University of British Columbia, Vancouver

Department of Computer Science

Project Description

Our project is about modeling PC components to allow users to understand how different parts of a PC work together and what is required to create your own PC. Using this database, users will be able to look up the price of different PC parts and customize their own PC. They can add parts to the tables to keep track of the parts that they want and get some summary query results from the parts they have added such as filtering for keyboards by their brand, colour, percentage and price, finding keyboards and mouses that have the same colour or brand, and finding the average, maximum, or minimum price of GPU(s) based on brand or number of fans.

Changes in Schema

We had to remove the table Mouse_Brand because the Oracle account we were provided with only allowed us to have a maximum of 30 tables. If we included Mouse_Brand, we would have 31 tables which would exceed the space quota we are given to work with in Oracle. We chose to remove this table as it seemed to be a little trivial and we assumed it would not affect the final project much.

Schema

CPUCooler_On_Model(Model, Lighting, Brand, CPUCooler_Type, LCD)

CaseFan_Inside_Model(Model, Brand, Lighting)

CPU_On_Power(Cores, Generation, Power)

Motherboard_Powers_Socket(CPU_Model, Socket)

Storage_Requires_RW_Speeds(Model, Read_Speeds, Write_Speeds, Brand)

Storage_Requires_Price(Model, Capacity, Storage_Type, Price)

RAM_Placed_On_Brand(Model, Brand)

Mouse(Model, Colour, Branch, Mouse_Size, Weight, Price, Wired_Wireless)

Keyboard(Model, Brand, Colour, Price Percentage)

Switches(Model, Brand, Colour, Sound)

Switches_Price(Model, Brand, Colour, Price)

GPU_Has_Model(Model, Fans)

GPU_HAS_Price(Model, Brand, Variant, VRAM, Design, Fans, Series, Price)

GPU_Has_Power(Model, VRAM, Fans, Power)

RAM_Placed_On_Power(<u>DDR</u>, <u>Capacity</u>, Power)

PowerSupply_In_Model(<u>Model</u>, Brand, Efficiency, Wattage)

Case_Contains(<u>Model,</u> <u>Colour</u>, <u>Case_Size</u>, Price)

PowerSupply_In(<u>Model</u>, <u>Modularity</u>, <u>Form_Factor</u>, Price, **Case_Model**, **Case_Colour**, **Case_Size**)

Motherboard_Powers_Socket(<u>Model</u>, <u>Form_Factor</u>, <u>Series</u>, <u>WIFI</u>, Brand, Power, Expansion_Slots, Price, Memory_Slots, DDR, Storage_Ports, **PSU_Modularity**, **PSU_Form_Factor**, **PSU_Model**, **Case_Model**, **Case_Colour**, **Case_Size**)

CPU_On(<u>Model</u>, Cores, Generation, Socket, Price, Brand, **MB_Model**, **MB_Form_Factor**, **MB_Series**, **MB_WIFI**)

CPUCooler_On(<u>Model</u>, <u>CPUCooler_Size</u>, Price, **CPU_Model**)

CaseFan_Inside(<u>Model</u>, <u>CaseFan_Size</u>, Price, Colour, **Case_Model, Case_Colour, Case_Size**)

Storage_Requires(<u>Model</u>, <u>Capacity</u>, <u>Interface</u>, <u>Storage_Type</u>, <u>Form_Factor</u>, Power, **MB_Model**, **MB_Form_Factor**, **MB_Series**, **MB_WIFI**)

GPU_Has(<u>Model</u>, <u>VRAM</u>, Fans, <u>Brand</u>, <u>Variant</u>, <u>Design</u>, Series, **MB_Model**, **MB_Form_Factor**, **MB_Series**, **MB_WIFI**)

Monitor_Attached_To_Model(<u>Model</u>, Brand, Display)

Monitor_Attached_To(<u>Model</u>, <u>Curvature</u>, <u>Resolution</u>, <u>Refresh_Rate</u>, <u>Monitor_Size</u>, Response_Time, Price, **GPU_Model**, **GPU_Brand**, **GPU_Variant**, **GPU_VRAM**, **GPU_Design**, **MB_Model**, **MB_Form_Factor**, **MB_Series**)

RAM_Placed_On(<u>Model</u>, <u>DDR</u>, <u>Capacity</u>, <u>Clock_Speed</u>, Price, **MB_Model**, **MB_Form_Factor**, **MB_Series**, **MB_WIFI**)

