University of British Columbia, Vancouver
Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: 4

Date: April 5th, 2024

Group Number: 106

Name	Student Number	CS Alias (Userid)	Preferred E-mail Address
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Rishavpreet Singh	88594635	r1u8j	rishavpreetsingh30@yahoo.com
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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

Repository Link:
https://github.students.cs.ubc.ca/CPSC304-2023W-T2/project_j9y5w_r1u8j_z0o7k

Project Description

Our project is a comprehensive user-friendly database that compiles information about various exoplanets. Our database contains different entities such as stars, galaxies, researchers, space agencies, publications, and space missions; and creates a centralised platform for the purpose of storing and retrieving this data.

We did not make changes to our final schema relative to the one we handed in.

Data After Initialization

Exoplanet_DiscoveredAt

NAME	TYPE	MASS	RADIUS	Discovery Year	Light Years from Earth	Orbital Period	ECCENTRICITY	SPACEAGENCYNAME	Discovery Method
Proxima Centauri b	Terrestrial	1.1	1.17	2016	4.24	11.2	.35	European Space Agency	Radial Velocity
Kepler-452b	Terrestrial	1.5	1.6	2015	1402	384.8	0	National Aeronautics and Space Administration	Transit
HD 209458 b	Gas Giant	1.35	1.35	1999	153	3.52	0	European Space Agency	Transit
TRAPPIST-1e	Terrestrial	.92	.62	2017	39.6	6.1	.08	National Aeronautics and Space Administration	Transit
WASP-1221b	Neptune-like	.001	.18	2015	880	1.27	0	National Aeronautics and Space Administration	Transit

StellarClass

CLASS	TEMPERATURERANGE	COLOUR
O	>30000	Blue
B	10000-30000	Blue-White
A	7500-10000	White
F	6000-7500	White-Yellow
G	5200-6000	Yellow
K	3400-4900	Orange-Red
M	2100-3400	Red

Galaxy

NAME	AGE	SIZE_T	Distance from milky way
Andromeda Galaxy (M31)	10	220000	2.537
Triangulum Galaxy (M33)	13	60000	2.73
Whirlpool Galaxy (M51)	13	60000	23
Sombrero Galaxy (M104)	11	50000	29.3
Pinwheel Galaxy (M101)	13	170000	21
Large Magellanic Cloud (LMC)	13.5	14000	.163
Small Magellanic Cloud (SMC)	13	7000	.2
Messier 87 (M87)	13.5	98000	53.5
Milky Way Galaxy	13.51	105700	0

Star_BelongsTo

NAME	GALAXYNAME	RADIUS	MASS	STELLARCLASSCLASS
Proxima Centauri	Milky Way Galaxy	.141	.123	M
Kepler-452	Milky Way Galaxy	1.11	1.04	G
HD 209458	Milky Way Galaxy	1.203	1.148	G
TRAPPIST-1	Milky Way Galaxy	.1192	.0898	F
WASP-121	Milky Way Galaxy	1.458	1.353	M

SpaceAgency

NAME	ACRONYM	REGION
National Aeronautics and Space Administration	NASA	USA
European Space Agency	ESA	Europe
Canadian Space Agency	CSA	Canada
Indian Space Research Organisation	ISRO	India
Japan Aerospace Exploration Agency	JAXA	Japan
French Space Agency	CNES	France

