

# **Project 1 : Project Management software.**

## **Overview :**

Many professionals manage business and personal projects every day but do not always give it much thought. The management process for developing an information system or working on a construction project is much the same. The only difference is the nature of the project. To manage a large-scale IT project, specific tools and techniques are needed.

A project manager is also needed, someone who is responsible for overseeing all relevant tasks. Project management for IT professionals includes planning, scheduling, monitoring and controlling, and reporting on information system development.

A project manager will break the project down into individual tasks, determine the order in which the tasks need to be performed, and figure out how long each task will take.

## **Objective :**

Create a software for IT project management that can be integrated in any repository. IT leads and developers can plan the tasks directly inside the repository.

The main parts of this software is a Work Breakdown Structure (WBS), a cli to interact with it by running some commands and a graphical interface for a better user experience.

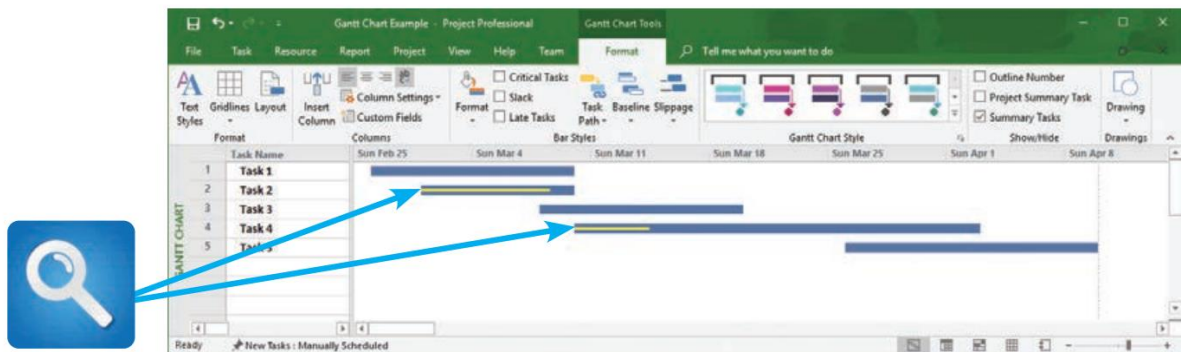
A work breakdown structure (WBS) involves breaking a project down into a series of smaller tasks. Before creating WBSs, the two primary chart types should be understood: Gantt charts and PERT/CPM charts.

## **Gantt chart**

A Gantt chart is a horizontal bar chart that represents a set of tasks. For example, the Gantt chart in Figure 1 displays five tasks in a vertical array, with time shown on the horizontal axis. The position of the bar shows the planned starting and ending time

of each task, and the length of the bar indicates its duration. On the horizontal axis, time can be shown as elapsed time from a fixed starting point or as actual calendar dates.

A Gantt chart also can simplify a complex project by combining several activities into a **task group** that contains subsidiary tasks. This allow a complex project to be viewed as a set of integrated modules.



**FIGURE 1** In this Gantt chart, note the yellow bars that show the percentage of task completion.

A Gantt chart can show task status by adding a contrasting color to the horizontal bars.

For example, a vertical red arrow marks the current date in Figure 1.

With a fixed reference point, it is easy to see that Task 1 is way behind schedule ; Task 2 is only about 80% done and is running behind schedule ; Task 3 should have started, but no work has been done ; Task 4 actually is running ahead of schedule ; and Task 5 will begin in several weeks.

Gantt charts can present an overview of the project's status, but they do not provide enough detailed information, which is necessary when managing a complex project.

Some project managers may find that PERT/CPM charts, which are discussed in the following section, are better tools for managing large projects.

