Apache Continuum 1.4.0

The Apache Continuum Project
## Documentation

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1 Index (category)

1.1 Welcome to Apache Continuum

Apache Continuum is an enterprise-ready continuous integration server with features such as automated builds, release management, role-based security and integration with popular build tools and source control management systems. Whether you have a centralized build team or want to put control of releases in the hands of developers, Continuum can help you improve quality and maintain a consistent build environment.

1.1.1 Documentation

- Release Notes
- Installation/Upgrade Guides
  - Installation
    - Standalone version: Standard (Linux, Mac OSX, Solaris, Windows, others) as a service or not
    - Webapp: Tomcat
  - How to upgrade from a previous version
- User's Guide
- Administrator's Guide
- Developer's Guide to building Continuum
- Knowledge Base
  - Frequently Asked Questions
  - Wiki
  - Old Wiki
  - Blog

This documentation is also available in PDF format.
2 Getting Started

2.1 Getting Started

When you start Continuum for the first time (without an existing database), the first thing you will do is create the admin account and perform the General Configuration.

Create Admin User

<table>
<thead>
<tr>
<th>Username:</th>
<th>admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Name*:</td>
<td></td>
</tr>
<tr>
<td>Email Address*:</td>
<td></td>
</tr>
<tr>
<td>Password*:</td>
<td></td>
</tr>
<tr>
<td>Confirm Password*:</td>
<td></td>
</tr>
</tbody>
</table>

Create Admin

Admin account creation

After the admin account has been created, you can log as the admin user. The next thing you will see is the General Configuration page.

General Configuration

<table>
<thead>
<tr>
<th>Working Directory*:</th>
<th>path/to/continuum/data/working-directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build Output Directory*:</td>
<td>path/to/continuum/data/build-output-directory</td>
</tr>
<tr>
<td>Release Output Directory:</td>
<td>path/to/continuum/data/release-output-directory</td>
</tr>
<tr>
<td>Deployment Repository Directory:</td>
<td></td>
</tr>
<tr>
<td>Base URL*:</td>
<td><a href="http://localhost:8080/continuum">http://localhost:8080/continuum</a></td>
</tr>
<tr>
<td>Number of Allowed Builds in Parallel:</td>
<td>1</td>
</tr>
</tbody>
</table>

Enable Distributed Builds

Save  Cancel

General Configuration

You may also create more users, add projects, etc.
3 Installation/Upgrade Guides

3.1 Installation/Upgrade Guides
In this section, you'll find information about Continuum installations:

- System Requirements
- Installation in different environments (standalone, webapp, service)
- Release Notes
- How to upgrade from a previous version?
- Installation of Build Agent for Distributed Builds
## 4 System Requirements

### 4.1 System Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Requirement Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JDK</strong></td>
<td>1.5 or above</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>No minimum requirement</td>
</tr>
<tr>
<td><strong>Disk</strong></td>
<td>The Continuum application package is less than 30MB but will use more disk space when it's checking out and building sources</td>
</tr>
<tr>
<td><strong>Operating System</strong></td>
<td>No minimum requirement. Tested on Windows XP, Debian, Fedora Core, Solaris and Mac OS X</td>
</tr>
</tbody>
</table>
5 Installation

5.1 Continuum Installation
In this section, you'll find information about Continuum installations:

- Standalone
- Tomcat
6 Standalone

6.1 Installing Continuum Standalone

6.1.1 Basics & Fundamentals

- Download the standalone version from the [Download page](#)
- Extract the file
- Set a `JAVA_HOME` environment variable which use a jdk >= 1.5

6.1.1.1 Defining JNDI Resources

6. Mail server configuration

Before you start Continuum, you must configure your SMTP configuration for mail notification. The configuration is in `$CONTINUUM_HOME/conf/jetty.xml`:

```xml
<New id="validation_mail" class="org.mortbay.jetty.plus.naming.Resource">
  <Arg>mail/Session</Arg>
  <Arg>
    <New class="org.mortbay.naming.factories.MailSessionReference">
      <Set name="user"></Set>
      <Set name="password"></Set>
      <Set name="properties">
        <New class="java.util.Properties">
          <Put name="mail.smtp.host">localhost</Put>
        </New>
      </Set>
    </New>
  </Arg>
</New>
```

6. Databases configuration

By default, Continuum use an embedded Derby database. If you want to use an other database, you can modify the JNDI configuration in `$CONTINUUM_HOME/conf/jetty.xml`:
6.1.2 Installing as a Windows Service

- Go to $CONTINUUM_HOME/bin/ and run the following command:
  continuum.bat install
- Edit the Apache Continuum service
• To see the services that are on your computer go to Start|Run and enter services.msc.
• Select the Startup Type
• Go to the Log On tab and select a real user. A real user is required because you'll need a home directory for Maven repository and some other things
• Validate your changes

6.1.3 Installing as a Linux Service

Since the Continuum Linux script bin/continuum understands the same arguments as Linux boot scripts, there is no need to write a particular startup script to add Continuum to the Linux boot process. All you need to do, as root, is:

6.1.3.1 Basic script in /etc/init.d

• Create a continuum file under /etc/init.d/ with the following content. Replace continuum_user with the name of an account you have already created.
  #!/bin/sh
  CONTINUUM_HOME=/opt/continuum-1.3
  su - continuum_user -c "$CONTINUUM_HOME/bin/continuum console $@ &"

6.1.3.2 On a Debian-based system

ln -s /usr/local/continuum-[VERSION]/bin/continuum /etc/init.d/continuum

At this point you have Continuum ready to be symlinked from different runlevels. This might sound a bit esoteric, but it is not. You will find these words very fast as soon as you start reading about the init process. Fortunately, Debian GNU/Linux comes with a very handy utility to create these links, just run as root:

update-rc.d -n continuum defaults 80

If you run this command, you will see something like this:

Adding system startup for /etc/init.d/continuum ...
/etc/rc0.d/K80continuum -> ../init.d/continuum
/etc/rc1.d/K80continuum -> ../init.d/continuum
/etc/rc6.d/K80continuum -> ../init.d/continuum
/etc/rc2.d/S80continuum -> ../init.d/continuum
/etc/rc3.d/S80continuum -> ../init.d/continuum
/etc/rc4.d/S80continuum -> ../init.d/continuum
/etc/rc5.d/S80continuum -> ../init.d/continuum

What you see is the symlinks that would be created. The above command didn't actually create anything because of the -n switch. Remove that switch and run the command again to have the real links created.

6.1.3.3 On a RedHat-based system

Configuring Continuum on a RedHat-based system (like Fedora Core) is slightly different. Instead of running update-rc.d, you need to add a new service using the chkconfig command. In order to add Continuum using chkconfig, it is necessary to add some comments to the /etc/rc.d/init.d/continuum script and run a couple of commands. These tasks are executed by running the chkconfig_install.sh script below. Note that _continuum_user_ needs to be replaced by the name of an account you have already created.

#!/bin/sh
#
# chkconfig_install.sh - install Continuum on a chkconfig-based system
#
# Author: Felipe Leme <felipeal at apache.org>
#
# figure out what's Continuum's directory
CONTINUUM_HOME=`dirname $0`
cd $({CONTINUUM_HOME}):
CONTINUUM_HOME='pwd'
INITD_SCRIPT=/etc/rc.d/init.d/continuum
if [ -f ${INITD_SCRIPT} ]
then
    echo "File ${INITD_SCRIPT} already exists. Please remove it and try again."
    exit 1
fi
echo "Creating file ${INITD_SCRIPT}"
cat >> ${INITD_SCRIPT} <<EOF
#!/bin/sh
# chkconfig: 345 90 10
# description: Apache Continuum server
# uncoment to set JAVA_HOME as the value present when Continuum installed
#export JAVA_HOME=${JAVA_HOME}
if [ -z "$JAVA_HOME" ]
then
    echo "Cannot manage Continuum without variable JAVA_HOME set"
    echo "  (try to set it on file ${INITD_SCRIPT})"
    exit 1
fi
# run Continuum as root
cd $({CONTINUUM_HOME})
./bin/continuum \$
# run Continuum as user _continuum_user_
#su - _continuum_user_ -c "cd $({CONTINUUM_HOME}); ./bin/continuum \$
EOF
chmod +x ${INITD_SCRIPT}
echo "Adding Continuum to chkconfig"
chkconfig --add continuum
echo "Enabling Continuum on chkconfig"
chkconfig continuum on
echo "Continuum set to start on run levels 3, 4 and 5."
echo "To start Continuum now, run 'service continuum start'"
7 Tomcat

7.1 Guide to Install Continuum on Tomcat

Instructions for installing, deploying, configuring Continuum for the Apache Tomcat web container.

Sections:

7.1.1 Basics & Fundamentals

With every Tomcat version you will need a few things before you can deploy Continuum.

1. Use at least Java JDK 1.5.0_11 to run Tomcat with Continuum.
2. A defined <Context> xml section to define the JNDI resources.
3. The JavaMail / Activation JAR files.
4. The Apache Derby JAR files.
5. Configure ${appserver.base} java property.

7.1.1.1 Defining JNDI Resources.

Continuum will, on startup, ask the web container for a few JNDI configured resources, two JDBC DataSources, and one JavaMail session.

To configure these JNDI resources in the Tomcat Web Container, you will need to specify a <Context> section that Tomcat can utilize for those requests coming from Continuum.

Tomcat has 3 main ways to accomplish this (ordered by most recommended to least recommended)

3. Adding a <Context> Section into the $CATALINA_HOME/conf/server.xml

The following are the JNDI names you will need to provide:

- mail/Session
- jdbc/continuum
- jdbc/users

The individual techniques for describing these resources, and the parameters associated with them are specific to the Tomcat version, resource type, and even JDBC implementation type.

For the purposes of this document, the following assumptions are made.

1. You are an Apache Tomcat administrator.
2. You have an SMTP Server on localhost, port 25, with no login / password.
3. You will be using the embedded Apache Derby database. (not an external database, that's another show)
4. Details specific to Apache Tomcat, JavaMail, or Apache Derby are left for the reader to research on those projects websites.

