

# FHIR Bulk Data Access

## The Basics of Population APIs

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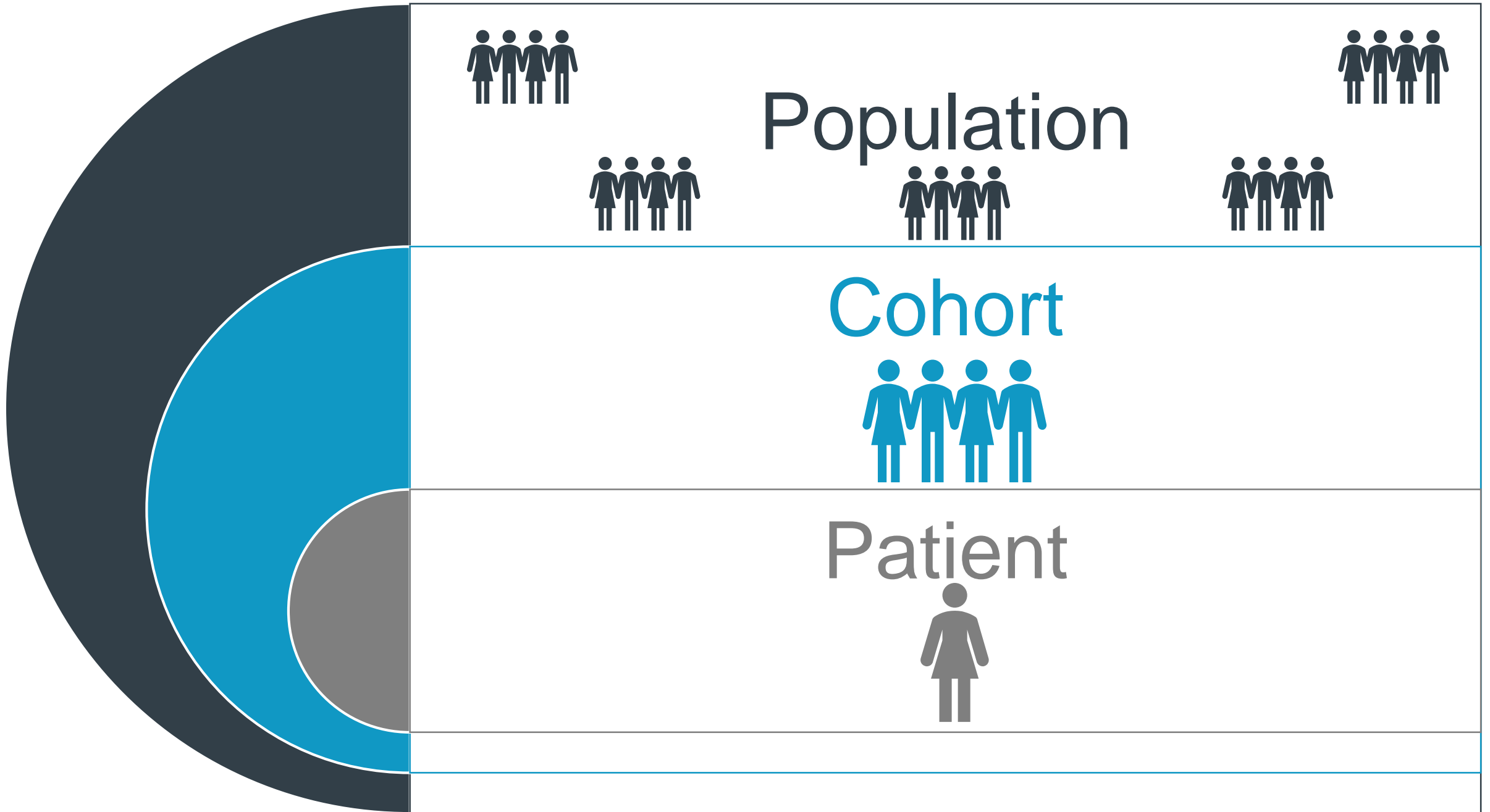
*November 13<sup>th</sup>, 2020*

