Compare/Merge Command Line Tool for DevOps Model RealTime and RSAD

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Overview

When working with modeling tools like Rational Software Architect Designer (RSAD) or DevOps Model RealTime, users often need to perform compare/merge operations on models outside of the IDE. Previously the only way to invoke compare/merge from command line was to use the XtoolsTypeManager utility which was specifically designed for ClearCase and did not work well with other SCM systems, such as Git. However, recent versions of RSAD and Model RealTime now provide a command line tool solely intended for performing compare/merge operations outside of the IDE. It can be used with any SCM system and is the recommended way of performing compare/merge operations from the command-line.

Tool location and architecture

The compare/merge command line tool is a JAR file called `cmcmdline.jar` and can be found in `<install-dir>\plugins\com.ibm.xtools.comparemerge.team_<version>\utm`, where `<version>` is a version identifier that depends on the version of Model RealTime.

The jar file does not depend on other plugins or libraries and uses only JDK. You may copy it to any other location. The tool connects to a running RSAD or Model RealTime instance and transfers all compare/merge requests to the Team Server in this instance. The Team Server is a special job in the running RSAD or Model RealTime instance which handles compare/merge requests from command line tools.
You may also specify that a new RSAD or Model RealTime instance should be launched to perform the compare/merge operation. The general recommendation is to use a dedicated RSAD/Model RealTime instance for compare/merge operations triggered from command line.

Tool usage

The tool can be executed from the command line as follows:

```
java -cp cmcmdline.jar com.ibm.xtools.comparemerge.cmcmdline.CMTool
<command> <options>
```

The following commands are available:

Command	Description
compare	Perform **non-visual** compare operation. Reports number of conflicts and differences. The details reported by non-visual compare operation can be customized by the option -cformat. The typical output is Non-Visual Compare completed with result : SUCCESS.DIFF conflicts : 0 left diffs : 1 right diffs : 1 The non-visual compare uses the same process as non-visual merge. When running visual compare or merge operation you may see slightly different number of diffs because in visual mode additional groups are created to simplify the

	presentation of changes to the user.
merge	Perform **non-visual** merge operation.
xcompare	Perform **visual** compare operation.
xmerge	Perform **visual** merge operation

The tool exit code is 0 if the compare/merge operation completed successfully and not 0 otherwise. The following conditions are used to determine if the operation was successful or not:

Command	Conditions
compare	Exit code is 0 if no diffs were reported and no issues during compare operation were found.
xcompare	Exit code is 0 if Compare editor was successfully opened. Command line tool will wait until the Compare editor is closed.
merge	Exit code is 0 if non-visual merge was performed successfully, no conflicts were detected and no other issues were found.
xmerge	Exit code is 0 if Merge editor was successfully opened, all conflicts were resolved and the “Commit Merge Session” button was clicked.

The tool also prints a message on the format:

```
<operation name> completed with result : SUCCESS|FAILED[.<additional information>]
```

where *<additional information>* depends on command:

Command	Possible additional information
compare	DIFF or MATCH (if compared contributors are different or not).
xcompare	-
merge	Unresolved conflicts (if merge failed due to unresolved conflicts)
xmerge	Canceled (if merge was canceled by the user)

You may also see other messages as *<additional information>*. This depends on the actual response from the Team Server which was processing the compare/merge request.

Some options require arguments. Arguments can be passed in two format: either as the following command line argument or in the form of an assignment *<option>=<value>:*

```
Form 1: -ancestor myFile.emx
Form 2: -ancestor=myFile.emx
```

The following options are available (the shorthand name for an option is specified after the | symbol):

