

Guide to the Programming Interview

Dear Candidate,

Thank you for applying to ImFusion. This document contains some instructions and general information about our programming interview.

As a member of a company that strives to deliver high-quality software for medical image processing and computer vision, a solid understanding of C++ is essential. Our goal is to develop robust algorithms with good performance, understandable interfaces and a clean architecture. This is particularly important since our software framework is part of numerous clinical products. Thus, as part of our hiring process, we need to assess whether a potential candidate has the right set of skills to contribute to these objectives.

During the interview, we do not expect candidates to master every C++ feature (e.g. move semantics, multi-threading, ...) or to implement advanced algorithms or data structures (e.g. red-black trees). Instead, we are focusing on your understanding of general concepts, problem solving expertise, and your abilities in learning and understanding new things.

The programming interview will consist of two main parts:

1. Code Review

We would like to ask you to perform a code review of the attached files (Octree.h and Octree.cpp). You can find a usage example of that class in UsageExample.cpp. Imagine that a colleague of yours has written this new class to implement an Octree acceleration structure [1]. They opened a pull request and assigned you as reviewer. Please analyze the code and suggest improvements that could be made. You may mention anything that you deem important – for instance aspects of correctness, readability, performance, etc. We will start the technical interview with a discussion of your code review. Therefore, please have the list of your comments ready to share with the interviewer. Preferably, send them an e-mail with the list prior to the interview.

Note: Please do not invest more than one hour max. of your time into this. We understand that you may have other important things to do and do not expect you to necessarily understand every single line of the code.

2. Hands-on Programming

The second part of the technical interview will consist of some hands-on C++ coding, where you will be implementing a small algorithm and/or class.

For remote interviews, you will need a working C++ IDE and compiler of your choice (whatever you prefer) running on your machine. Furthermore, please have a minimal Hello World C++ console application (i.e. a program that prints "Hello world." to stdout) working and ready to share via Skype/Google Hangout.

We appreciate the time you are dedicating to this interview,

The ImFusion Team

[1] An Octree is an acceleration data structure to be used with volumetric images. They hierarchically subdivide the volume into 8 sub-volumes. Each block stores meta information of the voxels contained in the block. In our code example each block stores the minimum and maximum voxel intensity. This information can for instance be leveraged during rendering to identify "empty" areas of the volume (i.e. areas where all voxels are outside a visible range of intensities).

Starting point for further reading: <https://en.wikipedia.org/wiki/Octree>