

# Definitive Painter User Manual

Plugin version	1.1.1
Supported UE versions	4.25, 4.26, 4.27
Supported platforms	Windows 64-bit
Latest Manual update	18 Feb 2022
Support	<a href="mailto:info@soucekmartin.cz">info@soucekmartin.cz</a>
Twitter	<a href="https://twitter.com/DefPainter">https://twitter.com/DefPainter</a>
Marketplace	<a href="https://www.unrealengine.com/marketplace/product/definitive-painter">https://www.unrealengine.com/marketplace/product/definitive-painter</a>
Discord	<a href="https://discord.com/invite/aDhVsSSShB">https://discord.com/invite/aDhVsSSShB</a>
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## Introduction

Definitive Painter is a 2D vector graphics plug-in based on Skia that enables you to draw various vector-based elements inside Unreal Motion Graphics in Unreal Engine. You can create anything from basic widgets to complex user interfaces without the need for any external tools. Everything can be done right inside Unreal Engine.

Definitive Painter seamlessly integrates with existing UMG system by introducing new Widgets. However, it does not replace UMG.

## Why?

Unreal Motion Graphics has been known for its numerous limitations in terms of rendering complex dynamic shapes with antialiasing. Do you need to draw an intricate curve or a simple rectangle with rounded corners without firing up Photoshop? Bad luck! Definitive Painter aims to fill this gap that has been there for years.

## How?

Definitive Painter is based on Skia by Google. It's an open source graphics library powering rendering in some web browsers and Android applications. Skia does its magic and saves whatever comes out of it into a buffer. Content of the buffer is then copied into a texture right in Unreal Engine.

## Installation

1. Install the plugin from [Epic Game Launcher](#) to the engine.
2. Launch [Unreal Editor](#), navigate to [Edit > Plugins](#) and enable [Definitive Painter](#) plugin and that's it! You're good to go!

## Architecture

Everything in Definitive Painter is encapsulated in [DP Canvas](#), a Widget managing rendering. All [DP Widgets](#) must be direct or indirect descendants of one of these.

While [DP Canvas](#) can contain only one child, other [DP Widgets](#) acts exactly like UMG [Canvas Panel](#). Therefore, they can contain any number of arbitrarily placed children. [Widget Tree](#) can be constructed in any way you're used to. [DP Widgets](#) can contain default UMG [Widgets](#) and vice versa.

In order to actually draw something, [DP Widgets](#) must be provided with a [Paint](#) asset. The relationship between the two is similar to the one between meshes and materials in Unreal Engine. While [DP Widgets](#) define geometric shape of the [Element](#), [Paint](#) defines color, gradient and other effects.

By default, every [DP Widget](#) draws one shape (rectangle, circle, text, etc.). [DP Widgets](#) can also draw additional shapes in the [Quick Draw](#) mode allowing for hundreds of shapes to be drawn without any significant performance impact. However, shapes drawn in this mode

have certain limitations in terms of what kinds of effects can be applied on them and are not subjects to UMG **Widget Tree** system. Learn more [here](#).

## Terminology

1. **Widget**

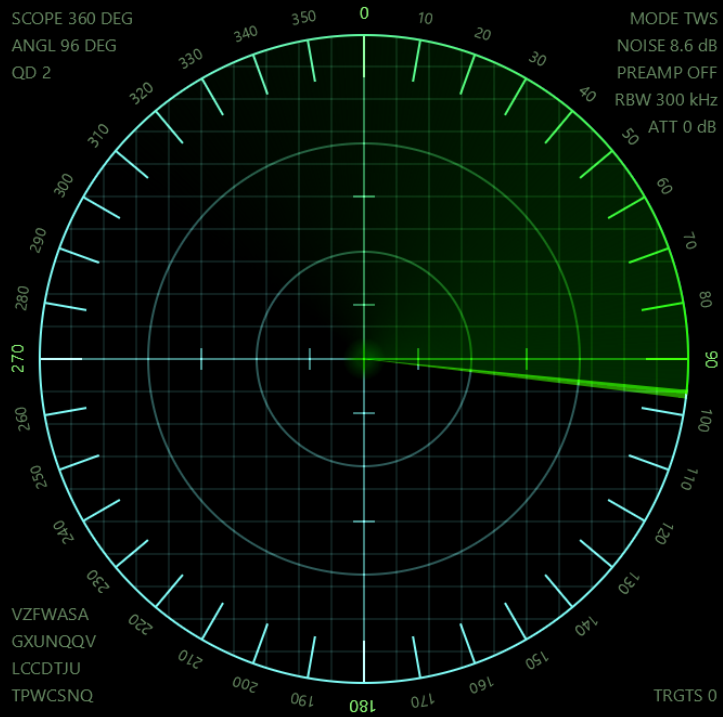
Widget is the fundamental building block of the UI in **Unreal Engine**. Widgets are organized within a **Widget Tree** to form a UI. Definitive Painter extends this system by introducing own Widgets. Each **DP Widget** draws a single **Element**.

2. **Element**

An **Element** is a single geometric shape that can be anything from a rectangle to a complex path.

3. **Paint**

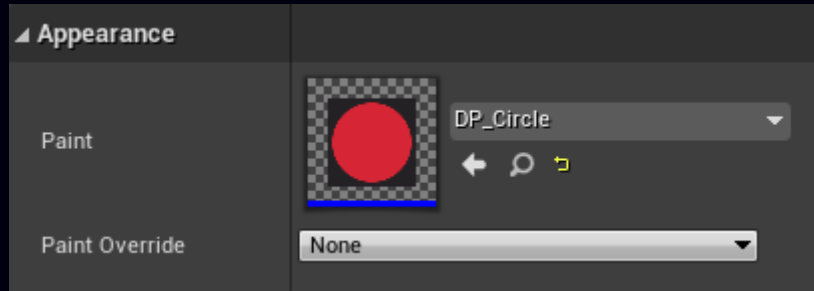
**Paint** controls the look of **Elements**. **Paint** can be defined as an asset and be reused on multiple **Elements**, or it can be created on the fly and altered dynamically.



# Widgets

## Widget Common parameters

Common parameters for all **Widgets** except for the **DP Canvas**.

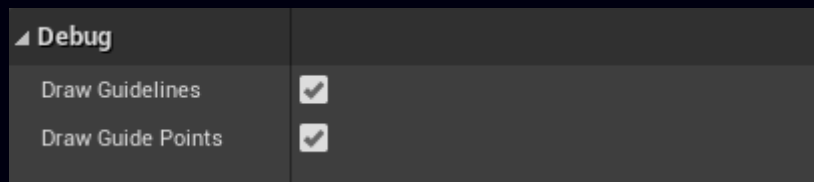


### Paint

The **Paint** asset used to draw the **Element**.

### Paint Override

Optional **Paint** override. Does nothing if set to *None*, otherwise overrides the **Paint** asset. If the **Paint** asset is set at the time you set the **Paint** override, the **Paint** asset is copied into the **Paint** override.



### Draw Guidelines

Toggles drawing of **Widget** guidelines in the **Editor**.

### Draw Guide Points

Toggles drawing of **Widget** guide points in the **Editor**.



### On Draw Quick Elements

This event is used to draw so called *Quick Elements* which are basic shapes like rectangles, circles, and even paths, etc. within the bounds of the **Widget**. These **Elements** are not managed by the **Widget Tree** so they are much faster to render. You cannot interact with these **Elements** in any way while in the game.

A typical usage for *Quick Elements* is to render bars in a bar charts or ticks on a scale. The event is executed right after the **Widget** itself is rendered. The list of all *Quick Elements* can be found [here](#).



### On LMB Pressed

Fires when the left mouse button was just pressed and the **Widget** is hovered by the mouse.



### Position **FVector2D**

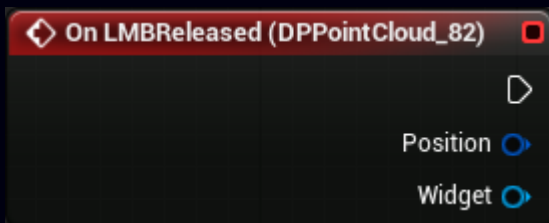
Mouse position relative to the top left corner of the **Widget**.

### Widget **UDPWidget**

The **Widget** that fired the event.

### On LMB Released

Fires when the left mouse button was just released and the **Widget** is hovered by the mouse.



### Position **FVector2D**

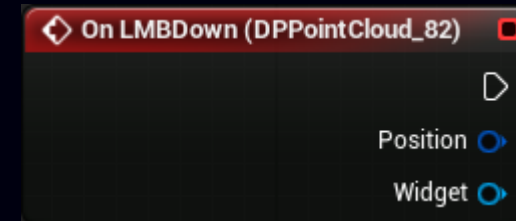
Mouse position relative to the top left corner of the **Widget**.

### Widget **UDPWidget**

The **Widget** that fired the event.

### On LMB Down

Fires when the **Widget** is hovered by the mouse and the left mouse button is being held down.



### Position **FVector2D**

Mouse position relative to the top left corner of the **Widget**.

### Widget **UDPWidget**

The **Widget** that fired the event.

### On RMB Pressed

Fires when the right mouse button was just pressed and the **Widget** is hovered by the mouse.



### Position **FVector2D**

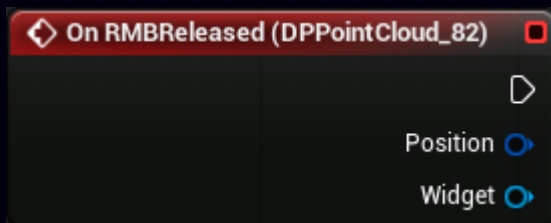
Mouse position relative to the top left corner of the **Widget**.

### Widget **UDPWidget**

The **Widget** that fired the event.

### On RMB Released

Fires when the right mouse button was just released and the **Widget** is hovered by the mouse.



### Position **FVector2D**

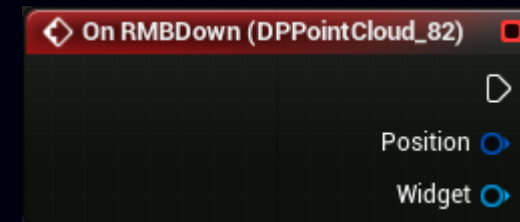
Mouse position relative to the top left corner of the **Widget**.

### Widget **UDPWidget**

The **Widget** that fired the event.

### On RMB Down

Fires when the **Widget** is hovered by the mouse and the right mouse button is being held down.



### Position **FVector2D**

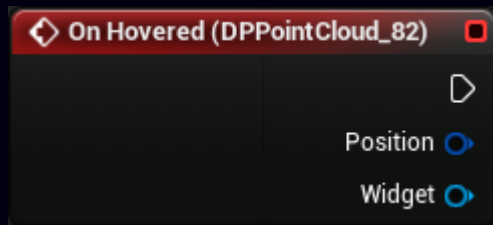
Mouse position relative to the top left corner of the **Widget**.

### Widget **UDPWidget**

The **Widget** that fired the event.

## On Hovered

Fires when the mouse enters the **Widget**'s geometric area.



Position **FVector2D**

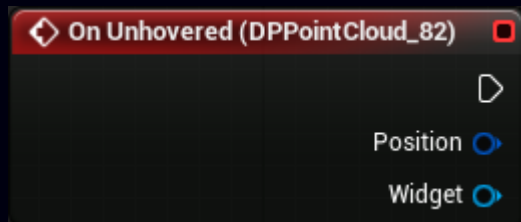
Mouse position relative to the top left corner of the **Widget**.

Widget **UDPWidget**

The **Widget** that fired the event.

## On Unhovered

Fires when the mouse leaves the **Widget**'s geometric area.



Position **FVector2D**

Mouse position relative to the top left corner of the **Widget**.

Widget **UDPWidget**

The **Widget** that fired the event.

Note that there are two hit test precision levels for all mouse related events called *Hit Test Precision* found in the *Behavior* section in all **DP Widgets**:

### A. Bounding Box

This is the same as the default **Unreal Engine** behavior.

### B. Precise

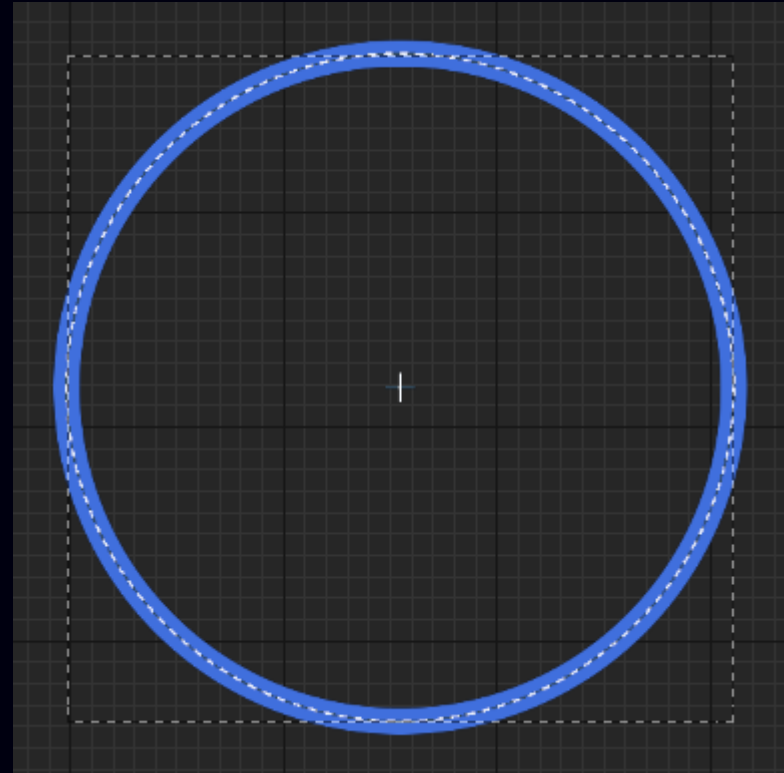
This takes into account the exact geometric shape of the **Element** and is not limited to the **Widget**'s rectangular bounding box.

## Widget Guides

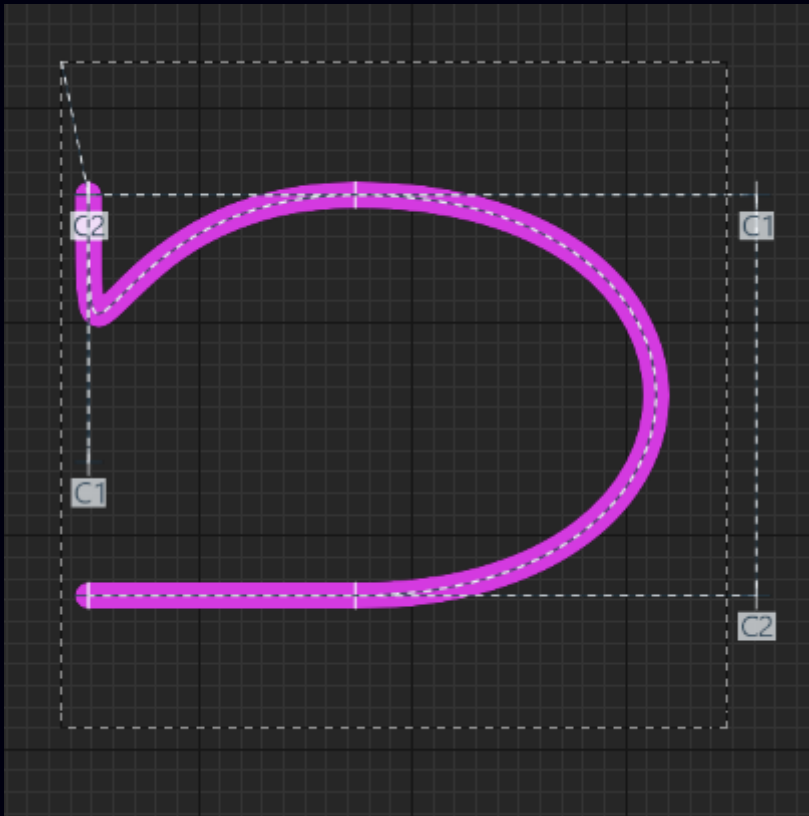
**Widget Guides** show you the exact geometric shape of **Elements**. When many **Elements** and/or complex **Paths** are present within a **DP Canvas**, it may be quite difficult to distinguish individual **Elements**, let alone **Path Commands**.

The **Guides** can be either lines and curves following **Path** and perimeters of other **Elements** or points indicating centers and control points of **Path Commands**.

The **Guides** can be enabled or disabled for each **Widget** individually or for the whole **DP Canvas** and all its children. They can also be toggled by the *Enables or disables showing the dashed outlines* button in the **Editor**.



*A circle with the real perimeter and center shown.*



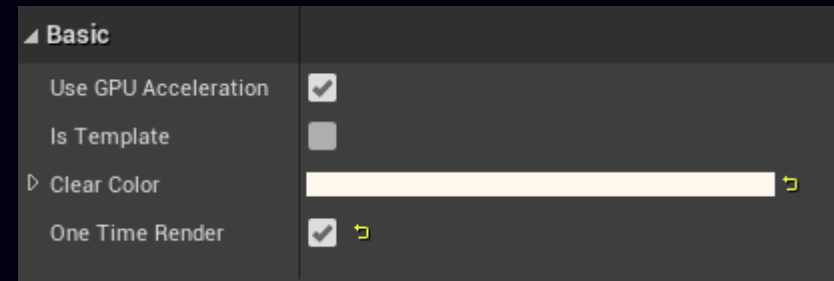
A path with the real perimeter and control points for each Command shown. This Path comprises a Move To command, two Cubic To commands, and a Line To command. The C1 and C2 point shows the locations of the cubic control points.

## DP Canvas

This is the most important **Widget** of them all. It manages rendering of all descendant **DP Widgets**. Multiple **DP Canvases** can be present inside a single **Widget Blueprint** but you should keep the total number of them as low as possible as every **DP Canvas** on its own brings additional performance cost.

**DP Canvas** can contain only one child and doesn't draw anything on its own except for optional background color.

## Parameters



## Use GPU Acceleration

Enables GPU accelerated rendering of **Elements**. You will usually benefit from this when using complex effects and/or rendering many (>100) **Elements**. On the other hand, it's better to disable this option when rendering only a few **Elements** with a flat color as the GPU acceleration may perform worse in these scenarios.

## Is Template

If a **Widget Blueprint** containing the **DP Canvas** marked with this flag is inserted as a child into another **DP Canvas**, all descendant **DP Widgets** will be rendered only into the topmost **DP Canvas** saving some performance. This is useful whenever you need to reuse the same **Widget Blueprint** multiple times - create a template.

## Clear Color

This color is used to fill the background of **DP Canvas** before **Elements** are rendered.

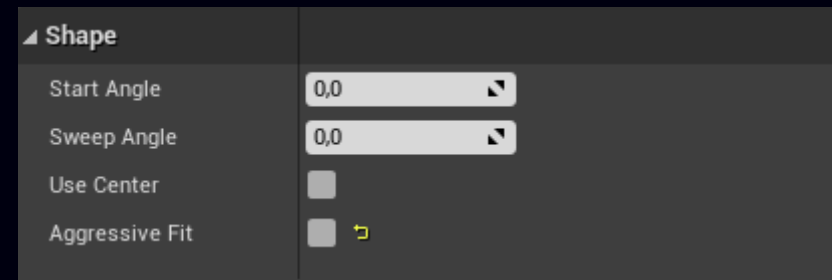
## One Time Render

Content of the **DP Canvas** will be rendered only once each time the **Widget** is rebuilt or spawned. This option saves a lot of performance and is useful when you need only a static **Widget** with no animations or user interaction.

## DP Arc

This **Widget** draws an arc defined by the start and sweep angles. Width and height of the arc are defined by the size of the **Widget**. Center of the arc lies at the center of the **Widget**.

## Parameters



### Start Angle

Start angle of the arc in degrees. Starts at 3 o'clock and goes counterclockwise when increased.

