Project Planning with

OPENPROJ

the open source

Project Management software
Project Planning with OpenProj

The Basics

Author: Jürgen Bruns & Associates.

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Preface

OpenProj is the most widely used open-source Freeware for project planning and controlling. As Java based software, OpenProj can be used with Windows, Macintosh and Linux operating systems.

The great popularity of OpenProj is not only based on the fact that it is available for free, but also because the look and feel of the software is very close to the market leader Microsoft Project.

OpenProj users should be able to change very quickly from OpenProj to MS Project when it becomes necessary, perhaps due to increasing projects or the demand for multi-project management, which cannot easily be handled with OpenProj.

Project plans created with OpenProj can be used with MS Project (up to version Project 2007) and vice versa.

This guide is intended for new users who wish to get hands-on with the key functions of OpenProj in the minimum amount of time. On completion of reading and understanding this guide, the user should be able to create, track and modify relatively complex projects to achieve a higher level of work productivity, control and efficiency.

If you do not already have OpenProj installed, please visit the official download page now at SourceForge.net http://sourceforge.net/projects/openproj/ and proceed to follow the instructions to install the software on your machine.

This guide applies to version 1.4 which as of April 2012 is the latest version. Other versions may have slightly different functionality, menus or descriptions.
**Project Management Basics**

**What is a project?**
A project is a series of activities leading to defined goals and deliverables achieved in a specific timeframe. A project always has a specific start date and a specific end date.

These activities (tasks) have to be accomplished in a distinct order by the means of allocated resources (manpower, machines, materials, costs) so that the framework of time, costs and deliverables is met.

Generally speaking a project should have the following characteristics:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Limitation</td>
<td>Both a start point and an endpoint must be defined for a project. Initially, it is common for just a start date to be specified and the resultant project plan will determine the end date.</td>
</tr>
<tr>
<td>Clear Objective</td>
<td>The objective to be achieved by the project must be clearly defined. For example, &quot;Launch Product&quot; is a clearly defined goal, whilst &quot;Sale of the Product&quot; (without quantification) is not a clearly defined goal.</td>
</tr>
<tr>
<td>Process Structure</td>
<td>The project must be split up into clearly defined tasks. It should not represent a singular process from beginning to end, but be broken down into distinct stages.</td>
</tr>
<tr>
<td>Organizational Structure</td>
<td>Projects often require an established organizational structure with unique skill sets to be effective, but this does depend somewhat on the scale of the project.</td>
</tr>
</tbody>
</table>

**What Is Project Management?**
Project management is the planning and control of a project. It allows the user to resolve conflicts in a continuously changing environment and is necessary to continuously drive towards the achievement of the baseline project goals.

Because project management should ideally result in the fulfillment of all set targets, a significant part of the project manager’s work is dealing with conflicts arising from unforeseen resource and task variations.

**Examples of Project Conflicts**

- Because of the absence of planned staff, the project cannot be completed within the allotted time (schedule variance). The increase of working capacity through overtime would cause additional costs (cost variance) or a possible reduction of scope would change the project deliverables (scope variance).

Most conflicts require the project manager to decide which goals and goal types can change and which cannot. OpenProj can be helpful in assisting these decisions by illustrating ‘critical paths’ within the project and allow the user to easily identify what impact any changes would have.
## Project Management Basics

### Project Management Terminology

Certain terminology is used throughout the OpenProj software (and this guide), so it would be useful to familiarize yourself with some of these phrases now.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tasks</strong></td>
<td>The partial activities from which the overall project is composed are called tasks. They are the smallest units/steps in a project.</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>The period between the start time and the finish time of a task.</td>
</tr>
<tr>
<td><strong>Predecessors</strong></td>
<td>A task that must be processed before a future dependent task can be started.</td>
</tr>
<tr>
<td><strong>Successors</strong></td>
<td>A task that can only be started if a previous dependent task has been processed.</td>
</tr>
<tr>
<td><strong>Milestones</strong></td>
<td>Milestones are important intermediate objectives. They often define phase transitions, critical project stages or intermediate results. They are usually represented as tasks that have no duration.</td>
</tr>
<tr>
<td><strong>Summary Tasks</strong></td>
<td>Each chunk of a project with multiple tasks should be headed by a parent task which is known as a Summary Task. Summary tasks usually terminate with a milestone and have a fixed result (output). Summary tasks have a duration assigned automatically from their sub-task’s duration and dependencies.</td>
</tr>
<tr>
<td><strong>Slack</strong></td>
<td>‘Free slack’ is how much a task can delay without impacting on other tasks. ‘Total slack’ is how much a task can delay without impacting on the end date of the project.</td>
</tr>
<tr>
<td><strong>Critical Path</strong></td>
<td>The shortest path from the beginning to the end of the project. Only tasks without slack exist on this path (critical path) and are called critical tasks. The project end date is automatically extended if a task on the critical path slips or has an extended duration.</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>Resources refer to all people, time, production and materials required to deliver the project. A mapping of required resources can be performed for each task. Reliable cost planning is only possible when real resources and costs are mapped to the tasks.</td>
</tr>
<tr>
<td><strong>Forward Scheduled</strong></td>
<td>This is where a start date is set for the project and the end date is automatically calculated from the duration of the operations and the task dependencies.</td>
</tr>
<tr>
<td><strong>Backward Scheduled</strong></td>
<td>This is where a deadline is set for the project and the latest possible project start is automatically calculated from the duration of the operations and the task dependencies.</td>
</tr>
<tr>
<td><strong>Fixed Duration Tasks</strong></td>
<td>The duration for a task is set, regardless of how many resources are assigned to it.</td>
</tr>
<tr>
<td><strong>Effort Driven Tasks</strong></td>
<td>The duration of a task is dependent on how many resources of the same type are assigned to it. For example, a deliverable is produced in less time with three employees than with one.</td>
</tr>
</tbody>
</table>
Using OpenProj for the first time

Starting and Exiting OpenProj

Having downloaded and installed the OpenProj software; start OpenProj from the start menu of Windows or via the icon on your desktop.

