LRU Cache

Slowest

Memory → Level 4 secondary memory (HDD/ROM)

→ Level 3 primary (main memory (RAM)

→ Level 2 Cache ✓

→ Level 1 Registers (this is a hardware device present in CPU to store data)

fastest

It is a totally fast memory but of very less size

Why we need cache??

↳ A lot of times we repeatedly access same data. then we tend to cache it.

Because cache is of very less size, so we need to again & again replace the data.

So the technique of removing old data is called Replacement Policy.

→ Least frequently used (LFU)

→ Least Recently Used (LRU)

→ Most frequently used

etc.....

<key, value>

LRU Cache → We will remove the data which was used way long back. or least recently.

get(k) → v

Example → Cache of size = 2

put → add

get → retrieve

{3, 3}	{4, 4}

put(1, 1)

key

value

put(2, 2)

get(1) → print → 1

put(3, 3)

get(2) → -1

put(4, 4)

get(1) → -1

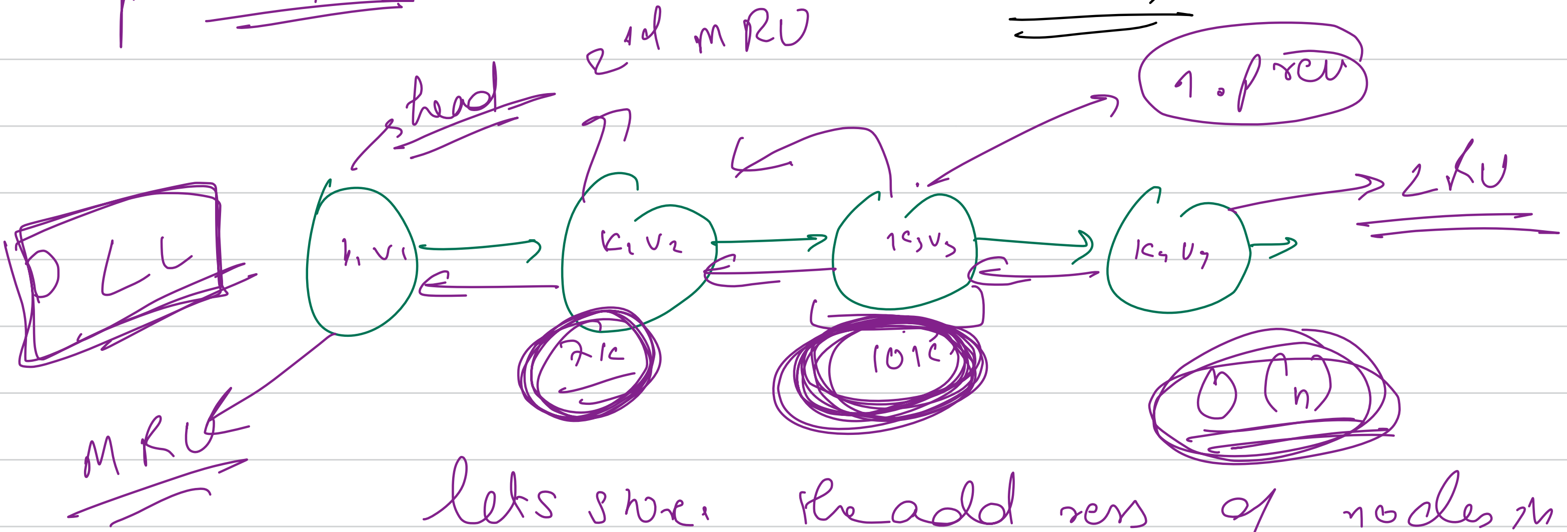
Process of removal in cache is called EVICTION.

get(4) → 4

get (k) → returns value ——→ O(1).