Plugged_Into(<u>**Case_Model**</u>, <u>**Case_Colour**</u>, <u>**Case_Size**</u>, <u>**Mouse_Model**</u>, <u>**Mouse_Colour**</u>)

Connected_To(<u>**Case_Model**</u>, <u>**Case_Colour**</u>, <u>**Case_Size**</u>, <u>**Keyboard_Model**</u>)

Insert `(functions.php - line 231)`

```
insert into CPUCooler_On (model, cpucooler_size, price, cpu_model) values ('Corsair SomeFan',
140, 80, 'New CPU_Model');
```

Insert Values into CPU Cooler Table

This will insert a new row into the currect CPU Cooler Table. (*) fields are required.

NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): [_____]

CPUCooler_Size (*): [_____]

Price : [_____]

CPU_Model : [_____]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by st

WARNING: Deleting a row here might delete a row in the

Model : [_____]

[Delete]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 5 5600X	6	5000	AM4	160	AMD				
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				

```
Insert - before
```

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Insert Values into CPU Cooler Table

This will insert a new row into the currect CPU Cooler Table. (*) fields are required.

NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): `Corsair SomeFan`

CPUCooler_Size (*): `140`

Price : `80`

CPU_Model : `New CPU_Model`

`Insert`

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by stat

WARNING: Deleting a row here might delete a row in the C

Model : `_____`

`Delete`

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 5 5600X	6	5000	AM4	160	AMD				
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				

```
Insert - during
```

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Insert Values into CPU Cooler Table

This will insert a new row into the currect CPU Cooler Table. (*) fields are required.

NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): [   ]

CPUCooler_Size (*): [   ]

Price : [   ]

CPU_Model : [   ]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by sta

WARNING: Deleting a row here might delete a row in the C

Model : [   ]

[Delete]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	
Corsair SomeFan	140	80	New CPU_Model

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 5 5600X	6	5000	AM4	160	AMD				
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				
New CPU_Model									

Insert - after

Delete `(functions.php - line 280)`

```
delete from CPU_On WHERE model = 'Ryzen 5 5600X';
```

Model (*): [   ]

CPUCooler_Size (*): [   ]

Price : [   ]

CPU_Model : [   ]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by stating its Model.

WARNING: Deleting a row here might delete a row in the CPU Cooler table!

Model : [   ]

[Delete]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	
Corsair SomeFan	140	80	New CPU_Model

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 5 5600X	6	5000	AM4	160	AMD				
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				
New CPU_Model									

```
Delete - before
```

NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): [   ]

CPUCooler_Size (*): [   ]

Price : [   ]

CPU_Model : [   ]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by stating its Model.

WARNING: Deleting a row here might delete a row in the CPU Cooler table!

Model : [Ryzen 5 5600X]

[Delete]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	
Corsair SomeFan	140	80	New CPU_Model

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 5 5600X	6	5000	AM4	160	AMD				
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				
New CPU_Model									

Delete - during

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NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): [_____]

CPUCooler_Size (*): [_____]

Price : [_____]

CPU_Model : [_____]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by stating its Model.

WARNING: Deleting a row here might delete a row in the CPU Cooler table!

Model : [_____]

[Delete]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	
Corsair SomeFan	140	80	New CPU_Model

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				
New CPU_Model									

Delete - after

Update `(functions.php - line 144)`

```
UPDATE CPUCooler_On SET price = 50 WHERE price = 39.99;

UPDATE CPUCooler_On SET cpu_model = 'Old CPU_Model' WHERE cpu_model = 'New CPU_Model';
```

Insert Values into CPU Cooler Table

This will insert a new row into the currect CPU Cooler Table. (*) fields are required.

NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): [   ]

CPUCooler_Size (*): [   ]

Price : [   ]

CPU_Model : [   ]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by stating its Model.

WARNING: Deleting a row here might delete a row in the CPU Cooler table!

Model : [   ]

[Delete]

Update Name in CPU Cooler Table

This will change all the values that are currently the old value to the new value in the table. The values are case sensitive and if you enter in the wrong case, the update statement will not do anything.

Old Price: [   ]

New Price: [   ]

Old CPU Model: [   ]

New CPU Model: [   ]

[Update]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	
Corsair SomeFan	140	80	New CPU_Model

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				
New CPU_Model									

`Update - before`

Insert Values into CPU Cooler Table

This will insert a new row into the currect CPU Cooler Table. (*) fields are required.

NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): [   ]

CPUCooler_Size (*): [   ]

Price : [   ]

CPU_Model : [   ]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by stating its Model.

WARNING: Deleting a row here might delete a row in the CPU Cooler table!

Model : [   ]

[Delete]

Update Name in CPU Cooler Table

This will change all the values that are currently the old value to the new value in the table. The values are case sensitive and if you enter in the wrong case, the update statement will not do anything.

Old Price: [39.99]

New Price: [50]

Old CPU Model: [New CPU_Model]

New CPU Model: [Old CPU_Model]

[Update]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	39.99	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	39.99	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	
Corsair SomeFan	140	80	New CPU_Model

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				
New CPU_Model									

`Update - during`

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Insert Values into CPU Cooler Table

This will insert a new row into the currect CPU Cooler Table. (*) fields are required.

NOTE: CPUCooler_Size input must be an integer and Price input must be a number!

Model (*): [   ]

CPUCooler_Size (*): [   ]

Price : [   ]

CPU_Model : [   ]

[Insert]

Delete Row in CPU Table

This deletes a row in the CPU Table. Specify the row by stating its Model.

WARNING: Deleting a row here might delete a row in the CPU Cooler table!

Model : [   ]

[Delete]

Update Name in CPU Cooler Table

This will change all the values that are currently the old value to the new value in the table. The values are case sensitive and if you enter in the wrong case, the update statement will not do anything.

Old Price: [   ]

New Price: [   ]

Old CPU Model: [   ]

New CPU Model: [   ]

[Update]

CPU Cooler Table

MODEL	CPUCOOLER_SIZE	PRICE	CPU_MODEL
DeepCool GAMMAXX AG400 BK ARGB	120	50	
DeepCool GAMMAXX AG400	120	34.99	
DeepCool GAMMAXX AG400 WH ARGB	120	50	
DeepCool GAMMAXX CT	120	49.99	
Corsair iCUE H150i Elite CAPELLIX XT	360	284.99	
Corsair SomeFan	140	80	Old CPU_Model

CPU Table

MODEL	CORES	GENERATION	SOCKET	PRICE	BRAND	MB_MODEL	MB_FORM_FACTOR	MB_SERIES	MB_WIFI
Ryzen 7 7800X3D	8	7000	AM5	370	AMD				
Ryzen 7 5800X	8	5000	AM4	160	AMD				
Intel Core i7-13700K	16	13	LGA 1700	360	Intel				
Intel Core i9-13900K	24	13	LGA 1700	570	Intel				
New CPU_Model									
Old CPU_Model									

Update - after

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Selection `(select_project.php - line 162)`

```
SELECT * FROM Keyboard WHERE (Brand = 'Corsair' OR Brand = 'Logitech') AND (Colour = 'Black'
OR Color = 'White')AND (Percentage = 100 OR Percentage = 80) AND Price < 200;
```

Select a Keyboard

Select filters below to find keyboards that match what you want!

Brand: Colour: Percentage: Price:

☐ Corsair   ☐ Black   ☐ 100%   ☐ < $50
☐ Logitech   ☐ White   ☐ 80%   ☐ < $100
☐ Havit   ☐ Blue   ☐ 65%   ☐ < $200

[Find Keyboards]

Filtered Keyboard Table

MODEL	BRAND	COLOUR	PERCENTAGE	PRICE
Corsair K55 Pro Lite	Corsair	Black	100	74.95
Corsair K70 Pro Mini Wireless	Corsair	Blue	60	259.99
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	100	399.99
Corsair K100 RGB Optical-Mechanical	Corsair	White	100	349.99
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	100	199.99
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	100	199.99
Havit Mechanical Keyboard 89 Keys	Havit	Black	85	42.99

Selection - before

Select a Keyboard

Select filters below to find keyboards that match what you want!

