Operációs rendszerek Bsc

12. Gyak.

2022. 05. 03.

Készítette:

Keresztes Iulia Bsc Programtervező informatikus szak ULA7Z2

1. Lapozási algoritmusok

- FIFO – 3 lapkeret

| FIFO | 7 | 6 | 5 | 4 | 6 | 7 | 3 | 2 | 6 | 7 | 6 | 5 | 1 | 2 | 5 | 6 | 7 | 6 | 5 | 2 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 2 |
| 2. lapkeret | | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 1 | 1 | 1 | 1 | 7 | 7 | 7 | 7 |
| 3. lapkeret | | | 5 | 5 | 5 | 5 | 3 | 3 | 3 | 7 | 7 | 7 | 7 | 2 | 2 | 2 | 2 | 2 | 5 | 5 |
| laphibák | * | * | * | * | | * | * | * | * | * | | * | * | * | | * | * | | * | * |
| FIFO sor | 7 | 6 | 5 | 4 | 7 | 3 | 2 | 6 | 7 | 5 | 1 | 2 | 6 | 7 | 5 | 2 | | | | |

laphibák száma: 3 + 13 = 16

- FIFO – 4 lapkeret

| FIFO | 7 | 6 | 5 | 4 | 6 | 7 | 3 | 2 | 6 | 7 | 6 | 5 | 1 | 2 | 5 | 6 | 7 | 6 | 5 | 2 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 7 | 7 | 7 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 7 | 7 | 7 | 7 |
| 2. lapkeret | | 6 | 6 | 6 | 6 | 6 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 5 |
| 3. lapkeret | | | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 4. lapkeret | | | | 4 | 4 | 4 | 4 | 4 | 4 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 |
| laphibák | * | * | * | * | | | * | * | * | * | | * | * | * | | * | * | | * | |

laphibák száma: 4 + 10 = 14

- OPT – 3 lapkeret

| OPT | 7 | 6 | 5 | 4 | 6 | 7 | 3 | 2 | 6 | 7 | 6 | 5 | 1 | 2 | 5 | 6 | 7 | 6 | 5 | 2 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2 |
| 2. lapkeret | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 1 | 1 | 1 | 6 | 6 | 6 | 6 | 6 |
| 3. lapkeret | | | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 7 | 7 | 7 | 7 |
| laphibák | * | * | * | * | | | * | * | | | | * | * | | | * | * | | | * |

laphibák száma: 3 + 8 = 11

- OPT – 4 lapkeret

| OPT | 7 | 6 | 5 | 4 | 6 | 7 | 3 | 2 | 6 | 7 | 6 | 5 | 1 | 2 | 5 | 6 | 7 | 6 | 5 | 2 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 1 | 1 | 1 | 1 | 7 | 7 | 7 | 7 |
| 2. lapkeret | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 3. lapkeret | | | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 4. lapkeret | | | | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| laphibák | * | * | * | * | | | * | * | | | | | * | | | | * | | | |

laphibák száma: 4 + 4 = 8

- LRU – 3 lapkeret

| LRU | 7 | 6 | 5 | 4 | 6 | 7 | 3 | 2 | 6 | 7 | 6 | 5 | 1 | 2 | 5 | 6 | 7 | 6 | 5 | 2 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 4 | 4 | 4 | 3 | 3 | 3 | 7 | 7 | 7 | 1 | 1 | 1 | 6 | 6 | 6 | 6 | 6 |
| 2. lapkeret | | 6 | 6 | 6 | 6 | 6 | 6 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 3. lapkeret | | | 5 | 5 | 5 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 2 | 2 | 2 | 7 | 7 | 7 | 2 |
| laphibák | * | * | * | * | | * | * | * | * | * | | * | * | * | | * | * | | | * |

