

FHIR Core Concepts and Best Practices

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November 12, 2020

Housekeeping

- First virtual code Learning Lab
- Please share feedback during or after the event
- Max is in the chat on Hubb if you have questions
- Thanks for attending!

Fast Healthcare Interoperability Resources

- FHIR is a standard for interoperability
- FHIR sounds like “fire”
- You can make a lot of puns with FHIR

A screenshot of a messaging application interface. It shows three messages from different users, each with a blurred profile picture and a timestamp. The first message is at 9:26 AM, the second at 9:27 AM, and the third at 9:27 AM. The messages are as follows:

- 9:26 AM: Probably the threshold needs to be raised for sandbox
- 9:27 AM: Or we need to exclude FHIRPLAY... if that is where the alert is happening...
- 9:27 AM: We actually discussed making the alerts FHIR (wah wah) off a change from "base" rather than hard thresholds

Getting Started: HL7 Community

Empowering **beyond**



This page is part of the FHIR Specification (v4.0.1: R4 - Mixed Normative and STU). This is the current published version in its permanent home (it will always be available at this URL). 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).

Technical Corrections:

- **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



Level 2 Supporting implementation and binding to external specifications



Level 3 Linking to real world concepts in the healthcare system



Level 4 Record-keeping and Data Exchange for the healthcare process



Level 5 Providing the ability to reason about the healthcare process



External Links:

Implementation Guides

Specifications based on the FHIR standard

- Published by HL7, Affiliates & FHIR Foundation
- Other IGs (FHIR Confluence)

FHIR Foundation

Enabling health interoperability through FHIR

- Community Forum + FHIR Chat
- Public Test Servers & Software
- Blogs that cover FHIR
- FHIR Confluence

Translations

Note that translations are not always up to date

- Russian
- Chinese
- Japanese

Note: This specification requires a browser that is SVG compatible (Microsoft Internet Explorer 10+/Edge, Firefox 3.0+, Chrome, or Safari), and uses the browser's session storage to remember which tabs are active.

Versioning

Introductions

API Resources

External information:
 Confluence wiki, blogs,
 reference servers

 Dashboard

...

Home

Created by Joshua Procius, last modified on Sep 18, 2019

[Administration](#) [Connectathons](#) [Designers](#) [Implementers](#) [Individuals Interested in FHIR IG Development](#) [FHIR IG Review](#) [Migration of FHIR from Wiki](#) [FHIR Bulk Data Access Implementation Guide](#)

- DSTU2 Ballot to Final breaking changes
- DSTU2 Technical Correction 1 Tasks
- FHIR Management Group
- FHIR Product Director Page
- FHIR Product Director Position Description
- FHIR Trademark Policy
- Governance Process
- Known Issues with the published FHIR Specifications

 A final page you can populate content on.

The bulk of the content for this page has yet to be migrated from <http://wiki.hl7.org/index.php?title=FHIR>

Popular Topics

- fhir-resource-proposal
- fhir-resource-proposal-approved
- fhir-ig-proposal
- fhir-ig-proposal-pending
- fhir-ig-proposal-approved
- fhir-resource-proposal-pending
- fhir-profile-proposal
- fhir-profile-proposal-pending
- drawio
- fhir-profile-proposal-approved

Wiki is being migrated from previous home

No labels

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Specification Versioning

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Publication (Version) History

This table provides a list of all the versions of FHIR (Fast Health Interoperability Resources) that are available. See also the directory of [FHIR Implementation Guides](#).

The following versions of the FHIR Specification have been published:

Date	Version	Description	Links
Current Versions			
2019-10-30	4.0.1	FHIR Release #4: First Normative Content	
(current)	(last commit)	Current Development build (about 30min behind version control, may be incoherent and change rapidly)	
R5 Sequence (Work in Progress)			
2020-08-20	4.5.0	FHIR Release #5: Preview #3	
2020-05-04	4.4.0	FHIR Release #5: Preview #2	
2019-12-31	4.2.0	FHIR Release #5: Preview #1	
R4 Sequence (Current)			
2019-10-30	4.0.1	FHIR Release #4 First Normative Content with 1 technical errata (Permanent Home) <ul style="list-style-type: none"> • <i>Technical Errata Archive (zip): v4.0.0</i> <i>(Permanent Home)</i>	
2018-11-09	3.5a.0	Special R4 Ballot #3 : Normative Packages for Terminology / Conformance + Observation	
2018-08-21	3.5.0	R4 Ballot #2 : Mixed Normative/Trial use (Second Normative ballot + Baltimore Connectathon)	
2018-04-02	3.3.0	R4 Ballot #1 : Mixed Normative/Trial use (First Normative ballot)	
2018-04-02	3.2.0	Draft for comment / First Candidate Normative Content	
STU 3 Sequence (Historical)			
2019-10-24	3.0.2	FHIR Release 3 (STU) with 2 technical errata (Permanent Home) <ul style="list-style-type: none"> • <i>Technical Errata Archive (zip): v3.0.1</i> • <i>Technical Errata Archive (zip): v3.0.0</i> 	
2016-12-06	1.8.0	FHIR STU3 Candidate + Connectathon 14 (San Antonio)	
2016-08-11	1.6.0	FHIR STU3 Ballot + Connectathon 13 (Baltimore)	
2016-03-30	1.4.0	CQF on FHIR Ballot + Connectathon 12 (Montreal)	
2015-12-11	1.2.0	Draft for comment	
2015-12-03	1.1.0	GAO Ballot + draft changes to main FHIR standard	
DSTU 2 Sequence (Historical)			
2015-10-24	1.0.2	DSTU 2 (Official version) with 1 technical errata (Permanent home)	
2015-08-31	1.0.0	DSTU 2 QA Preview + CQIF Ballot (Sep 2015)	
2015-04-02	0.5.0	DSTU 2 Ballot version (May 2015 Ballot)	
2014-12-12	0.4.0	Draft For Comment (January 2015 Ballot)	
DSTU 1 Sequence (Historical)			
2014-09-30	0.0.82	DSTU 1 (Official version) with 2 technical errata (Permanent home)	
2013-09	0.11	DSTU 1 Ballot version	
2012-12-04	0.06	2nd Draft for Comment (January 2013 Ballot)	
2012-09-09	0.05	1st Draft for Comment (Sept 2012 Ballot)	
Historical Archive Sequence (Historical)			
2012-05-14	0.01	First version labelled as 'FHIR'	
2011-09	0.00	Original Proposal, labelled as RfH	

