



ArcGIS Pro SDK for .NET: Programming Patterns

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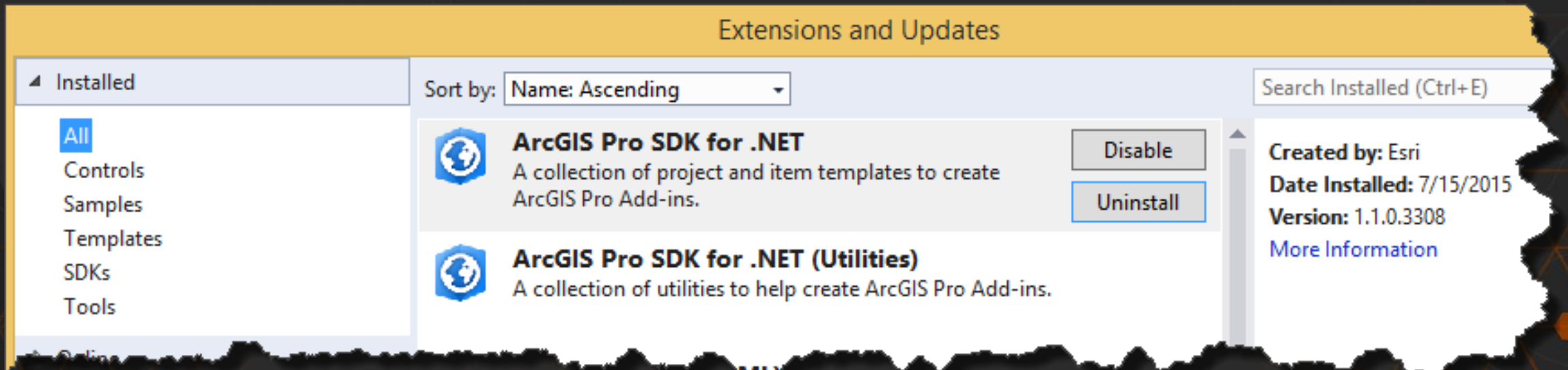
What is the ArcGIS Pro SDK ?

- Customization with Tasks
- Arcpy for automating Pro (Python 3.4)
- Modern asynchronous API (native .NET)
- .NET Add-ins for extending Pro (C#, VB)
- Pro SDK Resources
 - ProSamples
 - ProConcepts
 - ProTutorials
 - ProSnippets
 - API Reference
 - ... more



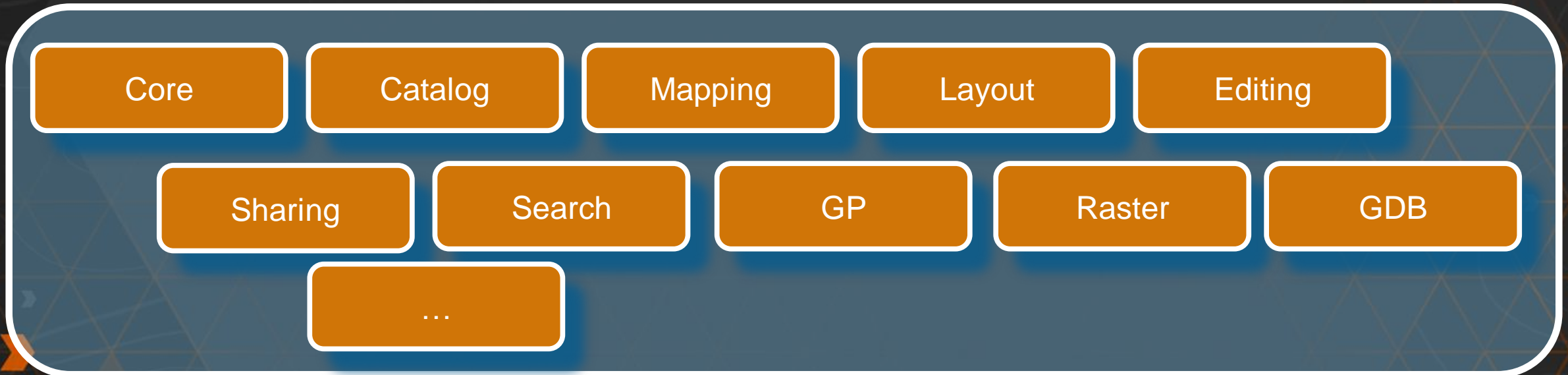
What is the ArcGIS Pro SDK for .NET?

