CS 249 Happy Patients App

CS 249, Fall 2017, Final Project
Presented by -
Rashmeet Kaur Khanuja, Anusha Vijay, Steven Yen

Under guidance of -
Prof. Tanuja Phadke

Outline

- **Happy Patients** is an application that allows users to manage and view patient data.
- Users can add, delete, update, retrieve and **filter** patient information in this application.
- The application uses caching (Memcached) to help improve retrieval speed so that not all requests requires a Cassandra query.
- A **Policy Server** maintains cache policies and users can retrieve and update the cache policies based on the need.
- **Message consumers** listens on a message queue (in ActiveMQ) for messages published by the Happy Patients app and runs appropriate routines when messages are received.

Technologies Used

- Jersey
- Cassandra
- ActiveMQ
- Memcached
- Jetty
- Maven
- Python
- Flask
- Javascript
- Angular

What we already knew?

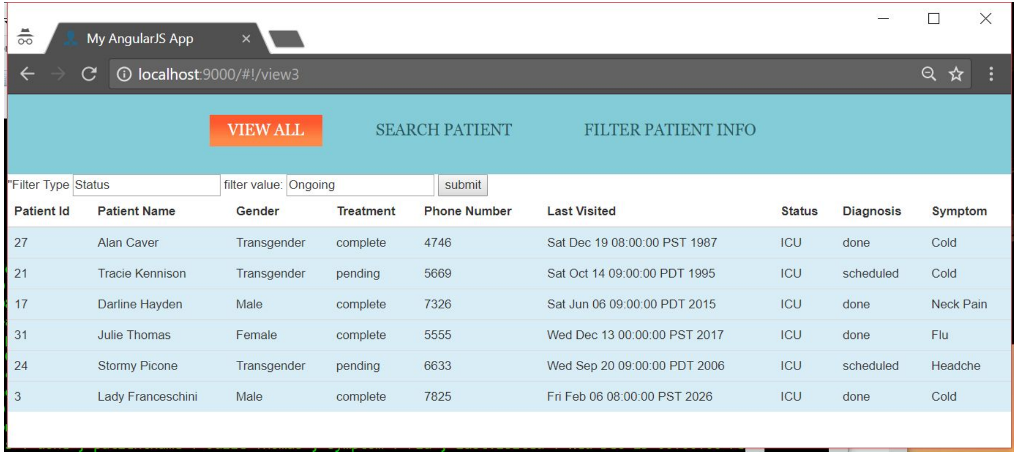
- Python Flask Server
- Jetty Container for Java Projects
- Maven Project and Dependency Management

What we had to learn from scratch?

- Java Jersey Web Services Framework
- Connecting to Cassandra through Java
- Connecting to ActiveMQ through Java, and using JMS API
- Connecting to Memcached

The POC we did

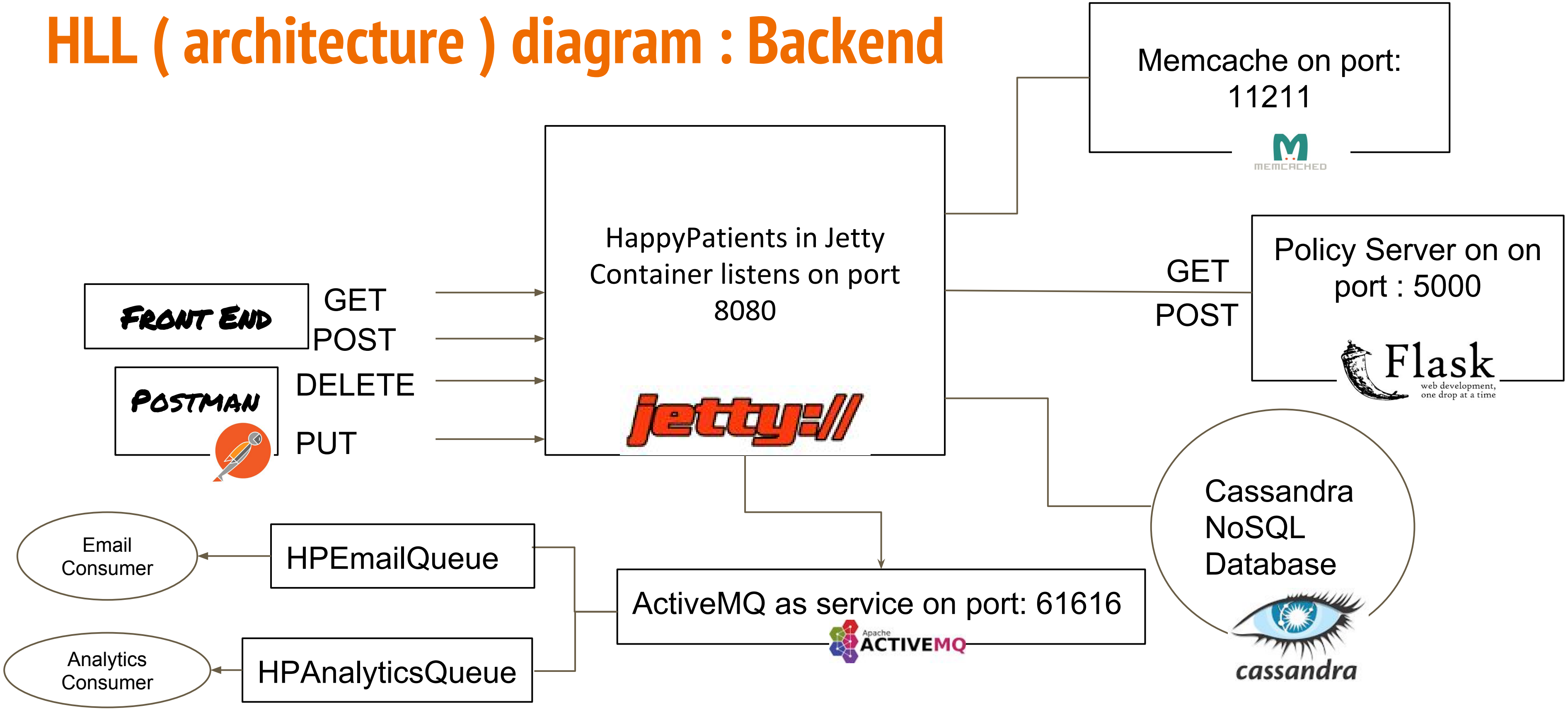
- Generated sample patient data as CSV file and import into Cassandra
- Used POSTMAN to send GET/POST/PUT/DELETE requests to endpoints
- Created mock front-ends that generates HTTP requests and parses the responding JSON object



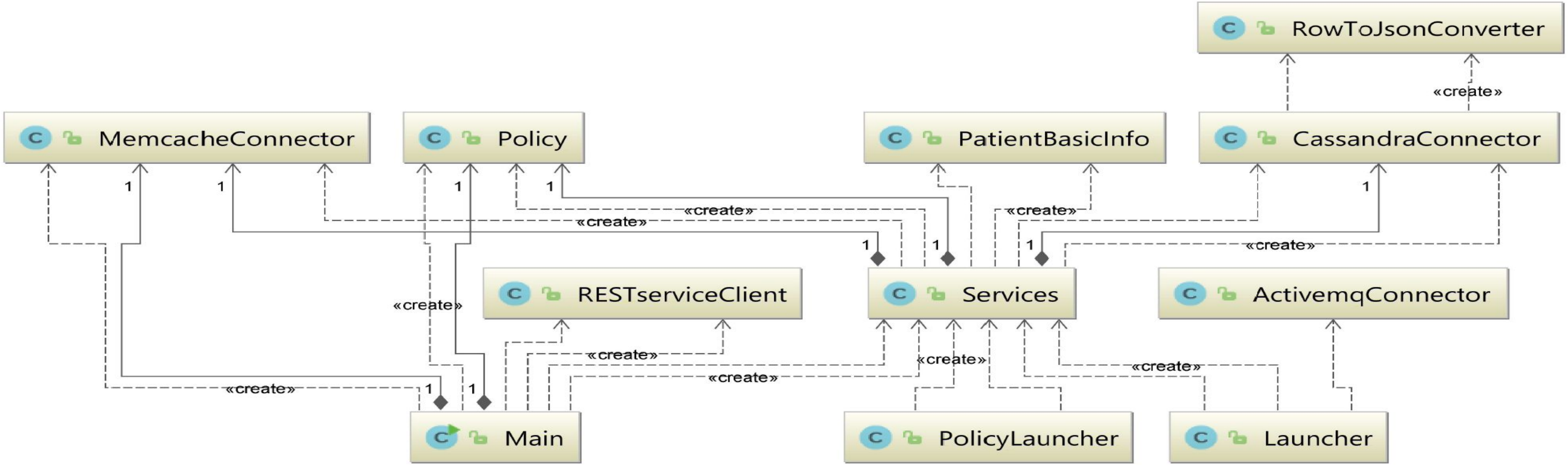
"Filter Type Status filter value: Ongoing

