Australian Government

Australian Digital Health Agency

FHIR® terminology services

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Revision of FHIR basics

The HL7® FHIR® standard

http://hl7.org/fhir/

HL7 FHIR Release 4

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Home

This page is part of the FHIR Specification (v4.0.1: R4 - Mixed Normative and STU). This is the current published version. For a full list of available versions, see the Directory of published versions

0 Welcome to FHIR®

FHIR is a standard for health care data exchange, published by HL7®.

First time here?
See the executive summary, the developer's introduction, clinical introduction, or architect's introduction, and then the FHIR overview / roadmap & Timelines. See also the open license (and don't miss the full Table of Contents and the Community Credits or you can search this specification).

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- **4.0.1**, Oct-30 2019: Corrections to invariants & generated conformance resources, and add ANSI Normative Status Notes

Level 1 Basic framework on which the specification is built

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Implementer Support	Security & Privacy	Conformance	Terminology	Exchange
Downloads, Version Mgmt, Use Cases, Testing	Security, Consent, Provenance, AuditEvent	StructureDefinition, CapabilityStatement, ImplementationGuide, Profiling	CodeSystem, ValueSet, ConceptMap, Terminology Svc	REST API + Search Documents Messaging Services Databases

Resource content

Name	Flags	Card.	Type	Description & Constraints
CodeSystem	I		DomainResource	A set of codes drawn from one or more code systems + *Within a code system definition, all the codes SHALL be unique* Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
url	Σ	0..1	uri	Logical URI to reference this code system (globally unique) (Coding.system)
identifier	Σ	0..1	Identifier	Additional identifier for the code system
version	Σ	0..1	string	Business version of the code system (Coding.version)
name	Σ	0..1	string	Name for this code system (computer friendly)
title	Σ	0..1	string	Name for this code system (human friendly)
status	?! Σ	1..1	code	draft | active | retired | unknown PublicationStatus (Required)
experimental	?! Σ	0..1	boolean	For testing purposes, not real usage
date	Σ	0..1	dateTime	Date this was last changed
publisher	Σ	0..1	string	Name of the publisher (organization or individual)
contact	Σ	0..*	ContactDetail	Contact details for the publisher
description		0..1	markdown	Natural language description of the code system
useContext	Σ	0..*	UsageContext	Context the content is intended to support
jurisdiction	Σ	0..*	CodeableConcept	Intended jurisdiction for code system (if applicable) Jurisdiction ValueSet (Extensible)
purpose		0..1	markdown	Why this code system is defined
copyright		0..1	markdown	Use and/or publishing restrictions
caseSensitive	Σ	0..1	boolean	If code comparison is case sensitive
valueSet	Σ	0..1	uri	Canonical URL for value set with entire code system
hierarchyMeaning	Σ	0..1	code	grouped-by | is-a | part-of | classified-with CodeSystemHierarchyMeaning (Required)
compositional	Σ	0..1	boolean	If code system defines a post-composition grammar
versionNeeded	Σ	0..1	boolean	If definitions are not stable
content	Σ	1..1	code	not-present | example | fragment | complete CodeSystemContentMode (Required)
count	Σ	0..1	unsignedInt	Total concepts in the code system

Formats

JSON

```
{
    "resourceType": "CodeSystem",
    "id": "01e08aaa-ce51-44d1-8f07-75fb454d58b7",
    "meta": {
        "versionId": "5",
        "lastUpdated": "2017-11-15T18:40:30.125+10:00"
    },
    "url": "http://csiro.au/cs/au-jurisdictions",
    "version": "0.0.1",
    "name": "Australian jurisdictions",
    "status": "draft",
    "experimental": true,
    "caseSensitive": false,
    "valueSet": "http://csiro.au/vs/au-jurisdictions",
    "hierarchyMeaning": "is-a",
    "versionNeeded": false,
    "content": "complete",
    "filter": [
        {
            "code": "capital",
            "description": "Capital city of the jurisdiction",
            "operator": [
                "=",
                "exists"
            ],
            "value": "The capital city of the jurisdiction"
        },
```

XML

```
<CodeSystem xmlns="http://hl7.org/fhir">
    <id value="01e08aaa-ce51-44d1-8f07-75fb454d58b7"/>
    <meta>
        <versionId value="5"/>
        <lastUpdated value="2017-11-15T18:40:30.125+10:00"/>
    </meta>
    <url value="http://csiro.au/cs/au-jurisdictions"/>
    <version value="0.0.1"/>
    <name value="Australian jurisdictions"/>
    <status value="draft"/>
    <experimental value="true"/>
    <caseSensitive value="false"/>
    <valueSet value="http://csiro.au/vs/au-jurisdictions"/>
    <hierarchyMeaning value="is-a"/>
    <versionNeeded value="false"/>
    <content value="complete"/>
    <filter>
        <code value="capital"/>
        <description value="Capital city of the jurisdiction"/>
        <operator value="="/>
        <operator value="exists"/>
        <value value="The capital city of the jurisdiction"/>
    </filter>
    <filter>
        <code value="neighbour"/>
        <description value="Neighbouring jurisdiction"/>
        <operator value="="/>
```

REST API

Instance Level Interactions	
read	Read the current state of the resource
vread	Read the state of a specific version of the resource
update	Update an existing resource by its id (or create it if it is new)
patch	Update an existing resource by posting a set of changes to it
delete	Delete a resource
history	Retrieve the change history for a particular resource
Type Level Interactions	
create	Create a new resource with a server assigned id
search	Search the resource type based on some filter criteria
history	Retrieve the change history for a particular resource type
Whole System Interactions	
capabilities	Get a capability statement for the system
batch/transaction	Update, create or delete a set of resources in a single interaction
history	Retrieve the change history for all resources
search	Search across all resource types based on some filter criteria

http://hl7.org/fhir/http.html

Basic REST operations

Search	GET /CodeSystem?url=http://somedomain.com/cs/1
Create	POST /CodeSystem
Read	GET /CodeSystem/1
Update	PUT /CodeSystem/1
Delete	DELETE /CodeSystem/1

Search REST API operation

Search Parameter Types	Parameters for all resources	Search result parameters

Number
Date/DateTime
String
Token
Reference
Composite
Quantity
URI
	`_id`
	`_lastUpdated`
	`_tag`
	`_profile`
	`_security`
	`_text`
	`_content`
	`_list`
	`_has`
	`_type`
	`_query`
		`_sort`
		`_count`
		`_include`
		`_revinclude`
		`_summary`
		`_elements`
		`_contained`
		`_containedType`

http://hl7.org/fhir/http.html

Operations

GET /Patient/1/$validate?profile=http://somedomain.com/fhir/sd/foo

Execute the "validate" operation on the Patient resource with ID 1, using "http://somedomain.com/fhir/sd/foo" as the value for the "profile" parameter.

