

Nuclei

Team Gen ChimpanZ's

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Team Leader

Mark Fastner

Team Members

Liam Joseph Abalos

Anh Huynh

Justin Le

Aster Lee

Brendan Paing

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Introduction

The backbone of society relies on its teachers; they bridge the connection of knowledge and experience to newer generations, where it is then that generation's responsibility to pass the same knowledge to generations below them. This cyclical nature is how society behaves, and so without teachers, the world is left without future progress. A teacher in this instance is merely abstract and is not limited to a school instructor, but it also encompasses all those who have a capacity to pass information and knowledge to those who are willing to learn such as sports instructors. We want to emphasize this relationship between the instructor and student to streamline their productivity, so that the desire to teach or the desire to learn is fulfilled to the utmost possibilities. Moreover, the relationships we are looking to focus on are that of recreational and sports-like mentorship. To make this a reality, all parties involved need a mediating system which organizes the tools required to function at the highest level in a training environment. That is where our sports management system Nuclei comes in. We hope to be able to help support the backbone of society, our teachers, by giving them the best experience possible with their jump into the sports training ecosystem.

Target Audience

Our target audience with this application will be athletic and sports minded individuals who are either seeking to learn about and train for a sports discipline or teach a sports discipline. We identified three primary user groups for our proposed training management software: *Manager*, *Trainer*, and *Trainee*. Based on the user group, some software features will display different information or have different functionality.

Value

With Nuclei, our main value is unity. Nuclei provides an all-in-one management solution, allowing more focus on training quality and establishing personal connections with other individuals in sports training. Because time is also a crucial resource and universal variable for everyone, Nuclei considers this and serves to streamline organization and logistics so more time is spent on doing rather than planning.

Problem Statement

In the world of sports training the problem that exists is that there is no singular, universal hub that provides all the different software necessary for all involved user groups. Managers, trainers, and trainees have a hard time finding ideal pairings with one another and do not have the means to review each other's strengths and weaknesses regarding sports training/teaching.

Organizations possess different views on the value of ongoing software support, resulting in a disparity between management tools. Some managers may have to use outdated tools to manage their trainers, as the software available to them is dictated by their affiliated organization. A trainer lacks the tools needed to excel in providing personal training. Trainers currently require the use of multiple resources to manage their training. They need to advertise and find new trainees through social media sites or other means, need to use their own calendar and messaging system to do their scheduling, and lack a way to give feedback to their trainees which may be useful for future trainers. Trainees, like trainers, also struggle with the burden of having to use multiple resources in different places to find, schedule, and provide feedback for lessons.

Problem Scope

The scope of the problem that we are addressing is the void in a unified software that exists in the teaching environment surrounding athletic-minded individuals. This includes ways for potential users to provide feedback to one another, ways for trainers/trainees to find out which trainee/trainer is right for them, and ways for trainers to display their skills. Our problem scope does not include interactions between the same user groups (manager to manager, trainer to trainer, or trainee to trainee), nor does it include the lack of a unified system containing every and all tools that one would potentially need.

Proposed Treatment

Our proposed software will address these issues by consolidating every user group under a common platform. A universal training hub for all involved users and organizations will reduce the amount of individual software customers need to manage, leading to less time spent in logistics related to scheduling and advertising. Trainers and managers will have a singular platform for managing their business operations, advertising their services, scheduling their lessons, and establishing a good reputation. Users seeking training will be able to find the most suitable trainer for their needs. By offering managers, trainers, and trainees an easy integration into the training ecosystem, they are more likely to establish personal connections with each other. As a result, trainers and trainees will be able to place greater focus on their training quality.

Current scheduling software often used in educational sectors lack a two-way evaluation system which is crucial for trainers and trainees to ensure they are providing/getting the best training possible. The implementation of a dual feedback system in our software allows trainers and trainees to more closely evaluate their training habits outside of scheduled meeting times within the same application. It also enables them to communicate without disclosing private contact information, which is more likely to occur when multiple platforms are involved. Similarly, freelance service software provides a platform for independent businesses, but does not possess the organizational and communication tools a user undergoing training may demand. Our

software will provide these tools using user satisfaction ratings as our primary metric. To users, these tools should feel intuitive and easy to understand to streamline their own management.

