



CSCI 1106 Lecture 12

Project Management



Announcements

- Today's Topics
 - Motivation
 - What's to manage
 - Scheduling tasks
 - Gantt charts
 - Managing risk



How well did You Manage your Time?

- The first module is nearly up!
- Did you have enough time?
- Were you able to get everything done?
- Did you make effective use of your time?



The Problem

- A project consists of many parts
 - Tasks
 - Goals and milestones
 - Dependencies
 - Resources
 - Risks
- To complete a project
 - Finish all tasks on time
 - Accomplish all goals
 - Satisfy all dependencies
 - Use only the allocated resources
 - Adapt to things going wrong

Example: Thanksgiving Dinner for 8

AG

- Tasks
 - Prepare meal
 - Clean house
 - Set the table
- Dependencies
 - Set table *after* house is clean
 - Roast turkey *after* stuffing is made
 - Make gravy *after* turkey is done
- Risks?
- Goals
 - Prepare meal by 7pm
 - Clean house by 2pm
 - Set table by 6pm
- Resources
 - One cook
 - One helper
 - One turkey
 - One oven and stove
 - \$200 dollars for supplies
 - 8 place settings
- Time: 8am to 7pm

Things to Consider

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- Tasks take a set amount of time
- Some task must precede other tasks
- Resources are limited
- Things go wrong

Example: Robotics Project

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- Tasks
 - Create three programs
 - Write one report
 - Participate in Olympics
- Dependencies
 - Programs must be finished before Olympics
 - Report must be completed after Olympics
- Risks?
- Goals
 - Finish programs by Oct 18
 - Finish report by Oct 22
 - Finish Olympics by Oct 18/19
- Resources
 - One Tribot
 - One computer
 - Three to four people
- Time
 - Five 2-hour lab periods
 - 21 evenings and nights

The Goal of Project Management

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- Identify and schedule tasks
- Allocate resources
- Anticipate and manage risks

- Complete a project on time and on budget

- Why is this lecture so late in the term?



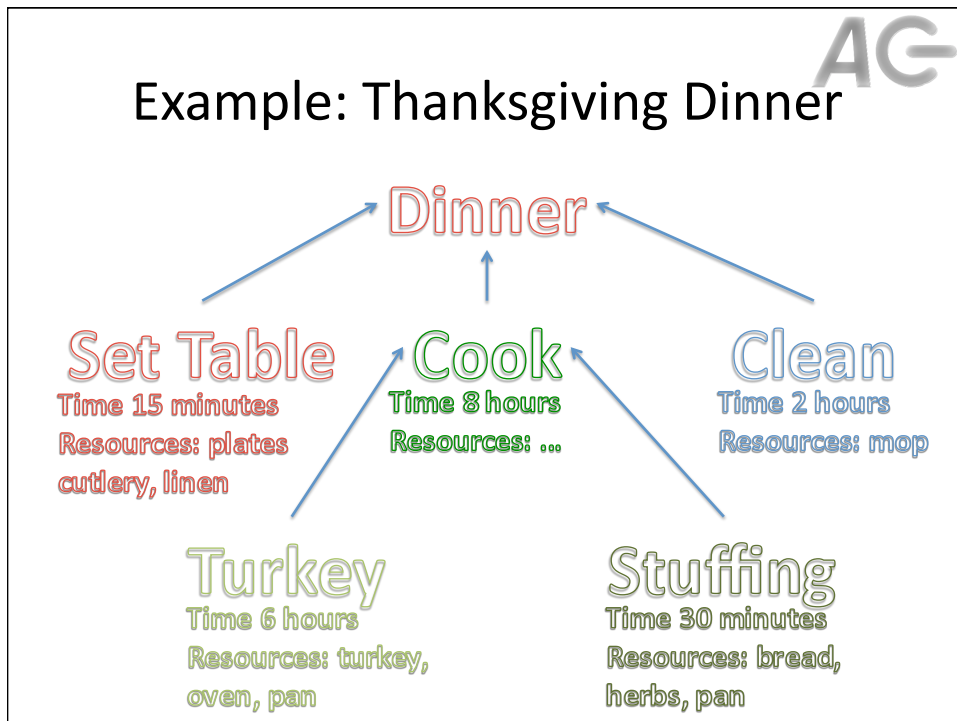
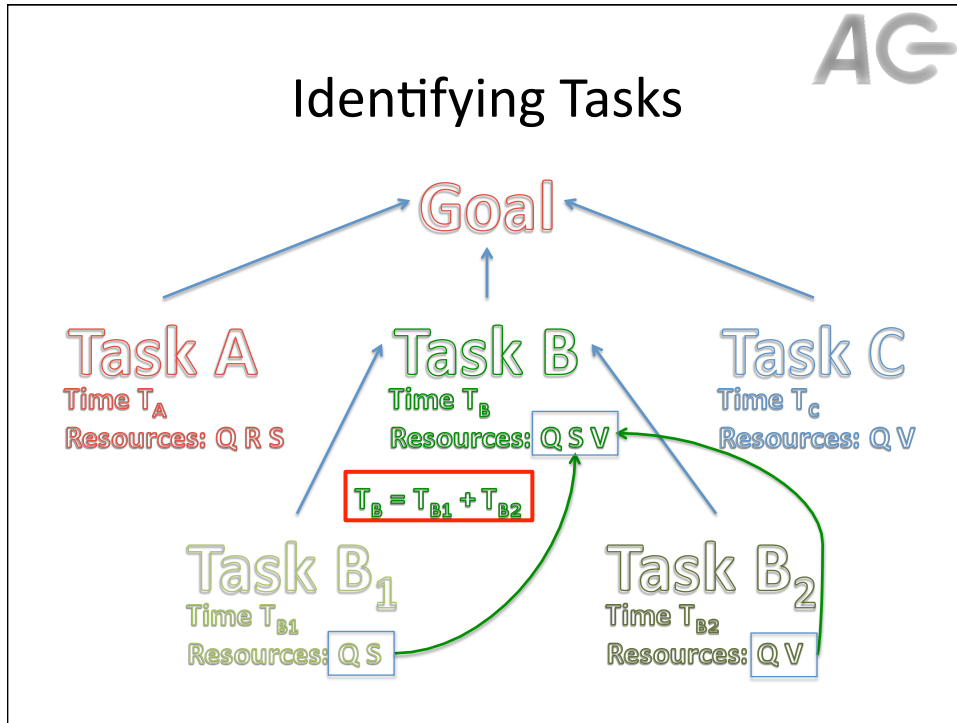
Tasks

