
		Transaction Processing.		
8.5.24	5	Introduction to Transaction Processing.	S.k	
9.5.24	4	Transaction concept	S.k	
10.5.24	4	Transaction, ACID Props	S.k	
14.5.24	2	Concurrency Control. Need for concurrency. Waiting time reduced.	S.k	
15.5.24	5	Failure and Recovery.	S.k	
16.5.24	7	Locking Protocols.	S.k	
21.5.24	2	Two phase locking.	S.k	
22.5.24	5	Two phase Commit Protocols.	S.k	
23.5.24	4	Save Points & Isolation levels.	S.k	
23.5.24	7	SQL facilities.	S.k	
29.5.24	CBS	Recoverability.	S.k	

CAT-2 to be

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PARTICULARS OF PORTIONS COVERED

Semester : IV Branch/Class : M.Tech CSE Course : 21CS402

Date	Time	Topic	Sign.	Remarks
		Unit-5.		
		Physical Database Design		
30.5.24	4	Overview of Physical Storage Media.	S.k	
20.5.24	7	Indexing.	S.k	
18.6.24	2	Introduction, Factors. Hashing.	S.k	
19.6.24	5	Introduction, factors. Static Hashing.	S.k	
20.6.24	4	Dynamic hashing.	S.k	
25.6.24	2	B+tree & B-Tree Index files.	S.k	
26.6.24	5	Files with dense index.	S.k	
27.6.24	4	Files with variable length records.	S.k	
29.6.24	7	Database and Tuning.	S.k	
2.7.24	5	CBS: Dynamic Bcgramming, left deep trees.	S.k	

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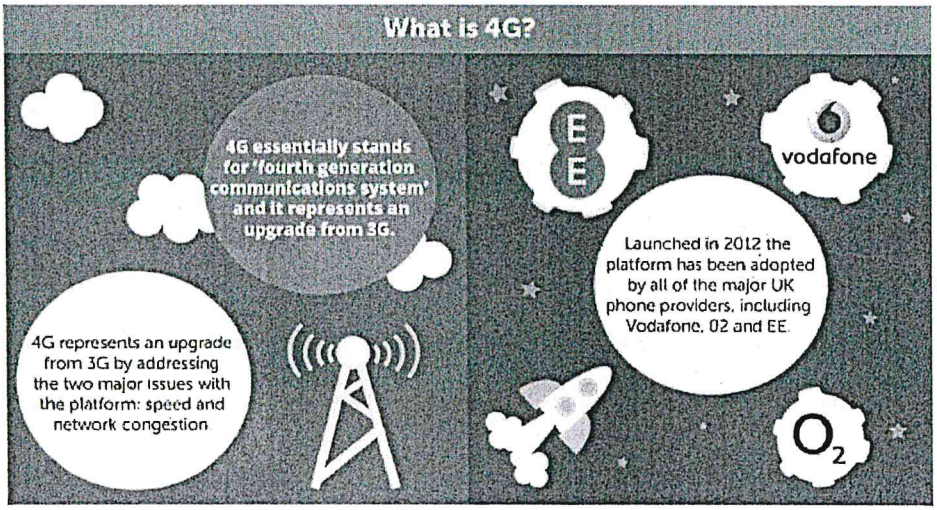
21CS401 – DATABASE MANAGEMENT SYSTEMS
Content beyond the Syllabus

UNIT I
Topic: 4G Environment

What is 4G?



4G essentially stands for 'Fourth Generation Communications System' and it represents an upgrade from 3G by addressing the two major issues with the platform: speed and network congestion. Since it launched in late 2012, the platform has been adopted by all of the major UK phone providers, including Vodafone, 02 and EE.

How does 4G work?

- 4G works much in the same way as 3G, simply faster. Using high-speed download and upload packets, 4G allows you to access broadband style speeds whilst away from your Wi-Fi. Users can often access speeds of up to 21Mb on the go, but this is, however, affected by location. A larger city, for example, will exhibit faster speeds than a small village.
- 4G is essentially a highly advanced radio system. You may even have seen masts dotted around the landscape. These masts broadcast the signals necessary for 4G to work and the challenge is for engineers and coders is to cram as much data into these signals as

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possible. By extension, this means the network is faster and more efficient.

- Like 3G, 4G is a protocol that sends and receives data in packets. However, 4G differs from 3G in how it works. 4G is entirely IP based, which means it uses internet protocols even for voice data. Conforming to this one standard means it is less likely for data to become scrambled while traversing the various networks, meaning a more seamless experience for us users!

One of the aspects that makes 4G an upgrade to 3G is its higher capacity. 4G can support a greater number of users, even at peak times. For example, a 3G tower may only be able to give 100 people the best possible connection speed, but a 4G tower can theoretically give 400 people the best service.

4G also features reduced latency, which if you're a mobile gamer is essential. Wit reduced latency, you'll see a much quicker response to your commands. So for gamers, if they are playing a fighting game, for example, this can mean the difference between winning and losing.

Once 4G infrastructures become more common, users will see more seamless streaming on the move from services like YouTube, better video calls and even better battery life. At the moment 4G signals are rarer outside of big cities, so phones expend a lot of energy looking around for a 4G signal.

How fast is 4G?

