

FHIR RDF Sample side by side comparisons

V10 Tony Mallia 12/1/15

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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.

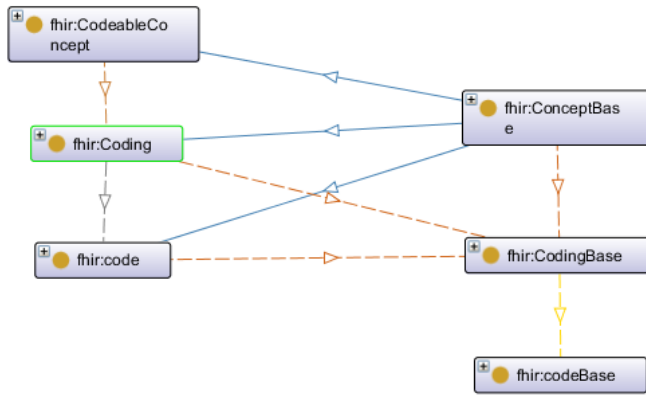
```
121 xxx.code [ a fhir:CodeableConcept ;  
122   ConceptBase.coding [ rdf:type fhir:CodingBase ;  
123     fhir:CodingBase.system [ a fhir:uri; "fhir:value http://example.org/local" ] ;  
124     fhir:CodingBase.code [ a fhir:codeBase ; fhir:value "admin" ] ;  
125     fhir:CodingBase.display [ a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

128

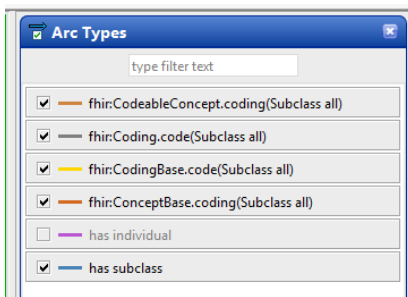
129 The fhir:CodeableConcept type assertion (as a marker) allows round trip back to the original XML type. The same
130 approach will be taken for fhir:Coding and fhir:code.

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

```

137 [ rdf:type owl:AllDisjointClasses ;
138     owl:members ( fhir:CodingBase
139                   fhir:ConceptBase
140                   fhir:codeBase
141                   )
142 ] .
  
```

143

```

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

```
166 ### http://hl7.org/fhir/CodingBase
167 fhir:CodingBase rdf:type owl:Class ;
168     rdfs:subClassOf fhir:Element ,
169         [ rdf:type owl:Restriction ;
170           owl:onProperty fhir:CodingBase.system ;
171           owl:allValuesFrom fhir:uri
172         ] ,
173         [ rdf:type owl:Restriction ;
174           owl:onProperty fhir:CodingBase.system ;
175           owl:maxCardinality "1"^^xsd:nonNegativeInteger
176         ] ,
177         [ rdf:type owl:Restriction ;
178           owl:onProperty fhir:CodingBase.version ;
179           owl:allValuesFrom fhir:string
180         ] ,
181         [ rdf:type owl:Restriction ;
182           owl:onProperty fhir:CodingBase.version ;
183           owl:maxCardinality "1"^^xsd:nonNegativeInteger
184         ] ,
185         [ rdf:type owl:Restriction ;
186           owl:onProperty fhir:CodingBase.code ;
187           owl:allValuesFrom fhir:codeBase
188         ]
189         [ rdf:type owl:Restriction ;
190           owl:onProperty fhir:CodingBase.code ;
191           owl:maxCardinality "1"^^xsd:nonNegativeInteger
192         ] ,
193         [ rdf:type owl:Restriction ;
194           owl:onProperty fhir:CodingBase.display ;
195           owl:allValuesFrom fhir:string
196         ] ,
197         [ rdf:type owl:Restriction ;
198           owl:onProperty fhir:CodingBase.display ;
199           owl:maxCardinality "1"^^xsd:nonNegativeInteger
200         ] ,
201         [ rdf:type owl:Restriction ;
202           owl:onProperty fhir:CodingBase.primary ;
203           owl:maxCardinality "1"^^xsd:nonNegativeInteger
204         ] ,
205         [ rdf:type owl:Restriction ;
206           owl:onProperty fhir:CodingBase.primary ;
207           owl:allValuesFrom fhir:boolean
208         ] .
```

