

# Diff

This topic covers the Diff tool, which compares saved data with incoming data and reports differences in SOAtest and Virtualize. Sections include:

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## Understanding Diff

With support for Binary, Text, XML, and JSON, the Diff tool is the current backbone of a best-practices regression testing solution. The Diff tool compares the data in its editor against the data that it receives from another tool's output or from another input that you specify and reports a failure when it finds a difference.

The Diff Project Configuration panel is divided into two main sections. The upper section contains general options. The bottom section contains the **Regression Control**, **Ignored Differences**, and **Options** tabs in which you can configure the options for comparing data in text, binary, JSON, and XML formats.

### Configuring Regression Options for Diff Tools in a Test Suite

To customize the logic and data source usage for all Diff regression controls in a test suite:

- Double-click the test suite's Test Case Explorer node and modify the available options, which are described in [Regression Options](#).

As with other tools, you can specify a data source for the tool if a source was added to the project. The data source for the Diff tool specifies the Data Source to be used for providing control values. For more information on Data Sources, see [Parameterizing Tests with Data Sources, Variables, or Values from Other Tests](#).

## Binary Diff Mode

Choose **Binary** from the **Diff Mode** drop-down menu to view differences for binary files.

## Regression Control

This setting determines what data source values, file, or text is used as the "control" value (the value against which it will compare all subsequent results). Choose one of the following options.

- **Editor**: Choose this option from the drop-down menu and enter text you want to use as a regression control in the related field.
- **File**: Choose this option from the drop-down menu and specify a file to use as a regression control. If you want to ensure that this file's path is always relative to your project file, enable the **Persist as Relative Path** option.
- **Data Source Column**: Choose this option from the drop-down menu and specify a value from the designated data source column as regression controls. *This option is only available if your project includes a data source.*

## Text Diff Mode

Choose **Text** from the **Diff Mode** drop-down menu to access the following configuration options for this mode.

## Regression Controls

Determines what data source values, file, or text is used as the "control" value (the value against which it will compare all subsequent results). Choose one of the following options.

- **Editor**: Choose this option from the drop-down menu and enter text you want to use as a regression control in the related field.
- **File**: Choose this option from the drop-down menu and specify a file to use as a regression control. If you want to ensure that this file's path is always relative to your project file, enable the **Persist as Relative Path** option.
- **Data Source Column**: Choose this option from the drop-down menu and specify a value from the designated data source column as regression controls. *This option is only available if your project includes a data source.*

## Ignored Differences

From the **Ignored Differences** tab of the Diff tool for **Text** mode, you can delete any ignored text differences by clicking the **Delete** button

## Options

The following options are available in the **Options** tab of the Diff tool for **Text** mode.

- **Regular Expression:** Determines whether the expected value will be parsed as a regular expression. If this box is unselected, the control value will not be parsed as a regular expression. If this box is selected, the control value will be parsed as a regular expression. For example, the following regular expression may be entered:  
`Java[a-zA-Z ]+\Q(\E[4-9]+th Edition\Q)\E`  
Where the actual string extracted may be the following: Java How to Program (4th Edition)  
The regular expression will parse through the above string to check if "Java" appears as the first substring, followed by one or more occurrences (indicated by the + operator after the open and closed brackets) whereas the occurrences are limited to only letters ranging between a-z and A-Z and whitespace. Notice we escaped ( and ) by adding \Q and \E around ( and ). This needs to be done because open and closed parentheses can be part of a regular expression, therefore they need to be escaped if they are represented to be substrings. We also have a digit appear after the first open parenthesis which is indicated by [4-9]+. This specifies at least one occurrence of a digit between 4 and 9 that should appear and be followed by "th Edition". Lastly we have the closed parenthesis which we escape with \Q\E.
- **Ignore Whitespace:** Determines whether empty lines and whitespaces at the end and beginning of input lines and diff control lines are ignored. If this box is unselected, empty lines and leading/trailing whitespaces will cause the regression test to fail. If this box is selected, empty lines and leading/trailing whitespaces will be ignored.  
A whitespace is any of the following: horizontal tabulation, new line, form feed, carriage return, space. An empty line is a line that contains one or more of these whitespaces.
- **Output results as UNIX-style diff:** Determines the diff output format. If this box is unselected, the output will display in table form. If this box is selected, the output will display in UNIX-style