Brand: Colour: Percentage: Price:

☑ Corsair   ☑ Black   ☑ 100%   ☐ < $50
☑ Logitech   ☑ White   ☑ 80%   ☐ < $100
☐ Havit   ☐ Blue   ☐ 65%   ☑ < $200

[Find Keyboards]

Filtered Keyboard Table

MODEL	BRAND	COLOUR	PERCENTAGE	PRICE
Corsair K55 Pro Lite	Corsair	Black	100	74.95
Corsair K70 Pro Mini Wireless	Corsair	Blue	60	259.99
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	100	399.99
Corsair K100 RGB Optical-Mechanical	Corsair	White	100	349.99
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	100	199.99
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	100	199.99
Havit Mechanical Keyboard 89 Keys	Havit	Black	85	42.99

Selection - during

Select a Keyboard

Select filters below to find keyboards that match what you want!

Brand:	Colour:	Percentage:	Price:
☐ Corsair	☐ Black	☐ 100%	☐ < $50
☐ Logitech	☐ White	☐ 80%	☐ < $100
☐ Havit	☐ Blue	☐ 65%	☐ < $200

[Find Keyboards]

Filtered Keyboard Table

MODEL	BRAND	COLOUR	PERCENTAGE	PRICE
Corsair K55 Pro Lite	Corsair	Black	100	74.95
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	100	199.99
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	100	199.99

Selection – after

Projection `(select_project.php - line 237)`

```
SELECT column_name FROM user_tab_columns WHERE table_name = 'CPUCooler_On_Model';

SELECT DISTINCT Model, Lighting, Brand FROM CPUCooler_On_Model;
```

Projection

Select a table from the dropdown, then click show columns and select the desired columns to see

Select a table: `CPUCOOLER_ON_MODEL ▾` Show Columns

attributes:

Submit

Did not select columns

Projection - before

Projection

Select a table from the dropdown, then click show columns and select the desired columns to see

Select a table: `CPUCOOLER_ON_MODEL ▾` Show Columns

CPUCOOLER_ON_MODEL attributes:

☑ MODEL
☑ LIGHTING
☑ BRAND
☐ CPUCOOLER_TYPE
☐ LCD
Submit

MODEL	LIGHTING	BRAND	CPUCOOLER_TYPE	LCD
DeepCool GAMMAXX AG400 BK ARGB	RGB	Deepcool	Air	
DeepCool GAMMAXX AG400		Deepcool	Air	
DeepCool GAMMAXX AG400 WH ARGB	RGB	Deepcool	Air	
DeepCool GAMMAXX CT	RGB	Deepcool	Air	
Corsair iCUE H150i Elite CAPELLIX XT	RGB	Corsair	Liquid	

Projection - during

Projection

Select a table from the dropdown, then click show columns and select the desired columns to see

Select a table: [CPUCOOLER_ON_MODEL ▾] [Show Columns]

attributes:

[Submit]

MODEL	LIGHTING	BRAND
DeepCool GAMMAXX AG400 BK ARGB	RGB	Deepcool
DeepCool GAMMAXX AG400		Deepcool
DeepCool GAMMAXX AG400 WH ARGB	RGB	Deepcool
DeepCool GAMMAXX CT	RGB	Deepcool
Corsair iCUE H150i Elite CAPELLIX XT	RGB	Corsair

Projection - after

Join `(queries.php - line 99)`

```
SELECT k.model AS Keyboard_model, k.brand AS Keyboard_brand, k.colour AS Keyboard_colour,
k.price AS Keyboard_price, m.model AS Mouse_model, m.brand AS Mouse_brand, m.colour AS
Mouse_colour, m.price AS Mouse_price, k.price + m.price AS Total_price
FROM Keyboard k
JOIN Mouse m ON k.brand = m.brand AND k.colour = m.colour
WHERE k.brand = 'Corsair' AND k.colour = 'Black'
ORDER BY Total_price ASC;
```

Find a Keyboard/Mouse Pair

Choose a colour/brand to match (e.g. "I want only Corsair keyboards/mouses"):

Brand: [_____]

Colour: [_____]

[Find]

Keyboards & Mouses Table

KEYBOARD_MODEL	KEYBOARD_BRAND	KEYBOARD_COLOUR	KEYBOARD_PRICE	MOUSE_MODEL	MOUSE_BRAND	MOUSE_COLOUR	MOUSE_PRICE	TOTAL_PRICE
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	199.99	G305 LIGHTSPEED	Logitech	Black	49.99	249.98
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	199.99	G305 LIGHTSPEED	Logitech	White	49.99	249.98
Corsair K55 Pro Lite	Corsair	Black	74.95	SCIMITAR RGB ELITE	Corsair	Black	189.99	264.94
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	199.99	G502 HERO	Logitech	Black	79.99	279.98
Corsair K100 RGB Optical-Mechanical	Corsair	White	349.99	M65 RGB Ultra Tunable	Corsair	White	79.99	429.98
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	399.99	SCIMITAR RGB ELITE	Corsair	Black	189.99	589.98

