DBMS GROUP-17

Zoo and Wildlife Data

081

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202312081

097

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117

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Project Details

Wildlife Database Management System
that majorly tracks statistics like

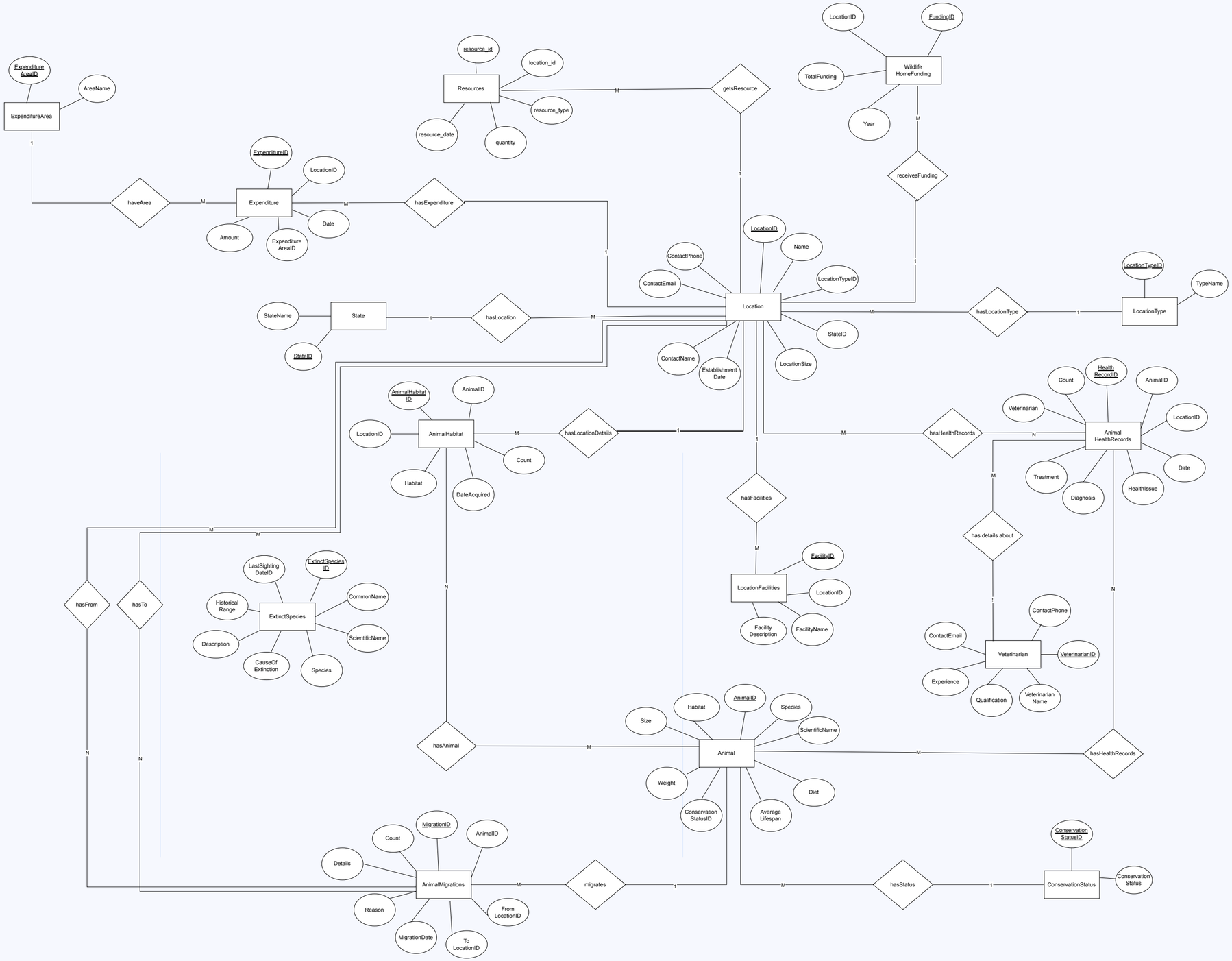
- animal count and distribution
- species details
- funding and resources
- animal health records
- migrations of animals

in
Indian wildlife sanctuaries, national parks, and zoos.