Note: Subsequent to Sept 2013, the FHIR version policy was changed.

Current version is
4.0.1: R4

Millennium

[Overview](#) [DSTU 2 Final \(1.0.2\)](#) [R4 First Normative Content \(4.0.0\)](#) [FAQ](#) [Support](#)

Overview

This describes the resources that make up Cerner's implementation of the HL7® FHIR® standard. If you have any problems or requests, please post to our [developer group](#).

- i. [Supported Versions](#)
- ii. [Determining Which Version You Should Use](#)
- iii. [Supported Resources Between Versions](#)

Supported Versions

Cerner's implementation currently supports both the R4 First Normative Content (4.0.1) version and DSTU 2 Final (1.0.2) version of the HL7® FHIR® standard. Cerner's implementation of the R4 version is ongoing and new resources and actions will be added over time.

Determining Which Version You Should Use

Determining which version you should use will depend upon your use case and, in general, if the R4 implementation meets all of your requirements, you should target your development against the R4 version. To determine if the R4 version meets your requirements, you need to consider supported resources and actions, patient access, and technical requirements. In general, there are more capabilities such as create and modify in R4 that will not be patched back to DSTU 2.

[- Collapse All](#)

▼ Overview

[Authorization](#)

This website is a [public GitHub repository](#). Please help us by forking the project and adding to it.

Cerner implements versions

1.0.2: DSTU 2

4.0.1: R4

Which Version Should I Use?

- At any point in time it is likely that Cerner implements multiple versions of the HL7 FHIR specification via multiple servers
- Use the newest version
- Old versions will be deprecated after their functionality is copied forward

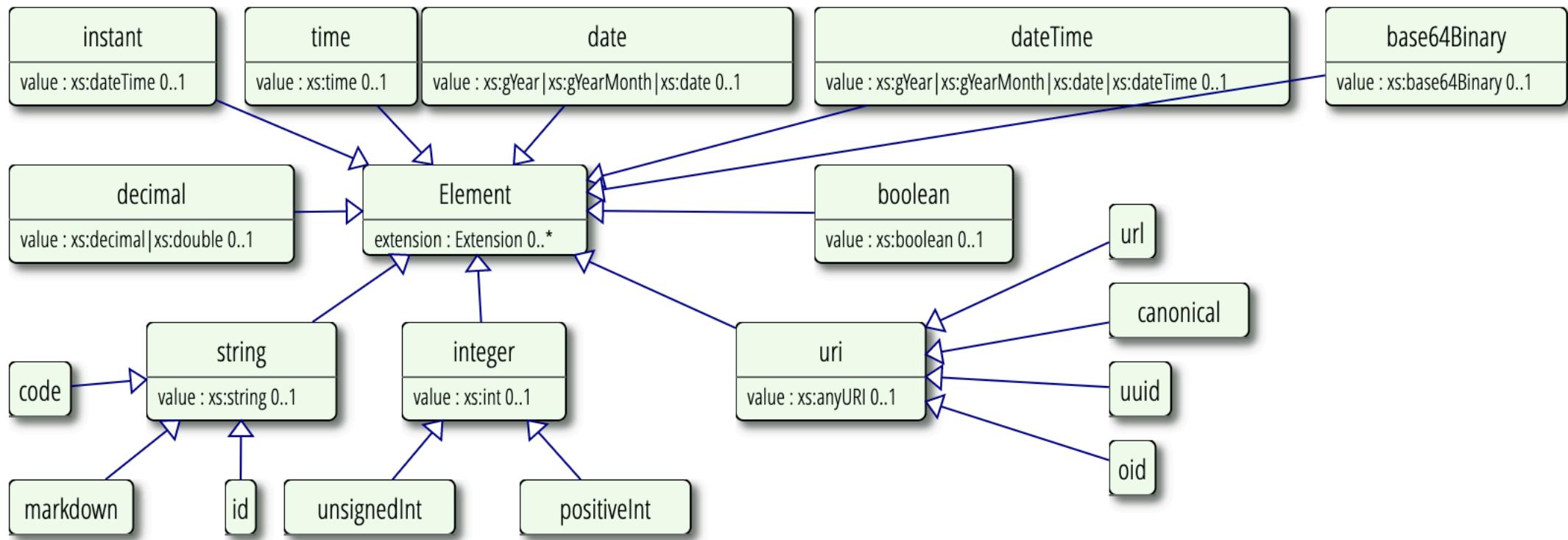
DSTU 2 Resource	Supported Actions	R4 Resource	Supported Actions
AllergyIntolerance		Account	
Appointment		AllergyIntolerance	
		Appointment	
		Basic	
Binary		Binary	

