How to Setup a Grouper Development Environment for Grouper v2.5

Wiki Grouper	Pelease Grouper	Grouper Deployment	Community	Internal Developer
Home Annound	cements Guides	Guide	Contributions	Resources

This how-to describes how to set up a Grouper development environment so that you can code, test, and debug Grouper.

This page is specific to Grouper v2.5.

Instructions for Grouper v2.4 are found at How to Setup a Grouper Development Environment for Grouper 2.4.

This is a "no build" dev env where

- the developer does not run ant or maven on an ongoing basis
- the IDE compiles java classes and copies files around so that Java classes can be run (e.g. unit tests, grouper shell, grouper client, any main())
- the UI and WS webapp is ready be run by Tomee without any ant or maven, and just uses the compiled classes and files from the IDE
- no grouper dependencies need to be compiled or built or copied it is all done by the IDE automatically

Developers should understand how it works since it is a little involved

Note, if using Java 17, pass this argument to tests and tomcat

```
--add-opens java.base/java.lang=ALL-UNNAMED --add-opens java.base/java.util=ALL-UNNAMED --add-opens java.sql
/java.sql=ALL-UNNAMED
```

Troubleshooting

Issue	Resolution
3rd party class not found	Grouper-parent clean and install
Something not compiling	Run the maven copy dependencies (if webapp)
Config not found	Refresh project
	Project clean (in eclipse), select applicable project
Class not found in webapp for command line program	Java Build Path Libraries Add external class folder: webapp/WEB-INF/classes
Still having issues	Look where things compile in file explorer in your OS, and see that all classes and configs are there
	Make sure all linked source configs are right
Linked source already exists	The name conflicts with existing or previous folder. Cancel out and delete the folder in the project which used to link. Or give it a different name
Crashing	Add more memory? Should have at least 3 gigs for eclipse

Grouper dev env high level diagram



In general the dev env uses:

- Java 8
- IDE (e.g. eclipse)
- Git clone
- Tomee (with tomcat 8.5)

Here are diagrams for the client (base dependency of grouper), api (next dependency), and UI (example of a third and final level dependency)

Grouper client dev env diagram



Grouper API dev env diagram

The API needs the client source and configs as linked source folders (e.g. for eclipse). This makes sure the current version of the configs and classes are in use when running tests or programs or compiling API source.



Non web-app dev env diagram

This an example of a non-web plugin for Grouper. Pretty much all modules for Grouper look like this (except web modules like UI/WS/scim). It generally depends on the API (and transitively client).



Webapp dev env diagram

This is an example of the UI dev env. Note other webapps (WS/scim) will look similar. There is no build script to run Tomee against the webapp, it will just work. When you edit Java classes you might need to restart Tomee (due to hotswap)



The example commands and screenshots are from Windows or MacOS and Eclipse, and may vary slightly for different environments. However, the overall process should be similar on any modern operating system and development tool chain. Developers can use whatever tools that let them work most efficiently.

Prerequisites Git for source code version control

- 1. Install Git
 - a. (Mac) Command line installs
 - i. \$ brew install git
 - ii. https://github.com/fabriziocucci/git-bash-for-mac
 - iii. Or Install from package https://git-scm.com/downloads
 - b. Eclipse IDE plugin
 - i https://www.eclipse.org/egit/
 - c. Github Desktop is also handy

Java - Grouper runs on Java

- 1. Install OpenJDK 8 exact version (not above or below). Grouper runs on Java.
 - a. https://aws.amazon.com/corretto/
- 2. Note: do not use Java language features above Java 8 for most of Grouper grouper, grouper-ui, grouper-ws, etc. The grouperClient code must be compliant with Java 6.

Apache Tomee - Grouper runs in Tomee

1. Download and unpack Tomee webprofile 7.0.7. Note: Grouper runs in tomcat 8.5, which is what tomee 7.07 has a. https://www.apache.org/dyn/closer.cgi/tomee/tomee-7.0.7/apache-tomee-7.0.7-webprofile.tar.gz

Database

- One option: Docker Desktop to run our development database
- 1. Install Docker Desktop. We'll use this to run our development database. a. https://www.docker.com/products/docker-desktop
- or You could just use hsql
- or Install mysql or postgres or use external database (external will be slow)

Eclipse - Grouper development happens in Eclipse (or your favorite IDE)

- 1. Install Eclipse IDE for Enterprise Java Developers or similar IDE
- a. https://www.eclipse.org/downloads/packages/
 2. Make sure you have the latest eclipse (2020) or upgrade your current eclipse
- 3. Make sure the eclipse ini has at least 3 gig memory

If you get errors on the client about deprecated libraries, you might need to adjust your compiler errors/warnings

	Preferences	
type filter text	Errors/Warnings	✓ - <>
type filter text General Ant Code Recommenders Gradle Help Install/Update Java Appearance Build Path Code Coverage Code Style Compiler Building Errors/Warnings Javadoc Task Tags Debug Editor Installed JREs JUnit Properties Files Editor Java EE JavaScript JSON	Errors / Warnings Select the severity level for the following optional problems: depr r Deprecated and restricted API Deprecated API: Signal use of deprecated API inside deprecated code Signal overriding or implementing deprecated method Deprecated API marked for removal: Forbidden reference (access rules): Discouraged reference (access rules): Annotations Missing '@Deprecated' annotation: Treat above errors like fatal compile errors (make compiled code	Configure Project Specific Settings Warning C Warning C Varning Info Ignore Ignore C
Maven MidPoint Mylyn Oomph		Restore Defaults Apply Cancel Apply and Close