SpaceProgram

NAME	OBJECTIVE
Kepler	Discover Earth-like planets orbiting other stars.
TESS (Transiting Exoplanet Survey Satellite)	Search for exoplanets in orbit around the brightest dwarfs in the sky.
CHEOPS (CHaracterising ExOPlanet Satellite)	Characterize known exoplanets orbiting bright stars.
James Webb Space Telescope (JWST)	Study exoplanet atmospheres, formation of stars and galaxies, and more.
Hubble Space Telescope	Exoplanet atmosphere studies, among other astronomical observations.
Gaia	Create a precise three-dimensional map of stars in the Milky Way, aiding in the indirect discovery of exoplanets.
PLATO (PLAnetary Transits and Oscillations of stars)	Detect and characterize a large number of exoplanetary systems, with a focus on discovering and characterizing Earth-sized planets and super-Earths.
COROT (Convection, Rotation and planetary Transits)	The first mission dedicated to the search for exoplanets, it aimed to find Earth-sized planets.
ASTROSAT (not directly exoplanet-focused but significant for astrophysical studies)	First dedicated multi-wavelength space observatory by India.
NEOSSat (Near-Earth Object Surveillance Satellite)	Satellite to track asteroids and near-Earth objects from Canada.

Observatory

SPACEPROGRAMNAME	LOCATION
Kepler	USA
TESS (Transiting Exoplanet Survey Satellite)	USA
CHEOPS (CHaracterising ExOPlanet Satellite)	Switzerland
PLATO (PLAnetary Transits and Oscillations of stars)	France
COROT (Convection, Rotation and planetary Transits)	France
ASTROSAT (not directly exoplanet-focused but significant for astrophysical studies)	India

Mission

SPACEPROGRAMNAME	LAUNCHYEAR	STATUS
Kepler	2009	Inactive
TESS (Transiting Exoplanet Survey Satellite)	2018	Active
CHEOPS (CHaracterising ExOPlanet Satellite)	2019	Active
James Webb Space Telescope (JWST)	2021	Active
Hubble Space Telescope	1990	Active
Gaia	2013	Active
PLATO (PLAnetary Transits and Oscillations of stars)	2026	Upcoming
COROT (Convection, Rotation and planetary Transits)	2006	Inactive
ASTROSAT (not directly exoplanet-focused but significant for astrophysical studies)	2015	Active
NEOSSat (Near-Earth Object Surveillance Satellite)	2013	Active

Publication

ID	TITLE	PEERREVIEWED	CITATION
1	Discovery of Proxima Centauri b	1	Smith et al., 2020
2	Characterizing Kepler-452b	1	Johnson & Brown, 2018
3	Atmospheric Characterization of HD 209458 b Using Hubble Space Telescope	1	Garcia et al., 2019
4	TRAPPIST-1e: A Habitable Exoplanet in the TRAPPIST-1 System	1	Chen & Lee, 2021
5	WASP-1221b: A Neptune-like Exoplanet Orbiting a Sun-like Star	1	Wilson & Taylor, 2017
6	Exploring New Horizons in Exoplanet Research	0	Martinez et al., 2019
7	Advancements in Space Telescope Technology	1	Brown & Garcia, 2016
8	Recent Developments in Planetary Atmosphere Studies	0	Jones et al., 2020
9	Innovations in Space Exploration: Challenges and Opportunities	1	Gomez & Wilson, 2018
10	Frontiers in Exoplanet Detection Methods	0	Taylor & Martinez, 2015
11	The Search for Exoplanets: Past, Present, and Future	0	Johnson et al., 2017
12	Methods for Detecting Exoplanets Using Radial Velocity	1	Garcia & Smith, 2018
13	Exoplanet Atmospheres: Observations and Models	1	Brown et al., 2019
14	Characterization of Exoplanetary Systems	0	Wilson & Jones, 2020
15	Exoplanet Habitability: Conditions and Constraints	1	Martinez & Taylor, 2016

ConferenceProceeding

PUBLICATIONID	LOCATION
6	Houston, Texas
7	Cape Town, South Africa
8	Paris, France
9	Tokyo, Japan
10	Sydney, Australia

BookChapter

PUBLICATIONID	BOOKNAME
11	Exoplanet Exploration: A Comprehensive Guide
12	Advances in Exoplanet Research: Techniques and Discoveries
13	Planetary Science: Recent Advances and Future Directions
14	The Encyclopedia of Exoplanets
15	The Handbook of Exoplanetology