- While 3G only really allowed for emails, maps and Facebook to be readily available, the rise of various technologies such as video calling and HD streaming has called for a faster option. 4G will allow you to do the vast majority of things you can do at home, including browsing YouTube, making calls on Skype and downloading music. As mentioned before, the highest speeds will be experienced in the most populated areas, with remote areas of the UK potentially seeing less of an effect.
- A recent study from OFCOM found that the average speed for 4G in 5 major cities was 15.1 Mbit/s. This means that within the cities where the test was carried out, 4G was on average 2.5 times faster than the average 3G speed, which was 6.1Mbit/s. Across all of the networks in the 5 cities that were tested, half of 4G download speeds were above 16Mbit/s, with Edinburgh having the highest average download speed across all the cities that were tested for both 4G and 3G.

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21CS401 – DATABASE MANAGEMENT SYSTEMS
Content beyond the Syllabus

UNIT II
Topic: Aggregation, Sub class / Super class, Union category

1. Aggregation

- Aggregation is an abstraction through which relationship are treated as higher-level entities.
- Aggregation is used to avoid redundant information.
- Aggregation is a process that represent a relationship between a whole object and its component parts.
- It abstracts a relationship between objects and viewing the relationship as an object.
- It is a process when two entity is treated as a single entity.

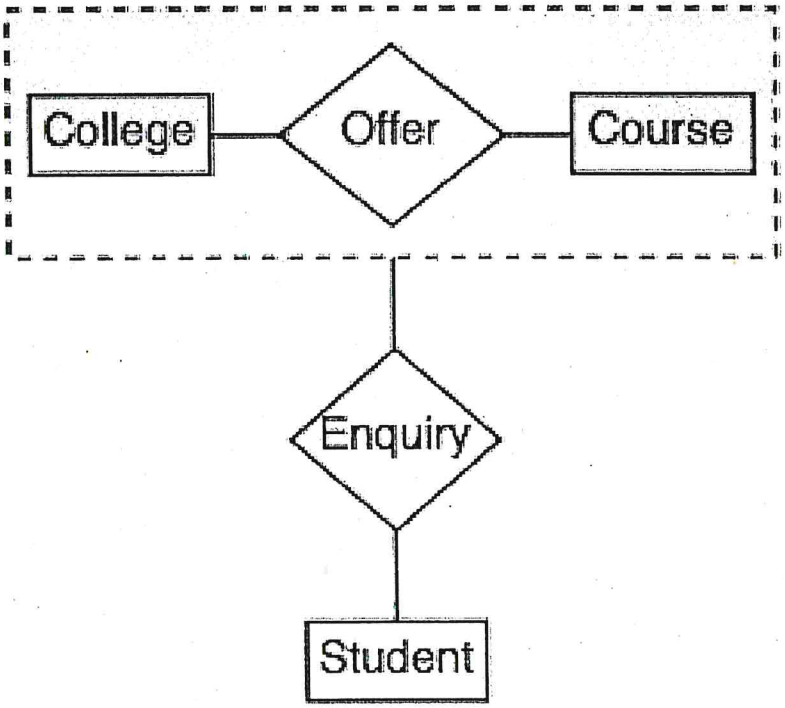

Fig. Aggregation

In the above example, the relation between College and Course is acting as an Entity in Relation with Student.

