University (University\_ID, City, Street)

PK: University\_ID,

Candidate Keys: University\_ID

Laboratory (Labor\_ID, Description, Capacity,Univ\_ID)

PK: Labor\_ID

FK: Univ\_ID ◊ University. University\_ID

Candidate Keys: Labor\_ID

Employs (Labor\_ID, Worker\_ID, Starting\_date, End\_contract)

PK: Labor\_ID, Worker\_ID

FK: Labor\_ID ◊ Laboratory.Labor\_ID, Worker\_ID ◊ Worker.Worker\_ID

Candidate Keys: Labor\_ID, Worker\_ID

Worker (Worker\_ID, Name, Date\_of\_birth )

PK: Worker\_ID

Candidate Keys: Worker\_ID

Researcher (Researcher\_ID,research\_area,Character)

PK: Researcher\_ID

FK: Researcher\_ID ◊ Worker.Worker\_ID

Candidate Keys: Researcher\_ID

Head\_Researcher (Chief\_ID, Experience, Awards)

PK: Chief\_ID

FK: Chief\_ID ◊ Worker.Worker\_ID,

Candidate Keys: Chief\_ID

Leads( Chief\_ID, Researcher\_ID)

PK: Chief\_ID, Researcher\_ID

FK: Chief\_ID ◊ Head\_Researcher.Chief\_ID, Researcher\_ID ◊  Researcher.Researcher\_ID

Candidate Keys: Chief\_ID,Researcher\_ID

Communicates(Sender\_ID, Receiver\_ID,Communication\_Time,Communication Type)

PK: Sender\_ID, Receiver\_ID,Communication\_Time

FK: Sender\_ID ◊  Researcher.Researcher\_ID, Receiver\_ID ◊  Researcher.Researcher\_ID

Candidate Keys: Sender\_ID,Receiver\_ID,Communication\_Time

Makes(Worker\_ID,Project\_ID,Report\_ID)

PK: Worker\_ID,Project\_ID,Report\_ID

FK: Worker\_ID ◊  Worker.Worker\_ID, Project\_ID ◊  Project.Project\_ID,Report\_ID ◊ Report.Report\_ID

Candidate Keys: Worker\_ID,Project\_ID,Report\_ID

Project(Project\_ID,direction\_of\_research,Project\_Name)

PK: Project\_ID

Candidate Keys: Project\_ID

Report(Report\_ID,Topic ,Report\_Name)

PK: Report\_ID

Candidate Keys: Report\_ID

Certainly! Let's analyze each table in your schema to ensure they conform to the Third Normal Form (3NF):

1. \*\*UNIVERSITY\*\*

- Attributes: `UNIVERSITY\_ID` (PK), `CITY`, `STREET`

- Analysis: The `CITY` and `STREET` are dependent only on the `UNIVERSITY\_ID`. No transitive dependencies.

- Conclusion: In 3NF.

2. \*\*LABORATORY\*\*

- Attributes: `LABOR\_ID` (PK), `DESCRIPTION`, `CAPACITY`, `UNIV\_ID` (FK)

- Analysis: The `DESCRIPTION` and `CAPACITY` depend solely on `LABOR\_ID`. `UNIV\_ID` is a foreign key and depends on `LABOR\_ID`.

- Conclusion: In 3NF.

3. \*\*WORKER\*\*

- Attributes: `WORKER\_ID` (PK), `NAME`, `EMAIL`, `DATE\_OF\_BIRTH`

- Analysis: All attributes depend only on `WORKER\_ID`. No transitive or partial dependencies.

- Conclusion: In 3NF.

4. \*\*RESEARCHER\*\*

- Attributes: `RESEARCHER\_ID` (PK, FK), `RESEARCH\_AREA`, `CHARACTER`

- Analysis: `RESEARCH\_AREA` and `CHARACTER` are dependent on `RESEARCHER\_ID`. `RESEARCHER\_ID` is also a foreign key to `WORKER`.

- Conclusion: In 3NF.

5. \*\*HEAD\_RESEARCHER\*\*

- Attributes: `CHIEF\_ID` (PK, FK), `EXPERIENCE`, `AWARDS`

- Analysis: `EXPERIENCE` and `AWARDS` are solely dependent on `CHIEF\_ID`. `CHIEF\_ID` is also a foreign key to `WORKER`.

- Conclusion: In 3NF.

6. \*\*EMPLOYS\*\*

- Attributes: `LABOR\_ID` (FK), `WORKER\_ID` (FK), `STARTING\_DATE`, `END\_CONTRACT`

- Analysis: `STARTING\_DATE` and `END\_CONTRACT` are dependent on the composite key (`LABOR\_ID`, `WORKER\_ID`).

- Conclusion: In 3NF.

7. \*\*LEADS\*\*

- Attributes: `CHIEF\_ID` (FK), `RESEARCHER\_ID` (FK)

- Analysis: This is a junction table with a composite key. Each attribute is part of the primary key and there are no non-key attributes.

- Conclusion: In 3NF.

8. \*\*COMMUNICATES\*\*

- Attributes: `SENDER\_ID` (FK), `RECEIVER\_ID` (FK), `COMMUNICATION\_TIME`, `COMMUNICATION\_TYPE`

- Analysis: `COMMUNICATION\_TIME` and `COMMUNICATION\_TYPE` depend on the composite key (`SENDER\_ID`, `RECEIVER\_ID`, `COMMUNICATION\_TIME`).

- Conclusion: In 3NF.

9. \*\*PROJECT\*\*

- Attributes: `PROJECT\_ID` (PK), `DIRECTION\_OF\_RESEARCH`, `PROJECT\_NAME`

- Analysis: Both `DIRECTION\_OF\_RESEARCH` and `PROJECT\_NAME` are dependent only on `PROJECT\_ID`.

- Conclusion: In 3NF.

10. \*\*REPORT\*\*

- Attributes: `REPORT\_ID` (PK), `TOPIC`, `REPORT\_NAME`

- Analysis: `TOPIC` and `REPORT\_NAME` depend solely on `REPORT\_ID`.

- Conclusion: In 3NF.

11. \*\*MAKES\*\*

- Attributes: `WORKER\_ID` (FK), `PROJECT\_ID` (FK), `REPORT\_ID` (FK)

- Analysis: This table is a linking table with a composite primary key. There are no non-key attributes.

- Conclusion: In 3NF.

Each table in your database schema has been analyzed based on the rules of normalization up to the third normal form. All tables conform to 3NF criteria, as there are no transitive dependencies and every non-key attribute is functionally dependent solely on the primary key (or composite primary key in some cases).