Option	Description
-ancestor|-a <file path>	Defines the ancestor version for a file compare/merge operation. You can use relative or absolute paths. If a relative path is used, it will be converted to an absolute path according to the current working directory. To change the current working directory use the -cwd option.
-autoLaunch|-al <argument>	Launch the specified RSAD or Model RealTime instance for a Compare/Merge operation. When this option is used, the tool will use **only** the auto-launched version. The argument should be a command line to launch an instance of RSAD/Model RealTime.
-autoLaunchFile|-alf <file path>	The same as -autoLaunch but reads the launch command from the specified file. **HINT**: You may use the file EclipseAutoLaunch.cfg (on Linux) or EclipseAutoLaunchCommand.cfg (on Windows) from the TeamServerSharedData folder which is used by XtoolsTypeManager.
-ccpath	Should be used when ClearCase-specific paths (with @@ symbols) are used in -ancestor, -left and -right options.
-cformat|-cf <argument>	Defines non-visual compare output format. Expected arguments: *details*, *conflicts*, *simple*. Default value is details. • *details* – report number of conflicts, left and right diffs • *conflicts* – report number of conflicts only • *simple* – report if files are different or not
-cwd <argument>	Sets the current working directory. Affects the -ancestor, -left, -right and -log options.
-exportSettings|-exps <file path>	Writes all passed command line arguments to the specified file. **NOTE:** The command and '*-exportSettings*' option are not exported to the file.
-fileExtension|-ext <argument>	Defines common file extension for contributors if they have different file extensions. By default, the tool expects files with the following extensions: • UML models and fragments: emx, efx • UML profiles: epx (not yet implemented) • BPMN models: bpx • Topology models and diagrams: topology, topologyv

-filter="pattern,pattern,.." or -filter "pattern,pattern,pattern.."	Defines a filter for logical or closure Compare operation. See the document "Comparing and Merging Models with Model RealTime" for more about logical/closure compare.
-help|-?	Shows information about tool usage.
-kind <argument>	Defines the kind of compare or merge command: • *file* (default) – file mode • *logical* – logical mode • *closure* – closure mode By default, the tool works in file mode.
-lancestor|-la <argument>	Defines a label for the ancestor version. This label will be used by the Compare/Merge editor when running a visual compare or merge operation.
-left|-l <file path>	Defines the left version for a file compare/merge operation. Relative or absolute paths can be used. If a relative path is used, it will be converted to an absolute path according to the current working directory. To change current working directory use the -cwd option.
-lleft|-ll <argument>	Defines a label for the left version. This label will be used by the Compare/Merge editor when running a visual compare or merge operation.
-log <file path>	Redirect all output to the specified file. Messages will be appended to the end of the file.
-lright|-lr <argument>	Defines a label for the right version. This label will be used by the Compare/Merge editor when running a visual compare or merge operation.
-manifest|-mf <file path>	Defines a manifest for a logical or closure Compare/Merge operation.
-out|-o <file path>	Defines the output file for a file-based merge operation. Cannot be used with logical or closure merge.
-portRange|-p <argument>	Defines the port range where to find a suitable RSAD/Model RealTime instance for the compare/merge operation. The format is <number>:<number>. The default value is 60001:60020.
-right|-r <file path>	Defines the right version for a file compare/merge operation. Relative or absolute paths can be used. If a relative path is used, it will be converted to an absolute path according to the current working directory. To change current working directory use the -cwd option.

-settings|-is <file path>	Reads options from a text file. Options should be specified on the format: *<option name>=<value>* or *<option name>=* One line can contain just one assignment. The first format is used for options with non-empty argument. The second format is for options without arguments. Lines that start with a '#' symbol are ignored.
-shutdown	Kills the RSAD/Model RealTime instance after the compare/merge operation is completed. By default, it kills the instance only if non-visual compare or merge operation was performed. Use *-shutdown=force* to kill the instance in any case.
-source|-src <argument>	Defines the source context for a logical or closure compare/merge operation. See the document "Model RealTime EGit Integration: Logical and closure merge from command line" to learn about invoking logical/closure merge from the command line.
-target|-trg <argument>	Defines the target context for a logical or closure compare/merge operation. See the document "Model RealTime EGit Integration: Logical and closure merge from command line" to learn about invoking logical/closure merge from the command line.
-threadCount <argument>	Defines the number of threads to use for detecting an appropriate RSAD/Model RealTime instance to use for the compare/merge operation. The default value is 10. If the port range is large, it is recommended to increase the number of threads to increase performance.
-verbose|-v <optional argument>	Enables additional log messages. Details can be customized via the argument. The format of the argument is: *-verbose=[+|-]tool(,[+|-]tool)** where 'tool' may have the following values: • *PROXY* - Show details about communication with TeamServer. **Default value is false.** • *WSCHECK* - Show details about matching specified workspace against TeamServer. **Default value is true.** • *CONNECT* - Show details about establishing connection to TeamServer. **Default value is true.** • *EXCEPTION* - Show exception stack traces. **Default value is false.** • *PATH* - Show details about path conversion. **Default value is true.** • *SYSPROP* - Show processing of system properties. **Default value is false.**

