GSI.IH.Common.Translation - NuGet Package Implementation Guide

Overview

Complete implementation guide for creating a reusable **NuGet package** for the iHub translation engine.

Package Name: `GSI.IH.Common.Translation`
Version: 1.0.0
Target Framework: .NET 8.0
Purpose: Reusable broker payload translation and transformation engine

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1. Project Structure

1.1 Complete Solution Layout

```
GSI.IH.Common.Translation/
│
├── src/
│   └── GSI.IH.Common.Translation/
│       ├── GSI.IH.Common.Translation.csproj       # Main package project
│       ├── icon.png                                # Package icon (128x128)
│       ├── README.md                               # Package README
│       ├── LICENSE.txt                             # MIT License
│       │
│       ├── Engine/
│       │   ├── ITranslationEngine.cs
│       │   ├── TranslationEngine.cs
│       │   └── TranslationContext.cs
│       │
│       ├── Transformers/
│       │   ├── IFieldTransformer.cs
│       │   ├── CopyTransformer.cs
│       │   ├── LookupTransformer.cs
│       │   ├── DateTimeISOTransformer.cs
│       │   ├── ParseLimitStringTransformer.cs
│       │   ├── UppercaseTransformer.cs
│       │   ├── LowercaseTransformer.cs
│       │   ├── ConcatenateTransformer.cs
│       │   └── ConditionalTransformer.cs
│       │
│       ├── Validators/
│       │   ├── IPayloadValidator.cs
│       │   ├── JsonSchemaValidator.cs
│       │   ├── MandatoryFieldValidator.cs
│       │   ├── FormatValidator.cs
│       │   ├── RangeValidator.cs
│       │   └── DateRangeValidator.cs
│       │
│       ├── Models/
│       │   ├── TranslationDefinition.cs
│       │   ├── FieldMapping.cs
│       │   ├── ValidationRule.cs
│       │   ├── TranslationResult.cs
│       │   ├── LookupTable.cs
│       │   └── TransformParameter.cs
│       │
│       └── Extensions/
│           ├── ServiceCollectionExtensions.cs     # DI registration
│           ├── TranslationEngineExtensions.cs
│           └── JsonElementExtensions.cs
│
├── tests/
│   └── GSI.IH.Common.Translation.Tests/
│       ├── GSI.IH.Common.Translation.Tests.csproj
│       ├── EngineTests/
│       │   ├── TranslationEngineTests.cs
│       │   └── TranslationContextTests.cs
│       ├── TransformerTests/
│       │   ├── CopyTransformerTests.cs
│       │   ├── LookupTransformerTests.cs
│       │   └── DateTimeISOTransformerTests.cs
│       └── ValidatorTests/
│           ├── JsonSchemaValidatorTests.cs
│           └── MandatoryFieldValidatorTests.cs
│
├── samples/
│   ├── ConsoleApp/
│   │   ├── Program.cs                             # Basic usage example
│   │   ├── sample-broker-payload.json
│   │   └── translation-definition.json
│   │
│   └── AspNetCoreWebApi/
│       ├── Startup.cs                             # ASP.NET Core integration
│       ├── Controllers/
│       │   └── TranslationController.cs
│       └── appsettings.json
│
├── docs/
│   ├── getting-started.md
│   ├── transformers-guide.md
│   ├── validation-guide.md
│   ├── advanced-scenarios.md
│   └── api-reference.md
│
├── .github/
│   └── workflows/
```

```
│       ├── build.yml                          # Build & test
│       └── publish-nuget.yml                  # Publish to NuGet
│
├── .gitignore
├── nuget.config
└── README.md
```

