LRU – CACHE

Team members :

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Description:

Using LRU cache , the project shows the most recent message received by the user .Messages are stored in binary file with proper details and retrieved when used.

The LRU caching scheme is to remove the least recently used frame when the cache is full and a new page is referenced which is not there in cache.

Here in this project LRU caching scheme has no fixed size so least recently used frame is retained at the last.

Data structures :

Implementing an LRU cache using

- Hash-maps
- Queue (Using Doubly linked list)

File structure:

- Binary file

Source Code : https://github.com/Aadityaprabu002/LRU-cache

Modules and Functions:

LRU:

- Message *get(Node **head, Node **tail, HashMap **map, const char *sendername);
- bool put(Node **head, Node **tail, HashMap **map, const char *sendername, const char *body);

HASHMAPS:

- static Bucket *newBucket();
- static void destroyBucket(Bucket *bucket);
- static int hash(const char *key);
- static bool isPrime(size_t num);
- static bool isOverLoad(int entries, int size, double lambda);
- static size_t findClosestPrime(size_t size);
- HashMap *newHashMap(size_t size);
- void destroyMap(HashMap *map);
- HashMap *insert(HashMap *map, const char *key, const Node *value);
- Node *obtain(HashMap *map, const char *key);
- static HashMap *reHash(HashMap *map);
- void printMap(HashMap *map);

LINKED LIST:

- Node* append(Node* tail,const char *sendername,const char *filename);

- Node* prepend(Node* head,const char *sendername,const char *filename);
- Node* deleteLast(Node* tail);
- Node* selectNodeAndPrepend(Node* head,Node** tail,Node* node);
- void printList(Node* head);
- void destroyList(Node *head);

FILE HANDLER :

- void encryptString(const char *original, char *encrypted);
- bool writeMessage(Message *message, const char *filename);
- Message *readMessage(const char *filename);

MODELS :

Node

- Node *newNode(const char *sendername, const char *filename);
- void destroyNode(Node* node);

Message

- Message *newMessage(const char *sendername, const char *body);
- void destroyMessage(Message *message);
- void printMessage(Message* message);

Structures :

```
struct Node
{
    char SenderName[100];
    char FileName[300];
    Node *Prev;
    Node *Next;
};
```

```
#define MAX_SENDER_NAME 50
#define MAX_BODY 1000
struct Message
{
    char SenderName[MAX_SENDER_NAME];
    struct tm *TimeAndDate;
    char Body[MAX_BODY];
};
```

```
struct Bucket
{
    char *Key;
    Node *Value;
};

struct HashMap
{
    Bucket **BucketList;
    size_t Size;
    int Entries;
};
```

Contribution:

1. AADITYA PRABU K (2020115001)

- **LRU**
- **HASHMAP**

2. AMARAJA VIJAYAKUMAR (2020115008)

- **FILE HANDLER**
- **MESSAGE MODEL**

3. SASI KUMAR K (2020115076)

- **DOUBLY LINKED LIST**
- **NODE MODEL**

OUTPUT

1

```
PS E:\Coding files\C project LRU-cache\LRU-cache\LRU-cache\main> ./main.exe
--------------------------------------------------------------------
Most Recent Message!:
--------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:1

Enter your name here:aaditya


Enter your message here:
=>hi my name is aaditya, we have implemented LRU cache using c programming language


Message put successfully!
```

2


Most Recent Message!:
1.)aaditya
LRU-cache
1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:

3


Most Recent Message!:
1.)aaditya
LRU-cache
1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:1
Enter your name here:amaraja
Enter your message here:
=>hi i am amaraja, i like to code..... and this project is awesome!!
Message put successfully!

4

```
------------------------------------------------------------------------
Most Recent Message!:

1.)amaraja

2.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:
```

5

```
------------------------------------------------------------------------
Most Recent Message!:

1.)amaraja

2.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:1

Enter your name here:sasi kumar


Enter your message here:
=>hi im sasikumar, we have used binary files to store our messages


Message put successfully!
```

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Most Recent Message!:
1.)sasi kumar
2.)amaraja
3.)aaditya
LRU-cache
1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:

7

```
------------------------------------------------------------------------
Most Recent Message!:

1.)sasi kumar

2.)amaraja

3.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:2

Enter your name here:amaraja

-------------------------MESSAGE----------------------------

Date: 31 - 1 - 2022
Time: 18 : 58 : 3
Sender name: amaraja

Body: hi i am amaraja, i like to code..... and this project is awesome!!
-------------------------THE END----------------------------
```

8

```
------------------------------------------------------------------------
Most Recent Message!:

1.)amaraja

2.)sasi kumar

3.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:
```

9

```
------------------------------------------------------------------------
Most Recent Message!:

1.)amaraja

2.)sasi kumar

3.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:2

Enter your name here:sasi


No message received from sasi

Failed to get message!
```

10

```
------------------------------------------------------------------------
Most Recent Message!:

1.)amaraja

2.)sasi kumar

3.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:2

Enter your name here:sasi kumar

-------------------------MESSAGE----------------------------

Date: 31 - 1 - 2022
Time: 18 : 59 : 51
Sender name: sasi kumar

Body: hi im sasikumar, we have used binary files to store our messages
-------------------------THE END----------------------------
```

11

```
------------------------------------------------------------------------
Most Recent Message!:

1.)sasi kumar

2.)amaraja

3.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:
```

12

```
------------------------------------------------------------------------
Most Recent Message!:

1.)sasi kumar

2.)amaraja

3.)aaditya
------------------------------------------------------------------------

LRU-cache

1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:2

Enter your name here:aaditya

------------------------MESSAGE--------------------------

Date: 31 - 1 - 2022
Time: 19 : 0 : 24
Sender name: aaditya

Body: hi my name is aaditya, we have implemented LRU cache using c programming language
------------------------THE END--------------------------
```

