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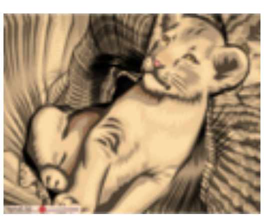
Demo Examples

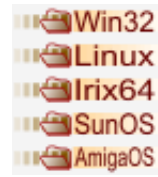
All the demo examples are in the distribution package, see Download. This page contains precompiled executables with screenshots and brief explanations. It is safe to download and run the executables, there are no viruses and no any trojan code. Also, there is nothing installed on your computer, you just download, unpack, run, and see the examples. However, it's always a good idea to double check everything with your favorite anti-virus software before running. If you don't trust it, you can download the sources (see Download), compile and run the examples, and of course, analyse the source code for any possible destructive subroutines. I have no responsibility if your computer is infected with some virus program.

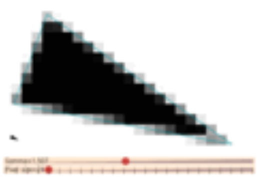
The image examples require file `spheres.bmp` for Windows executables, and `spheres.ppm` for Linux ones. Download them from here:
(../spheres.bmp)
(../spheres.ppm)
You can also use any other .BMP or .PPM file of about the same size. The .BMP file must be of 24 bit TrueColor, the .PPM one must be of type P6 (24 bit per pixel RGB). There are two ways to use your own files in image demo examples. You can simply call it `spheres.bmp` or `spheres.ppm` and put them to the directory where you run the examples, or indicate the name of the file in the command line, for example, `image_filters.exe my_image.bmp`

Screenshot	Source Code and Description	Executable
	**All examples in one package**	Win32 Linux Irix64 SunOS AmigaOS
	`lion.cpp` This is the first example I used to implement and debug the scanline rasterizer, affine transformer, and basic renderers. You can rotate and scale the “Lion” with the left mouse button. Right mouse button adds “skewing” transformations, proportional to the “X” coordinate. The image is drawn over the old one with a cetrain opacity value. Change “Alpha” to draw funny looking “lions”. Change window size to clear the window.	Win32 Linux Irix64 SunOS AmigaOS
	`idea.cpp` The polygons for this “idea” were taken from the book "Dynamic HTML in Action" by Eric Schurman. An example of using Microsoft Direct Animation can be found here: ideaDA.html. If you use Microsoft Internet Explorer you can compare the quality of rendering in **AGG** and Microsoft Direct Animation. Note that even	Win32

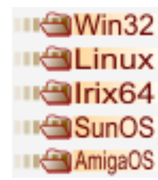
when you click "Rotate with High Quality", you will see it “jitters”. It's because there are actually no **Subpixel Accuracy** used in the Microsoft Direct Animation. In the **AGG** example, there's no jitter even in the “Draft” (low quality) mode. You can see the simulated jittering if you turn on the “Roundoff” mode, in which there integer pixel coordinated are used. As for the performance, note, that the image in **AGG** is rotated with step of 0.01 degree (initially), while in the Direct Animation Example the angle step is 0.1 degree.

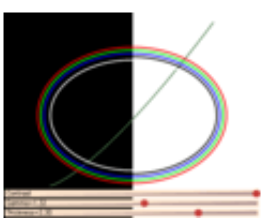
`lion_outline.cpp` The example demonstrates my new algorithm of drawing **Anti-Aliased** lines. The algorithm works about 2.5 times faster than the scanline rasterizer but has some restrictions, particularly, line joins can be only of the “miter” type, and when so called **miter limit** is exceded, they are not as accurate as generated by the stroke converter (conv_stroke). To see the difference, maximize the window and try to rotate and scale the “lion” with and without using the scanline rasterizer (a checkbox at the bottom). The difference in performance is obvious.



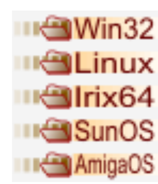


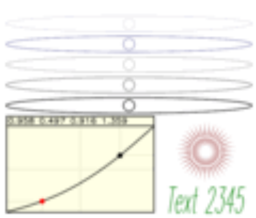
`aa_demo.cpp` Demonstration of the **Anti-Aliasing** principle with **Subpixel Accuracy**. The triangle is rendered two times, with its “natural” size (at the bottom-left) and enlarged. To draw the enlarged version there is a special scanline renderer was written (see class renderer_enlarged in the source code). You can drag the whole triangle as well as each vertex of it. Also change “Gamma” to see how it affects the quality of **Anti-Aliasing**.



