إستخدام الحاسب الآلي في إدارة مشروعات التشييد

Project Management Using Computer

م/ أنس الوهدان

Fundamentals of Project Management

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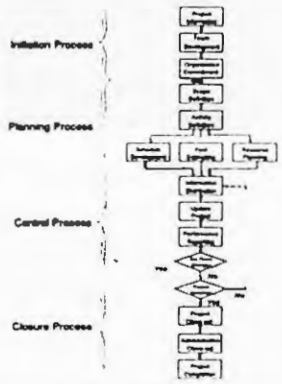
Lesson 1

Purpose and Objectives

This lesson introduces you to the basic concepts of project management Using Computer Software by Primavera Project Planer (P3) windows.

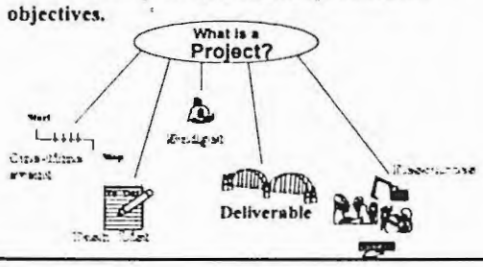
The Project Management Cycle

The Project Management Process Flow Diagram



What is a Project?

A project is a group of tasks performed in a definable timeperiod, to meet a specific set of objectives.



- **Unique, one-time event**
- **Specific start and end date**
- **Workscope with definable tasks**
- **Allocated resources**
- **Projected budget or cost**
- **Tangible set of deliverables**

Primary Elements of a Project

- Schedule, resource, and cost data are the primary elements of project management
- Elements are interrelated—a change in one affects the others

Project Management Phases: Planning and Control

Planning

- Establish project objectives and scope of work
- Delineate project organization/team
- Define the work
- Determine the timing
- Establish resource requirements/availability
- Establish a cost budget
- Evaluate, optimize and freeze baseline plan
- Distribute information

Control

- Track work in progress and actual costs
  - Update and modify the current project with realistic data
- Compare schedule and cost data to baseline
  - use the baseline to guide your decisions
- Analyze and evaluate performance
- Recommend action and re-forecast
- Communicate project goals

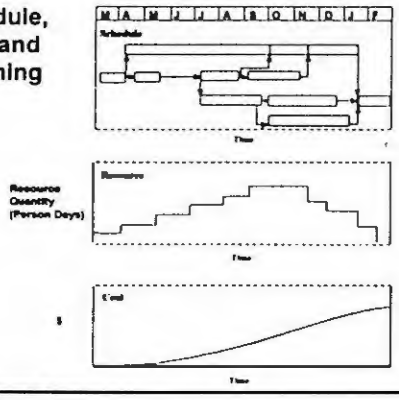
Planning Phase

- In the planning phase, you forecast a schedule, resources and costs over time

Critical path

- The critical path is the longest continuous path of activities through a project that determines the project end date
- A delay in one activity delays other activities and the project as a whole

Schedule, Resource and Cost Planning



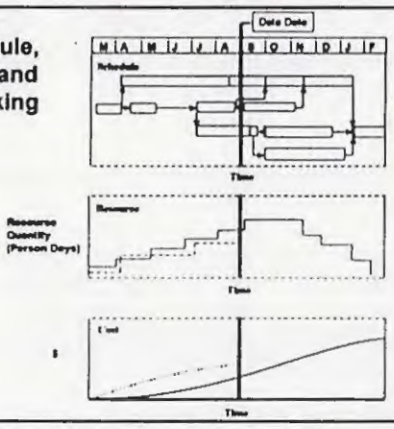
Control Phase

- During the control phase, you record progress on activities, resource use, and costs incurred relative to the data date

Data Date

- The data date is thee "time now" or the date up to which progress is reported and from which remaining work will be scheduled

Schedule, Resource and Cost Tracking



Establishing the Project and Coding Structures

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Lesson 2

Project Group/Project

Project Group

- Consists of the detailed activities from defined member projects, as well as its own activities
- Simplifies the management of multiple projects
- Summarizes and organizes information at different project levels

