



ASSISTANCE
PUBLIQUE



HÔPITAUX
DE PARIS

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i2b2 implemented over SMART-on-FHIR

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- ▶ i2b2 is a key leader with 200 implementations over the world
- ▶ Analytic tools extend i2b2 (transmart, i2b2-transmart) to handle omics
- ▶ Federation tools federate multiple i2b2 instances (Shrine, Insite, TrinetX)

→ How to get panoramic view of patients and hospitals?

Problem

i2b2 room of improvement



Panoramic View of Patients:

Data Variety

RDBMs based i2b2 star schema cannot handle every types
Dedicated technology emmerges faster than i2b2 can exploit them

Panoramic View of Hospitals:

Data Federation

ETL processes need a dedicated engineer team
Terminology Mapping tools in their infancy

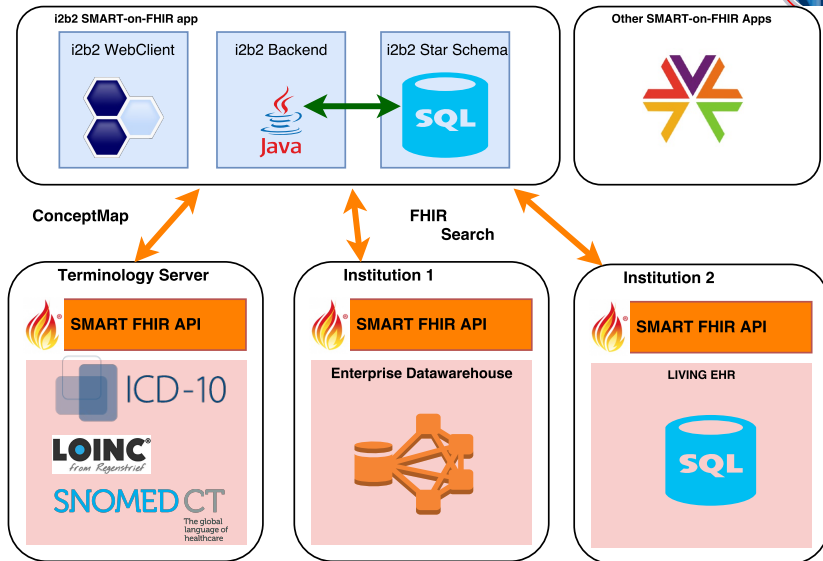


- ▶ FHIR an Agile and RESTful Approach to Healthcare Information Exchange
- ▶ FHIR specifies both a *Search* & a *Terminology Mapping* API
- ▶ EHR vendors are more & more FHIR conformant
- ▶ SMART-on-FHIR specifies how Apps should consume data (50 apps)

→ Let's implement i2b2 over SMART-on-FHIR !

Methods

i2b2-FHIR



Change made to CRC cell

- ▶ New pm_cell_data entry to point to URL of FHIR
- ▶ By using the project_path can configure to use different FHIR API for different projects
- ▶ Easy to change without restarting i2b2
- ▶ Limited to one FHIR API per project

Change made to PM cell

- ▶ New class written that extends Panel Items
- ▶ Any ontology item that begins with FHIR is sent to the new class
- ▶ The Item Code, constraint value and date constraints are sent to the FHIR API
- ▶ ...

Results

Screenshot



Query Tool

Query Name: Glucose-Circula@11:28:27

Temporal Constraint: Treat all groups independently

Group 1			Group 2			Group 3		
Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude
Treat Independently			Treat Independently			Treat Independently		
Glucose (Group:GLU) < 100 mg/dl [12/01/1979 to 9/27/2015]			Circulatory system					
GLUCOSE (LOINC:6777-7)			Acute Rheumatic fever					
GLUCOSE @11AM, SERUM (LOINC:16166-1)			Arterial vascular disease					
GLUCOSE @4PM			Cerebrovascular disease					

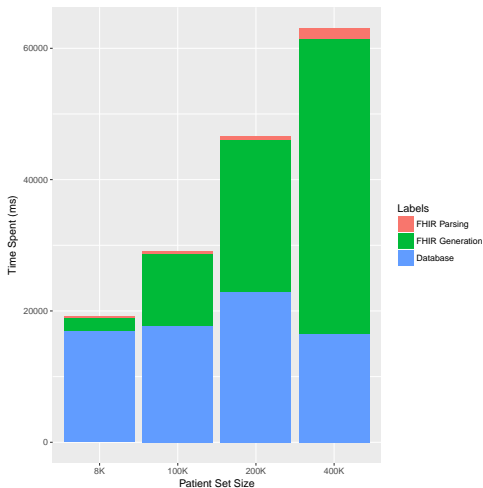
Run Query Clear 2 Groups New Group

Show Query Status Graph Results Query Report

Finished Query: "Glucose-Circula@11:28:27" [2.8 secs]
Compute Time: 0.9 secs

Number of patients for "Glucose-Circula@11:28:27"
patient_count: 8±3

→ Mixed Query is Working (star schema/FHIR endpoint)



5B physiological table

- ▶ FHIR generation step bottleneck
 - ▶ under the minute
 - ▶ linear performances
- Bridging the gap (i2b2 / specialized tech)

Work done:

- ▶ Ontology Model
- ▶ Querying FHIR API
- ▶ Terminology Mapping
- ▶ Mixed star schema & FHIR API & No-SQL DBs

Roadmap:

- ▶ Oauth2 securisation
- ▶ Multiple FHIR endpoint
- ▶ Performance optimisations (parallel FHIR API calls)
- ▶ Release as a SMART-on-FHIR app



i2b2-FHIR opens new area:

- ▶ Data federation
- ▶ Data Volume handling

→ Work in progress to release in future i2b2 version

Thank you

Core i2b2 www.i2b2.org/software

FHIR API <https://github.com/parisni/i2b2-fhir-search>

FHIR i2b2 <https://github.com/mikemendis/i2b2-fhir-search>