

# CPSC 304 Project Cover Page

Milestone #: 4

Date: Apr 01, 2024

Group Number: 102

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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:

The project revolves around construction management, focusing on the budgeting and financial management aspect of projects. This contains planning, monitoring and controlling of financial resources. The final product allows user to analyze information about their projects as well as alter the information they have about projects

## Description of Schema:

Changes From Milestone 1:

- Changed Invested relation to be many-to-many to better reflect that multiple investors can invest in multiple projects
- Changed ProjectManager PK to include name. ProjectManagers can now manage different project within the same company

## Copy of Schema:

Advertisement(companyName: Varchar(20))

Newspaper(**companyName**: Varchar(20), page#: Integer(2))

Billboard(companyName: Varchar(20), location: Varchar(20), size: Integer(3))

YouTube(**companyName**: Varchar(20), canSkip: Boolean, length: Integer(2))

Markets(**projectID**: Integer(5), **companyName**: Varchar(20), cost: Integer(10))

Investor(name: Varchar(20))

Owner(**name**: Varchar(20), percentageOwned: Integer(3), isMajorityOwner: Boolean)

Institution(**name**: Varchar(20), interestRate: Decimal(4,2), primeRate: Decimal(4,2), location: Varchar(20))

ProjectManager(companyName: Varchar(20), name: Varchar(20), **projectID**: Integer(5))

Project(**projectID**: Integer(2), siteAddress: Varchar(20), budget: Integer(10), deadline: DATE, **city**: Varchar(20), permitNumber: Integer(10), **license#**: Integer(10))

Invested(**projectID**: Integer(5), **name**: Varchar(20), amount: Integer(10))

Municipality(city: Varchar(20))

Developer(license#: Integer(10), name: Varchar(20), phoneNumber: Integer(10))

Hires(**license#**: Integer(10), **companyName**: Varchar(20), cost: Integer(10))

Architect(companyName: Varchar(20), phoneNumber: Integer(10), city: Varchar(20), houseNum: Varchar(5), streetName: Varchar(20), postalCode: Char(6), province: Varchar(20))

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Subcontractor(companyName: Varchar(20), phoneNumber: Integer(10), type: Varchar(20), city: Varchar(20), houseNum: Varchar(5), streetName: Varchar(20), postalCode: Char(6), province: Varchar(20))

WorkedFor(subcontractorName: Varchar(20), generalContractorName: Varchar 20, hoursWorked: Integer(4), cost: Integer(10))

GeneralContractor(companyName: Varchar(20), phoneNumber: Integer(10), city: Varchar(20), houseNum: Varchar(5), streetName: Varchar(20), postalcode: Char(6), province: Varchar(20))

Employs(companyName: Varchar(20), license#: Integer(10), cost: Integer(10))

## Starting Data Screenshots:

Project ▼

PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
1	123 St	900000	22/April/2025	Surrey	12345	789012
2	456 St	34567456	30/May/2029	Vancouver	23456	345678
3	789 St	9003000	14/December/2024	Richmond	34567	123456
4	321 St	7890678	07/March/2026	Delta	45678	234567

Newspaper ▼

COMPANYNAME	PAGENUMBER
Captivate Ads	3
Buzzworthy Studios	5
Click Marketing	1
Ad Blitz Inc	2
Vancouver Marketing	4

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Billboard ▾

COMPANYNAME	BILLBOARDLOCATION	BILLBOARDSIZE
Captivate Ads	Times Square	10
Buzzworthy Studios	Shibuya Crossing	15
Click Marketing	Piccadilly Circus	8
Ad Blitz Inc	Hollywood Walk of Fame	12
Vancouver Marketing	Las Vegas Strip	50

Youtube ▾

COMPANYNAME	CANSKIP	ADLENGTH
Captivate Ads	1	30
Buzzworthy Studios	1	60
Click Marketing	0	150
Ad Blitz Inc	1	45
Vancouver Marketing	0	90

Markets ▾

PROJECT_ID	COMPANYNAME	COST
1	Captivate Ads	100000
2	Buzzworthy Studios	80000
3	Click Marketing	150000
4	Ad Blitz Inc	70000

Advertisement ▾

COMPANYNAME
Ad Blitz Inc
Buzzworthy Studios
Captivate Ads
Click Marketing
Vancouver Marketing

Project Manager ▾

COMPANYNAME	MANAGERNAME	PROJECT_ID
Apex Blueprint	Jane Smith	1
Keystone Construction Solutions	Alex Yu	2
Hammerhead Horizon	Bob Thomas	3
Steadfast Structures	Olivia Jones	4
Bridgeway Builders	Ethan Garcia	5

