

Managing and Tracking the Software Project

- Not every group is a team, and not every team is effective.
Glenn Parker
- If you want to be incrementally better: Be competitive. If you want to be exponentially better: Be cooperative

Questions from a Customer

- Do you understand my problem and needs?
- Can you design a system to solve my problems or satisfy my needs?
- How long will it take to develop the system?
- How much will it cost to develop the system?

Project Planning

- Before starting
 - Establish system's scope and objectives
 - Consider alternative solutions
 - Identify technical and management constraints
- As a Project Manager
 - Decompose the product function (FD)
 - Select an appropriate process model
 - Select the task set for the project
 - Decompose the tasks into smaller work items (WBS)
 - Estimate effort for each task/work item
 - Estimate completion time of the project (Task/Activity Network)

Project Schedule (Contd.)

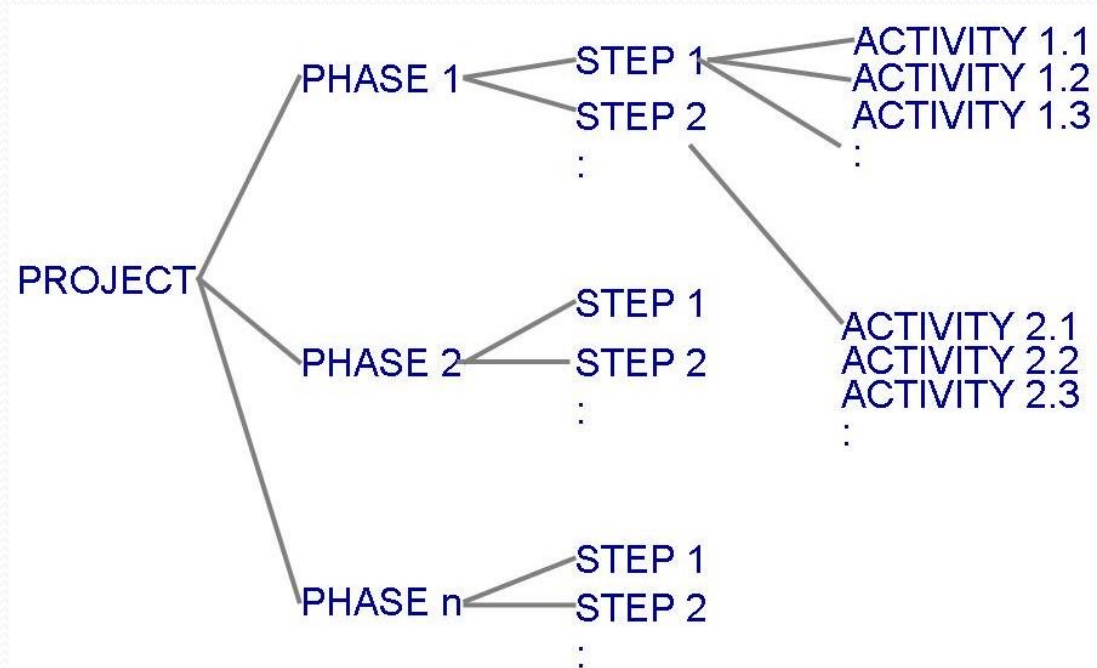
- Understanding customer's needs by listing all project deliverables
 - Documents
 - Demonstrations of function
 - Demonstrations of subsystems
 - Demonstrations of accuracy
 - Demonstrations of reliability, performance or security
- Determining milestones and activities to produce the deliverables

Project Schedule (Contd.)

- **Activity:** takes place over a period of time
- **Milestone:** completion of an activity -- a particular point in time
- **Precursor:** event or set of events that must occur in order for an activity to start
- **Duration:** length of time needed to complete an activity
- **Due date:** date by which an activity must be completed