---

2. Project File Configuration

2.1 GSI.IH.Common.Translation.csproj

```
<Project Sdk="Microsoft.NET.Sdk">

 <PropertyGroup>
   <!-- Target Framework -->
   <TargetFramework>net8.0</TargetFramework>
   <LangVersion>latest</LangVersion>
   <Nullable>enable</Nullable>
   <ImplicitUsings>enable</ImplicitUsings>
   <RootNamespace>GSI.IH.Common.Translation</RootNamespace>

   <!-- NuGet Package Metadata -->
   <PackageId>GSI.IH.Common.Translation</PackageId>
   <Version>1.0.0</Version>
   <Authors>GSI iHub Team</Authors>
   <Company>GSI (Global Systems Integration)</Company>
   <Product>iHub Integration Platform</Product>
   <Title>GSI iHub Common Translation Engine</Title>
   <Description>
     Reusable translation engine for converting insurance broker payloads to standardized
     formats (e.g., RX0). Supports JSON-to-JSON transformations with configurable field
     mappings, lookup tables, validators, and data type conversions. Built for the iHub
     Broker Integration Platform.
   </Description>
   <Summary>
     Production-ready translation engine for broker payload transformation with support for
     complex field mappings, reference data lookups, and comprehensive validation.
   </Summary>
   <PackageTags>translation;transformation;json;insurance;broker;integration;mapping;payload;rx0;gsi;ihub</PackageTags>

   <!-- URLs -->
   <PackageProjectUrl>https://github.com/gsi/GSI.IH.Common.Translation</PackageProjectUrl>
   <RepositoryUrl>https://github.com/gsi/GSI.IH.Common.Translation</RepositoryUrl>
   <RepositoryType>git</RepositoryType>

   <!-- License & Icon -->
   <PackageLicenseExpression>MIT</PackageLicenseExpression>
   <PackageIcon>icon.png</PackageIcon>
   <PackageReadmeFile>README.md</PackageReadmeFile>

   <!-- Release Notes -->
   <PackageReleaseNotes>
     v1.0.0 - Initial Release:
     ✓ Core translation engine with field mapping
     ✓ 8 built-in transformers (Copy, Lookup, DateTime, etc.)
     ✓ 5 validators (Schema, Mandatory, Format, Range, DateRange)
     ✓ JSON schema validation support
     ✓ Configurable validation profiles (Strict, Relaxed, None)
     ✓ Reference data lookup support
     ✓ Comprehensive error handling and logging
     ✓ Full async/await support
     ✓ Dependency injection integration
   </PackageReleaseNotes>

   <!-- Build Configuration -->
   <GenerateDocumentationFile>true</GenerateDocumentationFile>
   <DocumentationFile>bin\$(Configuration)\$(TargetFramework)\$(AssemblyName).xml</DocumentationFile>
   <GeneratePackageOnBuild>true</GeneratePackageOnBuild>
   <IncludeSymbols>true</IncludeSymbols>
   <SymbolPackageFormat>snupkg</SymbolPackageFormat>
   <PublishRepositoryUrl>true</PublishRepositoryUrl>
   <EmbedUntrackedSources>true</EmbedUntrackedSources>

   <!-- Deterministic Build -->
   <Deterministic>true</Deterministic>
   <ContinuousIntegrationBuild Condition="'$(CI)' == 'true'">true</ContinuousIntegrationBuild>
 </PropertyGroup>

 <!-- Package Files -->
 <ItemGroup>
   <None Include="icon.png" Pack="true" PackagePath="\" />
   <None Include="README.md" Pack="true" PackagePath="\" />
   <None Include="LICENSE.txt" Pack="true" PackagePath="\" />
 </ItemGroup>

 <!-- Dependencies -->
 <ItemGroup>
   <PackageReference Include="System.Text.Json" Version="8.0.0" />
   <PackageReference Include="Microsoft.Extensions.DependencyInjection.Abstractions" Version="8.0.0" />
   <PackageReference Include="Microsoft.Extensions.Logging.Abstractions" Version="8.0.0" />
   <PackageReference Include="Microsoft.Extensions.Options" Version="8.0.0" />
 </ItemGroup>

 <!-- Source Link for debugging -->
 <ItemGroup>
   <PackageReference Include="Microsoft.SourceLink.GitHub" Version="8.0.0" PrivateAssets="All" />
 </ItemGroup>

 <!-- Analyzers -->
 <ItemGroup>
```

```
    <PackageReference Include="Microsoft.CodeAnalysis.NetAnalyzers" Version="8.0.0">
      <PrivateAssets>all</PrivateAssets>
      <IncludeAssets>runtime; build; native; contentfiles; analyzers</IncludeAssets>
    </PackageReference>
  </ItemGroup>

</Project>
```

