Computer Graphics HW4

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1. main.cpp

(1) Generate a texture and create mipmap

void glGenTextures(GLsizei n, GLuint * textures);
n: Specifies the number of texture names to be generated.
textures: Specifies an array in which the generated texture names are stored.

void glBindTexture(GLenum target, GLuint texture);
target: Specifies the target to which the texture is bound.
texture: Specifies the name of a texture.

```
void glTexImage2D(GLenum target,
                  GLint level,
                  GLint internalformat,
                  GLsizei width,
                  GLsizei height,
                  GLint border,
                  GLenum format,
                  GLenum type,
                  const GLvoid * data);
```

target: Specifies the target texture.
level: Specifies the level-of-detail number.
internalformat: Specifies the number of color components in the texture.
width: Specifies the width of the texture image.
height: Specifies the height of the texture image.
border: This value must be 0.
format: Specifies the format of the pixel data.
type: Specifies the data type of the pixel data.
data: Specifies a pointer to the image data in memory.

void glGenerateMipmap(GLenum target);
target: Specifies the target to which the texture object is bound for glGenerateMipmap.

(2) Manually change texture parameters

mag_linear
True: do magnification by linear sampling
False: do magnification by nearest sampling

min_linear
True: do minification by linear sampling
False: do minification by nearest sampling

warp_clamp
True: apply clamp mode to s-axis and t-axis
False: apply repeat mode to s-axis and t-axis

(3) Bind the texture

Bind textures to each group according to their texture numbers.

(4) Get the location of the texture uniform variable

texture uniform variable: tex

(5) show information

參考範例印出current mode, model index, control instructions, model info, camera info, lighting info以及texture parameter。

current mode:
分為main mode及sub mode兩個部分。main mode會根據cur_main_mode的值印出對應的模式；sub mode則是根據cur_sub_mode決定印出的內容。

model idx:
印出cur_idx的值。

model info:
將Model struct內的position, scale, rotation印出。

camera info:
將Camera struct內的position, center, upVector印出。

light info:
同HW3，根據兩邊模型的光源種類決定印出的內容。若相同則只會印出一種，不同則兩種都會印出。兩邊共通的內容是LightInfo struct內的position, ambient, diffuse和specular。若是point light則還會印出constantAttenuation,linearAttenuation以及quadraticAttenuation。

