PROJECT TIME PLANNING

Process and Bar Chart Technique

Definition of Planning

- Planning is the process of thinking systematically about the future in order to decide
  - what our **goals** are, and
  - **how** we are going to achieve them.

- Planning means looking ahead, making preparations, and deciding the best course of action.

Dimensions of Planning

Planning can be viewed from following points:

- **Subject**:- **Time** Planning, **Quality** Planning, **Financial** Planning, **Risk** Planning, **Product** Planning, **Organizational** Planning, …….
- **Organization**:- **Strategic** Planning, **Corporate** Planning, **Project** Planning, …
- **Time**:- **Long-Rang** Planning, **Short-Range** Planning, **Weekly** Planning, ….

Why is Time Planning necessary?

1) The increasing importance of **timely completion**.

2) The continuous complexity and growth in the size of the project generates the necessity for specialization. Specialization may lead to a breakdown of communications. Time planning must be found **to facilitate communications**.

3) Planning is essential for **resource management**

4) Planning is important for the efficient and maximum **utilization of resources**.

Why is Time Planning necessary?

5) Planning is basis for evaluating progress, **controlling** the work and making decisions.

6) For achieving an **increase in production**.

7) **Financiers** require a workable plan.

8) Essential in projects when their is **transfer of personnel**.

9) **Minimum risk** of the problems occurring.

Who Needs Time Planning?

- Customer/ Client/ Owner
- Designer/ Consultant
- Project management team (Manager, Engineers)
- Cost estimating department
- Planning and controlling department
- Supervisors, foremen, labors
- Supplier
- Financiers

Processes of Time Planning

1. Visualize and define the **activities**.
2. Sequence the activities (Job **Logic**).
3. Estimate the **activity duration**.
4. **Schedule** the project or phase.
5. Allocate and balance **resources**.

1a) Visualize and define the activities

1. ***An activity*** is a single **work step (element)** that has a recognizable beginning and end and requires time for its accomplishment.

   Activity definition involves **identifying and documenting** the specific activities that must be performed to produce the deliverables and sub-deliverables.

1b) Visualize and define the activities

2) ***The technique of decomposition*** (**Work Breakdown**) may be used in defining activities. Decomposition involves subdividing project work packages into smaller, more manageable components to provide better management control.

3) ***The output from activity*** definition is the **activity list**.

4) ***The Level of detail*** of the plan should be considered in this phase.

1c) Visualize and define the activities

Case Study: Install a new machine

Activity Code	Activity Description	Depends on	Level	Duration (day)
	Inspect the machine after installation			
	Hire the operator			
	Install the new machine			
	Inspect and store the machine after delivery			
	Hire labor to install the new machine			
	Train the operator			
	Order and deliver the new machine			

2a) Sequence the activities

1.Sequence the activities or job logic refers to

identifying and documenting interactivity logical relationships,

i.e. determined **order** in which the activities are to be accomplished in the project.

2b) Sequence the activities

2. ***Job plan*** must ***reflect the practical restraints*** or limitations that apply to most job activities. ***The types of restraints are***:
   - Mandatory dependencies or hard logic (natural dependency),
   - Preferred logic (Discretionary dependencies),
   - External dependencies,
   - Resource restraints and
   - Safety restraints.

3) **Predecessor activities** mean coming before, while **successor activities** mean coming after.

4) **Overlap** the activities to reduce the project time.

2c) Sequence the activities

Case Study: Install a new machine

Activity Code	Activity Description	Depends on	Level	Duration (day)
100	Inspect the machine after installation	300	4	
200	Hire the operator	None	1	
300	Install the new machine	500, 400	3	
400	Inspect and store the machine after delivery	700	2	
500	Hire labor to install the new machine	None	1	
600	Train the operator	200, 300	4	
700	Order and deliver the new machine	None	1	

3a) Estimate the activity duration

1. Select the ***time unit*** (week, day,..) to be used.
2. Use one of the following tools and techniques for estimating the activity duration:
   - **Expert judgment**
   - **Quantitatively** based durations
     - ***Duration of activity (D) = Quantity of work / [Production rate of a crew or equipment * No. of crews].***

       Where production rate = Quantity produced in unit of time
     - ***Duration of activity (D) = Quantity of work * Unit rate productivity of a crew or equipment***

       Where unit rate productivity = Time needs to produce one unit of output

3b) Estimate the activity duration

Case Study: Install a new machine

Activity Code	Activity Description	Depends on	Level	Duration (day)
100	Inspect the machine after installation	300	4	1
200	Hire the operator	None	1	25
300	Install the new machine	500, 400	3	2
400	Inspect and store the machine after delivery	700	2	1
500	Hire labor to install the new machine	None	1	20
600	Train the operator	200, 300	4	3
700	Order and deliver the new machine	None	1	30

4a) Schedule the Project or Phase

Scheduling Defined

- It is process showing relationship of activities and determining of the project time and the timing of the activities comprising the project.

- *In scheduling we consider the following questions:*
  - how long the project is expected to take?
  - when each activity may be scheduled (started and ended)?
  - How resources can be used more proper?
  - What are the critical bottlenecks in the project?

