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**Week 1 Lab Response**

1. How are web documents transferred over the internet?
   1. Many web documents that are transferred over the internet are way too big or complex for the information to be transferred, therefore it is first converted into packets, then sent to the internet exchange point, where it finds its way towards its destination. Each packet has information on it, the most notable ones being the source (where it came from) and destination (where it needs to go). There are many paths that a packet can take to reach its destination. If a path is unavailable, the packet will take a detour and take another path that leads to the destination instead. When all packets reach its destination, it is then reconstructed, and the web document is displayed. If one or all packets do not reach its destination, this is call “packet loss”, and sometimes the web document cannot be displayed or will be missing information. All while this is happening, there are many things happening beneath the surface such as HTTP requests and responses as well as TCP/IP traffic (which is associated to the transit of packets). However, if there is an HTTPS request and response instead, the traffic that is transmitted is encrypted, preventing others from observing the information being sent.
2. How do JavaScript engines work?
   1. JavaScript engines are very quick engines that can execute JavaScript code extremely quickly. Each web browser appears to have their own JavaScript engine that executes code for them. Though this might seem counter intuitive since they’re not using the same JavaScript engine and making it standard, it provides better performance and efficiency due to there being competition. Typically, the compiler needs much information to create executable code to run; this makes it seem detrimental due to JavaScript being a dynamically typed language. However, thanks to the JavaScript engines using what is called Just-In-Time compilation, or JIT compilation, it is able to compile and run code just as fast or even faster than its object-oriented counterparts such as C++ or Java. JIT compilation allows the JavaScript Engine to simultaneously compile and run code, effectively reducing the time required to execute the code. Not only that, but it also has a built in AI system that can make run-time faster. As soon as the JavaScript engine identifies “hot code”, similar code that is compiled a lot, it optimizes the code and uses it if more code like the optimized code appears, thus reducing the run-time. If the optimized code fails, the JavaScript engine then reverts to using the baseline code instead.