SEQUENCING AND SCHEDULING ACTIVITIES

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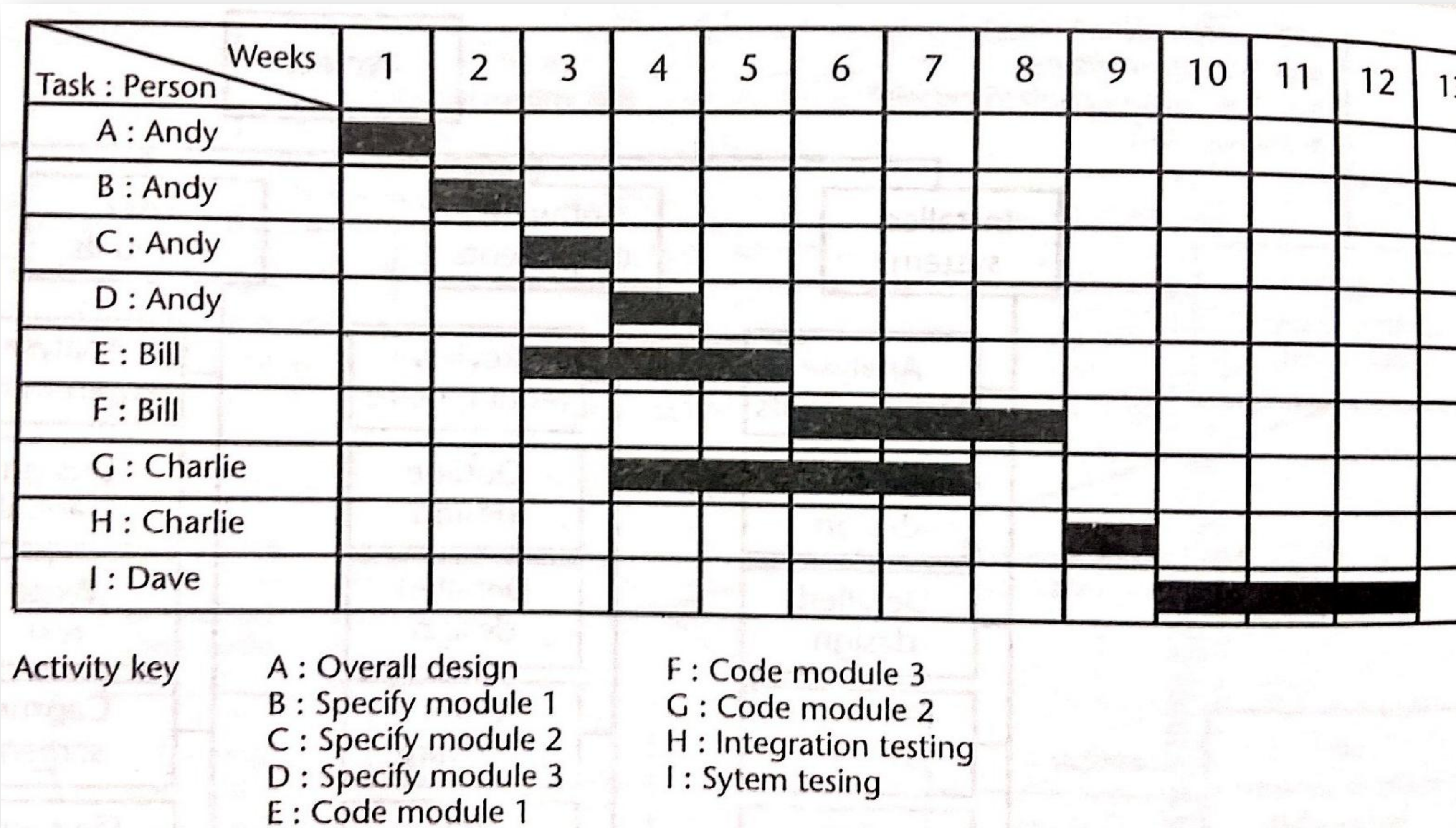
- Throughout a project, we will require a schedule that clearly indicates when each of the project’s activities is planned to occur and what resources it will need.
- One way of presenting such a plan is to use a bar chart as shown in the next slide.

SEQUENCING AND SCHEDULING ACTIVITIES CONT'D



SEQUENCING AND SCHEDULING ACTIVITIES CONT'D

- In drawing up the chart, we have done two things:-
  - ✓ Sequencing the tasks(i.e., identified the dependencies among activities dictated by the development process)
  - ✓ Scheduled them(i.e., specified when they should take place)
- The scheduling has had to take account of availability of staff and the way in which the activities have been allocated to them.

