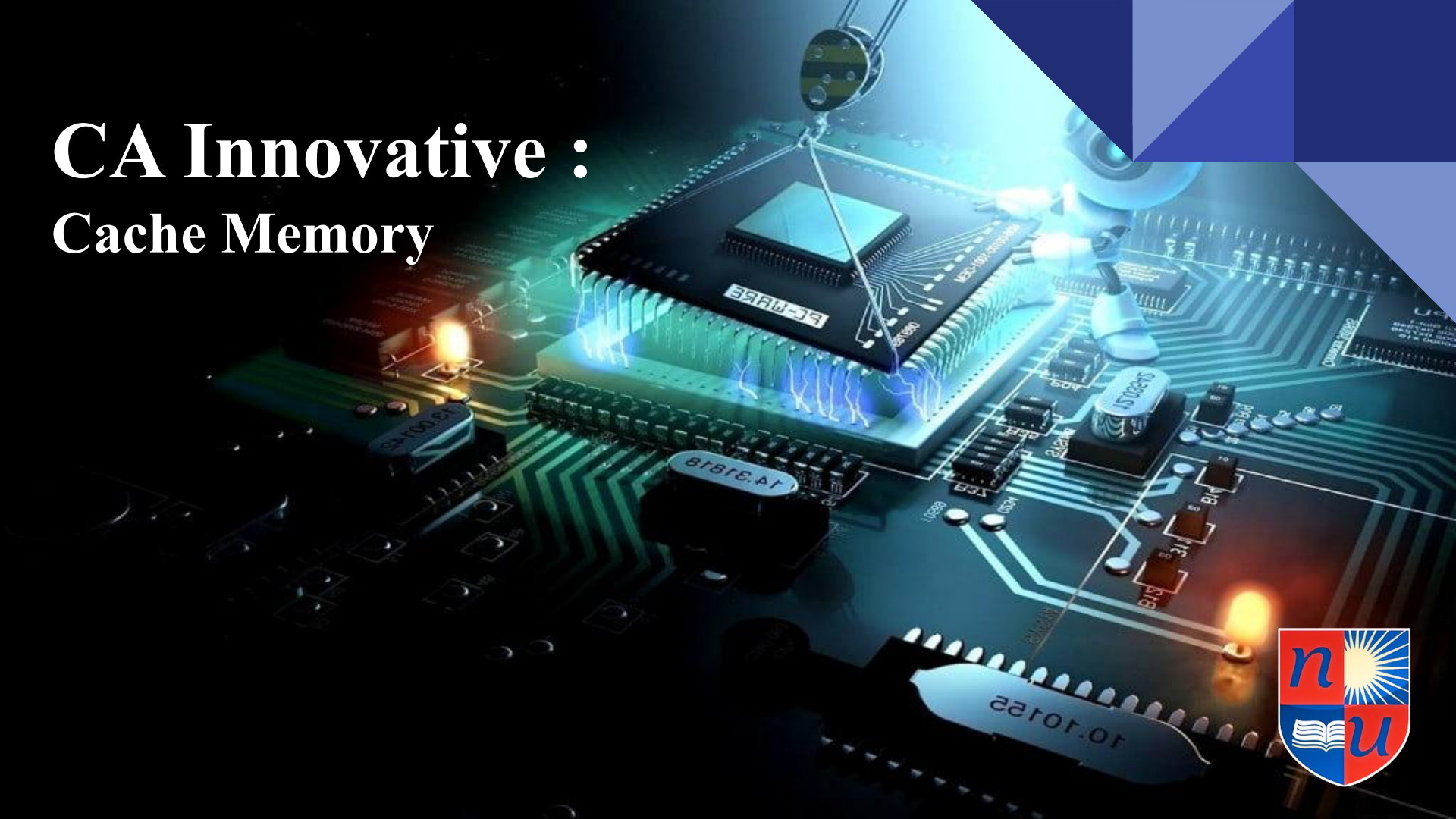
CA Innovative :
Cache Memory



About Cache Memory :-

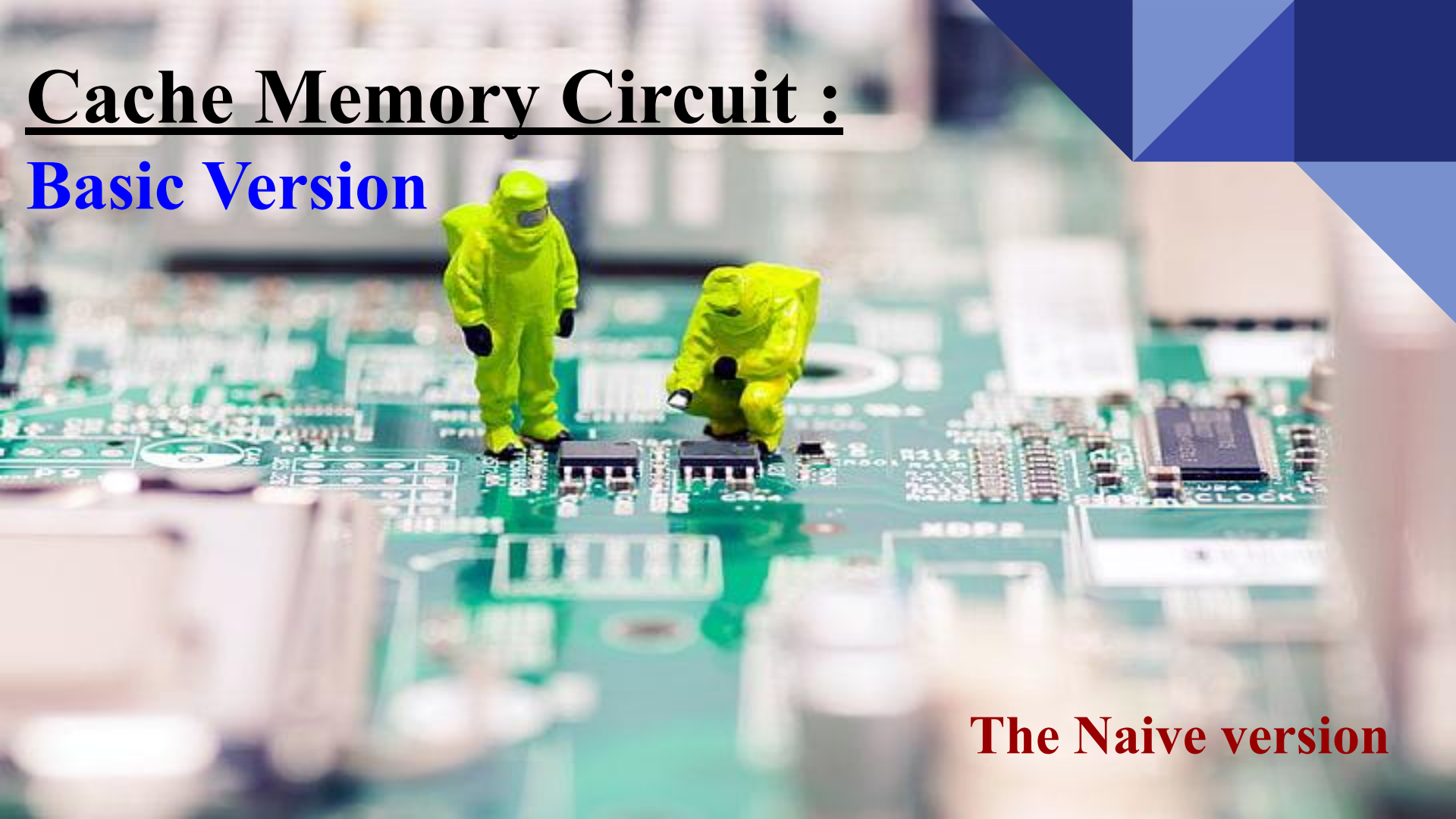
- Cache Memory is a special very high-speed memory. It is used to speed up and synchronizing with high-speed CPU.

