

Tips & Tricks: what I learnt while supporting Design Automation for Inventor

Adam Nagy

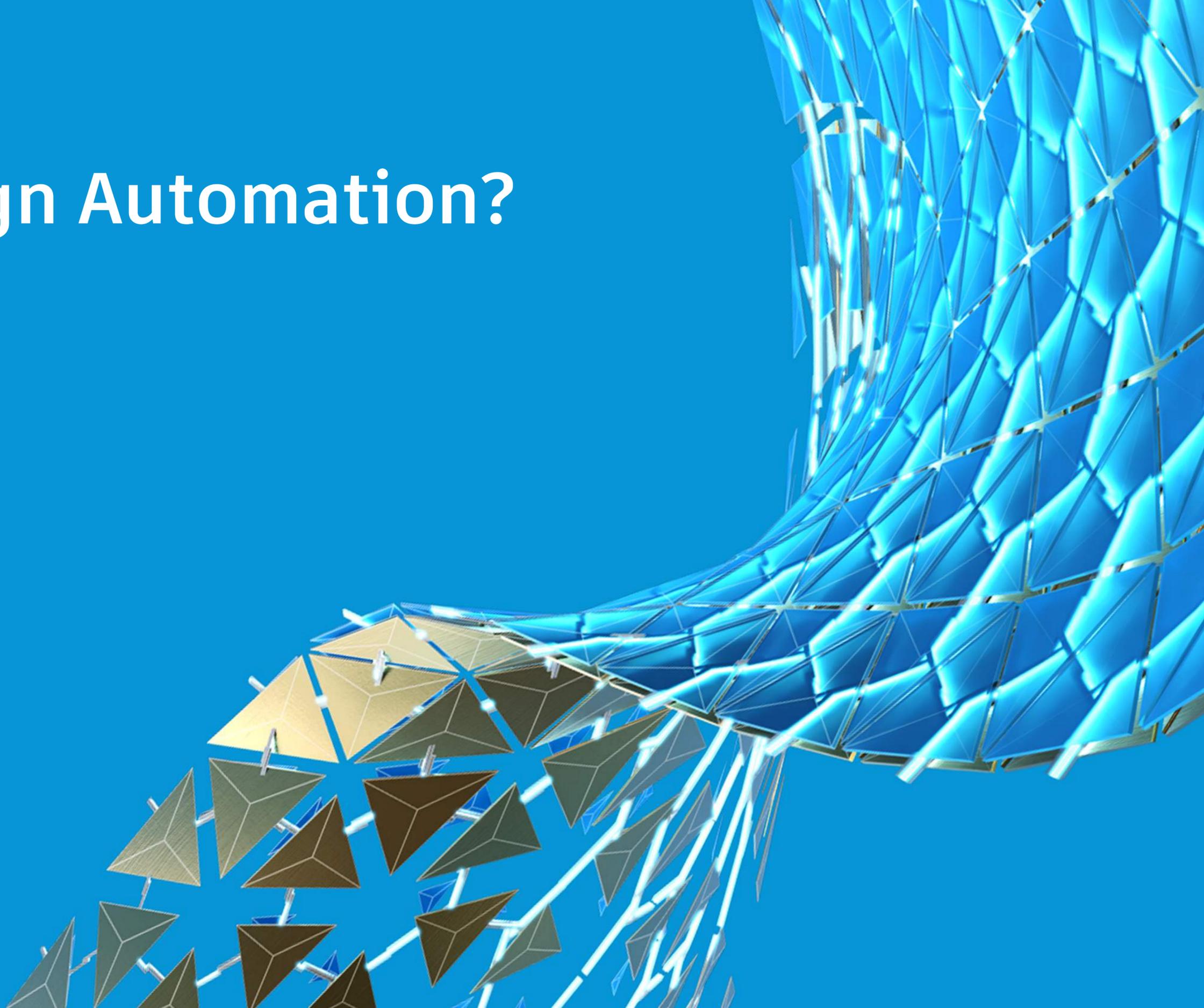
Principal Developer Advocate | @AdamTheNagy



About the speaker

Adam Nagy joined Autodesk back in 2005, and he has been providing programming support, consulting, training, and evangelism to external developers. He started his career in Budapest working for a civil engineering CAD software company. He then worked for Autodesk in Prague for 3 years, and now lives in South England, United Kingdom. Adam focuses on supporting Forge and the API's of our manufacturing products, Inventor and Fusion 360.

What is Design Automation?



Configurators

Object Storage Service

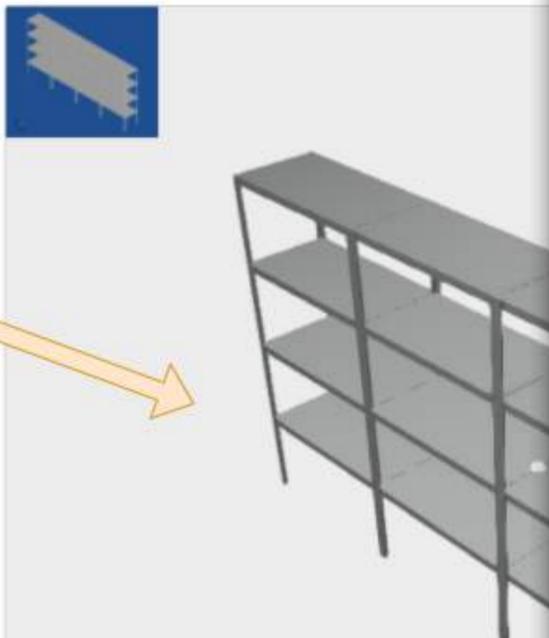


```
gyufax9guclivu9nxxeqwiagdm3o9as
├── corner180.ipt
├── shelves.iam
├── shelf90.ipt
├── mid180.ipt
├── shelf120.ipt
├── mid90.ipt
├── corner90.ipt
└── shelves.ipj
```

Use cache for storing and loading models

Start workitem

```
"stats": {
  "timeQueued": "2020-05-08T16:40:29",
  "timeDownloadStarted": "2020-05-08",
  "timeInstructionsStarted": "2020-0",
  "timeInstructionsEnded": "2020-05-",
  "timeUploadEnded": "2020-05-08T16:",
  "bytesDownloaded": 199,
  "bytesUploaded": 20363
},
"id": "5145b63a1bea4785b404ab528fd61"
}
https://developer.api.autodesk.com/oss
```



AUTODESK FORGE

Rim Style
Style - 1

Color
Titanium

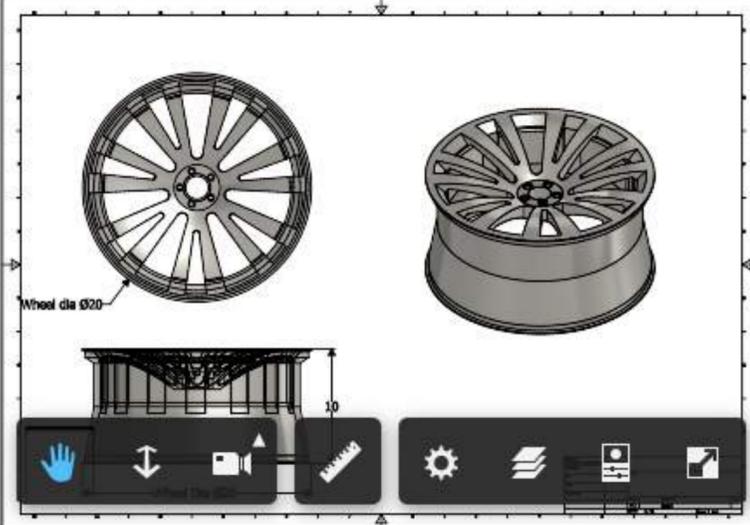
Diameter
20

Width
10

Raster Image



Generate Download



<https://forge-configurator.herokuapp.com/>

<https://forge-rimconfigurator-inventor.herokuapp.com/>

Configurators

The image displays a web-based configurator interface. On the left, an "Object Storage Service" panel shows a file tree with items like "corner180.ipt", "shelves.iam", "shelf90.ipt", "mid180.ipt", "shelf120.ipt", "mid90.ipt", "corner90.ipt", and "shelves.ipj". An orange arrow points from this panel to a 3D model of a shelf in the center. Below the file list is a "Start workitem" button and a JSON log showing metadata such as "timeQueued", "timeDownloadStarted", "timeInstructionsStarted", "timeInstructionsEnded", "timeUploadEnded", "bytesDownloaded", and "bytesUploaded".

On the right, a configurator window for a wheel is shown. It features a 3D model of a wheel and a control panel with the following settings:

- Rim Style:** Style - 1
- Color:** Titanium
- Diameter:** 20
- Width:** 10

Below the settings is a "Raster Image" section with a thumbnail of the wheel and "Generate" and "Download" buttons. The main 3D view includes a toolbar with icons for rotation, pan, zoom, and other controls. A smaller inset window shows a technical drawing of the wheel with a "Wheel dia 620" label.

<https://forge-configurator.herokuapp.com/>

<https://forge-rimconfigurator-inventor.herokuapp.com/>

Configurators

The image displays three overlapping screenshots of the Autodesk Forge configurator interface for a wheel. The top-left screenshot shows the 'Model' view with a 3D rendering of a wheel and a left-hand sidebar containing configuration options: WheelSize (22 in), NumberOfSpokes (6 ul), Slot (checked), WheelFinish (Chrome - Polished), BrakeMaterial (Cast Iron), CaliperFinish (Light Red), and TotalPrice (\$1085). The top-right screenshot shows the 'BOM' (Bill of Materials) view with a table listing parts. The bottom-right screenshot shows the 'Drawing' view with a technical drawing of the wheel assembly.

Row Number	Part Number	Quantity	Description	Material
1	M-RS-0019-A OZ Racing Alleggerita Wheel (8.5 x 17i...	1		Aluminum 6061
2	M-BR-0003 5 Stud Disc bell	1		Aluminum 6061
3	cp4456-104-1-4	1		Iron, Cast

<https://inventor-config-demo.autodesk.io/>

<https://github.com/Autodesk-Forge/forge-configurator-inventor>

Configurators

<https://inventor-config-demo.autodesk.io/>

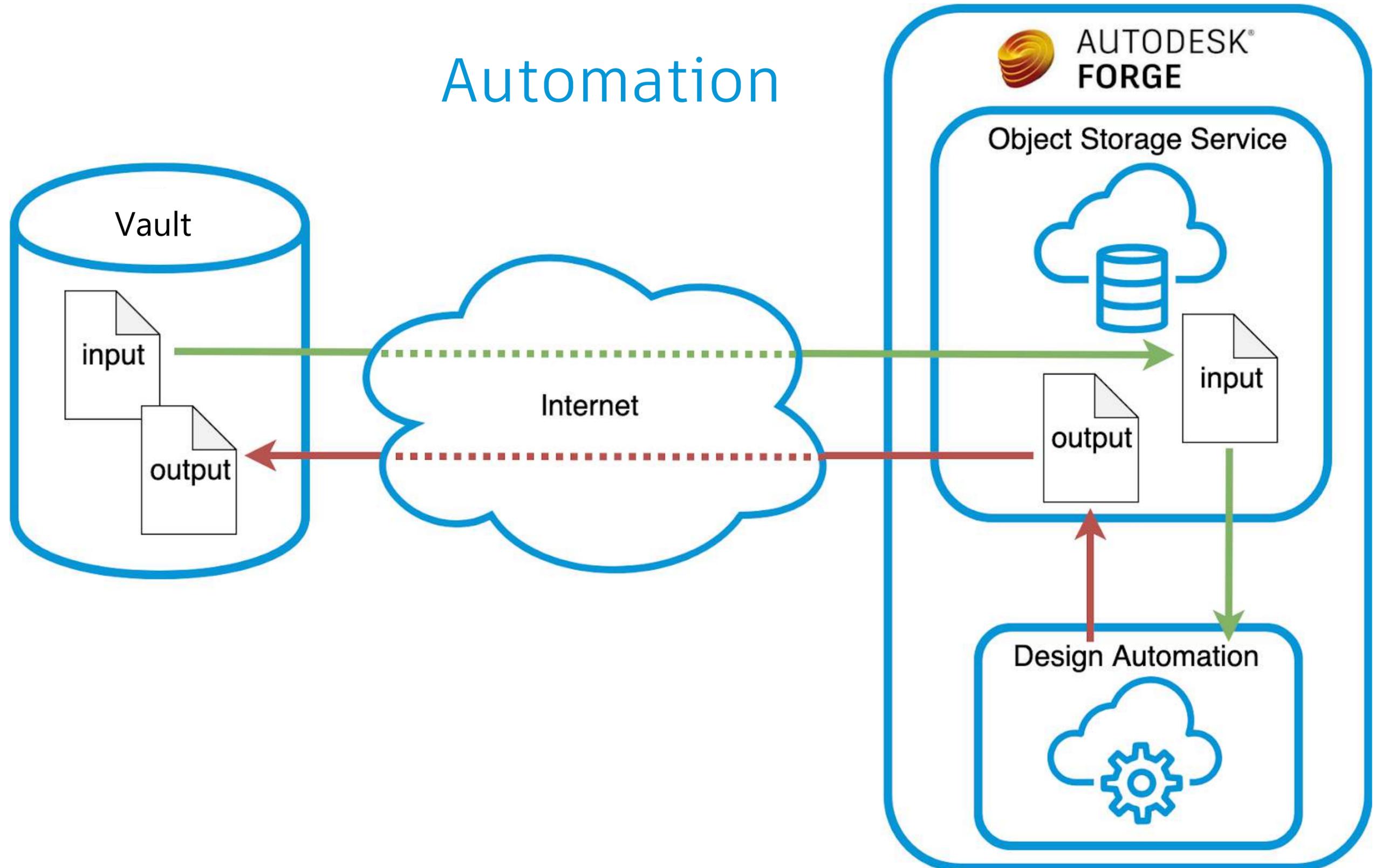
<https://github.com/Autodesk-Forge/forge-configurator-inventor>

Automation

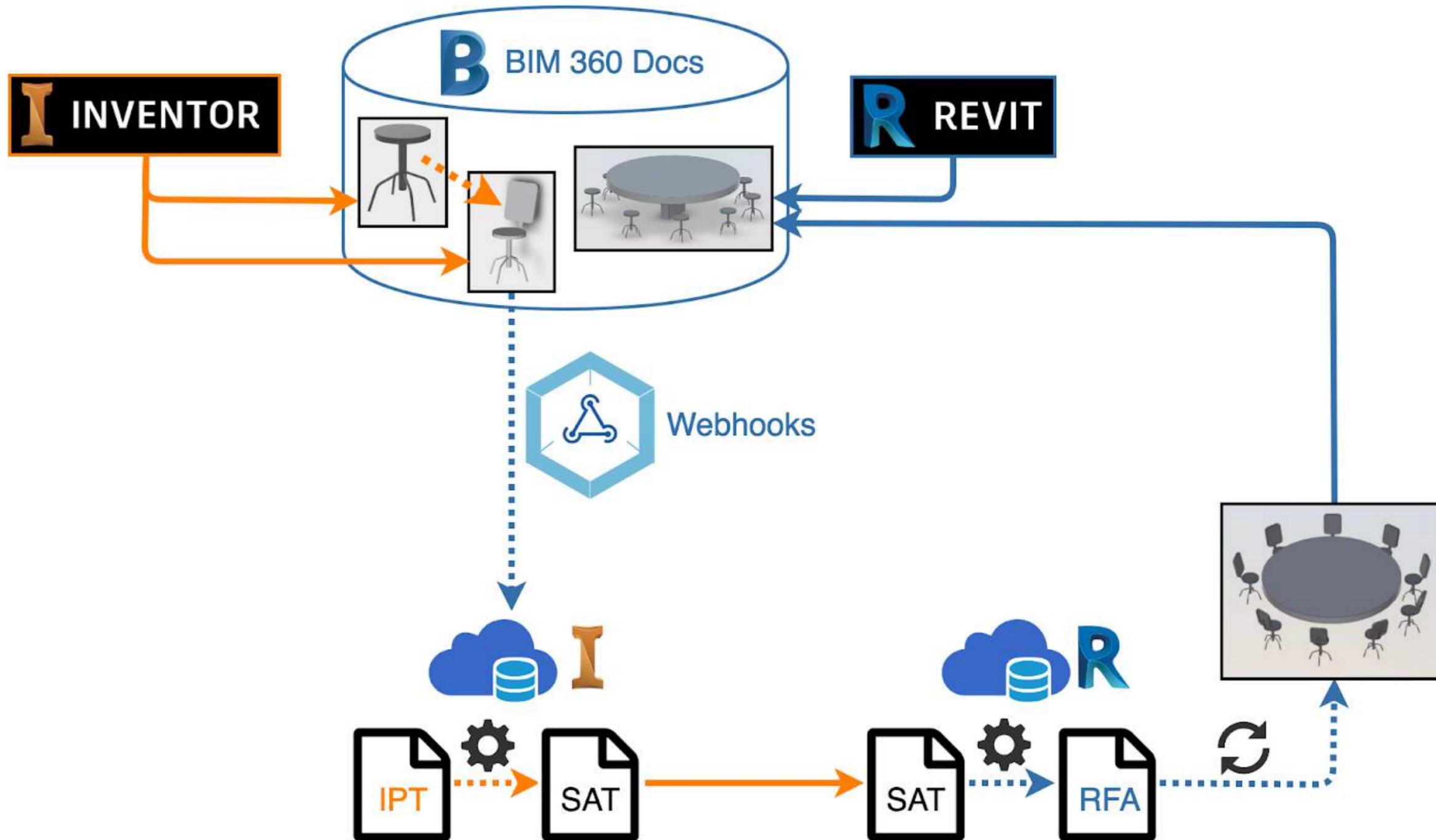
The screenshot displays the Autodesk Forge Design Migration web interface. At the top left is the Autodesk Forge logo, and at the top right is the GitHub logo. Below the logos, there are two tabs: 'Part' and 'Assembly', with 'Assembly' selected. The main content area is divided into two columns. The left column contains the following elements: a heading 'Upload assembly file to translate into Inventor file' with a 'Choose file' button and the filename 'CfgAssem1.SLDASM'; a heading 'Upload associated files to translate' with a 'Choose Files' button and '2 files'; and a 'Running activity name' field containing 'TranslatorPluginActivityAsy+dev'. A blue 'Start migration' button is positioned below these fields. The right column features a light gray box with migration logs: 'Migration started with id: 4b3699cd5f6f4bf4a75b475a137b1700' followed by a 'Download result file here' link, and 'Migration started with id: 3c15801f3b744dbcb29abff86d88bc5a' followed by another 'Download result file here' link. The bottom half of the interface is a large 3D viewer area with a light gray background. It contains a 3D model of a dark gray mechanical part with a circular feature on its front face. In the top right corner of the viewer, there is a small home icon and a 3D orientation cube with 'RIGHT' and 'UP' labels.

<https://design-migration.azurewebsites.net/>

Automation

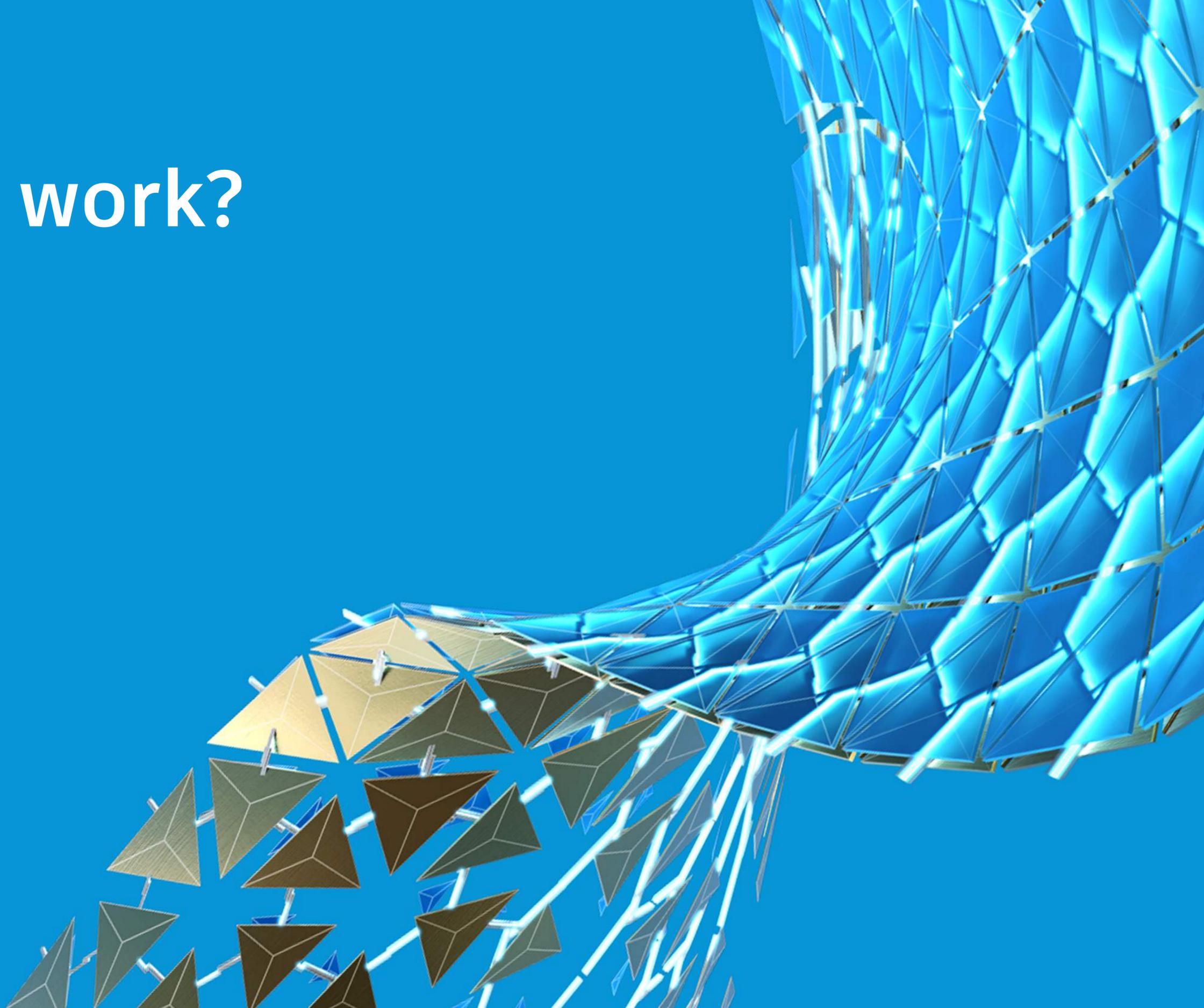


Automation



<https://github.com/Autodesk-Forge/forge-update-revitfamily-from-inventorpart>

How does it work?



