

```
In [1]: import numpy as np
import pandas as pd
from bs4 import BeautifulSoup as bs
import requests
import re
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
```

## Laptop Data collection (Reliance Digital Website)

```
In [2]: page = "https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:available"
```

```
In [33]: page = requests.get("https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:available")
```

```
In [34]: soup = bs(page.text)
```

```
In [ ]: Brand1 = []
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
    b = a.split()
    Brand1.append(b[0])
Model1 = []
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
    b = a.split("(")
    Model1.append(b[0])
Processor1 = []
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
    b = a.split("(")
    c = b[1].split("/")
    Processor1.append(c[0])
ram1 = []
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
    b = re.findall("(\\d+GB)/", a)
    if len(b)>=1:
        ram1.append(b[0])
    else:
        ram1.append(np.nan)
rom1 = []
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
    b = a.split("/")[2]
    rom1.append(b)
Price = []
for i in soup.find_all("span", class_="sc-bxivhb dmBTBc"):
    a = i.text
    Price.append(a)
```

```
In [35]: Brand1 = []
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
```

```
b = a.split()
Brand1.append(b[0])
```

In [38]: `len(Brand1)`

Out[38]: 24

```
Model1 = []
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("(")
    Model1.append(b[0])
```

In [8]: `len(Model1)`

Out[8]: 24

```
Processor1 = []
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("(")
    c = b[1].split("/")
    Processor1.append(c[0])
```

In [10]: `len(Processor1)`

Out[10]: 24

```
ram1 = []
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = re.findall("(\\d+GB)/",a)
    if len(b)>=1:
        ram1.append(b[0])
    else:
        ram1.append(np.nan)
```

In [12]: `len(ram1)`

Out[12]: 24

```
rom1 = []
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("/")[2]
    rom1.append(b)
```

In [14]: `len(rom1)`

Out[14]: 24

```
Graphic_card = []
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
```

```
b = a.split("//")[3]
Graphic_card.append(b)
```

In [16]: len(Graphic\_card)

Out[16]: 24

## Scraping Data from the website

In [4]: text = "https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:&Exclude%20out%20of%20Stock&page=0"

```
Brand = []
Model = []
Processor = []
ram = []
rom = []
Graphic_card = []
Price = []
for i in range(0,1):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    Brand = []
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("(")
        c = b[1].split("/")
        Processor.append(c[0])
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = re.findall("(\\d+GB)/",a)
        if len(b)>=1:
            ram.append(b[0])
        else:
            ram.append(np.nan)
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("//")[2]
        rom.append(b)
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("//")[3]
        Graphic_card.append(b)
    for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
        a = i.text
        Price.append(a)
```

<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:&Exclude%20out%20of%20Stock&page=0>

```
In [6]: print(len(Brand))
print(len(Model))
print(len(ram))
print(len(rom))
print(len(Processor))
print(len(Graphic_card))
print(len(Price))
```

```
24
24
24
24
24
24
24
```

```
In [20]: df1 = pd.DataFrame({
    "Brand" : Brand,
    "Model" : Model,
    "Ram" : ram,
    "Rom" : rom,
    "Processor" : Processor,
    "Price" : Price
})
```

```
In [21]: df1.to_csv("Laptops Price Analysis")
```

```
In [7]: page = requests.get("https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:re")
soup = bs(page.text)
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
    b = a.split()
    Brand.append(b)
```

```
In [8]: len(Brand)
```

```
Out[8]: 48
```

```
In [13]: page = requests.get("https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:re")
soup = bs(page.text)
m = []
for i in soup.find_all("p", class_="sp__name"):
    a = i.text
    b = a.split("(")
    m.append(b[0])
```

```
In [14]: m.pop(1)
```

```
Out[14]: 'Apple MacBook Pro MWP52HNA Quad Core-10th Gen i5-2.0GHz, 16GB,1TB SSD, 33.78 cm '
```

```
In [15]: m.insert(1, "Apple MacBook Pro")
```

```
In [16]: Model+=m
```

```
In [17]: len(Model)
```

Out[17]: 48

```
In [18]: m = ["8 GB", "16 GB", "8 GB", "16 GB", "8 GB", "8 GB", "8 GB", "16 GB", "8 GB", "8 GB", "8 GB", "8 GB"]
```

In [19]: len(m)

Out[19]: 24

```
In [20]: m.pop(1)
```

Out[20]: '16 GB'

In [21]: ram+=m

In [22]: len(ram)

Out[22]: 47

```
In [23]: for i in m:  
    b = i  
    print(b)
```

8 GB  
8 GB  
16 GB  
8 GB  
8 GB  
8 GB  
16 GB  
8 GB  
8 GB  
8 GB  
16 GB  
8 GB  
16 GB  
16 GB  
5/8 GB  
8 GB  
16 GB  
16 GB  
16 GB  
8 GB  
8 GB  
16 GB  
8 GB

```
In [24]: m = ["128 GB SSD", "1TB SSD", "1TB HDD", "1TB HDD", "512GB SSD", "1TB HDD", "256GB SSD", "1TB
```

In [25]: `rom+=m`

In [26]: len(rom)

Out[26]: 48

```
In [27]: page = requests.get("https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:re")
soup = bs(page.text)
```

```
m = []
for i in soup.find_all("p",class_="sp__name"):
    a = i.text
    b = a.split("(")
    c = re.findall("\((.*)/",a)
    print(c)

['13.5 inch) Surface Laptop 3 (10th Gen Core i5/8 GB']
[]
['P1440FA) Laptop (10th Gen Intel Core i5-10210U/8GB/1TB/Intel UHD Graphics 620/Windo
ws 10 Pro/MSO']
['10th Gen Intel Core i7-10750H/16 GB/1 TB SSD/Nvidia GeForce Graphics/Windows 10 Hom
e']
['10th Gen Intel Core i5-10300H/8 GB/512 GB SSD/Nvidia GeForce Graphics/Windows 10 Ho
me']
['11th Gen Intel Core i3-1115G4/8GB/1TB HDD/Intel UHD Graphics/Windows 10/MSO']
['10th Gen Intel Core i3-1005G1/8GB/256GB PCIe-SSD/Intel UHD Graphics/Windows 10/MS
O']
['AMD Ryzen 5/8GB/512GB SSD/AMD Radeon Graphics/Windows 10/MSO']
['10th Gen Intel Core i5-10300H/8GB/256GB SSD+1TB HDD/4GB Nvidia GeForce GTX 1650 Gra
phics/Windows 10/MSO']
['11th Gen Intel Core i5-1135G7/16GB/512GB SSD/Intel Iris Xe Graphics/Windows 10/MS
O']
['11th Gen Intel Core i7-11370H/16GB/512GB SSD/2GB Nvidia GeForce MX 450 Graphics/Win
dows 10/MSO']
['AMD Ryzen 7-5800U/16GB/1TB SSD/AMD Radeon Graphics/Windows 10/MSO']
['AMD\xA0Ryzen\xA07-5800H/8GB/512GB SSD/4GB Nvidia GeForce RTX 3050 Graphics/Windows
10/MSO']
['2021) Laptop (11th Gen Core i7-1165G7/16GB/1TB PCIe-SSD/2GB Nvidia GeForce MX450 Gr
aphics/Windows 10/MSO']
['AMD Ryzen 5 4600H/8GB/1TB HDD + 256GB SSD/4GB NVIDIA GeForce GTX 1650Ti Graphics/Wi
ndows 10 Home']
['AMD Ryzen 5 4600H/8GB/512GB/4GB NVIDIA GeForce GTX 1650 Graphics/Windows 10 Home']
['11th Gen Intel Core i5-1135G7/8GB/512GB SSD/Intel UHD Graphics/Windows 10/MSO']
['11th Gen Intel Core i7-11370H/16GB/512GB SSD/4GB Nvidia GeForce GTX 1650 Graphics/W
indows 10/MSO']
['11th Gen Intel Core i5-11400H/8GB/512GB SSD/4GB Nvidia GeForce GTX 1650 Graphics/Wi
ndows 10/MSO']
['11th Gen Intel Core i7-11800H/16GB/512GB SSD/4GB Nvidia GeForce RTX 3050 Graphics/W
indows 10/MSO']
['AMD Ryzen 9-5900HS/16GB/1TB SSD/4GB Nvidia GeForce GTX 1650 Graphics/Windows 10/MS
O']
['AMD Ryzen R5 3500U/8GB/512GB SSD/AMD Graphics/Windows 10']
['10th Gen Intel Core i7-10510U/16GB/1TB SSD/Intel Graphics/Windows 10/MSO']
['AMD Ryzen 5 4600H/8GB/512GB PCIe-SSD/4GB Nvidia GeForce GTX 1650Ti Graphics/Windows
10']
```

In [29]:

```
for i in range(2,3):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
```

```

for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("(")
    c = b[1].split("/")
    Processor.append(c[0])
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = re.findall("(\\d+GB)/",a)
    if len(b)>=1:
        ram.append(b[0])
    else:
        ram.append(np.nan)
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("/")[2]
    rom.append(b)
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("/")[3]
    Graphic_card.append(b)
for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
    a = i.text
    Price.append(a)

```

<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=2>

In [31]:

```

for i in range(3,4):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        c = b[1].split("/")
        Processor.append(c[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = re.findall("(\\d+GB)/",a)
        if len(b)>=1:
            ram.append(b[0])
        else:
            ram.append(np.nan)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("/")[2]
        rom.append(b)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("/")[3]
        Graphic_card.append(b)

```

```

for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
    a = i.text
    Price.append(a)

```

<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=3>

```

In [33]: for i in range(4,5):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        c = b[1].split("/")
        Processor.append(c[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = re.findall("(\\d+GB)/",a)
        if len(b)>1:
            ram.append(b[0])
        else:
            ram.append(np.nan)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("/")[2]
        rom.append(b)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("/")[3]
        Graphic_card.append(b)
    for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
        a = i.text
        Price.append(a)

```

<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=4>

```

In [35]: for i in range(5,6):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])

```

```

for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("(")
    c = b[1].split("/")
    Processor.append(c[0])
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = re.findall("(\\d+GB)/",a)
    if len(b)>=1:
        ram.append(b[0])
    else:
        ram.append(np.nan)
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("/")[2]
    rom.append(b)
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("/")[3]
    Graphic_card.append(b)
for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
    a = i.text
    Price.append(a)

```

<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=5>

In [36]:

```

for i in range(6,8):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        c = b[1].split("/")
        Processor.append(c[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = re.findall("(\\d+GB)/",a)
        if len(b)>=1:
            ram.append(b[0])
        else:
            ram.append(np.nan)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("/")[2]
        rom.append(b)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("/")[3]
        Graphic_card.append(b)

```

```

for i in soup.find_all("span", class_="sc-bxivhb dmBTBc"):
    a = i.text
    Price.append(a)

https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:
Exclude%20out%20of%20Stock&page=6
https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:
Exclude%20out%20of%20Stock&page=7

```

In [37]:

```

for i in range(8,10):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p", class_="sp_name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p", class_="sp_name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
    for i in soup.find_all("p", class_="sp_name"):
        a = i.text
        b = a.split("(")
        c = b[1].split("/")
        Processor.append(c[0])
    for i in soup.find_all("p", class_="sp_name"):
        a = i.text
        b = re.findall("(\\d+GB)/",a)
        if len(b)>=1:
            ram.append(b[0])
        else:
            ram.append(np.nan)
    for i in soup.find_all("p", class_="sp_name"):
        a = i.text
        b = a.split("/")[2]
        rom.append(b)
    for i in soup.find_all("p", class_="sp_name"):
        a = i.text
        b = a.split("/")[3]
        Graphic_card.append(b)
    for i in soup.find_all("span", class_="sc-bxivhb dmBTBc"):
        a = i.text
        Price.append(a)

```

```

https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:
Exclude%20out%20of%20Stock&page=8
https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:
Exclude%20out%20of%20Stock&page=9

```

In [38]:

```

for i in range(10,13):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p", class_="sp_name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])

```

```

for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("(")
    Model.append(b[0])
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("(")
    c = b[1].split("/")
    Processor.append(c[0])
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = re.findall("(\\d+GB)/",a)
    if len(b)>=1:
        ram.append(b[0])
    else:
        ram.append(np.nan)
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("/")[2]
    rom.append(b)
for i in soup.find_all("p",class_="sp_name"):
    a = i.text
    b = a.split("/")[3]
    Graphic_card.append(b)
for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
    a = i.text
    Price.append(a)

```

<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=10>  
<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=11>  
<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=12>

In [39]:

```

for i in range(13,16):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = a.split("(")
        c = b[1].split("/")
        Processor.append(c[0])
    for i in soup.find_all("p",class_="sp_name"):
        a = i.text
        b = re.findall("(\\d+GB)/",a)
        if len(b)>=1:
            ram.append(b[0])
        else:
            ram.append(np.nan)

```

```

for i in soup.find_all("p",class_="sp__name"):
    a = i.text
    b = a.split("/")[2]
    rom.append(b)
for i in soup.find_all("p",class_="sp__name"):
    a = i.text
    b = a.split("/")[3]
    Graphic_card.append(b)
for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
    a = i.text
    Price.append(a)

```

<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=13>  
<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=14>  
<https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:Exclude%20out%20of%20Stock&page=15>

```

In [40]: for i in range(16,19):
    url = text+str(i)
    print(url)
    page = requests.get(url)
    soup = bs(page.text)
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split()
        Brand.append(b[0])
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("(")
        Model.append(b[0])
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("(")
        c = b[1].split("/")
        Processor.append(c[0])
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = re.findall("(\\d+GB)/",a)
        if len(b)>=1:
            ram.append(b[0])
        else:
            ram.append(np.nan)
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("/")[2]
        rom.append(b)
    for i in soup.find_all("p",class_="sp__name"):
        a = i.text
        b = a.split("/")[3]
        Graphic_card.append(b)
    for i in soup.find_all("span",class_="sc-bxivhb dmBTBc"):
        a = i.text
        Price.append(a)

```

```
https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:
Exclude%20out%20of%20Stock&page=16
https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:
Exclude%20out%20of%20Stock&page=17
https://www.reliancedigital.in/laptops/c/S101210?searchQuery=:relevance:availability:
Exclude%20out%20of%20Stock&page=18
```

## Converting to DataFrame

```
In [42]: laptop = pd.read_csv("Laptops Price Analysis")
In [44]: laptop.drop("Unnamed: 0", axis=1, inplace=True)
```

## Cleaning the data

```
In [ ]: a = laptop["Ram"].reset_index()
In [ ]: a.drop("index", axis=1, inplace=True)
In [ ]: a.iloc[388] = "8GB"
In [ ]: a.iloc[384:408]
In [ ]: ram = []
for i in a["Ram"]:
    ram.append(i)
In [ ]: len(ram)
In [ ]: df = pd.read_csv("Laptops Price Analysis")
In [ ]: df.isnull().sum()
In [ ]: df.drop("Unnamed: 0", axis=1, inplace=True)
In [ ]: df.head()
```

## Converting the Data types

```
In [ ]: Price = []
for i in df["Price"]:
    a = re.sub("[₹,]", "", i)
    b = re.findall("(\\d+).", a)
    Price.append(b[0])
In [ ]: Price
In [ ]: df["Price (₹)"] = Price
In [ ]: df["Price"]
```

```
In [ ]: df["Price (₹)"] = df["Price (₹)"].astype(int)
```

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

```
In [ ]: df1 = pd.DataFrame({  
    "Brand" : Brand,  
    "Model" : Model,  
    "Ram" : ram,  
    "Rom" : rom,  
    "Processor" : Processor,  
    "Price (₹)" : price  
})
```

```
In [ ]: final_df.reset_index()
```

```
In [ ]: final_df.drop("Price",axis=1,inplace=True)
```

## Converting the Final DataFrame to CSV

```
In [72]: final_df.to_csv("Laptop Project")
```

```
In [104... df = pd.read_csv("Laptop Project")
```

```
In [105... df.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [106... df.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 418 entries, 0 to 417  
Data columns (total 6 columns):  
 #   Column      Non-Null Count  Dtype     
 ---  -----      -----            
 0   Brand       418 non-null    object    
 1   Model       418 non-null    object    
 2   Ram         418 non-null    object    
 3   Rom         418 non-null    object    
 4   Processor   418 non-null    object    
 5   Price (₹)  418 non-null    int64    
 dtypes: int64(1), object(5)  
 memory usage: 19.7+ KB
```

```
In [107... df.head()
```

Out[107]:

	Brand	Model	Ram	Rom	Processor	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	130990

In [108... df.Rom.unique()

```
Out[108]: array(['512GB SSD', '256GB SSD + 1TB HDD', '1TB SSD', '256GB SSD',
       '1TB Hard Drive', '1TB HDD+256 GB SSD', '1 TB SSD', '512GB SSD ',
       '64GB eMMC 5.1', '128GB eMMC 5.1', '256 GB SSD', '512 GB SSD',
       '16 GB', '256 GB SSD + 1TB HDD', '1TB HDD + 256GB SSD',
       '512GB SSD + 32GB Optane', '512GB', '512GB SSD Plus 32GB Optane',
       '1TB HDD', '512GB PCIe-SSD', '512GB SDD', 'Intel Iris Xe Graphics',
       '1TB + 256GB Hybrid', '256GB SDD', '128GB SSD',
       '1TB HDD + 256GB PCIe-SSD', '1TB',
       '512GB SSD + 32 GB Optane Memory', '128GB eMMC', '256GB eMMC',
       '1 TB + 256 GB SSD', '1TB HDD', '256 SSD', '1TB HDD+ 256GB SSD',
       '1TB HDD +256GB SSD ', '512GB SSD +32GB Intel Optane Memory',
       '128GB', '512 GB', '512 GB SSD', '128GB eMMC',
       '1 TB HDD + 256GB SSD', '1TB+256GB SSD', '1TB HDD +256GB SSD',
       '512 GB SSD', '1TB SSD ', '256GB', '\u200e512GB SSD',
       '1TB PCIe-SSD', '1TB SATA HDD', '64GB eMMC',
       '\u200e1TB HDD + 256GB SSD', '128 GB eMMC', '256 GB SSD',
       '1 TB HDD', '512GB SSD + 32GB Intel Optane Memory'], dtype=object)
```

In [109... a = []

```
for i in df["Rom"]:
    b = i.replace("512 GB SSD", "512GB SSD")
    a.append(b)
```

In [110... d = []

```
for i in a:
    b = i.replace("256 GB SSD", "256GB SSD")
    d.append(b)
```

In [111... len(d)

Out[111]: 418

In [112... df["Rom"] = d

In [113... df.head()

Out[113]:

	Brand	Model	Ram	Rom	Processor	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	130990

In [114... df["Rom"].unique()

```
Out[114]: array(['512GB SSD', '256GB SSD + 1TB HDD', '1TB SSD', '256GB SSD',
       '1TB Hard Drive', '1TB HDD+256GB SSD', '1 TB SSD', '512GB SSD ',
       '64GB eMMC 5.1', '128GB eMMC 5.1', '16 GB', '1TB HDD + 256GB SSD',
       '512GB SSD + 32GB Optane', '512GB', '512GB SSD Plus 32GB Optane',
       '1TB HDD', '512GB PCIe-SSD', '512GB SDD', 'Intel Iris Xe Graphics',
       '1TB + 256GB Hybrid', '256GB SDD', '128GB SSD',
       '1TB HDD + 256GB PCIe-SSD', '1TB',
       '512GB SSD + 32 GB Optane Memory', '128GB eMMC', '256GB eMMC',
       '1 TB + 256GB SSD', '1TB HDD ', '256 SSD', '1TB HDD+ 256GB SSD',
       '1TB HDD +256GB SSD ', '512GB SSD +32GB Intel Optane Memory',
       '128GB', '512 GB', '512 GB SSD', '128GB eMMC ',
       '1 TB HDD + 256GB SSD', '1TB+256GB SSD', '1TB HDD +256GB SSD',
       ' 512GB SSD', '1TB SSD ', '256GB', '\u200e512GB SSD',
       '1TB PCIe-SSD', '1TB SATA HDD', '64GB eMMC',
       '\u200e1TB HDD + 256GB SSD', '128 GB eMMC', ' 256GB SSD',
       '1 TB HDD', '512GB SSD + 32GB Intel Optane Memory'], dtype=object)
```

```
In [115... b = []
for i in df["Rom"]:
    c = i.replace(" 256GB SSD", "256GB SSD")
    b.append(c)
```

In [116... len(b)

Out[116]: 418

In [117... df["Rom"] = b

In [118... df.head()

Out[118]:

	Brand	Model	Ram	Rom	Processor	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	130990

In [119... df["Rom"].unique()

```
Out[119]: array(['512GB SSD', '256GB SSD + 1TB HDD', '1TB SSD', '256GB SSD',
       '1TB Hard Drive', '1TB HDD+256GB SSD', '1 TB SSD', '512GB SSD ',
       '64GB eMMC 5.1', '128GB eMMC 5.1', '16 GB', '1TB HDD +256GB SSD',
       '512GB SSD + 32GB Optane', '512GB', '512GB SSD Plus 32GB Optane',
       '1TB HDD', '512GB PCIe-SSD', '512GB SDD', 'Intel Iris Xe Graphics',
       '1TB + 256GB Hybrid', '256GB SDD', '128GB SSD',
       '1TB HDD + 256GB PCIe-SSD', '1TB',
       '512GB SSD + 32 GB Optane Memory', '128GB eMMC', '256GB eMMC',
       '1 TB +256GB SSD', '1TB HDD ', '256 SSD', '1TB HDD +256GB SSD ',
       '512GB SSD +32GB Intel Optane Memory', '128GB', '512 GB',
       '512 GB SSD', '128GB eMMC ', '1 TB HDD +256GB SSD',
       '1TB+256GB SSD', '512GB SSD', '1TB SSD ', '256GB',
       '\u200be512GB SSD', '1TB PCIe-SSD', '1TB SATA HDD', '64GB eMMC',
       '\u200be1TB HDD +256GB SSD', '128 GB eMMC', '1 TB HDD',
       '512GB SSD + 32GB Intel Optane Memory'], dtype=object)
```

