HL7® FHIR® DevDays 2019

HL7 FHIR

GraphQL / GraphDefinition

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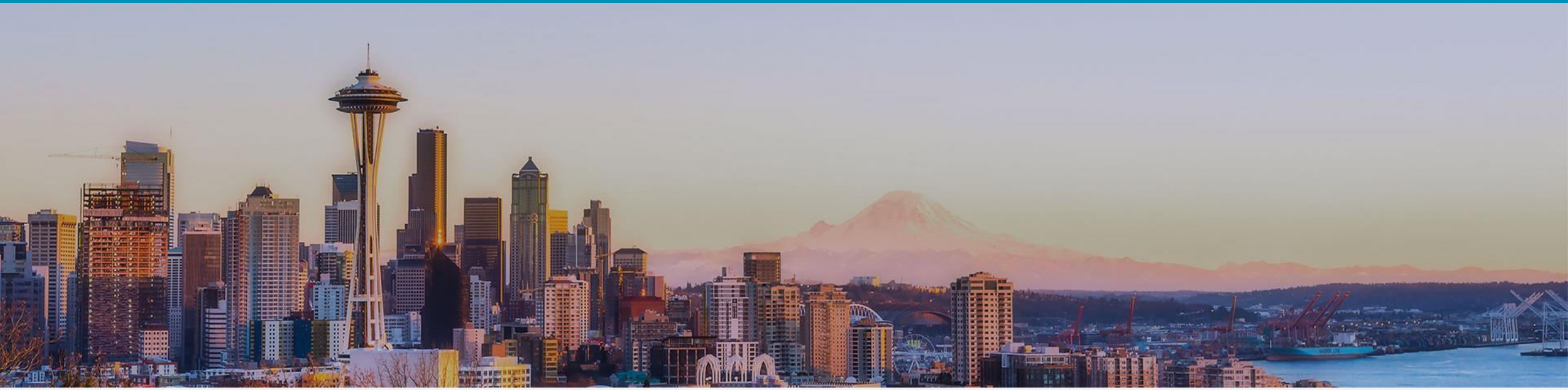

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GraphQL and GraphDefinition

- Both are concerned with scanning across resources
- GraphQL
  - Select a subset of information across a graph of resources
  - Return content is not actually resources
- GraphDefinition
  - Specify a set of rules about relationships between resources
  - May be used to retrieve a set of resources

Problem Statement

- Well described modular schema + CRUD Operations
- Client applications built against the API
- User interface applications require a set of resources
- To build a view e.g. List of encounters
  - For each encounter, fetch the patient to get their name
  - For each encounter, fetch the consulting physician to get their name
  - For each encounter, fetch the ward location to get it’s name
  - etc
- Similar for almost every operation

Getting a set of resources (1)

- Fetch the encounters
- Iterate the encounters fetching the related resources
- Cache up local copies of fetched resources

- Price: bandwidth, latency * N, cache management

Getting a set of resources (2)

- Fetch the encounters
- Use _include to fetch the related resources

- Price: bandwidth (up), latency * 1 (down)

Getting a set of resources: ideal

- Just fetch what you want to display:
- Fetch the elements from encounter that you want to display
- Get the server to replace the links to the other resources with your choice of display for them

- No work on the client…

- Price: bandwidth (down), latency * 1

GraphQL

- A language to tell the server what you want
- Query against the graph of resources it has
- Get just the structure you want returned

Simple GraphQL example

```
[base]/Patient/example/$graphql?query={name{text,given,family}}
```

```
{
  name { text given family }
}
```


```
{
  "data" : {
    "name":[{
      "given":["Peter","James"],
      "family":"Chalmers"
    },{
      "given":["Jim"]
    },{
      "given":["Peter","James"],
      "family":"Windsor"
    }]
  }}
```

Polymorphic Fields

```
{
  valueQuantity { value unit }
}
```

```
{
  "data" : {
    "valueQuantity":{
      "value":185,
      "unit":"lbs"
    }
  }
}
```

Lists

- fhirpath - a FHIRPath statement selecting which of the subnodes is to be included
- [field] - the name of a sub-property with a specified value that must be matched for the field to be included
- _offset - specify the offset to start at for a repeating element (see below)
- _count - specify how many to elements to return from a repeating list

Polymorphic Fields

```
{
 name(use: official)
  { text given family
    myext: extension(url: "[url]")
     { value : valueString }
  }
}
```

```
{
  "data" : {
    "name":[{
      "given":["Peter","James"],
      "family":"Chalmers"
    }],
    "myext" : {
       "value" : "some value"
    }
  }
}
```

