



WOLAITA SODO UNIVERSITY
COLLEGE OF ENGINEERING
DEPARTMENT OF CONSTRUCTION TECHNOLOGY
AND MANAGEMENT

Computer Based Construction Planning
(CoTM4222)

Pre-Requisites

Construction planning and scheduling
(CoTM4221)

What is planning?

What is scheduling?

What is the d/c b/n planning and scheduling?

What techniques are used in planning and scheduling

Objectives & Competences to be acquired

- To introduce the student to project planning using advanced recent computer software.
- At this times to introduce the student to the following:
 1. Project Management information systems MS Project and Primavera.
 2. To be able to plan an actual project using any of the software available at the time for the purpose.

Outline

Chapter one Introduction

- Planning and scheduling
- Application of Computer Software, Primavera, Microsoft Project;

Chapter Two Preparation of Construction plan and schedule

Using software:-

- MS-Project
- Primavera.

Assessment/Evaluation & Grading System

- 60% Two Project Works
- 10% Assignment
- 10% Quiz
- 20% Final Exam

Attendance Requirements

- Minimum of 90% during lectures and 100% during laboratory class

Reference

- Literature MS project and Primavera software's, Software manuals, any written literature on the above software

Introduction

- Planning is a general term that sets a clear road map that should be followed to reach a destination.
- The term, therefore, has been used at different levels to mean different things.
- What are the concepts involved in planning?
- Planning involves the breakdown of the project into definable, measurable, and identifiable tasks/activities, and then establishes the logical interdependences among them.
- Generally, planning answers three main questions:
 - What is to be done?
 - How to do it?
 - Who does it?

What Is a Project

- What Is a Project? Before we define project planning, we need to define a project.
- The Project Management Institute (PMI 2008) defines a project as “a temporary endeavor undertaken to create a unique product, service, or result”.
- The key words in this definition are temporary and unique:
- any project must have a starting point and an ending point, and it must have a deliverable product or service that is unique.

Projects Exclusivity

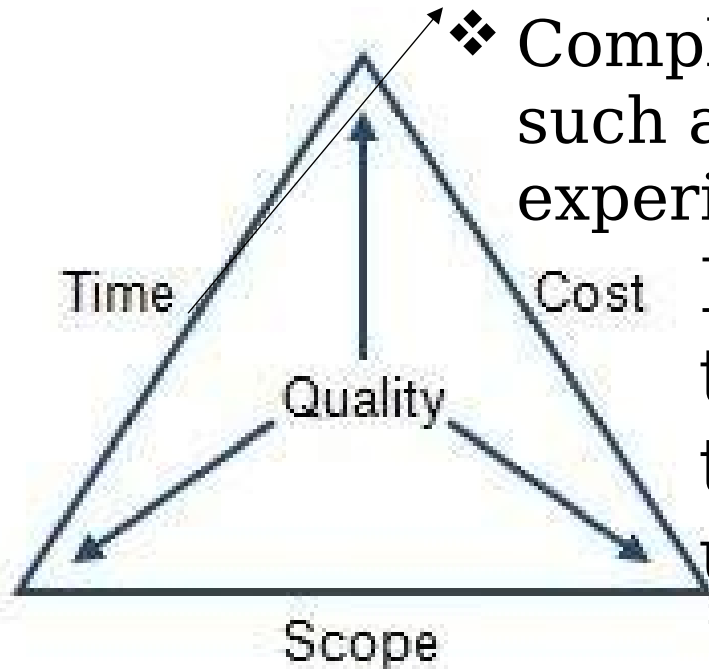
- Are Projects Unique?
- Some people may think of two construction projects as identical just because they have the same design.
- In project management, we may have similar projects, but every project is unique.
- Differences may come from a difference in location (soil type, weather conditions, labor market, building codes, unforeseen conditions, etc.), in management type and experience, or in circumstances.

Projects have the following characteristics

- ✓ A finite and defined life cycle
- ✓ Defined and measurable business products
- ✓ A corresponding set of activities to achieve the business products
- ✓ A defined amount of resources
- ✓ An organization structure, with defined responsibilities, to manage the project

Project Triangle

- All projects involve time, money, and scope.
- Change one and the others are impacted.
- At the center of the triangle is Quality - affected by any change in the other three.
 - ❖ A project's activities can either take shorter or longer amount of time to complete.
 - ❖ Completion of tasks depends on a number of factors such as the number of people working on the project, experience, skills, etc.



It's imperative or commanding for both the project manager and the organization to have an estimated cost when undertaking a project.

Scope looks at the outcome of the project undertaken

Project Planning

- **Project Planning** is defined as developing the basis for managing the project, including the planning objectives, deliverables, interim work products, procedures, organization, chain of activities, resources types and numbers, timing, routines and finances.

Project planning involves:

- Identification of all of the tasks to be performed given the scope of the project and the technical and business constraints;
- Estimating the effort and cost of completing each task; and
- Project scheduling

Project Planning

- Project planning has been defined as “the process of choosing the one method and order of work to be adopted for a project from all the various ways and sequences in which it could be done” (Antill and Woodhead 1990; Callahan, Quackenbush, and Rowings).

Project Planning Steps

The following steps may be used as a guideline, or checklist to develop a project plan:

1. Define the scope of work, method statement, and sequence of work.
2. Generate the work breakdown structure (WBS) to produce a complete list of activities.
3. Develop the organization breakdown structure (OBS) and link it with work breakdown structure to identify responsibilities.
4. Determine the relationship between activities.
5. Estimate activities time duration, cost expenditure, and resource requirement.

Project scheduling

- Project scheduling is one of the **critical management tasks** as it dictates **the time frames** in which the project will be completed, the budgets/costs in terms of resource requirements and the sequence of tasks to be completed is one of the critical management tasks as it dictates the time frames in which the project will be completed, the budgets/costs in terms of resource requirements and the sequence of tasks to be completed
- **Project scheduling** is defined as the **process of determining when project activities will take place depending** upon defined durations and precedent activities.

Scheduling

- Scheduling is the determination of the **timing** and **sequence of operations** in the project and their assembly to give the overall completion time.
- As mentioned previously, scheduling focuses on one part of the planning effort.

Project scheduling involves:

- ✓ Assigning resources to project tasks;
- ✓ Balancing completion dates against the availability of the appropriate resources to complete all tasks within the available time;
- ✓ Identifying dependencies between tasks so that they are scheduled in the correct sequence;
- ✓ Identifying realistic start and end points (elapsed time) to accommodate the number of man days work for each given task; and
- ✓ Critical path analysis to identify those tasks which are critical to the success and timely completion of the project.

THE SCHEDULER

❖ among three types of knowledge that a scheduler must have:

1. Knowledge of computer software (and perhaps hardware as well)
2. Knowledge of the principles of scheduling and project control (as part of project management)
3. Knowledge of the specific technical field, such as commercial building, industrial, transportation, and so forth

What is the d/c b/n planning and scheduling?

- Project planning answers the questions
 - ⇒ What is going to be done?
 - ⇒ How? Where? By whom? And
 - ⇒ When (in general terms, the project's start and end)?
 - ⇒ **Scheduling** deals with when on a detailed level.

why **project**
scheduling is needed?

- In the perspective of
- contractors or
- owners.

The Perspective of Contractors

1. Calculate the project completion date:
2. Calculate the start or end of a specific activity:
3. Coordinate among trades and subcontractors, and expose and adjust conflicts:
4. Predict and calculate the cash flow:
5. Improve work efficiency:
6. Serve as an effective project control tool
7. Evaluate the effect of changes

Perspective of Owners

1. Get an idea on project's expected finish date
2. Ensure contractor's proper planning for timely finish
3. Predict and calculate the cash flow
4. Serve as an effective project monitoring tool
5. Evaluate the effect of changes
6. Verify delay claims

Application of Computer Software, Primavera, Microsoft Project;

What is Project Management?

- The application of knowledge, skills, tools and techniques to a broad range of activities in order to meet the requirements of a particular project
- Is the processes of planning, organizing, and managing tasks and resources to accomplish a defined objective; usually within constraints on time, resources and cost.
- A project plan can be simple or complex

Application of Computer Software, Primavera, Microsoft Project;

Micro project 2010 comes with a collection of new features especially designed to **enhance your ability**

- to schedule,
- to collaborate with resources,
- to track progress and
- to communicate on your projects.

The Microsoft Project Map

- The Microsoft Project Map outlines the three phases of the project life cycle:
- Build a plan
- Track and manage a project
- Close a project

Microsoft Project

- Microsoft Project is software application designed to help Project Managers:
- Organize
 - List and group the tasks that together will lead to the desired Project outcome
 - Identify and assign the resources required to their respective tasks
- Schedule
 - Use dependencies between tasks plus constraints to position tasks on the Gantt chart
- Manage
 - Forecast costs and spending (Cash flow)
 - Allow the plan to be modified to account for actual progress
 - Monitor and report on progress including spend and workload

MS Project

- MS Project has been especially developed for project management and is a useful software application for **planning, tracking and controlling a project.**
- What can MS Project do for you?
- **MS Project is only a tool which supports project managers.** It does not execute project management for you.
- **MS Project can do calculations in terms of durations or costs accurately.**
- MS Project allows 'what if scenarios?', to make changes to the project and see the effects to those changes before finalising your plan and committing it to work.

