2D Art and Animation

[COGS Meeting 02/18/2015]

[Andrew]

Types of Images

- Raster Art
- Vector Art
- Pixel Art

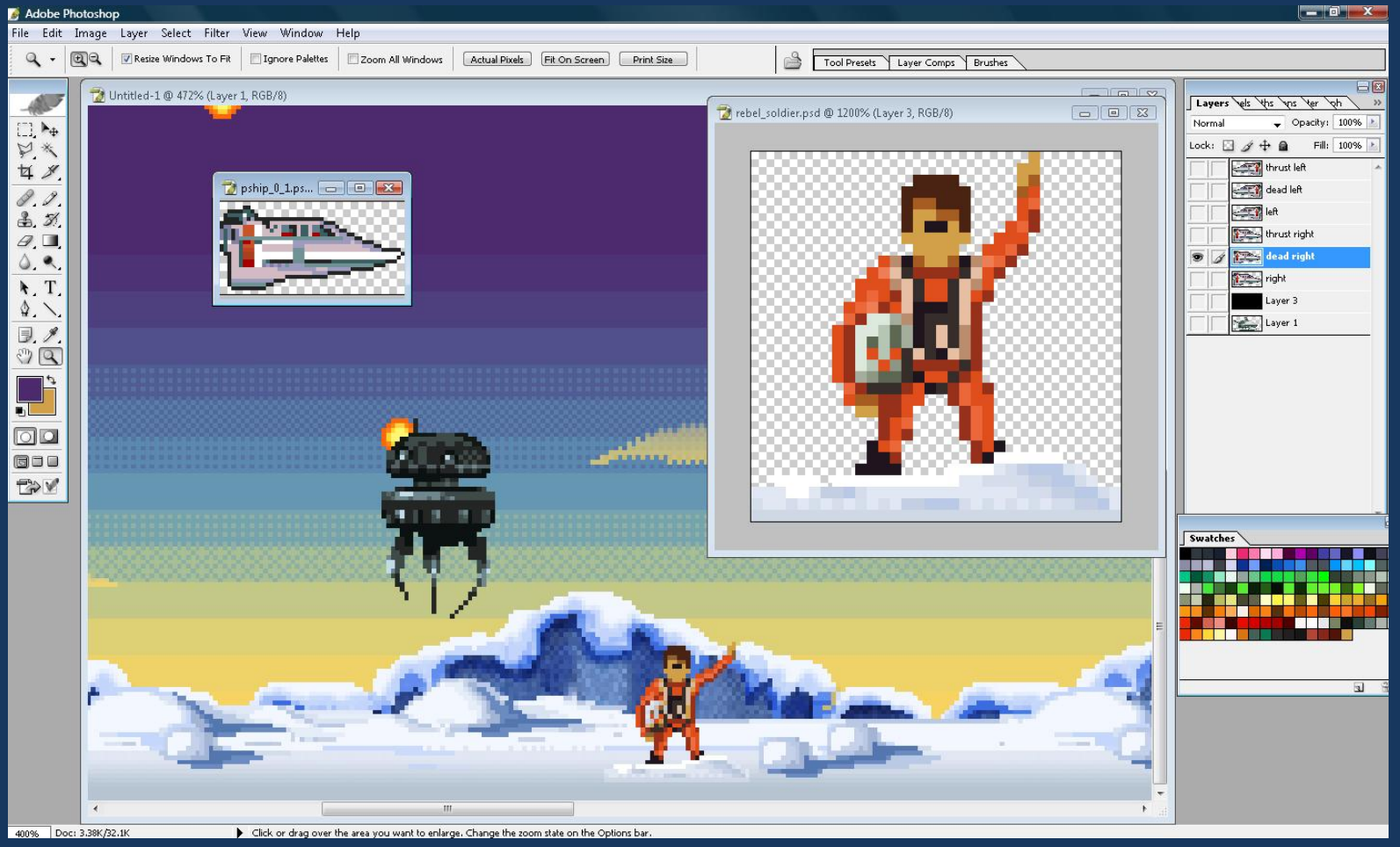
Raster Art

- These are the standard image types you're familiar with: PNG, JPEG, BMP, etc.
- Internally represented as a fixed-size grid of colored pixels.
- For this talk, we'll assume 'Raster Art' is referring to Digital Painting.
- Digital Painting is creating images like this, usually with the help of a graphics tablet:

Raster Art

Programs for Raster art:

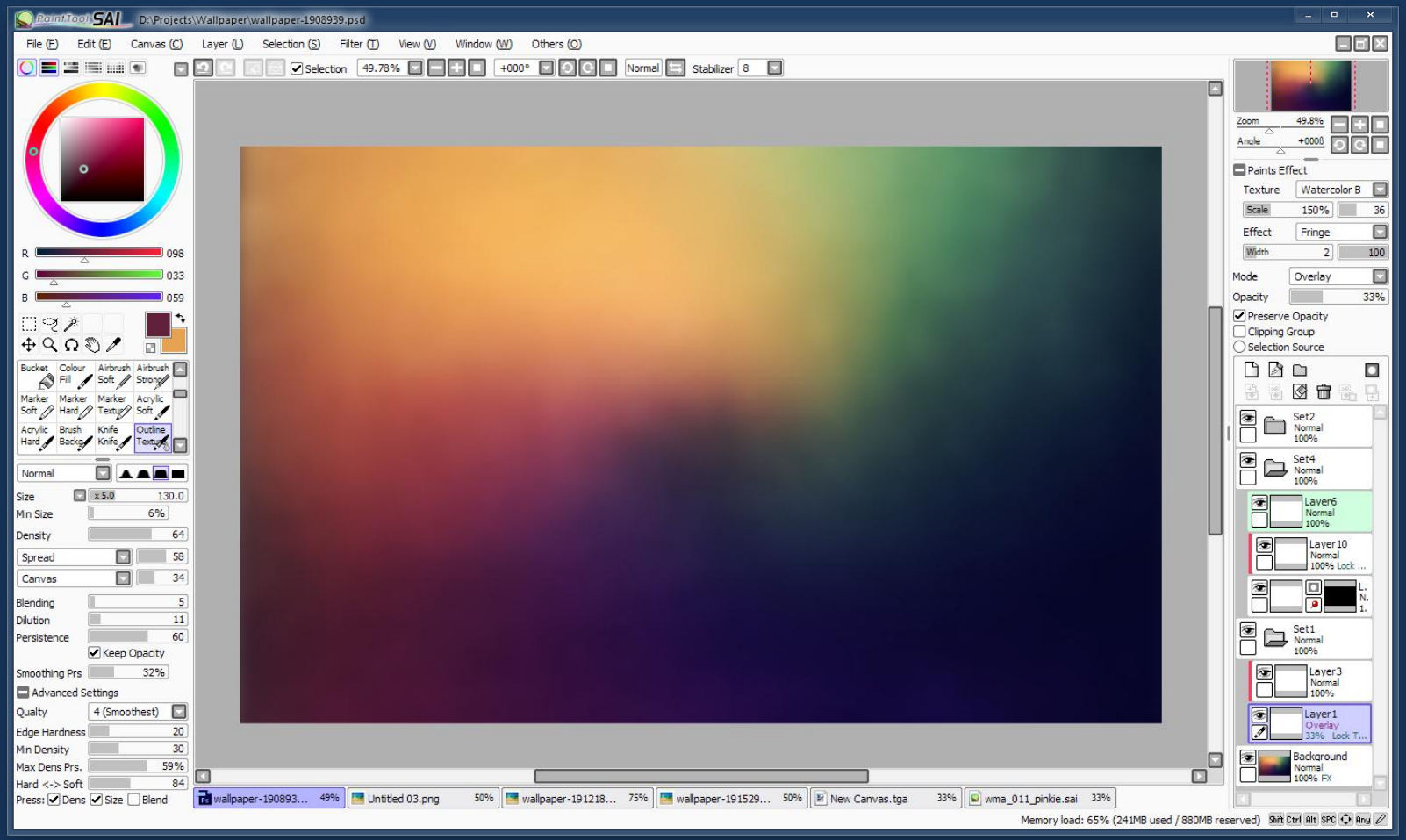
Adobe Photoshop:



