Guide to 2750 Lectures

- 4 topical headings (see Course Outline)
  1. Advanced programming concepts
  2. Software tools
  3. Intro. to use of databases
  4. Software development as a profession
- *Some* are in direct support of assignments
- *Others* are [only] training for future career
- *All* are on the midterm/final exams

Standards

*CIS*2750*

Professional Aspects of Software Development

What Are “Standards”?

- Essence of a standard:
  - Someone (hopefully expert!) has considered a problem and proposed a method (hopefully wise & good!) of solving it
  - Now we declare the method to be a “standard” and want everyone to use it
- Scope of standard:
  - Local, national, international

What Standards Do Software Developers Care About?

- Some kinds of problems we have to solve…
  - *Protocols:* communicating between different programs, on different computers
    - Python to C; Mac to Dell; Linux to Windows
  - *Codes:* representing data values as bit patterns
    - dates, times, colours, directions, sizes, graphics
  - *Procedures:* Carrying out steps of the software engineering process
    - writing source code, holding design reviews, testing

Why Standards?

- Standards encapsulate the **best** or most appropriate **practice**.
  - They capture historical knowledge, often gained by trial and error
  - They preserve and codify organizational knowledge and memory

Avoids people wasting time/money "reinventing wheel," re-solving the same problems!

Why Standards?

- Standards help to ensure **project/personnel continuity**.
  - Over a project's lifecycle, new team members may be added and standards help in assisting their useful integration
- Standards also provide a framework for **quality assurance** (QA).
  - QA now becomes the activity for ensuring that standards have been followed

Value of Standards

- **Why it is important for you to study standards?**
  - Many jobs will *require* you to follow specific standards.
  - Software that follows published standards is more likely to be *maintainable* and *marketable*.
  - There are many good ideas in the standards that you can learn from. Even the bad ideas are good to know since you have to deal with them.

Professional Software Development

- Part of being a professional software developer is the ability to read, comprehend and follow *specifications*.
- Standards are similar in that they must be read, understood and followed.
  - *How to cope with arcane language, special notation?*

Attacking a Standard

- With experience, you learn to identify:
  1. the *general* purpose and features that you must understand **now**
  2. the *details* that are likely needed for **this job**
  3. the 75-90% of *other* details that can be **ignored** till they're clearly relevant
     - But you have a sense of where they are, so you can go back and find them.

Professional Software Development

- The bottom line is that you are not developing code in a vacuum.
- Other people will:
  - **work** with your code (i.e. *read* it!),
  - **maintain** your code (they must *understand* it), and
  - **modify** your code (starting the whole cycle over again!).

Formal Definitions

- **What are Standards?**
  - Standards are documented agreements containing *technical specifications* or other *precise criteria* to be used consistently as *rules*, *guidelines*, *or definitions* of characteristics, to ensure that materials, products, processes and services are *fit* for their purpose.
  - International standards are supposed to contribute to making life simpler, and to increasing the reliability and effectiveness of the goods and services we use.

Informal Definitions

- **Standards**: enforced rules
- **Guidelines, conventions**: recommendations (maybe strong)
- *Coding conventions* [next lecture] are primarily for the **reader** of the code.

Who Writes Standards?

- Standards are difficult and time-consuming to create and administer. There are many national and international standards organizations.
- Certain organizations (usually governments) insist on contractors following their own standards.
- Many countries have national standards bodies where experts from industry and universities develop standards for all kinds of engineering problems, *e.g.* *ANSI* or the American National Standards Institute.

Who Writes Standards?

- The International Organization for Standardization, *ISO*, in Geneva is the head organization of all these national standardization bodies (from some 100 countries, one from each country).

ISO

- The *ISO* is a non-governmental organization and was established in 1947.
- *ISO's* work results in international agreements which are published as International Standards.

ISO

- *“ISO”* is not an acronym for the organization in any language. It is a wordplay based on the English initials and the Greek word isos, meaning “equal”, which is the root of the prefix “iso-” that occurs in a host of terms, such as “isometric” (of equal measure or dimensions).
- In addition, the name has the advantage of being valid in each of the organization's three official languages - English, French and Russian.

ISO Standards Relevant to Computing

- **ISO 646** Good ol' 7-bit ASCII with national variants
- **ISO 2022** ESC sequences for switching between various character sets
- **ISO 4217** Codes for the representation of currencies and funds
- **ISO 6709** Representation of latitude, longitude and altitude of geographic positions

ISO Standards Relevant to Computing

- **ISO 6429** ASCII Control Codes, also known as VT100/VT320/ANSI escape sequences
- **ISO 9899** The C programming language
- **ISO 9945** UNIX style system calls and shell commands (POSIX)

ISO 3166

Codes for the representation of names of countries

- This standard defines a 2-letter, a 3-letter and a numeric code for each country on this planet.

  US/USA/840=United States

  DE/DEU/276=Germany

  GB/GBR/826=United Kingdom

  FR/FRA/250=France

- The 2-letter codes are well known in the Internet as top-level domain names. The 3-letter versions are often used at international sports events.

ISO 5218

Representation of human sexes

- Sex is represented by a one-character language independent numerical code:

  0=not known

  1=male

  2=female

  9=not specified

- The standard also specifies, that “no significance” is to be placed on the fact that ‘Male’ is coded ‘1’ and ‘Female’ is coded ‘2’. “This standard was developed based upon predominant practice of the countries involved and does not convey any meaning of importance, ranking or any other basis that could imply discrimination.” :-)

ISO 8601

Representation of dates and times

- This standard defines a lot of details of the calendar, e.g. the ISO definition of the **week numbers** is that the *first day* (day number 1) of a week is Monday and that the *first week* in a year (week number 1) is the week that includes the first Thursday in January, *i.e.* the first week that has at least four days in January.

ISO 8601

Representation of dates and times

- Other definitions are, *e.g.*, that hours of a day are counted from 0 to 24 and that the international notation of dates is the Bigendian format year-month-day, *e.g.* 1993-04-17 and that for time is 20:36:04.
- There are also string formats for computer applications specified that have to represent date and time in files and protocol packets.

RFCs: Proposing Internet Standards

- "Request for Comments" overseen by **IETF**, Internet Engineering Task Force
- *Standards Track:* proposed→draft→international standard
- *Other kinds:* informational, experimental, best current practice, historic, unknown
- Once published, never removed/modified, only superseded by later RFC

Conclusion

- Standards are an excellent way to study best practices and to coordinate common concepts in many different situations.
- The professional software developer must be aware of all appropriate standards that relate to the application that they are developing.
- Standards are a sign of professional maturity.