

FHIR RDF Sample side by side comparisons

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32			

Legend

Most of the RDF is generated by verbatim logic (e.g. An unidentified element becomes an anonymous individual - blank node).

Where RDF is generated by special transformation it is **marked in red**

40 Where RDF is inferred by a reasoner it is **marked in green**.

41

42 1 Datatypes (section 1.18.0.1)

43 Difference in the treatment of datatypes code, string and uri as classes with primitive values as rdf:Datatypes.

44 Datatypes are transformed into OWL Classes where the value is expressed as a an OWL DataProperty with
45 restrictions (facets etc).

46 1.1 Id

47 1.1.1 Id instance

48 1.1.2 Id schema

```
49 fhir:id rdf:type owl:Class ;  
50     rdfs:subClassOf fhir:Element ,  
51         [ rdf:type owl:Restriction ;  
52           owl:onProperty fhir:value ;  
53           owl:allValuesFrom [ rdf:type rdfs:Datatype ;  
54                                 owl:onDatatype xsd:string ;  
55                                 owl:withRestrictions ( [ xsd:pattern "[A-Za-z0-9\\-\\.]{1,64}" ] )  
56                                 ]  
57         ] ,  
58         [ rdf:type owl:Restriction ;  
59           owl:onProperty fhir:value ;  
60           owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;  
61           owl:onDataRange xsd:string  
62         ] ;  
63     rdfs:comment "A whole number in the range 0 to 2^64-1, optionally represented in hex, a uuid, an oid or  
64 any other combination of lower-case letters a-z, numerals, "-" and ".", with a length limit of 36 characters" .
```

65 1.2 Decimal

66 Decimal has an additional DataProperty fhir:fractionaDigits which allows the explicit declaration of scale.

67 1.2.1 Decimal OWL instance

```
68 [ a fhir:decimal ; fhir:value 123.4 ; fhir:fractionalDigits 3 ]
```

69 1.2.2 Decimal OWL Schema

```
70 fhir:decimal rdf:type owl:Class ;  
71     rdfs:subClassOf fhir:Element ,  
72         [ rdf:type owl:Restriction ;  
73           owl:onProperty fhir:fractionDigits ;  
74           owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;  
75           owl:onDataRange xsd:nonNegativeInteger  
76         ] ,  
77         [ rdf:type owl:Restriction ;  
78           owl:onProperty fhir:fractionDigits ;  
79           owl:allValuesFrom xsd:nonNegativeInteger  
80         ] ,  
81         [ rdf:type owl:Restriction ;  
82           owl:onProperty fhir:value ;  
83           owl:allValuesFrom xsd:decimal  
84         ] ,  
85         [ rdf:type owl:Restriction ;  
86           owl:onProperty fhir:value ;  
87           owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;  
88           owl:onDataRange xsd:decimal  
89         ] ;  
90     rdfs:comment "A rational number with implicit precision" .  
91
```

92 1.3 FHIR CodeableConcept and Coding Structure Definition

93 1.3.1 FHIR XML

```
94 <code>  
95   <coding>  
96     <system value="http://example.org/local"/>  
97     <code value="admin"/>  
98     <display value="Admin"/>  
99   </coding>  
100 </code>
```

101 CodeableConcept Structural Definition

```
102 <[name] xmlns="http://hl7.org/fhir">  
103   <!-- from Element: extension -->  
104   <coding><!-- 0..* Coding Code defined by a terminology system --></coding>  
105   <text value="[string]"/><!-- 0..1 Plain text representation of the concept -->  
106 </[name]>
```

107

108 Coding Structural Definition

```
109 <[name] xmlns="http://hl7.org/fhir">  
110   <!-- from Element: extension -->  
111   <system value="[uri]"/><!-- 0..1 Identity of the terminology system -->  
112   <version value="[string]"/><!-- 0..1 Version of the system - if relevant -->  
113   <code value="[code]"/><!-- 0..1 Symbol in syntax defined by the system -->  
114   <display value="[string]"/><!-- 0..1 Representation defined by the system -->  
115   <primary value="[boolean]"/><!-- 0..1 If this code was chosen directly by the user -->  
116 </[name]>
```

117

118 1.3.2 RDF Data for Coding Instance

119 The RDF variant for fhir:Code, fhir:Coding and fhir:CodeableConcept are not straight translations of the FHIR
120 representation. 3 new additional classes are introduced – codeBase, CodingBase and ConceptBase.

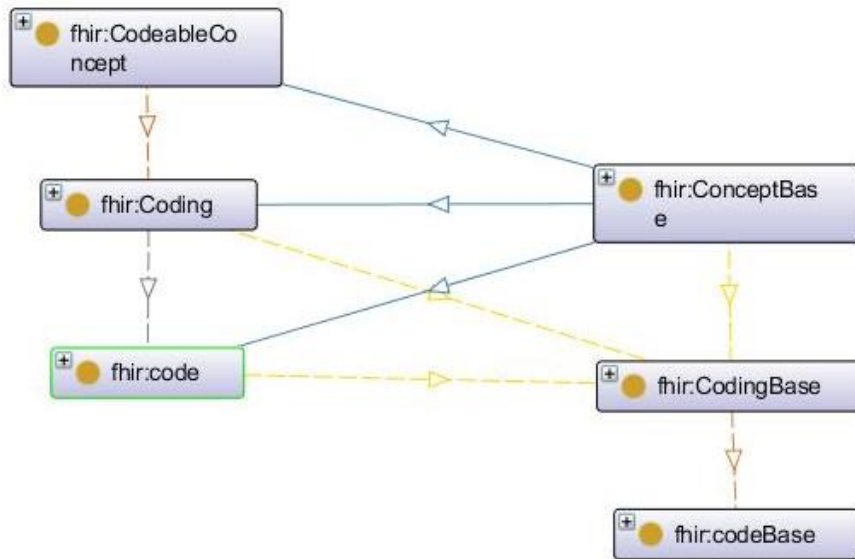
```
121 xxx.code [ a fhir:CodeableConcept ;  
122   ConceptBase.coding [ rdf:type fhir:CodingBase ;  
123     fhir:CodingBase.system [ a fhir:uri; "fhir:value http://example.org/local" ] ;  
124     fhir:CodingBase.code [ a fhir:codeBase ; fhir:value "admin" ] ;  
125     fhir:CodingBase.display [ a fhir:string; fhir:value "Admin" ] ;  
126   ] ;  
127 ] ;
```

128

129 The fhir:CodeableConcept type assertion (as a marker) allows round trip back to the original XML type. The same
130 approach will be taken for fhir:Coding and fhir:code.