NETWORK PLANNING MODEL

- These project scheduling techniques model the project's activities and their relationships as a network.
- In network, time flows from left to right.
- These technologies were originally developed in the 1950s- the two best known being CPM(critical path method) and PERT(program evaluation review technique).

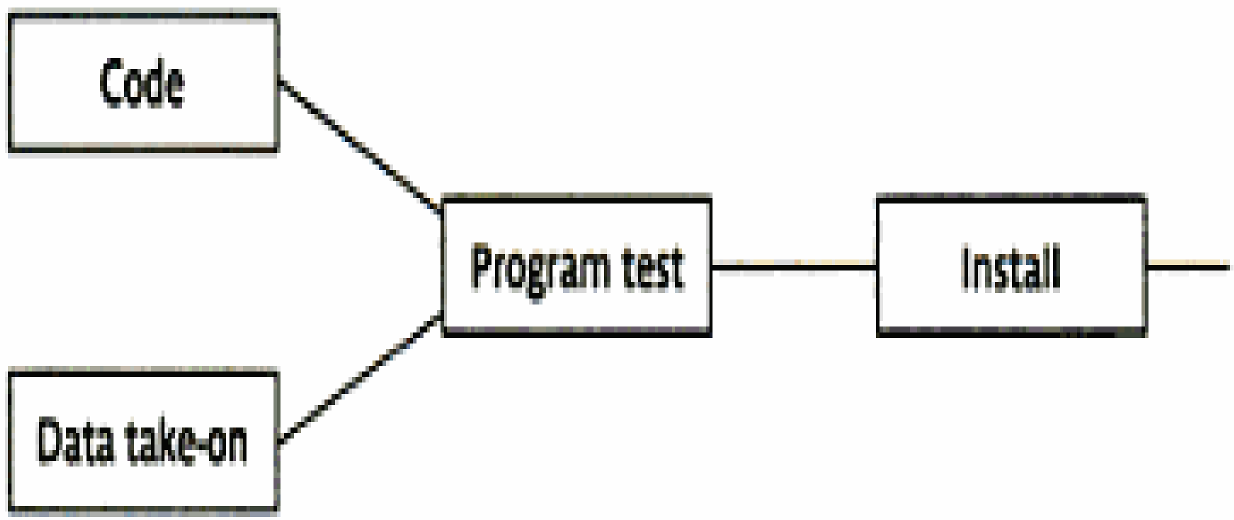
NETWORK PLANNING MODEL CONT'd

- Both of these techniques used an activity-on-arrow approach to visualizing the project as a network where activities are drawn as arrows joining circles or nodes, which represent the possible start and/or completion of an activity or set of activities.
- Now, precedence networks has become popular which use activity-on-node networks where activities are represented as nodes and the links between nodes represents precedence (or sequencing) requirements.