7.1.1.2 The JavaMail / Activation JAR files

Note: Continuum requires JavaMail 1.4 (or later)
Apache Tomcat does not typically ship with a copy of the JavaMail or Activation JAR files. In your role as the Apache Tomcat administrator of your installation, you will need to obtain these JAR files and place it into your preferred \texttt{lib} directory.

The appropriate \texttt{lib} directory to choose is a personal preference, and we do not encourage or enforce a specific location for it, as all installations of Apache Tomcat are different.

For the record, we personally put them in the \$\text{CATALINA\_HOME/common/lib/} directory.

Direct download links for these JAR files.
- JavaMail 1.4 - \texttt{mail-1.4.jar}
- Java Activation Framework 1.1 - \texttt{activation-1.1.jar}

7.1.1.3 The Apache Derby JAR files

Note: Continuum 1.2 has been tested with Apache Derby 10.1.3.1

The default installation of Continuum uses the Apache Derby 100\% Java database to maintain Continuum-specific information, and also the Users / Security Database.

You will need to obtain the \texttt{derby.jar} and \texttt{derbytools.jar} and place them into your preferred \texttt{lib} directory.

We put them into the \$\text{CATALINA\_HOME/common/lib/} directory.

Direct download links for these JAR files:
- \texttt{derby-10.1.3.1.jar}
- \texttt{derbytools-10.1.3.1.jar}

7.1.1.4 Configure the \texttt{appserver.base} java property

The \$\texttt{(appserver.base)} java property is used by the Continuum internal logging configuration to determine where to output its logs to. It is important to define this property either in the \$\texttt{CATALINA\_OPTS} system environment variable (if Tomcat is being launched via the command line) or the service properties (if being launched as a service or daemon).

The format typically expected is \texttt{-Dappserver.base=\text{SOMEWHERE}}

You can utilize the \$\text{CATALINA\_HOME/bin/setenv.sh} script to set this value in a Tomcat specific way.

#!/bin/bash
# Keep the appserver.home and appserver.base values the same when running under Tomcat
export CATALINA_OPTS="-Dappserver.home=$\text{CATALINA\_HOME} -Dappserver.base=$\text{CATALINA\_HOME}"

7.1.2 Tomcat 5.0.x Specifics

Tested on Tomcat v5.0.28.

These instructions explain how to deploy the Continuum 1.2 web application in an existing installation of Tomcat 5.0.x.

Extra Jars:
- You will need the \texttt{xalan-2.7.0.jar} copied into your \$\text{CATALINA\_HOME/common/lib/} directory.
- The Xerces XML Implementation provided in Tomcat 5.0.x is old and will cause problems with Continuum and the internal JAXP implementation in JDK 1.5, we recommend that you remove the files in \$\text{CATALINA\_HOME/common/endorsed/}.

\langle Context path="/continuum" docBase="/path/to/continuum-webapp-1.2.war" debug="0" \rangle
<!-- JNDI Datasource for User/Security Database (REQUIRED) -->
<Resource name="jdbc/users" auth="Container" type="javax.sql.DataSource"/>
<ResourceParams name="jdbc/users">
  <parameter>
    <name>driverClassName</name>
    <value>org.apache.derby.jdbc.EmbeddedDriver</value>
  </parameter>
  <parameter>
    <name>factory</name>
    <value>org.apache.commons.dbcp.BasicDataSourceFactory</value>
  </parameter>
  <parameter>
    <name>url</name>
    <value>jdbc:derby:database/users;create=true</value>
  </parameter>
  <parameter>
    <name>username</name>
    <value>sa</value>
  </parameter>
  <parameter>
    <name>password</name>
    <value></value>
  </parameter>
</ResourceParams>

<!-- JNDI Datasource for Continuum Database (REQUIRED) -->
<Resource name="jdbc/continuum" auth="Container" type="javax.sql.DataSource"/>
<ResourceParams name="jdbc/continuum">
  <parameter>
    <name>driverClassName</name>
    <value>org.apache.derby.jdbc.EmbeddedDriver</value>
  </parameter>
  <parameter>
    <name>factory</name>
    <value>org.apache.commons.dbcp.BasicDataSourceFactory</value>
  </parameter>
  <parameter>
    <name>url</name>
    <value>jdbc:derby:database/continuum;create=true</value>
  </parameter>
  <parameter>
    <name>username</name>
    <value>sa</value>
  </parameter>
  <parameter>
    <name>password</name>
    <value></value>
  </parameter>
</ResourceParams>
7.1.3 Tomcat 5.5.x Specifics

Tested on Tomcat v5.5.17 and v5.5.25.

This example `<Context>` assumes technique #2 in the Define JNDI Resource list. (This example lists out the docBase to the WAR file itself.)

```xml
<Context path="/continuum"
  docBase="/path/to/continuum-webapp-1.2.war">
  <Resource name="jdbc/users"
    auth="Container"
    type="javax.sql.DataSource"
    username="sa"
    password=""
    driverClassName="org.apache.derby.jdbc.EmbeddedDriver"
    url="jdbc:derby:database/users;create=true" />
  <Resource name="jdbc/continuum"
    auth="Container"
    type="javax.sql.DataSource"
    username="sa"
    password=""
    driverClassName="org.apache.derby.jdbc.EmbeddedDriver"
    url="jdbc:derby:database/continuum;create=true" />
  <Resource name="mail/Session"
    auth="Container"
    type="javax.mail.Session"
    mail.smtp.host="localhost" />
</Context>
```

**Warning:** The Tomcat 5.5.20 and 5.5.23 releases are missing MailSessionFactory and a few other classes. JNDI mail sessions will **not** work. Use Tomcat 5.5.17 or see the workaround on Bug 40668.

7.1.4 Tomcat 6.0.x Specifics

Tested on Tomcat v6.0.14.

```xml
<Context path="/continuum"
  docBase="/path/to/continuum-webapp-1.2.war">
  <Resource name="jdbc/users"
    auth="Container"
    type="javax.sql.DataSource"
    username="sa"
    password=""
    driverClassName="org.apache.derby.jdbc.EmbeddedDriver"
    url="jdbc:derby:database/users;create=true" />
</Context>
```
<Resource name="jdbc/continuum"
    auth="Container"
    type="javax.sql.DataSource"
    username="sa"
    password=""
    driverClassName="org.apache.derby.jdbc.EmbeddedDriver"
    url="jdbc:derby:database/continuum;create=true" />
<Resource name="mail/Session"
    auth="Container"
    type="javax.mail.Session"
    mail.smtp.host="localhost"/>
</Context>
8 Upgrade

8.1 Upgrading Continuum

This document will help you upgrade Continuum from 1.2.x to 1.3.3 and above.

When upgrading Continuum, it could have some database model changes. Usually these changes will be migrated for you, but in some cases you may need to use a backup from the previous version and restore that data into the new version. The Data Management tool exports data from the old database model and imports the data into the new database model.

If you had used the APP_BASE environment variable in Continuum 1.2 to differentiate your configuration from the installation, you should rename it to CONTINUUM_BASE in Continuum 1.3.

8.1.1 Changes to Take Note of in Continuum 1.3.x

The Jetty version in Continuum 1.3.4 and above has been upgraded to 6.1.19. When upgrading to Continuum 1.3.4 or higher, there is a need to update the library contents listed in $CONTINUUM_BASE/conf/wrapper.conf with the ones included in the new distribution especially if the $CONTINUUM_BASE directory is separate from the installation.

In Continuum 1.3.6, configuration for local repositories in build agents were added. This is used to match the local repository in the build agent to that of the local repository (used by the project to be built) set in the master. So if you are upgrading from a lower version, you might need to add the localRepositories configuration in your build agent's configuration file. For more details, read Installing and Configuring a Build Agent.

8.1.2 Using Backup and Restore to upgrade

There are 2 databases that need to be considered: one for the builds and one for the users.

There were no changes in the users database from 1.2.x to 1.3.2, so you can simply point Continuum 1.3.2 at your existing user database.

The builds database has had model changes, and will need to be exported and imported.

First, download the Data Management tools you will need. The tool is a standalone JAR that you can download from the central repo.

You will need to download two versions of the tool, one for the export out of the old version and one for the import into the new version:

**Note:** The 1.2, 1.2.2 and 1.2.3 released versions of this tool have a bug. To export databases from 1.2.2 or 1.2.3, you will need to use version 1.2.3.1 of the tool. To export databases from 1.2, you may use the 1.1 version of the tool.

- [http://repo1.maven.org/maven2/org/apache/continuum/data-management-cli/1.2.3.1/data-management-cli-1.2.3.1-app.jar](http://repo1.maven.org/maven2/org/apache/continuum/data-management-cli/1.2.3.1/data-management-cli-1.2.3.1-app.jar)

Next, follow these steps to export data from the old version

- Stop the old version of Continuum
- Execute this command to create the builds.xml export file
Then, follow these steps to import the data to the new version:

- Start the new version of Continuum to create the new data model, but do not configure it.
- Stop Continuum.
- Execute this command to import the builds data from the xml file you created earlier:
  ```
  java -Xmx512m -jar data-management-cli-1.3.2-app.jar -buildsJdbcUrl jdbc:derby:${new.continuum.home}/data/databases/continuum -mode IMPORT -directory backups -strict
  ```

**Note:** Remove `-strict` when importing data from 1.3.1 to 1.3.x to ignore unrecognized tags due to model changes.

Finally, be aware that sometimes the NEXT_VAL values in the SEQUENCE_TABLE need to be adjusted:

- Before starting Continuum for the first time after the import, connect to the db with a client like Squirrel SQL and check the values in the NEXT_VAL column of the SEQUENCE_TABLE.
- Values must be greater than the max id value in each table.
- For example, the next value of "org.apache.maven.continuum.model.Project" must be greater than the greatest id in Project table.
- Here are some example SQL statements. You may need to add or remove lines depending on the contents of your database.
  ```
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(systemconfiguration_id)+1 from SYSTEMCONFIGURATION) WHERE SEQUENCE_NAME='org.apache.maven.continuum.model.system.SystemConfiguration';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(id)+1 from BUILDQUEUE) WHERE SEQUENCE_NAME='org.apache.maven.continuum.model.project.BuildQueue';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(id)+1 from SCHEDULE) WHERE SEQUENCE_NAME='org.apache.maven.continuum.model.project.Schedule';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(id)+1 from BUILDDEFINITION) WHERE SEQUENCE_NAME='org.apache.maven.continuum.model.project.BuildDefinition';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(id)+1 from LOCALREPOSITORY) WHERE SEQUENCE_NAME='org.apache.continuum.model.repository.LocalRepository';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(scmresult_id)+1 from SCMRESULT) WHERE SEQUENCE_NAME='org.apache.maven.continuum.model.scm.ScmResult';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(projectdependency_id)+1 from PROJECTDEPENDENCY) WHERE SEQUENCE_NAME='org.apache.maven.continuum.model.project.ProjectDependency';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(id)+1 from BUILDDEFINITIONTEMPLATE) WHERE SEQUENCE_NAME='org.apache.maven.continuum.model.project.BuildDefinitionTemplate';
  UPDATE SEQUENCE_TABLE set NEXT_VAL = (select max(id)+1 from ABSTRACTPURGECONFIGURATION) WHERE SEQUENCE_NAME='org.apache.continuum.model.repository.AbstractPurgeConfiguration';
  ```

Now you can start your new version of Continuum.
9 User's Guides

9.1 User's Guides

- Building Projects
- Cancelling Builds
- Managing Build Definitions
- Managing Projects
- Notifications
- Releasing Projects
10 Managing Projects

10.1 Managing Projects

- How to add a project
- How to edit a project
- How to remove a project
- Viewing the project's working copy
11 Add a Project

11.1 Add a Project

11.1.1 Maven 2 project
From the menu, choose the Maven 2.0.x Project entry

The pom.xml file must be available through one of the following protocols: http, https, or ftp.

Note: The file protocol is also supported but is disabled by default for security and must be enabled manually.

The pom.xml can also be uploaded from a local file.

Note: This doesn't support multi module projects.

You can supply a username and password if the POM URL requires authentication. This information will be stored in the database in plain text and reused later for SCM checkouts and updates.

If your SCM stores credentials like CVS or SVN and you want to use the SCM Credentials cache, check the Use SCM Credentials Cache field.

You can define the group you want to use or Defined by POM in this case project.name will be used as Project Group.
You cannot add a duplicate project (duplicates would mean another instance of a project with the same groupId, artifactId, and version) in the same Project Group.

By default, Continuum adds each sub-module POM as an individual Continuum Project. If you want to add only the root POM without sub-modules, check the **load only root as recursive build** field.

You can choose a **Build Definition Template** which will be applied to your project. If you choose a **Build Definition Template**, the build definitions from the template will be added in addition to any build definitions that are defined at the project group level.

When adding projects whose parent project is building on another server, make sure that the settings.xml with the necessary repositories exists in `[USER_HOME]/.m2/` directory. Continuum uses `[USER_HOME]/.m2/settings.xml` and not the one found in `[M2_HOME]/conf/`.

The scm connection url must be present in the POM and must match the actual location of the pom in the scm repository.

### 11.1.2 Maven 1 project

From the menu, choose the **Maven 1.x Project** entry

![Add Maven 1 project](image)

The project.xml file must be available through one of the following format: http, https and ftp.

**Note:** The file protocol is off by default for security and must enabled manually.

The project.xml can also be uploaded from a local file.

**Note:** This doesn't support multi modules project.

The project you're adding can't use a parent.

![Add Maven 1 project](image)
11 Add a Project

You can define username/password if the POM URL require an authentication.
If your SCM store credentials like CVS or SVN and you want to use the SCM Credentials cache, check the Use SCM Credentials Cache field.
You can define the group you want to use or Defined by POM. In this case project.name will be used as the Project Group.
You cannot add a duplicate project (duplicates would mean another instance of a project with the same groupId, artifactId, and version) in the same Project Group.
You can choose a Build Definition Template which will be applied to your project.

11.1.3 ANT Project
From the menu, choose the Ant Project entry

Add an Ant project

TO WRITE

Add Ant Project

Project Name*: Enter the project name
Version*: Enter the version of the project
Scm Url*: Enter the Maven SCm URL
Scm Username: Enter the scm username
Scm Password: Enter the scm password
Scm Branch/Tag: Enter the scm branch/tag name (For subversion, tag name must be in scm URL and not in this field)
Use SCM Credentials Cache, if available
Project Group Name: Default Project Group
Build Definition Template: Default

Add an Ant project

11.1.4 Shell Project
From the menu, choose the Shell Project entry
Add a shell project

TO WRITE

Add a shell script project

11.1.5 Add a project from the Project Group

From the Project Group, you can add a project without using the menu. With this operation, the Project Group will be set to the current group.

11.1.6 SCM hints

11.1.6.1 ClearCase

With ClearCase, you can configure SCM things in few ways. For example, you can use, in the scm URL in your POM, the absolute path of your config spec file like this:
The SCM URL format used for ClearCase is defined [here](#).

And you can create a `clearcase-settings.xml` file under `$ user.home/.scm/` with the following content:

```xml
<clearcase-settings>
  <viewstore>\mymachine\myvwstore</viewstore>
  <useVWSParameter>true</useVWSParameter>
</clearcase-settings>
```

This configuration won't work with each ClearCase installation because each ClearCase configuration is different, so we recommend reading the [ClearCase page on the Maven SCM site](#).
12 Edit a Project

12.1 Edit a Project

12.1.1 Project View

When you edit a project from the Group Summary page, you will see basic information. The first part of the page contains information regarding:

- project name
- project version
- project SCM URL
- project Last Build Date
- all build definitions attached to the project

With the Edit button, you can change some project information like the SCM URL if your project was moved. With the Build Now button, you build the project manually with the default build definition.

The second part contains information regarding:

- project notifiers
- project dependencies
- project developers
12.1.2 Build Results

You can view all project’s Build Results with the link Builds. You will see all build results summary: start/end time, result. It's possible to delete some build results with checkboxes.

Build Results

Now you can edit a build result

12.1.3 Build Result

Editing a build result will display:

- SCM changes (author and file path)
- project dependencies (project recorded in this Continuum instance)
- detail of the build definition used
- the full build command line output
### Build Result

```
[INFO] Scanning for projects...
[INFO] Building Continua IRC Notifier
[INFO] task-segment: [clean, install]
[INFO] [clean:clean]
[INFO] Deleting directory C:\tap\continua\working-directory\target
[INFO] Deleting directory C:\tap\continua\working-directory\target\classes
[INFO] Deleting directory C:\tap\continua\working-directory\target\test-classes
[INFO] Deleting directory C:\tap\continua\working-directory\target\site
[INFO] [pwoos descriptor {execution: generate}]
```
13 Remove a Project

13.1 Remove a Project

To remove a project, go to the Project Group Summary and click the delete icon.

Delete icon

You can also use the Delete group button in the Project Group Summary to remove the whole project group.
14 Managing Build Definitions

14.1 Managing Build Definitions
Each project or project group must have at least one attached build definition in order to build.
Depending on the project, you can define different values which will be used in order to build your project.
Continuum includes some default build definitions which can be changed in the Build Definition Templates screen.
You can add or edit build definitions at the Project Group level or at the Project level.
15 Project Build Definition

15.1 Project Build Definition

The project level build definition is executed for a specific project where the build definition is defined.

To add a build definition to your project:

1. Select a project within the group.
2. Under the **Build Definitions** section in the **Project Information** screen, click **Add**.
3. Supply the values for the necessary fields.

   - Enter your **POM filename**, which is very likely the same as previous builds, pom.xml.
   - In the **Goals** text box, enter your new goals. For example, clean site deploy or release:branch.
   - You may have arguments for Maven, such as --batch-mode --non-recursive. Add your arguments in the **Arguments** text box or leave it empty.
   - Check **Build Fresh** to do a fresh checkout from SCM before the build process. Check **Always Build** if you want to execute the goal every time you build the project. If you want this build definition to be your default for building your project, check the **Is it default?** check box.
   - Select your build schedule from the pull-down menu. There will only be the DEFAULT_SCHEDULE if you have not defined any others.
   - Select from the pull-down menu the **Build Environment** for the build definition.
   - Select the **Type** from the pull-down menu.
   - You can supply a short description of the build definition (**Definition**).
4 Click Save.
16 Project Group Build Definition

16.1 Project Group Build Definition

The project group level build definition is executed on all of the projects in the group.

<table>
<thead>
<tr>
<th>Goals</th>
<th>Arguments</th>
<th>Build File</th>
<th>Schedule</th>
<th>Build Environment</th>
<th>From</th>
<th>Default</th>
<th>Description</th>
<th>Type</th>
<th>Always Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>clean install</td>
<td>-batch-mode pom.xml</td>
<td>DEFAULT_SCHEDULE</td>
<td>GROUP</td>
<td>false</td>
<td>true</td>
<td>Default: Maven 2 Build Definition</td>
<td>maven2</td>
<td>false</td>
<td></td>
</tr>
</tbody>
</table>

To add a build definition to your project group:

1. Under the Build Definitions tab in the Project Information screen, click Add.
2. Supply the values for the necessary fields.
   - Enter your POM filename, which is very likely the same as previous builds, pom.xml.
   - In the Goals text box, enter your new goals. For example, clean site deploy or release:branch.
   - You may have arguments for Maven, such as --batch-mode --non-recursive. Add your arguments in the Arguments text box or leave it empty.
   - Check Build Fresh to do a fresh checkout from SCM before the build process. Check Always Build if you want to execute the goal every time you build the project. If you want this build definition to be your default for building your project, check the Is it default? check box.
   - Select your build schedule from the pull-down menu. There will only be the DEFAULT_SCHEDULE if you have not defined any others.
   - Select from the pull-down menu the Build Environment for the build definition.
   - Select the Type from the pull-down menu.
   - You can supply a short description of the build definition (Definition).
3 Click **Save**.
17 Managing Notification

