Building Your Ant Colony

Designing an Automated Build System with Apache Ant

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PUG Challenge Americas 2017

Build Systems

What is a Build System?

- Creates a “build” (Compile, Link, bundle)
- Automates tasks related to your codebase
- Reduces the amount of time you spend doing boring things

What's the Business Case?

- Reduces manual boring stuff
- Easier to get new team members on board
- Continuous Integration
- Repeatable builds (Easier bug triage)

How much time do you spend on manual build tasks?

What can a Build System Do?

- Compile files
- Create files and directories
- Copy files and directories
- Delete files directories
- Rename files and directories
- Initialize data
- Run tests
- Run linting/static analysis
- Create docs from docstrings
- Download dependencies
- Zip/Unzip files
- FTP/Telnet/SSH
- Create a DB from a schema file
- Create a schema from a DB
- Index analysis
- Create a Procedure Library
- Create a REST WAR file

If you can script it, you can build it.

Build System Examples

- Make (C, C++)
- Cake (C#)
- Rake (Ruby)
- Grunt (JS)
- Pavement (Python)
- Phing (PHP)
- GB (Go)
- Ant (Java)
- Maven (Java)
- Gradle (Java)
- NAnt (C#)
- MSBuild (C#)

```
all: hello

hello: main.o factorial.o hello.o
    g++ main.o factorial.o hello.o -o hello

main.o: main.cpp
    g++ -c main.cpp

factorial.o: factorial.cpp
    g++ -c factorial.cpp

hello.o: hello.cpp
    g++ -c hello.cpp

clean:
    rm *o hello
```

Apache Ant

Intro to Ant

- “Another Neat Tool”
- Java Based
- XML Based
- Integrates with PDSOE / Eclipse
- Extensions written in Java

Getting Started

- Setup Ant Environment Variables
- Download and install Progress Compilation Tools (PCT)
- Create build.xml file

build.xml

- Consists of a <project> followed by some number of <targets>
- Each target can contain a number of directives called “tasks”.
- Targets are run from the commandline via `ant target_name`.

```
<?xml version="1.0"?>
<project name="Hello World" default="hello">
    <task name="hello">
        <echo>Hello World!</echo>
    </task>
</project>
```

```
> ant hello
Buildfile: /path/to/your/build.xml

hello:
     [echo]  Hello World!

BUILD SUCCESSFUL
Total time: 0 seconds
```

Core Concepts

- Properties
- Run-Time Parameters
- Dependencies
- Calling
- Filesets

Properties

- Build Configuration
- Variables that can be used in the build.
- Can be included directly or via an external file.

```
<property name="SrcDir" value="src" />
<property name="BuildDir" value="build" />
<property name="DocDir" value="docs" />
<property name="DbDir" value="db" />

<property file="build.properties" />
```

```
# build.properties

Dlc=C:\DLC116
Log=build.log
```

Run-Time Parameters

- Ant **does** accept run-time parameters from the command line, but it is clunky.
- Try to avoid more than one parameter.
- Spaces in the command are seen as different targets.

```
<target name="echo">
    <description>Echoes the input parameter.</description>
    <echo>${echo}</echo>
</target>
```

```
>ant echo -Decho="HELLO PUG!"
Buildfile: build.xml

echo:
     [echo] HELLO PUG!

BUILD SUCCESSFUL
Total time: 1 second
```

Dependencies

- Targets can “depend” on other targets.
- Ensures that the “dependee” target is run before the “depender”.
- Useful for separating complex tasks
- Downside: Make tasks harder to reason about

```
<!-- Ensures that "init" is always run before "build" -->
<target name="build" depends="init">
```

Calling

- Another way of running other tasks
- More like a function call
- Can conditionally execute

```
<antcall target="build" />
```

Filesets

- Allows selection of files that a task acts on.
- Can black-list or white-list.
- Very powerful.

```
<copy todir="${BuildDir}">
    <fileset dir="${SrcDir}">
        <include name="**/*.resx"/>
        <exclude name="**/exclude.resx" />
    </fileset>
</copy>
```

Ant and OpenEdge

Progress Compilation Tools

- Ant Plugin
- Provides a large number of OE related tasks
- Free, Apache Licensed
- https://github.com/Riverside-Software/pct

