TMS FNC Chart

Developer guide

tmssoftware.com

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1.1 Overview

1.1.1 Description

The TMS FNC Chart (further referred to as “Chart”) is a fully cross-platform component designed to display different kinds of data such as financial and marketing data, monthly business sales, graphical and math data and much more as a chart. The Chart supports types such as bar, area, line, marker and variants such as stacked bar, stacked area, stacked percentage area, stacked percentage bar XY-line, XY-scatter and digital line.

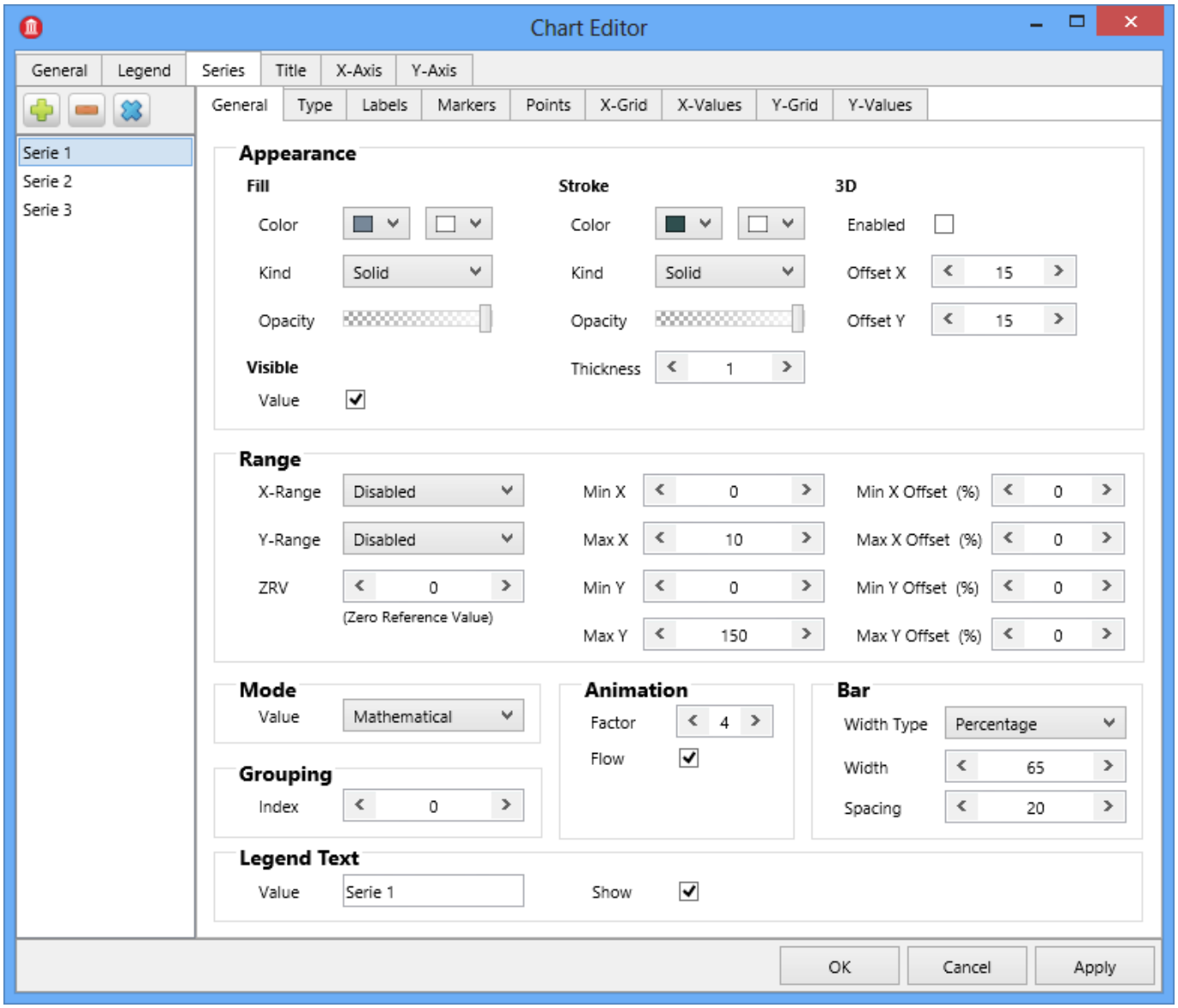
1.1.2 Getting Started

The Chart has a visual and a non-visual component. When creating a new project, the tool palette will allow you to select the `TTMSFNCChart` component, this is the global component for visual representation of your data. There ara a number of subtypes available to quickly start with the chart type of your choice. E.g. `TTMSFNCBarChart`, `TTMSFNCPieChart`, `TTMSFNCCandleStickChart`, ... The `TTMSFNCChartEditorDialog` can be used to manipulate the appearance and the data at runtime.

1.1.3 Design Time

When dropping an instance of the chart on the form you will notice that the component will initialize with some sample data based on chosen subtype. This allows you to quickly set up a test environment for your application.

Selecting the component allows you to manipulate the appearance of the various elements, the collection of series, points and annotations through the object inspector. To allow you to change these properties in a more convenient way, we have created a designtime editor available when double-clicking on the `TTMSFNCChart` instance, or when editing the Series property.



The editor presents each chart and series properties and its subproperties in different tabs and groups the properties in logical categories.

1.1.4 Runtime

The introduction of this chapter mentioned a non-visual component TTMSFNCChartEditorDialog. This component is a wrapper around the design time editor and can be used to edit the Chart at runtime.

The data that is initialized by default is also available at runtime when starting the application. This data can be cleared by removing the points from the series, or by removing all series from the Chart. The code that can be used to accomplish this is demonstrated below.

```
//Clear points, keep series
TMSFNCChart1.BeginUpdate;
for I := 0 to TMSFNCChart1.Series.Count - 1 do
 TMSFNCChart1.Series[I].Points.Clear;
TMSFNCChart1.EndUpdate;
```

```
//Clear series and points
TMSFNCChart1.BeginUpdate;
```

```
TMSFNCChart1.Clear;
TMSFNCChart1.EndUpdate;
```

When at some point you wish to add some sample series and points for testing purposes, you can use the code below.

```
//Initialize a sample
TMSFNCChart1.BeginUpdate;
TMSFNCChart1.InitSample;
TMSFNCChart1.EndUpdate;
```

1.1.5 Appearance

Color Scheme

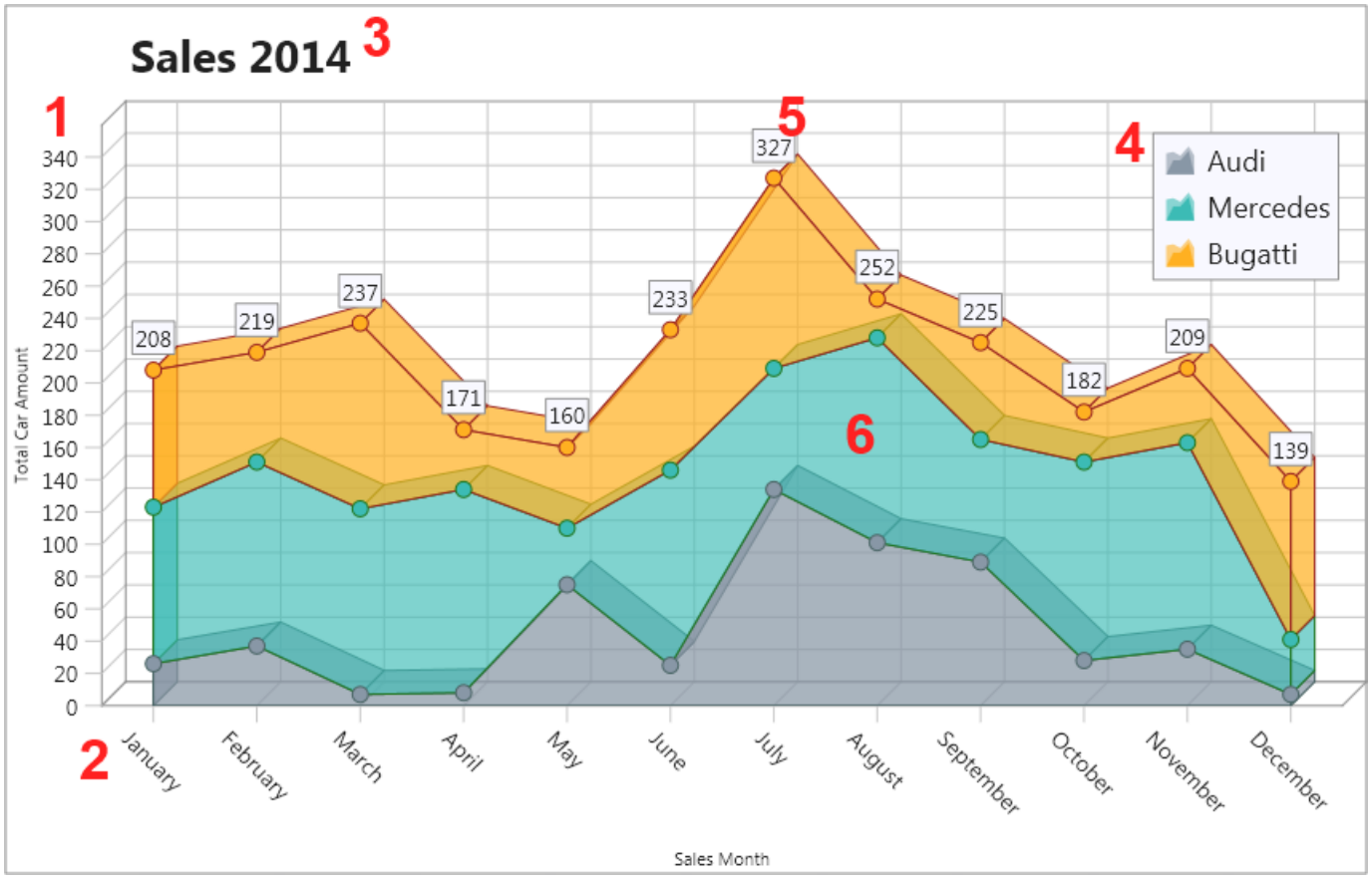
You can choose which initial colors you want to use for each series. You can select the color list that you can customize, the standard Excel colors or the Monochromatic value that will pick shades of a selected color.

Global Font

To change the font of the complete chart, you can use the GlobalFont property. This allows you to change the size, color, fontname and style of all the fonts in the chart. With the scale property you can change the font sizes in relation to their previous sizes.

1.1.6 Organization

The Chart consists of multiple configurable visual elements that are numbered and explained in the screenshot below.



1: Y–axis
The y-axis displays a range of series values from a predefined range or an automatic calculated minimum and maximum range. The y-axis can be set at the left, center and/or right side of the Chart. Different y-axis values can be shown for different series. The y-axis has the capability to show major & minor units with a different font and has multiple events for further customization.

2: X–axis
The x-axis displays a range of series values from a predefined range or an automatic calculated minimum and maximum range. The x-axis can be set at the top, center and/or bottom side of the Chart. Different x-axis values can be shown for different series. The x-axis has the capability to show major & minor units with a different font and has multiple events for further customization.

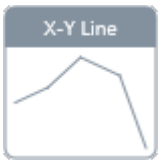
3: Title
The title optionally displays a text with customizable position, font and font color.

4: Legend
The legend optionally displays the text with a small glyph representing the chart type for each series added to the Chart.

5: Labels/Annotations
Each series has support for labels and multiple annotations for each added series point and can be customized in terms of appearance and formatting.

6: Series

The series of the Chart can be changed to one of the types listed below. Multiple series can be combined to create stacked series and show the summed total.

Name	Type	Description
ctLine		Series are shown as a line from value to value.
ctXYLine		Series are shown as a line from value to value, with a custom `X value`.
ctDigitalLine		Series are shown as a digital line from value to value.
ctBar		Series is shown as bars with height representing the value.
ctStackedBar		Multiple series joined in stacked bar which shows the summed value of all grouped series of type `ctStackedBar`.
ctStackedPercentageBar		Same as stacked bar but values per series are represented by percentage.
ctArea		Series are shown as a filled area
ctStackedArea		Multiple series joined in stacked area which shows the summed value of all grouped series of type ctStackedArea.
ctStackedPercentageArea		Same as stacked bar but values per series are represented by percentage.
ctMarker		Series are shown as shape/image per value.

Name	Type	Description
		
ctXYMarker		Series are shown as shape/image per value with a custom `x-value`
ctPie		Series are shown as a pie shape with individual colourable slices.
ctSizedPie		Series are shown as a pie with slices with a fixed angle and a radius based on the added values.
ctVariableRadiusPie		Series are shown as a pie with slices with a variable angle and variable radius based on the added values.
ctSpider		Series are shown as a spider chart with multiple spokes based on the added values.
ctBand		Series are shown as a band chart with an upper `(YValue)` and lower value `(YValueSecond)`

1.1.7 Availability

Supported frameworks and platforms

- VCL Win32/Win64
- FMX Win32/Win64, macOS, iOS, Android, Linux
- LCL Win32/Win64, macOS, iOS, Android, numerous Linux variants including Raspbian
- WEB: Chrome, Edge, Firefox, …

Supported IDE’s

- Delphi XE7 and C++ Builder XE7 or newer releases
- Lazarus 1.4.4 with FPC 2.6.4 or newer official releases
- TMS WEB Core for Visual Studio Code 1.3 or newer releases

Note

Important Notice: TMS FNC Chart requires TMS FNC Core (separately available at the My Products page)

2. Reference

2.1 TTMSFNCChart

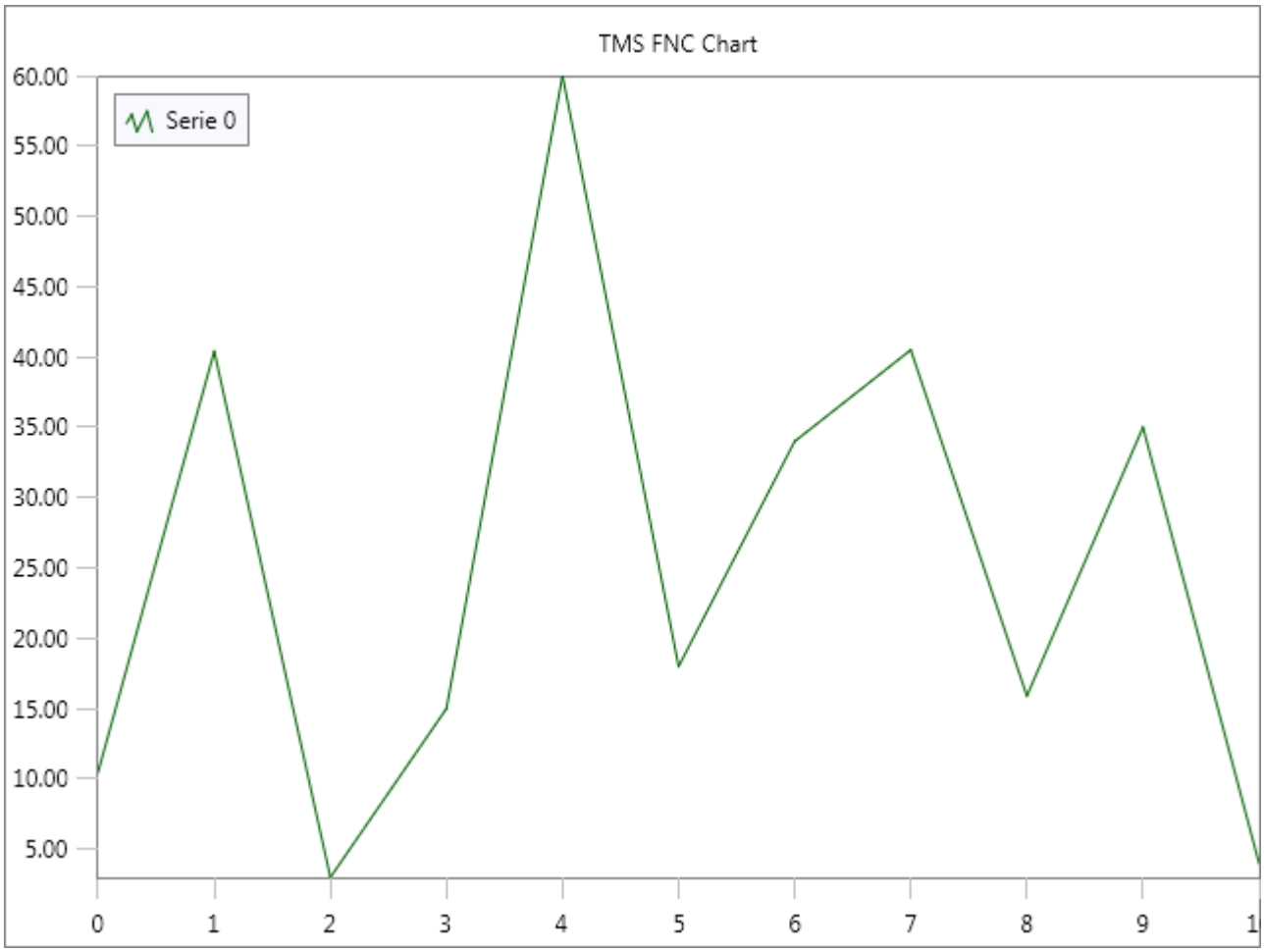
2.1.1 Overview

Virtual vs Collection based mode

When dropping a new instance of the `TTMSFNCChart` on the form, the chart is initialized with some sample data, this contains a set of points added through the `Points` collection. This is called a collection-based mode which is also the default mode. When taking a look at the events, you will notice that some events have a virtual equivalent that is only called when implementing a virtual mode. The reason for having these events is to make a clear difference between virtual and collection based modes whenever a point is passed through as a parameter. All the other events can access the internal record data that holds a reference to the point collection item (`Reference` property), or the virtual point record data (`VirtualReference` property).

