ISO/IEC 15909-2:2011-02 (E)

Systems and software engineering - High-level Petri nets - Part 2: Transfer format

Contents

Page

1 Scope 1

2 Conformance 1
2.1 PNML Documents 1
2.2 PNML Place/Transition Net Documents 1
2.3 Textually conformant PNML High-level Petri Net Documents 1
2.4 Structurally conformant PNML High-level Petri Net Documents 2
2.5 Place/Transition Net Document in High-level Notation 2
2.6 Symmetric Net Documents 2

3 Normative references 2

4 Terms, definitions and abbreviations 3
4.1 Terms and definitions 3
4.2 Abbreviations 5

5 Concepts 6
5.1 General Principles 6
5.2 PNML Core Model 7
5.2.1 Petri Net Documents, Petri Nets, and Objects 8
5.2.2 Pages and Reference Nodes 8
5.2.3 Labels 8
5.2.4 Graphical Information 9
5.2.5 Tool Specific Information 11
5.2.6 Data Types 11
5.3 Petri Net Type Meta Models and their Built-in Sorts 12
5.3.1 Place/Transition Nets 12
5.3.2 High-Level Core Structure 13
5.3.3 Dots 16
5.3.4 Multisets 16
5.3.5 Booleans 18
5.3.6 Finite Enumerations 19
5.3.7 Cyclic Enumerations 19
5.3.8 Finite Integer Ranges 20
5.3.9 Partitions 20
5.3.10 Symmetric Nets 21
5.3.11 High-Level Petri Net Graphs 21
5.3.12 Place/Transition Nets as High-level Net Graphs 24

6 Mapping between Part 1 and Part 2 27
6.1 Graphics and Structuring 27
6.2 Annotations of HLPNGs 27

7 PNML Syntax 29
7.1 PNML Documents 29
7.1.1 PNML Elements 29
7.1.2 Labels 29
7.1.3 Graphics 30
7.1.4 Mapping of XMLSchemaDataTypes concepts 31
7.1.5 Example 31
7.2 Mapping Petri Net Type Definitions to XML Syntax 33
7.3 Mapping for High-Level Nets 33

7.3.1 Mapping High-Level Nets meta model elements to PNML syntax 33

Annex A (normative) RELAX NG Grammar for the PNML Core Model 37

Annex B (normative) RELAX NG Grammars for special types 49

B.1 Place/Transition Nets 49
B.1.1 The labels 49
B.1.2 Token Graphics 50
B.1.3 The Grammar 51
B.2 High-level Petri Nets 52
B.2.1 Core structure of HLPNGs 52
B.2.2 Dots 61
B.2.3 Multisets 62
B.2.4 Booleans 64
B.2.5 Finite Enumerations 66
B.2.6 Cyclic Enumerations 68
B.2.7 Finite Integer Ranges 69
B.2.8 Partitions 71
B.2.9 Integers 73
B.2.10 Strings 77
B.2.11 Lists 80
B.2.12 Arbitrary Declarations 82
B.2.13 P/T Nets as restricted HLPNGs 84
B.2.14 Symmetric Nets 85
B.2.15 HLPNGs 86

Annex C (informative) PNML Example of a High-level Net 88

Annex D (informative) The PNML Framework: Easing the implementation of PNML 95

D.1 Introduction 95
D.2 Methodology 95
D.2.1 Overview 95
D.2.2 Generating the API from a model 96
D.3 Features of the PNML Framework 96
D.4 Application to a Petri nets CASE tool 97
D.4.1 Exporting Petri nets models to PNML 98
D.5 Importing Petri nets models from PNML 98
D.6 Time and effort required to develop and integrate a PNML plugin 99
D.7 Conclusion 99
D.7.1 Synthesis 99
D.7.2 The release 100

Bibliography 101