Pacific Northwest
NATIONAL LABORATORY

PNNL-33558

Watchmen 3.2.0 System Administrators Guide

October 2022

DT Keller
RE Wilson
JB Chapman
CJ McCall
CT Smith

U.S. DEPARTMENT OF ENERGY

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RL01830

Printed in the United States of America

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1 Getting to know Watchmen

Watchmen is a triaging tool for air sample measurements. It is accessed from a web browser by users and processes files from folders and stores them in a database as well as an archival folder.

1.1 "Watchmen"

Watchmen is an umbrella name for several pieces of software that work together to make users more productive. There are two major halves to deploying Watchmen:

- **mothman.war**
- **webviewer2.war**

mothman.war handles reading files from an incoming directory, processing them and storing them in the database. It also archives all files processed into another set of directories.

webviewer2.war is the user interface for the application. It hosts the webpages users navigate to in their browsers and serves them information from the database.

1.2 War files

The two halves of the application are Java Web ARchives (WAR) designed to be installed in a Tomcat instance. If unfamiliar with Tomcat, some introductory reading can be found at http://tomcat.apache.org/tomcat-8.0-doc/introduction.html

1.3 Supporting files

Watchmen also includes several supporting files and folders used to support its various functions. The location of these is configured in the Context.xml configuration for both Mothman and the Webviewer.

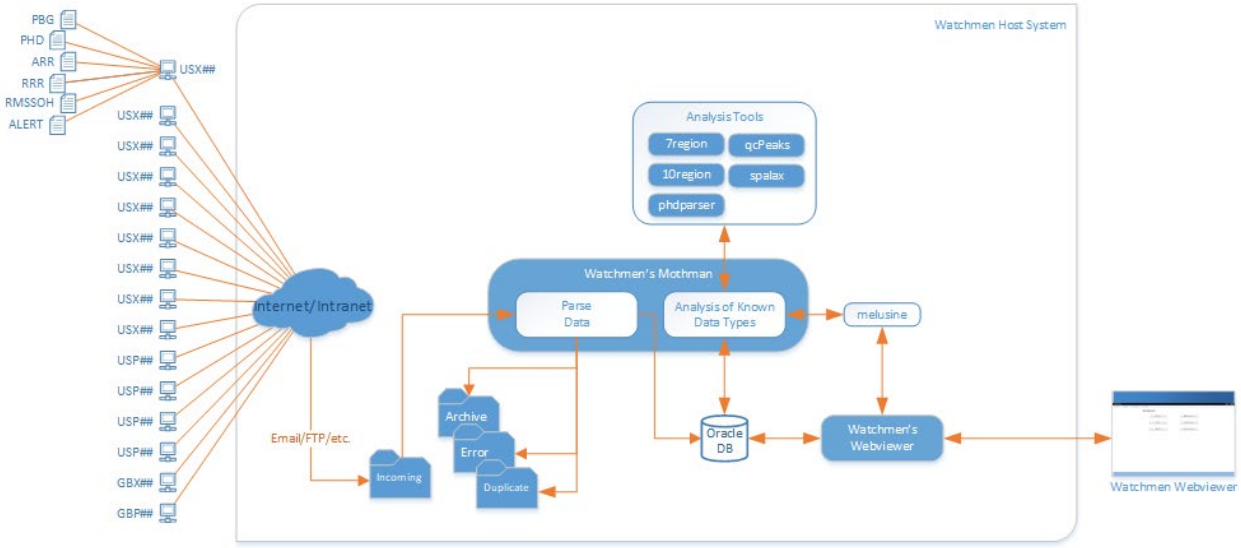
- Incoming measurements directory
- Archival directory for successfully processed measurements
- Duplicate directory for measurements processed before
- Error directory for measurements that could not be processed
- Analysis tools executables
- ~~Melusine~~
    - Melusine is no longer supported, but files may exist from a previous version
- ~~Looking Glass files~~
    - Because of the recent database overhaul, the Isotope Analyzer is non-functional and has been removed from this release

- XECON

1.4 Executables

While the main portion of Mothman and the Webviewer are Tomcat web archives utilizing the Java Runtime Environment, the other programs utilized by Watchmen are native executables. Currently, the only supported operating system is Red Hat Enterprise Linux and as such we only ship executables compatible with that operating system.

