# Postgresql 9.5 (Jay)

1. sudo apt-get update
2. sudo apt-get install postgresql postgresql-contrib
3. sudo -u postgres createuser --interactive
   * Name: fhir
   * Superuser? Y
4. sudo -u postgres createdb fhir
5. sudo -u postgres psql
   * \password fhir
   * \q
6. sudo -u postgres nano /etc/postgresql/9.5/main/pg\_hba.conf
   * add line “host all all 0.0.0.0/0 md5”
7. sudo –u postgres nano /etc/postgresql/9.5/main/postgresql.conf
   * change “#listen\_addresses = ‘localhost’” to “listen\_addresses = ‘\*’”
8. sudo /etc/init.d/postgresql restart

Steps 6 through 8 allow direct access to the postgres database. By default, postgres installation limits database connections to localhost only.

# PostGIS 2.X install (Peter)

1. sudo apt install postgis
2. sudo su – postgres
3. psql fhir -c “create extension postgis”
4. psql fhir -c “create extension fuzzystrmatch”
5. psql fhir -c “create extension postgis\_tiger\_geocoder”
6. psql fhir -c “create user synth\_ma encrypted password 'synth\_ma123'”
7. --export/import schemas: tiger\_data (ma partitions), tiger\_cb14\_500k, synth\_ma, zip (zip\_to\_zcta)

# Tomcat 8 (Jay)

1. sudo apt-get update
2. sudo apt-get install default-jdk
3. sudo groupadd tomcat
4. sudo useradd -s /bin/false -g tomcat -d /opt/tomcat tomcat
5. curl --proxy http://gatekeeper.mitre.org:80 -O http://mirror.reverse.net/pub/apache/tomcat/tomcat-8/v8.5.3/bin/apache-tomcat-8.5.3.tar.gz
6. sudo mkdir /opt/tomcat
7. sudo tar xzvf apache-tomcat-8.5.3.tar.gz -C /opt/tomcat/ --strip-components=1
8. cd /opt/tomcat/
9. sudo mkdir target
10. sudo mkdir target/lucenefiles
11. sudo chgrp -R tomcat /opt/tomcat
12. sudo chown -R tomcat /opt/tomcat
13. sudo chmod g+rwx conf
14. sudo chmod -R g+r conf
15. sudo nano /etc/systemd/system/tomcat.service

|  |
| --- |
| Contents of tomcat.service file |
| [Unit]  Description=Apache Tomcat Web Application Container  After=network.target  [Service]  Type=forking  Environment=JAVA\_HOME=/usr/lib/jvm/java-1.8.0-openjdk-amd64  Environment=CATALINA\_PID=/opt/tomcat/temp/tomcat.pid  Environment=CATALINA\_HOME=/opt/tomcat  Environment=CATALINA\_BASE=/opt/tomcat  Environment='CATALINA\_OPTS=-Xms512M -Xmx2048M -server -XX:+UseParallelGC'  Environment='JAVA\_OPTS=-Djava.awt.headless=true -Djava.security.egd=file:/dev/./urandom'  ExecStart=/opt/tomcat/bin/startup.sh  ExecStop=/opt/tomcat/bin/shutdown.sh  User=tomcat  Group=tomcat  RestartSec=10  Restart=always  [Install]  WantedBy=multi-user.target |

1. Development/Integration Only
   * sudo nano /opt/tomcat/conf/tomcat-users.xml
   * Add “<user username="fhir" password="fhir" roles="manager-gui" />” within <tomcat-users/>
2. sudo systemctl daemon-reload
3. sudo systemctl enable tomcat
4. sudo systemctl start tomcat
5. systemctl status tomcat.service

# Deploy SyntheticMass fork of HAPI-FHIR (Jay)

1. mvn package
2. mv hapi-fhir-jpaserver-example/target/hapi-fhir-jpaserver-example.war ./fhir.war
3. Copy fhir.war to Ubuntu machine /opt/tomcat/webapps/fhir.war
4. Webapp will autodeploy (if Tomcat is running)
   * Webpage: http://[server]:8080/fhir
   * FHIR REST API: <http://[server]:8080/fhir/baseDstu3>
5. If there are errors in running the war file:
   * sudo less /opt/tomcat/logs/catalina.out

# Move Tomcat 8 to Port 80 (Greg)

NOTE: End up moving tomcat to port 8081 and proxying it via apache web server on port 80

1. Echo $UID to find out my user id
2. sudo apt-get install unzip
3. sudo apt-get install ant
4. vim /opt/tomcat/conf/server.xml
5. Change port from 8080 to 80 and save and exit
6. Restarted tomcat and now it works!
7. See port usage: sudo netstat –peanut
8. see processes for process ids: ps all

# Install htc-api (Greg)

1. pip freeze got error that pip was not installed
2. sudo apt install python-pip
3. pip install virtualenv
4. added the following lines to the end of ~/.bashrc:

$ export no\_proxy='localhost,127.0.0.1,.mitre.org'

$ export NO\_PROXY=$no\_proxy

# Proxy on/off

$ alias proxy-on="export http\_proxy='http://gatekeeper.mitre.org:80'; export https\_proxy='http://gatekeeper.mitre.org:80'; export HTTP\_PROXY=$http\_proxy; export HTTPS\_PROXY=$https\_proxy;"

$ alias proxy-off="unset http\_proxy ; unset https\_proxy ; unset HTTP\_PROXY ; unset HTTPS\_PROXY"