### Sweep Angle

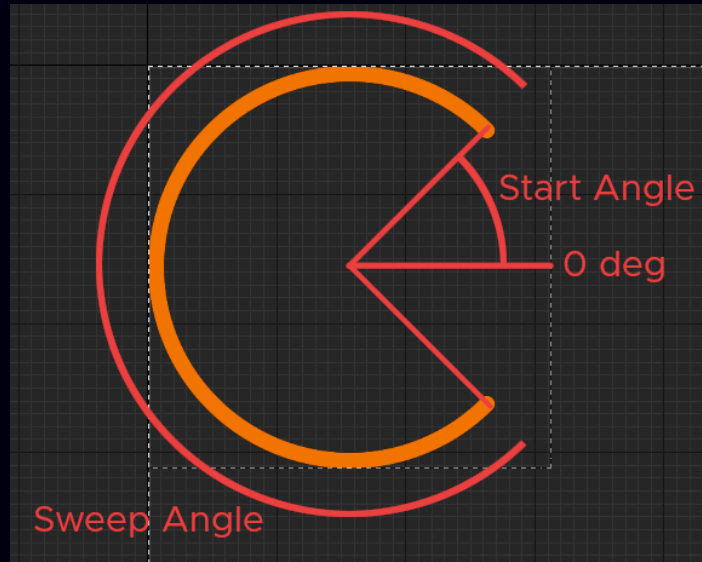
Defines the angle span of the arc in degrees. Starts at the Start Angle and goes counterclockwise.

### Use Center

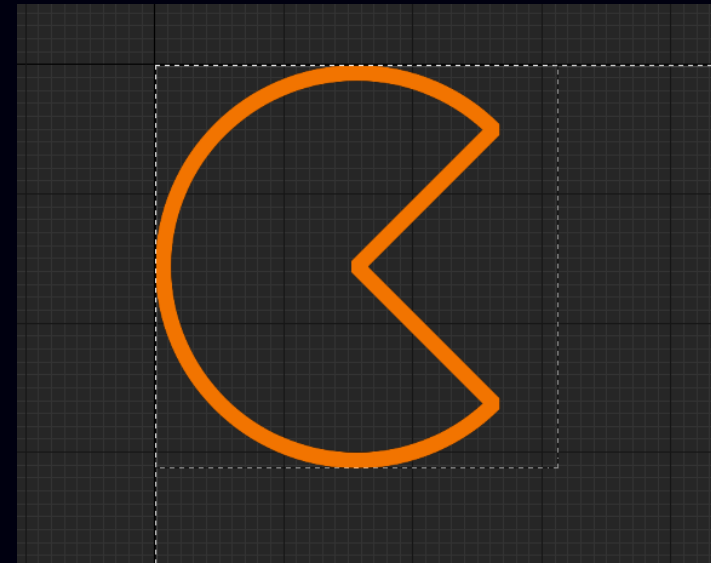
Connect both ends of the arc with its center. Has no effect when used with a filled **Paint**.

## Aggressive Fit

When enabled, the size of the shape will be reduced by the width of the stroke to make it perfectly fit within the bounds. Has no effect when used with a filled **Paint**.



*An arc with Start Angle 45 degrees and Sweep Angle 270 degrees.*

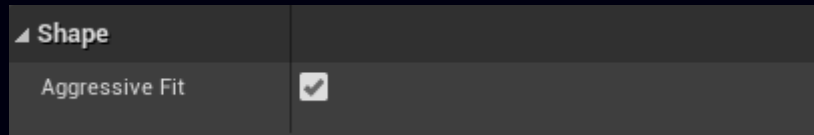


*An arc with enabled Center.*

## DP Circle

This **Widget** draws a circle. Radius of the circle is equal to half the smaller side of the **Widget**. Center of the circle lies at the center of the **Widget**.

### Parameters



### Aggressive Fit

When enabled, the size of the shape will be reduced by the width of the stroke to make it perfectly fit within the bounds. Has no effect when used with a filled **Paint**.

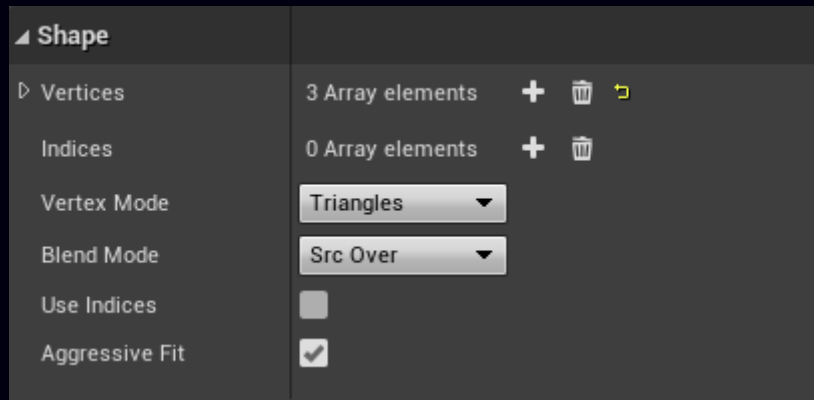




## DP Mesh

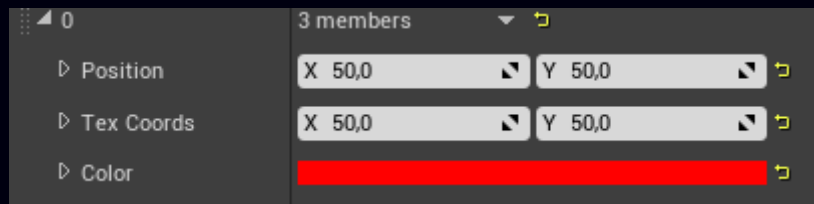
This **Widget** draws triangles defined by a set of vertices and optional indices. **DP Mesh** doesn't support stroked **Paint**. If you need to draw stroked (wireframe) triangles, use **DP Path Widget** instead.

### Parameters



### Vertices

An array of vertices defining the mesh. Only the *Position* parameter is required.



### Position

Vertex position in screen space.

### Tex Coords

Texture coordinates used when an effect is applied to the Paint. Value of this parameter is not in the usual range 0...1 but in the range 0...canvas width for the X axis and in the range 0...canvas height for the Y axis.

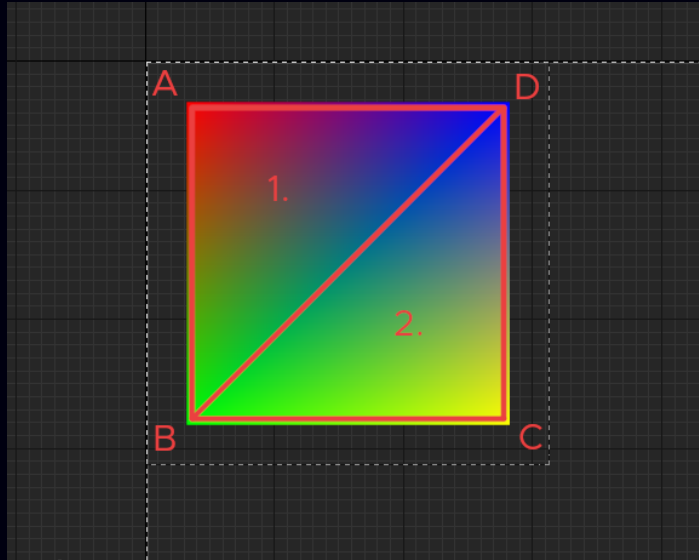
### Color

Vertex color.

### Indices

An array of integer indices defining the order in which the vertices are used to construct the mesh. Number of indices must be divisible by 3 as each triangle has 3 vertices thus total number of indices must be equal to the number of triangles times 3.

Each vertex can be used multiple times. Each index is equal to the position of a vertex in the vertex list beginning with 0. Using indices allows you to share vertices between multiple triangles thus saving some memory by defining vertices with same attributes (position, color, etc.) only once.



A rectangle drawn in the Triangles vertex mode using two triangles, four vertices ( $A = 50, 50$ ,  $B = 50, 450$ ,  $C = 450, 450$ ,  $D = 450, 50$ ) and six indices ( $0, 1, 3, 3, 1, 2$ ). The 1<sup>st</sup> triangle consists of vertices A, B, D (indices  $0, 1, 3$ ). The 2<sup>nd</sup> triangle consists of vertices D, B, C ( $3, 1, 2$ ). Note that vertices forming each triangle are defined in so called “counterclockwise winding”.

## Vertex Mode

Defines the method of constructing the mesh.

### A. Triangles

Draws a list of triangles, one by one. Triangles may or may not share vertices and can be detached from each other.

### B. Triangle Strip

Draws a strip of triangles. The first triangle is defined by 3 vertices. Every additional vertex adds a triangle consisting of the vertex and the 2 previously added ones.

### C. Triangle Fan

Draws a fan. The first triangle is defined by 3 vertices. The first vertex forms the center of the fan. Every additional vertex adds a triangle consisting of the vertex, the previously added vertex, and the vertex in the center of the fan.

## Blend Mode

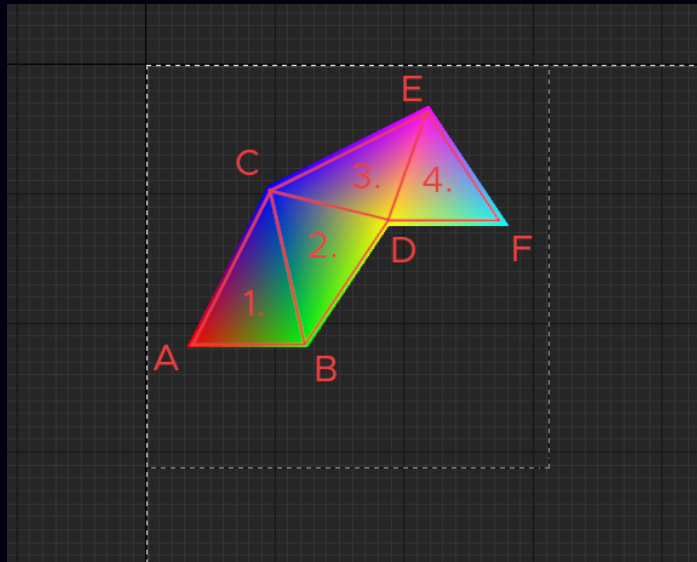
Defines the blending mode of vertex colors and the **Widget's Paint**.

## Use Indices

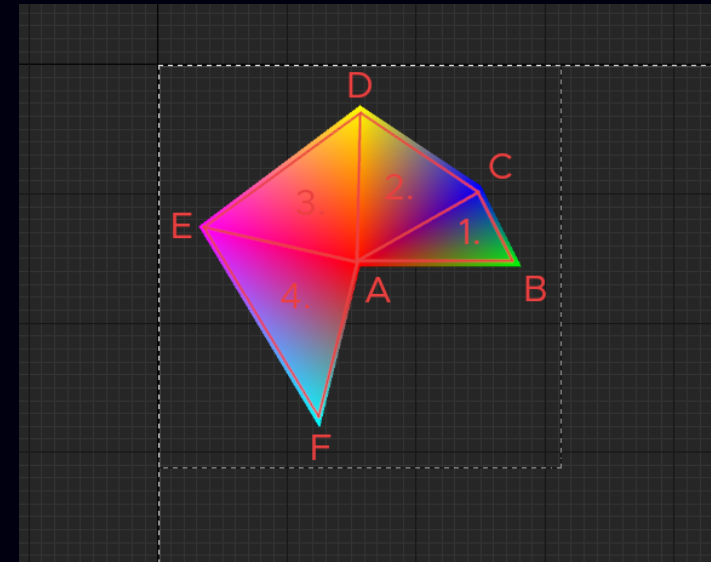
Use indices when constructing the mesh.

## Aggressive Fit

Has no effect as **DP Mesh** can't have a stroked **Paint**.



*A strip drawn using the Triangle strip vertex mode. Only six vertices (A, B, C, D, E, F) are needed to draw four triangles instead of twelve vertices that would be needed to draw the same shape in the Triangles vertex mode. The obvious downside of this mode is that adjacent triangles share an edge and can't be separated.*

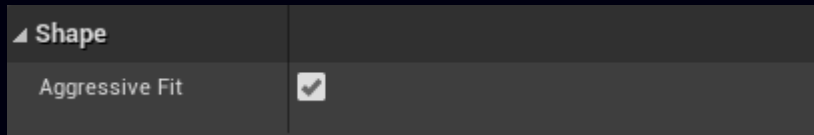


*A fan drawn using the Triangle Fan vertex mode. Only six vertices (A, B, C, D, E, F) are needed to draw four triangles instead of twelve vertices that would be needed to draw the same shape in the Triangles vertex mode. The obvious downside of this mode is that adjacent triangles share an edge and can't be separated. Also, all triangles share the vertex forming the center of the fan which is always the first vertex of the mesh.*

## DP Oval

This **Widget** draw an oval. The width of the oval is equal to the width of the **Widget** and the height of the oval is equal to the height of the **Widget**. The center of the oval lies at the center of the **Widget**.

### Parameters



### Aggressive Fit

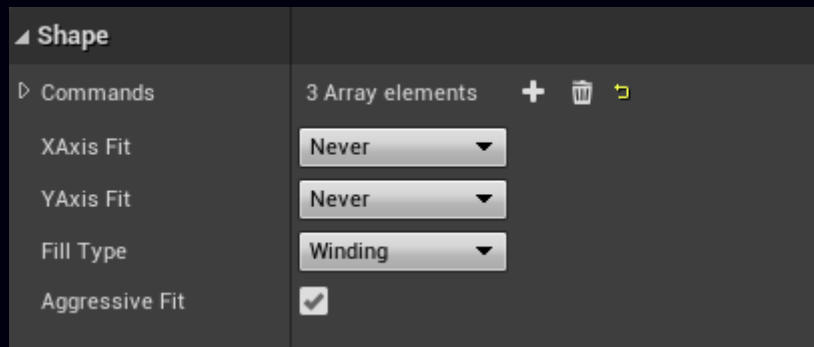
When enabled, the size of the shape will be reduced by the width of the stroke to make it perfectly fit within the bounds. Has no effect when used with a filled **Paint**.



## DP Path

DP Path can draw anything from a simple line to intricate curves and shapes. DP Path comprises of *commands* which defines individual parts of the path like lines, bézier curves, etc.

## Parameters



## Commands

An array of commands defining the path.

## X Axis Fit

Scales the path to fit the *Widget*'s width with the following options:

- A. Never  
Disables fitting.
- B. If Smaller  
Stretches the path if the path is narrower than the *Widget*.
- C. If Bigger  
Shrinks the path if the path is wider than the *Widget*.

- D. Always  
Combines the last two options.

## Y Axis Fit

Does the same as the previous parameter but for the Y axis.

## Fill Type

Defines the method of filling the path.

- A. Winding  
Specifies that inner area of the path is computed by a non-zero sum of signed edge crossings. Has no effect for paths with stroked *Paint*.
- B. Even-Odd  
Specifies that inner area of the path is computed by an odd number of edge crossings. Has no effect for paths with stroked *Paint*.
- C. Inverse Winding  
Is inverted Winding.
- D. Inverse Even-Odd  
Is Inverted Even-Odd.

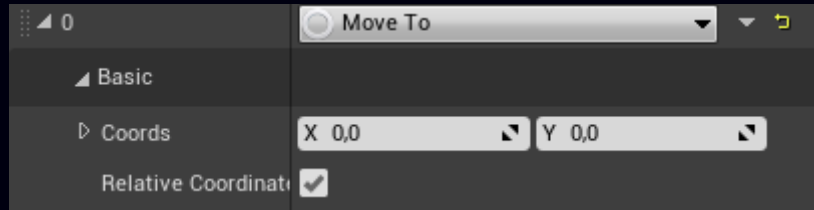
## Aggressive Fit

When enabled, the size of the shape will be reduced by the width of the stroke to make it perfectly fit within the bounds. Has no effect when used with a filled *Paint*.

## Commands

### Move To

Adds beginning of a new contour at the specified coordinates.



#### Coords

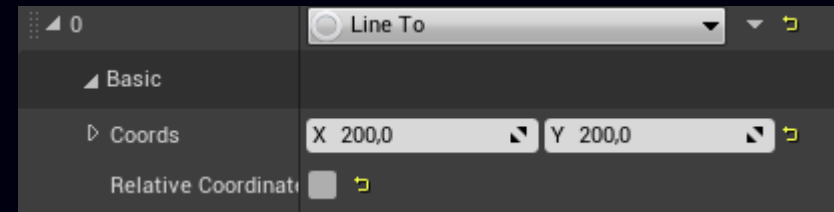
Coordinates at which the new contour should begin.

#### Relative Coordinates

If enabled, all coordinated specified in this command are relative to the last point of the path.

### Line To

Adds a line from the last point of the path ending at the specified coordinates.



#### Coords

Coordinates at which the line ends.

#### Relative Coordinates

If enabled, all coordinated specified in this command are relative to the last point of the path.

## Quad To

Adds a quad curve going from the last point of the path toward the *Control Point* and ending at the *End Point*.



### Control Point

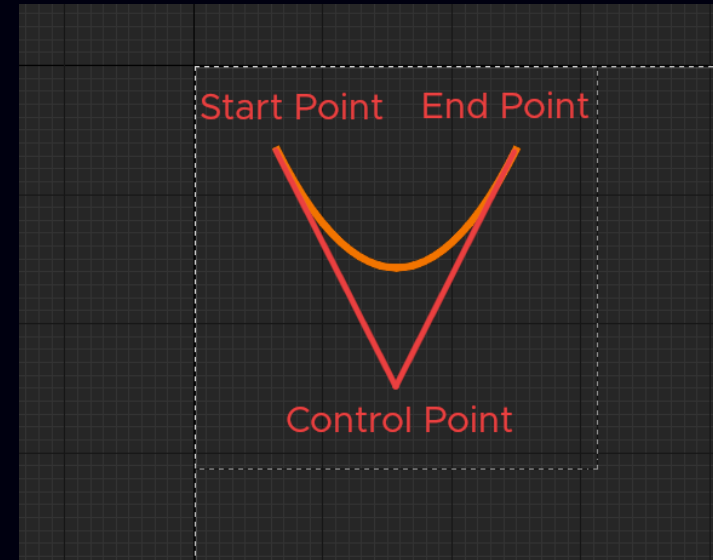
Defines the control point toward which the curve heads.

### End Point

Defines the end point of the curve.

### Relative Coordinates

If enabled, all coordinates specified in this command are relative to the last point of the path.



*A quad curve drawn from the start point (100, 100) toward the control point (250, 400) ending at the end point (400, 100).*

## Cubic To

Adds a cubic curve going from the last point of the path toward the *1<sup>st</sup> Control Point*, then toward the *2<sup>nd</sup> Control Point* and ending at the *End Point*.



### Control Point 1

Defines the 1<sup>st</sup> control point toward which the curve heads.

### Control Point 2

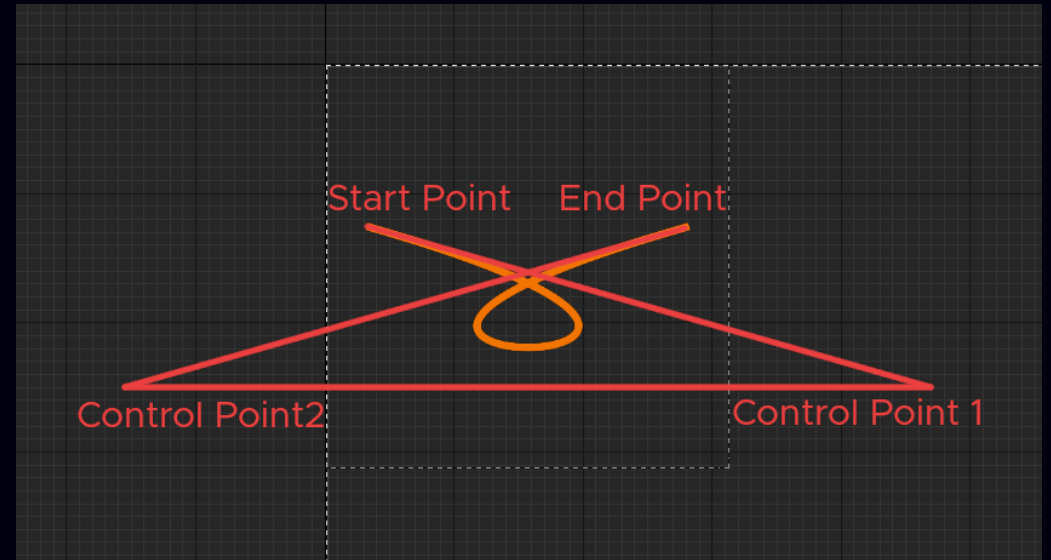
Defines the 2<sup>nd</sup> control point toward which the curve heads.

### End Point

Defines the end point of the curve.

### Relative Coordinates

If enabled, all coordinated specified in this command are relative to the last point of the path.