FHIR® Terminology Resources

Terminology content in the FHIR® specifications

http://hl7.org/fhir/

HL7 FHIR Release 4

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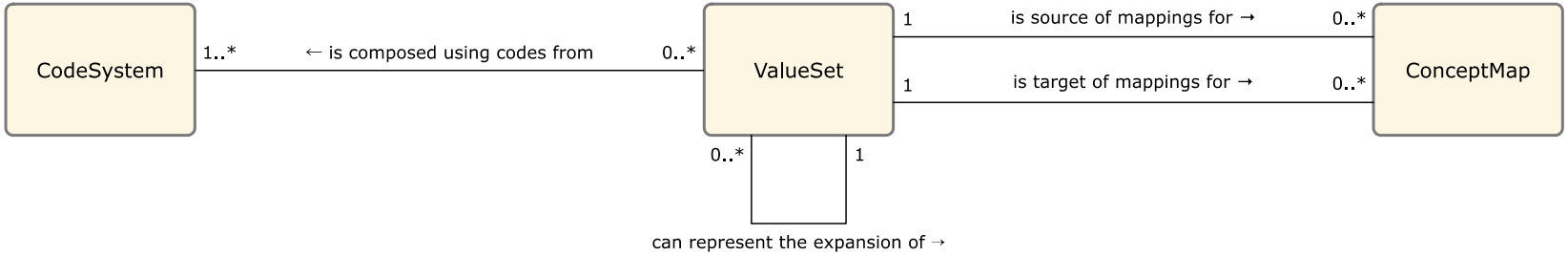
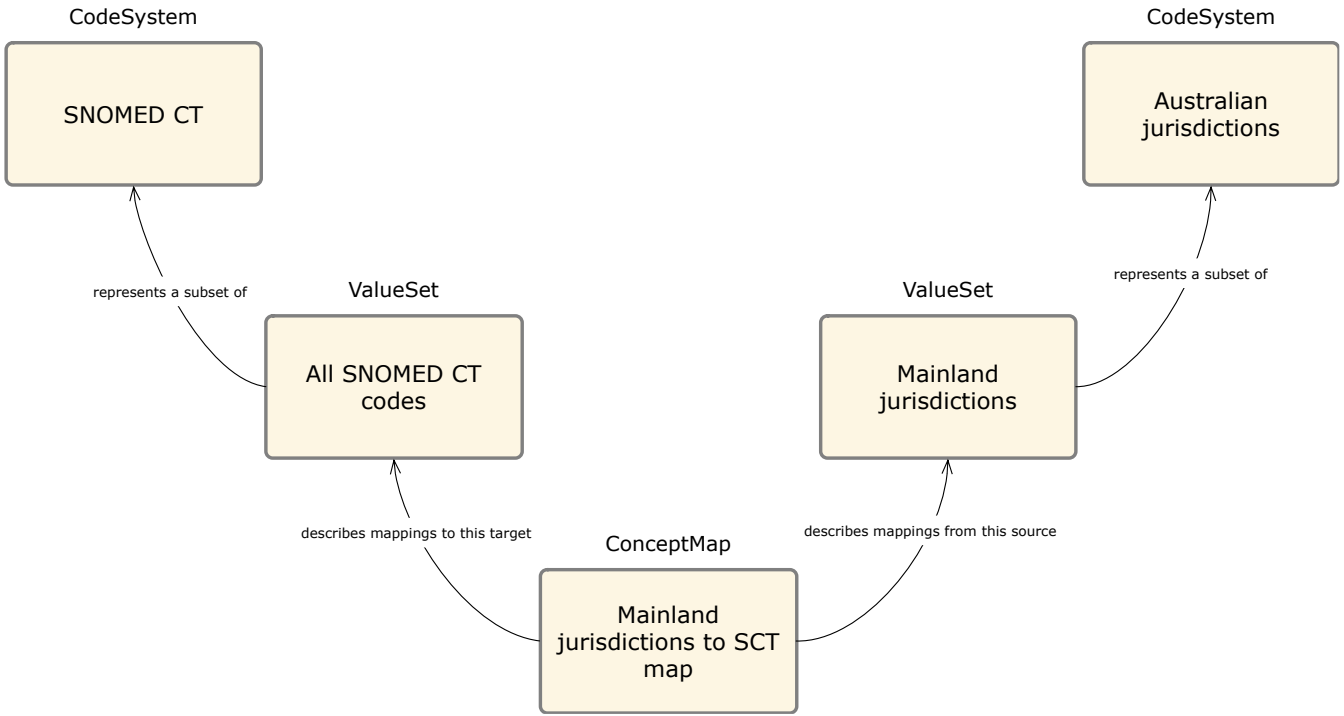
Downloads, Version Mgmt, Use Cases, Testing	Security, Consent, Provenance, AuditEvent	StructureDefinition, CapabilityStatement, ImplementationGuide, Profiling	CodeSystem, ValueSet, ConceptMap, Terminology Svc	REST API + Search, Documents, Messaging, Services, Databases

Terminology resources

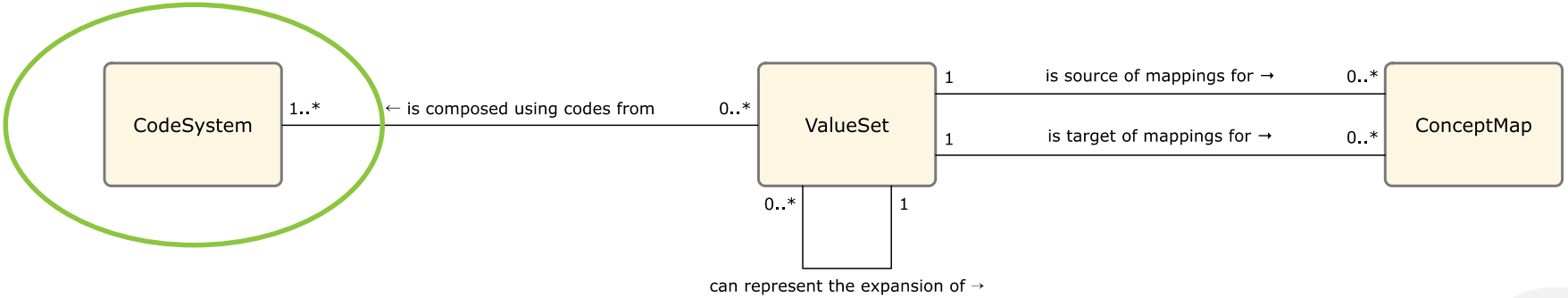


Terminology resources – example



CodeSystem

- Collection of terms
- Identified by a URI (and version)
- Can be hierarchical
- Properties, filters
- Standardised (SNOMED CT, LOINC, RxNorm, ICD, etc.), or custom