Add-In Manager 2020

Applications Translators

Available Add-Ins	Load Behavior
DockableWindow	
Drag & Drop Interoperability	Automatic / Parts
DrawingTools	Automatic / Loaded
Electrical Catalog Browser	Automatic / Assemblies
ESKD Support	
Frame Generator	Automatic / Parts
GeneralTools	Automatic / Loaded
GetUserIdProject	
iCopy	Automatic / Assemblies
iLogic	Automatic / Loaded
ImpersonatorTest	Automatic / Loaded
Interactive Tutorial	Automatic / Loaded
Inventor Studio	Automatic / Parts
Mold Design	Automatic / Parts
Routed Systems: Cable & Harness	Automatic / Parts
Routed Systems: Tube & Pipe	Automatic / Parts
SampleAddIn	Automatic / Loaded
Shared Views	Automatic / Loaded
Simulation: Dynamic Simulation	Automatic / Assemblies
Simulation: Frame Analysis	Automatic / Assemblies
Simulation: Stress Analysis	Automatic / Parts

Description

Load Behavior



**AUTODESK®
FORGE**

Design Automation



AppBundle

SampleBundle.zip

Main API endpoints

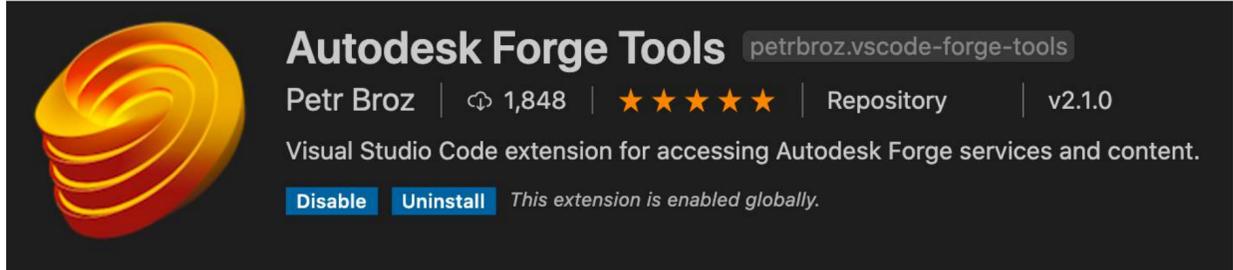
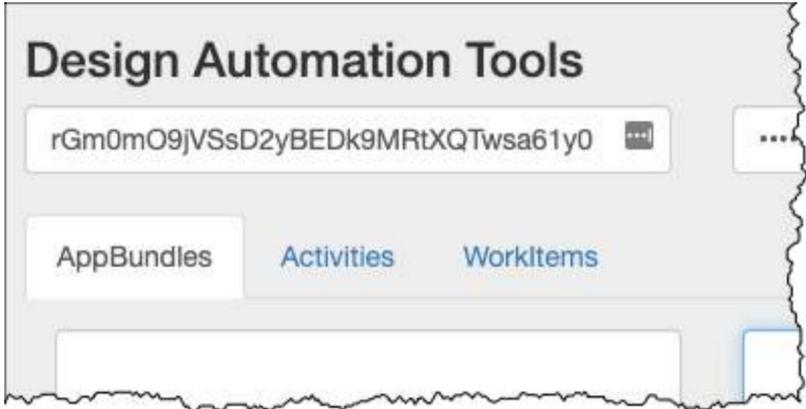
V3 HTTP Endpoint	Programming concept	Product concept
/workitems	Function call	Product execution, session
/activities	Function definition	Script file command line parameters
/appbundles	Shared library	Plugin
/engines	Instruction set	Product (Revit, AutoCAD, Inventor, etc) to use

Main API endpoints

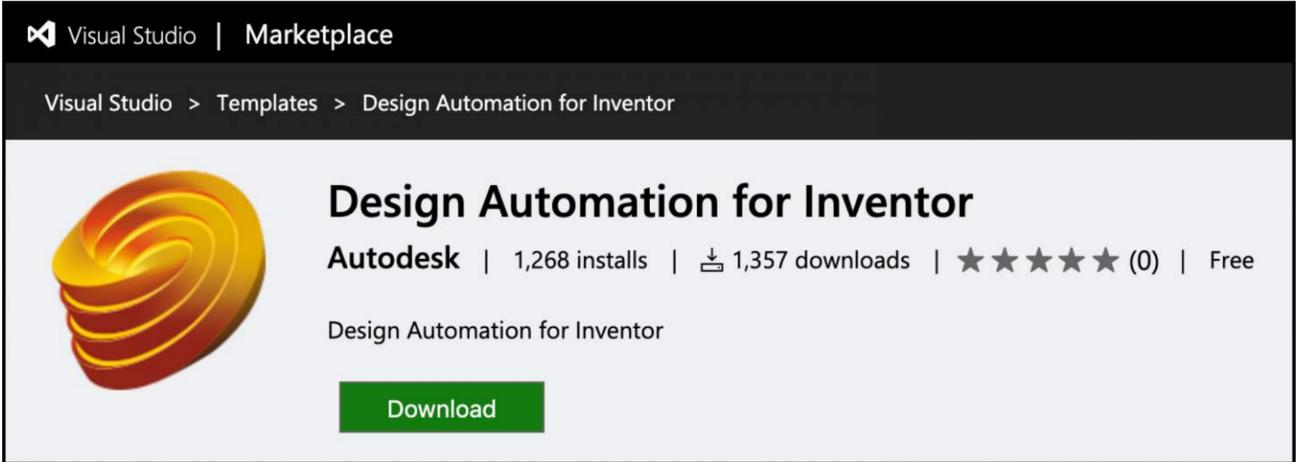
V3 HTTP Endpoint
/workitems
/activities
/appbundles
/engines

} execution – needs to be called from your web app

} setup – you can rely on tools to do this



Autodesk Forge Tools `petrbroz.vscode-forge-tools`
Petr Broz | 1,848 | ★★★★★ | Repository | v2.1.0
Visual Studio Code extension for accessing Autodesk Forge services and content.
[Disable](#) [Uninstall](#) *This extension is enabled globally.*



Visual Studio | Marketplace
Visual Studio > Templates > Design Automation for Inventor



Design Automation for Inventor
Autodesk | 1,268 installs | 1,357 downloads | ★★★★★ (0) | Free
Design Automation for Inventor
[Download](#)

Create Activity & Alias

Info

Command line ["\$(engine.path)\InventorCoreConsole.exe /i \$(args[inputFile].pe...]

Parameters

```
{  
  "inputFile": {  
    "verb": "get"  
  },  
  "inputJson": {  
    "verb": "get",  
    "localName": "params.json"  
  },  
  "outputFile": {  
    "verb": "put",  
    "localName": "outputFile.ipt"  
  }  
}
```

Settings {}

Engine Autodesk.Inventor+2021

App Bundles zG2sVY189dAVzCXm7TsQ7CUtEGaOAO.SimplifyModel+prod

Description Simplify Model

Id SimplifyModel

Create

Info

Alias name prod

Create

Create WorkItem

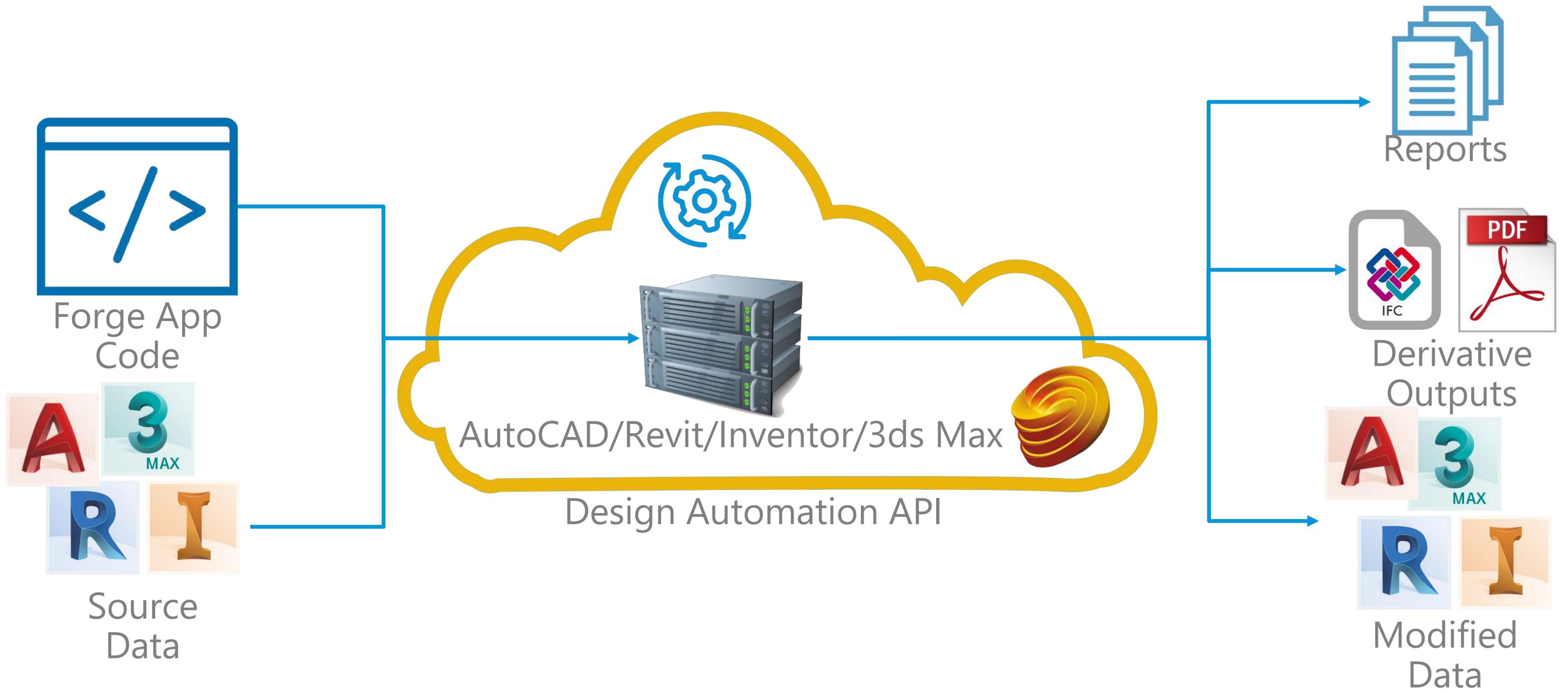
The image illustrates the process of creating a WorkItem in Autodesk Design Automation. It consists of three main components:

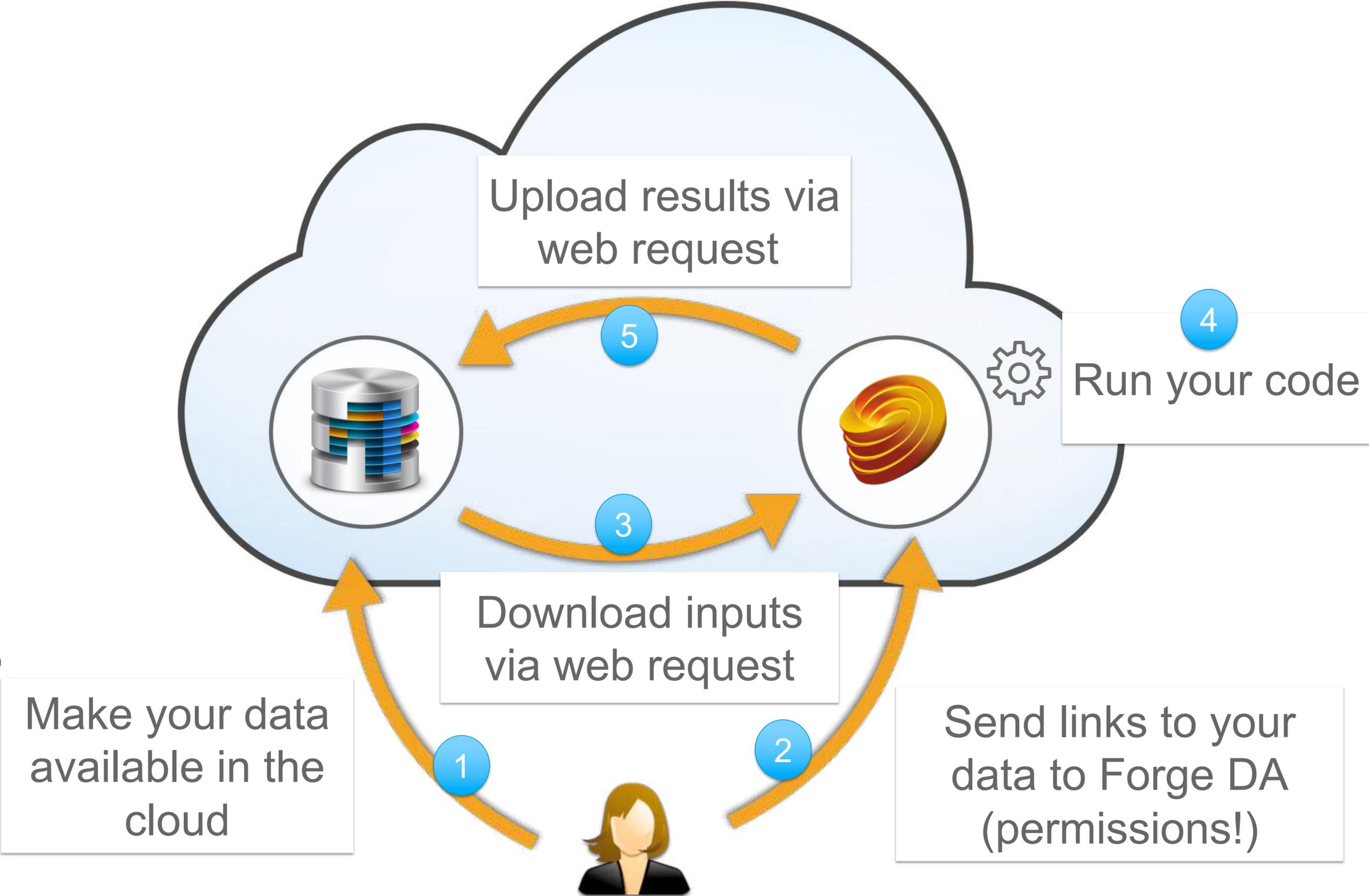
- Buckets Tools:** A panel on the left showing a file hierarchy. The file `Engine MKII.iam.zip` is selected, and the `Public URL` option is chosen from the context menu. An orange arrow points from this option to the notification box.
- Notification Box:** A dark box at the top left displays the message: `oss-manager.autodesk.io says https://developer.api.autodesk.com/oss/v2/signedresources/b197bf89-ec86-4319-ad32-cff376b301fe?region=US`. An orange arrow points from this URL to the `url` field in the Info dialog.
- Design Automation Interface:** The main interface on the right shows the `Activities` tab selected in the `AppBundles` section. The `prod` activity is highlighted. An orange arrow points from the `prod` activity to the `Arguments` section of the `Info` dialog.

The `Info` dialog shows the following JSON structure for the `Arguments` section:

```
{
  "inputZip": {
    "zip": true,
    "verb": "get",
    "description": "input zip",
    "required": true,
    "localName": "files",
    "url": ""
  },
  "inputJson": {
    "verb": "get",
    "description": "input json",
    "required": true,
    "localName": "input.json",
    "url": "data:application/json,{\"height\": \"16 in\", \"width\": \"10 in\"}"
  },
  "outputZip": {
    "zip": true,
    "verb": "put",
    "description": "output zip file",
    "localName": "files",
    "url": ""
  }
}
```

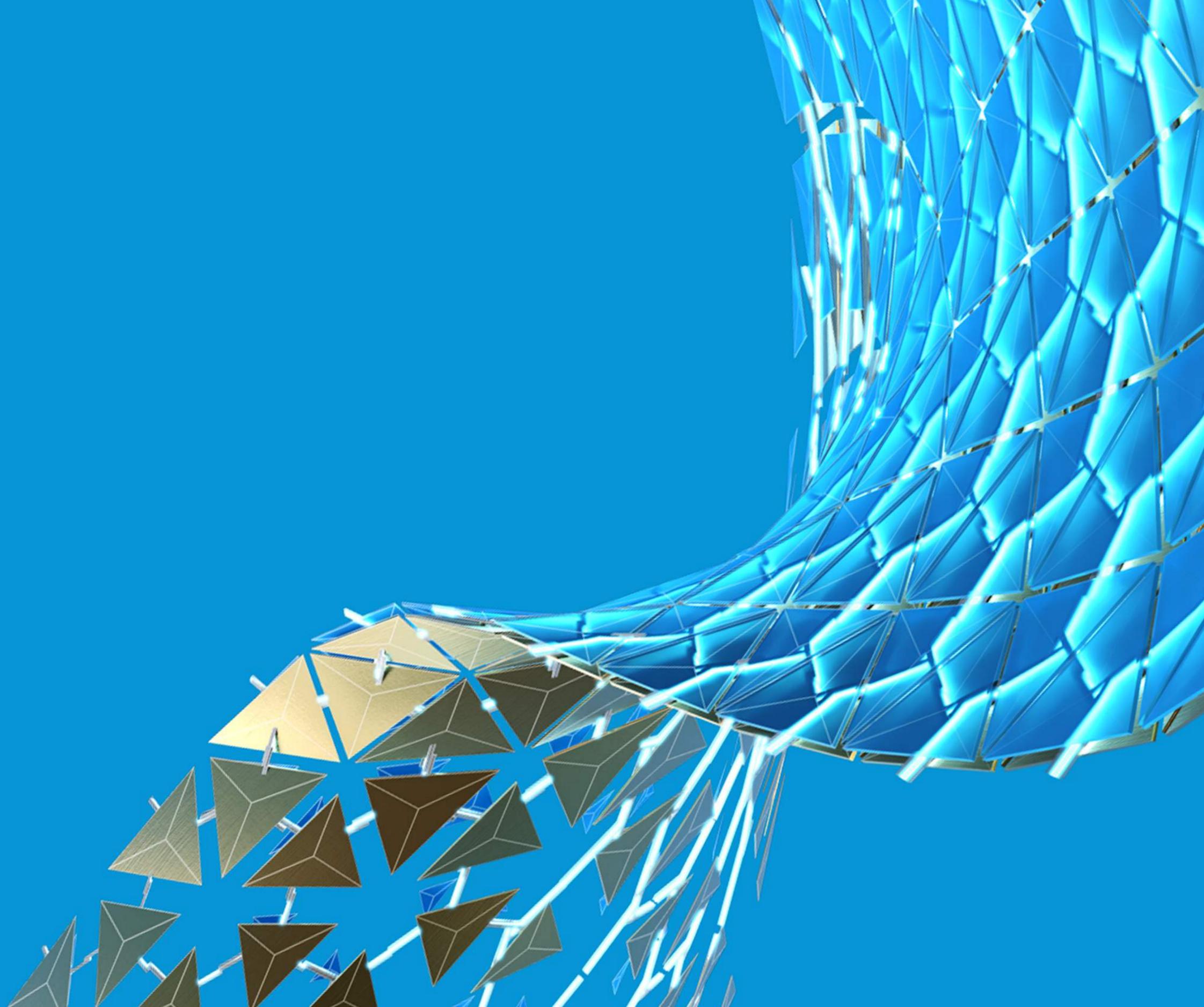
The `url` field for `inputJson` is highlighted with an orange box. A `Create` button is visible at the bottom right of the dialog.