MS Project

- Once your plan is in action, **MS Project can track all the information you collect about the work, duration, costs and resource** requirements for your project so that you can make adjustments in order to keep on target.
- MS Project helps you to create and print various predefined reports and views quickly.
- *However, whichever project management software package you have in use, the machine cannot do four things:-*

MS Project

- *It cannot create the **tasks** for you*
- *It cannot create the **logical** relationships between the tasks*
- *It does not know the **duration** of tasks*
- *It cannot possibly know what **resources** you have to apply to the tasks*
- Thus the drawing up of a detailed work plan showing the logic of sequences is an essential part of the planning process.

Project environment overview

- The Microsoft Project 2010 family of products consists of
 - Microsoft Project Standard 2010,
 - Microsoft Project Professional 2010 and
 - Microsoft Project Server 2010.
- The content of this course refers to features available in the two desktop versions (Standard and Professional).
- Most of the end user features are available in both versions, the main difference being that the Professional version is required if you want to connect to Project Server or sync tasks with SharePoint.
- Templates
 - o File ➡ New ➡ Available Templates (Templates on Office.com... On My Templates... or Recent Templates...)

File

Task

Resource

Project

View

Developer

Format



Save



Save As



Open



Close

Info

Recent

New

Print

Save & Send

Help



Options



Exit

Available Templates



Home



Blank project



Recent
templates



My templates

New from existing



New from
existing
project



New from
Excel
workbook



New from
SharePoint
task list

Office.com Templates

Search Office.com for templates



Forms



Planners



Plans and
proposals



Schedules

Microsoft Project 2010 new features

- Microsoft Project 2010 has numerous new features which are explored during this course:
- Customizable fluent user interface (the new ribbon) and Quick Access Toolbar
- Backstage view
- Timeline view
- Team Planner (Professional version only)
- Manual v Auto scheduling
- Task Inspector
- Active/inactive tasks
- Top down summary tasks

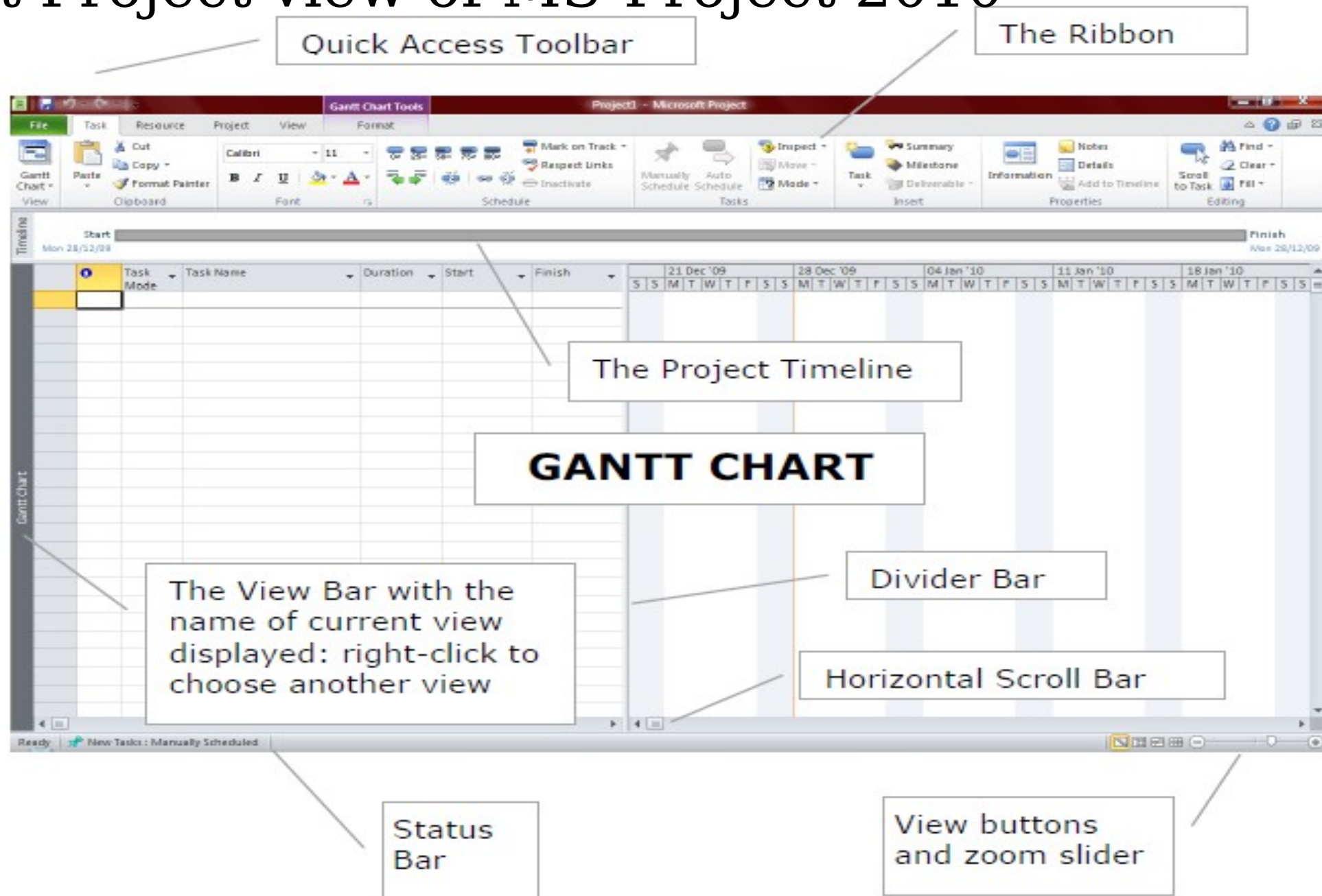
Understanding the Project 2010 Screen

- The main features the window project

Navigation

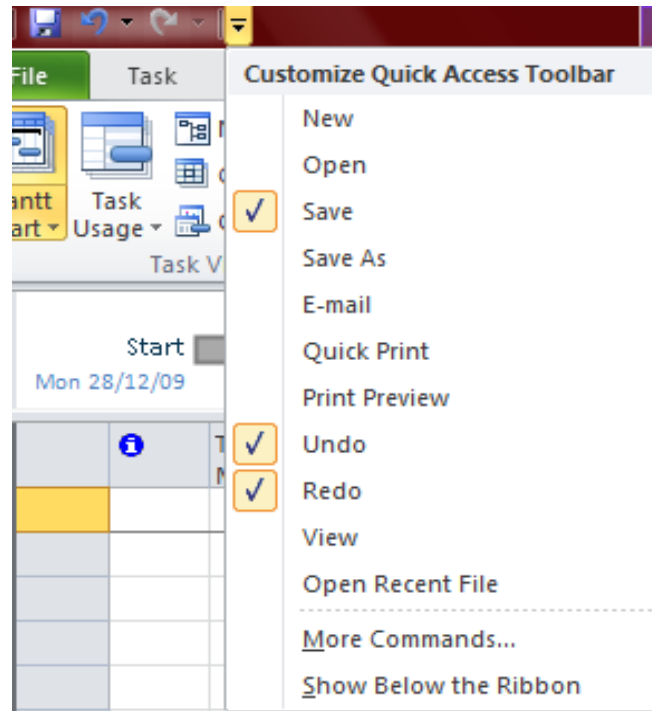
- The default Project view is the Gantt Chart view which consists of a table of data on the left hand side of the screen and a Gantt bar chart on the right.
- The Divider Bar separates the two and can be repositioned to display more of the table or more of the chart.
- The Gantt table consists of rows and columns. Just like on a spreadsheet, the intersection of a row and a column is called a cell. The Gantt bar chart graphically displays your schedule.