1.5 Flow of measurements



Measurements are typically sent via email to interested parties, Watchmen processes these emails as files in the Incoming directory. It is beyond the scope of Watchmen to dictate how those emails are converted to files.

From the Incoming directory, Mothman reads files and uses a combination of internal parsers and additional parsers located in Analysis Tools to interpret the data and store it in the database. The international community frequently modifies or does not comply with specifications outlined in the Format and Protocols for Messages from the IDC for IMS2.0 formats causing these parsers to fail and files to get routed to the Error directory.

After storing the measurement in the database, Mothman runs the information through Analysis Tools and then stores the results in the database.

Webviewer, when possible, displays all its information directly from the database.

2 Installation Tips

2.1 Installing Java 8 on RedHat Enterprise Linux

The minimum required version of Java is Java 8. Run the following to determine if system is running Java 8 or higher:

```
java -version
```

If the version is “1.8” or higher the remainder of this section can be skipped

2.1.1 To install Java 8 as root (OpenJDK8)

- Run the following to install:

  ```
  yum install -y java-1.8.0-openjdk
  ```

- Verify that system is pointing to OpenJDK 8:

  ```
  java -version
  ```

If version returned is not 1.8.x_y then the new install has not been selected as the default version and the user will need to adjust the system's configuration.

- Run the following

  ```
  alternatives --config java
  ```

- Sample response:

  ```
  There are 4 programs which provide 'java'.

    Selection    Command
  -----------------------------------------------
     1           /usr/lib/jvm/jre-1.5.0-gcj/bin/java
  *+ 2           /usr/lib/jvm/jre-1.6.0-openjdk.x86_64/bin/java
     3           /usr/lib/jvm/jre-1.7.0-openjdk.x86_64/bin/java
     4           /usr/lib/jvm/jre-1.8.0-openjdk.x86_64/bin/java

  Enter to keep the current selection[+], or type selection number:
  ```

- In the example the user should select 4
- Verify that system is now pointing to OpenJDK 8 by default

  ```
  java -version
  ```

2.2 Installing a war file from the file system

You can use this method to install a war file in Tomcat from the filesystem of the server or you can use the method described in the next section to install a war file from a web browser.

To install the war file, copy the war file into the webapps/ directory in the tomcat installation. If it has not been disabled in Tomcat, the war will automatically install/update.

2.3 Installing a war file in the Tomcat Manager

2.3.1 Accessing the Tomcat Manager App

The easiest way to stop and update WAR deployments is via the /manager application on Tomcat. With a default install of Tomcat it is located at http://localhost:8080/manager though it can be deployed with a different port or can be accessed on another computer replacing 'localhost' with its hostname.

If you don't know the password see https://tomcat.apache.org/tomcat-8.0-doc/manager-howto.html#Configuring_Manager_Application_Access

