

Contents

PREMO: A Standard for Distributed Multimedia	1
1.1 Introduction	1
1.1.1 What PREMO <i>Is</i>	1
1.1.2 What PREMO <i>Isn't</i>	4
1.2 Formal Description Techniques and PREMO	5
1.3 Structure of the Book	6
1.4 Typographical Conventions	8
1.5 Graphical Conventions	8
An Overview of PREMO	9
2.1 Introduction	9
2.2 The Structure of PREMO	9
2.3 The PREMO Object Model	10
2.3.1 Overview	11
2.3.2 From Language Bindings to Environment Bindings	12
2.3.3 Object References	12
2.3.4 Active Objects	13
2.3.5 Operation Dispatching	14
2.3.6 Attributes	14
2.3.7 Non-object Data Types	14
2.4 The Foundation Component	15
2.4.1 Structures, Services, and Types	15
2.4.2 Inter-Object Communication	16
2.4.3 Synchronization	18
2.4.4 Time	19
2.4.5 Property Management	20
2.4.6 Object <i>Factories</i>	21
2.5 The Multimedia Systems Services Component	22
2.5.1 The Paradigm of Media Networks	23
2.5.2 Virtual Resources	23
2.5.3 Stream Control	25
2.5.4 Virtual Devices	25
2.5.5 Virtual Connections	26
2.5.6 Higher-Levels of Organization: Groups and Logical Devices	27
2.5.7 Working in Unison	28
2.6 The Modelling, Rendering, and Interaction Component	28
2.6.1 Object-Oriented Rendering	29
2.6.2 Primitives	30
2.6.3 Modelling and Rendering Devices	31
2.6.4 Coordination	32
2.7 Closing Remarks	33

The Fundamentals of PREMO	35
3.1 Introduction	35
3.2 Basic Concepts	36
3.2.1 PREMO Objects and Object Types	36
3.2.2 Attributes	37
3.2.3 Non-object Types	38
3.2.4 Object Identity and Object References	38
3.3 Operations	40
3.4 Subtyping	40
3.5 Inheritance	42
3.6 Protected Operations	43
3.7 Operation Selection, and Casting	43
3.8 Operation Request Modes	45
3.9 Exceptions	46
3.10 The Object and Object Reference Lifecycle	47
3.11 The Environment Binding	48
 General Implementation Issues	 49
4.1 Implementation Choices	51
4.1.1 Implementation Language	51
4.1.2 Implementation Environment	53
4.2 PREMO Specifications in Java and Java RMI	54
4.2.1 Constraints on the Specification Details	54
4.2.2 Registering Server Objects	56
 The Foundation Component	 59
5.1 Introduction	59
5.2 PREMO Non-object Types	59
5.2.1 Basic Data Types	60
5.2.2 Constructed Data Types	61
5.2.3 Exceptions	63
5.3 Top Layer of the PREMO Object Hierarchy	64
5.3.1 The PREMOObject Interface	64
5.3.2 Simple PREMO Objects	65
5.3.2.1 Event Structures	66
5.3.2.2 Constraint Structures	67
5.3.3 Callbacks	68
5.3.4 Enhanced PREMO Objects	69
5.3.4.1 Enhanced PREMO Objects as Service Objects	69
5.3.4.2 Property Management	69
5.3.5 Top Layer of PREMO	73
5.4 General Utility Objects	74
5.4.1 Event Management	74
5.4.1.1 The PREMO Event Model	75
5.4.1.2 The Event Handler Object	76

5.4.1.3	Synchronization Points	78
5.4.2	Finite State Machines: Controller Objects	81
5.4.2.1	Detailed Specification of a Controller	82
5.4.2.2	Activity of Controllers	86
5.4.3	Time Objects	87
5.4.3.1	General Notions	87
5.4.3.2	Specification of the PREMO Time Objects	88
5.5	Synchronization Facilities	90
5.5.1	Synchronizable Objects	92
5.5.1.1	Overview: Event-Based Synchronization	92
5.5.1.2	State Transition Monitoring	99
5.5.1.3	Detailed Specification of the Synchronizable Object	99
5.5.1.4	Synchronizable Objects as Callbacks	103
5.5.2	Time and Synchronizable Objects	103
5.5.2.1	Stop-Watch and Progression	104
5.5.2.2	Time and Progression Space	105
5.5.2.3	Reference Point Specifications in Time	105
5.5.3	Combining TimeSynchronizable Objects: Time Slaves	107
5.5.4	Time-Lines	109
5.6	Negotiation and Configuration Management	110
5.6.1	General Notions	110
5.6.2	Property Inquiry Objects	113
5.6.3	Constraining Properties	114
5.6.4	Dynamic Change of Properties	115
5.6.5	Interaction among Properties	116
5.6.6	Some Conclusions on the Negotiation Facilities	117
5.7	Creation of Service Objects	118
5.7.1	Generic Factory Objects	118
5.7.2	Factory Finders	120
5.7.3	Use of Factories and Factory Finders	121
	Multimedia Systems Services Component	125
6.1	Introduction	125
6.2	Configuration Objects	128
6.2.1	Format Objects	131
6.2.2	Transport and Media Stream Protocol Objects	132
6.2.3	Quality of Service Descriptor Objects	134
6.3	Stream Control	136
6.3.1	The StreamControl Object	136
6.3.2	SyncStreamControl Objects	140
6.4	Virtual Resources	140
6.4.1	Property Control of Configurations	141
6.4.2	Resource and Configuration Management	142
6.4.3	Stream Control	144
6.4.4	Monitoring Resource Behaviour and Quality of Service Violations	145