texture parameter:
將mag_linear, min_linear及warp_clamp的值印出。

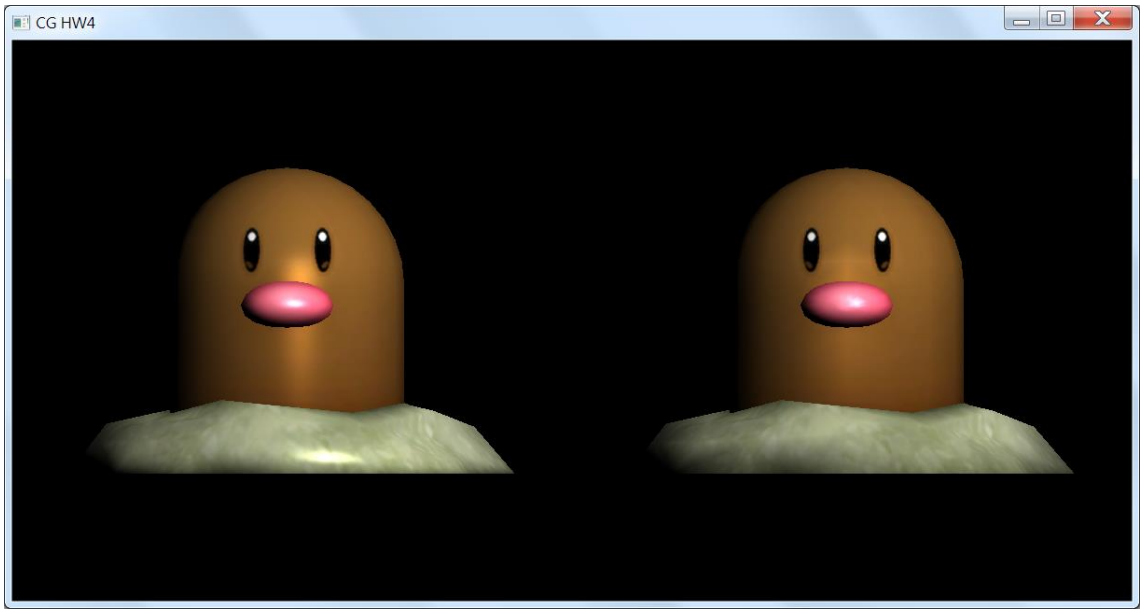
2. shader.frag

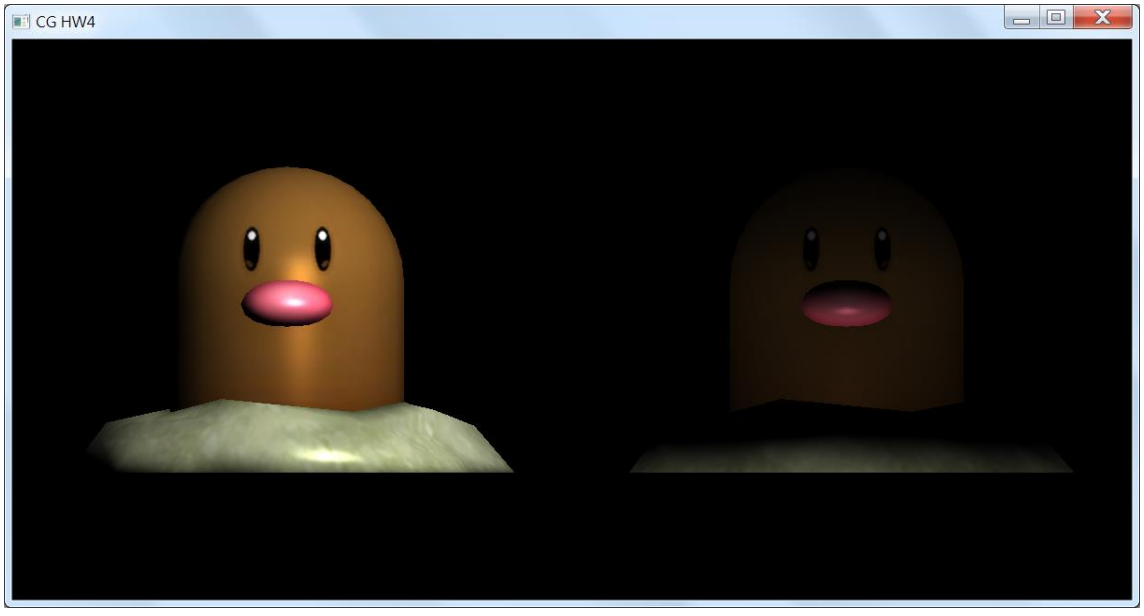
(1) [TODO]

