Operating System **Hsu PO-CHUN**
10610 CS342302 Student ID: s105062803
Prof. Pai H. Chou Submitted: Oct. 06, 2017
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Assignment 3

1 Problem 1

[20 points] 3.2: Describe the actions taken by a kernel to context-switch between processes.

1.1 Answer

The kernel save the CPU state including register sets in addition to memory allocation of the currently running process and restore the state of the process scheduled to be run next. Furthermore, many architecture-specific operations such as data and instruction cache flush are taken by the kernel as well.

2 Problem 2

[20 points] 3.11.a: What are the benefits and the disadvantages of each of the following? Consider both the system level and the programmer level. a. Synchronous and asynchronous communication

2.1 Answer

The benefit of synchronous communication is that it allows checkpoint to make data consisted and reliable between sender and receiver. The disadvantage is that it mechanism would decrease the communication performance.
The benefit of asynchronous communication is that processes no need to block its execution which could deliver the best performance. And the disadvantage is that the data could be lost, out of order or duplicated that lower the correctness and reliability.
In system level communication, message passing model often provide both communication for the benefits. And asynchronous communication need more kernel resources such as kernel memory space. In programmer level, the programmer must make sure the the data are sent and arrived when the receiver is needed while synchronous communication.

3 Section 2.1

[20 points] Explain why dereferencing the first parameter in $ExceptionHandler()$ does not result in the string whose address is passed by the statement:
Write(”Hello world \n”, 12, 1); in test/hw2.c:main()

3.1 Section 2.1 Explain

The reason is that the first parameter in $ExceptionHandler()$ is not the simulated address of the string located in the nachos main memory. That is just the index of the nachos simulated main memory array where the string are located.

4 Section 2.2

2. [20 points] Explain the correct way for ExceptionHandler() to obtain the string, by giving both verbal description and the C code to do it.

4.1 Section 2.2 Explain

We should use the passing pointer as an index to reference the array of the simulated main memory, and dereference it to obtain the desired address of the string passing by the statement:

```
write_val = kernel->machine->ReadRegister(4);
char *msg = &(kernel->machine->mainMemory[write_val]);
DEBUG(dbgSys, msg << "\n");
```