4b) Schedule the Project or Phase

- ***Project Scheduling principles***
  - *Project scheduling is carried out before a project begins*. It involves ***(1) identifying tasks, (2) estimating duration*** **and** ***(3) allocating resources.***
  - *Once the project is underway, the schedule may need to be revised based on initial progress.* This ensures ***(1) cost estimates*** and ***(2) time constraints are maintained*** at ***a specific level of quality and scope***.
  - *The revision is done by creating milestones*. Once the project is underway, the schedule may need to be revised based on initial progress. This ensures ***(1) cost estimates*** and ***(2) time constraints*** are ***maintained*** at ***a specific level of quality and scope***.

4c) Schedule the Project or Phase

- ***Remarks***
  - Practically every project is sufficiently complex that its ***breakdown and its inner relationships must be recorded on paper or other media***, and not only in the head of the planner.
  - Therefore as a plan is formulated some type of "**paper model**" of the project should be developed to communicate results of the plan to others and to serve as a basis for evaluating progress and controlling the work.

Time Planning Techniques

- To schedule the project, the planner needs a ***Time Planning Technique***.
  - **Bar Charts and Linked Bar Charts;**
  - **Network Model (Analysis), either**
    - **Activity on arrow (AOA),**
    - **Activity on node (AON),**
    - **Precedence Diagram**
  - **Line of Balance;**
  - **Time-location Diagram.**

BAR CHART

- During World War 1, Henry **Gantt** developed the Bar chart planning technique.
- ***A bar chart graphically*** describes a project consisting of well-defined activities, the completion of which marks its end.
- An activity is a task whose performance contributes to completion of the overall project.

BAR CHART

- All activities are listed in a column at the left side of the diagram.
- A horizontal time scale extends to the right of the list.
- A bar presenting each activity is drawn between its corresponding scheduled start and finish times.

Case study: Install a new machine

Activity Code	Activity Description	Depends on	Level	Duration (day)
100	Inspect the machine after installation	300	4	1
200	Hire the operator	None	1	25
300	Install the new machine	500, 400	3	2
400	Inspect and store the machine after delivery	700	2	1
500	Hire labor to install the new machine	None	1	20
600	Train the operator	200, 300	4	3
700	Order and deliver the new machine	None	1	30