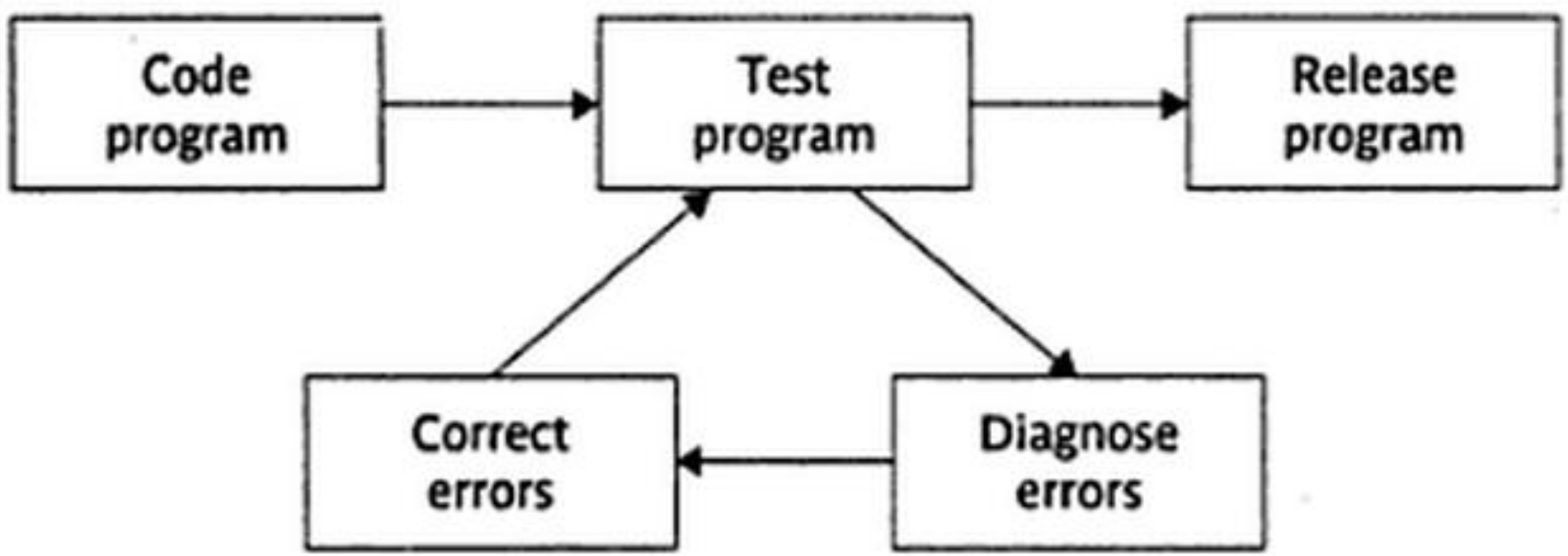
CONSTRUCTING THE PRECEDENCE NETWORK

- A project network should have only one start node.
- A project network should have only one end node.
- A node has duration.
- Links normally have no duration.
- Precedents are the immediate preceding activities.
- Time moves from left to right.
- A network may not contain loops.
- A network should not contain dangles.

