Lab Session 2:
Conduits Extensions

1. Logging and Synchronisation Aspects

Implement logging as an aspect. Write two separate logging aspects and run the application once with each logging aspect woven in separately. For example, write one aspect that outputs a log exactly similar to the original code and write one aspect that opens a separate window for each conduit element. Can you run the application with both aspects woven in?

Extract the synchronisation code from the current code and implement it as an aspect. Write two separate synchronisation aspects: one that performs exactly the same kind of synchronisation as the original code and one that does not use Java threads. Can you run the application with both aspects woven in?

For both the synchronisation and logging aspects, implement a framework (with a super-aspect) such that other variations of synchronisation and logging can be implemented as specialisations. How much of the code can you extract into the super-aspect?

2. Introduce a Liquid entity

In the original Conduit framework, the liquid that is transported through the conduits is represented using integers. This means there can only be one kind of liquid that is transported through the conduits. We will now refactor the code such that different kinds of liquids can be transported and identified.

- Implement a Liquid class and refactor the code of the original conduits so they can use objects of this Liquid class.
- Liquid entities have a name and a density (kg/l).
- Implement factory methods for water, oil and milk liquids.

3. Observer/observable framework for Conduits

Implement the observer/observable framework on conduits and liquids using aspects. Implement a small user-interface for each conduit that displays the current state of the conduit.

4. Additional Conduit Elements

Implement two additional conduits:
Split: implement a conduit element that splits the flow into different conduits.
Filter: implement a filter that can be placed on top of any existing conduit element. A filter extracts particular kinds of liquid from the flow and transfers them to another conduit.