SERENA® CHANGEMAN® BUILDER™ FOR PROFESSIONAL USER'S GUIDE

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Welcome to Version Manager

Thank you for choosing Serena® Version Manager™, a powerful and versatile version control system that will revolutionize the way you develop software. Version Manager helps you organize, manage, and protect your software development projects on every level—from storing and tracking changes to individual files, to managing and monitoring an entire development cycle.

Serena® ChangeMan® Builder™ for Professional integrates the Openmake build management system into Version Manager. ChangeMan Builder provides a way to control your organization's build process, yet is flexible enough to allow building for different groups, different release versions, or different life cycle stages.

With ChangeMan Builder, you can launch builds from within Version Manager, from the web, or from the PCLI command-line.

Purpose of this manual

This manual describes how to use ChangeMan Builder for Professional, including conceptual and "how to" information on basic and advanced ChangeMan Builder for Professional tasks, a summary of the ways to work with ChangeMan Builder for Professional, and instructions for accessing the online help.

For more information

This manual is one of several manuals related to ChangeMan Builder. See "Where to Find Information" on page 11.

Typographical Conventions

The following typographical conventions are used in the online manuals and online help. These typographical conventions are used to assist you when using the documentation; they are not meant to contradict or change any standard use of typographical conventions in the various product components or the host operating system.

Convention	Explanation
italics	Introduces new terms that you may not be familiar with and occasionally indicates emphasis.
bold	Emphasizes important information and field names.
UPPERCASE	Indicates keys or key combinations that you can use. For example, press the ENTER key.
monospace	Indicates syntax examples, values that you specify, or results that you receive.
monospaced italics	Indicates names that are placeholders for values you specify; for example, *filename*.
monospace bold	Indicates the results of an executed command.
vertical rule |	Separates menus and their associated commands. For example, select File | Copy means to select Copy from the File menu. Also, indicates mutually exclusive choices in a command syntax line.
brackets []	Indicates optional items. For example, in the following statement: `SELECT [DISTINCT]`, DISTINCT is an optional keyword.
. . .	Indicates command arguments that can have more than one value.
📄	Shows you which shortcut button to click. Shortcut buttons are placed in the margin.

Contacting Technical Support

Registered customers can log in to `http://support.serena.com/`.

Chapter 1

Introduction

What is Serena ChangeMan Builder for Professional?

Serena® ChangeMan® Builder™ for Professional is a build management system. It provides a way to control the build process, preventing multiple copies of source code from proliferating. Yet, it also provides the flexibility to organize your build process around different teams, different release versions, or different life cycle stages.

Based on the Openmake product from Catalyst Systems Corporation, ChangeMan Builder for Professional provides integration with Version Manager. From the Version Manager desktop client or the Version Manager web client, you can launch build jobs, inspect the results, and repeat the process after modifying your code, without leaving Version Manager.

Audience for This Document

The audience for this document is the individual developer or other user of ChangeMan Builder for Professional. This user will be creating individual build targets, submitting build jobs for execution, and examining build logs. This user will not be installing the product, and will not be setting up search paths or build types—generally, the Administrator does that before the individual users begin work.

If you are using the Enterprise Edition of ChangeMan Builder, your Administrator can define user groups that allow granting specific permissions, such as the permission to modify search paths. If that is the case and you have such permissions, you can find more detail on setting up search paths in the *ChangeMan Builder Administration Guide*.

ChangeMan Builder Products

ChangeMan Builder for Professional comes in two forms: ChangeMan Builder and ChangeMan Builder Enterprise Edition.

- ChangeMan Builder allows you to build Windows applications, including pre-defined build types for many popular Windows development tools such as Microsoft .NET and Microsoft Visual Studio.
- ChangeMan Builder Enterprise Edition adds support for Java and for UNIX. In addition, Enterprise Edition allows you to generate impact analysis reports, execute remote builds, and define user groups, roles, and privileges.

Every installation of ChangeMan Builder includes a free trial of the Enterprise Edition. If you have not purchased the Enterprise Edition, ChangeMan Builder will remind you of how many days remain until the evaluation period expires.

In addition to ChangeMan Builder for Professional, there are other ChangeMan Builder products:

- ChangeMan Builder for Dimensions enables you to build applications from within Serena Dimensions.

- ChangeMan Builder for z/OS enables you to build applications on z/OS mainframe UNIX System Services (USS) and native environments.

NOTE You should understand that in this manual, ChangeMan Builder for Professional may be informally referred to as just "ChangeMan Builder".

Where to Find Information

This document describes ChangeMan Builder for Professional from a user's point of view. If you are installing the ChangeMan Builder Knowledge Base server, or if you are the ChangeMan Builder administrator, you may require additional documentation. Here is a table describing where you can find different types of information.

Source of information	Description
ChangeMan Builder for Professional User's Guide	Contains information about the special features of the ChangeMan Builder integration with Version Manager.
ChangeMan Builder Installation Guide	Contains information about installing the ChangeMan Builder servers.
ChangeMan Builder Administration Guide	Contains information about topics such as setting up the servers, creating command scripts, defining build types, and defining search paths.
ChangeMan Builder Development Guide	Contains information about topics such as creating targets, performing builds, and converting makefiles to TGT files.
ChangeMan Builder Getting Started Guide	Contains information about the features and architecture of ChangeMan Builder, and some sample scenarios.
ChangeMan Builder for Dimensions User's Guide	Contains information about the special features of the ChangeMan Builder integration with ChangeMan Dimensions.
ChangeMan Builder z/OS Getting Started Guide	Contains information about using ChangeMan Builder on the z/OS platform.
ChangeMan Builder z/OS Administration Guide	Contains information about managing build types, rules, and projects on the z/OS platform.
Version Manager help	The ChangeMan Builder dialog boxes integrated within Version Manager have help available from the Help buttons or from the F1 key.

Source of information	**Description**
ChangeMan Builder web client help	The ChangeMan Builder web client home page contains a link to the online help. This help is produced by Catalyst Systems Corporation.
ChangeMan Builder web client online user's guide	The "i" icon on the ChangeMan Builder web client home page is a link to many different online documents, including a Development Guide and a Getting Started Guide.

NOTE The ChangeMan Builder Installation Guide, Administration Guide, Development Guide, and Getting Started Guide are installed with the software (see "Installing the Command-Line Client" on page 38), and will not be found in the same directory as this user's manual.

Chapter 2
Concepts

Understanding ChangeMan Builder

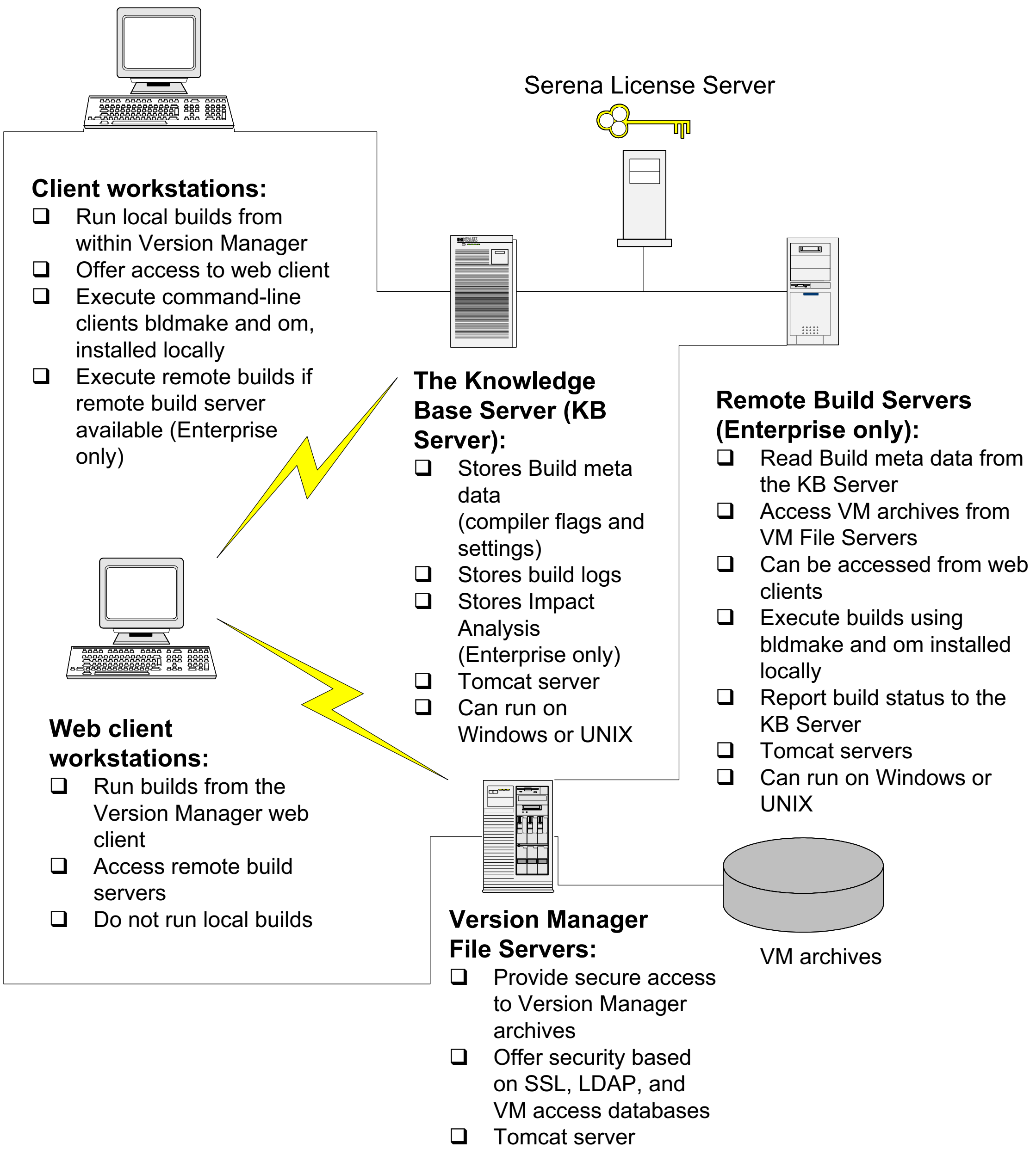
The following diagrams will help you understand Serena® ChangeMan® Builder™ for Professional.

The first diagram shows the ChangeMan Builder architecture.

The second diagram shows the variety of ChangeMan Builder clients.

The third diagram shows howChangeMan Builder can be used with integrated development environments (IDEs).

Serena ChangeMan Builder Architecture



Client workstations:

- ❑ Run local builds from within Version Manager
- ❑ Offer access to web client
- ❑ Execute command-line clients bldmake and om, installed locally
- ❑ Execute remote builds if remote build server available (Enterprise only)

The Knowledge Base Server (KB Server):

- ❑ Stores Build meta data (compiler flags and settings)
- ❑ Stores build logs
- ❑ Stores Impact Analysis (Enterprise only)
- ❑ Tomcat server
- ❑ Can run on Windows or UNIX

Remote Build Servers (Enterprise only):

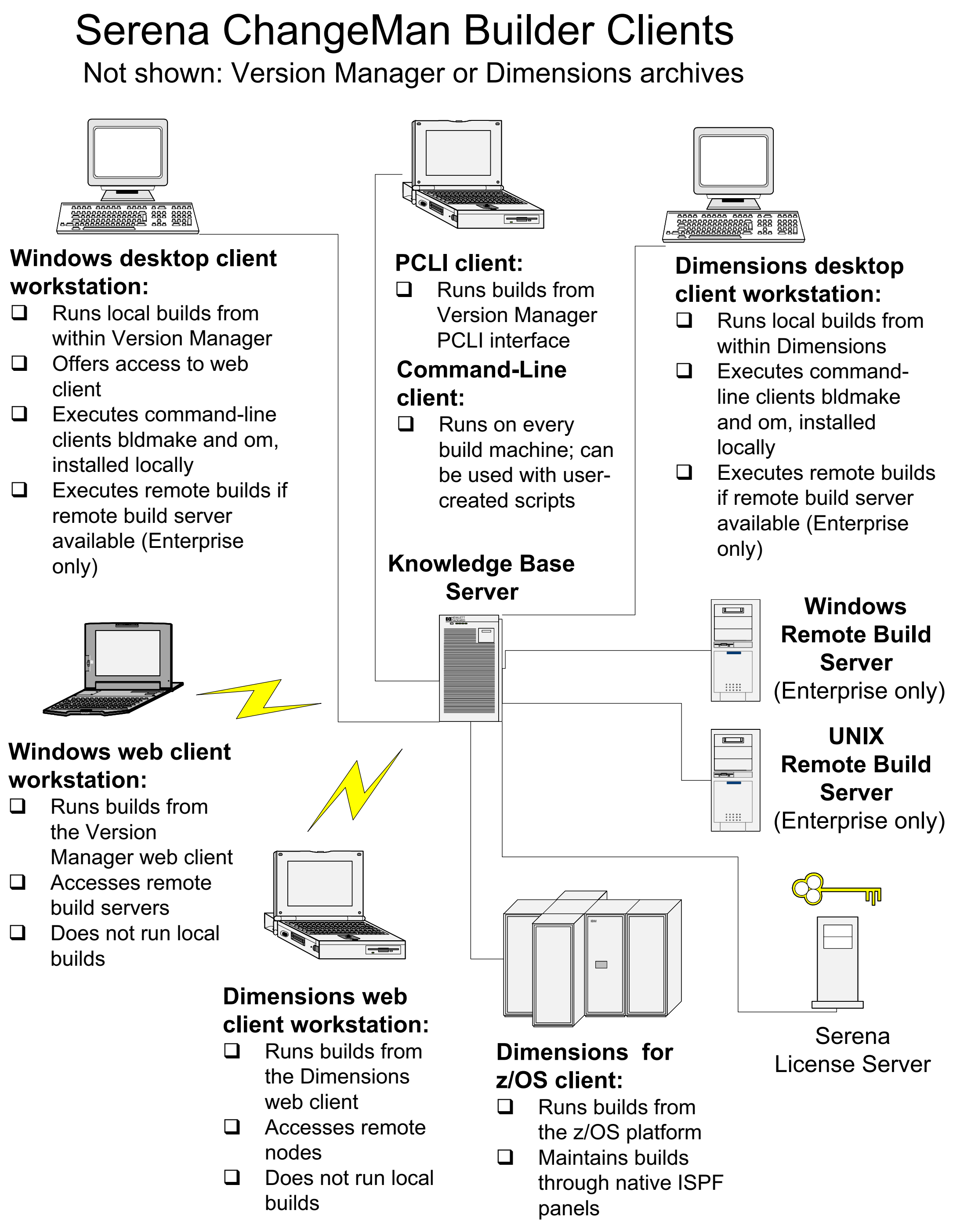
- ❑ Read Build meta data from the KB Server
- ❑ Access VM archives from VM File Servers
- ❑ Can be accessed from web clients
- ❑ Execute builds using bldmake and om installed locally
- ❑ Report build status to the KB Server
- ❑ Tomcat servers
- ❑ Can run on Windows or UNIX

Web client workstations:

- ❑ Run builds from the Version Manager web client
- ❑ Access remote build servers
- ❑ Do not run local builds

Version Manager File Servers:

- ❑ Provide secure access to Version Manager archives
- ❑ Offer security based on SSL, LDAP, and VM access databases
- ❑ Tomcat server



Serena ChangeMan Builder Clients

Not shown: Version Manager or Dimensions archives

Windows desktop client workstation:
- ❑ Runs local builds from within Version Manager
- ❑ Offers access to web client
- ❑ Executes command-line clients bldmake and om, installed locally
- ❑ Executes remote builds if remote build server available (Enterprise only)

PCLI client:
- ❑ Runs builds from Version Manager PCLI interface

Command-Line client:
- ❑ Runs on every build machine; can be used with user-created scripts

Dimensions desktop client workstation:
- ❑ Runs local builds from within Dimensions
- ❑ Executes command-line clients bldmake and om, installed locally
- ❑ Executes remote builds if remote build server available (Enterprise only)

Knowledge Base Server

Windows Remote Build Server (Enterprise only)

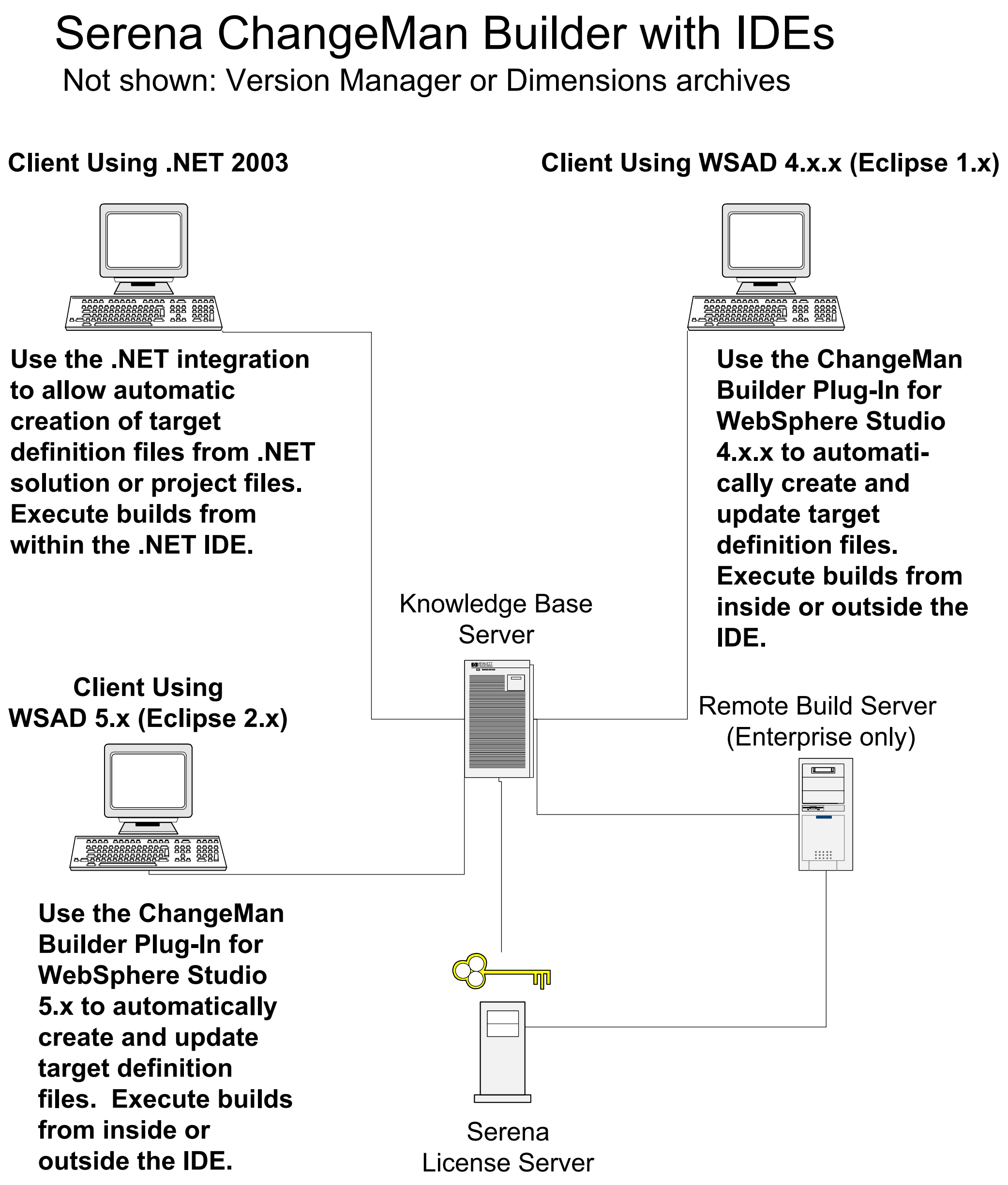
UNIX Remote Build Server (Enterprise only)

Windows web client workstation:
- ❑ Runs builds from the Version Manager web client
- ❑ Accesses remote build servers
- ❑ Does not run local builds

Dimensions web client workstation:
- ❑ Runs builds from the Dimensions web client
- ❑ Accesses remote nodes
- ❑ Does not run local builds

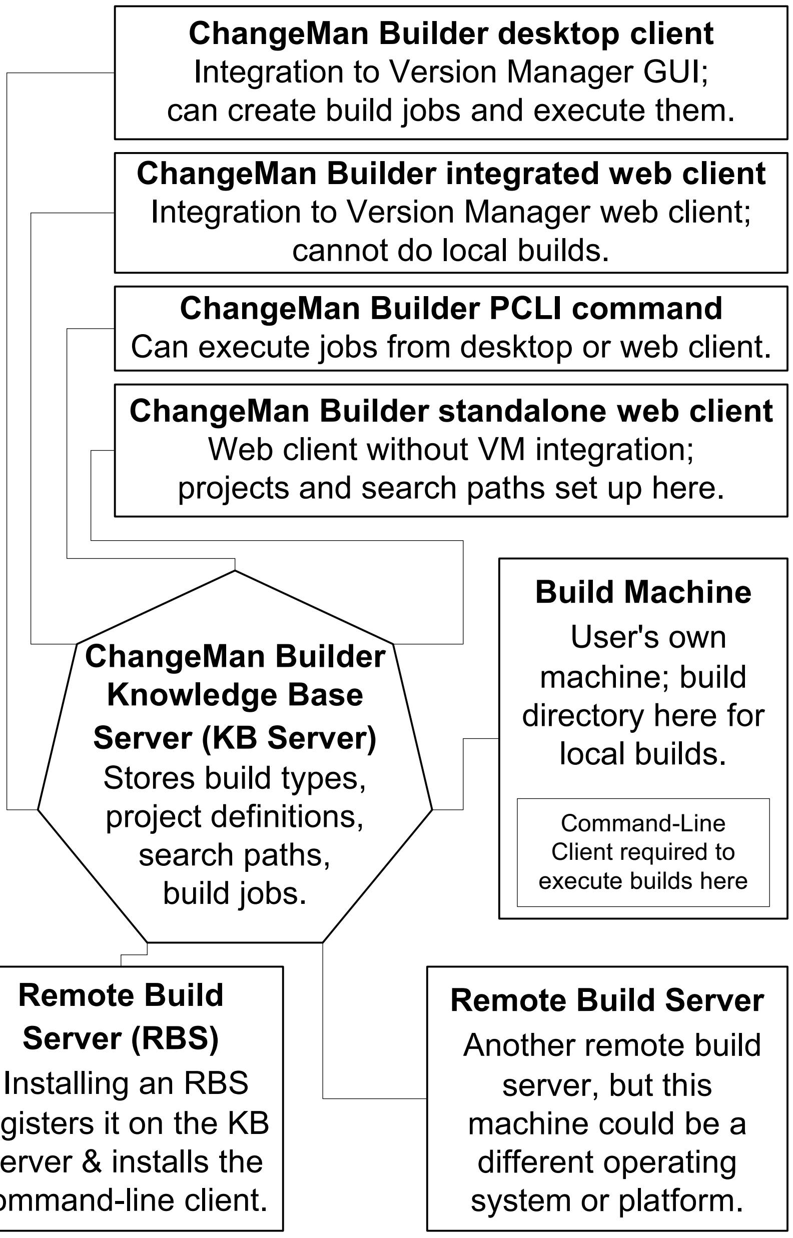
Dimensions for z/OS client:
- ❑ Runs builds from the z/OS platform
- ❑ Maintains builds through native ISPF panels

Serena License Server


Serena ChangeMan Builder with IDEs
Not shown: Version Manager or Dimensions archives
Client Using .NET 2003
Client Using WSAD 4.x.x (Eclipse 1.x)
Use the .NET integration to allow automatic creation of target definition files from .NET solution or project files. Execute builds from within the .NET IDE.
Use the ChangeMan Builder Plug-In for WebSphere Studio 4.x.x to automatically create and update target definition files. Execute builds from inside or outside the IDE.
Knowledge Base Server
Client Using WSAD 5.x (Eclipse 2.x)
Remote Build Server (Enterprise only)
Use the ChangeMan Builder Plug-In for WebSphere Studio 5.x to automatically create and update target definition files. Execute builds from inside or outside the IDE.
Serena License Server

ChangeMan Builder Components

Serena® ChangeMan® Builder™ components:


ChangeMan Builder desktop client
Integration to Version Manager GUI; can create build jobs and execute them.
ChangeMan Builder integrated web client
Integration to Version Manager web client; cannot do local builds.
ChangeMan Builder PCLI command
Can execute jobs from desktop or web client.
ChangeMan Builder standalone web client
Web client without VM integration; projects and search paths set up here.
ChangeMan Builder Knowledge Base Server (KB Server)
Stores build types, project definitions, search paths, build jobs.
Build Machine
User's own machine; build directory here for local builds.
Command-Line Client required to execute builds here
Remote Build Server (RBS)
Installing an RBS registers it on the KB Server & installs the command-line client.
Remote Build Server
Another remote build server, but this machine could be a different operating system or platform.

The preceding diagram illustrates several important ChangeMan Builder concepts:

- ChangeMan Builder has many different clients with which you can interact—clients integrated into Version Manager, a PCLI client, and a standalone web client. Each client has slightly different capabilities—for example, the standalone web client is the only client in which you can define build dependencies. Each client will be discussed more fully later.
- ChangeMan Builder has a central Knowledge Base server. This server stores the data that identify each build job. The KB server also stores data collected as a result of the build, and contains information that you want to be uniform across your group or

enterprise, such as definitions for the types of build jobs that can be compiled, or what to do with a `.java` file versus a `.cpp` file.

The ChangeMan Builder administrator sets up the Knowledge Base server, creates build projects and search paths, and does other work necessary to make the KB server transparent to the individual developers.

- Remote build servers are optional machines set up to be available on the network for performing builds. After the ChangeMan Builder administrator installs the remote build server on a given machine, that machine is registered with the Knowledge Base server, which then makes it visible to others on the network. Users can then specify that a build job should execute there.
- Build machines that are not remote build servers are typically individual users' machines. Users can perform a local build on their own machines, as long as they have installed the command-line client.
- The command-line client is a special client that goes on every build machine, remote or local, but is generally not used directly. Composed of the `bldmake` and `om` executables, the command-line client creates a makefile from your build job, then executes the makefile. Normally, however, you interact with it through one of the other clients. (It is sometimes useful to call `bldmake` and `om` directly, for debugging purposes. See Chapter 8, "Troubleshooting" on page 121).

ChangeMan Builder Clients

As mentioned earlier, ChangeMan Builder for Professional offers several different clients for you to use:

- ChangeMan Builder standalone web client

  This client is available from any web browser, and is not integrated into Version Manager.
- ChangeMan Builder desktop client

  This client is integrated into the desktop version of Version Manager.
- ChangeMan Builder integrated web client

  This client is integrated into the web version of Version Manager.
- ChangeMan Builder PCLI client

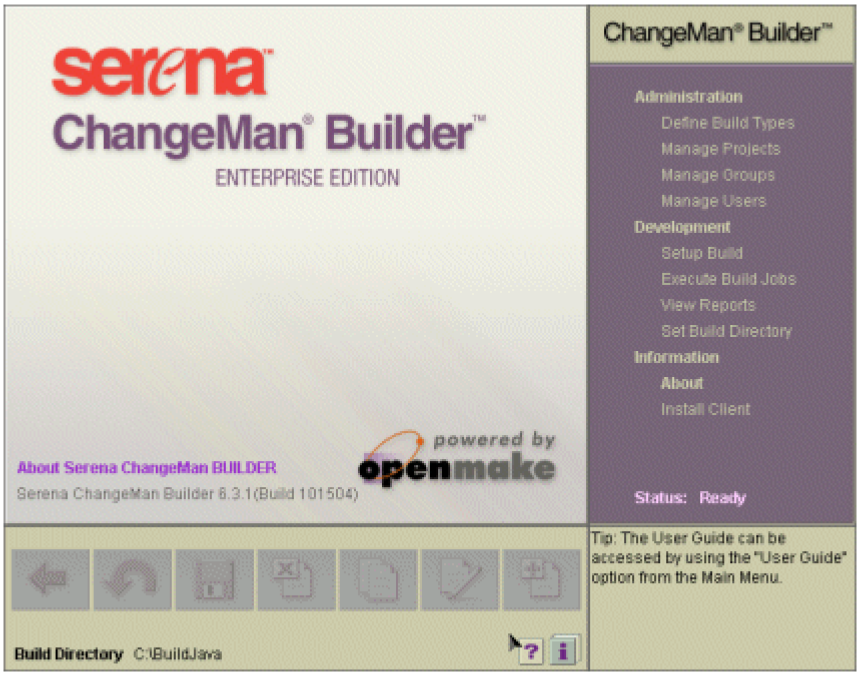
  This client is available from the Version Manager PCLI interface.
- ChangeMan Builder command-line client

  This client is installed on all build machines and on machines that wish to use the PCLI client. You do not generally interact with this client directly, but it is necessary to perform builds.

All of these clients communicate with the central Knowledge Base server; each has slightly different capabilities. A discussion of each client follows.

ChangeMan Builder Standalone Web Client

The ChangeMan Builder standalone web client is available from a web browser such as Microsoft Internet Explorer.



About Serena ChangeMan BUILDER
Serena ChangeMan Builder 6.3.1(Build 101504)

Tip: The User Guide can be accessed by using the "User Guide" option from the Main Menu.

NOTE In this book the client is referred to as the standalone web client in order to distinguish it from the web client that is integrated into the web version of Version Manager.

The client has a central display area, a set of icons along the bottom for operations such as Back, Undo, and Save, and a menu of commands along the right.

The menu of commands contains three headings:

- Administration
- Development
- Information

The Administration menu items permit the ChangeMan Builder administrator to modify build types, to create projects, to manage users, and, in the Enterprise Edition, to manage groups. These tasks are described in the *ChangeMan Builder Administration Guide*.

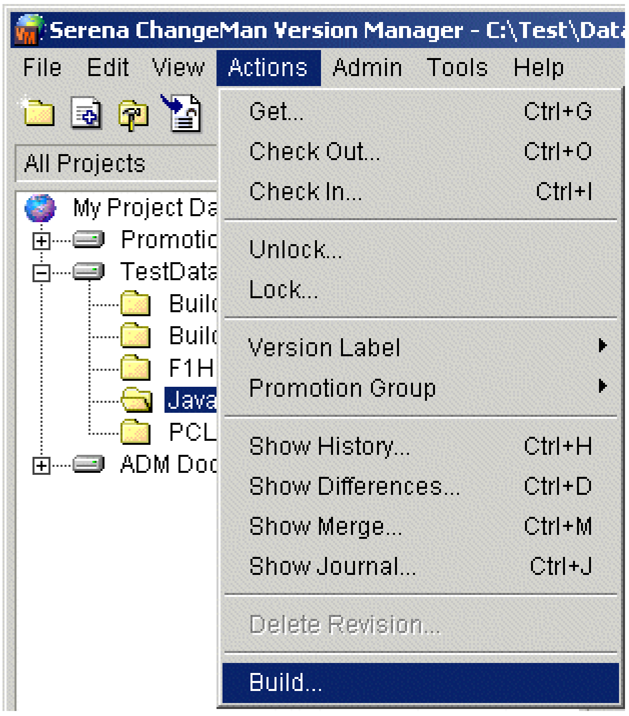
The Development menu items permit you to set up a build, to define build dependencies, to execute or modify existing build jobs, to view reports from completed builds, and to set the directory where the build should be executed. This is the only place where you can set up a build; it is not available from any of the other clients.

The Information menu items offer information about the version of ChangeMan Builder you are using, on-line help, and an on-line User's Guide (a set of documents different from the one you are reading). The command to install the command-line client is also under this menu.

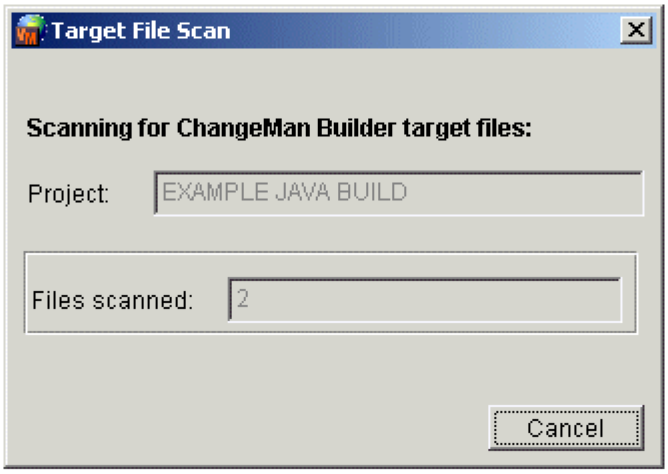
Examples of using the standalone web client appear in Chapter 4, "Tutorial" and Chapter 7, "Procedures".