Default Project view of MS-Project 2010



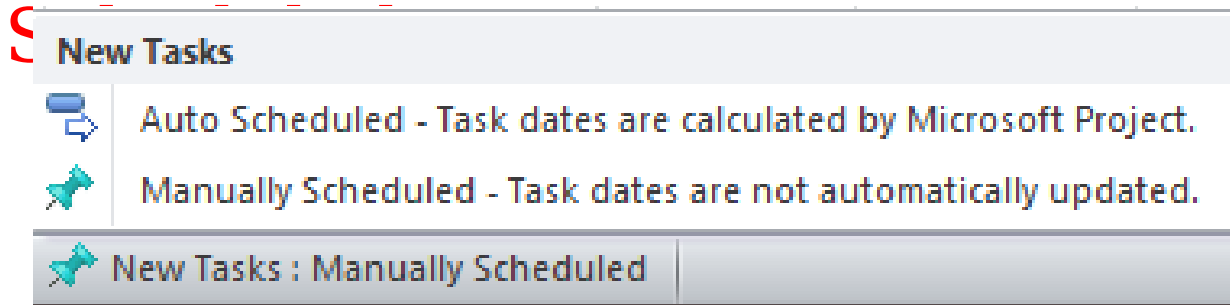
The Quick Access Toolbar

- The Quick Access Toolbar (QAT) is a customizable toolbar that can display either above or below the Ribbon.
- Click the Customize Quick Access Toolbar (on the right of the QAT) to change how it is displayed:



Understanding the Project 2010 Screen

- The Status Bar:
- The status bar displays information such as whether filters are applied or whether new tasks are 'Manually' or 'Auto

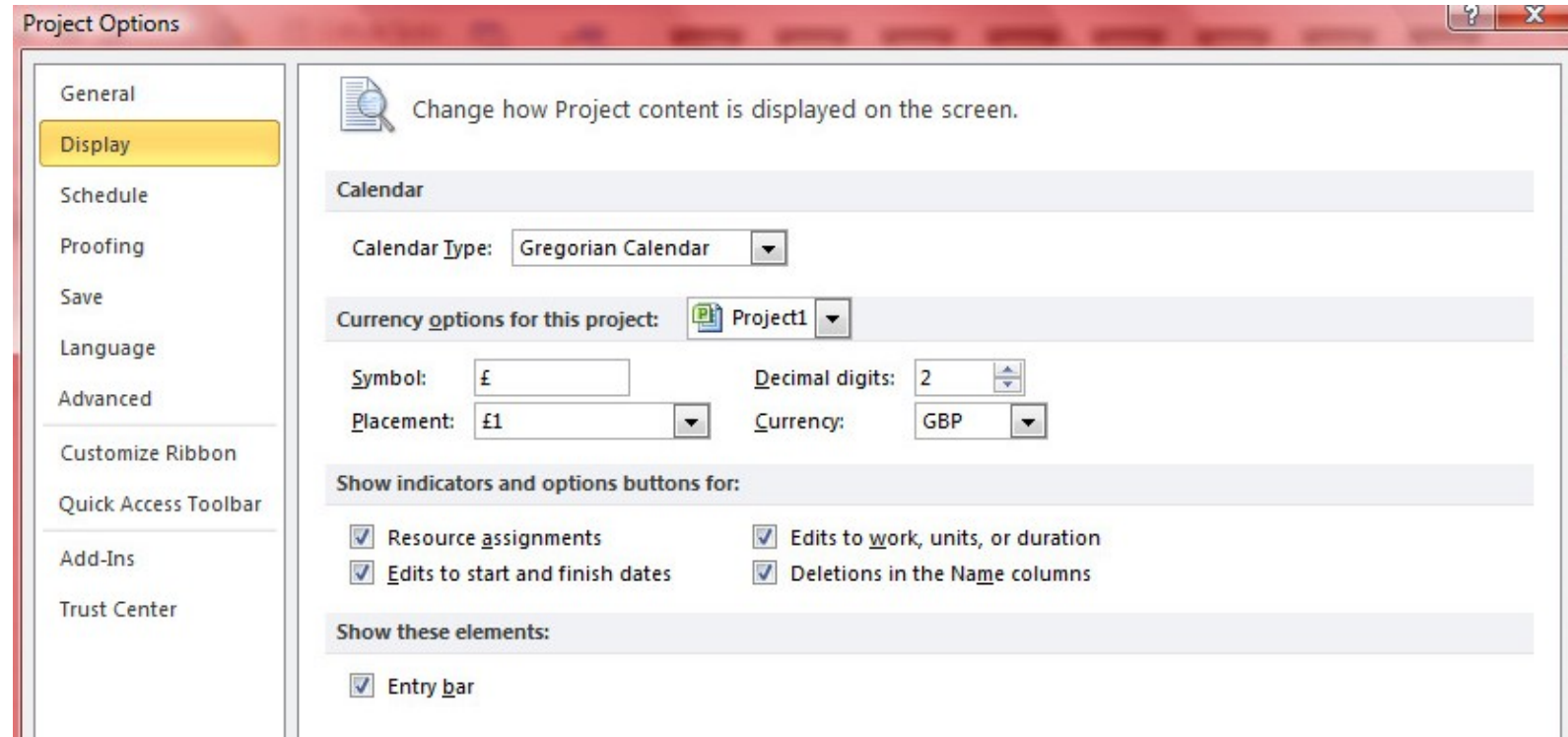
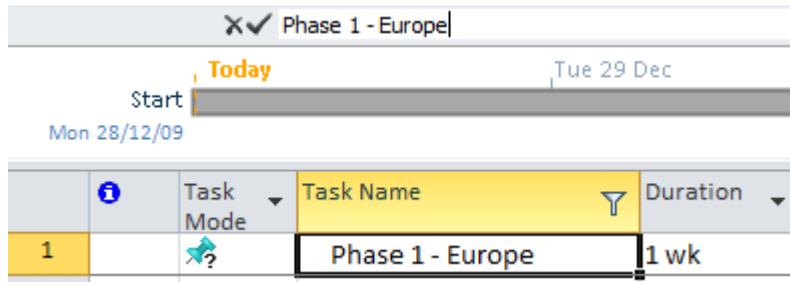


- On the right of the status bar is the Zoom Slider and quick buttons for displaying the main views of Project (Gantt Chart, Task Usage, Team Planner and Resource Sheet):



Understanding the Project 2010 Screen

- The Entry Bar:

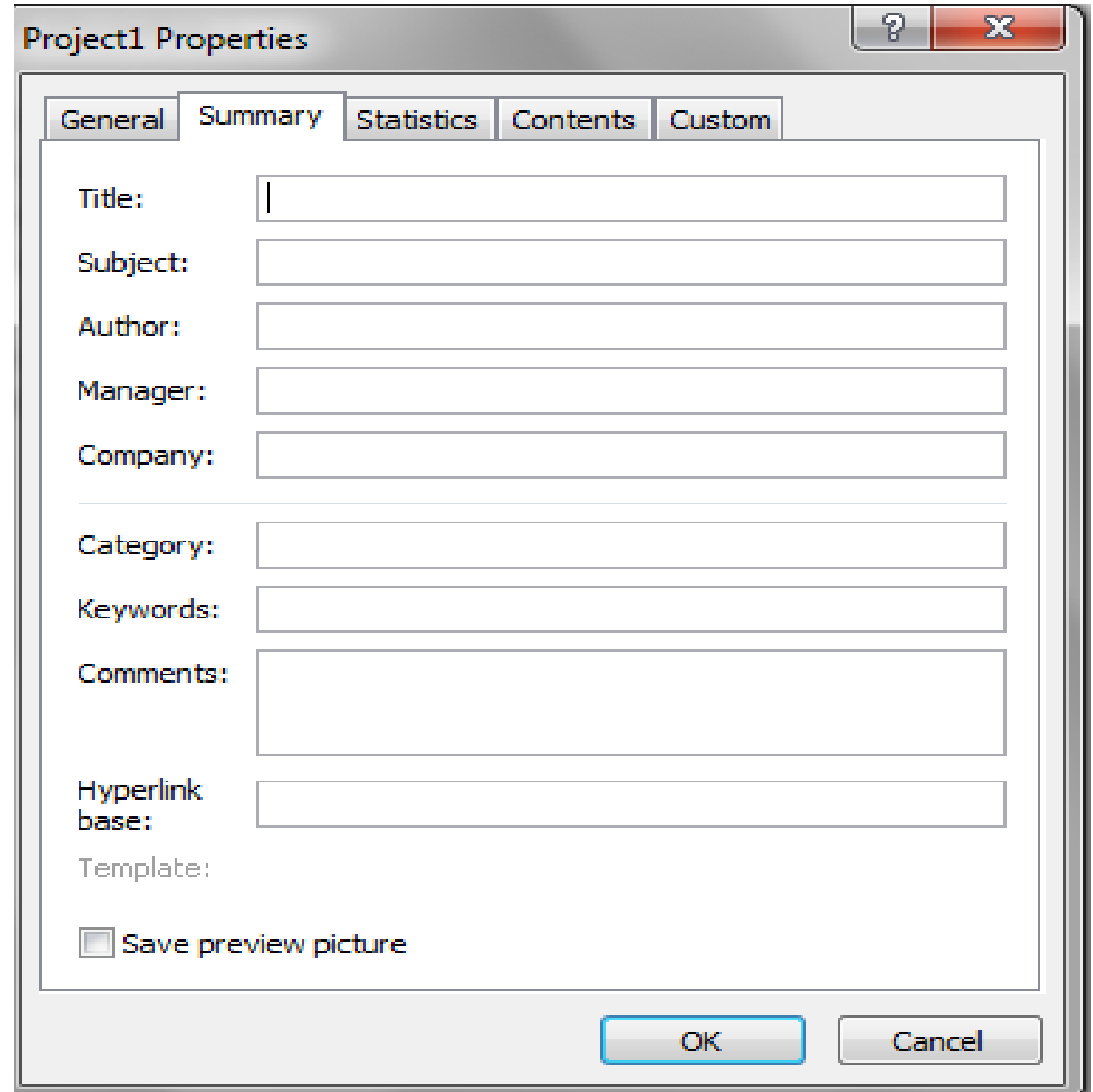


Basics of the MS Project Environment

- THE PROJECT TITLE
- Change working time
- Making your new company calendar
- Project Information
- Decide where to draw non-working time

THE PROJECT TITLE

- File => Info => Project Information => Advanced Properties => Summary tab
- Then **enter the Project Title and other relevant** information (can re-use this later in reports.)



