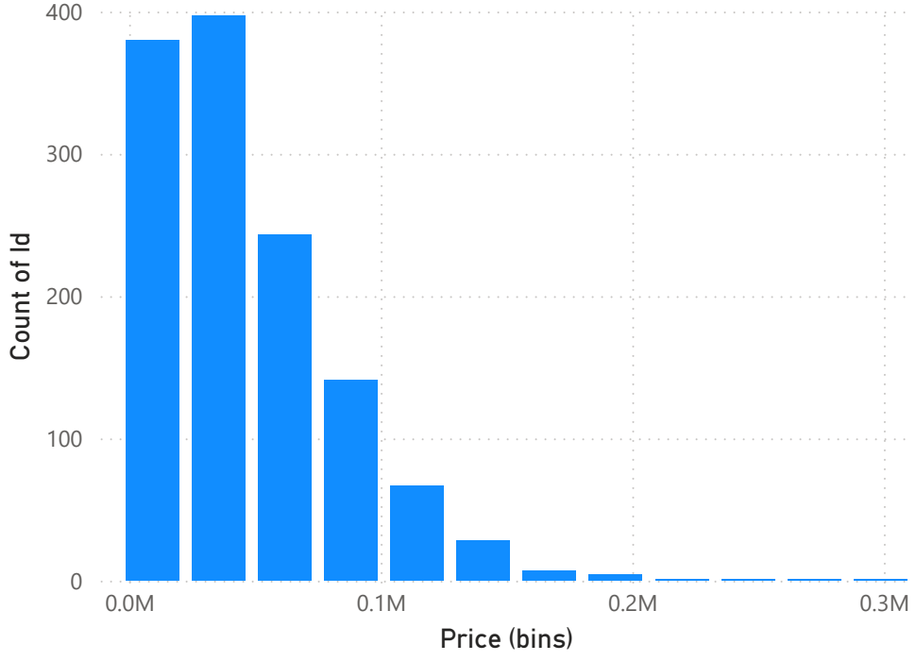
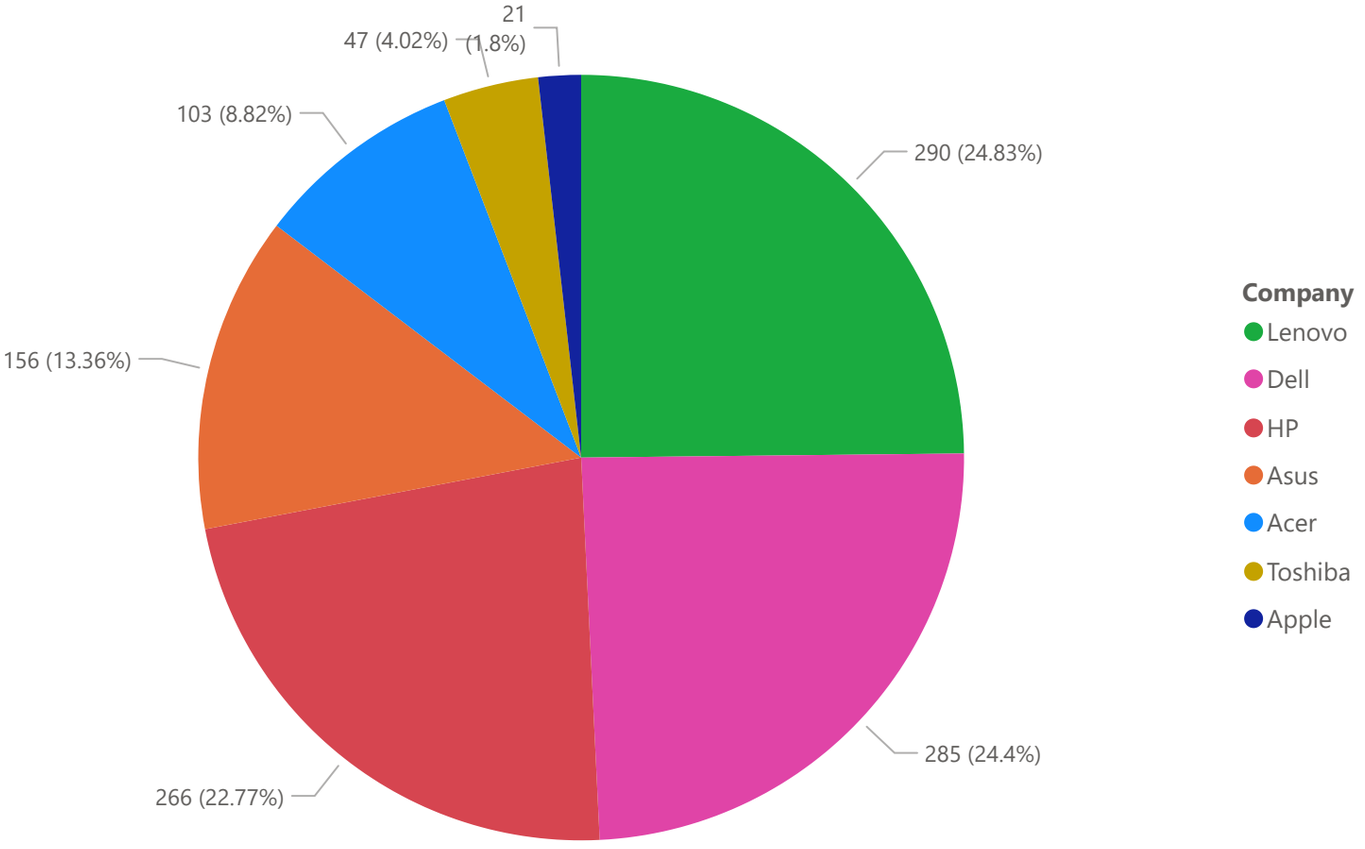
Descriptive Analysis

Count of Price	Min of Price	Max of Price	Median of Pri...	Average of Pr...	Standard dev...	Q1	Q3	IQR
1271	9271	324955	52055	59939.96	37343.72	31,915.00	79,360.00	47,445.00

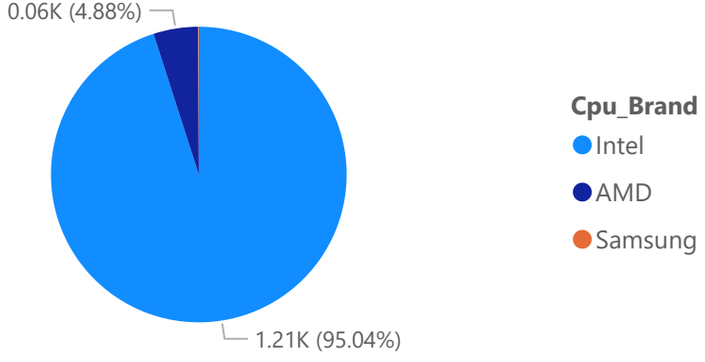
Count of Id by Price (bins)



