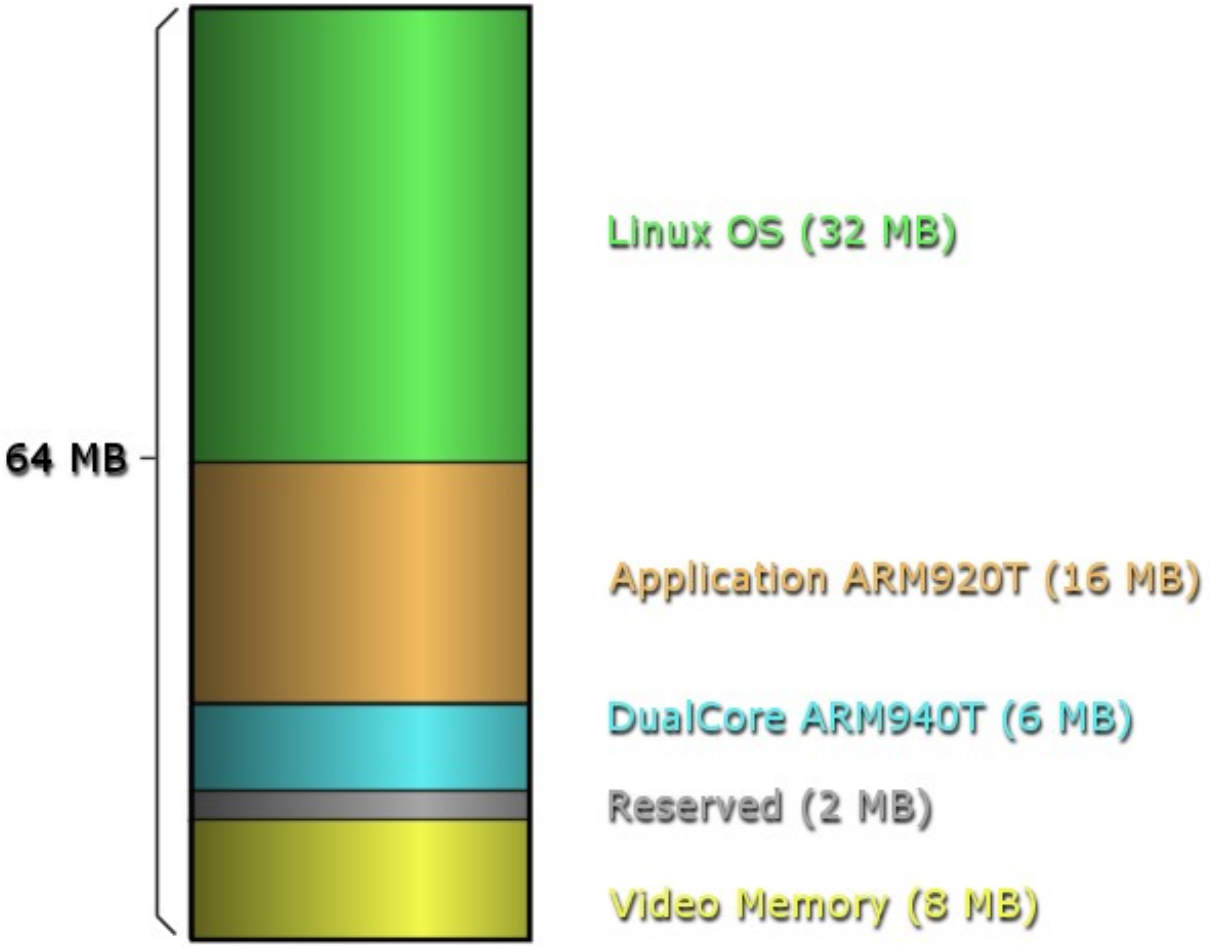
GP2X Low Level API v1.00

Author: F-Cycles / Québarium

Thanks to: Rlyeh (Squidge, Robster, Snaff, Reesy and NK), gamepack holdings

December 2006 – July 2011

Memory Architecture



ARM920T Cache

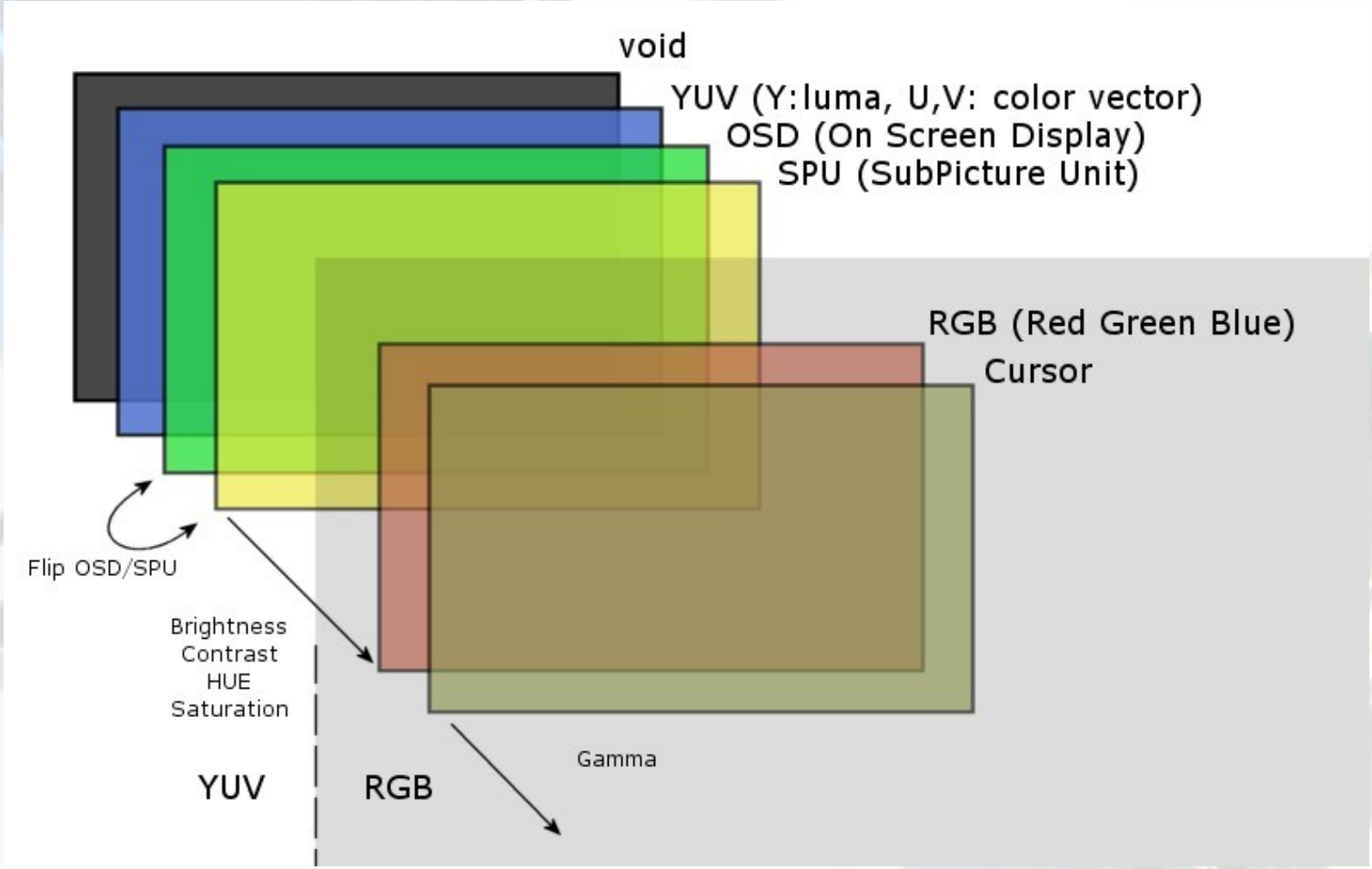
16KB Instruction

16KB Data

ARM940T Cache

4KB Instruction

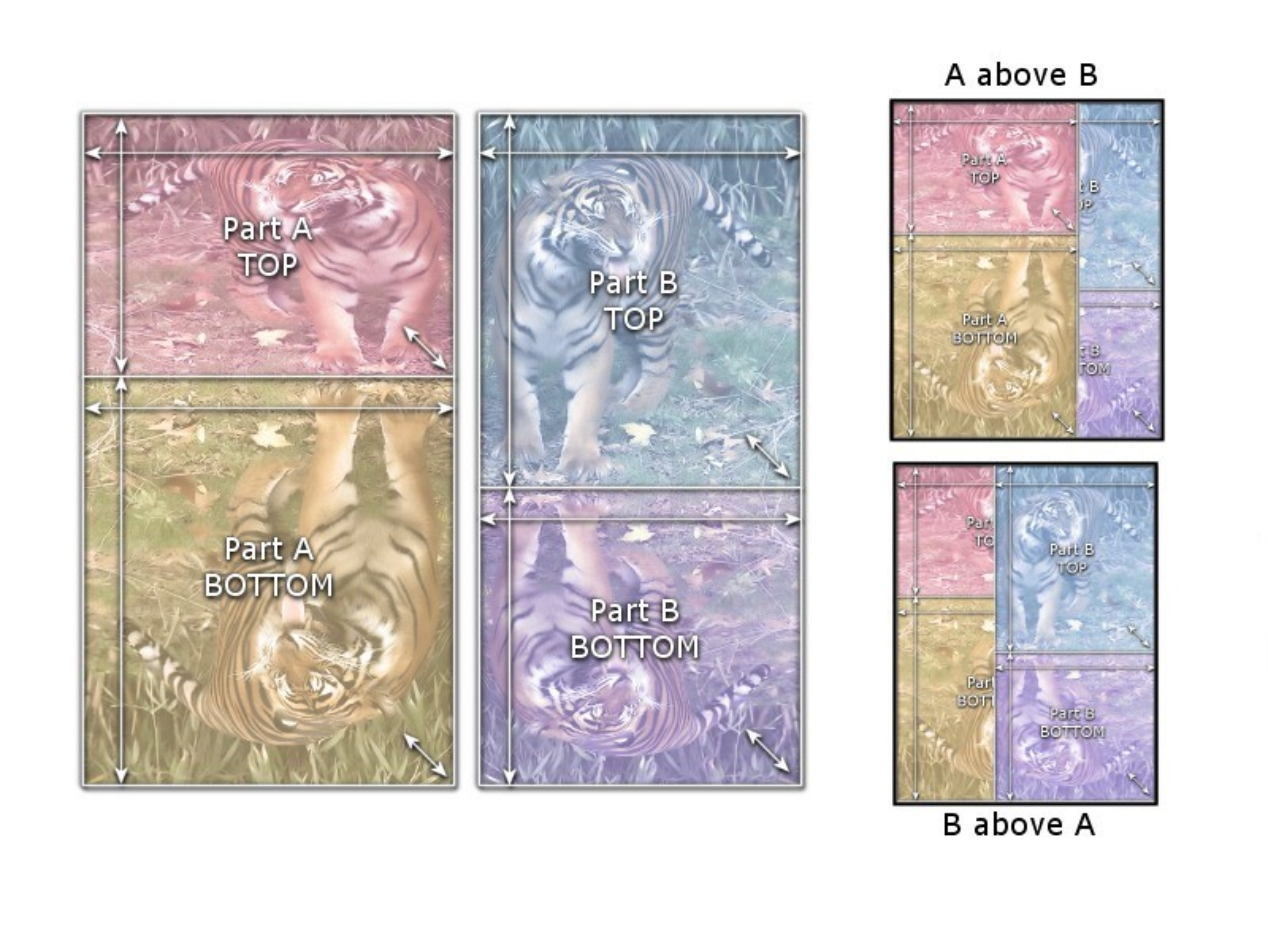
Hardware Video



YUV Layer Specification

- 32-bit per 2 pixels sharing same U and V components with distinct intensity (VYUY);
- 2 rectangles (A and B);
- Priority among A and B can be set;
- Each can be split vertically into 2 parts;
- Each part can be scale and flip in both direction independently;
- Each part has its own start address.

YUV Layer illustration



YUV Layer use



- Background (Solid or scrolling);
- Kaleidoscope;
- Mirror effect;
- Image custom size.

OSD Layer Specification

- The layer has its own 256 colors palette;
- 2, 4 and 8-bit per pixel;
- 8-bit data can be store compressed (RLE);
- Color key and 4-bit alpha can be use;
- Multiple rectangle regions can be defines with their own properties (for each field);
- Each region has its own start address.