CodeSystem structure

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CodeSystem	I		DomainResource	A set of codes drawn from one or more code systems + *Within a code system definition, all the codes SHALL be unique* Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
url	Σ	0..1	uri	Logical URI to reference this code system (globally unique) (Coding.system)
identifier	Σ	0..1	Identifier	Additional identifier for the code system
version	Σ	0..1	string	Business version of the code system (Coding.version)
name	Σ	0..1	string	Name for this code system (computer friendly)
title	Σ	0..1	string	Name for this code system (human friendly)
status	?! Σ	1..1	code	draft | active | retired | unknown PublicationStatus (Required)
experimental	?! Σ	0..1	boolean	For testing purposes, not real usage
date	Σ	0..1	dateTime	Date this was last changed
publisher	Σ	0..1	string	Name of the publisher (organization or individual)
contact	Σ	0..*	ContactDetail	Contact details for the publisher
description		0..1	markdown	Natural language description of the code system
useContext	Σ	0..*	UsageContext	Context the content is intended to support
jurisdiction	Σ	0..*	CodeableConcept	Intended jurisdiction for code system (if applicable) Jurisdiction ValueSet (Extensible)
purpose		0..1	markdown	Why this code system is defined
copyright		0..1	markdown	Use and/or publishing restrictions
caseSensitive	Σ	0..1	boolean	If code comparison is case sensitive
valueSet	Σ	0..1	uri	Canonical URL for value set with entire code system
hierarchyMeaning	Σ	0..1	code	grouped-by | is-a | part-of | classified-with CodeSystemHierarchyMeaning (Required)
compositional	Σ	0..1	boolean	If code system defines a post-composition grammar
versionNeeded	Σ	0..1	boolean	If definitions are not stable
content	Σ	1..1	code	not-present | example | fragment | complete CodeSystemContentMode (Required)
count	Σ	0..1	unsignedInt	Total concepts in the code system

http://hl7.org/fhir/codesystem.html

CodeSystem structure

filter	Σ	0..*	BackboneElement	Filter that can be used in a value set
code	Σ	1..1	code	Code that identifies the filter
description	Σ	0..1	string	How or why the filter is used
operator	Σ	1..*	code	Operators that can be used with filter FilterOperator (Required)
value	Σ	1..1	string	What to use for the value
property	Σ	0..*	BackboneElement	Additional information supplied about each concept
code	Σ	1..1	code	Identifies the property on the concepts, and when referred to in operations
uri	Σ	0..1	uri	Formal identifier for the property
description	Σ	0..1	string	Why the property is defined, and/or what it conveys
type	Σ	1..1	code	code | Coding | string | integer | boolean | dateTime PropertyType (Required)

CodeSystem structure

concept	0..*	BackboneElement	Concepts in the code system
code	1..1	code	Code that identifies concept
display	0..1	string	Text to display to the user
definition	0..1	string	Formal definition
designation	0..*	BackboneElement	Additional representations for the concept
language	0..1	code	Human language of the designation Common Languages (Extensible but limited to All Languages)
use	0..1	Coding	Details how this designation would be used Designation Use (Extensible)
value	1..1	string	The text value for this designation
property	0..*	BackboneElement	Property value for the concept
code	1..1	code	Reference to CodeSystem.property.code
value[x]	1..1		Value of the property for this concept
valueCode		code	
valueCoding		Coding	
valueString		string	
valueInteger		integer	
valueBoolean		boolean	
valueDateTime		dateTime	
concept	0..*	see concept	Child Concepts (is-a/contains/categorizes)

CodeSystem – example

https://documenter.getpostman.com/view/634774/fhir-terminology-services-webinar/RVu7ETtM

CodeSystem – example


```
{
  "resourceType": "CodeSystem",
  "id": "au-jurisdictions",
  "url": "http://csiro.au/cs/au-jurisdictions",
  "version": "0.0.1",
  "name": "Australian jurisdictions",
  "status": "draft",
  "experimental": true,
  "caseSensitive": false,
  "valueSet": "http://csiro.au/vs/au-jurisdictions",
  "hierarchyMeaning": "is-a",
  "versionNeeded": false,
  "content": "complete",
  "filter": [
    {
      "code": "capital",
      "description": "Capital city of the jurisdiction",
      "operator": [
        "=",
        "exists"
      ],
      "value": "The capital city of the jurisdiction"
    },
    {
      "code": "neighbour",
      "description": "Neighbouring jurisdiction",
      "operator": [
        "=",
        "exists",
        "is-a",
        "is-not-a",
        "descendent-of"
      ],
      "value": "Neighbouring jurisdiction"
    }
  ],
```

```
  "property": [
    {
      "code": "capital",
      "uri": "http://csiro.au/cs/jurisdiction-capital",
      "description": "Capital city of the jurisdiction",
      "type": "string"
    },
    {
      "code": "neighbour",
      "uri": "http://csiro.au/cs/jurisdiction-neighbour",
      "description": "Neighbouring jurisdiction",
      "type": "code"
    }
  ],
```

```
  "concept": [
    {
      "code": "AU",
      "display": "Australia",
      "definition": "Australian jurisdiction",
      "concept": [
        {
          "code": "AU-state",
          "display": "Australian state",
          "definition": "Australian state jurisdiction",
          "concept": [
            {
              "code": "WA",
              "display": "Western Australia",
              "definition": "Western Australia jurisdiction",
              "designation": [
                {
                  "use": {
                    "system": "http://snomed.info/sct",
                    "code": "900000000000013009"
                  },
                  "value": "West Australia"
                }
              ],
              "property": [
                {
                  "code": "capital",
                  "valueString": "Perth"
                },
                {
                  "code": "neighbour",
                  "valueCode": "NT"
```

