Final Business Analysis - Docks (Team 36)

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Executive Summary

Our product, Docks, is a real-time, collaborative text and code editor that can be used without a reliable internet connection by building a robust Bluetooth network between editors for network communication. We have built a simple-to-use interface which feels similar to typical collaboration tools and abstracts away the complex implementation details of an ad hoc Bluetooth connection network. The product has been specifically designed for education purposes where students and teachers often struggle with inconsistent WiFi connections.

Value Proposition

The main value of our product for consumers is its simplicity and familiarity. To the user, Docks looks and feels like any other traditional text or code editor. All of the Bluetooth network connections and messaging is completely abstracted away from the user; thus, there is no tangible difference between Docks and other traditional collaborative tools which operate over WiFi that people have been using for years. There is no learning curve for students and teachers when they switch to Docks.

Engineering Innovation

Our first key innovation is the scalability of our Bluetooth network. Most offline collaboration tools use local peer-to-peer WiFi networks to facilitate communication. However, these peer-to-peer networks can only support a limited number of devices (around 10 or less), while our Bluetooth mesh network can support an unlimited number of devices (assuming they are in close enough proximity). This allows us to support entire classrooms, something peer-to-peer networks could never do. Our Bluetooth network design is a mesh network where each node looks to connect with a maximum of five neighbors; thus, striking a balance between network size and robustness to dropped nodes and dropped connections. The network also consists of a single leader that's responsible for starting the network and bringing in new nodes into the network.

Another key innovation is the modularity of our Bluetooth server. Our architecture establishes three distinct layers: a frontend Electron layer, a middleman communication layer, and a Bluetooth network layer (see Figure 1). Within our Bluetooth server, we have built a custom Swift library, DocksNetwork which links into the system's native Bluetooth libraries which maintains all of the Bluetooth connections and handles all of the messaging through the Bluetooth port. DocksNetwork exposes two functions send(msg) and receive_msg(), these functions and the Bluetooth server can be used to support any frontend with essentially no knowledge of the complexities and intricacies of Bluetooth communication. Thus, we will easily be able to customize Docks to fit the needs of each specific school district and create new offline education tools beyond text editing which we can sell to schools. Furthermore, we can license out this library to developers who want to build new offline tools.

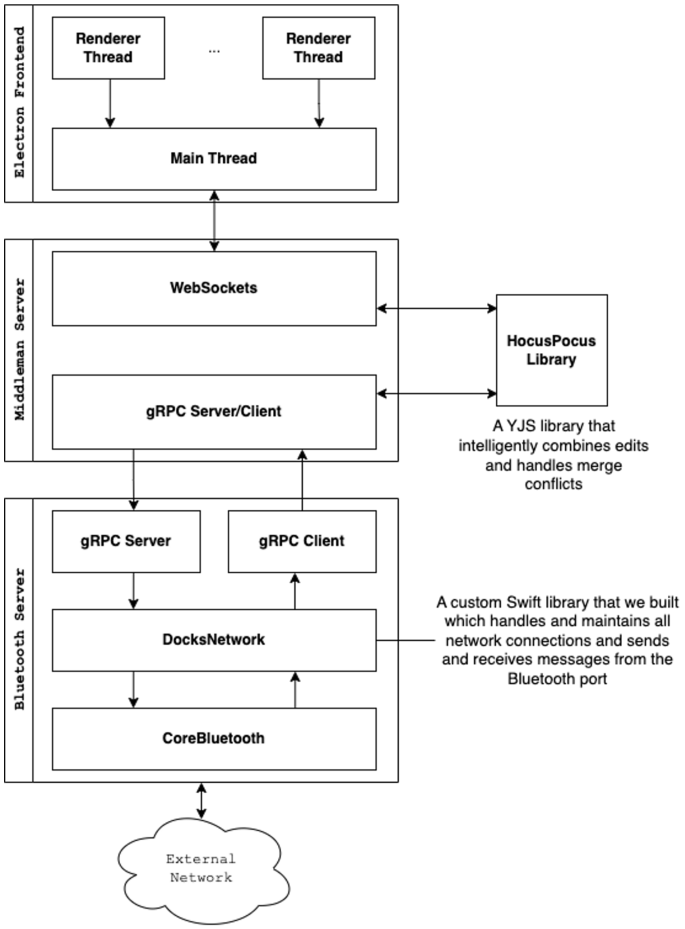

Figure 1

Stakeholders

The key stakeholders for Docks are our developers engineers, students, teachers, and administrators, and operating system developers (Apple, Microsoft, etc.). We rely on

the native Bluetooth protocols in these systems to support the networking of our product. We also need to be acutely aware of innovations to network communication and of the regulations surrounding the cybersecurity and privacy of Bluetooth communication.