`Join - before (default join on Brand and Colour)`

Find a Keyboard/Mouse Pair

Choose a colour/brand to match (e.g. "I want only Corsair keyboards/mouses"):

Brand: [Corsair]

Colour: [Black]

[Find]

Keyboards & Mouses Table

KEYBOARD_MODEL	KEYBOARD_BRAND	KEYBOARD_COLOUR	KEYBOARD_PRICE	MOUSE_MODEL	MOUSE_BRAND	MOUSE_COLOUR	MOUSE_PRICE	TOTAL_PRICE
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	199.99	G305 LIGHTSPEED	Logitech	Black	49.99	249.98
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	199.99	G305 LIGHTSPEED	Logitech	White	49.99	249.98
Corsair K55 Pro Lite	Corsair	Black	74.95	SCIMITAR RGB ELITE	Corsair	Black	189.99	264.94
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	199.99	G502 HERO	Logitech	Black	79.99	279.98
Corsair K100 RGB Optical-Mechanical	Corsair	White	349.99	M65 RGB Ultra Tunable	Corsair	White	79.99	429.98
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	399.99	SCIMITAR RGB ELITE	Corsair	Black	189.99	589.98

`Join - during`

Find a Keyboard/Mouse Pair

Choose a colour/brand to match (e.g. "I want only Corsair keyboards/mouses"):

Brand: [_____]

Colour: [_____]

[Find]

Keyboards & Mouses Table

KEYBOARD_MODEL	KEYBOARD_BRAND	KEYBOARD_COLOUR	KEYBOARD_PRICE	MOUSE_MODEL	MOUSE_BRAND	MOUSE_COLOUR	MOUSE_PRICE	TOTAL_PRICE
Corsair K55 Pro Lite	Corsair	Black	74.95	SCIMITAR RGB ELITE	Corsair	Black	189.99	264.94
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	399.99	SCIMITAR RGB ELITE	Corsair	Black	189.99	589.98

`Join - after`

Aggregation With Group By `(queries.php - line 179)`

```
SELECT Fans, Avg(Price) FROM GPU_Has_Price GROUP BY Fans;
```

Aggregation with Group By

Find the maximum, minimum, or average price of GPU(s) based on brand, number of fans or both!

☐ Brand ☐ Number of Fans

Select an operation: [Max ⌄] [Submit]

GPU Table

MODEL	BRAND	VARIANT	VRAM	DESIGN	FANS	SERIES	PRICE
RTX 2060	MSI	OC	6	Black	3	MSI GeForce RTX 2060	650
RTX 2060	ASUS	OC	12	Black	3	Dual NVIDIA GeForce RTX 2060	500
GTX 1050	ASUS	TI	4	Black	1	ASUS PH-GTX 1050	230
GTX 1050	MSI	OC TI	4	Black	2	MSI GTX 1050	450
GTX 1050	MSI	TI	4	Red	2	MSI GTX 1050	380

Agg w/ Group By - before

Aggregation with Group By

Find the maximum, minimum, or average price of GPU(s) based on brand, number of fans or both!

☐ Brand ☑ Number of Fans

Select an operation: [Avg ⌄] [Submit]

GPU Table

MODEL	BRAND	VARIANT	VRAM	DESIGN	FANS	SERIES	PRICE
RTX 2060	MSI	OC	6	Black	3	MSI GeForce RTX 2060	650
RTX 2060	ASUS	OC	12	Black	3	Dual NVIDIA GeForce RTX 2060	500
GTX 1050	ASUS	TI	4	Black	1	ASUS PH-GTX 1050	230
GTX 1050	MSI	OC TI	4	Black	2	MSI GTX 1050	450
GTX 1050	MSI	TI	4	Red	2	MSI GTX 1050	380

Agg w/ Group By - during

Aggregation with Group By

Find the maximum, minimum, or average price of GPU(s) based on brand, number of fans or both!

