MDG Integration for Visual Studio User Guide

Introduction

by Alistair Leslie-Hughes

MDG Integration for Visual Studio User Guide

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Foreword

1 Introduction

Welcome to the Enterprise Architect MDG Integration for Visual Studio, version 4.0.0. This set of tools takes the high-level modeling power of Enterprise Architect 7.5 and the Unified Modeling Language 2.1, and directly integrates it with Visual Studio 2005 and 2008.

With MDG Integration you can:
- Provide the UML Analyst, Designer and Architect with the tools to build detailed and precise UML 2.1 models
- Give the Visual Studio developer focused access to UML model content
- Offer the development team strong traceability features, from requirements to model, code, tests and finally to deployed artifacts
- Increase productivity by linking UML models to Domain Specific Language (DSL) tools and artifacts
- Import and synchronize work items from Team Foundation Server.

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- Using MDG Integration For Visual Studio
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MDG Integration Version 4.0 for Visual Studio

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1.3 Using MDG Integration for Visual Studio

The MDG Integration for Visual Studio brings together the model-and-design aspects of Enterprise Architect and UML with all the power of Visual Studio.

Architects and Engineers can communicate directly and efficiently within the Visual Studio environment, and Engineers can see exactly which project elements they are working on and how they relate to the rest of a system. Model elements appear in a special Enterprise Architect window within Visual Studio. Navigation from code to model only takes a mouse-click, and does not require leaving the Visual Studio interface.

For example, a workflow might go like this:

   Architect and designers prepare the model. In this case assume that the model resides in a central database.

   Specific coding tasks are assigned to the software engineers. The engineers can view the model from within Visual Studio. Once assigned a task, an engineer can locate all the model elements within their task domain, along with any notes made by the Architect.

   All the team members involved on the project can use the inbuilt Forum function to swap notes and files. Not only does this facilitate communication amongst team members, but helps to keep track of progress and changes to a project.

To begin using the MDG Integration for Visual Studio, see Getting Started.
2 Getting Started

After installation, you are ready to integrate your Visual Studio project with Sparx Systems' Enterprise Architect.

An Enterprise Architect model (a file with a .eap extension) can be added to a project using standard Visual Studio features. In addition, a wizard is supplied to automate creation and addition in one step. The following subsections describe this process in detail.

- Add an Enterprise Architect Model
- Link to a Model Package
- Multiple Linkings

See Also
- MDG Integrate Options
2.1 Add an Enterprise Architect Model

Add Existing Enterprise Architect Models

If you have an existing .EAP file to incorporate into your Visual Studio solution or project, you can add it using the standard Visual Studio facilities:

- Project | Add Existing Item ([Shift]+[Alt]+[A])
- Solution Explorer's context menu: Add | Existing Item.

The following illustration shows the Solution Explorer option.

When an Enterprise Architect model has been added in this way it might appear in the Solution Explorer unopened. To open it, double click on it.

Create New Enterprise Architect Models

New Enterprise Architect models are created using a wizard available through either the Project Menu | Attach UML Model menu option or through the solution's context menu as indicated below. Models added in this way are always placed inside the Solution Items folder.
After a new or existing model has been added through the ensuing wizard, the model hierarchy displays in an Enterprise Architect EA Project Explorer window on the Visual Studio screen.

**Embed Multiple Models**

While it is possible to embed multiple Enterprise Architect models into a single Visual Studio solution (and embedded projects), it is not possible for the MDG to identify which, of multiple linked projects, contain an element you are trying to view (eg. through View in UML).

It is therefore important that you ensure that any linked model is in the Solution Items folder, and is the first model listed in that folder.

**See Also**

- [Link to a Model Package](#)
2.2 Link to a Model Package

To link a Visual Studio project with an Enterprise Architect model package, follow these steps:

Select an existing package, or create a new model package in the EA Project Explorer - right-click on the parent node and select the Add | New Package menu option; give the package a meaningful name.

Link the package to a Visual Studio project by right-clicking on the package and selecting Current Package | Link Existing UML Package to Visual Studio Project. The Connect Project dialog displays, listing the currently-active projects.

Select the project to link with the Enterprise Architect file, and click the OK button.

When a package has been linked, this status is indicated by a Visual Studio icon next to the package name.

The UML package and the Visual Studio project are now integrated, enabling you to work using the UML model and the powerful toolset of Enterprise Architect, all from within Visual Studio.

See Also

Multiple Linkings
2.3 Multiple Linking

It is possible to link many different Visual Studio projects with multiple UML packages simultaneously.

Right-click on the required parent package in the EA Project Explorer window and select the Current Package | Import and Link Visual Studio Projects menu option.

Select the check box for each project to import, or click on the Select All button to select all projects in the list. Click on the OK button to reverse engineer the project(s). A new package is generated for each project, under the selected parent package.

Once the Integration Environment has successfully imported and linked the projects, you can view them in the EA Project Explorer window.
2.4 MDG Integrate Options

Before you start using the MDG Integration for Visual Studio, you should set the options for synchronizing your work in Visual Studio and Enterprise Architect.

In the EA Project Explorer window, right-click on the linked package and select the MDG Options context menu option. The MDG Integrate Options dialog displays.