131 This approach will be implemented by creating ConceptBase, CodingBase and codeBase individuals as blank
132 nodes.

133 **1.3.3 FHIR OWL Schema**
 134 ConceptBase has subclasses fhir:CodeableConcept, fhir:Coding and fhir:code.



135

```

136 [ rdf:type owl:AllDisjointClasses ;
137   owl:members ( fhir:CodingBase
138                 fhir:ConceptBase
139                 fhir:codeBase
140                 )
141 ] .

```

142

```

143 #####
144 # Classes
145 #####
146
147 ### http://hl7.org/fhir/ConceptBase
148
149 fhir:ConceptBase rdf:type owl:Class ;
150   rdfs:subClassOf fhir:Datatype ,
151     [ rdf:type owl:Restriction ;
152       owl:onProperty fhir:ConceptBase.coding ;
153       owl:allValuesFrom fhir:CodingBase
154     ] ,
155     [ rdf:type owl:Restriction ;
156       owl:onProperty fhir:ConceptBase.text ;
157       owl:maxCardinality "1"^^xsd:nonNegativeInteger
158     ] ,
159     [ rdf:type owl:Restriction ;
160       owl:onProperty fhir:ConceptBase.text ;
161       owl:allValuesFrom fhir:string
162     ]
163 .
164
165 ### http://hl7.org/fhir/CodingBase
166 fhir:CodingBase rdf:type owl:Class ;
167   rdfs:subClassOf fhir:Element ,
168     [ rdf:type owl:Restriction ;
169       owl:onProperty fhir:CodingBase.system ;
170       owl:allValuesFrom fhir:uri
171     ] ,

```

```
172 [ rdf:type owl:Restriction ;
173     owl:onProperty fhir:CodingBase.system ;
174     owl:maxCardinality "1"^^xsd:nonNegativeInteger
175 ] ,
176 [ rdf:type owl:Restriction ;
177     owl:onProperty fhir:CodingBase.version ;
178     owl:allValuesFrom fhir:string
179 ] ,
180 [ rdf:type owl:Restriction ;
181     owl:onProperty fhir:CodingBase.version ;
182     owl:maxCardinality "1"^^xsd:nonNegativeInteger
183 ] ,
184 [ rdf:type owl:Restriction ;
185     owl:onProperty fhir:CodingBase.code ;
186     owl:allValuesFrom fhir:codeBase
187 ]
188 [ rdf:type owl:Restriction ;
189     owl:onProperty fhir:CodingBase.code ;
190     owl:maxCardinality "1"^^xsd:nonNegativeInteger
191 ] ,
192 [ rdf:type owl:Restriction ;
193     owl:onProperty fhir:CodingBase.display ;
194     owl:allValuesFrom fhir:string
195 ] ,
196 [ rdf:type owl:Restriction ;
197     owl:onProperty fhir:CodingBase.display ;
198     owl:maxCardinality "1"^^xsd:nonNegativeInteger
199 ] ,
200 [ rdf:type owl:Restriction ;
201     owl:onProperty fhir:CodingBase.primary ;
202     owl:maxCardinality "1"^^xsd:nonNegativeInteger
203 ] ,
204 [ rdf:type owl:Restriction ;
205     owl:onProperty fhir:CodingBase.primary ;
206     owl:allValuesFrom fhir:boolean
207 ] .
```

208

```
209 fhir:codeBase rdf:type owl:Class ;
210     rdfs:subClassOf fhir:Element ,
211     [ rdf:type owl:Restriction ;
212         owl:onProperty fhir:value ;
213         owl:allValuesFrom xsd:token
214     ] ,
215     [ rdf:type owl:Restriction ;
216         owl:onProperty fhir:value ;
217         owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
218         owl:onDataRange xsd:token
219     ] .
```

220

221 The concrete subclasses of ConceptBase apply the additional restrictions:

```
222 ### http://hl7.org/fhir/CodeableConcept
223 fhir:CodeableConcept rdf:type owl:Class ;
224     rdfs:subClassOf fhir:ConceptBase ;
225     rdfs:comment "The set of possible coded values this coding was chosen from or constrained by." .
```

226

```
227 ### http://hl7.org/fhir/Coding
228 fhir:Coding rdf:type owl:Class ;
229     rdfs:subClassOf fhir:ConceptBase ,
230         [ rdf:type owl:Restriction ;
231           owl:onProperty fhir:ConceptBase.text ;
232           owl:maxCardinality "0"^^xsd:nonNegativeInteger
233         ] ,
234         [ rdf:type owl:Restriction ;
235           owl:onProperty fhir:ConceptBase.coding ;
236           owl:cardinality "1"^^xsd:nonNegativeInteger
237         ] .
```

238

```
239 fhir:code rdf:type owl:Class ;
240     rdfs:subClassOf fhir:ConceptBase , [ rdf:type owl:Restriction ;
241     owl:onProperty fhir:ConceptBase.coding ;
242     owl:allValuesFrom [ rdf:type owl:Class ;
243     owl:intersectionOf ( fhir:CodingBase
244         [ rdf:type owl:Restriction ;
245           owl:onProperty fhir:CodingBase.code ;
246           owl:cardinality "1"^^xsd:nonNegativeInteger
247         ]
248         [ rdf:type owl:Restriction ;
249           owl:onProperty fhir:CodingBase.display ;
250           owl:maxCardinality "0"^^xsd:nonNegativeInteger
251         ]
252         [ rdf:type owl:Restriction ;
253           owl:onProperty fhir:CodingBase.primary ;
254           owl:maxCardinality "0"^^xsd:nonNegativeInteger
255         ]
256         [ rdf:type owl:Restriction ;
257           owl:onProperty fhir:CodingBase.system ;
258           owl:maxCardinality "1"^^xsd:nonNegativeInteger
259         ]
260         [ rdf:type owl:Restriction ;
261           owl:onProperty fhir:CodingBase.version ;
262           owl:maxCardinality "1"^^xsd:nonNegativeInteger
263         ]
264     )
265     ]
266 ] ,
267 [ rdf:type owl:Restriction ;
268   owl:onProperty fhir:ConceptBase.coding ;
269   owl:cardinality "1"^^xsd:nonNegativeInteger
270 ] .
```

271

272 2 Coding Binding to external terminology (section 1.17.3.3.5)