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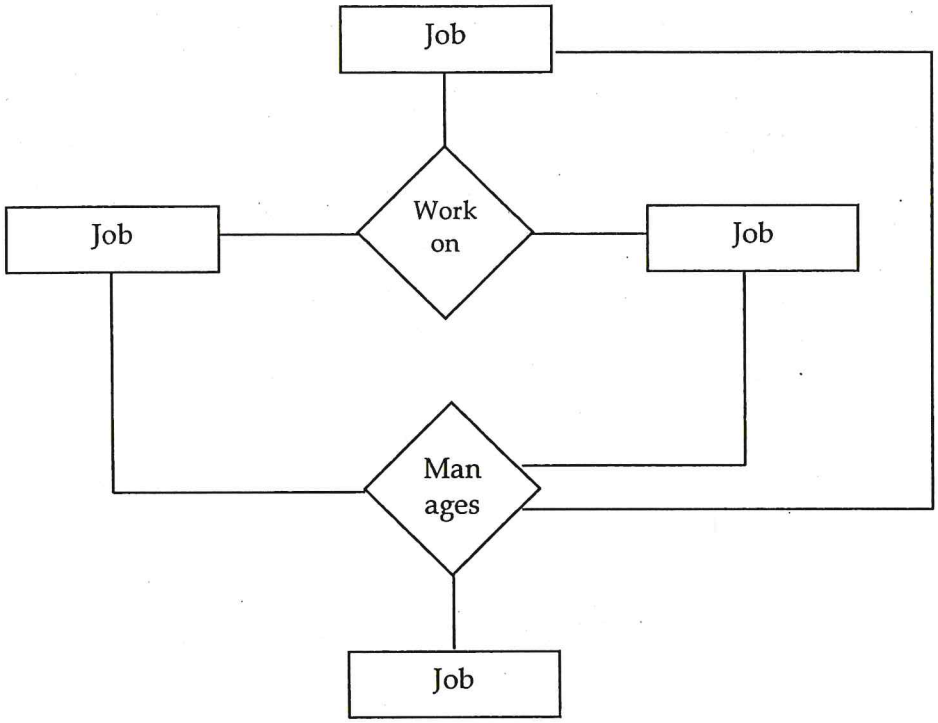
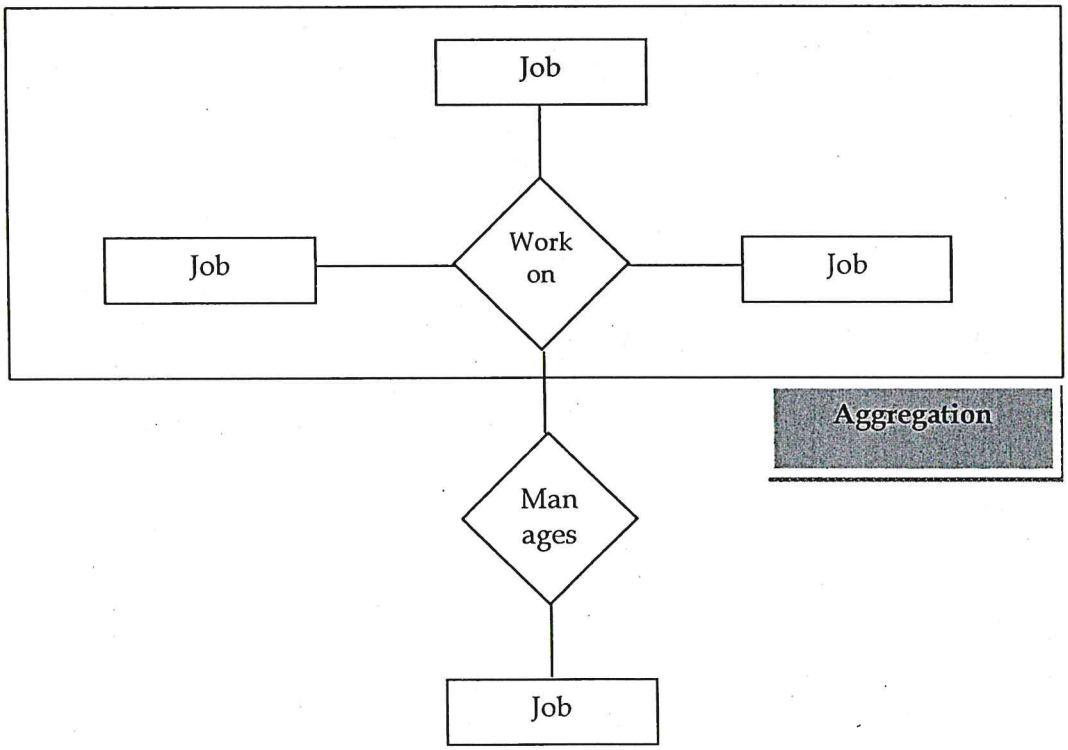
Example:
ER diagram with redundant relationship



ER Diagram with Aggregation



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2. Sub Class and Super Class

- Sub class and Super class relationship leads the concept of Inheritance.
- The relationship between sub class and super class is denoted with (d) symbol.

1. Super Class

- Super class is an entity type that has a relationship with one or more subtypes.
- An entity cannot exist in database merely by being member of any super class. **For example:** Shape super class is having sub groups as Square, Circle, Triangle.

2. Sub Class

- Sub class is a group of entities with unique attributes.
- Sub class inherits properties and attributes from its super class. **For example:** Square, Circle, Triangle are the sub class of Shape super class.

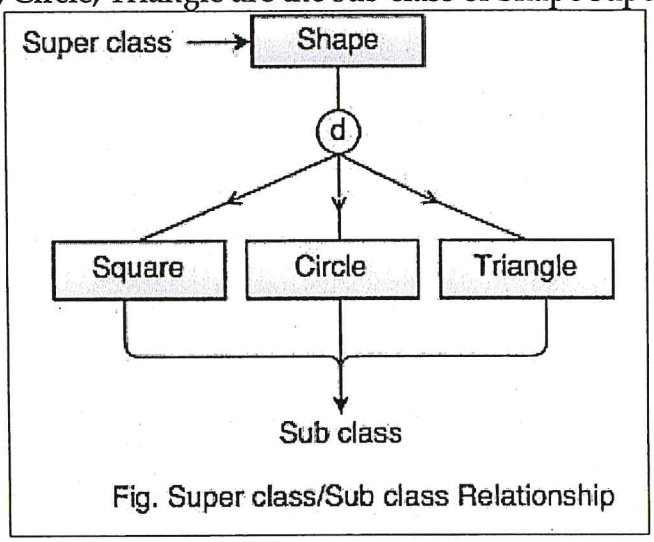

Fig. Super class/Sub class Relationship

3. Category or Union

- Category represents a single super class or sub class relationship with more than one super class.
- It can be a total or partial participation.

For example Car booking, Car owner can be a person, a bank (holds a possession on a Car) or a company. Category (sub class) → Owner is a subset of the union of the three super classes → Company, Bank, and Person. A Category member must exist in at least one of its super classes.

