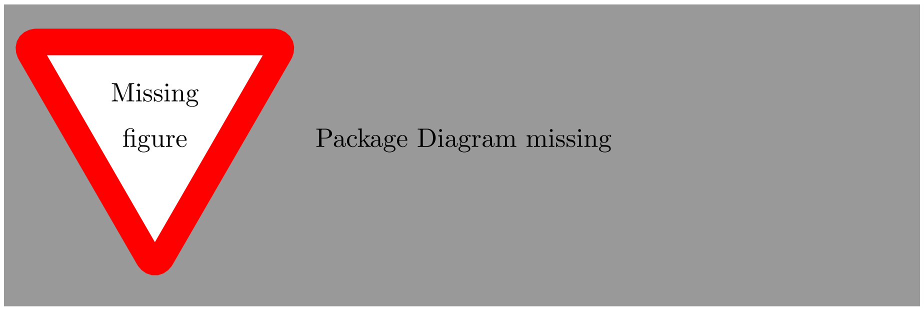
1 Package `uppaal`

Overview Contains Uppaal-specific sub-packages.



1.1 Class `NTA`

Overview A 'Network of Timed Automata' as basic input to Uppaal.

Super Types of `NTA`

`NamedElement` see Section 2.2 on Page 3 ,

`CommentableElement` see Section 2.1 on Page 3

References of `NTA`

`bool : PredefinedType [1..1]` see Section 9.4 on Page 38
The predefined type 'bool'.

`chan : PredefinedType [1..1]` see Section 9.4 on Page 38
The predefined type 'chan'.

`clock : PredefinedType [1..1]` see Section 9.4 on Page 38
The predefined type 'clock'.

`globalDeclarations : GlobalDeclarations` see Section 3.12 on Page 8
The global declarations for the NTA.

`int : PredefinedType [1..1]` see Section 9.4 on Page 38
The predefined type 'int'.

`systemDeclarations : SystemDeclarations [1..1]` see Section 3.17 on Page 10
The declarations of process instantiations.

`template : Template [1..*]` see Section 8.9 on Page 36
The Timed Automata templates of the NTA.

`void : PredefinedType [1..1]` see Section 9.4 on Page 38
The predefined dummy type 'void'.

OCL Constraints of `NTA`

MatchingIntDetails

```
(not self.int.oclIsUndefined())
implies
((self.int.type = types::BuiltInType::INT) and (
    self.int.name.equalsIgnoreCase('int')))
```

MatchingBoolDetails

```
(not self.bool.oclIsUndefined())
implies
((self.bool.type = types::BuiltInType::BOOL) and
    (self.bool.name.equalsIgnoreCase('bool')))
```

MatchingClockDetails

```
(not self.clock.oclIsUndefined())
implies
((self.clock.type = types::BuiltInType::CLOCK)
    and (self.clock.name.equalsIgnoreCase('clock')
    ))
```

MatchingChanDetails

```
(not self.chan.oclIsUndefined())
implies
((self.chan.type = types::BuiltInType::CHAN) and
    (self.chan.name.equalsIgnoreCase('chan')))
```

MatchingVoidDetails

```
(not self.void.oclIsUndefined())
implies
((self.void.type = types::BuiltInType::VOID) and
    (self.void.name.equalsIgnoreCase('void')))
```

UniqueTemplateNames

```
self.template->isUnique(name)
```

2 Package `uppaal::core`

Overview Contains abstract general purpose classes.

Missing figure

Package Diagram missing

2.1 Abstract Class `CommentableElement`

Overview Abstract base class for commentable model elements.

Attributes of `CommentableElement`

`comment : EString`

The comment for the model element.

CG says: Change cardinality to 1..1?

2.2 Abstract Class `NamedElement`

Overview Abstract base class for named model elements.

Attributes of `NamedElement`

`name : EString [1..1]`

The name of the model element..

OCL Constraints of `NamedElement`

NoWhitespace

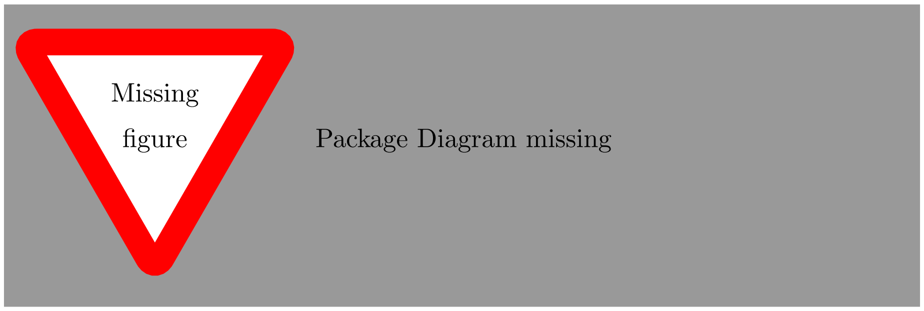
```
self.name.characters()->excludes(' ')
```

NoDigitStart

```
Set{0..9}->excludes(self.name.characters()->first
    ())
```

3 Package `uppaal::declarations`

Overview Support for all kinds of declarations, e.g. types, functions, or variables.



3.1 Class `ArrayInitializer`

Overview An initializer for array variables, referring to multiple sub-initializers.

Super Types of `ArrayInitializer`

`Initializer` see Section 3.14 on Page 9

References of `ArrayInitializer`

`initializer : Initializer [1..*]` see Section 3.14 on Page 9
A number of sub-initializers, each one representing the initial value for one array index.

3.2 Enumeration `CallType`

Overview Represents call-by-value or call-by-reference parameters.

Literals of `CallType`

`CALL_BY_VALUE = 0`

`CALL_BY_REFERENCE = 1`

3.3 Class `ChannelVariableDeclaration`

Overview A declaration of synchronization channel variables.

Super Types of `ChannelVariableDeclaration`

`VariableDeclaration` see Section 3.23 on Page 13

Attributes of `ChannelVariableDeclaration`

`broadcast : EBoolean [1..1]`
: Specifies whether the declared synchronization channels use broadcast.

`urgent : EBoolean [1..1]`
: Specifies the urgency of the declared synchronization channels.

OCL Constraints of `ChannelVariableDeclaration`

MatchingType

```
(not self.typeDefinition.oclIsUndefined())
implies
self.typeDefinition.baseType = types::BuiltInType
    ::CHAN
```

3.4 Class `ClockVariableDeclaration`

Overview A declaration of clock variables.

Super Types of `ClockVariableDeclaration`

`VariableDeclaration` see Section 3.23 on Page 13

OCL Constraints of `ClockVariableDeclaration`

MatchingType

```
(not self.typeDefinition.oclIsUndefined())
implies
self.typeDefinition.baseType = types::BuiltInType
    ::CLOCK
```

3.5 Class `DataVariableDeclaration`

Overview A declaration of data variables.