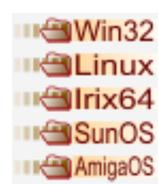


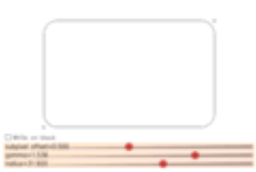
`gamma_correction.cpp` **Anti-Aliasing** is very tricky because everything depends. Particularly, having straight linear dependence **“pixel coverage”** → **“brightness”** may be not the best. It depends on the type of display (CRT, LCD), contrast, black-on-white vs white-on-black, it even depends on your personal vision. There are no linear dependencies in this World. This example demonstrates the importance of so called **Gamma Correction** in **Anti-Aliasing**. There a traditional **power** function is used, in terms of **C++** it's `brighness = pow(brighness, gamma)`. Change “Gamma” and see how the quality changes. Note, that if you improve the quality on the white side, it becomes worse on the black side and vice versa.



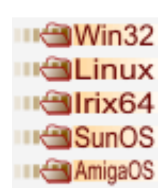


`gamma_ctrl.cpp` This is another experiment with gamma correction. See also Gamma Correction. I presumed that we can do better than with a traditional power function. So, I created a special control to have an arbitrary gamma function. The conclusion is that we can really achieve a better visual result with this control, but still, in practice, the traditional **power function** is good enough too.

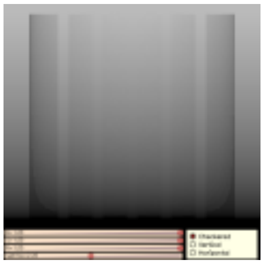




`rounded_rect.cpp` Yet another example dedicated to Gamma Correction. If you have a CRT monitor: The rectangle looks bad - the rounded corners are thicker than its side lines. First try to drag the **“subpixel offset”** control — it simply adds some fractional value to the coordinates. When dragging you will see that the rectangle is "blinking". Then increase **“Gamma”** to about 1.5. The result will look almost perfect — the visual thickness of the rectangle remains the same. That's good, but turn the checkbox **“White on black”** on — what do we see? Our rounded rectangle looks terrible. Drag the **“subpixel offset”** slider — it's blinking as hell. Now decrease



"Gamma" to about 0.6. What do we see now? Perfect result! If you use an LCD monitor, the good value of gamma will be closer to 1.0 in both cases — black on white or white on black. There's no perfection in this world, but at least you can control Gamma in **Anti-Grain Geometry** :-)



gamma_tuner.cpp Yet another gamma tuner. Set gamma value with the slider, and then try to tune your monitor so that the vertical strips would be almost invisible.

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rasterizers.cpp It's a very simple example that was written to compare the performance between Anti-Aliased and regular polygon filling. It appears that the most expensive operation is rendering of horizontal scanlines. So that, we can use the very same rasterization algorithm to draw regular, aliased polygons. Of course, it's possible to write a special version of the rasterizer that will work faster, but won't calculate the pixel coverage values. But on the other hand, the existing version of the rasterizer_scanline_aa allows you to change gamma, and to "dilate" or "shrink" the polygons in range of ± 1 pixel. As usual, you can drag the triangles as well as the vertices of them. Compare the performance with different shapes and opacity.

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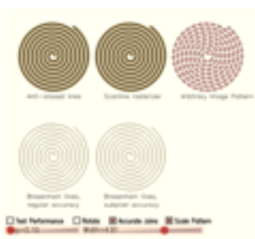

rasterizers2.cpp More complex example demostrating different rasterizers. Here you can see how the **outline** rasterizer works, and how to use an image as the line pattern. This capability can be very useful to draw geographical maps.

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component_rendering.cpp **AGG** has a gray-scale renderer that can use any 8-bit color channel of an RGB or RGBA frame buffer. Most likely it will be used to draw gray-scale images directly in the alpha-channel.

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polymorphic_renderer.cpp There's nothing looking effective. **AGG** has renderers for different pixel formats in memory, particularly, for different byte order (RGB or BGR). But the renderers are class templates, where byte order is defined at the compile time. It's done for the sake of performance and in most cases it fits all your needs. Still, if you need to switch between different pixel formats dynamically, you can write a simple polymorphic class wrapper, like the one in this example.