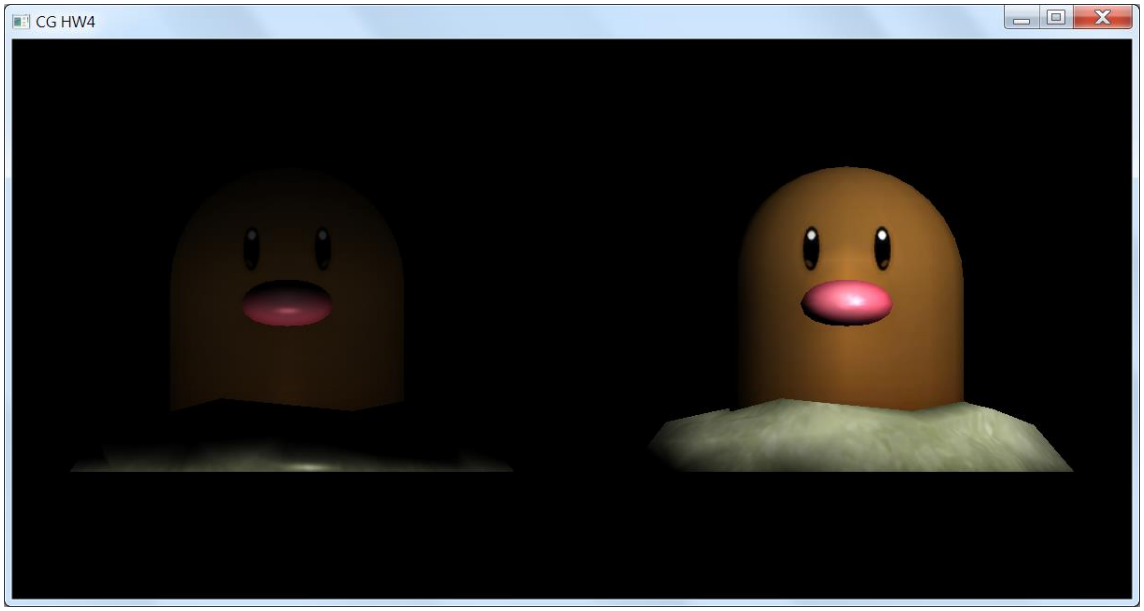
gvec4 texture(gsampler2D sampler, vec2 P, [float bias]);
把 2Dsampler(tex)及 texture coordinate(f_texcoord)填入即可。

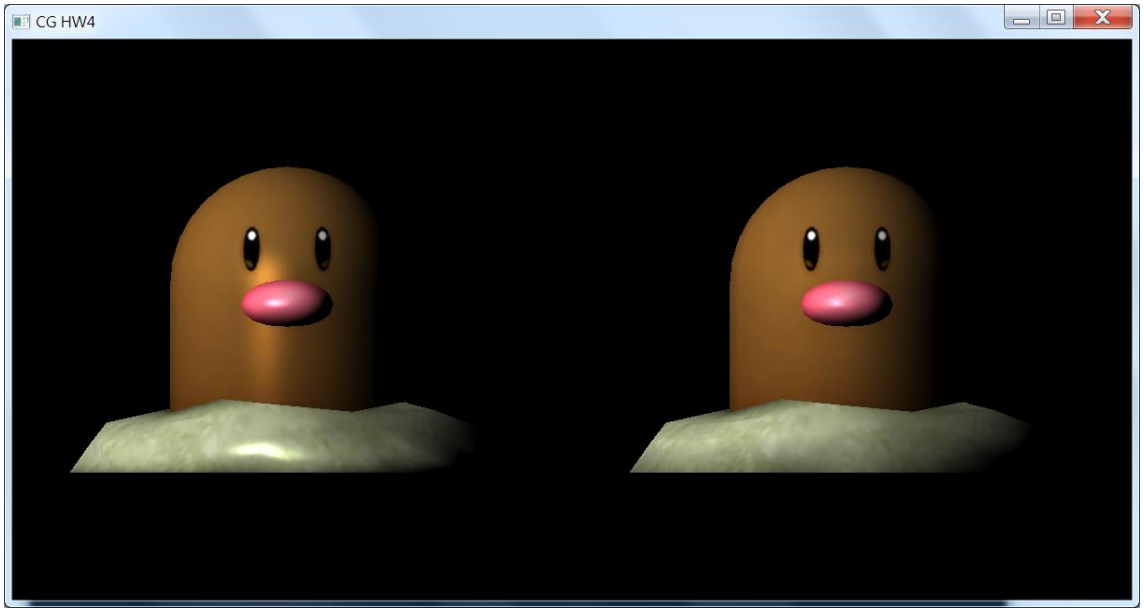
fragColor = texColor * fragColor
將 texture 貼到 fragment 上。

