PROJECT

Submitted To
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Batch: Database-2
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Project on Genetic Engineering Research Management System (GERMS)

A **Genetic Engineering Research Management System** can organize information about research projects, experiments, genes, genetic modifications, research teams, and lab equipment. This system supports efficient tracking of genetic experiments, experimental outcomes, and resources used in genetic engineering research.

Step-1: Identify the Entities

A **Genetic Engineering Research Management System** can organize information about research projects, experiments, genes, genetic modifications, research teams, and lab equipment. This system supports efficient tracking of genetic experiments, experimental outcomes, and resources used in genetic engineering research

Step-2: Identify the Attributes and Primary key for each Entity

1. **Project:** Project_id (PK), Title, Description, Start_date, End_date, Status, Budget
2. **Researcher**: Researcher_id (PK), First_name, Last_name, Position, Specialty, phone, email, Address.
3. **Experiment:** Experiment_id (PK), Project_id (FK from Project), Experiment_Name, Objective, Start_date, End_date, Status

4. **Gene:** Gene_id (PK), Gene_Symbol, Name, Chromosome, Description, Name_of_Organism
5. **Genetic Modification**: Modification_id(PK), Experiment_id (FK from Experiment), Gene_id(FK from Gene), Modification_type, Description, Impact
6. **Lab_Equipment**: Equipment_id (PK), Name, Type, Model, brand_name, Maintenance_date.
7. **Sample:** Sample_id (PK), Experiment_id (FK from Experiment), Gene_id (FK from Gene), Collection_date, Condition, Storage_Location.
8. **Result:** Result_id (PK), Experiment_id (FK from Experiment), Gene_id (FK from Gene), Observation, Measurement, Date_recorded.
9. **Funding Source**: Funding_id (PK), Project_id (FK from Project), Funding_agency, Amount, Issue_date

Step-3: Identify the Relationship needed

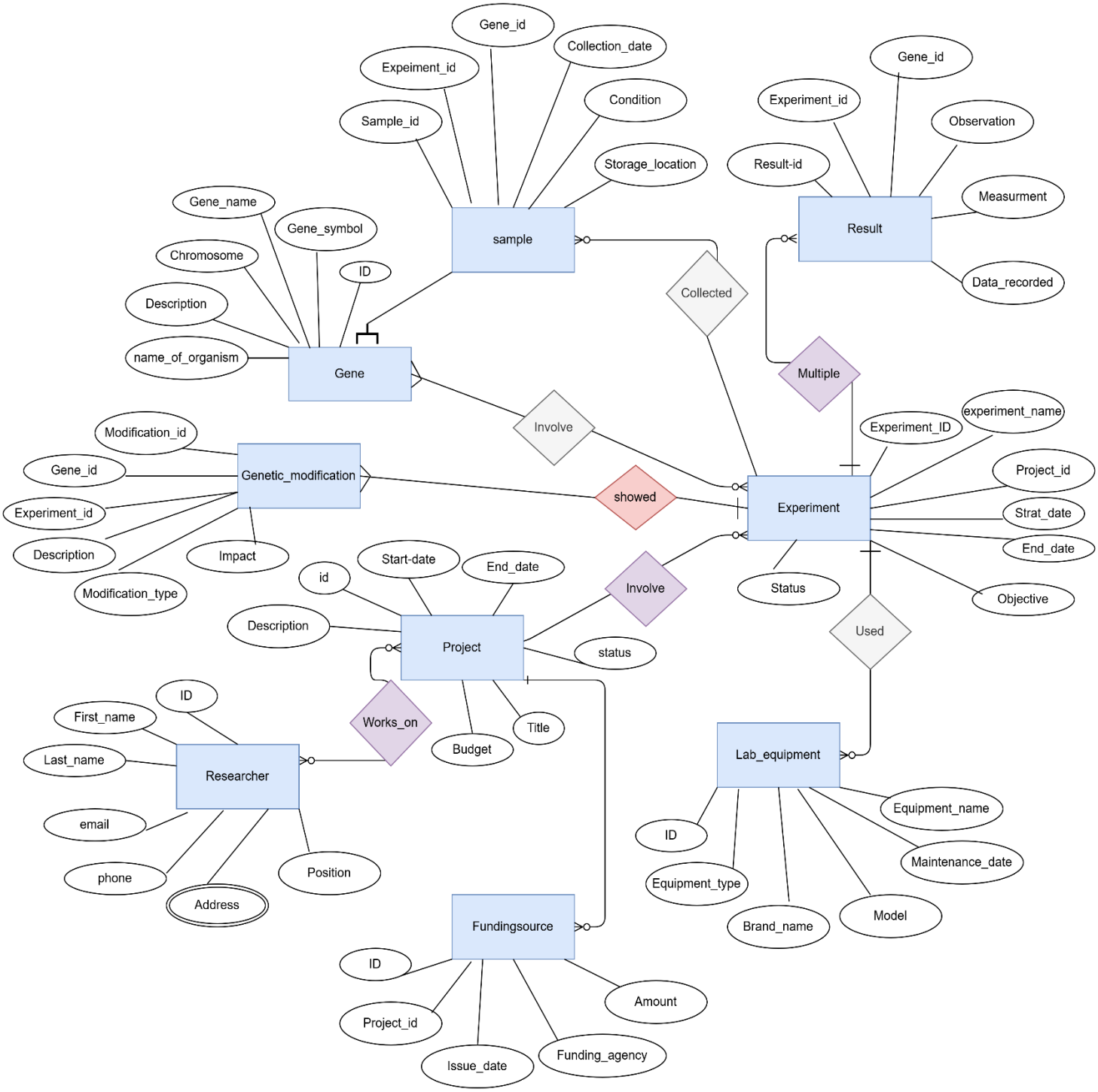
1. A project can have multiple researchers.
2. A researcher can work on multiple projects.
3. Each project may contain multiple experiments.
4. An experiment can involve multiple genes.
5. Each experiment may have multiple genetic modifications applied.
6. Experiments can use multiple pieces of lab equipment.
7. Each experiment may have multiple samples collected.
8. Each sample is related to one specific gene.
9. Each experiment has multiple results.
10. A project may have multiple funding sources.