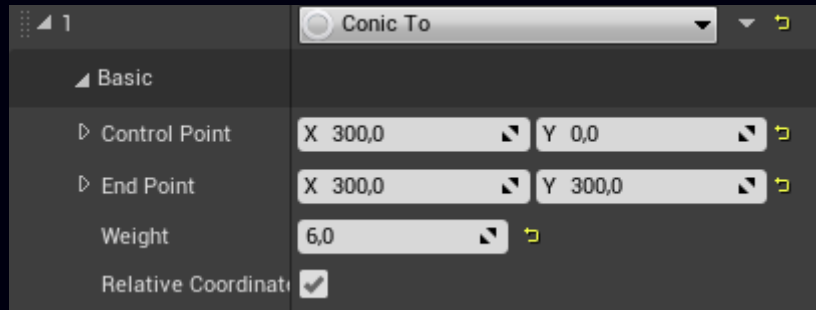


A cubic curve drawn from the start point (50, 200) toward the 1<sup>st</sup> control point (750, 400), then toward the 2<sup>nd</sup> control point (-250, 400) ending at the end point (450, 200).



## Conic To

Adds a conic curve going from the last point of the path toward the *Control Point* and ending at the *End Point*. The curve is weighted by the parameter *Weight*.



### Control Point

Defines the control point toward which the curve heads.

### End Point

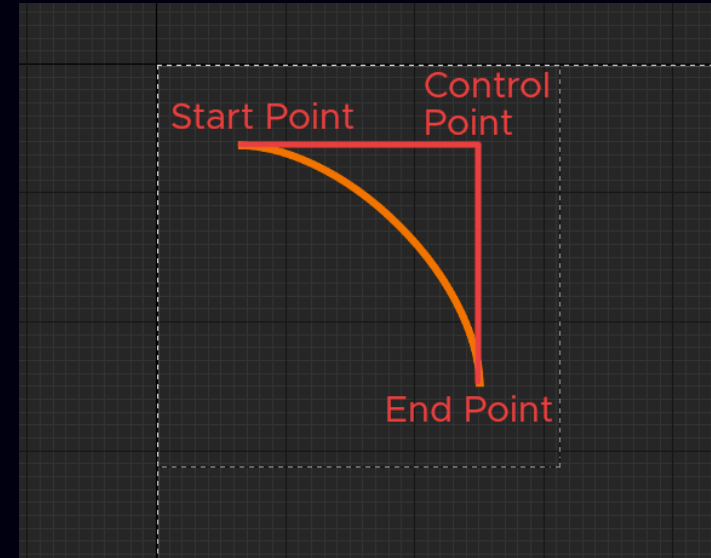
Defines the end point of the curve.

### Weight

Defines the weight of the curvature of the curve. The higher the weight, the closer the curve to the control point. 0 results in a straight line between end start and the end points, while high numbers like 100 and more result in a situation very close to two straight lines connecting the control point with the start point and the end point respectively.

## Relative Coordinates

If enabled, all coordinates specified in this command are relative to the last point of the path.



A conic curve drawn from the start point (100, 100) toward the control point (400, 100) ending at the end point (400, 400) with weight 0.5.

## Close

Closes the path by connecting the last point with the first point with a line. This command has no parameters.

## Add Circle

Adds a circle with the center at the *Center* and radius *Radius*.



### Center

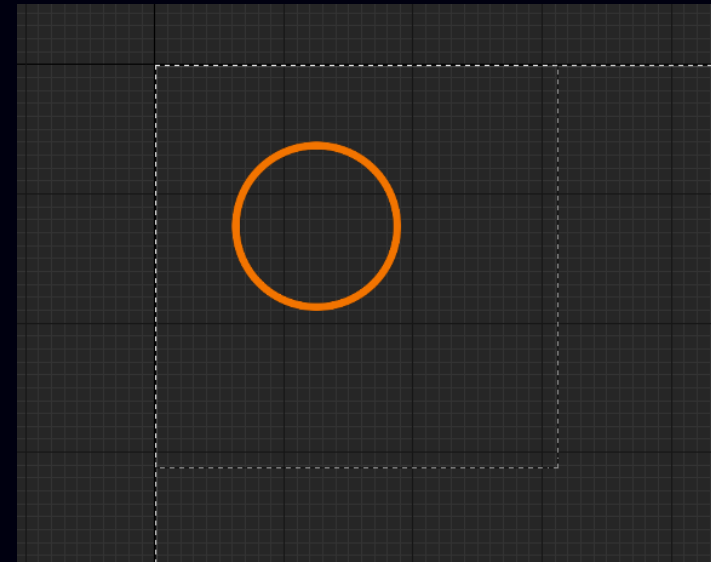
Center of the circle.

### Radius

Radius of the circle.

### Relative Coordinates

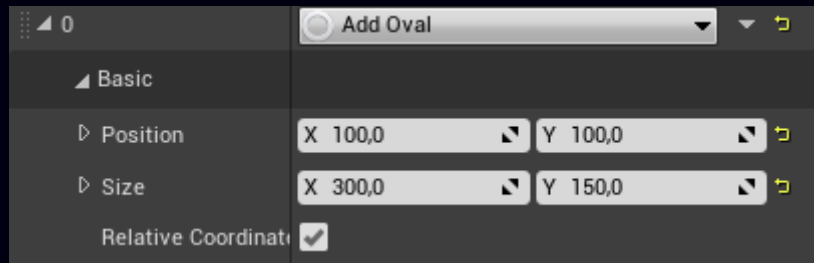
Not used.



A circle with center (200, 200) and radius (100).

## Add Oval

Adds an oval drawn within the bounds of a rectangle defined by *Position* and *Size*.



### Position

Position of the top left corner of the bounding rectangle.

### Size

Size of the bounding rectangle.

### Relative Coordinates

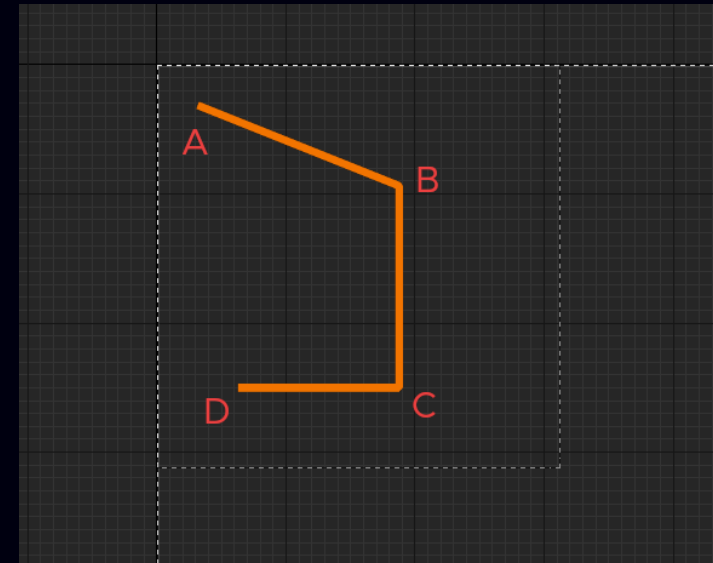
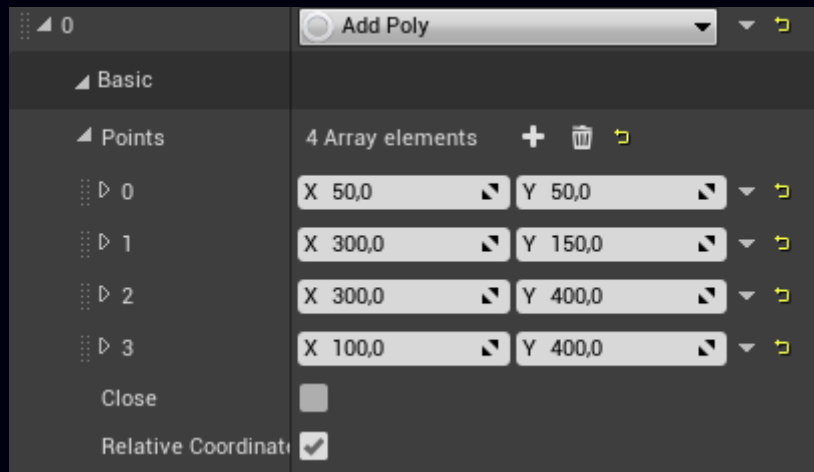
Not used.



*An oval drawn within the rectangle with position (100, 100) and size (300, 150).*

## Add Poly

Adds a polyline defined by a set of points.



A polyline made of a set of four points; A (50, 50), B (300, 150), C (300,400), and D (100, 400).

### Points

Points defining the polyline.

### Close

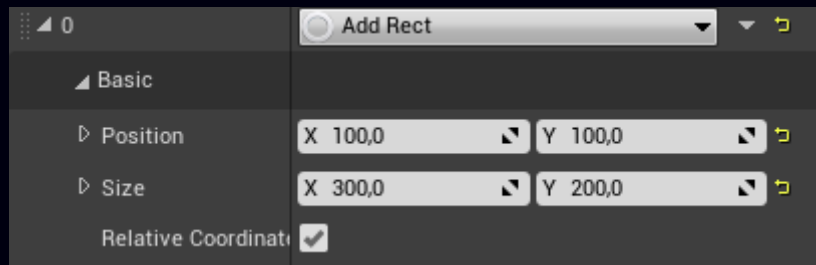
Close the polyline. If enabled, the polyline is closed by adding a line between the last and the first point.

### Relative Coordinates

Not used.

## Add Rect

Adds a rectangle with position at *Position* and size *Size*.



### Position

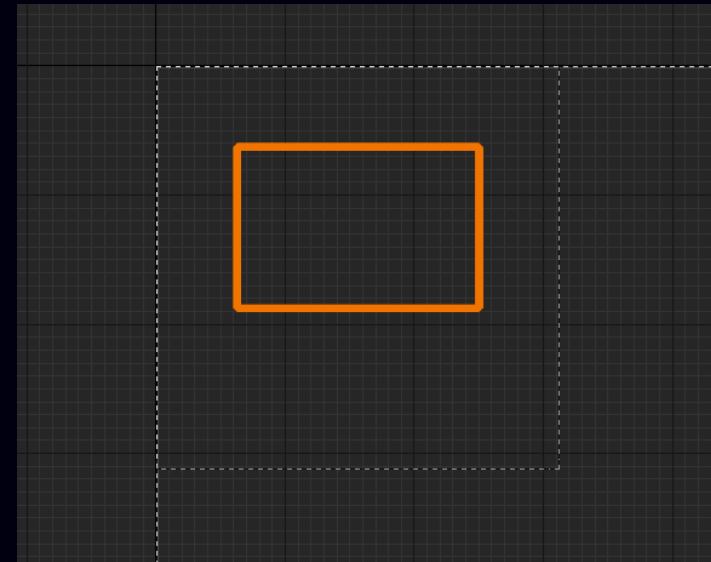
Position of the top left corner of the rectangle.

### Size

Size of the rectangle.

### Relative Coordinates

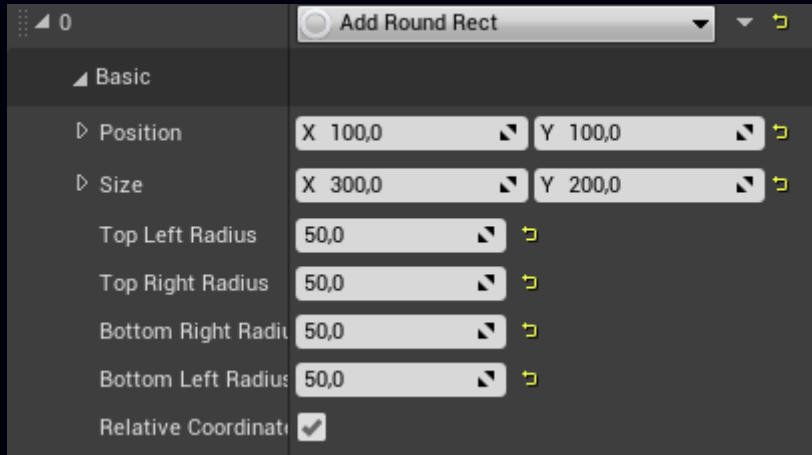
Not used.



A rectangle drawn at position (100, 100) with size (300, 200).

## Add Round Rect

Adds a rectangle with position at *Position* and size *Size* and optionally rounded corners. Each corner can have different radius.



### Position

Position of the top left corner of the rectangle.

### Size

Size of the rectangle.

### Top Left Radius

Radius of the top left corner.

### Top Right Radius

Radius of the top right corner.

### Bottom Right Radius

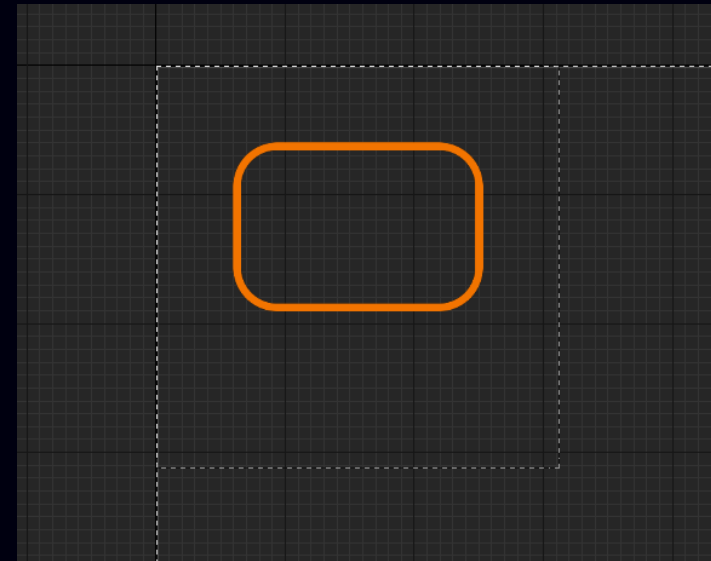
Radius of the bottom right corner.

### Bottom Left Radius

Radius of the bottom left corner.

### Relative Coordinates

Not used.



*A rectangle drawn at position (100, 100) with size (300, 200) and radius of all 4 corners set to (50).*

## DP Path Composer

DP Path Composer combines two Path together using one of the 5 available boolean operations. Both Paths contributing to the result can be individually transformed relatively to the Widget.

### Parameters

▲ Shape Path A	
Path A	DPPath_64 ▾ ↗
▷ Path A Translation	X 0,0 ▾ ↗ Y 0,0 ▾ ↗
▷ Path A Scale	X 1,5 ▾ ↗ Y 1,5 ▾ ↗ ↗
Path A Rotation	0,0 ▾ ↗
▷ Path A Pivot	X 0,0 ▾ ↗ Y 0,0 ▾ ↗ ↗
▲ Shape Path B	
Path B	DPPath_173 ▾ ↗
▷ Path B Translation	X 110,0 ▾ ↗ Y 100,0 ▾ ↗ ↗
▷ Path B Scale	X 1,3 ▾ ↗ Y 1,3 ▾ ↗ ↗
Path B Rotation	0,0 ▾ ↗
▷ Path B Pivot	X 0,0 ▾ ↗ Y 0,0 ▾ ↗ ↗

### Path A

The first Path.

### Path B

The second Path.

### Path X Translation

Moves Path A or B relative to the Widget.

### Path X Scale

Scales Path A or B relative to the Widget.

### Path X Rotation

Rotates Path A or B relative to the Widget.

### Path X Pivot

Moves the Path A or B pivot point relative to the Path in the range 0...1.

Both source Paths need to be constructed as DP Path Widgets. The two Widgets need to be marked as *Is Variable* and referenced in the Path A and Path B parameter respectively. Both source Widgets don't need to be visible.

Paints defined in the source Widgets are ignored. Instead, the resulting Path is render with the Paint defined in the DP Path Composer Widget.



## Compose Type

Controls the way the source Paths are combined together. The following boolean operations are available:

- A. Difference  
Subtracts Path B from Path A.
- B. Intersect  
Intersect Path A and Path B.
- C. Union  
Unions Path A and Path B (inclusive OR).
- D. XOR  
XORs Path A and Path B (exclusive OR).
- E. Reverse Difference  
Subtracts Path A from Path B.

## X Axis Fit

Scales the path to fit the **Widget's** width with the following options:

- A. Never  
Disables fitting.
- B. If Smaller

Stretches the path if the path is narrower than the **Widget**.

- C. If Bigger  
Shrinks the path if the path is wider than the **Widget**.
- D. Always  
Combines the last two options.

## Y Axis Fit

Does the same as the previous parameter but for the Y axis.

## Fill Type

Defines the method of filling the path.

- A. Winding  
Specifies that inner area of the path is computed by a non-zero sum of signed edge crossings. Has no effect for paths with stroked **Paint**.
- B. Even-Odd  
Specifies that inner area of the path is computed by an odd number of edge crossings. Has no effect for paths with stroked **Paint**.
- C. Inverse Winding  
Is inverted Winding.
- D. Inverse Even-Odd  
Is Inverted Even-Odd.

## Aggressive Fit

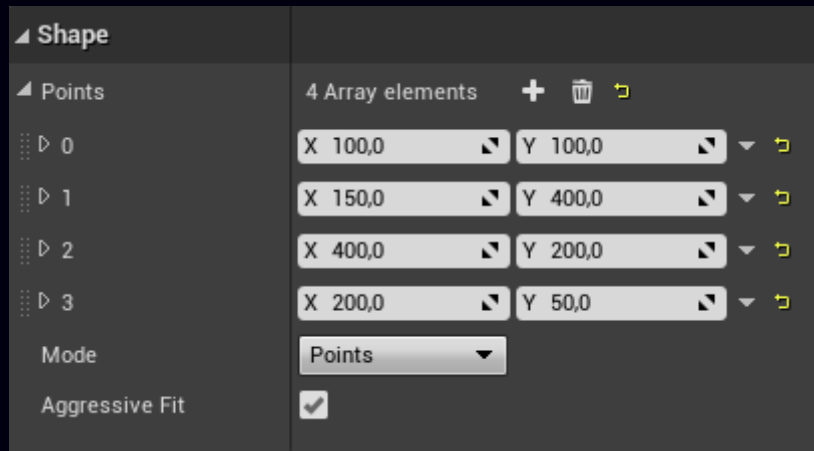
When enabled, the size of the shape will be reduced by the width of the stroke to make it perfectly fit within the bounds. Has no effect when used with a filled **Paint**.



## DP Point Cloud

DP Point Cloud draws a set of points. The points can be drawn individually or connected to form separated lines or a polyline.

### Parameters



### Points

The point set defining the cloud.

### Mode

Defines the mode of drawing the point cloud.

#### A. Points

Draw each point separately.

#### B. Lines

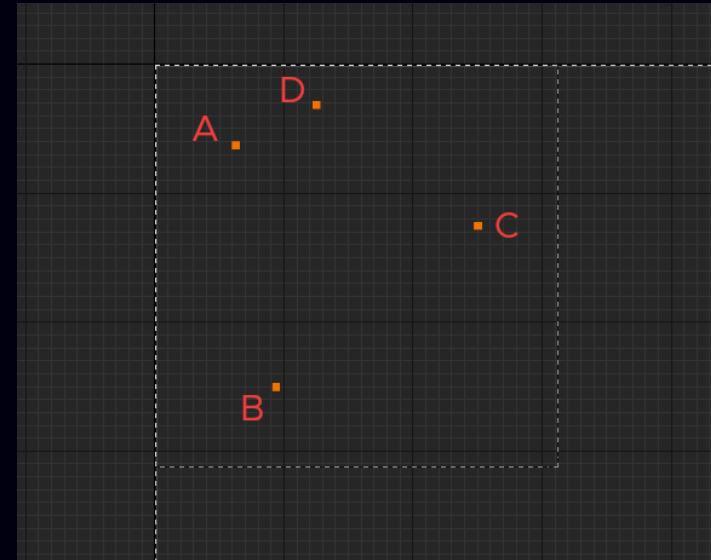
Draw each pair of odd-even points as a line.

#### C. Polygon

Draw the points as an open polygon.

### Aggressive Fit

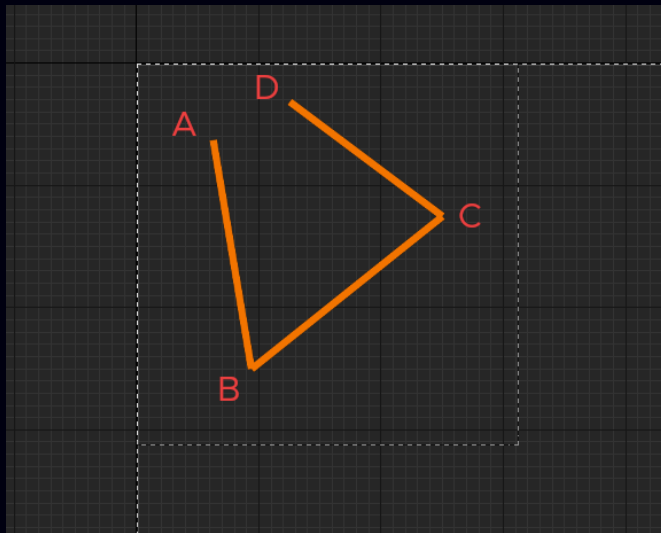
Not used.