Activity Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
200																																				
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700																																				
400																																				
300																																				
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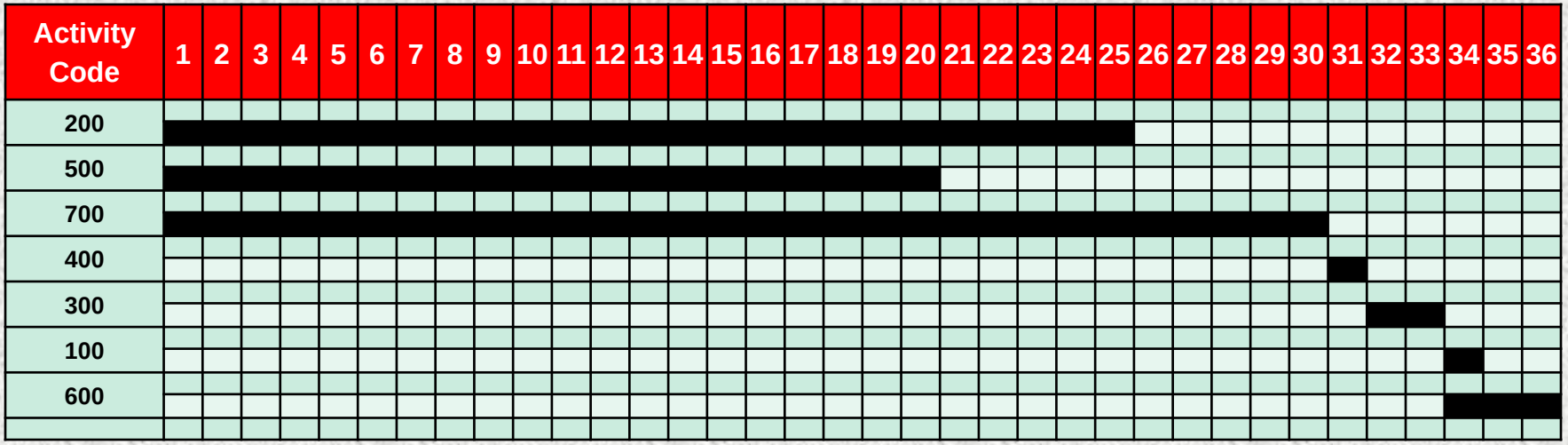
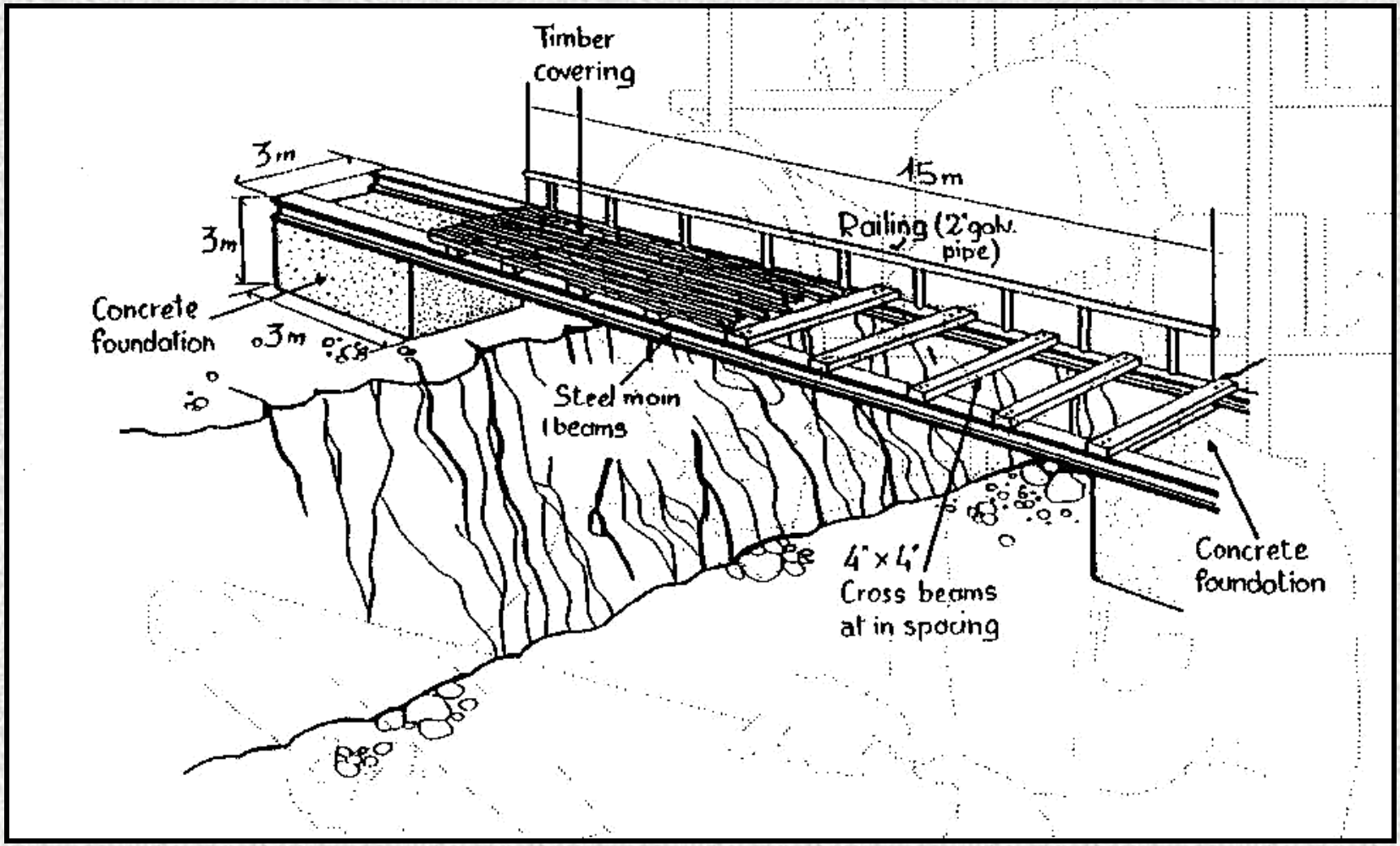
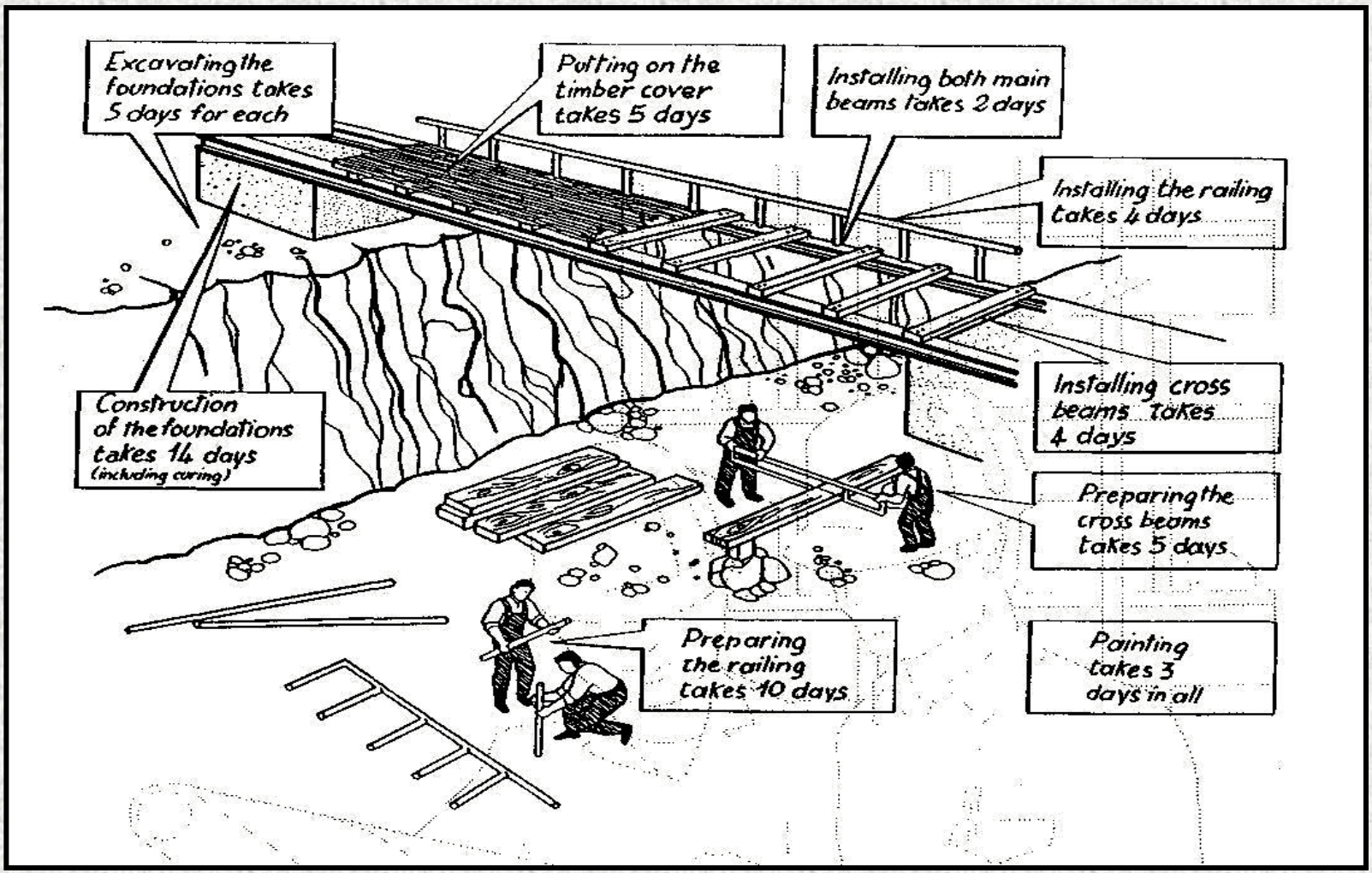


