

Question 4

A simple implementation of a caching library from scratch is tried for Page replacement.

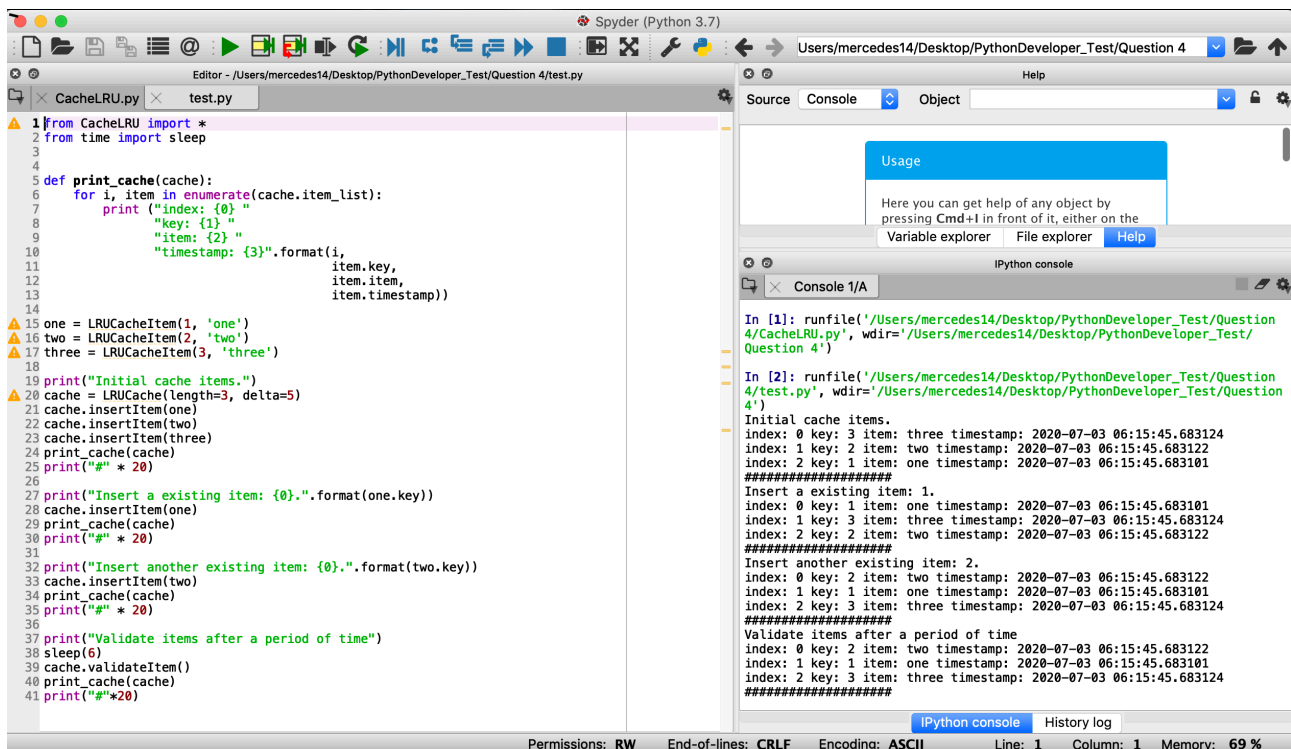
Design:

- The Page Replacement algorithm tried is for Least Recently Used (LRU).
Least Recently Used (LRU) algorithm is a Greedy algorithm where the page to be replaced is least recently used.
- Implemented LRU Algorithm in python

Consideration:

- Hashing is used
A Hash with page number as key and address of the corresponding queue node as value.

Implementation:



```
1 from CacheLRU import *
2 from time import sleep
3
4
5 def print_cache(cache):
6     for i, item in enumerate(cache.item_list):
7         print("index: {0} "
8               "key: {1} "
9               "item: {2} "
10              "timestamp: {3}").format(i,
11                                       item.key,
12                                       item.item,
13                                       item.timestamp)
14
15 one = LRUCacheItem(1, 'one')
16 two = LRUCacheItem(2, 'two')
17 three = LRUCacheItem(3, 'three')
18
19 print("Initial cache items.")
20 cache = LRUCache(length=3, delta=5)
21 cache.insertItem(one)
22 cache.insertItem(two)
23 cache.insertItem(three)
24 print_cache(cache)
25 print("#" * 20)
26
27 print("Insert a existing item: {0}.".format(one.key))
28 cache.insertItem(one)
29 print_cache(cache)
30 print("#" * 20)
31
32 print("Insert another existing item: {0}.".format(two.key))
33 cache.insertItem(two)
34 print_cache(cache)
35 print("#" * 20)
36
37 print("Validate items after a period of time")
38 sleep(6)
39 cache.validateItem()
40 print_cache(cache)
41 print("#" * 20)
```

Usage

Here you can get help of any object by pressing Cmd+I in front of it, either on the

Variable explorer File explorer Help

IPython console

In [1]: runfile('/Users/mercedes14/Desktop/PythonDeveloper_Test/Question 4/CacheLRU.py', wdir='/Users/mercedes14/Desktop/PythonDeveloper_Test/Question 4')

In [2]: runfile('/Users/mercedes14/Desktop/PythonDeveloper_Test/Question 4/test.py', wdir='/Users/mercedes14/Desktop/PythonDeveloper_Test/Question 4')

Initial cache items.
index: 0 key: 3 item: three timestamp: 2020-07-03 06:15:45.683124
index: 1 key: 2 item: two timestamp: 2020-07-03 06:15:45.683122
index: 2 key: 1 item: one timestamp: 2020-07-03 06:15:45.683101

Insert a existing item: 1.
index: 0 key: 1 item: one timestamp: 2020-07-03 06:15:45.683101
index: 1 key: 3 item: three timestamp: 2020-07-03 06:15:45.683124
index: 2 key: 2 item: two timestamp: 2020-07-03 06:15:45.683122

Insert another existing item: 2.
index: 0 key: 2 item: two timestamp: 2020-07-03 06:15:45.683122
index: 1 key: 1 item: one timestamp: 2020-07-03 06:15:45.683101
index: 2 key: 3 item: three timestamp: 2020-07-03 06:15:45.683124

Validate items after a period of time
index: 0 key: 2 item: two timestamp: 2020-07-03 06:15:45.683122
index: 1 key: 1 item: one timestamp: 2020-07-03 06:15:45.683101
index: 2 key: 3 item: three timestamp: 2020-07-03 06:15:45.683124
#####

Python console History log

Permissions: RW End-of-lines: CRLF Encoding: ASCII Line: 1 Column: 1 Memory: 69 %