After the license agreement, OpenProj starts with a choice of creating a new project or opening an existing one.

Choose ‘Create Project’

New Project window.

Enter a name for the project, the project manager’s name and a start date (which can also be modified later if required).

Place a check mark in the ‘Forward scheduled’ box (otherwise it will treat the project tasks as backward scheduled). See terminology on pg.6 for an explanation on the differences.

Provide a description in the Notes section as you see fit.
OpenProj Application Window

Indicator Column.

In this column, symbols are displayed to show the status of the corresponding tasks (see right).

Task Number Column.

Task numbers are assigned by OpenProj automatically when data is entered. The user does not enter information into this box.

Time Scale.

In many views, OpenProj shows a timeline whose scale can be changed via the + and - magnifying glass icon on the menu above.

Information View Type.

The area along the left side of the window lists a number of buttons representing the available views. Gantt, Network, Resources, WBS (work breakdown structure), RBS (resource breakdown structure), Reports, Task Usage and Resource Usage.

The lower view buttons open a split-screen where resource mapping tables and resource utilization as a graphic can be displayed. You can toggle views on and off by clicking the same button repeatedly.
Creating Your First Project

For accurate tracking of your project it is essential to first set up the OpenProj calendar to reflect the working hours in your organization.

Adjust the Calendar

OpenProj offers three default calendars:

- Standard Calendar (Mon-Fri, 08:00 to 17:00 with 1hr lunch break at noon)
- Night Shift (Mon-Sat 23:00 to 08:00 with a 1hr break from 03:00 to 04:00)
- 24-Hour Calendar (24/7 schedule)

You can assign any one of these to be your project calendar; however none of the default calendars contain public holidays so it is often necessary to create your own custom calendar to reflect your company’s general working hours.

Creating a Custom Base Calendar

Open the Calendar with the menu tool Tools – Change Working Calendar or with the icon .

- Click on New to create a new calendar.
- Enter a name for your new calendar and click OK.
- Mark the days for which you want to change the working time (e.g. for all Fridays you can click the column header ‘F’, or you can hold ctrl and click to select individual days). To make a global selection you would hold ctrl and click S,M,T,W,F,S in turn.
- Click “Non-default working time” on the left and change the working hours within the fields below.
- To mark company or public holidays, select the relevant days as above and click ‘Non-working time’.
- Edited calendar entries will appear in red.
- IMPORTANT: Click ‘Options’ at the bottom to set the corresponding working hours per day, hours per week and days per month. If you do not do this, OpenProj will not schedule the tasks correctly.
- Confirm changes by clicking OK.

You must now assign your custom Project calendar to your project. To do this, click Project – Project Information from the top menu and set the Base Calendar to your new custom base calendar name. This is also the screen where you enter the Project Start Date. Click close when done.
OpenProj can also associate calendars to individuals and to specific tasks. In this way you can designate individual vacation periods or you can specify a task to follow a different schedule to the one in your base calendar. So, in fact you can use three different types of calendars within your project:

1. Project calendar (your base calendar for the project as defined above)
2. Resource calendar (for individuals working time and vacation days)
3. Task calendar (for tasks that do not follow the regular working hours, e.g. a task cannot start on a Friday because it would be interrupted by the weekend or maybe a task that runs continuously for 24hrs).

Don’t worry too much about the resource and task calendar for now. We will come on to these later in the relevant section of the guide.

The calendar is stored with the particular project file, so if you start another project it is necessary to create the user defined calendar again.

**Tip**

After creating a user defined calendar, save the file as a template for all of your future projects under a specific name, e.g. my_blank_project_template.pod
Entering Tasks

Entering Task Names

When you create a new project, OpenProj by default opens the Gantt chart view on the right pane and the task input table on the left pane. You can drag the vertical line dividing the two panes to fit your monitor as you desire.

Now it’s time to think about your project in terms of small chunks, or tasks. You can literally use this as a brainstorm session as you can always edit, rearrange, insert or delete tasks later. Think about all the distinct stages of your project and try to break them down to an appropriate level. If your gut instinct is telling you that several people will need to work on something for several days, then look at that activity again to see if it can be broken down further.

Try to ask yourself questions like “What work needs to be done, what or who is required to do it and how long might it take?” the more detailed, the better. You need to identify the project deliverables and then figure out what actions are required to produce those deliverables.

If this sounds like a lot of work, well, that is the reality. OpenProj is a powerful tool which will help you calculate a schedule, visualize the plan and track progress but it is only as good as the data input at the start. **You** have to decide what tasks are required and that is fundamental to effective project planning. The importance of this cannot be over-emphasized.

To enter a task:

- Click in the **Name** column in the first row.
- Enter a name for the task.
- Confirm the input by clicking the mouse or pressing the tab button which takes you to the duration entry field.
- If you do not know the duration at this stage you do not have to input it. OpenProj enters a default value of 1 day? which you can alter at a later stage.
- If you have an estimate of the duration, then feel free to enter it into the cell. OpenProj automatically converts the duration to days. For example, enter 1w (1 week) and OpenProj will set the duration to 5 days. The input of 1 month would result in a display of 20 days and 1 hour would be displayed as 0.125 days (or 1/8th of a day).
- Confirm the input by pressing Enter or clicking on the next row.
- **It is important that you enter only task names and durations at this stage. Do not be tempted to enter any other information right now. Especially not a starting date.**
- It’s good practice even at this stage to enter general headings (phases) for tasks e.g “Design” and then more specific tasks underneath, but never enter a duration for a general heading.