Super Types of `DataVariableDeclaration`

`VariableDeclaration` see Section 3.23 on Page 13

Attributes of `DataVariableDeclaration`

`prefix : DataVariablePrefix [1..1]` see Section 3.6 on Page 6
: The prefix of the data variable declaration.

OCL Constraints of `DataVariableDeclaration`

MatchingType

```
(not self.typeDefinition.oclIsUndefined())
implies
(self.typeDefinition.baseType <> types::
    BuiltInType::CHAN
and
self.typeDefinition.baseType <> types::
    BuiltInType::CLOCK)
```

3.6 Enumeration `DataVariablePrefix`

Overview Prefixes for data variables with base type 'int' or 'bool'.

Literals of `DataVariablePrefix`

`NONE = 0`

`CONST = 1`

`META = 2`

3.7 Abstract Class `Declaration`

Overview Abstract base class representing a variable, function, or type declaration.

3.8 Abstract Class `Declarations`

Overview Represents a set of variable, type, function, or template declarations, that are either global, local to a template, local to a block, or system declarations.

References of `Declarations`

`declaration : Declaration [0..*]` see Section 3.7 on Page 6
The single declarations.

OCL Constraints of `Declarations`

UniqueFunctionNames

```
self.declaration->select(oclIsKindOf(
    FunctionDeclaration)).oclAsType(
    FunctionDeclaration)->collect(function)->
    isUnique(name)
```

UniqueVariableNames

```
self.declaration->select(oclIsKindOf(
    VariableDeclaration)).oclAsType(
    VariableDeclaration)->collect(variable)->
    isUnique(name)
```

UniqueTypeNames

```
self.declaration->select(oclIsKindOf(
    TypeDeclaration)).oclAsType(TypeDeclaration)->
    collect(type)->isUnique(name)
```

3.9 Class `ExpressionInitializer`

Overview An initializer that represents a single initial value by means of an expression.

Super Types of `ExpressionInitializer`

`Initializer` see Section 3.14 on Page 9

References of `ExpressionInitializer`

`expression : Expression [1..1]` see Section 6.13 on Page 22
The expression representing the initial value.

3.10 Class `Function`

Overview A function with a return type and optional parameters.

Super Types of `Function`

`NamedElement` see Section 2.2 on Page 3

References of `Function`

`block : Block [1..1]` see Section 7.1 on Page 28
The block of statements representing the function body.

`parameter : Parameter [0..*]` see Section 3.16 on Page 9
The function's parameters.

`returnType : TypeDefinition [1..1]` see Section 9.9 on Page 40
The return type of this function.

OCL Constraints of `Function`

ReturnStatementExistsIfRequired

```
((not self.returnType.oclIsUndefined()) and
self.returnType.baseType <> types::BuiltInType::
    VOID)
implies
((not self.block.oclIsUndefined()) and
self.block.statement->exists(oclIsKindOf(
    statements::ReturnStatement)))
```

ValidReturnType

```
(not returnType.oclIsUndefined())
implies
(returnType.baseType = types::BuiltInType::VOID
    or
 returnType.baseType = types::BuiltInType::INT or
 returnType.baseType = types::BuiltInType::BOOL)
```

UniqueParameterNames

```
self.parameter->collect(variableDeclaration)->
    collect(variable)->isUnique(name)
```

3.11 Class `FunctionDeclaration`

Overview Declaration of a single function.

Super Types of `FunctionDeclaration`

`Declaration` see Section 3.7 on Page 6

References of `FunctionDeclaration`

`function : Function [1..1]` see Section 3.10 on Page 7
The return type of this function.

3.12 Class `GlobalDeclarations`

Overview Global declarations of an NTA.

Super Types of `GlobalDeclarations`

`Declarations` see Section 3.8 on Page 6

References of `GlobalDeclarations`

`channelPriority : ChannelPriority` see Section 4.2 on Page 14
The declaration of the synchronization channel priorities.

OCL Constraints of `GlobalDeclarations`

NoTemplateDeclarations

```
not self.declaration->exists(oclIsKindOf(system::
    TemplateDeclaration))
```

3.13 Abstract Class `Index`

Overview Abstract base-class for indexing variables or types.

3.14 Abstract Class `Initializer`

Overview An initializer specifies a variable's initial value.

3.15 Class `LocalDeclarations`

Overview Local declarations inside a template or block of statements.

Super Types of `LocalDeclarations`

`Declarations` see Section 3.8 on Page 6

OCL Constraints of `LocalDeclarations`

NoTemplateDeclarations

```
not self.declaration->exists(oclIsKindOf(system::
    TemplateDeclaration))
```

NoChannelDeclarations

```
not self.declaration->exists(oclIsKindOf(
    ChannelVariableDeclaration))
```

3.16 Class `Parameter`

Overview A parameter of a function or template.

Attributes of `Parameter`

`callType : CallType` see Section 3.2 on Page 4
Specifies whether call-by-value or call-by-reference semantics should be applied.

References of `Parameter`

`variableDeclaration : VariableDeclaration [1..1]` see Section 3.23 on Page 13
A variable declaration containing the variable that represents the parameter.

OCL Constraints of `Parameter`

SingleVariable

```
(not self.variableDeclaration.oclIsUndefined())
implies
self.variableDeclaration.variable->size() <= 1
```

3.17 Class `SystemDeclarations`

Overview System declarations consisting of process instantiations.

Super Types of `SystemDeclarations`

`Declarations` see Section 3.8 on Page 6

References of `SystemDeclarations`

`progressMeasure : ProgressMeasure` see Section 5.2 on Page 17
The optional progress measure section.

`system : System [1..1]` see Section 5.3 on Page 17
The system section describing the process instantiations.

OCL Constraints of `SystemDeclarations`

UniqueTemplateNames

```
self.declaration->select(oclIsKindOf(system::
    TemplateDeclaration)).oclAsType(system::
    TemplateDeclaration)->collect(declaredTemplate
    )->isUnique(name)
```

NoChannelDeclarations

```
not self.declaration->exists(oclIsKindOf(
    ChannelVariableDeclaration))
```

3.18 Class `TypeDeclaration`

Overview A declaration of one or more types.

Super Types of `TypeDeclaration`

`Declaration` see Section 3.7 on Page 6

References of `TypeDeclaration`

`type : DeclaredType [1..*]` see Section 9.2 on Page 37
The types declared by this type declaration.

`typeDefinition : TypeDefinition [1..1]` see Section 9.9 on Page 40
The type definition for declared types.