## XML Diff Mode

Choose **XML** diff from the **Diff Mode** drop-down menu to access options for XML formats. XML mode parses XML files and compares them element by element and attribute by attribute (ignoring "ignorable" whitespace). The result of the comparison is expressed as an XML document. If you want to use this mode, make sure that both inputs are well-formed XML documents which have the same type of document element.

## Regression Control

Determines what data source values, file, or text is used as the "control" value (the value against which it will compare all subsequent results). The Regression Control settings include two graphical representations to configure XML messages.

### Literal XML Regression Controls

The following options are available in the **Regression Control** tab of the Diff tool for **Literal XML** mode.

- **Editor:** Choose this option from the drop-down menu and enter text you want to use as a regression control in the related field.
- **File:** Choose this option from the drop-down menu and specify a file to use as a regression control. If you want to ensure that this file's path is always relative to your project file, enable the **Persist as Relative Path** option.
- **Data Source Column:** Choose this option from the drop-down menu and specify a value from the designated data source column as regression controls. *This option is only available if your project includes a data source.*
- **Set From WSDL:** Initializes the Form XML content with the expected response based on the WSDL. This button is only available if a WSDL document exists for the particular SOAP client.

### Form XML Regression Controls

When Form XML is selected as the regression control mode, the options in the Regression Control tab are divided into an XML View tree and XML configuration tabs.

The XML tree displays the literal XML as a tree with each tree node representing an element. The options for the tree in the Diff panel can be configured in the same fashion as the Form XML SOAP Envelope options of the SOAP Client tool. For more information, see [Manipulating the XML View Tree](#).

The XML Configuration Tabs allow you to add, remove, and rename XML components. The options for the XML Configuration Tabs can be configured in the same fashion as the Form XML SOAP Envelope options of the SOAP Client tool. For more information, see [Manipulating the XML Configuration Tabs](#).

## XML Ignored Differences

From the **Ignored Differences** tab of the Diff tool for **XML** mode, you can **Add** and **Modify** XPath settings by clicking the appropriate buttons. For more information on configuring Ignored Differences, see [Understanding XPath](#)s.

## XML Options

The following options are available in the **Options** tab of the Diff tool for **XML** mode.

- **Diff engine:** Choose a diff engine from the drop-down menu. XMLUnit is the default engine. This engine provides support for large messages, comparisons that generate a large number of differences, and the ability to ignore changes in element order. If desired, you can switch to VMTools or ExamXML MDCXML.
- **Ignore element order:** Configures the tool to ignore element order throughout all areas of every processed document. Note that if you'd rather ignore order for only a specific part of the document, use the XML Sort tool to sort that part before passing the document to the Diff tool. See [XML Sort](#) for details.
- **SOAP mode:** If this box is selected, the following actions are enabled:
  - SOAP multi-references are resolved before diffing and are not reported as errors. For example, some services (such as Axis) rearrange the XML responses in an unpredictable way when using SOAP multi-refs (i.e., giving different id numbers to the references). When such responses are diffed in text mode, failures occur even though the SOAP messages are logically equivalent, but their references are different.
  - Namespace prefix changes in type and arrayType attributes are ignored. This is needed when the control is generated automatically from the WSDL because prefixes cannot be determined in advance.
  - Numerical values are compared as numbers. For example, the difference between 1 and 1.0 would not be reported as an error.
- **Ignore differences in comments:** Disable this option to include changes in XML comments. Default is enabled.

## Using ExamXML MDCXML

ExamXML is a 3rd party tool that is licensed and purchased separately from A7Soft. If you select ExamXML MDCXML, be sure to specify the location of the executable and options file.