Patient Id	Patient Name	Gender	Treatment	Phone Number	Last Visited	Status	Diagnosis	Symptom
27	Alan Caver	Transgender	complete	4746	Sat Dec 19 08:00:00 PST 1987	ICU	done	Cold
21	Tracie Kennison	Transgender	pending	5669	Sat Oct 14 09:00:00 PDT 1995	ICU	scheduled	Cold
17	Darline Hayden	Male	complete	7326	Sat Jun 06 09:00:00 PDT 2015	ICU	done	Neck Pain
31	Julie Thomas	Female	complete	5555	Wed Dec 13 00:00:00 PST 2017	ICU	done	Flu
24	Stormy Picone	Transgender	pending	6633	Wed Sep 20 09:00:00 PDT 2006	ICU	scheduled	Headche
3	Lady Franceschini	Male	complete	7825	Fri Feb 06 08:00:00 PST 2026	ICU	done	Cold

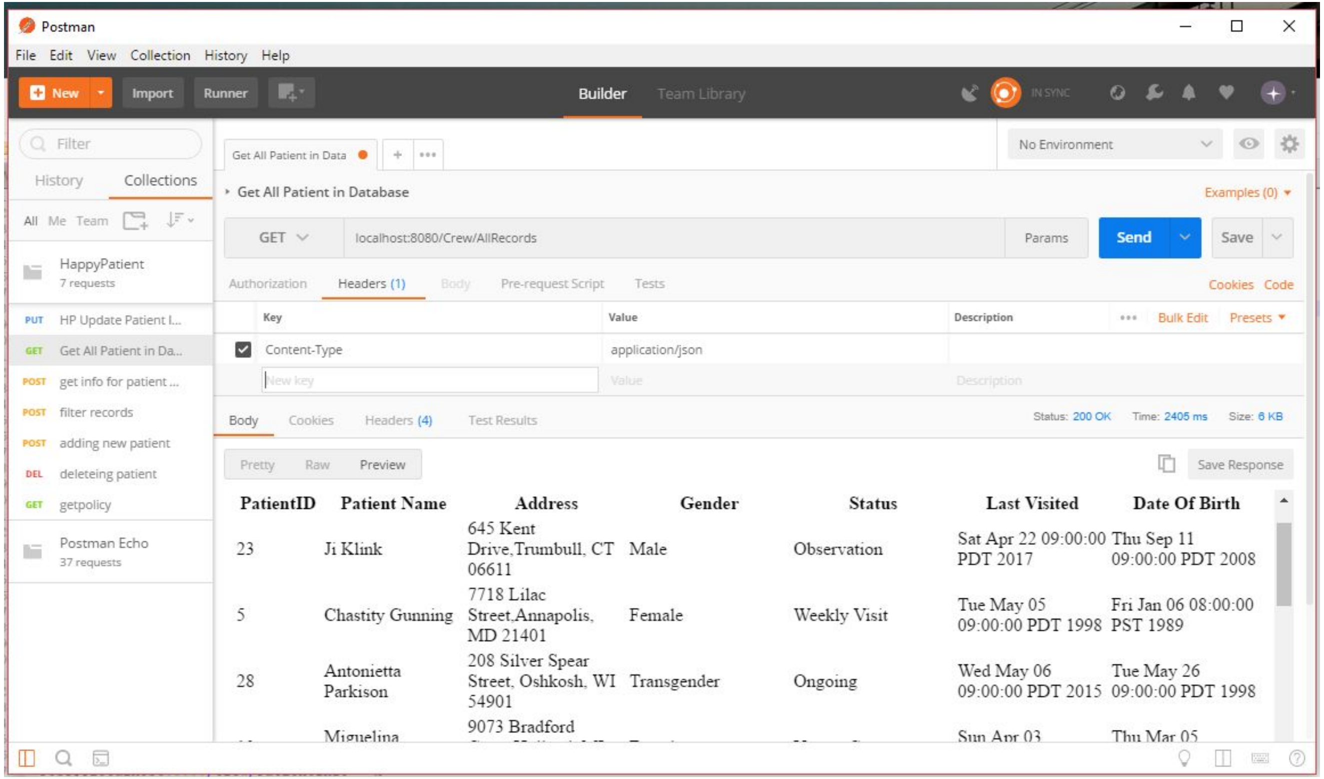
HLL (architecture) diagram : Backend



Class Diagram



GET, Endpoint: /Crew/AllRecords



Get All Patient in Database

GET localhost:8080/Crew/AllRecords

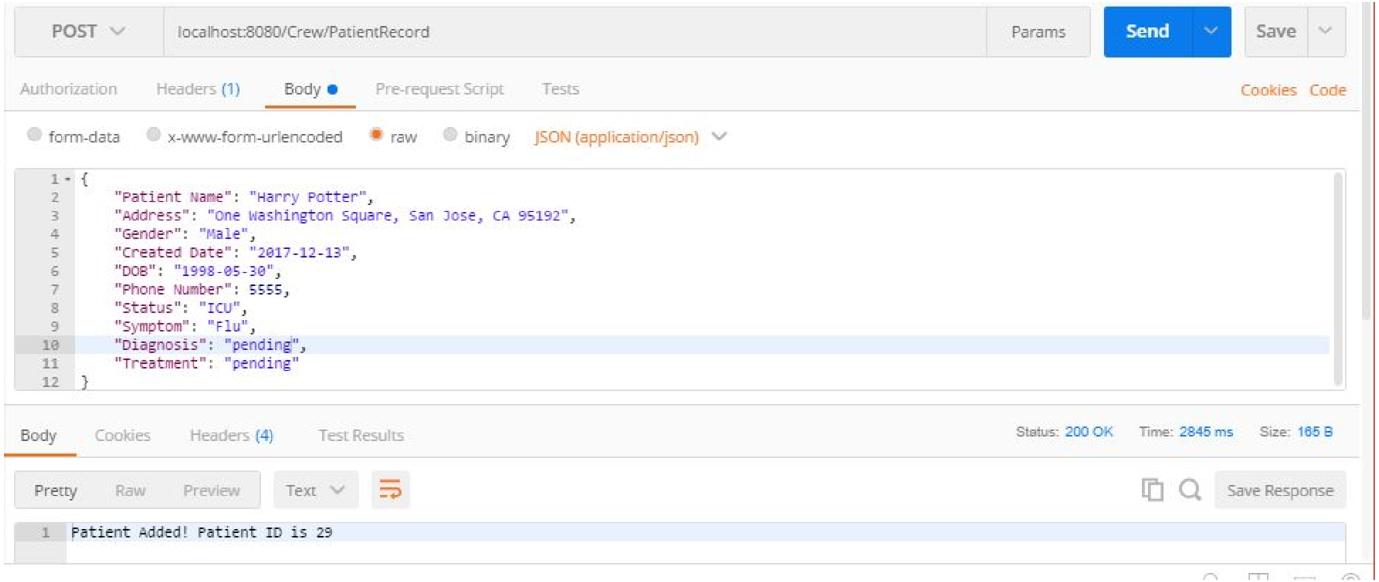
Key	Value	Description
☑ Content-Type	application/json	
New key	Value	Description

Status: 200 OK Time: 2405 ms Size: 6 KB

PatientID	Patient Name	Address	Gender	Status	Last Visited	Date Of Birth
23	Ji Klink	645 Kent Drive,Trumbull, CT 06611	Male	Observation	Sat Apr 22 09:00:00 PDT 2017	Thu Sep 11 09:00:00 PDT 2008
5	Chastity Gunning	7718 Lilac Street,Annapolis, MD 21401	Female	Weekly Visit	Tue May 05 09:00:00 PDT 1998	Fri Jan 06 08:00:00 PST 1989
28	Antonietta Parkison	208 Silver Spear Street, Oshkosh, WI 54901	Transgender	Ongoing	Wed May 06 09:00:00 PDT 2015	Tue May 26 09:00:00 PDT 1998
	Miguelina	9073 Bradford			Sun Apr 03	Thu Mar 05

Returns a table of information for all patients in the hospital’s database

POST, Endpoint: /Crew/PatientRecord



POST localhost:8080/Crew/PatientRecord

● raw

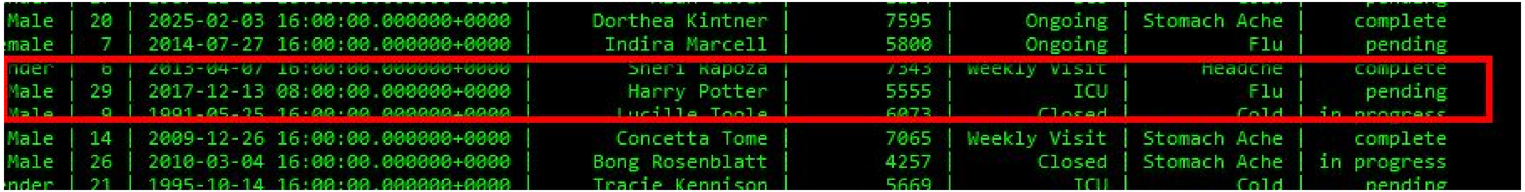
JSON (application/json)

```
{
    "Patient Name": "Harry Potter",
    "Address": "One Washington Square, San Jose, CA 95192",
    "Gender": "Male",
    "Created Date": "2017-12-13",
    "DOB": "1998-05-30",
    "Phone Number": 5555,
    "Status": "ICU",
    "Symptom": "Flu",
    "Diagnosis": "pending",
    "Treatment": "pending"
}
```

