CSE 460

Software Analysis and Design

(Fall 2022)

**Homework #1**

**Assigned:** August 26, 11:59 pm

**Due:** September 4, 11:59 pm

Posting ID |\_\_|\_\_|\_\_|\_\_|-|\_\_|\_\_|\_\_|

**Note 1:** Your submission to **Gradescope** must include the above header shown in maroon color. Do not include your name in your submission.

**Note 2:** Homework is to be done individually. You may discuss the homework problems with your fellow students, but you are NOT allowed to copy – either in part or in whole – anyone else’s answers. You are also encouraged to meet the TAs and the instructor.

**Note 3:** All submitted materials must be legible. Text-based answers must be typed. Figures/diagrams must follow the given instructions.

**Note 4:** Please check the Canvas Discussions for further instructions, questions, answers, and hints.

**Note 5:** The format Hw#-PostingID.pdf (e.g., Hw1-1234-987.pdf) should be used for naming homework assignment files.

1. [30 pts] The Sun Devil Sync software system (https://www.asu.edu/) at Arizona State University. It offers many sections for ASU students, alumni, staff, and faculty. Consider the *Event*, *Organizations*, and *News* sections of the Sun Devil Sync. Create three kinds of hierarchical diagrams for the Sun Devil Sync software system (see below). The diagrams should have elements belonging to the *Event*, *Organizations*, and *News* sections.
2. One diagram (aggregation hierarchy): It has elements with part-of relationships. This diagram should have three levels with 8 to 12 elements.
3. Three Diagrams (generalization hierarchies): Each diagram has elements with is-a relationships. Each diagram should have at most three levels with 3 to 5 elements.
4. One diagram (combined aggregation and generalization hierarchy): It has elements with part-of and is-a relationships (may include elements from parts i and ii). This diagram should have at least three levels with 12 to 18 elements.

The number of elements for each of the above diagrams excludes the number of relationships. Use a drawing tool to create the above diagrams. Include a *short description* for each part. Limit each description to 20 words. Note: The question is not asking for UML class diagrams.

1. [20 points] Again, consider the Sun Devil Sync software system. Explain clearly whether or not each of the following complexity attributes is satisfied for this software system.
2. [10 pts] “Frequently, complexity takes the form of a hierarchy…” (OOAD p. 12)
3. [10 pts] “Intra-component linkages are generally stronger than inter-component linkages…” (OOAD p. 13)

The explanations should be supported using the answers to question 1. Each explanation can be up to 50 words.

1. [20 points] Describe in your own words the content of “The importance of Model Building” in Section 1.6, Chapter 1, OOAD textbook. Limit your answer to 50 words.
2. [10 points] Read the letter entitled “Where is the science in computer science?” from the former ACM president. Identify two ideas that you find essential for software analysis and design. This paper is available under the Modules section in Canvas. Limit your answer to 25 words for each.

Cerf, Vinton G., 2012, “Where is the science in computer science?.” *Communications of the ACM, Vol.* 55, No.10 (2012), p. 5.

1. [20 points] Read the following article. This article describes software complexity in software for the automotive industry. It notes software complexity in view of the code, architecture, variants, and requirements aspects. Consider the code and requirements complexity aspects. Which two out of six complexity attributes are most directly tied to the code and variants complexities? Provide explanations for your answers.

Antinyan, V., 2020, Revealing the complexity of automotive software. In *Proceedings of the 28th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering*, pp. 1525-1528.