209

```
210 fhir:codeBase rdf:type owl:Class ;
211     rdfs:subClassOf fhir:Element ,
212         [ rdf:type owl:Restriction ;
213           owl:onProperty fhir:value ;
214           owl:allValuesFrom xsd:token
215         ] ,
216         [ rdf:type owl:Restriction ;
217           owl:onProperty fhir:value ;
218           owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
219           owl:onDataRange xsd:token
220         ] .
```

221

222 The concrete subclasses of ConceptBase apply the additional restrictions:

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

227

```
228 ### http://hl7.org/fhir/Coding
229 fhir:Coding rdf:type owl:Class ;
230     rdfs:subClassOf fhir:ConceptBase ,
231         [ rdf:type owl:Restriction ;
232           owl:onProperty fhir:ConceptBase.text ;
233           owl:maxCardinality "0"^^xsd:nonNegativeInteger
234         ] ,
235         [ rdf:type owl:Restriction ;
236           owl:onProperty fhir:ConceptBase.coding ;
237           owl:cardinality "1"^^xsd:nonNegativeInteger
238         ] .
```

239

```
240 fhir:code rdf:type owl:Class ;
241     rdfs:subClassOf fhir:ConceptBase , [ rdf:type owl:Restriction ;
242     owl:onProperty fhir:ConceptBase.coding ;
243     owl:allValuesFrom [ rdf:type owl:Class ;
244     owl:intersectionOf ( fhir:CodingBase
245         [ rdf:type owl:Restriction ;
246           owl:onProperty fhir:CodingBase.code ;
247           owl:cardinality "1"^^xsd:nonNegativeInteger
248         ]
249         [ rdf:type owl:Restriction ;
250           owl:onProperty fhir:CodingBase.display ;
251           owl:maxCardinality "0"^^xsd:nonNegativeInteger
252         ]
253         [ rdf:type owl:Restriction ;
254           owl:onProperty fhir:CodingBase.primary ;
255           owl:maxCardinality "0"^^xsd:nonNegativeInteger
256         ]
257         [ rdf:type owl:Restriction ;
258           owl:onProperty fhir:CodingBase.system ;
259           owl:maxCardinality "1"^^xsd:nonNegativeInteger
260         ]
261         [ rdf:type owl:Restriction ;
262           owl:onProperty fhir:CodingBase.version ;
263           owl:maxCardinality "1"^^xsd:nonNegativeInteger
264         ]
265     )
266     ]
267 ] ,
268 [ rdf:type owl:Restriction ;
269     owl:onProperty fhir:ConceptBase.coding ;
270     owl:cardinality "1"^^xsd:nonNegativeInteger
271 ] .
```

272

273 2 Coding Binding to external terminology (section 1.17.3.3.5)

