



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

Project Management for Managers

Lec – 45 Slacks & Floats- I

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Slack is the maximum delay possible for an event without affecting its overall duration.

Floats for activities are the same as slacks are for events.

So, we can define float as maximum delays possible for an activity without changing the project duration.



There are four types of floats:

1. Total float: It is the maximum delay possible for an activity without considering any delay in its precedence or succeeding activity.
2. Free float: It is the maximum delay possible for activities which will **not** affect the float of the successor activity.
3. Independent float: It is the maximum delay possible for an activity with used floats of preceding activities and will not affect the floats of succeeding activities.
4. Safety float: Let the preceding job finish at its latest possible time and the succeeding job finish as late as possible time.

The characteristics of float are:

Independent float \leq Free float \leq Total float

Only independent float can be negative, the rest two floats are always positive or zero.

Activities with all floats = 0 are critical activities.

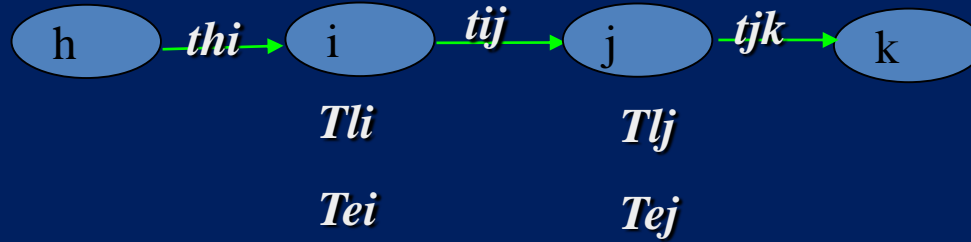


The applications of floats are as follows:

1. It identifies the critical activities as well as quantify maximum delays possible for all not critical activities.
2. It is very important in crashing of a network (reducing the time and/or cost of overall project).
3. It helps in resource allocation and smoothing.



Float: We can define following for a given activity i-j.



Earliest start time (Tei): This is the earliest occurrence time for the event from which the activity arrow originates.

Earliest finish time : $Tei + tij$

Latest finish time: The latest occurrence time for the node at which the activity arrow terminates, Tlj

Latest start time : $Tlj - t Ij$

Maximum time available = $T_{lj} - T_{ei}$

Total float: Total float for job i-j is the difference between maximum time available and the actual time it takes.

$$TF = T_{lj} - T_{ei} - t_{ij}$$

Free float: This is based on the possibility that all events occur at their earliest times, i.e. all activities start as early as possible. It is the difference between earliest finish time and earliest start time.

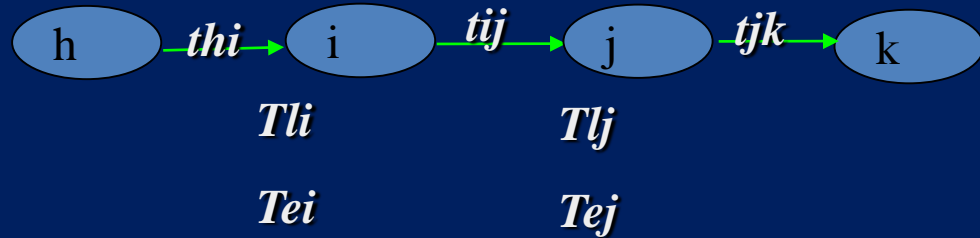
$$FF = T_{ej} - T_{ei} - t_{ij}$$

Predecessor	Successor	
	Early	Late
	Early	Total
	Late	Safety



Independent float: Let the preceding job h-i finish at its latest possible time T_{li} and the succeeding job j-k start at its earliest possible time , which is T_{ej} .

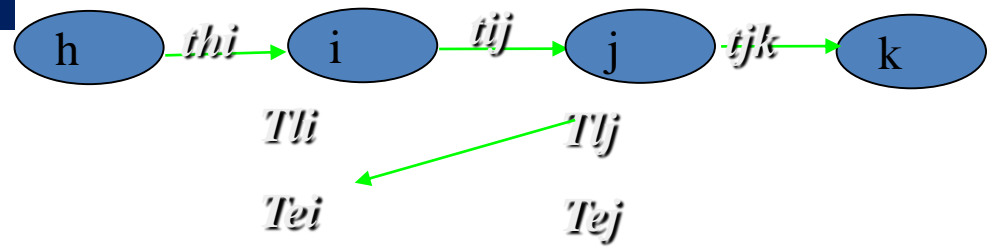
IF= $T_{ej}-T_{li}-t_{ij}$.



