Ontoserver Workshop

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Ontoserver Workshop: Outline

HEALEX

Terminologies

- Use of Terminologies
- Specific Terminologies
- FHIR Terminology Service

Ontoserver

- Syndication
  - Why syndicate?
  - Important configurations
  - Demonstration
  - Syndication workflow
- Encountered issues

Terminologies

Use of Terminologies – Problem

HEALEX

- Different healthcare providers
- Different types of documentation
- Different medical terms for identical or similar concepts (conditions, tests, observations, findings, etc.)
- Goal: Interoperability

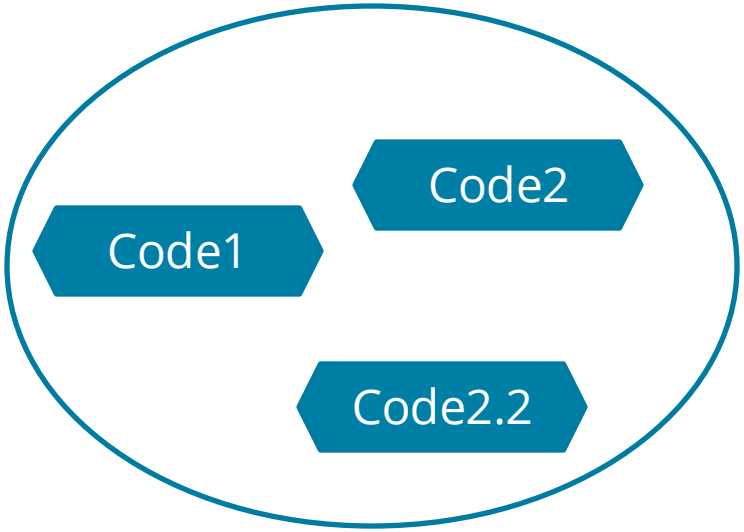
Use of Terminologies – Solution

HEALEX

- Use standardized codes and code systems
  - Independent of language
  - Independent of the health provider
  - Consistent across systems

Code
  - Alphanumeric string

Code System
  - Set of codes (or concepts) with coherent meaning
  - Maps codes to description/meaning
  - Rules and formal definitions

