Apache ANT

TUTORIAL

Small Codes

Programming Simplified

A SmlCodes.Com Small presentation

For more tutorials & Articles visit SmlCodes.com

Apache ANT Tutorial

If you discover any errors on our website or in this tutorial, please notify us at support@smlcodes.com or smlcodes@gmail.com

First published on Dec 2016, Published by **SmlCodes.com**

Author Credits

Name : **Satya Kaveti**

Email : satyakaveti@gmail.com

Website : smlcodes.com, satyajohnny.blogspot.com

Digital Partners

1. Introduction

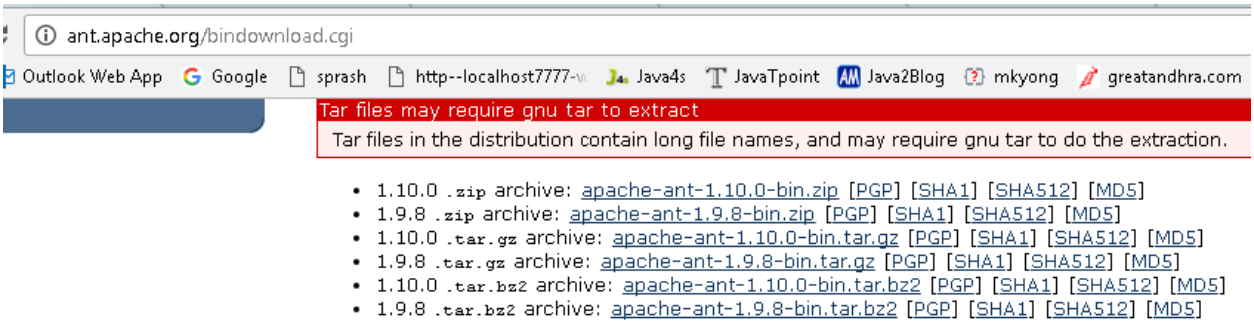
Apache Ant is a Java based build tool from Apache Software Foundation. Apache Ant's build files are written in XML and they take advantage of being open standard, portable and easy to understand.

Ant's build file, called **build.xml** should reside in the base directory of the project. However ***there is no restriction on the file name or its location***. You are free to use other file names or save the build file in some other location.

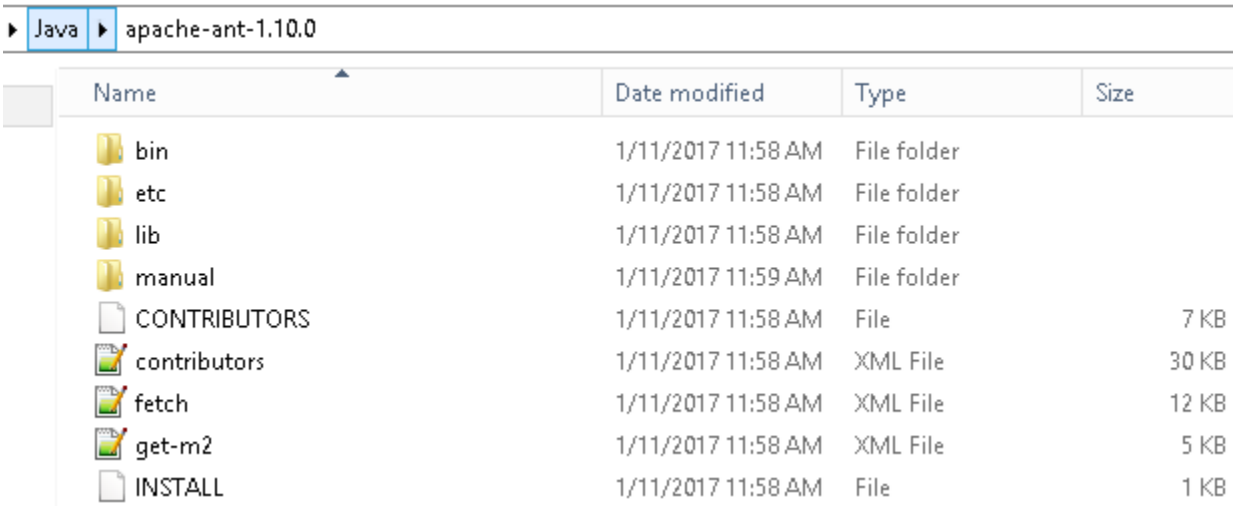
```
<?xml version="1.0"?>
   <project name="Hello World" default="info">

   <target name="info">
      <echo>Hello World Apache Ant!</echo>
   </target>
</project>
```