273 2.1 FHIR XML

```
274 <AllergyIntolerance xmlns=http://hl7.org/fhir >  
275   <id value="1"/>  
276   <text>  
277   </text>  
278   <!-- the date that this entry was recorded -->  
279   <recordedDate value="2010-03-01"/>  
280   <!-- the patient that actually has the risk of adverse reaction -->  
281   <patient>  
282     <reference value="http://record/Patient/PeterPatient"/>  
283     <display value="Peter Patient"/>  
284   </patient>  
285   <!-- substance, coded from SNOMED CT-->  
286   <substance>  
287     <coding>  
288       <system value="http://snomed.info/id/">  
289       <code value="90614001"/>  
290       <display value="beta-Lactam antibiotic"/>  
291     </coding>  
292   </substance>  
293   <status value="confirmed"/>  
294   <criticality value="high"/>  
295   <category value="medication"/>  
296 </AllergyIntolerance>
```

297 2.2 RDF Instance Example

298 This is the raw instance before processing and after in green for inference and red for specific processing

```
299 @prefix : <http://record/AllergyIntolerance/> .  
300 @prefix owl: <http://www.w3.org/2002/07/owl#> .  
301 @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .  
302 @prefix sct: <http://snomed.info/id/> .  
303 @prefix xml: <http://www.w3.org/XML/1998/namespace> .  
304 @prefix xsd: <http://www.w3.org/2001/XMLSchema#> .  
305 @prefix fhir: <http://hl7.org/fhir/> .  
306 @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .  
307 @prefix profile: <http://PatientSafetyProfile/> .  
308 @base <http://record/AllergyIntolerance/1> .  
309  
310 <http://record/AllergyIntolerance/> rdf:type owl:Ontology ;  
311   owl:imports <http://PatientSafetyProfile> .  
312  
313 ### http://record/AllergyIntolerance/1  
314  
315 <http://record/AllergyIntolerance/1> rdf:type profile:DomainResource, owl:NamedIndividual ;  
316   fhir:Resource.id [ rdf:type fhir:id ; fhir:value "1" ] ;  
317   fhir:AllergyIntolerance.status [ rdf:type fhir:code , <http://hl7.org/fhir/allergyIntoleranceStatus#confirmed>;  
318     fhir:ConceptBase.coding [ fhir:CodingBase.code [ fhir:value "confirmed" ] ]  
319   ] ;  
320   fhir:AllergyIntolerance.patient [ rdf:type fhir:Reference ;  
321     fhir:Reference.reference [ fhir:value "http://record/Patient/PeterPatient" ] ;  
322     fhir:Reference.display [ fhir:value "Peter Patient" ] ;  
323     fhir:Reference.link <http://record/Patient/PeterPatient> ;  
324   ] ;  
325   fhir:AllergyIntolerance.substance [ rdf:type fhir:CodeableConcept , <http://snomed.info/id/90614001>;  
326     rdfs:label "beta-lactam (antibiotic)" ;  
327     fhir:ConceptBase.coding [ rdf:type fhir:CodingBase ;  
328       fhir:CodingBase.code [ rdf:type fhir:codeBase ; fhir:value "90614001" ] ;  
329       fhir:CodingBase.system [ rdf:type fhir:string ; fhir:value "http://snomed.info/sct" ] ;  
330       fhir:CodingBase.display [ rdf:type fhir:string ; fhir:value "beta-lactam (antibiotic)" ]  
331     ] ;  
332     fhir:ConceptBase.text [ rdf:type fhir:string ; fhir:value "beta-lactam (antibiotic)" ]  
333   ] .  
334
```


335 Note the use of a profile binding through the type “profile:AllergyIntolerance” which then restricts the types of
336 CodingBase instances.

337 2.3 FHIR Allergy Intolerance OWL Schema

338 The schema is abridged to show the topics of interest:

```
339 ### http://hl7.org/fhir/AllergyIntolerance
340
341 fhir:AllergyIntolerance rdf:type owl:Class ;
342
343         rdfs:subClassOf fhir:DomainResource ,
344             [ rdf:type owl:Restriction ;
345               owl:onProperty fhir:AllergyIntolerance.substance ;
346               owl:maxCardinality "1"^^xsd:nonNegativeInteger
347             ] ,
348             [ rdf:type owl:Restriction ;
349               owl:onProperty fhir:AllergyIntolerance.substance ;
350               owl:allValuesFrom fhir:CodeableConcept
351             ] ,
352 Etc..
353 .
```

354 The substance Object Property has no valueset type yet only the restriction that it is a CodeableConcept type.

355 The valueset gets applied through the structural definition or profile binding.

356

357 **2.4 Definitions of Code System, Concept and ValueSet**

358 This section is needed to ground the definitions of Coding System, Concept and ValueSet when defined in
359 RDF/OWL.

360 **2.4.1 Code System**

361 *The **system** ensures that codes can be unambiguously traced back to their original definition, and that logical*
362 *comparisons, matching and inferences can be performed consistently by different systems.*

363 In RDF/OWL a code system is a namespace in which the code is unique. Since a code forms a fragment of a URI,
364 the code-system forms a prefix to that fragment making it unique. The code system identity and the prefix may
365 not be the same but are related using a property of the code system.

URI	Source	OID
http://snomed.info/sct	SNOMED CT (IHTSDO)	2.16.840.1.113883.6.96

366 The prefix for snomed is <http://snomed.info/id/>

367 However, the URI is a member of the fhir:uri class and an additional class is introduced – fhir:CodeSystemURI as
368 a subclass of fhir:URI to define the set that are CodeSystem identifiers. The individual code system may then be
369 declared and referenced:

```
370 ### http://snomed.info/sct  
371  
372 <http://snomed.info/sct> rdf:type fhir:CodeSystemURI ,  
373 owl:NamedIndividual ;  
374  
375 fhir:value "http://snomed.info/sct" .
```

376 A specific CodeSystem may be declared as a class which is a set of all the CodingBase individuals restricted by
377 the CodingBase.system property.

```
378 ### http://snomed.info/sct  
379  
380 <http://snomed.info/sct> rdf:type owl:Class ;  
381  
382 rdfs:subClassOf fhir:CodingBase_in_Systems .
```

383 **2.4.2 Bridging Ontology**

384 This forms a pun with the individual and it is declared in a bridging ontology which is aware of the constraints of
385 Concepts in that Code System.

