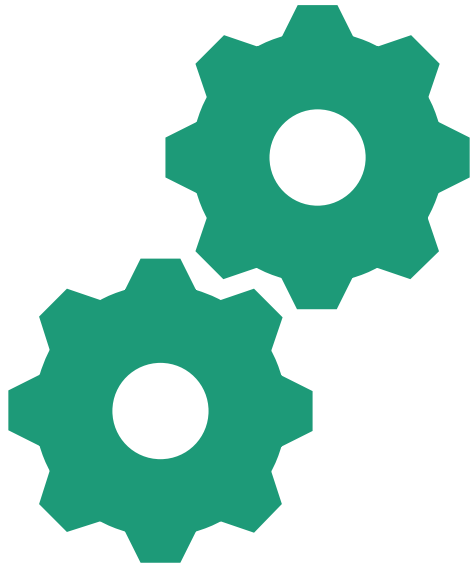
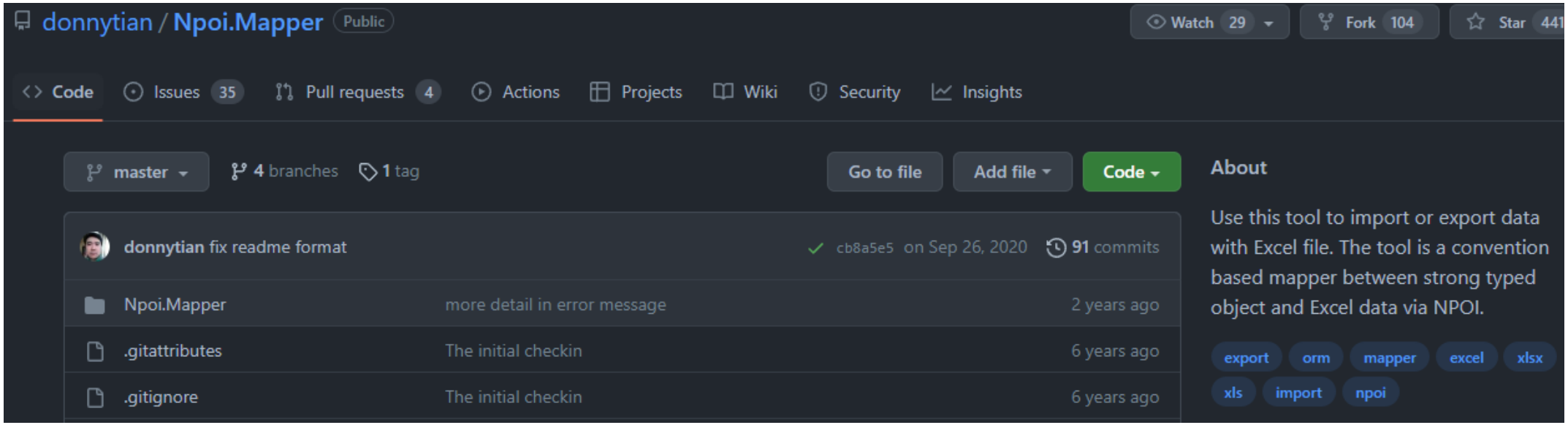
Using unit tests as a troubleshooting mechanism

By Jan Inge Nygård



20.05.2022

Repo for NPOI Mapper (excel mapper)



