

The Cultures 2 BMD and FNT File Formats

Games using the Cultures 2 engine (Cultures 2, Northland, 8th Wonder of the World, The Saga) use .bmd files to store 2d models and .fnt files to store fonts.

Below are some pseudocode and variable descriptions to explain the structure of those files.

BmdFile

```
BmdFile {  
    u4 magic;  
    u8 zero_1;  
    u4 num_frames;  
    u4 num_pixels;  
    u4 num_rows;  
    u4 unknown_1;  
    u4 unknown_2;  
    u4 zero_2;  
    section section_1;  
    section section_2;  
    section section_3;  
}
```

Name	Value
magic	F4 03 00 00 (= 1012)
zero_1	4 bytes of zeroes.
num_frames	The number of entries in section 1. (Amount of frames)
num_pixels	The number of entries in section 2. (Amount of pixels)
num_rows	The number of entries in section 3. (Amount of rows)
unknown_1	Is always the same as num_rows, purpose unknown.
unknown_2	Unknown.
zero_2	4 bytes of zeroes.
section_1	Frames.
section_2	Frame pixels.
section_3	Frame rows.

FntFile

.fnt files are used to store fonts and are basically just bmd files with 4 additional bytes at the beginning.

```
FntFile {  
    u4 magic;  
    u4 zero;  
    u4 unknown_1;  
    u4 unknown_2;  
    BmdFile rest;  
}
```

Name	Value
magic	F5 03 00 00 (= 1013)
zero	4 bytes of zeroes.
unknown_1	Unknown.
unknown_2	Unknown.
rest	A standalone bmd file containing the characters of this font.

section

```
section {  
    u4 section_magic;  
    u4 unknown;  
    u4 section_length;  
    section_data[section_length] section_data;  
}
```

Name	Value
section_magic	E9 03 00 00 (= 1001)
unknown	4 bytes of zeroes.
section_length	The length of this section, excluding the initial 12 bytes.
section_data	Varies from section to section. See next block.

section_data

In section 1

```
section_data {
    frame_info[section_length / 24] frame_infos;
}
```

Name	Value
frame_infos	Blocks of 24 bytes giving information about a single frame.

In section 2

```
section_data {
    u1[section_length] = pixel_block[?] {
        u1 head;
        u1[?] colors;
    }
}
```

Name	Value
pixel_block	Each row consists of one or more blocks of pixels (pixels next to each other). Blocs are separated by a number of transparent pixels between them.
head	<ul style="list-style-type: none">• If 0, the end of the row has been reached.• If < 128, it's the length of <i>colors</i>.• If >= 128, skip (X - 128) pixels from current position (in image, not file). The length of <i>colors</i> is 0.
colors	The index of a color in a PCX palette.

In section 3

```
section_data {
    frame_row[section_length / 4] rows;
}
```

Name	Value
rows	Blocks of 4 bytes giving information about one row of a frame

frame_info

```
frame_info {  
    u4 type;  
    u4 meta_1;  
    u4 meta_2;  
    u4 width;  
    u4 len;  
    u4 off;  
}
```

Name	Value
type	The frame type.
meta_1	Unknown except for fonts, where it gives the X-offset.
meta_2	Unknown except for fonts, where it gives the Y-offset.
width	The frame width.
len	The amount of entries to read from section 3.
off	The offset for section 3.

frame_row

```
frame {  
    b10 indent;  
    b22 off;  
}
```

Name	Value
indent	10 bits giving the amount of pixels to skip from the left border of the frame before a row from section 2 is drawn.
off	22 bits giving the position to start reading for section 2.

Known Frame Types

Type	Description
0	No frame.

1	<ul style="list-style-type: none"> • A normal frame: each value in section 2 is an index of the color palette of a PCX image. • A font frame: values from section 2 stand for the transparency with 0 = transparent and 255 = opaque, used on the 255th color from the palette.
2	An unknown frame type found in all the _s.bmd files.
3	Unknown format, almost never used.
4	Like type 1, but every 2nd pixel (starting with 0) serves a color/transparency mask for the following pixel.