The virtual mode is enabled as soon as you implement the `OnGetNumberOfPoints`. Virtual mode is a global chart mode, so it is not possible to combine a collection-based and a virtual mode series. After implementing the `OnGetNumberOfPoints`, the `OnGetPoint` event is called to retrieve the data for a point. This is done through a record that can be directly accessed and manipulated. The advantage is that the event signature will not change when adding more properties in the future. There is no difference between virtual and collection-based mode in terms of series. The series are through the `Series` collection. Below is a sample that demonstrates this.

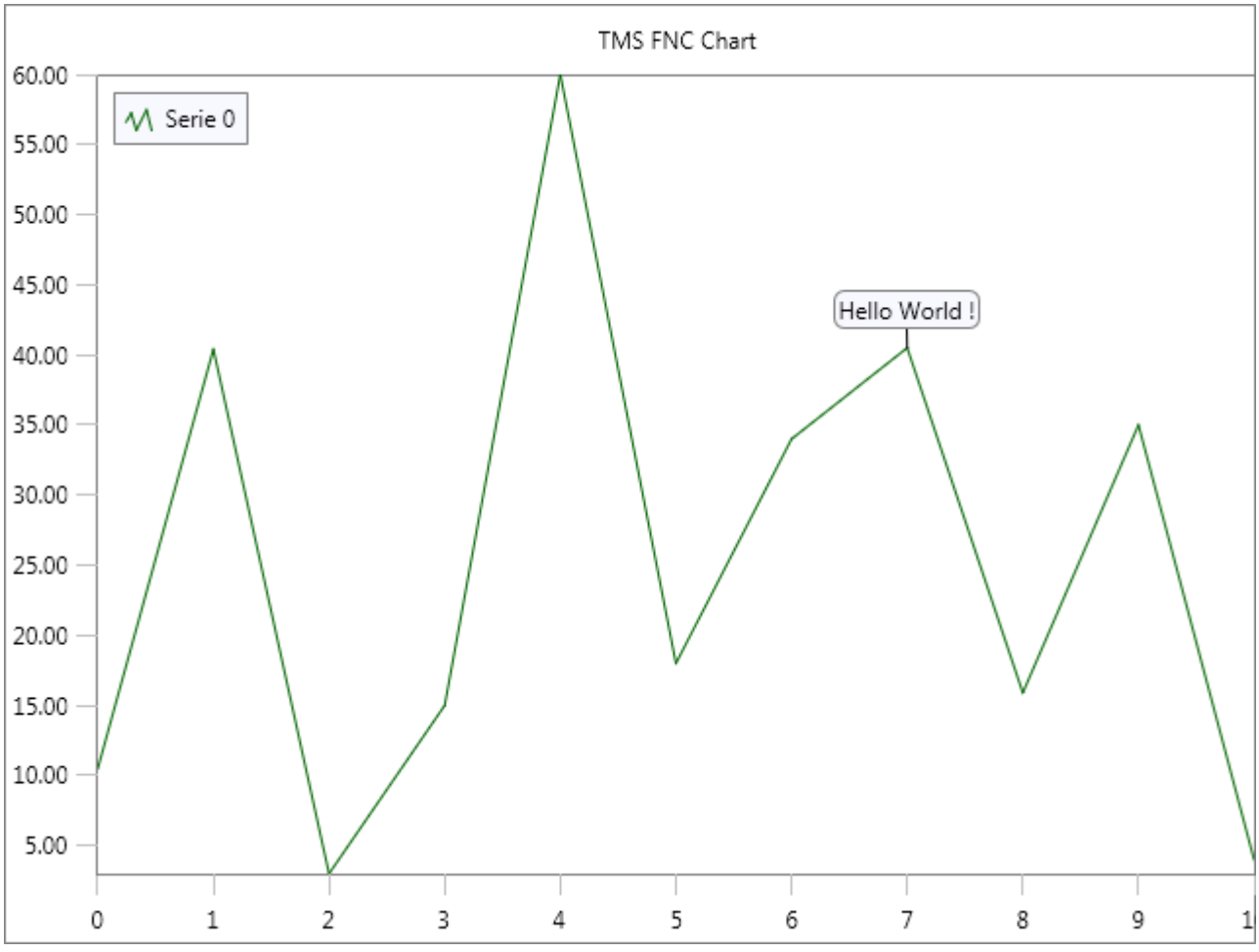
```
const
 PointArray: array[0..10] of Double = (10.5, 40.4, 3, 15, 60, 18, 34,
40.5, 15.9, 35, 4);

procedure TForm1.FormCreate(Sender: TObject);
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Series.Clear;
 TMSFNCChart1.Series.Add;
 TMSFNCChart1.EndUpdate;
end;

procedure TForm1.TMSFNCChart1GetNumberOfPoints(Sender: TObject;
 ASerie: TTMSFNCChartSerie; var ANumberOfPoints: Integer);
begin
 ANumberOfPoints := Length(PointArray);
end;

procedure TForm1.TMSFNCChart1GetPoint(Sender: TObject;
 ASerie: TTMSFNCChartSerie; AIndex: Integer;
 var APoint: TTMSFNCChartPointVirtual);
begin
 APoint.YValue := PointArray[AIndex];
 APoint.XValue := AIndex;
end;
```



The virtual equivalent for annotations is available through the `OnGetNumberOfAnnotations` and `OnGetAnnotation` events as demonstrated in the sample below.

```
const
 PointArray: array[0..10] of Double = (10.5, 40.4, 3, 15, 60, 18, 34,
40.5, 15.9, 35, 4);

procedure TForm1.FormCreate(Sender: TObject);
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Series.Clear;
 TMSFNCChart1.Series.Add;
 TMSFNCChart1.EndUpdate;
end;

procedure TForm1.TMSFNCChart1GetAnnotation(Sender: TObject;
 ASerie: TTMSFNCChartSerie; APoint: TTMSFNCChartPointVirtual; AIndex:
Integer;
 var AAnnotation: TTMSFNCChartAnnotationVirtual);
begin
 AAnnotation.Text := 'Hello World !';
end;

procedure TForm1.TMSFNCChart1GetNumberOfAnnotations(Sender: TObject;
 ASerie: TTMSFNCChartSerie; APoint: TTMSFNCChartPointVirtual;
 var ANumberOfAnnotations: Integer);
begin
 if APoint.Index = 7 then
```

```
 ANumberOfAnnotations := 1;
end;

procedure TForm1.TMSFNCChart1GetNumberOfPoints(Sender: TObject;
 ASerie: TTMSFNCChartSerie; var ANumberOfPoints: Integer);
begin
 ANumberOfPoints := Length(PointArray);
end;

procedure TForm1.TMSFNCChart1GetPoint(Sender: TObject;
 ASerie: TTMSFNCChartSerie; AIndex: Integer;
 var APoint: TTMSFNCChartPointVirtual);
begin
 APoint.YValue := PointArray[AIndex];
 APoint.XValue := AIndex;
end;
```



Persistence

The chart is capable of saving its published properties (settings), to a file or stream. The format that is being used is JSON. To save the chart settings, use the code below.

```
TMSFNCChart1.SaveSettingsToFile();
TMSFNCChart1.SaveSettingsToStream();
```

To load an existing settings stream/file use the following code.

```
TMSFNCChart1.LoadSettingsFromFile();
TMSFNCChart1.LoadSettingsFromStream();
```

The Chart additionally exposes events to control which properties need to be saved to the settings file. In some circumstances, it might be required to only save a specific set of properties. The `OnCanLoadProperty` and `OnCanSaveProperty` events are responsible for this. Below is a sample that excludes a property `'Extra'` from the persistence list.

```
procedure TForm1.TMSFNCChart1CanLoadProperty(Sender, AObject: TObject;
 APropertyName: string; APropertyType: TTypeKind; var ACanLoad: Boolean);
begin
 ACanLoad := ACanLoad and not (APropertyName = 'Extra');
end;
```

```
procedure TForm1. TMSFNCChart1CanSaveProperty(Sender, AObject: TObject;
 APropertyName: string; APropertyType: TTypeKind; var ACanSave: Boolean);
begin
 ACanSave := ACanSave and not (APropertyName = 'Extra');
end;
```

Please note that the above `AND` operation is crucial to maintain the existing exclusion list. Returning a `true` for each property will additionally save its default published properties such as `Align`, `Position` and many more.

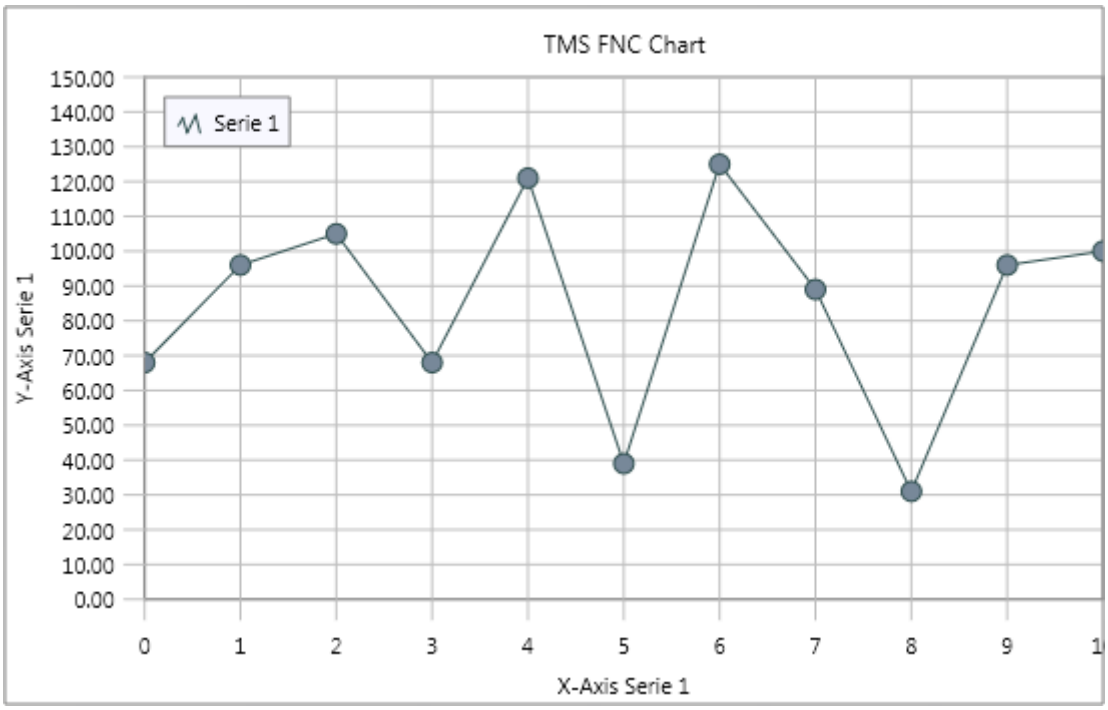
Adding and removing series

The Chart has a collection of series that can be accessed programmatically or through the editor. The code below shows you how to add a new series based on a default Chart. With the code, the Chart is cleared, and a new series is added.

```
TMSFNCChart1.BeginUpdate;
TMSFNCChart1.Clear;
TMSFNCChart1.Series.Add;
TMSFNCChart1.EndUpdate;
```

To delete a series, you will need to know the index of the series you wish to delete. By default, the Chart adds 3 series with random values. With the following code, the last 2 series in the collection are removed.

```
TMSFNCChart1.BeginUpdate;
TMSFNCChart1.Series.Delete(1);
TMSFNCChart1.Series.Delete(1);
TMSFNCChart1.EndUpdate;
```



When adding a new series, the series does not contain any points, so the Chart will not draw any lines, bars or other chosen Chart types. Adding and removing points is explained in the chapter Adding and removing points.

Accessing series

When adding a new series, the series automatically adds an identifier, set with the `LegendText` property. This property is used in the legend, and in the editor. In code, you can access the series with the index in the collection, but more convenient, with a function called `SerieByName`. Below is a sample that demonstrates how this function can be used.

```
var
 I: Integer;
 s: TTMSFNCChartSerie;
 begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 TMSFNCChart1.Series.Add; //adds 'Serie 0' by default
 TMSFNCChart1.Series.Add; //adds 'Serie 1' by default

 s := TMSFNCChart1.SerieByName['Serie 0'];
 for I := 0 to 7 do
 s.AddPoint(Random(100));

 s := TMSFNCChart1.SerieByName['Serie 1'];
 for I := 0 to 7 do
 s.AddPoint(Random(100));

 TMSFNCChart1.EndUpdate;
end;
```

```
var
 I: Integer;
 s: TTMSFNCChartSerie;
begin
 TMSFNCChart1.BeginUpdate;
```

```
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.LegendText := 'Mercedes';
 TMSFNCChart1.EndUpdate;
end;
```

```
var
 s: TTMSFNCChartSerie;
begin
 s := TMSFNCChart1.SerieByName['Mercedes'];
 for I := 0 to 7 do
 s.AddPoint(Random(100));
end;
```

Adding and removing points

Adding or removing points is as easy as adding or removing series. Simply use the new series or retrieve an already existing series and use the `Points` collection property to add or remove new or existing points. By default, the `Points` collection already adds a random value to the `YValue` property. The `XValue` property is automatically incremented and has a direct relation to the number of points.

To add a new point, use the following code:

```
var
 s: TTMSFNCChartSerie;
begin
 TMSFNCChart1.BeginUpdate;
 s := TMSFNCChart1.Series.Add;
 s.Points.Add;
 TMSFNCChart1.EndUpdate;
end;
```

As explained, the point that is added to the series contains a random value. To change this value, define a variable that gives you access to the point properties like demonstrated in the code below.

```
var
 s: TTMSFNCChartSerie;
 pt: TTMSFNCChartPoint;
begin
 TMSFNCChart1.BeginUpdate;
 s := TMSFNCChart1.Series.Add;
 pt := s.Points.Add;
 pt.YValue := 123;
 TMSFNCChart1.EndUpdate;
end;
```

Each point has a value on the y-axis which is set with the `YValue` property, and a value on the `x-axis`. The value on the `x-axis` is set with the `XValue` property but is only used in XY type charts such as the `ctXYLine` or the `ctXYMarker` types.