Line endings should be unix

Preferences

type filter text	Workspace	← → ⇒ 8
 ✓ General ∧ Appearance Capabilities Compare/Patch Content Types 	See <u>'Startup and Shutdown'</u> for workspace startup	p and shutdown preferences.
> Editors	Always close unrelated projects without prom	pt
Globalization Keys	Workspace save interval (in minutes): 5	
Network Connection	Window title	
Notifications	Show workspace name: eclipse_workspa	ceProd
Perspectives Project Natures Quick Search Search	 ☐ Show perspective name ☐ Show full workspace path: C:\mchyzer\ecli ☑ Show product name 	ipse_workspaceProd
 Security Service Policies Startup and Shutdow Tracing UI Responsiveness M Survey Storage Service 	Open referenced projects when a project is oper Report unknown project nature as:	ned: Prompt ~ Warning ~
Web Browser Workspace	Command for launching system explorer: expl	orer /E,/select=\${selected_resource_loc}
> Cloud Foundry	Text file encoding	New text file line delimiter
> Data Management	Default (Cp1252)	O Default (Windows)
> Docker Gradle	O Other: Cp1252 ∨	● Other: Unix ∨
> Help		
> Install/Update V		Restore Defaults Apply
? 🗠 🗹 🔘		Apply and Close Cancel

If you get errors on maven lifecycle set this:

Preferences			_		2
		Errors/Warnings		-	-
 Java Persistence Language Servers 	^	"groupld" duplicate of parent groupld	Warning	~	
✓ Maven		"version" duplicate of parent version	Warning	~	
Discovery		Out-of-date project configuration	Error	\sim	
Errors/Warnings Installations		Plugin execution not covered by lifecycle configuration	Ignore	~	
Java EE Integration		Overriding managed version	Warning	~	
Lifecycle Mappings Source Lookup					

Clone the Grouper Source Repository

The Grouper source code repository is managed in GitHub at https://github.com/Internet2/grouper.

1. D:\mchyzer\git>git clone https://github.com/Internet2/grouper.git

Note: The build strategy changed for the 2.5 release. Switching between 2.4 and 2.5 branches in the same directory and workspace when developing is not recommended. Instead, keep 2.4 and 2.5 work in separate local directories each with their git repository and their own eclipse workspace. For 2.4 development see How to Setup a Grouper Development Environment for Grouper 2.4.

Import Projects into Eclipse

Start a new eclipse workspace and import grouper modules as individual projects. Project will import as Maven projects and automatically download the required Maven dependencies. The example commands below assume the git repository was cloned to the local directory 'D:\mchyzer\git\grouper_v2_5'.

1. Make a variable for the root of the git repo called GIT_ROOT: e.g. for D:\mchyzer\git\grouper, and other variables

Preferences			
variab ×	Linked Resources		← ▼ ⇒ ▼ 8
 General Workspace Linked Resources Java Build Path Classpath Variable Compiler Frorce/Warnings 	✓ Enable linked resources Drag and drop items on a folder or pr ● Prompt ○ Copy ○ Link ○ Lin Drag and drop items on a virtual folde ● Prompt ○ Link ○ Link and creat	oject ik and create <u>v</u> irtual folders er ste v <u>i</u> rtual folders	
 ✓ Debug Detail Formatters Logical Structure Primitive Display 	Path variables specify locations in the fi may be specified relative to these path Defined path variables:	ile system. The locations of linked resources variables.	
✓ Editor	Name	Value	<u>N</u> ew
Hovers	GROUPER_V2_5_CLIENT_CONF	C:\git\grouper_v2_5\grouper-misc\grouperClient\conf	Edi <u>t</u>
Syntax Coloring	GROUPER_V2_5_CLIENT_SOURCE	C:\git\grouper_v2_5\grouper-misc\grouperClient\src\java	
✓ Run/Debug	GROUPER_V2_5_CONF	C:\git\grouper_v2_5\grouper\conf	Remove
String Substitution	GROUPER_V2_5_SOURCE	C:\git\grouper_v2_5\grouper\src\grouper	
✓ Web	GROUPER_V2_5_UI_CONF	C:\git\grouper_v2_5\grouper-ui\conf	
V HIML Files	GROUPER_V2_5_UI_SOURCE	C:\git\grouper_v2_5\grouper-ui\java\src	
Client-side JavaSci	ORACLE_DRIVER	C:\oracle\ojdbc8.jar	
V Editor			
Syntax Colo v			
< > >			
? 2 4 0		Apply and Close	Cancel

- 2. Import grouper-parent
 - a. Eclipse -> File -> Import Maven Existing Maven Project
 - b. Import source: \${GIT_ROOT}/grouper-parent
- 3. That should automatically import all grouper projects

Maven clean on grouper-parent Run the maven grouper-parent clean and install (you can right click in eclipse on the pom and run as: maven clean, then install). you might need to delete . m2/repository/* if it is corrupt.

You might need to bump up memory to 512MB to get maven to build

[INFO]	Reactor	Summary for Grouper 2.5.0-SNAPSHOT:				
[INFO]						
[INFO]	Grouper		SUCCESS	[1.632	s]
[INFO]	Grouper	Client	SUCCESS	[3.659	s]
[INFO]	Grouper	API	SUCCESS	[9.454	s]
[INFO]	Grouper	SCIM	SUCCESS	[0.256	s]
[INFO]	Grouper	UI	SUCCESS	[2.295	s]
[INFO]	Grouper	WS Parent	SUCCESS	[0.063	s]
[INFO]	Grouper	WS	SUCCESS	[3.129	s]
[INFO]	Grouper	WS Generated Client	SUCCESS	[5.320	s]
[INFO]	Grouper	WS Manual Client	SUCCESS	[0.825	s]
[INFO]	Grouper	WS Test	SUCCESS	[0.098	s]
[INFO]	Grouper	Installer	SUCCESS	[8.198	s]
[INFO]	Grouper	AMQ	SUCCESS	[0.853	s]
[INFO]	Grouper	Rabbitmq	SUCCESS	[6.950	s]
[INFO]	Grouper	AWS Messaging	SUCCESS	[9.099	s]
[INFO]	Grouper	PSP-NG	SUCCESS	[0.389	s]
[INFO]						
[INFO]	BUILD SU	JCCESS				