Invested

PROJECT_ID	INVESTORNAME	AMOUNT
1	John Doe	10000
2	Jane Smith	29504
3	Michael Brown	79036
4	Alice Garcia	65832
5	David Miller	75639
1	Bank of Montreal	368439
2	Royal Bank of Canada	753958
3	Toronto-Dominion Bank	782385
4	Scotiabank	890479
5	CIBC	670238

Hires


LICENSE_NUMBER	COMPANYNAME	COST
789012	Zaha Hadid Architects	2000
345678	Gensler	1500
123456	Arup	2500
234567	Astonish Designs	1800
948379	BIG - Bjarke Ingels Group	3000

Employs 

COMPANYNAME	LICENSE_NUMBER	COST
Turner Construction Company	789012	10000000
Other Construction Company	345678	8000000
Another Construction Company	123456	12000000
One More Construction Company	234567	9000000
Last Construction Company	948379	15000000

Owner 

OWNERNAME	PERCENTAGE_OWNED	IS_MAJORITY_OWNER
John Doe	51	1
Jane Smith	50	0
Michael Brown	15	0
Alice Garcia	10	0
David Miller	4	0

Institution 

INSTITUTIONNAME	INTEREST_RATE	PRIME_RATE	LOCATION
Bank of Montreal	0.05	0.03	Surrey, British Columbia
Royal Bank of Canada	0.06	0.04	Surrey, British Columbia
Toronto-Dominion Bank	0.07	0.05	Surrey, British Columbia
Scotiabank	0.08	0.06	Surrey, British Columbia
CIBC	0.09	0.07	Surrey, British Columbia

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Investor

INVESTORNAME

Alice Garcia

Bank of Montreal

CIBC

David Miller

Jane Smith

John Doe

Michael Brown

Royal Bank of Canada

Scotiabank

Toronto-Dominion Bank

Architect

COMPANYNAME	PHONE_NUMBER	CITY	HOUSE_NUMBER	STREET_NAME	POSTAL_CODE	PROVINCE
Zaha Hadid Architects	6048792857	Surrey	14310	64 Ave	V3W 1Z1	BC
Gensler	7789085432	Surrey	12822	16 Ave	V4A 1N4	BC
Arup	2368956734	Surrey	1681	152 St	V4A 4N3	BC
Astonish Designs	6045873982	Surrey	14752	108A Ave	V3R 1W8	BC
BIG - Bjarke Ingels Group	7783467923	Surrey	1677	128st	V4A 3V2	BC



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Worked For

SUBCONTRACTOR_NAME	GENERAL_CONTRACTOR_NAME	HOURS_WORKED	COST
ABC Electrical Inc.	Turner Construction Company	2000	500000
DEF Plumbing Ltd.	Other Construction Company	1500	300000
GHI Mechanical Inc.	Another Construction Company	2500	600000
JKL Construction Ltd.	One More Construction Company	1800	450000
MNO Finishing Inc.	Last Construction Company	3000	750000

Subcontractor

COMPANYNAME	PHONE_NUMBER	TYPE	CITY	HOUSE_NUMBER	STREET_NAME	POSTAL_CODE	PROVINCE
ABC Electrical Inc.	2223334444	Electrical	Surrey	100	King George Blvd	V3T 2V6	British Columbia
DEF Plumbing Ltd.	3334445555	Plumbing	Burnaby	200	Imperial Street	V5H 1Y9	British Columbia
GHI Mechanical Inc.	4445556666	Mechanical	Richmond	300	Cambie Road	V6X 2G1	British Columbia
JKL Construction Ltd.	5556667777	Construction	Delta	400	Nordel Way	V4G 1L2	British Columbia
MNO Finishing Inc.	6667778888	Finishing	Langley	500	Fraser Highway	V1M 2G6	British Columbia

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General Contractor ▾

COMPANYNAME	PHONE_NUMBER	CITY	HOUSE_NUMBER	STREET_NAME	POSTAL_CODE	PROVINCE
Turner Construction Company	6046784689	Surrey	2654	King George Hwy	V3W 4E3	BC
Other Construction Company	7784597853	Langley	13483	72 Ave	V3W 2N7	BC
Another Construction Company	2368734829	Richmond	10688	No 6 Rd	V6W 1E7	BC
One More Construction Company	6048925930	Richmond	8640	Alexandra Rd	V6X 4K6	BC
Last Construction Company	6048925930	Richmond	7188	Westminister Hwy	V6X 1A1	BC

