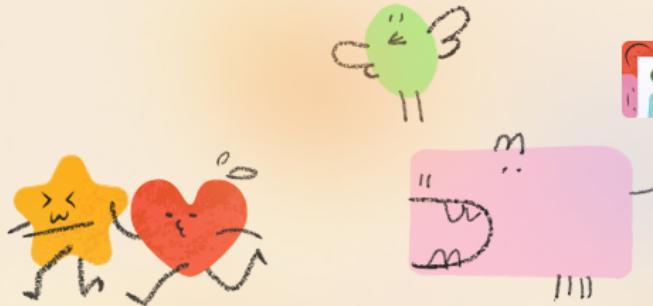


RunSquad

CS3216-06



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1. About RunSquad

RunSquad is more than just a running app - it is a holistic fitness platform designed to inject excitement, social interaction and motivation into the running experience. We aim to bring fun to fitness by leading the forefront in the gamification of running and fostering a vibrant running community through the ability to run and compete with other users anywhere. The below discusses the key features of RunSquad.

RunSquad can be downloaded from the [Google Play Store](#) or [Apple TestFlight](#).

The source code can be found [at this GitHub link](#).

1.1 Key Features

Interactive Mini-Games: RunSquad enhances the running experience with a unique selection of interactive audio-visual mini-games. As users run, they will encounter virtual challenges, collect rewards, and compete with other users in real time. These games transform ordinary jogging sessions into exhilarating adventures, boosting motivation and increasing user engagement.

Community and Social Features: RunSquad fosters a strong sense of community among its users. Users can connect with friends and fellow runners through a social feature that lets them run together, set group goals, and compete in challenges. Users can also share their achievements, compare statistics, and encourage each other to stay on track.

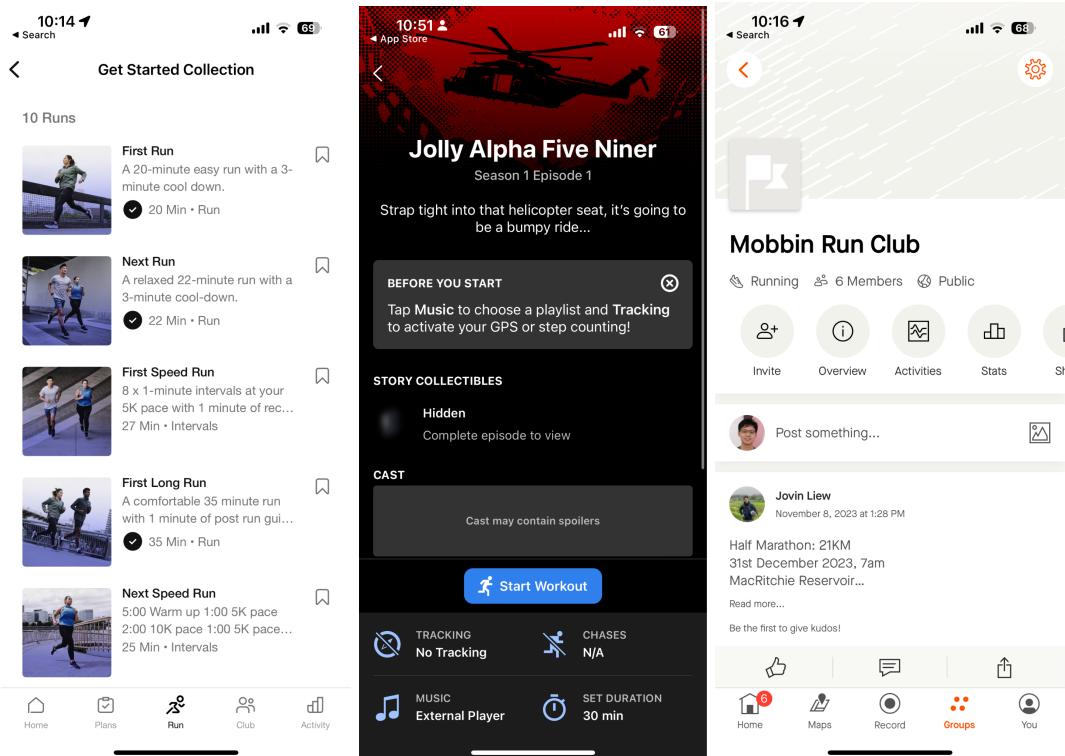
Performance Analytics: Detailed statistics and insights about runs are available to help users monitor your progress. Users are able to track distance, speed, elevation, and more to better understand their running habits and identify areas for improvement.

Achievement Badges: We motivate users with a comprehensive system of achievement badges. Users will earn badges for reaching milestones, conquering challenges, and consistently achieving their running goals. Collecting badges is not only satisfying but also a great way to track one's progress.

Leaderboards and Challenges: We encourage users to compete with runners worldwide on the leaderboards and participate in friendly challenges that push users to excel. Users can compare their performance against others, and strive to claim the top spot on the global leaderboards.

2. Competitor Analysis

RunSquad shares similarities with three other apps in the market, but each offers a unique approach to enhancing the running experience. Nike Run Club and Zombies, Run! both provide **audio-centric experiences** akin to RunSquad. Nike Run Club features "guided runs" with a virtual coach leading various types of runs, and offers structured training programs (like 5k and half-marathon) where each run is guided. On the other hand, Zombies, Run! transforms running into an **engaging game** by introducing an immersive narrative where players outrun zombies and complete missions like gathering supplies. Strava, while also a running app, leans more towards **social interaction**, enabling users to form running clubs, share achievements, and track fellow members' activities.