Status: 200 OK Time: 2845 ms Size: 165 B

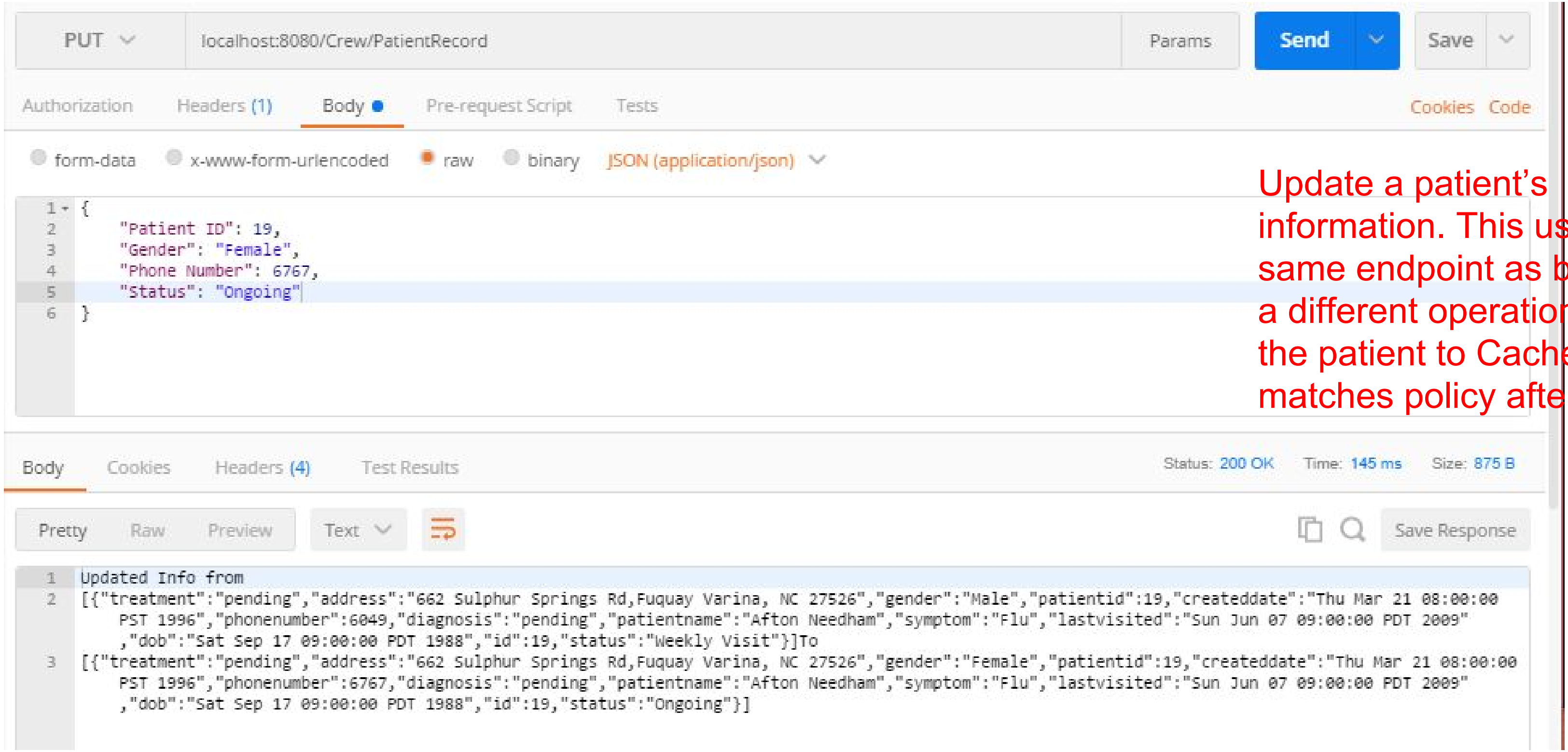
```
Patient Added! Patient ID is 29
```

Adds a new patient to the hospital’s database. And adds the patient’s record to cache if it matches the policy.



```
Male | 20 | 2025-02-03 16:00:00.000000+0000 |   Dorthea Kintner |  7595 |      Ongoing | Stomach Ache |    complete
male |  7 | 2014-07-27 16:00:00.000000+0000 |   Indira Marcell  |  5800 |      Ongoing |          Flu |     pending
nder |  6 | 2013-04-07 16:00:00.000000+0000 |     Sheri Rapoza  |  7343 | Weekly Visit |      Headche |    complete
Male | 29 | 2017-12-13 08:00:00.000000+0000 |     Harry Potter  |  5555 |          ICU |          Flu |     pending
Male |  9 | 1991-05-25 16:00:00.000000+0000 |    Lucille Toole  |  6073 |       Closed |         Cold | in progress
Male | 14 | 2009-12-26 16:00:00.000000+0000 |    Concetta Tome  |  7065 | Weekly Visit | Stomach Ache |    complete
Male | 26 | 2010-03-04 16:00:00.000000+0000 |  Bong Rosenblatt  |  4257 |       Closed | Stomach Ache | in progress
nder | 21 | 1995-10-14 16:00:00.000000+0000 |  Tracie Kennison  |  5669 |          ICU |         Cold |     pending
```

PUT, Endpoint: /Crew/PatientRecord



PUT localhost:8080/Crew/PatientRecord

● raw JSON (application/json)

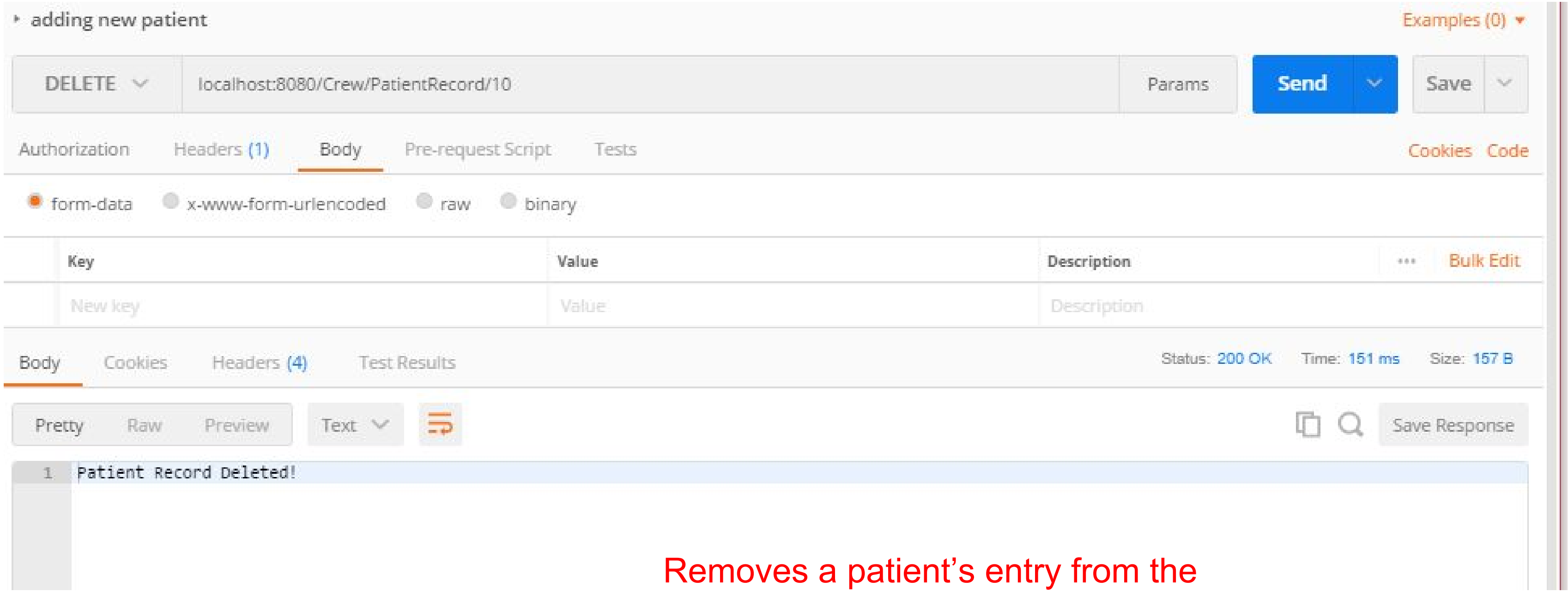
```
{
    "Patient ID": 19,
    "Gender": "Female",
    "Phone Number": 6767,
    "Status": "Ongoing"
}
```

Status: 200 OK Time: 145 ms Size: 875 B

```
Updated Info from
[{"treatment":"pending","address":"662 Sulphur Springs Rd,Fuquay Varina, NC 27526","gender":"Male","patientid":19,"createddate":"Thu Mar 21 08:00:00
    PST 1996","phonenumber":6049,"diagnosis":"pending","patientname":"Afton Needham","symptom":"Flu","lastvisited":"Sun Jun 07 09:00:00 PDT 2009"
    ,"dob":"Sat Sep 17 09:00:00 PDT 1988","id":19,"status":"Weekly Visit"}]To
[{"treatment":"pending","address":"662 Sulphur Springs Rd,Fuquay Varina, NC 27526","gender":"Female","patientid":19,"createddate":"Thu Mar 21 08:00:00
    PST 1996","phonenumber":6767,"diagnosis":"pending","patientname":"Afton Needham","symptom":"Flu","lastvisited":"Sun Jun 07 09:00:00 PDT 2009"
    ,"dob":"Sat Sep 17 09:00:00 PDT 1988","id":19,"status":"Ongoing"}]
```

Update a patient’s information. This uses the same endpoint as before with a different operation. Adds the patient to Cache if it matches policy after update.