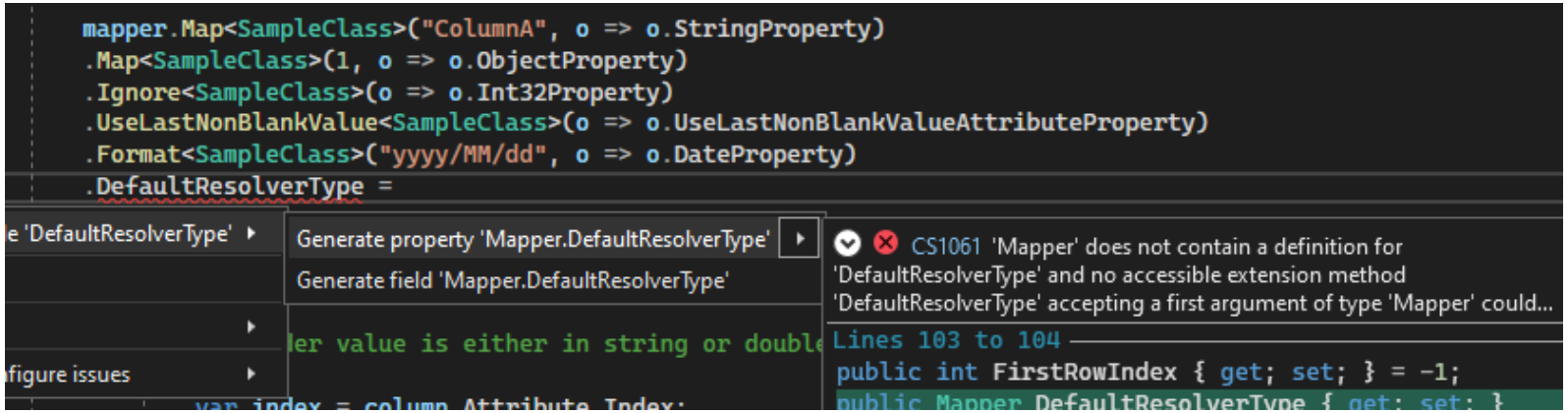
From Readme

Explicit column mapping

By fluent mapping methods:

```
mapper.Map<SampleClass>("ColumnA", o => o.Property1)
    .Map<SampleClass>(1, o => o.Property2)
    .Ignore<SampleClass>(o => o.Property3)
    .UseLastNonBlankValue<SampleClass>(o => o.Property1)
    .Format<SampleClass>("yyyy/MM/dd", o => o.DateProperty)
    .DefaultResolverType = typeof (SampleColumnResolver);
```

But not implemented, or removed



Where the main test case relevant to me is

```
[Test]
public void MultiColumnContainerTest()
{
    // Arrange
    var date1 = DateTime.Now;
    var date2 = date1.AddMonths(1);
    const string str1 = "aBC";
    const string str2 = "BCD";
    const string str3 = "_PutTest";
    var workbook = GetSimpleWorkbook(date1, str1);

    // We will import columns with index of 31 and 33 into a collection property.
    workbook.GetSheetAt(1).GetRow(0).CreateCell(31).SetCellValue(date1);
    workbook.GetSheetAt(1).GetRow(0).CreateCell(33).SetCellValue(date2);

    workbook.GetSheetAt(1).GetRow(1).CreateCell(31).SetCellValue(str1);
    workbook.GetSheetAt(1).GetRow(1).CreateCell(33).SetCellValue(str2);

    // Act
    var mapper = new Mapper(workbook);
    mapper.Map(
        column => // column filter : Custom logic to determine whether or not to map and include an unmapped column.
        {
```

- Has Arrange, Act and Asserts already
- But some scenarios not relevant to me as well

