

FHIR REST API

Nikolai Schwertner, Rispen Consulting



HL7 FHIR DevDays 2021, Virtual Edition, June 7–10, 2021 | @HL7 | @FirelyTeam | #fhirdevdays | www.devdays.com

ORGANIZED BY



PARTNER



Who am I?

- Nikolai Schwertner
- Principal, Rispen Consulting



Learning Objectives

- Understanding of the FHIR RESTful API
- Learn to create, read, update, and delete resources
- Gain familiarity with
 - bundles
 - transactions
 - search
 - validation
 - versioning

Overview of FHIR RESTful API

- Data model: FHIR resources (JSON/XML/Turtle)
- Main mechanism for interacting with FHIR servers
 - REpresenatational State Transfer web services
 - HTTP requests (GET, POST, UPDATE, etc)
 - Stateless session

Open endpoints for testing purposes

<http://test.fhir.org/r4>



<https://server.fire.ly/r4>

<http://hapi.fhir.org/baseR4>

<https://api.logicahealth.org/devdays21/open>

Cheat Sheet

<https://fire.ly/resources>

Resource	Domain Resource	Meta	Terminology Systems	MIME Types	Search																																																								
<p>Name Card.</p> <ul style="list-style-type: none"> Resource id 0..1 meta 0..1 implicitRules 0..1 language 0..1 	<p>Name Card.</p> <ul style="list-style-type: none"> DomainResource text 0..1 contained 0..* extension 0..* modifierExtension 0..* 	<p>Name Card.</p> <ul style="list-style-type: none"> Meta versionId 0..1 lastUpdated 0..1 source 0..1 profile 0..* security 0..* tag 0..* 	<p>SNOMED CT http://snomed.info/sct</p> <p>LOINC http://loinc.org</p> <p>UCUM http://unitsofmeasure.org</p> <p>Version 2 table code http://terminology.hl7.org/CodeSystem/v2-[X]</p> <p>Version 3 code system http://terminology.hl7.org/CodeSystem/v3-[X]</p>	<p>JSON application/fhir+json</p> <p>XML application/fhir+xml</p> <p>RDF application/fhir+turtle</p>	<p>Parameter Types</p> <p>Base search URL <code>base-url / resource ? parameter & parameter & ...</code> https://vonk.fire.ly/Patient?name=John</p> <p>number <code>field (modifier)=comparator number</code> length=27</p> <p>date <code>field (modifier) = comparator yyyy-mm-ddThh:mm:ss[Z](+-)hh:mm</code> birthdate=1964-12-10</p> <p>string <code>field (modifier) = text</code> name=John name:exact=John-William</p> <p>token <code>field = system code</code> gender=female gender=http://hl7.org/fhir/v3/AdministrativeGender female gender= female</p> <p>Reference <code>field (modifier) = id</code> subject:Patient=23</p> <p>Quantity <code>field = (comparator) number system code</code> value=5.4 http://unitsofmeasure.org mg value=1t5.4 http://unitsofmeasure.org mg</p> <p>Composite <code>field = value , value</code> <code>field = state\$value,state\$value</code> state-on-date=new\$2013-05-04,active\$2013-05-05</p> <p>uri <code>field (modifier) = uri</code> uri:below=http://acme.org/fhir/</p> <p>Parameters for all resources</p> <table border="0" style="width: 100%;"> <tr><td><code>_id</code></td><td><code>_id=23</code></td></tr> <tr><td><code>_lastUpdated</code></td><td><code>_lastUpdated=gt2010-10-01</code></td></tr> <tr><td><code>_tag</code></td><td><code>_tag=http://acme.org/codes needs-review</code></td></tr> <tr><td><code>_profile</code></td><td><code>_profile=http://hl7.org/fhir/StructureDefinition/lipid</code></td></tr> <tr><td><code>_security</code></td><td><code>_security = http://hl7.org/fhir/v3/ActCode CEL</code></td></tr> <tr><td><code>_text</code></td><td><code>_text=(bone OR liver) and metastases</code></td></tr> <tr><td><code>_content</code></td><td><code>_content=(bone OR liver) and metastases</code></td></tr> <tr><td><code>_list</code></td><td><code>_list=42</code></td></tr> <tr><td><code>_has</code></td><td><code>_has:Observation:patient:code=1234-5</code></td></tr> <tr><td><code>_type</code></td><td><code>_type=Observation,Condition</code></td></tr> <tr><td><code>_query</code></td><td><code>_query=name&parameters</code></td></tr> </table> <p>Search result parameters</p> <table border="0" style="width: 100%;"> <tr><td><code>_include</code></td><td><code>_include=MedicationPrescription:patient</code></td></tr> <tr><td><code>_revinclude</code></td><td><code>_revinclude=Provenance:target</code></td></tr> <tr><td><code>_count</code></td><td><code>_count=50</code></td></tr> <tr><td><code>_sort</code></td><td><code>_sort=status,-date,category</code></td></tr> <tr><td><code>_summary</code></td><td><code>_summary=true text data count false</code></td></tr> <tr><td><code>_elements</code></td><td><code>_elements=identifier,active,link</code></td></tr> <tr><td><code>_contained</code></td><td><code>_contained = true false both</code></td></tr> <tr><td><code>_containedType</code></td><td><code>_containedType = container contained</code></td></tr> </table> <p>Chained parameters</p> <p><code>GET [base-url]/DiagnosticReport?subject.name=peter</code></p>	<code>_id</code>	<code>_id=23</code>	<code>_lastUpdated</code>	<code>_lastUpdated=gt2010-10-01</code>	<code>_tag</code>	<code>_tag=http://acme.org/codes needs-review</code>	<code>_profile</code>	<code>_profile=http://hl7.org/fhir/StructureDefinition/lipid</code>	<code>_security</code>	<code>_security = http://hl7.org/fhir/v3/ActCode CEL</code>	<code>_text</code>	<code>_text=(bone OR liver) and metastases</code>	<code>_content</code>	<code>_content=(bone OR liver) and metastases</code>	<code>_list</code>	<code>_list=42</code>	<code>_has</code>	<code>_has:Observation:patient:code=1234-5</code>	<code>_type</code>	<code>_type=Observation,Condition</code>	<code>_query</code>	<code>_query=name&parameters</code>	<code>_include</code>	<code>_include=MedicationPrescription:patient</code>	<code>_revinclude</code>	<code>_revinclude=Provenance:target</code>	<code>_count</code>	<code>_count=50</code>	<code>_sort</code>	<code>_sort=status,-date,category</code>	<code>_summary</code>	<code>_summary=true text data count false</code>	<code>_elements</code>	<code>_elements=identifier,active,link</code>	<code>_contained</code>	<code>_contained = true false both</code>	<code>_containedType</code>	<code>_containedType = container contained</code>																		
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Constructing a FHIR API call

