On a system using Round Robin Scheduling, let s represent the time required to perform a process switch, q represent the RR time quantum, and r represent the average time a process runs before blocking on I/O. Give a formula for CPU efficiency given the following:

i) $q=\infty$ ii) $q>r$ iii) $s<q<r$ iv) $s=q<r$ v) q nearly 0

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3rd Year 5th Sem Operating System
Assignment-2

1) Assuming r is the total processing time, and s is the overhead for each context switch. Q is the time quantum, then the CPU efficiency can be represented by the equation:

$$r / (([r/Q]-1) * s + r)$$

Solution:

(a) When, $Q=\infty$, $S=0$

It becomes $T/T=1$.

So, CPU efficiency is 100%.

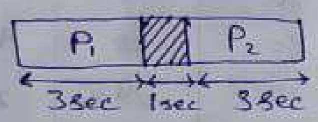
(b) When, $Q>r$, $S=0$

It becomes $T/T=1$.

So, CPU efficiency is 100%.

(c) $S<Q<r$

Example:



$P_1 = 3sec$ $P_2 = 3 Sec$

Switching = 1 Sec.

Efficiency formula $= \dfrac{r}{([\frac{r}{Q}]-1) * S + r}$

Let, $Q=2$

$$n = \frac{6}{(\frac{6}{2}-1)*1+6} = \frac{6}{2+6} = \frac{6}{8} = 75\%$$

Let, $Q=4$

$$n = \frac{6}{(\frac{6}{4}-1)*1+6} = \frac{6}{(1.5-1)+6} = 85.71\%$$

$\therefore$ The CPU efficiency is $r/(([r/Q]-1)*S+r$.

(d) When, $S=Q<r$

$$r/(r/Q*S-S)+r = r/(r-S)+r$$
$$= r/2r-S$$
$$= r/2r-Q$$

(e) Q nearly zero

When, Q is nearly zero.

It becomes $r/\text{infinity} = 0$.