DELETE, Endpoint: /Crew/PatientRecord/{patientID}



adding new patient

DELETE localhost:8080/Crew/PatientRecord/10

● form-data ○ x-www-form-urlencoded ○ raw ○ binary

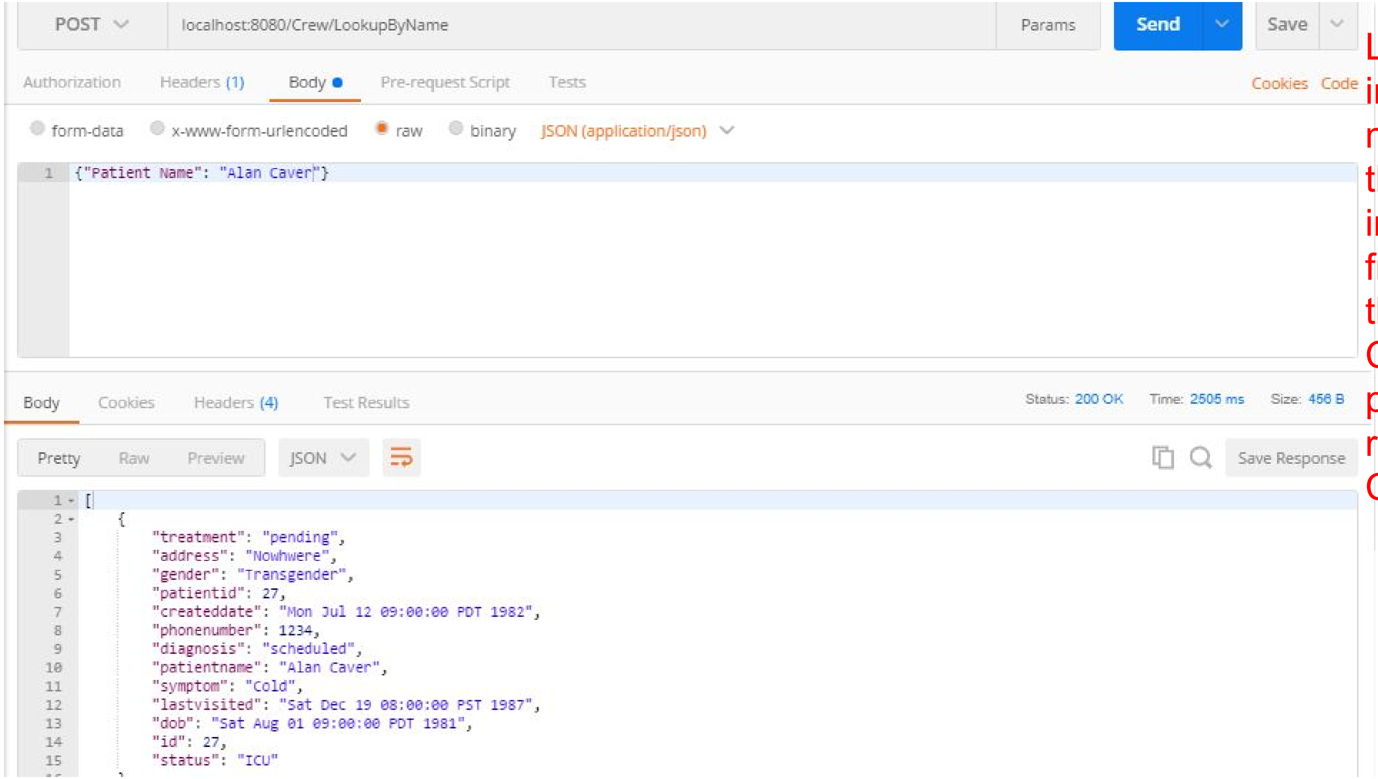
Key	Value	Description
New key	Value	Description

Status: 200 OK Time: 151 ms Size: 157 B

```
Patient Record Deleted!
```

Removes a patient’s entry from the hospital’s database (and the cache if it is there).

POST, Endpoint: /Crew/LookupByName



localhost:8080/Crew/LookupByName

raw, JSON (application/json)

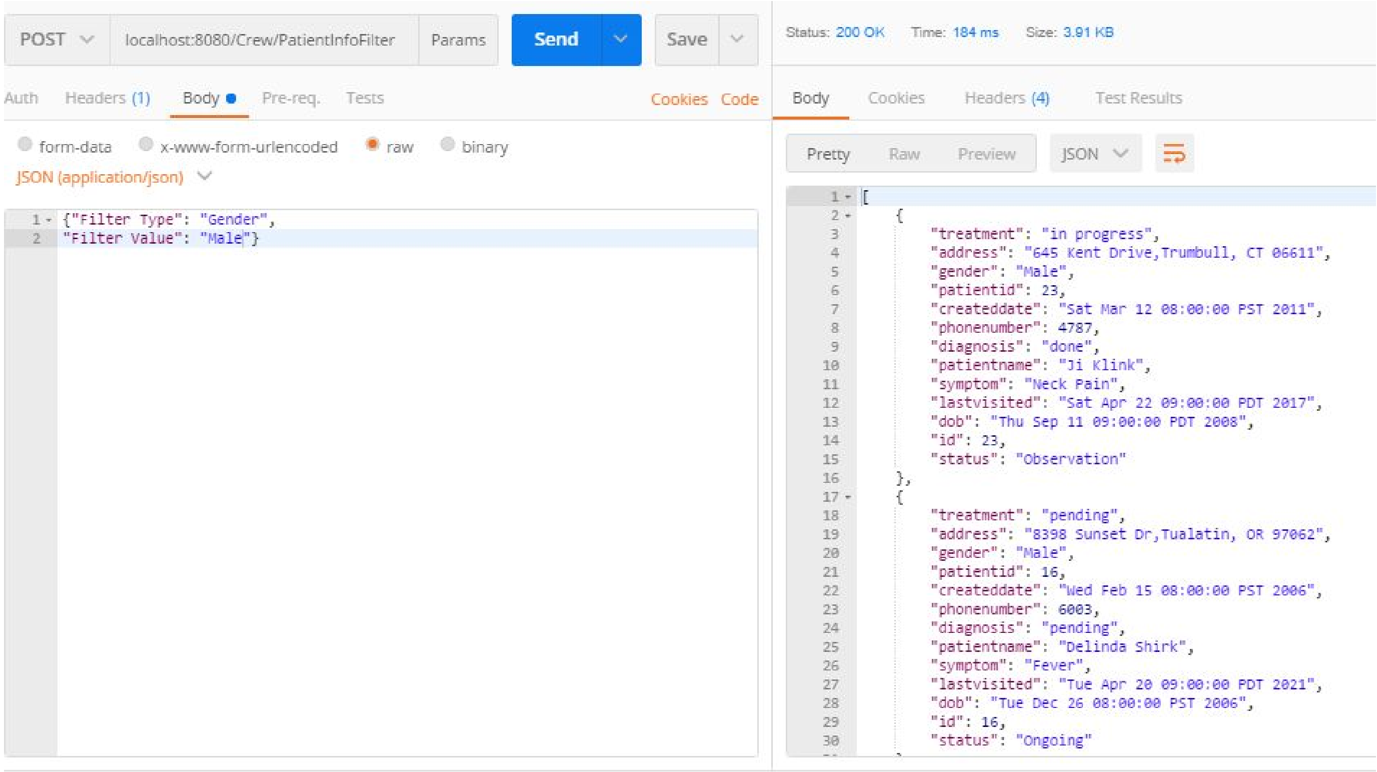
```
{"Patient Name": "Alan Caver"}
```

Status: 200 OK Time: 2505 ms Size: 456 B

```
[
    {
        "treatment": "pending",
        "address": "Nowhwere",
        "gender": "Transgender",
        "patientid": 27,
        "createddate": "Mon Jul 12 09:00:00 PDT 1982",
        "phonenumber": 1234,
        "diagnosis": "scheduled",
        "patientname": "Alan Caver",
        "symptom": "Cold",
        "lastvisited": "Sat Dec 19 08:00:00 PST 1987",
        "dob": "Sat Aug 01 09:00:00 PDT 1981",
        "id": 27,
        "status": "ICU"
```

Look’s up a patient’s information given the name. It first checks if the patient’s record is in the Cache. Returns from Cache if it is in the Cache. If we get a Cache miss, then the patient’s info will be retrieved from Cassandra

POST Endpoint: /Crew/PatientInfoFilter



POST localhost:8080/Crew/PatientInfoFilter

● raw

JSON (application/json)

```
{"Filter Type": "Gender",
"Filter Value": "Male"}
```

