



INSTITUTE OF INFORMATION TECHNOLOGY
JAHANGIRNAGAR UNIVERSITY

Assignment : 02
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Answer to the question no-1

Given that,

String = 2, 3, 4, 2, 1, 3, 7, 5, 4, 3

frame size = 3

(i) FiFo

	2	3	4	2	1	3	7	5	4	3
F ₁	2	2	2	2	1	1	1	1	4	4
F ₂		3	3	3	3	3	7	7	7	3
F ₃			4	4	4	4	4	5	5	5
				Hit		Hit				

$$\therefore \text{Hit ratio} = \frac{\text{Hit}}{\text{Hit} + \text{Mis}} \times 100$$

$$= \frac{2}{2+8} \times 100$$

$$= 20\% \text{ Ans.}$$

here,

$$\text{Hit} = 2$$

$$\text{Mis} = 8$$

(ii) LRU

	2	3	4	2	1	3	7	5	4	3
F ₁	2	2	2	2	2	2	7	7	7	3
F ₂		3	3	3	1	1	1	5	5	5
F ₃			4	4	4	3	3	3	4	4

Hit

$$\begin{aligned}
 \therefore \text{Hit ratio} &= \frac{\text{Hit}}{\text{Hit} + \text{Mis}} \times 100 \\
 &= \frac{1}{1+9} \times 100 \\
 &= 10\% \text{ Ans.}
 \end{aligned}
 \quad \left| \begin{array}{l} \text{here,} \\ \text{Hit} = 1 \\ \text{Mis} = 9 \end{array} \right.$$

(iii) LFU

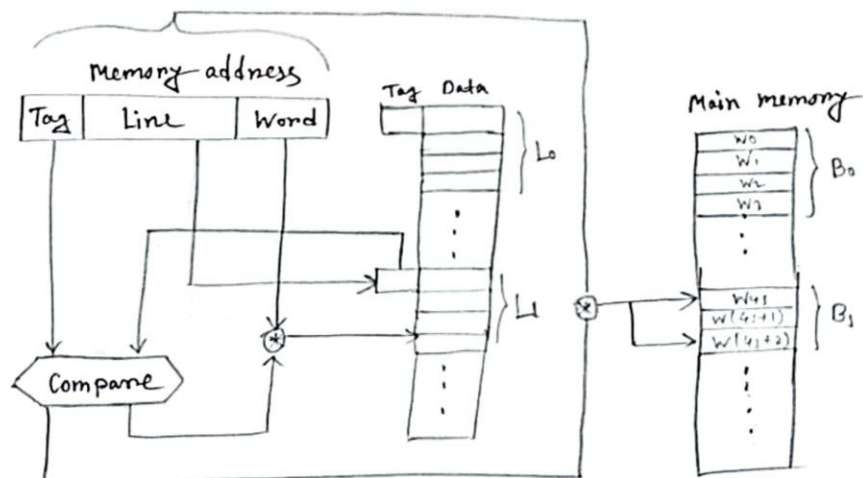
	2	3	4	2	1	3	7	5	4	3
F ₁	2	2	2	2	2	2	2	2	2	2
F ₂		3	3	3	1	1	7	7	4	4
F ₃			4	4	4	3	3	5	5	3

Hit

$$\begin{aligned}
 \therefore \text{Hit ratio} &= \frac{\text{Hit}}{\text{Hit} + \text{Mis}} \times 100 \\
 &= \frac{1}{1+9} \times 100 \\
 &= 10\% \text{ Ans.}
 \end{aligned}
 \quad \left| \begin{array}{l} \text{here} \\ \text{Hit} = 1 \\ \text{Mis} = 9 \end{array} \right.$$