Data Types

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2.24.0.1 Primitive Types



Weird Things About Primitive Data Types

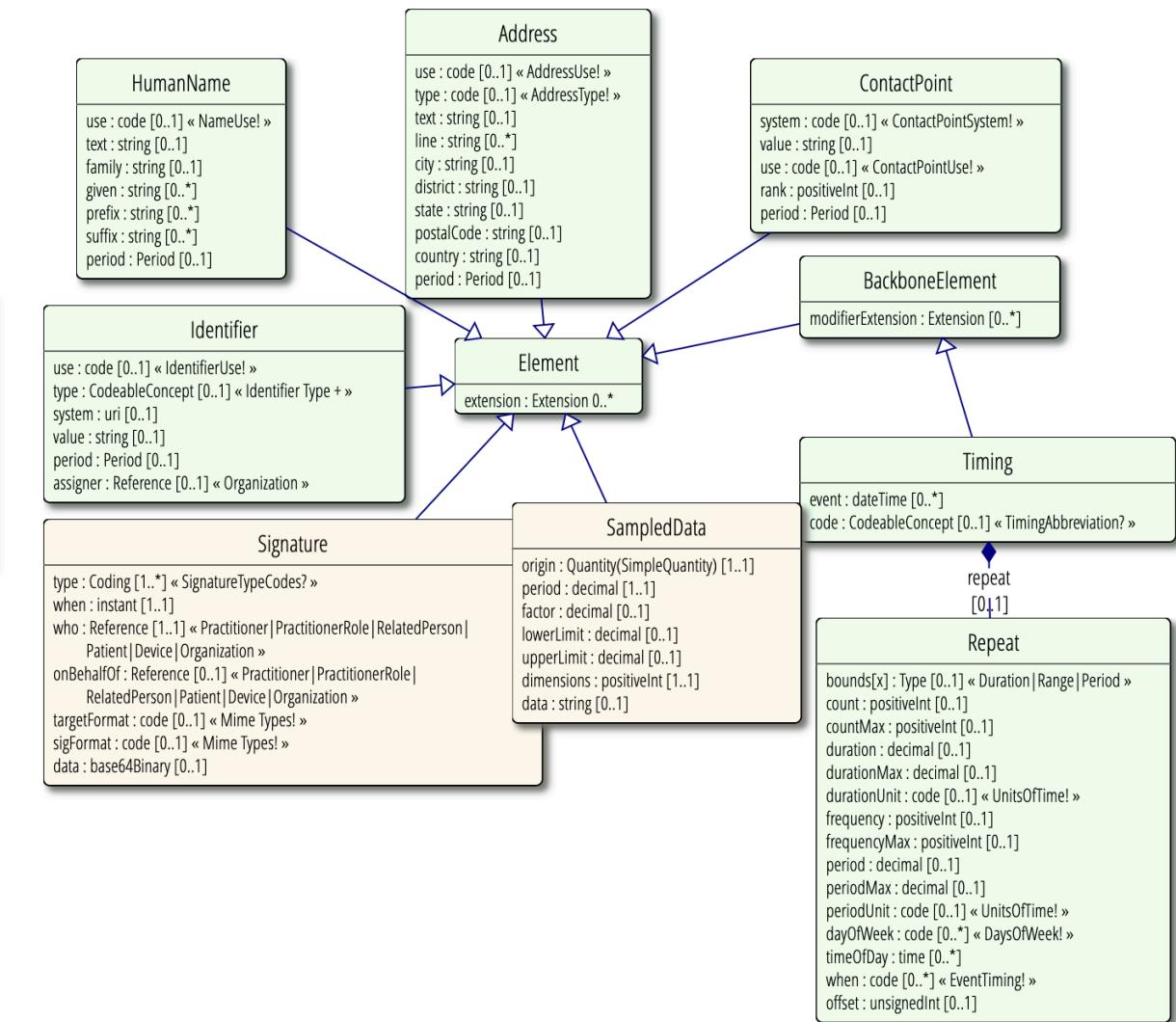
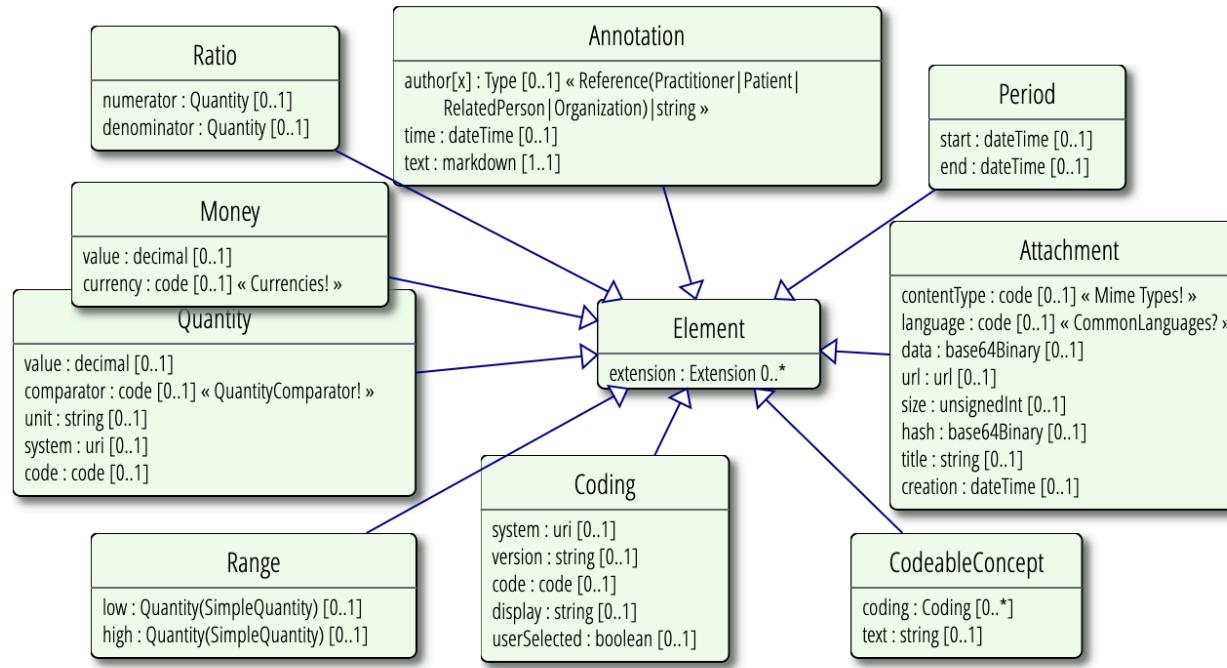
- **decimal**
 - $1.01 \neq 1.010$
- Dates and times
 - Computer: **instant** `2015-02-07T13:28:17.239+02:00`
 - Human:
 - No time zone: **date** `1905-08-23` | **time** `19:30:00`
 - Time zone: **dateTime** `date, date-time or partial date`