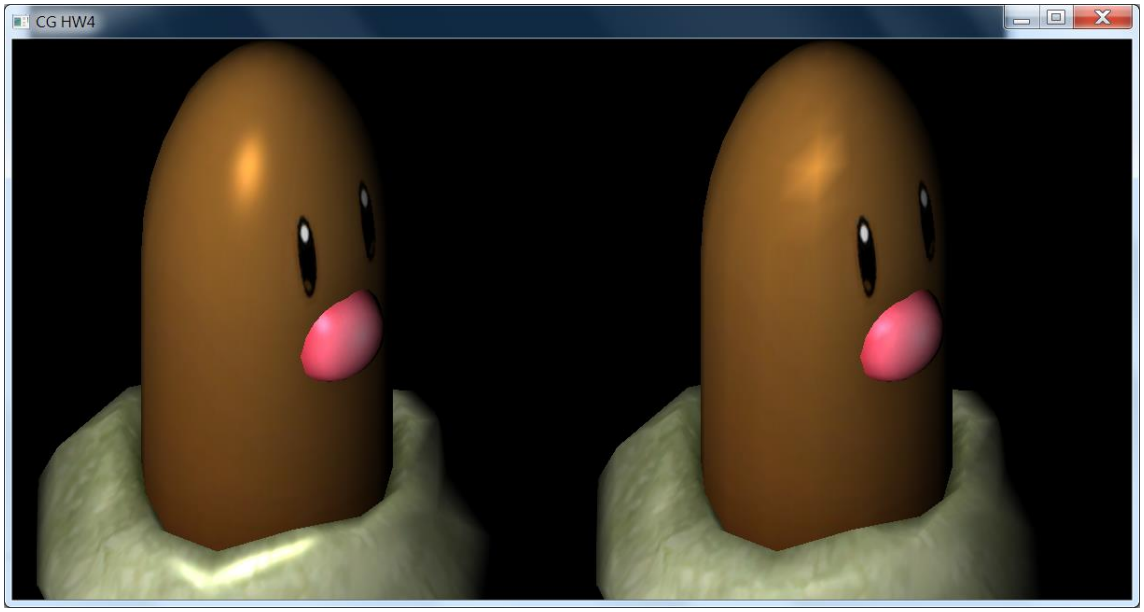
3. Screenshots






CG HW4


CG HW4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