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gouraud.cpp Gouraud shading. It's a simple method of interpolating colors in a triangle. There's no “cube” drawn, there're just 6 triangles. You define a triangle and colors in its vertices. When rendering, the colors will be linearly interpolated. But there's a problem that appears when drawing adjacent triangles with **Anti-Aliasing**. Anti-Aliased polygons do not "dock" to each other

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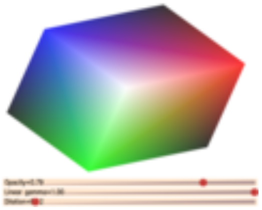

correctly, there visual artifacts at the edges appear. I call it "the problem of adjacent edges". **AGG** has a simple mechanism that allows you to get rid of the artifacts, just dilating the polygons and/or changing the gamma-correction value. But it's tricky, because the values depend on the opacity of the polygons. In this example you can change the opacity, the dilation value and gamma. Also you can drag the Red, Green and Blue corners of the "cube".

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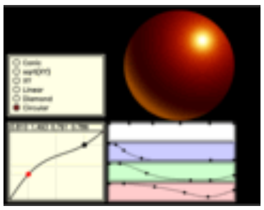

`gradients.cpp` This "sphere" is rendered with color gradients only. Initially there was an idea to compensate so called Mach Bands effect. To do so I added a gradient profile functor. Then the concept was extended to set a color profile. As a result you can render simple geometrical objects in 2D looking like 3D ones. In this example you can construct your own color profile and select the gradient function. There're not so many gradient functions in **AGG**, but you can easily add your own. Also, drag the "gradient" with the left mouse button, scale and rotate it with the right one.

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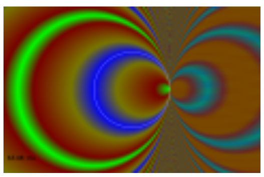

`gradient_focal.cpp` This demo evolved from testing code and performance measurements. In particular, it shows you how to calculate the parameters of a radial gradient with a separate focal point, considering arbitrary affine transformations. In this example window resizing transformations are taken into account. It also demonstrates the use case of gradient_lut and gamma correction.

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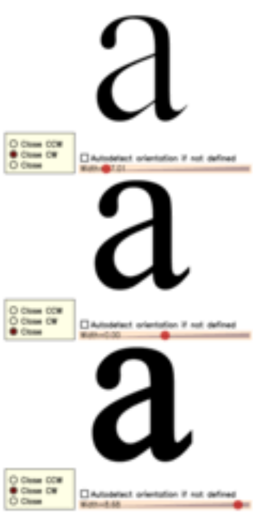

`conv_contour.cpp` One of the converters in **AGG** is conv_contour. It allows you to extend or shrink polygons. Initially, it was implemented to eliminate the "problem of adjacent edges" in the SVG Viewer, but it can be very useful in many other applications, for example, to change the font weight on the fly. The trick here is that the sign (dilation or shrinking) depends on the vertex order - clockwise or counterclockwise. In the conv_contour you can control the behavior. Sometimes you need to preserve the dilation regardless of the initial orientation, sometimes it should depend on the orientation. The glyph '**a**' has a "hole" whose orientation differs from the main contour. To change the "weight" correctly, you need to keep the orientation as it is originally defined. If you turn "Autodetect orientation…" on, the glyph will be extended or shrinked incorrectly. The radio buttons control the orientation flad assigned to all polygons. "Close" doesn't add the flag, "Close CW" and "Close CCW" add "clockwise" or "counterclockwise" flag respectively. Note, that the actual order of vertices remains the same, the flag is being added despite of the real orientation. Try to play with it.

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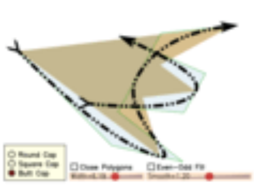

`conv_dash_marker.cpp` The example demonstrates rather a complex pipeline that consists of diffrerent converters, particularly, of the dash generator, marker generator, and of course, the stroke converter. There is also a converter that allows you to draw smooth curves based on polygons, see Interpolation with Bezier Curves. You can drag the three vertices of the "main" triangle.

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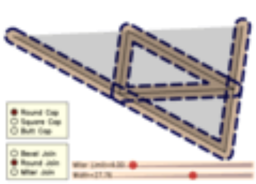

`conv_stroke.cpp` Another example that demonstrates the power of the custom pipeline concept. First, we calculate a thick outline (stroke), then generate dashes, and then, calculate the outlines (strokes) of the dashes again. Drag the verices as in the previous example.

