



An OMG® Systems Modeling Publication



OMG Systems Modeling Language™ (SysML®)

Version 2.0 Beta 1
Preliminary Revision 2023-10

Part 1: Language Specification

! LMV0FDEQ c PLIR0FLKP ! L0ML0>0FLK
! LMV0FDEQ c F0?RP
! LMV0FDEQ c 0>P ! L0ML0>0FLK

USE OF SPECIFICATION - TERMS, CONDITIONS & NOTICES

The material in this document details an Object Management Group specification in accordance with the terms, conditions and notices set forth below. This document does not represent a commitment to implement any portion of this specification in any company's products. The information contained in this document is subject to change without notice.

LICENSES

The companies listed above have granted to the Object Management Group, Inc. (OMG) a nonexclusive,

OWNERSHIP, IMPLIED WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE. IN NO EVENT SHALL THE OBJECT MANAGEMENT GROUP OR ANY OF THE COMPANIES LISTED ABOVE BE LIABLE FOR ERRORS CONTAINED HEREIN OR FOR DIRECT, INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL, RELIANCE OR COVER DAMAGES, INCLUDING LOSS OF PROFITS, REVENUE, DATA OR USE, INCURRED BY ANY USER OR ANY THIRD PARTY IN CONNECTION WITH THE FURNISHING, PERFORMANCE, OR USE OF THIS MATERIAL, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

OMG'S ISSUE REPORTING PROCEDURE

!>PB "BCFKFQFLKP >KA 3P>DBP
K>IVPPF !>PBP
K>IVPPF !>PBP - SB0SFBT
K>IVPPF !>PB "BCFKFQFLKP >KA 3P>DBP
20>AB - CC K>IVPBP
4 BOFCF@>QFLK !>PBP
4 BOFCF@>QFLK !>PBP - SB0SFBT
4 BOFCF@>QFLK !>PB "BCFKFQFLKP >KA 3P>DBP
3 PB !>PBP
3 PB !>PBP - SB0SFBT

.>QP 2BUQR>I ,LQ>FLK
.LOQP 2BUQR>I ,LQ>FLK
!LKKB@FLKP 2BUQR>I ,LQ>FLK
!LKKB@FLK "BCFKFQFLK >KA 3P>DB
FKAFKD !LKKB@LOP
1R@@BPPFLKP
+BPP>DBP >KA \$ILT !LKKB@FLKP
'KQB0C>@BP 2BUQR>I ,LQ>FLK
'KQB0C>@B "BCFKFQFLKP
'KQB0C>@B 3P>DBP
IIL@>FLKP 2BUQR>I ,LQ>FLK
@QFLKP 2BUQR>I ,LQ>FLK
@QFLK "BCFKFQFLKP
@QFLK 3P>DBP

!LKKB@QFLKP %0>MEF@>I ,L@>QFLK
'KQB0C>@BP %0>MEF@>I ,L@>QFLK
•d d MLD@QFLKP @0dMEF@>I@I@>QFLKP @W@A@D@ A L@>QFLK
@QFLKP %0>MEF@>I ,L@>QFLK
1@>QBP %0>MEF@>I ,L@>QFLK

Đ M f@Rb`Ø&
Đ] i ë b`N
Đ] i he Å& Ø

r 'KQB0C>ABP3P>KPKP>I ,L@>QFLK

.L0Q "BCFKFQFLK
.L0Q3P>DB

! LKPQ>FKQP ?PQ>@Q 1VKQ>U] ! LKPQAPQö P b`**D****N** **D**
0 - SB0SA @ - SB0SFBT
PPBQ ! LKPQ>FKQ3P>DB
! LKPQ>FKQ " BCFKFQF d & !

Q **N** **D**

0 - SB0SA0SCP4FKFP P μ \$t`**D****N**A**t`****R** **N** ö \$ö 5 0E F 1VKQ>U

#IB J BKQP
. >QQ
M>QQP
.LQQP
#IB@P .LSQQSFTQSPTO\$ OBB b`D4\$ Q\$D
#IBYB#IB J BKQP
.LQQ
MVQQP MLQQP

*LLM @QFLK
ILLM @QFLKP

4 BOFCF@>QFLK ! >PB
 SB0FCF@>QFLK ! >PBP
 4 BOFCF@>QFLK ! EB@H
 4 BOFCF@>QFLK + BQELA
 3 PB ! >PBP
 3 PB ! >PBP - SB0SFBT
 #IB J BKQP
 3 PB ! >PB
 RPB ! >PBP
 4FBTP **D** - å]
 4FBTP - SB0SFBT **D** - }
 #IB J BKQP **D** P f& - í **D**& **D** - **D** - **D**
 >P#IB J BKQ2>?IB
Db`**D** >P'KQB**D**KKB@QFLK "F>D0>J
 >P2BUQR>I , L>QFLK
DBH2OBBSBM>J GPS & && **D**PY & ' **D**' Re **D**
 %0>MEF@>IOBKAB0FKD
 OBKAB0FKD **D**] M **D**4\$\$μ
 OBKAB0FKD
 2>?RI>0OBKAB0FKD **D**] M **D**E**D**E**D**
 2BUQR>IOBKAB0FKD **D**] M **D**E p b`**D**
 4FBT
 4FBTMLFKQ ! EB@H **D**] M **D**D**D**
 SFBTMLFKQ ! EB@HP
 SFBTMLFKQ ! LKCL0J>K@B **D**] M **D**
 SFBTP **D**] **D** **D**
 1@>KA>0A 4FBT "BCFKFQFLKP
 1@>KA>0A 4FBT "BCFKFQFLKP - SB0SFBT
 #IB J BKQP
 @QFLK\$ILT 4FBT
 0LTPB04FBT
 %BKBO>I4FBT
 %BLJ BQOV4FBT
D

OFPH + B>A>>
OFPH + B>A>> - SB0SFB T
#IB J BKQP
*BSBI
*BSBI#KR J
OFPH
OFPH*BSBI
OFPH*BSBI#KR J
. >> J BQBOP LC 'KQBOPQ + B>A>>
. >> J BQBOP LC 'KQBOPQ + B>A>> - SB0SFB T
#IB J BKQP
+ B>PROB - C#CCB@FSKBPP

@>RP>@FLKP
@>RPBP
BCCB@QP
+ RI@F@>RP>@FLK
J RI@F@>RP>@FLKP
! >RPB >KA #CCB@Q
! >RPB >KA #CCB@Q - SB0SFBT
#IB J BKQP

#@@BKQOF@ ! VIFKABO

! LL0AFK>QB20>KPCL0 J >QFLK
@LRKQ / R>KQFQFBP
! LRKQ4>IRB
! V@IF@ O>QFL1 @>IB
" BCFKFQFLK>I / R>KQFQV4>IRB
" B0FSBA 3 KFQ

.LPFQFLK A4B@QLO
QEBO J LAVK> J F@2B J MBO>QROB
2EB0 J LAVK> J F@2B J MBO>QROB 3KFQ
2EB0 J LAVK> J F@2B J MBO>QROB 4>IRB
1' .OBCFUBP
1' .OBCFUBP - SB0SFBT
#IB J BKQP
1'
1' - SB0SFBT
#IB J BKQP
3 1 !RPQL J>OV 3KFQP
3 1 !RPQL J>OV 3KFQP - SB0SFBT

4 B0FCF@>QFLK
4 FB T >KA 4 FB TMLFK()
4>OF>?FIF(V
'KAFSFAR>IP

List of Tables

" BMBKABK@FBP h OBM0BPBK@>FSB , L@>FLK
KKL@>FLKP h OBM0BPBK@>FSB , L@>FLK
.>@H>DBP h OBM0BPBK@>FSB , L@>FLK
" BCFKF@FLK >KA 3P>DB h OBM0BPBK@>FSB , L@>FLK
QQF?R@BP h OBM0BPBK@>FSB , L@>FLK•]
#KR J BO@FLKP h OBM0BPBK@>FSB , L@>FLKV %B@&ND `ND LK OBM0BPBK@>FSB , L@>FLK
- @@ROOBK@BP h OBM0BPBK@>FSB , L@>FLK
'QB J P h OBM0BPBK@>FSB , L@>FLK
.>@QP h OBM0BPBK@>FSB , L@>FLK
.L@Q h OBM0BPBK@>FSB , L@>FLK
! LKKB@FLKP h OBM0BPBK@>FSB , L@>FLK O@&ND .% € ÄBK>KA 3P>DBV `ND@€ `ND Ä d Ä" pBK@>FSB MU@&ND

List of Figures

4FBT O BKABOKD + B J ?BOPEFM

0 Preface

OMG

2 Conformance

3 Normative References

2EB CLIIL TFKD KL0 J >FSB AL@R J BK@P @LK@>FK MOLSPFLKP TEF@E QEOLRDE 0BCB0BK@B FK QEFP QBUQ @LKP@FQR@B MOLSPFLKP
LC QEFP PMB@FC@>FLK

9) B0 + *; *Kernel Modeling Language (KerML)*, 4 BOPFLK
EQQMP TTT LJD LOD PMB@) B0 + *

9 + - \$; *Meta Object Facility*, 4 BOPFLK
EQQMP TTT LJD LOD PMB@ + - \$

9 - ! *; *Object Constraint Language*, 4 BOPFLK
EQQMP TTT LJD LOD PMB@ - ! *

91 + - \$; *MOF Support for Semantic Structures*, 4 BOPFLK
EQQMP TTT LJD LOD PMB@ 1 + - \$

91 VP + * S ; *OMG Systems Modeling Language (SysML)*, 4 BOPFLK
EQQMP TTT LJD LOD PMB@ 1 VP + *

9'1 - ;

4 Terms and Definitions

4>OFLRP QBO J P >KA ABCFKFQFLKP >OB PMB@FCFBA QEOLRDELRO QEB ?LAV LC QEFP PMB@FCF@>QFLK

5 Symbols

@LK@OB@PVK@>U CL0 1 VP + * FP PMB@FCFBA FK PR ?@I>RPB LC QEFP PMB@FCF@>QFLK

6 Introduction

6.1 Document Overview

TEBK @B>QFKD QEBFO LTK J LABIP #>@E J LABI IF?>0V FP ABP@OF?BA TQE > PBQ LC PR?@I>RPBP QE>Q @LSBOP B>@E LC QEB QLM IBSBI M>@H>DBP FK QEB J LABI IF?>0V OBCB00BA QL >P FQP *library models.*

2EBPB @I>RPBP >OB CLIILTBA ?V FKCL0 J >FSB KKBU TEF@E MOBPBKQP >K BU>J MIB J LABI RPKFD QEB 1VP + * I>KDR>DB
>P ABCFKBA FK QEFPM PMB@FCF@>QFLK QL FIIRPQ>OB ELT QEB I>KDR>DB CB>QROBP @>K ?B RPBA QL J LABI >PVPGJB

'K >AAFLK !>RPB LC 9) B0 + *; LK + LABI 'K|B0@E>KDB FP FK@IRABA ?V 0BCB0BR@B >P >KL0 J >FSB M=0Q LC @FP
PMB@FCF@>QLFK FK LOABO QL ABCFBK >IILT?>IB J BQEELAP CL0 FKQB0@E>KDFKD 1VP + * J LABIP

6.3 Document Conventions

2EB @LILNRF>I P@VIB >KA PELRIA ?B @LKFAB0BA FKCL0 J >FSB 0>EBO QEB0 QE>K KL0 J >FSB
2EB @LILNRF>I P@VIB >KA PELRIA ?B @LKFAB0BA FKCL0 J >FSB 0>EBO QEB0 QE>K KL0 J >FSB

,> J BP LC J BQ>@I>PPBP COL J QEB 1VP + * >PQ>@Q PVK>U J LABI >MMB>0 BU>@QV >P FK QEB >?PQ>@Q PVK>U FK@IRAFKD @>MFQ>IFW>FLK 5 EBK RPBA >P #KDFPFE @L J J LK KLRKP B D .>QO "BCFKFQFLK @QFLK 3 P>DB QEBV 0BCB0 QL FKPK>K@BP LC QEB J BQ>@I>PP FK J LABIP B D .>QO 3 P>DB J RPQ ?B ABCFKBA ?V > .>QO "BCFKFQFLK 0BCB0 QL FKPK>K@BP LC QEB J BQ>@I>PPB .>QO 3 P>DB >KA .>QO "BCFKFQFLK QE>Q OPBFAB FK J LABIP 2EFP @>K ?B J LAFCFB A RPKD QEB QBO J J BQ>@I>PP >P KB@BPP>OV QL 0BCB0 QL QEB J BQ>@I>PP FQPBIC FKPKB>A LC FQP FKPK>K@BP B D 2EB .>QO "BCFKFQFLK J BQ>@I>PP FP @LK>FKBA FK QEB .>QO >?PQ>@Q PVK>U M>@H>DB ,> J BP LC MOLMBQFBP LC J BQ>@I>PPBP FK QEB QBUQ >OB P QVIBA FK code CLKQ 5 EBK RPBA >P #KDFPFE @L J J LK KLRKP B D .>QO "BCFKFQFLK QEBV 0BCB0 QL S>IRBP LC QEB MOLMBQFBP 2EFP @>K ?B J LAFCFB A RPKD QEB QBO J J BQ>MOLMBQV >P KB@BPP>OV QL 0BCB0 QL QEB J BQ>MOLMBQV FQPBIC FKPKB>A LC FQP S>IRBP B D 2EB ownedParts J BQ>MOLMBQV FP >K >QOF?RQB LC QEB "BCFKFQFLK J BQ>@I>PP ,> J BP LC @I>PPBP >KA CB>QROBP LC BIB J BKQP COL J > 1VP + * J LABI >OB P QVIBA QEB P>J B >P >?PQ>@Q PVK>U J BQ>@I>PP >KA MOLMBQV K>J BP ?RQ MRQ FK FQ>IF@P >KA >IT>VP FK > @LAB CLKQ 2EFP FK@IRABP BIB J BKQP COL J >KV LC QEB 1VP + * + LABI *F?>OFBP B D Action >KA quantity >KA BIB J BKQP 0BCB0BK@BA COL J P>J MIB RPB0 J LABIP B D

a #A 1BFABTFQW +LABI "OFSBK 1LIRQFLKP
a OLDB0 R0HE>0Q 2EB J>QFU .>0KB0P
a #0>K %B0V ' +
a &FP>PEF +FV>PEFQ> +DKFQB
a

2EB CLIILT KFD FKAFSFAR>IP J >AB PFDKFCF@>KQ @LKQOF?RQFLKP QL QEB 1VP + * S MFILQ F J MIB J BKQ>QFLK ABSBILMBA ?V QEB
112 FK @LKORK@QFLK TFQE QEB ABSBILM J BKQ LC QEFP PMB@FCF@>QFLK

a

7 Language Description

'KCL0 J >QFSB

7.1 Language Overview

Elements >0B QEB @LKP@F@RBK@P LC > J LABI 1L J B BIB J BK@P OBM0BPBK@ relationships

- a *Textual notation*, [8.2.2.3](#)
- a *Graphical notation*, [8.2.3.3](#)
- a *Abstract syntax*, [8.3.3](#)
- a *Semantics, none*

dependency FP > HFKA LC OBI>FLKPEFM ?BQTBBK >KV KR J ?B0 LC @IFBK@ PLR0@B >KA PRMMIFB0 Q>0DBQ BIB J BKQP 2EFP FJ MIFBP QE>@E>KDB QL > PRMMIFB0 BIB J BKQ J >V OBPRIQ FK >@E>KDB QL > @IFBK@ BIB J BKQ "BMBKABK@FBP @>K ?B RPBCRI CL0 OBM0BPBKQFKD OBI>FLKPEFMP ?BQTBBK BIB J BKQP FK >K >?PQ>@Q T>V \$L0 BU>J MIB > ABMBKABK@V @>K ?B RPBA QL OBM0BPBKQ QE>@K RMMB0 I>VB0 LC >K >O@EFQB@QR0B P@>@H J >V ABMBKA LK > ILTB0 I>VB0 LC QEB P@>@H ABMBKABK@V @>K

7.4 Annotations

7.4.1 Annotations Overview

SYSML2-325: Wrong compartment name: documentation

Metamodel references:

- a *Textual notation*, [8.2.2.4](#)

Element	Graphical Notation	Textual Notation
<pre>" L@R J BKQ>@FLK ! L J M>@Q J BKQ</pre>		<pre>doc /*This is a documentation *compartment.*/</pre>

7.4.2 Comments and Documentation

```
part def C {
    attribute x: Real;
    assert x_constraint {
        rep inOCL language "ocl"
```

K BIB J BKQ J >V ?B *owned*


```
item B;  
alias <C> CCC
```

```
package P4 {
    item A;
    item B;
    package Q {
        item C;
    }
}
package P5 {
    import P4::*;
    // The above recursive import is equivalent to all
    // of the following taken together:
    //     import P4;
    //     import P4::*;
    //     import P4::Q::*;


```

```
    } . . .
package DesignModel {
    import
```

```
package PackageApprovals {
```


Specialization

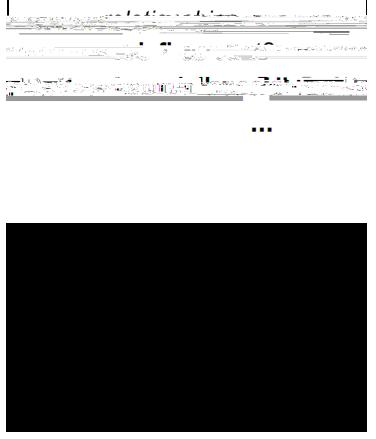
Variability

Variation >KA variant



Element	Graphical Notation	Textual Notation
1R?PBQFKD part1 {		<pre> part part1 : Part1 { attribute attribute2 : Attribute2; part part2 : Part2 [0..*]; } part part1S :> part1 { attribute attribute3 : Attribute3; part part3 : Part3 [0..*]; } L0 part part2S subsets part1 { ... } </pre>
subsets 0BABCFKFQFLK		<pre> part part1 : Part1 [0..*] { part part2 : Part2 [0..*]; } part part1S : Part1S [1] :> part1 { part part2R : Part2R :>> part2; </pre>

Element	Graphical Notation	Textual Notation

Element	Graphical Notation	Textual Notation
OBI>QFLKPEFMP ! L J M>Q J BKQ		<pre> part def PartDef1; part def PartDef2 :> PartDef1; part part1 : PartDef1; part part2 : PartDef2 :> part1; connect part2 to part3; part part3; </pre>

7.6.2 Definitions

2EB0B FP > ?>PF@ @L J J LK KLQ>QFLK CL0 >II HFKAP LC ABCFKFQFLKP >P ABP@OF?BA EB0B FK PR?@I>RPB ____P cß d° #0REY Ÿa#ß J J LK KLPES

7.6.3 Usages

a **ordered** h 'C > RP>DB FP *ordered*, QEBK QEB S>IRBP LC QEB RP>DB @>K ?B MI>@BA FK L0AB0 FKABUBA COL J QL QEB KR J ?B0 LC S>IRBP 2EB ABC>RIQ FP QE>Q QEB CB>QROB FP *unordered*.

```
part vehicle : Vehicle {
```

CB>QROB @E>FK FP PF J FI>0 QL > NR>IFCFBA K> J B ?RQ RKIFHB > NR>IFCFBA K> J B QEB M>QE LC RP>DBP CB>QROBP FK QEB @E>FK
FP OB@LOABA FK QEB >?PQO>@Q PVKQ>U KLQ GRPQ QEB 0BCB0BK@B QL QEB CFK>I RP>DBP 2EPF J B>KP QE>Q AFCCB0BKQ M>QEP QL QEB
P> J B RP>DB @>K ?B AFPQFKDRFPEBA FK QEB >?PQO>@Q PVKQ>U OBMOPPBKQ>FLK LC > J LABI \$B>QROB @E>FKP @>K ?B RPBA QL
PMB@FCV QEB Q>0DBQ CLO J LPQ HFKAP LC OBI>FLKPEFMP FKSLISFKD RP>DBP FK@IRAFKD PR?PBQFKD >KA 0BABCfkQFLK <BSB0
QEBF0 RPB FP M>0F@RI>0IV F J ML0>K TEBK PMB@FCVKD QEB OBI>BA CB>QROBP LC > @LKKB@FLK RP>DB QE>Q >OB J LOB ABBMIV
KBPQBA QE>K QEB @LKKB@FLK RP>DB FQPBIC PBB _____ 1BB >IPL 9) B0 + * ;

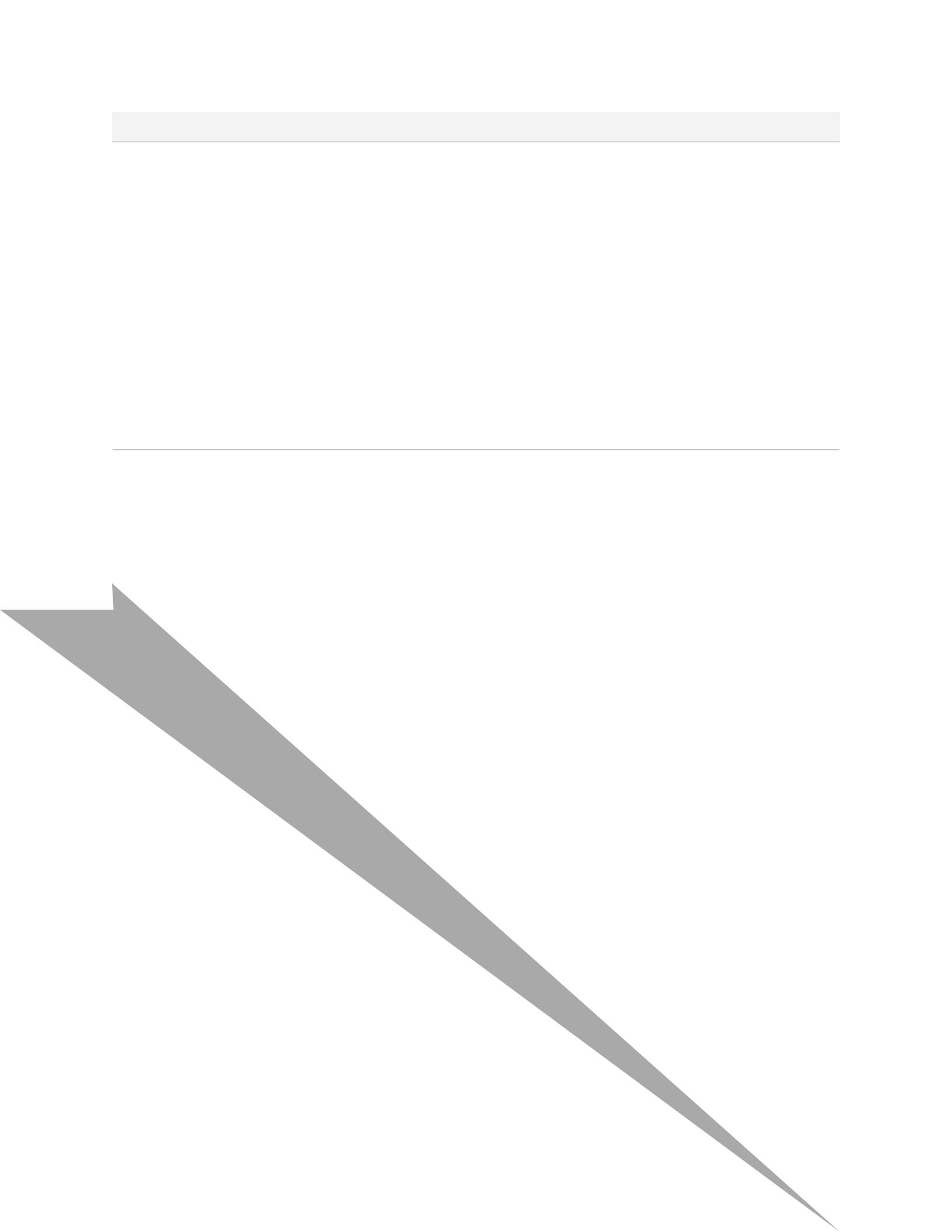
```
item uncles subsets parents.siblings;
item
```

PMB@F>IFWB QEB @L00BPMLKAFKD *base definition* COL J QEB 1VPQB J P + LABI *F?0>0V L0 ?>PB @I>PPFCFB0 COL J QEB) BOKBI
1B J >KQF@ *F?0>0V @L00BPMLKAFKD QL FQP HFKA

Q QEB EFDEBPQ IBSBI BSB0V ABCFKFQFLK BIB J BKQ J RPQ AF0B@QIV L0 FKAF0B@QIV PMB@F>IFWB QEB J LPQ DBKB0>I @I>PPFCFB0
Anything COL J QEB Base J LABI FK QEB) BOKBI 1B J >KQF@ *F?0>0V PBB 9) B0 + * ; 1MB@FCF@ HFKAP LC ABCFKFQFLK
QEBK E>SB J LOB PMB@FCF@ 0BNRF0B J BKQ P CL0 TE>Q J LOB PMB@FCF@ ?>PB ABCFKFQFLK QEBV J RPQ PMB@F>IFWB \$L0 BU>J MIB >K
>QQF?RQB ABCFKFQFLK J RPQ PMB@F>IFWB QEB ?>PB >QQF?RQB ABCFKFQFLK AttributeValue COL J QEB Attributes J LABI FK
QEB 1VPQB J P + LABI *F?0>0V TEFIB > M>0Q ABCFKFQFLK J RPQ PMB@F>IFWB QEB ?>PB M>0Q ABCFKFQFLK Part

PMB@F>IFWBA HFKA LC >QQF?RQB ABCFKFQFLK QE>Q CROQEBO OBPQOF@P QEB S>IRBP LC QEB A>Q QVMB QL > AFP@OBQB PBQ LC A>Q S>IRBP
PBB

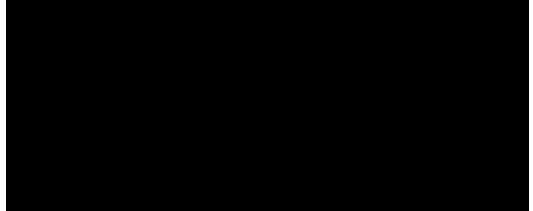
Element	Graphical Notation	Textual Notation
<pre>QOF?RQBP !LJM>QJBKQ</pre>		<pre>{ attribute attribute1 :</pre>



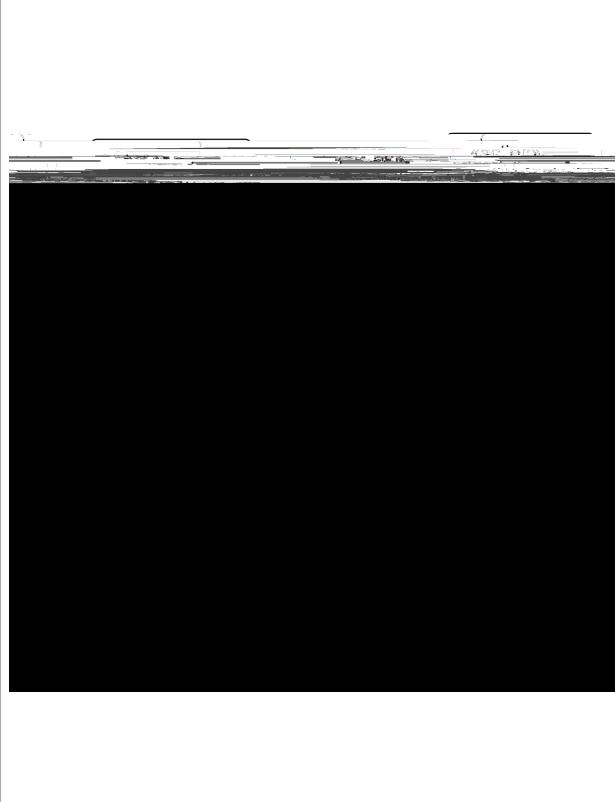
K FQB J QE>Q MB0CL0 J P >@QFLKP FP KL0 J >IIV J LABIBA >P > M>Q PBB II M>Q P >OB FQB J P ?RQ KLQ >II FQB J P >OB

