



# PxPlus .NET Interface

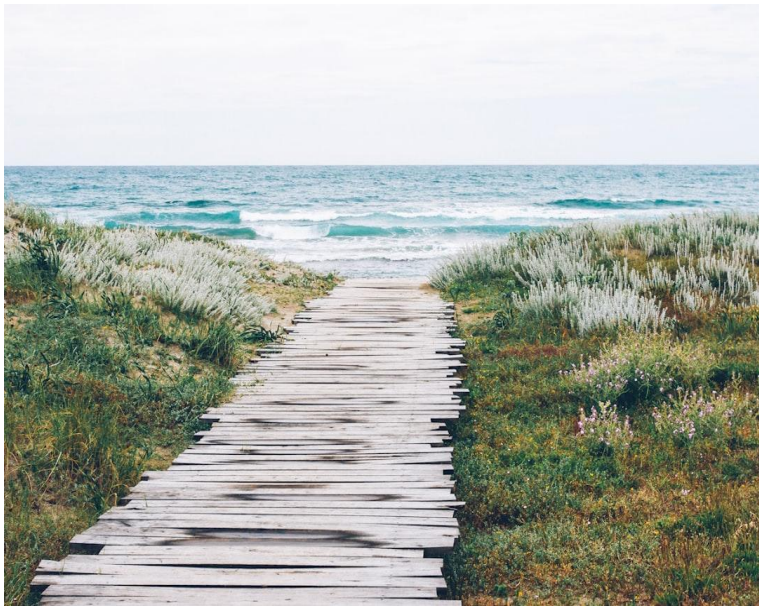
DireXions 2025 –Pathways to Progress



# Agenda

- What is .NET
- PxPlus .NET Interface
  - Create a .NET Control
  - Working with .NET Objects
  - Handling .NET Events
- Examples





# Introduction

Our goal is to introduce you to the power of .NET and show how you can use the new PxPlus .NET interface to leverage it in your applications

# What is .NET?



- A free and open-source modern application platform that is widely used throughout the industry
- It includes a built-in rich set of libraries covering UI components, networking, machine learning and more; over 300,000 libraries to extend functionality
- A vast catalog of sophisticated, ready-made UI components
  - Modern grids and list views that virtualize large datasets and support grouping, sorting and editing
  - Charts, diagrams and 3D visualizations
  - Specialized controls such as property grids, map displays and 3D model viewers
- A huge catalog of useful, ready-made components that extend beyond UI
  - Cryptography, XML/JSON parsing, database access, file I/O, and networking

# PxPlus .NET Interface

## Introduction

- Added in PxPlus 2025 to create a fast pathway between PxPlus and the .NET ecosystem
- Works under Windows and WindX
- Requires .NET Windows Desktop Runtime 8
  - If using 64-bit PxPlus, you must have the x64 Runtime installed
  - If using 32-bit PxPlus, you must have the x86 Runtime installed
- Access thousands of robust .NET libraries directly from within PxPlus
  - WinForms UI controls
  - Non-UI objects
- Significantly faster than COM



# PxPlus .NET Interface

## Introduction

- Two ways are available to define and interact with a .NET object
  - NOMADS panel
  - PxPlus program

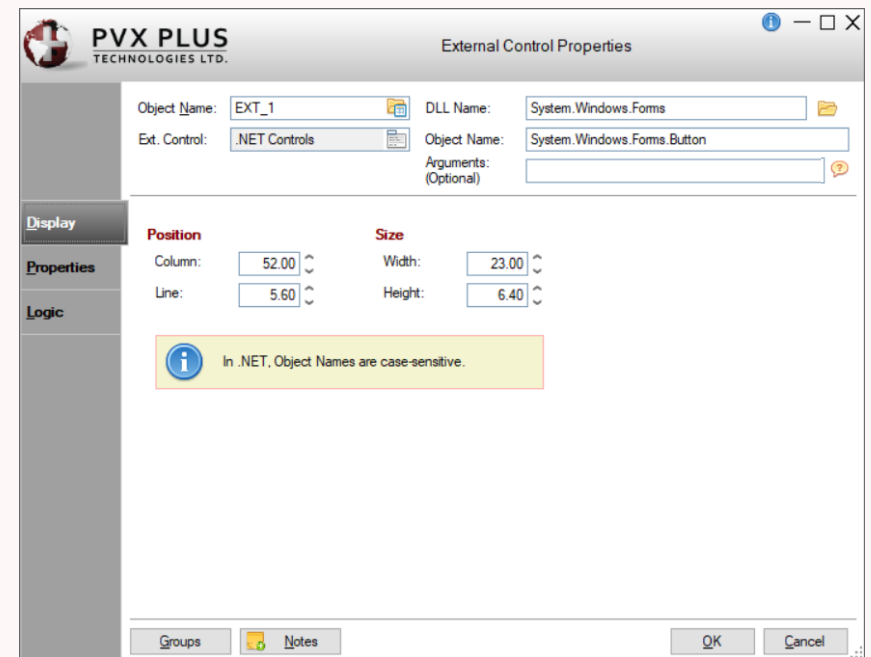
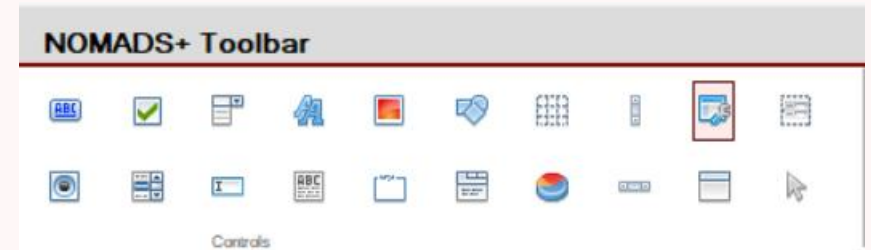




# PxPlus .NET Interface

## Create a .NET Control from NOMADS

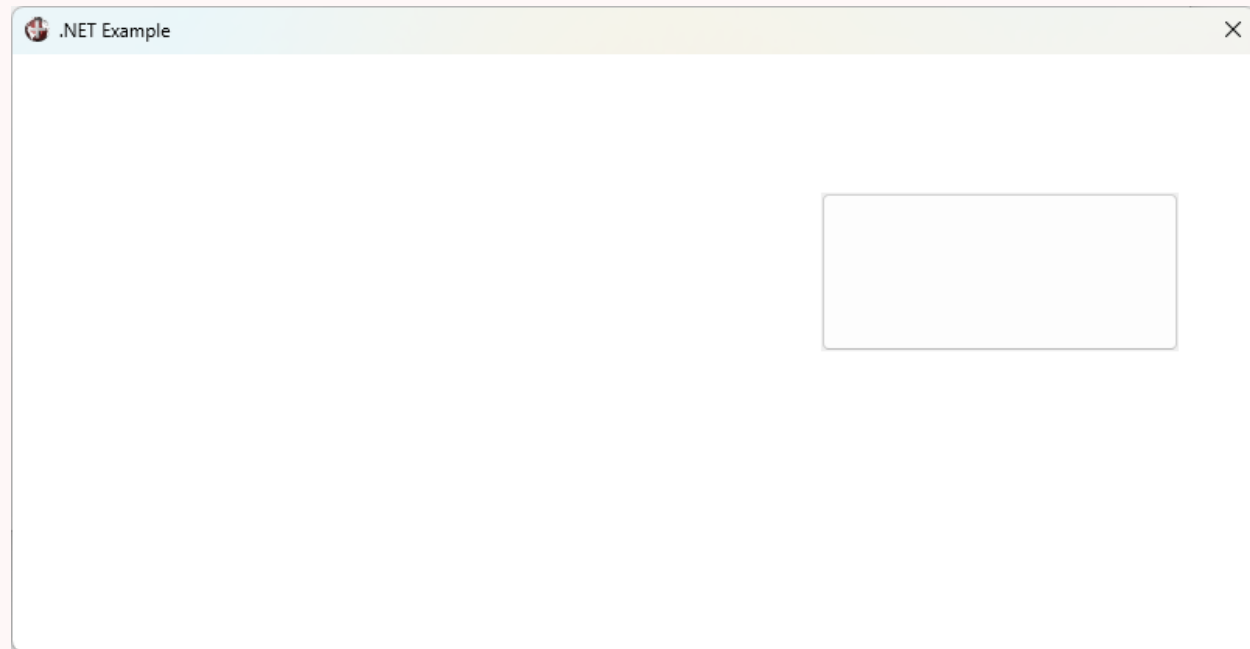
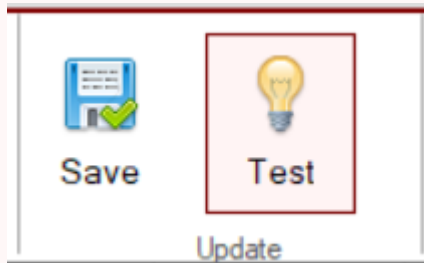
- Select the External Control tool, draw a rectangle and choose .NET Controls from the Ext. Control query
- Fill in the DLL Name input field with either the path of the .NET DLL or the name of the .NET system DLL in the Global Assembly Cache (GAC)
- Fill in the Object Name field with the namespace and object name of the .NET object to load
  - This is case sensitive, as .NET objects are case sensitive
- Optionally pass in arguments via the Arguments field
  - Comma separate multiple arguments; literal strings should be quoted
- Click Ok



# PxPlus .NET Interface

## Create a .NET Control from NOMADS

- From Nomads+ Toolbar press the Test button to see the empty .NET button





# PxPlus .NET Interface

## Create a .NET Control from PxPlus Program

- The **DEF OBJECT** directive is used to create a new instance of a .NET control
  - `DEF OBJECT ext_id, [@(col,ln,wth,ht),] objDef$[, arg_1[$], arg_2[$], ..., arg_n[$]]`
    - *ext\_id* is a numeric variable to receive a handle to the .NET object
    - Can be a graphical (visible) control `@()` included or a data (invisible) control `@()` not included
    - *objDef\$* is a string of the format "`[.NET]DLLName,ObjectName`"
      - *DLLName* is either the path of the .NET DLL or the name of the .NET system DLL in the Global Assembly Cache (GAC)
      - *ObjectName* is the namespace and object name of the .NET object to load
        - This is case sensitive, as .NET objects are case sensitive
      - If using WindX, you can prefix `[WDX]` or `[LCL]` in front of the `[.NET]`
    - *arg\_1[\$]-arg\_n[\$]* are optional numeric or string variables/literals that can be passed to the .NET object on creation

