

A simple and easy-to-use library to enjoy videogames programming

[raylib Discord server][github.com/raysan5/raylib]

raylib

v3.0 quick reference card [download as PDF]

module: core

```
// Window-related functions
void InitWindow(int width, int height, const char *title);
bool WindowShouldClose(void);
void CloseWindow(void);
bool IsWindowReady(void);
bool IsWindowMinimized(void);
bool IsWindowResized(void);
bool IsWindowHidden(void);
bool IsWindowFullscreen(void);
void ToggleFullscreen(void);
void UnhideWindow(void);
void HideWindow(void);
void SetWindowIcon(Image image);
void SetWindowTitle(const char *title);
void SetWindowPosition(int x, int y);
void SetWindowMonitor(int monitor);
void SetWindowMinSize(int width, int height);
void SetWindowSize(int width, int height);
void *GetWindowHandle(void);
int GetScreenWidth(void);
int GetScreenHeight(void);
int GetMonitorCount(void);
int GetMonitorWidth(int monitor);
int GetMonitorHeight(int monitor);
int GetMonitorPhysicalWidth(int monitor);
int GetMonitorPhysicalHeight(int monitor);
Vector2 GetWindowPosition(void);
const char *GetMonitorName(int monitor);
const char *GetClipboardText(void);
void SetClipboardText(const char *text);

// Cursor-related functions
void ShowCursor(void);
void HideCursor(void);
bool IsCursorHidden(void);
void EnableCursor(void);
void DisableCursor(void);

// Drawing-related functions
void ClearBackground(Color color);
void BeginDrawing(void);
void EndDrawing(void);
void BeginMode2D(Camera2D camera);
void EndMode2D(void);
void BeginMode3D(Camera3D camera);
void EndMode3D(void);
void BeginTextureMode(RenderTexture2D target);
void EndTextureMode(void);
void BeginScissorMode(int x, int y, int width, int height);
void EndScissorMode(void);

// Screen-space-related functions
Ray GetMouseRay(Vector2 mousePosition, Camera camera);
Matrix GetCameraMatrix(Camera camera);
Matrix GetCameraMatrix2D(Camera2D camera);
Vector2 GetWorldToScreen(Vector3 position, Camera camera);
Vector2 GetWorldToScreenEx(Vector3 position, Camera camera, int width, int height); // Returns size position for a 3d world space position
Vector2 GetWorldToScreen2D(Vector2 position, Camera2D camera);
Vector2 GetScreenToWorld2D(Vector2 position, Camera2D camera);

// Timing-related functions
void SetTargetFPS(int fps);
int GetFPS(void);
float GetFrameTime(void);
double GetTime(void);

// Color-related functions
int ColorToInt(Color color);
Vector4 ColorNormalize(Color color);
Color ColorFromNormalized(Vector4 normalized);
Vector3 ColorToHSV(Color color);
Color ColorFromHSV(Vector3 hsv);
Color GetColor(int hexValue);
Color Fade(Color color, float alpha);

// Misc. functions
void SetConfigFlags(unsigned int flags);
void SetTraceLogLevel(int logType);
void SetTraceLogExit(int logType);
void SetTraceLogCallback(TraceLogCallback callback);
void TraceLog(int logType, const char *text, ...);
void TakeScreenshot(const char *fileName);
int GetRandomValue(int min, int max);

// Files management functions
unsigned char *LoadFileData(const char *fileName, int *bytesRead);
void SaveFileData(const char *fileName, void *data, int bytesToWrite);
char *LoadFileText(const char *fileName);
void SaveFileText(const char *fileName, char *text);
bool FileExists(const char *fileName);
bool IsFileExtension(const char *fileName, const char *ext);
bool DirectoryExists(const char *dirPath);
const char *GetExtension(const char *fileName);
const char *GetFileName(const char *filePath);
const char *GetFileNameWithoutExt(const char *filePath);
const char *GetDirectoryPath(const char *filePath);
const char *GetPrevDirectoryPath(const char *dirPath);
const char *GetWorkingDirectory(void);
char **GetDirectoryFiles(const char *dirPath, int *count);
void ClearDirectoryFiles(void);
bool ChangeDirectory(const char *dir);
bool IsFileDropped(void);
char **GetDroppedFiles(int *count);
void ClearDroppedFiles(void);
long GetFileModTime(const char *fileName);

unsigned char *CompressData(unsigned char *data, int dataLength, int *compDataLength); // Compress data (DEFLATE algorithm)
unsigned char *DecompressData(unsigned char *compData, int compDataLength, int *dataLength); // Decompress data (DEFLATE algorithm)

// Persistent storage management
int LoadStorageValue(int position);
void SaveStorageValue(int position, int value);

void OpenURL(const char *url);

//-----
// Input Handling Functions
//-----

// Input-related functions: keyb
bool IsKeyPressed(int key); // Detect if a key has been pressed once
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bool IsKeyDown(int key); // Detect if a key is being pressed
bool IsKeyReleased(int key); // Detect if a key has been released once
bool IsKeyUp(int key); // Detect if a key is NOT being pressed
int GetKeyPressed(void); // Get latest key pressed
void SetExitKey(int key); // Set a custom key to exit program (default is ESC)

// Input-related functions: gamepads
bool IsGamepadAvailable(int gamepad); // Detect if a gamepad is available
bool IsGamepadName(int gamepad, const char *name); // Check gamepad name (if available)
const char *GetGamepadName(int gamepad); // Return gamepad internal name id
bool IsGamepadButtonPressed(int gamepad, int button); // Detect if a gamepad button has been pressed once
bool IsGamepadButtonDown(int gamepad, int button); // Detect if a gamepad button is being pressed
bool IsGamepadButtonReleased(int gamepad, int button); // Detect if a gamepad button has been released once
bool IsGamepadButtonUp(int gamepad, int button); // Detect if a gamepad button is NOT being pressed
int GetGamepadButtonPressed(void); // Get the last gamepad button pressed
int GetGamepadAxisCount(int gamepad); // Return gamepad axis count for a gamepad
float GetGamepadAxisMovement(int gamepad, int axis); // Return axis movement value for a gamepad axis

// Input-related functions: mouse
bool IsMouseButtonPressed(int button); // Detect if a mouse button has been pressed once