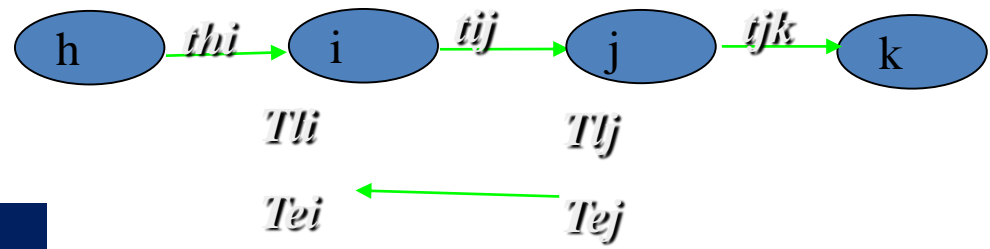
Predecessor	Successor	
	Early	Late
Early	Free	Total
Late	Independent	Safety

Safety float: Let the preceding job finish at its latest possible time and the succeeding job finish as late as possible time.

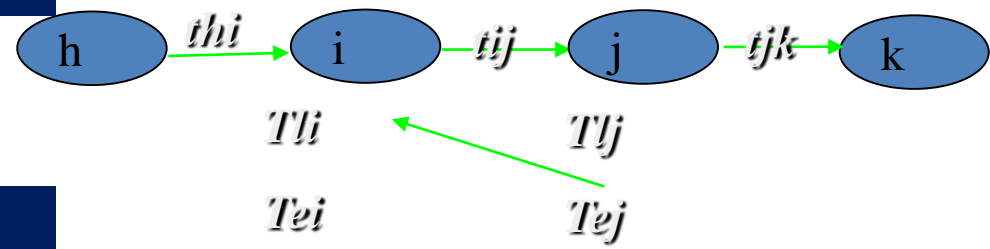
Total float



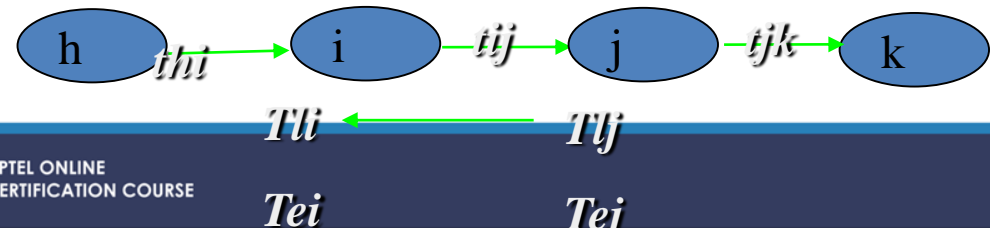
Free float

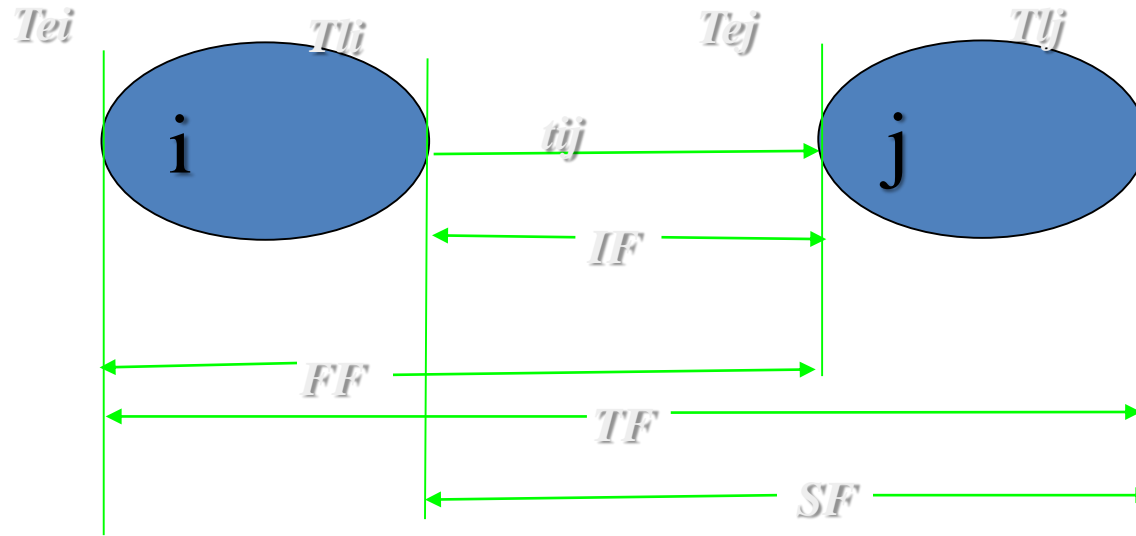


Independent float



Safety float





$$TF = Tlj - Tei - tij$$

$$FF = Tei - Tei - tii$$

$$IF = Tej - Tli - tij$$

$$SF = Tlj - Tli - tij$$

Predecessor

Successor

	Early	Late
Early	Free	Total
Late	Independent	Safety



Ex: Work out couple of examples