1. source ~/.bashrc
2. pip install virtualenv 🡪 FAILED
   1. apt-get remove python-pip python3-pip
   2. wget <https://bootstrap.pypa.io/get-pip.py> --no-check-certificate
   3. sudo –H python get-pip.py 🡪 FAILED
   4. sudo apt-get install python-pip
   5. sudo –H pip install virtualenv --proxy=gatekeeper.mitre.org:80 (indicated newer pip version available)
   6. ~~pip install --upgrade pip (skipped this the 2~~~~nd~~ ~~time because virtualenv venv was failing)~~
3. ssh-keygen –t rsa
4. more ~/.ssh/id\_rsa.pub
5. copy key
6. went to gitlab.mitre.org and added the public key using copy above
7. git clone [git@gitlab.mitre.org:HTCProject/htc-api.git](mailto:git@gitlab.mitre.org:HTCProject/htc-api.git)
8. cd htc-api/api
9. virtualenv venv 🡪 FAILED (setuptools pkg\_resources pip wheel failed with error code 2)
10. <https://github.com/pypa/pip/issues/1805>
11. Uninstalled pip and virtualenv and re-installed. Did #6 then continued at #13
12. Now get OSError: [Errno 17] File exists
13. Deleted venv directory in htc-api/api
14. virtualenv venv
15. source venv/bin/activate
16. pip install –r requirements.txt --proxy gatekeeper.mitre.org:80
    1. Command “python setup.py egg\_info” failed with error code 1 in /tmp/pip-build-Akzwsl/psycopg2/
    2. Error: You need to install postgresql-server-dev-X.Y for building a server-side extension or libpq-dev for building a client-side application
    3. sudo apt-get install postgresql 🡪 says already installed
    4. sudo apt-get install python-psycopg2
    5. sudo apt-get install libpq-dev
    6. Re-ran pip install –r requirements.txt –proxy gatekeeper.mitre.org:80
17. . htc\_run.sh
18. Hit <http://syntheticmass.mitre.org:8080/htc/api/v1> from firefox and it works fine
19. . test\_rest.sh

<returned here>

1. Moved htc-api to be under syntheticmass in /home/gquinn/

# Update htc-api (Greg)

1. Made pct\_male and pct\_female returned for counties/stats return percentages as decimalvs between 0 and 1.
2. From ~: git clone https://gregquinn2001@github.com/synthetichealth/syntheticmass.git
3. From ~: mv htc\_api syntheticmass
4. git add –a
5. git commit –m “1st push of htc-api”
6. git push

# Use local postgres (Greg)

1. Changed htc\_login.txt to point at local postgres
2. Changed mht schema in queries within htc\_api.py to synth\_ma
3. . htc\_kill.sh
4. . htc\_run.sh (make sure virtual environment activated with source command)
5. . test\_rest.sh
6. Error: relation “county\_health.chr” does not exist
   1. Sent e-mail to Peter Sylvester (cc’ed Andre and Jay) about missing table chr.
   2. Peter copied the chr table over from mht to syntheticmass postgres
7. . htc\_kill.sh
8. . htc\_run.sh (make sure virtual environment activated with source command)
9. . test\_rest.sh (all tests pass)

# Mod\_proxy (Greg)

(both fhir and api served through apache on port 80)

1. sudo apt-get install apache2 apache2-doc apache2-utils
2. sudo vim /etc/apache2/apache2.confs
3. sudo service apache2 restart
4. sudo a2dissite 000-default.conf
5. sudo vim /etc/apache2/sites-available/syntheticmass.mitre.org.conf
6. sudo mkdir –p /var/www/syntheticmass.mitre.org/public\_html
7. sudo mkdir /var/www/syntheticmass.mitre.org/logs
8. sudo a2ensite syntheticmass.mitre.org.conf
9. sudo service apache2 restart
10. vim /opt/tomcat/conf/server.xml
11. Change port from 80 to 8081 and save and exit
12. Restarted tomcat
13. sudo a2enmod proxy\_http
14. service apache2 restart
15. Edited the configuration /etc/apache2/sites-available/syntheticmass.mitre.org.conf (red lines above may be replaced by this instead):

<VirtualHost \*:80>

#ServerAdmin webmaster@syntheticmass.mitre.org

ServerName syntheticmass.mitre.org

#ServerAlias www.syntheticmass.mitre.org

#DocumentRoot /var/www/syntheticmass.mitre.org/public\_html

ErrorLog /var/www/syntheticmass.mitre.org/error.log

CustomLog /var/www/syntheticmass.mitre.org/access.log combined

ProxyPass "/api" "http://syntheticmass.mitre.org:8080/htc/api"

ProxyPassReverse "/api" "http://syntheticmass.mitre.org:8080/htc/api"

ProxyPass "/fhir" "http://syntheticmass.mitre.org:8081/fhir"

ProxyPassReverse "/fhir" "http://syntheticmass.mitre.org:8081/fhir"

</VirtualHost>

1. sudo service apache2 restart

NOTE: should switch to using AJP connector on tomcat behind proxy

# Install DIRECT reference implementation (bare metal)

<http://api.nhindirect.org/java/site/assembly/stock/3.0.1/users-guide/depl-hisp-only.html>

1. sudo apt-get install unzip
2. sudo apt-get install ant
3. export JAVA\_HOME=/usr/lib/jvm/java-8-openjdk-amd64/
4. echo "export JAVA\_HOME=$JAVA\_HOME" | sudo tee -a /etc/environment
5. Wrote, compiled, and ran simple program to check max AES encryption key length:

<https://gist.github.com/jehrhardt/5167854>

Key length is unlimited so no JCE install required for OpenJDK 8

1. cd /opt
2. sudo wget -e use\_proxy=yes -e https\_proxy=http://gatekeeper.mitre.org:80/ --no-check-certificate <https://oss.sonatype.org/content/repositories/releases/org/nhind/direct-project-stock/3.0.1/direct-project-stock-3.0.1.tar.gz>
3. sudo tar xvfz direct-project-stock-3.0.1.tar.gz
4. export DIRECT\_HOME=`pwd`/direct
5. echo "export DIRECT\_HOME=$DIRECT\_HOME" | sudo tee -a /etc/environment
6. cp /opt/direct/apache-tomcat-7.0.41/webapps/\*.war /opt/tomcat/webapps
7. cp –R /opt/direct/apache-tomcat-7.0.41/bin/nhindconfig /opt/tomcat/bin
8. /opt/tomcat/bin/shutdown.sh
9. /opt/tomcat/bin/startup.sh
10. tail –f /opt/tomcat/logs/catalina.out
11. <http://syntheticmass.mitre.org:8081/config-ui>
12. certGen.sh requires windowing

# ~~Install Unity 8~~

<http://news.softpedia.com/news/how-to-install-unity-8-on-ubuntu-16-04-lts-and-ubuntu-15-10-496949.shtml>

1. sudo apt-get update && sudo apt-get dist-upgrade
2. sudo apt-get install unity8-desktop-session-mir
3. sudo startx 🡪 failing
4. sudo apt-get --purge remove \*unity\*

# Support synthetic statistics

1. Open pgadmin II and connect to syntheticmass.mitre.org on port 5432
2. Open fhir database
3. Select table county\_stats and copy SQL pane contents
4. Open query window by clicking on SQL Query icon in toolbar
5. Paste “Create TABLE county\_stats” that you just copied from SQL Pane
6. Update table name in 4 places to have “synth\_” in front of table name so you end up with synth\_county\_stats (CREATE TABLE, CONSTRAINT, ALTER TABLE, GRANT ALL ON TABLE)
7. Execute query. Resulting query should look like:

CREATE TABLE synth\_county\_stats

(

ct\_name character varying(100),

ct\_fips character varying(3) NOT NULL,

sq\_mi double precision,

pop numeric,

pop\_male numeric,

pop\_female numeric,

pop\_sm double precision,

ct\_poly geometry(MultiPolygon,4269),

ct\_pnt geometry,

CONSTRAINT pk\_synth\_county\_stats PRIMARY KEY (ct\_fips)

)

WITH (

OIDS=FALSE

);

ALTER TABLE synth\_county\_stats

OWNER TO synth\_ma;

GRANT ALL ON TABLE synth\_county\_stats TO synth\_ma;

1. Repeat steps 3-7 for cousub\_stats to create synth\_cousub\_stats. Resulting query:

CREATE TABLE synth\_cousub\_stats

(

ct\_name character varying(100),

ct\_fips character varying(3) NOT NULL,

cs\_name character varying(100),

cs\_fips character varying(5) NOT NULL,

sq\_mi double precision,

pop numeric,

pop\_male numeric,

pop\_female numeric,

pop\_sm double precision,

cs\_poly geometry(MultiPolygon,4269),

cs\_pnt geometry,

CONSTRAINT pk\_synth\_cousub\_stats PRIMARY KEY (ct\_fips, cs\_fips)

)

WITH (

OIDS=FALSE

);

ALTER TABLE synth\_cousub\_stats

OWNER TO synth\_ma;

GRANT ALL ON TABLE synth\_cousub\_stats TO synth\_ma;

1. Updated ~/syntheticmass/htc-api/api/htc\_api.py.
   1. For each rest api method which queried statistics data, created a new one with a synth prefix that goes against the synth\_ prefixed table
2. Did a backup of the data from the non synth tables and then opened that file in the pgadmin query tool.
3. Searched and replace the table name with the synth\_ prefixed one
4. Execute queries
5. Changed the data in county mode
6. *< Need a script to reset all data in synth\_ to zeros >*

# Deploy synthetic mass web site

1. sudo su
2. export https\_proxy='http://gatekeeper.mitre.org:80'
3. export HTTPS\_PROXY=$https\_proxy
4. cd ~/syntheticmass
5. git pull
6. sudo apt-get install nodejs
7. sudo apt-get install npm
8. ln -s /usr/bin/nodejs /usr/bin/node (https://github.com/sass/node-sass/issues/1601)
9. npm install (as root)
10. sudo npm run build (build-stg or build-dev for those respective servers)
11. cp -R build/\* /var/www/syntheticmass.mitre.org/public\_html
12. sudo vim /etc/apache2/sites-available/syntheticmass.mitre.org.conf
13. uncommented out “DocumentRoot /var/www/syntheticmass.mitre.org/public.html”
14. Added after DocumentRoot within VirtualHost:

<Directory “/”>

DirectoryIndex index.html

</Directory>

1. Added “Header set Access-Control-Allow-Origin “\*”
2. saved and closed
3. sudo service apache2 reload

# SSL Enable Apache Web Server

<https://www.digitalocean.com/community/tutorials/how-to-create-a-ssl-certificate-on-apache-for-ubuntu-14-04>