# PxPlus .NET Interface



## Create a .NET Control from PxPlus Program

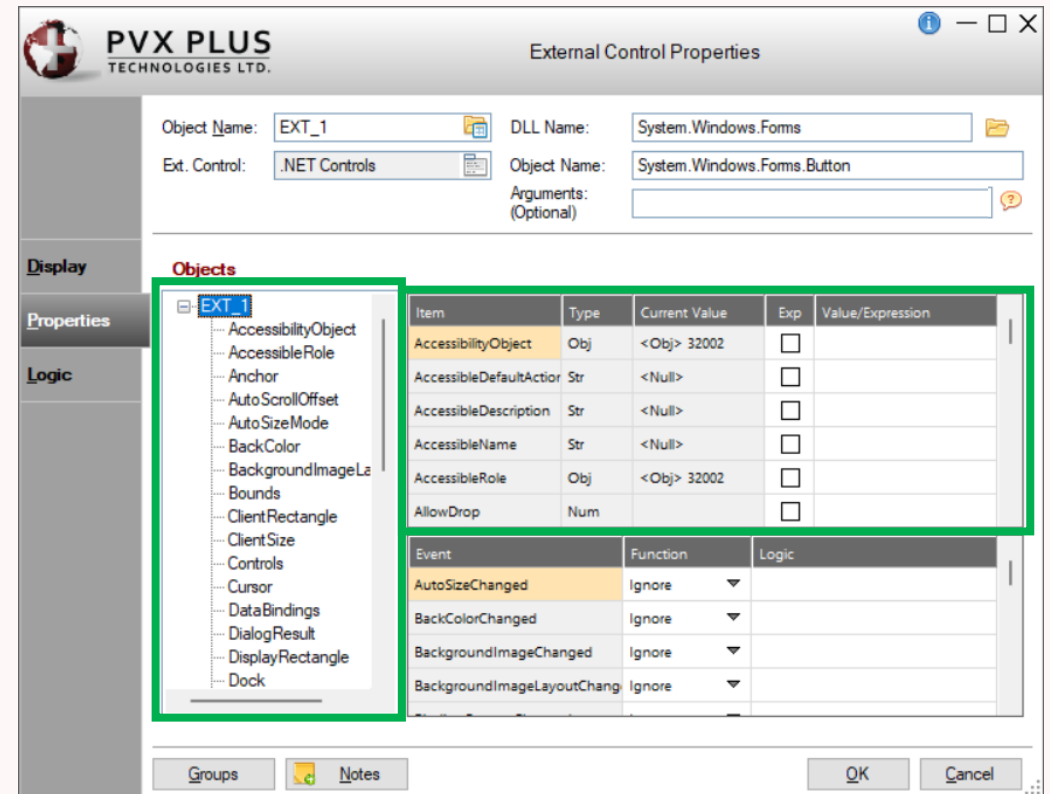
### Example: Create a Button

```
DLLName$="System.Windows.Forms"  
ObjName$="System.Windows.Forms.Button"  
def object net_button,@(20,20,18,2.8),"[LCL][.NET]" + DLLName$ + ", "+ObjName$
```

# PxPlus .NET Interface

## Working with .NET Objects

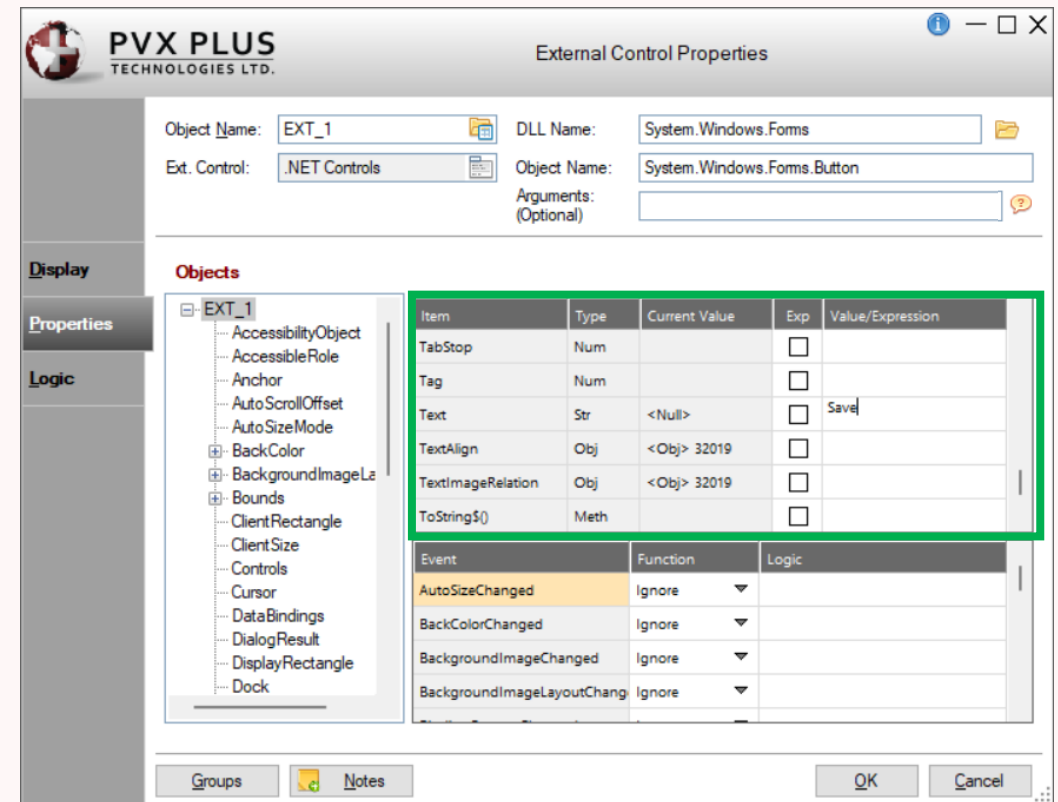
- Set .NET object properties via the Properties tab within the **External Control Properties** dialog in NOMADS
- The Objects tree view will be populated with all sub-objects defined by the .NET object
- All properties and methods defined by the .NET object or currently selected sub-object will be populated in the top grid



# PxPlus .NET Interface

## Working with .NET Objects

- **Item:** Contains the property or method name
- **Type:** Contains the type; i.e. Num, Str, Meth, Obj
- **Current Value:** Contains the current value for an item
- **Value/Expression:** Accepts either an expression or a value, depending on the **Exp** check box selection
  - Assigns a value to the property
    - For object properties, pass in the PvxHandle\$ extended property
  - Invokes a method if it accepts a string value as a single argument

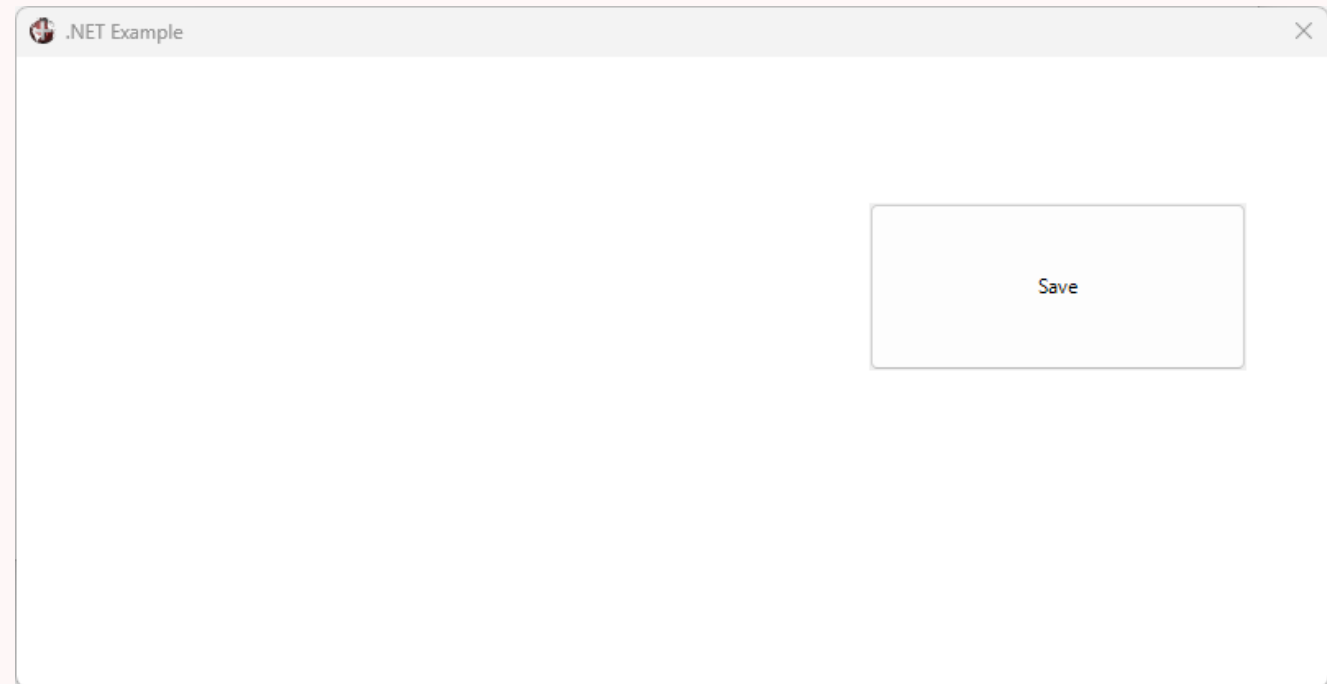
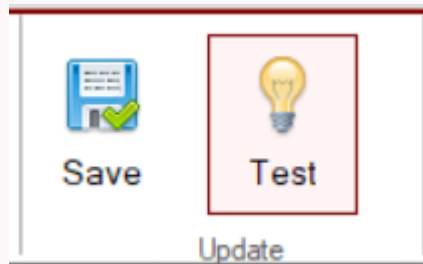




# PxPlus .NET Interface

## Working with .NET Objects

- From Nomads+ Toolbar press the Test button to see the .NET button with text



# PxPlus .NET Interface

## Working with .NET Objects

- Code that uses the .NET object properties and methods can be within a program or attached to NOMADS panel/control events; i.e. Pre-Display, Post-Display, and On Click
  - This code can define .NET objects that may be needed for setup and processing; e.g. it can define a color object that can be used to set the color of a control



# PxPlus .NET Interface

Save

## Working with .NET Objects

- Once you define a .NET object, you can use it like any PxPlus object through properties and methods
- You can list the properties and methods via:
  - `print ext_id'`
- Access properties and methods using the ' (apostrophe operator):
  - `ext_id'prop$="foxtrot"`  
`ext_id'doMethod$()`
  - Properties are methods that are case insensitive by default
    - Set `PvxCaseSensitive` property to 1 to force case sensitivity