2.24.0.2 Complex Types

In XML, these types are represented as XML Elements with child elements with the name of the defined elements of the type. The name of the element is defined where the type is used. In JSON, the data type is represented by an object with properties named the same as the XML elements. Since the JSON representation is almost exactly the same, only the first [example](#) has an additional explicit JSON representation.

Complex data types may be "profiled". A [Structure Definition](#) or type "constraint" makes a set of rules about which elements SHALL have values and what the possible values are.

UML Diagrams of the Data types



Using Coded Values

- **code**
 - Value only
- **Coding**
 - System and value
- **CodeableConcept**
 - Zero to many system/value pairs
 - Plain text representation

```
"valueCodeableConcept": {
  "coding": [
    {
      "system": "http://snomed.info/sct",
      "code": "260385009",
      "display": "Negative"
    },
    {
      "system": "https://acme.lab/resultcodes",
      "code": "NEG",
      "display": "Negative"
    }
  ],
  "text": "Negative for Chlamydia Trachomatis rRNA"
}
```

Data Formats

- XML, JSON, RDF
 - Cerner implements JSON
- Requested/set via
 - Headers
 - GET - Accept: application/fhir+json
 - POST - Content-Type: application/fhir+json
 - Query parameter
 - ...&_format=json

Resources

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Resources

- Patient, Condition, AllergyIntolerance, etc.
- All resources have **id**, **meta**, and **text**
- Resources differ in other structured data items
- API available at [base URL]/[Resource] (case sensitive)
 - Example:
<https://fhir-open.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/Patient>



1.2 Resource Index

FHIR Infrastructure Work Group

Maturity Level: N/A

Standards Status: Informative

This page is provided to help find resources quickly. There is also a more [detailed classification, ontology, and description](#). For background to the layout on the layers in this page, see the [Architect's Overview](#). See also the abstract Base Resources [Resource](#) and [DomainResource](#).

	Categorized	Alphabetical	R2 Layout	By Maturity	Security Category	By Standards Status	By Committee
Foundation	Conformance <ul style="list-style-type: none"> • CapabilityStatement N • StructureDefinition N • ImplementationGuide 1 • SearchParameter 3 • MessageDefinition 1 • OperationDefinition N • CompartmentDefinition 1 • StructureMap 2 • GraphDefinition 1 • ExampleScenario 0 	Terminology <ul style="list-style-type: none"> • CodeSystem N • ValueSet N • ConceptMap 3 • NamingSystem 1 • TerminologyCapabilities 0 	Security <ul style="list-style-type: none"> • Provenance 3 • AuditEvent 3 • Consent 2 	Documents <ul style="list-style-type: none"> • Composition 2 • DocumentManifest 2 • DocumentReference 3 • CatalogEntry 0 	Other <ul style="list-style-type: none"> • Basic 1 • Binary N • Bundle N • Linkage 0 • MessageHeader 4 • OperationOutcome N • Parameters N • Subscription 3 		
Base	Individuals <ul style="list-style-type: none"> • Patient N • Practitioner 3 • PractitionerRole 2 • RelatedPerson 2 • Person 2 • Group 1 	Entities #1 <ul style="list-style-type: none"> • Organization 3 • OrganizationAffiliation 0 • HealthcareService 2 • Endpoint 2 • Location 3 	Entities #2 <ul style="list-style-type: none"> • Substance 2 • BiologicallyDerivedProduct 0 • Device 2 • DeviceMetric 1 	Workflow <ul style="list-style-type: none"> • Task 2 • Appointment 3 • AppointmentResponse 3 • Schedule 3 • Slot 3 • VerificationResult 0 	Management <ul style="list-style-type: none"> • Encounter 2 • EpisodeOfCare 2 • Flag 1 • List 1 • Library 2 		
Clinical	Summary <ul style="list-style-type: none"> • AllergyIntolerance 3 • AdverseEvent 0 • Condition (Problem) 3 • Procedure 3 • FamilyMemberHistory 2 • ClinicalImpression 0 • DetectedIssue 1 	Diagnostics <ul style="list-style-type: none"> • Observation N • Media 1 • DiagnosticReport 3 • Specimen 2 • BodyStructure 1 • ImagingStudy 3 • QuestionnaireResponse 3 • MolecularSequence 1 	Medications <ul style="list-style-type: none"> • MedicationRequest 3 • MedicationAdministration 2 • MedicationDispense 2 • MedicationStatement 3 • Medication 3 • MedicationKnowledge 0 • Immunization 3 • ImmunizationEvaluation 0 • ImmunizationRecommendation 1 	Care Provision <ul style="list-style-type: none"> • CarePlan 2 • CareTeam 2 • Goal 2 • ServiceRequest 2 • NutritionOrder 2 • VisionPrescription 2 • RiskAssessment 1 • RequestGroup 2 	Request & Response <ul style="list-style-type: none"> • Communication 2 • CommunicationRequest 2 • DeviceRequest 1 • DeviceUseStatement 0 • GuidanceResponse 2 • SupplyRequest 1 • SupplyDelivery 1 		

