

Q1) Write an implementation LRU cache in python? (Marks 10)

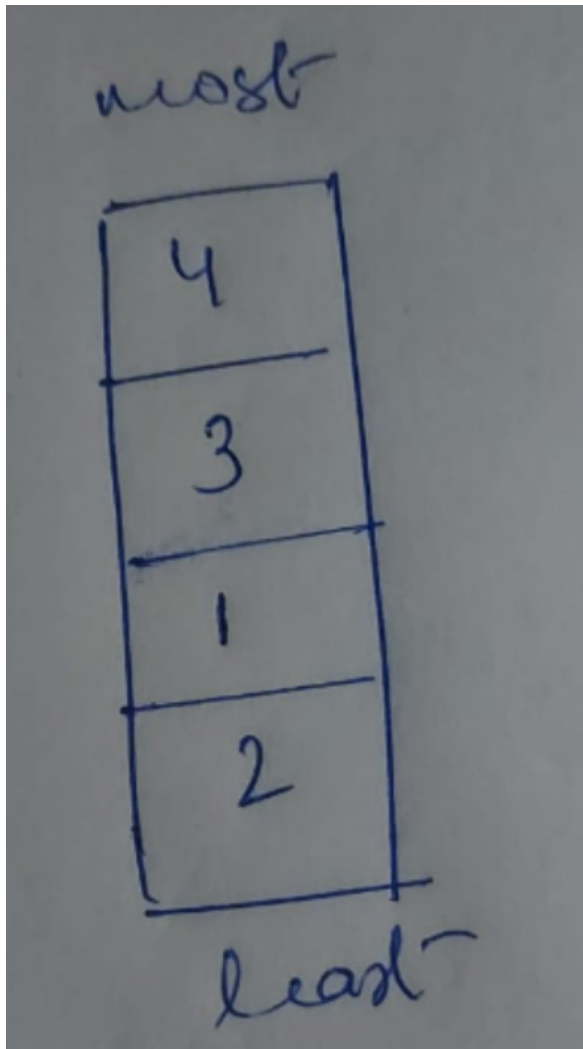
Ans:-

LRU Cache abbreviation Least recently used. It is to identify which item has not been used for long time.

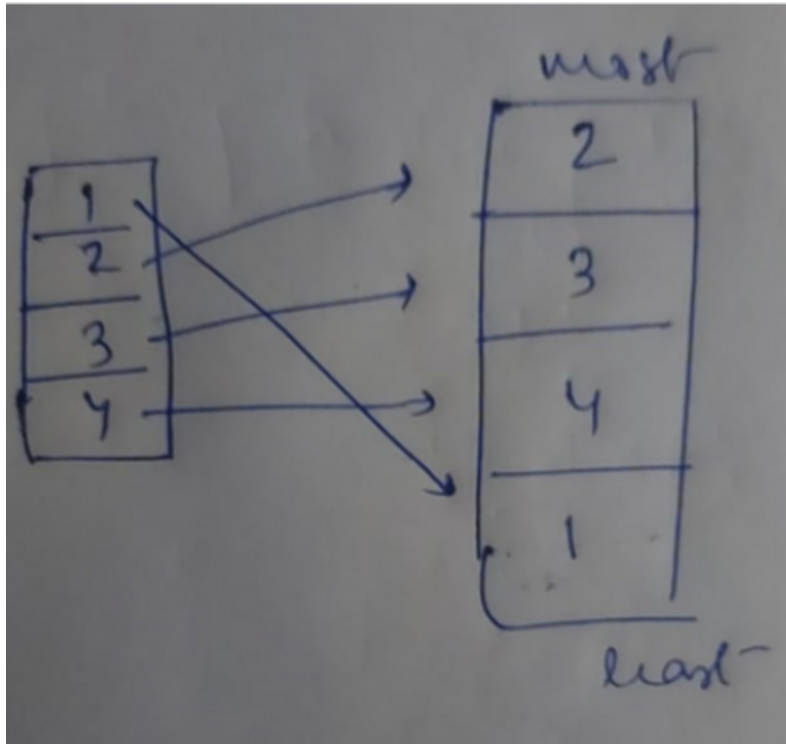
Suppose we have 4 items

if the user request for 4 then 3 then 1 then 2 and it gets the position for most recently used