In [120... df[df["Rom"] == "1TB Hard Drive"]]

Out[120]:

	Brand	Model	Ram	Rom	Processor	Price (₹)
8	Dell	Dell 3511 Inspiron 15 Standard Laptop	8GB	1TB Hard Drive	11th Gen Intel Core i3-1115G4 Processor	40999
128	Asus	Asus BV301T Laptop	4GB	1TB Hard Drive	10th Gen Intel Core i3-10110U	25999
156	Lenovo	Lenovo 92IN IdeaPad 3 Laptop	8GB	1TB Hard Drive	10th Gen Intel Core i3-10110U	31999

In [126... df.iloc[156,3]

Out[126]: '1TB HDD'

In [86]: df.head(30)

Out[86]:

	Brand	Model	Ram	Rom	Processor	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	130990
5	Microsoft	Microsoft 5PB-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 5 4680U	99990
6	Dell	Dell 3515 Inspiron 15 Standard Laptop	8GB	256GB SSD	AMD Ryzen 3 3250U Processor	38999
7	Dell	Dell 3515 Inspiron 15 Standard Laptop	8GB	512GB SSD	AMD Ryzen 3 3250U Processor	42999
8	Dell	Dell 3511 Inspiron 15 Standard Laptop	8GB	1TB HDD	11th Gen Intel Core i3-1115G4 Processor	40999
9	Dell	Dell 3405 Vostro 14 Laptop	8GB	256GB SSD	AMD Ryzen 5-3450U	45799
10	Dell	Dell 3511 Inspiron 15 Standard Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7 Processor	58999
11	Dell	Dell 3511 Inspiron 15 Laptop	8GB	1TB HDD+256GB SSD	11th Gen Intel Core i5-1135G7	63499
12	Lenovo	Lenovo 13IN IdeaPad 3i Laptop	4GB	256GB SSD	10th Gen Intel Core i3-10110U	31999
13	Lenovo	Lenovo 2EIN IdeaPad 3i Laptop	8GB	256GB SSD	10th Gen Intel Core i3-10110U	32999
14	HP	HP Envy x360 E13-AY0508AU Convertible Laptop	16GB	1 TB SSD	AMD Ryzen 7 4700U	91999
15	HP	HP Envy 13-ba1501TX Laptop	16GB	512GB SSD	Intel Core i5-1135G7	77999
16	HP	HP Pavilion 15-DK2076TX Gaming Laptop	16GB	512GB SSD	Intel Core i7-11370H	90999
17	Lenovo	Lenovo 2EHA IdeaPad Slim 3i Laptop	4GB	64GB	Intel Celeron N4020	16999
18	Lenovo	Lenovo 12HA IdeaPad Flex 3i Laptop	4GB	128GB eMMC 5.1	Intel Celeron N4500	23499
19	Lenovo	Lenovo DGIN IdeaPad Slim 3i Laptop	8GB	256GB SSD	Intel Core i5-1135G7	46999
20	HP	HP Pavilion 14-EC0000AX Laptop	16GB	512GB SSD	AMD Ryzen 5 5500U	62999
21	Acer	Acer NX.A1GSI.00D Aspire 5 Laptop	8GB	512GB SSD	Intel Core i5-1135G7	53999

	Brand	Model	Ram	Rom	Processor	Price (₹)
22	HP	HP Pavilion 14-EC0033AU Laptop	8GB	512GB SSD	AMD Ryzen 5 5500U	58999
23	HP	HP 33.78 cm	16GB	16 GB	Intel Core i7-11370H	161999
24	HP	HP 16d0351TX Victus Gaming Laptop	16GB	512GB SSD	11th Gen Intel Core i5-11400H	87999
25	HP	HP 16d0360TX Victus Gaming Laptop	16GB	512GB SSD	11th Gen Intel Core i7-11800H	108999
26	Lenovo	Lenovo 4DIN Ideapad Gaming 3i Laptop	8GB	512GB SSD	11th Gen Intel Core i5-11300H	73999
27	HP	HP 13-BE0030AU Pavilion Aero Laptop	16GB	512GB SSD	AMD Ryzen 5 5600U	65999
28	Asus	Asus HN272T TUF F15 Gaming Laptop	8GB	512GB SSD	10th Gen Intel Core i5-10300H	63990
29	Lenovo	Lenovo G0IN IdeaPad 3i Laptop	8GB	512GB SSD	11th Gen Intel Core i3-1115G4	39499

In [127]:

```
c = []
for i in df["Processor"]:
    a = re.findall("Intel",i)
    if a:
        c.append("Intel")
    else:
        c.append("AMD")
```

In [128]:

len(c)

Out[128]:

418

In [84]:

df["Processor"].unique()

```
Out[84]: array(['11th Gen Intel Core i5-1135G7',
   '11th Gen\xa0Intel Core i3-1115G4', 'AMD Ryzen 5-5600U',
   'AMD Ryzen 7-5800U', 'AMD Ryzen 7 4980U', 'AMD Ryzen 5 4680U',
   'AMD Ryzen 3 3250U Processor',
   '11th Gen Intel Core i3-1115G4 Processor', 'AMD Ryzen 5-3450U',
   '11th Gen Intel Core i5-1135G7 Processor',
   '10th Gen Intel Core i3-10110U',
   '10th Gen\x0AIntel Core i3-10110U', 'AMD Ryzen 7 4700U',
   'Intel Core i5-1135G7', 'Intel Core i7-11370H',
   'Intel Celeron N4020', 'Intel Celeron N4500', 'AMD Ryzen 5 5500U',
   '11th Gen Intel Core i5-11400H', '11th Gen Intel Core i7-11800H',
   '11th Gen Intel Core i5-11300H', 'AMD Ryzen 5 5600U',
   '10th Gen Intel Core i5-10300H', '11th Gen\x0AIntel Core i5',
   'AMD Ryzen 3 3250U', '10th Gen Intel Core i5-10210U',
   '11th Gen Intel Core i7-1165G7',
   '2021) Advantage Edition Gaming Laptop ', 'AMD Ryzen 7-4800HS',
   '11th Gen Intel Core i3-1115G4', 'AMD Ryzen 7-5800H',
   'AMD Ryzen 5-5500U', '11th Gen Intel Core i5-1155G7',
   'AMD Ryzen 9 5900HX', 'AMD 3020e', '11th Gen-Intel Core i5-1135G7',
   '10th Gen-Intel Core i5-1035G1', '12th Gen Intel Core i7-12700H',
   'AMD Ryzen 7-6800H', 'AMD Ryzen- 5 5500U ',
   '11th Gen Intel Core Core i5-1135G7',
   '11th Gen-Intel Core i3-1135G7', '11th Gen-Intel Core i7-1195G7',
   '2021) Laptop ', '10th Gen Intel Core i5-1035G1',
   'AMD Ryzen 7-4700U', 'AMD Ryzen 5 4600H',
   '10th Gen Intel Core i7-10870H', 'AMD Ryzen 7 5800U',
   'AMD Ryzen 7 5700U', '11th Gen Intel Core i5-1135G716GB',
   '10th Gen Intel Core i3-1005G1',
   '11th Gen Intel Evo Core i7-1165G7',
   '9th Gen Intel Core i5-9300HF', '10th Gen Intel Core i7-10750H',
   'Apple M1 Chip', 'P1440FA) Laptop ', 'AMD Ryzen R5 4500U',
   '11th Gen Intel Core i3-1125G4', 'Intel Core i3-1125G4 11th Gen',
   'AMD Ryzen 7 5800H', '10th Gen Intel Core i7-1065G7',
   'Intel Pentium Silver N6000', '11th Gen Intel Core i5-11320H',
   'Apple M1 Pro chip', '11th Gen Intel Core i3-1116G4',
   '11th Gen Intel Core i3-1155G4', 'AMD Ryzen 3-3250U',
   'AMD Ryzen 5 3450U', '11th Gen Intel Core i5-11300H Processor',
   '11th Gen Intel Core i7-11370H Processor',
   'AMD Ryzen 5 5600H Processor', 'Intel Core i7-11800H',
   'AMD Ryzen 7-5700U', '111th Gen Intel Core i5-1135G7',
   'AMD A6-9220e', 'AMD Ryzen 7 4800HS',
   '11th Gen-Intel Core i3-1115G4', '11th Gen-Intel Core i5-1155G7',
   '10th-Intel Core i3-10110U', 'AMD Ryzen 5 3450U Processor',
   '11th Gen Intel Core i3-1115G4 ', 'Microsoft SQ 1',
   'AMD Ryzen 9-5900HS', '2022) G513 Gaming Laptop ',
   '12th Gen-Intel Core i5-12500H',
   'Qualcomm Snapdragon 7C Gen 2 Processor',
   '12th Gen Intel Core i7 processor', 'AMD Ryzen 5-5600H',
   '12th Gen Intel Core i5 processor',
   '12th Gen Intel Core i7 Processor', '2022) Gaming Laptop ',
   '12th Gen-Intel Core i5-1235U', '11th-Intel Core i5-1155G7',
   '11th Generation Intel Core i5-11400H',
   '12th Gen Intel Core i5-12500H', '11th Gen Intel i5-1135G7',
   '11th Gen Intel Core i5 11400H', 'Intel Celeron N4020',
   '11th Gen Intel i3-1115G4', 'Intel Core i5-1240P',
   'AMD Ryzen 5 5625U', '11th Gen-Intel Core i5-11300H',
   '10th Gen-Intel Core i5-10300H',
   '12th Gen Intel Core i5 Processor', 'AMD Ryzen3-3250U',
   '12th Gen Intel Core i7-12650H', 'Intel Celeron',
   '12th Gen Intel Core i7-1260P ', 'AMD Athlon 3020e',
```

```
'AMD Ryzen 5-3500U', '11th Intel Core i5-11300H',
'2022) G713 Gaming Laptop ', 'AMD Ryzen 7 6800H',
'11th Gen-Intel Core i3-1125G4', 'AMD Ryzen 7 4800H',
'12th gen Intel Core i7-1260P', 'Apple M2 chip',
'12th Gen Intel Core i5-1240P', 'AMD Ryzen 7 R7-4800HS',
'12th Gen-Intel Core i7-12700H', '11th Gen Intel Core i3-1125G4 ',
'11th Gen-Intel Core i7-1165G7', '10th Gen-Intel Core i3-10110U',
'11th Gen Intel Core i5- 1155G7', '12th Gen Intel Core i5-12450H',
'11th Gen Intel Core i3 1115G4',
'11th Gen Intel Evo Core i7-1185G7', '11th-Intel Core i3-1115G4',
'AMD Ryzen 5 5500U Processor', 'AMD Ryzen 3 5300U',
'10th Gen Intel i3-10110U', 'AMD Ryzen 3 3200U',
'AMD Ryzen 5 5600H', 'Intel 10th Gen Core i5-10210U',
'Intel 10th Gen Core i3-10110U', '11 Gen Intel Core i3-1115G4',
'10th Gen-Intel Core i3-1005G1',
'11th Generation Intel Core i3-1125G4', '10th Gen Intel i3-1005G1',
'Qualcomm Snapdragon 7c Gen 2', '11th Gen Intel Core i7-1195G7',
'12th Gen Intel i7-12650H', '10th Gen Core i5',
'Quad Core-10th Gen i5-2.0GHz', '10th Gen Intel Core i5',
'10th Gen Intel Core i7', '11th Gen Intel Core i3',
'10th Gen Intel Core i3', '11th Gen Core i7',
'11th Gen Intel Core i5', '11th Gen Intel Core i7', 'AMD Ryzen 5',
'AMD Ryzen R5 3500U'], dtype=object)
```

In [129]: df["Processor Type"] = c

In [134]: df.iloc[386,6]

Out[134]: 'Qualcomm Snapdragon'

In [132]: df[df["Processor"] == "Qualcomm Snapdragon 7c Gen 2"]

	Brand	Model	Ram	Rom	Processor	Price ₹)	Processor Type
386	HP	HP 14-ED0007QU Laptop	16GB	128 GB eMMC	Qualcomm Snapdragon 7c Gen 2	39999	AMD

In [130]: df

Out[130]:

	Brand	Model	Ram	Rom	Processor	Price (₹)	Processor Type
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999	Intel
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999	Intel
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999	AMD
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499	AMD
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7-4980U	130990	AMD
...	...	...	...	...	...	...	...
413	Asus	Asus KG701TS Zenbook 13 Laptop	16 GB	1TB SSD	AMD Ryzen 7-5800U	72499	AMD
414	Lenovo	Lenovo 4DIN Legion 5 Gaming Laptop	8 GB	512GB SSD	AMD Ryzen 7-5800H	89499	AMD
415	VAIO	VAIO E15 V2IN007P Laptop	8 GB	512GB SSD	AMD Ryzen R5 3500U	48999	AMD
416	AVITA	AVITA Liber V14 A8INR672-MB Laptop	16 GB	1TB SSD	10th Gen Intel Core i7	58999	Intel
417	HP	HP 15-ec1051AX Pavilion Gaming Laptop	8 GB	512GB SSD	AMD Ryzen 5-4600H	72999	AMD

418 rows × 7 columns

In [135...]

```
p = []
for i in df["Price (₹)"]:
    p.append(i)
```

In [136...]

len(p)

Out[136]:

418

In [143...]

df["Price (₹)"] = p

In [144...]

df.head()

Out[144]:

	Brand	Model	Ram	Rom	Processor	Price (₹)	Processor Type	Price- (₹)	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999	Intel	81999	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999	Intel	45999	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999	AMD	67999	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499	AMD	72499	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	130990	AMD	130990	130990

In [142...]

df.drop("Price (₹)",axis=1)

Out[142]:

	Brand	Model	Ram	Rom	Processor	Processor Type	Price- (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Intel	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	Intel	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	AMD	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	AMD	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	AMD	130990
...	...	...	...	...	...	...	...
413	Asus	Asus KG701TS Zenbook 13 Laptop	16 GB	1TB SSD	AMD Ryzen 7-5800U	AMD	72499
414	Lenovo	Lenovo 4DIN Legion 5 Gaming Laptop	8 GB	512GB SSD	AMD Ryzen 7-5800H	AMD	89499
415	VAIO	VAIO E15 V2IN007P Laptop	8 GB	512GB SSD	AMD Ryzen R5 3500U	AMD	48999
416	AVITA	AVITA Liber V14 A8INR672-MB Laptop	16 GB	1TB SSD	10th Gen Intel Core i7	Intel	58999
417	HP	HP 15-ec1051AX Pavilion Gaming Laptop	8 GB	512GB SSD	AMD Ryzen 5 4600H	AMD	72999

418 rows × 7 columns

In [145...]

df.head()

Out[145]:

	Brand	Model	Ram	Rom	Processor	Price ₹)	Processor Type	Price- ₹)	Price ₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999	Intel	81999	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999	Intel	45999	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999	AMD	67999	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499	AMD	72499	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	130990	AMD	130990	130990

In [147... df.drop("Price-(₹)",axis=1,inplace=True)

In [148... df.head()

Out[148]:

	Brand	Model	Ram	Rom	Processor	Price ₹)	Processor Type	Price ₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	81999	Intel	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	45999	Intel	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	67999	AMD	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	72499	AMD	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	130990	AMD	130990

In [149... df.drop("Price (₹)",axis=1,inplace=True)

In [150... df.head()

Out[150]:

	Brand	Model	Ram	Rom	Processor	Processor Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Intel	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	256GB SSD + 1TB HDD	11th Gen Intel Core i3-1115G4	Intel	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	AMD	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	AMD	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	AMD	130990

In [151]: df.to\_csv("Laptop Project")

In [3]: import pandas as pd

In [3]: df = pd.read\_csv("Laptop Project")

In [4]: df.drop("Unnamed: 0", axis=1, inplace=True)

In [6]: df.head()

Out[6]:

	Brand	Model	Ram	Rom	Processor	Processor Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Intel	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3-1115G4	Intel	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	AMD	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	AMD	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	AMD	130990

In [7]: df["Rom"].unique()

Out[7]: array(['512GB SSD', '1TB HDD + 256GB SSD', '1TB SSD', '256GB SSD', '1TB HDD', '64GB eMMC 5.1', '128GB eMMC 5.1', '16 GB', '512GB SSD + 32GB Intel Optane Memory', '512GB SDD', '1TB + 256GB Hybrid', '128GB SSD', '512GB', '1TB', '512GB SSD + 32 GB Optane Memory', '128GB eMMC', '256GB eMMC', '256 SSD', '512GB SSD', '256GB', '1TB SATA HDD', '64GB eMMC'], dtype=object)

In [8]: df[df["Rom"] == "1TB HDD +256GB SSD"]

```
Out[8]: Brand Model Ram Rom Processor Processor Type Price (₹)
```

```
In [36]: df.iloc[402,3]
```

```
Out[36]: '1TB HDD + 256GB SSD'
```

```
In [37]: df.iloc[173,:]
```

```
Out[37]:
```

Brand	Dell
Model	Dell 3400 Vostro Laptop
Ram	8GB
Rom	1TB HDD + 256GB SSD
Processor	11th Gen Intel Core i5-1135G7
Processor Type	Intel
Price (₹)	58999
Name:	173, dtype: object

```
In [28]: df["Rom"].unique()
```

```
Out[28]: array(['512GB SSD', '1TB HDD + 256GB SSD', '1TB SSD', '256GB SSD',
   '1TB HDD', '64GB eMMC 5.1', '128GB eMMC 5.1', '16 GB',
   '512GB SSD + 32GB Intel Optane Memory', '512GB SDD',
   '1TB + 256GB Hybrid', '128GB SSD', '512GB', '1TB', '128GB eMMC',
   '256GB eMMC', '256GB', '64GB eMMC'], dtype=object)
```

```
In [29]: df[df["Rom"] == " 512GB SSD"]
```

```
Out[29]: Brand Model Ram Rom Processor Processor Type Price (₹)
```

```
In [27]: df.iloc[268,3]
```

```
Out[27]: '512GB SSD'
```

```
In [26]: df.iloc[278,3] = "512GB SSD"
```

```
In [161... df[df["Brand"] == "Apple"]
```

Out[161]:

	Brand	Model	Ram	Rom	Processor	Processor Type	Price (₹)
103	Apple	Apple MGN73HNA MacBook Air	8GB	512GB	Apple M1 Chip	Apple M1 Chip	110095
104	Apple	Apple MYD92HNA MacBook Pro	8GB	512GB	Apple M1 Chip	Apple M1 Chip	131435
131	Apple	Apple MBPMK183HNA MacBook Pro	16GB	512GB	Apple M1 Pro chip	Apple M1 Pro Chip	225506
201	Apple	Apple Z11C MacBook Pro	8GB	512GB	Apple M1 Chip	Apple M1 Chip	162900
275	Apple	Apple MNEQ3HNA MacBook Pro	8GB	512GB	Apple M2 chip	Apple M2 Chip	149900
280	Apple	Apple Z124 MacBook Air	8GB	256GB	Apple M1 Chip	Apple M1 Chip	112900
283	Apple	Apple MNEH3HNA MacBook Pro	8GB	512GB	Apple M2 chip	Apple M2 Chip	129900
284	Apple	Apple MNEJ3HNA MacBook Pro	8GB	512GB	Apple M2 chip	Apple M2 Chip	149900
285	Apple	Apple MNEH3HNA MacBook Pro	8GB	256GB	Apple M2 chip	Apple M2 Chip	129900
377	Apple	Apple MGN63HNA MacBook Air	8GB	256GB	Apple M1 Chip	Apple M1 Chip	92900
378	Apple	Apple MYD82HNA MacBook Pro	8GB	256GB	Apple M1 Chip	Apple M1 Chip	106699
381	Apple	Apple MGND3HNA MacBook Air	8GB	256GB	Apple M1 Chip	Apple M1 Chip	92900
383	Apple	Apple MBPMKGP3HNA MacBook Pro	16GB	512GB	Apple M1 Pro chip	Apple M1 Pro Chip	183206
395	Apple	Apple MacBook Pro MWP52HNA	16 GB	1TB	Apple M2 chip	Apple M2 Chip	189053

In [160]: df.iloc[395,5] = "Apple M2 Chip"

In [30]: df.to\_csv("Laptop Project")

In [31]: df = pd.read\_csv("Laptop Project")

In [33]: df.drop("Unnamed: 0", axis=1, inplace=True)

In [36]: df["Processor Type"].unique()

Out[36]: array(['Intel', 'AMD', 'Apple M1 Chip', 'Apple M1 Pro Chip', 'Apple M2 Chip', 'Qualcomm Snapdragon'], dtype=object)

In [37]: df.columns

Out[37]: Index(['Brand', 'Model', 'Ram', 'Rom', 'Processor', 'Processor Type', 'Price (₹)',], dtype='object')

In [39]: df[(df["Price (₹)"] &gt; 10000) &amp; (df["Price (₹)"] &lt; 50000)]

Out[39]:

	Brand	Model	Ram	Rom	Processor	Processor Type	Price (₹)
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3-1115G4	Intel	45999
6	Dell	Dell 3515 Inspiron 15 Standard Laptop	8GB	256GB SSD	AMD Ryzen 3 3250U Processor	AMD	38999
7	Dell	Dell 3515 Inspiron 15 Standard Laptop	8GB	512GB SSD	AMD Ryzen 3 3250U Processor	AMD	42999
8	Dell	Dell 3511 Inspiron 15 Standard Laptop	8GB	1TB HDD	11th Gen Intel Core i3-1115G4 Processor	Intel	40999
9	Dell	Dell 3405 Vostro 14 Laptop	8GB	256GB SSD	AMD Ryzen 5-3450U	AMD	45799
...	...	...	...	...	...	...	...
392	Lenovo	Lenovo 49IN IdeaPad 1 Laptop	8GB	512GB SSD	AMD Ryzen 3 3250U	AMD	39499
393	Dell	Dell 3511 Inspiron 15	8GB	1TB HDD + 256GB SSD	10th Gen Intel Core i3-1005G1	Intel	45199
399	Dell	Dell 3501 Inspiron 3000 Laptop	8 GB	1TB HDD	11th Gen Intel Core i3	Intel	41999
400	Dell	Dell 3501 Inspiron 3000 Laptop	8 GB	256GB SSD	10th Gen Intel Core i3	Intel	39999
415	VAIO	VAIO E15 V2IN007P Laptop	8 GB	512GB SSD	AMD Ryzen R5 3500U	AMD	48999

144 rows × 7 columns

In [40]: df[(df["Price (₹)"] &gt; 50000) &amp; (df["Price (₹)"] &lt; 70000)]

Out[40]:

	Brand	Model	Ram	Rom	Processor	Processor Type	Price (₹)
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	AMD	67999
10	Dell	Dell 3511 Inspiron 15 Standard Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7 Processor	Intel	58999
11	Dell	Dell 3511 Inspiron 15 Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Intel	63499
20	HP	HP Pavilion 14-EC0000AX Laptop	16GB	512GB SSD	AMD Ryzen 5 5500U	AMD	62999
21	Acer	Acer NX.A1GSI.00D Aspire 5 Laptop	8GB	512GB SSD	Intel Core i5-1135G7	Intel	53999
...	...	...	...	...	...	...	...
402	HP	HP 15-ec1023AX Pavilion Gaming Laptop	8 GB	1TB HDD + 256GB SSD	AMD Ryzen 5 4600H	AMD	61999
403	HP	HP 15-ec1106AX Pavilion Gaming Laptop	8 GB	512GB SSD	AMD Ryzen 5 4600H	AMD	63999
404	HP	HP 15s-FQ2076TU Laptop	8 GB	512GB SSD	11th Gen Intel Core i5	Intel	52999
409	Dell	Dell 5415 Vostro 14 Laptop	8 GB	512GB SSD	AMD Ryzen 5	AMD	57999
416	AVITA	AVITA Liber V14 A8INR672-MB Laptop	16 GB	1TB SSD	10th Gen Intel Core i7	Intel	58999

130 rows × 7 columns

In [49]:

```
df[(df["Price (₹)"] > 70000) & (df["Price (₹)"] < 200000)]
```

Out[49]:

	Brand	Model	Ram	Rom	Processor	Processor Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Intel	81999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	AMD	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	AMD	130990
5	Microsoft	Microsoft 5PB-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 5 4680U	AMD	99990
14	HP	HP Envy x360 E13-AY0508AU Convertible Laptop	16GB	1TB SSD	AMD Ryzen 7 4700U	AMD	91999
...	...	...	...	...	...	...	...
411	Dell	Dell 9305 XPS 13 Laptop	16 GB	512GB SSD	11th Gen Intel Core i5	Intel	115999
412	Dell	Dell 5310 Inspiron 13 Gaming Laptop	16 GB	512GB SSD	11th Gen Intel Core i7	Intel	92499
413	Asus	Asus KG701TS Zenbook 13 Laptop	16 GB	1TB SSD	AMD Ryzen 7-5800U	AMD	72499
414	Lenovo	Lenovo 4DIN Legion 5 Gaming Laptop	8 GB	512GB SSD	AMD Ryzen 7-5800H	AMD	89499
417	HP	HP 15-ec1051AX Pavilion Gaming Laptop	8 GB	512GB SSD	AMD Ryzen 5 4600H	AMD	72999

143 rows × 7 columns

In [50]: df["Rom"].unique()

```
Out[50]: array(['512GB SSD', '1TB HDD + 256GB SSD', '1TB SSD', '256GB SSD',
       '1TB HDD', '64GB eMMC 5.1', '128GB eMMC 5.1', '16 GB',
       '512GB SSD + 32GB Intel Optane Memory', '512GB SDD',
       '1TB + 256GB Hybrid', '128GB SSD', '512GB', '1TB', '128GB eMMC',
       '256GB eMMC', '256GB', '64GB eMMC'], dtype=object)
```

```
In [66]: Price_Category = []
for i in df["Price (₹)"]:
    if (i>10000) & (i<50000):
        Price_Category.append("Budget Laptop")
    elif (i>50000) & (i<70000):
        Price_Category.append("Mid Range Laptop")
    else:
        Price_Category.append("High End Laptop")
```

In [69]: len(Price\_Category)

Out[69]: 418

In [73]: df["Price Category"] = Price\_Category

```
In [75]: Pcolumn = df.pop("Price Category")
```

```
In [76]: df.insert(5,"Price Category",Pcolumn)
```

```
In [78]: df.to_csv("Laptop Project")
```

```
In [40]: df = pd.read_csv("Laptop Project")
```

```
In [41]: df.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [42]: df.head()
```

Out[42]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3-1115G4	Budget Laptop	Intel	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	Mid Range Laptop	AMD	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	High End Laptop	AMD	72499
4	Microsoft	Microsoft 5U1-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	High End Laptop	AMD	130990

```
In [64]: df["Rom"].unique()
```

```
Out[64]: array(['512GB SSD', '1TB HDD + 256GB SSD', '1TB SSD', '256GB SSD',
       '1TB HDD', '64GB eMMC 5.1', '128GB eMMC 5.1', '16 GB',
       '512GB SSD + 32GB Intel Optane Memory', '1TB + 256GB Hybrid',
       '128GB SSD', '512GB', '1TB', '128GB eMMC', '256GB eMMC', '256GB',
       '64GB eMMC'], dtype=object)
```

In [77]:

```
RomType = []
for i in df["Rom"]:
    if i in ["512GB SSD","1TB SSD","256GB SSD","128GB SSD","512GB","256GB"]:
        RomType.append("Solid State Drive")
    elif i in ["1TB HDD"]:
        RomType.append("Hard Disk Drive")
    elif i in ["64GB eMMC 5.1","128GB eMMC 5.1","128GB eMMC","256GB eMMC","64GB eMMC"]:
        RomType.append("Embedded Multimedia Card")
    elif i in ["1TB HDD + 256GB SSD"]:
        RomType.append("Hard Disk Drive & Solid State Drive")
    else:
        RomType.append("-")
```

```
In [79]: len(RomType)
```

Out[79]: 418

```
df[df["Rom"] == "512GB SSD"]
```

In [63]:

Out[63]: 

Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Price (₹)
-------	-------	-----	-----	-----------	----------------	----------------	-----------

In [54]: df.iloc[373,3] = "512GB SSD"

In [80]: df.insert(7,"Ram Type",RomType)

In [118...]: df.to\_csv("Laptop Project.csv")

In [29]: df = pd.read\_csv("Laptop Project")

In [3]: df.drop("Unnamed: 0",axis=1,inplace=True)

In [4]: df.head()

Out[4]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Ram Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3-1115G4	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	Mid Range Laptop	AMD	Solid State Drive	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	High End Laptop	AMD	Solid State Drive	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	High End Laptop	AMD	Solid State Drive	130990

In [51]: df["Processor"].unique()

```
Out[51]: array(['11th Gen Intel Core i5-1135G7',  
   '11th Gen\xa0Intel Core i3-1115G4', 'AMD Ryzen 5-5600U',  
   'AMD Ryzen 7-5800U', 'AMD Ryzen 7 4980U', 'AMD Ryzen 5 4680U',  
   'AMD Ryzen 3 3250U Processor',  
   '11th Gen Intel Core i3-1115G4 Processor', 'AMD Ryzen 5-3450U',  
   '11th Gen Intel Core i5-1135G7 Processor',  
   '10th Gen Intel Core i3-10110U',  
   '10th Gen\x0aIntel Core i3-10110U', 'AMD Ryzen 7 4700U',  
   'Intel Core i5-1135G7', 'Intel Core i7-11370H',  
   'Intel Celeron N4020', 'Intel Celeron N4500', 'AMD Ryzen 5 5500U',  
   '11th Gen Intel Core i5-11400H', '11th Gen Intel Core i7-11800H',  
   '11th Gen Intel Core i5-11300H', 'AMD Ryzen 5 5600U',  
   '10th Gen Intel Core i5-10300H', '11th Gen\x0aIntel Core i5',  
   'AMD Ryzen 3 3250U', '10th Gen Intel Core i5-10210U',  
   '11th Gen Intel Core i7-1165G7', 'AMD Ryzen 9-5900HX',  
   'AMD Ryzen 7-4800HS', '11th Gen Intel Core i3-1115G4',  
   'AMD Ryzen 7-5800H', 'AMD Ryzen 5-5500U',  
   '11th Gen Intel Core i5-1155G7', 'AMD Ryzen 9 5900HX', 'AMD 3020e',  
   '11th Gen-Intel Core i5-1135G7', '10th Gen-Intel Core i5-1035G1',  
   '12th Gen Intel Core i7-12700H', 'AMD Ryzen 7-6800H',  
   'AMD Ryzen- 5 5500U ', '11th Gen Intel Core Core i5-1135G7',  
   '11th Gen-Intel Core i3-1135G7', '11th Gen-Intel Core i7-1195G7',  
   '2021) Laptop ', '10th Gen Intel Core i5-1035G1',  
   'AMD Ryzen 7-4700U', 'AMD Ryzen 5 4600H',  
   '10th Gen Intel Core i7-10870H', 'AMD Ryzen 7 5800U',  
   'AMD Ryzen 7 5700U', '11th Gen Intel Core i5-1135G716GB',  
   '10th Gen Intel Core i3-1005G1',  
   '11th Gen Intel Evo Core i7-1165G7',  
   '9th Gen Intel Core i5-9300HF', '10th Gen Intel Core i7-10750H',  
   'Apple M1 Chip', 'P1440FA) Laptop ', 'AMD Ryzen R5 4500U',  
   '11th Gen Intel Core i3-1125G4', 'Intel Core i3-1125G4 11th Gen',  
   'AMD Ryzen 7 5800H', '10th Gen Intel Core i7-1065G7',  
   'Intel Pentium Silver N6000', '11th Gen Intel Core i5-11320H',  
   'Apple M1 Pro chip', '11th Gen Intel Core i3-1116G4',  
   '11th Gen Intel Core i3-1155G4', 'AMD Ryzen 3-3250U',  
   'AMD Ryzen 5 3450U', '11th Gen Intel Core i5-11300H Processor',  
   '11th Gen Intel Core i7-11370H Processor',  
   'AMD Ryzen 5 5600H Processor', 'Intel Core i7-11800H',  
   'AMD Ryzen 7-5700U', '111th Gen Intel Core i5-1135G7',  
   'AMD A6-9220e', 'AMD Ryzen 7 4800HS',  
   '11th Gen-Intel Core i3-1115G4', '11th Gen-Intel Core i5-1155G7',  
   '10th-Intel Core i3-10110U', 'AMD Ryzen 5 3450U Processor',  
   '11th Gen Intel Core i3-1115G4 ', 'Microsoft SQ 1',  
   'AMD Ryzen 9-5900HS', '2022) G513 Gaming Laptop ',  
   '12th Gen-Intel Core i5-12500H',  
   'Qualcomm Snapdragon 7C Gen 2 Processor',  
   '12th Gen Intel Core i7 processor', 'AMD Ryzen 5-5600H',  
   '12th Gen Intel Core i5 processor',  
   '12th Gen Intel Core i7 Processor', 'AMD Ryzen 7 6800H',  
   '12th Gen-Intel Core i5-1235U', '11th-Intel Core i5-1155G7',  
   '11th Generation Intel Core i5-11400H',  
   '12th Gen Intel Core i5-12500H', '11th Gen Intel i5-1135G7',  
   '11th Gen Intel Core i5 11400H', 'Intel Celeron N4020',  
   '11th Gen Intel i3-1115G4', 'Intel Core i5-1240P',  
   'AMD Ryzen 5 5625U', '11th Gen-Intel Core i5-11300H',  
   '10th Gen-Intel Core i5-10300H',  
   '12th Gen Intel Core i5 Processor', 'AMD Ryzen3-3250U',  
   '12th Gen Intel Core i7-12650H', 'Intel Celeron',  
   '12th Gen Intel Core i7-1260P ', 'AMD Athlon 3020e',  
   'AMD Ryzen 5-3500U', '11th Intel Core i5-11300H',
```

```
'11th Gen-Intel Core i3-1125G4', 'AMD Ryzen 7 4800H',
'12th gen Intel Core i7-1260P', 'Apple M2 chip',
'12th Gen Intel Core i5-1240P', 'AMD Ryzen 7 R7-4800HS',
'12th Gen-Intel Core i7-12700H', '11th Gen Intel Core i3-1125G4',
'11th Gen-Intel Core i7-1165G7', '10th Gen-Intel Core i3-10110U',
'11th Gen Intel Core i5- 1155G7', '12th Gen Intel Core i5-12450H',
'11th Gen Intel Core i3 1115G4',
'11th Gen Intel Evo Core i7-1185G7', '11th-Intel Core i3-1115G4',
'AMD Ryzen 5 5500U Processor', 'AMD Ryzen 3 5300U',
'10th Gen Intel i3-10110U', 'AMD Ryzen 3 3200U',
'AMD Ryzen 5 5600H', 'Intel 10th Gen Core i5-10210U',
'Intel 10th Gen Core i3-10110U', '11 Gen Intel Core i3-1115G4',
'10th Gen-Intel Core i3-1005G1',
'11th Generation Intel Core i3-1125G4', '10th Gen Intel i3-1005G1',
'Qualcomm Snapdragon 7c Gen 2', '11th Gen Intel Core i7-1195G7',
'12th Gen Intel i7-12650H', '10th Gen Core i5',
'10th Gen Intel Core i5', '10th Gen Intel Core i7',
'11th Gen Intel Core i3', '10th Gen Intel Core i3',
'11th Gen Core i7', '11th Gen Intel Core i5',
'11th Gen Intel Core i7', 'AMD Ryzen 5', 'AMD Ryzen R5 3500U'],
dtype=object)
```

In [27]:

```
Processorversion = []
for i in df["Processor"]:
    a = re.findall("Intel (.*)-",i)
    b = re.findall("AMD Ryzen (.*)-",i)
    c = "Intel Core"
    d = "AMD Ryzen"
    if a:
        e = c+" "+a[0]
        Processorversion.append(e)
    elif b:
        f = d+" "+b[0]
        Processorversion.append(f)
```

In [29]:

```
len(Processorversion)
```

Out[29]:

```
285
```

In [52]:

```
df[df["Processor"] == "11th Gen Intel Core i5-1135G7"]
```

Out[52]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Ram Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	81999
11	Dell	Dell 3511 Inspiron 15 Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	63499
31	Dell	Dell 9310 XPS Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	140999
35	Dell	Dell 3501 Inspiron Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	57999
36	Dell	Dell 3501 Inspiron Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	64999
37	HP	HP 15s-fq2071TU Laptop	8GB	512GB SSD + 32GB Intel Optane Memory	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	-	57999
39	Lenovo	Lenovo CTIN Yoga 7 Convertible Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	81990
41	Lenovo	Lenovo CVIN IdeaPad Slim 3i Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	61190
44	Asus	Asus BQ562TS Laptop	8GB	512GB SSD + 32GB Intel Optane Memory	11th Gen Intel Core i5-1135G7	Budget Laptop	Intel	-	49999
45	Asus	Asus EB562TS Laptop	8GB	512GB SSD + 32GB Intel Optane Memory	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	-	52999

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Ram Type	Price (₹)
52	Asus	Asus EB522TS Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Budget Laptop	Intel	Solid State Drive	47999
53	Asus	Asus EK562WS Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Budget Laptop	Intel	Solid State Drive	48999
68	HP	HP 13-bd0004TU Envy x360 Convertible Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	84999
69	Lenovo	Lenovo 22IN IdeaPad Slim 5i Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	67990
70	Lenovo	Lenovo 3VIN IdeaPad Slim 5i Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	74990
73	Lenovo	Lenovo KYIN IdeaPad Slim 3i Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	60999
85	Dell	Dell 3511 Inspiron 15 Gaming Laptop	8GB	1TB + 256GB Hybrid	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	-	64999
94	HP	HP 14s-DQ2535TU Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	55999
95	HP	HP 15s-DR3500TX Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	64999
96	HP	HP 14s-DR2016TU Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	58999
101	Lenovo	Lenovo BQIN IdeaPad 5 Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	64990
102	HP	HP 15S-du3032TU Laptop	8GB	1TB HDD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive	54999
105	Lenovo	Lenovo BPIN IdeaPad 5 Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Hard Disk Drive & Solid State Drive	72990

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Ram Type	Price (₹)
111	Realme	Realme RMNB1002 Book Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	59999
112	Realme	Realme RMNB1002 Book Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	59999
125	Asus	Asus HP562WS Zenbook Flip 13 2-in-1 Convertible...	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	85499
139	Dell	Dell 3400 Vostro Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	61999
145	Dell	Dell Vostro 3400 Laptop	8GB	1TB HDD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive	50499
152	Lenovo	Lenovo 56IN IdeaPad 3 Laptop	8GB	256GB SSD	11th Gen Intel Core i5-1135G7	Budget Laptop	Intel	Solid State Drive	48999
157	Lenovo	Lenovo 4DIN IdeaPad 5 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	65999
160	Lenovo	Lenovo DWIN IdeaPad 3 Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	52999
167	Dell	Dell 3511 Inspiron 15	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	56499
168	Dell	Dell 3511 Inspiron 15	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	57999
173	Dell	Dell 3400 Vostro Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	58999
174	Dell	Dell Inspiron 15 3511 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	63999
184	HP	HP 14-eb0019TX Envy Gaming Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	81999

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Ram Type	Price (₹)
186	HP	HP 14-ea0538TU Spectre x360 Convertible Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	104999
193	Lenovo	Lenovo DCIN IdeaPad 5 Pro Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	64999
194	Lenovo	Lenovo VXIN IdeaPad Flex 5 Convertible Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	66999
241	Dell	Dell Vostro 3400 Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	55499
243	Dell	Dell 3511 Inspiron 15 Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	54999
246	Dell	Dell 3511 Inspiron Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	69999
254	Dell	Dell Vostro 3500 Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	57999
279	Acer	Acer SF314-511 Swift 3 Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	59750
282	Asus	Asus L513WS VivoBook K15 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	64999
306	HP	HP 15s-du3060TX Laptop	8GB	1TB HDD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive	59499
307	Lenovo	Lenovo K0IN IdeaPad Slim 5i Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	64990
333	Lenovo	Lenovo V1IN IdeaPad 3 Laptop	4GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	52999
357	Asus	Asus AU521WS Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	54999
359	Asus	Asus EB502WS Laptop	8GB	256GB SSD	11th Gen Intel Core i5-1135G7	Budget Laptop	Intel	Solid State Drive	43999

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Ram Type	Price (₹)
380	Asus	Asus BQ512TS Vivobook Laptop	8GB	1TB HDD + 256GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Hard Disk Drive & Solid State Drive	53999
389	Lenovo	Lenovo J1IN IdeaPad Slim 3i Laptop	8GB	512GB SSD	11th Gen Intel Core i5-1135G7	Mid Range Laptop	Intel	Solid State Drive	50999

```
In [49]: df.iloc[211,4]
```

```
Out[49]: 'AMD Ryzen 7 6800H'
```

```
In [54]: df.rename(columns={"Ram Type": "Rom Type"}, inplace=True)
```

```
In [87]: df[df["Brand"] == "Apple"]
```

Out[87]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
103	Apple	Apple MGN73HNA MacBook Air	8GB	512GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	110095
104	Apple	Apple MYD92HNA MacBook Pro	8GB	512GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	131435
131	Apple	Apple MBPMK183HNA MacBook Pro	16GB	512GB	Apple M1 Pro chip	High End Laptop	Apple M1 Pro Chip	Solid State Drive	225506
201	Apple	Apple Z11C MacBook Pro	8GB	512GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	162900
275	Apple	Apple MNEQ3HNA MacBook Pro	8GB	512GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	149900
280	Apple	Apple Z124 MacBook Air	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	112900
283	Apple	Apple MNEH3HNA MacBook Pro	8GB	512GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	129900
284	Apple	Apple MNEJ3HNA MacBook Pro	8GB	512GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	149900
285	Apple	Apple MNEH3HNA MacBook Pro	8GB	256GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	129900
377	Apple	Apple MGN63HNA MacBook Air	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	92900
378	Apple	Apple MYD82HNA MacBook Pro	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	106699
381	Apple	Apple MGND3HNA MacBook Air	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	92900
383	Apple	Apple MBPMKG3HNA MacBook Pro	16GB	512GB	Apple M1 Pro chip	High End Laptop	Apple M1 Pro Chip	Solid State Drive	183206
395	Apple	Apple MacBook Pro MW5P5HNA	16 GB	1TB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	189053

In [84]: df.iloc[37, -2]

```
Out[84]:
```

Brand	HP
Model	HP 15s-fq2071TU Laptop
Ram	8GB
Rom	512GB SSD + 32GB Intel Optane Memory
Processor	11th Gen Intel Core i5-1135G7
Price Category	Mid Range Laptop
Processor Type	Intel
Rom Type	Solid State Drive & Intel Optane Memory
Price (₹)	57999
Name:	37, dtype: object

```
In [88]: df.to_csv("Laptop Project.csv")
```

```
In [89]: df.head()
```

```
Out[89]:
```

