

Article

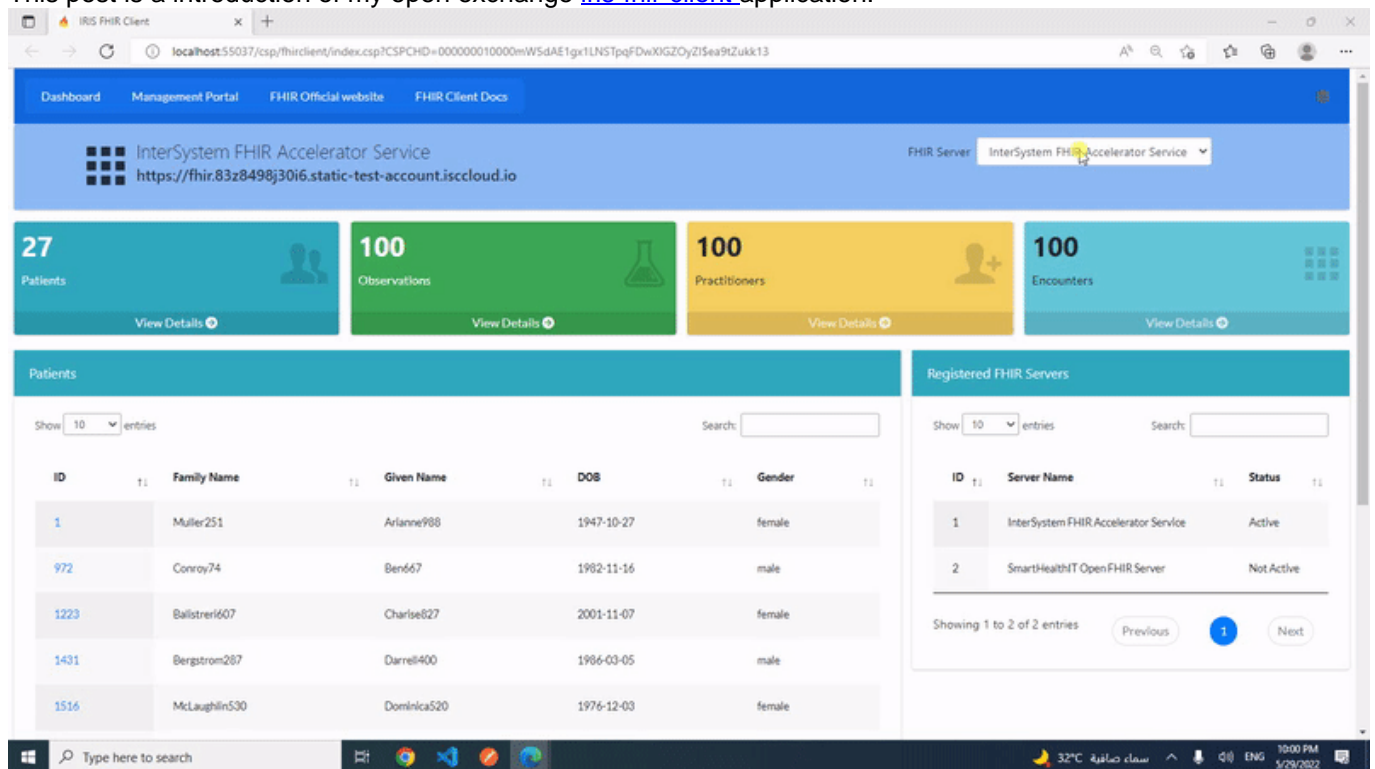
[Muhammad Waseem](#) · May 30, 2022 3m read

[Open Exchange](#)

## FHIR Client to connect any open FHIR Server by using embedded python

Hi Community,

This post is a introduction of my open exchange [iris-fhir-client](#) application.



[iris-fhir-client](#) can connect to any open FHIR Server by using embedded python with the help of [fhirpy](#) Library. Get Resource information by terminal and by using CSP web application.