1. sudo a2enmod ssl
2. sudo service apache2 restart
3. sudo mkdir /etc/apache2/ssl
4. sudo openssl
5. req -x509 -nodes -days 365 -newkey rsa:2048 -keyout /etc/apache2/ssl/apache.key -out /etc/apache2/ssl/apache.crt
   1. US
   2. Massachusetts
   3. Bedford
   4. MITRE
   5. Synthetic Mass
   6. syntheticmass.mitre.org
   7. < no e-mail address >
6. sudo nano /etc/apache2/sites-available/default-ssl.conf
7. Changed ServerAdmin
8. Added ServerName and ServerAlias
9. Updated DocumentRoot to be /var/www/syntheticmass.mitre.org/public\_html
10. Added Directory element with DirectoryIndex of index.html nested in it
11. Added ProxyPass and ProxyPassReverse for /api and /fhir:

ProxyPass "/api" <http://syntheticmass.mitre.org:8080/htc/api>

ProxyPassReverse "/api" "http://syntheticmass.mitre.org:8080/htc/api"

ProxyPass "/fhir" "http://syntheticmass.mitre.org:8081/fhir"

ProxyPassReverse "/fhir" "http://syntheticmass.mitre.org:8081/fhir"

1. Write out and close nano
2. sudo a2ensite ssl-syntheticmass.mitre.org.conf
3. sudo service apache2 restart
4. sudo a2dissite syntheticmass.mitre.org.conf
5. sudo service apache2 reload
6. sudo nano /etc/apache2/apache2.conf
   1. Remove “indexes” from options for Directory /var/www
   2. Save and close
7. sudo service apache2 restart

# Block traffic except to port 443 and allow loopback traffic

1. sudo iptables -A INPUT -m state --state ESTABLISHED,RELATED -j ACCEPT
2. sudo iptables -A INPUT -p tcp --dport ssh -j ACCEPT
3. sudo iptables -A INPUT -p tcp --dport 80 -j ACCEPT
4. sudo iptables -A INPUT -j DROP
5. sudo iptables -I INPUT 1 -i lo -j ACCEPT
6. sudo iptables -I INPUT 5 -m limit --limit 5/min -j LOG --log-prefix "iptables denied: " --log-level 7
7. sudo iptables -I INPUT 1 -p tcp --dport 443 -j ACCEPT
8. sudo nano webpack.config.js
   1. Changed API base URL to use https instead of http (API\_HOST for production case)
   2. Save and close
9. npm run build
10. rm -r /var/www/syntheticmass.mitre.org/public\_html/\*
11. cp -R build/\* /var/www/syntheticmass.mitre.org/public\_html/
12. sudo service apache2 reload
13. sudo sh -c "iptables-save > /etc/iptables.rules"
14. sudo nano /etc/network/interfaces
    1. Edit and add to end:

pre-up iptables-restore < /etc/iptables.rules

* 1. Save and close

# Install Apache James

<http://api.nhindirect.org/java/site/assembly/stock/3.0.1/users-guide/depl-hisp-only.html>

<http://stackoverflow.com/questions/12626027/chained-client-certificates>

<http://api.nhindirect.org/java/site/agent/1.5.1/users-guide/dev-cert-gen.html>

1. mkdir direct\_certs
2. cd direct\_certs
3. sudo openssl genrsa -out rootCA.key 2048
4. sudo openssl req -x509 -new -nodes -key rootCA.key -sha256 -days 1024 -out rootCA.pem
   1. US
   2. Massachusetts
   3. Bedford
   4. MITRE
   5. Synthetic Mass
   6. Syntheticmass.mitre.org Root CA
   7. [admin@syntheticmass.mitre.org](mailto:admin@syntheticmass.mitre.org)
5. sudo openssl genrsa -out device.key 2048
6. sudo openssl req -new -key device.key -out device.csr
   1. Country: US
   2. State: Massachusetts
   3. Locality: Bedford
   4. Org: MITRE
   5. Org unit: Synthetic Mass
   6. Common name: direct.syntheticmass.mitre.org
   7. Email: [admin@direct.syntheticmass.mitre.org](mailto:admin@direct.syntheticmass.mitre.org)
   8. Challenge Password: Password\_1
   9. Company name: MITRE
7. sudo openssl x509 -req -in device.csr -CA rootCA.pem -CAkey rootCA.key -CAcreateserial -out device.crt -days 500 -sha256
8. sudo openssl x509 -in rootCA.pem -out rootCA.der -outform DER
9. sudo openssl rsa -in rootCA.key -out rootCAkey.der -outform DER
10. sudo openssl x509 -in device.crt -out org.der -outform DER
11. sudo openssl rsa -in device.key -out orgkey.der -outform DER
12. sudo openssl pkcs12 -export -out org.p12 -inkey device.key -in device.crt -certfile rootCA.pem
    1. Export password: Password\_1
13. Temporarily Open config port 8081 (http)
    1. sudo iptables -I INPUT 1 -p tcp --dport 8081 -j ACCEPT
14. Use SFTP server (Bitvise SSH client) to copy ~/direct\_certs to desktop on windows machine so they can be accessed from browser
15. <http://syntheticmass.mitre.org:8081/config-ui>
    1. username: admin and password: adm1nD1r3ct
    2. Create New Domain
       1. Domain Name: direct.syntheticmass.mitre.org
       2. Postmaster e-mail: [postmaster@direct.syntheticmass.mitre.org](mailto:postmaster@direct.syntheticmass.mitre.org)
       3. Status: ENABLED
       4. Click Add
    3. Click “Anchors” tab
       1. Browse to the certificate in <Desktop>\direct\_certs
       2. Choose rootCA.der
       3. Check off Incoming and Outgoing
       4. Choose Status ENABLED
       5. Click Add Anchor
    4. Click “Certificates” in top toolbar
       1. Click Browse and go to <Desktop>\direct\_certs
       2. Chioose org.der
       3. Status: ENABLED
       4. Click Add Certificate.
16. cd /opt/direct/james-2.3.2
17. sudo sh bin/setdomain.sh direct.syntheticmass.mitre.org
18. Delete temporary access to port 8081
    1. sudo iptables -L -v --line-numbers
    2. sudo iptables -D INPUT 1
19. sudo -E sh bin/run.sh &
20. telnet localhost 4555
    1. root
    2. root
    3. adduser gquinn gquinn
    4. quit
21. sudo iptables -L -v --line-numbers
22. sudo iptables -I INPUT 4 -p tcp --dport 25 -j ACCEPT
23. sudo sh -c "iptables-save > /etc/iptables.rules"