Standard OpenEdge Build Targets

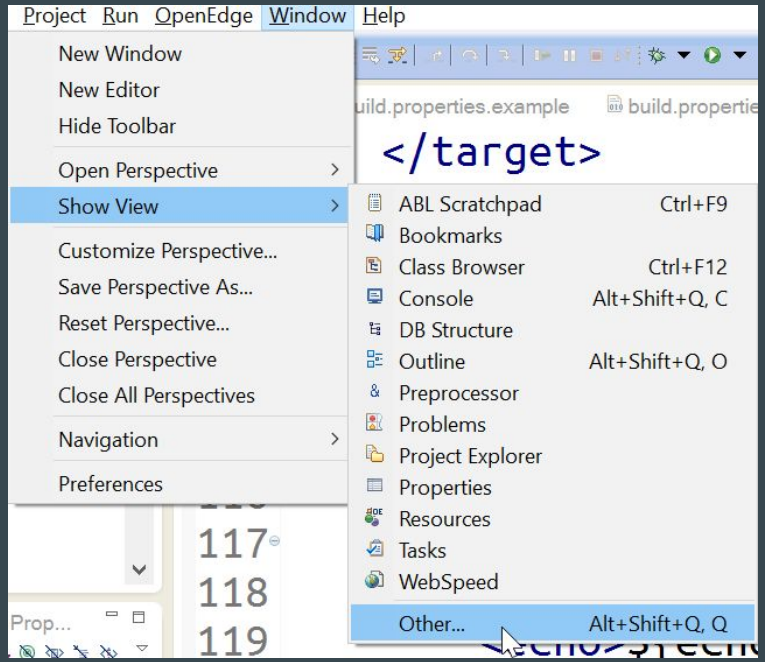
- Init
- Clean
- InitDB*
- CleanDB*
- Build
- Test
- Docs
- Package
- Install/Deploy
- Copy Resources

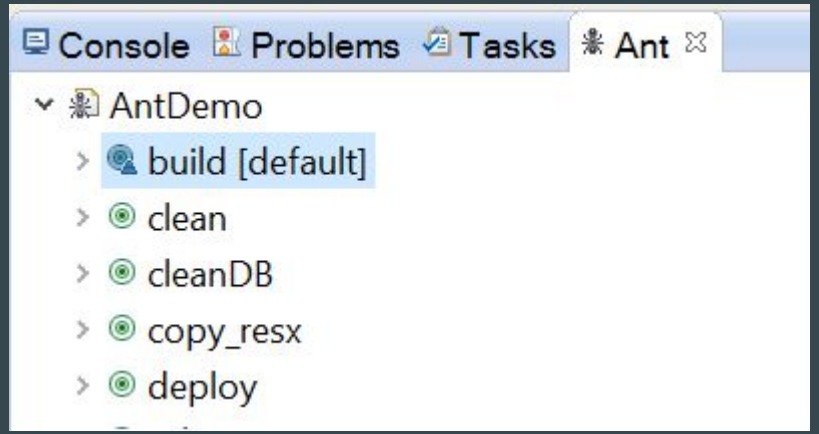
What do Ants and the Moon have in common?

