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Capstone Assignment

OPERATING SYSTEM

Ans 1 Modern System still depend heavily on operating system because as OS provides essential abstractions & management services that hardware alone cannot offer

Process Management

- Creates, schedules & terminate process
- Provides CPU scheduling
- Handles context switching

Memory Management

- Provide virtual memory abstraction
- Allocates memory
- Perform paging, segmentation

I/O Management

- Abstract hardware device using device drives
- Provides uniform

Ans 2 Monolithic kernel

- Entire OS runs in kernel mode
- Fast performance
- Difficult to maintain

layered OS

- OS divided into layers (hardware - User - Interface)
- Easier debugging & maintenance
- Slower due to overhead b/w layer

MicroKernal

- only minimal functionality in kernel
- other services run in user mode
- Highly reliable modular
- slight message - passing overhead.

Best choice for distributed web application

- High reliability
- Better maintainability & updates
- Supports distributed service using message.

Ans 3

Reasons threads are more efficient

- lower overhead - Creating a switching thread is faster than processes
- Shared memory - threads share code/data

But there are issues

- synchronization complexity - shared memory cause race conditions
- security risk - A faculty thread may corrupt entire process
- No Isolation - unlike processes, thread cannot be protected from each others

Ans 4

Process requirement - 12 MB, 10 MB, 6 MB,
Available blocks - 20 MB, 10 MB, 15 MB

First fit

1) 12 MB - goes to 20 MB Block - leftover - 8 MB
2) 10 MB - not fit in 10 or 15 → allo - fails
3) 6 MB - goes to 10 MB block - leftover - 4 MB

Fragmentation

- External - 8 MB, 4 MB, 15 MB remain unused
- Major issue - 10 MB cannot be allocated

Best fit

1) 12 MB → best fit - 15 MB block - leftover - 3 MB
2) 10 MB → best fit - 20 MB block - leftover - 2 MB
3) 6 MB → best fit - 10 MB block - leftover - 4 MB

Fragmentation -
Small external fragments - 3 MB, 2 MB, 4 MB

Ans 5 Given

Process	Burst	Arrival
P_1	5	0
P_2	3	1
P_3	8	2
P_4	6	3

a) Gantt charts

FCFS

P_1	P_2	P_3	P_4
0	5	16	22

SJF

P_1	P_2	P_4	P_3
0	5	14	22

Round Robin (q = 4

P_1	P_2	P_3	P_4	P_1	P_3	P_4	P_3
0	4	7	11	15	16	18	22	24

b) Waiting time & Turn around Time

→ FCFS

WT = [0, 11, 6, 13] - Avg WT = 5.75

TAT = [5, 7, 14, 19] - Avg TAT = 11.25

→ SJF

WT = [0, 4, 5, 8] - Avg WT = 4.25

TAT = [5, 7, 11, 14] - Avg TAT = 9.25

→ RR (q = 4)

WT = [11, 6, 14, 9] - Avg WT = 10

TAT = [16, 9, 22, 15] - Avg TAT = 15.5