

ANALYSING CPU MARKET

A study by: Abhishikt Emmanuel Prakash

Christ (Deemed to be University) - Bengaluru

INTRODUCTION: Benchmarks allow for easy comparison between multiple processors by scoring their performance on a standardized series of tests, and they are useful in many instances: When buying or building a new PC.

In this report, we will be analysing 1938 CPU models released between 2007 – 2022 ranging from 1-core CPUs to 64-core CPUs. This report analyses the CPU market for two major manufacturers, AMD and Intel. This analysis is done by using various excel functions and data analysis tools available with “ToolPak”.

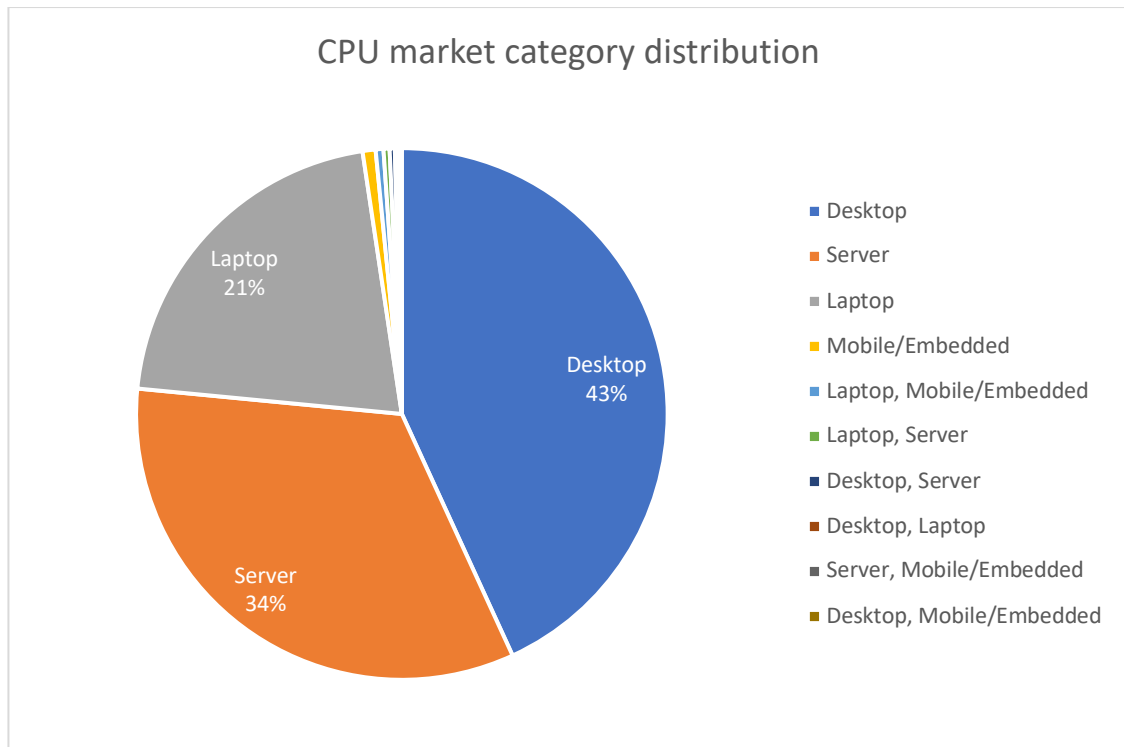
OBJECTIVE 1: Visual representation of CPU market division based on CPU category.

PROCEDURE:

- Keeping a cell within the master table selected
- Go to Insert tab
- Click insert pivot table a dialog box appears
- Select the table in input range
- Select new worksheet for output table range
- A pivot table is created
- Drag “category” to row box
- Drag “cpuName” to value box
- Click on “i” icon select count
- Keeping a cell within pivot table selected
- Go to insert tab
- Select 2D pie chart

RESULT:

Row Labels	Count of cpuName
Desktop	820
Server	634
Laptop	401
Mobile/Embedded	15
Laptop, Mobile/Embedded	9
Laptop, Server	7
Desktop, Server	6
Desktop, Laptop	4
Server, Mobile/Embedded	2
Desktop, Mobile/Embedded	2
Grand Total	1900



INFERENCE: Desktop CPU market hold the largest market share of 43% followed by server CPU market of 34% followed by laptop CPU market of 21%.

OBJECTIVE 2: Visual representation of CPU market division based on number of cores.

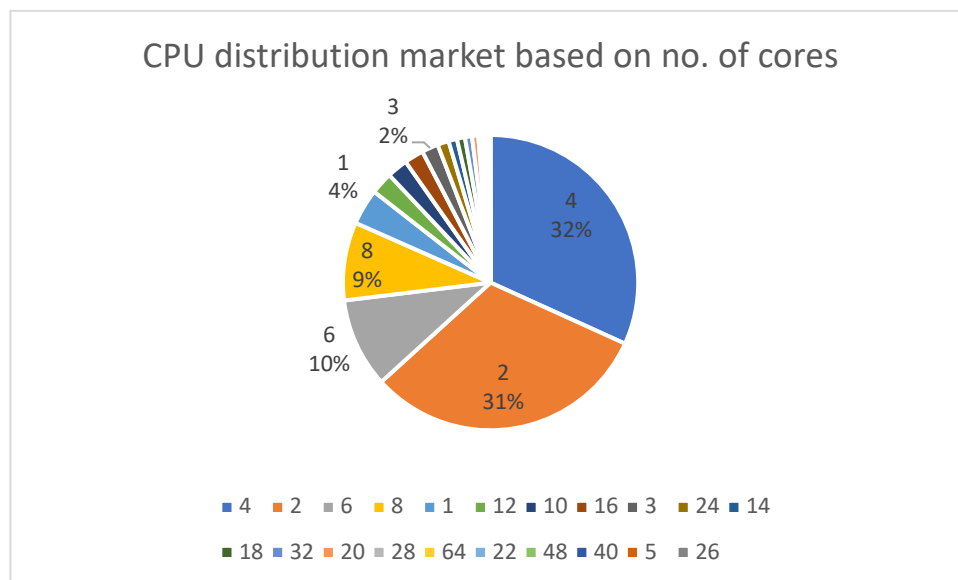
PROCEDURE:

