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CS 1103 – Project Proposal

**Final Proposal: Celestial Exoplanetary System Database**

**Project Overview**

The Celestial Exoplanetary System database is designed to store and manage data on stars and their exoplanets. It consists of a JavaFX front-end and a Java back-end using JDBC for database operations. The project includes a report detailing database design and implementation. This catalogue of stars, exoplanets and galaxies is inspired from sciemtific databases. It provides insight into how crucial DBMS is in astronomical research.

Database Schema

Tables:

1. Stars (Stores star data)

id (Primary Key)

name (VARCHAR)

type (VARCHAR)

distance in\_light\_years (FLOAT)

constellation (VARCHAR)

2. Exoplanets (Stores exoplanet data with foreign key reference to Stars)

id (Primary Key)

star\_id (Foreign Key → Stars.id)

name (VARCHAR)

type (VARCHAR)

mass (FLOAT)

mass\_unit (VARCHAR) (ME = Earth masses, MJ = Jupiter masses)

distance\_AU (FLOAT) (AU stands for Astronomical Units)

orbital\_period\_days (FLOAT)

**3 Galaxies (Stores galaxy data, containing planetary systems)**

id (Primary Key, Auto-Increment)

name (VARCHAR(100), Unique, Name of the galaxy)

num\_planetary\_systems (INT, Number of planetary systems found in the galaxy)

SQL Implementation

**Snippet of Database Creation (DDL Statements):**

CREATE TABLE Stars (

    id SERIAL PRIMARY KEY,

    name VARCHAR(100) NOT NULL,

    type VARCHAR(50) NOT NULL,

    distance\_light\_years FLOAT NOT NULL,

    constellation VARCHAR(50) NOT NULL

);

**Snippet of Data Insertion (DML Statements):**

Stars Table Entries

INSERT INTO Stars (name, type, distance\_light\_years, constellation) VALUES

('Gliese 876', 'Red Dwarf', 15.2, 'Aquarius'),

('HD 82943', 'G-type', 90.3, 'Hydra'),

('XO-2', 'K-type', 1300, 'Pegasus'),

('CoRoT-7', 'K-type', 480, 'Monoceros'),

('HAT-P-13', 'G-type', 1300, 'Lynx'),

('HD 69830', 'K-type', 41, 'Puppis'), ...

**Snippet of output:**

**1 Check All Stars**

SELECT \* FROM Stars;

**Expected Output (Example, first 5 rows):**

| **id** | **name** | **type** | **distance\_light\_years** | **constellation** |
| --- | --- | --- | --- | --- |
| 1 | Gliese 876 | Red Dwarf | 15.2 | Aquarius |
| 2 | HD 82943 | G-type | 90.3 | Hydra |
| 3 | XO-2 | K-type | 1300 | Pegasus |
| 4 | CoRoT-7 | K-type | 480 | Monoceros |
| 5 | HAT-P-13 | G-type | 1300 | Lynx |

**2 Check All Exoplanets**

SELECT \* FROM Exoplanets;

**Expected Output (Example, first 5 rows): (Earth Masses(ME), Jupiter Masses(MJ))**

| **id** | **star\_id** | **name** | **type** | **mass** | **mass\_unit** | **distance\_AU** | **orbital\_period\_days** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | Gliese 876 b | Gas Giant | 0.76 | MJ | 0.21 | 61.1 |
| 2 | 1 | Gliese 876 c | Gas Giant | 0.56 | MJ | 0.13 | 30.1 |
| 3 | 1 | Gliese 876 d | Super-Earth | 6.9 | ME | 0.02 | 1.9 |
| 4 | 2 | HD 82943 b | Gas Giant | 1.68 | MJ | 1.18 | 441.5 |
| 5 | 3 | XO-2 b | Gas Giant | 0.57 | MJ | 0.04 | 3.6 |

**3 Check All Galaxies**

SELECT \* FROM Galaxies;

**Expected Output:**

| **id** | **name** | **num\_planetary\_systems** |
| --- | --- | --- |
| 1 | Milky Way | 4000 |
| 2 | Andromeda | 5000 |
| 3 | Triangulum | 3000 |

Front-End (JavaFX GUI)

The interface will include:

Table Views: Display structured data using TableView components.

Search & Filter Options: Allows users to query specific stars and planets.

Back-End (Java & JDBC)

The Java back end will handle:

1)Database Connectivity: Using JDBC to interact with MySQL.

2)Implements queries for fetching celestial data

GitHub Repository:

https://github.com/Saakshi0506/DatabaseProject