# Time Planning and Control

## Time-Scaled Network

# Processes of Time Planning and Control

1. Visualize and define the ***activities***.
2. Sequence the activities ***(Job Logic)***.
3. Estimate the ***activity duration***.
4. ***Schedule*** of the project or phase.
5. Allocate and balance ***resources***.
6. Compare target, planned and actual dates and ***update*** as necessary.
7. ***Control*** the time schedule with respect to **changes**.

# TIME-SCALED DIAGRAM

- ❑ The original project network is ***not*** plotted to a time scale.

- ❑ When drawing a time-scaled diagram, two time scales can be used: one in terms of working days and the other as calendar dates.

- ❑ Each activity is shown as a ***one dimensional line*** rather than as a two dimensional box.

- ❑ The horizontal length is equal to its estimated time ***duration*** (beginning at its ES and ending with its EF values).
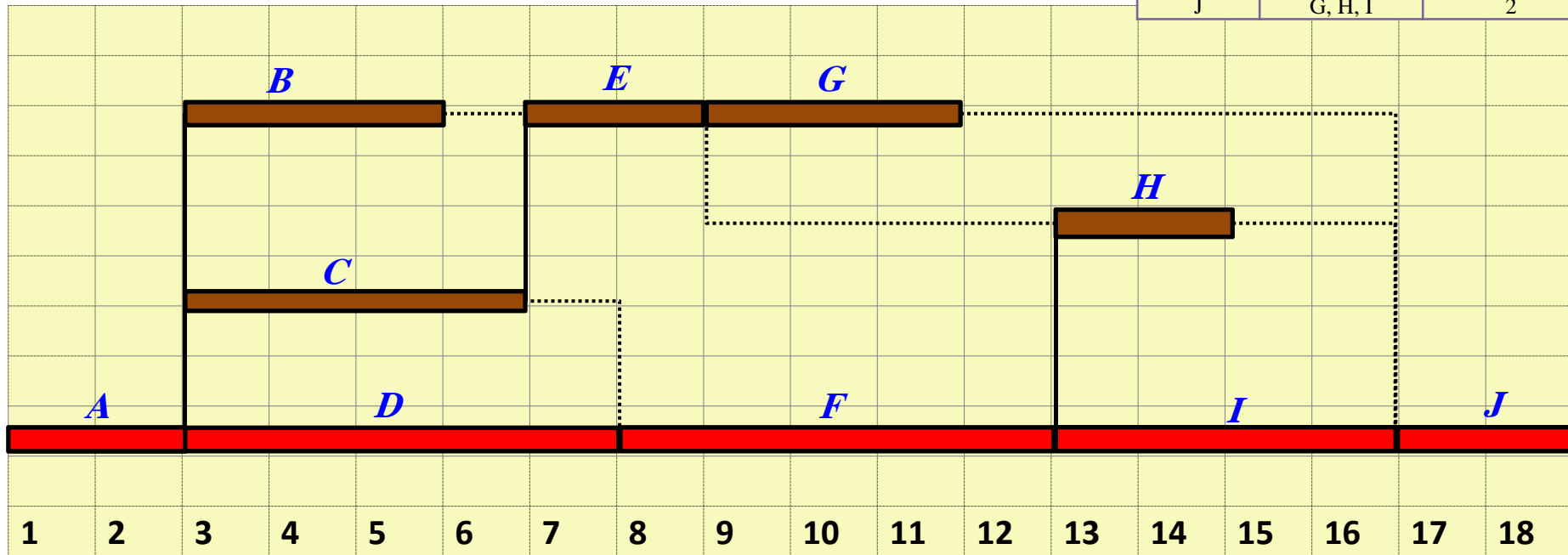
The following activity list represents the job logic and the durations of activities for a small engineering project. Draw a time- scaled network for the project, determine project time and calculate the activities float times.

| Activity | Depends on | Duration (day) |
|----------|------------|----------------|
| E | B, C | 2 |
| B | A | 3 |
| C | A | 4 |
| G | E | 3 |
| F | C, D | 5 |
| A | None | 2 |
| H | E, F | 2 |
| D | A | 5 |
| I | F | 4 |
| J | G, H, I | 2 |

| Activity | Depends on | Duration (day) |
|---|---|---|
| E | B, C | 2 |
| B | A | 3 |
| C | A | 4 |
| G | E | 3 |
| F | C, D | 5 |
| A | None | 2 |
| H | E, F | 2 |
| D | A | 5 |
| I | F | 4 |
| J | G, H, I | 2 |

B   E   G

H

C

A   D   F   I   J

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

➢ Project completion time = **18** working days
➢ Critical Path: **A, D, F, I, J**.

| Activity | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| Total float | 0 | 6 | 1 | 0 | 5 | 0 | 5 | 2 | 0 | 0 |
| Free float | 0 | 1 | 1 | 0 | 0 | 0 | 5 | 2 | 0 | 0 |

## ■ TIME-SCALED DIAGRAM: Explained

❑ *Vertical solid (dashed) lines* indicate sequential *dependence* of one activity on another.

❑ In effect, time-scaled networks are merely extensions of bar charts.