- Keeping a cell within the master table selected
- Go to Insert tab
- Click insert pivot table a dialog box appears
- Select the table in input range
- Select new worksheet for output table range
- A pivot table is created
- Drag “cores” to row box
- Drag “cpuName” to value box
- Click on “i” icon select count
- Keeping a cell within pivot table selected
- Go to insert tab
- Select 2D pie chart

RESULT:

Row Labels	Count of cpuName
4	616
2	610
6	190
8	166
1	76

12	47
10	44
16	41
3	35
24	24
14	18
18	17
32	15
20	13
28	8
64	8
22	5
48	2
40	1
5	1
26	1
Grand Total	1938



INFERENCE: The CPU market has maximum 2 core or 4 core CPUs, 32% and 31% respectively whereas 8 core CPUs contribute to 9% of the market and 6 core CPUs contribute to 10% market other CPU designs are 18% of the market collectively.

OBJECTIVE 3: Visual representation of CPU releases based on number of cores

PROCEDURE:

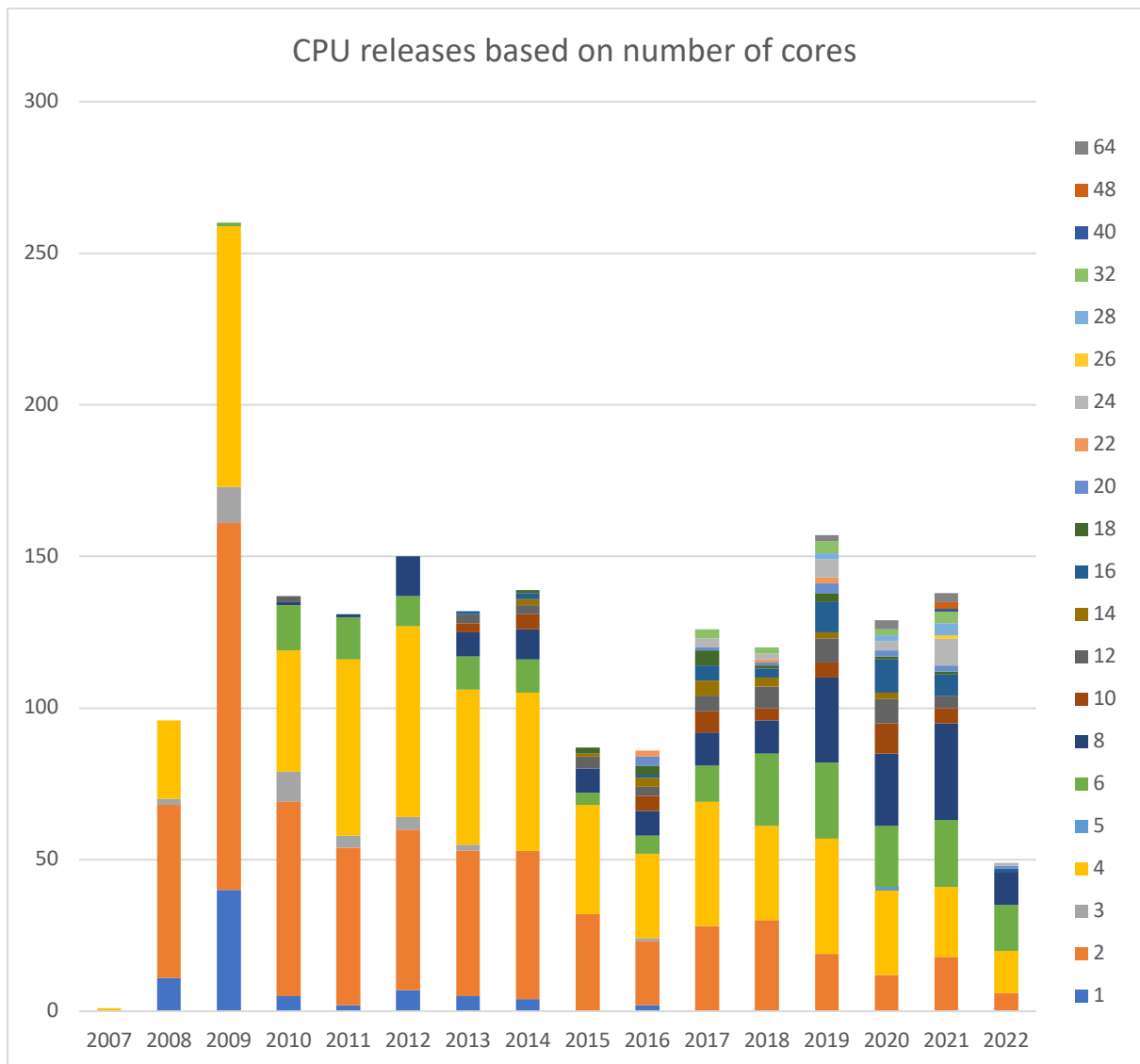
- Keeping a cell within the master table selected
- Go to Insert tab
- Click insert pivot table a dialog box appears
- Select the table in input range
- Select new worksheet for output table range

- A pivot table is created
- Drag “years” to row box
- Drag “cores” to column box
- Drag “cpuName” to value box
- Click on “i” icon select count
- Keeping a cell within pivot table selected
- Go to insert tab
- Select 2D stacked column

RESULT:

Year	1	2	3	4	5	6	8	1	1	1	1	1	2	2	2	2	2	3	4	4	6	Grand Total
								0	2	4	6	8	0	2	4	6	8	2	0	8	4	
2007				1																		1
2008	11	5		2																		96
		7	2	6																		
2009	40	1																				260
		2	1	8		1																
2010	5	1	2	6		1																137
		6	1	4		1																
2011	2	4					1		2													151
		5																				
2012	7	3	4	3		0	3															130
		4		5		1																
2013	5	8	2	1		1	8	3	3		1											132
		4		5		1	1															
2014	4	9		2		1	0	5	3	2	2	1										93
		3		3																		
2015		2		6		4	8		4	1		2										87
		2		2																		
2016	2	1	1	8		6	8	5	3	3	1	3	3	2								8612
		2		4		1	1															
2017		8		1		2	1	7	5	5	5	5	1		3			3				612
		3		3		2	1															
2018		0		1		4	1	4	7	3	3	1	1	1	2			2				015
		1		3		2	2				1											
2019		9		8		5	8	5	8	2	0	3	3	2	6		2	4		2		7

		1		2		2	2	1			1									12		
2020		2		8	1	0	4	0	8	2	1	1	2		3		2	2		3	9	
		1		2		2	3														13	
2021		8		3		2	2	5	4		7	1	2		9	1	4	4	1	2	3	8
				1		1	1															
2022		6		4		5	1				1		1		1						49	
Grand Total		6		6		1	1															
		1	3	1		9	6	4	4	1	4	1	1		2			1			19	
Grand Total	76	0	5	6	1	0	6	4	7	8	1	7	3	5	4	1	8	5	1	2	8	38



INFERENCE: A large number of CPUs were released in the year 2009 and over the years 4 core CPUs and 2 core CPUs have been releases in large quantities but if we observe closely number of 4 core CPUs being released is decreasing year by year while on the other hand releases of 8 core CPUs has been increasing.

OBJECTIVE 4: Visually represent the usage popularity of different sockets in the CPU market.

PROCEDURE:

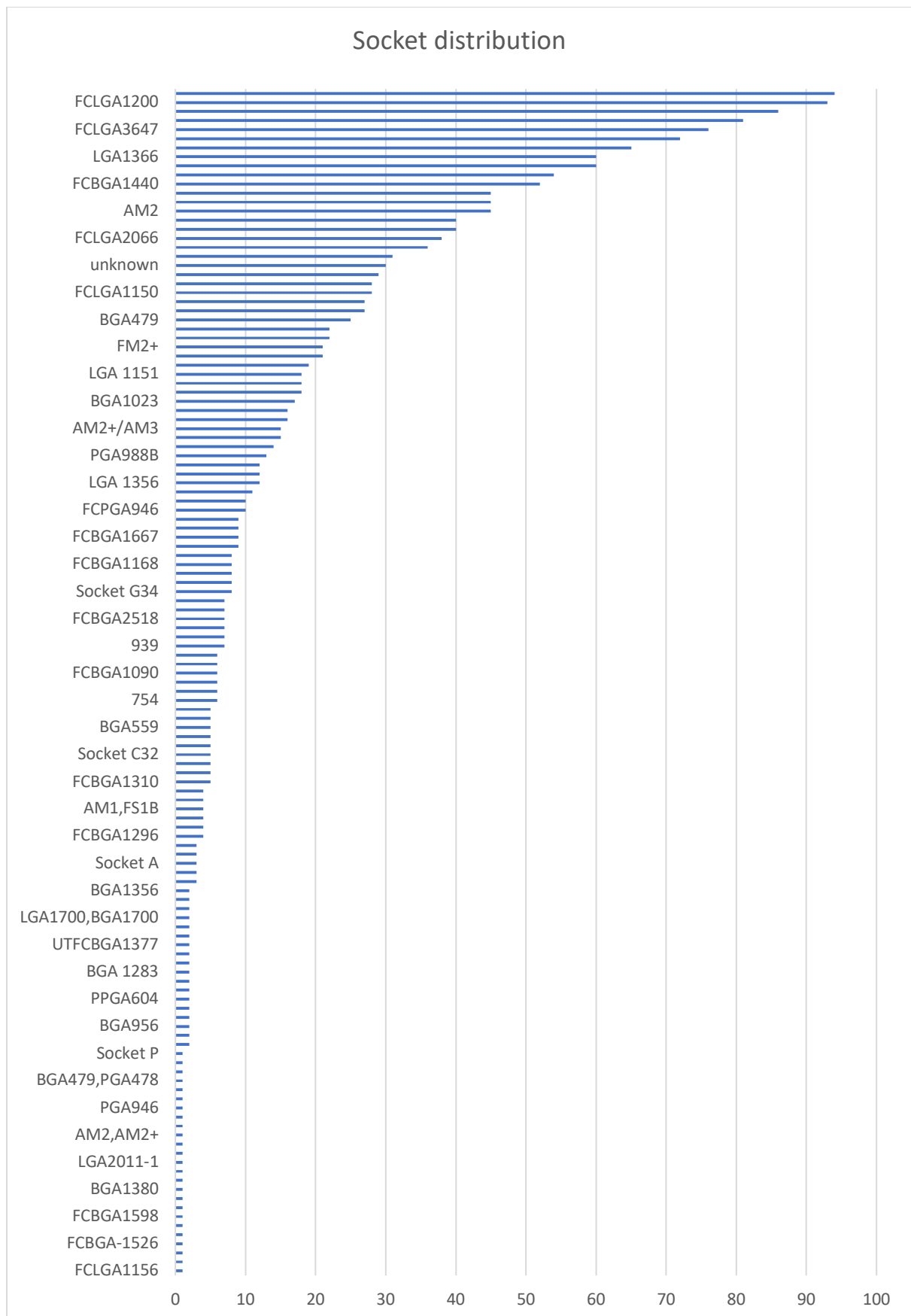
- Keeping a cell within the master table selected
- Go to Insert tab
- Click insert pivot table a dialog box appears
- Select the table in input range
- Select new worksheet for output table range
- A pivot table is created
- Drag “socket” to row box
- Drag “cpuName” to value box
- Click on “i” icon select count
- Keeping a cell within pivot table selected
- Go to insert tab
- Select vertical 2D clustered bar

