

Department of Mathematics and Computer Science

Goals for Writing in Computer Science

Computer science students should learn how to write clear and elegant code and produce professional technical documentation. These writing skills are often new to the students and will be developed over the four year program in computer science. Examples will be provided in class. The following goals define what we mean by well written programs and professional technical documents.

Computer Programs

A well written program should conform to the following eight criteria.

1. Correctness. The program must meet the specifications.
2. Headers.
 - a) File headers. The top of each file has comments giving the file name, author, date, course, purpose, and a modification log.
 - b) Class headers. At the beginning of each class, comments give the abstract, author, version number, and references. An abstract includes the purpose, other important information, and corresponding examples if useful.
 - c) Method headers. Each method begins with a comment block giving the abstract; the parameters and their descriptions; the return value and its description; and any exceptional conditions that may arrive.
3. Meaningful identifiers. Names of variables, classes, methods, etc., indicate clearly the role of the symbol in the program. Often it is useful to include definitions for each symbol.
4. Documentation of Statements.
 - a) Blocks. Break code into short blocks and document the purpose of each block before the first statement.
 - b) Loops. Include a comment before a loop giving the precondition, and state the post-condition after the loop.
 - c) Asserts. Use asserts judiciously.
5. Constants. Do not use magic numbers. Declare constants instead to make the code more robust and readable.
6. Clear flow of logic. Always choose the simplest most clearly understood algorithm for implementation first. If for reasons of performance it is necessary to use an alternative algorithm that is not easily understood by reading the code, then there is an obligation to document the performance and working of the code clearly.

7. Appropriate modularization. The code for the program is broken into appropriate classes and methods. In general classes should be loosely coupled and methods should exhibit high cohesion.
8. Correct grammar and spelling.

Technical Documents

Writing a technical document supporting a project in computer science is a skill you will study in-depth in the Software Engineering course. You will use this skill throughout your career. Here are the goals for technical documents:

1. Correctness and completeness.
2. Consistency.
 - a) Internal consistency.
 - b) External consistency. Each document should be consistent with the software and the other project documents.
3. Traceability. Program requirements should be traceable through the complete document set to their implementation in code.
4. Testability and non-ambiguity.
5. Standards. Use a standard structure for each particular document. Acceptable standards include the IEEE and the ISO 9000 standards.
6. Illustrations. Include pictures and diagrams giving a complete explanation in words as well.
7. Dressing. Include a cover page, table of contents, index, and glossary. The glossary contains all unique terminology, symbols and acronyms along with their definitions.
8. Correct grammar and spelling.

Assessment

Progress on meeting these objectives will be measured by comparing early efforts with final efforts. For each student, the first program written in Data Structures and the first document written in Software Engineering will be collected and graded, and the results will be kept in a file in the chair's office. Samples will be taken from the senior project, graded, and compared with the early efforts.

The rubric for grading the samples is to score each objective on a scale and total the scores. Half of the goals are graded with either a 0, 1, or 2, and the other half with either a 0, 2, or 4:

	0-2-4	0-1-2
Computer programs	Goals 1, 2, 6, and 7	Goals 3, 4, 5, and 8
Technical documents	Goals 1, 3, 4, and 5	Goals 2, 6, 7, and 8