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Charging for resources un multiprogramming systems can be complex.

1. In a dedicated system, the user normally charged for the entire system. Suppose that in a multiprogramming system. Suppose that in a multiprogramming system only one user is currently on the system. Should the user be charged for the entire system?

In a dedicated system, where the entire system is allocated to a single user, it makes sense to charge that user for the entire system. However, charging a single user for the entire system would not be fair in a multiprogramming system where resources are shared among multiple users. Since only one user is currently utilizing the system, it would be more equitable to charge that user only for the resources they consume rather than the entire system.

1. Multiprogramming operating systems generally consume substantial system resources, as they manage multiple-user environments. Should users pay for this overhead, or should it be “absorbed” by the operating system?

Charging users for the overhead incurred by multiprogramming operating systems can be a contentious issue. While it may seem reasonable to pass on these costs to users, doing so could discourage usage or unfairly burden certain users. However, by absorbing these overhead costs into the operating system's expenses, we could potentially promote fairness and ensure that all users have access to the system without additional financial barriers.

1. Most people agree that charges for computer system usage should be fair, but few can define precisely what “fairness” is. Another attribute of charging schemes, but one which is easier to define, is predictability. We want to know that if a job costs a certain amount to run once, running it again in similar circumstances will cost approximately the same amount. Suppose that in a multiprogramming environment we charge by wall clock time, i.e., the total real time involved in running the job from start to completion. Would such a scheme yield predictable charges? Why?

Charging by wall clock time in a multiprogramming environment may not necessarily yield predictable charges. The variability in system load and resource availability could lead to fluctuations in the time it takes for a job to complete, thereby impacting the total charges incurred. Additionally, system maintenance, updates, and unexpected events could further contribute to unpredictability. Therefore, while charging by wall clock time may provide a straightforward metric, users' actual charges may vary significantly depending on various system conditions.