i Input/outputs are **NOT** stored, they are downloaded/processed and **DISCARDED**

Aliases



Aliases

The screenshot displays the 'Design Automation Tools' interface. At the top, there is a header with a user ID 'rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0', a password field, and a 'You're logged in' button. Below the header are three tabs: 'AppBundles', 'Activities', and 'WorkItems'. The main content area is split into two panels. The left panel shows a file tree under 'SampleBundle' with sub-items 104 through 111. Under item 111, there are sub-items '\$LATEST' and 'alpha'. Under item 109, there are sub-items 'prod' and 'stg', both of which are highlighted with blue boxes and orange arrows pointing to them from the right. The right panel shows a JSON configuration for an alias:

```
{
  "package": "https://dasprod-
store.s3.amazonaws.com/apps/rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0/SampleBundle/109?
AWSAccessKeyId=ASIATGVJZKM3BF3AOHWZ&Expires=1599684547&x-amz-security-
token=IQoJb3JpZ2luX2VJEEMaCXVzLWVhc3QtMSJGMEQCIG1Hwba%2BkPWkgu3wN%2FbndG
QQYhLrHhcPQYsf9ldhVoQCAiBr9c0Xi%2BG171hKz7oUFgXjTBNPS8tiyDuY%2BmdDlupl%2BCrV
AQhMEAlaDDIyMDQ3MzE1MjMxMCIM%2B%2BvOOMi8UkVF%2FdYiKrIB%2FB84AbYSEJyGqOo
ai6pndcE1%2B3yI89FPn6ZIMajx5HjFgedmX7yzcLbTsvEdvO%2BG0SXHAIh09R7SOlgDNCEi80C5
A%2BZttP2iQZxqfaPTIV3a8dcyiUNStjQP%2BPG1%2FWteEOQUOihEX3ZtTol19dmUCmcTJfOzIj
HYwwQiubUNqEozkvxLzwWXyu8fWj7t3%2Bj%2Fre9PD%2Bdf1CEt6CNotD0elEatmMGerXESPVR
qvk98pqXqTCayOT6BTrhAfNYBf9IFPAbf8wE4hyDD32v2fq%2FW3IF3Nm%2BR%2BDkU8mhZl3t
irXCSuwRsCoStIS36kP16yIYoKTJ%2Fd%2BoYTl8fuEVgby8moM1U8oI0LJtLeXQBCHg0ANnfJxd8
85NvsZB86F82in5AFZ%2FtSsL3281cAstCalvZegpnQbuilVAIAvJRSaxzRUXuASd5FEYsyYNU7P8s
qJ4KEbf2uYz0%2Briqrxniq65bFd7D1DbCak4tbH%2FMW%2FOM8NMa6QUDRIGMyi4ZlrASKAb5
2I1Vx%2BBxAOTiFmgJF5FLY0DoOYgMiNBFLg%3D%3D&Signature=XxlpqLbg4s4voHHY6ATgJP
K4RPU%3D",
  "id": "rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0.SampleBundle+prod",
  "engine": "Autodesk.Inventor+24".
```

At the bottom of the interface, there are three icons: a refresh icon, a plus sign, and a trash icon.

Aliases

Design Automation Tools

rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0.SampleBundle+\$LATEST



rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0.SampleBundle+111



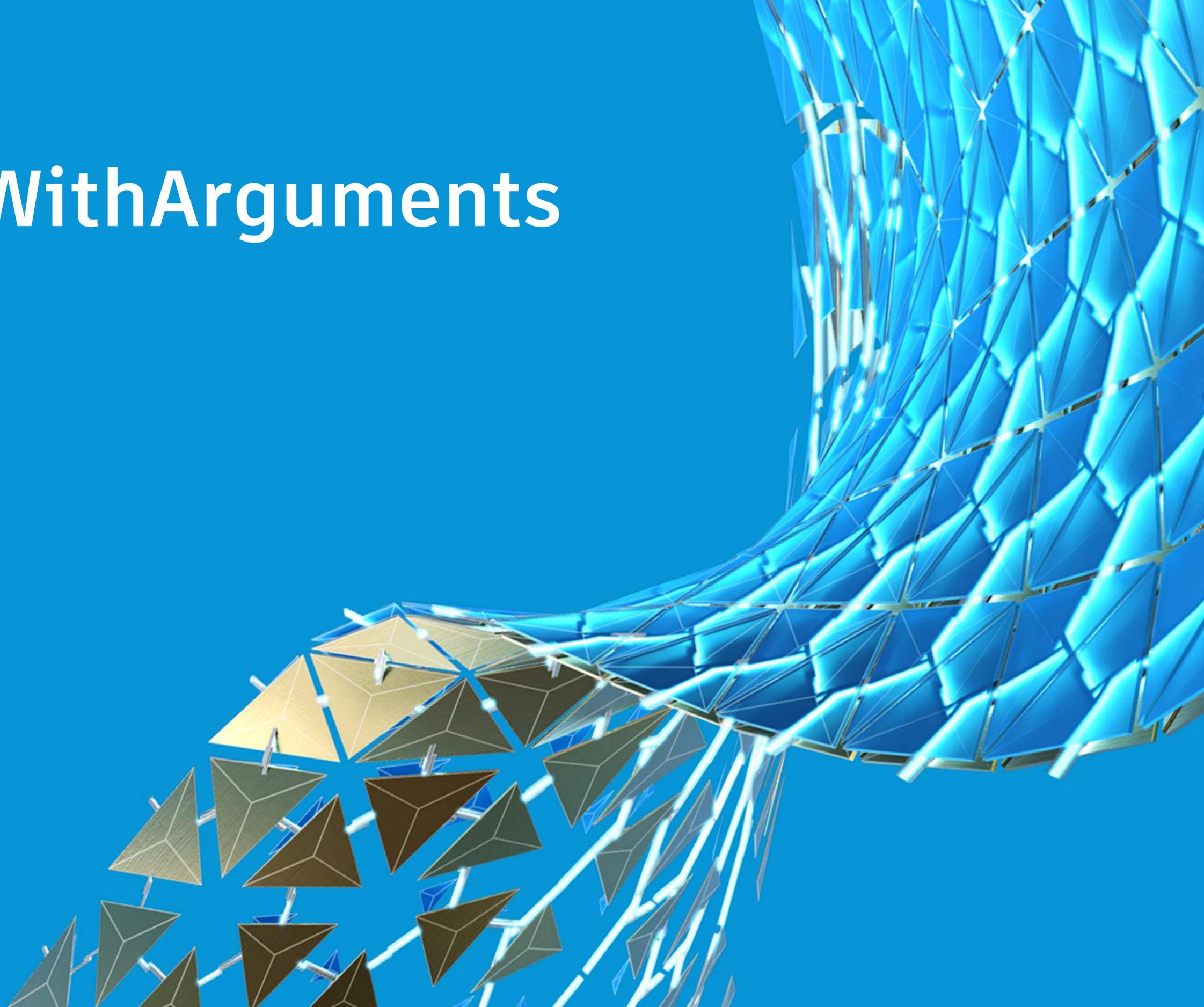
rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0.SampleBundle+alpha



```
irXCSuwRsCoStIS36kP16yIYoKTJ%2Fd%2BoYTl8fuEVgby8moM1U8oi0LJtLeXQBCHg0ANnfJxd8
85NvsZB86F82in5AFZ%2FtSsL3281cAstCalvZegpnQbuilVAIAvJRSaxzRUXuASd5FEYsyYNU7P8s
qJ4KEbf2uYz0%2Briqrxniq65bFd7D1DbCak4tbH%2FMW%2FOM8NMa6QUDRIGMyi4ZirASKAb5
2I1Vx%2BBxAOTiFmgJF5FLY0DoOYgMiNBFLg%3D%3D&Signature=XxlpqLBG4s4voHHY6ATgJP
K4RPU%3D",
"id": "rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0.SampleBundle+prod",
"engine": "Autodesk.Inventor+24".
```



Run vs RunWithArguments



Run vs RunWithArguments

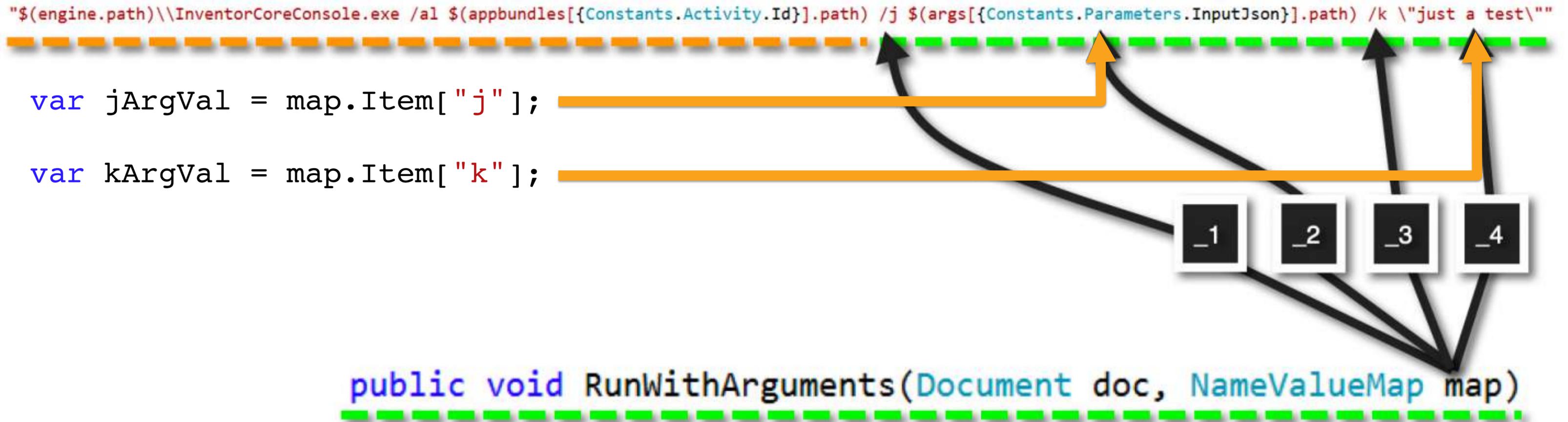
```
"$(engine.path)\\InventorCoreConsole.exe /al $(appbundles[Constants.Activity.Id].path) /j $(args[Constants.Parameters.InputJson].path) /k \"just a test\""
```

```
public void Run(Document doc)
```

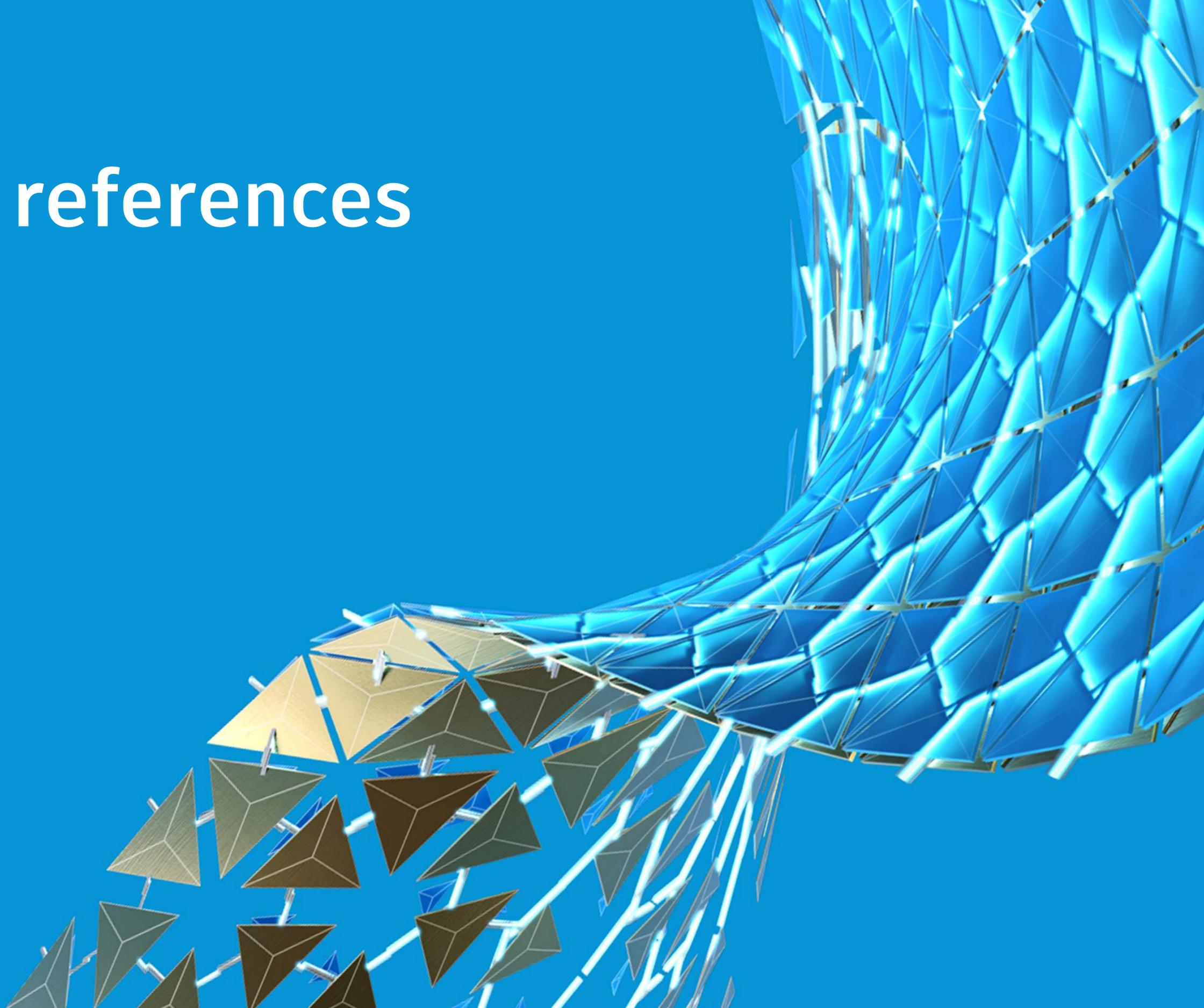


```
public void RunWithArguments(Document doc, NameValuePair map)
```

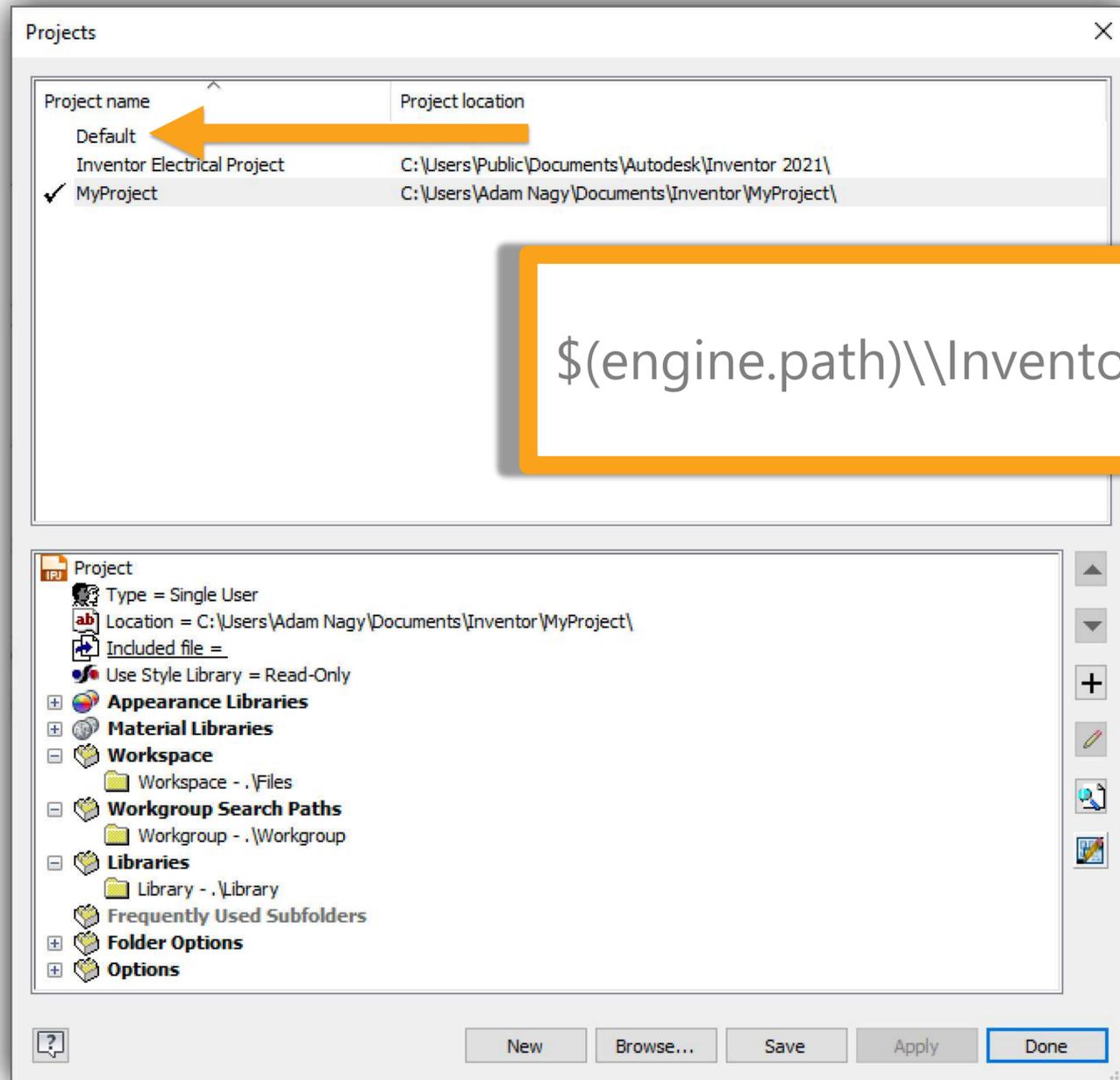
Run vs RunWithArguments



Resolve file references



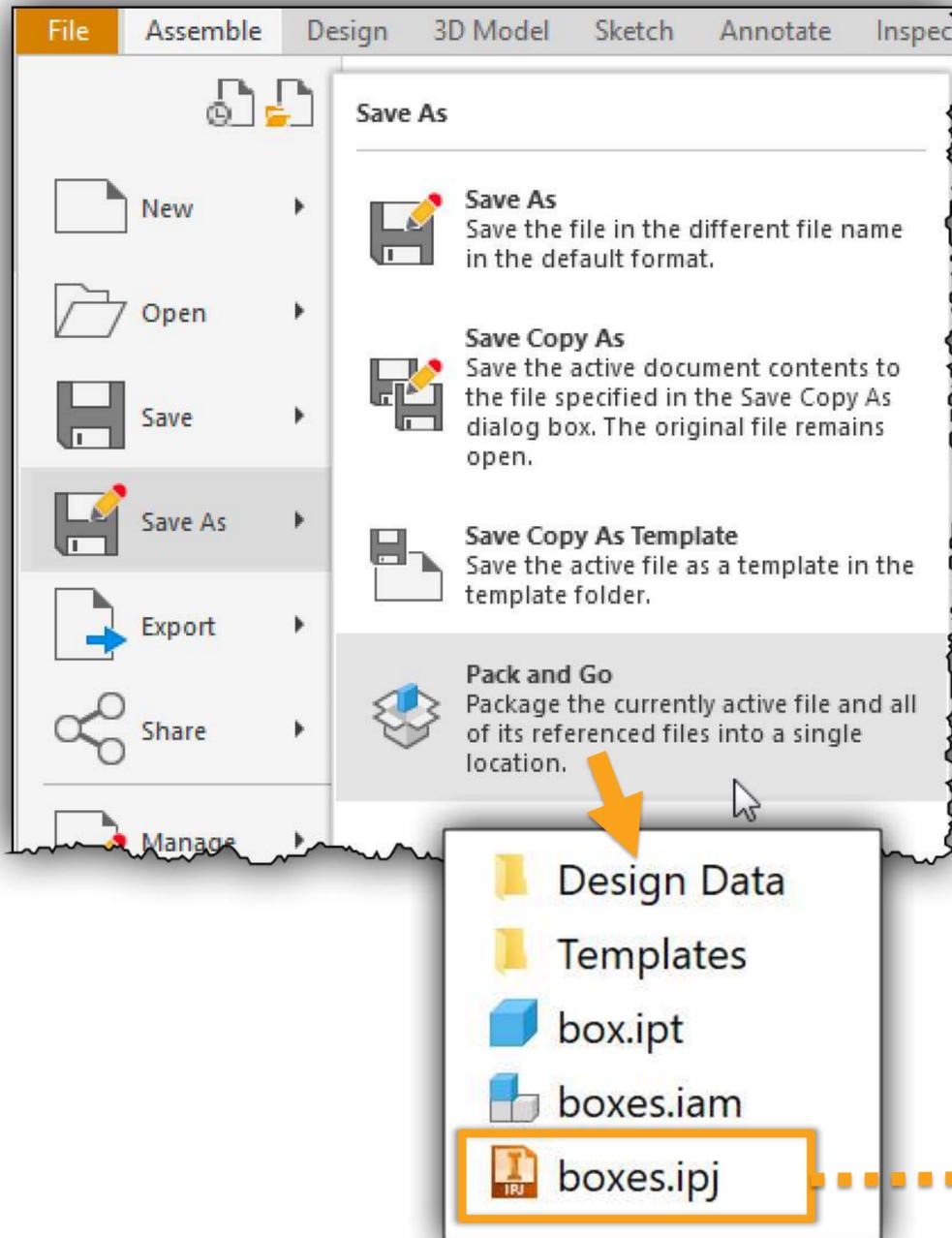
Resolve file references



```
$(engine.path)\InventorCoreConsole.exe /al \"$(appbundles[SampleBundle].path)\" /p
```