bool IsMouseButtonDown(int button); // Detect if a mouse button is being pressed
bool IsMouseButtonReleased(int button); // Detect if a mouse button has been released once
bool IsMouseButtonUp(int button); // Detect if a mouse button is NOT being pressed
int GetMouseX(void); // Returns mouse position X
int GetMouseY(void); // Returns mouse position Y
Vector2 GetMousePosition(void); // Returns mouse position XY
void SetMousePosition(int x, int y); // Set mouse position XY
void SetMouseOffset(int offsetX, int offsetY); // Set mouse offset
void SetMouseScale(float scaleX, float scaleY); // Set mouse scaling
int GetMouseWheelMove(void); // Returns mouse wheel movement Y

// Input-related functions: touch
int GetTouchX(void); // Returns touch position X for touch point 0 (relative to screen size)
int GetTouchY(void); // Returns touch position Y for touch point 0 (relative to screen size)
Vector2 GetTouchPosition(int index); // Returns touch position XY for a touch point index (relative to screen size)

//-----
// Gestures and Touch Handling Functions (Module: gestures)
//-----
void SetGesturesEnabled(unsigned int gestureFlags); // Enable a set of gestures using flags
bool IsGestureDetected(int gesture); // Check if a gesture have been detected
int GetGestureDetected(void); // Get latest detected gesture
int GetTouchPointsCount(void); // Get touch points count
float GetGestureHoldDuration(void); // Get gesture hold time in milliseconds
Vector2 GetGestureDragVector(void); // Get gesture drag vector
float GetGestureDragAngle(void); // Get gesture drag angle
Vector2 GetGesturePinchVector(void); // Get gesture pinch delta
float GetGesturePinchAngle(void); // Get gesture pinch angle

//-----
// Camera System Functions (Module: camera)
//-----
void SetCameraMode(Camera camera, int mode); // Set camera mode (multiple camera modes available)
void UpdateCamera(Camera *camera); // Update camera position for selected mode

void SetCameraPanControl(int panKey); // Set camera pan key to combine with mouse movement (free camera)
void SetCameraAltControl(int altKey); // Set camera alt key to combine with mouse movement (free camera)
void SetCameraSmoothZoomControl(int szKey); // Set camera smooth zoom key to combine with mouse (free camera)
void SetCameraMoveControls(int frontKey, int backKey, // Set camera move controls (1st person and 3rd person cameras)
                           int rightKey, int leftKey,
                           int upKey, int downKey);
```

module: shapes

```
// Basic shapes drawing functions
void DrawPixel(int posX, int posY, Color color); // Draw a pixel
void DrawPixelV(Vector2 position, Color color); // Draw a pixel (Vector version)
void DrawLine(int startPosX, int startPosY, int endPosX, int endPosY, Color color); // Draw a line
void DrawLineV(Vector2 startPos, Vector2 endPos, Color color); // Draw a line (Vector version)
void DrawLineEx(Vector2 startPos, Vector2 endPos, float thick, Color color); // Draw a line defining thickness
void DrawLineBezier(Vector2 startPos, Vector2 endPos, float thick, Color color); // Draw a line using cubic-bezier curves in-out
void DrawLineStrip(Vector2 *points, int numPoints, Color color); // Draw lines sequence
void DrawCircle(int centerX, int centerY, float radius, Color color); // Draw a color-filled circle
void DrawCircleSector(Vector2 center, float radius, int startAngle, int endAngle, int segments, Color color); // Draw a piece of a circle
void DrawCircleSectorLines(Vector2 center, float radius, int startAngle, int endAngle, int segments, Color color); // Draw circle sector outline
void DrawCircleGradient(int centerX, int centerY, float radius, Color color1, Color color2); // Draw a gradient-filled circle
void DrawCircleV(Vector2 center, float radius, Color color); // Draw a color-filled circle (Vector version)
void DrawCircleLines(int centerX, int centerY, float radius, Color color); // Draw circle outline
void DrawEllipse(int centerX, int centerY, float radiusH, float radiusV, Color color); // Draw ellipse
void DrawEllipseLines(int centerX, int centerY, float radiusH, float radiusV, Color color); // Draw ellipse outline
void DrawRing(Vector2 center, float innerRadius, float outerRadius, int startAngle, int endAngle, int segments, Color color); // Draw ring
void DrawRingLines(Vector2 center, float innerRadius, float outerRadius, int startAngle, int endAngle, int segments, Color color); // Draw ring outline
void DrawRectangle(int posX, int posY, int width, int height, Color color); // Draw a color-filled rectangle
void DrawRectangleV(Vector2 position, Vector2 size, Color color); // Draw a color-filled rectangle (Vector version)
void DrawRectangleRec(Rectangle rec, Color color); // Draw a color-filled rectangle
void DrawRectanglePro(Rectangle rec, Vector2 origin, float rotation, Color color); // Draw a color-filled rectangle with pro parameters
void DrawRectangleGradientV(int posX, int posY, int width, int height, Color color1, Color color2); // Draw a vertical-gradient-filled rectangle
void DrawRectangleGradientH(int posX, int posY, int width, int height, Color color1, Color color2); // Draw a horizontal-gradient-filled rectangle
void DrawRectangleGradientEx(Rectangle rec, Color col1, Color col2, Color col3, Color col4); // Draw a gradient-filled rectangle with custom vertex colors
void DrawRectangleLines(int posX, int posY, int width, int height, Color color); // Draw rectangle outline
void DrawRectangleLinesEx(Rectangle rec, int lineThick, Color color); // Draw rectangle outline with extended parameters
void DrawRectangleRounded(Rectangle rec, float roundness, int segments, Color color); // Draw rectangle with rounded edges
void DrawRectangleRoundedLines(Rectangle rec, float roundness, int segments, int lineThick, Color color); // Draw rectangle with rounded edges outline
void DrawTriangle(Vector2 v1, Vector2 v2, Vector2 v3, Color color); // Draw a color-filled triangle (vertex in counter-clockwise order!)
