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You can also read this information on my GitHub **wiki-pages**. Maybe it w

Link: https://github.com/VBrazhnik/FdF/wiki 494 (https://github.com,

How to handle mouse buttons and

On macOS, if you want to handle mouse buttons and key presses and clos function instead of the other hook functions:

```
int mlx_hook(void *win_ptr, int x_event, int x_mas
```

To handle a key press

At the place of int x_event parametr use 2.

At the place of int (*func)() parameter you use the following functi

```
Data Definitions for libX11 547
https://tkeycode.freedesktop.org/1.3.0/gLSB/c
ddefs.html) refsspecs.linuxfoundation.org
```

To handle a key release

At the place of int x_event parametr use 3.

At the place of Bresenham's line algorithm Wikipedia the following functi

```
int key_release(int keycode, void *param)
Rotation matrix - Wikipedia 295
```

To handle a mouse button press

At the place of int x_event parametr use 4.

At the place of int (*func)() parameter you use the following functi

```
int mouse_press(int button, int x, int y, void *pa
Компьютерная графика 231
```

To handle a mouse button release

At the place of int x_event parametr use 5.

At the place of int (*func)() parameter you use the following functi

```
int mouse_release(int button, int x, int y, void *
infographic-vectors/) vectips.com
```

To handle a mouse movement

At the place of int x_event parametr use 6.

At the place of int (*func)() parameter you use the following functi

```
int mouse_move(int x, int y, void *param) 138
(http://www.scratchapixel.com/lessons/mathematics-
```

To handle an expose event

At the place of int x_event parametr use 12.

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At the place of `int (*func)()` parameter you use the following function

```
int expose(int (*func)()) {
    // ...
}
```

To handle a red button (X button) press

At the place of `int x_event` parametr use 17 .

At the place of `int (*func)()` parameter you use the following function

```
int close(void *param)
```

Complete `int close(void *param)` function:

```
int close(void *param)
{
    (void)param;
    exit(0);
}
```

Tip:

`x_mask` is ignored on macOS. But if you want that your `FdF` will have cc

Key codes



Mouse button codes

- Left button — 1
- Right button — 2
- Third (Middle) button — 3
- Scroll Up — 4
- Scroll Down — 5
- Scroll Left — 6
- Scroll Right — 7

Masks

You can find values of `x_mask` here [544](https://refspecs.linuxfoundation.org/) (<https://refspecs.linuxfoundation.org/>)

Tip:

`x_mask` for `int close(void *param)` is `(1L << 17)` .

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Day 10 **13** (/Tags/508/Topics)

Day 11 **12** (/Tags/507/Topics)

Day 12 **6** (/Tags/509/Topics)

Day 13 **8** (/Tags/510/Topics)

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How to draw a line?

To draw a line you can use Bresenham's line algorithm **281** (https://en.wikipedia.org/wiki/Bresenham's_line_algorithm) or Xiaolin Wu's line algorithm **236** (https://en.wikipedia.org/wiki/Xiaolin_Wu's_line_algorithm) solution which will produced more beautiful result).

↑ 21
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↓ 0
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How to create linear gradient?

Here we will consider how to find the color between any two color points th

First of all we need to find current point position between two points with kn percentages.

The following function will help you find this value:

```
double percent(int start, int end, int current)
{
    double placement;
    double distance;

    placement = current - start;
    distance = end - start;
    return ((distance == 0) ? 1.0 : (placement / d
}
```

You can calculate this value depending on which delta value is bigger. Delt values.

Part of code:

```
// ...
double percentage;

if (delta.x > delta.y)
    percentage = percent(start.x, end.x, curre
else
    percentage = percent(start.y, end.y, curre
// ...
```

Then for creating each light (**Red**, **Green**, **Blue**) we need to get light from st need to get new color by union red, green and blue light.

