Building Custom Adapters

2012 User's Forum Tutorial

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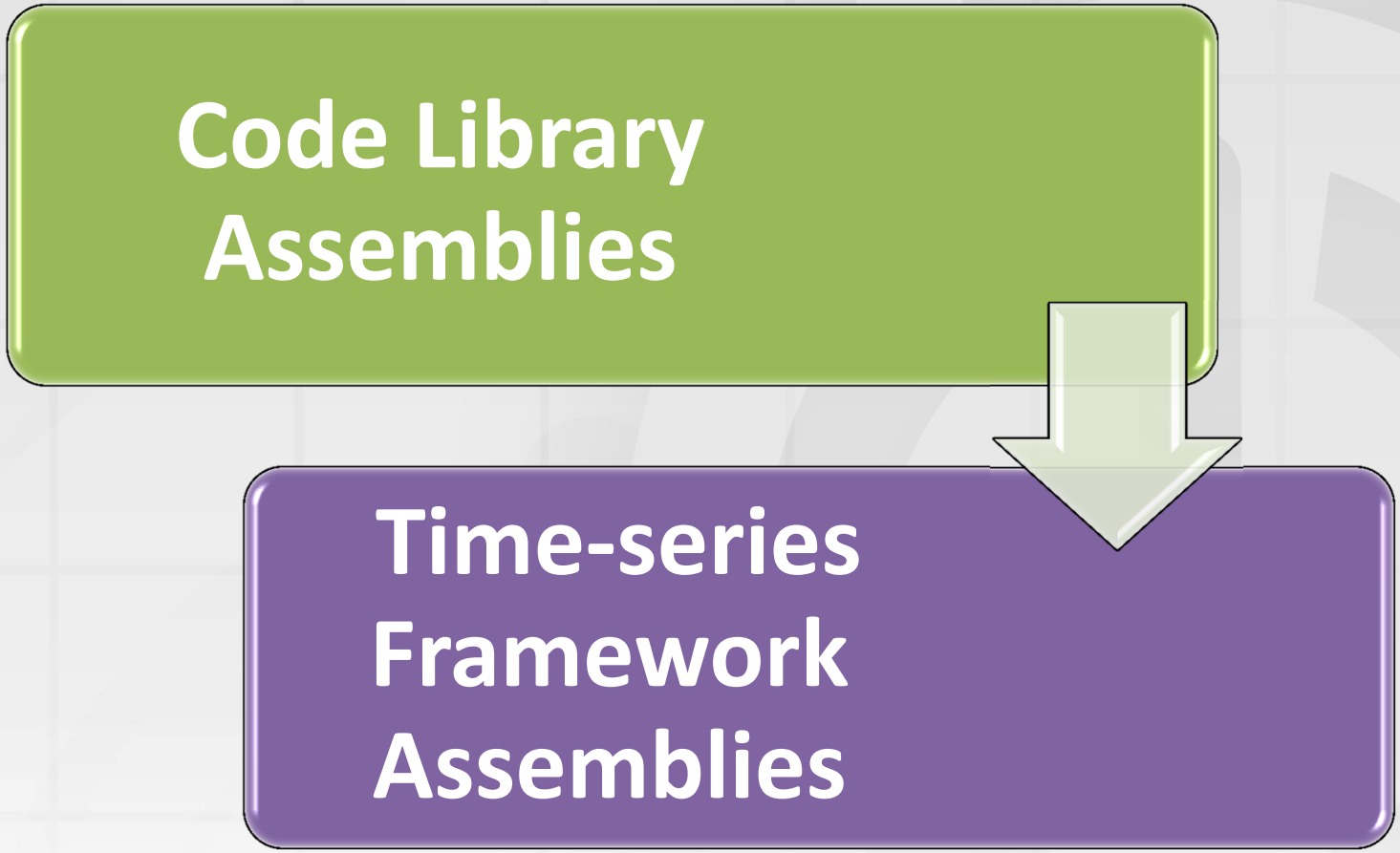
Reference Libraries



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Code Library Components

- Configuration API for easy and secure access to application settings.
- High speed binary parsing framework for implementing protocol parsing.
- High speed communications framework for socket (TCP, UDP) and serial communication.
- Security framework for implementing role-based security in ASP.NET, WCF, WPF, Windows Forms and Windows Services.

