System and device programming

Iniziato	mercoledì, 18 gennaio 2023, 14:49
Stato	Completato
Terminato	mercoledì, 18 gennaio 2023, 14:49
Tempo impiegato	12 secondi
Valutazione	**0,00** su un massimo di 15,00 (**0**%)

Domanda 1

Risposta non data

Punteggio max.: 2,00

An ASCII file stores a sequence of records storing students' information. Each record includes five fields: the register number (a long integer), two strings (of a maximum of 99 characters), the number of examinations passed (an integer value), and the overall mark average (a real number). All five fields have variable sizes and are separated by a variable number of white spaces.

An example of such a file is reported below:

```
234561 Blomkvist Mikael  3  26.50
245692 Salander  Lisbeth  5  28.75
251939  Vanger Harriet   2     24.58
268459 Berger Erika  6  28.85
```

Write a segment of C code that, using the UNIX system-calls **open()**, **read()**, **lseek()**, and **close()**, convert the file into its binary version (same set of records, same order, but binary format).

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 2

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 3

Risposta non data

Punteggio max.: 1,50

What are the elements of vector v after the execution of the while cycle?

Here is the signature of the function memcpy: void *memcpy(void *__dst, const void *__src, size_t __n)

Note that a wrong answer might imply a negative score

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

int main() {
   int i = 0;
   vector<int> v{1,2,3};
   auto l = [&](int& a){ memcpy(&v[i],&a,1*sizeof(int));};

   int temp;
   while( i<3 ){
      temp = v[i]*2;
      cout << temp << endl;
      l(temp);
      i++;
   }
}
```

- 0,1,2
- 2,4,6
- 0,2,4
- 2,3,4
- 1,2,3

Risposta errata.

La risposta corretta è: 2,4,6

Domanda 4

Risposta non data

Punteggio max.: 3,00

A program runs four threads: TA, TB, TC, and TD. These threads run forever through an infinite cycle and cooperate to generate sets of symbols on subsequent lines of the standard output. For each iteration, the thread TA prints only a single letter "A", TB only a unique letter "B", TC only a letter "D", and TD only a single letter "D". Each line must have one of two possible formats: AAABBBCD or AAABBBDC. A “new line” character terminates each sequence.

The following is an example of the output generated by the program:

```
AAABBBCD
AAABBBCD
AAABBBDC
AAABBBDC

...
```

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 5

Risposta non data

Punteggio max.: 2,50

Write a C++ program that operates on a vector of integers v.

You should manage the correct synchronization of the following threads:

- A thread “writer” that adds a random number between 1 and 10 to the vector every 5 seconds;
- A thread “worker” that executes the commands received from the console (if valid);
- A thread “ui” that constantly checks for user input from the console; the valid commands are the following ones:
  - 0 = terminate the program;
  - 1 = print all elements in the vector;
  - 2 = print the last element of the vector;
  - 3 = delete all elements from the vector.

The function to put a thread in the sleep status (e.g., for 1 second) is the following one:

```
std::this_thread::sleep_for (std::chrono::seconds(1))
```

Write the code of the program and manage threads synchronization. Make sure all threads finish running before the main program terminates.

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

Domanda 6

Risposta non data

Punteggio max.: 1,00

Suppose to execute the following program with the value three (3) as a parameter. Report the output generated. Please, report the response in one line, indicating the messages and the values in the output flow, separated by a single space. Do not insert any extra characters in the response.

```
sem_t s1, s2;

void *tA (void *);
void *tB (void *);

void *tA (void *p){
  pthread_t thA;
  long int n;
  pthread_detach (pthread_self ());
  sem_wait (&s1);
  n = (long int) p;
  printf ("tA%ld ", n);
  sem_post (&s2);
  n--;
  if (n>0)
    pthread_create (&thA, NULL, tA, (void *) n);
  pthread_exit (NULL);
}

void *tB (void *p){
  pthread_t thB;
  long int n;
  pthread_detach (pthread_self ());
  sem_post (&s1);
  sem_wait (&s2);
  n = (long int) p;
  printf ("tB%ld ", n);
  n--;
  if (n>0)
    pthread_create (&thB, NULL, tB, (void *) n);
  pthread_exit (NULL);
}

int main (int argc, char *argv[]) {
  pthread_t thA, thB;
  long int n;
  n = atoi (argv[1]);
  sem_init (&s1, 0, 0);
  sem_init (&s2, 0, 0);
  setbuf (stdout, 0);
  pthread_create (&thA, NULL, tA, (void *) n);
  pthread_create (&thB, NULL, tB, (void *) n);
  pthread_exit (NULL);
}
```

Risposta:

La risposta corretta è : tA3 tB3 tA2 tB2 tA1 tB1

Domanda 7

Risposta non data

Punteggio max.: 1,00

Suppose to execute the following program with a single integer parameter equal to 2. Report the output generated. Please, report the response in one line, indicating the exact messages and values in the output flow. Do not insert any extra characters in your response.

```
#define N 100

int main (int argc, char *argv[]) {
  int n;
  char str[N];

  n = atoi (argv[1]);
  setbuf(stdout,0);
  while (n>0 && !fork()) {
    fprintf (stdout, "F");
    if (fork()) {
      fprintf (stdout, "E");
      sprintf (str, "%d", n-1);
      sleep (1);
      execlp (argv[0], argv[0], str, NULL);
    } else {
      sprintf (str, "echo -n S");
      system (str);
    }
    n--;
  }

  return 1;
}
```

Risposta: ✘

La risposta corretta è : FESFESFES

Domanda 8

Risposta non data

Punteggio max.: 3,00

Cheat Sheet UNIX.

A UNIX process P orchestrates the following operations:

- It receives real values from three different FIFOs. These FIFOs connect P with P1, P2, and P3, respectively.
- P1, P2, and P3 send real values to P with different speed rates. In practice. the real values are generated randomly, and each process awaits a random number of seconds (from 1 to 5) before sending a new value to P.
- P uses I/O multiplexing to read the data from the three FIFOs.
- P stores all the real values received from the FIFOs into a memory-mapped file. The process P terminates when it receives a value equal to zero from the tree FIFOs (even if the zeros are not contiguous).

Implement the process P in C language and one of the processes P1, P2, or P3 at choice.

Domanda 9

Risposta non data

Punteggio max.: 1,00

In which lines of the main the move 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()  { std::cout << "dc " << std::endl; } //default constructor dc
   Y(const Y &) {  std::cout << "cc" << std::endl; } //copy constructor cc
   Y(Y &&) noexcept { std::cout << "mc" << std::endl; }; //move constructor mc
   //assignments
   Y &operator=(const Y &) { std::cout << "ca" << std::endl; } //copy assignment ca
   Y &operator=(Y &&) {std::cout << "ma" << std::endl;} //move assignment ma
   //destructor
   ~Y() { std::cout << "d" << std::endl; } //destructor d
};

Y* f_a(){ return new(Y);}
Y f_b(Y& y_b){ return Y(y_b);}

int main() {
   Y y0;    // line 1
   Y *y1 = f_a(); // line 2
   Y y2 = f_b(y0); // line 3
   delete(y1); // line 4
   return 0; //line 5
}
```

- ○ Line 3
- ○ Line 2
- ○ Line 1
- ○ Line 4
- ○ It is never called

Risposta errata.

La risposta corretta è: It is never called