DevDays HL7® FHIR®

Terminology Services: Taking a Closer Look at Applying $closure

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My Background

- Family Physician (GP)
- Electrical/Computer Engineer
- Healthcare Informatics Consultant
- Co-lead HL7 IPS Project
- Co-chair HL7 Vocabulary and Orders & Observations Work Groups
- Co-lead SNOMED on FHIR project
  - Joint project of HL7 International and SNOMED International

Goals

- Stimulate interest and awareness in the $closure operation
- Not claiming special expertise

Closure – why do we need it?

- Find any observations for male patients over the age of 50 who attended a particular clinic within a particular 2 week period, with a diagnosis of gout, and who had an elevated serum creatinine
- Some of this is terminology based, some isn't
- How do you make this work?

Closure – the problem and the FHIR approach

- Both "diagnosis of gout" and "serum creatinine" involve value set and/or subsumption queries (against SNOMED CT and LOINC respectively)
- Generate a subsumption closure table on the fly, as new codes are seen
  - Terminology server does terminological reasoning
  - Client does closure table maintenance

$closure

- For every new code encountered by the client in a context:
- Ask the server what relationships exist with codes already in that context
- Put them all in a ‘closure’ table
  - Concept table (key : system : code : display)
  - Closure table (keySource, keyDest)
- Can include joins on this table as part of other queries

Alternatives to $closure

- Build a full transitive closure table and rebuild whenever code system changes
- Do hierarchical queries at runtime
- Develop local caching schemes
- Others?

Personal Scenario

- Developed terminology architecture for startup working in infectious disease management
- Rule-based inference engine
- Rules written at a high level (e.g. “pneumonia”, “gram negative rods”)
- Instance data at a lower level (e.g. “pneumococcal pneumonia”, “Klebsiella oxytoca”)
- How to connect them? – use the terminology hierarchy

Personal Scenario

- But doing that is expensive
- Full transitive closure tables are big
- Decided to build "just in time" transitive closure
  - Very similar to the $closure operation!

Available FHIR Servers Supporting $closure

- Grahame's server (or at least it will be soon again☺)
- Ontoserver
- Terminz (New Zealand)
- Phast STS?
- Possibly a few others

Exploring Further

- Look at the documentation in the FHIR spec
- Let's Build hands on session later this morning – work with some (simple) code

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