Brief tutorial on Gantt charts

The assignment

Your team is expected to produce a Gantt chart and to keep it up to date for use in planning your project. Use MS Project (available in IT Labs) to produce your chart. (Why MS Project? Because it's the most widely used project planning package in industry and you should be learning how to use "real world" tools.).

Follow these guidelines in creating your chart:

- Use weeks as the time unit
- Include the Mid-project review, Design Show, and Final report due as milestones. Have up to four additional milestones, no more.
- Show more detail on design tasks, less detail on reports/documentation/presentation tasks. Should have about 3/4 design tasks, 1/4 documentation/presentation related tasks.
- Getting parts can take 2 weeks or more, depending on the part. If your company is building parts for your prototype, getting your part scheduled can take a long time. Build these delays into your planning chart.
- Review and update Gantt chart every 14 days, more often if needed.

Project Planning Basics

A "Project" is a set of activities which ends with specific accomplishment and which has (1) Non-routine tasks, (2) Distinct start/finish dates, and (3) Resource constraints (time/money/people/equipment).

"Tasks" are activities which must be completed to acheive project goal. Break the project into tasks and subtasks. Tasks have start and end points, are short relative to the project and are significant (not "going to library", but rather, "search literature"). Use verb-noun form for naming tasks, e.g. "create drawings" or "build prototype". Use action verbs such as "create", "define" and "gather" rather than "will be made". Each task has a duration. Very difficult to estimate durations accurately. Doubling your best guess usually works well.
"Milestones" are important checkpoints or interim goals for a project. Can be used to catch scheduling problems early. Name by noun-verb form, e.g. "report due", "parts ordered", "prototype complete".
Your plan will evolve so be flexible and update on a regular basis. It also helps to identify risk areas for project, for example, things you don't know how to do but will have to learn. These are risky because you may not have a good sense for how long the task will take. Or, you may not know how long it will take to receive components you purchased for a project.

Work Breakdown Statement

A work breakdown statement (WBS) is a categorized list of tasks with an estimate of resources required to complete the task. An example WBS appears below.

WBS #	Task Description	Est Person-Hrs	Who	Resources	M&S
5	Profile motor power				

5.1	Design test stand	20	SE, JM	Pro/E	
5.2	Build test stand	15	SE, JM	Frame & brake parts	$35
5.3	Test 3 motors	3	SE, JM	Stroboscope	$75
5.4	Plot torque vs. speed	2	JM	Excel	

(M&S = Materials & Supplies)

Gantt Chart Basics

Gantt charts are a project planning tool that can be used to represent the timing of tasks required to complete a project. Because Gantt charts are simple to understand and easy to construct, they are used by most project managers for all but the most complex projects.

In a Gantt chart, each task takes up one row. Dates run along the top in increments of days, weeks or months, depending on the total length of the project. The expected time for each task is represented by a horizontal bar whose left end marks the expected beginning of the task and whose right end marks the expected completion date. Tasks may run sequentially, in parallel or overlapping.

As the project progresses, the chart is updated by filling in the bars to a length proportional to the fraction of work that has been accomplished on the task. This way, one can get a quick reading of project progress by drawing a vertical line through the chart at the current date. Completed tasks lie to the left of the line and are completely filled in. Current tasks cross the line and are behind

schedule if their filled-in section is to the left of the line and ahead of schedule if the filled-in section stops to the right of the line. Future tasks lie completely to the right of the line.

In constructing a Gantt chart, keep the tasks to a manageable number (no more than 15 or 20) so that the chart fits on a single page. More complex projects may require subordinate charts which detail the timing of all the subtasks which make up one of the main tasks. For team projects, it often helps to have an additional column containing numbers or initials which identify who on the team is responsible for the task.

Often the project has important events which you would like to appear on the project timeline, but which are not tasks. For example, you may wish to highlight when a prototype is complete or the date of a design review. You enter these on a Gantt chart as "milestone" events and mark them with a special symbol, often an upside-down triangle.

Using Excel to Make Gantt Charts

A sample Gantt chart (.pdf format) made using Microsoft Excel appears in the figure which accompanies this document. If today's date were May 13, Task A would be behind schedule, Task B ahead and Task C right on schedule. The events marked by fat dots are milestones.

Gantt charts made with Excel are easy to update and maintain. Here's how to do it.

On a piece of scrap paper, make a list of tasks and assign each task tentative start and stop dates (or durations) and the people responsible for the task. Also list important milestones and their dates. If you have more than 15 or 20 tasks, split your project into main tasks and subtasks, then make an overall Gantt chart for the main tasks and separate Gantt charts for the subtasks which make up each main task.

Decide what resolution to use in the timeline. For projects of three months or less, use days, for longer projects use weeks or months, and for very short project use hours. For these instructions, we will assume you have chosen a resolution of days.