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design</td>
<td>1 day?</td>
</tr>
<tr>
<td>2</td>
<td>Gather informatic</td>
<td>5 days</td>
</tr>
<tr>
<td>3</td>
<td>Analyss</td>
<td>10 days</td>
</tr>
</tbody>
</table>
Work Breakdown Structure

Establish an outline
After entering the tasks (and the estimated durations) you now need to organize them into logical groups of related tasks. These groups of tasks will eventually be headed by Summary Tasks (the general headings that you input earlier). A Summary Task automatically adds up the time information about all the tasks in a summary group. More about Summary Tasks in the next section, but for now insert, move or copy your tasks around as necessary using the techniques described below:

Inserting, Moving, Copying and Deleting Tasks
To move or copy a task, the task must be selected as a whole (the entire task row in the table). Editing is otherwise only performed on the selected cell and the cell contents. To select an entire row, click on the numbered row header.

Entering New Tasks
- Select the row for where you want the new task to be inserted above
- Choose the Menu item: Insert – New Task/Resource, or right click New or press CTRL+K

Moving Tasks
- Select the desired task row
- Cut the task out with CTRL-X or from the Menu with Edit-Cut, or right-click with the mouse
- Paste the task to the desired position using CTRL-V (menu: Edit-Paste) or right-click for same options.

Copying Tasks
- Select the desired task row
- Copy the task using CTRL-C (menu: Edit-Copy), or right click and copy
- Paste the task to the desired location with CTRL-V (menu: Edit-Paste).

Deleting Tasks
- Select the desired task row
- Delete with (menu: Edit-Delete) or by pressing the Delete key on your keyboard.

Creating a Summary Task
By grouping tasks under a parent task, a hierarchical structure (or phase) can be produced which can contain several levels of detail.

In your task list, summary tasks will be automatically formatted in **bold**. Subtasks are displayed as indented text. Summary tasks contain the symbols + and – as prefixes depending on whether the individual tasks are expanded or collapsed. A summary task has a black bar on the Gantt view with start and end points which are calculated from the duration and the dependencies of the tasks in that phase. This is why you should never enter a duration for a summary task manually.
In order to create a Summary Task, identify the group of tasks which will come under the Summary Tasks by selecting all the appropriate rows (drag your mouse) and indent them by pressing the “>” icon. Below, we have selected tasks 2-6 and indented them, to make “Design” a Summary Task.

Indenting and Out-denting Tasks

- You can indent individual tasks or groups of tasks even further to create Summary Tasks within Master Summary Tasks. Organizing tasks in this way gives your project structure which makes it much easier to manage.
Assigning Task Calendars
You remember setting your base calendar at the beginning of your project? We can use a similar technique to create a Task calendar. Let’s create one where a task can only be worked on Monday, Tuesday and Wednesday.

Open the calendar tool using Tools – Change Working Calendar, click New, give it the Name MoTuWed (for Monday, Tuesday and Wednesday). Click the column heads for Thursday and Friday (T & F) and click Non-working Time.

Now, to assign this Task Calendar to a Task:

- Open the Task Information box by double-clicking on the Task name.
- Click on the Advanced Tab
- Select Task Calendar MoTuWed.
- Click Close to confirm.

Now this task can only be worked on one of the three days listed and OpenProj will recalculate the task accordingly, regardless of the calculated start date.
Setting Dependencies

Dependency Types
Dependencies allow you to show the relationships between tasks and set rules for when tasks can be started or finished.

OpenProj uses four types of dependencies:

<table>
<thead>
<tr>
<th>Dependency Relationships Between Predecessors and Successors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS (Finish-to-Start)</td>
<td>This is the default relationship in OpenProj. It defines that one task has to finish before the next one can start. For Example, ‘printing a document’ cannot start until ‘editing the document’ is finished.</td>
</tr>
<tr>
<td>SS (Start-to-Start)</td>
<td>The start of a task is dependent on the start of its predecessor. In other words, the task can only start after the predecessor task has started (or at a later date)</td>
</tr>
<tr>
<td>FF (Finish-to-Finish)</td>
<td>The completion of a task is dependent on the completion of its predecessor. In other words, the task can only finish at the same time (or after) the previous task has finished</td>
</tr>
<tr>
<td>SF (Start-to-Finish)</td>
<td>The finish of the next task depends on the start of the previous task. In other words, the first task begins after the second task ends – which is kind of weird! A SF relationship is seldom used but is included in OpenProj so that all four relationships are available.</td>
</tr>
</tbody>
</table>

When dependencies are created, the start and finish dates of tasks are usually affected. OpenProj automatically edits start and finish dates so that they adhere to these new constraints. Any change to the dependencies will update the task dates and Gantt bars automatically.

Selecting Tasks with FS Linkages (default and most commonly used)
You can link tasks in any of the three ways listed below. If you make a mistake at any time you can undo with the menu: Edit-Undo or press Ctrl-Z.

1) By Manual Entry
➢ Identify the relevant task and in the predecessor column; enter the task number(s) of the predecessor(s) which must be done before this task can start. Confirm your entry with the Enter key. You may separate multiple predecessors with a semicolon (;).

In the example above, we have specified that for the “Design” summary task, we cannot do the “Analysis” before we have done the “Gather Information”. We cannot do the “Present Alternative” until we have done the “Analysis”. We cannot do the “Design Document” until we have done the “Present Alternative” and we cannot do the “Design Complete” until we have “Design Document”.