# Key Questions

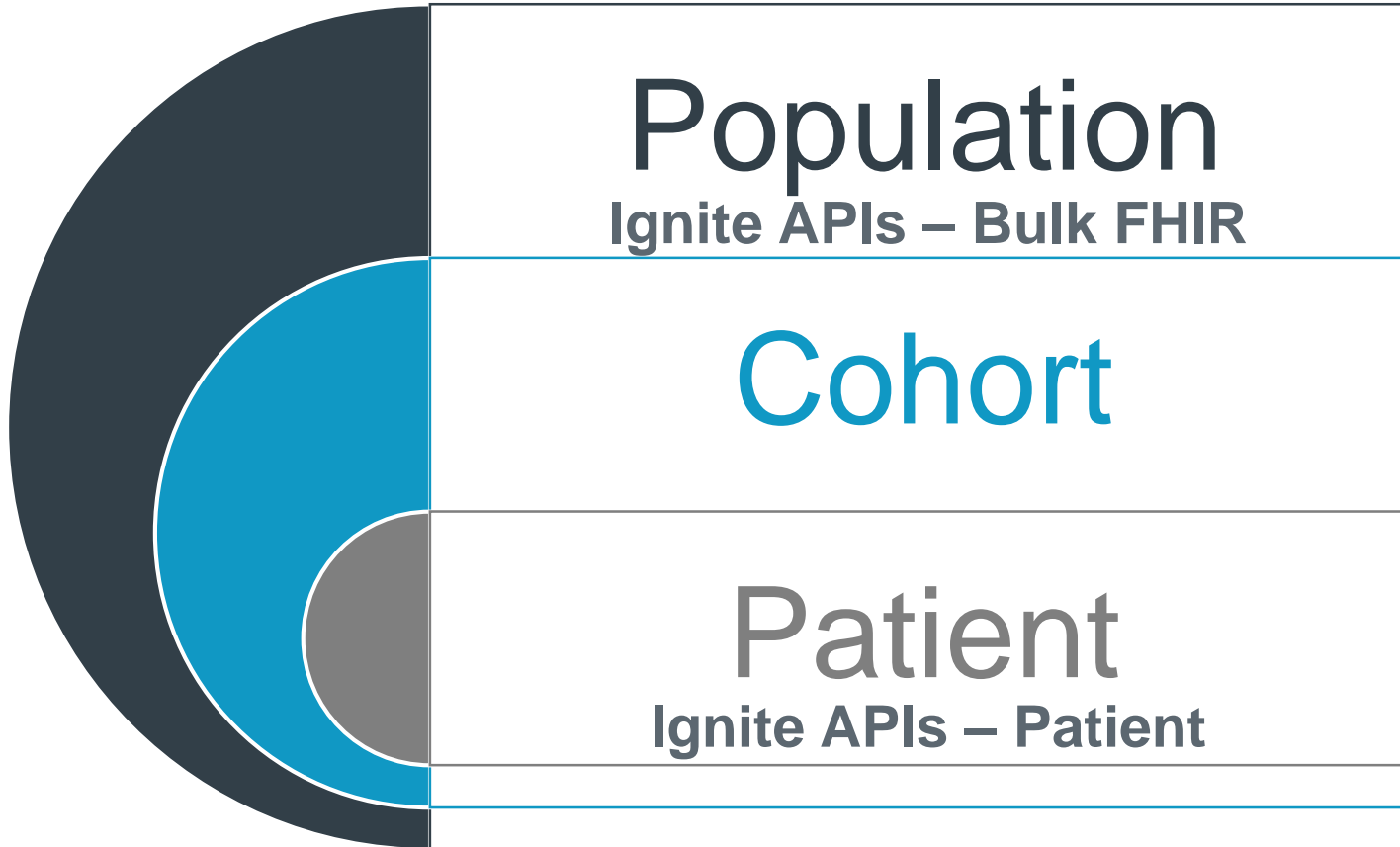
What is FHIR Bulk Data Access?

How is FHIR Bulk Data being defined?