Competitors/Market Analysis

In the world of sports training, we analyze through personal observations that individuals involved or interested in sports training do not have easy access to tools that are as powerful as the ones we are planning on providing. Our competitors in this field would be freelance service software which would be software that sports businesses are likely to use.¹ Nuclei would be a superior choice over freelance service software because we provide a way for managers and the trainers working under them to directly find clients. Other competitors would be any sort of scheduling software that is commonly used to schedule sporting events (Google Calendar, etc.). Nuclei would be a superior choice because our scheduling system is specifically tailored for sports training. In our market analysis we discovered that some sports like tennis have sites that connect trainees with trainers in a specific sport which is in direct competition to Nuclei.² Given that we will provide the same service for multiple sports, Nuclei is superior. Finally, any sites that can be used to connect people would be our competitors as any of our user groups could find one another through those types of sites (Fiverr, LinkedIn, Facebook, etc.). Nuclei is superior as we provide a dual feedback system allowing for ideal connections. In comparison to the last group of competitors, we allow managers to do better targeted marketing to the trainees who are interested in the sports they focus on, allowing for better match ups. We believe that our system will be the best choice for individuals involved in sport training because our system will provide everything that our competitors provide and more.

Project Scope

Nuclei will deliver a solution that will allow our target audience to process all management related activity within our application for sports training. The solution in question from a customer perspective will be a Google Chrome web application containing features that address the problems discussed earlier in the Value section. Our current scope will not address any issues outside of sports training scheduling or user interaction. This means that other sports training issues such as the commercial procurement of equipment will not be included in the current iteration of the project. Additionally, any logic associated with a sport itself will not be under the project's scope. For example, if there are not enough participants to field a particular game session, the issue will be handled externally by the respective trainer.

The Nuclei will support United States English. It will not support any money transaction and will not use any units of money. It will use the Pacific Standard Time (Pacific Daylight Time for daylight saving time) and no other language or time zone options will be available.

We will support a population audience of ages 13 and older; any ages younger will be managed by a parent or guardian as stated by Children's Online Privacy Protection Rule. Also, our regional jurisdiction will cover Southern California, specifically Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, San Luis Obispo, and Ventura counties.

Project Projections

Timeline: Our product is projected to take at least seven months from beginning development to product release. This time period will consist of the design, development, testing, and deployment of our product. After 3 months we hope to be done with the planning stage and move on to development, testing, and deployment. The exact time span of development, testing, and deployment are yet to be determined.

Cost: The cost of this project is the time that it takes for our team to finish with the deployment stage of our timeline. For deploying and hosting an application on a cloud-computing service via Amazon's Elastic Compute Cloud (EC2)³ is dynamically proportional to the application's use of resources, size, traffic, etc. The Amazon service will scale with the application and will cost more if the app grows. One of the most popular instances used on EC2 is the a1.medium which offers an hourly rate of \$0.0255 per hour or \$0.612 a day. At this base rate, we can assume the cost will increase assuming the application will too.

Resources: Our team consists of six college student developers that can collectively provide 40 hours of work per week. Resources that will be used to aid in planning and team communication are Discord and Jira. The resources we plan to utilize for development include: MySQL, Azure, Jira Software, HTML, CSS, VS, VS Code, C#, .NET.

Risks: The cloud service we plan on using may be harder to handle and use than initially planned, causing delays in development. It may also not be worth it for users to switch over to our system from whatever they were using before. Finally, unforeseeable events regarding team members may affect our team capacity hours, which in turn may affect the team's ability to meet deadlines.

Product Features

Core Components

Login (Authentication)

All users are required to authenticate their account with our server to access the application. The login screen will provide text boxes for users to enter their credentials (username/email and password) with additional user management buttons such as account registration for users without a registered account, and password reset for users who have forgotten their password.