An alternative to add a new point with a value is to use one of the `AddPoint` or `AddXYPoint` overloads that are publically accessible on serie level. The code below has an identical result as the previous code.

```
var
 s: TTMSFNCChartSerie;
begin
 TMSFNCChart1.BeginUpdate;
 s := TMSFNCChart1.Series.Add;
```

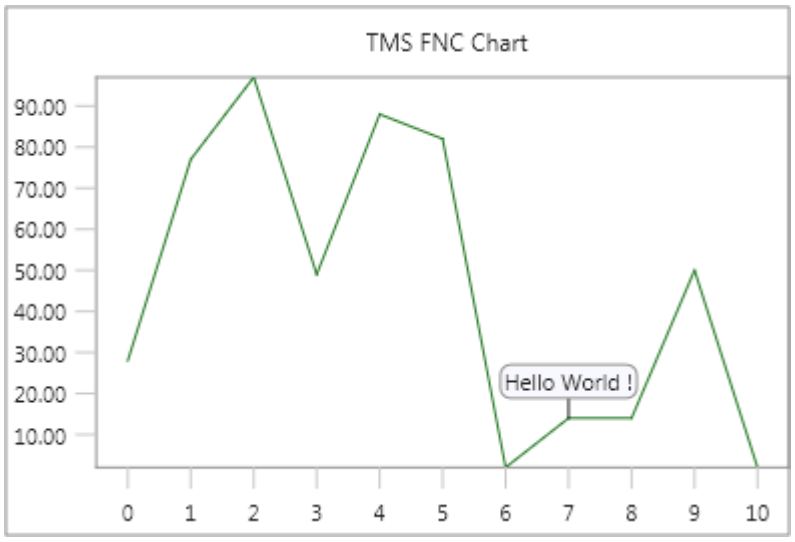
```
  s.AddPoint(Random(100));
  TMSFNCChart1.EndUpdate;
end;
```

To remove a point, simply use the same approach as removing a series.

Annotations

Annotations can be used to attach additional information to a specific point, shaped in a rectangle, ellipse or balloon, with many customization options. Annotations are added and deleted in the same way as series, but on point level. Below is a sample which adds an annotation to a specific point in a line Chart.

```
var
  s: TTMSFNCChartSerie;
  I: Integer;
  an: TTMSFNCChartAnnotation;
begin
  TMSFNCChart1.BeginUpdate;
  TMSFNCChart1.Clear;
  s := TMSFNCChart1.Series.Add;
  s.Mode := smStatistical;
  for I := 0 to 10 do
  begin
  s.Points.Add;
  if I = 7 then
  begin
  an := s.Points[I].Annotations.Add;
  an.Text := 'Hello World !';
end;
  end;
  TMSFNCChart1.EndUpdate;
```

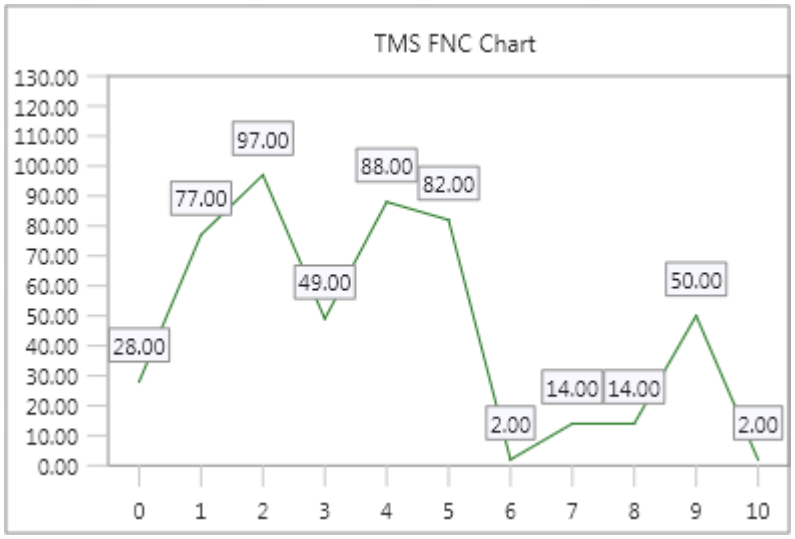


Annotations are auto-sized by default but can be configured to allow text alignment and wordwrapping.

Labels

Each series has the ability to show labels, which display a formatted string based on the `YValue` of the point. Labels have the same appearance, and are added to each point. Through events, labels can optionally be hidden, but are less configurable compared to annotations.

```
var
 s: TTMSFNCChartSerie;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.Mode := smStatistical;
 s.AutoYRange := arDisabled;
 s.MinY := 0;
 s.MaxY := 130;
 s.Labels.Visible := True;
 for I := 0 to 10 do
 s.Points.Add;
 TMSFNCChart1.EndUpdate;
end;
```



The labels shown in the sample are already formatted with the Delphi `Format` function which can be optionally modified to format floating point values or datetime values. The type of formatting can be changed with the `FormatType` property.

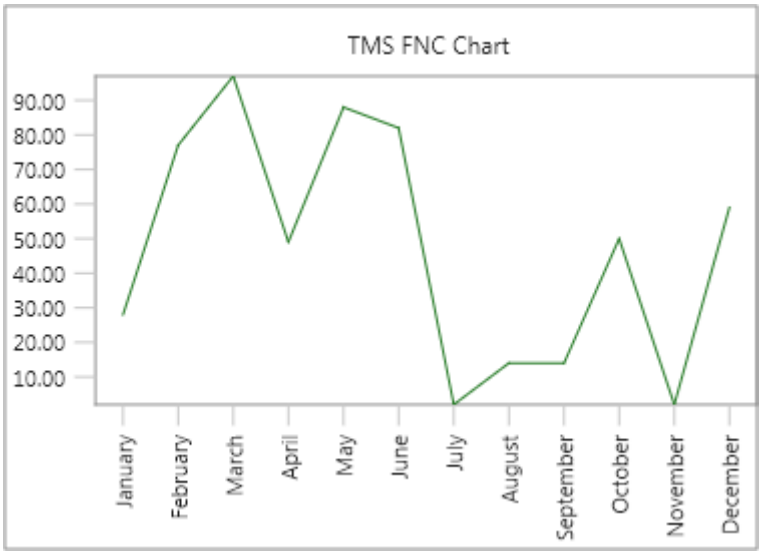
X-axis and y-axis values

By default, the Chart enables the `x-axis` and the `y-axis` for the first series only, but each series has its own `x-axis` and `y-axis` range and can configure the position and formatting for each axis separately. The amount of values that are shown depend on a number of properties, the available width / height, the major and minor unit and the font size are the most important properties.

Each series can position its `x-axis` top, center, bottom or a combination of those three values and the same applies for the `y-axis`, but with a left, center and right position. Further customization can be done with one of the various events for custom drawing, formatting, positioning, etc…

The `x-axis` has an additional feature that is based on the collection of points inside a series. Each point has an `XValueText` property that is linked to the `XValue` of that point. When the `XValueText` is set, the series will automatically detect and display the text at that point. Below is a sample which adds the months of the year as values of the `x-axis`.

```
var
 s: TTMSFNCChartSerie;
 I: Integer;
 pt: TTMSFNCChartPoint;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.Mode := smStatistical;
 s.AutoXRange := arEnabled;
 s.XValues.Angle := -90;
 for I := 1 to 12 do
 begin
 pt := s.Points.Add;
 pt.XValueText := FormatSettings.LongMonthNames[I];
 end;
 TMSFNCChart1.EndUpdate;
end;
```



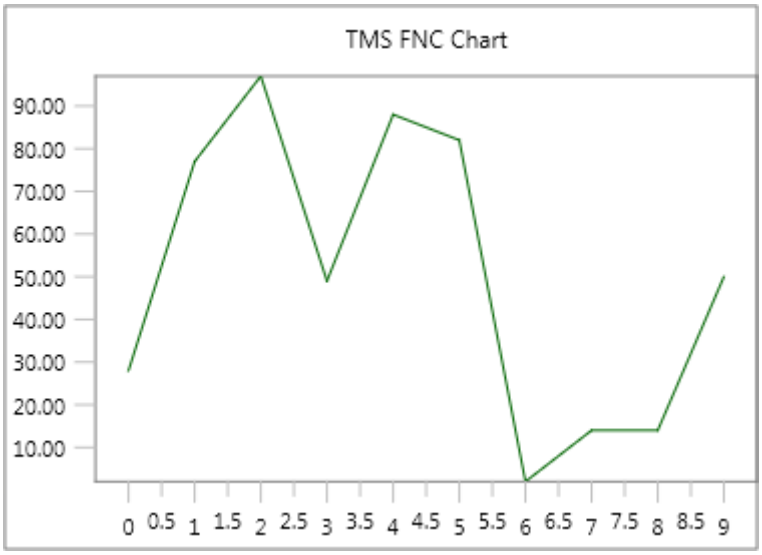
The values of the `x-axis` are now replaced with the months set via the `XValueText` property. In the sample, the values are rotated, because there isn't enough room to place all values horizontally. This is achieved with the `Angle` property of the series object.

The `MajorUnit` and `MinorUnit` properties that are available for the `x-axis` values at serie level can be used to change the appearance. By default the `MajorUnit` is `1` and the `MinorUnit` is `0`. The `x-axis` values do not automatically calculate the units as the `y-axis` does with the `AutoUnits` property. This property is false by default on the `x-axis`. Without a value assigned to the `XValueText` property, the `x-axis` will draw the floating point values with a specific formatting, based on the `MajorUnit` and `MinorUnit`.

Below is a sample which sets the `MinorUnit` to `0.5` for the `x-axis`.

```
var
 s: TTMSFNCChartSerie;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
```

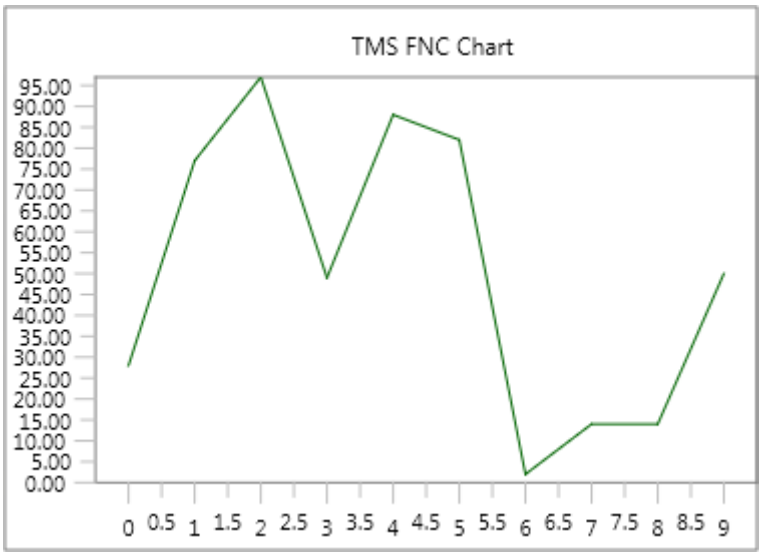
```
 s := TMSFNCChart1.Series.Add;
 s.Mode := smStatistical;
 s.AutoXRange := arEnabled;
 s.XValues.MinorUnit := 0.5;
 s.XValues.MinorUnitFormat := '%.1f';
 for I := 0 to 9 do
 s.Points.Add;
 TMSFNCChart1.EndUpdate;
end;
```



In this sample, we have also changed the `MinorUnitFormat` to display the fractional part of the `MinorUnit` set to `0.5`.

The `y-axis` automatically calculates the best possible `MajorUnit` and `MinorUnit` by default. Changing the `MajorUnit` and `MinorUnit` on the `y-axis` will only be possible when the `AutoUnits` property is set to false.

```
var
 s: TTMSFNCChartSerie;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.Mode := smStatistical;
 s.AutoXRange := arEnabled;
 s.AutoYRange := arEnabledZeroBased;
 s.XValues.MinorUnit := 0.5;
 s.XValues.MinorUnitFormat := '%.1f';
 s.YValues.AutoUnits := False;
 s.YValues.MajorUnit := 10;
 s.YValues.MinorUnit := 5;
 for I := 0 to 9 do
 s.Points.Add;
 TMSFNCChart1.EndUpdate;
end;
```

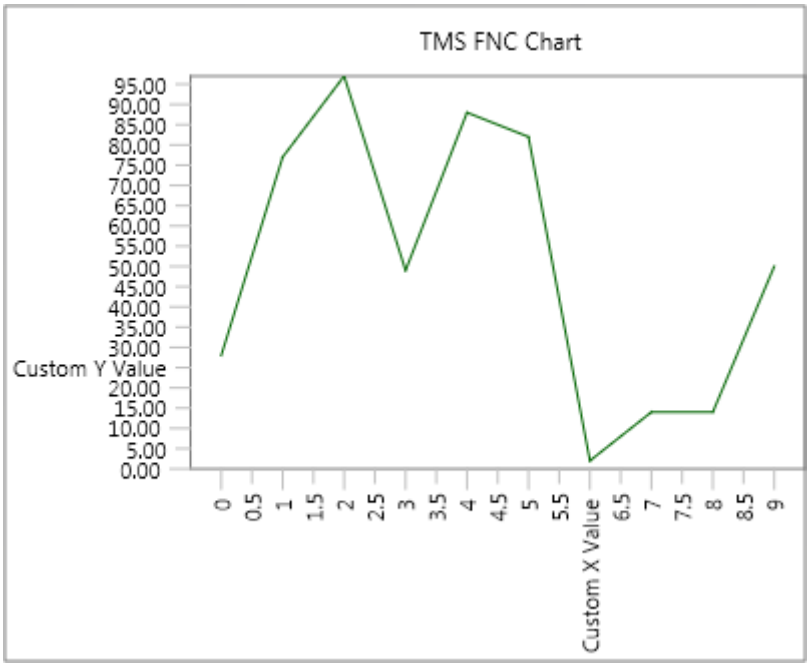


When the default formatting, or adding text to a point with the XValueText property is not sufficient, you can implement an event that returns a string at a specific `x-axis` value. This can be applied for both the `x-axis` and the `y-axis` and is demonstrated in the code below based on the previous sample.

```
var
 s: TTMSFNCChartSerie;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.Mode := smStatistical;
 s.AutoXRange := arEnabled;
 s.AutoYRange := arEnabledZeroBased;
 s.XValues.MinorUnit := 0.5;
 s.XValues.MinorUnitFormat := '%.1f';
 s.YValues.AutoUnits := False;
 s.YValues.MajorUnit := 10;
 s.YValues.MinorUnit := 5;
 s.XValues.Angle := -90;
 for I := 0 to 9 do
 s.Points.Add;
 TMSFNCChart1.EndUpdate;
end;
```

```
procedure TForm1.TMSFNCChart1GetSerieXValue(Sender: TObject;
 ASerie: TTMSFNCChartSerie; AIndex: Integer;
 AKind: TTMSFNCChartDrawXYValueKind; AValue: Double; var AValueString:
string);
begin
 if (AKind = vkMajor) and (AValue = 6) then
 AValueString := 'Custom X Value';
end;
procedure TForm1.TMSFNCChart1GetSerieYValue(Sender: TObject;
 ASerie: TTMSFNCChartSerie; AIndex: Integer;
AKind: TTMSFNCChartDrawXYValueKind; AValue: Double; var AValueString:
string);
begin
 if (AKind = vkMinor) and (AValue = 25) then
```

```
  AValueString := 'Custom Y Value';
end;
```



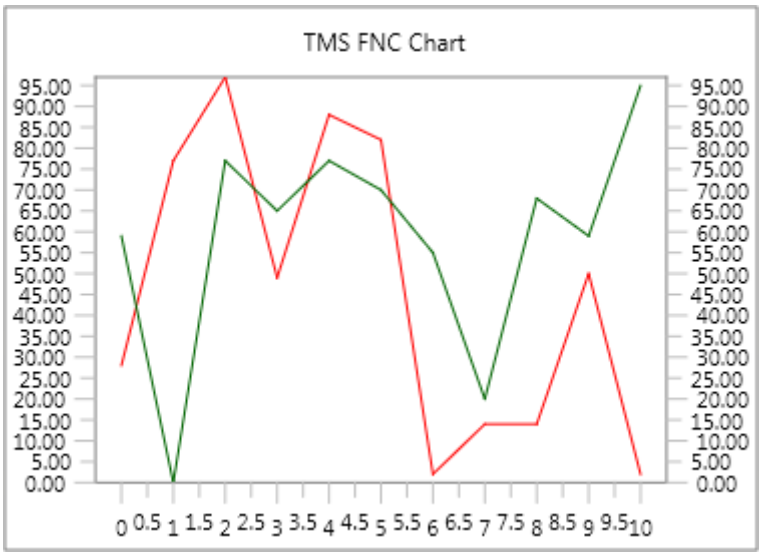
Autorange

Each series has an `AutoXRange` and an `AutoYRange` property. By default the `AutoXRange` property is set to `arDisabled` and the `AutoYRange` is set to `arEnabled`. When one of those properties has a disabled auto range, the range is set with the `MinX` and `MaxX` properties for the `x-axis`, and the `MinY` and `MaxY` properties for the `y-axis`. Each range can be extended with the percentage variant for each property.

