

CPSC 304 Project Cover Page

Milestone #: __2__

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Group Number: __35__

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

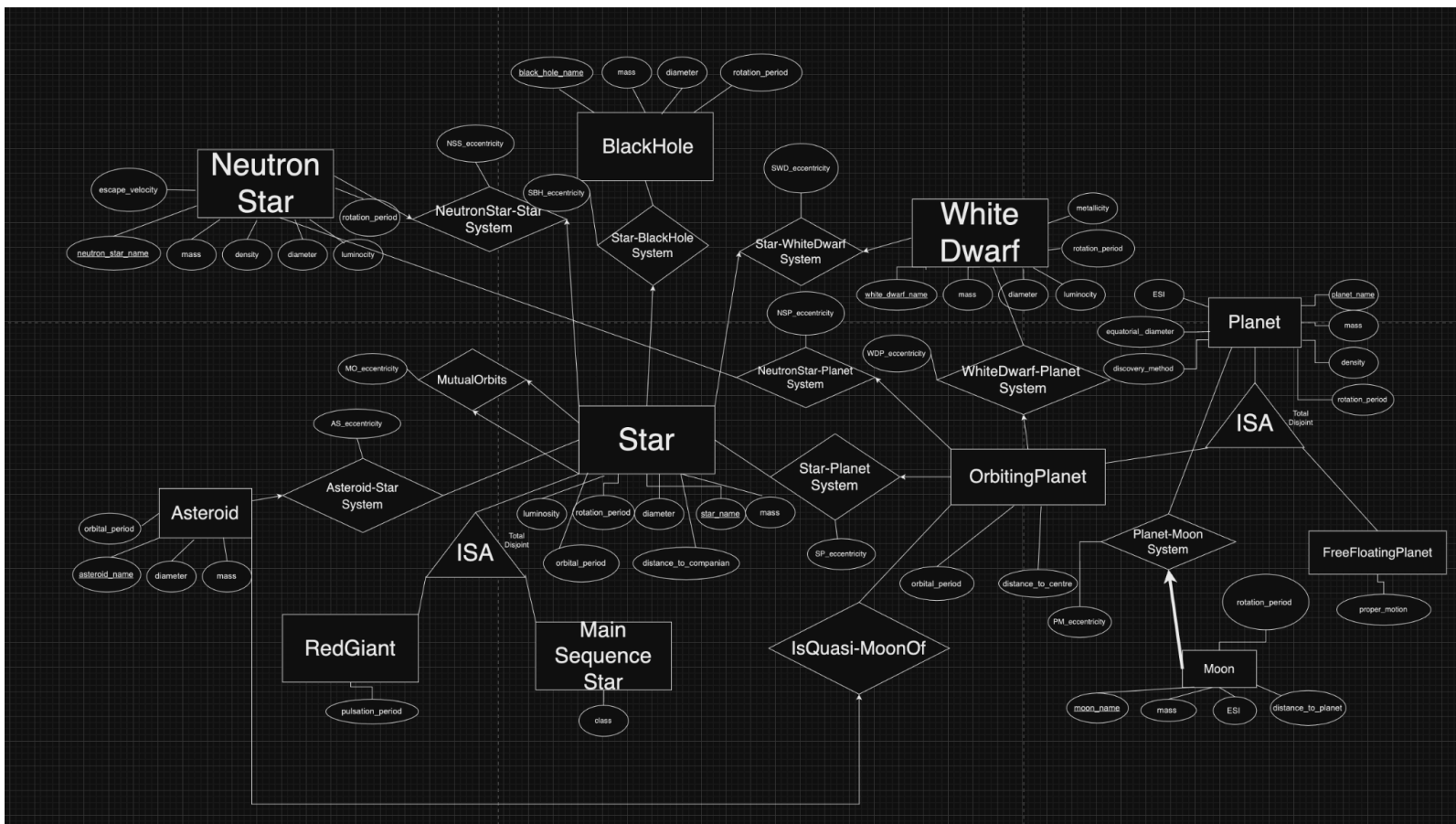
In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

Summary of the Project

Our project focuses on astronomy, tracking data of celestial bodies like stars, planets, and moons, storing parameters such as mass and diameter. It models star and planetary systems with real-world statistics and simple visualizations. This tool can be used by educational institutions to teach about star systems and modern astronomical research methods.