Logout

For the users who are currently logged in to our application, the button for logout will be available in the header of the website. Upon clicking the button, the logged in user will instantly be logged out, along with a message to indicate the action. After logging out, a user will be sent back to the login screen, where they are required to login again to access the application. The logged out user will be unable to access the formerly accessed sites, even if there were other tabs open that were only accessible when logged in.

User Management

Create Account

The users who are not logged in will be able to create their account from the login page. When creating the account, the users will be required to input their name, birthdate, username, password, password confirmation and email. They will also be given a checkbox that proves the user has read the end-user license agreement (EULA) of Nuclei. The user will be able to create their account after filling in all required input and agreeing to the EULA. When done so, the password will be hashed, and all info will be added into the user table in the database. If one or more are not done properly and the user presses the button for creating an account, the error message will be put up telling the users that certain inputs required have not been all done.

Change Password

If a user needs to change their password they can do so by accessing their account settings and selecting change password. They would then be prompted for their old password, new password, and to repeat their new password. When entering their new password users must follow our requirements for a valid password. Once the user enters everything a check is made to see if the old password is correct and if the new password and repeated new password match and if everything checks out, our system will receive the change password request. If the user forgot their password they will click a forgot password button which will bring them to a new page asking them to enter their email address in a text bar. A check will be made to see if the email is valid and if it is it will send an email to the user asking them to verify. Once the user is verified they are taken to a new page where they are prompted to type in their new password, and then

asked again to verify that the password is correct. Entered passwords must follow our requirements to be a valid password. Once they hit submit our system will receive the password change request and will be handled appropriately. The changed password will be hashed and sent to the application database to overwrite the old password..

Forgot Password

When a user forgets their password, they can click a button labeled “Forgot Password.” The user will have to input the username and email associated with their account. This will send an email to the user notifying them that they forgot their password and will now have to change the password to their account. This will be done with a one time link sent to their email which will require them to input a new password. The password will have to follow our requirements for a valid password. They will have to reenter the password to verify the changed password. After doing so, the user will have to log in with the new credentials. The password will be updated in a similar fashion to the Change Password section.

Delete Account

A user can delete their account by accessing a “Delete Account” button in their profile, only accessible by them. When deleting an account, users will be prompted that this action is irreversible. Users that wish to continue are then required to enter their account’s registered email address and password into a text box in order to gain access to a button that confirms the account deletion. When the email address and/or password does not match with the account, the error will be told to the user saying that either the email or the password does not match. When all the info is correct, the user will be told once again if they confirm to delete the account. When the user confirms, the account will be deleted. If the user had a trainee profile and was under any of the groups, the user will be removed from the group, and the trainer will be notified of the user leaving the group. If the user had a trainer profile and had a group currently active or to be active in future, the trainees in the group will be notified that the group is removed. The account data will be removed from the database after successful deletion.

User Access Control (Authorization)

After account creation and login, users are to create their profile. Under the profile, the user can edit their profile info: first name, last name, birthdate, gender, location, and additional info about themselves. These edited information will be saved when pressing the ‘Save’ button. In profile selection they can choose between which user group they belong too: *Manager*, *Trainer*, or *Trainee*. Users are also able to create multiple profiles within a single account. By having three distinct user profiles, we can separate and build specific features that are unique and relevant to each user type. Not all users need to perform the same actions, and this ensures that our users only see and interact with relevant features.

Manager

A manager is either an individual or an organization that is responsible for managing multiple trainers who may or may not be in contact with each other. They are able to see a list of trainers that they can claim work for them as a manager.

Trainer

A trainer is an individual that teaches, or trains others based on a set program or study regime. A trainer's profile shows their resume of qualifications and/or accolades that showcase their merit as a trainer. It also displays their time availability whether they are booked or free for certain hours of the day. They can specify if they prefer or only teach certain types of instruction groups (one-on-one, small groups, or large groups, however they deem the size of those groups). Trainers invite trainees as their students. A trainer is allowed to kick and/or ban a trainee with a justified reason.