2. Configuring Apache Ant in Windows

1. To install **Apache Ant** on Windows, you just need to download the Ant's zip file

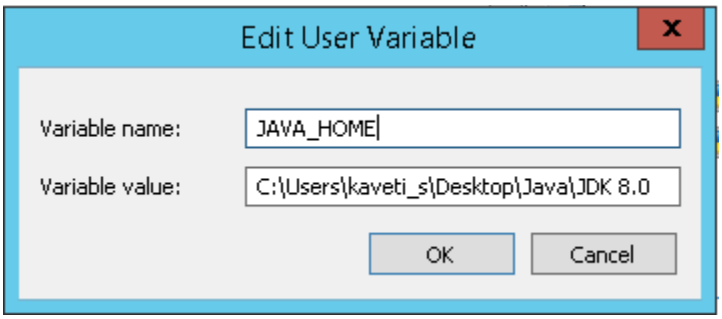


2. **Unzip Downlaoded file. It Folder Struture will be as follows**

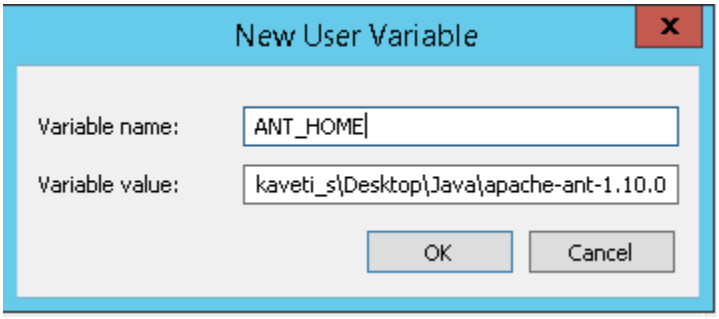


3. Configure the **JAVA_HOME** Windows environment variables by specifying Java Installation Location

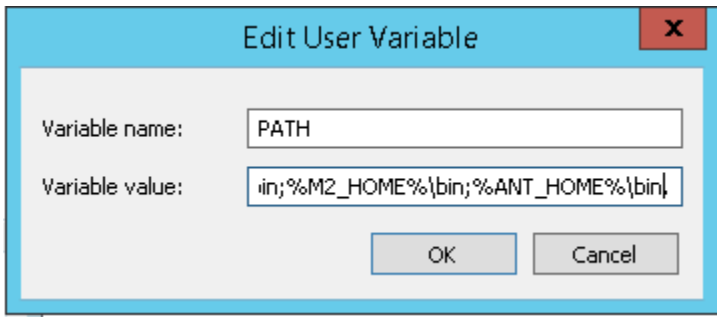
Control Panel → User Accounts → User Accounts → Change my Emvironmnet Variables



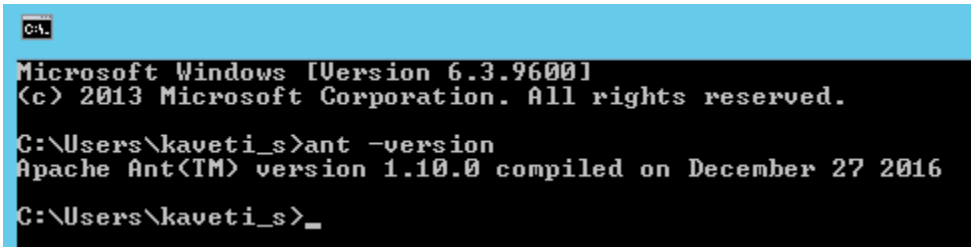
4. Add `ANT_HOME` as the Windows environment variable, and point it to your Ant folder



5. Update `PATH` variable, append `%ANT_HOME%\bin` at the end, so that you can run the Ant's command everywhere



6. Verifity ANT is installed properly or not by below command

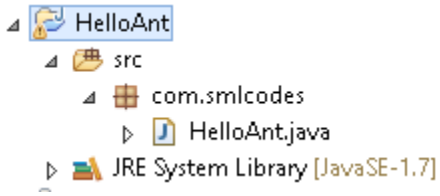


3. Ant Hello World Application

Ant build tool is used to manage a Java project, compile, and package it into a Jar file

1. Create a Java Project

In Eclipse IDE, create a new Java project named **"HelloAnt".**



2. Create Java Programe

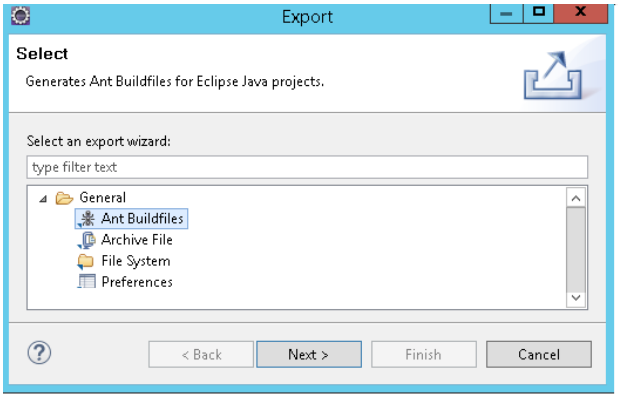
Create a new Java class to print "Hello Ant!"