RESULT:

Socket	Count of cpuName
FCLGA1156	1
μFCPGA-478	1
FCBGA2227	1
FCBGA-1526	1
FCBGA1023, PPG	1
AM1,FSB1	1
FCBGA1598	1
AM2/AM2+	1
FCBGA2579	1
BGA1380	1
FPGA946,FPGA947	1
BGA2270	1
LGA2011-1	1
FC-CSP1016	1
LGA2066	1
AM2,AM2+	1
LGA3647	1
BGA1744	1
PGA946	1
SP4r2	1
Socket 754	1
BGA479,PGA478	1
Socket A (462)	1
BGA1364	1
Socket P	1
FCBGA1234	2
PBGA479, PPGA478	2
BGA956	2
BGA 1449	2
LGA1567	2
PPGA604	2
FC-BGA1356	2
rPGA946B	2
BGA 1283	2
S1g4	2
LGA1356	2

UTFCBGA1377	2
AM2+,AM3	2
FCBGA1344	2
LGA1700,BGA1700	2
BGA1168	2
LGA775, PLGA775	2
BGA1356	2
UTFCBGA592	3
BGA1526	3
Socket A	3
sWRX8	3
sTRX4	3
FCBGA1296	4
LGA1151	4
C32	4
AM1,FS1B	4
FCBGA1283	4
PPGA478	4
FCBGA1310	5
FCBGA1526	5
FCPGA988	5
Socket C32	5
PLGA775	5
FS1r2	5
BGA559	5
FCLGA1356	5
UTFCBGA1380	5
754	6
BGA1224	6
FCBGA1023	6
FCBGA1090	6
940	6
LGA 1700	6
939	7
PGA988A	7
sTR4	7
FCBGA2518	7
rPGA988B	7
FCBGA1744	7
Socket G34	8
FCBGA1493	8
FCBGA1515	8
FCBGA1168	8
PGA988	8
FS1	9
FCBGA1667	9
FCBGA1170	9
G34	9
FCPGA946	10
FCBGA1364	10
FCBGA1449	11
LGA 1356	12
FCBGA1787	12
BGA1288	12
PGA988B	13

FCLGA1155	14
F (1207)	15
AM2+/AM3	15
FCLGA1700	16
FCBGA1356	16
BGA1023	17
FM1	18
LGA 2011	18
LGA 1151	18
FCLGA2011	19
FCLGA4189	21
FM2+	21
PGA478	22
AM2+	22
BGA479	25
LGA1156	27
LGA2011	27
FCLGA1150	28
FCBGA1528	28
AM3+	29
unknown	30
FM2	31
S1	36
FCLGA2066	38
LGA771	40
LGA2011-v3	40
AM2	45
FCLGA2011-3	45
SP3	45
FCBGA1440	52
FCLGA1151	54
LGA1150	60
LGA1366	60
AM4	65
AM3	72
FCLGA3647	76
LGA775	81
FCLGA1151-2	86
FCLGA1200	93
LGA1155	94
Grand Total	1938



INFERENCE: LGA1155, FCLGA1200, FCLGA1151-2, LGA775, FCLGA3647 are the top 5 sockets with highest usage in the CPU market.

OBJECTIVE 5: Average price of CPUs based on a data of 15 years.

PROCEDURE:

- Keeping a cell within the master table selected
- Go to Insert tab
- Click insert pivot table a dialog box appears
- Select the table in input range
- Select new worksheet for output table range
- A pivot table is created
- Drag “cores” to row box
- Drag “price” to value box
- Click on “i” icon select count
- Keeping a cell within pivot table selected
- Go to insert tab
- Select vertical 2D clustered bar

RESULT:

Cores	Average of price
1	\$ 93.64
2	\$ 130.85
3	\$ 73.57
4	\$ 259.09
5	\$ 281.00
6	\$ 327.60
8	\$ 530.52
10	\$ 662.88
12	\$ 1,018.65
14	\$ 1,175.34
16	\$ 1,643.80
18	\$ 1,895.89
20	\$ 2,371.30
22	\$ 3,911.20
24	\$ 3,083.28
26	\$ 1,870.00
28	\$ 3,782.02
32	\$ 2,773.48
40	\$ 8,978.00
48	\$ 4,554.50
64	\$ 6,116.33
Grand Total	\$ 445.12

INFERENCE: Average price of 4 core CPU over a course of 15 years has been \$259.09, while that of 8 core CPU has been \$530.52.

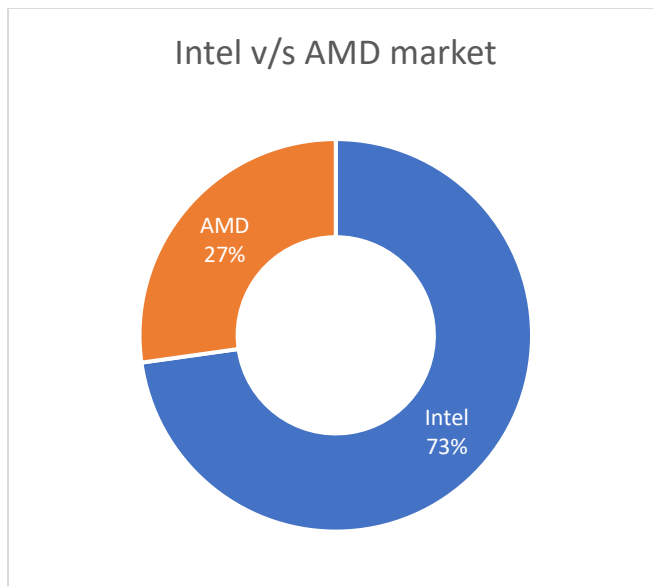
OBJECTIVE 6: Comparing market share of AMD and Intel in the CPU market over a course of 15 years.