Trainee

A trainee is an individual that wants to learn about or train for a specific sport discipline. They list which sports they would like to train for and the hours/days they would be available for a training session. They can specify if they are okay with a group session or would prefer to only be taught in one-on-one sessions. For every sport they want to receive training in, they will explicitly state their type of experience level (beginner, amateur, professional, etc.). Trainees must also request to train under a specified trainer, or leave the trainer after joining.

Logging

Each users' activity will be logged and listed on the server side. Parts that will be logged will include, but not limited to, login, failure to login, logout, profile creation, profile change, profile info edit, invitations, requests, feedback addition, feedback change, and feedback deletion.

Log Archiving

Logging is especially crucial for any application dealing with legal matters or contractual bindings. It is also important to keep backup of data in the event that it is ever corrupted, maliciously changed, or a record proof is needed for legal purposes. Nuclei will run a middleware pipeline which will audit all activities that occur throughout the application's lifetime.

Error Handling

Error handling serves as a high-level interpretation of the lower-level code errors which occur during the application's runtime and operation cycles. Secondly, lower-level errors should not be exposed to a client side interface since it can leak code and possible intellectual property. All and any possible errors should be caught and be documented on where the error occurred and a status code indicating the nature of error.

As an example, the login system will only allow access to users who provide valid account credentials, defined as an email address and password pair specified during account creation. A message will be sent back to the user to indicate a successful or unsuccessful login.

Analytics

Following trends is key to predicting the future outcomes of a certain function. Nuclei will store logging data and through data analysis, a forecast can be determined. Using analytics as a feedback system will allow our team to develop future Nuclei updates accordingly, so our users can obtain the best possible experience using our application.

Dashboard Interface

Our users will have a dashboard interface which will allow them to navigate all the provided tools and access account settings. The dashboard will display general components along with additional components based on the user type. Additional sections that do not fall under any section mentioned for each user group is not a part of our dashboard interface.

General Functions

All three groups will have a profile icon, account settings button, and profile settings button. They will also have a section to view a calendar associated with their account. In addition, conversations using the Direct Messaging system within a 3 day period will be viewable in a dropdown tab near the edge of the interface.

Manager

Managers will have an extra section that lists their managed trainers. There will also be a section to show requests from newcomers to become trainers. They will also have a section to create and view training camps.

Trainer

Trainers will have a section to list trainees, past and present. There will be a section to schedule new training sessions for trainees. Trainers will also have a section to create new “classrooms” and view any classrooms they have made. Interacting with a classroom will allow a trainer to make public posts viewable by all the trainees in that class. In addition, trainers will have a search bar section to find trainees and managers.

Trainee

A trainee will have a search bar section to find trainers. They will also have a section to view their current trainers and the activities they are assigned.

Value

When a user accesses their profile, it is good design for the user to have a place to see everything they will want to see and have access to. A dashboard interface will provide a quick synopsis of their profile and will be their go to place for interacting with the application.

Class System

A classroom consists of multiple trainees working under similar training conditions or as part of a larger group/event to combine their lesson plans into a classroom style environment. They are created by specifying the classroom size limit, the initial participants to invite, and the time and date—all of which can be edited at a later moment. After creation, trainers can then schedule classroom groups spanning a certain amount of time which evidently forms a program. For our current scope, only trainers will be able to create classrooms.

A trainer is able to create multiple classroom groups and can post training drills, exercises, or extra study material, which will be sent to all trainees in the selected classroom. Trainees in a classroom can post text-format questions or comments, which will then be public to view by all other users in the same classroom. Trainees are also able to leave a classroom group independently, alerting the classroom's trainer using the notification system explained in the next section. In addition, classroom training sessions scheduled by a trainer will have a different colored appearance when viewed in the calendar to distinguish itself from other types of training sessions. Finally, a classroom group will be deleted from a trainer's profile if there are no training sessions scheduled within a three-week period.