Element		

Element	Graphical Notation	Textual Notation
.Loop !L J M>0J BKQ	 <p>A UML Port Block diagram. At the top, there is a header bar with the word "port". Below it, there is a list of nodes connected to a central port. The port is labeled "port1" and has a multiplicity of "[1..*]" below it. The nodes connected to the port are labeled "BKQ" and "J". There is also a note "ordered nonunique;" associated with the connection.</p>	<pre>{ port port1 : PortDefl [1..*] ordered nonunique; /* ... */ }</pre>

Element	Graphical Notation	Textual Notation
FKAFKD !LKKB@QFLK		<pre>part def Part1 { part part2:part2 { ref part</pre>

Element	Graphical Notation	Textual Notation

Element	Graphical Notation	Textual Notation
\$ILT >P , LAB		<pre> action action1 : Action1 { out item1 : Item1; } action </pre>

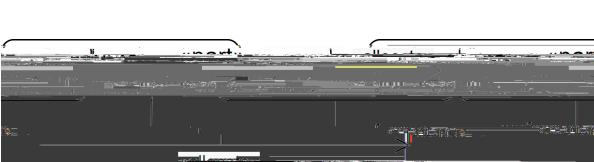
Element	Graphical Notation	Textual Notation


```
connection connection1 : DeviceConnection {
    end part hub ::> mainSwitch[1]; // Implicitly redefines DeviceConnection::hub.
    end part device ::> sensorFeed[1]; // Implicitly redefines DeviceConnection::device.
}
```

7.13.3 Bindings as Usages

?FKAFKD @>K ?B AB@I>0BA >P > RP>DB >P ABP@OF?BA FK _____ RPKD QEB HFKA HBVTL0A **binding** , LQB QE>Q > ?FKAFKD FP


```
part def Vehicle {
```


Element	Graphical Notation	Textual Notation
<pre> IIL@>FLK TFQE PR? >IIL@>FLK </pre>		<pre> part part1 : Part1 { perform action1; } part part2 : Part2 { perform action2; } allocate part1 to part2 { allocate part1.action1 to part2.action2; } </pre>

7.15.2 Allocation Definitions and Usages

7904615650E5314e

K > IIL@>QFLK ABCFKFQFLK L0 RP>DB FP AB@I>OBA IFHB > @LKKB@QFLK ABCFKFQFLK L0 RP>DB PBB _____ }

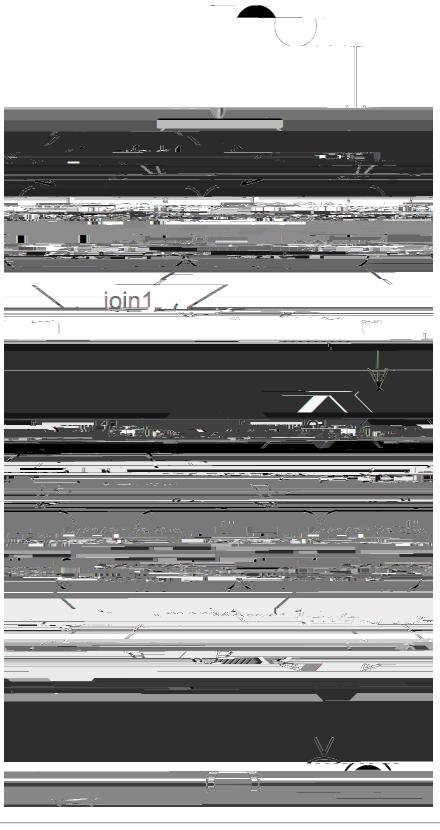
- a *Textual notation*, [8.2.2.16](#)
- a *Graphical notation*, [8.2.3.16](#)
- a *Abstract syntax*, [8.3.16](#)
- a *Semantics*, [8.4.12](#)

Action Definition and Usage

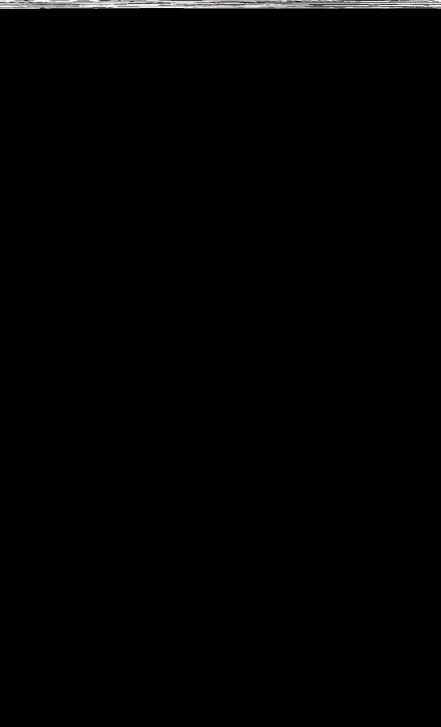
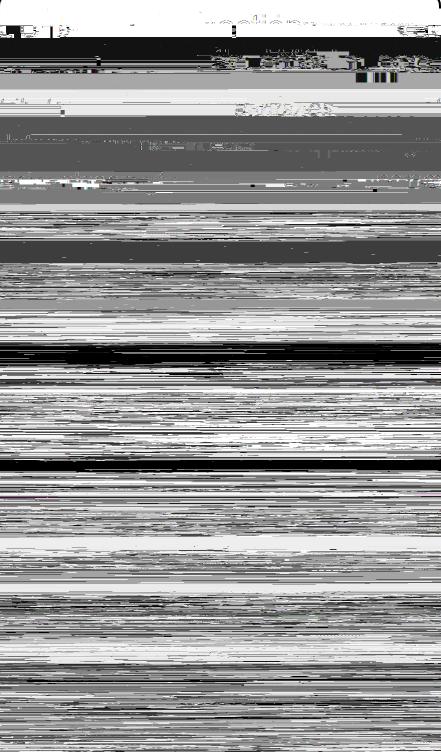
K action definition FP > HFKA LC L@@R00BK@B ABCFKFQFLK PBB _____ QE>Q @I>PPFCFBP >@QFLK MB0CL0 J >K@BP K action usage
FP > HFKA LC L@@R00BK@B RP>DB QE>Q FP > RP>DB LC LKB L0 J L0B >@QFLK ABCFKFQFLKP

a *join node*

Element	Graphical Notation	Textual Notation

Element	Graphical Notation	Textual Notation
@QFLKP TFQE !LKQOLI , LABP		<pre> first start; then fork fork1; then action1; then action2; action action1; then join1; action action2; then join1; </pre>

Element		

Element	Graphical Notation	Textual Notation
<p>@QFLK TRQE *LLM ?LAV FK D0>MEF@>I KL@QFLK</p> 		<pre> package Loop { action actionWithLoop { attribute x:Integer := 1; attribute increment:Integer = 1; attribute y:Integer; loop action loop1 { assign y := 2*x; then assign x := x+increment; } until x >= 10; then done; } } </pre>

Element		

2EB **then**

7.16.5 Conditional Successions

PR@@BPPFLK TFQEFK QEB ?LAV LC >K >@QFLK ABCFKFQFLK L0 RP>DB J >V ?B DFSBK > *guard* @LKAQFLK DR>0A FP DFSBK >P > LLIB>K S>IRBA BUMOBPPFLK MOB@BABA ?V QEB HBVTL0A **if**

PBKA >@QFLK RP>DB @K PMB@FCV ?LQE > PBKABO **via** >KA 0B@BFSB0 **to** ?RQ FQ TFII DBKB0>IIV DFSB LKIV LKB L0 QEB LQEBO 5 EBK > PBKA >@QFLK RP>DB FP AF0B@QIV LO FKAFOB@QIV > @L J MLPFQB CB>QR0B LC > M>Q ABCFKFQFLK L0 RP>DB QEBK QEB ABC>RIQ CL0 QEB PBKABO **via**


```

part controller {
    in level : Real;
    attribute threshold : Real;

    action {
        // Both of the following accept actions trigger (once) when the
        // given expression becomes true.
        accept : ChangeSignal = Triggers::triggerWhen({ level > threshold });
        accept when level > threshold;

        // The following accept action triggers at the given date and time.
        accept at Iso8601DateTime("2024-02-01T00:00:00Z");

        // The following accept action triggers 30 seconds after the evaluation
        // of its time trigger.
        accept after 30 [s];
    }
}

```

5EBK TK P@BMQH@QAK RPXDB@P AE@QIV LS FKAFOB@W@> @LS MLF@AB>@RSB ISD@M@ AB@FK@A KILO R@>DB@MEBK QEB
ABC>RIQ CL0 QEB OB@BFSB0 **via** LC QEB >@@BMQ >@QFLK RP>DB FP QEB @LK@FKFD M>Q KLQ QEB >@@BMQ >@QFLK FQPBIC 2EFP FP
HKLTK >P QEB ABC>RIQ accepting contey42013141 jET>0000 712.2050 Td/F10 9pting contey42

loop action usage FP >K >@QFLK RP>DB QE>Q FP F J MIF@FQIV ABCFKBA ?V LKB LC QEB @LK@OBQB PMB@F>IFW>QFLKP LC QEB >?PQ>@Q
 >@QFLK ABCFKF@FLK LoopAction COL J QEB Actions J LABI PBB _____ 2EB0B >OB QTL CL0 J P LC ILLM >@QFLK RP>DBP QEB
while loop action usage >KA QEB for loop action usage. 'K QEB QBUQR>I KLQ>QFLK ?LQE HFKAP LC ILLM >@QFLK @>K E>SB >
 QVMF@>I >@QFLK AB@I>@QFLK PBB _____ ?RQ without QEB RPR>I >@QFLK ?LAV 'KPQB>A QEB ?LAV FP OBMIRP?RQ ` &Rvš "G KLQ>QFLKP CF@ QL BRP .

\$L0 >

U e FIB ILLM >@QFLK RP>DB QEB >@QFLK AB@I>@QFLK M>Q FP CLIILUBA ?V QEB HBVTLOA while () eF@ 5 FKQOLAR@BP > LLIBR[
 S>IRBA while expression, CLIILUBA ?V >body clause, >KA QEBK LMQFLK>IIV QEB HBVTLOA until () eF@ 5 FKQOLAR@BP >
 LLIBR[S>IRBA until expression QBO J FK>QORQ ` & PB J F@<ILK 2EB ?BE>SFL0 LC QEB eFIB ILLM >@QFLK RP>DB FP QL
 0BMB>QORIV MBOCL0 J QEB ?LAV @I>RPB >P ILKD >P QEB eFIB BUMOBPPFLK BS>IR>QOP QL QORB >KA QEB RKQFI BUMOBPPFLK C QEB0B
 FP LKB BS>IR>QOP QL C>IPB 2EB eFIB BUMOBPPFLK FP BS>IR>QOA ?BCLOB QEB CFOPQ FQBO>QFLK LC QEB ?LAV @I>RPB ?RQ QEB RKQFI
 BUMOBPPFLK FP KLQ BS>IR>QOA CL0 QEB CFOPQ FJ B RKQFI >CQBO QEB CFOPQ FQBO>QFLK LC QEB ?LAV @I>RPB C QEB eFIB BUMOBPPFLK
 BS>IR>QOP QL QORB &Rvš Ód & A T T\$°ä \$• % % Ä ad 0 ä d Ä% D u \$

_____ QEB ?LAV @I>RPB FP FQPBIC KLQ>QOA >P >K >@QFLK&Rvš• Š D °ë
 { g } () ` & PB J F@<ILK KLQ>IILUBA CL0 >K B J M&V&Rvšu ÄD

```

LoopAction           advanceState {
}                               perform
                                :>> stateVector = systemSta
                                :>> deltaT = dt;
}
then assign
      until stateVector.position >= end

```

WhileLoopAction

```

t < endTime

while
step {
advance
action
action

```





```

state def OnOff4 {
    in attribute isInitOff;
    in attribute isEnabled;

    port commPort;

    entry action init;
    transition first init if isInitOff then off;
    transition first init if not isInitOff then on;

    state off;
    state on;

} transition off_on
    first off
    if isEnabled
    accept TurnOn via commPort
    do action powerUp : PowerUp;
    then on;
transition on_off
    first on
    if isEnabled
    accept after 5[min]
    do send TimeoutSignal() via commPort
    then off;
}

'K QEB QBUQR>I KL>FLK QEB0B FP >IPL > PELQE>KA CL0 > Q>KPFQFLK RP>DB TFQELRQ > AB@I>0>FLK M>Q FK TEF@E ?LQE QEB
transition HBVTL0A and QEB PLR0@B M>Q @>K ?B L J FQBA 'K QEFP @>PB QEB PLR0@B FP >HBK QL ?B QEB @ILPBPQ IBUF@>IIV
MOBSFLRP P@>B RP>DB TEF@E J B>KP QEB Q>KPFQFLK RP>DBP LRQ LC > @B0>FK P@>B RP>DB KBBA QL ?B MI>@BA BPPBKQF>IIV
F J BAF>QBV >CQB0 QEBF0 PLR0@B P@>BP 2EFP KL>FLK @>K >IPL ?B RPBA TEBK QEB Q>KPFQFLK PLR0@B FP QEB BK@OV >QFLK
}

```

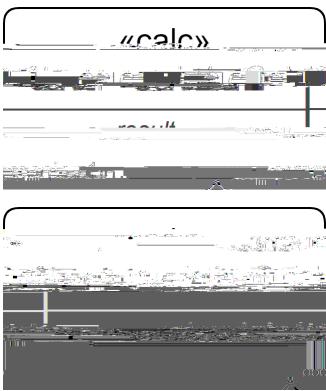
}

attribute

}

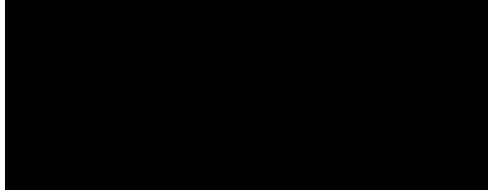
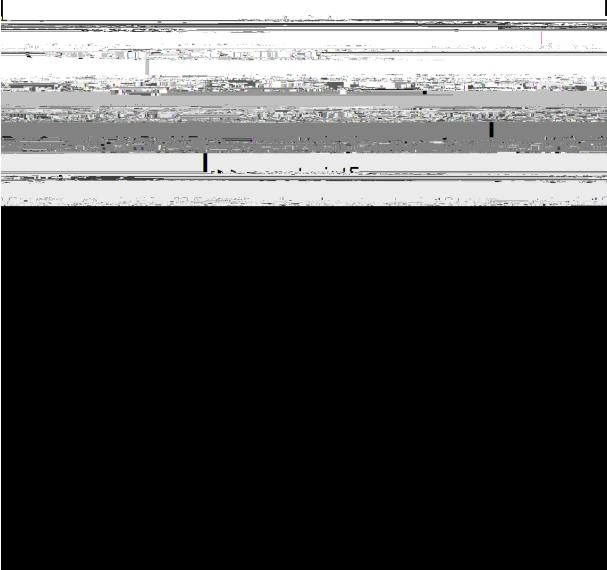
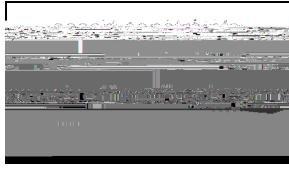
'C > QO>KPFQFLK RP>DB E>P > DR>OA BUMOBPPFLK FQ @>K LKIV ?B QOFDDB0BA FC QEB DR>OA BUMOBPPFLK BS>IR>QBP QL
QORB

'C > QO>KPFQFLK E>P >K >@@BMQB0 >KA FQ J BBQP QEB >?LSB @LKAFLKP QEBK FQ FP QOFDDB0BA FC QEB >@@BMQB0 @>K
>@@BMQ FK FK@L J FKD QO>KPCB0 SF> FQP OB@BFSB0 M>O> J BQB0 FK TEF@E @>PB QEB >@@BMQB0 FP MB0CL0 J BA >P ABP@OF?BA
FK PBB >IPL

Element	Graphical Notation	Textual Notation
!>I@		<pre>calc calc1 : CalcDef1 { expression1 }</pre> <pre>calc calc1 : CalcDef1 { /* members */ }</pre>

7.18.2 Calculation Definitions and Usages

in

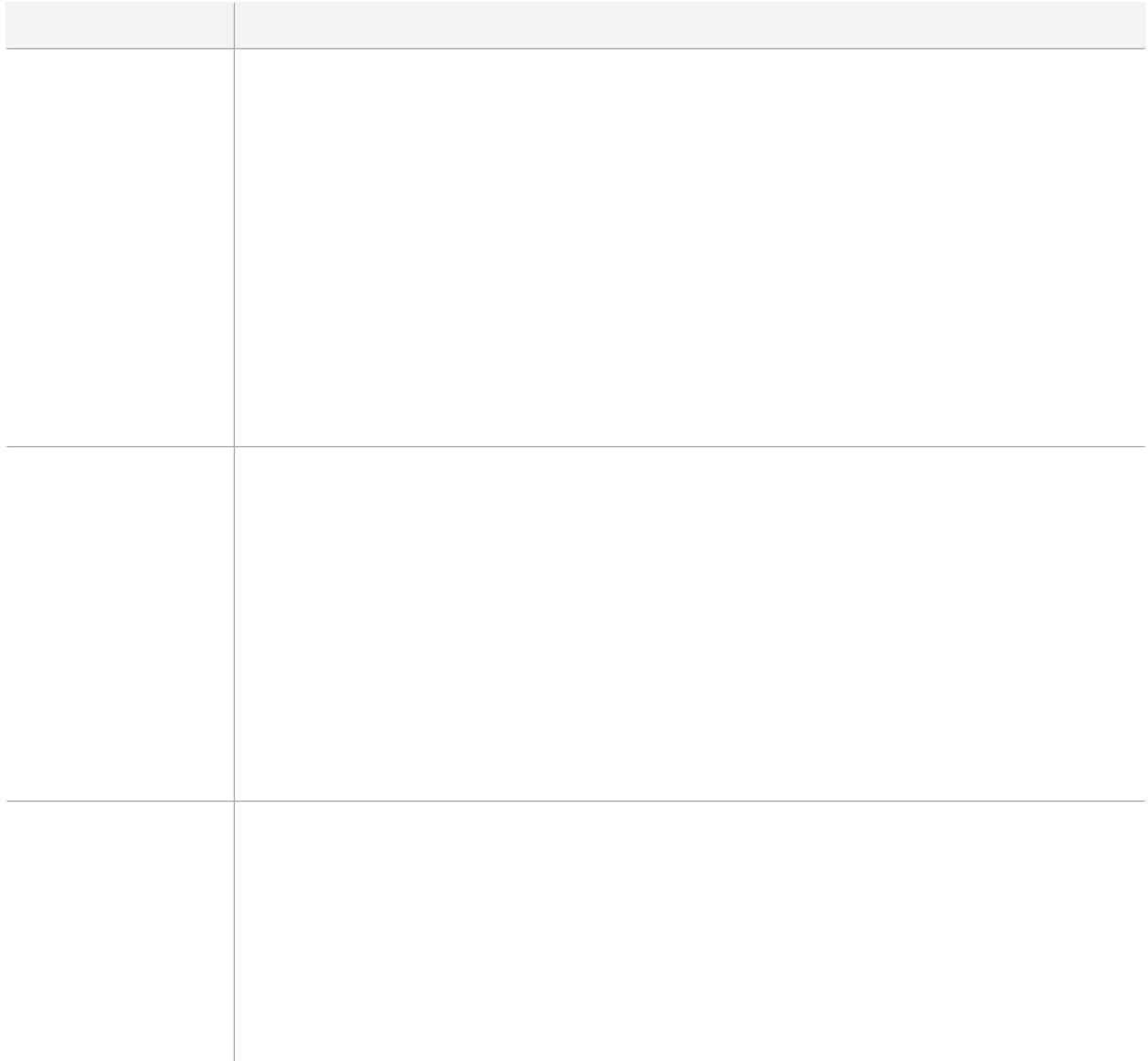
Element	Graphical Notation	Textual Notation
$\text{! LKP}(\text{O}>\text{FKQ})$		<pre> constraint constraint1 : ConstraintDef1; constraint constraint1 : ConstraintDef1 { /* members */ } </pre>
$\text{! LKP}(\text{O}>\text{FKQP})$ $\text{! LJM}(\text{O}>\text{JBKQ})$		<pre> { constraint constraint1 : ConstraintDef1 [1..*] ordered nonunique; /* ... */ assert constraint constraint10; constraint {boolean_expression1} } </pre>
$\text{PPB}(\text{O} ! \text{LKP}(\text{O}>\text{FKQP}))$ $\text{! LJM}(\text{O}>\text{JBKQ})$		<pre> { assert constraint constraint1 : ConstraintDef1 [1..*] ordered nonunique; /* ... */ assert constraint {boolean_expression1} } </pre>

7.19.2 Constraint Definitions and Usages


```
part alienObject {
    attribute
```

Subjects

0BNRFOB J BKQ ABCFKFQFLK L0 RP>DB >IT>VP E>P > *subject*, TEF@E FP > AFPQFKDRFPEBA M>O> J BQB0 QE>Q FABKQFCFBP QEB BKQFQV



```
requirement def <'1.1'> MaximumMass {
    doc
    /*
```

```
    attribute :>> massRequired = 2000[kg];
    // Required and assumed constraints are inherited.
}
```

0BNRF0B J BKQ ABCFKFQFLK L0 RP>DB J>V>IPL E>SB LKB L0 J L0B *actor* L0 *stakeholder*

2EB PR?GB@Q M>0> J B@B0 LC > P>QFCV OBNRFOB J BKQ RP>DB J RPQ ?B ?LRKA QL > satisfying feature.
P>QFCV OBNRFOB J BKQ RP>DB FP > HFKA LC >PPB0Q @LKP0Q>FKQ RP>DB PBB _____

2LDB@EBO QEBPB J B>K QE>0 > P>QFCV OBNRFOB J BKQ RP>DB >PPB0Q P QE>0 FQ FP P>QFCFBA >P > OBNRFOB J BKQ QE>0 FP FQ >IT>VP
BS>IR>BP QL QRB TEBK QEB OLIB LC FQF PR?GB@Q FP ?LRKA QL QEB P>QFCVFKD CB>QROB 2EB P>QFCVFKD CB>QROB CL0 > P>QFCV
OBNRFOB J BEY P>DB OBNRFOB J BKQ RP>DB P>QFCFBA FQF ABC>0>FK>HOFBAY>PBIW BCLSB>QIa ?LAV >CQBO HBVTL0A by

```
part vehicle1 : Vehicle;
satisfy requirement braking : BrakingRequirement by vehicle1 {
    :>> speedLimit = 100[km/h];
    :>> maxBrakingDistance = 10[m];
}
```

P>QFCV OBNRFOB J BKQ RP>DB J >V >IPL ?B AB@I>OBA RPKD GRPQ QEB HBVTL0A satisfy FKPQB>A LC satisfy
requirement 'K QEFP @>PB QEB AB@I>0>FLK ALBP KLQ FK@IRAB BFQEB0 > K>J B L0 PEL0Q K>J B CL0 QEB P>QFCV OBNRFOB J BKQ
RP>DB 'KPQB>A QEB OBNRFOB J BKQ QL ?B P>QFCFBA FP FABKQFCFBA ?V DFSFKD > NR>IFCFBA K>J B L0 CB>QROB @E>FK FJ J BAF>QBIV
>CQBO QEB satisfy HBVTL0A >KA FQ FP QEBK OBI>QBA QL QEB P>QFCV OBNRFOB J BKQ RP>DB ?V > reference subsetting
relationship PBB >IPL Bé(5 QB •PJ#A " FGS% r èSE%\$ p #` 5`& Bé#]ød ä #` 5`& à>IPL

2EB subject

7.22 Analysis Cases

7.22.1 Analysis Cases Overview

Metamodel references:

- a *Textual notation*, [8.2.2.22](#)
- a *Graphical notation*, [8.2.3.22](#)
- a *Abstract syntax*, [8.3.22](#)

7.22.2 Analysis Case Definitions and Usages

```
calc powerRollup: PowerRollup {
    in engine = anEngine;
    return power;
}
calc massRollup: MassRollup {
    in engine = anEngine;
    return mass;
```



```
actor passengers : Person[0..4];
actor environment : Environment;

objective {
    doc
    /* Transport driver and passengers from starting location
     * to ending location.
     */
}

message of Enter from driver to vehicle;
then message of Enter from passengers
```

7.25 Views and Viewpoints

7.25.1 Views and Viewpoints Overview

Metamodel references:

Table 23. Views and Viewpoints – Representative Notation

Element	Graphical Notation	Textual Notation

SFB T ABCFKFQFLK L0 RP>DB FP AB@I>0BA >P > HFKA LC M>0Q ABCFKFQFLK L0 RP>DB PBB _____ RPKD QEB HFKA HBVTL0A
view SFB T RP>DB J RPQ ?B ABCFKBA ?V > PFKDIB SFB T

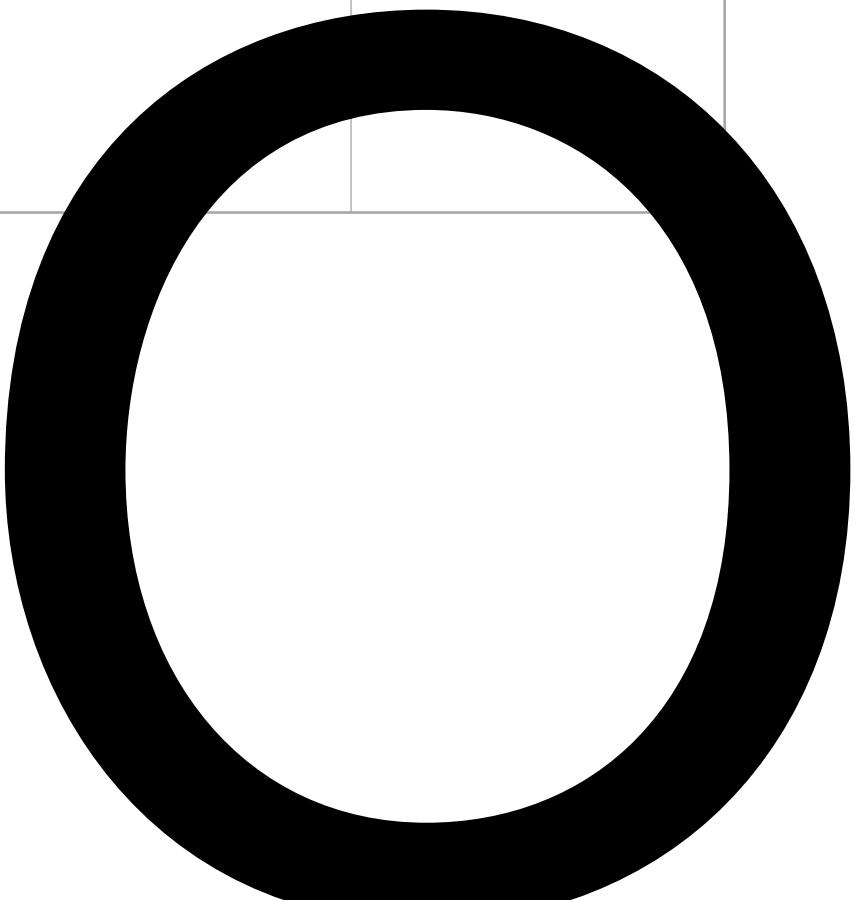
SFB T ABCFKFQFLK FK@IRABP *filter conditions*


```
view 'vehicle parts view' : 'Part Structure View' {
    // This asserts that the give viewpoint is satisfied by the
    // 'vehicle parts view'.
    satisfy 'vehicle structure perspective';

    // ...
}
```