- A task
 - Takes a minimum amount of time to complete
 - Requires specific resources
 - Requires certain other tasks to be completed first
 - Must be completed before other tasks can begin
 - May take longer than expected due to unanticipated events
- For each task we need to identify
 - What the task is
 - What resources it requires
 - What tasks does it depend on
 - How much time the task will take



Identifying Tasks

- How do we identify all the tasks?
- Idea: Work backwards (reverse engineering)
 - Start with the end goal
 - Ask what task(s) are needed to achieve the goal
 - Ask what resources are needed for the tasks
 - For each task break it down into subtasks and repeat
- Does this sound familiar?





Scheduling Tasks

- Problem:
 - There are many tasks
 - There are many resources
 - Each task may have multiple dependencies
- Need to
 - Organize all of them in one place
 - Sort dependencies
 - Check for resource contention
- Idea: Use a Gantt chart



Gantt Charts

Resource	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	...
Resource 1	Task 4						
Resource 2		Task 1					
Resource 3		Task 1		Task 3			
Resource 4				Task 3			
Resource 5			Task 2				
Resource 6							
Resource 7							
Resource 8	Task 4						
...							



Gantt Chart Rules

- Time is represented horizontally (left to right)
- Resources are denoted vertically
- A task requires both time and resources
 - Represented by one or more rectangles
- If two tasks require the same resource, they cannot overlap
- If task A depends on task B, task A must follow task B
- The minimum amount of time needed to fit in all the tasks is the minimum amount needed for the project



Example: Turkey Dinner

	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	...
Oven		Roast Turkey					
Pan	Stuffing						
Burner 1							
Burner 2							
Burner 3							
Burner 4		Cook Root Veggies					
Sink	Wash Turkey						
Dining Room				Clean	Set Table		

What resources are missing here?



Purpose of Gantt Chart

- Represent all tasks
- Represent resource use
- Represent dependencies
- Represent time of tasks

- Question: How do we know where to place what on the chart?



Three Main Issues

- Dependency chains
- Resource contention
- Risk management



Dependency Chains

- Task A depends on B depends on C depends on D ...
- Time of longest chain is the minimum time of the project
- Place longest chain first
- Then the next longest ...



Resource Contention

- Tasks cannot use a resource at the same time
- A *bottleneck* occurs when many tasks need the same resource
- Stagger tasks to avoid resource contention
- Add more resources to reduce contention



Risk Management

- Things will take longer than you think!
 - What happens to our schedule if the stuffing is burnt?
- How do we accommodate this fact of life?
- Solutions:
 - Schedule tasks as early as possible to provide time to deal with unforeseen events
 - Schedule extra time for each task
 - 10% to 15% extra time per task is not uncommon



Expectation

Try applying these techniques in the next module