Resource Maturity

- FHIR is a living specification. Resource definitions ‘mature’ with age
- 0 (Draft), 1, 2, 3, 4, 5, N (Normative)
- 0 = high risk of breaking change
- N = resource definition is stable

Terminology Bindings

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8.1.2.1 Terminology Bindings

Path	Definition	Type	Reference
Patient.gender	The gender of a person used for administrative purposes.	Required	AdministrativeGender
Patient.contact.gender			
Patient.maritalStatus	The domestic partnership status of a person.	Extensible	Marital Status Codes
Patient.contact.relationship	The nature of the relationship between a patient and a contact person for that patient.	Extensible	PatientContactRelationship
Patient.communication.language	A human language.	Preferred, but limited to AllLanguages	CommonLanguages
Patient.link.type	The type of link between this patient resource and another patient resource.	Required	LinkType

Terminology Binding Strength

- **required**
 - Must use the specified value set
- **extensible**
 - Must use the specified value set if applicable
- **preferred**
 - Encouraged to use the specified value set
- **example**
 - Not expected or encouraged to use the specified value set

Terminology Bindings

Observation.category
<i>Description</i> Codes for high level observation categories. Details: Observation Category Codes System: http://terminology.hl7.org/CodeSystem/observation-category
Observation.code
<i>Description</i> Codes identifying names of simple observations. Details: LOINC System: http://loinc.org Details: SNOMED CT System: http://snomed.info/sct Details: Millennium Clinical Event Code System: <a href="https://fhir.cerner.com/<EHR source id>/codeSet/72">https://fhir.cerner.com/<EHR source id>/codeSet/72
Observation.dataAbsentReason
<i>Description</i> Codes for reasons data is absent. Details: v4 data absentreason System: http://terminology.hl7.org/CodeSystem/data-absent-reason

Narrative

Empowering **beyond**



Narrative

- Narratives are available in the structured data item **text**
- Summary:

*Any resource may include a **human-readable narrative** that contains a summary of the resource*

It SHALL reflect all content needed for a human to understand the essential clinical and business information for the resource

It SHALL be safe to render only the narrative of the resource

Narrative

```
"text": {  
  "status": "generated",  
  "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\"><p><b>Patient</b></p><p><b>Name</b>: CARTER, KRISTIN CERNER</p><p><b>Status</b>: Active</p><p><b>DOB</b>: Jan 12, 1986</p><p><b>Administrative Gender</b>: Female</p><p><b>Marital Status</b>: Single</p></div>"  
},
```

Patient

Name: CARTER, KRISTIN CERNER

Status: Active

DOB: Jan 12, 1986

Administrative Gender: Female

Marital Status: Single

Examples

Empowering **beyond**



Example 1 of 3

- Identify the maturity level of the following resources for R4:
 - Patient
 - Condition
 - Observation
 - Coverage



Solution 1 of 3

- Identify the maturity level of the following resources for R4:
 - Patient: N
 - Condition: 3
 - Observation: N
 - Coverage: 2



Example 2 of 3

- What are the terminology bindings for the **identifier.type** field on Cerner's Millennium R4 Practitioner API?

Solution 2 of 3

- What are the terminology bindings for the **identifier.type** field on Cerner's Millennium R4 Practitioner API?
 - **Identifier Type Codes:** <http://hl7.org/fhir/identifier-type>
 - **v2 Identifier Type:** <http://terminology.hl7.org/CodeSystem/v2-0203>

Example 3 of 3

- What data format does Cerner's Millennium R4 sandbox server utilize?
What is the MIME-type for that data format?