### View and Activate Registered Servers

Connect to IRIS Terminal

```
docker-compose exec iris iris session iris
```

Application will register InterSystems FHIR Server and SmartHealthIT Open FHIR Server by default and both are ready to use.

Use below command to list down registered Servers

```
do ##class(dc.FhirClient).ServerList()
```

```
USER>do ##class(dc.FhirClient).ServerList()
```

### Registered FHIR Servers

```
-----  
ID          1  
Name        InterSystem FHIR Accelerator Service  
EndPoint     https://fhir.83z8498j30i6.static-test-account.isccloud.io  
ApiKey  
EPOAuth2  
ISActive     Active  
-----  
ID          2  
Name        SmartHealthIT Open FHIR Server  
EndPoint     https://r4.smarthealthit.org  
ApiKey  
EPOAuth2  
ISActive     Not Active  
-----
```

InterSystems FHIR Server is active. In order to select SmartHealthIT Open FHIR Server use SetFhirServer function of dc.FhirClient class by passing server ID

```
do ##class(dc.FhirClient).SetFhirServer(2)
```

## Registered FHIR Servers

To Register New Server use RegisterServer() function of dc.FhirClient class

```
class(dc.FhirClient).RegisterServer("Server Name","Endpoint","ApiKey"[optional],"EndpointOAuth"[optional])
```

```
do ##class(dc.FhirClient).RegisterServer("INTERSYSTEMS FHIR Server","http://localhost:52773/csp/healthshare/samples/fhir/r4/","","")
```

```
USER>do ##class(dc.FhirClient).RegisterServer("INTERSYSTEMS FHIR Server","http://localhost:52773/csp/healthshare/samples/fhir/r4/","","")  
FHIR Server registered successfully  
USER>do ##class(dc.FhirClient).ServerList()  
-----  
Registered FHIR Servers  
-----  
ID          1  
Name        InterSystem FHIR Accelerator Service  
EndPoint     https://fhir.83z8498j30i6.static-test-account.isccloud.io  
ApiKey  
EPOAuth2  
ISActive     Active  
-----  
ID          2  
Name        SmartHealthIT Open FHIR Server  
EndPoint     https://r4.smarthealthit.org  
ApiKey  
EPOAuth2  
ISActive     Not Active  
-----  
ID          3  
Name        INTERSYSTEMS FHIR Server  
EndPoint     http://localhost:52773/csp/healthshare/samples/fhir/r4/  
ApiKey  
EPOAuth2  
ISActive     Not Active  
-----
```

## Get Resources from the FHIR Servers

To Retrieve all the resources for the current server use ListResources() method of dc.FhirClient class

```
do ##class(dc.FhirClient).ListResources()
```

```
USER>do ##class(dc.FhirClient).ListResources()
Account CoverageEligibilityResponse ImmunizationRecommendation OperationDefinition Substance
ActivityDefinition DetectedIssue ImplementationGuide Organization SubstanceSpecification
AdverseEvent Device InsurancePlan OrganizationAffiliation SupplyDelivery
AllergyIntolerance DeviceDefinition Invoice Patient SupplyRequest
Appointment DeviceMetric Library PaymentNotice Task
AppointmentResponse DeviceRequest Linkage PaymentReconciliation TerminologyCapabilities
AuditEvent DeviceUseStatement List Person TestReport
Basic DiagnosticReport Location PlanDefinition TestScript
Binary DocumentManifest Measure Practitioner ValueSet
BodyStructure DocumentReference MeasurementReport PractitionerRole VerificationResult
Bundle EffectEvidenceSynthesis Media Procedure VisionPrescription
CapabilityStatement Encounter Medication Provenance
CarePlan Endpoint MedicationAdministration Questionnaire
CareTeam EnrollmentRequest MedicationDispense QuestionnaireResponse
ChargeItem EnrollmentResponse MedicationKnowledge RelatedPerson
ChargeItemDefinition EpisodeOfCare MedicationRequest RequestGroup
Claim EventDefinition MedicationStatement ResearchDefinition
ClaimResponse Evidence MedicinalProduct ResearchElementDefinition
ClinicalImpression EvidenceVariable MedicinalProductAuthorization ResearchStudy
CodeSystem ExampleScenario MedicinalProductContraindication ResearchSubject
Communication ExplanationOfBenefit MedicinalProductIndication RiskAssessment
CommunicationRequest FamilyMemberHistory MedicinalProductInteraction RiskEvidenceSynthesis
CompartmentDefinition Flag MedicinalProductPackaged Schedule
Composition Goal MedicinalProductPharmaceutical SearchParameter
ConceptMap GraphDefinition MedicinalProductUndesirableEffect ServiceRequest
Condition Group MessageDefinition Slot
Consent GuidanceResponse MessageHeader Specimen
Contract HealthcareService MolecularSequence SpecimenDefinition
Coverage ImagingStudy NamingSystem StructureDefinition
CoverageEligibilityRequest Immunization NutritionOrder StructureMap
CoverageEligibilityResponse ImmunizationEvaluation Observation Subscription
```

