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CS351: Intro to Computer Graphics – Report of Project B:

Petting a dog while you can float in the sky like a cloud

User's Guide:

1. Goals:

✧ My first goal is to create a cute world and let people can walk in the world the way they want. I want to make sure they can change the direction they are looking at. Also, they can decide to move forward or move backward (causing zooming in or zooming out).

✧ The second goal is to learn the inside work of "lens" on canvas and figure out all the transactions between different coordinates.

✧ My third goal is to understand the "quaternion".

✧ My fourth goal of mine is to realize a resizable canvas in HTML.

2. User's Instructions:

Table 1 Function Summary

Interaction	Reaction
"b/B" key	Press "b/B" to show the bone. Press again to remove it
"WASD" keys	Control bone's position, bone's position can influence Peanut's (the dog) running speed. Making bone close to Peanut to let him run. Making bone far away to make Peanut walk. "W/S" move the bone up/down. "A/D" turns the bone left/right.
"Sit/Run" button	Press this button to pet the dog. Tell him to sit or run
"IJKL" keys	Control the view angle without moving the standing point. "I/K" rotate view up/down. "J/L" rotate view left/right.
"←↑→↓" keys	Control the audience's position. ("↑" Go forward, "↓" go backward, "←" strafe left, "→" strafe right).
"c/C" key	Press "c/C" to change the left viewport to the cloud's view. Press again to return. The cloud in the scene always moving randomly.
Mouse drag	Drag the mouse on the screen to rotate the bone (rotation direction based on your view direction).
"Clear" button	Press "Clear" to clear the accumulation degree for bone (reset the bone).
"Submit" button	Type in your wanted degree to change the whole object from a different angle (inherit from project A).

3. Results

3.1. "IJKL" keys to change the viewing direction:

Users can press "J/L" to turn left/right. Or press "I/K" to look up/down.

(If there's no figures, open Console, please!)

Type in different angle to see the scene! -- 0 for reset

g_angle01= 0.00000
New Current Angle (-180 < x < +180 deg): [ ] [Submit]

Try press "B" and find what will happen!
Current Quaternion: w + xi + yj + zk where (i,j,k) are 3-way imaginary numbers:
X=0i, Y=0j, Z=0k, W=1.
length=1.

Figure 1 Original view direction

(If there's no figures, open Console, please!)

Type in different angle to see the scene! -- 0 for reset

g_angle01= 0.00000
New Current Angle (-180 < x < +180 deg): [ ] [Submit]

Try press "B" and find what will happen!
Current Quaternion: w + xi + yj + zk where (i,j,k) are 3-way imaginary numbers:
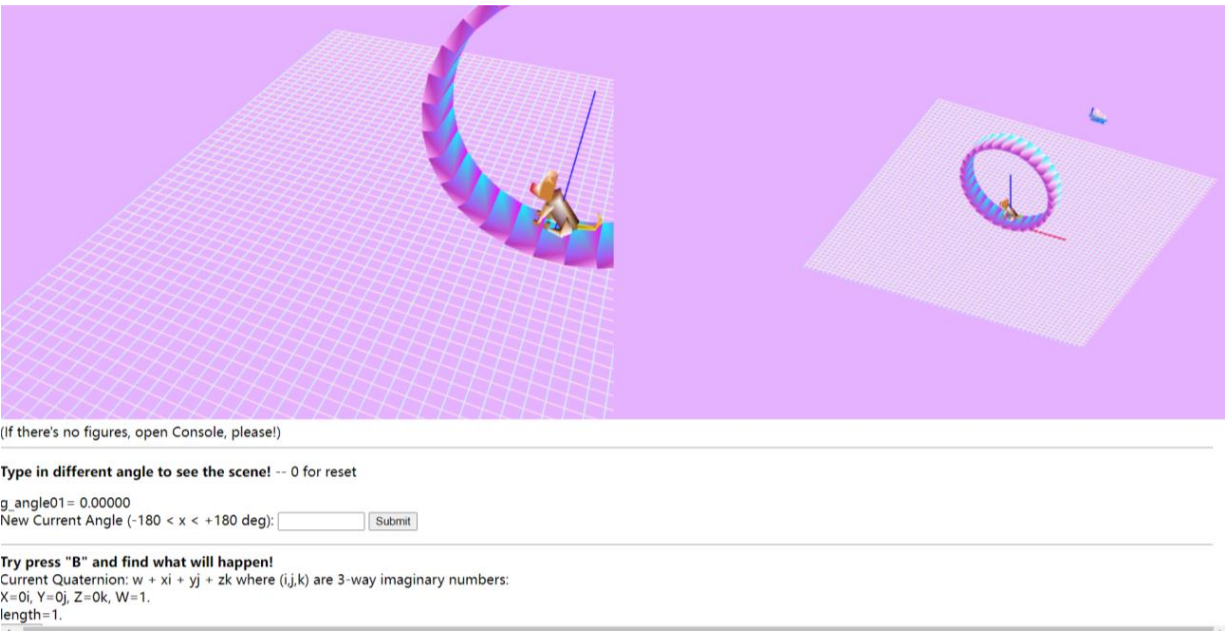X=0i, Y=0j, Z=0k, W=1.
length=1.

