

# 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 initial value is `HANCHOR_CENTER`.

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

#### GRAPHICS\_SET\_BMP\_FRAME

Changes the drawing frame of all subsequent `GRAPHICS_DRAW_BMP` operations.

output (int?,int?) `GRAPHICS_SET_BMP_FRAME;`

- Parameters:
  - `int?`: new frame index to show (default: 0)

- **int?**: new number of frames in the image (default: 1)

The initial frame index is 0 and number of frames is 1.

## **GRAPHICS\_SET\_BMP\_SIZE**

Changes the drawing size of all subsequent **GRAPHICS\_DRAW\_BMP** operations.

output (int?,int?) **GRAPHICS\_SET\_BMP\_SIZE**;

- Parameters:
  - **int?**: new width (default: proportional to new height)
  - **int?**: new height (default: proportional to new width)

If both width and height are set to default, the new size is the original image size.

The initial size is the original image size.

## **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 initial 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 initial 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\_\_SCALE**

Changes the drawing scale of all subsequent drawing operations **GRAPHICS\_DRAW\_BMP**, **GRAPHICS\_DRAW\_RECT**, and **GRAPHICS\_DRAW\_TEXT**.

output (real,real) GRAPHICS\_SET\_SCALE;

- Parameters:
  - **real**: new horizontal scale
  - **real**: new vertical scale

The initial scale is 1.0 x 1.0.

## **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 initial 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 (yes/no) FRAMES\_SET

- Parameters:
  - **yes/no**: 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 (yes/no) WINDOW\_SET\_GRID

- Parameters:
  - **yes/no**: 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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