

# Introduction

## Introduction

pico-Céu is a tiny programming environment for visual and interactive applications such as video games. It is composed of the programming language Céu and minimalist libraries for input, graphics, network, and sound.

## Graphics

### Graphics

Provides graphics operations, such as for drawing pixels and images on the screen.

TODO: `axis`

### Configuration

#### GRAPHICS\_SET\_ANCHOR

Changes the drawing anchor of all subsequent drawing operations `GRAPHICS_DRAW_BMP`, `GRAPHICS_DRAW_RECT`, and `GRAPHICS_DRAW_TEXT`.

output (`HAnchor`, `VAnchor`) `GRAPHICS_SET_ANCHOR`;

- Parameters:
  - `HAnchor`: new horizontal anchor
  - `VAnchor`: new vertical anchor

The anchor specifies the part of the shape to appear at the pixel position of the drawing operation.

The possible values for `HAnchor` are `HANCHOR_LEFT`, `HANCHOR_CENTER`, and `HANCHOR_RIGHT`. The default value is `HANCHOR_CENTER`.

The possible values for `HVnchor` are `VANCHOR_TOP`, `VANCHOR_CENTER`, and `VANCHOR_BOTTOM`. The default value is `VANCHOR_CENTER`.

#### GRAPHICS\_SET\_COLOR\_NAME

Changes the color of all subsequent drawing operations.

output (`Color`) `GRAPHICS_SET_COLOR_NAME`

- Parameters:
  - `Color`: new color name

The color names are based on the *HTML Web Colors*:

[https://en.wikipedia.org/wiki/Web\\_colors#HTML\\_color\\_names](https://en.wikipedia.org/wiki/Web_colors#HTML_color_names)

The possible values are COLOR\_WHITE, COLOR\_SILVER, COLOR\_GRAY, COLOR\_BLACK, COLOR\_RED, COLOR\_MAROON, COLOR\_YELLOW, COLOR\_OLIVE, COLOR\_LIME, COLOR\_GREEN, COLOR\_AQUA, COLOR\_TEAL, COLOR\_BLUE, COLOR\_NAVY, COLOR\_FUCHSIA, COLOR\_PURPLE.

The default color is white.

### **GRAPHICS\_SET\_COLOR\_RGB**

Changes the color in RGB of all subsequent drawing operations.

output (integer, integer, integer) GRAPHICS\_SET\_COLOR\_RGB

- Parameters:
  - integer: new red component
  - integer: new green component
  - integer: new blue component

The default color is white.

### **GRAPHICS\_SET\_FONT**

Changes the font for drawing and writing text.

output (text, integer) GRAPHICS\_SET\_FONT

- Parameters:
  - text: path for the .ttf font filename
  - integer: height of the new font in pixels

### **GRAPHICS\_SET\_WRITE\_CURSOR**

Changes the cursor starting position for writing text with GRAPHICS\_WRITE and GRAPHICS\_WRITELN.

output (integer, integer) GRAPHICS\_SET\_WRITE\_CURSOR

- Parameters:
  - integer: new position in the x-axis
  - integer: new position in the y-axis

The default starting position is the top-left of the screen.

The current position is reset on every WINDOW\_CLEAR operation.

## Drawing

### GRAPHICS\_DRAW\_BMP

Draws a bitmap image on the screen.

output (integer, integer, text) GRAPHICS\_DRAW\_BMP

- Parameters:
  - integer: position in the x-axis
  - integer: position in the y-axis
  - text: path for the .bmp image filename

### GRAPHICS\_DRAW\_PIXEL

Draws a pixel on the screen.

output (integer, integer) GRAPHICS\_DRAW\_PIXEL

- Parameters:
  - integer: position in the x-axis
  - integer: position in the y-axis

The drawing color is specified with GRAPHICS\_SET\_COLOR\_NAME or GRAPHICS\_SET\_COLOR\_RGB.