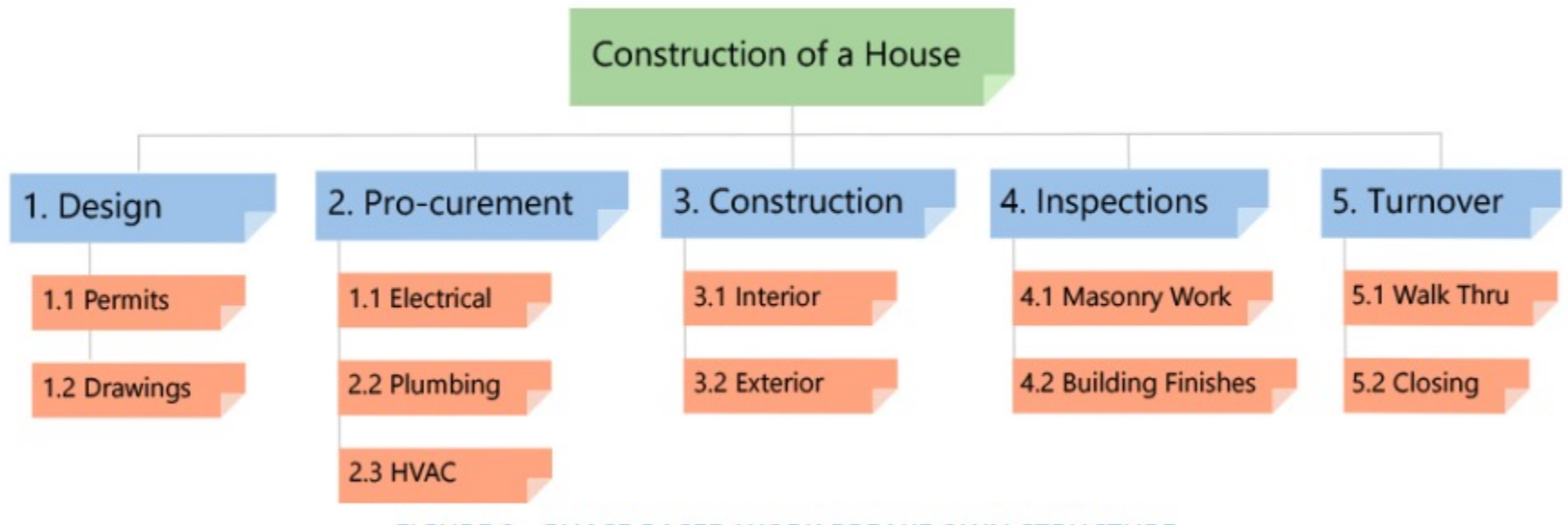
Project Schedule (Contd.)

- Project development can be separated into a succession of phases which are composed of steps, which are composed of activities (Work Breakdown Structure)



Work Break Down Structure(Contd.)

- Work breakdown structure depicts the project as a set of discrete pieces of work



Activity Networks

- Activity networks depict the dependencies among activities
- Activity networks can be of two types
 - AoA: Activity on Arc
 - AoN: Activity on Node

Project Types

- Concept Development
 - To explore new business concept
- New Application Development
 - As a consequence of specific customer request
- Application Enhancement
 - Modifications to existing functions, performance, interfaces of software; observable by the end user
- Application Maintenance
 - Correct, adapt, extend existing software; not immediately obvious to end user
- Reengineering Projects
 - Redevelop an existing system

Concept Development Projects

- Usually initiated to explore some new business concept or application of some new technology
- Task set might be like:
 - Scope the concept
 - Develop preliminary plan of the concept: develop the ability to undertake the work
 - Assess the technology risk
 - Develop proof of concept
 - Implement the concept
 - Get customer feedback

WBS for CDP

Task definition: Task 1.1 Concept Scoping

1.1.1 Identify need, benefits and potential customers;

1.1.2 Define desired output/control and input events that drive the application;

Begin Task 1.1.2

1.1.2.1 FTR: Review written description of need⁹

1.1.2.2 Derive a list of customer visible outputs/inputs

case of: mechanics

mechanics = quality function deployment

meet with customer to isolate major concept requirements;

interview end-users;

observe current approach to problem, current process;

review past requests and complaints;

mechanics = structured analysis

make list of major data objects;

define relationships between objects;

define object attributes;

mechanics = object view

make list of problem classes;

develop class hierarchy and class connections;

define attributes for classes;

endcase

1.1.2.3 FTR: Review outputs/inputs with customer and revise as required;

endtask Task 1.1.2

1.1.3 Define the functionality/behavior for each major function;

Begin Task 1.1.3

WBS for CDP (Contd.)

