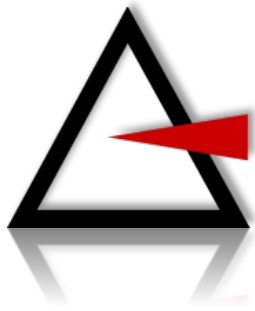


Project Management

Topic 5.2 Critical Path



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Critical Path

- Schedule analysis technique
- Does not consider resource limitations
- Assumes all activities start as early as possible
- Longest path in the network
- Critical path establishes project completion date

Earliest Start/Finish Times

- Earliest start (ES): earliest an activity can begin
- Earliest finish (EF): earliest an activity can finish
- $EF = ES + \text{Duration Estimate}$
- ES for an activity must be the same as or later than the latest of all the EF times leading directly into the activity
- **Forward** Pass: use **largest** EF leading into the activity

Latest Start/Finish Times

- Latest start (LS): latest an activity can start without changing project completion time
- Latest finish (LF): latest an activity can finish without changing project completion time
- $LS = LF - \text{Duration Estimate}$
- LF for an activity must be the same as or earlier than the earliest LS emerging directly from that activity
- **Reverse** Pass: use **smallest** LS emerging from the activity

Activity Slack or Float

- Slack or float of a particular activity
 - Activity Slack = $LF - EF$ or
 - Activity Slack = $LS - ES$
- Activities that make up the critical path have the least slack
- All activities with this value are on the critical path

Critical Path Process

- Make forward pass to compute ES & EF
 - Add using largest number
- Make reverse pass to compute LS & LF
 - Subtract using smallest number
- Compute float
 - Start or finish differences (LS-ES or LF-EF)
- Least float activities are the critical path

Critical Path Be Aware

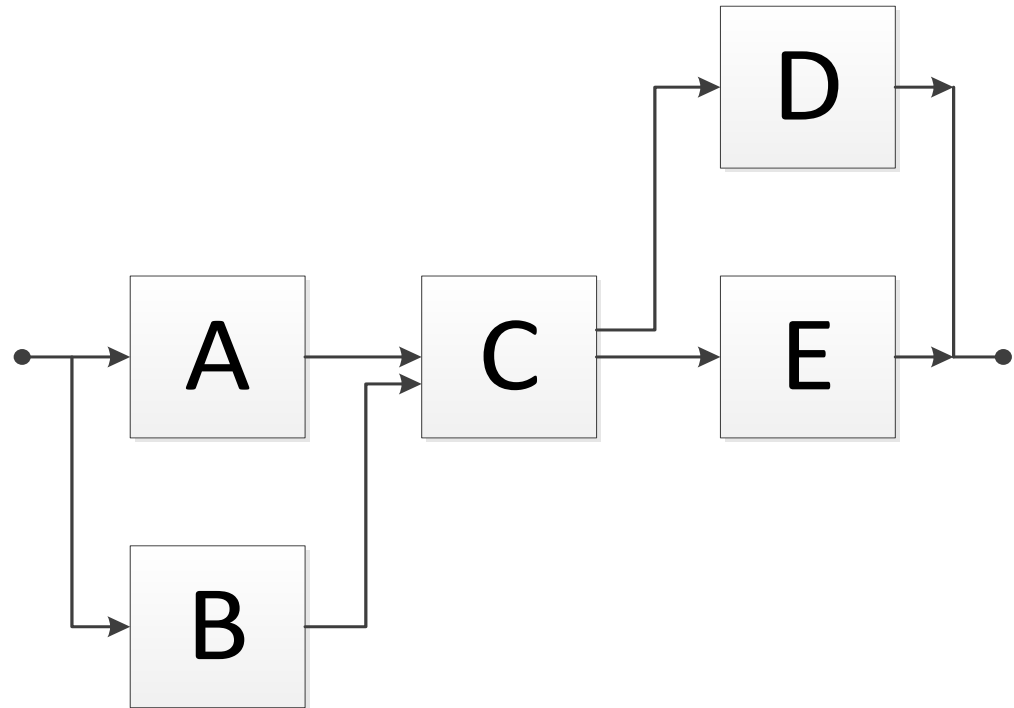
- You can have more than one critical path (multiple paths with zero or least float)
- Total negative float occurs when project duration is shorter than the schedule
- Total positive float occurs when project duration is longer than the schedule

5.2.1 Class Exercise - A



Forward Reverse Pass

Act.	Immed. Pred.	Est. Time
A	-	2
B	-	4
C	A,B	1
D	C	3
E	C	2



Learn by Doing Project Management
Pages 111-112



Raise Projector Screen

5.2.1 Class Exercise - B



Forward Reverse Pass

Act.	Immed. Pred.	Est. Time	Earliest		Latest		Float	Critical Path
			ES	EF	LS	LF		
A	-	2						
B	-	4						
C	A,B	1						
D	C	3						
E	C	2						

Learn by Doing Project Management
Pages 111-112



Raise Projector Screen

5.2.2 Team Exercise



Critical Path

Learn by Doing Project Management
Pages 113-116

Network & Schedule Problems

- Basic data provided
 - Task description or label
 - Task durations
 - Task dependencies
- Basic questions asked
 - Find early & late start & finish (ES,EF,LS,LF)
 - Find slack for each activity
 - Find critical path & project earliest completion