ExoplanetDimension

RADIUS	MASS	DENSITY	VOLUME
1.17	1.1	.05465441321	20.12646254
1.6	1.5	.02914214046	51.47185404
1.35	1.35	.04366390757	30.9179841
.62	.92	.307187044	2.994917976
.18	.001	.01364497112	.07328707342

Researcher_WorksAt

ID	NAME	AFFILIATION	EMAILADDRESS	SPACEAGENCYNAME
1	Guillem Anglada-Escud??	University of London	anglada@eso.org	European Space Agency
2	Michael Mayor	University of Geneva	mayor@unige.ch	European Space Agency
3	David Charbonneau	Harvard University	charbonneau@harvard.edu	European Space Agency
4	Timothy M.Brown	University of Colorado	tbrown@lco.global	European Space Agency
5	Michael Gillon	University of Li??ge	m.gillon@uliege.be	National Aeronautics and Space Administration
6	Amaury H.M.J. Triaud	University of Birmingham	a.triaud@nasa.gov	National Aeronautics and Space Administration
7	Don Pollacco	University of Warwick	d.pollacco@warwick.ac.uk	European Space Agency
8	Coel Hellier	Keele University	c.hellier@keele.ac.uk	European Space Agency
9	Charles Bailyn	Yale University	charles@yale.edu	European Space Agency
10	Jon M. Jenkins	NASA Ames Research Center	jon@nasa.gov	National Aeronautics and Space Administration
11	Timothy M. Brown	Las Cumbres Observatory	timothy@lco.global	National Aeronautics and Space Administration
12	Micha??l Gillon	University of Li??ge	michael@uliege.be	National Aeronautics and Space Administration
13	Laura Kreidberg	University of California, Santa Cruz	laura@ucsc.edu	National Aeronautics and Space Administration

InitatedBy

SPACEAGENCYNAME	SPACEPROGRAMNAME
Canadian Space Agency	NEOSSat (Near-Earth Object Surveillance Satellite)
European Space Agency	CHEOPS (CHaracterising ExOPlanet Satellite)
European Space Agency	COROT (Convection, Rotation and planetary Transits)
European Space Agency	Gaia
European Space Agency	PLATO (PLAnetary Transits and Oscillations of stars)
Indian Space Research Organisation	ASTROSAT (not directly exoplanet-focused but significant for astrophysical studies)
National Aeronautics and Space Administration	Hubble Space Telescope
National Aeronautics and Space Administration	James Webb Space Telescope (JWST)
National Aeronautics and Space Administration	Kepler
National Aeronautics and Space Administration	TESS (Transiting Exoplanet Survey Satellite)

WrittenBy

SPACEAGENCYNAME	SPACEPROGRAMNAME
Canadian Space Agency	NEOSSat (Near-Earth Object Surveillance Satellite)
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National Aeronautics and Space Administration	James Webb Space Telescope (JWST)
National Aeronautics and Space Administration	Kepler
National Aeronautics and Space Administration	TESS (Transiting Exoplanet Survey Satellite)

DiscoveredBy

RESEARCHERID	EXOPLANETNAME
1	Proxima Centauri b
2	Proxima Centauri b
3	HD 209458 b
4	HD 209458 b
5	TRAPPIST-1e
6	TRAPPIST-1e
7	WASP-1221b
8	WASP-1221b

Orbits

EXOPLANETNAME	STARNAME
HD 209458 b	HD 209458
Kepler-452b	Kepler-452
Proxima Centauri b	Proxima Centauri
TRAPPIST-1e	TRAPPIST-1
WASP-1221b	WASP-121

WrittenIn

PUBLICATIONID	EXOPLANETNAME
1	Proxima Centauri b
2	Kepler-452b
3	HD 209458 b
4	TRAPPIST-1e
5	WASP-1221b

JournalArticle

PUBLICATIONID	DOI
1	10.1038/nature19106
2	10.1126/science.aad8189
3	10.1088/0004-637X/680/2/1450
4	10.1126/science.aah6511
5	10.1093/mnras/stx1287