### Example:

```
net_button'text$="Save"
```

# PxPlus .NET Interface

## Working with .NET Objects

- Properties and methods with the same name as PxPlus system variables or functions, such as DAY or LOG( ), can be accessed by prefixing them with NotPvx\_
  - `ext_id'NotPvx_Day=12`
- Error messages are returned via MSG( -1)
- Drop/Delete any .NET objects once they are no longer needed to free up resources (ctls/memory)
  - `drop object ext_id`
  - `delete object ext_id`

Save the handle/ctl of a .NET object returned from a property or method, or created only for passing to another object, so that you can drop it when it's no longer needed



# PxPlus .NET Interface

## Working with .NET Objects

PxPlus extends .NET objects with several special properties to control case sensitivity, positioning, sizing, event lists and object handles. These are very useful when fine-tuning the layout or retrieving internal handles for advanced operations

Property	Description
PvxCaseSensitive	Sets case sensitivity for member names (0 = case insensitive, 1 = case sensitive)
PvxCol / PvxLine	Specify the column and row position (starting at 0) of the control within its container
PvxCols / PvxLines	Define the control's width in columns and height in lines
PvxLeft / PvxTop	Pixel-based X and Y coordinates for precise placement
PvxWidth / PvxHeight	Pixel width and height of the control
PvxEvents[\$]	Returns an event handler object or a list of subscribed events
PvxForm / PvxHandle\$	Provide access to the underlying form object and handle respectively

# PxPlus .NET Interface

## Working with .NET Objects

- Everything in .NET is an object, even numbers and strings
- When working with a .NET object, PxPlus will automatically convert to/from .NET object type:
  - A PxPlus number to/from a .NET Int16, UInt16, Int32, UInt32, Int64, UInt64, or Double object
  - A PxPlus string to/from a .NET String, Char, Char[], Byte, Byte[], SByte, or SByte[] object
  - A PxPlus 0 or 1 to/from a .NET Boolean object

# PxPlus .NET Interface

## Working with .NET Objects

- Other .NET types are not converted
  - Use a .NET object handle (PvxHandle\$) when assigning or passing in a .NET object to a .NET object constructor, property or method
    - For assignment, the property name on the left side must end in \$ to allow assignment via PvxHandle\$
    - `def object font,"[.NET]System.Drawing,System.Drawing.Font","Verdana",12,fontStyle'PvxHandle$`
    - `dotNetObjA'AddObj(dotNetObjB'PvxHandle$)`
    - `dotNetObjA'ChildObj$ = dotNetObjB'PvxHandle$`
  - Returned a handle/ctl to the .NET object, which can then be used the same as the originally created .NET object
    - `myObj=ext_id'ObjProp`  
`myObj'method()`

# PxPlus .NET Interface

Save

## Working with .NET Objects

Example:

```
def object color, "[.NET]System.Drawing, System.Drawing.Color"  
  lemonChiffon=color'LemonChiffon  
  net_button'BackColor$=lemonChiffon'PvxHandle$  
drop object lemonChiffon  
drop object color
```



# PxPlus .NET Interface

## Working with .NET Objects

- In .NET, enumerator objects are common
  - Enumerators allow you to have a pre-set list of named values that a property can be set to
  - Flag enumerators allow a combination of these values to be set
- The .NET enumerator object will have properties for each of the named values
  - These properties return their own enumerator object set to that named value
- The `value__` (underscore underscore) property allows getting/setting an enumerator's value directly
  - In PxPlus, to create a flag enumerator with multiple flags set, set this property to the sum of the set flags `value__` properties
- The `ToString()` method will return the current value's name

# PxPlus .NET Interface

Save

## Working with .NET Objects

Example:

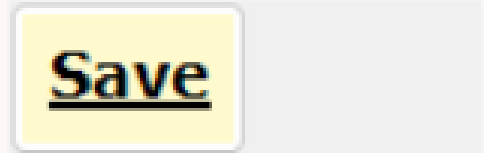
```
def object fontStyle, "[.NET]System.Drawing, System.Drawing.FontStyle"
print fontStyle'*
Bold, CompareTo(), Equals(), GetHashCode(), GetType(), GetTypeCode(), HasFlag(), Italic, PvxCaseSensitive, PvxCol,
PvxCols, PvxEvents, PvxEvents$, PvxForm, PvxHandle$, PvxHeight, PvxLeft, PvxLine, PvxLines, PvxTop, PvxWidth, Regular,
Strikeout, ToString$(), Underline, value__,
fontStyle'value__=fontStyle'Bold'value__+fontStyle'Underline'value__
print fontStyle'ToString$()
Bold, Underline
def object font, "[.NET]System.Drawing, System.Drawing.Font", "Verdana", 12, fontStyle'PvxHandle$
net_button'Font$=font'PvxHandle$
drop object fontStyle
```

# PxPlus .NET Interface

## Working with .NET Objects

- In .NET, some objects are value type objects where each time you return the object, it will be a unique object
- In this case, you cannot just access that value type object's properties or methods to change it and have the parent object changed
- You must get a handle to a value type object, modify it, and then set the parent object property to the modified value type object
- For example, enumerators are value type objects
- You want to drop/delete these objects when finished with them

# PxPlus .NET Interface



## Working with .NET Objects

Example:

```
! net_button'Size'Width=64 won't change the width since Size property is a value type
buttonSize=net_button'Size
buttonSize'Width=64
net_button'Size$=buttonSize'PvxHandle$
drop object buttonSize
```



# PxPlus .NET Interface

A yellow rectangular button with a thin grey border. The word "Save" is written in a bold, black, serif font and is underlined.

## Working with .NET Objects

- .NET controls are drawn in a System.Windows.Forms object
- You can control aspects of the form, such as size and background color, by using the PvxForm property

### Example:

```
formSize=net_button'PvxForm'Size  
formSize'Width=64  
net_button'PvxForm'Size$=formSize'PvxHandle$  
drop object formSize
```

# PxPlus .NET Interface

## Working with .NET Objects

- Non-value type objects will return the same object each time they are accessed
- You can access a non-value type object's properties and methods to change the behavior of the parent object
- PxPlus will use the same ctl value each time you access these types of objects
- You generally do not drop/delete these objects, as they are part of the parent object

### Example:

```
def object dataTable, "[.NET]System.Data.Common, System.Data.DataTable"  
nameCol=dataTable.Columns.Add("Name")
```

# PxPlus .NET Interface

## Working with .NET Objects

- Static .NET classes are supported as well
- A static class is a class with only static members, which can be used to get constant values and perform operations on passed-in values but does not store any data
- You do a DEF OBJECT on it the same as you would a .NET object and work with it in the same way

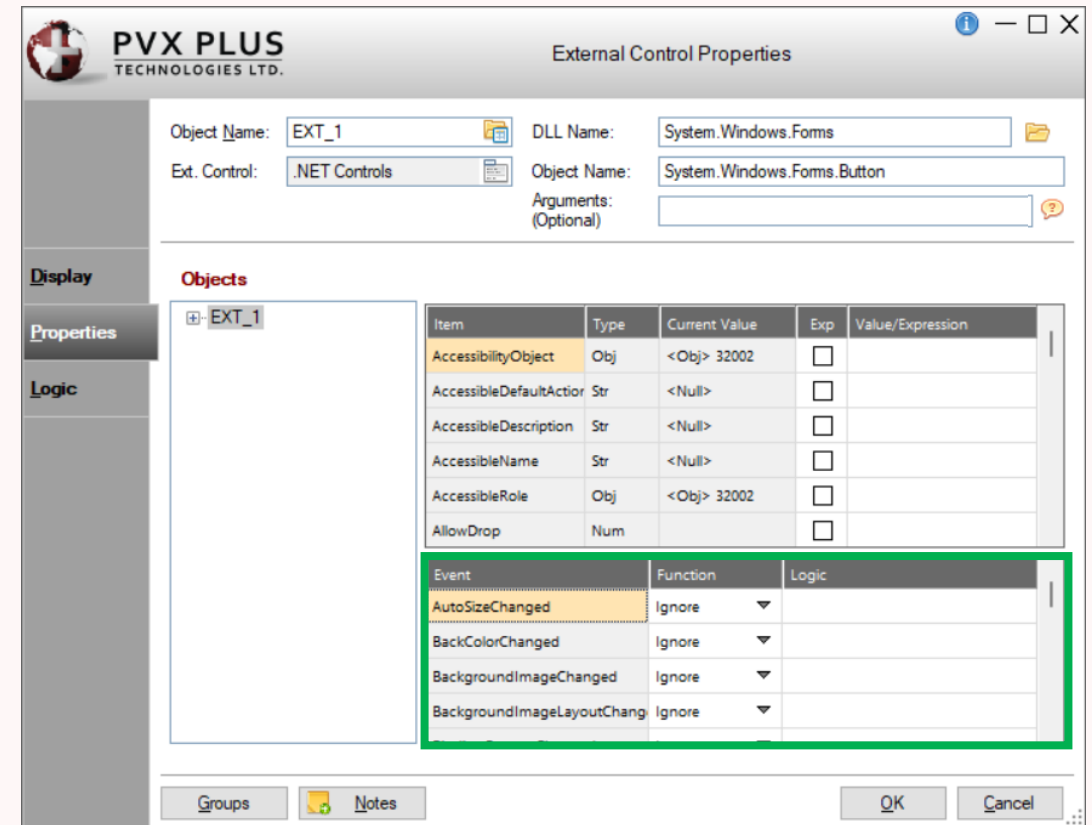
### Example:

```
def object mathObj, "[.NET]mscorlib,System.Math"  
print mathObj'PI  
3.141592653589793  
print mathObj'ACos(0.42)  
1.1373510067250105
```

# PxPlus .NET Interface

## Handling .NET Events

- Program what happens for .NET events via the Properties tab within the **External Control Properties** dialog in NOMADS
- All events defined by the .NET object will be populated in the Events grid
- Events handled here do not support event arguments



# PxPlus .NET Interface

## Handling .NET Events

- Event field is the name of the event
- Function field can be
  - Ignore: No event occurs
  - Link: Invoke a panel
  - Perform: Perform a program with optional label entry point
  - Call: Call a sub-program with optional label entry point
  - Execute: Run PxPlus commands separated by semi-colons
- Logic field is the logic/program that will run when the event is triggered

**PVX PLUS TECHNOLOGIES LTD.** External Control Properties

Object Name:  DLL Name:

Ext. Control:  Object Name:

Arguments: (Optional)

**Objects**

Item	Type	Current Value	Exp	Value/Expression
AccessibilityObject	Obj	<Obj> 32002	<input type="checkbox"/>	
AccessibleDefaultAction	Str	<Null>	<input type="checkbox"/>	
AccessibleDescription	Str	<Null>	<input type="checkbox"/>	
AccessibleName	Str	<Null>	<input type="checkbox"/>	
AccessibleRole	Obj	<Obj> 32002	<input type="checkbox"/>	
AllowDrop	Num		<input type="checkbox"/>	

**Event**

Event	Function	Logic
ChangeUICues	Ignore	
Click	Execute	msgbox "Button Clicked!"
ClientSizeChanged	Ignore	
CommandCanExecuteChanged	Ignore	

Groups Notes OK Cancel

# PxPlus .NET Interface

## Handling .NET Events

- .NET event handling via CTL events
  - Subscribe to .NET event via CTL Event: `ON EVENT evtname$ FROM ext_id PREINPUT ctl_id`
  - Unsubscribe to .NET event via CTL Event: `ON EVENT evtname$ FROM ext_id REMOVE`
- Event arguments are supported only when handling events via a class

### Example:

```
clickCtl=42
on event "Click" from net_button preinput clickCtl
setctl clickCtl:Click
...
Click:
msgbox "Button Clicked!","Event Handled"; return
```

# PxPlus .NET Interface

## Handling .NET Events

- .NET event handling via PxPlus object
  - Register an event handling object: `ON EVENT FROM ext_id PROCESS obj_id`
  - Unregister an event handling object: `ON EVENT FROM ext_id PROCESS 0`
- Registers a numeric object identifier (`obj_id`) to service a given .NET control (`ext_id`)
  - The registered object would define methods for each event to subscribe to
- The object identifier is stored in a read-only property of the .NET object called `PvxEvents`
- A comma-separated list of the events that are supported by the .NET object is available by querying `PvxEvents$`
  - Subscribed events are prefixed with a + (plus sign) while unsubscribed events are prefixed with a - (minus sign)
  - Only available after an object has been registered



# PxPlus .NET Interface

## Handling .NET Events

- All .NET events have two arguments, sender and evtArgs, where sender is the .NET object that triggered the event while evtArgs is a .NET object that contains additional event arguments, if needed
- What these are exactly will depend on the .NET object, and you can use the .NET objects documentation to find out details about specific events, evtArgs
- Our Button example does not have a good event that shows off the event arguments in a useful way so we will use the DateSelected event of the .NET MonthCalendar
  - sender for this event will be the MonthCalendar .NET object
  - evtArgs for this event will be a DateRangeEventArgs .NET object
    - Start: A DateTime .NET object representing the start date in the calendar selection
    - End: A DateTime .NET object representing the end date in the calendar selection

# PxPlus .NET Interface

## Handling .NET Events

CalSelection.pvc:

```
def class "CalSelection"  
function dateselectd(sender,evtArgs)DateSelected for event "DateSelected"  
end def  
DateSelected:  
enter sender,evtArgs  
fd$=evtArgs'Start'toString$("dd MMM yyyy")  
td$=evtArgs'End'toString$("dd MMM yyyy")  
msgbox "From Date: "+fd$+sep+"To Date: "+td$,"Date Range Selection"  
nxtMnt=evtArgs'End'AddMonths(1); sender'SetDate(nxtMnt'pvxHandle$)  
return
```

Example:

```
DateSelected=new("CalSelection")  
on event from net_calendar process DateSelected
```





**The way to  
get started  
is to quit  
talking and  
begin doing.**

**Examples**

Pathways to Progress



# DevExpress® Examples

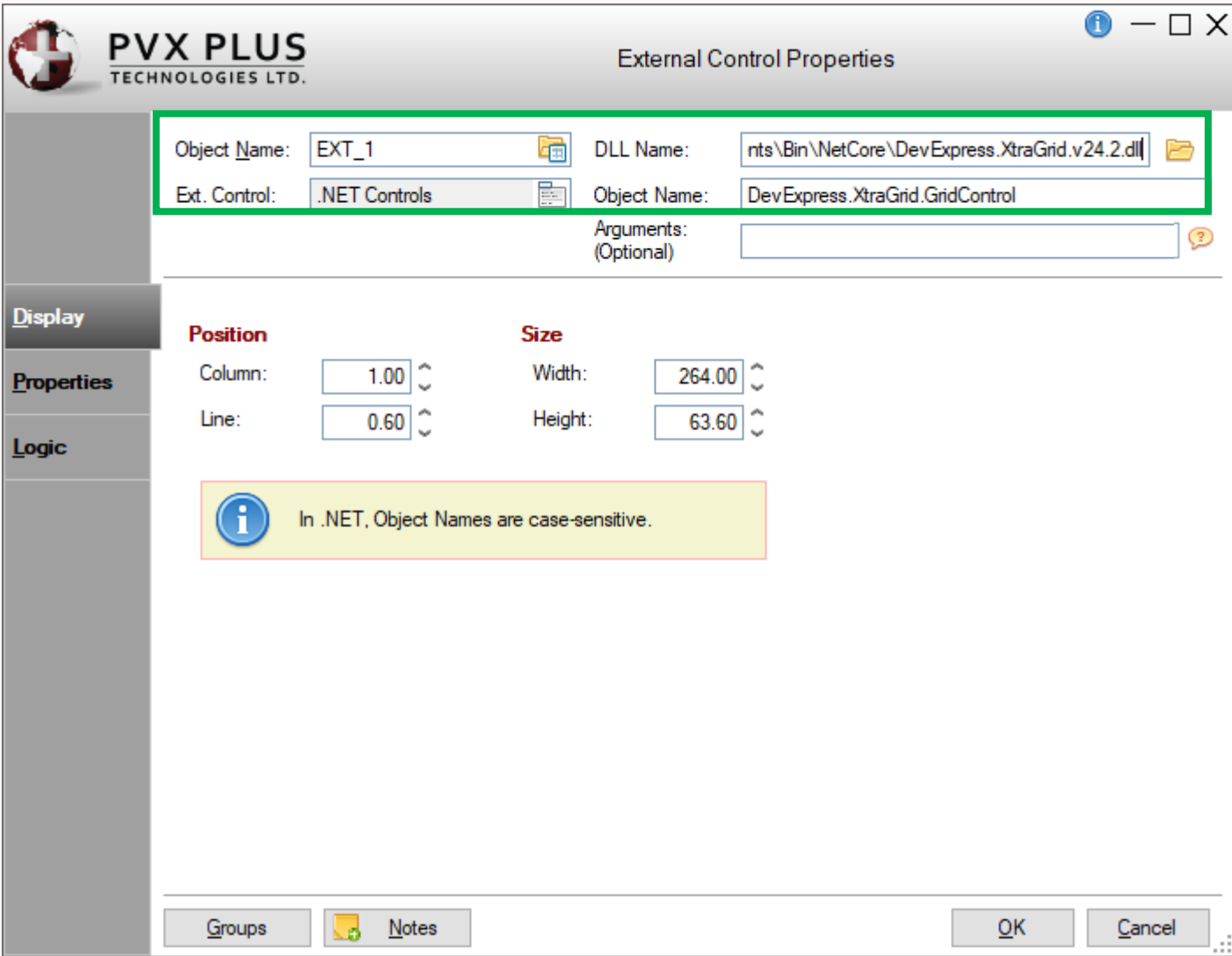
- Our goal with these examples
  - Demonstrate using PxPlus with a popular 3<sup>rd</sup> party .NET library
  - Provide you with examples that more closely reflect the real world
  - Pull together everything we just learned
    - Only used Nomads, could also be done using non-Nomads programs
- Reasons we choose the DevExpress® .NET library
  - It is popular and has a powerful set of UI controls and data processing tools
  - Customers have expressed interest in using this library with PxPlus
  - Costs money but you can get a free trial to test it out

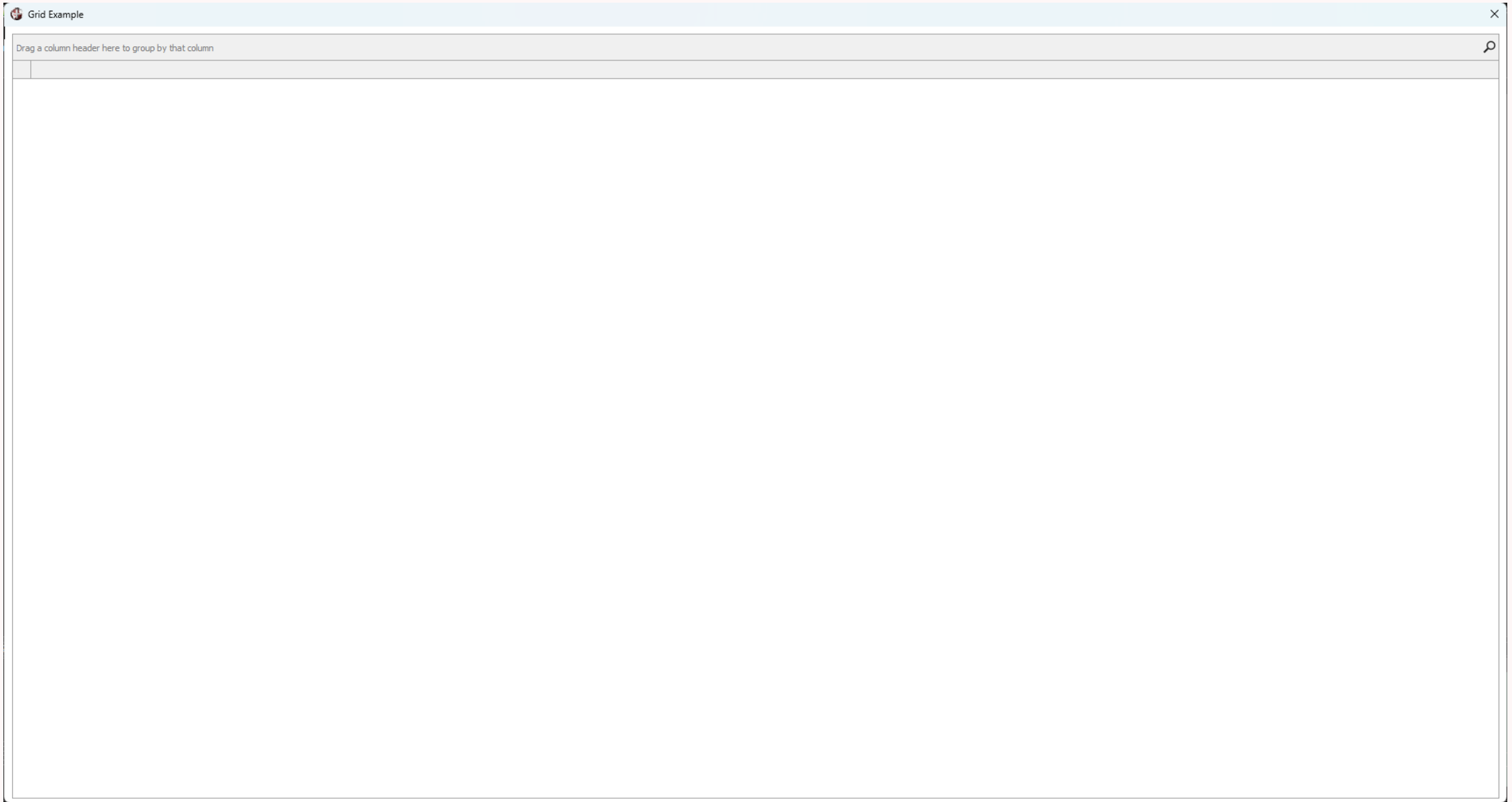


# DevExpress® Examples

## Grid Control

- We will add a DevExpress grid to a panel
  - The grid will be loaded from an Excel file
  - We will customize the look a little
- The grid loads a lot of data very fast
- The grid provides us with advanced sorting and filtering out of the box







