

Hello and welcome to one and all.

Today we'll be looking at the module named Process Description

module #7 from Unit 2 processes, process description and control.

Presented by Mr Girishr Abhyankar, .Associate professor. Dnyanprassarak Mandal's , college and Research Center. Assagao Bardez-Goa.

Outline process description in which we are

going to do two things. Operating system control

structures. Which include memory tables, IO tables, file tables

and process tables.

And process control structures, which include process control image and

process control block.

Learning outcomes : the student will be able to explain the

operating system control structures and explain the

process control structures.

Process description

The operating system controls events within the computer

system. It schedules and dispatches processes for

execution by the processor and local resources to the

processors, and responds to the request by user processes for

basic services. Fundamentally, the OS is an entity that manage

is the use of system resources by processes, so it's a resource

management. What information does the OS need to control

processes and manage resources

for them? The OS must have information about the current state of each and every process and the resource used by that process.

The operating system control structures are created to maintain information about each entity the OS manages.

So what are the operating system control structures? We are going to study the tables.

The first one comes memory tables.

These tables are used to keep track of both main or real memory and secondary virtual memory.

Some of the main memory is reserved for use by the operating system and the other part of the main memory is available for use by the processes.

Processes are maintained on the secondary memory using some sort of virtual memory or simple

swapping mechanism. As we know, every process to run should be in there in RAM. If we are doing for multiprogramming, many programs will be residing in the RAM but RAM is not enough to store all

the programs. So what we do segment the programs or pages are done of each program and certain pages

of each program is brought in the main memory and then the pages are swapped to and fro from the main memory to the secondary memory creating an image that all the programs are resulting in the main memory.

What does the memory table include? It must include the following information. The allocation of main Memory to processes.

And location of secondary memory to processes. This means each process table or each processes page where it is located in the memory main memory and the secondary memory. Any protection attributes of blocks of main or virtual memory such as.

Such as which processes may access certain shared memory regions.

So there are certain processes which are allowed to access certain shared memory regions. Others may not be allowed.

So such information should be that in the memory tables and Any information needed to manage virtual memory

I/O tables: I/O means input output. I/O tables are used by the operating system to manage the I/O devices and channels of the computer system. At any giventime, an I/O device may be

busy, or it may be available. Busy means it will be assigned for a particular process.

If an I/O operation is in progress, the operating system needs to know the two very important facts. Number one.

What is the status of operation? Is it pending? Is it continuing?

How much time is remaining to

complete? #2 the location in the main memory being used

as the source or destination of the input output transfer

so this all information is kept in the I/O tables.

Another operating system control structure is file tables.

Now this table provides information about a file,

whether a particular file is existing or not. You must have

seen. Sometimes you search for file and the message comes.

File does not exist.

So OS comes to know from this particular table whether the

file is there or not there.

The location of the file on the

secondary memory. The status of

the file. Suppose you are trying to copy a file from one

folder to another, but the file is open. It will not

allow it to copy, so it knows the status the file is open

and other attributes. So these are the things which are there in the file tables.

Finally, the OS must maintain process tables to manage the processes, so we have seen the memory tables, I/O tables, file tables, and now the process tables memory I/O and files are managed on behalf of the processes, so there must be some reference to these resources directly or indirectly in the process tables, so they're not four separate tables. They're cross

referenced. The file is referred in. The file tables are accessible via an I/O device and sometimes be in the main memory or virtual memory. The Table themselves must be accessed by OS and therefore are subject to memory management.

In order to control and manage the process, an operating system must know where the process is located and its attributes, such as program data and stack.

Thus, each process has associated with it a number of attributes that are used by the OS for process control.

The collection of such attributes are is referred to as process control block PCB.

And the PCB, the program, the data and the stack together is called the process image.

What are the typical elements of the process image user data?

What is that? It's a modifiable part of the user space. This may include program data and user stack and program that may be modified. User program this is the program to be executed.

System stack: Each process has one or more last In first out system stack associated with it. Now this stack is used to store temporary parameters during calling and returning of this procedure and system calls.

And process control block the data needed by OS to control the process. So the process image holds these four elements. These four elements make the process image. And this process image also must be stored in the memory. So what is the location of the process image? It will depend on the memory management scheme being used. In the simplest case, the process image is maintained as a continuous block of memory. This block is mounted in the secondary memory, usually the disk. To execute the process, the entire process image must be loaded in the main memory or at least a part of it should be there in the main memory. Thus OS needs to know the location of each process on the disk, and for each such

process that is in the main memory, the location of that process in the main memory.

Modern OS presume paging hardware that allows non contiguous physical memory to support partially resident processes at any given time. A portion of a process image may be the main memory with the remainder in the secondary memory. Therefore, the process tables maintained by OS must show the location of each page of each process image.

What are the typical elements of PCB? I mean, process control

Block 3 parts process identification, processor state information and process control

information. Process Identification means you are assigning a unique numeric identifier for a process.

Processor state information includes the contents of the processor registers. And the process control information is the additional information needed by OS to control and coordinate the various active processes.

Here, Process identification is the numeric identifiers that may be stored with the process control block that includes the identifier of this process. The Identifier of the process that created this process, wherein we have a parent child relation.

And a user identifier.

What all is there in the processor state information?

The context of user visible registers of the processor,

the controller status registers program counter

conditional flag status information such as enable,

disable, Flags, etc and stackpointers.

We have scheduling and state information in process

control information as Part of the process control block.

This is the information that is needed by OS to perform its

scheduling functions.

Typical items of information are the process statesuch as ready.

Running blocked like that; priority of the process.

Scheduling related information and event.

Data structuring: a process maybe linked to other process in

the queue in ring or some other

structures. A process may exhibit a parent child

relationship with other processes.

The process control block may contain pointers to

other processes to support these structures.

Interprocess communication, various flag signals and

messages are may be associated with communication between two

independent processes.

Some or all of this type of information may be maintained in the PCB. Process privileges.

Processes are granted privileges in terms of the memory that may be accessed.

And the type of the instruction that may be executed. In Addition, privileges may apply to the use of system utilities and services.

Memory management this section will include pointers to segments and or page tables that describe virtual memory assigned to this process.

Resource ownership and utilization: resources controlled by process may be indicated, such as open files and a history of utilization of processor or other resources may also be included. This information may be needed by the scheduler.

Thus, in total what is PCB? PCB is the most important data structure in an OS.

Each PCB contains all the information about the process that is needed by the OS.

The blocks are read and or modified by virtually every module in the OS.

Including those involved with scheduling, resource allocation,

Inter processing and performance monitoring and analysis.

The set of process control blocks defines the state

of the OS.

So this material was.

Compiled by referring to this particular textbook. Thank you

one and all.