OSD Layer illustration



OSD Layer use

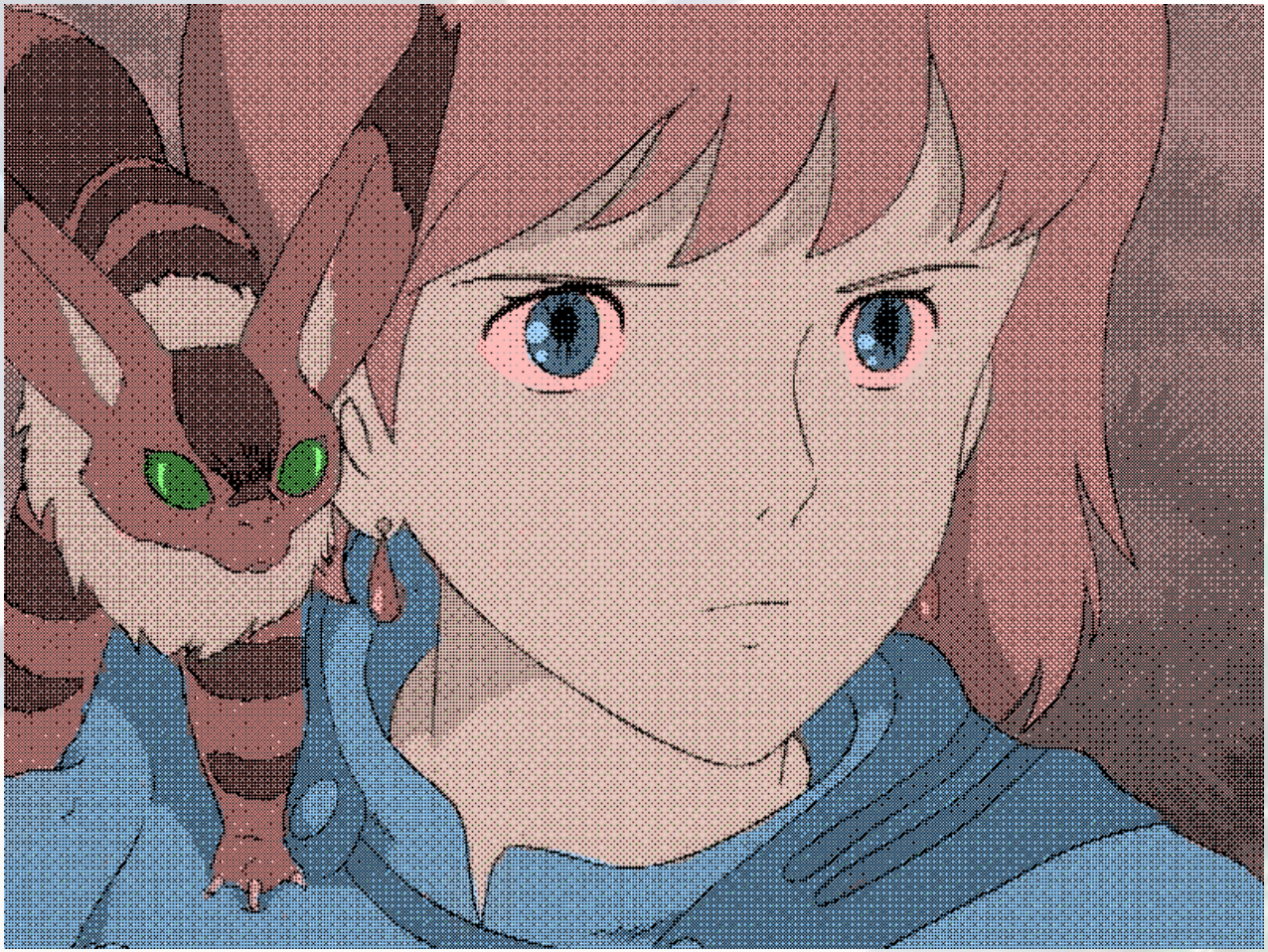


- Palette tricks (e.g. color cycling);
- Sprites;
- 8-bit RLE Video;
- Text fade in/out;
- Image mask.

SPU Layer Specification

- 16 colors palette;
- Compressed data with configurable 4 colors among the 16 and 4-bit alpha;
- 3 operating modes: simple, change and highlight;
- Up to 15 configurable regions per lines in ‘change mode’;
- Single highlight rectangle in ‘highlight mode’;
- Configurable start address.

