



DelphiDay
italian conference

Afterwarp Framework for 3D apps

Introducing new version of the Afterwarp Framework v3
for 3D real-time applications



Yuriy Kotsarenko

Afterwarp Interactive - Owner



<https://afterwarp.io>



ykot@afterwarp.io



<https://github.com/yunkot>



<https://asphyre.net>



DelphiDay

italian conference

11-12 Giugno 2024
Piacenza



wintech
italia

OPEN-SOURCE PROJECTS

<https://github.com/yunkot>

Afterwarp Framework

<https://afterwarp.io>

MicroPXL (New in 2024)

<https://github.com/yunkot/MicroPXL>

Other Projects and Resources

<https://asphyre.net>



11-12 Giugno 2024
Piacenza





We celebrate 25 year anniversary!

- **Afterwarp Framework: 2015 – current**
 - Portions of code written in 2000, 2008 and 2011
- **Asphyre Framework: 2005 – 2015**
 - Also known as Pascal eXtended Library (PXL)
- **PowerDraw library: 2001 – 2005**
- **PowerGrafix: 1999 - 2000**



Afterwarp Framework: at the glance

1. Up to 65536 shadow-casting light sources in real-time
 - Realistic real-time shadows with soft-penumbra
2. Beautiful 2D and 3D real-time text
 - Can be rotated and/or curved
 - Can have color gradient, border and shadow
3. Thousands of 3D objects with instancing and selection
4. Accurate order-independent transparency in one pass
 - Perfect for windows, glass and water



Afterwarp Framework: rendering

1. Hybrid forward+/deferred rendering pipeline
2. High dynamic range (HDR)
3. Physically-based rendering (PBR)
4. Multiple material and light reflection model types
5. Suitable for high-DPI posters and Lenticular printing
6. Up to 256 bits per pixel (32 bits per channel)
 - Optional real-time color dithering for better accuracy



Afterwarp Framework: advanced

1. Advanced 3D object hierarchy with visibility detection and precise mouse picking
 - Camera supporting both 1st and 3rd person views
2. Object highlight rendering effect
3. Spatial and ground fog effect
4. 2D vector graphics, image processing and blurring
5. Hi-DPI and Variable-Refresh Rate (VRR) monitor support



Let's run some samples!



Afterwarp Framework: requirements

1. Delphi XE2 or later

- Still using Delphi 7? Support is available on request
- FreePascal/Lazarus is supported
- .NET / C# is supported

2. Windows Vista or later

- **Windows 10/11** required for VRR support
- Older versions down to Windows NT 4.0 are supported on request

3. Linux / FreeBSD

- Raspberry PI is supported, Android support is coming!



Afterwarp Framework: internals

- Core framework is written in C++ using C++17 dialect
 - Uses proprietary template and runtime framework
 - Gradually becoming open-source
 - Does not use Standard C++ library / STL, standard C library is optional
 - Highly optimized for reliability and performance
- High-level framework is written in Delphi
 - Compiles under FreePascal/Lazarus
- .NET / C# port of high-level framework is available



Licensing

→ **Individual developers and small companies: FREE!**

As long as all projects using Afterwarp earn less than \$200 000 USD annual

→ **Medium and large enterprises**

→ Professional License

→ \$10 000 USD: one-time payment, perpetual

→ Enterprise License



Afterwarp Framework v3.1 is coming

- Advanced material and texture library per mesh
 - Supported in 3D object model hierarchy
- Fast native model loader/saver supporting full OBJ/MTL file specification
 - Fast loading of large models (> 4Gb)
- Optimized voxelization that can be used at run-time



QUESTIONS?