SIF 3.0 Framework (.NET)

Version

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# Introduction

This document explains the steps necessary for a software developer to implement a SIF Provider using the .NET version of the SIF 3.0 Framework.

Before attempting the steps in this document, it is assumed that the following document has already been read:

* SIF Framework Installation and Verification

# Pre-requisite libraries

In Visual Studio, create a new Solution and new ASP.NET Web Application Project (an empty project set for Web API). For those new to Web API, refer to the following web page:

<https://www.asp.net/web-api>

Once done, the following libraries need to be added to the project:

* SIF 3.0 Framework libraries
* System.Runtime.Serialization
* AutoMapper
* log4Net, slf4Net, slf4Net.log4Net

For a SIF Provider running in a DIRECT environment or for the testing of SIF Events in a BROKERED environment, the following additional libraries are also required:

* NHibernate
* SQLite

The SIF 3.0 Framework can be customised to use a database other than SQLite. It is highly recommended that you DO NOT use SQLite for a production system.

## SIF 3.0 Framework libraries

Add the following libraries from the SharedLibs directory included with the SIF 3.0 Framework:

* Sif.Framework 3.x.x\Sif.Framework.dll
* Sif.Specification.Infrastructure 3.x.x\Sif.Specification.Infrastructure.dll

Depending upon the locale, one of the following libraries is also required:

* Sif.Specification.DataModel.Au 3.x.x\Sif.Specification.DataModel.Au.dll
* Sif.Specification.DataModel.Uk 2.x.x\Sif.Specification.DataModel.Uk.dll
* Sif.Specification.DataModel.Us 3.x.x\Sif.Specification.DataModel.Us.dll

## System.Runtime.Serialization

Using “Add reference…” and browsing the Assemblies, add the System.Runtime.Serialization assembly to this project. This library is integral to the serialisation of XML message payloads.

## AutoMapper

Using “Manage NuGet Packages…”, add the AutoMapper package to this project. Instructions on the use of AutoMapper fall outside the scope of this document.

## log4Net, slf4Net, slf4Net.log4Net

Using “Manage NuGet Packages…”, add the log4Net, slf4Net and slf4Net.log4Net packages to this project. Instructions on the use of log4Net and slf4Net fall outside the scope of this document.

## NHibernate

Using “Manage NuGet Packages…”, add the NHibernate package to this project. Instructions on the use of NHibernate fall outside the scope of this document.

## SQLite

Using “Manage NuGet Packages…”, add the SQLite package to this project. Instructions on the use of SQLite fall outside the scope of this document.

# Project configuration

## SIF 3.0 Framework configuration

Copy the SifFramework.config configuration file from the Templates\Providers directory of the SIF 3.0 Framework into this project. Ensure the “Copy to Output Directory” file property is set to “Copy always”. Within the configuration file, set the following properties to uniquely identify your application to the EnvironmentProvider:

* provider.environment.sharedSecret
* provider.environment.template.applicationKey
* provider.environment.template.instanceId (if known)
* provider.environment.template.solutionId (if known)
* provider.environment.template.userToken (if known)

These values should have been provided by the Administrator of the EnvironmentProvider your SIF Provider is connecting with.

## Web API specific configuration

### Global.asax.cs

Replace the Global.asax.cs file of the project with the version from the Templates\Providers directory of the SIF 3.0 Framework.

In the “\*\*\* TO DO \*\*\*” section of the file, uncomment the lines of code and modify, replacing the SIF Data Model Object used with an appropriate one. Refer to the following section regarding a SIF Data Model Object for more information.

Without these lines, a StudentPersonal SIF Provider (for instance) would return a list of records with a root element of <ArrayOfStudentPersonal> rather than the required <StudentPersonals>.

### WebApiConfig.cs

Replace the WebApiConfig.cs file of the project with the version from the Templates\Providers directory of the SIF 3.0 Framework.

## log4Net and slf4Net configuration

Installation of the slf4Net and log4Net NuGet packages would have updated the Web.config file with appropriate configuration settings. Copy the log4net.config configuration file from the Templates\Providers directory of the SIF 3.0 Framework into this project. Ensure the “Copy to Output Directory” file property is set to “Copy always”.

## NHibernate configuration

Copy the SifFramework.cfg.xml NHibernate configuration file from the Templates\Providers directory of the SIF 3.0 Framework into this project. Ensure the “Copy to Output Directory” file property is set to “Copy always”.