- Ensure consistency among project structures
  - Project Codes
  - Activity codes
  - Calendars
  - Resources
  - Cost accounts
  - Custom data items
  - Work breakdown structure (WBS)

Project Group/Project

Project Group

- Consists of the detailed activities from defined member projects, as well as its own activities
- Simplifies the management of multiple projects
- Summarizes and organizes information at different project levels

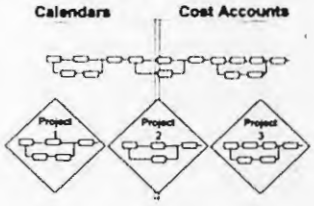
Member Project

- Portion of a project group
- Managed and controlled independently
- Reflects changes made to its member projects

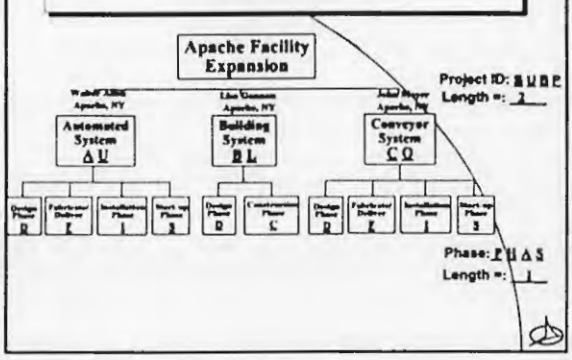
Managing the Project Group

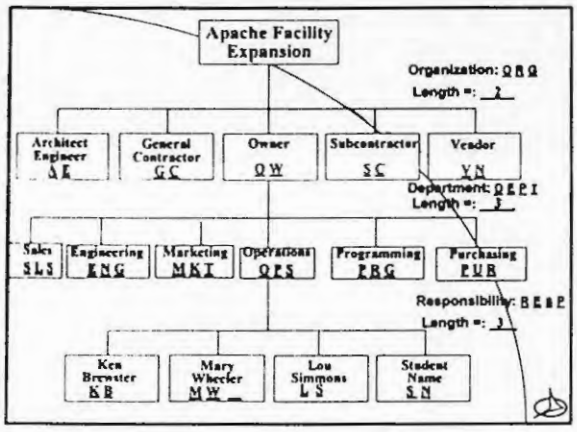
Project Group

Custom Data Items
Project Codes
Activity Codes
Resources
Calendars
Cost Accounts



Project Definition





Adding and Organizing Activities

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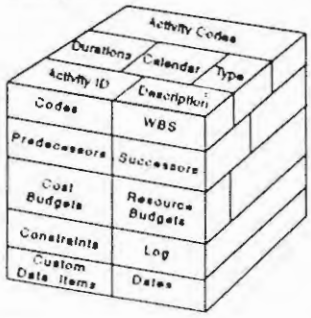
Lesson 4

What is an Activity?

- Most detailed work unit that is tracked in a project schedule
- Contains all detailed information about the work to be performed
- Also known as a task or item

Activity Components



Defining Activity Relationships

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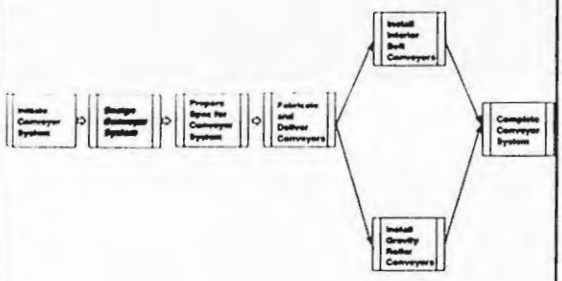
Lesson 5

Network Diagram

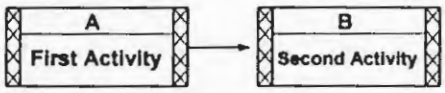
- Graphically displays the project's activities
- Presents activities as they relate to each other
  - Logic ties
  - Relationships
  - Predecessors/successors
- Displays the sequence in which the activities will be scheduled