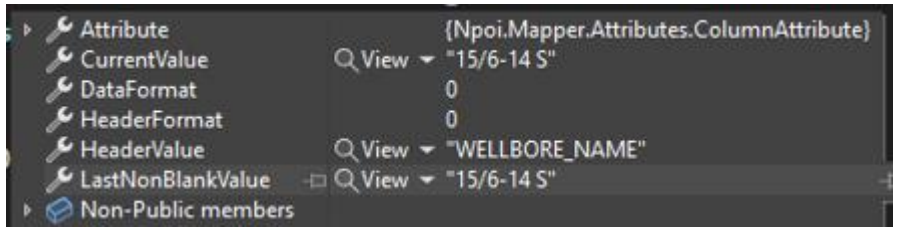
My two main objectives

1. Map excel rows to C# model
2. Be able to have custom validation on column values (ie. null checks)

First case handled fine, with repo's attribute functionality

```
3 references | jan93, 14 hours ago | 1 author, 1 change
public partial class ExcelMapperTests
{
    4 references | jan93, 14 hours ago | 1 author, 1 change
    public class SampleClassSimple
    {
        [Column("DateProperty")]
        0 references | jan93, 14 hours ago | 1 author, 1 change
        public DateTime DateProperty { get; set; }

        [Column("StringProperty")]
        1 reference | 1/1 passing | jan93, 14 hours ago | 1 author, 1 change
        public string StringProperty { get; set; }

        [Column("OtherProperty")]
        0 references | jan93, 14 hours ago | 1 author, 1 change
        public string OtherProperty { get; set; }
    }
}
```

Maps up (behind the scenes) as expected

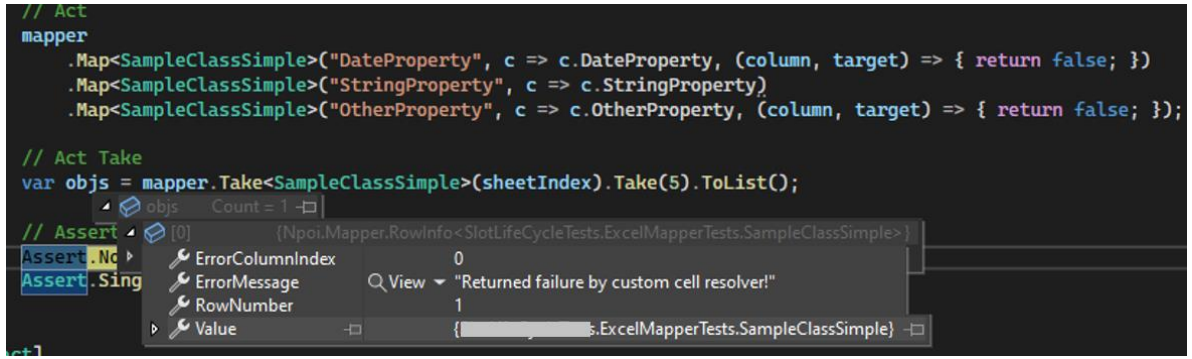


For the second case, we can also map like this

```
// Act
mapper
    .Map<SampleClassSimple>("DateProperty", c => c.DateProperty)
    .Map<SampleClassSimple>("StringProperty", c => c.StringProperty)
    .Map<SampleClassSimple>("OtherProperty", c => c.OtherProperty);

// Act Take
var objs = mapper.Take<SampleClassSimple>(sheetIndex).Take(5).ToList();
```

But only one error per row. Could also become cumbersome with multiple validations for each property

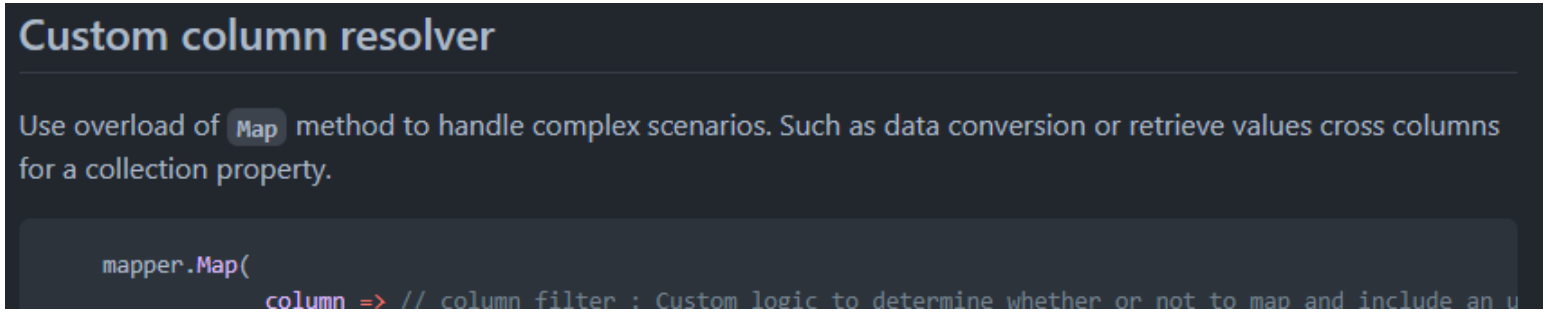
```
// Act
mapper
    .Map<SampleClassSimple>("DateProperty", c => c.DateProperty, (column, target) => { return false; })
    .Map<SampleClassSimple>("StringProperty", c => c.StringProperty)
    .Map<SampleClassSimple>("OtherProperty", c => c.OtherProperty, (column, target) => { return false; });

// Act Take
var objs = mapper.Take<SampleClassSimple>(sheetIndex).Take(5).ToList();
```