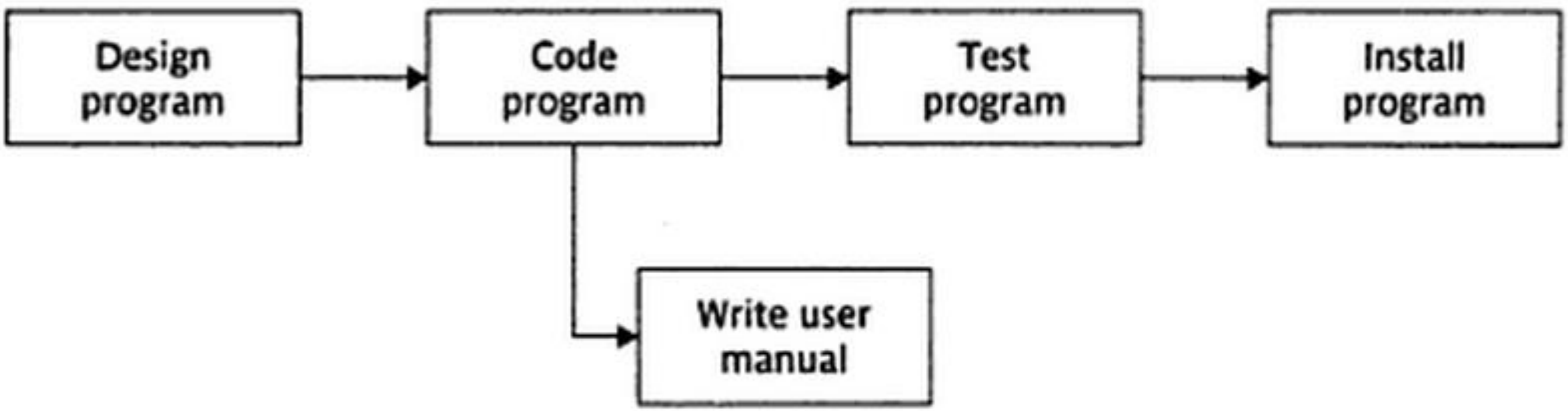
FRAGMENT OF A PRECEDENCE NETWORK



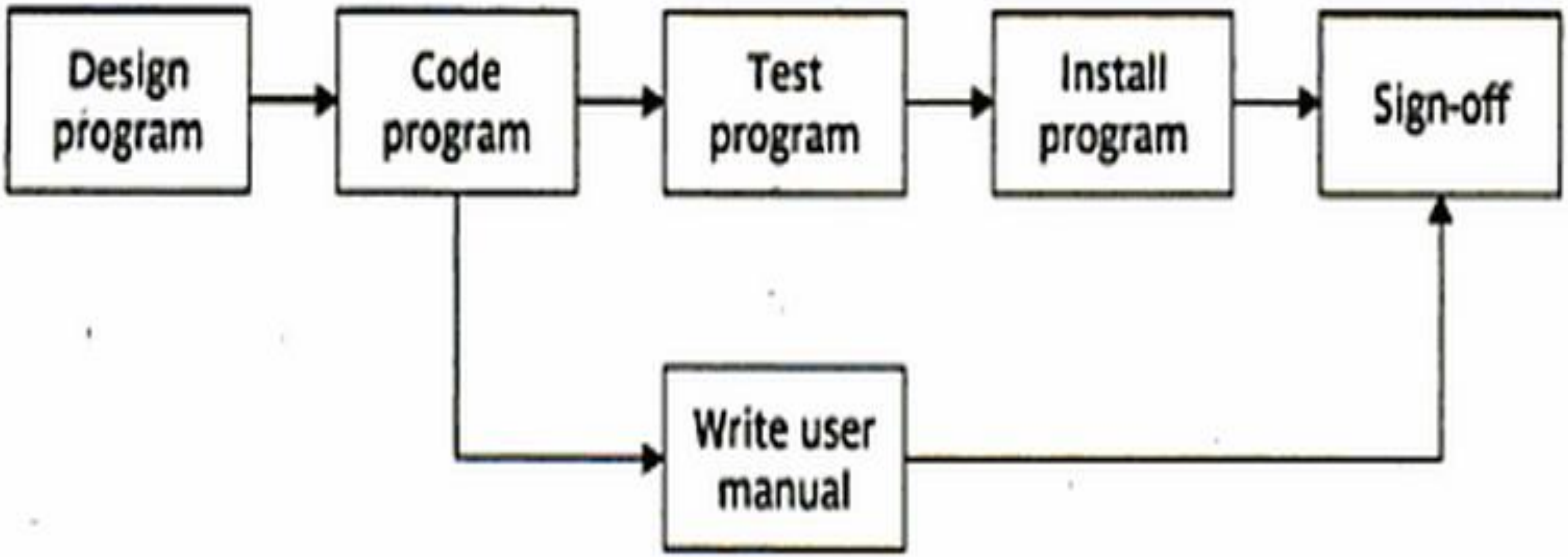
A LOOP REPRESENTS AN IMPOSSIBLE SEQUENCE



A DANGLE


Design program
Code program
Test program
Install program
Write user manual

RESOLVING THE DANGLE

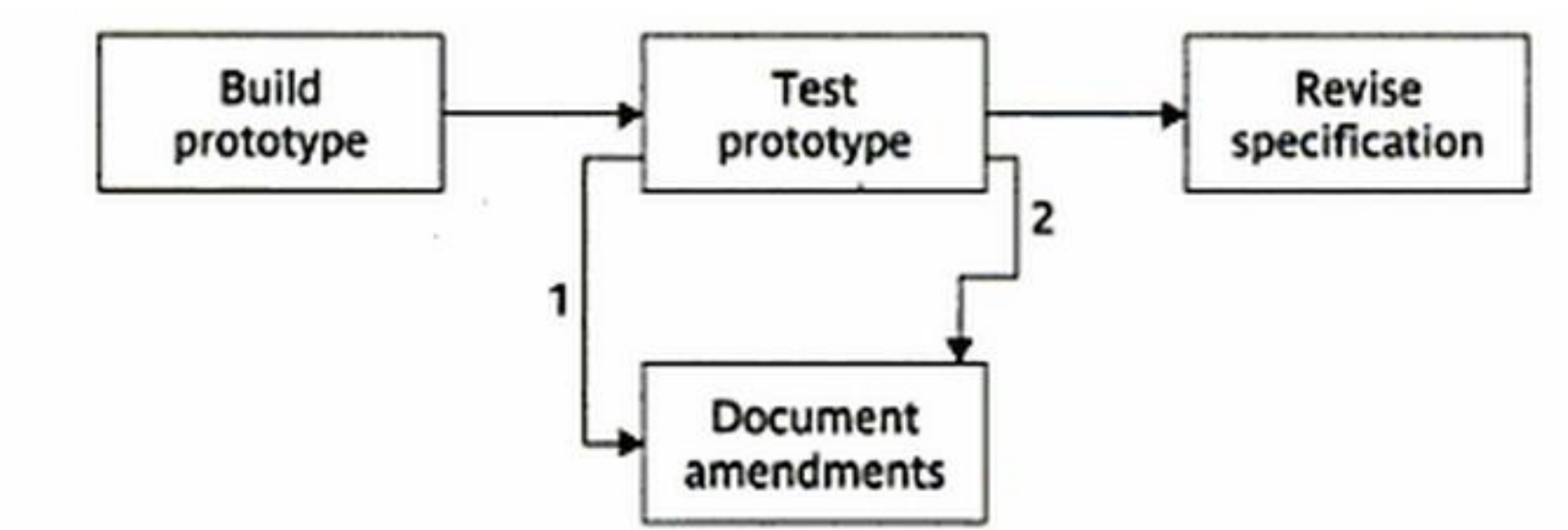


REPRESENTING LAGGED ACTIVITIES

- We might come across situation where we wished to undertake two activities in parallel so long as there is a lag between the two.
- We might wish to document amendments to a program as it was being tested- particularly if evaluating a prototype.
- In such a case we could designate an activity ‘test and document amendments’.