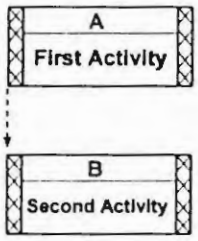
Activity Relationships

P3 supports four types of activity relationships:

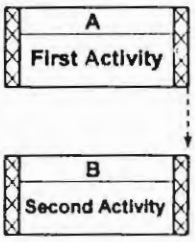
Finish-to-Start



Start-to-Start



Finish-to-Finish



Calculating the Scheduling

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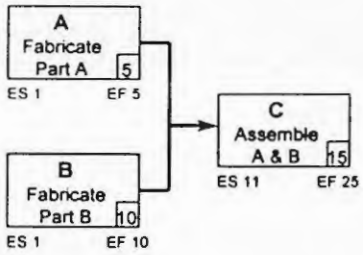
Lesson 6

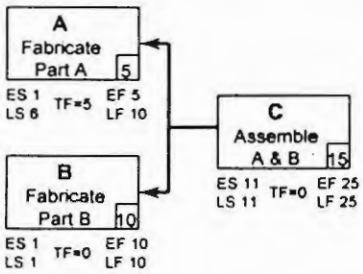
Forward Pass

- The forward pass calculates an activity's early dates
- Early dates are the earliest times an activity can start and finish once its predecessors have been completed
- The calculation begins with the activities without predecessors
- Early Start + Duration - 1 = Early Finish



Backward Pass

- The backward pass calculates an activity's late dates
- Late dates are the latest times an activity can start and finish without delaying the end date of the project
- The calculation begins with the activities without successors
- Late Finish - Duration + 1 = Late Start

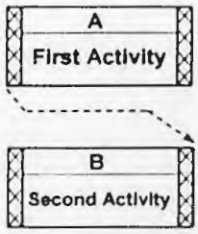


Float

Total Float

- Float is the amount of time an activity can slip from its early start without delaying the project
- Float is the difference between the late finish and early finish dates of an activity
- Activities with zero total float are critical

Start-to-Finish

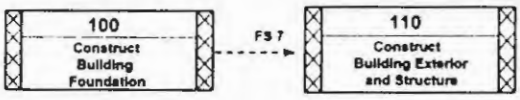


Relationships with Lag

Lag

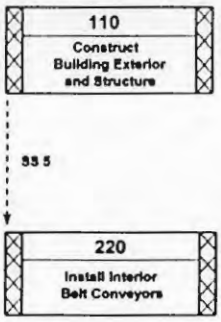
- An offset or delay between an activity and its successor
  - Calculated in the planning unit of the project
  - Based on the calendar of the predecessor activity

Finish-to-Start with Lag



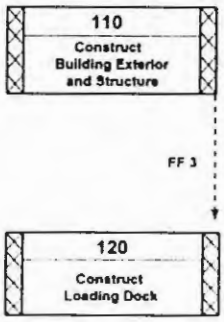
Construct Building Foundation must be finished for seven days before Construct Building Exterior and Structure can start.

Start-to-Start with Lag



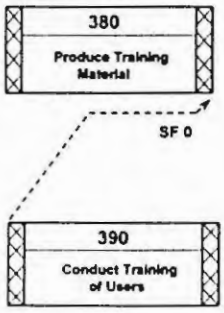
Install Interior Belt Conveyors can start five days or more after Construct Building Exterior and Structure starts.

Finish-to-Finish with Lag

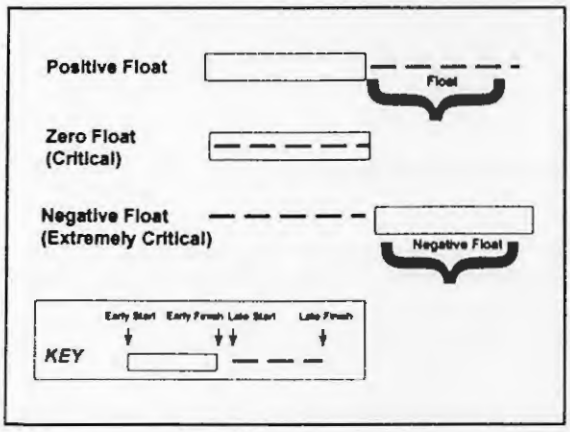


Construct Loading Dock can finish three days or more after Construct Building Exterior and Structure finishes.