In fact, all the tasks are dependent on their predecessors, so a quicker way to link the dependencies would be using the By Selection method as per below:
2) By Selection
   - Select the task rows in the table that are to be linked with a dependency. In the example above we know all the tasks are dependent on each other, so we will select rows 2, 3, 4, 5 & 6 with the mouse and click (menu: Edit / Link) or simply click the task linking icon.
   - You will see that all the tasks have now become dependent on each other with one click, rather than typing each individual task dependency in manually.

You can select multiple or separated rows by using the CTRL-click action (for multiple selections).

3) By Dragging the Mouse

   Note - tasks need to have a duration defined for mouse dragging to be effective.

   - You can link two tasks together by pointing the mouse on the Gantt chart at the bar of the predecessor task. The mouse pointer should change to a cross-hair symbol.
   - Left-click and hold on the predecessor task and drag it to the successor task. The pointer should change to a chain symbol. Release the button and the tasks should be linked together.

   Caution! Be careful not to move the Gantt bars to the left or the right as it will cause the start and end dates to change instead of the task linkages!!

You can also link individual Summary Tasks by any of the three methods, but you cannot link a summary task to any of its own sub-tasks.

Removing Task Dependency Linkages

You can delete dependencies by clicking on the number in the "predecessors" box and deleting it with the delete key.

Alternatively you can select the linked tasks in the table and use the menu item Edit – Unlink or click the icon or click the link line between the two tasks in the Gantt chart and select the “Remove” option in the pop-up menu.
Defining Other Task Dependencies (SS, FF, SF) and Creating Time-Lags or Overlapping Tasks

The dependencies entered can be differentiated even further, allowing you to specify a time gap between two tasks or overlap tasks.

For example:

- The walls cannot be plastered until one week after the pouring of the floor screed, because the floor screed has to dry first.
- One day before the end of the renovation work, you can begin with the cleanup activities.

Creating time lags or overlaps

Lags and overlaps are best applied by clicking the link line on the Gantt chart (assuming a link already exists):

- Click on the link line between two tasks in the Gantt chart.
- You can change the dependency type in the dialog box that appears if you wish.
- Enter the desired delay time into the **Lag** field.
- Confirm by clicking OK.

The default value of delay days is set to 0 days. By entering a positive value you create a time lag and by entering a negative value you will create an overlap of a predecessor and successor.

Alternatively, you could apply the following procedure:

- Double-click the task for which you wish to change the dependency relationship or click on the Task Information icon to bring up the information window.
- Open the **Predecessor** tab.
- Choose the dependency type and the lag duration value (positive or negative).

For even greater control, you can manually enter the link including the desired specifications into the ‘predecessors’ column as per below:
You can see in this way, highly complex dependencies can be specified.
Critical Tasks and Scheduling Conflicts

How to Identify Scheduling Conflicts

If you haven’t entered all the task durations into your project, now is the time to do it. Should the end date calculated by OpenProj not concur with your schedule target date, then you will need to assess and resolve the scheduling conflict by reviewing the critical tasks.

- Critical tasks are those tasks that have zero slack. A delay in any critical task will lead to the slippage of the entire project completion date.
- Critical tasks are displayed in red in OpenProj.
- ‘Slack time’ bar indicators can be displayed by right clicking in the Gantt chart and select Bar styles – Total slack. The hatched bars display the slack as specified. See page 21 for more on building in slack time and buffers.
- The Critical Path displays the critical tasks in the project.
- Since the critical tasks have a direct influence on the end date, it is important for the project manager to pay close attention to these in order to avoid slippages in the target completion date.

Possible Solutions to Scheduling Conflicts Achieved Through Changing Critical Tasks

- Assign additional project resources to the tasks (personnel, machine capacity, etc.)
- Rethink the duration of the tasks (is there hidden slack due to pessimistic estimations?)
- Apply overtime to the critical tasks.
- Review the task dependencies (don’t always use the ‘normal’ FS approach.)
- Look for opportunities to run tasks in parallel.

Filtering for Critical Tasks

OpenProj has the ability to only display the critical tasks to you by applying the filter as shown below.
Milestones and Deadlines

Establishing Milestones

Milestones are important completion or decision points in a project that are often tied to a deliverable. The start and finish of a phase should always be defined by a milestone. Milestones represent project status (not activities); thereby, they will have date values but as a rule, they will have no duration.

Enter a new task into the schedule (e.g. Design Complete) and give this task a duration of 0 (zero). The task will now appear in the Gantt chart as a black diamond shape.

Set the milestones of a phase to be at the same indent level as the Summary Task (not the indented task level), and then link the milestones directly to the Summary Task. Dependencies can only be set between elements on the same indent level.

In the next step, we will create start milestones and end milestones for each phase. We need to link the end-milestones of the previous phase to the start milestones of the next phase.

Now the project timeline is represented by a sequence of phases. The final milestones represent the results of each phase, the deliverable. The tasks within the phases describe the activities which are necessary to produce the phase result or deliverable.
**Note:** So far we have not set any further dates other than the start date of the project. A (preliminary) end date arises only from having a start date for the project, the duration of each activity and the selected task dependencies.

This is the only way to make Project Planning successful!

**Setting Deadlines**

Deadlines are used to monitor the progress of individual tasks. A deadline set for a particular date will trigger a notification as soon as that date slips and an icon in the indicator column is displayed. Deadlines also appear in the Gantt chart as yellow diamonds.

To set a deadline:

- Select the task in **Name** column for which you'd like to apply a deadline.
- Open the task information Dialog Box by double-clicking the task name, or click the **icon.**
- Select the **Advanced** tab and enter the desired date into the **Deadline:** field.
- Confirm your entry and click **Close.**
Changing Task Information

Editing the Task Information

All task-related information is managed centrally via the Task Information window. For every task you have the ability to modify information and task settings within six tabs.