ER Diagram

As per suggestion by Project mentor, most relationships have been **renamed** to ensure no two relations share the same name. One additional relationship “IsQuasi-MoonOf” is added.



Schema Derived from ERD

Planet(ESI: FLOAT, equatorial_diameter: FLOAT, discovery_method: VARCHAR(100), rotation_period: FLOAT, density: FLOAT, mass: FLOAT, planet_name: VARCHAR(100))
PK: planet_name

OrbitingPlanet(planet_name: VARCHAR(100), orbital_period: FLOAT, distance_to_centre: FLOAT, white_dwarf_name: VARCHAR(100), WDP_eccentricity: FLOAT, star_name: VARCHAR(100), SP_eccentricity: FLOAT, neutron_star_name: VARCHAR(100), NSP_eccentricity: FLOAT)
PK: planet_name, FK: planet_name referencing Planet(planet_name), white_dwarf_name referencing WhiteDwarf(white_dwarf_name), star_name referencing Star(star_name), neutron_star_name referencing NeutronStar(neutron_star_name)

FreeFloatingPlanet(planet_name: VARCHAR(100), proper_motion: FLOAT)
PK: planet_name, FK: planet_name referencing Planet(planet_name)

Moon(moon_name: VARCHAR(100), planet_name: VARCHAR(100) NOT NULL, distance_to_planet: FLOAT NOT NULL, ESI: FLOAT, mass: FLOAT, PM_eccentricity: FLOAT, rotation_period: FLOAT)
PK: moon_name, FK: planet_name referencing Planet(planet_name), planet_name can't be null

Star(R1_star_name: VARCHAR(100), R2_star_name: VARCHAR(100) UNIQUE, luminosity: FLOAT, rotation_period: FLOAT, diameter: FLOAT, mass: FLOAT, orbital_eccentricity: FLOAT, orbital_period: FLOAT, distance_to_companion: FLOAT, black_hole_name: VARCHAR(100))
PK: star_name, FK: black_hole_name referencing BlackHole(black_hole_name), R2_star_name referencing Star(star_name), R2_star_name need to be unique

MainSequenceStar(star_name: VARCHAR(100), class: VARCHAR(100))
PK: star_name, FK: star_name referencing Star(star_name)

RedGiant(star_name: VARCHAR(100), pulsation_period: FLOAT)
PK: star_name, FK: star_name referencing Star(star_name)

NeutronStar(neutron_star_name: VARCHAR(100), luminosity: FLOAT, rotation_period: FLOAT, diameter: FLOAT, mass: FLOAT, density: FLOAT, escape_velocity: FLOAT, star_name: VARCHAR(100) UNIQUE)
PK: neutron_star_name, FK: star_name referencing Star(star_name), star_name need to be unique.

Asteroid(asteroid_name: VARCHAR(100), orbital_period: FLOAT, diameter: FLOAT, mass: FLOAT, star_name: VARCHAR(100), AS_eccentricity: FLOAT, planet_name: VARCHAR(100))
PK: asteroid_name, FK: star_name referencing Star(star_name), planet_name referencing OrbitingPlanet(planet_name)

WhiteDwarf(white_dwarf_name: VARCHAR(100), rotation_period: FLOAT, luminosity: FLOAT, mass: FLOAT, diameter: FLOAT, density: FLOAT, metallicity: FLOAT, star_name: VARCHAR(100) UNIQUE)
PK: WDName, FK: companion_star referencing Star(star_name), star_name need to be unique

BlackHole(black_hole_name: VARCHAR(100), mass: FLOAT, diameter: FLOAT, rotation_period: FLOAT)
PK: black_hole_name

Functional Dependencies

Planet: (ESI = EarthSimilarIndex)

planet_name → ESI, discovery_method, equatorial_diameter, rotation_period, density, mass

equatorial_diameter, mass → density

Planet(ESI, ED, DM, RP, D, M, PN)

PN → ESI, DM, ED, RP, D, M

ED, M → D

R1(ED, M, D) R2(ESI, ED, DM, RP, M, PN)

Moon:

moon_name → planet_name, distance_to_planet, ESI, mass, PM_eccentricity, rotation_period,

distance_to_planet

MN → PN, DTP, ESI, M, PME, RP, DTP

OrbitingPlanet:

planet_name → orbital_period, distance_to_centre, white_dwarf_name, WDP_eccentricity, star_name,

SP_eccentricity, neutron_star_name, NSP_eccentricity.

