

# CPSC 304 Project Cover Page

Milestone #: 4

Date: 2024-4-3

Group Number: 83

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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

# Project Description

Our project is an application designed for the Aerospace Industry. Our project aims to help manage the creation of missions to outer space and the organization of human and capital resources.

## Repository Link

[https://github.students.cs.ubc.ca/CPSC304-2023W-T2/project\\_e4u2b\\_i6z8h\\_o5f8l](https://github.students.cs.ubc.ca/CPSC304-2023W-T2/project_e4u2b_i6z8h_o5f8l)

## SQL script

'SQL\_Script.sql' is the file that contains the script to create tables, drop tables and insert rows.

## Project changes

1. Added 'ON DELETE CASCADE' in Obtained and Requires tables. Because we need to meet the requirement in Milestone 5 about DELETE operation that 'Implement a cascade-on-delete situation'.
2. Changed table names from singular to plural because in sql it makes it more natural to use plural.
  - a. GROUNDMEMBERS
  - b. SUPPLYDEPOTS
  - c. NUMCONTROLROOMS
  - d. MISSIONCONTROLCENTERS
  - e. LAUNCHSITES
  - f. MODELS
  - g. SHIPS
  - h. PINPOINTS
  - i. MISSIONS
  - j. TASKS
  - k. STATIONS
  - l. CERTIFICATIONS

## Schema and Data

Missions(MissionID, ShipID, Planet, Latitude, Longitude, ControlCenterID, Name, Description, StartDate, EndDate)

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-05	25-May-07	0000000001	Mars	-49	-120	0000000001

0000000002	Lalopo-12	Lorem Ipsum	25-May-07	25-May-08	0000000002	Mars	-30	95	0000000002
0000000003	Lalopo-13	Lorem Ipsum	25-May-08	25-May-09	0000000003	Venus	33	71	0000000003
0000000004	Lalopo-14	Lorem Ipsum	25-May-09	25-May-10	0000000004	Pluto	44	-79	0000000002
0000000005	Lalopo-15	Lorem Ipsum	25-May-11	25-May-12	0000000005	Mercury	46	-74	0000000005

### Facilities(FacilityID, Name, Location)

FacilityID	Name	Location
0000000001	Mira HQ	Detroit
0000000002	Aperture Enrichment Center	Somewhere, Michigan
0000000003	Neumos	925 E Pike St, Seattle
0000000004	Googleplex	1600 Amphitheatre Pkwy, Mountain View
0000000005	Tesla HQ	3500 Deer Creek Rd, Palo Alto
0000000006	Polus	Polus
0000000007	Uber HQ	1515 Third Street in San Francisco
0000000008	Apple Park	1 Apple Park Way, Cupertino
0000000009	The Middle of Nowhere	Kinistino, Saskatchewan
0000000010	Vancouver Public Library	2425 Macdonald St, Vancouver
0000000011	ICICS	2366 Main Mall, Vancouver
0000000012	Hugh Dempster	6245 Agronomy Rd, Vancouver
0000000013	Basement Food Court	5726 University Blvd, Vancouver
0000000014	The Nest	6133 University Blvd, Vancouver
0000000015	My Back Yard	1234 Somewhere Street, Vancouver

### Ships(ShipID, Model, LaunchSiteID, ServiceStartDate)

ShipID	ServiceStartDate	Model	LaunchSiteID
0000000001	18-Mar-05	Victory-II	0000000006
0000000002	25-May-07	Lockmart CM-88B Bison	0000000006
0000000003	20-Sep-02	Aught Three	0000000006
0000000004	15-Jun-18	Skeld	0000000006
0000000005	09-Nov-23	Galactica	0000000006
0000000006	09-Nov-23	Aught Three	0000000006
0000000007	09-Nov-23	Aught Three	0000000006

0000000008	09-Nov-23	Aught Three	0000000006
0000000009	09-Nov-23	Aught Three	0000000006
0000000000	09-Nov-23	Galactica	0000000006
0000000010	09-Nov-23	Galactica	0000000006
0000000020	09-Nov-23	Galactica	0000000006
8495672135	22-Nov-22	Victory-II	0000000006
7269851340	14-Aug-21	Lockmart CM-88B Bison	0000000006
9348752610	05-Jan-23	Aught Three	0000000006
3579124680	27-Apr-20	Skeld	0000000006
6834192075	01-Oct-20	Galactica	0000000006
4951763028	19-Jun-23	Aught Three	0000000006
9276803154	28-Mar-22	Aught Three	0000000006
1658047932	10-Dec-20	Aught Three	0000000006
5938271460	07-Sep-21	Aught Three	0000000006
3791856240	03-Aug-22	Galactica	0000000006
5276349801	30-Oct-21	Galactica	0000000006