<table>
<thead>
<tr>
<th>Option</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Automatically Sync model with EA (recommended)</strong></td>
<td>MDG automatically refreshes the EA Project Explorer when elements within Enterprise Architect change.</td>
</tr>
</tbody>
</table>
| **Switch to Visual Studio on closing Enterprise Architect** | Click on the appropriate radio button:  
Refresh Entire Model - The entire model is refreshed.  
Refresh Current Model - The currently-selected package in MDG is refreshed when Enterprise Architect is closed.  
Note:  
If a non-package is selected, MDG iterates up the tree and refreshes from the first package that is found.  
Do not Refresh Anything - Nothing is refreshed. |
| **Synchronize Model with Code**             | Click on the appropriate radio button:  
Manual - You manually synchronize the code with the model.  
Automatically - When code is added or saved, the model is automatically updated to reflect the change. |

In the MDG Integrate Options dialog, the Automatically Sync model with EA option enables synchronization of the EA Project Explorer when you switch to the full Enterprise Architect user interface and back (using the Open in Enterprise Architect menu option). The Synchronize Model with Code Automatically radio button, however, makes MDG automatically reverse synchronize your source into your model when you save changes to your source files.

To automatically synchronize changes made in your model to your code, open Enterprise Architect using the Open in Enterprise Architect command, right-click on the MDG linked package, select the Build and Run | Package Build Scripts menu option and select the Use Live Code Generation checkbox. With this enabled, any changes you make in your model should be immediately synchronized in your source code.
3 Start Using UML 2.1

UML elements can be viewed and, to some extent, manipulated through Enterprise Architect's Project Browser and Documentation View without linking. For easy cross-referencing of UML and code models, however, you must link a Visual Studio project to an Enterprise Architect package. See Link To a Model Package for instructions. Equally, you can double-click on any .EAP file visible in the Solution Explorer.

This activates the MDG Integration for Visual Studio main interface components:

- The EA Project Explorer window, which shows the UML packages, diagrams and elements in a hierarchical view
- The UML Documentation tab, which is the main work area of MDG Integration for Visual Studio (see below)
- The <elementname>-<language> tab, which displays the code for an element selected from the EA Project Explorer
- The UML Diagram tab, which displays a diagram selected from the EA Project Explorer or UML Documentation tab.

The UML Documentation tab itself has four tabs:

- The Model tab displays the diagrams and UML properties of the model elements; most of the report information from the MDG Integration for Visual Studio is displayed on this tab
- The Search tab is used to find UML elements; search returns are shown as a report view with clickable items
- The Forum tab enables you to discuss projects using a BBS-style forum interface within Visual Studio
- The Help tab displays the HTML-based help for quick reference.

To display the UML Documentation tab, in the EA Project Explorer window either:
- double-click on an element name, or
- right-click on an element name and select the View UML Documentation context menu option.
3.1 EA Project Explorer

The EA Project Explorer contains an MS Explorer-style representation of the UML model, as shown below. It lists the UML packages, diagrams, elements, attributes and methods.

The EA Project Explorer helps you navigate your UML project from within Visual Studio. Right-click on an item in the tree to open a context-sensitive menu that enables you to investigate the item, or to perform operations on it. The following examples show the context menus for a package and an element.

From these menus you can also perform other actions such as:

- Browse UML
- View Properties
- Edit UML Diagrams
Alternatively, you can use the EA Project Explorer toolbar icons.

From left to right, these icons enable you to:
- Open the selected project in Enterprise Architect
- View the UML documentation
- Add a package
- Add a diagram
- Add an element
- Display the properties of the selected object
- Perform a search via the Search tab.

### 3.1.1 Object Properties

Right-click on an element, diagram, attribute or method in the EA Project Explorer and select the Properties context menu option. Alternatively, click on the object and on the Properties icon in the EA Project Explorer toolbar.

The appropriate Properties dialog displays.

See the Enterprise Architect User Guide for information on object properties and their settings, responsibilities, constraints, links, scenarios, associated files, object files and classifiers, and boundary element settings.

To display Help on properties from the Enterprise Architect User Guide, click on either:
- The Help button on the displayed Properties dialog, or
- This link to diagram details
- This link to element details
- This link to attribute details
- This link to operation / method details.

Changes to any information in the Properties dialogs are automatically reflected on the Model tab. In this example the Notes of Class Form1 have been modified.
The change is reflected in the UML Documentation tab below:

Form1 : public Class

Created: 2007-05-18 06:55:46
Modified: 2007-05-18 09:09:02

This is a modified form1 note. This change will reflect in the class properties.

Dispose ( bool ) : void
protected

Parameters
[ irr ] bool disposing true if man disposed, otherwise false.
3.2 Add New Elements / Packages

Add New Package
MDG Integration for Visual Studio enables you to add new elements and packages to the model. To start, in the EA Project Explorer select the package under which to create your new package and either:

- Right-click and select the Add | New Package context menu option, or
- Click on the New Package icon in the EA Project Explorer toolbar.

Give the package a relevant name. If you do not want a diagram for this package, deselect the Automatically add new diagram checkbox.

Click on the OK button. If you are also adding a diagram, provide the diagram name and type on the New Diagram dialog.

Add New Element
Either:

- Right-click on the newly-created package and select the Add | New Element context menu option, or
- Click on the New Element icon in the EA Project Explorer toolbar.

The New Element dialog displays.

In this example, the selected Type is UseCase with the name Use Case 1.

<table>
<thead>
<tr>
<th>Type:</th>
<th>UseCase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Use Case 1</td>
</tr>
<tr>
<td>Stereotype:</td>
<td></td>
</tr>
</tbody>
</table>

Checkboxes
- Open Properties Dialog on Creation - Select this checkbox to display the Properties dialog for the element, to tailor its information; for more information on this window, see Object Properties.
- Close Dialog on OK - Closes the New Element dialog when you click on the OK button; deselect the checkbox to add multiple elements in one go.
- Add to Current Diagram - Add the newly imported Class to the open diagram.

