

# Leveraging FHIR for IIS Bulk Data and Modernization

CDC-ONC Industry Days  
Public Health Data Modernization  
February 28, 2023

# Agenda

- Background:
  - IIS
  - FHIR
- FHIR and IIS – Bulk FHIR
- Rhode Island IIS Implementation
- Helios FHIR Accelerator for Public Health
- Leveraging FHIR Bulk Data for Modernization

# Background: Immunization Information Systems (IIS)

- ❑ Confidential, population-based systems
- ❑ Collect and consolidate immunization data in a given jurisdiction
- ❑ Provide actionable information for clinical and public health decision making. (Source: CDC)

# IIS Background (continued)

- ❑ Inbound data exchange:
  - HL7 version 2 Unsolicited Vaccination Update (VXU)
  - Flat file
  - Interactive web applications
- ❑ Outbound data exchange:
  - HL7 version 2 Query/Response (QBP/RSP)
  - Flat file (CDC Data Clearinghouse, HEDIS data, etc.)
  - Interactive web applications



# FHIR in a Nutshell

- ❑ Fast Healthcare Interoperability Resources (FHIR)
- ❑ Next generation HL7 standard
- ❑ Set of Resources and a modern RESTful API for accessing them
- ❑ FHIR Bulk Data – FHIR-based approach for exporting large amounts of data from a FHIR server
- ❑ SMART on FHIR – health app interface based on FHIR and other open standards

# FHIR Server Models

## □ **FHIR Façade**

- Data translation – translate FHIR REST calls to the underlying legacy database or service (no native FHIR storage)
- Intermediate FHIR server – synchronize native FHIR storage to underlying legacy database or service