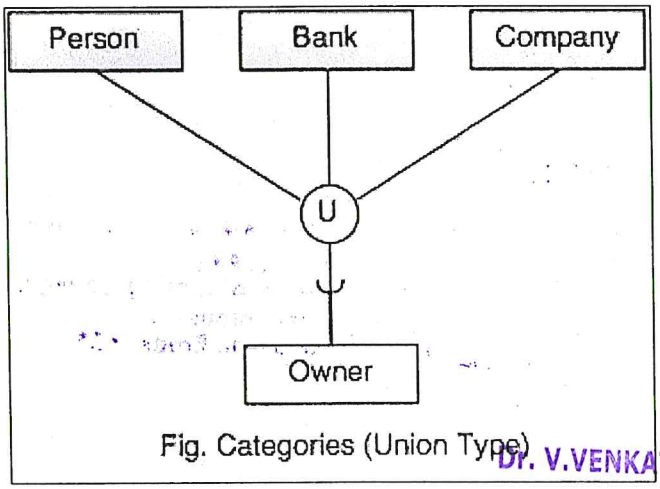

Fig. Categories (Union Type)

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21CS401 – DATABASE MANAGEMENT SYSTEMS
Content beyond the Syllabus

UNIT III
Topic: Extended relational algebraic operations

Extended Relational Algebra operations

- Arithmetic Operation
- Aggregate operation
- Outer Join

a) Arithmetic operation

- Generalized projection operation extends projection operation by allowing arithmetic functions to be used in the projection list.
- Syntax

$$\Pi\ F1,F2,\ldots,Fn\ (E))$$

Here, F1,F2,...Fn → arithmetic expressions
E → any relational algebraic expression

- Example

Student

Roll	Name	Total
1	Tamil	350
2	Selva	400
3	Kavi	375
4	Kutty	425

$$\Pi_{name,total/5\ as\ percentage}\ (student)$$

Name	Percentage
Tamil	70
Selva	80
Kavi	75
Kutty	85

b) Aggregate functions

- Aggregate function takes a collection of values and returns a single value as a result. Common aggregate functions are
  - Sum
  - Avg
  - count_distinct

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- max
- min etc.,

- Example (emp)

Emp_code	Name	Salary	Dept
E1	Tamil	25000	CSE
E2	Selva	23000	IT
E3	Kavi	20000	IT
E4	Kutty	30000	CSE

1) Calculate total salary paid to employees

$$G_{sum(salary)}(emp)$$

G → Group By symbol

Salary
98000

2) Calculate average salary paid to employees

$$G_{avg(salary)}(emp)$$

Salary
24500

3) Count number of distinct dept in the emp table

$$G_{count\_distinct(dept)}(emp)$$

2

4) Display total salary of employee department wise

$$dept\ G_{sum(salary)}(emp)$$

Dept	Salary
CSE	55000
IT	43000

c) Outer Join

- Outer join operation is an extension of join operation
- It is used to deal with mission information
- Types of outer join
  - Left outer join
  - Right outer join
  - Full outer join

Example

Emp

Name	City
Tamil	Kvp
Selva	Chml
Kavi	Gopi
Kutty	Chennai

Emp_salary

Name	Dept	Salary
Tamil	CSE	25000
Selva	IT	23000
Durai	IT	20000
Kutty	CSE	30000

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Natural Join

Emp ⋈ Emp_Salary

Name	City	Dept	Salary
Tamil	Kvp	CSE	25000
Selva	Chml	IT	23000
Kutty	Chennai	CSE	30000

Here, details of "kavi & durai" are lost. To avoid the loss of information, we can use outer join

1) Left outer Join

- It takes all the tuples in the left relation
- Pad tuples with NULL values the do not available in the right relation

Emp ⟕ Emp_Salary

Name	City	Dept	Salary
Tamil	Kvp	CSE	25000
Selva	Chml	IT	23000
Kavi	Gopi	NULL	NULL
Kutty	Chennai	CSE	30000

2) Right outer Join

- It takes all the tuples in the right relation
- Pad tuples with NULL values the do not available in the left relation

Emp ⟖ Emp_Salary

Name	City	Dept	Salary
Tamil	Kvp	CSE	25000
Selva	Chml	IT	23000
Durai	NULL	IT	20000
Kutty	Chennai	CSE	30000

3) Full outer Join

- It takes all the tuples from both left and right relation
- Pad tuples with NULL values the do not available.

Emp ⟗ Emp_Salary

Name	City	Dept	Salary
Tamil	Kvp	CSE	25000
Selva	Chml	IT	23000
Kavi	Gopi	NULL	NULL
Kutty	Chennai	CSE	30000
Durai	NULL	IT	20000

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21CS401 – DATABASE MANAGEMENT SYSTEMS
Innovative Assignment Question-1

Submission Due	**: 19.03.2024**
Mapping with Course Outcome	: CO1
Mapping with Programme Outcome	: PO1 PO2, PO3, PO4, PO9, PO12, PSO 1,2,3

nstructions:

- ANSWER NEATLY AND LEGIBLY on **A4 sheets only** and not in sheets torn from a book.
- Sketch diagrams whether relevant. Explain your notations explicitly and clearly.
- An incomplete assignment is not acceptable for submission.
- Once you submit your assignment, you will be expected to answer all the questions there INDEPENDENTLY. You may be asked to answer, you any questions of the assignment in the class.
- All other instruction as in this and all subsequent assignment also.