274 2.1 FHIR XML

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

298 2.2 RDF Instance Example

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

```
300 @prefix : <http://record/AllergyIntolerance/> .  
301 @prefix owl: <http://www.w3.org/2002/07/owl#> .  
302 @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .  
303 @prefix sct: <http://snomed.info/id/> .  
304 @prefix xml: <http://www.w3.org/XML/1998/namespace> .  
305 @prefix xsd: <http://www.w3.org/2001/XMLSchema#> .  
306 @prefix fhir: <http://hl7.org/fhir/> .  
307 @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .  
308 @prefix profile: <http://PatientSafetyProfile/> .  
309 @base <http://record/AllergyIntolerance/1> .  
310  
311 <http://record/AllergyIntolerance/> rdf:type owl:Ontology ;  
312   owl:imports <http://PatientSafetyProfile> .  
313  
314 ### http://record/AllergyIntolerance/1  
315  
316 <http://record/AllergyIntolerance/1> rdf:type profile:DomainResource, owl:NamedIndividual ;  
317   fhir:Resource.id [ rdf:type fhir:id ; fhir:value "1" ] ;  
318   fhir:AllergyIntolerance.status [ rdf:type fhir:code , <http://hl7.org/fhir/allergyIntoleranceStatus#confirmed>;  
319     fhir:ConceptBase.coding [ fhir:CodingBase.code [ fhir:value "confirmed" ] ]  
320   ] ;  
321   fhir:AllergyIntolerance.patient [ rdf:type fhir:Reference ;  
322     fhir:Reference.reference [ fhir:value "http://record/Patient/PeterPatient" ] ;  
323     fhir:Reference.display [ fhir:value "Peter Patient" ] ;  
324     fhir:Reference.link <http://record/Patient/PeterPatient> ;  
325   ] ;  
326   fhir:AllergyIntolerance.substance [ rdf:type fhir:CodeableConcept , <http://snomed.info/id/90614001>;  
327     rdfs:label "beta-lactam (antibiotic)" ;  
328     fhir:ConceptBase.coding [ rdf:type fhir:CodingBase ;  
329       fhir:CodingBase.code [ rdf:type fhir:code ; fhir:value "90614001" ] ;  
330       fhir:CodingBase.system [ rdf:type fhir:string ; fhir:value "http://snomed.info/sct" ] ;  
331       fhir:CodingBase.display [ rdf:type fhir:string ; fhir:value "beta-lactam (antibiotic)" ]  
332     ] ;  
333     fhir:ConceptBase.text [ rdf:type fhir:string ; fhir:value "beta-lactam (antibiotic)" ]  
334   ] .  
335
```


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

338 2.3 FHIR Allergy Intolerance OWL Schema

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

```
340 ### http://hl7.org/fhir/AllergyIntolerance
341
342 fhir:AllergyIntolerance rdf:type owl:Class ;
343
344         rdfs:subClassOf fhir:DomainResource ,
345             [ rdf:type owl:Restriction ;
346               owl:onProperty fhir:AllergyIntolerance.substance ;
347               owl:maxCardinality "1"^^xsd:nonNegativeInteger
348             ] ,
349             [ rdf:type owl:Restriction ;
350               owl:onProperty fhir:AllergyIntolerance.substance ;
351               owl:allValuesFrom fhir:CodeableConcept
352             ] ,
353 Etc..
354 .
```

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

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

357

358 2.4 Definitions of Code System, Concept and ValueSet

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

361 2.4.1 Code System

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

364 In RDF/OWL a code system is a namespace in which the code is unique. Since a code forms a fragment of a URI,
365 the code-system forms a prefix to that fragment making it unique. The code system identity and the prefix may
366 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

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

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

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

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

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

384 2.4.2 Bridging Ontology

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

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

```

388 [ rdf:type owl:Class ;
389   rdfs:subClassOf <http://snomed.info/id/282100009> ;
390   owl:intersectionOf ( <http://snomed.info/sct>
391     [ rdf:type owl:Restriction ;
392       owl:onProperty fhir:CodingBase.code ;
393       owl:someValuesFrom [ rdf:type owl:Restriction ;
394                             owl:onProperty fhir:value ;
395                             owl:hasValue "282100009"
396                           ]
397     ]
398   )
399 ] .
400

