Concurrency Programming

Assignment 1

My First Threads
Playing Music and Drawing Graphics

Mandatory

Farid Naisan
University Lecturer
Faculty of Technology and Society

Music Player and Graphics

1 Objectives

The main goal of this assignment is:

- To learn how to create and start a thread to perform to accomplish a certain task.

2 Description

Your job in this first assignment in the Concurrent Programming course is to write a simple GUI-based application for playing music files (e.g. mp3 or wav) and doing some graphic work. Although you may use any of the languages C#, Java or C++ (Visual C++), it is recommended to use Visual Studio and C#.

2.1 The jobs are to be done simultaneously by using threads. While the music file is to run under the applications main thread, you have to create at least two other threads as follows:

2.1.1 One thread to draw and manipulate a figure.

2.1.2 Another thread that displays a text, for instance its own name.

2.2 A sample GUI layout for the application is presented here.

2.3 The user should be able to select the music file from a drive and folder on the computer. The user should also be able to start and stop the music at any time.

2.4 The GUI should have two panels (as you can see in the figure below). Each of these panel is intended for a thread to work on.

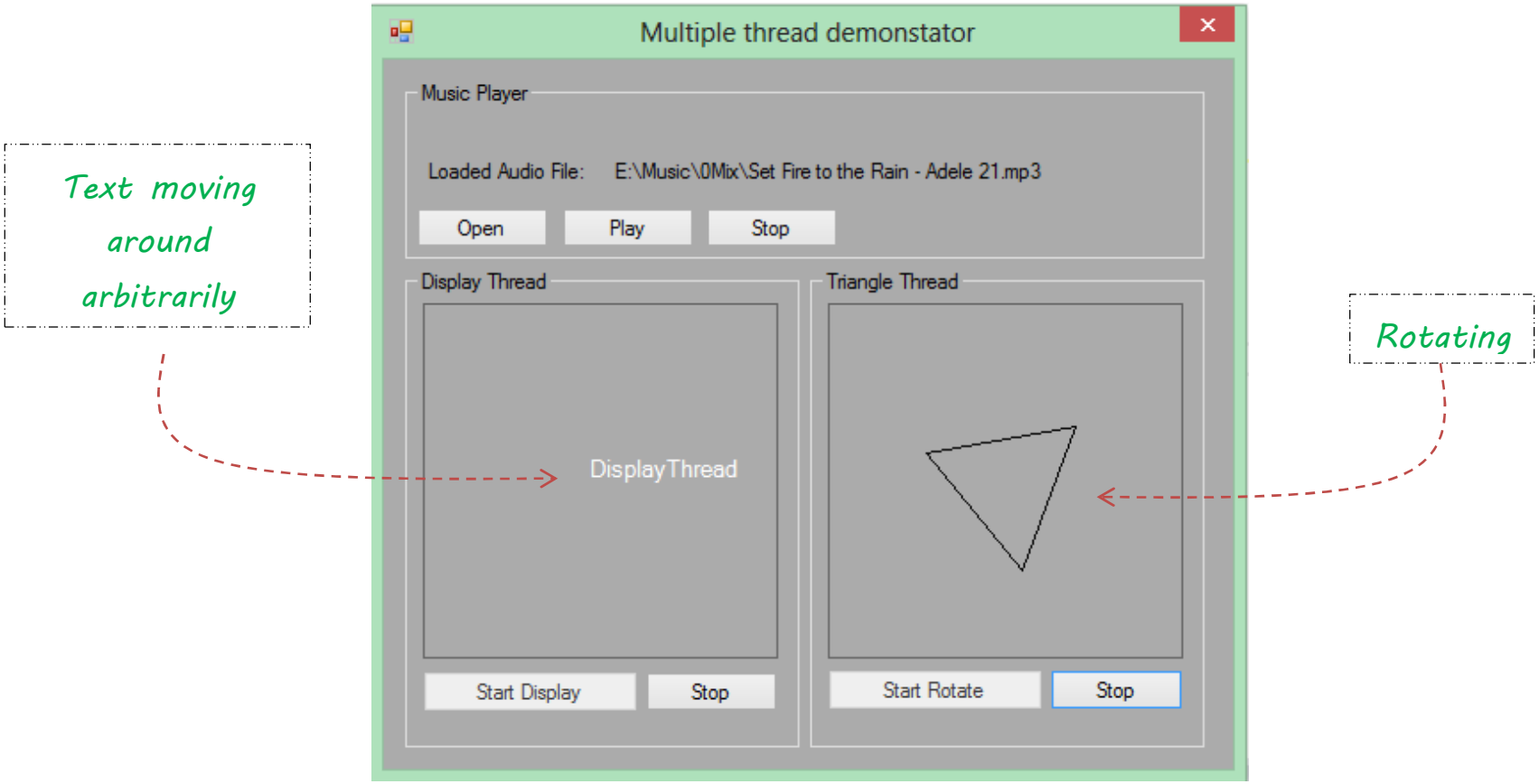
2.4.1 **Left-panel**: In this panel a thread is to display its own name arbitrarily inside the panel.