ChangeMan Builder Desktop Client

The ChangeMan Builder desktop client is available from the Actions menu of the Version Manager GUI:



Once you select the ChangeMan Builder menu item, ChangeMan Builder scans the selected Version Manager project, looking for files that indicate that a build job has been set up for that Version Manager project:

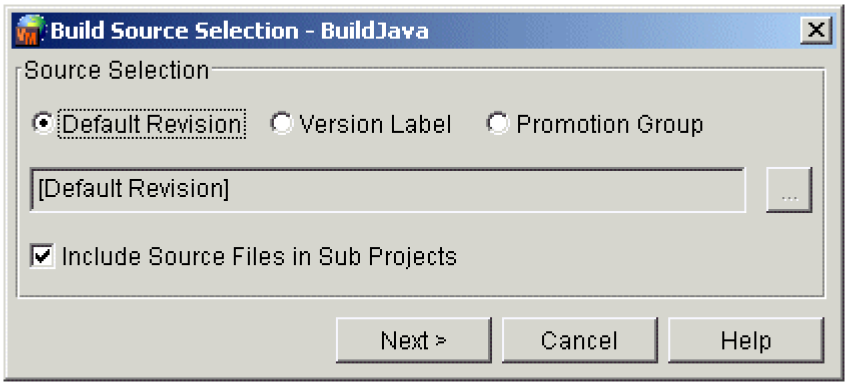

Target File Scan

Scanning for ChangeMan Builder target files:

Project: EXAMPLE JAVA BUILD

Files scanned: 2

ChangeMan Builder then presents you with a dialog asking how you would like to select source files:


Build Source Selection - BuildJava

Source Selection

[● Default Revision] ○ Version Label ○ Promotion Group

[Default Revision]

☑ Include Source Files in Sub Projects

From this client, you can execute previously-defined build jobs, give new names to existing build jobs, change from an incremental to a clean build, and do other tasks necessary in the edit-compile-test cycle.

Examples of using the desktop client appear in Chapter 4, "Tutorial" and Chapter 7, "Procedures".

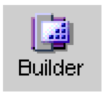
Differences: Standalone Web Client and Desktop Client

Using the standalone web client and the desktop client differ in some areas:

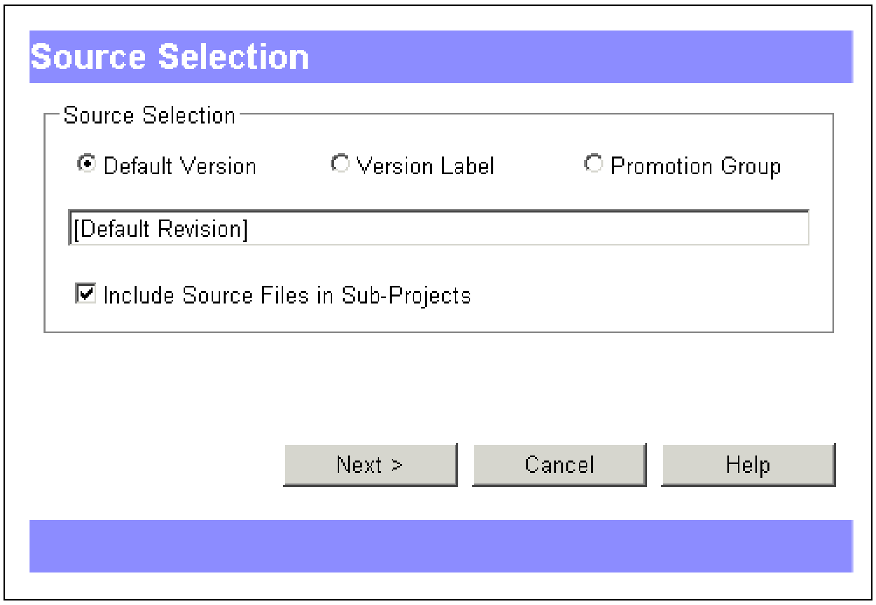
- All projects must be set up in the standalone web client, as you cannot set up projects in the desktop client.
- In the standalone web client, you must set a build directory and search path so that ChangeMan Builder can locate your source files.
- In the integrated or desktop client, the -s switch for case sensitivity is always on.
- In the integrated or desktop client, you check out your source files to a directory of your choosing, then tell ChangeMan Builder where to build by choosing the build directory from the Build Parameter dialog box.
- When you save a build job from the desktop client, it must be a private build job (see page 26). You can run a public build job from the desktop client, but when you save a build job, it is always saved as a private build job.
- If you wish to run a build job using PCLI, you must have created that build job in the desktop client.

ChangeMan Builder Integrated Web Client

The ChangeMan Builder integrated web client is available from the icons in the web version of Version Manager:



The integrated web client, like the desktop client, begins by scanning the files in the selected Version Manager project. It then shows you a dialog box asking you how source files should be selected:



Source Selection

Source Selection

[✓ Default Version] Version Label Promotion Group

[Default Revision]

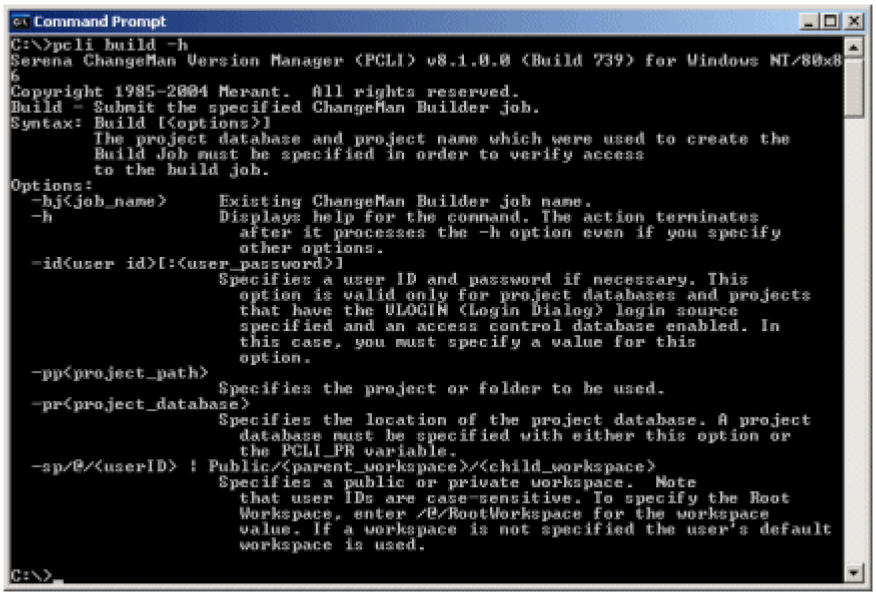
[✓] Include Source Files in Sub-Projects

From this client, you can perform any task that you can perform in the desktop client, with two exceptions:

- You cannot browse for version labels or promotion groups.
- You cannot execute a local build.

ChangeMan Builder PCLI Client

The ChangeMan Builder PCLI client is called from the PCLI command-line, in a Command Prompt window:



```
C:\>pcli build -h
Serena ChangeMan Version Manager (PCLI) v8.1.0.0 (Build 739) for Windows NT/80x8
6
Copyright 1985-2004 Merant.  All rights reserved.
Build - Submit the specified ChangeMan Builder job.
Syntax: Build [<options>]
        The project database and project name which were used to create the
        Build Job must be specified in order to verify access
        to the build job.
Options:
  -bj<job_name>       Existing ChangeMan Builder job name.
  -h                  Displays help for the command. The action terminates
                        after it processes the -h option even if you specify
                        other options.
  -id<user id>[:<user_password>]
                      Specifies a user ID and password if necessary. This
                        option is valid only for project databases and projects
                        that have the VLOGIN (Login Dialog) login source
                        specified and an access control database enabled. In
                        this case, you must specify a value for this
                        option.
  -pp<project_path>
                      Specifies the project or folder to be used.
  -pr<project_database>
                      Specifies the location of the project database. A project
                        database must be specified with either this option or
                        the PCLI_PR variable.
  -sp/@/<userID> | Public/<parent_workspace>/<child_workspace>
                      Specifies a public or private workspace.  Note
                        that user IDs are case-sensitive. To specify the Root
                        Workspace, enter /@/RootWorkspace for the workspace
                        value. If a workspace is not specified the user's default
                        workspace is used.

C:\>_
```

From this client you can execute any build job that was previously defined in either the desktop client or the integrated web client. You cannot execute a build job that was defined solely on the standalone web client; nor can you define a new build job using the PCLI client alone.

ChangeMan Builder Command-Line Client

The ChangeMan Builder command-line client is the name used to refer to two executables that perform the work of creating makefiles and executing them. These executables are `bldmake` and `om`. While you generally will not use `bldmake` and `om` directly, it is useful to know of them, because you will see them listed in the Build Commands field that is visible when you submit a build job, and in the build log that appears after a build job has been submitted.

Also, there are various options to the commands that can provide debugging or footprinting information. The options to `bldmake` and `om` are described in the *ChangeMan Builder Development Guide*.

Advantages of the Integrated Clients

The integrated clients have the advantage of automatically retrieving source and target definition files (.TGT files—see "Targets, Files, Projects, and Build Jobs" on page 25) from Version Manager archives into the specified build directory.

The standalone web client expects you to have placed all source files and .TGT files into the build directory before submitting the build.

Summarized Differences Between Clients

Here is a table summarizing the different capabilities of each of the ChangeMan Builder for Professional clients.

Type of Client	Define Search Paths?	Set Up Projects?	Create Build Jobs?	Submit Build Jobs?
Desktop client	No	No	Yes	Yes
Version Manager web client	No	No	Yes	Yes (cannot run local builds)
Standalone web client	Yes	Yes	Yes	Yes
PCLI client	No	No	No	Yes (if created in desktop client)
Command-line client (normally not interacted with directly)	No	No	No	No

Essentially, you need to set up search paths and projects in the standalone web client, and from there you can use any of the other clients except the PCLI client, which can only submit previously-defined build jobs.

Targets, Files, Projects, and Build Jobs

All of the ChangeMan Builder clients and servers described earlier exist for the purpose of generating or executing build jobs. Build jobs contain the definitions of which files and libraries make up the target—the thing being built. Here are descriptions of the concepts at this level.

- Target

  The target is the desired result of the build action. For example, in a *project* containing a set of source files, header files, and libraries, the target is the software being built, such as an .EXE file. Defining a target means specifying what the final product is, and what *dependencies* are necessary to create that product.

- Dependency

  A dependency is a file or other item that is used to create a *target*. Any source files mentioned in a *target definition file* are examples of dependencies, because the final target depends on their existence and proper compilation.

- Target definition file (.TGT file)

  A target definition file, or .TGT file, is the file that ChangeMan Builder creates to store the definition of what the target is.

  Some parts of the ChangeMan Builder documentation refer to a .TGT file as a target file, but do not confuse a .TGT file with a target. The .TGT file defines what the target is.

- Search path

  The search path is a set of directory locations that ChangeMan Builder uses to locate files needed to complete the build. These files are usually source files, but could also be third-party libraries. Setting up search paths is usually the task of the ChangeMan Builder administrator.

  By default, every search path includes a "." to represent the local build directory. Otherwise ChangeMan Builder will not be able to find the intermediate products of the build (such as an .obj file).

  Once a local copy of a file is found, ChangeMan Builder stops looking for that file. All other files are retrieved from the search path, making it unnecessary for the developer to check out the entire development tree. This avoids source code duplication and proliferation.

  ChangeMan Builder uses search paths for every build job, so it is critical to understand how they work, and to set them up properly. See "Search Paths" on page 26.

- Project

  A ChangeMan Builder project is a named collection of search paths that define where source files are to be found. It does not include the target definitions, nor the source files themselves. Because the project only contains search paths, individual developers can define their own targets.

- Build types

  A build type defines what type of compiler, source files, and platform ChangeMan Builder should use. An example of a build type is "Windows - Visual Basic", indicating that the platform is Windows, and the compiler to be used is Visual Basic.

  Build types appear on the Setup Build page and serve to indicate how a given target will be built. The ChangeMan Builder administrator can define custom build types if necessary, but most build types are predefined and it is very likely that no custom build types will be necessary.

- Build tasks

  A build task is a logical stage within a build. For example, a Java Jar build project would have the build tasks Set Classpath, Ant Javac, and Ant Jar. The Set Classpath task corresponds to pre-compile activities, the Ant Javac task corresponds to the compile operations, and the Ant Jar task corresponds to the .jar file packaging operations.

- Build rules

  A build rule defines what steps a given compiler should take to build the target, given a known type of input file and a known type of output file. For example, a build rule could specify that a .c file should be compiled to an .obj file by the C compiler.

- Build directory

  The build directory is where ChangeMan Builder will place the final products of the build. By default, ChangeMan Builder looks for source files here, and also in directories named in the search path. Specifying the build directory is one of the first things an individual developer should do.

- Build job

  Build jobs are the saved specifications of the build directory, targets, build options, build machines, and other parameters that determine how targets are to be built. The build jobs appear on the Execute Build Jobs page.

  Build jobs can be either public, meaning they are visible to and executable by everyone, or private, meaning that they are only visible to and executable by the build job's owner.

Search Paths

Each project in ChangeMan Builder is associated with a search path. A search path is a collection of directory paths. Just as the PATH variable tells your operating system where to find applications, the search paths tell ChangeMan Builder where to find source files or other needed files such as third-party libraries.

Different Search Path = Different Build Target

Projects in fact are commonly associated with multiple search paths. Each search path defines a different build deliverable. A project may have one search path for developers and another search path for quality assurance, or one search path for a Windows platform and another search path for UNIX.

Search Paths Look in Current Directory First

By default, each search path in ChangeMan Builder begins with ".", meaning that the current directory is to be searched first.

ChangeMan Builder Uses First-Found Copy of File

Once ChangeMan Builder finds a copy of a file, it stops looking for that file name. This means that a developer's local copy of a source file can take precedence over the copy checked in to the release area, allowing for testing of changes.

For example, when an individual developer wants to test his own `accounting_module.cpp`, ChangeMan Builder finds the local `accounting_module.cpp` and builds the project with that, ignoring the checked-in version found elsewhere in the search path directories.

So while it is true that search paths generally are set up by the ChangeMan Builder administrator, individual developers can still test their files locally by defining local build directories and placing their test files there.

Search Path Example

Consider a hypothetical project named Project1 that needs to be built by the developers, by quality assurance, and by a release engineer. Developers want to test their changes before passing them on to QA. QA needs to build their own debug versions, whereas the release engineer must build only what will be shipped to customers.

In this situation, the search paths might be defined as follows:

Search path	Defined as
DEV	.
	$project1\dev\src
	$project1\dev
	$project1\qa\src
	$project1\qa
	$project1\release\src
	$project1\release
QA	.
	$project1\qa\src
	$project1\qa
	$project1\release\src
	$project1\release
RELEASE	.
	$project1\release\src
	$project1\release

Notice the following:

- Each search path begins with ".", meaning that ChangeMan Builder will search the current directory first.
- The released version of the product (using the search path RELEASE) will be built only from files in the release\src or release directories.
- Quality Assurance can test proposed changes by placing those changes in the qa\src or qa directories and then building with the QA search path. This is possible because a) the order of directories listed is significant, and b) **ChangeMan Builder will stop looking for a file once it finds one copy**. This allows local copies of a file to supersede the "final" checked-in versions in the RELEASE area.
- Developers can test their changes by placing local copies of their changed files in the dev\src or dev directories and then building with the DEV search path. They do not need to check out the entire build tree, because ChangeMan Builder will automatically look for the remaining files in the other directories named in the search path. This allows individual developers or QA engineers to test locally, yet still be working with essentially the same source tree, rather than multiple copies of the source tree.
- ChangeMan Builder also uses the search path to locate .jar files, .zip files, and other third-party auxiliary files. It does not use the search path to locate compilers—those are located using the standard PATH variable.

Search Paths Can Contain Environment Variables

Another way to allow for variation in search paths is to use environment variables. If a search path contains an environment variable such as COMPILER, JAVA_HOME, or REFDIR, it can be modified by each developer as needed—to account for different drive mappings, for example.

See the example projects provided with ChangeMan Builder for more examples of how to use search paths.

Admin Controls Permissions to Modify Search Path

If it is essential for members of your group to modify the search paths, the ChangeMan Builder administrator can grant that privilege, provided that you are using the Enterprise Edition of ChangeMan Builder for Professional. See the *ChangeMan Builder Administration Guide*.

Example ChangeMan Builder Workflow

Here is a description of a typical workflow for ChangeMan Builder; this will be helpful when you come to the specific instructions on how to use the product.

1. The administrator installs the product and sets up the Knowledge Base server. This machine stores the configuration data such as build types, projects, search paths, and build jobs.
2. The administrator examines the predefined build types that come with ChangeMan Builder. These include many popular development environments, such as .NET, Visual Studio, Ant Java, and so on. If necessary, the administrator modifies the command

scripts and build rules associated with each build type. It is possible that no customization is needed.

When the administrator is done, there are a set of build types such as "Windows MSVC Application Static" that are ready to be used by the developers.

3. The administrator sets up the needed projects. This includes defining search paths for each project. Web client users in particular need to do this, as the search path determines where to locate source files, and in the case of Java programs, where to locate `.jar` or `.zip` files.
4. The administrator sets up groups, users, and privileges.
5. The individual users create their accounts by logging in to the web client, then installing the command-line client.
6. The users set a build directory to identify where the products of the build should be placed, or the users accept the default build directory.
7. The users set up their builds by defining targets (the end products of a given build) and by specifying dependencies (the files that are used to create the target). The users also specify which operating system and compiler shall be used to build each target.
8. The users save all this information into a build job, which they can submit immediately, or save for later. Users can execute their build jobs from the web client, the desktop client, or from PCLI.
9. When the build completes, the users review the build log. If the Enterprise Edition is installed, users may also review the Impact Analysis reports.

ChangeMan Builder vs. the Traditional Build Process

ChangeMan Builder is designed to avoid problems inherent in the traditional build process:

- Variations in compiler flags and configurations
- Multiple copies of source code
- Reliance on only one or two people who can execute the build process, using complex build scripts
- Lack of cross-platform support

Advantages of ChangeMan Builder

ChangeMan Builder improves on the traditional build process in the following ways:

- Standardization of compiler flags

  The ChangeMan Builder administrator can control how compilers are configured and which flags are used. While individual developers can still specify debug flags and release flags, can still have a choice of compilers, and can still pass special flags to the compilers, the ChangeMan Builder administrator sets the default compiler flags and defines which versions of each compiler are to be used. This avoids launching builds that have the wrong compiler version or have wrong compiler settings.

- Standardization of third-party libraries

  Because the ChangeMan Builder administrator controls the search path used to locate third-party libraries, proliferation of multiple copies of libraries is reduced or eliminated.

- Source code is always in known locations, yet allows individual developers to test locally

  Because ChangeMan Builder will stop looking for a specific file once a copy is found, an individual developer can make changes to a small set of files, then trigger a build that uses his local files and the official release files for everything else. This reduces the multiple local copies of source code that rapidly grow out of date.

- Standardized build scripts allow anyone to build

  Once a ChangeMan Builder project has been set up with the proper build types, project settings, and search paths, these values are stored on the ChangeMan Builder Knowledge Base server as a specific build job. If necessary, anyone can execute a public build job.

- Cross-platform support

  ChangeMan Builder can build products that are constructed partially on one platform and partially on another. The server component of a product, for example, might be built on a UNIX machine, while the client is built on a Windows machine.

  Furthermore, the creator of a build job may define a job on a Windows machine that will run on a UNIX machine, using a remote build capability (Enterprise Edition only).

ChangeMan Builder vs. Configuration Builder

If you have used Merant Configuration Builder, you should be aware of a difference between ChangeMan Builder for Professional and Configuration Builder:

- Configuration Builder can access Version Manager archives and can examine the revision dates of archives, for example, to determine whether a file needs to be checked out.
- The desktop client version of ChangeMan Builder can access Version Manager archives, but the web client version of ChangeMan Builder cannot open Version Manager archives, and expects to find all necessary files either in the build directory or in directories specified by the Search Path.

What to Do with Existing Build Processes

If you have existing build processes, you have the following choices:

- Continue to use your existing build system
- Use ChangeMan Builder to create a build job that encapsulates your existing build scripts (that is, use a wrapper script)

- Migrate your existing Configuration Builder or pcmsmake build scripts to ChangeMan Builder
- Create new build jobs using ChangeMan Builder

Chapter 3
Installation

This section discusses the installation of Serena® ChangeMan® Builder™ for Professional. Most of the installation steps should have been done for you by the ChangeMan Builder administrator, but some of the steps you have to do.

Installation Tasks for ChangeMan Builder for Professional

Although this is not a substitute for the installation and administration guides, here is a table of the ChangeMan Builder installation tasks that must be completed, and where the instructions for those tasks can be found.

Task	Responsible	Where described
Install ChangeMan Builder servers	Administrator	ChangeMan Builder Installation Guide
Customize Build Types and Build Rules for the compilers you use	Administrator	ChangeMan Builder Administration Guide
Define search paths	Administrator	ChangeMan Builder Administration Guide
Define build types	Administrator	ChangeMan Builder Administration Guide
Command-line client must be installed	You	This document (see "Installing the Command-Line Client" on page 38)
Create account by opening a browser session to standalone web client for the first time	You	This document (see "Installation Steps Done by You" on page 36)
Create target files	You	This document (see "Setting Up a Build" on page 92)
Add target files to Version Manager archives	You	Version Manager User's Guide
Define build job and submit it	You	This document

About Supported Platforms

ChangeMan Builder for Professional supports the same platforms that are supported by Serena ChangeMan Version Manager. You can find the most recent list of supported platforms in the Version Manager Readme.

Installation Steps Done by the Administrator

Here are the steps that the ChangeMan Builder administrator should do in order to get ChangeMan Builder running. These steps are described in greater detail in the *ChangeMan*

Builder Installation Guide, the *ChangeMan Builder Administration Guide*, and in Version Manager documentation, but this list should give you a sense of what needs to be done and who should do it.

1 Install the ChangeMan Builder Knowledge Base server. See the *ChangeMan Builder Installation Guide* and also check the Readme for the latest information.

On UNIX, be sure to capture the information that appears at the end of the install transcript; this needs to be added to the `.profile` or `.cshrc` file of the account that will run the Knowledge Base server. See "UNIX: Adding Setup Information to Accounts" on page 40

2 If the Knowledge Base server is also to be used as a build machine, the command-line client needs to be installed. Install the command-line client from the Install Client link on the web client home page.

3 Define the build types and build rules necessary to use the compilers needed at your company. See the *ChangeMan Builder Administration Guide* for instructions.

4 Create ChangeMan Builder projects corresponding to the projects at your company.

5 If you are using the web client, define search paths to the locations where source code for the projects can be found. (If you are using the integrated client, this is not necessary.) Again, see the *ChangeMan Builder Administration Guide* for instructions.

6 Set up users, groups, and privileges.

7 Once you have local builds working properly, set up remote build servers if desired. On UNIX, be sure to capture the information that appears at the end of the install transcript; this needs to be added to the `.profile` or `.cshrc` file of the account that will run the remote build server. See "UNIX: Adding Setup Information to Accounts" on page 40

Remote Build Server Issues

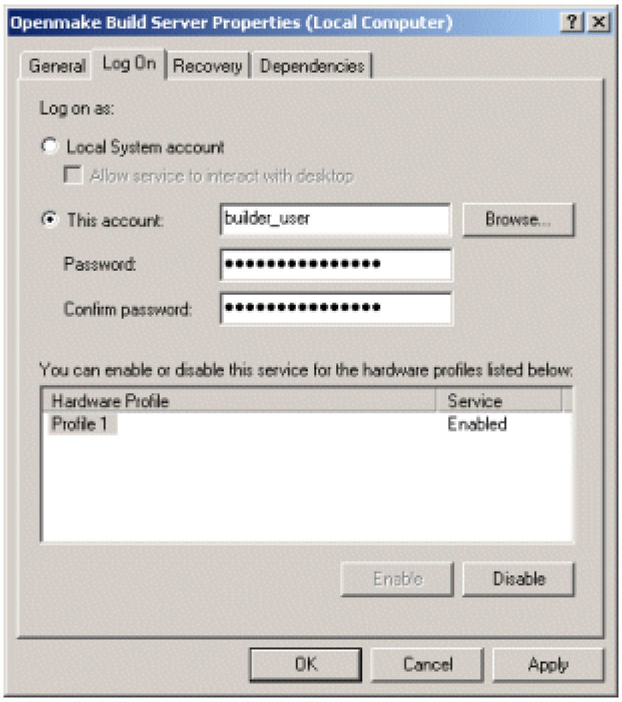
Following are two issues related to remote build server installation. For the main set of instructions on how to set up a remote build server, see the *ChangeMan Builder Administration Guide*.

Remote Build Server Service Must Run Under "This Account"

If you choose to install a remote build server on a Windows machine, a service named Openmake Build Server is installed on that machine.

It is important that this service not be run under "Local System Account". Instead, it should be run under a specific user that you create.

After creating the user for the remote build server, go to the Properties dialog box for the Openmake Build Server service and specify the user under **This account**:


Openmake Build Server Properties (Local Computer)

Log on as:

( ) Local System account

[ ] Allow service to interact with desktop

(•) This account: builder_user

Password: ••••••••••••••••

Confirm password: ••••••••••••••••

You can enable or disable this service for the hardware profiles listed below:

Hardware Profile	Service
Profile 1	Enabled

Drive Mappings Can Be Lost if User Logs Out

The previous section established the need for a user ID under which the remote build server could run. You should be aware that if that user logs out—for example, inadvertently, because of a system crash—the drive mappings under that user could be lost. This can cause a loss of access to a Version Manager project database (PDB) that ChangeMan Builder needs.

If this happens, log the remote build server back in as the user ID under which the proper drive mappings have been defined.

Installation Steps Done by You

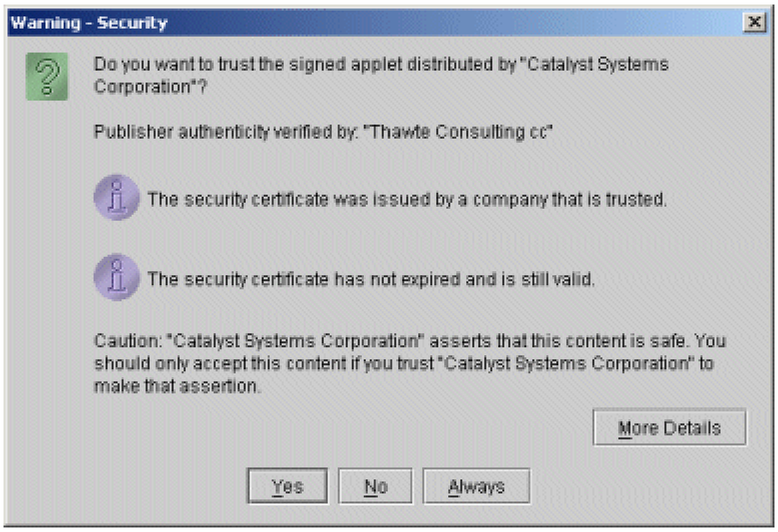
1 From your Administrator, get the DNS host name of the Knowledge Base server, and the port number to the server (default 58080).

2 Using the information from step 1, open a browser session using this URL:

```
http://<KB server DNS host name>:<port number>/openmake/index.html
```

3 If you do not have the Java runtime client installed, you will see dialog boxes asking if you wish to install. Follow the installation instructions.

4 When the Java runtime client install completes, you see a dialog box asking if you wish to accept the Catalyst security certificate:



Do you want to trust the signed applet distributed by "Catalyst Systems Corporation"?

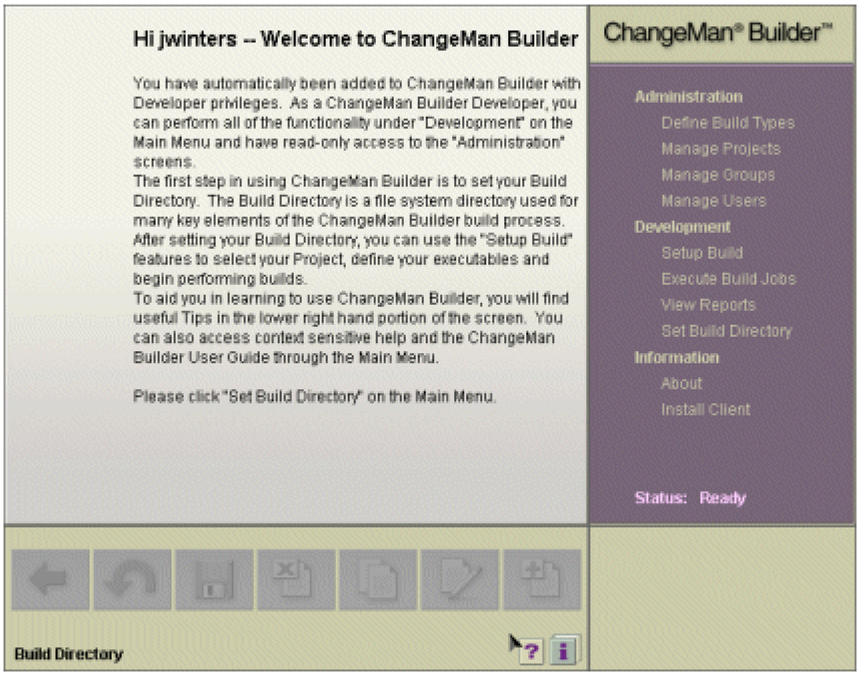
Publisher authenticity verified by: "Thawte Consulting cc"

The security certificate was issued by a company that is trusted.

The security certificate has not expired and is still valid.

Caution: "Catalyst Systems Corporation" asserts that this content is safe. You should only accept this content if you trust "Catalyst Systems Corporation" to make that assertion.

Click **Always**. A welcome page appears:



Hi jwinters -- Welcome to ChangeMan Builder

You have automatically been added to ChangeMan Builder with Developer privileges. As a ChangeMan Builder Developer, you can perform all of the functionality under "Development" on the Main Menu and have read-only access to the "Administration" screens.
The first step in using ChangeMan Builder is to set your Build Directory. The Build Directory is a file system directory used for many key elements of the ChangeMan Builder build process. After setting your Build Directory, you can use the "Setup Build" features to select your Project, define your executables and begin performing builds.
To aid you in learning to use ChangeMan Builder, you will find useful Tips in the lower right hand portion of the screen. You can also access context sensitive help and the ChangeMan Builder User Guide through the Main Menu.

Please click "Set Build Directory" on the Main Menu.

5 Click **Set Build Directory** as directed, and set a suitable location for placing builds (this can be easily changed later).

6 If you should have Administrator privileges, contact your ChangeMan Builder administrator to request them.

7 Return to the web client home page, and click **Install Client** to install the command-line client. See "Installing the Command-Line Client" on page 38. (On Windows machines, you will be asked to reboot after installing.)

8 On UNIX, be sure to capture the information that appears at the end of the install transcript; this needs to be added to the `.profile` or `.cshrc` file of the account that will run the command-line client. "UNIX: Adding Setup Information to Accounts" on page 40.

Installing the Command-Line Client

The installation of ChangeMan Builder is primarily carried out by the ChangeMan Builder administrator, but end-users must install the command-line client. Installing this client allows you to execute builds locally.

For both Windows and UNIX, you must install Perl separately. The Windows installation no longer installs Perl.

NOTE You can find ActiveState Perl, including a link to the ActivePerl documentation, at `http://www.activestate.com`.

For Windows, after installing the command-line client, you will be asked to reboot your computer.

To install the command-line client:

1 On the ChangeMan Builder standalone web client home page, click **Install Client**. You are taken to a page containing instructions for installing the client, and links to the downloadable install file. (Or, you can use the installation CD.)

2 Print the install instructions, and then download the install file.

3 Execute the install file and follow the instructions in the install wizard, and in the printed install instructions.

4 (Windows) When the install completes, reboot your computer.

NOTE If you install a command-line client after permanent licenses have been installed (for a new user, for example), you will have to convert the temporary license installed by default to a permanent license. You can do this by editing the value of the `MERANT_LICENSE_FILE` environment variable. See "Command-Line Client Permanent Licenses" on page 39.

Who Needs to Install the Command-Line Client

You must install the command-line client on the following machines:

- Any machine that will be performing local builds
- The machine hosting the Version Manager web server
- Any machine using ChangeMan Builder from PCLI

It is not necessary to install the command-line client on the Knowledge Base server, unless that machine will also be used to perform builds.

Remote build servers need the command-line client also, but the process of installing a remote build server automatically installs the command-line client.

Remote Build Server Licensing

To set up a remote build server, you must have a remote build server named license. These licenses can be ordered through your Serena sales representative or through web fulfillment and are expressly designated for remote build server machines. Without one of these named licenses, you will not be able to set up a remote build server, regardless of the number of other ChangeMan Builder licenses you have purchased. This licensing arrangement differs from previous ChangeMan Builder for Professional releases (that is, from the initial ChangeMan Builder for Professional release).

Note that the remote build server license enables the remote build machine to be accessed from within the Version Manager integration, but does not license Version Manager for general use from the remote build server machine.

To install the remote build server license, follow the instructions in the *Serena Version Manager Installation Guide* or the *Serena License Manager QuickStart Guide*.