void DrawTriangleLines(Vector2 v1, Vector2 v2, Vector2 v3, Color color); // Draw triangle outline (vertex in counter-clockwise order!)
void DrawTriangleFan(Vector2 *points, int numPoints, Color color); // Draw a triangle fan defined by points (first vertex is the center)
void DrawTriangleStrip(Vector2 *points, int pointsCount, Color color); // Draw a triangle strip defined by points
void DrawPoly(Vector2 center, int sides, float radius, float rotation, Color color); // Draw a regular polygon (Vector version)
void DrawPolyLines(Vector2 center, int sides, float radius, float rotation, Color color); // Draw a polygon outline of n sides

// Basic shapes collision detection functions
bool CheckCollisionRecs(Rectangle rec1, Rectangle rec2); // Check collision between two rectangles
bool CheckCollisionCircles(Vector2 center1, float radius1, Vector2 center2, float radius2); // Check collision between two circles
bool CheckCollisionCircleRec(Vector2 center, float radius, Rectangle rec); // Check collision between circle and rectangle
Rectangle GetCollisionRec(Rectangle rec1, Rectangle rec2); // Get collision rectangle for two rectangles collision
bool CheckCollisionPointRec(Vector2 point, Rectangle rec); // Check if point is inside rectangle
bool CheckCollisionPointCircle(Vector2 point, Vector2 center, float radius); // Check if point is inside circle
bool CheckCollisionPointTriangle(Vector2 point, Vector2 p1, Vector2 p2, Vector2 p3); // Check if point is inside a triangle
```

module: textures

```
// Image loading functions
// NOTE: This functions do not require GPU access
Image LoadImage(const char *fileName); // Load image from file into CPU memory (RAM)
Image LoadImageEx(Color *pixels, int width, int height); // Load image from Color array data (RGBA - 32bit)
Image LoadImagePro(void *data, int width, int height, int format); // Load image from raw data with parameters
Image LoadImageRaw(const char *fileName, int width, int height, int format, int headerSize); // Load image from RAW file data
void UnloadImage(Image image); // Unload image from CPU memory (RAM)
void ExportImage(Image image, const char *fileName); // Export image data to file
void ExportImageAsCode(Image image, const char *fileName); // Export image as code file defining an array of bytes
Color *GetImageData(Image image); // Get pixel data from image as a Color struct array
Vector4 *GetImageDataNormalized(Image image); // Get pixel data from image as Vector4 array (float normalized)
Rectangle GetImageAlphaBorder(Image image, float threshold); // Get image alpha border rectangle
int GetPixelDataSize(int width, int height, int format); // Get pixel data size in bytes (image or texture)

// Image generation functions
Image GenImageColor(int width, int height, Color color); // Generate image: plain color
Image GenImageGradientV(int width, int height, Color top, Color bottom); // Generate image: vertical gradient
Image GenImageGradientH(int width, int height, Color left, Color right); // Generate image: horizontal gradient
```



```
Image GenImageGradientRadial(int width, int height, float density, Color inner, Color outer); // Generate image: radial gradient
Image GenImageChecked(int width, int height, int checksX, int checksY, Color coll, Color col2); // Generate image: checked
Image GenImageWhiteNoise(int width, int height, float factor); // Generate image: white noise
Image GenImagePerlinNoise(int width, int height, int offsetX, int offsetY, float scale); // Generate image: perlin noise
Image GenImageCellular(int width, int height, int tileSize); // Generate image: cellular algorithm. Bigger tileSize means bigger cells

// Image manipulation functions
Image ImageCopy(Image image);
Image ImageFromImage(Image image, Rectangle rec);
Image ImageText(const char *text, int fontSize, Color color);
Image ImageTextEx(Font font, const char *text, float fontSize, float spacing, Color tint);
void ImageToPOT(Image *image, Color fillColor);
void ImageFormat(Image *image, int newFormat);
void ImageAlphaMask(Image *image, Image alphaMask);
void ImageAlphaClear(Image *image, Color color, float threshold);
void ImageAlphaCrop(Image *image, float threshold);
void ImageAlphaPremultiply(Image *image);
void ImageCrop(Image *image, Rectangle crop);
void ImageResize(Image *image, int newWidth, int newHeight);
void ImageResizeNN(Image *image, int newWidth, int newHeight);
void ImageResizeCanvas(Image *image, int newWidth, int newHeight, int offsetX, int offsetY, Color color); // Resize canvas and fill with color
void ImageMipmaps(Image *image); // Generate all mipmap levels for a provided image
void ImageDither(Image *image, int rBpp, int gBpp, int bBpp, int aBpp); // Dither image data to 16bpp or lower (Floyd-Steinberg dithering)
void ImageFlipVertical(Image *image); // Flip image vertically
void ImageFlipHorizontal(Image *image); // Flip image horizontally
void ImageRotateCW(Image *image); // Rotate image clockwise 90deg
void ImageRotateCCW(Image *image); // Rotate image counter-clockwise 90deg
void ImageColorTint(Image *image, Color color); // Modify image color: tint
void ImageColorInvert(Image *image); // Modify image color: invert
