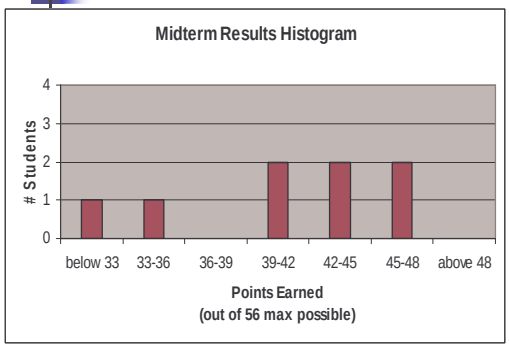
Midterm Exam Statistics



Other statistics:
- Average: 40.6
- Median: 42.3
- Std Dev: 6.2
- Max: 46.5
- Min: 28

Easiest Problems:
4, 3, 11

Hardest Problems:
8, 2, 10, 9

Lecture 15: Scheduling, Estimation, and Prioritization (Part I)

"Good judgement comes from experience. Experience comes from bad judgement."

"Doing things at the last minute is much more expensive than just before the last minute." -- Randy Pausch

"Plans are worthless, but planning is everything."
-- Dwight Eisenhower

Outline

- Software project estimation
- Prioritization
- Scheduling
  - Being behind schedule, ahead of schedule
- Frequent scheduling and prioritization-related mistakes students make
- Best practices for project scheduling
- Scheduling in the context of your projects

Resources

- *Rapid Development*, by Steve McConnell
  - Ch. 8, 9
  - Ch. 29, 32 (short summaries of best practices)
  - (optional) Ch. 14
- *Death March (2nd ed.)*, by Ed Yourdon
  - Critical-Chain Scheduling (pp.175-177)
- *The Mythical Man-Month*, by Fred Brooks
- *Code Complete*, by Steve McConnell
- *Software Requirements*, by Karl Wiegers

How The Three Concepts Tie Together

- You need an up-to-date *schedule* to keep you on track in the project.
- Items on the schedule must be continuously *estimated* (both in length and in start / completion times).
- Items on the schedule must have realistic *priorities*.

Software Project Estimation Approaches

- Estimate pieces of the project, then add the pieces together.
- Refer to estimate data from previous projects.
- Use an algorithmic approach (e.g., COCOMO).
- Use established time-tested models.
  - E.g.: expected-time = 3.0 * man-months$^{1/3}$
- Use scheduling software.
- Have outside experts do the project estimate.
- and many others...

How Are Software Projects Estimated?

- Software project estimation, as software development, is done through gradual refinement.
  - You will know better when you have seen more.
- An estimate is best represented as a range of values with an associated confidence level.
  - **Not** a single point!
- There is a trade-off between estimation accuracy and project control.
  - Why?

Advice on Giving Estimates

- Avoid giving estimates that are more precise than you can make them.
  - Otherwise, you risk hurting the estimate's accuracy.
- Estimates should **not** be "the most optimistic prediction that has a non-zero probability of coming true."
- If you don't know, **don't** make up a quick estimate under pressure.
  - Say you don't know but will let them know as soon as you do.
  - "I'll get back to you" is the mantra to remember.

Does This Apply to You Too?

- As you practice estimating (and see where you were initially wrong), you will learn to do it more accurately and reliably over time.
  - Rule of thumb: If you don't have any idea how long things will take, they will probably take ~3 times as long as you would guess.
- Practicing in a safe environment now is much better than practicing in a high-stakes situation later when your job may be on the line.

Prioritization

- "… means balancing the business benefit of each requirement [component] against its cost and any implications it has for the architectural foundation and future evolution of the product."
- Helps to resolve conflicts, plan for staged deliveries, and make needed trade-offs

Prioritization: Questions

- Who does requirements / task prioritization?
  - Developers, managers, or customers?
- When is the best time to set priorities?
  - Early in the project?
  - Just-in-time with the development of the relevant piece?

    OR
  - After a simple prototype of the feature / component has been completed?
- At what level do you prioritize?
  - Use cases, features, or detailed functional requirements?

Student Submission

Prioritization – A Simple Example

A knapsack problem:

- Fill a knapsack that can hold maximum 10 lbs of weight with as much *value* as possible from the following ingredients:

	Value per unit	Weight per unit (in lbs)
A	10	1
B	50	3
C	70	6
D	60	5

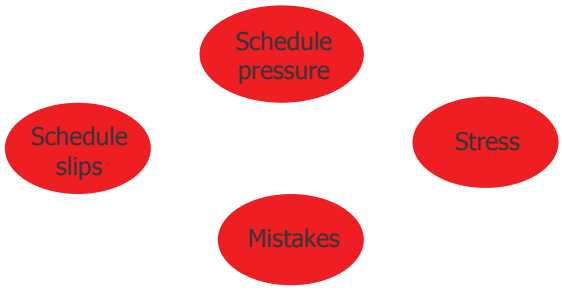
Prioritization Factors

Assume you have 100 features to implement.

- What are the main factors to consider when prioritizing features for your project?
- How do you put them together in a formula to arrive at a priority level for each feature?

Scheduling Concepts

- Schedule Pressure



Scheduling Woes

- If your project moves forward both on budget and on schedule, you are in the minority…
- What can you do if that's not the case?