### GRAPHICS\_DRAW\_LINE

Draws a line on the screen.

output (integer, integer, integer, integer) GRAPHICS\_DRAW\_LINE;

- Parameters:
  - integer: start position in the x-axis
  - integer: start position in the y-axis
  - integer: end position in the x-axis
  - integer: end position in the y-axis

The drawing color is specified with GRAPHICS\_SET\_COLOR\_NAME or GRAPHICS\_SET\_COLOR\_RGB.

### GRAPHICS\_DRAW\_RECT

Draws a rectangle on the screen.

output (integer, integer, integer, integer) GRAPHICS\_DRAW\_RECT

- Parameters:
  - integer: position in the x-axis
  - integer: position in the y-axis
  - integer: rectangle width
  - integer: rectangle height

The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

## **GRAPHICS\_DRAW\_TEXT**

Draws a text on the screen.

output (int,int,text) `GRAPHICS_DRAW_TEXT`;

- Parameters:
  - **integer**: position in the x-axis
  - **integer**: position in the y-axis
  - **text**: text to draw

The drawing font is specified with `GRAPHICS_SET_FONT`. The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

## **Writing**

### **GRAPHICS\_WRITE**

Writes a text on the screen.

output (text) `GRAPHICS_WRITE`;

- Parameters:
  - **text**: text to draw

The drawing position is first specified with `GRAPHICS_SET_WRITE_CURSOR`. The cursor advances automatically for the position after the text. The drawing font is specified with `GRAPHICS_SET_FONT`. The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

### **GRAPHICS\_WRITELN**

Writes a line of text on the screen.

output (text) `GRAPHICS_WRITELN`;

The drawing position is first specified with `GRAPHICS_SET_WRITE_CURSOR`. The cursor advances automatically for the next line after the text, at the same initial position. The drawing font is specified with `GRAPHICS_SET_FONT`. The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

## **Other**

### **GRAPHICS\_SCREENSHOT**

Takes a screen shot.

output (text) GRAPHICS\_SCREENSHOT

- Parameters:
  - **text**: path for the **.bmp** image filename to generate

## Input Devices

### Input Devices

Provides input handling, such as for keyboard and mouse.

#### Keyboard

##### KEY\_PRESS

input (integer) KEY\_PRESS

- Occurrences:
  - whenever a keyboard key is pressed
- Payload:
  - **integer**: numeric key code

TODO: key codes

##### KEY\_UNPRESS

input (integer) KEY\_UNPRESS

- Occurrences:
  - whenever a keyboard key is released
- Payload:
  - **integer**: numeric key code

TODO: key codes

#### Mouse

##### MOUSE\_CLICK

input (integer,integer,integer) MOUSE\_CLICK

- Occurrences:
  - whenever a mouse button is pressed
- Payload:
  - **integer**: numeric button code (TODO: left, middle, right?)
  - **integer**: current mouse position in the x-axis

- **integer**: current mouse position in the y-axis

## **MOUSE\_UNCLICK**

input (integer, integer, integer) MOUSE\_UNCLICK

- Occurrences:
  - whenever a mouse button is released
- Payload:
  - **integer**: numeric button code (TODO: left, middle, right?)
  - **integer**: current mouse position in the x-axis
  - **integer**: current mouse position in the y-axis

## **MOUSE\_MOVE**

input (integer, integer) MOUSE\_MOVE

- Occurrences:
  - whenever the mouse moves
- Payload:
  - **integer**: current mouse position in the x-axis
  - **integer**: current mouse position in the y-axis

# **Sound**

## **Sound**

Provides sound playback.

## **Configuration**

### **SOUND\_SET\_VOLUME**

Changes the volume of all subsequent sound playbacks.

output (integer) SOUND\_SET\_VOUME

- Parameters:
  - **integer**: new sound volume in percentage (from 0 to 100)

## **Playback**

### **SOUND\_PLAY**

Plays a sound file.

output (text) SOUND\_PLAY

- Parameters:
  - **text**: path for the sound filename

The playback volume is specified with SOUND\_SET\_VOLUME.

## Network

### Network

Provides unreliable broadcast communication between peers.