Figure 2 Turn left

3.2. "←↑→↓" keys to move:

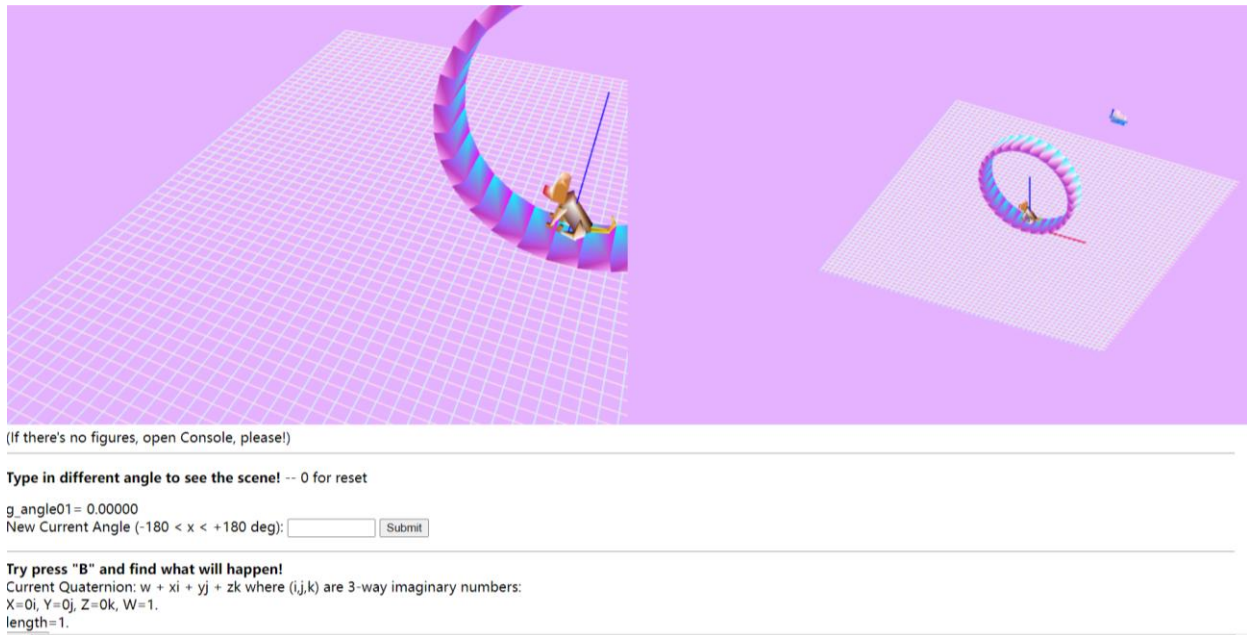Users can press "↑↓" to move forward/backward. Or press "←→" to strafe left or right.

(If there's no figures, open Console, please!)

Type in different angle to see the scene! -- 0 for reset

g_angle01 = 0.00000
New Current Angle (-180 < x < +180 deg): [   ] [Submit]

Try press "B" and find what will happen!
Current Quaternion: w + xi + yj + zk where (i,j,k) are 3-way imaginary numbers:
X=0i, Y=0j, Z=0k, W=1.
length=1.

