Project Management

Project Nomenclature

- **Deliverables**: Units that are delivered
- **Activities**: Major work categories
- **Tasks**: Small units of work that make up activity

Activity: Major Unit of Work

Culminates in major project **milestone**
(a scheduled event used to measure progress)

Examples of Activities

- **Major Activities**:
  - Planning
  - Requirements Elicitation
  - Requirements Analysis
  - System Design
  - Object Design
  - Implementation
  - System Testing
  - Delivery

- **Sub-activities during requirements analysis**:
  - Define scenarios
  - Define use-case model
  - Define object model
  - Define dynamic model
  - Design user interface

Big 3 Diagrams

- Work Breakdown Structure
- Precedence Diagram
- Schedule
  - with staff loading

Work Breakdown Structure (WBS)

- Break up project into activities, sub-activities, ... and tasks.
- The work breakdown structure does not attempt to show the interdependence or sequencing of the activities, only how they sub-divide and how much resources they are expected to require.
Work Breakdown Structure (WBS) Diagram

Activities

System planning (1.0)
Review specification (1.1)
Review budget (1.2)
Review schedule (1.3)
Develop plan (1.4)

System design (2.0)
Top level design (2.1)
Prototypeing (2.2)
User interface (2.3)
Detailed design (2.4)

Build software

Tasks

Work Breakdown Structure allows estimation of costs/time required, by “rolling up” such quantities:

\[ \sum (\text{children resources}) = \text{parent resource} \]

A WBS that is too coarse makes it difficult to assign tasks and utilize resources.

WBS Tradeoffs

- Work breakdown structure allows estimation of costs/time required, by “rolling up” such quantities:
- A WBS that is too coarse makes it difficult to assign tasks and utilize resources.

Precedence Diagram (PERT chart)

- List all the tasks.
- For each task:
  - List the tasks that must (immediately) precede that task
  - Remove implied dependencies (called the “transitive reduction” of the graph)

Task durations and dependencies

<table>
<thead>
<tr>
<th>Task</th>
<th>Duration (days)</th>
<th>Dependencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>15</td>
<td>T1</td>
</tr>
<tr>
<td>T3</td>
<td>15</td>
<td>T1</td>
</tr>
<tr>
<td>T4</td>
<td>10</td>
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<td>T2, T4</td>
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<td>T9</td>
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<tr>
<td>T12</td>
<td>10</td>
<td>T11</td>
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</tbody>
</table>

Precedence Chart with Milestones (ovals)

Critical Path

- A “critical path” on a Precedence chart is one in which the sum of durations of the tasks on the path equals the shortest overall project-completion time.
- The critical path is shaded on the preceding diagram.
- If your project’s critical path is too long, what can you do to reduce it?
Gantt chart (schedule)

- Schedule (or Gantt chart) shows a particular scheduling of the tasks to time lines, subject to all of the constraints (not just precedence).

Example of Schedule Symbology
(not standardized, so give a legend)

Staff Loading & Resources

- Staff loading and resource constraints are two aspects of scheduling not represented directly on Gantt chart.
- Generally they have the effect of providing added sequencing due to resource contention, and therefore lengthening overall project time.

One Way to Show Staff Loading

3 Diagrams in 1

- If you choose the right tool, you can avoid duplicating work in creating diagrams.
- Some tools, such as Microsoft Project, allow you to show the work breakdown and precedence on directly on the schedule.
- You enter the information just once.
Some Tools

- Microsoft Project
  - Handles WBS
  - Handles PERT to Gantt
  - Sort of handles staff loading
  - Does earned value tracking (to be described)
- Planner (http://www.imendio.com/projects/planner/) open source tool, for the Gnome Linux & Unix desktop
- TopDown (Mac) or Visio (PC) can be used for drawing any kind of diagram.
- PowerPoint is often useful for diagrams.
- Post pdf's of diagrams to your Wiki.

Tracking How Well We Are Doing

Troubles Shown by Gantt Chart

- Mostly long bars, and few of them
  - Difficult to track project status, since the longer the bar, the more likely there is error in the estimate
  - Solution: Break long bars into to smaller ones and reassign

Troubles Shown by Gantt Chart

- Long bars not in parallel with each other:
  - Is the whole team really doing that one task?
  - Or are a couple doing it while the others are idle?
  - Is it really not possible to describe in any finer detail?

Troubles Shown by Gantt Chart

- Long chains of short bars with one person assigned to each bar
  - Not enough parallelism among tasks
  - Solution: Reduce dependence between bars as much as possible.
Troubles Shown by Gantt Chart

- No specific staff assignment to bars
  - Difficult to know who on the team is actually doing the work
  - How do you know who to ask for status?

Think Carefully about Staff Assignments

- Idle staff now may mean that everyone pays later to make up for the lost resource.