# Conclusions

This past semester the amount of the things we learned really is innumerable. Here is a brief list of just some of the things we learned:

* Ionic Framework: We learned how to work with the Ionic Framework, particularly Ionic version 2. Ionic was at the core of app creation with its built-in dependencies and commands that made it simple to add features into our app.
* Xcode: To do the final build of the app and transport it to a mobile device like an iPhone or an iPad Xcode was used.
* NodeJS: NodeJS was used within the app for server communication and the HTTP protocols. By incorporating this feature into our app, we allowed it to communicate with our server and database.
* Databases: To have a working project one of our major project constraints was to have a working database that could receive and store the user info sent from the app. Throughout the semester we built a database using webhost that works in sync with our Luna app. Our customer will have access to this database which is needed for research purposes.
* App Making: We learned about app making in general. We learned that Ionic can be used to make apps for iOS, Android, and Windows operating systems. We learned that apps are typically made with a combination of Typescript, HTML, and Sass code for Ionic (in Xcode an app can be made directly for an iOS device typically using just use the Swift language)
* Security: Since we were sending sensitive information back and forth between the app and the server and storing it we learned about the Md5 protocol and hashing (one-way encryption). Security was achieved by storing both the username and the password in a hashed version server side and sending a random user ID to the app. This user ID was then stored it in local storage to identify app users when sending data to the server.
* Local Storage: We learned about app local storage and how it could be used to hold app info within the user’s mobile device. Using local storage allowed us to bypass the login page except for initial login, making usability much simpler. We also learned that by using local storage we could use fewer server calls to the database since some info could be stored directly on the device in the app making the overall project design much simpler.
* Network Communication: We learned about the HTTP protocol and how data can be sent over a network to a server. This was an essential feature of our app since we wanted user info to be stored in the server so the customer could access essential research data.
* Product Development: This class was set up to similar to a how a product design team would operate at a major corporation. We learned much about product development as we had weekly meetings with our customer and also met twice weekly (sometimes more) as a group to discuss product details, implementations, and potential challenges.
* Testing: We learned the importance of creating an efficient and well documented testing plan that is easy to follow. By creating a comlete testing plan, it not only made it easy to test the app but will also make it easier for future groups that may access or modify our product.
* Documentation: We learned the importance of proper documentation and how it is necessary for any major project like the one we undertook. Over the last two weeks of the semester we have primarily been concerned with documenting everything in our app. We have documented our source code, testing procedure, user scenarios, installation, etc. This will help any future developers who may view our designs and make modifications to the app and database.
* Teamwork: We learned the importance of teamwork and communication when working on any major project with more than one team member. To stay up to date on our latest project developments it was essential to use email to communicate between team members and let them know what was going on.

As you can see, throughout the semester we learned how to work with a wide variety of technologies and how to incorporate them all into one final working project. It seemed like every week we were faced with a new challenge that could potentially derail our entire project. However, through perseverance our group always managed to find a solution, implement it into the design, and solve the problem before tackling the next obstacle.

Although we couldn’t meet all customer requirements for the app, we have created a very solid groundwork that a future team will be able to use to finish the Luna project. We have virtually all essential features of the app incorporated except for the Calendar component, and the database is functioning properly to record user data. Our design and documentation make it easy to determine how the Luna product functions.