The autorange is especially useful for common ranges, ranges which have the same minimum and maximum for all series. Below is a sample with 2 series with random values which have a common range. This sample also shows each common range at the left and right side `y-axis`.

```
var
  s: TTMSFNCChartSerie;
  I, J: Integer;
begin
  TMSFNCChart1.BeginUpdate;
  TMSFNCChart1.Clear;
  for I := 0 to 1 do
  begin
  s := TMSFNCChart1.Series.Add;
  s.Mode := smStatistical;
  s.AutoYRange := arCommonZeroBased;
  s.XValues.MinorUnit := 0.5;
  s.XValues.MinorUnitFormat := '%.1f';
  s.YValues.AutoUnits := False;
s.YValues.MajorUnit := 10;
  s.YValues.MinorUnit := 5;
  if I = 0 then
  begin
  s.Stroke.Color := gcRed;
  s.YValues.Positions := [ypLeft, ypRight];
  s.XValues.Positions := [xpBottom];
  end
```

```
  else
  begin
  s.YValues.Positions := [];
  s.XValues.Positions := [];
  end;
  for J := 0 to 10 do
  s.Points.Add;
  end;
  TMSFNCChart1.EndUpdate;
end;
```

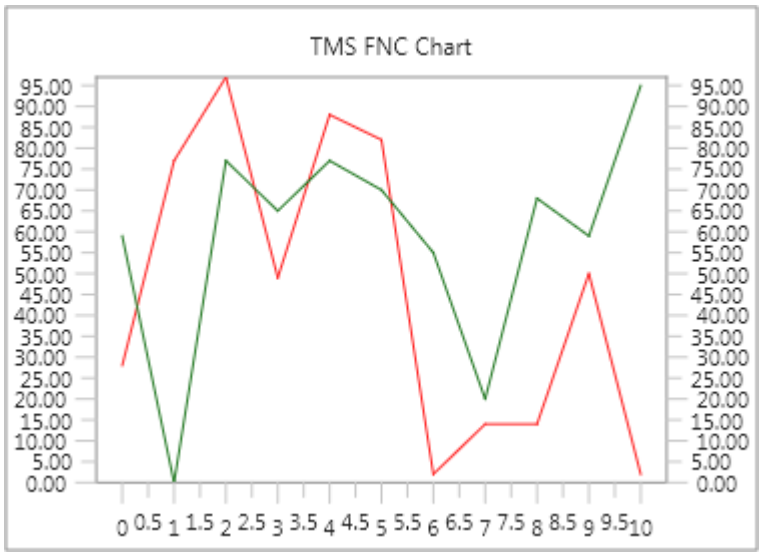


Mathemathical vs Statistical

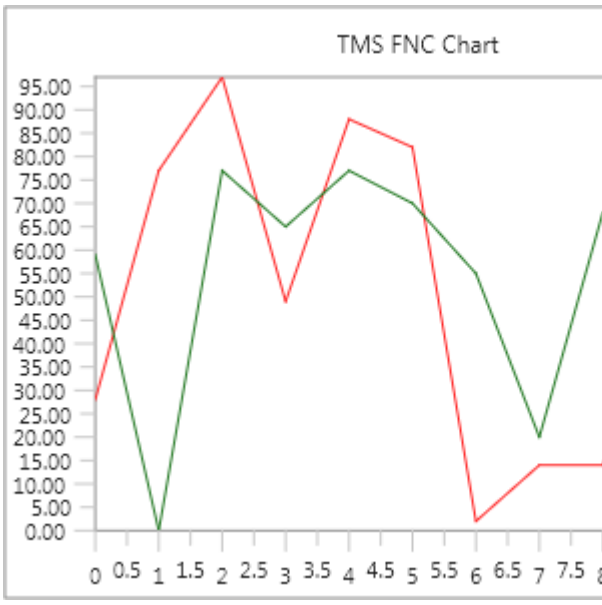
The Chart can display each series in a different mode. The default mode for each series is `Mathematical`. In mathematical mode, the `X-axis` zero value is at the crossing point of `X-axis` and `Yaxis` and thus the first value is displayed at the `Y-axis`. Further, it uses the

complete available width of the series rectangle. The alternative is `Statistical` mode, which automatically calculates and applies an offset on the `x-axis` to evenly distribute the values across the available chart width.

Statistical



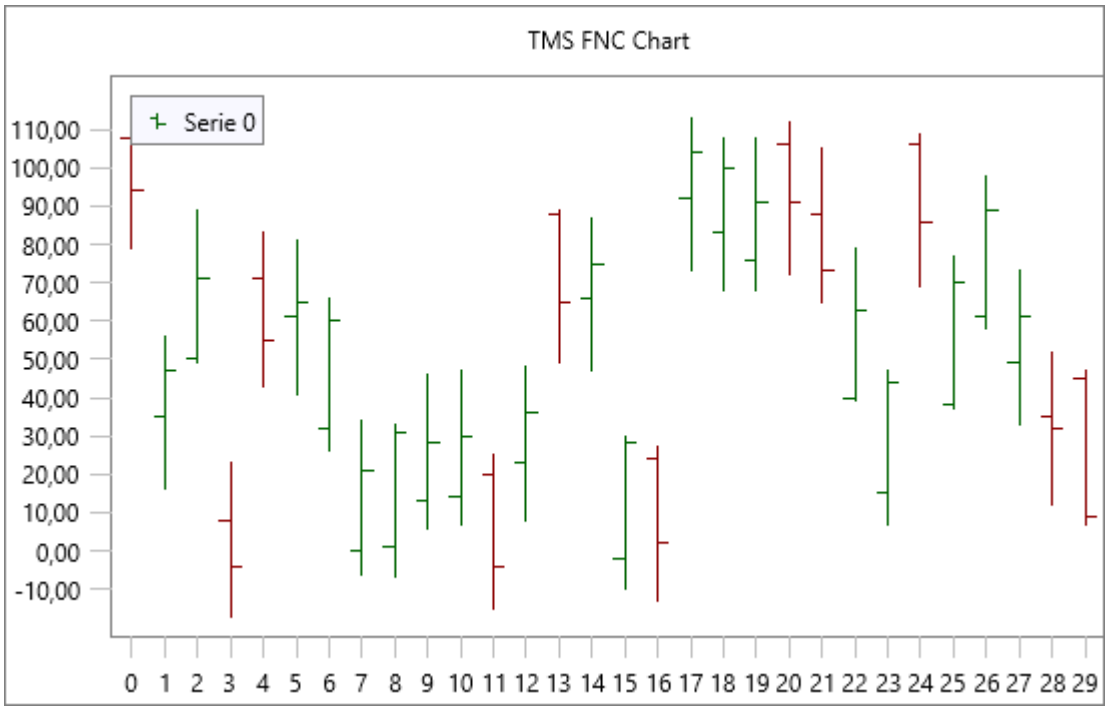
Mathematical



Multi-Point Series

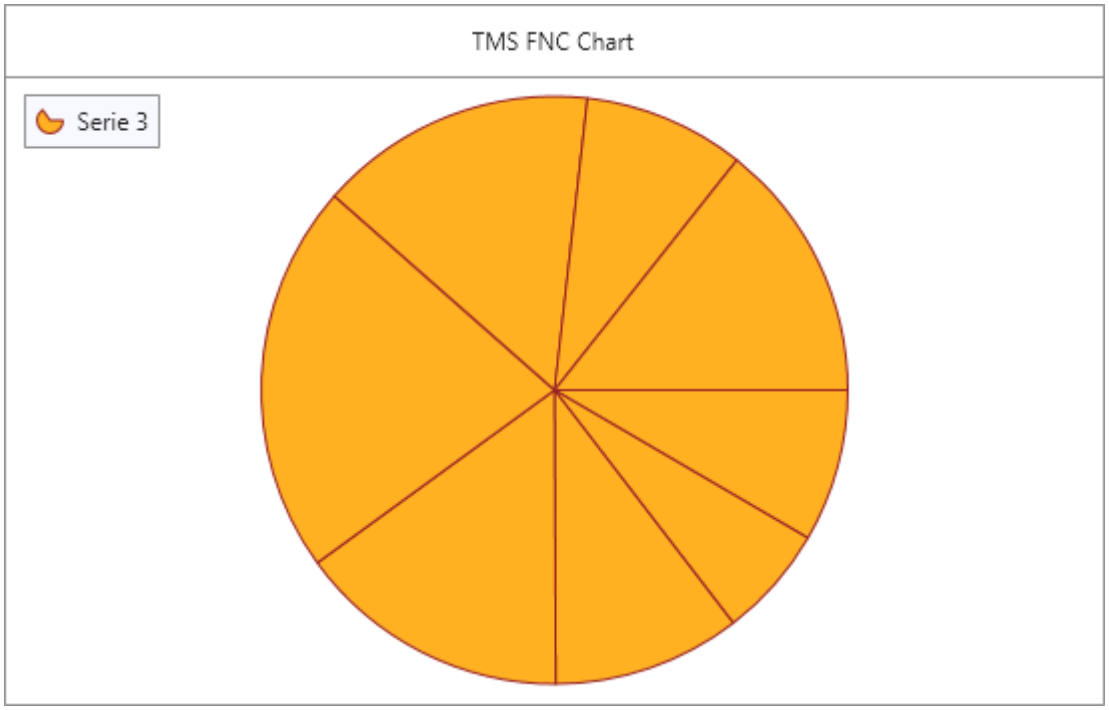
The Chart supports three types of multi-points series: `ctOHLC`, `ctCandleStick` and `ctBoxPlot`. Points can be added by using one of the `AddMultiPoint` overload methods. For the `ctCandleStick` and `ctBoxPlot` types, a separate increase and decrease fill and stroke color can be set under the series `MultiPoints` property. Below is a sample that demonstrates this.

```
var
 s: TTMSFNCChartSerie;
 c: Integer;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Series.Clear;
 TMSFNCChart1.SeriesMargins.Left := 10;
 TMSFNCChart1.SeriesMargins.Top := 10;
 TMSFNCChart1.SeriesMargins.Right := 10;
 TMSFNCChart1.SeriesMargins.Bottom := 10;
 s := TMSFNCChart1.Series.Add;
 s.ChartType := ctOHLC;
 s.AutoXRange := arCommonZeroBased;
 s.AutoYRange := arCommon;
 for I := 0 to 29 do
 begin
 c := Random(100);
 if Random(c) mod (Random(10) + 1) = 0 then
 s.AddMultiPoint(c + Random(20), c + 20, c - 20, c - Random(20))
 else
 s.AddMultiPoint(c - Random(20), c + 20, c - 20, c + Random(20));
end;
 TMSFNCChart1.EndUpdate;
```



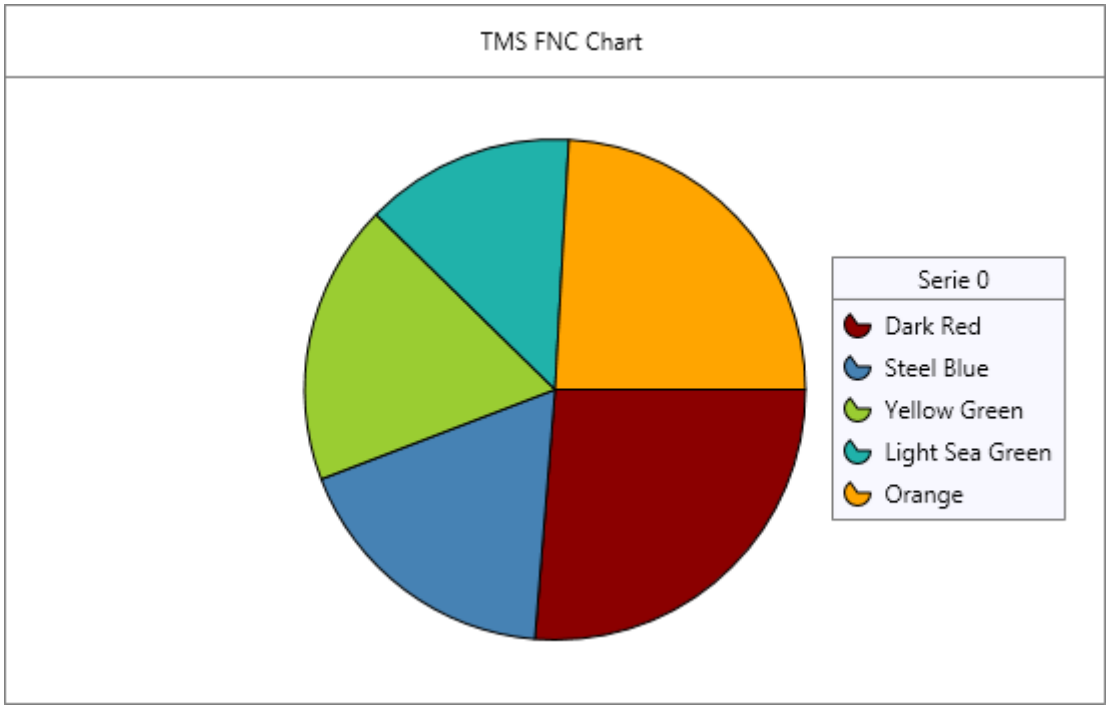
Pie

Changing the chart-type of one or multiple series to `ctPie` will automatically hide the x- and `y-axis` and the `x- and y-grid`. By default, the slices of the `Pie` will automatically take over the fill color of the series.



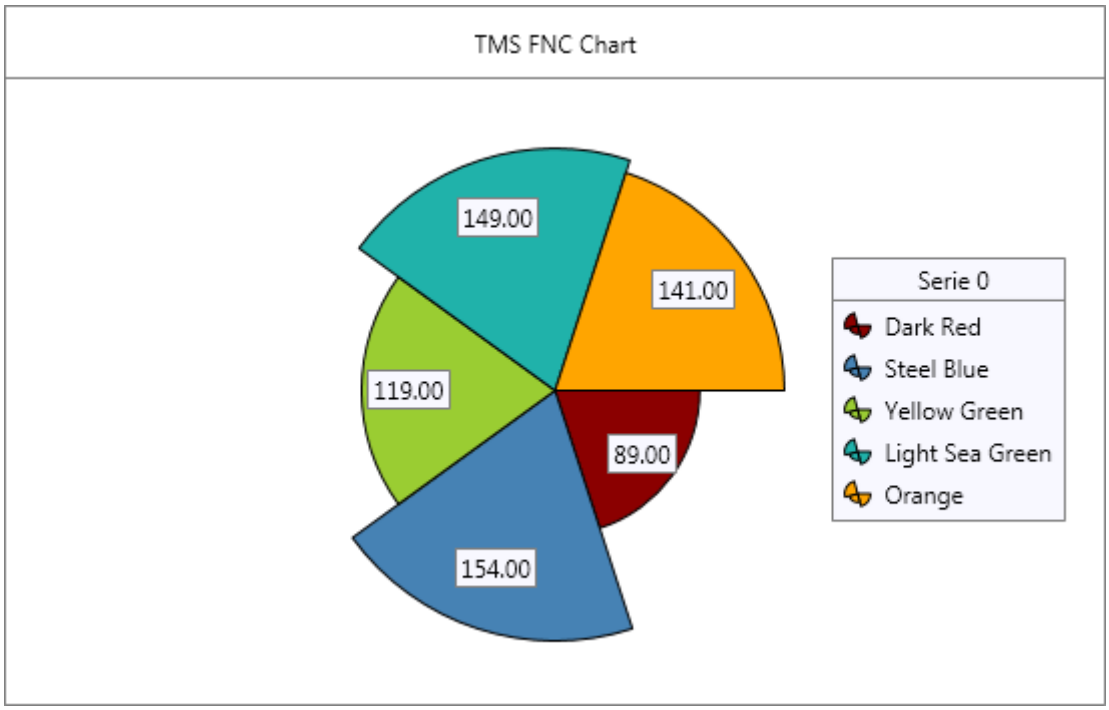
By default, the points that are added when initializing the series are reflected as separate slices. Adding points can be done with one of the `AddPoint` overloads. The general properties of a pie series can be changed at the `Pie` property. In the below sample, the main legend is hidden, the pie legend is shown and the colors for each slice are changed.

```
var
 s: TTMSFNCChartSerie;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Legend.Visible := False;
 TMSFNCChart1.Series.Clear;
 s := TMSFNCChart1.Series.Add;
 s.ChartType := ctPie;
 s.Pie.Size := 250;
 s.Points.Clear;
 s.Legend.Visible := True;
 s.Pie.AutoSize := False;
 s.Pie.Size := 250;
 s.Stroke.Color := gcBlack;
 s.AddPoint(Random(100) + 40, gcDarkred, 'Dark Red');
 s.AddPoint(Random(100) + 40, gcSteelblue, 'Steel Blue');
 s.AddPoint(Random(100) + 40, gcYellowgreen, 'Yellow Green');
 s.AddPoint(Random(100) + 40, gcLightseagreen, 'Light Sea Green');
 s.AddPoint(Random(100) + 40, gcOrange, 'Orange');
 TMSFNCChart1.EndUpdate;
end;
```