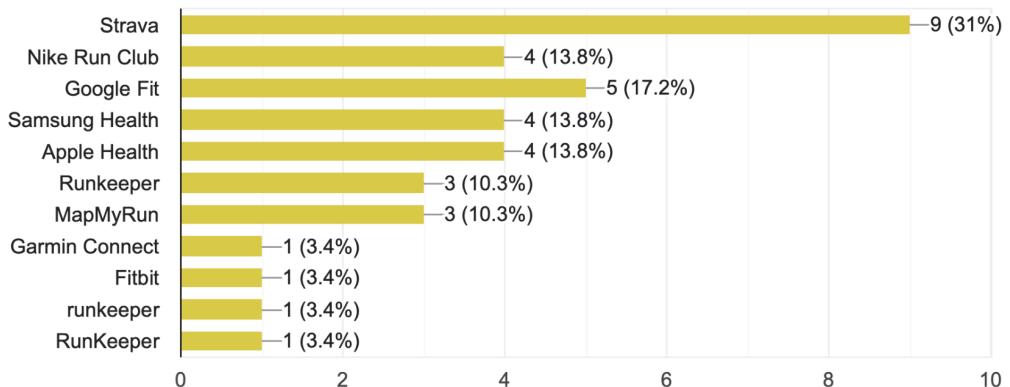


Nike Run Club's guided runs (left), Zombies, Run!'s game (middle), Strava's clubs (right).

What sets RunSquad apart is its innovative blend of (1) a social aspect, turning running into a multiplayer experience, and (2) an element of gamification with enjoyable running games like Duck Duck Run!, making it a unique offering in the fitness app arena. Rather than providing deeply detailed statistics, we chose to cater entirely to the market that enjoyed meeting their fitness goals and solving the pain point of motivation to run.

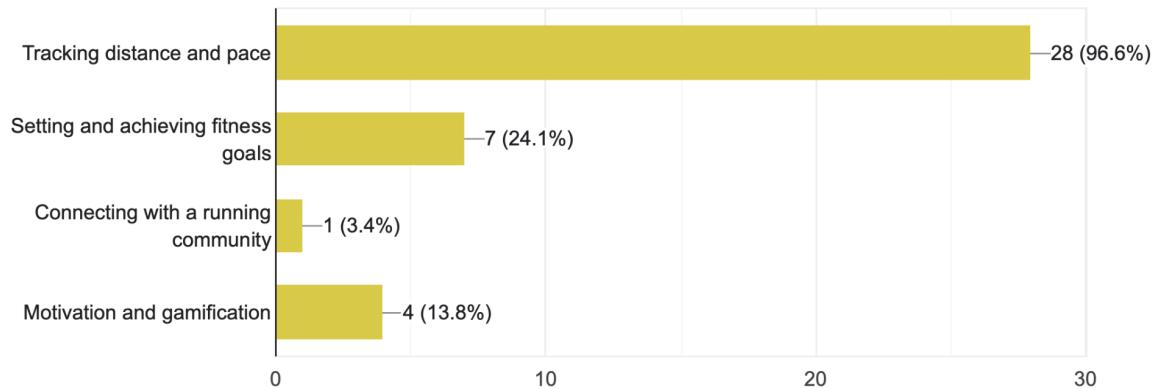
If you use a running app, please specify which ones(s):

29 responses



What are your main reasons for using a running app?

29 responses



Results from our user survey of casual runners (n=29)

3. Project Timeline

Actual Timeline:

Time Period	Milestones
Week 8 (9 Oct - 15 Oct)	<ul style="list-style-type: none">- Design MVP (basic infrastructure, components like location tracking)- Design concepts and game characters- Preliminary user interviews- Compile user personas- Progress Report #1
Week 9 (16 Oct - 22 Oct)	<ul style="list-style-type: none">- Familiarisation with Obytes Starter for development- Develop Authentication, onboarding, and basic run functionality- Cross-platform debugging (figuring out expo)
Week 10 (23 Oct - 29 Oct)	<ul style="list-style-type: none">- Develop profile tab and additional run features (e.g. post-run map UI)- Test our app on Android and iOS (live runs using the developed running feature)- Feature / bug fixes- Progress Report #2
Week 11	<ul style="list-style-type: none">- Develop social components (invites)

(30 Oct - 5 Nov)	<ul style="list-style-type: none"> - Develop and integrate game server - Test social running feature on Android and iOS (live runs from multiple devices, around campus + various locations around SG) - Fine-tune app UI - MVP developed, released to beta testers - Sent for approval on Google Play Store and Apple TestFlight - Feature / bug fixes - User Testing - Marketing <ul style="list-style-type: none"> - Poster release - Instagram account / Telegram channel creation and initial publicity - Begin marketing for next week's campaign - In-Class Progress Report
Week 12 (6 Nov - 12 Nov)	<ul style="list-style-type: none"> - Initial release approved on Google Play Store and Apple TestFlight - Develop STePS game - Iterate on UI/UX from feedback from beta testers - Marketing for STePS: <ul style="list-style-type: none"> - Printed and pasted 25x RunSquad posters all around campus - STePS preparation (videos, poster, STePS event)
15 Nov	 STePS
Week 13 (13 Nov - 19 Nov)	<ul style="list-style-type: none"> - Update releases on Google Play Store / Apple TestFlight for STePS - Continue marketing posts on Instagram account - STePS preparation (poster, STePS event details and logistics) - Used STePS as part of continual marketing campaign (user growth doesn't stop at STePS!)
Reading Week (20 Nov - 26 Nov)	<ul style="list-style-type: none"> - Consolidate final report and customer contact reports - Final Project Report submission

The above is the actual timeline of our project. There were some changes to the original timeline, in which we aimed to develop the MVP within the first 2 weeks of the project. However, we only managed to finish the development of the MVP in the 4th week. This delay was mainly attributed to the lack of buffer time allocated to familiarise ourselves with React Native (given that this was new to every single member of the development team), as well as the large Obytes Starter that we chose to develop on. This caused us to have a tighter turnaround time from developing the MVP to rolling it out on the Google Play Store and Apple TestFlight.

