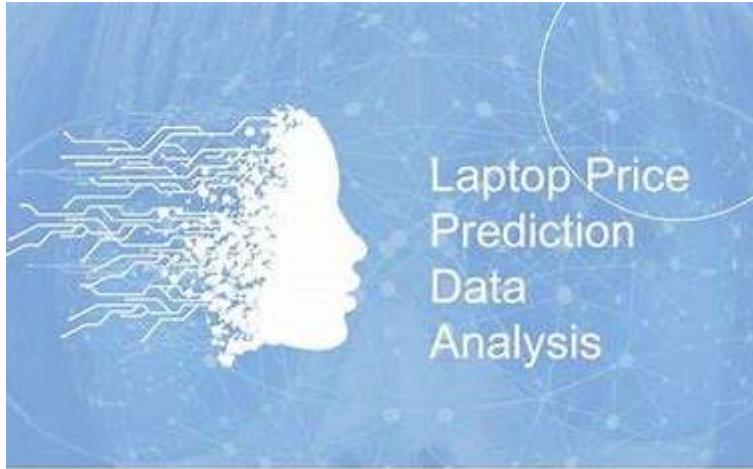


Project : Laptop Price Analysis

Introduction

```
In [1]: from IPython.display import Image  
Image(filename="C:/Users/OneDrive/Desktop/project2/Image.jpeg")
```

Out[1]:



Objective

The objective of laptop price analysis is to understand pricing patterns, identify key factors influencing prices, and provide insights for informed purchasing or selling decisions. This involves examining specifications, market trends, and consumer demands to reveal value-for-money opportunities.

Importing required libraries

```
In [2]: import numpy as np  
import pandas as pd  
import seaborn as sns  
import matplotlib.pyplot as plt
```

Loading data

```
In [3]: df=pd.read_csv('C:/Users/OneDrive/Desktop/project2/Laptop_Price_Dataset.csv')
```

```
In [4]: df
```

Out[4]:

	Laptop	Status	Brand	Model	CPU	RAM	Storage	Storage type
0	ASUS ExpertBook B1 B1502CBA-EJ0436X Intel Core...	New	Asus	ExpertBook	Intel Core i5	8	512	SSD
1	Alurin Go Start Intel Celeron N4020/8GB/256GB ...	New	Alurin	Go	Intel Celeron	8	256	SSD
2	ASUS ExpertBook B1 B1502CBA-EJ0424X Intel Core...	New	Asus	ExpertBook	Intel Core i3	8	256	SSD
3	MSI Katana GF66 12UC-082XES Intel Core i7-1270...	New	MSI	Katana	Intel Core i7	16	1000	SSD
4	HP 15S-FQ5085NS Intel Core i5-1235U/16GB/512GB...	New	HP	15S	Intel Core i5	16	512	SSD
...
2155	Razer Blade 17 FHD 360Hz Intel Core i7-11800H/...	Refurbished	Razer	Blade	Intel Core i7	16	1000	SSD
2156	Razer Blade 17 FHD 360Hz Intel Core i7-11800H/...	Refurbished	Razer	Blade	Intel Core i7	16	1000	SSD
2157	Razer Blade 17 FHD 360Hz Intel Core i7-11800H/...	Refurbished	Razer	Blade	Intel Core i7	32	1000	SSD
2158	Razer Book 13 Intel Evo Core i7-1165G7/16GB/1T...	Refurbished	Razer	Book	Intel Evo Core i7	16	1000	SSD
2159	Razer Book FHD+ Intel Evo Core i7-1165G7/16GB/...	Refurbished	Razer	Book	Intel Evo Core i7	16	256	SSD

2160 rows × 12 columns



In [5]:

```
# head method
df.head()
```

Out[5]:

	Laptop	Status	Brand	Model	CPU	RAM	Storage	Storage type	GPU
0	ASUS ExpertBook B1 B1502CBA-EJ0436X Intel Core...	New	Asus	ExpertBook	Intel Core i5	8	512	SSD	NaN
1	Alurin Go Start Intel Celeron N4020/8GB/256GB ...	New	Alurin	Go	Intel Celeron	8	256	SSD	NaN
2	ASUS ExpertBook B1 B1502CBA-EJ0424X Intel Core...	New	Asus	ExpertBook	Intel Core i3	8	256	SSD	NaN
3	MSI Katana GF66 12UC-082XES Intel Core i7-1270...	New	MSI	Katana	Intel Core i7	16	1000	SSD	RTX 3050
4	HP 15S-FQ5085NS Intel Core i5-1235U/16GB/512GB...	New	HP	15S	Intel Core i5	16	512	SSD	NaN



In [6]:

```
# tail method
df.tail()
```

Out[6]:

	Laptop	Status	Brand	Model	CPU	RAM	Storage	Storage type	GPU
2155	Razer Blade 17 FHD 360Hz Intel Core i7-11800H/...	Refurbished	Razer	Blade	Intel Core i7	16	1000	SSD	RTX 3060
2156	Razer Blade 17 FHD 360Hz Intel Core i7-11800H/...	Refurbished	Razer	Blade	Intel Core i7	16	1000	SSD	RTX 3070
2157	Razer Blade 17 FHD 360Hz Intel Core i7-11800H/...	Refurbished	Razer	Blade	Intel Core i7	32	1000	SSD	RTX 3080
2158	Razer Book 13 Intel Evo Core i7-1165G7/16GB/1T...	Refurbished	Razer	Book	Intel Evo Core i7	16	1000	SSD	NaN
2159	Razer Book FHD+ Intel Evo Core i7-1165G7/16GB/...	Refurbished	Razer	Book	Intel Evo Core i7	16	256	SSD	NaN