OCL Constraints of `TypeDeclaration`

UniqueTypeNames

```
self.type->isUnique(name)
```

3.19 Class `TypeIndex`

Overview An index specified by a bounded integer-based type.

Super Types of `TypeIndex`

`Index` see Section 3.13 on Page 8

References of `TypeIndex`

`typeDefinition : TypeDefinition [1..1]` see Section 9.9 on Page 40
An integer-based type representing size and range of the indexed type or variable.

OCL Constraints of `TypeIndex`

IntegerBasedIndex

```
(not self.typeDefinition.oclIsUndefined())
implies
self.typeDefinition.baseType = types::BuiltInType
    ::INT
```

3.20 Class `ValueIndex`

Overview An index specified by an expression value.

Super Types of `ValueIndex`

`Index` see Section 3.13 on Page 8

References of `ValueIndex`

`sizeExpression : Expression [1..1]` see Section 6.13 on Page 22
An integer-based expression representing size and range of the indexed type or variable.

3.21 Class `Variable`

Overview A typed variable.

Super Types of `Variable`

`NamedElement` see Section 2.2 on Page 3

References of `Variable`

`container : VariableContainer [1..1]` see Section 3.22 on Page 12
The container of this variable.

`index : Index [0..*]` see Section 3.13 on Page 8
A set of array indexes for the variable.

`initializer : Initializer` see Section 3.14 on Page 9

Represents the variable's initial value.

`/typeDefinition : TypeDefinition [1..1]` see Section 9.9 on Page 40

The type definition of this variable.

derivation

```
if self.container.oclIsUndefined()
then null
else
self.container.typeDefinition
endif
```

OCL Constraints of `Variable`

NoInitializerForClockAndChannelVariables

```
((not self.typeDefinition.oclIsUndefined()) and
(self.typeDefinition.baseType = types::
    BuiltInType::CHAN or
 self.typeDefinition.baseType = types::
     BuiltInType::CLOCK))
 implies self.initializer.oclIsUndefined()
```

3.22 Abstract Class `VariableContainer`

Overview Abstract base class for objects containing variables like variable declarations, iterations, quantifications or selections.

References of `VariableContainer`

`typeDefinition : TypeDefinition [1..1]` see Section 9.9 on Page 40

The type definition for the contained variables.

`variable : Variable [1..*]` see Section 3.21 on Page 11

The contained variables.

OCL Constraints of `VariableContainer`

NoVoidVariables

```
(not self.typeDefinition.oclIsUndefined())
implies
self.typeDefinition.baseType <> types::
    BuiltInType::VOID
```

UniqueVariableNames

```
self.variable->isUnique(name)
```

3.23 Abstract Class `VariableDeclaration`

Overview A declaration of one or more variables.

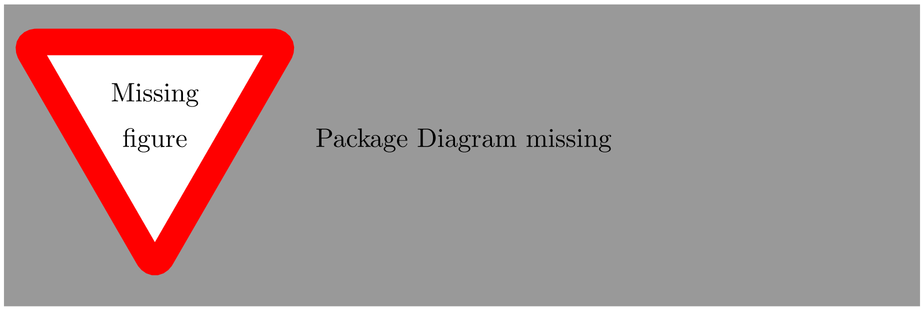
Super Types of `VariableDeclaration`

`Declaration` see Section 3.7 on Page 6 ,

`VariableContainer` see Section 3.22 on Page 12

4 Package `uppaal::declarations::global`

Overview Contains special classes that are relevant for the global declarations.



4.1 Class `ChannelList`

Overview A list of synchronization channel variables, used to assign these channels a common priority.

Super Types of `ChannelList`

`ChannelPriorityItem` see Section 4.3 on Page 15

References of `ChannelList`

`channelExpression : IdentifierExpression [1..*]` see Section 6.15 on Page 23

The variable expressions representing the synchronization channels inside the channel list.

OCL Constraints of `ChannelList`

ChannelVariablesOnly

```
self.channelExpression->forAll(
        (not identifier.typeDefinition.
            oclIsUndefined()) implies identifier.
            typeDefinition.baseType = types::
            BuiltInType::CHAN
)
```

4.2 Class `ChannelPriority`

Overview A priority ordering for synchronization channels.

References of `ChannelPriority`

`item : ChannelPriorityItem [1..*]` see Section 4.3 on Page 15
The items of the channel priority ordering.

OCL Constraints of `ChannelPriority`

AtMostOneDefaultItem

```
self.item->select(oclIsKindOf(
    DefaultChannelPriority))->size() <= 1
```

EachChannelContainedAtMostOnce

```
self.item->select(oclIsKindOf(ChannelList)).
    oclAsType(ChannelList)->collect(
    channelExpression)->isUnique(variable)
```

4.3 Abstract Class `ChannelPriorityItem`

Overview Abstract base class for items inside a channel priority.

4.4 Class `DefaultChannelPriority`

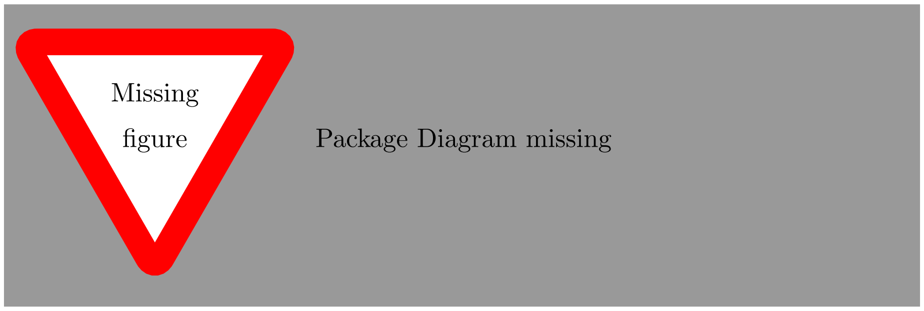
Overview A 'default' item inside a channel priority, representing all channels not listed explicitly.

Super Types of `DefaultChannelPriority`

`ChannelPriorityItem` see Section 4.3 on Page 15

5 Package `uppaal::declarations::system`

Overview Contains special classes that are relevant for the system declarations.



5.1 Class `InstantiationList`

Overview Represents a list of templates to be instantiated using a common priority.