Questions:

1) Consider the schema for Movie Database:
ACTOR (*Act_id, Act_Name, Act_Gender*) DIRECTOR (*Dir_id, Dir_Name, Dir_Phone*)
MOVIES (*Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id*) MOVIE_CAST (*Act_id, Mov_id, Role*)
RATING (*Mov_id, Rev_Stars*)

(a) Draw a Schema diagram for the above schema.

(b) Write SQL queries to:
1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

2) Consider the following Database Schema:
Employee(Fname,Lname, SSN, Bdate, address,Sex, Salary,Dno)\
Department(Dname,Dnumber, Mgrssn,)
Project(Pname, Pnumber, Plocation,Dnum)
Works_on(Essn,Pno,Hours)
(a) Draw a Schema Diagram for the above schema

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(b) Write the SQL Queries for the following:

1. For each department, retrieve the department number, the number of employees in the department, and their average salary.
2. For each project, retrieve the project number, project name, and the number of employees who work on that project.
3. For each project on which more than two employees work, retrieve the project number, project name, and the number of employees who work on that project.
4. Show the effect of giving all employees who work on the 'ProductX' project a 10% raise.
5. List the names of managers who have least one dependent.

Assignments are evaluated as per the given Rubrics as follows.

Criteria	Low(1)	Medium(2)	Strong(3)
Analytical skills	Minimal ability to analyze the given task.	Some ability to analyze the given task.	Able to analyze the given task.
Writing skills content	The content is quite relevant to the given task.	The content relevant to given task.	The content is highly relevant to given task.
Organization	The organization of the paper is weak and support is in substantial or unconvincing	The organization of the paper is good and generally supported with little evidence.	Sentence are correctly constructed and well-articulated.
Language	Sentence are somewhat varied, and some are in appropriate with minimal grammatical error.	Sentence are correctly constructed.	Sentence are correctly constructed and well-articulated.
Knowledge skills and creative idea	The students demonstrates a moderate level of the subject knowledge.	The student demonstrate a sufficient level of the subject knowledge with some creative idea.	The student demonstrates sound subject knowledge with some creative idea.

Course Coordinator

HOD/M.Tech CSE

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Assignment Number - 1

Name of the Student	: Soundarya. T
Roll No	: 85224554
Class / Section	: mtech- CSE
Subject Code	: 21CS401
Name of the Subject	: Database management Systems
Assignment given on	: 4/3/24
Submission date	: 19/3/24

S.No.	Rubrics for Evaluation	Max. Marks	Marks obtained
1	Analytical Skills	05	5
2	Writing Skills Content	05	5
3	Organization	05	5
4	Language	05	5
5	Knowledge Skills and Creative idea	05	5
	Total	25	25

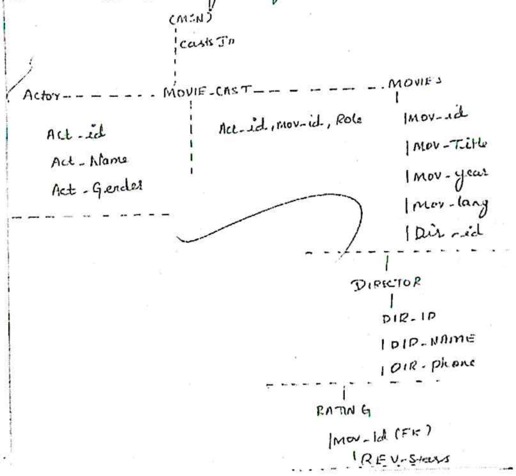
5

Signature of the Course Coordinator

① Consider the Schema for movie database

ACTOR (Act_id, Act_Name, Act_Gender) DIRECTOR (Dir_id, Dir_Name, Dir_phone) MOVIES (Mov_id, Mov_Title, Mov_year, Mov_lang, Dir_id) MOVIE_CAST (Mov_id, Act_id, Role) RATING (Mov_id, Rev_Stars).

(i) Draw a Schema diagram for all above Schema



(2) Write SQL quries to

1. List the titles of all movies directed by 'Hitchcock'.

SQL

```
SELECT MOV_Title
FROM MOVIES
WHERE DIR_Name = 'HITCHCOCK';
```

2. find the movie Names where one or more actors acted in two or more movies."

```
SELECT M.MOV_Title
FROM MOVIES M
INNER JOIN MOVIE_CAST C1 ON M.Mov_id = C1.Mov_id
INNER JOIN MOVIE_CAST C2 ON M.Mov_id != C2.Mov_id
                AND C1.Act_id = C2.Act_id
GROUP BY M.Mov_Title
HAVING COUNT (DISTINCT C1.Act_id) >= 2;
```

3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).

```
SELECT A.ACT_Name
FROM ACTOR A
INNER JOIN MOVIE_CAST MC1 ON A.ACT_id = MC1.ACT_id
INNER JOIN MOVIES M1 ON MC1.MOV_id = M1.MOV_id
INNER JOIN MOVIE_CAST MC2 ON A.Act_id = MC2.Act_id
INNER JOIN MOVIES M2 ON MC2.MOV_id = M2.MOV_id
WHERE M1.MOV_YEAR < 2000 AND M2.MOV_year > 2015;
```

4. find the title of the movies and number of stars of each movie that has atleast one rating and find the highest number of stars that movies received. Sort the result by movies title.