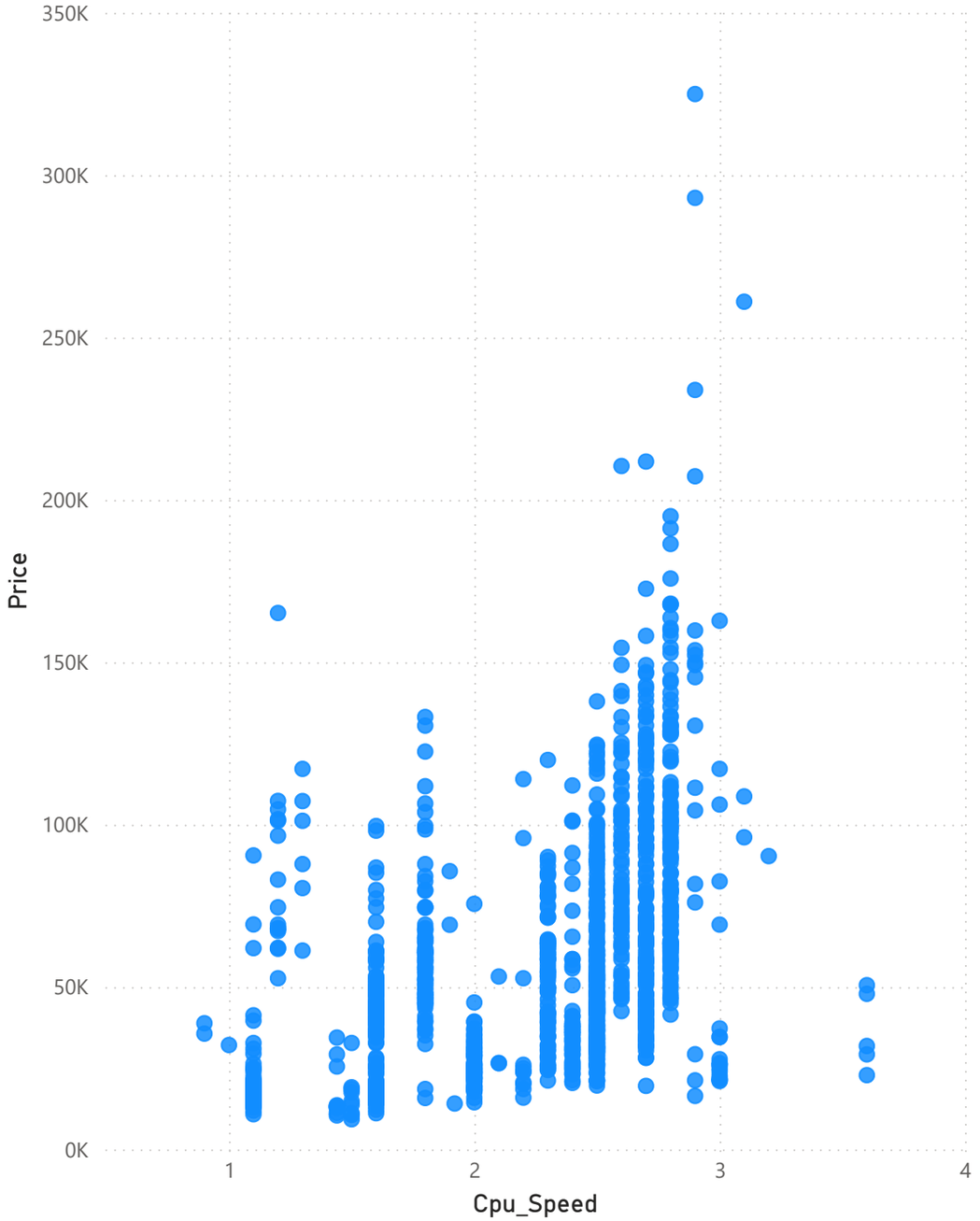
Count of Id by Company and Company



Count of Id by Cpu_Brand



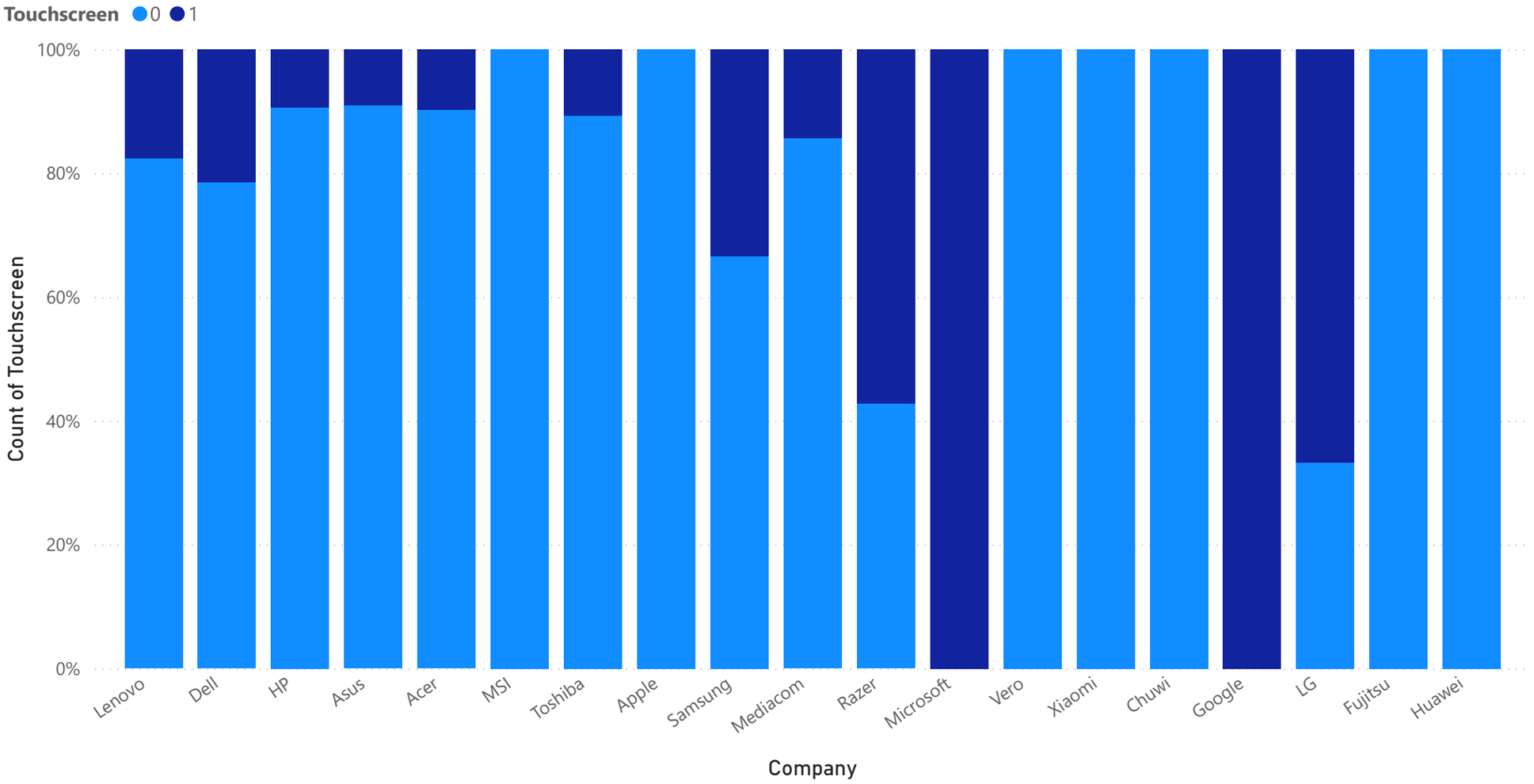
Cpu_Speed and Price



1.00

Price and Count of Touchscreen correlation for Cpu_Brand

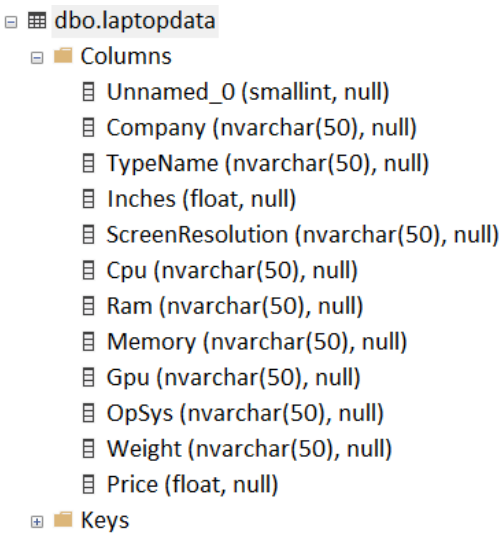
Count of Touchscreen by Company and Touchscreen



Dataset was obtained from Kaggle https://www.kaggle.com/datasets/ehtishamsadiq/uncleaned-laptop-price-dataset

Data was imported into SQL server from a .csv file

Table Schema -



Results Messages

	Unnamed_0	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price
1	0	Apple	Ultrabook	13.3000001907349	IPS Panel Retina Display 2560x1600	Intel Core i5 2.3GHz	8GB	128GB SSD	Intel Iris Plus Graphics 640	macOS	1.37kg	71378.6796875
2	1	Apple	Ultrabook	13.3000001907349	1440x900	Intel Core i5 1.8GHz	8GB	128GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	47895.5234375
3	2	HP	Notebook	15.6000003814697	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8GB	256GB SSD	Intel HD Graphics 620	No OS	1.86kg	30636
4	3	Apple	Ultrabook	15.3999996185303	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16GB	512GB SSD	AMD Radeon Pro 455	macOS	1.83kg	135195.34375
5	4	Apple	Ultrabook	13.3000001907349	IPS Panel Retina Display 2560x1600	Intel Core i5 3.1GHz	8GB	256GB SSD	Intel Iris Plus Graphics 650	macOS	1.37kg	96095.8046875
6	5	Acer	Notebook	15.6000003814697	1366x768	AMD A9-Series 9420 3GHz	4GB	500GB HDD	AMD Radeon R5	Windows 10	2.1kg	21312
7	6	Apple	Ultrabook	15.3999996185303	IPS Panel Retina Display 2880x1800	Intel Core i7 2.2GHz	16GB	256GB Flash Storage	Intel Iris Pro Graphics	Mac OS X	2.04kg	114017.6015625
8	7	Apple	Ultrabook	13.3000001907349	1440x900	Intel Core i5 1.8GHz	8GB	256GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	61735.53515625
9	8	Asus	Ultrabook	14	Full HD 1920x1080	Intel Core i7 8550U 1.8GHz	16GB	512GB SSD	Nvidia GeForce MX150	Windows 10	1.3kg	79653.6015625
10	9	Acer	Ultrabook	14	IPS Panel Full HD 1920x1080	Intel Core i5 8250U 1.6GHz	8GB	256GB SSD	Intel UHD Graphics 620	Windows 10	1.6kg	41025.6015625
11	10	HP	Notebook	15.6000003814697	1366x768	Intel Core i5 7200U 2.5GHz	4GB	500GB HDD	Intel HD Graphics 620	No OS	1.86kg	20986.9921875
12	11	HP	Notebook	15.6000003814697	Full HD 1920x1080	Intel Core i3 6006U 2GHz	4GB	500GB HDD	Intel HD Graphics 520	No OS	1.86kg	18381.06640625

1. Rename column – Rename Unnamed_0 to Id.

```
--rename column Unnamed_0 to ID
EXEC sp_rename 'laptopdata.Unnamed_0', 'Id', 'COLUMN';

SELECT * FROM laptopdata
```

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price
1	0	Apple	Ultrabook	13.3000001907349	IPS Panel Retina Display 2560x1600	Intel Core i5 2.3GHz	8GB	128GB SSD	Intel Iris Plus Graphics 640	macOS	1.37kg	71378.6796875
2	1	Apple	Ultrabook	13.3000001907349	1440x900	Intel Core i5 1.8GHz	8GB	128GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	47895.5234375
