FHIR® Pilot Interoperability Testbed (FHIR-PIT) Party

IHE North American Connectathon Conference
"A Hands On Introduction to FHIR - A FHIR PIT Party"

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MiHIN is Michigan’s initiative to continuously improve healthcare quality, efficiency, and patient safety by promoting secure, electronic exchange of health information. MiHIN represents a growing network of public and private organizations working to overcome data sharing barriers, reduce costs, and ultimately advance the health of Michigan’s population.

MiHIN is a network for sharing health information statewide for Michigan.
Today

What We Will Learn

- Core FHIR® (Fast Healthcare Interoperability Resources) basics
- Architecture and server standards
- Resources, components and bundles
- Servers and application programming interfaces (APIs)
- How to use the FHIR Pilot Interoperability Testbed (FHIR-PIT)
- Synthetic patient information for testing
- Sandbox interoperability services

You will learn how to use a FHIR client application to retrieve FHIR resources!
What is FHIR®?

- A standard describing health data and resources including an API for data exchange
- Enables interoperability between different programs created by different developers
- Defines data transportation using the HTTP(s) standard
- Defines how data is represented (resources)

FHIR® is the registered trademark of Health Level Seven International

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What’s the Big Deal about FHIR?

Current healthcare data standards were created before the Internet was universal

- Painful to use for sharing information
- Lacking modern efficiencies and best practices

FHIR uses modern, internet-based protocols to help healthcare developers improve data-sharing capabilities

- Potential to usher in new era of innovation in healthcare
How does that impact me?

FHIR is designed to help quickly and easily share with and retrieve data from electronic health record (EHR) systems.

FHIR will help health IT developers more efficiently build applications to support information exchange.

- **Example**: Get more supplemental clinical data to support HEDIS reporting, efficiently and easily.
FHIR Leverages a Client-Server Architecture
Your e-mail inbox is your e-mail client

Your e-mail inbox “talks” to an e-mail server which contains:

- Tags that allow a message to be routed (e.g., e-mail address)
- Discrete components that the email is broken down into:
  - Subject line
  - To / From
  - Body of e-mail
  - Search indexes (how to find text quickly)

Your email inbox and the e-mail server talk to each other through a standard set of APIs and definitions

- An API is not the same as a server – it is the part of the server that receives requests and sends responses
- Standard APIs allow any e-mail client to communicate with the same e-mail server
- Standard APIs allow an e-mail server to route and share an e-mail with each other in a standard way

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How This Translates to FHIR

FHIR provides server standards that define HOW a client or server will “talk”
• Leverages HTTP standards
• Leverages RESTful protocol

FHIR simply defines discrete components
• Termed “resources” – more about these in a minute!

FHIR also defines how to enhance or extend standard functionality
• Termed “extensions”
FHIR Resources
FHIR Basic Definitions

• Meant to capture a meaningful amount of data
• Not too large or too small
  • Gender is not a resource (too small)
  • Electronic Health Record is not a resource (too large)
  • Patient, Organization, Location, Allergy are all resources (just right)

• Metadata – Contains details about the resource, such as when it was last updated
• Narrative – Contains XHTML so that the resource can be read in browsers without having to parse apart all the data
• Elements – Contains the structured data of the resource (the part everyone knows how to read)
• Extensions – Used to include data that is not part of the defined structure of the resource (Z segment)

• List of resources

Data packages used to send or receive data from a FHIR repository

Bundle

Contain four basic elements

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**FHIR Server**

**Basic Definitions**

**STEP 01**
Simply fetch the resource(s) identified

**STEP 02**
Used to create new resource(s) on the server

**STEP 03**
Updates an existing resource on the server

**STEP 04**
Deletes the resource(s)
How does it work?

Instead of exchanging whole documents that have to be broken down into component pieces afterwards, FHIR allows applications to access individual packets of information in the form of resources like patient, practitioner etc. the same way a web browser allows a user to access a specific URL.