386 The bridging ontology is aware of FHIR and the external terminology ontologies.

```

387 [ rdf:type owl:Class ;
388     rdfs:subClassOf <http://snomed.info/id/282100009> ;
389     owl:intersectionOf ( <http://snomed.info/sct>
390         [ rdf:type owl:Restriction ;
391           owl:onProperty fhir:CodingBase.code ;
392           owl:someValuesFrom [ rdf:type owl:Restriction ;
393                                 owl:onProperty fhir:value ;
394                                 owl:hasValue "282100009"
395                               ]
396         ]
397     )
398 ] .
399

```

400 2.4.3 Concept

401 A concept may be a single Class in RDF which may in turn be a union of multiple classes based on subclass
402 relationships.

403 2.4.4 ValueSet

404 Example is substance-code used in AllergyIntolerance

405 2.4.4.1 Summary

Defining URL:	http://hl7.org/fhir/ValueSet/substance-code
Name:	Substance Code
Definition:	This value set contains concept codes for specific substances
OID:	2.16.840.1.113883.4.642.2.57 (for OID based terminology systems)
Copyright:	This value set includes content from SNOMED CT, which is copyright © 2002+ International Health Terminology Standards Development Organisation (IHTSDO), and distributed by agreement between IHTSDO and HL7. Implementer use of SNOMED CT is not covered by this agreement
Source Resource	XML / JSON

406

407 2.4.4.2 Content Logical Definition

408 This value set includes codes from the following code systems:

409• Include codes from http://snomed.info/sct where concept is-a 105590001

410• Include codes from http://snomed.info/sct where concept is-a 373873005

411 **2.4.4.3 RDF Definition**

412 Since these concepts in snomed are hierarchical classes the valueset is by definition a union of concept classes.

413 However the concept class bound to a system should have a different metatype – e.g. systemconcept.

414 A concept class is therefore a supertype of the systemconcept classes.

415 A named Valueset as a class is a union of named systemconcept classes (not a superclass). If an instance of
416 CodingBase is typed to a Valueset then it probably means that the codeBase is unknown or to be selected.

417 The FHIR “include” gets translated to a union expression:

418

2.4.5 Examples

420

2.4.5.1 Example from orim

421

```
### CONCEPT DOMAIN
```

422

```
### http://hl7.org/ontology/uv/vocab/cd#ActStatus
```

423

424

```
cd:ActStatus rdf:type :Class ;
```

425

```
    :equivalentClass [ rdf:type :Class ;
```

426

```
        :unionOf ( [ rdf:type :Restriction ;
```

427

```
            :onProperty hl7:VocabularyConcept.codingRef ;
```

428

```
            :someValuesFrom <urn:oid:2.16.840.1.113883.1.11.159331/Recent>
```

429

```
        ]
```

430

```
        [ rdf:type :Restriction ;
```

431

```
            :onProperty dt:ANY.nullFlavor ;
```

432

```
            :minCardinality "1"^^xs:nonNegativeInteger
```

433

```
        ]
```

434

```
    )
```

435

```
    ] ;
```

436

```
    rdfs:subClassOf hl7:ConceptDomain .
```

437

438

```
### CONCEPT
```

439

```
### http://hl7.org/ontology/uv/vocab/cs/ActStatus/Concept
```

440

441

```
<http://hl7.org/ontology/uv/vocab/cs/ActStatus/Concept> rdf:type :Class ;
```

442

```
    rdfs:subClassOf hl7:VocabularyConcept .
```

443

444

```
### http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept
```

445

446

```
<http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept> rdf:type :Class ;
```

447

```
    rdfs:subClassOf <http://hl7.org/ontology/uv/vocab/cs/ActStatus/Concept> .
```

448

449

```
### http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept#active
```

450

451

```
<http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept#active> rdf:type :Class ;
```

452

```
    :equivalentClass <urn:oid:2.16.840.1.113883.5.14/2011-12-20/Concept#active> ;
```

453

```
    rdfs:subClassOf <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept> ,
```

454

```
    <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept#normal> .
```

455

456

```
### urn:oid:2.16.840.1.113883.5.14/2011-12-20/Concept#active
```

457

458

```
<urn:oid:2.16.840.1.113883.5.14/2011-12-20/Concept#active> rdf:type :Class ;
```

459

```
    :equivalentClass <urn:oid:2.16.840.1.113883.5.14/Recent/Concept#active> ;
```

460

```
    rdfs:subClassOf <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept> ,
```

461

```
    <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept#normal> .
```

462

463

```
### urn:oid:2.16.840.1.113883.5.14/Recent/Concept#active
```

464

465

```
<urn:oid:2.16.840.1.113883.5.14/Recent/Concept#active> rdf:type :Class ;
```

466

```
    rdfs:subClassOf <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept> ,
```

467

```
    <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20/Concept#normal> .
```

468

469

470

```
### VALUESET
```

471

```
### http://hl7.org/ontology/uv/vocab/vs/ActStatus
```

472

473

```
vs:ActStatus rdf:type :Class ;
```

474

```
    :equivalentClass <http://hl7.org/ontology/uv/vocab/vs/ActStatus/2011-12-20> ,
```

475

```
    <urn:oid:2.16.840.1.113883.1.11.159331> ;
```

476

```
    rdfs:subClassOf hl7:ValueSet .
```

477

478

```
### http://hl7.org/ontology/uv/vocab/vs/ActStatusActive
```

479

480

```
vs:ActStatusActive rdf:type :Class ;
```

481

```
    :equivalentClass <http://hl7.org/ontology/uv/vocab/vs/ActStatusActive/2011-12-20> ,
```