References of `InstantiationList`

`template : AbstractTemplate [1..*]` see Section 8.1 on Page 32
The list of instantiations.

OCL Constraints of `InstantiationList`

OnlyLegalParamsForPartialInstantiation

```
self.template->forAll(
        parameter->forAll(
                callType = declarations::CallType
                    ::CALL\_BY\_VALUE
                and
                ((not variableDeclaration.
                    oclIsUndefined())
                        implies
                 (variableDeclaration.
                     typeDefinition.oclIsKindOf(
                     types::RangeTypeSpecification
                     ) or
                  variableDeclaration.
                      typeDefinition.oclIsKindOf(
                      types::
                      ScalarTypeSpecification)))
                    )
            )
```

5.2 Class `ProgressMeasure`

Overview A progress measure consisting of monotonically increasing expressions.

References of `ProgressMeasure`

`expression : Expression [1..*]` see Section 6.13 on Page 22
The progress measure expressions.

5.3 Class `System`

Overview A system contains declarations of template instantiations.

References of `System`

`instantiationList : InstantiationList [1..*]` see Section 5.1 on Page 16
A list of process instantiation sublists, ordered by decreasing priority. The templates referenced inside the sublists are instantiated to be part of the system at runtime.

OCL Constraints of `System`

EachTemplateReferencedAtMostOnce

```
self.instantiationList->collect(template)->
    isUnique(t : templates::AbstractTemplate | t)
```

5.4 Class `TemplateDeclaration`

Overview A declaration of a template redefinition.

Super Types of `TemplateDeclaration`

`Declaration` see Section 3.7 on Page 6

References of `TemplateDeclaration`

`argument : Expression [0..*]` see Section 6.13 on Page 22
A number of arguments that describe how the referred template's parameters should be mapped towards the declared template's parameters.

`declaredTemplate : RedefinedTemplate [1..1]` see Section 8.5 on Page 34

The template being declared.

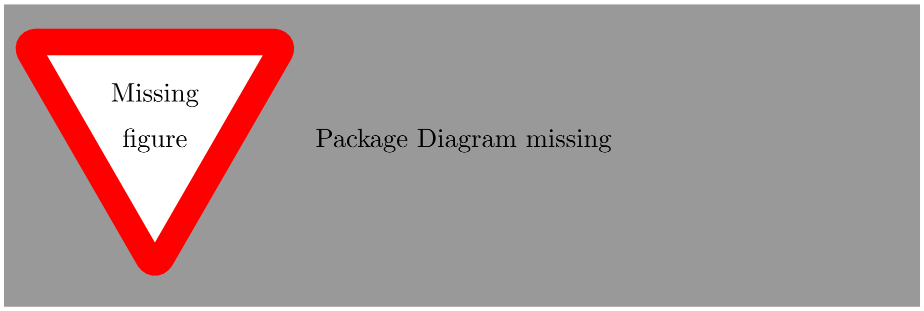
OCL Constraints of `TemplateDeclaration`

NumberOfArgumentsMatchesDeclaration

```
(not self.declaredTemplate.oclIsUndefined() and
    not self.declaredTemplate.referredTemplate.
    oclIsUndefined())
implies
self.argument->size() = self.declaredTemplate.
    referredTemplate.parameter->size()
```

6 Package `uppaal::expressions`

Overview Introduces all kinds of expressions.



6.1 Class `ArithmeticExpression`

Overview A binary expression representing an arithemtic operation.

Super Types of `ArithmeticExpression`

`BinaryExpression` see Section 6.5 on Page 20

Attributes of `ArithmeticExpression`

`operator : ArithmeticOperator [1..1]` see Section 6.2 on Page 19
The arithmetic operator to be applied.

6.2 Enumeration `ArithmeticOperator`

Overview Representing all arithmetic operators.

Literals of `ArithmeticOperator`

`ADD = 0`

`SUBTRACT = 1`

`MULTIPLICATE = 2`

`DIVIDE = 3`

`MODULO = 4`

6.3 Class `AssignmentExpression`

Overview A binary assignment expression using a specific assignment operator.

Super Types of `AssignmentExpression`

`BinaryExpression` see Section 6.5 on Page 20

Attributes of `AssignmentExpression`

`operator : AssignmentOperator [1..1]` see Section 6.4 on Page 20
The operator for the assignment.

6.4 Enumeration `AssignmentOperator`

Overview Representing all assignment operators.

Literals of `AssignmentOperator`

`EQUAL = 0`

`PLUS_EQUAL = 1`

`MINUS_EQUAL = 2`

`TIMES_EQUAL = 3`

`DIVIDE_EQUAL = 4`

`MODULO_EQUAL = 5`

`BIT_AND_EQUAL = 6`

`BIT_OR_EQUAL = 7`

`BIT_LEFT_EQUAL = 8`

`BIT_RIGHT_EQUAL = 9`

`BIT_XOR_EQUAL = 10`

6.5 Abstract Class `BinaryExpression`

Overview Abstract base class for all binary expressions connecting two sub-expressions.

Super Types of `BinaryExpression`

`Expression` see Section 6.13 on Page 22

References of `BinaryExpression`

`firstExpr : Expression [1..1]` see Section 6.13 on Page 22
The first sub-expression.

`secondExpr : Expression [1..1]` see Section 6.13 on Page 22
The second sub-expression.

6.6 Class `BitShiftExpression`

Overview A binary expression representing an arithemtic operation.

Super Types of `BitShiftExpression`

`BinaryExpression` see Section 6.5 on Page 20

Attributes of `BitShiftExpression`

`operator : BitShiftOperator [1..1]` see Section 6.7 on Page 21
The arithmetic operator to be applied.

6.7 Enumeration `BitShiftOperator`

Overview Representing all arithmetic operators.

Literals of `BitShiftOperator`

`LEFT = 0`

`RIGHT = 1`

6.8 Class `BitwiseExpression`

Overview A binary expression representing an arithemtic operation.

Super Types of `BitwiseExpression`

`BinaryExpression` see Section 6.5 on Page 20

Attributes of `BitwiseExpression`

`operator : BitwiseOperator [1..1]` see Section 6.9 on Page 21
The arithmetic operator to be applied.

6.9 Enumeration `BitwiseOperator`

Overview Representing all arithmetic operators.

Literals of `BitwiseOperator`

`AND = 0`

`XOR = 1`

`OR = 2`

6.10 Class `CompareExpression`

Overview A comparison between two expression values using a specific comparison operator.

Super Types of `CompareExpression`

`BinaryExpression` see Section 6.5 on Page 20

Attributes of `CompareExpression`

`operator : CompareOperator [1..1]` see Section 6.11 on Page 22
The comparison operator to be applied.