Raster Art

Programs for Raster art:

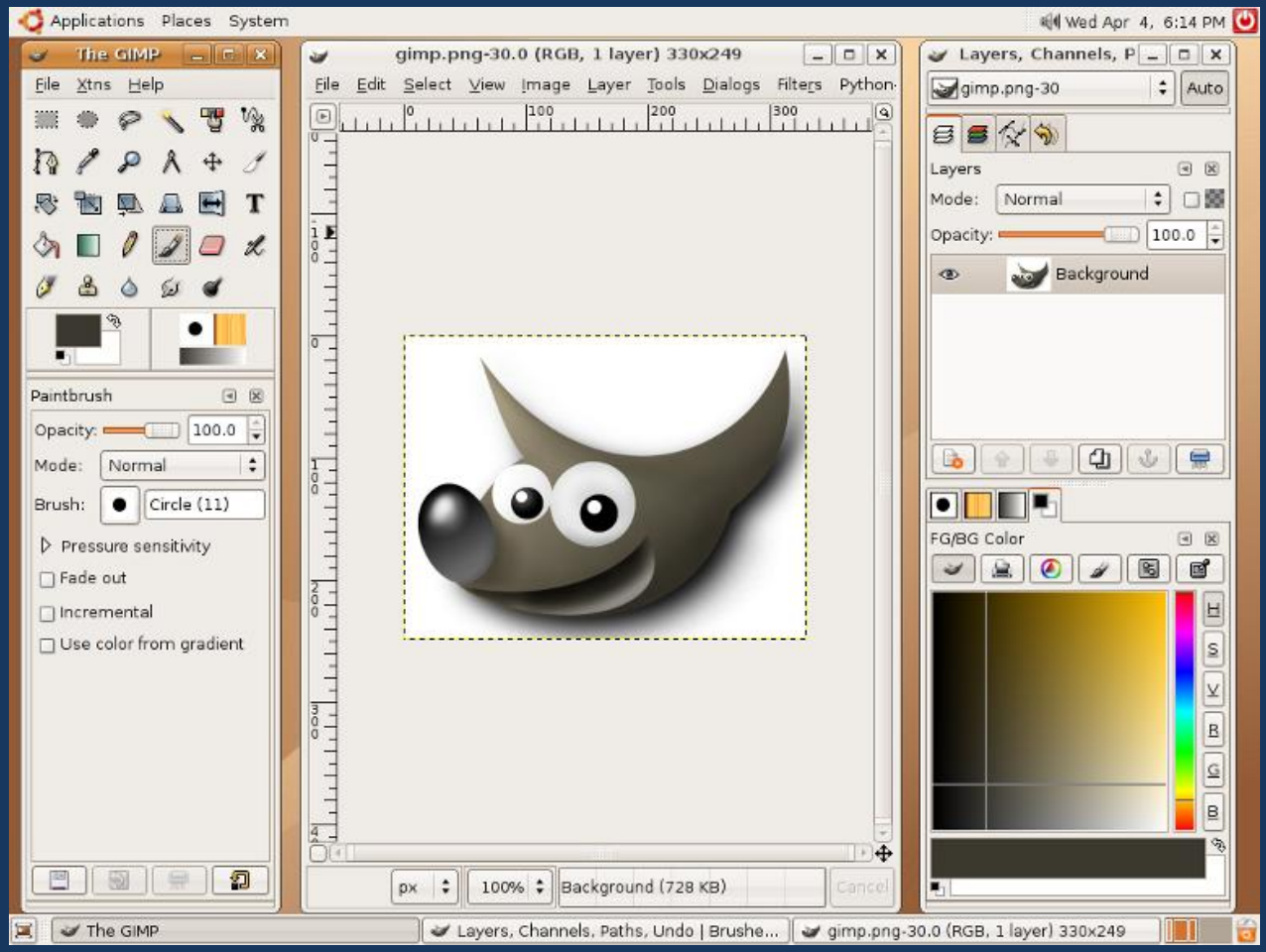
PaintTool SAI:



Raster Art

Programs for Raster art:

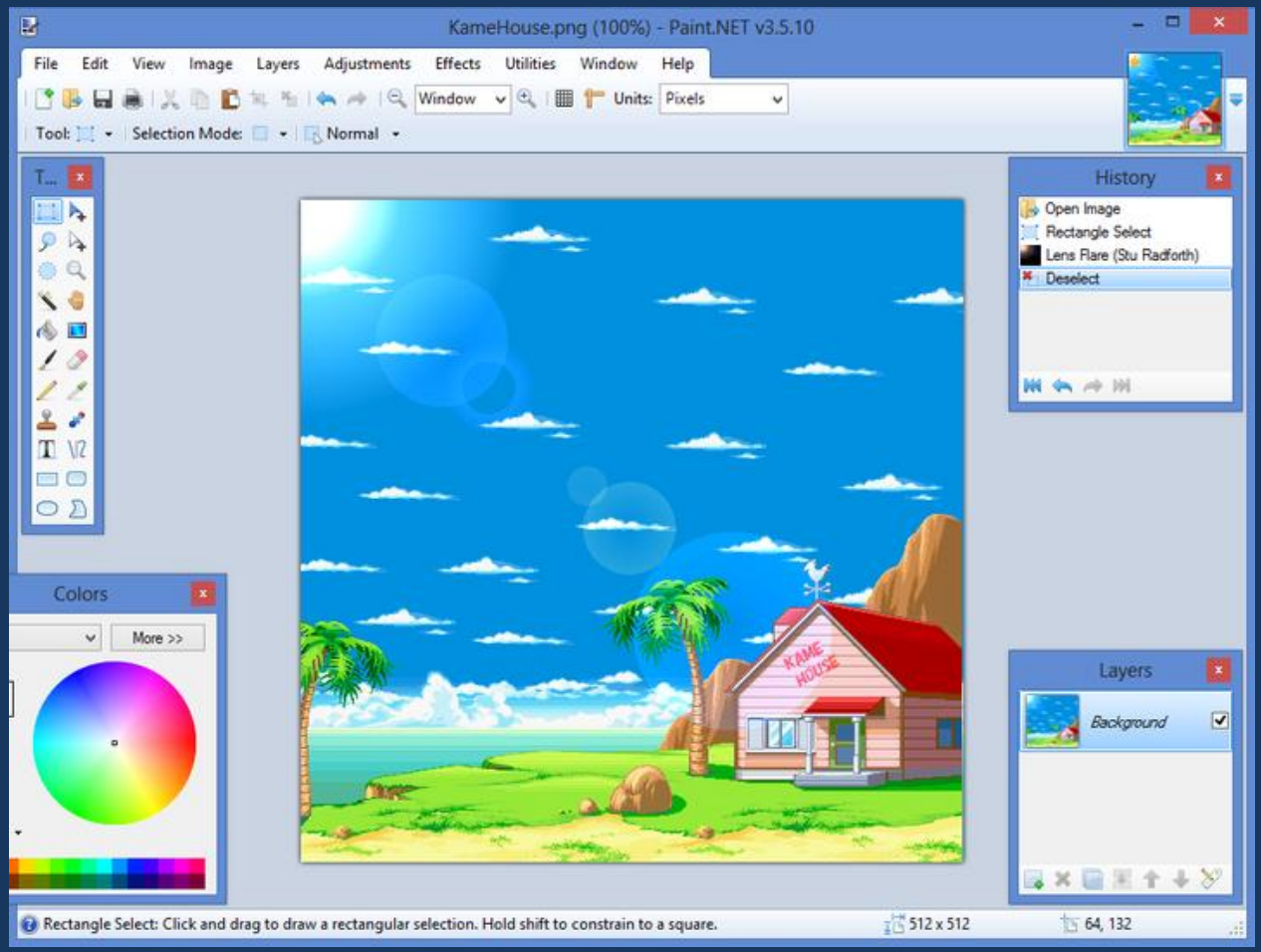
GIMP:



Raster Art

Programs for Raster art:

Paint.NET:

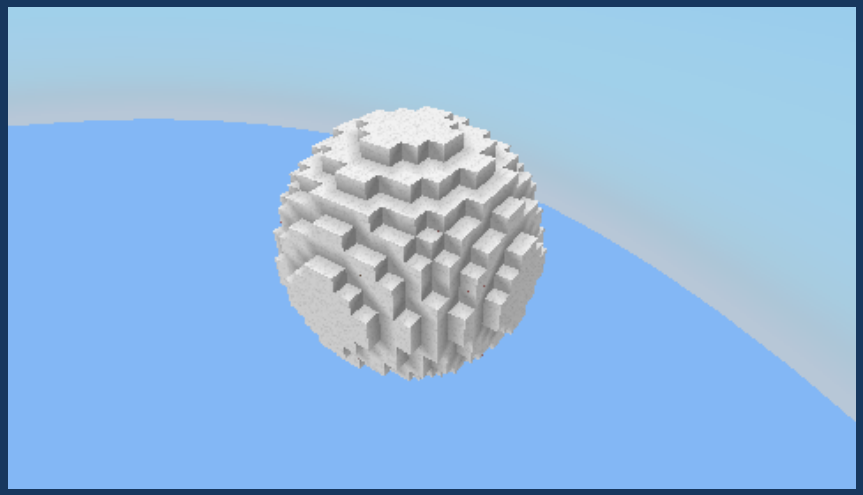


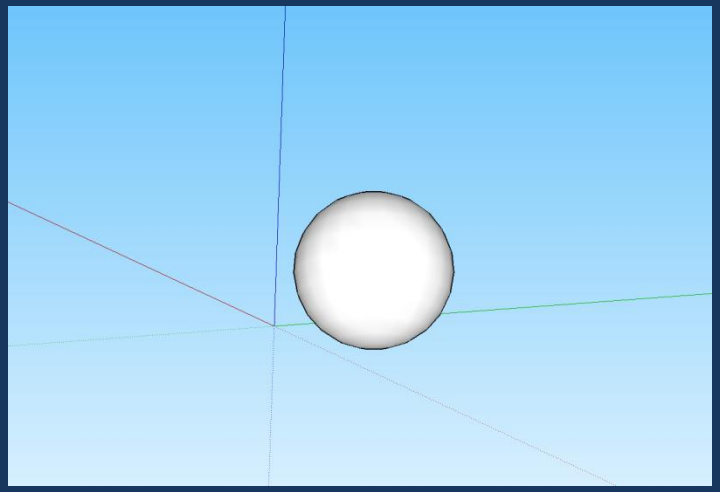
Pixel Art

- Technically, Pixel Art is also raster graphics.
- However, requires a very different skillset and tools from that of Digital Painting.

Pixel Art

Minecraft is to 3d modeling...





