**CSIS 2260 - Operating Systems**

**Assignment**

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# Solutions

## Solution 1

1. Number of bits used for page offset = log (Page Size) = **9 bits**

Number of bits used for page number = Length of logical address - Offset bits

= 12 - 9

= **3 bits**

1. For relative address **700**,

Converting 700 to 12-bit binary gives us 001010111100.

The first three bits are defined as page number. Hence, 001 or 1 in decimal is the page number.

The remaining 9 bits are defined as the page offset. Hence, 010111100 or 188 in decimal is the page offset.

Therefore, the logical address for the relative address of 700 is **(001, 010111100) or (1,188) in decimal**.

For relative address **1700**,

Converting 1700 to 12-bit binary gives us 011010100100.

The first three bits are defined as page number. Hence, 011 or 3 in decimal is the page number.

The remaining 9 bits are defined as the page offset. Hence, 010100100 or 164 in decimal is the page offset.

Therefore, the logical address for the relative address of 1700 is **(011, 010100100) or (3,164) in decimal**.

1. For relative address **700**,

The calculated page number was 1.

Page number 1 corresponds to frame 3 or 011 in binary according to the page table.

The physical address is calculated by appending the page offset value to the page frame number.

Therefore, the physical address for the relative address of 700 is **011010111100 or 1724 in decimal**.

For relative address **1700**,

The calculated page number was 3.

Page number 3 corresponds to frame 7 or 111 in binary according to the page table.

The physical address is calculated by appending the page offset value to the page frame number.

Therefore, the physical address for the relative address of 1700 is **111010100100 or 3748 in decimal**.

## Solution 2

To calculate physical address, we first compare offset address with segment length. If the offset address is less than the segment length, we add the starting segment and offset address for physical address else a segment fault has occurred.

1. For (0,160)

The segment number is 0, offset address is 160.

The starting address is 660 and segment length is 248.

In this case, the offset address is less than segment length.

So, physical address = starting address + offset address = 660 + 160 = **820**

1. For (2,100)

The segment number is 2, offset address is 100.

The starting address is 222 and segment length is 200.

In this case, the offset address is less than segment length.

So, physical address = starting address + offset address = 222 + 100 = **322**

1. For (1,480)

The segment number is 1, offset address is 480.

The starting address is 1752 and segment length is 422.

In this case, the offset address is greater than segment length.

Therefore, a **segment fault** has occurred.

1. For (4,120)

The segment number is 4, offset address is 120.

The starting address is 1600 and segment length is 150.

In this case, the offset address is less than segment length.

So, physical address = starting address + offset address = 1600 + 120 = **1720**

1. For (3,700)

The segment number is 3, offset address is 700.

The starting address is 996 and segment length is 600.

In this case, the offset address is greater than segment length.

Therefore, a **segment fault** has occurred.

## Solution 3

28, 39, 48, 60, 80, 95, 140, 175

Initial head position: 75

1. Using SSTF scheduling:

Total number of tracks traversed = (75 - 60) + (60 - 48) + (48 - 39) + (39 - 28) + (80 - 28) + (95 - 80) + (140 - 95) + (175 - 140) = **194**

1. Using SCAN scheduling:

Total number of tracks traversed = (75 - 60) + (60 - 48) + (48 - 39) + (39 - 28) + (28 - 0) + (80 - 0) + (95 - 80) + (140 - 95) + (175 - 140) = **250**

1. Using C-SCAN scheduling:

Total number of tracks traversed = (75 - 60) + (60 - 48) + (48 - 39) + (39 - 28) + (28 - 0) + (199 - 0) + (199 - 175) + (175 - 140) + (140 - 95) + (95 - 80) = **393**