

## Description logic view: GFO-basic

### Classes

#### Abstract

Abstract  $\sqsubseteq$  Individual  
Abstract  $\sqsubseteq \neg$  Space\_time  
Abstract  $\sqsubseteq \neg$  Concrete

#### Amount\_of\_substrate

Amount\_of\_substrate  $\sqsubseteq$  Presential

#### Axiom0

Axiom0  $\equiv$  Property  $\sqcap \exists$  property\_of Presential  
Axiom0  $\sqsubseteq$  Presential  
Axiom0  $\sqsubseteq$  Thing

#### Category

Category  $\sqsubseteq \neg$  Individual

#### Change

Change  $\sqsubseteq$  Occurrent  
Change  $\sqsubseteq \neg$  Event  
Change  $\sqsubseteq \neg$  History

#### Chronoid

Chronoid  $\sqsubseteq =$  has\_left\_time\_boundary Entity  
Chronoid  $\sqsubseteq$  Temporal\_region  
Chronoid  $\sqsubseteq =$  has\_right\_time\_boundary Entity

#### Concept

Concept  $\sqsubseteq$  Category  
Concept  $\sqsubseteq \neg$  Universal  
Concept  $\sqsubseteq \neg$  Symbol\_structure

#### Concrete

Concrete  $\sqsubseteq$  Individual  
Concrete  $\sqsubseteq \neg$  Space\_time  
Concrete  $\sqsubseteq \neg$  Abstract

### **Continuous<sub>c</sub>hange**

Continuous\_change  $\sqsubseteq$  Change

Continuous\_change  $\sqsubseteq \neg$  Discrete\_change

### **Continuous<sub>p</sub>rocess**

Continuous\_process  $\sqsubseteq$  Process

### **Discrete<sub>c</sub>hange**

Discrete\_change  $\sqsubseteq$  Change

Discrete\_change  $\sqsubseteq \neg$  Continuous\_change

### **Discrete<sub>p</sub>rocess**

Discrete\_process  $\sqsubseteq$  Process

### **Entity**

Entity  $\equiv$  Thing

### **Event**

Event  $\sqsubseteq$  Occurrent

Event  $\sqsubseteq \neg$  History

Event  $\sqsubseteq \neg$  Change

### **History**

History  $\sqsubseteq$  Occurrent

History  $\sqsubseteq \neg$  Event

History  $\sqsubseteq \neg$  Change

### **Individual**

Individual  $\sqsubseteq \neg$  Category

### **Left<sub>t</sub>ime<sub>b</sub>oundary**

Left\_time\_boundary  $\equiv$  Time\_boundary  $\sqcap \exists$  left\_boundary\_of Chronoid

Left\_time\_boundary  $\sqsubseteq \neg$  Right\_time\_boundary

### **Line**

Line  $\equiv \exists$  spatial\_boundary\_of Surface

Line  $\sqsubseteq$  Spatial\_boundary

### **Material<sub>boundary</sub>**

Material\_boundary  $\sqsubseteq \exists$  depends\_on Material\_object  
Material\_boundary  $\sqsubseteq$  Presential  
Material\_boundary  $\sqsubseteq \exists$  framed\_by Spatial\_boundary  
Material\_boundary  $\sqsubseteq \neg$  Material\_object

### **Material<sub>object</sub>**

Material\_object  $\sqsubseteq$  Presential  
Material\_object  $\sqsubseteq \exists$  framed\_by Topoid  
Material\_object  $\sqsubseteq \neg$  Material\_boundary

### **Occurrent**

Occurrent  $\sqsubseteq$  Processual\_Structure  
Occurrent  $\sqsubseteq \neg$  Process

### **Perpetuant**

Perpetuant  $\sqsubseteq$  Concrete

### **Point**

Point  $\equiv \exists$  spatial\_boundary\_of Line  
Point  $\sqsubseteq$  Spatial\_boundary

### **Presential**

Presential  $\sqsubseteq$  Concrete  
Presential  $\sqsubseteq \exists$  exists\_at Time\_boundary  
Presential  $\sqsubseteq \neg$  Processual\_Structure