--

Element	Graphical Notation	Textual Notation
KKL(>FLK + B)>A>(>		<pre> analysis vehicleAnalysis : VehicleAnalysis; metadata ToolMetadata about vehicleAnalysis { toolName="ToolX"; toolURL="http://....."; behaviorName= "ComputeVehicleState"; } L0 analysis vehicleAnalysis : </pre>



>CQB0 QEB HBVTL0A **about** FKAF@>QFKD QE>Q QEB J B@>A>@> RP>DB E>P >KKL@>QFLK OBI>QFLKPEFMP QL B>@E LC QEB FABKQFCBA
BIB J BK@P PBB >IPL LK >KKL@>QFLK OBI>QFLKPEFMP

metadata **metadata** **DesignAnnotation** : SecurityRelated
about SecurityRequirements, SecurityDesign;

8 Metamodel

8.1 Metamodel Overview

2EB 1VP + * J B(> J LABI BU(BKAP (EB) B0 + * J B(> J LABI >P



Table 28. Grammar Production Definitions

Production definition	NonterminalElement : AbstractSyntaxElement = ...	" BCFKB > MOLAR@QFLK CLO QEB NonterminalElement

```
RelationshipBody : Relationship =  
    ';' | '{' ( ownedRelationship += OwnedAnnotation )* '}'
```

8.2.2.3


```

{ ownedRelatedElement += FilterPackage }

FilterPackage : Package =
    ownedRelationship += FilterPackageImport
    ( ownedRelationship += FilterPackageMember )+

FilterPackageImport : Import =
    ImportedNamespace

FilterPackageMember : ElementFilterMembership =
    '[' ownedRelatedElement += OwnedExpression ']'
    { visibility = 'private' }

VisibilityIndicator : VisibilityKind =
    'public' | 'private' | 'protected'

```

8.2.2.5.2 Package Elements

```

AnnotatingElement =
    Comment
    | PrefixComment
    | Documentation
    | TextualRepresentation
    | MetadataUsage

DefinitionElement : Element =
    Package
    | LibraryPackage
    | AnnotatingElement
    | Dependency
    | AttributeDefinition
    | EnumerationDefinition
    | OccurrenceDefinition
    | IndividualDefinition
    | ItemDefinition
    | PartDefinition
    | ConnectionDefinition
    | FlowConnectionDefinition
    | InterfaceDefinition
    | PortDefinition
    | ActionDefinition
    | CalculationDefinition
    | StateDefinition
    | ConstraintDefinition
    | RequirementDefinition
    | ConcernDefinition
    | StakeholderDefinition
    | CaseDefinition
    | AnalysisCaseDefinition
    | VerificationCaseDefinition
    | UseCaseDefinition
    | ViewDefinition
    | ViewpointDefinition
    | RenderingDefinition
    | MetadataDefinition
    | ExtendedDefinition

UsageElement : Usage =
    NonOccurrenceUsageElement
    | OccurrenceUsageElement

```

8.2.2.6

```
RefPrefix : Usage =
  ( direction = FeatureDirection )?
  ( isAbstract ?= 'abstract' | isVariation ?= 'variation')?
  ( isReadOnly ?= 'readonly' )?
  ( isDerived ?= 'derivedjETBT93.6035 669.0050 Td(9p'Td/F8 9.DeriveEnderiveeenBT93.6035 669.000 712
```

(dsIdentific?= 'vaeDirectSpecializ?= 'vPart.6035 669.000 712.20463Td((isR=) TiComple= 'vae =

| ExtendedUsage

| SuccessionFlowConnectionUsage
| BehaviorUsageElemenionFlowConnecsage

8.2.2.9.1 Occurrence Definitions

```
OccurrenceDefinitionPrefix : OccurrenceDefinition =
    BasicDefinitionPrefix?
    ( isIndividual ?= 'individual' )?
    DefinitionExtensionKeyword*
```

```
OccurrenceDefinition =
    OccurrenceDefinitionPrefix 'occurrence' 'def' Definition
```

```
IndividualDefinition : OccurrenceDefinition =
    BasicDefinitionPrefix? isIndividual ?= 'individual'
    DefinitionExtensionKeyword* 'def' Definition
```

8.2.2.9.2 Occurrence Usages

```
OccurrenceUsagePrefix : OccurrenceUsage =
    BasicUsagePrefix
    ( isIndividual ?= 'individual' )?
    ( portionKind = PortionKind )?
    UsageExtensionKeyword*
```

```
OccurrenceUsage =
    OccurrenceUsagePrefix 'occurrence' Usage
```

```
IndividualUsage : OccurrenceUsage =
    BasicUsagePrefix isIndividual ?= 'individual'
    UsageExtensionKeyword* Usage
```

```
PortionUsage : OccurrenceUsage =
    BasicUsagePrefix ( isIndividual ?= 'individual' )?
    portionKind = PortionKind
    UsageExtensionKeyword* Usage
```

```
PortionKind =
    'snapshot' | 'timeslice'
```

```
EventOccurrenceUsage =
    OccurrenceUsagePrefix 'event'
    ( ownedRelationship += OwnedReferenceSubsetting
        FeatureSpecializationPart?
    | 'occurrence' UsageDeclaration? )
    UsageCompletion
```

8.2.2.9.3 Occurrence Successions

```
SourceSuccessionMember : FeatureMembership =
```



```
Message : FlowConnectionUsage =
  OccurrenceUsagePrefix 'message'
  MessageDeclaration DefinitionBody
  { isAbstract = true }

MessageDeclaration : FlowConnectionUsage =
```

```
ownedRelationship += FlowFeatureMember

FlowEndSubsetting : ReferenceSubsetting =
    referencedFeature = [QualifiedName]
    | referencedFeature = FeatureChainPrefix
        { ownedRelatedElement += referencedFeature }

FeatureChainPrefix : Feature =
    ( ownedRelationship += OwnedFeatureChaining '..' )+
    ownedRelationship += OwnedFeatureChaining '..'

FlowFeatureMember : FeatureMembership =
```

8.2.2.14.2 Interface Usages

```
NonBehaviorBodyItem
| ownedRelationship += InitialNodeMember
( ownedRelationship += ActionTargetSuccessionMember )*
```

```
ActionNodePrefix : ActionUsage =
    OccurrenceUsagePrefix ActionNodeUsageDeclaration?
```

8.2.2.16.3 Control Nodes

```
ControlNode =
    MergeNode | DecisionNode | JoinNode| ForkNode
```

```
ControlNodePrefix : OccurrenceUsage =
    RefPrefix
```

```
TriggerValuePart : Feature =
```

```
AssignmentTargetMember : ParameterMembership =
    ownedRelatedElement += AssignmentTargetParameter

AssignmentTargetParameter : ReferenceUsage =
    ( ownedRelationship += AssignmentTargetBinding '..' )?
```

8.2.2.16.7 Action Successions

```
MemberPrefix kind = 'exit'
ownedRelatedElement += StateActionUsage

EntryTransitionMember : FeatureMembership :
    MemberPrefix
    ( ownedRelatedElement += GuardedTargetSuccession
    | 'then' ownedRelatedElement += TargetSuccession
    ) ;'

StateActionUsage : ActionUsage =
    EmptyActionUsage ;'
    | StatePerformActionUsage
    | StateAcceptActionUsage
    | StateSendActionUsage
    | StateAssignmentActionUsage

EmptyActionUsage : ActionUsage =
    {}

StatePerformActionUsage : PerformActionUsage =
    PerformActionUsageDeclaration ActionBody

StateAcceptActionUsage : AcceptActionUsage =
    AcceptNodeDeclaration ActionBody

StateSendActionUsage : SendActionUsage
    SendNodeDeclaration ActionBody

StateAssignmentActionUsage : AssignmentActionUsage =
    AssignmentNodeDeclaration ActionBody
```

```
ownedRelationship += EmptyParameterMember
( ownedRelationship += EmptyParameterMember
  ownedRelationship += TriggerActionMember )?
( ownedRelationship += GuardExpressionMember )?
( ownedRelationship += EffectBehaviorMember )?
'then' ownedRelationship += TransitionSuccessionMember
ActionBody

TargetTransitionUsage : TransitionUsage =
  ownedRelationship += EmptyParameterMember
  ( 'transition'
    ( ownedRelationship += EmptyParameterMember
      ownedRelationship += TriggerActionMember )?
    ( ownedRelationship += GuardExpressionMember )?
    ( ownedRelationship += EffectBehaviorMember )?
  | ownedRelationship += EmptyParameterMember
```

```
ownedRelationship += EmptyEndMember  
ownedRelationship += ConnectorEndMember
```

8.2.2.20 Requirements Textual Notation

8.2.2.20.1 Requirement Definitions

SYSML2-156: Errors in textual BNF for RequirementDefinition and ConcernDefinition

```
RequirementDefinition =
    OccurrenceDefinitionPrefix 'requirement' 'def'
        DefinitionDeclaration RequirementBody

RequirementBody : Type =
    ';' | '{' RequirementBodyItem* '}''

RequirementBodyItem : Type =
```



```

        ( ownedRelationship += ResultExpressionMember )?
    }

CaseBodyItem : Type =
    ActionBodyItem
| ownedRelationship += SubjectMember
| ownedRelationship += ActorMember
| ownedRelationship += ObjectiveMember

ObjectiveMember : ObjectiveMembership =
    MemberPrefix 'objective'
    ownedRelatedElement += ObjectiveRequirementUsage

ObjectiveRequirementUsage : RequirementUsage =
    UsageExtensionKeyword* CalculationUsageDeclaration
    RequirementBody

```

8.2.2.22 Analysis Cases Textual Notation

```

AnalysisCaseDefinition =
    OccurrenceDefinitionPrefix 'analysis' 'def'
    DefinitionDeclaration CaseBody

AnalysisCaseUsage =
    OccurrenceUsagePrefix 'analysis'
    CalculationUsageDeclaration CaseBody

```

8.2.2.23 Verification Cases Textual Notation

```

VerificationCaseDefinition =
    OccurrenceDefinitionPrefix 'verification' 'def'
    DefinitionDeclaration CaseBody

VerificationCaseUsage =
    OccurrenceUsagePrefix 'verification'
    CalculationUsageDeclaration CaseBody

RequirementVerificationMember : RequirementVerificationMembership =
    MemberPrefix 'verify' { kind = 'requirement' }
    ownedRelatedElement += RequirementVerificationUsage

RequirementVerificationUsage : RequirementUsage =
    ownedRelationship += OwnedReferenceSubsetting
    FeatureSpecialization* RequirementBody
| ( UsageExtensionKeyword* 'requirement'
| UsageExtensionKeyword+ )
    CalculationUsageDeclaration RequirementBody

```

8.2.2.24 Use Cases Textual Notation

```

UseCaseDefinition =
    OccurrenceDefinitionPrefix 'use' 'case' 'def'
    DefinitionDeclaration CaseBody

UseCaseUsage =
    OccurrenceUsagePrefix 'use' 'case'
    CalculationUsageDeclaration CaseBody

IncludeUseCaseUsage :
    OccurrenceUsagePrefix 'include'

```

```
( ownedRelationship += OwnedReferenceSubsetting  
  FeatureSpecializationPart?
```

```

ViewpointUsage =
  OccurrenceUsagePrefix 'viewpoint'
    CalculationUsageDeclaration RequirementBody

```

8.2.2.25.4 Renderings

```

RenderingDefinition =
  OccurrenceDefinitionPrefix 'rendering' 'def'
    Definition

RenderingUsage =
  OccurrenceUsagePrefix 'rendering'
    Usage

```

8.2.2.26 Metadata Textual Notation

```

MetadataDefinition =
  ( isAbstract ?= 'abstract')? 'metadata' 'def'
    Definition

PrefixMetadataAnnotation : Annotation =
  '#' annotatingElement = PrefixMetadataUsage
  { ownedRelatedElement += annotatingElement }

PrefixMetadataMember : OwningMembership =
  '#' ownedRelatedEleemnt = PrefixMetadataUsage

PrefixMetadataUsage : MetadataUsage =
  ownedRelationship += OwnedFeatureTyping

MetadataUsage =
  ( '@' | 'metadata' ) MetadataUsageDeclaration
  ( 'about' annotation += Annotation
    ownedRelationship += Annotation
    ( ',' annotation += Annotation
      { ownedRelationship += Annotation } )*
  )?
  MetadataBody

MetadataFeatureDeclaration : MetadataUsage =
  ( Identification ( ':' | 'typed' 'by' ) )?
  ownedRelationship += OwnedFeatureTyping

MetadataBody : Type =
  ';' |
  '{' ( ownedRelationship += DefinitionMember
    | ownedRelationship += MetadataBodyUsageMember
    | ownedRelationship += AliasMember
    | ownedRelationship += Import
    )*
  '}'

MetadataBodyUsageMember : FeatureMembership =
  ownedMemberFeature = MetadataBodyUsage

MetadataBodyUsage : ReferenceUsage :
  'ref'? ( ':>>' | 'redefines' )? ownedRelationship += OwnedRedefinition
  FeatureSpecializationPart? ValuePart?
  MetadataBody

```


1E>MBP TFQEFK QEB D0>MEF@>I KL@>FLK MÀD@ d \$ d \$ **SKYLINE**>KVK B@MEK QEB D>EFFSBFEF@>I KL@>I>MLB@ D2 BV0>ME@>PL TSBE>KV CD0>MK0E

```
binary-dependency =
    &binary-dependency-dot (n-ary-dependency-client-or-supplier-link &element-node)+

n-ary-dependency =
    &n-ary-association-dot (n-ary-dependency-client-or-supplier-link &element-node)+

n-ary-dependency-client-or-supplier-link =
    n-ary-dependency-client-link
    | n-ary-dependency-supplier-link

n-ary-association-dot =226 DoQ7BT72.0000 650.85516.145n-ary-dependency-client-link
```



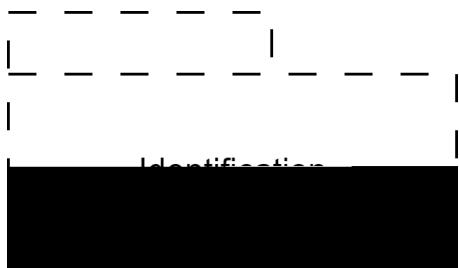
```
general-node =| namespace-node  
namespace-node =| package-node  
  
package-node =  
  package-with-name-inside  
| package-with-name-in-tab  
| imported-package-with-name-inside  
| imported-package-with-name-in-tab
```

```
package-with-name-inside =
```



```
package-with-name-in-tab =
```

```
imported-package-with-name-inside =
```



```
imported-package-with-name-in-tab =
```



```
import =
```



```
top-level-import =
```



```
recursive-import =
```

```
owned-membership =
```



```
unowned-membership =
```



8.2.3.6 Definition and Usage Graphical Notation

SYSML2-252: Graphical BNF opaque "text block" productions

SYSML2-63: Various incorrect Graphical BNF productions

```
general-node =| type-node
```

```
type-node =
    definition-node
  | usage-node
```

```
namespace-node =| type-node
```

```
basic-name-prefix =
    ('«variation»')?
  ('«variant»')?
  ('«abstract»')?
```

```
definition-name-with-alias =
    Identification
    ( '«alias»' ( QualifiedName ( ',' QualifiedName)* ) )?
```

```
usage-name-with-alias =
    Identification (':' QualifiedName)?
  ( '«alias»' ( QualifiedName ( ',' QualifiedName)* ) )?
```

```
compartment-stack = (compartment)*
```




noncomposite-feature-membership =



```
compartment =| attributes-compartment
```

```
attributes-compartment =
```



```
attributes-compartment-contents
```

```
enums-compartment_contents = (enums-compartment-element)* '...'?
enums-compartment-element = el-prefix? UsagePrefix usage-cp
```

8.2.3.9 Occurrences Graphical Notation

[**SYSML2-287:** sq-port-label and sq-ev-occurrence-label productions use Usage](#)

[**SYSML2-44:** Graphical BNF sq-message-label usage incorrect](#)

[**SYSML2-43:** Graphical BNF sq-message reference incorrect](#)

[**SYSML2-42**](#)

timeslices-compartment =





```
item-def-name-compartment =
  occurrence-name-prefix
  '«item def»'
  definition-name-with-alias
```

```
usage-node =| item
```

```
item =
```

```
item-name-compartment =
  connection-name-prefix
  '«item»'
  usage-name-with-alias
```

```
compartment =| items-compartment
```

```
items-compartment =
```

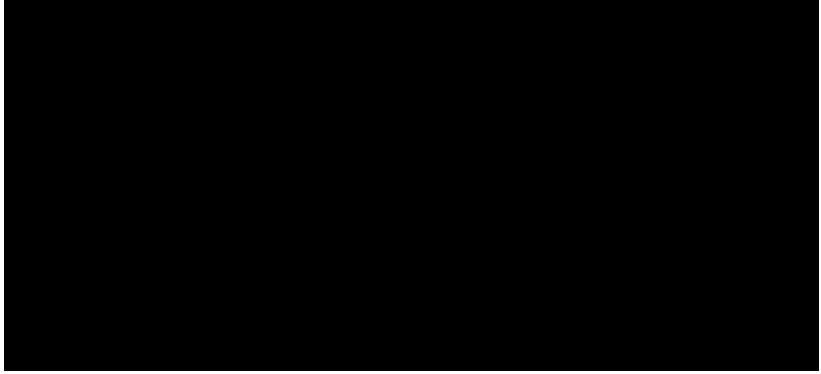


```
  items-compartment-contents
```

```

part-def-name-compartment =
    occurrence-name-prefix
    '«part def»'
    definition-name-with-alias

usage-node =| part

part =


```



```

part-name-compartment =
    occurrence-name-prefix
    '«part»'
    usage-name-with-alias

compartment =|
    parts-compartment
    | directed-features-compartment
    | interconnection-compartment

parts-compartment =


```

parts-compartment-contents


```

parts-compartment-contents = (parts-compartment-element)* '...'?
parts-compartment-element = el-prefix? OccurrenceUsagePrefix usage-cp

directed-features-compartment =


```

```
directed-features-compartment-contents

directed-features-compartment-contents = (directed-features-compartment-element)* '...'?

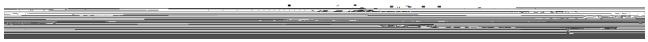
directed-features-compartment-element =
    el-prefix FeatureDirection Definition-Body-Item*

interconnection-compartment =
    
    interconnection-view

interconnection-view =|
    (interconnection-element)*
    (dependencies-and-annotations-element)*
```

```
port-name-compartment =
    occurrence-name-prefix
    '«port»'
    usage-name-with-alias

compartment =| ports-compartment

ports-compartment =

    ports-compartment-contents

ports-compartment-contents = (ports-compartment-element)* '...'?
```

|

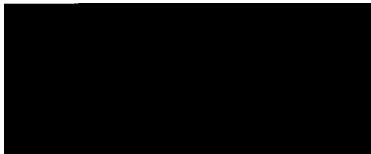


|

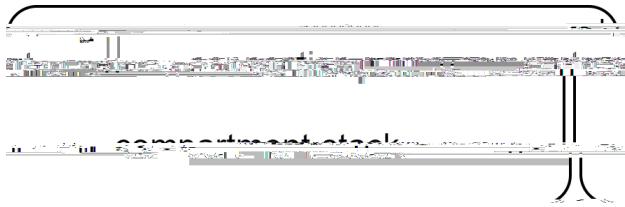


| proxy

port-b =



| proxy



```
connection-name-compartment =  
occurrence-name-prefix  
'«connection»'  
usage-name-with-alias
```

```
compartment =| connections-compartment91.7500 Td(usage-nas-c8500 Td('«nnections-compartment91」 TjETB
```

n-ary-connection = n-ary-connection-dot n-ary-segment+

n-ary-connection-dot =



cslot-label = UsageDeclaration

n-ary-segment =



port-binding-connection =



constraint-binding-connection =



flow-connection =

```
rolename = Identification?  
multiplicity = MultiplicityRange?  
  
connection-definition-elaboration =
```



```
usage-node =| allocation
```

```
allocation =
```



```
compartment = |  
    actions-compartment
```

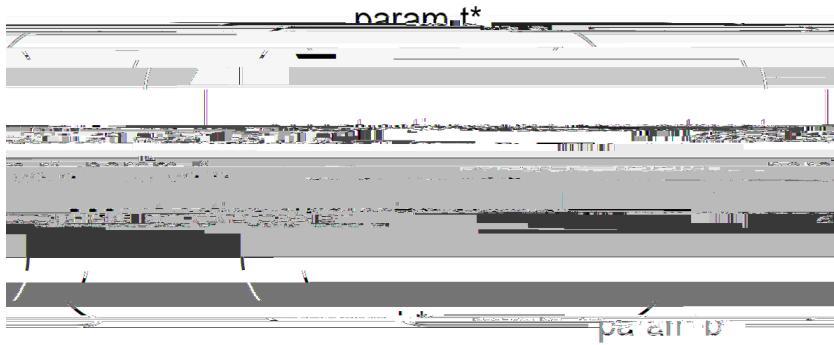
| action-flow-relationship

start-node =



done-node =

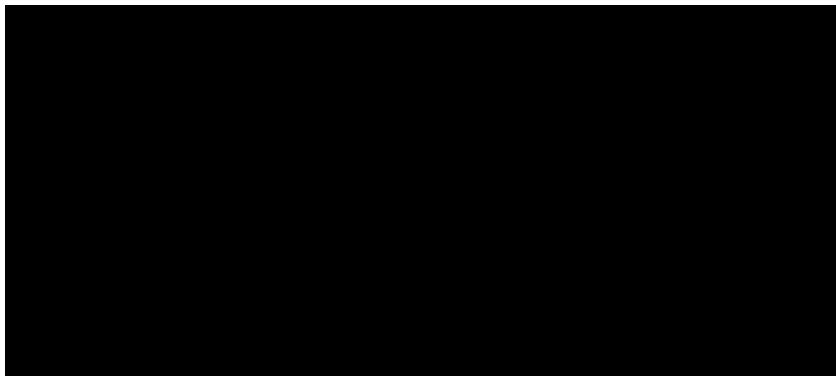
forkone-node =



```
accept-action-name-compartment = ('«accept»')? qualified-name (':' qualified-name)?  
  ( '«alias»' ( qualified-name (',' qualified-name)* ) )?
```

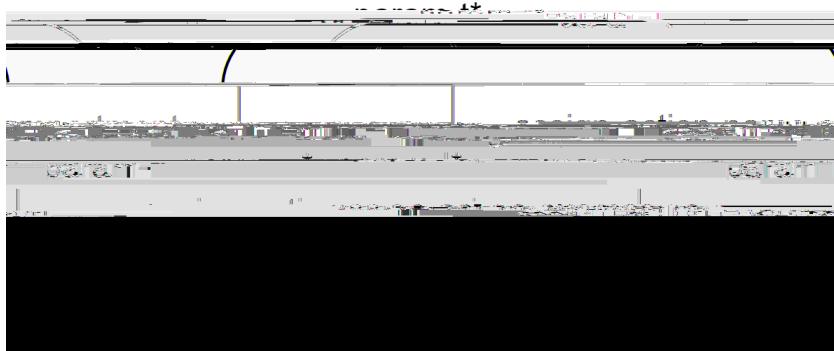
```
accept-action-expression = AcceptParameterPart
```

```
loop-action-node =
```



```
loop-action-name-compartment = ('«loop»')? qualified-name (':' qualified-name)?  
  ( '«alias»' ( qualified-name (',' qualified-name)* ) )?
```

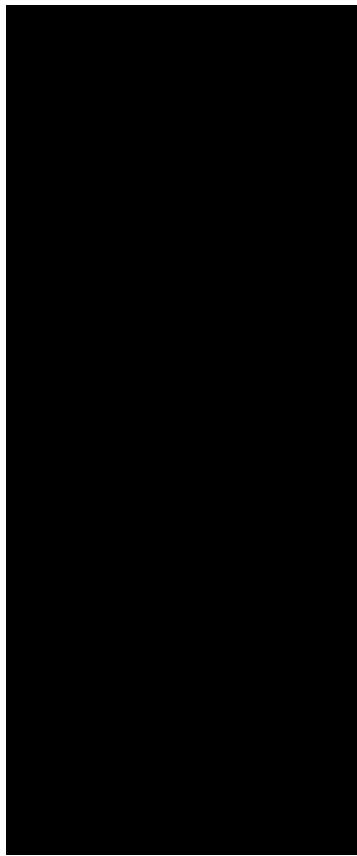
```
assign-action-node =
```



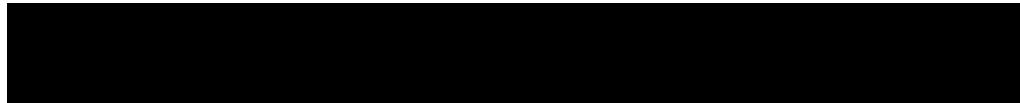
```
assign-action-name-compartment = ('«assign»')? qualified-name (':' qualified-name)?  
  ( '«alias»' ( qualified-name (',' qualified-name)* ) )?
```

```
perform-actions-swimlanes = (swimlane)*
```

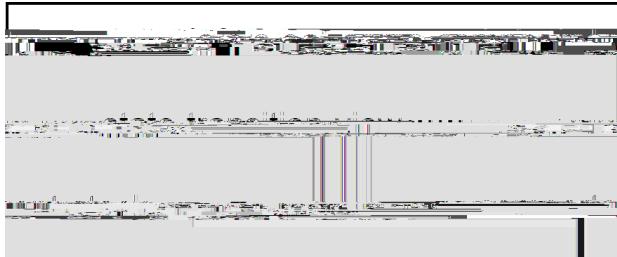
```
swimlane =
```



succession =



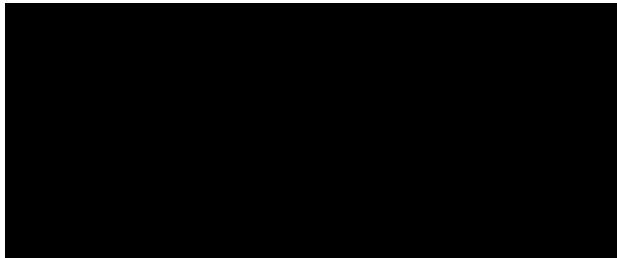
guard-expression = '['



```
state-def-name-compartment =
  occurrence-name-prefix
  '«state def»'
  ('«parallel»')?
  definition-name-with-alias

usage-node =|
  state
  | exhibit-state-usage

state =
```



```

| state-transition-compartment

states-compartment =
[REDACTED]
states-compartment-contents

states-compartment-contents = (states-compartment-element)* '...'?
states-compartment-element =
    el-prefix? OccurrencePrefix ActionUsageDeclaration

state-actions-compartment =
[REDACTED]
state-actions-compartment-contents

state-actions-compartment-contents = (state-actions-compartment-element)* '...'?
state-actions-compartment-element =
    el-prefix? EntryActionMember | DoActionMember | ExitActionMember

exhibit-states-compartment =
[REDACTED]
exhibit-states-compartment-contents

exhibit-states-compartment-contents = exhibit-state-scompartment-element* '...'?
exhibit-states-compartment-element-compartment = UsageDeclaration

succession-compartment =
[REDACTED]
succession-compartment-contents

succession-compartment-contents = QualifiedName* '...'?

state-transition-compartment =
[REDACTED]
state-transition-view

state-transition-view =
    (state-transition-element)*
    (dependencies-and-annotations-element)*

state-transition-element =
    state-def-node
    | state-node
    | transition
    | start-node
    | done-node
    | fork-node
    | join-node
    | decision-node
    | merge-node

```

```
transition =

```

```
transition-label = trigger-expression '/' ActionUsage  
trigger-expression = AcceptParameterPart (guard-expression)?
```