SQL

```
SELECT M.MOV_TITLE, AVG (R.REV_Stars) AS Average_Rating
            MAX (R.Rev_Stars) AS Highest_Rating
FROM MOVIES M
LEFT JOIN RATING R ON M.Mov_id = R.Mov_id
GROUP BY M.Mov_Title
```

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ORDER BY M.MOV-Title;

5) Update rating of all movies directed by 'Steven Spielberg' to 5.

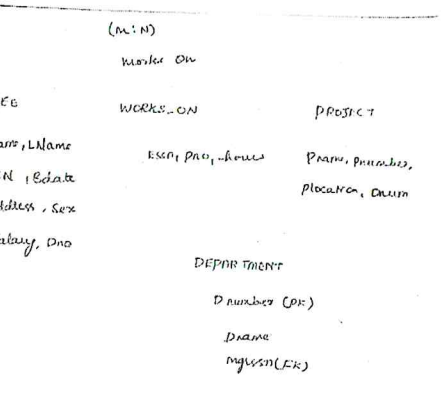
SQL

```
UPDATE RATING R
INNER JOIN MOVIES M ON R.MOV-id = M.MOV-id
SET R.REV-Stars = 5
WHERE M.DIR-Name = 'Steven Spielberg';
```

(2) Consider the following Database Schema:

Employee (Fname, LName, SSN, Bdate, address, Sex, Salary, DNO) / Department (DName, Dnum, Mgrssn).
Project (Pname, Pnumber, Plocation, Dnum)
Works_on (ESSN, Pno, Hours)

1. Draw the schema diagram for the above given schema



1. for each department, retrieve the department number, the number of employees in the department, and their average salary.

SQL

```
SELECT D.Dnumber, COUNT(E.SSN) AS Num_Employees,
       AVG(E.salary) AS Avg_Salary.
FROM DEPARTMENT D
INNER JOIN EMPLOYEE E ON D.Dnumber = E.DNO
GROUP BY D.Dnumber;
```

2. for each project, retrieve the project number, project name, and the number of employees who works on that project

SQL

```
SELECT P.Pnumber, P.Pname, COUNT(DISTINCT W.Essn) As Num_Employees
FROM PROJECT P
INNER JOIN WORKS_ON W ON P.Pnumber = W.Pno
GROUP BY P.Pnumber, P.Pname;
```

3. for each project on which more than two employees work, retrieve the project number, Project name, and the number of employees who works on that project.

SQL

```
SELECT P.Pnumber, P.Pname, COUNT(DISTINCT W.Essn) As Num_Employee
FROM PROJECT P
INNER JOIN WORKS_ON W ON P.Pnumber = W.Pno
Group By P.Pnumber, P.Pname
HAVING COUNT(DISTINCT W.Essn) > 2;
```

4. Show the effect of giving all employees who works on the 'ProductX' project a 10% raise (This must actually modify the data, but show the updated Salary.

SQL

```
SELECT E.Fname, E.Lname, E.Salary * 1.1 AS New_Salary
FROM EMPLOYEE E
INNER JOIN WORKS_ON W ON E.ESSN = W.Essn
INNER JOIN PROJECT P ON W.Pno = P.Pnumber
WHERE P.Pname = 'ProductX';
```

5. List the names of managers who have at least one dependent (Assuming a seperate dependents table exists).

SQL

```
SELECT E.Fname, E.Lname
FROM EMPLOYEE E
INNER JOIN DEPARTMENT D ON E.Dno = D.Dnumber
WHERE D.Mgrssn = E.SSN
AND EXISTS(SELECT * FROM Dependents WHERE dependents.
```

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INSTITUTION'S INNOVATION COUNCIL (Ministry of HRD Initiative)

DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING
21CS401 – DATABASE MANAGEMENT SYSTEMS
Innovative Assignment Question-2

Submission Due	**: 02.04.2024**
Mapping with Course Outcome	: CO2
Mapping with Programme Outcome	: PO1 PO2, PO3, PO4, PO8, PO9, PO10, PO11, PO12, PSO 1,2,3

Instructions:

- ANSWER NEATLY AND LEGIBLY on **A4 sheets only** and not in sheets torn from a book.
- Sketch diagrams wherever relevant. Explain your notations explicitly and clearly.
- An incomplete assignment is not acceptable for submission.
- Once you submit your assignment, you will be expected to answer all the questions there INDEPENDENTLY. You may be asked to answer any question of the assignment in the class.
- All other instructions as in this and all subsequent assignments also.

1. Consider the E-R diagram which models an online bookstore.
   a. List the entity sets and their primary keys.
   b. Suppose the bookstore adds music cassettes and compact disks to its collection. The same music item may be present in cassette or compact disk format, with differing prices. Extend the E-R diagram to model this addition, ignoring the effect on shopping baskets.
   c. Now extend the E-R diagram, using generalization, to model the case where a shopping basket may contain any combination of books, music cassettes, or compact disks.