The screenshot shows a Windows-style dialog box titled "Project1 Properties". It has a tabbed interface with five tabs: "General", "Summary", "Statistics", "Contents", and "Custom". The "Summary" tab is currently selected. Inside the "Summary" tab, there are several text input fields labeled "Title:", "Subject:", "Author:", "Manager:", "Company:", "Category:", "Keywords:", "Comments:", "Hyperlink base:", and "Template:". The "Title:" field is the first and is currently empty. Below these fields is a checkbox labeled "Save preview picture" which is unchecked. At the bottom right of the dialog box are two buttons: "OK" and "Cancel".

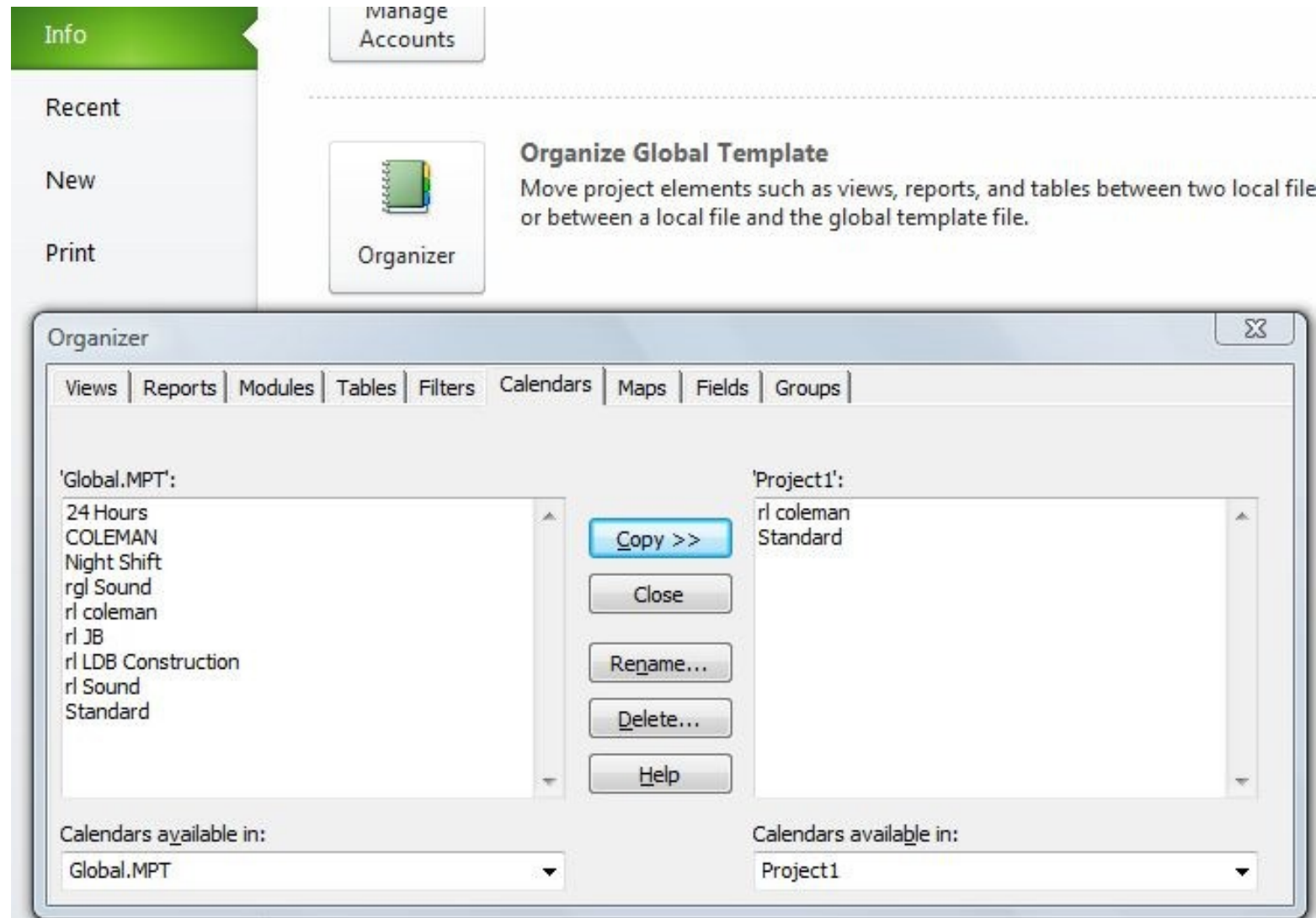
Change working time

- Project ribbon => Change working time => Create a new calendar based on the Standard calendar
- and mark off non-standard working and non-working days such as public holidays etc. in the Exceptions tab.

[illegible]

Making your new company calendar

- File => Info => Organizer => Calendars tab select new calendar from the right side and click Copy.
- This will make your new company calendar available for all new projects.



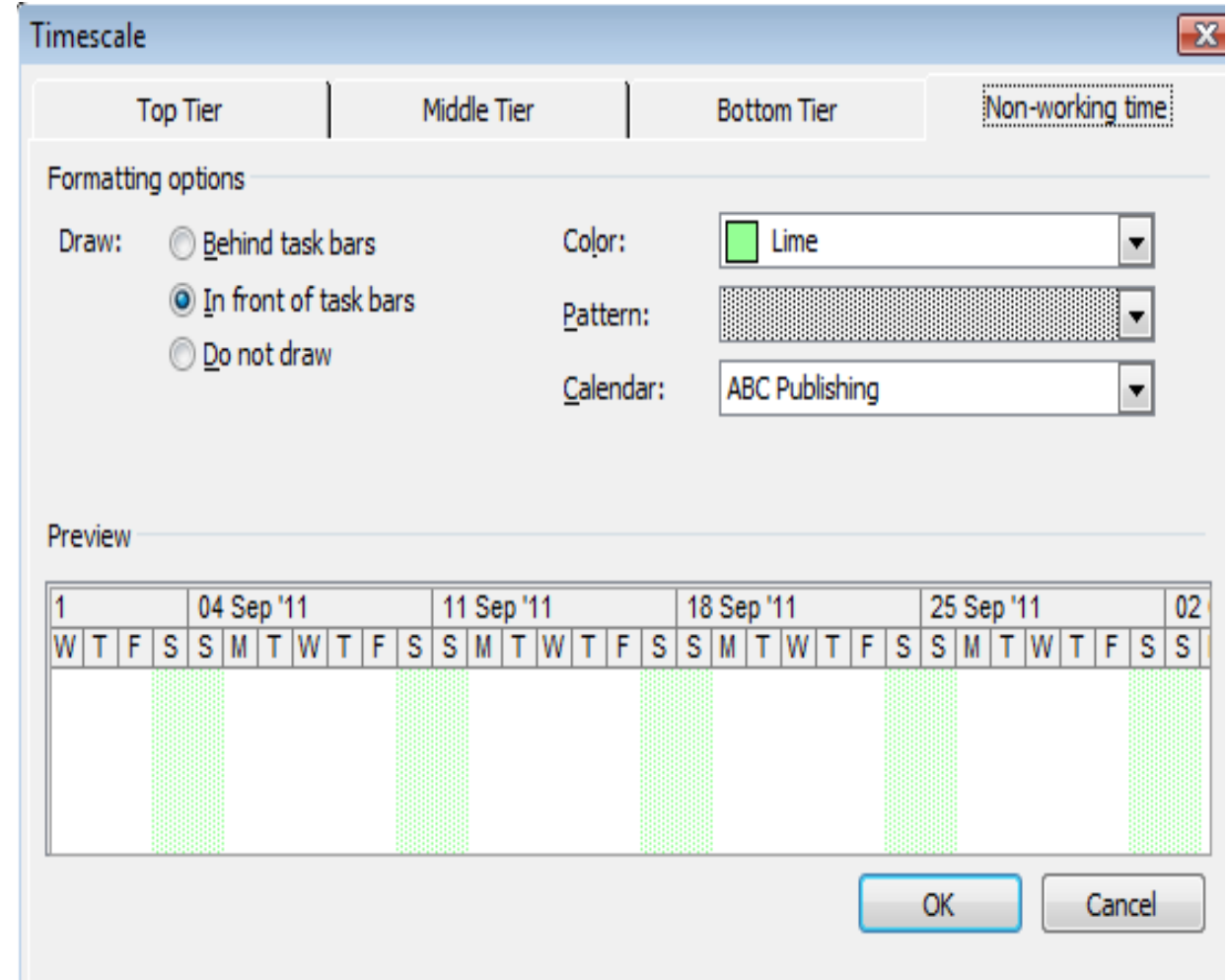
Project Information

- Project => Project Information => Start Date
- Then enter the estimated start date of your Project and from the **Calendar drop-down** arrow select your new calendar as the project calendar.