6.11 Enumeration `CompareOperator`

Overview Representing all comparison operators.

Literals of `CompareOperator`

`EQUAL = 0`

`GREATER = 1`

`GREATER_OR_EQUAL = 2`

`LESS = 3`

`LESS_OR_EQUAL = 4`

`UNEQUAL = 5`

6.12 Class `ConditionExpression`

Overview An expression representing a conditional redirection to one of the sub-expressions. Uses tokens '?' and ':' for delimitation.

Super Types of `ConditionExpression`

`Expression` see Section 6.13 on Page 22

References of `ConditionExpression`

`elseExpression : Expression [1..1]` see Section 6.13 on Page 22
The else-expression.

`ifExpression : Expression [1..1]` see Section 6.13 on Page 22
The boolean if-expression.

`thenExpression : Expression [1..1]` see Section 6.13 on Page 22
The then-expression.

6.13 Abstract Class `Expression`

Overview Abstract base class for all kinds of expressions.

6.14 Class `FunctionCallExpression`

Overview An expression representing a call to a function.

Super Types of `FunctionCallExpression`

`Expression` see Section 6.13 on Page 22

References of `FunctionCallExpression`

`argument : Expression [0..*]` see Section 6.13 on Page 22
: A set of expressions representing the argument values for the function call. Must conform to the parameters of the function declaration.

`function : Function [1..1]` see Section 3.10 on Page 7
: The function to be called.

OCL Constraints of `FunctionCallExpression`

NumberOfArgumentsMatchesDeclaration

```
(not self.function.oclIsUndefined())
implies
self.argument->size() = self.function.parameter->
    size()
```

6.15 Class `IdentifierExpression`

Overview An expression referring to a variable.

Super Types of `IdentifierExpression`

`Expression` see Section 6.13 on Page 22

References of `IdentifierExpression`

`identifier : NamedElement [1..1]` see Section 2.2 on Page 3
: The referred variable.

`index : Expression [0..*]` see Section 6.13 on Page 22
: A set of expressions that refer to the array indexes of the variable.

6.16 Class `IncrementDecrementExpression`

Overview An expression describing increment (++) or decrement (—) of an integer-based expression.

Super Types of `IncrementDecrementExpression`

`Expression` see Section 6.13 on Page 22

Attributes of `IncrementDecrementExpression`

`operator : IncrementDecrementOperator [1..1]` see Section 6.17 on Page 24
: Specifies increment or decrement.

`position : IncrementDecrementPosition [1..1]` see Section 6.18 on Page 24
: Specifies pre- or post-evaluation.

References of `IncrementDecrementExpression`

`expression : Expression [1..1]` see Section 6.13 on Page 22
: The expression to be incremented or decremented.

6.17 Enumeration `IncrementDecrementOperator`

Overview Representing increment and decrement operators.

Literals of `IncrementDecrementOperator`

`INCREMENT = 0`

`DECREMENT = 1`

6.18 Enumeration `IncrementDecrementPosition`

Overview Representing pre- or post-processing inside increment/decrement expressions.

Literals of `IncrementDecrementPosition`

`PRE = 0`

`POST = 1`

6.19 Class `LiteralExpression`

Overview An expression referring to a literal of any type.

Super Types of `LiteralExpression`

`Expression` see Section 6.13 on Page 22

Attributes of `LiteralExpression`

`text : EString [1..1]`
: The textual description of the literal.

6.20 Class `LogicalExpression`

Overview A logical expression.

Super Types of `LogicalExpression`

`BinaryExpression` see Section 6.5 on Page 20

Attributes of `LogicalExpression`

`operator : LogicalOperator [1..1]` see Section 6.21 on Page 25

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6.21 Enumeration `LogicalOperator`

Overview

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Literals of `LogicalOperator`

`AND = 0`

`OR = 1`

`IMPLY = 2`

6.22 Class `MinMaxExpression`

Overview A binary expression representing an arithemtic operation.

Super Types of `MinMaxExpression`

`BinaryExpression` see Section 6.5 on Page 20

Attributes of `MinMaxExpression`

`operator : MinMaxOperator [1..1]` see Section 6.23 on Page 25
The arithmetic operator to be applied.

6.23 Enumeration `MinMaxOperator`

Overview Representing all arithmetic operators.

Literals of `MinMaxOperator`

`MIN = 0`

`MAX = 1`

6.24 Class `MinusExpression`

Overview An inversion of an integer-based expression using the '-' token.

Super Types of `MinusExpression`

`Expression` see Section 6.13 on Page 22

References of `MinusExpression`

`invertedExpression : Expression [1..1]` see Section 6.13 on Page 22
The expression negated by this negation.

6.25 Class `NegationExpression`

Overview A negation of an expression.

Super Types of `NegationExpression`

`Expression` see Section 6.13 on Page 22

References of `NegationExpression`

`negatedExpression : Expression [1..1]` see Section 6.13 on Page 22
The expression negated by this negation.

6.26 Class `PlusExpression`

Overview A confirmation of an integer-based expression using the '+' token.

Super Types of `PlusExpression`

`Expression` see Section 6.13 on Page 22

References of `PlusExpression`

`confirmedExpression : Expression [1..1]` see Section 6.13 on Page 22
The expression negated by this negation.

6.27 Class `QuantificationExpression`

Overview A quantification expression introducing a quantified variable.

Super Types of `QuantificationExpression`

`Expression` see Section 6.13 on Page 22 ,

`VariableContainer` see Section 3.22 on Page 12

Attributes of `QuantificationExpression`

`quantifier : Quantifier [1..1]` see Section 6.28 on Page 27
: The quantifier to be applied.

References of `QuantificationExpression`

`expression : Expression [1..1]` see Section 6.13 on Page 22
: The quantified expression.

OCL Constraints of `QuantificationExpression`

SingleVariable

```
self.variable->size() <= 1
```

6.28 Enumeration `Quantifier`

Overview Representing existential and universal quantification.

Literals of `Quantifier`

`EXISTENTIAL = 0`

`UNIVERSAL = 1`

6.29 Class `ScopedIdentifierExpression`

Overview An expression used to access a scoped identifier. Uses a dot for delimination between scope and identifier.