I.1.3.1 FTR: Review output and input data objects derived in task I.1.2;

I.1.3.2 Derive a model of functions/behaviors;

case of: mechanics

mechanics = quality function deployment

meet with customer to review major concept requirements;

interview end-users;

observe current approach to problem, current process;

develop a hierarchical outline of functions/behaviors;

mechanics = structured analysis

derive a context level data flow diagram;

refine the data flow diagram to provide more detail;

write processing narratives for functions at lowest level of refinement;

mechanics = object view

define operations/methods that are relevant for each class;

endcase

I.1.3.3 FTR: Review functions/behaviors with customer and revise as required;

endtask Task I.1.3

I.1.4 Isolate those elements of the technology to be implemented in software;

I.1.5 Research availability of existing software;

I.1.6 Define technical feasibility;

I.1.7 Make quick estimate of size;

I.1.8 Create a Scope Definition;

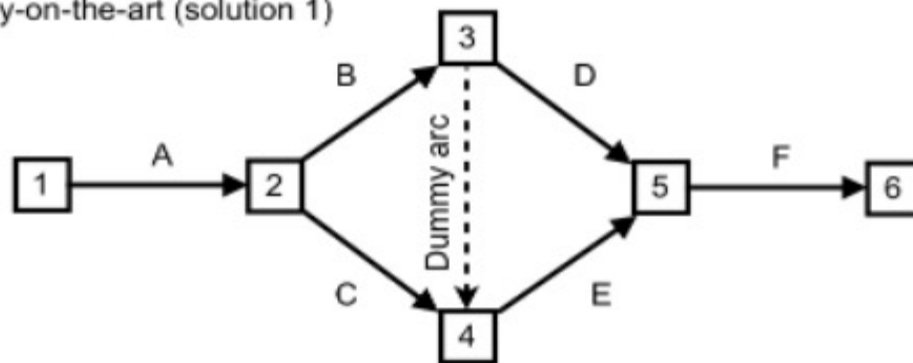
endTask definition: Task I.1

Activity on Arrow(AOA)

Activity	Predecessors
A	none
B	A
C	A
D	B
E	B and C
F	D and E

Figure 3: An AoA (not unique) and AoN (unique) network for the project data of table 2.

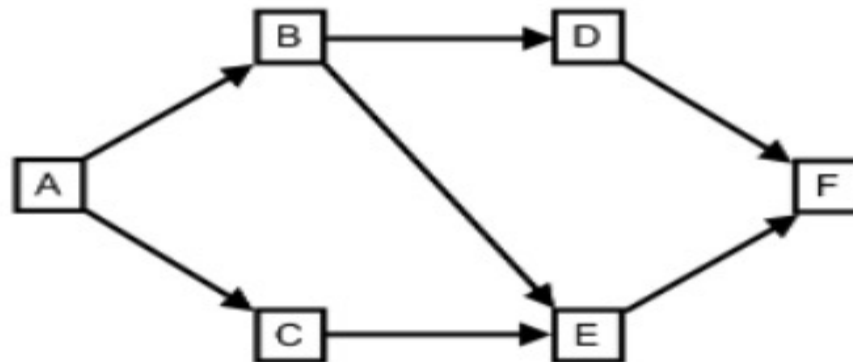
Activity-on-the-art (solution 1)



Activity on Node(AON)

Activity	Predecessors
A	none
B	A
C	A
D	B
E	B and C
F	D and E

Activity-on-the-node (unique)



Estimating Completion

Critical Path Method

- Minimum amount of time required to complete a project
 - Reveals those activities that are most critical to completing the project on time
- **Real time (actual time):** estimated amount of time required for the activity to be completed

Estimating Completion

Critical Path Method

- **Earliest Finish = Earliest Start + duration**
- **Latest Start = Latest Finish - Duration**
- **Slack time = Delayed time**
 - **Formulae = Latest Finish - Earliest Finish**
- **Critical path:** the slack at every activity is zero
 - can be more than one in a project schedule

