



sambaXP Conference

April 7-8, 2025

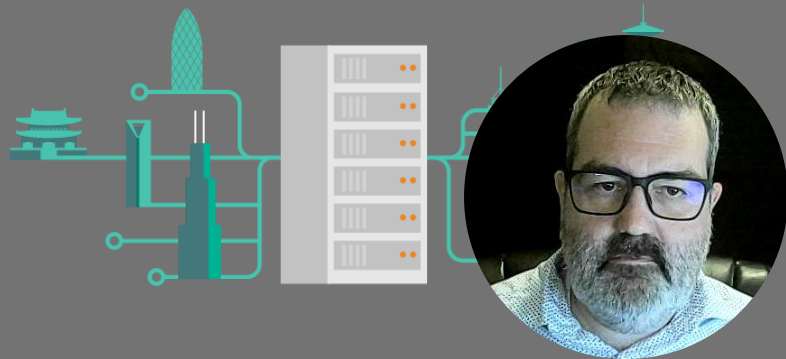
Microsoft Interoperability Track



Working with the Office Open XML file format and Azure AI

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Prerequisites

Visual Studio (free community edition is OK)

.NET 8.0+

Presentation app that can open .pptx files

Free Azure Account

See links provided at the end of the presentation

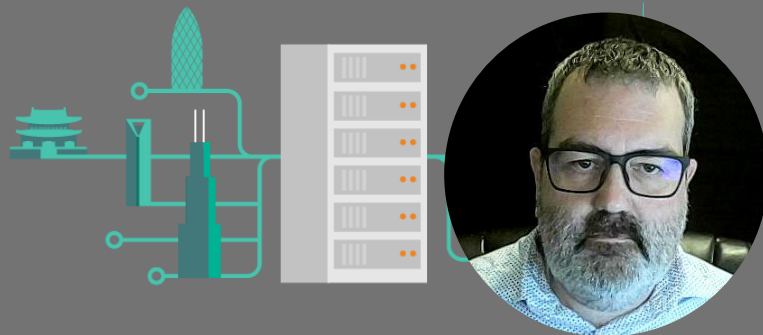


Agenda

- Open XML File Formats
- Open XML SDK
- Azure AI Vision



How the Office Open XML File Format Works



Office Open XML File Formats

- Set of file formats for Office documents
 - .pptx, .docx, xlsx, etc.
- Stored in Open Package Conventions (OPC)
 - Zip files containing xml and other data files



Microsoft Office implements ISO/IEC-29500 Office Open XML File Formats

Rename a PowerPoint file from
.pptx to .zip then unzip the file
to see the underlying xml

```
└─ _rels
  │ presentation.xml.rels
  └─ slideLayouts
    │ > _rels
    │ ── slideLayout1.xml
    │ ── slideLayout2.xml
    │ ── slideLayout3.xml
    │ ── slideLayout4.xml
    │ ── slideLayout5.xml
    │ ── slideLayout6.xml
    │ ── slideLayout7.xml
    │ ── slideLayout8.xml
    │ ── slideLayout9.xml
    │ ── slideLayout10.xml
    │ ── slideLayout11.xml
    └─ slideMasters
      │ > _rels
      │ ── slideMaster1.xml
      └─ slides
        │ > _rels
        │ ── slide1.xml
        │ ── slide2.xml
        └─ theme
          │ ── theme1.xml
          ── presentation.xml
          ── presProps.xml
          ── tableStyles.xml
          ── viewProps.xml
```