In order to display number of records of any resource use CountResource() method by passing Resource of dc.FhirClient

Below command will get counter of Patient Resource against active FHIR Server

```
set count = ##class(dc.FhirClient).CountResource("Patient")
write count
```

To Retrieve all the created Resources along with their count just pass 1 to ListResource() function

```
do ##class(dc.FhirClient).ListResources(1)
```

```
USER>do ##class(dc.FhirClient).ListResources(1)
AllergyIntolerance:9
CarePlan:59
CareTeam:59
Claim:100
Condition:100
DiagnosticReport:100
Encounter:100
ExplanationOfBenefit:100
Goal:49
ImagingStudy:6
Immunization:100
Location:1
MedicationRequest:100
Observation:100
Organization:100
Patient:27
Practitioner:100
Procedure:100
```

To get details of the resource use GetResource() by passing Resource of dc.FhirClient class  
Below command will retrieve all the Patients from the active FHIR Server

```
do ##class(dc.FhirClient).GetResource("Patient")
```

```
USER>do ##class(dc.FhirClient).GetResource("Patient")
  ID  Family Name      Given Name      DOB            Gender
----  -
   1  Muller251          Arianne988     1947-10-27    female
 972  Conroy74           Ben667         1982-11-16    male
1223  Balistreri607     Charise827     2001-11-07    female
1431  Bergstrom287     Darrell400     1986-03-05    male
1516  McLaughlin530    Dominica520    1976-12-03    female
1970  Kozey370         Donnell534     2009-09-17    male
2177  Almonte426       Elisa944       2001-01-27    female
2395  Waelchi213       Enrique929     1970-09-30    male
2592  Bednar518        Kenneth671     1958-06-24    male
2871  Steuber698       Kiera822       2019-03-06    female
3021  Schinner682      Lennie123      1947-03-04    female
3294  Durgan499        Lindsay928     1979-02-04    male
3432  Haley279         Logan497       1979-03-21    male
3558  Mueller846       Magaly973      1974-10-06    female
3963  Ratke343         Marcela739     2016-10-28    female
4122  Dibbert990       Mario764       1986-02-07    male
4379  FernÃ¡ndez399    Marisol435     1964-10-23    female
4908  Mayer370         Maryland870    2013-08-02    female
5166  Schumm995        Moises22       1962-10-17    male
5341  Schmidt332       Numbers230     1959-03-03    male
5637  Sanches349       RubÃ³n780      1946-06-28    male
6201  Franecki195      Sade71         1970-07-28    female
6591  Kuhlman484       Stevie682      2004-01-26    male
6805  Fisher429        Takako793      1977-02-14    female
7123  Peres371         Teodoro374     1946-06-28    male
7786  Upton904         Winnifred2     1987-03-09    female
8109  Donald           Duck           male
```