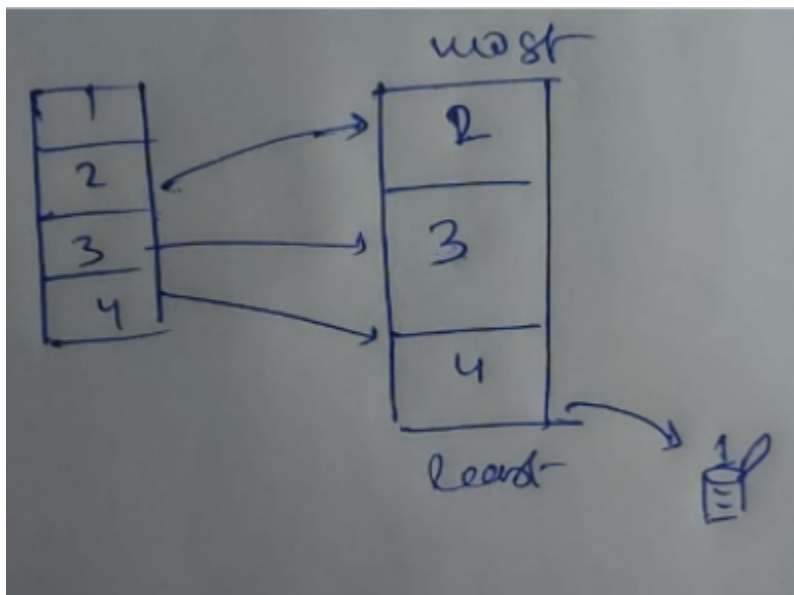
as the user demands the items gets listed like the image given below



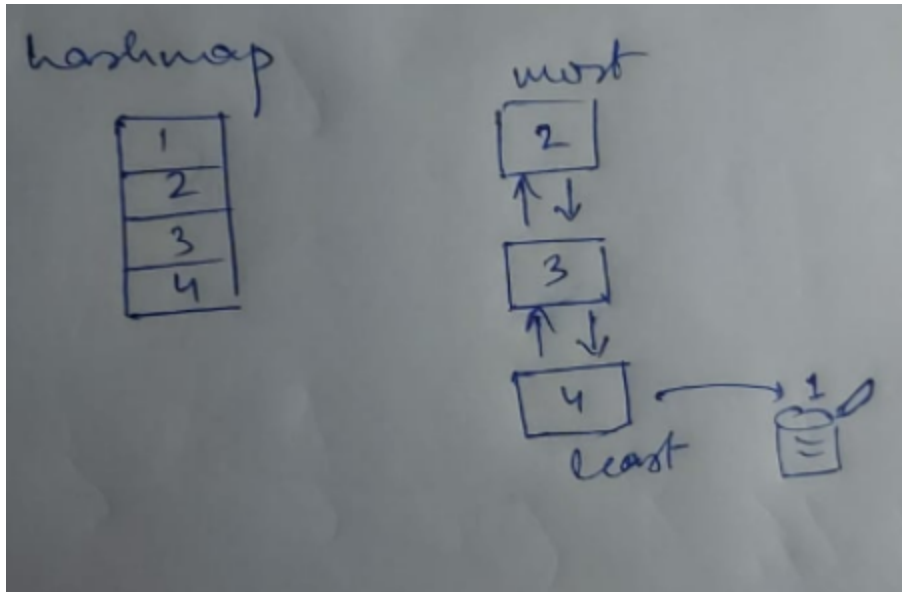
suppose if the user demands particular items most of the time then it move to the most recently used like the image given below



now if the database has only 3 spaces then the last one will be evicted like the image given below



it uses double linked list and hashmap to do this process like the image given below