Add Model using Wizard
You can also add one or more basic model structures to your project using a template wizard.

Right-click on the appropriate root package and select the Add | Add Model using Wizard context menu option. The Model Wizard dialog displays.
Click on the checkbox for each model to add to your project.

<table>
<thead>
<tr>
<th>Control</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select From</td>
<td>Select the model template group from which to select the template on which to base the model.</td>
</tr>
<tr>
<td>All</td>
<td>Select all of the models.</td>
</tr>
<tr>
<td>None</td>
<td>Clear all models selected.</td>
</tr>
<tr>
<td>OK</td>
<td>Click on this button to create the standard hierarchy for your project.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Click on this button to leave a blank project tree.</td>
</tr>
<tr>
<td>Help</td>
<td>Display Help on the dialog.</td>
</tr>
</tbody>
</table>
3.3 Model Tab

The Model tab shows the currently selected model element. The element name is displayed in the top left corner of the tab.

Just after the element name are two icons - an Enterprise Architect icon and a code page icon.

Click on the Enterprise Architect icon to open Enterprise Architect in the current model. (If Enterprise Architect is already open, this icon opens another instance of the application.)

Click on the code page icon to display the `<elementname>.<language>` tab, which displays the code for the selected element, including its attributes, operations, and associations.

The element's attributes, operations, Tagged Values, parameters and associations - both to and from the element - are also shown in the main body of the Model tab.

Additional information on the element can be seen by clicking on the Project and Advanced expansion boxes.

3.3.1 Navigating Hyperlinks

Within the UML Documentation tab, you can navigate between diagrams and sections using hyperlinks.
For example, you might click on the diagram name and display the diagram. Or perhaps, under the Associations From tab, click on an element hyperlink (such as Program, above) and display the element details for the source element. On that screen you could check under the Associations To tab and follow the link back to the original (Form1) element.

### 3.3.2 View UML diagrams

By clicking on the Diagrams hyperlink on the UML Documentation - Model tab, you can also display the UML models themselves. In the following example, the hyperlink WindowsApplication5 is clicked on.

This displays the UML diagram on the UML Documentation view (not the UML Diagram tab).

Notice that you can view the details of the Class, including its attributes and methods, all taken from Enterprise Architect. You should not change data in this view.

Alternatively, double-click on a diagram in the EA Project Explorer window, and click on the UML Diagram tab. (This has no effect on the UML Documentation tab). This is the view in which you can edit the diagram.
You can also add your elements into a new Visual Studio Class diagram. To do this, right-click on an element inside a linked folder, and select the View Class Diagram context menu option. The Class Details tab displays at the bottom of the screen, and a Diagram tab opens in the body of the screen.
3.4 Search Tab

The Search tab is a convenient way of locating the elements of a model. You can search on a range of criteria, from element name, type, and scope to element connections, or status within a project (work-in-progress, completed).

To begin a search, click on the Search tab.

In the Search Term input box, enter the text string to search for, then click on the drop-down arrow in the Search List field and select the type of search to perform.

To execute the search, click on the Run Search button.

You can click anywhere on the entry for a returned result to navigate to the Model tab for the item.

You can also specify which columns are returned. Click on the Columns button to display a list of the information that is returned. To turn a column on or off, simply select or deselect the checkbox next to the column title.
3.5 Project Discussion Forum

The Project Discussion Forum can be used to discuss the development of your project from within the Visual Studio environment. It operates much like any other web-based forum you might have used, applying the concept of Categories, Threads, and Posts.

You can access the Project Discussion Forum via the UML Documentation tab, selecting the Forum tab.

The Forum tab consists of two main areas: the message thread area, and the message contents area.

The message thread area is located on the left hand side, and appears as a tree. The message thread area is used to create new categories and threads, and to select posts for viewing, editing or deleting. When a post is selected for viewing, it appears in the message contents area on the right hand side.

See Also
- Categories, Topics and Posts
- Forum Message Dialog

3.5.1 Categories, Topics and Posts

The Project Discussion Forum enables you to create Categories, which contain Topics, which contain Posts. You can also edit and reply to posts.

Add Category

To create a new Category, click on the New Category icon at the bottom of the Forum tab. The Create New Category dialog displays.

Enter the name and any relevant details into the Text field. Enter the name of the author. Click on the OK button. You can now add new topics to the category.

Add Topic

To create a new Topic, click on the New Topic button at the bottom of the Forum tab. The Create New Topic dialog displays.

Enter the name and any relevant details into the Text field, and enter the name of the author. Click on the OK button. You can now add new posts to the topic.

Add Post

To create a new Post, click on the New Post button at the bottom of the Forum tab. The Create New Post dialog displays.

Enter the name and any relevant details into the Text field, and enter the name of the author. Click on the OK button. Other users can now reply to the post.
Reply to Post

To reply to a Post, click on the Post in the Forum tab and click on the Add Reply button at the bottom of the Forum tab. The Reply to Post dialog displays.

Enter the name and any relevant details into the Text field, and enter the name of the author. Click on the OK button.

Edit Post

To edit a Post, click on the Post in the Forum tab and click on the Edit button at the bottom of the Forum tab. Alternatively, press [Ctrl]+[E]. The Edit Post dialog displays.

Enter the name and any relevant details into the Text field. You cannot change the name of the author. Click on the OK button. Other users can now reply to the post.

3.5.2 Forum Message Dialog

The Project Discussion Forum message dialogs (Create New Category, Create New Topic, Create New Post, Edit Post and Reply to Post) all share the same functionality.

The table below describes the operation of each option available for the dialogs.

