

BIRKBECK, UNIVERSITY OF LONDON

Computer Systems Coursework Part 2

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Answers

1. (a) In uniprogramming jobs runs sequentially.
 First job have 20 s CPU time and 60 s I/O time $(20 + 60) = 80$ s
 Second job have 30 s CPU and 60 s I/O time $(30 + 60) = 90$ s
 Third job have 40 s CPU and 60 s I/O time $(40 + 60) = 100$ s

(b) Multiprogramming

2. TLB lookup: 100 ns
 TLB update 200 ns
 PT lookup $1\mu s = 1000$ ns
 PT update $2\mu s = 2000$ ns

In case of the TLB lookup: 100 ns

In case of the PT lookup: $100 + 1000 + 200 = 1300$ ns

weighted average for this scenario: $0.4 \times 100 + 0.6 \times 1300 = 820$ ns

Loading word from main memory: $10\mu s = 10000$ ns

Loading page from disk: $10\text{ ms} = 10^7$ ns

In case its in memory: $10\mu s$

In case reading from disk: $10^4 + 10 + 20 = 10,030\mu s$

$(0.3 \times 10000) + (0.7 \times (10^7 + 10000 + 2000)) = 7,024\mu s$

3. First 40 seconds there is only Type 4 jobs present given each of them have run time of 2, in total 20 of this jobs will run. Remaining number of Type 4 jobs: 60

From 40 to 50 seconds Type 1 jobs will arrive and because of their priority only these jobs will run and total of 10 will run until 50. Remaining number of Type 1 jobs: 10

From 50 to onwards all jobs arrived at the center and until high priority Type 1 and Type 2 jobs all finishes only these jobs will run.

(0 - 40) : 1 (20), 3 (20), 4 (60)

(40 - 50) : 1 (10), 2 (30), 3 (20), 4 (60)

(50 - 70) : 1 (0), 2 (25), 3 (20), 4 (60)

(70 - 120) : 2 (0), 3 (20), 4 (60)

$$\begin{array}{l} (120 - 160):3(0), 4 (50) \\ (160 - 260):4(0) \end{array}$$

$$\frac{(70 - 40) + (120 - 50) + (160 - 40) + (260 - 0)}{20 + 30 + 20 + 80} = \frac{480}{150} = 3.2(sec)$$