With a complex logical system such as the classroom scheduler which deals with ordering and organization, it is best represented as a visual construct. All user groups are shown a personal calendar to help give them a visual of their schedule so as to keep track of lessons or personnel. By interfacing a system that handles event coordination—the bodies of people that are associated with that event and displays a personal calendar to view upcoming sessions, a user can allot less time worrying about the tedious logistics of organization and spend more time training and or learning. We want to value our users' time, so the application opts to manage it for them.

The personal calendar will be the highlight of this classroom feature as its responsibilities are to display a trainer and trainee's schedule and even a manager's entire curriculum. Most importantly, this calendar must disallow any overlapping of sessions, and to do so the personal calendar will reconcile with the logic behind the classroom system.

Value

For trainers that are teaching multiple students with a similar curriculum/regiment interaction with all their students simultaneously proves to be useful. While not enforced, a trainer can have the option to teach an entire class versus privately training individuals. Moreover, time is one of the most valuable commodities we have. Being able to glance at one's schedule and workload, and being able to quickly manage said workload would allow for less time spent toying over schedules and more time on the field. Our scheduling system will provide our users with a simple interface to be easily interactable and understandable.

Notification System

This system will work with the other following systems: scheduling, classroom, dual feedback, and direct messaging. No notifications will be raised for actions outside these systems. For our current scope, users will be able to click on the notification in their inbox to send them to where the notification was sent. Depending on the user type and action, users will be notified of any changes that are relevant to them within these systems. Notifications are sent either through email or SMS. By default, notifications will be sent to the email inbox associated with a user's account. For SMS notifications, users will have to register a valid phone number and enable the SMS notification option on their profile. After the user inputs a phone number on their profile, a confirmation message will be texted to the phone number containing an authentication link. This authentication link must be accessed through the mobile device to fully register the phone number.

General Notifications

All users will receive notifications when a different user sends them a message through the direct messaging system. Only a notification will be sent; to see the message content the user will have to access it through the methods defined in the direct messaging section. Users will be notified about events the day they occur on their calendar.

Managers

Managers will receive notifications when a trainer requests to join their trainer list and if a trainer manually decides to leave their list.

Trainers

Trainers will receive notifications when managers accept their request to join their trainer list and if they are removed from the list by the manager. Trainers will also receive a notification when a trainee leaves their classroom or when a trainee reviews them using the dual feedback system.

Trainees

Trainees will be notified when trainers accept them into their program and/or classroom. They will also receive notifications of any updates, posts, training schedules, or exercises their trainer may post in their classroom. Like trainers, trainees will also receive a notification when the trainer reviews them on the dual feedback system.

Value

Notification can quickly log in users for quicker interaction between the managers, trainers, and trainees. This allows faster match up to the group trainers invited or trainees requested. It also lists up all the missing updates the users have not checked yet, allowing for no loss of unchecked information or requests/invites from other users. This in turn will help users stay organized and updated with information related to their training outside of the application.

Dual Feedback System

A dual feedback system will allow users to better gauge performance for future training sessions. The format of a review will consist of rating categories and an additional feedback textbox. Trainees that review trainers will have rating categories for coaching ability, skill, and training satisfaction. Trainers that review trainees will have rating categories on training summary and training satisfaction. Training summary will include what the trainer has taught the trainee and at what level of training. For any information not applicable to the rating category the additional feedback textbox can be used. Reviews are viewable by interacting with a user profile, where reviews from previous trainers and trainees will be displayed. In our current scope, only trainers and trainees who have trained together through the scheduling system are able to leave a review on each other. This means that trainers cannot leave reviews for other trainers. Likewise, trainees cannot leave reviews for other trainees. Reviews are also done on an individual basis. In our scope a trainer with a large class would need to individually review each trainee.

Value

By implementing a dual feedback system we are saving our users time by enabling them to find their ideal partners quickly. Having outsourced reviews by active users targeting different user groups gives value and power to Nuclei as it becomes a trustworthy system that users can rely on.

Direct Messaging System

Managers, Trainees, and Trainers can send direct messages to each other consisting of text. This system encourages users to stay within the application for training-related communication with the added benefit of privacy between two users compared to the classroom system where interaction is broadcasted to all participating users. Users can access the messaging system by interacting with a specified user profile or from the dashboard interface where recent conversations will be displayed. Our current scope will focus on one-to-one messaging and will not include group conversations. Additionally, text content will have a character limit and image support will be considered in a future update.