482

```
    <urn:oid:2.16.840.1.113883.1.11.20023> ;
```

483

```
    rdfs:subClassOf hl7:ValueSet .
```

484

```

485 ### http://hl7.org/ontology/uv/vocab/vs/ActStatus/2011-12-20
486
487 <http://hl7.org/ontology/uv/vocab/vs/ActStatus/2011-12-20> rdf:type :Class ;
488     :equivalentClass <urn:oid:2.16.840.1.113883.1.11.159331/2011-12-20> ,
489     [ rdf:type :Class ;
490       :intersectionOf ( [ rdf:type :Restriction ; :onProperty hl7:Coding.codeSystemRef ;
491                           :hasValue <urn:oid:2.16.840.1.113883.5.14>
492                         ]
493                       [ rdf:type :Restriction ; :onProperty hl7:Coding.codeSystemVersionRef ;
494                           :hasValue <urn:oid:2.16.840.1.113883.5.14/Recent>
495                       ]
496                     )
497     ] ;
498     rdfs:subClassOf hl7:ValueSet .
499
500
501 ### http://hl7.org/ontology/uv/vocab/vs/ActStatusActive/2011-12-20
502
503 <http://hl7.org/ontology/uv/vocab/vs/ActStatusActive/2011-12-20> rdf:type :Class ;
504     :equivalentClass <urn:oid:2.16.840.1.113883.1.11.20023/2011-12-20> ,
505     [ rdf:type :Class ; :intersectionOf ( [ rdf:type :Restriction ; :onProperty hl7:Coding.conceptRef ;
506       :someValuesFrom <urn:oid:2.16.840.1.113883.5.14/2011-12-20/Concept#active>
507     ]
508     [ rdf:type :Restriction ; :onProperty hl7:Coding.codeSystemRef ;
509       :hasValue <urn:oid:2.16.840.1.113883.5.14>
510     ]
511     [ rdf:type :Restriction ; :onProperty hl7:Coding.codeSystemVersionRef ;
512       :hasValue <urn:oid:2.16.840.1.113883.5.14/Recent>
513     ]
514     )
515     ] ;
516     rdfs:subClassOf hl7:ValueSet .
517
518 ### CODE SYSTEM
519 ### http://hl7.org/ontology/uv/vocab/cs/ActStatus
520
521 cs:ActStatus rdf:type hl7:CodeSystem ,
522     :NamedIndividual ,
523     [ rdf:type :Restriction ;
524       :onProperty hl7:CodeSystem.versionRef ;
525       :allValuesFrom [ rdf:type :Restriction ;
526                       :onProperty hl7:CodeSystemVersion.codeSystem ;
527                       :hasValue "2.16.840.1.113883.5.14"^^xs:string
528                     ]
529     ] ,
530     [ rdf:type :Restriction ;
531       :onProperty hl7:CodeSystem.versionRef ;
532       :allValuesFrom [ rdf:type :Class ;
533                       :oneOf ( <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20>
534                             )
535                     ]
536     ] ;
537
538     hl7:CodeSystem.id "2.16.840.1.113883.5.14"^^xs:string ;
539
540     :sameAs <urn:oid:2.16.840.1.113883.5.14> .
541
542 ### http://hl7.org/ontology/uv/vocab/cs/ActStatus/Recent
543
544 <http://hl7.org/ontology/uv/vocab/cs/ActStatus/Recent> rdf:type hl7:CodeSystemVersion , :NamedIndividual ;
545     :sameAs <urn:oid:2.16.840.1.113883.5.14/Recent> .
546
547 ### http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20
548
549 <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20> rdf:type hl7:CodeSystemVersion , :NamedIndividual ,
550     [ rdf:type :Restriction ; :onProperty hl7:CodeSystemVersion.codingRef ;
551       :allValuesFrom [ rdf:type :Restriction ; :onProperty hl7:Coding.codeSystemVersion ;
552                       :hasValue "2011-12-20"^^xs:string
553                     ]
554     ]

```

```

554     ] ,
555     [ rdf:type :Restriction ; :onProperty h17:CodeSystemVersion.codingRef ;
556       :allValuesFrom [ rdf:type :Class ;
557         :oneOf ( <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#nullified>
558           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#normal>
559           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#suspended>
560           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#new>
561           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#obsolete>
562           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#aborted>
563           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#active>
564           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#held>
565           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#completed>
566           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#cancelled>
567         )
568       ]
569     ] ,
570     [ rdf:type :Restriction ; :onProperty h17:CodeSystemVersion.codingRef ;
571       :allValuesFrom [ rdf:type :Restriction ; :onProperty h17:Coding.codeSystemRef ;
572         :hasValue cs:ActStatus
573       ]
574     ] ;
575     h17:CodeSystemVersion.codeSystem "2.16.840.1.113883.5.14"^^xs:string ;
576     h17:CodeSystemVersion.versionDate "2011-12-20"^^xs:string ;
577     :sameAs <urn:oid:2.16.840.1.113883.5.14/2011-12-20> .
578
579 ### http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#active
580
581 <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#active> rdf:type h17:Coding ,:NamedIndividual ;
582     h17:Coding.code "active"^^xs:string .
583
584

```

585 **2.4.5.2 ValueSet schema in FHIR**

586 A ValueSet individual will have define, compose and expansion object properties to applicable objects. The
587 following RDF samples show a direct translation of the metamodel viewpoint.

```
588 ### http://hl7.org/fhir/ValueSet
589 fhir:ValueSet rdf:type owl:Class ;
590     rdfs:subClassOf fhir:DomainResource ,
591     [ rdf:type owl:Restriction ;
592       owl:onProperty fhir:ValueSet.define ;
593       owl:allValuesFrom fhir:ValueSet.Define
594     ] ,
595     [ rdf:type owl:Restriction ;
596       owl:onProperty fhir:ValueSet.define ;
597       owl:maxCardinality "1"^^xsd:nonNegativeInteger
598     ] ,
599     [ rdf:type owl:Restriction ;
600       owl:onProperty fhir:ValueSet.compose ;
601       owl:allValuesFrom fhir:ValueSet.Compose
602     ] ,
603     [ rdf:type owl:Restriction ;
604       owl:onProperty fhir:ValueSet.expansion ;
605       owl:maxCardinality "1"^^xsd:nonNegativeInteger
606     ] ,
607     [ rdf:type owl:Restriction ;
608       owl:onProperty fhir:ValueSet.expansion ;
609       owl:allValuesFrom fhir:ValueSet.Expansion
610     ] ,
611     [ rdf:type owl:Restriction ;
612       owl:onProperty fhir:ValueSet.compose ;
613       owl:maxCardinality "1"^^xsd:nonNegativeInteger
614     ] .
615
616 ### http://hl7.org/fhir/ValueSet.Compose
617 fhir:ValueSet.Compose rdf:type owl:Class ;
618     rdfs:subClassOf fhir:BackboneElement .
619
```

```
620 ### http://hl7.org/fhir/ValueSet.Concept
621 fhir:ValueSet.Concept rdf:type owl:Class ;
622     rdfs:subClassOf fhir:BackboneElement ,
623     [ rdf:type owl:Restriction ;
624       owl:onProperty fhir:ValueSet.Concept.display ;
625       owl:allValuesFrom fhir:string
626     ] ,
627     [ rdf:type owl:Restriction ;
628       owl:onProperty fhir:ValueSet.Concept.code ;
629       owl:cardinality "1"^^xsd:nonNegativeInteger
630     ] ,
631     [ rdf:type owl:Restriction ;
632       owl:onProperty fhir:ValueSet.Concept.code ;
633       owl:allValuesFrom fhir:code
634     ] ,
635     [ rdf:type owl:Restriction ;
636       owl:onProperty fhir:ValueSet.Concept.definition ;
637       owl:maxCardinality "1"^^xsd:nonNegativeInteger
638     ] ,
639     [ rdf:type owl:Restriction ;
640       owl:onProperty fhir:ValueSet.Concept.display ;
641       owl:maxCardinality "1"^^xsd:nonNegativeInteger
642     ] ,
643     [ rdf:type owl:Restriction ;
644       owl:onProperty fhir:ValueSet.Concept.definition ;
645       owl:allValuesFrom fhir:string
646     ] .
647
```



```
648 ### http://hl7.org/fhir/ValueSet.Define
649 fhir:ValueSet.Define rdf:type owl:Class ;
650     rdfs:subClassOf fhir:BackboneElement ,
651     [ rdf:type owl:Restriction ;
652       owl:onProperty fhir:ValueSet.Define.system ;
653       owl:allValuesFrom fhir:uri
654     ] ,
655     [ rdf:type owl:Restriction ;
656       owl:onProperty fhir:ValueSet.Define.system ;
657       owl:cardinality "1"^^xsd:nonNegativeInteger
658     ] ,
659     [ rdf:type owl:Restriction ;
660       owl:onProperty fhir:ValueSet.Define.concept ;
661       owl:allValuesFrom fhir:ValueSet.Concept
662     ] .
663
664 ### http://hl7.org/fhir/ValueSet.Expansion
665 fhir:ValueSet.Expansion rdf:type owl:Class ;
666     rdfs:subClassOf fhir:BackboneElement .
667
668
669
```