Below command will retrieve all the Observations from the active FHIR Server

```
do ##class(dc.FhirClient).GetResource("Observation")
```

```
USER>do ##class(dc.FhirClient).GetResource("Observation")
```

ID	Category	Code	Value	UOM	Date	Patient
408	vital-signs	8302-2	174.1	cm	2010-08-30T11:59:49+00:00	Patient/1
409	vital-signs	72514-3	3	{score}	2010-08-30T11:59:49+00:00	Patient/1
410	vital-signs	29463-7	84.3	kg	2010-08-30T11:59:49+00:00	Patient/1
411	vital-signs	39156-5	27.81	kg/m2	2010-08-30T11:59:49+00:00	Patient/1
412	vital-signs	85354-9			2010-08-30T11:59:49+00:00	Patient/1
413	laboratory	2339-0	68.33	mg/dL	2010-08-30T11:59:49+00:00	Patient/1
414	laboratory	6299-2	17.31	mg/dL	2010-08-30T11:59:49+00:00	Patient/1
415	laboratory	38483-4	1.15	mg/dL	2010-08-30T11:59:49+00:00	Patient/1
416	laboratory	49765-1	8.89	mg/dL	2010-08-30T11:59:49+00:00	Patient/1
417	laboratory	2947-0	136.02	mmol/L	2010-08-30T11:59:49+00:00	Patient/1
418	laboratory	6298-4	4.99	mmol/L	2010-08-30T11:59:49+00:00	Patient/1
419	laboratory	2069-3	109.94	mmol/L	2010-08-30T11:59:49+00:00	Patient/1
420	laboratory	20565-8	21.06	mmol/L	2010-08-30T11:59:49+00:00	Patient/1
421	survey	72166-2			2010-08-30T11:59:49+00:00	Patient/1
422	laboratory	4548-4	6.23	%	2010-08-30T11:59:49+00:00	Patient/1
435	laboratory	2339-0	90.71	mg/dL	2011-05-11T11:59:49+00:00	Patient/1
436	laboratory	6299-2	13.99	mg/dL	2011-05-11T11:59:49+00:00	Patient/1
437	laboratory	38483-4	3.1234	mg/dL	2011-05-11T11:59:49+00:00	Patient/1
438	laboratory	49765-1	9.69	mg/dL	2011-05-11T11:59:49+00:00	Patient/1
439	laboratory	2947-0	141.28	mmol/L	2011-05-11T11:59:49+00:00	Patient/1
440	laboratory	6298-4	4.82	mmol/L	2011-05-11T11:59:49+00:00	Patient/1
441	laboratory	2069-3	105.23	mmol/L	2011-05-11T11:59:49+00:00	Patient/1
442	laboratory	20565-8	25.29	mmol/L	2011-05-11T11:59:49+00:00	Patient/1
443	laboratory	33914-3	68.715	mL/min	2011-05-11T11:59:49+00:00	Patient/1
444	laboratory	2885-2	79.415	g/dL	2011-05-11T11:59:49+00:00	Patient/1
445	laboratory	1751-7	5.0093	g/dL	2011-05-11T11:59:49+00:00	Patient/1
446	laboratory	10834-0	2.8258	g/L	2011-05-11T11:59:49+00:00	Patient/1
447	laboratory	1975-2	0.16126	mg/dL	2011-05-11T11:59:49+00:00	Patient/1