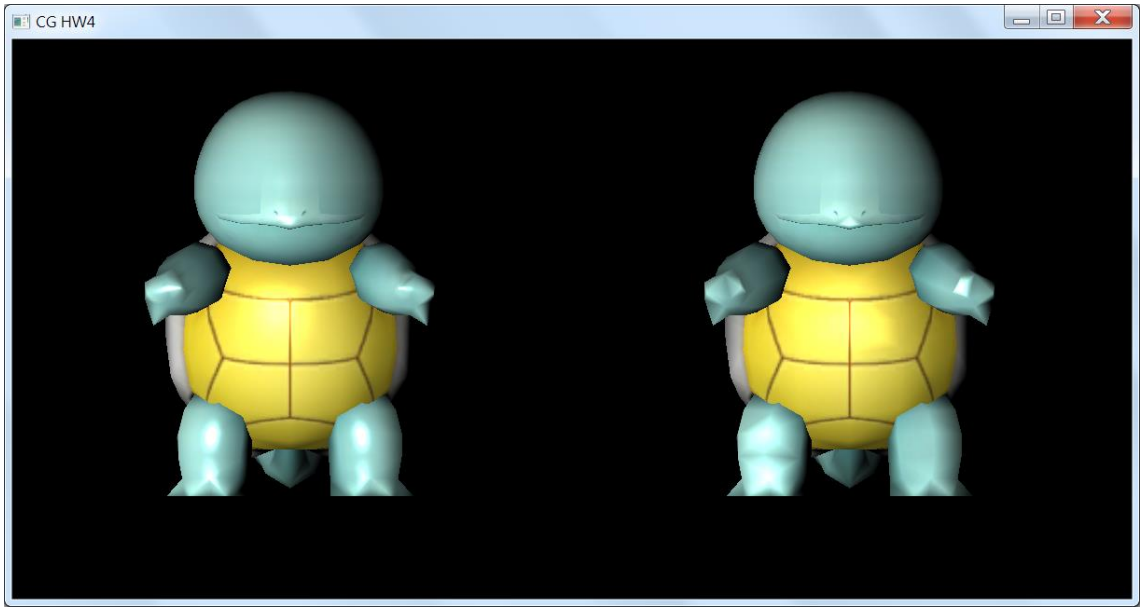
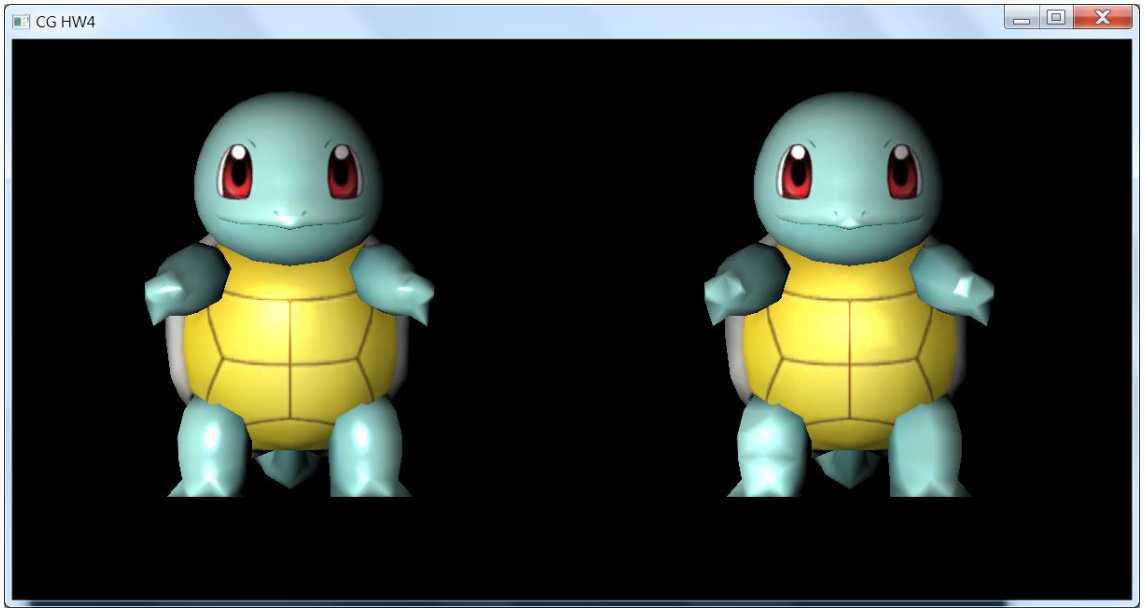