void ImageColorGrayscale(Image *image); // Modify image color: grayscale
void ImageColorContrast(Image *image, float contrast); // Modify image color: contrast (-100 to 100)
void ImageColorBrightness(Image *image, int brightness); // Modify image color: brightness (-255 to 255)
void ImageColorReplace(Image *image, Color color, Color replace); // Modify image color: replace color
Color *ImageExtractPalette(Image image, int maxPaletteSize, int *extractCount); // Extract color palette from image to maximum size (memory should be freed)

// Image drawing functions
// NOTE: Image software-rendering functions (CPU)
void ImageClearBackground(Image *dst, Color color); // Clear image background with given color
void ImageDrawPixel(Image *dst, int posX, int posY, Color color); // Draw pixel within an image
void ImageDrawPixelV(Image *dst, Vector2 position, Color color); // Draw pixel within an image (Vector version)
void ImageDrawLine(Image *dst, int startPosX, int startPosY, int endPosX, int endPosY, Color color); // Draw line within an image
void ImageDrawLineV(Image *dst, Vector2 start, Vector2 end, Color color); // Draw line within an image (Vector version)
void ImageDrawCircle(Image *dst, int centerX, int centerY, int radius, Color color); // Draw circle within an image
void ImageDrawCircleV(Image *dst, Vector2 center, int radius, Color color); // Draw circle within an image (Vector version)
void ImageDrawRectangle(Image *dst, int posX, int posY, int width, int height, Color color); // Draw rectangle within an image
void ImageDrawRectangleV(Image *dst, Vector2 position, Vector2 size, Color color); // Draw rectangle within an image (Vector version)
void ImageDrawRectangleRec(Image *dst, Rectangle rec, Color color); // Draw rectangle within an image
void ImageDrawRectangleLines(Image *dst, Rectangle rec, int thick, Color color); // Draw rectangle lines within an image
void ImageDraw(Image *dst, Image src, Rectangle srcRec, Rectangle dstRec, Color tint); // Draw a source image within a destination image (tint applied to source)
void ImageDrawText(Image *dst, Vector2 position, const char *text, int fontSize, Color color); // Draw text (default font) within an image (destination)
void ImageDrawTextEx(Image *dst, Vector2 position, Font font, const char *text, float fontSize, float spacing, Color color); // Draw text (custom sprite font) within an image

// Texture loading functions
// NOTE: These functions require GPU access
Texture2D LoadTexture(const char *fileName); // Load texture from file into GPU memory (VRAM)
Texture2D LoadTextureFromImage(Image image); // Load texture from image data
TextureCubemap LoadTextureCubemap(Image image, int layoutType); // Load cubemap from image, multiple image cubemap layouts supported
RenderTexture2D LoadRenderTexture(int width, int height); // Load texture for rendering (framebuffer)
void UnloadTexture(Texture2D texture); // Unload texture from GPU memory (VRAM)
void UnloadRenderTexture(RenderTexture2D target); // Unload render texture from GPU memory (VRAM)
void UpdateTexture(Texture2D texture, const void *pixels); // Update GPU texture with new data
Image GetTextureData(Texture2D texture); // Get pixel data from GPU texture and return an Image
Image GetScreenData(void); // Get pixel data from screen buffer and return an Image (screenshot)

// Texture configuration functions
void GenTextureMipmaps(Texture2D *texture); // Generate GPU mipmaps for a texture
void SetTextureFilter(Texture2D texture, int filterMode); // Set texture scaling filter mode
void SetTextureWrap(Texture2D texture, int wrapMode); // Set texture wrapping mode

// Texture drawing functions
void DrawTexture(Texture2D texture, int posX, int posY, Color tint); // Draw a Texture2D
void DrawTextureV(Texture2D texture, Vector2 position, Color tint); // Draw a Texture2D with position defined as Vector2
void DrawTextureEx(Texture2D texture, Vector2 position, float rotation, float scale, Color tint); // Draw a Texture2D with extended parameters
void DrawTextureRec(Texture2D texture, Rectangle sourceRec, Vector2 position, Color tint); // Draw a part of a texture defined by a rectangle
void DrawTextureQuad(Texture2D texture, Vector2 tiling, Vector2 offset, Rectangle quad, Color tint); // Draw texture quad with tiling and offset parameters
void DrawTexturePro(Texture2D texture, Rectangle sourceRec, Rectangle destRec, Vector2 origin, float rotation, Color tint); // Draw a part of a texture defined by a rectangle
void DrawTextureNPatch(Texture2D texture, NPatchInfo nPatchInfo, Rectangle destRec, Vector2 origin, float rotation, Color tint); // Draws a texture (or part of it) that stretches and rotates correctly
```

module: text

```
// Font loading/unloading functions
Font GetFontDefault(void); // Get the default Font
Font LoadFont(const char *fileName); // Load font from file into GPU memory (VRAM)
Font LoadFontEx(const char *fileName, int fontSize, int *fontChars, int charsCount); // Load font from file with extended parameters
Font LoadFontFromImage(Image image, Color key, int firstChar); // Load font from Image (XNA style)
