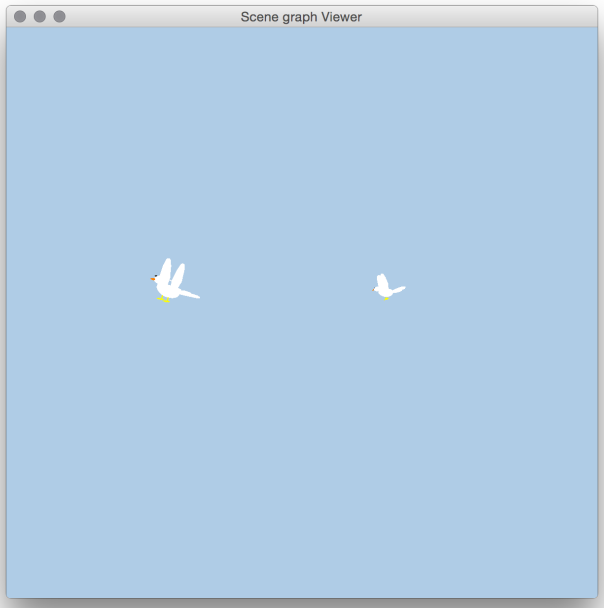
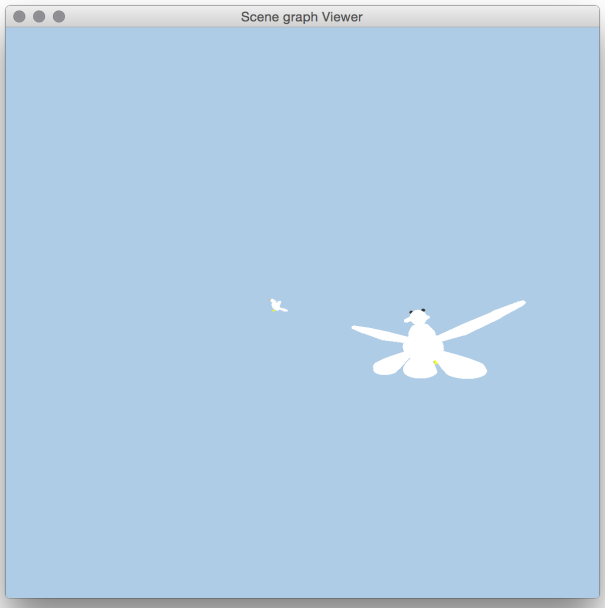
Birds Scene Graph

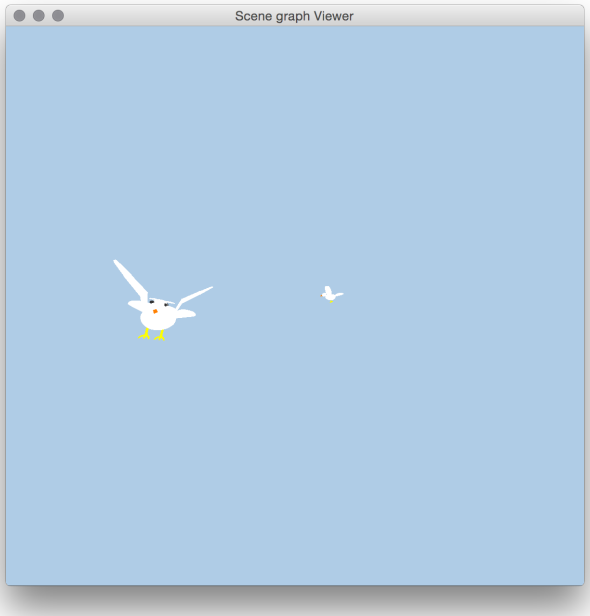
Model

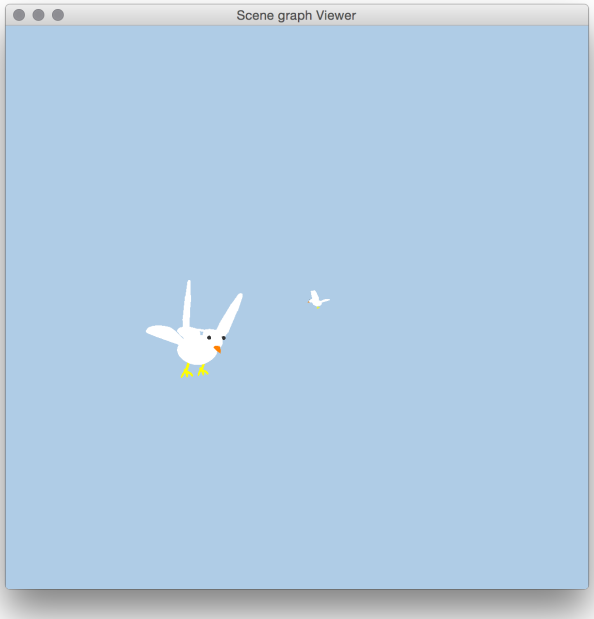
Birds world is a scene of two birds that move their wings up and down and fly in the sky along a pre-defined path.

Bird model has 2 main parts — head and body. Head consists of two eyes (right and left), beak, crest (three feathers). Body consists of torso, two wings (left and right), two legs (left and right), tail. Wing consists of humerus, ulna and hand, which are connected by joints. Ulna and hand form lower arm part. Leg consists of three toes and leg. Tail is three feathers.









Animation

In birds scene graph, two nodes of wing nodes (lower wing and humerus) and bird model node are animated. Each node is accessed by it's name ("leftwing", "rightwing", "bird", "rightlowerarm", "leftlowerarm"). In the code those nodes are accessed on *lines 25 - 29* in Bird.java

Whole bird model is moving around the center of the world. First, it rotates around y-axes by 90 degrees and translates by radius 350. It animates using time.

```
new Matrix4f()
        .rotate((float) Math.toRadians(sign * 20), 0, 0, 1)
        .rotate(0.01f * time, 0, 1, 0)
        .translate(0, 0, sign * 350)
        .rotate(sign * 90, 0, 1, 0)
```

Wings are rotated by an angle around bird's torso. Lower arm is rotated by an elbow angle around joint that connects it with humerus.

```
wing.setAnimationTransform(new Matrix4f().rotate(angle, 0, 0, 1));
ulna.setAnimationTransform(new Matrix4f().rotate(elbowangle, 0, 0, 1));
```