3	2	HP	Notebook	15.6000003814697	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8GB	256GB SSD	Intel HD Graphics 620	No OS	1.86kg	30636
4	3	Apple	Ultrabook	15.3999996185303	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16GB	512GB SSD	AMD Radeon Pro 455	macOS	1.83kg	135195.34375
5	4	Apple	Ultrabook	13.3000001907349	IPS Panel Retina Display 2560x1600	Intel Core i5 3.1GHz	8GB	256GB SSD	Intel Iris Plus Graphics 650	macOS	1.37kg	96095.8046875
6	5	Acer	Notebook	15.6000003814697	1366x768	AMD A9-Series 9420 3GHz	4GB	500GB HDD	AMD Radeon R5	Windows 10	2.1kg	21312

2. Find and delete those records that have NULL values in all columns

```
--find rows that have null values in all columns
SELECT * FROM laptopdata
WHERE Company IS NULL AND TypeName IS NULL
AND ScreenResolution IS NULL AND Cpu IS NULL
AND Ram IS NULL AND Memory IS NULL AND Gpu IS NULL
AND OpSys IS NULL AND Weight IS NULL AND Price IS NULL;
--30 rows
```

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price
1	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
3	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
4	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
5	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
6	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
7	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
8	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
9	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
10	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

```
DELETE FROM laptopdata WHERE Id IS NULL;
--total rows now = 1273
```

3. Convert Inches column from float to decimal(10,2). Also remove GB in Ram column.

```sql
-- convert Inches column from float to decimal(10,1)
ALTER TABLE laptopdata
ALTER COLUMN Inches decimal(10,1);

--remove GB from Ram column
UPDATE laptopdata
SET Ram = REPLACE(Ram, 'GB', '');

SELECT * FROM laptopdata

-- make Ram column a integer column from nvarchar(50)
ALTER TABLE laptopdata
ALTER COLUMN Ram int;

SELECT * FROM laptopdata
```

Before

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price
1	0	Apple	Ultrabook	13.3000001907349	IPS Panel Retina Display 2560x1600	Intel Core i5 2.3GHz	8GB	128GB SSD	Intel Iris Plus Graphics 640	macOS	1.37kg	71378.6796875
2	1	Apple	Ultrabook	13.3000001907349	1440x900	Intel Core i5 1.8GHz	8GB	128GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	47895.5234375
3	2	HP	Notebook	15.6000003814697	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8GB	256GB SSD	Intel HD Graphics 620	No OS	1.86kg	30636
4	3	Apple	Ultrabook	15.3999996185303	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16GB	512GB SSD	AMD Radeon Pro 455	macOS	1.83kg	135195.34375
5	4	Apple	Ultrabook	13.3000001907349	IPS Panel Retina Display 2560x1600	Intel Core i5 3.1GHz	8GB	256GB SSD	Intel Iris Plus Graphics 650	macOS	1.37kg	96095.8046875
6	5	Acer	Notebook	15.6000003814697	1366x768	AMD A9-Series 9420 3GHz	4GB	500GB HDD	AMD Radeon R5	Windows 10	2.1kg	21312

