Assignment 11 — 27.11.2019 – v1.0
Petri Net

Exercise 1 (3 Points)

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?

Exercise 2 (4 Points)

Perform some analysis on the provided Petri nets:

a) Provide the definition of the Petri net in figure 1. (1 pt)
   Hint: You can search the lecture slide "Petri nets: a definition" to see how a definition looks like.

b) Provide the definition of the Petri net in figure 2. (1 pt)

c) Is the Petri net in Figure 2 bounded? Safe? Conservative? Are all the transitions live? (2 pts)

Exercise 3 (2 Points)

Two machines need to interact with a database. The machines can read, write or stay idle. Model the environment using Petri nets ensuring that the machines cannot write at the same time. Use the Petri net editor from the web site of the course.[1] Hand-drawn Petri net graphs are accepted, but make them readable, please!

Exercise 4 (1 Points)

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?

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[1]http://scg.unibe.ch/download/petitpetri/

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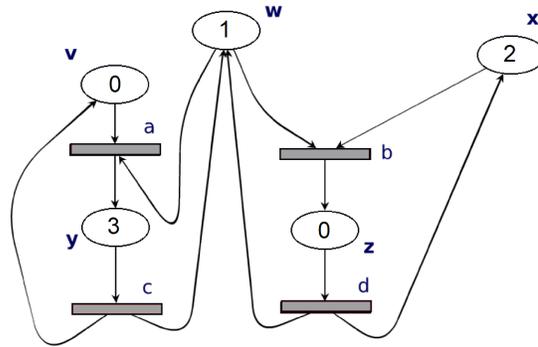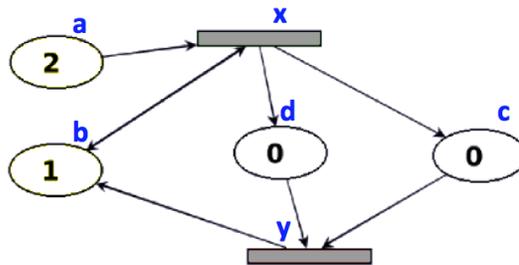
Prof. Dr. Oscar Nierstrasz
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Figure 1: Sample Petri net

Figure 2: Another sample Petri net