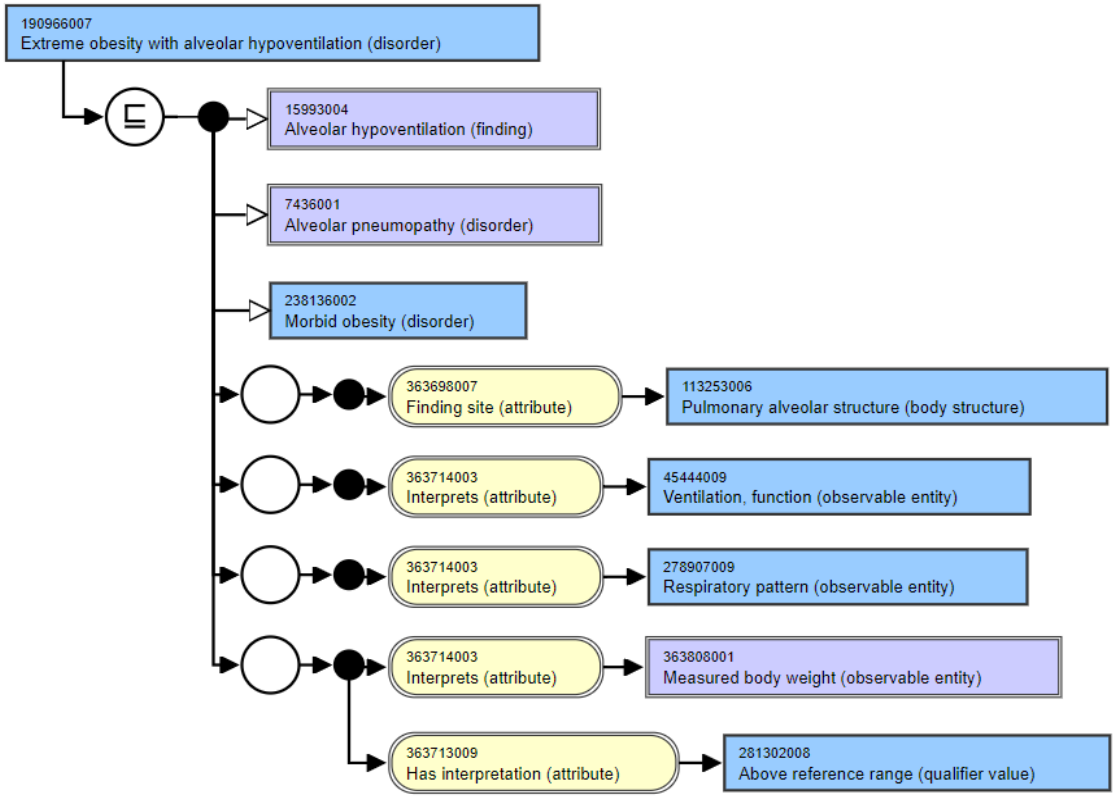


Code System

Specific Terminologies – SNOMED CT

HEALEX

- most comprehensive health terminology
- 3 components: Concepts, Descriptions, Relationships



SNOMED CT Browser: https://browser.ihtsdotools.org/

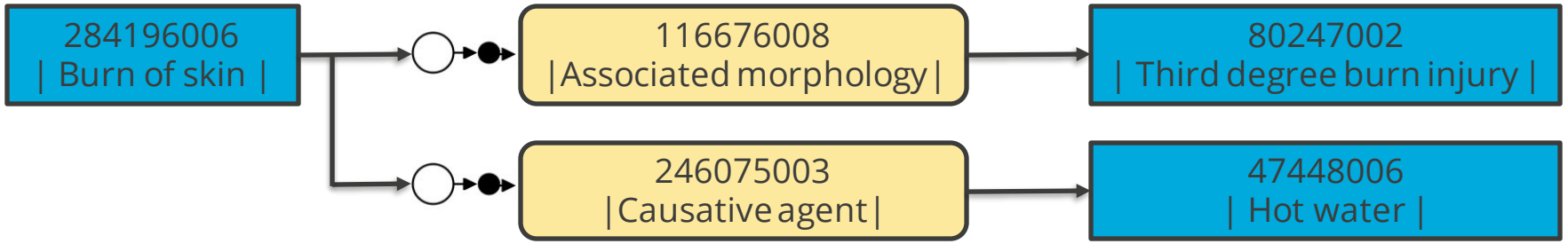
Specific Terminologies – SNOMED CT

HEALEX

Post-Coordination

- Mechanism to extend available concepts
- Combine existing concepts to additional medical ideas

Example



284196006 | Burn of skin | :