It’s good practice to edit information in this menu rather than in the columns in the table view of the spreadsheet.

<table>
<thead>
<tr>
<th>Tab</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>General task date information and percentage complete information.</td>
</tr>
<tr>
<td>Predecessors</td>
<td>List of all predecessor tasks and dependency type settings.</td>
</tr>
<tr>
<td>Successors</td>
<td>Information about successor tasks and dependency type settings.</td>
</tr>
<tr>
<td>Resources</td>
<td>Shows the assigned resources and allocations for this task.</td>
</tr>
<tr>
<td>Advanced</td>
<td>Task type and date constraint information.</td>
</tr>
<tr>
<td>Notes</td>
<td>Allows entry of notes about the task.</td>
</tr>
</tbody>
</table>

We will touch upon the subject of these tabs later in the guide.
Task Constraints

Working with Task Constraints

The default task constraint setting is: **As Soon As Possible**

This means that the start date of a task is calculated from the project start date, the duration of predecessor tasks and the task dependencies.

The other date constraints are self-explanatory.

The plan is still completely dynamic. A change in the project start date (Menu: *Project – Project Information*) will result in a recalculation of all project task dates.
The Encapsulated Project Structure

Now it's time to give your project schedule a firmer structure; metaphorically speaking, a skeletal frame. This will happen by encapsulating the phases and adding planned slack or buffers.

Buffers should be visibly represented and will be automatically reduced during the course of the project if schedule variances occur. Additionally, buffers should be in place so that a date variance at the beginning of the project doesn’t impact all phases, but rather only impacts the tasks in the relevant phase. In this way, the project manager has the opportunity to take countermeasures so as not to jeopardize the whole project. The very essence of good project control.

In order to achieve this, a buffer is inserted between the end milestone of a predecessor phase and the start milestone of the next phase by setting a task constraint “must start on” to the start milestone. The time difference between the calculated finish date of the end milestone and the fixed start milestone of the next phase is the “planned slack or buffer”.

The duration of the buffer time depends on several factors such as the complexity, familiarity (one can estimate more accurately the known activities vs. something that has never been done before) and the total length of the phase. For example, a buffer period of 5 days at the end of a phase which lasts only two weeks is probably a little exaggerated. The same slack in a phase lasting half a year is probably too optimistic.

- Select the starting milestone of the (successor) phase in the Name column
- Open the Task Information window
- Choose the Constraint Type: Must Start On and set a date that matches your desired buffer duration.
- Confirm and click Close.

Between task 6 (design complete) and task 7 (start development) a week of slack buffer time was entered (15/12/11 to 22/12/11).

The icon in the indicator column indicates that task 7 has a date constraint, thus, all activities within this phase have a time buffer (the hatched bars).

If the duration for task 3 (analysis) is now extended to 15 days the slack is used up, and the tasks in the phase will be displayed as critical tasks in the schedule.
Generally, critical tasks (red bars) are cause for concern for the project manager as he must try to maintain the scheduled project completion date through the application of other appropriate countermeasures and can no longer rely on a buffer.

The next stage in the project plan is to allocate resources!
Resource Planning

Entering Resources

Fundamentals for Resource Planning
An important step in project planning is the allocation of resources to individual tasks.

A resource is any type of entity (persons, material, equipment and expenses) that are required to accomplish the tasks in the plan. For example, the available project team members, external contractors, tools and computers, leased office space, building or manufacturing materials are all resources.

OpenProj only distinguishes between two types of resources:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>Work resource is basically time or labor (staff, consultants, freelancers and contractors)</td>
</tr>
<tr>
<td>Material</td>
<td>Material resource represent items or commodities consumed to complete tasks in the project (tons of concrete, lengths of wire, units of computers..)</td>
</tr>
</tbody>
</table>

Resource Sheet Creation

Before you are able to allocate resources to a task you will need to establish a resource sheet/table. In this table you will list the available resources and additional resource information.

- Select the menu item View – Resources or choose the icon from the view button pane.
- Enter the name of the resource into the Name column in the resource table.
- Choose the resource type in the Type column.
- You may also enter generic resource names (e.g. Software Programmer).
- The Max. Units reflect the quantity of this generic resource available. 700% means, that you have 7 Software Programmers in your project team.

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of the resource (name, job title, machine name, material name, cost type).</td>
</tr>
<tr>
<td>Type</td>
<td>Type of resource (Material or Work).</td>
</tr>
<tr>
<td>Material Label</td>
<td>This column contains the unit of measurement of the material, for example, liters, pallets, or cubic meters. Entries are only allowed for Material resources</td>
</tr>
<tr>
<td>Initials</td>
<td>OpenProj automatically assigns the first letter as initial. You can change this name if necessary.</td>
</tr>
<tr>
<td>Group</td>
<td>Here you can specify group names for resources (such as Department, cost center, etc.) It can be filtered according to this information.</td>
</tr>
</tbody>
</table>
Max. Units % Specifies the number of people, machines or similar in % for the total number of available units. The default is 100% (1). This field can only be used for work resources.

Standard-Rate Enter of the cost/unit. For example, labor cost per hour. For machines enter the price or fee per unit of time.

Overtime Costs for work outside normal working hours.

Cost Per Use Fixed pay rate for the use of a resource. For example travel costs of external employees, fixed price per device.

Base Calendar Select the project calendar you have created at the beginning. A resource calendar is assignable to each resource whereby individual working hours and holidays can be defined.