Part of code:

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Ft_p 1 (/Tags/53/Topics)

Ft_ping (/Tags/433/Topics)

Ft_printf 15 (/Tags/28/Topics)

Ft_script (/Tags/52/Topics)

Ft_select 3 (/Tags/48/Topics)

Ft_sh2 (/Tags/44/Topics)

Ft_sh3 (/Tags/49/Topics)

Ft_sommelier 2 (/Tags/757/Topics)★

Ft_ssl_des 2 (/Tags/649/Topics)

Ft_ssl_md5 2 (/Tags/650/Topics)

Ft_ssl_rsa (/Tags/648/Topics)

Ft_traceroute (/Tags/435/Topics)

```
// ...
int red;
int green;
int blue;

// Get percentage

red = get_light((start.color >> 16) & 0xFF, (e
green = get_light((start.color >> 8) & 0xFF, (
blue = get_light(start.color & 0xFF, end.color
return ((red << 16) | (green << 8) | blue);
```

```
int get_light(int start, int end, double percentag
{
    return ((int)((1 - percentage) * start + perce
}
```

Complete code:

```
int get_light(int start, int end, double percentag
{
    return ((int)((1 - percentage) * start + perce
}

int get_color(t_point current, t_point start, t_po
{
    int    red;
    int    green;
    int    blue;
    double percentage;

    if (current.color == end.color)
        return (current.color);
    if (delta.x > delta.y)
        percentage = percent(start.x, end.x, curre
    else
        percentage = percent(start.y, end.y, curre
    red = get_light((start.color >> 16) & 0xFF, (e
    green = get_light((start.color >> 8) & 0xFF, (
    blue = get_light(start.color & 0xFF, end.color
    return ((red << 16) | (green << 8) | blue);
}
```

Basic information was found here 126 (<https://graphicdesign.stackexha>

Color for pixel

Everything is easy if you decided to use the following function:

```
int mlx_pixel_put(void *mlx_ptr, void *win_ptr, in
```

In this case, the order of lights is standard:

O R G B

8 bits8 bits8 bits8 bits

As you can see that the first byte is filled with zeros. It means that the alpha

You can find this information in `mlx_pixel_put` man file.

Also, this information is actual for color parameter in the function which disp

```
int mlx_string_put(void *mlx_ptr, void *win_ptr, i
```

But if you decided to use an image, you will face with more complicated us

You will work with the following three functions:

```
void *mlx_new_image(void *mlx_ptr, int width, int
```

Ft_turing (/Tags/486/Topics)

Ft_vox (/Tags/646/Topics)

Ft_zenko (/Tags/644/Topics)

GBmu (/Tags/541/Topics)

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IRC ¹ (/Tags/109/Topics)

Jour 01 (/Tags/113/Topics)

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Jour 03 ¹ (/Tags/114/Topics)

Jour 04 ¹ (/Tags/115/Topics)

Jour 05 ⁵ (/Tags/116/Topics)

Jour 06 ³ (/Tags/117/Topics)

Jour 07 ¹ (/Tags/118/Topics)

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Jour 13 ² (/Tags/123/Topics)

KFS-1 (/Tags/565/Topics)

KFS-2 (/Tags/582/Topics)

```
char *mlx_get_data_addr(void *img_ptr, int *bits_p
```

```
int mlx_put_image_to_window(void *mlx_ptr, void *w
```

And the most interesting is the second function with such parameters as `bits`

What is bits per pixel or bit-depth value?

The number of bits used to define a pixel's color shade is as 24-bit color. Some new color display systems offer a : alpha channel, is used for control and special effects info

For macOS value of `bits_per_pixel` is constant. You can find the follo

```
#define UNIQ_BPP 4
```

```
// assume here 32bpp little endian
```

```
char *mlx_get_data_addr(mlx_img_list_t *img_ptr, i
*endian)
{
    *bits_per_pixel = UNIQ_BPP * 8;
    *size_line = img_ptr->width * UNIQ_BPP;
    // ...
}
```

If you decided to support only macOS , you don't need to worry about the bytes (32 bits).