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5-1135G7	High End Laptop	Intel	Solid State Drive	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3-1115G4	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5-5600U	Mid Range Laptop	AMD	Solid State Drive	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7-5800U	High End Laptop	AMD	Solid State Drive	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7 4980U	High End Laptop	AMD	Solid State Drive	130990

```
In [165...]: df["Processor"].unique()
```

```
Out[165]: array(['11th Gen Intel Core i5', '11th Gen Intel Core i3', 'AMD Ryzen 5',  
   'AMD Ryzen 7', 'AMD Ryzen 7 4980U', 'AMD Ryzen 5 4680U',  
   'AMD Ryzen 3 3250U Processor',  
   '11th Gen Intel Core i3-1115G4 Processor', 'AMD Ryzen 5-3450U',  
   '11th Gen Intel Core i5-1135G7 Processor',  
   '10th Gen Intel Core i3-10110U',  
   '10th Gen\xa0Intel Core i3-10110U', 'AMD Ryzen 7 4700U',  
   'Intel Core i5-1135G7', 'Intel Core i7-11370H',  
   'Intel Celeron N4020', 'Intel Celeron N4500', 'AMD Ryzen 5 5500U',  
   '11th Gen Intel Core i5-11400H', '11th Gen Intel Core i7-11800H',  
   '11th Gen Intel Core i5-11300H', 'AMD Ryzen 5 5600U',  
   '10th Gen Intel Core i5-10300H', '11th Gen\xa0Intel Core i5',  
   'AMD Ryzen 3 3250U', '10th Gen Intel Core i5-10210U',  
   '11th Gen Intel Core i7-1165G7', 'AMD Ryzen 9-5900HX',  
   'AMD Ryzen 7-4800HS', '11th Gen Intel Core i3-1115G4',  
   'AMD Ryzen 7-5800H', 'AMD Ryzen 5-5500U',  
   '11th Gen Intel Core i5-1155G7', 'AMD Ryzen 9 5900HX', 'AMD 3020e',  
   '11th Gen-Intel Core i5-1135G7', '10th Gen-Intel Core i5-1035G1',  
   '12th Gen Intel Core i7-12700H', 'AMD Ryzen 7-6800H',  
   'AMD Ryzen- 5 5500U ', '11th Gen Intel Core Core i5-1135G7',  
   '11th Gen-Intel Core i3-1135G7', '11th Gen-Intel Core i7-1195G7',  
   '2021) Laptop ', '10th Gen Intel Core i5-1035G1',  
   'AMD Ryzen 7-4700U', 'AMD Ryzen 5 4600H',  
   '10th Gen Intel Core i7-10870H', 'AMD Ryzen 7 5800U',  
   'AMD Ryzen 7 5700U', '11th Gen Intel Core i5-1135G716GB',  
   '10th Gen Intel Core i3-1005G1',  
   '11th Gen Intel Evo Core i7-1165G7',  
   '9th Gen Intel Core i5-9300HF', '10th Gen Intel Core i7-10750H',  
   'Apple M1 Chip', 'P1440FA) Laptop ', 'AMD Ryzen R5 4500U',  
   '11th Gen Intel Core i3-1125G4', 'Intel Core i3-1125G4 11th Gen',  
   'AMD Ryzen 7 5800H', '10th Gen Intel Core i7-1065G7',  
   'Intel Pentium Silver N6000', '11th Gen Intel Core i5-11320H',  
   'Apple M1 Pro chip', '11th Gen Intel Core i3-1116G4',  
   '11th Gen Intel Core i3-1155G4', 'AMD Ryzen 3-3250U',  
   'AMD Ryzen 5 3450U', '11th Gen Intel Core i5-11300H Processor',  
   '11th Gen Intel Core i7-11370H Processor',  
   'AMD Ryzen 5 5600H Processor', 'Intel Core i7-11800H',  
   'AMD Ryzen 7-5700U', '111th Gen Intel Core i5-1135G7',  
   'AMD A6-9220e', 'AMD Ryzen 7 4800HS',  
   '11th Gen-Intel Core i3-1115G4', '11th Gen-Intel Core i5-1155G7',  
   '10th-Intel Core i3-10110U', 'AMD Ryzen 5 3450U Processor',  
   '11th Gen Intel Core i3-1115G4 ', 'Microsoft SQ 1',  
   'AMD Ryzen 9-5900HS', '2022) G513 Gaming Laptop ',  
   '12th Gen-Intel Core i5-12500H',  
   'Qualcomm Snapdragon 7C Gen 2 Processor',  
   '12th Gen Intel Core i7 processor', 'AMD Ryzen 5-5600H',  
   '12th Gen Intel Core i5 processor',  
   '12th Gen Intel Core i7 Processor', 'AMD Ryzen 7 6800H',  
   '12th Gen-Intel Core i5-1235U', '11th-Intel Core i5-1155G7',  
   '11th Generation Intel Core i5-11400H',  
   '12th Gen Intel Core i5-12500H', '11th Gen Intel i5-1135G7',  
   '11th Gen Intel Core i5 11400H', 'Intel Celeron N4020',  
   '11th Gen Intel i3-1115G4', 'Intel Core i5-1240P',  
   'AMD Ryzen 5 5625U', '11th Gen-Intel Core i5-11300H',  
   '10th Gen-Intel Core i5-10300H',  
   '12th Gen Intel Core i5 Processor', 'AMD Ryzen3-3250U',  
   '12th Gen Intel Core i7-12650H', 'Intel Celeron',  
   '12th Gen Intel Core i7-1260P ', 'AMD Athlon 3020e',  
   'AMD Ryzen 5-3500U', '11th Intel Core i5-11300H',  
   '11th Gen-Intel Core i3-1125G4', 'AMD Ryzen 7 4800H',
```

```
'12th gen Intel Core i7-1260P', 'Apple M2 chip',
'12th Gen Intel Core i5-1240P', 'AMD Ryzen 7 R7-4800HS',
'12th Gen-Intel Core i7-12700H', '11th Gen Intel Core i3-1125G4 ',
'11th Gen-Intel Core i7-1165G7', '10th Gen-Intel Core i3-10110U',
'11th Gen Intel Core i5- 1155G7', '12th Gen Intel Core i5-12450H',
'11th Gen Intel Core i3 1115G4',
'11th Gen Intel Evo Core i7-1185G7', '11th-Intel Core i3-1115G4',
'AMD Ryzen 5 5500U Processor', 'AMD Ryzen 3 5300U',
'10th Gen Intel i3-10110U', 'AMD Ryzen 3 3200U',
'AMD Ryzen 5 5600H', 'Intel 10th Gen Core i5-10210U',
'Intel 10th Gen Core i3-10110U', '11 Gen Intel Core i3-1115G4',
'10th Gen-Intel Core i3-1005G1',
'11th Generation Intel Core i3-1125G4', '10th Gen Intel i3-1005G1',
'Qualcomm Snapdragon 7c Gen 2', '11th Gen Intel Core i7-1195G7',
'12th Gen Intel i7-12650H', '10th Gen Core i5',
'10th Gen Intel Core i5', '10th Gen Intel Core i7',
'10th Gen Intel Core i3', '11th Gen Core i7',
'11th Gen Intel Core i7', 'AMD Ryzen R5 3500U'], dtype=object)
```

In [987]: df[df["Processor"] == "AMD Ryzen R5 3500U"]

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
415	VAIO	VAIO E15 V2IN007P Laptop	8 GB	512GB SSD	AMD Ryzen R5 3500U	Budget Laptop	AMD	Solid State Drive	48999

In [988]: df.iloc[415,4] = "AMD Ryzen R5"

In [989]: df["Processor"].unique()

Out[989]: array(['11th Gen Intel Core i5', '11th Gen Intel Core i3', 'AMD Ryzen 5',
 'AMD Ryzen 7', 'AMD Ryzen 3', '10th Gen Intel Core i3',
 'Intel Core i5', 'Intel Core i7', 'Intel Celeron',
 '11th Gen Intel Core i7', '10th Gen Intel Core i5', 'AMD Ryzen 9',
 'AMD 3020e', '12th Gen Intel Core i7',
 '11th Gen Intel Core Core i3', '10th Gen Intel Core i7',
 '9th Gen Intel Core i5', 'Apple M1 Chip', 'AMD Ryzen R5',
 'Intel Pentium Silver N6000', 'Apple M1 Pro chip', 'AMD A6-9220e',
 'Microsoft SQ 1', '12th Gen Intel Core i5',
 'Qualcomm Snapdragon 7C', 'AMD Athlon', 'Apple M2 chip'],
 dtype=object)

In [990]: df.to\_csv("Laptop Project.csv")

In [100]: df.head()

Out[1000]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990

In [100...]: df["Processor"].unique()

```
Out[1001]: array(['11th Gen Intel Core i5', '11th Gen Intel Core i3', 'AMD Ryzen 5',
       'AMD Ryzen 7', 'AMD Ryzen 3', '10th Gen Intel Core i3',
       'Intel Core i5', 'Intel Core i7', 'Intel Celeron',
       '11th Gen Intel Core i7', '10th Gen Intel Core i5', 'AMD Ryzen 9',
       'AMD 3020e', '12th Gen Intel Core i7',
       '11th Gen Intel Core Core i3', '10th Gen Intel Core i7',
       '9th Gen Intel Core i5', 'Apple M1 Chip', 'AMD Ryzen R5',
       'Intel Pentium Silver N6000', 'Apple M1 Pro chip', 'AMD A6-9220e',
       'Microsoft SQ 1', '12th Gen Intel Core i5',
       'Qualcomm Snapdragon 7C', 'AMD Athlon', 'Apple M2 chip'],
      dtype=object)
```

In [273...]: df["Brand"].unique()

```
Out[273]: array(['Lenovo', 'Dell', 'Asus', 'Microsoft', 'HP', 'Acer', 'AVITA',
       'Apple', 'Realme', 'Samsung', 'Avita', 'MSI', 'VAIO'], dtype=object)
```

In [277...]: df[df["Brand"] == "Avita"]

```
Out[277]:  Brand  Model  Ram  Rom  Processor  Price Category  Processor Type  Rom Type  Price (₹)
```

In [276...]: df.iloc[242,0] = "AVITA"

## Exploratory Data Analysis

In [2]: df = pd.read\_csv("Laptop Project.csv")

In [3]: df.drop("Unnamed: 0", axis=1, inplace=True)

In [4]: `df.head()`

Out[4]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990

In [5]: `import plotly.express as px`In [7]: `df.to_csv("Laptop Project.csv")`In [6]: `df = pd.read_csv("Laptop Project.csv")`In [7]: `df.drop("Unnamed: 0", axis=1, inplace=True)`In [8]: `df.head()`

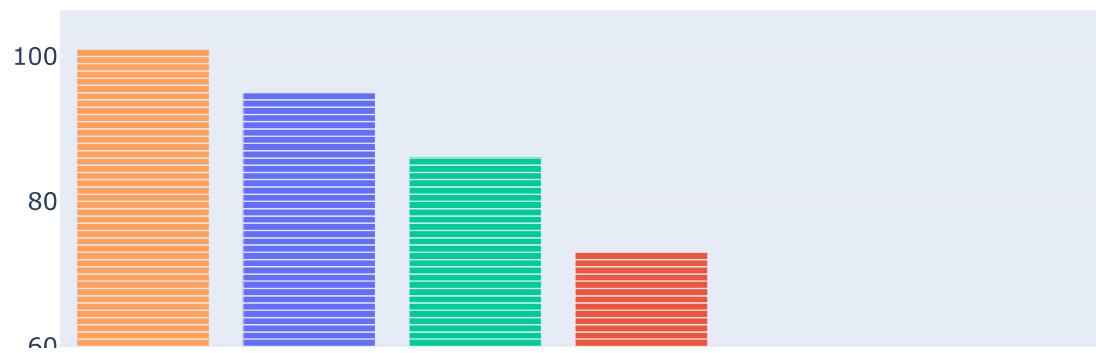
Out[8]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990

## Univariate analysis

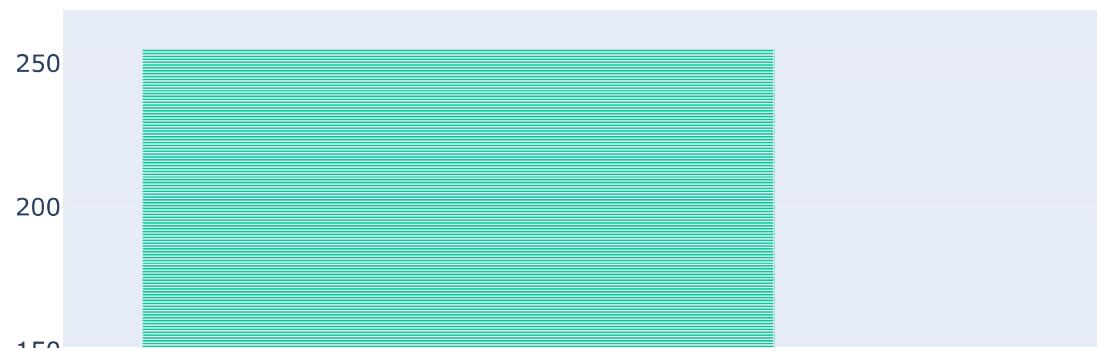
```
In [9]: fig = px.bar(df["Brand"], color=df["Brand"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Brands(Reliance Digital)', title_x=0.5)
```

Most ava

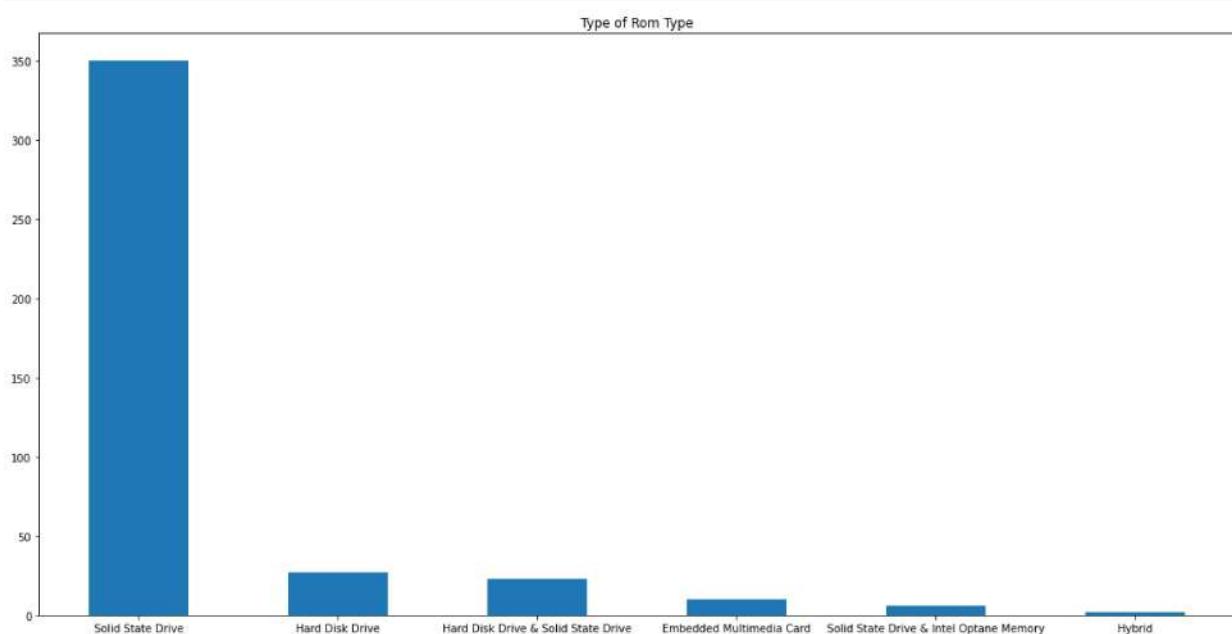


```
In [10]: fig = px.bar(df[ "Ram" ],color=df[ "Ram" ])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Ram in Laptops', title_x=0.5)
```

Most

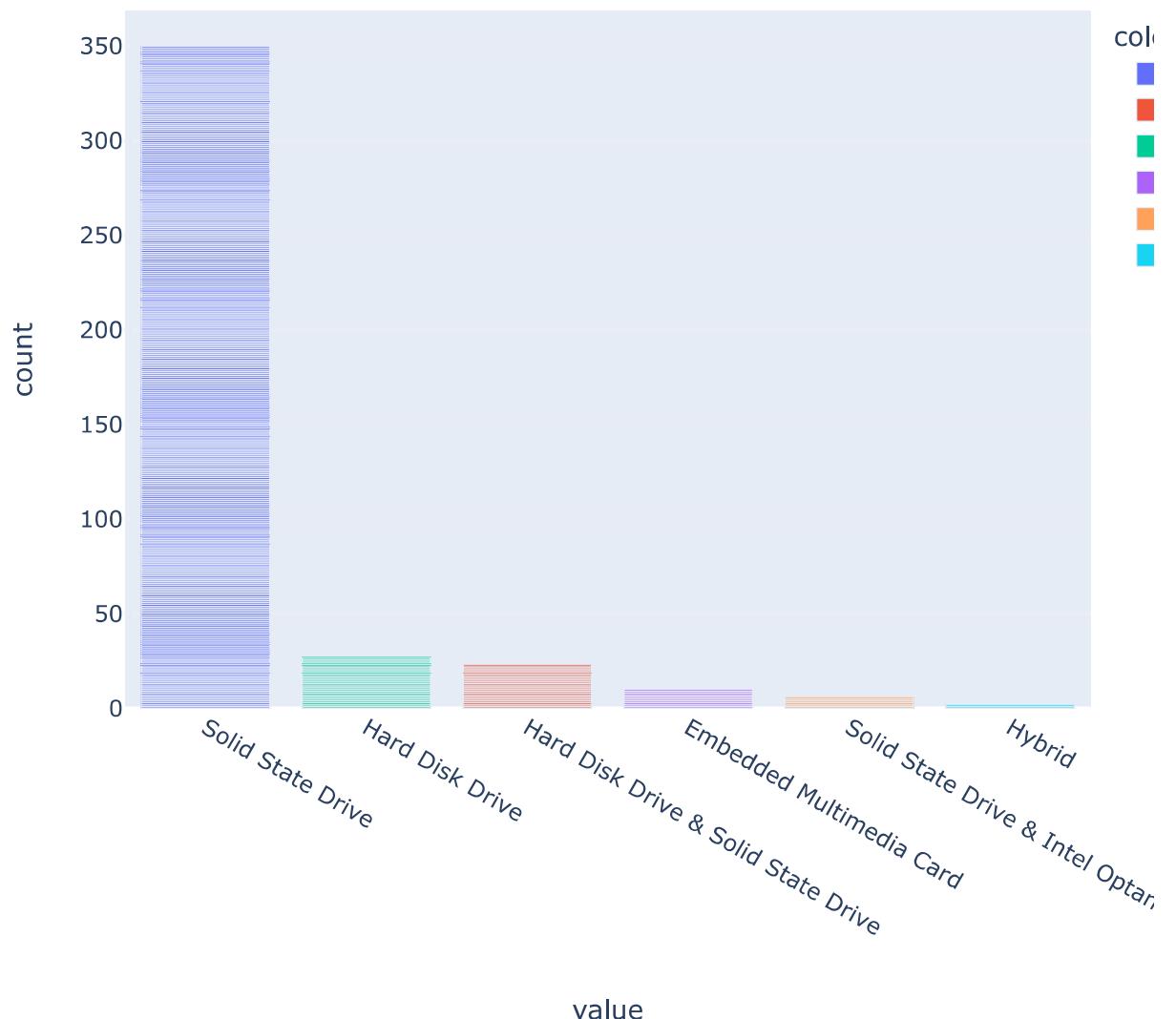


```
In [11]: plt.figure(figsize=(20,10))
df["Rom Type"].value_counts().plot.bar()
plt.title("Type of Rom Type")
plt.xticks(rotation=0)
plt.show()
```

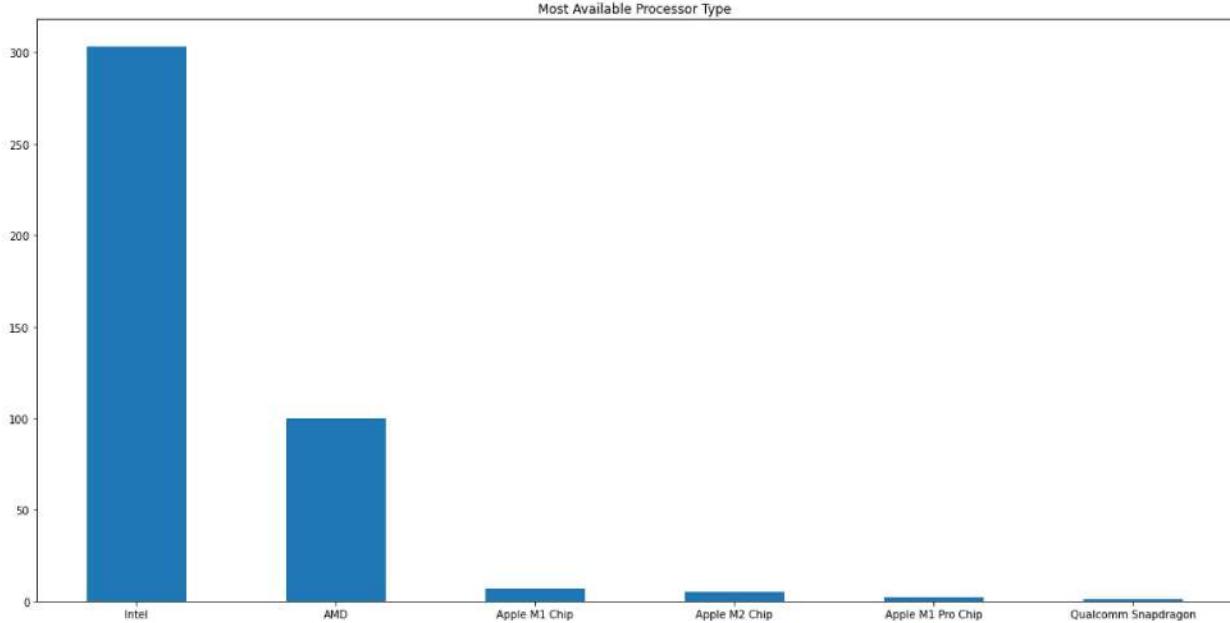


```
In [12]: fig = px.bar(df["Rom Type"], color=df["Rom Type"], width=900, height=600)
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Storage type in Laptops', title_x=0.5)
```