REPRESENTING LAGGED ACTIVITIES CONT'D

- Where activities can occur in parallel with a time lag between them we represent the lag with a duration on the linking arrow as shown below:-



ADDING TIME DIMENSIONS

- The method requires that for each activity we have an estimate of its duration.
- The forward pass
  - calculate the earliest start dates of the activities
  - To calculate the project completion date
- The backward pass
  - calculate the latest start dates for activities
  - identify the critical path from the graph

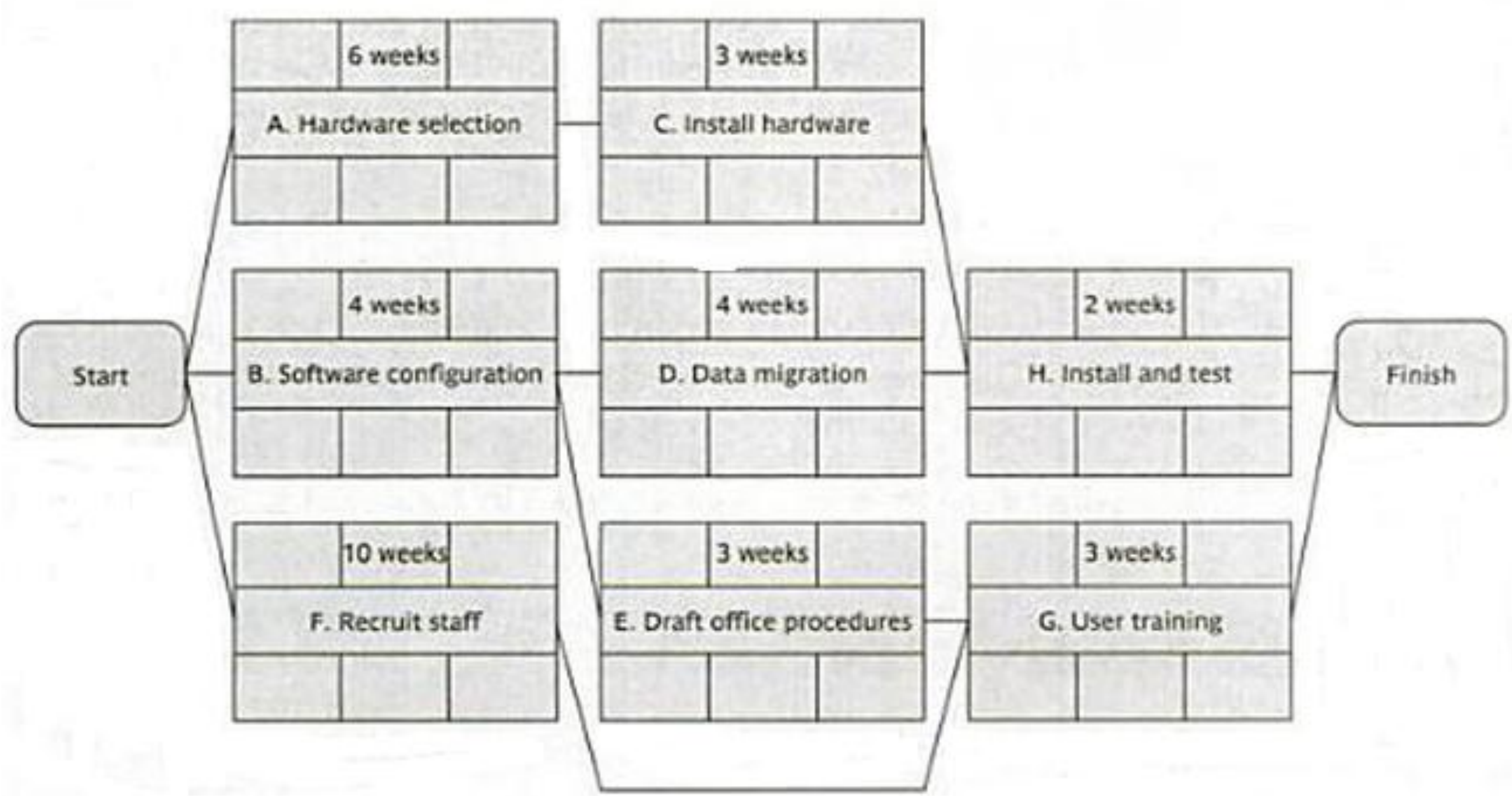
ADDING TIME DIMENSIONS CONT'D

- An example project specification with estimated activity durations and precedence requirements.

