Introduction

A basic example

Advanced use

The **GPUI** (General Purpose UI) is built around modular units called **Elements**. Each Element encapsulates its **position**, **functionality**, **normal data**, and **render data**, which collectively define its behavior and appearance on the screen.

- **Position** in GPUI is defined through *joints*—dynamic relationships between elements. A joint links a relative position within one element to a relative position in another element (or to a static rectangle). Joints also support *absolute offsets* in both x and y directions and can be used to *fix the size* of elements similarly. This system enables flexible, constraint-based layout behavior.
- **Functionality** refers to the methods available to the element, such as subscribing to button events or responding to user input.
- **Normal data** represents element-specific content that isn't exclusive to rendering—for example, the text in a text field.
- **Render data** includes appearance-related properties like font color, background color, and other visual attributes.

XML Parser

GPUI uses **XML** to define and load layouts.

Tags

The **tag system** provides a shorthand for managing complex rendering logic. A tag is a named reference initialized with element-specific data, such as a color. Elements can then refer to these tags for rendering purposes—for example, using a tag-based *color order* to alternate line segment colors in a `Line` element.

Tags must be strings that **do not start with a number** and **cannot contain** the characters: `=`, `:`, `;`, `[`, `]`, `{`, or `}`.

Available XML-Elements

Line-Element

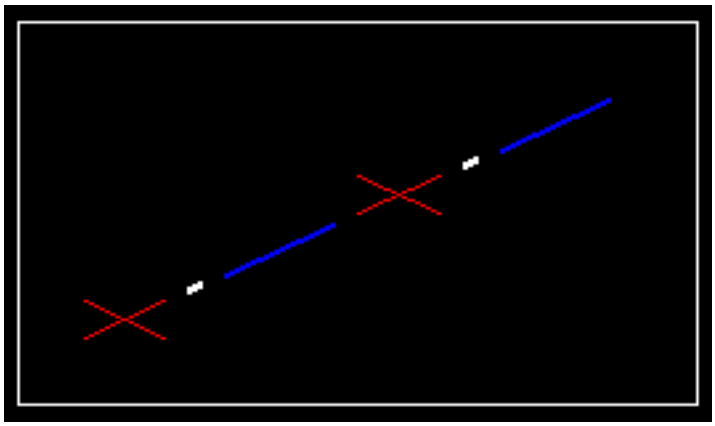
The `Line`-Element is used to specify a line to be drawn in the UI.

`<line>` | `<l>`

Arguments

Name	Values	Description
colors/ color/ col	tag:color;...	Defines tag-based colors for lines. Values can be RGB (r,g,b) or color names (e.g., "red"). "inv"/"none" makes them invisible. If no tag is set (e.g., "color=red"), default tag ” is used. Default: inv
flip		Draws line from bottom-left to top-right instead of default top-left to bottom-right. Default: noflip
inset	float|float,float| int|int,int	Adds padding to the line. One value applies to both dimensions; two values set width and height separately. Ints are absolute; floats are percentages. Default: 0
order/ sectionorder	tag1,tag2,...	Specifies a sequence of tags for color/size/thickness, repeated cyclically along the line. Default: ” (default tag)
sizes/ size	tag:float|int;...	Sets segment lengths (absolute or relative) per tag. Uses default tag ” if unspecified. Default: 1.0
thickness/ width	tag:int;...	Sets absolute line thickness per tag. Uses default tag ” if unspecified. Default: 1
	EXPERIMENTAL	
altmode	tag:mode;...	Alternate drawing mode. Supported: cross. Default: default

Example (256×144):
<line
color="inv;r:red;b:blue;w:white"
thickness="1;b:2;w:3"
flip=""
sizes="10;r:0.15;b:0.20;w:5"
inset="25"
sectionorder="r,,w,,b,"
altmode="r:cross"> </line>



Box-Element

The `Box`-Element is used to specify a box to be drawn in the UI.