Nevertheless, as we developed more on the starter code, progress moved faster after the initial hurdle and we managed to hit our target of rolling out RunSquad on both the Google Play Store and Apple TestFlight **a week before** the STePS event, a feat that took considerable planning in terms of the timeline given that there was a long review process (of close to a week) before our app could go live on both platforms. To achieve this, we opted for an iterative approach to deployment, pushing out the MVP for initial approval (which we had foreseen would take the longest), followed by smaller incremental updates to the app (which would usually only take a few hours up to a day to be approved and go live). In hindsight, this iterative approach was the right choice, as opposed to waiting for a more polished version of the app before starting deployment, which might have delayed our rollout.

We were also glad that our marketing efforts mostly kept to the original timeline such that the marketing materials could be released strategically the week before the STePS event to raise awareness of RunSquad even before people visit our STePS booth.

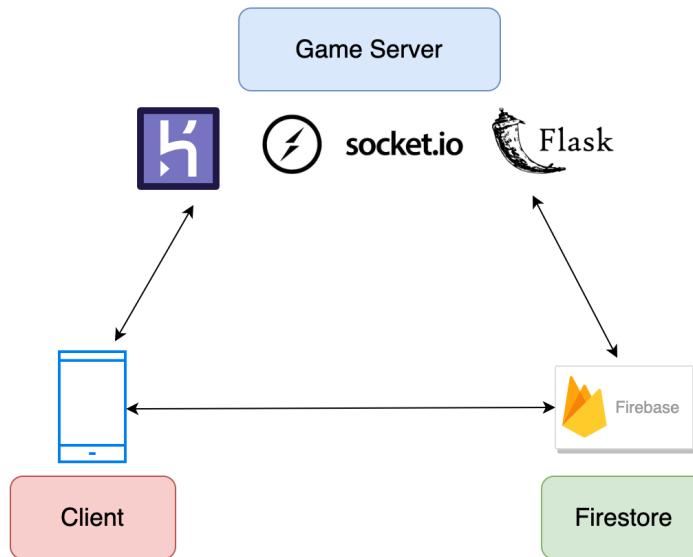
4. Our Team

Name	Roles & Responsibilities
Dexter	<ul style="list-style-type: none">- iOS development- Worked on Running Component, UX and UI- Worked on Post-Run Reports
Jefferson	<ul style="list-style-type: none">- Android development- Frontend design & character illustrations- Worked on Social Features + Achievements
Joong	<ul style="list-style-type: none">- RunSquad landing page- Marketing: social media, publicity posters- STePS poster
Kleon	<ul style="list-style-type: none">- Android development- Backend design- Worked on Authentication + Onboarding and Game Server

5. Application Design

5.1 Architecture

Below is a high-level overview of RunSquad's architecture.



5.2 Server & Authentication

Authentication & Onboarding

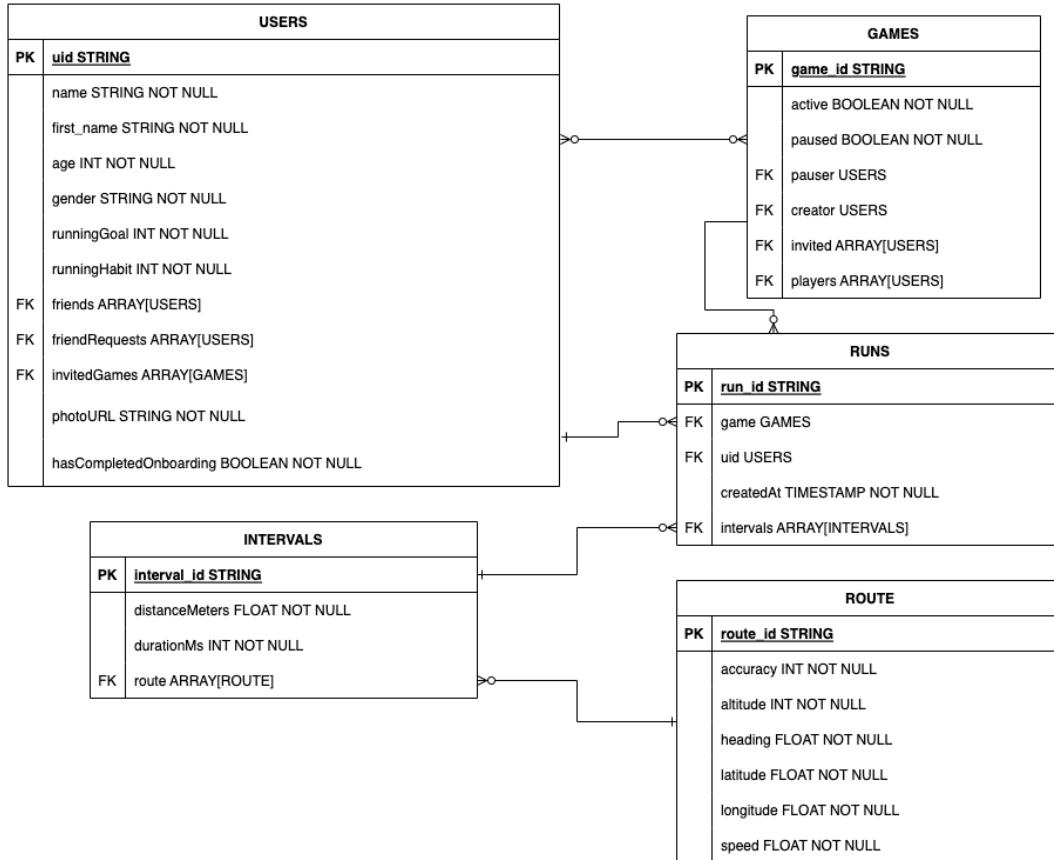
We chose Firebase Authentication as our authentication service. Firebase provides a well-documented, straightforward SDK that can be easily integrated with a variety of platforms, including web and mobile applications. This ease of integration is particularly beneficial for us working with React Native, as it simplifies the process of adding authentication to our app.