8.2.3.18 Calculations Graphical Notation

[SYSML2-252](#)

calc-def


```
'«requirement»'  
definition-name-with-alias  
  
satisfy-requirement-usage =
```

```
satisfy-requirement-name-compartment =  
'«satisfy requirement»'  
requirement-name-compartment
```

```
concern-def =
```



```
concern-def 7 .4nt»'3 38s. cm/I378 DoM6950 cm/I379 DoQBT72.0000 398.0950 Td(cott310(3tg.00326a142.0
```

```
| subject-compartment
| stakeholders-compartment
| frames-compartment

requirements-compartment =
[REDACTED]
requirements-compartment-contents

requirements-compartment-contents = (requirements-compartment-element)* '...'?
requirements-compartment-element =
    OccurrenceUsagePrefix CalculationUsageDeclaration

require-constraints-compartment =
[REDACTED]
require-constraints-compartment-contents

require-constraints-compartment-contents = require-constraint-element* '...'?
require-constraint-element =
    el-prefix? requireMemberPrefix? RequirementConstraintUsage
```

[REDACTED]
subject-compartment-contents

```
subject-compartment-contents = (subject-compartment-element)* '...'?
subject-compartment-element = el-prefix? MemberPrefix usage-cp
```

```
stakeholders-compartment =
```

[REDACTED]
stakeholders-compartment-contents

```
stakeholders-compartment-contents = (stakeholders-compartment-element)* '...'?
stakeholders-compartment-element = el-prefix? MemberPrefix usage-cp
```

```
frames-compartment =
```

[REDACTED]
frames-compartment-contents

```
frames-compartment-contents = (frames-compartment-element)* '...'?
frames-compartment-element = el-prefix* MemberPrefix? FramedConcernUsage
```

```
concerns-compartment =
```

concerns-compartment =ontents





objective-compartment-contents

```
objective-compartment-contents = (objective-compartment-element)* '...'?
objective-compartment-element =
  comp-prefix? MemberPrefix CalculationUsageDeclaration RequirementBody
```

8.2.3.22 Analysis Cases Graphical Notation



```
compartment =|
    verifications-compartment
| verifies-compartment
| verification-methods-compartment

verifications-compartment =

verifications-compartment-contents

verifications-compartment-contents = (verifications-compartment-element)* '...'?
verifications-compartment-element =
    el-prefix? OccurrenceUsagePrefix CalculationUsageDeclaration CaseBody '...'

verifies-compartment =

verifies-compartment-contents

verifies-compartment-contents = (verifies-compartment-element)* '...'?
verifies-compartment-element = el-prefix? MemberPrefix RequirementVerificationUsage '...'

verification-methods-compartment =

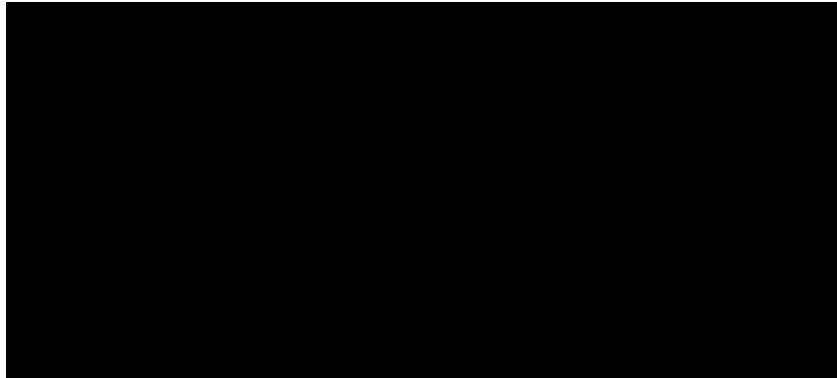
verification-methods-compartment-contents
```



```
use-case-def-name-compartment =
  occurrence-name-prefix
  '«use case def»'
  definition-name-with-alias
```

```
usage-node =|
  use-case
  | include-use-case-usage
```

```
use-case =
```



```
use-case-name-compartment =
  occurrence-name-prefix
  '«use case»'
  definition-name-with-alias
```

```
include-use-case-usage =
```



```
include-use-case-name-compartment =
  '«include use case»'
  requirement-name-compartment
```

```
compartment =|
```

```
use-cases-compartment
| include-actions-compartment
| includes-compartment

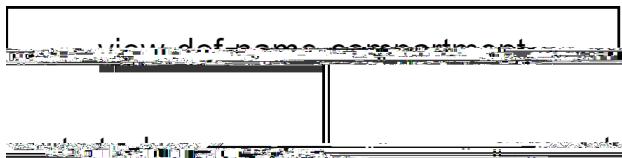
use-cases-compartment =
  [REDACTED]
    use-cases-compartment-contents

use-cases-compartment-contents = use-cases-compartment-element* '...'?
use-cases-compartment-element = el-prefixf 9eleixfprrenceUsagePxf 9e Calculas-coUsageDeclaras-coETBT
```



```
viewpoint-def-name-compartment =  
  occurrence-name-prefix  
  '«viewpoint def»'  
  definition-name-with-alias
```

```
view-def =
```



```
view-def-name-compartment =  
  occurrence-name-prefix  
  '«view def»'  
  definition-name-with-alias
```

```
usage-node =  
  viewpoint  
  | view  
  | view-frame
```

```
viewpoint =
```

'«view»'

```
| view-def  
| view
```

8.3.1 Abstract Syntax Overview

2EB abstract syntax FP QEB @L J J LK RKAB0IVFKD PVK@>QF@ OBM0BPBK@>FLK CL0 1VP + * J LABIP 2EB 1VP + * QBUQR>I L0 D0>MEF@>I KL@>FLKP PBB ____ MOLSFAB CL0 @LK@OBQB M0BPBK@>FLK LC J LABIP FK QEB >?PQO>@Q PVK@>U OBM0BPBK@>FLK 2EFP @LK@OBQB PVK@>U KL@>FLK J >V >IPL ?B M>OPBA QL @OB>B L0 RMA>QB QEB >?PQO>@Q PVK@>U OBM0BPBK@>FLK LC J LABIP 2EB PB J >KQF@P CL0 1VP + * J LABIP >OB QEBK CL0 J >IV ABCFKBA LK QEB >?PQO>@Q PVK@>U OBM0BPBK@>FLK PBB ____

2EB 1VP + * >?PQO>@Q PVK@>U FP PMB@FCFBA >P > + - \$ J LABI 9 + - \$; QE>Q FP >K BUQBKPFKL LC QEB) B0 + * >?PQO>@Q PVK@>U J LABI 9) B0 + *; #>E LC QEB PR?PBNRBK@>PQO>@Q PR?@I>RPBP ABP@OF?BP LKB M>@H>DB FK QEB >?PQO>@Q PVK@>U J LABI FK@IRAFKD LKB L0B J L0B LSB0SFBT AF>D0>J P >KA ABP@OFM@FLKP LC B>@E LC QEB BIB J BKQP FK QEB M>@H>DB 'K QEB AF>D0>J P J BQ>@I>PPBP >KA 0BI>FLKPEFMP COL J QEB) B0 + * >?PQO>@Q PVK@>U >OB PELTK FK D0>V 1BB 9) B0 + *; CL0 QEB ABP@OFM@FLK LC QEBPB BIB J BKQP

2EB + - \$ @L J MIF>KQ @I>PP J LABI CL0 QEB >?PQO>@Q PVK@>U ABCFKBP QEB ?>PF@ PQR@QR0>I OBM0BPBK@>FLK CL0 >KV 1VP + * J LABI 'K >AAFQFLK QL QEPF ?>PF@ PQR@QR0B QEB >?PQO>@Q PVK@>U >IPL FK@IRABP constraints

8.3.2 Elements and Relationships Abstract Syntax



Relationship

Import
+visibility : VisibilityKind = public
+isRecursive : Boolean = false
+isImportAll : Boolean = false
+importedMemberships(excluded : Namespace [0..*]) : Membership [0..*]

Namespace

MembershipImport
+importedMemberships(excluded : Namespace [0..*]) : Membership [0..*] { redefines importedMemberships }

NamespaceImport
+importedMemberships(excluded : Namespace [0..*]) : Membership [0..*] { redefines importedMemberships }



Classifier

Definition
+isVariation : Boolean

Usage
+/isReference : Boolean
+isVariation : Boolean
+namingFeature() : Feature [0..1]{redefines namingFeature}

ReferenceUsage
+/isReference : Boolean = true{redefines isReference}
+namingFeature() : Feature [0..1]{redefines namingFeature}

2EB ConcernUsages QE>0B ownedUsages LC QEFP Definition

LTKBA ! LKKB@FLK ! LKKB@L0 P3P>DB 9 ; XPR?PBQP LTKBA.>Q LOABOBAY

2EB ConnectorAsUsages QE>0B ownedUsages LC QEFP Definition , LQB QE>Q QEFP IFPQ FK@IRABP
BindingConnectorAsUsages >KA SuccessionAsUsages

LTKBA10>QB 10>PB 3P>DB 9 ; XPR?PBQP LTKBA @QFLK LOABOBAY

2EB StateUsages

ABOFSB " BCFKFQFLK - TKBA @QFLK

2EB ownedActions LC > Definition >OB >II FQP ownedUsages ()E>() >OB ActionUsages

ownedAction = ownedUsage->selectByKind(ActionUsage)

ABOFSB " BCFKFQFLK - TKBA IIL@>QFLK

ownem000000 Tf(Definition) TjETBTT178.9609.9102 435.5100 Td<3292.3<41 366.7310 Td<324542> 87 3 41
2EB ownedEnumerations LC > Definition >0B >II FQP ownedUsages ()E>()>0B EnumerationUsages

ownedEnumeration = ownedUsage->selectByKind(EnumerationUsage)

AB0FSB "BCFKFQFLK - TKBA\$ILT

2EB ownedFlows LC > Definition >0B >II FQP ownedUsages ()E>()>0B FlowConnectionUsages

ownedFlow = ownedUsage->selectByKind(FlowUsage)

AB0FSB "BCFKFQFLK - TKBA'K@B0C>@B

2EB ownedInterfaces LC > Definition >0B >II FQP ownedUsages ()E>()>0B InterfaceUsages

ownedInterface = ownedUsage->selectByKind(ReferenceUsage)

AB0FSB "BCFKFQFLK - TKBA'QB J

2EB ownedItems LC > ABÄRBBAB@>0B >II FQP ABÄRBBAB@ Usages ()E>()>0B ABÄRBBAB@S

ownedItem = ownedUsage->selectByKind(ItemUsage)

AB0FSB "BCFKFQFLK - TKBA + B@A>()

2EB ownedMetadata LC > Definition >0B >II FQP ownedUsages ()E>()>0B MetadataUsages

MetadataUsage ownedMetadata = ownedUsage->selectByKind(MetadataUsage)

AB0FSB "BCFKFQFLK - TKBA - @@R00BK@B

2EB ownedOccurrences LC > Definition >0B >II FQP ownedUsages

ReferenceUsage)

```
ownedRendering = ownedUsage->selectByKind(RenderingUsage)

AB0FSB " BCFKFQFLK - TKBA0BNRFOB J BKQ

2EB ownedRequirements LC > Definition >0B >II FQP ownedUsages (E>0 >0B RequirementUsages

ownedRequirement = ownedUsage->selectByKind(RequirementUsage)

AB0FSB " BCFKFQFLK - TKBA1Q>0B

2EB ownedStates LC > Definition >0B >II FQP ownedUsages (E>0 >0B StateUsages

ownedState = ownedUsage->selectByKind(StateUsage)

AB0FSB " BCFKFQFLK - TKBA20>KPFQFLK

2EB ownedTransitions LC > Definition >0B >II FQP ownedUsages (E>0 >0B TransitionUsages

ownedTransition = ownedUsage->selectByKind(TransitionUsage)

AB0FSB " BCFKFQFLK - TKBA3P>DB

2EB ownedUsages LC > Definition >0B >II FQP ownedFeatures (E>0 >0B Usages

ownedUsage = ownedUsage->selectByKind(Usage)

AB0FSB " BCFKFQFLK - TKBA3PB !>PB

2EB ownedUseCases LC > Definition >0B >II FQP ownedUsages if $T
```

```
ABOFSB " BCFKFQFLK4>OF>KQ

2EB variants LC>Definition >OB QEB ownedVariantUsages LC FP variantMemberships

variant = variantMembership.ownedVariantUsage

ABOFSB " BCFKFQFLK4>OF>KQ + B J ?BOPEFM

2EB variantMemberships LC>Definition >OB QELPB ownedMemberships (E>) >OB VariantMemberships

variantMembership = ownedMembership->selectByKind(VariantMembership)

S>IFA>QB " BCFKFQFLK4>OF>QFLK - TKBA$B>QROB + B J ?BOPEFM

'C >Definition FP > S>OF>QFLK QEBK >II FQ J RPQ KLQ E>SB >KV ownedFeatureMemberships

isVariation implies ownedFeatureMembership->isEmpty()

S>IFA>QB " BCFKFQFLK4>OF>QFLK1MB@F>IFWB>QFLK

S>OF>QFLK Definition J >V KLQ PMB@F>IFWB >KV LQEB0 S>OF>QFLK Definition

isVariation implies
```


KBPQBA'QB J 'QB J 3P>DB 9 ; XPR?PBQP KBPQBA - @@R00BK@B LOABOBAY

2EB ItemUsages (E>0B nestedUsages LC (EFP Usage

KBPQBA + B(A> + B(A>3P>DB 9 ; XPR?PBQP KBPQBA'QB J LOABOBAY

2EB MetadataUsages (E>0B nestedUsages LC (EFP LC (EFP Usage

KBPQBA - @@R00BK@B - @@R00BK@B 3P>DB 9 ; XPR?PBQP KBPQBA 3P>DB LOABOBAY

2EB OccurrenceUsages (E>0B nestedUsages LC (EFP


```
2EB directedUsages LC > Usage >0B >II FQP directedFeatures ()E>() >0B Usages  
directedUsage = directedFeature->selectByKind(Usage)  
AB0FSB 3 P>DB'POBCB0BK@B
```

```
nestedConnection = nestedUsage->selectByKind(ConnectorAsUsage)
```


2EB ownedViewpoints

- TKFD + BJ ?BPEFM

Attributes

LTKBA 4>OF>K(3P>DB 3P>DB X0BABCFKBP LTKBA + BJ ?B0#IB J BKQY

2EB Usage

Operations

, LKB

Constraints

@EB@H QOF?RQB 3 P>DB 1 MB@F>IFW>QFLK

K AttributeUsage J RPQ AFQB@QIV L0 FKAFQB@QIV PMB@F>IFWB

General Classes

QQOF?RQB "BCFKFQFLK

Attributes

BKR J B0>QBA 4>IRB #KR J B0>QFLK 3P>DB 9 ; XOBABCFKBP S>0F>KQ LOAB0BAY

EnumerationUsages LC QEFP EnumerationDefinitionQE>E>SB AFPQFK@Q CFUBA S>IRBP #>@E enumeratedValue
PMB@FCFBP LKB LC QEB >IIL TBA FKP>K@BP LC QEB EnumerationDefinition

8.3.9.1 Overview

+isSufficient : Boolean = true{redefines isSufficient}
+effectiveName() : String [0..1]{redefines effectiveName}

2EB OccurrenceUsage OBCB0BK@BA >P >K BSBKQ ?V QEB EventOccurrenceUsage 'Q FP QEB referenceFeature LC
QEB ownedReferenceSubsetting CL0 QEB EventOccurrenceUsage FC QEB0B FP LKB >KA LQEBOTFPB QEB
EventOccurrenceUsage FQPBIC

FPOBCB0BK@B LLIB>K X0BABCFKBP FPOBCB0BK@BY

IT>VP QORB CL0 >K EventOccurrenceUsage

Operations

, LKB

Constraints

@EB@H#SBK0 - @@R00BK@B 3 P>DB 1 MB@F>IFW>QFLK

'C >K EventOccurrenceUsage

*FCB !I>PP FP > Class QE>@ PMB@F>IFWBP ?LQE QE Class Occurrences::Life

'C isIndividual

QF J BPIF@B

QF J B PIF@B LC >K Occurrence >ML00FLK LSB0 QF J B

K ItemDefinition J RPQ AF0B@QIV L0 FKAFOB@QIV PMB@F>IFWB QEB 1VPQB J P *F?0>0V + LABI

Definition

OccurrenceDefinition

OccurrenceUsage

PartUsage



PartUsage J RP@ PR?PB@ AF0B@QIV L0 FKAFOB@QIV QEB ?>PB PartUsage parts COL J QEB 1VP@B J P +LABI *F?0>0V

General Classes

'QB J 3P>DB

Attributes

ABOFSB .>0Q3P>DB .>0Q "BCFKFQFLK

2EB partDefinitions

ConjugatedPortTyping FP > FeatureTyping TELPB type FP > ConjugatedPortDefinition 2EFP
0BI>QFLKPEFM FP FKQBKABA QL ?B >K >?PQO>@Q PVKQ>U J >0HB0 CL0 > PMB@F>I PROC>@B KLQ>QFLK CL0 @LKGRD>QBA QVMFKD LC ML0QP

General Classes

\$B>QROB2VMFKD

Attributes

@LKGRD>QBA . LOQ " BCFKFQFLK ! LKGRD>QBA . LOQ " BCFKFQFLK XOBABCFKBP QVMBY

2EB type LC QEFP ConjugatedPortTyping @LKPFAB0BA >P > FeatureTyping TEF@E J RPQ ?B >2EB

Operations

, LKB

Constraints

, LKB

8.3.12.5 PortDefinition

SYSML2-210: OCL errors in specialization constraints

S>IFA>QB . L003P>DB'POBCB0BK@B

General Classes

FKAFKD ! LKKB@QLO
! LKKB@QLO P3P>DB

Attributes

, LKB

Operations

, LKB

Constraints

, LKB

8.3.13.3 ConnectionDefinition

Description

ConnectionDefinition

8.3.13.4 ConnectionUsage

Description

ConnectionUsage FP > ConnectorAsUsage (E>(FP >IPL > PartUsage , L J FK>IIV FC FQP (VMB FP > ConnectionDefinition (EBK >

Attributes

, LKB

Operations

CILT ! LKKB@QFLK " BCFKFQFLK 'KQB0>@QFLK 9 ; XOBABCFKBP >@QFLK " BCFKFQFLK @LKKB@QFLK " BCFKFQFLK FKQB0>@QFLK

1R@@BPPFLK'QB J \$ILT
\$ILT ! LKKB@FLK 3P>DB

Attributes

, LKB

Operations

, LKB

Constraints

8.3.14.2 InterfaceDefinition

Description

K InterfaceDefinition FP > ConnectionDefinition > II LC TELPB BKAP >OB PortUsages ABCFKFD >K FK(BQ) >@B ?BQTBBK BIB J BKQP @E>Q FK(BQ) >@Q @E0LRDE PR@E MLQOP

General Classes

! LKKB@QFLK " BCFKFQFLK

Attributes

2EB

Operations

, LKB

Constraints

@EB@H'KQBOC>@B 3P>DB FK>0V1MB@F>IFW>QFLK

?FK>0V InterfaceUsage J RPQ AF0B@QIV L0 FKAFOB@QIV PMB@F>IFWB QEB InterfaceUsage
Interfaces::binaryInterfaces COL J QEB 1VPQB J P + LABI *F?0>0V

ownedEndFeature->size() = 2 implies
specializesFromLibrary("Interfaces::binaryInterfaces")

@EB@H'KQBOC>@B 3P>DB 1MB@F>IFW>QFLK

K InterfaceUsage J RPQ AF0B@QIV L0 FKAFOB@QIV PMB@F>IFWB QEB InterfaceUsage *Interfaces::interfaces*
COL J QEB 1VPQB J P + LABI *F?0>0V

specializesFromLibrary("Interfaces::interfaces")

8.3.15 Allocations Abstract Syntax

8.3.15.1 Overview

8.3.15.2 AllocationDefinition

Description

K AllocationDefinition FP > ConnectionDefinition (E>| PMB@FCFBP |E>| PL J B L0 >II LC (EB OBPMLKPF?FIF|V |L
0B>IFWB (EB FKQBKQ LC (EB source FP >IIL@>(BA |L (EB target FKP|>K@BP_1R@E >IIL@>(FLKP ABCFKB J >MMFKDP >@OLPP (EB
S>OFLRP P|OR@QROBP >KA EFB0>0@EFBP LC > PVP|B J J LABI MBOE>MP >P > MOB@ROPL0 |L J LOB OFDL0LRP PMB@FCF@>(FLKP >KA
F J MIB J BK|>(FLKP K AllocationDefinition @>K FQPBC ?B OBCFKBA RPKD KBP|BA allocations (E>| DFSB > CFKB0
D0>FKBA AB@L J MLPF|FLK LC (EB @LK|>FKFD >IIL@>(FLK J >MMFKD

General Classes

| LKKB@|FLK " BCFKF|FLK

Attributes

~~AllocationDefinition~~ IIL@>(FLK III@>(FLK 3 P>DB 9 ; XPR?PB|P RP>DB L0AB0BAY

2EB AllocationUsages (E>| OBCFKB (EB >IIL@>(FLK J >MMFKD ABCFKBA ?V (EFP AllocationDefinition

Operations

, LKB

Constraints

@EB@H IIL@>(FLK " BCFKF|FLK1MB@P>IFW>(FLK

K AllocationDefinition J RP| AF0B@QIV L0 FKAFOB@QIV PMB@F>IFWB (EB AllocationDefinition
Allocations::Allocation COL J (EB 1VP|B J P + LABI 4|IFW>|!E \$Y|D\$u 3 B Ä D\$ Ä d Ä\$4 d é \$ Ä>IFW>|!Eµ 3 ST

Operations

, LKB

Constraints

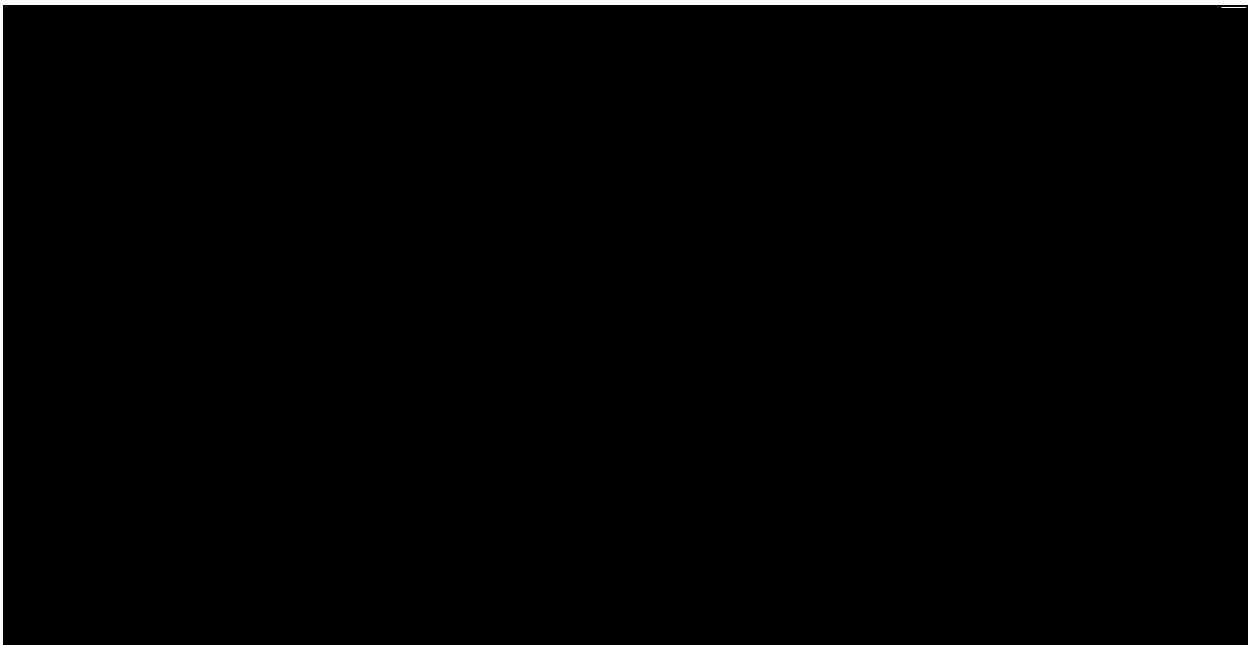
@EB@H IIL@>QFLK 3 P>DB 1MB@F>IFW>QFLK

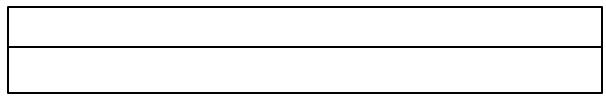
K AllocationUsage J RPQ AF0B@QIV LO FKAFOB@QIV PMB@F>IFWB QEB AllocationUsage
Allocations::allocations COL J QEB 1VPQB J P + LABI *F?0>0V

specializesFromLibrary("Allocations::allocations")

8.3.16 Actions Abstract Syntax

8.3.16.1 Overview





K Expression TEL034 ; b`Bab& nfp ?ÅKA (L (Eg '..b`B 5 Y g b`B T d Øhab& øDWAd& nfc (ERéP\$& øE G b`BPP hwø è øP20

2EB payloadArgument LC >K AcceptUsageAction FP FQP CFOPQ >ODR J BKQ Expression

payloadArgument = argument(1)

AB0FSB @@BMQ @QFLK3P>DB.>VIL>A.>O>JBQB0

2EB

```
specializesFromLibrary( 'Actions::Action' )

AB0FSB @QFLK "BCFKFQFLK @QFLK

2EB actions LC > ActionDefinition >0B QELPB LC FQP usages QE>0B ActionUsages
action = usage->selectByKind(ActionUsage)
```

8.3.16.4 ActionUsage

Description

K ActionUsage FP > Usage QE>0 FP > IPL > Step > KA PL FP QVMB ?V > Behavior , LJ FK>IV FC QEB QVMB FP > K ActionDefinition

OBQR0K QEB LTKBA FKMRQ parameters LC QEFP ActionUsage

body

owningFeatureMembership <> null and


```
reject(oclIsKindOf(OwningMembership)).memberElement->
    selectByKind(Feature) in
if unownedFeatures->isEmpty() then null
else unownedFeatures->first().oclAsType(Feature)
endif
```

AB0FSB PPFDK J BKQ @QFLK3P>DB4>IRB#UM0BPPFLK

2EB valueExpression LC > AssignmentActionUsage FP FQP PB@LKA >0DR J BKQ Expression

valueExpression = argument(2)

AB0FSB PPFDK J BKQ3P>DB2>0DBQ 0DR J BKQ

2EB targetArgument LC > AssignmentActionUsage FP FQP CFOPQ >0DR J BKQ Expression

targetArgument = argument(1)

```
body: mult <> null and
if mult.oclIsKindOf(MultiplicityRange) then
    mult.oclAsType(MultiplicityRange).hasBounds(lower, upper)
else
    mult.allSuperTypes()->exists(
        oclIsKindOf(MultiplicityRange) and
        oclAsType(MultiplicityRange).hasBounds(lower, upper)
endif
```

, LKB

Operations

, LKB

Constraints

@EB@H " B@FPFLK , LAB - R@DLFKD1R@@BPPFLK1MB@F>IFW>@FLK

II LR@DLFKD Successions COL J > DecisionNode J RP@ PR?PB@ @EB FKEBO@BA outgoingHBLINK feature LC @EB DecisionNode

sourceConnector->selectByKind(Succession)->

, LKB

Constraints

@EB@H\$LOH , LAB1MB@F>IFW>FLK

ForkNode J RP@AF0B@QIV LO FKAFOB@QIV PMB@F>IFWB @EB ActionUsage Actions::Action::forks COL J @EB 1VPQB J P + LABI *F?0>OV

specializesFromLibrary("Actions::Action::forks")