Example 3 of 3

- What data format does Cerner's Millennium R4 sandbox server utilize?
What is the MIME-type for that data format?
 - **JSON**
 - **application/fhir+json**

Cerner FHIR Developers Google Group

- Search for “Cerner FHIR Developers”
- Focused on providing troubleshooting and technical assistance to anyone consuming Cerner’s sandbox server
- Monitored by Cerner engineering

HTTP Operations: Read

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Read

- Access FHIR resources by ID
- API available at GET [base URL]/[Resource]/[ID]
 - Example:
[https://fhir-open.cerner.com/r4/
ec2458f2-1e24-41c8-b71b-0e701af7583d/Patient/12508016](https://fhir-open.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/Patient/12508016)

Weird Things About ids and identifiers

- **id**
 - Logical identifier
 - Must be unique within the FHIR server and FHIR resource
- **identifier**
 - Business identifier or “alias”
 - Examples: SSN, MRN, Military ID

HTTP Operations: Search

Empowering **beyond**



Search

- Search for FHIR resources by parameters
- API available at GET [base URL]/[Resource]?[parameters]
 - Example:
`https://fhir-open.cerner.com/r4/
ec2458f2-1e24-41c8-b71b-0e701af7583d/
Patient?family=carter&birthdate=1986-01-12`

Search

- HL7 FHIR specification defines available parameters for each resource
- Reference servers like Cerner's implement a subset
- Check <http://fhir.cerner.com/> to learn which parameters are supported and discover any information about search requirements
 - Example: Millennium R4 Appointment
*The **patient**, **practitioner**, and **location** parameters may be included only once and may not be used in combination*

Search - Paging Through Results

- When too many results would be returned, results are paginated. If you do not view all pages, clinically significant information may be missed
- Page size is controlled via `_count` query parameter
- Server response includes opaque pagination links
 - `self`, `next`, `previous`

```
"link": [  
  {  
    "relation": "self",  
    "url": "https://example.com/r4/Patient?-pageContext=e362f6290fa9"  
  },  
  {  
    "relation": "next",  
    "url": "https://example.com/r4/Patient?-pageContext=f6bfb3fb008d&-pageDirection=NEXT"  
  }  
,
```

HTTP Operations: Write

Empowering **beyond**



Create

- Add new FHIR resources
- API available at POST [base URL]/[Resource]
 - Example:
[https://fhir-ehr.cerner.com/r4/
ec2458f2-1e24-41c8-b71b-0e701af7583d/Patient](https://fhir-ehr.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/Patient)
- Pass in a request body representing the resource to create
- Only available in Cerner's closed sandbox (self-register for authorization)

Update

- Update existing FHIR resources
- API available at PUT or PATCH [base URL]/[Resource]/[ID]
 - Example:
[https://fhir-ehr.cerner.com/r4/
ec2458f2-1e24-41c8-b71b-0e701af7583d/Patient/12508016](https://fhir-ehr.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/Patient/12508016)
- Pass in a request body (PUT) or JSON Patch operations (PATCH) representing the updates to enact
- Only available in Cerner's closed sandbox (self-register for authorization)

Update - Optimistic Version Locking

- Clinically significant information may be lost if updates are allowed without some strategy for ensuring consumers have viewed the most recent version of a resource
- Use **If-Match** request header and resource **meta.version**
- Example: Patient in database has **meta.version 5**
 - Update request with **If-Match: 4** - 412 Precondition Failed
 - Update request with **If-Match: 5** - 200 OK

Examples

Empowering **beyond**



Example 4 of 7

- In Cerner's Millennium R4 server, what is the middle name of Patient Fred Smart? (id: 12743119)

Answer 4 of 7

- In Cerner's Millennium R4 server, what is the middle name of Patient Fred Smart? (id: 12743119)
 - **Rick**
 - Note: HL7 HumanName.given is an array
 - *Given names (not always 'first'). Includes middle names*

Example 5 of 7

- In Cerner's Millennium R4 server, how many **current** Conditions does Nancy Smart have? (id: 12724066)
 - *Hint: Condition.clinicalStatus determines whether a Condition is current*



Answer 5 of 7

- In Cerner's Millennium R4 server, how many **current** Conditions does Nancy Smart (id: 12724066) have?
 - *Hint: Condition.clinicalStatus determines whether a Condition is current*
 - *Check the terminology binding for Condition.clinicalStatus to learn which codes represent current*
- 26



https://fhir-open.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/Condition?patient=12724066&clinical-status=active,reurrence,relapse&_format=json

<https://www.hl7.org/fhir/r4/valueset-condition-clinical.html>

Example 6 of 7

- In Cerner's Millennium R4 server, how many Appointments does Practitioner Christina Applegate (id: 593923) have in May through July 2020?
 - *Hint: use these date parameters to filter for the proper date range*
`date=ge2020-05-01T00:00:00.000Z`
`&date=lt2020-08-01T00:00:00.000Z`

Answer 6 of 7

- In Cerner's Millennium R4 server, how many Appointments does Practitioner Christina Applegate (id: 593923) have in May through July 2020?
 - *Hint: use these date parameters to filter for the proper date range
date=ge2020-05-01T00:00:00.000Z
&date=lt2020-08-01T00:00:00.000Z*
 - **15 (make sure to page through all results)**

Example 7 of 7

- In Cerner's Millennium R4 server, what is the name of the patient with military ID 10050007026?
 - *Hint: Patient identifier is a token search parameter - a system and value must be provided. The system for military ID is “urn:oid: 2.16.840.1.113883.3.42.10001.100001.12”*

Answer 7 of 7

- In Cerner's Millennium R4 server, what is the name of the patient with military ID 10050007026?
 - *Hint: Patient identifier is a token search parameter - a system and value must be provided. The system for military ID is “urn:oid: 2.16.840.1.113883.3.42.10001.100001.12”*
 - **Hailey Smart**

