IndyFHIR

Capability Statement
ClinFHIR
GraphQL
(quick overview)

Capability Statement

- Provides a declaration of what an implementation supports:
  - **rest (RestfulAPI)**
    - mode (client|server)
    - resource
      - type (Resource Type code)
      - interaction (code=read,update, etc.)
      - searchInclude
      - searchRevInclude
      - searchParam (name, type, definition)
    - interaction (operations supported such as: transaction, batch, search-system, history-system)
    - operation
      - Non-resourceType specific / custom queries
- **messaging (Messages Supported)**
  - endpoint
  - event or supportedMessage description
  - Repeated
- **document (Documents supported)**
  - mode (Producer | Consumer)
  - documentation (Description of support
  - Profile (StructureDefinition)
  - Repeated

Kinds of Capability Statement

- Implementation
  - Capabilities of a specific installation of a service
  - Specific URLs such as for oauth2
- Capability
  - Capabilities independent of an installation
  - Won’t specify actual URLs
  - Service side of the contract
- Requirements
  - Specification of what a client application requires
  - Could be used as part of an implementation guide or proposal for a service that supports a desired workflow

Use Cases

- API - Server
  - Document Resources and Services you support
  - Document Search Parameters
  - Document CRUD Operations
  - Document Oauth2 and other security parameters
- API - Client
  - Examine
    - Security Mechanisms
    - Supported Resources
    - Supported Operations
    - Supported Search Params

Messaging - Service

- Document Endpoints / Protocols
- Specify Messages or Events
- Specify Sender vs. Receiver

Messaging - Client

- Discover Supported Messages / Events

Document

- Document What FHIR Documents you can Consume or Produce

Constraints

cpb-1: A Capability Statement SHALL have **at least one of REST**, **messaging** or **document element**.
(expression : rest.exists() or messaging.exists() or document.exists())

cpb-12: On CapabilityStatement.rest.resource: **Search parameter names must be unique in the context of a resource**.
(expression on CapabilityStatement.rest.resource: searchParam.select(name).isDistinct())

cpb-14: Capability Statements of **kind 'requirements'** do not have **software** or **implementation** elements. (expression : (software.empty() and implementation.empty()) or kind != 'requirements')

cpb-15: Capability Statements of **kind 'instance'** do not have **implementation elements**.
(expression : implementation.empty() or kind != 'capability')

cpb-16: On CapabilityStatement.**messaging**: A Capability Statement **messaging element SHALL have either supportedMessage or event element, but not both**.
(expression on CapabilityStatement.messaging: supportedMessage.empty() != event.empty())

cpb-2: A Capability Statement **SHALL have at least one of description, software, or implementation element**.
(expression : (description.count() + software.count() + implementation.count()) > 0)

cpb-3: **Messaging end-point is required (and is only permitted) when a statement is for an implementation.**
(expression : messaging.endpoint.empty() or kind = 'instance')

cpb-7: The **set of documents must be unique by the combination of profile and mode**.
(expression : document.select(profile.reference&mode).isDistinct())

cpb-8: There **can only be one REST declaration per mode**.
(expression : rest.select(mode).isDistinct())

cpb-9: On CapabilityStatement.**rest**: A **given resource can only be described once per RESTful mode**.
(expression on CapabilityStatement.rest: resource.select(type).isDistinct())

Examples

- Hapi FHIR Generated from Test Server STU3
  - http://hapi.fhir.org/baseDstu3/metadata
- Hapi FHIR Generated from Test Server DSTU2 (Conformance)
  - http://hapi.fhir.org/baseDstu2/metadata
- Hapi FHIR Generated from Test Server STU4
  - http://hapi.fhir.org/baseR4/metadata
- Cerner Sandbox Conformance (DSTU2)
  - https://fhir.cerner.com/millennium/dstu2/conformance/
- Epic
  - https://open-ic.epic.com/FHIR/api/FHIR/DSTU2/metadata

Consumption

Hapi FHIR Client (Java):

```
CapabilityStatement capabilityStatement =
            client.capabilities().ofType(CapabilityStatement.class).execute();
// Get type of first resource
capabilityStatement.getRestFirstRep().getResource().get(0).getType()

// Get first interaction code for first resource
capabilityStatement.getRestFirstRep().getResource().get(0).getInteraction().get(0).getCode()

// Get first search param for first resource
capabilityStatement.getRestFirstRep().getResource().get(0).getSearchParam().get(0)
```

Javascript:

```
function capabilitySupported(caps, res, func) {
  var found = false;
  caps.rest[0].resource.some( function(curRes) {
    if ( curRes.type == res ) {
      curRes.interaction.some(function( inter ) {
        if ( inter.code == func ) {
          found=true;
          return true;
        }
      });
      return true;
    }
  });
  return found;
}
```

Client Side Example / Demo

Cerner

Supports MedicationAdministration (but still errors out)

Epic

Does not support MedicationAdministration

Misc Links

Cerner - Documentation
https://fhir.cerner.com/millennium/dstu2/

Cerner - Sandbox Apps
https://code.cerner.com/developer/smart-on-fhir/apps

Epic - Documentation
https://open.epic.com/

Epic - Sandbox Launchpad
https://open.epic.com/Launchpad/OAuth2Sso

Shrimp Snomed Browser
http://ontoserver.csiro.au/shrimp

clinfhir.com - Possibly other presentation?

- FHIR related Builders
- Query Interface
- Patient Viewer
- GraphQL Query Builder
- Many more tools

Appears to be broken today so no active demo

I'll message the group when it is back up

Facts:

Developed by David Hay

Links:

- Project: https://github.com/davidhay25/clinFHIR
- Site: http://clinfhir.com/
- Wiki: https://clinfhir.atlassian.net/wiki/spaces/CLIN/pages/491526/Introduction
- Training Links on Clinfhir.com site - lower right

Clinfhir.com Training Videos

Scenario Builder
https://vimeo.com/199927777

Adding Structured Builder
https://vimeo.com/203252984

Logical Model
https://vimeo.com/203277373

FHIR Logical Model and Scenario Builder
https://vimeo.com/200105501

Rest Query
https://vimeo.com/203259751

GraphQL - Possible Future Presentation?

- Facebook API for Graph based queries https://graphql.org/
- Sits on top of API / DAO Layers
- Define Schema:
  - Queries
  - Entities and Relationships (1st class)
  - Request results in detail - get back only what you want.
  - Server-Side Destructuring effectively
- Provides Slice through nested related FHIR Resources
- Possible to query reduced denormalized view based on complex criteria to simplify view model building
- Better performance from Server-side caching and destructuring optimizations

- Implementation Options
- Apollo:
  - Client side Java Script API
  - GraphQL Server
  - Engine that sits in front of a GraphQL Server but provides performance metrics, caching, and other benefits
- GraphQL-Java https://github.com/graphql-java
- David Hay blog on GraphQL for FHIR

Questions?