670 2.5 FHIR internal System and Coding bindings (OWL Schema)

671 The system is inclusive of all the terms within it and all the instances of those terms.

```
672 @prefix allergy-intolerance-status: <http://hl7.org/fhir/allergy-intolerance-status#> .
673
674 ### http://hl7.org/fhir/allergy-intolerance-status
675
676 fhir:allergy-intolerance-status rdf:type owl:Class ;
677   rdfs:subClassOf fhir:valueset-system ,
678   [ rdf:type owl:Class ;
679     owl:unionOf (
680       allergy-intolerance-status:confirmed
681       allergy-intolerance-status:entered-in-error
682       allergy-intolerance-status:refuted
683       allergy-intolerance-status:resolved
684       allergy-intolerance-status:unconfirmed
685     )
686   ] ,
687   [ rdf:type owl:Restriction ;
688     owl:onProperty fhir:CodingBase.system ;
689     owl:allValuesFrom [ rdf:type owl:Restriction ;
690       owl:onProperty fhir:value ; owl:hasValue "http://hl7.org/fhir/allergy-intolerance-status"
691     ]
692   ] ;
693 fhir:prefix "http://hl7.org/fhir/allergy-intolerance-status#" .
694
695 ### http://hl7.org/fhir/allergy-intolerance-status#confirmed
696
697 allergy-intolerance-status:confirmed rdf:type owl:Class ;
698   rdfs:label "Confirmed" ;
699   rdfs:subClassOf fhir:allergy-intolerance-status ,
700   [ rdf:type owl:Restriction ;
701     owl:onProperty fhir:CodingBase.code ;
702     owl:allValuesFrom [ rdf:type owl:Restriction ;
703       owl:onProperty fhir:value ; owl:hasValue "confirmed"
704     ]
705   ] ;
706   rdfs:comment "A high level of certainty about the propensity for a reaction to the identified Substance, which
707   may include clinical evidence by testing or rechallenge." .
708
709 ### http://hl7.org/fhir/allergy-intolerance-status#entered-in-error
710
711 allergy-intolerance-status:entered-in-error rdf:type owl:Class ;
712   rdfs:label "Entered In Error" ;
713   rdfs:subClassOf fhir:allergy-intolerance-status ,
714   [ rdf:type owl:Restriction ;
715     owl:onProperty fhir:CodingBase.code ;
716     owl:allValuesFrom [ rdf:type owl:Restriction ;
717       owl:onProperty fhir:value ; owl:hasValue "entered-in-error"
718     ]
719   ] ;
720   rdfs:comment "The statement was entered in error and is not valid" .
```

721

722 The system Class definition shows it is a subclass of the abstract valueset-system and restricts its members to
723 the CodingBase.system.

724 There is also an annotation property fhir:prefix which defines the structure of the URI prefix when naming the
725 members of the system. It causes the @prefix declaration.

726 Two members are shown “confirmed” and “entered-in-error”. They are subclasses of allergy-intolerance-status
727 and have the restrictions of that class so they do not have to declare CodingBase.system restrictions.

728 2.6 System and codings external RDF representation

729 From the SNOMED RDF:

```
730 <http://snomed.info/id/138875005> rdf:type owl:Class ;  
731     rdfs:label "SNOMED CT Concept" .  
732  
733 <http://snomed.info/id/105590001> rdf:type owl:Class ;  
734     rdfs:label "Substance (substance)" ;  
735     rdfs:subClassOf <http://snomed.info/id/138875005> .  
736  
737 <http://snomed.info/id/373873005> rdf:type owl:Class ;  
738     rdfs:label "Pharmaceutical / biologic product (product)" ;  
739     rdfs:subClassOf <http://snomed.info/id/138875005> .  
740  
741 <http://snomed.info/id/346325008> rdf:type owl:Class ;  
742     rdfs:label "Antibacterial drugs (product)" ;  
743     rdfs:subClassOf <http://snomed.info/id/373873005> .  
744  
745 <http://snomed.info/id/90614001> rdf:type owl:Class ;  
746     rdfs:label "beta-Lactam antibiotic" ;  
747     rdfs:subClassOf <http://snomed.info/id/346325008> .
```

748 The system is defined further in the FHIR ontology

```
749 @prefix sct: <http://snomed.info/id/> .  
750  
751 ### http://snomed.info/sct  
752  
753 <http://snomed.info/sct> rdf:type owl:Class ;  
754     rdfs:subClassOf fhir:valueset-system ;  
755     fhir:prefix "http://snomed.info/id/" .
```

756

757

758 2.7 Valueset Definition

759 A ValueSet is somewhat similar to a value-set-system in that it applies constraints to the members but they can
760 be from different systems.

761 The specific ValueSet is a Class which is a union of Concept classes from one or more coding-systems. It is
762 expected that this representation can be computed from the FHIR representation.