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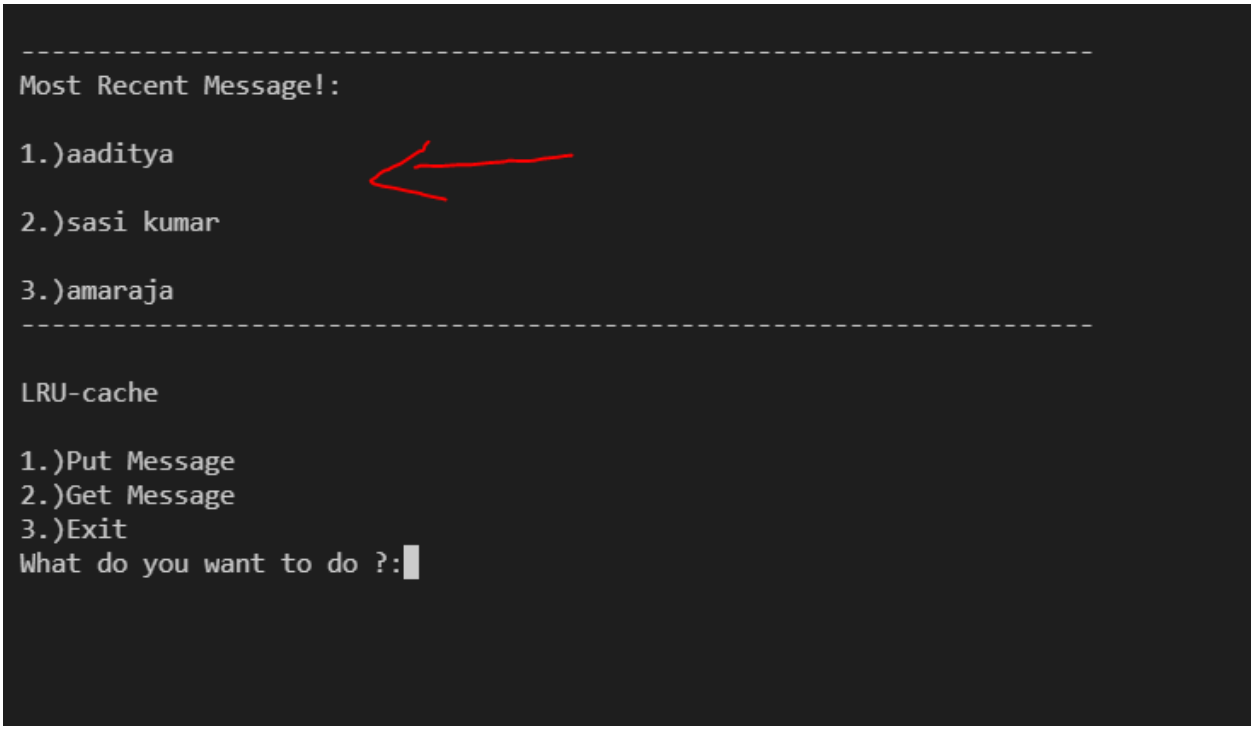

Most Recent Message!:
1.)aaditya
2.)sasi kumar
3.)amaraja

LRU-cache
1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:

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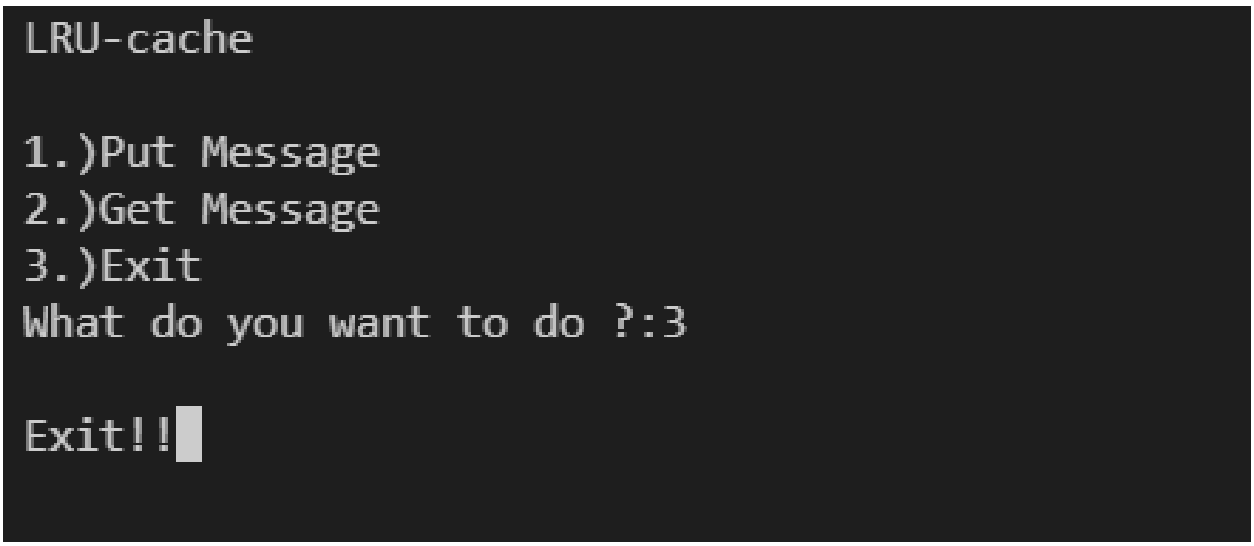
LRU-cache
1.)Put Message
2.)Get Message
3.)Exit
What do you want to do ?:3
Exit!!