Firebase Authentication also supports a wide range of authentication methods, including email/password and popular third-party providers like Google, Facebook, Apple and Twitter. Although we currently implement email/password and Google login as our two primary login methods, using Firebase Authentication allows us the flexibility of expanding the sign-in options to our users in the future.

After signing in, users will be prompted to complete an onboarding process if they have not previously done so. This collects important user information like their name (used to find other friends in RunSquad), age and gender (may be used in the management of running groups and contests in the future). We also ask for their running habits (current and targeted running frequency), so that we can understand our user base better to build app features in the future.

Since our app requires users to run in the real world where safety risks exist, we also mandate that they read and acknowledge a disclaimer to remind users that they are responsible for their own safety, and they should always be aware of their environment while using RunSquad.

Database Schema



Game Server

The multiplayer element of the game was made possible via a Client-Server architecture, as shown in the high-level overview in Section 5.1 above. The game server utilises Flask socket.io to manage web sockets that control the game events in RunSquad. Specifically, these game events include starting, stopping, pausing and resuming the game. When each client triggers any of these events, they are sent to the game server which handles the logic of the games.

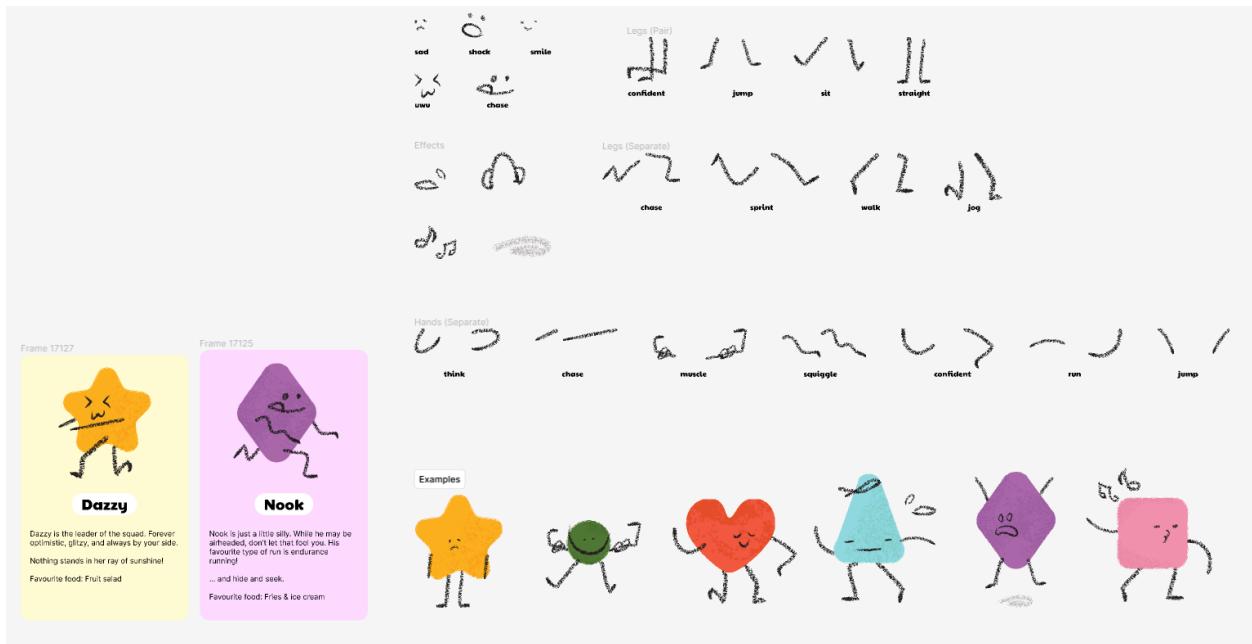
For example, only the creator of the game can start the game, and the game as a whole only ends when all players in the game have individually ended the game (this will update and broadcast the leaderboard to all players, which should only exist after the game has ended). After the game ends, the state of the game will also be written to Firebase for future retrieval (such as showing a user's runs in their profile).

