microvg

User Manual

Confidentiality & Intellectual Property

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- FT_Face face

- FT_Error error

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- FT_Vector pen

Data structure for pack all the variables required by freetype handler.

1.1.2. Field Documentation

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1.2.1. Data Fields

- jint count

- jfloat x

- jfloat y

- jfloat angle

- jfloat length

- jint colors_offset

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1.2.2. Field Documentation

1.3. MICROVG_PATH_HEADER struct Reference

1.3.1. Data Fields

- uint16_t data_size

- uint16_t data_offset

- uint8_t format

- uint8_t padding1

- uint8_t padding2

- uint8_t padding3

- float bounds_xmin

- float bounds_xmax

- float bounds_ymin

- float bounds_ymax

1.3.2. Field Documentation

1.4. transform_matrix struct Reference

1.4.1. Data Fields

- float m[3][3]

1.4.2. Field Documentation

Chapter 2. File Documentation

2.1. freetype_bitmap_helper.h File Reference

```
#include <stdint.h>
```

```
#include <ft2build.h>
```

```
#include <freetype/internal/ftobjs.h>
```

```
#include <LLVG_FONT_PAINTER_impl.h>
```

```
#include <LLVG_FONT_impl.h>
```

2.1.1. Data Structures

- struct Freetype_context_type

  Data structure for pack all the variables required by freetype handler.

- struct transform_matrix

2.1.2. Macros

- #define METRICS_DIVISOR 6

- #define FT_HELPER_X_MIN 0

- #define FT_HELPER_Y_MIN 0

- #define FREETYPE_OK 0

- #define FREETYPE_INTERNAL_ERROR -1

- #define FREETYPE_NOT_IMPLEMENTED -2

- #define TRANSFORM_MATRIX_POS_X 2

- #define TRANSFORM_MATRIX_POS_Y 5

- #define FT_RED_SHIFT 16

- #define FT_GREEN_SHIFT 8

- #define FT_BLUE_SHIFT 0

- #define max (((X) > (Y)) ? (X) : (Y))

- #define min (((X) < (Y)) ? (X) : (Y))

2.1.3. Typedefs

- typedef struct transform_matrix transform_matrix_t

2.1.4. Functions

- int ft_helper_print_jstring_clipped (MICROUI_GraphicsContext * gc, Freetype_context_type * freetype_context, jchar * string, jint s_size, jint x, jint y, jint color, jint alpha, jfloat size, jint blend, jfloat letterSpacing)

  Prints a string in a buffer respecting the clipping area of the MicroUI Graphics Context.

- static void ft_helper_write_to_framebuffer_clipped (MICROUI_GraphicsContext * gc, Freetype_context_type * freetype_context, jint x, jint y, jint color, jint alpha)

  Writes the current rendered glyph stored inside the Freetype context into the frame-buffer respecting the clipping area of the MicroUI Graphics Context.

- void ft_helper_free (Freetype_context_type * freetype_context)

  Frees all Freetype data context.

Detailed Description

Freetype bitmap helper implementation header for VectorGraphics Low Level API.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/inc/freetype_bitmap_helper.h

2.2. microvg_configuration.h File Reference

2.2.1. Macros

- #define MICROVG_CONFIGURATION_VERSION (1)

  Compatibility sanity check value. This define value is checked in the implementation to validate that the version of this configuration is compatible with the implementation.

- #define VG_FEATURE_GRADIENT_FULL (1)

- #define VG_FEATURE_GRADIENT_FIRST_COLOR (2)

- #define VG_FEATURE_FONT_FREETYPE_VECTOR (1)

- #define VG_FEATURE_FONT_FREETYPE_BITMAP (2)

- #define VG_FEATURE_PATH

- #define VG_FEATURE_GRADIENT VG_FEATURE_GRADIENT_FULL

- #define VG_FEATURE_FONT VG_FEATURE_FONT_FREETYPE_VECTOR

- #define VG_FEATURE_FREETYPE_TTF

- #define VG_FEATURE_FREETYPE_OTF

- #define VG_FEATURE_FREETYPE_COLORED_EMOJI

- #define VG_FEATURE_FONT_COMPLEX_LAYOUT

- #define VG_FEATURE_FONT_EXTERNAL

- #define VG_FEATURE_FREETYPE_HEAP_SIZE (160 * 1024)

- #define VG_FEATURE_FONT_COMPLEX_LAYOUT_HEAP_SIZE (80 * 1024)

Detailed Description

MicroEJ MicroVG library low level API: enable some features according to the hardware capacities.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/inc/microvg_configuration.h

2.3. microvg_font_freetype.h File Reference

```
#include "microvg_configuration.h"
```

```
#include <stdint.h>
```

2.3.1. Functions

- void MICROVG_FONT_FREETYPE_initialize (void)

