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OS Assignment #03

Q1. What resources are used when a thread is created? How do they differ from those used when a process is created?

Ans:

When a thread is created it uses minimum resources such as thread control block (TCB) and its own stack, while sharing memory (code, data, heap) with other threads in the same process.

In contrast, when a process is created, it gets its own memory space (code, data, heap & stack), Process Control Block making process creation more resource intensive and slower than thread creation.

Q2. Using Amdahl's law, calculate the speedup gain of an application that has a 60 percent parallel component for
a) two processing cores
b) four processing cores
c) eight processing cores.

Ans

Speedup $= \frac{1}{(S + \frac{(1-S)}{N})}$

for parallel $= \frac{1}{((1-p) + \frac{p}{N})}$

a) 2 cores

speed up $= \frac{1}{((1-0.6) + \frac{0.6}{2})} = 1.43$ times

b) 4 cores

speed up $= \frac{1}{((1-0.6) + \frac{0.6}{4})} = 1.82$ times

c) 8 cores

speed up $= \frac{1}{((1-0.6) + \frac{0.6}{8})} = 2.11$ times

Q3. Which of the following components of program state are shared across threads in a multithreaded process?

a) Register values
b) Heap memory
c) Global variables
d) Stack memory

Ans

Shared across threads

i) Heap memory
ii) Global variables.

Not shared across threads

i) Register values
ii) Stack memory

Q4. Run code, write its output and also a short note about what the code is doing.

Ans.

Output:

Factorial of 5 is 120
Fibonacci series upto 10: 0 1 1 2 3 5 8 13 21 34
Sum of 3 and 7 is 10

Note: This program creates three threads to calculate the factorial of a number, generate a Fibonacci series, and sum two number concurrently.

Q5. Run the code, write its output and also mention shortly what this code is doing.

Ans

Output:

Sum of 8 and 4 is 12
Difference of 8 and 4 is 4
Product of 8 and 4 is 32.

Note:

The program creates three threads to perform addition, subtraction and multiplication of two numbers concurrently.