Presenter: James Dickson, Flywheel

- Senior Director of Customer Solutions and Support
- Developed for and administered multiple XNAT systems since 2010 in Academia, Pharma and then with Radiologics, Inc.
- London is still warmer than either Glasgow or my current hometown of Philadelphia right now.
  - London 66F/18C
  - Glasgow 56F/13C
  - Philadelphia 50F/10C
XNAT Administration - Agenda

- Backend configuration
- Basic Site configuration
- Manage Notifications
- User Administration
  - Registration
  - Authentication
- Customization
  - Themes
  - Plugins
1. What do I do with this new shiny XNAT instance?
2. We have some boring backend configurations/optimizations to do.
XNAT Administration - Backend Items

- Postgresql Optimization and configuration
- Tomcat (XNAT) configuration
- Common XNAT cron jobs
Understanding the Components of XNAT

Contemporary View

CONTAINER SERVICE
Run processing in containers where each container image controls its own environment. Easily scaled using plugins.

XNAT PIPELINE ENGINE
Runs processing on XNAT data and return output to XNAT.

PLUGIN FRAMEWORK
Add data types, API, UI & features.

XNAT SERVER
Java-based web application on an Apache Tomcat server.

XNAT DATABASE
PostgreSQL used to store indexed project data according to defined XSD Schemas.

FILE STORE
All UI resources are stored. Only the Archive should be backed up.

EVENT SERVICE & AUTOMATION
Script-automated responses to user or system events.

ANONYMIZATION
DicomEdits scripts can be applied site-wide or on a per-project basis to remove PHI from DICOM headers.

FRONT END
UI is built in Flexibility templates and delivered as HTML / CSS for use in a web browser.

DICOM SCP RECEIVER
Allows your XNAT to be set up as a destination for PACS to send image sessions to. Requires PACS to be set up separately.

API
Core data functions and commands can be accessed by external tools or scripts with proper authentication.

DICOM SCP RECEIVER
Excel your XNAT to be set up as a destination for PACS to send image sessions to. Requires PACS to be set up separately.

SECURE USER AUTHENTICATION
Single Sign-On is used for all data access.

USER ACCESS
Data access in XNAT is segregated by project. Each project determine who has access to its data. User access can be enabled or disabled by site administrators as needed.

www.xnat.org | Winter 2022

XNAT WORKSHOP 2022
XNAT Administration - Slightly Simplified

Apache Tomcat Web Application

XNAT PostgreSQL DB

XNAT File Repository
Postgresql Optimization

https://pgtune.leopard.in.ua/#/
Tomcat Memory Config

MYMEM=$(free -m | grep Mem | awk '{print $7}')

MYJAVAMEM=$(bc <<< "scale=0;($MYMEM-1024) * .70" | cut -f1 -d'.')

echo "CATALINA_OPTS="-Xmx${MYJAVAMEM}m -Xms512m -XX:MaxPermSize=256m \ -Djavax.sql.DataSource.Factory=org.apache.commons.dbcp.BasicDataSourceFactory \ -Dxnat.home=/home/xnat/ -Djava.library.path=/usr/lib64:/usr/local/lib64/" " >> /home/xnat/tomcat/bin/setenv.sh

-Xmx3096m -Xms512m -XX:MaxPermSize=256m
## XNAT Filesystem Layout

<table>
<thead>
<tr>
<th>Folder Name</th>
<th>Standard Location</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>archive</td>
<td>/data/xnat/archive</td>
<td>The XNAT Archive is the permanent storage location for all XNAT files, such as uploaded DICOM files or project resource files. All files in this folder are catalogued in the XNAT web application, and tracked in the XNAT audit trail.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>⚠️ For any non-clinical XNAT, take steps to prevent files with personal health information (PHI) from being stored in this location.</td>
</tr>
<tr>
<td>build</td>
<td>/data/xnat/build</td>
<td>This path is currently unused, but is reserved for potential future enhancements to the build process.</td>
</tr>
<tr>
<td>cache</td>
<td>/data/xnat/cache</td>
<td>The XNAT user cache is a place where XNAT can store user-specific files. These are often temporary files.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☑️ When users or processes mark a file for deletion, XNAT does not actually delete the file. Instead, it is sent to the cache/DELETED directory. It is a good idea to monitor usage of this folder periodically, as it can retain large amounts of unneeded data.</td>
</tr>
<tr>
<td>ftp</td>
<td>/data/xnat/ftp</td>
<td>This is a reserved path for the now-deprecated XNAT FTP server.</td>
</tr>
<tr>
<td>prearchive</td>
<td>/data/xnat/prearchive</td>
<td>The XNAT Prearchive is an interim file storage area separate from the XNAT Archive, where uploaded files can be safely reviewed for PHI. It is common for ongoing studies to upload image sessions to the Prearchive rather than directly to the archive.</td>
</tr>
<tr>
<td>pipeline</td>
<td>/data/xnat/pipeline</td>
<td>This is a reserved path that is used when installing the XNAT Pipeline Engine</td>
</tr>
</tbody>
</table>
Common cron jobs

1. Security patches
2. XNAT log compression and archival.
3. Cache directory cleanout (older than x days)
4. Backing up Postgresql (pg_dump)
5. Backup the XNAT archive (rsync, zfs-snapshots etc)
Primary and Shadow Node

- Primary Tomcat node used for UI interaction.
- A ‘shadow’ node can be installed that point to the same filesystem and postgres.
- Shadow nodes will be used for pipeline and container rest api calls.
Deployment Strategies

- Docker compose
- Bare metal
- Hypervisor base local
  - ESXi, proxmox etc
- Hypervisor base cloud
  - aws, azure, gcp
Basic Site Configuration - Site Information

1. Set Site ID
2. Set Site Url
3. Set Site description
1. Set Admin Email
2. Set Primary Username
Change the Admin Password!