- Easy to use project templates and wizards (in the Visual Studio 2013 IDE)
- New installation experience
 - Integrated with VisualStudio gallery



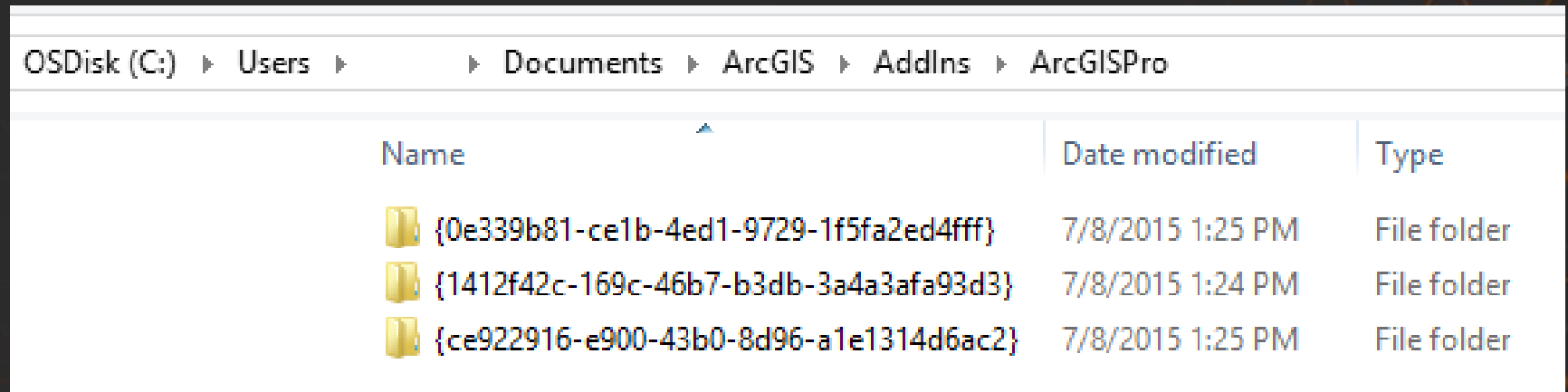
What is the ArcGIS Pro SDK for .NET? (Continued)

- .NET APIs exposed by the Pro Extensions (Installed as part of *Pro*)
- Modern API
 - Native .NET
 - UI is WPF and XAML



.NET Add-ins for extending Pro

- Declarative framework for creating a collection of customizations
- Conveniently packaged within a single compressed file (.esriAddInX)
- Easy to share between users
- Installs to a well known folder location
- Consists of
 - A module
 - An xml Configuration file (Config.daml)
 - and code files



The screenshot shows a Windows File Explorer window with the following path: OSDisk (C:) > Users > Documents > ArcGIS > AddIns > ArcGISPro. The main content area displays a table of folders.

Name	Date modified	Type
{0e339b81-ce1b-4ed1-9729-1f5fa2ed4fff}	7/8/2015 1:25 PM	File folder
{1412f42c-169c-46b7-b3db-3a4a3afa93d3}	7/8/2015 1:24 PM	File folder
{ce922916-e900-43b0-8d96-a1e1314d6ac2}	7/8/2015 1:25 PM	File folder

NET Add-ins for extending Pro (continued)

- **.NET Add-ins for extending Pro use the following:**
 - **64-bit platform**
 - **WPF with .NET 4.5 and newer**
 - MVVM pattern (Model View ViewModel)**
 - **Asynchronous Patterns: Multiple threads**
 - **ArcGIS Pro API – which comes with Pro out-of-box**

DAML Demo: create my first add-in

The background features a dark blue-grey color with a subtle grid of orange triangles. Several orange arrows are scattered across the page, pointing in various directions (up, down, left, right).