A Point Cloud drawn as separated points A (100, 100), B (150, 400), C (400, 200), and D (200, 50).



A Point Cloud drawn as lines connecting points A (100, 100) and B (150, 400); C (400, 200) and D (200, 50).



A Point Cloud drawn as an open polygon connecting points A (100, 100), B (150, 400), C (400, 200), and D (200, 50).

## DP Rectangle

DP Rectangle draws a rectangle within the bounds of the Widget with optionally rounded corners.

### Parameters

Shape	
Top Left Radius	0,0
Top Right Radius	0,0
Bottom Right Radius	0,0
Bottom Left Radius	0,0
Aggressive Fit	<input checked="" type="checkbox"/>

#### Top Left Radius

Radius of the top left corner.

#### Top Right Radius

Radius of the top right corner.

#### Bottom Right Radius

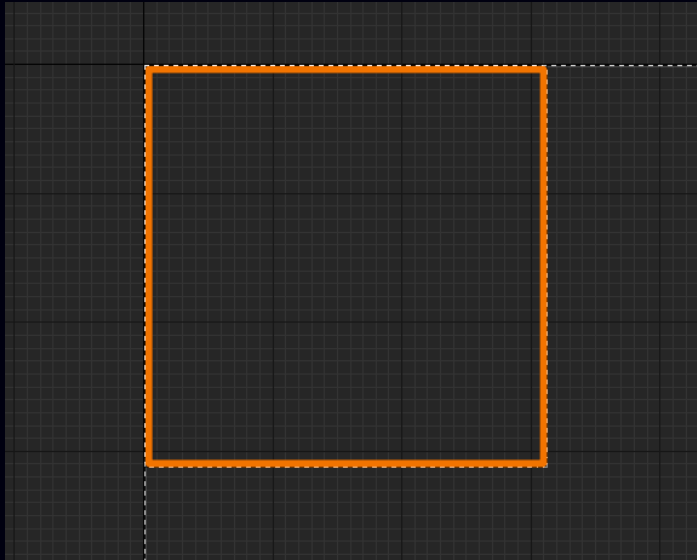
Radius of the bottom right corner.

#### Bottom Left Radius

Radius of the bottom left corner.

## Aggressive Fit

When enabled, the size of the shape will be reduced by the width of the stroke to make it perfectly fit within the bounds. Has no effect when used with a filled **Paint**.

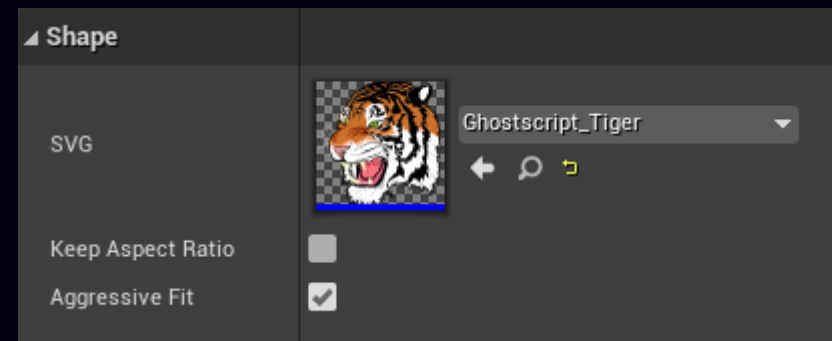


*A rectangle drawn with aggressive fit enabled.*

## DP SVG

**DP SVG** draws an **SVG asset**. SVG images can be imported directly into the editor to make an asset. Most features of SVG 1.1 are supported. Advanced features like *scripting* and *animations* aren't supported but this may change in the future.

## Parameters



## SVG

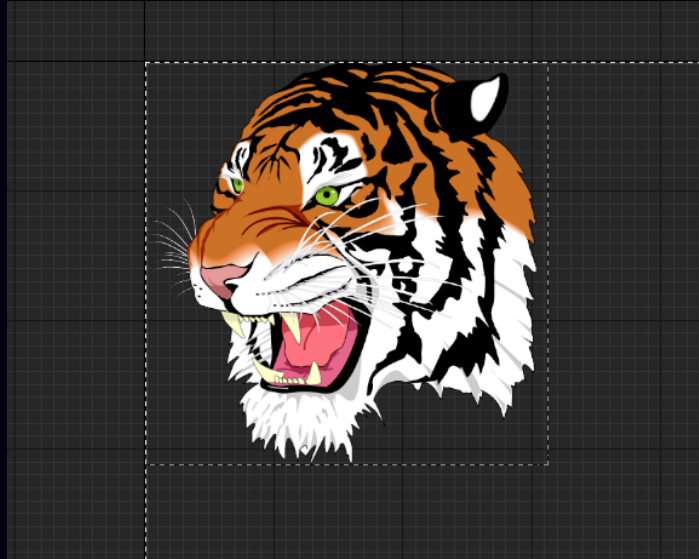
**SVG asset** to be drawn.

## Keep Aspect Ratio

If enabled, the SVG image will be drawn respecting its original aspect ratio. The image will be stretched to fit within the **Widget's** bounds otherwise.

## Aggressive Fit

Not used.



## DP Text

DP Text draws a text using a defined font style.

### Parameters

Shape	
Text	Lorem ipsum blah bla blah...
Justification	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
Wrap Text	<input checked="" type="checkbox"/>
Font Family	Default
Font Size	64,0
Font Color	<input type="color" value="#FFA500"/>
Font Weight	Normal
Font Width	Normal
Font Slant	Normal
Aggressive Fit	<input checked="" type="checkbox"/>

### Text

The text to be drawn.

### Justification

Justification of the text.

- A. Left
- B. Center
- C. Right

## Wrap Text

Wrap the text to make it fit within the bounds of the **Widget**.

## Font Family

Font family used to draw the text. Note that Definitive Painter uses this parameter to pick a font from fonts installed in the operating system rather than from fonts imported into the **Unreal Editor**. If a font from this family isn't available, the system default font is used.

## Font Size

Size of the font.

## Font Color

Color of the font.

## Font Weight

Weight of the font. Note that if selected font doesn't support the selected weight, the *Normal* weight is used.

- A. Invisible (0)
- B. Thin (100)
- C. Extra Light (200)
- D. Light (300)
- E. Normal (400)
- F. Medium (500)
- G. Semi Bold (600)
- H. Bold (700)
- I. Extra Bold (800)
- J. Black (900)

- K. Extra Black (1000)

## Font Width

Width of the font. Note that if selected font doesn't support the selected width, the *Normal* width is used.

- A. Undefined
- B. Ultra Condensed
- C. Extra Condensed
- D. Condensed
- E. Semi Condensed
- F. Normal
- G. Semi Expanded
- H. Expanded
- I. Extra Expanded
- J. Ultra Expanded

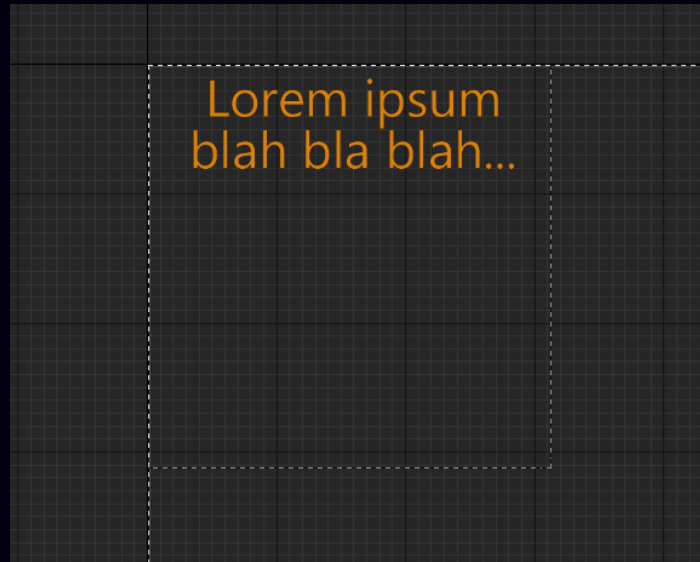
## Font Slant

Slant of the font. Note that if selected font doesn't support the selected slant, the *Normal* slant is used.

- A. Normal
- B. Italic
- C. Oblique

## Aggressive Fit

Not used.



## DP Text On Path

DP Text On Path draws a text following a path.

### Parameters

Shape	
Text	Lorem ipsum blah blah blah... ▾ ↗
Path Commands	7 Array elements + 🗑️ ↗
▷ 0	○ Move To ▾ ▾ ↗
▷ 1	○ Line To ▾ ▾ ↗
▷ 2	○ Quad To ▾ ▾ ↗
▷ 3	○ Line To ▾ ▾ ↗
▷ 4	○ Quad To ▾ ▾ ↗
▷ 5	○ Quad To ▾ ▾ ↗
▷ 6	○ Line To ▾ ▾ ↗
Warp Text	<input checked="" type="checkbox"/> ↗
Draw Path	<input type="checkbox"/>
Vertical Position Offset	0,0 ▾ ↗
Horizontal Position Offset	0,0 ▾ ↗
Justification	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Font Family	Times New Roman ↗
Font Size	64,0 ▾ ↗
▷ Font Color	<input type="color" value="#FFA500"/> ↗
Font Weight	Normal ▾
Font Width	Normal ▾
Font Slant	Italic ▾ ↗
Aggressive Fit	<input checked="" type="checkbox"/>

## Text

The text to be drawn.

## Path Commands

An array of commands defining the path.

## Warp Text

Warp individual characters to make them perfectly fit the followed path. Note that this feature is slow and might not work properly on paths with sharp edges.

## Draw Path

Draw the followed path.

## Vertical Offset

Offsets the text vertically.

## Horizontal Offset

Offsets the text horizontally.

## Justification

Justification of the text along the followed path.

- A. Left
- B. Center
- C. Right

## Font Family

Font family used to draw the text. Note that Definitive Painter uses this parameter to pick a font from fonts installed in the operating system rather than from fonts imported into the **Unreal Editor**. If a font with this family isn't available, the system default font is used.

## Font Size

Size of the font.

## Font Color

Color of the font.

## Font Weight

Weight of the font. Note that if selected font doesn't support the selected weight, the *Normal* weight is used.

- A. Invisible (0)
- B. Thin (100)
- C. Extra Light (200)
- D. Light (300)
- E. Normal (400)
- F. Medium (500)
- G. Semi Bold (600)
- H. Bold (700)
- I. Extra Bold (800)
- J. Black (900)
- K. Extra Black (1000)

## Font Width

Width of the font. Note that if selected font doesn't support the selected width, the *Normal* width is used.

- A. Undefined
- B. Ultra Condensed
- C. Extra Condensed
- D. Condensed
- E. Semi Condensed
- F. Normal
- G. Semi Expanded
- H. Expanded
- I. Extra Expanded
- J. Ultra Expanded

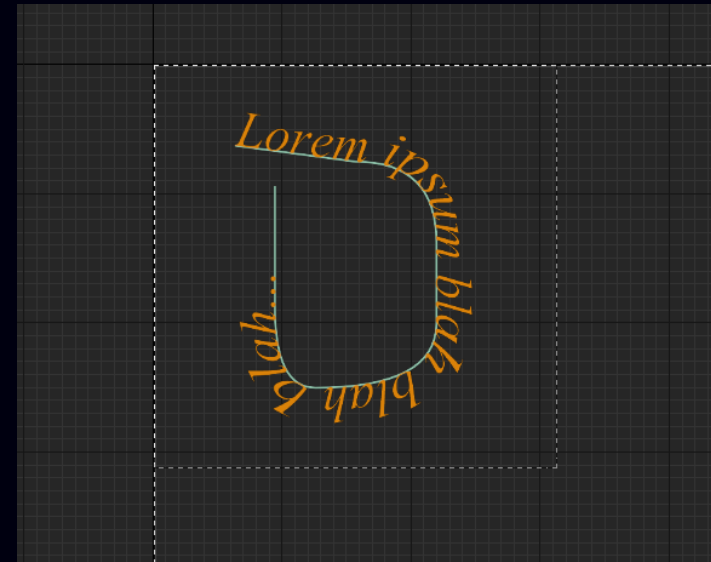
## Font Slant

Slant of the font. Note that if selected font doesn't support the selected slant, the *Normal* slant is used.

- A. Normal
- B. Italic
- C. Oblique

## Aggressive Fit

Not used.



Text following a path. Warp Text and Draw Path options are enabled.





# Widget Animation

Every **Definitive Painter Widget** has its own predefined set of parameters which can be animated. All animations start upon the creation of the **Widget** and last for a specified amount of seconds. You can choose from 32 different types of animation. The animation for each parameter is independent from other animations.

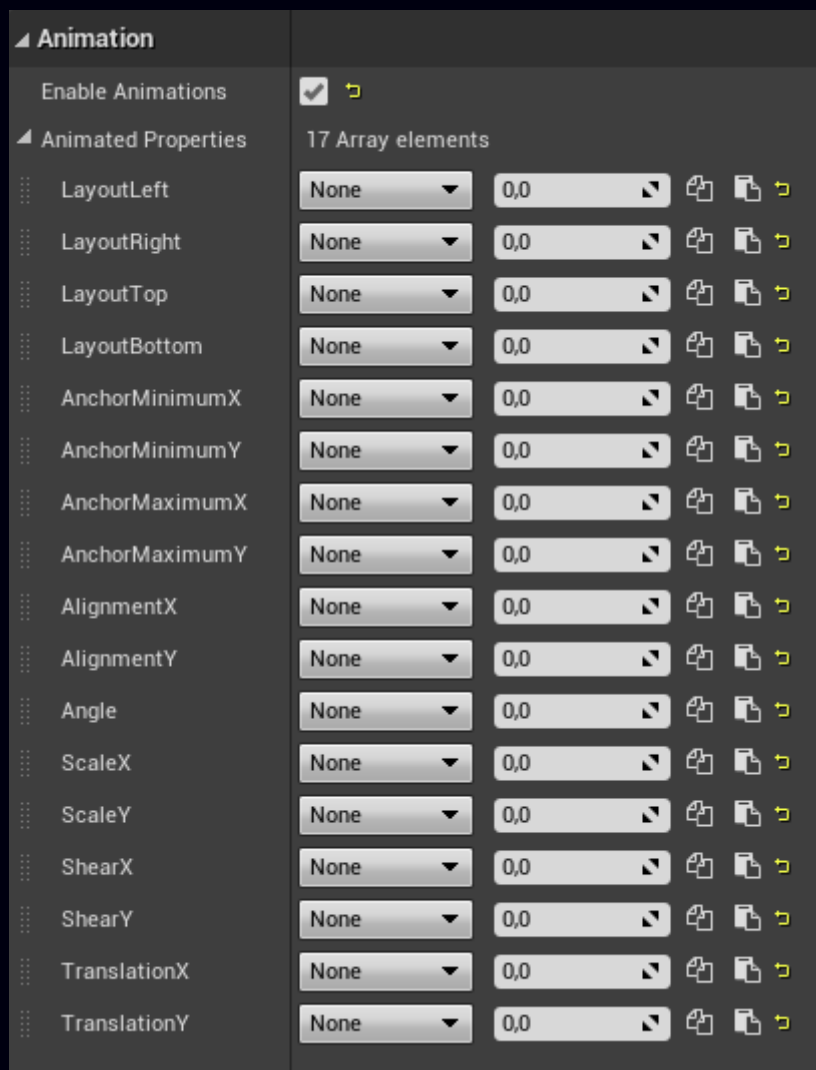
## Animation types

- A. None
- B. Linear
- C. In Sine
- D. Out Sine
- E. In-Out Sine
- F. In Quad
- G. Out Quad
- H. In-Out Quad
- I. In Cubic
- J. Out Cubic
- K. In-Out Cubic
- L. In Quart
- M. Out Quart
- N. In-Out Quart
- O. In Quint
- P. Out Quint
- Q. In-Out Quint
- R. In Expo
- S. Out Expo

- T. In-Out Expo
- U. In Circ
- V. Out Circ
- W. In-Out Circ
- X. In Back
- Y. Out Back
- Z. In-Out Back
- AA.In Elastic
- AB.Out Elastic
- AC.In-Out Elastic
- AD.In Bounce
- AE.Out Bounce
- AF.In-Out Bounce

If the animation type is set to *None* and/or the length is set to 0, the animation is disabled for the corresponding parameter. All animations for the **Widget** are disabled by default.

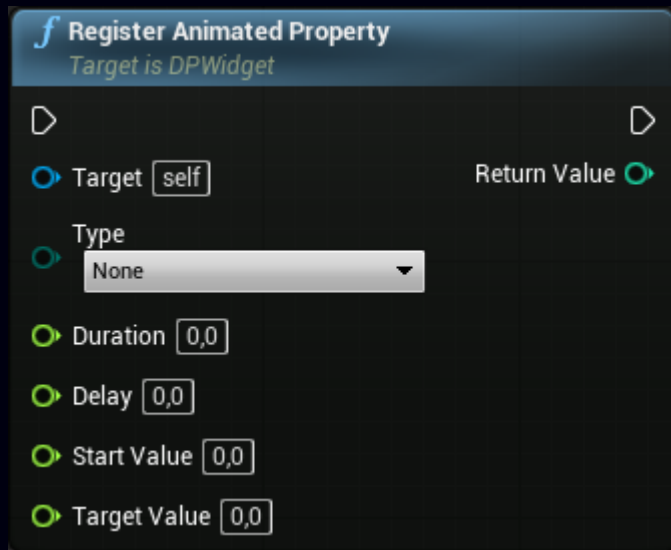
See [this amazing Easing Functions Cheat Sheet](#) to learn more about available animation types.



You can also register a custom **Animated Property** which is basically a helper that outputs a float value based on animation *Type*, *Duration*, *Delay* and *Start* and *Target Value*. The helper sets the output value to the *Start Value* upon the creation of the **Widget**, waits for a number of seconds specified in *Delay*, then interpolates the output value toward the *Target Value* for a period of time specified in *Duration* (seconds).

Using the two buttons at the end of each **Animation** row, you can copy and paste the **Animation** settings to another **Animation** within the same **Widget** or a different one.

## Register Animated Property



### Target `UDPWidget`

A `Definitive Painter Widget`. The `Widget` is responsible for managing custom `Animated Properties`.

### Type `EDPAnimationType`

Animation type.

### Duration `float`

Animation duration.

### Delay `float`

Animation delay.

### Start Value `float`

The output value is set to the *Start Value* upon the creation of the `Widget`.

### Target Value `float`

The output value is interpolated toward the *Target Value*.

### Return Value `int`

The ID of the custom `Animated Property`. Store this value in a variable. You need the ID every time you interact with a custom `Animated Property` (reading its output value, etc.).

## Get Animated Property Value



### Target `UDPWidget`

A `Definitive Painter Widget`. The `Widget` is responsible for managing custom `Animated Properties`.

### Return Value `int`

Number of custom `Animated Properties` registered in the target `Widget`.

## Get Animated Property Value



### Target `UDPWidget`

A `Definitive Painter Widget`. The `Widget` is responsible for managing custom `Animated Properties`.

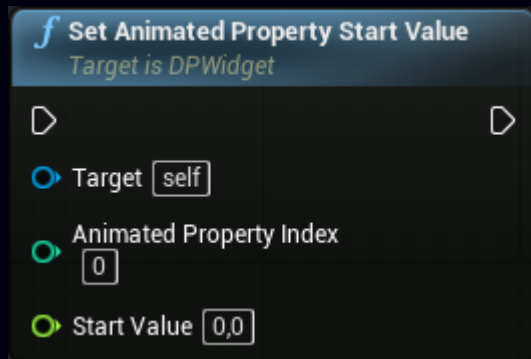
### Animated Property Index `int`

The ID of the custom `Animated Property`.

### Return Value `float`

The output value of the custom `Animated Property`.

## Set Animated Property Start Value



Sets a new *Start Value* for a custom **Animated Property**. This resets the timer of the **Animated Property**, sets the output value to the new *Start Value* and immediately starts interpolating the output value toward the *Target Value* ignoring the *Delay*.

### Target **UDPWidget**

A **Definitive Painter Widget**. The **Widget** is responsible for managing custom **Animated Properties**.

### Animated Property Index **int**

The ID of the custom **Animated Property**.

### Start Value **float**

New *Start Value*.

## Set Animated Property Target Value



Sets a new *Target Value* for a custom **Animated Property**. This resets the timer of the **Animated Property** and immediately starts interpolating the output value toward the new *Target Value* ignoring the *Delay*.