- Cache memory is used to reduce the average time to access data from the Main memory

- The performance of cache memory is frequently measured in terms of a quantity called Hit ratio.

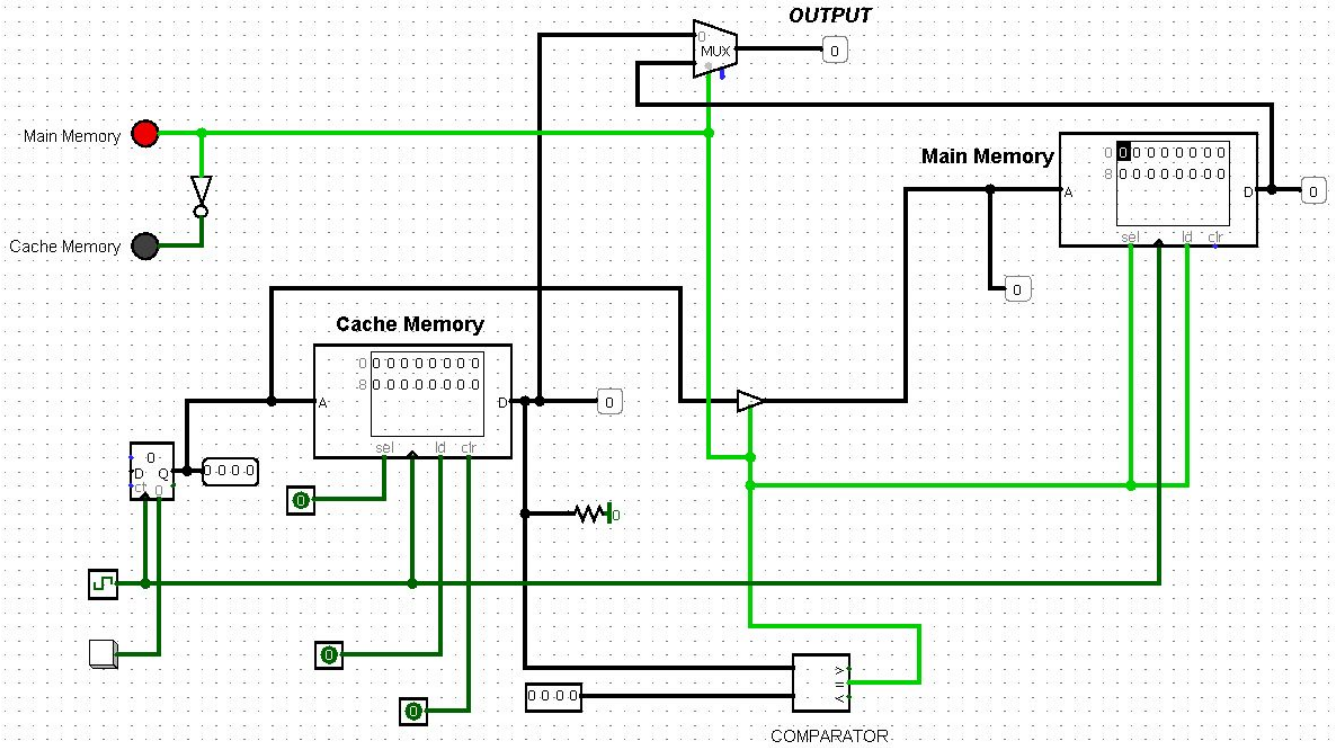
Cache Memory Circuit :

Basic Version



The Naive version

Cache Memory Basic Circuit



If counter value in cache then cache 'HIT' and output given from cache
else it searches for the value of counter in main memory

