This workbook is an introduction to scheduling using the software program Primavera Project Planner V.3 (P3). This workbook entails an overview of project scheduling with detailed descriptions associated to Primavera screenshots. This is an introduction workbook that will give you the tools you need to succeed in producing, managing, and reporting on a project schedule. Teamwork makes the dream work.

Table of Contents

Critical Path Method Scheduling

Critical Path Method (CPM) scheduling involves dividing a project into a level of detail that is acceptable to the parties involved in managing the day-to-day operations. Once those activities are defined, relationships are assigned and durations are estimated.
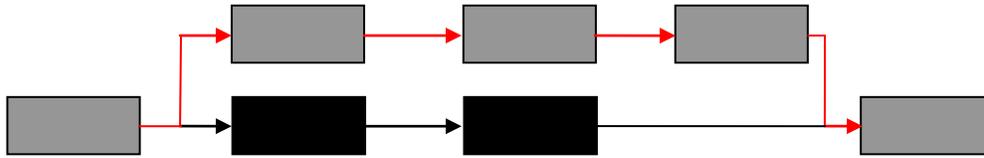
The longest path that can be traced through the diagram is the critical path. This is called the forward pass and is calculated by adding the durations of each activity from the first activity to the last. If a task is critical, the activity must be completed in the allotted time or else the total project duration will be delayed. If a non-critical activity is delayed, there will be no impact until all float is consumed.

Logic Relationships

As mentioned in the previous section, **CPM** scheduling is based upon the relationships that exist between activities. Although, **CPM** scheduling can be performed with the assistance of computerized software, the task is greatly enhanced with the use of applications like Primavera SureTrak, Primavera P3 and Microsoft Project.

These relationships allow the dates to be recalculated automatically with little input from the end user. A schedule that is determined strictly by dates would require extensive monitoring and continual calculation.

❖ **Types of Relationships** - There are four distinct types of relationships involved with CPM scheduling. In addition, the application of lag times can accommodate the modeling of any relationship.

❖ **Finish-to-Start (FS)** - The most common relationship dictates that an activity may not be scheduled to begin until the activity before it (predecessor) is complete.
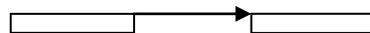
❖ **Start-to-Start (SS)** - This relationship applies to the start of activities rather than the completion. By definition, the activity may not be scheduled to begin until the activity before it has begun. Lag times are often incorporated into this type of relationship.
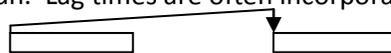
❖ **Finish-to-Finish (FF)** - This relationship states that an activity may not finish until its predecessor has finished.

❖ **Start-to-Finish (SF)** -This relationship states that an activity may not finish until its predecessor has started.

Calculating a Schedule

In calculating a schedule, Primavera actually calculates the schedule twice. The first calculation is called the *forward pass*. This calculates the early start and early finish of an activity. The second calculation is the *backward pass* that calculated the late start and late finish of an activity.

- ❖ **Forward Pass** - The forward pass begins at the project start date and Calculates the earliest start and finish date for every activity based on activity durations and the specified relationships.

- ❖ **Backward Pass** - The backward pass is the opposite of the forward pass and begins at the project finish date. The backward pass calculates the latest start and finish date for every activity based on activity durations and the specified relationships.

- ❖ **Total Float** - The amount of time that an activity can be delayed without delaying the overall total project duration is called total float. Total Float is calculated by subtracting the early start from the late start and the early finish from the late finish.   If an activity has total float equal to zero then the activity is critical and will delay the project if delayed.

- ❖ **Free Float** - The amount of time that an activity can be delayed without delaying the start of another activity. Activities can have total float and little or no free float.

EF = ES + Duration -1 (Forward Pass)
LS = LF − Duration + 1 (Backward Pass)
TF = LF − (ES + Duration) +1   and
TF = LS − ES   or   TF = LF - EF

Critical Path = Activities with Zero Float

Start Date is known, represented here with Day **1**.

Legend box:
Early Start	**Float**	Early Finish
	Activity Description	
Late Start	Duration	Late Finish

