

# CS 578 – Software Architectures

Spring 2011

## Homework Assignment #1

**Due:** *Tuesday, February 15, 2011*

*– see course websites for submission details –*

### Introduction

In this assignment, we will focus on selecting and designing a set of components, connectors, and architectural styles that satisfy the requirements and complete the challenges of the “Big Data” Bioinformatics System, hereafter referred to as the BD system.

This assignment aims to help you understand how to do the following:

- Decompose the description of a desired system and its requirements into components and connectors
- Understand how designs you come up with typically exhibit one or more architectural styles
- Weight the tradeoffs of selecting one architectural style over another
- Understand how your design fails to or succeeds in satisfying requirements or completing architectural challenges
- Explain how a use-case scenario relates to the architecture that you design

### Questions

#### Components and Connectors

1. Draw a diagram of your BD system architecture. Include the components, connectors, and associations between components and connectors in your diagram. Please ensure that your diagram is readable.
2. Provide a description of each component and connector. Your description should name each component, explain the key functionalities of each component, and explain the set of connectors selected for the system. We recommend that you answer this question as a bulleted or numbered list or in the form of a table.

#### Architectural Styles

3. Two architectural styles (e.g., layered or piper and filter) should be selected as part of your design. Describe the style constraints (e.g. types of components and connectors and constraints on which of these elements can communicate with each other) and the non-functional properties exhibited by the style. Explain which set of components and connectors from your design adhere to the style constraints of your selected styles. If you have decided to include a connector not typically associated with your selected architectural styles, please explain why you chose to deviate from your chosen styles.
4. For each style you selected, select another style that you have not already chosen and describe at least two advantages your selected style has over the third unselected style. Consequently, you will be describing four advantages all together.

## **Requirements and Key Architectural Challenges**

5. Select a subset of your components and connectors and describe how they satisfy two of the requirements of the BD system. Please avoid saying that all your components and connectors together satisfy the two requirements. Instead describe how the functionalities or properties of each component and/or connector work together to satisfy a particular requirement.
6. Select a subset of your components and connectors and describe how they deal with the two of the key architectural challenges of the BD system. Please avoid saying that all your components and connectors together deal with the two architectural challenges. Instead, describe how the functionalities or properties of each component and/or connector work together to complete a particular challenge.

## **Use-case scenarios**

7. Come up with a use-case scenario for the BD system then describe each component and connector involved in that use case scenario. If you can only think of a use case scenario that involves only two components, then describe a second use case scenario involving another two components.

## **Deliverables**

- Please limit your answers to 3 pages.
- Any diagrams you create are not included in the page limitation.
- Please include all your text and figures in a single PDF called <lastname>\_<firstname>\_csci578\_<mattmann|medvidovic>\_HW<n>.pdf. For example, if your name is Joshua Garcia and you are a student in Prof. Medvidovic's class. The name of the file would be Garcia\_Joshua\_csci578\_medvidovic\_HW1.pdf