If there are problems in a project, you might need to right click, and do Maven Update project

When you do that, the first time, check the box to update project configuration. In all subsequent times, do NOT have the box checked to update project configuration from pom, or your settings will get undone

🕘 Update Maven Project		×
Update Maven Project		
Select Maven projects and update options		
Available Maven Codebases		
🔲 🗁 grouper		Select All
grouper-activemq		Add out of data
grouper-installer		Add out-of-date
grouper-messaging-aws		Deselect All
🔲 🦢 grouper-parent		Expand All
🔲 🗁 grouper-pspng		
🔲 🗁 grouper-scim		Collapse All
🔽 🗁 grouper-ui		
a 🔲 🗁 grouper-ws-parent		
grouper-ws		
grouper-ws-java-generated-client		
arouperClient		
grouper energy		
Offline		
✓ Update dependencies		
Force Update of Snapshots/Releases		
Update project configuration from pom.xml		
Refresh workspace resources from local filesystem		
Clean projects		
	ОК	Cancel

All the projects should now be open and compiled.

- grouper [grouper_v2_5 master]
- grouper-activemq [grouper_v2_5 master]
- Big > grouper-installer [grouper_v2_5 master]
- grouper-messaging-aws [grouper_v2_5 master]
- grouper-messaging-rabbitmq [grouper_v2_5 master]
- grouper-parent [grouper_v2_5 master]
- grouper-pspng [grouper_v2_5 master]
- b grouper-scim [grouper_v2_5 master]
- grouper-ui [grouper_v2_5 master]
- grouper-ws [grouper_v2_5 master]
- grouper-ws-java-generated-client [grouper_v2_5 master]
- grouper-ws-manual-client [grouper_v2_5 master]
- grouper-ws-parent [grouper_v2_5 master]
- grouper-ws-test [grouper_v2_5 master]
- grouperClient [grouper_v2_5 master]

Link conf to grouper client project

This is one of the main tricks. In my eclipse, the "conf" dir is excluded due to the pom.xml in maven



Link the conf dir (even though its already a source folder) in java build path

• \${PROJECT_LOC}/conf GROUPER_CLIENT_CONF

🕘 Link Source		
Source Folder Link additional source to project 'grouperClient'.		
Linked folder location:		
\${PROJECT_LOC}/conf	Browse	Variables
Folder name:		
GROUPER_CLIENT_CONF]	
\bigcirc Update exclusion filters in other source folders to solv	ve nesting	
Ignore nesting conflicts		

Link source and conf to grouper project We want to be able to run and debug the Grouper so that it picks up client source changes as you develop. Also needs the grouper conf per above

- 1. Link source: \${GIT_ROOT}/grouper-misc/grouperClient/src/java
 GROUPER_CLIENT_SOURCE

 2. Link source: \${GIT_ROOT}/grouper-misc/grouperClient/conf
 GROUPER_CLIENT_SOURCE

 3. Link source: \${PROJECT_LOC}/conf
 GROUPER_CONF

 4. Look at src/test and make sure its not filtering only *.java. All files need to be on classpath for tests to work

Start HSQL (or whatever database) Make a java application:

- Project: grouper ٠ Class:
- Arguments: -port 9001 -database.0 file:hsql/grouperHSQL -dbname.0 grouper

💓 Run Configurations		- • •
Create, manage, and run configue Run a Java application	rations	
Image: Second secon	Name: hsql_start (Main M= Arguments A JRE & Classpath Source Environment Common P Pro	totype
Eclipse Application Eclipse Data Tools Generic Server Generic Server(External La	Project: grouper Main class:	Browse
Gradie Task Gradie Test Grunt Glup HTTP Preview	org.hsqldb.Server Include system libraries when searching for a main class Include inherited mains when searching for a main class Stop in main	Search
 j2EE Preview Java Applet Java Application j ExpirableCacheTest j GrouperClient j hsql_start Ju JUnit 		



Get grouper UI Jars

First off, we need all the jars. You need to do this in the future if you have any class not found exceptions or weird errors, goals: dependency:copy-dependencies

🛞 Run Configurations	
Create, manage, and run configurations	
📑 🖻 🖚 🗎 🗶 🖻 🍸 🔹 Name: grouper ui refresh jars	
type filter text	ource 🚾 Environment 🔲 Common
🗄 Generic Server(External La 🔺 🛛 Base directory:	
Gradle Task S{workspace_loc:/grouper-ui}	
Gradie Test	Workspace File System
Gulp	
HTTP Preview Goals: dependency:copy-d	ependencies
J2EE Preview Profiles:	
Java Applet	o?\settings yml
⊿ J Java Application	
D ExpirableCache l est	Workspace File System
GrouperClient Offline	Update Snapshots
Debug Output	Skip Tests Non-recursive
	artifacts
Ju Junit	. orthocco
1 ▼ Threads	
Launch Group Parameter Name Value	
⊿ m2 Maven Build	
m2 grouper ui refresh jars	
n Node.js Application	
🕀 OSGi Framework	
Ju Task Context Test Maven Runtime: EMBEDDED (3.6.3/1.1	4.0.20191209-1923) 🗸
× XSL •	
Ciles matched 27 of 27 items	Revert

All jars are not in target/dependency

a 🔛 grouper-ui [grouper_v2_5 master]
⊳ 🚌 java/src
⊳ 📇 conf
⊳ 💏 java/test
JRE System Library [JavaSE-1.8]
Maven Dependencies
b > cettings
> 🕞 contrib
🚌 java
b 🔓 misc
🛯 🧀 target
a 🗁 dependency
activation-1.1.1.jar
🗃 ant-1.10.1.jar
📓 ant-launcher-1.10.1.jar
📓 antlr-2.7.7.jar
aws-java-sdk-core-1.11.529.jar
📓 aws-java-sdk-kms-1.11.529.jar
aws-java-sdk-s3-1.11.529.jar
i backport-util-concurrent-3.1.jar
📓 bsh-2.0b5.jar

Link source and conf to grouper-ui project

We want to be able to run and debug the Grouper UI from the grouper-ui/webapp folder, so that we can work on webapp artifacts (JSPs, etc), and at the same time update Java code in the grouper project and other code locations. To do this we will update the Java Build Path output folder so that compiled classes and other artifacts go to the right directories under grouper-ui/webapp. We will also add some dependent source and library folders to the grouperui Java Build Path.