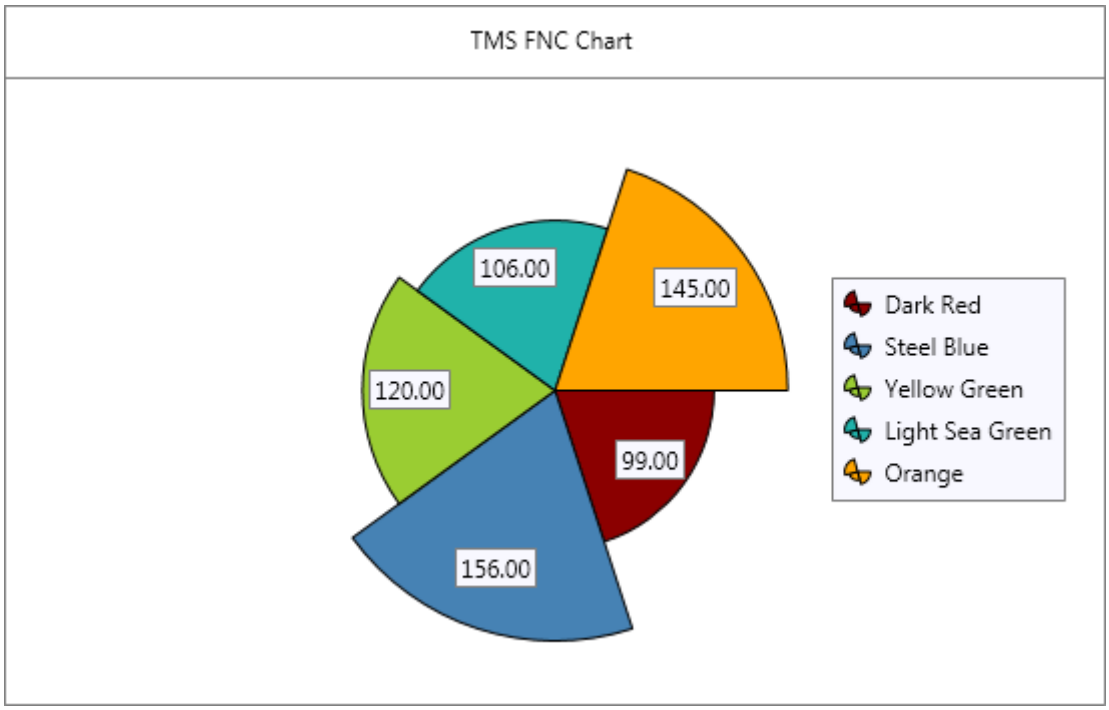
Labels and annotations are supported in the same way as they are for the other chart types. You simply add annotations and/or turn on the labels by setting the visible property to true.

```
s.Labels.Visible := True;
```



There are 2 variants for this charttype that allow handling more types of data. When setting the `ChartType` to `ctSizedPie`, the slices are equally divided, but the radius depends on the value of the point. When setting the `ChartType` to `ctVariableRadiusPie`, the slices are calculated as they are with a normal pie chart, but the radius can be controlled with an additional property called `YValueVariable`. This property can be accessed through the `AddVariablePoint` overload or directly at point level. Below is a sample of a `ctSizedPie`.

```
var
 s: TTMSFNCChartSerie;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Legend.Visible := False;
 TMSFNCChart1.Series.Clear;
 s := TMSFNCChart1.Series.Add;
 s.ChartType := ctSizedPie;
 s.Pie.Size := 400;
 s.Points.Clear;
 s.Legend.Visible := True;
 s.Pie.AutoSize := False;
 s.Pie.Size := 250;
 s.Stroke.Color := gcBlack;
 s.Labels.Visible := True;
 s.Labels.OffsetX := 0;
 s.Labels.OffsetY := 0;
 s.AddPoint(Random(100) + 75, gcDarkred, 'Dark Red');
 s.AddPoint(Random(100) + 75, gcSteelblue, 'Steel Blue');
 s.AddPoint(Random(100) + 75, gcYellowgreen, 'Yellow Green');
 s.AddPoint(Random(100) + 75, gcLightseagreen, 'Light Sea Green');
 s.AddPoint(Random(100) + 75, gcOrange, 'Orange');
 TMSFNCChart1.EndUpdate;
end;
```

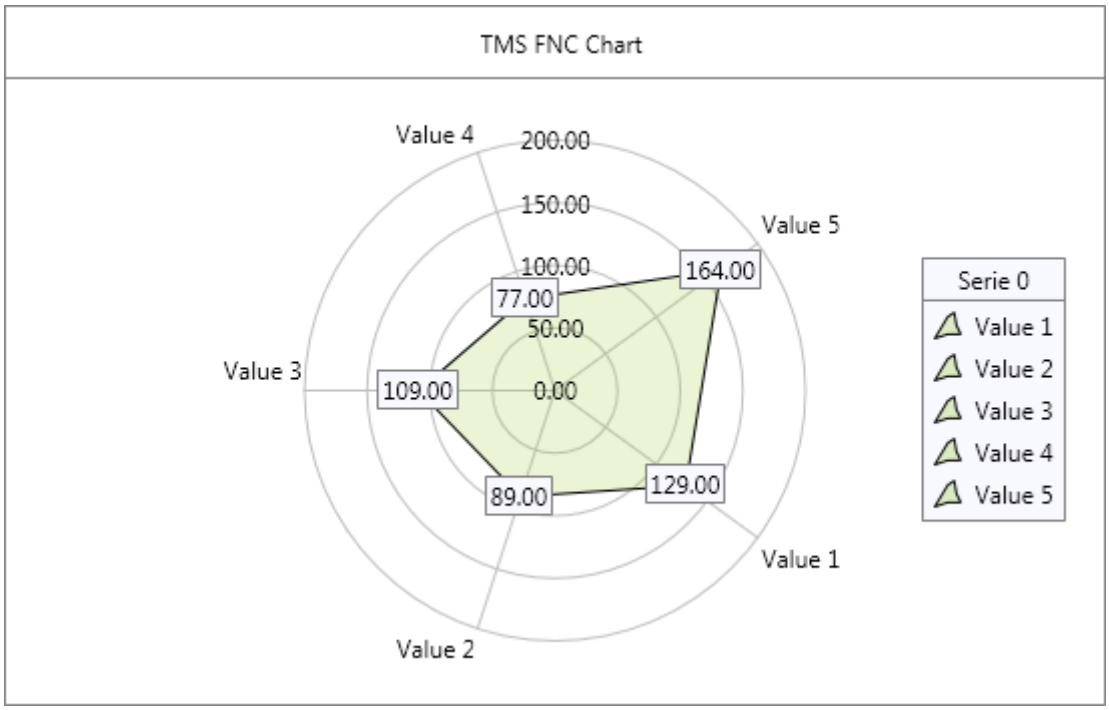


Spider

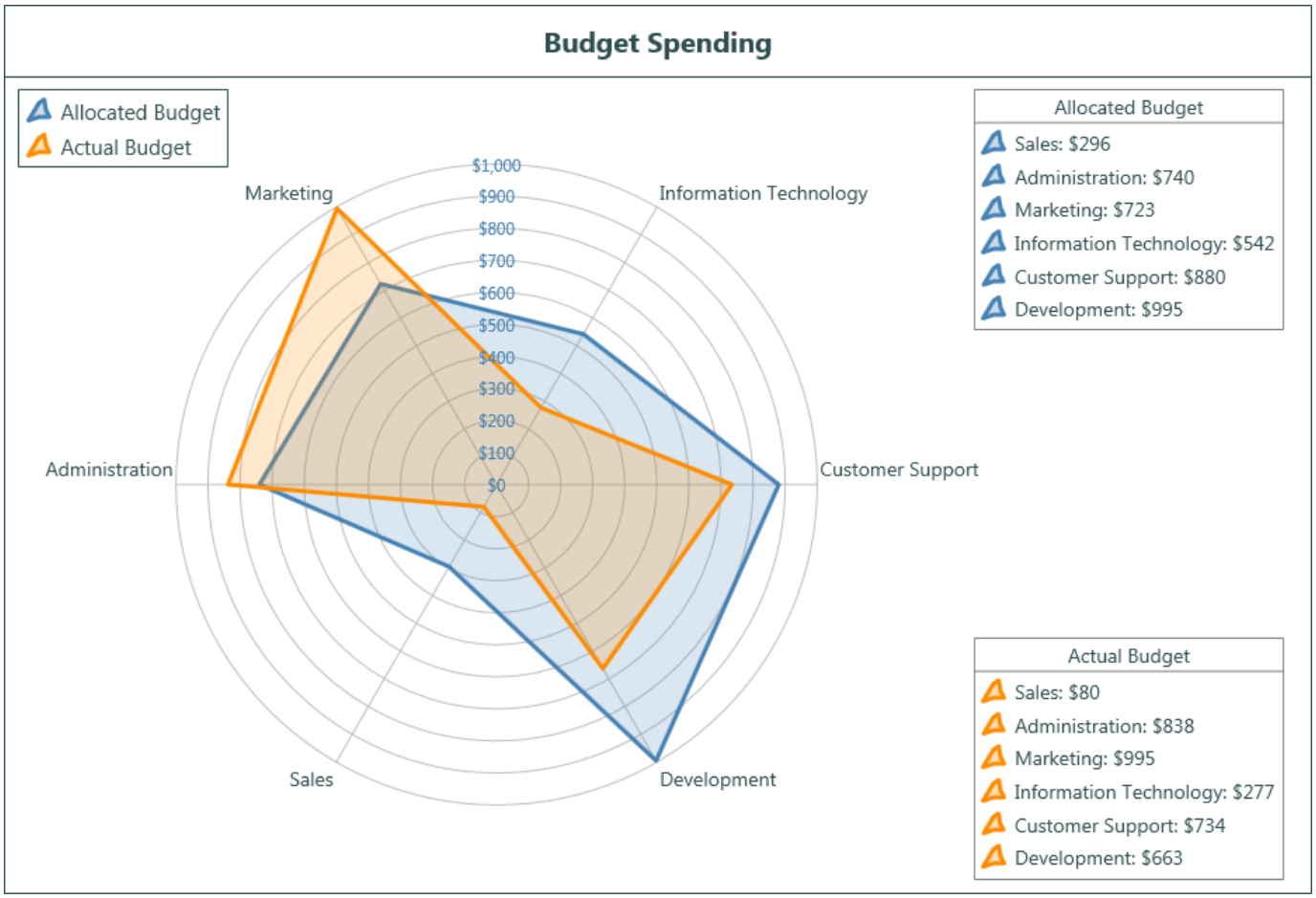
When changing the `ChartType` property to `ctSpider`, the properties of the `YValues` and `YGrid` properties are used to configure the visuals of the grid, while the start, sweep angles and dimensions are stored under the `Pie` property. Additionally, the `Spider*` properties under `YValues` and `YGrid` are used to further fine-tune spider chart specific features such as the grid kind and the values rotation angle. Applying the `ctSpider` chart type on the previous sample, changing the value labels, and applying the Spider properties to change Spider specific features generates the output below.

```
var
 s: TTMSFNCChartSerie;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Legend.Visible := False;
 TMSFNCChart1.Series.Clear;
 s := TMSFNCChart1.Series.Add;
 s.ChartType := ctSpider;
 s.Pie.Size := 400;
 s.Points.Clear;
 s.Legend.Visible := True;
 s.Pie.AutoSize := False;
 s.Pie.Size := 250;
 s.Fill.Opacity := 0.2; (FireMonkey only)
 s.Stroke.Color := gcBlack;
 s.Labels.Visible := True;
 s.Labels.OffsetX := 0;
 s.Labels.OffsetY := 0;
 s.YGrid.SpiderLegend := True;
 s.MaxY := 200;
 s.AutoYRange := arDisabled;
 s.YValues.AutoUnits := False;
 s.YValues.MajorUnit := 50;
 s.YValues.MinorUnit := 0;
 s.AddPoint(Random(100) + 75, 0, 'Value 1');
 s.AddPoint(Random(100) + 75, 0, 'Value 2');
 s.AddPoint(Random(100) + 75, 0, 'Value 3');
```

```
  s.AddPoint(Random(100) + 75, 0, 'Value 4');
  s.AddPoint(Random(100) + 75, 0, 'Value 5');
  TMSFNCChart1.EndUpdate;
end;
```



The `ctSpider` chart type follows the `AutoYRange` property to determine the maximum. When set to `arDisabled` (default), the `MaxY` property can be used to set a maximum for the grid drawing anspider chart calculation. Additionally, the enabled and common auto ranges can be used in combination with the stacked property on `Pie` level to compare multiple series in one chart. The above screenshot demonstrates this, and the code to accomplish this is demonstrated in the “Desktop” demo, available after installation.



Legend

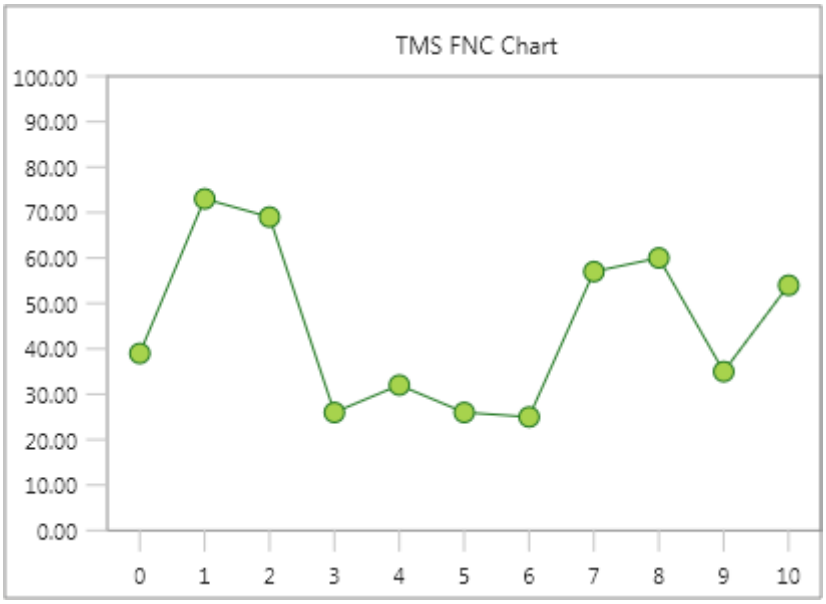
The legend displays the amount of series, each with their own legend text. If you want to display a legend for each series, with an entry for each point, you can turn off the `Legend` on chart level, and turn on the legend on series level. The properties are identical, and have the same customization events. In the previous chapter on the `Pie` chart type, the legend was displayed at the right side of the chart, with the typical chart type icon next to each entry. If you want further customization for this icon, you can override the `OnBeforeDrawSerieLegendIcon`. Below is a sample that demonstrates this.

```
procedure TForm1.TMSFNCChart1BeforeDrawSerieLegendIcon(Sender: TObject;
 ACanvas: TCanvas; ASerie: TTMSFNCChartSerie; APoint: TTMSFNCChartPoint;
 ARect: TRectF; var ADefaultDraw: Boolean);
begin
 ADefaultDraw := False;
 ACanvas.FillRect(ARect, 2, 2, AllCorners, 1);
 ACanvas.DrawRect(ARect, 2, 2, AllCorners, 1);
end;
```