2.4.2 **Right-panel**: In this panel you let a thread do **one** of the following job alternatives:

2.4.2.4 Draw a triangle (or a rectangle) rotating around its midpoint as in the figure.

2.4.2.5 Draw a clock showing the current time (system time or any local time) and let the thread place the component at random places inside the panel. The clock can be just a textual representation using a Label. (If you wish to do a more advanced solution, you can display a graphical clock).

2.4.2.6 You can load (embed) an image file and move the image around inside the panel.



2.5 Use a file dialog to let the user select a music file to play. The file dialog should filter files and list only *.wav and *.mp3 files.

2.6 When the button Start Rotate is pressed a thread is created and it starts drawing a triangle on that panel. Alternatively, you can display a clock (digital or analogue) on this panel. For the triangle, the panel can be updated at a certain amount of time, for example 200 milliseconds rotating with for example 10 degrees around its midpoint, clockwise or counter-clockwise. If you choose to display a clock, it should update itself and display the time every second. Do not use a Timer control or similar components.

2.7 There should be a Start and a Stop button for starting and stopping the thread working on each panel. The Start button should create and start the thread and the Stop button should end the thread execution.

3 Specifications and Requirements for a Pass grade (G)

3.1 Do all items described above. You may of course add more features or use more threads to improve the application.

3.2 You code must be well organized into classes and well object-oriented based on Encapsulation (private instance variables, short methods), inheritance and polymorphism wherever and whenever applicable.

3.3 Make sure that no user action can cause the program to crash. Test your application carefully before submitting.

3.4 It is not allowed to use a Timer control or any similar components. All such operations should be accomplished by the threads.

3.5 Make sure that a thread that is running cannot be restarted

3.6 Make sure to test that at no thread is active when closing the application; if so is the case, terminate before closing (can handle the FormClosing event if you use C#).

4 Grading and submission

This assignment can be submitted via Its L without the need to show your work to your lab teacher personally during the lab hours. However, if you need help and guidance, you can come to labs as per the schedule. Even in this case, you must upload your solution to Its L before showing your solution for grading.

Make sure that you submit the correct version of your project and that you have compiled and tested your project before handing in. Be careful not to use any hard-coded file paths (for example path to a music file on your C-drive) in your source code. It will not work on other computers. Projects that do not compile and run correctly will be directly returned for completion and resubmission.

Compress all the files, folders and subfolders into a **zip** or **rar** file, and then upload it via the Assignment page on It's L. Click the button “Submit Answer” and attach your file. Do not send your project via mail!

5 Links:

Playing sound (C#): http://www.caveofprogramming.com/guest-articles/csharp/c-for-beginners-make-your-own-mp3-player-free/
Drawing 2D (C#): https://www.youtube.com/watch?v=R8KTm4E3gEA , https://www.youtube.com/watch?v=R8KTm4E3gEA

Drawing 2D (Java): https://www.youtube.com/watch?v=ydQWhluoBXM
Java threads: https://www.youtube.com/watch?v=br_TEuE8TbY. https://www.youtube.com/watch?v=F-CkaU8aQZI

Threads (C++): http://www.tutorialspoint.com/cplusplus/cpp_multithreading.htm

Good Luck!

Farid Naisan,
Course Responsible and Instructor