RESOURCE LEVELLING

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Network Analysis

- Activity Listing
- Sequencing (Network Logic)
- Estimation of Time
- Time Analysis
- **Resource Analysis**
- Funds Analysis
- Monitoring and Information System
- Updating and Monitoring

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Types of Project Constraints

- Technical or Logic Constraints:
  - Predecessor relationships
- Resource Constraints:
  - Absence, shortage, interrelationship of resources

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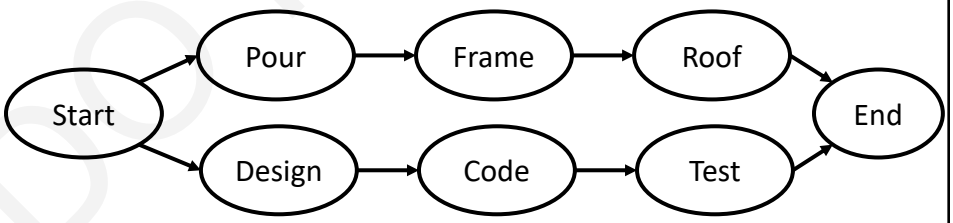
Types of Project Constraints

- Technical or Logic Constraints:



- House construction project
- Software project

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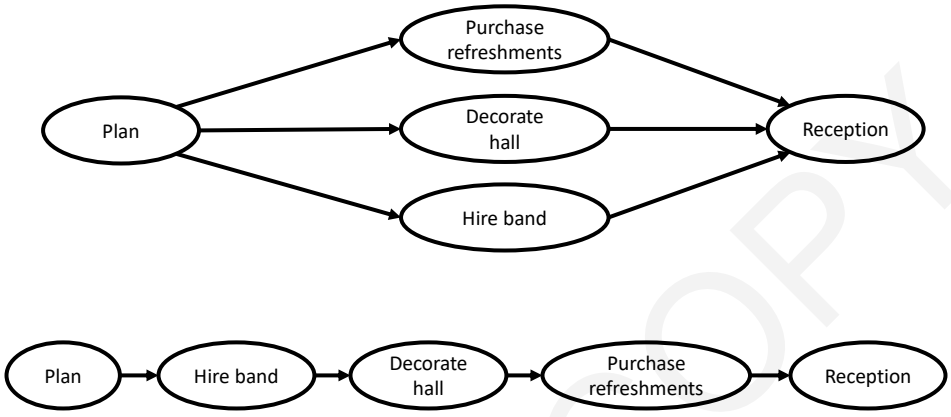
Types of Project Constraints

- Resource Constraints:



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Resource Allocation Methods

Assumptions

- Splitting of activities is not allowed – once an activity is started, it is carried to completion
  - Whenever an activity is split, the original duration is no longer relevant
- Level of resource already used for an activity cannot be changed
- Activities with the most slack pose the least risk
- Reduction of flexibility does not increase risk
- The nature of an activity (easy, complex) doesn't increase risk

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Resources – Walking Track

Activity Name	Activity Description	IP	Duration
A	Design	-	1
B	Layout and Marking	A	3
C	Build Walking Track	B	6
D	Install Lighting	C	6
E	Install Sprinklers	B	6
F	Build the fence	B	6
G	Sow Flower beds	D, E, F	8

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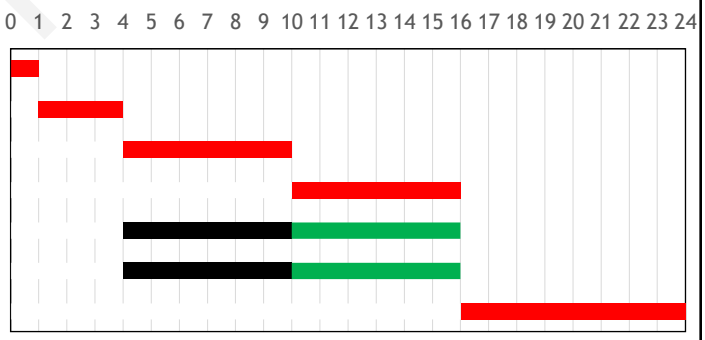
Resources – Walking Track