Start-to-Finish



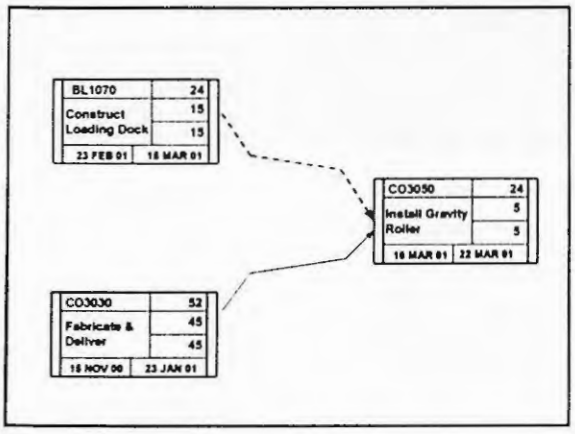
The start of Conduct Training of Users drives the finish of Produce Training Material.



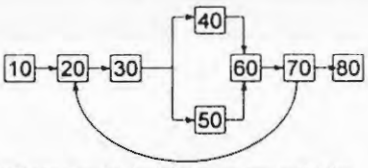
Driving Relationships

An activity may have a relationship that determines its early start. This logical tie is called a driving relationship.

- By default, a solid relationship line indicates a driving relationship
- By default, a dashed relationship line indicates a non-driving relationship



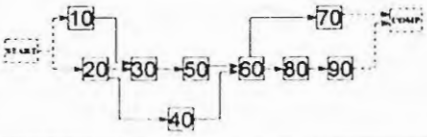
Loops



- Loops indicate circular logic between two activities
- P3 will not calculate until the loop is eliminated
  - Determine proper logic
  - Rerun schedule

Open Ends

- Open ends are activities without a predecessor or successor
  - No predecessor: activity uses data date as early start
  - No successor: activity uses project finish as late finish
- Try to limit a network to two open ends



Applying Constraints to a Schedule

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Lesson 7

Constraints

Constraints are user-imposed restrictions (such as dates) that may be used to reflect project requirements that cannot be built into the logic

Aid in building a schedule that more accurately reflects the real world aspects of your project

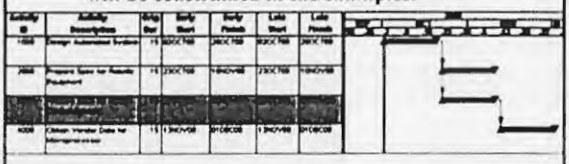
Provide added control in the schedule

Types:

- Date
- Duration
- Float

Example of Constraints

- The following sample network will be used to illustrate various constraints. Activity 3000 will be constrained in the examples.

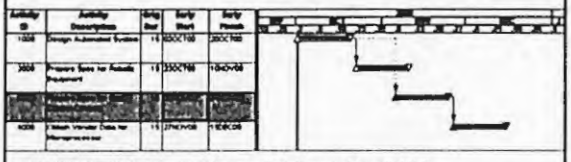


Early Start Constraint

- Start no earlier than constraint
  - Determines the earliest start date that an activity can begin
  - Shifts the early start date out to the constraint date
  - Affects only early dates
    - Used during a forward pass
  - Affects the constrained activity and the early dates of its successors

Applications

- Create different starting points within a project.
- Offset delivery dates.
- Prevent too many activities from starting at once.
- Delay activities until resources become available.



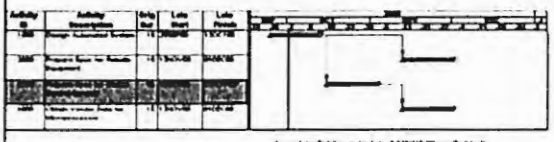
Activity 3000 is pushed out because it has an early start constraint applied to it.
It will begin on 06NOV00 instead of 23OCT00. This pushes the end date of the activity from 10NOV00
It also delays the successors of 3000.