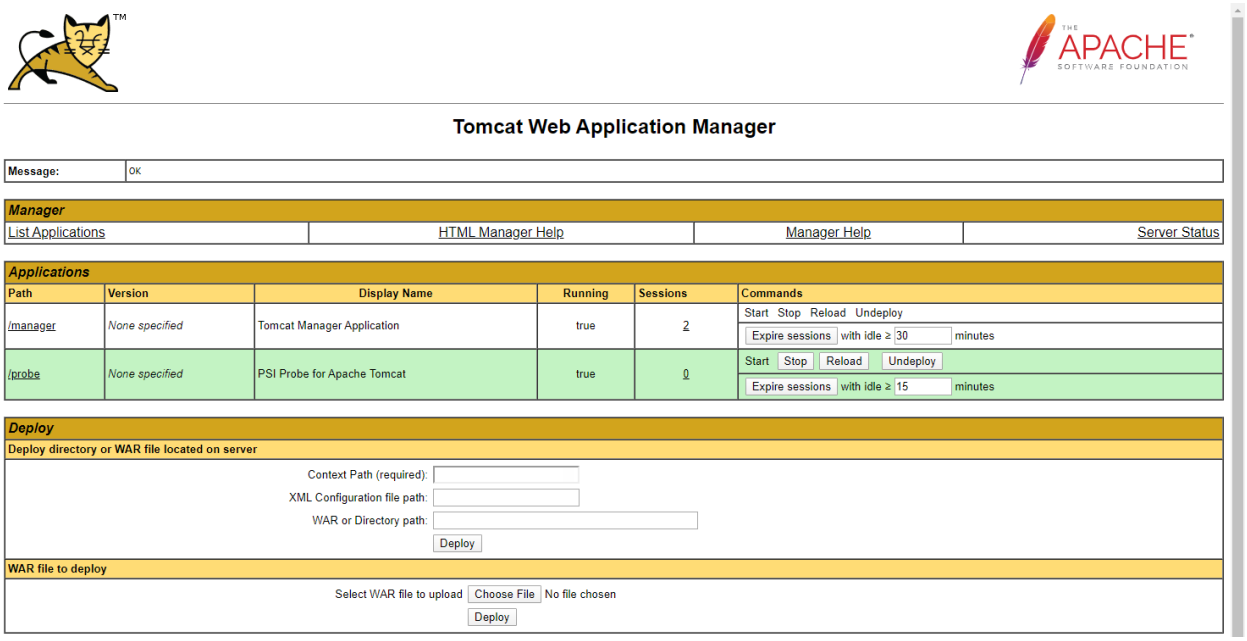
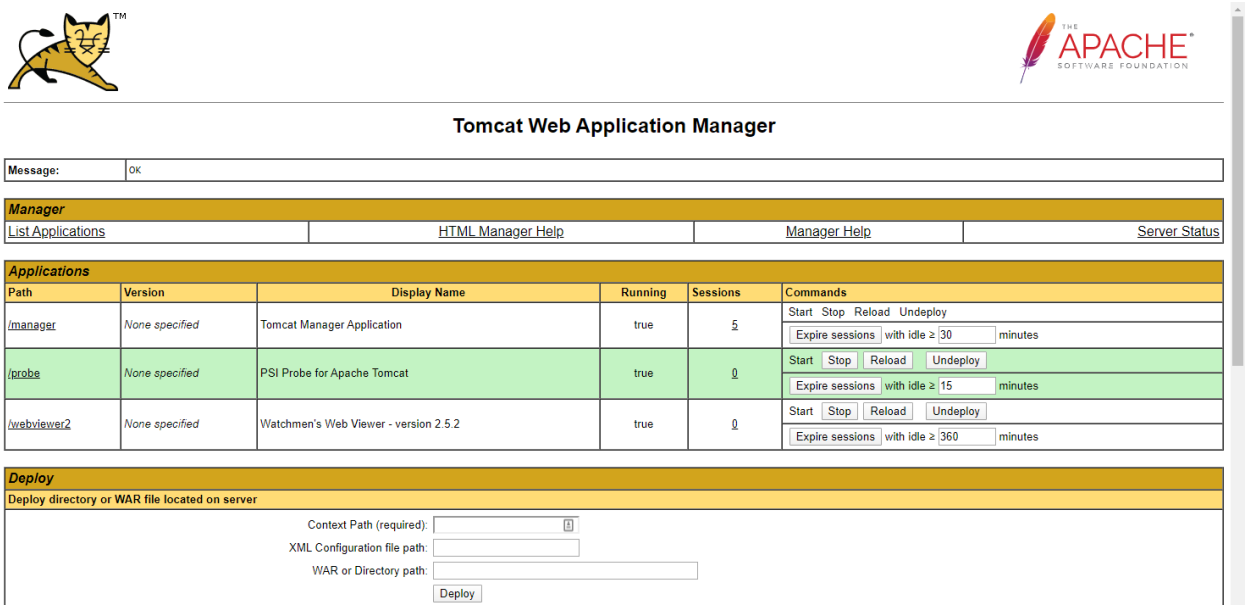


Figure 1 Tomcat Web Application Manager

2.3.2 Stop the existing WAR deployments

The existing WARs should be stopped to avoid an erroneous analysis with an incompatible version of the analysis tools. If this is the first time Watchmen is being installed, skip to “Uploading the War” below.

Press the `Stop` button. Once WAR has stopped, press the `Undeploy` button.