`endian` is the most important parameter that we have to consider.

For macOS its value is `0` , which means `little endian` .

Information about `endian` value you can also find in source files of minilib

```
/*
** endian : 0 = sever X is little endian, 1 = big
** endian : useless on macos, client and graphical
*/
```

```
// assume here 32bpp little endian
```

```
char *mlx_get_data_addr(mlx_img_list_t *img_ptr, i
*endian)
{
    // ...
    *endian = 0; // little endian for now on mac-i
    // ...
}
```

Big-endian and little-endian are the formats of ordering bytes.

Big-endian is the format that we used to know as **normal**.

Little-endian order is **reversed**.

For color these two formats look like:

Byte number 01 2 3

Big endian 0 RGB

Little endian B G R 0

So in the case of little-endian format, you have to use reversed order of col

KFS-3 (/Tags/585/Topics)

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Pestilence (/Tags/617/Topics)

Philosophers 1 (/Tags/74/Topics)

Piscine CPP (/Tags/89/Topics)

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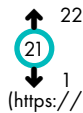
Piscine OCaml 1 (/Tags/298/Topics)

Piscine PHP 4 (/Tags/88/Topics)

Piscine Reloaded 3 (/Tags/580/Topics)

```
// ...
int i;

i = (x * fdf->bits_per_pixel / 8) + (y * fdf->
fdf->data_addr[i] = color; // B - Blue
fdf->data_addr[++i] = color >> 8; // G - Green
fdf->data_addr[++i] = color >> 16; // R - Red
fdf->data_addr[++i] = 0; // Alpha channel
// ...
```



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How to rotate figure in 3D?

If you want to rotate a vector you should construct what is known as a rotation matrix. (https://en.wikipedia.org/wiki/Rotation_matrix).

X-Axis Rotation

$$R_x(\theta) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos(\theta) & -\sin(\theta) \\ 0 & \sin(\theta) & \cos(\theta) \end{bmatrix}$$

After the transformations, we will get the formulas:

$$\begin{aligned} x' &= x; \\ y' &= y * \cos(\theta) + z * \sin(\theta); \\ z' &= -y * \sin(\theta) + z * \cos(\theta); \end{aligned}$$

Y-Axis Rotation

$$R_y(\theta) = \begin{bmatrix} \cos(\theta) & 0 & \sin(\theta) \\ 0 & 1 & 0 \\ -\sin(\theta) & 0 & \cos(\theta) \end{bmatrix}$$

After the transformations, we will get the formulas:

$$\begin{aligned} x' &= x * \cos(\theta) + z * \sin(\theta); \\ y' &= y; \\ z' &= -x * \sin(\theta) + z * \cos(\theta); \end{aligned}$$

Z-Axis Rotation

$$R_z(\theta) = \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

After the transformations, we will get the formulas:

$$\begin{aligned} x' &= x * \cos(\theta) - y * \sin(\theta); \\ y' &= x * \sin(\theta) + y * \cos(\theta); \\ z' &= z; \end{aligned}$$

Source of information **227** (<http://grafika.me/node/82>) (Russian)

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Piscine Swift
 IOS (/Tags/578/Topics)

Piscine Unity (/Tags/312/Topics)

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How to perform isometric transform

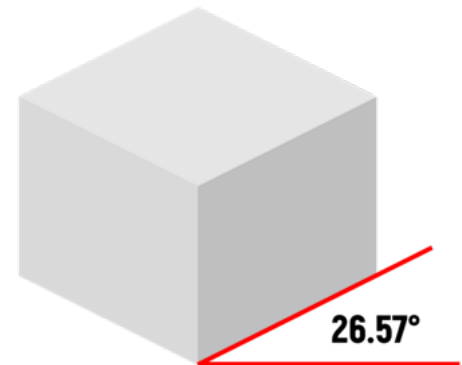
There are **"true"** isometric projection and **2:1** isometric projection.

