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### Senior project proposal (macOS packet analyzer)

The objective of this project is to develop a Packet Analysis application for the macOS platform. Such an application would allow the user to select a specific network interface on their mac, which would display all incoming outgoing packets on the device within a (relatively) user friendly GUI. Notable features of the application include but are not limited to the ability to save captured packets to a file for later use, full native support on Apple silicon, contextual Touch Bar support and the ability to filter packers by various attributes (protocol type, length, addresses). The motivating factors behind my choice of application are my interest & fascination with computer networks and the various technologies supporting them, followed by the desire to develop an application that isn't directly related to web development.

Developing this application would incur a considerable amount of challenging learning experiences; a few that immediately come to mind include familiarizing myself with various languages, development environments, libraries and frameworks that I have very limited or no experience with. Regarding the three languages I'm utilizing to implement this application, I am only familiar with C++. When it comes to Swift and Objective C, I have no applicable experience whatsoever. Besides the typical learning curve one encounters when approaching a new language, the significant difference in syntax between C++ and Swift will inevitably increase the learning curve; at first glance, swift seems to share many syntactic features similar

to python and Javascript. A highlight feature of Swift is the “optional type” (?), which ensures one *actually* wants to allow a variable to be set to null in a concise manner, aka nullable. This is in contrast to C++, where the syntax allows one’s program to be rife with memory issues. This leads into the other language, Objective C, the predecessor of Swift. The role Objective C in this project is to act as an intermediate between the C++ Library that I will utilize to interface with network adapters & capture data, and the Swift UI framework which will facilitate the visualization and interaction with the data supplied by the aforementioned framework. Such an interaction between the C++ and Swift components of the app will require significant use of the Bridge design pattern. On the topic of the C++ Library, utilization of the pcapplusplus Library will be a learning experience in its own right; my only experience with C++ is limited to homework assignments that only utilize standard C & C++ libraries such as the pthread library etc. On the other hand, the pcapplusplus library is an open source third party library, which will undoubtedly be a significantly different experience when compared to using the latter standard system libraries. Finally, I will become acclimated to the Xcode IDE, as it is the easiest environment to create a SwiftUI application in.

Overall, I believe that this project will be a great learning experience, as I will be exposed to new languages, frameworks and development environments. Besides the aforementioned new topics, I will reinforce previously encountered subjects such as design patterns, in the form of the bridge pattern and any other patterns I find appropriate to implement. Finally, this project will allow me to learn more about a subject I find fascinating (network standards & programming) and attaining a very marketable skill (experience developing a visual application in SwiftUI).