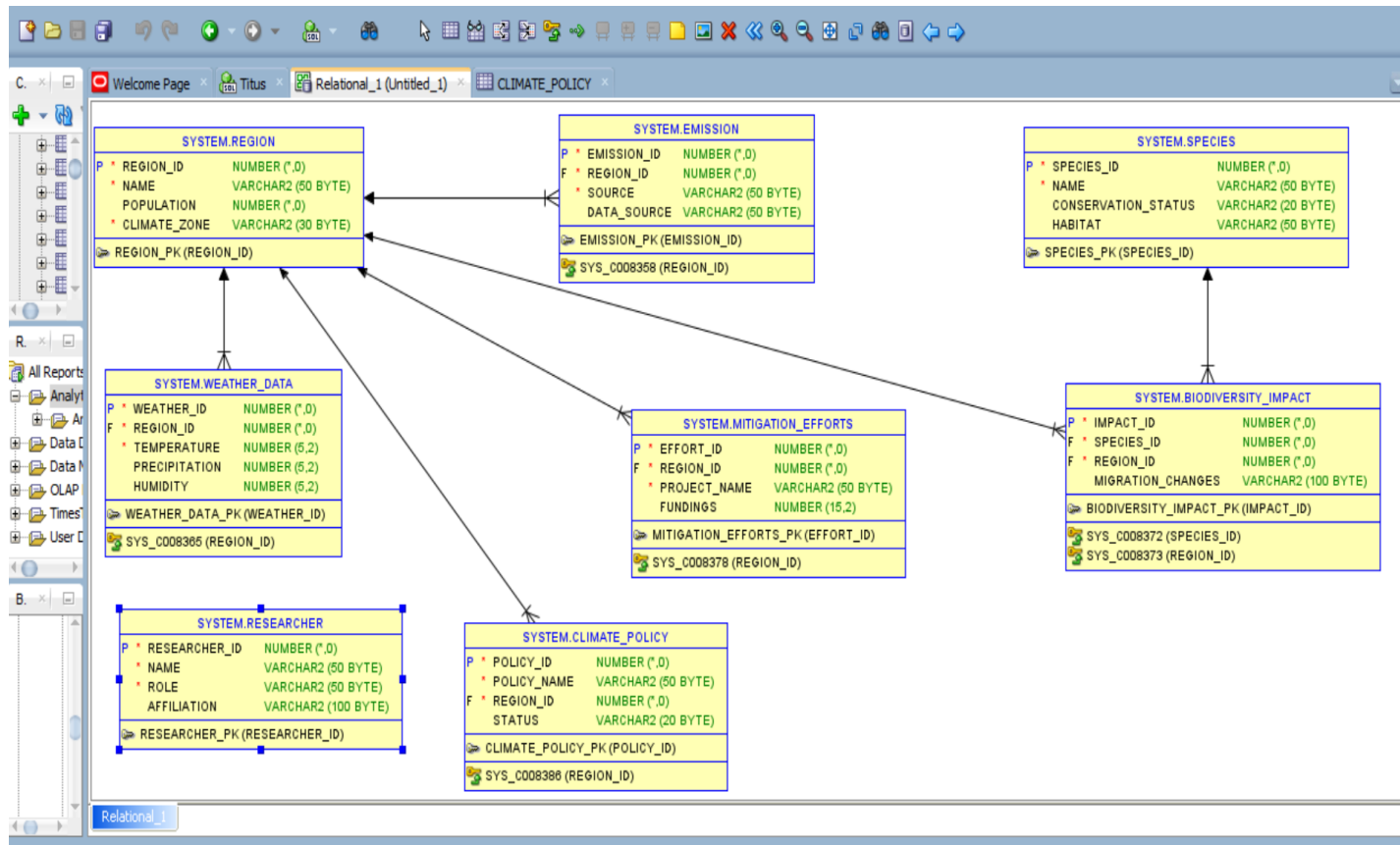# Logical Data Model

> ## Entities and Attributes with Keys and Constraints

1. Emission

- ❖ **Emission_id (Primary Key):** Unique identifier for each emission record.
- ❖ **Region_id (Foreign Key):** Links to the Region table.
- ❖ **Source:** Type of emission source (e.g., transportation, industry).
- ❖ **Data_source:** Source of the data (e.g., satellite, ground measurement).
- ❖ **Constraints:** NOT NULL on Emission_id and Region_id.

