Title: Simulating Business Processes with Deterministic or Non-Deterministic Finite Automata

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Description:

During the last decades, business process management (BPM) became an imperative for efficient functioning and evolution of organizations and gave a rise to the third wave of research interest in business process modeling and analysis. Since then, the main efforts of researchers have been focused on development of process modeling languages that would be easy to understand by both technical and business users and that would provide better control over processes. As a result, the majority of the process modeling methodologies widely used today (e.g. BPMN, UML, EPC) is characterized by a powerful graphical notation, a rich design environment, and by the imperative style of their models. Imperative modeling style encourages the early specification of the control flow (the exact order in which the activities of the process will be executed).

However, for certain forms of business processes the control flow cannot be identified at design time. These processes are also called Case Management Processes.

Example: In a legislative system or health care, the notion of case has been known for many years: here by a case we understand the set of circumstances or facts related to a criminal act or a patient condition that requires a decision making and a treatment with respect to some norms or regulations. The case-related conditions can vary widely and evolve with time, preventing the agent responsible for the case treatment from applying a standard predefined template or model. Thus, it is impossible to use traditional imperative modeling techniques for Case Management Process Modeling.

In this project, you will work on the declarative technique for business process specifications and study how these techniques can be used for Case Management Process Modeling.

Objective:
We make a hypothesis that a case management process can be simulated using one or several automata. The goal of this project is to define the operational semantics for a Case Management Process using the finite automata abstraction [1][4][5] and to simulate such a process using JFast [1][5] or another simulation environment of your choice.

Project stages:

1. Development of an example. At this stage you will study an existing case study describing a case management process in banking. The goal is to understand and formulate the challenges related to case management process (CMP) modelling.

2. State of the art. At this stage you will study different methodologies (mainstream and research) for business process modelling and simulation. You will examine these tools taking into account the challenges of CMP modelling.

3. Finite state automata. At this stage, you will study finite state automata as an underlying theory for simulation and analysis of CMP.

4. Simulation. This stage is the main part of this project. You will create the finite automaton (deterministic or non-deterministic) that will simulate a concrete example of CMP. To carry out this stage, you will have to define your execution platform: you may study and use one of the existing tools (such as JFast) or develop your own automata simulator.
Deliverables:
- Example, its model and its simulation.
- Report.

Pre-requisites:
- Interest in process modelling
- Interest in programming and software analysis

References:


[5] http://www46.homepage.villanova.edu/timothy.m.white/