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(<u>companyName</u>: Varchar(20))

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

Billboard(<u>companyName</u>: Varchar(20), location: Varchar(20), size: Integer(3)) YouTube(<u>companyName</u>: Varchar(20), canSkip: Boolean, length: Integer(2)) Markets(<u>projectID</u>: Integer(5), <u>companyName</u>: Varchar(20), cost: Integer(10))

Investor(name: Varchar(20))

Owner(<u>name</u>: Varchar(20), percentageOwned: Integer(3), isMajorityOwner: Boolean)

Institution(<u>name</u>: Varchar(20), interestRate: Decimal(4,2), primeRate: Decimal(4,2), location:

Varchar(20))

ProjectManager(<u>companyName</u>: Varchar(20), <u>name</u>: Varchar(20), <u>**projectID**</u>: 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(<u>city</u>: Varchar(20))

Developer(<u>license#</u>: 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(<u>companyName</u>: Varchar(20), phoneNumber: Integer(10), type: Varchar(20), city: Varchar(20), houseNum: Varchar(5), streetName: Varchar(20), postalCode: Char(6), province: Varchar(20))

 $Worked For (\underline{\textbf{subcontractorName}}: Varchar (20), \underline{\textbf{generalContractorName}}: Varchar \ 20,$

hoursWorked: Integer(4), cost: Integer(10))

GeneralContractor(<u>companyName</u>: 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:

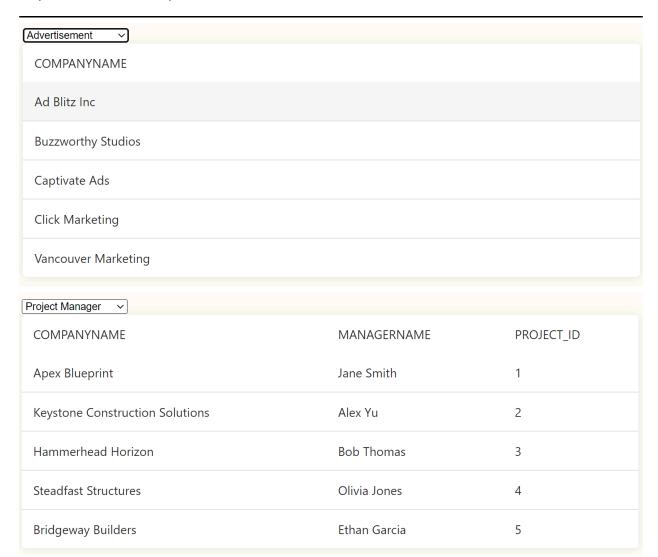
Project	$\overline{\lor}$					
PROJECT_ID	SITE_ADDRESS	BUDGET	DEADLINE	CITY	PERMIT_NUMBER	LICENSE_NUMBER
1	123 St	900000	22/April/2025	Surrey	12345	789012
2	456 St	34567456	30/May/2029	Vancouver	23456	345678
3	789 St	9003000	14/December/2024	Richmond	34567	123456
4	321 St	7890678	07/March/2026	Delta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

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

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 ~		

CANSKIP	ADLENGTH
1	30
1	60
0	150
1	45
0	90
	1 1 0

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



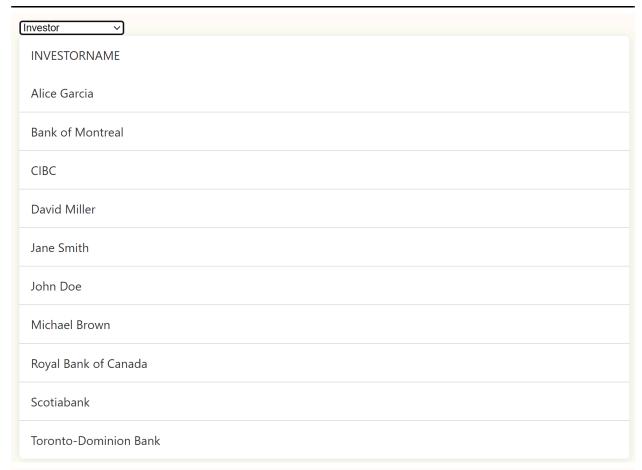
Invested V		
PROJECT_ID	INVESTORNAME	AMOUNT
1	John Doe	10000
2	Jane Smith	29504
3	Michael Brown	79036
4	Alice Garcia	65832
5	David Miller	75639
1	Bank of Montreal	368439
2	Royal Bank of Canada	753958
3	Toronto-Dominion Bank	782385
4	Scotiabank	890479
5	CIBC	670238
(Hires V		
LICENSE_NUMBER	COMPANYNAME	COST
789012	Zaha Hadid Architects	2000
345678	Gensler	1500
123456	Arup	2500
234567	Astonish Designs	1800
948379	BIG - Bjarke Ingels Group	3000