Licensing

ChangeMan Builder automatically installs an evaluation version of the Enterprise Edition, good for thirty days without a permanent license. After that period, you or your ChangeMan Builder administrator will have to take some steps to upgrade the temporary licenses to permanent licenses. The steps for doing this are slightly different depending on which component of ChangeMan Builder you are upgrading. Here are the steps for all components.

Knowledge Base Server Permanent Licenses

Upgrading the Knowledge Base Server license is usually done by the ChangeMan Builder Administrator.

1. Get a permanent license key using web fulfillment or by calling Support. This procedure is detailed in the *Version Manager User's Guide*.
2. Install this key on the Serena license server.
3. Edit the `license.ini` file on the Knowledge Base server so that it points to the Serena license server. To do this, you replace the line in `license.ini` that begins like this:

   ```
   http://<name of machine>...
   ```

   with a line that looks like this:

   ```
   @<name of license server>
   ```

   where <name of license server> is replaced by the name of your Serena license server.

Command-Line Client Permanent Licenses

Upgrading the command-line client license can be done by the individual user, assuming the permanent license key has been installed on the Serena license server.

To upgrade the command-line client license: Edit the value of the `MERANT_LICENSE_FILE` environment variable so that it points to the Serena license server. To do this, you replace the value of the environment variable, which begins like this:

```
http://<name of machine>...
```

with a line that looks like this:

```
@<name of license server>
```

where <name of license server> is replaced by the name of your Serena license server.

Remote Build Server Permanent Licenses

Upgrading the remote build server licenses is usually done by the ChangeMan Builder administrator. The procedure is the same as that described for upgrading command-line client licenses: Edit the `MERANT_LICENSE_FILE` environment variable so that it points to the Serena license server.

PCLI Licensing Tied to Version Manager

It is unnecessary to separately license the ChangeMan Builder command that is callable from PCLI. The PCLI commands are tied to Version Manager licensing.

UNIX: Adding Setup Information to Accounts

UNIX installations need to capture setup information, such as environment variable definitions, to individual users' accounts, so that the proper settings are in place when the users log in. To accomplish this, the ChangeMan Builder administrator should follow these steps:

1. At the end of a UNIX install, environment variable information that appears at the end of the install needs to be sourced into individual users' environments. The ChangeMan Builder administrator should copy this information into a separate file—for example, `buildervars`. Then, for each user, the administrator should add to the `.profile` or `.cshrc` file a source command calling the `buildervars` file.

2. The ChangeMan Builder administrator also should source the appropriate file listed below to each `.profile` or `.cshrc`:

   - If you are using Bourne shell, Korn shell, or bash, source the `vmprofile` file.
   - If you are using C shell, source the `vmcshrc` file.

   The `vmprofile` and `vmcshrc` files are in the `/bin` directory of your Version Manager install; that is:

   ```
   <install location>/vm/<platform>/bin
   ```

   The default install location is `/usr/serena`.

Upgrading from a Merant Build Installation

If you upgrade from a Merant Build installation, you will have to consider three migration issues:

- How to preserve the build jobs and projects you have created with Merant Build
- How to convert the TGT files from those build jobs to the Serena ChangeMan Builder TGT file format
- How to adapt build jobs to changes in build types

Preserving Merant Build Projects and Build Jobs

The default installation directory for Merant Build was:

- Windows: `C:\Program Files\Merant\Build`
- UNIX\Linux: `<USER_HOME>/Merant/Build`

The default installation directory for Serena ChangeMan Builder is:

- Windows: `C:\Program Files\Serena\ChangeMan\Builder`
- UNIX\Linux: `<USER_HOME>/Serena/ChangeMan/Builder`

If you install Serena ChangeMan Builder into the default directory, your existing build jobs and projects will not be moved to the new installation.

If you wish to preserve the existing projects and build jobs, follow this procedure:

1. On the Knowledge Base server of the existing installation, create the following directory structure:
   - Windows: `C:\Program Files\Serena\ChangeMan\Builder\tomcat\webapps\openmake.ear`
   - UNIX\Linux: `<USER_HOME>/Serena/ChangeMan/Builder/tomcat/webapps/openmake.ear`

   These directories will be filled in by the ChangeMan Builder install program, but you will move over the build job and build project information so that it will be preserved.
2. From the existing installation, copy this directory

   ```
   <install dir>\tomcat\webapps\openmake.ear\openmake.war
   ```

   into the new directory structure you just created.
3. Install Serena ChangeMan Builder into the new directory structure.

The existing projects will appear in the new Knowledge Base server.

Converting Merant Build TGT Files to ChangeMan Builder TGT File Format

If you try to execute a build job from a project that has been migrated to the new Knowledge Base server, the build job will likely fail to execute, and you will see a build log similar to this:

```
Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504,
    Copyright 1995-2004

Application BUILD_JAVA from DEVELOPMENT for all targets.
Search Path=.;C:\j2sdk1.4.2\jre\lib;
ERROR 390: Could not find Build Task for dependency HelloWorld.java
ERROR 49: Could not convert target file
    C:\BuildJava\Test2\HelloWorld.class.tgt to 6.3 format. Please
    convert the target file from the Web Client.
ERROR 42: Could not find any targets in the Search Path.
Done loading target lists.
```

ChangeMan Builder will attempt to convert some TGT files for you, during the execution of a given build job. If ChangeMan Builder is not able to convert the TGT file, then Error 49 appears and you need to convert the TGT file.

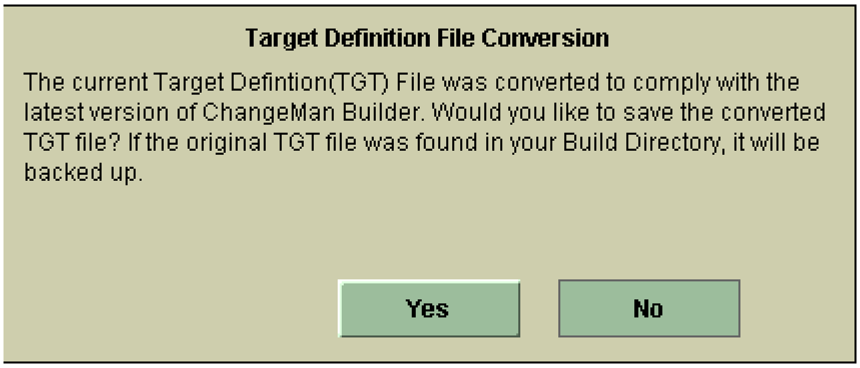
Batch Convert TGT Files

If you have many TGT files to convert, you can use a batch conversion utility available in the omcmdline.jar file. See the section "Converting Target Formats" in the *Serena ChangeMan Builder Development Guide*.

Afterwards, you should inspect the batch-converted TGT files in the standalone web client.

Convert Files in the Standalone Web Client

For an individual build job, ChangeMan Builder will automatically convert the TGT file of the build job when you open the Target Definition page for a given target. ChangeMan Builder then displays the following message:


Target Definition File Conversion

The current Target Defintion(TGT) File was converted to comply with the latest version of ChangeMan Builder. Would you like to save the converted TGT file? If the original TGT file was found in your Build Directory, it will be backed up.

If you click No, the converted TGT file is not saved, and you will not be able to execute the build job.

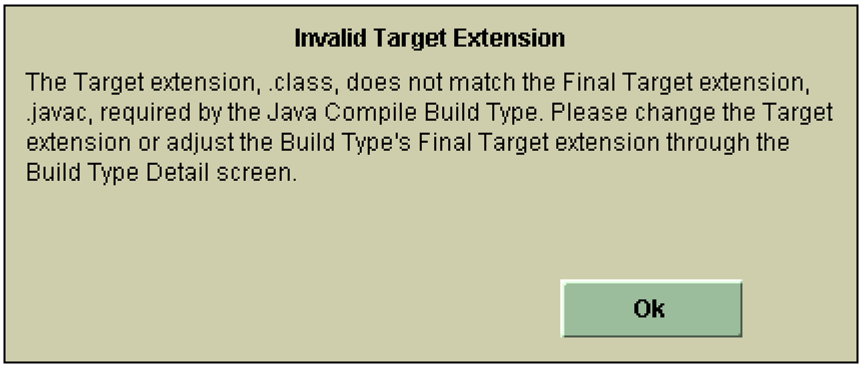
If you click Yes, the converted TGT file is saved, and the old TGT file is saved as `<old filename.tgt>.pre63`. However, you will likely see an additional error message referring to an invalid target extension. That is discussed in the following section.

Adapting Build Jobs to Changed Build Types

Even after you have converted a build job to the new TGT format, you may still have to modify a given build job because of changes to the build types in Serena ChangeMan Builder.

For example, the older build jobs used a task called Ant Classic Javac. This task would accept an individual .java file and compile it to a .class file, and the corresponding TGT file was named `<target>.class.tgt`.

If you try to execute this build job in Serena ChangeMan Builder, the following error message appears:



Invalid Target Extension

The Target extension, .class, does not match the Final Target extension, .javac, required by the Java Compile Build Type. Please change the Target extension or adjust the Build Type's Final Target extension through the Build Type Detail screen.

The new build types automatically include subtasks such as Set Classpath and Ant Javac. This is a convenience when creating a new build job, but it means that the file extensions of some targets have changed from the previous version.

To modify the build job, open the Target Definition page for each target, and change the target extension as appropriate.

Chapter 4

Tutorial

This section will show you several examples of how to use Serena® ChangeMan® Builder™ for Professional, from setting up new projects to executing builds.

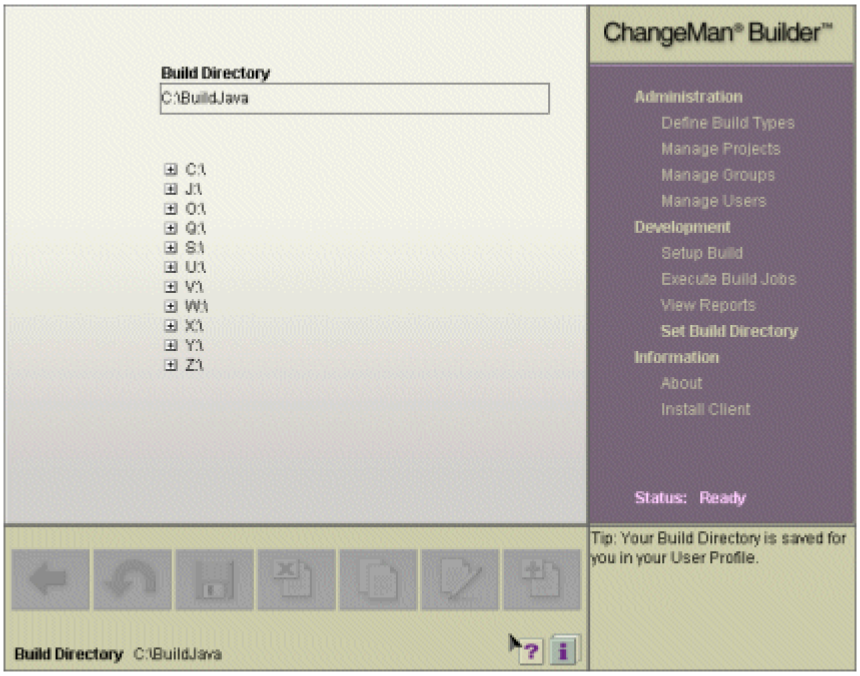
Creating a Java Build

Here is an example of how a Java developer using Ant would begin using ChangeMan Builder for Professional.

The developer has already installed the ChangeMan Builder command-line client and has explored the ChangeMan Builder menus. Now he wants to see if he can create a small build.

Set the Build Directory

Deciding that his build directory will be `C:\BuildJava`, he enters this value into the field that appears when he clicks **Set Build Directory** on the main screen:



The developer clicks the floppy-disk icon to save the build directory definition.

Import or Create Source Files

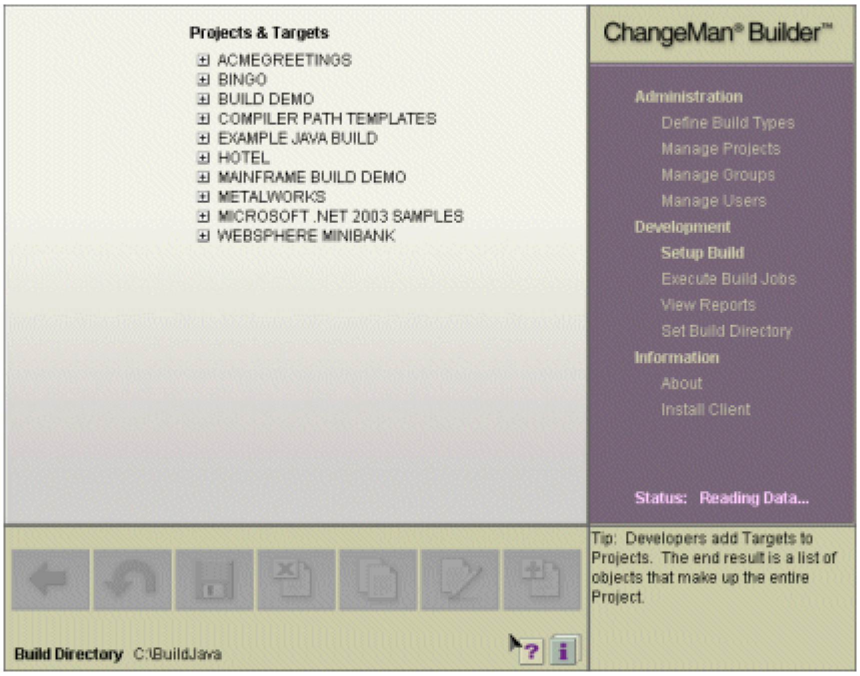
Now the developer is ready to move his source files into the build directory. He checks out a small Version Manager test project that he has already created, placing the test file into the build directory. This file is named `helloworld.java`, so the build directory currently contains the following files:

```
helloworld.java
```

Set Up the Build

Now the developer wants to specify how the project should be built. In this small test case, `helloworld.java` should become `helloworld.class`.

To accomplish this, the developer clicks **Setup Build** on the main page, and the Projects and Targets page appears:



Projects & Targets

- ACMEGREETINGS
- BINGO
- BUILD DEMO
- COMPILER PATH TEMPLATES
- EXAMPLE JAVA BUILD
- HOTEL
- MAINFRAME BUILD DEMO
- METALWORKS
- MICROSOFT .NET 2003 SAMPLES
- WEBSPHERE MINIBANK

Status: Reading Data...

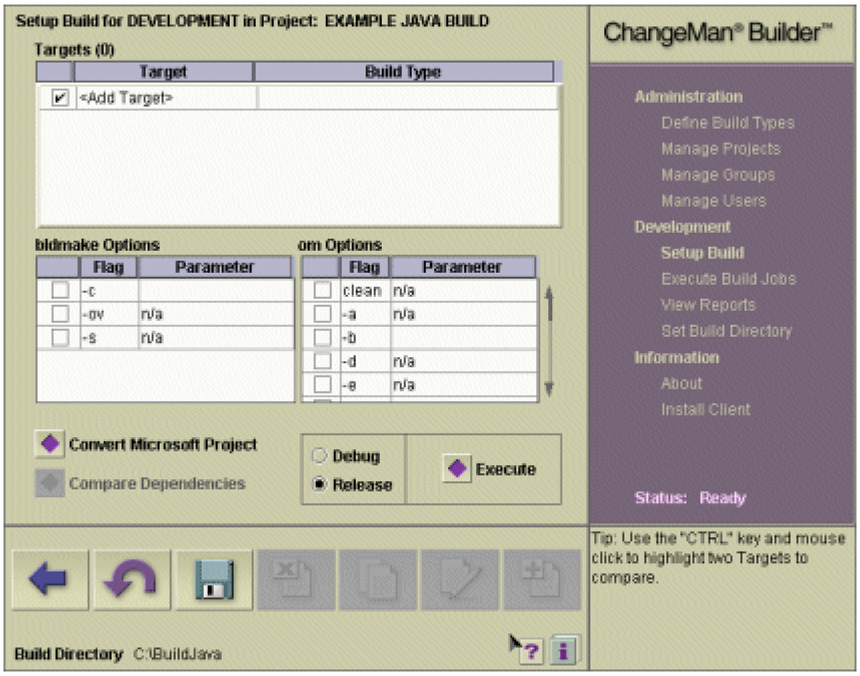
Tip: Developers add Targets to Projects. The end result is a list of objects that make up the entire Project.

Build Directory C:\BuildJava

The developer knows that he needs to find a project that is already set up for the Java compilers in use at his company. He finds a project named Example Java Build.

He clicks on the name of this project to see what it contains, and finds a single item named DEVELOPMENT. This represents a search path that has already been defined by the ChangeMan Builder administrator. That is, DEVELOPMENT specifies which directories ChangeMan Builder should look in to find the source files.

Knowing that the search path contains the current directory by default, the developer double-clicks **DEVELOPMENT** to display the Setup Build page:



Setup Build for DEVELOPMENT in Project: EXAMPLE JAVA BUILD

Targets (0)

	Target	Build Type
✓	<Add Target>	

bldmake Options

	Flag	Parameter
☐	-c	
☐	-ov	n/a
☐	-s	n/a

om Options

	Flag	Parameter
☐	clean	n/a
☐	-a	n/a
☐	-b	
☐	-d	n/a
☐	-e	n/a

○ Debug [✓ ● Release]

Status: Ready

Tip: Use the "CTRL" key and mouse click to highlight two Targets to compare.

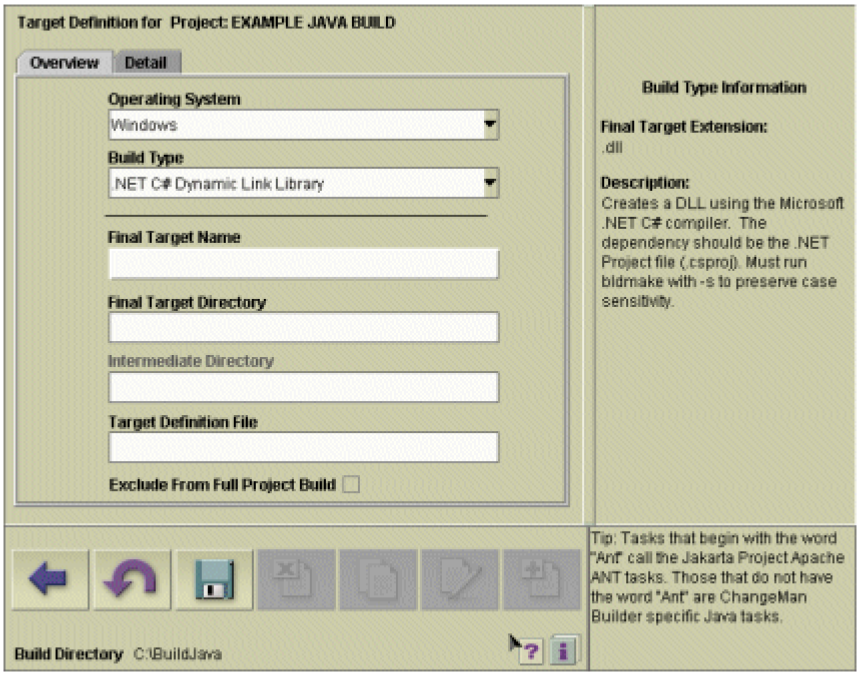
Build Directory C:\BuildJava

Add Targets

As mentioned earlier, the developer has only a single source file and knows what it should produce when compiled.

NOTE The end-product is the target, and the source file is the dependency.

The developer double-clicks **<Add Target>**, and the Target Overview page appears.


Target Definition for Project: EXAMPLE JAVA BUILD

Overview | Detail

Operating System: Windows

Build Type: .NET C# Dynamic Link Library

Final Target Name

Final Target Directory

Intermediate Directory

Target Definition File

Exclude From Full Project Build

Build Directory C:\BuildJava

Build Type Information

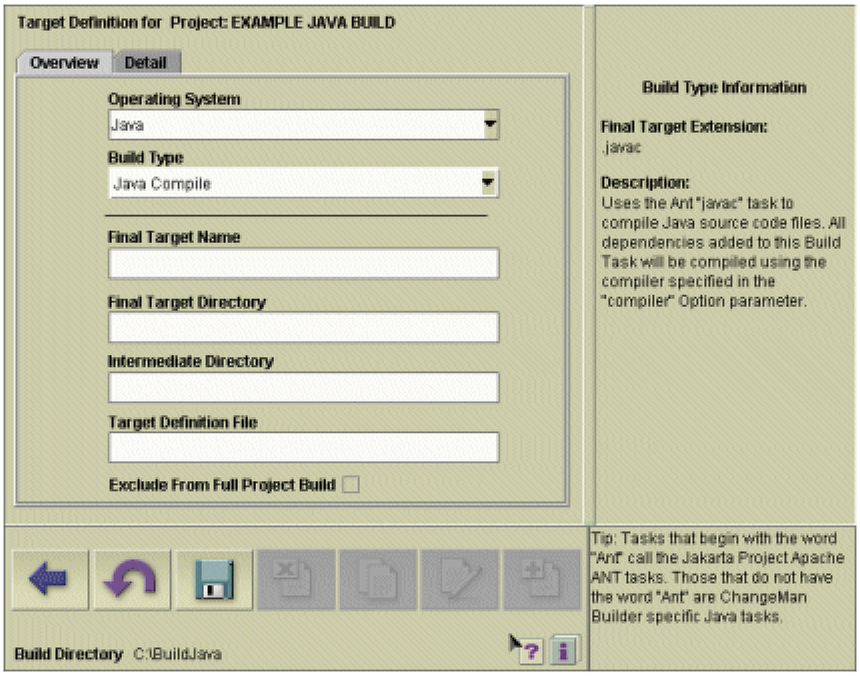
Final Target Extension:
.dll

Description:
Creates a DLL using the Microsoft .NET C# compiler. The dependency should be the .NET Project file (.csproj). Must run bldmake with -s to preserve case sensitivity.

Tip: Tasks that begin with the word "Ant" call the Jakarta Project Apache ANT tasks. Those that do not have the word "Ant" are ChangeMan Builder specific Java tasks.

Fill Out Target Overview

The first thing the developer does is select `Java` for the Operating System, and `Java Compile` for the Build Type. The screen changes to display the Java build type information:


Target Definition for Project: EXAMPLE JAVA BUILD
Overview
Detail
Exclude From Full Project Build

Operating System: Java

Build Type: Java Compile

Final Target Name

Final Target Directory

Intermediate Directory

Target Definition File

Build Type Information

Final Target Extension:
.javac

Description:
Uses the Ant "javac" task to compile Java source code files. All dependencies added to this Build Task will be compiled using the compiler specified in the "compiler" Option parameter.

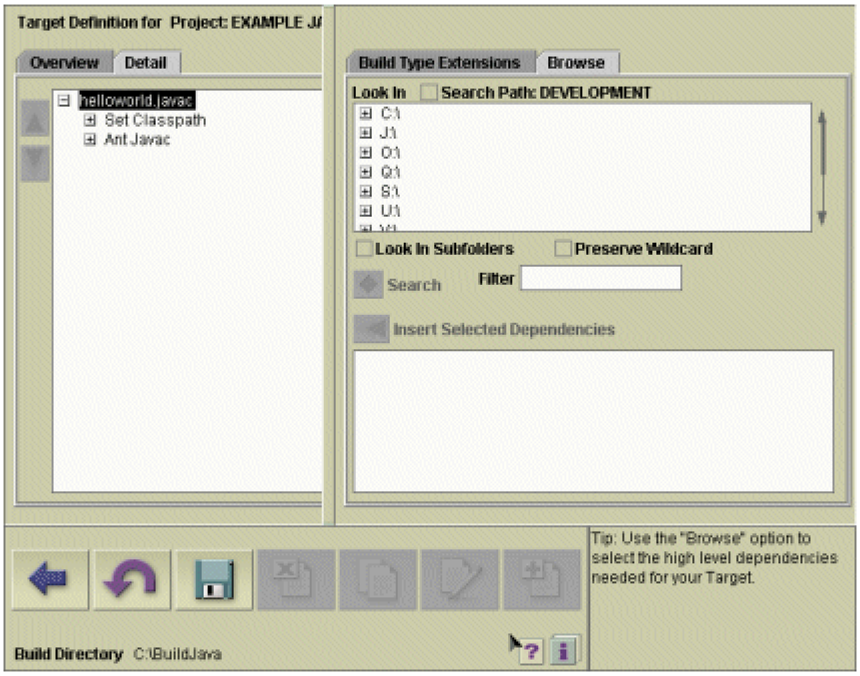
Tip: Tasks that begin with the word "Ant" call the Jakarta Project Apache ANT tasks. Those that do not have the word "Ant" are ChangeMan Builder specific Java tasks.

Build Directory C:\BuildJava

For Target Name, the developer types `helloworld.javac`, as recommended by the Build Type Information. ChangeMan Builder automatically fills in `helloworld.javac.tgt` for the Target File Name. The remaining fields are left blank.

Fill Out Target Detail

Now the developer clicks the **Detail** radio button at the top of the page, and the Target Detail page appears:

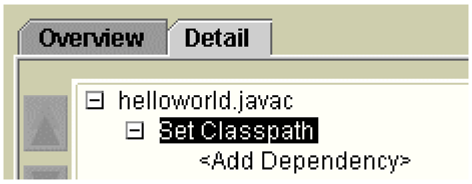


Tip: Use the "Browse" option to select the high level dependencies needed for your Target.

This version of ChangeMan Builder automatically includes a template for the appropriate build tasks—in this case, Set Classpath and Ant Javac—for you. The next step is to fill in the detail for those build tasks.

Set Classpath Task

Here the developer needs to specify the relationship of source file to final product. Because this is a Java program, the first task listed is Set Classpath. That task appears in the task list, with a plus sign next to its name. By clicking on the plus sign, or by double-clicking the task name, the developer reveals the <Add Dependency> item:



The developer double-clicks on **<Add Dependency>**, and the text becomes editable. The developer types `rt.jar`, since that file contains many of the standard Java classes.

NOTE The IBM Java Development Kit, version 1.4.0 and later, does not contain `rt.jar`. Therefore, on AIX, or with IBM WebSphere Developer Studio or AppServer, you should use `core.jar` and `graphics.jar`.

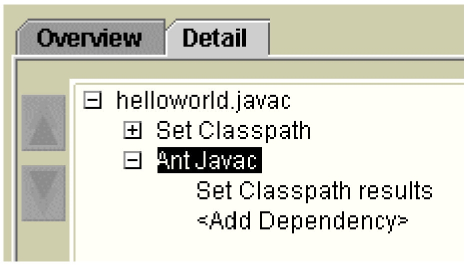
If the developer needed a specific .jar file, he could have used the Browse tab to locate the file.

If you enter the name of a file, use a non-fully-qualified filename; that is, do not include drive letters in the name of the file.

Ant Javac Task

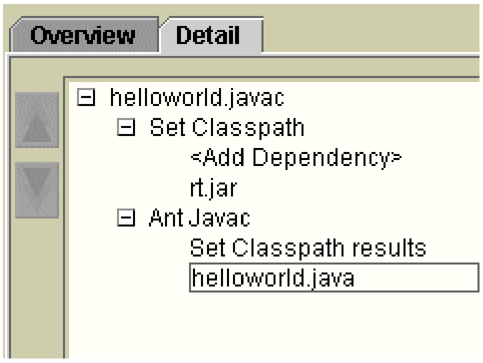
The next build task, also provided by Builder, is Ant Javac, indicating an Ant Java compile task.

The developer clicks the plus sign next to Ant Javac, or double-clicks the task name. The Ant Javac task hierarchy expands:



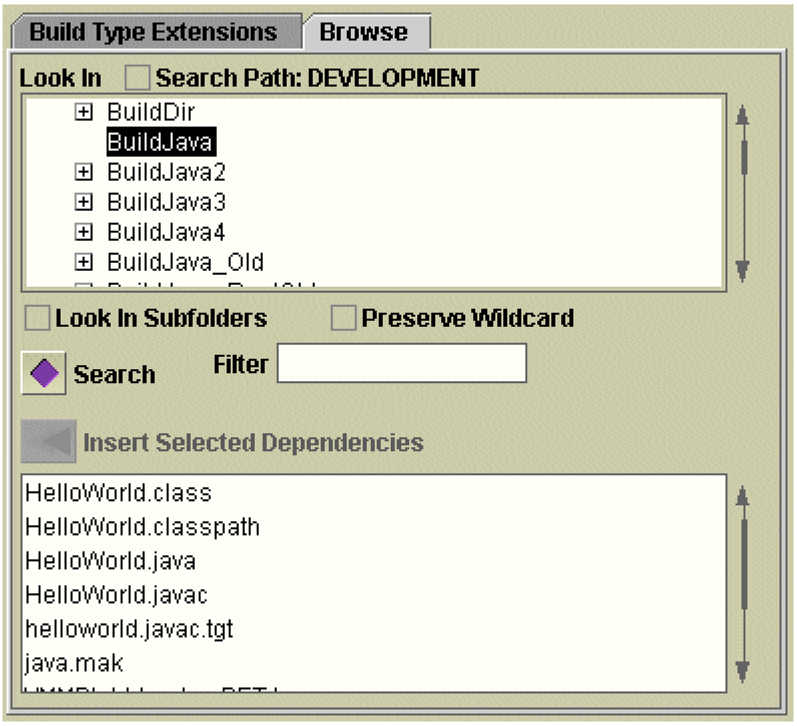
```
⊟ helloworld.javac
    ⊞ Set Classpath
    ⊟ Ant Javac
        Set Classpath results
        <Add Dependency>
```

The "Set Classpath results" indicate that the Set Classpath task will be performed first. To also indicate that the source file `helloworld.java` is a dependency and must be compiled to complete the build, the developer double-clicks the **<Add Dependency>** item, and types the name of the file:



```
⊟ helloworld.javac
    ⊟ Set Classpath
        <Add Dependency>
        rt.jar
    ⊟ Ant Javac
        Set Classpath results
        helloworld.java
```

The developer could also have clicked the **Browse** tab to browse locate the directory containing the source file, then clicked **Search**. The source file `HelloWorld.java` appears in the list of search results:



The developer selects `HelloWorld.java`, then uses the Insert Selected Dependencies button to move the file to the Detail area.

NOTE If the Ant Javac task is not selected first, the Insert Selected Dependencies button will have no effect.

Since there are no other dependencies, the developer clicks the floppy-disk icon to save the target detail, and then clicks the Back arrow icon to return to the Target Overview page. When asked if he would like to save the target, the developer clicks **Yes**.

Select Targets to be Built

Since there is only one target, the developer clicks the check box next to `helloworld.javac`, indicating that that target should be built. The <Add Target> check box automatically receives a check box also; this indicates that all targets have been selected.

Select Options

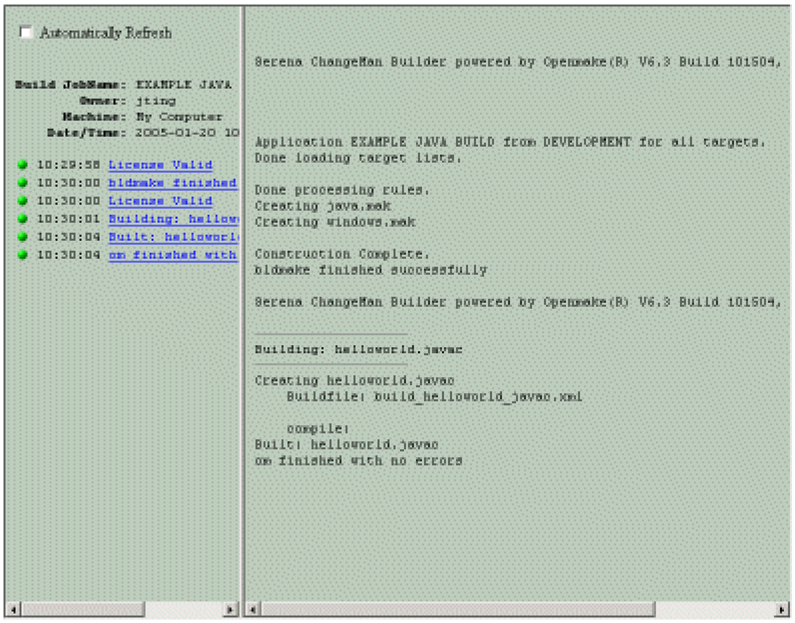
The developer considers the various options under bldmake Options and om Options, but as this is only a small test project, he leaves them all unselected, which is the default setting.

NOTE The options for the bldmake and om programs are detailed in the *ChangeMan Builder Development Guide*.

Execute the Build

To execute the build, the developer clicks the **Execute** button on the Setup Build page. Immediately a new browser window appears, displaying a two-paned build log window.

