



HL7[®] FHIR[®] DevDays

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FHIR Subscriptions

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<http://aka.ms/devdays-gino>

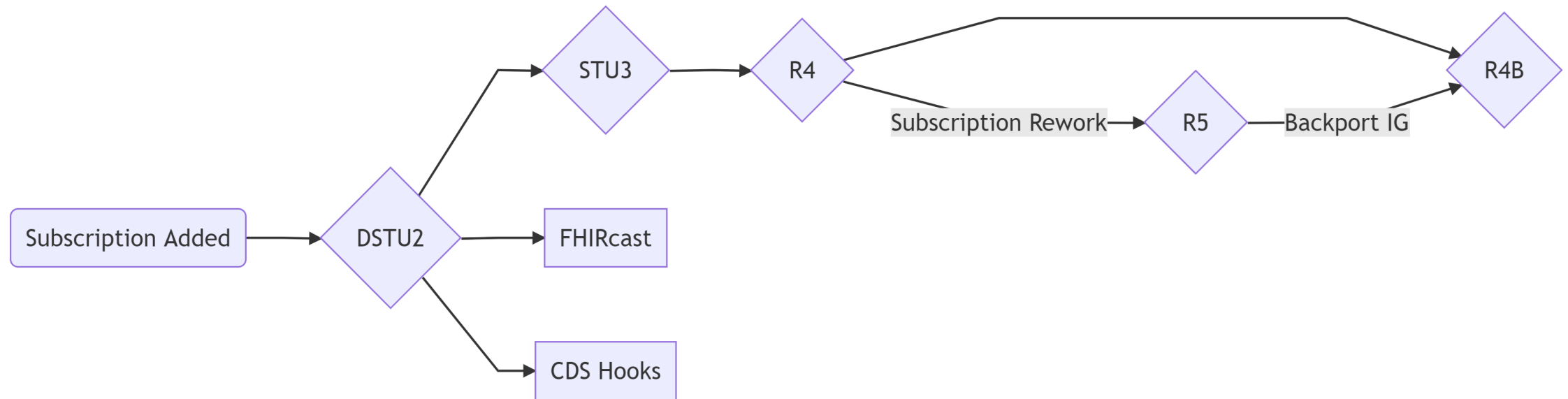
REST and the Polling Problem



"Tell me when data changes"

Problem Solved!

Should Be Easy, Right?



R2–R4 Result Sets



*Looked great
for clients*



*Issues with
scale*



*Hit or miss for
a use case*

R5 Redesign

- Make Subscriptions Topic Based
 - SubscriptionTopic resource
 - A conceptual event (e.g., admit)
 - Defines allowed filters
- Add Flexibility to Subscriptions
 - Filters by topic
 - Extensible channels
 - Payload options
- Update the Notification Format
 - New type of Bundle
 - SubscriptionStatus resource

R4(B) Backport IG

- All the functionality, half the wait!
- New resources in R4B
 - SubscriptionTopic
 - SubscriptionStatus
- Extensions for Subscription
 - Covers all functionality from R5
- Notification Format
 - 'history' Bundle



Topic

[SubscriptionTopic](#)

Define what causes a notification
Allowed filters



Subscription

[Subscription](#)

Notification configuration
Actual filters
Endpoint information



Notification

[Bundle](#), [SubscriptionStatus](#)

Payload contents

Parts of a Subscription

SubscriptionTopic What is it?

- Canonical (definitional) resource
 - FHIR Registry (after R4B release)
 - Define, Derive, Reference
- Describe what causes a notification
 - Human-readable text
 - Computable definitions (query, FHIRPath)
 - A resource state change
 - A FHIR interaction
- Defines **allowed** filters
 - Limits options for better scalability
 - Prevents arbitrary multi-level chaining

SubscriptionTopic Examples

- Patient Admission
 - Encounter resource
 - Specific status ('in-progress')
 - Filter on Patient Id
 - Filter on Patient Group membership
- New Explanation of Benefit
 - ExplanationOfBenefit resource
 - CREATE interaction
 - Filter on Patient Id / Group membership
 - Filter on Facility / Provider / Payee
 - Filter on Disposition

Patient Admission

resourceTrigger

resourceType

"Encounter"

description

"Beginning of a clinical encounter"

fhirPathCriteria

```
[ "%previous.status != 'in-progress' and  
  %current.status = 'in-progress'"]
```

queryCriteria

```
previous = "status:not=in-progress"  
current = "status =in-progress"  
requireBoth = true  
resultForCreate = 'test-passes'
```

Patient Admission

canFilterBy

documentation

"Matching based on the Patient (subject) of an Encounter or based on the Patient's Group membership (in)"

searchParamName

"patient"

searchModifier

["=",
"in"]

Subscription

What is it?