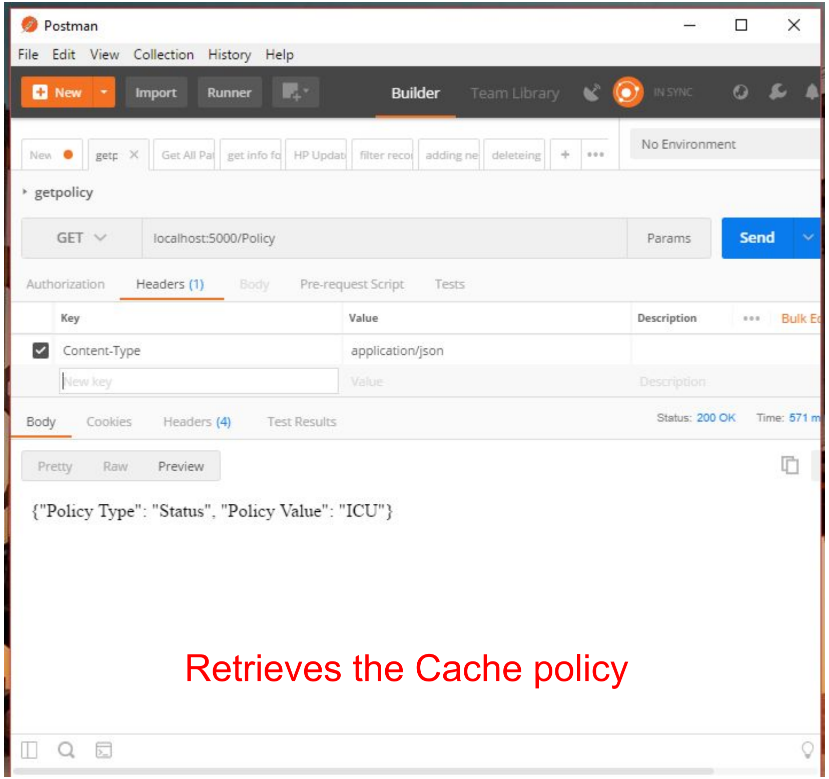
Status: 200 OK Time: 184 ms Size: 3.91 KB

JSON

```
[
    {
        "treatment": "in progress",
        "address": "645 Kent Drive,Trumbull, CT 06611",
        "gender": "Male",
        "patientid": 23,
        "createddate": "Sat Mar 12 08:00:00 PST 2011",
        "phonenumber": 4787,
        "diagnosis": "done",
        "patientname": "Ji Klink",
        "symptom": "Neck Pain",
        "lastvisited": "Sat Apr 22 09:00:00 PDT 2017",
        "dob": "Thu Sep 11 09:00:00 PDT 2008",
        "id": 23,
        "status": "Observation"
    },
    {
        "treatment": "pending",
        "address": "8398 Sunset Dr,Tualatin, OR 97062",
        "gender": "Male",
        "patientid": 16,
        "createddate": "Wed Feb 15 08:00:00 PST 2006",
        "phonenumber": 6003,
        "diagnosis": "pending",
        "patientname": "Delinda Shirk",
        "symptom": "Fever",
        "lastvisited": "Tue Apr 20 09:00:00 PDT 2021",
        "dob": "Tue Dec 26 08:00:00 PST 2006",
        "id": 16,
        "status": "Ongoing"
```

Filters the records based on specified filter type and value. When applicable, the Cache is checked and the data retrieved from Cache. Otherwise, queries Cassandra.

PolicyServer endpoint: “/Policy” GET and POST



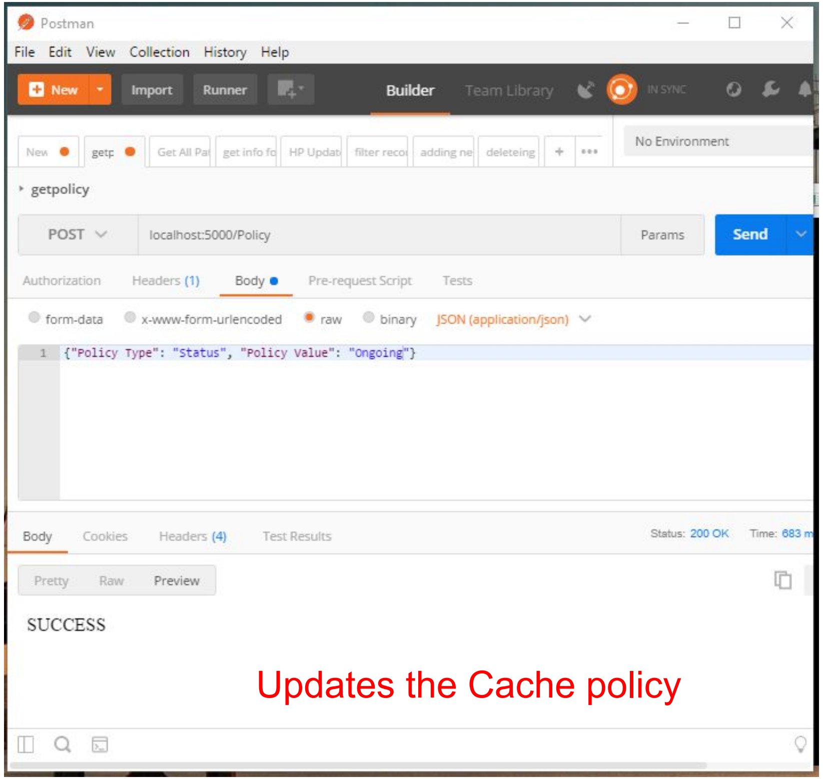
GET localhost:5000/Policy

	Key	Value	Description
☑	Content-Type	application/json	
	New key	Value	Description

Status: 200 OK Time: 571 m

```
{"Policy Type": "Status", "Policy Value": "ICU"}
```

Retrieves the Cache policy



POST localhost:5000/Policy

○ form-data ○ x-www-form-urlencoded ● raw ○ binary JSON (application/json)

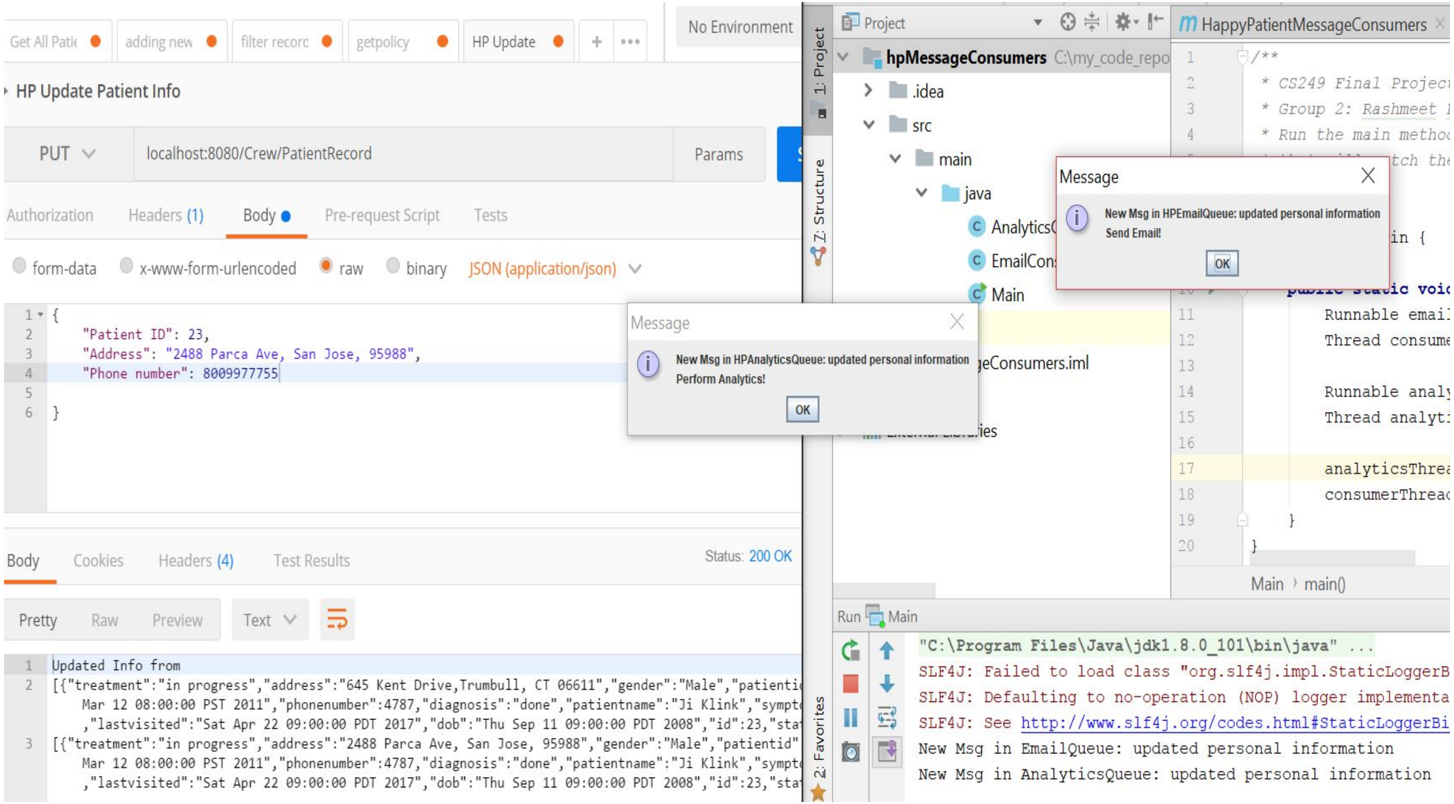
```
{"Policy Type": "Status", "Policy Value": "Ongoing"}
```