Most available Storage type in Laptops

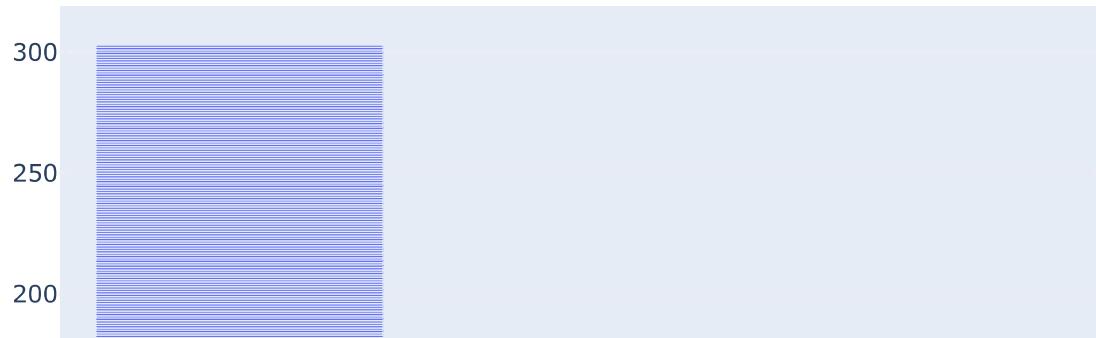


```
In [13]: plt.figure(figsize=(20,10))
df["Processor Type"].value_counts().plot.bar()
plt.title("Most Available Processor Type")
plt.xticks(rotation=0)
plt.show()
```



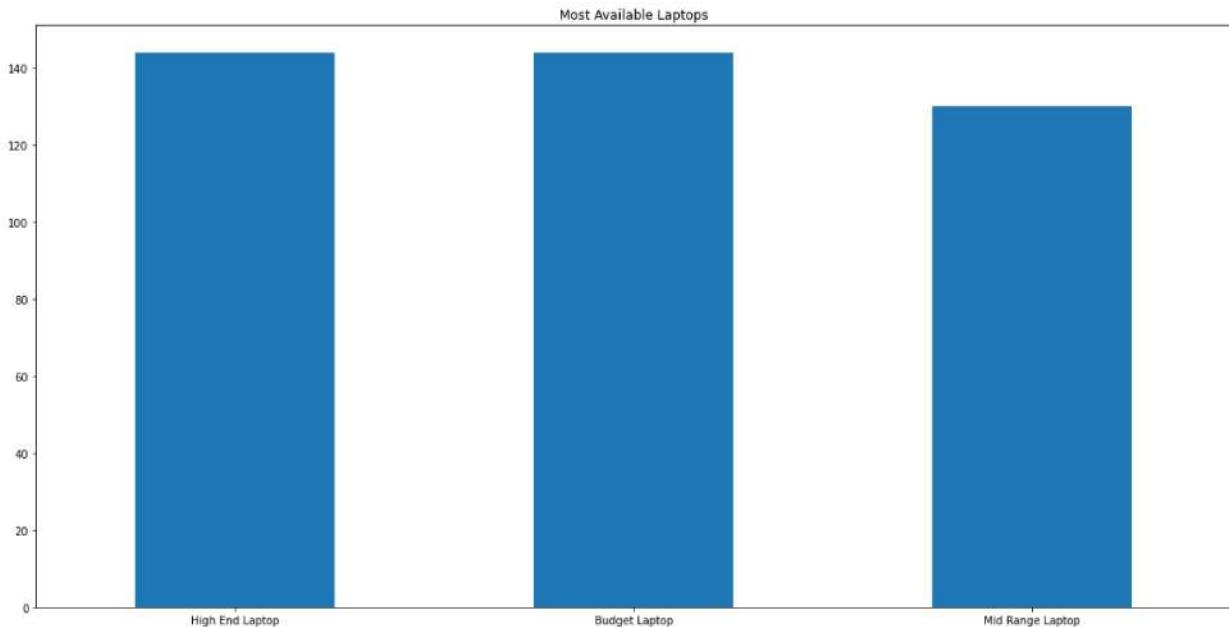
```
In [14]: fig = px.bar(df["Processor Type"], color=df["Processor Type"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Available Processors in Laptops', title_x=0.5)
```

Available Processors in Laptops



```
In [15]: plt.figure(figsize=(20,10))
df["Price Category"].value_counts().plot.bar()
```

```
plt.title("Most Available Laptops")
plt.xticks(rotation=0)
plt.show()
```

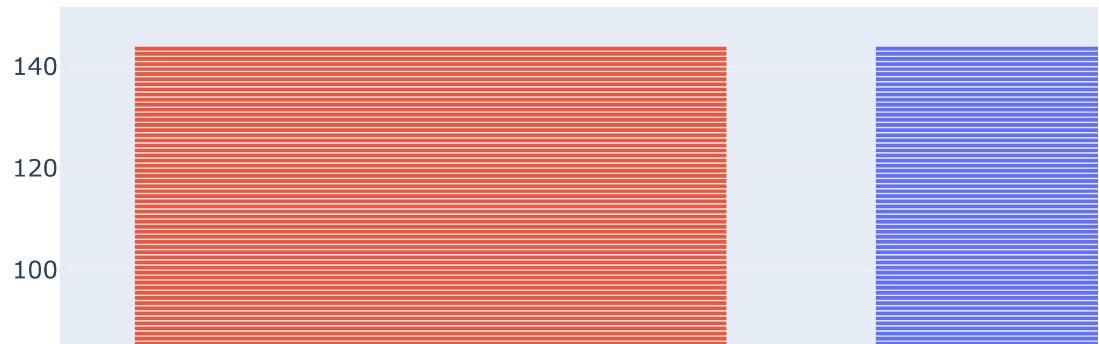


```
In [16]: df["Price Category"].value_counts()
```

```
Out[16]: High End Laptop    144
          Budget Laptop     144
          Mid Range Laptop   130
          Name: Price Category, dtype: int64
```

```
In [17]: fig = px.bar(df["Price Category"], color=df["Price Category"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Available Laptops Based on Prices', title_x=0.5)
```

Available



## Bi - Variate Analysis

```
In [18]: a = df.pivot_table("Price (₹)", index="Ram")
fig = px.bar(a["Price (₹)"], color=["16GB", "4GB", "8GB"])
fig.update_xaxes(categoryorder="mean descending")
fig.show()
```



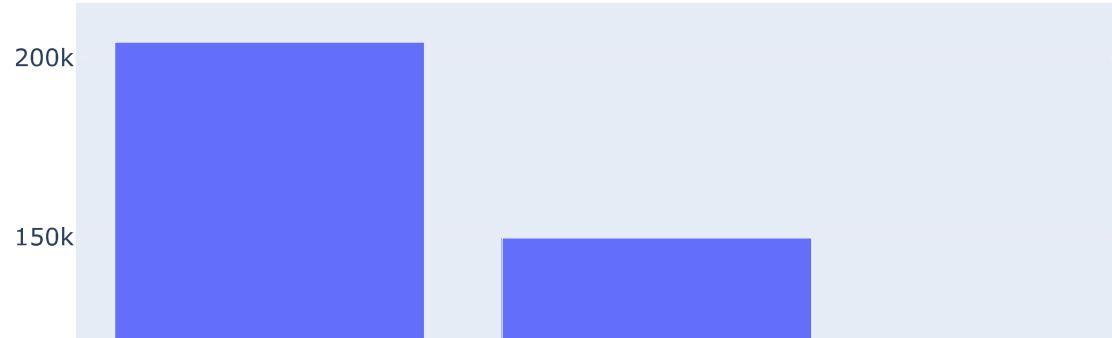
```
In [19]: a = df.pivot_table("Price (₹)", index="Brand")
fig = px.bar(a["Price (₹)"])
fig.update_xaxes(categoryorder="mean descending")
fig.show()
```



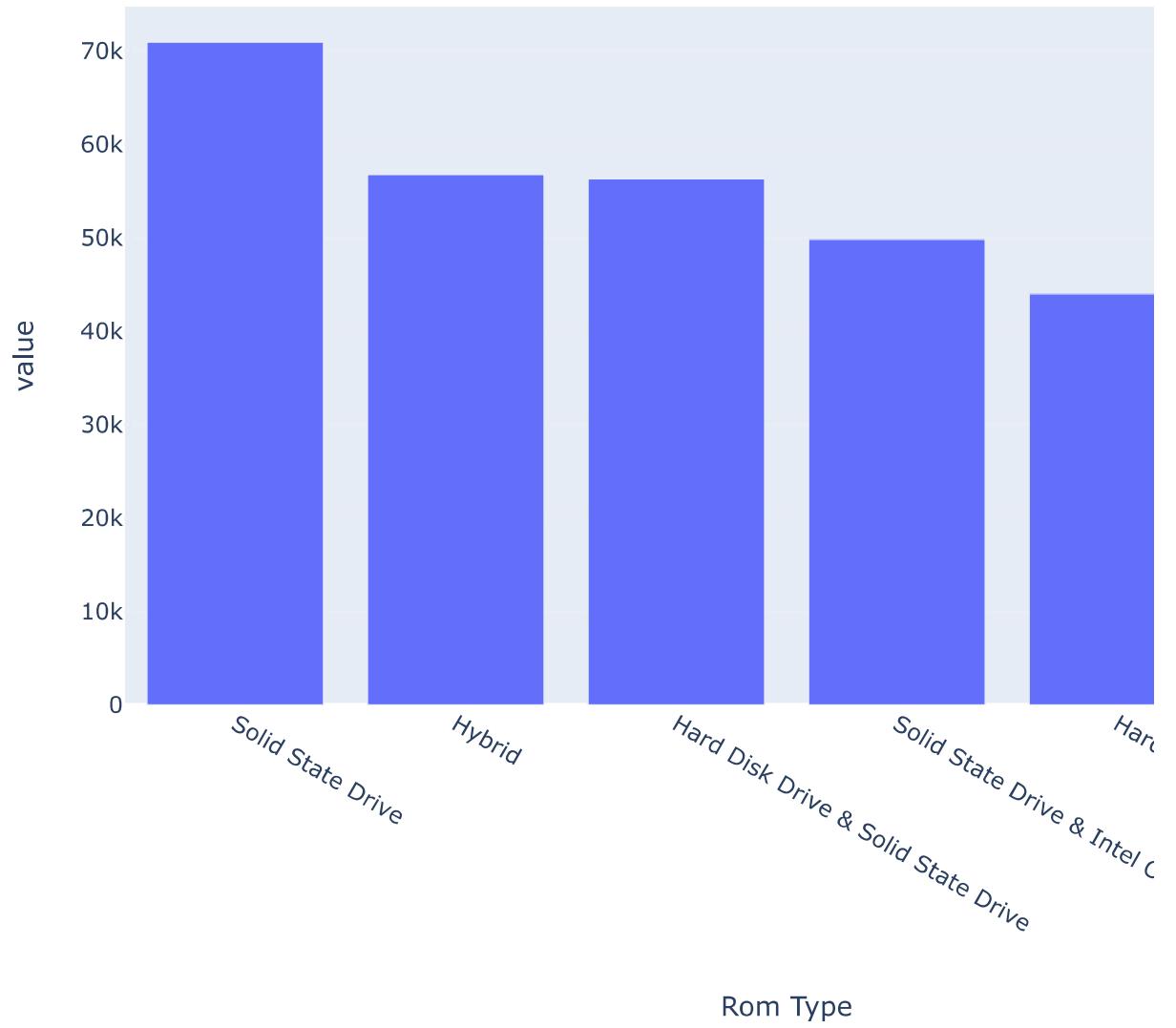
```
In [20]: a = df.pivot_table("Price (₹)", index="Brand")
fig = px.bar(a["Price (₹)"])
fig.update_xaxes(categoryorder="mean descending")
fig.show()
```



```
In [21]: a = df.pivot_table("Price (₹)", index="Processor Type")
fig = px.bar(a["Price (₹)"])
fig.update_xaxes(categoryorder="mean descending")
fig.show()
```



```
In [22]: a = df.pivot_table("Price (₹)", index="Rom Type")
fig = px.bar(a["Price (₹)"], width=900, height=600)
fig.update_xaxes(categoryorder="mean descending")
fig.show()
```



```
In [23]: df[df["Brand"] == "Apple"]
```

Out[23]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
103	Apple	Apple MGN73HNA MacBook Air	8GB	512GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	110095
104	Apple	Apple MYD92HNA MacBook Pro	8GB	512GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	131435
131	Apple	Apple MBPMK183HNA MacBook Pro	16GB	512GB	Apple M1 Pro chip	High End Laptop	Apple M1 Pro Chip	Solid State Drive	225506
201	Apple	Apple Z11C MacBook Pro	8GB	512GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	162900
275	Apple	Apple MNEQ3HNA MacBook Pro	8GB	512GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	149900
280	Apple	Apple Z124 MacBook Air	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	112900
283	Apple	Apple MNEH3HNA MacBook Pro	8GB	512GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	129900
284	Apple	Apple MNEJ3HNA MacBook Pro	8GB	512GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	149900
285	Apple	Apple MNEH3HNA MacBook Pro	8GB	256GB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	129900
377	Apple	Apple MGN63HNA MacBook Air	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	92900
378	Apple	Apple MYD82HNA MacBook Pro	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	106699
381	Apple	Apple MGND3HNA MacBook Air	8GB	256GB	Apple M1 Chip	High End Laptop	Apple M1 Chip	Solid State Drive	92900
383	Apple	Apple MBPMKGP3HNA MacBook Pro	16GB	512GB	Apple M1 Pro chip	High End Laptop	Apple M1 Pro Chip	Solid State Drive	183206
395	Apple	Apple MacBook Pro MWP52HNA	16GB	1TB	Apple M2 chip	High End Laptop	Apple M2 Chip	Solid State Drive	189053

In [23]: d = pd.read\_csv("Laptop Project.csv")

In [24]: d

Out[24]:

		Unnamed: 0	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
0	0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999	
1	1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999	
2	2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999	
3	3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499	
4	4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990	
...	...	...	...	...	...	...	...	...	...	...	
413	413	Asus	Asus KG701TS Zenbook 13 Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499	
414	414	Lenovo	Lenovo 4DIN Legion 5 Gaming Laptop	8GB	512GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	89499	
415	415	VAIO	VAIO E15 V2IN007P Laptop	8GB	512GB SSD	AMD Ryzen R5	Budget Laptop	AMD	Solid State Drive	48999	
416	416	AVITA	AVITA Liber V14 A8INR672-MB Laptop	16GB	1TB SSD	10th Gen Intel Core i7	Mid Range Laptop	Intel	Solid State Drive	58999	
417	417	HP	HP 15-ec1051AX Pavilion Gaming Laptop	8GB	512GB SSD	AMD Ryzen 5	High End Laptop	AMD	Solid State Drive	72999	

418 rows × 10 columns



In [26]: d["Website"] = "RelianceDigital.com"

```
In [25]: d.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [22]: d1 = pd.read_csv("Dell Laptop.csv")
```

```
In [24]: d1.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [26]: d1["Website"] = "Dell.com"
```

```
In [ ]:
```

```
In [ ]:
```

```
In [ ]:
```

```
In [27]: d2 = pd.concat([d,d1])
```

```
In [29]: d2
```

Out[29]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)	Web
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999	RelianceDigital.in
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999	RelianceDigital.in
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999	RelianceDigital.in
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499	RelianceDigital.in
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990	RelianceDigital.in
...	...	...	...	...	...	...	...	...	...	...
55	Dell	Inspiron 14 Laptop	8GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	60989	Dell.in
56	Dell	New Inspiron 14 Laptop	8GB	512GB SSD	12th Gen Intel Core i3	Mid Range Laptop	Intel	Solid State Drive	51989	Dell.in
57	Dell	Inspiron 15 3000 laptop	8GB	512GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Solid State Drive	44489	Dell.in
58	Dell	Inspiron 15 3000 Laptop	8GB	256GB SSD	AMD Athlon	Budget Laptop	AMD	Solid State Drive	33490	Dell.in
59	Dell	Inspiron 15 3000 Laptop	8GB	256GB SSD	Intel Pentium	Budget Laptop	Intel	Solid State Drive	34589	Dell.in

478 rows × 10 columns

In [ ]:

In [ ]:

```
In [30]: d3 = pd.read_csv("FLIPCART_Laptop.csv")
```

```
In [34]: d3.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [35]: d3.columns
```

```
Out[35]: Index(['Brand', 'Model', 'Ram', 'Rom', 'Processor', 'Price Category',
       'Processor Type', 'Rom Type', 'Price (₹)', 'Website'],
      dtype='object')
```

```
In [36]: a = d3.pop("Price (₹)")
```

```
In [37]: d3.insert(8,"Price (₹)",a)
```

```
In [44]: d3["Website"] = "Flipkart.com"
```

```
In [ ]:
```

```
In [45]: df = pd.concat([d2,d3])
```

```
In [46]: df.reset_index()
```

Out[46]:

	index	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
0	0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999 Relian
1	1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999 Relian
2	2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999 Relian
3	3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499 Relian
4	4	Microsoft	Microsoft SUI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990 Relian
...	...	...	...	...	...	...	...	...	...	...
686	208	DELL	DELL Vostro Core i5 11th Gen	8GB	1TB HDD	Intel Core i5	Mid Range Laptop	Intel	Hard Disk Drive	54790
687	209	DELL	DELL Inspiron Core i5 11th Gen	8GB	512GB SSD	Intel Core i5	High End Laptop	Intel	Solid State Drive	72490
688	210	DELL	DELL Inspiron Core i3 10th Gen	8GB	256GB SSD	Intel Core i3	Budget Laptop	Intel	Solid State Drive	44190
689	211	DELL	DELL Inspiron Ryzen 7 Octa Core 5825U	8GB	512GB SSD	AMD Ryzen 7	Mid Range Laptop	AMD	Solid State Drive	66190
690	212	DELL	DELL Inspiron Ryzen 5 Quad Core 3450U	8GB	256GB SSD	AMD Ryzen 5	Budget Laptop	AMD	Solid State Drive	49613

691 rows × 11 columns

```
In [47]: df.to_csv("Final Dataset.csv")
```

```
In [2]: df = pd.read_csv("Final Dataset.csv")
```

```
In [3]: df.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [5]: df.drop("Unnamed: 0.1",axis=1,inplace=True)
```

```
In [15]: df.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [6]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 691 entries, 0 to 690
Data columns (total 10 columns):
 #   Column            Non-Null Count  Dtype  
--- 
 0   Brand              691 non-null    object  
 1   Model              691 non-null    object  
 2   Ram                691 non-null    object  
 3   Rom                691 non-null    object  
 4   Processor          691 non-null    object  
 5   Price Category    691 non-null    object  
 6   Processor Type    691 non-null    object  
 7   Rom Type           691 non-null    object  
 8   Price  (₹)         691 non-null    int64  
 9   Website             691 non-null    object  
dtypes: int64(1), object(9)
memory usage: 54.1+ KB
```

```
In [7]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 691 entries, 0 to 690
Data columns (total 10 columns):
 #   Column            Non-Null Count  Dtype  
--- 
 0   Brand              691 non-null    object  
 1   Model              691 non-null    object  
 2   Ram                691 non-null    object  
 3   Rom                691 non-null    object  
 4   Processor          691 non-null    object  
 5   Price Category    691 non-null    object  
 6   Processor Type    691 non-null    object  
 7   Rom Type           691 non-null    object  
 8   Price  (₹)         691 non-null    int64  
 9   Website             691 non-null    object  
dtypes: int64(1), object(9)
memory usage: 54.1+ KB
```

```
In [66]: df["Brand"].unique()
```

```
Out[66]: array(['Lenovo', 'Dell', 'Asus', 'Microsoft', 'HP', 'Acer', 'AVITA',
   'Apple', 'Realme', 'Samsung', 'MSI', 'VAIO'], dtype=object)
```

```
In [3]: import pandas as pd
```

```
In [5]: df.to_csv("Final Dataset.csv")
```

```
In [26]: df = pd.read_csv("Final Dataset.csv")
```

```
In [27]: df.drop("Unnamed: 0",axis=1,inplace=True)
```

```
In [5]: df["Brand"].value_counts()
```

```
Out[5]:
```

Dell	181
HP	175
Lenovo	167
Asus	86
Apple	35
Acer	17
Microsoft	8
Samsung	8
AVITA	7
Realme	4
MSI	2
VAIO	1
Name: Brand, dtype:	int64

```
In [6]: a = df["Model"].value_counts().reset_index()
a.shape
```

```
Out[6]: (516, 2)
```

```
In [24]: df.drop("Unnamed: 0.1",axis=1,inplace=True)
```

```
In [7]: a = df.pivot_table(values="Price (₹)",index="Brand",columns="Website",aggfunc="mean")
```

```
In [19]: df[(df["Brand"] == "Apple")&(df["Processor Type"]== "Intel")]
```

```
Out[19]:
```

Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)	Website	Ram - b	Processor Type - b
-------	-------	-----	-----	-----------	----------------	----------------	----------	-----------	---------	---------	--------------------

```
In [18]: df.iloc[498,6] = "Apple"
```

```
In [20]: df.to_csv("Final Dataset.csv")
```

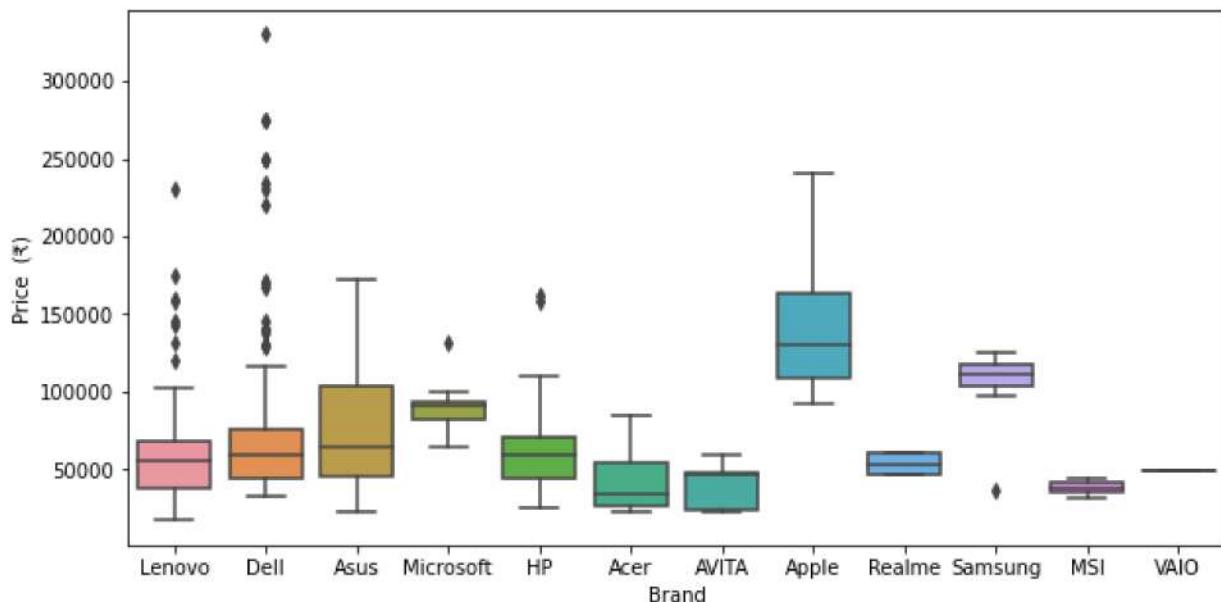
# Exploratory Data Analysis

## Univariate analysis

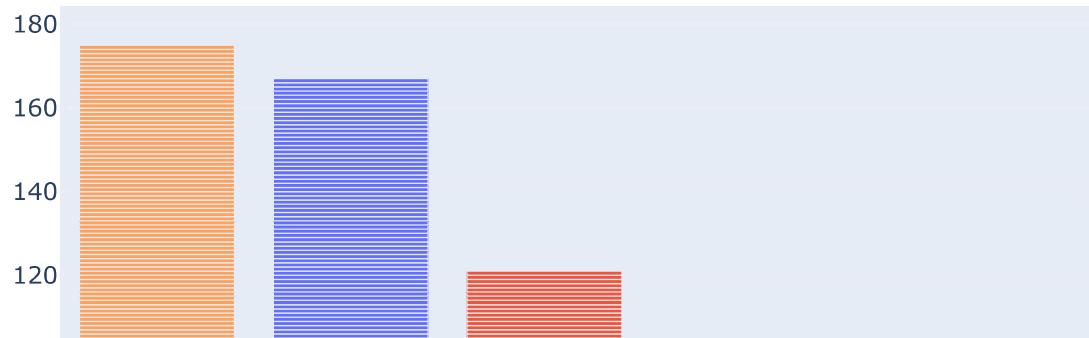
```
In [28]: b = df[(df["Website"] == "RelianceDigital.com") | (df["Website"] == "Flipkart.com")]
```

```
In [29]: plt.figure(figsize=(10,5))
sns.boxplot(x=df['Brand'],y=df["Price (₹)"])
```

```
plt.show()
```

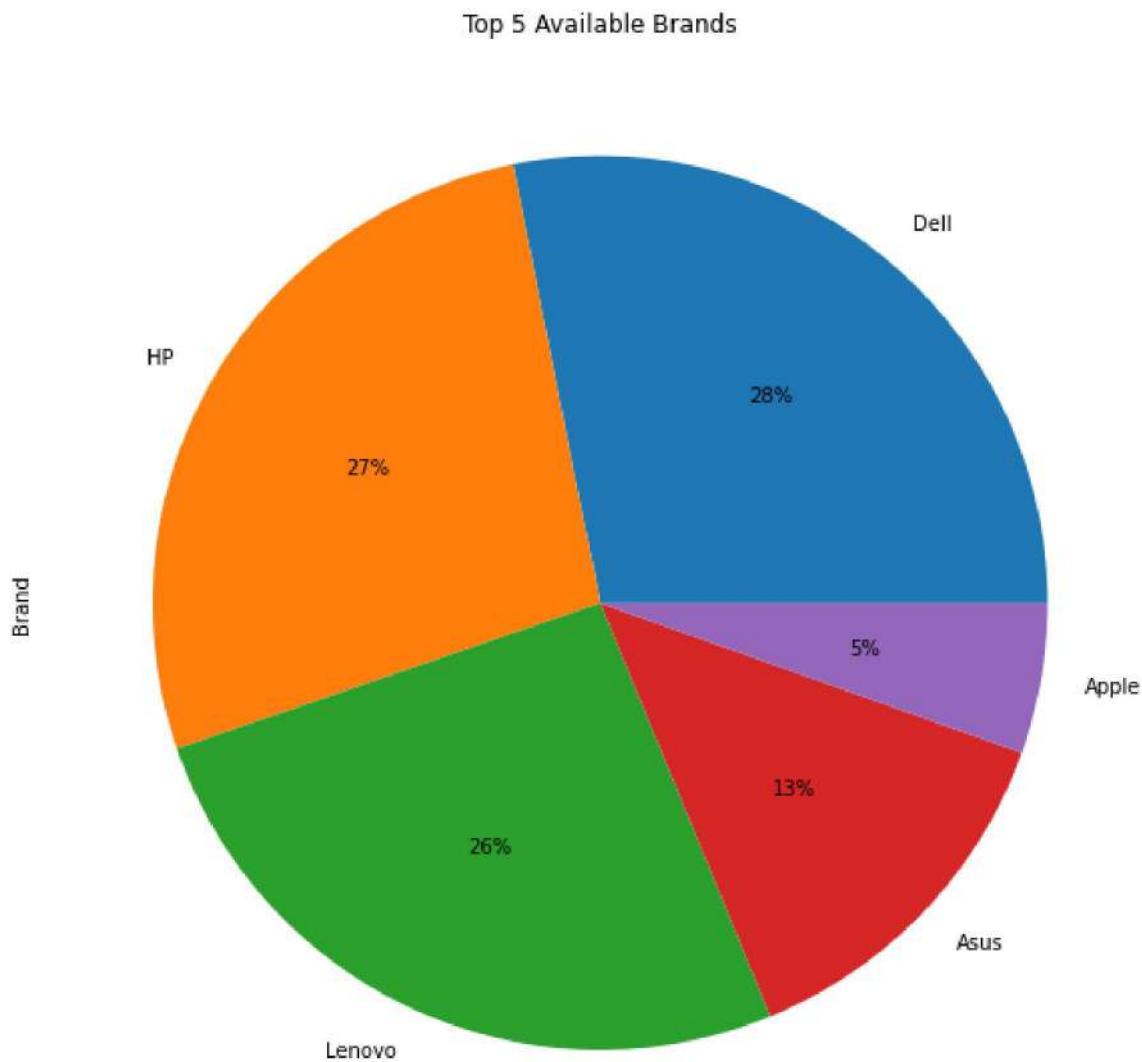


```
In [30]: fig = px.bar(b["Brand"], color=b["Brand"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Brands', title_x=0.5)
```



```
In [32]: plt.figure(figsize=(10,15))
plt.title("Top 5 Available Brands")
a = df["Brand"].value_counts()[0:5]
a.plot.pie(autopct=".f%%")
```

```
Out[32]: <AxesSubplot:title={'center':'Top 5 Available Brands'}, ylabel='Brand'>
```



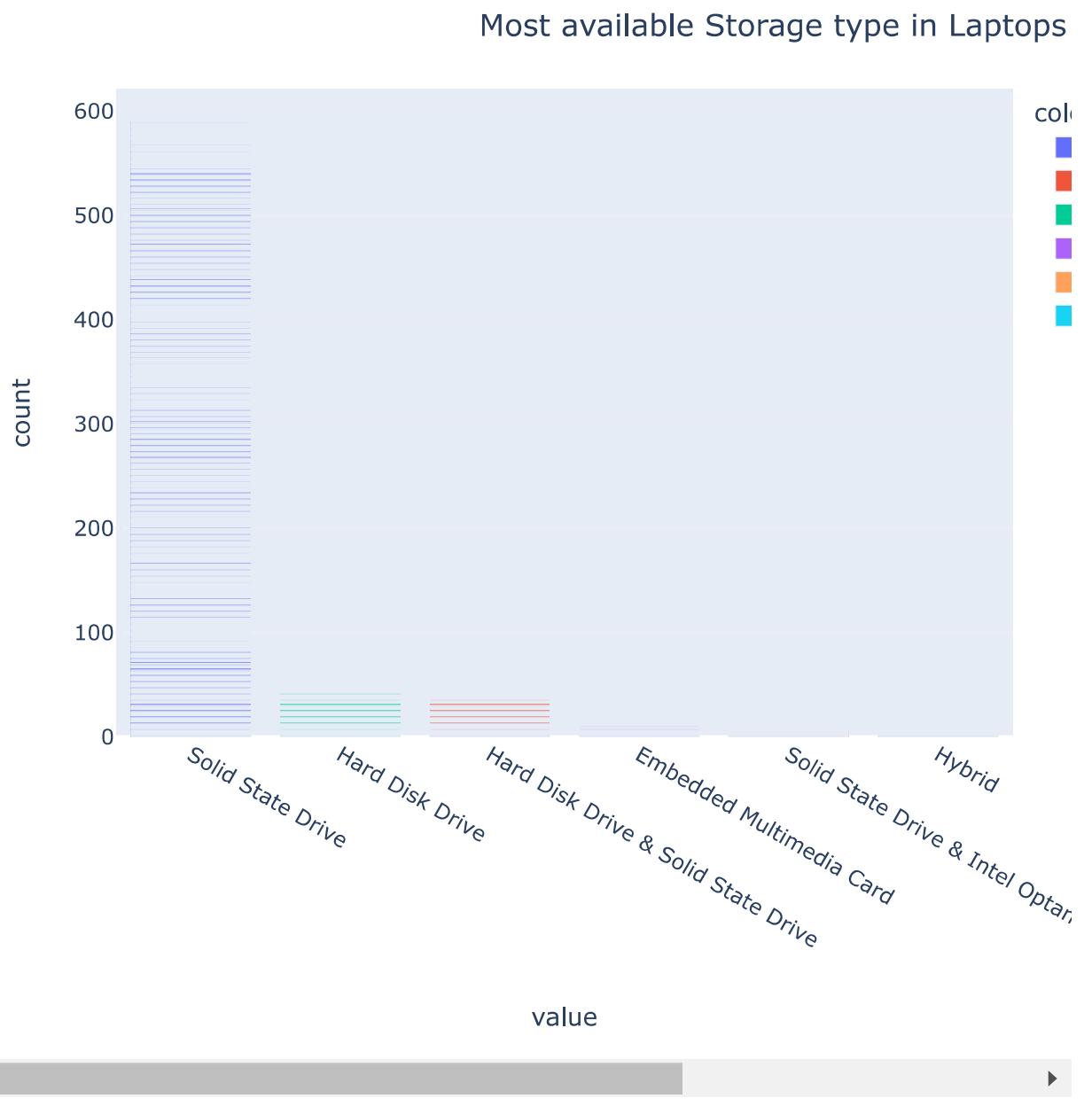
```
In [ ]: df["Ram"].value_counts()
```

```
In [ ]: fig = px.bar(df["Ram"], color=df["Ram"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Ram in Laptops', title_x=0.5)
```

```
In [35]: df["Rom Type"].value_counts()
```

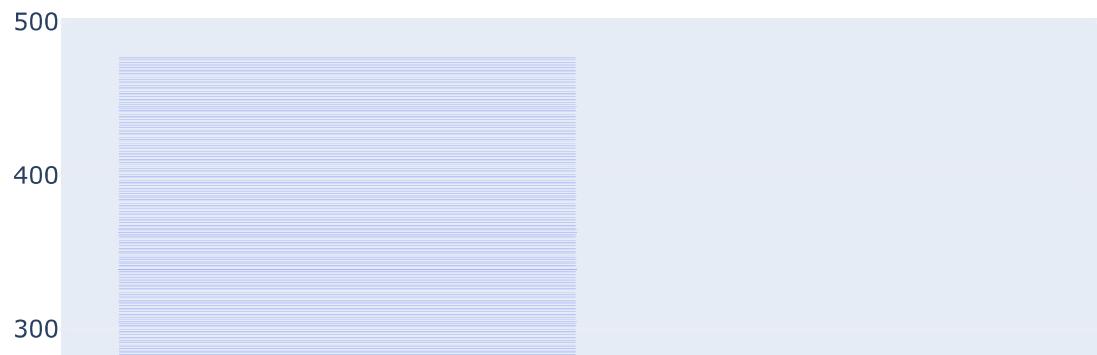
```
Out[35]: Solid State Drive      590
Hard Disk Drive               46
Hard Disk Drive & Solid State Drive 37
Embedded Multimedia Card     10
Solid State Drive & Intel Optane Memory 6
Hybrid                         2
Name: Rom Type, dtype: int64
```

```
In [33]: fig = px.bar(df["Rom Type"], color=df["Rom Type"], width=900, height=600)
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Storage type in Laptops', title_x=0.5)
```



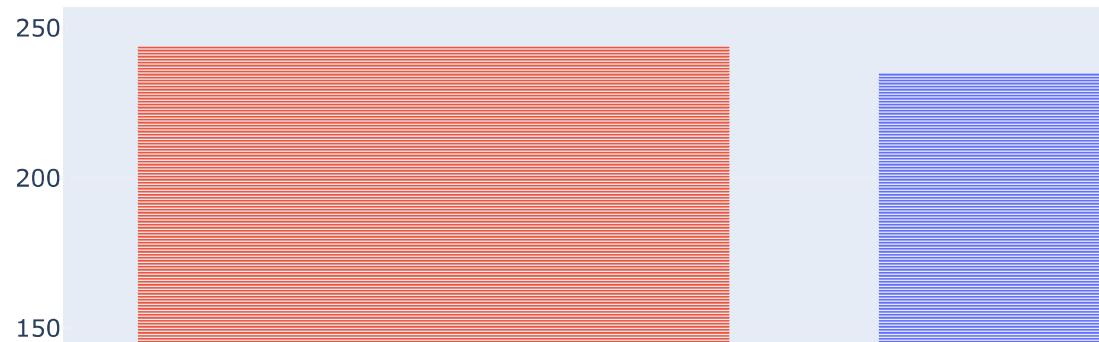
```
In [34]: fig = px.bar(df["Processor Type"], color=df["Processor Type"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Available Processors in Laptops', title_x=0.5)
```

Available



```
In [35]: fig = px.bar(df["Price Category"], color=df["Price Category"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Available Laptops Based on Prices', title_x=0.5)
```

Available



## Bi Variate analysis

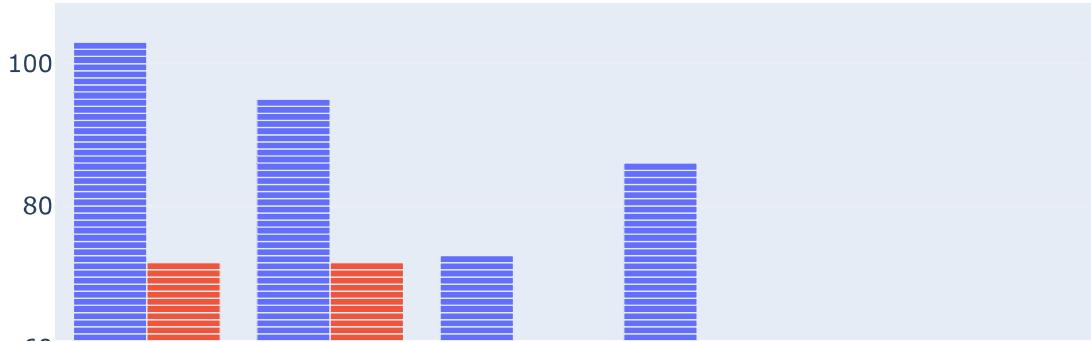
```
In [36]: b = df[(df["Website"] == "RelianceDigital.com") | (df["Website"] == "Flipkart.com")]
```

```
In [5]: b.groupby("Brand")["Website"].value_counts()
```

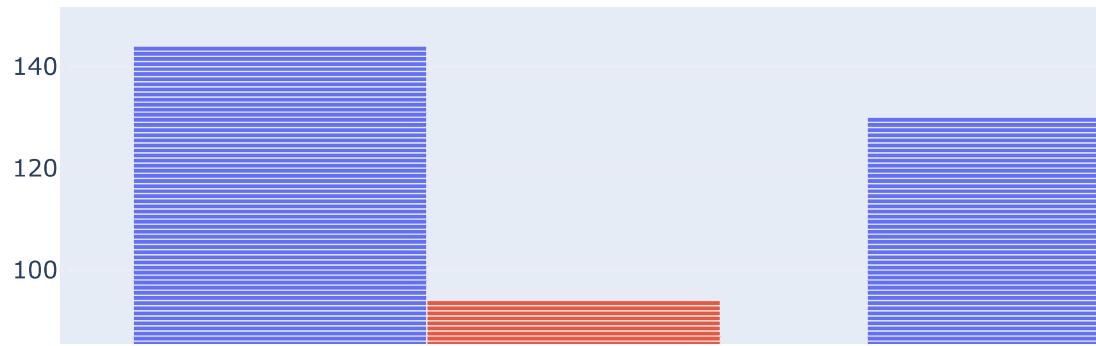
```
Out[5]:
```

Brand	Website	value
AVITA	RelianceDigital.com	7
Acer	RelianceDigital.com	17
Apple	Flipkart.com	21
	RelianceDigital.com	14
Asus	RelianceDigital.com	86
Dell	RelianceDigital.com	73
	Flipkart.com	48
HP	RelianceDigital.com	103
	Flipkart.com	72
Lenovo	RelianceDigital.com	95
	Flipkart.com	72
MSI	RelianceDigital.com	2
Microsoft	RelianceDigital.com	8
Realme	RelianceDigital.com	4
Samsung	RelianceDigital.com	8
VAIO	RelianceDigital.com	1
Name: Website, dtype: int64		

```
In [37]: fig = px.bar(b["Brand"],color=b["Website"],barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Brands', title_x=0.5)
```



```
In [38]: fig = px.bar(b["Price Category"],color=b["Website"],barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Brands', title_x=0.5)
```



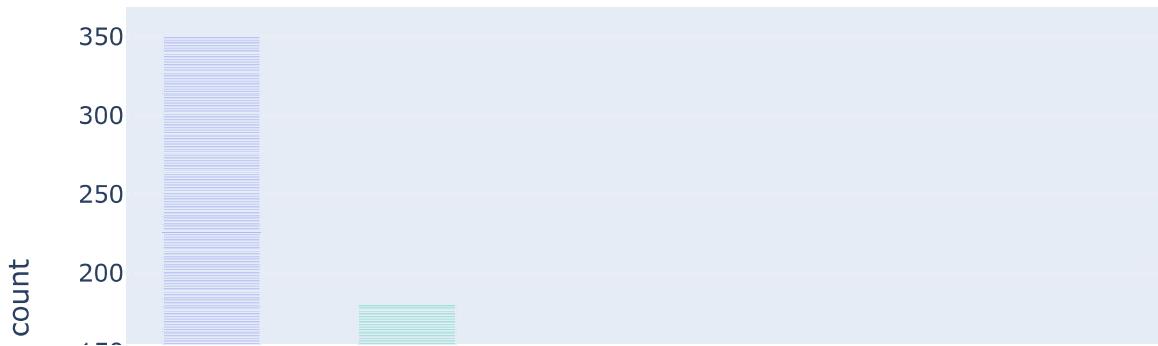
```
In [39]: fig = px.bar(df[ "Ram" ],color=df[ "Website" ],barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Ram in Laptops', title_x=0.5)
```

