

# README – HW1: ER Diagram Construction Using LLMs

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## Overview

This homework demonstrates the use of multiple locally run LLMs (via **Ollama**, **LiteLLM**, and **Streamlit**) to generate an **Entity-Relationship (ER) diagram** for the operations of a small college. Two models were used: **Llama3** and **Gemma2:2b**, and their outputs were compared side by side.

The final ER diagram was selected based on **completeness, clarity, and alignment** with the assignment requirements. Please note that I have joined Database and Systems course on 12<sup>th</sup> September 2025, so i was not aware of the assignment parameters as I have not attended the first 4 lectures.

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## Design Decisions

### 1. Academic Core (Base 9 Entities)

The foundation of the database follows the provided diagram, which focuses on academics:

- **Student**
- **Professor**
- **Department**
- **Course**
- **Classroom**
- **Room**
- **Building**
- **School**
- **Enroll**

These capture the **core teaching and learning processes** of a college.

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## 2. Additional Entities (6 New Areas)

To extend beyond academics, six additional entities were introduced:

1. **Residential College (Housing)** – Tracks where students live, including move-in and move-out dates.
2. **Doheny Library (Library System)** – Represents library operations, with student access logs and special collections.
3. **Trojan Athletics** – Captures student involvement in sports, roles, and seasons.
4. **Campus Events** – Includes events such as lectures, fairs, and performances, with event details and attendance.
5. **Greek Life** – Represents fraternities and sororities, with student memberships and join dates.
6. **Trojan Services (Campus Services)** – Covers student-facing services (e.g., dining, health, counseling) with usage logs.

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## 3. Relationships

All new entities are connected through **student-centered relationships**:

- **Housing\_Assignment** → Students live in Residential Colleges.
- **Library\_Access** → Students access library resources.
- **Participates** → Students participate in athletics.
- **Attends** → Students attend campus events.
- **Membership** → Students join Greek organizations.
- **Service\_Usage** → Students use campus services.

This ensures that the **student remains the central entity** of the database.

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## 4. Attributes and Keys

- Each entity defines a **primary key** (e.g., `STU_NUM` for Student, `CRS_CODE` for Course).
- **Foreign keys** enforce referential integrity (e.g., `STU_NUM` in `ENROLL`, `DEPT_CODE` in `COURSE`).
- Attributes were chosen to reflect **realistic operations** (emails, hours, capacities, roles, etc.).

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## 5. Rationale

The final ER diagram combines both **academic operations** and **campus life activities**. This provides a **holistic view** of how a college functions, going beyond classrooms to include **housing, events, athletics, and organizations**.

The **Llama3 output** was selected as the final ER diagram because it was:

- More detailed
- Included attributes and PK/FKs
- Better structured in **Mermaid syntax** compared to the Gemma2 output