Status: 200 OK Time: 683 m

```
SUCCESS
```

Updates the Cache policy

Message Consumers



HP Update Patient Info

PUT localhost:8080/Crew/PatientRecord

○ form-data ○ x-www-form-urlencoded ● raw ○ binary JSON (application/json)

```
{
    "Patient ID": 23,
    "Address": "2488 Parca Ave, San Jose, 95988",
    "Phone number": 8009977755

}
```

Status: 200 OK

```
Updated Info from
[{"treatment":"in progress","address":"645 Kent Drive,Trumbull, CT 06611","gender":"Male","patienti
    Mar 12 08:00:00 PST 2011","phonenumber":4787,"diagnosis":"done","patientname":"Ji Klink","sympt
    ,"lastvisited":"Sat Apr 22 09:00:00 PDT 2017","dob":"Thu Sep 11 09:00:00 PDT 2008","id":23,"sta
[{"treatment":"in progress","address":"2488 Parca Ave, San Jose, 95988","gender":"Male","patientid"
    Mar 12 08:00:00 PST 2011","phonenumber":4787,"diagnosis":"done","patientname":"Ji Klink","sympt
    ,"lastvisited":"Sat Apr 22 09:00:00 PDT 2017","dob":"Thu Sep 11 09:00:00 PDT 2008","id":23,"sta
```

Message

New Msg in HPAnalyticsQueue: updated personal information
Perform Analytics!

hpMessageConsumers C:\my_code_repo
- .idea
- src
  - main
    - java
      - Analytics
      - EmailCon
      - Main
- geConsumers.iml
- External Libraries

HappyPatientMessageConsumers

```
/**
 * CS249 Final Projec
 * Group 2: Rashmeet
 * Run the main metho
 *                tch the

                  in {

    public static voi
        Runnable emai
        Thread consume

        Runnable analy
        Thread analyti

        analyticsThre
        consumerThrea
    }
}
```

Main › main()

Message

New Msg in HPEmailQueue: updated personal information
Send Email!

```
"C:\Program Files\Java\jdk1.8.0_101\bin\java" ...
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerB
SLF4J: Defaulting to no-operation (NOP) logger implementa
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBi
New Msg in EmailQueue: updated personal information
New Msg in AnalyticsQueue: updated personal information
```

- Email consumer observes ActiveMQ Queue “HPEmailQueue”

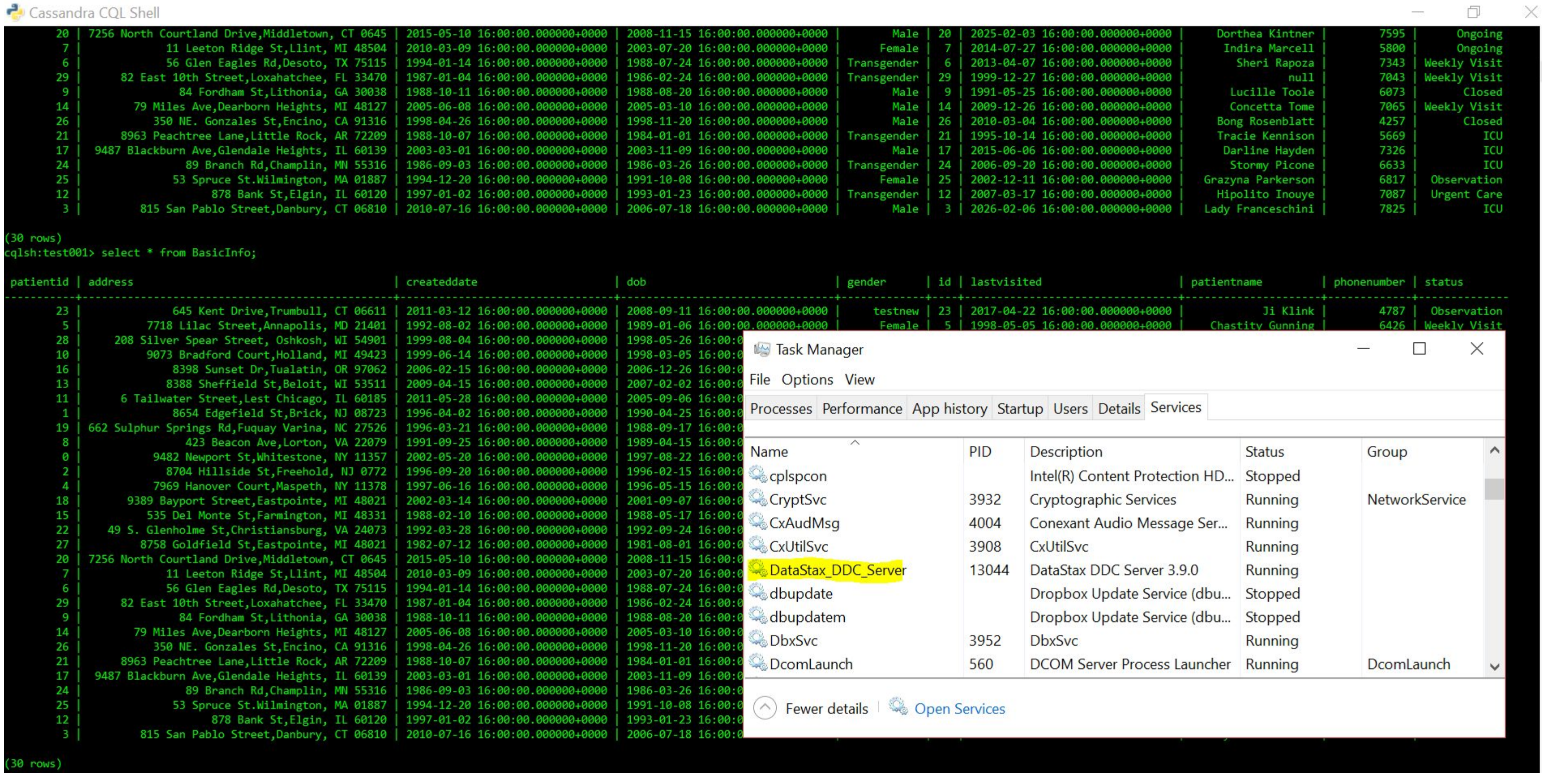
- Analytics consumer observers ActiveMQ Queue “HPAnalyticsQueue”

- When info is updated, main HP app sends message to queue triggering action by consumers

How we set up the environment?

- We set up the environment on both MAC and Windows
    - Install DataStax Community wrapper for Cassandra
    - Install Apache ActiveMQ as a service running in background
    - Download and run Memcache.exe
    - Do pip install for Flask for Python and its dependencies
        - JSON
        - Requests