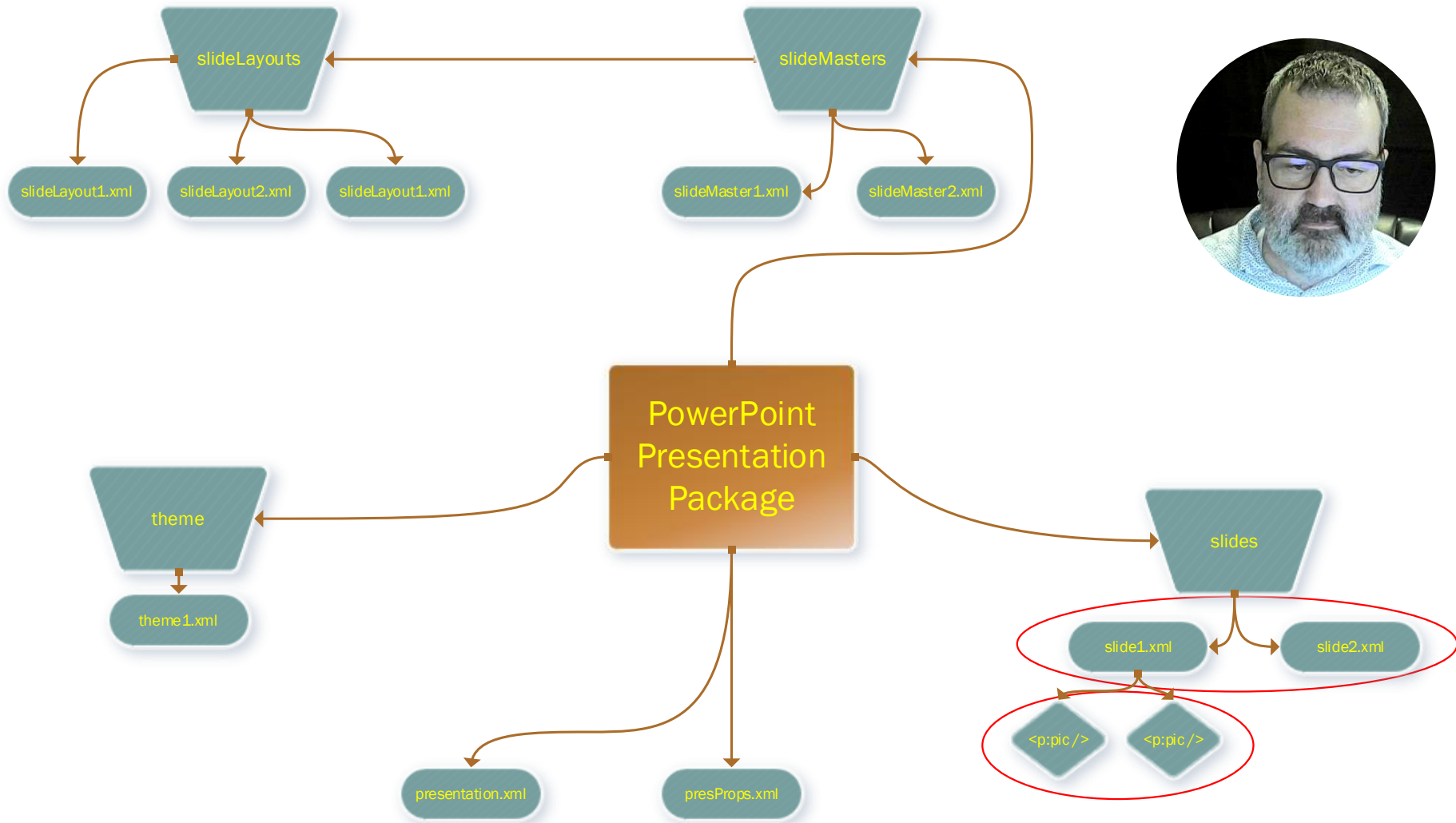
Presentation XML

```
<p:presentation>
  ...
  <p:sldIdLst>
    <p:sldId id="256" r:id="rId2"/>
    <p:sldId id="257" r:id="rId3"/>
  </p:sldIdLst>
  ...
</p:presentation>
```

presentation.xml.rels

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Relationships xmlns="http://schemas.openxmlformats.org/package/2006/relationships">
  <Relationship Id="rId3" Type="http://schemas.openxmlformats.org/officeDocument/2006/relationships/slide"
  Target="slides/slide2.xml"/>
  ...
  <Relationship Id="rId2" Type="http://schemas.openxmlformats.org/officeDocument/2006/relationships/slide"
  Target="slides/slide1.xml"/>
  ...
</Relationships>
```





Slide Parts