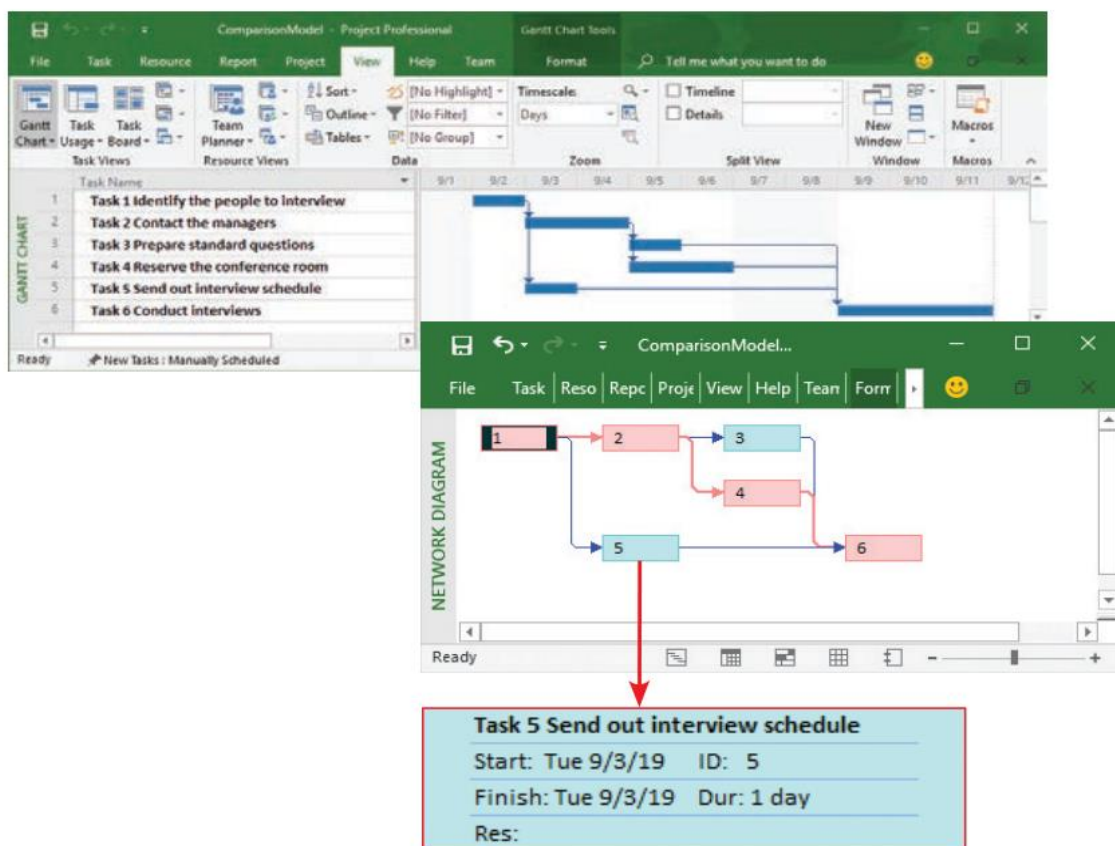
## PERT/CPM charts

The Program Evaluation Review Technique (PERT) was developed by the U.S. Navy to manage very complex projects, such as the construction of nuclear submarines. At approximately the same time, the Critical Path Method (CPM) was developed by private industry to meet similar project management needs. The distinction between the two methods has disappeared over time, and today the technique is called either PERT, CPM, or PERT/CPM. This text will use the term PERT chart.

PERT is a bottom-up technique because it analyzes a large, complex project as a series of individual tasks, just as a pyramid is built from the bottom up using individual blocks. To create a PERT chart, first identify all the project tasks and estimate how much time each task will take to perform. Next, determine the logical order in which the tasks must be performed. For example, some tasks cannot start until other tasks have been completed. In other situations, several tasks can be performed at the same time.

Once the tasks are known, their durations, and the order in which they must be performed, calculate the time that it will take to complete the project. The specific tasks that will be critical to the project's on-time completion can also be identified.

An example of a PERT chart, which Microsoft calls a network diagram, is shown in the lower screen in Figure 2.



**FIGURE 2** The top screen shows a Gantt chart with six tasks. The PERT chart in the bottom screen displays an easy-to-follow task pattern for the same project. When the user mouses over the summary box for Task 5, the details become visible.

## **Critical Path Method (CPM)**

Task patterns determine the order in which the tasks are performed. Once the task sequence has been defined, a project manager can schedule the tasks and calculate the critical path. A critical path is a series of tasks that, if delayed, would affect the completion date of the overall project. If any task on the critical path falls behind schedule, the entire project will be delayed.

For example, suppose that Joan and Jim are invited to someone's home for dinner. Joan arrives on time, but Jim arrives 30 minutes late. Jim's arrival is part of the critical path because the host does not want to start without him, so the meal will be served 30 minutes later than originally planned.

Project managers always must be aware of the critical path, so they can respond quickly to keep the project on track. Microsoft Project and other project management software can highlight the series of tasks that form the critical path.

### **Delivery :**

- Design an architecture for this software.
- Write unit test for each module by applying TDD methodology.
- Provide a cdn and npm package for that software.

For designing the architecture, you should also think about how the task duration are estimated, how we manage dependent tasks, multiple successor tasks, multiple predecessor tasks, critical path.