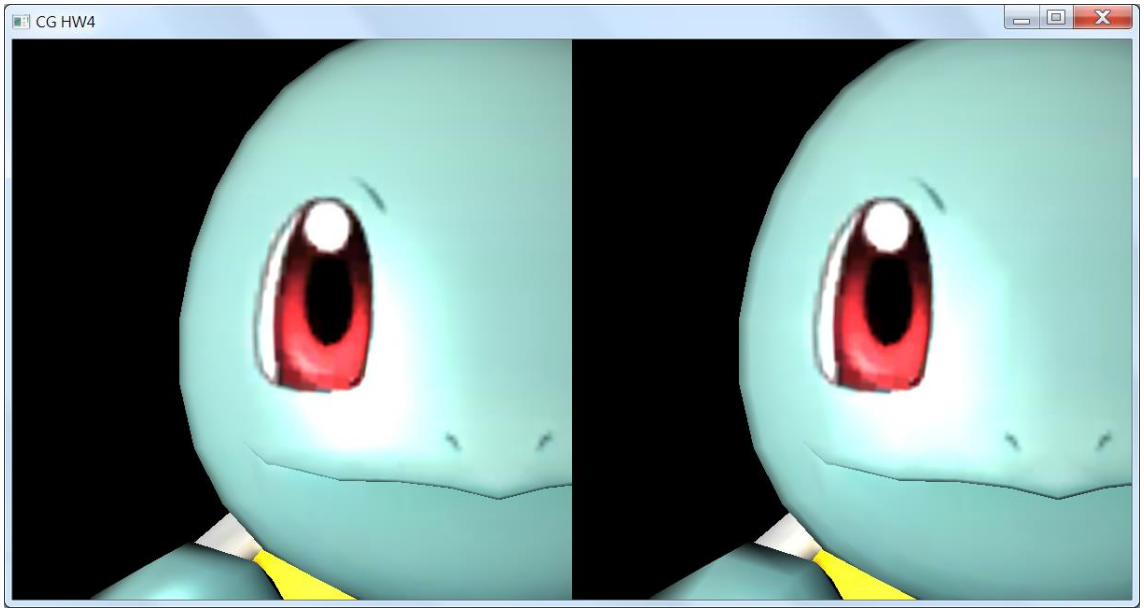
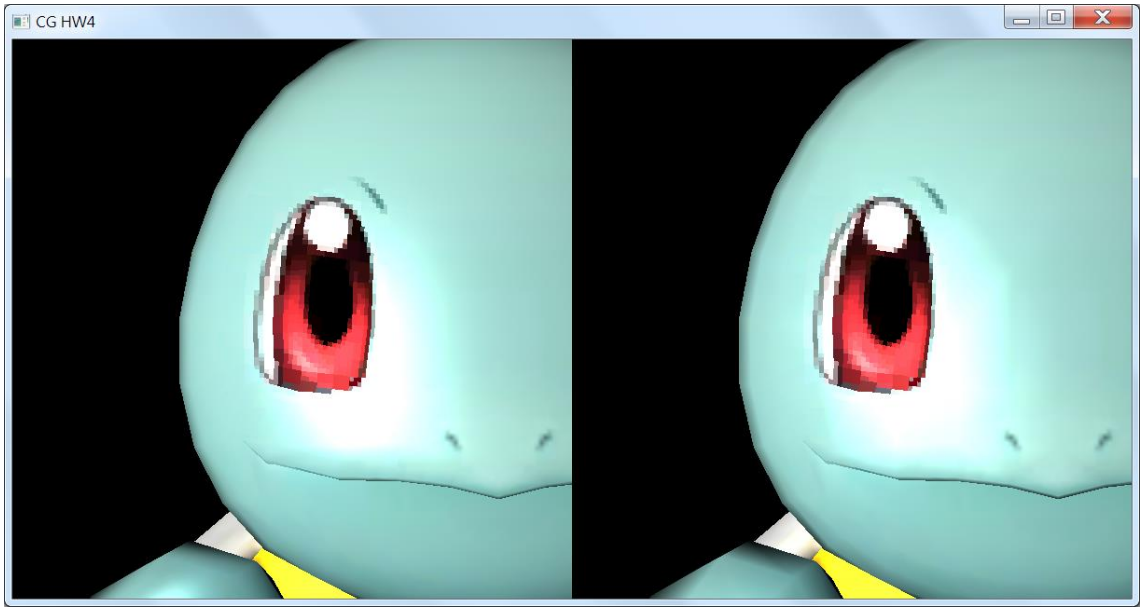
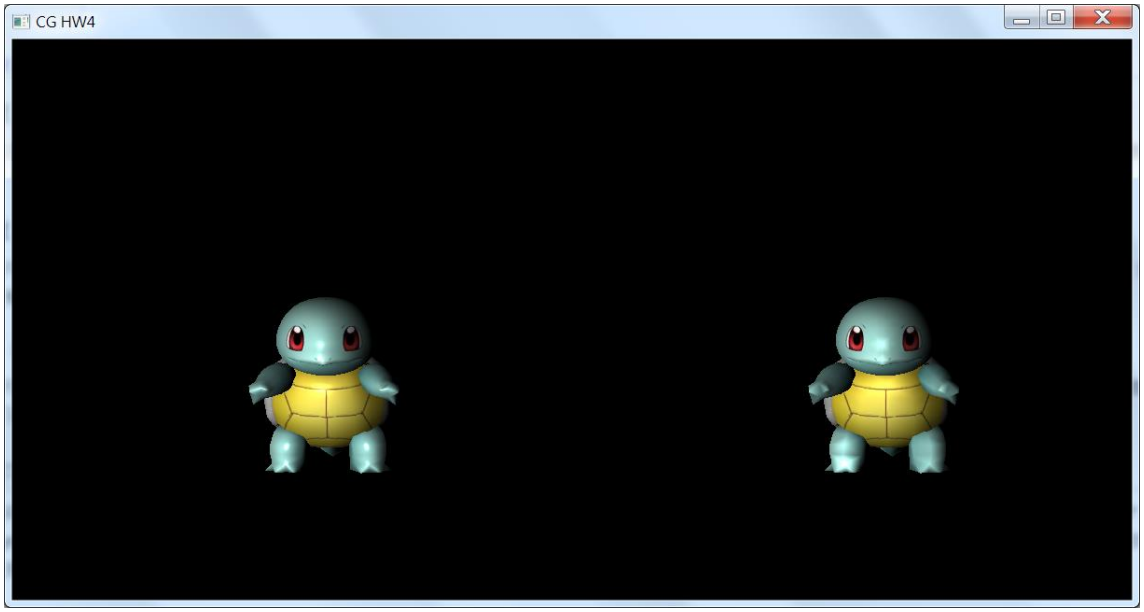
