Java Desktop Application Idea

The application idea that I propose makes use of Java and JavaFX to educate users on astronomical phenomena, specifically constellations. Using JavaFX, we would create a navigable canvas where a user could view different star formations. Clicking on a formation would prompt lines between each star to fully draw out the constellation. We would then provide both scientific, historical and mythological information on the constellation. We could also expand this to include other celestial bodies, like black holes, red dwarfs and neutron stars. The main purpose of this application is to educate and inform people on astronomical bodies, in a fun and interactive way.

Most of the application will be made using JavaFX, alongside concurrency for doing multiple processes at once. We will be making use of JavaFX's events and user input through these events from mouse input. Clicking any star (circle) will prompt the drawing of lines to fully draw out the constellation. When drawing in lines, we will use multi-threading to draw each line concurrently. Accompanying text will appear close to the constellation or celestial body, explaining it. Each star will be manually placed on the canvas, we will be researching the distance between each star to ensure that the drawing of the constellation is as accurate as possible. The canvas size would most likely start at 1200px by 1200px, with star sizes at 10px. If other celestial bodies are added, we could vary their sizes, like a black hole being 20px and a red dwarf being 50px, for example.

The structuring of the program is important here, our main thread will contain the main JavaFX logic and environment. We will set up and initialize the thread for each constellation cluster and celestial body here. With regards to encapsulation and the concept of object-oriented, each constellation and celestial body should have their own classes, implementing the Runnable interface and built upon classes going up in the hierarchy. Each class should oversee their own properties and have its own methods. A general interface would be provided as well, to create shared methods between classes. Anything that directly affects the object that the class creates should be handled in the logic of the class and not the environment. And example of hierarchy could be SpaceBody <- Star or SpaceBody <- Planet. Our main thread, or program, should also contain a List of the generated space phenomena. This List should be a private constant, making it easier for any thread to access it if needed, while preventing it from being externally changed.

Text display blocks and Constellation masses (collections of Stars) will be handled in their own separate classes. The Constellation class should contain a List of Lines and Stars, with each Star and Line given their own preset coordinates. Each Line should be hidden from sight at first. Once a Star is clicked, the Lines will be revealed, and corresponding Text will be displayed alongside the Constellation in question. Users can keep clicking the Stars at this point to change the brightness. There will be a button to disable these effects. Only one Constellation can have its information and Lines displayed at a time. Same for Planets, but only Text will be displayed alongside Planets. This application is doable in 12 hours, and is both fun and educational.