

Table of Contents

| | |
|---|-----|
| 1 Informal Introduction to Coloured Petri Nets | 1 |
| 1.1 Introduction to Place/Transition Nets | 2 |
| 1.2 Introduction to Coloured Petri Nets | 8 |
| 1.3 Example of CP-nets: Distributed Data Base | 21 |
| 1.4 Net Inscriptions in CPN ML | 26 |
| 1.5 Construction of CPN Models | 32 |
| 1.6 Drawing of CPN Diagrams | 41 |
| 1.7 Some Important Advantages of CP-nets | 50 |
| Bibliographical Remarks | 52 |
| Exercises | 55 |
| 2 Formal Definition of Coloured Petri Nets | 65 |
| 2.1 Multi-sets | 66 |
| 2.2 Structure of Non-Hierarchical CP-nets | 69 |
| 2.3 Behaviour of Non-Hierarchical CP-nets | 73 |
| 2.4 Equivalent Place/Transition Nets | 78 |
| Bibliographical Remarks | 85 |
| Exercises | 85 |
| 3 Hierarchical Coloured Petri Nets | 89 |
| 3.1 Introduction to Hierarchical CP-nets | 90 |
| 3.2 Example of Hierarchical CP-nets: Telephones | 99 |
| 3.3 Structure of Hierarchical CP-nets | 106 |
| 3.4 Behaviour of Hierarchical CP-nets | 113 |
| 3.5 Equivalent Non-Hierarchical CP-nets | 115 |
| Bibliographical Remarks | 119 |
| Exercises | 119 |
| 4 Dynamic and Static Properties of Coloured Petri Nets | 123 |
| 4.1 Static Properties | 124 |
| 4.2 Boundedness Properties | 127 |
| 4.3 Home Properties | 131 |
| 4.4 Liveness Properties | 132 |
| 4.5 Fairness Properties | 135 |
| Bibliographical Remarks | 138 |
| Exercises | 138 |

| | |
|---|-----|
| 5 Formal Analysis of Coloured Petri Nets | 141 |
| 5.1 Occurrence Graphs | 142 |
| 5.2 Place and Transition Invariants | 147 |
| 5.3 Reduction Rules | 150 |
| 5.4 Performance Analysis | 152 |
| Bibliographical Remarks | 152 |
| Exercises | 153 |
| 6 Computer Tools for Coloured Petri Nets | 155 |
| 6.1 Editing of CP-nets | 156 |
| 6.2 Simulation of CP-nets | 176 |
| 6.3 Computer Tools for Formal Analysis | 194 |
| Bibliographical Remarks | 202 |
| Exercises | 202 |
| 7 Industrial Applications of Coloured Petri Nets | 205 |
| 7.1 Communication Protocol | 206 |
| 7.2 Hardware Chip | 209 |
| 7.3 Radar Surveillance | 213 |
| 7.4 Electronic Funds Transfer | 217 |
| 7.5 General Observations About CPN Applications | 218 |
| Bibliographical Remarks | 219 |
| References | 221 |
| Index | 231 |