<https://forge.autodesk.com/blog/resolving-referenced-inventor-files>

Resolve file references



```
public void Run(Document doc)
{
    // Set Active Project
    // Note: localName of input assembly zip is set to "assembly"
    string curDir = System.IO.Directory.GetCurrentDirectory();
    string asmDir = System.IO.Path.Combine(curDir, "assembly");
    string projFile = System.IO.Path.Combine(asmDir, "boxes.ipj");
    DesignProject proj = inventorApplication.DesignProjectManager.
        DesignProjects.AddExisting(projFile);
    proj.Activate();

    // Open the assembly
    string asmFile = System.IO.Path.Combine(asmDir, "boxes.iam");
    doc = inventorApplication.Documents.Open(asmFile, false);

    // etc.
}
```

<https://forge.autodesk.com/blog/resolving-referenced-inventor-files>

Resolve file references

```
// Make sure you keep a reference to events objects otherwise the events won't fire
FileAccessEvents fae = inventorApplication.FileAccessEvents;
fae.OnFileResolution += Fae_OnFileResolution;

// etc

private void Fae_OnFileResolution(
    string RelativeFileName,
    string LibraryName,
    ref byte[] CustomLogicalName,
    EventTimingEnum BeforeOrAfter,
    NameValueMap Context,
    out string FullFileName,
    out HandlingCodeEnum HandlingCode)
{
    // It's best practice to first say we didn't handle the event
    // and then change it later on if needed
    HandlingCode = HandlingCodeEnum.kEventNotHandled;

    // Let's say all my parts will be in this specific folder
    string partsFolder = System.IO.Path.Combine(g_bundlePath, "SampleBundlePlugin.bundle");

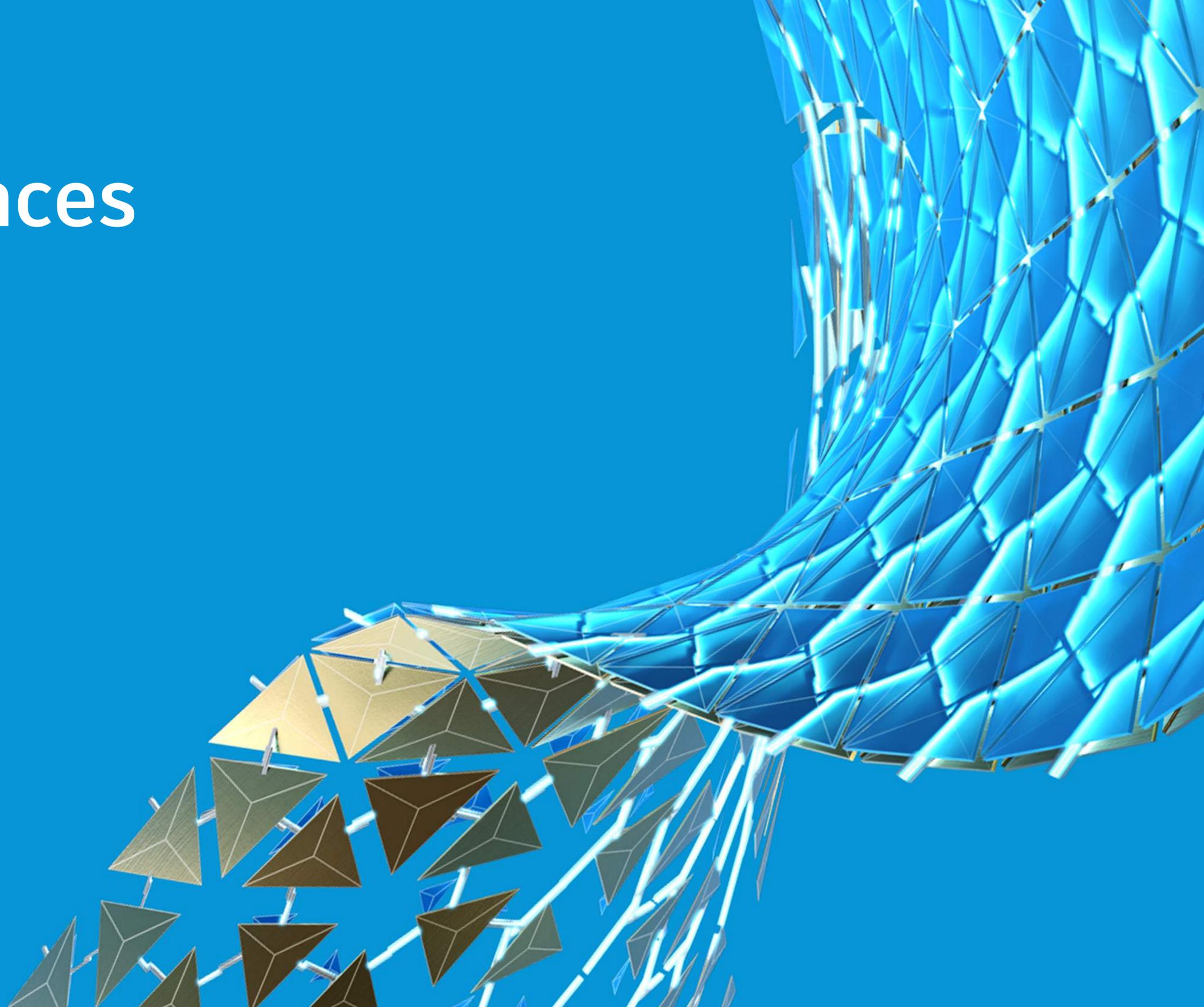
    // Get the file name without the path
    string fileName = System.IO.Path.GetFileName(RelativeFileName);

    // Combine it with our folder
    FullFileName = System.IO.Path.Combine(partsFolder, fileName);

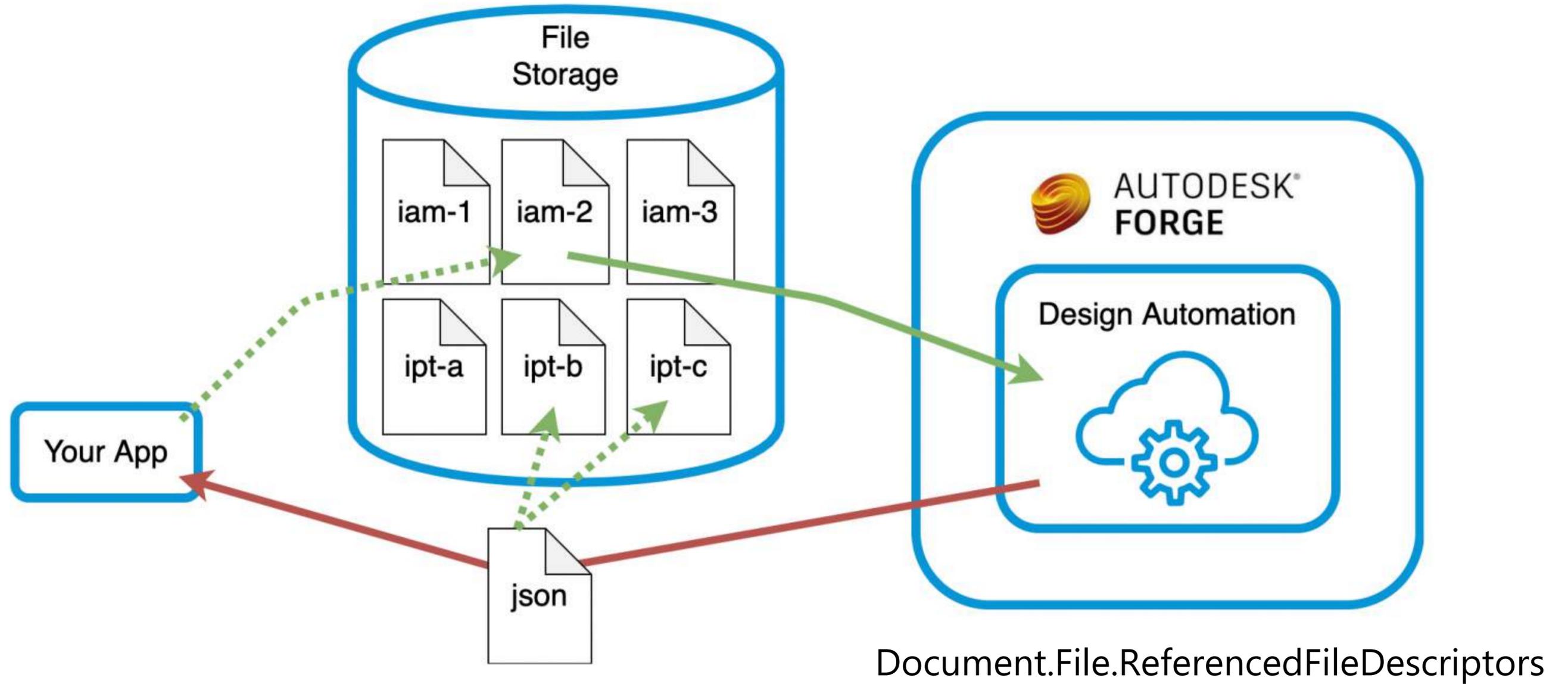
    if (System.IO.File.Exists(FullFileName))
    {
        HandlingCode = HandlingCodeEnum.kEventHandled;
    }
}
```

<https://forge.autodesk.com/blog/resolving-referenced-inventor-files>

Find references

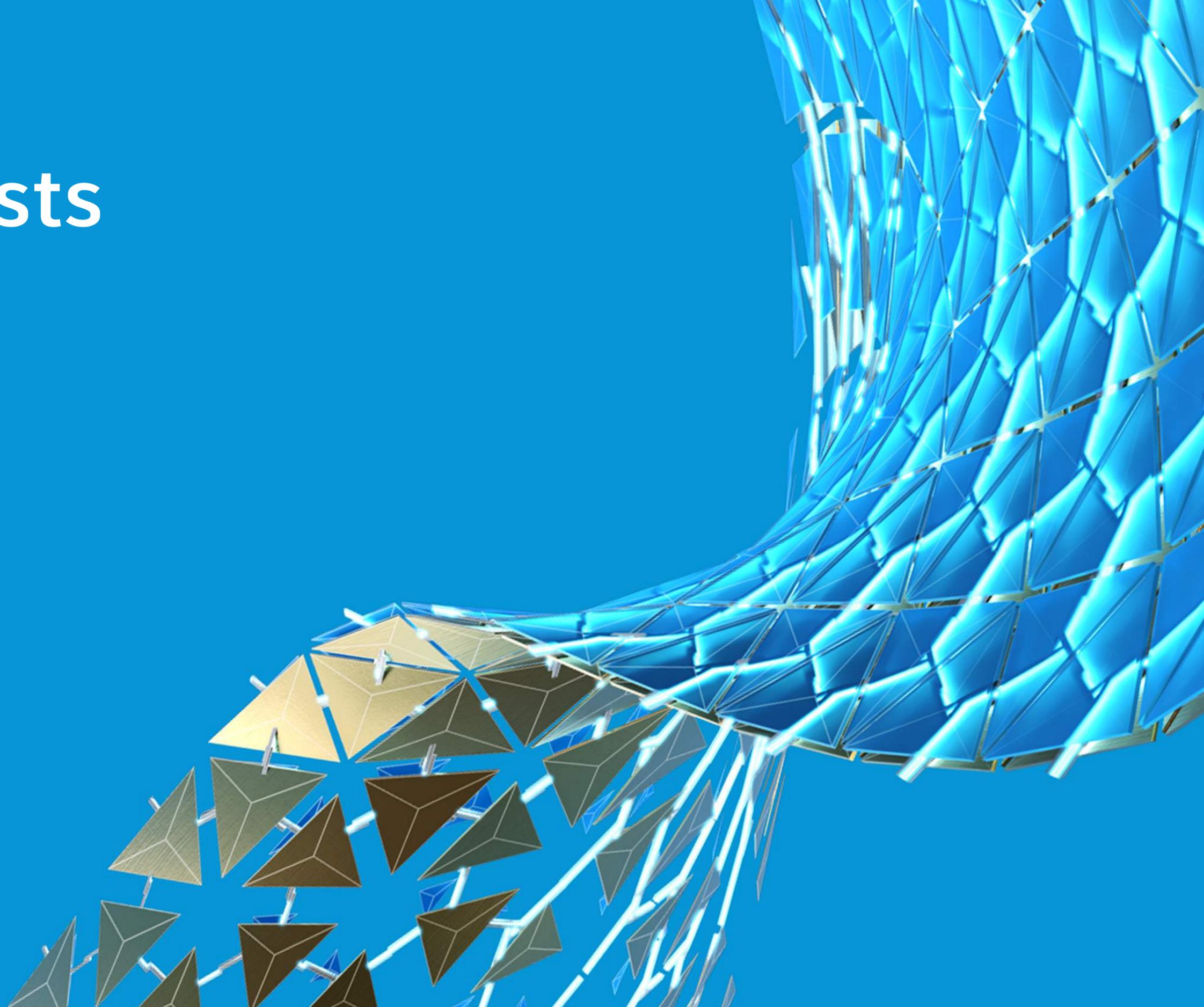


Find references

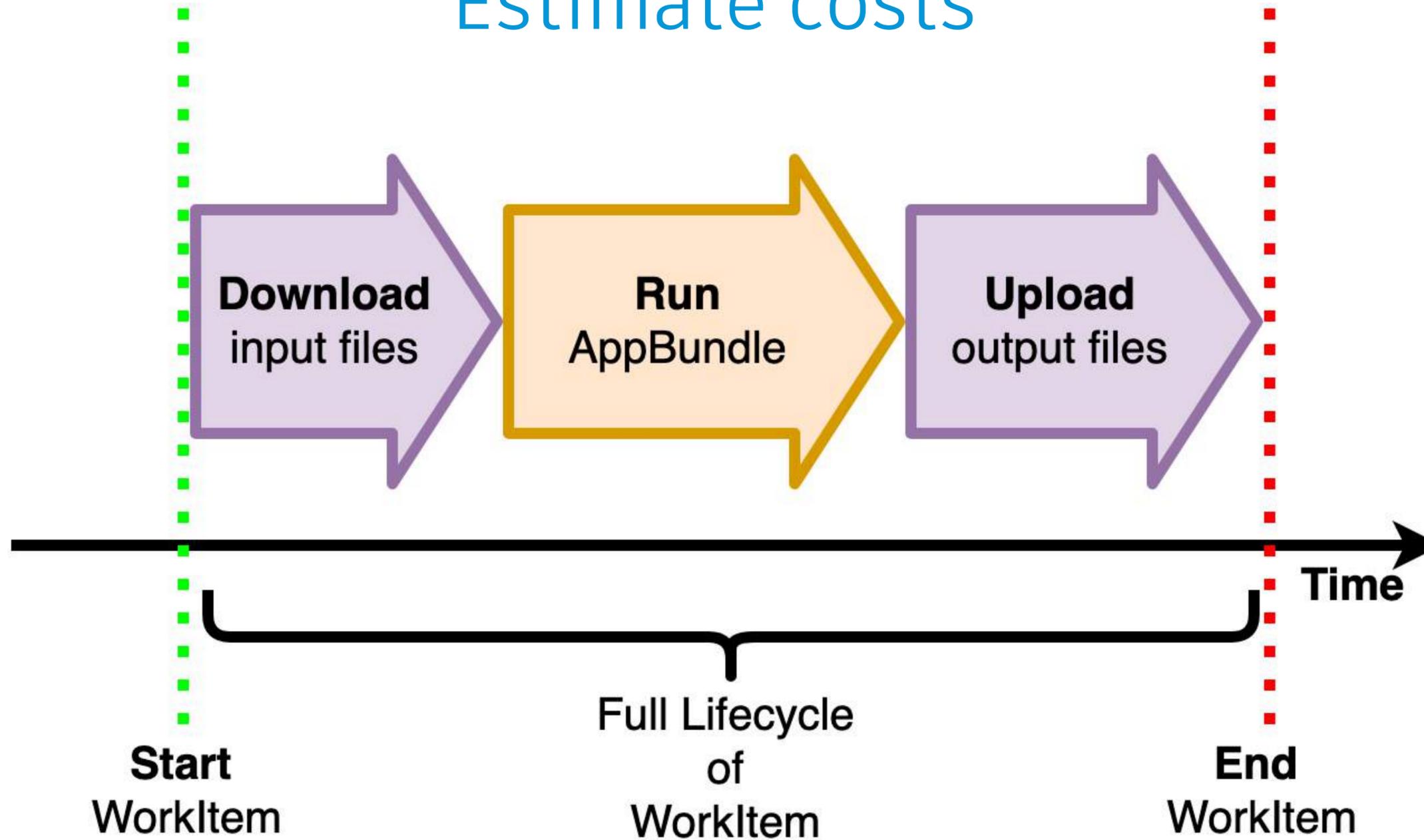


<https://forge.autodesk.com/blog/get-list-referenced-files>

Estimate costs



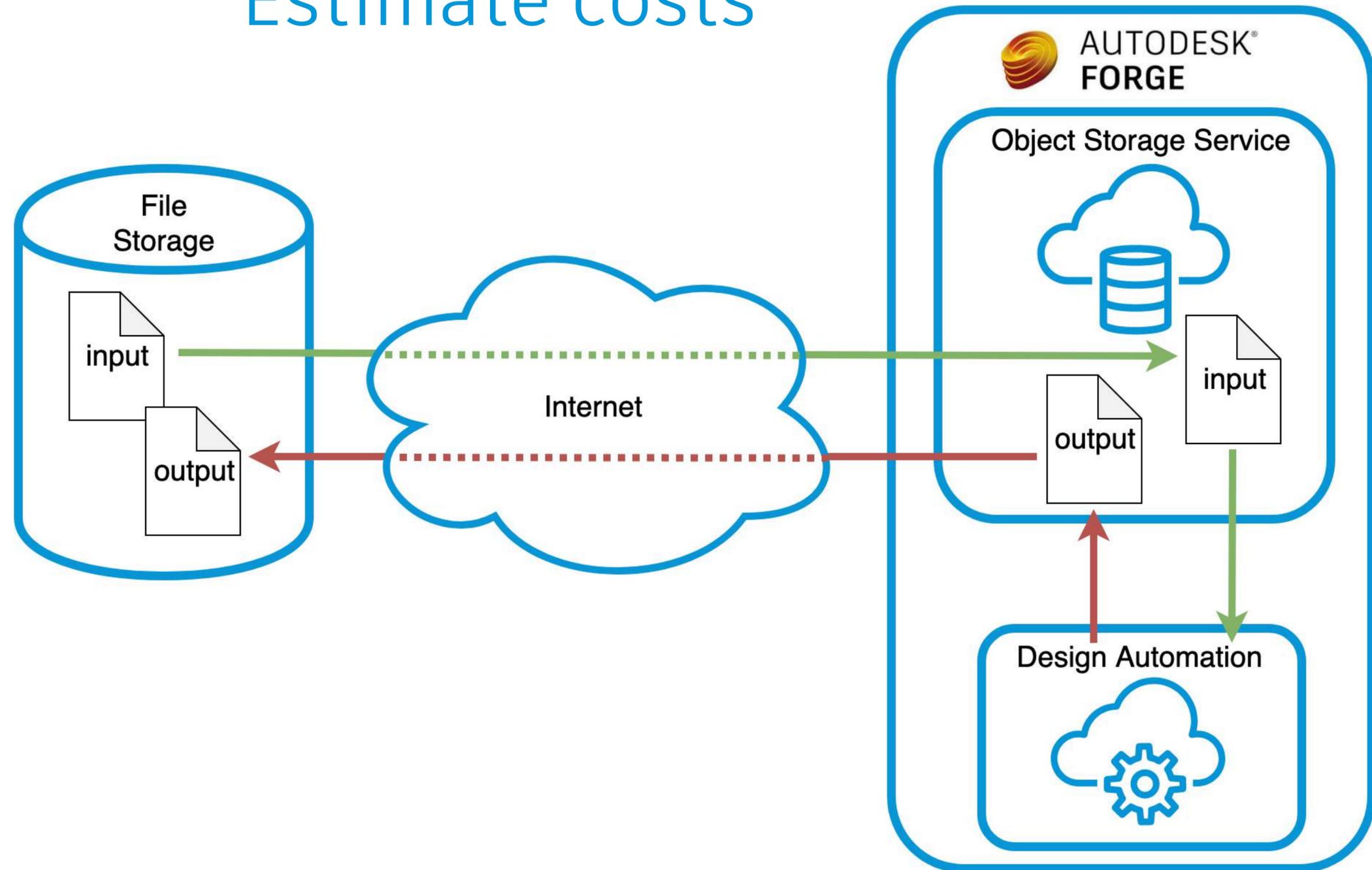
Estimate costs



<https://forge.autodesk.com/blog/estimate-design-automation-costs>

<https://forge.autodesk.com/blog/optimize-design-automation-process>

Estimate costs



<https://forge.autodesk.com/blog/estimate-design-automation-costs>

<https://forge.autodesk.com/blog/optimize-design-automation-process>

Estimate costs

The image shows the Autodesk Design Automation Manager interface. On the left, the 'Activities' tab is selected, and a list of activities is visible under the 'Personal' folder. A '+' icon at the bottom of the list is highlighted with an orange box. A dashed orange arrow points from this icon to the 'Info' window. The 'Info' window displays the configuration for an activity named 'NetworkSpeedTest'. The configuration includes a command line, parameters for input and output files, settings, engine, app bundles, description, and ID.