PN → OP, DTC, WDN, WDPE, SN, SPE, NSN, NSPE

FreeFloatingPlanet:

planet_name → proper_motion

PN → PM

Star:

R1-star_name → luminosity, rotation_period, diameter, mass, MO_eccentricity, orbital_period,

distance_to_companion, black_hole_name, SBH_eccentricity, R2-star_name

R1-SN → L, RP, D, M, MOE, OP, DTC, BHN, SBHE, R2-SN

R2-SN → R1-SN

Main_Sequence_Star:

star_name → class

SN → C

RedGiant:

star_name → pulsation_period

SN → PP

NeutronStar:

neutron_star_name → luminosity, rotation_period, diameter, mass, density, escape_velocity, star_name

star_name → neutron_star_name

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mass, diameter → density, escape_velocity

NeutronStar(NSN, L, RP, DI, M, DE, EV, SN)

NSN → L, RP, DI, M, DE, EV, SN

SN → NSN

M, DI → DE, EV

R1(M, DI, DE, EV) R2(NSN, L, RP, DI, M, SN)

Asteroid:

asteroid_name → orbital_period, diameter, mass, star_name, AS_eccentricity, planet_name

AN → OP, D, M, SN, ASE, PN

WhiteDwarf:

white_dwarf_name → rotation_period, luminosity, mass, diameter, density, star_name, metallicity

star_name → white_dwarf_name

WDN → RP, L, M, DI, DE, SN, M

SN → WDN

BlackHole:

black_hole_name → mass, diameter, rotation_period

mass, rotation_period → diameter

BHN → M, D, RP

M, RP → D

R1(M, RP, D) R2(BHN, M, RP)

Normalization

Normalized Tables:

Planet_Densities(equatorial_diameter: FLOAT, mass: FLOAT, density: FLOAT)

PK: (equatorial_diameter, mass)

Planet(planet_name: VARCHAR(100), **equatorial_diameter**: FLOAT, **mass**: FLOAT, ESI: FLOAT, discovery_method: VARCHAR(100), rotation_period: FLOAT)

PK: planet_name, FK: (equatorial_diameter, mass) referencing Planet_Densities(equatorial_diameter, mass)

NeutronStar_Density_EscapeVelocity(mass: FLOAT, diameter: FLOAT, density: FLOAT, escape_velocity: FLOAT)

PK: (mass, diameter)

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NeutronStar(neutron_star_name: VARCHAR(100), luminosity: FLOAT, rotation_period: FLOAT, **mass**: FLOAT, **diameter**: FLOAT, **star_name**: VARCHAR(100)).

PK: neutron_star_name, FK: (mass, diameter) referencing NeutronStar_Density_EscapeVelocity(mass, diameter), star_name referencing Star(star_name)

BlackHole_Diameter(mass: FLOAT, rotation_period: FLOAT, diameter: FLOAT)

PK: (mass, rotation_period)

BlackHole(black_hole_name: VARCHAR(100), **mass**: FLOAT, **rotation_period**: FLOAT)

PK: black_hole_name, FK: (mass, rotation_period) referencing BlackHole_Diameter

Other Tables

Moon(moon_name: VARCHAR(100), **planet_name**: VARCHAR(100) NOT NULL, distance_to_planet: FLOAT NOT NULL, ESI: FLOAT, mass: FLOAT, PM_eccentricity: FLOAT, rotation_period: FLOAT)

PK: moon_name, FK: planet_name referencing Planet(planet_name), planet_name can't be null