2. Consider the following information about a university database:
   - Professors have an SSN, a name, an age, a rank, and a research specialty.
   - Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget.
   - Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.).
   - Each project is managed by one professor (known as the project's principal investigator).
   - Each project is worked on by one or more professors (known as the project's co-investigators).
   - Professors can manage and/or work on multiple projects. Each project is worked on by one or more graduate students (known as the project's research assistants).
   - When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one. Departments have a department number, a department name, and a main office. Departments have a professor (known as the chairman) who runs the department.

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- Professor's work in one or more departments and for each department that they work in, a time percentage is associated with their job. Graduate students have one major department in which they are working on their degree. Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take. Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes. Be sure to indicate any key and participation constraints.

Assignments are evaluated as per the given Rubrics as follows.

Criteria	Low(1)	Medium(2)	Strong(3)
Analytical skills	Minimal ability to analyze the given task.	Some ability to analyze the given task.	Able to analyze the given task.
Writing skills content	The content is quite relevant to the given task.	The content relevant to given task.	The content is highly relevant to given task.
Organization	The organization of the paper is weak and support is in substantial or unconvincing	The organization of the paper is good and generally supported with little evidence.	Sentence are correctly constructed and well-articulated.
Language	Sentence are somewhat varied, and some are in appropriate with minimal grammatical error.	Sentence are correctly constructed.	Sentence are correctly constructed and well-articulated.
Knowledge skills and creative idea	The students demonstrates a moderate level of the subject knowledge.	The student demonstrate a sufficient level of the subject knowledge with some creative idea.	The student demonstrates sound subject knowledge with some creative idea.

Course Coordinator

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Assignment Number - 2

Name of the Student	: N. Samyuktha
Roll No	: E0522CS45
Class / Section	: M.Tech CSE
Subject Code	: 21CS401
Name of the Subject	: Database Management Systems
Assignment given on	: 21.3.24
Submission date	: 2.4.24

S.No.	Rubrics for Evaluation	Max. Marks	Marks obtained
1	Analytical Skills	05	5
2	Writing Skills Content	05	5
3	Organization	05	5
4	Language	05	5
5	Knowledge Skills and Creative idea	05	5
	Total	25	25

5

Signature of the Course Coordinator

1. Consider the ER diagram which models an online bookstore

a) List the entity sets and their primary keys

b) suppose the bookstore adds music cassettes and compact disks to its collection. the same music item may be present in cassette or compact disks format, with differing prices. Extend the E-R diagram to model this add ignoring the effort on shopping baskets

c) Now extends the E-R diagram using generalizing to model the case where a shopping basket may contain any combination of books, music cassette or compact disk.

a). Block [primary key : ISBN]

Author (primary key : Author -ID)

Publisher (primary key : Publisher-ID)

Customer (primary key : order -ID)

Order (primary key : order -ID)

Review (primary key:- Review-ID)

b) To extend the E-R diagram for adding music cassettes and compact disks.

Add two new entity sets

Music cassette (primary key : CD-ID)

Update the book entity to includes price attribute.

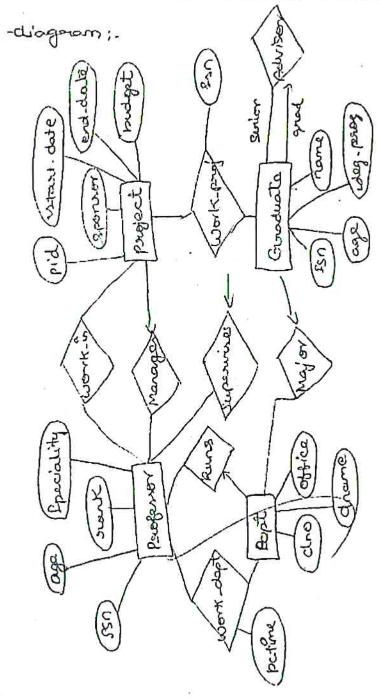
· Add a new relationship between music castle and compact disk entity sets & book entity set to represent the fact the same music item may.

be available in different formats with different prices.

c) To further extend E-R diagram using generalisation for shopping baskets.

Create a superclass entity set called item, with attributes such as item & price make book, music - cassette & BD & compact_disk entity sets subclasses of item.

2) E R diagram:-



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DEPARTMENT OF M.TECH COMPUTER SCIENCE AND ENGINEERING
21CS401 – DATABASE MANAGEMENT SYSTEMS
Innovative Assignment Question-3

Submission Due	**: 16.04.2024**
Mapping with Course Outcome	: CO3
Mapping with Programme Outcome	: PO1 PO2, PO3, PO4, PO8, PO11, PO12, PSO 1,2,3

Instructions:

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1. Consider the log sequence of two transactions of a bank account with an initial balance of 12000, that transfer 2000 to a mortgage payment and then apply a 5% of interest.
   a. T1 Start
   b. T1 B old=12000 new= 10000
   c. T1 M old=0 new=2000
   d. T1 commit
   e. T2 start
   f. T2 B old=10000 new=10500
   g. T2 commit

   Suppose the database system crashes just before log record g is written. What we have to do when the system restarts? Give the explanation.