	• *SHUTDOWN* - Show details about the RSAD/Model RealTime instance when it shuts down. **Default value is false.** • *RPLYSOCK* - Show additional details about connection to the auto-launched RSAD/Model RealTime instance. **Default value is false.** • *AUTO* - Show details about auto-launching of the RSAD/Model RealTime instance. **Default value is false.** • *PROGRESS* - Show auto-launching progress in console. **Default value is true.** • *ALL* - Enables or disables logging from all tools. • *silent* – Disables all messages.
-waitForLaunch|-wl <argument>	Wait for *1000 * <argument>* milliseconds when connecting to an auto-launched RSAD/Model RealTime instance. The default value is 180. You may increase this time if launching takes more time in your environment.
-workspace|-ws <argument>	Defines a pattern for workspace selection when connecting to a running RSAD/Model RealTime instance. The workspace pattern can include * and ? wildcard symbols. Example: *-workspace=/home/*/myworkspace* NOTE: The argument of -workspace option is matched against the **full path to workspace** in the file system. The workspace name specified in the preference *General - Workspace - Workspace name* is not used.
-SP<NAME>=<VALUE> or -SP<NAME>	Defines the system Java property with given name and value (optionally). This Java property will be also defined in the running RSAD/Model RealTime instance when performing a compare/merge operation.

Examples

Non-visual compare (diff)
Command: D:\tmp\cm_api_automatic_tests>C:\java-install\jdk\jre\bin\java.exe -cp C:\eclipse\plugins\com.ibm.xtools.comparemerge.team_7.60.100.v20180706_1406\utm\cmcmdline.jar com.ibm.xtools.comparemerge.cmcmdline.CMTool compare -ancestor=models/conflicting/CPPModel.emx -left=models/conflicting/CPPModel-v1.emx -right models/conflicting/CPPModel-v2.emx **Output:** PATH : Converted path in -ancestor=models/conflicting/CPPModel.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel.emx PATH : Converted path in -left=models/conflicting/CPPModel-v1.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel-v1.emx PATH : Converted path in -right=models/conflicting/CPPModel-v2.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel-v2.emx

```
CONNECT  : Connecting to TeamServer...
CONNECT  : Connected to TeamServer at port 60002. Protocol: 9.2
Non-Visual Compare completed with result : SUCCESS.DIFF
conflicts       : 2
left diffs      : 2
right diffs     : 1
```

Non-visual compare (match)

Command:

```
D:\tmp\cm_api_automatic_tests>C:\java-install\jdk\jre\bin\java.exe -cp C:\eclipse\plugins\
com.ibm.xtools.comparemerge.team_7.60.100.v20180706_1406\utm\cmcmdline.jar
com.ibm.xtools.comparemerge.cmcmdline.CMTool compare
-ancestor=models/conflicting/CPPModel.emx -left=models/conflicting/CPPModel.emx -right
models/conflicting/CPPModel.emx
```