CodeSystem – example

```
{
  "code": "QLD",
  "display": "Queensland",
  "definition": "Queensland jurisdiction",
  "property": [
    {
      "code": "capital",
      "valueString": "Brisbane"
    },
    {
      "code": "neighbour",
      "valueCode": "NSW"
    },
    {
      "code": "neighbour",
      "valueCode": "SA"
    },
    {
      "code": "neighbour",
      "valueCode": "NT"
    }
  ]
},
{
  "code": "NSW",
  "display": "New South Wales",
  "definition": "New South Wales jurisdiction",
  "property": [
    {
      "code": "capital",
      "valueString": "Sydney"
    },
    {
      "code": "neighbour",
      "valueCode": "QLD"
    },
    {
      "code": "neighbour",
      "valueCode": "VIC"
    },
    {
      "code": "neighbour",
      "valueCode": "ACT"
    }
  ]
},
```

```
{
  "code": "AU-territory",
  "display": "Australian territory",
  "definition": "Australian territory jurisdiction",
  "concept": [
    {
      "code": "NT",
      "display": "Northern Territory",
      "definition": "Northern Territory jurisdiction",
      "property": [
        {
          "code": "capital",
          "valueString": "Darwin"
        },
        {
          "code": "neighbour",
          "valueCode": "QLD"
        },
        {
          "code": "neighbour",
          "valueCode": "SA"
        },
        {
          "code": "neighbour",
          "valueCode": "WA"
        }
      ]
    },
    {
      "code": "ACT",
      "display": "Australian Capital Territory",
      "definition": "Australian Capital Territory jurisdiction",
      "property": [
        {
          "code": "capital",
          "valueString": "Canberra"
        },
        {
          "code": "neighbour",
          "valueCode": "NSW"
        }
      ]
    }
  ]
}
```

CodeSystem operations: $lookup

GET /CodeSystem/$lookup

POST /CodeSystem/$lookup

- Retrieve details about a code (as code/system/version, or Coding)
- Can be used to determine whether a code exists in the CodeSystem
- Can be used to retrieve specific/all properties/designations

CodeSystem operations: $lookup – example

GET /CodeSystem/$lookup?
system=http://csiro.au/cs/au-jurisdictions&code=WA&property=display&property=capital


```
{
  "resourceType": "Parameters",
  "parameter": [
    {
      "name": "display",
      "valueString": "Western Australia"
    },
    {
      "name": "property",
      "part": [
        {
          "name": "code",
          "valueCode": "capital"
        },
        {
          "name": "valueString",
          "valueString": "Perth"
        }
      ]
    }
  ]
}
```


Look up the "WA" code within the "http://csiro.au/cs/au-jurisdictions" CodeSystem, and include the "display" and "capital" properties in the response.

CodeSystem operations: $subsumes

GET /CodeSystem/$subsumes

POST /CodeSystem/$subsumes

- Check what (if any) subsumption relationship exists between two codes
  - codeA and codeB, as code/system/version, or codingA and codingB
  - Result will be ‘equivalent’, ‘subsumes’, ‘subsumed_by’, ‘not_subsumed’
- Depends on the code system’s ‘hierarchyMeaning’
- Can also use $closure

CodeSystem operations: $subsumes – example

GET /CodeSystem/$subsumes?
system=http://csiro.au/cs/au-jurisdictions&codeA=AU&codeB=QLD

```
{
  "resourceType": "Parameters",
  "parameter": [
    {
      "name": "outcome",
      "valueCode": "subsumes"
    }
  ]
}
```

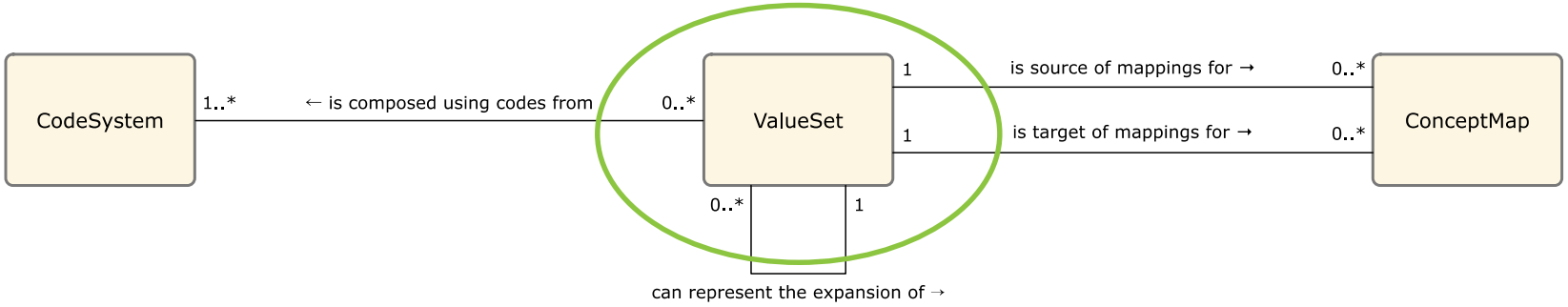
Check for a subsumption relationship between the "AU" and "QLD" codes within the "http://csiro.au/cs/au-jurisdictions" CodeSystem.

CodeSystem search parameters

Name	Type	Description	Expression	In Common
code	token	A code defined in the code system	CodeSystem.concept.code	
content-mode	token	not-present | example | fragment | complete	CodeSystem.content	
date	date	The code system publication date	CodeSystem.date	
description	string	The description of the code system	CodeSystem.description	
identifier	token	External identifier for the code system	CodeSystem.identifier	
jurisdiction	token	Intended jurisdiction for the code system	CodeSystem.jurisdiction	
language	token	A language in which a designation is provided	CodeSystem.concept.designation.language	
name	string	Computationally friendly name of the code system	CodeSystem.name	
publisher	string	Name of the publisher of the code system	CodeSystem.publisher	
status	token	The current status of the code system	CodeSystem.status	
system	uri	The system for any codes defined by this code system (same as 'url')	CodeSystem.url	
title	string	The human-friendly name of the code system	CodeSystem.title	
url	uri	The uri that identifies the code system	CodeSystem.url	
version	token	The business version of the code system	CodeSystem.version	

ValueSet

- A set of codes drawn from one or more CodeSystems
- Can be used to define a set of codes ('compose')
- Can be used to represent the result of an expansion of a ValueSet ('expansion')