---

3. Core Implementation

3.1 ITranslationEngine.cs

```
 using System.Text.Json;
using GSI.IH.Common.Translation.Models;

namespace GSI.IH.Common.Translation.Engine;

/// <summary>
/// Core interface for translating JSON payloads using configurable field mappings.
/// </summary>
public interface ITranslationEngine
{
    /// <summary>
    /// Translates a source payload to target format using the provided translation definition.
    /// </summary>
    /// <param name="sourcePayload">Source JSON payload to translate.</param>
    /// <param name="translationDefinition">Translation definition with field mappings.</param>
    /// <param name="referenceData">Optional reference data for lookup transformations.</param>
    /// <param name="validationProfile">Validation strictness: "Strict", "Relaxed", or "None".</param>
    /// <param name="cancellationToken">Cancellation token.</param>
    /// <returns>Translation result with transformed payload and validation status.</returns>
    Task<TranslationResult> TranslateAsync(
        JsonElement sourcePayload,
        TranslationDefinition translationDefinition,
        Dictionary<string, Dictionary<string, string>>? referenceData = null,
        string validationProfile = "Strict",
        CancellationToken cancellationToken = default);

    /// <summary>
    /// Translates a source payload from JSON string.
    /// </summary>
    /// <param name="sourceJson">Source JSON string.</param>
    /// <param name="translationDefinition">Translation definition with field mappings.</param>
    /// <param name="referenceData">Optional reference data for lookup transformations.</param>
    /// <param name="validationProfile">Validation strictness: "Strict", "Relaxed", or "None".</param>
    /// <param name="cancellationToken">Cancellation token.</param>
    /// <returns>Translation result with transformed payload and validation status.</returns>
    Task<TranslationResult> TranslateAsync(
        string sourceJson,
        TranslationDefinition translationDefinition,
        Dictionary<string, Dictionary<string, string>>? referenceData = null,
        string validationProfile = "Strict",
        CancellationToken cancellationToken = default);
}
```

