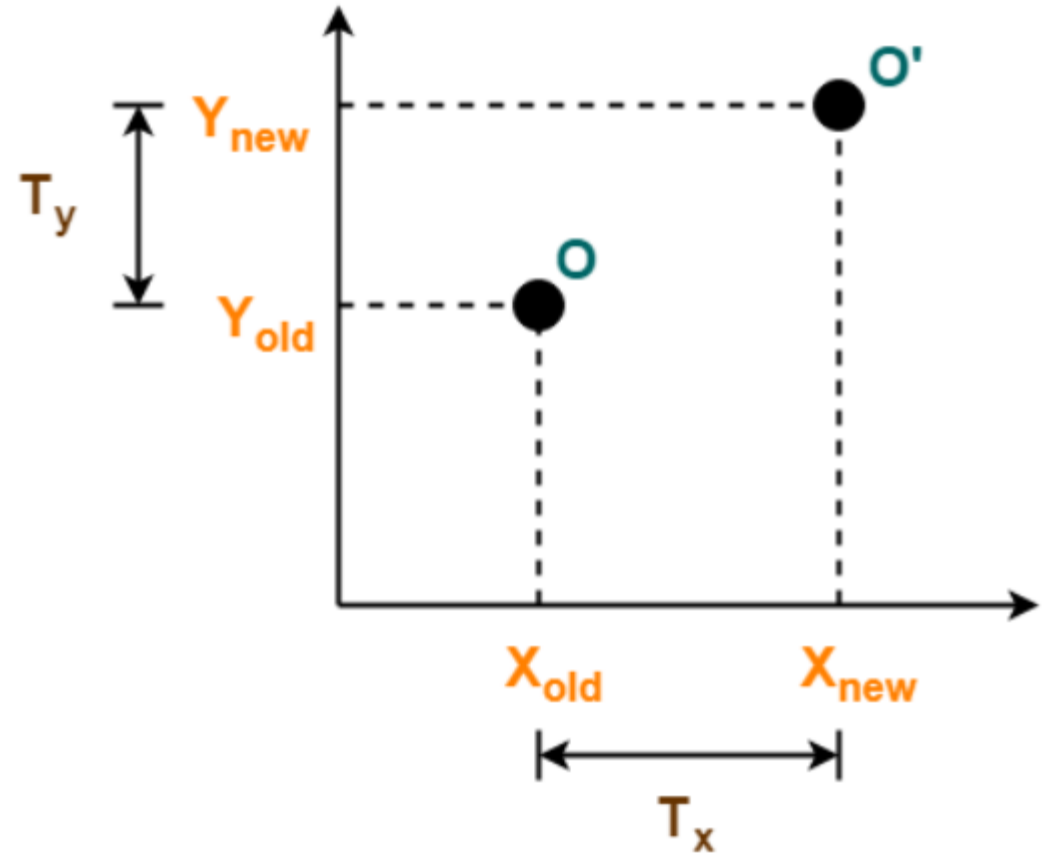# Vector Processor

Testcase #1

2D Matrix translation example

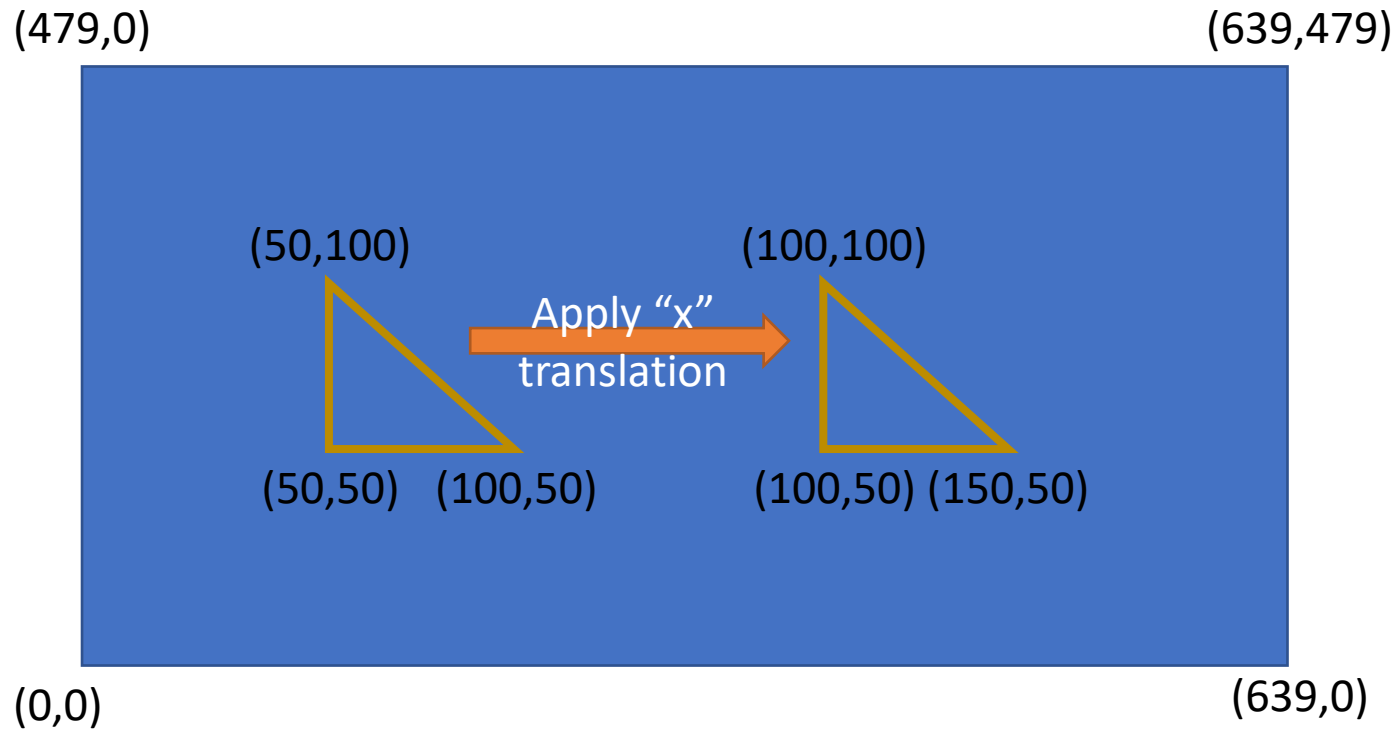$$
\begin{bmatrix} X_{new} \\ Y_{new} \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & T_x \\ 0 & 1 & T_y \\ 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} X_{old} \\ Y_{old} \\ 1 \end{bmatrix}
$$

**Translation Matrix**

(Homogeneous Coordinates Representation)

2D Translation in Computer Graphics

In this test case we will do a simple triangle transformation