Super Types of `ScopedIdentifierExpression`

`Expression` see Section 6.13 on Page 22

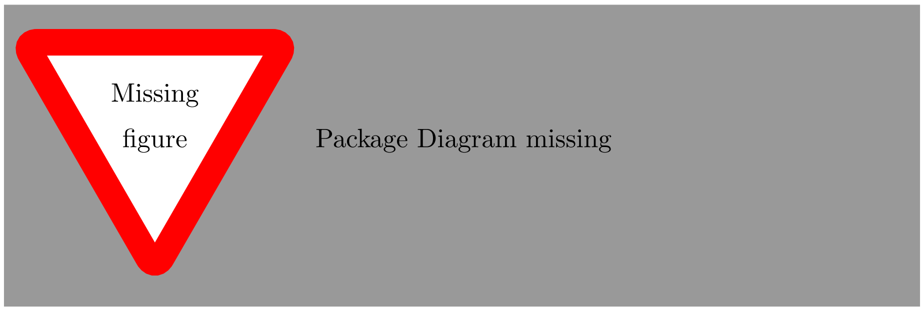
References of `ScopedIdentifierExpression`

`identifier : IdentifierExpression [1..1]` see Section 6.15 on Page 23
: An expression that refers to a member of the scope.

`scope : Expression [1..1]` see Section 6.13 on Page 22
: An expression that refers to a certain identifier scope.

7 Package `uppaal::statements`

Overview Support for statements inside functions.



7.1 Class `Block`

Overview A block of one or more statements.

Super Types of `Block`

`Statement` see Section 7.9 on Page 31

References of `Block`

`declarations : LocalDeclarations` see Section 3.15 on Page 9
The local declarations for the function's body.

`statement : Statement [1..*]` see Section 7.9 on Page 31
The statements inside the funtion's body.

OCL Constraints of `Block`

DataVariableDeclarationsOnly

```
(not self.declarations.oclIsUndefined())
implies
(self.declarations.declaration->forAll(
    oclIsKindOf(declarations::
    DataVariableDeclaration)))
```

7.2 Class `DoWhileLoop`

Overview A do-while-loop statement.

Super Types of `DoWhileLoop`

`Statement` see Section 7.9 on Page 31

References of `DoWhileLoop`

`expression : Expression [1..1]` see Section 6.13 on Page 22
 A boolean expression for the while loop.

`statement : Statement [1..1]` see Section 7.9 on Page 31
 The statement to be evaluated for every value.

7.3 Class `EmptyStatement`

Overview An empty statement represented by a semicolon only.

Super Types of `EmptyStatement`

`Statement` see Section 7.9 on Page 31

7.4 Class `ExpressionStatement`

Overview A statement that refers to an arbitrary expression.

Super Types of `ExpressionStatement`

`Statement` see Section 7.9 on Page 31

References of `ExpressionStatement`

`expression : Expression [1..1]` see Section 6.13 on Page 22
 The expression this statement refers to.

7.5 Class `ForLoop`

Overview A for-loop statement.

Super Types of `ForLoop`

`Statement` see Section 7.9 on Page 31

References of `ForLoop`

`condition : Expression [1..1]` see Section 6.13 on Page 22
 The condition of the for loop, represented by a boolean expression.

`initialization : Expression [1..1]` see Section 6.13 on Page 22
 The initialization expression of the for loop.

`iteration : Expression [1..1]` see Section 6.13 on Page 22
 The iteration statements of the for loop.

`statement : Statement [1..1]` see Section 7.9 on Page 31
 The statement to be evaluated for every value.

7.6 Class `IfStatement`

Overview An if-then-else statement.

Super Types of `IfStatement`

`Statement` see Section 7.9 on Page 31

References of `IfStatement`

`elseStatement : Statement` see Section 7.9 on Page 31
The else-statement.

`ifExpression : Expression [1..1]` see Section 6.13 on Page 22
The boolean if-expression.

`thenStatement : Statement [1..1]` see Section 7.9 on Page 31
The then-statement.

7.7 Class `Iteration`

Overview An iteration over all possible values of a bounded type using the 'for' keyword.

Super Types of `Iteration`

`Statement` see Section 7.9 on Page 31 ,

`VariableContainer` see Section 3.22 on Page 12

References of `Iteration`

`statement : Statement [1..1]` see Section 7.9 on Page 31
The statement to be evaluated for every value.

OCL Constraints of `Iteration`

SingleVariable

```
self.variable->size() <= 1
```

7.8 Class `ReturnStatement`

Overview A statement used to return from a function's body, optionally carrying a return value.

Super Types of `ReturnStatement`

`Statement` see Section 7.9 on Page 31

References of `ReturnStatement`

`returnExpression : Expression` see Section 6.13 on Page 22
The expression representing the return value.

7.9 Abstract Class `Statement`

Overview Abstract base-class for all statements inside a function's body.

7.10 Class `WhileLoop`

Overview A while-loop statement.

Super Types of `WhileLoop`

`Statement` see Section 7.9 on Page 31

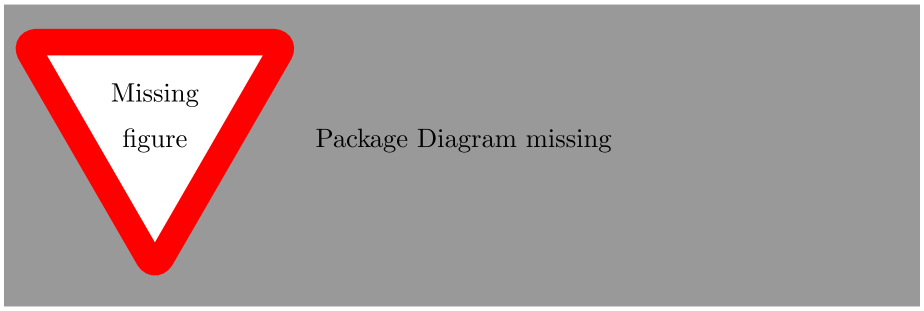
References of `WhileLoop`

`expression : Expression [1..1]` see Section 6.13 on Page 22
A boolean expression for the while loop.

`statement : Statement [1..1]` see Section 7.9 on Page 31
The statement to be evaluated for every value.

8 Package `uppaal::templates`

Overview Support for Timed Automata templates consisting of locations and edges.



8.1 Abstract Class `AbstractTemplate`

Overview Abstract base class for ordinary timed automata templates as well as redefined templates.

Super Types of `AbstractTemplate`

`NamedElement` see Section 2.2 on Page 3 ,

`CommentableElement` see Section 2.1 on Page 3

References of `AbstractTemplate`

`parameter : Parameter [0..*]` see Section 3.16 on Page 9
The parameter declarations of the template.

OCL Constraints of `AbstractTemplate`

UniqueParameterNames

```
self.parameter->collect(variableDeclaration)->
    collect(variable)->isUnique(name)
```

8.2 Class `Edge`

Overview An edge connecting two locations inside a template.

Super Types of `Edge`

`LinearElement` see Section 10.3 on Page 43 ,

`CommentableElement` see Section 2.1 on Page 3 ,

`ColoredElement` see Section 10.2 on Page 43

References of `Edge`

`guard : Expression` see Section 6.13 on Page 22
: The guard expression of the edge.