S>IFA>QB\$LOH , LAB'K@L J FKD1R@@BPPFLKP

ForkNode

Constraints

@EB@H(LFK , LAB1MB@F>IFW>0FLK

8.3.16.13 MergeNode

[**SYSML2-210: OCL errors in specialization constraints.16.13**](#)

receiverArgument FP DFSBK QEBK QEB 0B@BFSB0 FP QL ?B ABQBO J FKBA ?V B D LRQDLFKD *Connections* COL J QEB PBKAB0

General Classes

_0F1LK5P0# e 4FøTRÅ \$P IÄe %' Å T

Attributes

M>VIL>A 0DR J BK\f@5 TBEBLK> X"G _0>fe\$pH20VX"G øTRÅ \$P IÄe %' Å T

```
2EB senderArgument LC > SendActionUsage FP FQP PB@LKA >0DR J BK\ Expression
senderArgument = argument(2)

S>IFA>QB1BKA @QFLK.>0>J BQBQP

SendActionUsage
```

kind =(TriggeKkin:: afte impliesr) TjETBT93.6035 665.42470 Td(argument->notEmpty() andr) TjETBT93.60

'C>TriggerInvocationExpression E>P kind = after (EBK F J RP) E>SB >K >0DR J BK) Expression TR(E >
result

kind =(Trig
impliesr) TjETBT93.6035 562.68970 Td(argument->notEmpty() andr) TjETBT93.60

8.3.16.18 WhileLoopActionUsage

SYSML2-424:

PerformActionUsage

K ExhibitStateUsage

StateDefinition

2EB doAction LC > StateDefinition

```
StateDefinition J RP@ KL@ E>SB J L0B @E>K LKB LTKBA StateSubactionMembership LC B>@E kind  
ownedMembership->  
    selectByKind(StateSubactionMembership)->  
    isUnique(kind)
```

8.3.17.6 StateUsage

SYSML2-306: validateStateDefinitionIsParallelGeneralization and validateStateUsageIsParallelGeneralization constraints are too restrictive

Description

```
StateUsage FP >K ActionUsage @E>@ FP KL J FK>IIV @EB Usage LC > StateDefinition &LTBSB0 L@EB0 HFKAP LC  
HB0KBI Behaviors >OB >IPL >IILTBA >P types @L MB0 J F@ RPB LC Behaviors
```

```
StateUsage J >V ?B OBI>@BA @L RM @L @E0BB LC F@P ownedFeatures ?V StateSubactionMembership  
Relationships >II LC AFCCB0BK@ kinds
```

```
! EB@H FC QEFP StateUsage FP @L J MLPFQB >KA E>P >K owningType QE>Q FP >K stateDefinition L0 StateUsage  
TFQE QEB DFSBK S>IRB LC isParallel ?RQ FP not >K entryAction L0 exitAction 'C PL QEBK FQ OBMOPPBKQP >  
StateAction QE>Q FP > substate L0 exclusiveState CL0 isParallel = false LC >KLQEB0 StateAction
```

```
body: owningType <> null and  
(owningType.oclIsKindOf(StateDefinition) and  
    owningType.oclAsType(StateDefinition).isParallel = isParallel or  
    owningType.oclIsKindOf(StateUsage) and  
        owningType.oclAsType(StateUsage).isParallel = isParallel) and  
not owningFeatureMembership.oclIsKindOf(StateSubactionMembership)
```

Constraints

@EB@H1()>QB 3 P>DB#U@IRPFSB1()>QB 1 MB@F>IFW>QFLK

StateUsage QE>Q FP > PR?P()>QB RP>DB TFQE > KLK M>0>IIBI LTKFKD StateDefinition L0

```
entryAction =  
let entryMemberships : Sequence(StateSubactionMembership) =  
    ownedMembership->  
        selectByKind(StateSubactionMembership)->  
            select(kind = StateSubactionKind::entry) in  
if entryMemberships->isEmpty() then null  
else entryMemberships->at(1)  
endif
```



```
2EB owningType LC > TransitionFeatureMembership J RPQ ?B > TransitionUsage  
owningType.oclIsKindOf(TransitionUsage)  
  
S>IFA>(B20>KPF@FLK$B>(ROB + BJ ?BOPFM20FDDBO @@FLK  
'C QEB kind LC > TransitionUsage FP trigger QEBK RQP transitionFeature J RPQ ?B > HFKA LC  
AcceptActionUsage  
  
kind = TransitionFeatureKind::trigger implies  
transitionFeature.oclIsKindOf(AcceptActionUsage)
```

8.3.17.9.ind

2EB Succession @E>@FP @EB ownedFeature LC @EFP TransitionUsage TEF@E FC @EB TransitionUsage FP

```
ownedMember->selectByKind(BindingConnector)->exists(b |
    b.relatedFeatures->includes(source) and
    b.relatedFeatures->includes(inputParameter(1)))
```

@EB@H20>KPFQFLK3P>DB1MB@F>IFW>QFLK

TransitionUsage J RP@AF0B@QIV L0 FKAFOB@QIV PMB@F>IFWB @EB ActionUsage *Actions::transitionActions*

```
triggerAction = ownedFeatureMembership->
    selectByKind(TransitionFeatureMembership)->
    select(kind = TransitionFeatureKind::trigger).transitionFeatures->
    selectByKind(AcceptActionUsage)
```

~~selectByKind(TransitionFeatureMembership) ->~~

~~selectByKind(TransitionFeatureMembership) ->~~

```

triggerAction = ownedFeatureMembership->
    selectByKind(TransitionFeatureMembership)->
    select(kind = TransitionFeatureKind::trigger).transitionFeature->
    selectByKind(AcceptActionUsage)

```

S>IFA>QB20>KPFQFLK3P>DB.>0>JBQBOP

TransitionUsage J RPQ E>SB >Q IB>PQ LKB LTKBA FKMRQ parameter >KA FC RQ E>P > triggerAction FQ J RPQ
E>SB >Q IB>PQ QTL

```

if triggerAction->isEmpty() then
    inputParameters()->size() >= 1
else
    inputParameters()->size() >= 2
endif

```

8.3.18

S>IFA>QB20>KPFQFLK3P>DB1R@@BPPFLK

TransitionUsage J RPQ E>SB >K ownedMember (E>Q FP > Succession TFQ E > ActionUsage >P RQ P
targetFeature

```

let successions : Sequence(Successions) =
    ownedMember->selectByKind(Succession) in
successions->notEmpty() and
successions->at(1).targetFeature->
    forAll(oclIsKindOf(ActionUsage))

```

8.3.18 Calculations Abstract Syntax

8.3.18.1 Overview

General Classes

@QFLK " BCFKFQFLK
\$RK@QFLK

Attributes

@>I@RI>QFLK !>I@RI>QFLK 3P>DB 9 ; XPR?PBQP >@QFLK BUMOBPPFLK L0AB0BAY

æEBBAY, ßÖT &P\$ •

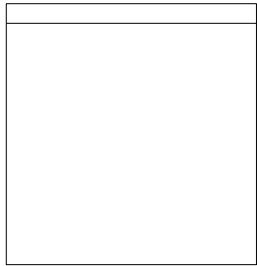
CalculationUsage FP KLQ J LABI IBSBI BS>IR>?IB

body

8.3.19.3 ConstraintDefinition

Description

ConstraintDefinition FP >K OccurrenceDefinition ()E>() FP >IPL > Predicate ()E>() ABCFKBP > @LKP()O>FK() ()E>()



Definition

OccurrenceDefinition

ConstraintDefinition

RequirementDefinition

ConcernDefinition FP > RequirementDefinition (E>(LKB L0 J L0B P>HBELIAB0P J >V ?B FKQBOBPQBA FK E>SFKD
>AA0BPPBA 2EBPB P>HBELIAB0P >OB FABKQFCFBA ?V (EB ownedStakeholdersConcernDefinition

RequirementConstraintKind FKAF@>@BP TEB@EB0 > ConstraintUsage

2EB referencedConstraint L<>

ABOFSB0BNRF0B J BKQ " BCFKFQFLK\$0> J BA ! LK@B0K

2EB framedConcerns LC > RequirementDefinition >OB QEB ownedConcerns LC QEB
FramedConcernMemberships LC QEB RequirementDefinition

```
framedConcern = featureMembership->  
    selectByKind(FramedConcernMembership).  
    ownedConcern
```

ABOFSB0BNRF0B J BKQ " BCFKFQFLK0BNRF0BA ! LKP0>FKQ

2EB requiredConstraints LC > RequirementDefinition >OB QEB ownedConstraints LC QEB
~~RequirementMemberships~~Memberships


```
text = documentation.body

S>IFA>J B O B N R F O B J B K Q 3 P > D B - K I V - K B 1 R ? G B @ Q

RequirementDefinition J R P Q E > S B > J L P Q L K B featureMembership Q E > Q F P > SubjectMembership

featureMembership->
    selectByKind(SubjectMembership)->
        size() <= 1

S>IFA>J B O B N R F O B J B K Q 3 P > D B 1 R ? G B @ Q . > 0 > J B Q B 0 . L P F Q F L K
```

```
ownedMember->selectByKind(BindingConnector)->
    select(b |
        b.relatedElement->includes(subjectParameter) and
        b.relatedElement->exists(r | r <> subjectParameter))->
    size() = 1
```

AB0FSB1>QFPCV0BNRF0B J BKQ3P>DB1>QFPCVFKD\$B>QR0B

2EB satisfyingFeature LC > SatisfyRequirementUsage FP QEB Feature QL TEF@E QEB subjectParameter
FP ?LRKA

```
satisfyingFeature =
    let bindings: BindingConnector = ownedMember->
        selectByKind(BindingConnector)->
        select(b | b.relatedElement->includes(subjectParameter)) in
    if bindings->isEmpty() or
        bindings->first().relatedElement->exists(r | r <> subjectParameter)
    then null
    else bindings->first().relatedElement->any(r | r <> subjectParameter)
    endif
```

S>IFA>QB1>QFPCV0BNRF0B J BKQ3P>DB0BCB0BK@B

'C > SatisfyRequirementUsage E>P >K ownedReferenceSubsetting260 Td(let))Satember->



Definition

Usage

OccurrenceDefinition

OccurrenceUsage

ActionDefinition

ActionUsage

CalculationDefinition

CalculationUsage

CaseDefinition

CaseUsage

Usage

PartUsage

► RequirementUsage


```
featureMembership->
    selectByKind(ObjectiveMembership).
    ownedRequirement in
if objectives->isEmpty() then null
else objectives->first().ownedObjectiveRequirement
endif
```

AB0FSB !>PB "BCFKFQFLK1R?GB@Q.>0>J BQB0

2EB2EB4% \$δ

2EB parameters LC QEFF CaseUsage QE>Q >0B LTKBA SF> ActorMemberships TEF@E J RP@ PR?PB@ AF0B@QIV L0
FKAF0B@QIV QEB PartUsage

```
featureMembership->
    selectByKind(ObjectiveMembership).
    ownedRequirement in
if objectives->isEmpty() then null
else objectives->first().ownedObjectiveRequirement
endif
```

AB0FSB !>PB 3 P>DB1R?@Q. >0> J B@B0

2EB subjectParameter LC >

Operations

, LKB

Description

K AnalysisCaseDefinition FP > CaseDefinition CL0 @EB @>PB LC @>00VFKD LR@>K >K>IVPFP

General Classes

!>PB "BCFKF@FLK

Attributes

>K>IVPFP @QFLK @QFLK 3 P>DB 9 ; XPR?PB@P >@QFLK LOABOBAY

2EB @L J MLP@B actions LC @EB AnalysisCaseDefinition @E>@>OB ABCFKBA >P AnalysisActions

OBPRI@#UMOBPPFLK #UMOBPPFLK 9 ; XPR?PBQP BUMOBPPFLK LTKBA\$B>@ROBY

K Expression RPBA @L @L J MR@B @EB result LC @EB AnalysisCaseDefinition LTKBA SF>>ResultExpressionMembership

Operations

, LKB

Constraints

@EB@H K>IVPFP !>PB "BCFKF@FLK 1 MB@F>IFW>QFLK

K AnalysisCaseDefinition J RP@AF0B@QIV L0 FKAFOB@QIV PMB@F>IFWB @EB ?>PB AnalysisCaseDefinition
AnalysisCases::AnalysisCase

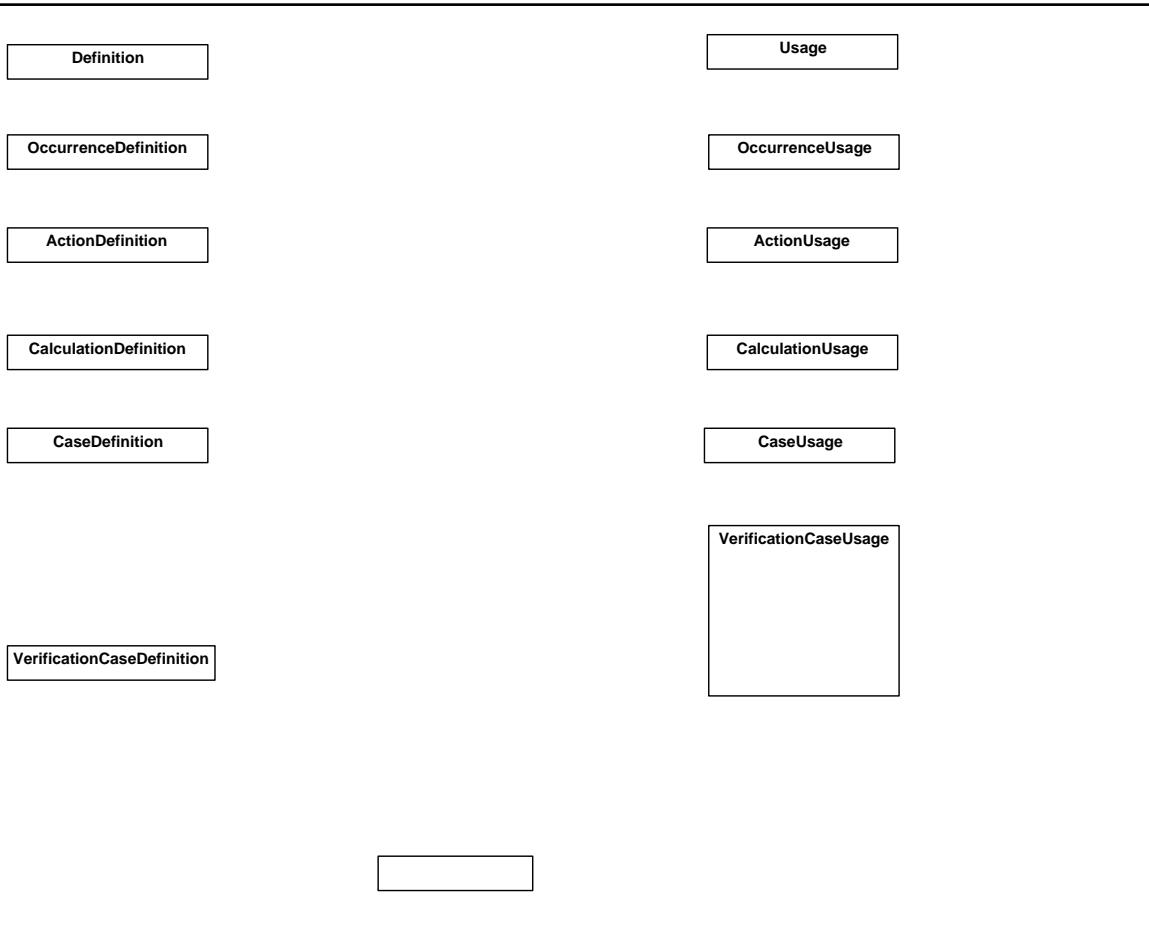
ABOFSB K>IVPPF !>PB 3P>DB0BPRI()#UM0BPPFLK

2EB resultExpression LC > AnalysisCaseUsage FP ()EB ownedResultExpression LC F()P
ResultExpressionMembership FC >KV

```
resultExpression =  
    let results : OrderedSet(ResultExpressionMembership) =  
        featureMembership->  
            selectByKind(ResultExpressionMembership) in  
    if results->isEmpty() then null  
    else results->first().ownedResultExpression  
    endif
```

8.3.23 Verification Cases Abstract Syntax

8.3.23.1 Overview



RequirementVerificationMembership
+kind : RequirementConstraintKind = requirement{redefines kind}


```
        selectByKind(RequirementVerificationMembership).  
        verifiedRequirement->asOrderedSet()  
    endif
```

8.3.23.4 VerificationCaseUsage

[SYSML2-210: OCL errors in specialization constraints](#)

Description

VerificationCaseUsage FP > 3P>DB LC > VerificationCaseDefinition

General Classes

!>PB 3P>DB

Attributes

SB0FCF@>QFLK !>PB "BCFKFQFLK 4B0FCF@>QFLK !>PB "BCFKFQFLK 9 ; XPR?PBQP @>PB "BCFKFQFLKY

2EB VerificationCase QE>| FP QEB definition LC QEFP VerificationCaseUsage

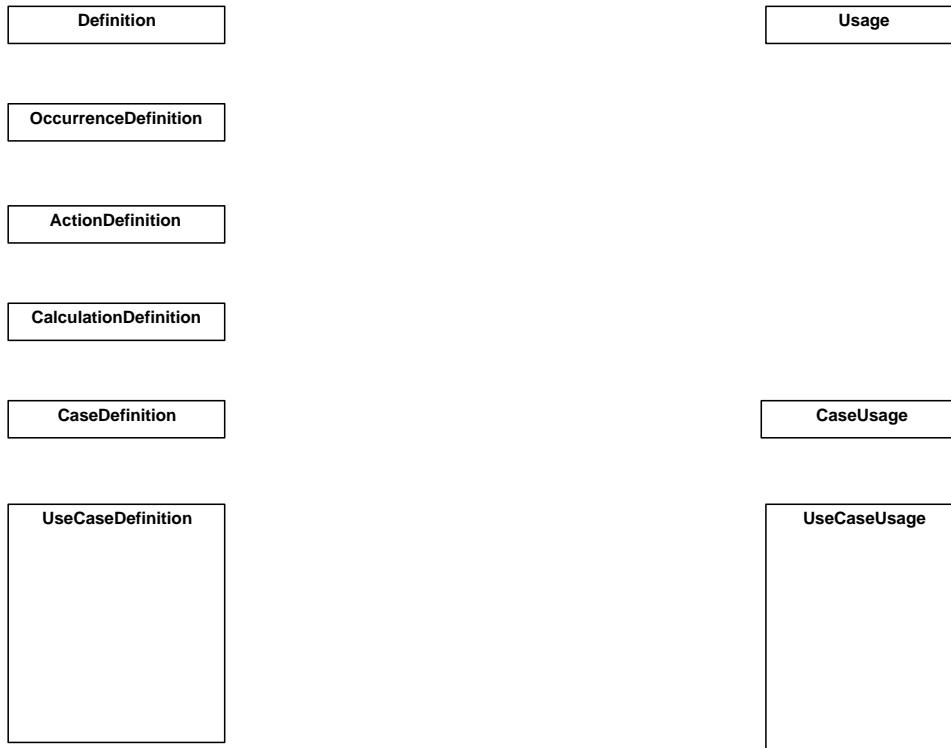
SB0FCFBABNRFOB J BKQ OBNRF0B J BKQ3P>DB 9 ; XLOABOBAY

2EB RequirementUsages SB0FCBA ?V QEFP VerificationCaseUsage TEF@E >OB QEB verifiedRequirements

```
verifiedRequirement =  
    if objectiveRequirement = null then OrderedSet{}  
    else  
        objectiveRequirement.featureMembership->  
            selectByKind(RequirementVerificationMembership).  
            verifiedRequirement->asOrderedSet()  
    endif
```

8.3.24 Use Cases Abstract Syntax

8.3.24.1 Overview



Description

K IncludeUseCaseUsage FP > UseCaseUsage (E>(OBM0BPBKQP QEB FK@IRPFLK LC > UseCaseUsage ?V > UseCaseDefinition L0 UseCaseUsage 3KIBPP FQ FP QEB IncludeUseCaseUsage

Attributes

FK@IRABA 3 PB !>PB 3 PB !>PB 3 P>DB 9 ; XL0AB0BAY

2EB UseCaseUsages @E>0B FK@IRABA ?V @EFP UseCaseDefinition TEF@E >0B @EB useCaseIncludeds LC @EB
IncludeUseCaseUsages LTKBA ?V @FPP UseCaseDefinition.

Operations

, LKB

NamespaceExpose FP >K Expose Relationship @E@ BUMLPBP @EB Memberships LC > PMB@FCF@

8.3.25.6 RenderingUsage

SYSML2-210: OCL errors in specialization constraints

Description

RenderingUsage FP (EB RP>DB LC) > RenderingDefini2 Td/F1 10.0000 Tf<465001114C1.8745F1 10.0000 Tf<4650015

ViewDefinition FP > PartDefinition


```

ViewpointDefinition JRPQ AFOB@QIV LO FKAFOB@QIV PMB@F>IFWB QEB ?>PB viewpointDefinition
Views::Viewpoint COL J QEB 1VPQB JP +LABI *F?0>OV

specializesFromLibrary('Views::Viewpoint')

ABOFSB4FBTMLFKQ "BCFKFQLK4FBTMLFKQ1()>HBELIABO

2EB viewpointStakeholders LC >V2.00Descripinition >OB (EB ownedStakeholderParameters LC >II
featureMemberships (E>()>OB StakeholderMemberships

viewpointStakeholder = framedConcern.featureMembership->
    selectByKind(StakeholderMembership).
    ownedStakeholderParameter

```

8.3.25.9

JRPQ AFOB@QIV LO FKAFOB@QIV PMB@F>IFWB QEB ?>PB

V4.00Descrip).

```
isComposite and owningType <> null and
(owningType.oclIsKindOf(ViewDefinition) or
owningType.oclIsKindOf(ViewUsage)) implies
specializesFromLibrary('Views::View::viewpointSatisfactions')
```

ABFSB4FBTMLFKQ3P>DB4FBTMLFKQ10>HBELIAB0

OB QEB

2EB viewpointStakeholders LC > ViewpointUsage >OB QEB ownedStakeholderParameters LC >II
featureMemberships (E)> >OB StakeholderMemberships

```
viewpointStakeholder = framedConcern.featureMembership->
selectByKind(StakeholderMembership).
ownedStakeholderParameter
```

8.3.25.10 ViewRenderingMembership

Description

ViewRenderingMembership PP >

RENDERING MEMBERSHIP

DY E>>LC >

V

MEMBERING MEMBERSHIP
REFERRED STAKEHOLDERS

ABFS4C IOAID MOÄ kÄU


```
body: let metadataFeatures: Sequence(AnnotatingElement) =
    element.ownedAnnotation.annotatingElement->
        select(oclIsKindOf(MetadataFeature)) in
self.membership->selectByKind(ElementFilterMembership).
```


, LKB

; 2EB PB J>KQF@ 0BNRF0B J BKQP >OB CL0 J>IFWBA ?V semantic constraints FK@IRABA FK QEB 1VP + * >?PQ>@Q PVKQ>U



Semantic Constraint Subsetting Target


```
variation part def P {
    variant part p1;
    variant part p2;
    ...
}
```

E>P TFQE F J MIFBA Relationships FK@IRABA QEB BNRFS>IBKQ HB0KBI PB J >KQF@P LC

```
// KerML
class P specializes // Krm
```

```
@LKP@>FKQ @BNRF0BP @E@>K AttributeDefinition PMB@F>IFWB Base::DataValue K AttributeDefinition FP
>IPL PVK@>@F@>IIV OBP@OF@QBA ?V @EB validateAttributeDefinitionFeatures @LKP@>FKQ @L E>SB KL @L J MLPFQB
features
```

```
attribute def D1 specializes Base::DataValue {
    ref a subsets
```

KBP@BA FK >K EnumerationDefinition >K EnumerationUsage FP PB J >K@>IIV GRP@>K AttributeUsage QE>Q FP
OBNRFOBA QL ?B QVMBA ?V BU>@QIV LKB EnumerationDefinition PVK@>QF@>IIV BKCL0@BA ?V QEB J RIQFMIF@FQV LC
EnumerationUsage::enumerationDefinition PBB _____

1FK@B >K EnumerationDefinition FP >I0B>AV > S>OFY

2EB OBNRF0BA Specializations

E>SB TRQE F J MIFBA Relationships FK@IRABA QEB BNRFS>IBKQ HB0KBI PB J >KQF@P LC

```
// KerML
feature t : Occ subsets Occurrences::occurrences {
    // Portioning feature
    feature redefines Occurrences::Occurrence::timeSliceOf : Occ {
```

8.4.6 Items Semantics

Abstract syntax reference: [8.3.10](#)

8.4.6.1 Item Definitions

K ItemDefinition FP > HFKA LC OccurrenceDefinition > KA > HFKA LC) B0 + * Structure P PR@E > II QEB

checkPartDefinitionSpecialization @LKP@>FK@ OBNRF0BP @E@ > PartDefinition PMB@F>IFWB QEB ?>PB
PartDefinition Parts::Part PBB _____ TEF@E PR?@I>PPFCFBP Items::Item PBB _____ .