Lists

```
{
  name(fhirpath: "family.exists()")
    { text given family }
 }
```

```
{
  "data" :
{
    "name":[{
      "given":["Peter","James"],
      "family":"Chalmers"
    },{
      "given":["Peter","James"],
      "family":"Windsor"
    }]
  }}
```

References

- { resource } – walk into the target of a resource
  - Optional – return an error if not resolvable
  - Type selector – specify type of target (always required, may be parameter)

- Can also search on reverse references, and add other resources that refer to the focus resource

Lists

```
{
  subject {
   resource {
      ...on Patient {
          birthDate
      }
    }
  }
  code {coding {system code} }
 }
```

```
{
  "data" : {
    "subject":{
      "resource":{
        "birthDate":"1974-12-25"
      }
    },
    "code":{
      "coding":[{
        "system":"http://loinc.org",
        "code":"29463-7"
      }
...
```

Managing a list of Resources

- On the server root, or an a particular resource
- By search parameter
- 2 forms:
  - List: Simple
  - Connection: Complex - With cursors

Simple GraphQL example

```
[base]/$graphql?query={Patient(id:example){id,name{given,family}}}
```

```
{
   Patient(id: example)
    { id, active }
}
```

```
{
   "data" : {
     "Patient" {
       "id" : "example",
       "active" : "true",
     }
   }
}
```

Search / List

```
{
   ConditionList
     (clinical_status: relapse,
      patient: example)
    { id, clinicalStatus }
 }
```

```
{
   "data" : {
     "ConditionList" : [{
       "id" : "100",
       "clinicalStatus" : "relapse"
     },{
       "id" : "100",
       "clinicalStatus" : "relapse"
     }]
   }
 }
```

Search / List

```
{
   ConditionConnection
      (clinical_status: active,
       patient: example) {
     count offset pagesize
     edges {
       mode, score, resource
        { id, active }
     }
     first previous next last
   }
 }
```

```
{
 "data" : {
   "ConditionConnection" : {
     "count": 50,
     "offset" : 0,
     "pageSize" : 25,
     "next" : "45f9ada8-db37-4498-ba7d…:3"
     "edges" : [{
        "resource" : {
          "id" : "100",
          "clinicalStatus" : "relapse",
        }
    }…
```

Flattening

- Drop spacer nodes
- Break Lists up

Flattening

```
{
  identifier @flatten
   { system value }
  active
  name @flatten
   { text given family }
}
```

```
{
   "data" : {
    "system":["[urn]"],
    "value":["12345"],
    "active":true,
    "given":["Peter","James"],
    "family":["Chalmers","Windsor"]
  }
}
```

GraphQL

- Powerful tool for client to reshape data to suit their own purposes
- May be particularly relevant where data is passed to analysis tools
- Supported by
  - test.fhir.org
  - HAPI
  - Assymetrik
  - Others ?

GraphDefinition

- A definition of a set of relationships between resources
- A fixed starting point (known type)
- Defines a nested series of links
  - What they are
  - Cardinality rules
  - Direction: Forwards / backwards
  - Target Types / Profiles
  - Rules about compartment consistency

GraphDefinition Example

```
Patient(http://hl7.org/fhir/us/core/Patient) {
  managingOrganization cardinality 0..1 'managing org' :
    Organization(http://hl7.org/fhir/us/core/Organization) {
      endpoint : Endpoint
    };
    Group {
      item : Patient
    },
  generalPractitioner : Organization,
  search Observation?patient={ref} cardinality 0..10 'Observations for the patient' {
    performer : Practitioner,
    related.where(type='has-member').target : Observation require matching Patient,
    related.where(type='derived-from').target : Observation where identical Patient
```

Uses of GraphDefinition

- Summarize a set of profiles on resources
  - e.g. documentation in an Implementation Guide
- Define a graph of resources to return in a query
  - e.g. GET [base]/MedicationDispense/example/$graph?graph=med-package
- Define a graph of resources to include in a document
  - e.g. GET [base]/Composition/example/$document?graph=example
- Document rules about the relationship between a set of resources e.g. must all resources concern the same patient?
  - E.g. $validate?graph=med-package

GraphDefinition

- Is over the horizon for most users
- Will become more important as people get further into their development processes

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  - May be used to retrieve a set of resources
  - But has other uses too