### **Process**

Process  $\sqsubseteq \exists$  projects\_to Temporal\_region  
Process  $\sqsubseteq$  Processual\_Structure  
Process  $\sqsubseteq \neg$  Occurrent

### **Processual<sub>structure</sub>**

Processual\_Structure  $\sqsubseteq$  Concrete  
Processual\_Structure  $\sqsubseteq \neg$  Presential

### **Processual<sub>role</sub>**

Processual\_role  $\sqsubseteq \exists$  role\_of Process  
Processual\_role  $\sqsubseteq$  Role

Processual\_role  $\sqsubseteq$  Process  
Processual\_role  $\sqsubseteq \neg$  Social\_role  
Processual\_role  $\sqsubseteq \neg$  Relational\_role

### **Property**

Property  $\sqsubseteq$  Individual  
Property  $\sqsubseteq \neg$  Relator

### **Relational<sub>role</sub>**

Relational\_role  $\sqsubseteq$  Property  
Relational\_role  $\sqsubseteq \exists$  played\_by Entity  
Relational\_role  $\sqsubseteq \exists$  role\_of Relator  
Relational\_role  $\sqsubseteq$  Role  
Relational\_role  $\sqsubseteq \neg$  Social\_role  
Relational\_role  $\sqsubseteq \neg$  Processual\_role

### **Relator**

Relator  $\sqsubseteq$  Individual  
Relator  $\sqsubseteq \neg$  Property

### **Right<sub>time<sub>boundary</sub></sub>**

Right\_time\_boundary  $\equiv$  Time\_boundary  $\sqcap \exists$  right\_boundary\_of Chronoid  
Right\_time\_boundary  $\sqsubseteq \neg$  Left\_time\_boundary

### **Role**

Role  $\sqsubseteq$  Individual

### **Social<sub>role</sub>**

Social\_role  $\sqsubseteq$  Role  
Social\_role  $\sqsubseteq \neg$  Relational\_role  
Social\_role  $\sqsubseteq \neg$  Processual\_role

### **Space**

Space  $\sqsubseteq$  Space\_time  
Space  $\sqsubseteq \neg$  Time

### **Space<sub>time</sub>**

Space\_time  $\sqsubseteq$  Individual  
Space\_time  $\sqsubseteq \neg$  Abstract  
Space\_time  $\sqsubseteq \neg$  Concrete

### **Spatial<sub>b</sub>oundary**

Spatial\_boundary  $\equiv \exists$  spatial\_boundary\_of Space

Spatial\_boundary  $\sqsubseteq$  Space

Spatial\_boundary  $\sqsubseteq \neg$  Spatial\_region

### **Spatial<sub>r</sub>egion**

Spatial\_region  $\sqsubseteq$  Space

Spatial\_region  $\sqsubseteq \neg$  Spatial\_boundary

### **State**

State  $\sqsubseteq$  Process

### **Surface**

Surface  $\equiv \exists$  spatial\_boundary\_of Topoid

Surface  $\sqsubseteq$  Spatial\_boundary

### **Symbol<sub>s</sub>tructure**

Symbol\_structure  $\sqsubseteq$  Category

Symbol\_structure  $\sqsubseteq \neg$  Concept

Symbol\_structure  $\sqsubseteq \neg$  Universal

### **Temporal<sub>r</sub>egion**

Temporal\_region  $\sqsubseteq$  Time

Temporal\_region  $\sqsubseteq \neg$  Time\_boundary

### **Thing**

Thing  $\equiv$  Entity

### **Time**

Time  $\sqsubseteq$  Space\_time

Time  $\sqsubseteq \neg$  Space

### **Time<sub>b</sub>oundary**

Time\_boundary  $\equiv$  Left\_time\_boundary  $\sqcup$  Right\_time\_boundary

Time\_boundary  $\equiv \exists$  time\_boundary\_of Temporal\_region

Time\_boundary  $\sqsubseteq$  Time

Time\_boundary  $\sqsubseteq \neg$  Temporal\_region

## Topoid

Topoid  $\sqsubseteq$  Spatial\_region

## Universal

Universal  $\sqsubseteq$  Category

Universal  $\sqsubseteq \neg$  Concept

Universal  $\sqsubseteq \neg$  Symbol\_structure

## Object properties

### **abstract<sub>haspart</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlabstractpartof} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlab}$