CharInfo *LoadFontData(const char *fileName, int fontSize, int *fontChars, int charsCount, int type); // Load font data for further use
Image GenImageFontAtlas(const CharInfo *chars, Rectangle **recs, int charsCount, int fontSize, int padding, int packMethod); // Generate image font atlas using chars info
void UnloadFont(Font font); // Unload Font from GPU memory (VRAM)

// Text drawing functions
void DrawFPS(int posX, int posY); // Shows current FPS
void DrawText(const char *text, int posX, int posY, int fontSize, Color color); // Draw text (using default font)
void DrawTextEx(Font font, const char *text, Vector2 position, float fontSize, float spacing, Color tint); // Draw text using font and additional parameters
void DrawTextRec(Font font, const char *text, Rectangle rec, float fontSize, float spacing, bool wordWrap, Color tint); // Draw text using font inside rectangle limits
void DrawTextRecEx(Font font, const char *text, Rectangle rec, float fontSize, float spacing, bool wordWrap, Color tint, int selectStart, int selectLength, Color selectTint, Color selectBackTint); // Draw text using font inside rectangle limits with support for text selection
void DrawTextCodepoint(Font font, int codepoint, Vector2 position, float scale, Color tint); // Draw one character (codepoint)

// Text misc. functions
int MeasureText(const char *text, int fontSize); // Measure string width for default font
Vector2 MeasureTextEx(Font font, const char *text, float fontSize, float spacing); // Measure string size for Font
int GetGlyphIndex(Font font, int codepoint); // Get index position for a unicode character on font

// Text strings management functions (no utf8 strings, only byte chars)
// NOTE: Some strings allocate memory internally for returned strings, just be careful!
int TextCopy(char *dst, const char *src); // Copy one string to another, returns bytes copied
bool TextIsEqual(const char *text1, const char *text2); // Check if two text string are equal
unsigned int TextLength(const char *text); // Get text length, checks for '\0' ending
const char *TextFormat(const char *text, ...); // Text formatting with variables (sprintf style)
const char *TextSubtext(const char *text, int position, int length); // Get a piece of a text string
char *TextReplace(char *text, const char *replace, const char *by); // Replace text string (memory must be freed!)
char *TextInsert(const char *text, const char *insert, int position); // Insert text in a position (memory must be freed!)
const char *TextJoin(const char **textList, int count, const char *delimiter); // Join text strings with delimiter
const char **TextSplit(const char *text, char delimiter, int *count); // Split text into multiple strings
void TextAppend(char *text, const char *append, int *position); // Append text at specific position and move cursor!
int TextFindIndex(const char *text, const char *find); // Find first text occurrence within a string
const char *TextToUpper(const char *text); // Get upper case version of provided string
const char *TextToLower(const char *text); // Get lower case version of provided string
const char *TextToPascal(const char *text); // Get Pascal case notation version of provided string
int TextToInteger(const char *text); // Get integer value from text (negative values not supported)
char *TextToUtf8(int *codepoints, int length); // Encode text codepoint into utf8 text (memory must be freed!)

// UTF8 text strings management functions
int *GetCodepoints(const char *text, int *count); // Get all codepoints in a string, codepoints count returned by parameters
int GetCodepointsCount(const char *text); // Get total number of characters (codepoints) in a UTF8 encoded string
int GetNextCodepoint(const char *text, int *bytesProcessed); // Returns next codepoint in a UTF8 encoded string; 0x3f('?') is returned on error
const char *CodepointToUtf8(int codepoint, int *byteLength); // Encode codepoint into utf8 text (char array length returned as parameter)
```

module: models

```
// Basic geometric 3D shapes drawing functions
void DrawLine3D(Vector3 startPos, Vector3 endPos, Color color); // Draw a line in 3D world space
void DrawPoint3D(Vector3 position, Color color); // Draw a point in 3D space, actually a small line
void DrawCircle3D(Vector3 center, float radius, Vector3 rotationAxis, float rotationAngle, Color color); // Draw a circle in 3D world space
void DrawCube(Vector3 position, float width, float height, float length, Color color); // Draw cube
void DrawCubeV(Vector3 position, Vector3 size, Color color); // Draw cube (Vector version)
void DrawCubeWires(Vector3 position, float width, float height, float length, Color color); // Draw cube wires
void DrawCubeWiresV(Vector3 position, Vector3 size, Color color); // Draw cube wires (Vector version)
void DrawCubeTexture(Texture2D texture, Vector3 position, float width, float height, float length, Color color); // Draw cube textured
void DrawSphere(Vector3 centerPos, float radius, Color color); // Draw sphere
void DrawSphereEx(Vector3 centerPos, float radius, int rings, int slices, Color color); // Draw sphere with extended parameters
void DrawSphereWires(Vector3 centerPos, float radius, int rings, int slices, Color color); // Draw sphere wires