Figure 3 View before strafing

(If there's no figures, open Console, please!)

Type in different angle to see the scene! -- 0 for reset

g_angle01 = 0.00000
New Current Angle (-180 < x < +180 deg): [   ] [Submit]

Try press "B" and find what will happen!
Current Quaternion: w + xi + yj + zk where (i,j,k) are 3-way imaginary numbers:
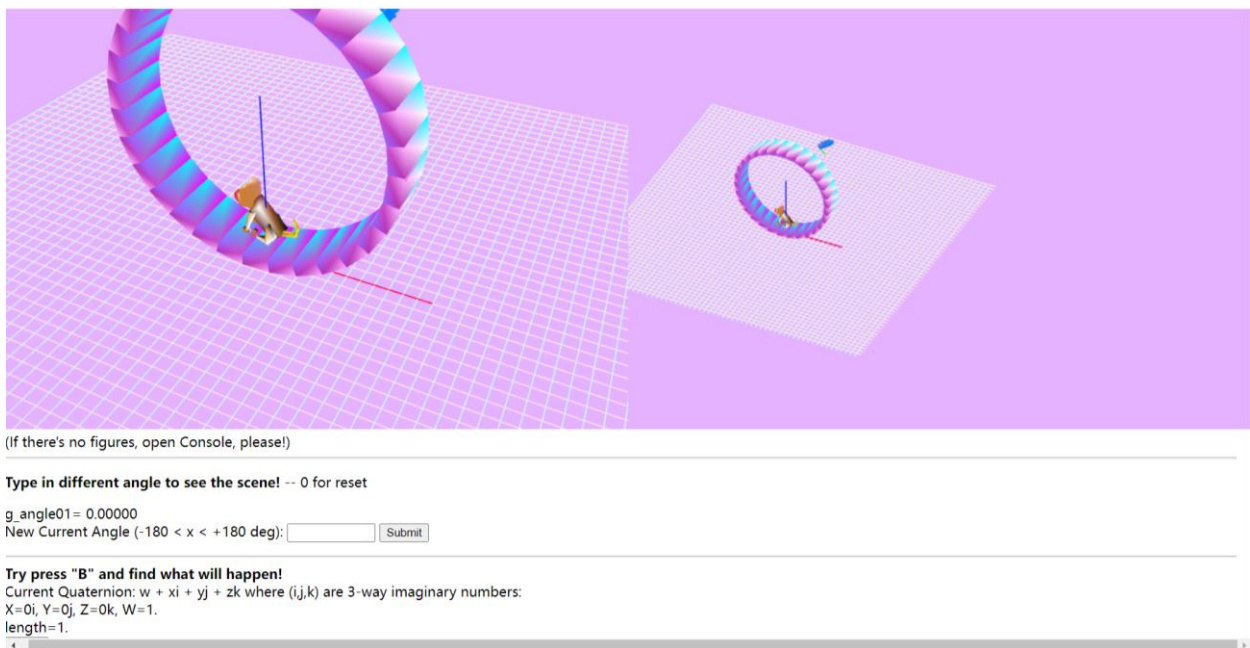X=0i, Y=0j, Z=0k, W=1.
length=1.