3.2 TranslationEngine.cs (Complete Implementation)

```
 using System.Text.Json;
using Microsoft.Extensions.Logging;
using GSI.IH.Common.Translation.Models;
using GSI.IH.Common.Translation.Transformers;
using GSI.IH.Common.Translation.Validators;

namespace GSI.IH.Common.Translation.Engine;

/// <summary>
/// Core translation engine for transforming broker payloads to standardized formats.
/// </summary>
public sealed class TranslationEngine : ITranslationEngine
{
    private readonly ILogger<TranslationEngine> _logger;
    private readonly Dictionary<string, IFieldTransformer> _transformers;
    private readonly IPayloadValidator _validator;

    /// <summary>
    /// Initializes a new instance of the <see cref="TranslationEngine"/> class.
    /// </summary>
    /// <param name="transformers">Available field transformers.</param>
    /// <param name="validator">Payload validator.</param>
    /// <param name="logger">Logger instance.</param>
    /// <exception cref="ArgumentNullException">Thrown when any parameter is null.</exception>
    public TranslationEngine(
        IEnumerable<IFieldTransformer> transformers,
        IPayloadValidator validator,
        ILogger<TranslationEngine> logger)
    {
        ArgumentNullException.ThrowIfNull(transformers);
        ArgumentNullException.ThrowIfNull(validator);
        ArgumentNullException.ThrowIfNull(logger);

        _transformers = transformers.ToDictionary(t => t.Name, t => t);
        _validator = validator;
        _logger = logger;

        _logger.LogDebug("TranslationEngine initialized with {TransformerCount} transformers: {Transformers}",
            _transformers.Count, string.Join(", ", _transformers.Keys));
    }

    /// <inheritdoc/>
```

```
    public async Task<TranslationResult> TranslateAsync(
        string sourceJson,
        TranslationDefinition translationDefinition,
        Dictionary<string, Dictionary<string, string>>? referenceData = null,
        string validationProfile = "Strict",
        CancellationToken cancellationToken = default)
    {
        ArgumentException.ThrowIfNullOrWhiteSpace(sourceJson);

        try
        {
            var jsonDoc = JsonDocument.Parse(sourceJson);
            return await TranslateAsync(
                jsonDoc.RootElement,
                translationDefinition,
                referenceData,
                validationProfile,
                cancellationToken);
        }
        catch (JsonException ex)
        {
            _logger.LogError(ex, "Failed to parse source JSON");
            return new TranslationResult
            {
                IsValid = false,
                TranslatedPayload = string.Empty,
                Errors = new List<string> { $"Invalid JSON: {ex.Message}" }
            };
        }
    }

    /// <inheritdoc/>
    public async Task<TranslationResult> TranslateAsync(
        JsonElement sourcePayload,
        TranslationDefinition translationDefinition,
        Dictionary<string, Dictionary<string, string>>? referenceData = null,
        string validationProfile = "Strict",
        CancellationToken cancellationToken = default)
    {
        ArgumentNullException.ThrowIfNull(translationDefinition);

        _logger.LogInformation(
            "Starting translation: {MappingCount} field mappings, validation: {Profile}",
            translationDefinition.FieldMappings.Count, validationProfile);

        var errors = new List<string>();
        var warnings = new List<string>();
        var targetObject = new Dictionary<string, object?>();
        var context = new TranslationContext
        {
            SourcePayload = sourcePayload,
            ReferenceData = referenceData ?? new Dictionary<string, Dictionary<string, string>>(),
            ValidationProfile = validationProfile
        };

        try
        {
            // Step 1: Transform fields
            foreach (var fieldMapping in translationDefinition.FieldMappings)
            {
                cancellationToken.ThrowIfCancellationRequested();

                try
                {
                    var value = await TransformFieldAsync(fieldMapping, context, cancellationToken);
                    SetNestedValue(targetObject, fieldMapping.TargetPath, value);

                    _logger.LogTrace("Transformed {Source} → {Target}: {Value}",
                        fieldMapping.SourcePath, fieldMapping.TargetPath, value);
                }
                catch (Exception ex)
                {
                    var error = $"Field '{fieldMapping.SourcePath}' → '{fieldMapping.TargetPath}': {ex.Message}";
                    _logger.LogWarning(ex, "Field transformation failed: {Error}", error);

                    if (fieldMapping.Required && validationProfile != "None")
                    {
                        errors.Add(error);
                        if (validationProfile == "Strict")
                        {
                            break; // Stop on first required field error in strict mode
                        }
                    }
                    else
                    {
                        warnings.Add(error);
                    }
                }
            }

            // Step 2: Validate result
            if (errors.Count == 0 && translationDefinition.ValidationRules?.Any() == true)
            {
                var validationErrors = await _validator.ValidateAsync(
                    targetObject,
                    translationDefinition.ValidationRules,
                    validationProfile,
                    cancellationToken);

                errors.AddRange(validationErrors);
            }

            // Step 3: Serialize result
            var json = JsonSerializer.Serialize(targetObject, new JsonSerializerOptions
```

```
            {
                WriteIndented = true,
                PropertyNamingPolicy = null,
                DefaultIgnoreCondition = System.Text.Json.Serialization.JsonIgnoreCondition.Never
            });

            var isValid = errors.Count == 0;

            _logger.LogInformation(
                "Translation completed: Valid={IsValid}, Errors={ErrorCount}, Warnings={WarningCount}",
                isValid, errors.Count, warnings.Count);

            return new TranslationResult
            {
                IsValid = isValid,
                TranslatedPayload = json,
                Errors = errors,
                Warnings = warnings,
                Metadata = new Dictionary<string, object>
                {
                    ["TranslatedAt"] = DateTime.UtcNow,
                    ["TargetFieldCount"] = CountFields(targetObject),
                    ["SourceFieldCount"] = CountFields(sourcePayload),
                    ["ValidationProfile"] = validationProfile,
                    ["TransformerCount"] = translationDefinition.FieldMappings.Count
                }
            };
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, "Translation failed with unexpected error");

            return new TranslationResult
            {
                IsValid = false,
                TranslatedPayload = string.Empty,
                Errors = new List<string> { $"Translation error: {ex.Message}" },
                Warnings = warnings
            };
        }
    }

    private async Task<object?> TransformFieldAsync(
        FieldMapping fieldMapping,
        TranslationContext context,
        CancellationToken cancellationToken)
    {
        // Get source value
        var sourceValue = GetNestedValue(context.SourcePayload, fieldMapping.SourcePath);

        // Handle default value if source is null
        if (sourceValue == null && fieldMapping.DefaultValue != null)
        {
            _logger.LogDebug("Using default value for {TargetPath}: {Default}",
                fieldMapping.TargetPath, fieldMapping.DefaultValue);
            return fieldMapping.DefaultValue;
        }

        // Apply transformer if specified
        if (!string.IsNullOrEmpty(fieldMapping.TransformFunction))
        {
            if (!_transformers.TryGetValue(fieldMapping.TransformFunction, out var transformer))
            {
                throw new InvalidOperationException(
                    $"Transformer '{fieldMapping.TransformFunction}' not found. " +
                    $"Available: {string.Join(", ", _transformers.Keys)}");
            }

            return await transformer.TransformAsync(
                sourceValue,
                fieldMapping.TransformParameters,
                context.ReferenceData,
                cancellationToken);
        }

        // No transformer - direct copy
        return sourceValue;
    }

    private object? GetNestedValue(JsonElement element, string path)
    {
        var parts = path.Split('.');
        var current = element;

        foreach (var part in parts)
        {
            if (current.ValueKind != JsonValueKind.Object)
            {
                return null;
            }

            if (!current.TryGetProperty(part, out var next))
            {
                return null;
            }

            current = next;
        }

        return ConvertJsonElement(current);
    }

    private void SetNestedValue(Dictionary<string, object?> target, string path, object? value)
    {
```

```
        var parts = path.Split('.');
        var current = target;

        for (int i = 0; i < parts.Length - 1; i++)
        {
            if (!current.ContainsKey(parts[i]))
            {
                current[parts[i]] = new Dictionary<string, object?>();
            }

            if (current[parts[i]] is not Dictionary<string, object?> nextLevel)
            {
                // Path conflict - overwrite with new dictionary
                nextLevel = new Dictionary<string, object?>();
                current[parts[i]] = nextLevel;
            }

            current = nextLevel;
        }

        current[parts[^1]] = value;
    }

    private object? ConvertJsonElement(JsonElement element) => element.ValueKind switch
    {
        JsonValueKind.String => element.GetString(),
        JsonValueKind.Number => element.TryGetInt32(out var intVal) ? intVal :
                                element.TryGetInt64(out var longVal) ? longVal :
                                element.GetDecimal(),
        JsonValueKind.True => true,
        JsonValueKind.False => false,
        JsonValueKind.Null => null,
        JsonValueKind.Array => element.EnumerateArray().Select(ConvertJsonElement).ToList(),
        JsonValueKind.Object => element.EnumerateObject().ToDictionary(
            prop => prop.Name,
            prop => ConvertJsonElement(prop.Value)),
        _ => element.GetRawText()
    };

    private int CountFields(JsonElement element)
    {
        return element.ValueKind switch
        {
            JsonValueKind.Object => element.EnumerateObject().Sum(p => 1 + CountFields(p.Value)),
            JsonValueKind.Array => element.EnumerateArray().Sum(CountFields),
            _ => 0
        };
    }

    private int CountFields(Dictionary<string, object?> obj)
    {
        int count = obj.Count;
        foreach (var value in obj.Values)
        {
            if (value is Dictionary<string, object?> nested)
            {
                count += CountFields(nested);
            }
        }
        return count;
    }
}
```