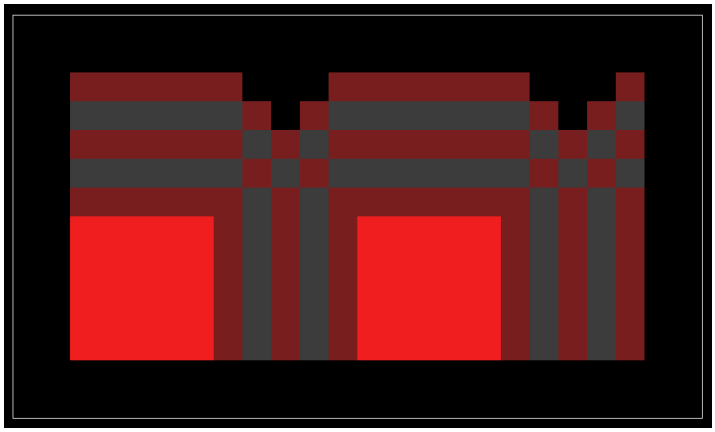
`<box>` | `<b>`

Arguments

Name	Values	Description
colors/ color/ col	tag:color;...	Defines tag-based colors for rendering. Colors can be RGB tuples (r,g,b) or names (e.g., "red"). "inv" or "none" make elements invisible. If no tag is specified (e.g., "color=red"), the default tag ” is used. Default: inv
fillmode(s)/ fill(s)/ altmode(s)/ mode(s)	tag:mode;...	Sets the fill pattern for sub-boxes: striped vertically/horizontally or checkerboard. Values: striped_vert (strv), striped_hor (strh), checkerboard (cb). Uses default tag ” if none given. Default: solid
fillsize(s)/ innersizing(s)/ size(s)	tag:int|float;...	Sets size of the alternating pattern, either absolute or relative. Uses default tag ” if none given. Default: 10
inset	float|float,float| int|int,int	Sets padding inside the box. One value applies to both dimensions; two values specify width and height separately. Ints are absolute; floats are percentages. Default: 0
orders/ sectionorders/ ord	tag:tag1,tag2,...;...	Defines tag sequence used to render fill patterns cyclically in sub-boxes. Uses default tag ” if none given. Default: ”
partitioning/ part	intxint;[c1,c2,...]| [1=c1,3=c3,...]| 4=[...]	Splits the box into columns × rows of sub-boxes. Each sub-box can have its own fillmode, size, and filter defined by tags. Labels are set per row or column using square brackets. Sub-boxes have ”-tag per default. Default: 1x1
	EXPERIMENTAL	
filter(s)/ filt	tag:mode= float,float,float+float;...	Applies shape filters to sub-boxes. Modes: triangle/linear/quadratic/circle, with optional inversion ("i" prefix). Filters define a point and max distance for visible area. Default: nofilter

Example (960×560):

```
<box
partitioning="4x2;[a,b,a,b][2=c,4=c]"
filter="b:it=0.5,0.0,0.5+0.0"
inset="80"
colors=
"(240,30,30);c1:(120,30,30);c2:(60,60,60)"
fillmode="a:strh;b:cb;c:strv"
fillsize="40"
sectionorders=
"c3;a:c1,c2;b:c1,c2;c:c1,c2"></box>
```



Text-Element

The `Text`-Element is used to specify a text to be drawn in the UI.

`<text>` | `<t>`

Arguments

Name	Values	Description
align	float|l|r,float|t|b	Sets the align of the text inside the text-box. Default: 0.5,0.5
colors/ color/ col	color	Defines fontcolor for rendering. Color can be RGB tuple (r,g,b) or name (e.g., "red"). "inv" or "none" makes text invisible. Default: inv
fontname/ sysfont/ font	fontname;...	Sets font for rendering . Default: Arial
fontsize/ size	d|int|xxs|xs|...|xl|xxl;...	Sets fontsize for rendering. 'd' sets the fontsize to be dynamicly calculated. Default: 24
inset	float|float,float| int|int,int	Sets padding inside the box. One value applies to both dimensions; two values specify width and height separately. Ints are absolute; floats are percentages. Default: 0

Example (640×360):

```
<text
inset="100"
color="red"
fontsize="l"
align="0.3,0.9">
Hello World
</text>
```

Framed-Element

The `Framed`-Element is used to wrap an element with an border and an background.

`<framed>` | `<fr>` | `<f>`

Arguments

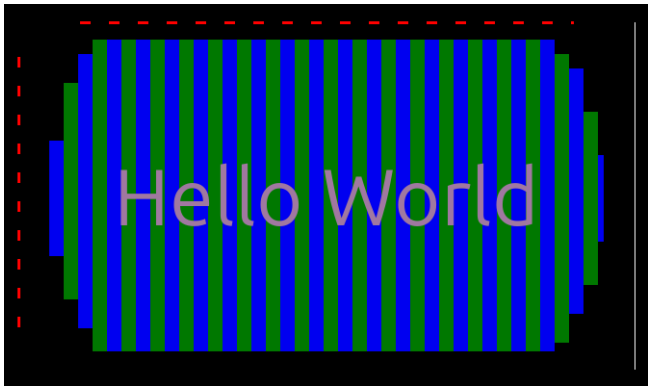
Name	Values	Description
inset/ offset/ padding	int	Sets padding inside the box. Default: 0

Children

Name	Amount	Description
`Line`	0 - 4	Sets the borders of the framed. If one is provided it is applied to all sides. If two are provided, the first is applied to left and right and the second to top and bottom. Otherwise borders are applied like 1-left, 2-right, 3-top, 4-bottom. Default: noborders
`Box`	0 - 1	Sets the background of the framed. Default: noback-ground
`Any Element`	1	Wrapped element.

Example (640×360):

```
<framed offset="50">
<line color="inv;r:red" thickness="3" sizes="10;n:20" inset="0.1" sectionorder="r,n"></line>
<line color="white"></line>
<line color="inv;r:red" thickness="3" sizes="10;n:20" inset="0.1" sectionorder="r,n"></line>
<box colors="(0,0,240);a:(0,120,0)" inset="0.05" fillmode="strv" sectionorders=",a" filter="c=0.5,0.5,0.5+0.5"
fillsize="15"></box>
<text inset="50" color="(160,120,160)" fontsize="d">Hello World</text>
</framed>
```



Group-Element

The `Group`-Element is used to group multiple elements together.

`<group>` | `<group>` | `<gr>` | `<g>`

Arguments

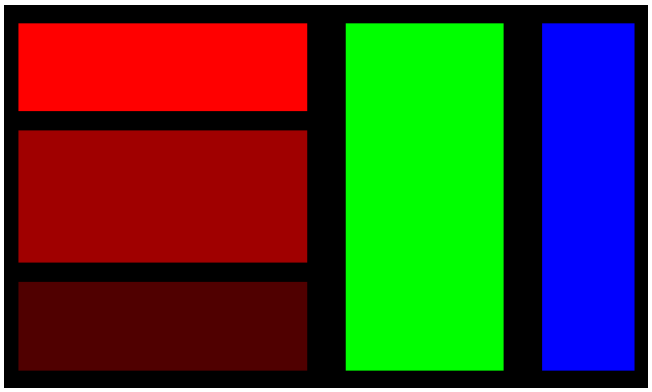
Name	Values	Description
horizontal/ hor		Sets the group to align the elements horizontal. Default: vertical
offset/ spacing	int	Sets the spacing between elements in the group. Default: 0
size(s)/ sizing(s)	float|int=float,...	Sets the relative sizing of the elements inside the group. Default: 1.0

Children

Name	Amount	Description
`Any Element`	1+	Grouped elements.

Example (640×360):

```
<group spacing="40" hor="" sizings="0.5,0.3,0.2">
<group spacing="20" sizing="2=1.4">
<box color="red"></box>
<box color="(160,0,0)"></box>
<box color="(80,0,0)"></box>
</group>
<box color="green"></box>
<box color="blue"></box>
</group>
```



Dropdown-Element

The `Dropdown`-Element is used to create a dropdown.

`<dropdown>` | `<dpd>`

Arguments

Name	Values	Description
horizontal/ hor		Sets the dropdown to be horizontal. Default: vertical
offset/ spacing	int	Sets the spacing between elements in the dropdown. Default: 0
size(s)/ sizing(s)	float|int=float,...	Sets the relative sizing of the elements inside the dropdown. Default: 1.0

Children

Name	Amount	Description
`Any Element`	1+	First element is the one to click to reveal the other elements as dropdown.

Example (128×72):

```
<dpd spacing="10" hor="" sizings="0.5,0.3,0.2,c5=1.2">
<box color="green"></box>
<dpd spacing="20" sizing="c2=1.9">
<box color="red"></box>
<box color="(160,0,0)"></box>
<box color="(80,0,0)"></box>
</dpd>
<box color="blue"></box>
<box color="green"></box>
<box color="blue"></box>
<box color="green"></box>
</dpd>
```