Easier to develop applications that can present targeted information to a user (e.g., just a patient’s allergy information, instead of an entire C-CDA)

Enables more reliable interoperability between different EHRs or other health IT systems
Why should I care?

1. Because FHIR solves many of the most painful problems you face when moving healthcare data from system to system.

2. Because developers at healthcare organizations across the country will soon be required to know FHIR (if they are not already!).

3. Because organizations across the nation are racing to implement FHIR solutions.

4. Because organizations have a chance to help shape the future of FHIR together.
Think of current healthcare IT as a smart phone filled with data, but with NO APPS installed on it.

FHIR is the technology that will let us attach applications to healthcare IT that will help us to MUCH MORE QUICKLY AND EASILY FIND, RETRIEVE and EXCHANGE DATA.
Who is using FHIR?

FHIR is still developing, but the level of focus and commitment industry-wide is unprecedented

FHIR has received major commitment from many of the top electronic health record vendors and other health IT stakeholders, including the Office of the National Coordinator for Health Information Technology

✓ Nearly every major national organization has started a FHIR initiative like...
MiHIN’s FHIR-PIT

An EASY way for an organization to “Pilot” functionality using FHIR
  o Unlimited testing and integration
  o Easy integration and testing with existing systems

It does NOT contain the restrictions of traditional healthcare development
  o No protected health information (PHI)
A FHIR-Pilot Interoperability Testbed (FHIR-PIT) is a simple user interface coupled with a FHIR-based API server i.e. an application hosting URLs for health information based on HL7 defined FHIR standards. It is capable of Creating, Reading, Updating, and Deleting health information following all the HL7 FHIR specifications.

An example of a simple Read request is www.mihin.org

In order to Create, Update, or Delete more coding is involved
Why FHIR-PIT Leverages FHIR

- Healthcare systems can understand and speak common language
- Technical interoperability barriers are removed (resources, communication and resource identifiers are defined in a standard way)
- Application developers can focus on “business logic”
- Application development is faster when a “standard” has been established
Simulates healthcare network of providers, practices, and hospitals with large population of patients who experience changes in their health status

MiHIN’s PatientGen™

FHIR-compatible “safe” test data generator that produces realistic patient histories involving clinically relevant patient encounters

Transitions of care (encounter notifications, medication reconciliations)
Clinical quality measures (CQMs)
Public health reporting (immunizations, reportable labs, etc.)
Several FHIR-PITs interconnected by FHIR client applications called **FHIR Stations** that serve as “hubs” to enable true interoperability testing.

Simulated “edge” organizations (e.g., hospitals, clinics, HIEs, health plans, government agencies, etc.) that produce and consume test data (resources).
FHIR-PIT Party Goals

- Have fun demystifying FHIR
- Access simple FHIR resources
- Execute read request to FHIR-PIT
- Tell your friends and family you played with FHIR
Starting Up
FHIR-PIT Party

Access FHIR-PIT at https://fire-pit.mihin.org/fhir-pit/
Let's Begin with Resources

FHIR-PIT Party

- Selection
- Search
- CRUD (Create, Read, Update, Delete) operations
- https://www.hl7.org/fhir/resourcelist.html
How to Search for a Patient Resource
FHIR-PIT Party

1. Select Patient Under Resources

2. Select Search

3. Select Read

4. View Results

URL: https://fire-pit.mihin.org/fhir-pit/baseDstu3/Patient/Patient-32399
How to Search for a Specific Patient

1. Select Home

2. Under Resources
   Select Patient

3. Under Search
   Parameters Select Given
   Type “Viola” in the Matches Field

4. Select the + Button to Add the Family Name to the Search Criteria
   Under the parameters select family and type “Herman”

5. Select the Search Button

6. Select Read

   Name: Viola Delacruz Herman
   Patient ID: Patient-32407
   Address...
   Date of Birth...

