Construction Planning, Equipment and Methods ENGI 8749 Fall Semester, 2008 Tutorial #1 – Introduction to MS Project

Project Example Overview

Microsoft Project is commercial scheduling software that allows us to enter our work breakdown activities and their sequences to aid in plan development. We have already seen how to generate the critical path and float times by hand. Let's now attempt to do the same thing using MSProject. As projects get larger they become more difficult to update and change by hand and scheduling software takes on greater importance.

Our Text on p.119 develops a schedule for a small gas station. Here there are 22 activities that are to be tracked. A list of these activities, their planned duration and their sequencing are shown in the figures below.

Table 7.2	Durations of Activities for the Sma	ll Gas Station	10	Exterior brick facade	14
		Duration	11	Exterior fascia panels	4
Activity	Title	(Days)	12	Roof construction	15
Activity	The	(Days)	13	Landscaping	12
1	Mobilize	10	14	Pour interior slabs	10
2	Obtain permits	15	15	Glazing and doors	6
3	Site work	8	16	Interior walls	10
4	Exterior utilities	12	17	Elec. & mech. Systems	25
5	Excavate catch basin	2	18	Shelves	3
6	Excavate footers	5	19	Floor coverings	6
7	Excavate foundation piers	6	20	Interior finishes	8
8	Pour footers, etc.	8	21	Final inspection	1
9	Erect bldg. frame	10	22	Demobilization	3



Starting Project

In this tutorial, I'm working with MS Project 2007. There are a few differences between Project 2003 and Project 2007, however, they are not as substantial as the changes that occurred with the other Office products. One big change is the introduction of multiple levels of undo, which helps you in backing out of mistakes you're made. Starting project from the start menu gives you:

0	Task Name	Duration	Start	o 3, '08	Feb 10, '08	Feb 17, '08	Feb 24, '08	Mar 2, '08
				M TVV TF	SSMTWTF	SSMTWTF	SSMTWTF	SSMTWT
				-				
_				-				
	-							
_				-				
_				-				
_				_				
				-				
				_				

You see here a blank project in the Gantt chart view with a spreadsheet like interface where the project tasks and their durations can be input. To facilitate learning Project you might want to invoke the *Project Guide* which leads you through the creation of a project. This is turned on by adding the toolbar to the menu under **View** > ^{Turn On Project Guide}. I'll work through this tutorial using the menu selection features and let you explore the Project Guide interface.

You'll notice in the Gnatt chart that the non-working days (Saturdays and Sundays) are grayed out. We'll change this later.

Like most MS software there are many ways to accomplish the same tasks. There is also extensive help under the help menu and free tutorials are available from the Microsoft Office web site and other locations through web searches.

Creating a New Project

To create a new project we only have to define a project starting date. This can be due under **Project > Project Information...** A new dialogue box appears as follows:

Project Informa	ntion fa	or 'Project1'			x
Start <u>d</u> ate:	Mon 2	2/11/08	C <u>u</u> rrent date:	Mon 2/11/08	•
Einish date:	Mon 2	く February, 2008 ▶ SMTWTFS	Status date:	Mon 2/11/08	•
Schedule from:	Proje	27 28 29 30 31 1 2	C <u>a</u> lendar:	Standard	~
All task	s begin	3 4 5 6 7 8 9 10 11 12 13 14 15 16	Priority:	500 🛨	
Enterprise Custor	n Fields	24 25 26 27 28 29 1			
		2345678			
Custom Field Na	me	<u>T</u> oday		Value	
					Ŧ
Help	Statį	įstics		ОК	Cancel

As you can see the start date can be selected from a pull down calendar menu. Selecting a start date is all that needs to be done here. You'll notice the Finish date: is grayed out here since this is calculated by Project. However, you also have to option of working backwards from an end date by selecting Project End Date from the *Schedule from:* pull down. You can also select the project *Calendar:* from here but we'll do this in the next step.

At this point we can save the project to give it a unique name under File > Save As... button. I've named the project "GasStation" and the extension ".mpp" is added indicating that this is a project file.

You can also save your project as an Excel worksheet and manipulate your data there.

Setting the Project Calendar

The project calendar is the base calendar that the project will use to calculate dates from. Calendars are one of the important features of scheduling software over hand calculations as by hand only event times from the start of the project are generated. The default calendar from Project is a 5-day per week, 8-hours day. All these are adjustable. To define a project calendar select **Tools > Change Working Time ...** to generate the project calendar.