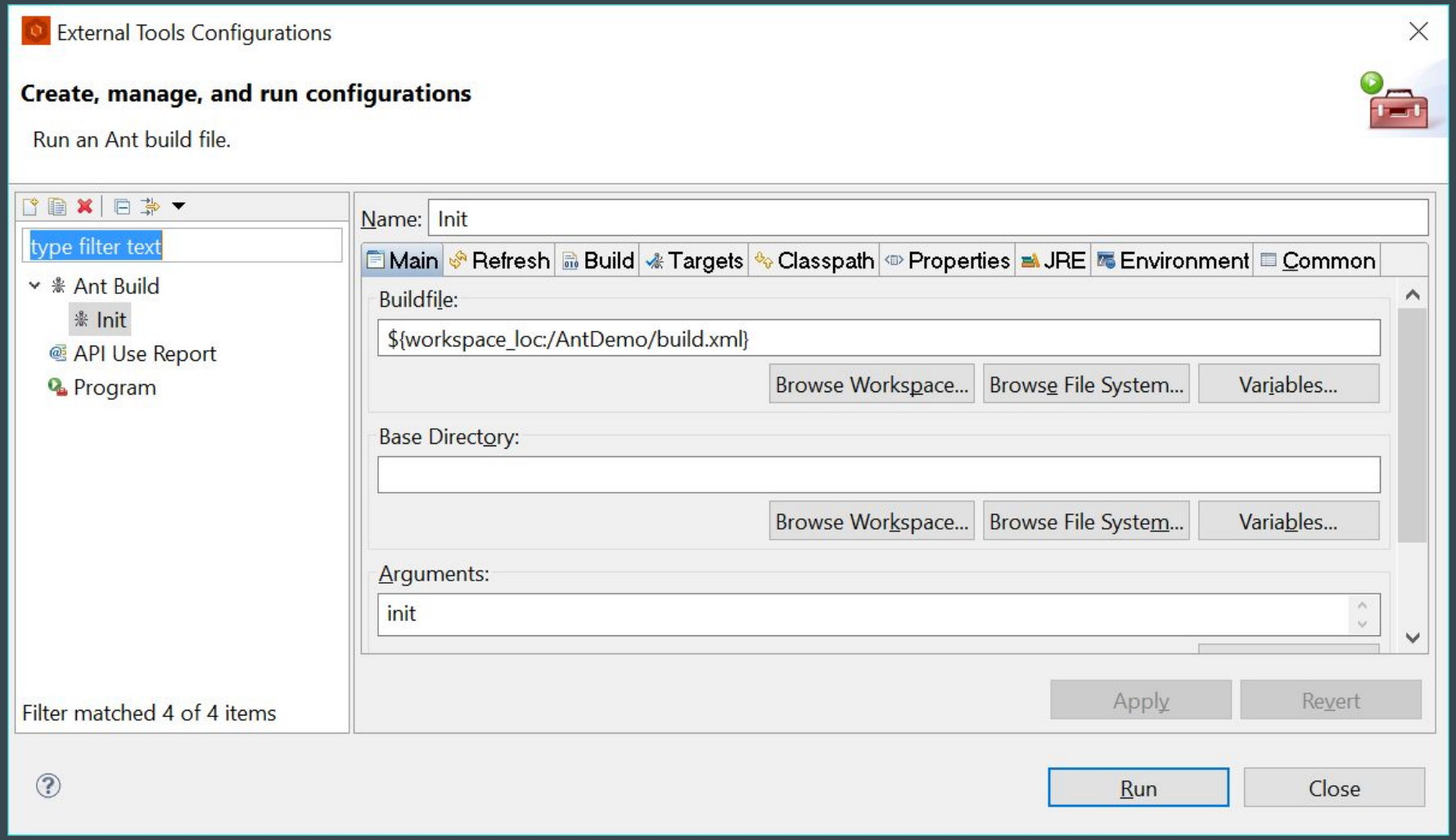
Integrating with Eclipse

Running Tasks from PDSOE

- Can be run from “External Tools” or the “Ant” View

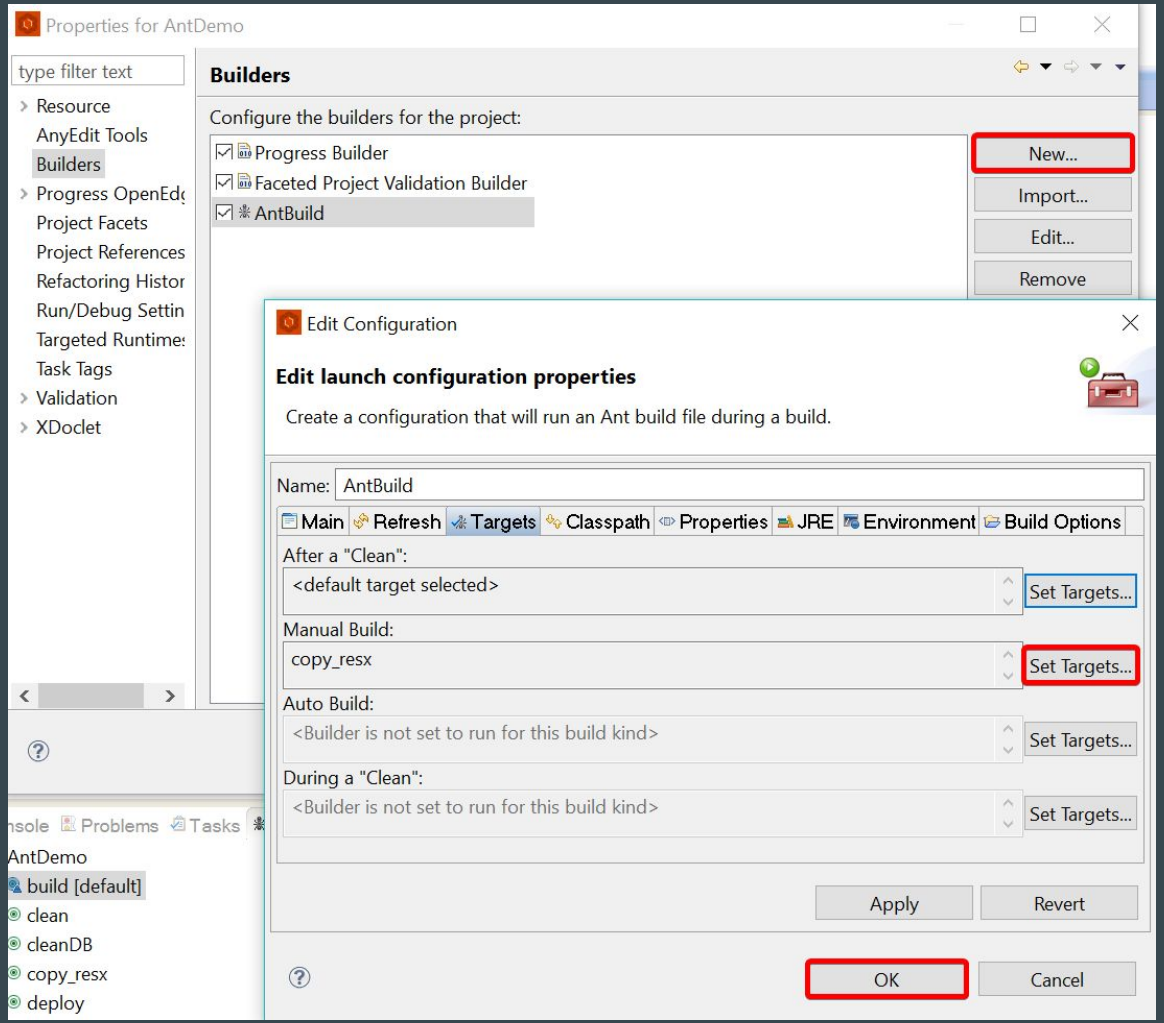





External Tools Configurations
Create, manage, and run configurations
Run an Ant build file.
type filter text
Ant Build
Init
API Use Report
Program
Filter matched 4 of 4 items
Name: Init
Main
Refresh
Build
Targets
Classpath
Properties
JRE
Environment
Common
Buildfile:
${workspace_loc:/AntDemo/build.xml}
Browse Workspace...
Browse File System...
Variables...
Base Directory:
Browse Workspace...
Browse File System...
Variables...
Arguments:
init
Apply
Revert
Run
Close

Running Targets Automatically

- You can set build targets to run automatically after a PDSOE compile.


Properties for AntDemo
type filter text
Resource
AnyEdit Tools
Builders
Progress OpenEd
Project Facets
Project References
Refactoring Histor
Run/Debug Settin
Targeted Runtime
Task Tags
Validation
XDoclet
Builders
Configure the builders for the project:
Progress Builder
Faceted Project Validation Builder
AntBuild
New...
Import...
Edit...
Remove
Edit Configuration
Edit launch configuration properties
Create a configuration that will run an Ant build file during a build.
Name: AntBuild