Now we will check shape , dimension , rows , columns, columns name

```
In [7]: df.shape
```

```
Out[7]: (2160, 12)
```

```
In [8]: df.ndim
```

```
Out[8]: 2
```

```
In [9]: df.columns
```

```
Out[9]: Index(['Laptop', 'Status', 'Brand', 'Model', 'CPU', 'RAM', 'Storage',  
              'Storage type', 'GPU', 'Screen', 'Touch', 'Final Price'],  
              dtype='object')
```

```
In [10]: df.dtypes
```

```
Out[10]: Laptop          object  
Status           object  
Brand            object  
Model            object  
CPU              object  
RAM             int64  
Storage          int64  
Storage type    object  
GPU              object  
Screen           float64  
Touch             object  
Final Price     float64  
dtype: object
```

```
In [11]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 2160 entries, 0 to 2159  
Data columns (total 12 columns):  
 #   Column      Non-Null Count  Dtype     
 ---  --          -----            
 0   Laptop       2160 non-null   object    
 1   Status       2160 non-null   object    
 2   Brand        2160 non-null   object    
 3   Model        2160 non-null   object    
 4   CPU          2160 non-null   object    
 5   RAM          2160 non-null   int64     
 6   Storage      2160 non-null   int64     
 7   Storage type 2118 non-null   object    
 8   GPU          789 non-null    object    
 9   Screen       2160 non-null   float64  
 10  Touch         2160 non-null   object    
 11  Final Price  2160 non-null   float64  
dtypes: float64(2), int64(2), object(8)  
memory usage: 202.6+ KB
```

Handling Missing Values

```
In [12]: df.isnull().sum()
```

```
Out[12]: Laptop      0  
Status       0  
Brand        0  
Model        0  
CPU          0  
RAM          0  
Storage      0  
Storage type 42  
GPU         1371  
Screen       0  
Touch         0  
Final Price  0  
dtype: int64
```

```
In [13]: df.isna().sum()
```

```
Out[13]: Laptop      0  
Status       0  
Brand        0  
Model        0  
CPU          0  
RAM          0  
Storage      0  
Storage type 42  
GPU         1371  
Screen       0  
Touch         0  
Final Price  0  
dtype: int64
```

Now we will change na or null to 0

```
In [14]: df.fillna(0,inplace=True)
```

```
In [15]: df.isnull().sum()
```

```
Out[15]: Laptop      0  
Status       0  
Brand        0  
Model        0  
CPU          0  
RAM          0  
Storage      0  
Storage type 0  
GPU          0  
Screen       0  
Touch         0  
Final Price  0  
dtype: int64
```

```
In [16]: df.isna().sum()
```

```
Out[16]: Laptop          0  
Status           0  
Brand            0  
Model            0  
CPU              0  
RAM              0  
Storage          0  
Storage type     0  
GPU              0  
Screen           0  
Touch             0  
Final Price      0  
dtype: int64
```

```
In [17]: df.describe()
```

	RAM	Storage	Screen	Final Price
count	2160.000000	2160.000000	2160.000000	2160.000000
mean	15.413889	596.294444	15.140023	1312.638509
std	9.867815	361.220506	1.367766	911.475417
min	4.000000	0.000000	0.000000	201.050000
25%	8.000000	256.000000	14.000000	661.082500
50%	16.000000	512.000000	15.600000	1031.945000
75%	16.000000	1000.000000	15.600000	1708.970000
max	128.000000	4000.000000	18.000000	7150.470000

Here all columns with numeric datatype

```
In [18]: cols=df.loc[:,(df.dtypes==np.int64) | (df.dtypes==np.float64)]
```

```
In [19]: cols
```

Out[19]:

	RAM	Storage	Screen	Final Price
0	8	512	15.6	1009.00
1	8	256	15.6	299.00
2	8	256	15.6	789.00
3	16	1000	15.6	1199.00
4	16	512	15.6	669.01
...
2155	16	1000	17.3	2699.99
2156	16	1000	17.3	2899.99
2157	32	1000	17.3	3399.99
2158	16	1000	13.4	1899.99
2159	16	256	13.4	1699.99