The screenshot shows the 'Project Information' dialog box for 'Project1'. The 'Format' tab is selected in the ribbon. The 'Start date' is set to 30/04/12 09:00, and the 'Current date' is also 30/04/12 09:00. The 'Finish date' is 30/04/12 09:00. The 'Status date' is NA. The 'Schedule from' is set to 'Project Start Date'. The 'Calendar' dropdown is open, showing a list of calendars: Standard (selected), 24 Hours, COLEMAN, Night Shift, rgl Sound, rl coleman, rl JB, rl LDB Construction, and rl Sound. The 'Enterprise Custom Fields' section is empty. The 'Department' dropdown is also empty. The 'All tasks begin as soon as possible.' checkbox is checked. The 'Priority' dropdown is set to 'Standard'. The 'Custom Field Name' list is empty. The 'Help' and 'Statistics...' buttons are at the bottom left, and the 'OK' and 'Cancel' buttons are at the bottom right.

Decide where to draw non-working time

- Right-Click Gantt chart Non Working Time draw non-working time in front of task bars
- to make the Gantt Chart easier to read and then select the Project Calendar from the Calendar drop-down.



Task Creation

- This is the **initial activity in setting up a new project.**
- The system will hold task information in a Task database, used by the system whenever we view task data.
- There are three databases the system uses,
- **Task database**
- **Resource database and**
- **Assignment database.**
- The order of entry for tasks does not need to follow any set pattern:

Task Creation

- There is no need to enter all the tasks at this stage: **additional tasks can be inserted, tasks can be moved, copied or deleted.**
- A practical approach is to initially enter only **the main tasks** (Summary Tasks) and afterwards fill in the detailed tasks (Subtasks):
- this is a 'brainstorming' stage where you and the project team are recognizing all the tasks necessary to meet the project's objectives. This method is also known as 'Top-down Planning'.
- Do not at this stage be concerned regarding the resources for each task or the duration: concentrate on thinking of all the requirements which need to be covered by creating the necessary tasks.

Manual Scheduling vs. Auto Scheduling

- In Project 2010 there is a new concept called 'User-Controlled Scheduling'.
- It's a collection of features designed to make Project a more flexible planning and schedule management tool.
- The idea is that you, as the project manager, can have complete control over when a task should happen.
- If and when appropriate, you can leverage Project's powerful scheduling engine to help forecast the date of a task based on various factors like dependencies, calendar, constraints, etc.
- But at any time, you have the flexibility to manually override Project's automatic calculations to better capture all of the high-level, possibly vague information that you have when you start your project.

Manual Scheduling vs. Auto Scheduling

- Tasks are by default "**Manually Scheduled**", meaning that you have complete control over their dates.
- For example, when you start typing tasks the Start, Finish & Duration fields are blank.
- When tasks are in this 'Manually Scheduled' mode, Project will not automatically calculate and fill in dates for you.

	 Task Mode	Task Name	Duration	Start	Finish	Oct 1
1		Design				
2		Engineering				
3		QA				
4		Marketing				
5						

Using the Gantt Chart to enter tasks

- The most user-friendly way to enter tasks is to use the Gantt Chart view with the Entry table and the Insert

the

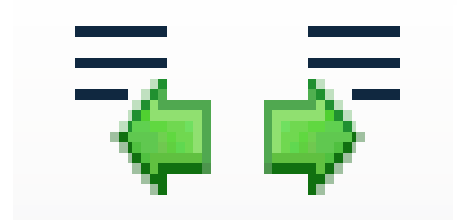
1. Click the Summary command to insert your first main task and overwrite the placeholder text with the correct task/phase name:



Task Mode	Task Name	Duration	Start	Finish
	<New Summary Task>	1 day	Wed 30/12/09	Wed 30/12/09
	<New Task>			

Using the Gantt Chart to enter tasks

2. Click the Task command to enter more subtasks
3. Continue adding as many Summary tasks and subtasks as you require
 - you will need to make sure that the Summary tasks are entered at the right outline level and you **can indent/out-indent** them by using the command buttons on the schedule group of the Task tab



4. You can write long, descriptive task names – the text should wrap automatically in the cell and you can widen the column width if required:

A screenshot of a Gantt chart task entry table. The table has two columns: 'Task Name' and 'Duration'. The 'Task Name' column is highlighted in yellow. The 'Duration' column is highlighted in light blue. The first row shows 'Scope' in the 'Task Name' column and '1 day' in the 'Duration' column. The second row shows 'Initial meeting with project team to be confirmed' in the 'Task Name' column and an empty cell in the 'Duration' column. An arrow points from the text 'Click and drag to widen the column' to the 'Task Name' column header.

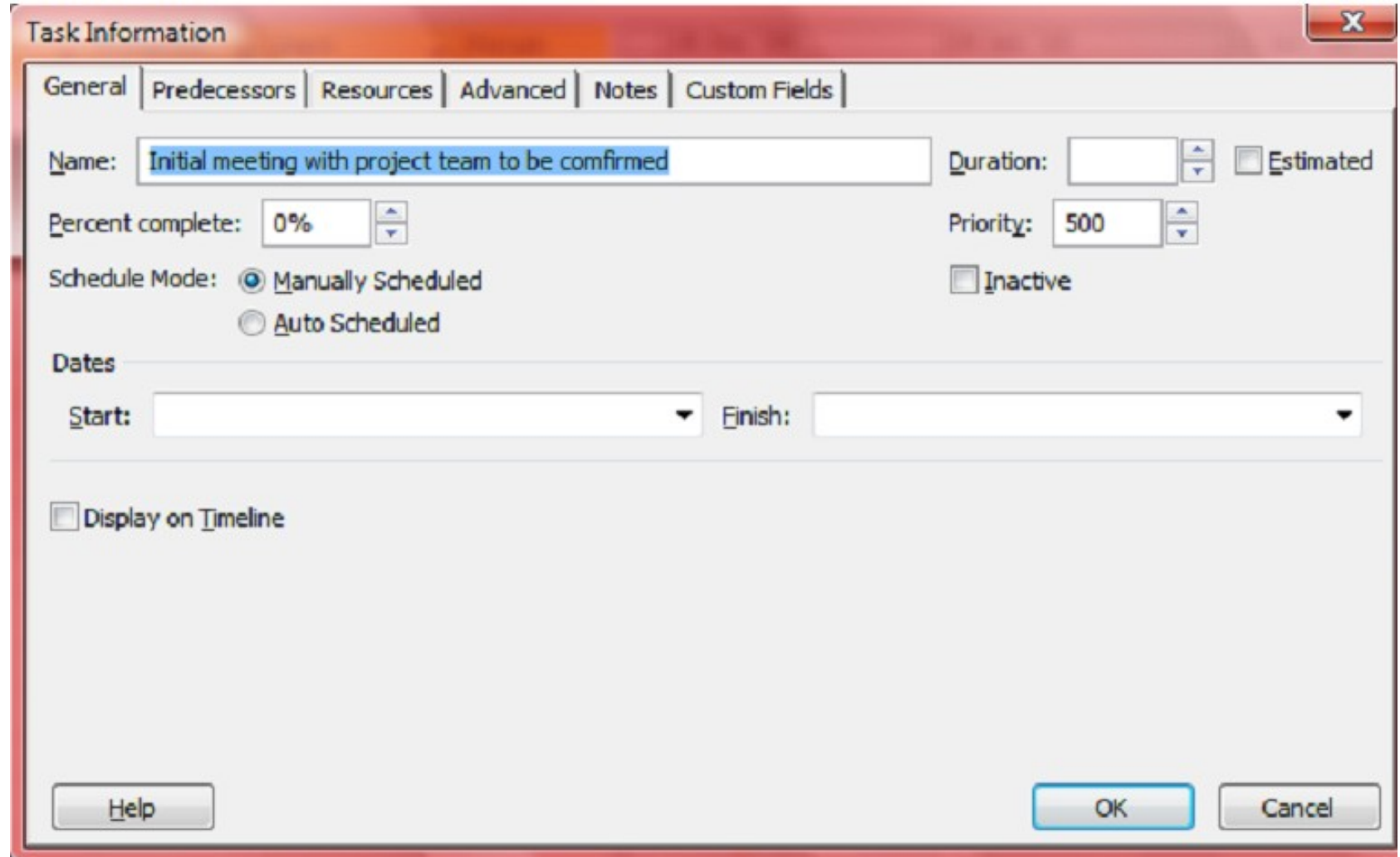
Task Name	Duration
Scope	1 day
Initial meeting with project team to be confirmed	

Using the Gantt Chart to enter tasks

5. the Undo button on the Quick Access Toolbar will undo your recent actions: by default up to 20 actions, but you can increase this to a maximum of 99 actions (on the File, Options, Advanced tab)
6. The cells which are affected by your last modification are automatically temporarily highlighted in a blue colour so you easily see if other cells have been affected by the change

Using the Gantt Chart to enter tasks

It is possible to use In-Cell Editing but you may prefer to double click the task and make the changes on the general tab of the Task Information Dialog Box:



The screenshot shows the 'Task Information' dialog box with the 'General' tab selected. The 'Name' field contains 'Initial meeting with project team to be confirmed'. The 'Duration' field is empty, and the 'Estimated' checkbox is unchecked. The 'Percent complete' is set to 0%. The 'Priority' is set to 500. The 'Schedule Mode' is set to 'Manually Scheduled'. The 'Dates' section shows 'Start' and 'Finish' fields, both empty. The 'Display on Timeline' checkbox is unchecked. The dialog box has 'Help', 'OK', and 'Cancel' buttons at the bottom.