Figure 4 Strafe right without changing view direction

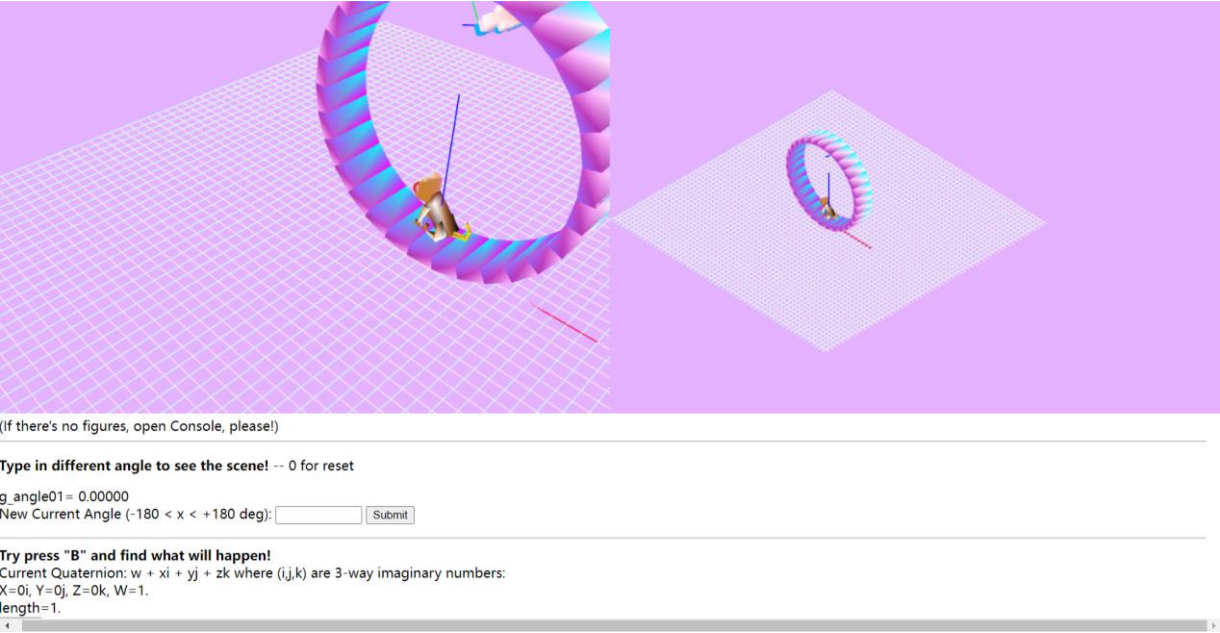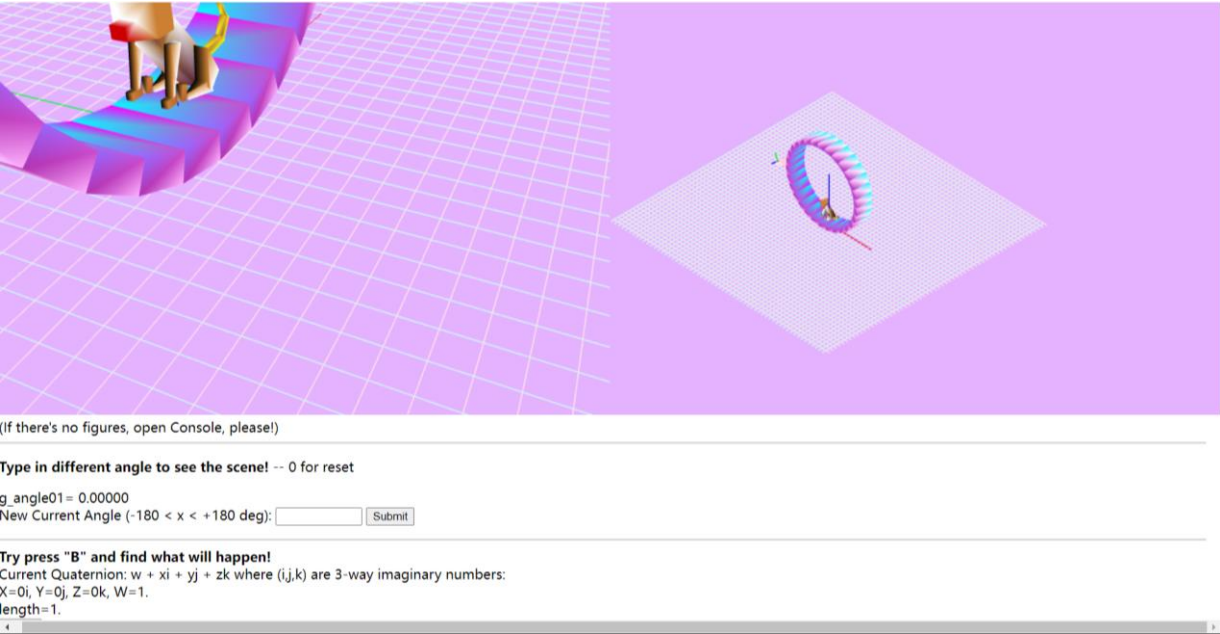**3.3. Press the "c/C" key to change the left viewport as the view from the randomly moving cloud**

(If there's no figures, open Console, please!)