763 2.7.1.1 Anonymous codings

764 Here is the definition of the specific ValueSet as a Class with restrictions on values not types:

```
765 <http://hl7.org/fhir/vs/allergy-intolerance-status> rdf:type owl:Class ;  
766   rdfs:label "Allergy Intolerance Status Value Set" ;  
767   rdfs:subClassOf fhir:valueset ,  
768   [ rdf:type owl:Class ;  
769     owl:intersectionOf (  
770       [ rdf:type owl:Restriction ;  
771         owl:onProperty fhir:CodingBase.code ;  
772         owl:someValuesFrom [ rdf:type owl:Class ;  
773           owl:unionOf (  
774             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "confirmed" ]  
775             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "entered-in-error" ]  
776             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "refuted" ]  
777             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "resolved" ]  
778             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "unconfirmed" ]  
779           )  
780         ]  
781       ]  
782     [ rdf:type owl:Restriction ;  
783       owl:onProperty fhir:CodingBase.system ;  
784       owl:allValuesFrom [ rdf:type owl:Restriction ; owl:onProperty fhir:value ;  
785         owl:hasValue "http://fhir/allergy-intolerance-status"  
786       ]  
787     ]  
788   )  
789 ] .
```

790 If the valueset needs to identify CodingBase restrictions from other systems then the restriction will have a
791 slightly different structure. The example here shows the optimization for a single system (Define).

792 2.7.2 Named codings

793 If named codings are used then the expression can be greatly simplified since the restrictions are in the named
794 class.

```
795 <http://hl7.org/fhir/vs/allergy-intolerance-status> rdf:type owl:Class ;  
796   rdfs:label "Allergy Intolerance Status Value Set" ;  
797   rdfs:subClassOf fhir:valueset ,  
798   [ rdf:type owl:Class ;  
799     owl:unionOf ( allergy-intolerance-status:confirmed  
800                   allergy-intolerance-status:entered-in-error  
801                   allergy-intolerance-status:refuted  
802                   allergy-intolerance-status:resolved  
803                   allergy-intolerance-status:unconfirmed  
804     )  
805   ] .
```

806

807

808 **2.8 ValueSet schema in the metamodel**

809 A metamodel is introduced when Classes in the Model are instances of MetaClasses which are subclasses of
810 owl:class. In general the Element Definition (1.23.0) is a metamodel.

811 In the metamodel viewpoint, an instance of ValueSet will have object property assertions to

- 812 a) instances of ValueSet.Define if all the codes are taken from a single system
- 813 b) instances of ValueSet.Compose if the codes come from multiple systems and allow inclusion and
814 exclusion
- 815 c) instances of ValueSet.Expansion if the valueset is converted into an enumerated list

816 A ValueSet individual will have define, compose and expansion object properties to applicable objects. However,
817 these object property semantics are not understood by RDF or OWL. They are translated in the Model to
818 subclass, intersection and union relationships between classes.

819

820 3 Resource References

821 3.1 Github example

```
822 :resource a fhir:Observation;  
823   fhir:contained fhir:Observation\#23;  
824   fhir:Observation.subject [  
825     fhir:Reference.reference fhir:Observation\#23  
826   ] .  
827  
828 fhir:Observation\#23 a fhir:Patient;  
829   fhir:Patient.name [ fhir:text "John Smith" ] .
```

830 This example is partially in line with the resolved example below. Even if it were a URL it will not be understood
831 by reasoners or SPARQL.

832 3.2 Subgroup example

833 3.2.1 FHIR XML

```
834 <AllergyIntolerance xmlns="http://hl7.org/fhir">  
835   <id value="1"/>  
836   <text>  
837  
838   </text>  
839   <!-- the date that this entry was recorded -->  
840   <recordedDate value="2010-03-01"/>  
841   <!-- the patient that actually has the risk of adverse reaction -->  
842   <patient>  
843     <reference value="http://record/Patient/PeterPatient"/>  
844     <display value="Peter Patient"/>  
845   </patient>  
846 </AllergyIntolerance>
```

847 3.2.2 RDF Data After processing (acquiring the resource and importing)

```
848 fhir:AllergyIntolerance.patient [ fhir:Reference.display [ fhir:value "Peter Patient" ] ;  
849   fhir:Reference.reference [ fhir:value "http://record/Patient/PeterPatient" ] ;  
850   fhir:Reference.link <http://record/Patient/PeterPatient>  
851 ] ;
```

852 Note that Reference object has been supplemented by the URI of the Reference.link.

853 AllergyIntolerance.patient.link can represent the property chain as shown earlier.

854 A reverse property of the property chain can get the resources for a particular patient.

```
855 ### http://hl7.org/fhir/AllergyForPatient  
856 fhir:AllergyForPatient rdf:type owl:ObjectProperty ;  
857   owl:inverseOf fhir:AllergyIntolerance.patient.link .  
858  
859 ### http://hl7.org/fhir/AllergyIntolerance.patient.link  
860  
861 fhir:AllergyIntolerance.patient.link rdf:type owl:ObjectProperty ;  
862   owl:propertyChainAxiom ( fhir:AllergyIntolerance.patient fhir:Reference.link ) .
```

863

864 The Reference.link is declared when the resource has been imported and closure has been achieved. This allows
865 the consumer to determine whether the import has happened or not and can trigger that function. If the
866 Reference.link is pre-established there will be no indication in the import and the Resource instance will be
867 empty.

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897
898

3.2.3 FHIR OWL Schema

```
### http://hl7.org/fhir/Reference
fhir:Reference rdf:type owl:Class ;
    rdfs:subClassOf fhir:Element ,
        [ rdf:type owl:Restriction ;
          owl:onProperty fhir:Reference.reference ;
          owl:allValuesFrom fhir:string
        ] ,
        [ rdf:type owl:Restriction ;
          owl:onProperty fhir:Reference.reference ;
          owl:maxCardinality "1"^^xsd:nonNegativeInteger
        ] ,
        [ rdf:type owl:Restriction ;
          owl:onProperty fhir:Reference.display ;
          owl:allValuesFrom fhir:string
        ] ,
        [ rdf:type owl:Restriction ;
          owl:onProperty fhir:Reference.display ;
          owl:maxCardinality "1"^^xsd:nonNegativeInteger
        ] ,
        [ rdf:type owl:Restriction ;
          owl:onProperty fhir:Reference.link ;
          owl:allValuesFrom fhir:DomainResource
        ] ,
        [ rdf:type owl:Restriction ;
          owl:onProperty fhir:Reference.link ;
          owl:maxCardinality "1"^^xsd:nonNegativeInteger
        ] .
```

899

900 **4 Bundle**

901 Some preliminary notes:

902 A Bundle instance has no special namespace semantics and therefore it can be referenced as an Ontology
903 record/Bundle/123.