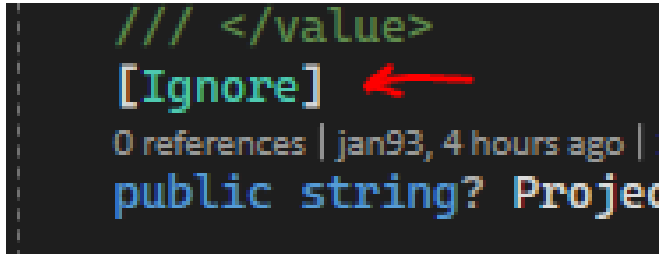


Handling custom scenarios

But for more complex scenarios, we may need more customization:

- To be able to run data validation independent of data fetching
- Especially as data fetch / load could be computationally heavy
- And for separation of concern
- This also requires overriding automapping, by setting Ignore attribute





..but which has some consequences

Problems:

- Not all degrees of freedom covered
- Less documentation (in this case)
- Uncertainty in behaviour of application

Solution: Use unit tests to learn the application behaviour, to achieve the goal of inducing a validation error.

Approach: Start with one unit test (as close to your given scenario), and build based on that (I ended up with ~10 tests).

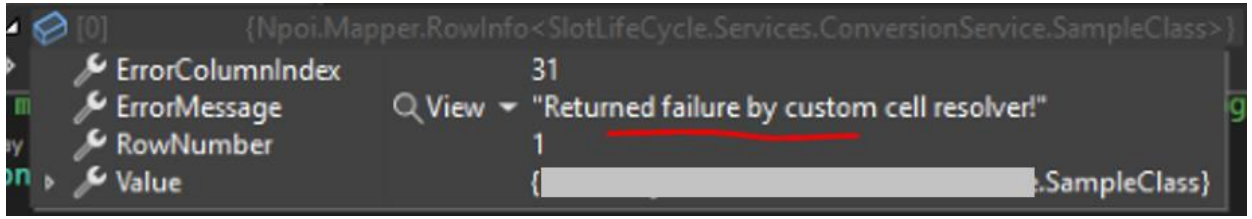
I were able to boil my scenario down to this

```
// Act
mapper.Map(
    column =>
    {
        return true;
    },
    (column, target) =>
    {
        return false;
    });
```

But I still had questions:

- Why does the error only triggers when first 'true' is returned and then 'false'?
- In lack of insight, I initially thought this was a bug

Which gives the desired error



..which for a single column looked like this

```
0 references | 0 changes | 0 authors, 0 changes
public static void PerformNullCheckForASingleColumnv0(Mapper mapper, int columnIndex)
{
    mapper.Map(
        column =>
        {
            var index = column.Attribute.Index;
            if (index == columnIndex)
            {
                return true;
            }
            return false;
        },
        (column, target) =>
        {
            if (String.IsNullOrWhiteSpace($"{column.CurrentValue}"))
            {
                return false;
            }
            return true;
        },
        (column, source) =>
        {
            return true;
        });
}
```

- While this was better, I were still a bit confused
- Why the need for a clutter of booleans?