Notes:

- Versions tested with this integration include 4.74 and 4.38.
- The MDCXML.exe options file contains various settings for mdcxml, including a list of elementsto ignore. An example of an options file is provided on the A7Soft Web site at <http://www.a7soft.com/mdcxml.html>.
- The options file needs to contain the following minimum settings (using different values for the following parameters is not supported):
  - ValidationErrorAsFatal=0
  - InsertPI=1
  - InsertTags=0
  - InsertComments=0
- In order to use the ExamXML mode, the Diff tool's Control content must be provided in a file.

You can create external regression controls automatically by saving the expected content into files instead of embedding it into the Diff tool as described in [Configuring Regression Testing](#).

## Using VMTools

VMTools is built in to the product. No additional license is needed. If you select VMTools, you can specify the following options:

- **Output results as XML:** Determines the diff output format. If this box is unselected, the output will display in table form. If this box is selected, the output will display in XML. Differences are only reflected when another tool is chained to the message output of the Diff tool.
- **SOAP mode:** If this box is selected, the following actions are enabled:
  - SOAP multi-references are resolved before diffing and are not reported as errors. For example, some services (such as Axis) rearrange the XML responses in an unpredictable way when using SOAP multirefs (i.e., giving different id numbers to the references). When such responses are diffed in text mode, failures occur even though the SOAP messages are logically equivalent, but their references are different.
  - Namespace prefix changes in type and arrayType attributes are ignored. This is needed when the control is generated automatically from the WSDL because prefixes cannot be determined in advance
  - Numerical values are compared as numbers. For example, the difference between 1 and 1.0 would not be reported as an error.

Under certain conditions, VMTools will fall back to a text-based diff. This can happen if the XML is very complex and produces an excessive number of differences or would take an excessive amount of time to complete.

If this occurs, one of the following message will be printed to the Console view to explain what happened.

```
Did not run XML Diff, there are too many differences. Performing text mode diffing instead.
```

```
Did not run XML Diff, it did not finish within 30.0 secs. Performing text mode diffing instead.
```

The maximum time allowed to perform an XML diff before switching to text mode is the default timeout value specified in the preference panel's Misc tab (Connection Settings> Default timeout)—but no higher than 120 seconds.

## JSON Diff Mode Options

When **JSON** is selected from the **Diff Mode** drop-down menu of the Diff tool, the Regression Control and Ignored Differences options are available.

## Regression Control

The following options are available in the **Regression Control** tab of the Diff tool for **JSON** mode.

- **Name:** Specifies the name of the Diff tool.
- **Regression Control Source:** Determines what data source values, file, or text is used as the "control" value (the value against which it will compare all subsequent results).

- **Editor:** Choose this option from the drop-down menu and enter text you want to use as a regression control in the related field.
- **File:** Choose this option from the drop-down menu and specify a file to use as a regression control. If you want to ensure that this file's path is always relative to your project file, enable the **Persist as Relative Path** option.
- **Data Source Column:** Choose this option from the drop-down menu and specify a value from the designated data source column as regression controls. *This option is only available if your project includes a data source.*

## Ignored Differences

From the **Ignored Differences** tab of the Diff tool for **JSON** mode, you can **Add** and **Delete** XPath settings by clicking the appropriate buttons.

## Understanding XPath

When the Diff tool is configured in the XML mode, any differences found between the actual value and the expected value are expressed in XPath. XPath represents the position of an XML element and specifies where a difference occurred, the type of difference that occurred, and whether that difference was caused by a modification, an insertion, or a deletion.

You can determine which XPath to ignore when running the Diff tool. You can choose to either ignore an entire XPath, or you can ignore a specific XPath operation such as a `Content: Insert` operation.

Ignoring XPath is useful for ignoring transient values that would normally cause the regression test to fail. For example, the actual outcome may contain a time stamp value that is constantly changing. Since this value is never the same, it will more than likely not match the value you configure in the Diff tool, causing the test to fail. Therefore, you can specify the XPath of this value to be ignored so that the test will not fail.