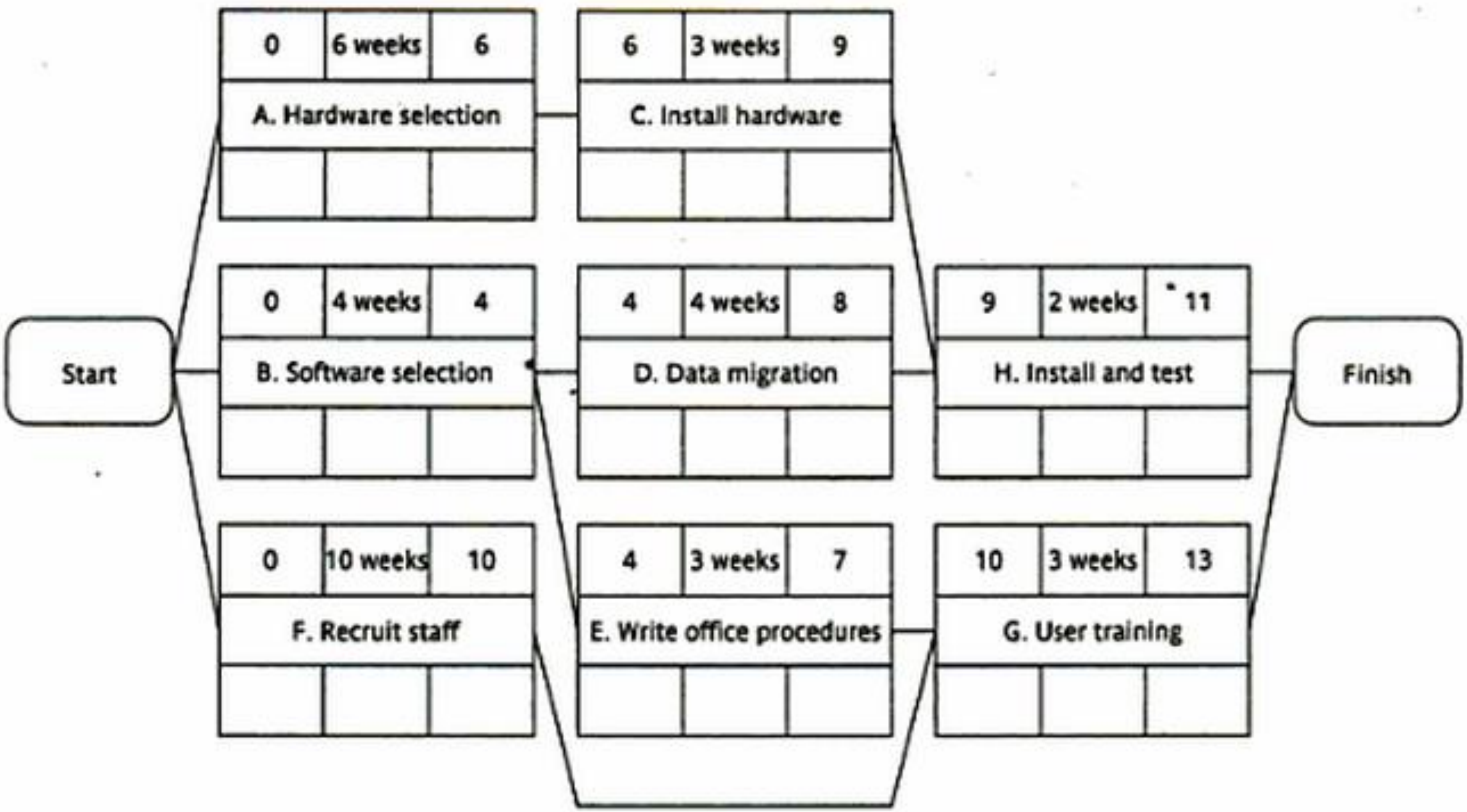
Activity		Duration (weeks)	Precedents
A	Hardware selection	6	
B	System configuration	4	
C	Install hardware	3	A
D	Data migration	4	B
E	Draft office procedures	3	B
F	Recruit staff	10	
G	User training	3	E, F
H	Install and test system	2	C, D