17.1 Managing Notification
Notifiers can be attached to a Maven project by adding them to the POM in the `ciManagement` section.

```
<ciManagement>
  <system>continuum</system>
  <url>http://127.0.0.1:8080/continuum</url>
  <notifiers>
    <notifier>
      <type>mail</type>
      <sendOnError>true</sendOnError>
      <sendOnFailure>true</sendOnFailure>
      <sendOnSuccess>false</sendOnSuccess>
      <sendOnWarning>false</sendOnWarning>
      <configuration>
        <address>continuum@127.0.0.1</address>
      </configuration>
    </notifier>
  </notifiers>
</ciManagement>
```

Or they can be added to a Project Group with the Notifiers link:

<table>
<thead>
<tr>
<th>Project Group Summary</th>
<th>Members</th>
<th>Build Definitions</th>
<th>Notifiers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Group Name:</strong></td>
<td>Continuum Parent Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Project Group Id:</strong></td>
<td>org.apache.maven.continuum</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Maven is a software project management and comprehension tool. can manage a project's build, reporting and documentation from a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Group Actions**

Notifiers Link

Or added to a project with the Add button on the Edit Project page:

<table>
<thead>
<tr>
<th>Notifiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>mail</td>
</tr>
</tbody>
</table>

Notifier Button

Here you select between the Notifier implementations provided with Continuum:
Notifier Type Choice

You have the following choices:

- Mail
- IRC
- Jabber
- MSN
- Wagon
18 Mail Notification

18.1 Mail Notification

If you are using Maven 2, email notifiers configured in `pom.xml` will be automatically added, and you may have as many as you need.

```xml
<ciManagement>
    <system>continuum</system>
    <notifiers>
        <notifier>
            <configuration>
                <address>email adress</address>
                <committers>true</committers>
                <developers>true</developers>
            </configuration>
        </notifier>
    </notifiers>
</ciManagement>
```

Or you can manually add mail notifiers at the project group or individual project level.

On the Add Notifier form select Mail from the pull-down menu and click Submit.

![Add/Edit Mail Notifier](image)

You must either provide a single email address, or select to notify the latest committers or project developers.
In addition you may select one or more Send on... options. Then, click Save.
19 IRC Notification

19.1 IRC Notification

1 Under Notifiers from the Project Information page, click Add.
2 On the Add Notifier form select IRC from the pull-down menu and click Submit.
3 On the next page, fill out the form with the following information:
   - IRC Host
   - IRC Port
   - IRC Channel
   - Nick Name
   - Alternate Nick Name
   - User Name
   - Full Name
   - Password which can be left blank if you did not specify one in your IRC account

<table>
<thead>
<tr>
<th>Add/Edit IRC Notifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRC Host*:</td>
</tr>
<tr>
<td>IRC port:</td>
</tr>
<tr>
<td>IRC channel*:</td>
</tr>
<tr>
<td>Nick Name (default value is continuum):</td>
</tr>
<tr>
<td>Alternate Nick Name (default value is continuum):</td>
</tr>
<tr>
<td>User Name (default value is the nick name):</td>
</tr>
<tr>
<td>Full Name (default value is the nick name):</td>
</tr>
<tr>
<td>Password: **********</td>
</tr>
</tbody>
</table>

☐ SSL
☐ Send on Success
☐ Send on Failure
☐ Send on Error
☐ Send on Warning
☐ Send On SCM Failure

Add IRC Notifier
4 Select the **Send on ...** options you want.

5 Click **Save**. The IRC notifier you just added will be listed under **Notifiers** on the **Project Information** page along with the other notifiers you may have set up prior to this.
20 Jabber Notification

20.1 Jabber Notification

1. Under Notifiers from the Project Information page, click Add.
2. Select Jabber from the pull-down menu and click Submit.
3. On the Add/Edit Jabber Notifier page, fill out the form with the following:
   - Jabber Host
   - Jabber Port is typically 5222
   - Jabber Login
   - Jabber Password
   - Jabber Domain Name is the fully qualified domain name of your Jabber login
   - Jabber Recipient Address

The Jabber login and Jabber recipient address must be different. The Jabber recipient must also be added in the contact list of the sender (at least for Google talk).
4. Select the Send on ... options you want.
5 Click **Save**. The Jabber notifier you just added will be listed under **Notifiers** on the **Project Information** page along with the other notifiers you may have set up prior to this.
21 MSN Notification

21.1 MSN Notification

1. Under Notifiers from the Project Information page, click Add.
2. On the Add Notifier form select MSN from the pull-down menu and click Submit.
3. On the next page, fill out the form with the following:
   - MSN Login
   - MSN Password
   - MSN Recipient Address

![Add/Edit MSN Notifier](image)

Add MSN Notifier

4. Select the Send on ... options you want.
5. Click Save. The MSN notifier you just added will be listed under Notifiers on the Project Information page along with the other notifiers you may have set up prior to this.
22 Wagon Notification

22.1 Wagon Notification

1. Under Notifiers from the Project Information page, click Add.
2. On the Add Notifier form select Wagon from the pull-down menu and click Submit.
3. On the next page, enter the Project Site URL. It must be a Wagon URL like the URL used in distributionManagement. For the Webdav protocol, you can use dav: [http_url], or file://path_to_the_directory if you want to copy it locally with the file protocol.
4. Enter the ServerId. This should match the value of the <id> in the server configuration found in settings.xml. Sample configuration follows:

```
<server>
  <username>admin</username>
  <password>admin123</password>
  <id>continuum.site</id>
</server>
```

Using the server configuration in [user_home].m2/settings.xml is a workaround for user authentication using the Wagon notifier.

The <username> and <password> should be set to the user account that has the Site Producer and Site Observer roles.

5. Select the Send on ... options you want.
6. Click Save. The Wagon notifier you just added will be listed under Notifiers on the Project Information page along with the other notifiers you may have set up prior to this.
The file protocol will create a `buildresult.txt` file locally in the location specified in the Wagon Notifier configuration. If you use the Webdav protocol, a `buildresult.txt` file will be copied to your disk, relative to where you told it to be placed when you set up the Wagon notifier.

You can also view the `buildresult.txt` file from a browser at the Project Site URL you specified.
23 Building a project

23.1 Building Projects
For Ant and Maven builds the following system properties will be added via -D command line:

- continuum.project.group.name
- continuum.project.lastBuild.state: last build state int flag
- continuum.project.lastBuild.number
- continuum.project.nextBuild.number
- continuum.project.id
- continuum.project.name
- continuum.project.version

When building projects, the build order is determined by the inter-dependency of the projects. This would mean that the dependencies of a project are built first.

In cases when a project group can build projects in parallel build queues but one of those projects depend on another project, the inter-dependent projects will build in the same build queue.

Projects can be built in two ways:

1. Scheduled Builds
2. Forced Builds

Projects will have the in queue icon once the forced build or a scheduled build is triggered. This means that the project is either in the prepare build queue or in the build queue.

Checkout or update of projects takes longer with distributed builds enabled because after an SCM checkout or SCM update, an SCM changelog follows to get the "latest update date" needed to determine whether projects should build or not.
24 Scheduled Build

24.1 Scheduling Project Build

Schedules determine the project's time interval to build.

When scheduled builds are triggered, there is no dependency ordering between project groups and the following happens:

- Projects are updated from the SCM. These are queued under the **Prepare Build Queues** section in Queues page.
- Builds of the projects are executed. These are queued under the **Build Queues** in Queues page.

To configure a scheduled build:

1. Create a schedule. You can refer to **Managing Schedules** section.
2. Add a build definition to a project using the schedule created in step 1 for the **Schedule** field. You can refer to the section **Managing Build Definitions**.

![Build Definition Configuration](image)

*Scheduling build

- Note* In a distributed build setup, the project builds are not executed if no build agent is configured or if a build agent group with no build agent, is configured in the build environment that is attached to the project's build definition.

To view the results of the build, refer to **Build Results Management**.
25 Forced Build

25.1 Force Project Build
Occasionally you may want to force a build outside of the regular schedule. When builds are triggered manually, the following happens:

- Projects are updated from the SCM. These are queued under the Prepare Build Queues section in Queues page.
- Builds of the projects are executed. These are queued under the Build Queues in Queues page.

To manually build a project perform the following steps:

1. Click Show Project Groups.
2. Click the project group link of the project you want to build. This will put you on the Summary page of the project group.
3. You can click Build all projects button under Group Actions to build all the projects in the project group.

   ![Project Group Actions](image)

4. To build an individual project, you can click on the build icon that is found along the row of the project you want to build. It is the first icon on the right of the project name. This will execute the default build goal you have defined for that project.

   To build selected projects, check the box beside the name of the project, then click the Build Project(s) button.

   If you want to build the project according to a specific build goal other than the default build goal, click on the project name to go to the Project's Information page. All build goal definitions for the project are listed under the Build Definitions section. Click on the build icon to the right of the specific build goal you want to execute.

   - Note* In a distributed build setup, the project builds are not executed if no build agent is configured or if a build agent group with no build agent, is configured in the build environment that is attached to the project's build definition.

   To view the results of the build, refer to Build Results Management.
26 Build Results Management

26.1 Build Results Management

To view the result of the build:

1. Click the link for the project group of the project you want to view - the link will be under the Name column.
2. Click the build number link under the Build column of the project you want to view. Or you can click the project link again and click the Builds link at the top of the page, then click the Result link, next to the State column.

When builds are executed frequently, deleting unnecessary and failed build results is needed. To delete build results, follow these steps:

1. Click the name of the project group.
2. Click on the build number under the Build column. You will be directed to the build result page as shown below.

Build Results page
The **Triggered by** field displays the username of the person who forced the build. However, this field is empty when the build is triggered by a schedule.

Or you can click on the name of the project that you want to delete build results from.

- Click the **Builds** tab. The build results list will be displayed.
- Check the box of the build results that you want to delete.

3 Click the **Delete** button.
27 Release Management

27.1 Releasing Projects
The release process has two steps, Prepare and Perform.

1 First, it prepares your project for release by doing the following:
   - Checks that your project is in a "releasable" state.
   - Updates the POMs for the new development version.
   - Runs a test build.
   - Generates a tag for the release.
   - Generates the artifact to be deployed, such as a JAR file.
   - Generates the site and deploys it.
   - Commits the new POMs with the new development version. It will do the commit to the
     SCM connection URL you specify (explained later).