<table>
<thead>
<tr>
<th>Control</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Type in the name of the message category, topic or post.</td>
</tr>
<tr>
<td>Author</td>
<td>Click on the drop-down arrow and select the message author name, or type in a new name if the author name is not present in the list. The names in the drop-down list are defined in the model Authors list. If you type a name into the Author field, it is used for this post but it is not added to the Authors list.</td>
</tr>
<tr>
<td>Formatting Tools</td>
<td>Standard formatting options for text.</td>
</tr>
<tr>
<td>OK</td>
<td>Click on this button to confirm the message.</td>
</tr>
</tbody>
</table>
3.6 Edit Diagrams

You can easily edit the UML diagrams from the EA Project Explorer in two ways, by:

- Double-clicking on a diagram name or
- Right-clicking on a diagram name and selecting the **Edit Diagram** menu option

The selected diagram displays on the **UML Diagram** tab, as shown below.

You can add new elements and give them their own attributes, operations and types, and customize or arrange them. You can also drag existing elements from the EA Project Explorer window.

To add elements and connectors to the diagram, either use the Enterprise Architect **Quick Linker** arrow or right-click on the diagram background and select the **New Element or Connector** context menu option to display the **UML Toolbox shortcut menu**.

To add attributes and operations, right-click on the element in the diagram or EA Project Explorer and select the **Attributes** or **Operations** context menu option. For further information, open the **Enterprise Architect User Guide** topic by:

- Clicking on the **Help** button on the **Attributes** or **Operations** dialog, or
- Selecting these Sparx Systems website links for **attributes** and **operations**.

This is a Notes element, you can format the text of this element too.
You can display the Notes text in the Notes window, enter and constrain values using Tagged Values to show the details.
4 Import and Synchronize TFS Work Items

MDG Integration for Visual Studio enables you to import and synchronize work items from Team Foundation Server. It also enables you to add, view, edit and unlink work items that have been linked against a UML element, and to map work item fields against Enterprise Architect elements and element properties.

Import Work Items

To import work items, follow the steps below:

1. In the EA Project Explorer, right-click on the required package and select the Team Foundation Server | Import Work Items context menu option. The Select Queries dialog displays.

2. Click on the checkbox against each query for which to import work items from Team Foundation Server.

3. Click on the Link Selected Queries to Package checkbox.

4. Click on the OK button. The work items in the selected queries are imported and, if the Link Selected Queries to Package checkbox is selected, the queries are stored against the package.

You can return to this dialog to add and remove queries for a package.

Synchronize With TFS

When a package has stored queries against it, new elements are automatically added and existing elements updated, based on each query.

Note:

Elements are never deleted.

To manage the mapped fields for a work item linked against a UML element, right-click on the required package in the EA Project Explorer and select the Team Foundation Server | Manage Mapped Fields context menu option.
### Configure Field Mappings

<table>
<thead>
<tr>
<th>Field/Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Work Item Type</strong></td>
<td>Click on the drop-down arrow and select the type of work item to configure.</td>
</tr>
<tr>
<td><strong>Don't create Elements for this work item type</strong></td>
<td>Select this checkbox to prevent MDG Integration For Visual Studio from creating an Enterprise Architect element if the query returns a work item of the specified type.</td>
</tr>
<tr>
<td><strong>UML Element</strong></td>
<td>If MDG Integration For Visual Studio is to create an element, click on the drop-down arrow and select the type of element to create.</td>
</tr>
<tr>
<td><strong>Element Stereotype</strong></td>
<td>If required, click on the drop-down arrow and select the stereotype to apply to the element.</td>
</tr>
<tr>
<td><strong>Work Item Field</strong></td>
<td>If required, click on a work item field against which to configure an Enterprise Architect property.</td>
</tr>
<tr>
<td><strong>Configure</strong></td>
<td>Click on this button to select an Enterprise Architect property to configure against the selected work item field.</td>
</tr>
<tr>
<td><strong>Clear</strong></td>
<td>Clear the currently-selected mapping.</td>
</tr>
<tr>
<td><strong>Default</strong></td>
<td>Apply the default mapping for this work item type.</td>
</tr>
</tbody>
</table>
4.1 Maintain Work Items

The EA Work Items tab enables you to add and update work items against a selected element, configure the connection to the Team Foundation Server, and connect to or disconnect from the server.

To display the EA Work Items tab, right-click on the required element in the EA Project View and select the Team Foundation Server | Maintain Work Items context menu option.

The EA Work Items tab has a toolbar. The functions provided by the toolbar icons are, from left to right:

- **Add New Work Item** - create a new work item linked to the currently-selected element
- **Save** - Save all changes to the current work item (selected from the panel underneath the toolbar)
- **Link** - Link one or more work items to the selected element
- **Remove** - un-link selected work items from the selected element
- **Properties** - Define the current Team Foundation Server connection properties; displays the Link Properties dialog
- **Connect** - Connect to the Team Foundation Server
- **Disconnect** - Disconnect from the Team Foundation Server.

**Connection Properties**

The Link Properties dialog enables you to configure the connection to the Team Foundation Server.
1. In the **Team Foundation Server** field, type the name of the server to connect to.
2. In the **Team System Project** field, type or select the name of the project to connect to.
3. Select the **Make Selected Project the Default** checkbox to make the specified project the default.
4. Click on the **OK** button.
4.2 Manage Mapped Fields

To manage the mapped fields for a work item linked against a UML element, right-click on the required package in the EA Project Explorer and select the Team Foundation Server | Manage Mapped Fields context menu option.

