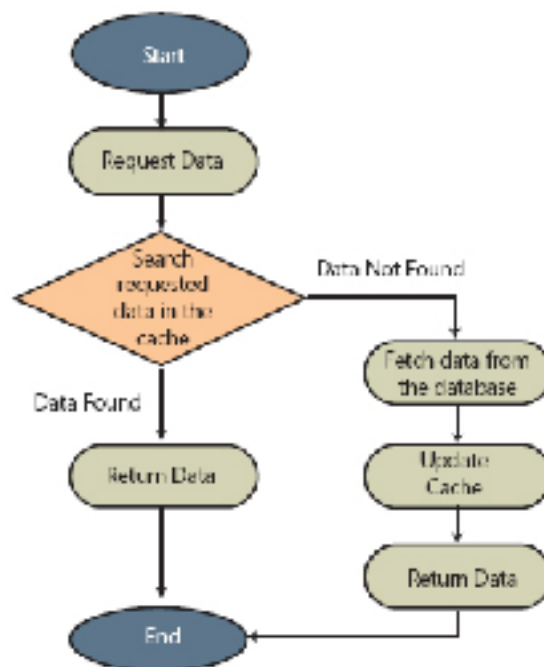


Abstract:

In computing, **cache algorithms** (also frequently called **cache replacement algorithms** or **cache replacement policies**) are optimizing instructions—or algorithms—that a computer program or a hardware-maintained structure can follow in order to manage a cache of information stored on the computer. When the cache is full, the algorithm must choose which items to discard to make room for the new ones.

This abstract talks about how to optimize the web application performance by leveraging the caching mechanism.

Flow diagram



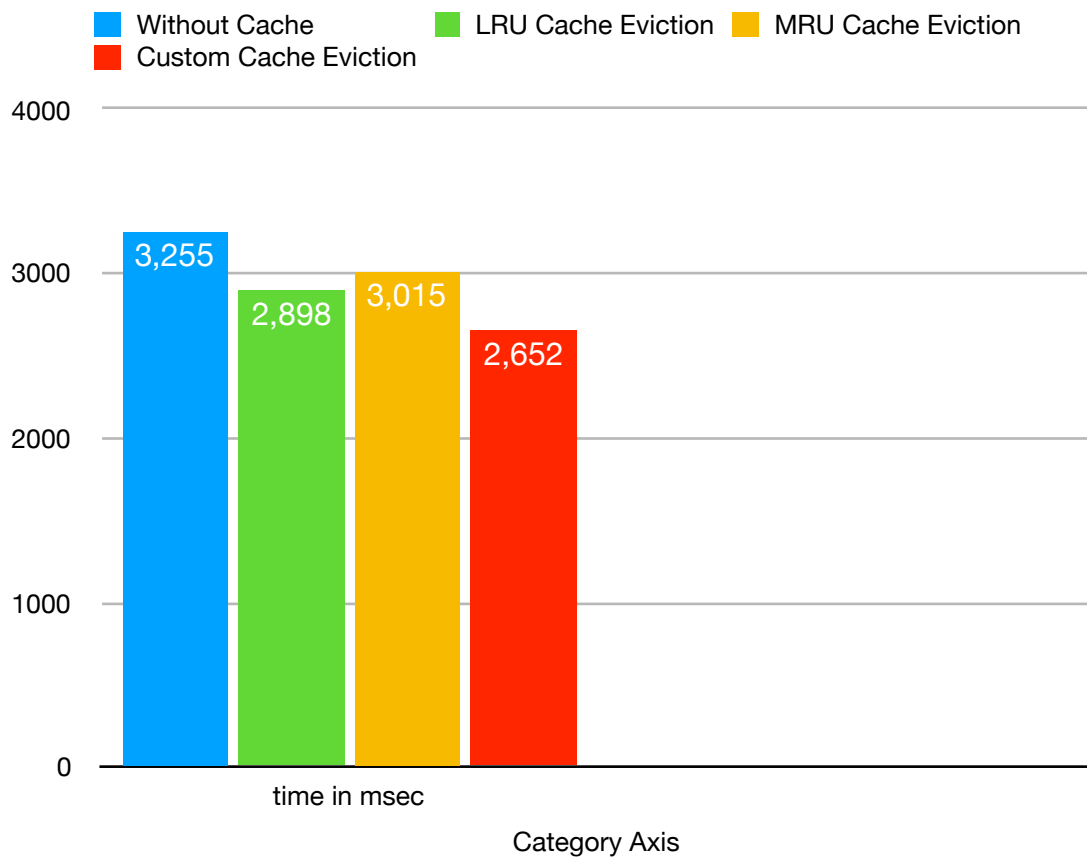
source :<https://msdn.microsoft.com/en-us/library/dd129907.aspx>

TESTS:

A random sequence of numbers is chosen, because the application generates different sequences, and the purpose is to test the performance of the three algorithms with the same sequence. Thus, the following sequence is chosen:

Page Frame size = 3 | no: of req = 11

Technique	time in msec	Req count
Without Cache	3255	11
LRU Cache Eviction	2898	11
MRU Cache Eviction	3015	11
Custom Cache Eviction	2652	11



Pros:

Operations performed:	Cost
cache.get()	O(1)
cache.put()	O(1)
cache.remove()	O(1)

Cons: Needs more memory to save objects.