Markers

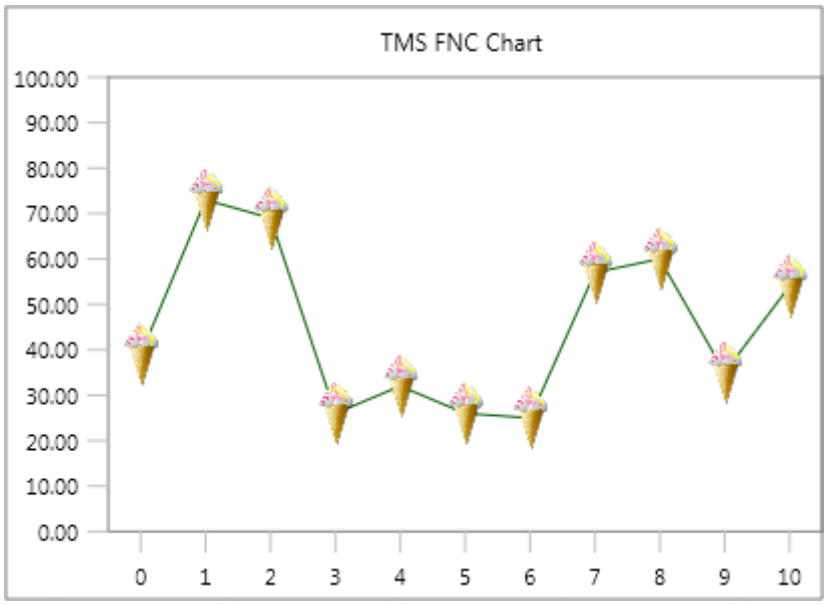
Each series has the ability to show markers. Markers have an ellipse shape by default but can be changed to draw a triangle, square, diamond and an image. Further customization can be achieved through the `OnBeforeDrawSerieMarker` and the `OnAfterDrawSerieMarker`. Below is a sample that shows how to enable the markers on a serie and how to change the shape to a bitmap.

```
var
 s: TTMSFNCChartSerie;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.Mode := smStatistical;
 s.Markers.Visible := True;
 s.AutoYRange := arDisabled;
 s.MinY := 0;
 s.MaxY := 100;
 for I := 0 to 10 do
 s.AddPoint(RandomRange(25, 75));
 TMSFNCChart1.EndUpdate;
end;
```




```
var
 s: TTMSFNCChartSerie;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.Mode := smStatistical;
s.Markers.Visible := True;
 s.Markers.Bitmap.LoadFromFile('icecream.png');
 s.Markers.Width := 32;
 s.Markers.Height := 32;
 s.Markers.Shape := msBitmap;
 s.AutoYRange := arDisabled;
 s.MinY := 0;
```

```
  s.MaxY := 100;
  for I := 0 to 10 do
  s.AddPoint(RandomRange(25, 75));
  TMSFNCChart1.EndUpdate;
end;
```

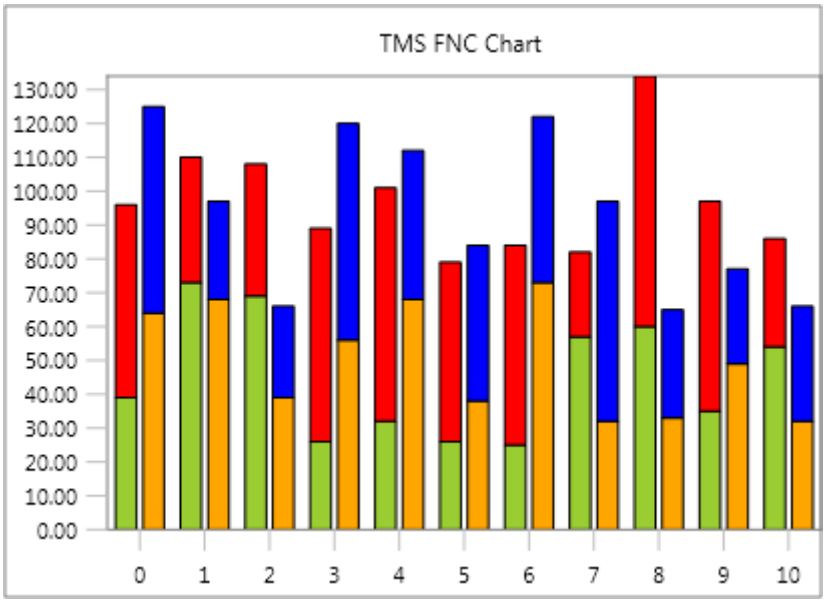


Stacked series

When choosing a bar or area chart, and adding multiple series, you are able to combine those series in stacked variants based on the type of chart and the `GroupIndex` property on series level. The requirement is that each of those combined series have the same range, and have a value that is larger than `0`. There are 2 types of stacked charts: the normal stacked charts combine the values for each group and the percentage stacked charts that represent the values of each series as a percentage of a maximum of `100`. Below is a sample that adds 4 bar series in 2 stacked groups.

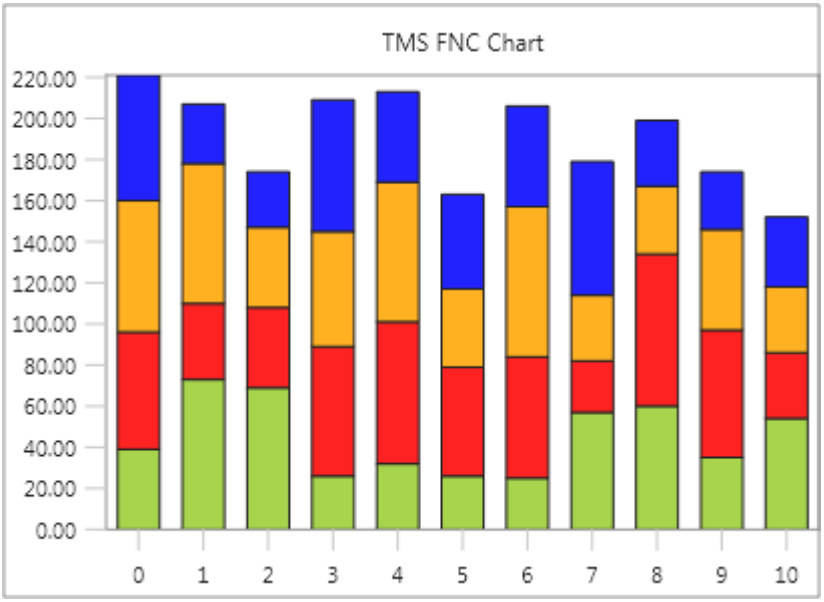
```
var
  s: TTMSFNCChartSerie;
  I, J: Integer;
begin
  TMSFNCChart1.BeginUpdate;
  TMSFNCChart1.Clear;
  for I := 0 to 3 do
  begin
  s := TMSFNCChart1.Series.Add;
  s.ChartType := ctStackedBar;
  s.Mode := smStatistical;
s.AutoYRange := arCommonZeroBased;
  s.GroupIndex := I div 2;

  case I of
  1: s.Fill.Color := gcRed;
  2: s.Fill.Color := gcOrange;
  3: s.Fill.Color := gcBlue;
  end;

  s.Stroke.Color := gcBlack;

  if I > 0 then
  begin
```

```
  s.YValues.Positions := [];
  s.XValues.Positions := [];
  end;

  for J := 0 to 10 do
  s.AddPoint(RandomRange(25, 75));
  end;
  TMSFNCChart1.EndUpdate;
end;
```

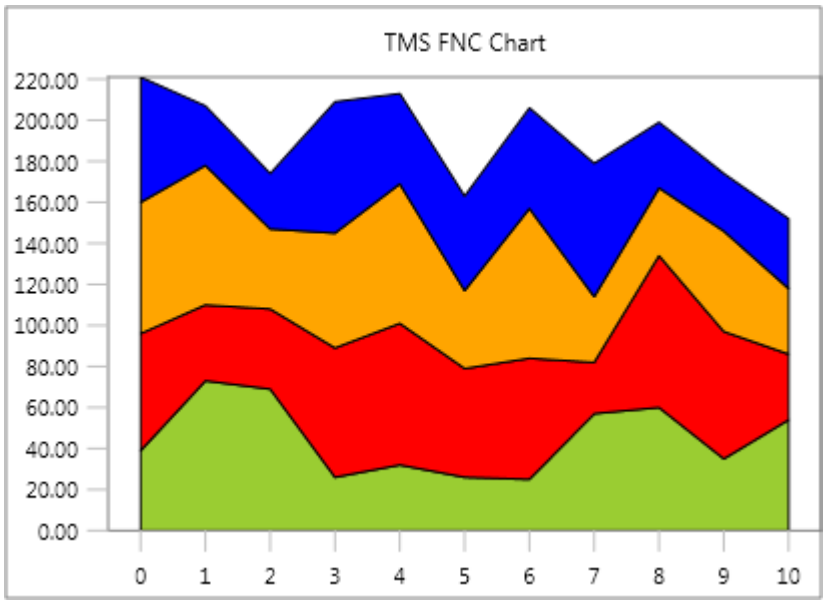


In this sample, the `GroupIndex` is `0` for the first 2 series and `1` for the last 2 series resulting in a multi-group stacked bar series `Chart`.

Changing the `GroupIndex` property to `0` for all series gives the result below.

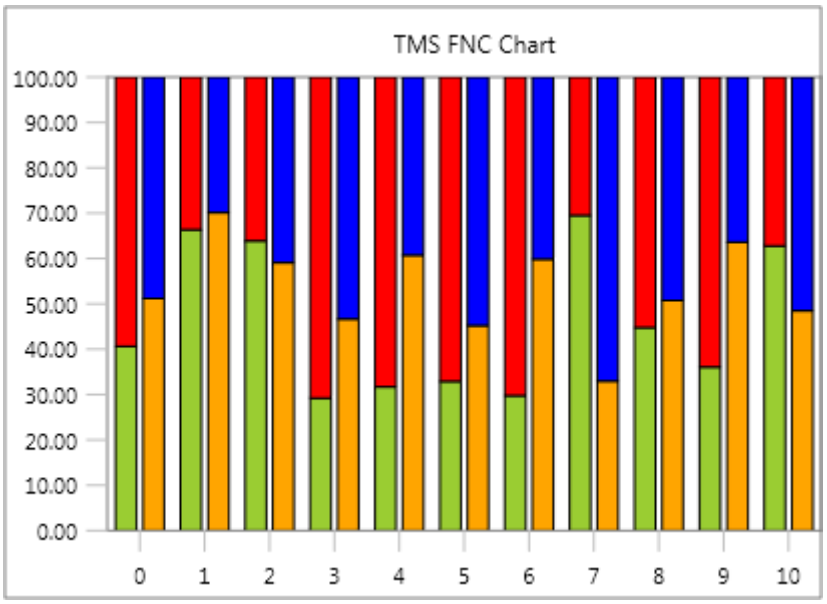


For an area type, the `GroupIndex` doesn't have any effect. With this type, all series are stacked like the previous sample with a `GroupIndex` that equals `0` for all series.



The second type of stacked series are based on a minimum of `0` and a maximum of `100`. The values that needs to be added can remain identical to the previous stacked chart and will internally be recalculated to match the `0` to `100` range. Below is a sample that demonstrates this.

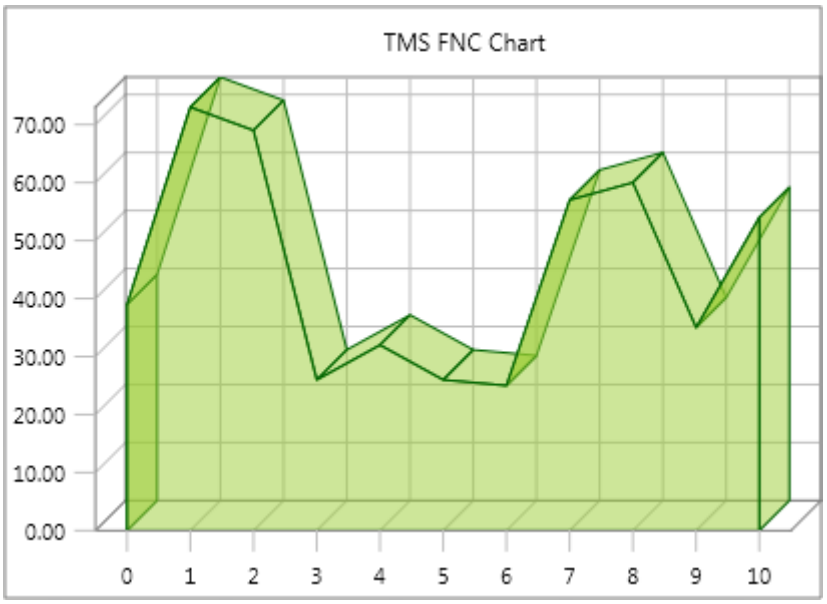
```
var
 s: TTMSFNCChartSerie;
 I, J: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 for I := 0 to 3 do
 begin
s := TMSFNCChart1.Series.Add;
 s.ChartType := ctStackedPercentageBar;
 s.Mode := smStatistical;
 s.AutoYRange := arCommonZeroBased;
 s.GroupIndex := I div 2;

 case I of
 1: s.Fill.Color := gcRed;
 2: s.Fill.Color := gcOrange;
 3: s.Fill.Color := gcBlue;
 end;

 s.Stroke.Color := gcBlack;

 if I > 0 then
 begin
 s.YValues.Positions := [];
 s.XValues.Positions := [];
 end;

 for J := 0 to 10 do
 s.AddPoint(RandomRange(25, 75));
 end;

 TMSFNCChart1.EndUpdate;
end;
```



3D

Each series has an `Enable3D` property that enables `2D` rendering of a `3D` like environment. The `Offset3DX` and `Offset3DY` properties on serie level determine the “depth” of the 3D visualization.Using the following code on an area chart, displays the chart with the following result:

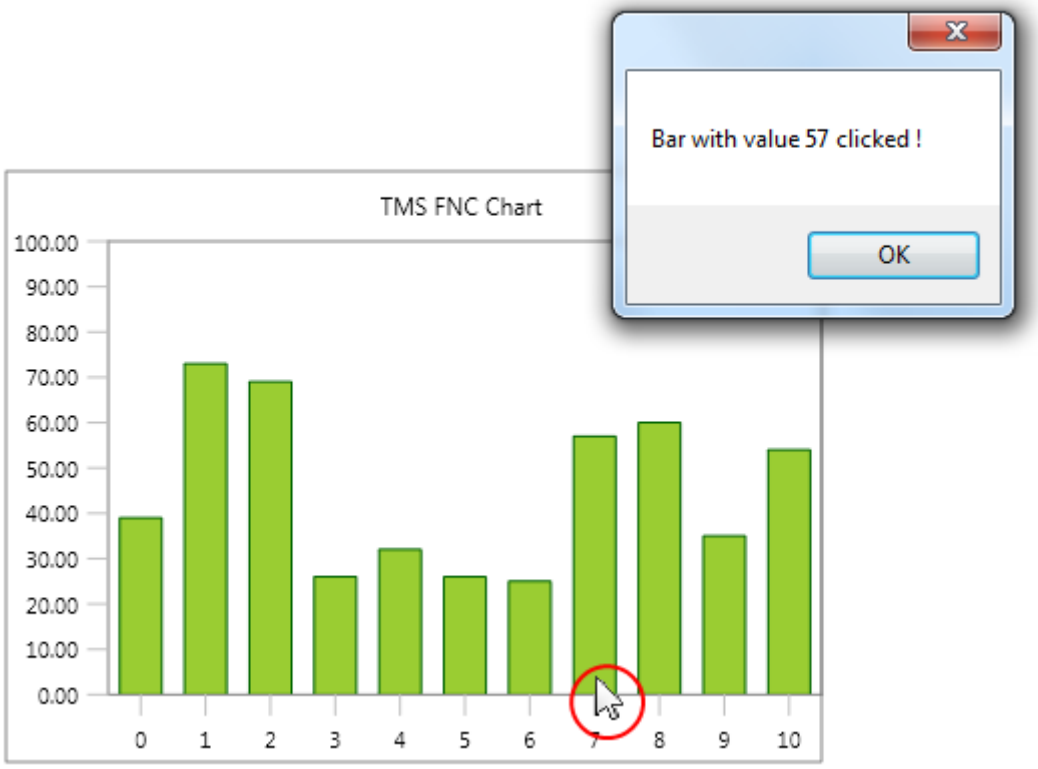
```
var
 s: TTMSFNCChartSerie;
 I: Integer;
begin
 TMSFNCChart1.BeginUpdate;
 TMSFNCChart1.Clear;
 s := TMSFNCChart1.Series.Add;
 s.ChartType := ctArea;
 s.Mode := smStatistical;
 s.AutoYRange := arEnabledZeroBased;
 s.Enable3D := True;
 s.XGrid.Visible := True;
 s.YGrid.Visible := True;
s.Fill.Opacity := 0.5; (FireMonkey only)
 for I := 0 to 10 do
 s.AddPoint(RandomRange(25, 75));
 TMSFNCChart1.EndUpdate;
end;
```



Interaction

The Chart supports interaction, which is enabled by default. Interaction enables click detection on a point or a bar and triggers the appropriate event. Additionally, panning and scaling can be performed in `X` and `Y` direction, depending on the property values under `InteractionOptions`. Below is a sample that implements the `OnSerieBarClick` event.

```
procedure TForm1.TMSFNCChart1SerieBarClick(Sender: TObject;
 APoint: TTMSFNCChartPoint);
begin
 ShowMessage('Bar with value ' + floattostr(APoint.YValue) + ' clicked
!');
end;
```



The alternative for all other chart types (except for the pie variants) is the `OnSeriePointClick` event which detects clicks on a point that lies within the `ClickMargin` boundaries relative from the point `X` and `Y` value. The `ClickMargin` is a property on Chart level. For the pie variants, the `OnSerieSliceClick` is executed.