5.3 Frontend, Design & Social Features

From a design perspective, our art direction focused on embodying our tagline, which is “Turning Your Miles into Smiles”. Our key brand principles revolve around being “Playful, Energetic, and Fun”. To achieve this, we leveraged a saturated brand colour palette, used a playful display, and sans-serif brand font, and created a suite of characters and mascots that our users at various stages of their running journey could empathize with.

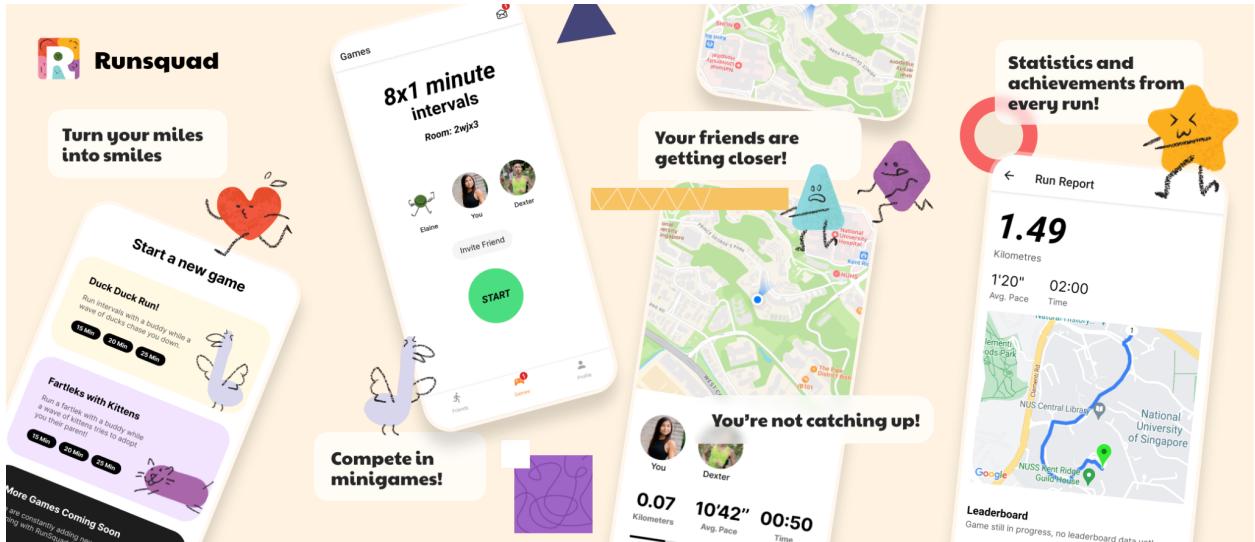


Visual inspiration board for RunSquad



Characters and modular customization system

For the design of the interface, we wanted to make actions clear and accessible in order to leave room for our main value proposition which was social running. We incorporated lots of white space, a clear call to action on each screen, and bold, contrastive typography.



Interface Screenshots

5.4 Running Experience

Audio Cues and Feedback

Audio cues play a crucial role in enhancing the running experience in RunSquad. Our app uses distinct audio signals to indicate when to start running and when to rest. This feature is particularly useful for interval training sessions, allowing users to focus on their runs without constantly checking their devices. Periodic audio updates inform runners of their progress through the intervals, particularly 5 seconds before starting a run or rest block.

In line with our playful theme, "Duck Duck Run!", we've incorporated whimsical duck sound effects. These sounds add a fun and lighthearted element to the running experience, aligning with our brand's energetic and playful ethos.

Visual Metrics and In-Game Features

The running interface also displays real-time metrics like distance covered and current pace. This data helps runners adjust their efforts on the go and strive for their personal best. For interval training, a countdown timer is prominently displayed, keeping runners informed about the time remaining in their current run or rest period.

Users can see who is currently participating in the run, fostering a sense of community and competition. When a participant pauses the game, an indication is provided to all players. This feature keeps all participants informed about the game's status and shows which player caused their run to be temporarily halted.

Thematic Elements

Our unique theme, "Duck Duck Run!", is woven throughout the app experience. From the whimsical duck sounds to the playful visual elements, this theme creates an engaging and

entertaining running environment. For key checkpoints throughout the run, such as the start and end of the game, when the game is paused or resumed, or when there is an upcoming interval or rest, duck sounds are played to alert players to the game status.

Instead of using a traditional audio countdown (“3, 2, 1, Start!”) before each key checkpoint, we have incorporated the theme as part of the countdowns, using the ducks’ quacking to signal the countdown to the players (based on the number of successive quacks). We have also designed the sound clips to be intuitive. For example, after the countdown, players will hear a flock of ducks flapping their wings, which indicates that it is time to run (as opposed to just saying “Go!”).

Post-Run Report

The Post-Run Reports feature in RunSquad offers a comprehensive analysis of each run, allowing users to review their performance and compare it with their friends. These reports serve as a powerful motivational tool, adding a competitive edge to the running experience.

Each report includes a detailed map showing the route taken by the player. This visual representation helps users to recall specific segments of their run and analyze their performance across different terrains or locations. Key milestones, such as each interval of the run, are also detailed on the map for easy reference.

The report provides vital statistics such as the total distance covered and the average pace maintained throughout the run. Detailed metrics for each interval are also available, including distance covered and pace for each segment. This breakdown is crucial for analyzing performance in different phases of the run to better tweak one’s running habits for future runs (e.g. slowing down in the first few intervals for more consistent performance in later intervals).

