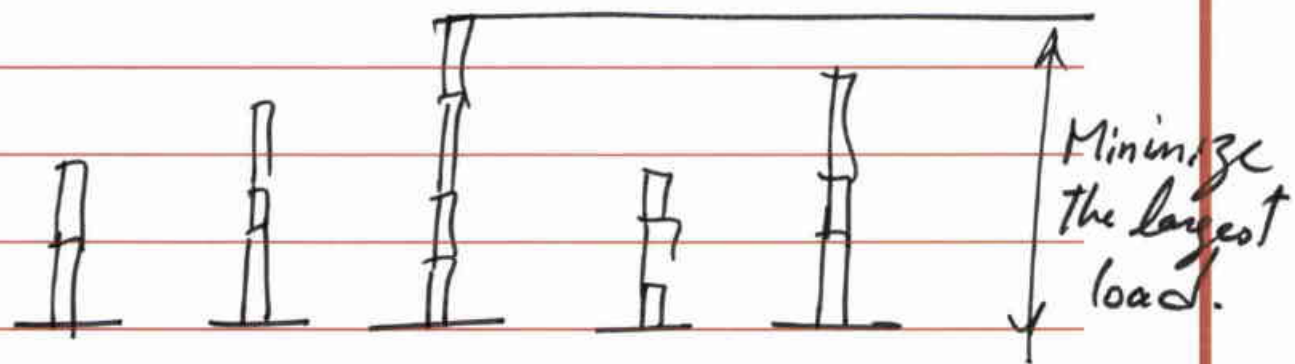


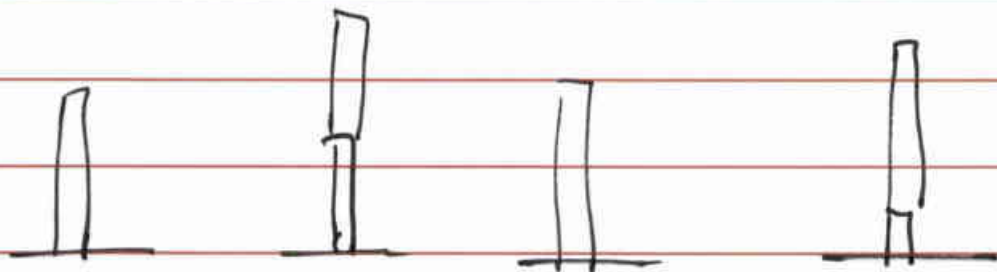
Load Balancing Problem

(Approximation Example)



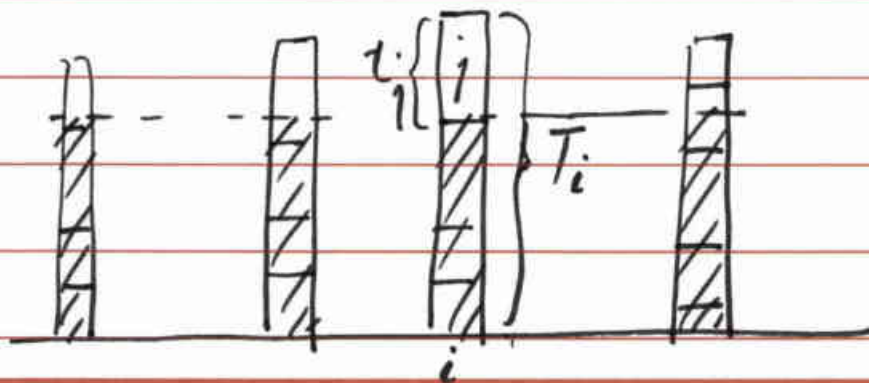
$m$  : no. of resources  
 $n$  : no. of jobs  
 $t_{ij}$  : time it takes to process job  $j$   
 $T_i$  : load on resource  $i$   
 $T^*$  : value of opt. sol.

Load Balancing Problem, Minimize the  
 Max. load on any machine.



$$T^* \geq \frac{1}{m} \sum_i t_i$$

$$T^* \geq \max_j t_j$$



$$\sum_{k=1}^m T_k \geq m \cdot (T_i - t_j)$$

$$T_i - t_j \leq \frac{1}{m} \sum_k T_k$$

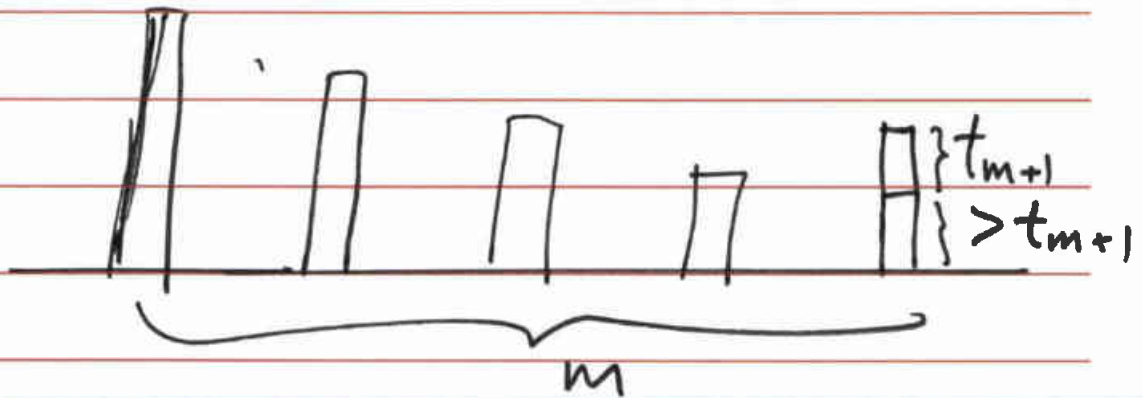
$$T_i - t_j \leq T^*$$

$$t_j \leq T^*$$

$$T_i \leq 2 \cdot T^*$$

Improved approx. to greedy Balancing

Initially sort jobs in decreasing order of length. Then use same greedy balancing.



$$T^* \geq 2 \cdot t_{m+1}$$

$$t_j \leq t_{m+1}$$

$$T^* \geq 2 \cdot t_j \text{ or } t_j \leq T^*/2$$

$$\rightarrow T_i - t_j \leq T^*$$

$$t_j \leq \frac{1}{2} \cdot T^*$$

$$T_i \leq 1.5 T^*$$