After

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price
1	0	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 2.3GHz	8	128GB SSD	Intel Iris Plus Graphics 640	macOS	1.37kg	71378.6796875
2	1	Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8	128GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	47895.5234375
3	2	HP	Notebook	15.6	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8	256GB SSD	Intel HD Graphics 620	No OS	1.86kg	30636
4	3	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16	512GB SSD	AMD Radeon Pro 455	macOS	1.83kg	135195.34375
5	4	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 3.1GHz	8	256GB SSD	Intel Iris Plus Graphics 650	macOS	1.37kg	96095.8046875
6	5	Acer	Notebook	15.6	1366x768	AMD A9-Series 9420 3GHz	4	500GB HDD	AMD Radeon R5	Windows 10	2.1kg	21312
7	6	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.2GHz	16	256GB Flash Storage	Intel Iris Pro Graphics	Mac OS X	2.04kg	114017.6015625
8	7	Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8	256GB Flash Storage	Intel HD Graphics 6000	macOS	1.34kg	61735.53515625
9	8	Asus	Ultrabook	14.0	Full HD 1920x1080	Intel Core i7 8550U 1.8GHz	16	512GB SSD	Nvidia GeForce MX150	Windows 10	1.3kg	79653.6015625
10	9	Acer	Ultrabook	14.0	IPS Panel Full HD 1920x1080	Intel Core i5 8250U 1.6GHz	8	256GB SSD	Intel UHD Graphics 620	Windows 10	1.6kg	41025.6015625

4. Remove Kg from Weight column. Round the Price column and change it to Integer. These Prices are in Rupees.

```
--remove kg from Weight column
UPDATE laptopdata
SET Weight = REPLACE(Weight, 'Kg', '');

--round Price to integer instead of float. First round it.
UPDATE laptopdata
SET Price = ROUND(Price, 0);


-- change Price data type
ALTER TABLE laptopdata
ALTER COLUMN Price INT;

select * from laptopdata
```

Before

	OpSys	Weight	Price
0	macOS	1.37kg	71378.6796875
	macOS	1.34kg	47895.5234375
	No OS	1.86kg	30636
	macOS	1.83kg	135195.34375
0	macOS	1.37kg	96095.8046875
	Windows 10	2.1kg	21312
	Mac OS X	2.04kg	114017.6015625
	macOS	1.34kg	61735.53515625
	Windows 10	1.3kg	79653.6015625
	Windows 10	1.6kg	41025.6015625
	No OS	1.86kg	20986.9921875
	No OS	1.86kg	18381.06640625
	macOS	1.83kg	130001.6015625

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	Gpu	OpSys	Weight	Price
1	0	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 2.3GHz	8	128GB SSD	Intel Iris Plus Graphics 640	macOS	1.37	71379
2	1	Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8	128GB Flash Storage	Intel HD Graphics 6000	macOS	1.34	47896
3	2	HP	Notebook	15.6	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8	256GB SSD	Intel HD Graphics 620	No OS	1.86	30636
4	3	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16	512GB SSD	AMD Radeon Pro 455	macOS	1.83	135195
5	4	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 3.1GHz	8	256GB SSD	Intel Iris Plus Graphics 650	macOS	1.37	96096
6	5	Acer	Notebook	15.6	1366x768	AMD A9-Series 9420 3GHz	4	500GB HDD	AMD Radeon R5	Windows 10	2.1	21312
7	6	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.2GHz	16	256GB Flash Storage	Intel Iris Pro Graphics	Mac OS X	2.04	114018
8	7	Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8	256GB Flash Storage	Intel HD Graphics 6000	macOS	1.34	61736
9	8	Asus	Ultrabook	14.0	Full HD 1920x1080	Intel Core i7 8550U 1.8GHz	16	512GB SSD	Nvidia GeForce MX150	Windows 10	1.3	79654

5. Operating System – OpSys

```sql
--OpSys -
SELECT Opsys,COUNT(*) as count FROM laptopdata
GROUP BY OpSys;
```

Results | Messages

	Opsys	count
1	Windows 7	45
2	No OS	63
3	Linux	61
4	Android	1
5	Chrome OS	27
6	Windows 10	1047
7	macOS	13
8	Windows 10 S	8
9	Mac OS X	8

***Group by Operating System Name instead of by Version number.

```sql
--Replace opsys with Windows, MacOS, Linux, Others
SELECT OpSys,
CASE
    WHEN opsys LIKE '%mac%' THEN 'MacOS'
    WHEN OpSys LIKE '%windows%' THEN 'Windows'
    WHEN OpSys LIKE '%Linux%' THEN 'Linux'
    WHEN OpSys = 'No OS' THEN 'N/A'
    ELSE 'Other'
END AS 'OS_Brand'
FROM laptopdata;

UPDATE laptopdata
SET OpSys =
CASE
    WHEN opsys LIKE '%mac%' THEN 'MacOS'
    WHEN OpSys LIKE '%windows%' THEN 'Windows'
    WHEN OpSys LIKE '%Linux%' THEN 'Linux'
    WHEN OpSys = 'No OS' THEN 'N/A'
    ELSE 'Other'
END;

--
SELECT Opsys,COUNT(*) as count FROM laptopdata
group by OpSys
```

Results | Messages

	Opsys	count
1	N/A	63
2	Linux	61
3	MacOS	21
4	Other	28
5	Windows	1100

6. GPU column – break it into Gpu_Brand and Gpu_Name.

```sql
--Break Gpu into Gpu_Name and Gpu_Brand
ALTER TABLE laptopdata
ADD Gpu_Brand VARCHAR(50),
Gpu_Name VARCHAR(50);

--select substring(gpu,1,CHARINDEX(' ',Gpu)-1) from laptopdata
UPDATE t1
SET Gpu_Brand = (SELECT SUBSTRING(t2.gpu,1,CHARINDEX(' ',t2.Gpu)-1) FROM laptopdata t2
                    WHERE t1.Id = t2.Id) FROM laptopdata t1;

--replace brand name with nothing in gpu and that gives us the type of graphics card
--select gpu, replace(gpu, gpu_brand,'') from laptopdata

UPDATE t1
SET Gpu_Name = (SELECT REPLACE(Gpu, Gpu_Brand, '') FROM laptopdata t2
                    WHERE t1.Id = t2.Id) FROM laptopdata t1;


SELECT * FROM laptopdata

--drop Gpu column
ALTER TABLE laptopdata
DROP COLUMN Gpu;

SELECT * FROM laptopdata;
```

Before

Gpu
Intel Iris Plus Graphics 640
Intel HD Graphics 6000
Intel HD Graphics 620
AMD Radeon Pro 455
Intel Iris Plus Graphics 650
AMD Radeon R5
Intel Iris Pro Graphics
Intel HD Graphics 6000
Nvidia GeForce MX150
Intel UHD Graphics 620
Intel HD Graphics 620
Intel HD Graphics 520
AMD Radeon Pro 555