Design Automation
rGm0mO9jVSsD2yBEDk9MRtX

AppBundles Activities

Personal

- CopyBetweenBu
- CreateBitmapsBu
- CreateDrawing
- ExtractParams
- ExtractUserParam
- GetZipContents
- HttpRequestTes
- InventorInfo
- IptToSatActivity
- MyTestActivity
- NetworkSpeedTe
- ObjToFbx
- OpenTemplateFr
- PrintCommandLi

+

Info

Command line ["\$(engine.path)\InventorCoreConsole.exe"]

Parameters

```
{
  "inputFile": {
    "verb": "get",
    "localName": "anyfile"
  },
  "outputFile": {
    "verb": "put",
    "localName": "anyfile"
  }
}
```

Settings {}

Engine Autodesk.Inventor+2021

App Bundles []

Description Testing network speed

Id NetworkSpeedTest

Create

<https://da-manager.autodesk.io/>

<https://oss-manager.autodesk.io/>

Estimate costs

Buckets Tools

rGm0mO9jVSsD2yBEDk9MRtXQ...

For a list of all the possible scopes

Retrieved hierarchy

- adam_201903072 [persistent]
- atlantis-zoombackground
- autocad sample file.dwg
- MultiLevel.iam.zip
- Classification.obj.zip
- Quote_001.dwg
- Classification_2.obj.zip

Context menu for MultiLevel.iam.zip:

- Delete file
- Download file
- Public URL

Tooltip: oss-manager.autodesk.io says
https://developer.api.autodesk.com/oss/v2/signedresources/cf2d0f64-8de5-47b6-9fca-6ae4d4b1f285?region=US

Design Automation

rGm0mO9jVSsD2yBEDk9MRtXQ...

AppBundles Activities WorkItems

test

Info

```
{
  "inputFile": {
    "verb": "get",
    "localName": "anyfile",
    "url": "https://developer.api.autodesk.com/oss/v2/signedresources/cf2d0f64-8de5-47b6-9fca-6ae4d4b1f285?region=US"
  },
  "outputFile": {
    "verb": "put",
    "localName": "anyfile",
    "url": "https://developer.api.autodesk.com/oss/v2/signedresources/cf2d0f64-8de5-47b6-9fca-6ae4d4b1f285?region=US"
  }
}
```

Create

Design Automation Tools

rGm0mO9jVSsD2yBEDk9MRtXQTwsa61y0

AppBundles Activities WorkItems

05be8e3f8ccb4ed7946079dd4ad1f8a5

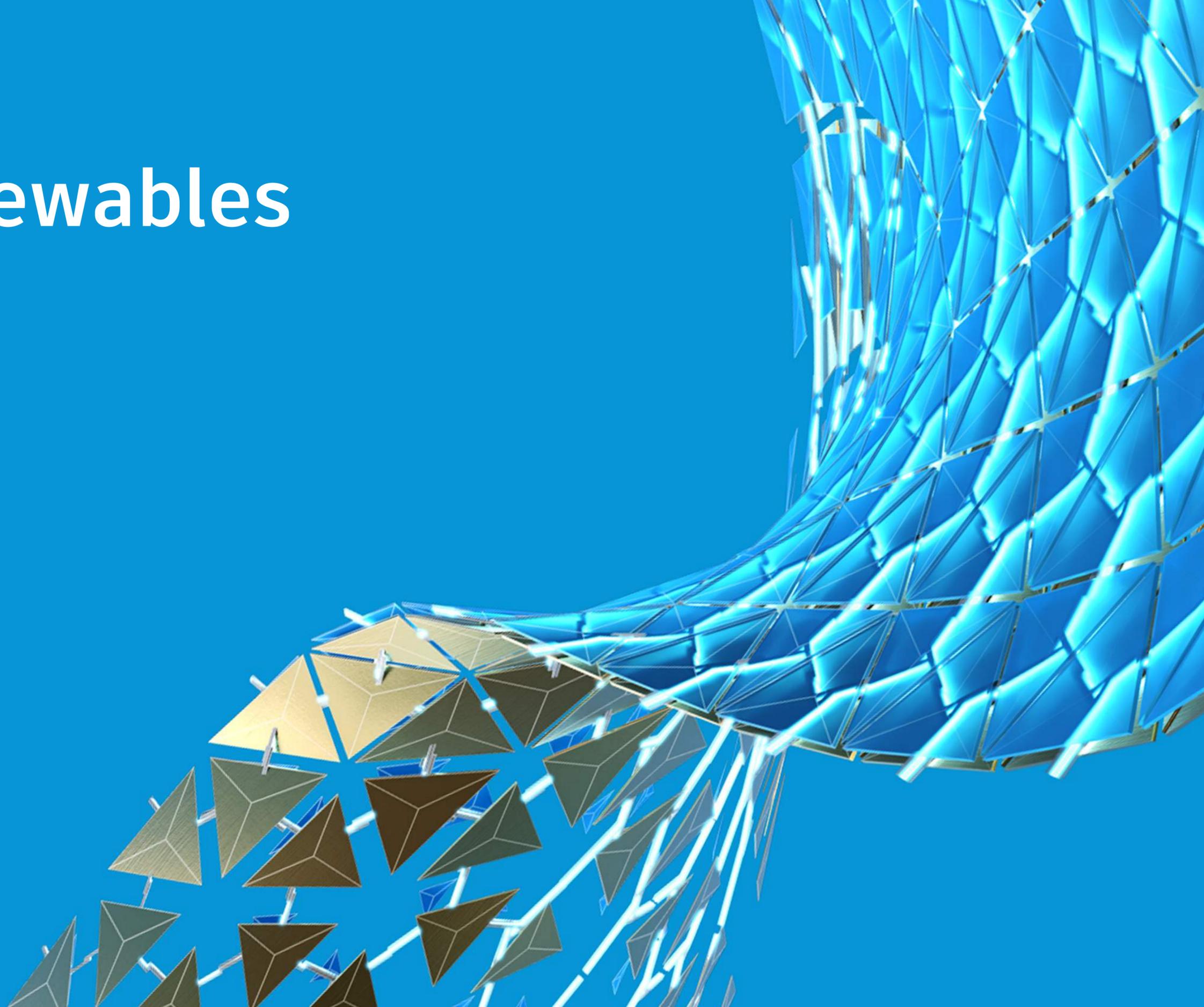
0.31 seconds
0.00 cloud credits

```
{
  "status": "success",
  "reportUrl": "https://dasprod-store.s3.amazonaws.com/workitem/rGm0mO9jVS946079dd4ad1f8a5/report.txt?AWSAccessKeyId=ASIATGVJZKM3DRNDKR7U&token=IQoJb3JpZ2luX2VJEFQaCXVzLWVhc3QtMz85ZSCBr6WLJbP4RAIEA5%2FdliivTt1NIC1UDK2GgwyMjA0NzIxMzMTAiDKCwkDWQYusIZPYN44%2FyNKVz8UFBz6oOx4HKjWj0L6dKShoaQ%2FZcni8s0KBzZtJIKmPnOvluz%2BQUV4zHoKS4ZcCLACbIHkrSOqOXnHdRMixbHQ9vyBF%2Bhsok%2BgU64AFrSAldsuTnvY6IPmaU2XZeZfWP3zfi0PXQE%2BLUdWWGB1CmA2ZzN8ZXIUfVUveDUO6l1yP0luTaCVQnqmI3kv5A9FcCHq0W1TIMzHGYW0nkovsWISJ%2BygAvWWLLzTFCdL3r4pWx1XU9O019v75RgchFIR9BXowknY4BxA%3D%3D&Sig"
}
```

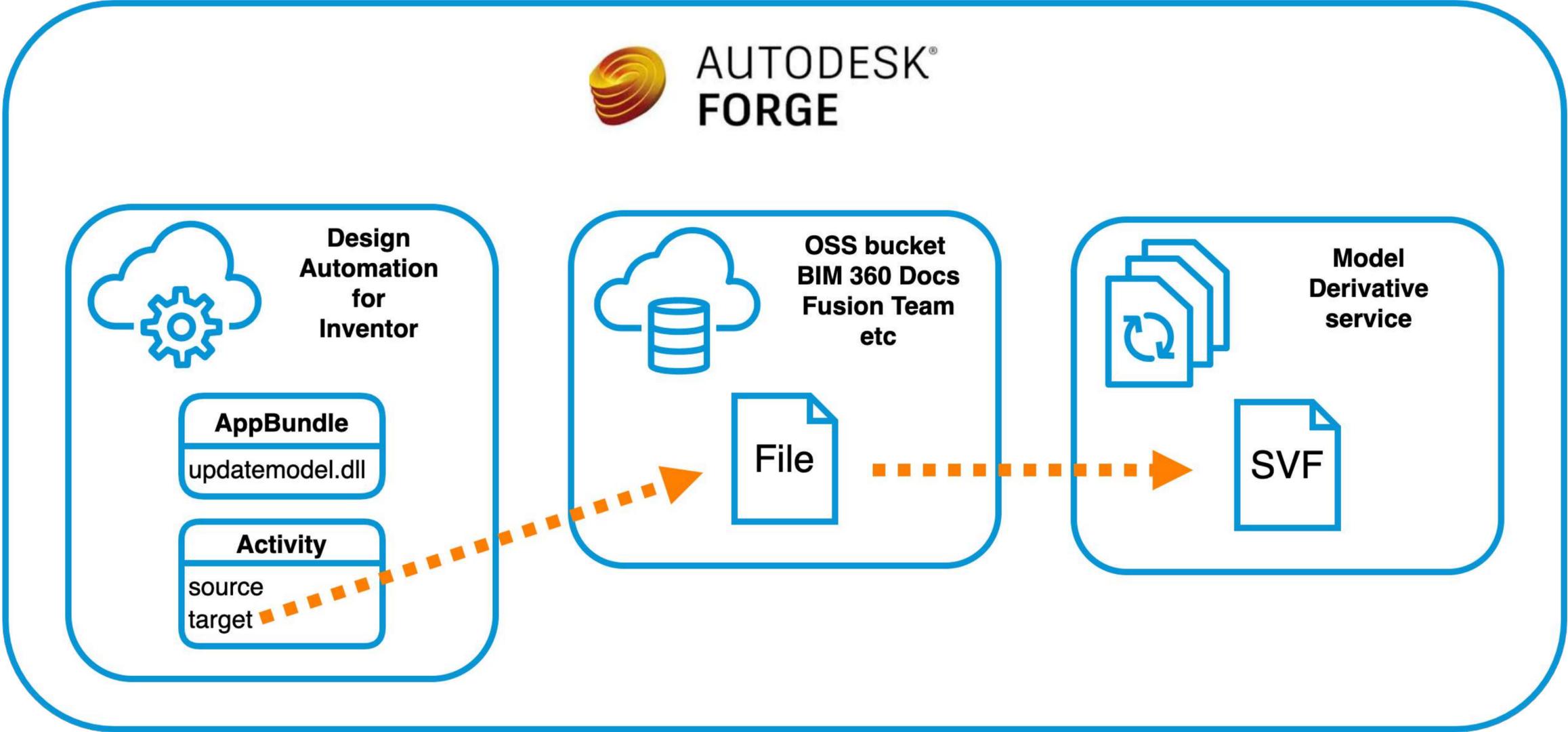
350KB -> 0.31 second -> 8Mbps
310MB -> 13 seconds -> 190Mbps

<https://da-manager.autodesk.io/>

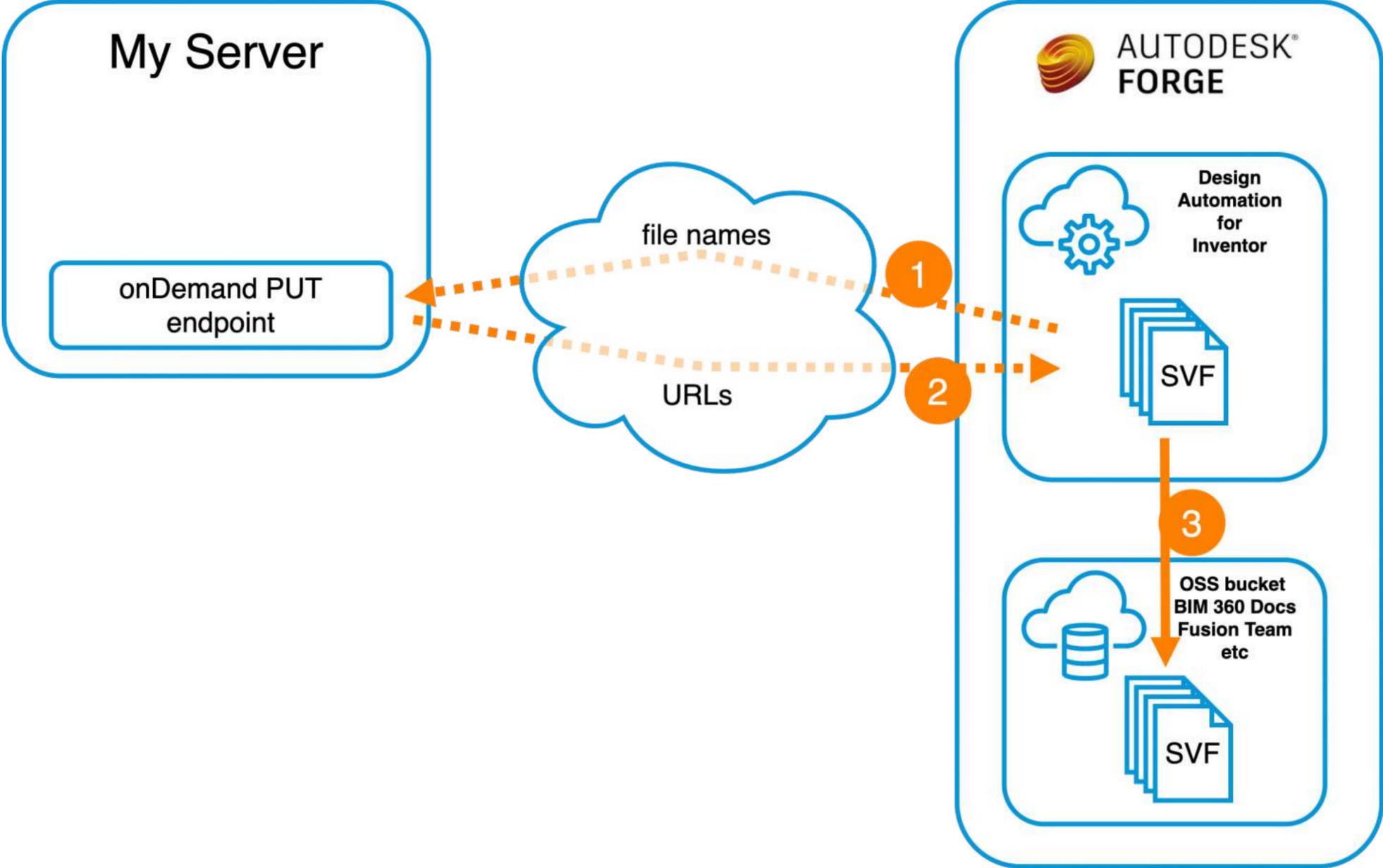
Generate viewables



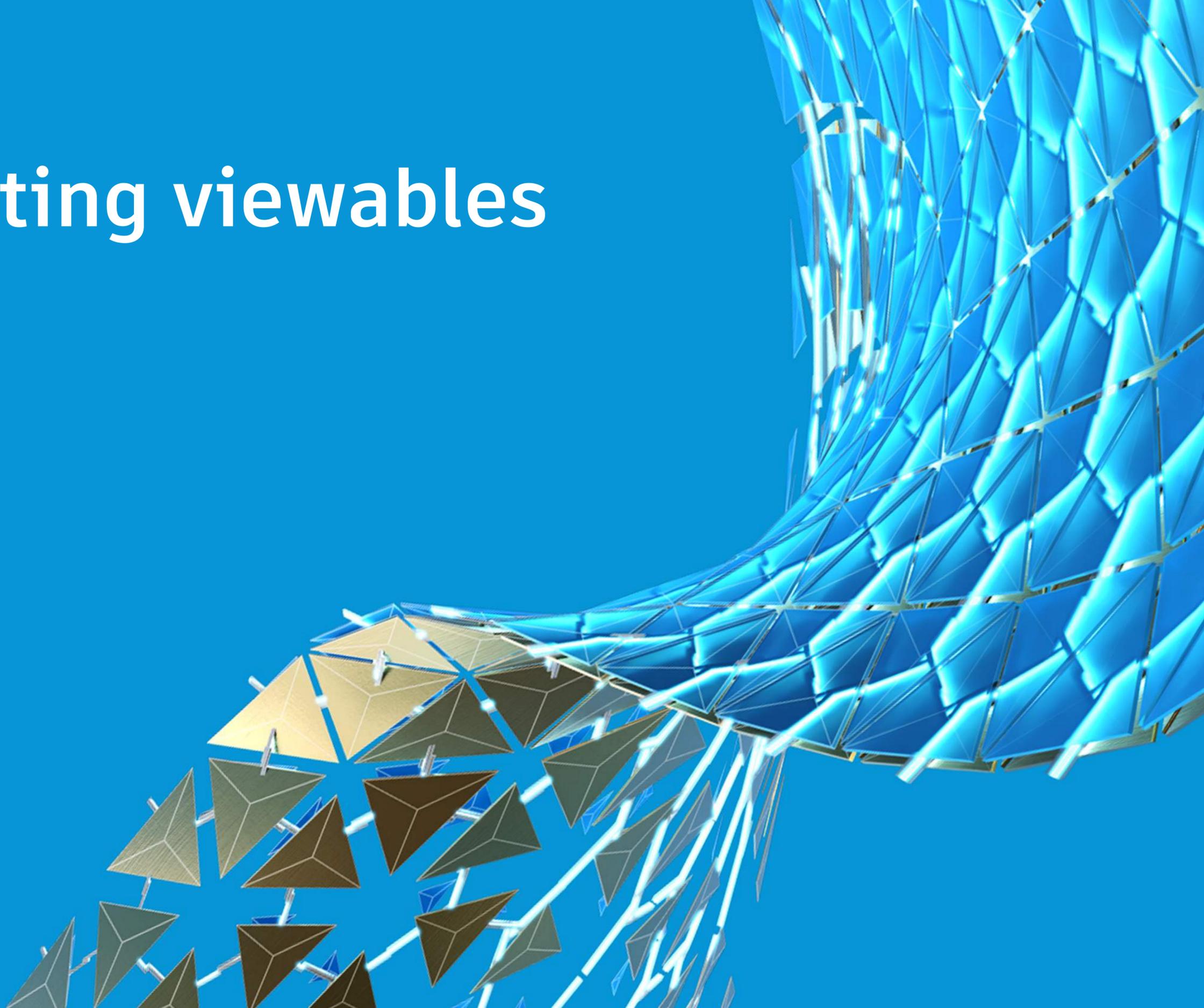
Generate viewables



Generate viewables



Skip generating viewables



Skip generating viewables

The image shows a screenshot of the Autodesk Forge interface. On the left, a blue-bordered box titled "Object Storage Service" contains a cloud icon and a list of files: corner180.ipt, shelves.iam, shelf90.ipt, mid180.ipt, shelf120.ipt, mid90.ipt, corner90.ipt, and shelves.ipj. An orange arrow points from this list to a 3D model viewer on the right. The viewer displays a 3D model of a shelving unit. Below the viewer, there is a "Start workitem" button and a JSON object representing the workitem's statistics.

```
"stats": {  
  "timeQueued": "2020-05-08T16:40:29",  
  "timeDownloadStarted": "2020-05-08",  
  "timeInstructionsStarted": "2020-0",  
  "timeInstructionsEnded": "2020-05-",  
  "timeUploadEnded": "2020-05-08T16:",  
  "bytesDownloaded": 199,  
  "bytesUploaded": 20363  
},  
"id": "5145b63a1bea4785b404ab528fd61",  
}
```