- 1. grouper-ui -> File -> Properties -> Java Build Path -> Source tab
 - a. Set 'Default output folder:' to: grouper-ui/webapp/WEB-INF/classes (you may have to create this directory)
- 2. Add dependent source and configuration folders to the grouper-ui Java Build Path
 - a. Link source: \${GIT_ROOT}/grouper-misc/grouperClient/src/java b. Link source: \${GIT_ROOT}/grouper-misc/grouperClient/conf GROUPER CLIENT SOURCE
 - GROUPER_CLIENT_CONF
 - c. Link source: \${PROJECT_LOC}/conf GROUPER_UI_CONF d. Link source: \${GIT_ROOT}/grouper/conf GROUPER_CONF

 - e. Link source: \${GIT_ROOT}/grouper/src/grouper GROUPER_SOURCE
 - f. Link source: \${PROJECT_LOC}/target/dependency GROUPER_UI_JARS
 - i. Output folder for jars is: webapp/WEB-INF/lib (create the folder)
- 3. Make sure all folders except 'grouper-ui/java/test' are using the default output folder
- 4. Make sure grouper-ui/conf has 'Excluded:' set to (None) (Note, this gets changed back for Chris, so ignore it)
- 5. Remove srcPoc and misc source folders (these are not needed)

The grouper-ui Java Build Path should now look something like this:

Java Build Path

🕮 Source 📴 Projects 🛋 Libraries 🍫 Order and Export 😡 Modu	le Dependencies	
Source folders on build path:		
Source folders on build path:	2_5\grouper-misc\grouperC er\conf uper\src\grouper uper-ui\conf cy (new)	
▷		-
	•	
Allow output folders for source folders		
Default output folder:		
grouper-ui\target\classes		

Properties for grouper-ui		
type filter text	Java Build Path	<> ▼
Resource Builders	😕 Source 🗁 Projects 🛋 Libraries 🗞 Order and Export 🙆 Module Dependencies	
Coverage	Required projects on the build path:	
Git Java Build Path	⊳ 🗁 grouper	Add
⊳ Java Code Style ⊳ Java Compiler		Edit
 Java Editor Javadoc Location 		Remove
Maven		
Project Facets		
Project Natures		
Project References		

In Grouper project, export all the maven dependencies in build path

Properties for grouper		- • •
type filter text	Java Build Path	<> ▼ ⇒ ▼ 8
▷ Resource Builders Coverage Git	Build class path order and exported entries: (Exported entries are contributed to dependent projects)	
Java Build Path	🔲 进 grouper/src/grouper	Up
 Java Code Style Java Compiler Java Editor Javadoc Location Maven Project Facets Project Natures Project References 	Grouper/GROUPER_CONF - D:\mchyzer\git\grouper_v2_5\grouper\conf Grouper/GROUPER_CLIENT_CONF - D:\mchyzer\git\grouper_v2_5\grouper-misc\grouperClient\co G G grouper/GROUPER_CLIENT_SOURCE - D:\mchyzer\git\grouper_v2_5\grouper-misc\grouperClient\ G G grouper/conf G G grouper/src/test ARE System Library [JavaSE-1.8] V Maven Dependencies	Down Top Bottom Select All
Refactoring History Run/Debug Settings Server > Task Repository		Deselect All

Configure Eclipse Code Formatter

- Eclipse -> Preferences -> Java Code Style -> Formatter
 Import... (navigate and select grouper/misc/eclipse/fastFormat.xml)
 Apply and close

• • •	Properties for grouper	
type filter text	Formatter	(⇒+⊂)+ ▼
▶ Resource Builders	Enable project specific settings	Configure Workspace Settings
Checkstyle Coverage	Active profile:	
Git Java Build Path	FAST	C Edit Remove
▼Java Code Style Clean Up	New Import Export All	
Code Templates	Preview:	
Organize Imports ▶ Java Compiler ▶ Java Editor	/*** * A sample source file for the code formatter preview */	
Javadoc Location	<pre>package mypackage;</pre>	
Project Facets	<pre>import java.util.LinkedList;</pre>	
Project References	<pre>public class MyIntStack {</pre>	
Run/Debug Settings ▶ Task Repository	<pre>private final LinkedList fStack;</pre>	
Task Tags ▶ Validation WikiText	<pre>public MyIntStack() { fStack = new LinkedList(); }</pre>	
	<pre>public int pop() {</pre>	
		Restore Defaults Apply
?		Cancel Apply and Close

- 4. Look in Eclipse config and change all tabs to 2 spaces for indenting (search for "tab")
- 5. Disable folding
- 6. Disable spell check
- 7. Look in eclipse config and ignore whitespace changes
- 8. Settings General Workspace New text file line endings Unix

Development Database

Multiple databases are supported including Oracle, mySQL, and PostgreSQL. We'll use PostgreSQL for this how-to. The steps for other databases would be similar.