☐ Brand ☐ Number of Fans

Select an operation: [Max ▾] [Submit]

GPU Table

MODEL	BRAND	VARIANT	VRAM	DESIGN	FANS	SERIES	PRICE
RTX 2060	MSI	OC	6	Black	3	MSI GeForce RTX 2060	650
RTX 2060	ASUS	OC	12	Black	3	Dual NVIDIA GeForce RTX 2060	500
GTX 1050	ASUS	TI	4	Black	1	ASUS PH-GTX 1050	230
GTX 1050	MSI	OC TI	4	Black	2	MSI GTX 1050	450
GTX 1050	MSI	TI	4	Red	2	MSI GTX 1050	380

Result Table

FANS	AVG(PRICE)
1	230
2	415
3	575

Agg w/ Group By - after

Aggregation With Having `(queries.php - line 227)`

`SELECT Colour, AVG(Price) FROM CaseFan_Inside GROUP BY Colour HAVING AVG(Price) < 30;`

Query with Having

The following query will group by the case fans colour and print out a table where the colour has an average price less than your given input.

Price Lower than: [   ]

[Submit]

CaseFan Table

MODEL	CASEFAN_SIZE	PRICE	COLOUR
Noctua NF-P12 Redux	120	15.95	grey
Noctua NF-A20 PWM	200	39.64	brown
Corsair iCUE QL120	120	44.99	black
Corsair iCUE QL140	140	49.99	black
Corsair LL Series LL120	120	25.99	black
Corsair iCUE AR120	120	21.74	black
Corsair iCUE SP120	120	44.99	white
Corsair SP120 Elite	120	14.99	black
Thermalright TL-C12CW-S	120	17.9	white
Arctic F12 PWM	120	15.99	white

`Agg w/ Having - before`

Query with Having

The following query will group by the case fans colour and print out a table where the colour has an average price less than your given input.

Price Lower than: [30]

[Submit]

CaseFan Table

MODEL	CASEFAN_SIZE	PRICE	COLOUR
Noctua NF-P12 Redux	120	15.95	grey
Noctua NF-A20 PWM	200	39.64	brown
Corsair iCUE QL120	120	44.99	black
Corsair iCUE QL140	140	49.99	black
Corsair LL Series LL120	120	25.99	black
Corsair iCUE AR120	120	21.74	black
Corsair iCUE SP120	120	44.99	white
Corsair SP120 Elite	120	14.99	black
Thermalright TL-C12CW-S	120	17.9	white
Arctic F12 PWM	120	15.99	white

`Agg w/ Having - during`

University of British Columbia, Vancouver

Department of Computer Science

Query with Having

The following query will group by the case fans colour and print out a table where the colour has an average price less than your given input.

Price Lower than: [   ]

[Submit]

CaseFan Table

MODEL	CASEFAN_SIZE	PRICE	COLOUR
Noctua NF-P12 Redux	120	15.95	grey
Noctua NF-A20 PWM	200	39.64	brown
Corsair iCUE QL120	120	44.99	black
Corsair iCUE QL140	140	49.99	black
Corsair LL Series LL120	120	25.99	black
Corsair iCUE AR120	120	21.74	black
Corsair iCUE SP120	120	44.99	white
Corsair SP120 Elite	120	14.99	black
Thermalright TL-C12CW-S	120	17.9	white
Arctic F12 PWM	120	15.99	white

Having Result Table

COLOUR	AVG(PRICE)
grey	15.95
white	26.29333333333333333333333333333333333333

Agg w/ Having - after

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Nested Aggregation With Group By `(queries.php - line 265)`

```
SELECT Brand, AVG(Price) FROM Keyboard GROUP BY Brand HAVING AVG(Price) < (SELECT AVG(Price)
FROM Keyboard);
```

Nested Query

The following query will group the keyboards by your choosen input(s) and print out a table where the group has an average price less than the average price of all the keyboards.

☐ Brand ☐ Colour Submit

Keyboard Table

MODEL	BRAND	COLOUR	PERCENTAGE	PRICE
Corsair K55 Pro Lite	Corsair	Black	100	74.95
Corsair K70 Pro Mini Wireless	Corsair	Blue	60	259.99
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	100	399.99
Corsair K100 RGB Optical-Mechanical	Corsair	White	100	349.99
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	100	199.99
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	100	199.99
Havit Mechanical Keyboard 89 Keys	Havit	Black	85	42.99

Nested Agg w/ Group By - before

Nested Query

The following query will group the keyboards by your choosen input(s) and print out a table where the group has an average price less than the average price of all the keyboards.