#### Personnel(EmployeeID, Salary, Name, YOE)

EmployeeID	Salary	Name	YOE
0000000001	75000	Crew Mate	15-Jun-18
0000000002	150000	Ellen Ripley	25-May-79
0000000003	150000	Jim Raynor	31-Mar-98
0000000004	85000	Malcolm Reynolds	28-Apr-24
0000000005	65000	John Doe	21-Apr-24
0000000006	85000	Neil Armstrong	01-Apr-62
0000000007	45000	Buzz Aldrin	23-May-62
0000000008	250000	Wulff Yularen	10-Jul-23
0000000009	45000	David Hickman	03-Jan-18
0000000010	45000	Joseph Hatfield	27-Nov-21
1888888888	145000	Sarah Kerrigan	01-Dec-79
2888888888	145000	Artanis	05-Nov-45

3888888888	95000	Tychus Findlay	27-Apr-60
4888888888	105000	Nova Terra	15-Jul-56
5888888888	105000	Matt Horner	08-Sep-50
6888888888	55000	Gabriel Tosh	18-Mar-48
7888888888	200000	Arcturus Mengsk	02-Oct-18
8888888888	85000	Tassadar	23-Jun-23
9888888888	65000	Fenix	12-Dec-12

#### CrewMembers(**EmployeeID**, MissionsFlown)

EmployeeID	MissionsFlown
0000000001	0
0000000002	6
0000000003	5
0000000004	6
0000000006	7

#### GroundMembers(**EmployeeID**, FacilityID, WorkModel, Clearance)

EmployeeID	WorkModel	FacilityID	Clearance
0000000005	Hybrid	0000000001	1
0000000007	In-Person	0000000001	1
0000000008	Online	0000000002	1
0000000009	In-Person	0000000002	1
0000000010	In-Person	0000000002	2
1888888888	Hybrid	0000000001	1
2888888888	In-Person	0000000001	1
3888888888	Online	0000000002	1
4888888888	In-Person	0000000002	4
5888888888	In-Person	0000000002	6

6888888888	Hybrid	0000000001	2
7888888888	In-Person	0000000001	2
8888888888	Online	0000000002	1
9888888888	In-Person	0000000002	1

### SupplyDepots(**FacilityID**, VolumetricCapacity)

FacilityID	VolumetricCapacity
11	100000
12	100000
13	100000
14	100000
15	10

### NumControlRooms(**NumControlRooms**, MaxStaffCapacity)

NumControlRooms	MaxStaffCapacity
1	100
2	200
3	300
4	400
5	500

### MissionControlCenters(**FacilityID**, NumControlRooms)

FacilityID	NumControlRooms
0000000001	1
0000000002	2
0000000003	3
0000000004	4
0000000005	5

LaunchSites(**FacilityID**, MaximumSupportedClass)

FacilityID	MaximumSupportedClass
0000000006	L-Class
0000000007	M-Class
0000000008	M-Class
0000000009	M-Class
10000000000	S-Class

Models(**Model**, Class)

Model	Class
Victory-II	L-Class
Lockmart CM-88B Bison	M-Class
Aught Three	S-Class
Skeld	L-Class
Galactica	L-Class

PinPoints(**Planet**, **Latitude**, **Longitude**)

Planet	Latitude	Longitude	FirstVisited	LastVisited
Mars	-49	-120	18-Mar-05	18-Mar-05
Mars	-30	95	25-May-07	25-May-07
Venus	33	71	25-May-08	25-May-08
Pluto	44	-79	25-May-09	25-May-09
Mercury	46	-74	25-May-11	25-May-11

AssignedTo(**EmployeeID**, **MissionID**, Role)

EmployeeID	MissionID	Role
0000000009	0000000001	Flight Director
10000000000	0000000001	Spacecraft Communicator
0000000002	0000000001	Flight Engineer
0000000003	0000000001	Commander
0000000001	0000000001	Pilot

0000000001	0000000002	Pilot
0000000001	0000000003	Pilot
0000000001	0000000004	Pilot
0000000001	0000000005	Pilot