Initially the build log window displays the message "Waiting for the log file to be created," but after a few moments, the build log window shows the results of the compile operation:



```
Build JobName: EXAMPLE JAVA
        Owner: jting
      Machine: My Computer
    Date/Time: 2005-01-20 10

● 10:29:58 License Valid
● 10:30:00 bldmake finished
● 10:30:00 License Valid
● 10:30:01 Building: hellow
● 10:30:04 Built: helloworl
● 10:30:04 om finished with
```

```
Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504,



Application EXAMPLE JAVA BUILD from DEVELOPMENT for all targets.
Done loading target lists.

Done processing rules.
Creating java.mak
Creating windows.mak

Construction Complete.
bldmake finished successfully

Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504,

____________________________________
Building: helloworld.javac
____________________________________
Creating helloworld.javac
    Buildfile: build_helloworld_javac.xml

    compile:
Built: helloworld.javac
om finished with no errors
```

Check the Results

The developer looks in the build directory. Whereas before there was only the `helloworld.java` file, now he finds the following files:

File	Purpose
helloworld.class	Java class file.
helloworld.classpath	Classpath definition file.
helloworld.java	Original source file.
helloworld.javac	File defining compile task in Ant.
helloworld.javac.tgt	Target definition file.
java.mak	Java makefile or build control file.
windows.mak	Windows makefile or build control file.

The developer checks the code defined by `helloworld.class` to verify that the build produced the desired results.

Archive the Target Definition File

Although this example is very simple, if the developer wanted to preserve all the setup work done just described, he would create a new source control archive for the target definition file (.TGT). This file would then be checked in and checked out along with the source files.

Creating a Java Jar

In this example, another developer takes the example used in the previous sections and sets up ChangeMan Builder to create a Java .jar file.

The developer in this example:

1. creates on her hard drive a new build directory named `C:\BuildJavaJar`
2. enters that location on the Set Build Directory page
3. uses the same EXAMPLE JAVA BUILD project
4. uses the same DEVELOPMENT search path

However, when she double-clicks **DEVELOPMENT**, no targets appear on the Setup Build page. This is because she is in a different build directory, and does not have the target definition file created by the other developers.

Add Targets

The developer double-clicks **<Add Target>** on the Setup Build page to begin creating a new target named `helloworld.jar`. The Target Overview page appears.

Fill Out Target Overview

On the Target Overview page, she sets the Operating System to Java, but sets the Build Type to Java Jar. She also fills in the target name as `helloworld.jar`. Filling in the target name allows her to move to the Target Detail page.

Fill Out Target Detail

On the Target Detail page, the developer sees that ChangeMan Builder has automatically entered three build tasks: Set Classpath, Ant Javac, and Ant Jar.

Set Classpath Task

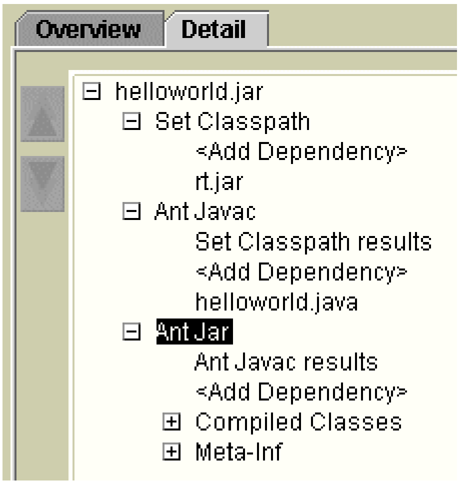
The developer specifies the name and location of .jar files and other classpath-related dependencies for her program, as described earlier. See "Set Classpath Task" on page 50.

Ant Javac Task

The developer specifies which files are to be compiled, as described earlier. See "Ant Javac Task" on page 51.

Ant Jar Task

The developer clicks on the plus sign next to the Ant Jar task (or double-clicks the task name. The Ant Jar hierarchy appears:



```
⊟ helloworld.jar
   ⊟ Set Classpath
        <Add Dependency>
        rt.jar
   ⊟ Ant Javac
        Set Classpath results
        <Add Dependency>
        helloworld.java
   ⊟ Ant Jar
        Ant Javac results
        <Add Dependency>
      ⊞ Compiled Classes
      ⊞ Meta-Inf
```

As seen earlier, the previous task (in this case, Ant Javac results) is listed first, indicating that the Ant Jar task is dependent on that task's results.

To complete the definition of the .jar file, the developer does the following:

By using <Add Dependency> underneath Meta-Inf, the developer can add a specific manifest for the .jar file.

By using <Add Dependency> under Compiled Classes, the develpper can add specific compiled classes to the .jar file.

By using <Add Dependency> immediately under Ant Javac results, the developer can add any other files needed by the .jar file.

When all needed dependencies have been specified, the developer clicks on the floppy-disk icon to save the target definition file. Then, to return to the Target Overview page, she clicks on the Back arrow icon.

Select and Submit Target

On the Target Overview page, the developer selects the `helloworld.jar` target to be built, and then clicks the **Execute** icon.

A browser session appears immediately, and after a few moments, the build log informs her that `helloworld.jar` was built.

The developer inspects the build directory and finds that the `helloworld.jar` file is indeed present. When she examines the manifest of the .jar file, it shows the proper contents.

To preserve her work, the developer adds `helloworld.jar.tgt` to her source control archives.

Working With Multiple Source Directories

In this example, two developers collaborate on the same project, illustrating how ChangeMan Builder handles source files in multiple locations.

The ChangeMan Builder installation directory contains the example `Examples\ref\metalworks`. A partial listing of this directory is:

```
metalworks
            \dev
            \dev\src
            \dev\src\MetalworksInbox.java
            \release
            \release\HelpFiles
            \release\IMAGES
            \release\src
            \release\src\MetalWorks.java
            \release\src\
            MetalWorksDocumentFrame.java
            \release\src\MetalWorksFrame.java
            \release\src\MetalWorksHelp.java
            \release\src\MetalWorksInbox.java
            \release\src\MetalWorksPrefs.java
```

The two directories `\dev` and `\release` represent an individual developer's working directory, and the official release directory, respectively. Each contains a source directory named `src`.

Notice the two files named `MetalWorksInbox.java`. The copy in the release directory represents the official version of the file, whereas the copy in `\dev\src\` represents work that an individual developer might be doing.

Through the use of different search paths, ChangeMan Builder makes it possible for the individual developer to test his changes before checking them in to the official release directory.

Also, it is unnecessary for the developer to make local copies of all source files. ChangeMan Builder looks in the directories named in the search path, and stops looking once it has found an instance of the file. This allows local developer files to take precedence over release directory files.

The developer working in the `\dev\src` directory builds the project using the search path named Development, which is set by the Administrator to look at the `\dev\src` directory. Once ChangeMan Builder finds the `MetalWorksInbox.java` file in `\dev\src`, it stops looking for that file. The copy in `\release\src` is never used. This allows the developer to build the entire project while testing his changes to `MetalWorksInbox.java`, yet not affect the final release until he is ready.

The release engineer building the final release version uses the Release search path. This search path never looks at the `\dev\src` directory, and considers only the `\release\src` directory.

NOTE The previously described method depends on the ChangeMan Builder administrator setting up the search paths to point to the `\dev` and `\release` directories.

Creating Development and QA Builds

In the previous example, you saw how using different search paths made it possible for individual developers to test their code without checking it into the main release directory, and without requiring multiple copies of all files.

The Metalworks example also shows how code may be separated for development and Quality Assurance.

The Metalworks project has three search paths set up: Dev, QA, and Release. These search paths are defined as follows:

Search path	Defined as
DEV	.
	./tgt
	$(REFDIR)\metalworks\dev\src
	$(REFDIR)\metalworks\dev
	$(REFDIR)\metalworks\qa\src
	$(REFDIR)\metalworks\qa
	$(REFDIR)\metalworks\release\src
	$(REFDIR)\metalworks\release
QA	$(REFDIR)\metalworks\qa\src
	$(REFDIR)\metalworks\qa
	$(REFDIR)\metalworks\release\src
	$(REFDIR)\metalworks\release
RELEASE	$(REFDIR)\metalworks\release\src
	$(REFDIR)\metalworks\release

This indicates that the DEV search path will cause ChangeMan Builder to search first in the current directory (.), then in a directory named `tgt` (for target files), then in the `\dev\src` directory. If the search does not find all of the files named in the build, ChangeMan Builder continues on to the `\qa` and `\release` directories, in that order. This allows the individual developer to have her local copies of files take precedence.

The QA search path, by contrast, does not even look in the `\dev` directory but instead starts with the `\qadev` directory. This allows the QA engineers to build only the version of the product that has been released to them for testing, or to the final release directory.

Finally, the RELEASE search path searches only in the release directory, insuring that when the release version of the product is built, ChangeMan Builder will take no source files from development or QA.

Creating Builds Based on Version Labels

In this example, a developer uses ChangeMan Builder with Version Manager version labels.

To support version labels, the ChangeMan Builder administrator must set up a search path corresponding to each version label. The version control software takes care of checking out each version, but different versions must be placed in different directories.

For an example of a project set up to use version labels, see the Acme Greetings project in the Examples directory.

Creating Builds Based on Promotion Groups

In this example, a developer uses ChangeMan Builder with Version Manager promotion groups to manage the different stages of a project.

To support promotion groups, the ChangeMan Builder administrator must set up a search path corresponding to each promotion level.

For an example of a project set up to use promotion groups, see the Build Demo project in the Examples directory.

Complex Build Job Examples

The previous examples used only simple examples. In real-world projects, many source files are used, including third-party libraries, non-Java files such as HTML files, and so on.

When you install the command-line client of ChangeMan Builder, you also install some examples of more complex build jobs that incorporates those elements. You can find those examples at:

```
<install directory>\Serena\ChangeMan\Builder\examples\ref
```

These examples are discussed in the *ChangeMan Builder Getting Started Guide*.

Example of Using the ChangeMan Builder Desktop Client

Here is an example of the process of using ChangeMan Builder for Professional from within Version Manager.

Create and Archive the .TGT File

1 Make sure that the source files for your project are archived in Version Manager.

2 Have your administrator create a suitable ChangeMan Builder project for your source files.

3 Optional: Have your administrator create a ChangeMan Builder search path to the location to which your source files will be checked out.

4 Optional: Set the build directory in the web client. This step is not absolutely necessary, but it does determine where you can find the .TGT file to be created in the next step.

5 Use the ChangeMan Builder web client to set up the build. This creates a target definition file (.TGT file). Make sure that the target is set to build (that is, the check box for the target is selected).

6 Locate the .TGT file and copy or move it as necessary to make sure it is in the same directory as your source files. Add the .TGT to the Version Manager archives.

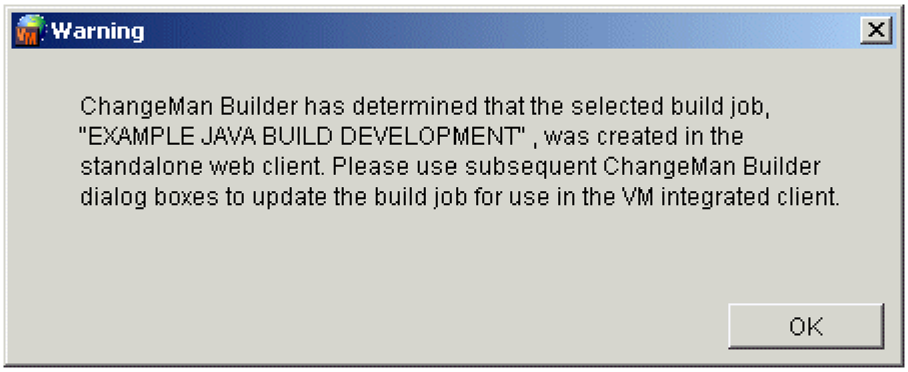
Select a Build Method and Build Machine

1 From Version Manager, select the project folder containing your source files.

2 Check out the files to the directory where you wish the build to occur. You do not need to check out the .TGT file, but you need write access to the source files and to the files that are the end products of the build.

3 Choose Actions | Build. The Target File Scan dialog searches for target definition files. If it finds a .TGT file, the Build Source Selection dialog box appears.

4 The first time you run the build job, the desktop client will announce that the build job was created in the standalone web client:



ChangeMan Builder has determined that the selected build job, "EXAMPLE JAVA BUILD DEVELOPMENT" , was created in the standalone web client. Please use subsequent ChangeMan Builder dialog boxes to update the build job for use in the VM integrated client.

Once you fill out the rest of the desktop client dialog boxes (covered in the rest of this section), the build job will be available from within Version Manager, and the dialog above will not appear in the future.

Click **OK**. The Build Source Selection dialog box appears.

5 Select whether the build should be done by default revision, version label, or promotion group, then click **Next**. The Build Job Selection dialog box appears.

6 Select the build machine to use. For a local build, select "My Computer", then click **Add**. The chosen build machine appears in the large field.

7 Click the build machine name in the large field. The Next button becomes enabled.

8 Click **Next**. The Target Selection dialog box appears.

Select Targets to Be Built

1 From the Project Targets Selection field, select the targets to be built, then click the **>** button to move the targets to the Project Targets Selected field.

2 Click **Next**. The Build Parameter dialog box appears.

Specify Build Parameters

1 Use the Browse button (...) to choose a directory where the build should take place. You must select a directory or the Next button will not become enabled.

2 Specify any parameters for bldmake or om (see the *ChangeMan Builder Development Guide* for possible parameters).

3 Specify whether the build is to be Debug or Release.

4 Select a build mode (see "Selecting a Build Mode" on page 106).

5 Select whether Footprinting and Project Processing should be enabled (see page 106).

6 Click **Next**. The Submission dialog box appears.

Submit the Build Job

1 Make any last-minute changes on the Submission dialog box.

2 If you wish, save the build job. This will make it unnecessary to re-enter the build directory and other information if you submit the build job again.

3 When you are satisfied with the parameters, click **Submit**. The build job is submitted for execution, and the ChangeMan Builder log browser appears. After a delay, the results of the build operation appear in the log browser.

Chapter 5

BINGO Tutorial

This tutorial shows you how to set up and build BINGO, a client-server game written in Java. This game ships with Serena® ChangeMan® Builder™ for Professional, in the examples directory.

You will perform the tutorial exercises in the standalone web client and in the Version Manager integration. The PCLI command-line interface is not used in this tutorial.

NOTE The example BINGO source files include pre-defined TGT files that you will add to Version Manager; therefore, you will not be defining TGT files in this tutorial.

Check Prerequisites

Before beginning work on the BINGO tutorial, be sure you have the following in place:

- License Manager available
- Version Manager installed
- ChangeMan Builder installed
- Java Development Kit installed
- Define environment variables
- Administrator rights, so that you can modify the search path

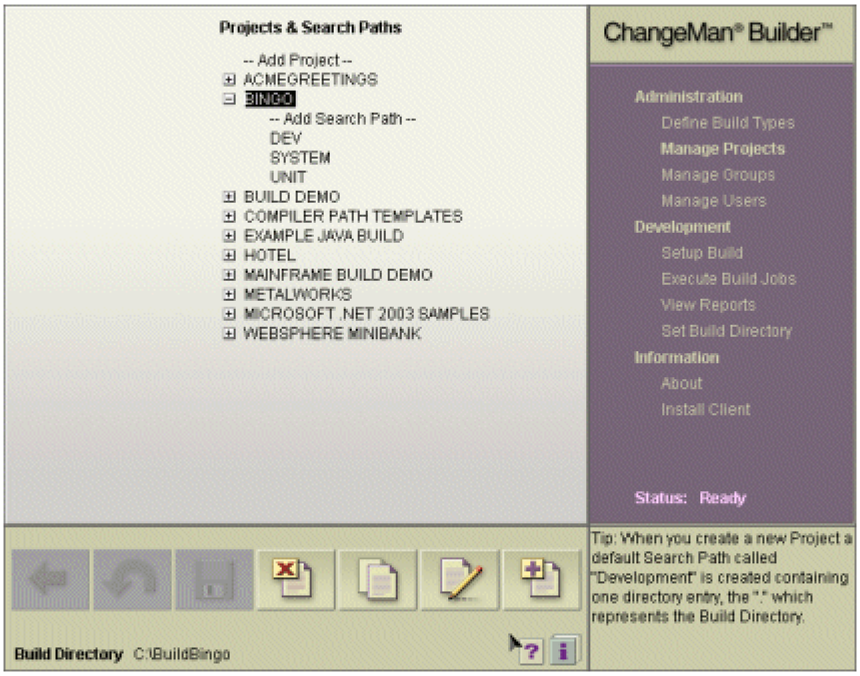
Prepare the Build Environment

As with any ChangeMan Builder project, you need to prepare the build environment. The BINGO project is a Java project, so you should make sure that the Java Development Kit is available and that it is recognized by ChangeMan Builder.

If you have not already done so, go through the smaller examples in the previous chapter; that will verify that the Java development environment is up and available.

Overview of the BINGO Project

The BINGO project is a client-server application written in Java. It appears in the list of projects on the ChangeMan Builder standalone web client:



Tip: When you create a new Project a default Search Path called "Development" is created containing one directory entry, the "." which represents the Build Directory.

Build Directory C:\BuildBingo

You can see the list of search paths—DEV, SYSTEM, and UNIT—each meant to capture the requirements for a different type of build. For example, a developer wants to use files from his local directory, and the system build will look for files in a common system turnover area.

This example covers the DEV build, representing an individual developer.

Set the Build Directory

At the start of every project, you must set the build directory. In this example, the build directory is `C:\BuildBingo`.

Copy Example Files to Working Directory

1 Create a working directory (in this example, BINGO_WorkingDir) so that the original source files remain unchanged.

2 Copy the example files from

```
<install directory>\examples\ref\bingo-game
```

into the working directory. The default install directory is `C:\Program Files\Serena\ChangeMan\Builder`.

3 Return to the BINGO project in the Builder standalone web client.

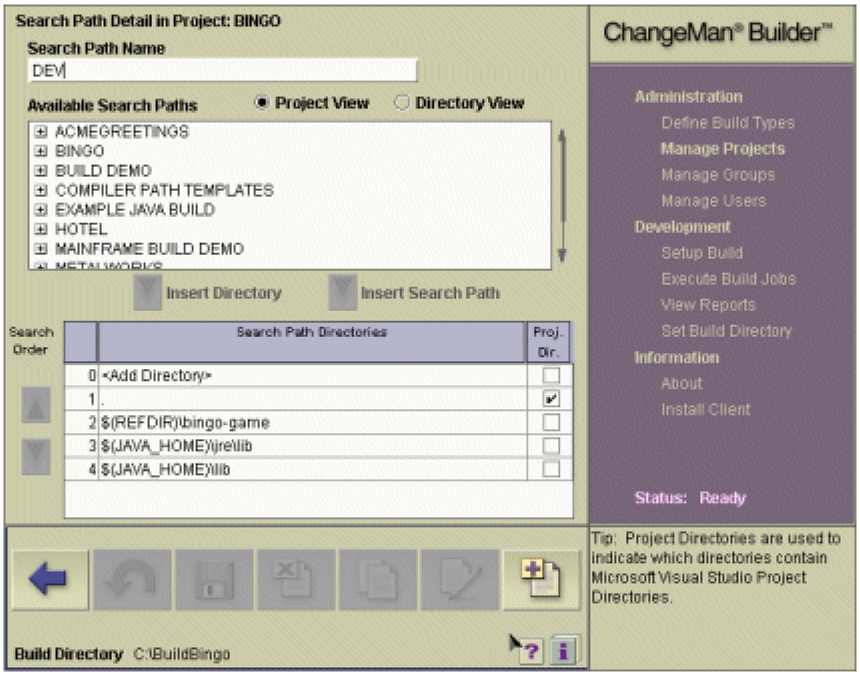
Define Search Paths for the BINGO Project

Now you will modify the search path for the project.

1 From the Builder standalone web client menu, click **Manage Projects**. The list of projects appears.

2 Expand the **BINGO** entry. The **DEV**, **SYSTEM**, and **UNIT** search paths appear, along with the **Add Search Path** task.

3 Double-click the **DEV** search path. The Search Path Detail page appears:



Search Path Detail in Project: BINGO

Search Path Name: DEV

Available Search Paths [✓ Project View] Directory View

- ⊞ ACMEGREETINGS
- ⊞ BINGO
- ⊞ BUILD DEMO
- ⊞ COMPILER PATH TEMPLATES
- ⊞ EXAMPLE JAVA BUILD
- ⊞ HOTEL
- ⊞ MAINFRAME BUILD DEMO

Search Order	Search Path Directories	Proj. Dir.
0	<Add Directory>	☐
1	.	✓
2	$(REFDIR)\bingo-game	☐
3	$(JAVA_HOME)\jre\lib	☐
4	$(JAVA_HOME)\lib	☐

Tip: Project Directories are used to indicate which directories contain Microsoft Visual Studio Project Directories.

Build Directory C:\BuildBingo

Status: Ready

The list of search path directories shows the directories that ChangeMan Builder will search when it evaluates dependencies in the project. Since "." is the first entry, the build directory will be the first location that Builder looks in, followed by the bingo-game directory in the reference directory tree, and finally the two locations underneath JAVA_HOME.

To add the working directory you created earlier to the list of search path directories, follow these steps:

1 Click the **Directory View** radio button.

2 Browse for the desired directory.

3 Click **Insert Directory** to add the directory to the list.

4 Use the Search Order buttons to adjust the directory's search priority.

5 Click the Save icon (floppy disk) to save the search path information.

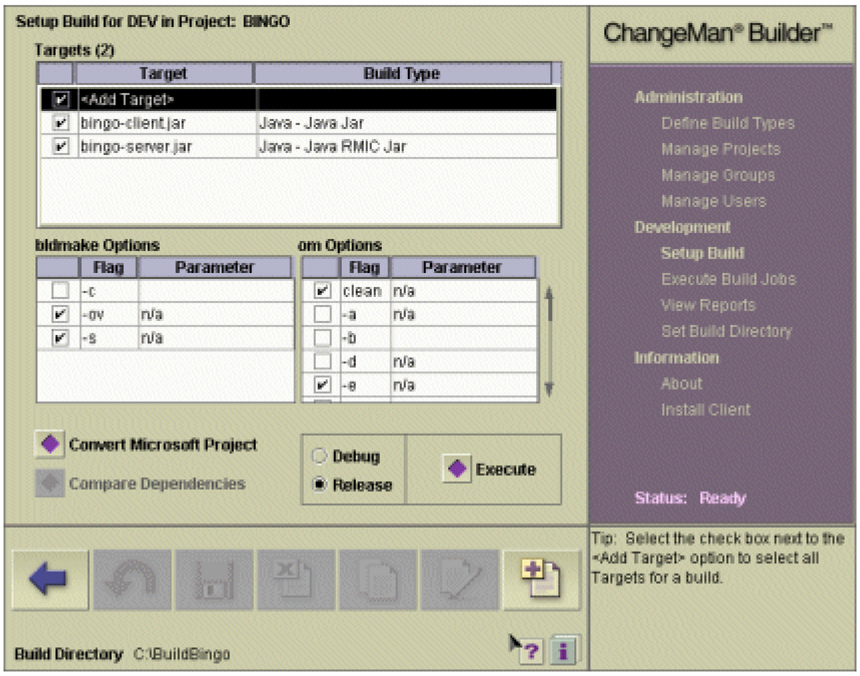
Set Up the BINGO Client Build

Once you have the project search paths set up, you can set up the build.

1 Click **Setup Build**.

2 As before, expand the **BINGO** item. The **DEV**, **SYSTEM**, and **UNIT** items again appear.

3 Double-click **DEV**. The **DEV** project structure, with a client target and a server target, appears in the Setup Build page:



Setup Build for DEV in Project: BINGO

Targets (2)

	Target	Build Type
✓	<Add Target>	
✓	bingo-client.jar	Java - Java Jar
✓	bingo-server.jar	Java - Java RMIC Jar

bldmake Options

	Flag	Parameter
	-c	
✓	-ov	n/a
✓	-s	n/a

om Options

	Flag	Parameter
✓	clean	n/a
	-a	n/a
	-b	
	-d	n/a
✓	-e	n/a

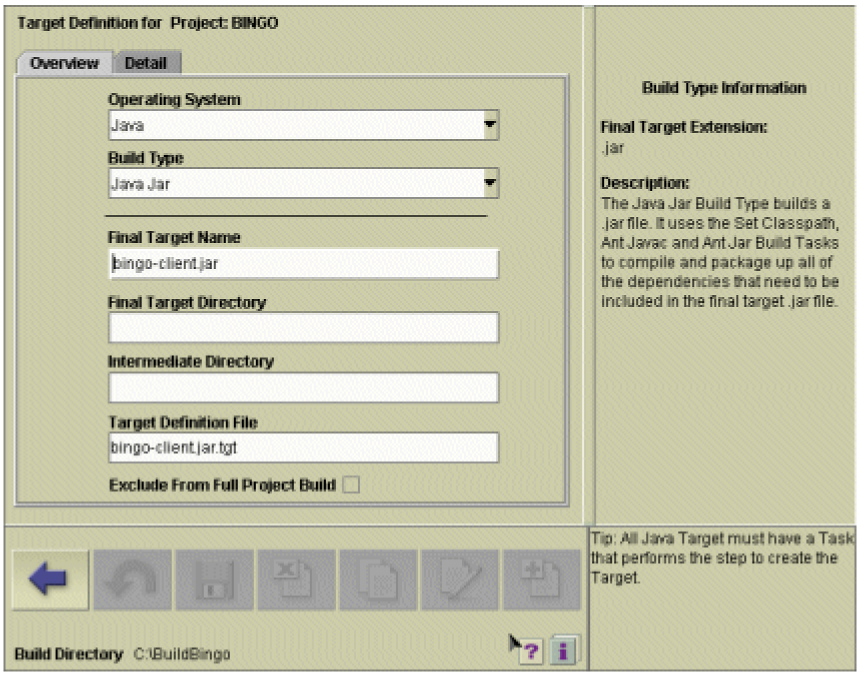
Debug [✓ Release]

Build Directory C:\BuildBingo

Tip: Select the check box next to the <Add Target> option to select all Targets for a build.

Status: Ready

4 Double-click bingo-client.jar. The Target Definition page appears, displaying the Overview tab.



Target Definition for Project: BINGO

Operating System: Java
Build Type: Java Jar
Final Target Name: bingo-client.jar
Final Target Directory:
Intermediate Directory:
Target Definition File: bingo-client.jar.tgt
Exclude From Full Project Build ☐

Build Type Information

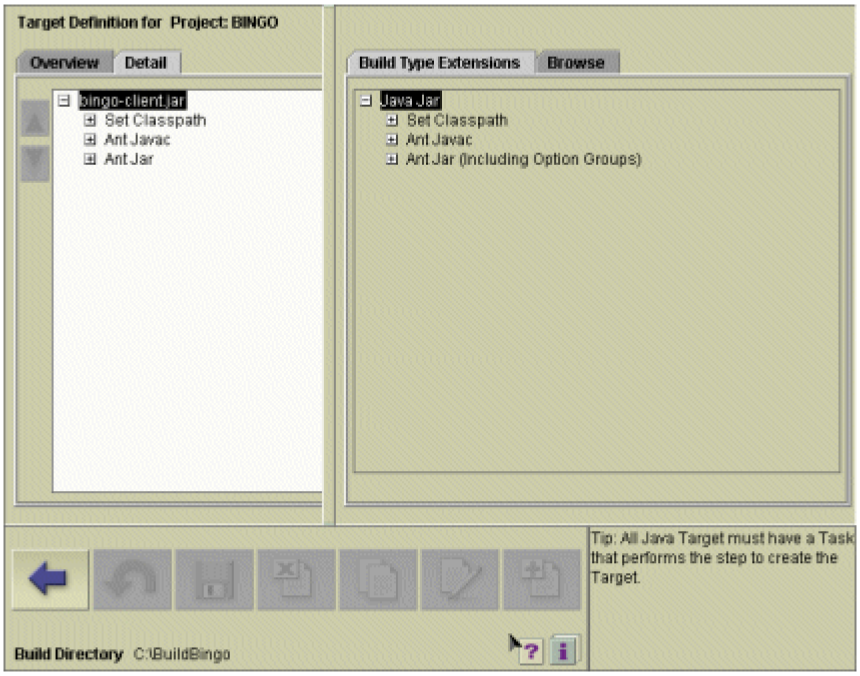
Final Target Extension: .jar

Description: The Java Jar Build Type builds a .jar file. It uses the Set Classpath, Ant Javac and Ant Jar Build Tasks to compile and package up all of the dependencies that need to be included in the final target .jar file.

Tip: All Java Target must have a Task that performs the step to create the Target.

Build Directory C:\BuildBingo

5 Click the Detail tab. You see a new hierarchy tree with bingo-client.jar at the top, and the three tasks underneath.



Target Definition for Project: BINGO

```
⊟ bingo-client.jar
    ⊞ Set Classpath
    ⊞ Ant Javac
    ⊞ Ant Jar
```

```
⊟ Java Jar
    ⊞ Set Classpath
    ⊞ Ant Javac
    ⊞ Ant Jar (Including Option Groups)
```

Tip: All Java Target must have a Task that performs the step to create the Target.

Build Directory C:\BuildBingo

The build tasks are automatically selected based on the build type of the target selected.

TIP The lower right-hand corner of the screen displays a brief explanation of the selected target type or selected build task.

For a Java .jar, the build tasks are Set Classpath, Ant Javac, and Ant Jar.

The Set Classpath Task

In this task you can see rt.jar and bingo-server .jar. These are both dependencies of bingo-client.jar. The rt.jar file contains many of the standard Java runtime classes, and the bingo-server.jar is the server half of the BINGO program. If there were another file that Builder needed to know about before beginning the compilation of source files, you would add it here.

The Ant Javac Task

In this task you can see Set Classpath results, meaning that this task depends on the results from Set Classpath, and two other tasks that list all .java files in the bingo\player and bingo\shared directories, meaning that Builder should compile all of those files.

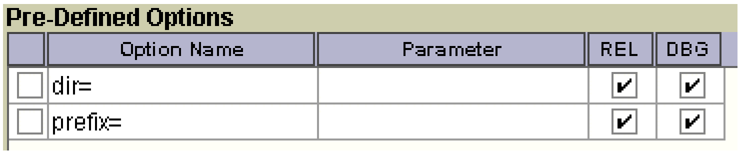
The Ant Jar Task

This task lists the items and tasks necessary to create the bingo-client.jar file itself.

- Ant Javac results—results of the previous task
- RegistrarImpl_Skel.class—RMIC skeleton file
- RegistrarImpl_Stub.class—RMIC stub file
- chit.gif and invisible.gif—Image files used in the BINGO game
- Compiled Classes—Option group for compiled classes (see "Option Groups and Source/Destination Directories," following)
- Meta-Inf—Option group for manifest info (see "Option Groups and Source/Destination Directories," following)

Option Groups and Source/Destination Directories

Option groups such as Compiled Classes allow you to set options in an identical way for an entire group of files. The Compiled Classes option group in the Ant Jar Task contain two pre-defined options, for example:


Pre-Defined Options

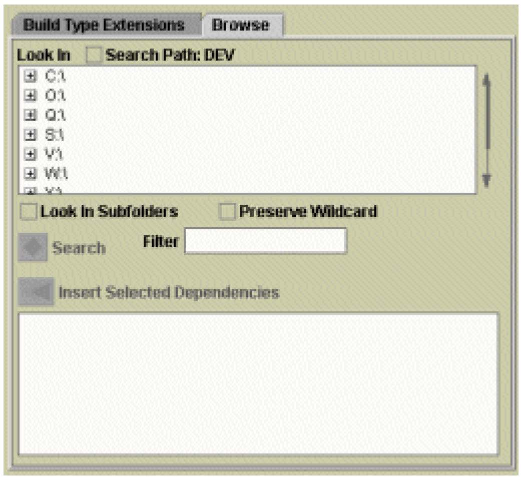
	Option Name	Parameter	REL	DBG
☐	dir=		✓	✓
☐	prefix=		✓	✓

The **dir** option allows you to specify where the compiled classes should be pulled from; the **prefix** option allows you to specify a directory where the classes added to the .jar file should be placed, rather than the default root directory of the .jar file.

Similarly, the **prefix** option in the Meta-Inf option group is already filled in with META-INF, indicating that dependencies you add to the Meta-Inf group will be placed by default in the META-INF directory.

Adding Dependencies

If you need to add a dependency, the Browse tab allows you to do this:



This tab allows you to search for a directory, then insert it underneath the selected build task, and then adjust its priority within the items for that task.

Set Up the BINGO Server Build

Setting up the BINGO server build is similar to the process just described for the BINGO client, but there are two new tasks in the BINGO server: Ant RMIC and Ant RMIC Jar.

Ant RMIC

The Ant RMIC task compiles the Remote Method Invocation classes. Notice that there is an option for the type of compiler to use. The default is "sun", but there are also choices for Kaffe and for Weblogic.

Ant RMIC Jar

The Ant RMIC Jar task specifies which files shall be placed in the RMIC jar. The task contains the following options:

- basedir—specify a directory from which to collect the files
- compress—apply compression to the jar file
- manifest—specify the name of the `manifest.mf` file

Build BINGO in the Standalone Web Client

Once you have set up the BINGO client and server, you can build the project.