Detailed Description

MicroEJ MicroVG library low level API: implementation over FreeType.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/inc/microvg_font_freetype.h

2.4. microvg_gradient.h File Reference

```
#include "microvg_configuration.h"
```

```
#include <sni.h>
```

2.4.1. Data Structures

- struct MICROVG_GRADIENT_HEADER

2.4.2. Typedefs

- typedef struct MICROVG_GRADIENT_HEADER MICROVG_GRADIENT_HEADER_t

2.4.3. Functions

- float MICROVG_GRADIENT_get_gradient_scale_size (void)

- uint32_t MICROVG_GRADIENT_get_gradient_header_size (void)

Detailed Description

MicroEJ MicroVG library low level API: implementation of LinearGradient.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/inc/microvg_gradient.h

2.5. microvg_helper.h File Reference

```
#include <stdio.h>
```

```
#include <sni.h>
```

```
#include "mej_log.h"
```

2.5.1. Macros

- #define MEJ_LOG_INFO_MICROVG

- #define MEJ_LOG_ERROR_MICROVG MEJ_LOG(ERROR,MICROVG,fmt, ##__VA_ARGS__)

- #define MICROVG_HELPER_NULL_GRADIENT 0

  Set this define to monitor freetype heap evolution. It needs MEJ_LOG_MICROVG and MEJ_LOG_INFO_LEVEL defines to print the heap logs.

- #define FT_FACE_FLAG_COMPLEX_LAYOUT (((uint32_t)1) << 31)

  Freetype supplementary flag for complex layout Uses a free bit in freetype face flags to convey the complex layout mode information with the freetype face. freetype.h must be checked on freetype update to ensure that this bit is still free.

- #define M_PI 3.1415926535

- #define RAD_TO_DEG ((r) * (180.0f / M_PI))

- #define DEG_TO_RAD (((d) * M_PI) / 180.0f)

- #define JFLOAT_TO_UINT32_t (*(uint32_t*)&(f))

- #define UINT32_t_TO_JFLOAT (*(float*)&(i))

2.5.2. Functions

- void MICROVG_HELPER_initialize (void)

- int MICROVG_HELPER_get_utf (unsigned short * text, int length, int * offset)

  Gets the next UTF character from a text buffer.

- void MICROVG_HELPER_layout_configure (int faceHandle, unsigned short * text, int length)

- bool MICROVG_HELPER_layout_load_glyph (int * glyph_idx, int * x_advance, int * y_advance, int * x_offset, int * y_offset)

- jfloat * MICROVG_HELPER_check_matrix (jfloat * matrix)

- uint32_t MICROVG_HELPER_apply_alpha (uint32_t color, uint32_t alpha)

Detailed Description

MicroEJ MicroVG library low level API: helper to implement library natives methods.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/tar-get~/ccomponentWorking/bsp/vg/inc/microvg_helper.h

2.6. microvg_path.h File Reference

```
#include "microvg_configuration.h"
```

```
#include <sni.h>
```

2.6.1. Data Structures

- struct MICROVG_PATH_HEADER

2.6.2. Typedefs

- typedef struct MICROVG_PATH_HEADER MICROVG_PATH_HEADER_t

2.6.3. Functions

- uint8_t MICROVG_PATH_get_path_encoder_format (void)

- uint32_t MICROVG_PATH_convert_path_command (jint command)

- uint32_t MICROVG_PATH_get_path_header_size (void)

- uint32_t MICROVG_PATH_get_path_command_size (jint command, uint32_t nbParams)

- uint32_t MICROVG_PATH_append_path_command0 (jbyte * path, uint32_t offset, jint cmd)

- uint32_t MICROVG_PATH_append_path_command1 (jbyte * path, uint32_t offset, jint cmd, jfloat x, jfloat y)

- uint32_t MICROVG_PATH_append_path_command2 (jbyte * path, uint32_t offset, jint cmd, jfloat x1, jfloat y1, jfloat x2, jfloat y2)

- uint32_t MICROVG_PATH_append_path_command3 (jbyte * path, uint32_t offset, jint cmd, jfloat x1, jfloat y1, jfloat x2, jfloat y2, jfloat x3, jfloat y3)

- uint32_t MICROVG_PATH_get_command_parameter_number (jint command)

Detailed Description

MicroEJ MicroVG library low level API: implementation of Path.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/inc/microvg_path.h

2.7. freetype_bitmap_helper.c File Reference

```
#include "microvg_configuration.h"
```

Detailed Description

FREETYPE helper implementation.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/freetype_bitmap_helper.c

2.8. LLVG_FONT_freetype.c File Reference

```
#include "microvg_configuration.h"
```

Detailed Description

MicroEJ MicroVG library low level API: implementation over FreeType.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_FONT_freetype.c