2. Weather_Data

- ❖ **Weather_id (Primary Key):** Unique identifier for each weather record.
- ❖ **Region_id (Foreign Key):** Links to the Region table.

- ❖ **Temperature:** Recorded temperature in the region.
- ❖ **Precipitation:** Recorded precipitation.
- ❖ **Humidity:** Percentage humidity if required.
- ❖ **Constraints:** NOT NULL on Weather_id and Region_id.

3. Region

- ❖ **Region_id (Primary Key):** Unique identifier for each region.
- ❖ **Name:** Name of the region.
- ❖ **Population:** Population data for each region.
- ❖ **Climate_zone:** Climate zone classification (e.g., tropical, arid).
- ❖ **Constraints:** NOT NULL on Region_id.

4. Biodiversity_Impact

- ❖ **Impact_id (Primary Key):** Unique identifier for each impact record.
- ❖ **Species_id (Foreign Key):** Links to the Species table.
- ❖ **Region_id (Foreign Key):** Links to the Region table.
- ❖ **Migration_changes:** Observed changes in migration patterns.
- ❖ **Constraints:** NOT NULL on Impact_id, Species_id, and Region_id.

5. Mitigation_Efforts

- ❖ **Effort_id (Primary Key):** Unique identifier for each effort.
- ❖ **Region_id (Foreign Key):** Links to the Region table.
- ❖ **Project_name:** Name of the mitigation project.
- ❖ **Fundings:** Funding allocated for each project.
- ❖ **Constraints:** NOT NULL on Effort_id and Region_id.

6. Researcher

- ❖ **Researcher_id (Primary Key):** Unique identifier for each researcher.
- ❖ **Name:** Name of the researcher.
- ❖ **Role:** Role in the project (e.g., data analyst, climate scientist).
- ❖ **Affiliation:** Organization or institution the researcher belongs to.

❖ **Constraints:** NOT NULL on Researcher_id.

7. Species

❖ **Species_id (Primary Key):** Unique identifier for each species.
❖ **Name:** Name of the species.
❖ **Conservation_status:** Conservation status (e.g., endangered, vulnerable).
❖ **Habitat:** Natural habitat of the species.
❖ **Constraints:** NOT NULL on Species_id.

8. Climate_Policy

❖ **Policy_id (Primary Key):** Unique identifier for each policy.
❖ **Policy_name:** Name of the climate policy.
❖ **Region_id (Foreign Key):** Links to the Region table.
❖ **Status:** Current status of the policy (e.g., active, under review).
❖ **Constraints:** NOT NULL on Policy_id and Region_id.

➢ **Relationships**

❖ Region has a one-to-many relationship with Weather_Data (one region can have multiple weather records).
❖ Region has a one-to-many relationship with Emission (one region can have multiple emissions records).
❖ Biodiversity_Impact has a many-to-many relationship with Species (captured through foreign keys), as each impact can affect multiple species, and each species can experience multiple impacts.
❖ Mitigation_Efforts and Climate_Policy have one-to-many relationships with Region (one region can have multiple efforts and policies).

➢ **Constraints and Considerations**

❖ **Primary Keys:** All entities have unique identifiers as primary keys.

❖ **Foreign Keys:** Many-to-many relationships are represented by foreign keys linking the entities (e.g., Region and Species).
❖ **Data Integrity Constraints:** Ensure NOT NULL constraints on essential attributes to maintain data integrity.