### **abstract<sub>partof</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlabstractpartof} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlab}$   
TransitivePropertyabstract\_part\_of

### **boundary<sub>of</sub>**

$\sqsubseteq$  depends\_on

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlboundaryof} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlhas}$

$\top \sqsubseteq \leq 1$  boundary\_of Thing

### **coincides<sub>with</sub>**

coincides\_with  $\equiv$  coincides\_with<sup>-</sup>

$\exists$  coincides\_with Thing  $\sqsubseteq$  Spatial\_boundary  $\sqcup$  Time\_boundary

$\top \sqsubseteq \forall$  coincides\_with (Spatial\_boundary  $\sqcup$  Time\_boundary)

### **depends<sub>on</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owldependson} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlnecess}$

TransitivePropertydepends\_on

### **exhibits**

$\exists$  exhibits Thing  $\sqsubseteq$  Perpetuant

$\top \sqsubseteq \forall$  exhibits Presential

### **exists<sub>at</sub>**

$\top \sqsubseteq \leq 1$  exists\_at Thing

$\exists$  exists\_at Thing  $\sqsubseteq$  Presential

$\top \sqsubseteq \forall$  exists\_at Time\_boundary

### **framed<sub>by</sub>**

$\langle \text{http://www.onto-med.de/ontologies/gfo.owlframed}_{by} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo.owlframes} \rangle$   
 $\exists \text{ framed\_by Thing} \sqsubseteq \text{Presential}$   
 $\top \sqsubseteq \forall \text{ framed\_by Space}$

### **frames**

$\langle \text{http://www.onto-med.de/ontologies/gfo.owlframed}_{by} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo.owlframes} \rangle$   
 $\exists \text{ frames Thing} \sqsubseteq \text{Space}$   
 $\top \sqsubseteq \forall \text{ frames Presential}$

### **has<sub>boundary</sub>**

$\sqsubseteq \text{necessary\_for}$   
 $\langle \text{http://www.onto-med.de/ontologies/gfo.owlboundary}_{of} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{boundary} \rangle$   
 $\top \sqsubseteq \leq 1 \text{ has\_boundary}^- \text{ Thing}$

### **has<sub>lefttimeboundary</sub>**

$\sqsubseteq \text{has\_time\_boundary}$   
 $\langle \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{lefttimeboundary} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo} \rangle$   
 $\top \sqsubseteq \leq 1 \text{ has\_left\_time\_boundary} \text{ Thing}$   
 $\top \sqsubseteq \leq 1 \text{ has\_left\_time\_boundary}^- \text{ Thing}$   
 $\top \sqsubseteq \forall \text{ has\_left\_time\_boundary} \text{ Left\_time\_boundary}$

### **has<sub>part</sub>**

$\sqsubseteq \text{abstract\_has\_part}$   
 $\langle \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{part} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo.owlpart}_{of} \rangle$   
 $\text{TransitivePropertyhas\_part}$

### **has<sub>participant</sub>**

$\langle \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{participant} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo.owlpart} \rangle$   
 $\exists \text{ has\_participant Thing} \sqsubseteq \text{Processual\_Structure}$   
 $\top \sqsubseteq \forall \text{ has\_participant} \neg \text{Processual\_Structure}$   
 $\top \sqsubseteq \forall \text{ has\_participant} \neg \text{Space\_time}$

### **has<sub>properpart</sub>**

$\sqsubseteq \text{has\_part}$   
 $\langle \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{properpart} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo.owlpro} \rangle$   
 $\text{TransitivePropertyhas\_proper\_part}$

### **has<sub>property</sub>**

$\langle \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{property} \rangle \equiv \langle \text{http://www.onto-med.de/ontologies/gfo.owlprope} \rangle$