- Domain (regular) resource
 - Link a topic to a specific request
- Endpoint Information
 - Channel Type
 - URL / Address / etc.
- Format of notifications
 - MIME Type
 - Payload Type (amount of data)
- Defines **actual** filters



Method of
communication



Pre-defined
channels

REST-Hook
Websocket
Email
FHIR Messaging



Extensible!

Create your own!
Yes, even fax.

Subscription

Channel Types



Ping Only
'empty'

Least information
Requires queries



Include Identifiers
'id-only'

Some information
Requires *fetch*
May require queries



Include Resources
'full-resource'

All information
Use a secure channel!

Subscription

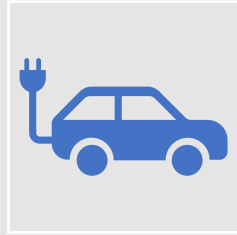
Payload Types

Comparing Payloads



Ping / empty

1. Notification has a subscription id
2. Client queries server
3. Client retrieves data



Id-only

1. Notification has a subscription id
 - 1.1. AND ids of relevant resources
2. Client retrieves data



Full Resource

1. Notification has a subscription id
 - 1.1. AND ids of relevant resources
 - 1.2. AND actual resources

Subscription Examples

- Patient Admission (consumer)
 - REST Hook
 - URL Endpoint
 - May be a relay (e.g., Push Notification)
 - Single patient filter
 - ID-only to limit PHI
 - JSON
- Medication Dispensed (practitioner)
 - Websocket (client will connect)
 - Filter on Location
 - Full-resource since this is internal
 - JSON

Patient Admission

consumer

topic

"http://example.org/subscriptiontopic/admission"

channelType

'rest-hook'

endpoint

"http://myserver.com/notifications/subscriptionXyz"

contentType

'application/fhir+json'

content

'id-only'

filterBy

resourceType = "Encounter"
searchParamName = "patient"
value = "patient/123"

Notification

What is it?

- Bundle
 - R5 type: 'subscription-notification'
 - R4 type: 'history'
- Status Information
 - SubscriptionStatus resource
 - MUST be at entry[0]
- Payload
 - By configuration

Want to Develop / Test / Play?

Reference Implementation



Info

Open source reference info, all project on GitHub
Detailed information available [here](#)



Server Proxy

C# CLI, intercepts calls and proxies to configured FHIR server
GitHub: [argonaut-server-proxy](#)
Azure: server.subscriptions.argo.run (/r4, /r5)



Client Host

C# CLI, manages endpoints and notification forwarding for UI
GitHub: [argonaut-subscription-client](#)
Azure: client.subscriptions.argo.run (only used by the UI)



Client UI

TypeScript / React, interface for testing subscriptions (can test your own!)
GitHub: [argonaut-subscription-client-ui](#)
Azure: <https://subscriptions.argo.run>



DevDays Examples

C# and JavaScript / Node
Minimum projects that show a complete REST workflow

One More Thing...

Current block of changes for both versions.

Calls every other Wednesday, everyone is welcome!

- HL7 Calendar, listed as FHIR-I Subscriptions
- Argonaut Project Calendar, listed as Subscriptions

There will be a track at the September Connectathon.

LAST CHANCE for changes in R4(B) / Backport IG.

Pretty close to last chance for R5.

Questions

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Links!

- This deck (and others)
 - <http://aka.ms/devdays-gino>
- R5 Subscriptions Overview Page
 - <http://build.fhir.org/subscriptions.html> (has links to all resources)
- R4 Backport IG (CI Build)
 - <http://build.fhir.org/ig/HL7/fhir-subscription-backport-ig/>
- Reference Implementation
 - <http://subscriptions.argo.run>
- 2021 Argonaut Subscriptions Project
 - <https://confluence.hl7.org/display/AP/Subscriptions+Home>



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THANK YOU!

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