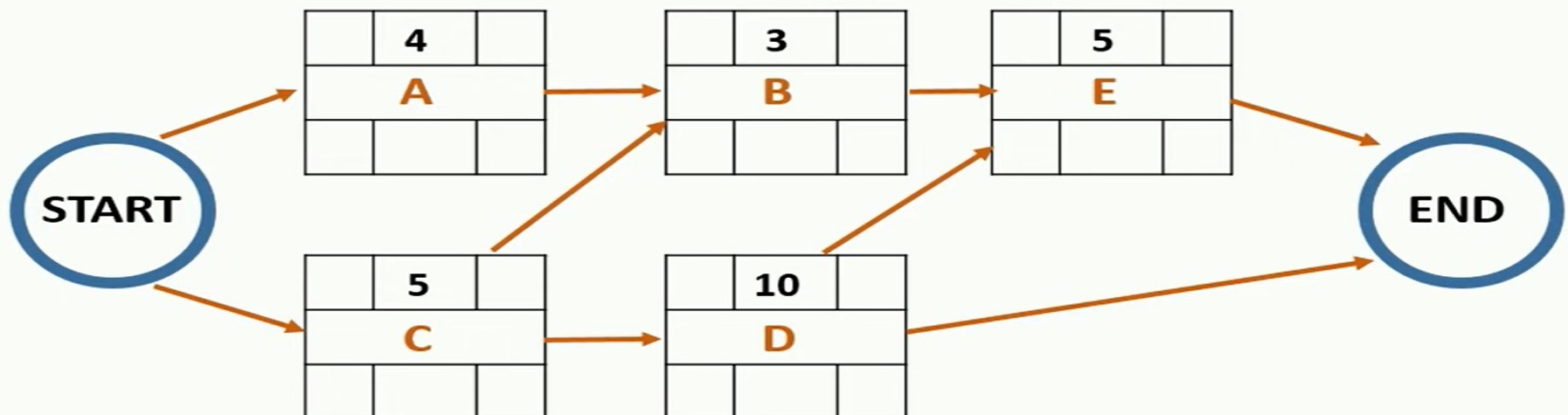
Program Evaluation Review Technique (PERT) Chart/ Critical Path Method

Activity	Duration	Predecessor
A	4	Start
C	5	Start
B	3	A & C
D	10	C
E	5	B & D
Finish	0	E & D



	D	
Activity Name		

D = Duration



Critical Path Method

Activity	Duration	Predecessor
A	4	Start
C	5	Start
B	3	A & C
D	10	C
E	5	B & D
Finish	0	E & D