#### Send

##### NET\_SEND

Broadcasts a message to all peers.

output (integer,byte&&) NET\_SEND;

- Parameters:
  - **integer**: number of bytes to transmit
  - **byte&&**: stream of bytes

#### Receive

##### NET\_RECEIVE

Receives all messages from all peers, including itself.

input (integer,byte&&) NET\_RECEIVE;

- Occurrences:
  - on every received message
- Payload:
  - **integer**: number of received bytes
  - **byte&&**: stream of bytes

## Frame Management

### Frame Management

Manages the game frames, such as for updating animations and redrawing the screen.

## Configuration

### FRAMES\_SET

Enables or disables the generation of periodic `FRAMES_UPDATE` and `FRAMES_REDRAW` inputs to the application.

output (yesno) `FRAMES_SET`

- Parameters:
  - **yesno**: new state
    - \* **yes**: enables the generation of frames
    - \* **no**: disables the generation of frames

## Inputs

### FRAMES\_UPDATE

input (integer) `FRAMES_UPDATE`

- Occurrences:
  - on every frame, before `FRAMES_REDRAW`
- Payload:
  - **integer**: the number of milliseconds elapsed since the previous frame

### FRAMES\_REDRAW

input (none) `FRAMES_REDRAW`

- Occurrences:
  - on every frame, after `FRAMES_UPDATE`
- Payload:
  - **none**: no payload

Before the input occurs, the screen is automatically cleared with `WINDOW_CLEAR`.

## Window Management

### Window Management

Manages the application window.

## Configuration

### WINDOW\_SET\_CLEAR\_COLOR\_NAME



Changes the background color of `WINDOW_CLEAR`.

output (Color) `WINDOW_SET_CLEAR_COLOR_NAME`

- Parameters:
  - **Color**: new color name

The color names are based on the *HTML Web Colors*:

[https://en.wikipedia.org/wiki/Web\\_colors#HTML\\_color\\_names](https://en.wikipedia.org/wiki/Web_colors#HTML_color_names)

The possible values are `COLOR_WHITE`, `COLOR_SILVER`, `COLOR_GRAY`, `COLOR_BLACK`, `COLOR_RED`, `COLOR_MAROON`, `COLOR_YELLOW`, `COLOR_OLIVE`, `COLOR_LIME`, `COLOR_GREEN`, `COLOR_AQUA`, `COLOR_TEAL`, `COLOR_BLUE`, `COLOR_NAVY`, `COLOR_FUCHSIA`, `COLOR_PURPLE`.

The default color is black.

## **WINDOW\_SET\_CLEAR\_COLOR\_RGB**

Changes the background color of `WINDOW_CLEAR` in RGB.

output (integer, integer, integer) `WINDOW_SET_CLEAR_COLOR_RGB`

- Parameters:
  - **integer**: new red component
  - **integer**: new green component
  - **integer**: new blue component

The default color is black.

## **WINDOW\_SET\_GRID**

Enables or disables a visual grid delimiting the screen pixels.

output (yesno) `WINDOW_SET_GRID`

- Parameters:
  - **yesno**: new state
    - \* **yes**: enables the grid
    - \* **no**: disables the grid

The ratio between the real and logical dimensions set with `WINDOW_SET_SIZE` must be greater than one.

The window is automatically cleared with `WINDOW_CLEAR`.

## **WINDOW\_SET\_SIZE**

Changes the real and logical sizes of the window.

output (integer, integer, integer, integer) `WINDOW_SET_SIZE`

- Parameters:
  - `integer`: new real width
  - `integer`: new real height
  - `integer`: new logical width
  - `integer`: new logical height

The window is automatically cleared with `WINDOW_CLEAR`.

The arithmetic division between the real and logical dimensions must be exact.

## **WINDOW\_SET\_TITLE**

Changes the title of the window.

output (text) `WINDOW_SET_TITLE`

- Parameters:
  - `text`: new window title

## **Clear**

### **WINDOW\_CLEAR**

Clears the window screen.

output (none) `WINDOW_CLEAR`

- Parameters:
  - `none`: no parameters

The clear color is specified with `WINDOW_SET_CLEAR_COLOR_NAME` or `WINDOW_SET_CLEAR_COLOR_RGB`.

The default color is black.

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