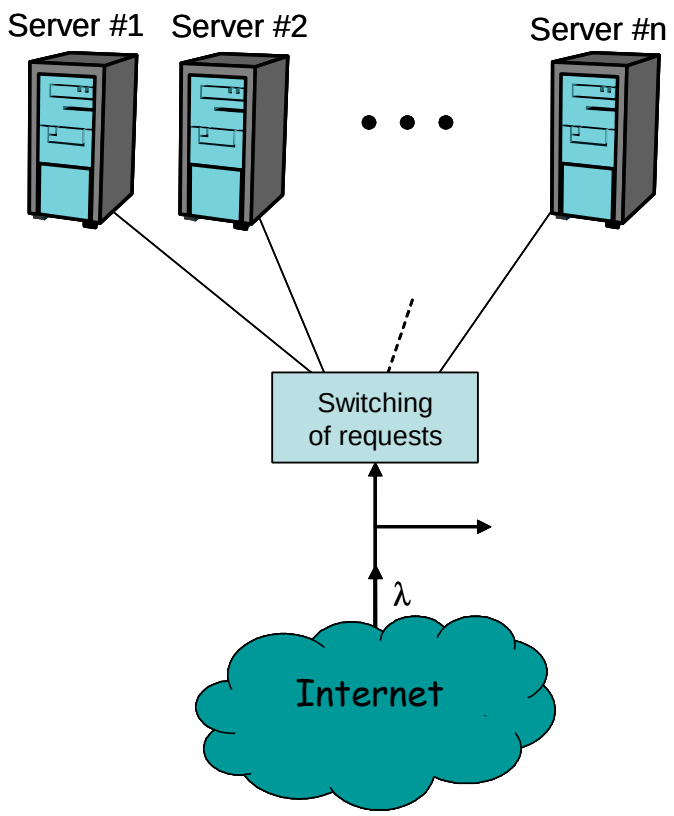
A load sharing system

A service provider provides fee-paying computing capability to its customers via the system illustrated in the figure below. The system is mainly used to perform simulations and comprises "n" identical servers and a device that, upon receipt of a request, allocates (for the job duration) any one of the "idle" servers to the customer who sent the request. The system is lossy, so that a request is lost if, upon its arrival, finds all the servers "busy" (BCC scheduling discipline: Blocked Calls Cleared). In this way, a customer avoids waiting (typically, simulations last long) and can try to start the simulation as soon as possible by sending the request to someone else provider.

Assume that requests arrive according to a Poisson process at rate λ and that times required for the execution of jobs can be modeled by independent and exponentially distributed random variables with mean $1/\mu$.

Calculate the loss probability, considering that, of course, servers are subject to failures. Assume that times to failure and times to repair of servers are independent and exponentially distributed random variables with parameter, respectively, γ e τ. Moreover, suppose that a single "repair facility" is shared.