6.5	Virtual Devices	146
6.5.1	Configuring Devices	146
6.5.1.1	Global Configuration	146
6.5.1.2	Port Configurations	147
6.5.2	Examples of Virtual Devices.	151
6.5.2.1	Simple Media Devices	152
6.5.2.2	Transformer Devices	153
6.6	Virtual Connections.	155
6.6.1	Overview.	155
6.6.2	Detailed Specification of Virtual Connections	156
6.6.3	Examples of Virtual Connections	157
6.6.4	Multicast Connections	160
6.7	Groups.	161
6.8	Logical Devices.	163

The Modelling, Rendering, and Interaction Component 165

7.1	Introduction.	165
7.2	Primitives	167
7.2.1	The Role of Primitives in PREMO.	168
7.2.2	The Hierarchy in Overview.	169
7.2.3	Captured Primitives.	170
7.2.4	Form Primitives.	171
7.2.5	Tactile Primitives	172
7.2.6	Modifier Primitives	173
7.2.7	Wrapper Primitives	176
7.2.8	Tracer Primitives.	176
7.2.9	Structured Primitives.	177
7.2.9.1	Aggregate Primitives	177
7.2.9.2	TimeComposite	179
7.2.10	Reference Primitives	185
7.3	Coordinate Spaces.	185
7.3.1	Coordinate.	186
7.3.2	TimeLocation	187
7.3.3	Colour	187
7.4	Devices for Modelling, Rendering, and Interaction	187
7.4.1	MRI_Format	188
7.4.2	Efficiency Measures	189
7.4.3	MRI Device.	190
7.4.4	Modeller	190
7.4.5	Renderer	191
7.4.6	MediaEngine.	192
7.5	Input Devices, and Routing.	192
7.5.1	InputDevice.	193
7.5.2	Router	194
7.6	The Scene Database	195

7.7	Coordination	199
7.7.1	Management	201
7.7.2	Allocation	201
7.7.3	Synchronization	202
Detailed Java Specifications of the PREMO Objects		205
8.1	Introduction	205
8.2	Foundation Objects	205
8.2.1	Enumerations	205
8.2.2	Additional Data Types	206
8.2.3	Top Level of PREMO Hierarchy	207
8.2.4	Structures	208
8.2.5	General Utility Objects	209
8.2.5.1	Event Management	209
8.2.5.2	Controllers	210
8.2.5.3	Time Objects	211
8.2.6	Synchronization Objects	211
8.2.7	Negotiation and Configuration Management	214
8.2.8	Creation of Service Objects	215
8.3	Multimedia Systems Services	216
8.3.1	Enumerations	216
8.3.2	Structures and Additional Data Types	216
8.3.3	Configuration Objects	217
8.3.4	Stream Control	218
8.3.5	Virtual Resource	218
8.3.6	Virtual Device	219
8.3.7	Virtual Connections	219
8.3.8	Group	220
8.3.9	Logical Device	220
8.4	The Modelling, Rendering, and Interaction Component	221
8.4.1	Objects for Coordinate Spaces	221
8.4.1.1	Coordinate Object	221
8.4.1.2	Colour Object	221
8.4.1.3	TimeLocation Object	221
8.4.2	Name Object	221
8.4.3	Objects for Media Primitives	222
8.4.3.1	Primitive Object	222
8.4.3.2	Captured Object	222
8.4.3.3	Primitives with Spatial and/or Temporal Form	222
8.4.3.4	Form Primitives for Audio Media Data	222
8.4.3.5	Form Primitives for Geometric Media Data	223
8.4.3.6	Primitives for the Modification of Media Data	223
8.4.3.7	Modifier Primitives for Audio Media Data	223
8.4.3.8	Modifier Primitives for Structural Aspects of Media Data	224
8.4.3.9	Modifier Primitives for Visual Aspects of Media Data	224

8.4.3.10 Organising Primitives into Structures	225
8.4.3.11 Organising Media Data within Time	225
8.4.4 Objects for Describing Properties of Devices.	227
8.4.4.1 MRI_Format Object	227
8.4.4.2 EfficiencyMeasure Object	227
8.4.5 Processing Devices for Media Data	227
8.4.5.1 MRI_Device Object	227
8.4.5.2 Modeller Object	227
8.4.5.3 Renderer Object	227
8.4.5.4 MediaEngine Object.	227
8.4.6 Scene Object	228
8.4.7 Objects for Supporting Interaction	228
8.4.7.1 InputDevice Object	228
8.4.7.2 Router Object	228
8.4.8 Coordinator Object	229
 Selected Implementation Issues	 231
A.1 The PREMO Environment	231
A.1.1 Activity of Objects	231
A.1.2 Top Level of the PREMO Hierarchy	232
A.1.3 Operation Request Modes.	232
A.1.4 Distribution and the Creation of PREMO Objects	235
A.2 Specific Part 3 Objects	237
A.2.1 Virtual Connection Objects	237
A.2.1.1 Devices on the Same JVM: Piped Streams	238
A.2.1.2 Devices on Different JVM's: Sockets	238
A.2.1.3 Multicast Connections	240
 References	 243
 Index.	 251

PREMO: A Framework for Multimedia Middleware
Specification, Rationale, and Java Binding

Duke, D.J.; Herman, I.; Marshall, M.S.

1999, XII, 264 p., Softcover

ISBN: 978-3-540-66720-9