What is a Process ?

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What is a process ?

Background

befor defining the term process, it is useful to summarize some of the concepts :

1. A computer platform consists of a collection of hardware resources, such as the processor , main memoy, I/O modules, timers , disk drives,and so on

.2. Computer applications are developed to perform some task . Typically,they accept input from the outside world , perform some processing , and gernerate output .

3. It is inefficient for applications to be written directly for a given hardware platform.The principal reasons for this are as follows :

a. Numerous applications can be be developed for the same platform. Thus , it makes sense to develop common routines for accessing the computer´s resouces .

b. The processor itself provides only limited support for multiprogramming , software is needed to mange the sharing of the processor and the other resources by multiple applications at the same time

c. When multiple applications are active at the same time, it is necessary to protect the date , I/O use , and other resource use of each application from the others.

4. The OS was develped to provide a convenient,feature-rich,secure,and consistent interface for applications touse.The OS is layer of software between the applications and the computer hardware the supports applications and utlities.

5. We can think of the OS as providing a uniform abstract representation of resources than can be requested and sucessed by applications . Resusources include main memory , newwork interfaces,file systems, and so on . Once the OS has created these resource abstractions for applications to use , it must also mange their use . For example , an OS may permit resource sharing and resource protection.

Now that we have the concepts of the applications ,systems software, and resources , we are in a postion to discuss how the OS can , in an orderly fashion ,mange the execution of applications so that

- Resources are made avilable to multiple applications.
- The physical processor is switched among multiple applications so all will appear to be progressing .

- The processor and I/O devices can be used efficiently .
  The approach taken by all modern operating systems is to rely on a model in which the execution of an application corresponds the existence of one or more processes.

Processes and process Control Blocks

recall from Chapter 2 the we suggested several definitions of the term process, including

- A program in execuation
- An instance of a program running on a computer
- The entity that can be assigened to and executed on a processor
- A unit of activity characterized by the execuation of a sequence of insturctions , a current state , and an associated set of system resources

we can also think of a process as an entity that consists of a number of elements. Two essential elements of a process are program code (which may be shared with other processes that are exeuating the same program) and a set of data associated with that code . Let us suppose that processor begins to excute this program code , and we refer to this executing entity as a process At any given point in time , while the program is executing , this process can be uniquely characterized by number of elements , including the following :

identifier: A unique identifier associated with his process to distinguish it from all other processes .

State: if the process is currently executing , it is the **running state** .

Priority: priority level relative to other processes .

Program conuter: the adress of the text insturaction in the program to be executed .

Memory pointers: include pointers to the program code and date associated with this process, plus any memory blocks shared with other processes.

Context date: These are date that are present in registers in the processor while the process is executing .

I/O status information: includes outstanding I/O requests , I/O devices (E.G disk drives) assigend to this process , a List of files in use by the process , and so on .

Accounting information: may include the amount of processor time and clock time used , time limits , accounts numbers , and so on .

The information in the preceding list is stored in a date structure , typically called a **process control block** that is created and managed by the OS .

The significant point about the process control block is that it countains sufficient information so that it is possible to interrupt a runnuing process and later resume execution as if the interruption had not occurred . The process control block is the key tool that enables the OS to support multiple process and to provide for multiprocessing . When a process is interrupted , the current values of the program counter and the processor registers (context date) are saved in the approprite fielde of the corresponding porcess control block , and the state of the process is changed so some other value such as *blockes or ready* . The OS is now free to put some other process in the running state . The program conuter and context date for this process are loaded into the processor registers and this process now begins to execute . Thus we can say that a process consists of program code and associated data plus a process control block . For a single-processor computer , at any given time , at most one process is executing and that process is in the running state .

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