Only allows SMTP traffic – no POP or IMAP.

# Build and Deploy HAPI-FHIR JPA Server

1. cd ~
2. git clone [git@gitlab.mitre.org:synthea/hapi-fhir.git](mailto:git@gitlab.mitre.org:synthea/hapi-fhir.git)
3. sudo apt install maven
4. If not already retrieved, get sonatype certificate using your laptop:
   1. Using firefox browse to <https://oss.sonatype.org/>
   2. Click on lock icon and click on right arrow then more information
   3. Click View Certificate
   4. Click on Details tab
   5. Click on Export… button
   6. Save certificate as \*.crt to downloads in user directory (c:\users\gquinn\Downloads\-.sonatype.org.crt)
5. Use SFTP (Bitvise) to copy -.sonatype.org.crt to home directory (~) on syntheticmass.mitre.org
6. sudo keytool -importcert -file -.sonatype.org.crt -keystore /usr/lib/jvm/java-8-openjdk-amd64/jre/lib/security/cacerts
   1. changeit
   2. y
7. sudo nano /etc/maven/settings.xml
   1. Uncomment out proxy and create one to gatekeeper.mitre.org on port 80 for http
   2. Save and close (Ctrl-O, Ctrl-X)
8. cd ~/hapi-fhir
9. mvn install (failed on hapi-fhir-jpaserver-example)
10. cd hapi-fhir-jpaserver-example
11. mvn package
12. sudo mv /opt/tomcat/webapps/fhir.war /opt/tomcat/webapps/fhir.bkp
13. sudo mv target/hapi-fhir-jpaserver-example.war /opt/tomcat/webapps/fhir.war
14. cd /opt/tomcat
15. sudo bin/shutdown.sh (wait a minute)
16. sudo bin/startup.sh (wait a few minutes)

# Redirect port 80 to port 443

1. sudo nano /etc/apache2/sites-available/syntheticmass.mitre.org.conf
2. Edit to look like:

<VirtualHost \*:80>

ServerName syntheticmass.mitre.org

ServerAlias www.syntheticmass.mitre.org

Redirect permanent / https://syntheticmass.mitre.org/

</VirtualHost>

* 1. Save and close

1. sudo a2ensite syntheticmass.mitre.org.conf
2. sudo service apache2 reload
3. rm /opt/tomcat/webapps/config-service.war (no longer needed and was endless looping on startup so just removed it for now)

# Fix conformance retrieval

1. cd ~/hapi-fhir/hapi-fhir-jpaserver-example
2. nano src/main/java/ca/uhn/fhir/jpa/demo/FhirTesterConfig.java
   1. update .withBaseUrl and replace ${serverBase} with <https://syntheticmass.mitre.org/fhir>”
   2. Write and close
3. Go to “Rebuilding HAPI-FHIR server on Ubuntu Server” below

# Allow tomcat to call back to itself (going through apache web server)

1. sudo keytool -alias apachewebserver -importcert -file /etc/apache2/ssl/apache.crt -keystore /usr/lib/jvm/java-8-openjdk-amd64/jre/lib/security/cacerts
   1. changeit
   2. y
2. sudo /opt/tomcat/bin/shutdown.sh
3. sudo /opt/tomcat/bin/startup.sh

# Rebuilding HAPI-FHIR server on Ubuntu Server

1. If changes are in a dependent project used by hapi-fhir-jpaserver-example (e.g., hapi-fhir-base or hapi-fhir-jpaserver-base)
   1. cd ~/hapi-fhir/< project name e.g. hapi-fhir-base >
   2. make changes to source files with src directory of that project
   3. mvn install
2. cd ~/hapi-fhir/hapi-fhir-jpaserver-example
3. Make changes to source files within hapi-fhir-jpaserver-example
4. mvn package
5. sudo cp target/hapi-fhir-jpaserver-example.war /opt/tomcat/webapps/fhir.war
6. sudo tail -f /opt/tomcat/logs/catalina.out
7. wait for deployment to be finished (about 46 seconds) by watching for log message

# Zero Statistics

1. psql -U fhir -W -h localhost -d fhir -c "update synth\_ma.synth\_county\_stats set pop\_male = 0, pop\_female = 0, pop = 0"
   1. fhir
2. psql -U fhir -W -h localhost -d fhir -c "update synth\_ma.synth\_cousub\_stats set pop\_male = 0, pop\_female = 0, pop = 0"
   1. fhir