Change Working	Time									x
For <u>c</u> alendar:	Standard (F	roject	Cale	ndar)				-	•	Create <u>N</u> ew Calendar
Calendar 'Standar	rd' is a base	calend	lar.							
Legend:		Clic	k on a	a day	to se	e its <u>v</u>	<u>v</u> orkin	ng tim	es:	
Working			Working times for February 11, 2008:							
Nonworkir	na	S	M	T	W	Th	F 1	2		 8:00 AM to 12:00 PM 1:00 PM to 5:00 PM
Edited wo	rking	3	4	5	6	7	8	9		
On this calendar		10	11	12	13	14	15	16		Based on:
34 Exception	udav	17	18	19	20	21	22	23		Default work week on calendar 'Standard'.
Nondefau	lt work	24	25	26	27	28	29			
31 week									•	
Excep	otions	1		٧	Vork \	Veeks	;		1	
Name						Star	t		Finish Details	
										Delete
Help										Ogtions OK Cancel

You can define non-working days individually under the "Exceptions" tab individually by selecting a day (or list of consecutive days) in the calendar and typing a name for them in the list. For our project we'll define the weekends as work time just so the task bars generated in the Gantt chart are not interrupted. To do this select the *Work Weeks* tab and the Details... button to give a new dialogue box for the [Default] calendar:

Details for '[Default]'						×
Set working time for this v	vork wee	k-				-
Select day(s): Sunday Monday Tuesday	Ou Os €s	lse l et c et c	Project <u>d</u> efa lays to <u>n</u> on lay(s) to th	ault times for working time. ese <u>s</u> pecific v	these days. vorking times	:
Wednesday Thursday			From	To		
Friday Saturday	ŀ	1	1:00 PM	12:00 PM 5:00 PM		
	-					
Help				OK	Cancel	

Here, I've selected Sunday and Saturday using the Control key and set these days to specific work times as if they were from Mon-Fri. You note now the Gantt chart weekends have disappeared.

Time Scale

The time scale on the Gantt chart displays the dates and days of the week in default mode. Up to three lines of information can be displayed. Since the days of the week are not material for us here let's set the display so the top bar appears months since project start and the bottom to days since the start of the project. This can be accomplished by selecting Format > Timescale from the menus (or right clicking on the time scale). A dialogue appears:

Timescale			×
Top Tier	Middle Tier	Bottom Tier	Non-working time
Middle tier formatting			
Units: Months	Label: January		🔽 Use fiscal year
Cou <u>n</u> t: 1 📑	Align Jan, Feb, J, F,	-	
Timescale options	1, 2,		
Show: Two tiers (Middle	e, Bottom) 1/02	(Europe Chaub)	<u>i</u> cale separator
Preview	Mi, M2, M3, (F	rom Start)	
ary SMITWITESS	1, 2, 3, 4, (Fro м т маг т Month 2, Month 1	m Start) , (From End)	March
3 10 1 10 1 1 3 3	M3, M2, M1, (F	rom End)	1 1 3 3 M 1 W 1
Help			OK Cancel

Select the Units: as Months and Label: as M1,M2,M3, ... (From Start).

We can also do the same thing for the bottom tier. Here we select the label as 1,2,3,4 ... (From Start) meaning number of days from the start of the project.

Timescale			x										
Top Tier	Middle Tier	Bottom Tier	Non-working time										
Bottom tier formatting	Bottom tier formatting												
Units: Days	▼ Label: 1, 2, 3, 4,	(From Start) 🗾 💌	✓ Use <u>f</u> iscal year										
Cou <u>n</u> t: 1 🔆	Align: Center 💌	 Tick lines 											
Timescale options													
Show: Two tiers (Middle	e, Bottom) 💌	Size: 100 🕂 % 🔽 😭	cale separator										
Preview													
-3 -2 -1	1 2 3 4	5 6 7	8 9 10										
Help			OK Cancel										

Here, we have effectively hidden the project calendar but only so that the textbook example and the software solutions match. This also illustrates some of the features of the software tool.

Entering Project Tasks

We can enter project task by simply typing their names in the Gantt chart view under "Task Name" and typing return after each addition. Note, as we do this a task number appears in the left most column and a default duration (indicated by the ?) of 1 day appears in the "Duration" column. The task number is important as Project uses this as a reference for other tasks. Note: the start and finish dates are also computed. Overriding these dates with fixed dates removes the software's ability to adjust these according to task dependent relationships.

If we right click on the "Start" and "Finish" columns of the Table and click ***** Hide Column these columns are removed from the input view. They can be added back to the table using the insert column feature. We should have the following view:

		Task Name	Duration	Predecessors							
					-2	-1	1	2	3	4	5
	1	Mobilize	1 day?								
	2	Obtain Permits	1 day?								
	3	Site Work	1 day?								
	4	Exterior Utilities	1 day?								
	5	Excavate Catch Basins	1 day?								
	6	Excavate Footers	1 day?								
	7	Excavate Foundation Piers	1 day?								
	8	Pour Footers	1 day?								
	9	Erect Bldg. Frame	1 day?								
	10	Exterior Brick Façade	1 day?								
	11	Exterior Facia Panels	1 day?								
t	12	Roof Construction	1 day?								
Ë	13	Landscaping	1 day?								
Ħ	14	Pour Interior Slabs	1 day?								
Ö	15	Glazing and Doors	1 day?								
	16	Interior Walls	1 day?								
	17	Elec. & Mech. Systems	1 day?								
	18	Shelves	1 day?								
	19	Floor Coverings	1 day?								
	20	Interior Finishes	1 day?								
	21	Final Inspection	1 day?								
	22	Demobilization	1 day?								