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Time-series Framework Components

- Adapter base class framework
- Concentration engine
- Statistics engine
- Alarming engine
- Publish / subscribe measurement data transport
- Hosting architecture (base Windows service and remote console implementations)

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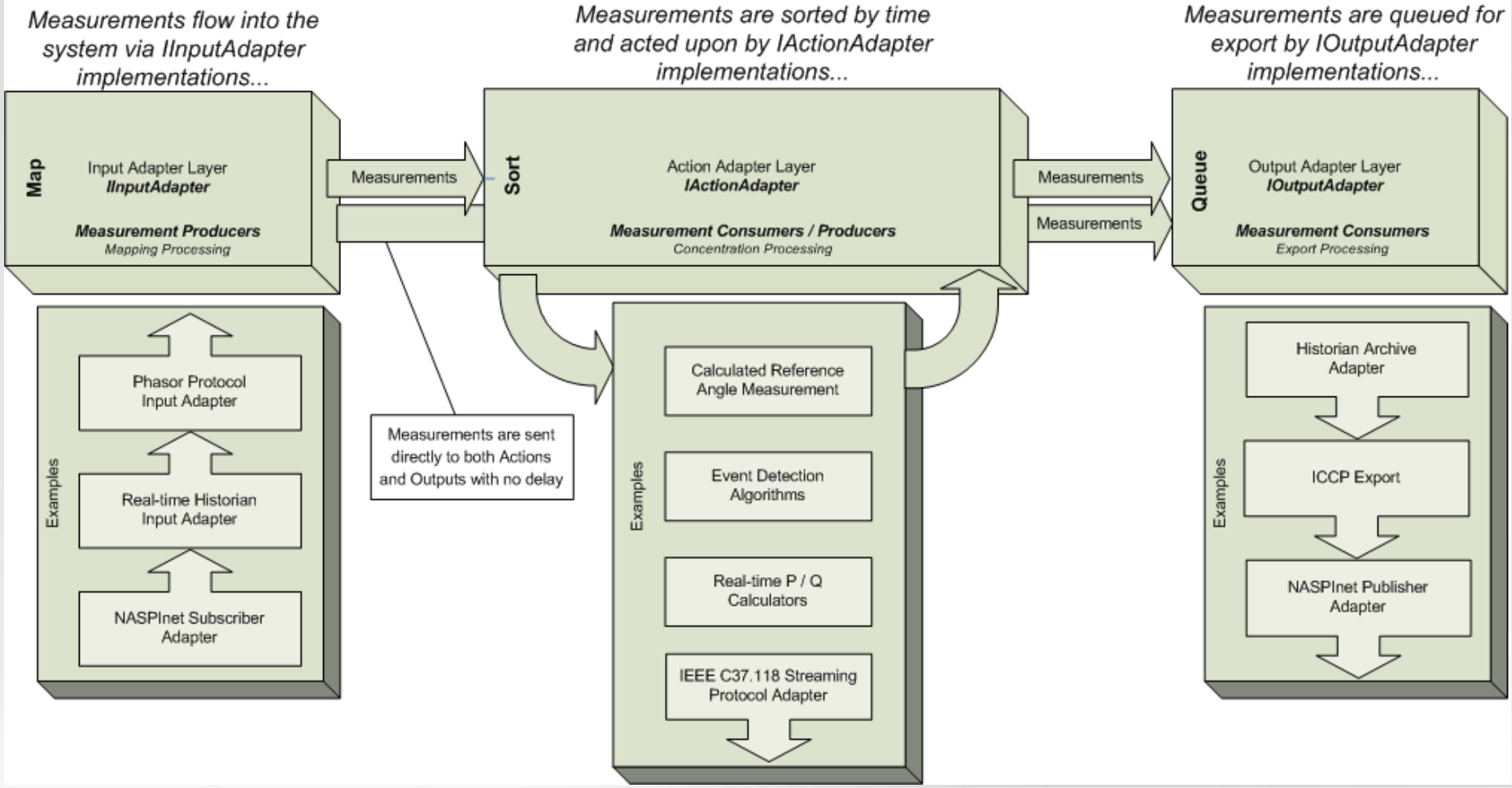
Input/Action/Output Interface Adapter Layer

