Politecnico di Torino

System and device programming

Iniziato	mercoledì, 13 luglio 2022, 11:52
Stato	Completato
Terminato	mercoledì, 13 luglio 2022, 11:53
Tempo impiegato	12 secondi
Valutazione	**0,00** su un massimo di 15,00 (**0**%)

Domanda 1

Risposta non data

Punteggio max.: 3,00

Cheat Sheet UNIX.

Two processes P1 and P2 share two memory buffers to optimize their effort using a pipeline approach in which their tasks can be divided into two units of times in the following way.

In a first-time unit, P1 randomly generates floating-point numbers in the first buffer while P2 sorts (in ascending order) the number stored in the second buffer. When both P1 and P2 have finished, they switch the buffers such that P1 first displays the number sorted by P2 and then it randomly generates a new set of floating-point numbers in the second buffer while P2 sorts (in ascending order) the number stored in the first buffer.
The size of the two buffers is supposed to be constant and the candidate must decide how to synchronize the two processes at the end of each phase.

The students who followed the course before the academic year 2021-2022 can write the C code adopting the UNIX or the Windows API notation.

Domanda 2

Risposta non data

Punteggio max.: 3,00

Cheat Sheet UNIX.

Two files store a list of real values sorted in **ascending** order. The number of real values stored in each file is indicated on top of the file using an integer value. The values of those two files have to be **merged** into a unique list of values (please notice, not **re-sorted** but simply **merged**) and stored into a third file with the same format but in **descending** order.

Write a C function receiving the 3 file names and performing such an operation using memory-mapped I/O. Indicate advantages and disadvantages of using memory mapping versus performing standard I/O operations in terms of logic, code complexity, efficiency, etc.

Domanda 3

Risposta non data

Non valutata

If you want to withdraw from this part (Quer/Vetrò) of the exam, please select true/vero/yes. Otherwise, i.e., you want to take the exam, select false/falso/no.

Notice: It is also possible to withdraw once the exam has been completed, sending an e-mail to the instructors.

Scegli una risposta:

- Vero
- Falso

La risposta corretta è 'Falso'.

Domanda 4

Risposta non data

Punteggio max.: 1,00

What is the value of b after execution of line *b+=l();*?

Note that a wrong answer might imply a negative score

```
#include <iostream>
int main() {
    int a = 10;
    int& b = a;
    auto l = [&](){return a+b;};
    a+=l();
    b+=l();
}
```

- 60
- 80
- 90
- 30
- 10
- 40

Risposta errata.

La risposta corretta è: 90

Domanda 5

Risposta non data

Punteggio max.: 2,00

An ASCII file stores a sequence of records. Each record includes 3 fields: an integer value, a string, and a real number. All three fields have variable sizes and are separated by a variable number of white spaces.

The following is an example of such a file:

```
15345 Acceptable 26.50
146467 Average 23.75
. . .
```

Write a segment of C code that, using the UNIX system calls **open()**, **read()**, and **close()** to perform file I/O, stores these records into an array of structures of type **record_t,** defined as follows:

```
#define N 100
struct record_s {
   int i;
   char s[N];
   float f;
} record_t;
```

The students who followed the course before the academic year 2021-2022 can write the C code adopting the UNIX or the Windows API notation (using the corresponding system call, CreateFile, ReadFIle, and CloseHandle).

Domanda 6

Risposta non data

Punteggio max.: 1,50

In which line(s) of the main the copy constructor is called?

Note that a wrong answer might imply a negative score

```
#include <iostream>
using namespace std;

class Y {

public: //the five copy-control members
   //constructors
   Y() { } //default constructor dc
   Y(const Y &) {  } //copy constructor cc
   Y(Y &&) noexcept { }; //move constructor mc
   //assignments
   Y &operator=(const Y &){ } //copy assignment ca
   Y &operator=(Y &&) { } //move assignment ma
   //destructor
   ~Y() { } //destructor d
};

void f1(Y&& y){ Y acopy= y; };

int main() {
   Y y0; //LINE 1
   Y y1= move(y0);  //LINE 2
   f1(move(y1)); // LINE 3
   return 0; //LINE 4
}
```

- (a) Line 1
- (b) Line 3
- (c) Line 2 and Line 3
- (d) Line 1 and Line 3
- (e) None
- (f) Line 2
- (g) Line 1, Line 2 and Line 3

Risposta errata.