# Deploy Web Site Updates

1. sudo su
2. cd ~/syntheticmass
3. export https\_proxy='http://gatekeeper.mitre.org:80'
4. export HTTPS\_PROXY=$htts\_proxy
5. git pull
6. exit
7. cd ~syntheticmass/site
8. sudo npm run build (to build for production)
9. sudo npm run build-dev (to build for dev server)
10. sudo npm run build-stg (to build for staging server)
11. rm -r /var/www/syntheticmass.mitre.org/public\_html/\*
12. cp -R build/\* /var/www/syntheticmass.mitre.org/public\_html
13. sudo service apache2 reload

# SFTP from Synthea Setup

1. Andre added user synthea password TestTest123$
2. Added synthea to AllowUsers at end of /etc/ssh/sshd\_config
3. Created directory /ccda
4. sudo chown synthea.synthea /ccda
5. sudo chmod 755 /ccda

# Synthetic-mass-dev.mitre.org

1. sudo nano /etc/network/interfaces
   1. Edit to comment out last line:

pre-up iptables-restore < /etc/iptables.rules

* 1. Save and close

1. Clear firewall rules after clone of VM from syntheticmass.mitre.org
   1. sudo iptables -P INPUT ACCEPT
   2. sudo iptables -P FORWARD ACCEPT
   3. sudo iptables -P OUTPUT ACCEPT
   4. sudo iptables -t nat -F
   5. sudo iptables -t mangle -F
   6. sudo iptables -F
   7. sudo iptables -X
2. Update ~/syntheticmass/htc\_api/api/htc\_login.txt to point at syntheticmass-dev
3. . htc\_kill.sh
4. . htc\_run.sh
5. cd /etc/apache2/sites-available
6. sudo nano ssl-syntheticmass.mite.org.conf
   1. Update to use syntheticmass-dev (but keep site name and directory as is) Proxy directives near end most important
   2. Write and close
7. sudo service apache2 reload
8. sudo nano webpack.config.js
   1. Changed API and FHIR base URLs to use dev
   2. Save and close
9. sudo npm run build
10. rm -r /var/www/syntheticmass.mitre.org/public\_html/\*
11. cp -R build/\* /var/www/syntheticmass.mitre.org/public\_html/
12. sudo service apache2 reload

# Switch Direct to use postgres Database

1. sudo nano /opt/tomcat/webapps/config-service/WEB-INF/beans.xml
   1. Comment out Derby configuration
   2. Uncomment out postgresl configuration
   3. Write and close
2. sudo -u postgres createdb nhindconfig
3. sudo -u postgres createuser nhind
4. sudo -u postgres psql
   1. postgres=# \password nhind
   2. nhind
   3. nhind
   4. \q
5. Sudo su
6. cp webapps/fhir/WEB-INF/lib/postgresql-9.3-1100-jdbc41.jar webapps/config-service/WEB-INF/lib/
7. /opt/tomcat/bin/shutdown.sh
8. /opt/tomcat/bin/startup.sh
9. Repeated steps 15-20 of “Install Apache James”

# James Testing

sudo nano /opt/direct/james-2.3.2/apps/james/SAR-INF/config.xml

/opt/direct/james-2.3.2/apps/james/var/mail is where mail is stored

tail -f /opt/direct/james-2.3.2/apps/james/logs/smtpserver-2016… [view log]

1. To stop James:
   1. ps -ef | grep james [to get the pid for james. Maybe should get pid for sh run.sh and kill that first?]
   2. sudo kill < pid >
2. sudo keytool -importkeystore -deststorepass changeit -destkeypass changeit -destkeystore /usr/lib/jvm/java-8-openjdk-amd64/jre/lib/security/cacerts -srckeystore ~/direct\_certs/org.p12 -srcstoretype PKCS12 -srcstorepass Password\_1 [import direct domain key/cert into keystore]
3. sudo nano /opt/direct/james-2.3.2/apps/james/SAR-INF/config.xml
   1. remove commenting around smime mailets
   2. end up with this:

<mailet match="IsSMIMEEncrypted" class="SMIMEDecrypt">

<!--keyStoreType>pkcs12</keyStoreType-->

<keyStoreFileName>/usr/lib/jvm/java-8-openjdk-amd64/jre/lib/security/cacerts</keyStoreFile$

<keyStorePassword>changeit</keyStorePassword>

<keyAlias>1</keyAlias>

<!--keyAliasPassword>myKeyPass</keyAliasPassword-->

</mailet>

<mailet match="IsSMIMESigned" class="SMIMECheckSignature">

<!--keyStoreType>pkcs12</keyStoreType-->

<keyStoreFileName>/usr/lib/jvm/java-8-openjdk-amd64/jre/lib/security/cacerts</keyStoreFile$