2 Then the release management system performs the release by checking out a clean copy of the
   tagged release and deploying the artifacts and site.

27.1.1 Modifying POM for Release
The source code control system you use must be specified in your POM file in an <scm> entry similar to the one shown here:

```xml
<scm>
  <connection>
    scm:svn:http://svn.apache.org/repos/asf/maven/components/trunk
  </connection>
  <developerConnection>
    scm:svn:https://svn.apache.org/repos/asf/maven/components/trunk
  </developerConnection>
  <url>http://svn.apache.org/viewcvs.cgi/maven/components/trunk</url>
</scm>
```

To determine what to enter for your connection URL (the <connection> tag) go to the link http://
maven.apache.org/scm/scms-overview.html for a list of supported SCMs and click on your source
code control system to see the appropriate syntax for your particular software.

In general the format for an SCM URL is:

```
scm:<scm_provider><delimiter><provider_specific_part>
```

In the example above, the scm_provider is svn (Subversion). The delimiter is a colon. And the
rest of the line is the provider_specific_part.

It is important to prepare the release just before performing the release. The reason these processes
have been separated into two steps is to allow the user to confirm that everything has been set
correctly before the actual release. If between the prepare and performing of the release there is a
change to the SCM tree, an error will occur causing the prepare process to restart.

27.1.2 Releasing projects in a distributed build
Release will happen in the Build Agent where the last build of project occurred.
To view on-going releases from different build agents, click the **Releases** button under the **Distributed Builds** menu.
28  Prepare Project Release

28.1 Prepare for Release

Navigate to the Project Group Summary and click the Release button or icon.

Choose Prepare project for release and click Submit.

Complete the form, providing the SCM tag name, etc.

Check the Use edit mode checkbox if you are using an SCM system that requires you to obtain a lock before editing.

Click Submit.
Note: When releasing in a distributed builds setup, a **Build environment** should be selected containing at least one enabled build agent. Furthermore, the release will not happen in the following cases:

- no build environment selected
- no build agent found in the build agent group attached to the build environment
- all build agents configured in the selected build environment are disabled

**Prepare Project for Release**

![Release Prepare Parameters](image)

### Release Prepare Parameters

- **SCM Username**: admin
- **SCM Password**: 
- **SCM Tag**: hello-5.5
- **SCM Tag Base**: http://example.com/repo/hello/tags
- **SCM Comment Prefix**: 
- **Preparation Goals**: clean
- **Arguments**: 
- **Build Environment**: JAVA_HOME

- Use edit mode
- Add a schema to the POM if it was previously missing on release

### Maven Quick Start Archetype

![Maven Quick Start Archetype](image)

- **Release Version**: 5.5
- **Next Development Version**: 5.6-SNAPSHOT

**Submit**

**Release Prepare parameters**

Wait for the process to complete, then click **Done**.

Note: Hitting the **Rollback** button does not roll back or delete the SCM tag created during the **scm-tag** phase. So when re-doing the release prepare of the same version, make sure that the tag does not exist in SVN, if so, the tag should be manually deleted.
You will be returned to this page to make another selection.

To view the release prepare results, refer to Release Results Management.
29 Perform Project Release

29.1 Perform Release

Choose **Perform Release** and the version number

Fill in the form and click **Submit**

To specify a different Maven goal to execute during the release, fill in the **Perform Goals** field with another goal. By default, the goal for this field is `clean deploy`.

To specify additional arguments during execution, fill in the **Arguments** field.

Wait for the process to complete, then click **Done**.
To view the release perform results, refer to Release Results Management.
30 Release Results Management

30.1 Release Results Management

The Release Results tab from the Project Information page displays all the release results of a project when executing the release goals prepare and perform.

**Release Results page**

To view the release result, click the View Result link in-line with the release goal being executed. The Triggered by field displays the username of the person who initiated the release.

**Project Release Summary**

<table>
<thead>
<tr>
<th>Release Project Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Name:</strong></td>
</tr>
<tr>
<td><strong>Release Goal:</strong></td>
</tr>
<tr>
<td><strong>Start Time:</strong></td>
</tr>
<tr>
<td><strong>End Time:</strong></td>
</tr>
<tr>
<td><strong>State:</strong></td>
</tr>
<tr>
<td><strong>Triggered by:</strong></td>
</tr>
</tbody>
</table>

**Release Execution Output**

```
[INFO] Updating local copy against the scm...
[INFO] Verifying that there are no local modifications...
[INFO] Checking dependencies and plugins for snapshots ...
[INFO] Transforming 'Maven Quick Start Archtype'...
[INFO] Not generating release POM.
```

**Release Summary**

To delete release results, select the boxes beside the project name then click **Delete**.
31 Administrator's Guides

31.1 Administrator's Guides

- Managing Users and Security
- Managing Project Groups
- Managing Builders
- Managing JDKs
- Managing Build Environments
- Managing Build Agents
- Managing Build Agent Groups
- Managing Schedules
- Managing General Configuration
- Managing Local Repositories
- Managing Purge Configuration
- Managing Parallel Builds
- Managing Build Queues
- Managing Project Queues
- External Databases
- Monitoring Continuum
- Log Files
- Appearance Configuration
- Build Definition Templates
- Shutting Down Continuum
- Understanding Distributed Builds
32 Managing Users and Security

32.1 Managing Users and Security

Security Configuration
LDAP Configuration
33 Security Configuration

33.1 Continuum Security Configuration

Security properties and password rules can be configured in the `security.properties` file, which by default is searched for in:

- `~/.m2/security.properties`
- `$CONTINUUM_HOME/conf/security.properties`

(In the list above, `~` is the home directory of the user who is running Continuum, and `$CONTINUUM_HOME` is the directory where Continuum is installed, such as `/opt/continuum-1.2`.)

Following are some of the properties you can modify. For a complete list, consult the default properties file in Redback's svn repo: `config-defaults.properties`

```
# Security Policies
security.policy.password.encoder=
security.policy.password.previous.count=6
security.policy.password.expiration.days=90
security.policy.allowed.login.attempt=3

# Password Rules
security.policy.password.rule.alphanumeric.enabled=false
security.policy.password.rule.alphacount.enabled=true
security.policy.password.rule.alphacount.minimum=1
security.policy.password.rule.characterlength.enabled=true
security.policy.password.rule.characterlength.minimum=1
security.policy.password.rule.characterlength.maximum=8
security.policy.password.rule.musthave.enabled=true
security.policy.password.rule.numericalcount.enabled=true
security.policy.password.rule.numericalcount.minimum=1
security.policy.password.rule.reuse.enabled=true
security.policy.password.rule.nowhitespace.enabled=true
```

Note: If installed standalone, Continuum's list of configuration files is itself configurable, and can be found in: `$CONTINUUM_HOME/apps/continuum/webapp/WEB-INF/classes/META-INF/plexus/application.xml`
34 LDAP Configuration

34.1 LDAP Configuration

Continuum supports LDAP for authentication. To configure it, you should follow these steps:

- Shutdown Continuum
- Add a security.properties files under $CONTINUUM_HOME/conf/ with the following content:
  ```properties
  security.policy.password.expiration.enabled=false
  user.manager.impl=ldap
  ldap.bind.authenticator.enabled=true
  ldap.config.context.factory=com.sun.jndi.ldap.LdapCtxFactory
  ldap.config.hostname=[ldap_hostname]
  ldap.config.base.dn=[ldap_base_dn]
  ldap.config.port=[ldap_port]
  ldap.config.mapper.attribute.user.id=cn
  ldap.config.mapper.attribute.user.email=email
  ldap.config.mapper.attribute.fullname=givenName
  redback.default.admin=[adminuser]
  redback.default.guest=[guestuser]
  
  adminuser is a LDAP user and will be the default Continuum admin. guestuser is a LDAP user and will be used for the guest role, generally, it is an utility LDAP account.
- Restart Continuum

34.1.1 Other resources

Redback LDAP page
35 Managing Project Groups

35.1 Managing Project Groups

### Project Groups

<table>
<thead>
<tr>
<th>Name</th>
<th>Group Id</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Project Group</td>
<td>default</td>
<td>400</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td>400</td>
</tr>
</tbody>
</table>

**Group Summary homepage**

#### 35.1.1 Adding a Project Group

From the home page (Group Summary) Use the the Add Project Group button

![Add Project Group button](image)

**Add Project Group**

Then You will have the project Group detail.

<table>
<thead>
<tr>
<th><strong>Add Project Group</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Group Name*:</td>
</tr>
<tr>
<td>Project Group Id#:</td>
</tr>
<tr>
<td>Description:</td>
</tr>
</tbody>
</table>

![Save and Cancel buttons](image)

**Edit Project Group detail**

Some fields are mandatory:

- Project Group Name
- Project Group Id

#### 35.1.2 Editing a Project Group

From the home page (Group Summary), click the project group name link.

The project group information will then be displayed.
Then, click on the Edit button.
Update Project Group

The following fields can be updated:

- **Project Group Name**: The name of the project group.
- **Description**: A brief description about the group.
- **Local Repository**: The specific repository used for the project which points to the exact location of the repository in the machine used for building.
- **Homepage Url**: The site of the project.

And, projects can be moved to another project group.

35.1.3 Deleting a Project Group

There are two ways to delete a project group.

From the home page (Group Summary), click the Delete icon to the right of the group you wish to delete.

From the Project Group Summary page, click the **Delete Group** button.

Confirm the deletion

Note that user roles for this project group will not be removed. This is intentional so that if you are sharing a user database among several Continuum instances, users will still be able to access the same group on a different server.
36 Managing Builders

36.1 Managing Building Tool

From the menu, choose the 'Installations' entry

![Installations](image)

Here you must choose the Installation Type you want to add (here a Tool)

![Installation Type Choice](image)

You must configure the tool you want to add

![Continuum - Installation](image)

You can use the checkbox if you want to add a Profile with the same name as your tool name.

The value 'Value/Path' field must contains the path to the tool:

- For maven2: it must be similar to your M2_HOME
- For maven1: it must be similar to your MAVEN_HOME
- For ant: it must be similar to your ANT_HOME
  A control will be made to validate the path value:
- For maven2: path/bin/mvn -v will be tested
- For maven1: path/bin/maven -v will be tested
- For ant: `path/bin/ant -v` will be tested
  - If the test fails, the following error will be displayed:

  ![Installation validation failed](image)

  *Installation validation failed*
37 Managing JDKs

37.1 Managing JDKs

From the menu, choose the 'Installations' entry

![Installations]

Here you must choose the Installation Type you want to add (here a Tool)

![Installation Type Choice]

You must configure the tool you want to add

![Continuum - Installation]

You can use the checkbox if you want to add a Profile with the same name as your jdk name.

The value 'Value/Path' field must contain the jdk path (as a JAVA_HOME value).

The value will validated by testing path `/bin/java -version`

If the test fails, the following error will be displayed

![Continuum - Installation]

Jdk validation failed
38 Managing Schedules

38.1 Managing Schedules
Schedules initiates the building of projects continuously. In this section, adding, modifying, and deleting of schedules are discussed.

Clicking the Schedules link from the menu on the left will display the following page:

List of schedules page

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Quiet Period</th>
<th>Cron Expression</th>
<th>Max Job Time</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULT_SCHED</td>
<td>Run hourly</td>
<td>0</td>
<td>0 0 * * * ?</td>
<td>3600</td>
<td>true</td>
</tr>
<tr>
<td>MONTHLY_SCHED</td>
<td>Run monthly</td>
<td>0</td>
<td>0 0 9 1 * ?</td>
<td>0</td>
<td>true</td>
</tr>
</tbody>
</table>

38.1.1 Adding Schedules
To add a schedule, follow these steps:

1. Click the Add button below the list of schedules.
2. Fill in the needed information in the Edit Schedules page shown below.
### Adding a build schedule

- **Name** The unique identifier of the schedule. This is a required field.
- **Description** Brief description of the configured schedule. This is a required field.
- **Cron Expression** Determines the exact time interval that the build schedule executes.
- **Maximum job execution time (seconds)** This sets the maximum time for a job to be executed. This is a required field.
- **Quiet Period (seconds)** This a setting that delays the build if there has been a commit in the defined number of seconds prior. This is useful when using CVS, since commits are not atomic and a developer might be committing midway through an update. It is not typically needed if using Subversion.
- **Add Build Queue** Move build queues from the left hand list box to the right hand list box by clicking the appropriate buttons in between the two list boxes. All build queues on the right hand list box will be attached to the schedule.
38.1.2 Editing Schedules
To edit a schedule, follow these steps:

1. Click the edit icon which can be found to the right of the schedule.
2. Modify the fields in the Edit Schedules page.
3. Click Save.

38.1.3 Deleting Schedules
To delete a schedule, click the delete icon, the rightmost icon inline with the schedule to be deleted.

- **Enabled** When selected, scheduled build will be executed. []

3 Click Save.
# Managing General Configuration

## 39.1 Managing General Configuration

The first time you start Continuum, you will see the 'General Configuration' page. This page is preconfigured with default values.

<table>
<thead>
<tr>
<th>General Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Working Directory</strong>:&lt;br&gt;<code>path/to/continuum/data/working-directory</code>&lt;br&gt;Enter the working directory of the Continuum web application</td>
</tr>
<tr>
<td><strong>Build Output Directory</strong>:&lt;br&gt;<code>path/to/continuum/data/build-output-directory</code>&lt;br&gt;Enter the build output directory of the Continuum web application</td>
</tr>
<tr>
<td><strong>Release Output Directory</strong>:&lt;br&gt;<code>path/to/continuum/data/release-output-directory</code>&lt;br&gt;Enter the release output directory of the Continuum web application</td>
</tr>
<tr>
<td><strong>Deployment Repository Directory</strong>:&lt;br&gt;Enter the deployment repository directory of the Continuum web application</td>
</tr>
<tr>
<td><strong>Base URL</strong>:&lt;br&gt;<code>http://localhost:8080/continuum</code>&lt;br&gt;Enter the base URL for the Continuum web application</td>
</tr>
<tr>
<td><strong>Number of Allowed Builds in Parallel</strong>: Enter the number of Allowed Builds in Parallel</td>
</tr>
<tr>
<td><strong>Enable Distributed Builds</strong></td>
</tr>
</tbody>
</table>

You can modify values or keep defaults then save.

Although Continuum defaults to storing its data within the installation, it is a best practice to separate the installation and data directories.

These values can be pre-configured in `continuum.xml`. Make sure that Continuum is not running when editing this file.
You can modify values at a later time with the following steps:

1. Login to Continuum with an Administrator account
2. Click the **Configuration** link under the **Administration** section
3. Click the **Edit** button
40 Managing Local Repositories

40.1 Local Repository
Local repositories can be configured for a specific project group's use. This is where the artifacts used for building the projects can be found instead of the default ($USER_HOME/.m2/repository).

Click the Local Repositories link under the Administration section.

You will see all the local repositories that have been created.

To display:

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Layout</th>
</tr>
</thead>
<tbody>
<tr>
<td>repo1</td>
<td>/home/marcal/repository1</td>
<td>default</td>
</tr>
<tr>
<td>repo2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this screen you can add/edit/delete/purge a local repository.

You can purge a repository if it has a default Purge Configuration, otherwise the purge icon is disabled.

40.1.1 Adding / Editing a Local Repository
All fields are mandatory.

• Name: must be a unique repository name.
• Location: must be the absolute path of a unique repository location.
• Layout: "default" or "legacy". Default layout is for maven2, while legacy layout is for maven1.

Adding a local repository will automatically create a default Purge Configuration for that repository.

If you're using distributed builds, you must configure a localRepository with the same name in the build agent's configuration file where the location is the local path to the local repository in the build agent machine. See Distributed Builds for more details.
40.1.2 Default

The default local repository location comes from the settings of the user running Continuum. The location cannot be edited within Continuum, but can be changed by specifying it in `~/.m2/settings.xml`. 
Managing Purge Configuration

41.1 Purge Configuration
Click the Purge Configurations link under the Administration section.

Purge Configurations

You will see all repository purge configurations and all directory purge configurations.

Repository Purge Configurations

Directory Purge Configurations

Here you can add/edit/delete the purge configuration.

You can also purge the repository or directory by clicking the corresponding purge icon of the purge configuration.

41.1.1 Adding / Editing Repository Purge Configuration
Specify the repository to purge.

41.1.2 Adding / Editing Directory Purge Configuration
There are two types of directory purge configuration:
41.1.3 Purging Repository

- Delete all - will delete the entire contents of the repository
- Days Old - will delete the artifact if it's older than the number of days old but still satisfies the number of retention count.

Example:
Days_Old = 30 days
Retention_Count = 2

If I have 5 artifacts that are older than 30 days, only 3 of them will be deleted because I have to retain any 2 artifacts (Retention count).

- Retention Count - the number of artifacts to retain; all in excess will be deleted
- Delete Released Snapshots - will delete all released snapshots

41.1.4 Purging Directory

- Delete all
  - Releases Directory - will delete all releases-* directories
  - Build Output Directory - will delete all build output of each project
- Days Old - will delete the directory if it's older than the number of days old
- Retention Count - number of directories to retain

41.1.5 Steps in purging:

- Perform Delete All purging if it is checked.
- If delete all is not checked, then is days old has a value greater than 0? If it has then perform days old purging.
- If days old is 0 then perform retention count purging.
- Delete released snapshots purging will always be performed if it is checked, unless the Delete All is also checked or it's a directory purging.
42 Managing Parallel Builds

42.1 Managing Parallel Builds
Since 1.3.1, Continuum can be configured to checkout and build projects in parallel or concurrently.

42.1.1 Configuring Parallel Builds
The number of build queues to be used when checking out or building projects can be configured in the Configuration page, via the Number of Allowed Builds in Parallel field (see Managing General Configuration). The value should be greater than one (1) to be able to create a build queue aside from the default.

Another thing to note is that if Distributed Builds is enabled, Parallel Builds is automatically disabled. To make it short, you're only allowed to use one of these functionalities at a time in the current implementation.

To configure parallel builds:

1. Create a build queue to be used for the projects. Refer to Managing Build Queues
2. Attach the build queue(s) to a build schedule. Refer to Attaching Build Queue to a Schedule
3. Create or edit the project’s build definition to use the build schedule configured with the build queue(s). Refer to Managing Build Definitions

A screen similar to the following is displayed under the Queues page when the project is built (force/scheduled).

42.1.2 Limitations
Below are some feature limitations for the current implementation:

1. Project groups cannot be built multiple times simultaneously.
2. Concurrent build of inter-dependent projects in a group is not yet supported.
3. All projects in a project group will be enqueued to the same Build Queue.
43 Managing Build Queues

43.1 Managing Build Queues

43.1.1 Adding a Build Queue
By default, there is already a DEFAULT_BUILD_QUEUE that cannot be deleted configured in Continuum. To add more build queues...

Click the **Build Queue** link under the **Administration** section.

![Build Queue](image)

You will see all the build queues.

![Build Queues list](image)

Here you can add/delete the build queue. Take note that you would only be allowed to create $N$ number of build queues, where $N =$ the Number of Allowed Builds in Parallel set in the Configuration page.

Input the name for the build queue and save.

![Add Parallel Build Queue](image)

43.1.2 Deleting a Build Queue
From the build queue page, you can delete a build queue by clicking the delete icon...
Delete icon
Managing Build Agents

44.1 Managing Build Agents

Before this, you may want to enable the Distributed Builds option in the General Configuration and install a Build Agent, or read about the Distributed Builds feature.

From the menu, choose the Build Agents item

Build Agents Menu

You will see a list of the existing Build Agents, if any.

Build Agents List

To add a new Build Agent, click the Add button. You will be prompted to enter the Build Agent URL and Description.

To edit an existing Build Agent, click the Edit link to the right of the entry. You will be prompted to edit the Build Agent Description.

Note: Once a Build Agent has been saved you can not change its URL.

Add/Edit Build Agent

Be sure to enable the agent by checking the Enabled checkbox.

After you save your changes, verify that the Enabled checkbox is checked. If it is not checked, most likely Continuum was unable to ping the agent. Consult the log file for additional information.
45 Managing Build Agent Groups

45.1 Managing Build Agent Groups

A Build Agent Group provides a logical association of Build Agents so that it can be attached to a Build Environment providing the user control on which agents it wants the project to be built.

From the menu, choose the ‘Build Agents’ item

![Build Agents Menu](image1)

You will see a list of the existing Build Agent Groups in the Build Agent Groups Section, if any.

![Build Agent Groups List](image2)

To add a new Build Agent Group, click the 'Add' button.

To edit an existing Build Agent Group, click the 'edit' link to the right of the entry.

You will be prompted to enter or edit the Build Agent Group Name and its associated Build Agent(s):

![Add/Edit Build Agent Group](image3)

Build Agent can be associated to one or more Build Agent Group

To use a Build Agent Group in a Project, you need to attach it to a build environment.

Refer to Attach Build Agent Group to a Build Environment
46 Managing Project Queues

46.1 Managing Queues
Current checkouts and builds, and all other projects queued in the checkout, build, and prepare build queues can be viewed in the Queues page.

Prepare Build Queue

Build Queues

Checkout Queue
Checkout Queue

You must have a Manage Continuum Queues role for you to:

1. Cancel current checkouts, current builds, queued prepare builds, queued checkouts and queued builds by clicking the cancel build icon.

2. Cancel multiple queued tasks by selecting the corresponding checkboxes of the checkouts, builds, or project updates you want to cancel and then click the Cancel Entries button. Note: Cancelling current prepare build is not allowed to prevent data corruption.
47 External databases

47.1 How to use an external database?

47.1.1 Supported databases

- Derby
- MySQL
- MS SQL Server
- Oracle (not yet, but coming soon)

47.1.2 Configure Continuum

47.1.2.1 Standalone version

To use an external database with Continuum standalone, you must configure DataSources in $CONTINUUM_HOME/conf/jetty.xml
47 External databases

<!-- continuum database -->

<New id="continuum" class="org.mortbay.jetty.plus.naming.Resource">
  <Arg>jdbc/continuum</Arg>
  <Arg>
    <New class="org.apache.derby.jdbc.EmbeddedDataSource">
      <Set name="DatabaseName">/data/databases/continuum</Set>
      <Set name="user">sa</Set>
      <Set name="createDatabase">create</Set>
    </New>
  </Arg>
</New>

<New id="continuumShutdown" class="org.mortbay.jetty.plus.naming.Resource">
  <Arg>jdbc/continuumShutdown</Arg>
  <Arg>
    <New class="org.apache.derby.jdbc.EmbeddedDataSource">
      <Set name="DatabaseName">/data/databases/continuum</Set>
      <Set name="user">sa</Set>
      <Set name="shutdownDatabase">shutdown</Set>
    </New>
  </Arg>
</New>

<!-- Users / Security Database -->

<New id="users" class="org.mortbay.jetty.plus.naming.Resource">
  <Arg>jdbc/users</Arg>
  <Arg>
    <New class="org.apache.derby.jdbc.EmbeddedDataSource">
      <Set name="DatabaseName">/data/databases/users</Set>
      <Set name="user">sa</Set>
      <Set name="createDatabase">create</Set>
    </New>
  </Arg>
</New>

<New id="usersShutdown" class="org.mortbay.jetty.plus.naming.Resource">
  <Arg>jdbc/usersShutdown</Arg>
  <Arg>
    <New class="org.apache.derby.jdbc.EmbeddedDataSource">
      <Set name="DatabaseName">/data/databases/users</Set>
      <Set name="user">sa</Set>
      <Set name="shutdownDatabase">shutdown</Set>
    </New>
  </Arg>
</New>

47.1.2.2 Webapp

To use an external database with the Continuum webapp, you should configure the DataSource in your container.
47.1.3 Shutdown Procedure
When using an external database, it is very important to stop Continuum prior to stopping or restarting the database. Continuum may exhibit unpredictable behavior if the database disappears while it is running, and may not recover once the database comes back up. If this happens, you must re-start Continuum. If you experience errors after re-starting, the data may be corrupted and may need to be fixed by editing records directly in the database.
48 Monitoring Continuum

48.1 Monitoring a Continuum instance

48.1.1 JConsole

- Edit $CONTINUUM_HOME/bin/[platform]/wrapper.conf to add:
  \`
  wrapper.java.additional.9=-Dcom.sun.management.jmxremote
  \`
- Start Continuum
- Start jconsole, (included with Sun JDK 1.5 and later,) select the 'WrapperSimpleApp' line, and click Connect

The following image shows starting Continuum 1.1, adding a project group, then adding and building the trunk of the Shale Framework (14 modules):

![JConsole screenshot](image)

The following image shows the same Continuum instance running for several hours:
48.1.2 Garbage Collection and Heap Size

Edit $CONTINUUM_HOME/bin/[platform]/wrapper.conf to add:

```java
wrapper.java.additional.10=-verbose:gc
or
wrapper.java.additional.10=-Xloggc:gc.txt
```

The first sends to the console (and wrapper log) while the second sends to the filename that you tell it to.

Example output:

```
420.568: [GC 62459K->58474K(65104K), 0.0074933 secs]
420.778: [GC 62634K->58733K(65104K), 0.0060762 secs]
420.919: [GC 62893K->58832K(65104K), 0.0034433 secs]
421.015: [GC 62992K->58723K(65104K), 0.0026420 secs]
421.067: [GC 62883K->60885K(65104K), 0.0107248 secs]
421.140: [GC 65045K->62114K(66384K), 0.0122194 secs]
421.153: [Full GC 62114K->32136K(66384K), 0.3591207 secs]
421.655: [GC 36296K->32242K(65104K), 0.0037377 secs]
421.754: [GC 36402K->33061K(65104K), 0.0037182 secs]
421.835: [GC 37221K->33120K(65104K), 0.0028722 secs]
421.930: [GC 37280K->34582K(65104K), 0.0056601 secs]
422.074: [GC 38742K->35150K(65104K), 0.0072451 secs]
```

before->after (total), time
This shows the heap size before and after garbage collection as well as the total heap size and the time for the GC run.

48.1.3 References

- [http://java.sun.com/developer/technicalArticles/J2SE/jconsole.html]
49 Log Files

49.1 Log Files

To keep track of the Continuum performance and problems, log files are created during runtime. These files can be found in the `logs/` directory.

- `continuum.log` - contains all the start-up information for Continuum.
- `continuum-audit.log` - contains information regarding the project operations and configurations being modified. For example, projects added are logged here, with date and timestamp, userId of who performed the deploy, and the project that was built. For security measure, passwords are masked behind asterisks.
- `continuum-security-audit.log` - contains information regarding Continuum's security. For example, a successful login of a user or a user account is created.
50 Audit Logs

50.1 Audit Logs

Continuum’s logs directory contains an audit log file named `continuum-audit.log`, which tracks events that occur in the server. For security measure, passwords are masked behind asterisks.

A typical record looks like this:

```
2009-07-22 12:31:00 - admin - PROJECT Project Group id=6 - Forced Project Build
```

The space delimited records are:

- date and time (server local time)
- user that enacted the change (or guest if none)
- the project or configurations affected
- the event that occurred

Currently, the following events are logged:

- add/delete of projects
- forced project builds
- release prepare/perform/rollback
- add/edit/delete of schedules
- add/edit/delete of build definition templates
51 Continuum Logs

51.1 Continuum Logs

Continuum's logs directory contains an continuum log file named continuum.log, which logs all the startup information of Continuum.

A typical record looks like this:

52 Security Logs

52.1 Security Logs

Continuum’s logs directory contains a security log file named `continuum-security-audit.log`, which keeps track of all the security operations.

A typical record looks like this:

2009-07-22 12:32:00 - admin - User Created: continuum
2009-07-22 12:32:10 - admin - Role Assigned to user continuum: Continuum Group Project Administrator
2009-07-22 12:32:47 - - Successful Login for user continuum

The hyphen delimited records are:

- date and time (server local time)
- current user performing the operation
- the operation performed

Currently, the following events are logged:

- user creation/modification/deletion
- user log in/out
- assigning roles to a user
53 Appearance Configuration

53.1 Configure Appearance

53.1.1 Banner

You can configure the right logo of the banner including title and link on the image. You have to add some information in a POM (like a company POM) (coming from org.apache:apache in this example):

```xml
<organization>
  <name>The Apache Software Foundation</name>
  <url>http://www.apache.org/</url>
</organization>
<properties>
  <organization.logo>http://www.apache.org/images/asf_logo_wide.gif</organization.logo>
</properties>
```

From the menu, choose the Appearance entry:

**Appearance**

**Company Details**

The logo in the top right of the screen is controlled by your selected 'company POM'.
You have not yet specified a company POM. Select a Company POM

Appearance

Use the Select a Company POM link:

**Appearance**

**Company Details**

Enter the details of the company super POM below. If it exists, the organization name, URL and logo will be read from it.

- **GroupId**: org.apache
- **ArtifactId**: apache

'Select a Company POM'

The result will be displayed (using org.apache:apache in this example):
Appearance

Company Details
The logo in the top right of the screen is controlled by your selected 'company POM'.
Your selected company POM is below. If you would like to change the organization name, url or logo, you can edit the POM.

<table>
<thead>
<tr>
<th>Group ID</th>
<th>org.apache</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artifact ID</td>
<td>apache</td>
</tr>
<tr>
<td>Version</td>
<td>4</td>
</tr>
</tbody>
</table>

'Selected a Company POM'

Note: the POM is searched for in the central repository and in the repositories available for the active profiles from your $ user.home/.m2/settings.xml.

53.1.2 Footer
You can configure the footer by putting your own html content in the Appearance entry of the menu.

'Configure footer'

The default value is:

```html
<div class="xright">Copyright &copy; 2005-$\{currentYear\}&nbsp;The Apache Software Foundation</div>
```
54 Build Definition Template

54.1 Build Definition Template

From the menu, choose the 'Build Definition Templates' entry

Build Definition Templates

You will see all build definition templates and the build definitions which can be added in templates. In this screen you can add/edit/update/delete a build definition (the Continuum defaults can be deleted)

Available Templates

Available Build Definitions

Build Definition Templates

In the build definition template edit screen, you can easily one or more build definitions.
55 Shutdown Continuum

55.1 Shutdown Continuum

Shutting down Continuum while a project is building or queued is NOT recommended. The build queues page should be used to cancel any currently running and queued builds before shutting down.

55.1.1 Queues view

From the menu, choose the 'Queues' link

Queues

Then you'll get the Queues page

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Build Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuum Project</td>
<td>clean install</td>
</tr>
</tbody>
</table>

Queues

In this page you can see the current build, projects in the build queue, the current checkout and projects in the checkout queue. For each line, you can cancel the process

55.1.2 Shutdown

To shutdown Continuum, the queue must be empty, so when you want to shutdown, you can either wait until all builds are complete or cancel them.

If you don't want to have new projects added in the build queue before you shutdown Continuum, you can disable all schedules. You'll need to re-enable them on the next startup. (In the future, you'll have an action to automate the disable/enable schedules process.)
56 Understanding Distributed Builds

56.1 Understanding Distributed Builds

56.1.1 Introduction
The Distributed Builds is an extension to the base Continuum functionalities that gives us the ability to process multiple independent builds beyond the capacity of a single server’s processing power. It also enables us to execute builds on multiple different platforms while retaining a unified view of all project builds.

56.1.2 Architecture
Continuum follows a Client-Server model using XML-RPC as the protocol. However, since it uses a bi-directional XML-RPC implementation, we instead distinguish the components by calling them Master and Build Agent.

The Master is a Continuum instance that has the ability to delegate the builds to registered Build Agents.

The Build Agent is a standalone Jetty-bundled webapp that listens for any build requests from the Master it is assigned to.

There is a one-to-many relationship between the Master and the Build Agents. A Master may have many Build Agents, but each Build Agent can only have one Master.

56.1.3 Behavior
Distributed Builds happen at the project group level of Continuum. When the entire project group is built in the Master, independent projects (single project or multi-module project) are distributed to a single registered Build Agent.

In a project group containing a mix of projects, the distribution of work goes through the following steps:

1. In the Master, a build in the project group is triggered.
2. Every independent project within the project group is identified, whether as a single project or a multi-module project. Projects with inter-dependencies cannot be distributed separately, so multi-module projects are delegated to a Build Agent as one build.
3. For each independent project, the Master iterates over the list of registered Build Agents and queries each if available. The query is an XML-RPC ping() followed by a getBuildSizeOfAgent() invocation.
4. If there is a Build Agent available, the Master collects the information necessary for the build (SCM URL, project id, etc.) and passes it when invoking buildProjects() to the Build Agent with the smallest number of tasks in its queue. The Master also passes the name of the local repository of the project’s project group. Make sure that a local repository with the same name is configured in the Build Agent’s configuration file since that is what will be used when the project is built in the build agent. Otherwise, it will use the local repository set in the build agent’s settings.xml file.
5. In the Build Agent, the build request is processed: the build is queued and executed. Upon execution, the Build Agent first performs an SCM checkout or an SCM update followed by an SCM changelog to get the latest update date, then the actual build follows.
6 At this point, when the build is running, the Master can invoke `cancelBuild()` which returns a transient build result, and `getBuildResult()` that updates the build output viewed in the Master.

7 After the build, the Build Agent returns the complete build result to the Master by invoking the callback method `returnBuildResult()`, which the Master aggregates to provide a unified view of projects.

A `ping()` is always called before each XML-RPC invocation to check if the agent is available. If it's not, the agent will be disabled.

56.1.4 Setup

- Install and Configure one or more Build Agents.
- Enable the Distributed Builds option in the General Configuration.
- Add your Build Agents to the Continuum Master.
- Add your Build Agents to a Build Agent Group.
- Add your Build Agent Group to a Build Environment.
- Configure a project to use that Build Environment.
- Make sure that the local repository of the project group is properly configured. In this case, it should point to the path of the repository where the Build Agent is installed/running.

**Warning:** You need to have a central remote repository to store the artifacts created from the Build Agent so that other agents will be able to use the new artifacts.

56.1.5 Limitations

- Only system administrator can enable/disable distributed builds
- Credentials (i.e. svn credentials) are passed along if specified, but if server cache is used it will need to be done individually on the Build Agents
- There is no tracking of SCM changes
- The Build Agent needs a configuration web interface
- All projects in a project group will be distributed to the same Build Agent

56.1.6 Future Enhancements

- Remote builders
  
  - Builders can be installed on remote machines, a Continuum manager will send actions to run to builders. An action can be something to run on all builders, on some of them or eventually only to an available builder if we don't want to run more than one build. Actions can be sent with JMS and builders can apply some filters if they don't want to receive all actions. With that, we can do some parallel builds but the dependency tree must be respected for the build order. To work correctly with dependencies, each builder must use a central local repository. Maybe we can use an internal Archiva.
  - With Continuum builders configured to receive all commands, users can run multi-platform build for each build definition execution.
  - With Continuum builders configured to receive only some project types, users can use a different builder by project group. In this case, the build of all projects will be done quickly because commands are balanced on several servers.
  - With Continuum builders configured to build something when it is available, users can install builders on several machine to balance the charge. In this case, it will be possible to run some parallel builds.
• When the builders work is done, a message will be sent to the manager to notify the end of the process.
• With JMS used for the communication, we can add some listeners to create reports/statistics, log some information.
• Policy-based distribution
  • Next available
  • Load balanced
  • Targeted environment matching
57 Developer’s Guides

57.1 Developer’s Guides

- Building Continuum
- XML-RPC
58 Building Continuum

58.1 Guide to building Continuum

58.1.1 Why would I want to build Continuum?
You might want to build Continuum yourself for one of two reasons:

- to try out a bleeding edge feature or bugfix (issues can be found in JIRA), but you can try our SNAPSHOTs: http://vmbuild.apache.org/
- to fix a problem you are having and submit a patch to the development team.

Note that you don't need to build Continuum for day to day use. While we encourage getting involved and fixing bugs that you find, for day to day use we recommend using the latest GA release.

58.1.2 Checking out the sources
All of the source code for Continuum and its related libraries is in a Subversion repository. You can also browse the repository, or checkout specific modules directly.

All SVN instructions are available on the Source Repository page.

58.1.3 Building the sources

58.1.3.1 Prerequisites

- JDK 5 or greater
- Maven 2

58.1.3.2 Building
To build Continuum, you run this command from the top (trunk) directory:

mvn clean install
59 XML-RPC

59.1 Guide to use XML-RPC with Continuum

59.1.1 Introduction
In this section, you'll learn how to connect to a Continuum instance and how to do some action on projects.

59.1.2 Requirements
To connect to a Continuum instance, you must use the continuum-xmlrpc-client jar.
This library have some others jars as dependencies, so the best way to start the development of a Continuum xmlrpc client is to create a maven2 project with the following dependencies:

```xml
<dependency>
  <groupId>org.apache.continuum</groupId>
  <artifactId>continuum-xmlrpc-client</artifactId>
  <version>YOUR_CONTINUUM_VERSION</version>
</dependency>
```

59.1.3 Connection to Continuum
To connect to your Continuum with the client API, you must use the ContinuumXmlRpcClient class.
The constructor use 3 parameters:

- url, the url of the xmlrpc listener that is http://host:port/continuum/xmlrpc
- user, a Continuum user
- password, the user's password

```java
URL url = new URL( "http://localhost:8080/continuum/xmlrpc" );
ContinuumXmlRpcClient client = new ContinuumXmlRpcClient( url, username, password );
```

59.1.4 Getting project groups list
You have two ways to get the project groups list. The first is to get only a summary of groups and the second returns groups with details. If you don't need all informations, we recommend to use the first way, so you'll save time to get datas and memory on the server.

```java
List<ProjectGroupSummary> pgs = client.getAllProjectGroups();
List<ProjectGroup> pgs = client.getAllProjectGroupsWithProjects();
```

59.1.5 Getting projects in a group
If you already have a ProjectGroup or ProjectGroupSummary object, you can access to the project group id with this:

```java
int projectGroupId = pg.getId();
```
59.1.6 Building all projects in a group
- With the default build definition
  ```java
  client.buildGroup( projectGroupId );
  ```
- With a build definition
  ```java
  client.buildGroup( projectGroupId, buildDefinitionId );
  ```

59.1.7 Building a project
- With the default build definition
  ```java
  client.buildProject( project.getId() );
  ```
- With a build definition
  ```java
  client.buildProject( project.getId(), buildDefinitionId );
  ```

**Note:** When you start a build, the project is put in the Continuum queue and will be built when all projects added previously in the queue will be built.

59.1.8 Triggering a build
In some case, users want to use the push build technique with a hook in their SCM, so when a developer will commit some files, a build will be triggered. To do this, you can write a simple xmlrpc client that will use a project id as parameter and you'll use the `buildProject(...)` method described above.

This method will start a forced build.

59.1.9 Removing a project
A project can be removed by supplying the project id.
```java
List<ProjectSummary> projects = client.getProjects( projectGroupId );
...
client.removeProject( ps.getId() );
```

59.1.10 Removing build results
Currently, to remove a build result, you need the entire build result (rather than just the summary).
```java
List<BuildResultSummary> results = client.getBuildResultsForProject( ps.getId() );
...
BuildResult br = client.getBuildResult( ps.getId(), brs.getId() );
client.removeBuildResult( br );
```

59.1.11 Editing build queue
You can edit all projects which are in the build queue or check if one project is currently in the build queue.
```java
List<BuildProjectTask> prjsInBuildQueue = client.getProjectsInBuildQueue();
client.isProjectInBuildingQueue( int projectId );
```
59.1.12 Backup
With the Continuum xmlrpc client, you can backup a full Continuum instance (without users database, for the moment).