1 Click **Execute Build Jobs**.

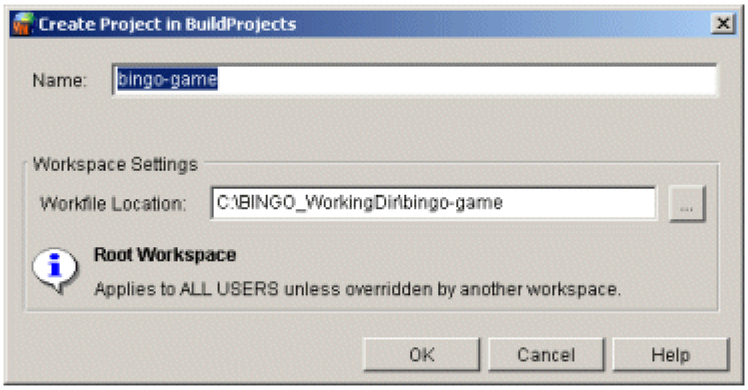
2 Select the build job from the list of available build jobs.

3 Click **Execute**. The build job should execute successfully.

Create a New Version Manager Project

Once you have successfully built the project in the Builder standalone web client, you can add the project to Version Manager.

In the Version Manager desktop, use **File > Create Project** to create a new Version Manager project.



Create Project in BuildProjects

Name: bingo-game

Workspace Settings

Workfile Location: C:\BINGO_WorkingDir\bingo-game

Root Workspace

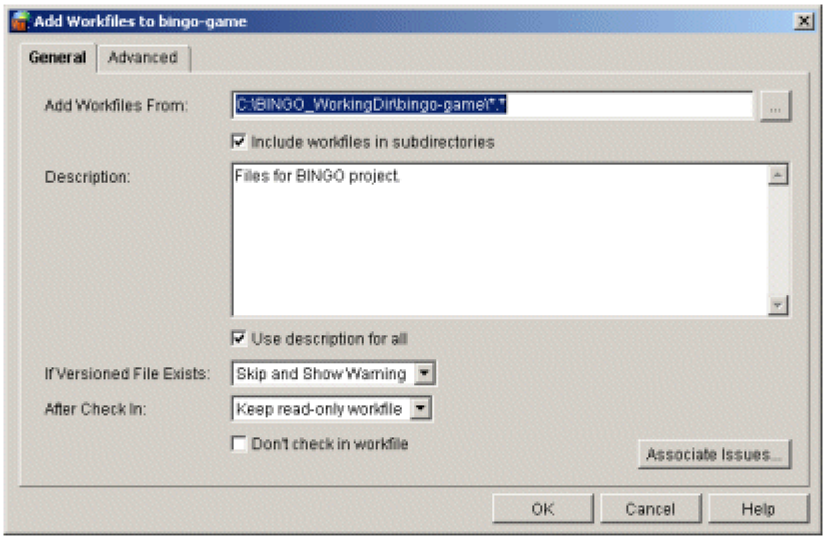
Applies to ALL USERS unless overridden by another workspace.

Set the Workfile Location to the working directory that you created in "Copy Example Files to Working Directory" on page 63.

Add Workfiles to Version Manager

After you have created the Version Manager project, add the workfiles for the BINGO example to the project.

Use **File > Add Workfiles** to add the contents of the bingo-game directory to Version Manager.



Add Workfiles From: C:\BINGO_WorkingDir\bingo-game\*.*

☑ Include workfiles in subdirectories

Description: Files for BINGO project.

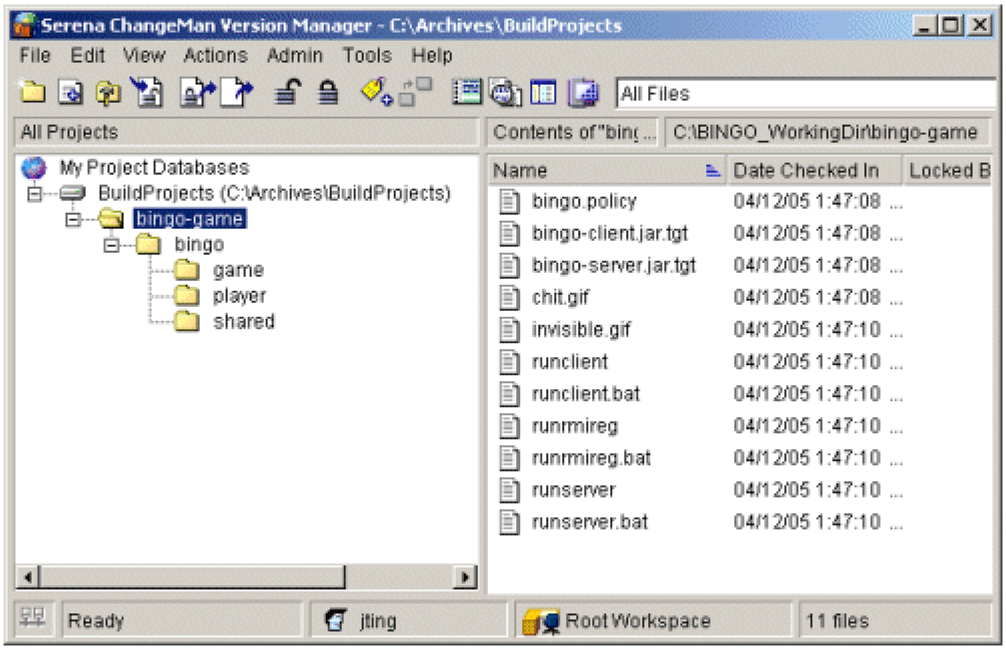
☑ Use description for all

If Versioned File Exists: Skip and Show Warning

After Check In: Keep read-only workfile

☐ Don't check in workfile

When you are done, the project should look like this:


Serena ChangeMan Version Manager - C:\Archives\BuildProjects
File
Edit
View
Actions
Admin
Tools
Help
All Files
All Projects
Contents of "bing...
C:\BINGO_WorkingDir\bingo-game

My Project Databases
- BuildProjects (C:\Archives\BuildProjects)
  - bingo-game
    - bingo
      - game
      - player
      - shared

Name	Date Checked In	Locked B
bingo.policy	04/12/05 1:47:08 ...	
bingo-client.jar.tgt	04/12/05 1:47:08 ...	
bingo-server.jar.tgt	04/12/05 1:47:08 ...	
chit.gif	04/12/05 1:47:08 ...	
invisible.gif	04/12/05 1:47:10 ...	
runclient	04/12/05 1:47:10 ...	
runclient.bat	04/12/05 1:47:10 ...	
runrmireg	04/12/05 1:47:10 ...	
runrmireg.bat	04/12/05 1:47:10 ...	
runserver	04/12/05 1:47:10 ...	
runserver.bat	04/12/05 1:47:10 ...	

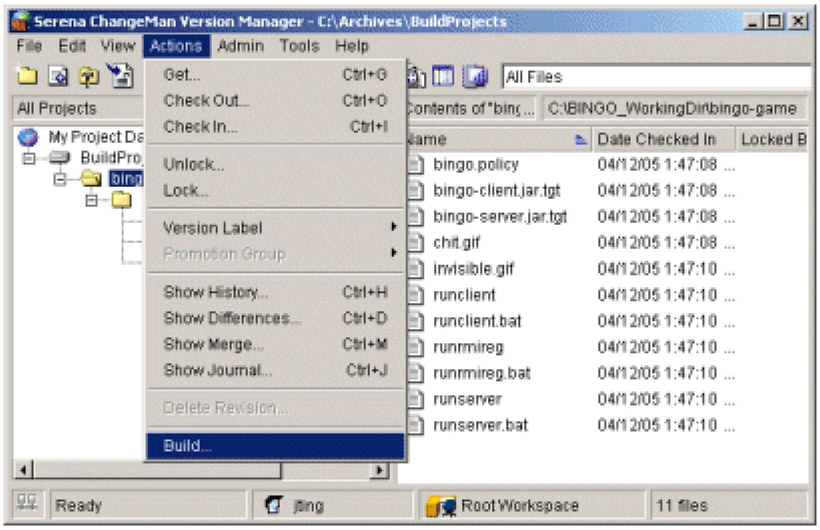
Ready | jting | Root Workspace | 11 files

As shown in the above illustration, the TGT files need to be archived in Version Manager before you can build the project using the Version Manager integration.

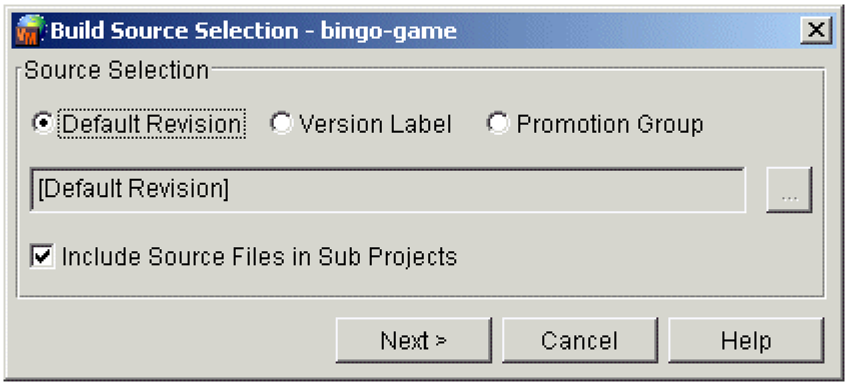
Build BINGO from the Version Manager Integration

Now you can configure the build job to run from the Version Manager integration.

1 In Version Manager, select the project and then choose **Actions > Build**.



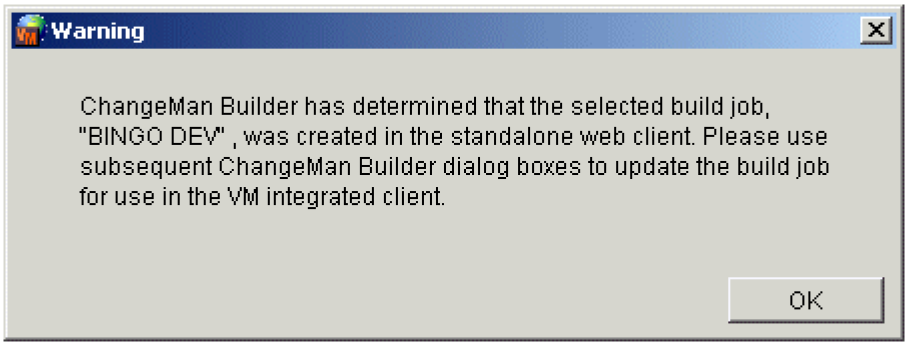
2 There is a slight delay as the ChangeMan Builder integration searches the project for TGT files. After that, the Build Source Selection dialog box appears:



NOTE The Build Source Selection dialog box is the first screen in what is referred to as the ChangeMan Builder wizard.

3 You can choose to build the project from the default revision, from a version label, or from a promotion group. Click **Next**.

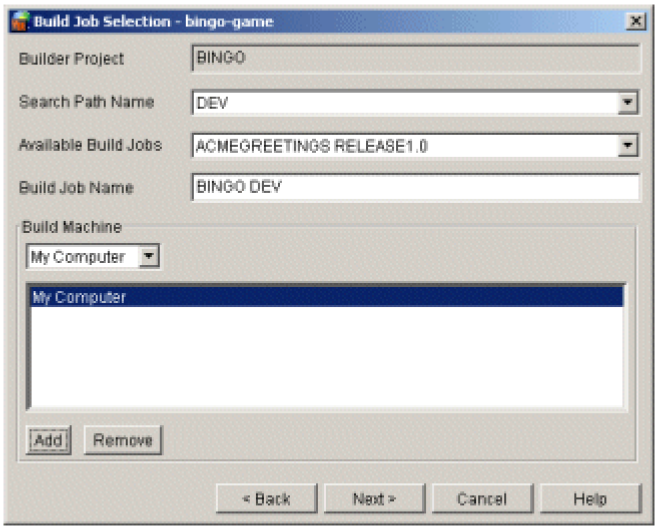
4 Because this is the first time the project has been built from the Version Manager integration, a warning dialog box appears:



ChangeMan Builder has determined that the selected build job, "BINGO DEV" , was created in the standalone web client. Please use subsequent ChangeMan Builder dialog boxes to update the build job for use in the VM integrated client.

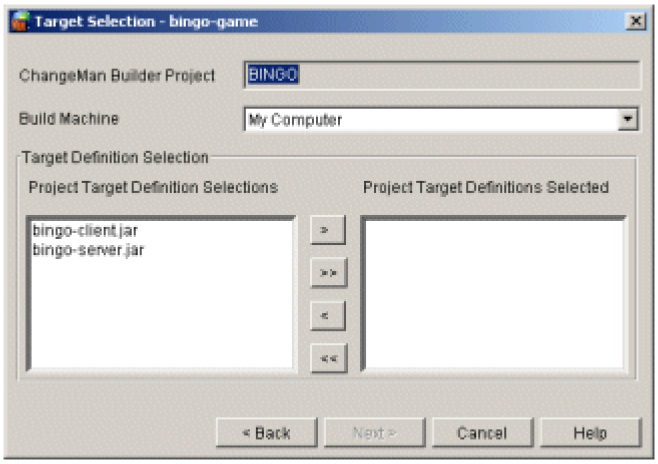
All that you need to do is finish completing the rest of the dialog boxes. Once you save the build job from the Version Manager integration, this message will no longer appear. Click **OK**. The Build Job Selection dialog box appears.

5 Click **Add** to add "My Computer" to the list of build machines.



Builder Project: BINGO
Search Path Name: DEV
Available Build Jobs: ACMEGREETINGS RELEASE1.0
Build Job Name: BINGO DEV
Build Machine: My Computer
My Computer

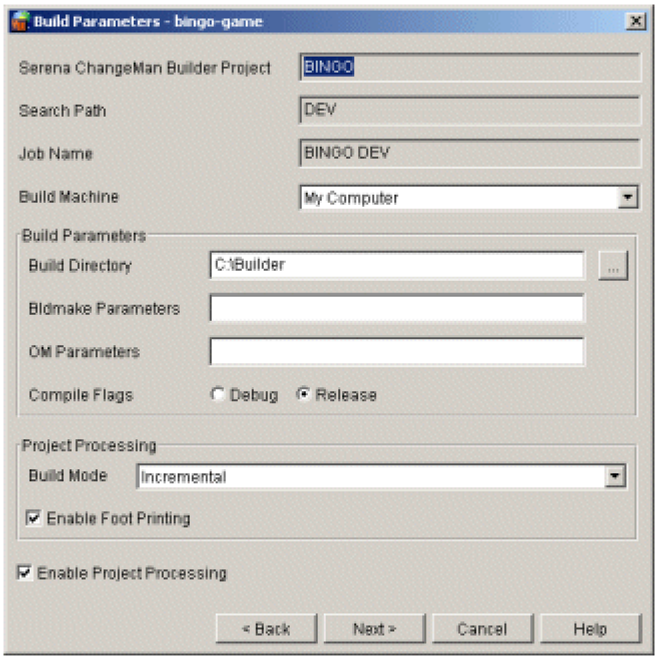
6 Click **Next**. The Target Selection dialog box appears.


Target Selection - bingo-game
ChangeMan Builder Project
Build Machine
Target Definition Selection
Project Target Definition Selections
Project Target Definitions Selected
>
>>
<
<<
< Back
Next >
Cancel
Help

ChangeMan Builder Project: BINGO
Build Machine: My Computer
bingo-client.jar
bingo-server.jar

7 Click the **>>** button to move all of the targets to the Project Target Definitions Selected area.

8 Click **Next**. The Build Parameters dialog box appears.

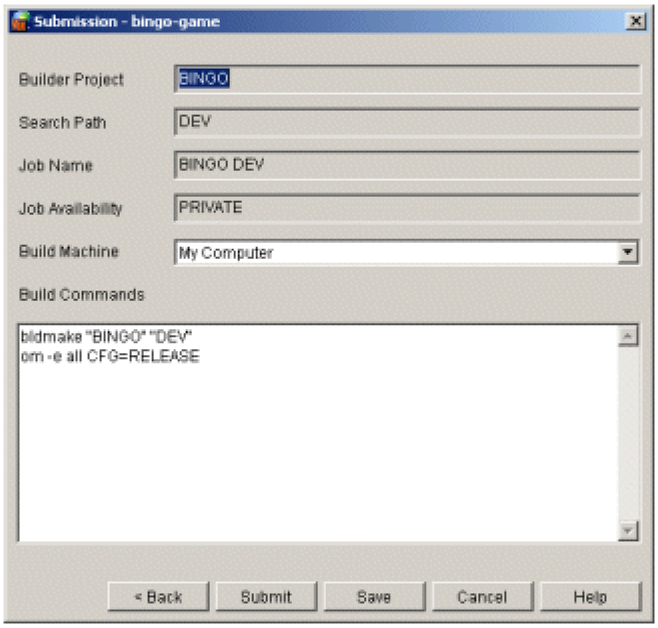


Serena ChangeMan Builder Project: BINGO
Search Path: DEV
Job Name: BINGO DEV
Build Machine: My Computer
Build Directory: C:\Builder
Bldmake Parameters:
OM Parameters:
Compile Flags: ( ) Debug (•) Release
Build Mode: Incremental
☑ Enable Foot Printing
☑ Enable Project Processing

Notice that the build directory is set to the default location—`C:\Builder` in Windows, `$HOME/Builder` in UNIX. If you wish to change the build directory to a different location, use this dialog box to change it.

9 Optional: To enable more output in the build log from either `bldmake` or `om`, enter `-ov` (for "output verbose") as a bldmake parameter or an om parameter.

10 Click **Next**. The Submission dialog box appears.



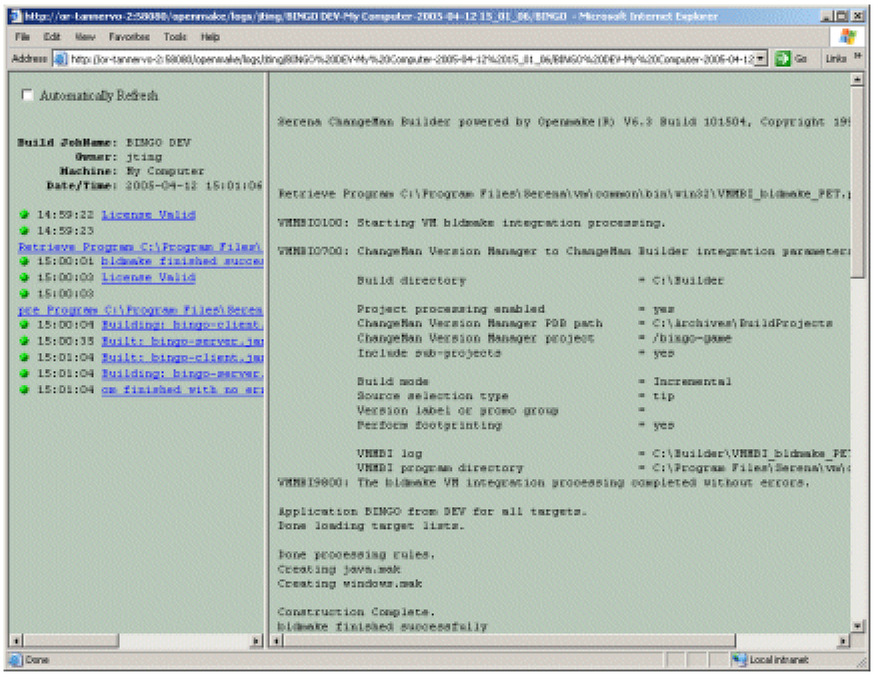
Builder Project: BINGO
Search Path: DEV
Job Name: BINGO DEV
Job Availability: PRIVATE
Build Machine: My Computer
Build Commands:

```
bldmake "BINGO" "DEV"
om -e all CFG=RELEASE
```

Notice the Build Machine field. Although this field also appears on the Build Parameters dialog box, you can use the drop-down list on this dialog box to change the build machine to other available build machines (a remote build server, for example).

11 Click Save to save the build job.

12 Click Submit to submit the build job. The build log appears in a window of your default Internet browser (you may have to bring the window to the front).


http://or-tannervo-2:58080/openmake/logs/jting/BINGO DEV-My Computer-2005-04-12 15_01_06/BINGO - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address
Go
Links
Automatically Refresh
Done
Local intranet

```
Build JobName: BINGO DEV
        Owner: jting
      Machine: My Computer
    Date/Time: 2005-04-12 15:01:06

14:59:22 License Valid
14:59:23
Retrieve Program C:\Program Files\
15:00:01 bldmake finished succes
15:00:03 License Valid
15:00:03
pce Program C:\Program Files\Seren
15:00:04 Building: bingo-client.
15:00:35 Built: bingo-server.ja
15:01:04 Built: bingo-client.ja
15:01:04 Building: bingo-server.
15:01:04 om finished with no er
```

```
Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504, Copyright 19


Retrieve Program C:\Program Files\Serena\vm\common\bin\win32\VMMBI_bldmake_PET.

VMMBI0100: Starting VM bldmake integration processing.

VMMBI0700: ChangeMan Version Manager to ChangeMan Builder integration parameter

           Build directory                          = C:\Builder

           Project processing enabled               = yes
           ChangeMan Version Manager PDB path       = C:\Archives\BuildProjects
           ChangeMan Version Manager project        = /bingo-game
           Include sub-projects                     = yes

           Build mode                               = Incremental
           Source selection type                    = tip
           Version label or promo group             =
           Perform footprinting                     = yes

           VMMBI log                                = C:\Builder\VMMBI_bldmake_PE
           VMMBI program directory                  = C:\Program Files\Serena\vm\
VMMBI9800: The bldmake VM integration processing completed without errors.

Application BINGO from DEV for all targets.
Done loading target lists.

Done processing rules.
Creating java.mak
Creating windows.mak

Construction Complete.
bldmake finished successfully
```

Unlike the build logs from jobs submitted to the standalone web client, the build log will contain messages such as this:

```
VMMBI0100: Starting VM bldmake integration processing.
```

You are looking for the following confirmation messages within the build log:

```
VMMBI9800: The bldmake VM integration processing completed without
    errors.
. . .
bldmake finished successfully
. . .
BUILD SUCCESSFUL
Total time: 1 second

Built: bingo-client.jar

Building: bingo-server.jar
om finished with no errors
```

These messages indicate that the VM integration completed successfully, and that the project built successfully.

Run the BINGO Game

To run the BINGO game, execute the following file from a command prompt window:

```
C:\<build directory>\bingo-game\runrmireg.bat
```

Wait a few seconds, then start the server by executing this file, again from a command prompt:

```
C:\<build directory>\bingo-game\runserver.bat
```

Wait a few more seconds, then start the client by executing this file, from a command prompt:

```
C:\<build directory>\bingo-game\runclient.bat
```

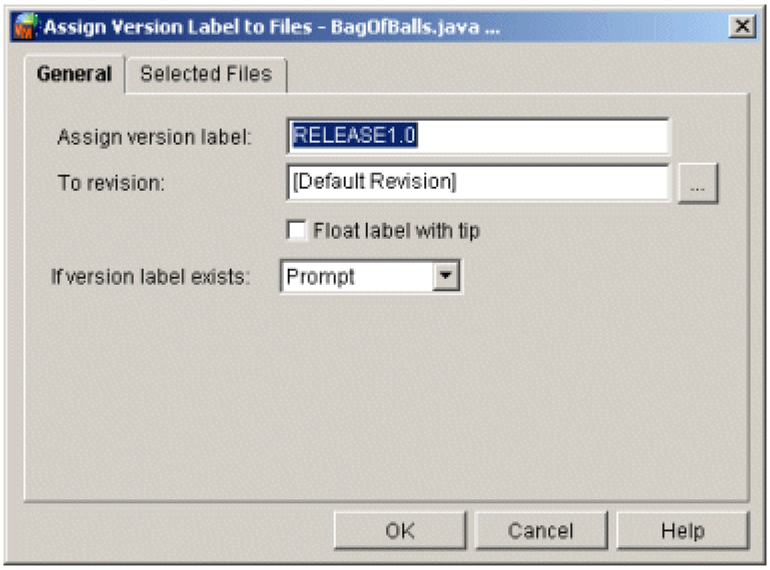
Apply Version Labels

You can optionally add version labels to the deliverables and then build the project according to version label.

To apply version labels:

1 In Version Manager, select the files or projects to receive the label.

2 Right-click and choose **Assign Version Label**:



Assign version label: RELEASE1.0
To revision: [Default Revision]
☐ Float label with tip
If version label exists: Prompt

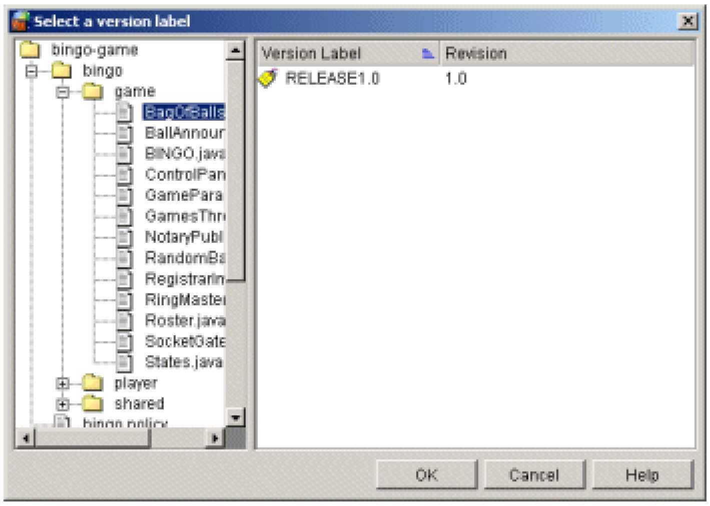
Build BINGO Using a Version Label

Once you have assigned version labels, you can build the project by version label instead of building the latest revision.

1 Select **Actions > Build**.

2 In the Build Source Selection dialog box, choose the **Version Label** radio button.

3 Enter the name of the version label, or use the **Browse** button (...) to display a list of the available labels.



Version Label	Revision
RELEASE1.0	1.0

4 Continue with the rest of the build procedure as detailed in the earlier parts of this chapter.

Chapter 6

ChangeMan Builder and Configuration Builder

This section discusses how to use Serena® ChangeMan® Builder™ for Professional with Configuration Builder.

Overview

You can use scripts developed for Merant Configuration Builder with Serena ChangeMan Builder for Professional. Through the use of a "wrapper" script, ChangeMan Builder can call a Configuration Builder build job and execute it from within ChangeMan Builder's standalone web client, or even from within Version Manager.

Prerequisites

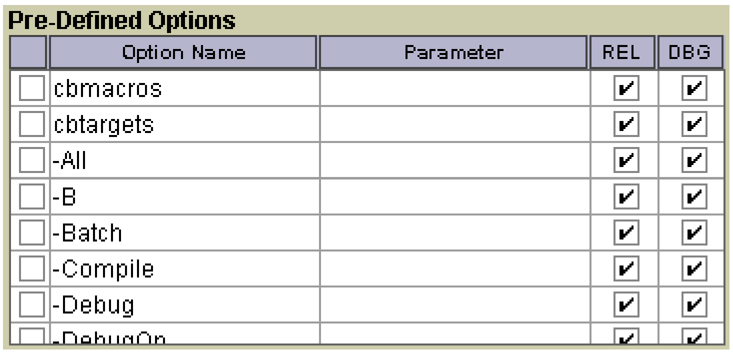
To use Configuration Builder with ChangeMan Builder, you should first make sure your Configuration Builder installation is set up properly and that the build jobs you wish to call from ChangeMan Builder are working.

Phony Targets and Dummy Targets

The ChangeMan Builder documentation refers to "phony" targets, which are TGT files that do not actually result in a built file, but which cause a particular task to be done—files are copied from one location to another, for example. The "phony" targets in ChangeMan Builder are the same as "dummy" targets in Configuration Builder. Using a phony target allows you to list a Configuration Builder script as a dependency.

Running Existing Configuration Builder Scripts

Running an existing Configuration Builder script is accomplished with the use of a "wrapper" script. To use this script, you define a project in ChangeMan Builder using the "Merant CB" build type, and set the CB script parameters using the values in the Options fields on the Build detail page.


Pre-Defined Options

	Option Name	Parameter	REL	DBG
☐	cbmacros		✓	✓
☐	cbtargets		✓	✓
☐	-All		✓	✓
☐	-B		✓	✓
☐	-Batch		✓	✓
☐	-Compile		✓	✓
☐	-Debug		✓	✓
☐	-DebugOn		✓	✓

Before using the Configuration Builder script, you still have to do the following:

1. Set the Build Directory to the location of the CB script.
2. Have the ChangeMan Builder administrator create a search path to the location of the files named in the CB script.

3 Create a phony target that calls the build script as one of its dependencies. This target does not have to do anything else. You should not define the final result of the CB script as the target of the ChangeMan Builder script. That is, if the CB script creates an executable file named "hello.exe", do not make "hello.exe" the target of the ChangeMan Builder script.

4 If there are any flags or macro definitions that you want to pass to Configuration Builder, use the Options Detail page.

Once you have completed these steps, you can run the Configuration Builder script using ChangeMan Builder.

Example: Running a CB Script from the Standalone Web Client

Here is an example of the process of incorporating a Configuration Builder script into a ChangeMan Builder build job.

Start With a Working CB Script

You should verify that the Configuration Builder script.bld (or equivalent) file successfully builds your product in Configuration Builder:

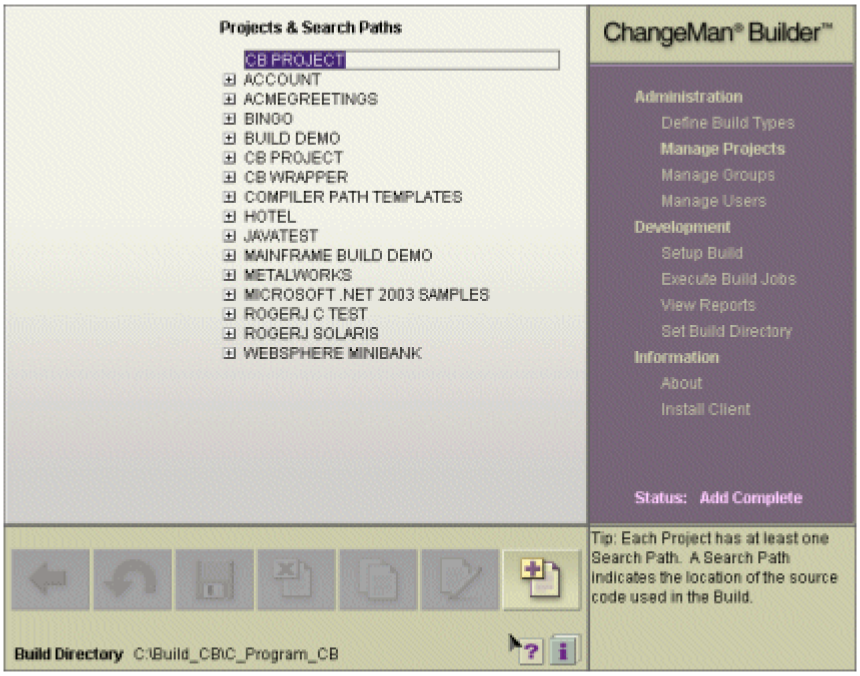
```
C:\Build_CB\C_Program_CB>build
PVCS Configuration Builder 7.5.0.0 (Build d230) for Windows NT/80x86
Copyright 1998-2002 MERANT. All rights reserved.
Today's date is 28 Mar 2005 11:08:26.
gcc -c -g -o hello.o C:\Build_CB\C_Program_CB\hello.c
echo Linking object modules . . .
Linking object modules . . .
gcc -o hello hello.o
build complete.
```

Set Up Build Directory and Search Paths

1 Start the ChangeMan Builder standalone web client.

2 Set the build directory to the desired location.

3 From the main page, click **Manage Projects**. The Projects & Search Paths page appears. Add a new project (in this example, the project is named CB PROJECT).