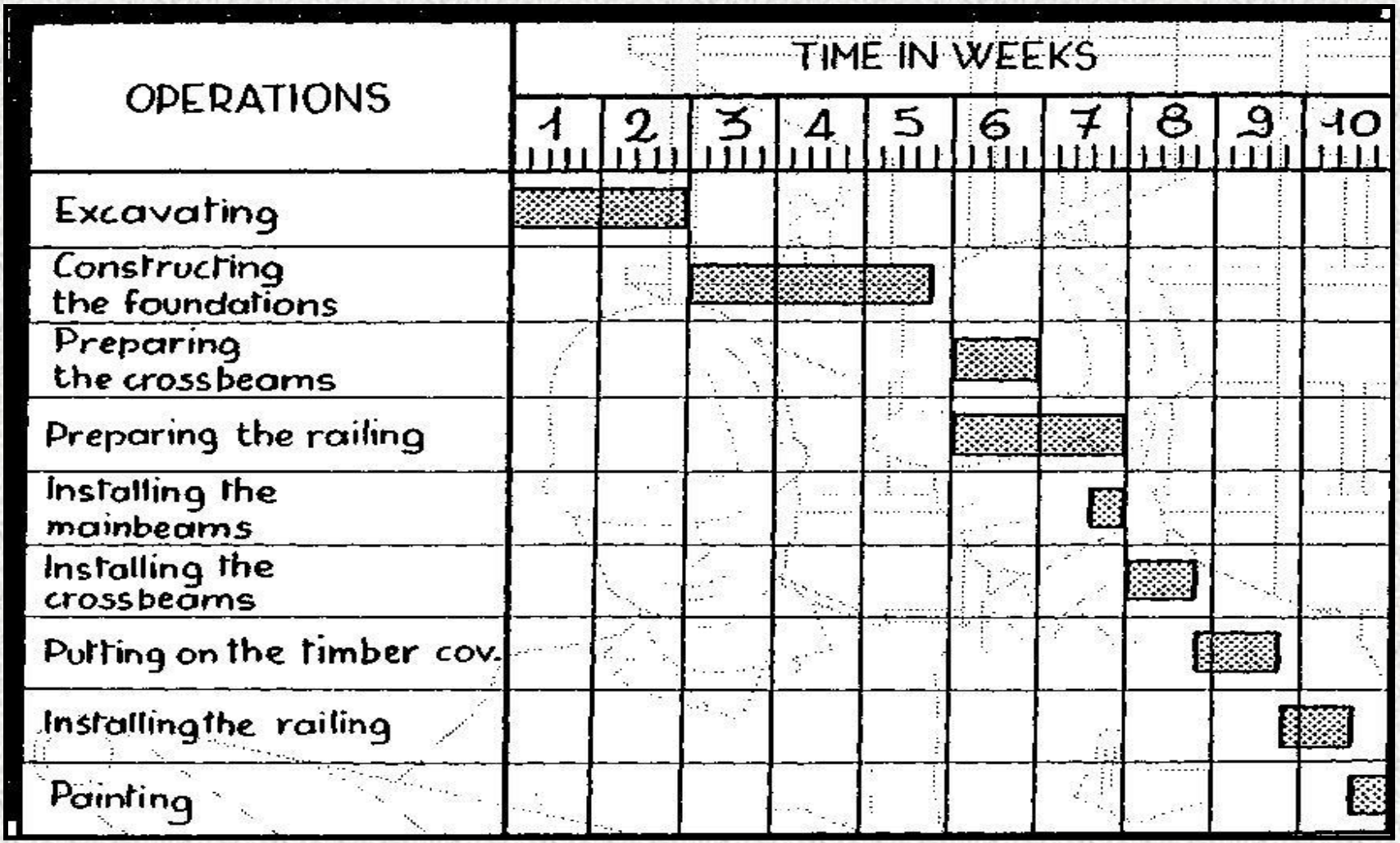
Case study: Building A bridge



Case study: Building a bridge



Preparing a Bar Chart



Gantt chart for Service For A Delta Jet

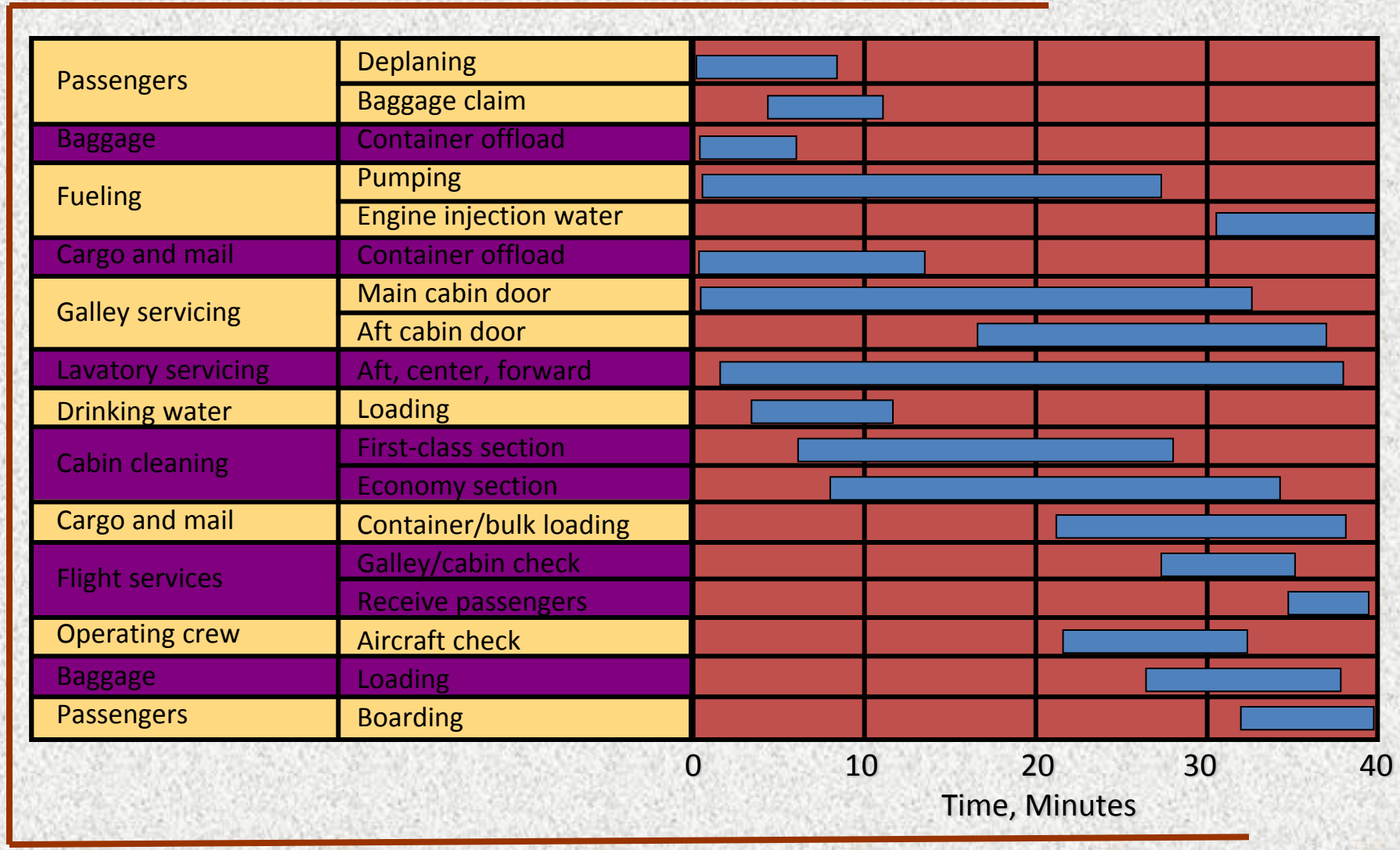


Figure 3.4 (From Heizer/Render; Operation Management

Planning a custom-written computer project

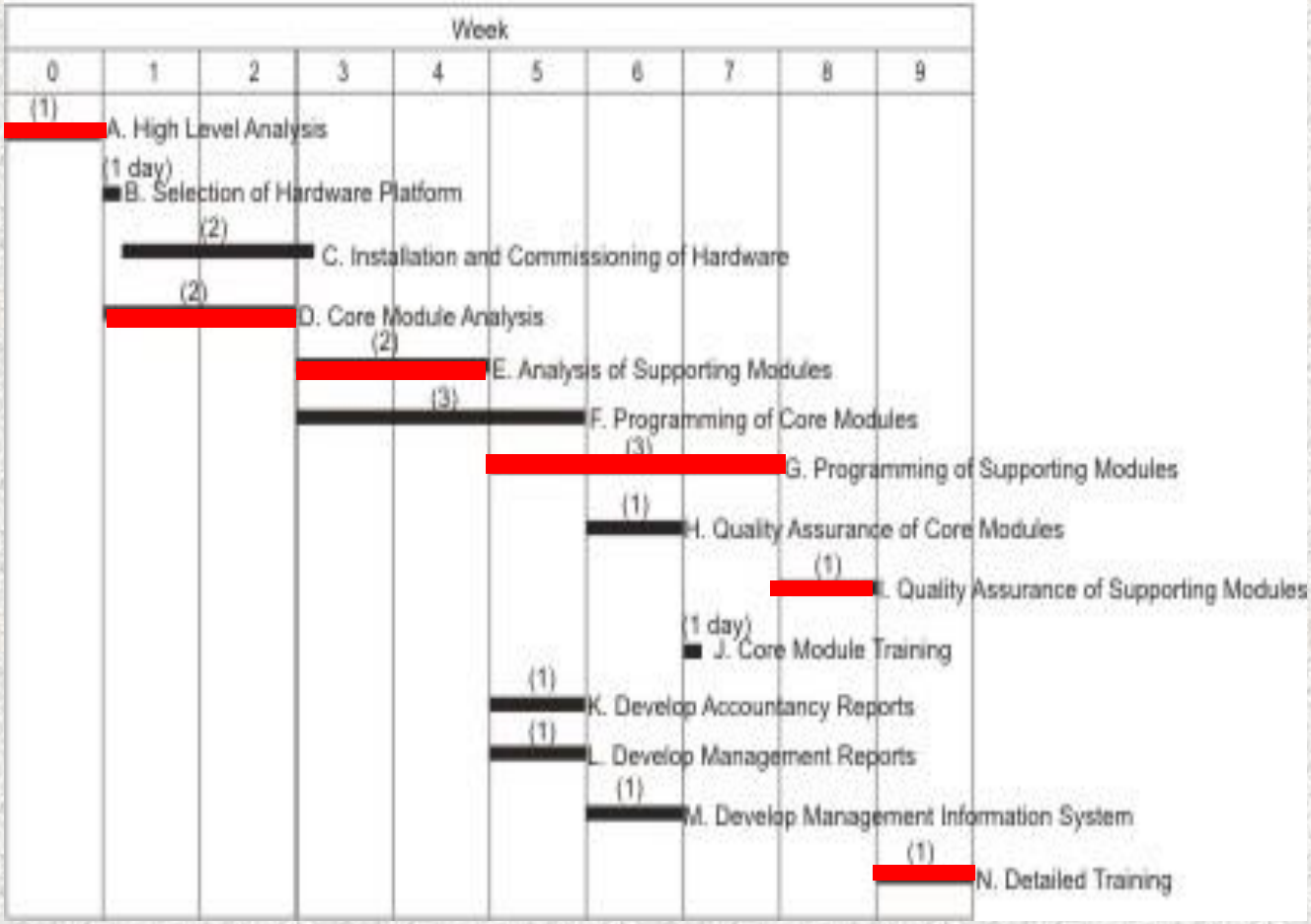
Step 1. List all activities in the plan

Task	Earliest start	Length	Type	Dependent on...
A. High level analysis	Week 0	1 week	Sequential	
B. Selection of hardware platform	Week 1	1 day	Sequential	A
C. Installation and commissioning of hardware	Week 1.2	2 weeks	Parallel	B
D. Detailed analysis of core modules	Week 1	2 weeks	Sequential	A
E. Detailed analysis of supporting modules	Week 3	2 weeks	Sequential	D
F. Programming of core modules	Week 3	2 weeks	Sequential	D
G. Programming of supporting modules	Week 5	3 weeks	Sequential	E
H. Quality assurance of core modules	Week 5	1 week	Sequential	F
I. Quality assurance of supporting modules	Week 8	1 week	Sequential	G
J. Core module training	Week 6	1 day	Parallel	C,H
K. Development and QA of accounting reporting	Week 5	1 week	Parallel	E
L. Development and QA of management reporting	Week 5	1 week	Parallel	E
M. Development of Management Information System	Week 6	1 week	Sequential	L
N. Detailed training	Week 9	1 week	Sequential	I, J, K, M

