

# CS 107 Fall 2006

## Lecture 3: Software Systems

### 1 Systems and Applications

To use a computer, somebody must write (and debug) a program. A program is a set of instructions about how to do a task, step by tiny step. (Writing programs is a science and an art that we will discuss later in the term.) There are several major kinds of programs:

1. Operating systems (Lecture 2): These programs form an interface between the computer and the people who use it. Today's popular systems include Windows XP, Linux, and OS-X. Review topics: ports, zombie systems, processes, denial of service, thrashing, engineer joke.
2. General-purpose applications: Programs such as Netscape, Oracle, Excel, Money, and Power-Point are used by millions of people all over the world. Some of these are commonly grouped into "Office" packages and called "productivity software".
3. Specialized applications: Schools, libraries, hospitals, businesses, and governments all have specialized programs to handle their records and business processes. Such programs are sometimes created for a company from the ground up, and sometimes built on existing general-purpose applications. SAM and ProGrader, which will be used in this class, are specialized applications.
4. Translators: Programs are written in many different computer languages; each language has its strong and weak points, its defenders and its detractors. Every computer language has a translator that converts the programs written by a programmer in a semi-human language and translates it to a series of bits and bytes a computer (and only a computer) can understand. Every different combination of computer hardware + operating system must have its own specialized translators.
5. Libraries: Every computer language has a library consisting of hundreds of functions, large and small, that do commonly-useful things. Putting a function into a library makes it available for other programmers to use. Many of these libraries are specialized, and different languages support different specialties. Often, the presence or absence of the library you need is the biggest difference between one language and another.

### 2 General-Purpose Applications

These fall into several broad categories:

- Personal-organization software (calendars, mail filing systems, etc – Outlook)
- Browsers (Netscape, Safari, Firefox, Internet Explorer)
- Spreadsheets (Excel, Mesa, OpenOffice)
- Databases (Large-scale: Oracle, MySQL, Small-scale: Access)
- Presentation software (PowerPoint, KPresenter, Keynote)

- Business systems (GnuCash, Money, Quasar, POS systems, etc.)
- Word processors, text editors, and type-setting systems.

We will look at all of these during the term. Today we go more deeply into only the last one.

## 2.1 Word Whomping

A word processor is today's answer to yesterday's typewriter, and is far more powerful, more forgiving, and easier to use. But a word processor is not the right answer to every writing task. This lecture guide was written in LaTeX. Once you know how to use it, you don't want to fight with Word anymore.

- A text editor (such as Notepad) gives you the text you wrote and nothing but that text. It does not handle fonts or styles. It does not try to correct your spelling. It does not indent things in undesirable ways for its own hidden reasons. It is very simple, very fast, produces simple compact files, is universally compatible. Computer programmers use text editors to write code and make data files.
- A simple rtf editor is like a text editor with the ability to handle multiple fonts and tab stops and the ability to integrate diagrams into the text. An rtf editor is simple, easy to use, and easy to learn. It cannot do as many things as a word processor, but everything it does is easy to do.
- A word processor such as Microsoft Word integrates the writer's words with formatting information. A word processor is called "wysiwyg" (what you see is what you get) because normally, you see only the finished, formatted product, not the raw words and control codes. Word is the world's most common word processor, but not the only one. All word processors support multiple font sizes and styles, margins and tabs that can be set, bulleted or numbered lists, and bold, italic, or underlined text. Modern ones have spelling and grammar checkers built in.

Word is an extremely complex word processor that tries to do everything anyone has thought about doing. Sometimes it seems to have a mind of its own, and simply refuses to do what you want the way you want it. A general truth is:

It is impossible to build a system or machine that is powerful, simple, and flexible.

Word is powerful and flexible. It is not simple to learn or simple to use.

- A type-setting system such as LaTeX is capable of producing professional-looking documents. LaTeX is powerful and flexible. It is not simple to learn. It takes more knowledge to use than a word processor, and it feels more like a stick-shift car than like one with an automatic transmission. However, LaTeX gives much better control over the results than does Word. It is also capable of handling a very large manuscript such as a whole book.

## 3 Development Paths

- Commercial products
- Free software foundation
- Open source is a compromise