Note “Result Narrative” at the bottom of the results

https://fire-pit.mihin.org/fhir-pit/baseDstu3/Patient?given=Viola&family=Herman
How to Find Patient by ID
FHIR-PIT Party

1. Select Patient from the Resources

2. Under Search Parameters Select ID

3. Enter in Code “Patient-32407” for the ID

4. Select Search

5. Select Read

When the Patient ID is known you can do a simple “GET” using the patient ID

https://fire-pit.mihin.org/fhir-pit/baseDstu3/Patient?_id=Patient-32407
How to Find Immunization Records

FHIR-PIT Party

1. Select Immunization under Resources

2. Under Search Parameters Select Patient

3. Enter in “Patient-44074” in the Resource ID field

4. Select Search Name: Brittany Karen Booker

5. Select Read for Brittany Karen Booker’s immunization histories

Exercises Using Search

**Time For a Test!**

**Number One**
What is the provider number for Jason Kline?

**Number Two**
What procedure(s) does Gloria Patel Delacruz have on record?

**Number Three**
What medication requests were made for Dennis Meadows Dominguez Jr.?

**Number Four**
What condition(s) does Bessie Murphy Lee have?

**Number Five**
How many organizations are at 433 N Nile Court?
Exercises Using Search

*Time For a Test!*

**Number One**

What is the provider number for Jason Kline?
Here Are the Answers!

Number One

Jason Kline’s provider number is ...
"999999998"
Exercises Using Search

Time For a Test!

Number Two
What procedure(s) does Gloria Patel Delacruz have on record?
Here Are the Answers!

Number Two
Gloria Patel Delacruz -
Patient-44065 had a
wellness visit with
Rebecca West Tate MD
Exercises Using Search

*Time For a Test*

Number Three

What medication requests were made for Dennis Meadows Dominguez Jr.?
Here Are the Answers!

Number Three

Dennis Meadows Dominguez Jr –
Patient-43863
Acetaminophen 160 MG Oral Tablet
Amoxicillin 200 MG Oral Tablet
Exercises Using Search

*Time For a Test!*

**Number Four**

What condition(s) does Bessie Murphy Lee have?
Here Are the Answers!

Number Four
Bessie Murphy Lee - Patient-44294 Gets Ear Infections and Pertussis (disorder)
Exercises Using Search

Time For a Test!

Number Five

How many organizations are at 433 N Nile Court?
Here Are the Answers!

Number Five

Eight organizations
Here Are the Answers!

Number One
Jason Kline’s provider number is “999999988”

Number Two
Gloria Patel Delacruz - Patient-44065 had a wellness visit with Rebecca West Tate MD

Number Three
Dennis Meadows Dominguez Jr – Patient-43863
Acetaminophen 160 MG Oral Tablet
Amoxicillin 200 MG Oral Tablet

Number Four
Bessie Murphy Lee - Patient-44294 Gets Ear Infections and Pertussis (disorder)

Number Five
Eight organizations
Now For A More Difficult Search...

Time For a Test!

**Bonus Question**

Ramon Tyler Wright was diagnosed with mild dehydration by a Practitioner. Where does that Practitioner work?
Here is the Answer!

Time For a Test!

Bonus Answer:
HIE Hospital 9

1. Search Patient by given name and family name to find Patient ID: Patient-44016
2. Search Condition with Patient ID to find Practitioner: Practitioner-2793 (Norma Bessie Cunningham, MD)
3. Search Practitioner Role with Practitioner ID to find hospital
Today We Learned

FHIR – standard describing resources and an API for exchanging EHRs
- Server standards define HOW a client or server will “talk”
- An API is not the same as a server
- The data packages used to send or receive data from a FHIR repository
- The four components: Metadata, Narrative, Elements, and Extensions

Basics about FHIR and the FHIR-PIT
To learn more, visit HL7:
https://www.hl7.org/fhir/overview.html
In the last hour, we searched several patient records. Imagine if a 90-page Clinical Care Document (CCD) was returned to find patient information. Substantially more time would have been spent searching a CCD than the few seconds it took for us to use a FHIR resource to locate the same information.

FHIR saves valuable time!
Thank you!

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