ValueSet structure

Name	Flags	Card.	Type	Description & Constraints
ValueSet	I		DomainResource	A set of codes drawn from one or more code systems + *Value set SHALL contain at least one of a compose or an expansion element* Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
url	Σ	0..1	uri	Logical URI to reference this value set (globally unique)
identifier	Σ	0..*	Identifier	Additional identifier for the value set
version	Σ	0..1	string	Business version of the value set
name	Σ	0..1	string	Name for this value set (computer friendly)
title	Σ	0..1	string	Name for this value set (human friendly)
status	?! Σ	1..1	code	draft | active | retired | unknown PublicationStatus (Required)
experimental	?! Σ	0..1	boolean	For testing purposes, not real usage
date	Σ	0..1	dateTime	Date this was last changed
publisher	Σ	0..1	string	Name of the publisher (organization or individual)
contact	Σ	0..*	ContactDetail	Contact details for the publisher
description		0..1	markdown	Natural language description of the value set
useContext	Σ	0..*	UsageContext	Context the content is intended to support
jurisdiction	Σ	0..*	CodeableConcept	Intended jurisdiction for value set (if applicable) Jurisdiction ValueSet (Extensible)
immutable	Σ	0..1	boolean	Indicates whether or not any change to the content logical definition may occur
purpose		0..1	markdown	Why this value set is defined
copyright		0..1	markdown	Use and/or publishing restrictions
extensible	Σ	0..1	boolean	Whether this is intended to be used with an extensible binding

http://hl7.org/fhir/valueset.html

ValueSet structure

compose	I	0..1	BackboneElement	Definition of the content of the value set (CLD)
lockedDate	Σ	0..1	date	Fixed date for version-less references (transitive)
inactive	Σ	0..1	boolean	Whether inactive codes are in the value set
include	Σ I	1..*	BackboneElement	Include one or more codes from a code system or other value set(s) *+ A value set with concepts or filters SHALL include a system* *+ Cannot have both concept and filter* *+ A value set include/exclude SHALL have a value set or a system*
system	Σ I	0..1	uri	The system the codes come from
version	Σ	0..1	string	Specific version of the code system referred to
concept	I	0..*	BackboneElement	A concept defined in the system
code		1..1	code	Code or expression from system
display		0..1	string	Text to display for this code for this value set in this valueset
designation		0..*	BackboneElement	Additional representations for this concept
language		0..1	code	Human language of the designation Common Languages (Extensible but limited to All Languages)
use		0..1	Coding	Details how this designation would be used Designation Use (Extensible)
value		1..1	string	The text value for this designation
filter	?! Σ I	0..*	BackboneElement	Select codes/concepts by their properties (including relationships)
property	Σ	1..1	code	A property defined by the code system
op	Σ	1..1	code	= | is-a | descendent-of | is-not-a | regex | in | not-in | generalizes | exists FilterOperator (Required)
value	Σ	1..1	code	Code from the system, or regex criteria, or boolean value for exists
valueSet	Σ I	0..*	uri	Select only contents included in this value set
exclude	I	0..*	see include	Explicitly exclude codes from a code system or other value sets

ValueSet structure

expansion	I	0..1	BackboneElement	Used when the value set is "expanded"
identifier		1..1	uri	Uniquely identifies this expansion
timestamp		1..1	dateTime	Time ValueSet expansion happened
total		0..1	integer	Total number of codes in the expansion
offset		0..1	integer	Offset at which this resource starts
parameter		0..*	BackboneElement	Parameter that controlled the expansion process
name		1..1	string	Name as assigned by the server
value[x]		0..1		Value of the named parameter
valueString			string	
valueBoolean			boolean	
valueInteger			integer	
valueDecimal			decimal	
valueUri			uri	
valueCode			code	
contains	I	0..*	BackboneElement	Codes in the value set *+ SHALL have a code or a display* *+ Must have a code if not abstract* *+ Must have a system if a code is present*
system		0..1	uri	System value for the code
abstract		0..1	boolean	If user cannot select this entry
inactive		0..1	boolean	If concept is inactive in the code system
version		0..1	string	Version in which this code/display is defined
code	I	0..1	code	Code - if blank, this is not a selectable code
display	I	0..1	string	User display for the concept
designation		0..*	see designation	Additional representations for this item
contains		0..*	see contains	Codes contained under this entry

ValueSet – example

```
{
  "resourceType": "ValueSet",
  "id": "australian-mainland-states",
  "url": "http://csiro.au/vs/australian-mainland-states",
  "version": "0.0.1",
  "name": "Australian mainland states",
  "status": "draft",
  "experimental": true,
  "compose": {
    "include": [
      {
        "system": "http://csiro.au/cs/au-jurisdictions",
        "filter": [
          {
            "property": "concept",
            "op": "descendent-of",
            "value": "AU-state"
          }
        ]
      }
    ],
    "exclude": [
      {
        "system": "http://csiro.au/cs/au-jurisdictions",
        "concept": [
          {
            "code": "TAS"
          }
        ]
      }
    ]
  }
}
```

ValueSet operations: $expand

GET /ValueSet/$expand

POST /ValueSet/[id]/$expand

- Retrieve the expansion of the ValueSet subject to a number of parameters
- Result is a ValueSet with an ‘expansion’ element
- Parameters include: filter, count, offset, includeDesignations, includeDefinition, activeOnly, excludeNested, excludeNotForUI, excludePostCoordinated, displayLanguage, limitedExpansion, profile
- This is the main/best way to search for a code!

ValueSet operations: $expand – example

GET /ValueSet/australian-mainland-states/$expand


```
{
  "resourceType": "ValueSet",
  "meta": {
    "versionId": "3",
    "lastUpdated": "2018-04-12T08:22:15.308+10:00"
  },
  "url": "http://csiro.au/vs/australian-mainland-states",
  "version": "0.0.1",
  "name": "Australian mainland states",
  "status": "draft",
  "experimental": true,
  "expansion": {
    "identifier": "b51d4d72-f7e0-404d-80e5-71d00ba1cc4e",
    "timestamp": "2018-04-12T09:32:18+10:00",
    "total": 5,
    "parameter": [
      {
        "name": "version",
        "valueUri": "http://csiro.au/cs/au-jurisdictions?version=0.0.1"
      }
    ],
```



```
    "contains": [
      {
        "system": "http://csiro.au/cs/au-jurisdictions",
        "code": "WA",
        "display": "Western Australia"
      },
      {
        "system": "http://csiro.au/cs/au-jurisdictions",
        "code": "QLD",
        "display": "Queensland"
      },
      {
        "system": "http://csiro.au/cs/au-jurisdictions",
        "code": "NSW",
        "display": "New South Wales"
      },
      {
        "system": "http://csiro.au/cs/au-jurisdictions",
        "code": "SA",
        "display": "South Australia"
      },
      {
        "system": "http://csiro.au/cs/au-jurisdictions",
        "code": "Victoria",
        "display": "Victoria"
      }
    ]
  }
}
```

ValueSet operations: $validate-code

GET /ValueSet/$validate-code

POST /ValueSet/[id]/$validate-code

- Validate a code (and display text) against a ValueSet
- Determine whether the code is included in the ValueSet
- (optionally) Determine whether the provided display text is the correct display text for the code
- This is the main method for validating coded data!