Municipality ▾

CITY
Delta
Langley
Richmond
Surrey
Vancouver

Developer		
LICENSE_NUMBER	DEVELOPERNAME	PHONE_NUMBER
789012	Quick Construction Company	6045892387
345678	Ace Construction Ltd	7783924829
123456	SeaShore Builders Ltd	2363930498
234567	Pacific Development Ltd	7788903848
948379	Fraser Property Group	6040593968

## List of All SQL Queries Used:

AppService.js Line 104 'SELECT \* FROM ' + tableName

AppService.js Line 124 `SELECT \* FROM \${tableName} t1 INNER JOIN project t2 ON t1.project\_id = t2.project\_id WHERE t2.project\_id = :projectId`,

AppService.js Line 144 `INSERT INTO PROJECT VALUES (:project\_id, :site\_address, :budget, :deadline, :city, :permit\_number, :license\_number)`

AppService.js Line 158 `DELETE FROM PROJECT WHERE project\_id = :project\_id`

AppService.js Line 172 `INSERT INTO DEVELOPER VALUES (:license\_number, :developername, :phone\_number)`

AppService.js Line 186 `DELETE FROM DEVELOPER WHERE license\_number = :license\_number`,

AppService.js Line 200 `INSERT INTO project\_manager VALUES (:companyname, :managername, :project\_id)`

AppService.js Line 214 `DELETE FROM project\_manager WHERE companyname = :companyname AND project\_id = :project\_id`

AppService.js Line 229 `SELECT \* FROM project WHERE \${whereClause}`

AppService.js Line 248 `SELECT \${selectString} FROM \${selectedTable}`

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AppService.js Line 267 `SELECT \${selectString} FROM \${selectedTable}`

AppService.js Line 286 `UPDATE PROJECT SET SITE\_ADDRESS = :site\_address, BUDGET = :budget, DEADLINE = :deadline, CITY = :city,  
PERMIT\_NUMBER = :permit\_number, LICENSE\_NUMBER = :license\_number  
WHERE PROJECT\_ID = :project\_id`,

AppService.js Line 311 `UPDATE developer SET developername = :developername,  
phone\_number = :phone\_number WHERE license\_number = :license\_number`

AppService.js Line 333 'SELECT project\_id, SUM(cost) AS total\_cost FROM markets GROUP BY project\_id'

AppService.js Line 335 'SELECT project\_id, SUM(amount) AS total\_cost FROM invested GROUP BY project\_id'

AppService.js Line 355 `INSERT INTO MARKETS VALUES (:project\_id, :companyname, :cost)`

AppService Line 369 `INSERT INTO INVESTOR VALUES (:investorname)`

AppService Line 385-388 `SELECT project\_id, SUM(cost) AS total\_cost FROM markets GROUP BY project\_id HAVING SUM(cost) > :amount`

AppService Line 406-411 `SELECT pm.managename FROM project\_manager pm JOIN project p ON pm.project\_id = p.project\_id WHERE p.license\_number = :licenseNumber GROUP BY pm.managename HAVING COUNT(DISTINCT p.project\_id) = (SELECT COUNT(\*) FROM project WHERE license\_number = :licenseNumber)`

AppService Line 425-426 `SELECT p1.CITY, MAX(p1.BUDGET) AS MAX\_BUDGET FROM PROJECT p1 GROUP BY p1.CITY HAVING 1 < (SELECT COUNT(\*) FROM PROJECT p2 WHERE p1.CITY=p2.CITY)`

# Screenshot Demonstrations:

*Insert Operation Before:*

Project

PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
1	123 St	900000	22/April/2025	Surrey	12345	789012
2	456 St	34567456	30/May/2029	Vancouver	23456	345678
3	789 St	9003000	14/December/2024	Richmond	34567	123456
4	321 St	7890678	07/March/2026	Delta	45678	234567

*Insert Operation During:*

Insert new data into table:

Select Table: Project

ProjectID:  
10

Site Address:  
1234 144 Ave

Budget:  
999999

Deadline:  
2024 - 04 - 19

City:  
Surrey

Permit Number:  
567765

License Number:  
123456

Insert

Insert Operation After:

Project ▾

PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
10	1234 144 Ave	999999	2024-04-19	Surrey	567765	123456
1	123 St	900000	22/April/2025	Surrey	12345	789012
2	456 St	34567456	30/May/2029	Vancouver	23456	345678
3	789 St	9003000	14/December/2024	Richmond	34567	123456
4	321 St	7890678	07/March/2026	Delta	45678	234567
5	654 St	2345234	28/June/2027	Langley	56789	948379

Delete Operation Before:

Project Manager ▾

COMPANYNAME	MANAGERNAME	PROJECT_ID
Apex Blueprint	Jane Smith	1
Keystone Construction Solutions	Alex Yu	2
Hammerhead Horizon	Bob Thomas	3
Steadfast Structures	Olivia Jones	4
Bridgeway Builders	Ethan Garcia	5

Delete Operation During:

Delete data from table:

Select Table: Project Manager

COMPANYNAME	MANAGERNAME	PROJECT_ID
Apex Blueprint	Jane Smith	1
Keystone Construction Solutions	Alex Yu	2
Hammerhead Horizon	Bob Thomas	3
Steadfast Structures	Olivia Jones	4
Bridgeway Builders	Ethan Garcia	5

Delete

Delete Operation After:

Project Manager

COMPANYNAME	MANAGERNAME	PROJECT_ID
Keystone Construction Solutions	Alex Yu	2
Hammerhead Horizon	Bob Thomas	3
Steadfast Structures	Olivia Jones	4
Bridgeway Builders	Ethan Garcia	5

Update Operation Before:

Developer

LICENSE_NUMBER	DEVELOPERNAME	PHONE_NUMBER
789012	Quick Construction Company	6045892387
345678	Ace Construction Ltd	7783924829
123456	SeaShore Builders Ltd	2363930498
234567	Pacific Development Ltd	7788903848
948379	Fraser Property Group	6040593968

Update Operation During:

Update data in table:

Select Table: Developer

LICENSE_NUMBER	DEVELOPERNAME	PHONE_NUMBER	
789012	<input type="text" value="Fast Construction Company"/>	<input type="text" value="6045892387"/>	<input type="button" value="Update"/>
345678	<input type="text" value="Ace Construction Ltd"/>	<input type="text" value="7783924829"/>	<input type="button" value="Update"/>
123456	<input type="text" value="SeaShore Builders Ltd"/>	<input type="text" value="2363930498"/>	<input type="button" value="Update"/>
234567	<input type="text" value="Pacific Development Ltd"/>	<input type="text" value="7788903848"/>	<input type="button" value="Update"/>
948379	<input type="text" value="Fraser Property Group"/>	<input type="text" value="6040593968"/>	<input type="button" value="Update"/>



Update Operation After:

Developer

▼

LICENSE_NUMBER	DEVELOPERNAME	PHONE_NUMBER
789012	Fast Construction Company	6045892387
345678	Ace Construction Ltd	7783924829
123456	SeaShore Builders Ltd	2363930498
234567	Pacific Development Ltd	7788903848
948379	Fraser Property Group	6040593968

Select Operation Before:

Choose a table to display:

Project

▼

PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
10	1234 144 Ave	999999	2024-04-19	Surrey	567765	123456
1	123 St	900000	22/April/2025	Surrey	12345	789012
2	456 St	34567456	30/May/2029	Vancouver	23456	345678
3	789 St	9003000	14/December/2024	Richmond	34567	123456
4	321 St	7890678	07/March/2026	Delta	45678	234567
5	654 St	2345234	28/June/2027	Langley	56789	948379

Select Operation During:

Search Project table:

ProjectID =

AND/OR: 

Empty

Site Address =

AND/OR: 

Empty

Budget =

AND/OR: 

Empty

Deadline =  

yyyy - mm - dd

AND/OR: 

Empty

City =

AND/OR: 

Empty

Permit Number =

AND/OR: 

Empty

License Number =

Search

Select Operation After:

Search

PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
10	1234 144 Ave	999999	2024-04-19	Surrey	567765	123456
1	123 St	900000	22/April/2025	Surrey	12345	789012

Searched table successfully!

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***Project Operation Before:***

Developer

LICENSE_NUMBER	DEVELOPERNAME	PHONE_NUMBER
789012	Quick Construction Company	6045892387
345678	Ace Construction Ltd	7783924829
123456	SeaShore Builders Ltd	2363930498
234567	Pacific Development Ltd	7788903848
948379	Fraser Property Group	6040593968

***Project Operation During:***

**Select a table to filter columns:**

Select Table:



license\_number



developername



phone\_number

Project Operation After:

LICENSE_NUMBER	DEVELOPERNAME
789012	Quick Construction Company
345678	Ace Construction Ltd
123456	SeaShore Builders Ltd
234567	Pacific Development Ltd
948379	Fraser Property Group

Filtered table successfully!