What we did:

1. Integrated diverse wildlife data into a unified database.
2. Captured detailed statistics of sanctuaries, national parks, and zoos.
3. Initiated the project by characterizing data needs and clarifying requirements.
4. Designed the database by translating requirements into a conceptual schema. Built ER diagram.
5. Ensured removing multi-valued attributes and minimizing redundancy.
6. Implemented the schema in PostgreSQL, imported sample data.
7. Executed SQL queries to retrieve information from the database.

ER Diagram



SQL Tables

01 State

	stateid [PK] integer	statename character varying (255)
1	1	Andhra Pradesh
2	2	Arunachal Pradesh
3	3	Assam

Total rows: 28 of 28 Query complete 00:00

02 LocationType

	locationtypeid [PK] integer	typename character varying (255)
1	1	Natural Park
2	2	Wildlife Sanctuary
3	3	Zoo

Total rows: 3 of 3 Query complete 00:00:00.

03 Location

	locationid [PK] integer	name character varying (255)	locationtypeid integer	stateid integer	locationsize numeric (10,2)	establishmentdate date	contactname character varying (255)	contactemail character varying (255)	contactphone character varying (255)
1	1	Jim Corbett National Park	1	5	500.25	1936-07-01	Rahul Sharma	rahul.sharma@example.com	9876543290
2	2	Ranthambore National Park	1	21	450.50	1955-03-01	Sonia Verma	sonia.verma@example.com	9765432109
3	3	Sundarbans Wildlife Sanctuary	2	19	300.75	1973-12-04	Amit Roy	amit.roy@example.com	9654321098
4	4	Kanha National Park	1	13	420.30	1955-06-01	Deepak Singh	deepak.singh@example.com	9543210987
5	5	Gir Forest National Park	1	7	350.20	1965-05-01	Riya Patel	riya.patel@example.com	9432109876

Total rows: 70 of 70 Query complete 00:00:00.246

SQL Tables

04 ConservationStatus

	conservationstatusid [PK] integer	conservationstatus character varying (255)
1	1	Critically Endangered
2	2	Endangered
3	3	Vulnerable

Total rows: 30 of 30 Query complete 00:00:00.283

06 AnimalHabitat

	animalhabitatid [PK] integer	animalid integer	locationid integer	count integer	dateacquired date
1	1	12	32	83	2023-01-01
2	2	5	18	54	2023-02-05
3	3	29	65	102	2023-03-10
4	4	8	47	78	2023-04-15

Total rows: 60 of 60 Query complete 00:00:00.431

05 Animal

	animalid [PK] integer	species character varying (255)	scientificname character varying (255)	diet character varying (255)	averagelifespan integer	conservationstatusid integer	weight numeric (10,2)	size character varying (255)	habitat character varying (255)
1	1	Sumatran Tiger	Panthera tigris sumatrae	Carnivore	15	1	120.50	Large	Rainforest
2	2	Javan Rhino	Rhinoceros sondaicus	Herbivore	45	2	2100.75	Medium	Swamp
3	3	Mountain Gorilla	Gorilla beringei beringei	Herbivore	40	3	180.00	Large	Mountain

Total rows: 60 of 60 Query complete 00:00:00.290

SQL Tables

07 ExtinctSpecies

	extinctspeciesid [PK] integer	commonname character varying (255)	scientificname character varying (255)	species character varying (255)	causeofextinction character varying (255)	lastsightingdate date	historicalrange character varying (255)	description text
1	1	Bengal Tiger	Panthera tigris tigris	**Tiger**	Habitat Loss	2022-01-01	India	The Bengal tiger was driven to
2	2	Indian Rhinoceros	Rhinoceros unicornis	**Rhinoceros**	Hunting	2019-05-15	India	The Indian rhinoceros, once ab
3	3	Indian Cheetah	Acinonyx jubatus venaticus	**Cheetah**	Habitat Loss	2018-07-20	India	The Indian cheetah faced rapic

08 Location Facalites

	facilityid [PK] integer	locationid integer	facilityname character varying (255)	facilitydescription text
5	5	18	Picnic Area	Designated area for picnics and outdoor dining
6	6	42	Viewing Deck	Elevated platform for scenic views of wildlife
7	7	3	Educational Exhibits	Displays providing information about wildlife
8	8	60	Amphitheater	Outdoor venue for wildlife shows and presentations