```

401 2.4.3 Concept

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

404 2.4.4 ValueSet

405 Example is substance-code used in AllergyIntolerance

406 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

407

408 2.4.4.2 Content Logical Definition

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

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

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

412 **2.4.4.3 RDF Definition**

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

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

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

416 A named Valueset as a class is a union of named systemconcept classes (not a superclass). If an instance of

417 CodingBase is typed to a Valueset then it probably means that the codeBase is unknown or to be selected.

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

419

2.4.5 Examples

421

2.4.5.1 Example from orim

422

```
### CONCEPT DOMAIN
```

423

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

424

425

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

426

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

427

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

428

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

429

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

430

```
        ]
```

431

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

432

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

433

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

434

```
        ]
```

435

```
    )
```

436

```
    ] ;
```

437

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

438

439

```
### CONCEPT
```

440

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

441

442

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

443

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

444

445

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

446

447

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

448

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

449

450

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

451

452

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

453

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

454

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

455

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

456

457

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

458

459

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

460

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

461

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

462

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

463

464

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

465

466

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

467

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

468

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

469

470

471

```
### VALUESET
```

472

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

473

474

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

475

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

476

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

477

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

478

479

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

480

481

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

482

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

483

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

484

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

485

```

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

```

```

555     ] ,
556     [ rdf:type :Restriction ; :onProperty h17:CodeSystemVersion.codingRef ;
557       :allValuesFrom [ rdf:type :Class ;
558         :oneOf ( <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#nullified>
559           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#normal>
560           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#suspended>
561           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#new>
562           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#obsolete>
563           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#aborted>
564           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#active>
565           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#held>
566           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#completed>
567           <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#cancelled>
568         )
569       ]
570     ] ,
571     [ rdf:type :Restriction ; :onProperty h17:CodeSystemVersion.codingRef ;
572       :allValuesFrom [ rdf:type :Restriction ; :onProperty h17:Coding.codeSystemRef ;
573         :hasValue cs:ActStatus
574       ]
575     ] ;
576     h17:CodeSystemVersion.codeSystem "2.16.840.1.113883.5.14"^^xs:string ;
577     h17:CodeSystemVersion.versionDate "2011-12-20"^^xs:string ;
578     :sameAs <urn:oid:2.16.840.1.113883.5.14/2011-12-20> .
579
580 ### http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#active
581
582 <http://hl7.org/ontology/uv/vocab/cs/ActStatus/2011-12-20#active> rdf:type h17:Coding ,:NamedIndividual ;
583     h17:Coding.code "active"^^xs:string .
584
585

```

586 **2.4.5.2 ValueSet schema in FHIR**

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

```

589 ### http://hl7.org/fhir/ValueSet
590 fhir:ValueSet rdf:type owl:Class ;
591     rdfs:subClassOf fhir:DomainResource ,
592     [ rdf:type owl:Restriction ;
593       owl:onProperty fhir:ValueSet.define ;
594       owl:allValuesFrom fhir:ValueSet.Define
595     ] ,
596     [ rdf:type owl:Restriction ;
597       owl:onProperty fhir:ValueSet.define ;
598       owl:maxCardinality "1"^^xsd:nonNegativeInteger
599     ] ,
600     [ rdf:type owl:Restriction ;
601       owl:onProperty fhir:ValueSet.compose ;
602       owl:allValuesFrom fhir:ValueSet.Compose
603     ] ,
604     [ rdf:type owl:Restriction ;
605       owl:onProperty fhir:ValueSet.expansion ;
606       owl:maxCardinality "1"^^xsd:nonNegativeInteger
607     ] ,
608     [ rdf:type owl:Restriction ;
609       owl:onProperty fhir:ValueSet.expansion ;
610       owl:allValuesFrom fhir:ValueSet.Expansion
611     ] ,
612     [ rdf:type owl:Restriction ;
613       owl:onProperty fhir:ValueSet.compose ;
614       owl:maxCardinality "1"^^xsd:nonNegativeInteger
615     ] .
616
617 ### http://hl7.org/fhir/ValueSet.Compose
618 fhir:ValueSet.Compose rdf:type owl:Class ;
619     rdfs:subClassOf fhir:BackboneElement .
620

```

```

621 ### http://hl7.org/fhir/ValueSet.Concept
622 fhir:ValueSet.Concept rdf:type owl:Class ;
623     rdfs:subClassOf fhir:BackboneElement ,
624     [ rdf:type owl:Restriction ;
625       owl:onProperty fhir:ValueSet.Concept.display ;
626       owl:allValuesFrom fhir:string
627     ] ,
628     [ rdf:type owl:Restriction ;
629       owl:onProperty fhir:ValueSet.Concept.code ;
630       owl:cardinality "1"^^xsd:nonNegativeInteger
631     ] ,
632     [ rdf:type owl:Restriction ;
633       owl:onProperty fhir:ValueSet.Concept.code ;
634       owl:allValuesFrom fhir:code
635     ] ,
636     [ rdf:type owl:Restriction ;
637       owl:onProperty fhir:ValueSet.Concept.definition ;
638       owl:maxCardinality "1"^^xsd:nonNegativeInteger
639     ] ,
640     [ rdf:type owl:Restriction ;
641       owl:onProperty fhir:ValueSet.Concept.display ;
642       owl:maxCardinality "1"^^xsd:nonNegativeInteger
643     ] ,
644     [ rdf:type owl:Restriction ;
645       owl:onProperty fhir:ValueSet.Concept.definition ;
646       owl:allValuesFrom fhir:string
647     ] .
648