After the game ends, a leaderboard is displayed, showing how the user’s performance stacks up against their friends. This feature fuels the competitive spirit, encouraging users to push their limits. Key metrics like total distance and average pace are listed for each participant, providing a comprehensive overview of everyone’s performance.

Over time, users can track their performance trends through these reports (which can be accessed after the run via their Profile), helping them to set new goals, identify their running strengths and weaknesses, and improve their running skills.

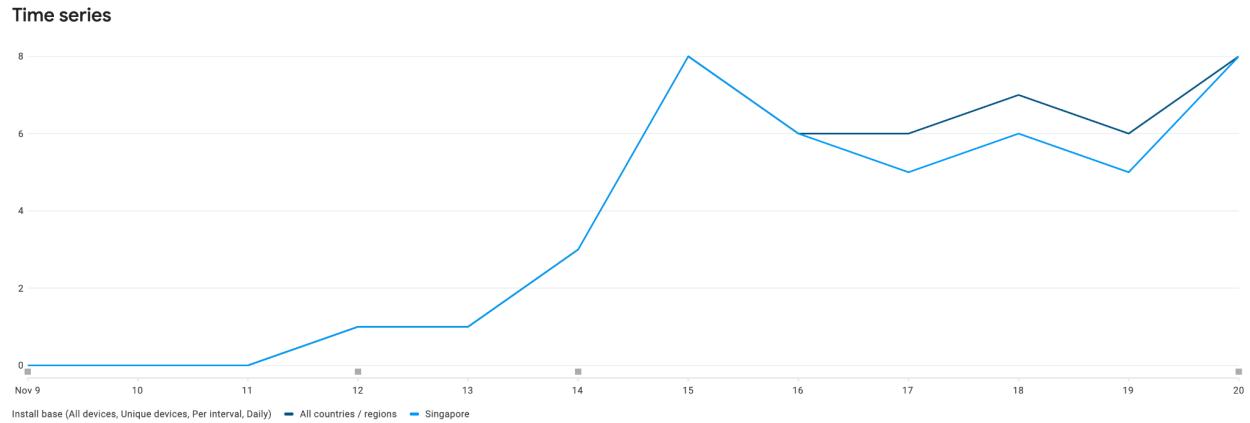
6. Our Users

Despite a later launch than originally scheduled, we were able to gather close to 30 users across our iOS and Android apps (as of 22 November 2023, across our internal beta release and public Google Play Store and TestFlight links), many of which include beta testers, friends, and from publicity at STePS as well as post-STePS. With a robust feature set and strong demand for this concept, we believe that RunSquad can grow even further and attain stronger user growth.

The charts below (generated based on data available on 20 November 2023, due to the lag time of these analytics tools) show the users from the live app rollout to the Google Play Store and Apple TestFlight and exclude a number of users who participated in our internal beta programme.

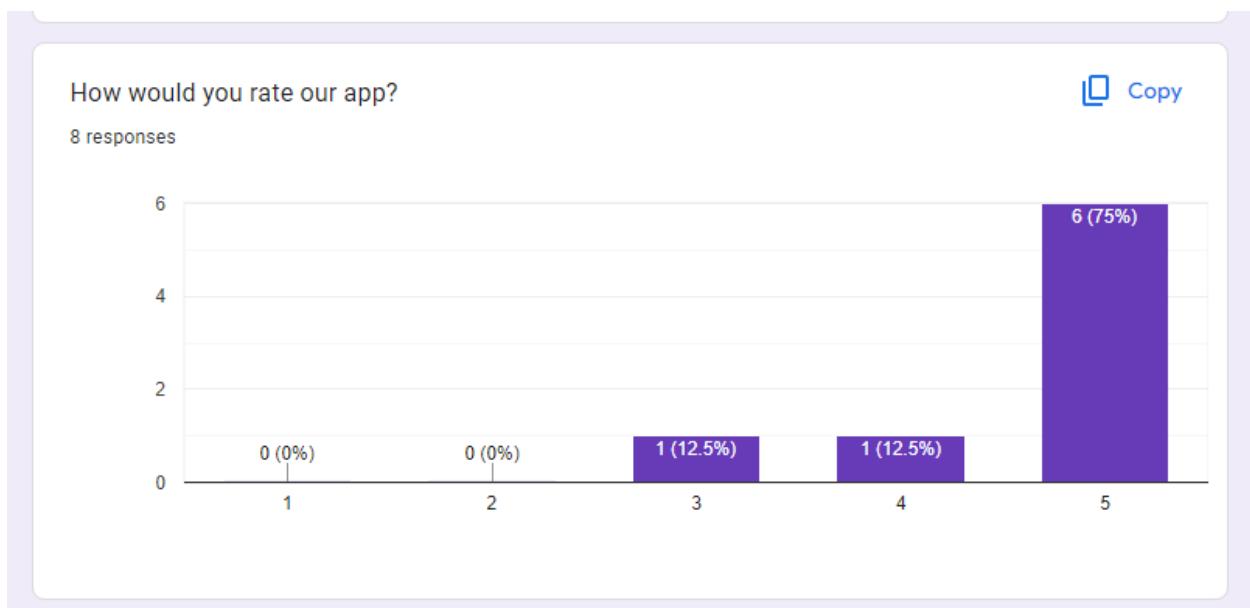
RunSquad Beta Testers Edit Name						
You can add anyone to this group, and they can test builds using the TestFlight app . Builds may need approval from Beta App Review.						
Testers (9) +						
Add Filter						
TESTER	STATUS	SESSIONS	CRASHES	FEEDBACK	DEVICES	
Public link Anonymous	Installed 0.0.2 (2) Nov 15, 2023	3			iPhone 11 iOS 16.7	
Public link Anonymous	Installed 0.0.2 (2) Nov 15, 2023	6			iPhone 15 Pro iOS 17.0.3	
Public link Anonymous	Installed 0.0.2 (2) Nov 15, 2023	7	2	2	iPhone 13 Pro iOS 16.6.1	
Public link Anonymous	Installed 0.0.3 (3) Nov 22, 2023	9	1	1	iPhone 13 iOS 16.0.2	
Public link Anonymous	Installed 0.0.3 (3) Nov 22, 2023	3	1		iPhone 13 iOS 17.0	
Public link Anonymous	Installed 0.0.3 (3) Nov 22, 2023	4			iPhone 11 iOS 17.1.1	
dexterlengcs@gmail.com Dexter Leng	Installed 0.0.3 (3) Nov 21, 2023	27	3		iPhone 14 Pro iOS 16.6.1	
Public link Anonymous	Installed 0.0.3 (3) Nov 22, 2023	3			iPhone 12 Pro Max iOS 17.1.1	
Public link Anonymous	Installed 0.0.3 (3) Nov 22, 2023	1			iPhone 15 Pro iOS 17.0.3	