Extensions

Empowering **beyond**



80

20

Extensions

- They're expected
- They can nest within one another
- Servers and clients cannot reject requests because of extensions

```
"name": {  
  "extension": [  
    {  
      "url": "http://hl7.org/fhir/StructureDefinition/iso-21090-EN-use",  
      "valueCode": "I"  
    }  
  ],  
  "text" : "Chief Red Cloud"  
}
```

Extensions

- They're expected
- They can nest within one another
- Servers and clients cannot reject requests because of extensions
 - Unless the extension is a modifier extension

```
"resourceType": "MedicationRequest",
"modifierExtension": [
  {
    "url": "http://example.org/fhir/StructureDefinition/anti-prescription",
    "valueBoolean": true
  }
]
```

Capability Statement

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CapabilityStatement

- Weird thing about CapabilityStatement
 - API available at GET [base URL]/CapabilityStatement
 - API available at GET [base URL]/metadata
- The capability statement describes and documents the server
 - Security
 - Resources and parameters
 - Operations
 - Profiles

Examples

Empowering **beyond**



Example 8 of 9

- Which extensions are supported by Cerner's Millennium R4 Patient resource?

Answer 8 of 9

- Which extensions are supported by Cerner's Millennium R4 Patient resource?
 - **Patient Birth Time**
 - **US Core Race**
 - **US Core Ethnicity**
 - **US Core Birth Sex**

Example 9 of 9

- According to its CapabilityStatement, does this FHIR server support OAuth? <https://fhir-open.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/>

Answer 9 of 9

- According to its CapabilityStatement, does this FHIR server support OAuth? <https://fhir-open.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/>
 - No (change fhir-open to fhirehr-code for a server that does support OAuth)

Profiles

Empowering **beyond**



Profiles

- Another way to build upon the base HL7 FHIR specification
- Profiles are used when different jurisdictions have different practices or regulations
- Instead of structured definitions (extensions), profiles are specification rules



Profile Rules

- Profiles are detailed contracts
- Changes from the base HL7 FHIR specification may include:
 - Parameters, operations, or other API calls
 - API fields and their cardinality
 - Terminology bindings
 - Extensions

Profiles Must Be Compatible With the Core Spec

- Changes may not include:
 - Edits to required terminology bindings
 - Cardinality expansions
 - Base 1..* to profile 1..1 is ok since base requirements are met
 - Base 1..* to profile 0..* is not ok
 - Field renames

3.23.1 StructureDefinition-us-core-race

3.23.1.1 US Core Race Extension

This Complex Extension for race allows one or more race codes of which:

- Must Support at least one code from OMB Race Categories
- May include additional race codes from CDC Race Codes
- Must include text description of race

Context of Use: [US Core Patient Profile](#)

Example can be found in [Patient-example](#)

3.23.1.2 Formal Views of Profile Content

Description of Profiles, Differentials, and Snapshots [↗](#).

The official URL for this profile is: <http://hl7.org/fhir/us/core/StructureDefinition/us-core-race> [Copy](#)

Published on Tue May 21 00:00:00 UTC 2019 as active by the HL7 US Realm Steering Committee.

This profile builds on [Extension](#) [↗](#)

Name	Flags	Card.	Type	Description & Constraints
Extension		0..1	Extension	US Core Race Extension
extension:ombCategory	S	0..5	Extension	American Indian or Alaska Native Asian Black or African American Native Hawaiian or Other Pacific Islander White
url		1..1	uri	"ombCategory"
valueCoding		1..1	Coding	Value of extension
Binding: OMB Race Categories (required)				
extension:detailed		0..*	Extension	Extended race codes
url		1..1	uri	"detailed"
valueCoding		1..1	Coding	Value of extension
Binding: Detailed Race (required)				
extension:text	S	1..1	Extension	Race Text
url		1..1	uri	"text"
valueString		1..1	string	Value of extension
url		1..1	uri	"http://hl7.org/fhir/us/core/StructureDefinition/us-core-race"
value[x]		0..0		

[↗ Documentation for this format](#)

More Examples

Empowering **beyond**



Example 10 of 14

- In Cerner's Millennium R4 server, does Patient Nancy Smart (id: 12724066) have a normal blood pressure?
 - *Hint: The Observation resource contains vital signs like BP*
 - *Hint: SNOMED 75367002 can be used to search for BP*

Answer 10 of 14

- In Cerner's Millennium R4 server, does Patient Nancy Smart (id: 12724066) have a normal blood pressure?
 - *Hint: The Observation resource contains vital signs like BP*
 - *Hint: SNOMED 75367002 can be used to search for BP*
 - **Yes**