2EB Part PB J >K@F@ J LABI >IPL FK@IRABP >AAF@FLK>I features TELPB PB J >K@F@P FP @LSB0BA FK LQEBO PR?@I>RPBP

a ownedPorts

8.4.8.1 Port Definitions

PortDefinition FP > HFKA LC OccurrenceDefinition >KA > HFKA LC) B0 + * Structure P PR@E >II ()EB
DBKB0>I PB J >KQF@ @LKP()>FKQP CL0 >KA

8.4.8.2 Port Usages

PartDefinition *Parts*::*Part* PBB _____ >KA QEB HBOKBI AssociationStructure
Objects::*LinkObject*

, LQBQE>QEB relatedFeatures LC> ConnectionUsage

J LABI FQ FP >IILT>?IB (L RPB > BindingConnectorAsUsage 0>EB0 (E>K > MI>FK) B0+ * BindingConnector >P

M>OPBA >P FK parameters TEF@E >OB @EBK ?V @EB) B0+ * checkFeatureParameterRedefinition @LKP@>FK@

1FK@B > FlowConnectionUsage FP > HFKA LC ActionUsage QEB
checkActionUsageSubactionSpecialization @LKPQ>FKQ OBNRF0BP QE>Q > FlowConnectionUsage KBPQBA FK >K
ActionDefinition L0 ActionUsage PMB@F>IFWB Actions::Action::subactions PBB _____ >P TBII >P
Connections::flowConnections PBB >IPL _____

```
action def A specializes Actions::Action {  
    action a1 : A1 subsets Actions::Action::subactions;  
    action a2 : A2 subsets Actions::Action::subactions;  
    flow subsets Connections::flowConnections, Actions::Action::subactions  
        from a1.a1_out to a2.a2_in;  
}
```

8.4.9.7 Succession Flow Connection Usage


```
interface b : B
    subsets Interface::binaryInterfaces, Items::Items::subparts
    connects f1.p1 to f2.p2;
}
```

8.4.11 Allocations Semantics

Abstract syntax reference: [8.3.15](#)

8.4.11.1 Allocation Definitions

KAllocationDefinition

action def


```
action a1 : A[1] subsets Action::actions {
    // a1.this == a1
    // b.x == a1
}
part p subsets Parts::parts {
    action a2: A[1] subsets Parts::Part::ownedActions {
        // a2.this == p
        // b.this == p
    }
}
}
```

P FKAF@>QBA @EB S>IRB LC *this* CL0 ?LQE @EB Action a1 >KA FQP *subaction a1.b* TFI?B @EB S>IRB LC a1 PFK@B @EB
ActionUsage a1 FP > M>@H>DB IBSBI TEFIB @EB S>IRB LC

Join Nodes

JoinNode FP > HFKA LC ControlNode

a checkForkNodeSpecialization OBNRFOBP ()> ForkNode PMB@F>IFWB ()EB ActionUsage
Actions::Action::forks PBB _____ TEF@E FP ABCFKBA ?V ()EB

DecisionAction PR?@I>PPFCFBP

```
action def A5 {  
    action
```


K AcceptActionUsage MOLSFABP >K argument CL0 QEB FKMRQ

, LQB >IPL QEB AcceptAction::payload parameter

FKP>K@B FK >K OccurrenceDefinition L0 OccurrenceUsage M>0@F@RI>0IV > PartDefinition L0 PartUsage
J B>KP @E>@EFP Clock FKP>K@B TFII ?B RPBA >P QEB ABC>RI@CL0 >II @LK@>FKBA suboccurrences M>0@F@RI>0IV
ownedActions >KA subactions >@KV IBSBI LC KBP@FKD FK QEB @L J MLPF@FLK EFB@>0@EV RKIBPP FQ FP CRO@EB0

```
redefines Actions::AssignmentAction::target::startingAt {
    redefines Actions::AssignmentAction::target::startingAt::accessedFeature,
        rfnt;
}
```

TEB0B test1 >KA test2 @>K ?B >0?F0>0V Boolean S>IRABA Expressions >0B M>OPBA TFQE FJ MIFBA Specializations FK@IRABA >P PBB _____

```
action def AC specializes Actions::Action {
    action if1 subsets Actions::Action::ifSubactions {
        in calc redefines Actions::IfThenAction::ifTest {
            test1
```

body TEF@E FP >K Action
untilTest TEF@E FP > BooleanExpression ()E>() ABC>RI()P ()L false

2EB whileArgument bodyAction >KA untilArgument LC ()EB WhileLoopActionUsage >OB ()EBK M>OPBA >P
LTKB

seq, TEF@E FP > PBNRBK@B LC *Anything*
body, TEF@E FP >K *Action*

'@>IPL E>P > MOLQB@QBA ownedFeature var @E>@ FP > PR?PB@LC seq TFE J RIQMIF@FQV 0..1 2EB loopVariable
seqArgument >KA bodyAction LC > ForLoopActionUsage

```
action act;
part p {
    perform action perf references act;
    // Other than having a name, the above is equivalent to
    // perform act;
}
```

FP TQE FJ MIFBA Specializations

StateSubactionMembership

```

state def SP specializes States::StateAction parallel {
    state sp1 subsets States::StateAction::substates;
    state sp2 subsets States::StateAction::substates;
}

a checkStateUsageOwnedStateSpecialization 0BNRFOBP {E>@L J MLPFB StateUsage TELPB
owningType FP > PartDefinition L0 > PartUsage PMB@F>IFWB {EB StateUsage
Parts::Part::ownedStates PBB _____ TEF@E PR ?PB@P {EB ActionUsage
Parts::Part::ownedActions , L@B >IPL {E>FK L@EB0 @>PBP {EB DBKB0>I
)B0+*

```

a checkTransitionUsageStateSpecialization OBNRF0BP @E> @L J MLPF@B TransitionUsage TELPB
ownedType FP > StateDefinition L0 StateUsage PMB@F>IFWB @EB ActionUsage
States::StateAction::stateTransitions PBB _____ TEF@E FP @VMBA ?V @EB
ActionDefinition *States::StateTransitionAction* PBB

QEBK FQP accepter FP >IPL MB0CL0 J BA AROFKD QEB PLR0@B StateAction, >CQBO TEF@E QEB exitAction LC QEB StateAction FP MB0CL0 J BA FC FQ E>P LKB >KA QEBK QEB effect LC QEB StateTransitionAction FP MB0CL0 J BA FC FQ E>P LKB \$FK>IIV QEB transitionLink LC QEB StateTransitionAction FP >PPB0QBA QL E>SB > S>IRB J B>KFKD QE>Q QEB0B J RPQ ?B > Q>0DBQ Action QB J MLO>IIV CLIILTFKD QEB PLR0@B StateAction. \$L0 > @L J MIBQB ABP@OFM@FLK LC QEB PB J >KQF@P LC StateTransitionPerformance,

8.4.14 Calculations Semantics

Abstract syntax reference: [8.3.18](#)

8.4.14.1 Calculation Definitions

CalculationDefinition FP > HFKA LC ActionDefinition >KA > HFKA LC) B0 + *

```
checkFeatureParameterRedefinition @LKP@>FK@ (E>) >MMIFBP (L >II HFKAP LC ActionUsages PBB
_____ (EB ) B0+ * checkFeatureResultRedefinition @LKP@>FK@ PBB 9 ) B0+ * ; >IPL
OBNRFOBP (E>) (EB result parameter LC > CalculationUsage redefine (EB result parameters LC
>KV Functions L0 Expressions F) PMB@F>IFWBP FK@IRAFKD CalculationDefinitions >KA
CalculationUsages .
```

```
calc c : C subsets
```

```

; >IPL >MMIV QL > ConstraintDefinition 'K >AAFQFLK QEB
checkConstraintDefinitionSpecialization @LKP@>FKQ OBNRFOBP QE>0 > ConstraintDefinition PMB@F>IFWB
QE >PB ConstraintDefinition Constraints::ConstraintCheck PBB _____ TEF@E PR?@I>PPFCFBP QE
HB0KBI Predicate Performances::BooleanEvaluation PBB 9 ) B0 + * ;

    ConstraintDefinition FP KL@> CalculationDefinition ?RQ PFK@B > Predicate FP > HFKA LC ) B0 + *
Function QE KerML checkFeatureParameterRedefinition @LKP@>FKQ PBB 9 ) B0 + * ; >KA
checkFeatureResultRedefinition PBB 9 ) B0 + * ; @LKP@>FKQP >IPL >MMIV QL QE parameters LC >
ConstraintDefinition >P CL0 > CalculationDefinition PBB _____ &LTBSB0 QE result parameter
LC BooleanEvaluation E>P type ScalarValues::Boolean PL QE result LC > ConstraintDefinition
J RPQ >IPL E>SB type Boolean L0 > PMB@F>IFW>QFLK LC RQ >KA QEBOBCLOB RQ FP LCQBK GRPQ FKEBOFQBA FKQL QE
ConstraintDefinition

    IPL >P CL0 > CalculationDefinition FC > ConstraintDefinition LTKP >K Expression SF >
ResultExpressionMembership QEbk QE ) B0 + * checkFunctionResultBindingConnector @LKP@>FKQ PBB
9 ) B0 + * ; OBNRFOBP QE>0 QE ConstraintDefinition E>SB >P >K ownedFeature >
BindingConnector ?BQTBBK QE result parameter LC QE Expression >KA QE result parameter LC QE
ConstraintDefinition 2EB 0BPRIQ Expression J RPQ QEBOBCLOB ?B Boolean-S>IRBA

constraint def Cst specializes Constraints::ConstraintCheck {
    in attribute x : ScalarValues::Real subsets Base::dataValues;
    // Implied binding between the inherited result parameter
    // and the result of the Expression x > 0.
    x > 0
}

```

8.4.15.2 Constraint Usages

```

ConstraintUsage FP > HFKA LC OccurrenceUsage >KA > HFKA LC ) B0 + * Expression P PR@E >II QE DBKB0>I
Constraint.0000PB1>Kf001LKB05KQ9CLikK29and5028029g>PBB29_0DKA>Kf001T5028029 PBB9 ) B0 + * /F8T10.0000>HPE>NMEV
QE > ConstraintUsage >P TBII >P QE CLIILTFKD >AAFQFLK>I PMB@F>IFW>QFLK @LKP@>FKQP

a checkConstraintUsageSpecialization OBNRFOBP QE>0 > ConstraintUsage PMB@F>IFWB QE ?>PB
ConstraintUsage Constraints::constraintChecks PBB TEF@E FP ABCFKBA ?V QE
ConstraintDefinition Constraints::ConstraintCheck PBB _____ >KA PR?PBQP QE HB0KBI
Step

```

Expression

```

item def ICst specializes Items::Item {
    constraint c : Cst subsets Items::Item::checkedConstraints;
}
action def ACst specializes Actions::Action {
    constraint c : Cst subsets Objects::Object::ownedPerformances;
}

a checkConstraintUsageRequirementConstraintSpecialization OBNRF0BP QE>Q >
    ConstraintUsage TELPB owningFeatureMembership FP > RequirementConstraintMembership
    PMB@F>IFWB BFQEBO QEB assumptions FC FQ FP >K assumedConstraint L0 constraints FC FQ FP >
    requiredConstraint feature LC QEB RequirementDefinition
    Requirements::RequirementCheck PBB _____ 1BB >IPL _____ LK OBNRF0B J BKQP PB J >KQF@P

```

8.4.15.3 Assert Constraint Usages

K AssertConstraintUsage FP > HFKA LC ConstraintUsage >KA > HFKA LC)B0+ * Invariant P PR@E >II QEB
DBKB0>I PB J >KQF@ @LKPQ>FKQP CL0 > ConstraintUsage PBB _____ >KA >K Invariant PBB 9)B0+ * ;
'K>AAF@LK QEB checkAssertConstraintUsageSpecialization @LKPQ>PKQ OBNRF0BP QE>Q >K
AssertConstraintUsage PMB@F>IFWB LKB LC QEB CLIILTTFKD

a 'C QEB AssertConstraintUsage FP not KBD>QBA ConstraintUsage
ConstraintUsage assertedOnConstraintChecks PBB _____ TEF3 7FR4\$ d q)1\$ d \$o\$


```
    stakeholder s subsets Requirements::RequirementCheck::stakeholders;
}
```

8.4.16.2 Requirement Usages

RequirementUsage FP > HFKA LC ConstraintUsage P PR@E >II QEB DBKB0>I PB J >KQF@ @LKPQ0>FKQP CL0 >
ConstraintUsage PBB _____ >IPL >MMIV QL >RequirementUsage >P TBII >P QEB CLIILTFKD >AAFQFLK>I
PMB@F>IFWB>QFLK @LKPQ0>FKQP

a checkRequirementUsageSpecialization OBNRFOBP (E>| >RequirementUsage PMB@F>IFWB QEB ?>PB
RequirementUsage Requirements::requirementChecks PBB

8.4.16.3 Satisfy Requirement Usages

SatisfyRequirementUsage FP > HFKA LC RequirementUsage >KA > HFKA LC AssertConstraintUsage P
PR@E >II QEB DBKBO>I PB J >KQF@ @LKPQO>FKQP CL0 > RequirementUsage PBB

8.4.16.4 Concern Definitions

ConcernDefinition FP > HFKA LC RequirementDefinition


```
    ref case csc2 subsets Cases::cases,
        Performances::Performance::enclosedPerformances;
}
```

```
1FJFl>0IV @L > CaseDefinition >
```

{ } >

AnalysisCases::AnalysisCase ()EBK E>P >K *analysisSteps* CB>QR0B ()E>() PR?PBQP
Actions::Action::subaction PBB

8.4.19 Verification Cases Semantics

Abstract syntax reference: [8.3.23](#)

8.4.19.1 Verification Case Definitions

8.4.19.2 Verification Case Usages

VerificationCaseUsage FP > HFKA LC CaseUsage

UseCaseDefinition *UseCases*::*UseCase* PBB _____

2ERP QEB S>IRBP LC uc2 . inc1 TFI?B QEB PR?PBQ LC QEB UseCases OBM0BPBKQBA ?V uc1 QE>Q>OB MB0CLO J BA TRQEFK uc2.

'C QEB IncludeUseCaseUsage E>P > ReferenceSubsetting QEBK QEFP TFI?PRCCF@B QL P>QFPCV QEB checkUseCaseUsageSpecialization

QEB ?>PB ViewpointDefinition Views::ViewpointCheck PBB _____ TEF@E PMB@F>IFWBP QEB
RequirementDefinition Requirements::RequirementCheck PBB _____

```
viewpoint def Vp specializes Viewpoints::ViewpointCheck;  
viewpoint def Vp1 specializes Vp;
```

8.4.21.4 Viewpoint Usages

ViewpointUsage FP > HFKA LC RequirementUsage P PR@E >II QEB DBKB0>I PB J >KQF@ @LKP@>FKQP CL0 >
RequirementUsage

```
view rnd2 subsets Renderings::Rendering::subrenderings;nd2
```


9 Model Libraries

9.1 Model Libraries Overview

Features

, LKB

Constraints

, LKB

9.2.3 Items

9.2.3.1 Items Overview

2EFP M>@H>DB ABCFKBP QEB ?>PB QVMBP CL0 FQB J P >KA 0BI>QBA P0R@QRO>I BIB J BKQP FK QEB 1VP + * I>KDR>DB

9.2.3.2 Elements

9.2.3.2.1 Item

Element

'QB J " BCFKFQFLK

Description

'QB J FP QEB J LP DBKB0>I @I>PP LC L?GB@P QE>Q>OB M>0Q LC BUFP FK L0 CILT QEOLRDE > PVPQB J 'QB J FP QEB ?>PB QVMB LC >II
'QB J " BCFKFQFLKP

General Types

- ?GB@Q

Features

?LRKAFKD1E>MBP 'QB J 9 ; XPR?PBQP BKSBLMFKD1E>MBPY

#KSBILMFKD PE>MBP QE>Q>OB 1Q0R@QROBA>9 face L0 BSB0V edge FKQBOPFKD QEFP 'QB J

HBA ! LKP0 d μ • Å K!^D. #δ % Å\$ \$4Å% •

! LKP0 d μ Så Så \$S° ^\$ δ Te u\$D

\$Å\$Å C SÅ • u\$ D

1E>MBP QE>Q>OB QEB shape LC >K 'QB J QE>Q FK@IRABP QEFP 'QB J FK PÅKA FJB

e Å • Å

K 'QB J FP PLIFA FC FQ E>P KL voids

PE>MB 'QB J X0BABCFKBP PÅLRKA>0VY

4 c åÅ' Å Te u\$D

PR?FQB J P 'QB J 9 ; XPR?PBQP PR?LÅ00BK@BPY

2EB 'QB J P QE>Q>OB @L J MLPFQB PR?FQB J P LC QEFP 'QB J

PR?M>0QP .>0Q 9 ; XPR?PBQP PR?FQB J PY
2EB subitems LC QEFP FQB J QE>Q >OB parts
SLFAP 'QB J 9 ; XOBABCFKBP FKKB01M>@B - @@R00BK@BPY
4LFAP >OB QE innerSpaceOccurrences LC QEFP 'QB J

Constraints

, LKB

9.2.3.2.2 items

Element

'QB J 3 P>DB

Description

items

QLR@EBP 'QB J 9 ; XPR?PBQP GRPQ - RQPFAB - C - @@R00BK@BP QFJ B ! LFK@FABKQ - @@R00BK@BPY

QLR@EBP2LL 'QB J 9 ; XPR?PBQP QFJ B ! LFK@FABKQ - @@R00BK@BP GRPQ - RQPFAB - C - @@R00BK@BPY

Constraints

, LKB

9.2.4 Parts

9.2.4.1 Parts Overview

2EFP M>@H>DB ABCFKBP QEB ?>PB QVMBP CL0 M>00P >KA 0BI>QBA P00R@Q0>I BIB J BKQF FK QEB 1VP + * I>KDR>DB

9.2.4.2 Elements

9.2.4.2.1 Part

Element

9.2.4.2.2 parts

Element

.>003P>DB

Description

parts

9.2.6.2.2 binaryConnections

Element

Description

connections FP QEB ?>PB CB>QROB LC >II !LKKB@QFLK 3P>DBP

General Types

M>0QP
IFKH - ?GB@QP

Features

ChkBstrainon

Constraints

, LKB

9.2.6.2.5 FlowConnection

Element

J BPP>DB ! LKKB@QFLKP
\$ILT ! LKKB@QFLK
CILT20>KPCBOP

Features

PLR0@B - @@R00BK@B 9 ; X0BABCFKBP PLR0@BY

(>0DBQ - @@R00BK@B 9 ; X0BABCFKBP (>0DBQY

Constraints

, LKB

?FK>0V ! LKKB@QFLKP
>@QFLKP

Features

9KL K>J B; - @@R00BK@B

9KL K>JB; - @@R00BK@B

Constraints

, b \$SOTX& \$E b`BILT?FK>0V!LKB.00FB AL0bBH— \$E& n @U LKBD\$E! \$E à !I>PP @ ILT d! \$E AE>O E>MMB>C

Features

PLR0@B - @@R00BK@B 9 ; X0BABCFKBP PLR0@BY

(>ODB) - @@R00BK@B 9 ; X0BABCFKBP (>ODB)Y

Constraints

, LKB

9.2.7 Interfaces

9.2.7.1 Interfaces Overview

FK>OV'KQB0C>@B
FKQB0C>@BP
?FK>OV ! LKKB@QFLKP

Features

9KL K>JB; .L0Q

9KL K>JB; .L0Q

Constraints

, LKB

9.2.7.2.3 Interface

Element

'KQB0C>@B "BCFKFQFLK

Description

Interface FP QEB J LPQ DBKB0>I @I>PP LC IFKHP ?BQTBBK PortUsages TFQEFK PL JB @LK>FKFD P00R@QROB Interface FP QEB ?>PB Type LC>II InterfaceDefinitions

General Types

! LKKB@QFLK

Features

, LKB

Constraints

, LKB

9.2.7.2.4 interfaces

Element

'KQB0C>@B 3P>DB

Description

interfaces FP QEB ?>PB CB>QROB LC>II InterfaceUsages

General Types

@LKKB@QFLKP
'KQB0C>@B

Features

, LKB

Constraints

, LKB

9.2.8 Allocations

9.2.8.1 Allocations Overview

9KL K>J B; KVQEFKD

9KL K>J B; KVQEFKD

Constraints

, LKB

9.2.9 Actions

9.2.9.1 Actions Overview

, LKB

Constraints

, LKB

9.2.9.2.3 AcceptMessageAction

Element

@QFLK " BCFKFQFLK

Description

K AcceptMessageAction FP >K Action >KA AcceptPerformance \$ >Q LACKFLFKB >K

>PPFDK J BKQP PPFDK J BKQ @QFLK 9 ; XPR?PBQP PR?>@QFLKPY

2EB *subactions* LC QEFP @QFLK QE>>B AssignmentActions

@LKQOLIP !LKQOLI @QFLK 9 ; XPR?PBQP PR?>@QFLKPY

2EB *subactions* LC QEFP Action QE>>B ControlActions

AB@FPFLKP "B@FPFLK @QFLK 9 ; XPR?PBQP @LKQOLIPY

2EB *controls* LC QEFP Action QE>>B DecisionActions



2EB subperformances LC QEFP Action QE>Q>B Actions 2EB this 0BCB0BK@B LC > subaction FP >IT>VP QEB P>JB
>P QEB>LC FS&T æä @0 ßpÓ SØ B i û ãÝ i Ø í; XPR?P õ #ûi û \$pQE>I-b`QE>lg 5` d eUQE>LC QEFP

Features

Constraints

9.2.9.2.11 ForkAction

Element

@QFLK " BCFKFQFLK

Description

ForkAction FP QEB ControlAction CL0 > \$L0H , LAB

, LQB \$L0H ?BE>SFL0 0BPRIQP COL J OBNRF0FKD QE>Q QEB Q>0DBQ J RIQFMIF@FQV LC >II LRQDLFKD PR@@BPPFLK @LKKB@QLOP ?B

General Types

! LKQOLI @QFLK

Features

, LKB

Constraints

, LKB

9.2.9.2.12 ForLoopAction

Element

@QFLK " BCFKFQFLK

2EB PBNRBK@B LC S>IRBP LSB0 TEF@E QEB ILLM FQB0>QBP

S>0 KVQEFKD

2EB ILLM S>OF>?IB QE>0 FP >PPFDKBA PR@@BPPFSB BIB J BKQ LC seq LK B>@E FQB0>QFLK LC QEB ILLM

TEFIB*LLM 5 EFIB*LLM @QFLK

5 EFIB index FP IBPP QE>K L0 BNR>I QL QEB PFWB LC seq >PPFDKP var QL QEB index BIB J BKQ LC seq QEBK MB0CL0 J P body >KA FK@OB J BKQ index

Constraints

, LKB

9.2.9.2.13 forLoopActions

Element

@QFLK 3 P>DB

Description

forLoopActions FP QEB ?>PB CB>QROB CL0 >II \$L0*LLM @QFLK 3 P>DBP

General Types

ILLM @QFLKP
\$L0*LLM @QFLK

Features

, LKB

Constraints

, LKB

9.2.9.2.14 IfThenAction

Element

@QFLK "BCFKFQFLK

Description

K IfThenAction FP >) BOKBI IfThenPerformance QE>0 FP >IPL >K @QFLK 'Q FP QEB ?>PB QVMB CL0 >II 'C @QFLK 3 P>DBP

General Types

@QFLK
'C2EBK . B0CL0 J >K@B

Features

K LM@FLK>I *Performance* @E>L@@ROP FC >KA LKIV FC @EB 0BPRI@ LC @EB *ifTest* FP C>IPB

Constraints

, LKB

9.2.9.2.17 ifThenElseActions

Element

@QFLK 3 P>DB

Description

ifThenElseactions FP @EB ?>PB CB>@ROB CL0 >II 'C @QFLK 3 P>DBP @E>E>SB >K *elseAction*

General Types

'C2EBK#IPB @QFLK
FC2EBK @QFLKP

Features

, LKB

Constraints

, LKB

9.2.9.2.18 JoinAction

Element

@QFLK " BCFKFQFLK

Description

JoinAction FP @EB *ControlAction* CL0 > (LFK , LAB

9.2.9.2.19 LoopAction

Element

@QFLK "BCFKFQFLK

Description

LoopAction FP QEB ?>PB QVMB CL0 >II LoopActionUsages

General Types

@QFLK

Features

?LAV @QFLK 9 ;

2EB >@QFLK QE>Q FP MB0CL0 J BA 0BMB>QBA1 / ž

Element "BCFKFQFLK

Description 9.2.1 Method 9D LoopAction /

MergeAction FP QEB

General Types

>@QFLKP
1BKA @QFLK

Features

, LKB

Constraints

, LKB

9.2.9.2.24 TransitionAction

Element

@QFLK "BCFKFQFLK

Description

20>KPFQFLK @QFLK FP > 20>KPFQFLK . B0CL0 J>K@B TFQE>K @QFLK >P transitionLinkSource '@FP QEB ?>PB QVMB LC
>II 20>KPFQFLK 3P>DBP

General Types

20>KPFQFLK . B0CL0 J>K@B
@QFLK

Features

>@@BMQBA + BPP>DB + BPP>DB ! LKKB@QFLK X0BABCFKBP @OFDB0Y
@@BMQBO @@BMQ + BPP>DB @QFLK 9 ; XPR?PBQP PR?>@QFLKP 0BABCFKBP >@@BMQY
BCCB@Q @QFLK 9 ; XPR?PBQP PR?>@QFLKP 0BABCFKBP BCCB@QY
0B@BFSB0 - @@R00BK@B X0BABCFKBP @OFDB02>0DBQY
Q0>KPFQFLK*FKH1LR0@B @QFLK X0BABCFKBP Q0>KPFQFLK*FKH1LR0@BY

Constraints

, LKB

9.2.9.2.25 transitionActions

Element

20>KPFQFLK 3P>DB

Description

transitionActions FP QEB ?>PB CB>QR0B CL0 >II 20>KPFQFLK 3P>DBP

General Types

Features

, LKB

Constraints

, LKB

9.2.12 Constraints

, LKB

Constraints

, LKB

9.2.12.2.3 constraintChecks

Element

! LKP(0>FK(3 P>DB

Description

constraintChecks FP QEB ?>PB CB>QR0B LC>I áI á d & u E %& n e ál B0B D`0B FSKBT25 9 QRKQPQN. @H- BKP(0>FK(3 RB 4 Ž @Fb 0

2EFP M>@H>DB ABCFKBP QEB ?>PB QVMBP CL0 OBNRFOB J BKQP >KA OBI>QBA ?BE>SFL0>I BIB J BKQP FK QEB 1VP + * I>KDR>DB

9.2.13.2 Elements

9.2.13.2.1 ConcernCheck

Element

! LK@BOK " BCFKFQFLK

Description

! LK@BOK ! EB@H FP QEB J LPQ DBKB0>I @I>PP CL0 @LK@BOK @EB@HFKD ! LK@BOK ! EB@H FP QEB ?>PB QVMB LC >II
! LK@BOK " BCFKFQFLKP

General Types

OBNRFOB J BKQ ! EB@H

Features

, LKB

Constraints

, LKB

9.2.13.2.2 concernChecks

Element

! LK@BOK 3P>DB

Description

concernChecks FP QEB ?>PB C@ C@ KFQFLKP

Description

OBNRFOB J BKQ " BCFKFQFLK

Description

OBNRFOB J BKQ ! EB@H FP QEB J LPQ DBKB0>I @I>PP CL0 OBNRFOB J BKQ@EB@HFKD OBNRFOB J BKQ ! EB@H FP QEB ?>PB QVMB LC >II
OBNRFOB J BKQ " BCFKFQFLKP

General Types

! LKPQO>FKQ ! EB@H

Features

>@QLOP .>Q9 ;

2EB .>QP QE>Q CFII QEB OLIB LC >@QLOP CL0 QEPF OBNRFOB J BKQ ! EB@H

>PPR J MFLKP ! LKPQO>FKQ ! EB@H 9 ; XL0AB0BAY

2EB @EB@HP LC >PPR J MFLKP QE>Q J RPQ ELIA CL0 QEB OBNRFOBA @LKPQO>FKQP QL >MMIV

@LK@BOKP ! LK@BOK ! EB@H 9 ; XPR ?PBQP @LKPQO>FKQPY

2EB @EB@HP LC >KV @LK@BOKP ?BFKD >AA0BPPBA >P OBNRFOBA @LKPQO>FKQP

@LKPQO>FKQP ! LKPQO>FKQ ! EB@H 9 ; XL0AB0BAY

2EB @EB@HP LC OBNRFOBA @LKPQO>FKQP

PQ>HBELIABOP .>Q9 ;

2EB .>QP QE>Q OBM0BPBKQ PQ>HBELIABOP FKQB0BPQBA FK QEB OBNRFOB J BKQ ?BFKD @EB@HBA

PR ?G KVQEFKD

2EB BKQFQV QE>Q FP ?BFKD @EB@H CL0 P>QFPC>QFLK LC QEB OBNRFOBA @LKPQO>FKQP

Constraints

9KL K>H&(& ..#¶ XL0AB0BAY

0BNRFOB J BKQ ! EB@H
@LKP@>FKQ ! EB@HP

Features

Constraints

, LKB

9.2.16 Verification Cases

9.2.16.1

Description

VerificationCheck FP > PMB@F>IFW>QFLK LC *RequirementCheck* RPBA CL0 QEB objective LC >
VerificationCase FK L0AB0 QL 0B@L0A QEB BS>IR>QFLKP LC QEB *RequirementChecks* LC 0BNRFOB J BKQP ?BFKD SB0FCFBA

General Types

asTextualNotation 0BKAB0P > 4FBT FKQL QBUQR>I KLQ>FLK >P ABCFKBA FK QEB) B0 + * >KA 1VP + * PMB@FCF@>FLKP

General Types

2BUQR>IOBKAB0FKD

Features

, LKB

Constraints

, LKB

9.2.18.2.4 asTreeDiagram

Element

0BKAB0FKD 3P>DB

Description

asTreeDiagram 0BKAB0P > 4FBT >P > Q0BB AF>D0>J RPKD QEB D0>MEF@>I KLQ>FLK ABCFKBA FK QEB 1VP + * PMB@FCF@>FLK

General Types

%0>MEF@>IOBKAB0FKD

Features

, LKB

Constraints

, LKB

9.2.18.2.5 GraphicalRendering

Element

0BKAB0FKD " BCFKFQFLK

Description

%0>MEF@>IOBKAB0FKD FP > 0BKAB0FKD LC > 4FBT FKQL > %0>MEF@>I CLONFB !BB J à EF@>I CLON9 F FKQL > " h IOBKAB0FKD

, LKB

9.2.18.2.6 Rendering

Element

OBKAB0FKD " BCFKFQFLK

Description

OBKAB0FKD FP QEB ?>PB QVMB LC >II OBKAB0FKD " BCFKFQFLKP

General Types

.>QQ

Features

PR?OBKAB0FKDP OBKAB0FKD 9 ;