Start the development database

Running Postgres in Docker on a Windows Host

Postgres' docker image runs the database as an unprivileged user *postgres*. The container's startup script attempts to chown /var/lib/postgresql /data folder to this user. In Docker Desktop for Windows, this causes the script to throw an error and exit. Bind volumes cannot easily have their ownership changed from within the container running on a Windows host. The workaround for this is creating a named volume instead.

We will run postgres with a mounted external volume to preserve data between docker container restarts.

- 1. Create a named volume 'docker create volume grouper-postgres'
- 2. Run 'docker run --name grouperdb -e POSTGRES_PASSWORD=grouper -e POSTGRES_USER=grouper -d -p 5432:5432 -v grouper-postgres: /var/lib/postgresql/data postgres'

Connect to development database in Eclipse

Note, this is one way to do it. Using any other database UI browser works too. e.g. Squirrel SQL client works with all DBs

- 1. Window -> Perspective -> Open Perspective -> Other -> Database Development -> Open
- 2. Right click 'Database Connections' and create PostgreSQL connection profile
- 3. Add the postgess JDBC driver found in under ../grouper/grouper-ui/target/dependency
- 4. Enter the connection details and then click Test Connection

	New JDBC Connection Profile	
	Spacify a Driver and Connection Details	-
1	Select a driver from the drop-down and provide login details for the connection.	EY.
nd		
e (Drivers: PostgreSQL JDBC Driver	o ∉ ∆
(ba	Properties	
ane	Optional	
	Database: grouper	
ane	URL: idbc:postgresql./focalhost.5432/grouper	
	User name: grouper	
ane	Password: ++++++	
sho	Save password	
	O O Success	
(ba -'S ane	Ping succeeded	
1	-	ск
re		
arg		
va	Connect when the wizard completes Test	Connection
100	Connect every time the workbench is started	
on P	ABack Next > Cancel	Finish

Configure minimum properties files for development Create and configure the grouper-hibernate.properties for postgres (for example)

1. cd grouper/conf 2. cp .../misc/grouper.hibernate.example.properties grouper.hibernate.properties 3. edit grouper hibernate properties to look like the following: 29 ## DB settings 31 32 # e.g. mysql: jdbc:mysql://localhost:3306/grouper 33 # e.g. p6spy (log sql): [use the URL that your DB requires] 34 # e.g. oracle: jdbc:oracle:thin:@server.school.edu:1521:sid 35 # e.g. hsqldb (a): jdbc:hsqldb:dist/run/grouper;create=true 36 # e.g. hsqldb (b):jdbc:hsqldb:hsql://localhost:9001/grouper37 # e.g. postgres:jdbc:postgresql://localhost:5432/database38 # e.g. mssql:jdbc:sqlserver://localhost:3280;databaseName=grouper 39 hibernate.connection.url = jdbc:postgresql://localhost:5432/grouper 40 41 hibernate.connection.username = grouper 42 # If you are using an empty password, depending upon your version of 43 # Java and Ant you may need to specify a password of "". 44 # Note: you can keep passwords external and encrypted: https://bugs.internet2.edu/jira/browse/GRP-122 45 hibernate.connection.password = grouper 46

Example for HSQL database: make a file grouper/conf/grouper.hibernate.properties:

```
******
## DB settings
******
# e.g. mysql:
                       jdbc:mysql://localhost:3306/grouper?useSSL=false
# e.g. p6spy (log sql): [use the URL that your DB requires]
                  jdbc:oracle:thin:@server.school.edu:1521:sid
# e.g. oracle:
# e.g. hsqldb (a):
                     jdbc:hsqldb:dist/run/grouper;create=true
# e.g. hsqldb (b): jdbc:hsqldb:hsql://localhost:9001/grouper
# e.g. postgres: jdbc:postgresql://localhost:5432/database
# e.g. mssql: jdbc:sqlserver://localhost:3280;databaseName=grouper
hibernate.connection.url = jdbc:hsqldb:hsql://localhost:9001/grouper
hibernate.connection.username
                                     = sa
# If you are using an empty password, depending upon your version of
# Java and Ant you may need to specify a password of "".
# Note: you can keep passwords external and encrypted: https://bugs.internet2.edu/jira/browse/GRP-122
hibernate.connection.password
```

Create and configure morphString.properties

- 1. cd grouper/conf
- 2. cp .../misc/morphString.example.properties morphString.properties
- 3. Edit .../grouper/grouper/conf/morphString.properties
- 4. encrypt.key = not_a_random_key
- Make a file grouper/conf/morphString.properties (make up an encrypt.key or generate alphanumeric from password generator)

- · Copy grouper/conf/log4j.example.properties to log4j.properties
- Make a grouper/conf/subject.properties

```
*****
# enter the location of the sources.xml. Must start with classpath: or file:
# blank means dont use sources.xml, use subject.properties
# default is: classpath:sources.xml
# e.g. file:/dir1/dir2/sources.xml
subject.sources.xml.location =
*****
## Configuration for source id: jdbc
## Source configName: jdbc
*****
subjectApi.source.jdbc.id = jdbc
# this is a friendly name for the source
subjectApi.source.jdbc.name = Example JDBC Source Adapter
# type is not used all that much. Can have multiple types, comma separate. Can be person, group,
application
subjectApi.source.jdbc.types = person
# the adapter class implements the interface: edu.internet2.middleware.subject.Source
# adapter class must extend: edu.internet2.middleware.subject.provider.BaseSourceAdapter
```