iOS: TestFlight Data (as of 20 November 2023)



Android: Google Play Store Data (as of 20 November 2023)

We polled users and booth attendees during STePS to understand sentiment towards our product. We generally received positive feedback, with comments such as “Simple but good”, “Great idea”, “App looks great”.



User Feedback from STePS

7. Future Direction

It's a common question to ask any CS3216 project – what's next for our project after the class is over? We aim to keep it running for at least 6 months after launch, as server costs and hosting etc are negligible. We plan to continue attracting users and see where the app goes from there. Over the next few weeks, we aim to continue polishing our app to include features and games for a v1.0 official release. This includes adding new games, rounding out the achievements system, and doing an official launch on our social media.

Of course, the main reason we built this app in the first place is to solve our running pain points, so we'll certainly be using RunSquad for our own training purposes.

7.1 Future Features

Enhanced Game Customization: This feature will allow users to personalize their running intervals based on their preferences and fitness goals. For instance, users could set varying lengths for running and rest periods, aligning with high-intensity interval training (HIIT) or more relaxed jogging sessions.

Asynchronous Runs

To accommodate users' varying schedules, the app will support asynchronous runs. Participants can complete runs in their own time while still competing or collaborating with others. Leaderboards and challenges could be based on aggregate performance over a week or month, rather than in real-time.

Custom Running Targets

Users can set their running targets, such as running a certain number of days per week or covering a specific distance. The app can then track their progress towards these goals. The app can then also provide users with visual progress tracking, showing them how close they are to achieving their weekly or monthly goals, similar to a fitness streak.

Running Groups

Users will be able to create or join running groups. These groups can serve as mini-communities within the app where members can share tips, motivate each other, and track collective progress. Groups can also organize events together, either competing against other groups or working towards a common goal.

Progress Sharing and Monitoring

Within a group, members can opt to share their progress, routes, and achievements. This transparency allows for mutual motivation and support, and group leaders or peers can provide personalized advice or encouragement based on shared data.

Accessory Integration

With common fitness accessories such as the Apple Watch and Samsung Galaxy Watch, RunSquad can integrate with Apple Health and Samsung Health / Google Fit to provide multimodal performance analytics such as heart rate, calories and so on.

Monetization

Monetization strategies are something our team is considering to increase the longevity of RunSquad. We believe our strategies should focus on those that are optimal for mobile apps such as in-app purchases, subscriptions or advertisements. We discuss this further in the next section.

8. Insights

8.1 Technical Skills and Knowledge

Mobile App Development

Our journey began with gaining proficiency in React Native, an essential framework for building cross-platform mobile applications. We delved into the intricacies of developing for both iOS and Android platforms, uncovering the unique challenges and opportunities each presents. This experience not only sharpened our technical skills but also broadened our understanding of the mobile app landscape.

Real-time Networking

One of the project's central features was setting up a game server using a client-server architecture to support live, interactive games among multiple players. This aspect of the project was particularly enlightening, as it involved complex networking concepts and real-time data handling to ensure a smooth and synchronous gaming experience for all participants. While we originally wanted to push ourselves to support real-time voice calls (through WebRTC), the technical challenge proved to be quite large, but it certainly is on our roadmap.

Geolocation and Mapping Integration

A pivotal part of RunSquad involved integrating geolocation services and mapping APIs. This integration was used in accurately tracking user movements and plotting routes, which is core functionality. Mastering this integration taught us not only about geographical data handling but also about presenting this data in a user-friendly manner.

Backend Integration

Our project also involved a significant amount of work on integrating the front-end application with backend services. This included not only database interactions but also handling various API requests, such as those required for user authentication. This experience was instrumental

in understanding the full spectrum of app development, from user interface design to data management and security.

In sum, the technical skills we developed through the RunSquad project were diverse and comprehensive, covering a broad range of essential aspects of modern app development. This experience has not only equipped us with valuable skills but also prepared us for future challenges in the ever-evolving field of mobile app development.

8.2 User Experience and Design

User Interface Design

One challenge of the design was to make it look fun, motivational and exciting, yet not appear childish. Based on customer feedback, it appears that this goal has been met with many mentions of the interface being “clear”, “easy to navigate”, and “engaging and fun”.