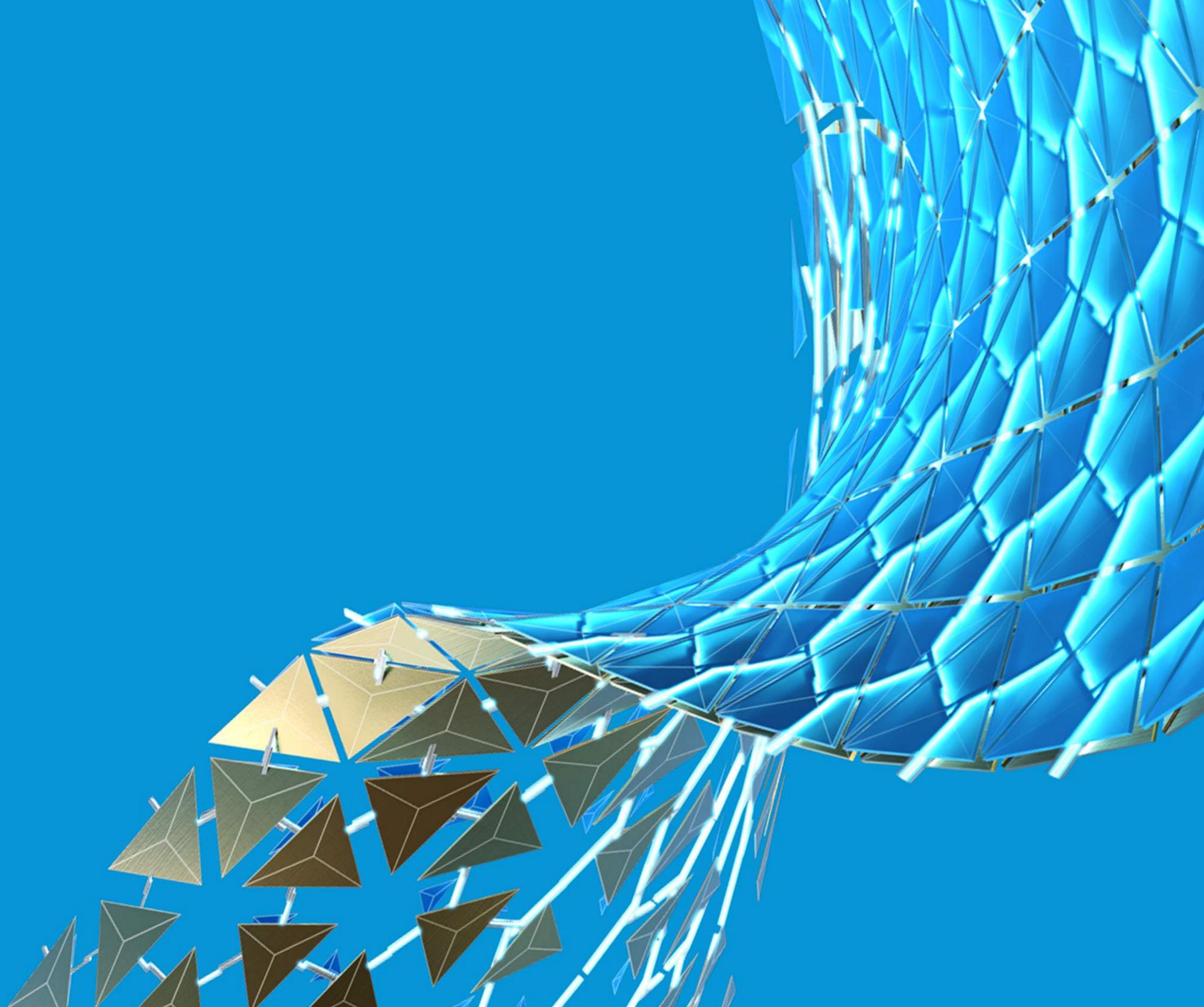
<https://developer.api.autodesk.com/oss>

<https://forge.autodesk.com/blog/faster-configuration-results>

Skip generating viewables

<https://forge-configurator.herokuapp.com/>

Debugging



Debugging - local

```
1 reference
private static void DebugSamplePlugin(InventorServer app)
{
    // get project directory
    string projectdir = Directory.GetParent(Directory.GetCurrentDirectory()).Parent.FullName;

    // get box.ipt absolute path
    string boxPath = System.IO.Path.Combine(projectdir, @"inputFiles\", "box.ipt");

    string boxPathCopy = System.IO.Path.Combine(projectdir, @"inputFiles\", "boxcopy.ipt");

    try
    {
        // delete an existing file
        System.IO.File.Delete(boxPathCopy);
    }
    catch (IOException)
    {
        Console.WriteLine("The specified file is in use. It might be open by Inventor");
        return;
    }

    // create a copy
    System.IO.File.Copy(boxPath, boxPathCopy);

    // open box.ipt by Inventor
    Document doc = app.Documents.Open(boxPathCopy);

    // get params.json absolute path
    string paramsPath = System.IO.Path.Combine(projectdir, @"inputFiles\", "params.json");

    // create a name value map
    Inventor.NameValueMap map = app.TransientObjects.CreateNameValueMap();

    // add parameters into the map, do not change "_1". You may add more parameters "_2", "_3"...
    map.Add("_1", paramsPath);

    // create an instance of TestPlugin
    TestPlugin.SampleAutomation plugin = new TestPlugin.SampleAutomation(app);

    // run the plugin
    plugin.RunWithArguments(doc, map);
}
```

The Solution Explorer shows the following structure:

- Solution 'Test' (3 of 3 projects)
 - DebugPluginLocally
 - Properties
 - References
 - inputFiles
 - box.ipt
 - params.json
 - App.config
 - InventorConnector.cs
 - Program.cs
 - Program
 - Main(string[]) : void
 - DebugSamplePlugin(InventorServer) : void
 - Interaction
 - Dependencies
 - appsettings.json
 - Program.cs
 - Publisher.cs
 - Publisher.Custom.cs
 - readme.md
 - TestPlugin
 - Properties
 - References
 - PackageContents.xml
 - PluginServer.cs
 - SampleAutomation.cs
 - TestPlugin.Inventor.addin
 - TestPlugin.X.manifest

Debugging - server

AppBundle

```
2 references  
public void RunWithArguments(Document doc, NameValueMap map)  
{  
    LogTrace("RunWithArguments called");  
    OnSaveRule(doc);  
}  
  
1 reference  
public void OnSaveRule(Document doc)  
{  
    using (new HeartBeat())  
    {  
        LogTrace("Setting BoxWidth");  
        AssemblyDocument asm = doc as AssemblyDocument;  
        AssemblyComponentDefinition cd = asm.ComponentDefinition;  
        cd.Parameters.UserParameters["BoxWidth"].Expression = "4 in";  
    }  
}
```

iLogic Rule

```
Trace.WriteLine("1")  
Components.Add("MyBlock", "myblock.ipt", position := Nothing)  
  
Trace.WriteLine("2")  
  
Parameter("MyBlock", "Width") = BoxWidth  
Parameter("MyBlock", "Height") = BoxHeight  
Parameter("MyBlock", "Depth") = BoxDepth  
  
Trace.WriteLine("3")
```

report.txt

```
...  
BundlePlugin.bundle\Contents\Parts\SampleAssembly.iam".  
Standard output dump.  
Information: 0 : InventorCoreConsole.exe: 25.0.18300.0  
Information: 0 : Starting Inventor Server.  
Information: 0 : Started Inventor Server 2020.3 (Build 243373000, 373)  
Information: 0 : Loading plug-in: iLogic Plugin  
Information: 0 : Activating plug-in: iLogic Plugin  
...  
Information: 0 : Opening document: T:\Aces\Applications\55eec6b6125d6e06ea  
SampleBundle[110].package\SampleBundlePlugin.bundle\Contents\Parts\Sampl  
...  
Information: 0 : Opened  
Information: 0 : Getting Inventor plug-in.  
Information: 0 : Plug-in: SampleBundlePlugin  
Information: 0 : Activating plug-in: SampleBundlePlugin  
Information: 0 : : SampleBundlePlugin (1.2.0.0): initializing...  
Information: 0 : Executing 'Run' method on Automation object.  
Information: 0 : Run called  
Information: 0 : RunWithArguments called  
Information: 0 : Setting BoxWidth  
Information: 0 : HeartBeating every 50000ms.  
1  
2  
3  
4  
5  
Information: 0 : Calling Save()  
Information: 0 : Calling Save2()  
Information: 0 : Done  
Information: 0 : Ending HeartBeat
```

Debugging - server

Model iLogic X +

Rules Forms iLogic Log Favorites

iLogicEvents.i
BeforeSave
AfterOpen

Logger.Trace("My message")

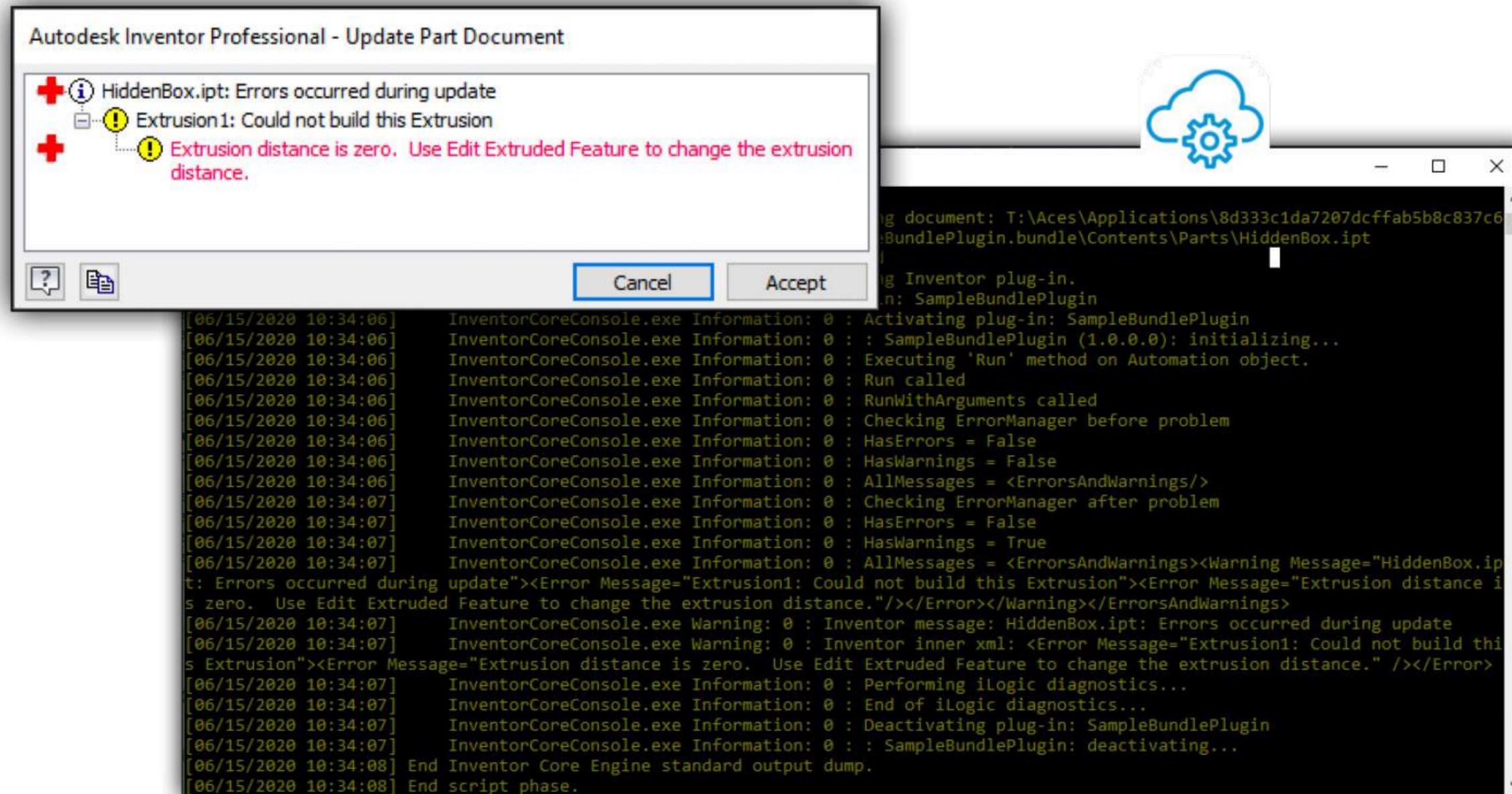
Log Level Trace Detailed Trace

Save Save & Run Close

Ln 1 Col 1

Trace.WriteLine("message")

Debugging - ErrorManager



The image shows two overlapping windows from Autodesk Inventor Professional. The top window is titled "Autodesk Inventor Professional - Update Part Document" and displays an error message: "HiddenBox.ipt: Errors occurred during update". Below this, a tree view shows "Extrusion 1: Could not build this Extrusion" and "Extrusion distance is zero. Use Edit Extruded Feature to change the extrusion distance." The bottom window is a console window showing the following log output:

```
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : Activating plug-in: SampleBundlePlugin
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : : SampleBundlePlugin (1.0.0.0): initializing...
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : Executing 'Run' method on Automation object.
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : Run called
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : RunWithArguments called
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : Checking ErrorManager before problem
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : HasErrors = False
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : HasWarnings = False
[06/15/2020 10:34:06] InventorCoreConsole.exe Information: 0 : AllMessages = <ErrorsAndWarnings/>
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : Checking ErrorManager after problem
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : HasErrors = False
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : HasWarnings = True
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : AllMessages = <ErrorsAndWarnings><Warning Message="HiddenBox.ipt: Errors occurred during update"><Error Message="Extrusion1: Could not build this Extrusion"><Error Message="Extrusion distance is zero. Use Edit Extruded Feature to change the extrusion distance." /></Error></Warning></ErrorsAndWarnings>
[06/15/2020 10:34:07] InventorCoreConsole.exe Warning: 0 : Inventor message: HiddenBox.ipt: Errors occurred during update
[06/15/2020 10:34:07] InventorCoreConsole.exe Warning: 0 : Inventor inner xml: <Error Message="Extrusion1: Could not build this Extrusion"><Error Message="Extrusion distance is zero. Use Edit Extruded Feature to change the extrusion distance." /></Error>
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : Performing iLogic diagnostics...
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : End of iLogic diagnostics...
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : Deactivating plug-in: SampleBundlePlugin
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 : : SampleBundlePlugin: deactivating...
[06/15/2020 10:34:08] End Inventor Core Engine standard output dump.
[06/15/2020 10:34:08] End script phase.
```

Debugging - ErrorManager

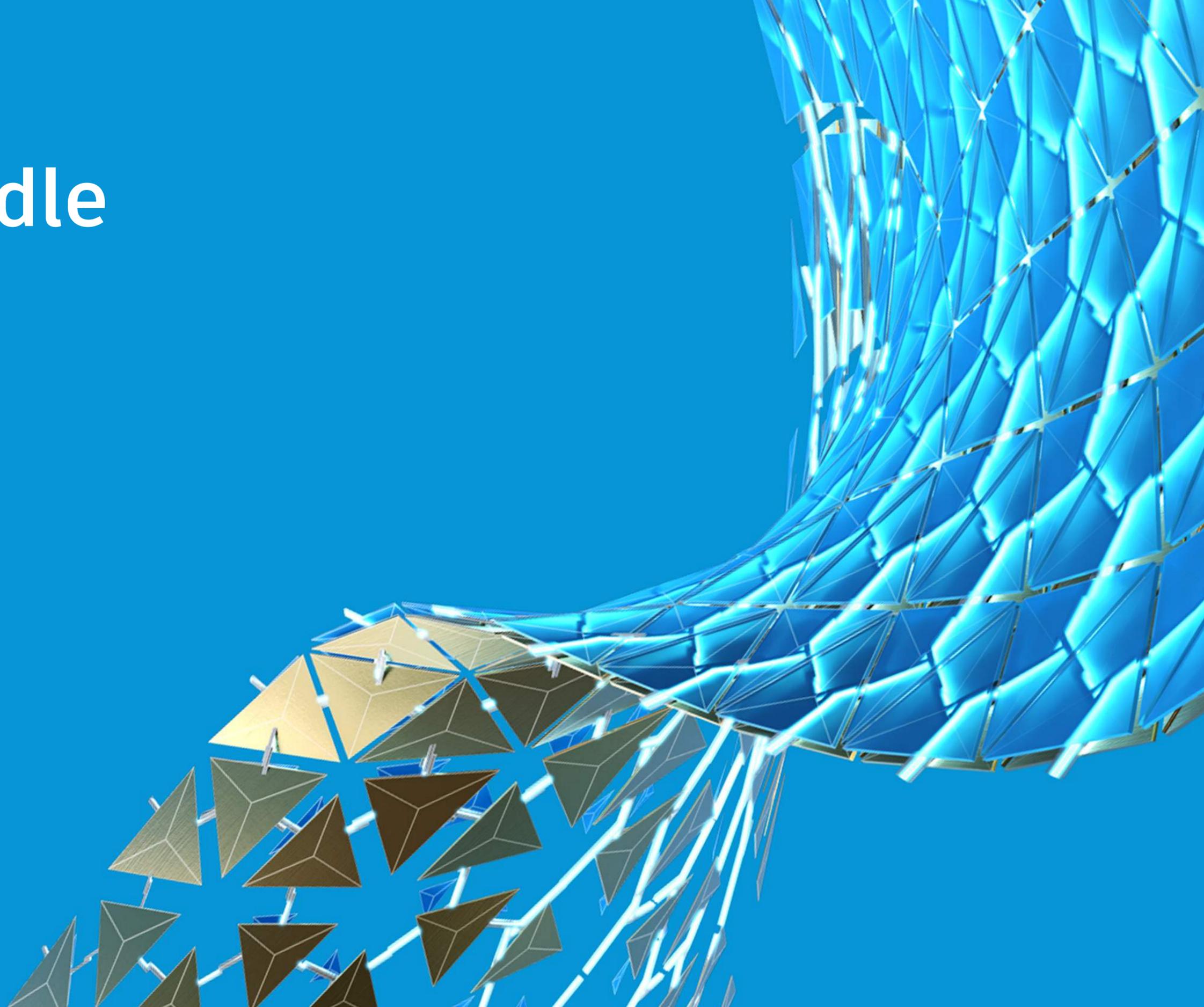
```
public void RunWithArguments(Document doc, NameValueMap map)
{
    var em = inventorApplication.ErrorManager;
    LogTrace($"Checking ErrorManager before problem");
    LogTrace($"HasErrors = {em.HasErrors}");
    LogTrace($"HasWarnings = {em.HasWarnings}");
    LogTrace($"AllMessages = {em.AllMessages}");

    PartDocument pd = doc as PartDocument;
    pd.ComponentDefinition.Parameters["height"].Expression = "0";
    pd.Update2();

    LogTrace($"Checking ErrorManager after problem");
    LogTrace($"HasErrors = {em.HasErrors}");
    LogTrace($"HasWarnings = {em.HasWarnings}");
    LogTrace($"AllMessages = {em.AllMessages}");
}
```

```
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 :
Checking ErrorManager after problem [06/15/2020 10:34:07]
InventorCoreConsole.exe Information: 0 : HasErrors = False
[06/15/2020 10:34:07] InventorCoreConsole.exe Information: 0 :
HasWarnings = True [06/15/2020 10:34:07] InventorCoreConsole.exe
Information: 0 : AllMessages = <ErrorsAndWarnings> <Warning
Message="HiddenBox.ipt: Errors occurred during update"> <Error
Message="Extrusion1: Could not build this Extrusion"> <Error
Message="Extrusion distance is zero. Use Edit Extruded Feature to
change the extrusion
distance." /> </Error> </Warning> </ErrorsAndWarnings> [06/15/2020
10:34:07] InventorCoreConsole.exe Warning: 0 : Inventor message:
HiddenBox.ipt: Errors occurred during update [06/15/2020 10:34:07]
InventorCoreConsole.exe Warning: 0 : Inventor inner xml: <Error
Message="Extrusion1: Could not build this Extrusion"> <Error
Message="Extrusion distance is zero. Use Edit Extruded Feature to
change the extrusion distance." /> </Error>
```