ES	D	EF
Activity Name		
LS		LF

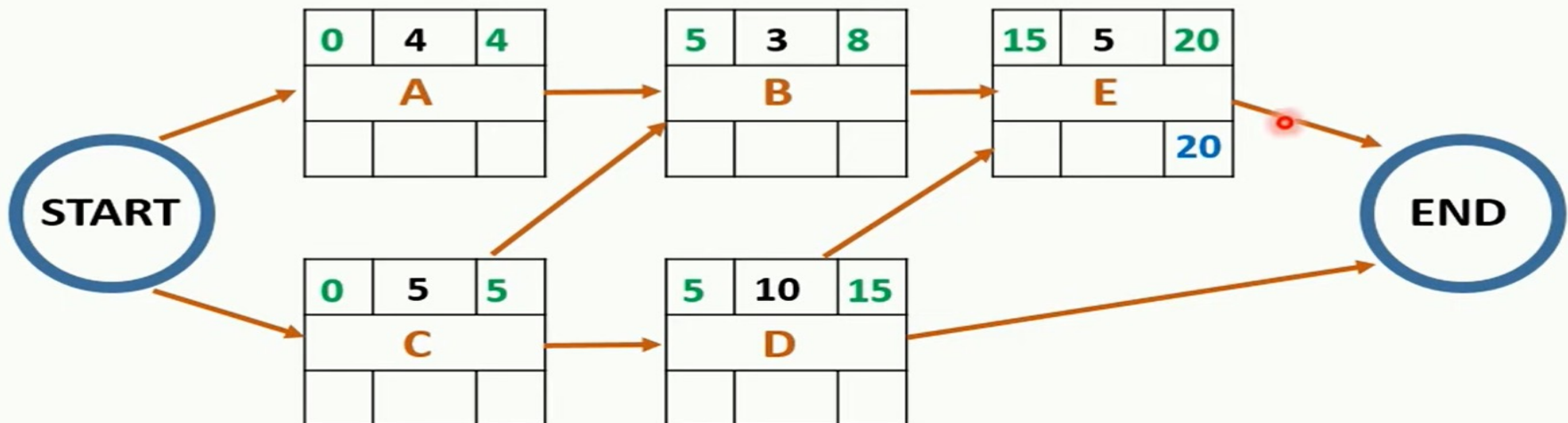
D = Duration

ES = Early Start

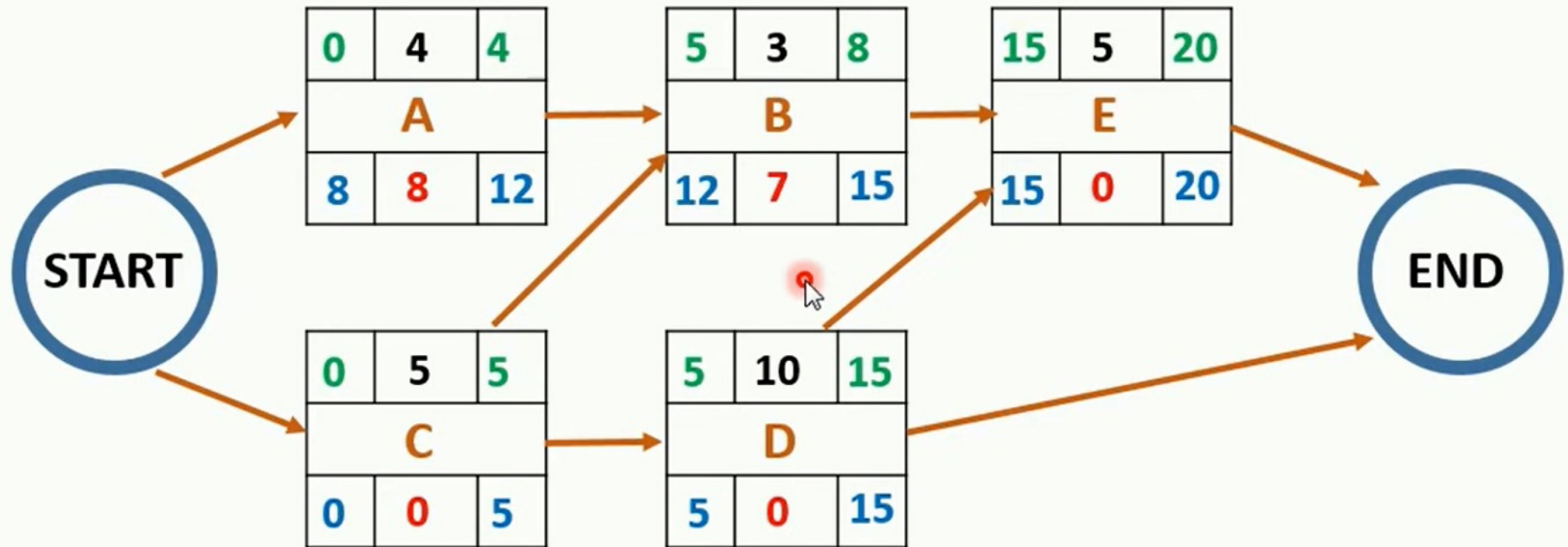
EF = Early Finish

LS = Late Start

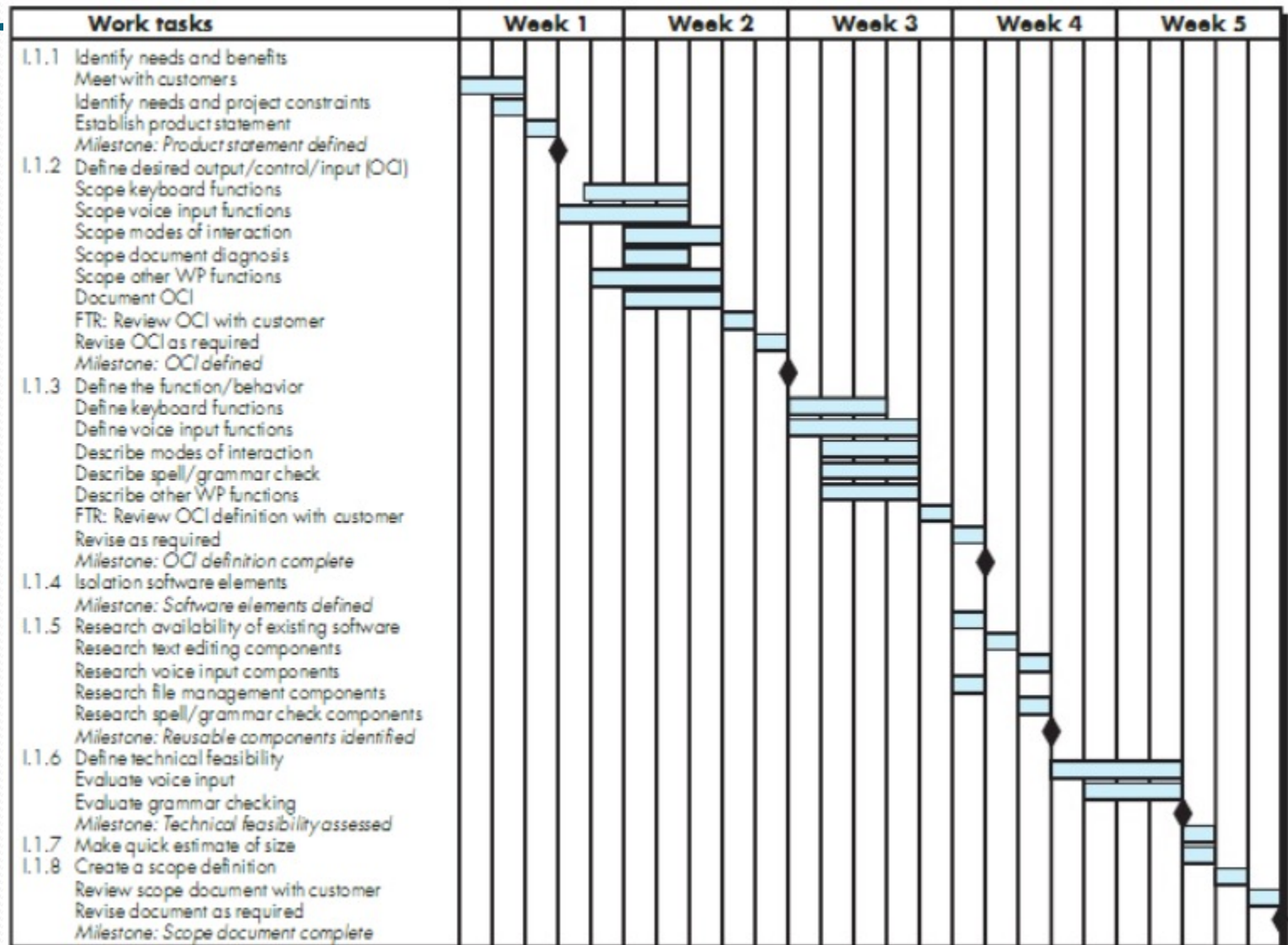
LF = Late Finish



Critical Path Method



Gantt



Gantt Chart

Work tasks	Planned start	Actual start	Planned complete	Actual complete	Assigned person	Effort allocated	Notes
1.1.1 Identify needs and benefits							Scoping will require more effort/time
Meet with customers	wk1, d1	wk1, d1	wk1, d2	wk1, d2	BLS	2 p-d	
Identify needs and project constraints	wk1, d2	wk1, d2	wk1, d2	wk1, d2	JPP	1 p-d	
Establish product statement	wk1, d3	wk1, d3	wk1, d3	wk1, d3	BLS/JPP	1 p-d	
Milestone: Product statement defined	wk1, d3	wk1, d3	wk1, d3	wk1, d3			
1.1.2 Define desired output/control/input (OCI)							
Scope keyboard functions	wk1, d4	wk1, d4	wk2, d2		BLS	1.5 p-d	
Scope voice input functions	wk1, d3	wk1, d3	wk2, d2		JPP	2 p-d	
Scope modes of interaction	wk2, d1		wk2, d3		MLL	1 p-d	
Scope document diagnostics	wk2, d1		wk2, d2		BLS	1.5 p-d	
Scope other WP functions	wk1, d4	wk1, d4	wk2, d3		JPP	2 p-d	
Document OCI	wk2, d1		wk2, d3		MLL	3 p-d	
FTR: Review OCI with customer	wk2, d3		wk2, d3		all	3 p-d	
Revise OCI as required	wk2, d4		wk2, d4		all	3 p-d	
Milestone: OCI defined	wk2, d5		wk2, d5				
1.1.3 Define the function/behavior							

References

- Pfleeger SE Book
- Pressman SE Book

Acknowledgement

- A few slides have been reused from UCF slides for the SE course