Queries (Screenshots)

INSERT Query

Insert Values for Exoplanets

Name: Krypton

Type: Alien

Mass: 2.3

Radius: 6.9

Discovery Year: 2013

Light Years from Earth: 4.5

Orbital Period: 3.2

Eccentricity: 1.2

Space Agency Name: UBC Space Agency

Discovery Method: Spaceship

Insert

Before

Exoplanet_DiscoveredAt

NAME	TYPE	MASS	RADIUS	Discovery Year	Light Years from Earth	Orbital Period	ECCENTRICITY	SPACEAGENCYNAME	Discovery Method
Proxima Centauri b	Terrestrial	1.1	1.17	2016	4.24	11.2	.35	European Space Agency	Radial Velocity
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SpaceAgency

NAME	ACRONYM	REGION
National Aeronautics and Space Administration	NASA	USA
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ExoplanetDimensions

RADIUS	MASS	DENSITY	VOLUME
1.17	1.1	.05465441321	20.12646254
1.6	1.5	.02914214046	51.47185404
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.62	.92	.307187044	2.994917976
.18	.001	.01364497112	.07328707342

After

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WASP-1221b	Neptune-like	.001	.18	2015	880	1.27	0	National Aeronautics and Space Administration	Transit
Krypton	Alien	2.3	6.9	2013	4.5	3.2	1.2	UBC Space Agency	Spaceship

SpaceAgency

NAME	ACRONYM	REGION
National Aeronautics and Space Administration	NASA	USA
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Canadian Space Agency	CSA	Canada
Indian Space Research Organisation	ISRO	India
Japan Aerospace Exploration Agency	JAXA	Japan
French Space Agency	CNES	France
UBC Space Agency		

ExoplanetDimensions

RADIUS	MASS	DENSITY	VOLUME
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.62	.92	.307187044	2.994917976
.18	.001	.01364497112	.07328707342
6.9	2.3		

DELETE Query

Insert Space Agency to delete

Name: French Space Agency

Submit

Before

Exoplanet_DiscoveredAt

NAME	TYPE	MASS	RADIUS	Discovery Year	Light Years from Earth	Orbital Period	ECCENTRICITY	SPACEAGENCYNAME	Discovery Method
Proxima Centauri b	Terrestrial	1.1	1.17	2016	4.24	11.2	.35	European Space Agency	Radial Velocity
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WASP-1221b	Neptune-like	.001	.18	2015	880	1.27	0	National Aeronautics and Space Administration	Transit
Krypton	Alien	2.3	6.9	2013	4.5	3.2	1.2	UBC Space Agency	Spaceship

SpaceAgency

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French Space Agency	CNES	France
UBC Space Agency		

After

Exoplanet_DiscoveredAt

NAME	TYPE	MASS	RADIUS	Discovery Year	Light Years from Earth	Orbital Period	ECCENTRICITY	SPACEAGENCYNAME	Discovery Method
Kepler-452b	Terrestrial	1.5	1.6	2015	1402	384.8	0	National Aeronautics and Space Administration	Transit
TRAPPIST-1e	Terrestrial	.92	.62	2017	39.6	6.1	.08	National Aeronautics and Space Administration	Transit
WASP-1221b	Neptune-like	.001	.18	2015	880	1.27	0	National Aeronautics and Space Administration	Transit
Krypton	Alien	2.3	6.9	2013	4.5	3.2	1.2	UBC Space Agency	Spaceship

SpaceAgency

NAME	ACRONYM	REGION
National Aeronautics and Space Administration	NASA	USA
Canadian Space Agency	CSA	Canada
Indian Space Research Organisation	ISRO	India
Japan Aerospace Exploration Agency	JAXA	Japan
French Space Agency	CNES	France
UBC Space Agency		

