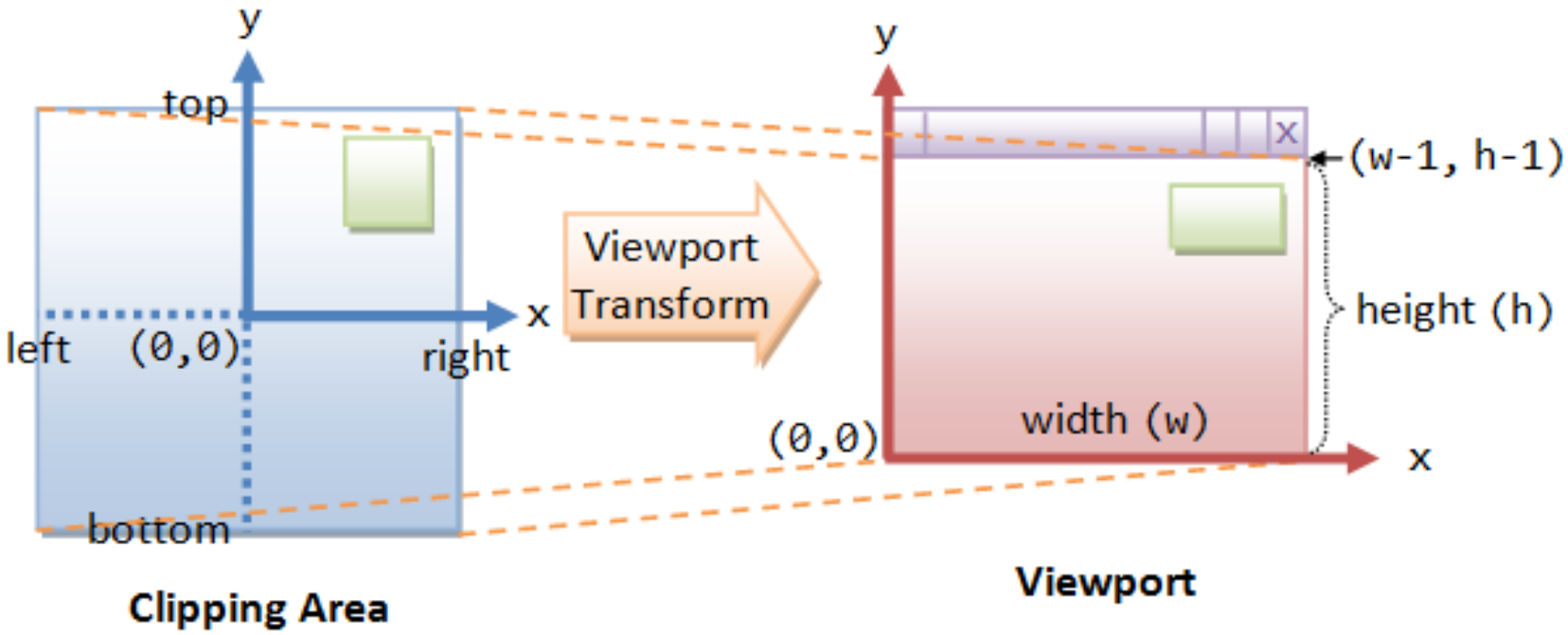
การมองใน 2 มิติ
2D viewing

พื้นที่การวาดของ OpenGL



Clipping Area and Viewport: Objects will be distorted if the aspect ratios of the clipping area and viewport are different.

https://www3.ntu.edu.sg/home/ehchua/programming/opengl/CG_Introduction.html

พื้นที่การวาดของ OpenGL

```
void gluOrtho2D(GLdouble left, GLdouble right, GLdouble bottom, GLdouble top)
   // The default clipping area is (-1.0, 1.0, -1.0, 1.0) in OpenGL coordinates,
   // i.e., 2x2 square centered at the origin.
```

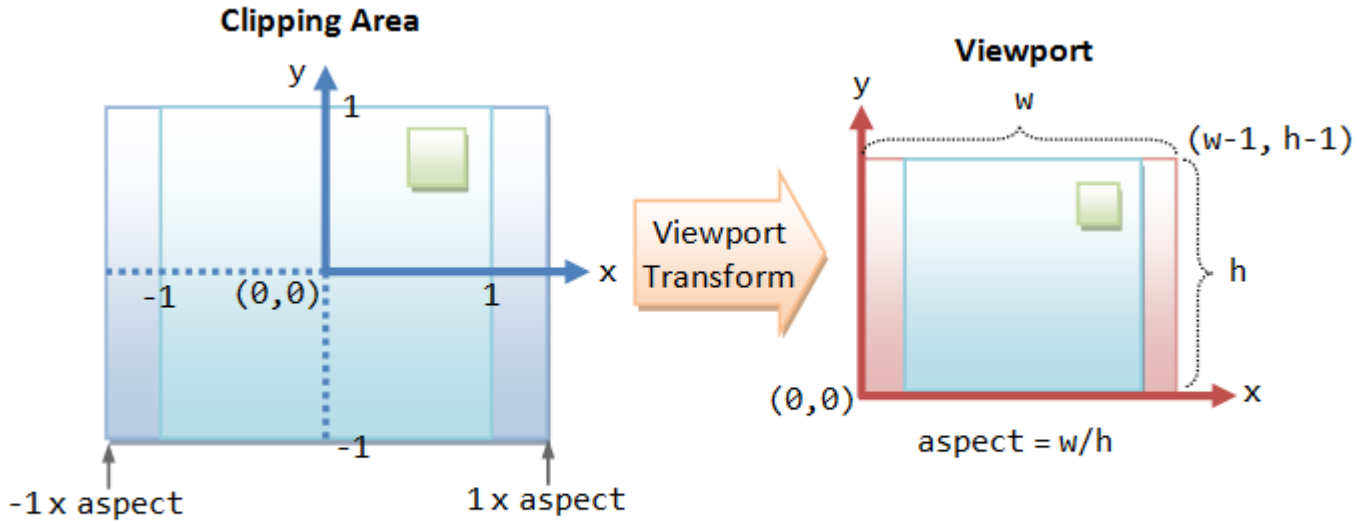
```
// Set to 2D orthographic projection with the specified clipping area
glMatrixMode(GL_PROJECTION);      // Select the Projection matrix for operation
glLoadIdentity();                 // Reset Projection matrix
gluOrtho2D(-1.0, 1.0, -1.0, 1.0); // Set clipping area's left, right, bottom, top
```

```
void glViewport(GLint xTopLeft, GLint yTopLeft, GLsizei width, GLsizei height)
```

การปรับสัดส่วน

```
GLfloat aspect = (GLfloat)width / (GLfloat)height;
```

```
glViewport(0, 0, width, height);
```



Clipping Area and Viewport: same aspect ratio for the clipping area and viewport to ensure that the objects are not distorted.

```
glMatrixMode(GL_PROJECTION);
glLoadIdentity();
if (width >= height) {
   gluOrtho2D(-1.0 * aspect, 1.0 * aspect, -1.0, 1.0);
} else {
   gluOrtho2D(-1.0, 1.0, -1.0 / aspect, 1.0 / aspect);
}
```