## Get Resources for particular patient from the FHIR Servers

Below command will retrieve Observations detail against Patient ID 1 from the active FHIR Server

```
do ##class(dc.FhirClient).GetPatientResources("Observation", "1")
```



```

USER>do ##class(dc.FhirClient).GetPatientResources("Observation","1")
ID      Category      Code      Value      UOM      Date      Patient
-----
408 vital-signs 8302-2    174.1     cm         2010-08-30T11:59:49+00:00 Patient/1
409 vital-signs 72514-3   3         {score}    2010-08-30T11:59:49+00:00 Patient/1
410 vital-signs 29463-7   84.3     kg         2010-08-30T11:59:49+00:00 Patient/1
411 vital-signs 39156-5   27.81    kg/m2      2010-08-30T11:59:49+00:00 Patient/1
412 vital-signs 85354-9   2010-08-30T11:59:49+00:00 Patient/1
413 laboratory 2339-0    68.33    mg/dL      2010-08-30T11:59:49+00:00 Patient/1
414 laboratory 6299-2    17.31    mg/dL      2010-08-30T11:59:49+00:00 Patient/1
415 laboratory 38483-4   1.15     mg/dL      2010-08-30T11:59:49+00:00 Patient/1
416 laboratory 49765-1   8.89     mg/dL      2010-08-30T11:59:49+00:00 Patient/1
417 laboratory 2947-0    136.02   mmol/L     2010-08-30T11:59:49+00:00 Patient/1
418 laboratory 6298-4    4.99     mmol/L     2010-08-30T11:59:49+00:00 Patient/1
419 laboratory 2069-3    109.94   mmol/L     2010-08-30T11:59:49+00:00 Patient/1
420 laboratory 20565-8   21.06    mmol/L     2010-08-30T11:59:49+00:00 Patient/1
421 survey 72166-2   2010-08-30T11:59:49+00:00 Patient/1
422 laboratory 4548-4    6.23     %          2010-08-30T11:59:49+00:00 Patient/1
435 laboratory 2339-0    90.71    mg/dL      2011-05-11T11:59:49+00:00 Patient/1
436 laboratory 6299-2    13.99    mg/dL      2011-05-11T11:59:49+00:00 Patient/1
437 laboratory 38483-4   3.1234   mg/dL      2011-05-11T11:59:49+00:00 Patient/1
438 laboratory 49765-1   9.69     mg/dL      2011-05-11T11:59:49+00:00 Patient/1
439 laboratory 2947-0    141.28   mmol/L     2011-05-11T11:59:49+00:00 Patient/1
440 laboratory 6298-4    4.82     mmol/L     2011-05-11T11:59:49+00:00 Patient/1
441 laboratory 2069-3    105.23   mmol/L     2011-05-11T11:59:49+00:00 Patient/1
442 laboratory 20565-8   25.29    mmol/L     2011-05-11T11:59:49+00:00 Patient/1
443 laboratory 33914-3   68.715   mL/min     2011-05-11T11:59:49+00:00 Patient/1
444 laboratory 2885-2    79.415   g/dL       2011-05-11T11:59:49+00:00 Patient/1
    
```

View FHIR Server information from CSP Web application

Navigate to <http://localhost:55037/csp/fhirclient/index.csp>  
 Index Page will show active server Patients, Observations, Practitioners and Encounters count along with Patient and Registered Servers details

The screenshot shows the FHIR Client web application interface. At the top, there is a navigation bar with links for Dashboard, Management Portal, FHIR Official website, and FHIR Client Docs. Below this is a header section for the InterSystem FHIR Accelerator Service, including the URL <https://fhir.83z8498j30i6.static-test-account.iscloud.io> and a dropdown menu for the FHIR Server.

The main dashboard features four large tiles representing counts for different resource types:

- 27 Patients** (View Details)
- 100 Observations** (View Details)
- 100 Practitioners** (View Details)
- 100 Encounters** (View Details)

Below the dashboard, there are two tables:

**Patients Table:**

ID	Family Name	Given Name	DOB	Gender
1	Muller251	Ariane988	1947-10-27	female
972	Conroy74	Ben667	1982-11-16	male
1223	Balistreri607	Charise827	2001-11-07	female
1431	Bergstrom287	Darrell400	1986-03-05	male
1516	McLaughlin530	Dominica520	1976-12-03	female

**Registered FHIR Servers Table:**

ID	Server Name	Status
1	InterSystem FHIR Accelerator Service	Active
2	SmartHealthIT Open FHIR Server	Not Active

At the bottom of the Registered FHIR Servers table, there is a pagination control showing "Showing 1 to 2 of 2 entries" with "Previous", "1", and "Next" buttons.