True isometric projection uses a 30° angle (0.523599 rad).

2:1 isometric projection uses a 26.57° angle (0.46373398 rad).

2:1 ISOMETRIC PROJECTION

TRI



Source of information **179** (<http://vectips.com/tutorials/isometric-infogr>)

Code for transforming:

```
static void iso(int *x, int *y, int z)
{
    int previous_x;
    int previous_y;

    previous_x = *x;
    previous_y = *y;
    *x = (previous_x - previous_y) * cos(0.523599)
    *y = -z + (previous_x + previous_y) * sin(0.52
}

t_point project(t_point p, t_fdf *fdf)
{
    // ...
    if (fdf->camera->projection == ISO)
        iso(&p.x, &p.y, p.z);
    // ...
}
```

Source of information **167** (<https://www.kirupa.com/developer/actions>)

- # Userspace_digressions (/Tags/753/Topics)
- # Walking Marvin 1 (/Tags/647/Topics)
- # War 2 (/Tags/618/Topics)
- # Web Initiation (/Tags/524/Topics)
- # Wildcard (/Tags/827/Topics)
- # Wolf3d 4 (/Tags/30/Topics)
- # Woody Woodpacker (/Tags/549/Topics)
- # XV (/Tags/535/Topics)
- # Yellow Brick Road 1 (/Tags/784/Topics)
- # Zappy 1 (/Tags/107/Topics)

👍 7 🗨 0 ^ 7

(https://profile.intra.42.fr/users/mtaylor)

mtaylor (https://profile.intra.42.fr/users/mtaylor)
This transformation is pretty good, but it results in a "backwards" image, but the text is reversed.)

To fix this, invert the + and -:

```
new_x = (x + y) * cos(angle);
new_y = (x - y) * sin(angle) - z;
```

👍 2 🗨 0 ^ 2

(https://profile.intra.42.fr/users/vbrazhni)

Altruist vbrazhni (https://profile.intra.42.fr/users/vbrazhni)
It depends only on your realization of reading and storage of the image. If you don't reverse the image after projection, someone will get a reverse image.

You are completely right that it is simply to fix. You can correct it by changing the sign before x, y or z to reverse axis direction.

The format of formulas, that are listed here, is the best for a perfect result.

👍 7 🗨 0 ^ 7

(https://profile.intra.42.fr/users/mtaylor)

mtaylor (https://profile.intra.42.fr/users/mtaylor)
Slanting right:

```
new_x = (x + y) * cos(angle);
new_y = (x - y) * sin(angle) - z;
```

Slanting left:

```
new_x = (x - y) * -cos(angle);
new_y = ((x + y) * sin(angle)) - z;
```

Mirror image slanting right:

```
new_x = (x - y) * cos(angle);
new_y = ((x + y) * sin(angle)) - z;
```

Mirror image slanting left:

```
new_x = (x + y) * -cos(angle);
new_y = ((x - y) * sin(angle)) - z;
```



(https://profile.intra.42.fr/users/cfargere)

cfargere

(https://profile.intra.42.fr/users/cfargere)

Interestingly, the rotation matrix shown here are reversed from the scratchpi: (http://www.scratchapixel.com/lessons/mathematics-physics-for-computer-graphics/3d-rendering-part-1-introduction-to-the-rasterizer)



(https://profile.intra.42.fr/users/cyuriko)

cyuriko

(https://profile.intra.42.fr/users/cyuriko)

Most helpful, thanks!

↑

0

↓

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0

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↓

bshara
(<https://profile.intra.42.fr/users/bshara>)
thanks 😊



↑

0

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0

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↓

jmacgyve
(<https://profile.intra.42.fr/users/jmacgyve>)



↑

1

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1

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samymone
(<https://profile.intra.42.fr/users/samymone>)
very helpful, thanks!



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