# What is FHIR Bulk Data Access?



# Create Value



FHIR Bulk Data Access will provide...

standardization

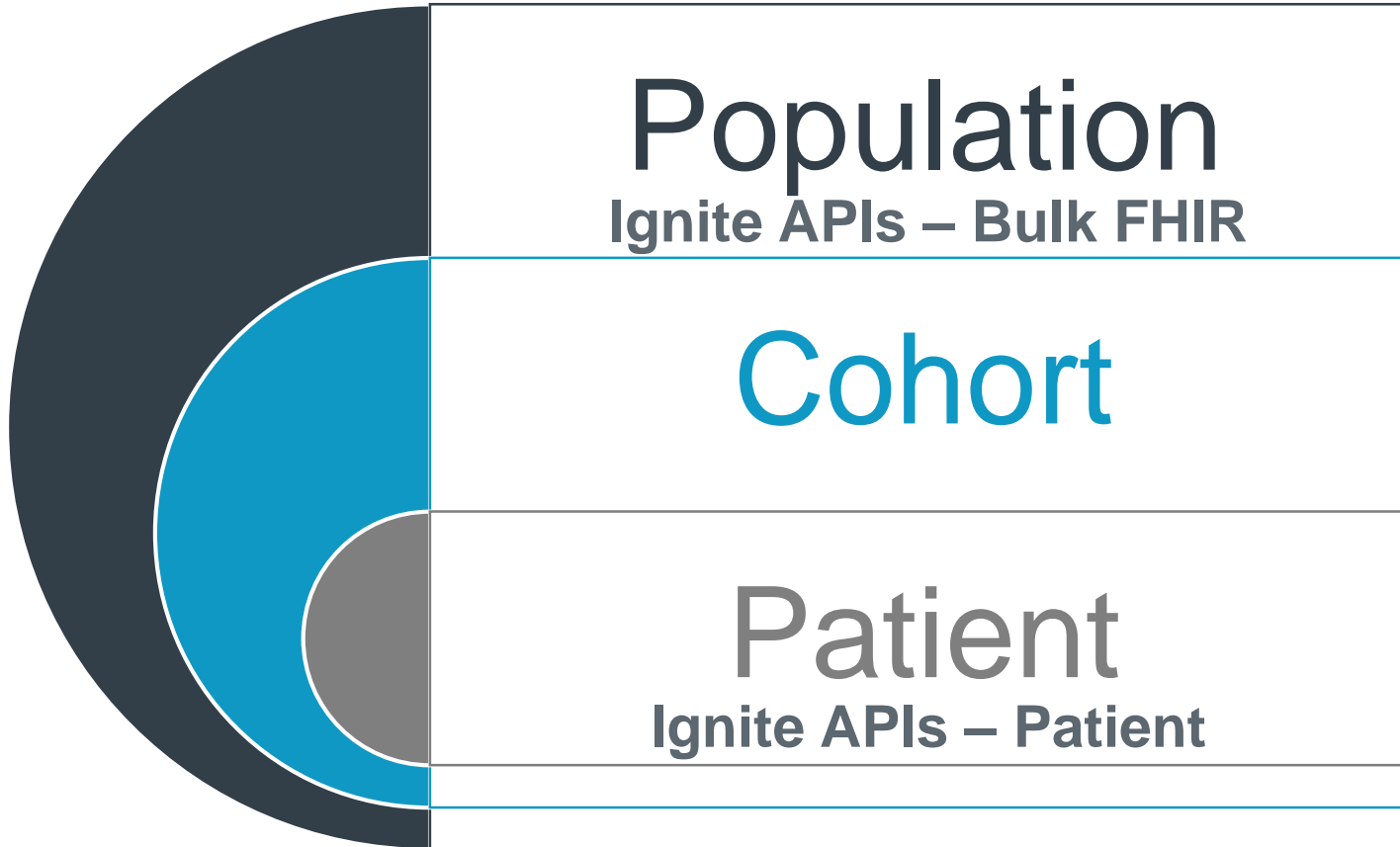
integration

stability

cost reduction

**scale.**

# Enable Innovation



FHIR Bulk Data Access will enable...

cohort analysis

clinical research

quality measures calculation

public health reporting

data liquidity

**new opportunities.**



# Product Scope

## Bulk Data is:

- FHIR Resources
- FHIR Operation API (read-only)
- SMART Backend Services Authorization