<table>
<thead>
<tr>
<th>Field/Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Item Type</td>
<td>Click on the drop-down arrow and select the type of work item to configure.</td>
</tr>
<tr>
<td>Don’t create Elements for this work item type</td>
<td>Select this checkbox to prevent MDG Integration For Visual Studio from creating an Enterprise Architect element if the query returns a work item of the specified type.</td>
</tr>
<tr>
<td>UML Element</td>
<td>If MDG Integration For Visual Studio is to create an element, click on the drop-down arrow and select the type of element to create.</td>
</tr>
<tr>
<td>Element Stereotype</td>
<td>If required, click on the drop-down arrow and select the stereotype to apply to the element.</td>
</tr>
<tr>
<td>Work Item Field</td>
<td>If required, click on a work item field against which to configure an Enterprise Architect property.</td>
</tr>
<tr>
<td>Configure</td>
<td>Click on this button to select an Enterprise Architect property to configure against the selected work item field.</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear the currently-selected mapping.</td>
</tr>
<tr>
<td>Default</td>
<td>Apply the default mapping for this work item type.</td>
</tr>
</tbody>
</table>
5 Version Control

MDG Integration for Visual Studio supports Enterprise Architect's version control of packages and their component sub-packages in a central repository. This repository is maintained by third-party version control applications that control access and record revisions. Version controlled packages are packages that have been configured for use with version control software. The supported Version Control products are CVS, SCC, TFS and Subversion.

Version control can be assigned to individual packages. Each package can only be linked to one version control configuration at a time, although it is possible to connect multiple control configurations for each model. The Version Control Configurations dialog can be used to connect to an SCC provider, CVS configuration, MS Team Foundation Server or Subversion configuration.

In MDG Integration for Visual Studio, right-click on the required package in the EA Project Explorer and select the Version Control menu option. To set the version control configuration then select the Version Control Options... menu item.

The options on the Version Control menu are described in the following table.

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configure Package</td>
<td>Displays the Package Control dialog, which enables you to specify whether this package (and its children) is controlled, and which file it is controlled through.</td>
</tr>
<tr>
<td>Check In Branch</td>
<td>For the selected branch of the model, (i.e. the selected package and all of its child packages) displays a list of all version controlled packages within that branch that are checked out to the current user. You can then select packages in the displayed list to check them in to the version control repository.</td>
</tr>
<tr>
<td>Menu Item</td>
<td>Functionality</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Check In</td>
<td>Submits the currently selected package and all sub-packages to the central repository. Enterprise Architect prompts you to enter optional comments describing changes to the packages.</td>
</tr>
<tr>
<td>Check Out</td>
<td>Retrieves the latest revision of the currently selected package and sub-packages from the central repository, overwriting the current packages. After check out the packages are available for editing.</td>
</tr>
<tr>
<td>Undo Check Out</td>
<td>Cancels all changes you have made to the currently-selected package and sub-packages. Restores the model to the state it was in before package was checked out, leaving the selected package and sub-packages locked.</td>
</tr>
<tr>
<td>Get Latest</td>
<td>Available only on Private Models, for packages that are checked in. Retrieves the latest revision of the package from the repository.</td>
</tr>
<tr>
<td>Get All Latest</td>
<td>Available only on Private Models. Retrieves the latest revision of all version controlled packages in the project. Only retrieves packages that are checked in.</td>
</tr>
<tr>
<td>Put Latest</td>
<td>Updates the central repository with the currently-selected package (which you have checked out), while retaining checkout status on the package. This is equivalent to checking a package in and immediately checking it back out again.</td>
</tr>
<tr>
<td>File Properties</td>
<td>Asks the version control provider to show the version control properties associated with the XML export file pertaining to the currently-selected package.</td>
</tr>
<tr>
<td>File History</td>
<td>Where the controlling package has been configured by an SCC provider, this provider shows a change history for the package. Refer to your provider's documentation for details on how to use the control. Otherwise, if the version control is CVS the history is shown via Enterprise Architect's internal CVS history menu.</td>
</tr>
<tr>
<td>Get Package</td>
<td>Enables you to gain access from packages in the version control repository that is not currently available in the users model.</td>
</tr>
<tr>
<td>Version Control Options</td>
<td>Displays the Version Control Options dialog.</td>
</tr>
<tr>
<td>Work Offline</td>
<td>Toggles version control between offline and online.</td>
</tr>
</tbody>
</table>

**More Information**

For further information on version control, see the *Enterprise Architect User Guide*. To access the *Enterprise Architect User Guide*, either:

- Click on the Help button on the Version Control Settings dialog, or
- Click on this [Sparx Systems web page](#) link.

**See Also**

- [Version Control Overview](#)
- [Controlled Packages](#)
5.1 Version Control Overview

Features
The version control feature provides two key facilities:

- Coordinating the sharing of packages between users
- Saving a history of changes to Enterprise Architect packages, including the ability to retrieve previous versions.

System Requirements
To use version control in MDG Integration for Visual Studio, a third-party source-code control application is required. MDG Integration for Visual Studio supports the following version control applications:

- Subversion, which is available from http://subversion.tigris.org/
- CVS, which is available from http://www.tortoisecvs.org/
- Any version control product that complies with the Microsoft Common Source Code Control standard, version 1.1 or higher.

Set-Up
Before using MDG Integration for Visual Studio's version control facility, your version control software must be installed on each machine where it is intended to be used.

Typically there are:

- A server component that manages a version control repository
- Client components on the workstations that MDG Integration for Visual Studio uses to communicate with the server.

A version control client must be installed on every machine where you run MDG Integration for Visual Studio and want to access your version control system. Once the version control software has been installed and configured, you must define a Version Control Configuration within MDG Integration for Visual Studio, to use your installed version control product.