Load Data

> **Note**
>
> More examples can be found in the Demos folder after installation.

FROM FILE, STREAM OR TEXT

There are a couple of ways that you can load data into your chart. Each of these methods can be used for a normal YValue, XValue and/or XLabel. The Ex-overload where you can add the YVariableValue and/or YSecondValue. And the Multi-Point overload where you set the high, low, open, close and if desired the median values.

When you call these methods you can use the DefaultLoadOptions or create a new instance of `TTMSFNCChartLoadOptions` and add this parameter to the call.

LoadFromDataArray, gives you the ability to load data in a serie or add a new serie with the data.

```
var
  loadOptions: TTMSFNCChartLoadOptions;
begin
  loadOptions := TTMSFNCChartLoadOptions.Create;
  loadOptions.YRange := arEnabledZeroBased;

  // Will change the values of the first Series in the chart, in case it doesn't exist, it will create
a new.
```

```
  // We add the YValues, the XValues are nil and not used, and we set the XLabels, with the options
that we've set.
  TMSFNCBarChart.LoadFromDataArray(loadOptions, 0, [123, 98, 54, 154, 128, 87, 103], nil, ['Apple',
'Watermelon', 'Pineapple', 'Pear', 'Banana', 'Lemon','Grapefruit', 'Peach']).LegendText := 'Sold';

  TMSFNCOHLCChart.LoadFromMultiPointDataArray(0, [82.63, 81.81, 82.44, 91.24, 95.92], [79.11, 79.99,
77.13, 75.71, 88.51], [81.56, 80.34, 80.94, 77.19, 91.01], [80.37, 80.94, 77.25, 91.00, 95.48]);
end;
```

LoadFromCSV, you can load data from a CSV-file by setting the indices of the different columns that you want to use. You can load the CSV from a file, url, stream or as text.

```
  // This method will create two series with the YValues and second values. The -1 values are the
XValues and XLabels and those aren't used.
  TMSFNCBandChart.LoadFromCSVEx(myCSVStream, [0,2], -1, -1 [1,3]);

  // This method will create an additional series with the values in the file. The -1 value is the
Median which isn't used.
  TMSFNCCandleStickChart.DefaultLoadOptions.ClearSeries := False;
  TMSFNCCandleStickChart.LoadFromCSVMultiPointData('myFile.csv', 3, 4, 2, 1, -1, 0);
```

LoadFromJSON, you can load the JSON from a file, url, stream or as text. The JSON values are set by choosing the name for each value. You can set the Series, Points, YValues are possible as a string or an array of strings if you have multiple values, ...

```
procedure Load;
begin
  TMSFNCBarChart1.LoadFromJSONData('my.json', 'series', 'points', 'sold', '', 'label', SeriesCallBack,
PointsCallBack);
end;

procedure PointsCallBack(ASerie: TTMSFNCChartSerie; APoint: TTMSFNCChartPoint; APointJSONValue:
TJSONValue);
var
  j: TJSONValue;
begin
    j := TTMSFNCUtils.GetJSONValue(APointJSONValue, 'fill');
    if Assigned(j) then
      APoint.Color :=  TTMSFNCUtils.GetJSONProp(APointJSONValue, 'fill');
end;
```

The JSON code used for this example:

```
{
  "series": {
    "type": "pie",
    "points": [
      {"label": "Apples", "sold": "128.14", "fill": "green"},
      {"label": "Oranges", "sold": "66.72", "fill": "orange"},
      {"label": "Lemons", "sold": "84.39", "fill": "yellow"}
    ],
    "other": "additional values"
  }
}
```

LOAD FROM DATABASE

The chart can be filled with a dataset and the Adapter property set to an instance of the `TTMSFNCChartDatabaseAdapter`.

LOAD FROM TMS FNC GRID

This requires to have TMS FNC UI Pack installed as well. You can link the data from the cells of a `TMSFNCGrid` with Adapter property set to an instance of the `TTMSFNCChartGridAdapter`.

2.1.2 Properties

Overview

Property name	Description
Adapter	Optional source to get data form, can be TTMSFNCChartDatabaseAdapter or TTMSFNCChartGridAdapter
Appearance	Set the look of the chart with the color scheme and global font.
ClickMargin	The margin which is used to detect a point when clicking on the Chart.
DefaultLoadOptions	The default settings used to load data.
Fill*	The fill of the background of the Chart.
Interaction	Enables or disables interaction on the Chart.
InteractionOptions	Interaction options for the Chart
Legend	The Legend of the Chart.
Series	The collection of series.
SeriesMargins	Additional margins applied to the series rectangle after calculation based on the `x-axis`, `y-axis` and title.
Stroke*	The stroke of the Chart.
Title	The title of the Chart.
XAxis	The x-axis of the Chart.
YAxis	The y-axis of the Chart.

InteractionOptions

Property name	Description
Panning	Enables or disables panning of the Chart in `x / y direction`. Please note that the `AutoXRange` and/or `AutoYRange` of the series need to be set to `arDisabled` to allow panning.
ScaleMode	Enables or disables scaling of the Chart in `x / y direction`. Please note that the `AutoXRange` and/or `AutoYrange` of the series need to be set to `arDisabled` to allow scaling.

Go back to Properties

Legend

Property name	Description
Fill*	The fill of the legend.
Font*	The font of the legend.
Left	The left offset of the legend
Position	The position of the legend relative from the series rectangle.
Stroke	The stroke of the legend.
Top	The top offset of the legend.
Visible	Shows / hides the legend.

Go back to Properties

LoadOptions

Of the type TTMSFNCChartLoadOptions.

You have the DefaultLoadPptions that are available as a property of the `TTMSFNCChart`. Or you can create a new instance of the class to load with specific settings.

Property name	Description
ClearSeries	Clear the previous created series.
CSVDelimiter	The seperator to use for the CSV, this is default empty and if empty it will check for the best fitting char.
CSVFirstLine	How to use the first line of the CSV file. You can skip it, use it as the series name or set it as values.
MaxYOffsetPercentage	The percentage to add to the maximum of the YValues, default set to 5%.
XGrid	Should the XGrid be visible, default False.
YGrid	Should the YGrid be visible, default True.
XRange	The AutoRange value that should be set for the added series.
YRange	The AutoRange value that should be set for the added series.
XValuesFormatType	The FormatType value that should be set for the added series.
XValuesFormatString	The FormatString value that should be set for the added series.
YValuesFormatType	The FormatType value that should be set for the added series.
YValuesFormatString	The FormatString value that should be set for the added series.

Go back to Properties

Series

OVERVIEW

Property name	Description
AnimationFactor	
AnimationFlow	
AutoXRange	The range of the series x-values. - `arDisabled` Does not automatically calculate the range of the series `x-values` and applies the `Series` → `MinX` and `Series` → `MaxX` properties - `arEnabled` Automatically calculates the range of the series x-values. - `arEnabledZeroBased` Automatically calculates the range of the series `x-values` based on a minimum of `0` (default reference value). - `arCommon` Automatically calculates the common range of all series `x-values` with the `Series` → `AutoXRange` property set to `arCommon` or `arCommonZeroBased`. - `arCommonZeroBased` Automatically calculates the common range of all series `x-values` with a common minimum of `0` (default reference value) with the `Series` → `AutoXRange` property set to `arCommon` or `arCommonZeroBased`.
Bar	Bar
Fill	The fill of the series.
GroupIndex	The group index of the series when using bar charts and stacked bar charts or stacked area charts.
Labels	The labels of the series that can be made visible and display for each point.
Legend	The Legend of the series.
Markers	The markers of the series. Markers are predefined shapes or images with the ability to apply customization through one of the various events.
MaxX	The maximum `x value` when the `Series` → `AutoXRange` property is set to `arDisabled`.
MaxXOffsetPercentage	An additional offset in percentage that is applied to the series maximum `x value`.
MaxY	The maximum `y value` when the `Series` → `AutoYRange` property is set to `arDisabled`.
MaxYOffsetPercentage	An additional offset in percentage that is applied to the series maximum `y value`.
MinX	An additional offset in percentage that is applied to the series minimum `x value`.
MinXOffsetPercentage	An additional offset in percentage that is applied to the series minimum `x value`.

Property name	Description
MinY	The minmum y value when the `Series` → `AutoXRange` property is set to `arDisabled`.
MinYOffsetPercentage	An additional offset in percentage that is applied to the series minimum `y value`.
Mode	Changes the mode of the series between mathematicaly and statistical.
Multipoint	
Offset3DX	The `x offset` used to draw the series in a 3D-like view in a 2D coordinate space.
Offset3DY	The `y offset` used to draw the series in a 3D-like view in a 2D coordinate space.
Pie	The settings of a series, when the series contain one or multiple pie charts.
Points	The points
ShowInLegend	Optionally displays the LegendText of the series in the legend.
Stroke	The stroke of the series, applied on a line type Chart and the border of area and bar charts.
Visible	Shows / hides the series.
XGrid	The grid based on the x values of the series which automatically follows the `XValues` MajorUnit and MinorUnit properties.
Xvalues	The values drawn on the x-axis.
YGrid	The grid based on the y values of the series which automatically follows the YValues MajorUnit and MinorUnit properties.
YValues	The values drawn on the `y-axis`.
ZeroReferenceValue	The value used as a reference for drawing the bar and area Chart types.

Go back to Properties

BAR

Property name	Description
Spacing	The spacing between a group of bars.
Width	The width of a bar chart
WidthType	The type of the width applied, which can be actual pixels or a percentage of the available `XScale`.

Go back to Series

LABELS

Property name	Description
Fill*	The fill of the labels
Font	The font of the text of the labels. The text is based on the `Series` → `Points` → `YValue` property and formatted with the `Series` → `Labels` → `Format` property.
Format	The format string of the labels.
FormatType	The type of format of the labels. The type can be set to `normal` (Format Delphi function), `float` (FormatFloat Delphi function) or `DateTime` (FormatDateTime function).
Mode	The mode of the labels. The mode is set to `normal` by default which displays the actual `Series` → `Points` → `YValue` property value with the chosen formatting. When set to stacked, the same formatting is applied but on the summed total of each series.
OffsetX	An additional x offset starting from the default location of the label.
OffsetY	An additional y offset starting from the default location of the label.
Stroke*	The stroke of the label.
Visible	Shows or hides the labels.

Go back to Series

LEGEND

Property name	Description
Fill*	The fill of the legend.
Font*	The font of the legend.
Left	The left offset of the legend
Position	The position of the legend relative from the series rectangle.
Stroke	The stroke of the legend.
Top	The top offset of the legend.
Visible	Shows / hides the legend.

Go back to Series

MARKERS

Property name	Description
Bitmap	The default bitmap of a marker when the `Series` → `Markers` → `Shape` property is set to contain a bitmap
Fill*	The fill of the marker.
Height	The height of the marker.
Shape	The shape of the marker.
Stroke*	The stroke of the marker.
Visible	Shows / hides the marker.
Width	The width of the marker.

Go back to Series

MULTIPOINT

Property name	Description
DecreaseFillColor	The fill color applied to a multi-point chart when the open or `Q3` value is lower than the close or `Q1` value.
DecreaseStrokeColor	The stroke color applied to a multi-point chart when the open or `Q3` value is lower than the close or `Q1` value.
IncreaseFillColor	The fill color applied to a multi-point chart when the open or `Q3` value is higher than the close or `Q1` value.
IncreaseStrokeColor	The stroke color applied to a multi-point chart when the open or `Q3` value is higher than the close or `Q1` value.
Width	The width of the rectangular area of a multi-point series
WidthType	The type of width applied to the rectangular area of a multi-point series, which can be actual pixels or a percentage of the available `X-Scale`.

Go back to Series

PIE

Property name	Description
AutoSize	Enables auto-sizing of the pie. If false, the size property is used to determine the size of the pie.
InnerSize	The inner size of the pie.
Position	The position of the pie relative to the series rectangle, and determined by the stacked property and the number of series.
Size	The size of the pie, if the `AutoSize` property is false.
Stacked	When one or multiple pie(s) have the stacked property to True, the series rectangle is not divided by the number of series. Instead all series are drawn with the same rectangle. The `Margins` still apply
StartAngle	The start angle of the pie.
SweepAngle	The sweep angle of the pie.
Margins	The pie margins, which are also used to determine the pie rectangle, based on the stacked property and the number of series.

Go back to Series

POINTS

Overview

Property name	Description
Annotations	The annotations of a point for a series. Each series can have multiple points, and each point can have multiple annotations.
Color	The color of the point, used to color bars or pie slices of a series.
Explode	The explode value of a slice of a pie type chart.
LegendText	The legend text of a point.
LegendText	The x value of the point. When adding a new point, this value is incremented by 1.
XValueText	The text of the x value used in combination with an unmodified `XValue`.
YValue	The y value of the point.
YValueSecond	The second / lower y value of the point (`ctBand`).
YValueVariable	The second or variable y value of the point.

Go back to Series

Annotations

Property name	Description
Arrow	The type of arrow that is drawn when displaying an annotation.
ArrowColor	The color of the arrow(s).
ArrowOpacity (FireMonkey only)	The opacity of the arrow(s).
ArrowSize	The size of the arrow(s).
AutoSize	Enables auto-sizing of the annotation based on the text.
BalloonArrowSize	The size of the balloon arrow when the shape is set to `asBalloon`.
BalloonDirection	The direction to which the balloon should point.
CornerRadius	The radius of the corners of the shape when the shape is set to `asBalloon` or `asRectangle`.
Fill*	The fill of the annotation.
Font*	The font of the text of the annotation.
Height	The height of the annotation when `AutoSize` is false.
LineColor	The color of the line of the annotation.
LineOpacity (FireMonkey only)	The opacity of the line of the annotation.
LineThickness	The thickness of the line of the annotation.
OffsetX	An additional x offset applied to the annotation starting from the default position.
OffsetY	An additional y offset applied to the annotation starting from the default position.
Shape	The shape of the annotation. An annotation can be change to a rectangle, a balloon or an ellipse shape.
Stroke*	The stroke of the annotation.
Text	The text of the annotation.
TextHorizontalAlignment	The horizontal alignment of the text of the annotation.
TextVerticalAlignment	The vertical alignment of the text of the annotation.
Visible	Shows / hides the annotation.
Width	The width of the annotation with `AutoSize` is false.
WordWrap	Enables / disables wordwrapping on the annotation.

Go back to Points

XGRID

Property name	Description
Extended	Extends the grid to the series rectangle with or without `SeriesMargins` or limits the grid to the same rectangle with the `SeriesMargins`.
MajorUnitStroke*	The major unit stroke settings for the `x-grid`.
MinorUnitStroke*	The minor unit stroke settings for the `x-grid`.
Visible	Shows / hides the `x-grid`.

Go back to Series

XVALUES

Property name	Description
Angle	The angle that is used to rotate the values drawn on the `x-axis`.
AutoUnits	Applies automatic unit calculation based on the available width of the `x-axis`.
MajorUnit	The major unit value used to draw the `x-axis` values in divisions.
MajorUnitFont*	The font of the major unit values.
MajorUnitFormat	The formatting of the major unit values.
MajorUnitFormatType	The format type of the major unit values. The formatting is identical to the series labels formatting
MajorUnitSpacing	The spacing of the major unit values between the text and the tickmark.
MajorUnitTickMarkColor	The color of the tickmark of the minor unit.
MajorUnitTickMarkSize	The size of the tickmark of the minor unit.
MinorUnit	The minor unit value used to draw the `x-axis` values in divisions.
MinorUnitFont*	The font of the minor unit values.
MinorUnitFormat	The formatting of the minor unit values.
MinorUnitFormatType	The format type of the minor unit values. The formatting is identical to the series labels formatting.
MinorUnitSpacing	The spacing of the minor unit values between the text and the tickmark.
MinorUnitTickMarkColor	The color of the tickmark of the minor unit.
MinorUnitTickMarkSize	The size of the tickmark of the minor unit.
Positions	The position of the `x-axis` values of a series. Each series can position its values optionally top, center and/or bottom.
Title	The title of the `x-axis` values of a series.