```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<p:sld xmlns:a="http://schemas.openxmlformats.org/drawingml/2006/main"
xmlns:r="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
xmlns:p="http://schemas.openxmlformats.org/presentationml/2006/main">
  <p:cSld>
    <p:spTree>
      <p:nvGrpSpPr>
        <p:cNvPr id="1" name=""/>
        <p:cNvGrpSpPr/>
        <p:nvPr/>
      </p:nvGrpSpPr>
      <p:grpSpPr>
        <a:xfrm>
          <a:off x="0" y="0"/>
          <a:ext cx="0" cy="0"/>
          <a:chOff x="0" y="0"/>
          <a:chExt cx="0" cy="0"/>
        </a:xfrm>
      </p:grpSpPr>
      <p:pic>
        ...
      </p:pic>
    </p:spTree>
    <p:extLst>
      <p:ext uri="{BB962C8B-B14F-4D97-AF65-F5344CB8AC3E}">
        <p14:creationId xmlns:p14="http://schemas.microsoft.com/office/powerpoint/2010/main" val="2703244698"/>
      </p:ext>
    </p:extLst>
  </p:cSld>
  <p:clrMapOvr>
    <a:masterClrMapping/>
  </p:clrMapOvr>
</p:sld>
```

Picture Element

```
<p:pic>
  <p:nvPicPr>
    <p:cNvPr id="5" name="Picture 4" descr="A shark">
      <a:extLst>
        <a:ext uri="{FF2B5EF4-FFF2-40B4-BE49-F238E27FC236}">
          <a16:creationId xmlns:a16="http://schemas.microsoft.com/office/drawing/2014/main" id="{3CB9C978-09C7-56FD-8FBE-
B3417A919FCA}"/>
        </a:ext>
      </a:extLst>
    </p:cNvPr>
    <p:cNvPicPr>...
  </p:cNvPicPr>
  <p:nvPr/>
</p:nvPicPr>
<p:blipFill>
  <a:blip r:embed="rId2">...
  </a:blip>
  <a:stretch>
    <a:fillRect/>
  </a:stretch>
</p:blipFill>
<p:spPr>
  <a:xfrm>
    <a:off x="2286000" y="571500"/>
    <a:ext cx="7620000" cy="5715000"/>
  </a:xfrm>
  <a:prstGeom prst="rect">
    <a:avLst/>
  </a:prstGeom>
</p:spPr>
</p:pic>
```



Accessing all Pictures in a PPTX File

```
ZipFile.ExtractToDirectory(pptxPath, extractPath);

string xmlFilePath = $"{rootPath}presentation.xml";

XmlDocument doc = new XmlDocument();

doc.Load(xmlFilePath);

XmlNodeList elemList = doc.GetElementsByTagName("p:sldId");
List<string> rIDs = new List<string>();
List<string> slidePaths = new List<string>();

for (int i = 0; i < elemList.Count; i++)
{
    var rIdValue = elemList[i]?.Attributes?["r:id"]?.Value;

    if (rIdValue is not null)
    {
        rIDs.Add(rIdValue);
    }
}
```



```
XmlDocument presentationRels = new XmlDocument();

presentationRels.Load(String.Concat(rootPath, @"_rels\presentation.xml.rels"));

XmlNodeList relsList = presentationRels.GetElementsByTagName("Relationship");

foreach (XmlNode slideRel in relsList)
{
    string? rIdValue = slideRel?.Attributes?["Id"]?.Value;

    if (rIdValue is not null && rIDs.Contains(rIdValue))
    {
        string? slidePath = (slideRel?.Attributes?["Target"]?.Value)?.Replace("/", @"\");

        if (slidePath is not null)
        {
            slidePaths.Add(String.Concat(rootPath, slidePath));
        }
    }
}