ValueSet operations: $validate-code – example

GET /ValueSet/australian-mainland-states/$validate-code?system=http://csiro.au/cs/au-jurisdictions&code=QLD&display=Queensland

```
{
  "resourceType": "Parameters",
  "parameter": [
    {
      "name": "result",
      "valueBoolean": true
    }
  ]
}
```

Check that the "QLD" code with the display "Queensland" from the "http://csiro.au/cs/au-jurisdictions" CodeSystem exists within the "australian-mainland-states" ValueSet.

ValueSet search parameters

Name	Type	Description	Expression	In Common
date	date	The value set publication date	ValueSet.date	
description	string	The description of the value set	ValueSet.description	
expansion	uri	Uniquely identifies this expansion	ValueSet.expansion.identifier	
identifier	token	External identifier for the value set	ValueSet.identifier	
jurisdiction	token	Intended jurisdiction for the value set	ValueSet.jurisdiction	
name	string	Computationally friendly name of the value set	ValueSet.name	
publisher	string	Name of the publisher of the value set	ValueSet.publisher	
reference	uri	A code system included or excluded in the value set or an imported value set	ValueSet.compose.include.system	
status	token	The current status of the value set	ValueSet.status	
title	string	The human-friendly name of the value set	ValueSet.title	
url	uri	The uri that identifies the value set	ValueSet.url	
version	token	The business version of the value set	ValueSet.version	

SNOMED CT on FHIR®

SNOMED CT on FHIR®

http://hl7.org/fhir/snomedct.html

HL7 FHIR Release 4

Home | Getting Started | Documentation | Resources | Profiles | Extensions | Operations | Terminologies

Terminology > Code Systems > SNOMED CT

This page is part of the FHIR Specification (v4.0.1: R4 - Mixed Normative and STU). This is the current published version. For a full list of available versions, see the Directory of published versions

Using Codes | Code Systems | Value Sets | Concept Maps | Identifier Systems

4.3.1.0 Using SNOMED CT with FHIR

Vocabulary Work Group	Maturity Level: 5	Standards Status: Trial Use

4.3.1.0.1 Summary

Source	SNOMED CT is owned, maintained and distributed by SNOMED International. SNOMED International is the organization which publishes the International Edition of SNOMED CT. SNOMED International Members may also distribute their own SNOMED CT National Edition, which contains the international release plus local extension content and derivatives.
System	The URI http://snomed.info/sct identifies the SNOMED CT code system.
Version	Where a code system version is used, it should be specified as a URI that represents a specific SNOMED CT Edition published on a particular date (e.g. the International Edition or a National Edition, with a version date), following the SNOMED CT URI Specification (see note below).
Code	The following SNOMED CT artifacts are valid in the *code* element for the http://snomed.info/sct namespace: Concept IDs and SNOMED CT Expressions (using SNOMED CT Compositional Grammar). SNOMED CT Terms and Description Identifiers are not valid as codes in FHIR, nor are other alternative identifiers associated with SNOMED CT Concepts. Note: When SNOMED CT Terms must be exchanged, use the Description Id Extension.
Display	The correct display for a SNOMED CT concept is one of the terms associated with that concept. The best display is the preferred term in the relevant language or dialect, as specified in the associated language reference set. SNOMED CT synonyms may be case sensitive. SNOMED International does not define terms for expressions. If a SNOMED terminology producer publishes human-readable terms for expressions in an expression repository, this term may be used as the display. Similarly, if a SNOMED terminology producer publishes an official template for generating terms from an expression, a term generated using the template may be used as the display. If no term or description template has been published, the full expression with terms embedded may be used. Note that Display is not intended to contain terms entered by the user that have not been officially published by a SNOMED CT Terminology Producer.
Inactive	Inactive codes are identified using the 'inactive' property (see below)
Subsumption	SNOMED CT Subsumption testing for concepts is based on the |is a| relationship defined by SNOMED CT
Filter Properties	Several filter properties are defined, as described below

This specification publishes a canonical SNOMED CT CodeSystem resource. See also the SNOMED CT Usage Summary.

Note: The SNOMED International glossary explains some of these SNOMED CT specific terms.

SNOMED CT on FHIR®

http://snomed.info/sct

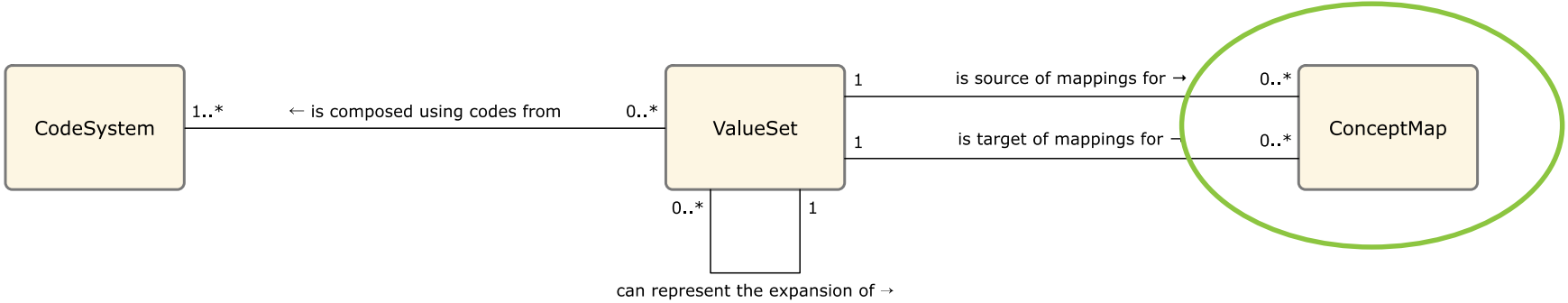
http://snomed.info/sct/[sctid]

http://snomed.info/sct/[sctid]/version/[timestamp]

- Filters: by subsumption, by refset, by ECL expression (ECL examples: https://audigitalhealth.github.io/ecl-examples)
- Implicit ValueSets
  - All codes: http://snomed.info/sct?fhir_vs
  - By subsumption: http://snomed.info/sct?fhir_vs=isa/404684003
  - List of refsets: http://snomed.info/sct?fhir_vs=refset
  - All codes in a refset: http://snomed.info/sct?fhir_vs=refset/734138000
- Implicit ConceptMaps
  - Historical associations: http://snomed.info/sct?fhir_cm=900000000000527005

ConceptMap

- Represents a code-to-code mapping, typically from a source ValueSet to a target ValueSet
- Once set up, can be used to perform translations on coded data



