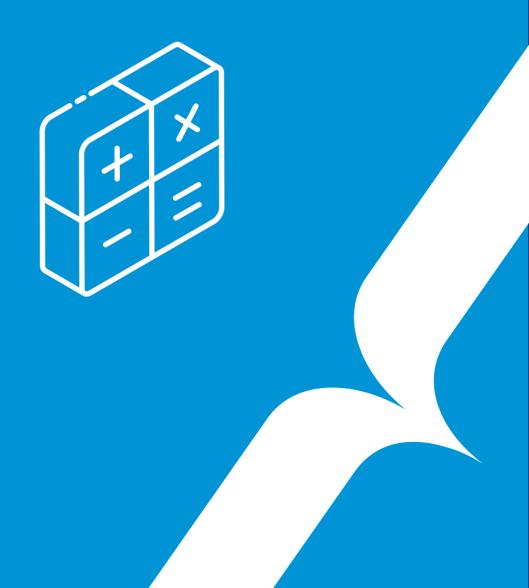# {EPITECH}

102ARCHITECT
HOME PLANNING AND HOMOGENEOUS COORDINATES

102ARCHITECT

> **binary name:** 102architect
> **language:** everything working on "the dump"
> **compilation:** when necessary, via Makefile, including re, clean and fclean rules

> - ✓ The totality of your source files, except all useless files (binary, temp files, obj files,…), must be included in your delivery.
> - ✓ All the bonus files (including a potential specific Makefile) should be in a directory named bonus.
> - ✓ Error messages have to be written on the error output, and the program should then exit with the 84 error code (0 if there is no error).

You are working on a homeplanning software for an architecture firm. The goal is to simplify the process of drawing the plan, and to integrate various features such as scale management, changing the point of view, moving doors and windows along walls… You are in charge of implementing the geometric transformations (rotation to change point of view, translation to move an object, scaling to zoom in and out, reflection and any combination of these transformations).

You need to develop a program to compute the coordinates of a point after several transformations. To make it nice and clean, you chose to use homogeneous coordinates. O being the origin of both axis, here are the transformations to be implemented:

- ✓ Translation,
- ✓ Scaling,
- ✓ Rotation centered at O,
- ✓ Reflection over any axis that passes through O,
- ✓ Any combination of the previous transformations.

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Usage

```
~/B-MAT-100> ./102architect -h
USAGE
    ./102architect x y transfo1 arg11 [arg12] [transfo2 arg21 [arg22]] ...


DESCRIPTION
    x    abscissa of the original point
    y    ordinate of the original point
    transfo arg1 [arg2]
    -t i j   translation along vector (i, j)
    -z m n   scaling by factors m (x-axis) and n (y-axis)
    -r d     rotation centered in O by a d degree angle
    -s d     reflection over the axis passing through O with an inclination
             angle of d degrees
```

🔊 The use of a matrix calculus library (such as numpy) is prohibited!

Suggested bonuses

✓ Additional transformations,
✓ Graphical interface showing the transformations applied on several points / figures.

Examples

```
~/B-MAT-100> ./102architect 5 0 -t -1 1
Translation along vector (-1, 1)
1.00    0.00    -1.00
0.00    1.00    1.00
0.00    0.00    1.00
(5.00, 0.00) => (4.00, 1.00)
```

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```
~/B-MAT-100> ./102architect 2 2 -z -1 1
Scaling by factors -1 and 1
-1.00    0.00     0.00
0.00     1.00     0.00
0.00     0.00     1.00
(2.00, 2.00) => (-2.00, 2.00)
```

```
~/B-MAT-100> ./102architect 1 0 -r 90
Rotation by a 90 degree angle
0.00     -1.00    0.00
1.00     0.00     0.00
0.00     0.00     1.00
(1.00, 0.00) => (0.00, 1.00)
```

```
~/B-MAT-100> ./102architect 3 -1 -s 270
Reflection over an axis with an inclination angle of 270 degrees
-1.00    0.00     0.00
0.00     1.00     0.00
0.00     0.00     1.00
(3.00, -1.00) => (-3.00, -1.00)
```

```
~/B-MAT-100> ./102architect 1 2 -t 2 3 -z 1 -2 -r 45 -s 30
Translation along vector (2, 3)
Scaling by factors 1 and -2
Rotation by a 45 degree angle
Reflection over an axis with an inclination angle of 30 degrees
0.97     -0.52    0.38
0.26     1.93     6.31
0.00     0.00     1.00
(1.00, 2.00) => (0.31, 10.44)
```

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