Step-4: Identify the Cardinality Ratio and Participation

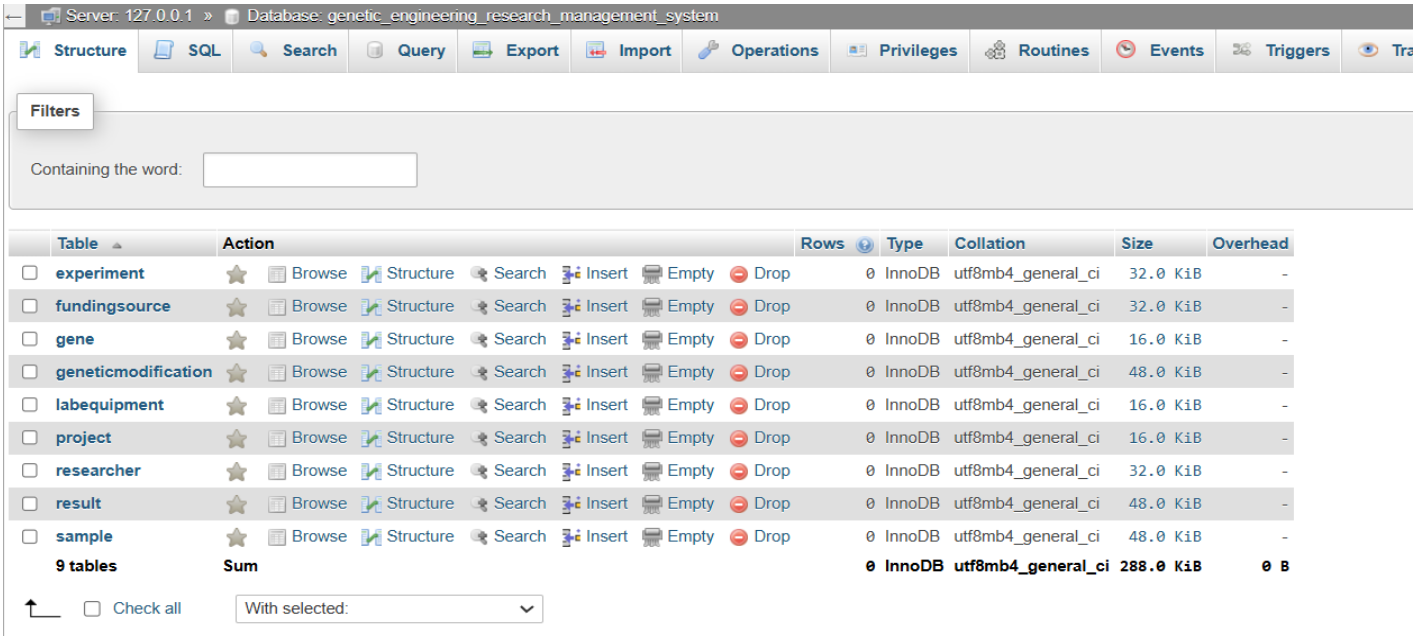
1. Project to Researcher: Many-to-Many
2. Project to Experiment: One-to-Many
3. Experiment to Gene: Many-to-Many
4. Experiment to Genetic Modification: One-to-Many
5. Experiment to Lab Equipment: Many-to-Many
6. Experiment to Sample: One-to-Many

7. Sample to Gene: Many-to-One.
8. Experiment to Result: One-to-Many

Step-5: Draw the Diagram



❖ Database on Genetic Engineering Research Management System (GERMS)



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gene	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_general_ci	16.0 KiB	-
geneticmodification	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_general_ci	48.0 KiB	-
labequipment	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_general_ci	16.0 KiB	-
project	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_general_ci	16.0 KiB	-
researcher	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_general_ci	32.0 KiB	-
result	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_general_ci	48.0 KiB	-
sample	Browse Structure Search Insert Empty Drop	0	InnoDB	utf8mb4_general_ci	48.0 KiB	-
9 tables	**Sum**	**0**	**InnoDB**	**utf8mb4_general_ci**	**288.0 KiB**	**0 B**

Check all With selected:

❖ Schema diagram of GERMS database