PROCEDURE:

- Select an empty cell
- Fill in the “COUNTIF” formula “=COUNTIF(Table1[cpuName], “*Intel*)”
- Select an empty cell
- Fill in the “COUNTIF” formula “=COUNTIF(Table1[cpuName], “*AMD*)”
- In the adjacent cell create title for the same
- Select the table
- Go to insert
- Select Doughnut chart

RESULT:

Number of Intel processors	1409
Number of AMD processors	527



INFERENCE: Here we can see Intel definitely has a larger market share of 73% as compared to that of AMD 27%.

OBJECTIVE 7: Comparing market share of AMD and Intel in the CPU market for year 2021.

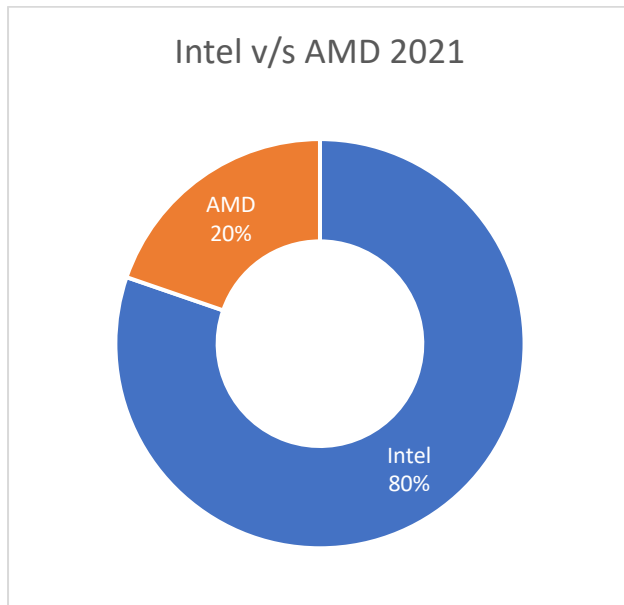
PROCEDURE:

- Select an empty cell
- Fill in the “COUNTIFS” formula “=COUNTIFS(Table1[cpuName], “*Intel*”, Table1[testDate], “2021”)”
- Select an empty cell
- Fill in the “COUNTIFS” formula “=COUNTIFS(Table1[cpuName], “*AMD*”, Table1[testDate], “2021”)”
- In the adjacent cell create title for the same
- Select the table
- Go to insert

- Select Doughnut chart

RESULT:

Number of Intel processors in 2021	118
Number of AMD processors in 2021	29



INFERENCE: In this chart we can see the market share of Intel i.e. 80% is larger as compared to that of AMD which is 20%. We can also compare this chart with previous chart and say that the market share of AMD as compared to Intel has decreased from the total average market share. Or in other words Intel's market share is increasing which should concern its competitor AMD.

OBJECTIVE 8: Average price of CPUs released in 2021 bases on number of cores.

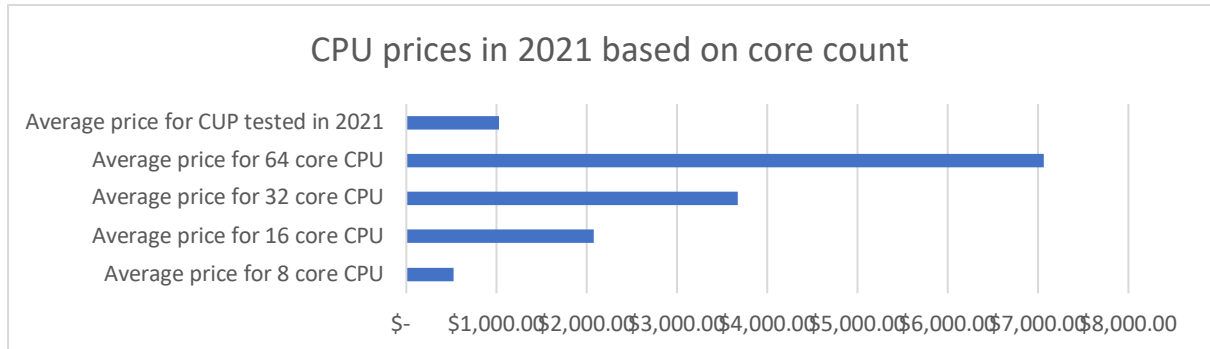
PROCEDURE:

- Select an empty cell
- Fill in the "AVERAGEIFS" formula "`=AVERAGEIFS(Table1[price], Table1[cores], 8, Table1[testDate],2021)`"
- Select an empty cell
- Fill in the "AVERAGEIFS" formula "`=AVERAGEIFS(Table1[price], Table1[cores], 16, Table1[testDate],2021)`"
- Select an empty cell
- Fill in the "AVERAGEIFS" formula "`=AVERAGEIFS(Table1[price], Table1[cores], 32, Table1[testDate],2021)`"
- Select an empty cell
- Fill in the "AVERAGEIFS" formula "`=AVERAGEIFS(Table1[price], Table1[cores], 64, Table1[testDate],2021)`"
- Select an empty cell
- Fill in the "AVERAGEIF" formula "`=AVERAGEIF(Table1[testDate], 2021,Table1[price])`"
- Select the table
- Go to insert

- Select vertical 2D clustered bars

RESULT:

Average price for 8 core CPU	\$ 521.20
Average price for 16 core CPU	\$ 2,076.72
Average price for 32 core CPU	\$ 3,674.44
Average price for 64 core CPU	\$ 7,059.00
Average price for CUP tested in 2021	\$ 1,027.23



INFERENCE: The 2021 price of 16 core, 32 core and 64 core CPUs is higher than average price of CPUs released in 2021. While the price for 8 core CPUs in 2021 is lower than the average price of CPUs in 2021.