Activity "B"
5	7	8
	Activity "B"	
10	4 Days	15

Activity "A"
1	0	4
	Activity "A"	
1	4 Days	4

Activity "C"
5	3	7
	Activity "C"	
8	3 Days	10

Activity "E"
11	0	15
	Activity "E"	
11	5 Days	15

Activity "G"
16	0	17
	Activity "G"	
16	2 Days	17

Activity "D"
5	0	10
	Activity "D"	
5	6 Days	10

Activity "F"
11	2	13
	Activity "F"	
13	3 Days	15
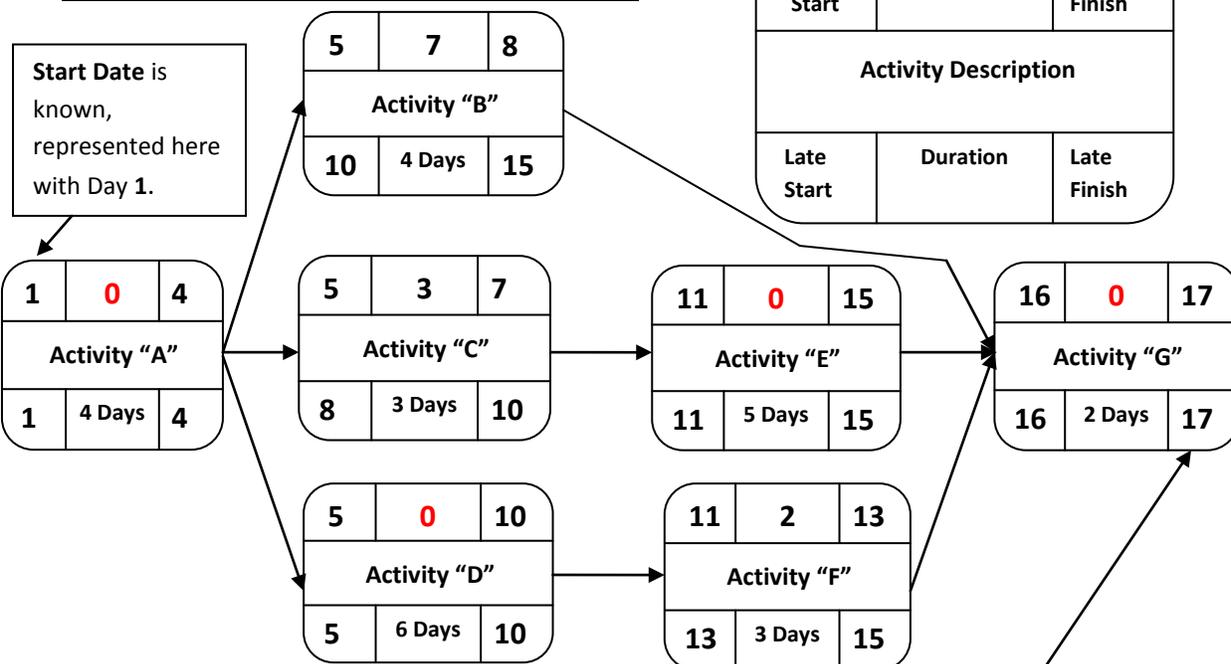
Final Activity must be on Critical Path. Here the Final Activity has **Early Start** of 16, and a **Duration** of 2, which means it will be performed on Days 16 and 17. **Late Finish** = (16 + 2-1) = 17.

Additional Resource Management Tools

❖ **Resource Curve** – Primavera allows you to assign predefined or customize resource usage curves. This allows the user to fine-tune a resource plan based on planned resource usage within a specific activity.

❖ **Resource Lag / Duration** - This feature also allows the user to refine a resource plan. Resource lag and duration allows the resource usage to be delayed a specified number of days from the beginning of the activity (resource lag) and also specifies how long the resource will be active (duration).

Resource Profiles

Primavera utilizes on screen resource profile graphics to display whether resources are sufficient to complete the scheduled work. The profile shows the required resource levels to meet the current schedule. By displaying peak or average resources, the established resource limits are displayed on the histogram with different colors. This will show whether the resource availability is sufficient to meet the current work plan.

Use the **Resource Profile/Table** box to select what resources you wish to profile, as well as what aspects of the resource are displayed. For example, the user may wish to modify the time interval, display histogram and/or cumulative data, and display total, peak, or average resource usage.

Resource / Cost Profiles

Resource profiles are a valuable tool for schedule forecasts. By using resource profiles to evaluate critical resources or completion goals, the user can quickly validate the achievability of the schedule against current productivity. To access the **Resource Profile** on the **menu bar** select **View,** then **Resource Profile** or **Ctrl-F7.**
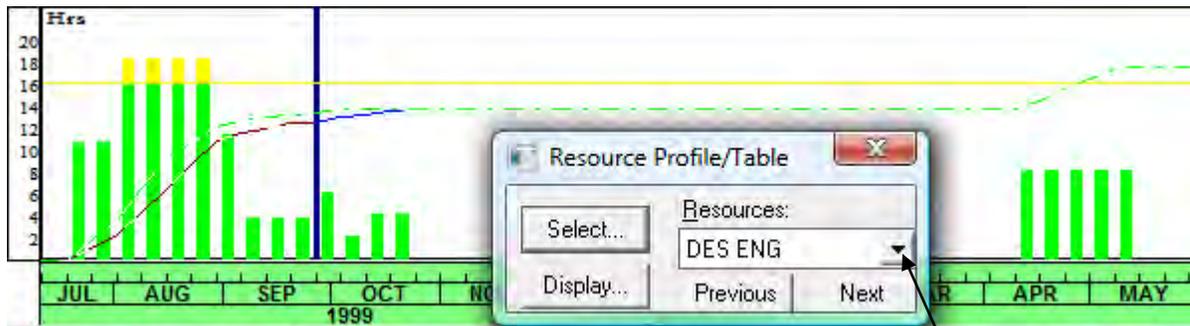
To select which Resources