#### Tasks(TaskID, **MissionID**, Priority, Description, Status)

TaskID	Priority	Description	Status
0000000001	0000000003	Fix wiring	Uninitialized
0000000002	0000000001	Clear asteroids	Uninitialized
0000000003	0000000001	Mine minerals	Uninitialized
0000000004	0000000001	Collect vespene	Uninitialized
0000000005	0000000001	Twiddle thumbs	Uninitialized

#### Cargo(BarcodeNumber, **DepotID**, **ShipID**, Volume, Weight, Description)

BarcodeNumber	Volume	Weight	Description	DepotID
0000000001	10	2	Components	0000000011
0000000002	2	4	Components	0000000011
0000000003	100	3	Components	0000000011
0000000004	6	3	Components	0000000011
0000000005	3	5	Components	0000000011

#### Stations(**ShipID**, Position, Description)

ShipID	Position	Description
0000000001	Navigation	Determines route and makes course changes
0000000001	Botanical	Runs botanical garden in ship
0000000001	Security	Runs security
0000000001	Flight Control	Flies the ship
0000000001	Research	Conducts research in space
0000000001	Bridge	Read ship vitals

#### Certifications(CertificationID, Description)



CertificationID	Description
0000000001	Flying a ship 101
0000000002	Bachelor of Science
0000000003	Exercising authority in space 101
0000000004	Gardening 101
0000000005	How to find yourself in space 101

**Designated(CrewMemberID, ShipID, Position)**

CrewMemberID	ShipID	Position
0000000001	0000000001	Navigation
0000000002	0000000001	Botanical
0000000003	0000000001	Security
0000000004	0000000001	Flight Control
0000000006	0000000001	Research

**Obtained(CertificationID, CrewMemberID)**

CertificationID	CrewMemberID
0000000003	0000000001
0000000003	0000000003
0000000004	0000000001
0000000004	0000000002
0000000005	0000000001
0000000005	0000000002

**Requires(CertificationID, ShipID, Position)**

CertificationID	ShipID	Position
0000000001	0000000001	Bridge
0000000002	0000000001	Research
0000000003	0000000001	Security
0000000004	0000000001	Botanical
0000000005	0000000001	Flight Control

# Timeline

## Database setup - Fei Long & Jonathan

### Jonathan

- SQL script to create all the tables and data in the database 2024-3-15
- Queries: INSERT Operation
- Queries: DELETE Operation
- Queries: UPDATE Operation 2024-3-22

### Fei

- Configure Oracle Database on department remote server 2024-3-15
- Queries: Selection
- Queries: Projection
- Queries: Join
- Queries: Aggregation with Group By
- Queries: Aggregation with Having
- Queries: Nested Aggregation with Group By
- Queries: Division 2024-3-22

## Backend - Matias

- Create python development environment 2024-3-15
- Setup FastAPI app with uvicorn 2024-3-18
- Agree on schema for backend endpoint calls - Matias and Jonathan 2024-3-20
- Implement GET endpoints 2024-3-23
- Implement POST endpoints 2024-3-26
- Implement PUTS endpoints 2024-3-29

## Frontend (GUI) - Jonathan

- Create React boilerplate 2024-3-15
- Implement GET endpoint calls
- Implement POST endpoint calls
- Implement PUTS endpoints calls
- Use mock data from mock endpoint calls
- Implement React components associated with main table, using mock 2024-3-29
- Connect components to endpoint calls 2024-4-1

# Queries

Please note the screenshots are in the next section.

## **Insert Row (all tables) backend/main.py:138**

Query:

```
INSERT INTO {table}
VALUES ({val1}, {val2});
```

## **Delete Row (Certifications only) backend/main.py:153**

Query:

```
DELETE FROM {table}
WHERE {key1}={id1} and {key2}={id2};
```

## **Update Row (Missions only) backend/main.py:172**

Query:

```
UPDATE {table}
SET {attr1}={val1}, {attr2}={val2};
WHERE {key1}={id1};
```

## **Selection (Mission) backend/main.py:192**

Query:

```
SELECT *
FROM {table}
WHERE {user input};
```

## **Projection (all tables) backend/main.py:207**

Query:

```
SELECT {attr1} {attr2}
FROM {table};
```

## **Join (Mission and AssignedTo) backend/main.py:119**

Query:

```
SELECT *
FROM missions m, assignedTo a, personnel p
WHERE m.MissionID=a.MissionID and a.EmployeeID=p.EmployeeID and
{date1}≤m.startDate and m.endDate≤{date2};
```