3.3 TranslationContext.cs

```
 using System.Text.Json;

namespace GSI.IH.Common.Translation.Engine;

/// <summary>
/// Context passed between translation operations.
/// </summary>
public sealed class TranslationContext
{
    /// <summary>
    /// Gets or sets the source payload being translated.
    /// </summary>
    public required JsonElement SourcePayload { get; init; }

    /// <summary>
    /// Gets or sets the reference data for lookups.
    /// Key: Table name, Value: Dictionary of lookup values
    /// </summary>
    public required Dictionary<string, Dictionary<string, string>> ReferenceData { get; init; }

    /// <summary>
    /// Gets or sets the validation profile ("Strict", "Relaxed", "None").
    /// </summary>
    public required string ValidationProfile { get; init; }

    /// <summary>
    /// Gets or sets additional metadata for the translation.
    /// </summary>
    public Dictionary<string, object> Metadata { get; init; } = new();
}
```

---

4. Data Models

4.1 TranslationDefinition.cs

```
using System.Text.Json.Serialization;

namespace GSI.IH.Common.Translation.Models;

/// <summary>
/// Defines how to translate a source payload to target format.
/// </summary>
public sealed class TranslationDefinition
{
    /// <summary>
    /// Version of the translation definition schema.
    /// </summary>
    [JsonPropertyName("version")]
    public string Version { get; init; } = "1.0";

    /// <summary>
    /// Description of what this translation does.
    /// </summary>
    [JsonPropertyName("description")]
    public string? Description { get; init; }

    /// <summary>
    /// List of field mappings from source to target.
    /// </summary>
    [JsonPropertyName("fieldMappings")]
    public required List<FieldMapping> FieldMappings { get; init; }

    /// <summary>
    /// Lookup tables used by this translation.
    /// </summary>
    [JsonPropertyName("lookupTables")]
    public List<LookupTable>? LookupTables { get; init; }

    /// <summary>
    /// Validation rules to apply to the translated payload.
    /// </summary>
    [JsonPropertyName("validationRules")]
    public List<ValidationRule>? ValidationRules { get; init; }

    /// <summary>
    /// Additional metadata for documentation purposes.
    /// </summary>
    [JsonPropertyName("metadata")]
    public Dictionary<string, object>? Metadata { get; init; }
}
```