**IMPORTANT:** Within the configuration file, the “connection.connection\_string” property needs to reference the same database as that used by the EnvironmentProvider included in the SIF 3.0 Framework. When using the default SQLite database, the connection string defines a relative path from your SIF Provider.

# Define the SIF Data Model Object

For the implementation of a SIF Provider, a SIF Data Model Object class needs to be specified. A requirement for the use of this Framework is that the class must implement the IDataModel interface. For an example implementation (of a student), refer to one of the Provider demo projects.

It is important that the model object used will serialise (XML) to meet the SIF Data Model Specification for a locale. To assist with this requirement, the Sif3Specification Solution can be used as a reference for any data model objects used. Of particular importance are the namespaces used for types.

# Implement the Service interface

Create a Service class that implements the IBasicProviderService interface with the previously defined SIF Data Model Object class as the generic type. Implement the methods of the interface that are required for the SIF Provider. For an example Service class implementation (for a student), refer to one of the Provider demo projects.

# Create the SIF Provider

To implement the SIF Provider, create a new class that extends the BasicProvider class with the previously defined SIF Data Model Object class as the generic type. In the default constructor, call upon the “base” constructor of the BasicProvider class that takes the Service class created. For an example SIF Provider implementation (for a student), refer to one of the Provider demo projects.

As the Web API specification relies heavily on coding convention, some important points to consider when implementing a Provider are the following:

1. The prefix (name) to the “Provider” class defines both the SIF Data Model Object used and the Web Service URL, and MUST therefore be named appropriately, i.e. SchoolInfo**s**Provider not SchoolInfoProvider.
2. As the creation of a single object in SIF does not follow the normal RESTful conventions, specific routing for this situation needs to be declared in the newly created SIF Provider. For instance, for the creation of a single StudentPersonal object, the POST action would use a route of “[Route("~/api/StudentPersonals/StudentPersonal")]”. This requirement is necessary to cater for multiple object operations.
3. If the Provider is going to broadcast events, the instructions specified in Appendix A need to be applied. If the Provider is not going to broadcast events, the [NonAction] attribute needs to be applied to the BroadcastEvents(string, string) method. This also means that this method needs to be overridden in the Provider implementation. For instance:

[NonAction]

public override IHttpActionResult BroadcastEvents(string zoneId = null, string contextId = null)

{

return base.BroadcastEvents(zoneId, contextId);

}

# Appendix A – Enabling SIF Events

## Introduction

To enable the broadcast of SIF Events for a SIF Provider, the following changes need to be implemented:

1. Create a SIF Events iterator class that implements the IEventIterator<TMultiple> interface.
2. In addition to implementing the IBasicProviderService<T> interface, the Service class needs to implement the IEventService<TMultiple> interface.
3. Define a specific route in the SIF Provider that exposes the BroadcastEvents REST endpoint.
4. Update the SifFramework.config file to specify the use of a BROKERED environment.

## IEventIterator interface

The class implementation of the IEventIterator interface forms the core logic called upon by the SIF Framework for the broadcast of SIF Events. It is the responsibility of the developer to return appropriate change records through the GetNext() method.

For an example, refer to the StudentPersonalIterator class of the Sif.Framework.Demo.Au.Provider project.

## IEventService

The IEventService interface provides the hook necessary for the SIF Framework to retrieve change records.

For an example, refer to the StudentPersonalService class of the Sif.Framework.Demo.Au.Provider project.

## BroadcastEvents Web API route

To configure an RPC-style REST endpoint for the broadcasting of SIF Events, a route attribute is required for the SIF Provider’s BroadcastEvents action (as I was unable to do so using a conventional route). For instance, for the broadcasting of StudentPersonal SIF Events, the BroadcastEvents action would use a route of “[Route("~/api/StudentPersonals/BroadcastEvents")]”.

For an example, refer to the StudentPersonalProvider class of the Sif.Framework.Demo.Au.Provider project.

## SIF 3.0 Framework configuration

In the SifFramework.config file, set the “provider.environmentType“ property to “BROKERED”. The SIF Framework does not support SIF Events in a “DIRECT” environment. If the BroadcastEvents action is called when the SIF Provider is running in a “DIRECT” environment, and error will be returned.

## Scheduling SIF Events

As the implementation of SIF Events in the SIF Framework is done by using a REST endpoint, it is the responsibility of the developer to schedule calls to execute the broadcast of change records. The mechanism used for scheduling SIF Events is therefore outside the scope of this document.

An example mechanism that could be used would be Azure WebJobs.