Demand Paging Algos – Tutorial Questions

1. A. Consider these reference string. Using **FIFO**:

1. 1, 3, 0, 3, 5, 6, 3 of frame size 3. Using FIFO algorithm:

i. Draw the page trace analysis diagram.

ii. determine number of page faults.

iii. Calculate the failure and success ratios.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Page reference | 1 | 3 | 0 | 3 | 5 | 6 | 3 |
| Page frame 1 | 1 | 1 | 1 | 1 | 5 | 5 | 5 |
| Page frame 2 |  | 3 | 3 | 3 | 3 | 6 | 6 |
| Page frame 3 |  |  | 0 | 0 | 0 | 0 | 3 |
| Page fault | \* | \* | \* |  | \* | \* | \* |

Page faults : 6

Failure rate: 6/7 = 0.86

Success rate: 1/7 = 0.14

* 1. 2. 3, 2, 1, 3, 4, 1, 6, 2, 4 of frame size 3. i. Draw the page trace analysis diagram.
  2. ii. determine number of page faults.
  3. iii. Calculate the failure and success ratios.

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| Page reference | 3 | 2 | 1 | 3 | 4 | 1 | 6 | 2 | 4 |
| Page frame 1 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| Page frame 2 |  | 2 | 2 | 2 | 2 | 2 | 6 | 6 | 6 |
| Page frame 3 |  |  | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| Page fault | \* | \* | \* |  | \* |  | \* | \* |  |

Page faults : 6

Failure rate: 6/9 = 0.67

Success rate: 3/9 = 0.33

* 1. 3. 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 of frame size 3. i. Draw the page trace analysis diagram.
  2. ii. determine number of page faults.
  3. iii. Calculate the failure and success ratios.

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| Page reference | 7 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 2 | 1 | 2 | 0 | 1 | 7 | 0 | 1 |
| Page frame 1 | 7 | 7 | 7 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | 7 |
| Page frame 2 |  | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| Page frame 3 |  |  | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 |
| Page fault | \* | \* | \* | \* |  | \* | \* | \* | \* | \* | \* |  |  | \* | \* |  |  | \* | \* | \* |

1. Page faults : 15
2. Failure rate: 15/20 = 0.75
3. Success rate: 5/20 = 0.25
4. B. Consider these reference string. Using **LRU** algorithm:

1. 4, 7, 6, 1, 7, 6, 1, 2, 7, 2. the number of frames in the memory is 3.

i. Draw the page trace analysis diagram.

ii. determine number of page faults.

iii. Calculate the failure and success ratios.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Page reference | 4 | 7 | 6 | 1 | 7 | 6 | 1 | 2 | 7 | 2 |
| Page frame 1 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Page frame 2 |  | 7 | 7 | 7 | 7 | 7 | 7 | 2 | 2 | 2 |
| Page frame 3 |  |  | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 7 |
| Page fault | \* | \* | \* | \* |  |  |  | \* | \* |  |

Page faults : 6

Failure rate: 6/10 = 0.6

Success rate: 4/10 = 0.4

* 1. 2. A, B, A, C, A, B, D, B, A, C, D of frame size 2
  2. i. Draw the page trace analysis diagram.
  3. ii. determine number of page faults.
  4. iii. Calculate the failure and success ratios.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Page reference | A | B | A | C | A | B | D | B | A | C | D |
| Page frame 1 | A | A | A | A | A | A | D | D | A | A | D |
| Page frame 2 |  | B | B | C | C | B | B | B | B | C | C |
| Page fault | \* | \* |  | \* |  | \* | \* |  | \* | \* | \* |

1. Page faults : 8
2. Failure rate: 8/11 = 0.73
3. Success rate: 3/11 = 0.27
   1. 3. 3, 2, 1, 3, 4, 1, 6, 2, 4, 3, 4, 2, 1, 4, 5, 2, 1, 3, 4 of frame size 3. i. Draw the page trace analysis diagram.
   2. ii. determine number of page faults.
   3. iii. Calculate the failure and success ratios.

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| Page reference | 3 | 2 | 1 | 3 | 4 | 1 | 6 | 2 | 4 | 3 | 4 | 2 | 1 | 4 | 5 | 2 | 1 | 3 | 4 |
| Page frame 1 | 3 | 3 | 3 | 3 | 3 | 3 | 6 | 6 | 6 | 3 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 4 |
| Page frame 2 |  | 2 | 2 | 2 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 3 | 3 |
| Page frame 3 |  |  | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 1 | 1 | 1 |
| Page fault | \* | \* | \* |  | \* |  | \* | \* | \* | \* |  |  | \* |  | \* | \* | \* | \* | \* |

Page faults : 14

Failure rate: 14/19 = 0.74

Success rate: 5/19 = 0.26

1. C. Consider these reference string. Using **Optimal** algorithm:
   1. 1. 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 3 with 4 page frame. a. Draw the page trace analysis diagram.
   2. b. determine number of page faults.
   3. c. Calculate the failure and success ratios.

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| Page reference | 7 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 2 | 3 |
| Page frame 1 | 7 | 7 | 7 | 7 | 7 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Page frame 2 |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Page frame 3 |  |  | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Page frame 4 |  |  |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Page fault | \* | \* | \* | \* |  | \* |  | \* |  |  |  |  |  |  |

Page faults : 6

Failure rate: 6/14 = 0.74

Success rate: 8/14 = 0.26

* 1. 2. 0, 2, 1, 6, 4, 0, 1, 0, 3, 1, 2, 1 the number of frames in the memory is 4. a. Draw the page trace analysis diagram.
  2. b. determine number of page faults.
  3. c. Calculate the failure and success ratios.

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| Page reference | 0 | 2 | 1 | 6 | 4 | 0 | 1 | 0 | 3 | 1 | 2 | 1 |
| Page frame 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 3 |
| Page frame 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Page frame 3 |  |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Page frame 4 |  |  |  | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Page fault | \* | \* | \* | \* | \* |  |  |  | \* |  |  |  |

Page faults : 6

Failure rate: 6/12 = 0.5

Success rate: 6/12 = 0.5

* 1. 3. 3, 2, 1, 3, 4, 1, 6, 2, 4, 3, 4, 2, 1, 4, 5, 2, 1, 3, 4 of frame size 3. a. Draw the page trace analysis diagram.
  2. b. determine number of page faults.
  3. c. Calculate the failure and success ratios.

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| Page reference | 3 | 2 | 1 | 3 | 4 | 1 | 6 | 2 | 4 | 3 | 4 | 2 | 1 | 4 | 5 | 2 | 1 | 3 | 4 |
| Page frame 1 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 |
| Page frame 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| Page frame 3 |  |  | 1 | 1 | 1 | 1 | 6 | 6 | 6 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| Page fault | \* | \* | \* |  | \* |  | \* |  |  | \* |  |  | \* |  | \* |  |  | \* | \* |

Page faults : 10

Failure rate: 10/19 = 0.53

Success rate: 9/19 = 0.47