

1 Aufgabe 6

The Programm is written in C++. The clock algorithm is implemented the following way:

- A page struct, that contains page number and an R-Bit

```
struct page {
    char pnumber;
    bool R;
}
```

- A Ringbuffer, implemented by a simple page-Array

Output for Reference A:

```
Anzahl der Seitenrahmen (default 3): 3
Referenzfolge (default 70120304230321201701):
7 -> [(7), 10 , 10 ]
0 -> [ 7 ,(0), 10 ]
1 -> [ 7 , 0 ,(1)]
2 -> [(2), 0 , 1 ]
0 -> [ 2 , 0 , 1 ]
3 -> [ 2 , 0 ,(3)]
0 -> [ 2 , 0 , 3 ]
4 -> [(4), 0 , 3 ]
2 -> [ 4 , 0 ,(2)]
3 -> [(3), 0 , 2 ]
0 -> [ 3 , 0 , 2 ]
3 -> [ 3 , 0 , 2 ]
2 -> [ 3 , 0 , 2 ]
1 -> [ 3 ,(1), 2 ]
2 -> [ 3 , 1 , 2 ]
0 -> [(0), 1 , 2 ]
1 -> [ 0 , 1 , 2 ]
7 -> [ 0 , 1 ,(7)]
0 -> [ 0 , 1 , 7 ]
1 -> [ 0 , 1 , 7 ]
```

Output for Reference B:

```
Anzahl der Seitenrahmen (default 3): 3
Referenzfolge (default 70120304230321201701): 232152453252
2 -> [(2), 10 , 10 ]
3 -> [ 2 ,(3), 10 ]
2 -> [ 2 , 3 , 10 ]
1 -> [ 2 , 3 ,(1)]
5 -> [ 2 ,(5), 1 ]
2 -> [ 2 , 5 , 1 ]
4 -> [ 2 , 5 ,(4)]
5 -> [ 2 , 5 , 4 ]
3 -> [ 2 , 5 ,(3)]
2 -> [ 2 , 5 , 3 ]
5 -> [ 2 , 5 , 3 ]
2 -> [ 2 , 5 , 3 ]
```

For the LRU algorithm, we expand our data structure to include a string where the R-Bits are saved, and a counter that can be accessed when a page conflict is taking place (this is

usually handled by the OS, but implementing it here in the Data structure made things much more simple to program).

Output for Reference A (Epoch every 3rd step):

```
Anzahl der Seitenrahmen (default 3):
Referenzfolge (default 70120304230321201701):
7 -> [ 10 , 10 ,(7)]
0 -> [ 10 ,(0), 7 ]
1 -> [(1), 0 , 7 ]
2 -> [ 1 , 0 ,(2)]
0 -> [ 1 , 0 , 2 ]
3 -> [ 1 ,(3), 2 ]
0 -> [(0), 3 , 2 ]
4 -> [ 0 , 3 ,(4)]
2 -> [ 0 , 3 ,(2)]
3 -> [ 0 , 3 , 2 ]
0 -> [ 0 , 3 , 2 ]
3 -> [ 0 , 3 , 2 ]
2 -> [ 0 , 3 , 2 ]
1 -> [ 0 , 3 ,(1)]
2 -> [ 0 , 3 ,(2)]
0 -> [ 0 , 3 , 2 ]
1 -> [ 0 ,(1), 2 ]
7 -> [(7), 1 , 2 ]
0 -> [ 7 , 1 ,(0)]
1 -> [ 7 , 1 , 0 ]
```

Output for Reference B (Epoch every 3rd step):

```
Anzahl der Seitenrahmen (default 3):
Referenzfolge (default 70120304230321201701): 232152453252
2 -> [ 10 , 10 ,(2)]
3 -> [ 10 ,(3), 2 ]
2 -> [ 10 , 3 , 2 ]
1 -> [(1), 3 , 2 ]
5 -> [ 1 ,(5), 2 ]
2 -> [ 1 , 5 , 2 ]
4 -> [ 1 ,(4), 2 ]
5 -> [(5), 4 , 2 ]
3 -> [ 5 , 4 ,(3)]
2 -> [ 5 , 4 ,(2)]
5 -> [ 5 , 4 , 2 ]
2 -> [ 5 , 4 , 2 ]
```