# Apache Ant and DevOps Practices

The practice of DevOps frequently requires assembling collections of modified files to be deployed to remote servers. There are many tools to handle the “push” operation to remote servers, and to maintain the concordance between the repository of source documents and the transformed representations on remote servers (e.g., Chef.)

What is *not* handled well by these tools is the *actual assembly* and *disassembly* of the deployable files at each end of the deployment. Software development is a mature practice with similar requirements and a long history of tools to “build” software components. This parallels DevOps practice of building deployable components. We are going to examine using one such tool, ANT, in a DevOps scenario. We first begin with a little background build tools.

## Build Tool History

In the beginning, there was command-line scripting combined with custom programs created for unique build situations (I was there and I remember.) Then MAKE came along. Unfortunately, MAKE was optimized to compile C code and did a poor job of dealing with the slow Javac compiler (see <https://stackoverflow.com/questions/2209827/why-is-no-one-using-make-for-java>.) In addition, MAKE represented actions to resolve dependencies as parameterized native executable invocations. IDE products sometimes used MAKE, but they hide that use from users. Many developers relied on IDE driven builds that were difficult to automate.

Apache ANT was created for Java builds and used the Javac compiler to handle incremental builds of Java files. ANT is basically a system-independent scripting language expressed using XML. ANT runs on all systems with Java, and *it runs the same way!* ANT is extensible using “tasks”. Ivy was later added to ANT to provide dependency management. Widespread ANT use resulted in complex build scripts and poor build engineers having to address each build as a special case.

There was a movement for ***Convention over Configuration***, first introduced with Rails, to simplify complex software creation (see <https://en.wikipedia.org/wiki/Convention_over_configuration>.) As part of this movement, Apache Maven was created to take advantage of strict convention. Everything in Maven is a convention. Directory layouts, the build cycle, and nested project structure are all proscribed. In summary, Maven extends ANT capabilities by providing dependency management, standard project layout and project management (Phases and Goals.) Maven worked well and its use is widespread, but Maven makes deviation from the “convention” difficult. Complex non-conforming Maven builds are difficult to understand.

Gradle was created to allow “convention over configuration” but make it easier to express complex builds. Gradle expresses work actions as “tasks” using a DSL (Domain Specific Language) based on the language Groovy, and now Kotlin. Plugins provide the functionality for tasks. Like Maven, there are proscribed project layouts, but these can easily be altered as needed. Gradle offers greater flexibility over other build tools resolving version conflicts and managing transitive dependencies. In addition, Gradle accelerates builds through sophisticated incremental compilation and build caching.

## Why ANT

Most DevOps tasks do not require a compilation step, where the target file (object code) is older than the source file (Java) and time-consuming processing is needed to transform source to object. DevOps tasks have little dependency resolution. Primarily, in DevOps we transform source collections of files into target collections of files. The transformation step usually involves reading text files, modifying the files, and compressing them into an Achieves.

BASH and similar scripts were long ago abandoned by build engineers, and for good reasons. There are no standard versions of any scripting language . . . not even BASH. BASH scripts have very limited IDE support, offer no runtime error protection, make modularization difficult, and typically invoke native executables that vary of OS. Sadly, they offer no built-in target-dependency specification.

MAKE can perform these DevOps tasks, but MAKE is not system independent. There are many variants of native executable versions of MAKE. In addition, the MAKE dependency actions are specific to the operating system running MAKE. For example, a Linux MAKE invoking a C compiler will not work on a Windows system.

ANT offers all of the features of MAKE, but is system-independent, and includes decades of special capabilities extending the basic MAKE targets-and-dependencies task definitions. In addition to offering target-dependencies definitions, ANT is easily extensible my multiple mechanisms. ANT is well documented, well supported in the community, and has excellent IDE support. Finally, ANT is easily installed in many environments, and only requires a version of Java to be accessable. ANT is so *historic* that there is a version of ANT for *any* version of Java.

Maven and Gradle are more capable, but also more complex than needed for most DevOps tasks. Both tools involve significant learning curves. With these criteria leading us to ANT, we can now view an ANT example.

## References

Supporting material to understand the ANT example:

1. Ant Project
2. Ant On-line user manual: <https://ant.apache.org/manual/>.
3. Eclipse Ant integration example: <https://community.synopsys.com/s/article/Setting-up-ant-build-for-Java-Workspace-in-Eclipse>.
4. Freemarker site: <https://freemarker.apache.org/>.
5. Freemarker tutorial-1: <http://zetcode.com/java/freemarker/>.
6. Freemarker tutorial-2: <https://www.vogella.com/tutorials/FreeMarker/article.html>.
7. Freemarker manual: <https://freemarker.apache.org/docs/index.html>.

*DemoDev Repository References*

1. The DemoDev repository:
2. The DemoDev generation utility: <https://github.com/DonaldET/DemoDev/tree/master/dev-topics-generationutils>.
3. This example in the repository: xxxxxx

## Appendix A – TextSourceGeneratorRunner command line interface

-defaultContext VAL : A file with properties definitions to use as the

[REQUIRED] primary context

-overrideContextList VAL : A comma separated list file names of properties

definitions to augment the primary context

-srcDir VAL : Defines base directory for all text templates

(source) files

-templateList VAL : A comma separated list source file names, found

[REQUIRED] under srcDir, of templates to process

-dstDir VAL : Defines base target directory for all generated

[REQUIRED] text files

-generatedFileList VAL : A comma separated list file names, found under

[REQUIRED] dstDir, of generated files from processing

templates and contexts

Usage: -defaultContext VAL -dstDir VAL -generatedFileList VAL -overrideContextList VAL \

-srcDir VAL -templateList VAL

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