## Bulk Data *is not*:

- Data sharing agreements
- Real-time data access
- Patient Matching
- Data Transformation

USCDI United States Core Data for Interoperability Version 1 (July 2020 Errata)			The Office of the National Coordinator for Health Information Technology
<b>Allergies and Intolerances</b> <ul style="list-style-type: none"><li>• Substance (Medication)</li><li>• Substance (Drug Class)</li><li>• Reaction</li></ul>	<b>Laboratory</b> <ul style="list-style-type: none"><li>• Tests</li><li>• Values/Results</li></ul>	<b>Smoking Status</b> <ul style="list-style-type: none"><li>• Smoking Status</li></ul>	
<b>Assessment and Plan of Treatment</b> <ul style="list-style-type: none"><li>• Assessment and Plan of Treatment</li></ul>	<b>Medications</b> <ul style="list-style-type: none"><li>• Medications</li></ul>	<b>Unique Device Identifier(s) for a Patient's Implantable Device(s)</b> <ul style="list-style-type: none"><li>• Unique Device Identifier(s) for a Patient's Implantable Device(s)</li></ul>	
<b>Care Team Members</b> <ul style="list-style-type: none"><li>• Care Team Members</li></ul>	<b>Patient Demographics</b> <ul style="list-style-type: none"><li>• First Name</li><li>• Last Name</li><li>• Previous Name</li><li>• Middle Name (including Middle Initial)</li><li>• Suffix</li><li>• Birth Sex</li><li>• Date of Birth</li><li>• Race</li><li>• Ethnicity</li><li>• Preferred Language</li><li>• Current Address</li><li>• Previous Address</li><li>• Phone Number</li><li>• Phone Number Type</li><li>• Email Address</li></ul>	<b>Vital Signs</b> <ul style="list-style-type: none"><li>• Diastolic Blood Pressure</li><li>• Systolic Blood Pressure</li><li>• Body Height</li><li>• Body Weight</li><li>• Heart Rate</li><li>• Respiratory Rate</li><li>• Body Temperature</li><li>• Pulse Oximetry</li><li>• Inhaled Oxygen Concentration</li><li>• BMI Percentile (2 - 20 Years)</li><li>• Weight-for-length Percentile (Birth - 36 Months)</li><li>• Head Occipital-frontal Circumference Percentile (Birth - 36 Months)</li></ul>	
<b>Clinical Notes</b> <ul style="list-style-type: none"><li>• Consultation Note</li><li>• Discharge Summary Note</li><li>• History &amp; Physical</li><li>• Imaging Narrative</li><li>• Laboratory Report Narrative</li><li>• Pathology Report Narrative</li><li>• Procedure Note</li><li>• Progress Note</li></ul>	<b>Problems</b> <ul style="list-style-type: none"><li>• Problems</li></ul>		
<b>Goals</b> <ul style="list-style-type: none"><li>• Patient Goals</li></ul>	<b>Procedures</b> <ul style="list-style-type: none"><li>• Procedures</li></ul>		
<b>Health Concerns</b> <ul style="list-style-type: none"><li>• Health Concerns</li></ul>	<b>Provenance</b> <ul style="list-style-type: none"><li>• Author Time Stamp</li><li>• Author Organization</li></ul>		
<b>Immunizations</b> <ul style="list-style-type: none"><li>• Immunizations</li></ul>			

# 21<sup>st</sup> Century Cures Act – Final Rule

## 7. STANDARDIZED API FOR PATIENT AND POPULATION SERVICES CRITERION

We proposed to adopt a new API criterion in § 170.315(g)(10)...The new criterion focuses on supporting two types of API-enabled services: (1) Services for which a single patient's data is the focus **and (2) services for which multiple patients' data are the focus**.... This certification criterion will align industry efforts around **FHIR Release 4** and advance interoperability of API-enabled “read” services for single and multiple patients.