AutoSave Off Air\_Quality.xlsx • Saved to this PC

File Home Insert Page Layout Formulas Data Review View Automate Developer Help

Clipboard Font Alignment Number Conditional Formatting Format as Table Cells Editing Sensitivity Add-ins Copilot

A1 Unique ID


	A	B	C	D	E	F	G	H	I	J	K	L
1	Unique ID	Indicator	Name	Measure	Measure I	Geo Type	Geo Join	Geo Place	Time Peric	Start_Date	Data Valu	Message
2	336867	375	Nitrogen c	Mean	ppb	CD	407	Flushing e	Winter 2011	12/01/2014	23.97	
3	336741	375	Nitrogen c	Mean	ppb	CD	107	Upper We	Winter 2011	12/01/2014	27.42	
4	550157	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Annual Av	01/01/2017	12.55	
5	412802	375	Nitrogen c	Mean	ppb	CD	407	Flushing e	Winter 2011	12/01/2014	22.63	
6	412803	375	Nitrogen c	Mean	ppb	CD	407	Flushing e	Summer 2 06	06/01/2014	14	
7	412676	375	Nitrogen c	Mean	ppb	CD	107	Upper We	Winter 2011	12/01/2014	26.43	
8	412677	375	Nitrogen c	Mean	ppb	CD	107	Upper We	Summer 2 06	06/01/2014	19.1	
9	603044	375	Nitrogen c	Mean	ppb	CD	314	Flatbush e	Annual Av	01/01/2014	17.28	
10	412804	375	Nitrogen c	Mean	ppb	CD	407	Flushing e	Annual Av	12/31/2014	18.2	
11	825832	375	Nitrogen c	Mean	ppb	CD	107	Upper We	Winter 202	12/01/2024	22.07527	
12	741291	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Annual Av	01/01/2024	11.33729	
13	166679	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Summer 2 06	06/01/2009	8.44	
14	165912	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Winter 2011	12/01/2014	20.26	
15	167800	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Annual Av	12/01/2014	12.54	
16	336888	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Winter 2011	12/01/2014	20.58	
17	741290	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Summer 2 06	06/01/2024	4.850858	
18	603098	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Annual Av	01/01/2014	10.41	
19	826075	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Winter 202	12/01/2024	15.70203	
20	170430	365	Fine partic	Mean	mcg/m3	CD	307	Sunset Pa	Annual Av	12/01/2014	9.18	
21	410984	365	Fine partic	Mean	mcg/m3	CD	107	Upper We	Winter 2011	12/01/2014	8.85	
22	742558	365	Fine partic	Mean	mcg/m3	CD	414	Rockaway	Winter 202	12/01/2024	6.331093	
23	169393	365	Fine partic	Mean	mcg/m3	CD	414	Rockaway	Summer 2 06	06/01/2014	10.74	
24	169452	365	Fine partic	Mean	mcg/m3	CD	414	Rockaway	Summer 2 06	06/01/2014	10.59	
25	166856	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Summer 2 06	06/01/2014	8.11	
26	166915	375	Nitrogen c	Mean	ppb	CD	414	Rockaway	Summer 2 06	06/01/2014	7.88	
27	213253	375	Nitrogen c	Mean	ppb	CD	307	Sunset Pa	Winter 2011	12/01/2014	27.81	
28	643639	375	Nitrogen c	Mean	ppb	CD	307	Sunset Pa	Annual Av	01/01/2014	18.52	
29	603046	375	Nitrogen c	Mean	ppb	CD	314	Flatbush e	Winter 2011	12/01/2014	23.47	
30	643693	375	Nitrogen c	Mean	ppb	CD	407	Flushing e	Annual Av	01/01/2014	16.27	
31	825830	375	Nitrogen c	Mean	ppb	CD	107	Upper We	Annual Av	01/01/2024	18.1703	

Air\_Quality

Ready Accessibility: Good to go 100%

Properties Header Panel Menu

Maintain

**PVX PLUS**  
TECHNOLOGIES LTD.

Panel Definition

Panel: gridExample Last update: 2025/09/16 14:37 devon

**Display**  
**Font/Color**  
**Attributes**  
**Logic**  
**User Aids**  
**iNomads Settings**  
**TitleBar**

**Title**  
Fixed Grid Example

**Default Program**  
Fixed Gridexample

Tag Field: Precision: <Asis>

**Position**  
Absolute Column: 0 Line: 0

**Size**  
Width: 189 Height: 61

**Panel Transparency (0 - 100%)**  
Fixed 0

**Background Image**  
Widget


**Image Alignment**  
☒ Top Left ☐ Tiled  
☐ Centered ☐ Scaled

Security Popup Menu Notes OK Cancel

## Gridexample:

PreDisplay:

```
devExpPath$="C:\Program Files\DevExpress 24.2\Components\Bin\NetCore\  
dataAccessDLL$=devExpPath$+"DevExpress.DataAccess.v24.2.dll"  
ExcelDataSrcObj$="DevExpress.DataAccess.Excel.ExcelDataSource"  
ExcelSettingsObj$="DevExpress.DataAccess.Excel.ExcelWorksheetSettings"  
ExcelOptObj$="DevExpress.DataAccess.Excel.ExcelSourceOptions"  
!  
DEF OBJECT excelDataSrc,"[.NET]" +dataAccessDLL$+"", "+ExcelDataSrcObj$  
excelDataSrc'FileName$="C:\Users\user\Documents\Air_Quality.xlsx"  
!  
DEF OBJECT excelSettings,"[.NET]" +dataAccessDLL$+"", "+ExcelSettingsObj$,"Air_Quality"  
!  
DEF OBJECT excelOpt,"[.NET]" +dataAccessDLL$+"", "+ExcelOptObj$,excelSettings'PvxHandle$  
excelOpt'UseFirstRowAsHeader=1  
!  
excelDataSrc'SourceOptions$=excelOpt'PvxHandle$  
excelDataSrc'Fill()
```



**PVX PLUS**  
TECHNOLOGIES LTD.

Panel Definition

Panel:

Last update: 2025/09/16 14:37 devon

Display

Font/Color

Attributes

Logic


User Aids

iNomads Settings


TitleBar

Default Program:


Pre-Display

Perform 

Post-Display

Ignore 

On Exit


Ignore 

On Timer

Define


Security





Popup Menu

 Notes

OK

Cancel


**PVX PLUS**  
 TECHNOLOGIES LTD.

External Control Properties
 





Object Name: 
 DLL Name:

Ext. Control: 
 Object Name:

Arguments: (Optional)

Display
 Properties
 Logic

**Objects**

+ EXT\_1

Item	Type	Current Value	Exp	Value/Expression
DataContext	Num		<input type="checkbox"/>	
DataMember	Str	<Null>	<input type="checkbox"/>	
DataSource	Num		<input checked="" type="checkbox"/>	excelDataSrc.PvxHandle\$
DefaultView	Num		<input type="checkbox"/>	
DeviceDpi	Num		<input type="checkbox"/>	
DisableAccessibility	Num		<input type="checkbox"/>	


Event	Function	Logic
AutoSizeChanged	Ignore ▼	
BackColorChanged	Ignore ▼	
BackgroundImageChanged	Ignore ▼	
BackgroundImageLayoutChanged	Ignore ▼	
BindingContextChanged	Ignore ▼	