Space complexity

Without cache	0
LRU	$A(n) + B(n)$
MRU	$A(n) + B(n)$
Custom	$2(A(n) + B(n))$

Results:

If the LRU cache evicted values are stored back in the MRU cache ,this serves as a level 2 cache ,thus improving the response time.

Future work :

Applying dynamic cost based eviction in a multisite web application the cache hit rate will be higher .

Ex: In the US timezone the cost of the objects stored in the cache will have higher value than India.This results in higher cache hit for US requests .

Reduce the space complexity.

Without Cache

total DB hit===1

Total time for each itr == 0-->998

Total cache hit === 0

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===2

Total time for each itr == 1-->1204

Total cache hit === 0

25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===3

Total time for each itr == 2-->1434

Total cache hit === 0

25556---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===4

Total time for each itr == 3-->1696

Total cache hit === 0

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===5

Total time for each itr == 4-->1994

Total cache hit === 0

25509---Rolls-Royce---Phantom---2009---Rear-Wheel Drive

total DB hit===6

Total time for each itr == 5-->2259

Total cache hit === 0

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===7

Total time for each itr == 6-->2504

Total cache hit === 0

25512---Saturn---Aura---2009---Front-Wheel Drive

total DB hit===8

Total time for each itr == 7-->2749

Total cache hit === 0

25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===9

Total time for each itr == 8-->2940

Total cache hit === 0
18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

total DB hit===10
Total time for each itr == 9-->3110
Total cache hit === 0
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===11
Total time for each itr == 10-->3255
Total cache hit === 0
18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

Total time ===>3255

MRU Cache

total DB hit===1
Total time for each itr == 0-->1025
Total cache hit === 0
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===2
Total time for each itr == 1-->1208
Total cache hit === 0
25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===3
Total time for each itr == 2-->1440
Total cache hit === 0
25556---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

Accessing from cache
Total time for each itr == 3-->1440
Total cache hit === 1
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===4
Total time for each itr == 4-->1725
Total cache hit === 1
25509---Rolls-Royce---Phantom---2009---Rear-Wheel Drive

total DB hit===5
Total time for each itr == 5-->1981
Total cache hit === 1
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===6
Total time for each itr == 6-->2238
Total cache hit === 1
25512---Saturn---Aura---2009---Front-Wheel Drive

Accessing from cache
Total time for each itr == 7-->2238
Total cache hit === 2
25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===7
Total time for each itr == 8-->2556
Total cache hit === 2

18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

total DB hit===8

Total time for each itr == 9-->2809

Total cache hit === 2

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===9

Total time for each itr == 10-->3015

Total cache hit === 2

18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

Total time ==>3015

LRU Cache

total DB hit===1

Total time for each itr == 0-->951

Total cache hit === 0

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===2

Total time for each itr == 1-->1129

Total cache hit === 0

25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===3

Total time for each itr == 2-->1374

Total cache hit === 0

25556---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

Accessing from cache

Total time for each itr == 3-->1375

Total cache hit === 1

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===4

Total time for each itr == 4-->1725

Total cache hit === 1

25509---Rolls-Royce---Phantom---2009---Rear-Wheel Drive

Accessing from cache

Total time for each itr == 5-->1725

Total cache hit === 2

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===5

Total time for each itr == 6-->2038

Total cache hit === 2

25512---Saturn---Aura---2009---Front-Wheel Drive

total DB hit===6

Total time for each itr == 7-->2327

Total cache hit === 2

25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===7

Total time for each itr == 8-->2619

Total cache hit === 2

18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

total DB hit===8
Total time for each itr == 9-->2898
Total cache hit === 2
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

Accessing from cache
Total time for each itr == 10-->2898
Total cache hit === 3
18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

Total time ===>2898

Custom Cache

total DB hit===1
Total time for each itr == 0-->1253
Total cache hit === 0
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===2
Total time for each itr == 1-->1488
Total cache hit === 0
25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===3
Total time for each itr == 2-->1742
Total cache hit === 0
25556---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

Accessing from cache
Total time for each itr == 3-->1742
Total cache hit === 1
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===4
Total time for each itr == 4-->2015
Total cache hit === 1
25509---Rolls-Royce---Phantom---2009---Rear-Wheel Drive

Accessing from cache
Total time for each itr == 5-->2015
Total cache hit === 2
25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

total DB hit===5
Total time for each itr == 6-->2369
Total cache hit === 2
25512---Saturn---Aura---2009---Front-Wheel Drive

Accessing from L2 cache
Total time for each itr == 7-->2369
Total cache hit === 3
25555---GMC---Canyon Crew Cab 2WD---2009---Rear-Wheel Drive

total DB hit===6
Total time for each itr == 8-->2652
Total cache hit === 3
18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

Accessing from cache

Total time for each itr == 9-->2652

Total cache hit === 4

25533---Hyundai---Elantra Touring---2009---Front-Wheel Drive

Accessing from cache

Total time for each itr == 10-->2652

Total cache hit === 5

18451---Volkswagen---New Beetle---2003---Front-Wheel Drive

Total time ===>2652