ADDING TIME DIMENSIONS CONT'D

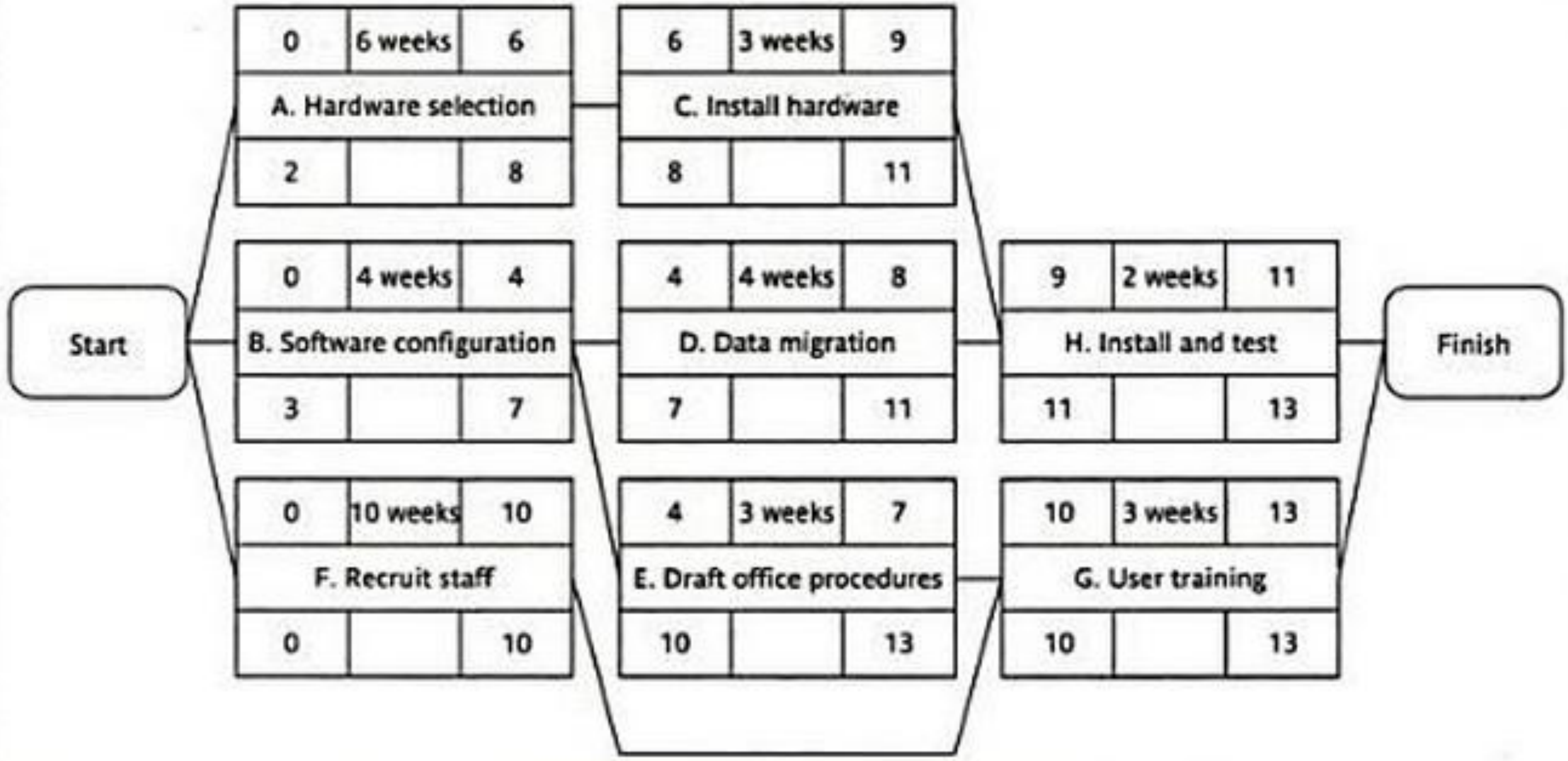
- The precedence network for the example project.