So, I refactored with intent to create meaning

```
10 references | jan93, 9 hours ago | 1 author, 1 change
public static class CustomResolverTypes
{
    4 references | jan93, 9 hours ago | 1 author, 1 change
    public static class StageOne
    {
        public const bool IncludeColumnInNextStageValidation = true;
        public const bool IgnoreThisColumn = false;
    }

    4 references | jan93, 9 hours ago | 1 author, 1 change
    public static class StageTwo
    {
        public const bool FinalizeInMemoryMappingOperation = true;
        public const bool TriggerValidationError = false;
    }

    2 references | jan93, 9 hours ago | 1 author, 1 change
    public static class StageThree
    {
        public const bool ReturnTrue = true;
        public const bool ReturnFalse = false;
    }
}
```

- Still returning booleans
- But now with meaning
- StageThree not discovered yet, so is a placeholder to indicate next step

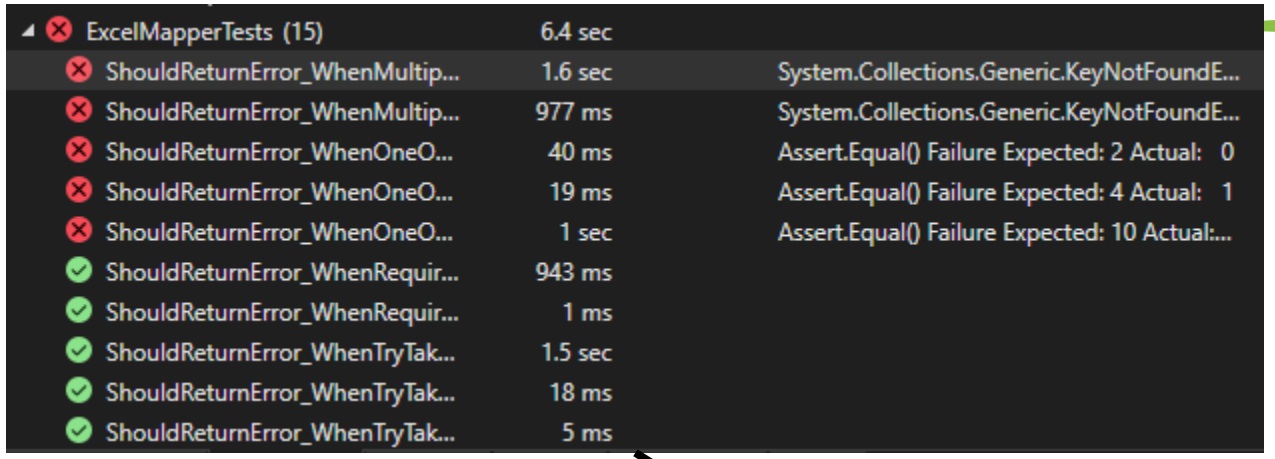
..which looks like this

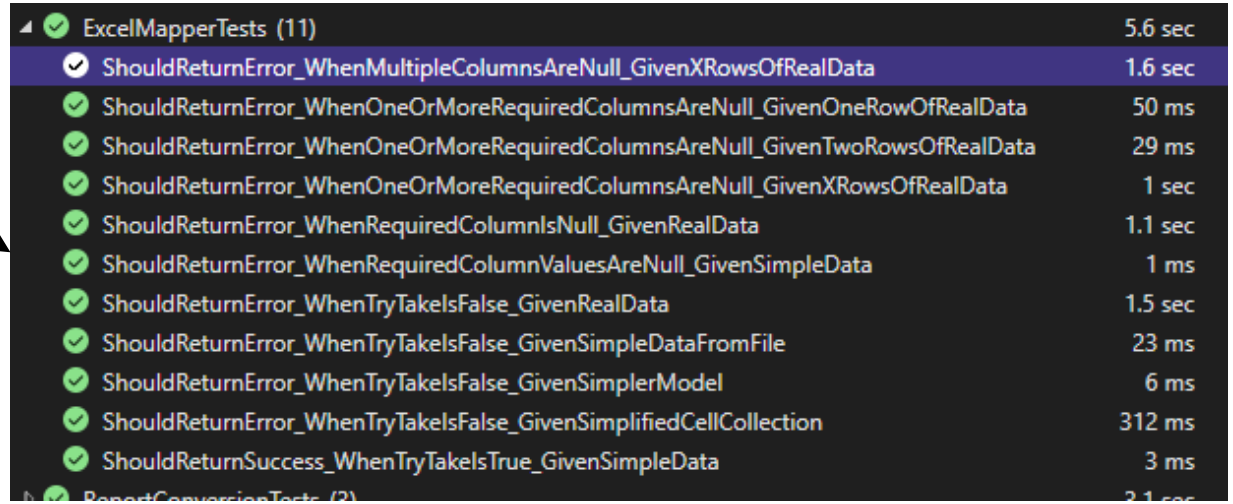
```
public static void PerformNullCheckForASingleColumn(Mapper mapper, int columnIndex)
{
    mapper.Map(
        column =>
        {
            var index = column.Attribute.Index;
            if (index == columnIndex)
            {
                return CustomResolverTypes.StageOne.IncludeColumnInNextStageValidation;
            }
            return CustomResolverTypes.StageOne.IgnoreThisColumn;
        },
        (column, target) =>
        {
            if (String.IsNullOrWhiteSpace($"{column.CurrentValue}"))
            {
                return CustomResolverTypes.StageTwo.TriggerValidationError;
            }
            return CustomResolverTypes.StageTwo.FinalizeInMemoryMappingOperation;
        },
        (column, source) =>
        {
            return CustomResolverTypes.StageThree.ReturnTrue;
        });
}
```

- This handles validation
- But for data mapping, my idea is to do something similar

..and then, a trillion tests later

..and with some troubleshooting





..we arrive at the following

- Where the test itself is more readable than before

```
[Fact]
