# 4.2.1.0 Using SNOMED CT with FHIR

Note that this page has been copied from [http://build.fhir.org/snomedct.html](http://build.fhir.org/snomedct.html) purely for the purpose of review and consolidating feedback. It would be acceptable to modify this document however, so we have a 'complete' draft to return to HL7. We'll be able to track the changes through Confluence document history.

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Work Group</th>
<th>Maturity Level: 5</th>
<th>Ballot Status: Trial Use</th>
</tr>
</thead>
</table>

## 4.2.1.0.1 Summary

### Source

SNOMED CT is used in FHIR international standards and resources. SNOMED CT is owned, maintained and distributed by [SNOMED International](http://www.snomed.org). 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](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](http://snomed.info/sct) (see note below).

### Code

The following SNOMED CT artifacts are valid in the code element for the [http://snomed.info/sct](http://snomed.info/sct) namespace: Concept IDs and [SNOMED CT Terms and Description Identifiers](http://www.snomed.co.uk) 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 code system resource. See also the [SNOMED CT Usage Summary](http://www.snomed.org). Note: The [SNOMED International glossary](http://www.snomed.org) explains some of these SNOMED CT specific terms.

## 4.2.1.0.2 Versions

There is no single distribution that contains all defined SNOMED CT codes in all contexts of use. Instead the International Edition contains all concepts shared and agreed to be internationally relevant and each National Release Centre distributes this International Edition plus additional national content (to extend the international set). Other release authorities may also be designated. The [SNOMED CT URI Specification](http://snomed.info/sct) describes how to unambiguously reference a particular version of a SNOMED CT edition:

[http://snomed.info/sct/[sctid]/version/[YYYYMMDD]](http://snomed.info/sct/[sctid]/version/[YYYYMMDD])
where [sctid] is the concept id that identifies the given SNOMED CT edition (based on the identifier of the most dependent module), and "YYYYMMDD" is the date of release. Examples of scids that identify a specific edition are listed here.

4.2.1.0.3 SNOMED CT Expressions

A SNOMED CT Expression is a structured combination of one or more clinical concepts, stated using Compositional Grammar Syntax.

Expressions may optionally contain display terms.

4.2.1.0.4 Copyright and Licenses

Note that many implementations are in the habit of simply using the date of release in the form YYYYMMDD (e.g. "20140531"), and assuming that the edition is known. However this is not always safe, so implementations that populate the version element must use the URI form.

This specification includes content from SNOMED Clinical Terms® (SNOMED CT®) which is copyright of the International Health Terminology Standards Development Organisation (IHTSDO). Implementers of these specifications must have the appropriate SNOMED CT Affiliate license - for more information contact http://www.snomed.org/snomed-ct/get-snomed-ct or info@snomed.org.

4.2.1.0.5 RDF

The SNOMED International URI specifications use the namespace http://snomed.info/sct for the code system, and the URI http://snomed.info/id for the individual concepts in the code system. This means that when a SNOMED CT concept is converted from the system:code pair, where the system is http://snomed.info/sct, to the RDF ontological form, the representation is http://snomed.info/id/[concept-id]. Expressions are represented using the URI pattern http://snomed.info/scg/[expression]. Expressions represented in this way SHALL not contain whitespace, terms, or comments.

4.2.1.0.6 SNOMED CT Properties

In addition to the standard properties, the following properties are defined for SNOMED CT:

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Data Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>inactive</td>
<td>boolean</td>
<td>Whether the code is active or not (defaults to false). This is derived from the active column in the Concept file of the RF2 Distribution (by inverting the value)</td>
</tr>
<tr>
<td>sufficientyDefined</td>
<td>boolean</td>
<td>True if the description logic definition of the concept includes sufficient conditions. This is derived from the definitionStatusId value in the Concept file of the RF2 distribution (i.e. If 900000000000073002 [Sufficiently defined concept definition status] then true)</td>
</tr>
<tr>
<td>moduleid</td>
<td>code</td>
<td>The SNOMED CT concept id of the module that the concept belongs to.</td>
</tr>
<tr>
<td>normalForm</td>
<td>string</td>
<td>Generated Necessary Normal form expression for the provided code or expression, with terms. See <a href="http://snomed.org/nnf">http://snomed.org/nnf</a></td>
</tr>
<tr>
<td>normalFormTerm</td>
<td>string</td>
<td>Generated Necessary Normal form expression for the provided code or expression, conceptIds only.</td>
</tr>
</tbody>
</table>

SNOMED CT relationships, where the relationship type is subsumed by 410662002 [Concept model attribute], also automatically become properties. Properties that represent SNOMED CT concept model attributes are referred to using their concept id, rather than their human readable term.

