Android Development for an e-Commerce Company

CS4991 Capstone Report, 2023

Parul Goswami
Computer Science
The University of Virginia
School of Engineering and Applied Science
Charlottesville, Virginia USA
pg7wfm@virginia.edu

ABSTRACT
To encompass changing regulations, requirements, research, and products, and maintain customer demand, changes on an e-Commerce App must be fast, effective, and comprehensive, especially during in-App promotional periods. To satisfy these requirements for the company for which I interned, I used android app engineering to deliver results during the sprint timeline. Approaches involved localization work utilizing an internal translation tool and corresponding with other stakeholders like backend engineers and international geos teams to ensure seamless functionality. All coding utilized Android's native language, Kotlin, and Java. Major outcomes included an App page modification to comply with General Data Protection Regulation (GDPR) and fixed image upload functionality for the App's "Write a Review" page. Future work includes further learning Android App Development to move on to more advanced tickets related to refactoring old modules present within the codebase.

1. INTRODUCTION

E-commerce companies utilize three main customer-facing avenues for customers to purchase their products: their website from a typical machine like a computer (Web); their website from a mobile device (mWeb); or their app (App). Most companies provide their app on the two mobile app operating systems on the market, IOS (owned by Apple) and Android (owned by Google). I focused on the Android app for this company, taking on various bug tickets ranging from changes for GDPR compliance to fixing broken features.

GDPR refers to the General Data Protection Regulation present within the European Union. In effect since May 25, 2018, GDPR is one of the most comprehensive data protection policies in the world, aiming to protect individuals' personal data by imposing restrictions on businesses that collect such data on or offline (Marini, et al., 2018). Since the regulation applies to all EU residents and companies operating internationally, e-commerce companies offering their goods and services are also required to abide by these constraints (Singh, 2020). Especially for companies with a primary influence in the United States and Canada but with a growing interest in and transition into the EU, these constraints can be difficult to manage, as they are geo-specific.

"Write a Review" is a common page on e-commerce apps, enabling customers to review the product they have bought. A review is an example of user-generated content that can motivate new customers to buy a product. To alleviate any anxiety about the online shopping experience, customer photos of products can help potential customers to gain an idea on how a product will arrive to their home.

2. RELATED WORKS

Similar apps include Amazon, Walmart, and Ikea. These are competitors of the company I interned for and are e-commerce platforms that sell a variety of products. Viewing the app store entry for Amazon (LLC, 2008) was helpful in seeing how the app represents itself, which can be compared similarly to my company, as well. This information-gathering was mostly observational on my part.

Ott (2023) informed me about the way mobile apps do general compliance under GDPR. It was beneficial for developing my own background knowledge about personally identifiable data points were, as defined by GDPR. While I was not working with personally identifiable data in my work, I found this background knowledge helpful in determining the urgency of my GDPR ticket during my internship.

3. PROJECT DESIGN

As an intern working on a company's android app, I had to balance stakeholder interactions with backend engineers, international geos teams, UI/UX designers, and IOS engineers on my team to make sure progress developed on the android app in parity with the company's IOS version. Tickets represented portions of work that were doable for the software developer with the task within the sprint.

Tasks/tickets I took during my time as an intern were smaller bug fixes associated with app localization needs, GDPR requirements, and a larger project associated with fixing the Write a Review Page. I worked with two major tickets: 1) a GDPR ticket utilizing language localization; and 2) a fixing broken functionality ticket.

3.1 GDPR Compliance Ticket

Language localization is associated with the process of adapting a product's translation to the user's country or region, accounting for differences in different geographical markets (Ishika & Miller, 2005). The company I interned for has a presence in the United States, Canada, Ireland, Germany and the United Kingdom, requiring language translations for French-Canada, English-Canada, United States, German, Irish-English, and United-Kingdom-English. I conducted these translations using an internal localization tool to ensure the text present within the app was properly associated with intended cultural context and meaning.

One such translational tool usage was for a GDPR ticket. The specific string displayed for particular products was "excl. delivery and handling," linking to a new page that would detail the exclusions that applied to a product. In non-North American regions, there was no mention of "handling" of the product in the secondary page the string sends the user to. The intent of GDPR is data and fee transparency, so the removal of "handling" was important, as the linked page failed to mention it in the non-North American regions.

My solution to the ticket revolved around running the internal translation task differently based on the geo the app was being run in, and coding in android's native language, Kotlin. Major outcomes included an App page modification to comply with General Data Protection Regulation compliance (GDPR) that is still present within production, the released version of the app, as of writing.