Total rows: 50 of 50 Query complete 00:00:00.437

09 ExpenditureArea

	expenditureareaid [PK] integer	areaname character varying (255)
1	1	Visitor Center Maintenance
2	2	Animal Enclosure Upkeep

Total rows: 100 of 100 Query complete 00:00:00.284

SQL Tables

10 Wildlife Home Funding

	fundingid [PK] integer	locationid integer	totalfunding numeric (10,2)	date date
1	1	5	750000.00	2022-01-15
2	2	12	800000.50	2022-02-22
3	3	25	600000.75	2022-03-12

Total rows: 70 of 70 Query complete 00:00:00.157

12 Expenditure

	expenditureid [PK] integer	locationid integer	date date	expenditureareaid integer	amount numeric (10,2)
1	1	10	2022-01-05	5	250000.00
2	2	25	2022-02-15	40	350000.00
3	3	15	2022-03-20	20	280000.00

Total rows: 60 of 60 Query complete 00:00:00.335

11 Resources

	resource_id [PK] integer	location_id integer	resource_type character varying (255)	quantity integer	resource_date date
1	1	15	Fencing Material	100	2022-11-15
2	2	22	Animal Feed - Herbivore Pellets	500	2022-10-20
3	3	8	Veterinary Supplies - Surgical Instruments	1	2021-08-05
4	4	45	Enrichment Items - Puzzle Feeders	10	2021-05-12
5	5	60	Staff Training Workshop Fees	3	2020-09-30

Total rows: 100 of 100 Query complete 00:00:00.210

SQL Tables

13

Veterinarian

	veterinarianid [PK] integer	veterinarianname character varying (255)	qualification character varying (255)	experience integer	contactemail character varying (255)	contactphone character varying (255)
101	101	Dr. Tiwari	DVSc	5	dr.tiwari@email.com	9123456876
102	102	Dr. Sahoo	DVM	10	dr.sahoo@email.com	9123456877
103	103	Dr. Rathore	DVSc	7	dr.rathore@email.com	9123456878

Total rows: 191 of 191 Query complete 00:00:00.168

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AnimalHeathRecords

	healthrecordid [PK] integer	animalid integer	locationid integer	date date	healthissue character varying (255)	diagnosis character varying (255)	treatment text	veterinarianid integer	count integer
1	1	5	10	2022-01-05	Fever	High temperature observed	Prescribed medication and rest	15	20
2	2	15	25	2022-02-15	Digestive Issues	Diarrhea and vomiting	Administered oral medication	35	25
3	3	25	35	2022-03-20	Respiratory Infection	Coughing and sneezing	Prescribed antibiotics	75	15

Total rows: 50 of 50 Query complete 00:00:00.202

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AnimalMigration

	migrationid [PK] integer	animalid integer	fromlocationi integer	tolocationid integer	migrationdate date	reason character varying (255)	details text	count integer
1	1	5	10	20	2022-01-05	Seasonal Migration	Seasonal migration due to temperature changes and food availability.	25
2	2	15	25	30	2022-02-15	Food Availability	Migration for better access to food resources in the destination area.	30
3	3	25	35	40	2022-03-20	Breeding Season	Annual migration for breeding purposes and to avoid predators.	45

Total rows: 50 of 50 Query complete 00:00:00.324

SQL Simple Queries

01 Retrieve name and last sighting dates of animals that got extinct within last one year

Query | Query History

```
SELECT commonname,LastSightingDate
FROM ExtinctSpecies
WHERE LastSightingDate >= CURRENT_DATE - INTERVAL '1 year';
```

Data Output

	commonname character varying (255)	lastsightingdate date
1	Indian Elephant	2023-02-28
2	Indian Flying Fox	2023-01-12
3	Indian Black Turtle	2023-03-08
4	Indian Glassy Fish	2023-08-14
5	Indian Purple Frog	2023-06-29

Total rows: 5 of 5 Query complete 00:00:00.051

02 Retrieve ids of Veterinarian who treated animals with Fever.

Query | Query History

```
SELECT DISTINCT VeterinarianID
FROM AnimalHealthRecords
WHERE HealthIssue = 'Fever';
```

Data Output

	veterinarianid integer
1	12
2	14
3	15
4	16
5	18

Total rows: 5 of 5 Query complete 00:00:00.156

03 Retrieve total number of animals at location id = 3.

Query | Query History

```
SELECT LocationID, SUM(Count) AS TotalAnimals
FROM AnimalHabitat
WHERE LocationID = 3
GROUP BY LocationID;
```