Field	Value
Name	Initial meeting with project team to be confirmed
Duration	
Estimated	☐
Percent complete	0%
Priority	500
Inactive	☐
Schedule Mode	☒ Manually Scheduled ☐ Auto Scheduled
Start	
Finish	
Display on Timeline	☐

Modifying a Task List

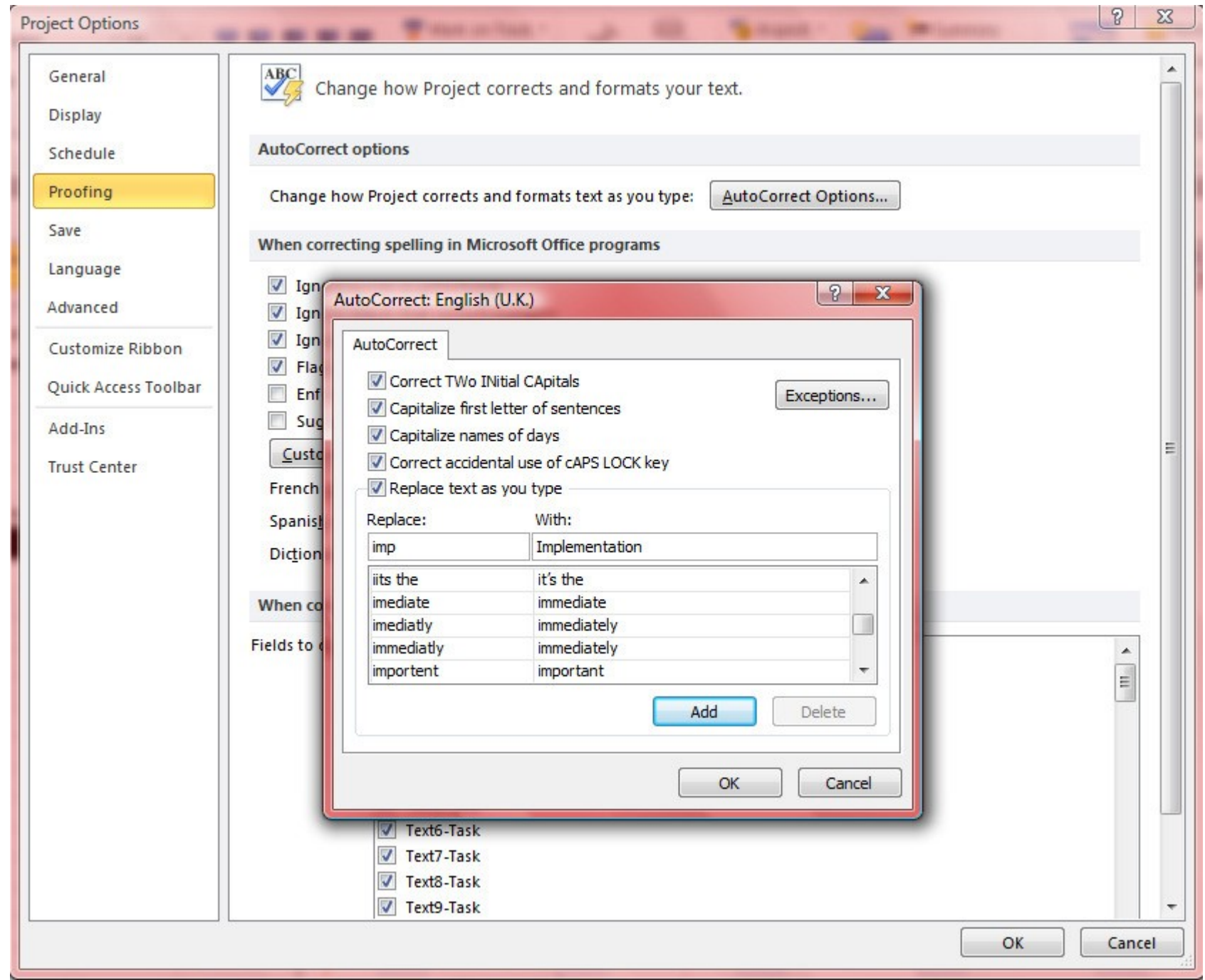
- Inserting an additional task
- Deleting a task
- Moving a task
- Copying a task
- Using AutoFill to enter repeat data
- As in Microsoft Excel, in any table view in Project you can use the 'Fill Handle' for fast entry of repeat information.
- For example, you don't have to type out repeat durations or resource names:

Modifying a Task List

- **Using AutoCorrect**

- AutoCorrect automatically **corrects mistyped** words and expands abbreviations as you type. Project provides an extensive list of predefined typing corrections and abbreviations, and enables you to customize the list by adding your own:
 1. Click the File Tab, choose Options, choose Proofing
 2. Type the name of the entry in the Replace text box.
 3. Type the name of the replacement in the With text box.
 4. Click Add and then click OK

How to AutoCorrect automatically?

