**Replacement Techniques**

 When all lines are occupied, bringing in a new block requires that an existing line be overwritten.

**For Direct mapping :**

 • No choice possible with direct mapping

 • Each block only maps to one line

 • Replace that line

**For Associative and set- associative:**

A number of replacement techniques can be used. These include a:

**1-Random selection:** Let us assume that when a computer system is powered up:

• A random number generator starts generating numbers between 0 and (N- 1).

• A cache block for replacement is done based on the output of the random number generator at the time of replacement.

• This technique is simple and does not require much additional overhead.

**2-FIFO:**

 • Takes the time spent by a block in the cache as a measure for replacement.

 • The block that has been in the cache the longest is selected for replacement regardless of the recent pattern of access to the block.

 • This technique requires keeping track of the lifetime of a cache block.

 • Therefore, it is not as simple as the random selection technique.

**3-** **Least Recently used (LRU):**

• Replace that block in the set which has been in cache longest with no reference to it

• Implementation: having a USE bit for each line . When a block is read into cache, use the line whose USE bit is set to 0, then set its USE bit to one and •The other line’s USE bit to 0.

 Probably the most effective method

**4-** **Least-frequently-used (LFU):**

• Replace that block in the set which has experienced the fewest references or hits

• Implementation: associate a counter with each slot and increment when used