void DrawCylinder(Vector3 position, float radiusTop, float radiusBottom, float height, int slices, Color color); // Draw a cylinder/cone
void DrawCylinderWires(Vector3 position, float radiusTop, float radiusBottom, float height, int slices, Color color); // Draw a cylinder/cone wires
void DrawPlane(Vector3 centerPos, Vector2 size, Color color); // Draw a plane XZ
void DrawRay(Ray ray, Color color); // Draw a ray line
void DrawGrid(int slices, float spacing); // Draw a grid (centered at (0, 0, 0))
void DrawGizmo(Vector3 position); // Draw simple gizmo

// Model loading/unloading functions
Model LoadModel(const char *fileName); // Load model from files (meshes and materials)
Model LoadModelFromMesh(Mesh mesh); // Load model from generated mesh (default material)
void UnloadModel(Model model); // Unload model from memory (RAM and/or VRAM)

// Mesh loading/unloading functions
Mesh *LoadMeshes(const char *fileName, int *meshCount); // Load meshes from model file
void ExportMesh(Mesh mesh, const char *fileName); // Export mesh data to file
void UnloadMesh(Mesh mesh); // Unload mesh from memory (RAM and/or VRAM)

// Material loading/unloading functions
Material *LoadMaterials(const char *fileName, int *materialCount); // Load materials from model file
Material LoadMaterialDefault(void); // Load default material (Supports: DIFFUSE, SPECULAR, NORMAL maps)
void UnloadMaterial(Material material); // Unload material from GPU memory (VRAM)
void SetMaterialTexture(Material *material, int mapType, Texture2D texture); // Set texture for a material map type (MAP_DIFFUSE, MAP_SPECULAR...)
void SetModelMeshMaterial(Model *model, int meshId, int materialId); // Set material for a mesh

// Model animations loading/unloading functions
ModelAnimation *LoadModelAnimations(const char *fileName, int *animsCount); // Load model animations from file
void UpdateModelAnimation(Model model, ModelAnimation anim, int frame); // Update model animation pose
void UnloadModelAnimation(ModelAnimation anim); // Unload animation data
bool IsModelAnimationValid(Model model, ModelAnimation anim); // Check model animation skeleton match

// Mesh generation functions
Mesh GenMeshPoly(int sides, float radius); // Generate polygonal mesh
Mesh GenMeshPlane(float width, float length, int resX, int resZ); // Generate plane mesh (with subdivisions)
Mesh GenMeshCube(float width, float height, float length); // Generate cuboid mesh
Mesh GenMeshSphere(float radius, int rings, int slices); // Generate sphere mesh (standard sphere)
Mesh GenMeshHemiSphere(float radius, int rings, int slices); // Generate half-sphere mesh (no bottom cap)
Mesh GenMeshCylinder(float radius, float height, int slices); // Generate cylinder mesh
Mesh GenMeshTorus(float radius, float size, int radSeg, int sides); // Generate torus mesh
Mesh GenMeshKnot(float radius, float size, int radSeg, int sides); // Generate trefoil knot mesh
Mesh GenMeshHeightmap(Image heightmap, Vector3 size); // Generate heightmap mesh from image data
Mesh GenMeshCubicmap(Image cubicmap, Vector3 cubeSize); // Generate cubes-based map mesh from image data

// Mesh manipulation functions
BoundingBox MeshBoundingBox(Mesh mesh); // Compute mesh bounding box limits
void MeshTangents(Mesh *mesh); // Compute mesh tangents
void MeshBinormals(Mesh *mesh); // Compute mesh binormals

// Model drawing functions
void DrawModel(Model model, Vector3 position, float scale, Color tint); // Draw a model (with texture if set)
void DrawModelEx(Model model, Vector3 position, Vector3 rotationAxis, float rotationAngle, Vector3 scale, Color tint); // Draw a model with extended parameters
void DrawModelWires(Model model, Vector3 position, float scale, Color tint); // Draw a model wires (with texture if set)
void DrawModelWiresEx(Model model, Vector3 position, Vector3 rotationAxis, float rotationAngle, Vector3 scale, Color tint); // Draw a model wires (with texture if set) with ex
void DrawBoundingBox(BoundingBox box, Color color); // Draw bounding box (wires)
void DrawBillboard(Camera camera, Texture2D texture, Vector3 center, float size, Color tint); // Draw a billboard texture
void DrawBillboardRec(Camera camera, Texture2D texture, Rectangle sourceRec, Vector3 center, float size, Color tint); // Draw a billboard texture defined by sourceRec

// Collision detection functions
bool CheckCollisionSpheres(Vector3 centerA, float radiusA, Vector3 centerB, float radiusB); // Detect collision between two spheres
bool CheckCollisionBoxes(BoundingBox box1, BoundingBox box2); // Detect collision between two bounding boxes
bool CheckCollisionBoxSphere(BoundingBox box, Vector3 center, float radius); // Detect collision between box and sphere
bool CheckCollisionRaySphere(Ray ray, Vector3 center, float radius); // Detect collision between ray and sphere
bool CheckCollisionRaySphereEx(Ray ray, Vector3 center, float radius, Vector3 *collisionPoint); // Detect collision between ray and sphere, returns collision point
bool CheckCollisionRayBox(Ray ray, BoundingBox box); // Detect collision between ray and box
RayHitInfo GetCollisionRayModel(Ray ray, Model model); // Get collision info between ray and model
