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9.8 Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page. faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, and seven frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each.

- LRU replacement
- FIFO replacement
- Optimal replacement

Jawaban :

String Referensi Halaman

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

Frame: 3

1. Least Recently Used (LRU)

Aturan: Jika terjadi page fault dan memori penuh, ganti halaman yang paling lama tidak digunakan.

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
1	1	1 _ _	Fault
2	2	1 2 _	Fault
3	3	1 2 3	Fault
4	4	4 2 3	Fault
5	2	4 2 3	-
6	1	1 2 3	Fault
7	5	1 5 3	Fault
8	6	6 5 3	Fault
9	2	6 2 3	Fault
10	1	1 2 3	Fault
11	2	1 2 3	-
12	3	1 2 3	-

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
13	7	7 2 3	Fault
14	6	6 7 3	Fault
15	3	6 7 3	-
16	2	2 7 3	Fault
17	1	1 7 3	Fault
18	2	2 7 3	Fault
19	3	2 7 3	-
20	6	6 7 3	Fault

Jumlah Page Fault: 16

2. First-In-First-Out (FIFO)

Aturan: Jika terjadi page fault dan memori penuh, ganti halaman yang dimuat paling awal.

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
1	1	1 _ _	Fault
2	2	1 2 _	Fault
3	3	1 2 3	Fault
4	4	4 2 3	Fault
5	2	4 2 3	-
6	1	1 2 3	Fault
7	5	5 2 3	Fault
8	6	6 2 3	Fault
9	2	6 2 3	-
10	1	1 2 3	Fault
11	2	1 2 3	-
12	3	1 2 3	-

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
13	7	7 2 3	Fault
14	6	7 6 3	Fault
15	3	7 6 3	-
16	2	2 6 3	Fault
17	1	1 6 3	Fault
18	2	2 6 3	Fault
19	3	2 6 3	-
20	6	2 6 3	-

Jumlah Page Fault: 17

3. Optimal Replacement

Aturan: Ganti halaman yang tidak akan dibutuhkan untuk waktu terlama di masa depan.

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
1	1	1 _ _	Fault
2	2	1 2 _	Fault
3	3	1 2 3	Fault
4	4	4 2 3	Fault
5	2	4 2 3	-
6	1	1 2 3	Fault
7	5	5 2 3	Fault
8	6	6 2 3	Fault
9	2	6 2 3	-
10	1	1 2 3	Fault
11	2	1 2 3	-
12	3	1 2 3	-

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
13	**7**	**7 2 3**	**Fault**
14	**6**	**7 6 3**	**Fault**
15	**3**	**7 6 3**	**-**
16	**2**	**7 6 2**	**Fault**
17	**1**	**1 6 2**	**Fault**
18	**2**	**1 6 2**	**-**
19	**3**	**1 3 2**	**Fault**
20	**6**	**6 3 2**	**Fault**

Jumlah Page Fault: 14

9.21 Consider the following page reference string:

7,2,3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0, 1.

Assuming demand paging with three frames, how many page faults would occur for the following replacement algorithms? *

- LRU replacement
- FIFO replacement
- Optimal replacement

Jawaban :

String Referensi Halaman

7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0, 1.

Jumlah Frame: 3

1. Least Recently Used (LRU)

Aturan: Jika terjadi page fault dan memori penuh, ganti halaman yang paling lama tidak digunakan.

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
1	7	7 _ _	Fault
2	2	7 2 _	Fault

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
3	3	7 2 3	Fault
4	1	1 2 3	Fault
5	2	1 2 3	-
6	5	5 2 3	Fault
7	3	5 2 3	-
8	4	4 2 3	Fault
9	6	6 2 3	Fault
10	7	7 6 3	Fault
11	7	7 6 3	-
12	1	1 6 3	Fault
13	0	0 6 3	Fault
14	5	5 6 3	Fault
15	4	4 6 3	Fault
16	6	4 6 3	-
17	2	2 6 3	Fault
18	3	2 6 3	-
19	0	0 6 3	Fault
20	1	1 6 3	Fault

Jumlah Page Fault (LRU): 15

2. First-In-First-Out (FIFO)

Aturan: Jika terjadi page fault dan memori penuh, ganti halaman yang dimuat paling awal.

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
1	7	7 _ _	Fault
2	2	7 2 _	Fault

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
3	3	7 2 3	Fault
4	1	1 2 3	Fault
5	2	1 2 3	-
6	5	5 2 3	Fault
7	3	5 2 3	-
8	4	4 2 3	Fault
9	6	6 2 3	Fault
10	7	7 2 3	Fault
11	7	7 2 3	-
12	1	1 2 3	Fault
13	0	0 2 3	Fault
14	5	5 2 3	Fault
15	4	4 2 3	Fault
16	6	6 2 3	Fault
17	2	6 2 3	-
18	3	6 2 3	-
19	0	0 2 3	Fault
20	1	1 2 3	Fault

Jumlah Page Fault (FIFO): 16

3. Optimal Replacement

Aturan: Ganti halaman yang tidak akan dibutuhkan untuk waktu terlama di masa depan.

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
1	7	7 _ _	Fault
2	2	7 2 _	Fault

Langkah	Halaman	Memori (Isi Frame)	Page Fault?
3	3	7 2 3	Fault
4	1	1 2 3	Fault
5	2	1 2 3	-
6	5	5 2 3	Fault
7	3	5 2 3	-
8	4	4 2 3	Fault
9	6	4 6 3	Fault
10	7	7 6 3	Fault
11	7	7 6 3	-
12	1	1 6 3	Fault
13	0	1 0 3	Fault
14	5	1 0 5	Fault
15	4	4 0 5	Fault
16	6	6 0 5	Fault
17	2	2 0 5	Fault
18	3	3 0 5	Fault
19	0	3 0 5	-
20	1	1 0 5	Fault

Jumlah Page Fault (Optimal): 13

Hasil Akhir

Algoritma	Jumlah Page Fault
LRU	**15**
FIFO	**16**
Optimal	**13**