### **Aggregation with GROUP BY (Ship count by class)**

**backend/main.py:35**

**Query:**

```
SELECT m.Class, COUNT(*) as shipCount
FROM ships s, models m
WHERE s.Model=m.Model
GROUP BY m.Class
```

### **Aggregation with HAVING (Ship count by class having more than 5)**

**backend/main.py:54**

**Query:**

```
SELECT m.Class, COUNT(*) as shipCount
FROM ships s, models m
WHERE s.Model=m.Model
GROUP BY m.Class
HAVING COUNT(*)>5
```

### **Nested Aggregation with GROUP BY**

**backend/main.py:74**

**Query:**

```
SELECT g.WorkModel, AVG(p.Salary) AS modelAvgSalary
FROM groundMembers g, personnel p
WHERE g.EmployeeID=p.EmployeeID
GROUP BY g.WorkModel
HAVING AVG(p.Salary) > ( SELECT AVG(p1.Salary)
                        FROM groundmembers g, personnel p1
                        where g.employeeid=p1.employeeid )
```

### **Division**

**backend/main.py:96**

**Query:**

```
SELECT p.EmployeeID
FROM Personnel p
WHERE NOT EXISTS (SELECT m.MissionID
                  FROM Missions m
                  MINUS
                  SELECT a.MissionID
                  FROM AssignedTo a
                  WHERE a.EmployeeID = p.EmployeeID);
```

# Screenshots

## Project

Before

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

COOL STATS

Space Agency

Projection

Missions ▾

☒ MissionID

☒ Name

☒ Description

☒ StartDate

☒ EndDate

☒ ShipID

☒ Planet

☒ Latitude

☒ Longitude

☒ ControlCenterID

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005

During (selecting different columns)

## Space Agency

### Projection

Missions ▾

☒ MissionID ☒ Name ☐ Description ☐ StartDate ☐ EndDate ☐ ShipID ☐ Planet ☒ Latitude ☒ Longitude  
☒ ControlCenterID

MissionID	Name	Latitude	Longitude	ControlCenterID
0000000001	Lalopo-11	-49	-120	0000000001
0000000002	Lalopo-12	-30	95	0000000002
0000000003	Lalopo-13	33	71	0000000003
0000000004	Lalopo-14	44	-79	0000000002
0000000005	Lalopo-15	46	-74	0000000005

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION

ASSIGNMENTS

COOL STATS

After

## Space Agency

### Projection

Missions ▾

☒ MissionID ☒ Name ☐ Description ☐ StartDate ☐ EndDate ☐ ShipID ☐ Planet ☒ Latitude ☒ Longitude  
☐ ControlCenterID

MissionID	Name	Latitude	Longitude
0000000001	Lalopo-11	-49	-120
0000000002	Lalopo-12	-30	95
0000000003	Lalopo-13	33	71
0000000004	Lalopo-14	44	-79
0000000005	Lalopo-15	46	-74

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION

ASSIGNMENTS

COOL STATS

# Insert

Before

## Space Agency

Insert

Missions ▾

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

MissionID

Name

Description

StartDate

EndDate

ShipID

Planet

Latitude

Longitude

ControlCenterID

INSERT

During

# Space Agency

Insert

Missions ▾

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

MissionID  
0000000006

Name

Go Somewhere

Description

fly somewhere and do stuff

StartDate

4-Apr-2024

EndDate

25-Dec-2024

ShipID

0000000006

Planet

Mars

Latitude

-30

Longitude

95

ControlCenterID

0000000001

INSERT



After

# Space Agency

Insert

Missions ▾

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenter
0000000006	Go Somewhere	fly somewhere and do stuff	4-Apr-2024	25-Dec-2024	0000000006	Mars	-30	95	0000000001
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

MissionID

Name

Description

StartDate

EndDate

ShipID

Planet

Latitude

Longitude

## Delete Row (Certifications only)

Before

### Space Agency

#### Delete Certification Certifications

CertificationID	Description	
0000000001	Flying a ship 101	DELETE
0000000002	Bachelor of Science	DELETE
0000000003	Exercising authority in space 101	DELETE
0000000004	Gardening 101	DELETE
0000000005	How to find yourself in space 101	DELETE