...as pixel art is to digital painting

Pixel Art

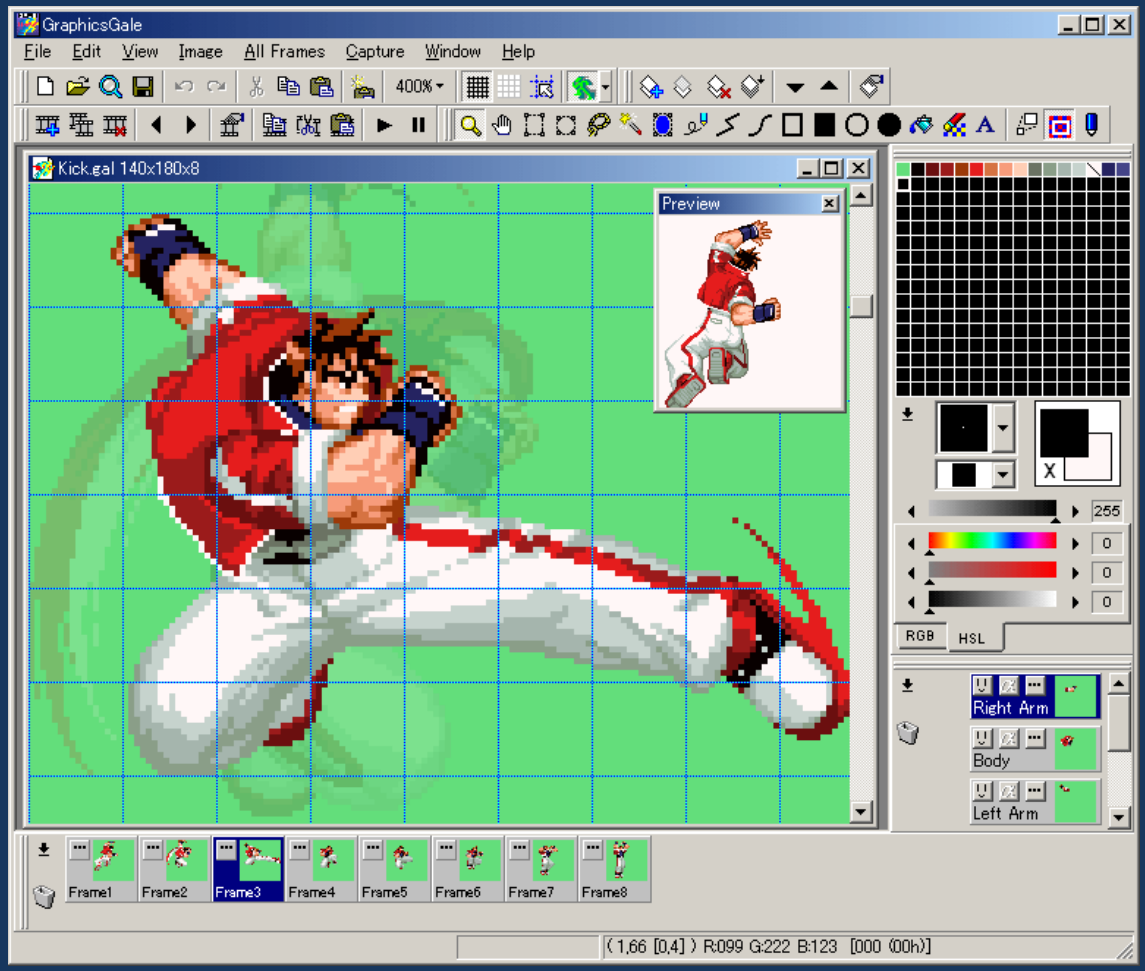
Pixel art is ***very difficult***:

- It's like the "assembly language" of the art world.
- Very low-level drawing... Hardcore artists literally work one pixel at a time.
- Extremely tedious and time consuming.
- Many less "shortcuts" exist than in standard digital painting.
- Self-imposed restrictions: Color count, resolution, etc.
- Usually working with low resolution – details must be abstracted in a careful and intelligent way... a difficult challenge to many new artists.
- Many other unavoidable restrictions/limitations, as we'll see later.

Pixel Art

Programs for Pixel art:

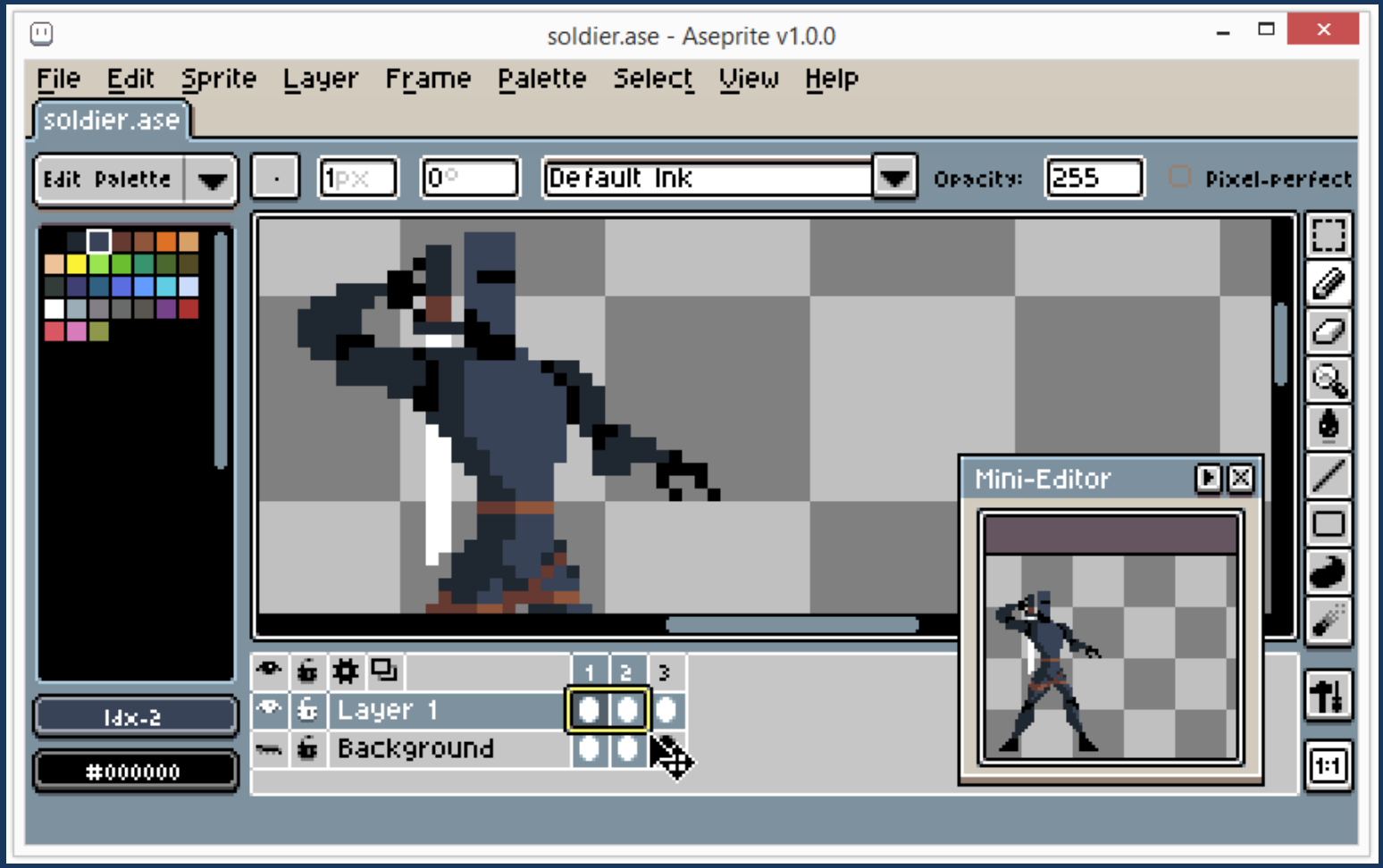
GraphicsGale:



Pixel Art

Programs for Pixel art:

Aseprite:



Vector Art

- Special format of images different from raster.
- Images are actually made up of disjoint polygonal shapes.
- This representation results in small file sizes.
- Even more importantly, allows for completely lossless scaling and rotation.