Tomcat Web Application Manager

Message:	OK

Manager

List Applications	HTML Manager Help	Manager Help	Server Status

Applications

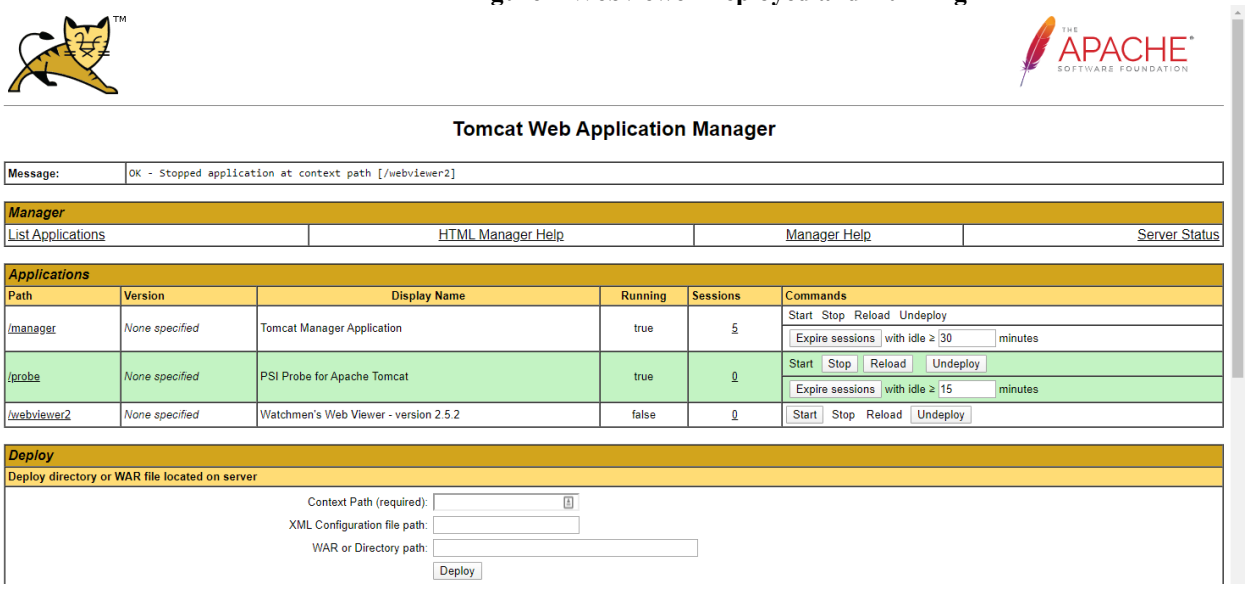
Path	Version	Display Name	Running	Sessions	Commands
/manager	None specified	Tomcat Manager Application	true	5	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/probe	None specified	PSI Probe for Apache Tomcat	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 15 minutes
/webviewer2	None specified	Watchmen's Web Viewer - version 2.5.2	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 360 minutes

Deploy

Deploy directory or WAR file located on server

Context Path (required):
XML Configuration file path:
WAR or Directory path:
Deploy

Figure 2 Webviewer Deployed and Running



Tomcat Web Application Manager

Message:	OK - Stopped application at context path [/webviewer2]

Manager

List Applications	HTML Manager Help	Manager Help	Server Status

Applications

Path	Version	Display Name	Running	Sessions	Commands
/manager	None specified	Tomcat Manager Application	true	5	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/probe	None specified	PSI Probe for Apache Tomcat	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 15 minutes
/webviewer2	None specified	Watchmen's Web Viewer - version 2.5.2	false	0	Start Stop Reload Undeploy

Deploy

Deploy directory or WAR file located on server

Context Path (required):
XML Configuration file path:
WAR or Directory path:
Deploy

Figure 3 Webviewer Stopped and Ready for Undeploy

2.3.3 Install other updates

If performing an upgrade, consult the release notes for tasks that should be performed after undeploying the old version.

CAUTION: Continuing without performing those tasks may result in data corruption.

2.3.4 Update the Analysis Tools

Once the AnalysisTools zip file has been placed into deployment system's filesystem, unpack and overwrite the existing AnalysisTools installation including the "plugins" folder (`unzip /path/to/file.zip -d /path/to/analysis/tools/installation/dir`).