La risposta corretta è: Line 3

Domanda 7

Risposta non data

Punteggio max.: 1,00

Suppose to execute the following program with the value 4 passed on the command line. Report the output generated by the program. Please, report the response on a single line, indicating the various messages and output values separated by a single space.

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <pthread.h>

pthread_t thread;
int i;

void *t1 (void *a){
  int *p;
  p = (int *) a;
  i = *p;
  pthread_detach (pthread_self ());
  printf ("%d ", i);
  i--;
  if (i>0)
    pthread_create (&thread, NULL, t1, (void *) &i);
  return NULL;
}

int main(int argc, char **argv) {
  i = atoi (argv[1]);
  if (fork())
    pthread_create (&thread, NULL, t1, (void *) &i);
  sleep (1);
  printf ("%d ", -i);
}
```

- (a) 5 4 3 2 1 -5
- (b) 4 3 2 1 0 -4
- (c) -4 4 3 2 1 0
- (d) -5 5 4 3 2 1
- (e) 5 4 3 2 1 -4

Risposta errata.

La risposta corretta è: 4 3 2 1 0 -4

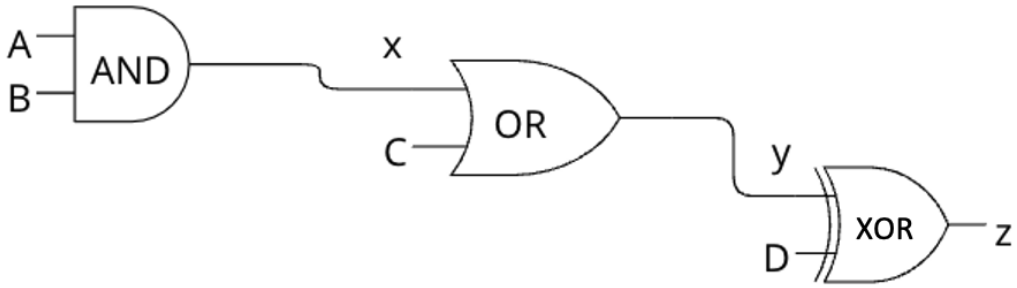
Domanda 8

Risposta non data

Punteggio max.: 2,50

Write a C++ program that parallelizes the computations of the following logic circuit:

- x = a AND b
- y = x OR c
- z = y XOR d



For the sake of simplicity, make A,B,C and D integer variables initialized directly in the program.

For example:

A = 5(bin. 00000101), B = 9(bin.00001001) , C= 7(bin.00000111), D= 10 (bin. 00001010)

x = A AND B = 00000001 (dec.= 1)

y = x OR C= 00000111 (dec.= 7)

z = y XOR D = 00001101 (dec.= 13)

The necessary bitwise operators in C++ are:

- the **&** (bitwise AND) : e.g., a & b ;
- the **|** (bitwise OR) : e.g., a|b ;
- the **^** (bitwise XOR) : e.g, a^b;

Write the code of the program making uses of futures and providers of your choice, making sure that parallelism still satisfies the correct order of operations.

If you do not remember the exact syntax of C++ synchronization primitives, you can write down a mock version (with same sense...). Correctness is strictly required in the template syntax which is required to be right, as well as in any basic C++ syntax.

Domanda 9

Risposta non data

Punteggio max.: 1,00

Analyze the following segment of code. Assume that in a few milliseconds all output operations are completed.

Indicate which is the output generated by the program when 4 is passed as its first argument. Note that incorrect answers imply a penalty in the final score.

```
int main (int argc, char *argv[]) {
  char str[50];
  int i;
  setbuf (stdout, 0);
  i = atoi (argv[1]);
  if (i>0) {
    if (fork () > 0) {
      if (fork () > 0) {
        if (fork () > 0) {
          sprintf (str, "%s %d", argv[0], i-1);
          system (str);
        } else {
          system ("echo -n 1");
        }
      } else {
        system ("echo -n 2");
      }
    } else {
       system ("echo -n 3");
    }
  }
  return (0);
}
```

Scegli una o più alternative:

- [ ] (a) 123132123123
- [ ] (b) 321321123123
- [ ] (c) 322123133122
- [ ] (d) 321213123123
- [ ] (e) 111222333111
- [ ] (f) 333222111333

Risposta errata.

La risposta corretta è: 321321123123, 123132123123, 321213123123