- QEB0 OBKAB0FKDP RPBA QL @>00V LRQ QEFP OBKAB0FKD

Constraints

, LKB

9.2.18.2.7 renderings

Element

OBKAB0FKD 3P>DB

Description

renderings FP QEB ?>PB CB>QROB LC >II OBKAB0FKD 3P>DBP

General Types

OBKAB0FKD
M>QQP

Features

, LKB

Constraints

, LKB

9.2.18.2.8 TabularRendering

Element

OBKAB0FKD " BCFKFQFLK

Description

PR?SFBTP 4FBT 9 ;

- QEB0 4FBTP QE>Q >OB RPBA FK QEB 0BKAB0FKD LC QEFP 4FBT

SFBTMLFKQ ! LKCL0 J >K@B SFBTMLFKQ ! LKCL0 J >K@B

K >PPB0QFLK QE>Q >II viewpointSatisfactions >OB QRB

General Types

4FBTMLFKQ ! EB@H
0BNRFOB J BKQ ! EB@HP

Features

, LKB

Constraints

, LKB

9.2.18.2.13 viewpointConformance

Element

1>(FPCVOBNRFOB J BKQ)3P>DB

Description

General Types

0BNRFOB J BKQ ! EB@H

Features

SFBTMLFKQ1>(FPC>@FLKP 4FBTMLFKQ ! EB@H 9 ; XPR ?PB@P @LKP@>FK@PY

2EB 0BNRFOBA 4FBTMLFKQ ! EB@HP

Constraints

, LKB

9.2.18.2.14 views

Element

4FBT 3P>DB

Description

views FP @EB ?>PB CB>@ROB LC >II 4FBT 3P>DBP

General Types

M>0@P
4FBT

Features

, LKB

Constraints

9.2.19.2 Elements

[SYSML2-291](#)

General Types

, LKB

Features

, LKB

Constraints

, LKB

9.2.19.2.3 GeneralView

Element

4FBT "BCFKFQFLK

Description

4FBT ABCFKFQFLK QL MOBPBKQ >KV J B J ?BOP LC BUMLPBA J LABI BIB J QL `&H Å ÁED\$Y HUMBL SKFQK >BYQL P & B >KV J B J >MOBPBBA BOP

4FBT "BCFKFQFLK

Description

, LKB

Features

, LKB

Constraints

, LKB

9.2.19.2.6 InterconnectionView

Element

4FBT "BCFKFQFLK

Description

4FBT ABCFKFQFLK QL M0BPBKQ BUMLPBA CB>QROBP >P KLABP KBPQBA CB>QROBP >P KBPQBA KLABP >KA @LKKB@QFLKP ?BQTBBK CB>QROBP >P BADBP ?BQTBBK KBPQBA KLABP , BPQBA KLABP J>V M0BPBKQ ?LRKA>OV CB>QROBP B D ML0QP M>O>JBQBOP

1EL0Q K>JB FS

General Types

, LKB

Features

, LKB

Constraints

, LKB

9.2.19.2.7 SequenceView

Element

4FBT "BCFKFQFLK

Description

4FBT ABCFKFQFLK QL M0BPBKQ QJ B LOAB0FKD LC BSBKQ L@R00BK@BP LK IFCBIFKBP LC BUMLPBA CB>QROBP 4>IFA KLABP >KA BADBP FK > 1BNRBK@B 4FBT >OB

a \$B>QROBP PR@E >P M>QP TFQE QEBFO IFCBIFKBP

a #SBKQ L@R00BK@BP LK QEB IFCBIFKBP

a + BPP>DBP PBKQ COL J LKB M>OQ QL QBKFO IE QEB@LKE QEA>LRKA ! BUML2PA R" `@Ö

+ B>A>> " BCFKFQFLK

Description

*MetadataItem FP @EB J LP@ DBKB@>I @I>PP LC Items @E>@ OBM0BPBK@ *Metaobjects* MetadataItem FP @EB ?>PB @VMB LC >II + B>A>> " BCFKFQFLKP*

General Types

+ B>L?GB@&
'QB J

Description

Issue FP RPBA (L OB@L0A PL J B FPPRB @LK@B0KFKD (EB >KKL()BA BIB J BK)

General Types

+ B()A()'B J

Features

BU() 1()FKD

(BU()R>I ABP@0FM()FLK LC (EB FPPRB

Constraints

, LKB

9.3.2.2.2 Rationale

Element

+ B()A()" BCFKF()FLK

Description

Rationale FP RPBA (L BUMI>FK > @ELF@B L0 L(EB0 AB@FPFLK J >AB 0BI>BA (L (EB >KKL()BA BIB J BK)

General Types

+ B()A()'B J

Features

BUMI>K>()FLK KV()FKD 9 ;

OBCB0BK@B (L > Feature (E> MOLSFABP > CL0 J >I BUMI>K>()FLK LC (EB 0>()FLK>IB \$L0 BU>J MIB > ()AB P()RAV TELPB
OBPRI(BUMI>FKP (EB @ELF@B LC > @B0>FK >I(B0K>()FSB

BU() 1()FKD

(BU()R>I ABP@0FM()FLK LC (EB 0>()FLK>IB OBNRF0BA

Constraints

, LKB

9.3.2.2.3 Refinement

Element

+ B()A()" BCFKF()FLK

Description

#KR J B0>FLK " BCFKFQFLK

Description

StatusKind BKR J B0>BP QEB MLPPF?IB P0>RPBP LC TLOH LK > J LABI BIB J BKQ

General Types

QOF?RQB 4>IRB

Features

@ILPBA

10>RP FP @ILPBA

ALKB

10>RP FP ALKB

L@pD

Level FP > Real KR J ?B0 FK QEB FKQB0S>I QL FK@IRPFSB

General Types

QOF?RQB4>IRB
OB>I

Features

IBSBI *BSBI X0BABCFKBP PBICY

Constraints

IBSBIO>KDB

Description

Risk

+ B@>A>@>'@B J
1B J >K@F@ + B@>A>@>

Features

>QQF?RQB 4>IRBP

Features

, LKB

Constraints

, LKB

9.3.4.2.4 measuresOfPerformance

Element

QQF?RQB 3 P>DB

Description

+ B>A>>'@B J

Features

CRII' J>DB ' J>DB 9 ;

Features

!>I@RI>QFLK " BCFKFQFLK

Description

K *Interpolate*

S>IRB KVQEFKD X0BABCFKBP S>IRBY

FKMRQ

Constraints

, LKB

9.4.3.2.4 Range

Element

!>I@RI>QFLK "BCFKFQFLK

Description

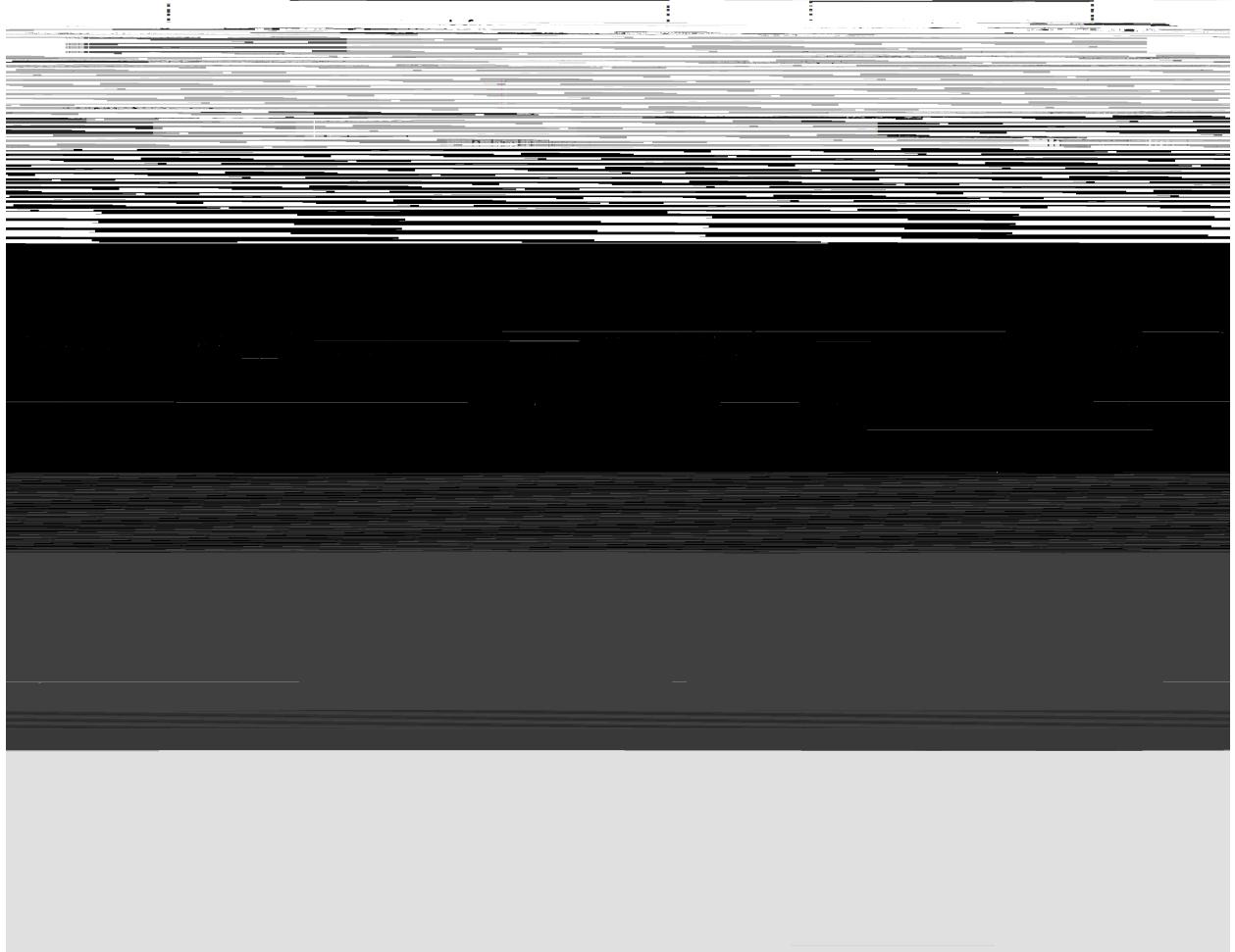
Range 0BQR0KP QEB PBNRBK@B LC QEB *rangeValues*

SamplePair FP > HBV S>IRB M>F0 LC > *domainValue* >KA > *rangeValue* RPBA >P > P>J MIB BIB J BKQ FK
SampledFunction

General Types

) BV4>IRB .>F0

Features



K EvaluationFunction FP > @>I@RI>@FLK @E>@ BS>IR>@BP > TradeStudy >I@BOK>@FSB MOLAR@FKD > ScalarValue
QE>@>K ?B @L J M>@BA TFQE @EB BS>IR>@FLK LC L@EB0 >I@BOK>@FSBP

General Types

MinimizeObjective FP > *TradeStudyObjective* QEB QBNRF0BP QEB selectedAlternative E>SB QEB J FKF J R J *EvaluationFunction* S>IRB LC >II QEB DFSBK >IQBOK>QFSBP

General Types

20>AB 1>RAV - ?GB@QFSB

Features

?BPQ 1@>I>04>IRB X0BABCFKBP ?BPQY

\$L0 > *MinimizeObjective* QEB ?BPQ S>IRB FP QEB J FKF J R J LKB

Constraints

, LKB

9.4.5.2.4 TradeStudy

Element

K>IVPFP !>PB "BCFKFQFLK

Description

TradeStudy FP >K >K>IVPFP @>PB TELPB PR?B@Q FP > PBQ LC >IQBOK>QFSBP >Q IB>PQ LKB >KA TELPB 0BPRIQ FP > PBIB@QFLK LC LKB LC QELPB >IQBOK>QFSBP 2EB >IQBOK>QFSBP >OB BS>IR>QBA ?>PBA LK > DFSBK *ObjectiveFunction* >KA QEB PBIB@QFLK FP J >AB PR@E QEB ?P>QFPCFBP QEB L?GB@QFSB LC QEB *TradeStudy* TEF@E J RPQ ?B > *TradeStudyObjective*

General Types

K>IVPFP !>PB

Features

BS>IR>QFLK\$RK@QFLK #S>IR>QFLK\$RK@QFLK 9 ;

2EB *EvaluationFunction* QL ?B RPBA QL BS>IR>OB QEB >IQBOK>QFSBP

'K > *TradeStudy* RP>Ö³ Ô #ÓA]?Å#å #ÖÝ 1A0B>IR>QSBÖjSå å• Ö#å0% \$ P %D

2EB L?GB@QFSB LC QEFP 20>AB1@RAV

OBABCFKB QEFP CB>QROB QL DFSB FQ > ABCFKFQFLK QE>Q FP > @LK@OBQB XFBIP e AFKLG>>Q FP 2QRAV

9.5.2 Causation Connections

9.5.2.1 Causation Connections Overview

2EFP M>@H>DB M0LSFABP > IF?0>0V J LABI J LABIFKD @>RPBP BCCB@QP >KA @>RP>@FLK @LKKB@QFLKP ?BQTBBK QEB J

9.5.2.2 Elements

9.5.2.2.1 Causation

Element

! LKKB@QFLK " BCFKF@FLK

Description

Description

CausationMetadata PEL00 K>JB causation FP SemanticMetadata CL0 > Causation @LKKB@FLK

General Types

!>RP>FLK + B|>A>|>
1B J>KF@ + B|>A>|>

Features

?>PB2VMB 2VMB XOBABCFKBP ?>PB2VMBY

>PB (VMB FP *CausationConnections::causations*

Constraints

, LKB

9.5.3.2.3 CauseMetadata

Element

+ B|>A>|> " BCFKF@FLK

Description

CauseMetadata PEL00 K>JB cause FABK@FCFBP > Usage

9.6.2.2.1 Derivation

Element

! LKKB@QFLK " BCFKFQFLK

Description

Features

, LKB

Constraints

, LKB

9.6.3 Requirement Derivation

9.6.3.1 Requirement Derivation Overview

9.7.2.2 Elements

9.7.2.2.1 CurrentDisplacementOf

Element

`!>I@RI>QFLK "BCFKFQFLK`

Description

2EB Description of element

PM>QF>I'QB J 1M>QF>I'QB J X0BABCFKBP C0>J BY

Constraints

, LKB

2EB *PositionOf* > *Point* 0BI>FSB QL > *SpatialItem* >0 > PMB@FCF@ *TimeInstantValue* 0BI>FSB QL > DFSBK
Clock FP > *positionVector* 0E>FP > *VectorQuantityValue* FK 0EB *coordinateFrame* LC 0EB *TBT231.88 69240f* (coordinate

@L J MLKBKQ'QB J P 1M>F>I'QB J 9 ; XPR?PBQP PR?FQB J PY

SpatialItem

#IIFMPB

Features

0>AFRP *BKDQE4>IRB

PB J F +>GL0 UFP XOBABCFKBP PB J F +>GL0 UFPY

Constraints

, LKB

9.7.3.2.2 CircularCone

Element

'QB J " BCFKFQFLK

Description

! F0@RI>0 ! LKB FP > ! LKB TFQE > @F0@RI>0 ?>PB

General Types

! LKB

Features

?>PB ! F0@RI>0 " FP@ XOBABCFKBP ?>PBY

0>AFRP *BKDQE4>IRB

PB J F +>GL0 UFP XOBABCFKBP PB J F +>GL0 UFPY

Constraints

, LKB

9.7.3.2.3 CircularCylinder

Element

'QB J " BCFKFQFLK

Description

! F0@RI>0 ! VIFKAB0 FP > ! VIFKAB0 TFQE QTL @F0@RI>0 PFABP

General Types

! VIFKAB0

Features

>C ! F0@RI>0 " FP@ XOBABCFKBP >CY

?>PB !F0@RI>0 "FP@ X0BABCFKBP ?>PBY

C>@BP X0BABCFKBP C>@BPY

Constraints

, LKB

9.7.3.2.6 ConeOrCylinder

Element#106

'QB J " BCFKFQFLK

Description

! LKB - 0 ! VIFKAB0 FP > ! LKB L0 > ! VIFKAB0 TFQE > DFSBK BIIFMQF@>I ?>PB EBFDEQ TFAQE MBOMBKA@RI>0 AFP@>K@B COL J

9.7.3.2.7 ConicSection

Element

'QB J " BCFKFQFLK

Description

9.7.3.2.9 Cuboid

Element

'QB J " BCFKFQFLK

Description

! R?LFA FP > .LIVEBAOLK TFQE PFU PFABP >II NR>AOFI>QB0>I

General Types

! R?LFA - 020F>KDRI>0 .0FP J

Features

BADBP X0BABCFKBP BADBPy

C>@BP X0BABCFKBP C>@BPy

CC / R>AOFI>QB0>I X0BABCFKBP CCY

OC / R>AOFI>QB0>I X0BABCFKBP OCY

Constraints

, LKB

9.7.3.2.10 CuboidOrTriangularPrism

Element

'QB J " BCFKFQFLK

Description

! R?LFA - 020F>KDRI>0 .0FP J FP > .LIVEBAOLK QE>Q FP BFQEBO > ! R?LFA L0 20F>KDRI>0 .0FP J

General Types

.LIVEBAOLK

Features

?C / R>AOFI>QB0>I XPR?PBQP C>@BPy

?CB XPR?PBQP BADBPy

?CIS XPR?PBQP SBQF@BPy

?COS XPR?PBQP SBQF@BPy

?OB XPR?PBQP BADBPy

?OIS XPR?PBQP SBQF@BPy

Description

! VIFKAB0 E>P QTL BIIFM@>I PFABP GLFKBA ?V > @R0SBA PFAB

, LKB

9.7.3.2.13 EccentricCone

Element

'QB J " BCFKFQFLK

Description

K #@@BKQOF@ ! LKB FP > ! LKB TFQE IB>PQ LKB MLPFQFSB LCCPBQ

General Types

! LKB

Features

, LKB

Constraints

, LKB

9.7.3.2.14 EccentricCylinder

Element

'QB J " BCFKFQFLK

Description

K #@@BKQOF@ ! VIFKAB0 FP > ! VIFKAB0 TFQE IB>PQ LKB MLPFQFSB LCCPBQ

General Types

! VIFKAB0

Features

, LKB

Constraints

, LKB

9.7.3.2.15 Ellipse

Element

'QB J " BCFKFQFLK

Description

K #IIFMPB FP > ! LKF@1B@QFLK FK QEB PE>MB LC >K BIIFMPB LC DFSBK PB J F>UBP

General Types

! LKF@1B@QFLK

Features

BADBP X0BABCFKBP BADBPY

PB J F+>GL0 UFP *BKDQE4>IRB

PB J F+FKL0 UFP *BKDQE4>IRB

Constraints

, LKB

9.7.3.2.16 Ellipsoid

Element

'QB J " BCFKFQFLK

Description

K #IIFMPLFA FP > ! LKF@1ROC>@B TFQE LKIV BIIFMQF@>I @OLPP PB@QFLKP

General Types

! LKF@1ROC>@B

Features

! LKF@1B@QFLK

Features

@LKGRD>QB UFP *BKDQE4>IRB

, LKB

9.7.3.2.20 Parabola

Element

'QB J " BCFKFQFLK

Description

.>0>?LI> FP > MI>K>0 .>QE FK QEB PE>MB LC > M>0>?LI> LC > DFSBK CL@>I IBKDQE

General Types

! LKF@1B@QFLK

Features

BADBP X0BABCFKBP BADBPY

CL@>I " FP@>K@B *BKDQE4>IRB

Constraints

, LKB

9.7.3.2.21 Paraboloid

Element

'QB J " BCFKFQFLK

Description

.>0>?LILFA FP > ! LKF@1ROC>@B TFQE LKIV M>0>?LIF@ @0LPP PB@QFLKP

General Types

! LKF@1ROC>@B

Features

C>@BP X0BABCFKBP C>@BPy

CL@>I " FP@>K@B *BKDQE4>IRB

Constraints

, LKB

9.7.3.2.22 Path

Element

'QB J " BCFKFQFLK

Description

.>E FP QEB J LPQ DBKB0>I PQR@QROBA !ROSB

General Types

1QR@QROBA 1M>@B - ?GB@Q
'QB J
!ROSB

Features

BADBP 9 ; X0BABCFKBP BADBPY

C>@BP X0BABCFKBP C>@BPY

SB0FF@BP X0BABCFKBP SB0FF@BPY

Constraints

, LKB

9.7.3.2.23 PlanarCurve

Element

'QB J " BCFKFQFLK

Description

.I>K>0 !ROSB FP > !ROSB TFE > DFSBK length

.I>K>01R0C>@B FP > 1R0C>@B TFQE DFSBK area @E>@FP CI>@

General Types

, LKB

9.7.3. Quadrilateral

H

'QB J " BCFKFQFLK

Description

/ R>AOFI>QB0>I FP > CLR0 PFABA . LIVDLK

General Types

. LIVDLK

Features

B

General Types

. V0> J FA

Features

Features

, LKB

9.7.3.2.36 RightTriangularPrism

Element

'QB J " BCFKFQFLK

Description

OFDE(20>KDRI>0.0FP J > 20>KDRI>0.0FP J TFQE(TL OFDE(0>KDIR>0 PFABP TFQE DF\$BK length width

, LKB

Constraints

, LKB

9.7.3.2.38 Sphere

Element

'QB J " BCFKFQFLK

Description

1MEB0B FP >K #IIFMPLFA TFQE >II QEB P> J B PB J F>UBP

General Types

#IIFMPLFA

Features

0>AFRP *BKDJQE4>IRB

PB J F UFP XOBABCFKBP PB J F UFP Y

PB J F UFP

Constraints

, LKB

9.7.3.2.39 Tetrahedron

Element

'QB J " BCFKFQFLK

Description

2BQ0>EBA0LK FP . V0> J FA TFQE > QF>KDRI>0 ?>PB

General Types

. V0> J FA

Features

?>PB 20F>KDIB X0BABCFKBP ?>PBY

?>PB*BKDQE *BKDJQE4>IRB

?>PB 5 FAQE *BKDJQE4>IRB

Constraints

Description

20F>KDRI>0 .0FP J FP > .LIVEBA0LK TFQE CFSB PFABP QTL QOF>KDRI>0 >KA QEB LQEBOP NR>AOFI>QB0>I

General Types

! R?LFA - 020F>KDRI>0 .0FP J

Features

#U> J MIBP QE>Q FKCL0 J >IIV FIIRPQ>QB QEB AFPQFK@QFLK ?BQTBBK COBB >KA ?LRKA SB@QLO NR>KQFQFCU> δ e D 5 aL0 @QLO NR9åMLFO 5 a d 3 #U>

NR>KQFQV . LTB0\$>@QLOP / R>KQFQV . LTB0\$>@QLO 9 ; XL0AB0BAY

Constraints

, LKB

9.8.2.2.3 QuantityPowerFactor

Element

QQOF?RQB " BCFKFQFLK

Description

?>PB / R>K0F0FBP 1@>I>0 / R>K0F0V4>IRB 9 ; XLOAB0BAY

Constraints

@LK@>S>OF>K@ ?V ABC>RI@ >KA @EB@BCL@B PB@ contravariantOrder BNR>I @L order >KA covariantOrder BNR>I @L
WBOL

General Types

Constraints

@BIIIP J>0HBA O CL0 J QEB 0L>QFLK J>QOFU >KA QEB @BIIIP J>0HBA 2 CL0 J QEB Q0>KPI>QFLK SB@QLO , LQB 1BB
EQQMP BK TFHFMBAF> LOD TFHF 20>KPCL0 J>QFLK= J>QOFU RKAB0 >CCFKB Q0>KPCL0 J>QFLKP CL0 > DBKB0>I BUMI>K>QFLK

4 B@QLO + B>PROB J BKQOBCB0BK@B

Features

!0>KPCL0 J >QFLK ! LL0AFK>QB20>KPCL0 J >QFLK 9 ;

Constraints

, LKB

9.8.3.2.6 CoordinateFramePlacement

Element

QQOF?RQB " BCFKFQFLK

Description

! LL0AFK>QB\$0>JB . I>@B J BKQ FP > ! LL0AFK>QB20>KPCL0 J >QFLK ?V MI>@B J BKQ LC QEB >0DBQ C0>J B FK QEB PLR0@B C0>J B
QQOF?RQB origin PMB@FCFBP QEB IL@>QFLK LC QEB LOFDFK LC QEB >0DBQ C0>J B QEOLRDE > SB@QLO FK QEB PLR0@B C0>J B
QQOF?RQB basisDirections PMB@FCFBP QEB LOFBKQ>QFLK LC QEB

! LL0AFK>QB20>KPCL0 J >QFLK FP >K QQOF?RQB " BCFKFQFLK QE>Q ABCFKBP QEB QO>KPCL0 J >QFLK OBI>QFLKPEFM ?BQTBBK QT

QQOF?RQB "BCFKFQFLK

Description

CountValue FP >K BUMIF@F ABCFKFQFLK LC > DBKB0F@ @LRK@ NR>KQF@V >P > DimensionOneValue

V@IF@I@P@T@8T@ñ) ñD

"F J BKPFLK - KB4>IRB

Features

, LKB

Constraints

, LKB

9.8.3.2.10 CyclicRatioScale

Element

QQOF?RQB "BCFKFQFLK

Description

! V@IF@O>QFL1@>IB FP > + B>PROB J BK@1@>IB QE>0 BMOBPBK@P > 0>QFL P@>IB TF@E > MB0FLAF@ @V@IB

#U>J MIB @V@IF@ ABD0BB QL BUMOBPP MI>K>0 >KDRI>0 J B>PROBP TF@E modulus = 360 >KA unit ABD0BB

#U>J MIB ELR0 LC A>V TF@E

, LKB

Constraints

, LKB

Constraints

, LKB

9.8.3.2.21 nullTransformation

Element

QQOF?RQB 3 P>DB

Description

General Types

, RII20>KPCL0 J >QFLK

Features

, LKB

Constraints

, LKB

9.8.3.2.22 153e

Element

QQOF?RQB 3 P>DB

Description

General Types

" F J BKPFLK - KB 3 KFQ

Note 'K L0ABO QL HBBM QEB IF?0>0V PF J MIB QEB >PPL@F>QBA unit LC >K - 0AFK>I1@>IB PE>II ?B PBQ QL QEB RKFQ LC AF J BKPKLK LKB >IQLRDE > RKFQ FP J B>KFKDIBPP CL0 >K - 0AFK>I1@>IB

Implementation note 2EB RKFQ >QOF?RQB LC + B>PROB J BKQ1@>IB PELRIA ?B J >AB LMQFLK>I >KA FQP J RIQFMIF@FQV ?B OBABCFLKBA FK QEB PMB@F>FW>FLK LC + B>PROB J BKQ1@>IB

General Types

+ B>PROB J BKQ1@>IB

Features

, LKB

Constraints

, LKB

9.8.3.2.24 QuantityValueMapping

Element

QOF?RQB "BCFKFQFLK

Description

1@>IB 4>IRB "BCFKFQFLK FP >K QOF?RQB "BCFKFQFLK QE>Q 0BD@D4 d é . 8G ñÄD

QOF?RQB "BCFKFQFLK

Description

OBMOBPBK>QFLK LC >OL>QFLK >?LR>K >UFP LSB0 >K >KDIB QOF?RQB axisDirection PMB@FCFBP QEB AF0B@QFLK LC QEB OL>QFLK >UFP QOF?RQB angle PMB@FCFBP QEB >KDIB LC OL>QFLK TEB0B >MLPFQFSB S>IRB FJ MIFBP OFDEQ E>KABA OL>QFLK

QOF?RQB isIntrinsic asserts whether the intermediate coordinate frame moves with the rotation or not, i.e. whether an intrinsic or extrinsic rotation is specified. See

9.8.3.2.28 SystemOfUnits

Element

QQOF?RQB "BCFKFQFLK

Description

SystemOfUnits 0BM0BPBKQP QEB BPPBKQF>IP LC 94 '+ ; @LK@BMQ PVPQB J LC RKFQP EQQMP G@D J ?FM J LOD SF J BK

2EB shortName

Outright f&hβ` J

, LKB

Features

@LKSBOPLK\$>@L0 OB>I

QQF?RQB TonFehsi(dIFactorT Ås\$ b F^DQTU 2¼ RÅ EFJ ?0 d ÅN3 TP 6Å, #ð d Å Ä 6 X(’ V Eg ‡ X(” ÅB&

QQOF?RQB " BCFKFQFLK

Description

3KFQ. OBCFU FP >K QQOF?RQB " BCFKFQFLK QE>Q OBM0BPBKQP > K> J BA J RIQFMIB L0 PR? J RIQFMIB J B>PROB J BKQ RKFQ MOBCFU >P ABCFKBA FK '1 - '# !