Vector Art

Resizing vector images:

By comparison, resizing raster images:

Vector Art

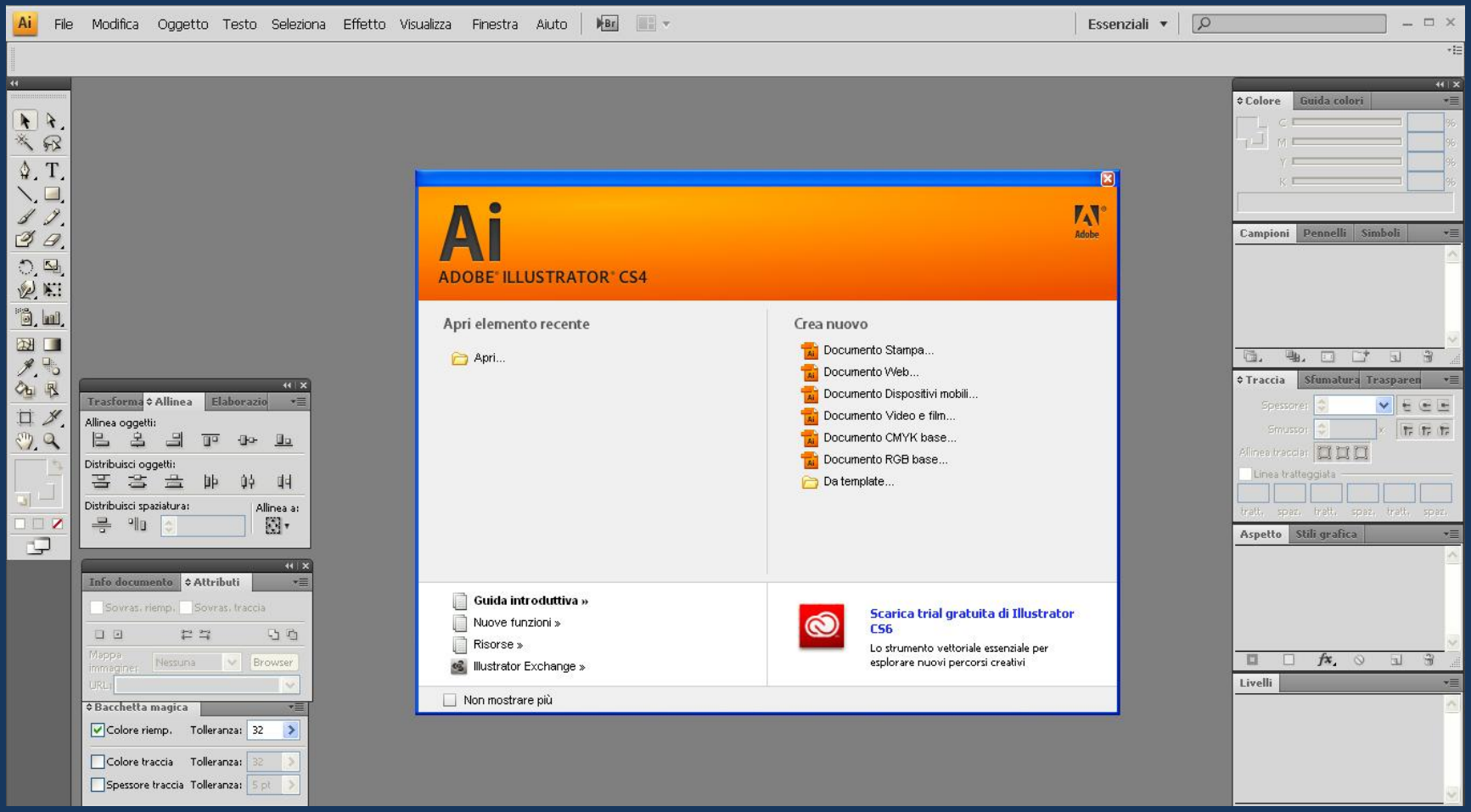
Vector art is also difficult:

- Like pixel art, it requires a very different skillset and tools.
- Being confined to polygons, lines, paths, etc, can be challenging and limiting.

Vector Art

Programs for Vector art:

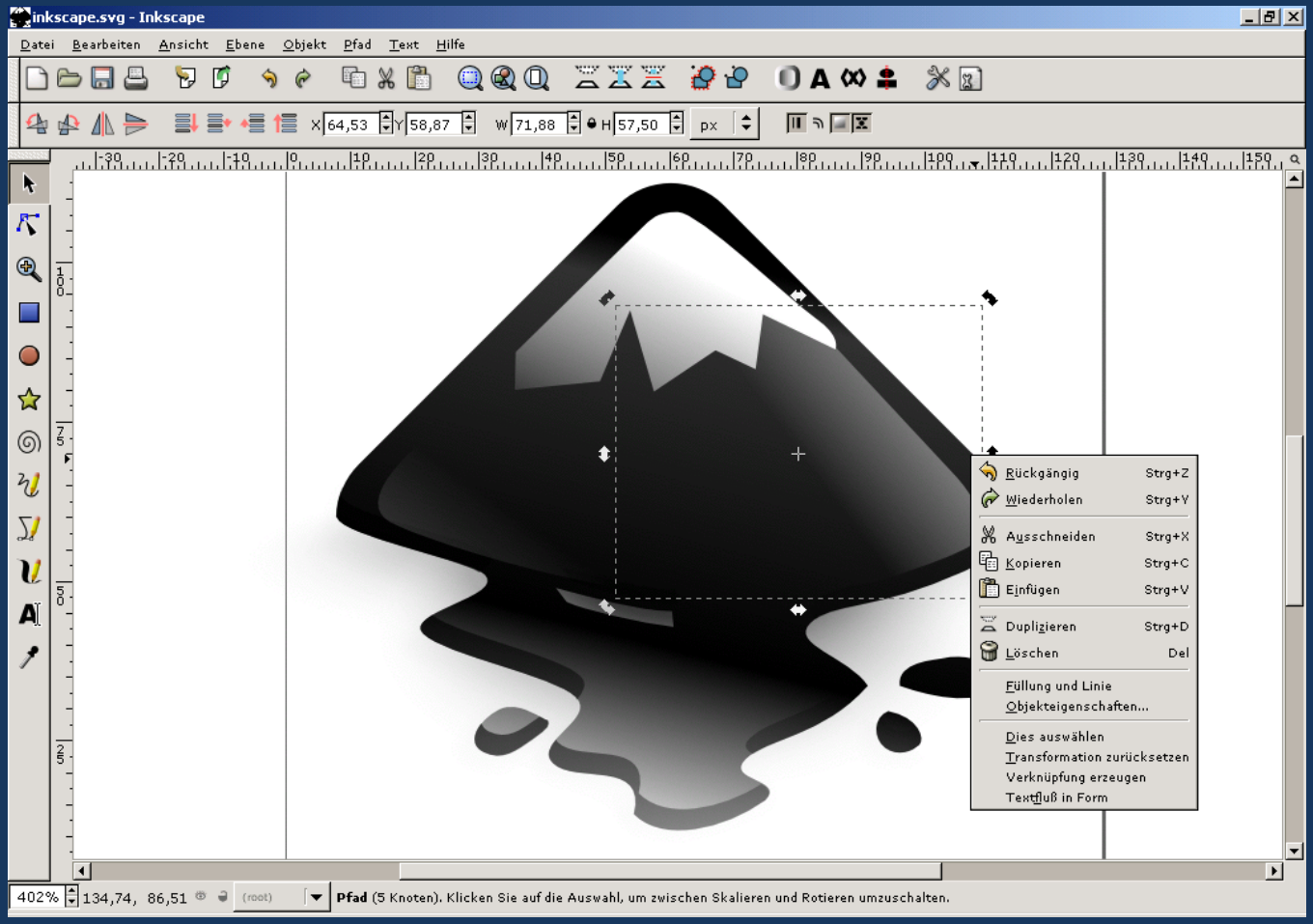
Adobe Illustrator:



Vector Art

Programs for Vector art:

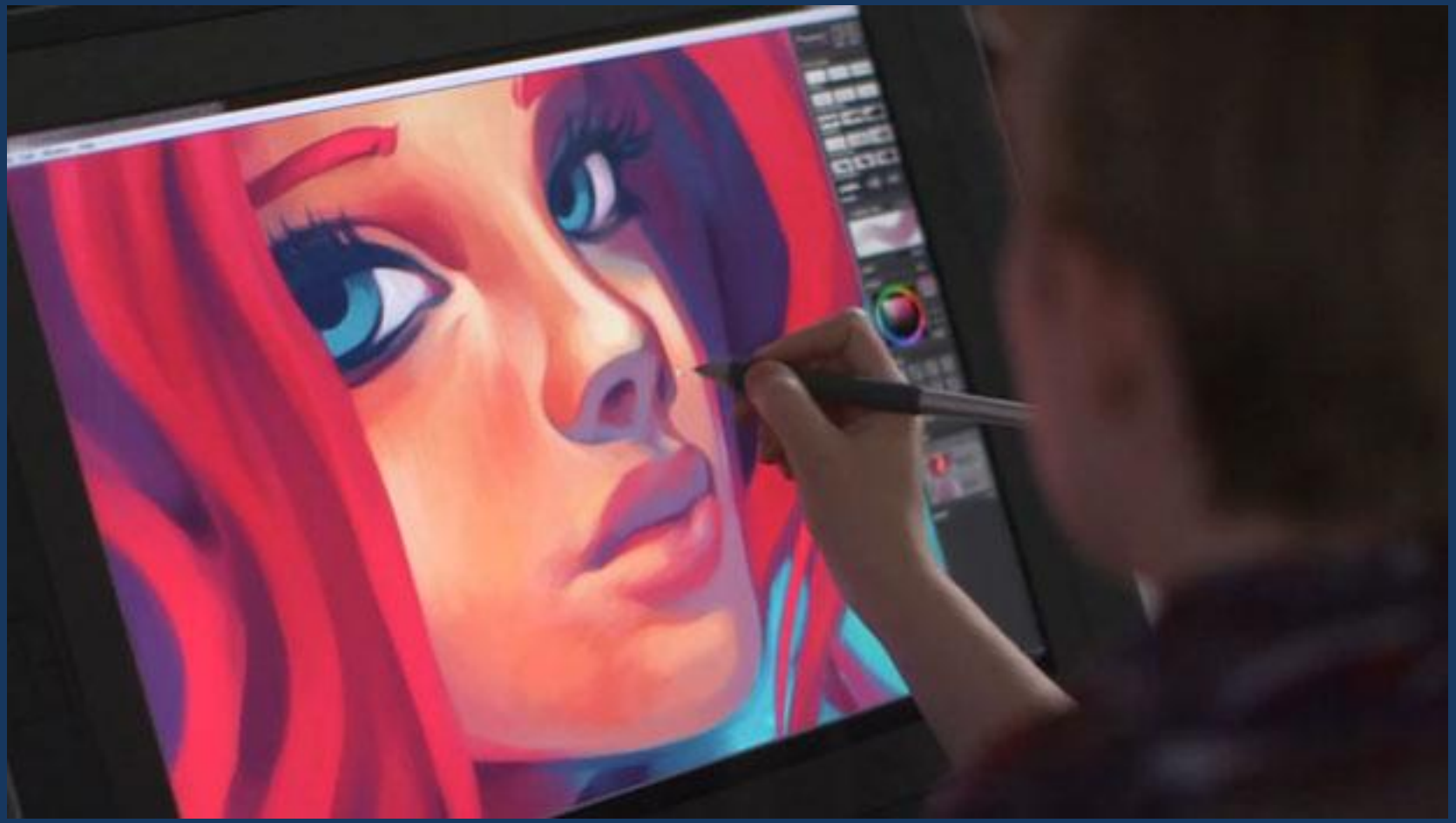
Inkscape:



Vector Art

Programs for Vector art:

Mischief:



Scaling Images

- Unlike with vector art, scaling raster graphics can be problematic.
- Let's look at pixel art first:
  - Bilinear Interpolation is Photoshop's default scaling method. You cannot use this for resizing pixel art.
  - Nearest Neighbor is the ideal scaling algorithm for pixel art.
  - However, must only scale upwards by integer multiples.
  - 1.5x zoom, for example, produces bad results.

