

3. What is one advantage of a compiler (over an interpreter)?

Compiled programs run faster, especially when they are compiled into a directly executable form on the underlying hardware.

4. What is one advantage of an interpreter (over a compiler)?

Interpreted programs tend to be more portable, which means it can run the program on different machines or platforms as they are high-level source code or virtual machine code.

5. What is Just-In-Time compilation good for?

JIT is used to have the benefits of both static compilation and interpretation. It stands as a balanced approach that has running time benefit of native code while still keeping the program relatively small (benefit from interpreted code).

6. Explain the tradeoff between space and time for compiled/JIT-compiled/Interpreted languages.

For compiled languages, the program is translated to native code (code that is directly executable by the machine it is running on). Thus, native code is faster. However, since it is at low-level, it will take more space to “describe” what it is doing to the machine. On the other hand, since interpreted code is high-level, interpreted code is more concise, hence, takes less space. However, since it is not native, which means the machine has to run the code through a given interpreter or virtual machine, it is slower than native code. JIT-compiled is supposed to mediate these tradeoffs between space and time by using different methods such as mixed code (mixing native code and interpreted code) or throw-away code (part of a program could be compiled dynamically if needed).

7. Summarize the benefits of JIT compilation for Java.

As early JVM (Java Virtual Machine) was all interpreters, the running speed was not optimized. Noticing that “interpretation proper only accounted for 68% of execution time” (in one of their experiments), they decided to use JVM bytecode as an intermediate representation for JIT compilation and optimization. Then they looked for other optimization techniques that brought a balance between speed of algorithm execution and speed of the resulting code. Java now can be run on different machines while still having a relatively fast speed.

8. What is a concurrent JIT compiler?

Concurrent JIT compiler can operate as the program is executing in a separate thread or process or even processor.