$\top \sqsubseteq \leq 1$  has\_property<sup>-</sup> Thing  
 $\exists$  has\_property Thing  $\sqsubseteq$  Entity  
 $\top \sqsubseteq \forall$  has\_property Property

#### **has<sub>r</sub>ight<sub>t</sub>ime<sub>b</sub>oundary**

$\sqsubseteq$  has\_time\_boundary  
|<http://www.onto-med.de/ontologies/gfo.owl>has<sub>r</sub>ight<sub>t</sub>ime<sub>b</sub>oundary >  $\equiv$  < <http://www.onto-med.de/ontologies/gfo.owl>right<sub>t</sub>ime<sub>b</sub>oundary <  
 $\top \sqsubseteq \leq 1$  has\_right\_time\_boundary Thing  
 $\top \sqsubseteq \leq 1$  has\_right\_time\_boundary<sup>-</sup> Thing  
 $\top \sqsubseteq \forall$  has\_right\_time\_boundary Right\_time\_boundary

#### **has<sub>r</sub>ole**

$\sqsubseteq$  abstract\_has\_part  
|<http://www.onto-med.de/ontologies/gfo.owl>has<sub>r</sub>ole >  $\equiv$  < <http://www.onto-med.de/ontologies/gfo.owl>role<sub>o</sub>f >  
 $\exists$  has\_role Thing  $\sqsubseteq$  Entity  
 $\top \sqsubseteq \forall$  has\_role Role

#### **has<sub>s</sub>patial<sub>b</sub>oundary**

$\sqsubseteq$  has\_boundary  
|<http://www.onto-med.de/ontologies/gfo.owl>has<sub>s</sub>patial<sub>b</sub>oundary >  $\equiv$  < <http://www.onto-med.de/ontologies/gfo.owl>spatial<sub>b</sub>oundary <  
 $\top \sqsubseteq \leq 1$  has\_spatial\_boundary<sup>-</sup> Thing  
 $\exists$  has\_spatial\_boundary Thing  $\sqsubseteq$  Space  
 $\top \sqsubseteq \forall$  has\_spatial\_boundary Spatial\_boundary

#### **has<sub>t</sub>emporal<sub>p</sub>art**

$\sqsubseteq$  has\_part  
|<http://www.onto-med.de/ontologies/gfo.owl>has<sub>t</sub>emporal<sub>p</sub>art >  $\equiv$  < <http://www.onto-med.de/ontologies/gfo.owl>temporal<sub>p</sub>art <

#### **has<sub>t</sub>ime<sub>b</sub>oundary**

$\sqsubseteq$  has\_boundary  
|<http://www.onto-med.de/ontologies/gfo.owl>has<sub>t</sub>ime<sub>b</sub>oundary >  $\equiv$  < <http://www.onto-med.de/ontologies/gfo.owl>time<sub>b</sub>oundary <  
 $\top \sqsubseteq \leq 1$  has\_time\_boundary<sup>-</sup> Thing  
 $\exists$  has\_time\_boundary Thing  $\sqsubseteq$  Temporal\_region  
 $\top \sqsubseteq \forall$  has\_time\_boundary Time\_boundary

#### **has<sub>t</sub>oken**

$\sqsubseteq$  instantiated\_by  
|<http://www.onto-med.de/ontologies/gfo.owl>has<sub>t</sub>oken >  $\equiv$  < <http://www.onto-med.de/ontologies/gfo.owl>token<sub>o</sub>f >  
 $\exists$  has\_token Thing  $\sqsubseteq$  Symbol\_structure  
 $\top \sqsubseteq \forall$  has\_token Concrete

### **instance<sub>of</sub>**

$\text{!http://www.onto-med.de/ontologies/gfo.owlinstance}_{of} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlinstance}_{of} >$   
 $\exists \text{ instance\_of Thing} \sqsubseteq \text{Entity}$   
 $\top \sqsubseteq \forall \text{ instance\_of Category}$

### **instantiated<sub>by</sub>**

$\text{!http://www.onto-med.de/ontologies/gfo.owlinstance}_{of} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlinstance}_{of} >$   
 $\exists \text{ instantiated\_by Thing} \sqsubseteq \text{Category}$   
 $\top \sqsubseteq \forall \text{ instantiated\_by Entity}$