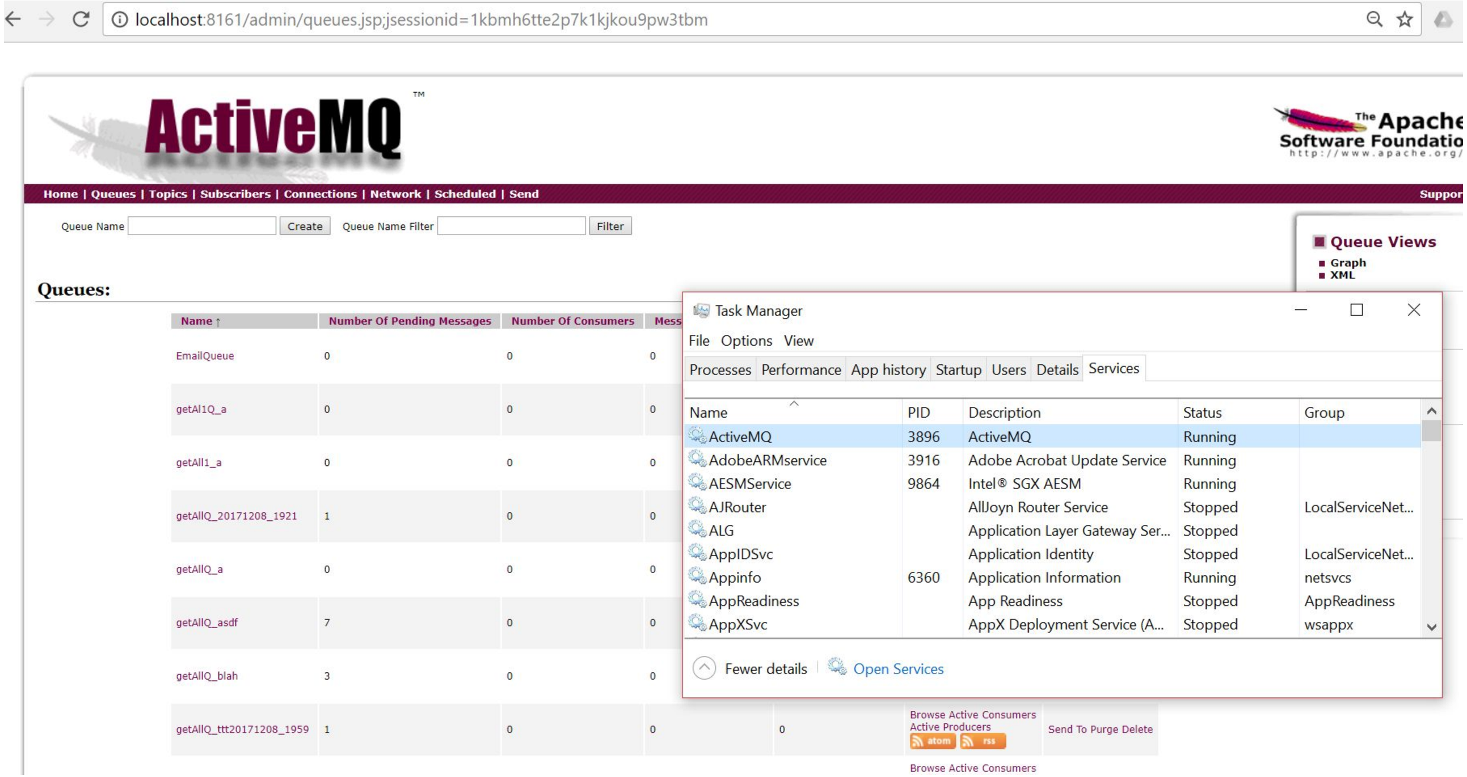
Environment: Cassandra



```
        20 | 7256 North Courtland Drive,Middletown, CT 0645 | 2015-05-10 16:00:00.000000+0000 | 2008-11-15 16:00:00.000000+0000 |        Male | 20 | 2025-02-03 16:00:00.000000+0000 |   Dorthea Kintner |        7595 |      Ongoing
         7 |             11 Leeton Ridge St,Llint, MI 48504 | 2010-03-09 16:00:00.000000+0000 | 2003-07-20 16:00:00.000000+0000 |      Female |  7 | 2014-07-27 16:00:00.000000+0000 |    Indira Marcell |        5800 |      Ongoing
         6 |             56 Glen Eagles Rd,Desoto, TX 75115 | 1994-01-14 16:00:00.000000+0000 | 1988-07-24 16:00:00.000000+0000 | Transgender |  6 | 2013-04-07 16:00:00.000000+0000 |      Sheri Rapoza |        7343 | Weekly Visit
        29 |      82 East 10th Street,Loxahatchee, FL 33470 | 1987-01-04 16:00:00.000000+0000 | 1986-02-24 16:00:00.000000+0000 | Transgender | 29 | 1999-12-27 16:00:00.000000+0000 |              null |        7043 | Weekly Visit
         9 |               84 Fordham St,Lithonia, GA 30038 | 1988-10-11 16:00:00.000000+0000 | 1988-08-20 16:00:00.000000+0000 |        Male |  9 | 1991-05-25 16:00:00.000000+0000 |     Lucille Toole |        6073 |       Closed
        14 |        79 Miles Ave,Dearborn Heights, MI 48127 | 2005-06-08 16:00:00.000000+0000 | 2005-03-10 16:00:00.000000+0000 |        Male | 14 | 2009-12-26 16:00:00.000000+0000 |     Concetta Tome |        7065 | Weekly Visit
        26 |           350 NE. Gonzales St,Encino, CA 91316 | 1998-04-26 16:00:00.000000+0000 | 1998-11-20 16:00:00.000000+0000 |        Male | 26 | 2010-03-04 16:00:00.000000+0000 |   Bong Rosenblatt |        4257 |       Closed
        21 |      8963 Peachtree Lane,Little Rock, AR 72209 | 1988-10-07 16:00:00.000000+0000 | 1984-01-01 16:00:00.000000+0000 | Transgender | 21 | 1995-10-14 16:00:00.000000+0000 |   Tracie Kennison |        5669 |          ICU
        17 |  9487 Blackburn Ave,Glendale Heights, IL 60139 | 2003-03-01 16:00:00.000000+0000 | 2003-11-09 16:00:00.000000+0000 |        Male | 17 | 2015-06-06 16:00:00.000000+0000 |    Darline Hayden |        7326 |          ICU
        24 |                89 Branch Rd,Champlin, MN 55316 | 1986-09-03 16:00:00.000000+0000 | 1986-03-26 16:00:00.000000+0000 | Transgender | 24 | 2006-09-20 16:00:00.000000+0000 |     Stormy Picone |        6633 |          ICU
        25 |              53 Spruce St.Wilmington, MA 01887 | 1994-12-20 16:00:00.000000+0000 | 1991-10-08 16:00:00.000000+0000 |      Female | 25 | 2002-12-11 16:00:00.000000+0000 | Grazyna Parkerson |        6817 |  Observation
        12 |                    878 Bank St,Elgin, IL 60120 | 1997-01-02 16:00:00.000000+0000 | 1993-01-23 16:00:00.000000+0000 | Transgender | 12 | 2007-03-17 16:00:00.000000+0000 |   Hipolito Inouye |        7087 |  Urgent Care
         3 |         815 San Pablo Street,Danbury, CT 06810 | 2010-07-16 16:00:00.000000+0000 | 2006-07-18 16:00:00.000000+0000 |        Male |  3 | 2026-02-06 16:00:00.000000+0000 | Lady Franceschini |        7825 |          ICU

(30 rows)
cqlsh:test001> select * from BasicInfo;

 patientid | address                                        | createddate                     | dob                             | gender      | id | lastvisited                     | patientname       | phonenumber | status
-----------+------------------------------------------------+---------------------------------+---------------------------------+-------------+----+---------------------------------+-------------------+-------------+--------------
        23 |              645 Kent Drive,Trumbull, CT 06611 | 2011-03-12 16:00:00.000000+0000 | 2008-09-11 16:00:00.000000+0000 |     testnew | 23 | 2017-04-22 16:00:00.000000+0000 |          Ji Klink |        4787 |  Observation
         5 |          7718 Lilac Street,Annapolis, MD 21401 | 1992-08-02 16:00:00.000000+0000 | 1989-01-06 16:00:00.000000+0000 |      Female |  5 | 1998-05-05 16:00:00.000000+0000 |  Chastity Gunning |        6426 | Weekly Visit
        28 |     208 Silver Spear Street, Oshkosh, WI 54901 | 1999-08-04 16:00:00.000000+0000 | 1998-05-26 16:00:0
        10 |          9073 Bradford Court,Holland, MI 49423 | 1999-06-14 16:00:00.000000+0000 | 1998-03-05 16:00:0
        16 |              8398 Sunset Dr,Tualatin, OR 97062 | 2006-02-15 16:00:00.000000+0000 | 2006-12-26 16:00:0
        13 |             8388 Sheffield St,Beloit, WI 53511 | 2009-04-15 16:00:00.000000+0000 | 2007-02-02 16:00:0
        11 |      6 Tailwater Street,Lest Chicago, IL 60185 | 2011-05-28 16:00:00.000000+0000 | 2005-09-06 16:00:0
         1 |              8654 Edgefield St,Brick, NJ 08723 | 1996-04-02 16:00:00.000000+0000 | 1990-04-25 16:00:0
        19 | 662 Sulphur Springs Rd,Fuquay Varina, NC 27526 | 1996-03-21 16:00:00.000000+0000 | 1988-09-17 16:00:0
         8 |                423 Beacon Ave,Lorton, VA 22079 | 1991-09-25 16:00:00.000000+0000 | 1989-04-15 16:00:0
         0 |           9482 Newport St,Whitestone, NY 11357 | 2002-05-20 16:00:00.000000+0000 | 1997-08-22 16:00:0
         2 |             8704 Hillside St,Freehold, NJ 0772 | 1996-09-20 16:00:00.000000+0000 | 1996-02-15 16:00:0
         4 |           7969 Hanover Court,Maspeth, NY 11378 | 1997-06-16 16:00:00.000000+0000 | 1996-05-15 16:00:0
        18 |       9389 Bayport Street,Eastpointe, MI 48021 | 2002-03-14 16:00:00.000000+0000 | 2001-09-07 16:00:0
        15 |          535 Del Monte St,Farmington, MI 48331 | 1988-02-10 16:00:00.000000+0000 | 1988-05-17 16:00:0
        22 |    49 S. Glenholme St,Christiansburg, VA 24073 | 1992-03-28 16:00:00.000000+0000 | 1992-09-24 16:00:0
        27 |         8758 Goldfield St,Eastpointe, MI 48021 | 1982-07-12 16:00:00.000000+0000 | 1981-08-01 16:00:0
        20 | 7256 North Courtland Drive,Middletown, CT 0645 | 2015-05-10 16:00:00.000000+0000 | 2008-11-15 16:00:0
         7 |             11 Leeton Ridge St,Llint, MI 48504 | 2010-03-09 16:00:00.000000+0000 | 2003-07-20 16:00:0
         6 |             56 Glen Eagles Rd,Desoto, TX 75115 | 1994-01-14 16:00:00.000000+0000 | 1988-07-24 16:00:0
        29 |      82 East 10th Street,Loxahatchee, FL 33470 | 1987-01-04 16:00:00.000000+0000 | 1986-02-24 16:00:0
         9 |               84 Fordham St,Lithonia, GA 30038 | 1988-10-11 16:00:00.000000+0000 | 1988-08-20 16:00:0
        14 |        79 Miles Ave,Dearborn Heights, MI 48127 | 2005-06-08 16:00:00.000000+0000 | 2005-03-10 16:00:0
        26 |           350 NE. Gonzales St,Encino, CA 91316 | 1998-04-26 16:00:00.000000+0000 | 1998-11-20 16:00:0
        21 |      8963 Peachtree Lane,Little Rock, AR 72209 | 1988-10-07 16:00:00.000000+0000 | 1984-01-01 16:00:0
        17 |  9487 Blackburn Ave,Glendale Heights, IL 60139 | 2003-03-01 16:00:00.000000+0000 | 2003-11-09 16:00:0
        24 |                89 Branch Rd,Champlin, MN 55316 | 1986-09-03 16:00:00.000000+0000 | 1986-03-26 16:00:0
        25 |              53 Spruce St.Wilmington, MA 01887 | 1994-12-20 16:00:00.000000+0000 | 1991-10-08 16:00:0
        12 |                    878 Bank St,Elgin, IL 60120 | 1997-01-02 16:00:00.000000+0000 | 1993-01-23 16:00:0
         3 |         815 San Pablo Street,Danbury, CT 06810 | 2010-07-16 16:00:00.000000+0000 | 2006-07-18 16:00:0

(30 rows)
```