OrbitingPlanet(planet_name: VARCHAR(100), orbital_period: FLOAT, distance_to_centre: FLOAT,

white_dwarf_name: VARCHAR(100), WDP_eccentricity: FLOAT, **star_name**: VARCHAR(100),

SP_eccentricity: FLOAT, **neutron_star_name**: VARCHAR(100), NSP_eccentricity: FLOAT)

PK: planet_name, FK: planet_name referencing Planet(planet_name), white_dwarf_name referencing

WhileDwarf(while_dwarf_name), star_name referencing Star(star_name), neutron_star_name referencing

NeutronStar(neutron_star_name)

Star(R1-star_name: VARCHAR(100), **R2-star_name**: VARCHAR(100) UNIQUE, luminosity: FLOAT, rotation_period: FLOAT, diameter: FLOAT, mass: FLOAT, orbital_eccentricity: FLOAT, orbital_period: FLOAT, distance_to_companion: FLOAT, **black_hole_name**: VARCHAR(100))

PK: star_name, FK: black_hole_name referencing BlackHole(black_hole_name), R2-star_name referencing Star(star_name), R2-star_name need to be unique

FreeFloatingPlanet(planet_name: VARCHAR(100), proper_motion: FLOAT)

PK: planet_name, FK: planet_name referencing Planet(planet_name)

MainSequenceStar(star_name: VARCHAR(100), class: VARCHAR(100))

PK: star_name, FK: star_name referencing Star(star_name)

RedGiant(star_name: VARCHAR(100), pulsation_period: FLOAT)

PK: star_name, FK: star_name referencing Star(star_name)

Asteroid(asteroid_name: VARCHAR(100), orbital_period: FLOAT, diameter: FLOAT, mass: FLOAT, **star_name**: VARCHAR(100), AS_eccentricity: FLOAT, **planet_name**: VARCHAR(100))

PK: asteroid_name, FK: star_name referencing Star(star_name), planet_name referencing OrbitingPlanet(planet_name)

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WhiteDwarf(white_dwarf_name: VARCHAR(100), rotation_period: FLOAT, luminosity: FLOAT, mass: FLOAT, diameter: FLOAT, density: FLOAT, metallicity: FLOAT, **star_name**: VARCHAR(100) UNIQUE)
PK: WDName, FK: companion_star referencing Star(star_name), star_name need to be unique

SQL DDL Statements to Create Tables

```
CREATE TABLE Planet_Densities (  
    equatorial_diameter FLOAT,  
    mass FLOAT,  
    density FLOAT,  
    PRIMARY KEY (equatorial_diameter, mass)  
);
```

```
CREATE TABLE Planet (  
    planet_name VARCHAR(100),  
    equatorial_diameter FLOAT,  
    mass FLOAT,  
    ESI FLOAT,  
    discovery_method VARCHAR(100),  
    rotation_period FLOAT,  
    PRIMARY KEY (planet_name),  
    FOREIGN KEY (equatorial_diameter, mass) REFERENCES Planet_Densities(equatorial_diameter,  
mass)  
);
```

```
CREATE TABLE NeutronStar_Density_EscapeVelocity (  
    mass FLOAT,  
    diameter FLOAT,  
    density FLOAT,  
    escape_velocity FLOAT,  
    PRIMARY KEY (mass, diameter)  
);
```

```
CREATE TABLE NeutronStar (  
    neutron_star_name VARCHAR(100) PRIMARY KEY,  
    luminosity FLOAT,  
    rotation_period FLOAT,  
    mass FLOAT,  
    diameter FLOAT,  
    star_name VARCHAR(100),  
    FOREIGN KEY (mass, diameter) REFERENCES NeutronStar_Density_EscapeVelocity(mass,  
diameter),  
    FOREIGN KEY (star_name) REFERENCES Star(star_name)  
);
```

```
CREATE TABLE BlackHole_Diameter (  
    mass FLOAT,  
    rotation_period FLOAT,  
    diameter FLOAT,  
    PRIMARY KEY (mass, rotation_period)
```