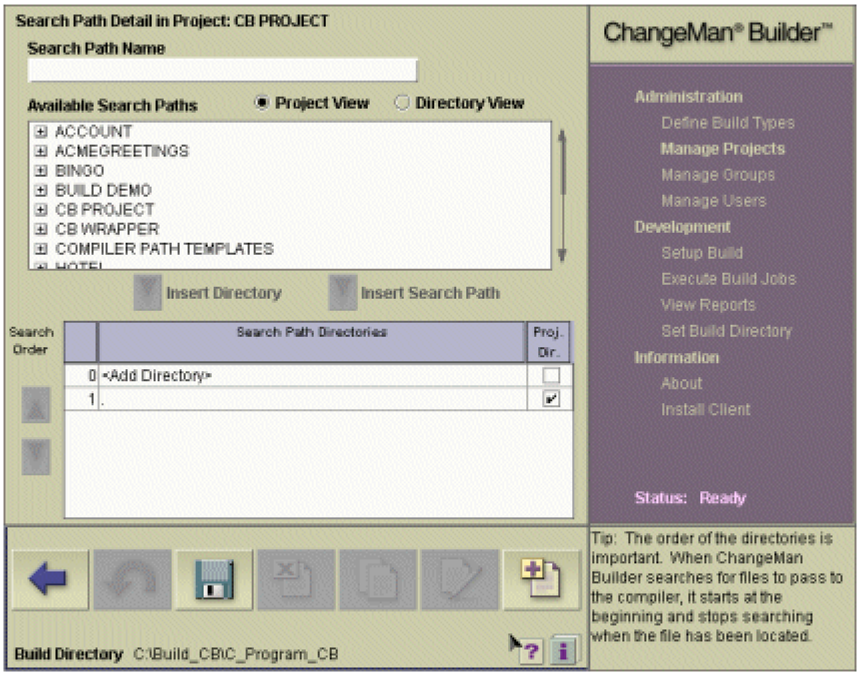
Status: Add Complete

Tip: Each Project has at least one Search Path. A Search Path indicates the location of the source code used in the Build.

Build Directory C:\Build_CB\C_Program_CB

4 Expand CB PROJECT so that you can see the Add Search Path item.

5 Double-click **Add Search Path** to display the Search Path Detail page.



Available Search Paths [✓ Project View] Directory View

Search Order	Search Path Directories	Proj. Dir.
0	<Add Directory>	☐
1	.	✓

Status: Ready

Tip: The order of the directories is important. When ChangeMan Builder searches for files to pass to the compiler, it starts at the beginning and stops searching when the file has been located.

Build Directory C:\Build_CB\C_Program_CB

6 Name the Search Path (in this example, the search is named DEVELOPMENT).

7 Add any necessary directories to the search path and save it.

Set Up the Build

1 Click **Setup Build** to display the Projects and Targets page.

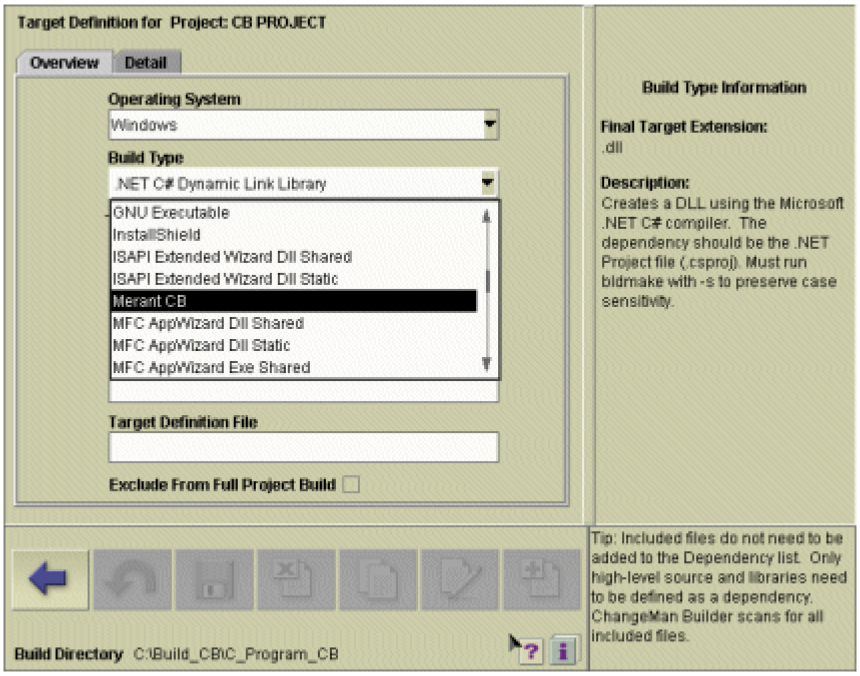
2 Expand the new project (CB PROJECT) to display the newly-created search path (DEVELOPMENT).

3 Double-click the name of the search path to display the Setup Build page.

4 Double-click **<Add Target>**. The Target Definition page appears.

5 For the operating system, accept the default choice of Windows.

6 For the build type, select Merant CB.



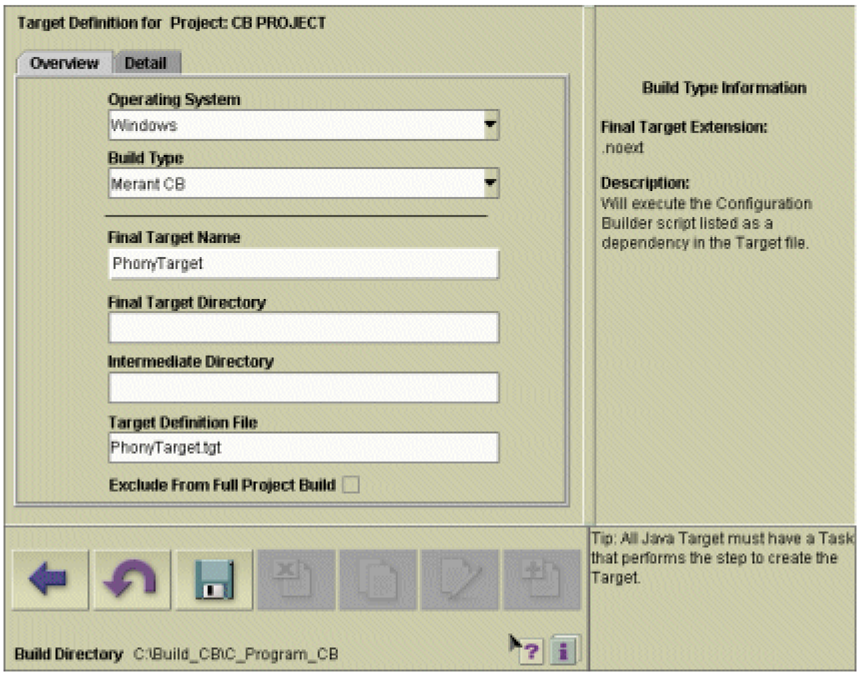
Final Target Extension:
.dll

Description:
Creates a DLL using the Microsoft .NET C# compiler. The dependency should be the .NET Project file (.csproj). Must run bldmake with -s to preserve case sensitivity.

Tip: Included files do not need to be added to the Dependency list. Only high-level source and libraries need to be defined as a dependency. ChangeMan Builder scans for all included files.

Build Directory C:\Build_CB\C_Program_CB

7 Enter a "phony target" name in the Final Target Name field. This example uses the name "PhonyTarget".



Target Definition for Project: CB PROJECT

Overview | Detail

Operating System: Windows

Build Type: Merant CB

Final Target Name: PhonyTarget

Final Target Directory:

Intermediate Directory:

Target Definition File: PhonyTarget.tgt

Exclude From Full Project Build ☐

Build Type Information

Final Target Extension: .noext

Description: Will execute the Configuration Builder script listed as a dependency in the Target file.

Tip: All Java Target must have a Task that performs the step to create the Target.

Build Directory C:\Build_CB\C_Program_CB

ChangeMan Builder fills in the name of the Target Definition file for you.

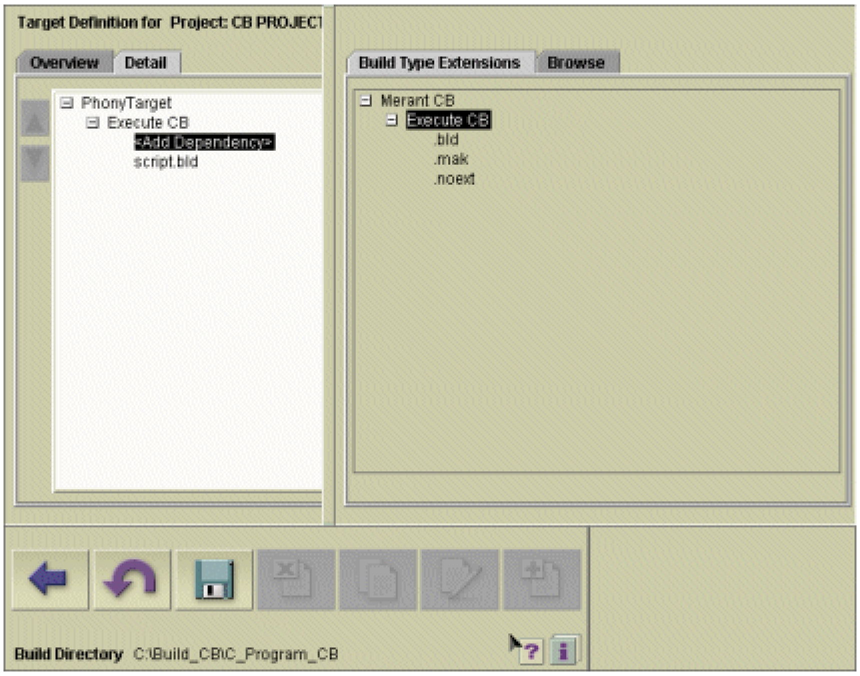
8 Do not click the Save icon (the floppy disk) yet because you have to define the target dependencies. You will do this in the next section.

Define Target Detail

1 Click the **Detail** tab to start defining dependencies for the project. You see the name of the phony target, and the Execute CB task underneath it.

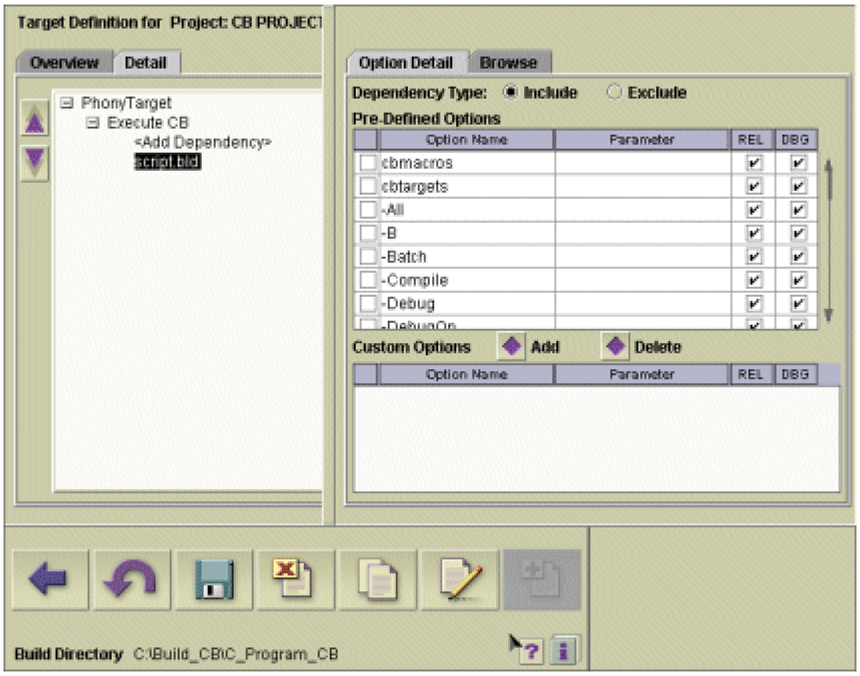
2 Expand the Execute CB task to display the <Add Dependency> item.

3 Double-click **<Add Dependency>** to add the name of the Configuration Builder script file. In this example, the file is named script.bld.



Select Build Options

1 Select the name of the dependency to display the Option Detail tab.



Dependency Type: [✓ Include] Exclude

Pre-Defined Options

	Option Name	Parameter	REL	DBG
☐	cbmacros		✓	✓
☐	cbtargets		✓	✓
☐	-All		✓	✓
☐	-B		✓	✓
☐	-Batch		✓	✓
☐	-Compile		✓	✓
☐	-Debug		✓	✓
☐	-DebugOn		✓	✓

Custom Options

	Option Name	Parameter	REL	DBG

2 If you wish to enter values for CBMACROS or CBTARGETS, use the corresponding entries in the list of option names. (See "Using CBMACROS, CBTARGETS, and CBFLAGS" on page 85 for important usage information.)

3 If you wish to enter values for Configuration Builder flags, select them from the list of Pre-Defined Options.

4 Click the floppy disk icon to save the target definitions.

Execute the Build Job

1 Click **Execute Build Jobs**.

2 Select the build job from the list of available build jobs.

3 Click **Execute**. The Configuration Builder build job should execute successfully. Here is a sample transcript:

```
Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504, Copyright 1995-2004

Application CB WRAPPER from DEV for all targets. Done loading target lists.

Done processing rules.
Creating windows.mak

Construction Complete.
bldmake finished successfully

Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504, Copyright 1995-2004

Building: phonytarget

Creating phonytarget **********************************************************
*
* Executing Configuration Builder:
*
*      Build type version = 1.1
*
*      Verbose = YES
*      Config = DEBUG
*
*      Build program = C:\PROGRA~1\PVCS\CB\nt\build.EXE
* Build script flag = -script "C:\Build_CB\C_Program_CB\script.bld"
*
*      TGT file:
*         flags =
*         cbmacros =
*         cbtargets =
*      OM command line:
*         cbflags = -NoSilent
*         cbmacros =
*         cbtargets =
*
*      CB command:
* C:\PROGRA~1\PVCS\CB\nt\build.EXE -script "C:\Build_CB\C_Program_CB\script.bld" -
NoSilent
*
**********************************************************

PVCS Configuration Builder 7.5.0.0 (Build d230) for Windows NT/80x86
Copyright 1998-2002 MERANT. All rights reserved.
Today's date is 28 Mar 2005 11:04:20.
gcc -c -g -o hello.o C:\Build_CB\C_Program_CB\hello.c
echo Linking object modules . . .
Linking object modules . . .
gcc -o hello hello.o
build complete.
```

```
*******************************************************
*
* Configuration Builder Script Completed:
*
* Return Code = 0
*
*******************************************************

om finished with no errors
```

Using CBMACROS, CBTARGETS, and CBFLAGS

The Merant CB build type allows you to enter values for Configuration Builder macros, targets, or flags.

NOTE If you are unfamiliar with Configuration Builder macros, flags, or targets, see the Configuration Builder documentation.

You can enter values for CBMACROS, CBTARGETS, and CBFLAGS in two ways:

- On the Build Detail tab, using Pre-Defined Options
- From Execute Build Jobs, using the Build Commands field

If you define values for CBMACROS, CBTARGETS, or CBFLAGS using the Pre-Defined Options, you will have to save the build job before you can execute it, so the values will be stored in the TGT file, and will apply to all build machines.

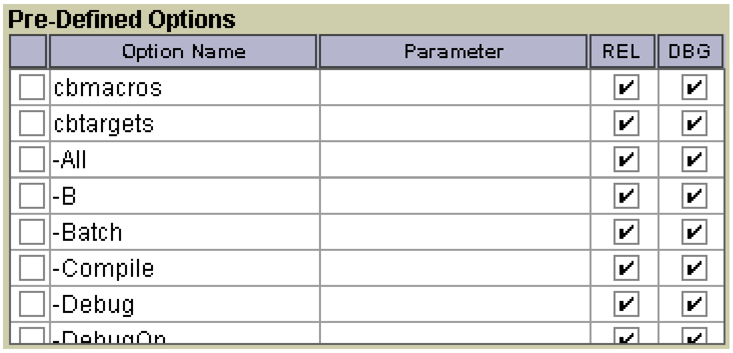
If you define values for CBMACROS, CBTARGETS, or CBFLAGS using the Build Commands field, you can execute the build job without saving it. Also, you can apply different values for each build machine.

In both cases, you should be aware of requirements for spaces and double quotes in the parameters to CBMACROS, CBTARGETS, and CBFLAGS. See "Parameter Syntax for CBMACROS, CBTARGETS, and CBFLAGS" on page 86.

Finally, note that you can redefine a macro on the command-line, and it will take precedence over the value defined for CBMACROS on the Build Detail tab. However, you will usually not be able to override values for CBFLAGS and CBTARGETS in the same way.

Entering Values Using Predefined Options

In the list of predefined options on the Option Detail tab, there are entries for CBMACROS and CBTARGETS. (CBFLAGS are listed individually.)



Pre-Defined Options

	Option Name	Parameter	REL	DBG
☐	cbmacros		✓	✓
☐	cbtargets		✓	✓
☐	-All		✓	✓
☐	-B		✓	✓
☐	-Batch		✓	✓
☐	-Compile		✓	✓
☐	-Debug		✓	✓
☐	-DebugOn		✓	✓

To use any of these options, simply check the box to the left of the desired option, and then enter the parameter to the option in the Parameter field. Values for CBMACROS, CBTARGETS, and CBFLAGS entered in this way are recorded in the TGT file.

Entering Values Using the Build Commands Field

If you wish, you can enter values for CBMACROS, CBTARGETS, and CBFLAGS in the Build Commands field of the Build Detail page. Use the same syntax as in the Pre-Defined Options fields.

Parameter Syntax for CBMACROS, CBTARGETS, and CBFLAGS

When you enter values for the parameters to CBMACROS and CBTARGETS, you must be careful with spaces and quotation marks.

- Only double quotes are allowed.
- Spaces are not permitted after or preceding the equal sign ("=").
- If you need to pass a parameter that contains a quoted string itself, use the backslash character to escape the nested double quotation marks:

  CBMACROS="x=\"nested string\" "
- When there is a nested string, you must include a space between the two quotation marks at the end of the parameter (as shown in the previous example).

If you make a mistake with quotation marks, a Perl syntax error is likely to result. This may appear in the build log as a failure to run the build script.

Running a CB Script from a Command Prompt Window

1 Navigate to the directory where the Configuration Builder script is and execute bldmake from there.

You must execute bldmake using the syntax that appears on the Build Detail page. That is, if you are using bldmake to execute a Configuration Builder script named Script.bld that creates an executable file named MyApplication.exe, you still have to know the name of the ChangeMan Builder project and search path in order to call bldmake.

2 When bldmake has finished creating the build control file, execute om.

Again, you should execute om using the syntax on the web client's Build Detail page. That is, if you have parameters to pass to the CB script, add them to the end of the om command. Use the following syntax:

```
cbflags="-NoSilent" cbmacros="NewMessage=Done."
```

3 Inspect the command window transcript.

The command window transcript should show that the target named in the Configuration Builder script was actually completed.

Converting a Simple CB Script to a ChangeMan Builder Script

The instructions for performing this task are in the *ChangeMan Builder Development Guide*. See the section "Make to TGT Conversion".

Chapter 7
Procedures

This section discusses procedural information for Serena® ChangeMan® Builder™ for Professional.

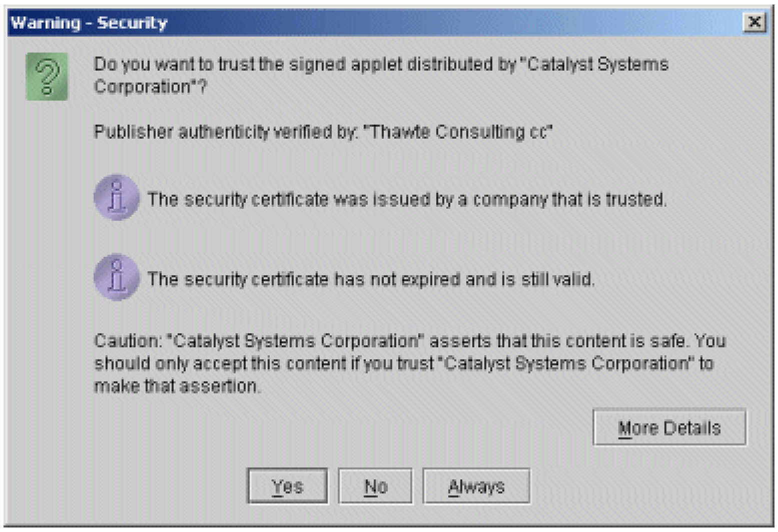
Using the Standalone Web Client

After you have installed the command-line client, you can use the full functionality of the standalone web client.

NOTE This section is designed to get you started with the standalone web client. The ChangeMan Builder Development Guide goes into much more detail on this topic.

1 Start your browser and open the standalone web client home page.

2 You see the Catalyst security certificate dialog box:



Do you want to trust the signed applet distributed by "Catalyst Systems Corporation"?

Publisher authenticity verified by: "Thawte Consulting cc"

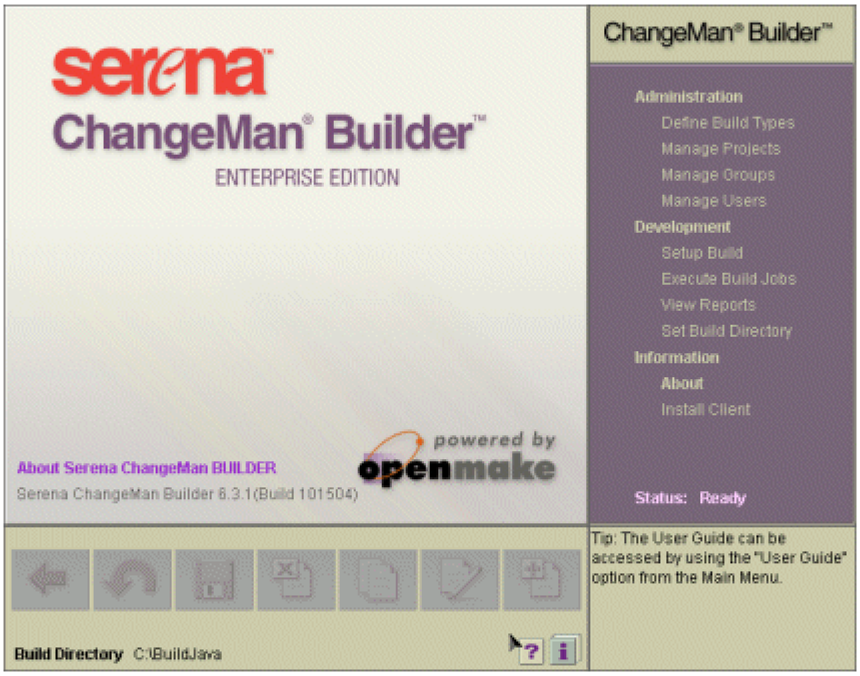
The security certificate was issued by a company that is trusted.

The security certificate has not expired and is still valid.

Caution: "Catalyst Systems Corporation" asserts that this content is safe. You should only accept this content if you trust "Catalyst Systems Corporation" to make that assertion.

Click **Always**. The Java applet loads (this may take several seconds).

3 You see the ChangeMan Builder standalone web client home page.



Tip: The User Guide can be accessed by using the "User Guide" option from the Main Menu.

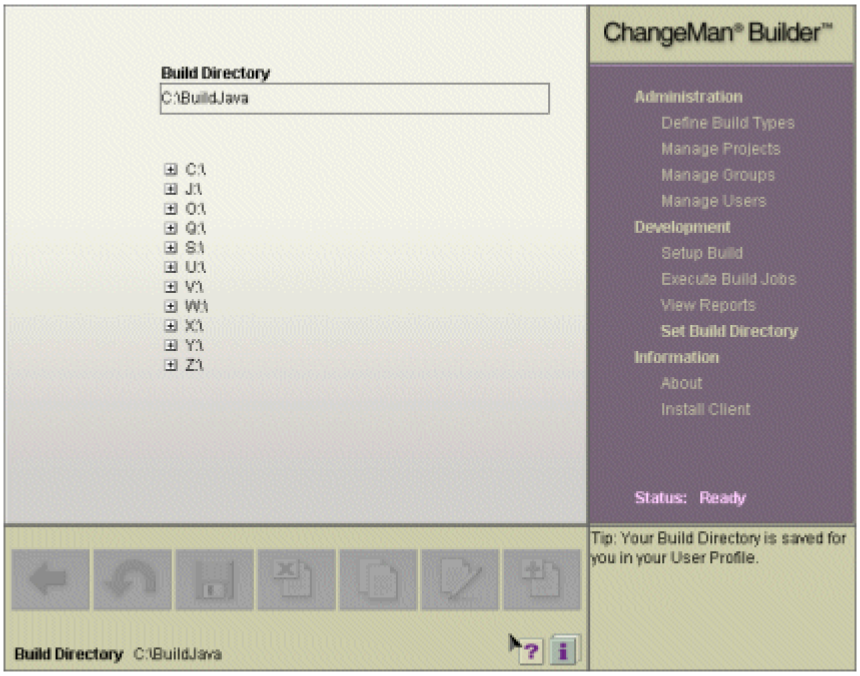
NOTE Enterprise Edition vs. Standard Edition—All users receive the Enterprise Edition for a thirty-day evaluation period. If after the evaluation period you choose not to purchase the Enterprise Edition, you can still use the Standard Edition.

Setting the Build Directory

After you have installed the command-line client and before you attempt to create any new build jobs, you must first set the build directory. This is a directory into which ChangeMan Builder can write the results of each build.

To set the build directory:

1 Under the Development commands, click **Set Build Directory**. You see the following screen:



2 Type the location for the build directory into the text field, or browse for it using the directory trees underneath. If you change your mind, the Undo icon

will return the build directory to the last saved value.

3 Save the build directory by clicking the Save icon.

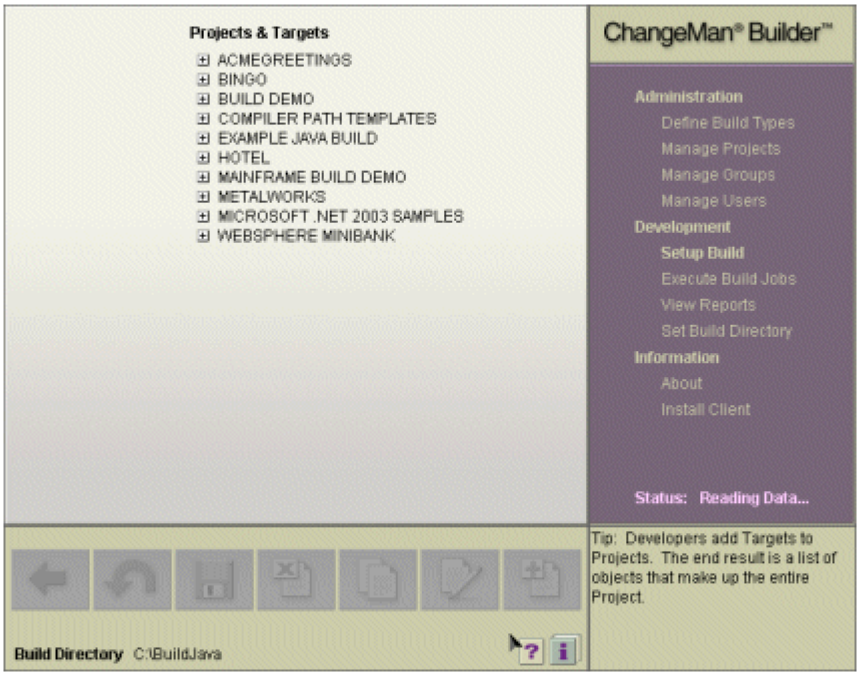
If you change your mind and wish to use a different location, simply use Set Build Directory again.

Setting Up a Build

After you have set a build directory, you can set up a build.

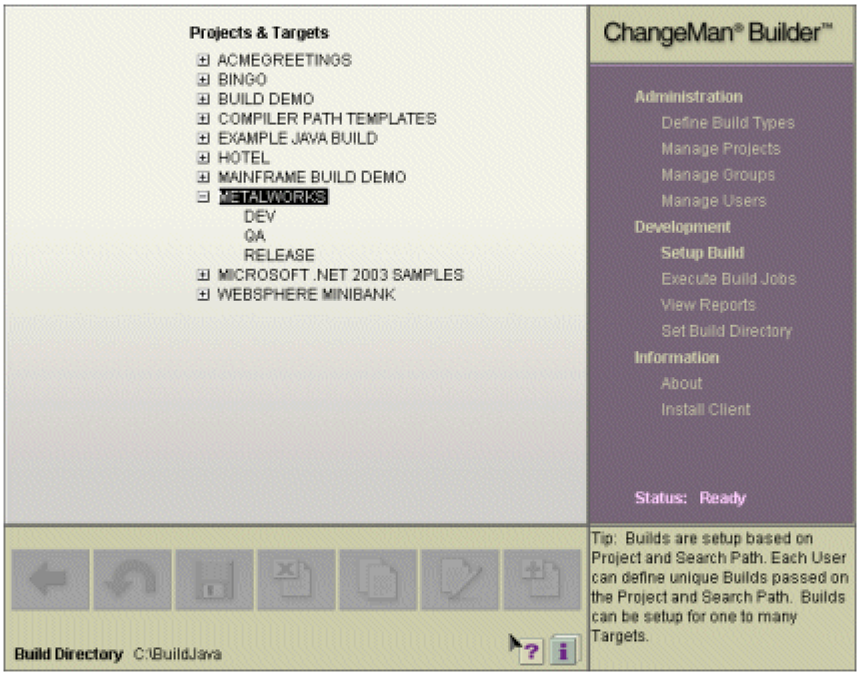
To set up a build:

1 Under the Development set of commands, click **Setup Build**. You see a list of Projects and Targets.



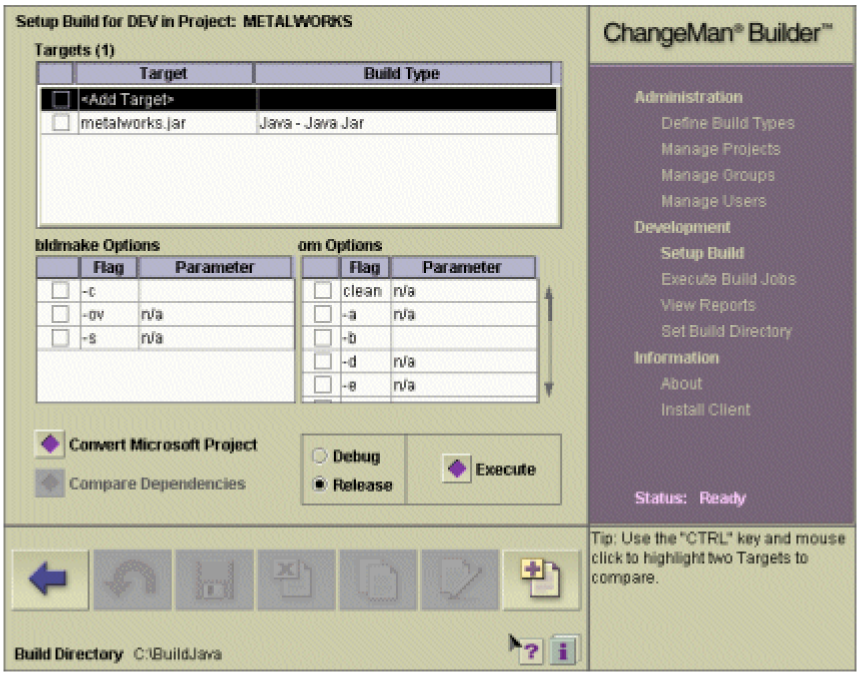
Tip: Developers add Targets to Projects. The end result is a list of objects that make up the entire Project.

2 Expand the project for which you wish to define a target. You see the search paths defined for that project:



Tip: Builds are setup based on Project and Search Path. Each User can define unique Builds passed on the Project and Search Path. Builds can be setup for one to many Targets.

3 Double-click the Search Path for which you wish to create a target. You see the Setup Build screen:



Setup Build for DEV in Project: METALWORKS

Targets (1)

	Target	Build Type
☐	<Add Target>	
☐	metalworks.jar	Java - Java Jar

bldmake Options

	Flag	Parameter
☐	-c	
☐	-ov	n/a
☐	-s	n/a

om Options

	Flag	Parameter
☐	clean	n/a
☐	-a	n/a
☐	-b	
☐	-d	n/a
☐	-e	n/a

Debug [✓ Release]

Status: Ready

Tip: Use the "CTRL" key and mouse click to highlight two Targets to compare.

Build Directory C:\BuildJava

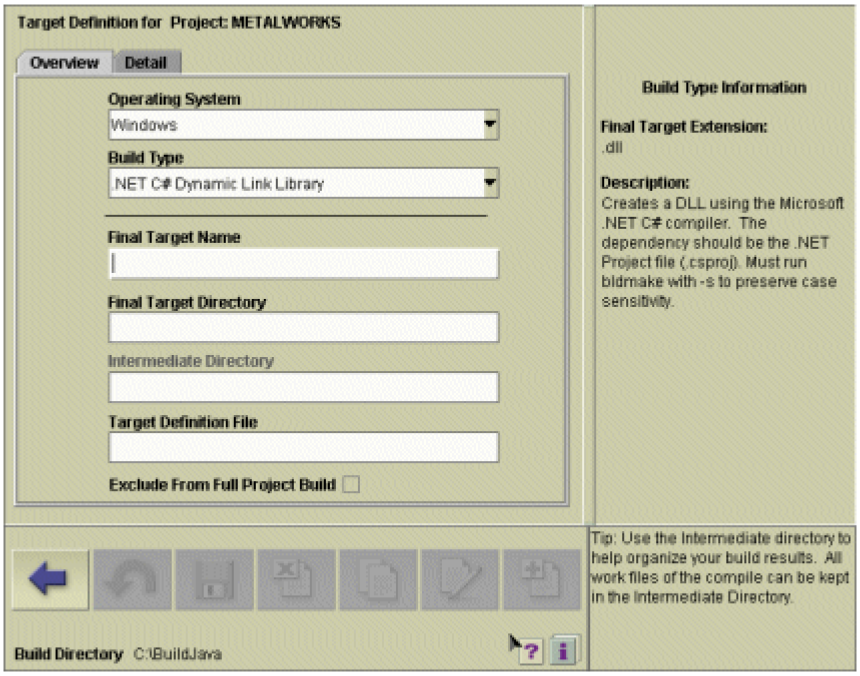
In the list of targets, you can see that the first entry is <Add Target>. Now you are ready to define a target.