There are three different ways you can set XPath to Ignore:

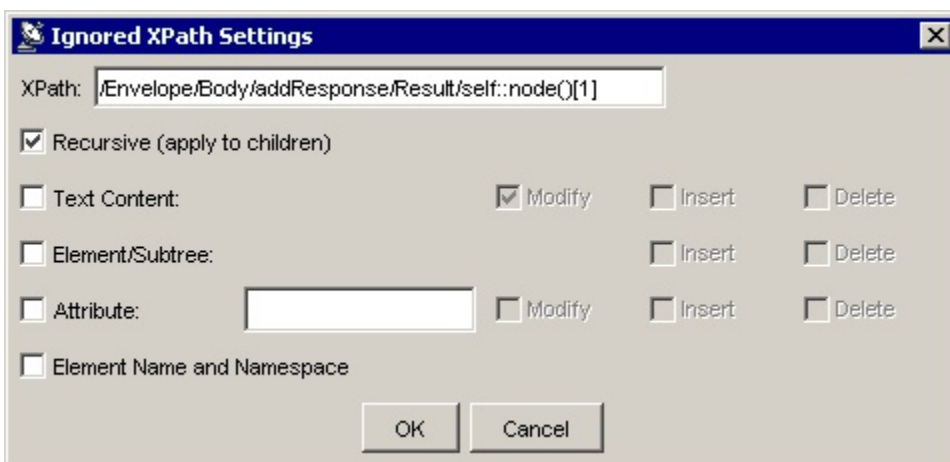
- **Ignore XPath from the Quality Tasks view:** This is the easiest way to configure the Diff tool to ignore XPath. After a failed regression test, you can simply right-click the Quality Tasks view node to select an XPath to ignore.
- **Manually entering an XPath in the Diff GUI:** You can manually enter an XPath by clicking the **Configure Ignored Differences** button in the Diff GUI.
- **Ignore XPath from the Form XML tree:** You can right-click an element node from the Form XML tree and configure an XPath to ignore based on the selected element.

## Ignoring XPath from the Quality Tasks View

When entering XPath to ignore in the Diff tool, it is easiest to right-click in the Quality Tasks view rather than manually entering the XPath position into the Diff tool GUI. XPath positions are displayed in tree form in the Quality Tasks view after a failed regression test:

To ignore an XPath from the Quality Tasks view after a failed regression test:

1. Right-click the error, then choose **Ignore XPath** from the shortcut menu. An **Ignored XPath Settings** dialog displays with the selected XPath automatically entered.



2. Select the appropriate check boxes of the XPath operations you would like to ignore. The following options are available:
  - **XPath:** Specifies the XPath position that you selected.
  - **Recursive:** Select to apply the Ignored XPath settings to child elements.
  - **Text Content (Modify/Insert/Delete):** Select the content operation you want to ignore.
  - **Element/Subtree (Insert/Delete):** Select the element or subtree operation you want to ignore.
  - **Attribute (Modify/Insert/Delete):** Select the attribute operation you want to ignore. If this field is selected, SOAtest will only ignore the specified attribute name within the XPath. To ignore a specific attribute, enter the attribute name in the field next to the **Attribute** check box. If you want to ignore more than one attribute at an element's XPath location, leave the attribute name empty or use the wild card \* (e.g. myAttribute\*).
  - **Element Name and Namespace (Modify/Insert/Delete):** Select the element name operation you want to ignore.
3. Click **OK**.

The XPath you specified will now be ignored for any future test runs. In addition, the XPath you specified now appears in the Ignored Differences tab of the XML Mode in the Diff tool. To modify the XPath, see [Modifying XPath Settings](#).

## Manually Entering XPath's to Ignore

You can also manually type or paste an XPath to ignore into the Diff tool configuration panel.

