

# Frozenbyte Programming Task Documentation

## GENERAL INFORMATION

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Hi Frozenbyte people!

Thank you for considering my application and for giving me this assignment. Here I will do my best to provide general information about what I have done for this task.

This task took **five days** from me. I spent around **two days** collecting necessary information from different sources, including scientific papers, computer graphics blogs, and the Advanced Computer Graphics course slides with Prof. Jakko Lehtinen at Aalto University. I spent **two days** on the actual implementation and **one day** for the required documentation.

I have used **no external libraries** for this task. Besides, I tried to use the tools that **fb** namespace is providing when needed, as required.

Although the code itself should be pretty much self-explanatory, I accompanied all the changes I made in the project with comprehensive comments so that a reader can follow up on the treat easily.

These are the **materials** I used along the way:

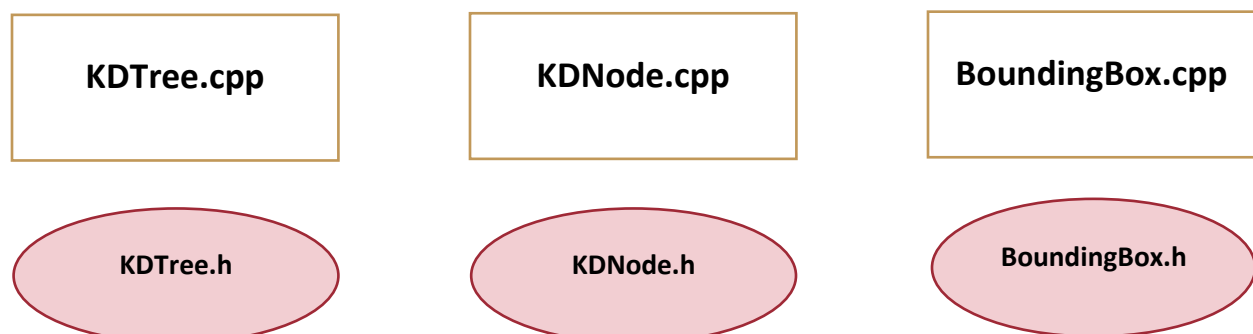
- 1- Game Engine Architecture book by Jason Gregory
- 2- Advanced Computer Graphics course materials by Jakko Lehtinen
- 3- [https://www.flipcode.com/archives/Raytracing\\_Topics\\_Techniques-Part\\_7\\_Kd-Trees\\_and\\_More\\_Speed.shtml](https://www.flipcode.com/archives/Raytracing_Topics_Techniques-Part_7_Kd-Trees_and_More_Speed.shtml)

## TECHNICAL INFORMATION

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I have implemented the **K-D Tree spatial subdivision algorithm** by adding **three** classes to the given source code. I also had to do some minor modifications to other classes like **Triangle** and **Model**.

Here are all the files I have added to the project:



The only technical problem I had along the way was that I wanted to split triangles into three triangles when each one hits the bounding box planes so that I could sort them out probably between each child, however; some of the triangles in the model were too small to decompose into any smaller triangles (float point precision was not enough). So, I needed to re-implement all the provided classes in higher precision like doubles, which was not actually needed for this task as assigning such triangles to both children would also give us the same result in the level.

In the end, I would like to appreciate the time you put on reviewing this task and my application. Hope to see you soon!

Regards, Amir Alizadeh 31/08/2020