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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

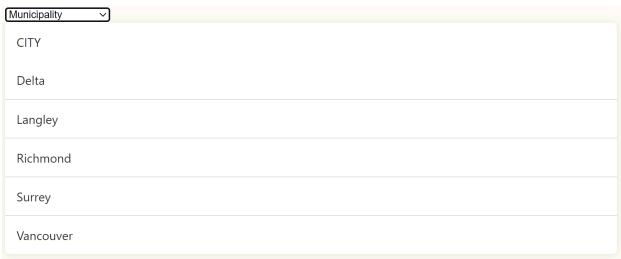
Institution V			
INSTITUTIONNAME	INTEREST_RATE	PRIME_RATE	LOCATION
Bank of Montreal	0.05	0.03	Surrey, British Columbia
Royal Bank of Canada	0.06	0.04	Surrey, British Columbia
Toronto-Dominion Bank	0.07	0.05	Surrey, British Columbia
Scotiabank	0.08	0.06	Surrey, British Columbia
CIBC	0.09	0.07	Surrey,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



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

Worked For	~						
SUBCONTRAC	CTOR_NAME	GENERAL _.	GENERAL_CONTRACTOR_NAME			HOURS_WORKED	
ABC Electrical	Inc.	Turner Co	nstruction	Company	2000		500000
DEF Plumbing	g Ltd.	Other Cor	nstruction (Company	1500		300000
GHI Mechanio	cal Inc.	Another C	Construction	n Company	2500		600000
JKL Construct	ion Ltd.	One More	e Construct	ion Company	1800		450000
MNO Finishin	g Inc.	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	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

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



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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 (:invesotrname)'

AppService Line 385-388 `SELECT project_id, SUM(cost) AS total_cost FROM markets GROUP BY project id HAVING SUM(cost) > :amount`

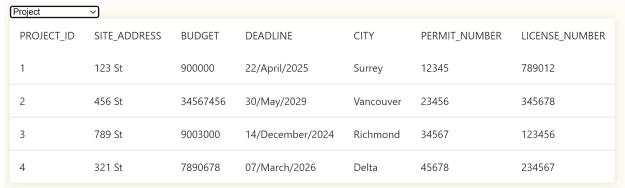
AppService Line 406-411 `SELECT pm.managername FROM project_manager pm JOIN project p ON pm.project_id = p.project_id WHERE p.license_number = :licenseNumber GROUP BY pm.managername HAVING COUNT(DISTINCT p.project_id) = (SELECT COUNT(*) FROM project WHERE license number = :licenseNumber)`

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)`

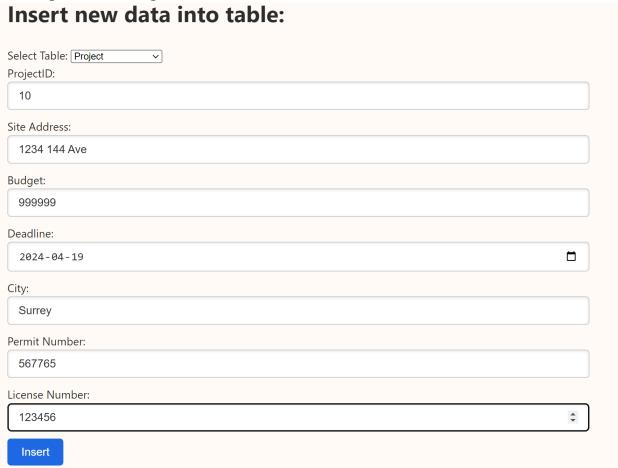
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Screenshot Demonstrations:

Insert Operation Before:



Insert Operation During:



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Insert Operation After:

Project	$\overline{\lor}$					
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:

MANAGERNAME	PROJECT_ID
Jane Smith	1
Alex Yu	2
Bob Thomas	3
Olivia Jones	4
Ethan Garcia	5
	Jane Smith Alex Yu Bob Thomas Olivia Jones

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Delete Operation During:

Delete data from table: Select Table: Project Manager V COMPANYNAME MANAGERNAME PROJECT_ID Apex Blueprint Jane Smith Alex Yu 2 **Keystone Construction Solutions** Hammerhead Horizon **Bob Thomas** 3 Olivia Jones 4 Steadfast Structures Bridgeway Builders Ethan Garcia 5 Delete

Delete Operation After:

Project Manager V		
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

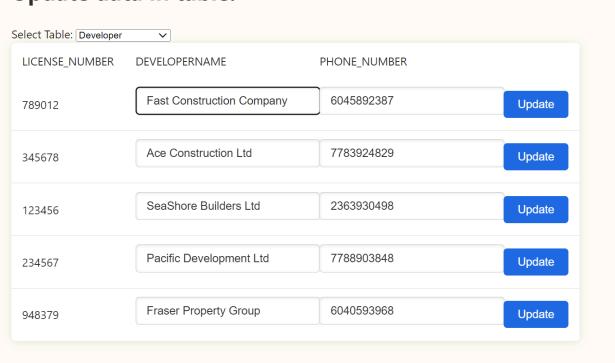
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Update Operation Before:

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:



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Update Operation After:

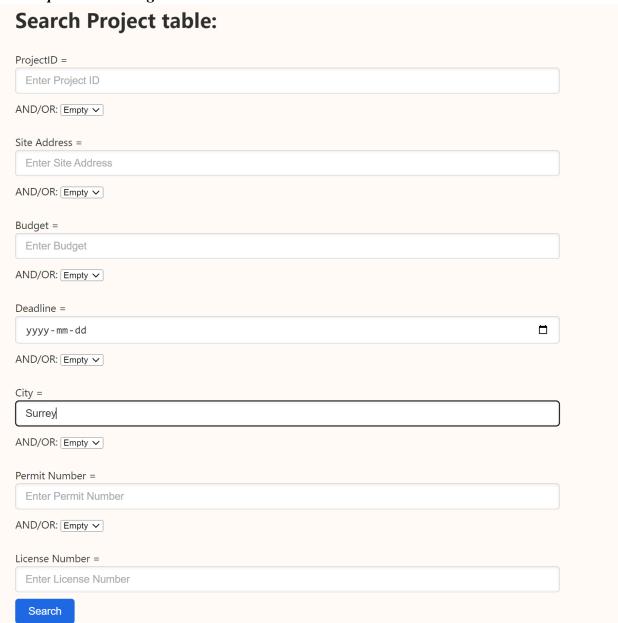
Developer		
LICENSE_NUMBER	DEVELOPERNAME	PHONE_NUMBER
789012	Fast Construction Company	6045892387
345678	Ace Construction Ltd	7783924829
123456	SeaShore Builders Ltd	2363930498
234567	Pacific Development Ltd	7788903848
948379	Fraser Property Group	6040593968

Select Operation Before: Choose a table to display:

Project	\vee					
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

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Select Operation During:



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 s	uccessfully!					

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Project Operation Before:

Developer V		
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:

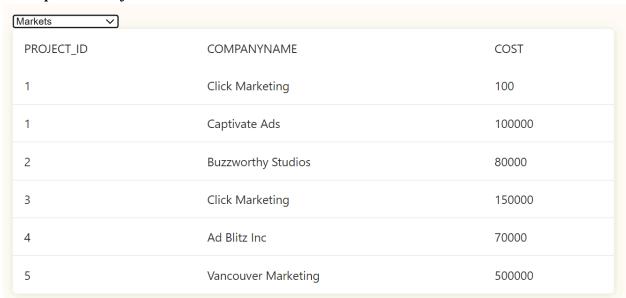
Select a table to litter columns.	
Select Table: Developer	
license_number	
developername	
phone_number	
Submit	

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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:



Join Operation During:

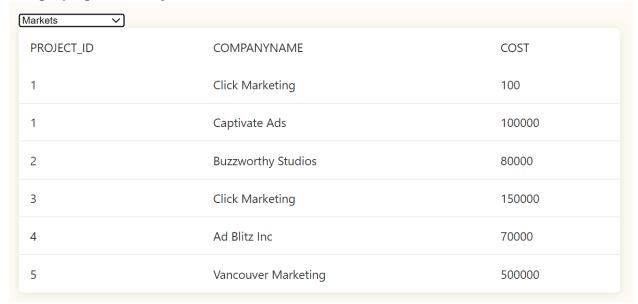
Join With Project: Select which table to find project data for Markets ProjectID: 1 Search

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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:



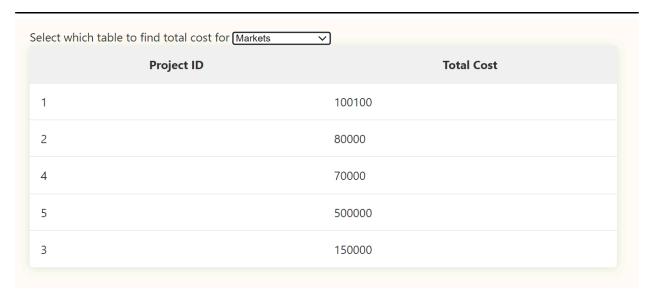
Group By Operation During:

Find Total Cost In A Project

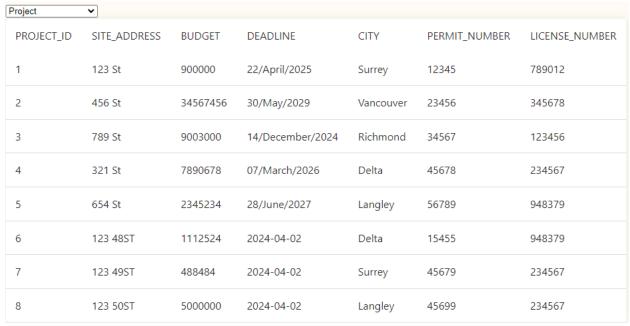
Select which table to find total cost for Select your option >

Group By Operation After:

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Nested Aggregation with Group By Operation Before:



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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ject Manager 💙			
OMPANYNAME		MANAGERNAME	PROJECT_ID
pex Blueprint		Jane Smith	1
pex Blueprint		Jane Smith	6
pex Blueprint		Jane Smith	7
ridgeway Builders		Ethan Garcia	5
Hammerhead Horizon		Bob Thomas	3
eystone Construction Solu	utions	Alex Yu	2
teadfast Structures		John Doe	6
teadfast Structures		John Doe	8
teadfast Structures		John Doe	9
teadfast Structures		Olivia Jones	4
eveloper 💙			
LICENSE_NUMBER	DEVELOPERNAME		PHONE_NUMBER
789012 Quick Construction Co		Company	6045892387
345678	Ace Construction Ltd	1	7783924829
123456	SeaShore Builders Lt	d	2363930498
234567 Pacific Development Lt		Ltd	7788903848
948379	Fraser Property Grou	ıp	6040593968
112233	Skyline Innovations		6049987654

Division Operation During:

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Find Project Managers Involved In Every Project

Select Developer: Quick Construction Company ▼

Find Project Managers

Division Operation After:

Find Project Managers Involved In Every Project

Select Developer: Skyline Innovations

Find Project Managers

Manager Name: John Doe

Find Project Managers Involved In Every Project

Select Developer: Quick Construction Company ✔

Find Project Managers

Manager Name: Jane Smith

Find Project Managers Involved In Every Project

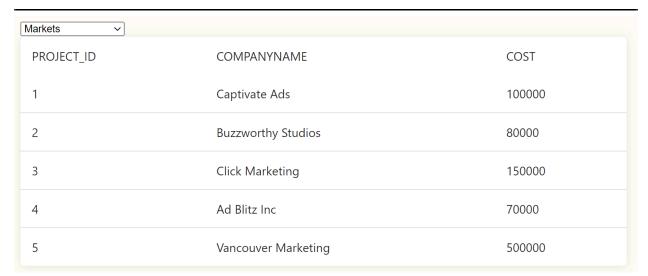
Select Developer: Ace Construction Ltd

Find Project Managers

No project managers found.

Having Operation Before

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Having Operation During

Find Total Marketing For Projects Greater Than Amount: 90000 Search

Having Operation After

Proje	ect ID	Total Cost
1	100000	
5	500000	
3	150000	