FHIR Tooling and Ecosystem
Design/Profile

Registry

Test services

Build & Implement

Support

Terminology Services

Tools & Libraries

Distribute

Guide

Publish

Review
Design/Profile (conformance resources)

• Goal: Support creation of FHIR “profiles”, valuesets and other conformance resources

• Forge – visual editor for profiles
• Trifolia – CDA templates + FHIR profile editor
• Notepad++ extension – “FHIR toolkit”
  • ValueSet, CodeSystem, CapabilityStatement

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Profile on Observation: **MyObservation**

Element Properties: **status**

- **Element ID**: Observation.status
- **Cardinality**: 0..1
- **Type(s)**: Profile
- **Valueset binding**: registered | preliminary | final | amended
- **Definition**: The status of the result value.

Observation / URL: The canonical resource url 'StructureDefinition/MyObservation' is invalid and not suitable for publishing purposes. A canonical url should be absolute.
• **Goal:** turn conformance resources into an *implementation guide (“IG”)*

Publish (Implementation Guide)

- ValueSet
- Structure Definition
- CodingSystem
- Operation Definition
- NamingSystem
- TestScript
- SearchParam Definition
- Capability Statement

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Publish (Implementation Guide)

- HL7 IG Publisher
- Simplifier IG Editor
- Trifolia IG export

Resource Details:
1. Patient
   Supported Profiles: US Core Patient Profile

Search Criteria:
1. A server **SHALL** be capable of returning a patient using:
   ```
   GET [base]/Patient/[id].
   ```

1. A server **SHALL** be capable of returning a patient by identifier using
   ```
   GET [base]/Patient?identifier=[system][code]
   ```

1. A server **SHALL** be capable of returning a patient by supporting
   - name
   - gender
   - birthdate
   - for example:
     ```
     GET [base]/Patient?name=[name]&gender=[gender]
     ```

Search Parameters:

<table>
<thead>
<tr>
<th>Conformance</th>
<th>Parameter</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHALL</td>
<td>name</td>
<td>string</td>
</tr>
<tr>
<td>SHALL</td>
<td>identifier</td>
<td>token</td>
</tr>
<tr>
<td>SHALL</td>
<td>family + gender</td>
<td>string + token</td>
</tr>
<tr>
<td>SHALL</td>
<td>given + gender</td>
<td>string + token</td>
</tr>
<tr>
<td>SHALL</td>
<td>name + gender</td>
<td>string + token</td>
</tr>
<tr>
<td>SHALL</td>
<td>name + birthdate</td>
<td>string + date</td>
</tr>
</tbody>
</table>

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Publish (to registry.fhir.org)

Start publishing
Choose or create a project and upload your FHIR resources. In the project settings, you can choose to publish to other registries like registry.fhir.org.

1. Log In or Sign Up
You are signed in.

2. Select a project
Ewoud's Projects

3. Upload a resource
Select file
Upload

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Registry

• Goal: Find & retrieve published profiles and guides – worldwide!
• Access for humans (UI) and systems (API)

• registry.fhir.org
• simplifier.net
Registry

Simplifier.net

PROJECT Finnish PHR Allergy Intolerance profile

Finnish PHR Allergy Intolerance profile

Profile

HCIM Medication Agreement
- Profile on MedicationRequest
  - Project: Netto STU3
    - This profile is based the Dutch Health and Care Information models (Dutch: Zorginformatiebouwstenen or ZIB) nl.org.MedicationRequest version 1.0, year 2017.

HCIM AllergyIntolerance
- Profile on AllergyIntolerance
  - Project: Netto STU3
    - An AllergyIntolerance resource as defined by the Dutch Health and Care Information models (Dutch: Zorginformatiebouwstenen or ZIB) version 1.0

HCIM Medication Administration
- Profile on MedicationAdministration
  - Project: Netto STU3
    - This profile is based the Dutch Health and Care Information models (Dutch: Zorginformatiebouwstenen or ZIB) nl.org.MedicationAdministration version 1.0, year 2017.

HCIM Medication Use
- Profile on MedicationStatement
  - Project: Netto STU3
    - This profile is based the Dutch Health and Care Information models (Dutch: Zorginformatiebouwstenen or ZIB) nl.org.MedicationStatement version 1.0, year 2017.