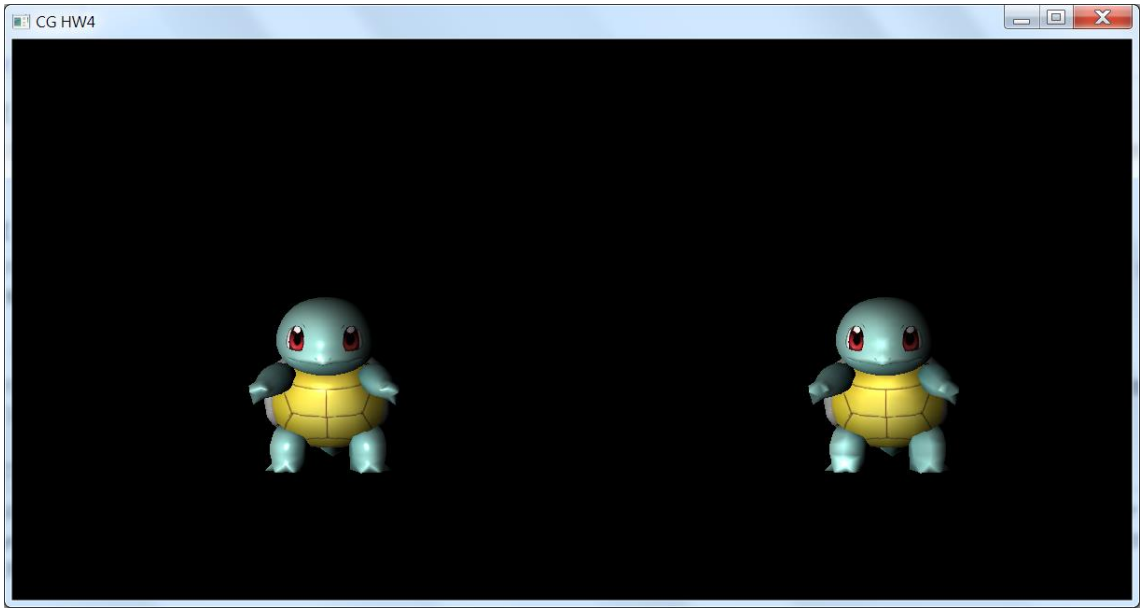

CG HW4


CG HW4


CG HW4


CG HW4


CG HW4


CG HW4