edu.internet2.middleware.grouper.subj.GrouperJdbcSourceAdapter2 : if doing JDBC this should be used if possible. All subject data in one table/view. # edu.internet2.middleware.grouper.subj.GrouperJdbcSourceAdapter : oldest JDBC source. Put freeform queries in here # edu.internet2.middleware.grouper.subj.GrouperJndiSourceAdapter : used for LDAP subjectApi.source.jdbc.adapterClass = edu.internet2.middleware.grouper.subj.GrouperJdbcSourceAdapter subjectApi.source.jdbc.param.jdbcConnectionProvider.value = edu.internet2.middleware.grouper.subj. GrouperJdbcConnectionProvider subjectApi.source.jdbc.param.emailAttributeName.value = email # maximum number of results from a search, generally no need to get more than 1000 subjectApi.source.jdbc.param.maxResults.value = 1000 subjectApi.source.jdbc.param.maxPageSize.value = 100 # ldap attribute which is the subject id. e.g. exampleEduRegID Each subject has one and only one subject id. Generally it is opaque and permanent. subjectApi.source.jdbc.param.SubjectID_AttributeType.value = id # attribute which is the subject name subjectApi.source.jdbc.param.Name_AttributeType.value = name # attribute which is the subject description subjectApi.source.jdbc.param.Description_AttributeType.value = description # This virtual attribute index 0 is accessible via: subject.getAttributeValue("searchAttribute0"); subjectApi.source.jdbc.param.subjectVirtualAttribute_0_searchAttribute0.value = \${subject. name},\${subjectUtils.defaultIfBlank(subject.getAttributeValue('LFNAME'), "")},\${subjectUtils. defaultIfBlank(subject.getAttributeValue('LOGINID'), "")},\${subjectUtils.defaultIfBlank(subject. description, "")},\${subjectUtils.defaultIfBlank(subject.getAttributeValue('EMAIL'), "")} # the 1st sort attribute for lists on screen that are derived from member table (e.g. search for member in group) # you can have up to 5 sort attributes subjectApi.source.jdbc.param.sortAttribute0.value = LFNAME # the 2nd sort attribute for lists on screen that are derived from member table (e.g. search for member in group) # you can have up to 5 sort attributes subjectApi.source.jdbc.param.sortAttributel.value = LOGINID # the 1st search attribute for lists on screen that are derived from member table (e.g. search for member in group) # you can have up to 5 search attributes subjectApi.source.jdbc.param.searchAttribute0.value = searchAttribute0 subjectApi.source.jdbc.param.useInClauseForIdAndIdentifier.value = true subjectApi.source.jdbc.param.identifierAttributes.value = LOGINID # subject identifier to store in grouper's member table. this is used to increase speed of loader and perhaps for provisioning # you can have up to max 1 subject identifier subjectApi.source.jdbc.param.subjectIdentifierAttribute0.value = LOGINID #searchSubject: find a subject by ID. ID is generally an opaque and permanent identifier, e.g. 12345678. # Each subject has one and only on ID. Returns one result when searching for one ID. # sql is the sql to search for the subject by id should use an {inclause} subjectApi.source.jdbc.search.searchSubject.param.sql.value = select s.subjectid as id, s.name as (select sa2.value from subjectattribute sa2 where name='name' and sa2.SUBJECTID = s.subjectid) name, (select sa3.value from subjectattribute sa3 where name='loginid' and sa3.SUBJECTID = s. as lfname, subjectid) as loginid, (select sa4.value from subjectattribute sa4 where name='description' and sa4. SUBJECTID = s.subjectid) as description, (select sa5.value from subjectattribute sa5 where name='email' and sa5.SUBJECTID = s.subjectid) as email from subject s where {inclause} # inclause allows searching by subject for multiple ids or identifiers in one query, must have {inclause} in the sql query,

this will be subsituted to in clause with the following. Should use a question mark ? for bind

variable subjectApi.source.jdbc.search.searchSubject.param.inclause.value = s.subjectid = ? #searchSubjectByIdentifier: find a subject by identifier. Identifier is anything that uniquely # identifies the user, e.g. jsmith or jsmith@institution.edu. # Subjects can have multiple identifiers. Note: it is nice to have if identifiers are unique # even across sources. Returns one result when searching for one identifier. # sql is the sql to search for the subject by identifier should use an {inclause} subjectApi.source.jdbc.search.searchSubjectByIdentifier.param.sql.value = select s.subjectid as id. s. name as name, (select sa2.value from subjectattribute sa2 where name='name' and sa2.SUBJECTID = s. subjectid) as lfname, (select sa3.value from subjectattribute sa3 where name='loginid' and sa3. SUBJECTID = s.subjectid) as loginid, (select sa4.value from subjectattribute sa4 where name='description' and sa4.SUBJECTID = s.subjectid) as description, (select sa5.value from subjectattribute sa5 where name='email' and sa5.SUBJECTID = s.subjectid) as email from subject s, subjectattribute a where a.name='loginid' and s.subjectid = a.subjectid and {inclause} # inclause allows searching by subject for multiple ids or identifiers in one query, must have {inclause} in the sql query, this will be subsituted to in clause with the following. Should use a question mark ? for bind # variable subjectApi.source.jdbc.search.searchSubjectByIdentifier.param.inclause.value = a.value = ? # search: find subjects by free form search. Returns multiple results. # sql is the sql to search for the subject free-form search. user question marks for bind variables (select sa2.value from subjectattribute sa2 where name='name' and sa2.SUBJECTID = s.subjectid) as (select sa3.value from subjectattribute sa3 where name='loginid' and sa3.SUBJECTID = s. lfname. subjectid) as loginid, (select sa4.value from subjectattribute sa4 where name='description' and sa4. SUBJECTID = s.subjectid) as description, (select sa5.value from subjectattribute sa5 where name='email' and sa5.SUBJECTID = s.subjectid) as email from subject s where s.subjectid in (select subjectid from subject where lower(name) like concat('%',concat(?,'%')) union select subjectid from subjectattribute where searchvalue like concat('%',concat(?,'%'))) # internal attributes are used by grouper only not exposed to code that uses subjects. comma separated subjectApi.source.jdbc.internalAttributes = searchAttribute0

Make a grouper/conf/grouper.properties and add

grouper.dev.env.allowMissingServlets = true

• if you are editing a lot of text, you can do this without waiting for cache to refresh