(Bilinear Interpolation)

(Nearest Neighbor)

(NN, w/ Non-Integer)

Scaling Images

- With other forms of raster art (Digital Painting, etc)...
  - Nearest Neighbor for upscaling doesn't look very good.
  - Interpolation works better for upscaling, but still looks shitty.

(Nearest Neighbor)

(Bilinear Interpolation)

Scaling Images

- As a general rule of thumb:
    - **Pixel Art** should ONLY be upscaled.
    - Downscaling will ruin the image – it's not an integer multiple.
    - **Raster Art** should ONLY be downscaled.
    - Upscaling will always look bad, and ruin the image.

Scaling Images

- When making raster graphics for your games, it's a good idea to always make them bigger than the size you actually need.
- You're sacrificing file size for greater flexibility in lossless resizing.

Rotating Images

- Rotating can also be problematic, especially for pixel art.
  - Programs like Photoshop aren't built for pixel art – rotation doesn't preserve pixel integrity.
  - Programs that do support pixel rotation still generally mangle the image.
  - Only clean way to do rotation is to redraw the image by hand.

(Interpolated Rotation)

(Pixel Rotation)

(Manual Redraw)

Spritesheet Animation

- Think of flip-books. Many fully rendered images played in quick succession.
- End result looks like this:

- But actually consists of this:

- Very time consuming and laborious to create these.
- Can be stored as a literal sheet of sprites, and animated programmatically.
- Or can be stored as an animated GIF file.

Modular Animation

Modular Animation

Modular Animation

Per-frame information you might include for reassembly of the components:

- X-Offset
- Y-Offset
- Rotation Angle
- Z-Index (Depth)
- Component Index (sprite variant to use)

Modular Animation

Example:

(No Alignment)

(X-Off = 25)

(Y-Off = 15)

(Rotation = 180°)

(Z-Index = 5)

(Comp Index = 2)

Modular Animation

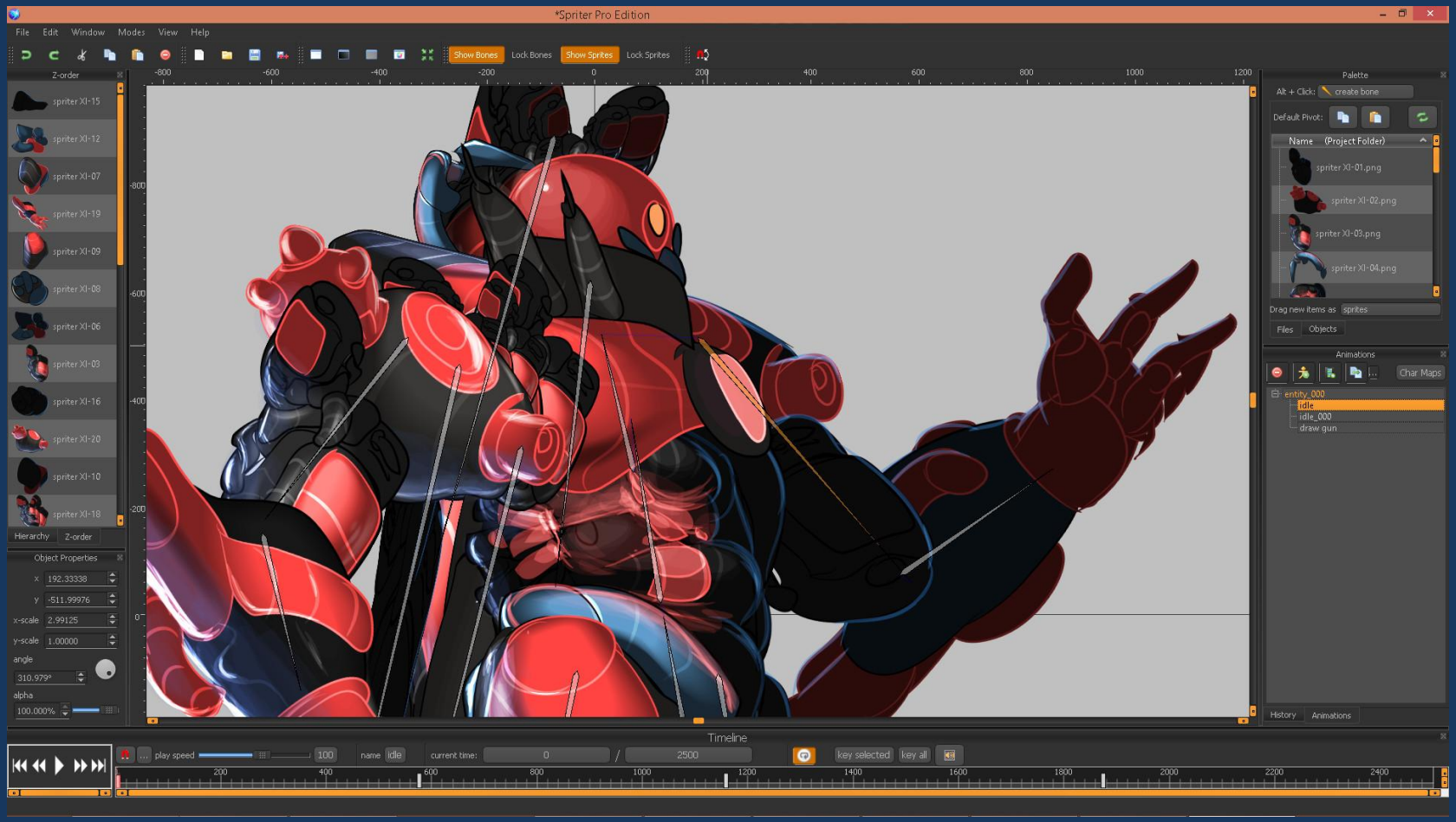
Programs for Modular Animation:

Spine:

Modular Animation

Programs for Modular Animation:

Spriter:



Art for Level Design

- Some games may fully hand draw their entire environments. However, it's uncommon.
- Many games have repetition in their scenery.
- Especially for grid-based games, they build their maps by sampling from a tileset.