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);

```
CREATE TABLE BlackHole (  
    black_hole_name VARCHAR(100) PRIMARY KEY,  
    mass FLOAT,  
    rotation_period FLOAT,  
    FOREIGN KEY (mass, rotation_period) REFERENCES BlackHole_Diameter(mass, rotation_period)  
);
```

```
CREATE TABLE Moon (  
    moon_name VARCHAR(100) PRIMARY KEY,  
    planet_name VARCHAR(100) NOT NULL,  
    distance_to_planet FLOAT NOT NULL,  
    ESI FLOAT,  
    mass FLOAT,  
    PM_eccentricity FLOAT,  
    rotation_period FLOAT,  
    FOREIGN KEY (planet_name) REFERENCES Planet(planet_name)  
);
```

```
CREATE TABLE OrbitingPlanet (  
    planet_name VARCHAR(100) PRIMARY KEY,  
    orbital_period FLOAT,  
    distance_to_centre FLOAT,  
    white_dwarf_name VARCHAR(100),  
    WDP_eccentricity FLOAT,  
    star_name VARCHAR(100),  
    SP_eccentricity FLOAT,  
    neutron_star_name VARCHAR(100),  
    NSP_eccentricity FLOAT,  
    FOREIGN KEY (planet_name) REFERENCES Planet(planet_name),  
    FOREIGN KEY (white_dwarf_name) REFERENCES WhiteDwarf(white_dwarf_name),  
    FOREIGN KEY (star_name) REFERENCES Star(star_name),  
    FOREIGN KEY (neutron_star_name) REFERENCES NeutronStar(neutron_star_name)  
);
```

```
CREATE TABLE Star (  
    star_name VARCHAR(100) PRIMARY KEY,  
    R2_star_name VARCHAR(100) UNIQUE,  
    luminosity FLOAT,  
    rotation_period FLOAT,  
    diameter FLOAT,  
    mass FLOAT,  
    orbital_eccentricity FLOAT,  
    orbital_period FLOAT,  
    distance_to_companion FLOAT,  
    black_hole_name VARCHAR(100),  
    FOREIGN KEY (black_hole_name) REFERENCES BlackHole(black_hole_name),  
    FOREIGN KEY (R2_star_name) REFERENCES Star(star_name)  
);
```

```
CREATE TABLE FreeFloatingPlanet (  
    planet_name VARCHAR(100) PRIMARY KEY,  
    proper_motion FLOAT,
```


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```
FOREIGN KEY (planet_name) REFERENCES Planet(planet_name)
);

CREATE TABLE MainSequenceStar (
    star_name VARCHAR(100) PRIMARY KEY,
    class VARCHAR(100),
    FOREIGN KEY (star_name) REFERENCES Star(star_name)
);

CREATE TABLE RedGiant (
    star_name VARCHAR(100) PRIMARY KEY,
    pulsation_period FLOAT,
    FOREIGN KEY (star_name) REFERENCES Star(star_name)
);

CREATE TABLE Asteroid (
    asteroid_name VARCHAR(100) PRIMARY KEY,
    orbital_period FLOAT,
    diameter FLOAT,
    mass FLOAT,
    star_name VARCHAR(100),
    AS_eccentricity FLOAT,
    planet_name VARCHAR(100),
    FOREIGN KEY (star_name) REFERENCES Star(star_name),
    FOREIGN KEY (planet_name) REFERENCES OrbitingPlanet(planet_name)
);

CREATE TABLE WhiteDwarf (
    white_dwarf_name VARCHAR(100) PRIMARY KEY,
    rotation_period FLOAT,
    luminosity FLOAT,
    mass FLOAT,
    diameter FLOAT,
    density FLOAT,
    metallicity FLOAT,
    star_name VARCHAR(100) UNIQUE,
    FOREIGN KEY (star_name) REFERENCES Star(star_name)
);
```

Insert Statements

```
INSERT INTO Moon VALUES
INSERT INTO Planet_Densities VALUES
(12742, 5.972e24, 5514),
(6792, 6.39e23, 3933),
(142984, 1.898e27, 1326),
(120536, 5.683e26, 687),
(51118, 8.681e25, 1271),
(49528, 1.024e26, 1638),
(2370, 1.3e22, 2100),
(3475, 7.35e22, 3340),
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(4900, 4.8e22, 3010),
(139822, 1.898e27, 1326);