2160 rows × 4 columns

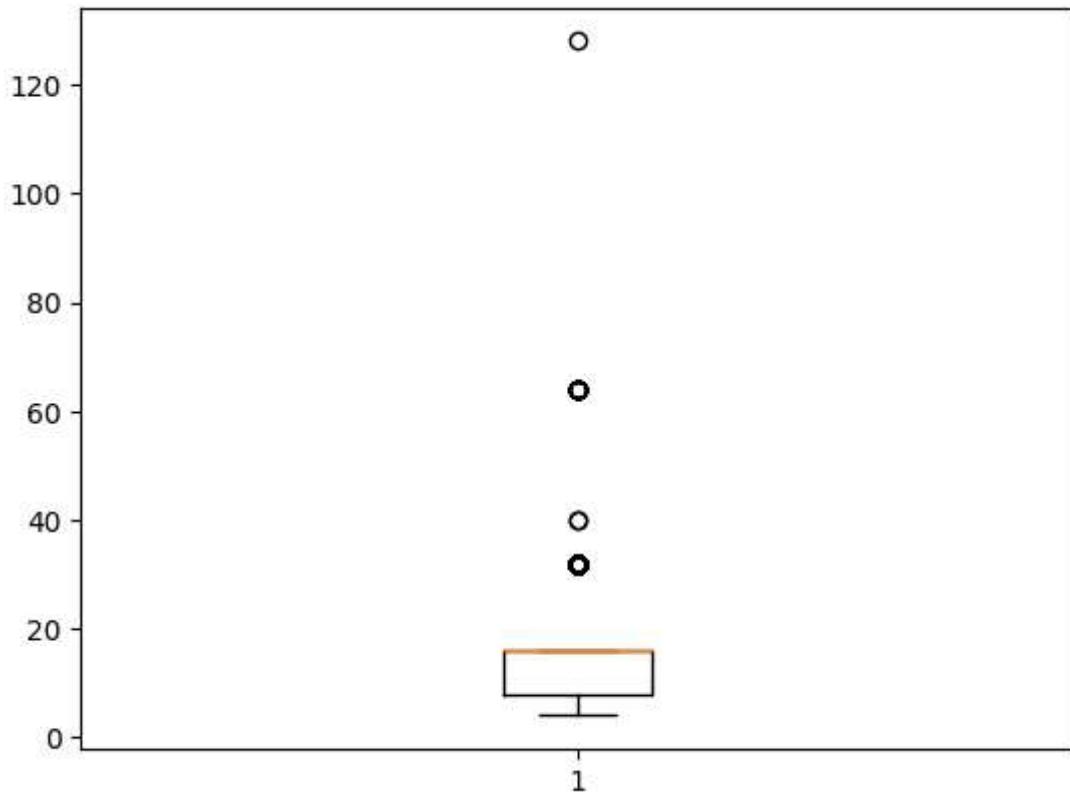
EDA (Exploratory Data Analysis) method

In [20]:

```
# for RAM feature
plt.boxplot(df['RAM'])
```

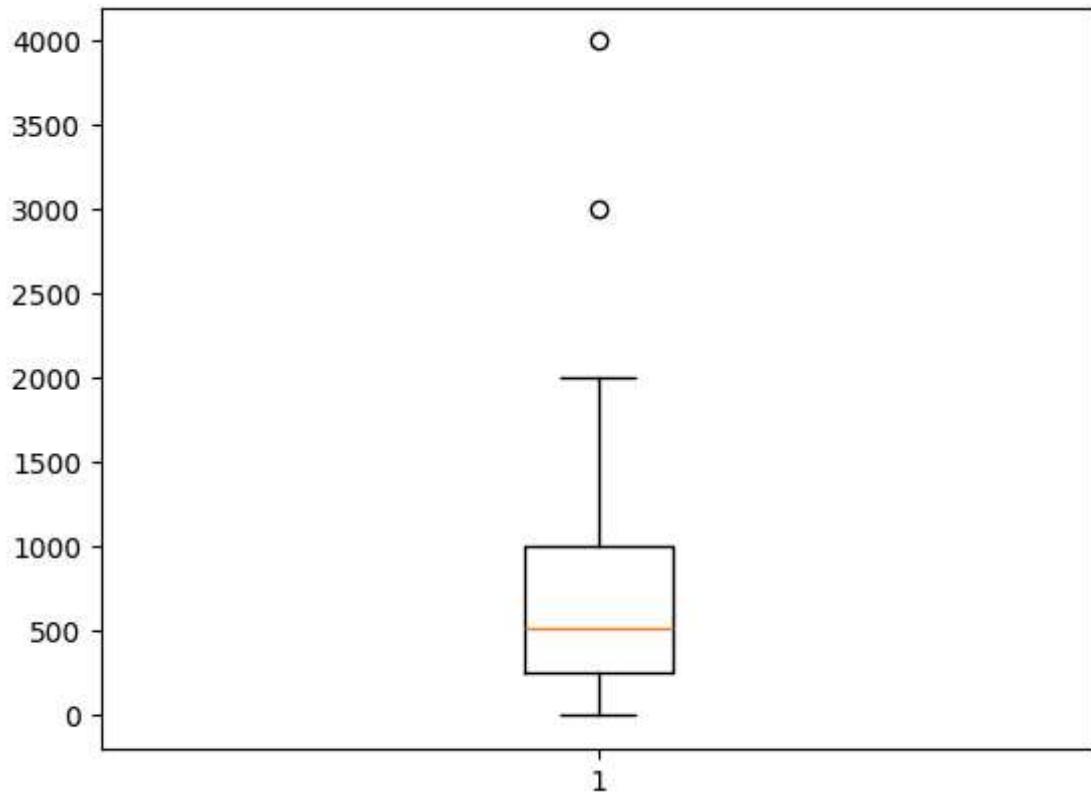
Out[20]:

```
{'whiskers': [
```



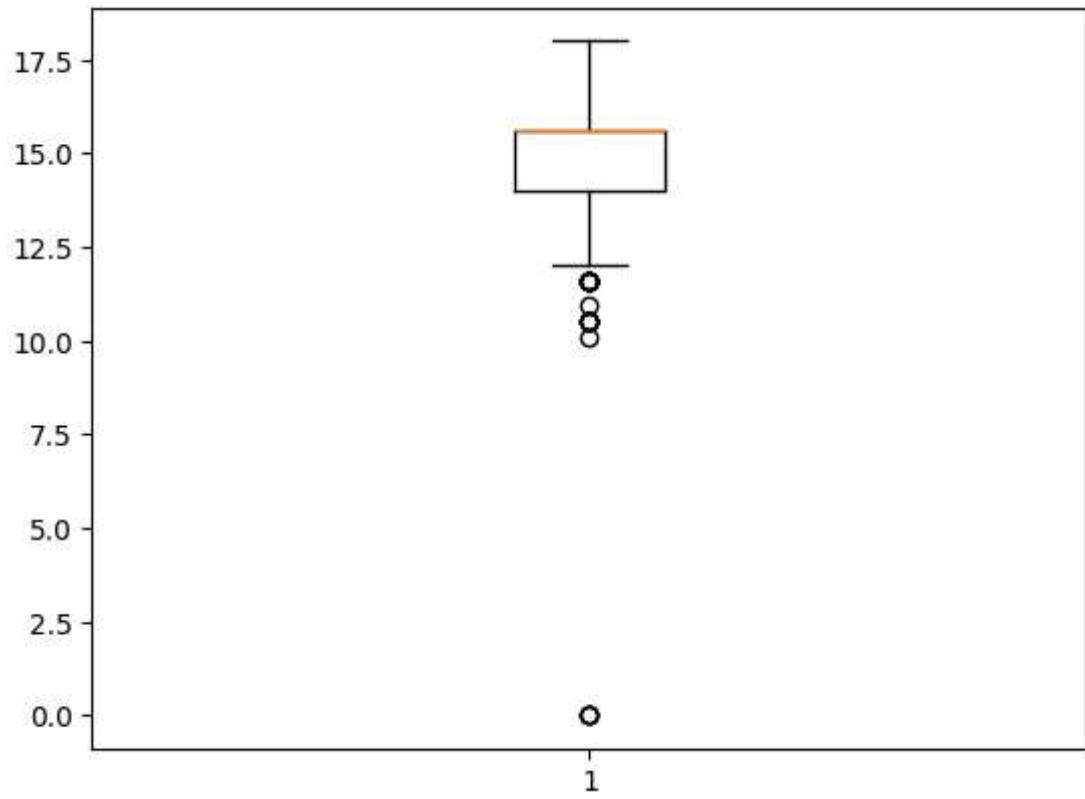
Good to see nicely showing the 25 and 75 quartile. And the data is not wide/infinity/large .

```
In [21]: #for feature Storage  
plt.boxplot(df['Storage'])  
plt.show()
```