### § 170.215 Application Programming Interface Standards.

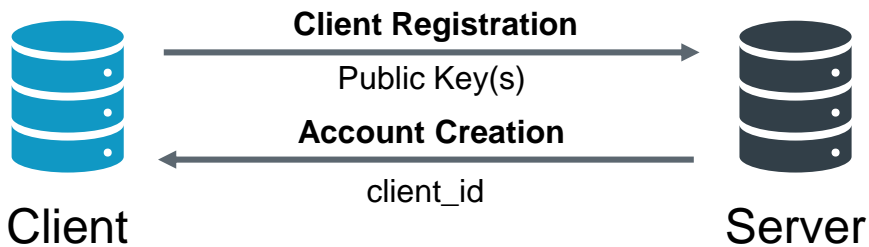
To enable consistent health IT implementation of API enabled “read” services for multiple patients, we have finalized the adoption of the Bulk IG **[FHIR Bulk Data Access (Flat FHIR) (v1.0.0: STU 1)]**, including **mandatory support for the “group-export”** “OperationDefinition” in § 170.215(a)(4).



# How is FHIR Bulk Data being defined?

# Authorization Flow

## SMART Backend Services Authorization



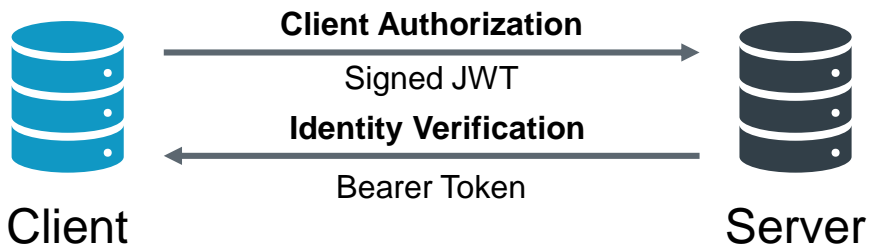
Formalizes the access pattern for system-level scopes to FHIR resources using OAuth2.0

### Registration

Bulk Data Client will register public key(s) with FHIR server (JWKS or URL)

Bulk Data Client will be assigned an OAuth client ID

App registration will also include resource scope, data source access, and group access, among other configuration settings.