SELECT Query

Select from Exoplanet_DiscoveredAt

WHERE: Mass = 1.1

Submit

Before

Exoplanet_DiscoveredAt

NAME	TYPE	MASS	RADIUS	Discovery Year	Light Years from Earth	Orbital Period	ECCENTRICITY	SPACEAGENCYNAME	Discovery Method
Proxima Centauri b	Terrestrial	1.1	1.17	2016	4.24	11.2	.35	European Space Agency	Radial Velocity
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HD 209458 b	Gas Giant	1.35	1.35	1999	153	3.52	0	European Space Agency	Transit
TRAPPIST-1e	Terrestrial	.92	.62	2017	39.6	6.1	.08	National Aeronautics and Space Administration	Transit
WASP-1221b	Neptune-like	.001	.18	2015	880	1.27	0	National Aeronautics and Space Administration	Transit

After

Exoplanet_DiscoveredAt

NAME	TYPE	MASS	RADIUS	Discovery Year	Light Years from Earth	Orbital Period	ECCENTRICITY	SPACEAGENCYNAME	Discovery Method
Proxima Centauri b	Terrestrial	1.1	1.17	2016	4.24	11.2	.35	European Space Agency	Radial Velocity

Success!

UPDATE Query

Update Researcher Information

The values are case sensitive and if you enter in the wrong case, the update statement will not do anything. Leave blank if you want to keep the original value.

ID: 2

Change Name to: Michael Jordan

Change Affiliation to: University of NBA

Change EmailAddress to: mj@gmail.com

Change SpaceAgencyName to: National Aeronautics ar

Update

Before

Researcher_WorksAt

ID	NAME	AFFILIATION	EMAILADDRESS	SPACEAGENCYNAME
1	Guillem Anglada-Escud??	University of London	anglada@eso.org	European Space Agency
2	Michael Mayor	University of Geneva	mayor@unige.ch	European Space Agency
3	David Charbonneau	Harvard University	charbonneau@harvard.edu	European Space Agency
4	Timothy M.Brown	University of Colorado	tbrown@lco.global	European Space Agency
5	Michael Gillon	University of Li??ge	m.gillon@uliege.be	National Aeronautics and Space Administration
6	Amaury H.M.J. Triaud	University of Birmingham	a.triaud@nasa.gov	National Aeronautics and Space Administration
7	Don Pollacco	University of Warwick	d.pollacco@warwick.ac.uk	European Space Agency
8	Coel Hellier	Keele University	c.hellier@keele.ac.uk	European Space Agency
9	Charles Bailyn	Yale University	charles@yale.edu	European Space Agency
10	Jon M. Jenkins	NASA Ames Research Center	jon@nasa.gov	National Aeronautics and Space Administration
11	Timothy M. Brown	Las Cumbres Observatory	timothy@lco.global	National Aeronautics and Space Administration
12	Micha??l Gillon	University of Li??ge	michael@uliege.be	National Aeronautics and Space Administration
13	Laura Kreidberg	University of California, Santa Cruz	laura@ucsc.edu	National Aeronautics and Space Administration

After

Researcher_WorksAt

ID	NAME	AFFILIATION	EMAILADDRESS	SPACEAGENCYNAME
1	Guillem Anglada-Escud??	University of London	anglada@eso.org	European Space Agency
2	Michael Jordan	University of NBA	mj@gmail.com	National Aeronautics and Space Administration
3	David Charbonneau	Harvard University	charbonneau@harvard.edu	European Space Agency
4	Timothy M.Brown	University of Colorado	tbrown@lco.global	European Space Agency
5	Michael Gillon	University of Li??ge	m.gillon@uliege.be	National Aeronautics and Space Administration
6	Amaury H.M.J. Triaud	University of Birmingham	a.triaud@nasa.gov	National Aeronautics and Space Administration
7	Don Pollacco	University of Warwick	d.pollacco@warwick.ac.uk	European Space Agency
8	Coel Hellier	Keele University	c.hellier@keele.ac.uk	European Space Agency
9	Charles Bailyn	Yale University	charles@yale.edu	European Space Agency
10	Jon M. Jenkins	NASA Ames Research Center	jon@nasa.gov	National Aeronautics and Space Administration
11	Timothy M. Brown	Las Cumbres Observatory	timothy@lco.global	National Aeronautics and Space Administration
12	Micha??l Gillon	University of Li??ge	michael@uliege.be	National Aeronautics and Space Administration
13	Laura Kreidberg	University of California, Santa Cruz	laura@ucsc.edu	National Aeronautics and Space Administration