To manually enter an XPath:

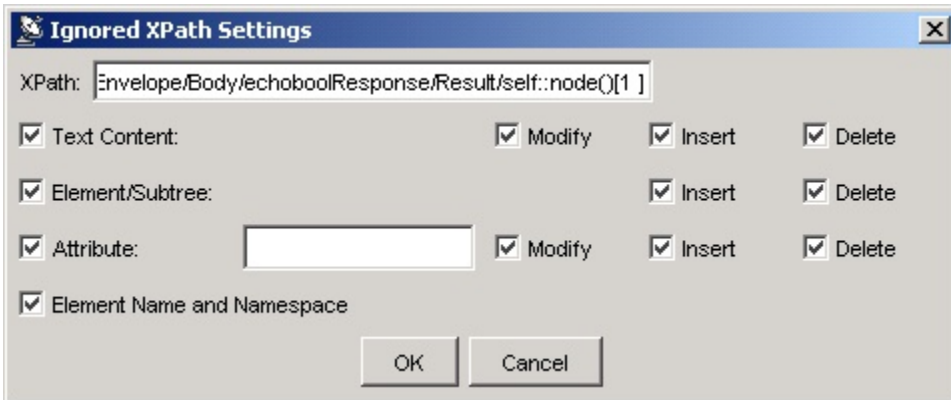
1. Select the **Ignored Differences** tab within the **Text**, **XML**, or **JSON** mode of the Diff tool.
2. Click the **Add** button. An empty field displays in the **XPath** column of the Ignored XPath's list. By default, the **Settings** column is automatically filled in with all XPath operations specified, meaning that the entire XPath you add will be ignored. To specify a single XPath operation to ignore, see [Ignoring XPath's from the Form XML Tree](#).
3. Either enter an XPath position in the empty **XPath** field.
4. To add additional XPath's, repeat steps 1 through 3.
5. Click the **OK** button.

All XPath's added will be ignored in future runs of the modified regression test. For information on modifying ignored XPath's, see [Modifying XPath Settings](#).

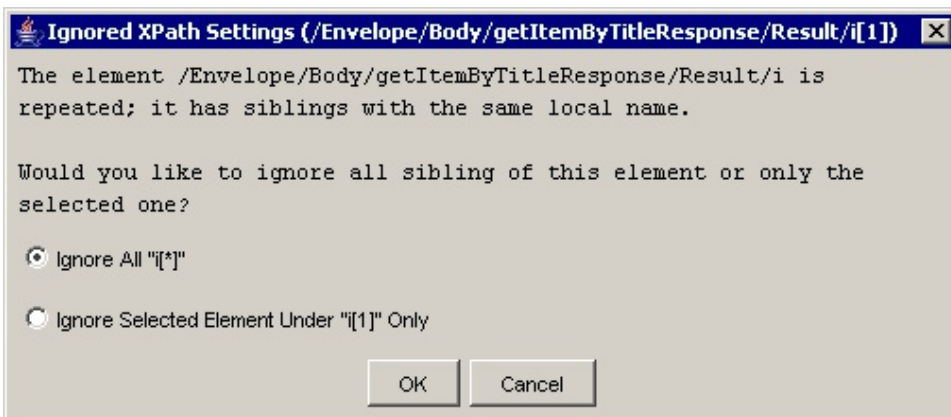
## Ignoring XPath's from the Form XML Tree

You may also ignore XPath's directly from the Form XML tree within the Form XML tab by completing the following:

1. Right-click an element node from the tree and choose **Setup Ignored XPath's** from the shortcut menu.
  - If the element you selected from the Form XML tree is not a repeated element, the **Ignored XPath's Settings** dialog box displays with the selected XPath automatically entered.



- If the element you selected from the Form XML tree is a repeated element that has siblings with the same local name, a Repeated XPath Settings dialog displays.



- You can either select to **Ignore All** of the repeated elements, or **Ignore Selected Element Only**. After making your selection and clicking **OK**, the Ignored XPath's Settings dialog box displays with the selected XPath automatically entered.
2. Select the appropriate check boxes of the XPath operations you would like to ignore. The following options are available:
    - **XPath**: Specifies the XPath position that you selected.
    - **Recursive**: Select to apply the Ignored XPath settings to child elements.
    - **Text Content** (Modify/Insert/Delete): Select the content operation you want to ignore.
    - **Element/Subtree** (Insert/Delete): Select the element or subtree operation you want to ignore.
    - **Attribute** (Modify/Insert/Delete): Select the attribute operation you want to ignore. If this field is selected, only the specified attribute name within the XPath will be ignored. To ignore a specific attribute, enter the attribute name in the field next to the **Attribute** check box.