Join Operation Before:

Markets

PROJECT_ID	COMPANYNAME	COST
1	Click Marketing	100
1	Captivate Ads	100000
2	Buzzworthy Studios	80000
3	Click Marketing	150000
4	Ad Blitz Inc	70000
5	Vancouver Marketing	500000

Join Operation During:

Join With Project:

Select which table to find project data for

Markets

ProjectID:


1

Search

Join Operation After:

PROJECT_ID	COMPANYNAME	COST	PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
1	Click Marketing	100	1	123 St	900000	22/April/2025	Surrey	12345	789012
1	Captivate Ads	100000	1	123 St	900000	22/April/2025	Surrey	12345	789012

Group By Operation Before:


Markets 

PROJECT_ID	COMPANYNAME	COST
1	Click Marketing	100
1	Captivate Ads	100000
2	Buzzworthy Studios	80000
3	Click Marketing	150000
4	Ad Blitz Inc	70000
5	Vancouver Marketing	500000

Group By Operation During:

Find Total Cost In A Project

Select which table to find total cost for 

Select your option 

Group By Operation After:

Select which table to find total cost for Markets

Project ID	Total Cost
1	100100
2	80000
4	70000
5	500000
3	150000

*Nested Aggregation with Group By Operation Before:*

Project	PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
	1	123 St	900000	22/April/2025	Surrey	12345	789012
	2	456 St	34567456	30/May/2029	Vancouver	23456	345678
	3	789 St	9003000	14/December/2024	Richmond	34567	123456
	4	321 St	7890678	07/March/2026	Delta	45678	234567
	5	654 St	2345234	28/June/2027	Langley	56789	948379
	6	123 48ST	1112524	2024-04-02	Delta	15455	948379
	7	123 49ST	488484	2024-04-02	Surrey	45679	234567
	8	123 50ST	5000000	2024-04-02	Langley	45699	234567

*Nested Aggregation with Group By Operation During:*

**Max Budget for Cities:**

Finds the maximum budget of the projects for each city, where the city has at least two projects.

Find Results

*Nested Aggregation with Group By Operation After:*

**Max Budget for Cities:**

**Finds the maximum budget of the projects for each city, where the city has at least two projects.**

Find Results

CITY	MAX_BUDGET
Langley	5000000
Delta	7890678
Surrey	900000

Results found!

*Division Operation Before:*

Project ▼

PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
1	123 St	900000	22/April/2025	Surrey	12345	789012
2	456 St	34567456	30/May/2029	Vancouver	23456	345678
3	789 St	9003000	14/December/2024	Richmond	34567	123456
4	321 St	7890678	07/March/2026	Delta	45678	234567
5	654 St	2345234	28/June/2027	Langley	56789	948379
6	1010 Mountain Rd	150000	2024-04-18	Delta	67890	789012
7	2020 Lake View	120000	2024-05-02	Delta	78901	789012
8	3030 River Rd	200000	2024-04-23	Surrey	89012	112233
9	3032 River Rd	200000	2024-04-23	Surrey	90123	112233
10	2324	12325	2024-04-30	Delta	13513	345678

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Project Manager ▼

COMPANYNAME	MANAGERNAME	PROJECT_ID
Apex Blueprint	Jane Smith	1
Apex Blueprint	Jane Smith	6
Apex Blueprint	Jane Smith	7
Bridgeway Builders	Ethan Garcia	5
Hammerhead Horizon	Bob Thomas	3
Keystone Construction Solutions	Alex Yu	2
Steadfast Structures	John Doe	6
Steadfast Structures	John Doe	8
Steadfast Structures	John Doe	9
Steadfast Structures	Olivia Jones	4

Developer ▼

LICENSE_NUMBER	DEVELOPERNAME	PHONE_NUMBER
789012	Quick Construction Company	6045892387
345678	Ace Construction Ltd	7783924829
123456	SeaShore Builders Ltd	2363930498
234567	Pacific Development Ltd	7788903848
948379	Fraser Property Group	6040593968
112233	Skyline Innovations	6049987654

***Division Operation During:***



## Find Project Managers Involved In Every Project

Select Developer:

Find Project Managers

*Division Operation After:*

## Find Project Managers Involved In Every Project

Select Developer:

Find Project Managers

Manager Name: John Doe

## Find Project Managers Involved In Every Project

Select Developer:

Find Project Managers

Manager Name: Jane Smith


## Find Project Managers Involved In Every Project

Select Developer:

Find Project Managers

No project managers found.

**Having Operation Before**

Markets 

PROJECT_ID	COMPANYNAME	COST
1	Captivate Ads	100000
2	Buzzworthy Studios	80000
3	Click Marketing	150000
4	Ad Blitz Inc	70000
5	Vancouver Marketing	500000

Having Operation During

Find Total Marketing For Projects Greater Than

Amount:

90000



Search

Having Operation After

Project ID	Total Cost
1	100000
5	500000
3	150000