116676008 | Associated morphology | = 80247002 | Third degree burn injury |,

246075003 | Causative agent | = 47448006 | Hot water |

Specific Terminologies – SNOMED CT

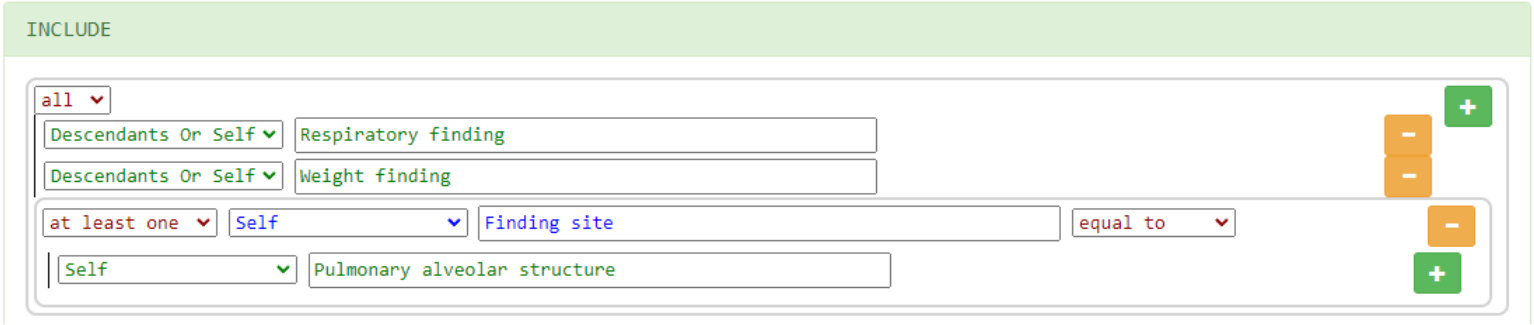
HEALEX

ECL - Expression Constraint Language

- Mechanism to limit scope of applicable concepts
- Computable rules to dynamically create subsets of concepts

Example

(<< 106048009 AND << 107647005) : 363698007 = 113253006



Total matches: 1

CODE	DISPLAY
190966007	Extreme obesity with alveolar hypoventilation

ECL Builder: https://ontoserver.csiro.au/shrimp/ecl/

Specific Terminologies – LOINC

HEALEX

- Logical Observation Identifier Names and Codes
- Term = Code + Fully Specified Name
  - Code has no specific structure
  - FSN: 5 or 6 parts
    - Component/Analyte
    - Property
    - Time
    - System
    - Scale
    - Method (optional)