For example, the laterality property is represented using the concept id '272741003', rather than the term 'laterality':

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Data Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>272741003</td>
<td>code</td>
<td>The value of the laterality attribute in the definition of the given code or expression. The equivalent URI for the Laterality property is <a href="http://snomed.info/id/272741003">http://snomed.info/id/272741003</a> (see the code system definition).</td>
</tr>
</tbody>
</table>

Note that when a lookup operation is performed on a SNOMED CT concept, servers SHALL return the full URI for the edition and version being used (see above) in the version property. Other properties are at the discretion of the server and the client.
4.2.1.0.7 SNOMED CT Filters

This section documents the property filters that can be used with the SNOMED CT code system in value set composition statements.

For implementer convenience, some of the property filters are documented in terms of the SNOMED CT Expression Constraint Language, but this does not imply that its use is required.

### 4.2.1.0.7.1 By Subsumption

<table>
<thead>
<tr>
<th>Description</th>
<th>Select a set of concepts based on subsumption testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Name</td>
<td>concept</td>
</tr>
<tr>
<td>Operations Allowed</td>
<td>is-a</td>
</tr>
<tr>
<td>Values Allowed</td>
<td>[concept id]</td>
</tr>
<tr>
<td>Comments</td>
<td>Includes all concept ids that have a transitive is-a relationship with the concept Id provided as the value (including the concept itself)</td>
</tr>
<tr>
<td>Example</td>
<td>Administration Methods</td>
</tr>
<tr>
<td><strong>SCT ECL</strong></td>
<td>&lt;&lt; [concept] (Long syntax: descendantOrSelfOf [concept])</td>
</tr>
</tbody>
</table>

### 4.2.1.0.7.2 By Reference Set

<table>
<thead>
<tr>
<th>Description</th>
<th>Select a set of concepts based on their membership of a SNOMED CT reference set</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Name</td>
<td>concept</td>
</tr>
<tr>
<td>Operations Allowed</td>
<td>in</td>
</tr>
<tr>
<td>Values Allowed</td>
<td>[concept id]</td>
</tr>
<tr>
<td>Comments</td>
<td>Includes all concept ids that are active members of the reference set identified by the concept Id provided as the value</td>
</tr>
<tr>
<td><strong>SCT ECL</strong></td>
<td>^ [concept] (Long syntax: memberOf [concept])</td>
</tr>
</tbody>
</table>

### 4.2.1.0.7.3 By SNOMED Expression Constraint

<table>
<thead>
<tr>
<th>Description</th>
<th>Select a set of concepts based on a formal expression constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Name</td>
<td>constraint</td>
</tr>
<tr>
<td>Operations Allowed</td>
<td>=</td>
</tr>
<tr>
<td>Values Allowed</td>
<td>[expression constraint]</td>
</tr>
</tbody>
</table>
The result of the filter is the result of executing the given SNOMED CT Expression Constraint.

Example:
```
"compose": {
  "include": [
    {
      "system": "http://snomed.info/sct",
      "filter": [
        {
          "property": "constraint",
          "op": "=",
          "value": "<< 30506011000036107 |Australian product|: 700000101000036108 |hasTP| = 17311000168105 |Panadol|"
        }
      ]
    }
  ]
}
```

### 4.2.1.0.7.4 By whether postcoordination is allowed

<table>
<thead>
<tr>
<th>Description</th>
<th>Specifying whether postcoordination is allowed or not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Name</td>
<td>expressions</td>
</tr>
<tr>
<td>Operations Allowed</td>
<td>=</td>
</tr>
<tr>
<td>Values Allowed</td>
<td>true or false</td>
</tr>
<tr>
<td>Comments</td>
<td>Expressions, if allowed, are subject to the same rules as precoordinated concepts. (Note: simple reference sets do not include expressions).</td>
</tr>
<tr>
<td>Example</td>
<td>Administration Methods</td>
</tr>
<tr>
<td>SCT ECL</td>
<td>n/a</td>
</tr>
</tbody>
</table>

### 4.2.1.0.8 Implicit Value Sets

Implicit value sets are those whose specification can be predicted based on the grammar of the underlying code system, and the known structure of the URL that identifies them. SNOMED CT has two common sets of implicit value sets defined: By Subsumption, and By Reference Set. These implicit value sets do not use complex queries. This allows a single URL to serve as a value set definition that defines a value set, and can serve as the basis for the `$expand` operation.

If any value set resources exist with an identifier that conforms to the URL patterns specified below, the content of the resource must conform to the template provided. Profiles and other value set references are allowed to reference these value sets directly (by reference as a URI, rather than by a value set reference, which is a literal reference).

A SNOMED CT implicit value set URL has two parts:

- the base URL is either "http://snomed.info/sct", or the URI for the edition version, in the format specified by SNOMED International the [SNOMED CT URI Specification](http://snomed.info/sct)
- a query portion that specifies the scope of the content

"http://snomed.info/sct" should be understood to mean an unspecified edition/version. This defines an incomplete value set whose actual membership will depend on the particular edition used when it is expanded. If no version or edition is specified, the terminology service SHALL use the latest version available for its default edition (or the international edition, if no other edition is the default).