INSERT INTO Planet VALUES

('Earth', 12742, 5.972e24, 0.93, 'Radial Velocity', 24.0),
('Mars', 6792, 6.39e23, 0.64, 'Transit', 24.6),
('Jupiter', 142984, 1.898e27, 0.81, 'Direct Imaging', 9.9),
('Saturn', 120536, 5.683e26, 0.73, 'Microlensing', 10.7),
('Uranus', 51118, 8.681e25, 0.61, 'Transit', 17.2),
('Neptune', 49528, 1.024e26, 0.65, 'Astrometry', 16.1),
('Pluto', 2370, 1.3e22, 0.57, 'Occultation', 153.3),
('Moon', 3475, 7.35e22, 0.91, 'Radar', 27.3),
('Europa', 4900, 4.8e22, 0.9, 'Flyby', 3.55),
('Ganymede', 139822, 1.898e27, 0.92, 'Flyby', 7.15);

INSERT INTO NeutronStar_Density_EscapeVelocity VALUES

(1.4, 20, 4.5e17, 100000),
(2.0, 15, 6.0e17, 150000),
(1.7, 18, 5.0e17, 120000),
(1.9, 16, 5.8e17, 140000),
(1.5, 19, 4.7e17, 110000),
(1.8, 17, 5.6e17, 130000),
(2.2, 14, 6.2e17, 160000),
(1.6, 19, 4.9e17, 115000),
(2.1, 13, 6.1e17, 155000),
(1.3, 21, 4.4e17, 95000);

INSERT INTO NeutronStar VALUES

('Pulsar A', 1.0e27, 0.033, 1.4, 20, 'Alpha Centauri A'),
('Pulsar B', 5.0e26, 0.044, 2.0, 15, 'Alpha Centauri B'),
('Pulsar C', 3.0e27, 0.025, 1.7, 18, 'Betelgeuse'),
('Pulsar D', 2.5e26, 0.048, 1.9, 16, 'Procyon A'),
('Pulsar E', 4.0e27, 0.030, 1.5, 19, 'Sirius A'),
('Pulsar F', 2.8e27, 0.036, 1.8, 17, 'Rigel'),
('Pulsar G', 1.9e27, 0.042, 2.2, 14, 'Vega'),
('Pulsar H', 3.5e27, 0.038, 1.6, 19, 'Altair'),
('Pulsar I', 2.7e27, 0.034, 2.1, 13, 'Polaris'),
('Pulsar J', 1.2e27, 0.040, 1.3, 21, 'Deneb');

INSERT INTO BlackHole_Diameter VALUES

(10.0, 0.5, 60),
(15.0, 0.4, 45),
(12.0, 0.6, 50),
(20.0, 0.3, 40),
(8.0, 0.7, 70),
(25.0, 0.2, 35),
(30.0, 0.8, 65),
(18.0, 0.4, 48),
(22.0, 0.5, 55),
(11.0, 0.6, 52);

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INSERT INTO BlackHole VALUES

('Cygnus X-1', 10.0, 0.5),
('Sagittarius A*', 15.0, 0.4),
('V404 Cygni', 12.0, 0.6),
('M87*', 20.0, 0.3),
('A0620-00', 8.0, 0.7),
('GRO J1655-40', 25.0, 0.2),
('GS 1124-683', 30.0, 0.8),
('GRS 1915+105', 18.0, 0.4),
('LMC X-1', 22.0, 0.5),
('XTE J1118+480', 11.0, 0.6);