Late Finish Constraint

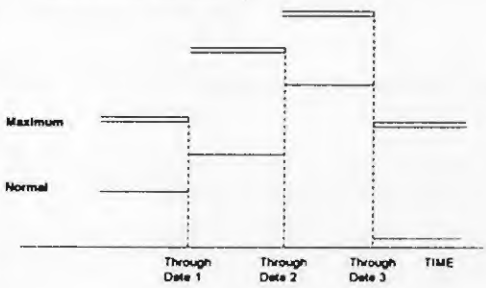
- Finish no later than constraint
  - Indicates the date by which an activity must finish
  - Applies if the calculated late finish is later than the constraint
    - Pulls late finish date back to the constrained date
  - Affects late dates
    - Used during backward pass
  - Affects the constrained activity and the late dates of its predecessors

Applications

- Set intermediate completion points
- Emphasize urgency of finishing designated work early
- Use for contract deliverables
- Remove excessive float
- Impose target completion dates on activities
- Remove excessive float

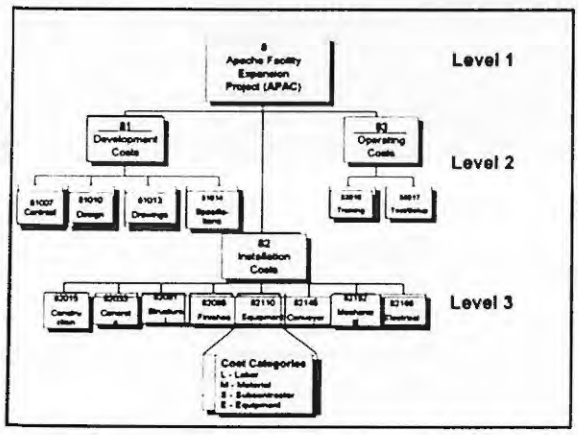


Resource Limits



Cost Accounts

- Used to track resource and activity costs
- Basis for cost reporting
- May be based on internal accounting system
- Allows for roll-up or summary reporting
- Provides a breakdown for costs within a project



Creating the Target Plan

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Lesson 10

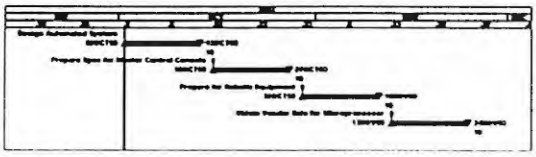
Shortening the Schedule

- Copy the project for what-if analysis
- Focus on critical activities
- Add resources to reduce durations
- Use relationships to overlap activities
- Break down long activities
- Change calendar assignments
  - Put critical activities on a longer workweek
  - Add exceptions to nonworktime

Situation

The critical path needs to be shortened by at least five days.

Initial Schedule



Additional Constraints

Late Start

- Start no later than constraint
  - Pulls a late start to the constraint date
  - Use to place a deadline on the start of an activity

Early Finish

- Finish no earlier than constraint
  - Pushes an early finish to the constraint date
  - Use to prevent an activity from finishing too early

Start-On

- Imposed start no earlier than and start no later than constraint on same activity
- Use to specify dates submitted by contractor

Mandatory Start and Finish

- Forces early or late dates to be equal to constraint
- Violates network logic

Zero Total Float

- If float is positive, the late dates are set to early dates

Zero Free Float

- Delays an activity as late as possible without delaying successors
- Use to schedule a delivery as late as possible

Leveling

- Use to dictate how to constrain an activity during resource leveling

Managing Resources and Costs

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Lesson 9

Definition of a Resource

- Anything used to get the job done: equipment, labor, or material
- Necessary for completion of the project
- Critical to meeting the schedule
- Assigned at the activity level

Project Management Elements

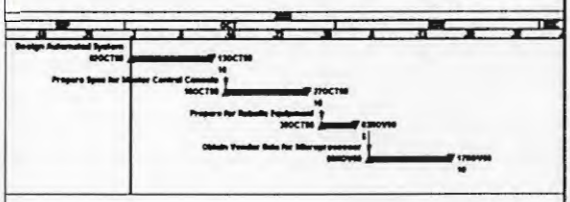
- Schedule, resource and cost data are the primary elements of project management
- Elements are interrelated; a change in one affects the others.