Go back to Series

YGRID

Property name	Description
Extended	Extends the grid to the series rectangle with or without `SeriesMargins` or limits the grid to the same rectangle with the `SeriesMargins`.
MajorUnitStroke*	The major unit stroke settings for the `y-grid`.
MinorUnitStroke*	The minor unit stroke settings for the `y-grid`.
SpiderKind	Sets the kind of grid that is displayed when the `ctSpider` chart type is chosen.
SpiderLegend	Shows / hides the legend values on the outside of the grid when the `ctSpider` chart type is chosen.
SpiderVisible	Shows / hides the grid when the `ctSpider` chart type is chosen.
Visible	Shows / hides the `y-grid`.
SpiderKind	Sets the kind of grid that is displayed when the `ctSpider` chart type is chosen.
SpiderLegend	Shows / hides the legend values on the outside of the grid when the `ctSpider` chart type is chosen.
SpiderVisible	Shows / hides the grid when the `ctSpider` chart type is chosen.
Visible	Shows / hides the `y-grid`.

Go back to Series

YVALUES

Property name	Description
AutoUnits	Applies automatic unit calculation based on the available width of the `y-axis`.
MajorUnit	The major unit value used to draw the `y-axis` values in divisions.
MajorUnitFont*	The font of the major unit values.
MajorUnitFormat	The formatting of the major unit values.
MajorUnitFormatType	The format type of the major unit values. The formatting is identical to the series labels formatting
MajorUnitSpacing	The spacing of the major unit values between the text and the tickmark
MajorUnitTickMarkColor	The color of the tickmark of the minor unit
MajorUnitTickMarkSize	The size of the tickmark of the minor unit
MinorUnit	The minor unit value used to draw the `y-axis` values in divisions.
MinorUnitFont*	The font of the minor unit values.
MinorUnitFormat	The formatting of the minor unit values
MinorUnitFormatType	The format type of the minor unit values. The formatting is identical to the series labels formatting.
MinorUnitSpacing	The spacing of the minor unit values between the text and the tickmark.
MinorUnitTickMarkColor	The color of the tickmark of the minor unit.
MinorUnitTickMarkSize	The size of the tickmark of the minor unit.
Positions	The position of the `y-axis` values of a series. Each series can position its values optionally top, center and/or bottom
SpiderValues	Shows / hides the values on the grid when the `ctSpider` chart type is chosen
Title	The title of the `y-axis` values of a series.

Go back to Series

Title

Property name	Description
Border	Optionally enables / disables a border on the title.
Fill	The fill of the title.
Font*	The font of the title.
Height	The height of the title
Line	Draws a single line on the title rectangle based on its position in the Chart.
Positions	The title positions, which can be top, bottom or both.
Stroke	The stroke of the title.
Text	The text of the title.
TextHorizontalAlignment	The horizontal alignment of the text of the title.
TextMargins	The text margins of the title.
TextVerticalAlignment	The vertical alignment of the text of the title.
Visible	Shows / hides the title.

Go back to Properties

XAxis

Property name	Description
Autosize	Enables autosizing of the `x-axis`. Autosizing automatically calculates the spacing for all `x-axis` enabled series.
Border	Optionally displays the border of the x-axis.
DisplayAtReferenceValue	Optionally displays the centered `X-Axis` at a specific reference value based on the `ReferenceValueSeriesIndex` property
Fill*	The fill of the `x-axis`.
Height	The height of the `x-axis`
Line	Draws a single line on the `x-axis` rectangle based on its position in the Chart.
Positions	The `x-axis` positions, which can be `top`, `center`, `bottom` or combinations of those three values.
ReferenceValue	The value where the centered `X-Axis` is placed based on the `ReferenceValueSeriesIndex` and `ReferenceValue` properties.
ReferenceValueSeriesIndex	The index of the series that is being referenced to calculate the position of the centered `X-Axis` based on the `ReferenceValue` property
Stroke*	The stroke of the `x-axis`.
Visible	Shows / hides the `x-axis`.

Go back to Properties

YAxis

Property name	Description
Autosize	Enables autosizing of the `y-axis`. Autosizing automatically calculates the spacing for all `y-axis` enabled series
Border	Optionally displays the border of the `y-axis`.
DisplayAtReferenceValue	Optionally displays the centered `Y-Axis` at a specific reference value based on the `ReferenceValueSeriesIndex` property
Fill*	The fill of the `y-axis`
Line	The height of the `y-axis`.
Positions	Draws a single line on the `y-axis` rectangle based on its position in the Chart
ReferenceValue	The value where the centered `Y-Axis` is placed based on the `ReferenceValueSeriesIndex` and `ReferenceValue` properties.
ReferenceValueSeriesIndex	The index of the series that is being referenced to calculate the position of the centered `Y-Axis` based on the `ReferenceValue` property
Stroke*	The `y-axis` positions, which can be `top`, `center`, `bottom` or combinations of those three values.
Visible	The stroke of the `y-axis`.
Width	Shows / hides the `y-axis`.

Go back to Properties

2.1.3 Events

Event name	Description
OnAfterDrawBackground	Event called after the background of the Chart is drawn.
OnAfterDrawChart	Event called after the Chart is drawn.
OnAfterDrawLegend	Event called after the legend is drawn.
OnAfterDrawLegendIcon	Event called after the icon of an entry in the legend is drawn.
OnAfterDrawSerieAnnotation	Event called after an annotation of a point on a series is drawn.
OnAfterDrawSerieBar	Event called after a bar of point on a series is drawn.
OnAfterDrawSerieLabel	Event called after a label of a point on a series is drawn.
OnAfterDrawSerieLegend	Event called after the legend of a series is drawn.
OnAfterDrawSerieLegendIcon	Event called after the icon of an entry in the legend of a series is drawn.
OnAfterDrawSerieLegendIconVirtual	
OnAfterDrawSerieLine	Event called after a line between 2 points on a series is drawn.
OnAfterDrawSerieMarker	Event called after a marker of a point on a series is drawn
OnAfterDrawSeries	Event called after all series have been drawn.
OnAfterDrawSerieSlice	Event called after the slice of a series is drawn.
OnAfterDrawSerieXGridLine	Event called after an `x grid` line of a series has been drawn.
OnAfterDrawSerieXValue	Event called after an `x value` of a series has been drawn.
OnAfterDrawSerieYGridLine	Event called after a `y grid` line of a series has been drawn.
OnAfterDrawSerieYValue	Event called after a `y value` of a series has been drawn.
OnAfterDrawTitle	Event called after the title has been drawn.
OnAfterDrawXAxis	Event called after the `x-axis` has been drawn.
OnAfterDrawXValuesTitle	Event called after the `x-values` title of a series has been drawn.
OnAfterDrawYAxis	Event called after the `y-axis` has been drawn.
OnAfterDrawYValuesTitle	Event called after the `y-values` title of a series has been drawn.
OnAnimateSerieFinished	Event called when the series animation is finished.
OnAnimateSerieStarted	Event called when the series animation is started.
OnBeforeDrawBackground	Event called before the background of the Chart is drawn.
OnBeforeDrawChart	Event called before the Chart is drawn.
OnBeforeDrawLegend	Event called before the legend is drawn.

Event name	Description
OnBeforeDrawLegendIcon	Event called before the icon of an entry in the legend is drawn.
OnBeforeDrawSerieAnnotation	Event called before an annotation of a point on a series is drawn.
OnBeforeDrawSerieBar	Event called before a bar of point on a series is drawn.
OnBeforeDrawSerieLabel	Event called before a label of a point on a series is drawn.
OnBeforeDrawSerieLegend	Event called before the legend of a series is drawn.
OnBeforeDrawSerieLegendIcon	Event called before the icon of an entry in the legend of a series is drawn.
OnBeforeDrawSerieLegendIconVirtual	
OnBeforeDrawSerieLine	Event called before a line between 2 points on a series is drawn.
OnBeforeDrawSerieMarker	Event called before a marker of a point on a series is drawn.
OnBeforeDrawSeries	Event called before all series have been drawn.
OnBeforeDrawSerieSlice	Event called before the slice of a series is drawn.
OnBeforeDrawSerieXGridLine	Event called before an `x grid` line of a series has been drawn
OnBeforeDrawSerieXValue	Event called before an `x value` of a series has been drawn.
OnBeforeDrawSerieYGridLine	Event called before a `y grid` line of a series has been drawn.
OnBeforeDrawSerieYValue	Event called before a y value of a series has been drawn
OnBeforeDrawTitle	Event called before the title has been drawn.
OnBeforeDrawXAxis	Event called before the `x-axis` has been drawn.
OnBeforeDrawXValuesTitle	Event called before the `x-values` title of a series has been drawn.
OnBeforeDrawYAxis	Event called before the y-axis has been drawn.
OnBeforeDrawYValuesTitle	Event called before the `y-values` title of a series has been drawn.
OnBeforeSetAllFonts	Event called before setting all of the fonts via the GlobalFont property. You can see what property will be set and select for which fonts you want to apply it.
OnCustomizeAnnotationFill	Event called to customize the fill for an annotation
OnCustomizeAnnotationFont	Event called to customize the font for an annotation
OnCustomizeAnnotationStroke	Event called to customize the stroke for an annotation
OnDrawTitleText	Event called when the tile of the Chart is being drawn.
OnGetAnnotation	Event called to retrieve the data for a virtual annotation based on an index after looping through the number of annotations returns in the `OnGetNumberOfAnnotations` event.

Event name	Description
OnGetNumberOfAnnotations	Event called when retrieving the number of annotations for a specific point.
OnGetNumberOfPoints	Event called when retrieving the number of points in virtual mode. When implemented, the points collection is cleared.
OnGetPoint	Retrieves the data for a virtual point based on an index after looping through the the number of points returned in the `OnGetNumberOfPoints` event.
OnGetSerieLabel	Event called when retrieving the value of a series label on a specific point.
OnGetSerieLabelVirtual	Event called when retrieving the value of a series label on a specific point when using virtual mode.
OnGetSerieLegendText	Event called to change the text that will be drawn in the series legend, for each value in a series point collection.
OnGetSerieLegendTextVirtual	Event called to change the text that will be drawn in the series legend, for each value in a series point collection when using virtual mode
OnGetSerieSpiderLegendText	Event called to change the text that will be drawn in the spider grid legend, for each value in a series point collection.
OnGetSerieSpiderLegendTextVirtual	Event called to change the text that will be drawn in the spider grid legend, for each value in a series point collection when using virtual mode.
OnGetSerieXValue	Event called when retrieving the value of a series `x value` on the `x-axis`.
OnGetSerieYValue	Event called when retrieving the value of a series `y value` on the `y-axis`.
OnJSONAddSeries	Event called when a new series was added via the LoadFromJSON procedure.
OnJSONAddPoint	Event called when a new point was added via the LoadFromJSON procedure.
OnSerieBarClick	Event called when clicking on a bar.
OnSerieBarClickVirtual	Event called when clicking on a bar in virtual mode.
OnSeriePointClick	Event called when clicking on a point.
OnSeriePointClickVirtual	Event called when clicking on a point in virtual mode.
OnSerieSliceClick	Event called when clicking on a slice.
OnSerieSliceClickVirtual	Event called when clicking on a slice in virtual mode.

2.2 TTMSFNCChartDatabaseAdapter

2.2.1 Overview

The `TTMSFNCChartDatabaseAdapter` can be used for databinding with the Adapter property of the `TTMSFNCChart`

This adapter is responsible for connecting to the dataset and for loading, displaying and editing the data. The adapter exposes a set of properties for data visualization and manipulation and a column collection that represents the available fields. Below is an overview of the available properties and events.

PROPERTIES

Property name	Description
Active	Activates the adapter and displays the data from the dataset when the dataset is active.
AutoCreateSeries	When true, automatically retrieves the fields from the dataset and creates series for each field. (Default True.)
SkipFirstColumn	Can be set to skip the first column, as these are usually Ids. (Default True.)
`Source`	The source to retrieve the data from and which contains the series to add.

EVENTS

Event name	Description
OnFieldsToPoint	Event that is triggered when a point was added with all of the available fields filled in. Gives the ability to further customize the point.
OnFieldsToSeries	Event that is triggered when a series was filled with all of the points. Gives the ability to further customize the series.
OnSetFieldValueIndex	Event that is triggered while going over all the fields to choose the series.
OnSetFieldValueType	Event that is triggered while going over all the fields to choose the type of the field.

TTMSFNCChartDatabaseAdapterSource

The adapter source has two properties, the DataSource of the data and the `Series` which is a collection that has the fieldnames for the different values.

TTMSFNCChartDatabaseAdapterSeriesItem

The collection item that contains the field names for each value. One item creates a new series in the chart.

The properties can stay empty except for YValue or YValueHigh.

PROPERTIES

Property name	Description
YValue	The fieldname used for the Y-Value of the series.
XValue	Optional, fieldname used for the X-Value of the series.
XLabel	Optional, fieldname used for the X-Label of the series.
YValueSecond	Optional, fieldname used for the Y-ValueSecond in a band type series.
YValueVariable	Optional, fieldname used for the Y-ValueVariable in e.g. a pie type series.
YValueHigh	The fieldname used for the high value in a multi-point series.
YValueLow	The fieldname used for the low value in a multi-point series.
YValueOpen	The fieldname used for the open value in a multi-point series.
YValueClose	The fieldname used for the close value in a multi-point series.
YValueMedian	Optional, fieldname used for the median value in a multi-point series.

2.3 TTMSFNCChartGridAdapter

2.3.1 Overview

The `TTMSFNCChartGridAdapter` can be used for binding the cells of a `TTMSFNCGrid` with the `TTMSFNCChart` via the Adapter property.

This adapter is responsible for connecting to the dataset and for loading, displaying and editing the data. The adapter exposes a set of properties for data visualization and manipulation and a series collection that represents the columns. Below is an overview of the available properties and events.

With the BindSeries methods you can add a `Series` in one call.

Note

Important Notice: This requires TMS FNC UI Pack (separately available at the My Products page)

PROPERTIES

Property name	Description
Active	Activates the adapter and displays the data from the dataset when the dataset is active.
AutoCreateSeries	When true, automatically retrieves the fields from the dataset and creates series for each field. (Default True.)
HeaderRow	Can be set to indicate on which row the headers are defined. (Default 0)
`Source`	The source to retrieve the data from and which contains the series to add.
SynchronizeOnGridUpdate	Can be set to update the chart when a cell was edited in the grid. (Default True)

EVENTS

Event name	Description
OnRowToPoint	Event that is triggered when a point was added with all of the available columns filled in. Gives the ability to further customize the point.
OnSetColumnValueIndex	Event that is triggered while going over all the columns to choose the series.
OnSetColumnValueType	Event that is triggered while going over all the columns to choose the type of the field.
OnSynchronized	Event that is triggered when a synchornization is done from the grid data.

TTMSFNCChartGridAdapterSource

The adapter source has two properties, the Grid which is the `TTMSFNCGrid` to connect with and the `Series` which is a collection that has the fieldnames for the different values.

TTMSFNCChartGridAdapterSeriesItem

The collection item that contains the column index for each value. One item creates a new series in the chart.

The properties can stay -1 except for YValueColumnIndex or YValueHighColumnIndex.

PROPERTIES

Property name	Description
YValueColumnIndex	The column index used for the Y-Value of the series.
XValueColumnIndex	Optional, column index used for the X-Value of the series.
XLabelColumnIndex	Optional, column index used for the X-Label of the series.
YValueSecondColumnIndex	Optional, column index used for the Y-ValueSecond in a band type series.
YValueVariableColumnIndex	Optional, column index used for the Y-ValueVariable in e.g. a pie type series.
YValueHighColumnIndex	The column index used for the high value in a multi-point series.
YValueLowColumnIndex	The column index used for the low value in a multi-point series.
YValueOpenColumnIndex	The column index used for the open value in a multi-point series.
YValueCloseColumnIndex	The column index used for the close value in a multi-point series.
YValueMedianColumnIndex	Optional, column index used for the median value in a multi-point series.