1. You’d be amazed....
Manage Notifications

1. Mail Server Settings
2. Notification Emails
3. Site-wide Alerts
Each of these system notifications are sent to users based on various actions. Each notification email has a set of usable shortcodes, such as "USER_USERNAME". For help with system notifications, see Notifications and Alerts in XNAT.

Select Email Template

Toggle which email template appears in the panel below

Verify Email Change Request

A request was made to change the email address for the user with username USER_USERNAME to this address. If you did not make this request, you can ignore this email. If you made this request and wish to have this change take effect, please log into your account and click CHANGE_EMAIL_LINK.

Text of the message sent to a new email address for a user to verify the change made to the account's associated email. Available shortcodes:
USER_USERNAME - The username of the account.
CHANGE_EMAIL_LINK - The link to change the email address.
Site-wide Alerts

1. Turn on the site wide alert when scheduling any downtime for updates or maintenance.
User Administration

1. Local users (XNAT managed authentication and authorization)
2. LDAP users (LDAP authentication with XNAT managed authorization)
3. OpenID users (OpenID authentications with XNAT managed authorization)
LDAP Configuration

Jumpcloud-provider.properties

- name=JumpCloud
- provider.id=jumpcloud
- auth.method=ldap
- auto.enabled=true
- auto.verified=false
- address=ldap://ldap.jumpcloud.com
- userdn=uid=ldap,ou=Users,o=sthshsthsthsthsth,dc=jumpcloud,dc=com
- search.base=o=sthshsthsthsthsth,dc=jumpcloud,dc=com
- search.filter=(uid={0})
- password=&^%&^%*^%*&^%*&^
Registration Options

1. The user can register an account for themselves
2. A new user can be invited to join XNAT by a current user who is a project owner
3. A new user account can be created by an XNAT administrator
Customizing XNAT

1. Adding a theme.
2. Adding custom variables.
3. Creating an XNAT Plugin for a new DataType
Customizing XNAT - Installing Data Type Plugins

- XSD Schema Entry
- XML Display Document
- UI Templates and custom scripts (optional)
- XNAT Plugin Java Class
Customizing XNAT - Rad Read Plugin

https://bitbucket.org/nrg_customizations/nrg_plugin_radread

README.md

XNAT 1.7 Rad Read Plugin

This is the XNAT 1.7 Rad Read Plugin. It adds the Radiological Assessment data type.

Building

To build the XNAT 1.7 Rad plugin:

1. If you haven’t already, clone this repository and cd to the newly cloned folder.
2. Build the plugin: ./gradlew jar (on Windows, you can use the batch file: gradlew.bat jar). This should build the plugin in the file build/libs/xnat-radread-plugin-1.0.0.jar (the version may differ based on updates to the code).
3. Copy the plugin jar to your plugins folder: cp build/libs/xnat-radread-plugin-1.0.0.jar /data/xnat/home/plugins

Deploying

Deploying your XNAT plugin just requires copying it to the plugins folder for your XNAT installation. The location of the plugins folder varies based on how and where you have installed your XNAT. If you are running a virtual machine created through the XNAT Vagrant project, you can copy the plugin to the appropriate configuration folder and then copy it within the VM from /vagrant to /data/xnat/home/plugins.

You can also set up a share for your Vagrant configuration that actually creates the VM’s plugins folder as a share with your host machine. This allows you to deploy the plugin by copying it into the shared local folder, where it will then appear on the VM in the linked shared folder.

Once you’ve copied the plugin jar into your XNAT’s plugins folder, you need to restart the Tomcat server. Your new plugin will be available and the data type will be enabled in your XNAT as soon as the restart and initialization process is completed.
1. Checkout the plugin.
   • `git clone https://bitbucket.org/nrg_customizations/nrg_plugin_radread`

2. Build the plugin.
   • `./gradlew jar`
Customizing XNAT - Plugin Installation Process

1. Shut down the Apache Tomcat Server
   • systemctl stop tomcat
2. Copy the Plugin jar file into XNAT’s Plugin directory
   • cp build/libs/*.jar /home/xnat/plugins/
3. Start up the Apache Tomcat Server
   • systemctl start tomcat
Configuring a new Data Type

1. Click Administrator-> Data Type menu.
2. Choose Setup Additional Data Type
3. Select new data type.
4. Insert singular/plural name
5. Click next, next, next ……..
Enabling Rad Reads

The easiest way for users to add a new Rad Read assessor to an image session in your XNAT is if you give them a link in the Actions menu of that image session report page. To add this action, do the following for each image session data type you want to add this functionality to:

1. In the top navigation of your XNAT, go to Administer > Data Types.
2. Click on the image session xsiType link for the data type you want to modify; for example, xnat:mrSessionData.
3. Click "Edit" in the summary dialog that opens for that data type.

1. Removing a plugin usually results in the datatype being hidden.
2. Recommend versioning data types.
Theme support

https://wiki.xnat.org/documentation/xnat-administration/working-with-ui-themes
Monitoring

Probably the least know page in XNAT.
https://admin-101.workshop.xnat.org/monitoring
Logging
