concurrency

In this collection of exercises you will investigate specifying the operation of concurrent threads in Java. Your aim is to investigate building threads, notice the small glitches & anomalies, try to determine why these are occurring & then correct them.

Try to build your programs into small collections (like some of the Java demos) so you can initiate all versions from the same entry point/JFrame.

Borrow code from the examples given in lectures (if this helps) but make sure you understand fully how all these code fragments work.

Develop your program in stages (as below), test each step & understand how/why any errors are occurring.

stages

1. write a program which gets two *blobs* (filled ovals) moving independently – each running in their own thread. The blobs should be visible and bounce/wrap-around whatever graphics surface (JFrame, etc) you use.
2. build a blob-monitor mechanism which keeps track of the positions of both blobs. The monitor should display blob positions somewhere so you can see what is happening;
3. run the monitor in its own thread & get it to detect collisions between the blobs. A collision is when the blobs (or, for simplicity, the squares they are drawn in) overlap. Indicate collisions by changing something (anything will do) on the displayed frame/window;
4. analyse your program. Could there be anomalies due to multi-threading? Is there a need for any synchronisation?
5. modify the code so, when there is a collision, the monitor signals the blobs (in any way you like) which causes the blobs to "bounce" away from the collision
6. extend the program so it can handle multiple (ie: lots more than 2) blobs. Examine it carefully to check for synchronisation glitches and threading problems

advanced work

Build on your existing solutions/ideas to show 2 types of blob: *foreground blobs* (FBs) & *background blobs* (BBs). BBs & FBs logically inhabit their own plane of travel. BBs are free to collide with each other (they do not bounce off each other) and should wrap around their plane of travel. BBs positions are not monitored.

FBs operate as outlined in stages 1-6 above (so they do bounce off each other).

FBs & BBs do not interact (so a BB cannot deflect/bounce an FB).

FBs are drawn on the foreground, BBs on the background. As before all blobs (both types) operate in their own thread.

NB: I found it easier to visualise what was happening by making BBs small & lighter colour and FBs larger & bold in colour.