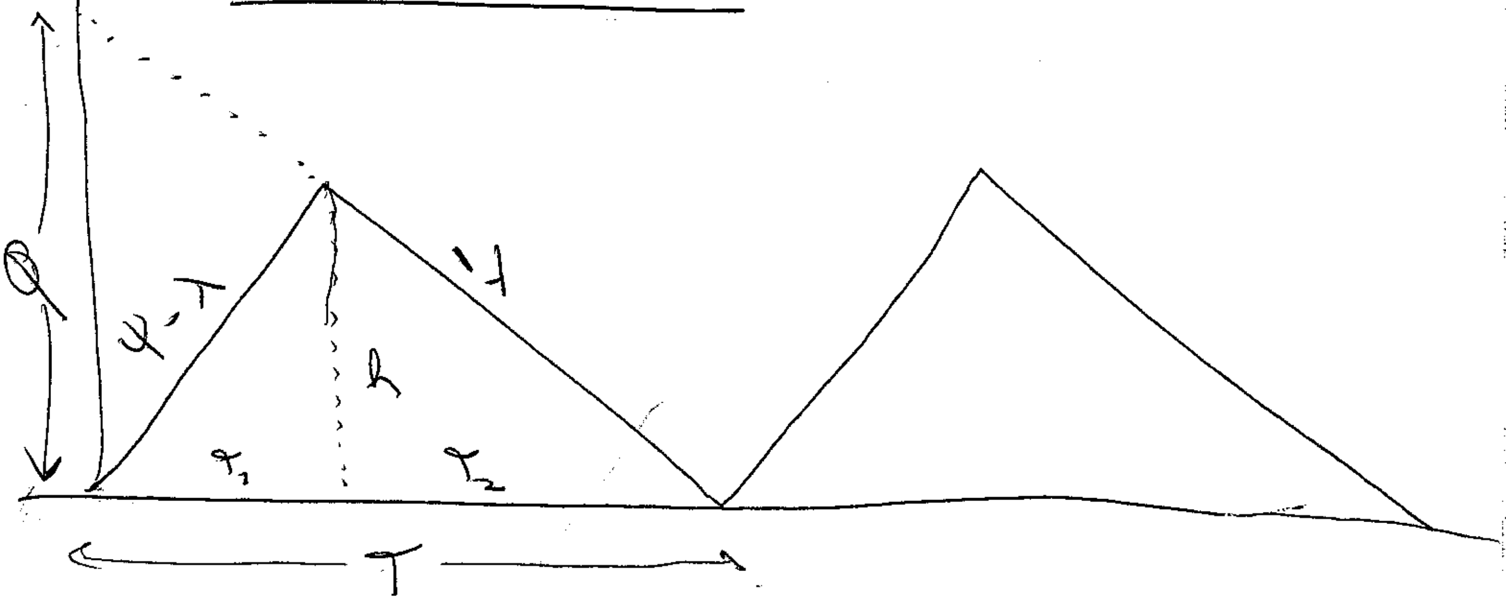
10/21/15



Total Cost per period $= \dfrac{A}{T} + I\dfrac{h}{2}$

Order Cost + inventory cost

Need to express everything else in terms of T

$Q = \lambda T \qquad h = \lambda T_2$

$T_1 + T_2 = T \qquad h = (\psi - \lambda) T_1$

$$K = \frac{A}{T} + \frac{1}{2} I \underbrace{\cancel{\lambda} T(\psi - \lambda)}_{h\psi}$$