☑ Brand ☐ Colour Submit

Keyboard Table

MODEL	BRAND	COLOUR	PERCENTAGE	PRICE
Corsair K55 Pro Lite	Corsair	Black	100	74.95
Corsair K70 Pro Mini Wireless	Corsair	Blue	60	259.99
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	100	399.99
Corsair K100 RGB Optical-Mechanical	Corsair	White	100	349.99
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	100	199.99
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	100	199.99
Havit Mechanical Keyboard 89 Keys	Havit	Black	85	42.99

Nested Agg w/ Group By - during

Nested Query

The following query will group the keyboards by your choosen input(s) and print out a table where the group has an average price less than the average price of all the keyboards.

☐ Brand ☐ Colour Submit

Keyboard Table

MODEL	BRAND	COLOUR	PERCENTAGE	PRICE
Corsair K55 Pro Lite	Corsair	Black	100	74.95
Corsair K70 Pro Mini Wireless	Corsair	Blue	60	259.99
Corsair K100 Air Wireless RGB Ultra-Thin	Corsair	Black	100	399.99
Corsair K100 RGB Optical-Mechanical	Corsair	White	100	349.99
Logitech G815 LIGHTSYNC RGB Mecahnical W	Logitech	White	100	199.99
Logitech G815 LIGHTSYNC RGB Mecahnical	Logitech	Black	100	199.99
Havit Mechanical Keyboard 89 Keys	Havit	Black	85	42.99

Nested Query Result Table

BRAND	AVG(PRICE)
Logitech	199.99
Havit	42.99

Nested Agg w/ Group By - after

Division (`queries.php - line 365`)

```
SELECT * FROM Case_Contains CC WHERE NOT EXISTS
(SELECT K.Model FROM Keyboard K WHERE NOT EXISTS
(SELECT C.Case_Model, C.Case_Colour, C.Case_Size FROM Connected_To C
WHERE C.Keyboard_Model = K.Model
AND CC.Model = C.Case_Model
AND CC.Colour = C.Case_Colour
AND CC.Case_Size = C.Case_Size))
```

Find Cases That Come With All Mouses

Find Cases

Cases Table

CASE_MODEL	CASE_COLOUR	CASE_SIZE	KEYBOARD_MODEL
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K100 Air Wireless RGB Ultra-Thin
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K100 RGB Optical-Mechanical
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K55 Pro Lite
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K70 Pro Mini Wireless
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Havit Mechanical Keyboard 89 Keys
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Logitech G815 LIGHTSYNC RGB Mecahnical
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Logitech G815 LIGHTSYNC RGB Mecahnical W
Corsair 4000D CC-9011201-WW	White	Mid-Tower	Corsair K70 Pro Mini Wireless
Corsair iCUE 4000X RGB CC-9011204-WW	Black	Mid-Tower	Corsair K100 Air Wireless RGB Ultra-Thin
Corsair iCUE 4000X RGB CC-9011205-WW	White	Mid-Tower	Corsair K100 RGB Optical-Mechanical

`Division - before`

Find Cases That Come With All Mouses

Find Cases

Cases Table

CASE_MODEL	CASE_COLOUR	CASE_SIZE	KEYBOARD_MODEL
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K100 Air Wireless RGB Ultra-Thin
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K100 RGB Optical-Mechanical
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K55 Pro Lite
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Corsair K70 Pro Mini Wireless
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Havit Mechanical Keyboard 89 Keys
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Logitech G815 LIGHTSYNC RGB Mecahnical
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	Logitech G815 LIGHTSYNC RGB Mecahnical W
Corsair 4000D CC-9011201-WW	White	Mid-Tower	Corsair K70 Pro Mini Wireless
Corsair iCUE 4000X RGB CC-9011204-WW	Black	Mid-Tower	Corsair K100 Air Wireless RGB Ultra-Thin
Corsair iCUE 4000X RGB CC-9011205-WW	White	Mid-Tower	Corsair K100 RGB Optical-Mechanical

`Division - during`

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Find Cases That Come With All Mouses

[Find Cases]

Cases Table

MODEL	COLOUR	CASE_SIZE	PRICE
Corsair 4000D CC-9011200-WW	Black	Mid-Tower	119.98

Division - after