`parentTemplate : Template [1..1]` see Section 8.9 on Page 36
: The parent template containing the edge.

`selection : Selection [0..*]` see Section 8.6 on Page 34
: A set of non-deterministic value selections.

`source : Location [1..1]` see Section 8.3 on Page 33
: The source location of the edge.

`synchronization : Synchronization` see Section 8.7 on Page 35
: A synchronization performed when the edge fires.

`target : Location [1..1]` see Section 8.3 on Page 33
: The target location of the edge.

`update : Expression [0..*]` see Section 6.13 on Page 22
: A set of update expressions for the edge, evaluated if the edge fires.

OCL Constraints of `Edge`

UniqueParentTemplate

```
(not (self.source.oclIsUndefined() or self.target
    .oclIsUndefined()))
implies
self.source.parentTemplate = self.target.
    parentTemplate
```

8.3 Class `Location`

Overview A location inside a template.

Super Types of `Location`

`NamedElement` see Section 2.2 on Page 3 ,

`CommentableElement` see Section 2.1 on Page 3 ,

`PlanarElement` see Section 10.4 on Page 43 ,

`ColoredElement` see Section 10.2 on Page 43

Attributes of `Location`

`locationTimeKind : LocationKind [1..1]` see Section 8.4 on Page 34
: Specifies the kind of location (default, urgent, or committed).

References of `Location`

`invariant : Expression` see Section 6.13 on Page 22
: A boolean expression representing the location's invariant.

`parentTemplate : Template [1..1]` see Section 8.9 on Page 36
: The parent template containing the location.

8.4 Enumeration `LocationKind`

Overview Location types.

Literals of `LocationKind`

`NORMAL = 0`

`URGENT = 1`

`COMMITED = 2`

8.5 Class `RedefinedTemplate`

Overview A template resulting from redefinition of another referred template, altering its name and parametrization.

Super Types of `RedefinedTemplate`

`AbstractTemplate` see Section 8.1 on Page 32

References of `RedefinedTemplate`

`declaration : TemplateDeclaration [1..1]` see Section 5.4 on Page 17
: The declaration of this template.

`referredTemplate : AbstractTemplate [1..1]` see Section 8.1 on Page 32
: The template that serves as basis for redefinition.

8.6 Class `Selection`

Overview A non-deterministic selection of a value from a range. The range is specified by a bounded type.

Super Types of `Selection`

`VariableContainer` see Section 3.22 on Page 12

OCL Constraints of `Selection`

SingleVariable

```
self.variable->size() <= 1
```

IntegerBasedType

```
(not self.typeDefinition.oclIsUndefined())
implies
self.typeDefinition.baseType = types::BuiltInType
    ::INT
```

8.7 Class `Synchronization`

Overview A sent or received synchronization between two templates using a specific synchronization channel.

Attributes of `Synchronization`

`kind : SynchronizationKind [1..1]` see Section 8.8 on Page 35
The kind of synchronization (sent or received).

References of `Synchronization`

`channelExpression : IdentifierExpression [1..1]` see Section 6.15 on Page 23
An expression representing the channel variable used for synchronization.

OCL Constraints of `Synchronization`

ChannelVariablesOnly

```
(not self.channelExpression.oclIsUndefined())
and
(not self.channelExpression.identifier.
    oclIsUndefined())
and
(self.channelExpression.identifier.oclIsKindOf(
    declarations::Variable))
and
(not self.channelExpression.identifier.oclAsType(
    declarations::Variable).typeDefinition.
    oclIsUndefined())
implies
self.channelExpression.identifier.oclAsType(
    declarations::Variable).typeDefinition.
    baseType = types::BuiltInType::CHAN
```

8.8 Enumeration `SynchronizationKind`

Overview Representing the type of synchronization.

Literals of `SynchronizationKind`

`RECEIVE = 0`

`SEND = 1`

8.9 Class `Template`

Overview An Uppaal template representing a single timed automaton.

Super Types of `Template`

`AbstractTemplate` see Section 8.1 on Page 32

References of `Template`

`declarations : LocalDeclarations` see Section 3.15 on Page 9
The local declarations of the template.

`edge : Edge [0..*]` see Section 8.2 on Page 32
The edges inside this template.

`init : Location [1..1]` see Section 8.3 on Page 33
The initial location of this template.

`location : Location [1..*]` see Section 8.3 on Page 33
The locations inside this template.

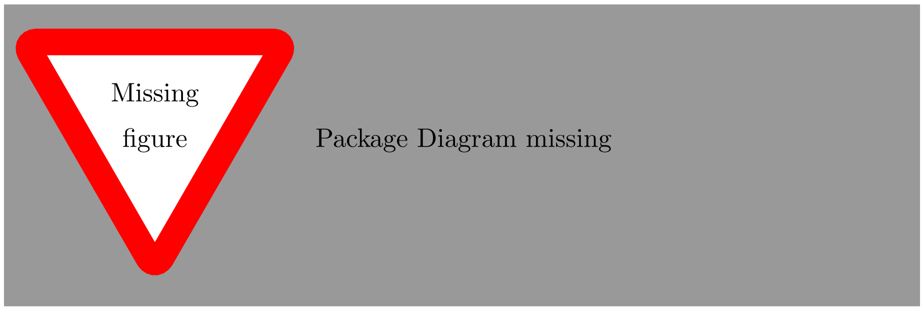
OCL Constraints of `Template`

UniqueLocationNames

```
self.location->isUnique(name)
```

9 Package `uppaal::types`

Overview Provides support for built-in and user-defined types.



9.1 Enumeration `BuiltInType`

Overview All built-in types.

Literals of `BuiltInType`

`INT = 0`

`CLOCK = 1`

`CHAN = 2`

`BOOL = 3`

`VOID = 4`

9.2 Class `DeclaredType`

Overview A user-declared type.

Super Types of `DeclaredType`

`Type` see Section 9.8 on Page 39

References of `DeclaredType`

`typeDeclaration : TypeDeclaration [1..1]` see Section 3.18 on Page 10
The declaration that declares this type.

`/typeDefinition : TypeDefinition [1..1]` see Section 9.9 on Page 40
The definition of the declared type. Usually a type specification, but can also be a type reference to a ”renamed” type.

derivation

```
if self.typeDeclaration.oclIsUndefined()
then null
else self.typeDeclaration.typeDefinition
endif
```

9.3 Class `IntegerBounds`

Overview Used to restrict the 'int' type to a range of values.

References of `IntegerBounds`

`lowerBound : Expression [1..1]` see Section 6.13 on Page 22
An integer-based expression representing the lower bound.