Feature of the Basic Version :-

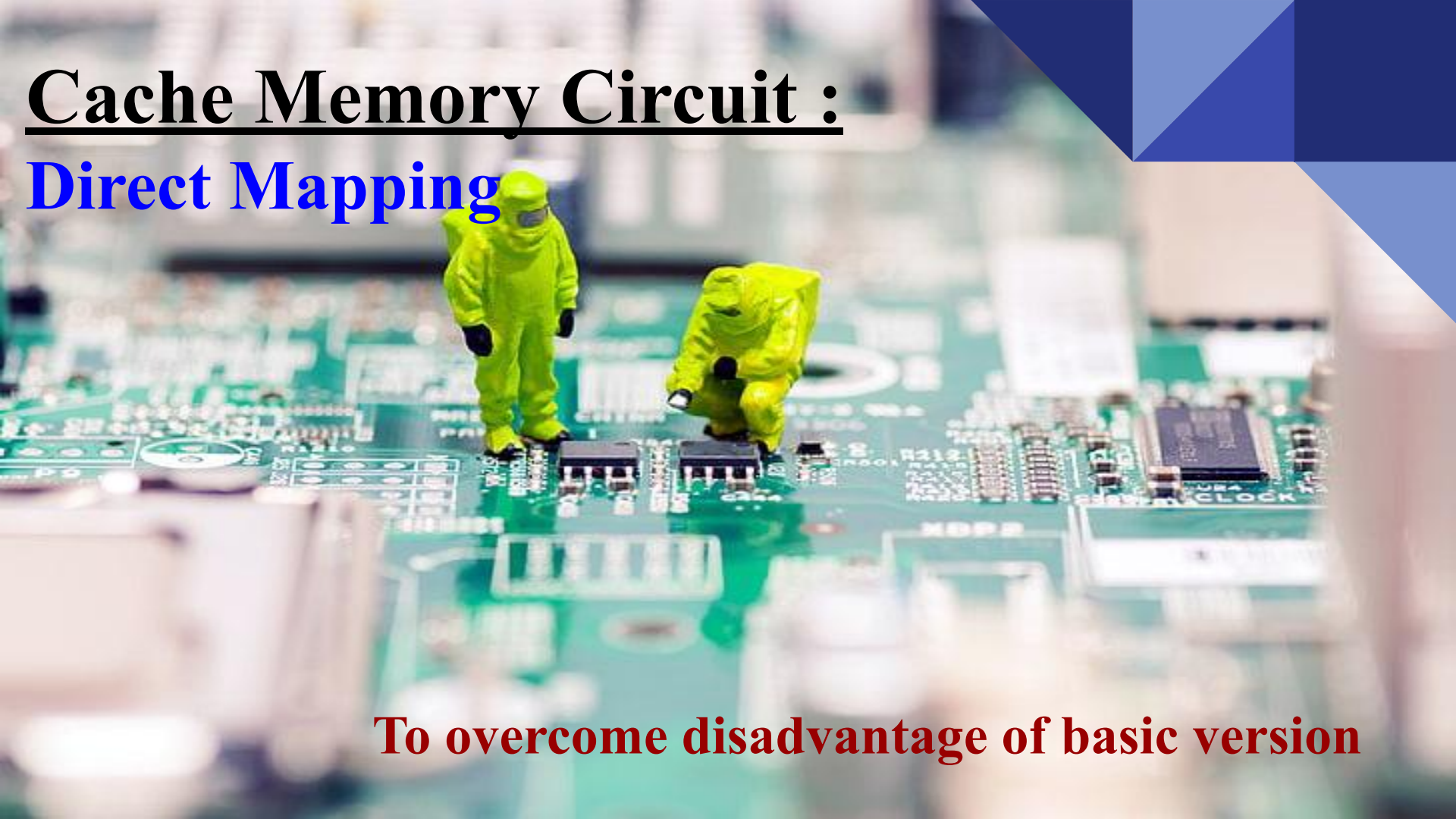
- It demonstrates how to cache memory is accessed.
- Cache Memory similar to Main Memory (without updation).
- If any value exists in cache, cache value is given as input for that address access.
- Else it is fetched from main memory.
- No hierarchy seen.