For the second part of the URL (the query part), the 4 possible values are:

- `?fhir_vs` - all Concept IDs in the edition/version. If the base URI is `http://snomed.info/sct`, this means all possible SNOMED CT concepts
- `?fhir_vs=isa[/sctid]` - all concept IDs that are subsumed by the specified Concept.
- `?fhir_vs=refset` - all concept IDs that correspond to real references sets defined in the specified SNOMED CT edition
- `?fhir_vs=refset[/sctid]` - all concept IDs in the specified reference set

A value set with a URL that follows the pattern "[edition/version]?fhir_vs=isa[/sctid]" follows this template:
<ValueSet xmlns="http://hl7.org/fhir">
  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">
      [Some HTML that describes this value set as all concepts subsumed by conceptid]
    </div>
  </text>
  <url value="[edition/version]?fhir_vs=isa/[sctid]"/>
  <version value="[edition/version]"/>
  <name value="SNOMED CT Concept [conceptid] and descendants"/>
  <description value="All SNOMED CT concepts for [concept id or preferred description]"/>
  <copyright value="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"/>
  <status value="active"/>
  <compose>
    <include>
      <system value="http://snomed.info/sct"/>
      <filter>
        <property value="concept"/>
        <op value="is-a"/>
        <value value="[sctid]"/>
      </filter>
    </include>
  </compose>
</ValueSet>

The value set with a url that follows the pattern "[edition/version]?fhir_vs=refset" follows this template:

<ValueSet xmlns="http://hl7.org/fhir">
  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">
      [Some HTML that describes this value set as all concepts with associated reference sets]
    </div>
  </text>
  <url value="[edition/version]?fhir_vs=refset"/>
  <version value="[edition/version]"/>
  <name value="SNOMED CT Reference Sets"/>
  <description value="All SNOMED CT concepts associated with a reference set"/>
  <copyright value="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"/>
  <status value="active"/>
  <compose>
    <include>
      <system value="http://snomed.info/sct"/>
      <!-- repeat: one concept element with a code for each concept that has an associated reference set -->
      <concept>
        <code value="[sctid]"/>
      </concept>
      <!-- end repeat -->
    </include>
  </compose>
</ValueSet>

For each concept that is associated with a reference set, there will be one concept element with a contained code that contains the concept id.

A value set with a url that follows the pattern "[edition/version]?fhir_vs=refset/[conceptid]" follows this template:
Implicit Concept Maps

Implicit concept maps are those whose specification can be predicted based on the grammar and/or content of the underlying code system, and the known structure of the URL that identifies them. This allows a single URL to serve as a concept map definition that defines a mapping between two sets of concepts, and which can serve as the basis for the $translate operation. SNOMED CT has two common sets of implicit concept maps defined:

- Association Reference Sets
- Simple Map Reference Sets

**Association Reference Sets** are part of the core SNOMED CT distribution. The following standard Association Reference sets are mapped to implicit Concept Maps:

<table>
<thead>
<tr>
<th>Name</th>
<th>Concept Id</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSSIBLY EQUIVALENT TO</td>
<td>900000000000523009</td>
<td>inexact</td>
</tr>
<tr>
<td>REPLACED BY</td>
<td>900000000000526001</td>
<td>equivalent</td>
</tr>
<tr>
<td>SAME AS</td>
<td>900000000000527005</td>
<td>equal</td>
</tr>
<tr>
<td>ALTERNATIVE</td>
<td>900000000000530003</td>
<td>inexact</td>
</tr>
</tbody>
</table>

If any concept map resources exist with an identifier that conforms to the URL pattern specified below, the content of the resource must conform to the template provided. Canonical references to concept maps are allowed to reference these concept maps directly by referring to their URI.

A SNOMED CT implicit concept map URL has two parts:

- the base URL is either "http://snomed.info/sct", or the URI for the edition version, in the format specified by SNOMED International in the SNOMED CT URI Specification
- a query portion that specifies the scope of the content

"http://snomed.info/sct" should be understood to mean an unspecified edition/version. This defines an incomplete concept map whose actual membership will depend on the particular edition used when it is expanded. If no version or edition is specified, the terminology service SHALL use the latest version available for its default edition (or the international edition, if no other edition is the default).

For the second part of the URL (the query part), there is only one possible value:

- \$fhir_cm=[sctid] - where [sctid] is a value from the table above

A concept map with a URL that follows the pattern "[edition/version]?\$fhir_cm=[sctid]" follows this template, where [name], [sctid] and [relationship] are taken from the table above:
Simple Map Reference Sets  (reference sets which are descendants of 900000000000496009 “Simple map”) also define an implicit concept map.

List of Substantive Changes to the above to discuss with HL7

Expressions

We've added a new section for Expressions. Bringing other text on the page into line with SNOMED International's definition of what constitutes valid SNOMED CT compositional grammar, we've removed advice about including or not including text definitions - both are considered equally valid, although there may be an argument for including the original text selected by the end user.

New Sections - works in progress

These have been removed into their own pages while the text is agreed. Since they are additional guidance, there is no reason to think that anything being added will 'break' the above.

4.2.1.0.3 Display