Fire up Excel. Under Page Setup, select landscape orientation, and then select the options to center the chart horizontally and vertically on the page. Also under Page Setup, activate the "fit to one page" button. (Note that if the text comes out too small, you may have to print your chart on two pages and paste together. Even better, adjust the resolution of your date scale or drop less important tasks to make your chart fit comfortably on one page.) Still under Page Setup, set header and footer to be blank. (It's better to write the title right on the spreadsheet rather than use the header for the title. Finally, under Page Setup, turn off the option to print gridlines.

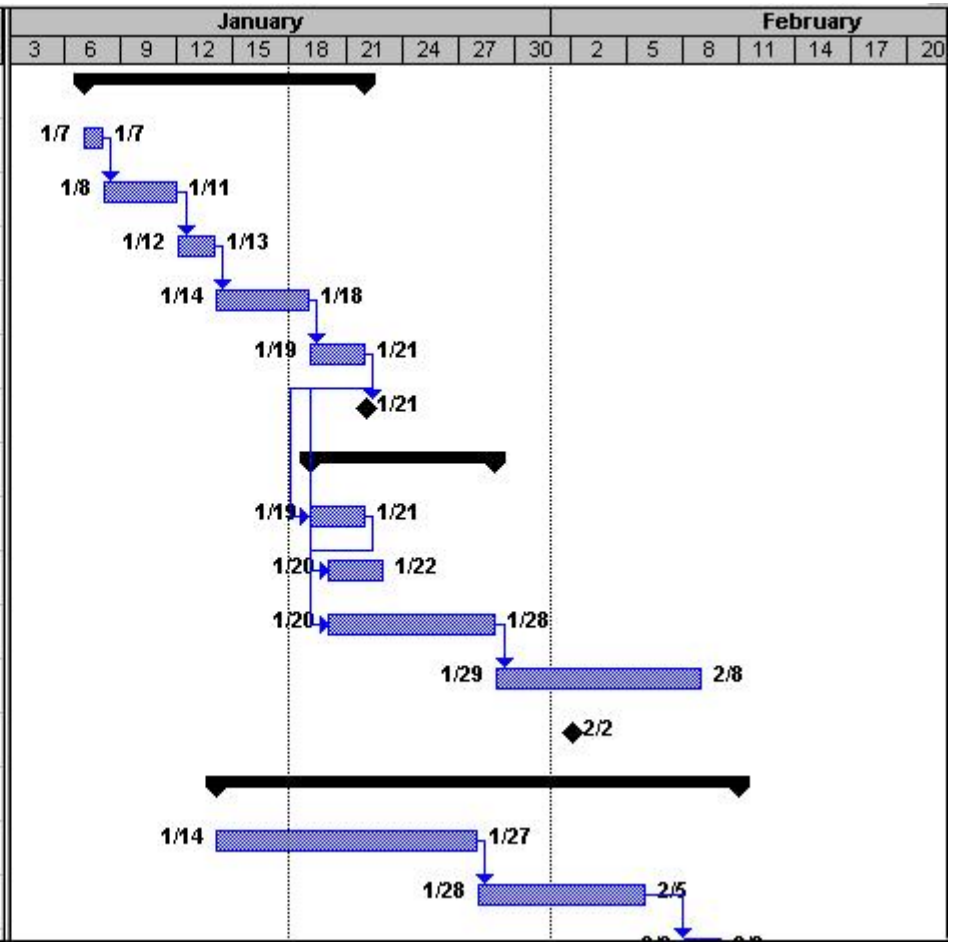
Set up the cells. You can use the sample (found elsewhere on this web page) as a guide. Use the border command to draw boxes around the appropriate cells. Enter your scheduling data. To make the gray bars which indicate length of task, select the appropriate cells, then the fill command (one of the buttons near the top).

As the project progresses, fill in the gray bars with black to denote the fraction of a task that is complete.

Project Management Packages

You can also create Gantt charts using a project managment computer package. A sample chart made using Microsoft Project appears below. Project is the most widely used scheduling tool for small projects. It is available on the PC's in MechE 308 for use by IT students.

WBS	Task Name
1	**Define specifications**
1.1	Identify customers
1.2	Interview 10 customers
1.3	Interpret requirements
1.4	Benchmark products
1.5	Define target PDS
1.6	Target PDS Released
2	**Generate concepts**
2.1	Review comp products
2.2	Search patents
2.3	Brainstorm concepts
3	Select top 2 concepts
4	MQ Presented
5	**Profile motor power**
5.1	Design test stand
5.2	Build test stand



We strongly recommend that you use MS Project to create your Gantt charts, if nothing else because it will give you experience using this important package.

To embedd a Project Gantt chart into a Word document, get the chart showing on the screen, then Edit > Copy Picture... > to GIF file. From there you can import the gif file into Word. You may have to rotate it 90 degrees in MS Paint to get it to fit and be readable.