RayHitInfo GetCollisionRayTriangle(Ray ray, Vector3 p1, Vector3 p2, Vector3 p3); // Get collision info between ray and triangle
RayHitInfo GetCollisionRayGround(Ray ray, float groundHeight); // Get collision info between ray and ground plane (Y-normal plane)
```

module: shaders (rLgL)

```
// Shader loading/unloading functions
char *LoadText(const char *fileName); // Load chars array from text file
Shader LoadShader(const char *vsFileName, const char *fsFileName); // Load shader from files and bind default locations
Shader LoadShaderCode(char *vsCode, char *fsCode); // Load shader from code strings and bind default locations
void UnloadShader(Shader shader); // Unload shader from GPU memory (VRAM)

Shader GetShaderDefault(void); // Get default shader
Texture2D GetTextureDefault(void); // Get default texture
Texture2D GetShapesTexture(void); // Get texture to draw shapes
Rectangle GetShapesTextureRec(void); // Get texture rectangle to draw shapes
void SetShapesTexture(Texture2D texture, Rectangle source); // Define default texture used to draw shapes

// Shader configuration functions
int GetShaderLocation(Shader shader, const char *uniformName); // Get shader uniform location
void SetShaderValue(Shader shader, int uniformLoc, const void *value, int uniformType); // Set shader uniform value
void SetShaderValueV(Shader shader, int uniformLoc, const void *value, int uniformType, int count); // Set shader uniform value vector
void SetShaderValueMatrix(Shader shader, int uniformLoc, Matrix mat); // Set shader uniform value (matrix 4x4)
void SetShaderValueTexture(Shader shader, int uniformLoc, Texture2D texture); // Set shader uniform value for texture
void SetMatrixProjection(Matrix proj); // Set a custom projection matrix (replaces internal projection matrix)
void SetMatrixModelview(Matrix view); // Set a custom modelview matrix (replaces internal modelview matrix)
Matrix GetMatrixModelview(); // Get internal modelview matrix
Matrix GetMatrixProjection(void); // Get internal projection matrix

// Shading begin/end functions
void BeginShaderMode(Shader shader); // Begin custom shader drawing
void EndShaderMode(void); // End custom shader drawing (use default shader)
void BeginBlendMode(int mode); // Begin blending mode (alpha, additive, multiplied)
void EndBlendMode(void); // End blending mode (reset to default: alpha blending)

// VR control functions
void InitVrSimulator(void); // Init VR simulator for selected device parameters
void CloseVrSimulator(void); // Close VR simulator for current device
void UpdateVrTracking(Camera *camera); // Update VR tracking (position and orientation) and camera
void SetVrConfiguration(VrDeviceInfo info, Shader distortion); // Set stereo rendering configuration parameters
bool IsVrSimulatorReady(void); // Detect if VR simulator is ready
void ToggleVrMode(void); // Enable/Disable VR experience
void BeginVrDrawing(void); // Begin VR simulator stereo rendering
void EndVrDrawing(void); // End VR simulator stereo rendering
```

module: audio

```
// Audio device management functions
```



```
void InitAudioDevice(void); // Initialize audio device and context
void CloseAudioDevice(void); // Close the audio device and context (and music stream)
bool IsAudioDeviceReady(void); // Check if audio device is ready
void SetMasterVolume(float volume); // Set master volume (listener)

// Wave/Sound loading/unloading functions
Wave LoadWave(const char *fileName); // Load wave data from file
Wave LoadWaveEx(void *data, int sampleCount, int sampleRate, int sampleSize, int channels); // Load wave data from raw array data
Sound LoadSound(const char *fileName); // Load sound from file
Sound LoadSoundFromWave(Wave wave); // Load sound from wave data
void UpdateSound(Sound sound, const void *data, int samplesCount); // Update sound buffer with new data
void UnloadWave(Wave wave); // Unload wave data
void UnloadSound(Sound sound); // Unload sound
void ExportWave(Wave wave, const char *fileName); // Export wave data to file
void ExportWaveAsCode(Wave wave, const char *fileName); // Export wave sample data to code (.h)

// Wave/Sound management functions
void PlaySound(Sound sound); // Play a sound
void StopSound(Sound sound); // Stop playing a sound
void PauseSound(Sound sound); // Pause a sound
void ResumeSound(Sound sound); // Resume a paused sound
void PlaySoundMulti(Sound sound); // Play a sound (using multichannel buffer pool)
void StopSoundMulti(void); // Stop any sound playing (using multichannel buffer pool)
int GetSoundsPlaying(void); // Get number of sounds playing in the multichannel
bool IsSoundPlaying(Sound sound); // Check if a sound is currently playing
void SetSoundVolume(Sound sound, float volume); // Set volume for a sound (1.0 is max level)
void SetSoundPitch(Sound sound, float pitch); // Set pitch for a sound (1.0 is base level)
void WaveFormat(Wave *wave, int sampleRate, int sampleSize, int channels); // Convert wave data to desired format
Wave WaveCopy(Wave wave); // Copy a wave to a new wave
void WaveCrop(Wave *wave, int initSample, int finalSample); // Crop a wave to defined samples range