Usage
There are four basic ways in which you might apply the version control facility:

<table>
<thead>
<tr>
<th>Use</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Shared model</td>
<td>Users share an MDG Integration for Visual Studio model, stored in a central EAP file or DBMS repository. This configuration enables users to see other users' packages without explicitly having to retrieve them. Version control regulates access to packages, and maintains package revision history.</td>
</tr>
<tr>
<td>Multiple Private models</td>
<td>An MDG Integration for Visual Studio model is created by a single user who configures it for version control. The model file is then distributed to other users, with each user storing their own private copy of the model. Users update their model's packages through version control. Version control regulates access to packages, and maintains package revision history. Other users' new packages are retrieved using the Get Package menu option.</td>
</tr>
<tr>
<td>Shared packages</td>
<td>Individual users create separate MDG Integration for Visual Studio models but share one or more packages. Users share packages through version control.</td>
</tr>
<tr>
<td>Standard packages</td>
<td>A company might have a standard set of packages that are broadly shared (as read-only files). Individual users retrieve packages with the Get Package menu option.</td>
</tr>
</tbody>
</table>
See Also

Version Control
Controlled Packages
5.2 Controlled Packages

Controlled packages are a powerful means of 'externalizing' parts of an MDG Integration for Visual Studio model. Using controlled packages you can:

- Support widely distributed development by having team members submit packages in the form of XML for import into a central Enterprise Architect repository.
- Support version control, by writing model elements in XML text files suitable for version control using standard version control software. Using XMI this way enables you to manually connect to third-party version control software outside the MDG Integration for Visual Studio environment. MDG Integration for Visual Studio internally supports the configuration of version control through SCC and CVS.
- Support import and export of model elements between different models; for example, a Class library can be re-used in many models and kept up to date in target models using controlled packages, reloading packages as required when new versions of the Class model become available.

Package XML is standard XMI-compliant output that can be loaded into any XML viewer, or used by any XML-based tool to perform manipulations and extracts, such as document or code generators.

For more information on Controlled Packages, see the Enterprise Architect User Guide topic via this Sparx Systems web Help link.
XML Technologies

MDG Integration for Visual Studio enables rapid modeling and forward and reverse engineering of two key W3C XML technologies: XML Schema (XSD) and Web Service Definition Language (WSDL).

XSD and WSDL support is critical for the development of a complete Service Oriented Architecture (SOA), and the coupling of UML 2.1 and XML provides the natural mechanism for specifying, constructing and deploying XML based SOA artifacts within an organization.

The following topics explain how to work with these technologies using MDG Integration for Visual Studio:

- XML Schema (XSD)
- Web Services (WSDL)
6.1 XML Schema (XSD)

MDG Integration for Visual Studio enables forward and reverse engineering of W3C XML schemas (XSD).

Model XSD Schema

XML schemas are modeled using UML Class diagrams within MDG Integration for Visual Studio, as in Enterprise Architect. See the Model XSD Schema help topic in the Enterprise Architect User Guide.

The UML Profile for XSD specifies a set of stereotypes, Tagged Values and constraints that can be applied to the UML model in order to change particular aspects of the resulting schema.

Note:

You cannot edit Tagged Values in MDG Integration for Visual Studio. To work on Tagged Values, switch to Enterprise Architect.

When modeling XSD constructs, it is often useful to have the XSD primitive types represented as UML elements. In this way, user-defined types (for example) can reference the datatype elements as part of inheritance or association relationships.

Sparx Systems provides the set of primitive XSD data types as a UML package in the form of an XMI file. Each XSD primitive type is represented by a UML Class in a package named XSDDatatypes.

Generate XSD

The Generate XML Schema feature forward engineers a UML Class model to a W3C XML Schema (XSD) file. An XML schema corresponds to a UML package in MDG Integration for Visual Studio, therefore XML schema generation is a package-level operation.

To generate an XML schema from a package, follow the steps below:

1. In the EA Project Explorer, right click on the package to be converted to XSD. The context menu displays.
2. Select the XML Services | Generate XML Schema menu option. The Generate XML Schema dialog displays, showing the name of the selected package in the Source Package field.

Import XSD

The Import XML Schema facility reverse engineers a W3C XML Schema (XSD) file as a UML Class model. XSD files are imported into MDG Integration for Visual Studio as a UML package.

To import an XSD file, follow the steps below:

1. In the EA Project Explorer, right click on the package to contain the imported XSD package. The context menu displays.
2. Select the XML Services | Import XML Schema menu option.
6.2 Web Services (WSDL)

MDG Integration for Visual Studio supports forward engineering and reverse engineering of the W3C Web Service Definition Language (WSDL).

WSDL documents are represented as components marked with the stereotype `WSDL`. WSDL documents are contained in a package hierarchy representing the target WSDL namespace and its constituent XSD Types, Messages, PortTypes, Bindings and Services. The top-level package is stereotyped as a `WSDLnamespace`. The figure below shows a skeletal WSDL namespace package structure:

A `WSDLnamespace` package can contain one or more WSDL components. Each WSDL component can be automatically generated to a WSDL file using Enterprise Architect's built-in WSDL generator.

For information on the Enterprise Architect WSDL generator and importing WSDL, see the *Enterprise Architect User Guide* via this [Sparx Systems web Help](https://www.sparxsystems.com) link.
7 Working with Code

MDG integration for Visual Studio enables you to generate code directly from model packages and elements, and to automatically synchronize model and code.