OBJECTIVE 9: List of TOP 10 CPU based on CPU value.

PROCEDURE:

- Select an empty cell
- Fill in the formula “=VLOOKUP(V4,CHOOSE({1,2},Table1[Rank based on cpuValue],Table1[cpuName]),2,FALSE)”
- Select an empty cell
- Fill in the formula “=VLOOKUP(W4,Table1,2,FALSE)”
- Select an empty cell
- Fill in the formula “=VLOOKUP(W4,Table1,10,FALSE)”
- Select an empty cell
- Fill in the formula “=VLOOKUP(W4,Table1,9,FALSE)”
- Select the four cells and drag to copy

RESULT:

TOP 10 CPU based on CPU value				
Rank	Name	Price	Year	Core
1	Intel Xeon E5-1603 v3 @ 2.80GHz	\$ 12.88	2015	4
2	Intel Xeon E5-1607 @ 3.00GHz	\$ 11.53	2012	4
3	Intel Xeon E5-1428L v2 @ 2.20GHz	\$ 20.37	2019	6
4	AMD Opteron 6220	\$ 14.82	2013	4
5	AMD Opteron 4284	\$ 14.82	2013	4
6	Intel Xeon E5-1410 v2 @ 2.80GHz	\$ 19.20	2015	4

7	AMD A6-3410MX APU	\$ 3.99	2010	4
8	AMD Opteron 2435	\$ 10.95	2014	6
9	Intel Xeon X5667 @ 3.07GHz	\$ 18.04	2010	4
10	AMD Phenom II N620 Dual-Core	\$ 3.99	2009	2

OBJECTIVE 10: List of TOP 10 CPU based on CPU power.

PROCEDURE:

- Select an empty cell
- Fill in the formula `=VLOOKUP(1,CHOOSE({1,2},Table1[Rank based on power],Table1[cpuName]),2,FALSE)`
- Select an empty cell
- Fill in the formula `"=VLOOKUP(W4,Table1,2,FALSE)"`
- Select an empty cell
- Fill in the formula `"=VLOOKUP(W4,Table1,10,FALSE)"`
- Select an empty cell
- Fill in the formula `"=VLOOKUP(W4,Table1,9,FALSE)"`
- Select the four cells and drag to copy

RESULT:

TOP 10 CPU based on CPU power				
Rank	Name	Price	Year	Core
1	Intel Core i9-12900T	\$ 489.00	2022	8
2	Intel Core i7-1265U	\$ 426.00	2022	2
3	Intel Core i5-1235U	\$ 309.00	2022	2
4	Intel Core i7-1185G7E @ 2.80GHz	\$ 431.00	2021	4
5	Intel Core i7-1185G7 @ 3.00GHz	\$ 426.00	2020	4
6	Intel Core i7-10510Y @ 1.20GHz	\$ 403.00	2020	4
7	Intel Core i7-1165G7 @ 2.80GHz	\$ 426.00	2020	4
8	Intel Core i5-1145G7E @ 2.60GHz	\$ 312.00	2021	4
9	Intel Core i7-10710U @ 1.10GHz	\$ 644.99	2019	6
10	Intel Core i5-1135G7 @ 2.40GHz	\$ 309.00	2020	4

OBJECTIVE 11: Rank of CPU based on Power

PROCEDURE:

- Select an empty cell
- Fill in the formula `"=RANK([@powerPerf],[powerPerf])"`
- Select the cell and drag to copy

RESULT:

Rank based on power
130
79
153

162
112
94
125
146
151
156
253
258
250
141
210
155
165
213
239
325
273
235
260
170
179

OBJECTIVE 12: Rank based on CPU value.

PROCEDURE:

- Select an empty cell
- Fill in the formula “=RANK([@cpuValue],[cpuValue])”
- Select the cell and drag to copy

RESULT:

Rank based on cpuValue
1480
1479
1470
1593
1391
1239
1550
1419
1225
1087

1123
1390
1730
1252
1475
1132
618
796
1351
784
1541
851
1284
956
1241

OBJECTIVE 13: Using “LOOKUP” function in excel create remark for CPU.

PROCEDURE:

- Create a reference table for lookup function using mathematical functions in excel
- This table contains remarks
- Select an empty cell
- Fill in the formula “=LOOKUP([@[Rank based on power]],\$S\$5:\$S\$9,\$T\$5:\$T\$9)”
- Drag the cell to copy the formula for each row of the master sheet.

RESULT:

Performance remark guide	
1	Best performance
387.8	High performance
775.6	Average performance
1551.2	Low performance
1842.05	Very low performance

Performance remark based on performance

High performance
Best performance
Best performance
Best performance
Best performance
High performance
Best performance
Best performance

Best performance
High performance
Best performance
Best performance
Best performance
Best performance
Best performance
Best performance
High performance
Best performance
High performance
Best performance
Best performance
Best performance
Best performance
High performance

OBJECTIVE 14: Calculate for how many years the processor has been in the market.

PROCEDURE:

- Select an empty cell
- Fill in the formula “TODAY()” this will return the current date
- Select an empty cell adjacent to master table
- Fill in the formula “=YEAR(\$T\$2)-[@testDate]”
- Select and drag the cell to copy formula for each row of the master table.