```



```
649 ### http://hl7.org/fhir/ValueSet.Define
650 fhir:ValueSet.Define rdf:type owl:Class ;
651     rdfs:subClassOf fhir:BackboneElement ,
652     [ rdf:type owl:Restriction ;
653       owl:onProperty fhir:ValueSet.Define.system ;
654       owl:allValuesFrom fhir:uri
655     ] ,
656     [ rdf:type owl:Restriction ;
657       owl:onProperty fhir:ValueSet.Define.system ;
658       owl:cardinality "1"^^xsd:nonNegativeInteger
659     ] ,
660     [ rdf:type owl:Restriction ;
661       owl:onProperty fhir:ValueSet.Define.concept ;
662       owl:allValuesFrom fhir:ValueSet.Concept
663     ] .
664
665 ### http://hl7.org/fhir/ValueSet.Expansion
666 fhir:ValueSet.Expansion rdf:type owl:Class ;
667     rdfs:subClassOf fhir:BackboneElement .
668
669
670
```

671 2.5 FHIR internal System and Coding bindings (OWL Schema)

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

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

722

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

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

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

729 2.6 System and codings external RDF representation

730 From the SNOMED RDF:

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

749 The system is defined further in the FHIR ontology

```
750 @prefix sct: <http://snomed.info/id/> .  
751  
752 ### http://snomed.info/sct  
753  
754 <http://snomed.info/sct> rdf:type owl:Class ;  
755     rdfs:subClassOf fhir:valueset-system ;  
756     fhir:prefix "http://snomed.info/id/" .  
757
```

758

759 2.7 Valueset Definition

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

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

764 2.7.1.1 Anonymous codings

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

```
766 <http://hl7.org/fhir/vs/allergy-intolerance-status> rdf:type owl:Class ;  
767   rdfs:label "Allergy Intolerance Status Value Set" ;  
768   rdfs:subClassOf fhir:valueset ,  
769   [ rdf:type owl:Class ;  
770     owl:intersectionOf (  
771       [ rdf:type owl:Restriction ;  
772         owl:onProperty fhir:CodingBase.code ;  
773         owl:someValuesFrom [ rdf:type owl:Class ;  
774           owl:unionOf (  
775             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "confirmed" ]  
776             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "entered-in-error" ]  
777             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "refuted" ]  
778             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "resolved" ]  
779             [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "unconfirmed" ]  
780           )  
781         ]  
782       ]  
783     [ rdf:type owl:Restriction ;  
784       owl:onProperty fhir:CodingBase.system ;  
785       owl:allValuesFrom [ rdf:type owl:Restriction ; owl:onProperty fhir:value ;  
786         owl:hasValue "http://fhir/allergy-intolerance-status"  
787       ]  
788     ]  
789   )  
790 ] .
```

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

793 2.7.2 Named codings

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

```
796 <http://hl7.org/fhir/vs/allergy-intolerance-status> rdf:type owl:Class ;  
797   rdfs:label "Allergy Intolerance Status Value Set" ;  
798   rdfs:subClassOf fhir:valueset ,  
799   [ rdf:type owl:Class ;  
800     owl:unionOf ( allergy-intolerance-status:confirmed  
801                   allergy-intolerance-status:entered-in-error  
802                   allergy-intolerance-status:refuted  
803                   allergy-intolerance-status:resolved  
804                   allergy-intolerance-status:unconfirmed  
805     )  
806   ] .
```

807

808

809 **2.8 ValueSet schema in the metamodel**

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

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

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

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

820

821 3 Resource References

822 3.1 Github example

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

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

833 3.2 Subgroup example

834 3.2.1 FHIR XML

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

848 3.2.2 RDF Data After processing (acquiring the resource and importing)

```
849 fhir:AllergyIntolerance.patient [ fhir:Reference.display [ fhir:value "Peter Patient" ] ;  
850   fhir:Reference.reference [ fhir:value "http://record/Patient/PeterPatient" ] ;  
851   fhir:Reference.link <http://record/Patient/PeterPatient>  
852 ] ;
```