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To summarize: For the authors...
Terminology Services

- **Goal:** provide standardized access to valuesets and codesystems
- **Implement FHIR TerminologyService sub-API:**

  - Looking up a code in a code system:
    
    ```
    ```

  - Test whether a SNOMED CT Concept 'Disorder of liver' (235856003) subsumes 'Viral hepatitis' (3738000):
    
    ```
    ```
Terminology Services

- tx.fhir.org
- Terminz
- Apelon
- CSIRO’s Ontoserver
- NLM Fhir services on VSAC
- Art-Decor
- Health Language FHIR terminology services

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Software Developers

- FHIR client libraries
- FHIR server frameworks
- Instance editing and generation
**FHIR Client libraries**

- Pre-built libraries to create FHIR clients quickly
- Implement FHIR REST protocol
- Parsing and serialization
- Validation

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FHIR Client libraries

- Java HAPI
- .NET FHIR API
- fhir.js
- Meteor on FHIR (Javascript)
- Health Intersections Delphi
- Swift-FHIR
FHlR Server Frameworks

• “Starter-kit” to build a FHlR server with
• Handle HTTP calls, operations, FHlR search syntax
• Connect to your data:
  • Use relational storage (as blob)
  • Document dbs (e.g. MongoDb)
  • Facade to existing database
FHIR Server frameworks

- Health Intersections FhirServer
- SmileCDR - HAPI (Java)
- Firely Vonk (.NET)
- Aidbox.io
- AEGIS WildFHIR
- open.epic.com
- fhir-open.sandboxcerner.com

More at:


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Edit FHIR instances

Note that the Patient is not displayed in this graph.
Generating FHIR instances

SyntheticMass
Visualize and Interact with synthetic patient and population health data that simulates the state of Massachusetts in 2021.

About SyntheticMass
SyntheticMass is an open-source, simulated Health Information Exchange (HIE) populated with realistic "synthetic residents" of Massachusetts.

- Population health and demographic data at the city and town level
- The ability to drill down to individual synthetic patient data
- Fictional but realistic data representing synthetic patients
- APIs and Data Services such as Direct, FHIR and CCDAs

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Testing your FHIR software

- Testing FHIR data ("validation")
- Testing your service’s FHIR API (conformance testing)

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Instance validation

- Goal: Given a set of profiles & valuesets, determine whether a bit of FHIR data is "valid"
- Much like XSD schema, JsonSchema
- Java toolkit validator (commandline) (http://hl7.org/fhir/validation.html#jar)
- Simplifier.net validation (web)
- .NET API Profile Validation UI (win) (https://github.com/ewoutkramer/Furore.Fhir.ValidationDemo/releases)
Testing

• Goal: Run fhir TestScripts on your endpoint and analyze your compliance

• Aegis TouchStone
• MITRE Crucible
• Library of test scripts
• Scripts for each connectathon
Become certified!

**HL7 FHIR® STU3**

**HL7 FHIR STU3 Proficiency Exam Preparation**

HL7 FHIR is the latest standard for exchanging healthcare information electronically based on current and emerging industry approaches and informed by HL7’s long-term experience in the field of interoperability standards development. The HL7 FHIR STU3 Proficiency Exam allows test takers to demonstrate their understanding of the fundamental concepts of FHIR and their proficiency with the FHIR standard specification.

**HL7 FHIR (STU3) Proficiency Exam Tutorial**

This tutorial is designed to assist students in their preparation for the HL7 FHIR STU3 Proficiency Exam. Students preparing for the exam are expected to study the HL7 FHIR STU3 Specification as recommended in the FHIR Proficiency Exam Study Guide.

The tutorial will benefit

- Anyone preparing for the HL7 FHIR STU3 Proficiency Exam
- Implementers seeking a detailed review of the fundamental components in the FHIR specification.
- Implementers seeking a detailed review of the fundamental components in the FHIR specification.
Community support


chat.fhir.org

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HL7 FHIR DevDays

VISIT BOSTON

VISIT AMSTERDAM

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