Optimal

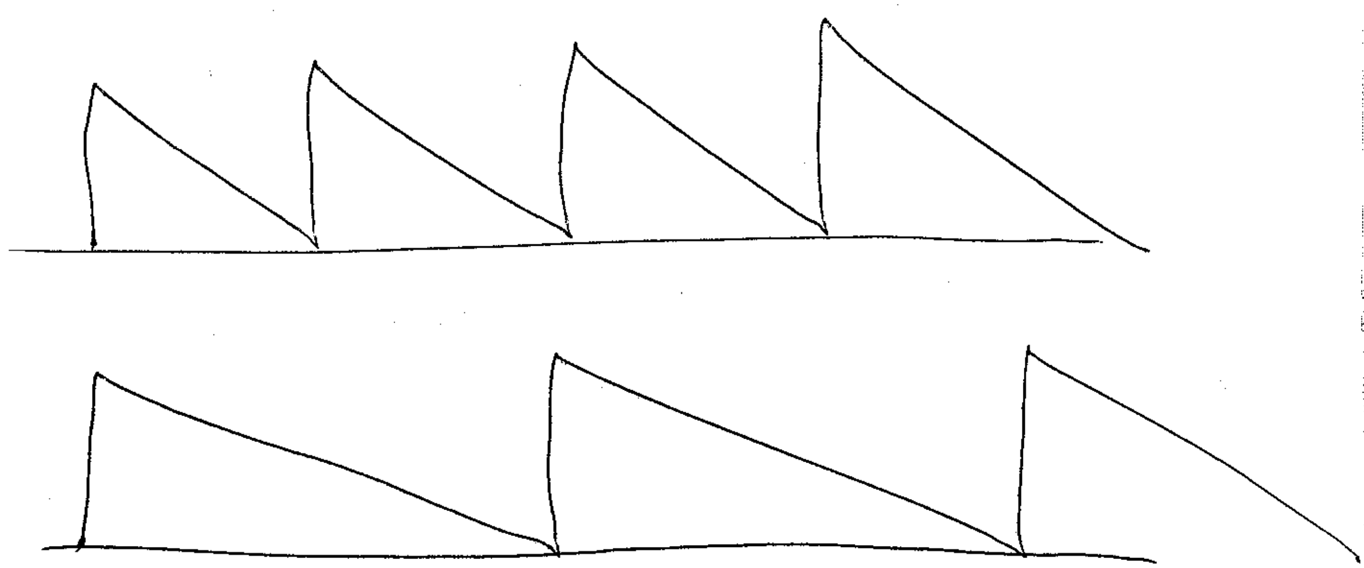
$$
\left(
\begin{aligned}
Q &= Q_w \left(\frac{\psi}{\psi - \lambda} \right)^{1/2} \\
K &= K_w \left(\frac{\psi - \lambda}{\psi} \right)^{1/2} \\
T &= T_w \left(\frac{\psi}{\psi - \lambda} \right)^{1/2}
\end{aligned}
\right.
$$

Multi-item variant

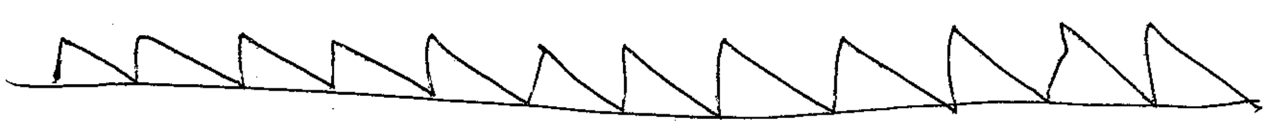
n different items, each with its own λ_j & I_j

When ordering the cost is A regardless of what we order.

$n=3$



Non-optimal — always use shortest time interval. Order cost doesn't increase



Inventory cost goes down.