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

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

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

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

864

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

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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
        ] .
```

900

901 **4 Bundle**

902 Some preliminary notes:

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

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

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

908 **5 URI Naming**

909 **5.1 Github example**

910 No example

911 **5.2 Subgroup example**

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

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

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

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

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

920

921

922 6 Ordering

923 6.1 Github example

924 No example

925 6.2 RDF individual ordering example

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

927

```
928 ### http://hl7.org/fhir/index
929 fhir:index rdf:type owl:DatatypeProperty ;
930         rdfs:range fhir:index-primitive .
931
932 ### http://hl7.org/fhir/index-primitive
933 fhir:index-primitive rdf:type rdfs:Datatype ;
934         owl:equivalentClass [ rdf:type rdfs:Datatype ;
935                                 owl:onDatatype xsd:integer ;
936                                 owl:withRestrictions ( [ xsd:minInclusive 1 ] )
937         ] .
938 ### http://hl7.org/fhir/Element
939 fhir:Element rdf:type owl:Class ;
940         rdfs:label "Element" ;
941         rdfs:subClassOf [ rdf:type owl:Restriction ;
942                             owl:onProperty fhir:Element.extension ;
943                             owl:someValuesFrom fhir:Extension
944         ] ,
945         [ rdf:type owl:Restriction ;
946           owl:onProperty fhir:Element.id ;
947           owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
948           owl:onDataRange fhir:id-primitive
949         ] ,
950         [ rdf:type owl:Restriction ;
951           owl:onProperty fhir:index ;
952           owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
953           owl:onDataRange fhir:index-primitive
954         ] ;
955         rdfs:comment "The base element used for all FHIR elements and resources - allows for them to be
956 extended with extensions" .
957 .
```

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

960 6.3 RDF Object Property Ordering example

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

```
964 ### http://hl7.org/fhir/index
965
966 fhir:index rdf:type owl:AnnotationProperty .
967
```

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

987

988

989

990 7 Profiles

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

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

```
993 <http://record/AllergyIntolerance/1> rdf:type profile:AllergyIntolerance , owl:NamedIndividual ;  
994
```

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

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

```
999 allergy:AllergyIntolerance.substance.coding rdf:type owl:ObjectProperty ;  
1000     owl:inverseOf fhir:Coding.Resource ;  
1001     owl:propertyChainAxiom ( allergy:AllergyIntolerance.substance fhir:ConceptBase.coding ).  
1002
```

1003 Here is a sample of the Profile Turtle.

```
1004 ### http://PatientSafetyProfile/AllergyIntolerance  
1005  
1006 profile:AllergyIntolerance rdf:type owl:Class ;  
1007     owl:equivalentClass [ rdf:type owl:Class ;  
1008         owl:intersectionOf ( profile:DomainResource  
1009             [ rdf:type owl:Restriction ;  
1010                 owl:onProperty fhir:tag ;  
1011                 owl:hasValue "AllergyIntolerance"  
1012             ]  
1013         )  
1014     ] ;  
1015     rdfs:subClassOf fhir:AllergyIntolerance ,  
1016     [ rdf:type owl:Restriction ;  
1017         owl:onProperty <http://hl7.org/fhir/AllergyIntolerance/AllergyIntolerance.substance> ;  
1018         owl:allValuesFrom <http://PatientSafetyProfile/substance-type>  
1019     ] .  
1020  
1021 ### http://PatientSafetyProfile/DomainResource  
1022  
1023 profile:DomainResource rdf:type owl:Class ;  
1024     rdfs:subClassOf fhir:DomainResource .  
1025  
1026 ### http://PatientSafetyProfile/substance-type  
1027 <http://PatientSafetyProfile/substance-type> rdf:type owl:Class ;  
1028     rdfs:subClassOf fhir:ValueSet ,  
1029     [ rdf:type owl:Class ;  
1030         owl:unionOf (  
1031             <http://snomed.info/id/105590001>  
1032             <http://snomed.info/id/373873005>  
1033         )  
1034     ] .  
1035
```

1036

1037