

Concurrency: State Models & Design Patterns

Practical Session

Week 11

Assignment 11

Preview

A11 - Exercise 1

Answer the following *questions* about Petri nets:

- a) List and briefly explain all the elements a petri net consists of.
- b) How can nets model concurrency and synchronization?
- c) What is the reachability set of a net? How can you compute this set?
- d) What kinds of Petri nets can be modeled by finite state processes?
- e) What are some simple conditions for guaranteeing that a net is bounded?
- f) What could you add to Petri nets to make them Turing-complete?

A11 - Exercise 2

Perform some *analysis* on the provided Petri nets:

- a) Provide the definition of the Petri net in figure 1.
- b) Provide the definition of the Petri net in figure 2.
- c) Is the Petri net in Figure 2 bounded? Safe? Conservative? Are all the transitions live?

A11 - Exercise 3

Two machines need to interact with a database. The machines can read, write or stay idle. **Model** the situation using Petri nets ensuring that the machines cannot write at the same time.

Use the Petri net editor in the web site of the course. Hand-drawn Petri net diagrams are acceptable, ***but make them readable please!***

A11 - Exercise 4

Answer the following *questions* about lock objects and threads:

a) How do the classes ReentrantLock and Semaphore support fairness?

Hint: You may have to look at the Java documentation.

b) What are daemon threads in Java? What is their purpose? How can you create them?