2. Consider the simple relation Employee (ID, salary) storing employee ID's and salaries, where ID is a key. Consider the following two transactions:

   T1: <begin transaction>
   update Employee set salary = 2 * salary where ID = 25
   update Employee set salary = 3 * salary where ID = 25
   commit
   T2: <begin transaction>
   update Employee set salary = 100 where salary > 100
   Commit

   Suppose the salary of the employee with ID=25 is 100 before either transaction executes.

   (a) If both transactions T1 and T2 execute to completion with isolation level serializable, what are the

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possible final salaries for the employee with ID=25?
(b)Now suppose transaction T1 executes with isolation level read committed, transaction T2 executes with isolation level read uncommitted, and both transactions execute to completion. What are the possible final salaries for the employee with ID=25?

3. Consider the following two transactions and schedule (time goes from top to bottom). Is this schedule conflict-serializable? Explain why or why not

Transaction T_0	Transaction T_1
$r_0[A]$	
$w_0[A]$	
	$r_1[A]$
	$r_1[B]$
	c_1
$r_0[B]$	
$w_0[B]$	
c_0	

4. Show how the use of locks without 2PL can lead to a schedule that is NOT conflict serializable.
5. Show how 2PL can ensure a conflict-serializable schedule for the same transactions above. Use th notationLi[A] to indicate that transaction I acquires the lock on element A and Ui[A] to indicate tha transaction i releases its lock on A.

Assignments are evaluated as per the given Rubrics as follows.

Criteria	Low(1)	Medium(2)	Strong(3)
Analytical skills	Minimal ability to analyze the given task.	Some ability to analyze the given task.	Able to analyze the given task.
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Language	Sentence are somewhat varied, and some are in appropriate with minimal grammatical error.	Sentence are correctly constructed.	Sentence are correctly constructed and well-articulated.
Knowledge skills and creative idea	The students demonstrates a moderate level of the subject knowledge.	The student demonstrate a sufficient level of the subject knowledge with some creative idea.	The student demonstrates sound subject knowledge with some creative idea.

Course Coordinator

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Assignment Number - 3

Name of the Student	:	S. Sri Madhumitha
Roll No	:	ES22CJ55
Class / Section	:	M.Tech CSE
Subject Code	:	21CS401
Name of the Subject	:	DBMS
Assignment given on	:	05.04.2024
Submission date	:	16.04.2024

S.No.	Rubrics for Evaluation	Max. Marks	Marks obtained
1	Analytical Skills	05	5
2	Writing Skills Content	05	5
3	Organization	05	5
4	Language	05	5
5	Knowledge Skills and Creative idea	05	5
	Total	25	25

5

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1] Undo phase

We undo the effects of transactions that committed after the last checkpoint. In this case, transaction T_2 committed after the last checkpoint, so we need to undo its effect. We do this by rolling back T_2's changes to restore the database to its state before T_2 began

Redo Phase

After undoing, we redo the effects of transactions that committed but we are not get written to the database

So we redo T_1's changes, applying the interest of 5% to the updated balance.

2] a) If both transactions T_1 and T_2 execute to completion with isolation level serializable, the possible final salaries for the employee with ID = 25 are:

T_1 updates the salary to 200 (2×100) and then to 600 (3×200)

T_2 doesn't affect the salary of the employee with ID = 25 because the initial salary is not greater than 100. So, the final salary could be either 600.

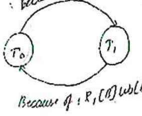
b] T_1 reads the initial salary (100), updates it to 200 (2×100), Then T_2 reads the updated salary (200) and sets it to 100 and finally T_1 reads the updated salary (100) & multiplies it by 3, resulting in 300

3]

Transaction T_0	Transaction T_1
r_0 [A]	
w_0 [A]	r_1 [A]
	r_1 [B]
r_0 [B]	c_1
w_0 [B]	
c_0	

The schedule is not conflict serializable because the precedence graph contains a cycle. The graph has an edge $T_0 \to T_1$ because the schedule contains $w_0[A] \to r_1[A]$. The graph has an edge $T_1 \to T_0$ because the schedule contains $r_1[B] \to w_0[B]$.

Because of $w_0[A]\, R_1[A]$



Because of : $R_1[B]\, w_0[B]$

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4) Soln:-

Transaction T_0	Transaction T_1
L_0 [A]	
r_0 [A]	
W_0 [A]	L_1 [A] → blocks
L_0 [B]	
r_0 [B]	
W_0 [B]	
U_0 [A]	
U_0 [B]	
C_0	L_1 [A] → granted
	r_1 [A]
	L_2 [B]
	L_1 [B]
	r_1 [B]
	U_1 [A]
	U_1 [B]
	L_1

c) Show how the use of locks without 2PL can lead to a schedule that is Not conflict serializable.

Soln

Transaction T_0	Tran
L_0 [A]	
r_0 [A]	
W_0 [A]	
U_0 [A]	
	L_1 [A]
	r_1 [A]
	L_1 [A]
	L_1 [B]
	r_1 [B]
	U_1 [B]
	C_1
L_0 [B]	
r_0 [B]	
W_0 [B]	
U_0 [B]	
C_0	