Art for Level Design

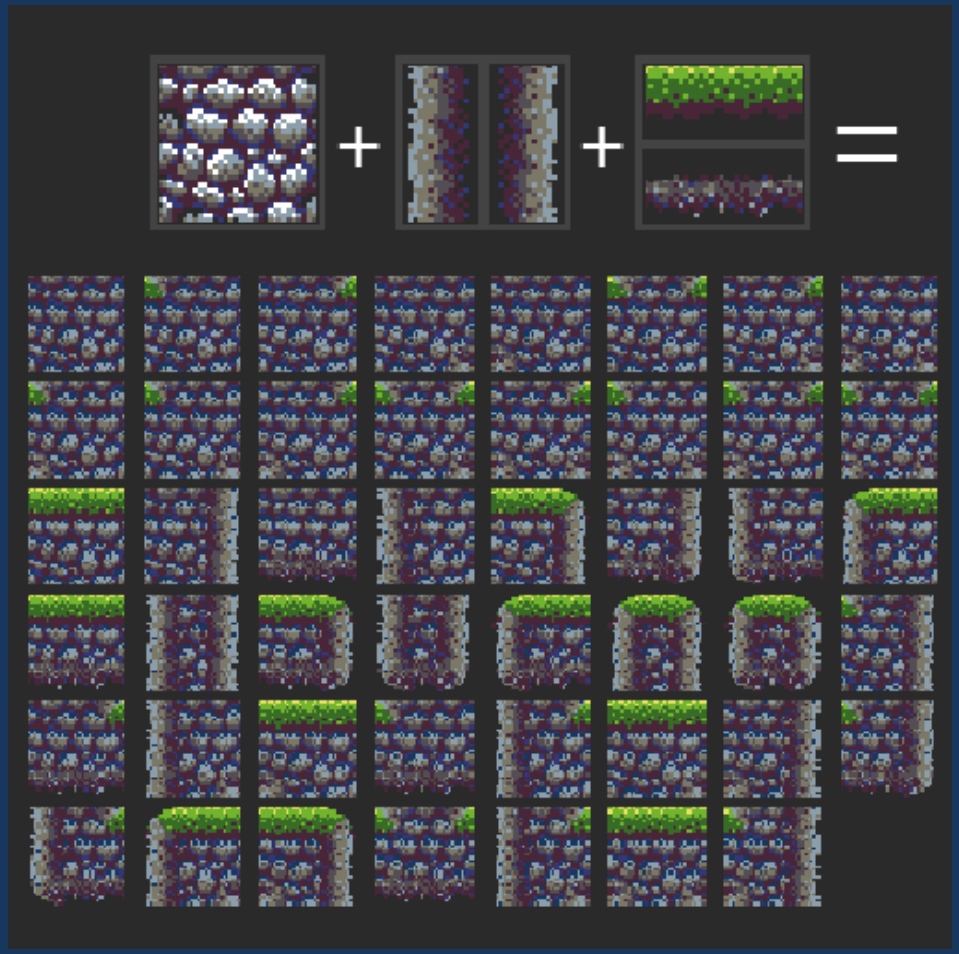
- A common challenge: Make sure the tiles loop seamlessly.
  - First draw the tile without worrying about looping.
  - Then offset it (with wraparound) by half its width and height.
  - Fix the seams.




Art for Level Design

Programs for Tileset work:

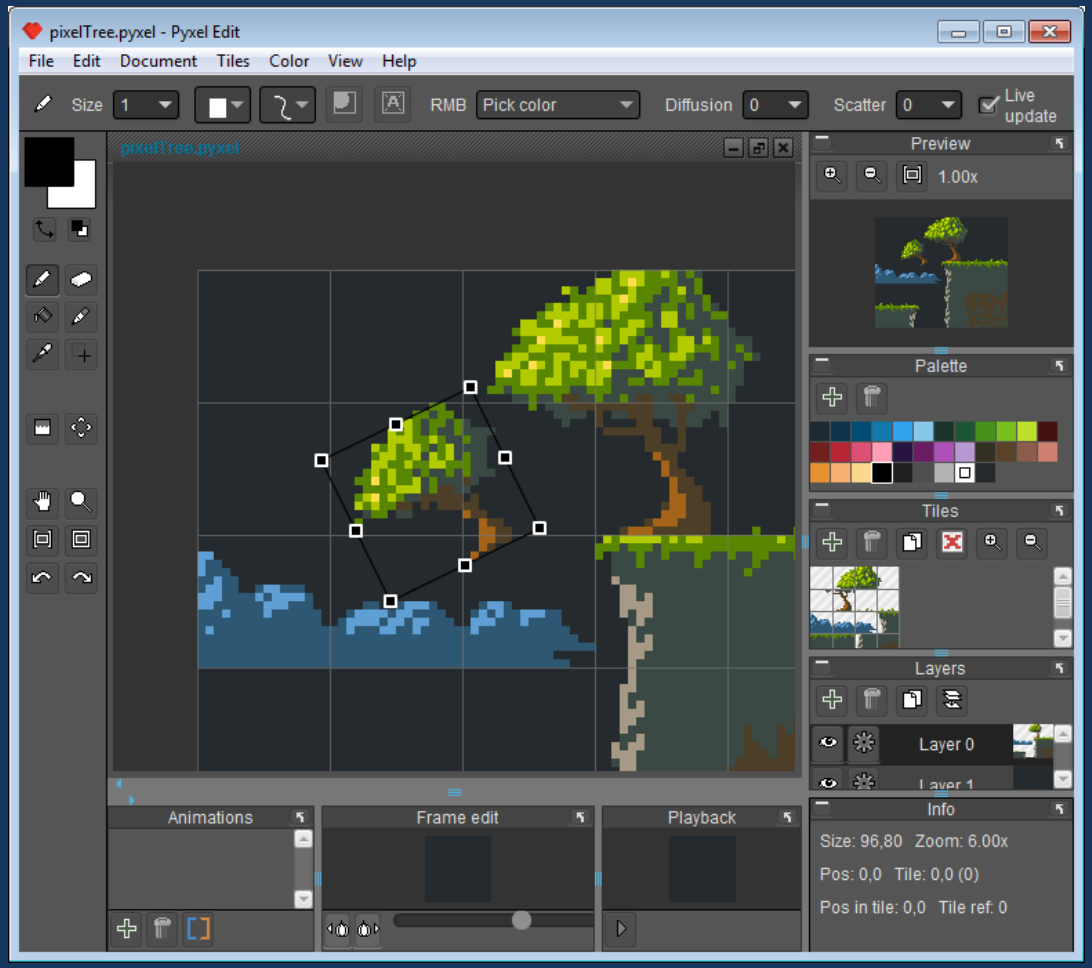
AutoTileGen:



Art for Level Design

Programs for Tileset work:

Pyxel Edit:



Program Demos

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Bonus

Psuedo-Pixel Art generation with Photoshop:
http://danfessler.com/blog/hd-index-painting-in-photoshop