After

Gpu_Brand	Gpu_Name
Intel	Iris Plus Graphics 640
Intel	HD Graphics 6000
Intel	HD Graphics 620
AMD	Radeon Pro 455
Intel	Iris Plus Graphics 650
AMD	Radeon R5
Intel	Iris Pro Graphics
Intel	HD Graphics 6000
Nvidia	GeForce MX150
Intel	UHD Graphics 620
Intel	HD Graphics 620
Intel	HD Graphics 520
AMD	Radeon Pro 555

After

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Cpu	Ram	Memory	OpSys	Weight	Price	Gpu_Brand	Gpu_Name
1	0	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 2.3GHz	8	128GB SSD	MacOS	1.37	71379	Intel	Iris Plus Graphics 640
2	1	Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8	128GB Flash Storage	MacOS	1.34	47896	Intel	HD Graphics 6000
3	2	HP	Notebook	15.6	Full HD 1920x1080	Intel Core i5 7200U 2.5GHz	8	256GB SSD	N/A	1.86	30636	Intel	HD Graphics 620
4	3	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.7GHz	16	512GB SSD	MacOS	1.83	135195	AMD	Radeon Pro 455
5	4	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	Intel Core i5 3.1GHz	8	256GB SSD	MacOS	1.37	96096	Intel	Iris Plus Graphics 650
6	5	Acer	Notebook	15.6	1366x768	AMD A9-Series 9420 3GHz	4	500GB HDD	Windows	2.1	21312	AMD	Radeon R5
7	6	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	Intel Core i7 2.2GHz	16	256GB Flash Storage	MacOS	2.04	114018	Intel	Iris Pro Graphics
8	7	Apple	Ultrabook	13.3	1440x900	Intel Core i5 1.8GHz	8	256GB Flash Storage	MacOS	1.34	61736	Intel	HD Graphics 6000
9	8	Asus	Ultrabook	14.0	Full HD 1920x1080	Intel Core i7 8550U 1.8GHz	16	512GB SSD	Windows	1.3	79654	Nvidia	GeForce MX150

7. Cpu column – separate Cpu column into Cpu_Brand, Cpu_Speed, Cpu_Name

```sql
--CPU - break Cpu into 3 cols - Cpu_Brand, Cpu_Speed, Cpu_Name
ALTER TABLE laptopdata
ADD
Cpu_Brand VARCHAR(50),
Cpu_Name VARCHAR(50),
Cpu_Speed DECIMAL(10,1);

--select CPU, substring(cpu,1,CHARINDEX(' ',Cpu)-1) from laptopdata
UPDATE t1
SET Cpu_Brand = (SELECT SUBSTRING(Cpu,1,CHARINDEX(' ',Cpu)-1) FROM laptopdata t2
                    WHERE t1.Id = t2.Id) FROM laptopdata t1;

--set speed as decimal and also remove GHz
UPDATE t1
SET Cpu_Speed = (SELECT CAST(REPLACE(TRIM(SUBSTRING(Cpu, LEN(Cpu) - CHARINDEX(' ', REVERSE(Cpu)) + 1, LEN(Cpu))),
                    'GHz', '') AS DECIMAL(10,2))
                    FROM laptopdata t2 WHERE t1.Id = t2.Id)
                    FROM laptopdata t1;

--updata Cpu_Name
WITH cpucte AS
(
    SELECT Id, TRIM(REPLACE(Cpu, Cpu_Brand, '')) AS temp FROM laptopdata
)
UPDATE t1
SET Cpu_Name = SUBSTRING(temp , 1, LEN(temp) - CHARINDEX(' ', REVERSE(temp))+1)
                FROM laptopdata t1
                INNER JOIN cpucte ON t1.Id = cpucte.Id;


SELECT * FROM laptopdata
```

Before

Cpu	Ram
Intel Core i5 2.3GHz	8
Intel Core i5 1.8GHz	8
Intel Core i5 7200U 2.5GHz	8
Intel Core i7 2.7GHz	16
Intel Core i5 3.1GHz	8
AMD A9-Series 9420 3GHz	4
Intel Core i7 2.2GHz	16
Intel Core i5 1.8GHz	8
Intel Core i7 8550U 1.8GHz	16
Intel Core i5 8250U 1.6GHz	8
Intel Core i5 7200U 2.5GHz	4
Intel Core i3 6006U 2GHz	4
Intel Core i7 2.8GHz	16

After

Cpu_Brand	Cpu_Name	Cpu_Speed
Intel	Core i5	2.3
Intel	Core i5	1.8
Intel	Core i5 7200U	2.5
Intel	Core i7	2.7
Intel	Core i5	3.1
AMD	A9-Series 9420	3.0
Intel	Core i7	2.2
Intel	Core i5	1.8
Intel	Core i7 8550U	1.8
Intel	Core i5 8250U	1.6
Intel	Core i5 7200U	2.5
Intel	Core i3 6006U	2.0
Intel	Core i7	2.8

**Shortening the Cpu_Name column. For eg., Core i5 7200U becomes Core i5. This is better for categorical column analysis. The number of distinct Cpu_Names reduce from 92 to 39. After that Cpu column is dropped.

```sql
--deleting 7200 U in Core i5 7200U, keeping only first 2 for categorical analysis
UPDATE t1
SET Cpu_name = (SELECT
                -- Extract the first two words from cpu_name
                CASE
                    WHEN CHARINDEX(' ', cpu_name) = 0 THEN cpu_name
                    WHEN CHARINDEX(' ', cpu_name, CHARINDEX(' ', cpu_name) + 1) = 0 THEN cpu_name
                    ELSE
                        SUBSTRING(
                            cpu_name,
                            1,
                            CHARINDEX(' ', cpu_name, CHARINDEX(' ', cpu_name) + 1) - 1
                        )
                END AS FirstTwoWords
            FROM laptopdata t2
            WHERE t1.Id = t2.Id)
            FROM laptopdata t1;

SELECT  DISTINCT(cpu_name) FROM laptopdata;--39 distinct cpu_names now


--drop Cpu column
ALTER TABLE laptopdata
DROP COLUMN Cpu;

SELECT * FROM laptopdata;
```

Before

Cpu_Brand	Cpu_Name	Cpu_Speed
Intel	Core i5	2.3
Intel	Core i5	1.8
Intel	Core i5 7200U	2.5
Intel	Core i7	2.7
Intel	Core i5	3.1
AMD	A9-Series 9420	3.0
Intel	Core i7	2.2
Intel	Core i5	1.8
Intel	Core i7 8550U	1.8
Intel	Core i5 8250U	1.6
Intel	Core i5 7200U	2.5
Intel	Core i3 6006U	2.0
Intel	Core i7	2.8

After

Cpu_Name
Core i5
Core i5
Core i5
Core i7
Core i5
A9-Series 9420
Core i7
Core i5
Core i7
Core i5
Core i5
Core i3
Core i7

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Ram	Memory	OpSys	Weight	Price	Gpu_Brand	Gpu_Name	Cpu_Brand	Cpu_Name	Cpu_Speed
1	0	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	8	128GB SSD	MacOS	1.37	71379	Intel	Iris Plus Graphics 640	Intel	Core i5	2.3
2	1	Apple	Ultrabook	13.3	1440x900	8	128GB Flash Storage	MacOS	1.34	47896	Intel	HD Graphics 6000	Intel	Core i5	1.8
3	2	HP	Notebook	15.6	Full HD 1920x1080	8	256GB SSD	N/A	1.86	30636	Intel	HD Graphics 620	Intel	Core i5	2.5
4	3	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	16	512GB SSD	MacOS	1.83	135195	AMD	Radeon Pro 455	Intel	Core i7	2.7
5	4	Apple	Ultrabook	13.3	IPS Panel Retina Display 2560x1600	8	256GB SSD	MacOS	1.37	96096	Intel	Iris Plus Graphics 650	Intel	Core i5	3.1
6	5	Acer	Notebook	15.6	1366x768	4	500GB HDD	Windows	2.1	21312	AMD	Radeon R5	AMD	A9-Series 9420	3.0
7	6	Apple	Ultrabook	15.4	IPS Panel Retina Display 2880x1800	16	256GB Flash Storage	MacOS	2.04	114018	Intel	Iris Pro Graphics	Intel	Core i7	2.2
8	7	Apple	Ultrabook	13.3	1440x900	8	256GB Flash Storage	MacOS	1.34	61736	Intel	HD Graphics 6000	Intel	Core i5	1.8

8. Break Screen resolution column into width and height.

```sql
--ScreenResolution - add 2 columns to hold the width and height
ALTER TABLE laptopdata
ADD
Resolution_Width INT,
Resolution_Height INT;

--Get width and height
--width
UPDATE t1
SET Resolution_Width =
                    (SELECT
                    CASE
                        WHEN
                        (LEN(ScreenResolution) - CHARINDEX('x',REVERSE(ScreenResolution))+2)-
                        (LEN(ScreenResolution) - CHARINDEX(' ',REVERSE(ScreenResolution))+3) < 0
                        THEN
                        SUBSTRING(Screenresolution, 1,CHARINDEX('x', screenresolution)-1)
                    ELSE
                        SUBSTRING(Screenresolution,
                        (LEN(ScreenResolution) - CHARINDEX(' ',REVERSE(ScreenResolution))+2),
                        ABS((LEN(ScreenResolution) - CHARINDEX('x',REVERSE(ScreenResolution))+2)-
                        (LEN(ScreenResolution) - CHARINDEX(' ',REVERSE(ScreenResolution))+3))
                        )
                    END
                FROM laptopdata t2
                WHERE t1.Id = t2.Id
                )
        FROM laptopdata t1;
```

```sql
--height
UPDATE t1
SET Resolution_Height = (
                        SELECT
                        TRIM(SUBSTRING(ScreenResolution, CHARINDEX('x', screenresolution)+1, LEN(screenresolution)))
                        FROM laptopdata t2
                        WHERE t1.Id = t2.Id
                        )
        FROM laptopdata t1;


SELECT * FROM laptopdata;
```

Before

ScreenResolution	Ram
IPS Panel Retina Display 2560x1600	8
1440x900	8
Full HD 1920x1080	8
IPS Panel Retina Display 2880x1800	16
IPS Panel Retina Display 2560x1600	8
1366x768	4
IPS Panel Retina Display 2880x1800	16
1440x900	8
Full HD 1920x1080	16
IPS Panel Full HD 1920x1080	8
1366x768	4
Full HD 1920x1080	4
IPS Panel Retina Display 2880x1800	16

After

Resolution_Width	Resolution_Height
2560	1600
1440	900
1920	1080
2880	1800
2560	1600
1366	768
2880	1800
1440	900
1920	1080
1920	1080
1366	768
1920	1080
2880	1800

Results Messages

	Id	Company	TypeName	Inches	ScreenResolution	Ram	Memory	OpSys	Weight	Price	Gpu_Brand	Gpu_Name	Cpu_Brand	Cpu_Name	Cpu_Speed	Resolution_Width	Resolution_Height
1	0	Apple	Ultrabook	13.3	IPS Panel Retina Display 256...	8	128GB SSD	MacOS	1.37	71379	Intel	Iris Plus Graphics...	Intel	Core i5	2.3	2560	1600
2	1	Apple	Ultrabook	13.3	1440x900	8	128GB Flash Storage	MacOS	1.34	47896	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900
3	2	HP	Notebook	15.6	Full HD 1920x1080	8	256GB SSD	N/A	1.86	30636	Intel	HD Graphics 620	Intel	Core i5	2.5	1920	1080
4	3	Apple	Ultrabook	15.4	IPS Panel Retina Display 288...	16	512GB SSD	MacOS	1.83	135195	AMD	Radeon Pro 455	Intel	Core i7	2.7	2880	1800
5	4	Apple	Ultrabook	13.3	IPS Panel Retina Display 256...	8	256GB SSD	MacOS	1.37	96096	Intel	Iris Plus Graphics...	Intel	Core i5	3.1	2560	1600
6	5	Acer	Notebook	15.6	1366x768	4	500GB HDD	Windows	2.1	21312	AMD	Radeon R5	AMD	A9-Series 9420	3.0	1366	768
7	6	Apple	Ultrabook	15.4	IPS Panel Retina Display 288...	16	256GB Flash Storage	MacOS	2.04	114018	Intel	Iris Pro Graphics	Intel	Core i7	2.2	2880	1800
8	7	Apple	Ultrabook	13.3	1440x900	8	256GB Flash Storage	MacOS	1.34	61736	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900
9	8	Asus	Ultrabook	14.0	Full HD 1920x1080	16	512GB SSD	Windows	1.3	79654	Nvidia	GeForce MX150	Intel	Core i7	1.8	1920	1080
10	9	Acer	Ultrabook	14.0	IPS Panel Full HD 1920x1080	8	256GB SSD	Windows	1.6	41026	Intel	UHD Graphics 620	Intel	Core i5	1.6	1920	1080
11	10	HP	Notebook	15.6	1366x768	4	500GB HDD	N/A	1.86	20987	Intel	HD Graphics 620	Intel	Core i5	2.5	1366	768

***Create a new column to hold if the laptop has touchscreen which is indicated in the ScreenResolution column. And then delete the ScreenResolution column**

```
1  --Adding if it is touchscreen or not
2  ALTER TABLE laptopdata
3  ADD Touchscreen INTEGER;
4
5  SELECT * FROM laptopdata WHERE ScreenResolution LIKE '%Touch%';
6
7  UPDATE laptopdata
8  SET Touchscreen = CASE
9                       WHEN ScreenResolution LIKE '%Touch%' THEN 1
10                      ELSE 0
11                    END;
12
13
14 SELECT * FROM laptopdata;
15
16 ALTER TABLE laptopdata
17 DROP COLUMN ScreenResolution;
18
19 SELECT * FROM laptopdata;
```

Results Messages

	Id	Company	TypeName	Inches	Ram	Memory	OpSys	Weight	Price	Gpu_Brand	Gpu_Name	Cpu_Brand	Cpu_Name	Cpu_Speed	Resolution_Width	Resolution_Height	Touchscreen
1	0	Apple	Ultrabook	13.3	8	128GB SSD	MacOS	1.37	71379	Intel	Iris Plus Graphics 640	Intel	Core i5	2.3	2560	1600	0
2	1	Apple	Ultrabook	13.3	8	128GB Flash Storage	MacOS	1.34	47896	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900	0
3	2	HP	Notebook	15.6	8	256GB SSD	N/A	1.86	30636	Intel	HD Graphics 620	Intel	Core i5	2.5	1920	1080	0
4	3	Apple	Ultrabook	15.4	16	512GB SSD	MacOS	1.83	135195	AMD	Radeon Pro 455	Intel	Core i7	2.7	2880	1800	0
5	4	Apple	Ultrabook	13.3	8	256GB SSD	MacOS	1.37	96096	Intel	Iris Plus Graphics 650	Intel	Core i5	3.1	2560	1600	0
6	5	Acer	Notebook	15.6	4	500GB HDD	Windows	2.1	21312	AMD	Radeon R5	AMD	A9-Series 9420	3.0	1366	768	0
7	6	Apple	Ultrabook	15.4	16	256GB Flash Storage	MacOS	2.04	114018	Intel	Iris Pro Graphics	Intel	Core i7	2.2	2880	1800	0
8	7	Apple	Ultrabook	13.3	8	256GB Flash Storage	MacOS	1.34	61736	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900	0
9	8	Asus	Ultrabook	14.0	16	512GB SSD	Windows	1.3	79654	Nvidia	GeForce MX150	Intel	Core i7	1.8	1920	1080	0

9. Memory column – First group Memory based on type (SSD, HDD, Flash Storage, Hybrid). Then for a memory of type '128GB SSD + 1TB HDD' break into two additional columns with Primary_Storage having 128 and Secondary_Storage having 1. Later convert all TBs to GBs and there should be no units.

```sql
--Memory
ALTER TABLE laptopdata
ADD
Memory_Type VARCHAR(50),
Primary_Storage INTEGER,
Secondary_Storage INTEGER;


SELECT Memory,
CASE
    WHEN Memory LIKE '%SSD%' AND Memory LIKE '%HDD%' THEN 'Hybrid'
    WHEN Memory LIKE '%SSD%' THEN 'SSD'
    WHEN Memory LIKE '%HDD%' THEN 'HDD'
    WHEN Memory LIKE '%Flash Storage%' THEN 'Flash Storage'
    WHEN Memory LIKE '%Hybrid%' THEN 'Hybrid'
    WHEN Memory LIKE '%Flash Storage%' AND Memory LIKE '%HDD%' THEN 'Hybrid'
    ELSE NULL
END AS 'memory_type'
FROM laptopdata;


UPDATE laptopdata
SET memory_type = CASE
    WHEN Memory LIKE '%SSD%' AND Memory LIKE '%HDD%' THEN 'Hybrid'
    WHEN Memory LIKE '%SSD%' THEN 'SSD'
    WHEN Memory LIKE '%HDD%' THEN 'HDD'
    WHEN Memory LIKE '%Flash Storage%' THEN 'Flash Storage'
    WHEN Memory LIKE '%Hybrid%' THEN 'Hybrid'
    WHEN Memory LIKE '%Flash Storage%' AND Memory LIKE '%HDD%' THEN 'Hybrid'
    ELSE NULL
END;
```

```sql
-- populate the columns with cte
WITH cte AS
(
    SELECT
        Id, Memory,
        -- Extract the number before the '+' sign
        CASE
            WHEN CHARINDEX('+', Memory) > 0 THEN
                -- Extract substring before '+', then remove non-numeric characters
                LEFT(SUBSTRING(Memory, 1, CHARINDEX('+', Memory) - 1),
                    PATINDEX('%[^0-9]%', SUBSTRING(Memory, 1, CHARINDEX('+', Memory) - 1)) - 1)
            ELSE
                -- Remove non-numeric characters
                LEFT(Memory, PATINDEX('%[^0-9]%', Memory) - 1)
        END AS Memory_Before_Plus,

        -- Extract the number after the '+' sign, if present
        CASE
            WHEN CHARINDEX('+', Memory) > 0 THEN
                CAST(
                LEFT(
                    LTRIM(RTRIM(SUBSTRING(Memory, CHARINDEX('+', Memory) + 1,
                        LEN(Memory) - CHARINDEX('+', Memory)))),
                    PATINDEX('%[^0-9]%', LTRIM(RTRIM(SUBSTRING(Memory, CHARINDEX('+', Memory) + 1,
                        LEN(Memory) - CHARINDEX('+', Memory)))) + 'X') - 1
                ) AS INT
            )
            ELSE
                '0'
        END AS Memory_After_Plus
    FROM laptopdata
)
```

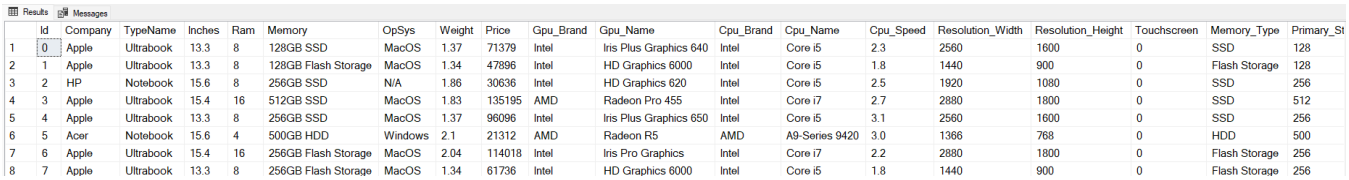
```sql
-- Update the laptopdata table using the cleaned values from the CTE
UPDATE t1
SET
    t1.primary_storage = TRY_CAST(cte.Memory_Before_Plus AS INT),
    t1.secondary_storage = TRY_CAST(cte.Memory_After_Plus AS INT)
FROM laptopdata t1
INNER JOIN cte ON t1.Id = cte.Id;

SELECT * FROM laptopdata
```

Before

Memory	OpSys
128GB SSD	MacOS
128GB Flash Storage	MacOS
256GB SSD	N/A
512GB SSD	MacOS
256GB SSD	MacOS
500GB HDD	Window
256GB Flash Storage	MacOS
256GB Flash Storage	MacOS
512GB SSD	Window
256GB SSD	Window
500GB HDD	N/A
500GB HDD	N/A
256GB SSD	MacOS

After

Memory_Type	Primary_Storage	Secondary_Storage
SSD	128	0
Flash Storage	128	0
SSD	256	0
SSD	512	0
SSD	256	0
HDD	500	0
Flash Storage	256	0
Flash Storage	256	0
SSD	512	0
SSD	256	0
HDD	500	0
HDD	500	0
SSD	256	0



	Id	Company	TypeName	Inches	Ram	Memory	OpSys	Weight	Price	Gpu_Brand	Gpu_Name	Cpu_Brand	Cpu_Name	Cpu_Speed	Resolution_Width	Resolution_Height	Touchscreen	Memory_Type	Primary_St
1	0	Apple	Ultrabook	13.3	8	128GB SSD	MacOS	1.37	71379	Intel	Iris Plus Graphics 640	Intel	Core i5	2.3	2560	1600	0	SSD	128
2	1	Apple	Ultrabook	13.3	8	128GB Flash Storage	MacOS	1.34	47896	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900	0	Flash Storage	128
3	2	HP	Notebook	15.6	8	256GB SSD	N/A	1.86	30636	Intel	HD Graphics 620	Intel	Core i5	2.5	1920	1080	0	SSD	256
4	3	Apple	Ultrabook	15.4	16	512GB SSD	MacOS	1.83	135195	AMD	Radeon Pro 455	Intel	Core i7	2.7	2880	1800	0	SSD	512
5	4	Apple	Ultrabook	13.3	8	256GB SSD	MacOS	1.37	96096	Intel	Iris Plus Graphics 650	Intel	Core i5	3.1	2560	1600	0	SSD	256
6	5	Acer	Notebook	15.6	4	500GB HDD	Windows	2.1	21312	AMD	Radeon R5	AMD	A9-Series 9420	3.0	1366	768	0	HDD	500
7	6	Apple	Ultrabook	15.4	16	256GB Flash Storage	MacOS	2.04	114018	Intel	Iris Pro Graphics	Intel	Core i7	2.2	2880	1800	0	Flash Storage	256
8	7	Apple	Ultrabook	13.3	8	256GB Flash Storage	MacOS	1.34	61736	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900	0	Flash Storage	256

updating TB to GBs and deleting the memory column.*

```sql
--replace TB with GBs
SELECT primary_storage,
    CASE
        WHEN primary_storage <= 2 THEN primary_storage*1024 ELSE primary_storage END,
    secondary_storage,
    CASE
        WHEN secondary_storage <= 2 THEN secondary_storage*1024 ELSE secondary_storage END
FROM laptopdata;


UPDATE laptopdata
SET
    primary_storage =
        CASE
            WHEN primary_storage <= 2
            THEN primary_storage * 1024
            ELSE primary_storage
        END,
    secondary_storage =
        CASE
            WHEN secondary_storage <= 2
            THEN secondary_storage * 1024
            ELSE secondary_storage
        END;

--Drop memory column
ALTER TABLE laptopdata
DROP COLUMN Memory;

SELECT * FROM laptopdata
```

Before

Memory_Type	Primary_Storage	Secondary_Storage
Hybrid	128	1
HDD	500	0
SSD	256	0
SSD	256	0
HDD	1	0
Flash Storage	128	0
SSD	256	0
SSD	256	256
HDD	1	0
Flash Storage	64	0
Flash Storage	32	0

After

Memory_Type	Primary_Storage	Secondary_Storage
Hybrid	128	1024
HDD	500	0
SSD	256	0
SSD	256	0
HDD	1024	0
Flash Storage	128	0
SSD	256	0
SSD	256	256
HDD	1024	0
Flash Storage	64	0
Flash Storage	32	0

Results Messages

	Id	Company	TypeName	Inches	Ram	OpSys	Weight	Price	Gpu_Brand	Gpu_Name	Cpu_Brand	Cpu_Name	Cpu_Speed	Resolution_Width	Resolution_Height	Touchscreen	Memory_Type	Primary_Storage	Secondary_St
1	0	Apple	Ultrabook	13.3	8	MacOS	1.37	71379	Intel	Iris Plus Graphics 640	Intel	Core i5	2.3	2560	1600	0	SSD	128	0
2	1	Apple	Ultrabook	13.3	8	MacOS	1.34	47896	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900	0	Flash Storage	128	0
3	2	HP	Notebook	15.6	8	N/A	1.86	30636	Intel	HD Graphics 620	Intel	Core i5	2.5	1920	1080	0	SSD	256	0
4	3	Apple	Ultrabook	15.4	16	MacOS	1.83	135195	AMD	Radeon Pro 455	Intel	Core i7	2.7	2880	1800	0	SSD	512	0
5	4	Apple	Ultrabook	13.3	8	MacOS	1.37	96096	Intel	Iris Plus Graphics 650	Intel	Core i5	3.1	2560	1600	0	SSD	256	0
6	5	Acer	Notebook	15.6	4	Windows	2.1	21312	AMD	Radeon R5	AMD	A9-Series 9420	3.0	1366	768	0	HDD	500	0
7	6	Apple	Ultrabook	15.4	16	MacOS	2.04	114018	Intel	Iris Pro Graphics	Intel	Core i7	2.2	2880	1800	0	Flash Storage	256	0
8	7	Apple	Ultrabook	13.3	8	MacOS	1.34	61736	Intel	HD Graphics 6000	Intel	Core i5	1.8	1440	900	0	Flash Storage	256	0
9	8	Asus	Ultrabook	14.0	16	Windows	1.3	79654	Nvidia	GeForce MX150	Intel	Core i7	1.8	1920	1080	0	SSD	512	0
10	9	Acer	Ultrabook	14.0	8	Windows	1.6	41026	Intel	UHD Graphics 620	Intel	Core i5	1.6	1920	1080	0	SSD	256	0

10. Revisited the Gpu_Name column. There are 106 distinct Gpu_Name values and it will not result in meaningful Categorical data analysis. So dropping this column.

```
1  --drop Gpu_Name column as there are too many categorical columns
2  -- for meaning ful ML prediction
3  ALTER TABLE laptopdata
4  DROP COLUMN gpu_name;
5
6  SELECT * FROM laptopdata
```

Before

Gpu_Brand	Gpu_Name
Nvidia	GeForce GTX 1050
AMD	Radeon R2
Intel	UHD Graphics 620
Intel	HD Graphics 620
Intel	HD Graphics 520
Intel	HD Graphics 6000
AMD	Radeon 530
Intel	UHD Graphics 620
Nvidia	GeForce 930MX
Intel	HD Graphics
AMD	Radeon R2
AMD	Radeon 530

Results Messages

	Id	Company	TypeName	Inches	Ram	OpSys	Weight	Price	Gpu_Brand	Cpu_Brand	Cpu_Name	Cpu_Speed	Resolution_Width	Resolution_Height	Touchscreen	Memory_Type	Primary_Storage	Secondary_Storage
1	0	Apple	Ultrabook	13.3	8	MacOS	1.37	71379	Intel	Intel	Core i5	2.3	2560	1600	0	SSD	128	0
2	1	Apple	Ultrabook	13.3	8	MacOS	1.34	47896	Intel	Intel	Core i5	1.8	1440	900	0	Flash Storage	128	0
3	2	HP	Notebook	15.6	8	N/A	1.86	30636	Intel	Intel	Core i5	2.5	1920	1080	0	SSD	256	0
4	3	Apple	Ultrabook	15.4	16	MacOS	1.83	135195	AMD	Intel	Core i7	2.7	2880	1800	0	SSD	512	0
5	4	Apple	Ultrabook	13.3	8	MacOS	1.37	96096	Intel	Intel	Core i5	3.1	2560	1600	0	SSD	256	0
6	5	Acer	Notebook	15.6	4	Windows	2.1	21312	AMD	AMD	A9-Series 9420	3.0	1366	768	0	HDD	500	0
7	6	Apple	Ultrabook	15.4	16	MacOS	2.04	114018	Intel	Intel	Core i7	2.2	2880	1800	0	Flash Storage	256	0
8	7	Apple	Ultrabook	13.3	8	MacOS	1.34	61736	Intel	Intel	Core i5	1.8	1440	900	0	Flash Storage	256	0

11. After the cleanup the table schema looks like this