Specific Terminologies – LOINC

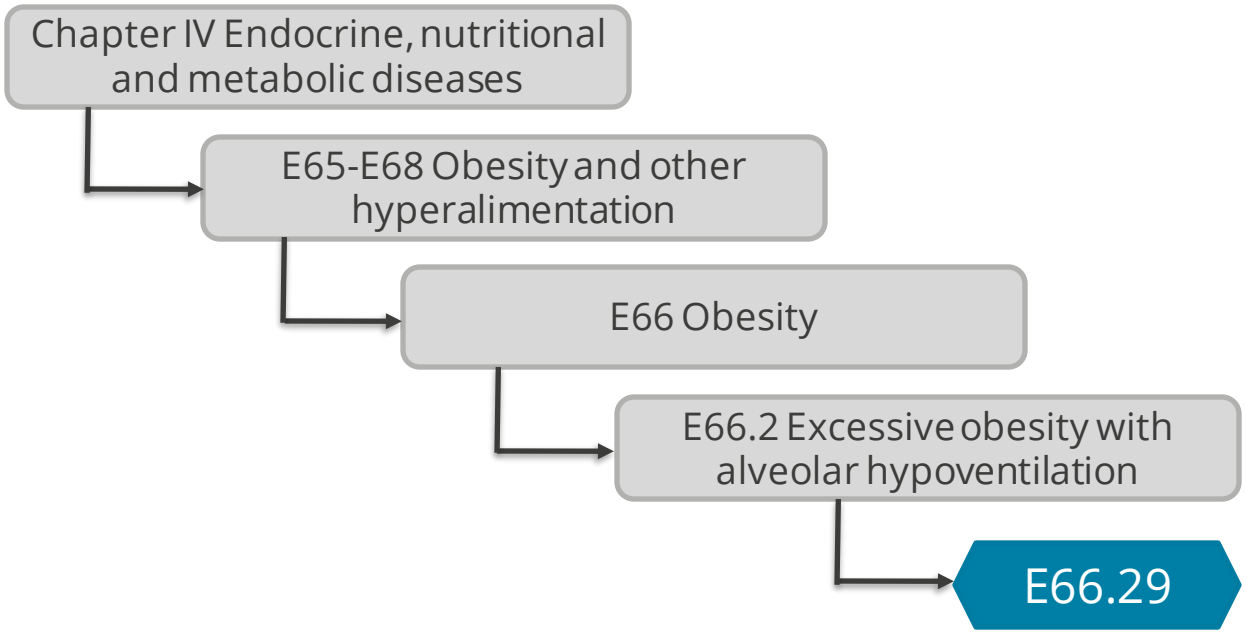
HEALEX

- Example: Second or third degree burn
  - Code: 45784-6
  - FSN:
    Second or third degree burns:Find:Pt:^Patient:Ord:MDS
- Example: Second or third degree burns in last 7 days
  - Code: 54968-3
  - FSN:
    Second or third degree burns in last 7D:Find:7D:^Patient:Ord:MDSv3

Specific Terminologies – ICD-10

HEALEX

- Hierarchical organized classes with up to 5 layers
- Base version and country-specific modifications



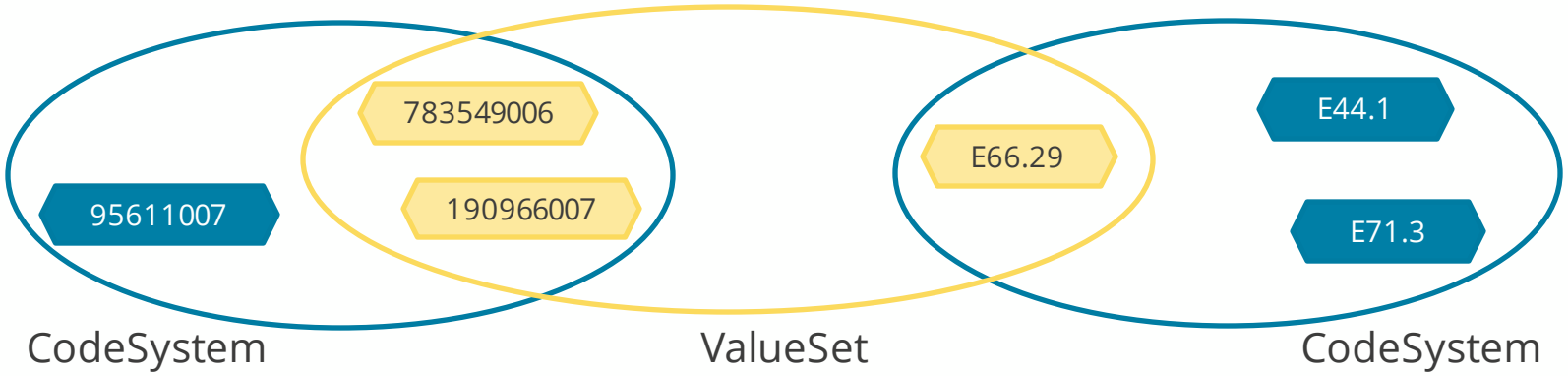
FHIR Terminology Service

HEALEX

- Relevant FHIR resources: CodeSystem, ValueSet, ConceptMap

ValueSet

- Selection of codes from any number of CodeSystems
- Contains rules or definition for applicable codes