laphibák száma: 3 + 12 = 15

- LRU – 4 lapkeret

| LRU | 7 | 6 | 5 | 4 | 6 | 7 | 3 | 2 | 6 | 7 | 6 | 5 | 1 | 2 | 5 | 6 | 7 | 6 | 5 | 2 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 2. lapkeret | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 3. lapkeret | | | 5 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 4. lapkeret | | | | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 7 | 7 | 7 | 7 |
| laphibák | * | * | * | * | | | * | * | | | | * | * | * | | | * | | | * |

laphibák száma: 4 + 7 = 11

- SC FIFO – 3 lapkeret

| SC | 7 | 6 | 5 | 4 | | | | 6 | 7 | | 3 | | 2 | | 6 | | 7 | | 6 | 5 | | 1 | | 2 | | 5 | 6 | | | | 7 | 6 | 5 | 2 | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. lapkeret | 7.1 | 7.1 | 7.1 | 7,0 | 7,0 | 7,0 | 4,1 | 4,1 | 4,1 | 4,1 | 4,0 | 4,0 | 4,0 | 2,1 | 2,1 | 2,1 | 2,0 | 2,0 | 2,0 | 2,0 | 5,1 | 5,1 | 5,1 | 5,0 | 5,0 | 5,1 | 5,1 | 5,0 | 5,0 | 5,0 | 7,0 | 7,0 | 7,0 | 7,0 | 2,1 |
| 2. lapkeret | | 6.1 | 6.1 | 6.1 | 6,0 | 6,0 | 6,0 | 6,1 | 6,0 | 6,0 | 6,0 | 3,1 | 3,1 | 3,1 | 3,0 | 3,0 | 3,0 | 7,1 | 7,1 | 7,1 | 7,1 | 7,0 | 7,0 | 7,0 | 2,1 | 2,1 | 2,1 | 2,1 | 2,0 | 2,0 | 2,0 | 2,0 | 5,1 | 5,1 | 5,1 |
| 3. lapkeret | | | 5.1 | 5.1 | 5,1 | 5,0 | 5,0 | 5,0 | 5,0 | 7,1 | 7,1 | 7,1 | 7,0 | 7,0 | 7,0 | 6,1 | 6,1 | 6,1 | 6,1 | 6,0 | 6,0 | 6,0 | 1,1 | 1,1 | 1,1 | 1,1 | 1,0 | 1,0 | 1,0 | 6,1 | 6,1 | 6,1 | 6,1 | 6,0 | 6,0 |
| laphibák | * | * | * | | | | * | | | * | | * | | * | | * | | * | | | * | | * | | * | | | | | * | * | | * | | * |
| FIFO sor | 7 | 6 | 5 | 7 | 6 | 5 | 4 | 6 | 7 | Δ | 3 | 7 | 2 | 3 | 6 | 2 | 7 | 6 | 5 | 7 | 1 | 5 | 2 | 1 | - 5 | 2 | 6 | 7 | 2 | | | | | | |