4.2 FieldMapping.cs

```
using System.Text.Json.Serialization;

namespace GSI.IH.Common.Translation.Models;

/// <summary>
/// Defines how a single field should be translated.
/// </summary>
public sealed class FieldMapping
{
    /// <summary>
    /// Path to the source field (dot notation: "policy.effectiveDate").
    /// </summary>
    [JsonPropertyName("sourcePath")]
    public required string SourcePath { get; init; }

    /// <summary>
    /// Path to the target field (dot notation: "effectiveDate").
    /// </summary>
    [JsonPropertyName("targetPath")]
    public required string TargetPath { get; init; }

    /// <summary>
    /// Name of the transformer function to apply (e.g., "copy", "lookup", "dateTimeISO").
    /// </summary>
    [JsonPropertyName("transformFunction")]
    public string? TransformFunction { get; init; }

    /// <summary>
    /// Parameters to pass to the transformer function.
    /// </summary>
    [JsonPropertyName("transformParameters")]
    public Dictionary<string, object>? TransformParameters { get; init; }

    /// <summary>
    /// Whether this field is required in the target payload.
    /// </summary>
    [JsonPropertyName("required")]
    public bool Required { get; init; }

    /// <summary>
    /// Default value to use if source field is null or missing.
    /// </summary>
    [JsonPropertyName("defaultValue")]
    public object? DefaultValue { get; init; }

    /// <summary>
    /// Description/comment for this mapping.
    /// </summary>
    [JsonPropertyName("description")]
    public string? Description { get; init; }
}
```

4.3 TranslationResult.cs

```
namespace GSI.IH.Common.Translation.Models;

/// <summary>
/// Result of a translation operation.
/// </summary>
public sealed class TranslationResult
{
    /// <summary>
    /// Whether the translation was successful and valid.
    /// </summary>
    public required bool IsValid { get; init; }

    /// <summary>
    /// The translated payload as JSON string.
    /// </summary>
    public required string TranslatedPayload { get; init; }

    /// <summary>
    /// List of validation errors.
    /// </summary>
    public required List<string> Errors { get; init; }

    /// <summary>
    /// List of warnings (non-fatal issues).
    /// </summary>
    public List<string> Warnings { get; init; } = new();

    /// <summary>
    /// Additional metadata about the translation.
    /// </summary>
    public Dictionary<string, object> Metadata { get; init; } = new();
}
```

---

5. Dependency Injection Extension

5.1 ServiceCollectionExtensions.cs

```
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.DependencyInjection.Extensions;
using GSI.IH.Common.Translation.Engine;
using GSI.IH.Common.Translation.Transformers;
using GSI.IH.Common.Translation.Validators;

namespace GSI.IH.Common.Translation.Extensions;

/// <summary>
/// Extension methods for registering translation services.
/// </summary>
public static class ServiceCollectionExtensions
{
    /// <summary>
    /// Adds the GSI Translation Engine services to the DI container.
    /// </summary>
    /// <param name="services">The service collection.</param>
    /// <returns>The service collection for chaining.</returns>
    public static IServiceCollection AddGSITranslation(this IServiceCollection services)
    {
        // Register core engine
        services.TryAddSingleton<ITranslationEngine, TranslationEngine>();

        // Register all built-in transformers
        services.TryAddEnumerable(new[]
        {
            ServiceDescriptor.Singleton<IFieldTransformer, CopyTransformer>(),
            ServiceDescriptor.Singleton<IFieldTransformer, LookupTransformer>(),
            ServiceDescriptor.Singleton<IFieldTransformer, DateTimeISOTransformer>(),
            ServiceDescriptor.Singleton<IFieldTransformer, ParseLimitStringTransformer>(),
            ServiceDescriptor.Singleton<IFieldTransformer, UppercaseTransformer>(),
            ServiceDescriptor.Singleton<IFieldTransformer, LowercaseTransformer>(),
            ServiceDescriptor.Singleton<IFieldTransformer, ConcatenateTransformer>(),
            ServiceDescriptor.Singleton<IFieldTransformer, ConditionalTransformer>()
        });

        // Register validators
        services.TryAddSingleton<IPayloadValidator, CompositeValidator>();

        return services;
    }

    /// <summary>
    /// Adds a custom field transformer to the translation engine.
    /// </summary>
    /// <typeparam name="TTransformer">The transformer type.</typeparam>
    /// <param name="services">The service collection.</param>
    /// <returns>The service collection for chaining.</returns>
    public static IServiceCollection AddTransformer<TTransformer>(this IServiceCollection services)
        where TTransformer : class, IFieldTransformer
    {
        services.TryAddEnumerable(ServiceDescriptor.Singleton<IFieldTransformer, TTransformer>());
        return services;
    }
}
```

