Physical Design

Computation of the Blocking Factor for each of the Tables with the use of the standard block size of 512 byte. The Blocking Factor is a lower-limit integer value as part of the tuple cannot be saved in one block of data storage.

Table Name	Computation	BFR Value
Goods	512 / 54	**9**
Products	512 / 116	**4**
Sellers	512 / 48	**10**
Customers	512 / 154	**3**
Customer Items	512 / 44	**11**
Mobiles	512 / 108	**4**
Media	512 / 24	**21**
Laptops	512 / 104	**4**
TV	512 / 74	**6**
Books	512 / 44	**11**
Fashion	512 / 60	**8**

Computation of the number of blocks and total memory required per table is calculation by the formula b = [t/bfr] where b is the number of blocks, t is the number of tuples and bfr is the Blocking Factor. The computation for total memory is calculated by multiplying the number of block to the size of a single block. The value for number of blocks will be upper-bound integer.

Table Name	Computation for number of blocks	Number of Blocks required	Computation for number of blocks	Total Memory Required (bytes)
Goods	2400000/9	**266667**	266667 x 512	**136533504**
Products	2400000/4	**600000**	600000 x 512	**307200000**
Sellers	10000/10	**1000**	1000 x 512	**512000**
Customers	200/3	**67**	67 x 512	**34304**
Customer Items	1000/11	**91**	91 x 512	**46592**
Mobiles	400000/4	**100000**	100000 x 512	**51200000**
Media	400000/21	**19048**	19048 x 512	**9752576**
Laptops	400000/4	**100000**	100000 x 512	**51200000**
TV	400000/6	**666667**	666667 x 512	**341333504**
Books	400000/11	**36364**	36364 x 512	**18618368**
Fashion	400000/8	**50000**	50000 x 512	**25600000**

Table Name	Computation for number of blocks	Number of Blocks required	Number of Blocks Required for index	Computation for number of blocks	Total Memory Required (bytes)
Goods	2400000/9	**266667**	6138	32805 x 512	**16796160**
Products	2400000/4	**600000**	171429	771429x 512	**394971648**
Sellers	10000/10	**1000**	57	1057 x 512	**54964**
Customers	200/3	**67**	448	515 x 512	**263680**
Customer Items	1000/11	**91**	200	291 x 512	**148992**
Mobiles	400000/4	**100000**	11765	21765 x 512	**11143680**
Media	400000/21	**19048**	11765	30813 x 512	**15776256**
Laptops	400000/4	**100000**	11765	21765 x 512	**11143680**
TV	400000/6	**666667**	11765	678432 x 512	**347357184**
Books	400000/11	**36364**	11765	48129x 512	**24642048**
Fashion	400000/8	**50000**	11765	61765 x 512	**31623680**

Computation of the time taken for full table scan and the retrieval of the one tuple(average). Assumptions for full table scan, seek time = 12ms, rotational delay = 11.11ms and block transfer time = 1ms. For the retrieval of 1st tuple, we have chosen unordered type, hence b/2 is the average block to a specific record.

Table Name	Computation for a full table scan ft = b x (s + rd + btt)	Full Table Scan (ms)	Computation for the time taken for the retrieval of one tuple	Time taken for retrieval of one tuple (ms)
Goods	266667 x (12 + 11.11 + 1)	**6429341.37**	6429341.37/2	**3214670.685**
Products	600000 x (12 + 11.11 + 1)	**14466000**	14466000/2	**7233000**
Sellers	1000 x (12 + 11.11 + 1)	**24110**	24110/2	**12055**
Customers	67 x (12 + 11.11 + 1)	**1615.37**	1615.37/2	**807.685**
Customer Items	91 x (12 + 11.11 + 1)	**2194.01**	2194.01/2	**1097**
Mobiles	100000 x (12 + 11.11 + 1)	**2411000**	2411000/2	**1205500**
Media	19048 x (12 + 11.11 + 1)	**459247.28**	459247.28/2	**229623.64**
Laptops	100000 x (12 + 11.11 + 1)	**2411000**	2411000/2	**1205500**
TV	666667 x (12 + 11.11 + 1)	**16073341.37**	16073341.37/2	**8036670.685**
Books	36364 x (12 + 11.11 + 1)	**876736.04**	876736.04/2	**438368.02**
Fashion	50000 x (12 + 11.11 + 1)	**1205500**	1205500/2	**602750**

Total size of database including index and metadata is 1975547805 bytes