Black Panthas - Eric Higgins, Zak Kulphongpatana, Josh High

# Maintenance Plan

In order to properly maintain our application there are a number of costs that are necessary in order to make the continuation of our application successful. Major costs include the cost of server hosting for our application, the cost of hiring additional developers to fulfill the vision of the application and continue making updates, the potential cost of converting the application into native versions, and costs of deploying to the app store.

## Costs of Servers:

In order to evaluate the cost of servers we need to evaluate the costs of various cloud server options and deciding which cloud server option is best for our application. The cloud server options that we have evaluated are Amazon Web Services, Microsoft Azure, and Google Cloud.

**Amazon Web Services**

With regards to Amazon Web Services, the instance we need to do computation would likely be an EC2 instance. For a medium instance in US East(Ohio), the cost is about $12 per month. However, we would likely need 8 instances which would bring the total to $48 per month. This comes out to about a cost of $1152 per year.

https://aws.amazon.com/ec2/pricing/reserved-instances/pricing/

**Microsoft Azure**

With regards to Microsoft Azure, we would likely need a virtual machine in order to run our application. We would likely need 1 virtual machine which has a cost of approximately $125 per month. This comes out to a cost of about $1500 per year.

https://azure.microsoft.com/en-us/pricing/calculator/

**Google Cloud**

With regards to Google Cloud, we would likely need multiple app engine instances, likely of the B1 class. The cost per hour for this instance is about $.05 per hour per instance. This instance would be based out of Iowa which would be the us-central1 server location. $.05 per hour per instance comes out to about $40 per month which would come out to about $480 per year. We would likely need 4 of these instances which would be a total cost or about $2000.

https://cloud.google.com/appengine/pricing

**Conclusion:**

As a result of analyzing these various cost options, the best option for us would likely be Amazon Web Services instances because it is the best price option as well as that Amazon Web Services is a standard in cloud computing and can be counted on to be reliable given they're many servers across the country.

# Costs of Hiring Developers:

In order to further development of the application in order to reach a production quality state as well as continue to make improvements continuing into the future, there are a number of developers that are necessary. These developers include machine learning developers, mobile app developers, backend software developers, web developers, and also a graphic designer.

There are a number of sources that could be looked at to hire developers, but particularly because this application would be closest to a "startup" we will analyze the costs including potential equity costs in addition to salary. There are a number of sites where we can find employee, such as Angellist and Glassdoor, these are the sources we will use to determine costs.

**Machine Learning Developer**

Based on a search of Angellist, there appears to multiple types of machine learning employees to hire, such as data scientists, engineers, and researchers. These all approximately have the same cost to hire. These costs typically range from $120,000 to $170,000. With regards to our needs for a machine learning developer with expertise in

Optical Character Recognition, these costs would likely be on the higher side because of the expertise requirements, so we can estimate our cost for one machine learning developer to be close to $170,000. We would likely need two such developers which could drive the total cost up to $340,000. In order to bring these costs down, an equity play would likely be necessary which each machine learning developer earning up to about 2% equity each to bring down the salary cost to around $120,000 per developer per year.

https://angel.co/jobs

**Mobile App Developer**

Based on a search of Glassdoor, the average base pay of a mobile app developer is around $100,000, this ranges significantly and on the upper end could be around $130,000. In order to bring on two mobile app developers the total cost would likely be around $200,000; however, if compensated at least partially by equity with .5% per mobile app developer. That could likely bring the cost of salary down to about $75,000 per developer for a total of $150,000 per year.

https://www.glassdoor.com/Salaries/mobile-app-developer-salary-SRCH_KO0,20.htm

**Backend Software Developer**

Based on a search of Angellist, the cost of a backend software developer is between $80,000 and $120,000. With equity compensation similar to the mobile app developer, the total cost per year for 2 backend software developers would likely be around $150,000.

https://angel.co/jobs

**Web Developer**

Based on a search of Glassdoor, the average base pay is approximately $90,000. While this is an average, a look at the distribution indicates that that base pay is on the higher end. It is likely that a web developer could be hired for closer to $70,000. The web developer would have the role of building a launch website for the application as well as likely any potential implementation into a web app that may serve as an interface for developing the application into a platform.

https://www.glassdoor.com/Salaries/web-developer-salary-SRCH_KO0,13.htm

**Graphic Designer**

Based on Glassdoor, the average base pay for a graphic designer is approximately $50,000. This seems like a reasonable cost for a graphic designer, and it is likely that we would not need a graphic designer for an extended period of time so the cost would be closer to around half of that or $25,000.

https://www.glassdoor.com/Salaries/graphic-designer-salary-SRCH_KO0,16.htm

# Additional Cost of Developing Native Application:

There are many advantages to developing an application natively rather than cross-platform in the way we currently have developed the application. This section explores the possibilities that we rebuilt the application and deploy it to native on iOS and Android.

**iOS**

According to Glassdoor, the cost of an iOS developer is approximately $100,000 which given equity incentives would likely be closer to $80,000. This developer would be an additional developer to the aforementioned mobile developers in the previous section.

https://www.glassdoor.com/Salaries/ios-developer-salary-SRCH_KO0,13.htm

**Android**

According to Glassdoor, the cost of an Android developer is approximately $100,000 which given equity incentives would likely be closer to $80,000. This developer would be an additional developer to the aforementioned mobile developers in the previous section.

# Costs of App Store Deployment:

The cost of deploying the app to both the Android and iOS through the Google Play Store and Apple App Store, respectively, is approximately $250 over 2 years according to https://www.quora.com/How-much-does-it-cost-to-publish-a-mobile-app. The cost to

deploy an iOS app is $99 per year, while deploying onto Android is a $25 one time fee to deploy.

**Breakdown of Costs:**

Below is a breakdown of costs that would be to maintain and build this application into a full fledged company essentially, as a result the development costs are very high whereas other costs are not as high comparatively. This is making assumptions for what it would require to scale the application and develop it into a very serious product in addition to maintaining the application and continuing to release updates.

| Item | Amount | Total |
|---|---|---|
| **Amazon Web Services** | | **$1152** |
| **Machine Learning Developer** | **2** | **$240,000** |
| **Mobile App Developer** | **2** | **$150,000** |
| **Backend Software Developer** | **2** | **$150,000** |
| **Web Developer** | **1** | **$70,000** |
| **Graphic Designer** | **1** | **$25,000** |
| **Apple App Store Deployment** | | **$99** |
| **Android App Store Deployment** | | **$25** |
| **Total** | | **About $640,000** |