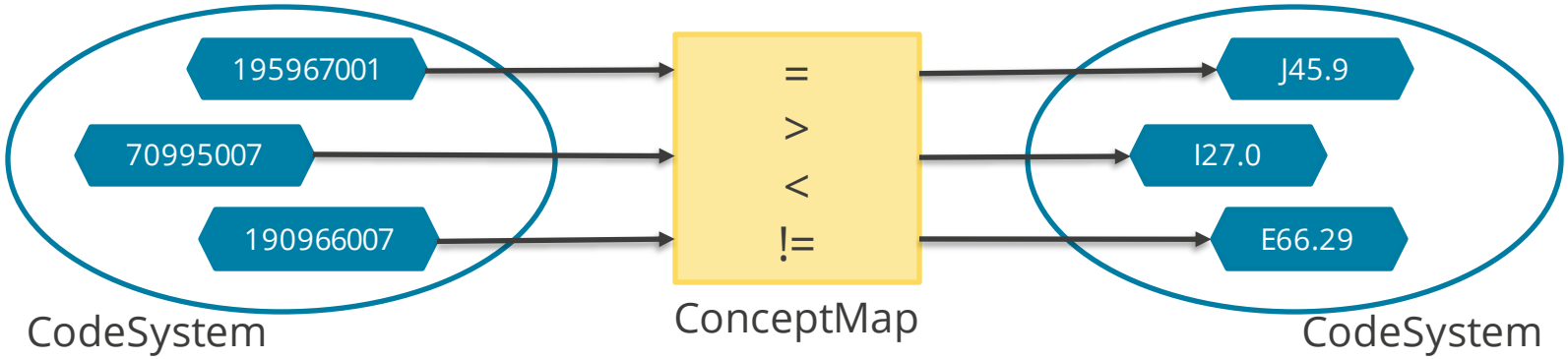
FHIR Terminology Service

HEALEX

- Relevant FHIR resources: CodeSystem, ValueSet, ConceptMap

ConceptMap

- Translation between concepts (one way)
- Captures translation accuracy (equivalent, wider, narrower,..)



FHIR Terminology Service

HEALEX

CodeSystem

- $lookup – Retrieve details for a given concept/code
- $subsume – Evaluate hierarchical relation of 2 (sets of) codes

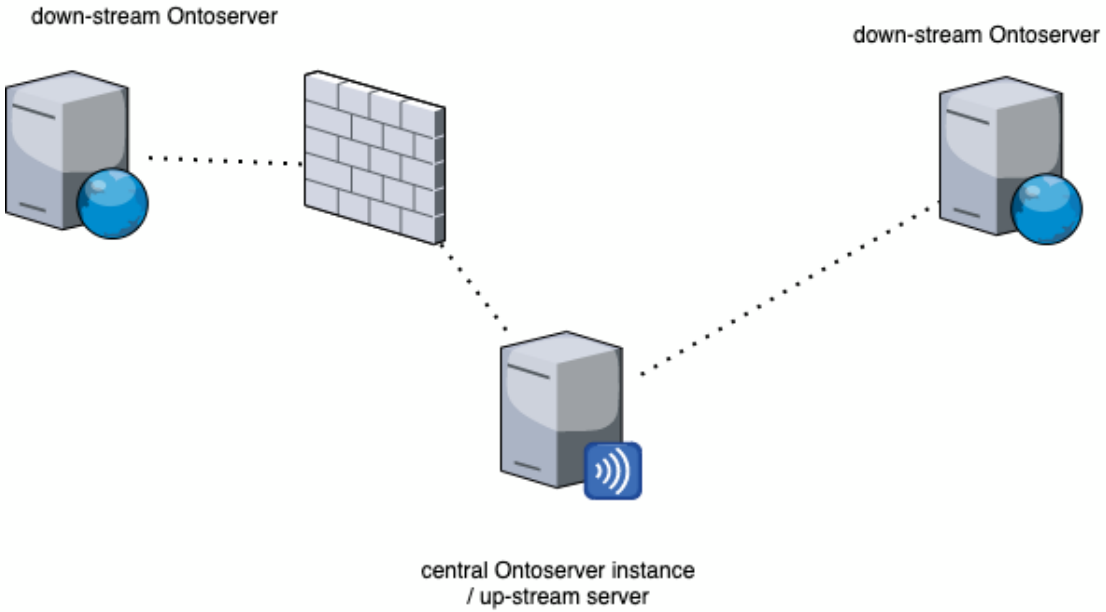
ValueSet

- $expand – Combine all codes matching the rules and definitions
- $validate-code – Check if a code matches the ValueSet's rules and definitions

ConceptMap

- $translate – Get the code corresponding to a given code from another CodeSystem

Syndication



- Ontoserver can advertise that it allows other servers to fetch CodeSystems from it
- These are then made available for the down-stream server
- Do note that you trigger syndication manually

Why syndicate?