❑ When an activity has an early finish time that precedes the earliest start of activities following, the time interval between the two is the *free float* of the activity.

❑ *Float times* are shown as *horizontal dashed lines*.

## ■ *TIME-SCALED DIAGRAM: Explained*

- ❑ ***Free float*** or activity float is the amount of time that an activity's completion time may be delayed ***without affecting the earliest start of succeeding activity.***

- ❑ ***Total float*** or path float is the amount of time that an activity's completion may be delayed ***without extending project completion time.***

- ❑ ***Total float*** or path float is the amount of time that an activity's completion may be delayed ***without affecting the earliest start of any activity on the network critical path.***

## TIME-SCALED DIAGRAM: Explained

❑ ***Activity float*** is "**owned**" by an individual activity, whereas **path or total float is shared by all activities along a slack path**.

❑ Total path float time for activity (i-j) is the total float associated with a path.

# ■ TIME-SCALED DIAGRAM: Explained

- ➢ **Advantages of Time-scaled Diagram**
- ❑ Very suitable device for ***checking daily project needs*** of different resources, and for the advance detection of conflicting demands among activities for the same resource.
- ❑ Useful for project ***financial management*** applications.


- ➢ **Disadvantages of Time-scaled Diagram**
- ❑ Because it is drawn by manual drafting methods, the level of effort needed to modify and update them is very large.
- ❑ **Dependencies** among activities are not always so obvious as they are on the activity on node network.
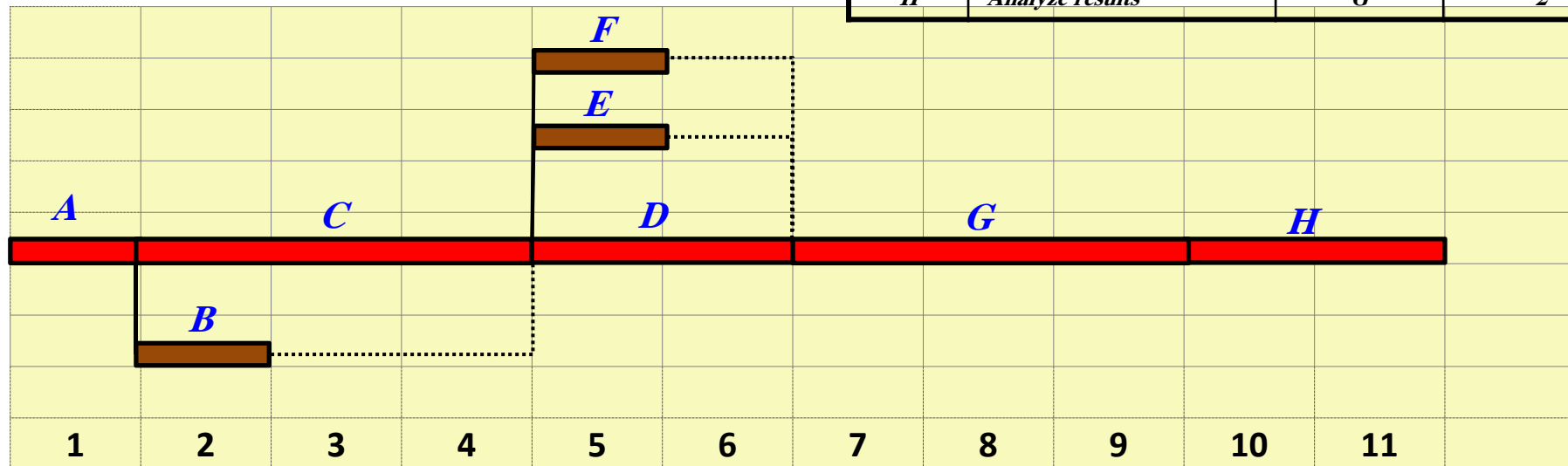
# Example2: TSN A market survey

The following activity list represents the job logic and the durations of activities for a market survey project. Draw a time- scaled network for the project, determine project time and calculate the activities float times.

| Activity | Description | predecessors | Duration, week |
|----------|-------------|--------------|----------------|
| A | Plan survey | — | 1 |
| B | Hire personnel | A | 1 |
| C | Design questionnaire | A | 3 |
| D | Train personnel | B, C | 2 |
| E | Select samples of customers | C | 1 |
| F | Print questionnaire | C | 1 |
| G | Conduct survey | D,E,F | 3 |
| H | Analyze results | G | 2 |

# Example 2

## Time-scaled Diagram

| Activity | Description | predecessors | Duration, week |
|---|---|---|---|
| A | Plan survey | — | 1 |
| B | Hire personnel | A | 1 |
| C | Design questionnaire | A | 3 |
| D | Train personnel | B, C | 2 |
| E | Select samples of customers | C | 1 |
| F | Print questionnaire | C | 1 |
| G | Conduct survey | D,E,F | 3 |
| H | Analyze results | G | 2 |



➤ Project completion time = **11** working days
➤ Critical Path: **A, C, D, G, H**.

| Activity | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| Total float | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 |
| Free float | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 |