2.9. LLVG_FONT_PAINTER_freetype_bitmap.c File Reference

```
#include "microvg_configuration.h"
```

Detailed Description

MicroEJ VectorGraphics library low level API.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_FONT_PAINTER_freetype_bitmap.c

2.10. LLVG_FONT_stub.c File Reference

```
#include "microvg_configuration.h"
```

```
#include <LLVG_FONT_impl.h>
```

```
#include <LLVG_FONT_PAINTER_impl.h>
```

2.10.1. Functions

- jint LLVG_FONT_IMPL_load_font (jchar * font_name, jboolean complex_layout)

- jfloat LLVG_FONT_IMPL_string_width (jchar * text, jint faceHandle, jfloat size, jfloat letterSpacing)

- jfloat LLVG_FONT_IMPL_string_height (jchar * text, jint faceHandle, jfloat size)

- jfloat LLVG_FONT_IMPL_get_baseline_position (jint faceHandle, jfloat size)

- jfloat LLVG_FONT_IMPL_get_height (jint faceHandle, jfloat size)

- void LLVG_FONT_IMPL_dispose (jint faceHandle)

- jint LLVG_FONT_PAINTER_IMPL_draw_string (MICROUI_GraphicsContext * gc, jchar * text, jint faceHandle, jfloat size, jfloat x, jfloat y, jfloat * matrix, jint alpha, jint blend, jfloat letterSpacing)

- jint LLVG_FONT_PAINTER_IMPL_draw_string_gradient (MICROUI_GraphicsContext * gc, jchar * text, jint faceHandle, jfloat size, jfloat x, jfloat y, jfloat * matrix, jint alpha, jint blend, jfloat letterSpacing, jint * gradientData, jfloat * gradientMatrix)

- jint LLVG_FONT_PAINTER_IMPL_draw_string_on_circle (MICROUI_GraphicsContext * gc, jchar * text, jint faceHandle, jfloat size, jint x, jint y, jfloat * matrix, jint alpha, jint blend, jfloat letterSpacing, jfloat radius, jint direction)

- jint LLVG_FONT_PAINTER_IMPL_draw_string_on_circle_gradient (MICROUI_GraphicsContext * gc, jchar * text, jint faceHandle, jfloat size, jint x, jint y, jfloat * matrix, jint alpha, jint blend, jfloat letterSpacing, jfloat radius, jint direction, jint * gradientData, jfloat * gradientMatrix)

- void LLVG_FONT_IMPL_set_complex_layout (bool enabled)

- bool LLVG_FONT_IMPL_has_complex_layouter (void)

Detailed Description

MicroEJ MicroVG library low level API: implementation over FreeType.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_FONT_stub.c

2.11. LLVG_GRADIENT_impl.c File Reference

```
#include "microvg_configuration.h"
```

Detailed Description

MicroVG library low level API: implementation of gradient.

This implementation uses 32-bit "integer" values to store the colors and the colors positions.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_GRADIENT_impl.c

2.12. LLVG_impl.c File Reference

```
#include <LLVG_impl.h>
```

```
#include "microvg_configuration.h"
```

```
#include "microvg_helper.h"
```

```
#include "microvg_font_freetype.h"
```

2.12.1. Functions

- void LLVG_IMPL_initialize (void)

Detailed Description

MicroEJ MicroVG library low level API: basic implementation of matrix APIs.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_impl.c

2.13. LLVG_MATRIX_impl.c File Reference

```
#include <math.h>
```

```
#include <string.h>
```

```
#include <LLVG_MATRIX_impl.h>
```

```
#include "microvg_helper.h"
```

2.13.1. Functions

- void LLVG_MATRIX_IMPL_identity (jfloat * matrix)

- void LLVG_MATRIX_IMPL_copy (jfloat * dest, jfloat * src)

- void LLVG_MATRIX_IMPL_setTranslate (jfloat * matrix, jfloat x, jfloat y)

- void LLVG_MATRIX_IMPL_setScale (jfloat * matrix, jfloat sx, jfloat sy)

- void LLVG_MATRIX_IMPL_setRotate (jfloat * matrix, jfloat degrees)

- void LLVG_MATRIX_IMPL_setConcat (jfloat * dest, jfloat * a, jfloat * b)

- void LLVG_MATRIX_IMPL_translate (jfloat * matrix, jfloat x, jfloat y)

- void LLVG_MATRIX_IMPL_scale (jfloat * matrix, jfloat scaleX, jfloat scaleY)

- void LLVG_MATRIX_IMPL_rotate (jfloat * matrix, jfloat angleDegrees)

- void LLVG_MATRIX_IMPL_concatenate (jfloat * matrix, jfloat * other)

- void LLVG_MATRIX_IMPL_postTranslate (jfloat * matrix, jfloat dx, jfloat dy)

- void LLVG_MATRIX_IMPL_postScale (jfloat * matrix, jfloat sx, jfloat sy)

- void LLVG_MATRIX_IMPL_postRotate (jfloat * matrix, jfloat degrees)

- void LLVG_MATRIX_IMPL_postConcat (jfloat * matrix, jfloat * other)

Detailed Description

MicroEJ MicroVG library low level API: basic implementation of matrix APIs.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_MATRIX_impl.c

2.14. LLVG_PATH_impl.c File Reference

```
#include "microvg_configuration.h"
```

Detailed Description

MicroVG library low level API: implementation of path.