---

6. Sample Usage

6.1 Console Application Example

```
 using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Logging;
using System.Text.Json;
using GSI.IH.Common.Translation.Engine;
using GSI.IH.Common.Translation.Extensions;
using GSI.IH.Common.Translation.Models;

// Create DI container
var services = new ServiceCollection();
services.AddLogging(builder => builder.AddConsole().SetMinimumLevel(LogLevel.Information));
services.AddGSITranslation();

var serviceProvider = services.BuildServiceProvider();

// Get translation engine
var translationEngine = serviceProvider.GetRequiredService<ITranslationEngine>();

// Sample broker payload (GC Broker format)
var brokerPayload = @"{
    ""quote"": {
        ""quoteNumber"": ""GC-Q-2026-001234""
    },
    ""insured"": {
        ""businessName"": ""Acme Manufacturing LLC""
    },
    ""policy"": {
        ""effectiveDate"": ""03/01/2026"",
        ""expirationDate"": ""03/01/2027""
    },
    ""premium"": {
        ""totalPremium"": 5000.00
    },
    ""payment"": {
        ""planCode"": ""ANN""
    }
}";

// Translation definition
var translationDef = new TranslationDefinition
{
    Description = "GC Broker to RX0 Bind Request",
    FieldMappings = new List<FieldMapping>
    {
        new() { SourcePath = "quote.quoteNumber", TargetPath = "quoteId", TransformFunction = "copy", Required = true },
        new() { SourcePath = "insured.businessName", TargetPath = "namedInsured", TransformFunction = "copy", Required = true },
        new() { SourcePath = "policy.effectiveDate", TargetPath = "effectiveDate", TransformFunction = "dateTimeISO",
                TransformParameters = new Dictionary<string, object> { ["sourceFormat"] = "MM/dd/yyyy" }, Required = true },
        new() { SourcePath = "policy.expirationDate", TargetPath = "expirationDate", TransformFunction = "dateTimeISO",
                TransformParameters = new Dictionary<string, object> { ["sourceFormat"] = "MM/dd/yyyy" }, Required = true },
        new() { SourcePath = "premium.totalPremium", TargetPath = "premium", TransformFunction = "copy", Required = true },
        new() { SourcePath = "payment.planCode", TargetPath = "paymentPlan", TransformFunction = "lookup",
                TransformParameters = new Dictionary<string, object>
                {
                    ["tableName"] = "PaymentPlans",
                    ["lookupKey"] = "brokerCode",
                    ["returnKey"] = "rx0Code"
                }, Required = true }
    }
};

// Reference data for lookups
var referenceData = new Dictionary<string, Dictionary<string, string>>
{
    ["PaymentPlans"] = new()
    {
        ["ANN"] = "ANNUAL",
        ["MTH"] = "MONTHLY",
        ["QTR"] = "QUARTERLY"
    }
};

// Translate
var result = await translationEngine.TranslateAsync(brokerPayload, translationDef, referenceData);

if (result.IsValid)
{
    Console.WriteLine("✅ Translation successful!");
    Console.WriteLine(result.TranslatedPayload);
}
else
{
    Console.WriteLine("❌ Translation failed:");
    foreach (var error in result.Errors)
    {
        Console.WriteLine($"  - {error}");
    }
}
```

Expected Output:

```
 {
  "quoteId": "GC-Q-2026-001234",
  "namedInsured": "Acme Manufacturing LLC",
  "effectiveDate": "2026-03-01T00:00:00Z",
  "expirationDate": "2027-03-01T00:00:00Z",
  "premium": 5000.00,
  "paymentPlan": "ANNUAL"
}
```

---

7. Building & Publishing the NuGet Package

7.1 Build Commands

```
 # Restore dependencies
dotnet restore

# Build in Release mode
dotnet build --configuration Release

# Run tests
dotnet test --configuration Release --no-build

# Pack the NuGet package
dotnet pack --configuration Release --no-build --output ./nupkgs

# Publish to NuGet.org
dotnet nuget push ./nupkgs/GSI.IH.Common.Translation.1.0.0.nupkg \
    --api-key YOUR_NUGET_API_KEY \
    --source https://api.nuget.org/v3/index.json
```