HEALEX

- Consistency across systems
- Single source of truth
- Content is available locally
- Scalability, availability
- (almost) trivial to deploy and access latest versions of terminologies

Important configurations

HEALEX

Initial setup of the up-stream (source):

- Feed location
  - `atom.syndication.feedLocation=file:///syndication.xml`
- Enable security
  - `ontoserver.security.enabled=true`
  - `ontoserver.security.readOnly.fhir=true`
  - `ontoserver.security.readOnly.api=true`
  - `ontoserver.security.readOnly.synd=true`
- Configure memory
  - `JAVA_OPTS=-Xmx16G`
- Syndication base URLs
  - `ontoserver.synd.base={{source_url}}/synd`
  - `ontoserver.fhir.base={{source_url}}/fhir`

Important configurations

HEALEX

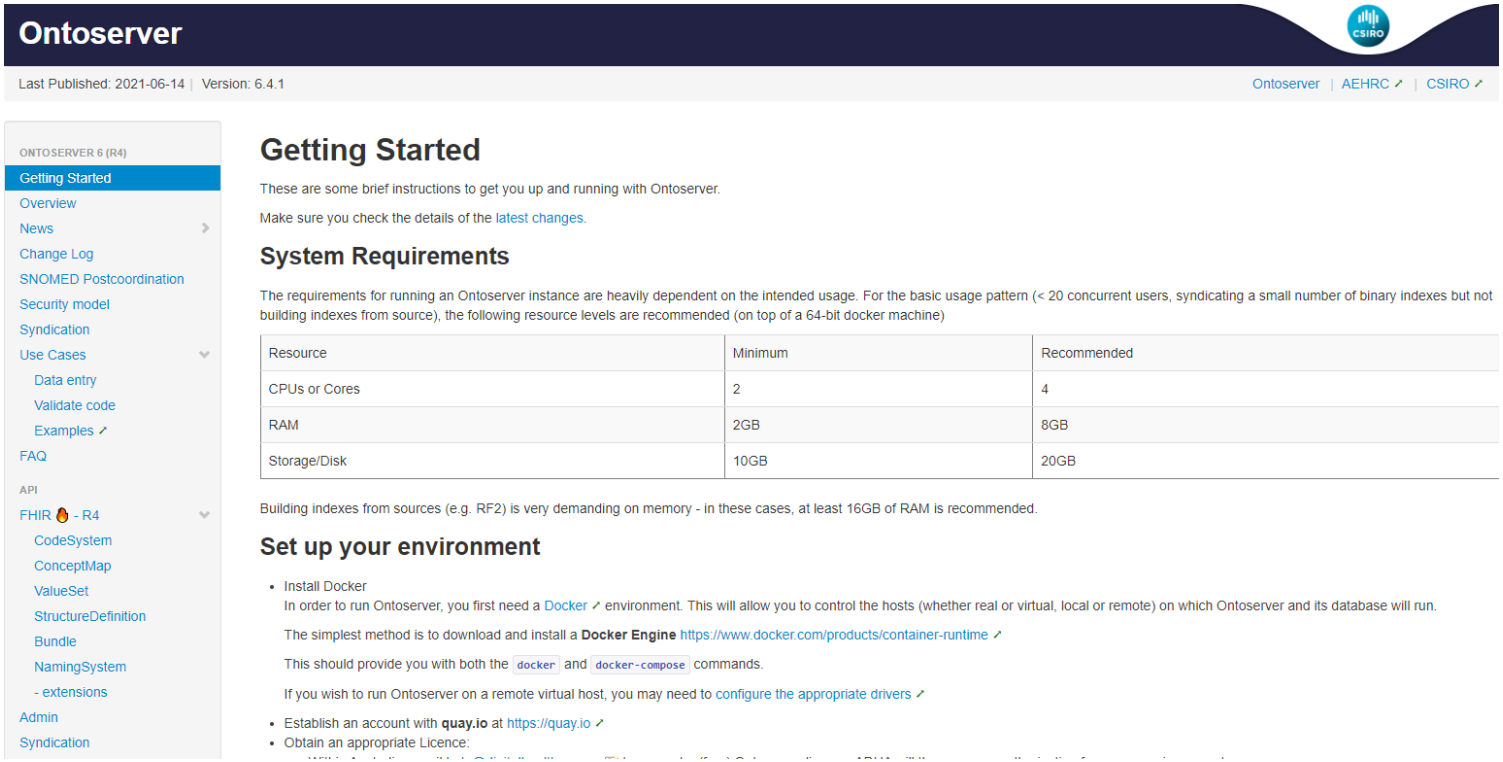
Initial setup of the down-stream (client):