General Types

, LKB

Features

@LKSBOPLK\$>@L0 OB>I

QQOF?RQB conversionFactor FP >K 'KQBDB0 QE>Q PMB@FCFBP QEB S>IRB LC J RIQFMIB L0 PR? J RIQFMIB LC QEFP 3KFQ. OBCFU
ILKD ,>J B 1QFKD

PV J ?LI 1QFKD

QQOF?RQB symbol OBM0BPBKQP QEB PEL0Q PV J ?LIF@ K> J B LC QEFP 3KFQ. OBCFU

#U  YC~~S~~ PÄD

a ISQCharacteristicNumbers CL0 9'1 - ; !E>@QB0FPQF@ KR J ?B0P
a ISQCondensedMatter CL0 9'1 - ; !LKABKPBA J>@QB0 MEVPF@P
a

Description

General Types

1@>I>0 / R>KQFQV4>IRB

Features

Constraints

, LKB

9.8.4.2.6 duration

QQOF?RQB " BCFKFQFLK

Description

General Types

1F J MIB 3 KFQ

Features

, LKB

Constraints

BKB⁴

9.8.4.2.17 LuminousIntensityValue

Element

QQOF?RQB " BCFKFQFLK

Default Types

Constraints

, LKB

9.8.4.2.19 MassUnit

Element

QQOF?RQB " BCFKFQFLK

Description

General Types

1F J MIB 3 KFQ

Features

, LKB

Constraints

, LKB

9.8.4.2.20 MassValue

Element

QQOF?RQB " BCFKFQFLK

Description

General Types

1@>I>0 / R>KQF(V4>IRB

Features

J OBC +>PP 3 KFQ X0BABCFKBP J OBCY

KR J OB>I X0BABCFKBP KR J Y

Constraints

, LKB

9.8.4.2.21 Position3dVector

Element

QQOF?RQB " BCFKFQFLK

Description

General Types

Name	Symbol	Value
DFD>	%	
QBO>	2	
MBQ>	.	
BU>	#	
WBQQ>	8	
VLQQ>	7	

'1 - '# ! MOBCFUBP CLO ?FK>OV J RIQFMIBP F B J RIQFMIBP LC
 FK>OV=MOBCFU 1BB >IPL EQQMP BK TFHFMBAF> LOD TFHF

Name	Symbol	Value
HF?Fd) F	
J B?F	+ F	
DF?F	%F	
QB?F	2F	

9.8.8.2.5 Iso8601DateTime

Element

QQOF?RQB "BCFKFQFLK

Description

OBM0BPBKQ>FLK LC>K '1 - A>QB>KA QFJ B FK BUQBKABA P00FKD CL0 J>Q

General Types

3@2FJ B'KPQ>K@4>IRB

Features

KR J OB>I X0BABCfkBP KR J Y

S>I 'PL " >QB2FJ B#K@LAFKD

Constraints

, LKB

General Types

3@2F J B'KP>K@4>IRB

Features

A>V , >R>I

ELR0 , >R>I

ELR0 - CCPBQ 'KBDB0

J F@0LPB@LKA , >R>I

J FKRQB , >R>I

J FKRQB - CCPBQ 'KBDB0

J LKQE , >R>I

KR J OB>I X0BABCFBP KR J Y

PB@LKA , >R>I

VB>0 'KBDB0

Constraints

, LKB

9.8.8.2.8 timelInstant

Element

QQF?RB3P>DB

Description

General Types

P@I>0 / R>K@FBP
2F J B'KP>K@4>IRB

Features

AD

'C LKB Occurrence E>MMBKP F J J BAF>QBV ?BCL0B >KLQEB0 QEBK QEB TimeOf QEB BKA PK>MPELQ LC QEB CFOPQ - @@R00BK@B
BNR>IP QEB TimeOf QEB PB@LKA Occurrence

QF J B - OABOKD ! LKPQO>FKQ

'C LKB Occurrence E>MMBKP ?BCL0B >KLQEB0 QEBK QEB TimeOf QEB BKA PK>MPELQ LC QEB CFOPQ Occurrence FP KL
DOB>QBO QE>K QEB TimeOf QEB PB@LKA Occurrence

9.8.8.2.11 TimeOfDay

Element

QQOF?RQB " BCFKFQFLK

Description

%BKB0F@ 0BMOBPBK>QFLK LC >QI i P 6àßà µççD

General Types

2FJB' n gS

Features

, LKB

Constraints

, LKB

9.8.8.2.12 TimeScale

Element

QQOF?RQB " BCFKFQFLK

Description

%BKB0F@ QI i U 6PA%T@ à µn %@IRE @ à %U #BCFKFQFLK LC QEB J B>KF @ Ä \$Aµn %@IRB
QQOF?RQB *definitionalEpoch*

, LKB

9.8.8.2.13 universalClock

Element

.>003P>DB

Description

universalClock FP > PFKDIB clock (E>@K ?B RPBA >P > ABC>RIQ RKFSB0P>I (FJB 0BCB0BK@B

General Types

! IL@H
L?B@QP
! IL@H
RKFSB0P>I ! IL@H

Features

, LKB

Constraints

, LKB

9.8.8.2.14 UTC

Element

9.8.10.1 Vector Calculations Overview

Basics

A Annex: Example Model

'KCL0 J>QFSB

A.1 Introduction

```
package VehicleConfigurations{
    package VehicleConfiguration_a{ ... }
    package VehicleConfiguration_b{
        package PartsTree{ ... }
        package ActionTree{ ... }
        package Requirements{ ... }
    }
}
package VehicleAnalysis{ ... }
package VehicleVerification{ ... }
package Individuals{ ... }
package Views_Viewpoints{ ... }
...
}
```

DEANSHK2PLÄ\$YPQBAJLABICBLCQKL0D0YI\$+HNP%&HBS\$XK5DE\$JK500, ,TATÄÄ?D6 &S\$V

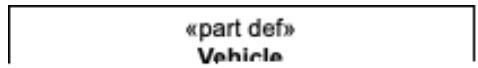


Figure 56. Part Definition for Vehicle

>PPFDKBA P|>KA>0A RKF|P COL J |EB SI PBB _____ L0 *USCustomaryUnits* PBB _____

2EB *fuel1* @LK0>FKP >K >QOF?RQB @>IIBA *fuel1Mass* 2EB *Fuel1Tank* @LK0>FKP >K >QOF?RQB @>IIBA *fuel1MassMax* TEF@E
0BMOBPBKQP QEB J >UF J R J >J LRKQ LC CRBI QE>Q >*Fuel1Tank* @>K PQLOB @LKPQ0>FKQ FP F J MLPBA QE>Q QEB *fuel1Mass* J RPQ
?B IBPP QE>K L0 BNR>I QL QEB *fuel1MassMax* 2EB @LKPQ0>FKQ FP >PPBQBA QL ?B QORB ?B@>RPB FC QEB *fuel1Mass* BU@BBAP
QEB *fuel1MassMax* QEB J LABI TLRIA ?B FK@LKPFPQBKQ >KA QEB J LABI S>IFA>FLK PELRIA DBKB0>QB >K B00L0 'C >PPBQ FP
KLQ RPBA TQE QEB @LKPQ0>FKQ QEB J LABI @LRIA BS>IR>QB QEB @LKPQ0>FKQ QL ?B C>IPB >KA QEB J LABI S>IFA>FLK PELRIA KLQ
DBKB0>QB >K B00L0

2EB *Fuel1Tank* >IPL @LK0>FKP > *fuel1InPort*

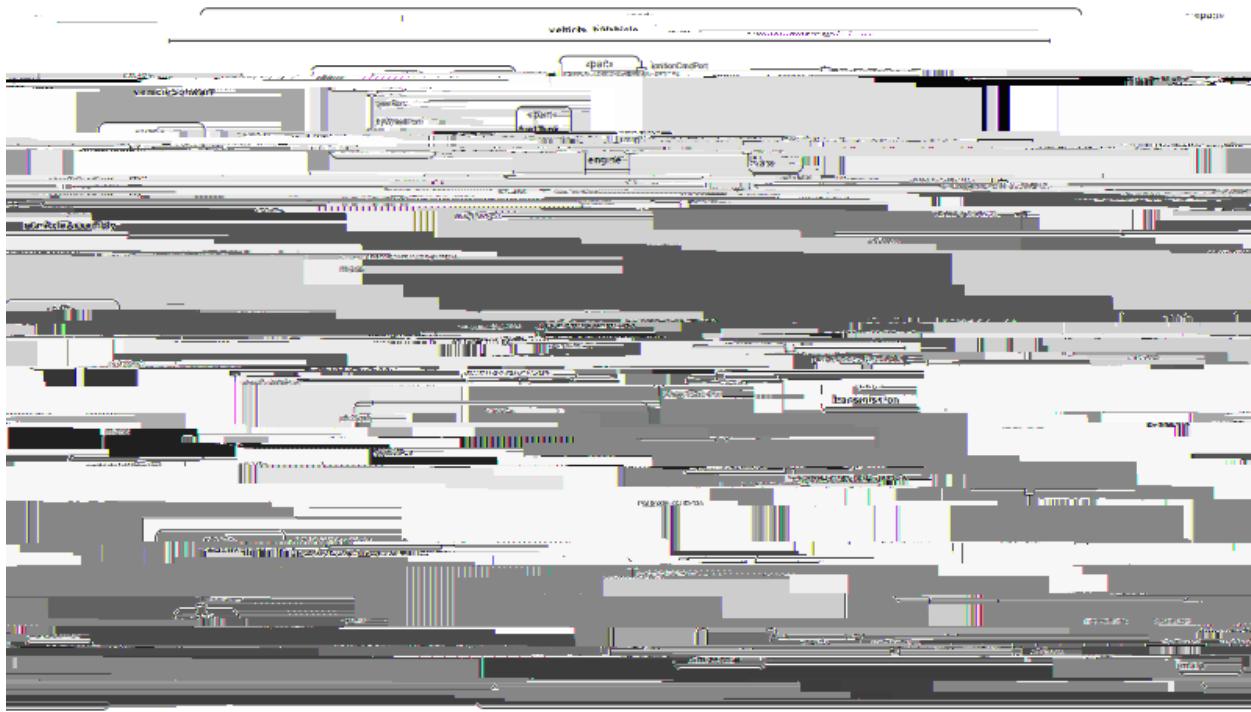


Figure 63. Parts Interconnection for vehicle_b

```
part vehicle_b : Vehicle{
    port fuelCmdPort redefines pwrCmdPort;
    port vehicleToRoadPort redefines vehicleToRoadPort{
        port wheelToRoadPort1;
        port wheelToRoadPort2;
    }
    part fuelTank:FuelTank{
        port fuelOutPort;
    }
    part rearAxleAssembly{
        port shaftPort_d;
        part 283 Tf:iq4:f:iq
```

```
    port rightAxleToWheelPort;  
}
```



```
...
first start;
then fork fork1;
    then driverGetInVehicle;
    then passenger1GetInVehicle;
```

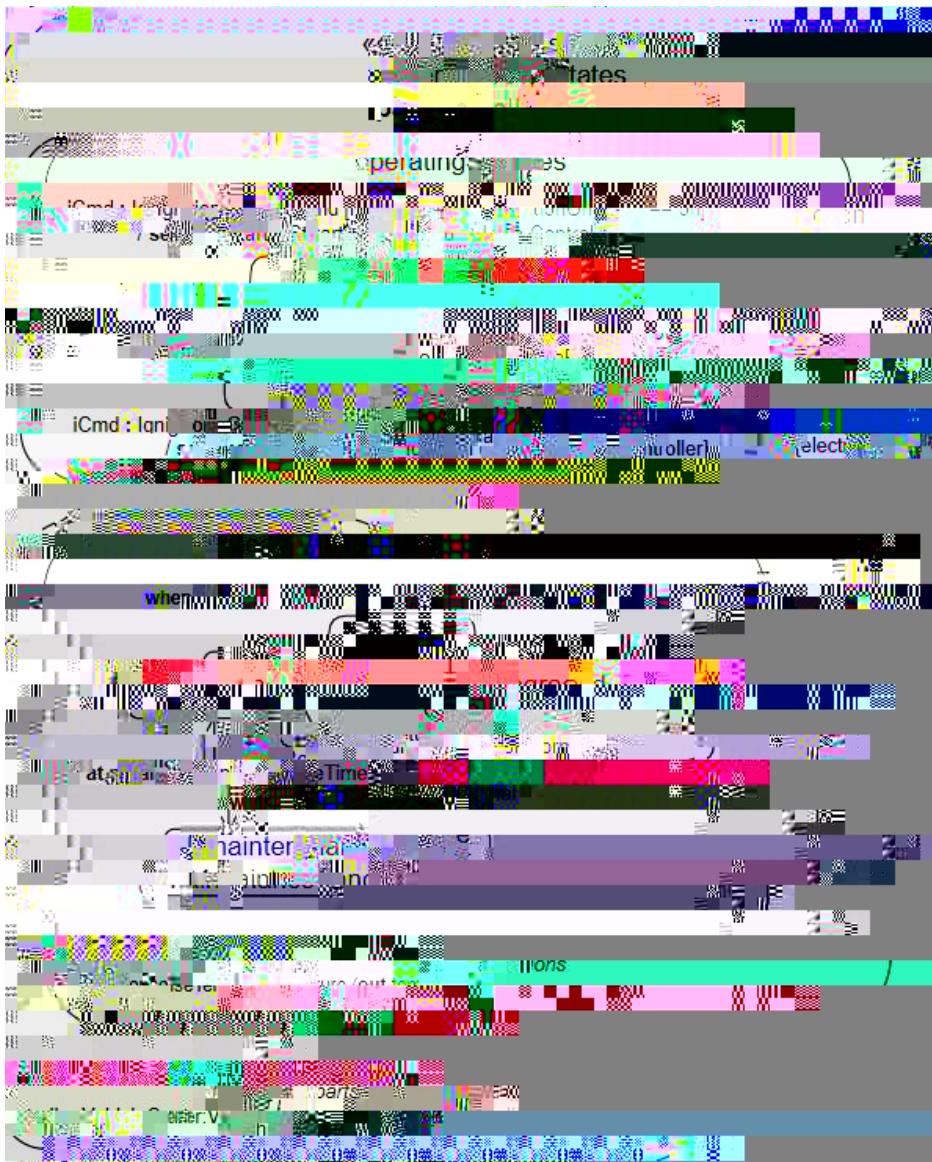


Figure 67. Vehicle States

```
exhibit state vehicleStates parallel {
    ref controller;

    state operatingStates {
        ...
    }

    state healthStates {
        ...
    }
}
```

2EB *operatingStates*

```
out temp;
```



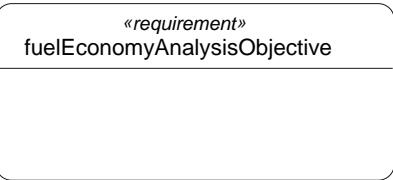
```

        }
        requirement <'2_2'> highwayFuelEconomyRequirement : FuelEconomyRequirement {
            redefines requiredFuelEconomy= 12.75 [km / L];
            assume constraint {assumedCargoMass>=500 [kg]}
        }
    }
requirement engineSpecification{
    subject engine1:Engine;
    requirement <'1'> enegineMassRequirement : MassRequirement {
        ...
    }
    #derivation connection{
        end #original ::> vehicleSpecification.vehicleMassRequirement;
        end #derive ::> engineSpecification.engineMassRequirement;
    }
}

```

'K LOAB0 @L BS>IR>@B TEB@EB0 vehicle_b P>@FPCFBP @EB vehicleMassRequirement @EB

<i>«analysis»</i> fuelEconomyAnalysis
<i>parameters</i>
in scenario: Scenario out calculatedFuelEconomy:> AttributeDefinitions::distancePerVolume=FuelConsumption(f_a, f_b, tpd_avg)
<i>attributes</i>
bsfc= ComputeBSFC(vehicle_b.engine) distance= TraveledDistance(scenario) f_a= BestFuelConsumptionPerDistance(vehicle_b.mass, bsfc, tpd_avg, distance) f_b= IdlingFuelConsumptionPerTime(vehicle_b.engine) tpd_avg= AverageTravelTimePerDistance(scenario)
<i>subjects</i>
= vehicle_b



SB0FCF@>QFLK @>PB 0BQR0KP > SB0AF@Q LC *pass* L0 *fail* ?>PBA LK TEBQEBO QEB J B>PROBA J >PP P>QFPCFBP QEB J >PP
0BNRF0B J BKQ

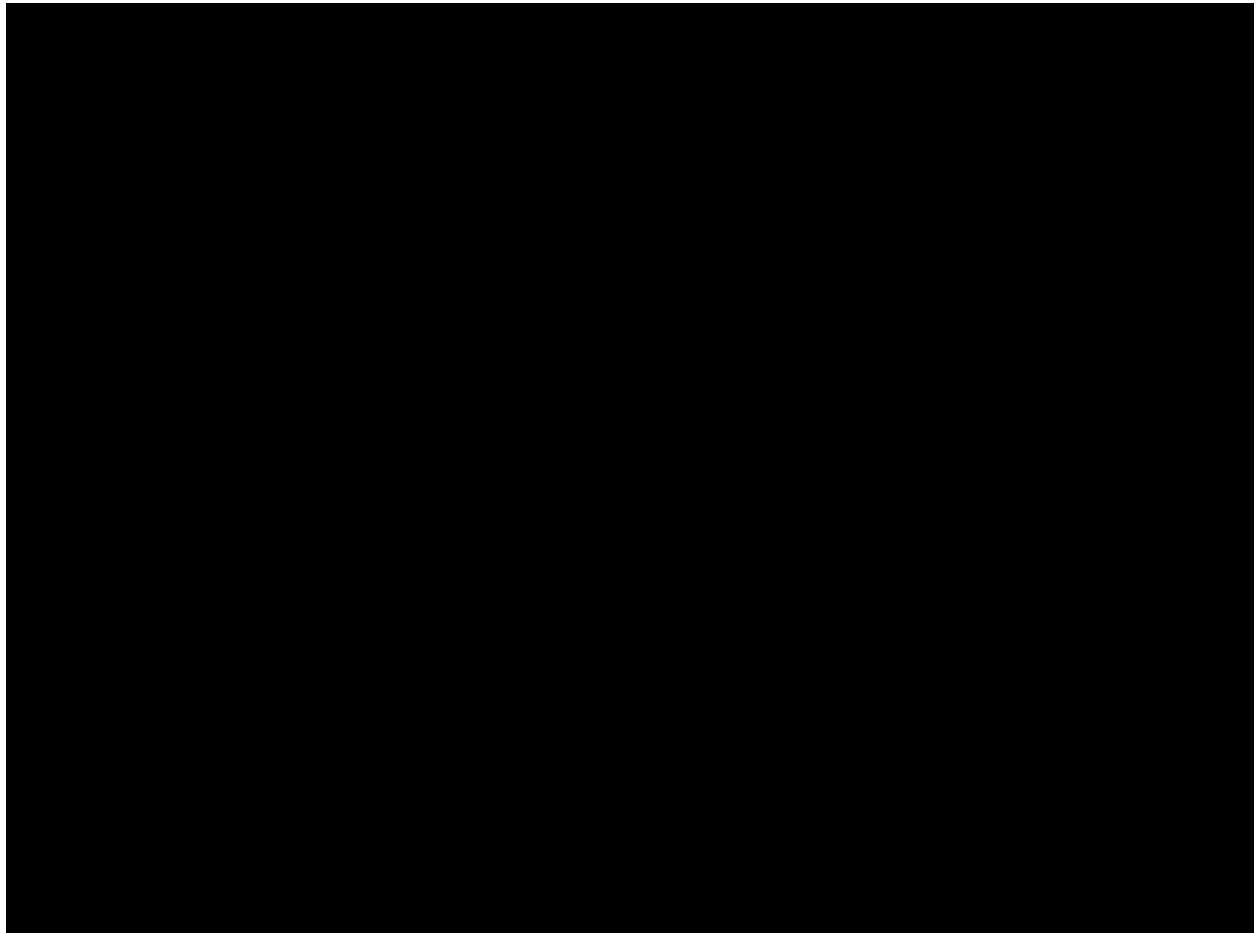


Figure 71. Vehicle Mass Verification Test

```

        vehicleSpecification.vehicleMassRequirement(vehicle_b)
    );
}
flow from weighVehicle.massMeasured to evaluatePassFail.massMeasured;
return :>> verdict = evaluatePassFail.verdict;
}
}
package VerificationSystem{
    part massVerificationSystem{
        perform massTests;
        part scale{
            perform massTests.weighVehicle;
        }
        part operator{
            perform massTests.evaluatePassFail;
        }
    }
}

```

A.11 View and Viewpoint

2EB SafetyEngineer FP > P@HBELIAB0 TRQE > @LK@B0K CL0 VehicleSafety 2EB safetyViewpoint CO>J BP QFP
 @LK@B0K 2EB SFBT vehiclePartsTree_Safety FP > PartsTreeView QE>P>QFPCFBP QEB SafetyViewpoint >KA
 QEBOBCL0B >AAOBPPBP QEB VehicleSafety @LK@B0K

2EB SFBT ABCFKFQFLK TreeView

```

        }
        viewpoint safetyViewpoint{
            frame concern vs:VehicleSafety;
        }
    }
    package ViewDefinitions{
        view def TreeView {
            render asTreeDiagram;
        }
        view def PartsTreeView:>TreeView {
            filter @SysML:::PartUsage;
        }
    }
    package VehicleViews{
        view vehiclePartsTree_Safety:PartsTreeView{
            satisfy safetyViewpoint;
            filter @Safety;
            expose vehicle_b::**;
        }
    }
}

```

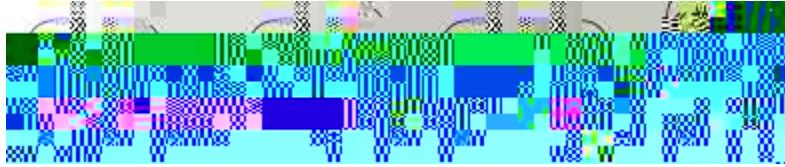


Figure 73. Rendering of view vehiclePartsTree_Safety

A.12 Variability

2EB M>0 vehicleFamily

K >K>IVPFP J >V ?B RPBA QL @L J MRQB QEB S>IRBP LC QEB >QQOF?RQBP CL0 B>@E PK>MPELQ 2EB >K>IVPFP 0BPRIQP 0BCIB@Q QEB
QF J B EFPQLOV LC QEB FKAFSFAR>IP TEF@E J >V ?B SFPR>IFWBA RPKD QVMF@>I QF J B ?>PBA MILQP >KA A>> 0BM0BPBKQ>QFLKP

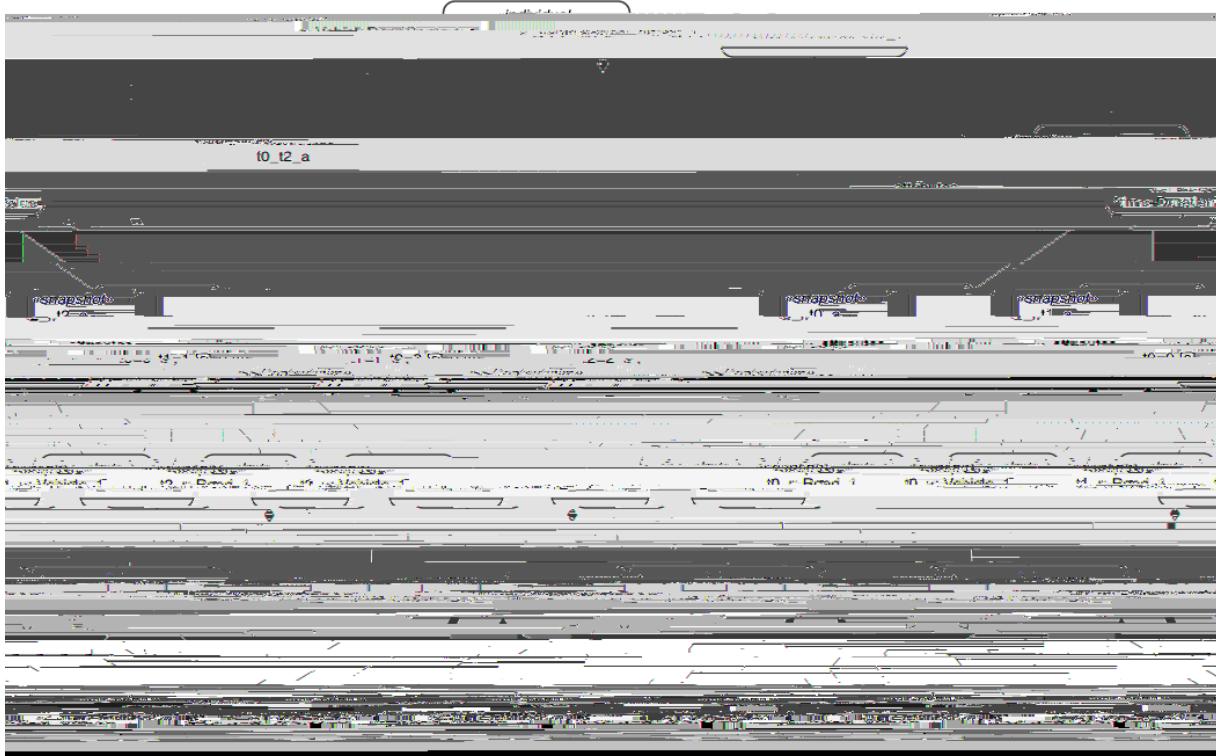


Figure 75. Vehicle Individuals and Snapshots

```
:>>acceleration=1.96 [m/s**2];
snapshot t1_fa:FrontAxeAssembly_1{
    snapshot t1_leftFront:Wheel_1;
    snapshot t1_rightFront:Wheel_2;
}
}
}
snapshot t2_a{
    attribute t2 redefines time=2 [s];
    snapshot t2_r:Road_1{
        :>>incline =0;
        :>>friction=.1;
    }
    snapshot t2_v:Vehicle_1{
        :>>position=3.92 [m];
        :>>velocity=3.92 [m/s];
        :>>acceleration=1.96 [m/s**2];
        snapshot t2_fa:FrontAxeAssembly_1{
            snapshot t2_leftFront:Wheel_1;
            snapshot t2_rightFront:Wheel_2;
        }
    }
}
```