This implementation uses a 32-bit "integer" value to store a path command and a 32-bit "float" value to store each command parameter.

The encoding can be overrided, see "[optional]: weak functions" in "microvg_path.h"

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_PATH_impl.c

2.15. LLVG_PATH_stub.c File Reference

```
#include "microvg_configuration.h"
```

```
#include <LLVG_PATH_impl.h>
```

```
#include <LLVG_PATH_PAINTER_impl.h>
```

2.15.1. Functions

- jint LLVG_PATH_IMPL_initializePath (jbyte * jpath, jint length)

- jint LLVG_PATH_IMPL_appendPathCommand1 (jbyte * jpath, jint length, jint cmd, jfloat x, jfloat y)

- jint LLVG_PATH_IMPL_appendPathCommand2 (jbyte * jpath, jint length, jint cmd, jfloat x1, jfloat y1, jfloat x2, jfloat y2)

- jint LLVG_PATH_IMPL_appendPathCommand3 (jbyte * jpath, jint length, jint cmd, jfloat x1, jfloat y1, jfloat x2, jfloat y2, jfloat x3, jfloat y3)

- void LLVG_PATH_IMPL_reopenPath (jbyte * jpath)

- jint LLVG_PATH_PAINTER_IMPL_drawPath (MICROUI_GraphicsContext * gc, jbyte * pathData, jint x, jint y, jfloat * matrix, jint fillRule, jint blend, jint color)

- jint LLVG_PATH_PAINTER_IMPL_drawGradient (MICROUI_GraphicsContext * gc, jbyte * path-Data, jint x, jint y, jfloat * matrix, jint fillRule, jint blend, jint * gradientData, jfloat * gradientMatrix, jint alpha)

Detailed Description

MicroVG library low level API: implementation of path.

This implementation uses a 32-bit "integer" value to store a path command and a 32-bit "float" value to store each command parameter.

The encoding can be overrided, see "[optional]: weak functions" in "microvg_path.h"

Author: . MicroEJ Developer Team

Version: . 2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/target~/ccomponentWorking/bsp/vg/src/LLVG_PATH_stub.c

2.16. microvg_helper.c File Reference

```
#include <LLVG_MATRIX_impl.h>
```

```
#include <freetype/internal/ftobjs.h>
```

```
#include "microvg_helper.h"
```

```
#include "microvg_configuration.h"
```

2.16.1. Macros

- #define MIN_HIGH_SURROGATE ((unsigned short)0xD800)

- #define MAX_HIGH_SURROGATE ((unsigned short)0xDBFF)

- #define MIN_LOW_SURROGATE ((unsigned short)0xDC00)

- #define MAX_LOW_SURROGATE ((unsigned short)0xDFFF)

- #define MIN_SUPPLEMENTARY_CODE_POINT 0x010000

- #define GET_NEXT_CHARACTER ((o) >= (l) ? (unsigned short)0 : (t)[o])

- #define IS_SIMPLE_LAYOUT true

2.16.2. Variables

- static jfloat g_identity_matrix

- static FT_Face face

- static unsigned short * current_text

- static unsigned int current_length

- static int current_offset

- static FT_UInt previous_glyph_index

2.16.3. Functions

- void MICROVG_HELPER_initialize (void)

- int MICROVG_HELPER_get_utf (unsigned short * text, int length, int * offset)

  Gets the next UTF character from a text buffer.

- void MICROVG_HELPER_layout_configure (int faceHandle, unsigned short * text, int length)

- bool MICROVG_HELPER_layout_load_glyph (int * glyph_idx, int * x_advance, int * y_advance, int * x_offset, int * y_offset)

- jfloat * MICROVG_HELPER_check_matrix (jfloat * matrix)

- uint32_t MICROVG_HELPER_apply_alpha (uint32_t color, uint32_t alpha)

Detailed Description

MicroEJ MicroVG library low level API: helper to implement library natives methods.

Author: .   MicroEJ Developer Team

Version: .   2.0.0

Definition in file C:/Jenkins/workspace/master074c8e04/com.microej.clibrary.llimpl.microvg/tar-get~/ccomponentWorking/bsp/vg/src/microvg_helper.c