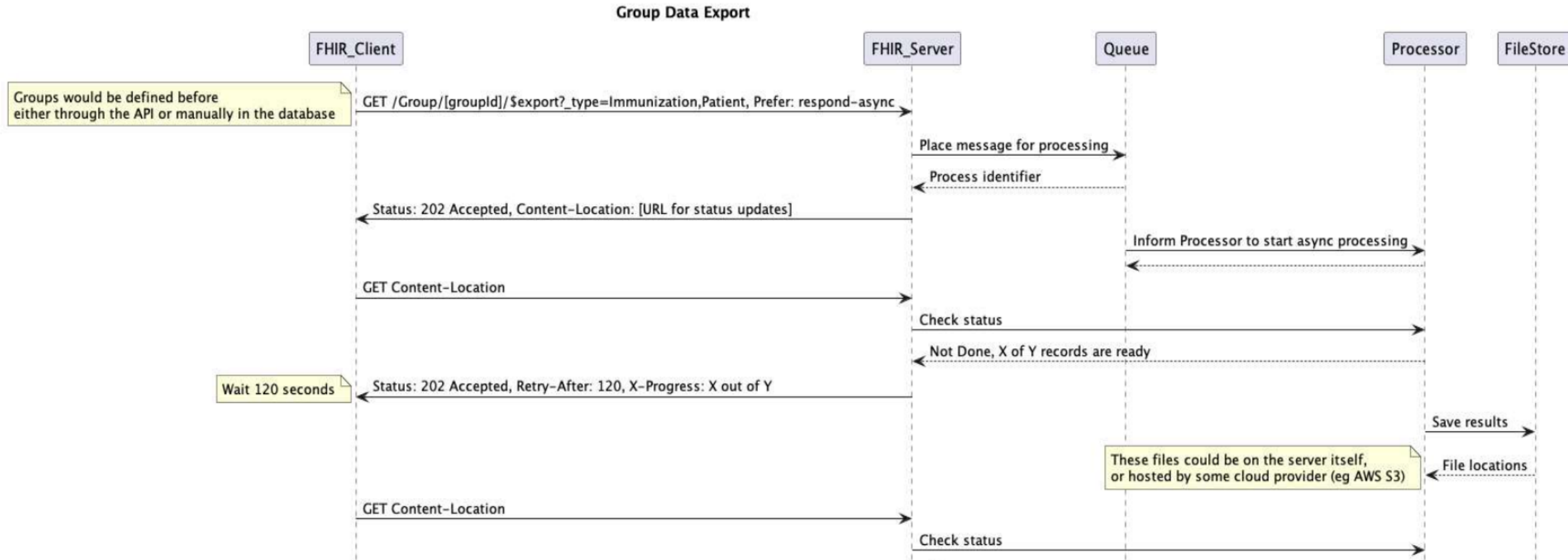
## □ **Native FHIR server**

- FHIR storage is the operational data store

# Why FHIR for IIS Data Access?

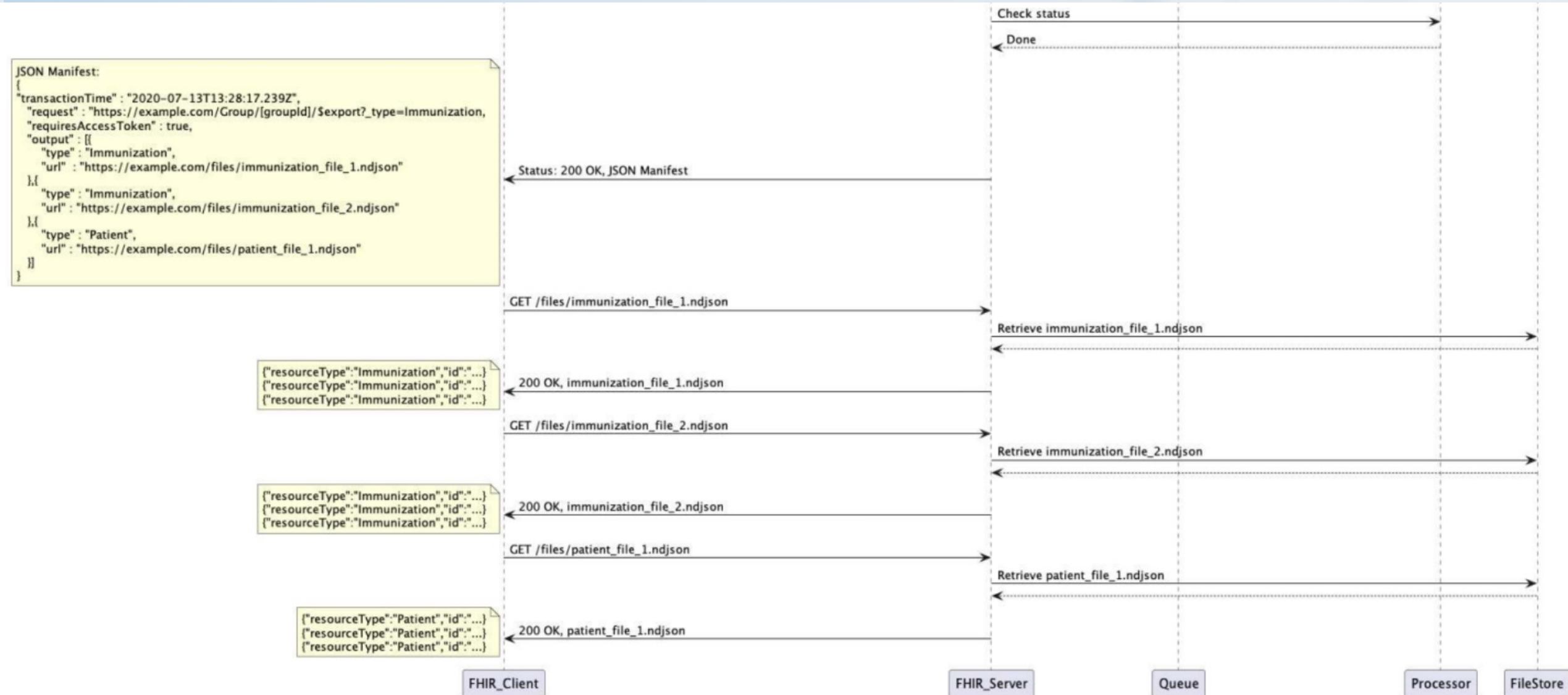
- ❑ Accessible to general purpose developers
- ❑ Modern APIs, software, tools, resources, and support
- ❑ FHIR Bulk Query:
  - Efficiently access up-to-date immunization data
  - Reduce redundant queries
  - Easy to parse bulk data format
  - Flexibility for different use cases: Hospitals, physicians, schools, payers, etc.

# Bulk FHIR Workflow for IIS





# Bulk FHIR Workflow for IIS (continued)



# Rhode Island IIS Implementation

- ❑ Rhode Island Child and Adult Immunization Registry (RICAIR)
- ❑ FHIR Façade Model (with translation layer) using open source HAPI FHIR server
- ❑ Bulk Query:
  - Predefined Groups, or search and define custom groups
  - Query Patient, Immunization, ImmunizationRecommendation, and ImmunizationEvaluation resources
  - Download up to 100k patients or more in a fraction of the time of HL7 v2 QBP/RSP
  - Server has flexibility in scheduling and allocating resources to query