Defining a Target

To define a Target, you must fill out the fields on the Target Overview page and the Target Detail page.

Filling out the Target Overview page

1 Double-click the **<Add Target>** entry on the Setup Build page. You see the Target Overview page:


Target Definition for Project: METALWORKS

Operating System: Windows

Build Type: .NET C# Dynamic Link Library

Final Target Name

Final Target Directory

Intermediate Directory

Target Definition File

Exclude From Full Project Build

Build Type Information

Final Target Extension: .dll

Description: Creates a DLL using the Microsoft .NET C# compiler. The dependency should be the .NET Project file (.csproj). Must run bldmake with -s to preserve case sensitivity.

Tip: Use the Intermediate directory to help organize your build results. All work files of the compile can be kept in the Intermediate Directory.

Build Directory C:\BuildJava

2 Type a name for the target. The name for the target file is automatically filled in, though you can change it if you want to.

3 Select the operating system for the target. The default is the operating system you are using, but if the target is to be built on a remote machine, you should select the operating system of that machine. (If you are using ChangeMan Builder Standard Edition, the operating system will default to Windows.) Also note that Java is listed as its own operating system.

4 Select the build type for the target. These build types are already set up for you by your Administrator.

5 If you wish to save intermediate targets (for example, object files before linking) in a directory separate from the build directory, type that name into the Intermediate directory field.

NOTE You should use relative paths—such as project1\foo.java—because ChangeMan Builder will concatenate these paths with the Search Path directories when looking for dependencies.

6 You can optionally enter any pre-compile parameters. Be aware that any parameters entered here are for pre-compile steps, and are passed to every dependency. If you wish to specify individual parameters for each dependency, you can do that on the Target Detail page.

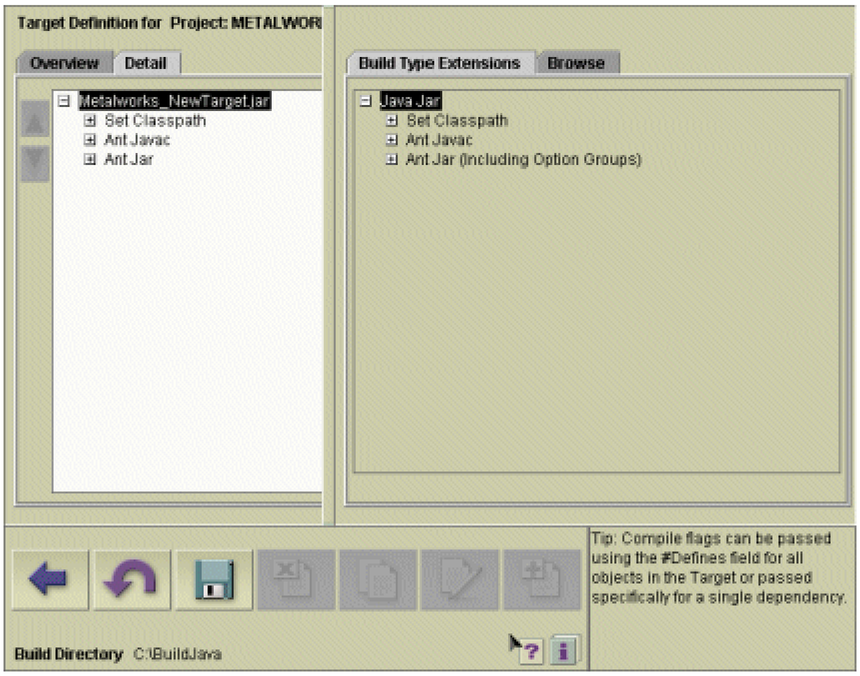
7 You can also optionally enter any additional flags meant for the compiler, such as #defines. Once again, parameters entered here are passed to every dependency. To specify compiler flags specific to each dependency, enter those flags on the Target Detail page.

8 Finally, if the target should not be included every time there is a full build, you can select the **Exclude from full build** check box. An example of this would be if the target defines a large file such as a releaseable disk image--it may not be necessary to build this every night.

After you have entered at least the target name and target file name on the Target Overview page, you can fill out the fields on the Target Detail page. You don't have to save the target file first.

Filling out the Target Detail page

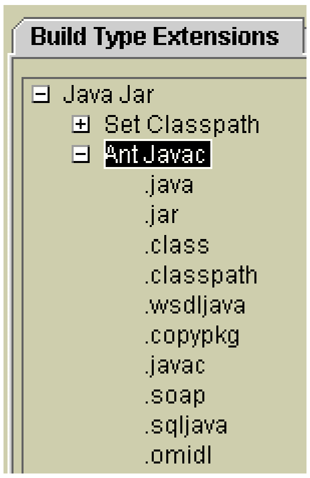
1 Click the **Detail** radio button on the Target Overview page. You see the Target Detail page.



Tip: Compile flags can be passed using the #Defines field for all objects in the Target or passed specifically for a single dependency.

You see a hierarchy with your target at the top, and the build tasks associated with that type of target underneath.

On the right, the Build Type Extensions tab displays. This tab shows you the file extensions that are permitted for the selected build type. If you selected "Java Jar", for example, and expanded the "Ant Javac" build task in the Build Type Extensions hierarchy, you would see this:



These represent the types of files that can be used as input files for the type of target you have chosen.

2 Go back to the Detail tab, on the left side of the page. Expand the hierarchy. You should observe the following behavior:

a When you select an item such as <Add Dependency> , the right-hand tabs change to Build Type Extensions and Browse.

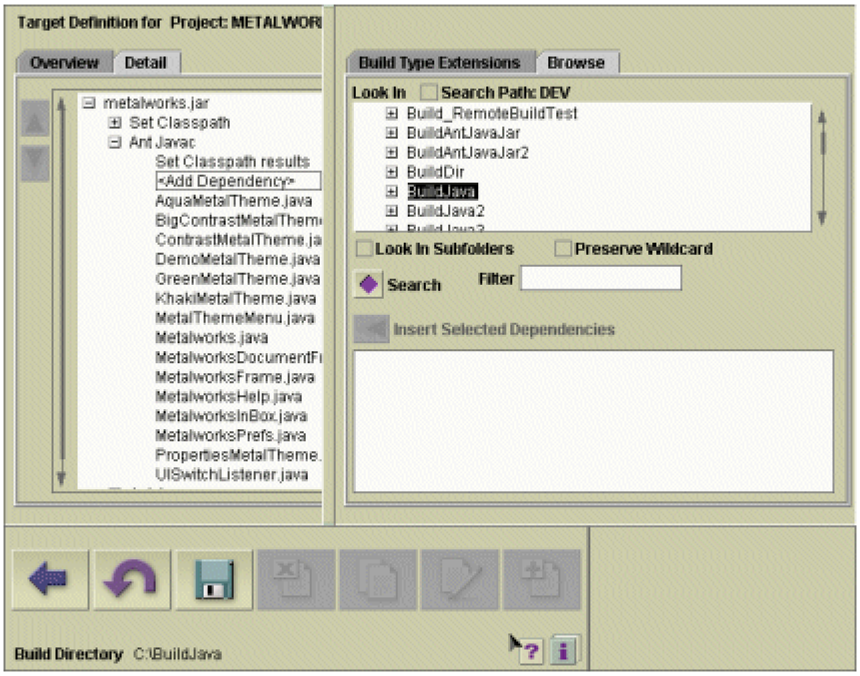
b When you select the name of a build task, the name of a file, or an item representing the results of a previous build task (such as Set Classpath results), the right-hand tabs change to Option Detail and Browse.

The Option Detail page allows you to enable the pre-defined options for a build task or for a specific file. The pre-defined options are those that have been defined by your Administrator.

You can also enable custom options, if you know the names of the options. The names follow the Ant conventions, and can be seen by examining the example build jobs.

See "Using Options" on page 99.

3 To browse for a specific file, use the Browse tab on the right-hand side of the screen:



NOTE If you know the name of the item, you can type it in instead of browsing for it.

4 Use the Look In tree and Search Filter to browse for the source files that make up this dependency. Select the directory that contains the source files, then click **Search**. The possible items appear in the lower list box.

5 Select the dependencies that should be included, then click the Insert Selected Dependencies arrow. The dependencies appear in the Detail tab, under the current build task.

TIP When you add

6 If you change your mind about using a dependency, select it from the Detail tab, then click the Delete icon. This will remove the dependency from the build task. (It will not delete the item from disk.)

7 When you are done adding the dependencies, click the Save icon, then click the Back icon to return to the Setup Build page. From there you can execute the build job.

NOTE You may want to rearrange the order of the dependencies. Use the up and down arrows next to the build task hierarchy to accomplish this.

Which Files Should Be Dependencies?

You do not have to specify every single source file as a dependency. Here are some tips for specifying dependencies.

- You do not have to specify any file that is named as an included file.

- You can use wildcards to specify a group of files. (Java developers can use the "double-star" wildcards familiar to Ant users. See "Java Developers: Using Double-Star Wildcards" on page 99.)

Java Developers: Using Double-Star Wildcards

Several of the examples use the traditional "*"wildcard to indicate that all files of a certain extension should be compiled:

```
<path>/top_level_dir/intermediate_directory/*.java
```

In Java packages, however, there are many intermediate-level directories, and you might end up with this:

```
<path>/top_level_dir/second_level_dir1/*.java
<path>/top_level_dir/second_level_dir2/*.java
<path>/top_level_dir/second_level_dir3/level3_dirA/*.java
<path>/top_level_dir/second_level_dir3/level3_dirB/*.java
```

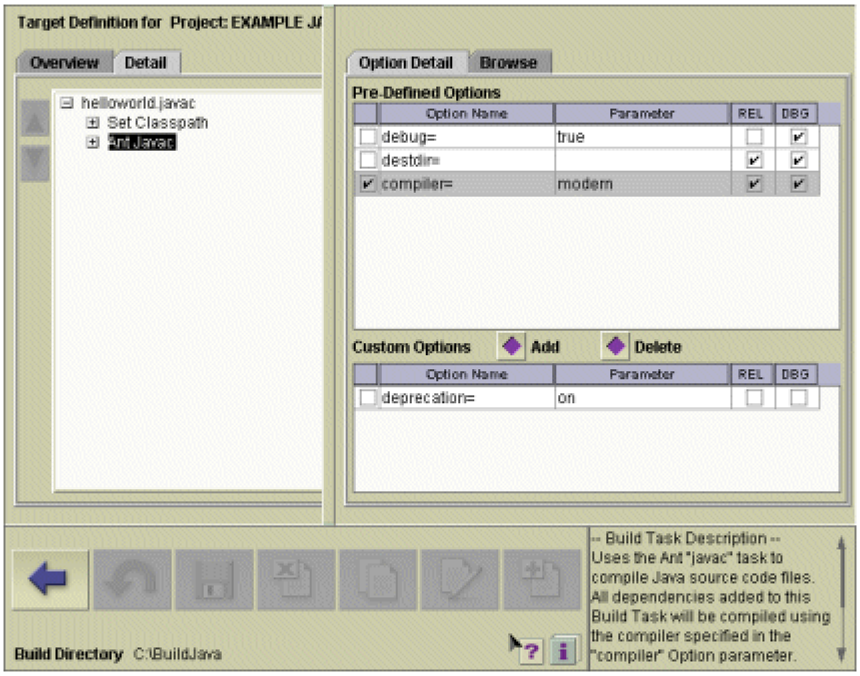
ChangeMan Builder allows you to specify a "double-star" wildcard, to allow the search for source files to explore multiple directories without having to name them individually:

```
<path>/top_level_dir/**/*.java
```

This dependency specification will match all of the intermediate directories given in the previous example.

Using Options

ChangeMan Builder allows you to specify options for a given build task. The Detail tab on the Target Definition page allows this:



Pre-Defined Options

	Option Name	Parameter	REL	DBG
☐	debug=	true	☐	✓
☐	destdir=		✓	✓
✓	compiler=	modern	✓	✓

Custom Options Add Delete

	Option Name	Parameter	REL	DBG
☐	deprecation=	on	☐	☐

-- Build Task Description --
Uses the Ant "javac" task to compile Java source code files. All dependencies added to this Build Task will be compiled using the compiler specified in the "compiler" Option parameter.

Build Directory C:\BuildJava

When you select a build task or dependency, the right-hand side of the screen shows you the Option Detail tab. This tab has sections for Pre-Defined Options and for Custom Options.

Pre-defined options are those that have been defined by the ChangeMan Builder administrator. These options can be applied to a build task, a build rule, or to a build type. If you do not have Adminstrator privileges, you will not be able to delete or add to these options.

Custom options are options that you add, to a build task or individual dependency. These options follow the Ant format. For example, the switch to list deprecated classes in Java should take this form:

Option Name	**Parameter**
deprecation=	on

Your ChangeMan Builder administrator defines which options are available. If your administrator has permitted it, you can choose whether or not to use the options, and whether or not they apply to Release builds, Debug builds, or both. See the *Serena ChangeMan Builder Administration Guide* for details.

Archiving the Target Files

Once you have created the target files, you must add them to your Version Manager archives if you wish to use the Version Manager integration. Use the standard process of adding workfiles to archives; if you are unfamiliar with this, see the *Version Manager User's Guide* or online help.

Use 1:1 Ratio for Version Manager Projects and ChangeMan Builder Projects

In each Version Manager project, you should store only the target files for that one project. ChangeMan Builder does not examine sub-projects for target files, so the target file should define which subdirectories need to be examined for source files.

Using the Version Manager Integration (Desktop Client)

Once you have set up target files and have checked them into Version Manager, you can then use the Version Manager integration to submit build jobs from within Version Manager.

There are some limitations:

- You cannot create or edit search paths or target files from within Version Manager.
- You can create or submit build jobs.
- The integration will not use workspace settings when retrieving files.

  Even if you have a Version Manager workspace defined that causes files to be checked out to a specific workspace, the integration will always use the project hierarchy when retrieving files. The Build Directory becomes the root of the project, and the project hierarchy applies starting from there.

Following are procedures detailing the steps for using the ChangeMan Builder desktop client Version Manager integration. As you will see, the search path strategy in the desktop client is a little different than in the web client. For an overview of the process, see "Example of Using the ChangeMan Builder Desktop Client" on page 58.

Setting Up the Project

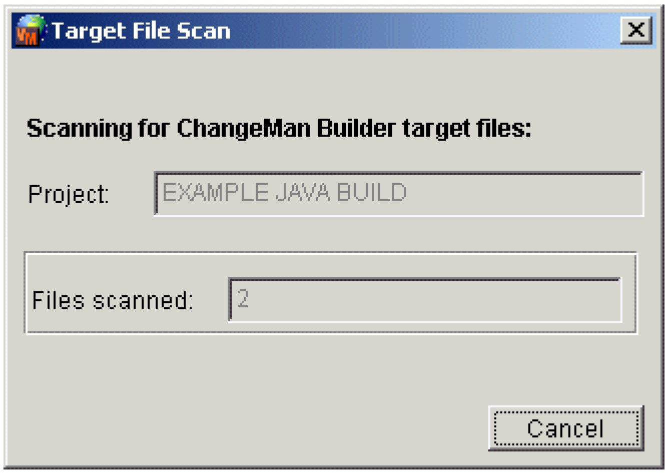
Before you can build a project, you must make sure certain conditions are met:

1. Verify that your ChangeMan Builder administrator has set up a proper project for your build process. That is, if you wish to build a Java project, be sure that there is a project that calls the desired Java compiler and has the proper search path and other parameters defined.
2. In the web client, define the targets you wish to build. This will create a target definition file (.TGT file).
3. Check the target definition file into Version Manager, alongside the source files. You should not need to check it out again unless you wish to change it.

Building the Project

After you check in a set of changes to a given project, follow these steps to build the project:

1. From Version Manager, choose the Actions | Build menu item. ChangeMan Builder scans the project for Builder target definition files:



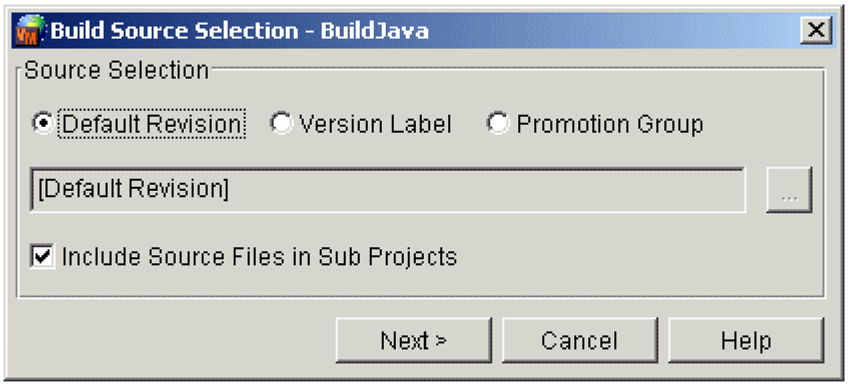
Scanning for ChangeMan Builder target files:

Project: EXAMPLE JAVA BUILD

Files scanned: 2

NOTE If you have not checked in the target definition files, ChangeMan Builder will display a message at this point indicating that it could not find any target definition files in the project.

2 After the scanning completes, you see the ChangeMan Builder Source Selection dialog box:



Build Source Selection - BuildJava

Source Selection

[✓ Default Revision] Version Label Promotion Group

[Default Revision]

✓ Include Source Files in Sub Projects

Selecting Source Revisions

When you are looking at the ChangeMan Builder Source Selection dialog box, your aim is to specify whether you wish to use the default revision, a revision with a particular label, or a particular promotion group.

NOTE If you are unfamiliar with the concepts of labeling and promotion groups, see the *Version Manager User's Guide*.

Choose **Default revision** when you have not used labels nor promotion groups, and are interested in using the latest revision. When you select this option, the text field displays [Default revision]. Both the text field and the browse button are disabled.

Choose **Version label** when you have applied labels to your source code and wish to build only files with that label. When you select this option, the text field and browse button become enabled. Clicking the browse button displays the "Select a version label" dialog box, from which you can select a file and then choose from the available labels.

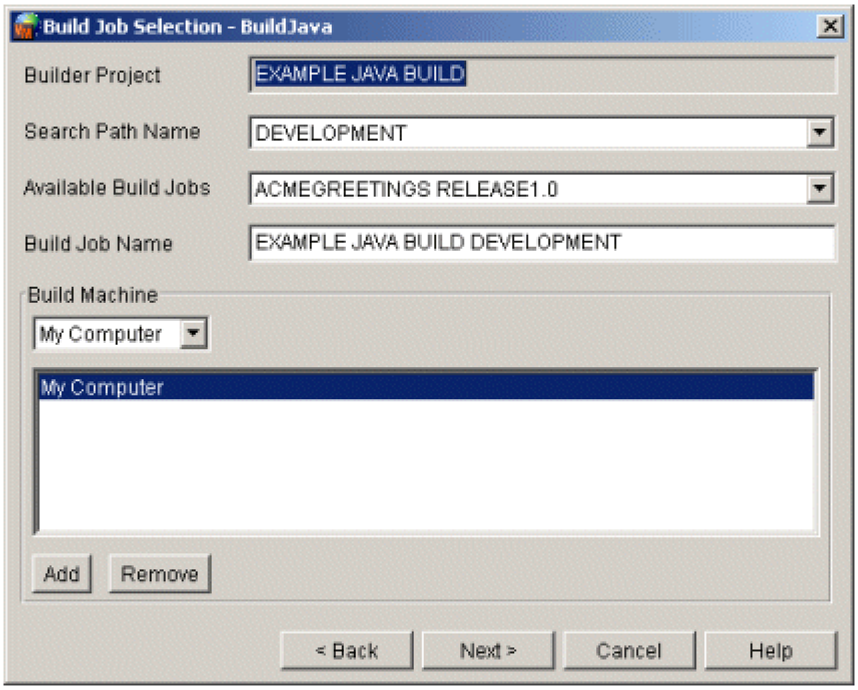
Choose **Promotion group** when you have created promotion groups and wish to build only files in a particular promotion group. (Note that the .TGT file must also be assigned to the promotion group.) When you select this option, the text field and browse button become enabled.

Choose **Include source files in subprojects** when you wish to build all of the files in the subprojects, as opposed to just those at the top level Version Manager project.

When you have finished, click **Next** to move to the Build Job Selection dialog box.

Creating a Build Job

After you have specified how source files should be selected, you are ready to create a build job. This is done with the ChangeMan Builder Job Selection dialog box:



Builder Project: EXAMPLE JAVA BUILD
Search Path Name: DEVELOPMENT
Available Build Jobs: ACMEGREETINGS RELEASE1.0
Build Job Name: EXAMPLE JAVA BUILD DEVELOPMENT
Build Machine: My Computer
My Computer

The dialog box allows you to select from previously-created build jobs. It also allows you to create a build job if none currently exist; the steps for this task follow.

To create a new build job:

1 Verify that the **Project** field lists the correct project.

2 Select a search path name from the list. These search paths are already set up for you by the Administrator. They point to specific directories, which may represent different operating systems or different release versions.

NOTE Once you select a search path, the **Build job name** field is populated, because the default build job name is the project name followed by the search path name. If there were existing build jobs, selecting one from the **Available build jobs** list would replace the default build job, and all subsequent fields would be filled in with the previous settings.

3 If you wish to change the name of the build job, type the new name into the **Build job name** field.

4 Use the **Build machine** list to locate a build machine from the list. This list displays all available machines on the ChangeMan Builder Knowledge Base server.

5 Use the **Add** button to add the selected machine to the large list box.

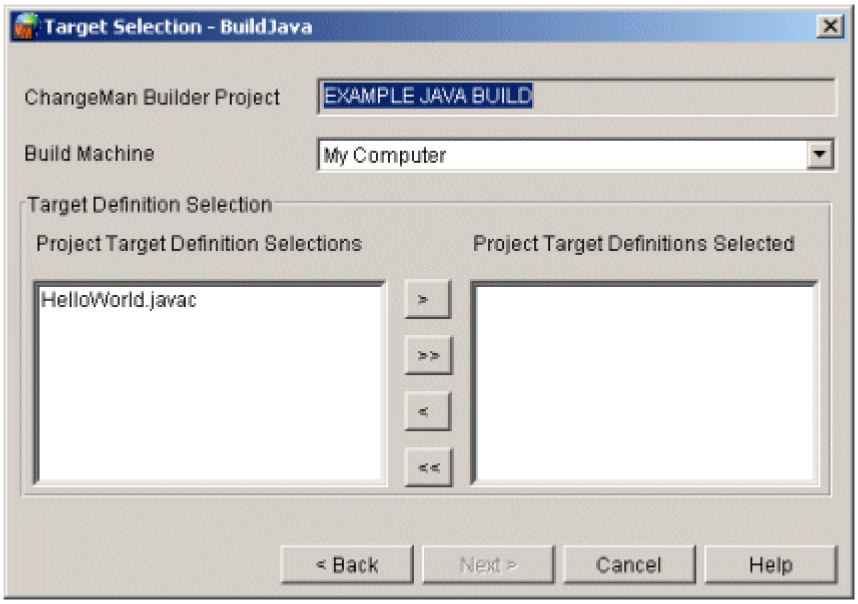
6 Repeat until all desired machines for this build job have been added. The machines in the list box are the ones that will appear in the **Build machine** lists in subsequent dialog boxes.

NOTE Settings in subsequent dialog boxes are based on the currently selected build machine. If you change build machines, you should revisit other settings as well.

7 Click **Next** to move to the ChangeMan Builder Target Selection dialog box. (If Next is grayed out, try clicking the name of the build machine.)

Selecting Targets to be Built

After you have created or selected a build job, you are ready to select the targets to be built. This is done with the Target Selection dialog box:


Target Selection - BuildJava
Target Definition Selection
Project Target Definition Selections
Project Target Definitions Selected
>
>>
<
<<
< Back
Next >
Cancel
Help

ChangeMan Builder Project: EXAMPLE JAVA BUILD
Build Machine: My Computer
HelloWorld.javac

Be aware that the targets change with each build machine—targets are specific to a particular operating system and set of tools.

To select targets:

1 Select a build machine from the list. The selected build machine has associated targets; these targets appear in the **Project Target Definition Selections** list.

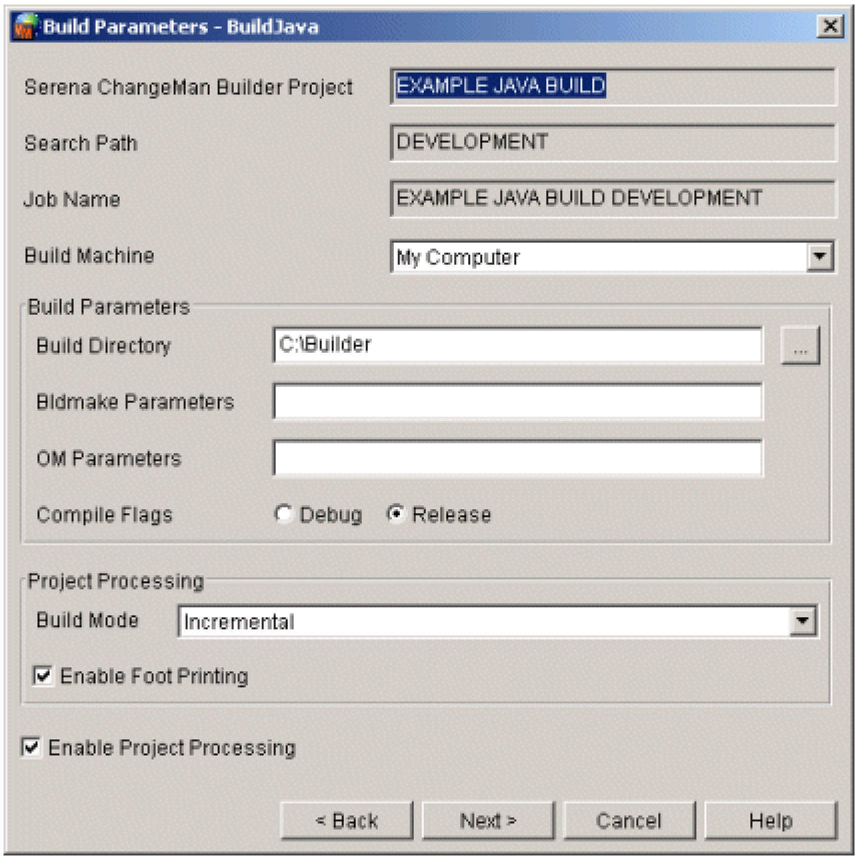
2 Use the arrow buttons to move specific targets from the **Project Target Definition Selections** list to the **Project Target Definitions Selected** list. To add all targets, click the **>>** button.

3 If you wish to remove any targets, use the **<** button, or the **<<** button to remove all targets.

4 When you have finished selecting targets, click **Next** to move to the Parameters dialog box.

Specifying Build Parameters

After you have selected the targets to be built, you are ready to specify build parameters. This is done with the Build Parameters dialog box:



Build Parameters - BuildJava

Serena ChangeMan Builder Project: EXAMPLE JAVA BUILD
Search Path: DEVELOPMENT
Job Name: EXAMPLE JAVA BUILD DEVELOPMENT
Build Machine: My Computer

Build Parameters
Build Directory: C:\Builder
Bldmake Parameters:
OM Parameters:
Compile Flags: Debug [✓ Release]

Project Processing
Build Mode: Incremental
[✓] Enable Foot Printing

[✓] Enable Project Processing

To specify parameters:

1 Select a build machine from the list.

2 Make sure that the build directory points to the location of your source files. If necessary, type the directory path, or use the browse button to locate the correct build directory.

The build directory field defaults to `C:\Builder` on Windows, and `$HOME/Builder` under UNIX.

If you are creating a remote build, you must make sure the build directory path is one that can be recognized by the remote machine. See "Archiving the Target Files" on page 100.

3 Accept the current value for bldmake parameters, or change them as desired.

As described earlier, bldmake is one of the executables that make up ChangeMan Builder for Professional. It has its own set of parameters, which are described in the *ChangeMan Builder Development Guide*.

The parameters that display by default are those that were specified during the creation of the build job. Showing the bldmake parameters here gives you a chance to modify them.

4 Accept the current value for om parameters, or change them as desired.

As with bldmake, om is another executable that is part of ChangeMan Builder for Professional. Its parameters are also described in the *ChangeMan Builder Development Guide*.

5 Accept the current setting for **Debug** or **Release** compiler flags, or change the setting as desired.

The setting of this control is again specified initially during the creation of the build job, but you can modify it here.

6 Accept the default setting of **Enable project processing**, or disable it.

When you leave project processing enabled, the following is true:

- A bldmake pre-event trigger retrieves the selected ChangeMan Builder target file revisions into the build directory.
- The bldmake pre-event trigger also retrieves all project source file revisions into the build directory.
- You can select the build mode (see "Selecting a Build Mode" on page 106).
- You can enable footprint processing, which extracts revision information from the Version Manager archives and embeds it into the final build product (for .EXE and .DLL files only). This can then be queried later; see "Viewing Footprint Information" on page 115.

If you do not enable project processing, then the following is true:

- A bldmake pre-event trigger retrieves the selected ChangeMan Builder target file revisions, but not the source file revisions, into the build directory.
- You cannot select the build mode, which means that ChangeMan Builder will use only the files already populated in the build directory to perform the build.
- You cannot enable footprint processing, so no revision information will be embedded into the .EXE or .DLL files.

Selecting a Build Mode

When Project Processing is enabled, you can select a Build mode. This allows you to control how the build handles existing work files and revisions.

Build Mode	Description
Incremental	Checks out revisions from the archives if the date and time of the archive revisions are newer than the existing work files.
Exact	Checks out revisions from the archives if the date and time on the archive revisions does not match exactly the date and time on the existing work files.
Clean	Deletes existing build directory structure before retrieving revisions from the archives. Note: if you have a file editor or command shell open to the existing directory, that may prevent Clean from completing.

Build Mode	Description
New	Builds only if the named build directory does not exist. This keeps a user from overwriting existing directories. If you wish to perform another build on a build marked New, you must delete any existing build directories first.
Rebuild	Rebuilds all intermediate and final targets. Does the same check for revisions as the incremental build, but then forces a rebuild of the final targets and deletes intermediate files.

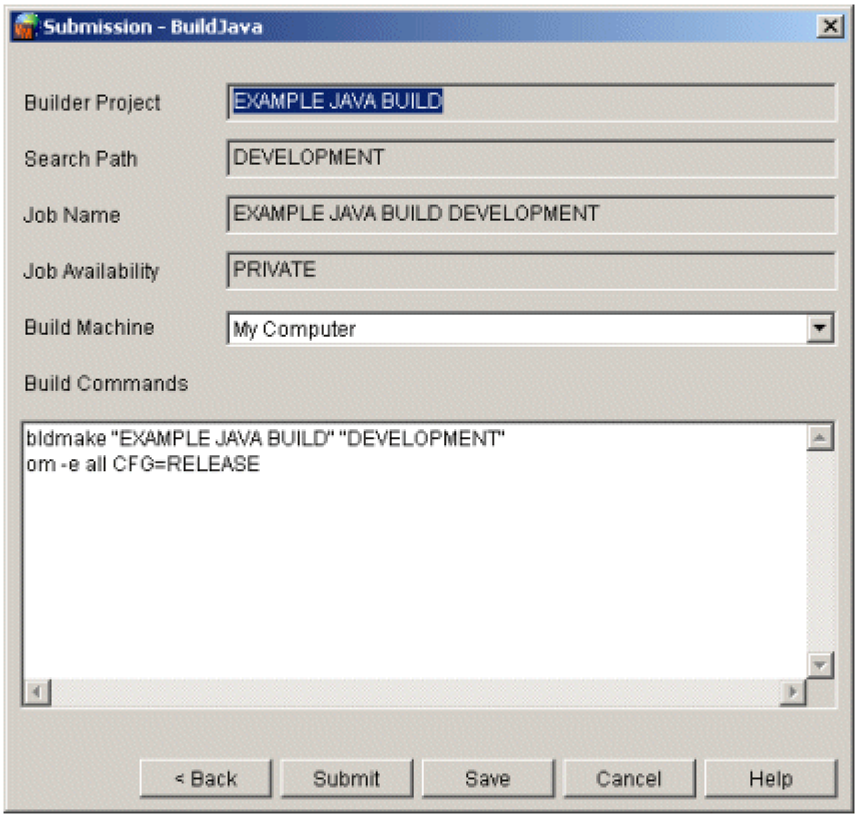
Be careful when using a Clean build! Be sure you know where the build directory is, since that directory will be emptied.