Planning a custom-written computer project

Step 2. Plot the tasks onto the graph paper

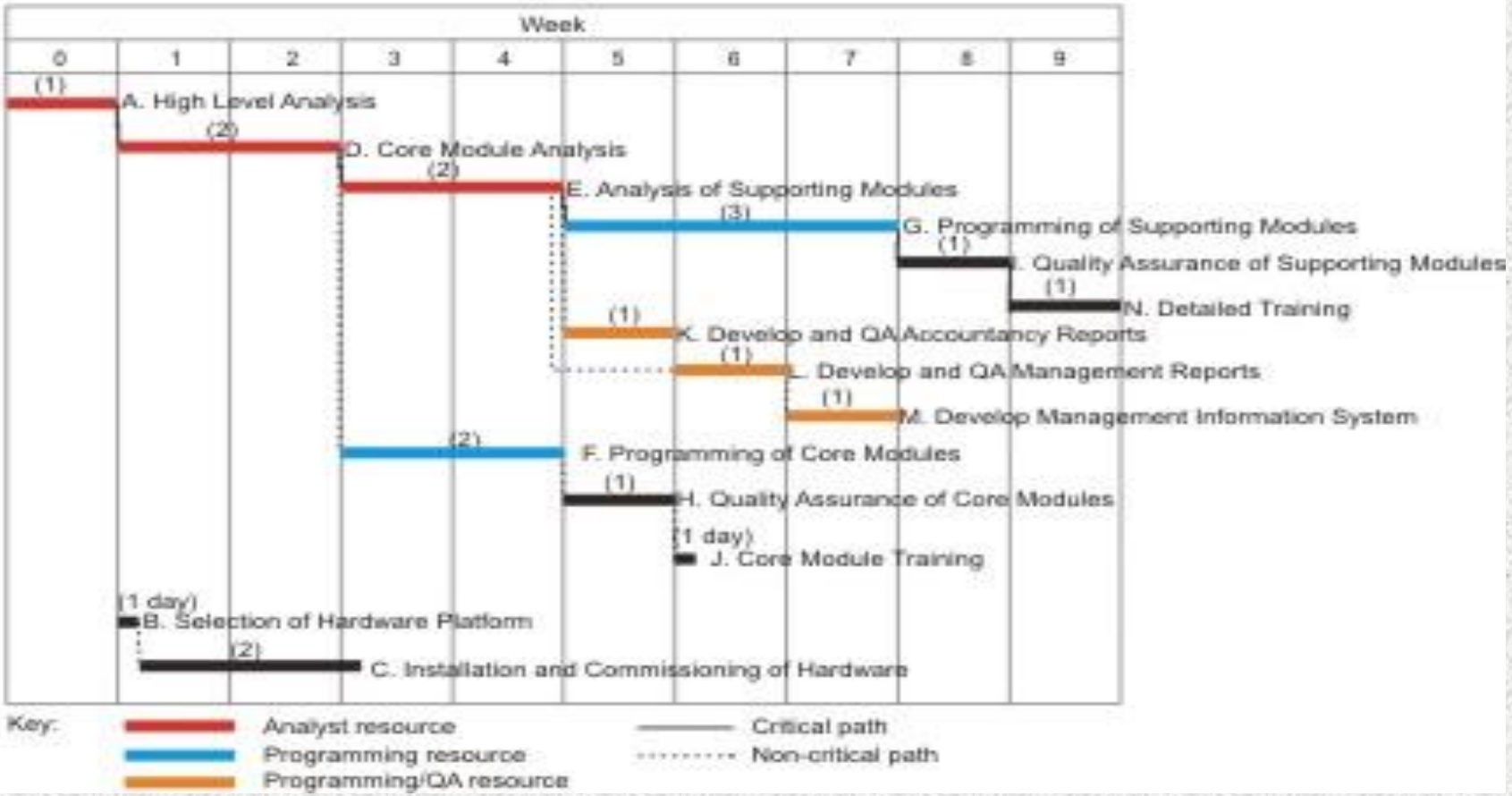
Figure 2: Draft Gantt Chart: Example Computer Project



Planning a custom-written computer project

Step 3. Presenting the analysis

Figure 3: Critical Path Analysis: Activities Scheduled on a Gantt Chart



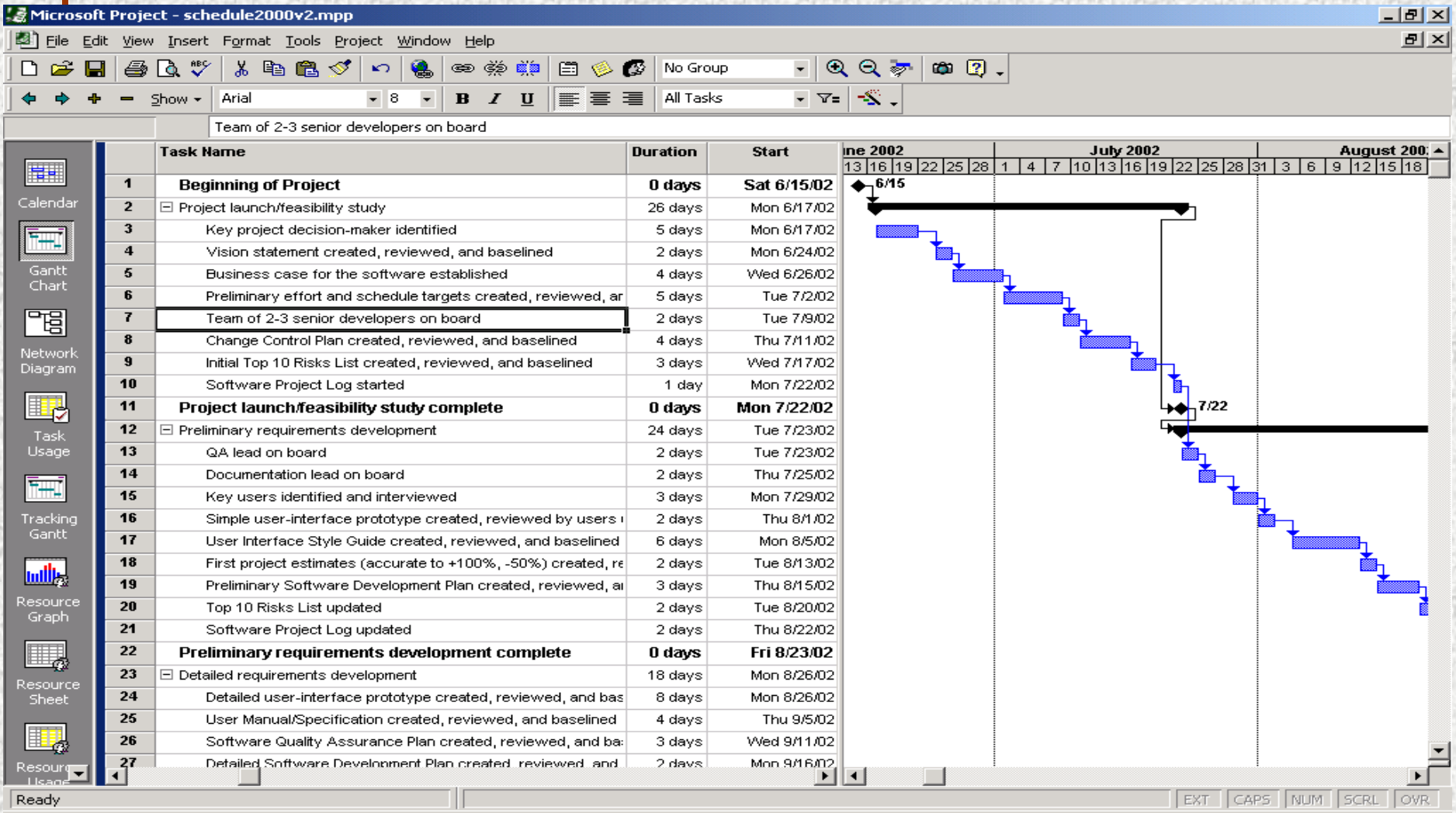
Planning a custom-written computer project

