Faculty of Engineering and Applied Science

SOFE - 3950U Operating Systems

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Tutorial 7 - Signals and Data Structures

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Github: https://github.com/23Vishan/OS-Tutorial-7

For Code and Screenshots of Program Execution

Conceptual Questions:

1. **What are signals, what is their purpose?**

A signal is a software generated interrupt that is sent to a process by an operating system when the user presses Ctrl-C or another process tells something to this process.

2. Explain the following signals: SIGINT, SIGTSTP, SIGCONT how can they be used to suspend, resume, and terminate a program?

a. SIGINT - External interrupt, usually initiated by the user. For example, Ctrl-C
b. SIGSTOP - Sent to process to pause the process in its current state.
c. SIGCONT - When SIGSTOP is sent to a process, it pauses the process in its current state. It can only be resumed with SIGCONT. SIGSTOP and SIGCONT are used for job control in the Unix shell.

3. Explain the following functions: kill(), waitpid() how can they be used to terminate a process and wait until it has ended before continuing

Kill (): kill function terminates a process defined by its pid by sending it a signal, and the signal is selected from <signal.h>.
waitpid (): This function is used in the parent process so that the child process can run while the parent process waits for the termination of the child process. The parent process will start running after the child process is terminated. In addition to this, the waitpid() functions get teh status information of the parent's child process.

4. Explain what a linked-list (queue) is, what does FIFO mean? What are the common operations that a linked-list must have?

The linked list is a type of linear data structure , which contains the sequence of nodes and each node is connected to another node. Each node in the linked list contains data and a pointer that points to the next node.

FIFO(First in first out) means that the item which is added to the queue first, will be removed first.

Common operations of linked-list:

1. Insert node(adding a new node)
2. Delete node(deleting an old node)
3. Searching a node
4. Traversing through the nodes

5. Explain the structure of a linked list as implemented in C, explain how would you implement the operations to add and remove values from the queue?

For insertion, this operation is done by getting the first position of the list, and then adding the tail of the previous note to the new node. The head of the node that came after is then added to the current node.

For deletion, you get the node ID and then get the tail of the previous node. Using that tail, you need to change it to the position of the node that is after the node you are currently on. Then you go to the node after your selected one and get the head. The head of the node after the selected is changed to the node before selected. You can then remove the selected node.