

Best Practices: Critical Paths

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Best Practices: Critical Paths

With your project tasks listed, scoped and related logically to each other; you now have a schedule created for your project. Your next step is to analyse this schedule to determine:

- which tasks directly affect key milestones and the project's overall end date;
- and which tasks could (if necessary) be delayed without impacting on the project's schedule.

Below you'll find a handful of best practice tips and tricks, gained over many years of experience from working with people who plan real-world projects using Microsoft Project as their project management tool of choice.

I. Review the schedule in words and numbers

A great way to review the overall schedule for your project is to look at its 'Statistics'. You can easily achieve this by selecting Project Information from the Project menu, followed by a click on the Statistics button.

If you have resources or costs associated with your project, you can see that information within the Statistics dialog box as well. If you want to review your project's statistics regularly, you'll find a useful tool button on the Tracking toolbar. You can also print this information out by using the 'Project Summary' report, which you can access by selecting Reports from the Report menu in Project 2007 or from the View menu in Project 2003. Once in the Reports dialog, simply choose Overview, followed by Select.

Another option to see the schedule summarised is to display a 'Project Summary Task'. Located on row 0 of every table, the Project Summary Task displays summarised schedule information, together with totalised information for work and costs.

To display a Project Summary Task, simply select Options from the Tools menu and you'll see a check box in the bottom-right corner of the View tab. Do note that the font size for the Project Summary Task is larger than the default font for other tasks and this can cause information within sheet columns to appear truncated (or shown as '###'). If this is the case, simply double-click on a column divider to best-fit a relevant column's width.

A more detailed way to review your schedule is to use the 'Schedule' table. You can apply this table to a Gantt Chart view by selecting Table from the View menu, followed by the Schedule option. A right-click on the Select All button at the top-left corner of a table offers a useful shortcut. Whilst this table's information may appear a bit detailed at first, it can give you an invaluable insight into exactly what can happen when.

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2. How a schedule is calculated

Within Microsoft Project there is a scheduling engine that calculates exact dates and times when tasks can happen and milestones can be achieved. This engine uses a technique called Critical Path Analysis (or CPA) to determine what can happen when. Basically, it works like this:

- A 'Forward Pass' works through the project from the first task to the last task adding duration values together to determine how quickly the tasks can be performed. This calculation provides 'Early Start' and 'Early Finish' dates for each task. If your project is scheduled from the Project Start Date (the default setting - as set within the Project Information dialog), then a task's 'Start' date equals its early start and its 'Finish' date equals its early finish.
- The next CPA step is to calculate how slowly tasks can be performed. Working from the latest task back to the earliest, a 'Backward Pass' subtracts duration values and calculates 'Late Start' and 'Late Finish' dates for each task.
- With early and late dates worked out, CPA determines its final calculation; how much 'Slack' a task possesses. You can find out the exact definition of 'Total Slack' and 'Free Slack' by placing your cursor over a column heading and then clicking on the 'Help On...' hyperlink.

Slack is incredibly useful stuff. When Total Slack is 0 days, a task is 'Critical' and its early and late dates for starts and finishes match; in other words, delay a Critical task and you delay the finish date for the project.

When tasks possess Total Slack, they are 'Not Critical' and can be delayed by the Total Slack value without affecting the project's finish.

Free slack is even more useful as tasks possessing Free Slack can be delayed within Free Slack without affecting the schedule of any other task. If you delay a task that only possesses Total Slack, a non-critical successor will be subsequently delayed.

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3. Highlight criticality graphically

When you view the Network Diagram view, some task boxes are coloured red, and some are coloured blue. This is because the view's default Box Styles highlight the difference between critical and non-critical tasks. By default, the Gantt Chart doesn't highlight differences, but the Detail Gantt view does.

To display this view, select More Views from the View menu, followed by Detail Gantt, followed by Apply. If you have non-critical tasks, you should see some thin teal-coloured lines to the right of blue-coloured (non-critical) bars. Place your cursor over a teal-coloured line and a screen tip will display Free Slack information.

Whilst the default Detail Gantt provides useful information, it can be improved upon:

- Firstly, by default, the 'Delay' table is applied to the view and the view's name isn't listed within the View menu. To apply the Schedule table to the view and add the view to the View menu, simply select More Views from the View menu, followed by Edit. Next, choose Schedule from the drop down list of Tables and select the Show in Menu check box. Confirm this with OK, followed by Apply.
- Secondly, it would be really useful to display Total Slack bars as well as ones for Free Slack. To do this, you'll have to edit some Bar Styles. Select Bar Styles from the Format menu and scroll down within the dialog box until you find the 'Slack' bar style. Rename this as 'Free Slack', and then click the Cut Row button. Without moving the cursor, click the Paste Row button twice to create two identical bar styles. Leave the lower 'Free Slack' style as it is and rename the upper one as 'Total Slack'. Next, for the Total Slack style, change the bar colour (and optionally its pattern if you want to print this view on a mono laser printer). Finally, choose 'Total Slack' as the To option for this particular style, followed by OK.

Your Detail Gantt chart should now be enhanced with additional information and also be readily accessible from the View Menu. You could make additional improvements to this view by editing text options for the bar styles – just use the Text tab within the Bar Styles dialog box.

4. Perform Schedule What-If's

Now you know more about the project's schedule you can experiment with it. Here are a few suggestions:

- Extend a critical task by increasing its duration and see all other critical tasks are delayed and non-critical tasks gain extra free and total slack.
- Extend a task that possesses free slack and note that no other tasks are affected until you exceed the free slack available.
- Extend a task that only possesses total slack and see its successors rescheduled.

Note that if you are using Project 2003, do save your project before performing these what-if's. Then use Undo/Redo to see before and after scenarios.

If you are using Project 2007, you can use some great new functionality. Firstly, you aren't limited to just 1 level of undo - by default there are 20, allowing lots of before and after simulations.

You'll also notice that cell backgrounds for dates change when the schedule changes. These cell backgrounds highlight which dates have been recalculated by CPA - another really useful feature.

Thirdly, do use the Task Drivers feature. Simply select a relevant task and click on the Task Drivers button on the Standard toolbar. A side pane will indicate to you EXACTLY why the task is scheduled when it is. You can even track back through predecessor task listings and trace a critical path throughout your entire project!