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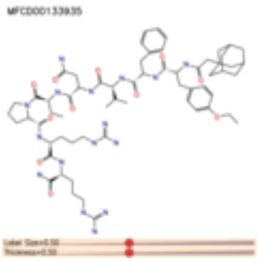
`mol_view.cpp` This is rather a complex but effective example that renders 2D organic molecules from the popular MDL Molecule Format



(SDF). Press the left mouse button to rotate and scale the molecule, and the right one to drag it. PageUp, PageDown keys switch between the molecules in the file. Look at the performance, and note, that the molecules are being drawn from scratch every time you change anything.
A little note for chemists. There's no ring perception is done, so that, the double bonds in rings are drawn incorrectly, but understandable. Also note, that even very complex molecules with macrocycles, drawn in limited space still remain consistent and recognizable.

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alpha_mask.cpp Alpha-mask is a simple method of clipping and masking polygons to a number of other arbitrary polygons. Alpha mask is a buffer that is mixed to the scanline container and controls the **Anti-Aliasing** values in it. It's not the perfect mechanism of clipping, but it allows you not only to clip the polygons, but also to change the opacity in certain areas, i.e., the clipping can be translucent. Press and drag the left mouse button to scale and rotate the “lion”, resize the window to grnerate new alpha-mask.

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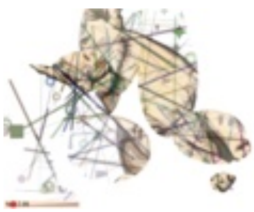

alpha_mask2.cpp Another example of alpha-masking. In the previous example the alpha-mask is applied to the scan line container with unpacked data (scanline_u), while in this one there a special adapter of a pixel format renderer is used (pixfmt_amask_adaptor). It allows you to use the alpha-mask with all possible primitives and renderers. Besides, if the alpha-mask buffer is of the same size as the main rendering buffer (usually it is) we don't have to perform clipping for the alpha-mask, because all the primitives are already clipped at the higher level, see class amask_no_clip_u8. Press and drag the left mouse button to scale and rotate the “lion” and generate a new set of other primitives, change the **“N”** value to generate a new set of masking ellipses.

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alpha_mask3.cpp Yet another example of alpha-masking. It simulates arbitrary polygon clipping similar to gpc_test.cpp. Alpha-Masking allows you to perform only the Intersection (AND) and Difference (SUB) operations, but works much faster that conv_gpc. Actually, there're different compexities and different dependencies. The performance of conv_gpc depends on the number of vertices, while Alpha-Masking depends on the area of the rendered polygons. Still, with typical screen resolutions, Alpha-Masking works much faster than **General Polygon Clipper**. Compare the timings between alpha_mask3.cpp and gpc_test.cpp.

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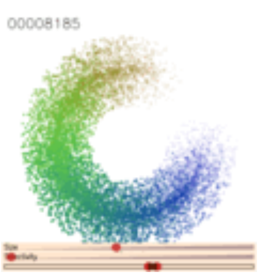

circles.cpp This example just demonstrates that **AGG** can be used in different scatter plot apllications. There's a number of small circles drawn. You can change the parameters of drawing, watching for the performance and the number of circles simultaneously rendered. Press the left mouse button to generate a new set of points. Press the right mouse button to make the points randomly change their coordinates. Note, that the circles are drawn with high quality, possibly translucent, and with subpixel accuracy.

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graph_test.cpp Yet another example of the "general" kind. It was used mostly to compare the performance of different steps of rendering in order to see the weaknesses. The WIn GDI+ analog of it looks worse and works slower. Try (GDI_graph_test.zip) and compare it with the

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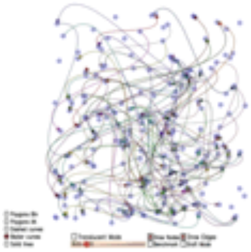

AGG one. The most disappointing thing in GDI+ is that it cannot draw Bezier curves correctly. Run the GDI+ example, choose menu **Image/Bezier curves**, expand the window to about 1000x1000 pixels, and then gradually change the size of the window. You will see that some curves miss the destination points (the centers of the node circles). That looks really ridiculous, so, I overcame my laziness and made an animated GIF of 5 screenshots.

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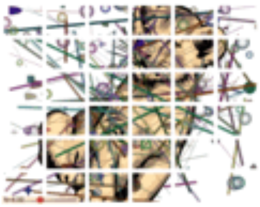

multi_clip.cpp A testing example that demonstrates clipping to multiple rectangular regions. It's a low-level (pixel) clipping that can be useful to draw images clipped to a complex region with orthogonal boundaries. It can be useful in some window interfaces that use a custom mechanism to draw window content. The example uses all possible rendering mechanisms.