### Target **UDPWidget**

A **Definitive Painter Widget**. The **Widget** is responsible for managing custom **Animated Properties**.

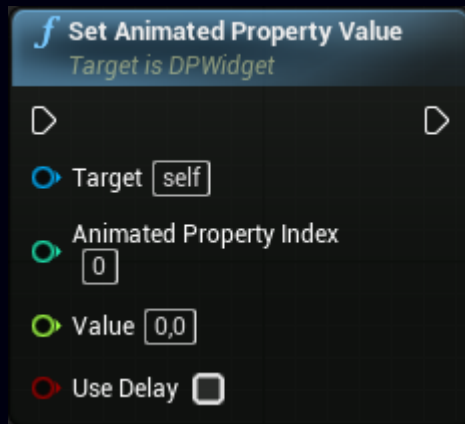
### Animated Property Index **int**

The ID of the custom **Animated Property**.

### Target Value **float**

New *Target Value*.

## Set Animated Property Value



Sets the output value to the *Value* for a custom *Animated Property*. This resets the timer of the *Animated Property* and starts interpolating the output value toward the *Target Value* ignoring the *Delay* and the *Start Value*.

### Target *UDPWidget*

A *Definitive Painter Widget*. The *Widget* is responsible for managing custom *Animated Properties*.

### Animated Property Index *int*

The ID of the custom *Animated Property*.

### Value *float*

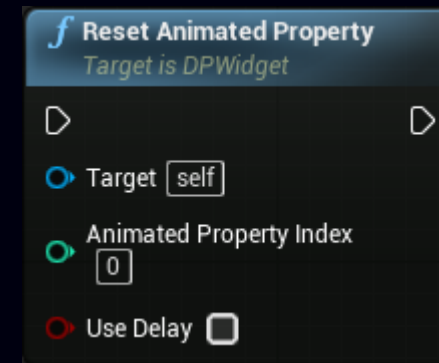
New *Value*.

### Use Delay *bool*

Wait for the *Delay* time set when registering the *Animated Property* before interpolating the output value toward the *Target Value*.

## Reset Animated Property

Resets the output value and the timer of the *Animated Property*.



### Target *UDPWidget*

A *Definitive Painter Widget*. The *Widget* is responsible for managing custom *Animated Properties*.

### Animated Property Index *int*

The ID of the custom *Animated Property*.

### Use Delay *bool*

Wait for the *Delay* time set when registering the *Animated Property* before interpolating the output value toward the *Target Value*.

CONICAL GRADIENT



LINEAR GRADIENT



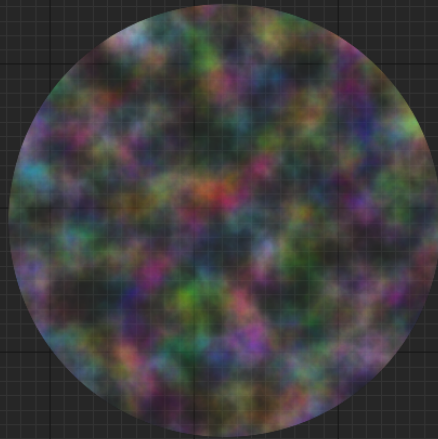
RADIAL GRADIENT



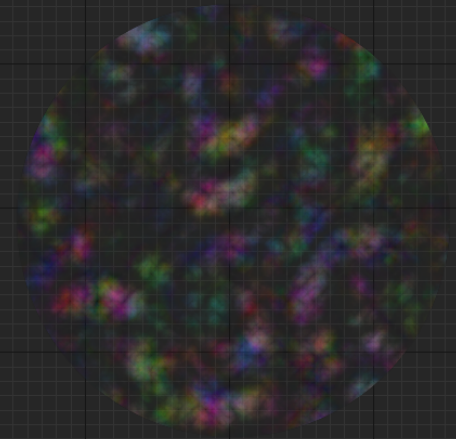
SWEEP GRADIENT



FRACTAL NOISE



TURBULENT NOISE

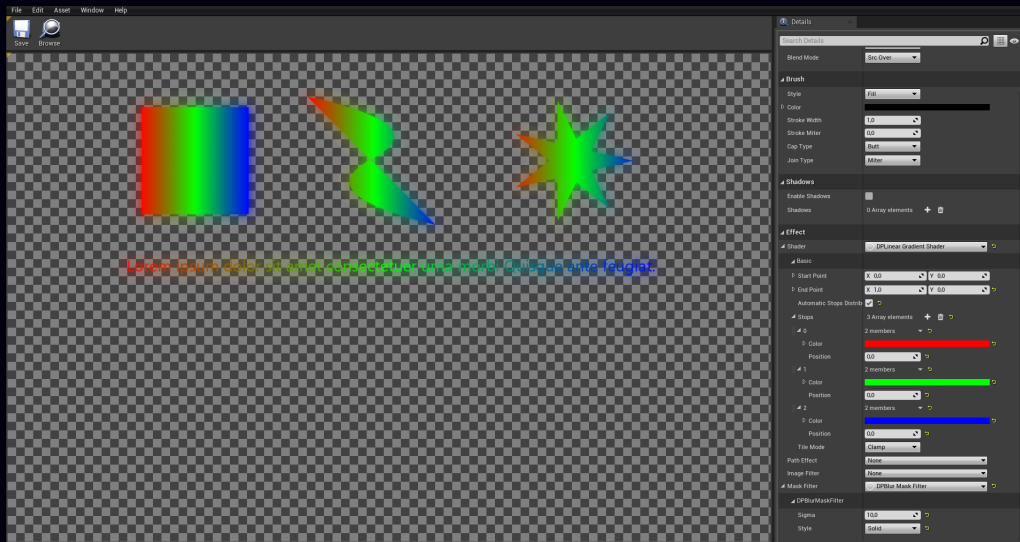




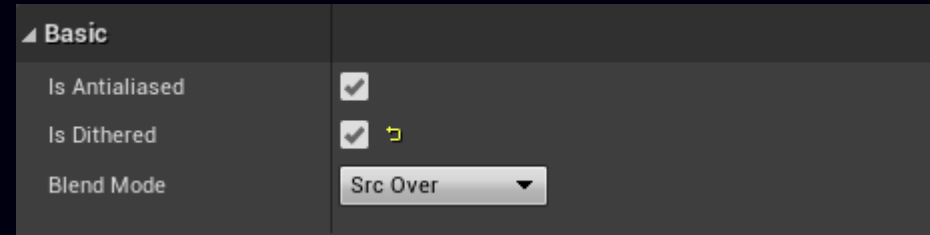
# Paint

**Paint** is an asset defining the appearance of **DP Widgets**. To create a **Paint**, right click in the **Content Browser** → **Definitive Painter** → **Definitive Painter Paint**.

**Paint** has its own editor. The editor window is divided into two panels; the *preview panel* and the *detail panel*. In the *detail panel*, you can change the properties of the **Paint** and see it applied onto basic shapes drawn in the *preview panel*.



# Parameters



## Is Antialiased

This parameter is intended for a future optimization. Right now, every piece of geometry is rendered with hardware multisample antialiasing enabled (if supported).

## Is Dithered

Enable this to reduce visible bands between similar colors. This is especially useful for **Paints** with gradients where blending between similar colors over a long distance is performed.

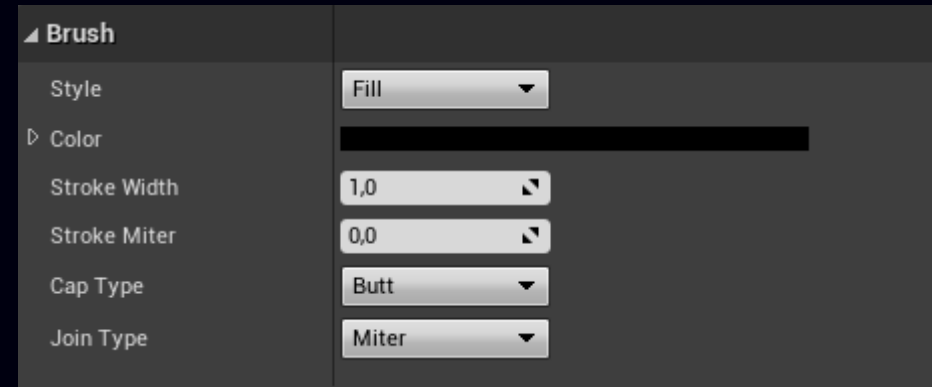
## Blend Mode

Defines the blending between the currently rendered **Element** and the **Elements** that were rendered before the current one.

- A. Clear
- B. Src
- C. Dst
- D. Src Over
- E. Dst Over
- F. Src In

- G. Dst In
- H. Src Out
- I. Dst Out
- J. Src A Top
- K. Dst A Top
- L. Xor
- M. Plus
- N. Modulate
- O. Screen
- P. Overlay
- Q. Darken
- R. Lighten
- S. Color Dodge
- T. Color Burn
- U. Hard Light
- V. Soft Light
- W. Difference,
- X. Exclusion
- Y. Multiply
- Z. Hue
- AA.Saturation
- AB.Color
- AC.Luminosity

Default is *Src Over*. You can learn more about the available blend modes [here](#).



## Style

Defines whether the **Element** is filled, stroked or both.

- A. Fill  
Fill the area of the **Element** with the **Paint**.
- B. Stroke  
Draw only the outline of the **Element**.
- C. Fill and Stroke  
The previous two combined.

## Color

Color used to draw the **Element**.

## Stroke Width

The width of the outline. Has effect only with the *Fill* and *Fill and Stroke Style*.

## Stroke Miter

Defines the limit at which sharp corners are drawn beveled. Has effect only with the *Fill* and *Fill and Stroke Style*.

## Cap Type

Defines the cap type of strokes. Has effect only with the *Fill* and *Fill and Stroke Style*.

### A. Butt

Default. Strokes have no extension.

### B. Round

Adds a circle at each end of strokes.

### C. Square

Adds a square at each end of strokes.

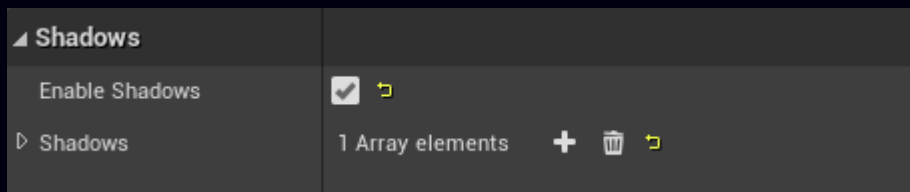
## Join Type

Defines the corner type of strokes. Has effect only with the *Fill* and *Fill and Stroke Style*.

### A. Miter

### B. Round

### C. Bevel



## Enable Shadows

Enable shadows for the **Element**.

## Shadows

An array of *Shadows*. Each **Paint** can hold an unlimited number of *Shadows* the **Element** can cast shadows with different colors in many directions.



### Enable

Enable the shadow.

### Color

Shadow color.

### Blur

Shadow blur or softness.

### Offset

Shadow offset (or shadow length) from the position of the **Element**.

## Style

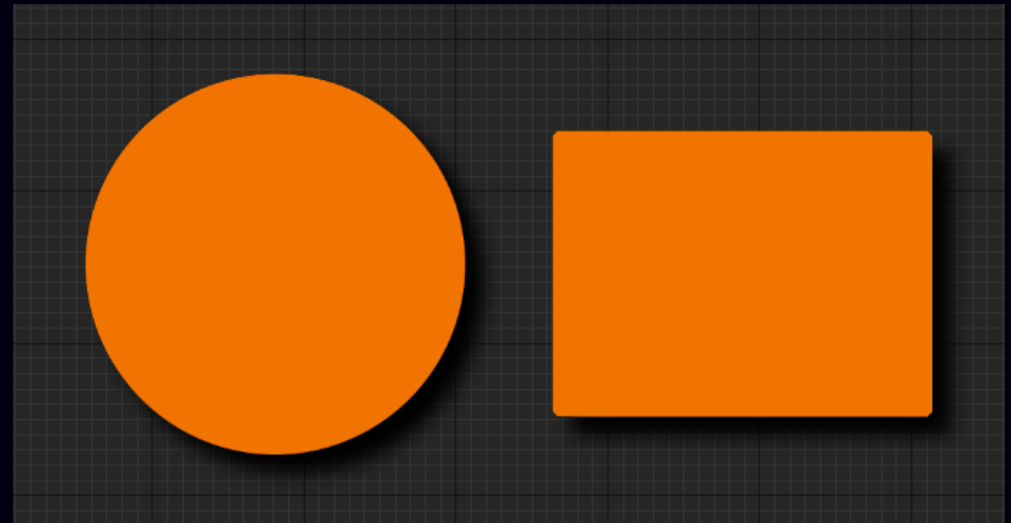
Shadow style.

### A. Outset

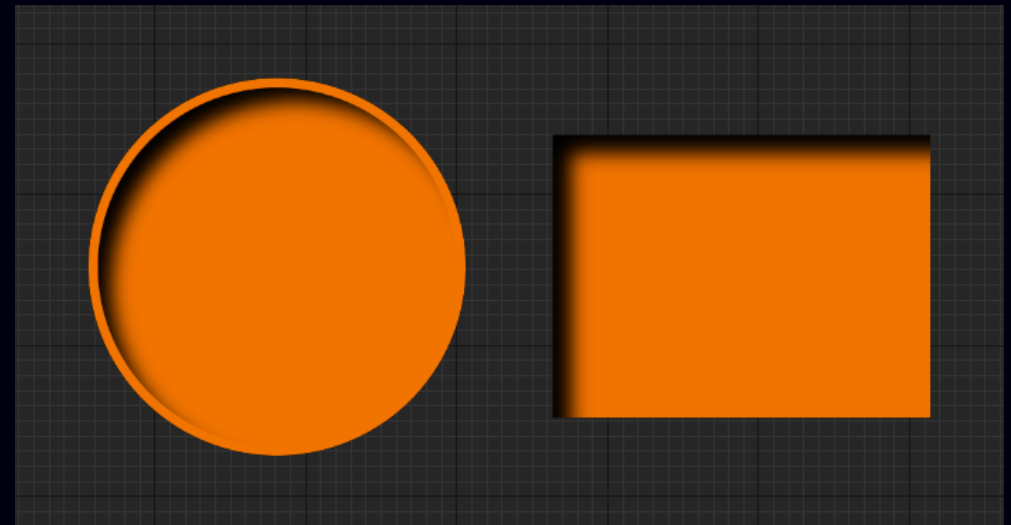
The **Element** casts shadow as if it was above the background.

### B. Inset

The background casts shadow on the **Element** as if the **Element** formed a hole in the background.

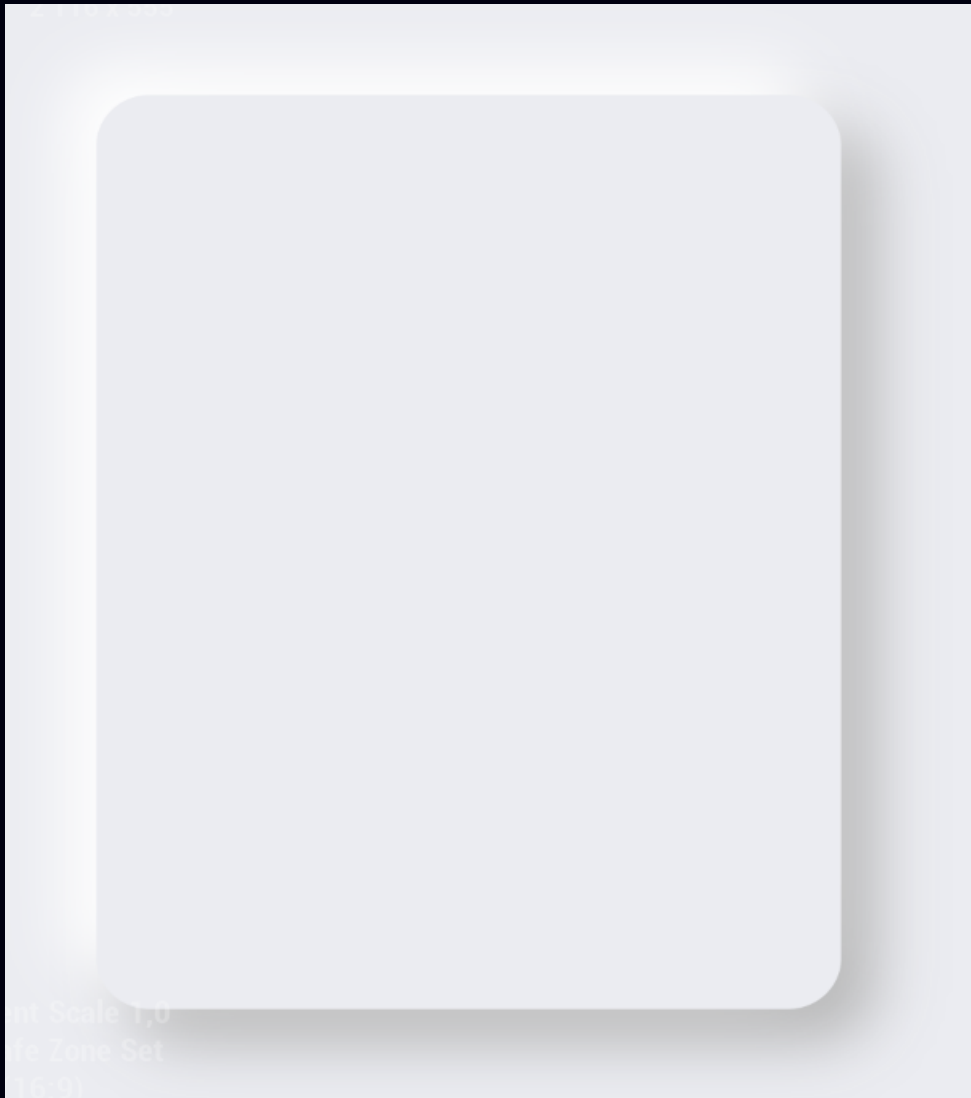


*A single outset Shadow with offset (20, 20), blur (10), and black color.*



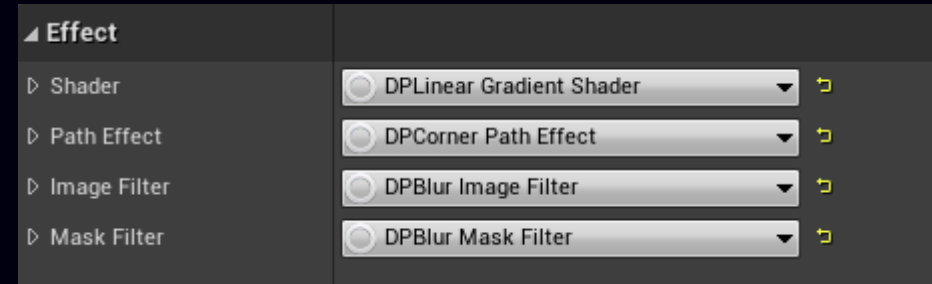
*A single inset Shadow with offset (20, 20), blur (10), and black color.*

*Note that the circle is drawn with a filled&stroked Paint, while the rectangle is drawn only with a filled Paint.*



Font Scale 1,0  
Life Zone Set  
(1, 9)

*Two offset Shadows; one with offset (30, 30), blur (30) and darker color (#B3B3B3FF), and one with offset (-30, -30), blur (30) and lighter color (white).*



## Shader

An image shader defining the texture of the **Element**.

## Path Effect

An effects altering the geometry of the **Element**.

## Image Filter

A filter altering the appearance of the whole **Element**.

## Mask Filter

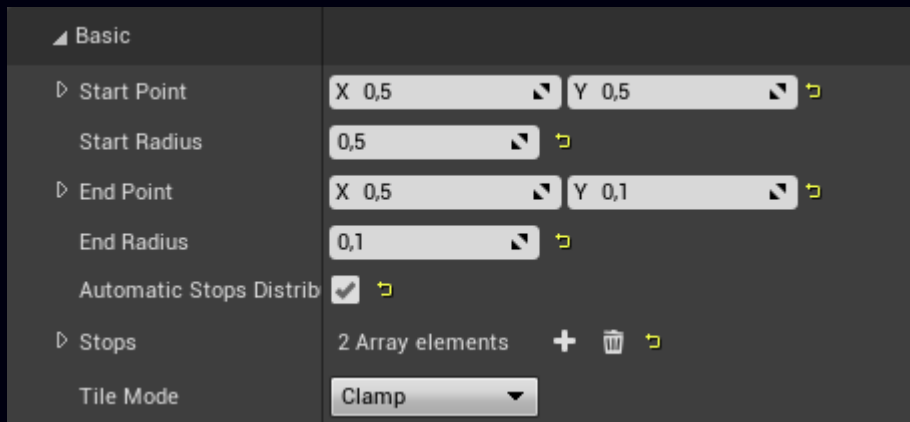
A filter altering the appearance of the **Element**'s border.