Value

Instant communication is a given in our modern day, technology advanced society. Our application will allow users to be able to communicate with an individual on demand given there's some sort of relationship between the two.

Document System

The document system would allow users to upload and store documents for other users to access; view and download. For example, a trainer may want to have a release of liability document for trainees to view online. A trainee may want to have medical documents stored on the application to inform trainers of any medical complications that may affect their training. Documents can be accessed through a user's profile page. In addition, no digital signing function will be included in our current system. To address privacy concerns we will allow users the option to choose between either having a document public or private to view. Documents will be private by default and can be changed at the user's discretion.

Public visibility: The document is available to see and download to anyone.

Private visibility: The document is only viewable by the uploader user. The user can allow other specific users to access, view and download the document.

The scope of the document system is that it only supports upload of PDF documents and that documents can be set by the user to be public or private. Upload of non PDF file types is outside the scope of the document system.

Value

The ability to upload, share, and display documents on a profile decreases the time spent on the managerial aspect of training scheduling. A trainer can verify documents on profiles instead of having to consult each trainee individually to ask for documents. Being able to see documents in advance will also allow a trainer to adapt their training in accordance with the trainee's needs before a scheduled session, increasing overall training quality.

Vision

The current scope of our product is limited to sports training. In the near future we would like to implement additional tools to account for other types of recreational training that are not traditionally categorized under physical activity such as musical instruments or chess. We would also like to expand to multiple browser and language support as well as a mobile application in the far future.

Glossary

Term	Definition
Character Limit	The maximum number of letters, numbers, or symbols (a character) allowed in text.
Classroom	A collection of trainees under the same trainer that are learning the same curriculum
Cloud Service	A service provided over the the Internet without the need of internal infrastructure or hardware
Digital Signing	A type of electronic signature that validates the authenticity and integrity of a message
End-user license agreement (Eula)	An agreement between the user of the product and software producer that lets the user know what the product is allowed to do with their data.
Manager	A person who oversees a group of trainers for an organization or building
Nuclei	A sports management system (our proposed software product)
Personal Calendar	A visual calendar displaying events or sessions.
Release of Liability	A legal document a person signs in which they acknowledge and agree to any potential risks associated in their participation
SMS	Abbreviation for Short Messaging Service, a common protocol used for sending message between wireless devices
Trainee	A person that wants to learn about or train for a specific sport discipline and seeks out a trainer
Trainer	A person that teaches or trains individuals with a set program or study regime

References

1. <https://abcfitness.com/>
2. <https://www.usta.com/en/home.html>
3. <https://aws.amazon.com/ec2/pricing/>
4. <https://cutewallpaper.org/24/sports-png/view-page-24.html>

Version Changelog

Version	Submission Date	Changelog
1	09/07/22	Initial Version
2	09/19/22	<ul style="list-style-type: none"> • Add the following sections: <ul style="list-style-type: none"> ○ Core Components ○ Value - new subsection Problem Scope added, Problem Diagnosis and Proposed Solution from previous version moved here as subsections ○ Competitors ○ Project Scope ○ Project Projections ○ Vision ○ Glossary ○ References • Reorganize product features to include scope and relation to other features/product value • Rename User Groups section to Target Audience
3	9/23/22	<ul style="list-style-type: none"> • Product Feature changes <ul style="list-style-type: none"> ○ Modify Notification System to send messages to destinations outside of the application ○ Combine Scheduling System and Classroom System into single feature “Class System” ○ Move Core Components section into Product Features as new feature ○ Remove Different Profile Types, move to User Access Control under Core Components ○ Add Document System from Vision section • Update Project Scope to reflect Product Feature changes • Remove Vendor System from Vision (descope) • Add the following terms to Glossary: <ul style="list-style-type: none"> ○ SMS ○ End-User License Agreement • Update Table of Contents to reflect version changes