(479,0)   (639,479)

(50,100)   (100,100)

Apply "x"
translation

(50,50)   (100,50)   (100,50) (150,50)

(0,0)   (639,0)

After performing translation the triangle will move to the right. Transform matrix will be as following

$$\begin{bmatrix} 1 & 0 & 50 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$
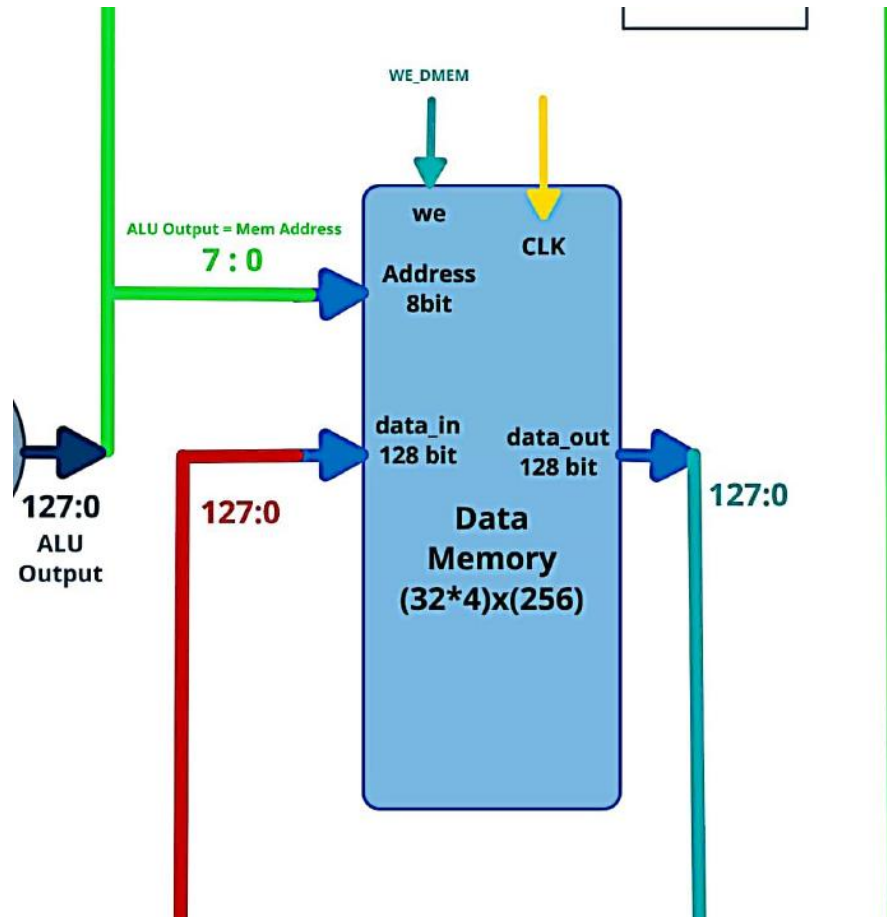
We will preload data into Data_Memory with needed vertices & transform matrix starting from address 150(you can modify this offset)