Name	PID	Description	Status	Group
cplspcon		Intel(R) Content Protection HD...	Stopped	
CryptSvc	3932	Cryptographic Services	Running	NetworkService
CxAudMsg	4004	Conexant Audio Message Ser...	Running	
CxUtilSvc	3908	CxUtilSvc	Running	
DataStax_DDC_Server	13044	DataStax DDC Server 3.9.0	Running	
dbupdate		Dropbox Update Service (dbu...	Stopped	
dbupdatem		Dropbox Update Service (dbu...	Stopped	
DbxSvc	3952	DbxSvc	Running	
DcomLaunch	560	DCOM Server Process Launcher	Running	DcomLaunch

Environment: ActiveMQ



localhost:8161/admin/queues.jsp;jsessionid=1kbmh6tte2p7k1kjkou9pw3tbm

ActiveMQ™
The Apache Software Foundatio
http://www.apache.org/
Home | Queues | Topics | Subscribers | Connections | Network | Scheduled | Send
Suppor
Queue Name
Create
Queue Name Filter
Filter
Queue Views
Graph
XML

Queues:

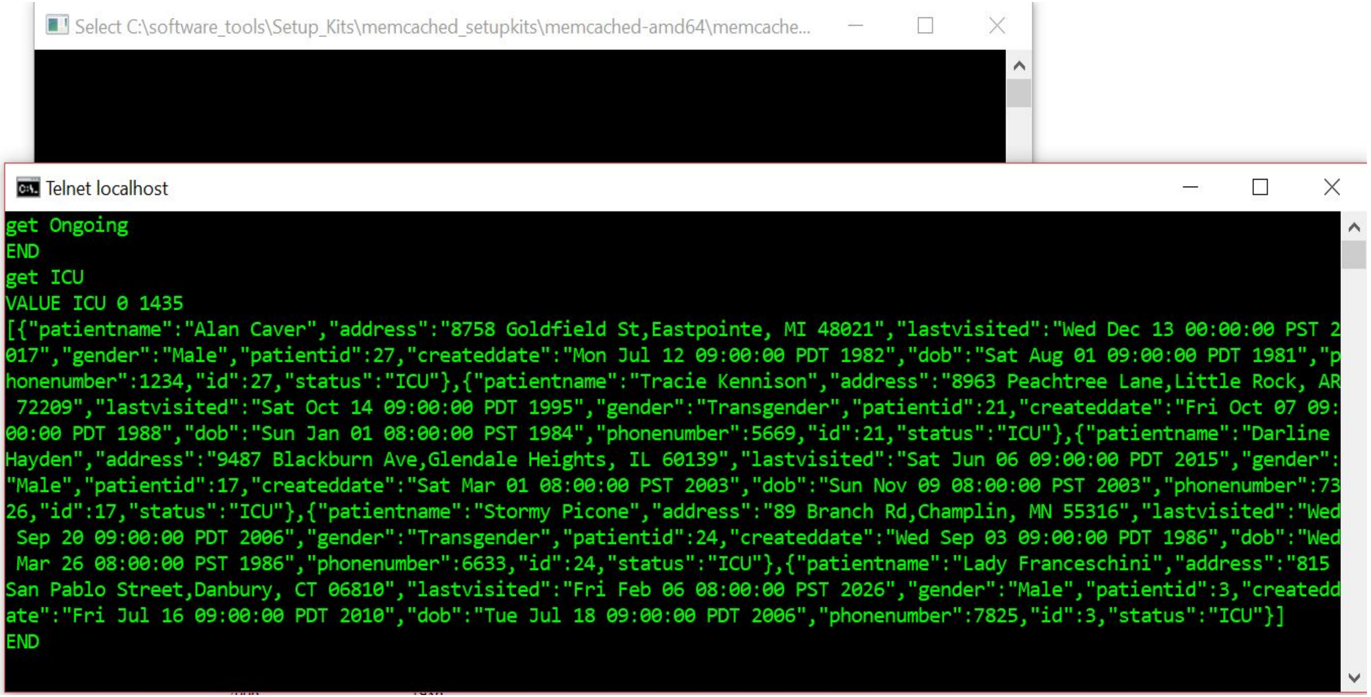
Name ↑	Number Of Pending Messages	Number Of Consumers	Mess			
EmailQueue	0	0	0			
getAl1Q_a	0	0	0			
getAll1_a	0	0	0			
getAllQ_20171208_1921	1	0	0			
getAllQ_a	0	0	0			
getAllQ_asdf	7	0	0			
getAllQ_blah	3	0	0			
getAllQ_ttt20171208_1959	1	0	0	0	Browse Active Consumers Active Producers atom rss	Send To Purge Delete
					Browse Active Consumers	

Task Manager
File Options View
Processes Performance App history Startup Users Details Services

Name	PID	Description	Status	Group
ActiveMQ	3896	ActiveMQ	Running	
AdobeARMservice	3916	Adobe Acrobat Update Service	Running	
AESMService	9864	Intel® SGX AESM	Running	
AJRouter		AllJoyn Router Service	Stopped	LocalServiceNet...
ALG		Application Layer Gateway Ser...	Stopped	
AppIDSvc		Application Identity	Stopped	LocalServiceNet...
Appinfo	6360	Application Information	Running	netsvcs
AppReadiness		App Readiness	Stopped	AppReadiness
AppXSvc		AppX Deployment Service (A...	Stopped	wsappx

Environment: Memcache

Memcahce telnet console: When the policy is set to ICU


Select C:\software_tools\Setup_Kits\memcached_setupkits\memcached-amd64\memcache...
Telnet localhost

```
get Ongoing
END
get ICU
VALUE ICU 0 1435
[{"patientname":"Alan Caver","address":"8758 Goldfield St,Eastpointe, MI 48021","lastvisited":"Wed Dec 13 00:00:00 PST 2
017","gender":"Male","patientid":27,"createddate":"Mon Jul 12 09:00:00 PDT 1982","dob":"Sat Aug 01 09:00:00 PDT 1981","p
honenumber":1234,"id":27,"status":"ICU"},{"patientname":"Tracie Kennison","address":"8963 Peachtree Lane,Little Rock, AR
 72209","lastvisited":"Sat Oct 14 09:00:00 PDT 1995","gender":"Transgender","patientid":21,"createddate":"Fri Oct 07 09:
00:00 PDT 1988","dob":"Sun Jan 01 08:00:00 PST 1984","phonenumber":5669,"id":21,"status":"ICU"},{"patientname":"Darline
Hayden","address":"9487 Blackburn Ave,Glendale Heights, IL 60139","lastvisited":"Sat Jun 06 09:00:00 PDT 2015","gender":
"Male","patientid":17,"createddate":"Sat Mar 01 08:00:00 PST 2003","dob":"Sun Nov 09 08:00:00 PST 2003","phonenumber":73
26,"id":17,"status":"ICU"},{"patientname":"Stormy Picone","address":"89 Branch Rd,Champlin, MN 55316","lastvisited":"Wed
 Sep 20 09:00:00 PDT 2006","gender":"Transgender","patientid":24,"createddate":"Wed Sep 03 09:00:00 PDT 1986","dob":"Wed
 Mar 26 08:00:00 PST 1986","phonenumber":6633,"id":24,"status":"ICU"},{"patientname":"Lady Franceschini","address":"815
San Pablo Street,Danbury, CT 06810","lastvisited":"Fri Feb 06 08:00:00 PST 2026","gender":"Male","patientid":3,"createdd
ate":"Fri Jul 16 09:00:00 PDT 2010","dob":"Tue Jul 18 09:00:00 PDT 2006","phonenumber":7825,"id":3,"status":"ICU"}]
END
```

What we referred to learn concepts

- Jersey example:
  - https://www.mkyong.com/webservices/jax-rs/jersey-hello-world-example/
- Java Cassandra interaction:
  - http://www.baeldung.com/cassandra-with-java
- Java ActiveMQ Interaction:
  - http://activemq.apache.org/hello-world.html
  - https://www.youtube.com/watch?v=yQcC6Z0PPes&t=879s
  - https://www.youtube.com/watch?v=3T-lDT-vALE
- Memcache Interaction:
  - https://www.tutorialspoint.com/memcached

Code walkthrough

- 3 Main Projects:
  - “HappyPatients” main App
  - “CS249PolicyServer” cache policy server
  - “hpMessageConsumers” email and analytics consumers
- Sample Data Generated through Python

Thank You