Today

- Quiz 3
- Professional Development

Homework

- Exercise Set 5 out
- Essay 1 & 2 out

Reminders

- No class next week
- CEDE presentations the following week
Professional Development and Lifelong Learning

What is meant by “lifelong learning”

- Learning on your own – or how to learn on your own
- Effectively use continuing education to maintain & develop technical currency

Q: Why is lifelong learning important in Computer Science?

- Professional obligation to stay current
- Software development changes rapidly
- New projects often require new skills
- Many projects also require non-CS skills (e.g., to understand user needs)
- Because you are interested / have a desire to learn

A process for learning ... Identify:

1. Reason for learning ... for project, self, etc.
2. Extent of learning ... how deep / how much?
3. Resources to use ... many options
4. Assessment of learning ... “done” criteria
5. Process improvement ... reflection

Exercise: Come up with a scenario for the process based on senior design
Resources for learning

Exercise: What resources (sources of information) have you used to “learn on your own” so far for your senior design project?

Not all sources of information are equally “authoritative”

- “An authoritative source is a work known to be reliable because its authority or authenticity is widely recognized by experts in the field”
- Implies need to verify authorship and/or content
- E.g., on Wikipedia it is difficult to verify authorship and hard to determine if authors have authority in the subject

Exercise: What should “reliable” entail for software engineering sources?

Exercise: For each resource you identified, determine how “good” the source of information was, i.e., to what degree was it authoritative/reliable?

Exercise: What are some positives and negatives with using sites like Stack-Overflow or online “tutorials”?
Potential Resources for Your own Lifelong Learning

Sources often considered more “authoritative”:

1. Online Courses (Coursera, EdX, Udacity, Udemy, Kahn Academy, ...)
2. Seminars/Short Courses (e.g., 1 to 5 day intensives)
3. Technical conferences (Google I/O, CodeOne/JavaOne, PyCon, O’Reilly,...)
4. Books (tons of technical books)
5. Online Tutorials (many of these as well)
6. Side projects (often best for technical skills ...)
7. Certificate programs
8. Graduate school (Masters, Ph.D.)
Ten Simple Rules for Lifelong Learning (R. Hamming)

1. Cultivate lifelong learning as a “Style of Thinking” that concentrates on fundamental principles over facts
   - look for principles, fundamentals, and patterns
   - facts are important only so far as they lead to principles

2. Structure your learning to ride the information tsunami rather than drown in it
   - total amount of knowledge has doubled about every 17 years since Isaac Newton (1643-1727)
   - half-life of technical knowledge estimated at 15 years
   - if $x$ is the amount of knowledge available today, then $2x$ in 15 years with $0.5x$ obsolete, thus from $x$ to $1.5x$
   - need to structure our learning to not get buried in information (be structured, not haphazard)

3. Be prepared to compete and interact with a greater and more rapidly increasing number of scientists than at any time in the past
   - e.g., 90% of the scientists who ever lived are alive today
4. **Focus on the future but don’t ignore the past**
   - prepare for the future when it comes
   - don’t reinvent what has already been done

5. **Look for the personal angle**
   - helps to know why certain technology or approaches exist
   - and helps to remember them

6. **Learn from the success of others**
   - “there are so many ways of being wrong and so few of being right, studying successes is more efficient, and furthermore, when your turn comes you will know how to succeed rather than how to fail”
   - “vicarious learning from the experiences of others saves making errors yourself”

7. **Use trial and error to find the style of learning that best suits you**
   - Learning how to learn is like learning how to paint ...
   - you learn by trying different approaches that seem to surround the subject
8. No matter how much advice you get and how much talent you possess, it is still you who must do the learning and put in the time
   • be prepared to put in hard work and effort
   • can’t rely on others to tell you what to do

9. Have a vision to give you a general direction
   • be economical and structure your efforts according to the general direction in which you want/need to move
   • “having a vision is what tends to separate the leaders from the followers”

10. Make your life count: Struggle for excellence
    • “the life of trying to achieve excellence in some area is in itself a worthy goal for your life ...”
    • “a life without such a goal is not really living but is merely existing”