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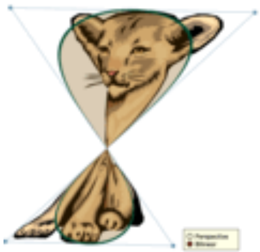

perspective.cpp Perspective and bilinear transformations. In general, these classes can transform an arbitrary quadrangle to another arbitrary quadrangle (with some restrictions). The example demonstrates how to transform a rectangle to a quadrangle defined by 4 vertices. You can drag the 4 corners of the quadrangle, as well as its boundaries. Note, that the perspective transformations don't work correctly if the destination quadrangle is concave. Bilinear thansformations give a different result, but remain valid with any shape of the destination quadrangle.

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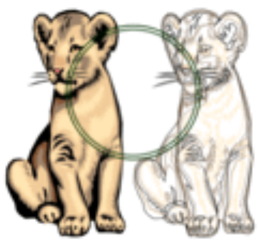

simple_blur.cpp The example demonstrates how to write custom span generators. This one just applies the simplest “blur” filter 3x3 to a prerendered image. It calculates the average value of 9 neighbor pixels. Just press the left mouse button and drag.

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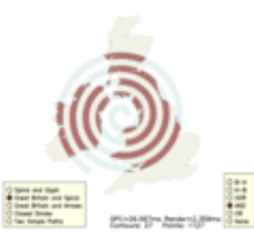

gpc_test.cpp **General Polygon Clipper** by Alan Murta is the most reliable implementation of the polygon boolean algebra. It implements Bala R. Vatti's algorithm of arbitrary polygon clipping and allows you to calculate the Union, Intersection, Difference, and Exclusive OR between two poly-polygons (i.e., polygonal areas consisted of several contours). **AGG** has a simple wrapper class that can be used in the coordinate conversion pipeline. The implementation by Alan Murta has restrictions of using it in commercial software, so that, please contact the author to settle the legal issues. The example demonstrates the use of GPC. You can drag one polygon with the left mouse button pressed. Note, that all operations are done in the vectorial representation of the contours before rendering.

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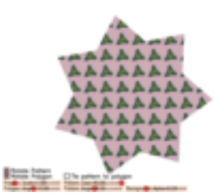

pattern_fill.cpp The example demonstrates how to use arbitrary images as fill patterns. This span generator is very simple, so, it doesn't allow you to apply arbitrary transformations to the pattern, i.e., it cannot be used as a texturing tool. But it works pretty fast and can be useful in some applications.

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raster_text.cpp Classes that render raster text was added in **AGG** mostly to prove the concept of the design. They can be used to

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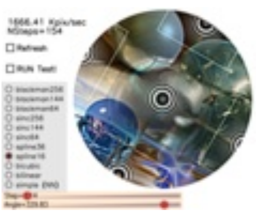
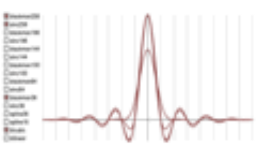
draw simple (aliased) raster text. The example demonstrates how to use text as a custom scanline generator together with any span generator (in this example it's gradient filling). The font format is propriatory, but there are some predefined fonts that are shown in the example.

image1.cpp This is the first example with the new "reincarnation" of the image transformation algorithms. The example allows you to rotate and scale the image with respect to its center. Also, the image is scaled when resizing the window.

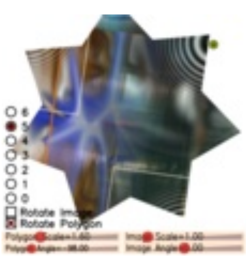
image_alpha.cpp A very powerful feature that allows you to simulate the alpha-channel on the basis of some functioon. In this example it's brightness, but it can be of any complexity. In the example you can form the brightness function and watch for the translucency. Resize the windows to move the image over the backgraund.



image_filters.cpp The image transformer algorithm can work with different interpolation filters, such as Bilinear, Bicubic, Sinc, Blackman. The example demonstrates the difference in quality between different filters. When switch the “Run Test” on, the image starts rotating. But at each step there is the previously rotated image taken, so the quality degrades. This degradation as well as the performance depend on the type of the interpolation filter.

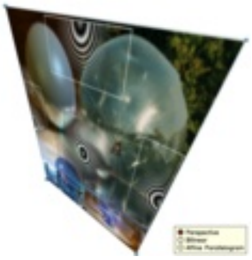


image_fltr_graph.cpp Demonstration of the shapes of different interpolation filters. Just in case if you are curious.



