DIRECT-MAPPING ALGORITHM

1. **Divide the main memory into blocks**
    - Main memory is split into equal-sized blocks.
    - Cache is divided into lines (or slots), each capable of holding one block.
2. **Break down the memory address into three parts**:
    - **Tag bits (t):** Identify which block of memory is currently stored in the cache line.
    - **Line (index) bits (l):** Select the specific cache line where the block should be placed.
    - **Word (offset) bits (w):** Identify the exact word within the block.
3. **Mapping rule**
    - A memory block number i is mapped to cache line i mod (number of cache lines).
    - Example: If cache has 512 lines, block 0, 512, 1024… will all map to line 0.
4. **Access procedure**

- Extract the **line index** from the address.
- Check the **tag** stored in that cache line.
- If the tag matches → **Cache hit** (data is found in cache).
- If the tag does not match → **Cache miss** (the block must be fetched from main memory and replace the existing block in that line).