So we should order all items at Same time

Total Cost

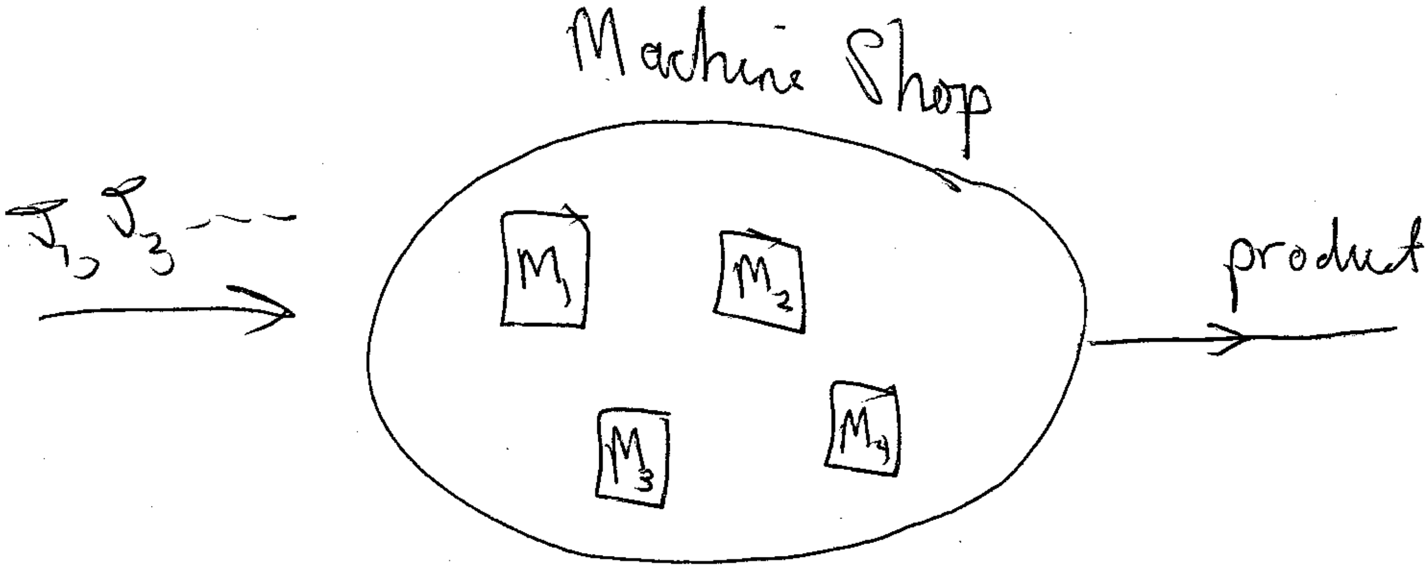
$$K = \frac{A}{T} + \sum_{j=1}^{n} \frac{I Q_j}{2}$$