## Shaders

All positions, centers, radii and stop positions are expressed as fractions of the **Element**'s geometrical size. For an **Element** of size 400, 400, a Center (0.5, 0.75) is transformed to the position (200, 300) relative to the top left corner of the **Element**. For the same **Element**, Radius (0.25) is transformed to (100).

### DP Conical Gradient Shader

Creates a conical gradient which is basically a radial gradient with two focal points. Each point has its own position and radius.



#### Start Point

Start point position (0...1, 0...1).

#### Start Radius

Radius around the *Start Point* (0...1).

#### End Point

End point position (0...1, 0...1).

#### End Radius

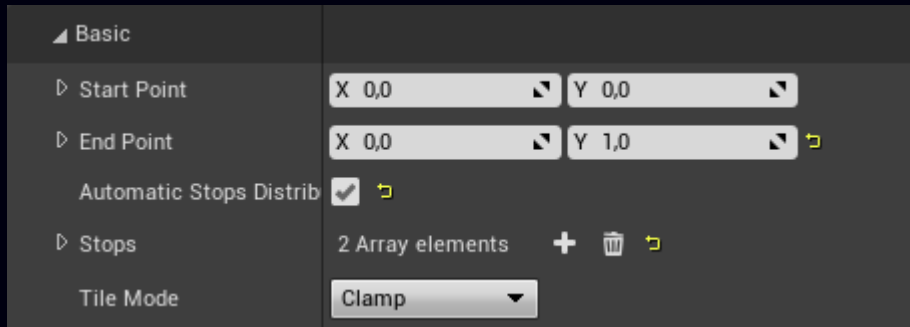
Radius around the *End Point* (0...1).



*A Conical Gradient with Start Point (0.5, 0.5), Start Radius 0.5, End Point (0.5, 0.1), End Radius (0.1), and two Stops.*

## DP Linear Gradient Shader

Creates a linear gradient from the *Start Point* to the *End Point*.



### Start Point

Start point position.

### End Point

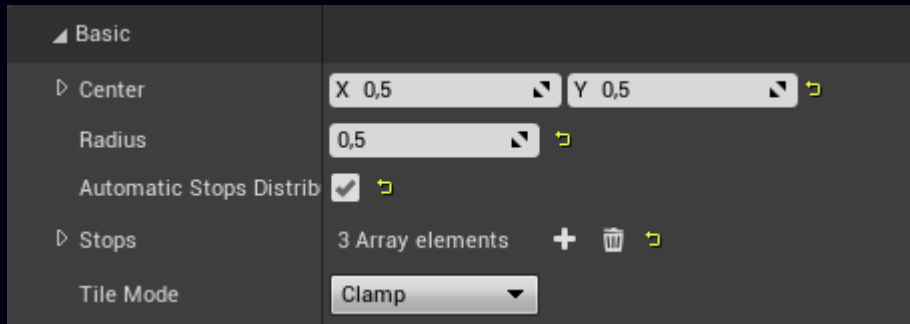
End point position.



*A Linear Gradient with Start Point (0.0, 0.0), End Point (0.0, 1.0), and three Stops.*

## DP Radial Gradient Shader

Creates a radial gradient from at the *Center* with the radius *Radius*.

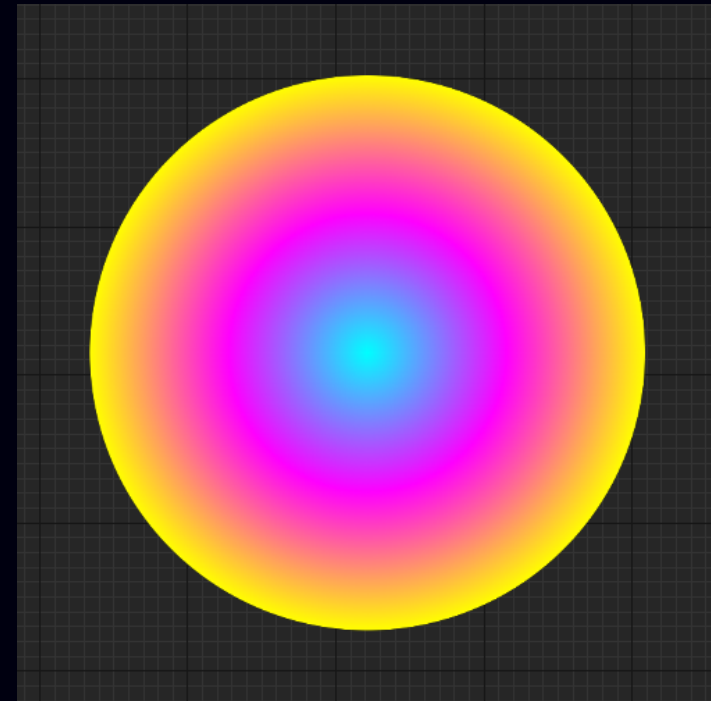


Center

Center position.

Radius

Gradient radius.



*A Linear Gradient with Center (0.5, 0.5), Radius (0.5), and three Stops.*



## DP Sweep Gradient Shader

Creates a Sweep (umbrella-like) gradient at the *Center*, starting at the *Start Angle*, ending at the *End Angle* and with optional *Rotation*.



### Center

Center position.

### Start Angle

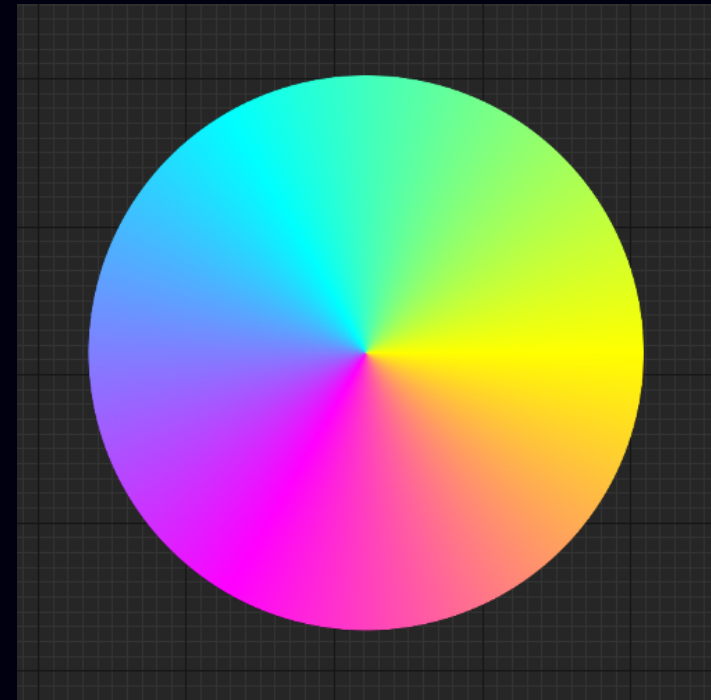
Start angle of the gradient in degrees. Starts at 3 o'clock and goes clockwise when increased.

### End Angle

End angle of the gradient in degrees. Starts at 3 o'clock and goes clockwise when increased.

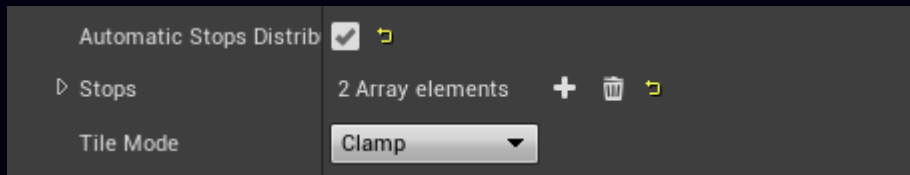
### Rotation

Optional rotation of the gradient.



*A Sweep Gradient with Center (0.5, 0.5), Start Angle (0.0), End Angle (360.0), Rotation(0.0) and three Stops.*

## Gradient Common parameters



### Automatic Stops Distribution

Center position.

### Stops

An array of *Stops*. Each *Stop* defines a color at a certain point along the direction of the gradient.



### Color

Stop color.

### Position

Stop position (0...1) along the direction of the Gradient.

### Tile Mode

Controls drawing outside of the Gradient range.

#### A. Clamp

Repeat the edge color.

#### B. Repeat

Repeats the texture generated by the shader.

#### C. Mirror

Repeatedly mirrors the texture generated by the shader.

#### D. Decal

Fills the area outside of the Gradient range with transparent black.

## DP Turbulent Noise Shader

Creates a turbulent noise texture useful for simulating organic images like water, lava, clouds, etc.

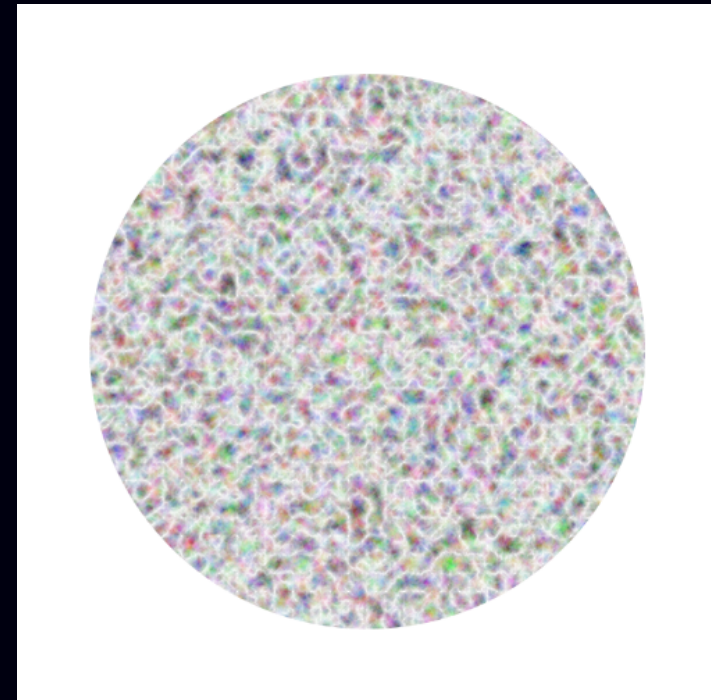
▲ Basic	
Base Frequency X	0,06 <input type="text"/> ↕ ↗
Base Frequency Y	0,06 <input type="text"/> ↕ ↗
Num Octaves	5 <input type="text"/> ↕ ↗
Seed	123,0 <input type="text"/> ↕ ↗

Base Frequency X  
Frequency X.

Base Frequency Y  
Frequency Y.

Num Octaves  
Number of octaves.

Seed  
Noise randomization parameter.



*Turbulent noise with Base Frequency X (0.05), Base Frequency Y (0.05), Num Octaves (5), and Seed (123).*

## DP Fractal Noise Shader

Creates a fractal noise texture useful for simulating landscapes, force fields, etc.

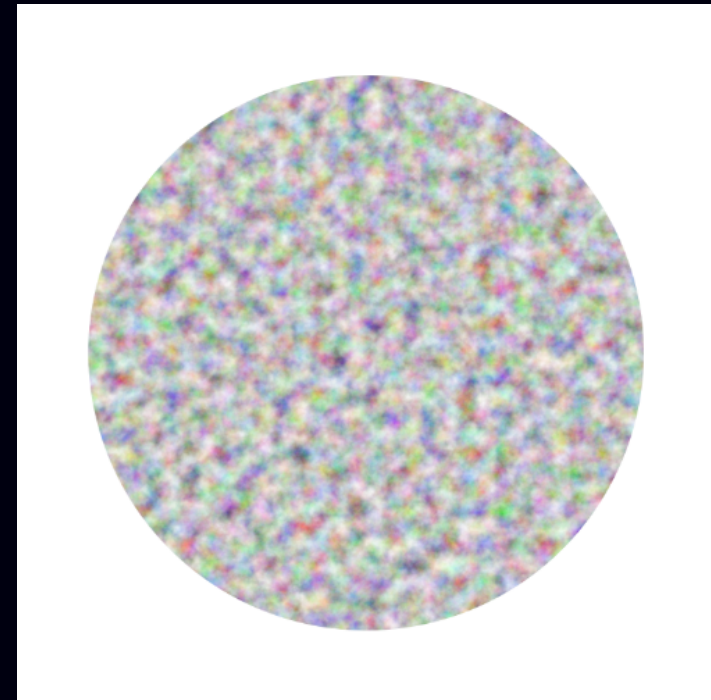
Basic	
Base Frequency X	0,06 <input type="text"/>  
Base Frequency Y	0,06 <input type="text"/>  
Num Octaves	5 <input type="text"/>  
Seed	123,0 <input type="text"/>  

**Base Frequency X**  
Frequency X.

**Base Frequency Y**  
Frequency Y.

**Num Octaves**  
Number of octaves.

**Seed**  
Noise randomization parameter.

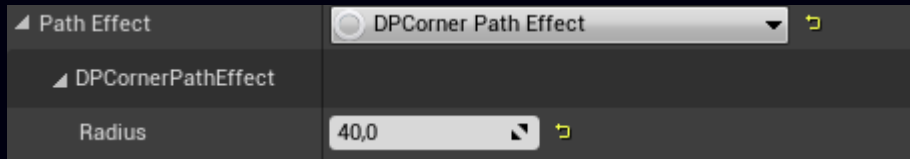


*Fractal noise with Base Frequency X (0.05), Base Frequency Y (0.05), Num Octaves (5), and Seed (123).*

## Path Effects

### DP Corner Path Effect

Rounds corners of the shape to the specified radius.



#### Radius

Corner radius.



A path without (left) and with rounded corners (right) with radius (100).

### DP Dash Path Effect

Turns a stroked path into a dashed path. This works only with a stroked **Paint**.

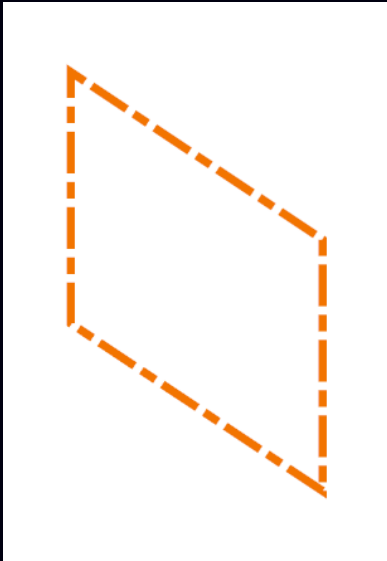


#### Intervals

An array of floats defining interval at which path is either visible or invisible. Intervals with odd indices define the length of visible parts and intervals with even indices define the length of invisible parts.

#### Phase

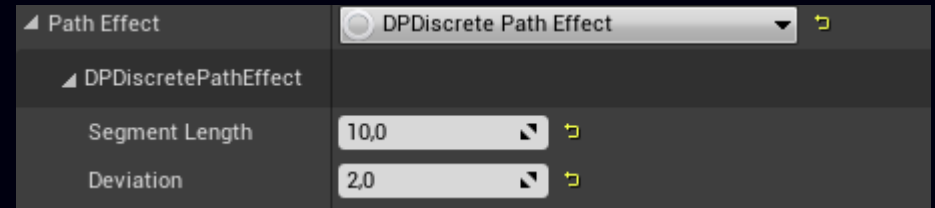
The offset of *Intervals* along the path.



*A dashed path with 4 intervals (20, 10, 50, and 10). The effect starts at the top left corner and goes clockwise.*

## DP Discrete Path Effect

Randomly deforms the shape of the **Element**.

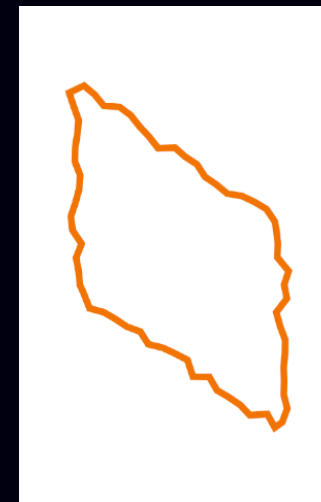


### Segment Length

Length of segments the path is broken into.

### Deviation

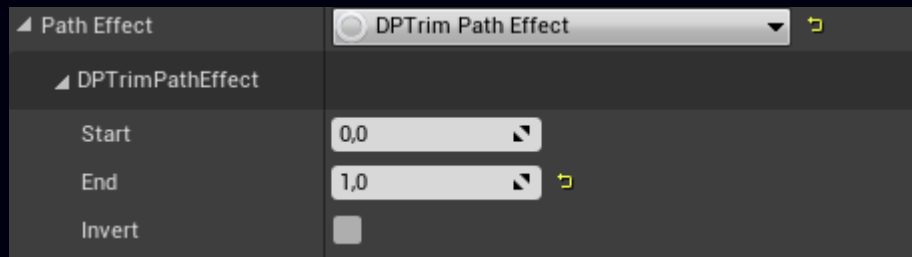
Maximum amount of random offset applied to the forementioned path segments.



*A deformed path with segment length (20) and deviation (10).*

## DP Trim Path Effect

Trims the path.



### Start

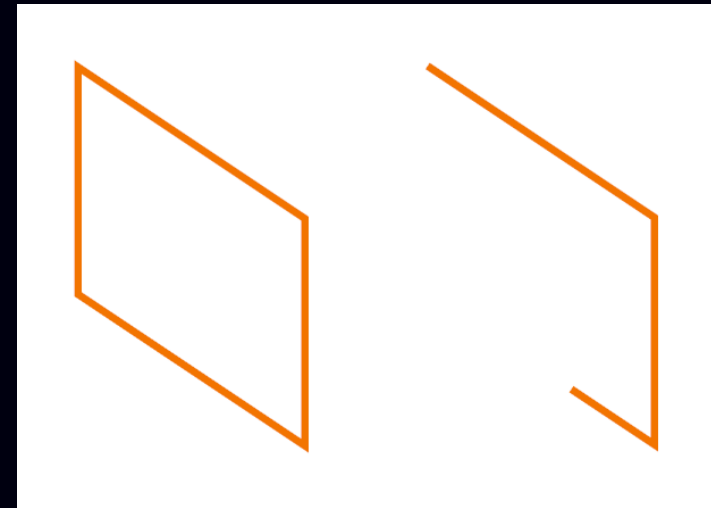
Start of the visible part of the path (0...1).

### End

End of the visible part of the path (0...1).

### Invert

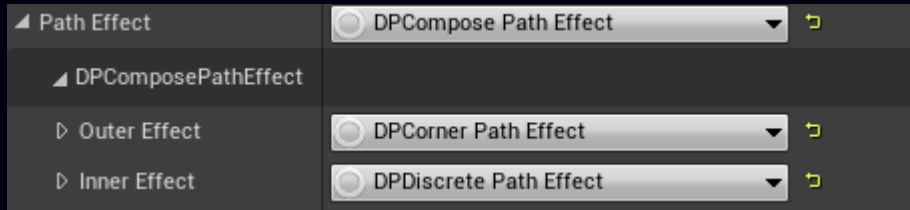
Invert the visible and invisible parts of the path.



*A path without (left) and with the trim effect (right) with Start (0), End (0.6) end Inverse (disabled).*

## DP Compose Path Effect

Composes two Path Effects. It applies the *Inner Effect* to the path and then applies the *Outer Effect* to the result of that operation.



### Outer Effect

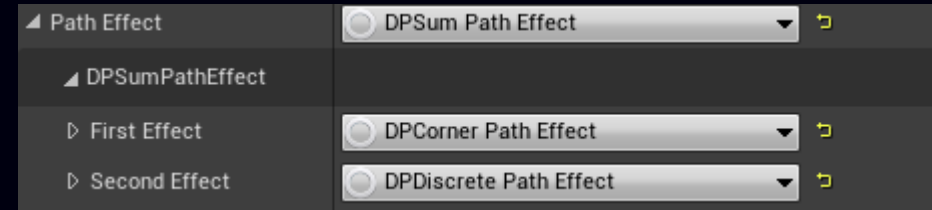
This effect is applied to the result of applying the *Inner Effect* to the path.

### Inner Effect

This effect is the first to be applied to the path.

## DP Sum Path Effect

Sums two Path Effects. It applies the *First Effect* and the *Second Effect* to the path and sums the results of these operations.