📑 🗗 💿 🖿 🗶 🖻 🏹 🗸	Name: GrouperShell drop init registry
type filter text	🞯 Main 😡= Arguments 🛋 JRE 🍫 Classpath 🦆 Source 🖾 Environment 🔲 Common 🖻 Prototype
 Eclipse Application Eclipse Data Tools Generic Server Generic Server(External La Gradle Task Gradle Test Grunt Gulp HTTP Preview J2EE Preview Java Applet Tava Applet Tava Application ExpirableCacheTest GrouperClient GrouperShell drop init 	Project: grouper Browse Main class: edu.internet2.middleware.grouper.app.gsh.GrouperShell Search Include system libraries when searching for a main class Include inherited mains when searching for a main class Stop in main
📼 kaal atat	

	Name: GrouperShell drop init registry
type filter text	🜀 Main 🕪 Arguments 🛛 🛋 JRE 🍫 Classpath 🧤 Source 📼 Environment 🔲 Common 🖻 Prototype
 Eclipse Application Eclipse Data Tools Generic Server Generic Server(External La Gradle Task Gradle Test Grunt Guun Guun	Program arguments: -registry -drop -runscript
HTTP Preview	VM arguments:
Java Applet	
ExpirableCacheTest GrouperClient	
 GrouperShell drop init hsql_start 	Variables

FYI: how to run Java classes on the command line

- 1. Run maven goal (right click and type in goal like above with UI): dependency:copy-dependencies
- 2. Call class command line

```
grouper $ java -cp target/classes:target/dependency/* edu.internet2.middleware.grouper.app.gsh.
GrouperShell
```

Bootstrap the Grouper Database

For development purposes, we'll bootstrap the Grouper database, add sample subjects, and reset the database using a few Java classes.

Run GrouperShell from Eclipse to initialize the Grouper database:

- 1. Right click GrouperShell in the Grouper project explorer
- Select 'Run as' and then 'Run Configurations...'
 Name: GrouperShell -registry -runscript -noprompt
- 4. (x) = Arguments tab

- a. Program arguments: -registry -runscript -noprompt
- 5. Classpath tab
 - a. Highlight User Entries and click 'Advanced...'
 - a. Add the 'conf' folder to the classpath for the properties files
- 6. Click 'Apply'
- 7. Click 'Run'

Run GrouperShell from Eclipse to check the Grouper database:

- 1. Right click GrouperShell in grouper project explorer
- Select 'Run as' and then 'Run Configurations...'
- a. Name: GrouperShell -registry -check -noprompt
- 3. (x) = Arguments tab
 - a. -registry -check -noprompt
 - a. Program arguments:
- 4. Classpath tab
 - a. Highlight User Entries and click 'Advanced...'
 - b. Add the 'conf' folder to the classpath
- 5. Click 'Apply'
- 6. Click 'Run'

Run RegistryReset with 'addSubjects' as an argument to add sample subjects:

- 1. Right click RegistryReset in grouper project explorer
- 2. Select 'Run as' and then 'Run Configurations ... '
- a. Name: RegistryReset addSubjects
- 3. (x) = Arguments tab
 - a. Program arguments: i. addSubjects
- 4. Classpath tab
 - a. Highlight User Entries and click 'Advanced...'
 - b. Add the 'conf' folder to the classpath
 - c. Click 'Apply'
- 5. Click 'Run'

Query the subjects table from the Eclipse Data Source Explorer to see the added subjects:

Ornegrand L. D. Ornegrand	subjecti person person person person person person person person	20 RegistryRese.	Pegistry inst., name (VARCHAR) my name is test.s. my name is test.s.	Registryint 2253) 2253) 2253) 2253) 2253) 2253) 2253 2253	m subject 13	"10		There is n provides a	o active e an outline	ditor tha	2 2 2	4
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The subject 0 and a subject 1	person person person person person person person person		my name is test.s my name is test.s	ubject.0 ubject.1 ubject.2 ubject.3 ubject.6 ubject.6 ubject.7 ubject.7 ubject.9				There is n provides a	io active e an outline	ditor tha	t	
Mahara Departura Alexandra	person person person person person person person		my name is test.s my name is test.s	ubject.1 ubject.2 ubject.3 ubject.4 ubject.6 ubject.6 ubject.8 ubject.8				provides a	an outline.	ontor tha	ĸ	
et adjet 2 et adjet 2 Managet 6 et adjet 7 et adje	person person person person person person		my name is test.s my name is test.s	ubject.2 ubject.3 ubject.4 ubject.6 ubject.6 ubject.7 ubject.9				provides	an outane.			
In subject 3 endudget 4 endudget 6 endudget 7 endudget 7 endudget 7 endudget 7 endudget 9 endudget 9 endu	person person person person person person		my name is tests, my name is tests,	ubject.3 ubject.4 ubject.5 ubject.6 ubject.7 ubject.8 ubject.9								
est.ubject 6 endubject 6 est.ubject 7 est.ubject 7 est.ubject 9 est.ubject 9 est.ub	person person person person person		my name is test.s my name is test.s	ubject.4 ubject.5 ubject.6 ubject.7 ubject.8 ubject.9								
ert subject 5 est subject 5 est subject 6 est subject 8 est subject 8 est subject 9 est 9	person person person person		my name is test.s my name is test.s my name is test.s my name is test.s my name is test.s	ubject.5 ubject.6 ubject.7 ubject.8 ubject.9								
est Aubiert 0 est Aubiert 0 est Aubiert 0 est Aubiert 0 enter mous	person person person		my name is test.s my name is test.s my name is test.s my name is test.s	ubject.6 ubject.7 ubject.8 ubject.9								
est Augler 1.7 est Augler 1.0 creat mous- creat mous-	person person person		my name is test.s my name is test.s my name is test.s	ibject.7 ibject.8 ibject.9								
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Plat File Data Source												

