**7.1**a)  
FIFO

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Referenz | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 | 2 |
| Rahmen 1 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 |
| Rahmen 2 |  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 1 | 1 |
| Rahmen 3 |  |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 9 | 9 | 9 | 9 | 9 | 2 |
| Rahmen 4 |  |  |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 |
| Priorität 1 | 0 | 3 | 1 | 2 | 2 | 9 | 9 | 9 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 3 | 4 | 1 | 2 |
| Priorität 2 |  | 0 | 3 | 1 | 1 | 2 | 2 | 2 | 9 | 4 | 4 | 3 | 1 | 2 | 5 | 9 | 9 | 3 | 4 | 1 |
| Priorität 3 |  |  | 0 | 3 | 3 | 1 | 1 | 1 | 2 | 9 | 9 | 4 | 3 | 1 | 2 | 5 | 5 | 9 | 3 | 4 |
| Priorität 4 |  |  |  | 0 | 0 | 3 | 3 | 3 | 1 | 2 | 2 | 9 | 4 | 3 | 1 | 2 | 2 | 5 | 9 | 3 |
| Seitenfehler | x | x | x | x |  | x |  |  | x | x |  | x | x | x | x | x |  | x | x | x |

Anzahl Seitenfehler: 15LRU

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Referenz | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 | 2 |
| Rahmen 1 | 0 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Rahmen 2 |  | 0 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 9 | 9 | 9 | 9 | 1 | 1 |
| Rahmen 3 |  |  | 0 | 3 | 3 | 9 | 9 | 9 | 9 | 9 | 9 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 |
| Rahmen 4 |  |  |  | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 |
| Priorität 1 | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 | 2 |
| Priorität 2 |  | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 4 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 |
| Priorität 3 |  |  | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 2 | 4 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 |
| Priorität 4 |  |  |  | 0 | 3 | 1 | 2 | 0 | 9 | 9 | 9 | 2 | 4 | 3 | 1 | 2 | 5 | 9 | 3 | 3 |
| Seitenfehler | x | x | x | x |  | x | x |  | x |  |  | x |  | x | x | x |  | x | x |  |

Anzahl Seitenfehler: 13SC (Hierbei steht i in Xi für das gesetzte Access-Bit der Page X)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Referenz | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 | 2 |
| Rahmen 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 |
| Rahmen 2 |  | 3 | 3 | 3 | 3 | 9 | 9 | 9 | 9 | 9 | 9 | 1 | 1 | 1 | 9 | 9 | 9 | 9 | 1 | 1 |
| Rahmen 3 |  |  | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Rahmen 4 |  |  |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Priorität 1 | 0 | 3 | 1 | 2 | 2 | 9 | 3 | 3 | 4 | 4 | 4 | 1 | 1 | 5 | 9 | 9 | 9 | 4 | 1 | 1 |
| Priorität 2 |  | 0 | 3 | 1 | 1 | 0 | 9 | 9 | 2 | 2 | 2 | 4 | 4 | 2 | 5 | 5 | 5 | 2 | 4 | 4 |
| Priorität 3 |  |  | 0 | 3 | 3 | 2 | 0 | 0 | 3 | 3i | 3i | 2 | 2i | 3 | 2 | 2 | 2i | 3 | 2 | 2i |
| Priorität 4 |  |  |  | 0 | 0i | 1 | 2 | 2i | 9 | 9 | 9 | 3i | 3i | 1 | 3 | 3i | 3i | 9 | 3 | 3 |
| Seitenfehler | x | x | x | x |  | x | x |  | x |  |  | x |  | x | x |  |  | x | x |  |

Anzahl Seitenfehler: 12  
  
  
LFU (Hierbei steht i in Xi für die Anzahl der Zugriffe auf die Page X seit seinem Laden)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Referenz | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 | 2 |
| Rahmen 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rahmen 2 |  | 3 | 3 | 3 | 3 | 9 | 9 | 9 | 4 | 4 | 4 | 1 | 1 | 5 | 9 | 9 | 9 | 4 | 1 | 1 |
| Rahmen 3 |  |  | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Rahmen 4 |  |  |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Priorität 1 | 01 | 31 | 11 | 21 | 21 | 91 | 31 | 31 | 41 | 41 | 41 | 11 | 11 | 51 | 91 | 91 | 91 | 41 | 11 | 11 |
| Priorität 2 |  | 01 | 31 | 11 | 11 | 21 | 91 | 91 | 31 | 32 | 33 | 33 | 33 | 33 | 33 | 34 | 34 | 34 | 34 | 34 |
| Priorität 3 |  |  | 01 | 31 | 31 | 11 | 21 | 22 | 22 | 22 | 22 | 22 | 23 | 23 | 23 | 23 | 24 | 24 | 24 | 25 |
| Priorität 4 |  |  |  | 01 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 | 02 |
| Seitenfehler | x | x | x | x |  | x | x |  | x |  |  | x |  | x | x |  |  | x | x |  |

Anzahl Seitenfehler: 12CLIMB

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Referenz | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 | 2 |
| Rahmen 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rahmen 2 |  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Rahmen 3 |  |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Rahmen 4 |  |  |  | 2 | 2 | 9 | 9 | 2 | 4 | 4 | 4 | 4 | 2 | 5 | 9 | 9 | 2 | 4 | 4 | 2 |
| Priorität 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 |
| Priorität 2 |  | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 |
| Priorität 3 |  |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Priorität 4 |  |  |  | 2 | 2 | 9 | 9 | 2 | 4 | 4 | 4 | 4 | 2 | 5 | 9 | 9 | 2 | 4 | 4 | 2 |
| Seitenfehler | x | x | x | x |  | x |  | x | x |  |  |  | x | x | x |  | x | x |  | x |

Anzahl Seitenfehler: 13OPT

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Referenz | 0 | 3 | 1 | 2 | 0 | 9 | 3 | 2 | 4 | 3 | 3 | 1 | 2 | 5 | 9 | 3 | 2 | 4 | 1 | 2 |
| Rahmen 1 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 9 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 1 | 1 |
| Rahmen 2 |  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Rahmen 3 |  |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 9 | 9 | 9 | 9 | 9 | 9 |
| Rahmen 4 |  |  |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Priorität 1 | 0 | 0 | 0 | 0 | 3 | 3 | 2 | 3 | 3 | 3 | 1 | 2 | 3 | 3 | 3 | 2 | 4 | 2 | 2 | 9 |
| Priorität 2 |  | 3 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 4 | 2 | 9 | 9 | 3 |
| Priorität 3 |  |  | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 9 | 9 | 3 | 3 | 1 |
| Priorität 4 |  |  |  | 1 | 0 | 9 | 9 | 9 | 4 | 4 | 4 | 1 | 1 | 5 | 9 | 3 | 3 | 4 | 1 | 2 |
| Seitenfehler | x | x | x | x |  | x |  |  | x |  |  |  |  | x | x |  |  |  |  |  |

Anzahl Seitenfehler: 8  
(Angenommen, dass eine Page, die nicht mehr gebraucht wird, unter ältere sortiert wird, die ebenfalls nicht mehr gebraucht werden.)  
b)  
Ein entstehendes Problem dabei ist, dass so Seiten, welche zum Beispiel am Anfang einige Zugriffe hatte, unter Umständen nicht mehr verdrängt wird, falls ständig neue Pages geladen und wieder verdrängt werden, obwohl die alte Seite mit anfänglich vielen Zugriffen gar nicht mehr benutzt wird, wodurch sie effektiv anderen Seiten den Platz wegnimmt.