☆ Randamized load Balancer

for every job j = 1 to n

{

(1) Create Random Number x

x = rand() % m + 1 ;

(x is in 1 to m)

(2) Assign j to machine x

(3) Incread Load of x

load[x] = load[x] + t[j];

}

Print Load array

Analysis of Randomized Load Balancer

n jobs
m machines

R_{ij} = Random Variable indicating the load on machine i when job j is assigned to machine i

$\therefore R_{ij} = t_j$ if job j is assigned to machine i
$= 0$

$E[R_{ij}]$ = Expected value of R_{ij}

$= t_j * Pr[R_{ij} = t_j]$
$+ 0 * Pr[R_{ij} \neq t_j]$

$= t_j * Pr[R_{ij} = t_j] + 0$

$= t_j * \frac{1}{m}$ (∵ Every machine is equally likely for job j)

$= \frac{t_j}{m}$

Load on Machine i is R.V.

$\therefore X_i$ = Total Load on Machine i

$$= \sum_{j=1}^{n} R_{ij}$$

$$\therefore E[X_i] = E\left[\sum_{j=1}^{n} R_{ij}\right]$$

$$= \sum_{j=1}^{n} E[R_{ij}]$$

$$= \sum_{j=1}^{n} t_j/m$$

$$= \frac{\sum_{j=1}^{n} t_j}{m}$$

$$= \frac{\text{Total Load}}{m}$$

Thus Expected Load on Machine i is Total Load / Number of Machines (m)

$\therefore$ Load Balanced.

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