XmlNamespaceManager nsmgr = new XmlNamespaceManager(doc.NameTable);
nsmgr.AddNamespace("p", "http://schemas.openxmlformats.org/presentationml/2006/main");
```



```

foreach (var slidePath in slidePaths)
{
    XmlDocument slideDoc = new XmlDocument();
    slideDoc.Load(slidePath);

    XmlNodeList? picNodes = slideDoc.SelectNodes("//p:pic", nsmgr);

    if (picNodes is null)
    {
        continue;
    }

    foreach (XmlNode picNode in picNodes)
    {
        XmlNode? nvPicPrNode = picNode.SelectSingleNode("p:nvPicPr", nsmgr);

        if (nvPicPrNode is not null)
        {
            XmlNode? cNvPrNode = nvPicPrNode.SelectSingleNode("p:cNvPr", nsmgr);

            if (cNvPrNode is not null)
            {
                string? desc = cNvPrNode.Attributes?["descr"]?.Value;
                ...
            }
        }
    }
}

```



The Open XML SDK



What is the OOXML SDK?

Provides strongly-typed classes to manipulate documents that adhere to the Office Open XML File Formats specification



Accessing all Pictures in a PPTX File

```
using (PresentationDocument presentation = PresentationDocument.Open(pptxPath, true))
{
    IEnumerable<SlidePart>? slideParts = presentation?.PresentationPart?.SlideParts;

    if (slideParts is not null)
    {
        foreach (SlidePart slide in slideParts)
        {
            IEnumerable<Picture> pictures = slide.Slide.Descendants<Picture>();

            foreach (Picture picture in pictures)
            {
                NonVisualDrawingProperties? cNvPr =
picture.NonVisualPictureProperties?.NonVisualDrawingProperties;

                if (cNvPr is not null)
                {
                    StringValue? description = cNvPr.Description;
                }
            }
        }
    }
}
```



Accessing all Pictures in a PPTX File Using LINQ

```
using (PresentationDocument presentation = PresentationDocument.Open(pptxPath, true))
{
    IEnumerable<Picture>? pictures =
presentation?.PresentationPart?.SlideParts?.SelectMany(s => s.Slide.Descendants<Picture>());

    foreach (Picture picture in pictures)
    {
        NonVisualDrawingProperties? cNvPr =
picture.NonVisualPictureProperties?.NonVisualDrawingProperties;

        if (cNvPr is not null)
        {
            StringValue? description = cNvPr.Description;
        }
    }
}
```



Finding the image part for each picture

```
foreach (var picture in pictures)
{
    var nVPP = picture.NonVisualPictureProperties;
    var cNvPr = nVPP?.NonVisualDrawingProperties;

    if (cNvPr is not null)
    {
        var desc = cNvPr.Description;

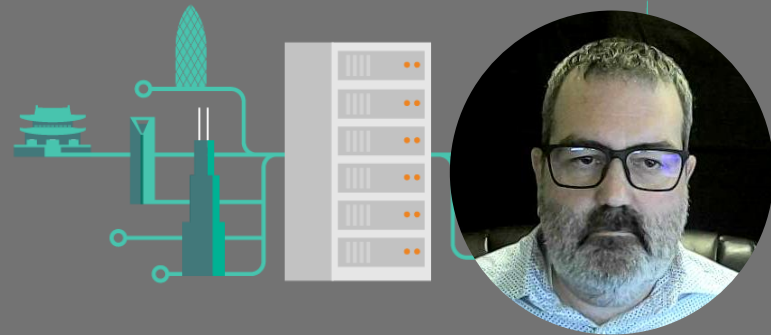
        string? relationshipId = picture.BlipFill?.Blip?.Embed?.Value;

        if (relationshipId is null)
        {
            continue;
        }

        ImagePart imagePart = (ImagePart)slide.GetPartById(relationshipId);
    }
}
```



What is Azure AI Vision?



Azure AI Vision Encompasses

- Optical Character Recognition
- Face Service
- Video Analysis
- Image Analysis



Image Analysis

- Read text from images
- Detect people in images
- Generate image captions
- Detect objects
- & more...