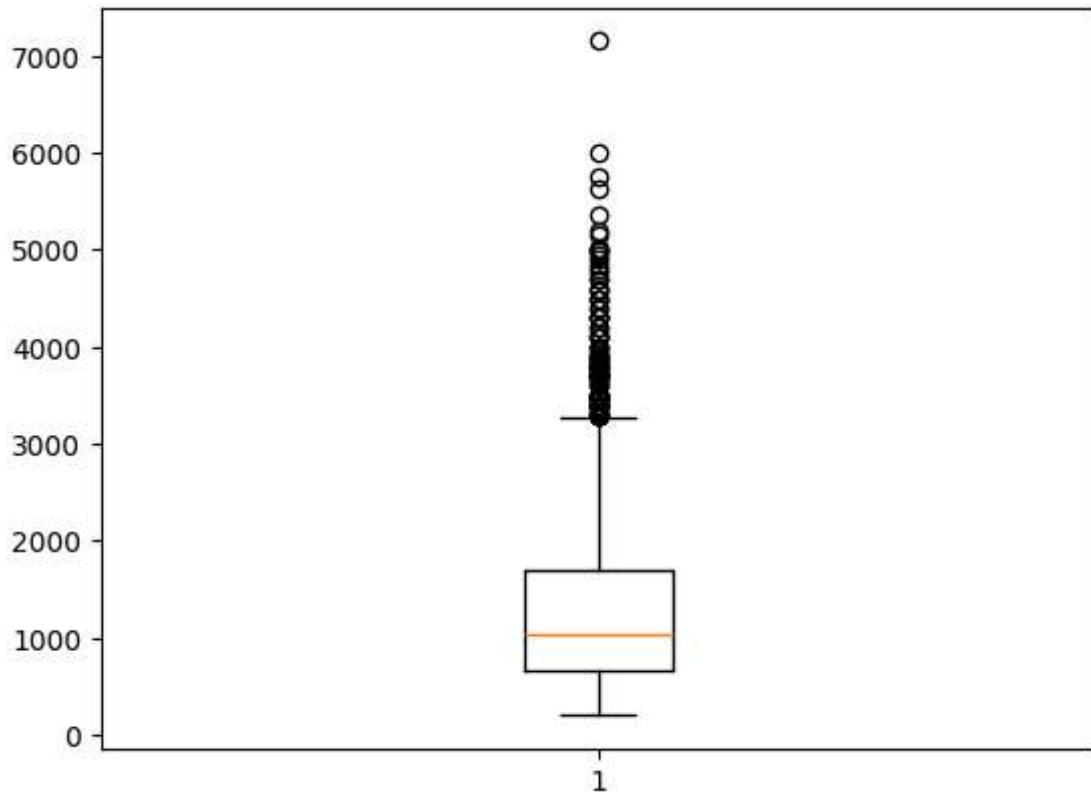
Good to see nicely showing the 25 and 75 quartile. And the data is not wide/infinity/large .

```
In [22]: # for feature Screen  
plt.boxplot(df['Screen'])  
plt.show()
```



Good to see nicely showing the 25 and 75 quartile. And the data is not wide/infinity/large .

```
In [23]: #for feature Final Price  
plt.boxplot(df['Final Price'])  
plt.show()
```



Good to see nicely showing the 25 and 75 quartile. And the data is not wide/infinity/large .

Now we have no any outliers values .

Visualization

```
In [24]: df.head()
```

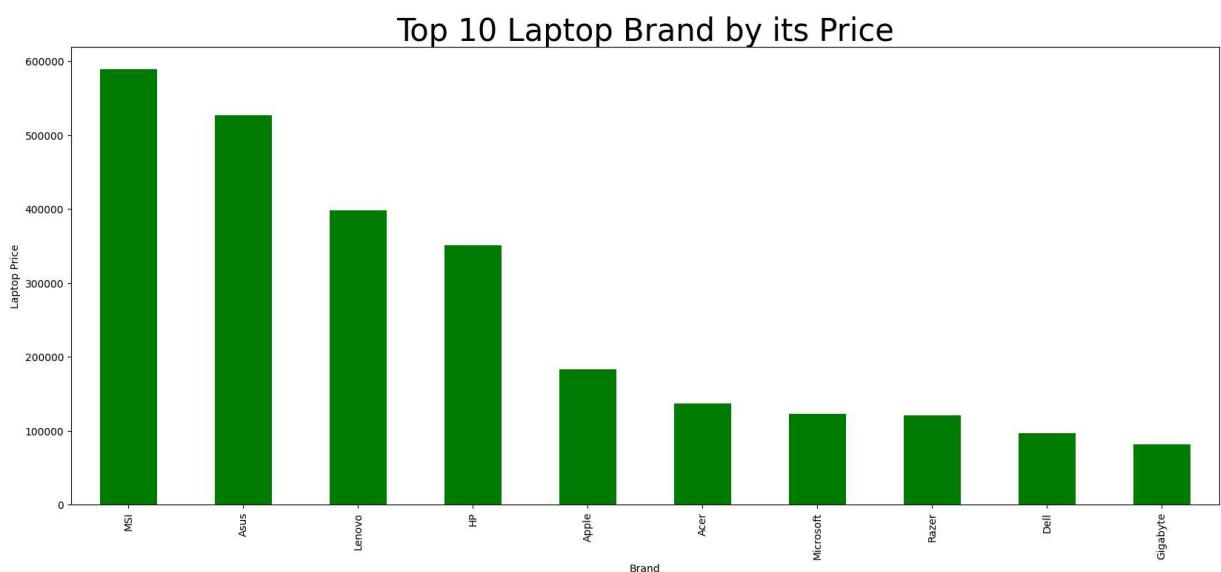
Out[24]:

	Laptop	Status	Brand	Model	CPU	RAM	Storage	Storage type	GPU
0	ASUS ExpertBook B1 B1502CBA-EJ0436X Intel Core...	New	Asus	ExpertBook	Intel Core i5	8	512	SSD	0
1	Alurin Go Start Intel Celeron N4020/8GB/256GB ...	New	Alurin	Go	Intel Celeron	8	256	SSD	0
2	ASUS ExpertBook B1 B1502CBA-EJ0424X Intel Core...	New	Asus	ExpertBook	Intel Core i3	8	256	SSD	0
3	MSI Katana GF66 12UC-082XES Intel Core i7-1270...	New	MSI	Katana	Intel Core i7	16	1000	SSD	RTX 3050
4	HP 15S-FQ5085NS Intel Core i5-1235U/16GB/512GB...	New	HP	15S	Intel Core i5	16	512	SSD	0

Top 10 Laptop Brand by its Price

In [25]:

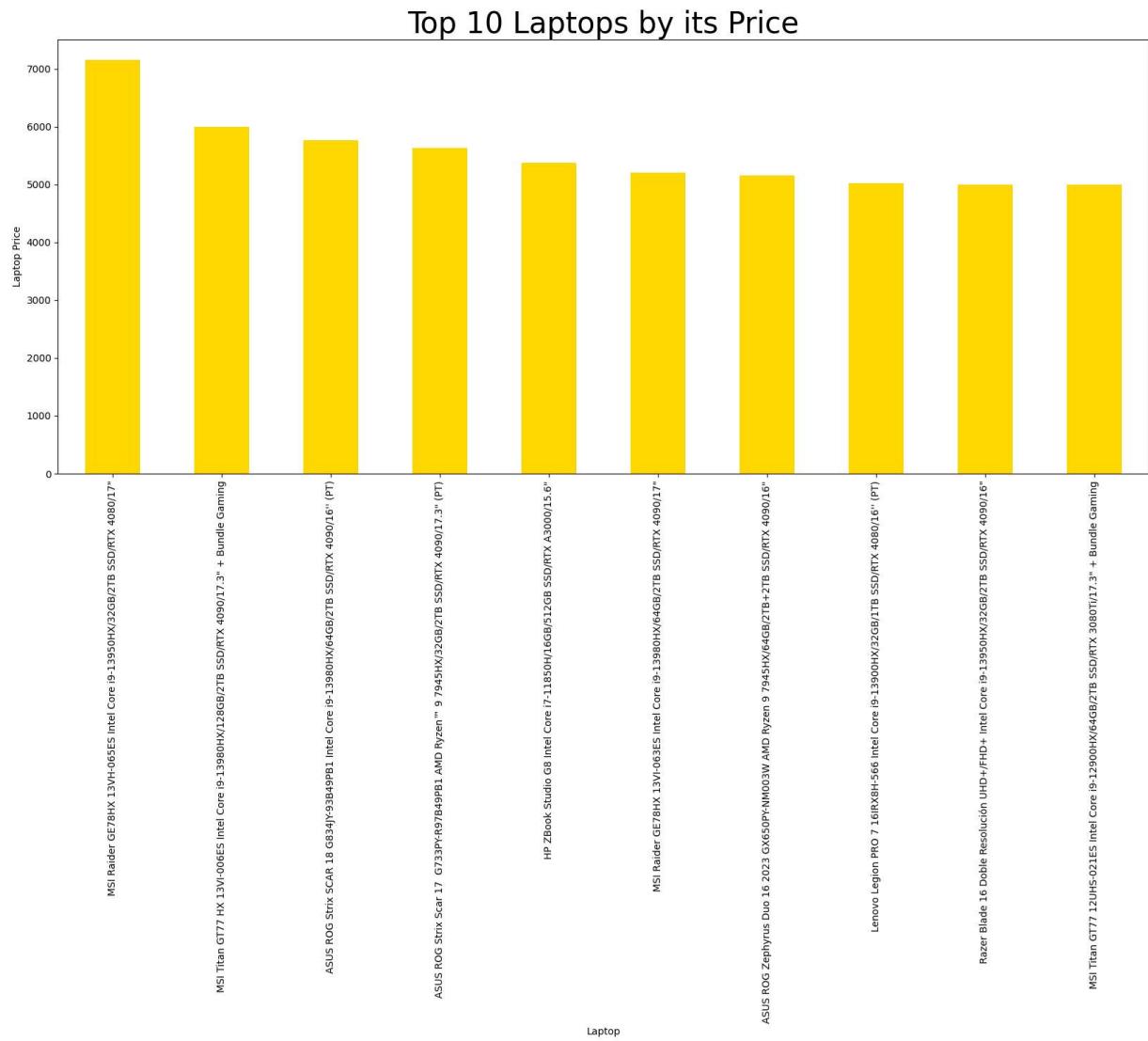
```
plt.figure(figsize=(20,8))
df.groupby('Brand')[["Final Price"]].sum().sort_values(ascending=False).head(10).plot
plt.title("Top 10 Laptop Brand by its Price",size=30)
plt.ylabel("Laptop Price")
plt.show()
```



Here , we can see that MSI brand is the most expensive Laptop brand.

Top 10 Laptops by its Price

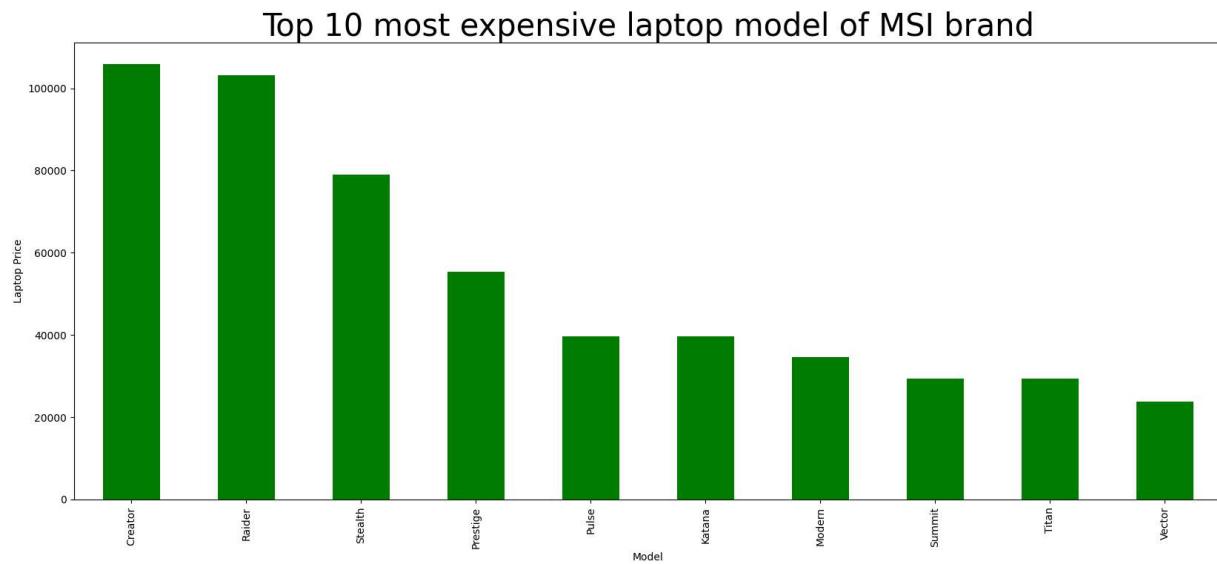
```
In [27]: plt.figure(figsize=(20,8))
df.groupby('Laptop')[["Final Price"]].sum().sort_values(ascending=False).head(10).plot
plt.title("Top 10 Laptops by its Price",size=30)
plt.ylabel("Laptop Price")
plt.show()
```