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION  
ASSIGNMENTS

COOL STATS

#### Obtained

CertificationID	CrewMemberID
0000000003	0000000001
0000000003	0000000003
0000000004	0000000001
0000000004	0000000002
0000000005	0000000001
0000000005	0000000002

#### Requires

CertificationID	ShipID	Position
0000000001	0000000001	Bridge
0000000002	0000000001	Research

During

# Space Agency

## Delete Certification

Certifications

CertificationID	Description	
0000000001	Flying a ship 101	DELETE
0000000002	Bachelor of Science	DELETE
0000000003	Exercising authority in space 101	DELETE
0000000004	Gardening 101	DELETE
0000000005	How to find yourself in space 101	DELETE

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION
- ASSIGNMENTS
- COOL STATS

### Obtained

CertificationID	CrewMemberID
0000000003	0000000001
0000000003	0000000003
0000000004	0000000001
0000000004	0000000002
0000000005	0000000001
0000000005	0000000002

### Requires

CertificationID	ShipID	Position
0000000001	0000000001	Bridge
0000000002	0000000001	Research

After

# Space Agency

## Delete Certification

### Certifications

CertificationID	Description	
0000000002	Bachelor of Science	DELETE
0000000003	Exercising authority in space 101	DELETE
0000000004	Gardening 101	DELETE
0000000005	How to find yourself in space 101	DELETE

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION

ASSIGNMENTS

COOL STATS

### Obtained

CertificationID	CrewMemberID
0000000003	0000000001
0000000003	0000000003
0000000004	0000000001
0000000004	0000000002
0000000005	0000000001
0000000005	0000000002

### Requires

CertificationID	ShipID	Position
0000000002	0000000001	Research
0000000003	0000000001	Security
0000000004	0000000001	Botanical
0000000005	0000000001	Flight Control

# Update Row (Missions only)

Before

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION

ASSIGNMENTS

COOL STATS

Space Agency

Update Mission

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID	
0000000006	Go Somewhere	Fly somewhere and do stuff	4-Apr-2024	25-Dec-2024	0000000006	Mars	-30	95	0000000001	EDIT
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001	EDIT
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002	EDIT
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003	EDIT
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002	EDIT
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005	EDIT

During

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION

ASSIGNMENTS

COOL STATS

Space Agency

Update Mission

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID	
0000000006	Go Elsewhere	fly elsewhere and do othr	4-Apr-2066	25-Dec-2077	0000000008	Pluto	44	-79	0000000003	SAVE CANCEL
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001	EDIT
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002	EDIT
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003	EDIT
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002	EDIT
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005	EDIT

After

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION

ASSIGNMENTS

COOL STATS

Space Agency

Update Mission

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID	
0000000006	Go Elsewhere	Fly elsewhere and do other things	4-Apr-2066	25-Dec-2077	0000000008	Pluto	44	-79	0000000003	EDIT
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001	EDIT
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002	EDIT
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003	EDIT
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002	EDIT
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005	EDIT

# Selection (Mission)

Before

## Space Agency

Select Mission

ADD SELECTOR

SELECT

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000006	Go Elsewhere	fly elsewhere and do other things	4-Apr-2066	25-Dec-2077	0000000008	Pluto	44	-79	0000000003
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

During

# Space Agency

## Select Mission

MissionID ▾

= ▾

0000000003

DELETE

OR ▾

MissionID ▾

<> ▾

Lorem Ipsum

DELETE

OR ▾

Planet ▾

= ▾

Mars

DELETE

AND ▾

EndDate ▾

< ▾

1-Jan-2008

DELETE

ADD SELECTOR

SELECT

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000006	Go Elsewhere	fly elsewhere and do other things	4-Apr-2066	25-Dec-2077	0000000008	Pluto	44	-79	0000000003
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000002	Lalopo-12	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003
0000000004	Lalopo-14	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000005	Lalopo-15	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005

After

# Space Agency

## Select Mission

MissionID ▾

= ▾

0000000003

DELETE

OR ▾

Description ▾

<> ▾

Lorem Ipsum

DELETE

OR ▾

Planet ▾

= ▾

Mars

DELETE

AND ▾

EndDate ▾

< ▾

1-Jan-2008

DELETE

ADD SELECTOR

SELECT

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000006	Go Elsewhere	fly elsewhere and do other things	4-Apr-2066	25-Dec-2077	0000000008	Pluto	44	-79	0000000003
0000000001	Lalopo-11	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000003	Lalopo-13	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003