Schedule

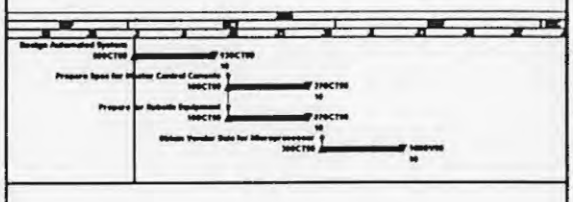
Project Management

Resources Costs

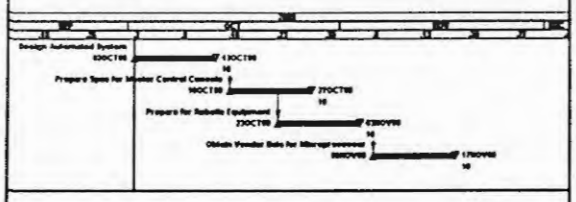
Refine Duration Estimates



Parallel Activities



Overlapping Activities



Targets

- Freeze original optimized plan
  - Also known as a baseline plan
- Reflect original goals of project
- Unlimited number can be created
  - Tie two targets to current schedule for comparison
  - Targets may be reassigned
- Necessary for target analysis

Target Analysis

- Compares current schedule to target plan
- Provides baseline for schedule, resource and cost comparison
- Necessary for measuring performance
- Shows target comparison data in columns or bars

Updating the Current Schedule

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Lesson 11

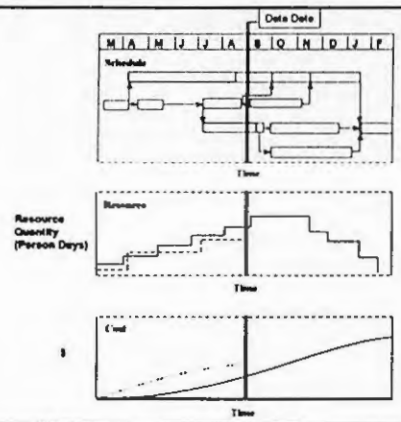
Tracking Progress

Control Phase

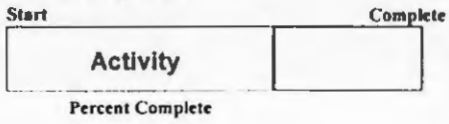
- During the tracking phase you will record actuals for each activity relative to the data date.

Data Date

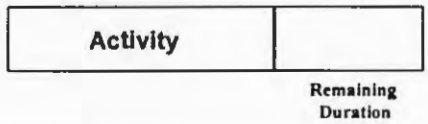
- "Time now"--the date up to which you are reporting progress and on which date you will start to schedule future work



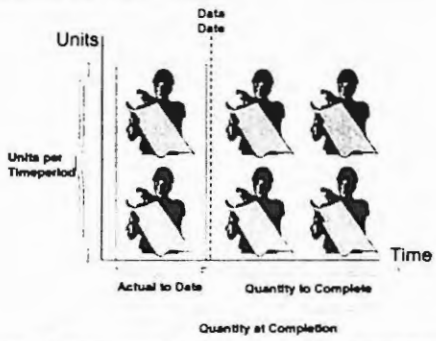
Percent Complete



Remaining Duration



Resource Variables



Calculations:

- Remaining Duration x Unit Per Timeperiod = Qty. To Complete
- Actual To Date + Quantity To Complete = Qty. At Completion
- Quantity At Completion - Budgeted Quantity = Variance (units)

The Control Loop

- Review performance to date.
- Analyze critical path activities.
- Focus on short term but don't lose sight of long term
- Develop strategies.
- Gain project team agreement.
- Implement revised plan.