NOTE You might be tempted to add a "cd" command to the Build Commands field, in order to change to a specific directory. If you do this, do not place the "cd" command before the bldmake command, or the Windows version of Builder will report a "Directory deletion failed" error.

After you have specified all of the parameters, click **Next** to move to the ChangeMan Builder Submission dialog box.

Submitting a Build

After you have specified build parameters, you are ready to submit the build. This is done with the Submission dialog box:



Builder Project: EXAMPLE JAVA BUILD
Search Path: DEVELOPMENT
Job Name: EXAMPLE JAVA BUILD DEVELOPMENT
Job Availability: PRIVATE
Build Machine: My Computer
Build Commands

```
bldmake "EXAMPLE JAVA BUILD" "DEVELOPMENT"
om -e all CFG=RELEASE
```

To submit a build job:

1 Select whether the job should be **Private** or **Public**. Private build jobs can be executed only by the person who created the build job. Public build jobs can be executed by and are visible to everyone. You can save a job only as a private build job.

2 For each **Build machine** used in the build:

   a Verify that the build machine is correct.

   b Examine the **Build commands** for the correct bldmake and om commands. This field can contain other commands. For example, if you wanted to automatically launch a text editor when the build completes, you could add a command to do that.

NOTE Be aware that deleting the existing bldmake and om commands can cause the build to fail. You can change, delete, or add to the parameters to either bldmake or om. Also, Serena adds some commands and parameters (to bldmake and om) that are not visible in this field.

3 When you are satisfied with the contents of the dialog box, submit the build job by clicking **Submit**. If you wish to save the build job and submit it later, click **Save**.

4 If there are no problems with the submission of the build job, a dialog box indicates that the build job has been successfully submitted. This does not indicate that the build job has completed successfully. The dialog box indicates how you can view the log (one per build machine) and reports when the build has completed (see "Viewing Reports" on page 112).

NOTE After you save a build job in the Version Manager integration, it is no longer modifiable from the standalone web client. Although the standalone web client will still allow you to make changes to the build directory and other parameters, the build job will still execute according to the parameters defined in the Version Manager integration. These parameters are stored in the VMMBI variables that appear in the Build Commands field.
If you remove the VMMBI variables (and some other additions to the Build Commands field), then you can modify the build job in the standalone web client again. See "Removing Version Manager Integration Variables" on page 108.

Removing Version Manager Integration Variables

If you wish to return a build job to a state where it can be modified in the standalone web client, you must remove the Version Manager integration variables from the Build Commands:

1 In the standalone web client, click **Execute Build Jobs**.

2 Select the build job to be modified from the list of build jobs. The Build Detail page appears.

3 In the Build Commands field, remove every line that begins with SET VMMBI.

4 If you are using a UNIX platform, you should also remove the line that begins with "export". It follows all of the SET VMMBI definitions.

5 In the line that begins with bldmake, delete everything from -rp to the end of the line.

6 In the line that begins with om, delete everything from -vp to the end of the line.

7 Save the build job.

The build job now will be modifiable in the standalone web client.

Workspace Info Not Used in Version Manager Integration

The ChangeMan Builder integration does not make use of workspace information. That means that for a given Version Manager project, ChangeMan Builder will retrieve files based on the project hierarchy, and will disregard any specific workfile locations that may have been set in a workspace.

For example, consider the following Version Manager project:

```
FoucaultApplication
+Module1
--File1.c (in workspace, checks out to C:\Test)
--File2.c (in workspace, checks out to C:\Test)
--Module1.TGT
+Module2
```

In this example, a user has defined a workspace and within that workspace, has set two of the files to check out to a specific workfile location (`C:\Test`). Using the ChangeMan Builder integration to Version Manager, however, the files would be retrieved to the top of the project structure. In this case, that would be the build directory for Module1.

The top of the project structure is considered to be wherever the .TGT file is.

Build Directory Embedded into Integrated Build Jobs

When you save a build job in the Version Manager integration, the build directory is saved with that build job. This means that under certain situations, if you try to change the build directory, you will not be able to.

- If you try to change the build directory by adding a "cd" command to the Build Commands field of the Submission dialog, that will not work (and may cause problems; see "Build directory deletion fails on clean build in Windows Version Manager Integration" on page 125).
- If you use the standalone web client to open a build job that previously has been saved in the Version Manager integration, the build directory set in the Version Manager integration will be retained. If you want to change the build directory, you must change it in the Version Manager integration, or you must delete all of the Version Manager integration variables in the Build Commands field (see "Removing Version Manager Integration Variables" on page 108).

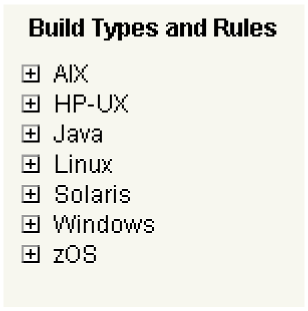
Incorporating an Ant Task into ChangeMan Builder

This feature is available only in ChangeMan Builder for Professional Enterprise Edition.

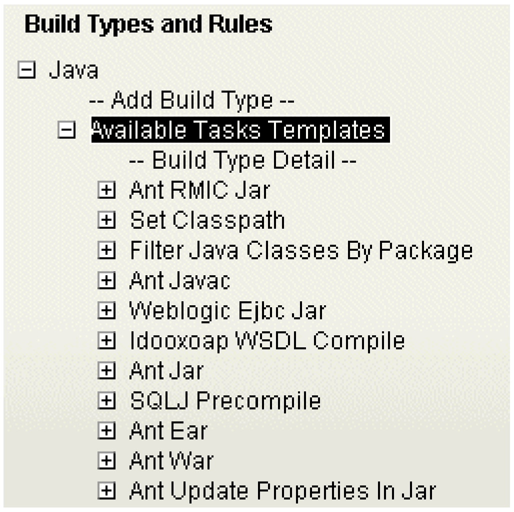
In earlier versions of ChangeMan Builder, many Ant tasks were available under the Target Detail page. Now, however, the build tasks for each type of build job are templated, and only the appropriate tasks appear. Each build task corresponds to an Ant task.

If you have Administrator privileges, you can still view the list of Ant tasks and add them to a particular build type.

To view the list of available tasks, click **Define Build Types** in the Administration menu on the ChangeMan Builder standalone web client home page. A list of build types and rules appears.



If you expand the Java entry, and then the Available Tasks Templates entry, you will see the list of available Ant tasks:



If you require a task that is not included in the existing set of tasks, it is possible to add the task. This requires creating a Perl command script and an XML file to describe the task to the Knowledge Base server.

Creating your own command script requires Perl proficiency and is beyond the scope of this manual. See the "Scripting" section of the *ChangeMan Builder Administration Guide*.

Using Remote Build Machines

NOTE This feature is available only on the Enterprise Edition of ChangeMan Builder, and also requires the purchase of remote build server licenses.

If you are using the Enterprise Edition of ChangeMan Builder, you can run builds on machines other than your own. These machines are known as remote build machines or remote build servers.

Setting Up Remote Build Machines

Remote build machines must be set up at install time. Once this is done, the ChangeMan Builder Knowledge Base server becomes aware that they are available, and henceforth they appear in the list of available build machines. The details of the remote build server install process are covered in the *ChangeMan Builder Installation Guide*.

Setting Up Remote Builds

When creating a build that will run on a remote machine, the build directory path must be in a form that can be recognized by the remote machine.

In Windows, if the remote build machine is mapped to a local drive on your machine, you can use the browse button to locate the build directory. However, you will have to edit the path so that it is recognizable to the remote machine.

Another way to specify build directories is to use an environment variable. For example:

```
%SERENA_CM_BUILD_DIR%\build_project\dev
```

Remote Builds and Permissions

Permissions can cause a remote build to fail. If the process running the remote build does not have permission to reach the Version Manager archive databases (PDBs) or the directories where tools such as compilers are located, the build will fail.

To avoid this problem, you should do the following:

- Make sure there is a particular user ID that has access to the Version Manager PDB files; for example, the pvcs user ID.
- On Windows, open the Services dialog box (from Control Panel | Administrative Tools) and check the properties of the "Openmake Build Server" service.
- You should log in as the user ID of the remote process to check permissions.

Creating a Remote Build

To create a remote build:

1. Find out which machines on your network are available as remote ChangeMan Builder servers, and verify that they have Version Manager, the proper compilers, and any other necessary software installed.

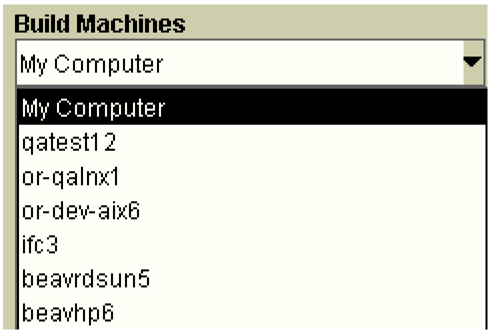
2 If you are using the web client, verify that you have permission to copy your source files to these machines; if you are using the desktop client, this is unnecessary.

3 Have the ChangeMan Builder administrator define a search path that points to a build directory on the remote build machine.

4 Set this directory as the build directory in ChangeMan Builder.

5 Set up the build job normally.

6 When you execute the build job, select the remote build machine from the list of available machines:



7 In the Build Commands field, add the commands necessary to change the current directory of the remote machine to the directory containing your source files. Add these commands before the line containing bldmake. For example:

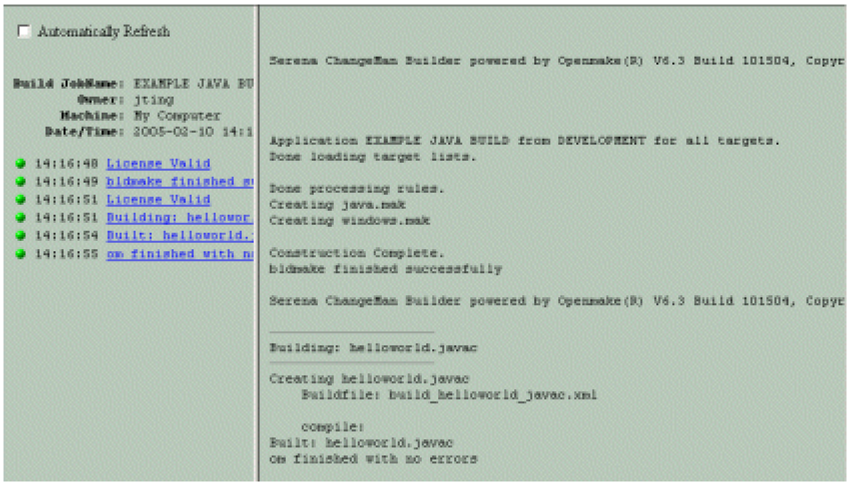
```
cd /d C:\data\Build_Directory\Test1
bldmake "EXAMPLE_TEST1" "RELEASE"
```

8 Save the build job.

9 Execute the build job.

Viewing Reports

After you have successfully submitted a build, ChangeMan Builder launches a log browser for the just-submitted build job:



```
Build JobName: EXAMPLE JAVA BU
        Owner: jting
      Machine: My Computer
    Date/Time: 2005-02-10 14:1

● 14:16:48 License Valid
● 14:16:49 bldmake finished s
● 14:16:51 License Valid
● 14:16:51 Building: hellowor
● 14:16:54 Built: helloworld.
● 14:16:55 om finished with n
```

```
Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504, Copyr



Application EXAMPLE JAVA BUILD from DEVELOPMENT for all targets.
Done loading target lists.

Done processing rules.
Creating java.mak
Creating windows.mak


Construction Complete.
bldmake finished successfully

Serena ChangeMan Builder powered by Openmake(R) V6.3 Build 101504, Copyr


Building: helloworld.javac

Creating helloworld.javac
    Buildfile: build_helloworld_javac.xml

    compile:
Built: helloworld.javac
om finished with no errors
```

The browser has two panes:

- The left-hand pane shows the name of the build job, a summary of the build activities, and a check box controlling whether or not the browser should be automatically refreshed.
- The right-hand pane displays messages describing the progress of the build. If you see the message "No information has been logged at this time", it commonly means that the build has not yet completed. If the build has completed, you will likely see the message "om completed successfully."

Viewing the Log for a Previous Build

If you want to see the log for a build performed in the past, click **View Reports** on the ChangeMan Builder web client, then locate and double-click the build in the tree of reports. A new log browser window displays the build log.

To view the log for a build performed in the past:

1. Click **View Reports** on the ChangeMan Builder web client.
2. Double-click **Build Logs** to expand its list of entries. You see a list of date entries (Today, Yesterday, and so on). Date entries that have build logs appear with plus signs next to the name.
3. Locate and expand the desired date entry. You see a list of build machines. If you are building only on your own computer, "My Computer" will be the only entry.
4. Double-click the desired build machine entry to find the desired build log. The build logs are named with timestamp information.
5. Double-click the build log to view it again.

Impact Analysis

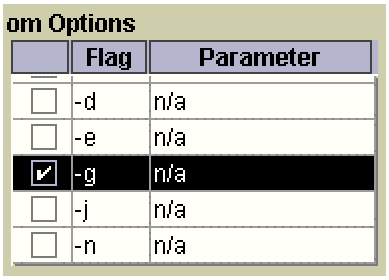
This feature is available only with the Enterprise Edition of ChangeMan Builder for Professional.

Impact analysis allows you to predetermine which files will be affected by a change. You can see which files are used to create the result of the build, or you can see which build result is affected by the file in question.

ChangeMan Builder calls these two types of impact analysis reports **implosion reports** and **explosion reports**:

Enabling Impact Analysis

To view impact analysis reports, you must generate the information at the time of the build. To do this, edit the build job so that the -g parameter is passed to om:



om Options

	Flag	Parameter
☐	-d	n/a
☐	-e	n/a
✓	-g	n/a
☐	-j	n/a
☐	-n	n/a

Implosion and Explosion Reports

Both types of reports provide information about what files will be affected by a change to the source code. The main difference is where the reports begin.

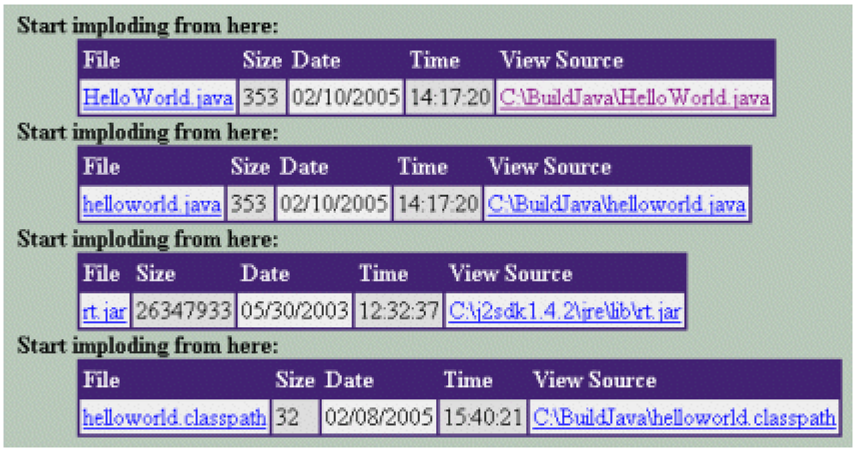
Implosion reports start with the files that were used in the build and show you how those files affect the build result.

Explosion reports start with the build result and expand to show you the files that made up the build result.

To view either type of report:

1. Click **View Reports** on the ChangeMan Builder web client.
2. Double-click **Impact Analysis** to expand its list of entries.
3. Double-click the date entries (Today, Yesterday, and so on) to find the desired impact analysis report. The reports are named with timestamp information.
4. Select the desired report, then click either the Implosion or Explosion icon.

Here is a sample Implosion report:



Start imploding from here:

File	Size	Date	Time	View Source
HelloWorld.java	353	02/10/2005	14:17:20	C:\BuildJava\HelloWorld.java

Start imploding from here:

File	Size	Date	Time	View Source
helloworld.java	353	02/10/2005	14:17:20	C:\BuildJava\helloworld.java

Start imploding from here:

File	Size	Date	Time	View Source
rt.jar	26347933	05/30/2003	12:32:37	C:\j2sdk1.4.2\jre\lib\rt.jar

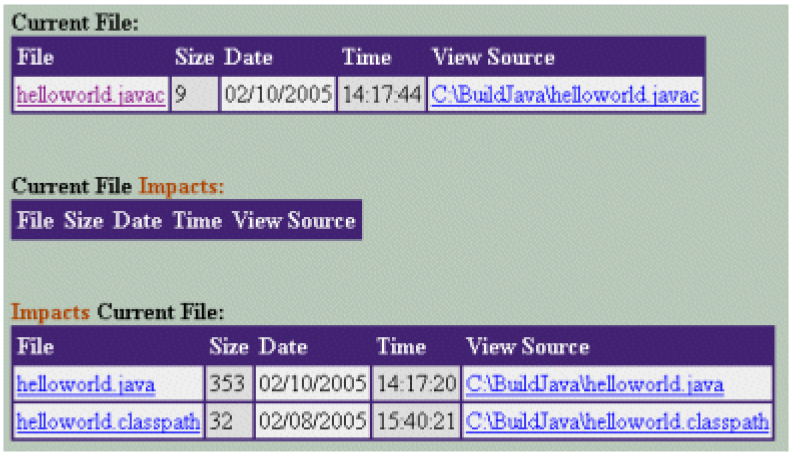
Start imploding from here:

File	Size	Date	Time	View Source
helloworld.classpath	32	02/08/2005	15:40:21	C:\BuildJava\helloworld.classpath

The blue links lead to pages with more detail. On the detail pages you will see the following notes:

When you see...	It means:
Current File	The starting point of the analysis.
Impacts Current File	These files affect the Current File.
Current File Impacts	These files are affected by the Current File.

Here is how the report (in this case an Explosion report) is expanded after you click on a blue link::



Current File:

File	Size	Date	Time	View Source
helloworld.javac	9	02/10/2005	14:17:44	C:\BuildJava\helloworld.javac

Current File Impacts:

File	Size	Date	Time	View Source

Impacts Current File:

File	Size	Date	Time	View Source
helloworld.java	353	02/10/2005	14:17:20	C:\BuildJava\helloworld.java
helloworld.classpath	32	02/08/2005	15:40:21	C:\BuildJava\helloworld.classpath

Viewing Footprint Information

Footprint information in .EXE or .DLL files may be viewed using the `omident` utility in the *\bin* directory underneath the ChangeMan Builder command-line client install directory.

From a command prompt, type:

```
omident <name of final target executable>
```

This will print the footprinting information to standard output.

The ChangeMan Builder for Professional Web Client

The ChangeMan Builder for Professional Web client is to be used with the Version Manager web client. Its dialogs and functionality should be identical to the desktop Version Manager integration, except that you cannot execute a local build.

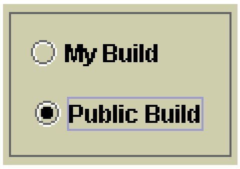
Therefore, if in the Web client you define a build job that names "My Computer" as the build machine, you will not be able to execute that job.

Customizing Build Jobs

When you click **Execute Build Jobs**, two lists of build jobs appear, Public Builds and My Builds. Normally you select a build job from one of the lists, and then click the Execute icon. However, if you edit the build job, either by double-clicking the name of the build job or by clicking the Edit icon, you can customize the build job in the following ways.

Public vs. Private Build Jobs

By default, build jobs that you create are private, meaning that they are not executable by anyone other than you. You can make your build jobs available to others by specifying that they are Public:

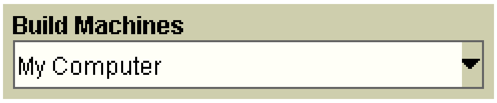

My Build [✓ Public Build]

Some caveats:

- Once a build job has been made public, it cannot be made private again.
- If a build job requires access to specific archives, those archives must also be available to everyone, or at least to users executing the build job—otherwise the build job will fail.
- If you are the creator of a private build job that has been made public, you retain your ability to modify that build job, even if you do not have permissions to modify any other public build jobs.

Changing the Build Machine

If you have the Enterprise Edition of ChangeMan Builder, your ChangeMan Builder administrator has the ability to set up multiple build machines. If you click **Execute Build Jobs**, select a build job, and then expand it, you will see a pulldown list of build machines on the Build Detail page :


Build Machines: My Computer

By selecting a different build machine, you can cause the build to be executed on that machine, but:

- The specified build directory must exist on that machine.
- If the build machine uses a different operating system or platform, you may have to specify new build targets.

Changing the Build Job Name

You can also change the build job name on the Build Detail page. You might want to do this to help with debugging a build job, or if you are trying to create a build job by modifying an existing one.

Changing Bldmake or Om Flags

In the Build Commands field on the Build Detail page, you can see the bldmake and om commands that ChangeMan Builder will use to execute your build job. These two commands have many options, and it is beyond the scope of this manual to discuss them all.

TIP You can read about these options in the *ChangeMan Builder Development Guide*; also, typing `bldmake -?` or `om -?` at a command prompt will display the options for the command.

However, here is an example of how you might want to modify the build commands: If you want to add Impact Analysis to a build job (Enterprise Edition only), you could do that by modifying the `om` command to `om -g`.

To do this, click to set the insertion point on the command containing `om`, then edit the command. When you modify the build commands, the disk icon becomes active, allowing you to save the build job if desired.

ChangeMan Builder and Cross-Platform Development

If you plan to use ChangeMan Builder to develop programs on multiple platforms at once, please be aware of the following two suggestions:

- If you use ChangeMan Builder with either of the Version Manager-integrated clients, you must make sure that the Version Manager project databases (PDBs) have been set up properly for cross-platform access. See the *Version Manager Administrator's Guide* for instructions on this process.
- ChangeMan Builder comes with a file that can help with path mapping issues that sometimes arise in cross-platform development. Check the `VMMBI_bldmake_PET_INI.pl` file, which can be found in:

  Windows:
  `<Version Mgr Install Dir>\Serena\vm\common\bin\win32`

  UNIX:
  `<Version Mgr Install Dir>\Serena\vm\<platform>\bin`

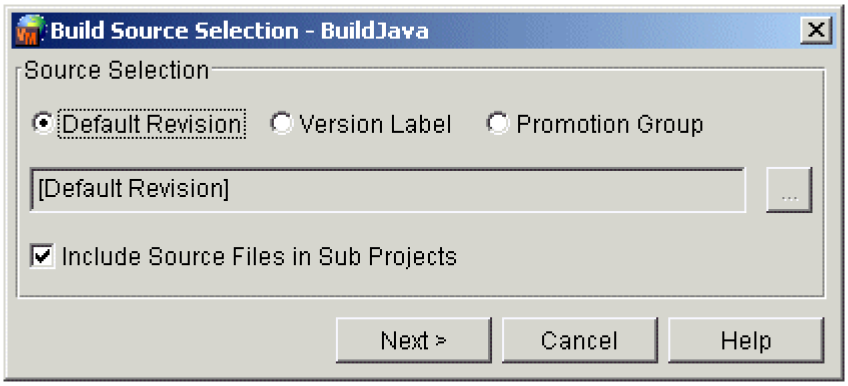
  This file will contain the most up-to-date information regarding path mapping for cross-platform development.

Building from Different Source Revisions

You can use ChangeMan Builder for Professional to build the same set of source files in different ways:

- You can build the default revision (usually the tip, or default version label)
- You can build from a specific version label
- You can build from a specific promotion group

The choice is determined by choosing the appropriate radio button on the Source Selection dialog box.



Building from the Tip

To build from the tip or default version label, click **Default Revision** on the Source Selection dialog box.

NOTE In Version Manager, the default revision is typically the latest revision; however, it can be a version label. The default revision is defined in the workspace setting or a configuration file. See the Version Manager online help.

Building from a Version Label

To build from a specific version label, click **Version Label** on the Source Selection dialog box, then enter the name of the version label, or locate it using the Browse button.

Building from a Promotion Group

To build from a specific promotion group, click **Promotion Group** on the Source Selection dialog box, then enter the name of the promotion group, or locate it using the Browse button.

Be aware that the .TGT file must be assigned to the same promotion groups as the source files that you are building, or the build will fail.

Building From Reference Directories

Serena ChangeMan Version Manager is able to define reference directories. A reference directory provides a central repository of workfiles for browsing, printing, or copying. These directories automatically store a copy of each workfile each time the workfile is checked into an archive.

Thus, if you add the reference directory to your search path, you can build your project without having to check out revisions.

Some of the examples in the ChangeMan Builder examples directory use an environment variable named REFDIR to define the root of the reference directory. Subdirectories underneath the reference directory then refer to QA or dev, allowing different teams to build different versions of the product.

Your ChangeMan Builder administrator should let you know if you need to define a REFDIR environment variable.

Using ChangeMan Builder with PCLI

ChangeMan Builder for Professional is available from the PCLI interface. A single command, `build`, allows you to execute builds from the PCLI command line, provided that the build job was created using the desktop client. (The build job will run under the user ID that submits the build, not the user ID that created the job.)

NOTE If you have created a build job using the web client only, you will not be able to run it using PCLI.

Here is an example `build` command line:

```
C:>pcli build -prC:\Test\YourVersionMgrDatabaseName
   -pp/YourVM_Project -bjPCLI_BUILDJOB
```

where the -pr flag specifies the location of the Version Manager database, the -pp flag specifies the location of the Version Manager project, and the -bj flag specifies the name of the ChangeMan Builder build job.

For full usage details on the build command, use the help flag:

```
C:>pcli build -h
```

The command is also documented in the *Version Manager PCLI User's Guide and Reference*.

Chapter 8

Troubleshooting

This section discusses troubleshooting information, tips, and suggestions for using Serena® ChangeMan® Builder™ for Professional.

Checklist

Here is a checklist for the user starting to use Serena® ChangeMan® Builder™ for Professional.

- ❑ Have the correct type and number of ChangeMan Builder licenses
- ❑ Have received the URL for the standalone web client from Administrator
- ❑ Have verified that the Knowledge Base server is up and running (use ping)
- ❑ Have installed a compatible version of the Java Development Kit
- ❑ Have set environment variables (UNIX: **TMP**; Windows: **tmp** and **temp**)
- ❑ Have installed the Java runtime client
- ❑ Have seen Welcome screen that indicates I have been added to user list
- ❑ Have set a build directory
- ❑ Have installed a compatible version of Perl
- ❑ Have installed the command-line client
- ❑ UNIX: Have received changes to `.profile` from Administrator (to set environment variables; see "UNIX: Adding Setup Information to Accounts" on page 40

If all of the above are true, you should be able to start building projects as described in the "Tutorial" on page 45.

Troubleshooting

Here are some commonly-experienced problems, along with suggestions for what to do.

- Compiler complains of no input files

  This may be because the directory containing the source files are not specified in the Search Path.

- Project was not found on the KB (Knowledge Base) server

  This may mean that your target definition file makes reference to a project that has changed or was deleted.

- Error connecting to KB server

  This may mean that there are network problems, but it may also mean that there are no valid ChangeMan Builder licenses. ChangeMan Builder performs a license check when any of the clients, including the PCLI client, tries to connect to the Knowledge Base server.

- Can't find compiler

  ChangeMan Builder does not use the search path to locate your compiler. Use your PATH variable to specify the path to your compiler.

- Could not find any targets in the target list

  ChangeMan Builder cannot find any targets. Check the Setup Build page to make sure that at least one target is selected.

  If you see this message when trying to do a remote build, it may mean that ChangeMan Builder is not aware of where your source files are on the remote machine. You must either add the source directory to the search path in a form recognizable to the remote machine, or use commands such as "cd <source directory>" preceding the bldmake command on the Build Detail page of Execute Build Job.

- Metalworks example: class BigContrastMetalTheme is public, should be declared in a file named BigContrastMetalTheme.java

  OR

- Bingo example: ERROR 40: The source dependency bingo-server.rmic was not found.

  Add the -s case sensitivity switch to bldmake and try the build job again. In the Version Manager integration, this switch is always on, so this problem should occur only in the standalone web client.

- Targets were defined, but have disappeared

  If you change the build directory, the .TGT file is still in the old build directory and thus ChangeMan Builder cannot find it. You should either recreate the .TGT file or copy it from the old build directory.

- The source dependency <.jar file> was not found.

  If you see an error complaining that a .jar file that you used in the Set Classpath task was not found, even though you listed it as one of the dependencies, you may need to add the path to the .jar file into the Search Path for that project. ChangeMan Builder uses the Search Path to locate .jar or .zip files in the Set Classpath task.

- ChangeMan Builder complains that it can't open a *.mak file

  This may be because you added the *.mak files as Version Manager archives. This is unnecessary and will cause the build to fail, since ChangeMan Builder does a Get on the archives, resulting in read-only workfiles. The only files you need to archive are the source files and the .TGT files.

- ChangeMan Builder complains that it cannot create a *.mak file

  This may be because there are existing *.mak files that are set to read-only. Reset the permissions on these files and try the build job again.

- Log Report Browser opens in same window as web client

  This is a setting controlled by your web browser. For example, in Internet Explorer, deselecting the setting "Reuse windows for launching shortcuts" in Tools | Internet Options | Advanced | Browsing causes the log report browser to open in its own window.

- Log Report Browser opens, but nothing displays

  There are several possible reasons for this:

  - Local builds: Command-line client is not installed
  - Local builds: Command-line client directory is not in the path
  - Remote builds: Remote build server is not running
  - Remote builds: Command-line client is not installed
  - Remote builds: Command-line client directory is not in the path

  The common thread in all of these is that ChangeMan Builder cannot find bldmake in the path.

- PDB path mismatch

  In the Version Manager integrated clients, two situations can cause a PDB path mismatch error to display. In both cases, the error is most likely caused by a build job that has the same name as another build job that references a different Version Manager project (that is, a different PDB).

  Scenario #1: Default build job

  If the default build job is from a different Version Manager project, you will see the error message right away.

  Scenario #2: User selects build job from wrong PDB.

  If you select a build job that has the same name as a build job from a different Version Manager project, then you will see the PDB path error message.

  In both cases, you should select the build job that matches the associated Version Manager project, or click to dismiss the error message and create a new build job.

- ChangeMan Builder asks if you would like to install an update

  If another user (with administrative privileges) has changed the build type you are using, you will be asked if you would like to install an update from the Knowledge Base server.

- ERROR 538: om could not open translated pre script file

  If you see this error, it is possible that the TMP environment variable is not defined, or the user has insufficient privileges to write to or execute scripts in the directory.

- Build directory deletion fails on clean build in Windows Version Manager Integration

  If you see a Build directory deletion error, it is possible that it is caused by the addition of a "cd /d <directory>" command in the Build Commands field of the Submission dialog in the Version Manager integration.

  Using a clean build means that the build directory will be deleted each time the build job begins to execute. If you add a "cd" command into the build directory, Windows considers the directory busy and ChangeMan Builder is unable to delete it.

  If you must add a "cd" to the Build Commands, place it after the bldmake command.

- Error running Retrieve program

  If you see this error, it may mean that ChangeMan Builder is not able to find a supported version of Perl. (The Retrieve program is a Perl script.) Check the value of the PERLLIB environment variable, and check to see that you have a supported version of Perl.

- Unable to get OPENMAKE_SERVER environment variable value

  If you see this error, it could mean that the OPENMAKE_SERVER variable is not set, but it could also mean that Perl is not installed or in your path.

Tips and Suggestions

- Check log files in the build directory

  The integrated version of ChangeMan Builder creates log files that remain in the build directory. If you are having difficulty with a build, check the build directory for the presence of these log files as they may contain information that can help you. The newest data is appended to the end of the log file.

- Use verbose flags

  The build options on the Setup Build page of the web client contain several options that can help you determine what is wrong with a troublesome build.

- Check for conflict with other programs during clean build

  If you tell ChangeMan Builder to perform a clean build, and another program such as a text editor is editing a file in a subdirectory of the build directory, ChangeMan Builder will be unable to delete the contents of the build directory and the build will fail.

- Check for permission to access Version Manager archives

  Even if a build job is Public, if you do not have permission to access the Version Manager archives referenced in the build job, the build job will not complete. That is, if the user who created the build job made it Public, but the archives used in the build job are not available to all user IDs, the build job will fail.

- Check value of OPENMAKE_SERVER environment variable

  This should point to your Knowledge Base server. Normally it is set when you install the command-line client. If you changed the name of your Knowledge Base server machine, or have switched from one KB server to another, you need to reset the value of OPENMAKE_SERVER.

- UNIX: Be aware that Bourne shell is the default shell

  On UNIX, ChangeMan Builder uses Bourne shell as the default shell. This can affect you in two situations:

  - If you define /bin/sh to something other than Bourne shell
  - If you add your own commands to the Build Commands field on the Submission dialog box

  Be aware that ChangeMan Builder is using Bourne shell and adjust your customizations accordingly.

  If you are using both UNIX and Linux, you may find that the bash shell allows the greatest compatibility between platforms.

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