INSERT INTO Moon VALUES

('Moon', 'Earth', 384400, 0.56, 7.35e22, 0.0549, 27.3),
('Phobos', 'Mars', 9377, 0.1, 1.08e16, 0.015, 0.32),
('Deimos', 'Mars', 23460, 0.03, 1.48e15, 0.0005, 1.26),
('Io', 'Jupiter', 421800, 0.58, 4.15e22, 0.0041, 1.77),
('Europa', 'Jupiter', 670900, 0.67, 4.80e22, 0.0094, 3.55),
('Ganymede', 'Jupiter', 1070400, 0.62, 1.48e23, 0.0013, 7.15),
('Callisto', 'Jupiter', 1882700, 0.55, 1.08e23, 0.0074, 16.69),
('Titan', 'Saturn', 1221870, 0.62, 1.35e23, 0.028, 15.9),
('Rhea', 'Saturn', 527580, 0.3, 2.31e21, 0.027, 4.5),
('Iapetus', 'Saturn', 3561300, 0.11, 4.0e21, 0.027, 79.3);

INSERT INTO OrbitingPlanet VALUES

('Earth', 365.25, 1.496e11, 'WhiteDwarf1', 0.01, 'Alpha Centauri A', 0.015, NULL, NULL),
('Mars', 687.0, 2.279e11, 'WhiteDwarf2', 0.02, 'Procyon A', 0.014, NULL, NULL),
('Jupiter', 4332.59, 7.783e11, 'WhiteDwarf3', 0.05, 'Sirius A', 0.017, NULL, NULL),
('Saturn', 10759.22, 1.429e12, 'WhiteDwarf4', 0.03, 'Vega', 0.013, NULL, NULL),
('Uranus', 30687.15, 2.871e12, 'WhiteDwarf5', 0.02, 'Altair', 0.016, NULL, NULL),
('Neptune', 60190.03, 4.495e12, 'WhiteDwarf6', 0.01, 'Pollux', 0.014, NULL, NULL),
('Pluto', 90560.0, 5.906e12, 'WhiteDwarf7', 0.05, 'Aldebaran', 0.018, NULL, NULL),
('Eris', 140500.0, 9.657e12, 'WhiteDwarf8', 0.06, 'Canopus', 0.021, NULL, NULL),
('Ceres', 1680.0, 2.77e8, 'WhiteDwarf9', 0.03, 'Capella', 0.017, NULL, NULL),
('Pallas', 1685.0, 2.16e8, 'WhiteDwarf10', 0.02, 'Arcturus', 0.015, NULL, NULL),
('FreePlanetX', 1200.0, 1.0e9, NULL, NULL, 'Deneb', 0.035, 'PulsarA', 0.022);

INSERT INTO Star VALUES

('Alpha Centauri A', 'Alpha Centauri B', 1.519e26, 22, 1.227e9, 2.187e30, 0.0, 79.91, 23.5e6, 'Cygnus X-1'),
('Alpha Centauri B', 'Alpha Centauri A', 1.519e26, 22, 1.227e9, 2.187e30, 0.0, 79.91, 23.5e6, 'Sagittarius A*'),
('Betelgeuse', 'Rigel', 1.26e31, 8.4, 8.6e8, 1.76e31, 0.0, 233.75, 548.7e6, 'V404 Cygni'),
('Sirius A', 'Sirius B', 2.364e27, 5.5, 2.062e9, 3.978e30, 0.0, 365.25, 8.6e6, 'M87*'),
('Procyon A', 'Procyon B', 6.93e26, 23.1, 2.048e9, 3.5e30, 0.0, 365.25, 11.4e6, 'A0620-00'),
('Rigel', 'Betelgeuse', 2.645e30, 10, 7.8e8, 3.978e30, 0.0, 360, 4.7e8, 'GRO J1655-40'),

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```
('Vega', 'Altair', 5.45e27, 12.5, 2.362e9, 2.135e30, 0.0, 200, 7.7e7, 'GS 1124-683'),  
( 'Altair', 'Vega', 1.47e27, 9.9, 1.88e9, 2.135e30, 0.0, 150, 9.3e8, 'GRS 1915+105'),  
( 'Polaris', 'Deneb', 4.2e27, 30, 3.8e9, 4.026e30, 0.0, 400, 3.6e8, 'LMC X-1'),  
( 'Deneb', 'Polaris', 5.1e28, 18, 2.3e9, 5.026e30, 0.0, 365, 1.8e8, 'XTE J1118+480');
```

INSERT INTO FreeFloatingPlanet VALUES

