

ECSE-211

Lecture 17

12 February 2016

Design VII

Design
Process
Steps
Doz.

Controlled
↓
project
management

GANTT Chart

- Chart to illustrate a project schedule
- Work breakdown of project in terms of terminal elements and summary elements
- Can show current schedule status
- Dates back to around 1910
- Now implemented on personal computers and are common in collaborative projects..

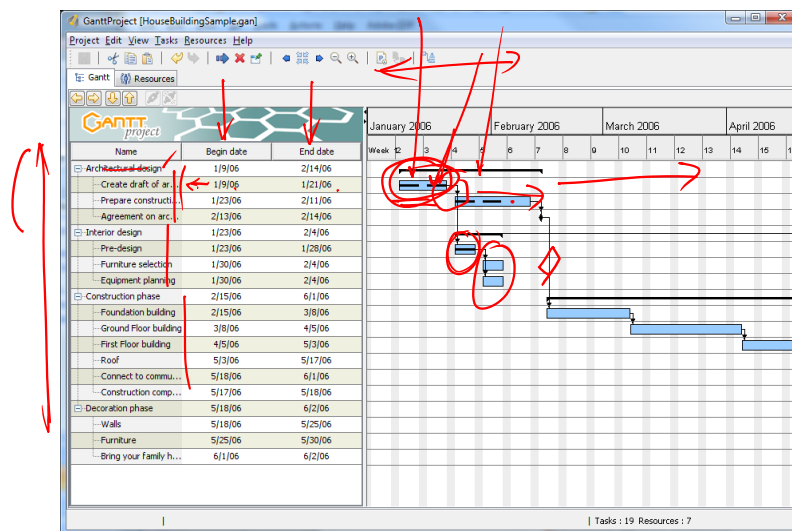
GANTT Chart

- Common technique for representing the phases and activities of a project
- Note that a Gantt chart only shows the schedule. The tasks and project breakdown should be done first and also allocated to resources.
- A Gantt chart focuses on schedule management *NOT on the size of a project or the relative sizes of work elements* so the magnitude of a “behind-schedule condition” may not be correctly indicated.

Project Management

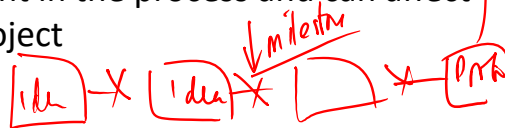
- In the engineering design process, we need to have predictability.
 - What tasks need doing?
 - What are the dependencies?
 - Where are the milestones?
 - When are the deliverables due?
 - How much budget has been spent, how much is left?

The GANTT Chart

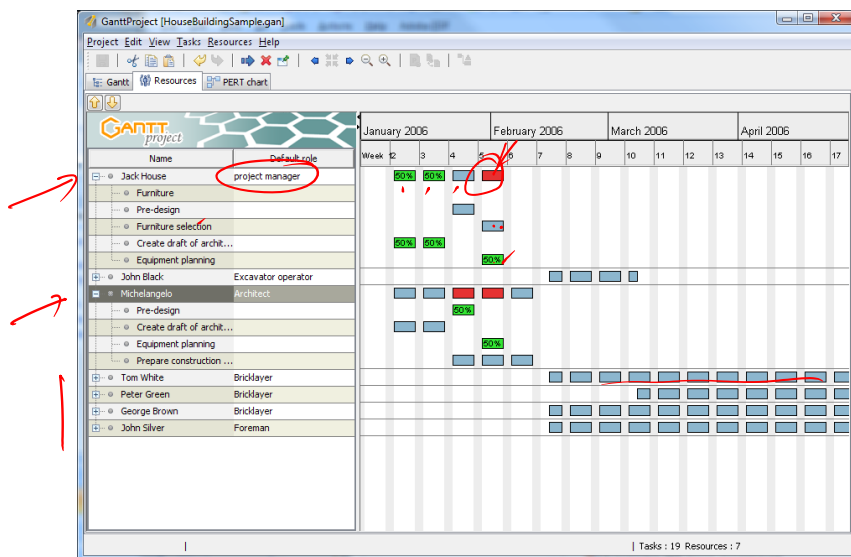


Milestones

- What is a milestone?
 - A defining point in the process – a reference point a “known” distance into a project
 - An event that receives special attention – usually put at the end of a stage to mark the completion of a work package or phase (Wikipedia)
 - It is a decision point in the process and can affect the future of a project



Resource Usage



The PERT Chart

- Project Evaluation and Review Technique
 - Used to analyze and represent the tasks in completing a given project
 - Developed by the U.S. Navy in the 1950's

