Introduction to Apache Ant

- What is Ant?
- Ant Targets
- Tasks

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What is Apache Ant?

- From Ant's Homepage:

> Apache Ant is a Java-based build tool. In theory, it is kind of like Make, but without Make's wrinkles.

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Ant versus Make

- Ant is geared toward Java
- You write Ant scripts in XML rather than an arcane syntax

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Installing and Configuring

- Download Ant from http://ant.apache.org
- After unzipping, you need to define ANT_HOME and JAVA_HOME environment variables and optionally add the ANT_HOME/bin directory to your PATH

After downloading and setting up the environment variables, you should be able to run Ant at the command line by typing "Ant".

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A Simple Ant Script

```
1    <?xml version="1.0"?>
2    <project default="build">
3      <target name="build">
4        <echo message="Hello, world"/>
5      </target>
6    </project>


C:\>ant -f ant-first.xml

Buildfile: ant-first.xml

build:
     [echo] Hello, world

BUILD SUCCESSFUL
Total time: 2 seconds
```

Here we show a simple, "Hello, world" Ant script.

We also show the command to run the script and its output.

Note that if you name your script build.xml, you can omit the -f switch and the script file name.

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Ant Targets

- An Ant script consists of **targets**, each of which represents a set of jobs you wish the script to accomplish
- A target typically contains one or more **tasks**, which are the commands to execute for this target



Note that you can define the "default" target on the project definition.

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Dependent Targets

- Any target can depend on other targets, which means that those targets will execute first
- That lets you define an order of execution

```
<target name="compile">
  <javac . . .>
</target>

<target name="make-ear"
        depends="compile">
   <ear . . .>
</target>
```

You can put a list of targets in the "depend" attribute so that a task depends on multiple other targets.

Separate the multiple tasks with commas.

"javac" and "ear" are built-in Ant tasks.

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Properties

- Instead of hard-coding values (e.g. file paths), you can define them as **properties** and then reference them in tasks
- That makes it easier to read, understand and maintain Ant scripts

```
<property name="html-deploy"
  value="/myweb/default"/>
. . .
<target name="deploy" depends="build">
   <copy todir="${html-deploy}">
      <fileset dir="." includes="*.html"/>
   </copy>
</target>
```


Here we show defining a property named "html-deploy", and then using it in a target named "deploy". We are using the core Ant "copy" task to copy a set of HTML files to the specified directory.

The beauty of this approach is that if we are using "html-deploy" in several places, we can update it by changing it only in the property definition.

Note that it's also possible to read properties from system environment variables and standard Java property files.

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Ant Tasks

- A task represents a command that a script will execute
- Ant defines numerous built-in tasks and you can even write your own (not covered in this chapter)

See the Ant documentation for a complete listing of tasks provided by Ant.

So far, we have seen examples of the "javac", "ear", "copy" and "echo" tasks.

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Core Tasks

Ant	Echo	Record
AntCall	Exec	Replace
AntStructure	Fail	Rmic
Apply/ExecOn	Filter	Sequential
Available	FixCRLF	SignJar
Basename	GenKey	Sleep
BuildNumber	Get	Sql
BUnzip2	GUnzip	Style
BZip2	GZip	Tar
Checksum	Input	Taskdef
Chmod	Jar	Tempfile
Concat	Java	Touch
Condition	Javac	TStamp
Copy	Javadoc	Typedef
Cvs	LoadFile	Unjar
CvsChangeLog	LoadProperties	Untar
CvsVersion	Mail	Unwar
CVSPass	Manifest	Unzip
CvsTagDiff	Mkdir	Uptodate
Defaultexcludes	Move	Waitfor
Delete	Parallel	War
Dependset	Patch	XmlProperty
Dirname	PathConvert	Xslt
Ear	Property	Zip

Core tasks are included with Ant.

There are also optional tasks that require you to download and install additional software (e.g. an XSLT processor)

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File Tasks

- Ant has a set of core tasks that let you copy, delete and move files or directories
- You can also build zip files and other archives

```
<target name="deploy" depends="build">
  <copy todir="${html-deploy}">
     <fileset dir="." includes="*.html"/>
  </copy>
  <copy todir="${servlet-deploy}">
     <fileset dir="." includes="Controller.class"/>
  </copy>
  <mkdir dir="${servlet-deploy}/conference"/>
  <copy todir="${servlet-deploy}/conference">
     <fileset dir="conference"
          includes="RegistrationBean.class"/>
  </copy>
</target>
```


This fragment of an Ant script shows a target that deploys a Web application by copying files to a deployment directory

It also demonstrates creating directories.

The "fileset" command represents a group of files and provides various ways to include or exclude files from the group.

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Java Tasks

- A popular Ant task is **javac**, which conditionally compiles one or more Java files
- You can use the **java** task to run any arbitrary Java program, passing arguments if desired

```
<target name="build" depends="test-env">
 <javac srcdir=".">
    <classpath>
       <pathelement
         location="${mydir}/app.jar"/>
    </classpath>
 </javac>
 <java classname="RetroGuard" fork="yes">
   <arg value="myfile.class"/>
   <arg value="script.rgs"/>
   <classpath>
     <pathelement location="retroguard.jar"/>
   </classpath>
 </java>
</target>
```


Here we show a "build" target that compiles some Java files and then runs a Java program (Retroguard) to obfuscate the compiled code.

Note that the "java" task lets you pass command-line arguments, in this case "myfile.class" and "script.rgs".

Note that if you are using an IDE like Eclipse, you generally don't need to write "javac" tasks, since the IDE compiles for you. However, that task is still useful for batch builds.

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JEE Tasks

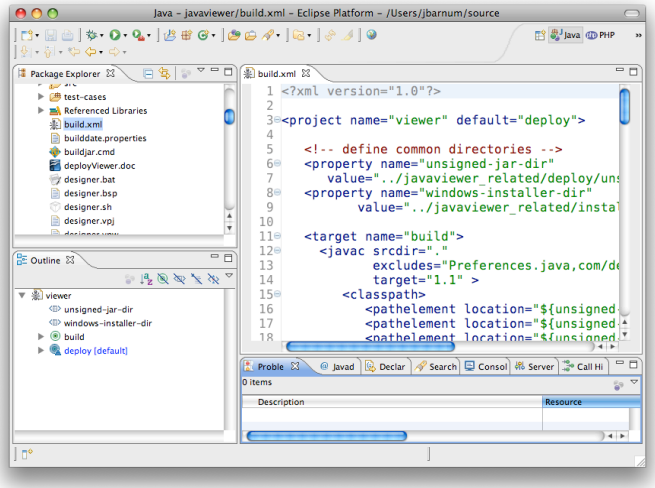
- Ant supplies core tasks for building WAR and EAR files
- In addition, many JEE vendors have written custom tasks for deploying to their containers

```
<target name="makewar">
  <war warfile="gaspurchase.war" webxml="web.xml">
     <fileset dir="." includes="*.html,*.jsp"/>
     <classes dir="." includes="**/*.class"/>
  </war>
</target>
```


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IDE Support for Ant

- Many Java-based Integrated Development Environments bundle Ant and provide support for creating and running Ant scripts
- For example, the Eclipse IDE provides an Ant build-file editor as well as the ability to run Ant tasks and specify the initial target



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Chapter Summary

In this chapter, you learned:

- The basics of Apache Ant

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