float *GetWaveData(Wave wave); // Get samples data from wave as a floats array

// Music management functions
Music LoadMusicStream(const char *fileName); // Load music stream from file
void UnloadMusicStream(Music music); // Unload music stream
void PlayMusicStream(Music music); // Start music playing
void UpdateMusicStream(Music music); // Updates buffers for music streaming
void StopMusicStream(Music music); // Stop music playing
void PauseMusicStream(Music music); // Pause music playing
void ResumeMusicStream(Music music); // Resume playing paused music
bool IsMusicPlaying(Music music); // Check if music is playing
void SetMusicVolume(Music music, float volume); // Set volume for music (1.0 is max level)
void SetMusicPitch(Music music, float pitch); // Set pitch for a music (1.0 is base level)
void SetMusicLoopCount(Music music, int count); // Set music loop count (loop repeats)
float GetMusicTimeLength(Music music); // Get music time length (in seconds)
float GetMusicTimePlayed(Music music); // Get current music time played (in seconds)

// AudioStream management functions
AudioStream InitAudioStream(unsigned int sampleRate, unsigned int sampleSize, unsigned int channels); // Init audio stream (to stream raw audio pcm data)
void UpdateAudioStream(AudioStream stream, const void *data, int samplesCount); // Update audio stream buffers with data
void CloseAudioStream(AudioStream stream); // Close audio stream and free memory
bool IsAudioBufferProcessed(AudioStream stream); // Check if any audio stream buffers requires refill
void PlayAudioStream(AudioStream stream); // Play audio stream
void PauseAudioStream(AudioStream stream); // Pause audio stream
void ResumeAudioStream(AudioStream stream); // Resume audio stream
bool IsAudioStreamPlaying(AudioStream stream); // Check if audio stream is playing
void StopAudioStream(AudioStream stream); // Stop audio stream
void SetAudioStreamVolume(AudioStream stream, float volume); // Set volume for audio stream (1.0 is max level)
void SetAudioStreamPitch(AudioStream stream, float pitch); // Set pitch for audio stream (1.0 is base level)
```

structs

```
struct Vector2; // Vector2 type
struct Vector3; // Vector3 type
struct Vector4; // Vector4 type
struct Quaternion; // Quaternion type
struct Matrix; // Matrix type (OpenGL style 4x4)
struct Color; // Color type, RGBA (32bit)
struct Rectangle; // Rectangle type

struct Image; // Image type (multiple pixel formats supported)
// NOTE: Data stored in CPU memory (RAM)
struct Texture; // Texture type (multiple internal formats supported)
// NOTE: Data stored in GPU memory (VRAM)

struct RenderTexture; // RenderTexture type, for texture rendering
struct NPatchInfo; // N-Patch layout info
struct CharInfo; // Font character info
struct Font; // Font type, includes texture and chars data

struct Camera; // Camera type, defines 3d camera position/orientation
struct Camera2D; // Camera2D type, defines a 2d camera
struct Mesh; // Vertex data definning a mesh
struct Shader; // Shader type (generic shader)
struct MaterialMap; // Material texture map
struct Material; // Material type
struct Model; // Basic 3d Model type
struct Transform; // Transformation (used for bones)
struct BoneInfo; // Bone information
struct ModelAnimation; // Model animation data (bones and frames)
struct Ray; // Ray type (useful for raycast)
struct RayHitInfo; // Raycast hit information
struct BoundingBox; // Bounding box type for 3d mesh

struct Wave; // Wave type, defines audio wave data
struct Sound; // Basic Sound source and buffer
struct Music; // Music type (file streaming from memory)
struct AudioStream; // Raw audio stream type

struct VrDeviceInfo; // VR device parameters
```

colors

```
// Custom raylib color palette for amazing visuals
#define LIGHTGRAY (Color){ 200, 200, 200, 255 } // Light Gray
#define GRAY (Color){ 130, 130, 130, 255 } // Gray
#define DARKGRAY (Color){ 80, 80, 80, 255 } // Dark Gray
#define YELLOW (Color){ 253, 249, 0, 255 } // Yellow
#define GOLD (Color){ 255, 203, 0, 255 } // Gold
#define ORANGE (Color){ 255, 161, 0, 255 } // Orange
#define PINK (Color){ 255, 109, 194, 255 } // Pink
#define RED (Color){ 230, 41, 55, 255 } // Red
#define MAROON (Color){ 190, 33, 55, 255 } // Maroon
#define GREEN (Color){ 0, 228, 48, 255 } // Green
#define LIME (Color){ 0, 158, 47, 255 } // Lime
#define DARKGREEN (Color){ 0, 117, 44, 255 } // Dark Green
#define SKYBLUE (Color){ 102, 191, 255, 255 } // Sky Blue
#define BLUE (Color){ 0, 121, 241, 255 } // Blue
#define DARKBLUE (Color){ 0, 82, 172, 255 } // Dark Blue
#define PURPLE (Color){ 200, 122, 255, 255 } // Purple
#define VIOLET (Color){ 135, 60, 190, 255 } // Violet
#define DARKPURPLE (Color){ 112, 31, 126, 255 } // Dark Purple
#define BEIGE (Color){ 211, 176, 131, 255 } // Beige
#define BROWN (Color){ 127, 106, 79, 255 } // Brown
#define DARKBROWN (Color){ 76, 63, 47, 255 } // Dark Brown

#define WHITE (Color){ 255, 255, 255, 255 } // White
#define BLACK (Color){ 0, 0, 0, 255 } // Black
#define BLANK (Color){ 0, 0, 0, 0 } // Transparent
#define MAGENTA (Color){ 255, 0, 255, 255 } // Magenta
#define RAYWHITE (Color){ 245, 245, 245, 255 } // Ray White
```