Limitations of Basic Version :-

- No updation of cache memory
- No direct mapping followed

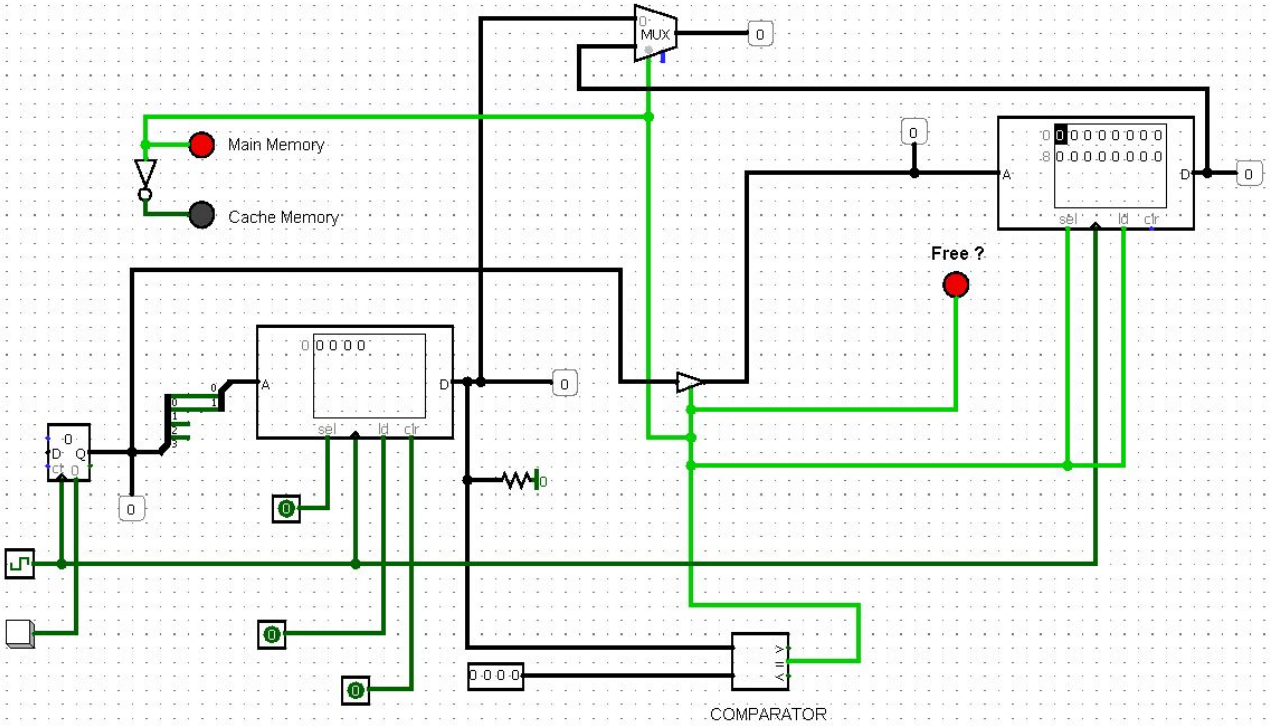
Cache Memory Circuit :

Direct Mapping



To overcome disadvantage of basic version

Direct Mapping in Cache



NOTE : When HIT occurs in cache memory, the Main Memory will be free and can be utilized simultaneously for other operations (for eg. I/O, etc.)