Resource Allocation

Assigning Resources to Tasks

After you have populated the Resource Sheet with resource, you have various methods available to apply them to tasks in the plan:

1) Assigning Resources Using the Assign Resource Dialog Box

- Select the desired task in the task table for which you would like to add a resource.
- Choose **Tools-Assign Resources** from menu bar.
- Alternatively: *Assign Resources* entry Dialog Box you’ll see a list of all assignable resources.
- Click on the resource you want to add and click the Assign button.
- Close the window.

After you’ve assigned the resources you’ll see them listed next to the task bars in the Gantt view as well as in the Resource Names column.
2) **Through the Task Information Dialog Window**

- Double-click on the task and then choose the **Resources** tab.
- Click the ![Resources](icon.png) icon.
- The familiar resource window should open.
- Assign the desired resources and then close the **Assign Resources** window.

The **Assign Resources** window will also allow you to replace, remove, add or change % allocation to tasks after the fact.
**Resource Information**

As with the Task Information window there also is a centralized resource administration feature within the application. This feature is called **Resource Information dialog box**.

You can open this feature by double-clicking the resource’s name in the Resource Sheet or by clicking the icon. You can also access it by using the menu bar item **Project – Tasks/Resource Information**.

The 5 tabs in this window allow you to add various details to the resources:

<table>
<thead>
<tr>
<th>Tab</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Contains general resource information.</td>
</tr>
<tr>
<td>Costs</td>
<td>Here you can modify the cost per hour as well as 5 different cost rates (e.g. for subcontractors).</td>
</tr>
<tr>
<td>Resource Availability</td>
<td>Here you can assign date availability of the resource as well as available capacity (e.g. 50%).</td>
</tr>
<tr>
<td>Tasks</td>
<td>Here you will see all tasks to which this resource has been assigned. You can determine allocation as well as perform leveling of the resource. You can also get to the standard rate table from here.</td>
</tr>
<tr>
<td>Notes</td>
<td>Here you can enter additional notes and information about the resource.</td>
</tr>
</tbody>
</table>
Resource Calendars
Just like we can define a custom calendar for certain tasks, we can do the same for resources.

To create a Resource calendar, go to the Resource Information view by clicking View – Resources. Here you should see a list of all resources for your project. Let us change the calendar for the resource Bob Hunt.

- Double click on the resource name.
- Select your Project Calendar as the Base Calendar.
- Click on the calendar icon to the right of Base Calendar.
- The resource calendar for Bob Hunt opens (confirmed by the name in the top left corner).
- Mark the vacations of Bob Hunt and click Non-Working Time or change his individual working hours as appropriate.
Work and “Scheduling By Task Type”

Work & Effort
The ability to add one or multiple resources to a task has opened up a whole new variable in the project. The variable of “effort”:

\[ \text{Effort} = \text{Duration} \times \text{Resource Allocation} \]

You should really understand this equation in order to grasp the following concepts and practical applications of planning your project. For example, if we take a task with a duration of one day (8 hours) and we assign two resources at 100%, the total effort equates to 16 hours (and costs are calculated accordingly). A task with a duration of two days, with one resource at 100% plus another resource allocated at 50% will equate to 24 hours of effort. (16 hours plus 8 hours).

We can monitor the effort by inserting the Work (this is how OpenProj represents effort) column before the Duration column. To insert this column you must right-click the column header on the Start column and then choose the Insert Column – Work. You can start typing the word “Wor...” to quickly get to the correct item.

There are some tasks that can be completed within a shorter duration if more resources are allocated to it. For example, 4 brick layers will build the walls of a single family home in half the time than two. In contrast, will a meeting finish more quickly if more people are present? Probably not.

The specific attributes of a task are controlled through the Task Type in OpenProj.

- Menu Project – Tasks/Resource Information
- Or the icon Advanced tab.
- Type field.
- Checkbox “Effort Driven”

The default task type in OpenProj is Fixed Units – Effort Driven. This means that the resource allocation determines the duration and effort of the task.

OpenProj works with proportional changes. By doubling the units you cut the task duration by half. In practicality, this relationship does not always hold true. Four programmers don’t necessarily develop a program in half the time that two developers would. In that example the added cost and effort would not necessarily be effective.
The Work (Effort) Package Is Defined by Initial Resource Allocation! It is during the initial assignment of a resource to a task that the work package gets defined. A change in the resource allocation (percentage-wise or through addition or reduction of a resource) will change the duration if the task type is set to Fixed Units.

This sometimes leads to surprising but not necessarily false results. Task Duration Is Determined By Controlling Resource.

For the calculation of a task’s end date in effort-driven planning, it is the resource that works the longest on the task that will determine task completion (logically!) This can also be due to a part-time resource that only has a few hours daily to commit to the task.

You can deactivate the effort-driven attribute of the task by removing the check mark in the “Effort Driven” check box in the task information window.

The setting Fixed Duration is frequently preferred by those users who do not fully trust the automatic calculation of OpenProj. The duration remains fixed as the project manager planned it, regardless of how many resources are added or removed. The project manager calculates the duration manually - he would rather do this in his head instead of leaving that task to a machine.

As described earlier, there are compelling reasons to choose this task type: will construction of a building finish more quickly if more supervisors are added? Does the drive from New York to Chicago take half as long if 4 people instead of 2 sit in the car? Will a business meeting be shorter if 20 participants instead of 10 attend? OpenProj is a calculation program, which can only handle the basics of mathematics; it has no knowledge about your tasks or the people on your team.