Data Output

	locationid integer	totalanimals bigint
1	3	120

Total rows: 1 of 1 Query complete 00:00:00.136

04 Calculate total expenditure of location id 10 after 2021

Query | Query History

```
SELECT SUM(Amount) AS TotalExpenditure
FROM Expenditure
WHERE LocationID = 10 AND EXTRACT(YEAR FROM Date) > 2021;
```

Data Output

	totalexpenditure numeric
1	250000.00

05 Display the number of animals who migrated due to Breeding Season

Query | Query History

```
SELECT SUM(Count) AS TotalCountMigrated
FROM AnimalMigrations
WHERE Reason = 'Breeding Season';

```

Data Output

	totalcountmigrated bigint
1	220

SQL Complex Queries

06 Count number of animals who migrated from National Parks or Wildlife sanctuaries to zoos

Query | Query History

```
SELECT SUM(AM.Count) AS MigrationCount
FROM AnimalMigrations AM
JOIN Location FromLocation ON AM.FromLocationID = FromLocation.LocationID
JOIN Location ToLocation ON AM.ToLocationID = ToLocation.LocationID
WHERE FromLocation.LocationTypeID IN (SELECT LocationTypeID
                                      FROM LocationType
                                      WHERE TypeName IN ('National Park', 'Wildlife Sanctuary'))
AND ToLocation.LocationTypeID = (SELECT LocationTypeID FROM LocationType WHERE TypeName = 'Zoo');
```

Data Output

	migrationcount bigint
1	195

Total rows: 1 of 1 | Query complete 00:00:00.113

07 Retrieve the Top 5 States with the Highest Total Funding for Wildlife Homes in the Last Year

Query | Query History

```
SELECT S.StateName, SUM(WF.TotalFunding) AS TotalFundingLastYear
FROM WildlifeHomeFunding WF
JOIN Location L ON WF.LocationID = L.LocationID
JOIN State S ON L.StateID = S.StateID
WHERE WF.Date >= CURRENT_DATE - INTERVAL '1 year'
GROUP BY S.StateName
ORDER BY TotalFundingLastYear DESC
LIMIT 5;
```

Data Output

	statename character varying (255)	totalfundinglastyear numeric
1	Tamil Nadu	1610001.00
2	Assam	1560000.75
3	Karnataka	1500000.00
4	Andhra Pradesh	1390000.75
5	Rajasthan	1360000.50

Total rows: 5 of 5 | Query complete 00:00:00.579

SQL Complex Queries

08

List names of all the wildlife reserves where Asian Elephants are found

Query | Query History

```
SELECT L.Name AS LocationName
FROM Location L
JOIN AnimalHabitat AH ON L.LocationID = AH.LocationID
JOIN Animal A ON AH.AnimalID = A.AnimalID
WHERE A.Species = 'Asian Elephant';
```

Data Output

	locationname character varying (255)
1	Bharatpur Bird Sanctuary
2	Bandipur National Park

Total rows: 2 of 2 | Query complete 00:00:00.126

09

Retrieve top 3 states Maximum Endangered Species

Query | Query History

```
SELECT
    S.StateName,
    COUNT(DISTINCT A.AnimalID) AS EndangeredSpeciesCount
FROM
    State S
    JOIN Location L ON S.StateID = L.StateID
    JOIN AnimalHabitat AL ON L.LocationID = AL.LocationID
    JOIN Animal A ON AL.AnimalID = A.AnimalID
    JOIN ConservationStatus CS ON A.ConservationStatusID = CS.ConservationStatusID
WHERE
    CS.ConservationStatus = 'Endangered'
GROUP BY
    S.StateID
ORDER BY
    EndangeredSpeciesCount DESC
LIMIT 3;
```

Data Output

	statename character varying (255)	endangeredspeciescount bigint
1	Kerala	1
2	Tamil Nadu	1

SQL Complex Queries

10

List top 3 major expenditure areas of Zoos

Query | Query History

```
SELECT EA.AreaName
FROM ExpenditureArea EA
JOIN Expenditure E ON EA.ExpenditureAreaID = E.ExpenditureAreaID
JOIN Location L ON E.LocationID = L.LocationID
JOIN LocationType LT ON L.LocationTypeID = LT.LocationTypeID
WHERE LT.TypeName = 'Zoo'
GROUP BY EA.AreaName
ORDER BY COUNT(*) DESC
LIMIT 3;
```