Groups
 Notes
 OK
 Cancel

Grid Example

Drag a column header here to group by that column

Unique ID	Indicator ID	Name	Measure	Measure Info	Geo Type Name	Geo Join ID	Geo Place Name	Time Period	Start Date	Data Value	Message
336867	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		407 Flushing and Whitestone (C...	Winter 2014-15	12/01/2014	23.97	
336741	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		107 Upper West Side (CD7)	Winter 2014-15	12/01/2014	27.42	
550157	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Annual Average 2017	01/01/2017	12.55	
412802	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		407 Flushing and Whitestone (C...	Winter 2015-16	12/01/2015	22.63	
412803	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		407 Flushing and Whitestone (C...	Summer 2016	06/01/2016	14	
412676	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		107 Upper West Side (CD7)	Winter 2015-16	12/01/2015	26.43	
412677	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		107 Upper West Side (CD7)	Summer 2016	06/01/2016	19.1	
603044	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		314 Flatbush and Midwood (CD14)	Annual Average 2018	01/01/2018	17.28	
412804	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		407 Flushing and Whitestone (C...	Annual Average 2016	12/31/2015	18.2	
825832	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		107 Upper West Side (CD7)	Winter 2021-22	12/01/2021	22.07527023	
741291	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Annual Average 2021	01/01/2021	11.33729397	
166679	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Summer 2009	06/01/2009	8.44	
165912	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Winter 2010-11	12/01/2010	20.26	
167800	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Annual Average 2013	12/01/2012	12.54	
336888	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Winter 2014-15	12/01/2014	20.58	
741290	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Summer 2021	06/01/2021	4.850858294	
603098	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Annual Average 2018	01/01/2018	10.41	
826075	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Winter 2021-22	12/01/2021	15.70203388	
170430	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		307 Sunset Park (CD7)	Annual Average 2013	12/01/2012	9.18	
410984	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		107 Upper West Side (CD7)	Winter 2015-16	12/01/2015	8.85	
742558	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Winter 2020-21	12/01/2020	6.33109299	
169393	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Summer 2010	06/01/2010	10.74	
169452	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Summer 2011	06/01/2011	10.59	
166856	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Summer 2012	06/01/2012	8.11	
166915	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Summer 2013	06/01/2013	7.88	
213253	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		307 Sunset Park (CD7)	Winter 2013-14	12/01/2013	27.81	
643639	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		307 Sunset Park (CD7)	Annual Average 2019	01/01/2019	18.52	
603046	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		314 Flatbush and Midwood (CD14)	Winter 2017-18	12/01/2017	23.47	
643693	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		407 Flushing and Whitestone (C...	Annual Average 2019	01/01/2019	16.27	
825830	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		107 Upper West Side (CD7)	Annual Average 2022	01/01/2022	18.1703003	
603100	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Winter 2017-18	12/01/2017	14.31	
643714	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Annual Average 2019	01/01/2019	9.94	
826077	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Annual Average 2022	01/01/2022	11.36047467	
165794	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Winter 2008-09	12/01/2008	20.89	
213278	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		414 Rockaway and Broad Chann...	Winter 2013-14	12/01/2013	22.58	
411022	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		207 Kingsbridge Heights and Be...	Annual Average 2016	12/31/2015	7.78	
169545	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		307 Sunset Park (CD7)	Summer 2013	06/01/2013	10.7	
170455	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Annual Average 2013	12/01/2012	7.61	
742560	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Annual Average 2021	01/01/2021	5.918832207	
547765	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Annual Average 2017	01/01/2017	6.32	
168567	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Winter 2010-11	12/01/2010	10.28	
169334	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD		414 Rockaway and Broad Chann...	Summer 2009	06/01/2009	9.6	
643640	375	Nitrogen dioxide (NO2)	Mean	ppb	CD		307 Sunset Park (CD7)	Summer 2019	06/01/2019	16.22	

**PVX PLUS**  
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External Control Properties

Display

Properties

Logic

Object Name: EXT\_1

Ext. Control: .NET Controls

DLL Name: C:\Program Files\DevExpress 24.2\Components\Bin\N...

Object Name: DevExpress.XtraGrid.GridControl

Arguments: (Optional)

Default Program: Gridexample

Post Create

Execute

EXT\_1.ct!MainView'OptionsView>ShowGroupPanel=0

Groups

Notes

OK

Cancel

Grid Example											
Unique ID	Indicator ID	Name	Measure	Measure Info	Geo Type Name	Geo Join ID	Geo Place Name	Time Period	Start_Date	Data Value	Message
336867	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	407	Flushing and Whitestone (C...	Winter 2014-15	12/01/2014	23.97	
336741	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	107	Upper West Side (CD7)	Winter 2014-15	12/01/2014	27.42	
550157	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Annual Average 2017	01/01/2017	12.55	
412802	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	407	Flushing and Whitestone (C...	Winter 2015-16	12/01/2015	22.63	
412803	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	407	Flushing and Whitestone (C...	Summer 2016	06/01/2016	14	
412676	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	107	Upper West Side (CD7)	Winter 2015-16	12/01/2015	26.43	
412677	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	107	Upper West Side (CD7)	Summer 2016	06/01/2016	19.1	
603044	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	314	Flatbush and Midwood (CD14)	Annual Average 2018	01/01/2018	17.28	
412804	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	407	Flushing and Whitestone (C...	Annual Average 2016	12/31/2015	18.2	
825832	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	107	Upper West Side (CD7)	Winter 2021-22	12/01/2021	22.07527023	
741291	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Annual Average 2021	01/01/2021	11.33729397	
166679	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Summer 2009	06/01/2009	8.44	
165912	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Winter 2010-11	12/01/2010	20.26	
167800	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Annual Average 2013	12/01/2012	12.54	
336888	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Winter 2014-15	12/01/2014	20.58	
741290	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Summer 2021	06/01/2021	4.850858294	
603098	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Annual Average 2018	01/01/2018	10.41	
826075	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Winter 2021-22	12/01/2021	15.70203388	
170430	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	307	Sunset Park (CD7)	Annual Average 2013	12/01/2012	9.18	
410984	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	107	Upper West Side (CD7)	Winter 2015-16	12/01/2015	8.85	
742558	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Winter 2020-21	12/01/2020	6.33109299	
169393	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Summer 2010	06/01/2010	10.74	
169452	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Summer 2011	06/01/2011	10.59	
166856	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Summer 2012	06/01/2012	8.11	
166915	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Summer 2013	06/01/2013	7.88	
213253	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	307	Sunset Park (CD7)	Winter 2013-14	12/01/2013	27.81	
643639	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	307	Sunset Park (CD7)	Annual Average 2019	01/01/2019	18.52	
603046	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	314	Flatbush and Midwood (CD14)	Winter 2017-18	12/01/2017	23.47	
643693	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	407	Flushing and Whitestone (C...	Annual Average 2019	01/01/2019	16.27	
825830	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	107	Upper West Side (CD7)	Annual Average 2022	01/01/2022	18.1703003	
603100	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Winter 2017-18	12/01/2017	14.31	
643714	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Annual Average 2019	01/01/2019	9.94	
826077	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Annual Average 2022	01/01/2022	11.36047467	
165794	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Winter 2008-09	12/01/2008	20.89	
213278	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	414	Rockaway and Broad Chann...	Winter 2013-14	12/01/2013	22.58	
411022	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	207	Kingsbridge Heights and Be...	Annual Average 2016	12/31/2015	7.78	
169545	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	307	Sunset Park (CD7)	Summer 2013	06/01/2013	10.7	
170455	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Annual Average 2013	12/01/2012	7.61	
742560	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Annual Average 2021	01/01/2021	5.918832207	
547765	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Annual Average 2017	01/01/2017	6.32	
168567	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Winter 2010-11	12/01/2010	10.28	
169334	365	Fine particles (PM 2.5)	Mean	mcg/m3	CD	414	Rockaway and Broad Chann...	Summer 2009	06/01/2009	9.6	
643640	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	307	Sunset Park (CD7)	Summer 2019	06/01/2019	16.22	
336866	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	407	Flushing and Whitestone (C...	Summer 2015	06/01/2015	14.4	
667808	375	Nitrogen dioxide (NO2)	Mean	ppb	CD	407	Flushing and Whitestone (C...	Winter 2019-20	12/01/2019	22.99	























# DevExpress® Examples

## PDF Viewer Control


- We will add a DevExpress® PDF viewer to a panel
  - We will create space above the PDF viewer for a ribbon bar
  - We will add the ribbon bar to the control
  - We will load a PDF file
  - We will disable opening links from the PDF
- The PDF viewer gives you an advanced embedded solution for displaying PDFs

NOMADS+ Toolbar





Controls



PVX PLUS

TECHNOLOGIES LTD.

Display

Properties

Logic

External Control Properties

Object Name: EXT\_1

Ext. Control: .NET Controls

DLL Name: nents\Bin\NetCore\DevExpress.XtraPdfViewer.v24.2.dll

Object Name: DevExpress.XtraPdfViewer.PdfViewer

Arguments (Optional)

Position


Size

Column: 0.60

Line: 0.38

Width: 180.90

Height: 60.13

 In .NET, Object Names are case-sensitive.

Groups

Notes

OK

Cancel





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## External Control Properties

Object Name:



DLL Name:



Ext. Control:



Object Name:

Arguments: (Optional)



Display

Properties

Logic

### Objects

+ EXT\_1

Item	Type	Current Value	Exp	Value/Expression
Text	Str	<Null>	<input type="checkbox"/>	
ToString()	Meth		<input type="checkbox"/>	
Top	Num		<input type="checkbox"/>	150
TopLevelControl	Num		<input type="checkbox"/>	
UnderlineSelectedText()	Meth		<input type="checkbox"/>	
Update()	Meth		<input type="checkbox"/>	

Event	Function	Logic
AnnotationChanged	Ignore ▼	
AnnotationChanging	Ignore ▼	
AnnotationCreated	Ignore ▼	
AnnotationCreating	Ignore ▼	
AnnotationDeleted	Ignore ▼	


Groups







Notes

OK

Cancel


**PVX PLUS**  
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External Control Properties
 





Object Name: 
 DLL Name:

Ext. Control: 
 Object Name:

Arguments:

Display
 Properties
 Logic

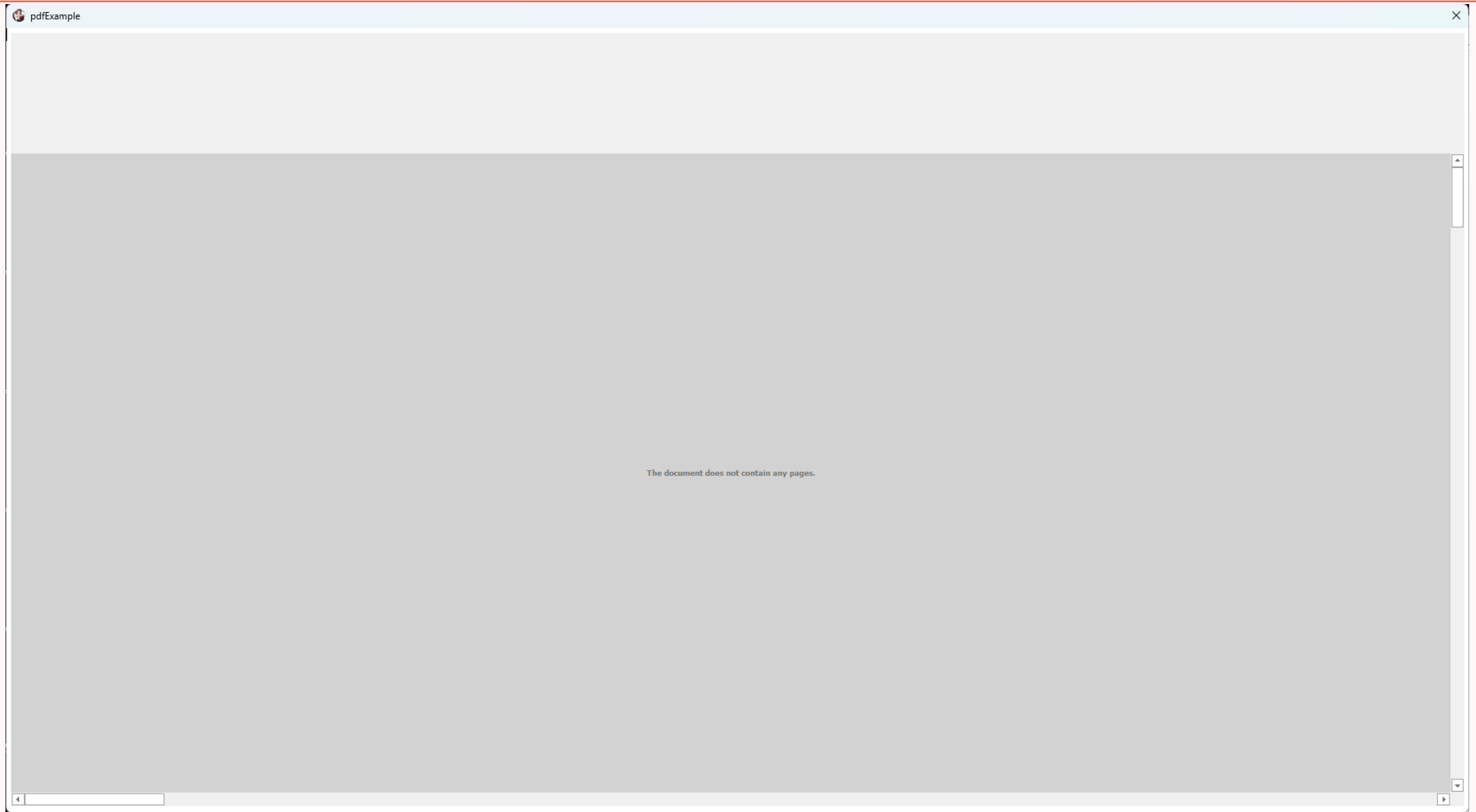
**Objects**


+ EXT\_1

Item	Type	Current Value	Exp	Value/Expression
Handle	Obj	<Obj> 32030	<input type="checkbox"/>	
HasChildren	Num		<input type="checkbox"/>	
HasSelection	Num		<input type="checkbox"/>	
Height	Num		<input checked="" type="checkbox"/>	EXT_1.ctfHeight-150
Hide()	Meth		<input type="checkbox"/>	
HideFindDialog()	Meth		<input type="checkbox"/>	

Event	Function	Logic
AnnotationChanged	Ignore	
AnnotationChanging	Ignore	
AnnotationCreated	Ignore	
AnnotationCreating	Ignore	
AnnotationDeleted	Ignore	

Groups
 Notes
 OK
 Cancel



**PVX PLUS**  
TECHNOLOGIES LTD.

External Control Properties

Display

Properties

Logic

Object Name: EXT\_1

Ext. Control: .NET Controls

DLL Name: C:\Program Files\DevExpress 24.2\Components\Bin\N...

Object Name: DevExpress.XtraPdfViewer.PdfViewer

Arguments: (Optional)

Default Program:

Post Create

Execute

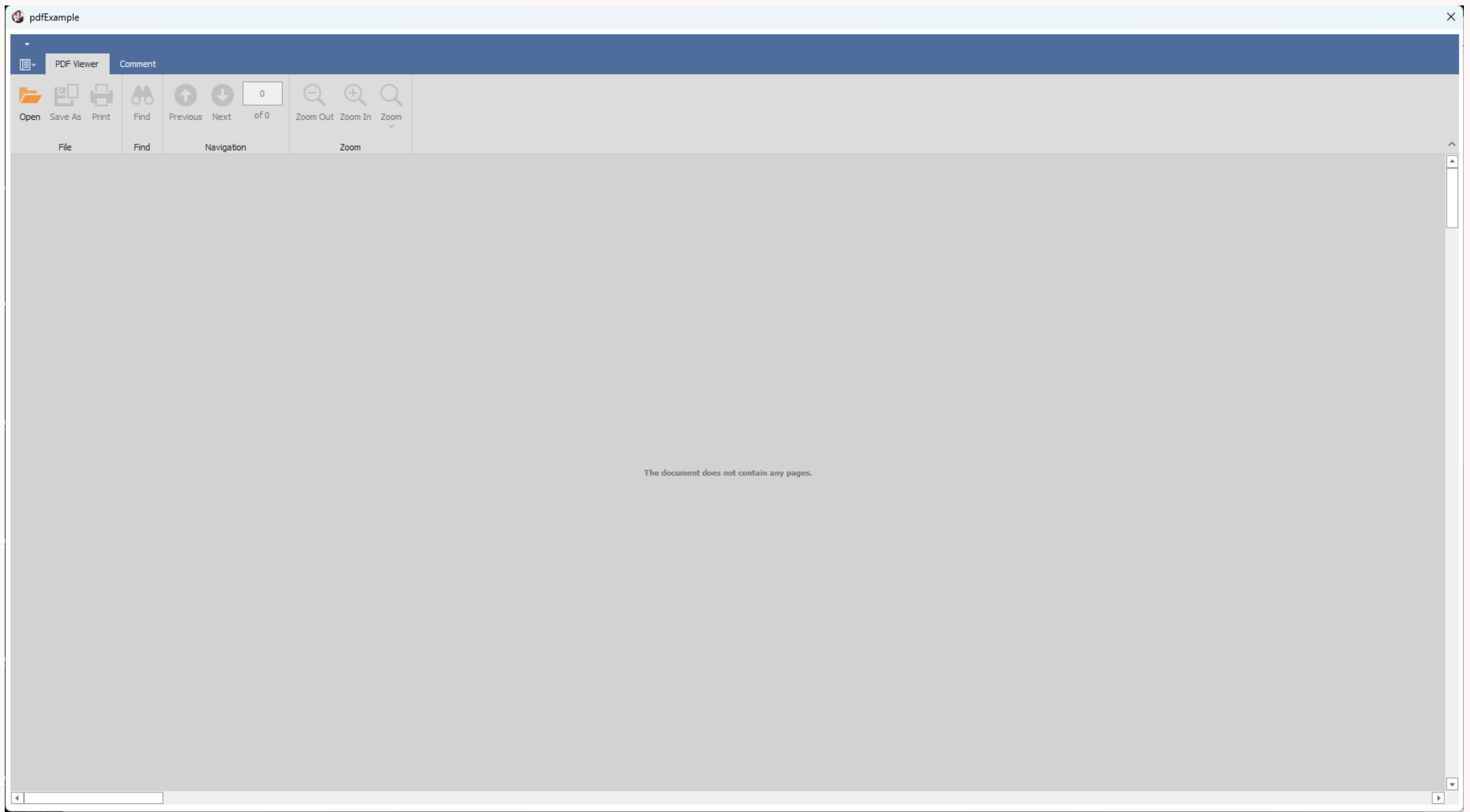
EXT\_1.ct!CreateRibbon()

Groups

Notes

OK

Cancel







Object Name: EXT\_1



DLL Name: C:\Program Files\DevExpress 24.2\Components\Bin\N



Ext. Control: .NET Controls



Object Name: DevExpress.XtraPdfViewer.PdfViewer

Arguments:  
(Optional)



Display

Properties

Logic

**Objects**

+ EXT\_1

Item	Type	Current Value	Exp	Value/Expression
LayoutEngine	Obj	<Obj> 32002	<input type="checkbox"/>	
Left	Num		<input type="checkbox"/>	
LoadDocument()	Meth		<input type="checkbox"/>	C:\Users\user\Documents\sample.pdf
Location	Obj	<Obj> 32002	<input type="checkbox"/>	
LogicalToDeviceUnits()	Meth		<input type="checkbox"/>	
LookAndFeel	Obj	<Obj> 32002	<input type="checkbox"/>	

Event	Function	Logic
AnnotationChanged	Ignore ▼	
AnnotationChanging	Ignore ▼	
AnnotationCreated	Ignore ▼	
AnnotationCreating	Ignore ▼	
AnnotationDeleted	Ignore ▼	

