

CS578: Software Architectures Spring 2006

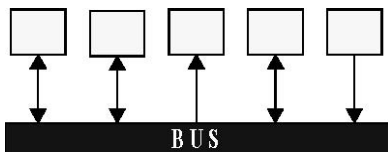
Homework #2

**Due Date: Tuesday, February 9
before 3:30pm – no exceptions**

1. (10%) Define the following terms?

- a) Cohesion
- b) Coupling
- c) How do you measure Cohesion and Coupling?
- d) Discuss how cohesion and coupling impact the *element, form, rationale* identified by Perry and Wolf.

2. (15%) A Software Bus is a type of connector that facilitates the interaction among software components. The figure below depicts a number of software components attached to such a software bus.



- a) Discuss two potential problems of using such a bus to support software modeling
- b) Draw two alternative software architectures that do not have the problems you identified in a)

3. (10%) How would the following non-functional requirements impact a software system's architecture? You may answer individual questions by pointing out appropriate trade-offs among the requirements.

- (a) Performance
- (b) Safety
- (c) Reliability
- (d) Adaptability
- (e) Security

4. (10%) To have an architecture adopted, the architect needs to convince others. Which stakeholders need to be convinced? What arguments will the architect use? Is it enough merely to develop a good architecture for a given problem?

5. (30%) We discussed the KWIC example in class to illustrate that even a fairly trivial software system has an architecture *and* that architectural decisions strongly influence the properties of the software system.

- a) Identify another simple, intuitive system of your choice and come up with four different architectural solutions.
- b) Briefly describe each architectural solution and discuss their respective advantages and disadvantages.

6. (15%) Define the following terms:

- Software component
- Software connector
- Software system
- Distributed system
- Software model
- Architectural style
- Application domain
- Middleware
- Product line

Each definition may be as short as a single sentence, but no longer than a paragraph. Try to refrain from copying existing definitions wholesale; I would like you to convey your own understanding of these concepts. Justify your definitions whenever needed.

7. (10%) D. E. Perry and A. L. Wolf. Foundations for the Study of Software Architectures. ACM SIGSOFT Software Engineering Notes, October 1992.

- a) What do you think was the novel contribution of the Perry-Wolf paper? (aside of inventing the term software architecture)
- b) How did they justify the need for software architectures?
- c) Why do you think did they have a hard time in publishing this paper?

Submission Instructions: see class web site at http://sunset.usc.edu/classes/cs578_2006/