Add a GrouperSystem basic auth password

Preferred method in dev/test only, in a Grouper v2.5 build (maybe 2.5.25?) there is a config file override for UI/WS local basic password. in grouperhibernate.properties add something like this

 $\ensuremath{\texttt{\#}}$ override a grouper authn password here for testing and development

- # grouperPasswordConfigOverride_<APP>_subjectId_pass = pass (hopefully encrypted but doesnt need to)
- # e.g. grouperPasswordConfigOverride_UI_GrouperSystem_pass = abnf234
- grouperPasswordConfigOverride_UI_GrouperSystem_pass = someGoodPass

grouperPasswordConfigOverride_WS_test.subject.0_pass = someGoodPass

Run this in GrouperShell (run again with no args) though this is not ideal in dev env since unit tests delete it, use the previous method

```
GrouperSession grouperSession = GrouperSession.startRootSession();
GrouperPasswordSave grouperPasswordSave = new GrouperPasswordSave();
grouperPasswordSave.assignUsername("GrouperSystem").assignPassword("password").assignEntityType("username");
grouperPasswordSave.assignApplication(GrouperPassword.Application.UI);
new Authentication().assignUserPassword(grouperPasswordSave);
```

Run grouper-ui in Eclipse with Tomcat

Now that we have a Grouper database and some test subjects, the next step is to add the grouper-ui/webapp directory to the Eclipse Tomcat launcher so we can run and debug the grouper-ui.

Replace the tomee/lib/hsql jar with the one from grouper-ui/target/dependency

Add Tomcat server to Eclipse:

- Eclipse -> J2EE Perspective -> Servers Tab
 Click "No servers are available. Click this link to create a new server..."
 - a. Select 'Tomcat v8.5'
 - b. Select your tomee installation directory
 - c. Select your JRE

💽 New Server		- • •
Define a New Server		
Choose the type of server to	create	
Select the server type:		
type filter text		
📋 Tomcat v5.0 Serve	r	
Tomcat v5.5 Serve	r	
📋 Tomcat v6.0 Serve	r	
Tomcat v7.0 Serve	r	
Tomcat v8.0 Serve	er -	
Tomcat v9.0 Serve	r	-
Publishes and runs J2EE and J	 lava EE Web projects and server configuration:	s to a local
Tomcat server.		
	2	
Server's host name:	localhost	
Server name:	Tomee 7.0.1 at localhost	
C	T701	
Server runtime environment:	Tomee 7.0.1	• <u>Add</u>
	Configure runtin	ne environments
(?) < B	ack Next > Finish	Cancel

Add grouper-ui web module to Tomcat Server

- Double click on Tomcat v8.5 at localhost [Stopped, Republish] to access configuration panel
 Click on 'Modules' tab, click 'Add External Web Module..."

00	Add Web Module
Document base:	/grouper/grouper-ui/webapp Browse
Path:	/grouper
	Auto reloading enabled
	Cancel OK

Configure Server Location

1. Select 'Use Tomcat installation (takes control Tomcat installation)

Server Locations

Specify the server path (i.e. catalina.base) and deploy path. Server must be published with no modules present to make changes.

Use workspace metadata (does not modify Tomcat installation)
 Use Tomcat installation (takes control of Tomcat installation)
 Use custom location (does not modify Tomcat installation)
 Server path: //Users/thompsow/opt/apache-tomcat-8.5 Browse...
 Set deploy path to the default value (currently set)
 Deploy path: wtpwebapps Browse...

Configure Tomcat Server Working Directory to direct Grouper logs

- 1. Servers tab -> Overview -> click on "Open launch configuration"
- 2. (x)= Arguments tab
- Working directory: a. Select grouper-ui/webapp/WEB-INF
 - a. Choose Other
 - b. Click Workspace...

0.0.	Edit Configuration	
dit launch configuration prop	Select a workspace relative working directory:	
	h 🔿	-
Sane Torrest v& 5 Server at los	P ing proceedings - with the P ing proceedings - P ing proceedings -	Yangbies
Vid arguments: -Costalina.hasen "JUsers/Hom tomca'r 8.5.50" -Owtp.diaday thompsow/opt;apache-tomcat	 Source Minute Source Minute Source Minute Source Minute Source Minute Source Minute 	revisol/spache- andsroed.dirs="(Users/
Use the -ValuetOnFirstTime	(?) Canad Ca	Variables
Working directory:		
Obtail: Defaile		
• Other Strenkspace	Jie grupe-ulivibago/WIE-NIS Matopase	getern
T		Cancel) (DK

Grouper logs will now show up under ../grouper-ui/webapp/WEB-INF/logs

Update conf/grouper.hibernate.properties

```
grouper.is.ui = true
grouper.is.ui.basicAuthn = true
```

Run Grouper from Eclipse

Start Tomcat from Eclipse by selecting the server under the Servers tab and clicking the green 'Run' button.

Grouper UI should be available at http://localhost:8080/grouper. You should be able to log in with GrouperSystem or any of the test subjects and no password.

🌒 🔍 🔍 🚎 Grouper Group	Management	an: × +					
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		Edited group grouperUiUserData			2020/	01/23 21:06 PM	
		Added group grouperUiUserData			2020/	01/23 21:06 PM	
		Added folder grouperUi .			2020/	01/23 21:06 PM	
		My favorites View all favorites	\$	Groups I manage	My services View all services	0	ŕ

Debug Grouper from Eclipse

- Set a breakpoint in UiV2Main.java line #114
 Start the server in debug mode
 Login and try to search in the Grouper UI

 a. This should hit the breakpoint in Eclipse and allow you step through the code.

Congrats! You now have a working Grouper development environment. Now go check out Grouper developers coding standards and then pick up some JI RAs!