Here we can see , the most expensive and costly laptop is 'MSI Raider GE78HX 13VH-065ES Intel Core i9-13950HX/32GB/2TB SSD/RTX 4080/....'.

Top 10 most expensive laptop model of MSI Brand

```
In [28]: plt.figure(figsize=(20,8))
df[df['Brand']=='MSI'].groupby('Model')[ 'Final Price'].sum().sort_values(ascending=False)
plt.title("Top 10 most expensive laptop model of MSI brand",size=30)
plt.ylabel("Laptop Price")
plt.show()
```

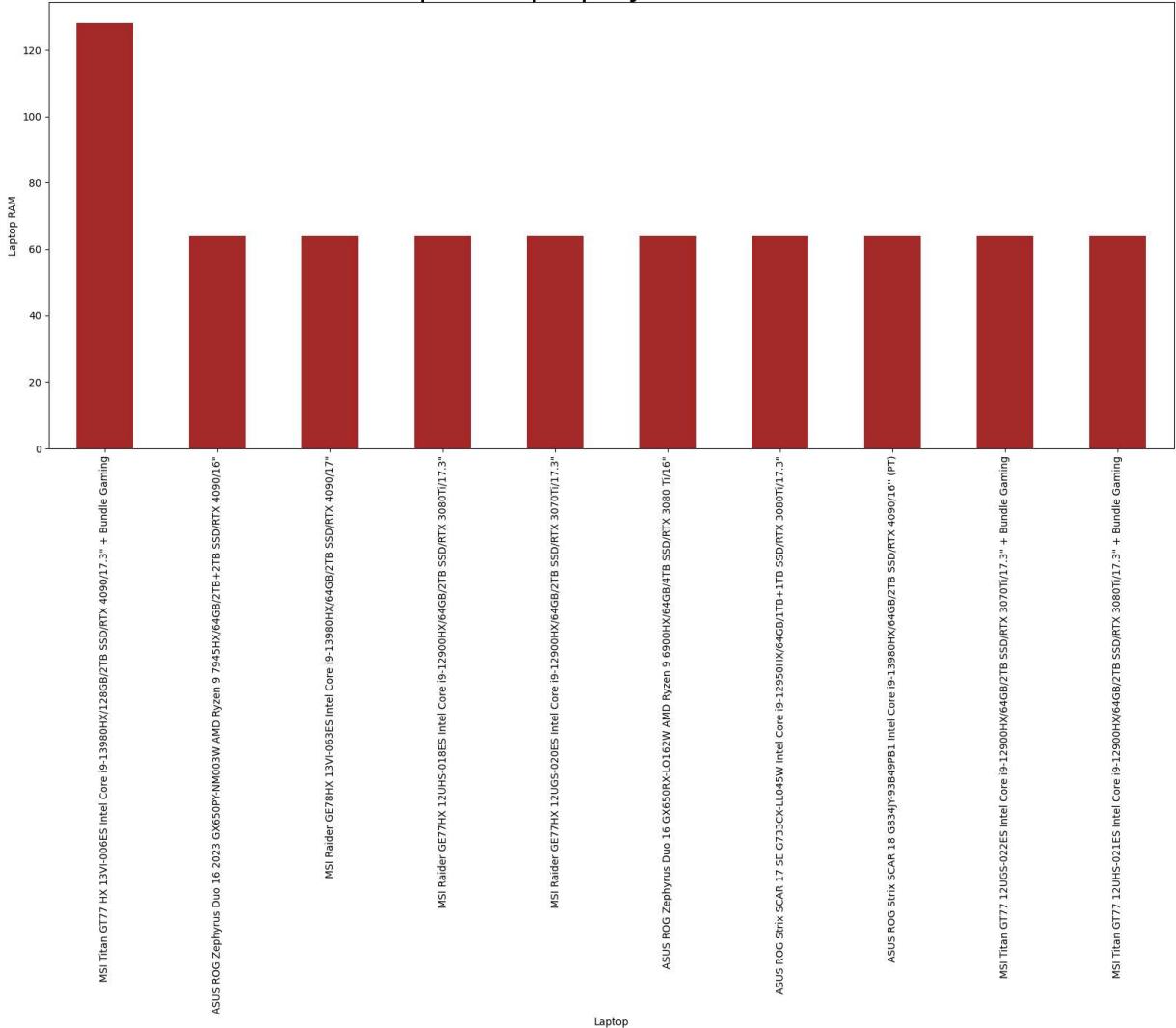


Here we can see that , these are the MSI model in which Creator is the most expensive and costly model of MSI.