User Experience Testing

As part of the design process, we constantly had mockups and user testing to validate our ideas. Some design bugs included unclear copy on buttons; pages not having a back button when such a functionality would be useful; or, in the worst case, a failure to understand our value proposition due to having too much text. From user testing, we managed to surface these usability and accessibility issues, and it gave us a greater appreciation for the importance of testing at every step.

8.3 Project Management and Team Collaboration

Given our relative unfamiliarity with React Native, we chose to go with a “brownfield” approach by building on the [Obytes Starter](#), a starter repository for building React Native apps, instead of building from scratch. This meant that additional time was needed to bridge the learning curve of React Native, as well as the components of the Obytes Starter, which caused a delay in our initial timeline.

In retrospect, when planning project timelines, we should cater a buffer in similar cases where members of the team are required to pick up and be familiar with a new framework as part of the development process. This would ensure that time was allocated for developers to learn the new tech stack so that everyone would understand how the various components of the repository work when actual development work began.

As explained in Section 3, our iterative approach to development, as opposed to a “waterfall” approach, was instrumental in meeting our intended rollout timelines for the app stores. This approach not only facilitated a more flexible and responsive development process but also underscored the importance of effective communication and collaboration within our team.

Comprising developers, designers, and marketing roles, our team's diverse responsibilities necessitated a strong emphasis on coordination and teamwork, which were key in achieving our targets.

8.4 Business and Marketing

Market Research

Because fundamentally RunSquad is a running app, there were several factors to consider when designing our app. Namely, what motivates users to use running apps? More importantly, what are the non-negotiable features of running apps, let alone fitness apps? We conducted a preliminary survey to gauge what running apps users were already using and what features users liked and disliked. Through preliminary surveys and asking around, we realized that contrary to our initial belief that mini-games could be a sufficient feature exciting enough to gather users, performance tracking features were something that users very much looked for in running apps. Consequently, we realized that it is important to understand our target audience and challenge our assumptions about their needs.

A large part of our app was also the auditory experience. On top of asking users how they felt about the auditory experience while running, testing existing apps that used this feature was a key breakthrough in how we would integrate sound into RunSquad. Indeed, consciously using competitors' apps can provide a useful benchmark for the effectiveness of features.

Marketing Strategies

User acquisition was a large hurdle that RunSquad faced as our primary audience was NUS students. In particular our main value proposition - gamification of running - was something that was only truly tangible by using our app. However, students are busy, thus finding an effective way to encourage users to onboard on a running app was a challenging task. Nonetheless, our team learned that we could encourage running as a healthy activity and market it as a break from studying to introduce interested runners to our app. Redirecting our attention from the app itself to the underlying concept it promotes opened up novel avenues for engaging with users.

Furthermore, we learned to make use of marketing opportunities as they came by. With the STePS event also came official publicity from the NUS Computing team. RunSquad was fortunate enough to be featured on the cover of [an Instagram post](#) by @nuscomputing on STePS 2023, which currently has more than 180 likes. We leveraged that as an opportunity to further promote the app by commenting on the post to raise awareness of our Instagram account and hence the app. This enabled us to reach more than 75 Instagram accounts who interacted with our posts since its creation.

Monetization Models

Monetization strategies are a key consideration for the longevity of RunSquad. While this is not yet implemented, our team has narrowed down our strategies to those that would be most

effective for mobile apps such as in-app purchases, subscriptions or advertisements. Several options include premium accounts that allow users to play an unlimited number of games per week, or in-game currencies that can be used to purchase vouchers for partnered companies.

8.5 User Feedback and Iterative Improvement

Feedback Integration

Integrating user feedback into the development process was a key factor for the continuous improvement of our app given that our features revolved around synchronous minigames. Because minigames were our main feature, incorporating user feedback was crucial to ensure that our games captured the attention of interested runners and were engaging enough so that users stuck to our app. Notable feedback that shaped RunSquad was implementing a leaderboard to increase the competitive element of our games and improving the audio queues to increase user engagement.

9. Conclusion

As the final project officially comes to a close, it is evident that RunSquad has evolved from a mere concept to a real, deployed application. Embarking on this journey, our goal was to intertwine the elements of fun, social interaction, and healthy competition into the running experience, thereby addressing the common challenge of maintaining motivation in fitness routines. RunSquad stands out in the digital fitness realm, not just as an app but as a platform that brings together a community of runners, each driven by the desire to improve and enjoy their running journey.

The development of RunSquad was an arduous but rewarding process. From the initial stages of ideation to the final execution, each step was taken with careful consideration of our end users – the runners. Our emphasis on interactive mini-games and community building, coupled with a user-friendly interface, has set RunSquad apart in the competitive landscape of fitness applications.

As we look to the future, we remain committed to enhancing and expanding RunSquad. We also plan to explore monetization strategies to ensure the sustainability of the app. With a growing user base and positive reception from the community, we are motivated to continue our work, ensuring that RunSquad remains a dynamic, engaging, and valuable tool for runners worldwide.

All in all, RunSquad is more than just a product of our combined efforts; it is a testament to our passion for innovation and fitness. We extend our heartfelt gratitude to all those who have supported us on this journey, including Uncle Soo, our TAs, and our RunSquad users. As we stride forward, we are excited to see how RunSquad will continue to evolve, inspiring more individuals to embrace running as a joyful, social, and rewarding part of their lives.



RunSquad Team at STePS 2023