Index page will display FHIR Server List with active server selected. Select other server from the list to view details of selected server

The screenshot shows the FHIR Client interface. At the top, there are navigation links: Dashboard, Management Portal, FHIR Official website, and FHIR Client Docs. Below this is the InterSystem FHIR Accelerator Service header with the URL <https://fhir.83z8498j30i6.static-test-account.iscloud.io>. A dropdown menu for 'FHIR Server' is open, showing three options: 'InterSystem FHIR Accelerator Service' (selected), 'SmartHealthIT Open FHIR Server', and 'INTERSYSTEMS FHIR Server'. A red arrow points to the dropdown menu. Below the header are four summary cards: Patients (27), Observations (100), Practitioners (100), and Encounters (100). The main content area is divided into two sections: 'Patients' and 'Registered FHIR Servers'. The 'Patients' section shows a table with columns: ID, Family Name, Given Name, DOB, and Gender. The 'Registered FHIR Servers' section shows a table with columns: ID, Server Name, and Status.

ID	Family Name	Given Name	DOB	Gender
1	Muller251	Arianne988	1947-10-27	female
972	Conroy74	Ben667	1982-11-16	male
1223	Ballistreri607	Charise827	2001-11-07	female
1431	Bergstrom287	Darrell400	1986-03-05	male

ID	Server Name	Status
1	InterSystem FHIR Accelerator Service	Active
2	SmartHealthIT Open FHIR Server	Not Active
3	INTERSYSTEMS FHIR Server	Not Active

Hover to Patient ID and select to get details of Patient Resources

The screenshot shows the FHIR Client interface with a red arrow pointing to the patient ID '972' in the 'Patients' table. The 'Registered FHIR Servers' table is also visible.

ID	Family Name	Given Name	DOB	Gender
1	Muller251	Arianne988	1947-10-27	female
972	Conroy74	Ben667	1982-11-16	male
1223	Ballistreri607	Charise827	2001-11-07	female
1431	Bergstrom287	Darrell400	1986-03-05	male
1516	McLaughlin530	Dominica520	1976-12-03	female

ID	Server Name	Status
1	InterSystem FHIR Accelerator Service	Active
2	SmartHealthIT Open FHIR Server	Not Active

This page will display count of some of Patient Resources along with Patient Observations details



The screenshot displays a web application interface with a blue header bar containing navigation links: Dashboard, Management Portal, FHIR Official website, and FHIR Client Docs. Below the header, a user profile is shown for 'Conroy74 Ben667' with ID = 972. The main content area is divided into two panels. The left panel, titled 'Patient Resources', lists various resource types with their counts: Observations (94), Procedure (7), Immunization (7), Encounter (25), Condition (4), Practitioner (101), and Organization (101). The right panel, titled 'Patient Observations', features a search bar and export options (Copy, Excel, CSV, PDF). It contains a table with the following data:

ID	Category	Codes	Value	UOM	Date
1049	vital-signs	8302-2	167.7	cm	2011-03-08T02:53:04+00:00
1050	vital-signs	72514-3	1	[score]	2011-03-08T02:53:04+00:00
1051	vital-signs	29463-7	64	kg	2011-03-08T02:53:04+00:00
1052	vital-signs	39156-5	22.76	kg/m2	2011-03-08T02:53:04+00:00
1053	vital-signs	85354-9	None	None	2011-03-08T02:53:04+00:00
1054	survey	72166-2	None	None	2011-03-08T02:53:04+00:00
1061	vital-signs	8302-2	167.7	cm	2012-03-13T02:53:04+00:00
1062	vital-signs	72514-3	0	[score]	2012-03-13T02:53:04+00:00

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#### Source

URL: <https://community.intersystems.com/post/fhir-client-connect-any-open-fhir-server-using-embedded-python>