Type in different angle to see the scene! -- 0 for reset

g_angle01= 0.00000
New Current Angle (-180 < x < +180 deg): [   ] [Submit]

Try press "B" and find what will happen!
Current Quaternion: w + xi + yj + zk where (i,j,k) are 3-way imaginary numbers:
X=0i, Y=0j, Z=0k, W=1.
length=1.

Figure 5 Normal viewport

(If there's no figures, open Console, please!)

Type in different angle to see the scene! -- 0 for reset

g_angle01= 0.00000
New Current Angle (-180 < x < +180 deg): [   ] [Submit]

Try press "B" and find what will happen!
Current Quaternion: w + xi + yj + zk where (i,j,k) are 3-way imaginary numbers:
X=0i, Y=0j, Z=0k, W=1.
length=1.

Figure 6 Attach the viewport to the cloud

3.4. Rotate the bone with mouse dragging:

Users can rotate the bone vertically or horizontally. The rotation direction is based on your view direction (left/right rotation works on your view direction's z-axis, up/down rotation works on your view direction's x-axis).
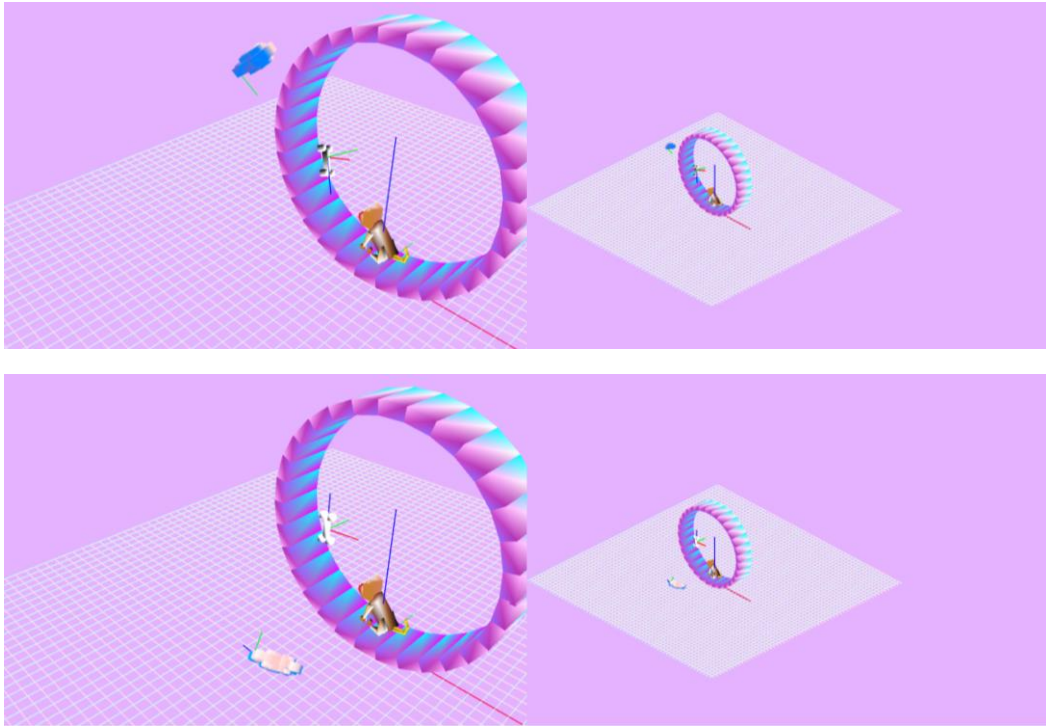

