CSS-430 : Operating Systems : HW03-Questions

David Liu

CSS 430

**Assignment Text**

Complete the following problems from the OSC book, 10th edition:

* Problem 4.10
* Problem 4.14
* Problem 4.19
* Read and summarize following page: [http://www.thegeekstuff.com/2013/11/linux-process-and-threads](http://www.thegeekstuff.com/2013/11/linux-process-and-threads/)

4.10

Question: 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

4.14

Question: UsingAmdahl’s Law, calculate the speedup gain for the following applications:

• 40 percent parallel with (a) eight processing cores and (b) sixteen processing cores

* a.)
  + 1 / (0.6 + (1.0 – 0.6) / 8) = 1.538 speedup gain
* b.)
  + 1 / (0.6 + (1.0 – 0.6) / 16) = 1.6 speedup gain

• 67 percent parallel with (a) two processing cores and (b) four pro-cessing cores

* a.)
  + 1 / (0.33 + (1.0 – 0.33) / 2) = 1.504 speedup gain
* b.)
  + 1 / (0.33 + (1.0 – 0.33) / 4) = 2.01 speedup gain

• 90 percent parallel with (a) four processing cores and (b) eight pro-cessing cores

* a.)
  + 1 / (0.1 + (1.0 – 0.1) / 4) = 3.077 speedup gain
* b.)
  + 1 / (0.1 + (1.0 – 0.1) / 8) = 4.706 speedup gain

4.19

Question: The program shown in Figure 4.23 uses the Pthreads API. What would be the output from the program at LINE C and LINE P?

LINE C – “CHILD: value = 5”

LINE P – “PARENT: value = 0”

The process is forked so the instance of the parent process has its global value unchanged.

#include <pthread.h>

#include <stdio.h>

int value = 0;

void \*runner(void \*param); /\* the thread \*/

int main(int argc, char \*argv[]) {

pid t pid;

pthread t tid;

pthread attr t attr;

pid = fork();

if (pid == 0) { /\* child process \*/

pthread attr init(&attr);

pthread create(&tid,&attr,runner,NULL);

pthread join(tid,NULL);

printf("CHILD: value = %d",value); /\* LINE C \*/

} else if (pid > 0) { /\* parent process \*/

wait(NULL);

printf("PARENT: value = %d",value); /\* LINE P \*/

}

}

void \*runner(void \*param) { value = 5; pthread exit(0);

}