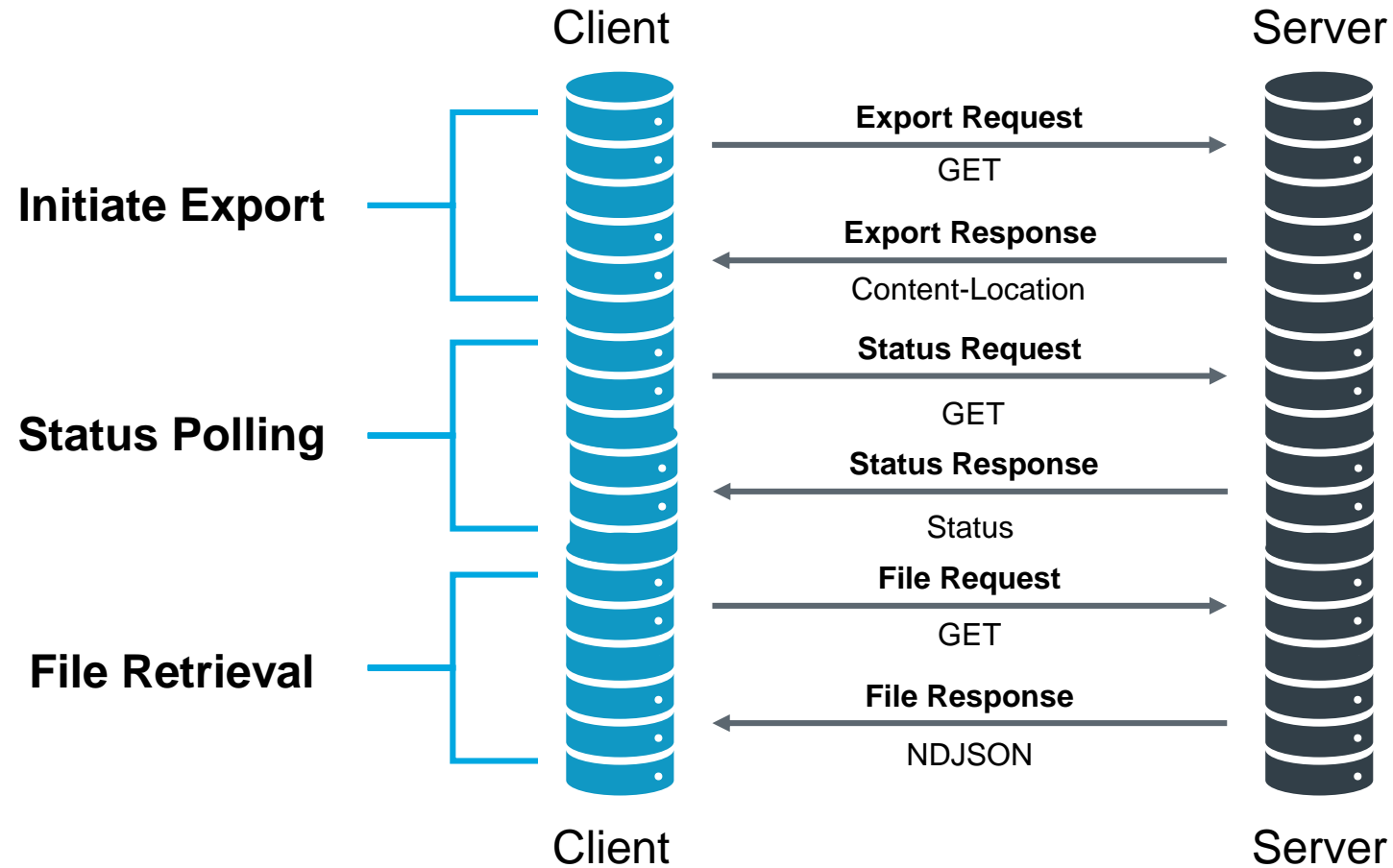


### Request Authorization

Bulk Data Client will sign JWT with a private key

FHIR server will provide short-lived access token for initiating requests

# Request Flow



# Request Flow: Initiate Export

## Export Request

Request Header

**Accept:** `application/fhir+json`

**Prefer:** `respond-async`

Endpoints

`GET [FHIR Server Base]/Patient/$export`

`GET [FHIR Server Base]/Group/[group id]/$export`

`GET [FHIR Server Base]/$export`

Query Parameters

`_outputFormat`

`_since`

`_type`

## Export Response

Response Header

**Status:** `202 Accepted`

**Content-Location:** `[Content-Location URL]`



# Request Flow: Status Polling

## Status Request

Request Header

**Accept:** `application/json`

Endpoints

**GET** `[Content-Location URL]`

## Status Response

### In-Progress

Response Header

**Status:** `202 Accepted`

**X-Progress:** `"In-Progress"`

**Retry-After:** `[x]`

### Error

Response Header

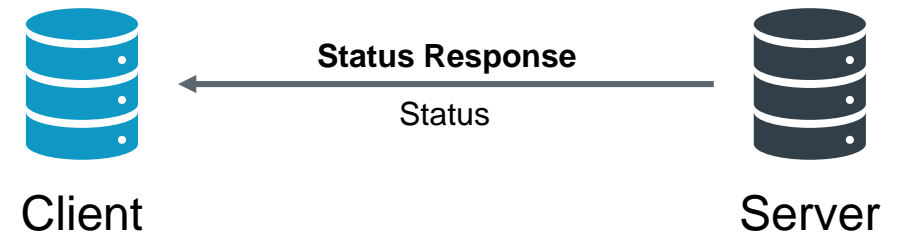
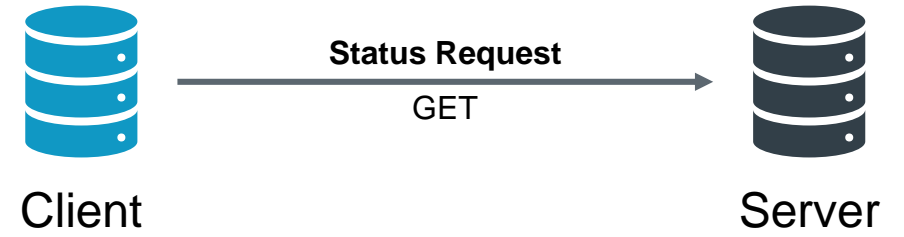
**Status:** `500 Internal Server Error`