Top 10 Laptop by its RAM size

```
In [29]: plt.figure(figsize=(20,8))
df.groupby('Laptop')[ "RAM"].sum().sort_values(ascending=False).head(10).plot(kind='bar')
plt.title("Top 10 Laptop by its RAM size",size=30)
plt.ylabel("Laptop RAM")
plt.show()
```

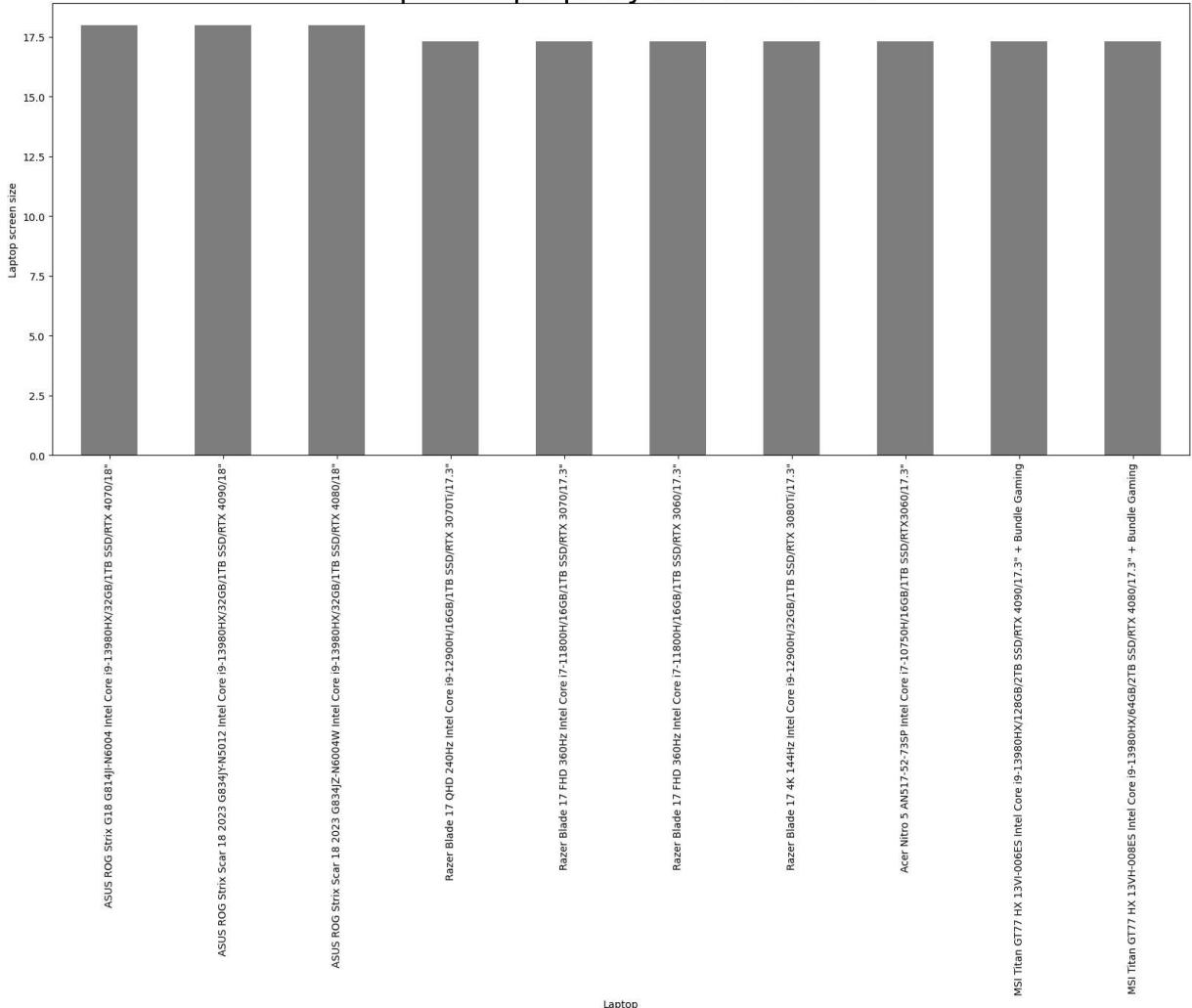
Top 10 Laptop by its RAM size



MSI Titan GT77 HX 13VI-006ES Intel Core i9-139.. is the Laptop with highest RAM size i.e., 128GB

```
In [30]: plt.figure(figsize=(20,8))
df.groupby('Laptop')[["Screen"]].sum().sort_values(ascending=False).head(10).plot(kind='bar')
plt.title("Top 10 Laptops by its Screen size",size=30)
plt.ylabel("Laptop screen size")
plt.show()
```