To generate code for a UML model element, such as a Class, right-click on it in the EA Project Explorer and select the Code Services | Generate Code context menu option.

To generate the code for a model package, right-click on the package and select either of the following:

- The Code Services | Generate Code context menu option to simply generate code for an individual package element; the Generate Package Source Code dialog displays.
- The Code Services | Generate Package option to generate code for the entire selected package; the Synchronize Package Contents dialog displays, with the options to either forward engineer the code (from model to source) or reverse engineer (source to model).

Synchronization keeps your models and your code in line, so that you can always be sure that what is represented in code is represented in the model. For instance, if you have made changes to a Class definition by hand-coding, your model is out of date. Synchronization ensures that the Class you have altered is updated in the model to reflect the changes you have made.

Reverse Engineering

The MDG Integration for Visual Studio is also able to reverse engineer both source code and Visual Studio binary portables into UML Class diagrams.
7.1 Import Binary

Enterprise Architect is capable of reverse engineering Visual Studio portable binaries (*.exe, *.dll) and generating Class models.

1. Right-click on the target package (in which to store the resulting models) in the EA Project Explorer and select the Code Services | Import Binary Module context menu option. The Import dialog displays.

2. Select the file to import. Once you have selected the file you must set certain options, as outlined below. Once all your settings are set, click on the Import button. Enterprise Architect imports the binary module; the UML representation is then constructed as a diagram and laid out.

   - Synchronize existing classes
   - Overwrite existing Classes
   - Create Logical Diagram for each package
   - Do not import private members

   Please be aware that creating diagrams for each package may significantly increase the time required to import.

3. Generation

   Select whether
   - Pre-existing classes are to be synchronized or overwritten
   - To automatically create a Logical Diagram for each package
   - To import private members.

   New Diagram Options

   This button displays the New Diagram Options dialog, through which you define what features are to be visible in any diagrams generated by the import.

   Import Method

   Enables you to select the method Enterprise Architect uses to analyse the binary file. Select from:
   - Reflection
   - Disassembly or
   - Let EA decide, which triggers Enterprise Architect to select the most appropriate method for the selected file.
Reverse engineering your project code into UML Class models is a simple process, as follows:

1. Create and link a new package, or use a linked package associated with the project to reverse engineer.
2. Right-click on the package name in the EA Project Explorer, and select the Code Services | Import Directory context menu option. The Import Source Directory dialog displays.

3. Select the root directory for the package to import.
4. Set the source code type (such as C++ or C#) and the expected file extension (.c, .cs). You can select from a number of further options to control the import process, as below.
5. Once you have set your options, click on the OK button to invoke Enterprise Architect to process the directory. When Enterprise Architect is finished, the newly created models appear in the EA Project Explorer and in the Model tab.

**Options**

**Main Body of Dialog**
These options define what data is imported.

- **Recursively Process Subdirectories** - select to make Enterprise Architect search the directory being imported for subdirectories, and to also process them
- **Create Logical Diagram for Each Package** - select to make Enterprise Architect create a logical diagram for each package being imported
- **Import defined components** - select to import only those packages with defined components
- **Do not import private members** - select to prevent private members from being imported.

**Package Structure**
This selection offers different methods for controlling packaging of the imported objects.

- **Create Package Per Directory** - select to create a new package for each directory, including the selected root and all subdirectories if recursion is checked
Create Package Per Namespace - select to create a new model package for each namespace encountered in the code being imported
Create Package Per File - select to create a new package for each source file that is being imported.

Synchronization
This section controls the way Enterprise Architect's import process deals with pre-existing models.

Synchronize existing classes - select to synchronize models; existing models are altered to comply with the results of reverse engineering, but are not completely overwritten or deleted
Overwrite existing classes - select to overwrite any model with the same name already existing in the package you are importing to, with the newly-generated model.

Remove Classes not found in code
Never delete - select to never delete any Classes found in the model but not found in the code
Prompt for action - select to prompt you if Classes found that are not in the code are to be removed first
Always delete - select to delete Classes without prompting you.

New Diagram Options
This button displays the New Diagram Options dialog, through which you define what features are to be visible in any diagrams generated by the import.
7.3 Model Driven Transformation

MDG Integration for Visual Studio supports the Model-Driven Architecture and the use of Platform Independent Models (PIMs) and Platform Specific Models (PSMs).

You can create a PIM and define rules for transforming a PIM into a PSM. For instance, a single independent model might generate specific models that account for particular features of a system or language, such as C# or Java.

To perform an MDA transform you must have a master model, the PIM. Once you have created or imported a model, right-click on the containing package and select the **Current Package | Apply MDA Transformation** context menu option. The Model Transformation dialog displays.

When the dialog displays, all elements are selected and all transformations previously performed from any of the Classes are checked.

<table>
<thead>
<tr>
<th>Control</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements</td>
<td>Selects the elements that are to be included in the transformation.</td>
</tr>
<tr>
<td>All</td>
<td>Selects all of the elements from the list to be included in the transformation.</td>
</tr>
<tr>
<td>None</td>
<td>Deselects all of the elements from the list.</td>
</tr>
<tr>
<td>Transformations</td>
<td>Enables you to select which transformations to perform and the package each of them should be transformed to.</td>
</tr>
<tr>
<td>Select Package [...]</td>
<td>Use the [...] button to select the package in which the transformed elements are created.</td>
</tr>
<tr>
<td>Generate Code on result</td>
<td>Specifies whether or not to automatically generate code from the target classes.</td>
</tr>
<tr>
<td>Perform Transformations on result</td>
<td>Specifies whether transformations previously done on target classes should be automatically executed.</td>
</tr>
<tr>
<td>Intermediary File Path</td>
<td>Specifies the filename of the intermediary file (if any).</td>
</tr>
<tr>
<td>Write Always</td>
<td>Specifies whether an intermediary file should be written to disk.</td>
</tr>
<tr>
<td>Control</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Write Now</td>
<td>Generates the intermediary file but doesn't perform the transform.</td>
</tr>
<tr>
<td>Do Transform</td>
<td>Executes the transform command.</td>
</tr>
</tbody>
</table>