JOIN Query

Join Star_BelongsTo and StellarClass

StellarClass for FILTERING: G

Join

Before

StellarClass

CLASS	TEMPERATURERANGE	COLOUR
O	>30000	Blue
B	10000-30000	Blue-White
A	7500-10000	White
F	6000-7500	White-Yellow
G	5200-6000	Yellow
K	3400-4900	Orange-Red
M	2100-3400	Red

Star_BelongsTo

NAME	GALAXYNAME	RADIUS	MASS	STELLARCLASSCLASS
Proxima Centauri	Milky Way Galaxy	.141	.123	M
Kepler-452	Milky Way Galaxy	1.11	1.04	G
HD 209458	Milky Way Galaxy	1.203	1.148	G
TRAPPIST-1	Milky Way Galaxy	.1192	.0898	F
WASP-121	Milky Way Galaxy	1.458	1.353	M

After
Star_BelongsTo_Join_StellarClass (Based on stellar class ‘G’)

NAME	GALAXYNAME	RADIUS	MASS	STELLARCLASSCLASS	CLASS	TEMPERATURERANGE	COLOUR
Kepler-452	Milky Way Galaxy	1.11	1.04	G	G	5200-6000	Yellow
HD 209458	Milky Way Galaxy	1.203	1.148	G	G	5200-6000	Yellow

AGGREGATION WITH GROUP BY Query

Number of Missions for each Space Program (GROUP BY)

Submit

Results

SPACEPROGRAMNAME	NUMMISSIONS
ASTROSAT (not directly exoplanet-focused but significant for astrophysical studies)	1
CHEOPS (CHaracterising ExOPlanet Satellite)	1
COROT (Convection, Rotation and planetary Transits)	1
Gaia	1
Hubble Space Telescope	1
James Webb Space Telescope (JWST)	1
Kepler	1
NEOSSat (Near-Earth Object Surveillance Satellite)	1
PLATO (PLAnetary Transits and Oscillations of stars)	1
TESS (Transiting Exoplanet Survey Satellite)	1

AGGREGATION WITH HAVING Query

Number of Stellar Classes having more than 2 stars (HAVING)

Submit

Results

CLASS	NUMSTARS
M	2
G	2

PROJECTION Query

Projection Query

TableName: Exoplanet_DiscoveredA

Attributes (comma-separated): Name, SpaceAgencyNa

Project

Before
Exoplanet_DiscoveredAt

NAME	TYPE	MASS	RADIUS	Discovery Year	Light Years from Earth	Orbital Period	ECCENTRICITY	SPACEAGENCYNAME	Discovery Method
Proxima Centauri b	Terrestrial	1.1	1.17	2016	4.24	11.2	.35	European Space Agency	Radial Velocity
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After

Exoplanet_DiscoveredAt

NAME	SPACEAGENCYNAME	Discovery Year
Proxima Centauri b	European Space Agency	2016
Kepler-452b	National Aeronautics and Space Administration	2015
HD 209458 b	European Space Agency	1999
TRAPPIST-1e	National Aeronautics and Space Administration	2017
WASP-1221b	National Aeronautics and Space Administration	2015

DIVISION Query

DIVISION: Find galaxy names of those galaxies that contain all the stars in the dataset

Submit

Results

GALAXYNAME
Milky Way Galaxy