

CSE 460/598

Software Analysis and Design

(Spring 2018)

Programming Assignment

Assigned Date: March 26, 2018

Due Date: April 16, 2018

Submit your report (see the report template), source files, and Astah files in a single ZIP file (no other archive formats will be accepted) to Blackboard. The report name is CSE460_postid.zip (replace “postId” with your ASU posting ID). You must include your student ID number as a comment at the beginning of every source file. Submit your solution in the following format: **CSE460_postid.zip** (replace “postId” with your ASU posting ID).

Description of System

The discussion board of the Blackboard system used by Arizona State University is a tool that students can use to communicate with each other and with their teaching assistants and professors. One feature of the discussion board is the ability for students to subscribe to forums of their choice. Blackboard then sends notifications to subscribers whenever a new message is posted to the forum. While anyone in the class can post messages, the list of subscribers to a forum is not accessible to the users.

Each forum of the discussion board may have a number of threads, and each thread has a number of posts. Within each thread, each post may have a set of replies. New forums, threads, and posts can be created at any time. Any of the users of the discussion board may subscribe or unsubscribe to any of its forums.

Users may not subscribe to a forum that does not already exist. No error message occurs if a user tries to unsubscribe to a forum to which the user is not subscribed. There is also no error message if a user subscribes multiple times to a forum, but there is no such thing as a duplicate subscription. When a post is added in a forum (including when a new thread is created), every subscriber to the forum should receive a notification telling the name of the person who posted, the forum name, the thread name, and the number of posts in that thread.

Scope

Develop a design and program for the Blackboard Discussion Board Notification System. The system will receive text inputs, sent through stdin, to indicate what commands will be given in the use of the discussion board. Commands to create forums, add posts, subscribe, and unsubscribe may occur in any order. The same command is used to add a post to a thread and to create a new thread, depending on whether the thread exists. Notifications must be sent in the corresponding order; notifications are always received earlier for posts that are added earlier. For a given post, notifications are received in the order of current subscriptions, with the most recent subscriber receiving the notification last. When members unsubscribe, their place in the order of subscribers is lost.

You will develop specifications and implementations for the **Blackboard Discussion Board Notification System**. As described above, this software system allows members of the ASU community to be notified of posts to the discussion board. This software system is to be developed according to the Publisher/Subscriber with notification Design Pattern. In your design, objects that represent the subscribers and post authors must perform the actions indicated by the text inputs.

Analysis and Design

You need to develop specifications using UML and Astah tool prior to implementing them. You should include an appropriate number of class and sequence diagrams and at least one state machine.

Inputs must be read from a text string received through stdin. Each input is one of the following five commands.

```
new forum,[forum name]
new post,[user name],[forum name],[thread title],[post text]
subscribe,[user name],[forum name]
unsubscribe,[user name],[forum name]
```

The brackets are not included in the inputs, but indicate where strings will be placed in the inputs. Commands are separated by a single newline character, ‘\n’, with no space before or after the comma. You may assume that names, titles, and text to be posted do not have comma, newline, or semicolon characters.

Outputs for your system include a list of notifications received and failed send attempts, all in the order in which they occur. Outputs are separated by a semicolon (;). The output for a received email is

```
Sent to [subscriber name]: A new post was added by [author name] in
[forum name]: [thread title]. Posts in thread: [number of posts].
```

(Without the brackets).

Inputs must be read from stdin, and outputs must be sent to stdout. Names and email text may contain any character other than comma. It is your responsibility to handle the upper-case/lower-case names (i.e., treating them to be the same such as “Aaron Baker” and “aaron baker”). Your output file may be lowercase/uppercase or mixed. However, the characters should exactly match the output for each test case (no extra space, lines, or additional characters) as all programs will be tested automatically. Sample input and output files are provided.

Show how the parts of your design are related including parts that process the input strings.

Coding and Testing

You must use forward engineering to convert your UML design specification to Java code. Then you must complete the partially generated Java classes by adding your own code to the stubs generated by Astah. Manually added code must be identified using **// Begin** and **// End** comments. The UML diagrams must completely match your code to the degree possible. Do not delete or change any of the Java code produced by Astah. If you need to change any line of code from Astah, such as for a return statement, leave a commented out copy of the original line in the program.

Text files will be used as input with their corresponding outputs written to text files via redirection (see sampleInput.txt and sampleOutput.txt files). The produced output files for the input files must match the given syntax to allow automatic testing (see Table 1 and the sample files). Our input test files will differ from the sample input file and have different orders for publishing, subscribing, and unsubscribing to events.

Sample entry in input file	new forum,Programming Assignment Subscribe,Allison Barnes,Programming Assignment new post,will boyd,programming assignment,hints, Check the discussion board.
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Sample output in output file	Sent to allison barnes: A new post was added by will boyd in programming assignment: hints. Posts in thread: 1.
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Table 1: Sample input and output files

- **Note that J2SE must be used—J2EE is not allowed.**
- We will execute your source code on Windows OS.
- Source code can be implemented only using the Java programming language.
- We will execute your source code using JRE 1.8. Please do not include any compiled code or third party APIs.
- Make sure your code compiles and runs from command line (there is no dependency on IDEs or anything else that is specific to your software development environment; you may include Junit tests)
 - `javac MainClass.java` (substitute your main class name)
 - `java MainClass < inputFile > outputFile` (substitute the file names)

These commands redirect an input text file to stdin and redirect stdout to a new text file, erasing any existing file with the outputFile name. Your program should have no mention of files.

Rubric

Parts	Points
Uses publisher-subscriber model	25
Class diagrams	8
Sequence diagrams	8
State machine diagram	4
Design quality	5
Forward engineering (partial code is generated automatically)	10
A good design (including a provided interface) for storing and retrieving every reply to every post is shown. You may assume that no posts are deleted. (Extra credit)	10
Produces correct outputs	20
Code documentation and quality	10
Documentation: class, sequence, and state machine descriptions, a readme file (including the name of the main class), and any other supporting materials. A single PDF or Microsoft Word file must be used. A template for this document is posted.	10
Total	110

Be sure to check the Blackboard discussion board for updates to this assignment's hints, questions, and answers. You are responsible for knowing any posted requirements or guidelines. If you are not certain about some aspect of this assignment, it is good to ask.