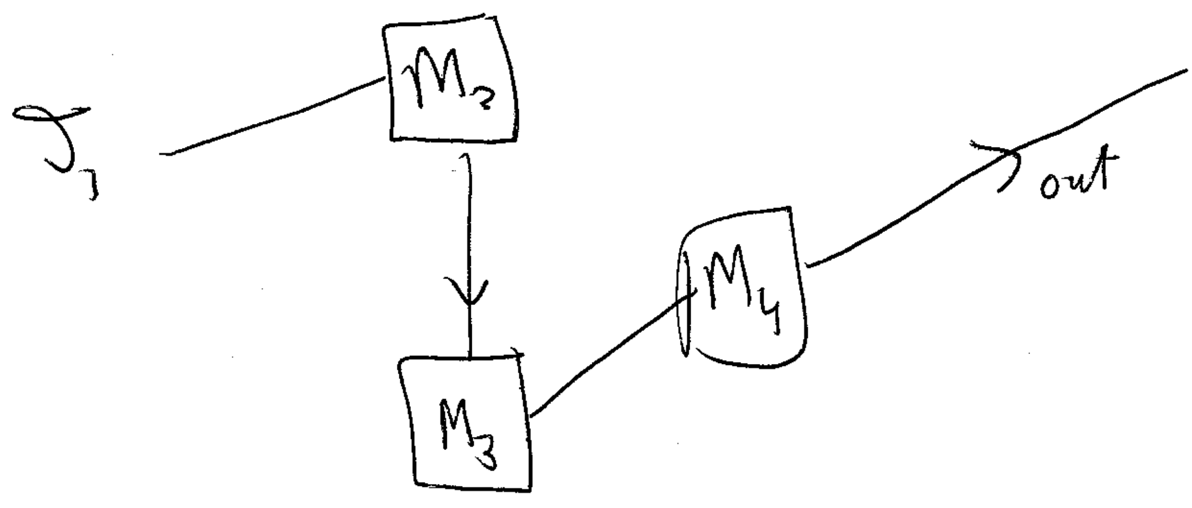
$$Q_j = \lambda_j T$$

$$= A/T + \left(\sum_{j=1}^{n} \frac{I \lambda_j}{2} \right) T$$

$$\vdots$$

Job Shop Scheduling





Get queues in front of machines

Various optimization problems associated with this situation

Example 1

$$1 \mid \dots \mid \sum_j w_j C_j$$

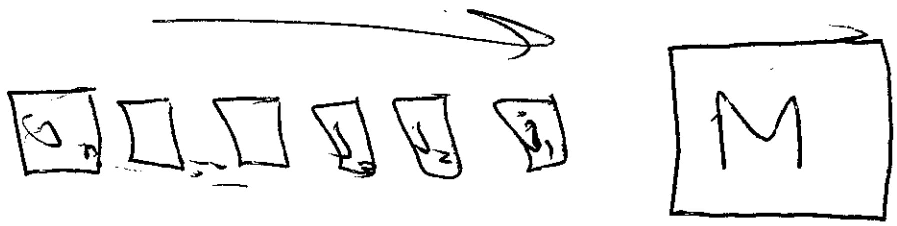
# of machines — restrictions ??? — objective

Data: p_j = processing time of job j

w_j = weighting factor ("importance")

C_j = completion time of job j — depends on the ordering of the jobs.

Problem: find the ordering of the jobs that minimises $\sum w_j C_j$

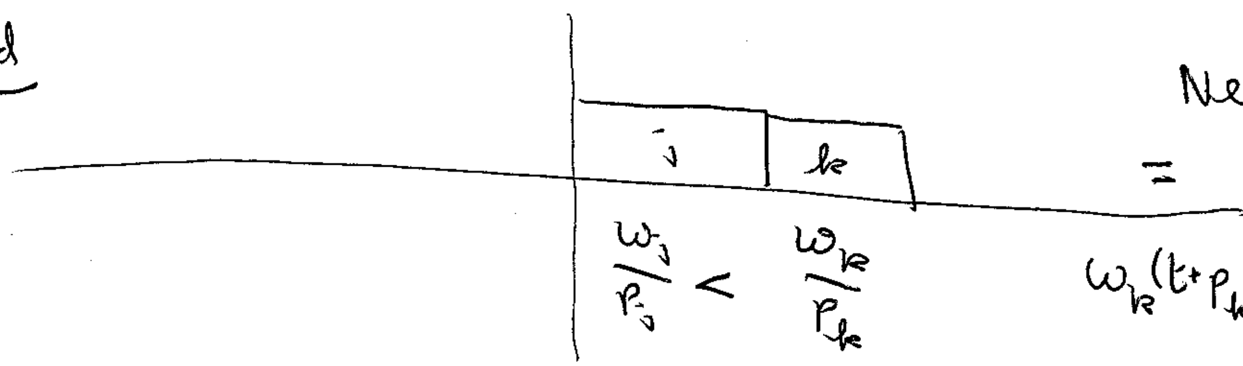


Optimal ordering – re-number so that

$$\frac{w_1}{p_1} \geq \frac{w_2}{p_2} \geq \cdots \geq \frac{w_n}{p_n}$$

Why is this optimal? Suppose we do not use this order.

Old



$$\frac{w_j}{p_j} < \frac{w_k}{p_k}$$

New – Old

$$= w_k(t+p_k) + w_j(t+p_k+p_j)$$

$$- \; w_j(t+p_j) + w_k(t+p_k+p_j)$$

$$= w_j p_k - w_k p_j < 0$$

New