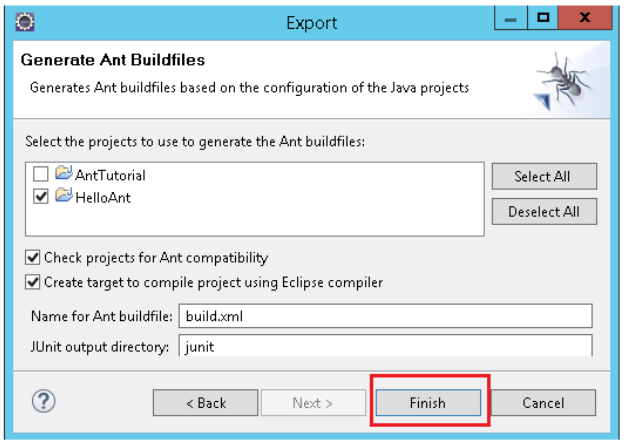
```
package com.smlcodes;

public class HelloAnt {

        public static void main(String[] args) {
                System.out.println(sayHello());
        }

        private static String sayHello() {
                return "Hello Ant!!";
        }
}
```

3. Create build.xml

Create a new **build.xml** in the project root folder. In eclipse

Right Click on Project →Export → General →Ant Bulild Files →Select Project →Finish





```
<project name="HelloAnt" default="main" basedir=".">
        <description>
                Create a Java Project (JAR) with Ant build script
        </description>

        <property name="projectName" value="HelloAnt" />

        <!-- Java sources -->
        <property name="src.dir" location="src" />

        <!-- Java classes -->
        <property name="build.dir" location="bin" />

        <!-- Output, Jar -->
        <property name="dist.dir" location="dist" />

        <target name="init">
                <!-- Create the time stamp -->
                <tstamp />
                <!-- Create the build directory structure used by compile -->
                <mkdir dir="${build.dir}" />
        </target>

        <target name="compile" depends="init" description="compile the source ">
                <!-- Compile the java code from ${src.dir} into ${build.dir} -->
                <javac includeantruntime="false" srcdir="${src.dir}" destdir="${build.dir}" />
        </target>

        <target name="dist" depends="compile" description="package, output to JAR">

                <!-- Create the distribution directory -->
                <mkdir dir="${dist.dir}" />

                <!-- Put everything in ${build} into the {$projectName}-${DSTAMP}.jar file -->
                <jar jarfile="${dist.dir}/${projectName}-${DSTAMP}.jar" basedir="${build.dir}">
                        <manifest>
                                <attribute name="Main-Class" value="com.com.smlcodes.HelloAnt" />
                        </manifest>
                </jar>
        </target>

        <target name="clean" description="clean up">
                <delete dir="${build.dir}" />
                <delete dir="${dist.dir}" />
        </target>

        <!-- Default, run this -->
        <target name="main" depends="clean, compile, dist" />

</project>
```

3.1 Run Ant Build Scrpits

Open Command Prompt & Go to Project location

1. Compile the source code using > ant compile

```
<target name="compile" depends="init" description="compile the source ">
                <!-- Compile the java code from ${src.dir} into ${build.dir} -->
                <javac includeantruntime="false" srcdir="${src.dir}" destdir="${build.dir}" />
</target>
```

It will compile the java socurce code and places in **/bin** folder.

```
C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>ant compile
Buildfile: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\build.xml

init:

compile:

BUILD SUCCESSFUL
Total time: 1 second
```

2 Package the project into an executable Jar file using >ant dist

```
<target name="dist" depends="compile" description="package, output to JAR">

                <!-- Create the distribution directory -->
                <mkdir dir="${dist.dir}" />

                <!-- Put everything in ${build} into the {$projectName}-${DSTAMP}.jar file -->
                <jar jarfile="${dist.dir}/${projectName}-${DSTAMP}.jar" basedir="${build.dir}">
                        <manifest>
                                <attribute name="Main-Class" value="com.com.smlcodes.HelloAnt" />
                        </manifest>
                </jar>
        </target>
```