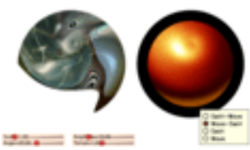
image_transforms.cpp Affine transformations of the images. The examples demonstrates how to construct the affine transformer matrix for different cases. See the “readme!” file for details. Now there are methods in trans_affine that allow you to construct transformations from an arbitrary parallelogram to another parallelogram. It's very convenient and easy.

image_perspective.cpp Image perspective transformations. There are two types of arbitrary quadrangle transformations, Perspective and Bilinear. The image transformer always uses reverse transformations, and there is a problem. The Perspective transformations are perfectly reversible, so they work correctly with images, but the Bilinear transformer behave somehow strange. It can transform a rectangle to a quadrangle, but not vice versa. In this example you can see this effect, when the edges of the image "sag". I'd highly appreciate if someone could help me with math for



transformations similar to Bilinear ones, but correctly reversible (i.e., that can transform an arbitrary quadrangle to a rectangle). The bilinear transformations are simple, see agg_trans_bilinear.h and agg_simul_eq.h

AmigaOS



distortions.cpp To transform an image as well as to define a color gradient you have to write several declarations. This approach can seem difficult to handle (compared with one function call), but it's very flexible. For example, you can add an arbitrary distortion function. This mechanism is pretty much the same in image transformers and color gradients. Try to play with this example changing different parameters of the distortions.

Win32 Linux Irix64 SunOS AmigaOS

lion_lens.cpp This example exhibits a non-linear transformer that "magnifies" vertices that fall inside a circle and extends the rest (trans_warp_magnifier). Non-linear transformations are tricky because straight lines become curves. To achieve the correct result we need to divide long line segments into short ones. The example also demonstrates the use of conv_segmentator that does this division job. Drag the center of the "lens" with the left mouse button and change the "Scale" and "Radius". The transformer can also shrink away the image if the scaling value is less than 1. To watch for an amazing effect, set the scale to the minimum (0.01), decrease the radius to about 1 and drag the "lens". You will see it behaves like a black hole consuming space around it. Move the lens somewhere to the side of the window and change the radius. It looks like changing the event horizon of the "black hole". There are some more screenshots of the poor lion: **Sad Lion**, **Cyclop Lion**, **Lion in Trouble** (being eaten by the black hole), an animated GIF.

Win32 Linux Irix64 SunOS AmigaOS

trans_polar.cpp Another example of non-linear transformations requested by one of my friends. Here we render a standard **AGG** control in its original form (the slider in the bottom) and after the transformation. The transformer itself is not a part of **AGG** and just demonstrates how to write custom transformers (class trans_polar). Note that because the transformer is non-linear, we need to use conv_segmentator first. Try to drag the value of the slider at the bottom and watch how it's being synchronized in the polar coordinates. Also change two other parameters (**Spiral** and **Base Y**) and the size of the window. Don't worry much about the transformed_control class, it's just an adaptor used to render the controls with additional transformations. The use of trans_polar is quite standard:

Win32 AmigaOS

```
agg::trans_polar tr;
agg::conv_transform<SomeVertexSource,
                    trans_polar> tp(some_source, tr);
```

scanline_boolean.cpp A new method to perform boolean operations on polygons (**Union**, **Intersection**, **XOR**, and **Difference**). It uses the scanline approach and in typical screen resolutions works much faster (about 10 times) than vectorial

algorithms like **General Polygon Clipper**. It preserves perfect **Anti-Aliasing** and besides, can work with translucency. There are two **XOR** operations, **Linear XOR** and **Saddle XOR**. The only difference is in the formula of XORing of the two cells with **Anti-Aliasing**. The first one is:

```
cover = a+b; if(cover > 1) cover = 2.0 - cover;
```

The second uses the classical “Saddle” formula:

```
cover = 1.0 - (1.0 - a + a*b) * (1.0 - b + a*b);
```

The **Linear XOR** produces more correct intersections and works constistently with the scanline rasterizer algorithm. The **Saddle XOR** works better with semi-transparent polygons.

`scanline_boolean2.cpp` This is another example of using of the scanline boolean algebra. The example is similar to Demo gpc_test.cpp. Note that the cost of the boolean operation with **Anti-Aliasing** is comparable with rendering (the rasterization time is not included). Also note that there is a difference in timings between using of `scanline_u` and `scanline_p`. Most often `scanline_u` works faster, but it's because of much less number of produced spans. Actually, when using the `scanline_u` the complexity of the algorithm becomes proportional to the **area** of the polygons, while in `scanline_p` it's proportional to the **perimeter**. Of course, the binary variant works much faster than the **Anti-Aliased** one.

