PixelPower
A Rohde&Schwarz Company

C++ Software Pre-Interview Question

When reviewing answers, due consideration will be given to your experience level with C++.

A single channel digital audio signal is represented as a continuous stream of signed floating point samples, at a rate of 48000 samples per second. The samples are stored and manipulated in fixed size data blocks of 480 samples each. The data is initialised with a 1kHz sine wave, and then goes through these subsequent processing stages:

- a static gain control (i.e. scaling of the audio samples by a constant value)
- a delay of 100 milliseconds.

The processed data is then output as simple numbers in text form to the output console.

Implement this system in C++ as a program that runs indefinitely, continually generating, processing, and outputting data in real-time. Write the code so that the data generation and processing stages can be easily swapped for different ones. Maximise the use of a multi-core CPU by running the different processing stages in parallel, even if this is at the expense of increased input-to-output delay.

Make assumptions where you are unclear about the requirements - the emphasis should be on well structured, robust, and maintainable code. Any C++ compiler can be used together with appropriate external libraries for e.g. threading/signalling/timing (such as the C++ standard template library).