`upperBound : Expression [1..1]` see Section 6.13 on Page 22
An integer-based expression representing the upper bound.

9.4 Class `PredefinedType`

Overview One of the predefined types 'int', 'bool', 'chan', 'clock' or 'void'.

Super Types of `PredefinedType`

`Type` see Section 9.8 on Page 39

Attributes of `PredefinedType`

`type : BuiltInType [1..1]` see Section 9.1 on Page 37
Stores the concrete literal that represents the predefined type.

9.5 Class `RangeTypeSpecification`

Overview A type specification restricting the 'int' type to a range of values.

Super Types of `RangeTypeSpecification`

`TypeSpecification` see Section 9.11 on Page 41

References of `RangeTypeSpecification`

`bounds : IntegerBounds [1..1]` see Section 9.3 on Page 38
The bounds that restrict the type specification.

9.6 Class `ScalarTypeSpecification`

Overview A specification of a 'scalar' type.

Super Types of `ScalarTypeSpecification`

`TypeSpecification` see Section 9.11 on Page 41

References of `ScalarTypeSpecification`

`sizeExpression : Expression [1..1]` see Section 6.13 on Page 22
An integer-based expression that represents the size of the scalar type.

9.7 Class `StructTypeSpecification`

Overview A specification of a 'struct' type.

Super Types of `StructTypeSpecification`

`TypeSpecification` see Section 9.11 on Page 41

References of `StructTypeSpecification`

`declaration : DataVariableDeclaration [1..*]` see Section 3.5 on Page 5
The variable declarations representing the fields of the 'struct' type.

OCL Constraints of `StructTypeSpecification`

UniqueFieldNames

```
self.declaration->collect(variable)->isUnique(
    name)
```

9.8 Abstract Class `Type`

Overview Abstract base class for all types.

Super Types of `Type`

`NamedElement` see Section 2.2 on Page 3

Attributes of `Type`

`/baseType : BuiltInType` see Section 9.1 on Page 37

ecore2latex: Documentation missing (GenModel is not defined)

derivation

```
if self.oclIsKindOf(DeclaredType)
then
        if self.oclAsType(DeclaredType).
            typeDefinition.oclIsUndefined()
        then null
        else self.oclAsType(DeclaredType).
            typeDefinition.baseType
        endif
else
        if self.oclIsKindOf(PredefinedType)
        then self.oclAsType(PredefinedType).
            type
        else null
        endif
endif
```

References of `Type`

`index : Index [0..*]` see Section 3.13 on Page 8

A set of array indexes for the type.

9.9 Abstract Class `TypeDefinition`

Overview Abstract base class for type definitions of all typed elements. Type definitions are either references to types defined elsewhere, or in place specifications of new types.

Attributes of `TypeDefinition`

`/baseType : BuiltInType` see Section 9.1 on Page 37

The built-in base type this type definition relies on. Can be 'null' in case of a 'struct' type definition involved.

derivation

```
if self.oclIsKindOf(TypeReference)
then
        if self.oclAsType(TypeReference).
            referredType.oclIsUndefined()
        then null
        else self.oclAsType(TypeReference).
            referredType.baseType
        endif
else
        if self.oclIsKindOf(
            ScalarTypeSpecification) or self.
            oclIsKindOf(RangeTypeSpecification)
        then BuiltInType::INT
        else null
        endif
    endif
```

9.10 Class `TypeReference`

Overview A reference to a type defined elsewhere.

Super Types of `TypeReference`

`TypeDefinition` see Section 9.9 on Page 40

References of `TypeReference`

`referredType : Type [1..1]` see Section 9.8 on Page 39
The referred type.

9.11 Abstract Class `TypeSpecification`

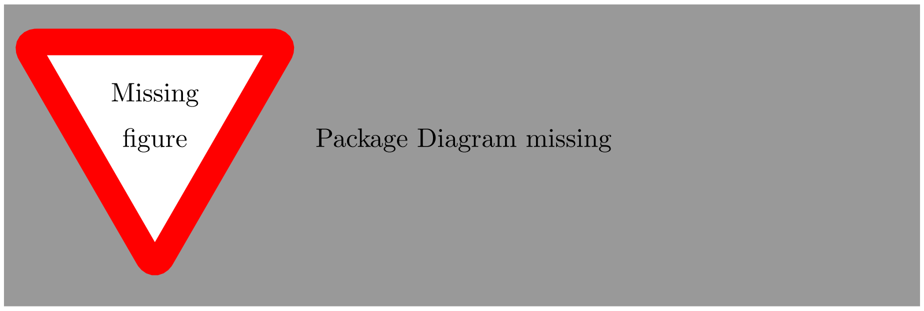
Overview Abstract base class for the specification of new types, using either the 'struct' or 'scalar' keywords, or restricting a type to a range of values.

Super Types of `TypeSpecification`

`TypeDefinition` see Section 9.9 on Page 40

10 Package `uppaal::visuals`

Overview Provides support for the visual representation of model elements.



10.1 Enumeration `ColorKind`

Overview The color kinds of an element. They are the standard colors of uppaal or a self-defined color.

Literals of `ColorKind`

```
DEFAULT = 0
WHITE = 1
LIGHTGREY = 2
DARKGREY = 3
BLACK = 4
BLUE = 5
CYAN = 6
GREEN = 7
MAGENTA = 8
ORANGE = 9
PINK = 10
RED = 11
YELLOW = 12
SELF_DEFINED = 13
```

10.2 Abstract Class `ColoredElement`

Overview A model element that has an optional color.

Attributes of `ColoredElement`

`color : ColorKind` see Section 10.1 on Page 42
: The color of the model element. It is either a standard uppaal color (default, white, light grey, dark grey, black, blue, cyan, green, magenta, orange, pink, red, yellow) or a self-defined color. Edges should not be white.

SD says: We need an OCL-Constraint: Edges should not be white.

SD says: We need an OCL-Constraint: If self defined is choosen then a color code must be specified.

`colorCode : EString`
: The hexadecimal color code of the model element that must be defined if a self-defined color should be used.

10.3 Abstract Class `LinearElement`

Overview A linear model element that has a set of bend points.

References of `LinearElement`

`bendPoint : Point [0..*]` see Section 10.5 on Page 43
: The bend points of the linear model element.

10.4 Abstract Class `PlanarElement`

Overview A planar model element that has an optional position.

References of `PlanarElement`

`position : Point` see Section 10.5 on Page 43
: The planar position of the model element.

10.5 Class `Point`

Overview Represents a point in the two-dimensional space.

Attributes of `Point`

`x : EInt [1..1]`
: The horizontal component of the point.

`y : EInt [1..1]`
: The vertical component of the point.