Join (Mission and AssignedTo)

Before

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

COOL STATS

Space Agency

Personnel Mission Assignments By Period

Start

04 Apr 00

End

04 Apr 24

FIND PERSONNEL

EmployeeID	Salary	Name	YOE	Role	MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000001	Crew Mate	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000002	Crew Mate	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000003	Crew Mate	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000004	Crew Mate	Lorem Ipsum	25-May-2009	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000005	Crew Mate	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005
0000000002	150000	Ellen Ripley	25-May-1979	Flight Engineer	0000000001	Ellen Ripley	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000003	150000	Jim Raynor	31-Mar-1998	Commander	0000000001	Jim Raynor	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000009	45000	David Hickman	3-Jan-2018	Flight Director	0000000001	David Hickman	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000010	45000	Joseph Hatfield	27-Nov-2021	Spacecraft Communicator	0000000001	Joseph Hatfield	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001

During

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

COOL STATS

Space Agency

Personnel Mission Assignments By Period

Start

13-Apr-06

End

14-Apr-10

FIND PERSONNEL

April 2010

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EmployeeID	Salary	Name	YOE	Role	MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000001	Crew Mate		25-May-2007	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000002	Crew Mate		25-May-2008	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000003	Crew Mate		25-May-2009	25-May-2009	0000000003	Venus	33	71	0000000003
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000004	Crew Mate		25-May-2010	25-May-2010	0000000004	Pluto	44	-79	0000000002
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000005	Crew Mate	Lorem Ipsum	25-May-2011	25-May-2012	0000000005	Mercury	46	-74	0000000005
0000000002	150000	Ellen Ripley	25-May-1979	Flight Engineer	0000000001	Ellen Ripley	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000003	150000	Jim Raynor	31-Mar-1998	Commander	0000000001	Jim Raynor	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000009	45000	David Hickman	3-Jan-2018	Flight Director	0000000001	David Hickman	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001
0000000010	45000	Joseph Hatfield	27-Nov-2021	Spacecraft Communicator	0000000001	Joseph Hatfield	Lorem Ipsum	18-Mar-2005	25-May-2007	0000000001	Mars	-49	-120	0000000001

After

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

COOL STATS

Space Agency

Personnel Mission Assignments By Period

Start

13-Apr-06

End

14-Apr-10

FIND PERSONNEL

EmployeeID	Salary	Name	YOE	Role	MissionID	Name	Description	StartDate	EndDate	ShipID	Planet	Latitude	Longitude	ControlCenterID
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000002	Crew Mate	Lorem Ipsum	25-May-2007	25-May-2008	0000000002	Mars	-30	95	0000000002
0000000001	75000	Crew Mate	15-Jun-2018	Pilot	0000000003	Crew Mate	Lorem Ipsum	25-May-2008	25-May-2009	0000000003	Venus	33	71	0000000003

## Aggregation with Group By (Ship count by class)

Before

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

### Space Agency

#### Ship Counts by Class

Class	ShipCount
M-Class	2
L-Class	11
S-Class	10

During (query runs on page load, any successful updates to the database are broadcast and triggers the query again, here we insert a ship)

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

COOL STATS

### Space Agency

5938271460	7-Sept-2021	Aught Three	0000000006
3791856240	3-Aug-2022	Galactica	0000000006
5276349801	30-Oct-2021	Galactica	0000000006

ShipID

1234567890

ServiceStartDate

4-Apr-2024

Model

Lockmart CM-88B Bison

LaunchSiteID

0000000006

INSERT

After

Space Agency	
Ship Counts by Class	
PROJECT DATA	
INSERT ROW	
DELETE CERTIFICATION	
UPDATE MISSION	
SELECT MISSION	
PERSONNEL MISSION ASSIGNMENTS	
COOL STATS	
Class	ShipCount
M-Class	3
L-Class	11
S-Class	10

Aggregation with HAVING (Ship count by class having more than 5)

Before

Space Agency	
PROJECT DATA	
INSERT ROW	
DELETE CERTIFICATION	
UPDATE MISSION	
SELECT MISSION	
PERSONNEL MISSION ASSIGNMENTS	
COOL STATS	
S-Class	10
Most Popular Ship Classes	
Classes having more than 5 ships	
Class	ShipCount
L-Class	11
S-Class	10