Durations

Activity durations can be added by typing the correct time for each task. The default unit is "days". However, other times are allowed by adding the appropriate unit: 'm'-minute, 'h'-hour, 'd'-day, 'w'-week, 'mo'-month. These times follow the standard times set in the *Calendar* tab under **Project** > **Options** of 8 hrs per day, 40 hrs per week, 20 days per month. Adding an 'e' before any of the time units by-passes the standard times and allows use of the 24-hr clock, 7-day week, 30-day month.

Durations can be typed directly in the sheet view cell or by incrementing the counter as:

Task Name	Duration I
Mobilize	10 days 📫

Linking Tasks

Task linking defines the relations between tasks. So far we have been introduced to the Finish-Start (FS) link that is the default in Project. Here, a successor task cannot start until its predecessor has finished. To enter these relationships in Project you have a number of choices:

Link Tasks Tool — Here select the predecessor task and pressing the 'Control" key select the successor. With both highlighted hit the Link Task Icon or the (Ctrl+F2) shortcut.

Predecessor Codes – If you know the task number of each the successor we can type them in a comma separated format directly in the predecessor column on the Table Entry sheet. This is the simplest method especially when the Gantt chart gets large.

Successor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pred1	S	S	1	1	2	3	3	4	8	9	9	9	10	12	10	10	10	15	15	15	13	21
Pred2					3			5					11		11	11	11	16	16	16	17	
Pred3								6							14	14	14				18	
Pred4								7													19	
Pred5																					20	

Task Information Dialogue – Highlighting a task and selecting **Project** > **Task Information** ... produces a dialogue box (short cuts: task double click or (Shift+F2)). Under the *Predecessors* tab the task ID can be typed or the Task Name can be selected from the pull down list. Here we specify that Site Work cannot be started until Mobilization is complete.



Drag and Drop – We can also drag and drop a link on the Gantt chart. To do this, start on the predecessor duration bar and drag the curser to the successors duration bar. This works great while the bars remain in view on the chart.

Viewing Critical Path

After the links have been added we obtain a view without the critical path. To produce the view below you must zoom the chart to show the entire project using View > Zoom ... to produce a dialogue box and select \circ Entire project radio button.

	Task Name	Duration	Predecessors		M1			M2			M3			M4		
				-14	-5	5	14	23	32	41	50	59	68	77	86	95
1	Mobilize	10 days					հ									
2	Obtain Permits	15 days														
3	Site Work	8 days	1				Č	1								
4	Exterior Utilities	12 days	1													
5	Excavate Catch Basins	2 days	2,3					6								
6	Excavate Footers	5 days	3				i									
7	Excavate Foundation Piers	6 days	3				i									
8	Pour Footers	8 days	4,5,6,7					<u>۳</u>								
9	Erect Bldg. Frame	10 days	8													
10	Exterior Brick Façade	14 days	9							- č		1	_			
11	Exterior Facia Panels	4 days	9							- Č	1		_			
12	Roof Construction	15 days	9							_ Č _		h				
13	Landscaping	12 days	10,11													
14	Pour Interior Slabs	10 days	12									<u> </u>	⊐h			
15	Glazing and Doors	6 days	10,11,14										*	- I		
16	Interior Walls	10 days	10,11,14													
17	Elec. & Mech. Systems	25 days	10,11,14										*			
18	Shelves	3 days	15,16											1 -		
19	Floor Coverings	6 days	15,16											1		
20	Interior Finishes	8 days	15,16											<u> </u>		
21	Final Inspection	1 day	13,17,18,19,20												T	í.
22	Demobilization	3 days	21												i	ò

To show the critical path we can use the Gantt Chart Wizard button so or select Detailed Gantt under the **Views > More Views ...** dialogue box. Note: in either case you will have to readjust the Gantt chart Timescale formatting.

Mo	ore Views		X
⊻ie	ews:		
В	ar Rollup		<u>N</u> ew
IC.	alendar		
D	escriptive Network Diagram		Edit
D	etail Gantt		
G	antt Chart		I
L	eveling Gantt		<u>⊆</u> opy
M	lilestone Date Rollup		
M	lilestone Rollup		Organizer
M	lultiple Baselines Gantt		
N	etwork Diagram		
R	elationship Diagram	-	
		Apply	Cancel
		Apply	Cancel

Here the critical path items will be displayed in red (or any color you choose).

Display Float (Slack) Times

Free float time is displayed on the Gantt Chart when the Detailed Gantt chart view is selected. To obtain a table of both Free Float and Total Float a new table view must be used. There are a number of predefined table in Project and the float (slack) times are shown in the Schedule Table. To view this table select **View > Table: xxx** and change the selection from Entry to Schedule.



Here's where we see all the event times and slack (float) times. Hide the event times for now to produce a table we can compare with the textbook float times in Table 7.5.