Here, as in many other instances- it is the experience and wisdom of the project manager that should be predominant. The intelligence is sitting in front of the computer!
### Overview of Task Types

<table>
<thead>
<tr>
<th>Fixed Units</th>
<th>Effort Driven</th>
<th>You Change</th>
<th>OpenProj Calculates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Units</td>
<td>Yes</td>
<td>Duration</td>
<td>Work</td>
</tr>
<tr>
<td>Fixed Units</td>
<td>Yes</td>
<td>Work</td>
<td>Duration</td>
</tr>
<tr>
<td>Fixed Units</td>
<td>Yes</td>
<td>Resource Units</td>
<td>Duration</td>
</tr>
<tr>
<td>Fixed Units</td>
<td>No</td>
<td>Duration</td>
<td>Work</td>
</tr>
<tr>
<td>Fixed Units</td>
<td>No</td>
<td>Work</td>
<td>Duration</td>
</tr>
<tr>
<td>Fixed Units</td>
<td>No</td>
<td>Resource Units</td>
<td>Duration</td>
</tr>
<tr>
<td>Fixed Units</td>
<td>No</td>
<td>Additional resources with other names.</td>
<td>Work for the task</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixed Work</th>
<th>Effort Driven</th>
<th>You Change</th>
<th>OpenProj Calculates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Work</td>
<td>n/a</td>
<td>Duration</td>
<td>Resource Units</td>
</tr>
<tr>
<td>Fixed Work</td>
<td>n/a</td>
<td>Work</td>
<td>Duration</td>
</tr>
<tr>
<td>Fixed Work</td>
<td>n/a</td>
<td>Resource Units</td>
<td>Duration</td>
</tr>
<tr>
<td>Fixed Work</td>
<td>n/a</td>
<td>Additional resources with other names.</td>
<td>Duration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixed Duration</th>
<th>Effort Driven</th>
<th>You Change</th>
<th>OpenProj Calculates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Duration</td>
<td>Yes</td>
<td>Duration</td>
<td>Work</td>
</tr>
<tr>
<td>Fixed Duration</td>
<td>Yes</td>
<td>Work</td>
<td>Duration</td>
</tr>
<tr>
<td>Fixed Duration</td>
<td>Yes</td>
<td>Resource Units</td>
<td>Work</td>
</tr>
<tr>
<td>Fixed Duration</td>
<td>Yes</td>
<td>Additional resources with other names.</td>
<td>Resource Units</td>
</tr>
<tr>
<td>Fixed Duration</td>
<td>No</td>
<td>Duration</td>
<td>Work</td>
</tr>
<tr>
<td>Fixed Duration</td>
<td>No</td>
<td>Work</td>
<td>Resource Units</td>
</tr>
<tr>
<td>Fixed Duration</td>
<td>No</td>
<td>Resource Units</td>
<td>Work for the task</td>
</tr>
<tr>
<td>Fixed Duration</td>
<td>No</td>
<td>Additional resources with other names.</td>
<td>Work for the task</td>
</tr>
</tbody>
</table>
Individual resource allocation

Two resources by the name of Bob Hunt and Kerry Peters are working on a task with duration of 7.5 days. Due to the nature of the task it was required that Bob starts first as well as works throughout the entire activity. The result of Bob’s work is the foundation for the work to be started by Kerry. Kerry is only allocated part-time to the task. This type of allocation is called a ‘staggered order’ or ‘staggered allocation’.

First, apply the normal resource assignments for Bob and Kerry, both at 100% allocation. Then, change the allocation in the view called Task Usage.

The Task Usage Detail view is accessible from the menu item View-Task Usage, or also via the icon on the view button pane.

Allocation of Staggered Resources

The newly calculated assignment duration for Bob now entails 60 hours and Kerry is allocated at 38 hours. The total work effort now requires 98 hours instead of 120 hours. Due to this staggered allocation model we don’t seem to observe any side effects with respect to the task type or effort allocation type. Regardless of which task type is set, it does not change the task’s duration. It only changes the total calculated work effort.

The end result can also be viewed in the Gantt Chart.

With a right-click to the diagram you’ll be able to pull up the contextual menu and activate the Show Assignments feature.
Resource Leveling

What is the Purpose of Resource Leveling?
So, you’ve entered all planned tasks into your project, mapped the dependencies between the tasks and assigned resources and their allocations to the tasks. Perhaps you’ve assigned a resource to two or more tasks at the same time in the schedule (parallel tasks), and are now faced with an over-allocated resource. If this happens, then you will encounter a resource conflict which must be dealt with. This process is called “resource leveling” which is a critical part of project planning.

Resource Leveling Strategies
In order to remedy a resource over-allocation, you can apply one or several of the following measures:

- Change the properties of certain tasks (delay them, interrupt them)
- Change the allocations of tasks
- Change the working times of a resource

Viewing Resource Over-allocations
Unfortunately OpenProj will not display over-allocation of resources in the Resource Sheet. To review and check the resource utilization you will need to click the relevant task in the top window then open the resource diagram in the lower part of the split window. Use the menu View-Histogram or click the view button pane icon.

The capacity diagram can be zoomed in and out by using the magnifier icon, just like all other views.

In this view you see that the resource, Marshall Duffy begins work during the week of January 22nd, and is already over-allocated (>100%). Note, you can also select a blank row in the top window and then select Marshall Duffy in the bottom window to see over allocations for Marshall for the whole project.

Now select row 11 in the top window again and change the view in the bottom half of the window to the Resource Usage view. You can access the view from the menu from View – Resource Usage or by clicking the icon.
In the upper half of the split window, insert a new column called **Free slack** after the **Duration** column.

Select the task to which the over-allocation applies (Develop final product) in the Gantt chart. In the bottom view you will see the assigned resource(s) and assigned tasks as well as the allocated work hours. A possible solution to resource over-allocation could be to move the task “Develop final product” to a later date. Since this task has free slack of 7.5 days we also know the maximum value for which a move can be made without impacting other phases.