RESULT:

Today date	04/09/2022
------------	------------

Age
1
1
2
2
1
2
1
3
1
1
3
2
1

3
1
1
1
3
1
3
1
1
1
2

OBJECTIVE 15: Use “concatenate” function, “proper” function, “upper” function, “trim” function in excel to generate a performance category title.

PROCEDURE:

- Select an empty cell adjacent to master table
- Fill in the formula “=CONCATENATE(PROPER([@[Performance remark based on performance]]), " ", UPPER(TRIM([@category])))”
- Select and drag the cell to copy formula for each row of the master table.

RESULT:

Performance category
Best Performance SERVER
Best Performance SERVER
Best Performance SERVER
Best Performance SERVER
High Performance DESKTOP
Best Performance DESKTOP
High Performance SERVER
Best Performance SERVER
Best Performance DESKTOP
Best Performance DESKTOP
Best Performance DESKTOP
Best Performance SERVER
Best Performance SERVER
Best Performance DESKTOP
Best Performance SERVER
Best Performance SERVER
Best Performance DESKTOP
Best Performance DESKTOP
High Performance SERVER
Best Performance SERVER

High Performance DESKTOP
Best Performance SERVER
Best Performance DESKTOP
Best Performance SERVER
Best Performance DESKTOP
Best Performance SERVER
Best Performance DESKTOP
Best Performance SERVER
Best Performance DESKTOP
Best Performance DESKTOP
High Performance SERVER
High Performance DESKTOP, SERVER
Best Performance SERVER
Best Performance DESKTOP
Best Performance DESKTOP
High Performance SERVER
Best Performance DESKTOP
High Performance DESKTOP
High Performance DESKTOP
Best Performance DESKTOP, SERVER
Best Performance SERVER

OBJECTIVE 16: Visually represent distribution of performance category CPUs

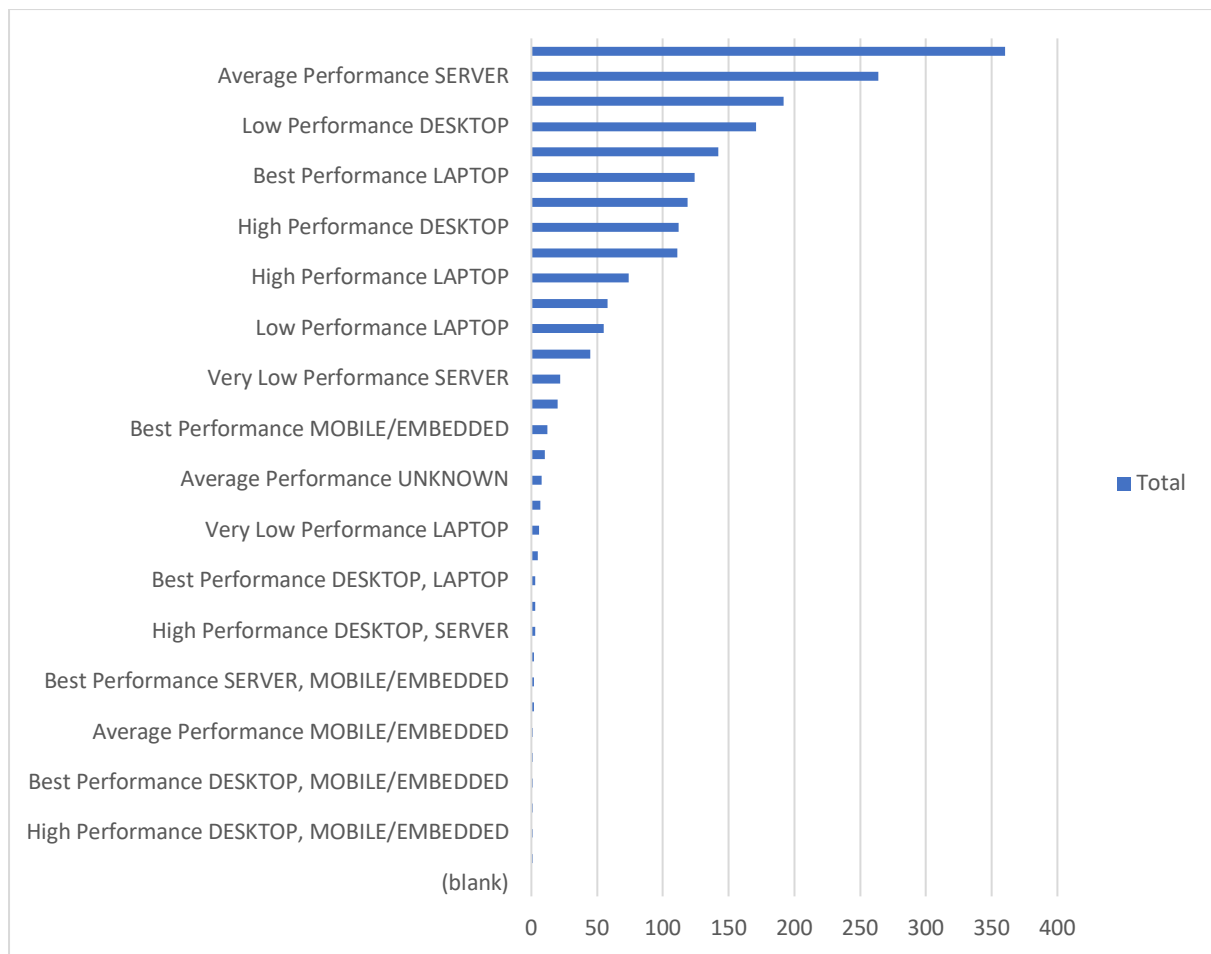
PROCEDURE:

- Select the Performance category column
- Go to insert
- Insert pivot table
- Drag performance category to rows and to values
- Go to insert
- Insert 2D vertical clustered bar

RESULT:

Row Labels	Count of Performance category
(blank)	
High Performance DESKTOP, LAPTOP	1
High Performance DESKTOP, MOBILE/EMBEDDED	1
Average Performance LAPTOP, MOBILE/EMBEDDED	1
Best Performance DESKTOP, MOBILE/EMBEDDED	1
High Performance LAPTOP, MOBILE/EMBEDDED	1
Average Performance MOBILE/EMBEDDED	1

High Performance MOBILE/EMBEDDED	2
Best Performance SERVER, MOBILE/EMBEDDED	2
High Performance LAPTOP, SERVER	2
High Performance DESKTOP, SERVER	3
Best Performance DESKTOP, SERVER	3
Best Performance DESKTOP, LAPTOP	3
Best Performance LAPTOP, SERVER	5
Very Low Performance LAPTOP	6
Best Performance LAPTOP, MOBILE/EMBEDDED	7
Average Performance UNKNOWN	8
Very Low Performance UNKNOWN	10
Best Performance MOBILE/EMBEDDED	12
Low Performance UNKNOWN	20
Very Low Performance SERVER	22
Low Performance SERVER	45
Low Performance LAPTOP	55
Very Low Performance DESKTOP	58
High Performance LAPTOP	74
Best Performance SERVER	111
High Performance DESKTOP	112
Best Performance DESKTOP	119
Best Performance LAPTOP	124
Average Performance LAPTOP	142
Low Performance DESKTOP	171
High Performance SERVER	192
Average Performance SERVER	264
Average Performance DESKTOP	360
Grand Total	1938



INFERENCE: Most of the CPUs in the market are average performance server CPUs.

OBJECTIVE 17: Statistical summary for price

PROCEDURE:

- Go to data tab
- Select data analysis
- Select Descriptive statistics
- Click ok a dialog box appears
- Select input range
- Check summary statistics
- Select output range
- Click Ok

RESULT:

<i>price</i>	
Mean	445.1242157
Standard Error	20.73360097
Median	161
Mode	250

Standard Deviation	912.7495394
Sample Variance	833111.7217
Kurtosis	30.43425169
Skewness	4.950301496
Range	8974.01
Minimum	3.99
Maximum	8978
Sum	862650.73
Count	1938

OBJECTIVE 18: Statistical summary for CPU value

PROCEDURE:

- Go to data tab
- Select data analysis
- Select Descriptive statistics
- Click ok a dialog box appears
- Select input range
- Check summary statistics
- Select output range
- Click Ok

RESULT:

<i>cpuValue</i>	
Mean	35.65339009
Standard Error	0.815515163
Median	25.825
Mode	10.16
Standard Deviation	35.90119683
Sample Variance	1288.895934
Kurtosis	17.73023938
Skewness	3.240370207
Range	345.11
Minimum	0.22
Maximum	345.33
Sum	69096.27
Count	1938

OBJECTIVE 19: Statistical summary for power performance

PROCEDURE:

- Go to data tab
- Select data analysis
- Select Descriptive statistics

- Click ok a dialog box appears
- Select input range
- Check summary statistics
- Select output range
- Click Ok

RESULT:

<i>powerPerf</i>	
Mean	111.8206656
Standard Error	2.741156842
Median	69.295
Mode	150.3
Standard Deviation	120.673184
Sample Variance	14562.01734
Kurtosis	6.43783524
Skewness	2.189152454
Range	997.22
Minimum	2.75
Maximum	999.97
Sum	216708.45
Count	1938

OBJECTIVE 20: Statistical summary for thread value

PROCEDURE:

- Go to data tab
- Select data analysis
- Select Descriptive statistics
- Click ok a dialog box appears
- Select input range
- Check summary statistics
- Select output range
- Click Ok

RESULT:

<i>threadValue</i>	
Mean	15.21938596
Standard Error	0.408008994
Median	9.845
Mode	1.43
Standard Deviation	17.96166626
Sample Variance	322.6214549

Kurtosis	30.17646552
Skewness	3.902919394
Range	267.69
Minimum	0.13
Maximum	267.82
Sum	29495.17
Count	1938

OBJECTIVE 21: Regression statistics for thread value and CPU value

PROCEDURE:

- Go to data tab
- Select data analysis
- Select Regression
- Select input range for X
- Select input range for Y
- Select output range
- Click Ok

RESULT:

SUMMA

RY

OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.659108115
R Square	0.434423508
Adjusted R Square	0.434131371
Standard Error	27.00640248
Observations	1938

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	108457.78	108457.8004	1487.055991	7.093E-242
Residual	1936	14120.42	729.3457748		

		24965
Total	1937	91.42

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	15.6033	0.8041	19.4032	8.86298	14.026	17.1804	14.0261	17.180
threadValue	1.31740	0.0341	38.5623	7.0927E-77	1.2504	1.38440	1.25040	1.3844
cpuValue	3956	6295	6495	-242	0393	3985	3926	0398

OBJECTIVE 22: t-Test for CPU value and thread value

PROCEDURE:

- Go to data tab
- Select data analysis
- Select t-Test: Paired Two Sample for Means
- Select input range 1 as CPU value
- Select input range 2 as thread value
- Select output range
- Click Ok

RESULT:

t-Test: Paired Two Sample for Means

	<i>cpuValue</i>	<i>threadValue</i>
Mean	35.65339009	15.219386
Variance	1288.895934	322.621455
Observations	1938	1938
Pearson Correlation	0.659108115	
Hypothesized Mean Difference	0	
df	1937	
t Stat	32.59893734	
P(T<=t) one-tail	1.6546E-186	
t Critical one-tail	1.64564067	
P(T<=t) two-tail	3.3091E-186	
t Critical two-tail	1.961189451	

INFERENCE: Since the P(T<=t) two-tail value is less than 0.05 hence we reject the null hypothesis

THANKYOU