SPU Layer illustration



SPU Layer use

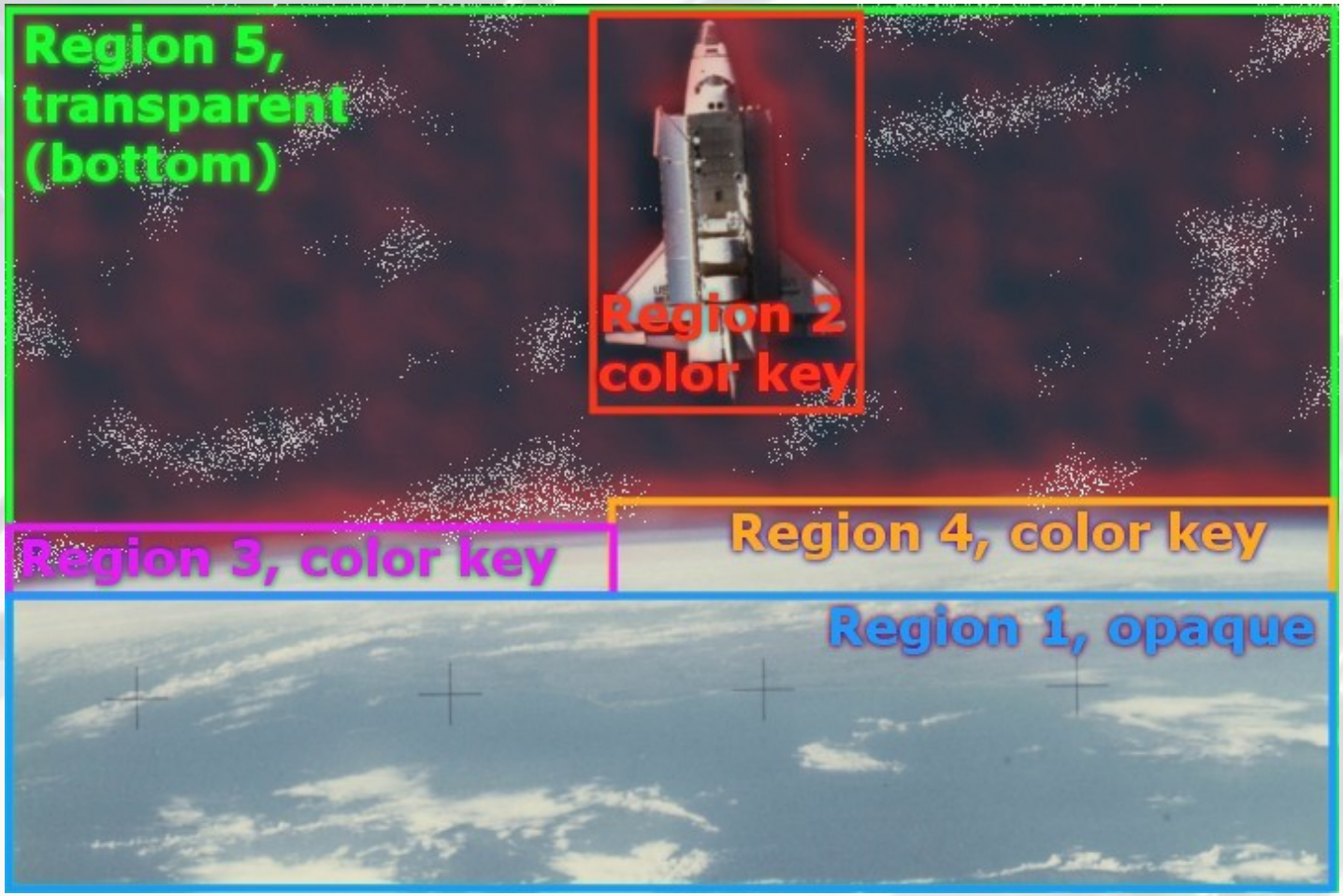


- Raster;
- Solid color transition;
- Menu highlight;
- 4 colors video;
- Light color effect;
- 1 to 3 colors mask.

RGB Layer Specification

- 4, 8, 16 and 24-bit per pixel;
- RGB palette in 4 and 8 bit per pixel;
- 5 regions with alpha and color keying capability base on a single color key value;
- Multiple resolutions supported with predefined values.
- Configurable start address.

RGB Layer illustration



Cursor Layer Specification

- Single sprite of size 32x32 or 64x64 (double in height for interlaced output)
- 2 bit per pixel: 2 colors + Transparent + Invert
- Cropping on the right and bottom part of the screen
- Configurable start address

Hardware Blitter

- Fast and non-blocking CPU call;
- Video Memory to Video Memory operator;
- 16 binary operators;
- 16-bit, 8-bit, 1 bit to 8 bits, 1 bit to 16 bits;
- Transparent color;
- Configurable size for input and output.

Hardware Rotate Blitter

- Fast and non-blocking CPU call;
- Independent of Hardware Blitter;
- 24-bit, 16-bit and 8-bit;
- Rotation of 0, 90, 180 and 270 degrees;
- Configurable size for input and output.

Dual CPU Programming

- Main function on the Arm940T (slave) which process Arm920T (master) notification through a a 32-bit value;
- Cannot use libraries, global variables, initialized static or Arm920T function calls within the Arm940T section;
- 1 Meg for Arm940T code + stack;
- 1 Meg for share data among CPU;
- Wait function on the Arm920T to synchronize on a specific task to be completed.

Windows Platform

- The result may be different on the real hardware;
- Pure software rendering (no optimization)
- Can render on disk (.bmp)
- Pre-Render on GP2X and re-compile with the frame-time for most realistic emulation and movie output.

Additional supports

- HID Devices (mouse, keyboard, joystick);
- Hardware states (SD card, battery level & LED, CPU Speed, TV field);
- Non-interlaced TV Output;
- Direct Access (registers, I/O on CX25874);
- Data type conversions;
- TV Subtitles support;
- Timing functions.

Future Enhancement

- Sound support.