Resource Tables

Resource data may also be displayed in tabular form. The tabular form will display resource loading for each time interval. This feature is also useful for determining when resources are scheduled to be used, and in what quantities. To access the **Resource Table** on the **menu bar** select **View**, then **Resource Table** or **Shift F7.**

Resource table display options may also be modified to reflect various time intervals, decimals, and fonts.

Examples

This view is only organized by **Project** to see all **Activities**. **Critical Path** activities are indicated with Red Bars. **Date Date Line** = Blue Vertical

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
Plant Expansion & Modernization						
AS216	Prepare Drawings for System	10	5	50	23AUG09A	28SEP09
AS310	Site Preparation	10	2	80	14SEP09A	23SEP09
BA640	Site Preparation	20	18	10	21SEP09A	15OCT09
BA480	Assemble and Submit Flooring	10	2	80	21SEP09A	23SEP09
AS206	Fabricate & Deliver Temp	20	16	20	22SEP09A	13OCT09
BA469	Assemble Technical Data for	3	3	0	22SEP09	24SEP09
BA530	Review and Approve Brick	10	10	0	22SEP09	05OCT09
AS315	Install Electrical Power	24	24	0	24SEP09	27OCT09
AS103	Install Robot Base	18	18	0	24SEP09	19OCT09
AS104	Run Sealant, Air, and Water	13	13	0	24SEP09	12OCT09
BA560	Review and Approve Flooring	10	10	0	24SEP09	07OCT09
BA470	Review Technical Data on Heat	10	10	0	25SEP09	08OCT09
AS217	Review and Approve System	10	10	0	29SEP09	12OCT09
BA421	Prepare and Solicit Bids for	4	4	0	06OCT09	09OCT09
BA407	Prepare and Solicit Bids for	0	0	0	08OCT09	07OCT09
BA408	Review Bids for Flooring	0	0	0	08OCT09	07OCT09
BA409	Award Contract for Flooring	0	0	0	08OCT09	07OCT09
BA620	Fabricate and Deliver Flooring	0	0	0	08OCT09	07OCT09
BA411	Prepare and Solicit Bids for	3	3	0	09OCT09	13OCT09
BA422	Review Bids for Brick	1	1	0	12OCT09	12OCT09
BA423	Award Contract for Brick	0	0	0	13OCT09	12OCT09
BA600	Deliver Brick	0	0	0	13OCT09	12OCT09
AS213	Prepare and Solicit Bids for	5	5	0	13OCT09	19OCT09
BA412	Review Bids for Heat Pump	2	2	0	14OCT09	15OCT09
BA650	Excavation	10	10	0	16OCT09	29OCT09
BA413	Award Contract for Heat Pump	1	1	0	16OCT09	16OCT09
BA550	Fabricate and Deliver Heat	90	90	0	19OCT09	23FEB10
AS214	Review Bids for System	4	4	0	20OCT09	23OCT09
AS215	Award Contract for System	1	1	0	26OCT09	26OCT09
AS218	Fabricate and Deliver System	60	60	0	27OCT09	20JAN10
AS105	Install Temperature Control	20	20	0	28OCT09	24NOV09
BA660	Install Underground Water	5	5	0	30OCT09	05NOV09
BA670	Install Underground Electric	5	5	0	30OCT09	05NOV09
BA680	Form/Pour Concrete Footings	10	10	0	06NOV09	19NOV09
BA681	Concrete Foundation Walls	10	10	0	20NOV09	03DEC09
AS106	Set & Connect Robots	18	18	0	25NOV09	18DEC09
BA690	Form and Pour Slab	5	5	0	04DEC09	10DEC09
BA700	Backfill and Compact Walls	2	2	0	11DEC09	14DEC09
BA701	Foundation Phase Complete	0	0	0		14DEC09
BA702	Begin Structural Phase	0	0	0	15DEC09	
BA710	Erect Structural Frame	20	20	0	15DEC09	13JAN10

Critical Path Only

Here a Filter with Total Float = 0 gives all Critical Path Activities in one view.