FORWARD PASS



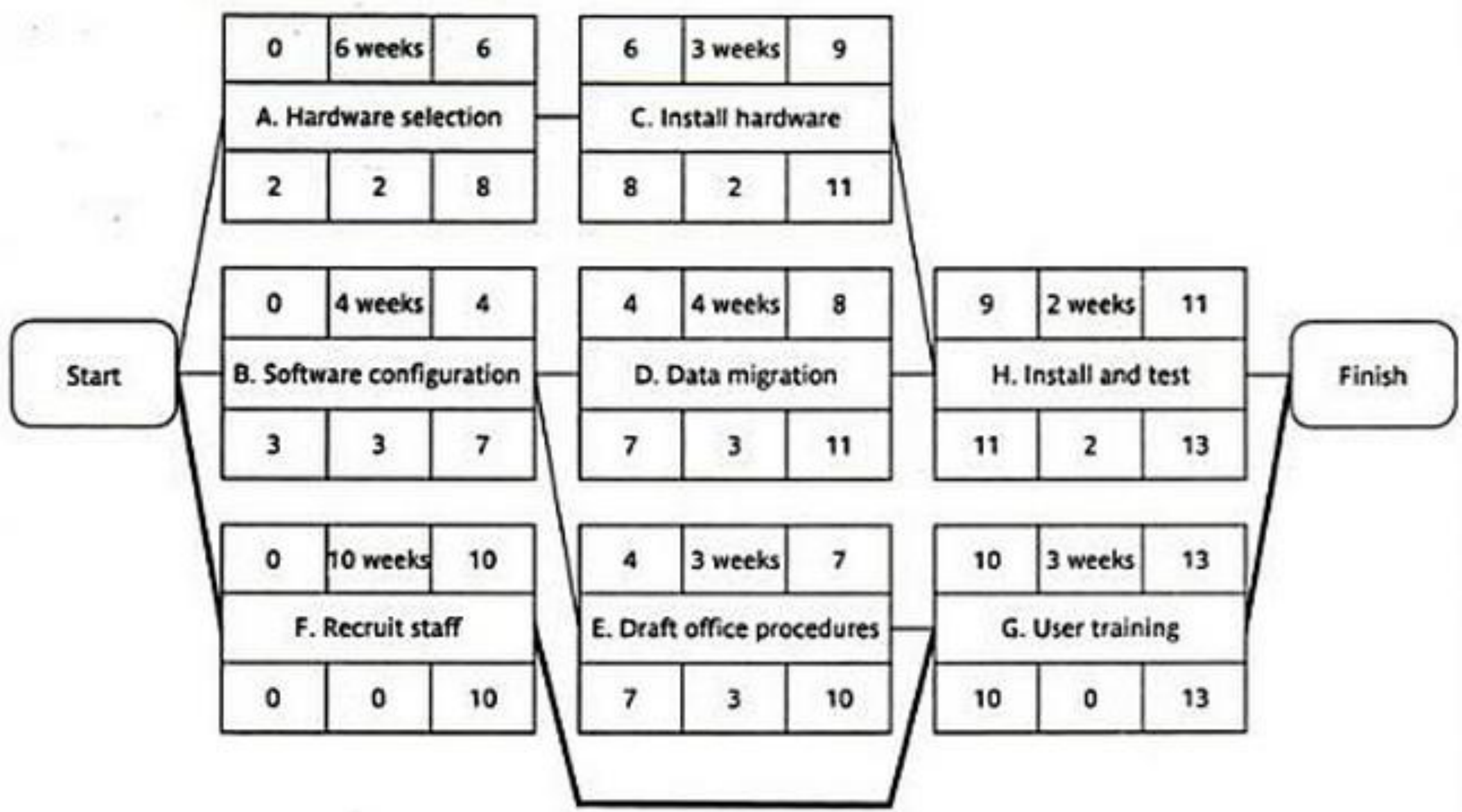
BACKWARD PASS



IDENTIFYING THE CRITICAL PATH

- There will be at least one path through the network (i.e., one set of successive activities) that defines the duration of the project.
- This is known as the critical path.
- Any delay to any activities on this critical path will delay the completion of the project.

IDENTIFYING THE CRITICAL PATH CONT'D



ACTIVITY FLOAT

- The difference between an activity's earliest start date and its latest start date is known as the activity's float which is a measure of how much the start or completion of an activity may be delayed without affecting the end date of the project.

MEASURES OF ACTIVITY FLOAT

- There are number of other measures of activity float, including the following:
- Free float: the time by which an activity may be delayed without affecting any subsequent activity. It is calculated as the difference between the earliest completion date for the activity and the earliest start date of succeeding activity.
- Interfering float: the difference between total float and free float.

SHORTENING THE PROJECT DURATION

- How can you shorten the schedule?
- Via
  - Reducing scope (or quality)
  - Adding resources
  - Concurrency (perform tasks in parallel)
  - Substitution of activities