```
{
  "apim-request-id": "4e9439c1-0ad0-4bee-b84f-ba77c5ad39ea",
  "content-length": "158",
  "content-type": "application/json; charset=utf-8",
  "modelVersion": "2023-10-01",
  "captionResult": {
    "text": "a baseball player holding a bat",
    "confidence": 0.8208903074264526
  },
  "metadata": {
    "width": 250,
    "height": 322
  }
}
```



Azure AI Account

Instance	Features	Price
Free (F0) - Web/Container	All	5,000 free transactions per month 20 transactions per minute



Ways to use Azure AI Vision



C#

[Azure.AI.Vision.ImageAnalysis](https://github.com/Azure/Azure.AI.Vision.ImageAnalysis)



Java

[azure-ai-vision-imageanalysis](https://github.com/Azure/azure-ai-vision-imageanalysis)



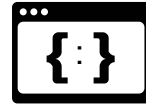
Python

[azure-ai-vision-imageanalysis](https://github.com/Azure/azure-ai-vision-imageanalysis)



Node.js

[@azure-rest/ai-vision-image-analysis](https://github.com/Azure-rest/ai-vision-image-analysis)



Rest API

Azure AI | Vision Studio

Vision Studio



Azure AI SDK

```
string endpoint = Environment.GetEnvironmentVariable("VISION_ENDPOINT");
string key = Environment.GetEnvironmentVariable("VISION_KEY");

ImageAnalysisClient client = new ImageAnalysisClient(new Uri(endpoint), new AzureKeyCredential(key));

...

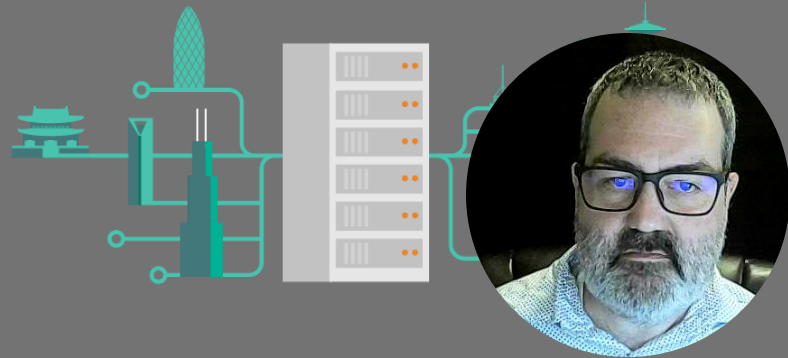
using (Stream imageStream = imagePart.GetStream())
{
    BinaryData binaryData = BinaryData.FromStream(imageStream);
    ImageAnalysisResult result = client.Analyze(binaryData, VisualFeatures.Caption);
    ...
    cNvPr.Description = result.Caption.Text;
}
```