The **Leveling Delay** field in the **Resource Utilization** view serves the purpose of delaying the task for resource leveling purposes. We will enter a value of 5 days for this task here.

Going back to the View-Histogram on the lower pane shows us that the resource is no longer over-allocated.
Of course, we could have taken other approaches here. For example, letting the task in the Task Table start 5 days after its predecessor (with a dependency type relationship that creates a positive delay of 5 days) or, as discussed in the previous chapter about staggering approaches, manually distributing the work for the over-allocated resource so that it is completely leveled via over-time.

You can see that there are many methods available to level out a resource over-allocation problem. This kind of situation is one in which the creativity and personal judgment of the project manager are essential.

As you already know: The Intelligence ....
Project Cost Calculations in OpenProj

Project Cost Calculation Fundamentals
Frequently the success of the project isn’t just tied to the on-time delivery, but also to cost management and cost control. With the help of OpenProj you will be able to determine and monitor these project costs.

Cost Table
After the individual task resources were assigned (work and material resource types), the costs were calculated by OpenProj per task, per phase and for the entire project. This data is viewable in the Cost Table which can be viewed as follows:

- Right-click the mouse on the intersection point between the column headers and rows (top left corner) and you’ll see a menu of standard table choices.
- Select the Cost table view.

Select Default to return to the standard entry table (or Default* if you have modified the standard table). Note, you can also rename any view here.
Set Baseline

You should now have a project plan that is free of scheduling conflicts and resource over-allocations. Always try to start your project with a “clean” plan. Problems with schedule variances and over-allocated resources will appear sooner or later all on their own, and you will have plenty of work to do in keeping your plan under control. You should have created a cleanly encapsulated planning model with buffer/slack built into each of the individual phases which you will be grateful for as the project progresses.

Once the plan has been presented and approved, it is time to set you set your baseline plan. Setting a baseline allows an illustration of how the plan was originally perceived (i.e. the baseline plan) against how it is actually doing in practice. You tell OpenProj how the plan is progressing in practice by inputting ‘actuals values’ against the specific tasks.

The baseline plan can be established by going to the menu and selecting **Tools – Tracking – Save Baseline**.

- If a baseline plan already exists, you can still add further tasks later by using the check box “Selected Tasks”.
- An updated version of a baseline plan will always overwrite the previous version. This is typically undesirable as it changes the current actuals values into new estimated values, and could invalidate the original business approval assumptions for the project.

After confirming and saving by clicking OK, you’ll notice gray bars that have now appeared in the Gantt chart. These indicate the values of the baseline plan.
Project Monitoring

Once the project is up and running, we need to let OpenProj know how the tasks are progressing in the real world. This is called project monitoring. Monitoring means comparing the plan to the reality and taking appropriate action where negative variances arise.

For example, if you now have a duration for task 4 (Present Alternatives) that needs to be extended to 10 days, then you’ll see a deviation between the baseline plan and the actual plan.

Since the project monitoring module for OpenProj contains several bugs we suggest you exercise caution while making updates. Always save a backup copy under a different filename after you’ve saved your baseline plan!

Use the Tracking entry view for the entry of actuals. (Do you remember how? Right-click on the intersection point between the rows and column headers top left of the table).

Only enter values into the Actual Start, Actual Finish and/or Actual Duration and/or Percent Complete fields. The other values will be automatically calculated from your entries in the actual fields.

When you enter Actual Start and Actual Finish, OpenProj will automatically calculate the Actual Duration and place the Percent Complete value at 100% (otherwise there wouldn’t be an Actual Finish). The Actual Work and Actual Costs will be automatically updated as well. It’s a good idea to create a practice plan file for yourself to get acquainted with these operations.
You also have the ability to enter values for the actuals through the *Task Information* window or through the menu at *Tools – Tracking – Update Tasks*. It is strongly advised against this, though. As wonderful as the planning module for OpenProj is – the monitoring module remains quite vulnerable to corruption during usage of the form views.

The results of the entries for the actuals values can be easily discerned within the Gantt chart.

The black bars inside the task bars represent the level of completion for the activities; likewise, the green checkmarks in the status column indicate completed tasks.
Reports

Standard Reports
OpenProj offers a number of standard reports, which you can open from the navigation pane with the following icon:

Play with the various reporting options and determine which of them will suit your reporting requirements. You can select from the dropdown menu in the top middle of the screen and choose from:

- Project Details
- Resource information
- Task Information
- Who does what

Some of these selections bring up a further options box to the right which enables you to select different types of data.

User Defined Reports
You also have the option to create your own reports, in which you can insert tables that contain the columns and rows that are of highest importance for your needs.

In addition, you can apply filters, sorting and grouping formats to them and you can choose to print them or store them as .pdf documents.

To do this, simply navigate to the menu and click File – Print. The print out will correspond exactly to the view visible on your computer monitor so by moving the screen split bar to the left or right you can view a table without a Gantt chart, or a Gantt chart without a table, or a combination of both.

Proof the print job prior to printing by using the print preview feature located at the menu and File – Print Preview. Here you can make some additional tweaks and adjustments for the print job e.g. Print table (spreadsheet), print diagram (Gantt).

There are almost endless options available so it’s worth experimenting for a while to see which options produce the best result for your individual needs.

Unfortunately, OpenProj lacks the ability to store user-defined formats. You will need to recreate your desired table/graphic again each time you return to the printing menu.
Afterword

You now hopefully now have the basic operational knowledge about OpenProj. It may still take some time for you to fully understand how to lay out and plan a complete project. Mastering a tool alone does not necessarily mean you have mastered the methodology.

We wish you much success in the planning and implementation of your projects. Good luck!