Activity Name	IP	Duration
A	-	1
B	A	3
C	B	6
D	C	6
E	B	6
F	B	6
G	D, E, F	8



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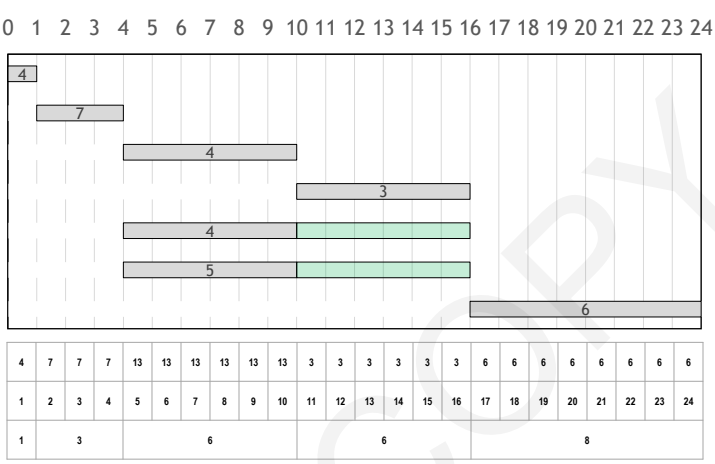
Resources – Walking Track

Activity Name	IP	Duration
A	-	1
B	A	3
C	B	6
D	C	6
E	B	6
F	B	6
G	D, E, F	8



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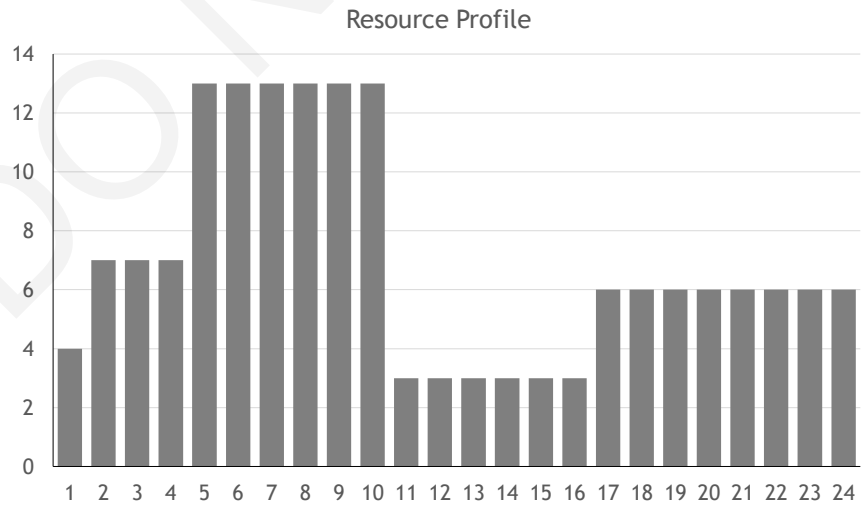
Resource Profile – Walking Track



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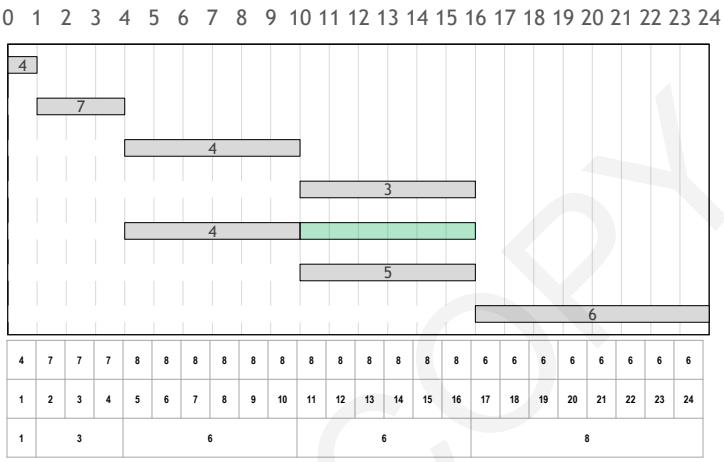
Resource Levelling
- F postponed by 6 weeks