Most



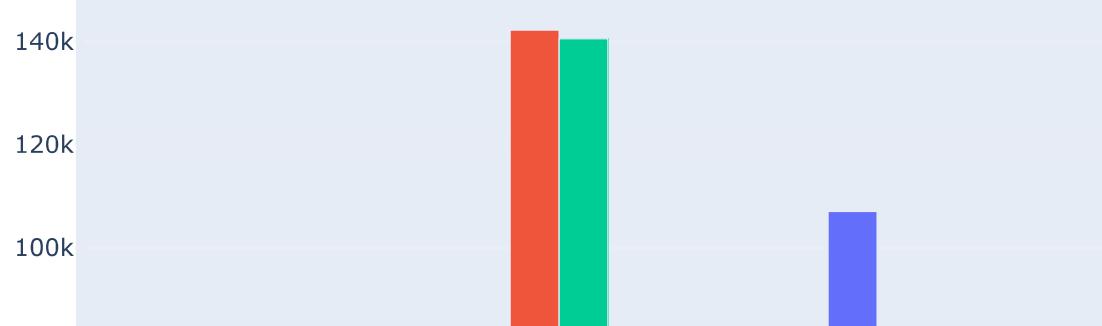
```
In [40]: fig = px.bar(df[ "Rom Type"],color=df[ "Website"],barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Storage type in Laptops', title_x=0.5)
```

Most ava



```
In [41]: a = df.pivot_table(values="Price  (₹)", index=["Brand"], columns="Website", aggfunc="mean")
```

```
In [42]: fig = px.bar(a, barmode="group")
fig.show()
```

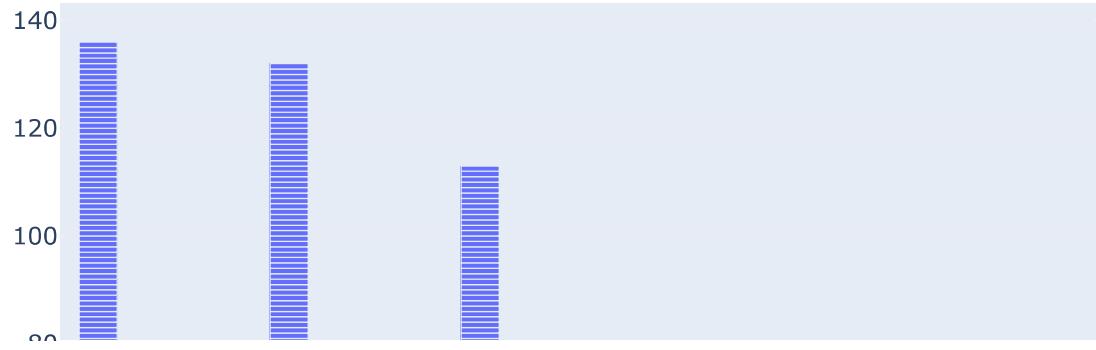


```
In [43]: b = df.pivot_table(values="Price (₹)", index=["Ram"], columns="Website", aggfunc="mean")
```

```
In [44]: fig = px.bar(x=df["Brand"], color=df["Rom Type"], barmode="group")
fig.show()
```



```
In [45]: fig = px.bar(x=df[ "Brand" ],color=df[ "Processor Type" ],barmode="group")
fig.show()
```



```
In [46]: fig = px.bar(x=df[ "Brand" ],color=df[ "Ram" ],barmode="group")
fig.show()
```



```
In [47]: fig = px.bar(x=df["Brand"],color=df["Rom Type"])
fig.show()
```



```
In [48]: c = df.pivot_table(index=["Processor Type"],columns="Brand",aggfunc="mean")
```

```
In [ ]: fig = px.bar(c,barmode="group")
fig.show()
```

```
In [ ]: a = fig, axes = plt.subplots(figsize=(30, 10),nrows=2,ncols=2,)
sns.barplot(x = a,ax=axes[0][0])
sns.barplot(x = b,ax=axes[0][1])
sns.barplot(x = c,ax=axes[1][0])
plt.xticks(rotation = 90)
plt.show()
```

```
In [ ]: fig = px.bar(df["Price (₹)"],df["Brand"],color=df["Processor Type"],barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Storage type in Laptops', title_x=0.5)
```

```
In [ ]: crosstab=pd.crosstab(df["Brand"],df["Ram"])
crosstab.plot(kind="bar")
```

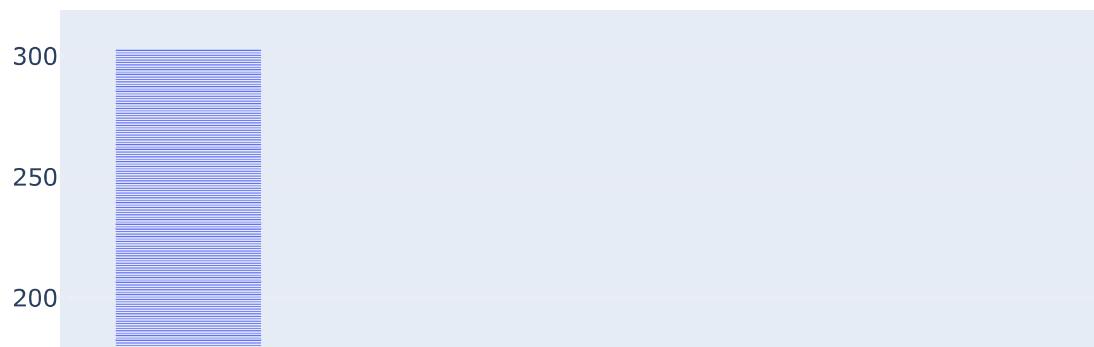
```
In [50]: px.bar(df["Brand"],color=df["Processor Type"],barmode="group")
```



```
In [ ]: plt.figure(figsize=(20,10))
crosstab=pd.crosstab(values=b["Price (₹)"],columns=b["Website"],index=b["Brand"],aggfunc='sum')
crosstab.plot(kind="bar")
plt.show()
```

```
In [52]: fig = px.bar(df["Processor Type"],color=df["Website"],barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Available Processors in Laptops', title_x=0.5)
```

Available



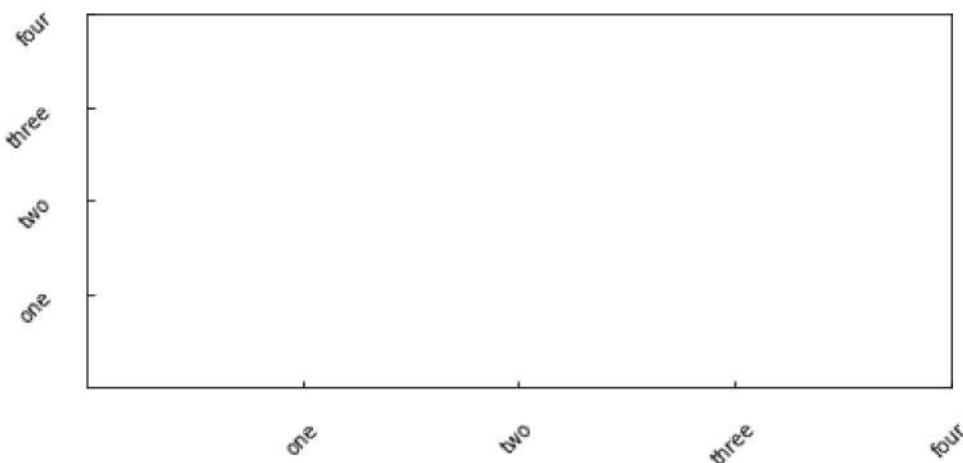
In [53]: df

Out[53]:

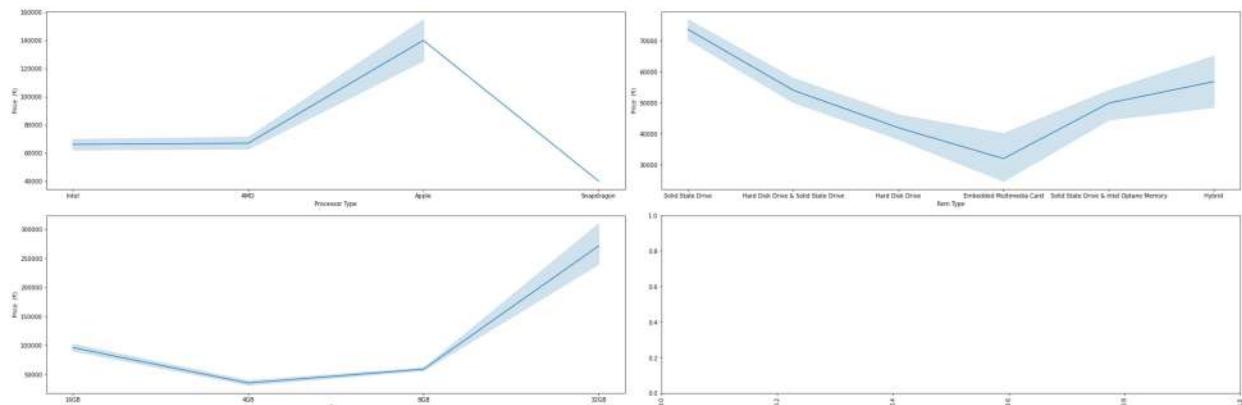
	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)	We
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999	RelianceDigital
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999	RelianceDigital
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999	RelianceDigital
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499	RelianceDigital
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990	RelianceDigital
...	...	...	...	...	...	...	...	...	...	...
686	Dell	DELL Vostro Core i5 11th Gen	8GB	1TB HDD	Intel Core i5	Mid Range Laptop	Intel	Hard Disk Drive	54790	Flipkart
687	Dell	DELL Inspiron Core i5 11th Gen	8GB	512GB SSD	Intel Core i5	High End Laptop	Intel	Solid State Drive	72490	Flipkart
688	Dell	DELL Inspiron Core i3 10th Gen	8GB	256GB SSD	Intel Core i3	Budget Laptop	Intel	Solid State Drive	44190	Flipkart
689	Dell	DELL Inspiron Ryzen 7 Octa Core 5825U	8GB	512GB SSD	AMD Ryzen 7	Mid Range Laptop	AMD	Solid State Drive	66190	Flipkart
690	Dell	DELL Inspiron Ryzen 5 Quad Core 3450U	8GB	256GB SSD	AMD Ryzen 5	Budget Laptop	AMD	Solid State Drive	49613	Flipkart

691 rows × 13 columns

```
In [54]: plt.rcParams["figure.figsize"] = [7.00, 3.50]
plt.rcParams["figure.autolayout"] = True
x = [1, 2, 3, 4]
ax1 = plt.subplot()
ax1.set_xticks(x)
ax1.set_yticks(x)
ax1.set_xticklabels(["one", "two", "three", "four"], rotation=45)
ax1.set_yticklabels(["one", "two", "three", "four"], rotation=45)
ax1.tick_params(axis="both", direction="in", pad=15)
plt.show()
```

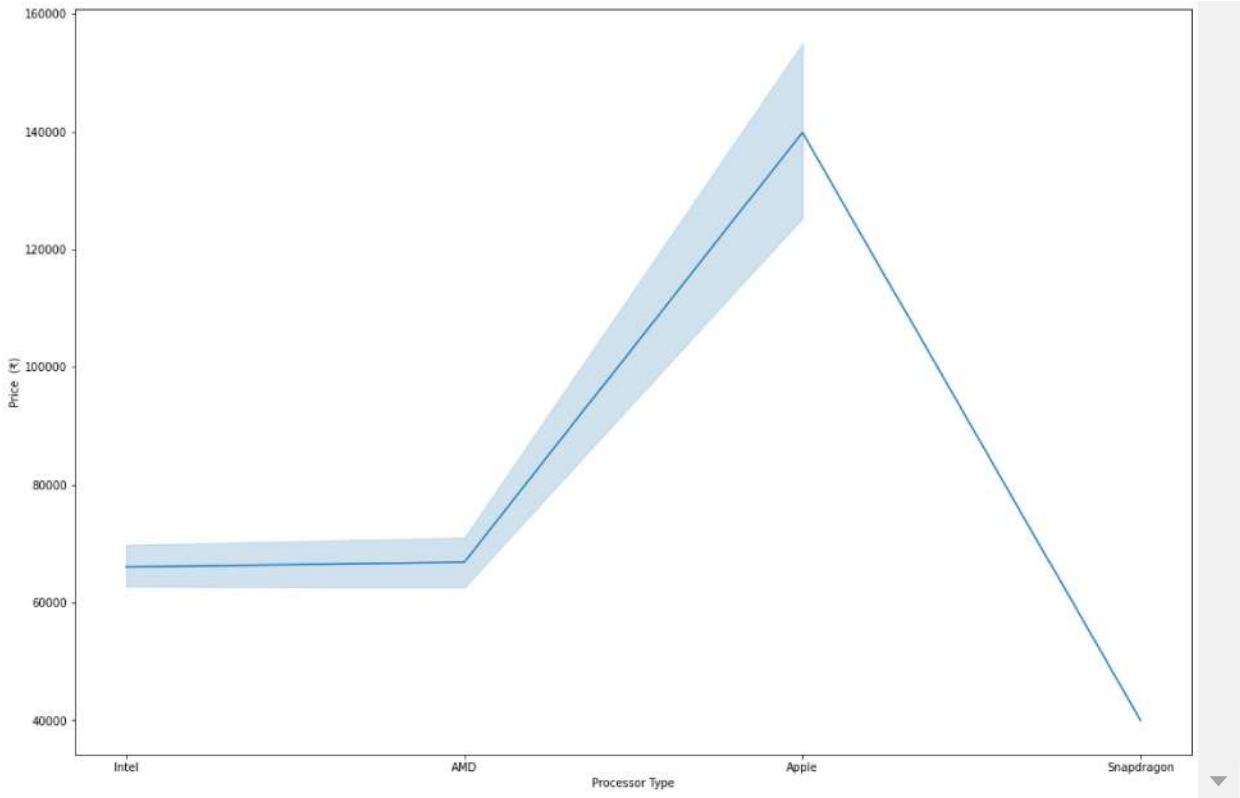


```
In [29]: a = fig, axs = plt.subplots(figsize=(30, 10), nrows=2, ncols=2,)
# axs.set_xticklabels(ax.get_xticks(), rotation = 50)
sns.lineplot(x=df["Processor Type"],y=df["Price (₹)"], ax=axs[0][0])
sns.lineplot(x=df['Rom Type'],y=df["Price (₹)"], ax=axs[0][1])
sns.lineplot(x=df['Ram'],y=df["Price (₹)"], ax=axs[1][0])
plt.xticks(rotation = 90)
plt.show()
```

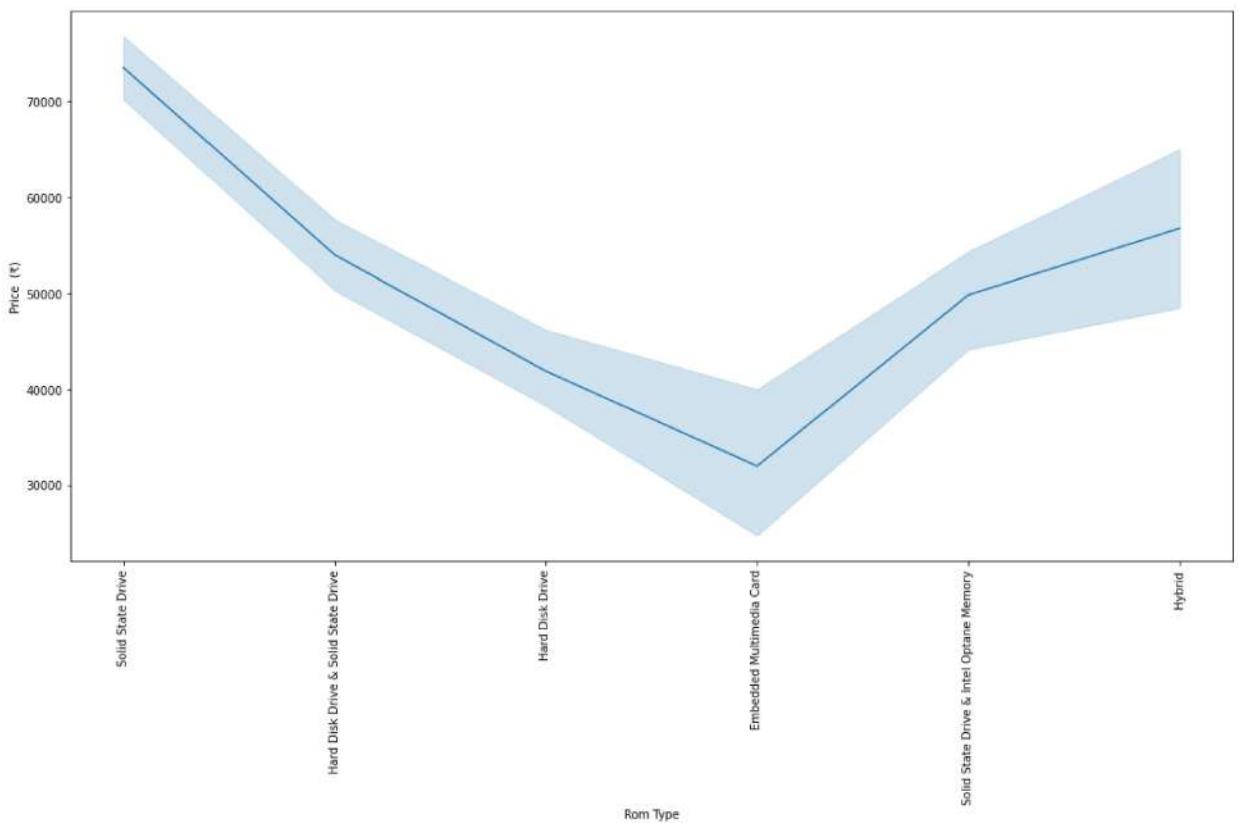


```
In [29]: plt.figure(figsize=(15,10))
sns.lineplot(x=df["Processor Type"],y=df["Price (₹)"])
```

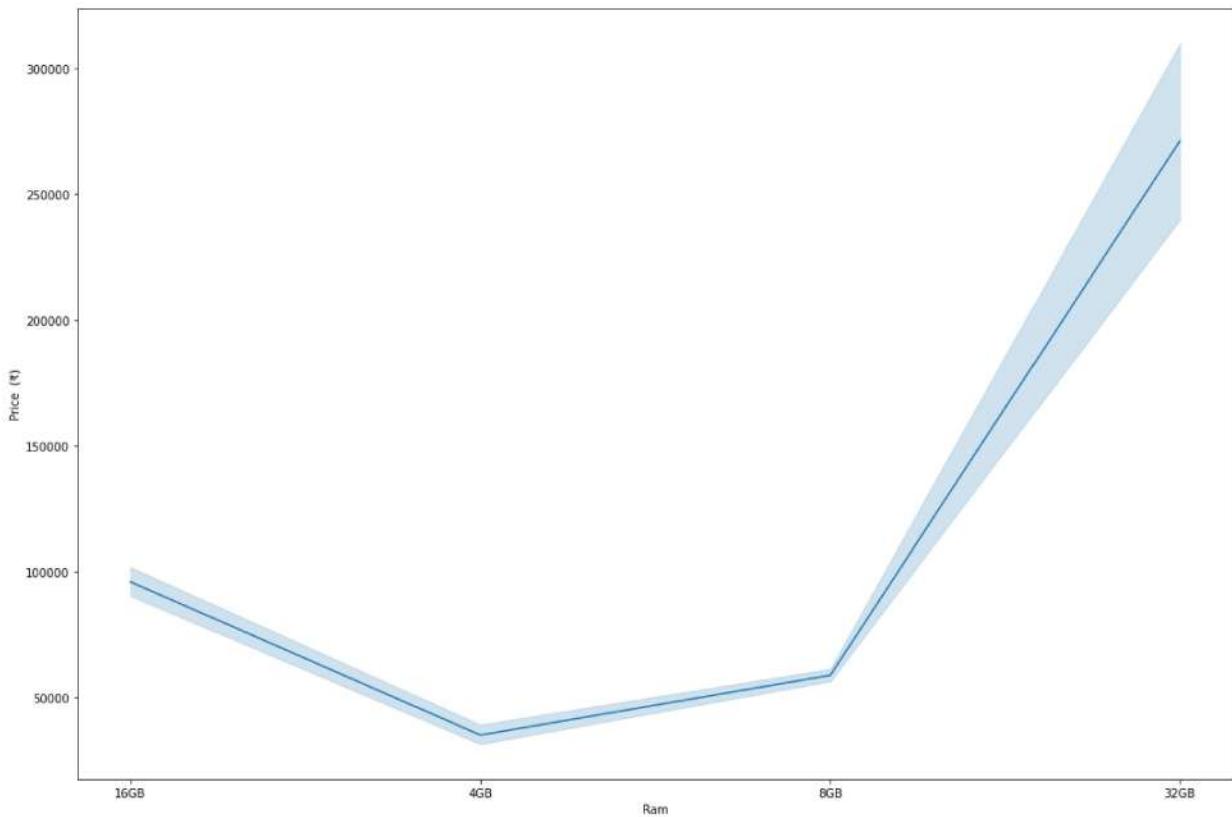
```
Out[29]: <AxesSubplot:xlabel='Processor Type', ylabel='Price (₹)'>
```



```
In [30]: plt.figure(figsize=(15,10))
plt.xticks(rotation=90)
sns.lineplot(x=df["Rom Type"],y=df["Price (₹)"])
plt.show()
```

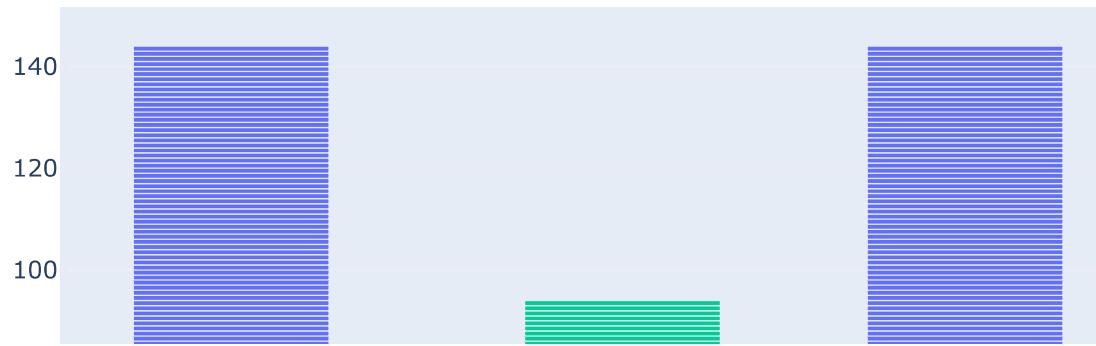


```
In [31]: plt.figure(figsize=(15,10))
sns.lineplot(x=df["Ram"],y=df["Price (₹)"])
plt.show()
```



```
In [55]: fig = px.bar(df[ "Price Category"], color=df[ "Website"], barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Available Laptops Based on Prices', title_x=0.5)
```

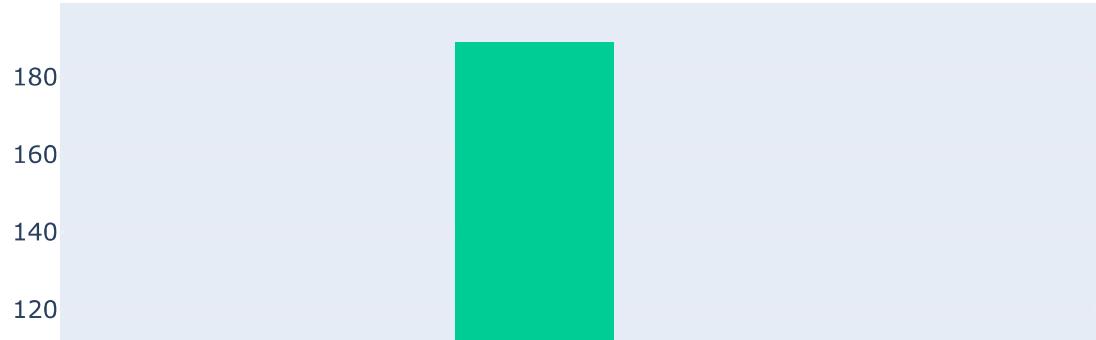
Available



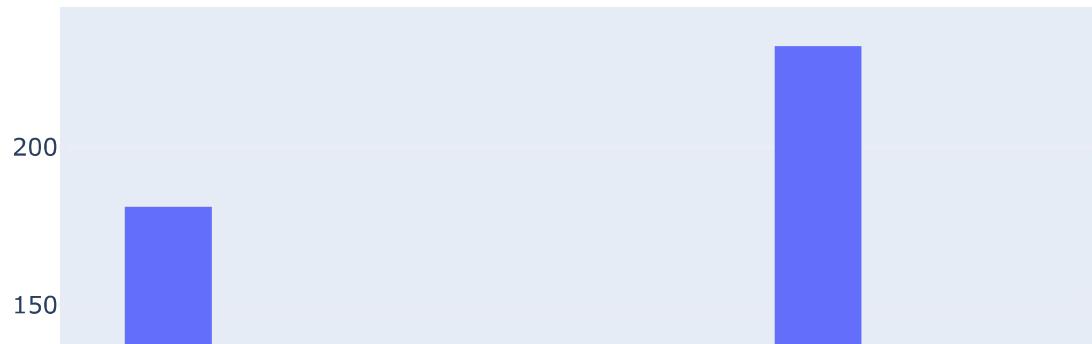
```
In [56]: fig = px.bar(df["Brand"], color=df["Price Category"], barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Brands', title_x=0.5)
```



```
In [57]: fig = px.histogram(df["Price Category"], color=df["Ram"], barmode="group")
fig.update_xaxes(categoryorder="mean descending")
fig.update_layout(title_text='Most available Brands', title_x=0.5)
```



```
In [58]: fig = px.histogram(df["Price Category"], color=df["Rom Type"], barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Brands', title_x=0.5)
```



```
In [59]: fig = px.histogram(df["Price Category"], color=df["Processor Type"], barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price and Processor Comparison', title_x=0.5)
```

Price



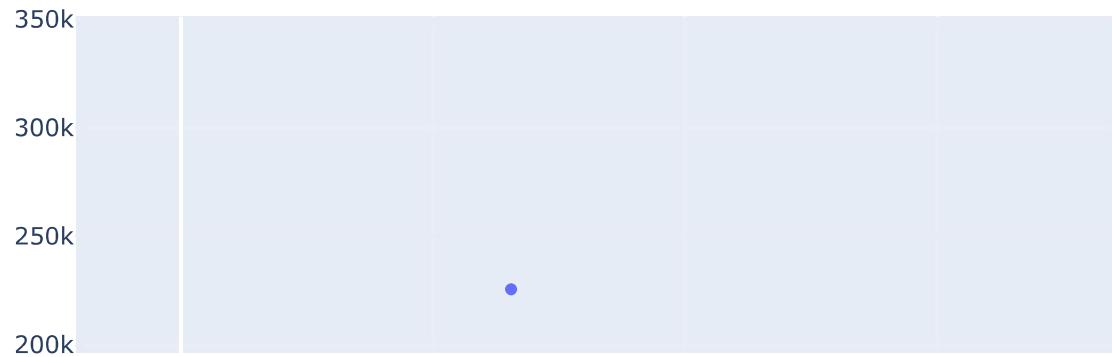
```
In [60]: fig = px.bar(df[ "Rom Type"],color=df[ "Price Category"],barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Most available Brands', title_x=0.5)
```



```
In [61]: fig = px.scatter(df["Price (₹)"], color=df["Price Category"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



```
In [62]: fig = px.scatter(df["Price (₹)"], color=df["Rom Type"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



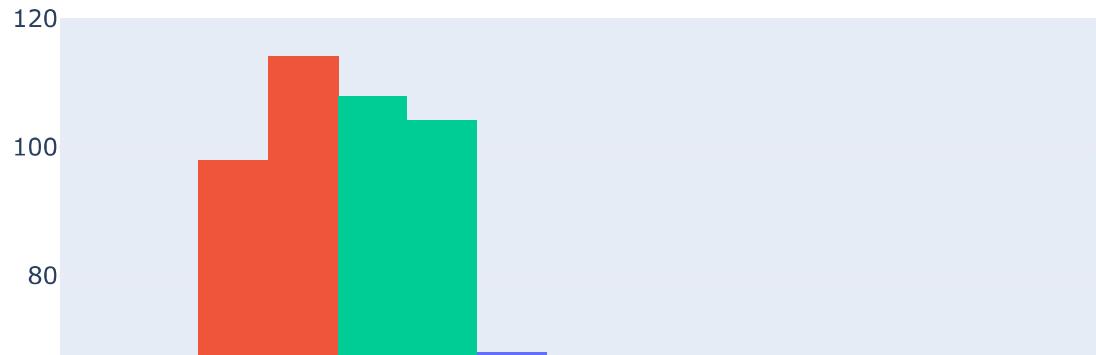
```
In [63]: fig = px.scatter(df["Price (₹)"], color=df["Processor Type"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



```
In [64]: fig = px.scatter(df["Price (₹)"], color=df["Ram"])
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



```
In [65]: fig = px.histogram(df["Price (₹)"], color=df["Price Category"],)  
fig.update_xaxes(categoryorder="sum descending")  
fig.update_layout(title_text='Price Category', title_x=0.5)
```



```
In [66]: fig = px.histogram(df["Price (₹)"], color=df["Ram"], barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



## Multivariate analysis

```
In [67]: df = pd.read_csv("Final Numeric Dataset.csv")
```

```
In [33]: df["Ram"].unique()
```

```
Out[33]: array(['16GB', '4GB', '8GB', '32GB'], dtype=object)
```

```
In [29]: a = []
for i in df["Ram"]:
    if i == "4GB":
        a.append(0)
    elif i == "8GB":
        a.append(1)
    else:
        a.append(2)
```

```
In [30]: len(a)
```

```
Out[30]: 691
```

```
In [31]: df["Ram - b"] = a
```

```
In [32]: df["Processor Type"].unique()
```

```
Out[32]: array(['Intel', 'AMD', 'Apple', 'Snapdragon'], dtype=object)
```

```
In [33]: a = []
for i in df["Processor Type"]:
    if i in ["Apple M1 Chip", "Apple M1 Pro Chip", "Apple M2 Chip", "Apple M1 Processor"]:
        a.append("Apple")
    elif i in ["Qualcomm Snapdragon"]:
        a.append("Snapdragon")
    else:
        a.append(i)
```

```
In [34]: df["Processor Type"] = a
```

```
In [35]: a = []
for i in df["Processor Type"]:
    if i == "Intel":
        a.append(0)
    elif i == "AMD":
        a.append(1)
    elif i == "Apple":
        a.append(2)
    else:
        a.append(3)
```

```
In [36]: df["Processor Type - b"] = a
```

```
In [44]: df.drop("Unnamed: 0", axis=1, inplace=True)
```

```
In [38]: df["Price Category"].unique()
```

```
Out[38]: array(['High End Laptop', 'Budget Laptop', 'Mid Range Laptop'],
              dtype=object)
```

```
In [39]: a = []
for i in df["Price Category"]:
    if i == "High End Laptop":
        a.append(0)
    elif i == "Budget Laptop":
        a.append(1)
    else:
        a.append(2)
```

```
In [40]: df["Price Category - b"] = a
```

```
In [45]: df.drop("Unnamed: 0.1", axis=1, inplace=True)
```

```
In [35]: df
```

Out[35]:

	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)	We
0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999	RelianceDigital
1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999	RelianceDigital
2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999	RelianceDigital
3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499	RelianceDigital
4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990	RelianceDigital
...	...	...	...	...	...	...	...	...	...	...
686	Dell	DELL Vostro Core i5 11th Gen	8GB	1TB HDD	Intel Core i5	Mid Range Laptop	Intel	Hard Disk Drive	54790	Flipkart
687	Dell	DELL Inspiron Core i5 11th Gen	8GB	512GB SSD	Intel Core i5	High End Laptop	Intel	Solid State Drive	72490	Flipkart
688	Dell	DELL Inspiron Core i3 10th Gen	8GB	256GB SSD	Intel Core i3	Budget Laptop	Intel	Solid State Drive	44190	Flipkart
689	Dell	DELL Inspiron Ryzen 7 Octa Core 5825U	8GB	512GB SSD	AMD Ryzen 7	Mid Range Laptop	AMD	Solid State Drive	66190	Flipkart
690	Dell	DELL Inspiron Ryzen 5 Quad Core 3450U	8GB	256GB SSD	AMD Ryzen 5	Budget Laptop	AMD	Solid State Drive	49613	Flipkart

691 rows × 13 columns

The screenshot shows a Jupyter Notebook interface with three code cells and their outputs.

In [81]:

```
a = df.select_dtypes(include="number")
```

In [ ]:

In [82]:

```
a
```

Out[82]:

	Price (₹)	Ram - b	Processor Type - b	Price Category - b
0	81999	2	0	0
1	45999	0	0	1
2	67999	2	1	2
3	72499	2	1	0
4	130990	1	1	0
...	...	...	...	...
686	54790	1	0	2
687	72490	1	0	0
688	44190	1	0	1
689	66190	1	1	2
690	49613	1	1	1

691 rows × 4 columns

In [84]:

```
plt.figure(figsize=(15,10))
sns.heatmap(a.corr(), annot=True)
```

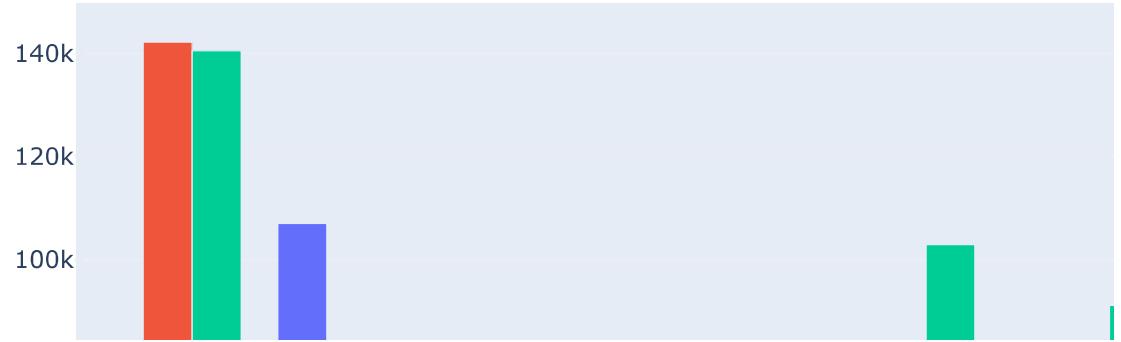
Out[84]:

```
<AxesSubplot:>
```



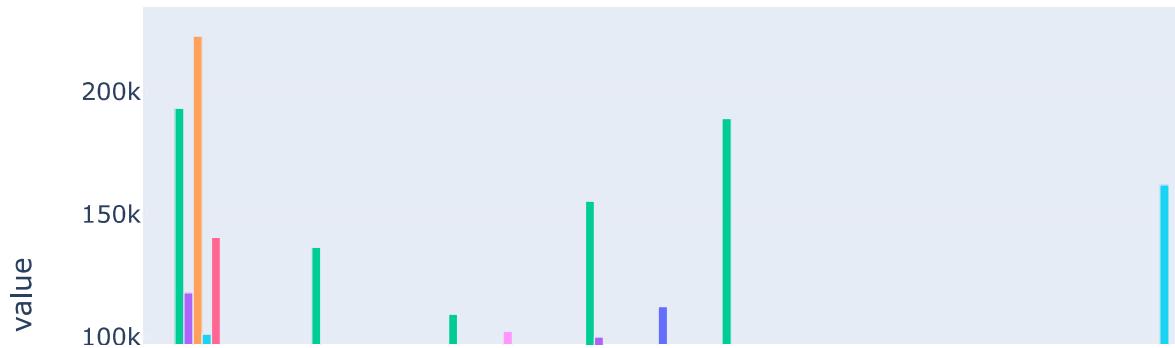
```
In [58]: a = b.pivot_table(values="Price (₹)", index="Website", columns="Brand")
a
```

```
In [68]: fig = px.bar(a,barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



```
In [69]: a = df.pivot_table(values="Price  (₹)", index="Rom", columns="Brand")
```

```
In [70]: fig = px.bar(a,barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```

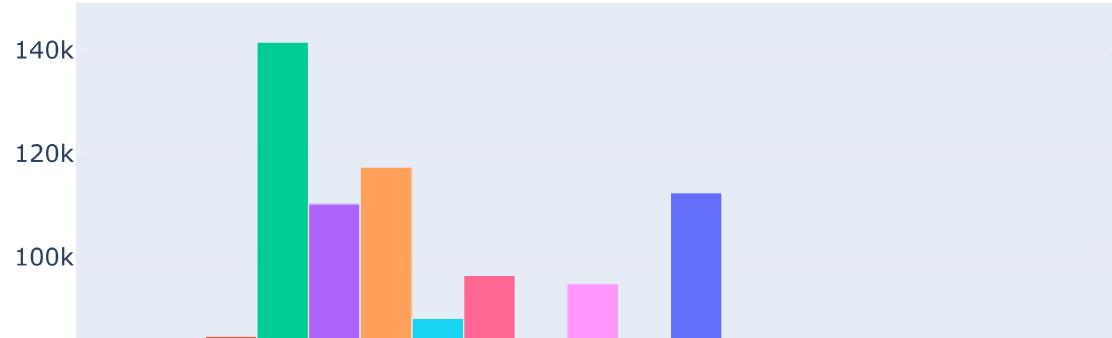


```
In [71]: a = df.pivot_table(values="Price (₹)", index="Price Category", columns="Brand")
```

```
In [72]: df.groupby("Price Category")["Price (₹)"].mean()
```

```
Out[72]: Price Category
Budget Laptop      38935.131148
High End Laptop    109659.659574
Mid Range Laptop   60247.231132
Name: Price (₹), dtype: float64
```

```
In [73]: fig = px.bar(a, barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



```
In [74]: a = df.pivot_table(values="Price  (₹)", index="Website", columns="Brand")
```

```
In [75]: fig = px.bar(a,barmode="group")
fig.update_xaxes(categoryorder="sum descending")
fig.update_layout(title_text='Price Category', title_x=0.5)
```



```
In [76]: b["Brand"].value_counts()
```

```

-----
KeyError                                                 Traceback (most recent call last)
File ~\anaconda3\lib\site-packages\pandas\core\indexes\base.py:3621, in Index.get_loc
(self, key, method, tolerance)
    3620     try:
-> 3621         return self._engine.get_loc(casted_key)
    3622     except KeyError as err:

File ~\anaconda3\lib\site-packages\pandas\_libs\index.pyx:136, in pandas._libs.index.IndexEngine.get_loc()

File ~\anaconda3\lib\site-packages\pandas\_libs\index.pyx:163, in pandas._libs.index.IndexEngine.get_loc()

File pandas\_libs\hashtable_class_helper.pxi:5198, in pandas._libs.hashtable.PyObject
HashTable.get_item()

File pandas\_libs\hashtable_class_helper.pxi:5206, in pandas._libs.hashtable.PyObject
HashTable.get_item()

KeyError: 'Brand'

The above exception was the direct cause of the following exception:

KeyError                                                 Traceback (most recent call last)
Input In [76], in <cell line: 1>()
----> 1 b["Brand"].value_counts()

File ~\anaconda3\lib\site-packages\pandas\core\frame.py:3505, in DataFrame.__getitem__
_(self, key)
    3503     if self.columns.nlevels > 1:
    3504         return self._getitem_multilevel(key)
-> 3505     indexer = self.columns.get_loc(key)
    3506     if is_integer(indexer):
    3507         indexer = [indexer]

File ~\anaconda3\lib\site-packages\pandas\core\indexes\base.py:3623, in Index.get_loc
(self, key, method, tolerance)
    3621     return self._engine.get_loc(casted_key)
    3622     except KeyError as err:
-> 3623         raise KeyError(key) from err
    3624     except TypeError:
        # If we have a listlike key, _check_indexing_error will raise
        # InvalidIndexError. Otherwise we fall through and re-raise
        # the TypeError.
    3628     self._check_indexing_error(key)

KeyError: 'Brand'

```

In [77]: df

Out[77]:

	Unnamed: 0	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
0	0	Lenovo	Lenovo DFIN Yoga Slim 7 Laptop	16GB	512GB SSD	11th Gen Intel Core i5	High End Laptop	Intel	Solid State Drive	81999 ₹
1	1	Dell	Dell 3400 Vostro 14 Laptop	4GB	1TB HDD + 256GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Hard Disk Drive & Solid State Drive	45999 ₹
2	2	Asus	Asus KG512S Laptop	16GB	512GB SSD	AMD Ryzen 5	Mid Range Laptop	AMD	Solid State Drive	67999 ₹
3	3	Asus	Asus KG711TS Laptop	16GB	1TB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	72499 ₹
4	4	Microsoft	Microsoft 5UI-00023 Surface 4 Laptop	8GB	256GB SSD	AMD Ryzen 7	High End Laptop	AMD	Solid State Drive	130990 ₹
...	...	...	...	...	...	...	...	...	...	...
686	686	Dell	DELL Vostro Core i5 11th Gen	8GB	1TB HDD	Intel Core i5	Mid Range Laptop	Intel	Hard Disk Drive	54790
687	687	Dell	DELL Inspiron Core i5 11th Gen	8GB	512GB SSD	Intel Core i5	High End Laptop	Intel	Solid State Drive	72490
688	688	Dell	DELL Inspiron Core i3 10th Gen	8GB	256GB SSD	Intel Core i3	Budget Laptop	Intel	Solid State Drive	44190
689	689	Dell	DELL Inspiron Ryzen 7 Octa Core 5825U	8GB	512GB SSD	AMD Ryzen 7	Mid Range Laptop	AMD	Solid State Drive	66190
690	690	Dell	DELL Inspiron Ryzen 5 Quad Core 3450U	8GB	256GB SSD	AMD Ryzen 5	Budget Laptop	AMD	Solid State Drive	49613

691 rows × 14 columns

In [78]: `df[(df["Price Category"] == "Budget Laptop") & (df["Ram"] == "16GB") & (df["Rom Type"] == "Solid State Drive")]`

Out[78]:

	Unnamed: 0	Brand	Model	Ram	Rom	Processor	Price Category	Processor Type	Rom Type	Price (₹)
86	86	Asus	Asus EK562WS Laptop	16GB	512GB SSD	10th Gen Intel Core i3	Budget Laptop	Intel	Solid State Drive	35999 Relia
235	235	Lenovo	Lenovo IdeaPad 3 L1IN Laptop	16GB	512GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Solid State Drive	37999 Relia
236	236	Dell	Dell Inspiron 3511 Laptop	16GB	512GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Solid State Drive	47999 Relia
312	312	Asus	Asus EJ562WS Laptop	16GB	512GB SSD	10th Gen Intel Core i5	Budget Laptop	Intel	Solid State Drive	45999 Relia
328	328	Lenovo	Lenovo K8IN IdeaPad Slim 3i Laptop	16GB	512GB SSD	11th Gen Intel Core i3	Budget Laptop	Intel	Solid State Drive	38999 Relia

In [44]: `df["Rom Type"].unique()`

Out[44]: `array(['Solid State Drive', 'Hard Disk Drive & Solid State Drive', 'Hard Disk Drive', 'Embedded Multimedia Card', 'Solid State Drive & Intel Optane Memory', 'Hybrid'], dtype=object)`