Example 11 of 14

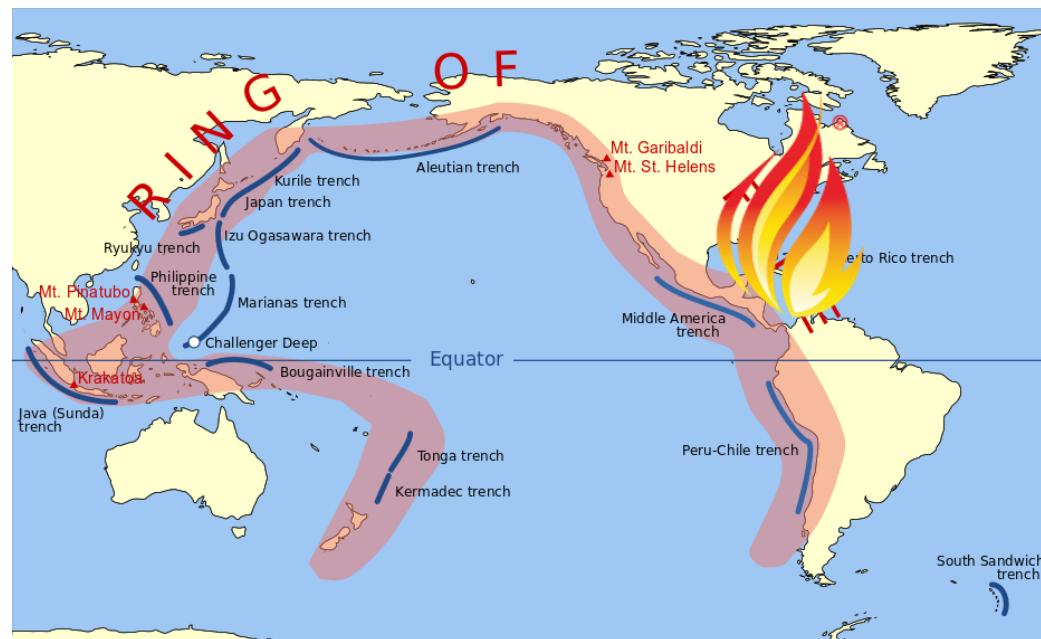
- In Cerner's Millennium R4 server, is Patient Hailey Smart (id: 12724068) currently taking insulin?
 - *Hint: items like insulin are available in the MedicationRequest resource*

Answer 11 of 14

- In Cerner's Millennium R4 server, is Patient Hailey Smart (id: 12724068) currently taking insulin?
 - *Hint: items like insulin are available in the MedicationRequest resource*
 - Yes

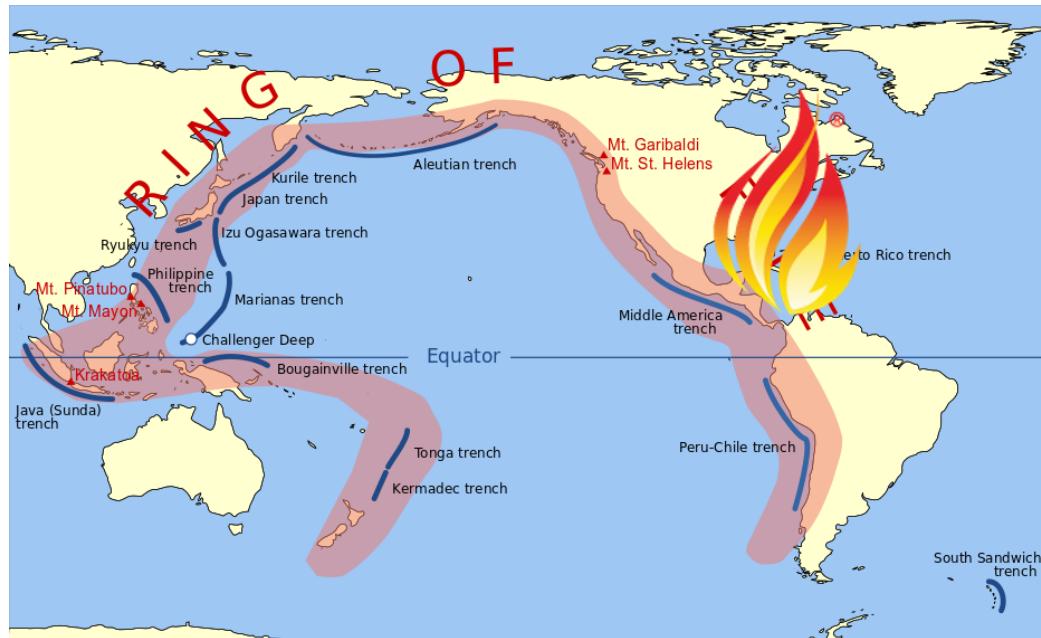
Example 12 of 14

- In Cerner's Millennium R4 server, which patient has an allergy to shellfish: Hailey Smart (id: 12724068) or Fredrick Smart (id: 12724070)?



Answer 12 of 14

- In Cerner's Millennium R4 server, which patient has an allergy to shellfish: Hailey Smart (id: 12724068) or Fredrick Smart (id: 12724070)?
 - **Fredrick Smart**



Example 13 of 14

- In Cerner's Millennium R4 server, has patient Timmy Smart (id: 12724069) had any Procedures?

Answer 13 of 14

- In Cerner's Millennium R4 server, has patient Timmy Smart (id: 12724069) had any Procedures?
 - No

Example 14 of 14

- In Cerner's Millennium R4 server, what happens when querying for Appointments of patient Sandy Smart (id: 12742399)? Can you guess why?

Answer 14 of 14

- In Cerner's Millennium R4 server, what happens when querying for Appointments of patient Sandy Smart (id: 12742399)? Can you guess why?
 - An **OperationOutcome** is returned indicating that the date parameter must be set
 - In a production environment, scheduling data is very heavyweight, so Cerner enforces extra rules to limit input space

[https://fhir-open.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/Appointment?
patient=12742399&_format=json](https://fhir-open.cerner.com/r4/ec2458f2-1e24-41c8-b71b-0e701af7583d/Appointment?patient=12742399&_format=json)
<http://fhir.cerner.com/millennium/r4/scheduling/appointment/#parameters>

Thanks for listening!

Go forth and fight fire with FHIR