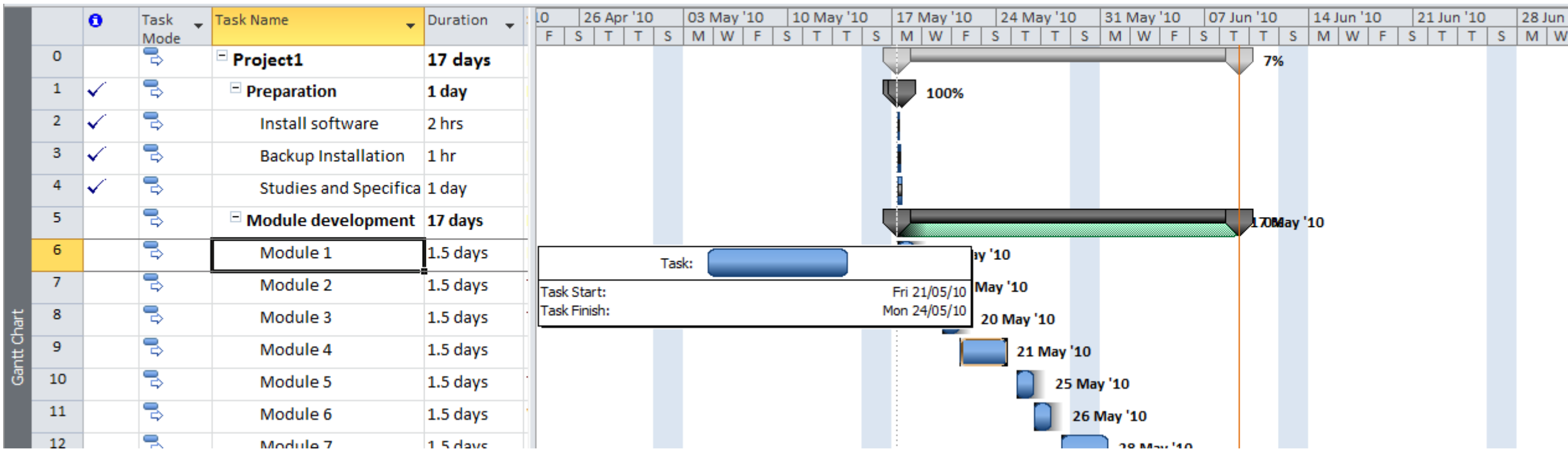


- **Editing Tasks using the Gantt Chart**

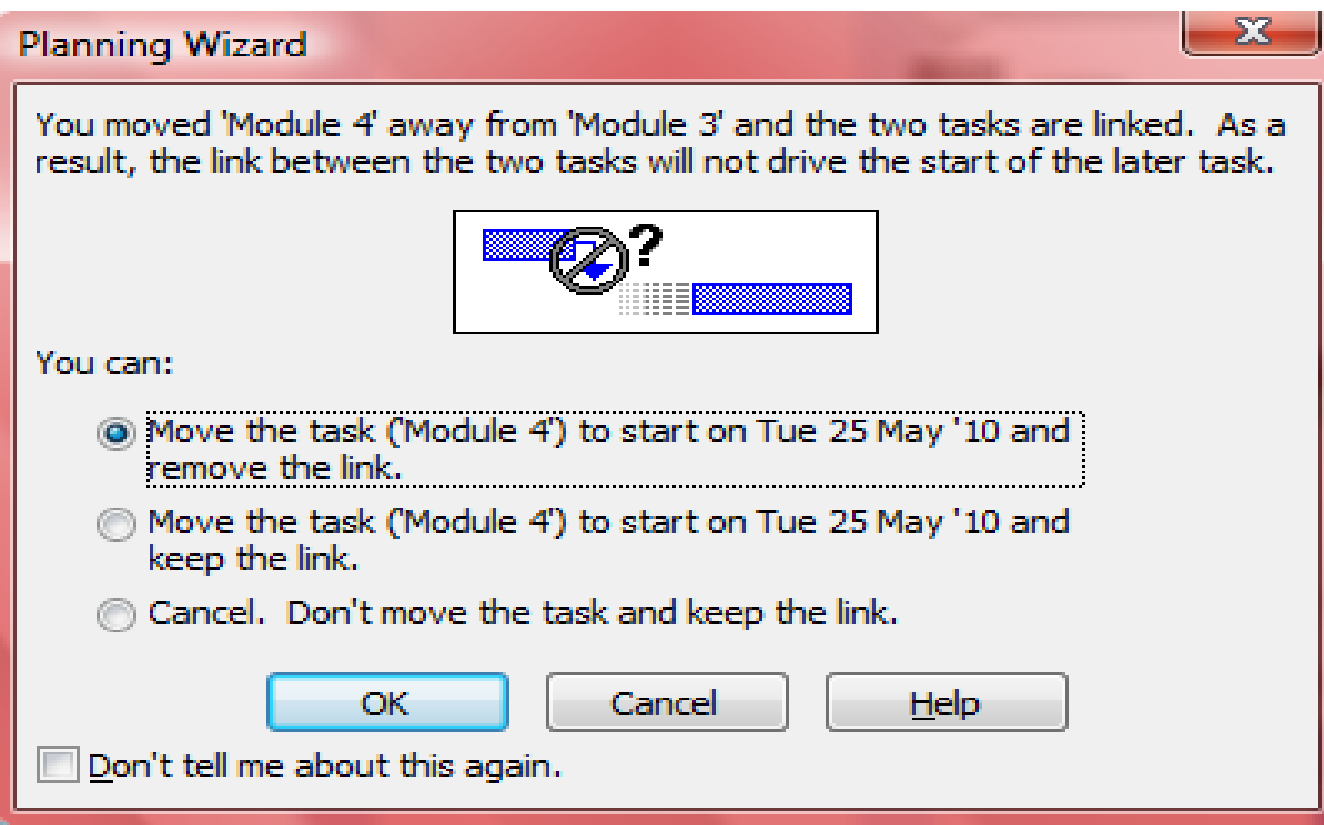
- One method of editing tasks is to change them on the Gantt Chart using the mouse and dragging:

1. Positioning the pointer at the beginning of a bar will change the pointer to a % sign and dragging with the mouse to the left will update the percentage complete of the task.
2. If the pointer is placed in the center of the bar it will change to a four-way arrow pointer.

It is then possible to drag the bar to the left or right. A label will appear informing you of what you are doing:



If you change a date that then causes a conflict, the Planning Wizard dialog box will alert you of the problem:



3 The duration of the task can be changed by **changing the length of the bar.**

If the pointer is positioned at the right end of the bar it will change into a right pointing arrow.

You can then drag to

Tips for **naming tasks and setting** level of detail

- **Summary tasks**: use a broad description ("selection phase", "User testing")
- **Tasks**: verb + noun are often enough ("Brief consultant", "Install transformer")
- **Milestones**: **describe a point in time**, a start/end ("start of review", "testing completed")
- **To find the right level of detail for your tasks aim for tasks that:**
 - have **durations** that can be reasonably estimated

Tips for naming tasks and setting level of detail

- are **hard to divide** into smaller tasks
- **will be easy to measure progress / completion**
- are self-contained or independent
- are likely to be carried out by parties outside your project
- **Note:** If you still need to add further detail you can avoid having to create more tasks by adding the additional information into the task notes tab (double click on the task name)
- Add Notes to tasks to provide details - double click the task name and go to Notes tab

Creating Task Dependencies

Creating Task

- **Task mode (Auto schedule vs. Manual)**
- **Adding tasks/ inserting tasks/listing tasks (using either approach**
- **WBS and Organizing tasks**
- **Entering duration**
- **Work** => is the total number of hours b/n all contributors spent on the task
- **Duration** => is the amount of time in which you want the task to be completed
- **Units** => is the percentage of a resource's time assigned to a task
- Hence, $\text{work} = \text{duration} * \text{units}$
- **Task dependences**
- **Resource**

Entering duration

- a. When we enter durations, we enter them in the **subtask cells**. The duration of the summary task will automatically update according to the subtasks. To **enter the duration** of a subtask, under the **Duration** column, click inside the empty cell.
 - i. Simply type in the cell the duration you plan to work on the specific task. Use units “mo” for months, “w” for weeks, “d” for days, “h” for hours, and “m” for minutes.
 - ii. A common mistake is to try to fill in all the information all the way across (as one would in Excel). Instead, leave Start and Finish dates empty and let Project fill them in. When manually entered, it deadlocks them as constraints which makes Project less useful.

Entering duration

- b. To add *work* into the spreadsheet to see the amount of total hours the task will take, select *Add New Column*.



- i. Scroll down, and select **Work**.
- ii. The number of hours of total work completed for the task is automatically calculated depending on the number of **Resource Names** and the set

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Work	Ad
		☐ G+12 Building project	35 days?	Tue 1/1/19	Sat 2/9/19			240 hrs	
		☐ Sub-Structure	35 days	Tue 1/1/19	Sat 2/9/19			240 hrs	
		☐ Earth work & Excavation	18 days	Tue 1/1/19	Mon 1/21/19			240 hrs	
		Site clearance	6 days	Tue 1/1/19	Mon 1/7/19		Dily labor[4	240 hrs	
		Bulk Excavation	7 days	Tue 1/8/19	Tue 1/15/19	4		0 hrs	

Creating Task dependencies

- Linking tasks
- Each task has a Start and a Finish. These can be used to connect one task to another using a dependency or link. Linking your tasks lets Project adjust the schedule as tasks change.

Types of task dependency

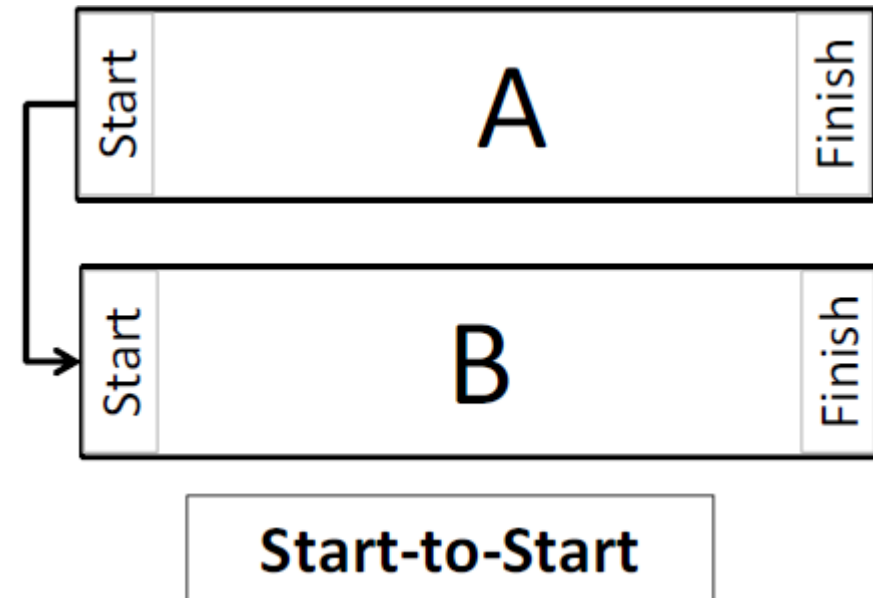
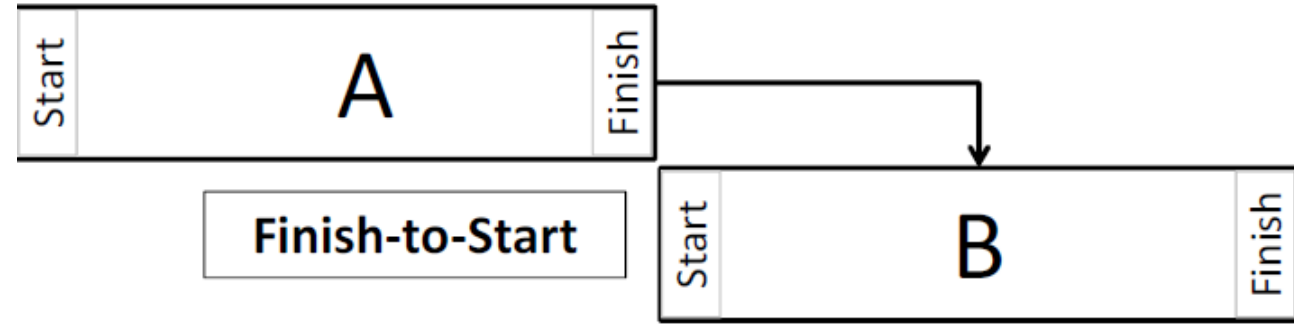
- **Predecessors and successors**

Creating Task dependencies

- When tasks are connected they take on the following roles:
- Predecessor is the task whose start or finish drives the start or finish of the successor
- Successor is the task whose start or finish is driven by the predecessor task
- There are four types of dependency that can link Predecessors and Successors. You choose the type that best describes the relationship between them:

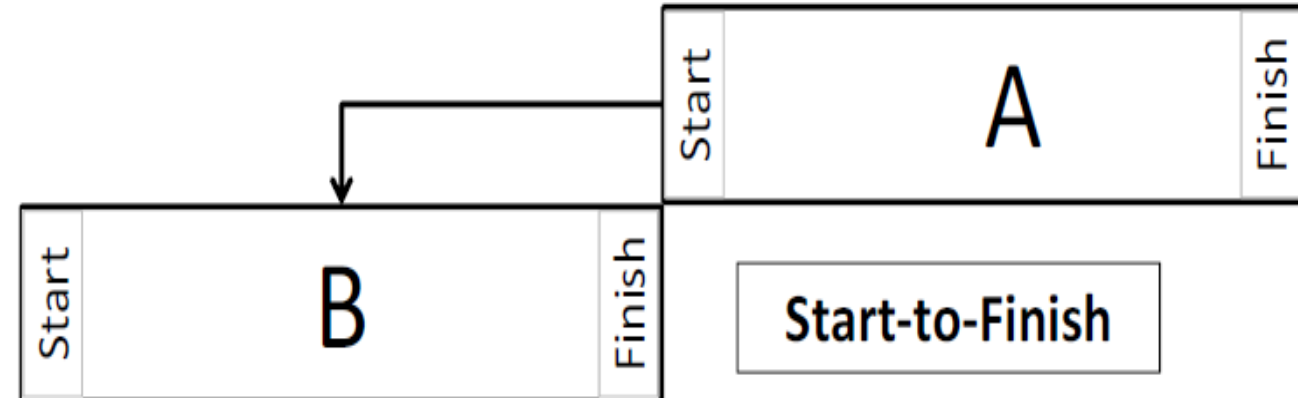
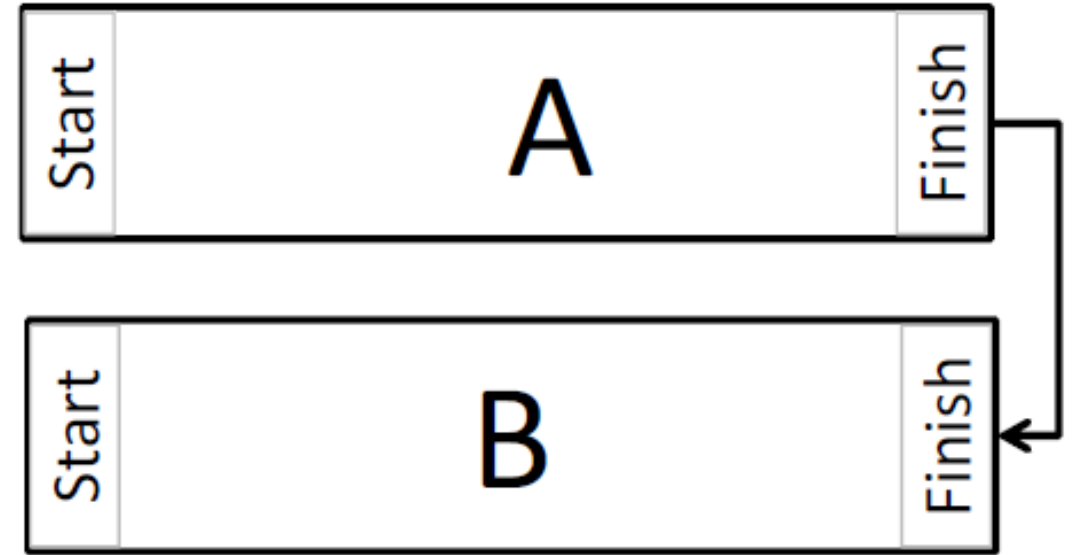
Creating Task dependencies

- Finish to Start (FS) - Finish of Predecessor drives Start of Successor or The task cannot be started until the predecessor task is completed
- Start to Start (SS) - Start of Predecessor drives Start of Successor or The task cannot be started until the predecessor task is started



Creating Task dependencies

- Finish to Finish (FF) - Finish of Predecessor drives Finish of Successor or The task cannot be finished until the predecessor task is finished
- Start to Finish (SF) - Start of Predecessor drives Finish of Successor or The task cannot be finished until the predecessor task begins



Five ways to create task links

1. Block-select the tasks to be linked (use Click with the Ctrl key held down to select tasks that are not adjacent) and click the link button on the Schedule group on the Task ribbon.
2. Hover the mouse over the middle of the predecessor bar on the Gantt Chart, left click and drag a link up/down to its successor

Five ways to create task links

3. Double click on the name of a task, on the predecessors tab choose the name of the predecessor(s) and set the link type
 4. On the successor task row, in the predecessor column enter the ID number of the predecessor followed by the initials of the relationship (e.g. 11FS)
 5. Split the screen and in the top half of the screen select a task that will be the successor and in the lower right half of the screen click below task name to choose the predecessor and type of link.
- Click OK to commit the change.

Using Lag (delay) & Lead time

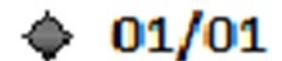
To model delay between tasks you can either:

- Double click on the arrow linking the tasks or
- Double click on the name of the successor and choose the predecessor tab then
- In the lag field add the number of days, estimated days or % delay

A negative value produces “lead” rather than lag, and brings the successor earlier into the plan as opposed to delaying it.

Creating milestone

- Is a task that acts as a reference point, making a major event in the project and which is used to monitor the project's progress. How to add milestone
- Entering a milestone task
- Select where you want to insert the task and click the Milestone command.
- Note the Duration is zero and the format of the Milestone symbol on the Gantt chart is:
 1. Clicking milestone icon where you want to add



Deadlines, constraints and Notes

- **Constraints** are conditions or limitations placed on the start or finish date of a task
- **Deadlines** are target dates that indicates when you want a task to be completed
- Deadlines added to a task show the date when it should finish but won't prevent the task being delayed beyond that date. Instead an alert icon appears in the indicators column if the task finishes later than its deadline. To add deadline to a task:
 - Double click the task

Deadlines, constraints and Notes

- On the advanced tab enter a date in the Deadline box and click OK. On the Gantt
- Chart a green arrow indicates the deadline for the task.
- To remove a deadline double click the task and delete the date from the deadline
- field then click OK
- **Note** are additional or supporting information

Resources

- Resources are best defined using the **Resource Sheet**,
- which can **be accessed** via the Quick Access toolbar, the View ribbon, the Task ribbon, the Resource ribbon or the View bar.

Creating resources

- Each resource is entered on its own line as follows:
- Basic resource properties
- **Name** Enter an appropriate name for the resource. This can either be the name of an individual, a job role or a team name for generic resources.
- **Type** Resource types can be work, material or Cost.
- Use the Work resource type for people and equipment whose availability is capped (Max Units) so you can see if they become over-allocated.
- Use the material resource type if the resource is a consumable.

Creating resources

- Use the **cost resource** type to track variable items such as expenses. The rate for this type of resource is not stored in the resource sheet. Each time this resource is assigned to a task you can enter the cost that applies just to that task.
- **Material Label** Only applicable for material resources. This is the volume that the resource is purchased in. For example paint might be purchased in liters.
- **Initials** An alternative to having the full name beside bars on the GANTT chart
- **Group** Can be used to categories resources appropriately for reports, filters and grouping. Typical uses are team names, departments, subcontractors etc

Creating resources

- **Max Units** The maximum number of units of the resource. 100% generally means one individual; 300% 3 individuals.(Work type only)
- **Standard Rate** Cost of standard work, can be recorded as Hourly/Daily/Weekly/Monthly/Yearly e.g. £200/d for a daily rate
- **Overtime Rate** Cost of resource when work is specified as overtime. (work type only)
- **Cost/Use** A one off cost associated with the resource. Is charged every
- time resource is allocated to a task. Can also be used in addition to Standard Rate.

Creating resources

- **Accrue At** Determines if the resource costs are charged at the start of the task; throughout the task, or at its end.
- **Base Calendar** The base calendar which determines the resource's working time. (Work Type only)
- **Code** A general code that can be used to identify the resource or resource group. A typical example would be a cost center code.

Making Simple Assignments to Tasks

- There are two stages of resource allocation. The Initial allocation, where resources are first allocated to a task; and then any changes made to that allocation, for example adding extra resources, or removing resources.
- Initial allocation
- The initial allocation of resources involves specifying the resources necessary to complete each task in the duration specified.
- Procedure
 1. In the Gantt chart view

Making Simple Assignments to Tasks

3. Select the task which is to be resourced Then in the lower pane, under resources:
4. Select each resource required for the task
5. Then Click OK (Note all required resources must be selected before OK is clicked)

Making Simple Assignments to Tasks

- Allocating multiple resources
- When multiple resources are allocated to a task Project will assume that each resource must work on the task for the specified duration.
- So if two resources are to work on a 2 day task, then each resource must work on it for 2 days.
- If both resources can work at the same time, then the total duration of the task will remain unchanged. If however, they are working at different times then the duration of the task will likely change.