### **left<sub>boundary</sub><sub>of</sub>**

$\sqsubseteq \text{time\_boundary\_of}$   
 $\text{!http://www.onto-med.de/ontologies/gfo.owlhas}_{left\_time\_boundary} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{left\_time\_boundary} >$   
 $\top \sqsubseteq \leq 1 \text{ left\_boundary\_of Thing}$   
 $\top \sqsubseteq \leq 1 \text{ left\_boundary\_of}^- \text{ Thing}$

### **necessary<sub>for</sub>**

$\text{!http://www.onto-med.de/ontologies/gfo.owldepends}_{on} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owldepends}_{on} >$   
 $\text{TransitivePropertynecessary\_for}$

### **occupied<sub>by</sub>**

$\sqsubseteq \text{frames}$   
 $\text{!http://www.onto-med.de/ontologies/gfo.owloccupied}_{by} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owloccupied}_{by} >$   
 $\top \sqsubseteq \leq 1 \text{ occupied\_by}^- \text{ Thing}$   
 $\exists \text{ occupied\_by Thing} \sqsubseteq \text{Space}$   
 $\top \sqsubseteq \forall \text{ occupied\_by Presential}$

### **occupies**

$\sqsubseteq \text{framed\_by}$   
 $\text{!http://www.onto-med.de/ontologies/gfo.owloccupied}_{by} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owloccupied}_{by} >$   
 $\top \sqsubseteq \leq 1 \text{ occupies Thing}$   
 $\exists \text{ occupies Thing} \sqsubseteq \text{Presential}$   
 $\top \sqsubseteq \forall \text{ occupies Space}$

### **part<sub>of</sub>**

$\sqsubseteq \text{abstract\_part\_of}$   
 $\text{!http://www.onto-med.de/ontologies/gfo.owlhas}_{part} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{part} >$   
 $\text{TransitivePropertypart\_of}$   
 $\exists \text{ part\_of Thing} \sqsubseteq \text{Concrete} \sqcup \text{Space\_time}$   
 $\top \sqsubseteq \forall \text{ part\_of (Concrete} \sqcup \text{Space\_time)}$

### **participates<sub>n</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{participat} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlpa} >$   
 $\exists \text{ participates\_in Thing} \sqsubseteq \neg \text{Space\_time}$   
 $\exists \text{ participates\_in Thing} \sqsubseteq \neg \text{Processual\_Structure}$   
 $\top \sqsubseteq \forall \text{ participates\_in Processual\_Structure}$

### **played<sub>by</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlplayed}_{by} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlplays}_{role} >$   
 $\top \sqsubseteq \leq 1 \text{ played\_by Thing}$   
 $\exists \text{ played\_by Thing} \sqsubseteq \text{Role}$   
 $\top \sqsubseteq \forall \text{ played\_by Entity}$

### **plays<sub>role</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlplayed}_{by} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlplays}_{role} >$   
 $\top \sqsubseteq \leq 1 \text{ plays\_role Thing}$   
 $\exists \text{ plays\_role Thing} \sqsubseteq \text{Entity}$   
 $\top \sqsubseteq \forall \text{ plays\_role Role}$

### **projection<sub>of</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlprojects}_{to} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlproject} >$   
 $\top \sqsubseteq \leq 1 \text{ projection\_of Thing}$   
 $\exists \text{ projection\_of Thing} \sqsubseteq \text{Time}$

### **projects<sub>to</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlprojects}_{to} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlproject} >$   
 $\top \sqsubseteq \leq 1 \text{ projects\_to Thing}$   
 $\top \sqsubseteq \forall \text{ projects\_to Time}$

### **proper<sub>part\_of</sub>**

$\sqsubseteq \text{part\_of}$   
 $\{ \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{proper}_{part} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlpro} >$   
 $\text{TransitivePropertyproper\_part\_of}$