### First Effect

The first effect,

### Second Effect

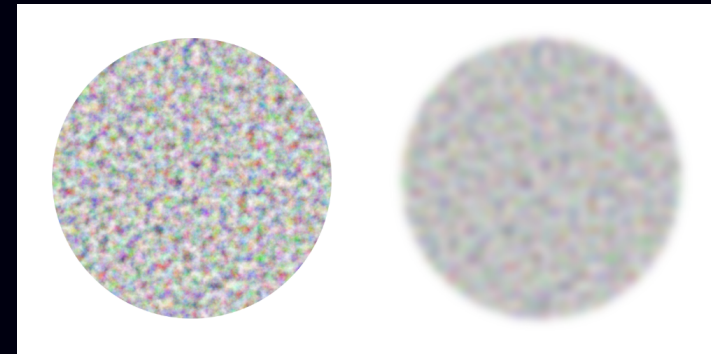
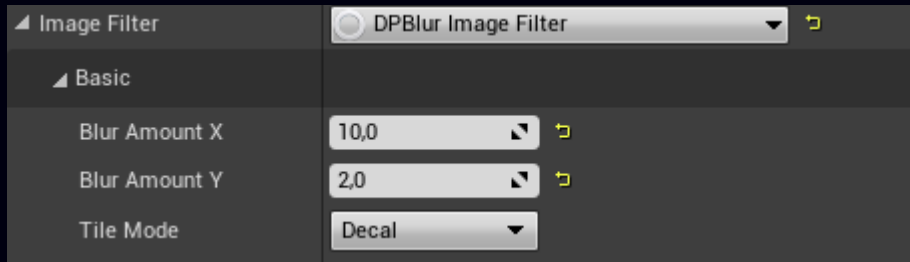
The second effect.



## Image Filters

### DP Blur Image Filter

Applies a Gaussian blur filter to the whole **Element**.



*A circle without (left) and with the Blur Image Filter (right) with Blur Amount X (10), Blur Amount Y (10), and Tile Mode (Decal).*

#### Blur Amount X

Blur amount in the X direction.

#### Blur Amount Y

Blur amount in the Y direction.

#### Tile Mode

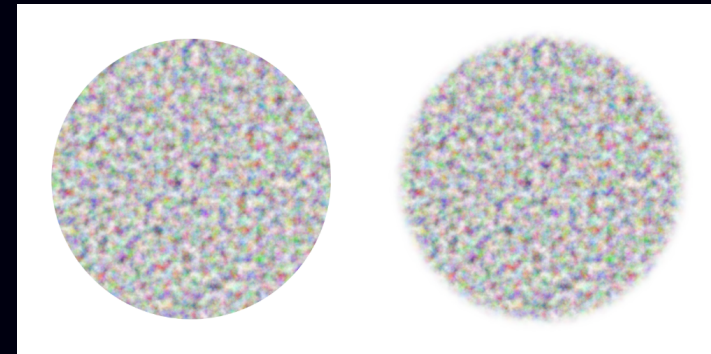
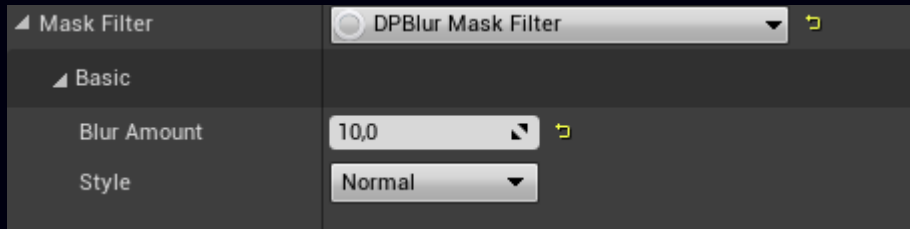
Controls drawing outside of the **Element** area.

- A. Clamp  
Repeat the edge color.
- B. Repeat  
Repeats the blurred **Element**.
- C. Mirror  
Repeatedly mirrors the blurred **Element**.
- D. Decal  
Fills the area outside of the **Element** with transparent black.

## Mask Filters

### DP Blur Mask Filter

Applies a Gaussian blur filter to the **Element**'s borders.



*A circle without (left) and with the Blur Mask Filter (right) with Blur Amount (10) and Style (Normal).*

#### Blur Amount

Blur amount.

#### Style

Controls the blur style.

##### A. Normal

Blurs the border to both inside and outside of the **Element**.

##### B. Solid

Blurs the border only to the outside of the **Element**.

##### C. Outer

Blurs the border only to the outside of the **Element**. The inside of the **Element** is filled with transparent black.

##### D. Inner

Blurs the border only to the inside of the **Element**. The outside of the **Element** is filled with transparent black.

< February 2023 >

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

Select Cancel

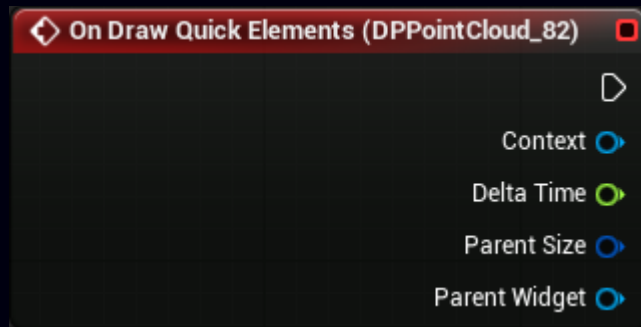


Days to show

Sunday	<input type="checkbox"/>
Monday	<input checked="" type="checkbox"/>
Tuesday	<input checked="" type="checkbox"/>
Wednesday	<input type="checkbox"/>
Thursday	<input type="checkbox"/>
Friday	<input type="checkbox"/>
Saturday	<input checked="" type="checkbox"/>

## Quick Elements

Quick Elements are basic shapes like rectangles, circles, and even paths, etc. drawn within the bounds of the **Widget** in the **On Draw Quick Elements** event. These **Elements** are not managed by the **Widget Tree** and ignore user input so they render much faster.



### Context **UDPContext**

A **Context** that must be passed as an argument to every **Quick Element** draw call.

### Delta Time **float**

The time elapsed since the last frame in seconds.

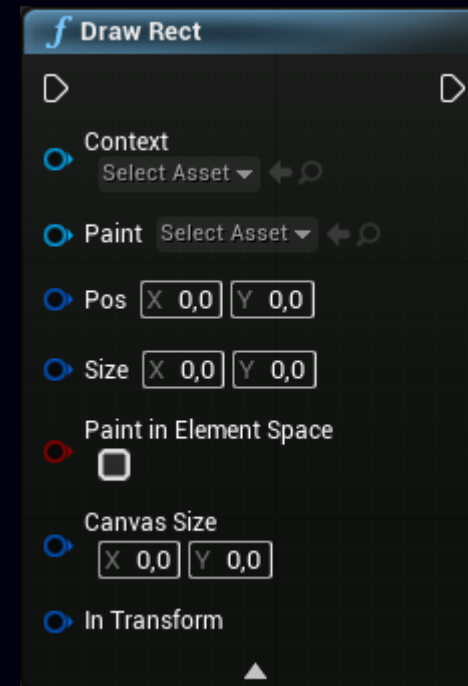
### Parent Size **FVector2D**

The size of the **Widget**.

### Parent Widget **UDPWidget**

The size of the **Widget**.

## Draw Rect



### Context **UDPContext**

A **Context** that came with the **On Draw Quick Elements** event.

### Paint **UDPPaint**

The **Paint** asset used to draw the **Element**.

### Pos **FVector2D**

Rectangle position.

## Size [FVector2D](#)

Rectangle size.

## Paint in Element Space [bool](#)

When enabled, the *Canvas Size* will be used as the reference size for generating [Paint](#) effects. Otherwise the [Element](#)'s size will be used for that purpose.

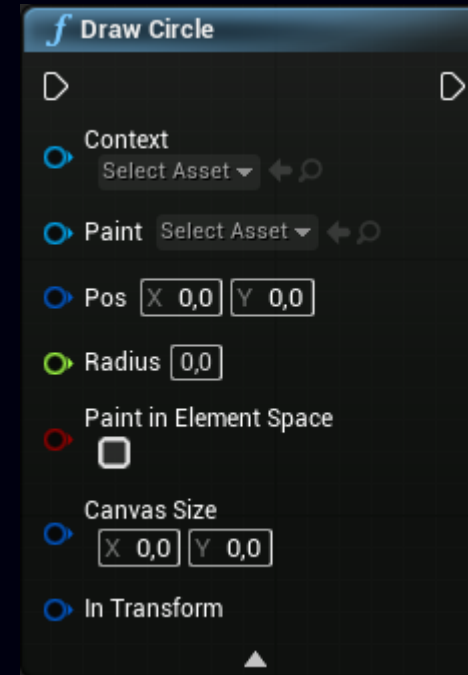
## Canvas Size [FVector2D](#)

The reference size for generating [Paint](#) Effects. Has effect only with enabled *Paint in Element Space*.

## In Transform [FDPQuickTransform](#)

[Element](#) transformation relative to the [Widget](#). Learn more [here](#).

## Draw Circle



## Context [UDPContext](#)

A [Context](#) that came with the [On Draw Quick Elements](#) event.

## Paint [UDPPaint](#)

The [Paint](#) asset used to draw the [Element](#).

## Pos [FVector2D](#)

Circle center.

## Radius [float](#)

Circle radius.

## Paint in Element Space [bool](#)

When enabled, the *Canvas Size* will be used as the reference size for generating **Paint** effects. Otherwise the **Element**'s size will be used for that purpose.

## Canvas Size [FVector2D](#)

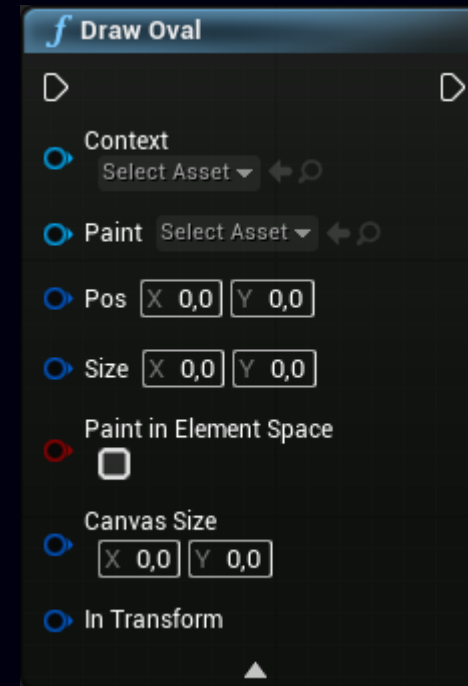
The reference size for generating **Paint** Effects. Has effect only with enabled *Paint in Element Space*.

## In Transform [FDPQuickTransform](#)

**Element** transformation relative to the **Widget**. Learn more here.

## Draw Oval

Learn more about ovals here.



## Context [UDPContext](#)

A **Context** that came with the **On Draw Quick Elements** event.

## Paint [UDPPaint](#)

The **Paint** asset used to draw the **Element**.

## Pos [FVector2D](#)

Bounding rectangle position.

## Size [FVector2D](#)

Bounding rectangle size.

## Paint in Element Space [bool](#)

When enabled, the *Canvas Size* will be used as the reference size for generating [Paint](#) effects. Otherwise the [Element](#)'s size will be used for that purpose.

## Canvas Size [FVector2D](#)

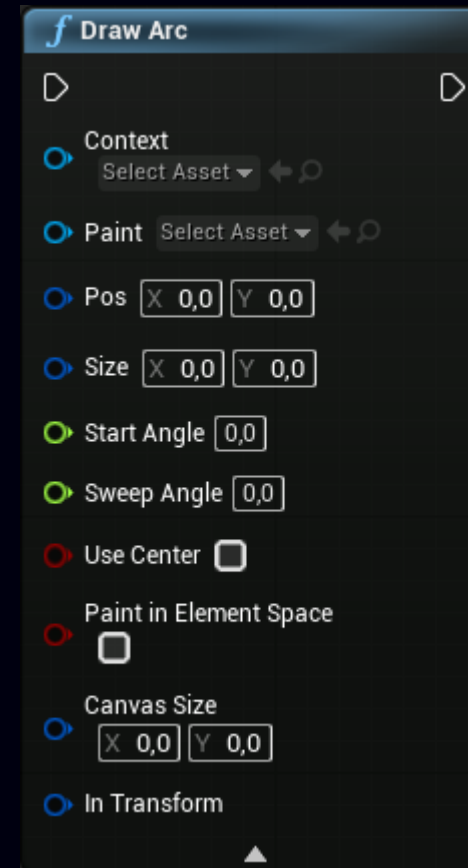
The reference size for generating [Paint](#) Effects. Has effect only with enabled *Paint in Element Space*.

## In Transform [FDPQuickTransform](#)

[Element](#) transformation relative to the [Widget](#). Learn more here.

## Draw Arc

Learn more about arcs here.



## Context [UDPContext](#)

A [Context](#) that came with the [On Draw Quick Elements](#) event.

## Paint [UDPPaint](#)

The [Paint](#) asset used to draw the [Element](#).

## Pos [FVector2D](#)

Bounding rectangle position.

## Size [FVector2D](#)

Bounding rectangle size.

## Start Angle [float](#)

Start angle of the arc in degrees. Starts at 3 o'clock and goes counterclockwise when increased.

## Sweep Angle [float](#)

Defines the angle span of the arc in degrees. Starts at the *Start Angle* and goes counterclockwise.

## Use Center [bool](#)

Connect both ends of the arc with its center. Has no effect when used with a filled [Paint](#).

## Paint in Element Space [bool](#)

When enabled, the *Canvas Size* will be used as the reference size for generating [Paint](#) effects. Otherwise the [Element](#)'s size will be used for that purpose.

## Canvas Size [FVector2D](#)

The reference size for generating [Paint](#) Effects. Has effect only with enabled *Paint in Element Space*.

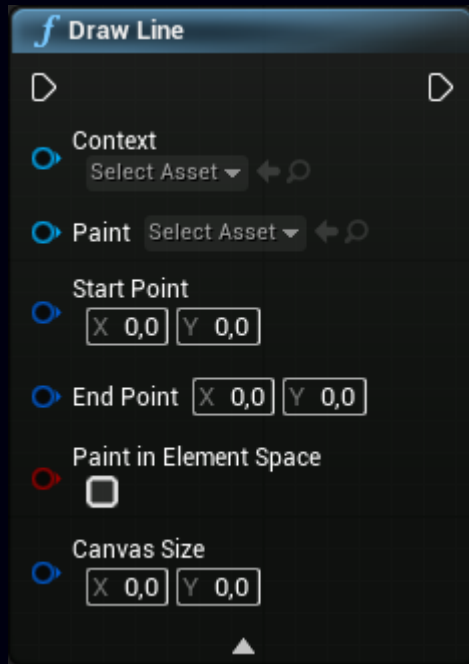
## In Transform [FDPQuickTransform](#)

[Element](#) transformation relative to the [Widget](#). Learn more here.



## Draw Line

Draws a straight line from the *Start Point* to the *End Point*.



### Context [UDPContext](#)

A [Context](#) that came with the [On Draw Quick Elements](#) event.

### Paint [UDPPaint](#)

The [Paint](#) asset used to draw the [Element](#).

### Start Point [FVector2D](#)

Line start point.

### End Point [FVector2D](#)

Line end point.

### Paint in Element Space [bool](#)

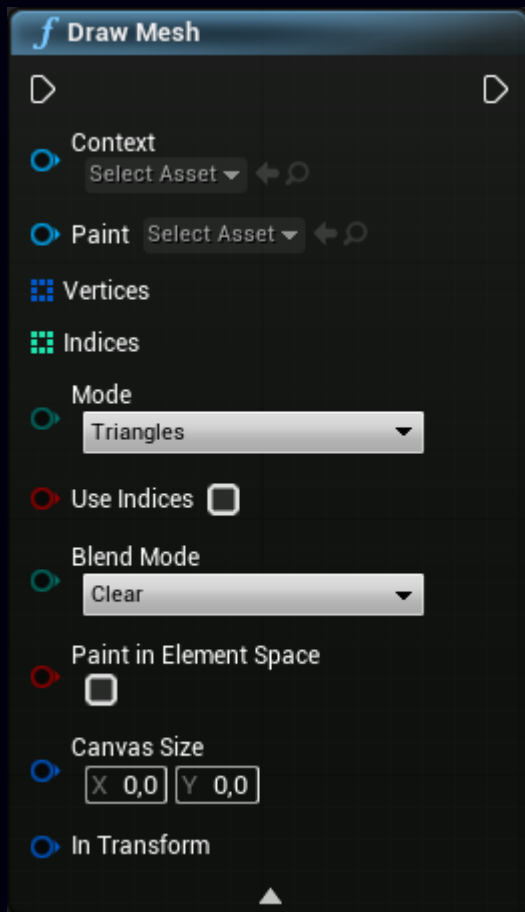
When enabled, the *Canvas Size* will be used as the reference size for generating [Paint](#) effects. Otherwise the [Element](#)'s size will be used for that purpose.

### Canvas Size [FVector2D](#)

The reference size for generating [Paint](#) Effects. Has effect only with enabled *Paint in Element Space*.

## Draw Mesh

Learn more about meshes here.



### Context [UDPContext](#)

A [Context](#) that came with the [On Draw Quick Elements](#) event.

### Paint [UDPPaint](#)

The [Paint](#) asset used to draw the [Element](#).

### Vertices [FDPVertex \(array\)](#)

An array of vertices defining the mesh. Learn more here.

### Indices [int \(array\)](#)

An array of integer indices defining the order in which the vertices are used to construct the mesh. Learn more here.

### Mode [EDPVertexMode](#)

Defines the method of constructing the mesh. Learn more here.

### Use Indices [bool](#)

Use indices when constructing the mesh.

### Blend Mode [EDPBlendMode](#)

Defines the blending mode of vertex colors and the [Widget's Paint](#).

### Paint in Element Space [bool](#)

When enabled, the *Canvas Size* will be used as the reference size for generating [Paint](#) effects. Otherwise the [Element's](#) size will be used for that purpose.

### Canvas Size [FVector2D](#)

The reference size for generating [Paint](#) Effects. Has effect only with enabled *Paint in Element Space*.

In Transform [FDPQuickTransform](#)

[Element](#) transformation relative to the [Widget](#). Learn more here.

## Make Path

Makes a [Quick Path](#) object that can be filled with commands and used to draw a path.



Path [FDPQuickPath](#)

A [Quick Path](#) object.

## Path Move To

Adds beginning of a new contour at the specified coordinates. Learn more about this command here.



Path [FDPQuickPath](#)

A [Quick Path](#) object.

Coords [FVector2D](#)

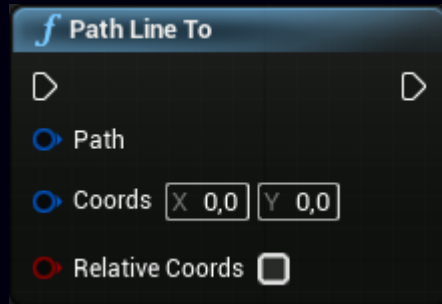
Coordinates at which the new contour should begin.

Relative Coordinates [bool](#)

If enabled, all coordinated specified in this command are relative to the last point of the path.

## Path Line To

Adds a line from the last point of the path ending at the specified coordinates. Learn more about this command here.



### Path [FDPQuickPath](#)

A [Quick Path](#) object.

### Coords [FVector2D](#)

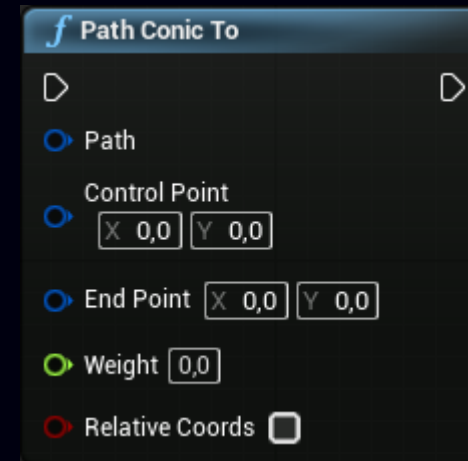
Coordinates at which the line ends.

### Relative Coordinates [bool](#)

If enabled, all coordinated specified in this command are relative to the last point of the path.

## Path Conic To

Adds a conic curve going from the last point of the path toward the *Control Point* and ending at the *End Point*. The curve is weighted by the parameter *Weight*. Learn more about this command here.



### Path [FDPQuickPath](#)

A [Quick Path](#) object.

### Control Point [FVector2D](#)

Defines the control point toward which the curve heads.

### End Point [FVector2D](#)

Defines the end point of the curve.