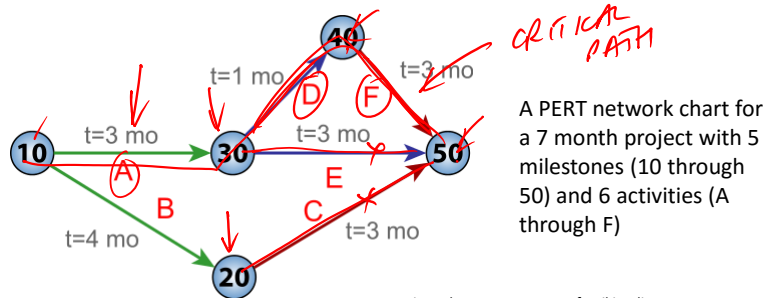
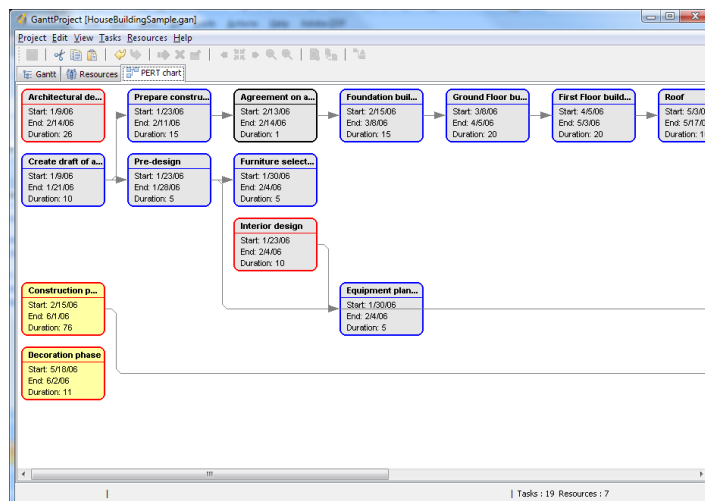


Figure by Jeremy Kemp, ref. Wikipedia

The PERT Chart



Construct the Gantt Chart

- 1. Determine the tasks necessary to complete the task.
- 2. What are the properties of these tasks? Are they independent or are there dependencies.
- 3. What is the estimate of the amount of elapsed time that a task will take?
- 4. What resources will the task need for its completion?

Construct the Gantt Chart (cont'd)

- 5. What is the delivery date on this project?
- 6. Are there milestones to be achieved? If so, when are they and what is the content of the milestone?
- 7. What is the critical path?

The Critical Path

- The longest string of dependent tasks in the system..
 - For example:
 - In completing a degree in Engineering, several courses are pre-requisite to others. E.g. DPM requires Introduction to Computing, Introduction to electronics requires Circuits 2 which also requires Circuits 1... so a 3 semester dependency...
 - To estimate when you will graduate, you need to draw out the dependency chains and identify the longest chain – this is the critical path.

So – Let's Start..

- The design project for this semester has some basic needs

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- The design project for this semester has some basic needs
 - The robot must be able to localize (i.e. identify where it is)
 - It must be able to navigate
 - It must be able to avoid obstacles
 - ...
- This involves Research and Development
 - The Labs..

The R&D Labs

- There are 5 labs planned to implement the basic R&D tasks related to tasks the robot must perform.
 - In a sense, these labs are independent, i.e. when drawn out they are investigating different features of the Mindstorms system and they involve different pieces of theory, e.g. control, signal processing, fault-tolerance, etc.
 - However, the resources are not available to do all the Labs at once..

R&D Labs

- Each lab lasts one week and consists of 3 subtasks – which are dependent
- Each lab uses the same resources (i.e. 2 people and a Mindstorms kit)
- So let's start on the Gantt chart..

Gantt Task

- The Gantt tool will be available on the My Courses site
- Try constructing the timeline for the labs for this course.
- Allocate resources, etc..
- Set milestones.

Building the Gantt Chart

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Building the Gantt Chart

- How do you start?
 - This is a design problem!
- What is the goal? (the requirement)
 - Most effective use of resources
 - Manage the process so that the product is delivered on time and meets requirements
 - Show all tasks needed to complete the design

Building the Gantt Chart

- Need to identify all subtasks
 - Not easy since this will depend on the results of the initial phases
 - But – delivery date is known
 - Resources available (people, time, equipment) are known
 - Breakdown the requirements into a set of subtasks – this is a task itself which should appear on the Gantt Chart!

Building the Gantt Chart

- The first task is “easy” – it is the identification phase and the deliverables are the four documents
- The second major task is R&D
 - This can be broken down into a set of R&D subtasks, e.g. each of the experiments or lectures.. And time can be allocated.
 - The deliverable is a document(s) describing the outcome of each experiment

The Project

- Available Wednesday, 10 February ✓
- Start Monday, 22 February ✓
 - Identify the problem, set up the tasks, identify the resources, complete the documents
- Milestones?
 - 14 March– initial mechanical design, software architecture
 - 21 March – Mechanical design complete, initial software running (Beta 1)
 - 30 March – Beta 2 Demonstration ✓
 - 13 April – Final Design Demonstration ✓