| 0 references | jan93, 5 hours ago | 1 author, 1 change
public void ShouldReturnError_WhenMultipleColumnsAreNull_GivenXRowsOfRealData()
{
    // Arrange
    var sheetIndex = 0;
    var rowsToCheck = 2;
    var mustNotBeNull = RawExcelHeadersSimple.MustNotBeNull;
    var expectedErrors = mustNotBeNull.Count() * rowsToCheck;
    var workbook = WorkbookExtensions.GetWorkbookFromTestData("[redacted].xlsx");
    var mapper = new Mapper(workbook);

    // Act
    var validationErrors = WorkbookExtensions.PerformNullChecksForMultipleColumns(mapper, mustNotBeNull, sheetIndex, rowsToCheck);

    // Assert
    Assert.Equal(expectedErrors, validationErrors.Count);
}
```

..and the main method is more declarative

- I find that these abstractions give me a new / better insight

```
public static List<RowInfo<RawExcelFormatSimple>> PerformNullChecksForMultipleColumns(Mapper mapper,
    string[] mustNotBeNull, int sheetIndex, int rowsToCheck)
{
    var rowInfos = new List<RowInfo<RawExcelFormatSimple>>();
    var rowInfoInternalDict = new Dictionary<int, List<RowInfo<RawExcelFormatSimple>>>();
    var rowIndex = 0;

    mapper.Map(
        column =>
        {
            return HandleColumnChecks(mustNotBeNull, column);
        },
        (column, target) =>
        {
            return HandleValidationChecks(column, rowInfos, rowInfoInternalDict, ref rowIndex);
        });

    mapper.Take<RawExcelFormatSimple>(sheetIndex).Take(rowsToCheck).ToList();

    AddLastRowOfValidationErrors(rowInfos, rowInfoInternalDict, rowIndex);

    var allErrors = CollectAllErrors(rowInfoInternalDict);

    return allErrors;
}
```

Learnings

- Quite useful to use unit tests, especially when making new microservices
- Unit tests are also useful as a means of understanding external packages or dependencies better, ie. if documentation is lackluster
- The "best" form of refactoring is to have better design upfront, thus avoiding having to fix or refactor design mistakes in the future

Questions?

Thanks for your time

Repo used:

- https://github.com/donnytian/Npoi.Mapper

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