Data Output

	areaname character varying (255)
1	Animal Enrichment Program
2	Conservation Office Outreach
3	Animal Welfare Advocacy

Total rows: 3 of 3 | Query complete 00:00:00.142

Relational Queries

Simple Queries:

1. Retrieve name and last sighting dates of animals that got extinct within last one year.

$$\pi_{\text{Species}}(\sigma_{\text{LastSightingDate} \geq \text{CURRENT\_DATE - INTERVAL '1 year'}}(\text{ExtinctSpecies}))$$

2. Retrieve ids of Veterinarian who treated animals with Fever.

$$\pi_{\text{ VeterinarianID }}(\sigma_{\text{ HealthIssue='Fever'}}(\text{AnimalHealthRecords}))$$

3. Retrieve total number of animals at location id = 3.

$$\pi_{\text{LocationID, SUM(Count)}}(\sigma_{\text{LocationID} = 3}(\text{AnimalHabitat}))$$

4. Calculate total expenditure of location id 10 after 2021.

$$\pi_{\text{SUM(Amount)}}(\sigma_{\text{LocationID} = 10 \text{ AND EXTRACT(YEAR FROM Date)} > 2021}(\text{Expenditure}))$$

5. Display the number of animals who migrated due to Breeding Season

$$\pi_{\text{SUM(Count)}}(\sigma_{\text{Reason} = \text{'Breeding Season'}}(\text{AnimalMigrations}))$$

Relational Queries

Complex Queries:

6. Count number of animals who migrated from National Parks or Wildlife sanctuaries to zoos

$$\pi_{SUM(Count)}(\sigma_{FromLocType.TypeName = 'National\ Park'\ or\ FromLocType.TypeName = 'Wildlife\ Sanctuary'\ and\ ToLocType.TypeName = 'Zoo'}(AnimalMigrations \bowtie Location \bowtie Location \bowtie LocationType \bowtie LocationType))$$

7. Retrieve the Top 5 States with the Highest Total Funding for Wildlife Homes in the Last Year

$$\delta 5(\pi_{StateName,\ TotalFundingLastYear}(\gamma_{(TotalFunding,SUM(TotalFunding))})(\sigma_{Date >= CURRENT\_DATE - INTERVAL\ '1\ year'}(WildlifeHomeFunding \bowtie Location \bowtie State))))$$

8. List names of all the wildlife reserves where Asian Elephants are found

$$\pi_{Name}(\sigma_{Species='AsianElephant'}\ (Location \bowtie AnimalHabitat \bowtie Animal))$$

9. Retrieve top 3 states Maximum Endangered Species

$$\delta 3(\pi_{StateName,\ EndangeredSpeciesCount}(\gamma_{(StateName,\ COUNT(DISTINCT\ AnimalID))}(\sigma_{StatusName = 'Endangered'}(State \bowtie Location \bowtie AnimalLocation \bowtie Animal \bowtie ConservationStatus))))$$

10. List top 3 major expenditure areas of Zoos

$$\delta 3(\gamma_{(AreaName,COUNT(ExpenditureAreaId))}(\pi_{AreaName}(\sigma_{TypeName='Zoo'}(ExpenditureArea \bowtie Expenditure \bowtie Location \bowtie LocationType))))$$

Contribution Slide

Vishal, Jetal, Nidhi, Madhav, Parth:

- Equal contribution to the project.
- Active involvement in all decision-making processes.
- Collaborative teamwork throughout the project lifecycle.

Key Project Contributions:

- **Database Design:** Collaborative creation of the database schema and ER diagram.
- **Implementation:** Shared responsibilities in implementing the schema in PostgreSQL using SQL.
- **Queries and Optimization:** Joint effort in formulating SQL queries, ensuring efficiency.
- **Relational Algebra Expressions:** Collaborative design and formulation of relational algebra expressions

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Team Dynamics:

- Regular team meetings for updates, discussions, and issue resolution.
- Transparent communication and shared responsibility for project milestones.

Acknowledgments:

- Each team member acknowledges the equal contribution of others.
- The project's success is attributed to the combined efforts of the entire team.

Thank You