Step 4. Discuss the result

By drawing this example Gantt Chart, you can see that:

- If all goes well, the project can be completed in 10 weeks.
- If you want to complete the task as rapidly as possible, you need:
  - 1 analyst for the first 5 weeks.
  - 1 programmer for 5 weeks starting week 4.
  - 1 programmer/QA expert for 3 weeks starting week 6. Note: Activities L and M have been moved back a week. This does not affect the critical path, but it does mean that a single programming/QA resource can carry out all three of activities K, L and M.
- Analysis, development and testing of supporting modules are essential activities that must be completed on time.
- Hardware installation and commissioning is not time-critical as long as it is completed before the Core Module Training starts.

Example: output of a software program



Example: output of a software program

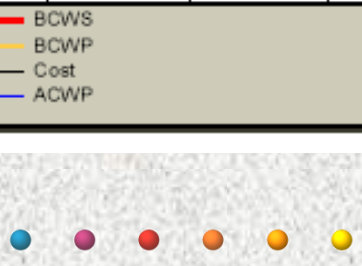
Project Plan
Total Performance Review

Created Using Milestones Software
www.kidasa.com

% CMPLT	SV BCWP-BCWS	CV BCWP-BCWS	Project/ Tasks	First		Second			Third	Project Cost	BCWS	ACWP	BCWP
				Feb'05	Mar'05	Apr'05	May'05	Jun'05	Jul'05				
47%	($56,664)	($33,446)	Develop Management System							$324,229	$169,838	$146,608	$113,174
99%	$0	($10,465)	Phase 1							$95,805	$85,340	$95,805	$85,340
100%	$0	$0	Perform Project Planning,Scheduling, &							$50,558	$50,558	$50,558	$50,558
100%	$0	$0	Coordinate & Develop System Requirements							$15,883	$15,883	$15,883	$15,883
99%	$0	($10,465)	Evaluate Systems for Use and Perform Cost Benefit Analysis							$29,363	$18,898	$29,363	$18,898
15%	($48,132)	($22,969)	Phase 2							$182,156	$61,026	$35,863	$12,894
15%	($48,132)	($22,969)	Design, Develop, Test & Deliver ADMS							$182,156	$61,026	$35,863	$12,894
32%	($8,532)	($12)	Project Reporting							$46,268	$23,473	$14,941	$14,941
36%	($6,035)	($8)	Recurring Weekly Status Report							$21,418	$15,960	$9,925	$9,925
30%	($1,855)	($4)	Recurring Monthly Status Report							$8,862	$5,674	$3,819	$3,819
30%	($320)	$0	Recurring Monthly EVMS Report							$1,994	$918	$598	$598
30%	($322)	$0	Recurring Monthly Financial Report							$1,994	$920	$598	$598
0%	$0	$0	Equipment Purchase							$12,000	$0	$0	$0

BCWS
BCWP
Cost
ACWP

$300,000.00
$200,000.00
$100,000.00
$0.00



Uses of Bar Chart Planning Technique

- Showing the order of the different activities
- Showing when operations should start and finish
- Checking what labor or equipment are needed and when
- Checking out delivery dates for materials
- Explaining to everyone concerned what and when is due to happen
- Forecasting cash flow
- During execution, the chart used to control the work

Advantages of Bar Chart

- Simple graphical form
- Easy understood for all levels of management
- Good form of communication.

Limitations of Bar Chart

- Very cumbersome as the number of activities, increases
- Logic is not expressed in the diagram
- Difficult to use it for forecasting the effects of changes, It is therefore limited as control tool
- No indication where management attention should be focused
- Ineffective for project shortening

Logic is not represented in the Bar Chart