### Complete

Response Header

**Status:** `200 OK`

**Expires:** `[date/time]`



# Request Flow: Completed Request

Response Header

Status: 200 OK

Expires: [date/time]

Content-Type: application/json

Body

```
{
  "transactionTime": "[instant]",
  "request" : "[base]/Group/[group_id]/$export",
  "requiresAccessToken" : true,
  "output" : [{
    "type" : "Patient",
    "url" : "https://serverpath2/patient_file_1.ndjson"
  }, {
    "type" : "Patient",
    "url" : "https://serverpath2/patient_file_2.ndjson"
  }, {
    "type" : "AllergyIntolerance",
    "url" : "https://serverpath2/allergyIntolerance_file_1.ndjson"
  } ],
  "error" : [{
    "type" : "OperationOutcome",
    "url" : "https://serverpath2/err_file_1.ndjson"
  } ]
}
```



# Request Flow: File Retrieval

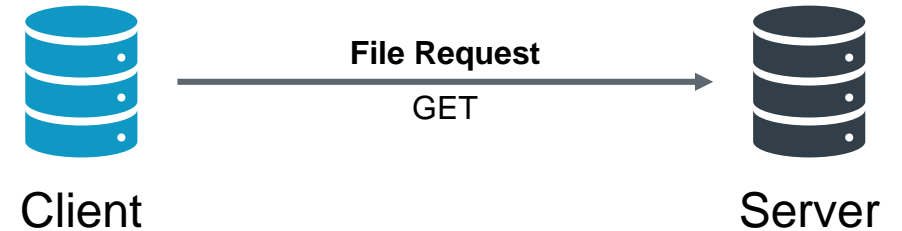
## File Request

Request Header

**Accept:** `application/fhir+ndjson`

Endpoints

**GET** [File-Location URL]



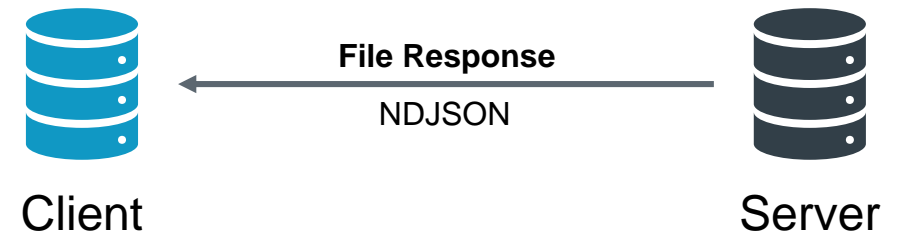
## File Response

Response Header

**Status:** 200 OK

**Content-Type:** `application/fhir+ndjson`

Output File



```
{ "id": "33abc11a", "name": [ { "given": "Herman", "family": "Munster" } ], "gender": "male" }
{ "id": "44def22b", "name": [ { "given": "Lily", "family": "Munster" } ], "gender": "female" }
{ "id": "55ghi44c", "name": [ { "given": "Eddie", "family": "Munster" } ], "gender": "male" }
```

# Key Questions

## **What is FHIR Bulk Data Access?**

A standardized approach to extracting large volumes of clinical data from certified HIT systems.

## **How is FHIR Bulk Data being defined?**

An asynchronous data request pattern that aligns with FHIR standards and resources. Authentication is performed at a system-to-system level using OAuth2.

# Resources

**FHIR Bulk Data IG**

<https://hl7.org/fhir/uv/bulkdata/>

**SMART BE Services Authorization**

<https://hl7.org/fhir/uv/bulkdata/authorization/index.html>

**Cerner Open Developer Experience**

<https://code.cerner.com/>

**Cerner Ignite APIs Reference Pages**

<https://wiki.cerner.com/display/reference/Cerner+Ignite+APIs+for+Millennium+Reference+Pages>

**Cerner FHIR Developers Google Group**

<https://groups.google.com/g/cerner-fhir-developers>