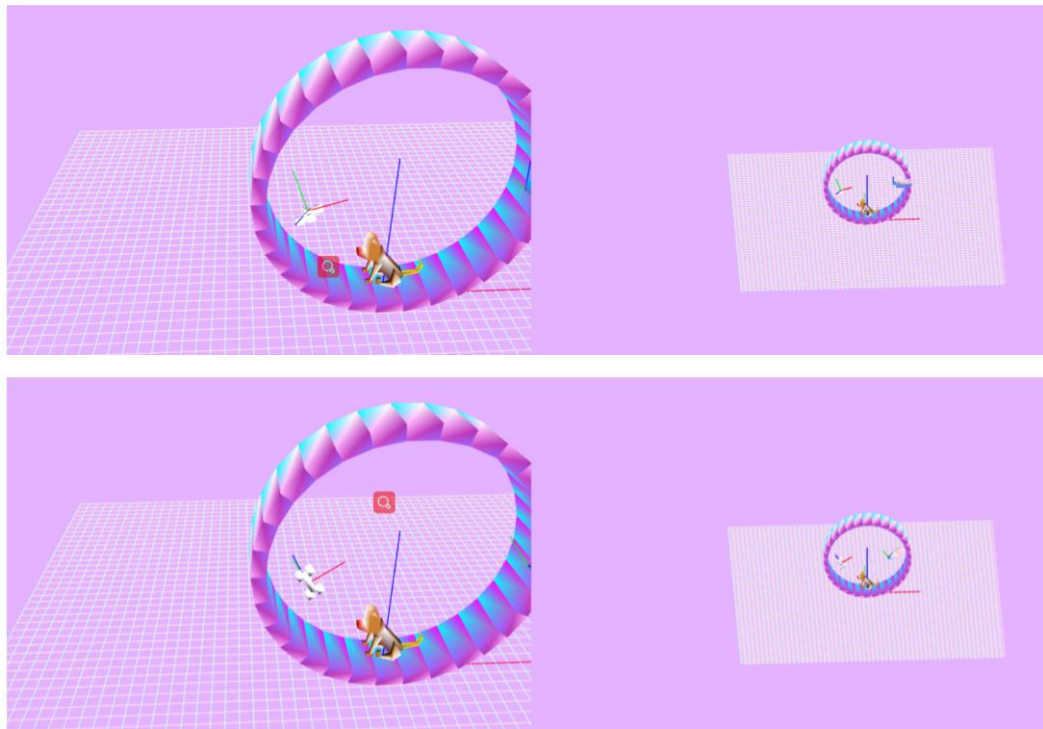Figure 7 Vertically dragging from view direction 1

