Design of countTraps()

In file proc.h:

Two new variables are added into struct proc(per-process state). One variable is called *countSyscall*, which is an int array with 22 elements and the element in the array is used to record the numbers of each system call. Another variable is called *countOtherTraps*, which is an int array with 19 elements and used to record the numbers of other traps except system calls.

In file traps.c:

Function *countothertraps()* is created and takes *struct trapframe* tf* as its input. If the type of the trap*(tf -> trapno)* is not system call, *countothertraps()* is called to analyze the type of the trap and increase the values of the corresponding element in array *countOtherTraps(myproc()->countOtherTraps[i])*. If the type of the trap*(tf -> trapno)* is system call, *tf->eax* is used to specify the type of the system call and increase the values of the corresponding element in array *countSyscall(myproc()->countSyscall[i])*.

In file proc.c:

Static arrays *syscallname* and *othertraps* are used to store the names of system calls and other types of traps(exceptions and interrupts). *countTraps()* function is implemented in this file. Firstly, the arrays *countSyscall* and *countOtherTraps* are initialized in the function *allocproc()*(call function *assignarray()*) and every element in these two arrays is assigned to 0. When system call exit() is called, if the parent of the current process is not equal to initproc, add the respective trap of the child process into its parent's trap. In function *countTraps()*, *myproc()* is used to get the user process and two for-loops are used to calculate the numbers of system calls and the total numbers of all traps. Two for-loops are used to print out traps and each trap's name and amount.

Call from user level

The data has been stored in the process state and when *countTraps()* is called in user level. *countTraps()* function will print out the required information(the number of times the user process has been trapped to the OS, and what types of traps has been occurred and their corresponding number of occurrence).