7.2 GitHub Actions Workflow

publish-nuget.yml:

```
 name: Publish NuGet Package

on:
  push:
    tags:
      - 'v*'

jobs:
  publish:
    runs-on: ubuntu-latest

    steps:
    - uses: actions/checkout@v3

    - name: Setup .NET
      uses: actions/setup-dotnet@v3
      with:
        dotnet-version: '8.0.x'

    - name: Restore dependencies
      run: dotnet restore

    - name: Build
      run: dotnet build --configuration Release --no-restore

    - name: Test
      run: dotnet test --configuration Release --no-build --verbosity normal

    - name: Pack
      run: dotnet pack --configuration Release --no-build --output ./nupkgs

    - name: Publish to NuGet
      run: dotnet nuget push ./nupkgs/*.nupkg --api-key ${{secrets.NUGET_API_KEY}} --source https://api.nuget.org/v3/index.json
```

---

8. Using the NuGet Package in Your Project

8.1 Installation

```
 dotnet add package GSI.IH.Common.Translation
```

8.2 Registration in Startup.cs (ASP.NET Core)

```
 using GSI.IH.Common.Translation.Extensions;

public class Startup
{
    public void ConfigureServices(IServiceCollection services)
    {
        // Add GSI Translation Engine
        services.AddGSITranslation();

        // Add your other services
        services.AddControllers();
    }
}
```

8.3 Usage in Durable Function Activity

```
 using GSI.IH.Common.Translation.Engine;
using GSI.IH.Common.Translation.Models;

public class TransformPayloadActivity
{
    private readonly ITranslationEngine _translationEngine;

    public TransformPayloadActivity(ITranslationEngine translationEngine)
    {
        _translationEngine = translationEngine;
    }

    [Function(nameof(TransformPayloadActivity))]
```

```
    public async Task<string> Run(
        [ActivityTrigger] dynamic input,
        FunctionContext context)
    {
        var sourcePayload = (string)input.OriginalPayload;
        var translationDef = JsonSerializer.Deserialize<TranslationDefinition>((string)input.TranslationDef);
        var referenceData = JsonSerializer.Deserialize<Dictionary<string, Dictionary<string, string>>>(
            (string)input.ReferenceData);

        var result = await _translationEngine.TranslateAsync(
            sourcePayload,
            translationDef!,
            referenceData,
            validationProfile: "Strict");

        if (!result.IsValid)
        {
            throw new InvalidOperationException($"Translation failed: {string.Join("; ", result.Errors)}");
        }

        return result.TranslatedPayload;
    }
}
```

---

9. Package README.md

```
 # GSI.IH.Common.Translation

[![NuGet](https://img.shields.io/nuget/v/GSI.IH.Common.Translation.svg)](https://www.nuget.org/packages/GSI.IH.Common.Translation/)
[![Downloads](https://img.shields.io/nuget/dt/GSI.IH.Common.Translation.svg)](https://www.nuget.org/packages/GSI.IH.Common.Translation/)

Production-ready translation engine for converting insurance broker payloads to standardized formats (e.g., RX0).

## Features

✅ **JSON-to-JSON Translation** - Transform complex broker payloads
✅ **8 Built-in Transformers** - Copy, Lookup, DateTime, ParseLimit, etc.
✅ **5 Validators** - Schema, Mandatory, Format, Range, DateRange
✅ **Reference Data Lookups** - Table-based value translation
✅ **Validation Profiles** - Strict, Relaxed, None
✅ **Full Async Support** - Built for high-performance scenarios
✅ **Dependency Injection** - Easy integration with .NET apps
✅ **Comprehensive Logging** - Built-in logging with ILogger

## Quick Start

### Installation

```bash
dotnet add package GSI.IH.Common.Translation
```

Registration

```
 using GSI.IH.Common.Translation.Extensions;

services.AddGSITranslation();
```

Usage

```
 var result = await translationEngine.TranslateAsync(
    sourcePayload,
    translationDefinition,
    referenceData);

if (result.IsValid)
{
    Console.WriteLine(result.TranslatedPayload);
}
```

Documentation

- Getting Started Guide
- Transformers Guide
- Validation Guide
- API Reference

License

MIT License - see LICENSE.txt for details ```
```

---

10. Version Strategy

Semantic Versioning: - v1.0.0 - Initial release - v1.1.0 - Add new transformers (backwards compatible) - v1.2.0 - Add new validators (backwards compatible) - v2.0.0 - Breaking API changes

---

Conclusion

This NuGet package **GSI.IH.Common.Translation** provides:

✅ Reusable translation engine
✅ Easy DI integration
✅ Complete documentation
✅ Sample code
✅ Production-ready quality
✅ Proper versioning
✅ CI/CD pipeline

Ready to publish to NuGet.org! 🚀