Main
Refresh
Targets
Classpath
Properties
JRE
Environment
Build Options
After a "Clean":
<default target selected>
Set Targets...
Manual Build:
copy_resx
Set Targets...
Auto Build:
<Builder is not set to run for this build kind>
Set Targets...
During a "Clean":
<Builder is not set to run for this build kind>
Set Targets...
Apply
Revert
OK
Cancel
nsole
Problems
Tasks
AntDemo
build [default]
clean
cleanDB
copy_resx
deploy

DEMO

Questions?

Advanced Usage

- Continuous Integration
  - Commit to Git -> Push to Gitlab -> Sends to Gitlab CI runner -> Build in new Container/VM
- Include Git Commit # in output
  - Run git via exec task to output SHA1 hash to a BUILD file.
- Deploy Via SSH/FTP
- Automatically Update Release Notes via Commit Logs
- Update Libraries
- Check listing/xref output

Further Reading

Ant Docs: https://ant.apache.org/manual/index.html

PCT Docs: https://github.com/Riverside-Software/pct/wiki

Github: Search for build.xml files or other build files.

Related Talks

- 430: The Future of OpenEdge build system
  - Wed 9:45
- 201: The Tool-Stack Used by an OpenEdge Tool Vendor
  - Tues 9:45

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Email: johnc@factivity.com

Talk: https://speakerdeck.com/jcleaver/intro-to-ant