Output:

```
PATH     : Converted path in -ancestor=models/conflicting/CPPModel.emx to D:\tmp\
cm_api_automatic_tests\models\conflicting\CPPModel.emx
PATH     : Converted path in -left=models/conflicting/CPPModel.emx to D:\tmp\
cm_api_automatic_tests\models\conflicting\CPPModel.emx
PATH     : Converted path in -right=models/conflicting/CPPModel.emx to D:\tmp\
cm_api_automatic_tests\models\conflicting\CPPModel.emx
CONNECT  : Connecting to TeamServer...
CONNECT  : Connected to TeamServer at port 60002. Protocol: 9.2
Non-Visual Compare completed with result : SUCCESS.MATCH
conflicts       : 0
left diffs      : 0
right diffs     : 0
```

Non-Visual merge

Command:

```
D:\tmp\cm_api_automatic_tests>C:\java-install\jdk\jre\bin\java.exe -cp C:\eclipse\plugins\
com.ibm.xtools.comparemerge.team_7.60.100.v20180706_1406\utm\cmcmdline.jar
com.ibm.xtools.comparemerge.cmcmdline.CMTool merge
-ancestor=models/non_conflicting/CPPModel.emx -left=models/non_conflicting/CPPModel-v1.emx
-right models/non_conflicting/CPPModel-v2.emx -out run/merged.emx
```

Output:

```
PATH     : Converted path in -ancestor=models/non_conflicting/CPPModel.emx to D:\tmp\
cm_api_automatic_tests\models\non_conflicting\CPPModel.emx
PATH     : Converted path in -left=models/non_conflicting/CPPModel-v1.emx to D:\tmp\
cm_api_automatic_tests\models\non_conflicting\CPPModel-v1.emx
PATH     : Converted path in -right=models/non_conflicting/CPPModel-v2.emx to D:\tmp\
cm_api_automatic_tests\models\non_conflicting\CPPModel-v2.emx
CONNECT  : Connecting to TeamServer...
CONNECT  : Connected to TeamServer at port 60002. Protocol: 9.2
Non-Visual Merge completed with result : SUCCESS
```

Visual merge

Command:
D:\tmp\cm_api_automatic_tests>C:\java-install\jdk\jre\bin\java.exe -cp C:\eclipse\plugins\com.ibm.xtools.comparemerge.team_7.60.100.v20180706_1406\utm\cmcmdline.jar com.ibm.xtools.comparemerge.cmcmdline.CMTool xmerge -ancestor=models/conflicting/CPPModel.emx -left=models/conflicting/CPPModel-v1.emx -right models/conflicting/CPPModel-v2.emx -out run/merged.emx

Output:
PATH : Converted path in -ancestor=models/conflicting/CPPModel.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel.emx
PATH : Converted path in -left=models/conflicting/CPPModel-v1.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel-v1.emx
PATH : Converted path in -right=models/conflicting/CPPModel-v2.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel-v2.emx
CONNECT : Connecting to TeamServer...
CONNECT : Connected to TeamServer at port 60002. Protocol: 9.2
Visual Merge completed with result : SUCCESS

Failed non-visual merge (due to unresolved conflicts)

Command:
D:\tmp\cm_api_automatic_tests>C:\java-install\jdk\jre\bin\java.exe -cp C:\eclipse\plugins\com.ibm.xtools.comparemerge.team_7.60.100.v20180706_1406\utm\cmcmdline.jar com.ibm.xtools.comparemerge.cmcmdline.CMTool merge -ancestor=models/conflicting/CPPModel.emx -left=models/conflicting/CPPModel-v1.emx -right models/conflicting/CPPModel-v2.emx -out run/merged.emx

Output:
PATH : Converted path in -ancestor=models/conflicting/CPPModel.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel.emx
PATH : Converted path in -left=models/conflicting/CPPModel-v1.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel-v1.emx
PATH : Converted path in -right=models/conflicting/CPPModel-v2.emx to D:\tmp\cm_api_automatic_tests\models\conflicting\CPPModel-v2.emx
CONNECT : Connecting to TeamServer...
CONNECT : Connected to TeamServer at port 60002. Protocol: 9.2
Non-visual Merge completed with result : FAILED.Unresolved Conflicts