laphibák száma: 3 + 13 = 16

- SC FIFO – 4 lapkeret

| | 1- | - | - | | _ | _ | _ | | | | | _ | _ | _ | _ | - | | | | | - | _ | - | _ | _ | | | | | _ | - | _ |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| SC | / | 6 | 5 | 4 | 6 | / | 3 | | | | | 2 | 6 | / | 6 | 5 | | | | | 1 | 2 | 5 | 6 | / | | | | | 6 | 5 | 2 |
| 1. lapkeret | 7.1 | 7.1 | 7.1 | 7.1 | 7.1 | 7.1 | 7,0 | 7,0 | 7,0 | 7,0 | 3,1 | 3,1 | 3,1 | 3,1 | 3,1 | 3,0 | 3,0 | 3,0 | 3,0 | 5,1 | 5,1 | 5,1 | 5,1 | 5,1 | 5,0 | 5,0 | 5,0 | 5,0 | 7,1 | 7,1 | 7,1 | 7,1 |
| 2. lapkeret | | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6,1 | 6,0 | 6,0 | 6,0 | 6,0 | 2,1 | 2,1 | 2,1 | 2,1 | 2,1 | 2,0 | 2,0 | 2,0 | 2,0 | 1,1 | 1,1 | 1,1 | 1,1 | 1,1 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 | 5,1 | 5,1 |
| 3. lapkeret | | | 5.1 | 5.1 | 5.1 | 5.1 | 5,1 | 5,1 | 5,0 | 5,0 | 5,0 | 5,0 | 6,1 | 6,1 | 6,1 | 6,1 | 6,1 | 6,0 | 6,0 | 6,0 | 6,0 | 2,1 | 2,1 | 2,1 | 2,1 | 2,1 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,1 |
| 4. lapkeret | | | | 4.1 | 4.1 | 4.1 | 4,1 | 4,1 | 4,1 | 4,0 | 4,0 | 4,0 | 4,0 | 7,1 | 7,1 | 7,1 | 7,1 | 7,1 | 7,0 | 7,0 | 7,0 | 7,0 | 7,0 | 6,1 | 6,1 | 6,1 | 6,1 | 6,0 | 6,0 | 6,1 | 6,1 | 6,1 |
| laphibák | * | * | * | * | | | | | | | * | * | * | * | | | | | | * | * | * | | * | | | | | * | | * | Т |
| FIFO sor | 7 | 6 | 5 | 4 | 7 | 6 | 5 | 4 | 3 | 2 | 6 | 7 | 3 | 2 | 6 | 7 | 5 | 1 | 2 | 6 | 5 | 1 | 2 | 6 | 7 | 5 | | | | | | |

laphibák száma: 4 + 10 = 14

Itt is látszik, hogy az optimális algoritmus valóban a legoptimálisabb. A legkevesebb laphibával jár.

A második legoptimálisabb ebben az esetben az LRU, ráadásul egyetlen lapkeret hozzáadásának hatására még 4-gyel csökken a laphibák száma.

2. Lapozási algoritmusok, 3 lapkeret

Laphivatkozások sorrendje: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

- FIFO

| FIFO | 7 | 0 | 1 | 2 | 0 | 3 | 0 | 1 | 4 | 2 | 3 | 0 | 3 | 2 | 1 | 2 | 0 | 1 | 7 | 0 | 1 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 2 | 2 | 2 | 2 | | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | 7 |
| 2. lapkeret | | 0 | 0 | 0 | 0 | 3 | 3 | | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 3. lapkeret | | | 1 | 1 | 1 | 1 | 0 | | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 |
| laphibák | * | * | * | * | | * | * | * | * | | * | * | | | * | * | | | * | * | * |

laphibák száma: 3 + 12 = 15

- LRU

| | | | | _ | _ | | _ | | _ | | _ | | _ | | | _ | _ | | | |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRU | 7 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 2 | 1 | 2 | 0 | 1 | 7 | 0 | 1 |
| 1. lapkeret | 7 | 7 | 7 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2. lapkeret | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 |
| 3. lapkeret | | | 1 | 1 | 1 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 7 | 7 | 7 |
| laphibák | * | * | * | * | | * | | * | * | * | * | | | * | | * | | * | | |

laphibák száma: 3 + 9 = 12

- OPT

| ОРТ | 7 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 2 | 1 | 2 | 0 | 1 | 7 | 0 | 1 |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. lapkeret | 7 | 7 | 7 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 7 | 7 | 7 |
| 2. lapkeret | | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3. lapkeret | | | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| laphibák | * | * | * | * | | * | | * | | | * | | | * | | | | * | | |

laphibák száma: 3 + 6 = 9

Az optimális algoritmus ezúttal is a legkevesebb laphibával jár, hiszen a legelőrelátóbb.

A FIFO a leghátrányosabb, mivel nagyon változatosan jönnek a laphivatkozások, a FIFO pedig ezeket semmilyen formában nem veszi figyelembe, kivéve a beérkezési sorrendjüket.