<keyStorePassword>changeit</keyStorePassword>

<strip>false</strip>

<onlyTrusted>true</onlyTrusted>

</mailet>

1. sudo -E sh run.sh & [to start James]
2. Wrote SMTP client on my windows machine in NetBeans
   1. Downloaded and used libraries:
      1. Commons-codec-1.10.jar (Apache Commons Codec)
      2. bcprov-jdk15on-155.jar (Bouncy Castle Provider)
      3. bcmail-jdk15on-155.jar (Bouncy Castle S/MIME)
      4. bcpkix-jdk15on-155.jar (Bouncy Castle Security)
      5. javax.mail.jar (Javamail)
   2. Installed Unlimited Key Length policy JARs for JCE on my Windows PC (not needed on Ubuntu as OpenJDK includes them already). In C:\Program Files\Java\jdk1.8.0\_102\jre\lib\security
      1. Moved local\_policy.jar and US\_export\_policy.jar out and put them in C:\bouncycastle\jce\_policy-8\original limited
      2. Copied JARs of same name from C:\bouncycastle\jce\_policy-8\UnlimitedJCEPolicyJDK8 (extracted from zip: jce\_policy-8.zip)
   3. Client sends an encrypted e-mail which is successfully decrypted by Direct RI See result in my inbox: /opt/direct/james-2.3.2/apps/james/var/mail/inboxes/gquinn. Note that authentication is not being done as it is not required for delivery to our mail server. If we wanted our mail server to forward it to another mail server, then it would require authentication.
   4. Need to try adding digital signature which Direct RI should already be set up to handle.

package sendemail;

import java.io.FileInputStream;

import java.security.KeyStore;

import java.security.Security;

import java.security.cert.Certificate;

import java.security.cert.X509Certificate;

import java.util.Date;

import java.util.Enumeration;

import java.util.Properties;

import javax.mail.Address;

import javax.mail.Authenticator;

import javax.mail.Message;

import javax.mail.Session;

import javax.mail.Transport;

import javax.mail.internet.InternetAddress;

import javax.mail.internet.MimeBodyPart;

import javax.mail.internet.MimeMessage;

import org.bouncycastle.cms.CMSAlgorithm;

import org.bouncycastle.cms.jcajce.JceCMSContentEncryptorBuilder;

import org.bouncycastle.cms.jcajce.JceKeyTransRecipientInfoGenerator;

import org.bouncycastle.jce.provider.BouncyCastleProvider;

import org.bouncycastle.mail.smime.SMIMEEnvelopedGenerator;

/\*\*

\*

\* @author GQUINN

\*/

public class SendEmail {

/\*\*

\* @param args the command line arguments

\*/

public static void main(String[] args) {

System.out.println("SendEmail Start");

String smtpHostServer = "syntheticmass-dev.mitre.org";

String fromUser = "gquinn";

String fromName = "Greg Quinn";

String fromEmail = "gquinn@direct.syntheticmass-dev.mitre.org";

String password = "gquinn";

String toEmail = "gquinn@direct.syntheticmass-dev.mitre.org";

Properties props = System.getProperties();

props.put("mail.smtp.host", smtpHostServer);

//props.put("mail.smtp.auth", "true");

//props.put("mail.smtp.port", "587");

//props.put("mail.smtp.starttls.enable", "true");

/\*Authenticator auth = new Authenticator() {

//override the getPasswordAuthentication method

@Override

protected PasswordAuthentication getPasswordAuthentication() {

return new PasswordAuthentication(Base64.encode(fromEmail.getBytes()), Base64.encode(password.getBytes())); //Base64.encode(DigestUtils.sha1(password))

}

};\*/

Authenticator auth = null;

Session session = Session.getInstance(props, auth);

sendEmail(session, fromEmail, fromName, toEmail, "SendEmail Direct Testing Subject", "SimpleEmail Testing Body");

}

public static void sendEmail(Session session, String fromEmail, String fromName, String toEmail, String subject, String body) {

try {

MimeMessage msg = new MimeMessage(session);

msg.addHeader("Content-type", "text/HTML; charset=UTF-8");

msg.addHeader("format", "flowed");

msg.addHeader("Content-Transfer-Encoding", "8bit");

msg.setFrom(new InternetAddress(fromEmail, fromName));

msg.setReplyTo(InternetAddress.parse(fromEmail, false));

//msg.setSubject(subject, "UTF-8");

//msg.setText(body, "UTF-8");

encryptMessage(msg, subject, body);

msg.setSentDate(new Date());

msg.setRecipients(Message.RecipientType.TO, InternetAddress.parse(toEmail, false));

System.out.println("Message is ready");

Transport.send(msg);

System.out.println("EMail Sent Successfully!!");

} catch (Exception e) {

e.printStackTrace();

}

}

private static final String KEY\_STORE = "C:\\Users\\gquinn\\Desktop\\direct\_certs\\org.p12";

private static final String KEY\_STORE\_PASSWORD = "Password\_1";

private static void encryptMessage(MimeMessage pMessage, String pSubject, String pContent) {

if (Security.getProvider("BC") == null) {

Security.addProvider(new BouncyCastleProvider());

}

//

// Open the key store

//

try {

KeyStore ks = KeyStore.getInstance("PKCS12", "BC");

ks.load(new FileInputStream(KEY\_STORE), KEY\_STORE\_PASSWORD.toCharArray());

Enumeration e = ks.aliases();

String keyAlias = null;

while (e.hasMoreElements())

{

String alias = (String)e.nextElement();

if (ks.isKeyEntry(alias))

{

keyAlias = alias;

}

}

if (keyAlias == null)

{

System.err.println("can't find a private key!");

System.exit(0);

}

Certificate[] chain = ks.getCertificateChain(keyAlias);

//

// create the generator for creating an smime/encrypted message

//

SMIMEEnvelopedGenerator gen = new SMIMEEnvelopedGenerator();

gen.addRecipientInfoGenerator(new JceKeyTransRecipientInfoGenerator((X509Certificate)chain[0]).setProvider("BC"));

//

// create a subject key id - this has to be done the same way as

// it is done in the certificate associated with the private key

// version 3 only.

