Institute for Information Systems Research
University of Koblenz-Landau
Prof. Dr. Patrick Delfmann, Sabine Nagel

Business Process Management
SS 2021
Exercise 5

Formalities for submitting your solution:

- Please submit your solution in OLAT
- The solution is due on **16.06.21 at 23:59 (UTC+2)**
- Please provide one single PDF file per group
- Please include the names of all group members into your solution
- You can reach up to 10 points in this exercise sheet

Consider the following model data:

- T_V = {Function, Event, XOR, OR, AND} is the set of vertex types.
- T_E = {**F**unction_**E**vent, **F**unction_**X**OR, **F**unction_**O**R, **F**unction_**A**ND, **E**vent_**F**unction, **E**vent_**X**OR, **E**vent_**O**R, **E**vent_**A**ND, **X**OR_**F**unction, **X**OR_**E**vent, **X**OR_**X**OR, **X**OR_**O**R, **X**OR_**A**ND, **O**R_**F**unction, **O**R_**E**vent, **O**R_**X**OR, **O**R_**O**R, **O**R_**A**ND, **A**ND_**F**unction, **A**ND_**E**vent, **A**ND_**X**OR, **A**ND_**O**R, **A**ND_**A**ND} is the set of edge types, which are all directed (thus: Function_Event = (Function, Event, 1) and so on..)
- $T = T_V \cup T_E$ is the set of element types.
- $Z = V \cup E$ is the set of elements.

In the following, please provide the respective model queries in GMQL based on this data!

Task 1 (2 points)

In EPC, functions and events must alternate. To find violations of this (e.g., a function followed directly by a function), a GMQL model query can be used.

Design a pattern that represents a function followed by a function without an event in between, even if there are ANY NUMBER OF connectors in-between (e.g., "Function -> XOR -> XOR-> Function" must also be detected, not only "Function -> Function").

Task 2 (3 points)

Design a pattern that represents loops in EPCs containing connectors only (i.e., that start and end with a connector and furthermore contain only connectors on the whole loop).

Task 3 (3 points)

Design a pattern that represents connectors having more than one predecessor and more than one successor (i.e., connectors that join and split at the same time).

Task 4 (2 points)

While some GMQL functions can be expressed as an equivalent CTL formula, there are GMQL functions that cannot be expressed equivalently by a respective CTL formula.

Please provide 1 GMQL **function** and its equivalent CTL formula. Please also provide 1 GMQL **function** that cannot be expressed by a CTL formula (please also explain why not).