Feature of the Direct Mapping :-

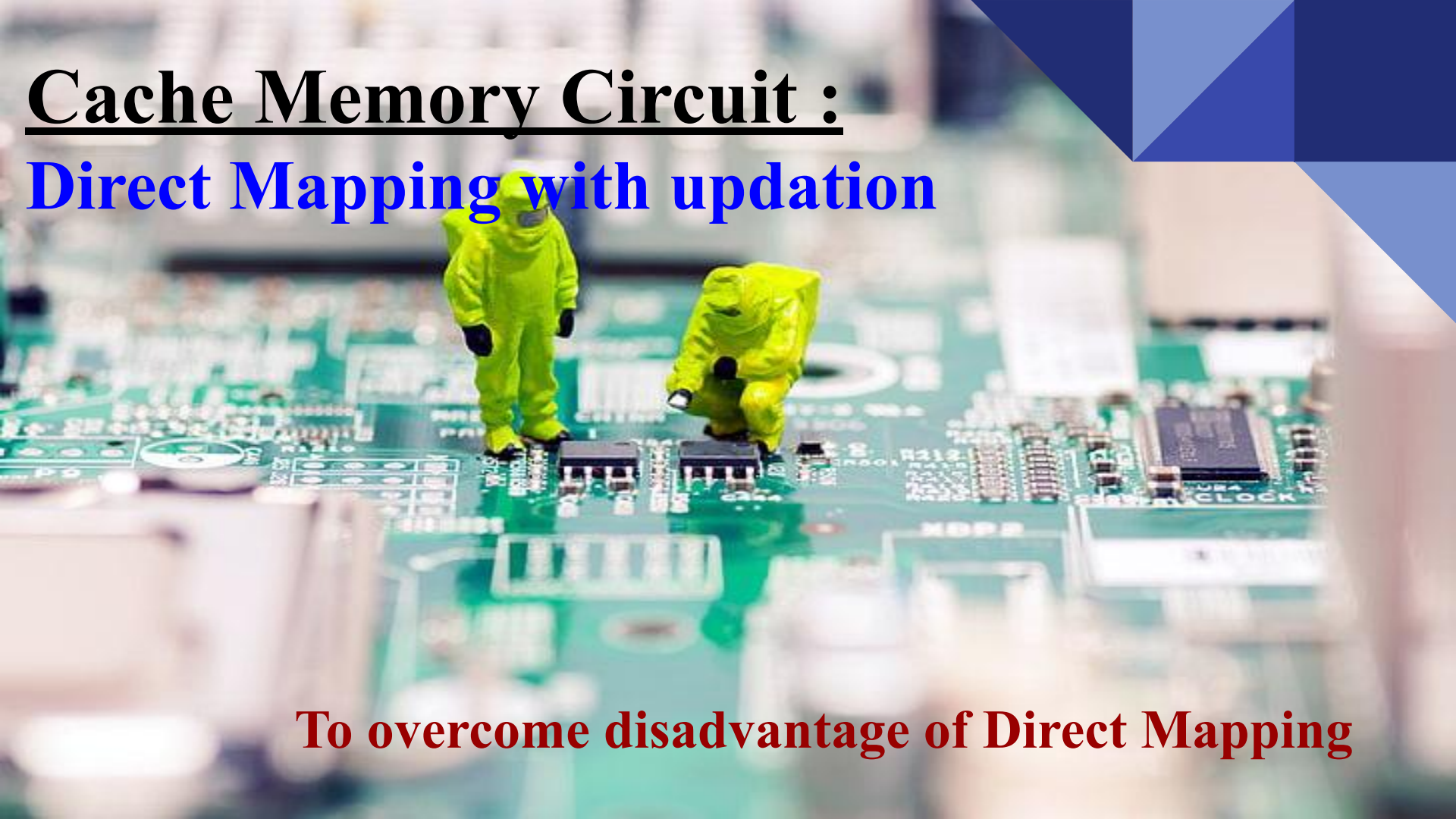
- Practical sizes of cache and main memory (cache << main).
- Each address location in main memory has a pre-specified address location in cache memory.
- For eg. here each address in cache is shared by 4 addresses in main memory.

Limitations :-

- No updation in cache memory done.
- Yet no hierarchy seen.