```
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help AddMetaDataToPPTX
Debug Any CPU AddMetaDataToPPTX
What's New? AddMetaDataToPPTX Program.cs
AddMetaDataToPPTX
1
2 using Azure;
3 using Azure.AI.Vision.ImageAnalysis;
4 using DocumentFormat.OpenXml;
5 using DocumentFormat.OpenXml.Packaging;
6 using DocumentFormat.OpenXml.Presentation;
7
8 string pptxPath = @"C:\source\delete-this\test - Copy.pptx";
9 string endpoint = Environment.GetEnvironmentVariable("VISION_ENDPOINT") ?? throw new ArgumentNullException("VISION_ENDPOINT");
10 string key = Environment.GetEnvironmentVariable("VISION_KEY") ?? throw new ArgumentNullException("VISION_KEY");
11
12 ImageAnalysisClient client = new ImageAnalysisClient(new Uri(endpoint), new AzureKeyCredential(key));
13
14 using (PresentationDocument presentation = PresentationDocument.Open(pptxPath, true))
15 {
16     IEnumerable<SlidePart>? slideParts = presentation?.PresentationPart?.SlideParts;
17
18     if (slideParts is not null)
19     {
20         foreach (SlidePart slide in slideParts)
21         {
22             IEnumerable<Picture> pictures = slide.Slide.Descendants<Picture>();
23
24             if (pictures is not null)
25             {
26                 foreach (Picture picture in pictures)
27                 {
28                     NonVisualDrawingProperties? cNvPr = picture.NonVisualPictureProperties?.NonVisualDrawingProperties;
29
30                     if (cNvPr is not null)
31                     {
32                         StringValue? description = cNvPr.Description;
33
34                         string? relationshipId = picture.BlipFill?.Blip?.Embed?.Value;
35
36                         if (relationshipId is null)
37                         {
38                             continue;
39                         }
40
41                         ImagePart imagePart = (ImagePart)slide.GetPartById(relationshipId);
42
43                         using (Stream imageStream = imagePart.GetStream())
44                         {
45                             BinaryData binaryData = BinaryData.FromStream(imageStream);
46                             ImageAnalysisResult result = client.Analyze(binaryData, VisualFeatures.Caption);
47
48                             Console.WriteLine("Image analysis results:");
49                             Console.WriteLine("  Caption:");
50                             Console.WriteLine($"    '{result.Caption.Text}', Confidence {result.Caption.Confidence:F4}");
51
52                             cNvPr.Description = result.Caption.Text;
53
54                         }
55
56                         if (description is not null)
57                         {
58                             Console.WriteLine($"Name: {cNvPr.Name} Description: {description}");
59                         }
60                     }
61                 }
62             }
63         }
64     }
65 }
100% No issues found | microsoft-my.sharepoint.com is sharing your screen. Stop sharing Hide | Ln: 52 Ch: 69 SPC CRLF
Error List Output Developer PowerShell
```

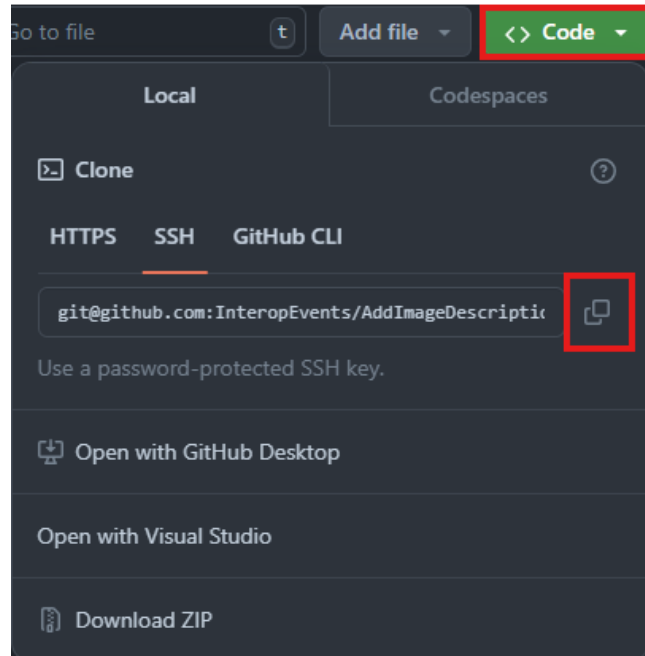


Next Steps



Project Code is Available on GitHub

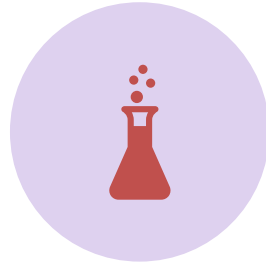
github.com/InteropEvents/AddImageDescriptions



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Open XML SDK



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[dotnet/Open-XML-SDK: Open XML SDK by Microsoft \(github.com\)](#)



[OOXML Viewer - Visual Studio Marketplace](#)



Thank You