```
('Rogue-1', 0.003),  
( 'Rogue-2', 0.004),  
( 'Rogue-3', 0.0025),  
( 'Rogue-4', 0.0035),  
( 'Rogue-5', 0.0032);  
( 'Rogue-6', 0.0028),  
( 'Rogue-7', 0.0041),  
( 'Rogue-8', 0.0037),  
( 'Rogue-9', 0.0029),  
( 'Rogue-10', 0.0033);
```

INSERT INTO MainSequenceStar VALUES

```
('Sun', 'G2V'),  
( 'Alpha Centauri A', 'G2V'),  
( 'Sirius A', 'A1V'),  
( 'Procyon A', 'F5IV-V'),  
( 'Vega', 'A0V'),  
( 'Altair', 'A7V'),  
( 'Pollux', 'K0III'),  
( 'Aldebaran', 'K5III'),  
( 'Capella', 'G8III'),  
( 'Arcturus', 'K1.5III');
```

INSERT INTO RedGiant VALUES

```
('Betelgeuse', 400),  
( 'Antares', 1730),  
( 'Arcturus', 271),  
( 'Aldebaran', 645),  
( 'Pollux', 590),  
( 'Gamma Cassiopeiae', 350),  
( 'Delta Scorpii', 560),  
( 'Mu Cephei', 850),  
( 'Nu Scorpii', 400),  
( 'Rho Cassiopeiae', 600);
```

INSERT INTO Asteroid VALUES

```
('Ceres', 1680, 946, 9.3835e20, 'Sun', 0.075, 'Earth'),  
( 'Pallas', 1685, 512, 2.04e20, 'Sun', 0.23, 'Mars'),  
( 'Vesta', 1325, 525, 2.59e20, 'Sun', 0.089, 'Jupiter'),  
( 'Hygiea', 2035, 431, 8.67e19, 'Sun', 0.117, 'Saturn'),  
( 'Euphrosyne', 1735, 282, 6.6e19, 'Sun', 0.21, 'Venus'),
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('Juno', 1730, 258, 5.59e19, 'Sun', 0.097, 'Earth'),  
( 'Eros', 1.76, 16.8, 6.69e18, 'Sun', 0.22, 'Mars'),  
( 'Vesta', 0.72, 0.5, 1.04e17, 'Sun', 0.18, 'Jupiter'),  
( 'Psyche', 1500, 226, 4.1e19, 'Sun', 0.11, 'Saturn'),  
( 'Hebe', 5.14, 0.4, 8.2e18, 'Sun', 0.08, 'Venus');
```

INSERT INTO WhiteDwarf VALUES

```
('Sirius B', 1.4, 0.056, 1.02e30, 1.22e4, 2.9e9, 0.001, 'Sirius A'),  
( 'Procyon B', 0.4, 0.0005, 0.6e30, 1.8e4, 8.0e6, 0.002, 'Procyon A'),  
( 'Altair B', 0.9, 0.001, 1.4e30, 1.7e4, 1.3e9, 0.003, 'Altair'),  
( 'Canopus B', 1.0, 0.003, 1.1e30, 1.5e4, 4.2e9, 0.001, 'Canopus'),  
( 'Vega B', 0.7, 0.002, 0.9e30, 1.6e4, 3.1e9, 0.002, 'Vega'),  
( 'Epsilon Eridani B', 0.8, 0.004, 1.0e30, 1.6e4, 2.5e9, 0.003, 'Epsilon Eridani'),  
( 'Alpha Centauri B', 0.6, 0.003, 0.7e30, 1.5e4, 3.0e9, 0.001, 'Alpha Centauri A'),  
( 'Beta Cancrri B', 1.1, 0.002, 1.2e30, 1.4e4, 3.0e9, 0.002, 'Beta Cancrri'),  
( 'Zeta Reticuli B', 0.7, 0.003, 0.8e30, 1.3e4, 2.8e9, 0.002, 'Zeta Reticuli'),  
( 'Tau Ceti B', 1.2, 0.005, 1.3e30, 1.7e4, 3.2e9, 0.003, 'Tau Ceti');
```