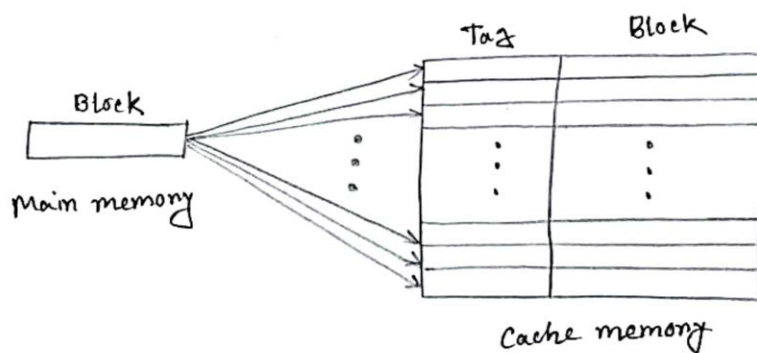
Answer to the question no-2

- (i) Direct Mapping: Direct mapping is a Procedure used to assign each memory block in the main memory to a Particular line in the cache. If a line is already filled with a memory block and a new block needs to be loaded then the old block is discarded from the cache.



Direct mapping divides an address into three parts: Tag, line, word. The word are the least significant bits that identify the specific word within a block of memory.

(ii) Associative Mapping: In the associative mapping function any block of main memory can probably consist of any cache block position. It breaks the main memory address into two parts - the word ID and a tag as shown in the figure. To check for a block stored in the memory the tag is pulled from the memory address and a search is performed through all of the lines of the cache to see if the block is present.



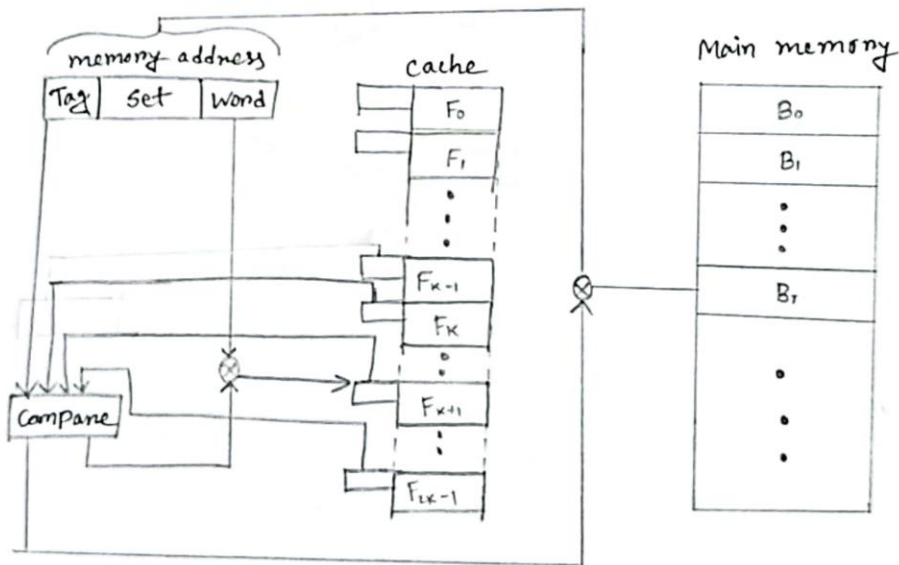
This method of searching for a block within a cache appears like it might be a slow process but it is not. Each line of the cache has its compare circuitry which can quickly analyze whether or not the block is contained at that line.

With all of the lines performing this comparison process in parallel the correct line is identified quickly.

This mapping technique is designed to solve a problem that exists with direct mapping where to active blocks of main memory could map to the same line of the cache. When this happens neither block of memory is allowed to stay in the cache as it is replaced quickly by the competing block. This leads to a condition that is referred to as thrashing.

In thrashing a line in the cache goes back and forth between two or more blocks usually replacing a block even before the processor goes through it. Thrashing can be avoided by allowing a block of memory to map to any line of the cache.

(iii) Set Associative Mapping: Set associative mapping combines direct mapping with fully associative by arrangement lines of a cache into sets. The sets are persistent using a direct mapping schema. However the lines within each set are treated as a small fully associative cache where any block that can save in the set can be stored to any line inside the set.



A set-associative cache that includes K lines per set is known as a K way set associative cache. Because the mapping approach uses the memory address only like direct mapping does the number of lines include in a set should be similar to an integer Power of two.

THE END