Activity Name	IP	Duration
A	-	1
B	A	3
C	B	6
D	C	6
E	B	6
F	B	6
G	D, E, F	8



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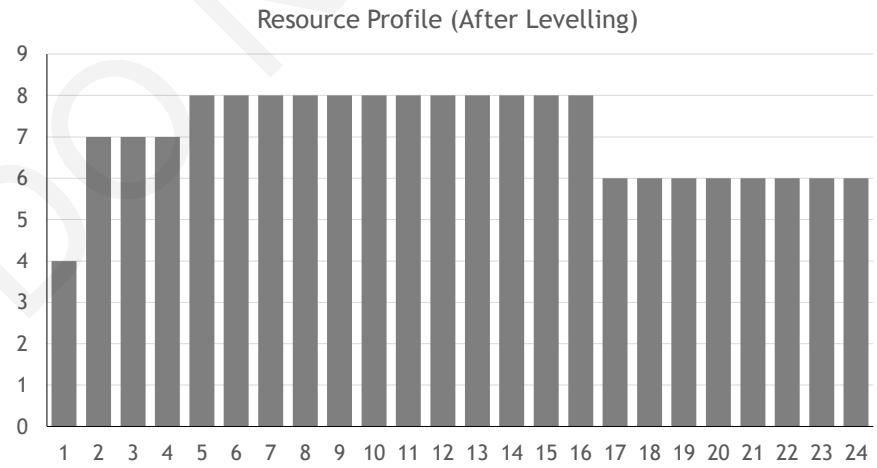
Resource Profile – After Levelling



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Resource Allocation Methods

Time-Constrained Projects

- Advantages:
  - Peak resource demands are reduced
  - Resources over the life of the project are reduced
  - Fluctuation in resource demand is minimized
- Disadvantages:
  - Loss of flexibility that occurs from reducing slack
  - Increases the criticality of activities

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Resource Allocation Methods

Resource-Constrained Projects

- Linear Integer Programming Model
- Heuristics:
  - Minimum slack
  - Smallest duration
  - Lowest activity identification number
  - Parallel method

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Resource Allocation Methods

- Consider a project with the following set of activities and other details:
- Quantity of resource available = 5
- Use Smallest Duration

Activity	Duration	Preceding Activity	Resource required
A	4	-	4
B	3	-	1
C	2	B	0
D	6	A	4
E	10	A	2
F	8	C, D	1
G	16	B	3
H	2	E	4

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Resource Allocation Methods

- Use Smallest Duration

Time	Resource Available	Schedulable activities	Resource Required	Schedulable activities	Duration	Activity chosen	Finish time
0	5	A, B	4, 1	A, B	4, 3	B	3
0	4	A	4	A	4	A	4
3	1	C, G	0, 3	C	2	C	5

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Resource Allocation Methods

- Use Smallest Duration

Time	Resource Available	Schedulable activities	Resource Required	Schedulable activities	Duration	Activity chosen	Finish time
0	5	A, B	4, 1	A, B	4, 3	B	3
0	4	A	4	A	4	A	4
3	1	C, G	0, 3	C	2	C	5
4	5	D, E, G	4, 2, 3	D, E, G	6, 10, 16	D	10
5	1	E, G	2, 3	-			
10	5	E, F, G	2, 1, 3	E, F, G	10, 8, 16	F	18
10	4	E, G	2, 3	E, G	10, 16	E	20
10	2	G	3	-			
18	3	G	3	G	16	G	34
20	2	H	4	-			
34	5	H	4	H	2	H	36

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