TimeSeriesFramework.Adapters



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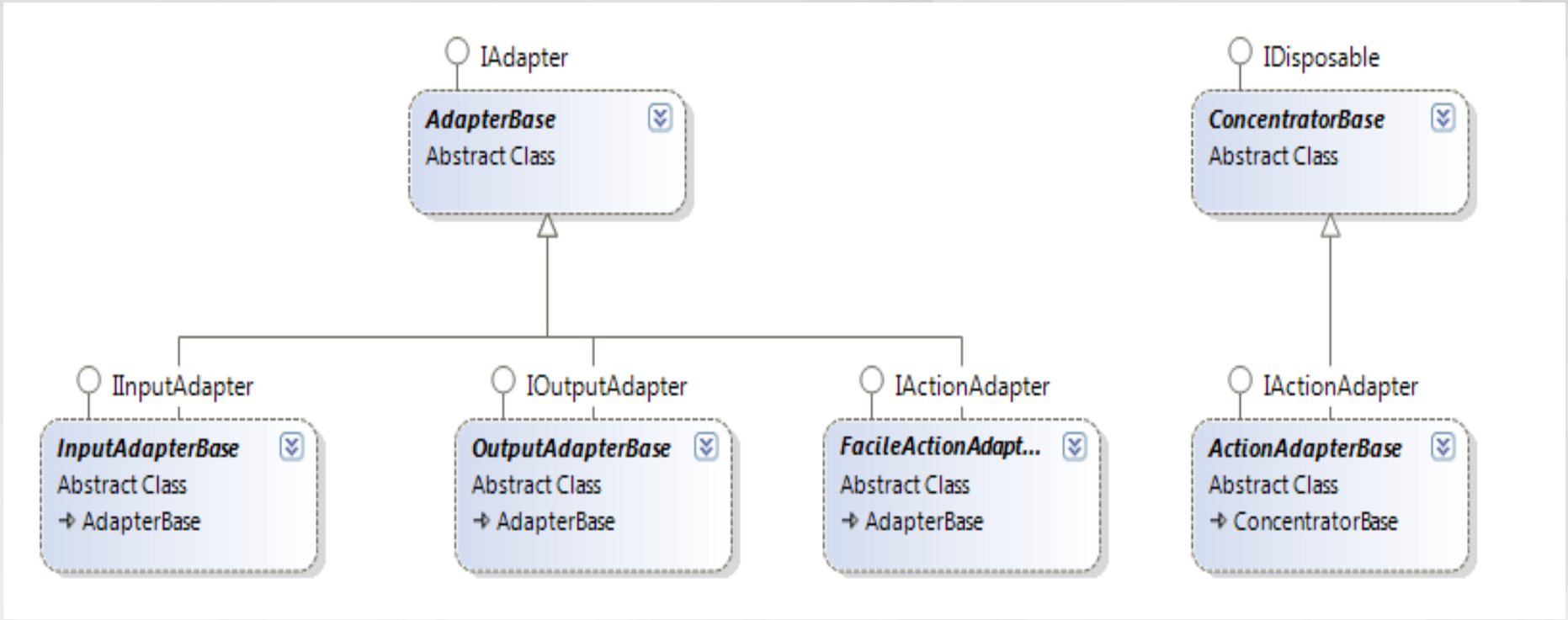
Base Class Relationships



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InputAdapterBase Overrides

Purpose:
MAP

- **SupportsTemporalProcessing**
- **UseAsyncConnect**
- **Initialize**
- **GetShortStatus**
- **AttemptConnection**
- **AttemptDisconnection**

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Common Adapter Override Definitions

- **SupportsTemporalProcessing**
  - Gets the flag indicating if adapter supports temporal processing.
- **UseAsyncConnect**
  - Gets flag that determines if the adapter will be using a connection that is asynchronous (i.e., on another thread).
- **Initialize**
  - Initializes the adapter
- **GetShortStatus**
  - Gets a short one-line status of the adapter.
- **AttemptConnection**
  - Attempts to connect to adapters source or sync.
- **AttemptDisconnection**
  - Attempts to disconnect from adapter source or sync.