2.3.5 Uploading the WAR

Use "Select WAR file to upload" section (see Figure 1) to deploy the two WAR files (only one WAR can be deployed at a time via the dialog box). Press `Choose`, select a WAR, press `Open` and then press `Deploy`.

- mothman.war
- webviewer2.war

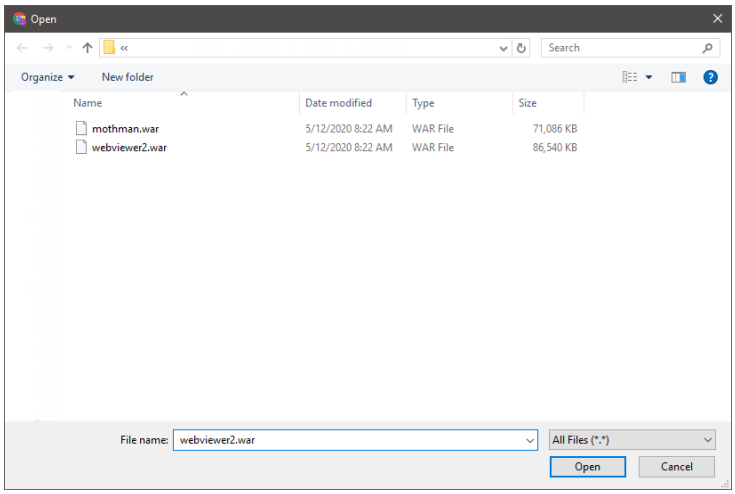


Figure 4 Manager Deploy Dialog Box

3 Tips for Working with Watchmen

3.1 Tomcat

- Root
    - Never run Tomcat as root. Do not use "sudo" to start Tomcat. This will create files with the wrong permissions and is troublesome to correct.
- Logs
    - In the tomcat installation, the folder **logs/** can be useful for diagnosing issues such as permission problems.

3.2 Shared Tomcat

It is common for organizations to use a shared Tomcat instance to deploy Watchmen alongside other software applications. While not recommended, here are some things to keep in mind if you do use a shared Tomcat instance.

- Modifying Context.xml will redeploy ALL applications in Tomcat.
    - To avoid losing configuration settings, Watchmen stores its configuration in the Tomcat Context.xml file. This has the side effect that modifying the configuration will redeploy all "wars" deployed to that Tomcat instance including ones unrelated to Watchmen which may be undesirable or require a scheduled outage to avoid disrupting other applications.
- Memory Limits
    - Tomcat is Java software and deploying multiple software applications increases the memory requirements for Tomcat. It may be necessary to modify the configuration of Tomcat to increase the maximum allowable memory usage if you receive OutOfMemoryException's.
- Database initial pool
    - Since Watchmen is configured in the Tomcat Context.xml, all applications inherit its settings. In the case of the database pool, if the initial connection setting is greater than zero, you may end up with a number of worthless connections to the database multiplied by the number of applications deployed in Tomcat.

3.3 Data Processing Troubleshooting

- Files are ending up in the Error Directory
    - Check the Tomcat logs, there is usually a log entry describing what error occurred

    - Validate that the database connection is working, failure to communicate with the database may cause errors processing measurements
    - Try restarting Tomcat.[1] Updating Java without stopping Tomcat first can result in unforeseeable errors, often restarting Tomcat is sufficient to correct the problem
- What about the files in the error directory?
    - To reprocess measurements in the error directory, simply move them to the incoming directory
- How fast is Mothman at processing files?
    - A conservative estimate is it takes roughly 1 second to process a file and another second to analyze it. Much of this is database latency and can vary significantly.

[1] Caution: Restarting Tomcat will affect ALL applications being served by that particular instance of Tomcat

4 Other Information

4.1 System Requirements

Web Browser: Chrome or Firefox

Server:

RedHat Enterprise Linux 7+ or CENTOS 7+ 64bit

Java 8+ (note: Java 8 is not compatible with Apache Tomcat versions prior to 7.0.58)

Apache Tomcat 7/8/9

Oracle 11+ Database

Pacific Northwest National Laboratory

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99354
1-888-375-PNNL (7665)

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