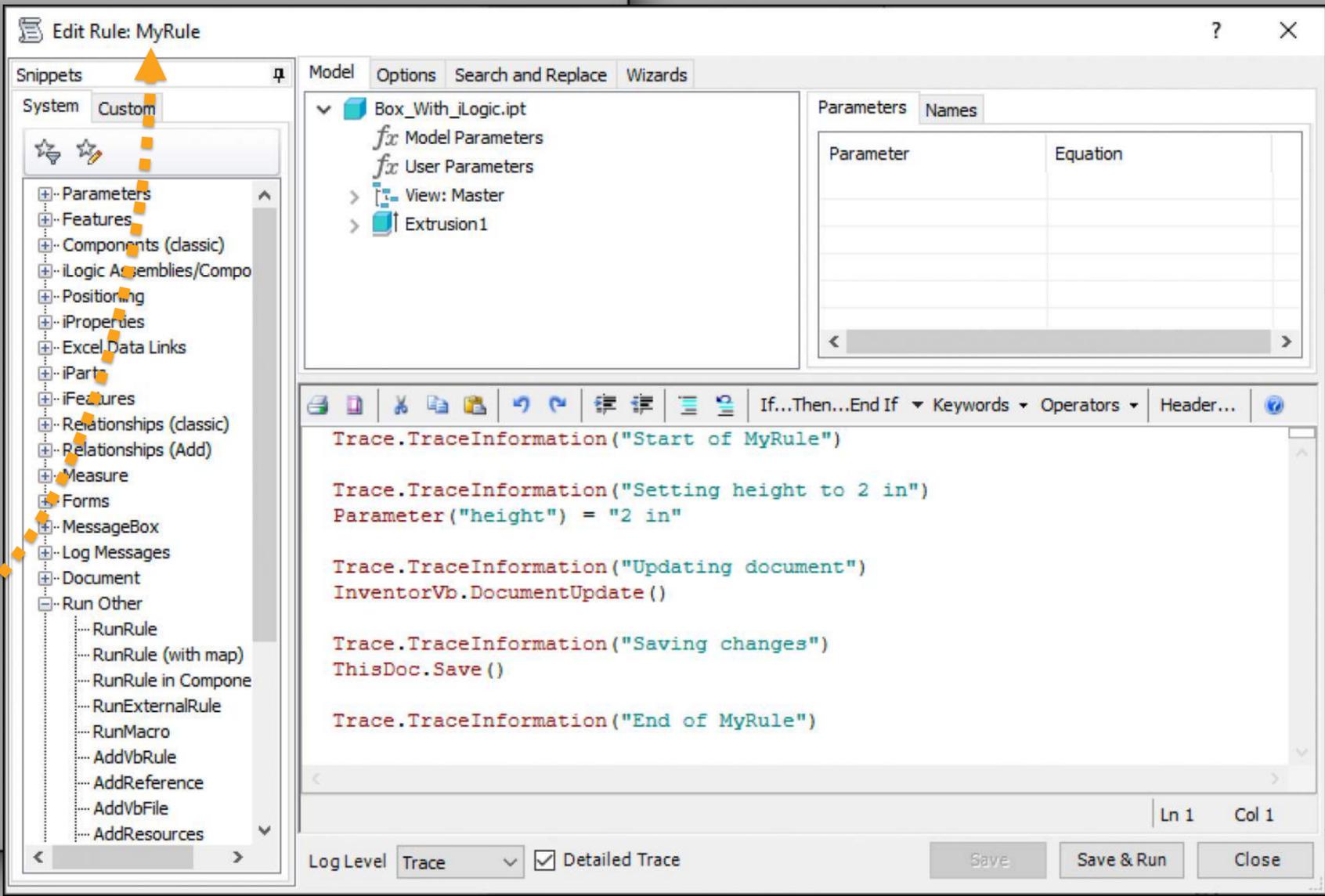
No App Bundle



No App Bundle

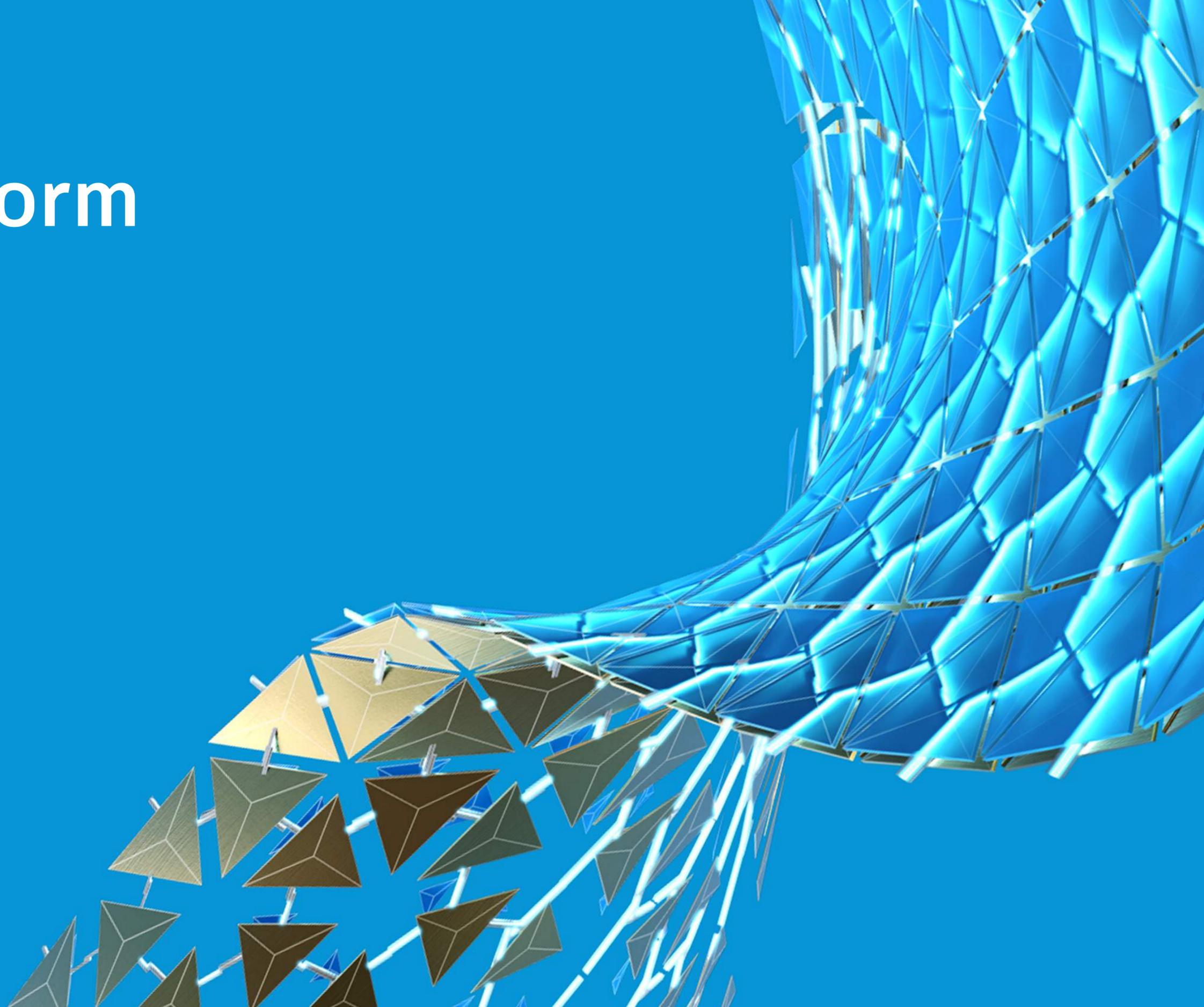
Activity

```
{  
  "commandLine": [  
    "$(engine.path)\\InventorCoreConsole.exe /i $(args[inputFile].path) /s $(settings[script].path)"  
  ],  
  "parameters": {  
    "inputFile": {  
      "verb": "get",  
      "localName": "inputFile.ipt"  
    },  
    "outputFile": {  
      "verb": "put",  
      "localName": "inputFile.ipt"  
    }  
  },  
  "id": "rGm0m09jVSsD2yBEDk9MRtXQTwsa6ly0.RunRule+prod",  
  "engine": "Autodesk.Inventor+24",  
  "appbundles": [],  
  "settings": {  
    "script": {  
      "value": "iLogicVb.RunRule(\"MyRule\")"  
    }  
  },  
  "description": "Running iLogic Rule",  
  "version": 1  
}
```



<https://forge.autodesk.com/blog/run-ilogic-rule-without-appbundle>

Get iLogic Form



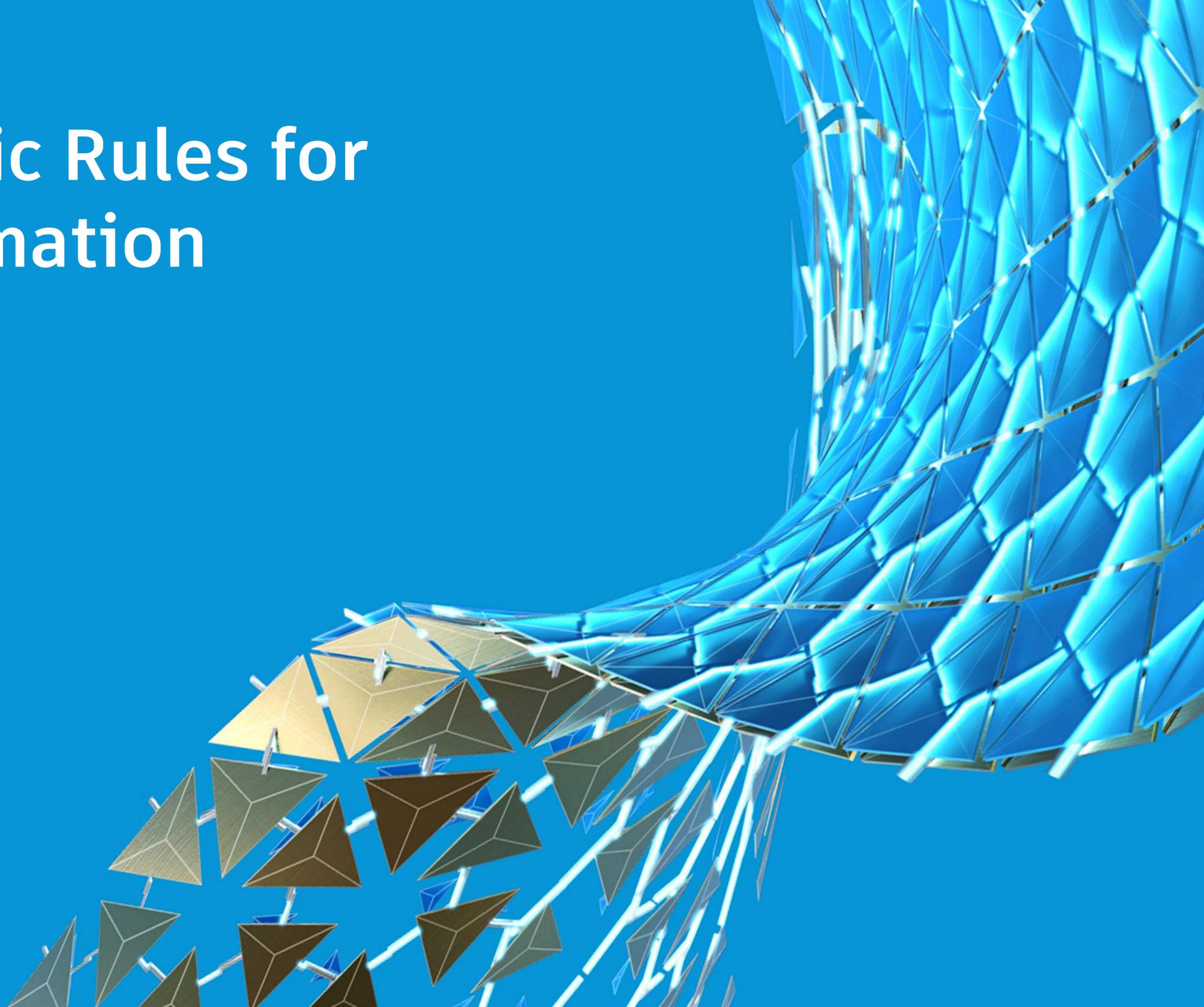
Get iLogic Form

The image illustrates the process of exporting iLogic form information. On the left, the 'Form Editor' window shows a form named 'TestForm' with various controls and properties. The 'Properties' pane at the bottom indicates 'Show Item Borders' is set to 'False' and 'Allow Control Resizing' is enabled. An orange arrow points from the 'TestForm' preview to a collection of six icons representing different form elements, each with a unique ID and file path. A dashed orange arrow points from one of these icons to a JSON file named 'result.json'. Below this, a code block displays the JSON structure for the form, including details for a 'Group 1' control and a 'Picture 4' control.

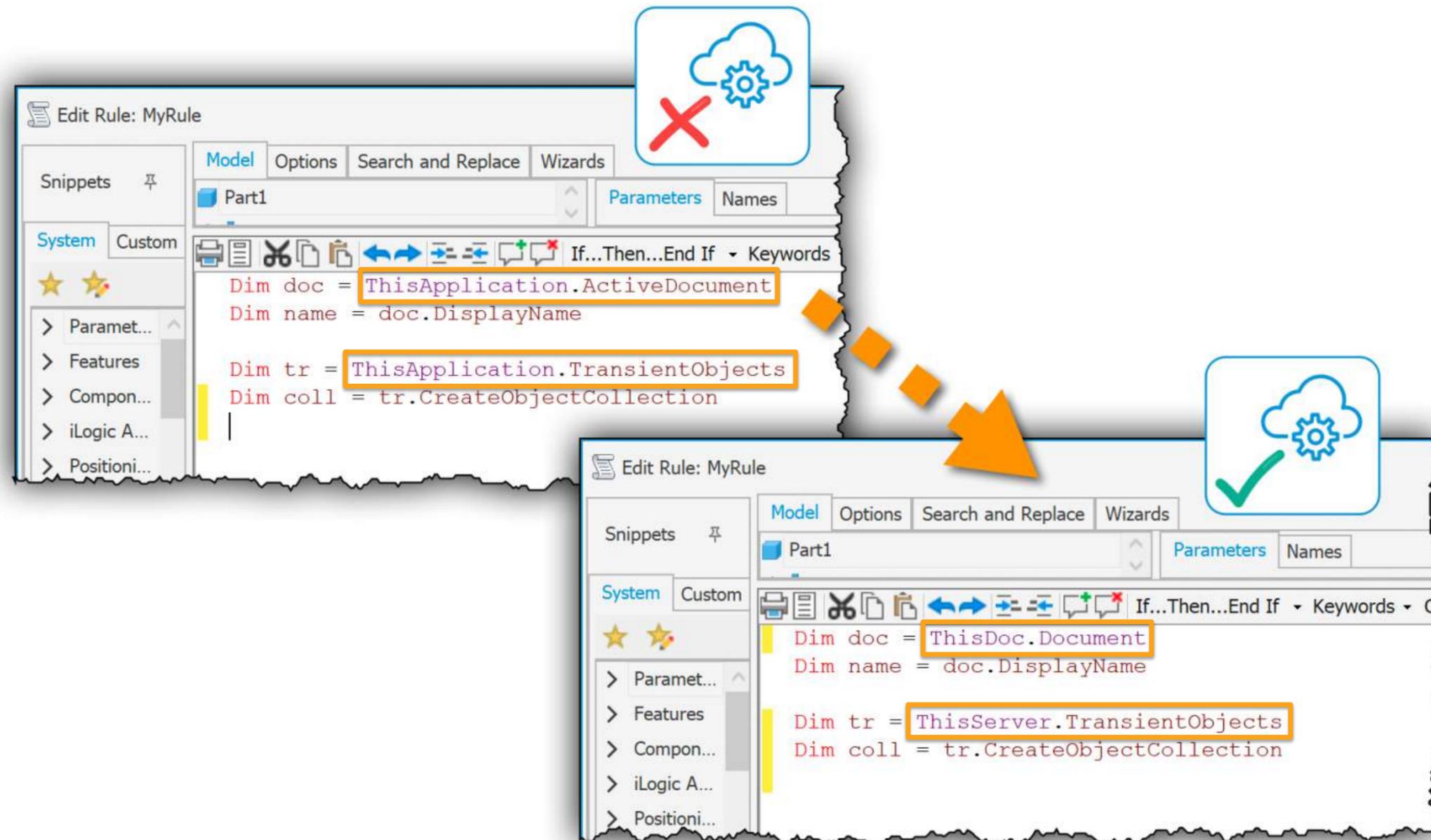
```
213     "displayName": "height",
214     "type": "NumericParameterControlSpec"
215   },
216   {
217     "alwaysReadOnly": false,
218     "readOnly": false,
219     "enablingParameterName": null,
220     "parameterName": "thickness",
221     "editControlType": "TextBox",
222     "name": "thickness",
223     "tooltip": "",
224     "displayName": "thickness",
225     "type": "NumericParameterControlSpec"
226   }
227 ],
228 "name": "Group 1",
229 "tooltip": null,
230 "displayName": "Group 1",
231 "type": "ControlGroupSpec"
232 },
233 {
234   "pictureParameterName": "PictureFolderParam",
235   "file": "70615c76ddf77db54115251379f79868.png",
236   "name": "Picture 4",
237   "tooltip": null,
238   "displayName": "Picture 4",
239   "type": "PictureControlSpec"
240 }
241 ],
242 "name": "TestForm"
243 }
244 ]
```

<https://forge.autodesk.com/blog/get-ilogic-form-information-inventor-documents>

Prepare iLogic Rules for Design Automation



Prepare iLogic Rules for Design Automation



Prepare iLogic Rules for Design Automation

The image illustrates the preparation of iLogic rules for design automation. It shows three main components:

- UpdateTopAssembly Rule:** A screenshot of the 'Edit Rule: UpdateTopAssembly' window. The code in the main area is `iLogicVb.RunRule("part:1", "UpdatePart")`. The left pane shows a tree view of the assembly structure: `topassembly.iam` containing `UpdateTopAssembly` and `subassembly:1` containing `Origin` and `part:1` containing `UpdatePart`.
- UpdatePart Rule:** A screenshot of the 'Edit Rule: UpdatePart' window. The code in the main area is `MsgBox (_
"ThisApplication.ActiveDocument = " + ThisApplication.ActiveDocument.DisplayName +
vbCrLf + _
"ThisDoc.Document = " + ThisDoc.Document.DisplayName)`. The left pane shows a tree view of the part structure: `part.ipt` containing `Part`, `Features`, and `Compo...`.
- GetTopAssembly Function:** A code snippet defining a function to find the top assembly document. The code is:

```
Function GetTopAssembly(doc As Document) As Document  
If doc.ReferencingDocuments.Count = 0 Then  
Set GetTopAssembly = doc  
Else  
Set GetTopAssembly = _  
GetTopAssembly(doc.ReferencingDocuments(1))  
End If  
End Function
```
- Dialog Box:** A screenshot of a dialog box titled 'zzgfquev' with an 'OK' button. The text inside the dialog is `ThisApplication.ActiveDocument = topassembly.iam` and `ThisDoc.Document = part.ipt`.

Arrows indicate the flow of information: orange dashed arrows point from the assembly tree to the 'UpdateTopAssembly' rule and from the 'UpdatePart' rule to the dialog box; purple dashed arrows point from the 'UpdatePart' rule to the 'UpdateTopAssembly' rule and from the dialog box to the 'UpdatePart' rule.