10 min

put (k, v) → ——→ O(1)



lets store the address of nodes in

Dictionary / HM

DLL + Hashmap → removal → O(1)

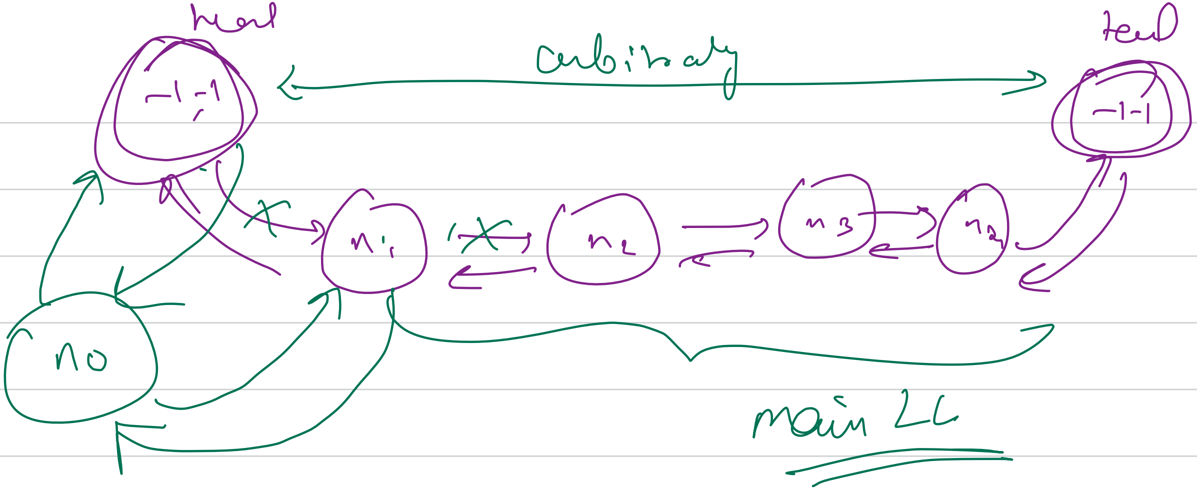
We maintain the DLL such that head is the most recently used element

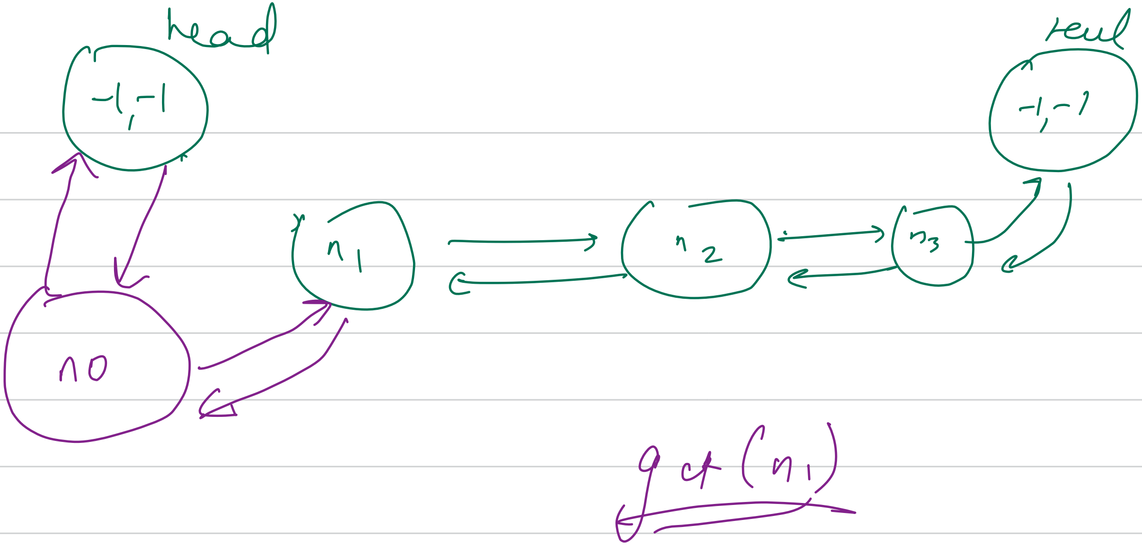
Then 2nd node is the 2nd most recently used, & so-on

get → O(1)

→ update that this node was recently used.

put(k, v)


head
tail
arbitrary
-1 -1
-1-1
n0
n1
n2
n3
n4
main LL


head
-1, -1
tail
-1, -1
n1
n2
n3
n0
get(n1)