If you want to ignore more than one attribute at an element's XPath location, leave the attribute name empty or use the wild card \* (e.g. myAttribute\*).

- **Element Name and Namespace** (Modify/Insert/Delete): Select the element name operation you want to ignore.
3. Click **OK**.

The selected element node now displays in gray in the Form XML tree. All XPath operations specified will be ignored in future runs of the modified regression test.

To reset and no longer ignore an XPath, right-click the Ignored XPath node and select **Remove Ignored XPath** from the shortcut menu. The node will then display in black and will no longer be ignored.

## Creating a Shared Ignored XPath List

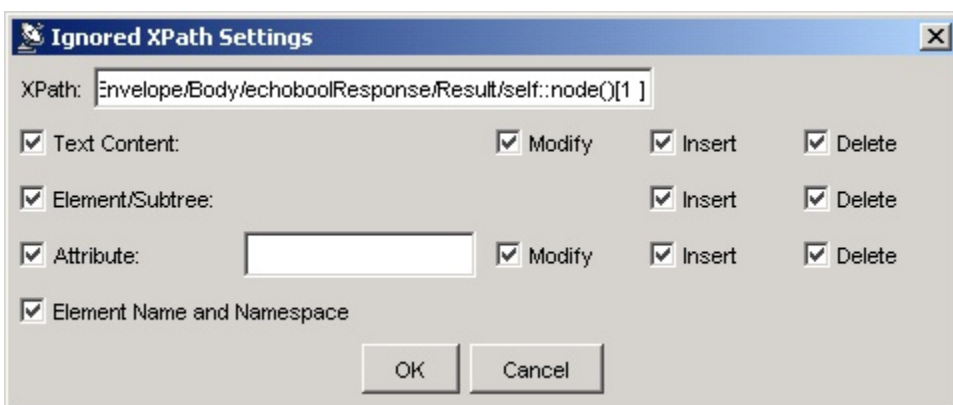
Diff tools can either have their own local, exclusive Ignored XPath settings, or they can reference a list of XPath's that can be used by other Diff tools. To create a shared list of ignored XPath's, see [Global Ignored XPath Properties](#).

## Modifying XPath Settings

By default, when you add an XPath to the Ignored Differences tab, all of the possible operations for that XPath display in the **Settings** column. Since all of the possible operations for the XPath are specified by default, all of these operations will be ignored the next time the regression test is run. However, you can specify which operations are ignored, rather than having all of them ignored, by modifying the XPath settings.

To modify XPath settings:

1. In the Ignored Differences tab, select the XPath you would like to modify and click the **Modify** button. The **Ignored XPath Settings** dialog box displays.



2. Select the appropriate check boxes of the XPath operations you would like to ignore. The following options are available:
  - **Recursive**: Select to apply the Ignored XPath settings to child elements.
  - **XPath**: Specifies the XPath position that you selected.
  - **Text Content** (Modify/Insert/Delete): Select the content operation you want to ignore.
  - **Element/Subtree** (Insert/Delete): Select the element or subtree operation you want to ignore.
  - **Attribute** (Modify/Insert/Delete): Select the attribute operation you want to ignore. If this field is selected, only the specified attribute name within the XPath will be ignored. To ignore a specific attribute, enter the attribute name in the field next to the **Attribute** check box. If you want to ignore more than one attribute at an element's XPath location, leave the attribute name empty or use the wild card \* (e.g. myAttribute\*).
  - **Element Name and Namespace** (Modify/Insert/Delete): Select the element name operation you want to ignore.
3. Click **OK**.

All XPath operations specified will be ignored in future runs of the modified regression test.

## Video Tutorial

In this video, you'll learn how to generate and update regression controls.

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