- Request pattern
 - Method: GET, POST, PUT, DELETE, etc
 - URL: `{base}/{resourceType} [{/id}] [{/operation}] [?parameter=value&...]`
 - Headers
 - Request body
- Example
 - GET `https://server.fire.ly/r4/Observation?patient=123`
- Shorthand
 - GET `/Observation?patient=123`

Capabilities statement

GET /metadata

- Detailed statement of the supported API elements
- Key uses:
 - Security endpoints discovery
 - Graceful degradation

Basic resource interactions

Create: **POST /Patient** (payload: resource)

- resource ID assigned by server and returned in *Location* header

Read: **GET /Patient/123**

- most recent resource version returned

Update: **PUT /Patient/123** (payload: resource)

- replace resource completely (if exists) or create resource (optional)

Delete: **DELETE /Patient/123**

- non-destructive (with versioning)

History: **GET /Patient/123/_history**

Bundle

- Collection of resources or requests
- Types
 - history (result of history interactions)
 - searchset (response to search operations)
 - transaction (batch of ordered requests to be processed atomically)
 - transaction-response
 - batch (ordered requests to be processed non-atomically)
 - batch-response

Transactions

POST / (payload: Bundle)

- server executes requests in order
- temporary references between bundled resources possible

Validation

POST /Patient/\$validate (payload: resource)

- explicit validation against FHIR core profiles
- resource is not created on server

GET /Observation/7/\$validate?profile=<http://hl7.org/fhir/StructureDefinition/hearttrate>

- validation of existing resource against specific profile

Search

- Pattern matching based on search parameters*
 - core parameters (all resource types)
_id, _type, etc.
 - resource specific (type dependent)
name, category, etc

- Variants

GET /Observation?patient=123&category=vital-signs

POST /Observation/_search (payload: “patient=123&category=vital-signs”)

* parameters are typed (string, date, token, etc)

Additional search features

- Parameter modifiers (:exact, :in, etc)
- Prefixes (lt, gt, le, ge, ne, etc)
- Referenced resource inclusion (_include)
- Chaining

What did you learn?

- Basic FHIR RESTful API (CRUD)
- Glimpse of resource versioning
- Reviewed transaction bundles, validation, search
- Exposure to test servers
- Check out cheat sheet!

Contact

- You can reach me by:
 - Email: nikolai@rispen.us
 - PM at FHIR Community Chat (<https://chat.fhir.org>)

Q&A

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