Add-in Fundamentals, Development Patterns

- **Asynchronous Programming**

- ArcGIS Pro differs markedly from existing ArcGIS Desktop applications in that it is multithreaded
- Pro framework's custom Task scheduler is used run synchronous ArcGIS Pro SDK methods in the background
- ArcGIS Pro incorporates the latest asynchronous language features from Microsoft along with a threading infrastructure tailored to reduce complexity

Three Categories of Methods in ArcGIS Pro API

- Coarse-grained asynchronous methods that can be called on any thread
- Finer grained synchronous methods that must be called within a `QueuedTask`
 - Non-API “.NET” methods can be called on System threads as you wish
- Synchronous methods that must be called on the GUI thread only
 - These types of methods are usually associated with WPF and UI updates

Coarse Grained Methods

- **Can be called from any thread. Typically invoked from the UI thread**
 - They execute in the background on Pro internal threads
 - Use `async/await` semantic
 - Aggregation of these methods into larger coarse grained `async` methods is not encouraged

```
//Adding a Geodatabase:  
string gdbPath = "@C:\\myDataFolder\\myData.gdb";  
var newlyAddedGDB = await Project.Current.AddAsync(ItemFactory.Create(gdbPath));  
  
//Execute a GP Tool  
await Geoprocessing.ExecuteToolAsync("SelectLayerByAttribute_management",  
    new string[] {"parcels", "NEW_SELECTION", "description = 'VACANT LAND'"});  
await MapView.Active.ZoomToSelectedAsync(new TimeSpan(0, 0, 3));
```

Fine Grained, Synchronous Methods

Must be called within a QueuedTask

- A much greater number of fine grained methods and classes
- No async/await. Runs on the “Main CIM Thread”
- Designed for aggregation into your own coarse-grained async methods

```
await ArcGIS.Desktop.Framework.Threading.Tasks.QueuedTask.Run(() =>
{
    var layers =
MapView.Active.Map.FindLayers("Parcels").OfType<FeatureLayer>().ToList();
    var parcels = layers[0] as FeatureLayer;
    QueryFilter qf = new QueryFilter()
    {
        WhereClause = "description = 'VACANT LAND'",
        SubFields = "*"
    };
    parcels.Select(qf, SelectionCombinationMethod.New);
});
```

ArcGIS Pro SDK for .NET Resources

- Accessible from <https://pro.arcgis.com/en/pro-app/>
- All ArcGIS Pro SDK Developer Resources hosted on GitHub under the Esri organization:
- <https://github.com/Esri/arcgis-pro-sdk> ...
- Repositories available with ArcGIS Pro 1.1:
 - arcgis-pro-sdk
 - ProConcepts, ProSamples, ProGuides, ProTutorial, ProSnippets
 - arcgis-pro-sdk-community-samples
 - Accept pull requests from the user community.
- Online API Reference

ArcGIS Pro SDK for .NET Sessions

Wed 11 Nov 10:15 - 11:15 A 03/04

ArcGIS Pro SDK for .NET: Programming Patterns

Technical Workshop | Desktop & Pro

Wed 11 Nov 13:45 - 14:45 B 07/08

ArcGIS Pro SDK for .NET: 2D and 3D, Tool Design, and MVVM

Technical Workshop | Desktop & Pro

Thu 12 Nov 13:45 - 14:45 B 05

ArcGIS Pro SDK for .NET: Editing and Geodatabase Integration

Technical Workshop | Desktop & Pro



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Understanding our world.