Addr	Data
150	Triangle V_1 $(v_x, v_y, 0, 0)$
151	Triangle V_2 $(v_x, v_y, 0, 0)$
152	Triangle V_3 $(v_x, v_y, 0, 0)$
153	Matrix Row 1 (r_0, r_1, r_2)
154	Matrix Row 2 (r_0, r_1, r_2)
155	Matrix Row 3 (r_0, r_1, r_2)
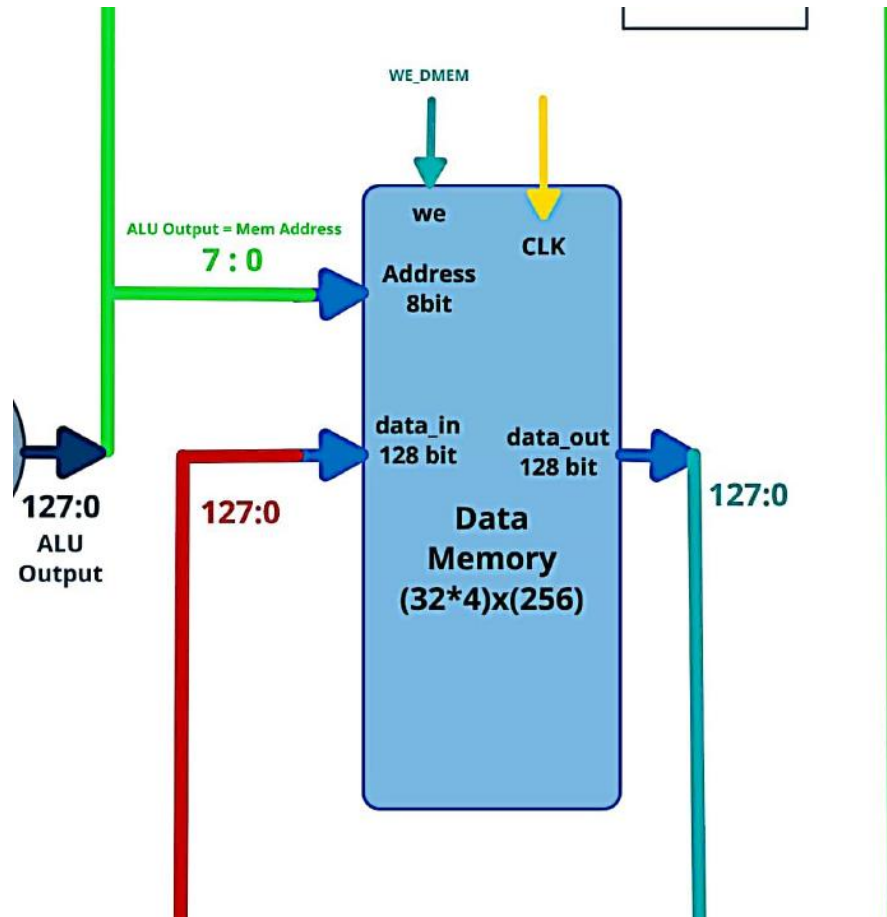
We will store transformed vertices in Data_Memory starting from address 200 (you can modify this offset)

Addr	Data
200	Transformed Triangle V_1 (0,0, 0, v_x)
201	Transformed Triangle V_1 (0,0, 0, v_y)
~~202~~	~~Transformed Triangle V_1 (0,0, 0, v_z)~~
202	Transformed Triangle V_2 (0,0, 0, v_x)
203	Transformed Triangle V_2 (0,0, 0, v_y)
~~205~~	~~Transformed Triangle V_2 (0,0, 0, v_z)~~
...	Transformed Triangle V_3 ...