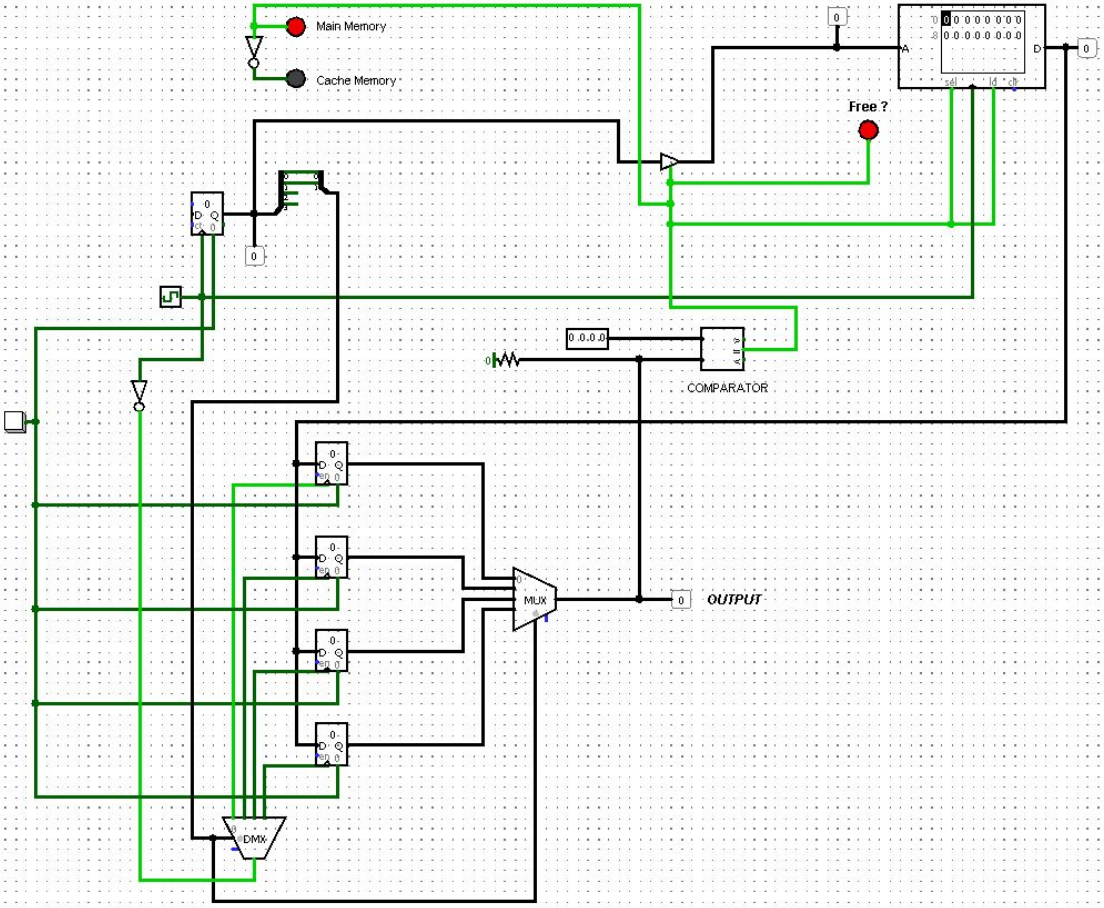
Cache Memory Circuit :

Direct Mapping with updation



To overcome disadvantage of Direct Mapping

Direct Mapping with Cache Memory Filling



Features of Direct Mapping with Updation :-

- If cache Miss Occurs and that memory is free, it is updated with the value from main memory.
- Output comes from cache memory only.
- Features of Direct Mapping applicable here too.
- Hierarchy is seen while updating cache.

Limitation :-

- Cache value at a particular address location can be updated only once.
- There is no way to replace the value in cache if cache is MISSED.
- A cache replacement mechanism is required to overcome this.

The End

Thank You