ConceptMap structure

Name	Flags	Card.	Type	Description & Constraints
ConceptMap			DomainResource	A map from one set of concepts to one or more other concepts Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension
url	Σ	0..1	uri	Logical URI to reference this concept map (globally unique)
identifier	Σ	0..1	Identifier	Additional identifier for the concept map
version	Σ	0..1	string	Business version of the concept map
name	Σ	0..1	string	Name for this concept map (computer friendly)
title	Σ	0..1	string	Name for this concept map (human friendly)
status	?! Σ	1..1	code	draft | active | retired | unknown PublicationStatus (Required)
experimental	?! Σ	0..1	boolean	For testing purposes, not real usage
date	Σ	0..1	dateTime	Date this was last changed
publisher	Σ	0..1	string	Name of the publisher (organization or individual)
contact	Σ	0..*	ContactDetail	Contact details for the publisher
description		0..1	markdown	Natural language description of the concept map
useContext	Σ	0..*	UsageContext	Context the content is intended to support
jurisdiction	Σ	0..*	CodeableConcept	Intended jurisdiction for concept map (if applicable) Jurisdiction ValueSet (Extensible)
purpose		0..1	markdown	Why this concept map is defined
copyright		0..1	markdown	Use and/or publishing restrictions
source[x]	Σ	0..1		Identifies the source of the concepts which are being mapped
sourceUri			uri	
sourceReference			Reference(ValueSet)	
target[x]	Σ	0..1		Provides context to the mappings
targetUri			uri	
targetReference			Reference(ValueSet)	

http://hl7.org/fhir/conceptmap.html

ConceptMap structure

group		0..*	BackboneElement	Same source and target systems
source		0..1	uri	Code System (if value set crosses code systems)
sourceVersion		0..1	string	Specific version of the code system
target		0..1	uri	System of the target (if necessary)
targetVersion		0..1	string	Specific version of the code system
element		1..*	BackboneElement	Mappings for a concept from the source set
code		0..1	code	Identifies element being mapped
display		0..1	string	Display for the code
target	I	0..*	BackboneElement	Concept in target system for element *+ If the map is narrower or inexact, there SHALL be some comments*
code		0..1	code	Code that identifies the target element
display		0..1	string	Display for the code
equivalence	?!	0..1	code	relatedto | equivalent | equal | wider | subsumes | narrower | specializes | inexact | unmatched | disjoint ConceptMapEquivalence (Required)
comment	I	0..1	string	Description of status/issues in mapping
dependsOn		0..*	BackboneElement	Other elements required for this mapping (from context)
property		1..1	uri	Reference to property mapping depends on
system		0..1	uri	Code System (if necessary)
code		1..1	string	Value of the referenced element
display		0..1	string	Display for the code
product		0..*	see dependsOn	Other concepts that this mapping also produces
unmapped	I	0..1	BackboneElement	When no match in the mappings *+ If the mode is 'other-map', a code must be provided* *+ If the mode is 'fixed', a code must be provided*
mode		1..1	code	provided | fixed | other-map ConceptMapGroupUnmappedMode (Required)
code		0..1	code	Fixed code when mode = fixed
display		0..1	string	Display for the code
url		0..1	uri	Canonical URL for other concept map

ConceptMap – example

```
{
  "resourceType": "ConceptMap",
  "id": "au-jurisdictions",
  "url": "http://csiro.au/cm/au-jurisdictions",
  "version": "0.0.1",
  "status": "draft",
  "experimental": true,
  "sourceUri": "http://csiro.au/vs/australian-mainland-states",
  "targetUri": "http://snomed.info/sct?fhir_vs",
```

```
  "group": [
    {
      "source": "http://csiro.au/cs/au-jurisdictions",
      "target": "http://snomed.info/sct",
      "element": [
        {
          "code": "QLD",
          "target": [
            {
              "code": "223778006",
              "equivalence": "equivalent"
            }
          ]
        },
        {
          "code": "WA",
          "target": [
            {
              "code": "223782008",
              "equivalence": "equivalent"
            }
          ]
        },
        {
          "code": "NSW",
          "target": [
            {
              "code": "223776005",
              "equivalence": "equivalent"
            }
          ]
        },
        {
          "code": "SA",
          "target": [
            {
              "code": "223779003",
              "equivalence": "equivalent"
            }
          ]
```

ConceptMap operations: $translate

GET /ConceptMap/[id]/$translate

POST /ConceptMap/[id]/$translate

- Translate a code from one ValueSet to another, according to the server's resources, and/or other knowledge available to the server
- Specify source ValueSet, and target ValueSet (or targetSystem)
- Can be run in reverse (given target, show source)
- Results come back as Parameters with 'match' elements

ConceptMap operations: $translate – example

GET /ConceptMap/au-jurisdictions/$translate?code=QLD&system=http://csiro.au/cs/au-jurisdictions&target=http://snomed.info/sct?fhir_vs


```
{
  "resourceType": "Parameters",
  "parameter": [
    {
      "name": "result",
      "valueBoolean": true
    },
    {
      "name": "match",
      "part": [
        {
          "name": "equivalence",
          "valueCode": "equivalent"
        },
        {
          "name": "concept",
          "valueCoding": {
            "system": "http://snomed.info/sct",
            "code": "223778006"
          }
        }
      ]
    }
  ]
}
```


Translate the "QLD" code from the "http://csiro.au/cs/au-jurisdictions" CodeSystem to SNOMED CT, using the "au-jurisdictions" ConceptMap.

ConceptMap search parameters

Name	Type	Description	Expression	In Common
date	date	The concept map publication date	ConceptMap.date	
dependson	uri	Reference to property mapping depends on	ConceptMap.group.element.target.dependsOn.property	
description	string	The description of the concept map	ConceptMap.description	
identifier	token	External identifier for the concept map	ConceptMap.identifier	
jurisdiction	token	Intended jurisdiction for the concept map	ConceptMap.jurisdiction	
name	string	Computationally friendly name of the concept map	ConceptMap.name	
other	uri	Canonical URL for other concept map	ConceptMap.group.unmapped.url	
product	uri	Reference to property mapping depends on	ConceptMap.group.element.target.product.property	
publisher	string	Name of the publisher of the concept map	ConceptMap.publisher	
source	reference	Identifies the source of the concepts which are being mapped	ConceptMap.source.as(Reference) (ValueSet)	
source-code	token	Identifies element being mapped	ConceptMap.group.element.code	
source-system	uri	Code System (if value set crosses code systems)	ConceptMap.group.source	
source-uri	reference	Identifies the source of the concepts which are being mapped	ConceptMap.source.as(Uri) (ValueSet)	
status	token	The current status of the concept map	ConceptMap.status	
target	reference	Provides context to the mappings	ConceptMap.target.as(Reference) (ValueSet)	
target-code	token	Code that identifies the target element	ConceptMap.group.element.target.code	
target-system	uri	System of the target (if necessary)	ConceptMap.group.target	
target-uri	reference	Provides context to the mappings	ConceptMap.target.as(Uri) (ValueSet)	
title	string	The human-friendly name of the concept map	ConceptMap.title	
url	uri	The uri that identifies the concept map	ConceptMap.url	
version	token	The business version of the concept map	ConceptMap.version	