During (query runs on page load, any successful updates to the database are broadcast and triggers the query again, here we insert a ship)

## Space Agency

PROJECT DATA  
INSERT ROW  
DELETE CERTIFICATION  
UPDATE MISSION  
SELECT MISSION  
PERSONNEL MISSION  
ASSIGNMENTS  
COOL STATS

5938271460	7-Sept-2021	Aught Three	0000000006
3791856240	3-Aug-2022	Galactica	0000000006
5276349801	30-Oct-2021	Galactica	0000000006

ShipID

9999999999

ServiceStartDate

1-Jan-1950

Model

Aught Three

LaunchSiteID

0000000006

INSERT

After

## Space Agency

PROJECT DATA  
INSERT ROW  
DELETE CERTIFICATION  
UPDATE MISSION  
SELECT MISSION  
PERSONNEL MISSION  
ASSIGNMENTS  
COOL STATS

S-Class	11
---------	----

### Most Popular Ship Classes

Classes having more than 5 ships

Class	ShipCount
L-Class	11
S-Class	11

# Nested Aggregation with GROUP BY

Before

PROJECT DATA  
INSERT ROW  
DELETE CERTIFICATION  
UPDATE MISSION  
SELECT MISSION  
PERSONNEL MISSION  
ASSIGNMENTS  
COOL STATS

## Space Agency

### High Earning Work Models

Work model salary averages that earn more than the average of ground member salaries

WorkModel	modelAvgSalary
Online	143333.33333333334

Personnel Working On All Missions

During (query runs on page load, any successful updates to the database are broadcast and triggers the query again, here we insert a personnel and then insert him as a ground member with a massive category winning salary)

## Space Agency

PROJECT DATA  
INSERT ROW  
DELETE CERTIFICATION  
UPDATE MISSION  
SELECT MISSION  
PERSONNEL MISSION  
ASSIGNMENTS  
COOL STATS

7888888888	200000	Arcturus Mengsk	2-Oct-2418
8888888888	85000	Tassadar	23-Jun-2323
9888888888	65000	Fenix	12-Dec-2312

EmployeeID  
1234567890

Salary  
999999999999

Name  
Jeff Bezos

YOE  
4-4-2024

INSERT

## Space Agency

PROJECT DATA  
INSERT ROW  
DELETE CERTIFICATION  
UPDATE MISSION  
SELECT MISSION  
PERSONNEL MISSION  
ASSIGNMENTS  
COOL STATS

7888888888	In-Person	0000000001	2
8888888888	Online	0000000002	1
9888888888	In-Person	0000000002	1

EmployeeID  
1234567890

WorkModel  
In-Person

FacilityID  
0000000002

Clearance  
99

INSERT

After

# Space Agency

- PROJECT DATA
- INSERT ROW
- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

## High Earning Work Models

Work model salary averages that earn more than the average of ground member salaries

WorkModel	modelAvgSalary
In-Person	111111194999.88889

## Personnel Working On All Missions

## Division

Before

- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

In-Person	111111194999.88889
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## Personnel Working On All Missions

EmployeeID
0000000001

During (query runs on page load, any successful updates to the database are broadcast and triggers the query again, here we insert a personnel and assign him to every mission)

## Space Agency

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

COOL STATS

Insert

AssignedTo ▾

EmployeeID	MissionID	Role
1234567890	0000000001	CEO
1234567890	0000000002	CEO
1234567890	0000000003	CEO
1234567890	0000000004	CEO
1234567890	0000000005	CEO
0000000009	0000000001	Flight Director

## Space Agency

PROJECT DATA

INSERT ROW

DELETE CERTIFICATION

UPDATE MISSION

SELECT MISSION

PERSONNEL MISSION ASSIGNMENTS

COOL STATS

0000000001	0000000001	Pilot
0000000001	0000000002	Pilot
0000000001	0000000003	Pilot
0000000001	0000000004	Pilot
0000000001	0000000005	Pilot

EmployeeID

MissionID

1234567890

0000000001

Role

CEO

INSERT



After

- DELETE CERTIFICATION
- UPDATE MISSION
- SELECT MISSION
- PERSONNEL MISSION ASSIGNMENTS
- COOL STATS

In-Person	111111194999.88889
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Personnel Working On All Missions

EmployeeID
0000000001
1234567890