Command Prompt

```
C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>ant dist
Buildfile: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\build.xml

init:

compile:

dist:
      [jar] Building jar: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\dist\HelloAnt-20170111.jar

BUILD SUCCESSFUL
Total time: 0 seconds

C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>_
```

Verify Created Jar

```
C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>tree /f
Folder PATH listing
Volume serial number is 4AC1-D948
C:.
|   .classpath
|   .DS_Store
|   .project
|   build.xml
|
|---.settings
|       org.eclipse.jdt.core.prefs
|
|---bin
|   \---com
|       \---smlcodes
|               HelloAnt.class
|
|---dist
|       HelloAnt-20170111.jar
|
\---src
    \---com
        \---smlcodes
                HelloAnt.java
```

3. Delete folders using > ant clean

```
<target name="clean" description="clean up">
        <delete dir="${build.dir}" />
        <delete dir="${dist.dir}" />
</target>
```

```
C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>ant clean
Buildfile: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\build.xml

clean:
   [delete] Deleting directory C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\bin
   [delete] Deleting directory C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\dist

BUILD SUCCESSFUL
Total time: 0 seconds

C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>tree /f
Folder PATH listing
Volume serial number is 4AC1-D948
C:.
    .classpath
    .DS_Store
    .project
    build.xml

    .settings
        org.eclipse.jdt.core.prefs

    src
        com
            smlcodes
                HelloAnt.java
```

4. If no options, the default target will be executed, in this example, the default target is `main`

```
Command Prompt

C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>ant
Buildfile: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\build.xml

clean:

init:
    [mkdir] Created dir: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\bin

compile:
    [javac] Compiling 1 source file to C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\bin

dist:
    [mkdir] Created dir: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\dist
      [jar] Building jar: C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt\dist\HelloAnt-20170111.jar

main:

BUILD SUCCESSFUL
Total time: 2 seconds

C:\Users\kaveti_s\Desktop\SmlCodes\JSONWorkspace\HelloAnt>tree /f
Folder PATH listing
Volume serial number is 4AC1-D948
C:.
    .classpath
    .DS_Store
    .project
    build.xml

    .settings
        org.eclipse.jdt.core.prefs

    bin
        com
            smlcodes
                HelloAnt.class

    dist
        HelloAnt-20170111.jar

    src
        com
            smlcodes
                HelloAnt.java
```

4. Advanced Ant

4.1 Ant -How to Create a Jar File with external libraries

In Maven if we write dependency details it will automatically contacts the repo server and downloads Jar files mentioned in pom.xml. In Ant manage the project external libraries with **Apache Ivy**

1.Create this file `ivy.xml`

We use Apache Ivy to get the project's external libraries / dependencies.

```
//ivy.xml
<ivy-module version="2.0">
        <info organisation="org.apache" module="dateUtilsProject" />
        <dependencies>
                <dependency org="joda-time" name="joda-time" rev="2.5"  />
                <dependency org="org.slf4j" name="slf4j-api" rev="1.7.6" />
                <dependency org="ch.qos.logback" name="logback-classic" rev="1.1.2" />
        </dependencies>
</ivy-module>
```

2.Update `build.xml`

Update `build.xml`, add ivy namespace on top, and "ivy" task to download the ivy module, and "resolve" task to ask Ivy module to download the external libraries

```
build.xml
<project xmlns:ivy="antlib:org.apache.ivy.ant"
        name="dateUtilsProject" default="main" basedir=".">

        <!-- ivy start -->
        <!-- ivy to get dependencies and copy to project lib folder automatically -->
        <target name="resolve" description="retrieve dependencies with ivy">
                <ivy:retrieve />
        </target>

        <!-- install ivy -->
        <target name="ivy" description="Install ivy">
                <mkdir dir="${user.home}/.ant/lib" />
                <get dest="${user.home}/.ant/lib/ivy.jar"
                        src="http://search.maven.org/remotecontent?filepath=org/apache/ivy/ivy/2.4.0-
rc1/ivy-2.4.0-rc1.jar" />
        </target>
        <!-- ivy end -->

</project>
```

For the first time, download the ivy module from Maven center repository to local `${user.home}/.ant/lib/ivy.jar`.

```
$ ant ivy
```

To download the external libraries, run task "resolve". The declared libraries will be downloaded to the project `lib` folder.

```
$ ant resolve
```