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Example Input Adapter Code

```
namespace TestingAdapters
{
    /// <summary>
    /// Represents a virtual input adapter used for testing purposes - no data gets produced.
    /// </summary>
    [Description("Virtual: defines a testing input that does not provide measurements.")]
    [EditorBrowsable(EditorBrowsableState.Advanced)] // Normally defined as an input device protocol
    public class VirtualInputAdapter : InputAdapterBase
    {
        #region [ Properties ]

        /// <summary>
        /// Gets flag that determines if this <see cref="VirtualInputAdapter"/> uses an asynchronous connection.
        /// </summary>
        protected override bool UseAsyncConnect
        {
            get
            {
                return false;
            }
        }

        /// <summary>
        /// Gets the flag indicating if this adapter supports temporal processing.
        /// </summary>
        public override bool SupportsTemporalProcessing
        {
            get
            {
                return false;
            }
        }
```


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OutputAdapterBase Overrides

Purpose:
QUEUE

- **OutputIsForArchive**
- **SupportsTemporalProcessing**
- **UseAsyncConnect**
- **Initialize**
- **GetShortStatus**
- **AttemptConnection**
- **AttemptDisconnection**
- **ProcessMeasurements**

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Unique Output Override Definitions

- **OutputIsForArchive**
  - Gets the flag that determines if measurements sent to the OutputAdapterBase implementation are destined for archival – if so system will track total output statistics for this adapter.
- **ProcessMeasurements**
  - Serializes measurements to data output stream. For example, this method would be used to "archive" measurements when output adapter implementation is for a historian.

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Example Output Adapter Code

```
namespace TestingAdapters
{
    /// <summary>
    /// Represents a virtual historian output adapter used for testing purposes - no data gets archived.
    /// </summary>
    [Description("Virtual: defines a testing output that does not archive measurements.")]
    public class VirtualOutputAdapter : OutputAdapterBase
    {
        #region [ Properties ]

        /// <summary>
        /// Returns a flag that determines if measurements sent to this <see cref="VirtualOutputAdapter"/> are
        /// destined for archival.
        /// </summary>
        public override bool OutputIsForArchive
        {
            get
            {
                return true;
            }
        }

        /// <summary>
        /// Gets flag that determines if this <see cref="VirtualOutputAdapter"/> uses an asynchronous connection.
        /// </summary>
        protected override bool UseAsyncConnect
        {
            get
            {
                return false;
            }
        }
```


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ActionAdapterBase Overrides

Purpose:
SORT

- **SupportsTemporalProcessing**
- **Initialize**
- **GetShortStatus**
- **PublishFrame**

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Unique Action Override Definitions

- **PublishFrame**
  - Publishes a time-aligned collection of measurement values (i.e., a “frame” of data) that arrived within the action adapter’s defined “LagTime”. The adapter LagTime is the allowed past time deviation tolerance, in seconds (can be subsecond) that defines the time sensitivity to past measurement timestamps. This becomes the maximum amount of delay introduced by the concentrator to allow time for data to flow into the system.

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Example Action Adapter Code

```
namespace FrequencyAverager
{
    /// <summary>
    /// Represents an adapter that calculates the average
    /// of the input frequencies over each full second.
    /// </summary>
    [Description("FrequencyAverager: averages frequencies over one second intervals")]
    public class FrequencyAverager : ActionAdapterBase
    {
        [ Members ]

        #region [ Properties ]

        /// <summary>
        /// Gets a flag indicating whether this adapter supports temporal processing.
        /// </summary>
        public override bool SupportsTemporalProcessing
        {
            get
            {
                return m_supportsTemporalProcessing;
            }
        }

        #endregion

        #region [ Methods ]

        /// <summary>
        /// Initializes this <see cref="FrequencyAverager"/>.
        /// </summary>
        public override void Initialize()
```


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Defining the "Inputs & Outputs"

- **Measurement Keys:**
  - PPA:12; PPA:15; STAT:21
- **Guids:**
  - E5E4EE01-B3D2-4FC3-B39C-03478F0BA2B9; 5BE1FB5A-412F-4338-9BC8-08BB701221BB
- **Point Tags:**
  - TVA_SHELBY:ABBF; TVA_SHELBY-CORD:ABBI
- **Filter Expression:**
  - FILTER *ActiveMeasurements* WHERE *SignalType* = 'FREQ'

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Live Demos

- *Creating an a new action adapter*
  - Build new action adapter
  - Deploy new assembly
  - Configure new adapter
- *Create a new screen for adapter*
  - Build new WPF screen
  - Deploy new assembly
  - Add screen to Menu.xml
- *Add custom adapter statistics*

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