For instance, to transform the basic package into a C# application, in the Transformations panel select the checkbox for C#. Once you select the transformation type, Enterprise Architect prompts you to select the destination folder. In the example below the Implementation Model (PSM) folder is selected:

- Project Models
  - Start here
  - Business Domain Model
  - Requirements Model
  - System Model
    - System Model
    - Analysis
    - Design Model
    - Implementation Model (PSM)
    - Component Model
    - Deployment Model
    - Environment Model
  - QA Model
  - Project Model
  - Example diagrams

Click on the Do Transform button to perform the transformation. These Classes are also generated as code and imported into the Visual Studio Project.
8 Import Database Schema from ODBC

MDG integration for Visual Studio supports importing database tables from an ODBC data source. Tables are imported as stereotyped Classes with suitable data definitions for the source DBMS.

Note:
Import of stored procedures and views is supported for DB2; SQL Server; Firebird/Interbase; Informix; Ingres; Oracle 9i, 10g and 11g; MySQL; PostgreSQL; Sybase Adaptive Server Enterprise (ASE) and Sybase Adaptive Server Anywhere (ASA).

Import Database Tables and Stored Procedures
To import database tables and stored procedures, follow the steps below:

1. Select a package in the EA Project Explorer.
2. To import into:
   - the package only, right-click on the package and select the Code Services | Import DDL from ODBC context menu option
   - a suitable diagram in the selected package, right-click on the opened diagram and select the Import DB Schema from ODBC context menu option.

The Import DB Schema from ODBC Source dialog displays.
9 Baselines, Differencing and Merges

MDG integration for Visual Studio includes tools to help you manage and review changes to your models over time. These tools apply the concepts of Baselines, Differencing and Merges.

To access these facilities, right-click on the required package in the EA Project Explorer and select the Current Package | Manage Baselines menu option.

Baselines
MDG integration for Visual Studio provides a facility to create a Baseline (snapshot) of the contents of a selected package and its child packages at a particular point in time, enabling you to later compare that branch of the model at that time with the current state of the branch. Baselines are stored in the same XML format as is used for version control, but are stored within the project in compressed format. You can also have parallel copies of parts of your model for team development, and create Baselines within each copy to merge changes into the project master.

Differencing
Differencing (Diff, or Compare) enables you to explore the differences between the current state of a specific part of your project, and previous or parallel versions captured in a Baseline or an XML file on disk.

Merges
Once Differencing is complete, you can merge information from the Baseline into the current project; it is not possible to go the other way. You can merge information manually, change by change, or automatically by electing to merge in all changes in one batch procedure. You can also revert completely to the original Baseline by importing the stored XMI directly, and merge in information and elements from a Baseline in a different project, making it possible to keep multiple versions of a single model in synch.

For further information on the Baseline and Differencing facilities, see the Enterprise Architect User Guide.
10 Generate RTF Documentation

MDG integration for Visual Studio can automate the generation of RTF documentation based on your project models. Rich text reports are documents produced by Enterprise Architect in Rich Text Format (RTF), a format common to many word processors.

The RTF Generator

Enterprise Architect has an enhanced RTF Document Generator that features:

- Powerful WYSIWYG RTF style template editor support, enabling:
  - Headers and Footers
  - Images
  - Indexes
  - Tabular Sections
  - Nested Sections
  - All model elements, connectors, diagrams and their properties
  - Template import and export using XML
  - Basic templates supplied for customization.

A document generator that:

- Provides simplified options
- Generates complex documents based on RTF templates.

An embedded RTF viewer that you use to view RTF documents generated in Enterprise Architect directly within Enterprise Architect.

To generate RTF Documentation

Briefly, to generate the documentation for a model package:

1. Right-click on the package name in the EA Project Explorer.
3. Enter a filename for the document to be created, and select a style template.
4. Click on the Generate button to start Enterprise Architect generating the RTF file. The Progress bar displays the progress of the RTF generation.

Once the document has been created you can view it immediately by clicking on the View button. You can also view the document at any time later by opening the file from the directory in which it was created.

More Information

For further information on the Generate RTF Documentation dialog and RTF report generation, review the Enterprise Architect User Guide. To access this information, either:

- Click on the Help button on the Generate RTF Documentation dialog, or
- Click on this Sparx Systems web page link.

Note:

MDG Integration for Visual Studio does not apply Word Masters, Bookmarks or Virtual Documents. It uses the Enhanced RTF Document Generator and has no access to the Enterprise Architect Legacy RTF Generator.
11 Generate HTML Documentation

MDG integration for Visual Studio can automate generation of documentation based on your project models.

To generate documentation for a model package:

1. Right-click on the package name in the EA Project Explorer.
3. Enter a title and the output directory for the web site to be generated.
4. Click Generate to generate the HTML files. The Progress field shows the progress of the HTML Generation.

Once the document has been created you can view it immediately by clicking on the View button on the dialog.

More Information

For further information on the Generate HTML Report dialog and HTML report generation, review the Enterprise Architect User Guide. To access this information, either:

- Click on the Help button on the Generate HTML Report dialog, or
- Click on this Sparx Systems web page link.
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