4.2 Ant -Build Java Documentation

1. Add below <target>in build.xml as follows

```
<!-- Ant Ant -Build Java Documentation  -->
        <target name = "generate-javadoc">
           <javadoc packagenames="com.smlcodes.*" sourcepath="${src.dir}"
              destdir = "doc" version = "true" windowtitle = "Fax Application">

              <doctitle><![CDATA[= Fax Application =]]></doctitle>

              <bottom>
                 <![CDATA[Copyright © 2011. All Rights Reserved.]]>
              </bottom>

              <group title = "doa packges" packages = "com.smlcodes.dao.*"/>
              <group title = "web packages" packages = "com.smlcodes.web.*"/>
              <group title = "data packages" packages = "com.smlcodes.util.*"/>
           </javadoc>

           <echo message = "java doc has been generated!" />
        </target>
```

2. If we execute the javadoc Ant task. It generates and places the java documentation files in the **doc folder**.

```
ant generate-javadoc
```

```
C:\Workspace\HelloAnt>ant generate-javadoc
Buildfile: C:\Workspace\HelloAnt\build.xml

generate-javadoc:
  [javadoc] Generating Javadoc
  [javadoc] Javadoc execution
  [javadoc] Loading source files for package com.smlcodes...
  [javadoc] Loading source files for package com.smlcodes.dao...
  [javadoc] Loading source files for package com.smlcodes.util...
  [javadoc] Loading source files for package com.smlcodes.web...
  [javadoc] Constructing Javadoc information...
  [javadoc] Creating destination directory: "C:\Workspace\HelloAnt\doc\"
  [javadoc] Standard Doclet version 1.8.0_111
  [javadoc] Building tree for all the packages and classes...
  [javadoc] Building index for all the packages and classes...
  [javadoc] Building index for all classes...
     [echo] java doc has been generated!

BUILD SUCCESSFUL
Total time: 5 seconds
```

3. Open C:\Workspace\HelloAnt\doc folder to check generated java document

This PC ▸ Local Disk (C:) ▸ Workspace ▸ HelloAnt ▸ doc

Name	Date modified	Type	Size
allclasses-frame	1/11/2017 3:10 PM	Chrome HTML Do...	2 KB
allclasses-noframe	1/11/2017 3:10 PM	Chrome HTML Do...	1 KB
constant-values	1/11/2017 3:10 PM	Chrome HTML Do...	4 KB
deprecated-list	1/11/2017 3:10 PM	Chrome HTML Do...	4 KB
help-doc	1/11/2017 3:10 PM	Chrome HTML Do...	9 KB
index	1/11/2017 3:10 PM	Chrome HTML Do...	3 KB

4.3 Ant – Creating JAR files

In HelloAnt application it self we Covered Craeting Jar files. Ok, just recall target & Command once

```
<target name="dist" depends="compile" description="package, output to JAR">

                <!-- Create the distribution directory -->
                <mkdir dir="${dist.dir}" />

                <!-- Put everything in ${build} into the {$projectName}-${DSTAMP}.jar file -->
                <jar jarfile="${dist.dir}/${projectName}-${DSTAMP}.jar" basedir="${build.dir}">
                        <manifest>
                                <attribute name="Main-Class" value="com.com.smlcodes.HelloAnt" />
                        </manifest>
                </jar>
        </target>
```

Command for creating jar file is >ant dist

```
C:\Workspace\HelloAnt>ant dist
Buildfile: C:\Workspace\HelloAnt\build.xml

init:

compile:

dist:
      [jar] Building jar: C:\Workspace\HelloAnt\dist\HelloAnt-20170111.jar

BUILD SUCCESSFUL
Total time: 1 second
```

4.4 Ant – Creating war Files

War files will be created only for web applciations. So , I created AntWeb webapllication it contains only index.jsp file for testing purpose

1. Add following lines in build.xml

```
<target name="build-war">

           <war destfile="AntWeb.war" webxml="${web.dir}/web.xml">
              <fileset dir="WebContent">
                 <include name="**/*.*"/>
              </fileset>

              <classes dir="${build.dir}/web"/>
           </war>

    </target>
```

Command for creating jar file is >ant build-war

```
C:\Workspace\AntWeb>ant build-war
Buildfile: C:\Workspace\AntWeb\build.xml

build-war:

BUILD SUCCESSFUL
Total time: 1 second
```

4.5 Ant – JUnit Integration

JUnit is the commonly used unit testing framework for Java-based developments.To Configure JUnit in build.xml add below lines to build.xml

```
<target name="unittest">
   <junit haltonfailure="true" printsummary="true">
      <test name="com.smlcodes.HelloTestCase"/>
   </junit>
</target>
```

References

http://www.mkyong.com/tutorials/apache-ant-tutorial/

https://www.tutorialspoint.com/ant/