- Feed location
  - `atom.syndication.feedLocation={{source_url}}/synd/syndication.xml`
- Timeouts
  - `atom.syndication.timeout.ms=60000`
  - `atom.syndication.client.connectTimeout=60000`
  - `atom.syndication.client.requestTimeout=60000`
  - `atom.syndication.client.socketTimeout=60000`

Important configurations

HEALEX

- detailed documentation and minimal configuration: https://ontoserver.csiro.au/docs/6/



Ontoserver

Last Published: 2021-06-14 | Version: 6.4.1

Ontoserver | AEHRC | CSIRO

ONTOSERVER 6 (R4)
- Getting Started
- Overview
- News
- Change Log
- SNOMED Postcoordination
- Security model
- Syndication
- Use Cases
  - Data entry
  - Validate code
  - Examples
- FAQ

API
- FHIR - R4
  - CodeSystem
  - ConceptMap
  - ValueSet
  - StructureDefinition
  - Bundle
  - NamingSystem
  - - extensions
- Admin
- Syndication

Getting Started

These are some brief instructions to get you up and running with Ontoserver.

Make sure you check the details of the latest changes.

System Requirements

The requirements for running an Ontoserver instance are heavily dependent on the intended usage. For the basic usage pattern (< 20 concurrent users, syndicating a small number of binary indexes but not building indexes from source), the following resource levels are recommended (on top of a 64-bit docker machine)

Resource	Minimum	Recommended
CPUs or Cores	2	4
RAM	2GB	8GB
Storage/Disk	10GB	20GB

Building indexes from sources (e.g. RF2) is very demanding on memory - in these cases, at least 16GB of RAM is recommended.

