*Reactive and Event Based Systems*

# Assignment 1: Process Models and Event-Based Systems

## Part 1: Modelling Event Patterns as DCR Graphs

Model the following patterns as DCR Graphs, based on the Dreyers log introduced and examined in the paper *The Analysis of a Real Life Declarative Process:*

1) *Fill out application* should always be the first event of the case.
2) *Reject* should always eventually be followed by *Applicant informed* **and** *Change phase to Abort*.
3) *First payment* should only occur once.
4) *Lawyer Review* and *Architect Review* should never occur together.

## Part 2: Implementing a conformance checker for DCR Graphs

Implement a simple conformance checker for DCR Graphs and use it to check the patterns defined in Part 1 against the Dreyers log[1].
The conformance checker should be able to take any DCR Graph and log as input, i.e. it will not suffice to hard code the patterns of part 1. For the logs we advise that you use the CSV format of the Dreyers log. For DCR Graphs we leave the input format to you, but advise you use the language format used by the sample engine that will be provided.
As output the program should show for each pattern how many traces in the log satisfy it, and how many do not.

In principle you may use any language you like, but for your own convenience you're strongly encouraged to use JavaScript and the sample engine which will be made available next week on Absalon.
Note that the code you hand-in should compile and run. If for some reason we cannot compile and run your code on our own machines (e.g. because you used a non-standard programming language), you may be asked to demonstrate that it works on your own machine.

**Optional**: Have your program output for each trace that does not satisfy a pattern the reason that this is the case.

## Hand-in

For this assignment you should deliver:

a) A ZIP file containing, for Part 1:
    1. One PNG image file for each pattern, named "pattern_x.png"
    2. *Or* one text file for each pattern following the language format used in the sample JavaScript program.
b) A second ZIP file containing, for Part 2:
    1. Your source code.
    2. Clear instructions on how to run your code on the 4 patterns of Part 1 and the Dreyers log. Alternatively, a script or batch file that runs your program on the 4 patterns of Part 1 and the Dreyers log would suffice.
c) A 2-3 page PDF report containing:

[1] https://www.dropbox.com/s/1l0ur2pr2bpqyix/log.csv?dl=0

1. A front page stating your group name (“assignments x”) and the names of the group members that contributed to the submission. (Not counted towards the 2-3 pages.)
2. A short description of how you came to model each pattern (a couple of lines per pattern will suffice).
3. A short description of how you implemented the conformance checker (including an overview of your main design decisions).
4. A screenshot of your program running, including the output of results.
5. A table showing for each pattern how many traces satisfied it, and how many did not.

The two-page report must use 11-point font of the Times family and be formatted single-column with 2 cm margin.