

CGRA350 Real-time 3D Computer Graphics T2/2020

Assignment #2: Primitive Man (15 points)

Assigned: 4th August 2020

Due: **31st August 2020**

The main objective of the assignment is to create a skeleton model called a "Primitive Man". Your task is to build the model and its arbitrary poses using hierarchical modelling techniques. The goals of this assignment are to:

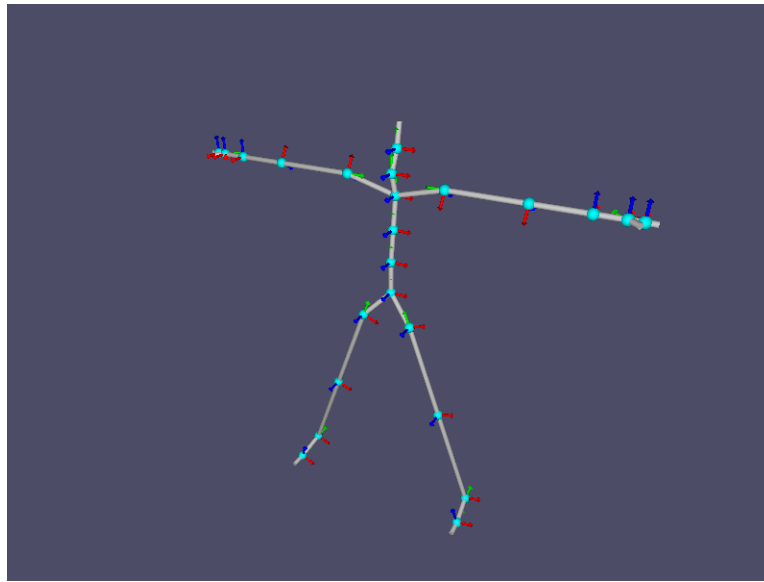


Figure 1: Primitive Man: an example of a primitive skeleton model.

- Implement a hierarchical model using basic 3D affine transformations (translation, rotation, scaling) of the basic primitives (e.g. sphere, cone, and cylinder).
- Understand skeleton formats such as ASF (ASCII Skeleton Format), which is a format for motion capture data.
- Understand basic forward kinematics to create arbitrary poses of the skeleton.

Turn in procedure

You should submit your work as a zip file using the ECS submission system. Please name your file as <LastName><FirstName>-Assignment<X>.zip where X is the assignment number. When your file is unzipped you should have:

1. The C++ and shader programs you have written. You should use files in the form of the samples given, rather than producing files from scratch. This will help us follow your code.

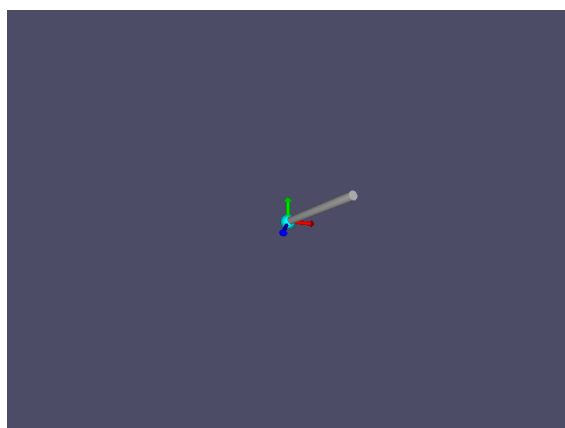
2. Your report in PDF format (either typed directly or scanned in).
3. If the question asks you to write code to make images, provide sample images created by your program. You can save these by taking a screenshot. Alternatively you can include these in your PDF report.
4. Any other information or supporting documentation to help us run and evaluate your submission.

If your programs fail on the machines used for grading, you may be asked to bring in your system to demonstrate that the files you submitted functioned in the environment you worked in.

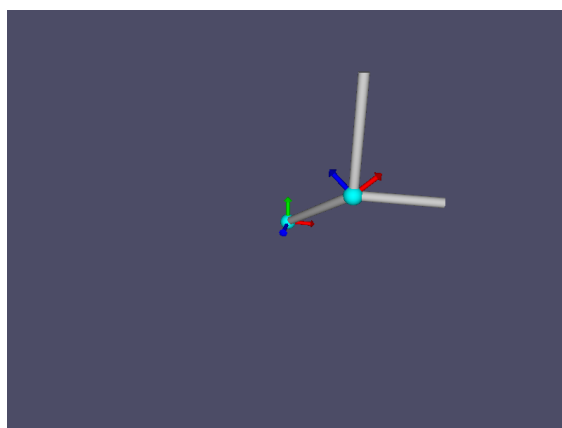
Part 1: Skeleton rendering and animation (13 points total)

Core (7 points)

Create program to draw the skeleton file `priman.asf`. Your task is to draw a whole skeleton properly using the hierarchy of bones. We have provided two additional files, `testskeleton1.asf` and `testskeleton2.asf` to help you debug your program.



(a) testskeleton1.asf



(b) testskeleton2.asf

Figure 2: The zoomed-in and rotated output of the supplied test files.

Bone Light-grey cylinder, oriented in the bone direction.

Joint Cyan sphere slightly wider than the bone.

Axis An arrow made up of a thin-cylinder and a small cone. Each arrow for the X, Y, Z axes are red, green and blue respectively. The axis are oriented using the bone basis.

Completion (4 points)

1. Create a set of 3 arbitrary poses for your skeleton. The implementation of the pose is up to you; the joint rotations could be hard-coded, or could read from a file you have created. Describe what your pose is in your report (e.g. jumping, punching, dabbing).
2. Create a walking pose for your primitive man
3. Create a seated pose for your primitive man
4. Each pose (a total of 3 different poses) should be switched using some form of user input.

Challenge (2 points)

Create a “motion capture player” for your skeleton. Use the provided AMC player to load in frame data and create a player that will automatically play the animation by setting the skeleton in sequential poses each frame. Use two skeletons loaded with separate skeleton files `subject1.asf` and `subject2.asf` and separate animation files `interaction_s1.asf` and `interaction_s2.asf` respectively.

Part 2: Writing (2 points total)

Report (2 points)

Submit a 1-2-page PDF document outlining your experiences. In this report, you should include:

- Brief introduction of your functions in your programs, including how to run your program to get the desired results.
- The results of core, completion and challenge (depending on how much you have done) including images produced by your programs.