Set up your environment

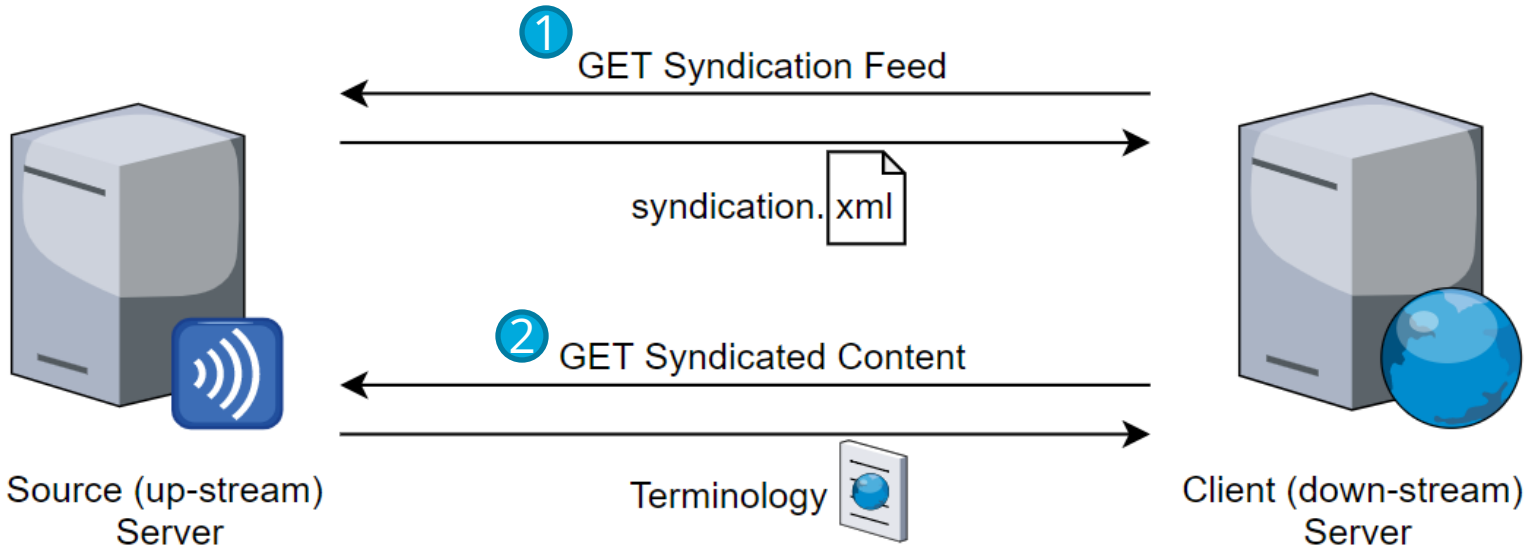
- Install Docker
  In order to run Ontoserver, you first need a Docker environment. This will allow you to control the hosts (whether real or virtual, local or remote) on which Ontoserver and its database will run.

  The simplest method is to download and install a **Docker Engine** https://www.docker.com/products/container-runtime

  This should provide you with both the `docker` and `docker-compose` commands.

  If you wish to run Ontoserver on a remote virtual host, you may need to configure the appropriate drivers
- Establish an account with **quay.io** at https://quay.io
- Obtain an appropriate Licence:

Demonstration



Syndication workflow

HEALEX

1. Disable Security of source
2. Upload a new CodeSystem to source
   - FHIR CodeSystem:

     ```
     PUT {{source_url}}/fhir/CodeSystem/{{CodeSystemId}}
     ```

   - SNOMED/LOINC:

     ```
     POST {{source_url}}/fhir/CodeSystem/$x-upload-external?system={{System}}&version={{Version}}
     ```

     - also set SyndicationStatus:

       ```
       POST {{source_url}}/synd/setIndexSyndicationStatus?codeSystemId={{System}}&syndicate=true&codeSystemVersion={{Version}}
       ```

3. Enable Security on source

Syndication workflow

4. Import from source: Import from source
   - FHIR CodeSystem:

     ```
     GET {{client_url}}/synd/fetchSyndicatedContentEntry
     ?resourceType=CodeSystem&url={{CodeSystemUrl}}&version
     ={{Version}}
     ```

   - SNOMED/LOINC:

     ```
     POST {{client_url}}/api/indexCodeSystem?codeSystemId=
     {{CodeSystemId}}&validate=false&codeSystemVersion={{Ve
     rsion}}
     ```

   - OntoCommand: Dashboard (GUI) available at https://ontoserver.csiro.au/ui

Encountered issues

HEALEX

CodeSystem with broken IndexStatus

- Solution: re-index CodeSystem

Timeout during syndication

- Potential cause: many CodeSystems/ValueSets on the server
- Solution: configure higher timeouts in clients

Unable to syndicate with Ontoserver behind Proxy

- Potential cause: base URL(s) are set explicitly and incorrectly
- Solution: remove those settings, let Ontoserver auto-detect

HEALEX

Thank you for your attention.

Any questions?