Competition

There are some competitors in the offline collaboration space ranging from offline, peer-to-peer file transfer to chat to collaborative drawing [1], with the closest direct competitor being Collabio, an office suite app that allows for offline collaborative document editing [2]. However, all of these products function over a local peer-to-peer network, and we have differentiated ourselves by building our collaborative document editor over an innovative and robust Bluetooth mesh network. Local peer-to-peer WiFi networks can only support a limited number of devices (around 10 or less), while our Bluetooth mesh network can support an unlimited number of devices (assuming they are in close enough proximity). Furthermore, our product offers a code editor with code highlighting and shared terminal emulation, allowing users to edit and run code in real time, fully offline, a feature that has yet to exist in offline collaboration tools.

Of course, our greatest competition will be traditional online collaboration tools, such as Google Docs and VSCode LiveShare, which are deeply entrenched in the education system. It has been reported that over 90 million students and educators use G Suite for Education across the world [3], and we do not believe that we can successfully compete directly with these legacy tools. Instead, we seek to position ourselves as a complement to these online collaboration tools, by offering schools a solution when an inconsistent or lacking WiFi connection prevents students from using these traditional online collaboration tools.

Market Research

Our target customer segment is grade schools where the majority, if not all, of the students use computers during class and network and WiFi connections have proved to be a challenge and a hindrance in the learning environment. According to a report published by the National Center for Education Statistics on the use of educational technology in public schools in the United States, 45% of schools have a computer for each student, and another 37% had a computer for every student in some grades or classrooms [4]. Furthermore, the report found that 52% of schools reported having problems with internet connections or speed when using educational technologies [4]. A conservative estimate would be that around 25% of grade school students fall into our target segment. With around 77 million students enrolled in school in the United States (according to the US Census Bureau) [5], we have a conservative market size of 20 million users in the United States alone that is completely untapped and only growing as more and more students get access to personal computers. We also have the ability to expand internationally with relative ease.

One might argue that teachers might prefer to revert back to "old school" methods when facing internet connection problems. However, a poll conducted by Gallup found that 53% of teachers "would like to use digital learning tools to teach more often", and another 44% "would like to use them about as often as they use them now" [6]. Thus, there is a clear, demonstrated need for an offline education technology tool. Teachers can continue to share digital documents with their students, and students can continue to collaborate in groups on digital presentations and code seamlessly with our product when the WiFi connection fails.

Additionally, we have strong evidence that schools really value educational technology, which means high willingness to pay for products such as our own. The same Gallup poll also found that 81% of teachers, 88% of principals, and 92% administrators "strongly agree or agree they see great value in using digital learning tools in the classroom now" and an even higher percentage for each group "strongly agree or agree they see great value in using them in the future" [6]. Furthermore, the poll found that 71% of principals and 75% of administrators "fully support increased use of digital learning tools" [6].

This demonstrates the ability for our product to break into the educational technology market and the high willingness to pay of our customer segment because these principals and administrators are the exact group that we would be negotiating with to secure long term contracts for the use of our product in schools. Coupled with the rapid growth of computer science and programming courses in grade schools (the percentage of high schools offering a computer science class increased from 35% to 51% from 2018 to 2021 [7]), our unique offline code editing and shared terminal emulation, the only product on the market that allows for collaborative, real-time code editing and execution, has even greater value to schools.

Intellectual Property

We do not have any formal IP.

Revenue Model

We plan to follow the business model of a B2B SaaS company, with our primary revenue drivers being long term contracts with schools which includes a monthly subscription fee to use our product. We will also make Docks available to individuals on the App Store through a monthly subscription fee, but the focus will be on forming long term partnerships. Using this business model, we are able to benefit from a predictable, consistent cash flow that we can reinvest into the company.

In terms of pricing, we will use the pricing of $4 per student per month for Google Suite for Education [8] as a reference point. We believe a lower initial price of $1 per student per month will allow schools to afford to bring on Docks as a complement to their current online education tools. This price can be raised as schools become more dependent on Docks and as we add new education features to Docks. The long term contracts will

create high switching costs and a stickiness that will give us more leverage with our customers.

Costs

Our primary cost driver is personnel, specifically software developers as we continue to develop our product and tailor it to the needs of each school, and sales and marketing personnel to source and negotiate the long term contracts with school administrators. Initially, the costs of sales and marketing will be extremely high due to the challenge of securing new first-time customers, but these costs will come down as school districts become repeat customers and experience high switching costs.

As with most SaaS firms, the cost of developers will persist throughout the life of the firm and will grow relatively linearly with revenue as more users leads to more maintenance and product development. However, we have a massive cost advantage over traditional SaaS firms because we do not have server or storage costs since Docks is a completely offline product. This leads to higher margins which means we can afford to invest more into product development and sales and marketing, giving us a strong competitive advantage.

Sources

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