`freetype_test.cpp` This example demonstrates the use of the **FreeType** font engine with cache. Cache can keep three types of data, vector path, **Anti-Aliased** scanline shape, and monochrome scanline shape. In case of caching scanline shapes the speed is pretty good and comparable with Windows hardware accelerated font rendering.

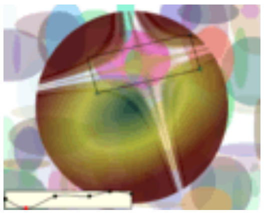
`truetype_test.cpp` The same as the above, but with using Win32 API as the font engine (`GetGlyphOutline()`).

`trans_curve1.cpp` This is a "kinda-cool-stuff" demo that performs non-linear transformations and draws vector text along a curve. Note that it's not just calculating of the glyph angles and positions, they are transformed as if they were elastic. The curve is calculated as a bicubic spline. The option "Preserve X scale" makes the converter distribute all the points uniformly along the curve. If it's unchechked, the scale will be proportional to the distance between the control points.

`trans_curve2.cpp` Similar to the previous demo, but here the transformer operates with two arbitrary curves. It requires more calculations, but gives you more freedom. In other words you will see :-).

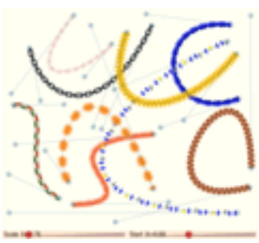
aa_test.cpp A test of **Anti-Aliasing** the same as in http://homepage.mac.com/arekkusu/bugs/invariance
The performance of **AGG** on a typical P-IV 2GHz is:
Points: 37.46K/sec, Lines: 5.04K/sec, Triangles: 7.43K/sec

Win32
AmigaOS



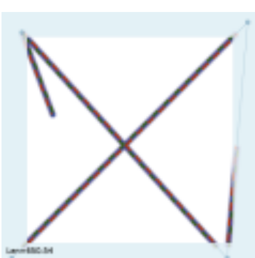
alpha_gradient.cpp The demo shows how to combine any span generator with alpha-channel gradient.

Win32
AmigaOS



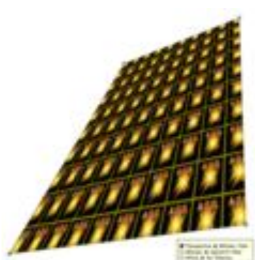
line_patterns.cpp The demo shows a very powerful mechanism of using arbitrary images as line patterns. The main point of it is that the images are drawn along the path. It allows you to draw very fancy looking lines quite easily and very useful in GIS/cartography applications. There the bilinear filtering is used, but it's also possible to add any other filtering methods, or just use the nearest neighbour one for the sake of speed.
Before running this demo make sure that you have files 1.bmp…9.bmp for Win32, MacOS, AmigaOS, and SDL platforms and 1.ppm…9.ppm for X11.
In the demo you can drag the control points of the curves and observe that the images are transformed quite consistently and smoothly. You can also try to replace the image files (1…9) with your own. The BMP files must have 24bit colors (TrueColor), the PPM ones must be of type "P6". Also, the heigh should not exceed 64 pixels, and the background should be white or very close to white. Actually, the algorithm uses 32bit images with alpha channel, but in this demo alpha is simulated in such a way that wite is transparent, black is opaque. The intermediate colors have intermediate opacity that is defined by the brightness_to_alpha array.

Win32



line_patterns_clip.cpp Demonstrates the mechanism of clipping the polylines and/or polygons with image patterns. Shows that the clipper maintains correct pattern repetition along the line, considering clipped parts.

Win32

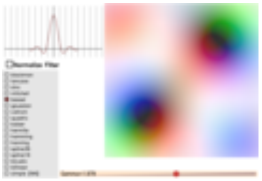


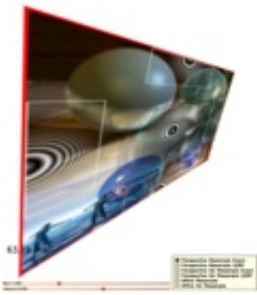
pattern_perspective.cpp Pattern perspective transformations. Essentially it's the same as Demo image_perspective.cpp, but working with a repeating pattern. Can be used for texturing.

Win32

image_filters2.cpp Another example that demonstrates the difference of image filters. It just displays a simple 4x4 pixels image with huge zoom. You can see how different filters affect the result. Also see how gamma correction works.