### Weight [float](#)

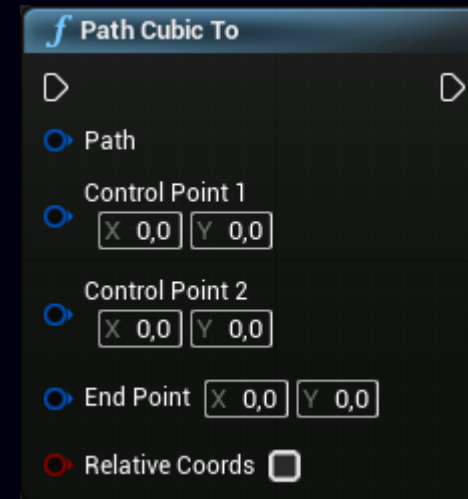
Defines the weight of the curvature of the curve.

## Relative Coordinates **bool**

If enabled, all coordinates specified in this command are relative to the last point of the path.

## Path Cubic To

Adds a cubic curve going from the last point of the path toward the *1<sup>st</sup> Control Point*, then toward the *2<sup>nd</sup> Control Point* and ending at the *End Point*. Learn more about this command here.



### Path [FDPQuickPath](#)

A **Quick Path** object.

### Control Point 1 [FVector2D](#)

Defines the *1<sup>st</sup>* control point toward which the curve heads.

### Control Point 2 [FVector2D](#)

Defines the *2<sup>nd</sup>* control point toward which the curve heads.

## End Point [FVector2D](#)

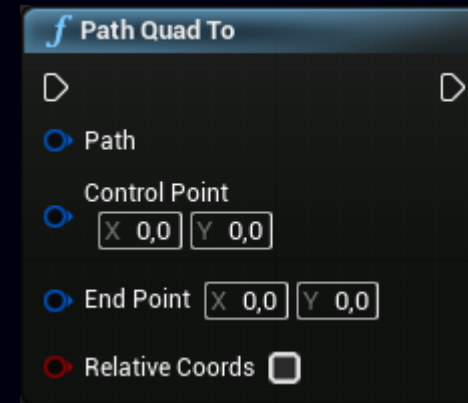
Defines the end point of the curve.

## Relative Coordinates [bool](#)

If enabled, all coordinates specified in this command are relative to the last point of the path.

## Path Quad To

Adds a quad curve going from the last point of the path toward the *Control Point* and ending at the *End Point*. Learn more about this command [here](#).



## Path [FDPQuickPath](#)

A Quick Path object.

## Control Point [FVector2D](#)

Defines the control point toward which the curve heads.

## End Point [FVector2D](#)

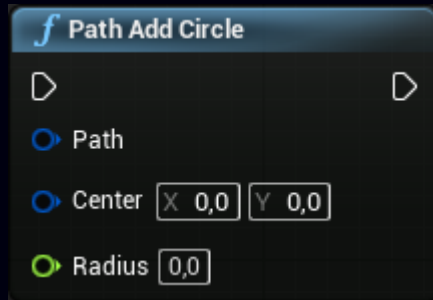
Defines the end point of the curve.

## Relative Coordinates [bool](#)

If enabled, all coordinates specified in this command are relative to the last point of the path.

## Path Add Circle

Adds a circle with the center at the *Center* and radius *Radius*. Learn more about this command [here](#).



## Path Add Oval

Adds an oval drawn within the bounds of a rectangle defined by *Position* and *Size*. Learn more about this command [here](#).



### Path [FDPQuickPath](#)

A [Quick Path](#) object.

### Center [FVector2D](#)

Center of the circle.

### Radius [float](#)

Radius of the circle.

### Path [FDPQuickPath](#)

A [Quick Path](#) object.

### Pos [FVector2D](#)

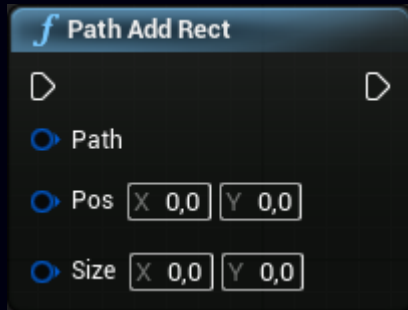
Position of the top left corner of the bounding rectangle.

### Size [FVector2D](#)

Size of the bounding rectangle.

## Path Add Rect

Adds a rectangle with position at *Position* and size *Size*. Learn more about this command [here](#).



### Path [FDPQuickPath](#)

A [Quick Path](#) object.

### Pos [FVector2D](#)

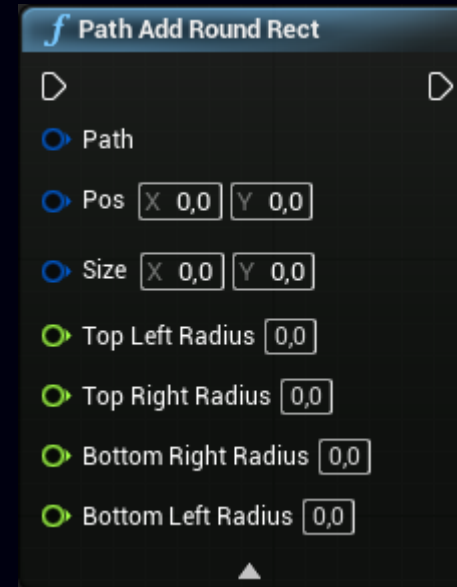
Position of the top left corner of the rectangle.

### Size [FVector2D](#)

Size of the rectangle.

## Path Add Round Rect

Adds a rectangle with position at *Position* and size *Size* and optionally rounded corners. Each corner can have different radius. Learn more about this command [here](#).



### Path [FDPQuickPath](#)

A [Quick Path](#) object.

### Pos [FVector2D](#)

Position of the top left corner of the rectangle.

### Size [FVector2D](#)

Size of the rectangle.



### Top Left Radius **float**

Radius of the top left corner.

### Top Right Radius **float**

Radius of the top right corner.

### Bottom Right Radius **float**

Radius of the bottom right corner.

### Bottom Left Radius **float**

Radius of the bottom left corner.

## Path Add Poly

Adds a polyline defined by a set of points. Learn more about this command [here](#).



### Path **FDPQuickPath**

A **Quick Path** object.

### Points **FVector2D (array)**

Points defining the polyline.

### Close **bool**

Close the polyline. If enabled, the polyline is closed by adding a line between the last and the first point.

## Path Close

Closes the path by connecting the last point with the first point with a line. Learn more about this command here.

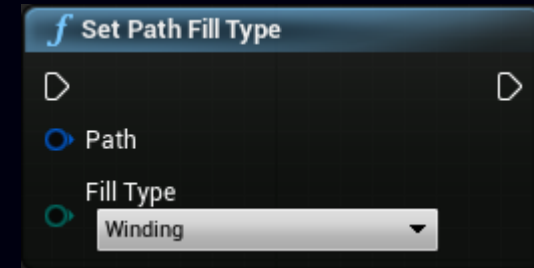


Path [FDPQuickPath](#)

A [Quick Path](#) object.

## Set Path Fill Type

Defines the method of filling the path. Learn more about this command here.



Path [FDPQuickPath](#)

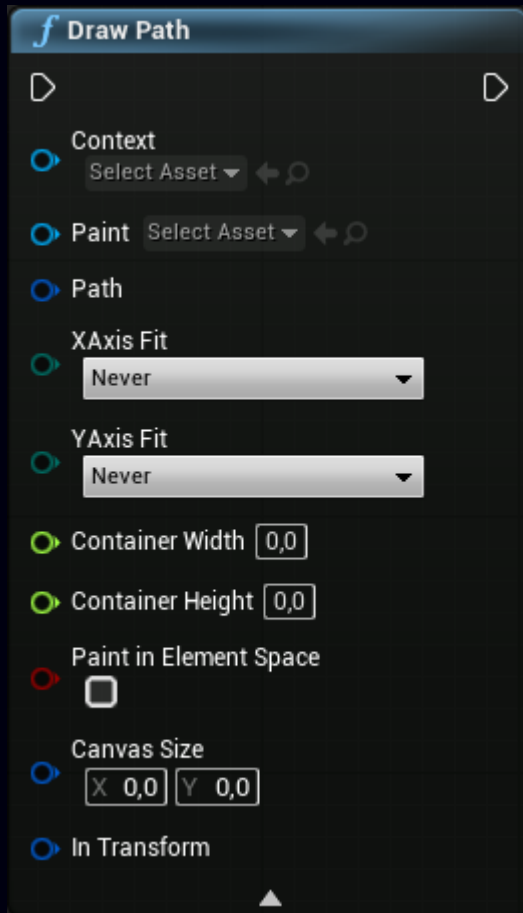
A [Quick Path](#) object.

Fill Type [EDPPathFillType](#)

Fill type.

## Draw Path

Learn more about paths here.



## Context [UDPContext](#)

A [Context](#) that came with the [On Draw Quick Elements](#) event.

## Paint [UDPPaint](#)

The [Paint](#) asset used to draw the [Element](#).

## Path [FDPQuickPath](#)

A [Quick Path](#) to draw.

## X Axis Fit [EDPFitType](#)

Scales the path to fit the *Container Width* parameter with the following options:

- A. Never  
Disables fitting.
- B. If Smaller  
Stretches the path if the path is narrower than the *Container Width*.
- C. If Bigger  
Shrinks the path if the path is wider than the *Container Width*.
- D. Always  
Combines the last two options.

## Y Axis Fit [EDPFitType](#)

Does the same as the previous parameter but for the Y axis and the *Container Height* parameter.

## Container Width [float](#)

Width of the container to fit the path into.

## Container Height **float**

Height of the container to fit the path into.

## Paint in Element Space **bool**

When enabled, the *Canvas Size* will be used as the reference size for generating **Paint** effects. Otherwise the **Element**'s size will be used for that purpose.

## Canvas Size **FVector2D**

The reference size for generating **Paint** Effects. Has effect only with enabled *Paint in Element Space*.

## In Transform **FDPQuickTransform**

**Element** transformation relative to the **Widget**. Learn more [here](#).

## Get Path Length

Returns Path length.



## Path **FDPQuickPath**

A **Quick Path** to measure.

## Return Value **float**

Path length.

## Get Position on Path

Returns the position on the path at the given distance from the beginning.



Path [FDPQuickPath](#)

A [Quick Path](#) to measure.

Distance [float](#)

Distance from the beginning.

Return Value [FVector2D](#)

Position on the path.

## Get Path Tangent

Returns the tangent vector at the given distance from the beginning.



Path [FDPQuickPath](#)

A [Quick Path](#) to measure.

Distance [float](#)

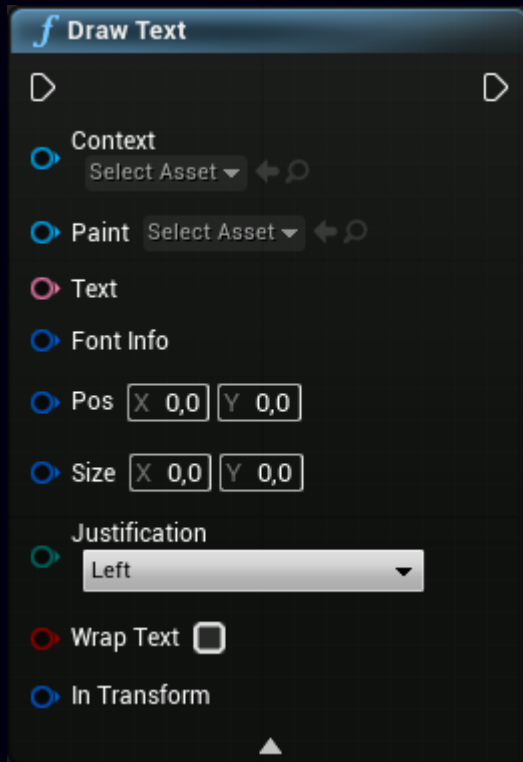
Distance from the beginning.

Return Value [FVector2D](#)

Tangent vector.

## Draw Text

Draws a block of text.



### Context [UDPContext](#)

A [Context](#) that came with the [On Draw Quick Elements](#) event.

### Paint [UDPPaint](#)

The [Paint](#) asset used to draw the [Element](#).

### Text [FText](#)

Text to be drawn.

### Font Info [FDPFontInfo](#)

Structure of parameters defining font properties. [Learn more here.](#)

### Pos [FVector2D](#)

Text block position.

### Size [FVector2D](#)

Text block size.

### Justification [ETextJustify](#)

Text justification.

- A. Left
- B. Center
- C. Right

### Wrap Text [bool](#)

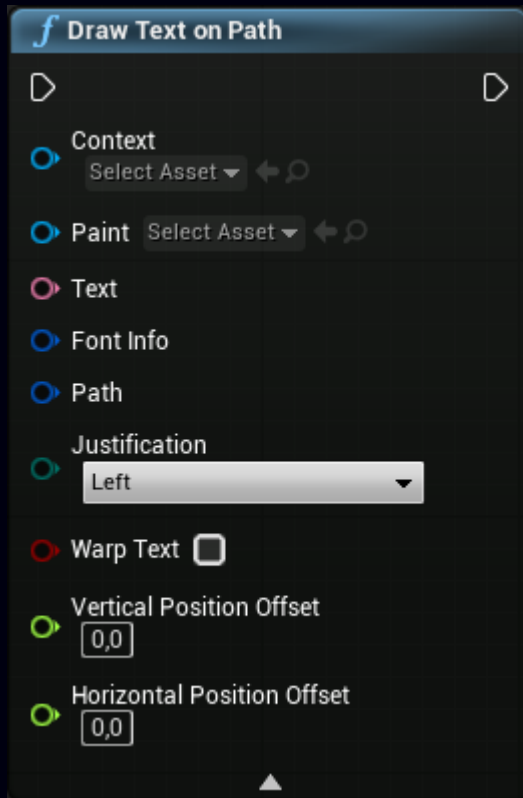
Wrap the text to prevent overflowing of the block.

### In Transform [FDPQuickTransform](#)

[Element](#) transformation relative to the [Widget](#). [Learn more here.](#)

## Draw Text on Path

Draw a line of text following a Path.



### Context [UDPContext](#)

A [Context](#) that came with the [On Draw Quick Elements](#) event.

### Paint [UDPPaint](#)

The [Paint](#) asset used to draw the [Element](#).

### Text [FText](#)

Text to be drawn.

### Font Info [FDPFontInfo](#)

Structure of parameters defining font properties. [Learn more here](#).

### Path [FDPQuickPath](#)

A [Quick Path](#) to follow.

### Justification [ETextJustify](#)

Text justification along the path.

- D. Left
- A. Center
- B. Right

### Warp Text [bool](#)

Warp individual characters to make them perfectly fit the followed path.

Note that this feature is slow and might not work properly on paths with sharp edges.

### Vertical Position Offset [float](#)

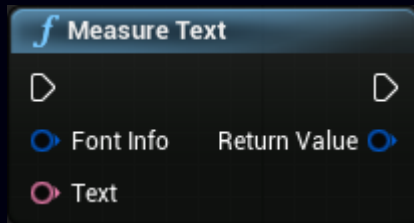
Move the text above or below the path.

### Horizontal Position Offset [float](#)

Text offset along the path.

## Measure Text

Returns the size of a line of text.



### Font Info [FDPFontInfo](#)

Structure of parameters defining font properties. [Learn more here.](#)

### Text [FText](#)

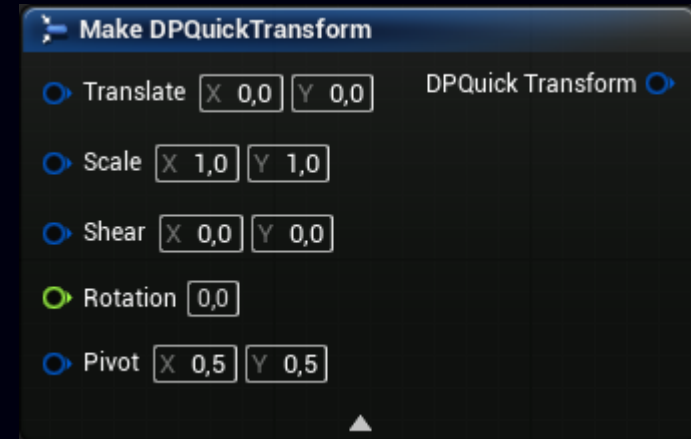
Text to measure.

### Return Value [FVector2D](#)

Size of the text line.

## FDPQuickTransform

[DP Quick Transform](#) is a structure holding attributes controlling the transformation of [Quick Elements](#).



### Translate [FVector2D](#)

[Element](#) position.

### Scale [FVector2D](#)

[Element](#) scale.

### Shear [FVector2D](#)

[Element](#) shear (skew).

### Rotation [float](#)

[Element](#) rotation in degrees.



## Pivot `FVector2D`

Transformation pivot or center. Default is (0.5, 0.5) at the center of the `Element`. (0.0, 0.0) would be at the top left corner and (1.0, 1.0) at the bottom right corner. The transformation is performed around this point.

## DP Quick Transform `FDPQuickTransform`

Created transformation.

# Performance considerations

The same rule applies here as anywhere else; use only what you really need when you need it. Every **Element** drawn has its cost. So has every effect applied to a **Paint**.

## Geometry

1. Complexity  
The more complex the geometry, the more expensive it is to draw. Avoid paths whenever possible and try to substitute them with basic shapes like rectangles, circles, arcs, etc.
2. Dynamic  
While generating basic shapes at runtime is fast, generating paths at runtime is quite expensive. Whenever possible, construct paths at startup and reuse them.
3. Size  
The bigger the geometry, the more expensive it is to draw. Always try to keep the screen area occupied by the **Element** as small as possible.

## Paint

1. Opacity  
Set the opacity to anything lower than 1, i.e. make the **Element** transparent, only when necessary. The same applies to setting the **Blend Mode** to anything other than *Src Over*.

2. Shadows  
**Shadows** bring significant performance cost. If you really need to use them (they look cool so I believe you do!), avoid using very high *Blur* amount (>10) and keep them from overlapping each other.
3. Shaders  
**Shaders** in general are relatively cheap but avoid using a large number (>20) of **Stops** for **Gradients**.
4. Path Effects  
The performance cost of **Path Effects** is heavily dependent on the complexity of the geometry. The more complex the geometry, the more expensive **Path Effects** are.
5. Filters  
The performance cost of **Filters** is determined by the *blur amount* and by the screen area covered by the geometry affected by the **Filter**.

## Animations

Animations themselves are very cheap but frequent changes to the transformation of **Elements** and/or shape of **Elements** and/or **Paint** properties might result in a significant impact on performance.

## Known limitations and issues

1. Drawing lots of slant path segments may result in a significant performance degradation in the **Editor**. This issue isn't present in projects packaged for shipping.
2. Mouse hit test and text path follow ignore shape alterations made using **Path Effects**.
3. Some changes to **DP Widgets** made in the **Widget Blueprint Editor** might not take effect until the **Widget Blueprint** is recompiled.
4. The **Editor** might occasionally freeze when more than one **Widget Blueprint Editors** containing at least one **DP Canvas Widget** and/or **DP Paint** Editors and/or **DP SVG** Editors are opened at the same time. This issue isn't present in the **PIE** mode or in packaged projects.

# Changelogs

## Changelog 1.1.1

### Fixed

- Mouse hit test not working for children of **DP Canvases** positioned anywhere else then at the 0; 0 coordinates
- **Widgets** using **Paths** cause random crashes
- **Pie Chart Prefab** crashes when all data points have 0 value

## Changelog 1.1.0

### New

- All **Widget** mouse related events provides a reference to the **Widget** that fired the event
- Mouse hit test precision can be set to two precision levels
- In the **Widget Blueprint Editor**, **DP Widgets** draw guides showing the user the real geometric shape of **Elements**
- **Widget Animation** settings can be copy&pasted.
- Added **DP Path Composer Widget**
- Each **Path Command** in **DP Path** and in **DP Text on Path Widgets** can be optionally skipped.

### Changed

- **DP Prefabs** plugin has been merged into **Definitive Painter** plugin and is no longer separated.
- Removed redundant module dependencies from the source code.
- The default color for **Paint** and **Gradient Stop** was set to white.

### Fixed

- Clipping not working for **DP Paths** fitted into the parent **Widget's** bounds.

## Changelog 1.0.3

### Fixed

- Some classes aren't exposed through the API

## Changelog 1.0.2

### Fixed

- Animations aren't updating in the **Editor**
- **DP Widgets** overflow their **Scroll Box** parent
- **Path** X&Y fit options are missing from the **Quick Draw** mode

# Changelog 1.0.1

## Fixed

- **DP Widgets** in the **Editor** don't redraw when zooming and/or panning the **Editor** viewport
- **DP Path** not properly fitting into its **Widget** bounds
- **DP Arc** mouse hit test not working for Arcs with enabled center