FHIR® Terminology Services

FHIR® terminology service

- A server that implements all these can claim to be a terminology server by instantiating “http://hl7.org/fhir/CapabilityStatement/terminology-server” in its CapabilityStatement
- CodeSystem, ValueSet, ConceptMap read/search
- $expand, $validate-code, $lookup, $translate, $closure

Tips and tricks

- Paging
  - Search results can be paged (http://hl7.org/fhir/search.html, see _count parameter)
  - $expand results have a separate paging mechanism (count, offset)
- Can reduce bandwidth/response times by requesting the specific elements you want
  - includeDefinition, includeDesignations on $expand
  - property on $lookup
  - _elements on search/read/operation results

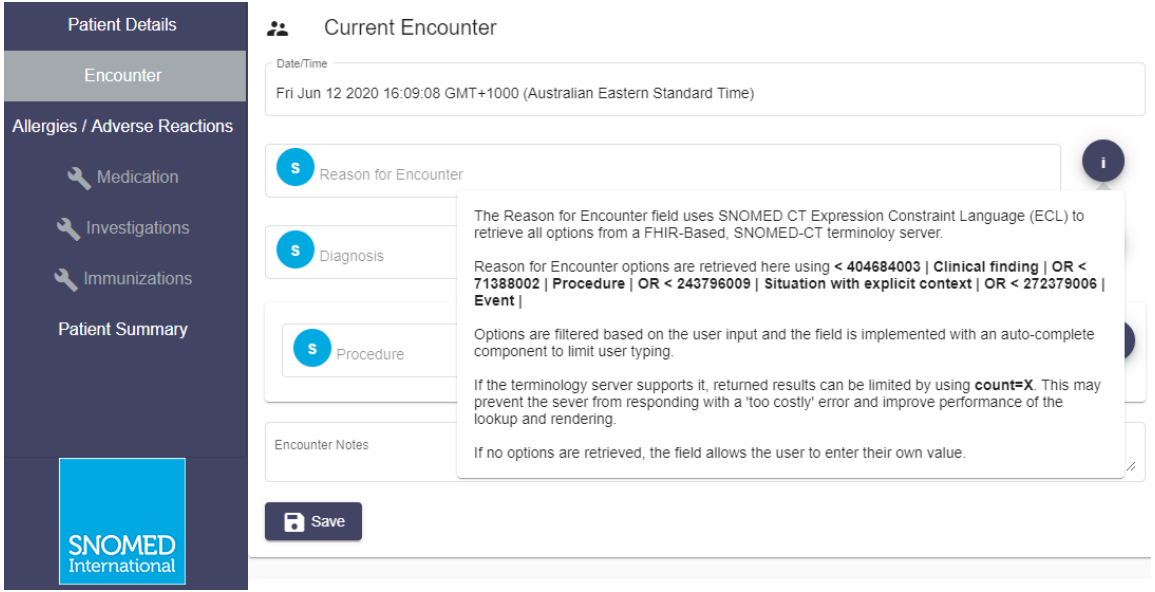
Tips and tricks

- Batch
  - A lot of terminology operations are small – it can often be more efficient to send them as a batch (http://hl7.org/fhir/http.html#transaction) then deal with the result when it comes back
- Manage content types (Content-Type, Accept, _format)
  - JSON, XML
- Accept-Encoding: gzip

What if I am…

Designing interfaces for data entry?

- Choose your CodeSystem/s (ideally standardised ones!)
- Choose or define your ValueSets
- If your ValueSet is small, a picklist can be populated using $expand
- If your ValueSet is large, a typeahead widget can use $expand?filter=xxx
- Exemplars:
  - https://ihtsdo.github.io/snomed-ui-examples/
  - https://aehrc.github.io/fhir-ts-exemplars/



What if I am…

Making a Profile?

- Choose/define which code systems you want to allow
- Make ValueSets with lists of codes you want to allow
- Make sure you respect the binding strength
- Set up some processes for maintaining/updating them
- Concepts can become deprecated over time; you can sometimes use ConceptMaps to find which concepts have changed

What if I am…

Analysing/validating coded data?

- Choose your CodeSystem/ValueSets
- Use $validate-code to check whether the codes are valid in the context in which you're using them, and whether the display text is correct (many clinical systems allow users to override the display text for the term)
- Use $translate to map 'foreign' coded data into a normalized CodeSystem/ValueSet for analysis
- Use $subsumes, $closure, or $validate-code with an inline ValueSet, to categorize data

Validate Code

GET {{url}}/ValueSet/$validate-code?system=http://snomed.info/sct&code=38341003&url=http://snomed.info/sct?fhir_vs&display=Hypertensio

Params Authorization Headers (7) Body Pre-request Script Tests

Query Params

KEY	VALUE
system	http://snomed.info/sct
code	38341003
url	http://snomed.info/sct?fhir_vs
display	Hypertensio
Key	Value

Body Cookies Headers (13) Test Results

Pretty Raw Preview JSON


```
{
    "resourceType": "Parameters",
    "parameter": [
        {
            "name": "result",
            "valueBoolean": false
        },
        {
            "name": "message",
            "valueString": "The code 38341003 exists in the ValueSet, but the display \"Hypertensio\" is incorrect"
        },
        {
            "name": "display",
            "valueString": "Hypertension"
        }
    ]
}
```

Links

- HL7® FHIR® standard: http://hl7.org/fhir
- National terminology and tools: https://www.healthterminologies.gov.au
- Terminology server: http://ontoserver.csiro.au
- Terminology browser: https://ontoserver.csiro.au/shrimp
- Terminology resource editor: https://ontoserver.csiro.au/snapper2

Questions?

Contact us

Help Centre	1300 901 001
Email	help@digitalhealth.gov.au
Website	healthterminologies.gov.au developer.digitalhealth.gov.au digitalhealth.gov.au
Twitter	twitter.com/AuDigitalHealth

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