Figure 8 Vertically dragging from view direction 2
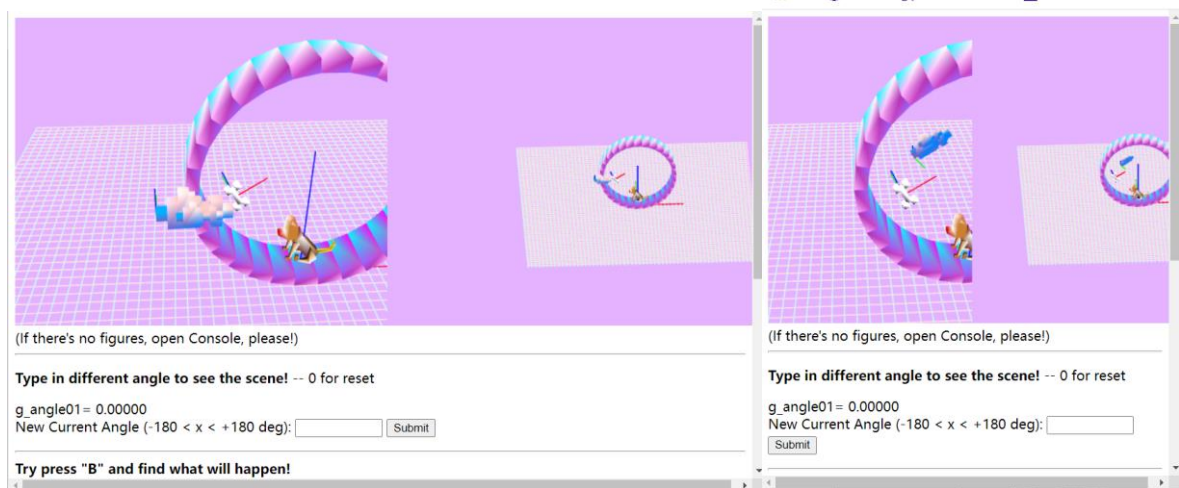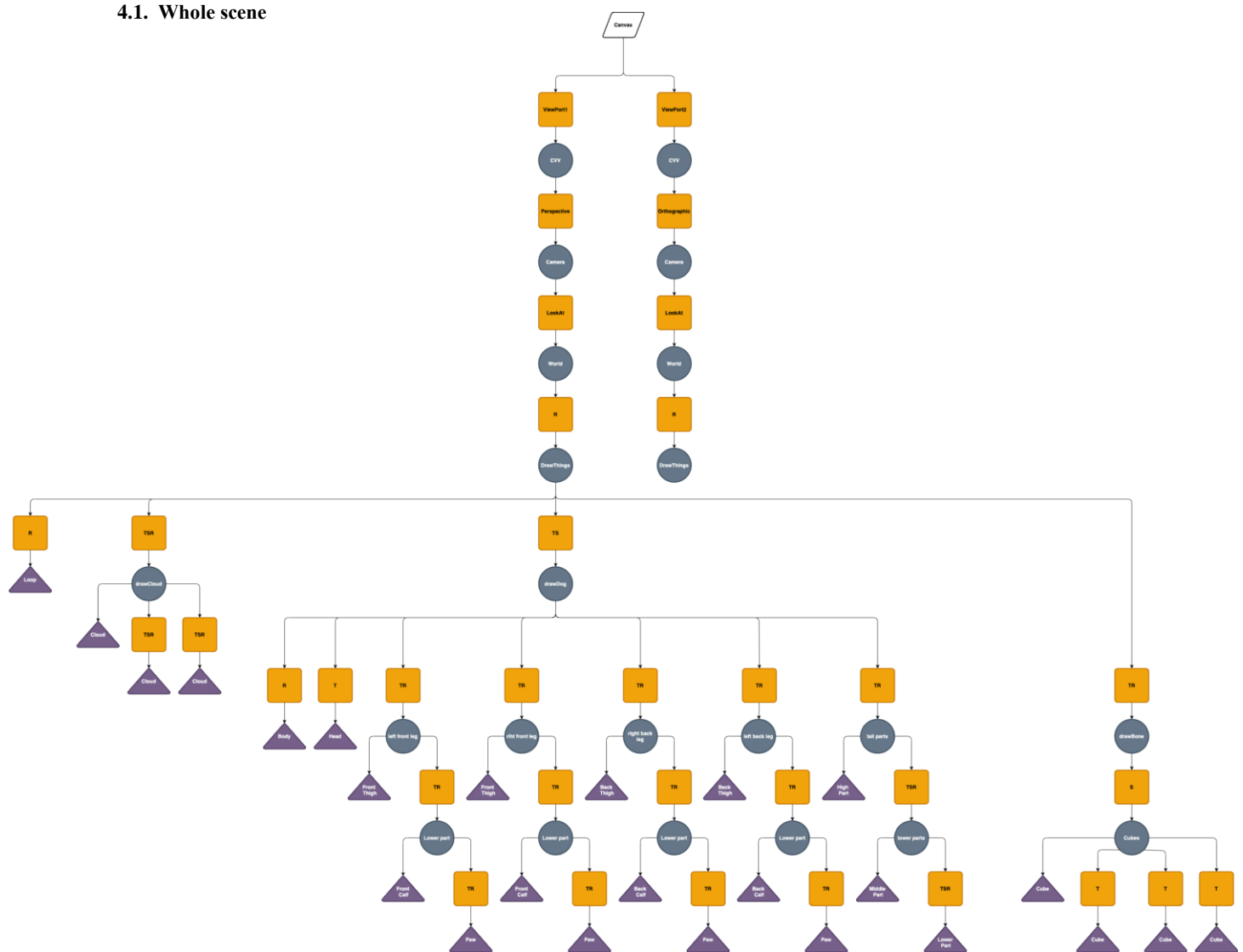
3.5. Flexible canvas size without scene distortion

Figure 9 Canvas adjustment without distortion

4. Scene Graph

4.1. Whole scene

4.2. Zoom in: