News on Bloc for Pharo

Pablo Tesone
Martín Dias

Thales
Pharo Consortium

ESUG 2023 - Lyon
What is Bloc?

a low-level UI infrastructure & framework for Pharo
Element's visual properties

- a BIElement
- geometry (polygon)
- border
- background
- transformation (a matrix with skew and translation)
Element's outskirts

aBlElement
outskirts: BLOutskirts outside

aBlElement
outskirts: BLOutskirts centered

aBlElement
outskirts: BLOutskirts inside
Border's cap

vertices := \{ 50@150. 150@50 \}.

referenceLine := (BlPolylineGeometry vertices: vertices) asElement.

capLine := (BlPolylineGeometry vertices: vertices) asElement.
capLine border: (BlBorder builder
    paint: Color pink;
    width: 50;
    lineCap: BlStrokeLineCap round:
    build)
Border's join
What is **Bloc?**  
For API tasting, please watch!  

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**Bloc for Pharo - ESUG 2022**
What is Bloc?

Architecture

applications

Bloc

Alexandrie

OSWindow

cairo.dll freetype.dll harfbuzz.dll SDL2.dll

Pharo VM
News!

10 things you may not know of Bloc in 2023
Bloc and Alexandrie

New pre-release: **Bloc v2.0.0-alpha**

- New commits: 874
- Closed issues: 65
- Closed PR: 43
- Total tests: 1287

Alexandrie counts with 222 FFI call bindings.

~100 more than Athens (we are ready to create an Athens backend)

Bloc: [https://github.com/pharo-graphics/Bloc/releases/tag/v2.0.0-alpha](https://github.com/pharo-graphics/Bloc/releases/tag/v2.0.0-alpha)
Alexandrie: [https://github.com/pharo-graphics/Alexandrie/releases/tag/v2.0.0-alpha](https://github.com/pharo-graphics/Alexandrie/releases/tag/v2.0.0-alpha)
New projects using Bloc
Compositing Layers
Avoid rasterizing again elements that didn't change

Only a simple implementation for the moment:

- Any B1Element that answers true to `wantsSeparateCompositingLayer` is **cached** on a cairo surface (yeah, no GPU yet).

- Such element will be rasterized again only after a visual property changed (except a position change).

- It must be enabled **explicitly** by sending `beInSeparateCompositionLayer` to a B1Element.
Compositing Layers

An example

These 3 text elements received beInSeparateCompositionLayer

The 3 layers are rasterized only once (already transformed)
Benchmarks show it can help

100 static circles of 200x200 pixels that move down.

Three flavors:
👉 Dashed Border Circles
👉 Radial Gradient Circles
👉 Translucent Circles

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<td>ratio</td>
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Reference: Browse PCBenchmarker in [https://github.com/pharo-graphics/BlocBenchs](https://github.com/pharo-graphics/BlocBenchs)
Harfbuzz ffi bindings

Bloc-Alexandrie now has FFI bindings to this C library

Why? 🔥
It converts a Unicode string into properly formatted and positioned glyph output (based on font info that cairo+freetype ignore)
Harfbuzz ligatures example

Only Cairo 👉

Harfbuzz + Cairo 👉

After coffee

Source Sans Pro

A~~~~~~~~~~~~~~~~~~B----------C

Cascadia Code

Font files can provide a ligature glyph for certain sequences
Harfbuzz emoji example

Zero Width Joiner
Zero Width Joiner
Zero Width Joiner
Zero Width Joiner

Harfbuzz

is a Unicode character to explicit "related with"
Dynamic libraries
Some work was required

- Win, Linux, Mac had different versions
- Harfbuzz was missing

Lib upgrade instructions were too complex both for users and for defining CI jobs
Dynamic libraries
New VM version did it

Pharo VM v9.0.21 ~ Dec'22

cairo  freetype  harfbuzz  SDL2

Now all platforms have:
• Cairo: 1.17.4
• Freetype: 2.12.1
• Harfbuzz: 5.3.1
• SDL: 2.24.1

👍 Simplify Bloc install instructions
👍 Consistent CI results on all platforms
👍 Speed-up in some cases
Dynamic libraries
MacOS had too old (slow) versions!

According to this benchmark (18 variations).

300 rounded rectangles
200 x 200 pixels each
each one has a small child (that is either clipped or not)

Frames per second boosted between 1.8X and 4.4X

Reference: #exampleOutskirts in https://github.com/pharo-graphics/BlocBenchs
CI exports regressions
Inspect by dropping a fuel file

Use case:
- CI: Emoji regression test (randomly) fails
- CI: fuel-outs the test's pixel comparison
- Download it from web
- Drop it into Pharo
- Discover somehow it is rendered in a single color!
Rounded Rectangle
Bug fix: wrong hit testing

How you see the test fixture
Mouse events were only dispatched on the colored regions
After the fix

Want to see more?
- Evaluate: BAHitTest inspectAll
- Browse: BIRoundedRectangleGeometry>>#containsPoint:alreadyInGeometryBoundsOf:
Rounded Rectangle
Enhancement: Give more flexibility on corner radii (as in CSS)

Before, each radius was limited to 50% of (width min: height)

Now, a corner can take 100% available

More info at: https://github.com/pharo-graphics/Bloc/issues/217
Rounded Rectangle
If two corners overlap, all corners are reduced proportionally

Based on CSS spec: https://w3c.github.io/csswg-drafts/css-backgrounds/#corner-overlap
Import SVG
Repair and improve code from BlocPac and Athens-SVG

```xml
<?xml version="1.0" standalone="no"?>
<svg width="1024" height="1024">
  <path d="M512 64C264.6...z"/>
  <path d="M232.3 15...z"/>
</svg>
```

More about this change in https://github.com/pharo-graphics/Bloc/pull/296
Export SVG and PDF
As vectors (not just pixels) via cairo API

For more information, look at AeCairoPDFSurface and BIPdfExporter
Gaussian Shadow Effect

Cairo doesn't provide this effect, we implemented the algorithm.

```ruby
BlElement new
  geometry: (Bl RoundedRectangleGeometry cornerRadius: 50);
  size: 500@100;
  border: (Bl Border builder
     paint: Color blue;
     width: 15;
     dashArray: #(20);
     build);
  effect: (Bl Gaussian Shadow Effect
     color: Color orange
     width: 20
     offset: 20 asPoint);
  yourself
```

It can be slow (not GPU)
**Border with gradients**
Feature request in Bloc-Alexandrie

**BEFORE:**
an element's border could only have a single color

**NOW:**
Borders can have a linear or radial gradient as paint
Mailing-list: lse-openbloc@inria.fr
(subscribe at: http://sympa.inria.fr)

Discord: Pharo server / #bloc channel

Bloc: https://github.com/pharo-graphics/Bloc
Alexandrie: https://github.com/pharo-graphics/Alexandrie

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