Prepare iLogic Rules for Design Automation

MessageBox.Show()



MsgBox()



iLogicForm.Show()

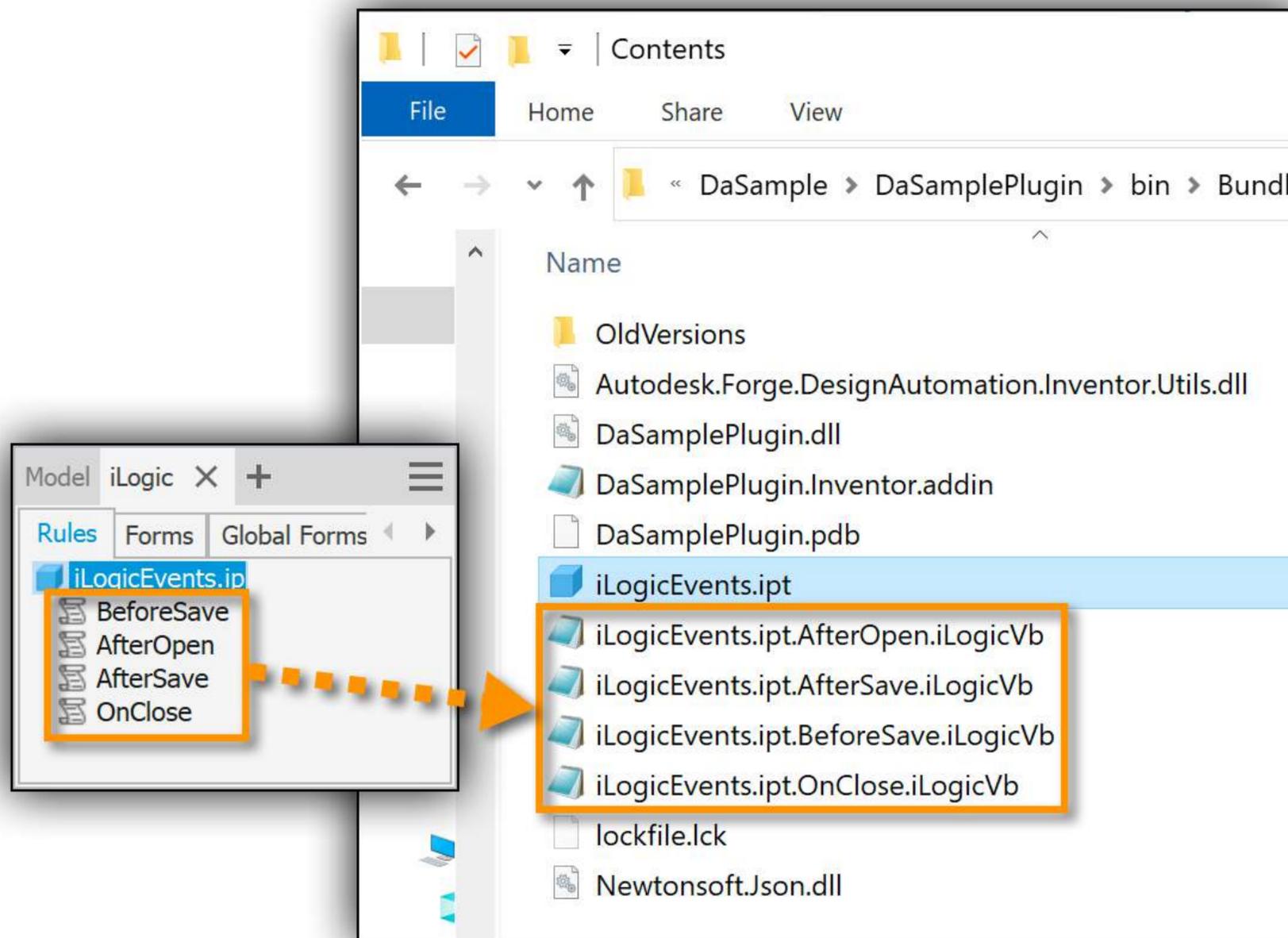


InputDialog()

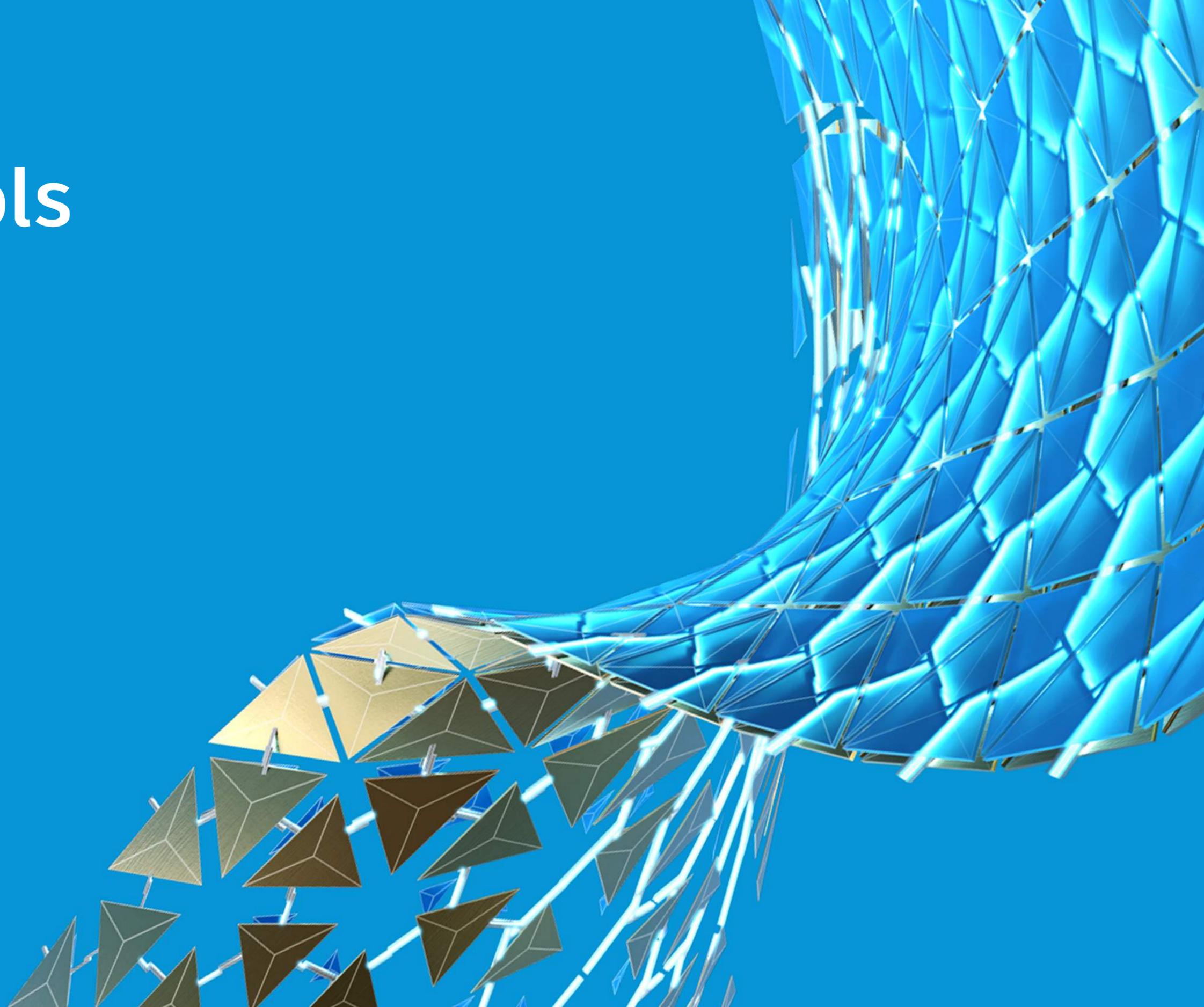


Etc

iLogic Rule Exporter



Buckets Tools



Buckets Tools

<https://forge.autodesk.com/blog/prepare-ilogic-rules-design-automation>

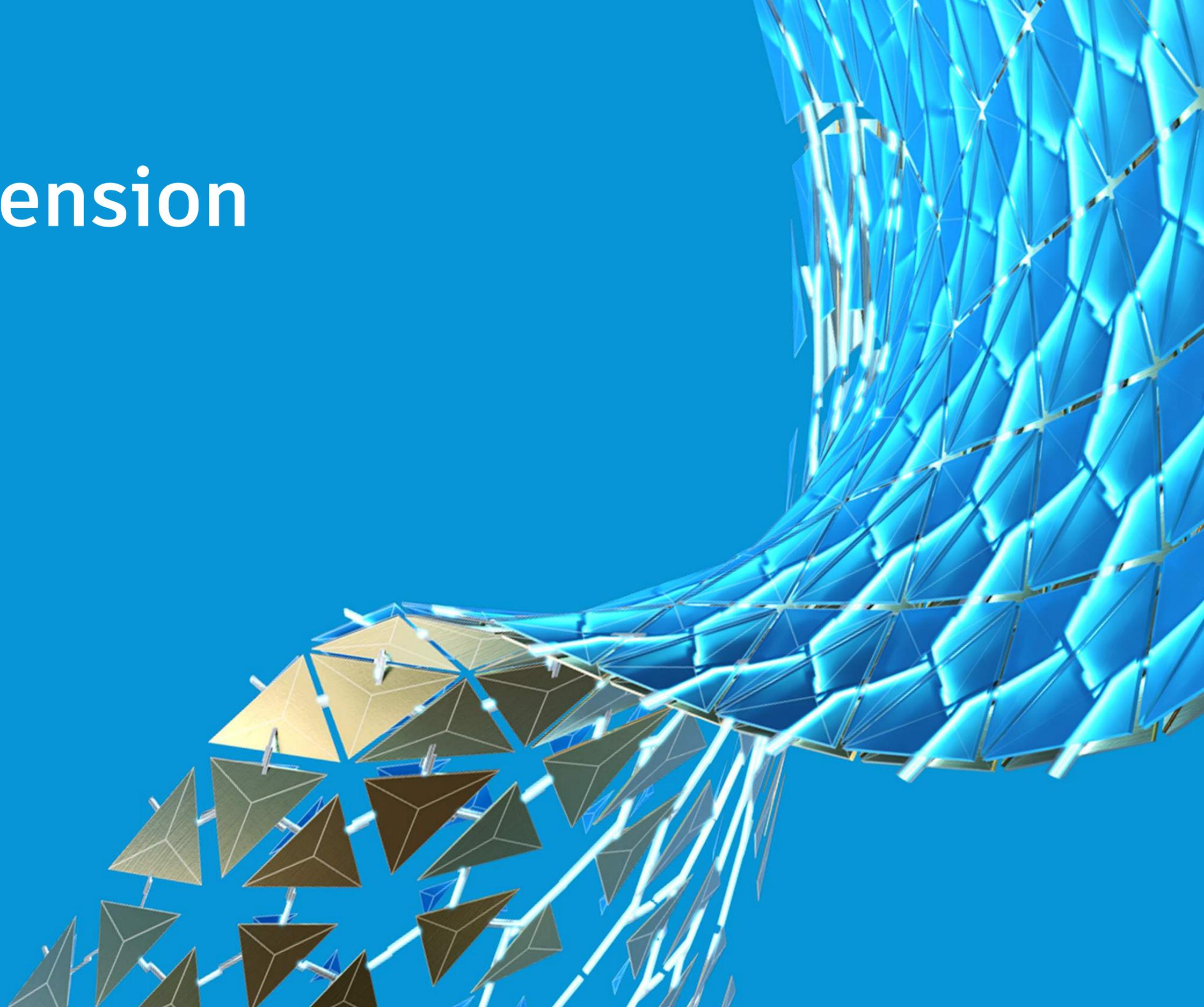
Design Automation Tools



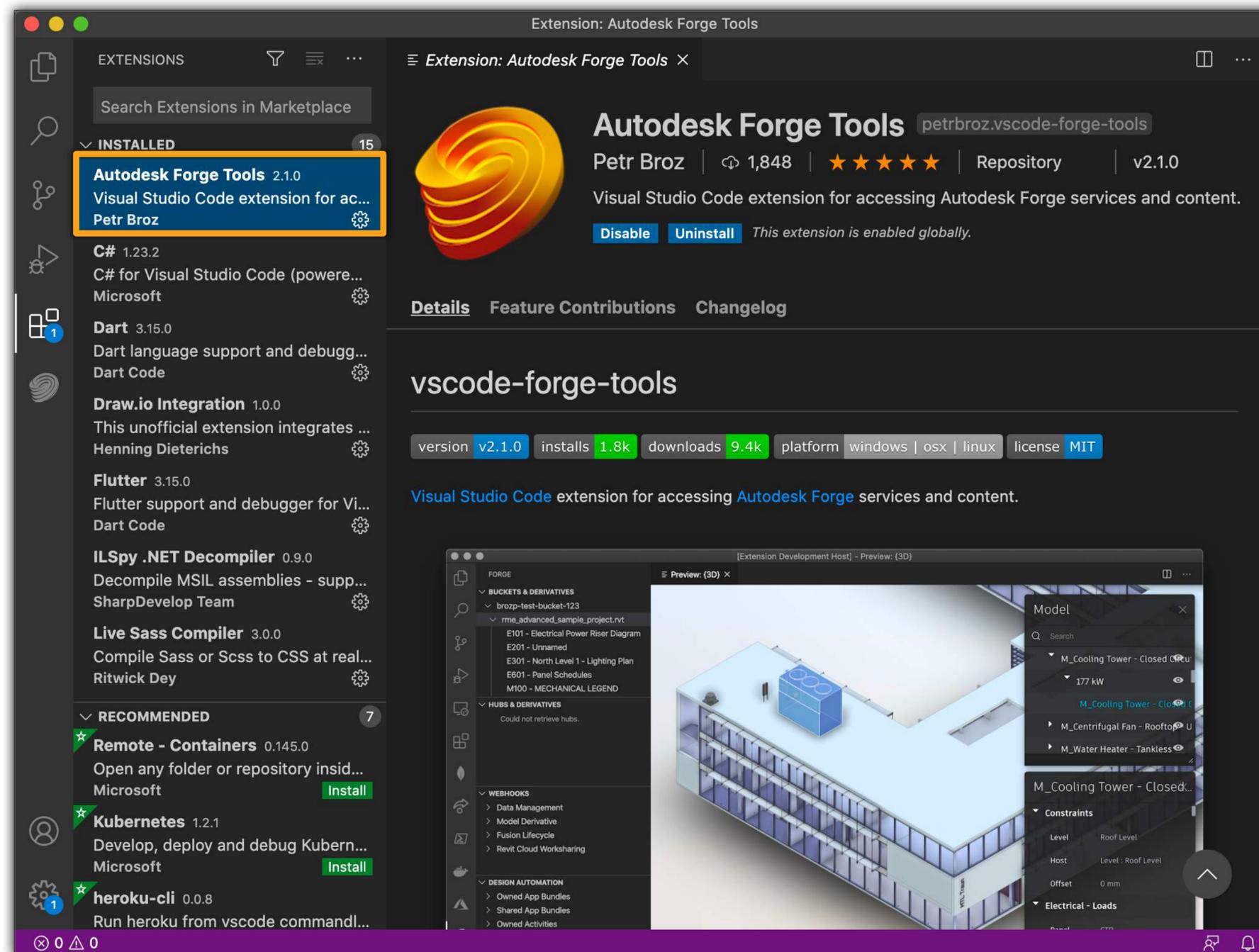
Design Automation Tools

<https://forge.autodesk.com/blog/prepare-ilogic-rules-design-automation>

VS Code Extension



VS Code Extension



<https://forge.autodesk.com/blog/forge-visual-studio-code>

VS Code Extension

The screenshot displays the Visual Studio Code interface with the Autodesk Forge Tools extension installed. The left sidebar shows the 'FORGE' extension tree with categories like 'BUCKETS & DERIVATIVES', 'HUBS & DERIVATIVES', 'WEBHOOKS', and 'DESIGN AUTOMATION'. The main editor area shows the extension's details page, including the Autodesk Forge logo, the name 'Autodesk Forge Tools', the author 'Petr Broz', and a 5-star rating. Below this, there are tabs for 'Details', 'Feature Contributions', and 'Changelog'. The 'Details' tab is active, showing the extension's version (v2.1.0), install count (1.8k), download count (9.4k), and supported platforms (windows, osx, linux). A preview window at the bottom shows a 3D model of a building with a cooling tower, and a 'Model' panel on the right lists various components like 'M_Cooling Tower - Closed' and 'M_Centrifugal Fan - Rooftop'.

<https://forge.autodesk.com/blog/forge-visual-studio-code>

Questions?

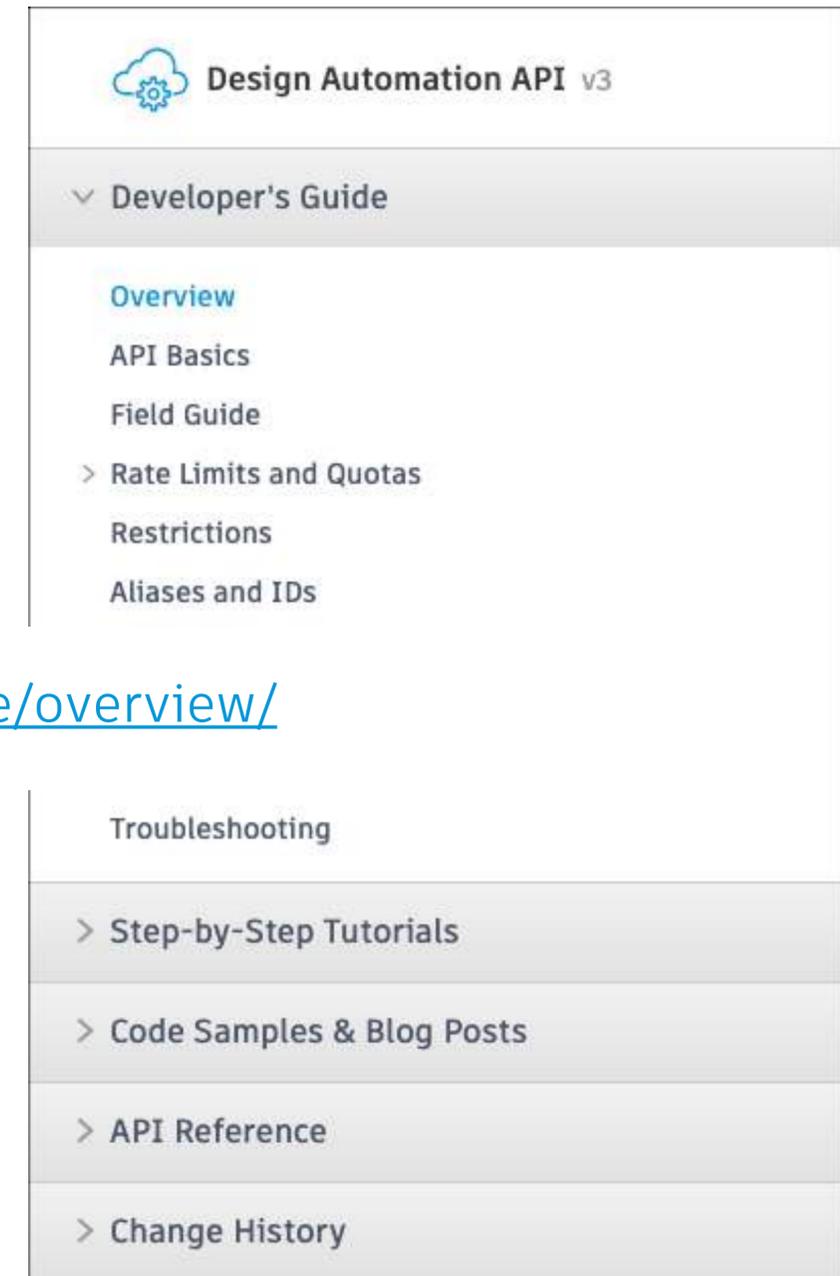
- **During AU**
 - There will be a scheduled Q&A for this class
 - Check the class page for details
 - Class is identified as **SD473689 - Tips & Tricks: what I learnt while supporting Design Automation for Inventor**
 - Comments / Questions section on the Class page
 - Forge Answer Bar
 - Search for the Answer Bar from AU site, and then find the Forge specific one
 - Time slots will be available around the clock during this year's Virtual AU event!
 - Also languages and experts will be advertised, so we can help you as much as possible in a “live” setting



Questions?

- **Anytime**

- Look for related topics in the Forge blog, documentation and code samples:
 - https://forge.autodesk.com/en/docs/design-automation/v3/developers_guide/overview/
- Forge Help: <https://forge.autodesk.com/en/support/get-help>
- Have an idea for an awesome Forge App, but need help getting started?
 - Join an accelerator: <https://forge.autodesk.com/accelerator-program>



The image shows a screenshot of the 'Design Automation API v3' documentation menu. At the top, there is a gear icon and the text 'Design Automation API v3'. Below this, there is a dropdown menu for 'Developer's Guide' which is currently expanded. The expanded menu lists several items: 'Overview' (highlighted in blue), 'API Basics', 'Field Guide', '> Rate Limits and Quotas', 'Restrictions', and 'Aliases and IDs'. Below the 'Developer's Guide' section, there is a 'Troubleshooting' section which is collapsed. Underneath 'Troubleshooting', there are four more collapsed sections: '> Step-by-Step Tutorials', '> Code Samples & Blog Posts', '> API Reference', and '> Change History'.

 Design Automation API v3
▼ Developer's Guide
Overview
API Basics
Field Guide
> Rate Limits and Quotas
Restrictions
Aliases and IDs
Troubleshooting
> Step-by-Step Tutorials
> Code Samples & Blog Posts
> API Reference
> Change History

FORGE

Accelerator Program

Benefit from dedicated time to develop your Forge application – with direct help from Forge engineering experts.



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