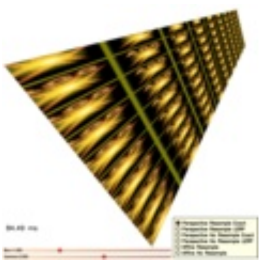
Win32





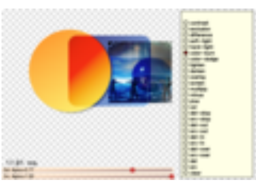
image_resample.cpp The demonstration of image transformations with resampling. You can see the difference in quality between regular image transformers and the ones with resampling. Of course, image tranformations with resampling work slower because they provide the best possible quality.

Win32



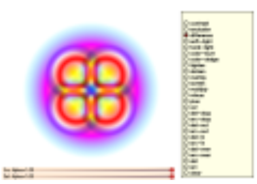
image_resample.cpp The demonstration of pattern transformations with resampling. The same as the above but with texturing patterns.

Win32



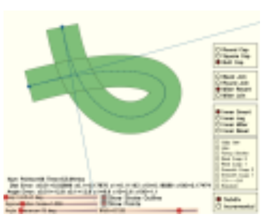
compositing.cpp Extended compositing modes fully compatible with SVG 1.2

Win32



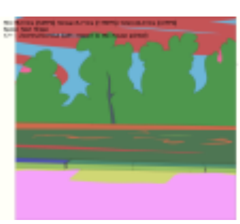
compositing2.cpp Another demo example with extended compositing modes.

Win32



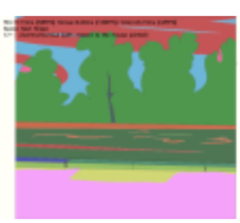
bezier_div.cpp Demonstration of new methods of Bezier curve approximation. You can compare the old, incremental method with adaptive De Casteljau's subdivion. The new method uses two criteria to stop subdivision: estimation of distance and estimation of angle. It gives us perfectly smooth result even for very sharp turns and loops.

Win32



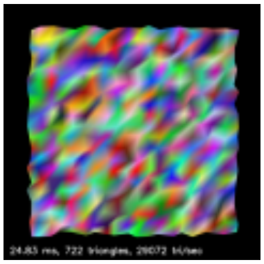
flash_rasterizer.cpp Demonstration of Flash compound shape rasterizer. The rasterizer accepts vectorial data in a form of Flash paths, that is, with two fill styles, fill on the left and fill on the right of the path. Then it produces a number of scanlines with corresponding styles and requests for the colors and/or gradients, images, etc. The algorithm takes care of anti-aliasing and perfect stitching between fill areas.

Win32



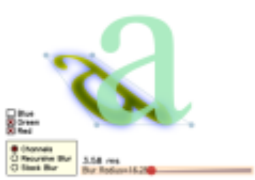
flash_rasterizer2.cpp Another possible way to render Flash compound shapes. The idea behind it is prety simple. You just use the regular rasterizer, but in a mode when it doesn't automatically close the contours. Every compound shape is decomposed into a number of single shapes that are rasterized and rendered separately.

Win32



gouraud_mesh.cpp Yet another example that demonstrates the power of compound shape rasterization. Here we create a mesh of triangles and render them in one pass with multiple Gouraud shaders (span_gouraud_rgba). The example demonstrates perfect **Anti-Aliasing** and perfect triangle stitching (seamless edges) at the same time.

rasterizer_compound.cpp This simple example demonstrates a rather advanced technique of using the compound rasterizer. The idea is you assign styles to the polygons (left=style, right=-1) and rasterize this "multi-styled" compound shape as a whole. If the polygons in the shape overlap, the greater styles have higher priority. That is, the result is as if greater styles were painted last, but the geometry is flattened before rendering. It means there are no pixels will be painted twice. Then the style are associated with colors, gradients, images, etc. in a special style handler. It simulates Constructive Solid Geometry so that, you can, for example draw a translucent fill plus translucent stroke without the overlapped part of the fill being visible through the stroke.



blur.cpp Now you can blur rendered images rather fast! There two algorithms are used: Stack Blur by Mario Klingemann and Fast Recursive Gaussian Filter, described here and here (PDF). The speed of both methods does not depend on the filter radius. Mario's method works 3-5 times faster; it doesn't produce exactly Gaussian response, but pretty fair for most practical purposes. The recursive filter uses floating point arithmetic and works slower. But it is true Gaussian filter, with theoretically infinite impulse response. The radius (actually 2*sigma value) can be fractional and the filter produces quite adequate result.

...TO BE CONTINUED