Model Converter: What you have to know about Petri Nets and BPMN models

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Based on lecture material by Marlon Dumas (University of Tartu, Estonia) and Wil van der Aalst (Eindhoven University of Technology, The Netherlands http://www.workflowcourse.com)

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Business Process Lifecycle

1. Process identification
2. Process architecture
3. Process discovery
   - Conformance and performance insights
   - As-is process model
4. Process monitoring and controlling
   - Executable process model
5. Process implementation
   - To-be process model
6. Process analysis
   - Insights on weaknesses and their impact
7. Process redesign
1. Introduction
2. Process Identification
3. Essential Process Modeling
4. Advanced Process Modeling
5. Process Discovery
6. Qualitative Process Analysis
7. Quantitative Process Analysis
8. Process Redesign
9. Process Automation
10. Process Intelligence
Business Process Lifecycle

1. Process identification
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Key stages:
- Conformance and performance insights
- As-is process model
- Insights on weaknesses and their impact
- Executable process model
- To-be process model
Elements

(name)

place

(name)

transition

arc (directed connection)

token

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Rules

- Connections are directed.
- No connections between two places or two transitions.
- Places may hold zero or more tokens.
- We consider the case of at most one arc between two nodes.
Marking and Enabled Transition

- The **state** of a net is a distribution of tokens over places (also referred to as **marking**).
- A transition is **enabled** if each of its input places contains at least one token.
Firing

- An **enabled** transition can **fire** (i.e., it occurs).
- When it **fires** it **consumes** a token from each input place and **produces** a token for each output place.
- Which transitions are enabled now?

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“Token Game”

• In the new state, *make_picture* is enabled. It will fire, etc.
Order-to-cash process model
1. Introduction
2. Process Identification
3. **Essential Process Modeling**
4. Advanced Process Modeling
5. Process Discovery
6. Qualitative Process Analysis
7. Quantitative Process Analysis
8. Process Redesign
9. Process Automation
10. Process Intelligence
Business Process Model and Notation (BPMN)

- OMG standard (nowadays BPMN 2.0)
- Supported by numerous tools: bpmn.org lists over 70 tools
A BPMN process model is a graph consisting of four types of **core elements**:

- **activity**
- **start**
- **end**
- **gateway**
- **sequence flow**
A little bit more on events...

A *start event* triggers a new process instance by generating a token that traverses the sequence flow ("tokens source")

An *end event* signals that a process instance has completed with a given outcome by consuming a token ("tokens sink")
A little more on gateways: XOR Gateway

An *XOR Gateway* captures decision points (XOR-split) and points where alternative flows are merged (XOR-join).

- **XOR-split** → takes *one* outgoing branch
- **XOR-join** → proceeds when *one* incoming branch has completed

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Example: XOR Gateway
A little more on gateways: AND Gateway

An *AND Gateway* provides a mechanism to create and synchronize “parallel” flows.

**AND-split** ➔ takes all outgoing branches

**AND-join** ➔ proceeds when all incoming branches have completed
Example: AND Gateway

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