### **property<sub>of</sub>**

$\{ \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{property} > \equiv < \text{http://www.onto-med.de/ontologies/gfo.owlprope} >$   
 $\exists \text{ property\_of Thing} \sqsubseteq \text{Property}$

### **right<sub>boundary\_of</sub>**

$\sqsubseteq \text{time\_boundary\_of}$   
 $\{ \text{http://www.onto-med.de/ontologies/gfo.owlhas}_{right}_{time}_{boundary} > \equiv < \text{http://www.onto-med.de/ontologies/gf} >$

$\top \sqsubseteq \leq 1$  right\_boundary\_of Thing  
 $\top \sqsubseteq \leq 1$  right\_boundary\_of<sup>-</sup> Thing

### **role<sub>of</sub>**

$\sqsubseteq$  abstract\_part\_of  
|[http://www.onto-med.de/ontologies/gfo.owl#has\\_role](http://www.onto-med.de/ontologies/gfo.owl#has_role) >  $\equiv$  < [http://www.onto-med.de/ontologies/gfo.owl#role\\_of](http://www.onto-med.de/ontologies/gfo.owl#role_of) >  
 $\exists$  role\_of Thing  $\sqsubseteq$  Role  
 $\top \sqsubseteq \forall$  role\_of Entity

### **spatial<sub>boundary\_of</sub>**

$\sqsubseteq$  boundary\_of  
|[http://www.onto-med.de/ontologies/gfo.owl#has\\_spatial\\_boundary](http://www.onto-med.de/ontologies/gfo.owl#has_spatial_boundary) >  $\equiv$  < [http://www.onto-med.de/ontologies/gfo.owl#spatial\\_boundary\\_of](http://www.onto-med.de/ontologies/gfo.owl#spatial_boundary_of) >  
 $\top \sqsubseteq \leq 1$  spatial\_boundary\_of Thing  
 $\exists$  spatial\_boundary\_of Thing  $\sqsubseteq$  Spatial\_boundary  
 $\top \sqsubseteq \forall$  spatial\_boundary\_of Space

### **temporal<sub>part\_of</sub>**

$\sqsubseteq$  part\_of  
|[http://www.onto-med.de/ontologies/gfo.owl#has\\_temporal\\_part](http://www.onto-med.de/ontologies/gfo.owl#has_temporal_part) >  $\equiv$  < [http://www.onto-med.de/ontologies/gfo.owl#temporal\\_part\\_of](http://www.onto-med.de/ontologies/gfo.owl#temporal_part_of) >  
TransitivePropertytemporal\_part\_of  
 $\exists$  temporal\_part\_of Thing  $\sqsubseteq$  Time  
 $\top \sqsubseteq \forall$  temporal\_part\_of (Time  $\sqcap$   $\neg$ Time\_boundary)

### **time<sub>boundary\_of</sub>**

$\sqsubseteq$  boundary\_of  
|[http://www.onto-med.de/ontologies/gfo.owl#has\\_time\\_boundary](http://www.onto-med.de/ontologies/gfo.owl#has_time_boundary) >  $\equiv$  < [http://www.onto-med.de/ontologies/gfo.owl#time\\_boundary\\_of](http://www.onto-med.de/ontologies/gfo.owl#time_boundary_of) >  
 $\top \sqsubseteq \leq 1$  time\_boundary\_of Thing  
 $\exists$  time\_boundary\_of Thing  $\sqsubseteq$  Time\_boundary  
 $\top \sqsubseteq \forall$  time\_boundary\_of Temporal\_region

### **token<sub>of</sub>**

$\sqsubseteq$  instance\_of  
|[http://www.onto-med.de/ontologies/gfo.owl#has\\_token](http://www.onto-med.de/ontologies/gfo.owl#has_token) >  $\equiv$  < [http://www.onto-med.de/ontologies/gfo.owl#token\\_of](http://www.onto-med.de/ontologies/gfo.owl#token_of) >  
 $\exists$  token\_of Thing  $\sqsubseteq$  Concrete  
 $\top \sqsubseteq \forall$  token\_of Symbol\_structure

Data properties

Individuals

Datatypes

PlainLiteral

string