904 The contents of the Bundle.Entry have URIs and would be imported into the Bundle Ontology.

905 The Bundle.Link will be treated as a Reference and Bundle.Link.link will be created when the referenced
906 resource has been resolved.

907 **5 URI Naming**

908 **5.1 Github example**

909 No example

910 **5.2 Subgroup example**

911 Detailed rules for URI construction must be made for internally referenced resource class instances. The
912 example has proposed URI constructs where

- 913 1. the Resource namespace precedes the assigned identifier for the contained instance
- 914 2. the root resource object has an URI identifier identical to the resource class instance URI

915 Thus <http://record/AllergyIntolerance/1> has “record/AllergyIntolerance” as the resource namespace with “1”
916 as the contained instance identifier.

917 It is also intended that the resource namespace should also be the ontology IRI. This is to be tested.

918 `<http://record/AllergyIntolerance/> rdf:type owl:Ontology ;`

919

920

921 6 Ordering

922 6.1 Github example

923 No example

924 6.2 RDF individual ordering example

925 Simple integer DataProperty fhir:index can be applied to individuals of subclasses of fhir:Element

926

```
927 ### http://hl7.org/fhir/index
928 fhir:index rdf:type owl:DatatypeProperty ;
929           rdfs:range fhir:index-primitive .
930
931 ### http://hl7.org/fhir/index-primitive
932 fhir:index-primitive rdf:type rdfs:Datatype ;
933                    owl:equivalentClass [ rdf:type rdfs:Datatype ;
934                                           owl:onDatatype xsd:integer ;
935                                           owl:withRestrictions ( [ xsd:minInclusive 1 ] )
936                                           ] .
937 ### http://hl7.org/fhir/Element
938 fhir:Element rdf:type owl:Class ;
939            rdfs:label "Element" ;
940            rdfs:subClassOf [ rdf:type owl:Restriction ;
941                             owl:onProperty fhir:Element.extension ;
942                             owl:someValuesFrom fhir:Extension
943                             ] ,
944                             [ rdf:type owl:Restriction ;
945                             owl:onProperty fhir:Element.id ;
946                             owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
947                             owl:onDataRange fhir:id-primitive
948                             ] ,
949                             [ rdf:type owl:Restriction ;
950                             owl:onProperty fhir:index ;
951                             owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
952                             owl:onDataRange fhir:index-primitive
953                             ] ;
954            rdfs:comment "The base element used for all FHIR elements and resources - allows for them to be
955            extended with extensions" .
956 .
```

957 In general fhir:value and fhir:Element.id are converted to an attribute in XML. fhir:index dictates the sequence
958 only.

959 6.3 RDF Object Property Ordering example

960 Where object properties need to be ordered to construct the sequence of properties in XML, the fhir:index is
961 defined as an annotation property on the Object Property. The example of ordered properties inside CodingBase
962 is shown:

```
963 ### http://hl7.org/fhir/index
964
965 fhir:index rdf:type owl:AnnotationProperty .
966
```

```
967   ### http://hl7.org/fhir/CodingBase.system
968   fhir:CodingBase.system rdf:type owl:ObjectProperty ;
969     fhir:index 1 ;
970
971   ### http://hl7.org/fhir/CodingBase.version
972   fhir:CodingBase.version rdf:type owl:ObjectProperty ;
973     fhir:index 2 .
974
975   ### http://hl7.org/fhir/CodingBase.code
976   fhir:CodingBase.code rdf:type owl:ObjectProperty ;
977     fhir:index 3 .
978
979   ### http://hl7.org/fhir/CodingBase.display
980   fhir:CodingBase.display rdf:type owl:ObjectProperty ;
981     fhir:index 4 ;
982
983   ### http://hl7.org/fhir/CodingBase.primary
984   fhir:CodingBase.primary rdf:type owl:ObjectProperty ;
985     fhir:index 5 ;
986
987
988
```

989 7 Profiles

990 The example shows “profile” ontology restricting the Valueset of Substance:

991 The AllergyIntolerance Resource is declared again inside the Profile ontology.

```
992 <http://record/AllergyIntolerance/1> rdf:type profile:AllergyIntolerance , owl:NamedIndividual ;  
993
```

994 This prefix on the rdf:type profile:AllergyIntolerance binds to the Profile and causes typing to the
995 profile:AllergyIntolerance where further restrictions (and extensions) are added.

996 AllergyIntolerance.substance.coding is defines as a property chain and allows constraints to be applied to the
997 codings for substance

```
998 allergy:AllergyIntolerance.substance.coding rdf:type owl:ObjectProperty ;  
999     owl:inverseOf fhir:Coding.Resource ;  
1000     owl:propertyChainAxiom ( allergy:AllergyIntolerance.substance fhir:ConceptBase.coding ).  
1001
```

1001

1002 Here is a sample of the Profile Turtle.

```
1003 ### http://PatientSafetyProfile/AllergyIntolerance  
1004  
1005 profile:AllergyIntolerance rdf:type owl:Class ;  
1006     owl:equivalentClass [ rdf:type owl:Class ;  
1007         owl:intersectionOf ( profile:DomainResource  
1008             [ rdf:type owl:Restriction ;  
1009                 owl:onProperty fhir:tag ;  
1010                 owl:hasValue "AllergyIntolerance"  
1011             ]  
1012         )  
1013     ] ;  
1014     rdfs:subClassOf fhir:AllergyIntolerance ,  
1015     [ rdf:type owl:Restriction ;  
1016         owl:onProperty <http://hl7.org/fhir/AllergyIntolerance/AllergyIntolerance.substance> ;  
1017         owl:allValuesFrom <http://PatientSafetyProfile/substance-type>  
1018     ] .  
1019  
1020 ### http://PatientSafetyProfile/DomainResource  
1021  
1022 profile:DomainResource rdf:type owl:Class ;  
1023     rdfs:subClassOf fhir:DomainResource .  
1024  
1025 ### http://PatientSafetyProfile/substance-type  
1026 <http://PatientSafetyProfile/substance-type> rdf:type owl:Class ;  
1027     rdfs:subClassOf fhir:ValueSet ,  
1028     [ rdf:type owl:Class ;  
1029         owl:unionOf (  
1030             <http://snomed.info/id/105590001>  
1031             <http://snomed.info/id/373873005>  
1032         )  
1033     ] .  
1034
```

1035

1036