

Astronomy Data Management & Analysis System

Introduction

This project develops a **database-driven application** for managing **astronomical data** (exoplanets, stars, galaxies, asteroids). It helps **astronomers, researchers, and students** access and visualize celestial data. Components utilized:

- **Database (Oracle)** for structured storage
- **Frontend (React)**
- **Data Analysis (Python, Matplotlib, Dash)**

Project Modules & Features

- ◆ **User Module** – Authentication, role-based access (Admin, Researcher, Guest)
- ◆ **Celestial Object Module** – View, add, search objects (stars, planets, galaxies)
- ◆ **Exoplanet Module** – Store host star, mass, orbit, atmosphere details
- ◆ **Spectral Data Module** – Query spectral types (O, B, A, F, G, K, M)
- ◆ **Observation Log Module** – Log telescope observations
- ◆ **Graphical Visualization** – Charts/maps of celestial objects
- ◆ **Data Import & Export** – Import NASA/SDSS/JPL data (CSV, API)
- ◆ **Admin Module** – Manage users, permissions, backups

Database Entities

Entity	Attributes
Users	user_id, name, email, role, password
CelestialObjects	object_id, name, type, discovery_date, distance_ly
Exoplanets	exo_id, name, host_star_id, orbital_period, mass, radius, atmosphere
Stars	star_id, name, spectral_type, temperature, luminosity
Galaxies	galaxy_id, name, type, redshift, mass, distance_ly
Asteroids	asteroid_id, name, diameter, composition, orbit_type
Observation Logs	log_id, user_id, object_id, telescope, date_observed
SpectralData	spectra_id, object_id, spectral_type, wavelength_nm

Technology Stack

Component	Technology
Backend (DBMS)	Oracle 19c
Backend (API)	Flask (Python) or Node.js
Frontend (UI)	React.js, Streamlit
Data Visualization	Matplotlib, Plotly, D3.js
Dev Tools	VS Code, Oracle SQL Developer
OS	Windows/Linux

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