//

/\*

MessageDigest dig = MessageDigest.getInstance("SHA1", "BC");

dig.update(cert.getPublicKey().getEncoded());

gen.addKeyTransRecipient(cert.getPublicKey(), dig.digest());

\*/

//

// create the base for our message

//

MimeBodyPart msg = new MimeBodyPart();

msg.setText(pContent);

MimeBodyPart mp = gen.generate(msg, new JceCMSContentEncryptorBuilder(CMSAlgorithm.RC2\_CBC).setProvider("BC").build());

//

// Get a Session object and create the mail message

//

//Properties props = System.getProperties();

//Session session = Session.getDefaultInstance(props, null);

//Address fromUser = new InternetAddress("\"Eric H. Echidna\"<eric@bouncycastle.org>");

//Address toUser = new InternetAddress("example@bouncycastle.org");

//MimeMessage body = new MimeMessage(session);

//body.setFrom(fromUser);

//body.setRecipient(Message.RecipientType.TO, toUser);

pMessage.setSubject(pSubject);

pMessage.setContent(mp.getContent(), mp.getContentType());

pMessage.saveChanges();

} catch (Exception e) {

e.printStackTrace();

}

}

}

# HTC\_API Startup on Boot

1. crontab -e
   1. chose nano
   2. added “@reboot . /home/gquinn/syntheticmass/htc-api/api/htc\_run.sh”
   3. save and close
2. chmod +x /home/gquinn/syntheticmass/htc-api/api/htc\_run.sh

# GO FHIR Server Startup

1. nohup /opt/gofhir/gofhir -pgurl postgres://fhir:fhir@localhost/fhir?sslmode=disable > /opt/gofhir/gofhir.log &

# Adding a New User to Ubuntu Server

1. sudo adduser < username >
   1. Password: TestTest123$
2. sudo chage -d 0 < username >
3. [For SUDO access] sudo usermod -G sudo < username >
4. sudo nano /etc/ssh/sshd\_config
   1. (ADD USERNAME TO LIST)
   2. Save and close
5. sudo /etc/init.d/ssh restart

# Mount Share on syntheticmass-dev

1. sudo mount nfs.storage-bed.mitre.org:/ifs/bed/STaaS/CCG/SHR /mnt/synthea/

# Automatic start of gofhir and htc-api on boot

1. cd /lib/systemd/system
2. sudo nano gofhir-auto.service

[Unit]

Description=Job that starts the gofhir server

After=postgresql.service mongod.service

[Service]

Type=forking

ExecStart=/bin/bash /opt/gofhir/fhir\_run.sh

[Install]

WantedBy=multi-user.target

1. sudo nano htc-api-auto.service

[Unit]

Description=Job that starts the syntheticmass htc api

After=postgresql.service

[Service]

Type=forking

WorkingDirectory=/opt/syntheticmass/htc-api/api

ExecStart=/bin/bash /opt/syntheticmass/htc-api/api/htc\_run.sh

[Install]

WantedBy=multi-user.target

1. sudo systemctl enable gofhir-auto.service
2. sudo systemctl enable htc-api-auto.service
3. commands:

# get status

> systemctl status gofhir-auto.service

# start/stop/disable

> systemctl [start/stop/disable] gofhir-auto.service

# service log

> journalctl -u gofhir-auto.service

> systemctl -a | grep gofhir-auto.service

1. sudo nano /opt/gofhir/fhir\_run.sh

#!/bin/bash

cd /opt/gofhir

nohup ./gofhir -pgurl postgres://fhir:fhir@localhost/fhir?sslmode=disable > ./gofhir.log &

1. sudo chmod a+x /opt/gofhir/fhir\_run.sh
2. sudo chmod a+x /opt/syntheticmass/htc-api/api/htc\_run.sh

# Installed new SendDirectEmailService

1. Use SFTP to copy WAR file to syntheticmass-dev server from my local machine
2. Put WAR into /opt/tomcat/webapps folder
3. Ran test app from my local machine to send a synthetic patient via direct message to gquinn@direct.syntheticmass.mitre.org
4. ls -l /opt/direct/james-2.3.2/apps/james/var/mail/inboxes/gquinn/ (Verified e-mail delivered)

# Made Web Site use https proxied go fhir server (via Apache web server)

1. sudo nano ~/syntheticmass/site/webpack.config.js
   1. Updated FHIR\_HOST for production and development to <https://synthetichost-dev.mitre.org/fhir/>
   2. Saved and closed
2. cd ~/syntheticmass/site
3. sudo npm run build
4. rm -r /var/www/syntheticmass.mitre.org/public\_html/\*
5. cp -R build/\* /var/www/syntheticmass.mitre.org/public\_html/
6. sudo service apache2 reload
7. proxy-on
8. git add -A
9. git commit -m “changed fhir server access to use https”
10. git push
11. ISSUE: URLs returned by Go FHIR server are absolute and not based on proxy

# HTTPS Proxy for Send Direct Email Service

1. sudo nano /etc/apache2/sites-available/ssl-syntheticmass.mitre.org.conf
   1. added to end of virtual host:

ProxyPass "/SendDirectEmailService" "http://syntheticmass-dev.mitre.org:8081/SendDirectEmailService"

ProxyPassReverse "/SendDirectEmailService" "http://syntheticmass-dev.mitre.org:8081/SendDirectEmailService"

* 1. save and close

1. sudo service apache2 reload