Program:-

```
from collections import OrderedDict
```

```
class LRUCache:
```

```
    def __init__(self, capacity: int):
```

```
        self.cache = OrderedDict()
```

```
        self.capacity = capacity
```

```
    def get(self, key: int) -> int:
```

```
        if key not in self.cache:
```

```
            return -1
```

```
        else:
```

```
            self.cache.move_to_end(key)
```

```
            return self.cache[key]
```

```
    def put(self, key: int, value: int) -> None:
```

```
        self.cache[key] = value
```

```
        self.cache.move_to_end(key)
```

```
        if len(self.cache) > self.capacity:
```

```
            self.cache.popitem(last = False)
```

```
cache = LRUCache(2)
```

```
cache.put(1, 1)
print(cache.cache)
cache.put(2, 2)
print(cache.cache)
cache.get(1)
print(cache.cache)
cache.put(3, 3)
print(cache.cache)
cache.get(2)
print(cache.cache)
cache.put(4, 4)
print(cache.cache)
cache.get(1)
print(cache.cache)
cache.get(3)
print(cache.cache)
cache.get(4)
print(cache.cache)
```

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Q2). What happens when you type [www.attainu.com](http://www.attainu.com) in your browser? (Marks 10)

When we enter any URL in the browser. The browser tries to find the IP address for the domain name via the DNS server then the browser sends the HTTP request to the server to fetch the data. The server then sends back an HTTP response. The browser sends the requests for the HTML. Once the page is loaded the browser sends further async requests if needed.

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Q3) What is the difference between private and public IP. (Marks 10)

A public IP address is an IP address that can be accessed directly over the internet and is assigned to your network router by your internet service provider (ISP).

A private IP address is an address your network router assigns to your device. Each device within the same network is assigned a unique private IP address

The main difference between public and private IP addresses is how far they can reach, and what they're connected to. A public IP address identifies you to the wider internet so that all the information you're searching for can find you. A private IP address is used within a private network to connect securely to other devices within that same network.

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Q4) Describe deadlock characteristics. ( Marks 10)

It happens when two or more processes require some resource to complete their execution that is held by the other process.

- mutual exclusion- a resource that is held by one process at a time.
  - hold and wait- a process that holds many resources and even requests more resources from other processes. which are holding them.
  - No preemption- process which can only release resources voluntarily.
  - circular wait- process gets token to execute the resources for some time then releases the token.
- 

## 5. Explain in brief ( Marks 10)

### 1. Swap memory-

- It can easily hold those inactive blocks of RAM that are hardly used once or twice and then they are never used. The freed-up RAM can then be used to hold more programs that have a higher priority.
- It prevents RAM from running out of space.
- It acts as a backup for enhancing the actual space of RAM.
- It allows you to run heavy applications more conveniently that require a large amount of RAM.
- During the process of hibernation, all the contents of RAM are written on the swap memory. Therefore, it is essentially required for the hibernation process to take place successfully.
- It enhances the overall performance of your system.

### 2. Context switching-

- Context Switching involves storing the context or state of a process so that it can be reloaded when required and execution can be resumed from the same point as earlier. This is a feature of a multitasking operating system and allows a single CPU to be shared by multiple processes.

### 3. IPv4 address-

- IPv4 addresses are 32-bit numbers that are typically displayed in dotted decimal notation. A 32-bit address contains two primary parts: the network prefix and the host number.
- EX- 208.98.192.170

### 4. IPV6 address

- An IPv6 address is a 128-bit alphanumeric value that identifies an endpoint device in an IPv6 network. IPv6 is the successor to a previous addressing infrastructure, IPv4, which had limitations IPv6 was designed to overcome. Notably, IPv6 has drastically increased address space compared to IPv4.
  - EX-3FFE:0:0:1:200:F8FF:FE75:50DF
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