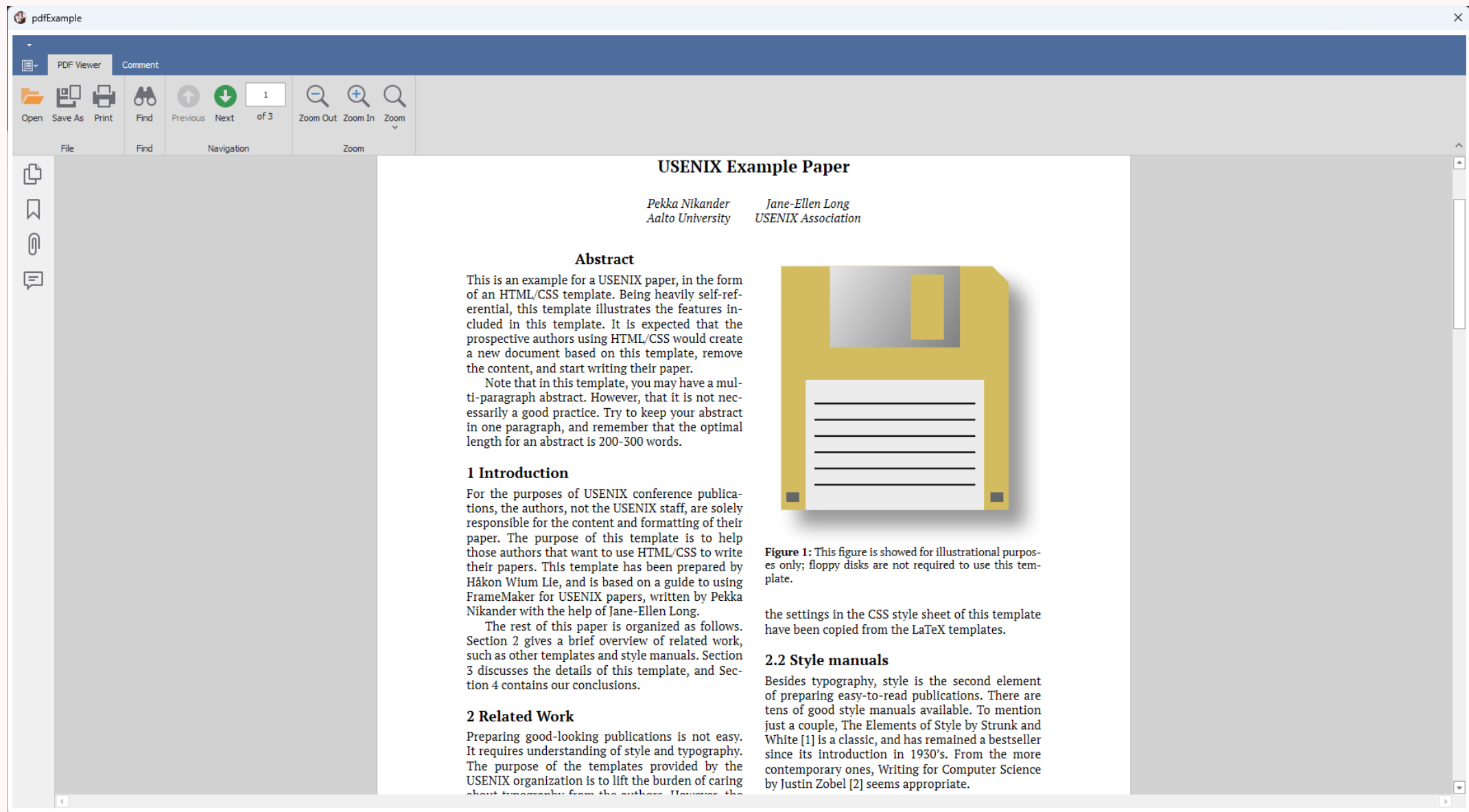
Groups



Notes

OK

Cancel

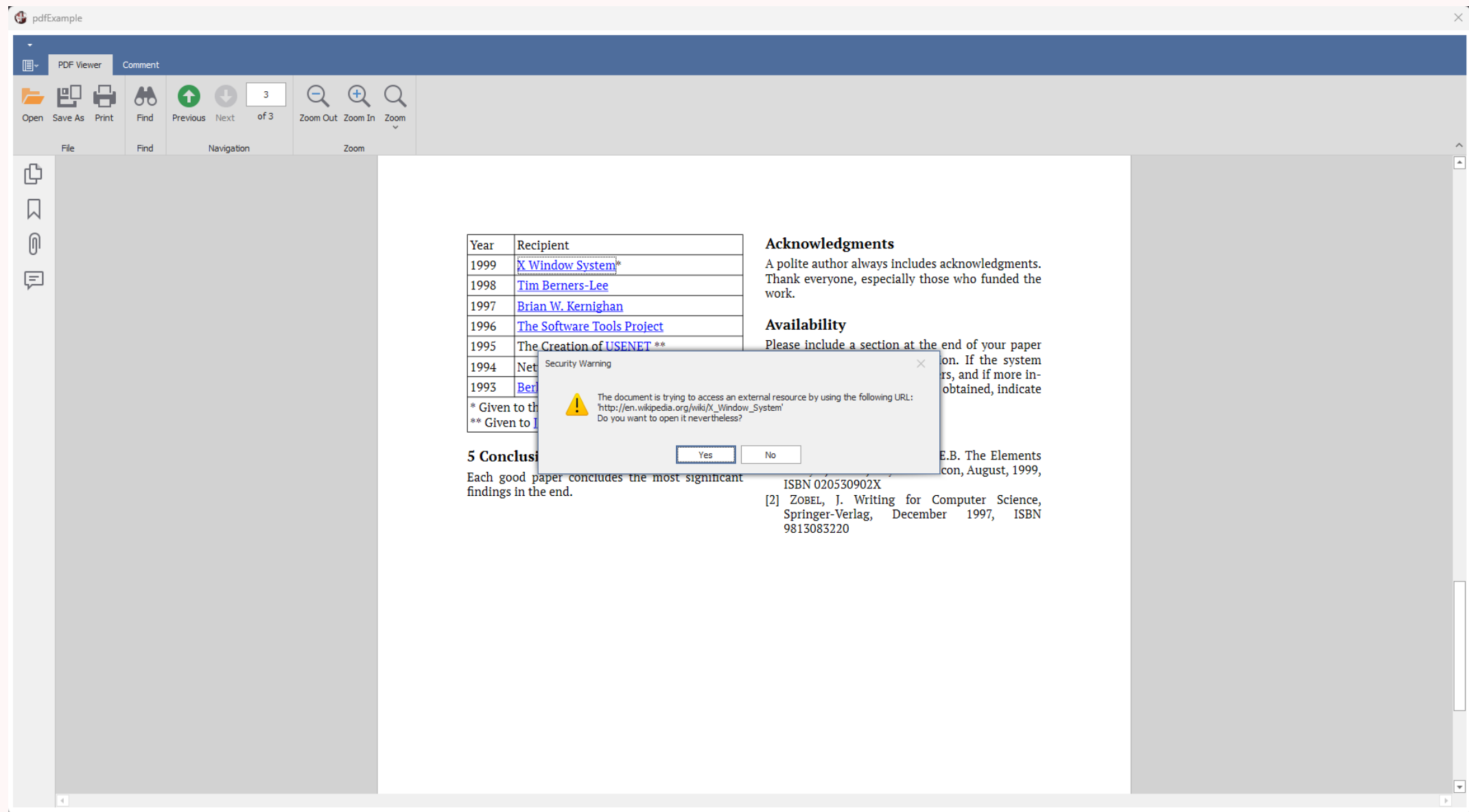


**Figure 1:** This figure is shown for illustrational purposes only; floppy disks are not required to use this template.

the settings in the CSS style sheet of this template have been copied from the LaTeX templates.


## 2.2 Style manuals

Besides typography, style is the second element of preparing easy-to-read publications. There are tens of good style manuals available. To mention just a couple, *The Elements of Style* by Strunk and White [1] is a classic, and has remained a bestseller since its introduction in 1930's. From the more contemporary ones, *Writing for Computer Science* by Justin Zobel [2] seems appropriate.



### pdfViewerEvents.pvc:

```
def class "pdfViewerEvents"  
function uriopening(sender,evtArgs)UriOpening for event "UriOpening"  
end def  
UriOpening:  
enter sender,evtArgs  
evtArgs.Handled=1  
msgbox "Opening links not allowed","Error","!"  
evtArgs.Cancel=1  
return
```



**PVX PLUS**  
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External Control Properties

Display

Properties

Logic

Object Name: EXT\_1

Ext. Control: .NET Controls

DLL Name: C:\Program Files\DevExpress 24.2\Components\Bin\N

Object Name: DevExpress.XtraPdfViewer.PdfViewer

Arguments: (Optional)

Default Program:

Post Create

Execute

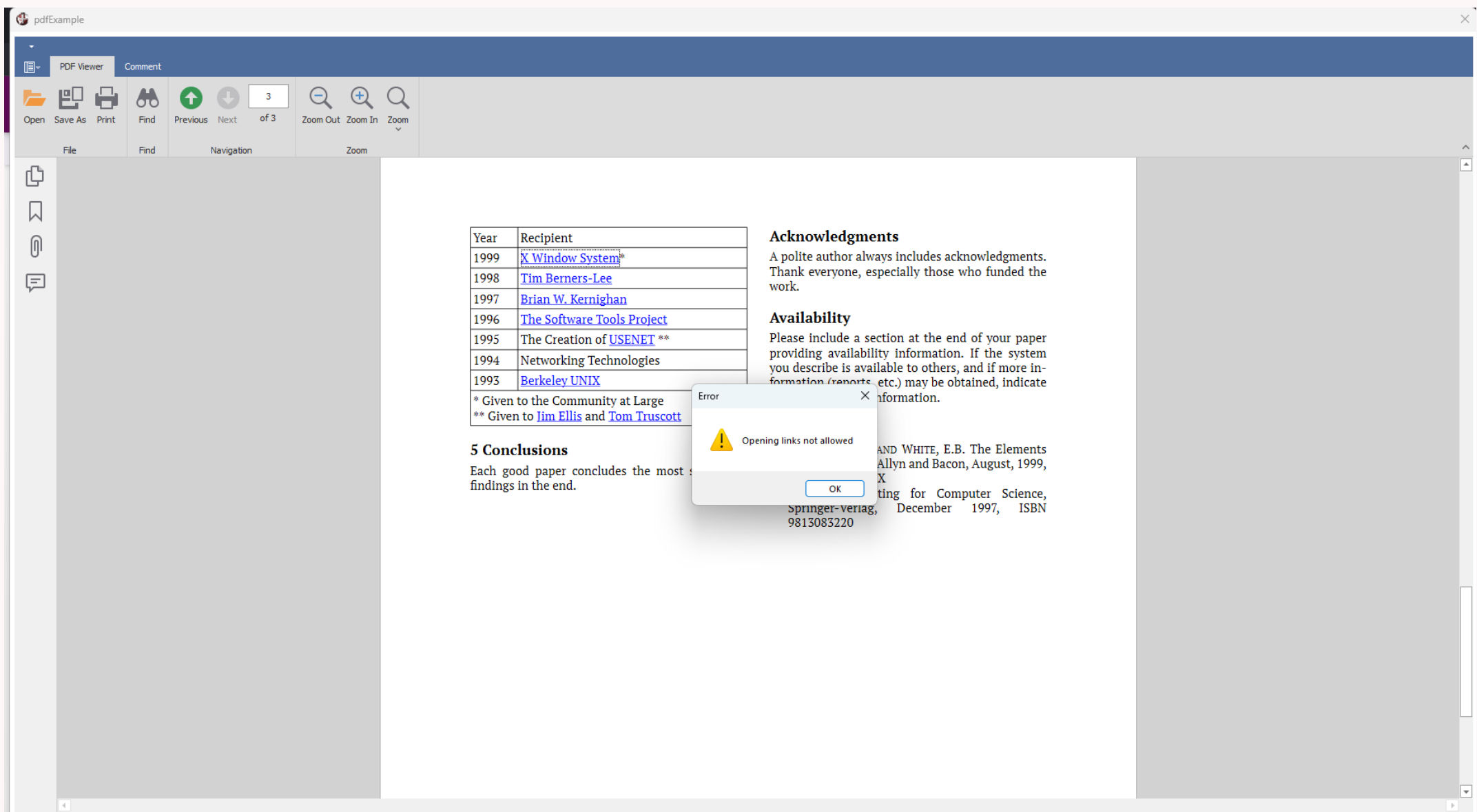
evtHandler=new("pdfviewerevents");ON EVENT FROM EXT\_1.ctf PROCESS evtHandler,EXT\_1.ctf>CreateRibbon()

Groups

Notes

OK

Cancel





# Resources

**Where can I find more information about the PxPlus .NET interface?**

[How To Tutorials](#) – Several How To tutorials on working with the PxPlus .NET interface

[PxPlus Video Library](#) – 2-part video series that covers the highlights of the PxPlus .NET interface and the creation of .NET components

[PxPlus Help - .NET Interface](#) – Full descriptions of the directives and the NOMADS designer screens used in the PxPlus .NET interface

[.NET API Browser](#) – API browser for the .NET system objects



# Thank you

Got an idea for a new feature?  
Found a bug?  
Let us know!  
Contact us at [info@pvxplus.com](mailto:info@pvxplus.com)

Devon Austen