# Helios FHIR Accelerator for Public Health

- ❑ Part of the **Immunization Integration Program (IIP)**  
Workgroup – collaborative to improve EHR/IIS interoperability
  - Convening Partners: CDC, AIRA, HIMSS, Drummond & SME Consultants
- ❑ **IIS Bulk Data Query - Make Data in Public Health Systems Accessible in Bulk**
  - Leverage bulk FHIR to develop a uniform process for querying IIS data
  - Develop Implementation Guidance & vision for bulk data exchange
  - Test & pilot solutions



# HL7 FHIR Connectathon 32

- ❑ HL7 Working Group Meeting - January 14-15, 2023
- ❑ American Immunization Registry Association (AIRA) & National Institutes of Standards and Technology, MITRE, Envision Technology Partners, HLN & Rhode Island Department of Health, STChealth, Epic, AWS, Intersystems
- ❑ Exchanged groups of up to 100,000 patients & immunizations



# Now that we have a FHIR server, what else can we do with it?

03 / 01 / 2021	ADMINISTERING PRO...	FK0101	DTaP,IPV,Hib,HepB (Vaxelis) ...	GlaxoSmithKline (for...	01 / 01 / 2024
03 / 01 / 2021	ADMINISTERING PRO...	FK0101	Pneumococcal conjugate PCV...	Merck & Co., Inc.	01 / 01 / 2024
05 / 01 / 2021	ADMINISTERING PRO...	FK0101	DTaP,IPV,Hib,HepB (Vaxelis) ...	GlaxoSmithKline (for...	01 / 01 / 2024
05 / 01 / 2021	ADMINISTERING PRO...	FK0101	Pneumococcal conjugate PCV...	Merck & Co., Inc.	10 / 10 / 2024
07 / 01 / 2021	ADMINISTERING PRO...	FK0101	DTaP,IPV,Hib,HepB (Vaxelis) ...	GlaxoSmithKline (for...	01 / 01 / 2024
07 / 01 / 2021	ADMINISTERING PRO...	FK0101	Pneumococcal conjugate PCV...	Merck & Co., Inc.	01 / 01 / 2024
01 / 01 / 2022	ADMINISTERING PRO...	FK0102	Measles, Mumps,Rubella, live ...	Merck & Co., Inc.	01 / 01 / 2024

## Information

Immunization record added for patient 11468369, MMR given on 1/1/2023  
Immunization record added for patient 11468369, MMR given on 1/1/2022

Okay

# IIS Web App – FHIR behind the scenes

Name

- \_search?lot-number:exact=FK0102&\_sort=-expiration-...
- \_search?lot-number:exact=FK0102&\_sort=-expiration-...
- \_search?lot-number:exact=FK0102&\_sort=-expiration-...
- \_search?lot-number:exact=FK0102&\_sort=-expiration-...
- fhir/
- 11468369
- \_search?patient=Patient/11468369&\_sort=date
- ValueSet
- \_search?type=prov&\_count=1000
- \_search?type=bus&\_count=1000

X Headers **Payload** Preview Response Initiator Timing Cookies

▼ Request Payload view source

- ▼ {resourceType: "Bundle", type: "batch", total: 2,...}
- ▼ entry: [{request: {url: "Immunization?updateProvider=false", method: "POST"},...},...]
- ▼ 0: {request: {url: "Immunization?updateProvider=false", method: "POST"},...}
- ▼ request: {url: "Immunization?updateProvider=false", method: "POST"}
- method: "POST"
- url: "Immunization?updateProvider=false"
- ▼ resource: {resourceType: "Immunization", status: "completed", id: "11468369.03.2023-01-01",...}
- ▼ doseQuantity: {system: "http://unitsofmeasure.org", unit: "mL", value: 0.5}
- system: "http://unitsofmeasure.org"
- unit: "mL"
- value: 0.5
- expirationDate: "2024-01-01"
- ▼ extension: [{url: "https://health.ri.gov/immunization-source-of-update", valueString: "01"}]
- ▼ 0: {url: "https://health.ri.gov/immunization-source-of-update", valueString: "01"}
- url: "https://health.ri.gov/immunization-source-of-update"
- valueString: "01"
- id: "11468369.03.2023-01-01"
- lotNumber: "FK0102"
- ▼ manufacturer: {type: "Organization", reference: "MSD", display: "Merck & Co., Inc."}
- display: "Merck & Co., Inc."

# Leveraging FHIR Bulk Data for DMI

- ❑ FHIR Server for IIS can double as an application modernization strategy
- ❑ Replace legacy web applications with modern front-ends that communicate with the FHIR back-end:
  - Immunization Data Entry/Update
  - Other potential uses:
    - Immunization Display, Patient Demographics, SMART Health Cards, School Forms, etc.
    - SMART on FHIR apps
    - Consumer apps
    - IIS-to-IIS - IZ Gateway

# Questions?

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