An Overview of Process Modelling Languages and their Interrelationships

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1. Introduction

Process models play a crucial role in Business Process Management, where they are used for communication of as-is and to-be states of processes, analyses of process data, prediction of ongoing cases, and even full support of a business process through a business process management system.

The global market for enterprise software is unimaginably large, and an ever-growing part of this market is in one way or another process-aware. The emergence of automation, bots and Artificial Intelligence has been a catalyst for this: it makes process models as a means of communication between humans and AI systems, structuring services and providing guardrails for AI agents even more important. As such, thinking about and modelling concepts of process modelling languages is more important than ever.

In this tutorial, we'll have a look at current and previous process modelling formalisms, through a lens of their purposes, commonalities and differences.

2. The Tutorial

The tutorial will consist of three parts, the first of which is to briefly introduce process modelling and its use cases, such as discovery, conformance checking, analysis and prediction, before diving in into several process modelling languages, in an interactive setting with the audience. Languages that may show up include:

- Directly-follows models [1, 2]
- Petri nets [3]
- Process trees [4]
- BPMN models [5]
- BPEL [6]
- Declare [7]
- Multi-level activity modelling
- Model-checking formalisms [8]

In the second part, we'll attempt to create order in the chaotic landscape of process modelling languages, by identifying common language and expressivity concepts, where we will use the combined knowledge of the audience to identify common concepts.

A couple of process modelling language concepts that may just pass the stage include:

- Silent steps [9]
- Unboundedness [10]
- Recursion [4, 11]
- Stochastics & priority [9, 12]

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- Time [13]
- Data [14]
- Communicating/object-centric processes [15, 11]
- Hierarchy [11]
- Hybridity [16, 17, 18]
- Edge-cases: empty language, empty traces, non-termination

We'll finish the tutorial with several group-wise modelling practice, where we attempt to decide which process modelling formalism would be best to use given several modelling scenarios.

3. The Presenter

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His research interests include process mining, process discovery, conformance checking, stochastic process mining, and robotic process automation. In particular, he specialises in making solid academic techniques available to end-users, analysts and industry partners. He teaches business process management, business process modelling and business process improvement.

Declaration on Generative AI

No large language models or other forms of artificial intelligence were used in the writing of this abstract.

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