3.2 Fixing Broken "Write a Review" Page

After making a purchase, a customer can review the purchase. Reviews provide benefits to both customers who have already purchased a product and users of an app who are interested in buying that product. Reviews, especially images of the purchased product, are considered examples of UGC—user-generated content. User-generated content is a great way to bridge the gap between curated

stock and company-provided images of a product versus what a consumer may potentially receive in the mail.

At the time of my internship, the "Write a Review" page on the company's android app exhibited a frustrating user experience where users were unable to upload an image via camera or camera roll. This was due to a recent schema shift present in which the backend POST request required more information than was previously being sent in the methods.

To triage and solve this issue, I had to go straight to the code and the app side by side, following the user's path through the app within the codebase with the help of Android Studio's tracing values properties. From there, I determined an image extension was needed to be sent to the backend systems to properly upload the image. Once I made the changes and tested my pull request, my code changes went into quality assurance testing and eventually into production in the next app release. The rest of the "Write a Review" page had other broken functionalities: remove thumbnail was not working correctly, and multiple images could not be uploaded.
Remove thumbnail not working was causing an unintuitive user experience where users believed their uploaded images should be deleted from the page but were not. Instead, to remove an uploaded image from the page, users had to exit the page twice (two levels), to the general profile page. In diagnosing the cause of this issue, I had to understand a different architecture pattern the app had for this particular older module than the new modules present within the app. In my triage, I found the issue to be the passing of a deprecated value was disallowing otherwise functioning methods to do as intended. In the solution of this issue, I proposed both short-term and long-term solutions.

My short-term solution was to pass in a valid, unique identifier that was different than the one currently being passed into the layered methods. This solution, which enabled the functionality to begin working again, would allow the changes to be percolated into the next app release after proper testing.

My long-term solution was to flush the entire codebase of this deprecated old value to ensure that other features do not unintentionally have a dependency on this value. This solution would take more time and care to ensure that the feature was working as desired, and there were no unintended consequences of flushing the value on other app modules. In the end, I successfully completed my short term and long term solution, taking the duration of 1.5 sprints.

4. RESULTS

The outcomes of the two tickets was compliance with GDPR and successfully patching a broken feature. To this date, both ticket changes are still present and are allowing for a better customer experience with fixed features and comprehensive localization efforts. Other than complying by the definition of done for these tickets, the company was so happy with my performance that I earned a return offer from them. Only five of the 29 software engineering interns received a return offer, so I felt recognized for my work.

5. CONCLUSION

The work I did during my internship had relevance in the company's compliance to GDPR regulation in their international geos Ireland, United Kingdom, and Germany and by creating a more seamless user experience when writing a product review. The need was encapsulated in the fact that both projects were Severity 2 (where Severity levels ranged from 1 through 4 with 1 being the most severe)

tickets, indicating that they aligned with the company's current goals to be completed in a relatively quick manner due to their range of impact on its users. The anticipated value is straightforward for both contributions in assisting the company in remaining compliant to relevant authorities and provide basic functionality to customers, helping to create a solid foundation for the app to further innovate and improve upon to gather more revenue for the company.

6. FUTURE WORK

Future work with regards to the internship would be to further measure out the impact of my past accomplishments in terms of user engagement. For example, the fixed write a review capability for the company's android app users could be measured with the metric system already established within the company to see if being able to successfully submit and delete a product review will increase this subsection of customer's engagement.

Other steps that could be conducted in the future would be to take on more tickets for the company I interned for. While I am no longer working for the company, it would be interesting to explore the opportunity to take on part time work for the company in order to continue to make an impact and assist on the company's android app.

REFERENCES

LLC, A. M. (2008, December 3). *Amazon shopping*. App Store. https://apps.apple.com/us/app/amazon-shopping/id297606951

Marini, A., Kateifides, A., Bates, J., Zanfir-Fortuna, G., Bae, M., Gray, S., & Sen , G. (2018). *Comparing privacy laws: GDPR v. CCPA - Future of Privacy Forum*. Future of Privacy Forum. https://fpf.org/wp-content/uploads/2018/11/GDPR_CCPA_Comparison-Guide.pdf

Ott, J. (2023, September 12). *Understanding GDPR compliance with MDM*. Understanding GDPR Compliance with MDM. https://blog.appaloosa.io/en/understanding-gdpr-compliance-with-mdm

Singh, N. K. (2020, February 6). *What you need to know about the CCPA and the European Union's GDPR*. American Bar Association. https://www.americanbar.org/groups/litigation/committees/minority-trial-lawyer/practice/2020/what-you-need-to-know-about-the-ccpa-and-the-european-unions-gdpr/