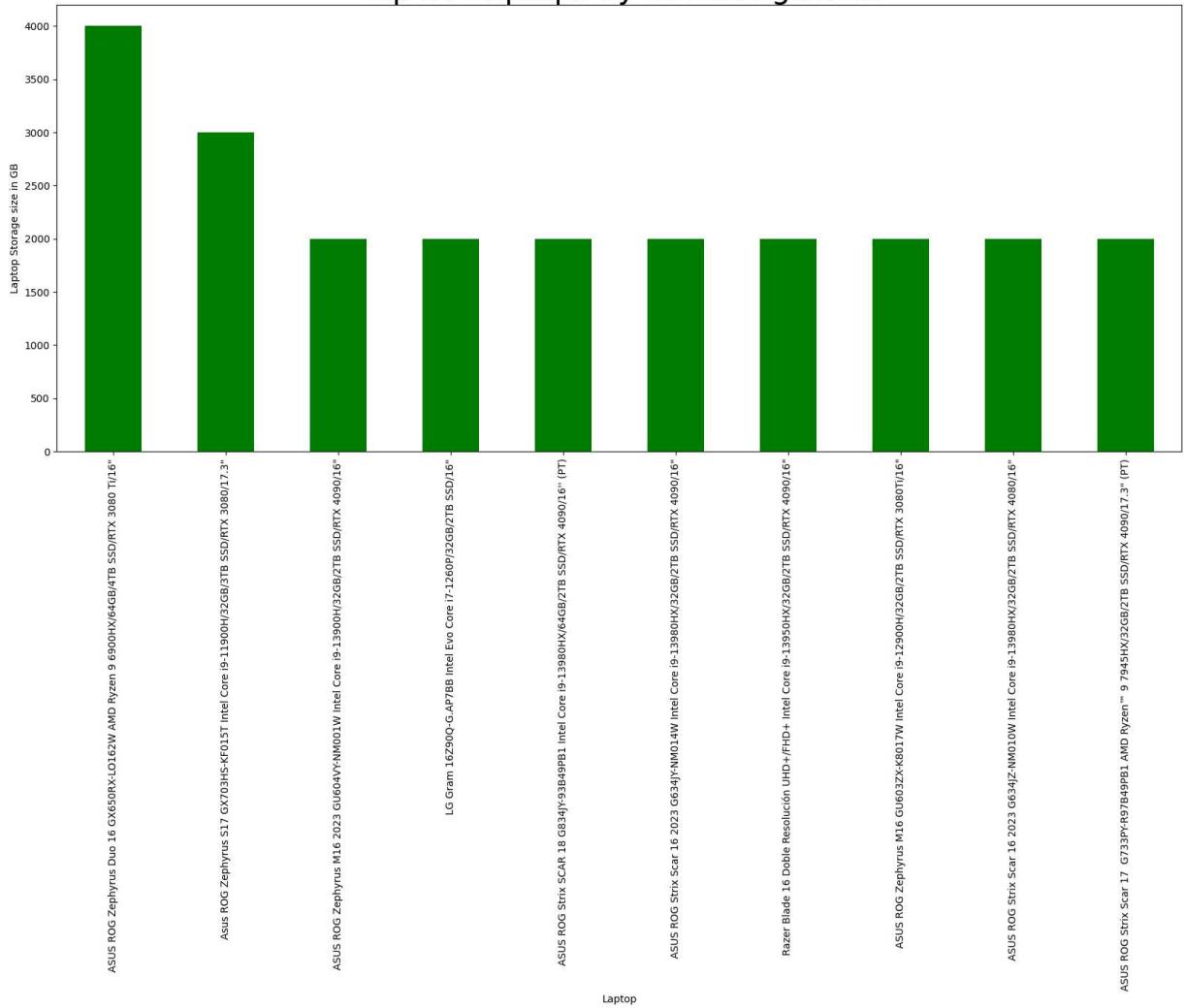
Top 10 Laptops by its Screen size



Here we can see that ASUS brand laptops have big screen size i.e., 17.5

```
In [31]: plt.figure(figsize=(20,8))
df.groupby('Laptop')[["Storage"]].sum().sort_values(ascending=False).head(10).plot(kind='bar')
plt.title("Top 10 Laptops by its Storage size",size=30)
plt.ylabel("Laptop Storage size in GB")
plt.show()
```

Top 10 Laptops by its Storage size



ASUS ROG Zephyrus Duo 16 GX650RX-LO162W AMD Ryzen 9 6900HX/64GB/4TB SSD/RTX 3080 Ti/... has highest storage i.e. 4TB

```
In [32]: df[df['GPU']=='RTX 4090'].sort_values(by='Final Price', ascending=False)
```

Out[32]:

	Laptop	Status	Brand	Model	CPU	RAM	Storage	Storage type	GPU	Si
478	MSI Titan GT77 HX 13VI-006ES Intel Core i9-139...	New	MSI	Titan	Intel Core i9	128	2000	SSD	RTX 4090	
1202	ASUS ROG Strix SCAR 18 G834JY-93B49PB1 Intel C...	New	Asus	ROG	Intel Core i9	64	2000	SSD	RTX 4090	
1245	ASUS ROG Strix Scar 17 G733PY-R97B49PB1 AMD R...	New	Asus	ROG	AMD Radeon 9	32	2000	SSD	RTX 4090	
952	MSI Raider GE78HX 13VI-063ES Intel Core i9-139...	New	MSI	Raider	Intel Core i9	64	2000	SSD	RTX 4090	
495	ASUS ROG Zephyrus Duo 16 2023 GX650PY-NM003WA...	New	Asus	ROG	AMD Ryzen 9	64	2000	SSD	RTX 4090	
550	Razer Blade 16 Doble Resolución UHD+/FHD+ Inte...	New	Razer	Blade	Intel Core i9	32	2000	SSD	RTX 4090	
1606	MSI Titan GT77 HX 13VI-007ES Intel Core i9-139...	New	MSI	Titan	Intel Core i9	64	2000	SSD	RTX 4090	
406	ASUS ROG Strix Scar 16 2023 G634JY-NM014W Inte...	New	Asus	14w	Intel Core i9	32	2000	SSD	RTX 4090	
695	ASUS ROG Zephyrus G14 2023 GA402XY-	New	Asus	ROG	AMD Ryzen 9	32	1000	SSD	RTX 4090	

	Laptop	Status	Brand	Model	CPU	RAM	Storage	Storage type	GPU	Screen
	NC019W AMD ...									
414	ASUS ROG Zephyrus M16 2023 GU604VY-NM001W Intel...	New	Asus	ROG	Intel Core i9	32	2000	SSD	RTX 4090	
763	Lenovo Legion Pro 7 16IRX8H Intel Core i9-1390...	New	Lenovo	Legion	Intel Core i9	32	1000	SSD	RTX 4090	
1601	MSI Raider GE78HX 13VI-201ES Intel Core i7-137...	New	MSI	Raider	Intel Core i7	32	1000	SSD	RTX 4090	
446	MSI Stealth 17 Studio A13VI-030ES Intel Core i...	New	MSI	Stealth	Intel Core i7	32	1000	SSD	RTX 4090	
644	Medion Erazer Beast X40 Intel Core i9-13900HX/...	New	Medion	Beast	Intel Core i9	32	2000	SSD	RTX 4090	
292	ASUS ROG Strix Scar 16 2023 G634JY-N4013 Intel...	New	Asus	ROG	Intel Core i9	32	1000	SSD	RTX 4090	
307	ASUS ROG Strix Scar 18 2023 G834JY-N5012 Intel...	New	Asus	ROG	Intel Core i9	32	1000	SSD	RTX 4090	
903	ASUS ROG Strix SCAR 17 2023 G733PY-LL002 AMD R...	Refurbished	Asus	ROG	AMD Ryzen 9	32	1000	SSD	RTX 4090	

478 MSI Titan GT77 HX 13VI-006ES Intel Core i9-139... New
MSI Titan Intel Core i9 128 2000 SSD RTX 4090 17.3 No
5999.00(price)

Project by

Shailendra Patel