STEP 1

1. Alternative Tools
    a. CI: **Drone CI**
    b. Real time error monitoring: **Bugsnag**

2. Notable features
    a. Drone CI: Drone CI is an open-source continuous integration tool. At first glance this means at its base download it is a free service with paid options offering more integration options and better security. The increased price is based on company needs and can be discussed with their sales team. On top of the reduced price for utilizing the tool, as it is an open source tool, Drone CI requires less maintenance than other popular options such as CircleCI or Jenkins. This means far less FTE is required from the company to keep it running. Drone CI also boasts better scalability by integrating a broad selection of scalability tools such as Amazon EC2, Digital Ocean, Google Computer and more.

    b. Bugsnag: The primary selling point of Bugsnag will be its long list of 3rd party integration beating out other services like Rollbar in this category. Bugsnag offers a reliable and design friendly free service with unlimited use. It will also group up your root cause errors and notify you through email, sms or in a chat. Bugsnap also supports over 50 different languages and platforms including many of the most popular options in these categories making it a very flexible error monitoring tool.

3. Getting Started
    a. Drone CI: Drone CI offers well documented and clear instructions on how to start up with their free service here https://0-8-0.docs.drone.io/getting-started/. The documentation gives visual examples of how to properly integrate the service into your code through .drone.yml files. Past start-up it offers further instruction into pipeline integration, publishing, deployment, and even information into secrets, credentials, and the various Drone CI concepts.

    b. Bugsnag: Bugsnag offers documentation into a quick startup here https://docs.bugsnag.com/product/getting-started/. This documentation is very brief and does not show any visual guides, but it does link you to more detailed documentation with instructions and explanations on platform integration here https://docs.bugsnag.com/platforms/. With this documentation you can select your preferred platform and it will offer visual and written guides on how to properly install and set up this platform. It also will have a library reference and further reading section for many of the popular options here.

4. Notable Details
    a. Drone CI
        i. Founded in 2016

ii. Very popular among small open source developers and among some companies as well. Including Ancestory.com which notably is a Utah based company!
iii. Despite being a newer company Drone CI has grown quickly in popularity and usage worldwide.

b. Bugsnag
   i. Bugsnag launched in 2012 which, notably, is the same year as Rollbar
   ii. Despite being more niche than Rollbar as far as universal popularity Bugsnag is used by a good number of notable companies such as Lyft, Target, Pandora, and Tinder.
   iii. Bugsnag has about half the popularity of Rollbar according to stackshare and seems to be more appealing to companies utilizing a lot of 3rd party integrations.

STEP 2

	Timing Results					
Functions		TinyArray	smallArray	mediumArray	largeArray	extraLargeArray
	douAppend	88.2 µs	105 µs	238.9 µs	1.0851 ms	3.8483 ms
	douInsert	36.9 µs	50.9 µs	187.8 µs	5.1894 ms	494.1875 ms

1. From the results gained on running the timing tests for both the doubleAppend and doubleInsert we can determine that the doubleAppend function runs faster on larger arrays while doubleInsert runs faster on smaller ones. The change happens somewhere between the size of mediumArray and largeArray. While it may seem more efficient to be running doubleInsert on smaller arrays, and it is, it is probably always going to be the correct choice to go with doubleAppend instead as the difference between functions at the smaller levels is negligible but the difference once doubleInsert starts to fall off is quickly detrimental to your runtime.