



Project

NARWHAL

CREATING THE NAVAL WORKFORCE'S
TALENT-PROJECT GIG-ECONOMY SOLUTION
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ATL ROBOTICS

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1. MOTIVATION

The Naval Warfare Centers work on ever changing Research, Development, Test, and Evaluation (RDT&E) projects for various customers/sponsors across the DoD. However, being able to match project needs with available personnel is a challenge. With the help of a workshop with Begin Morning Nautical Twilight (BMNT), the Naval Information Warfare Center Pacific (NIWC Pacific) have derived that the Naval workforce could benefit from an online, interactive Gig economy. Therefore, we are looking to leverage novel concepts and new technologies currently being used to create the emergent "Gig Economy" and develop an internal capability to more efficiently and effectively solicit short-term project needs and find skilled workers to help with tasks.

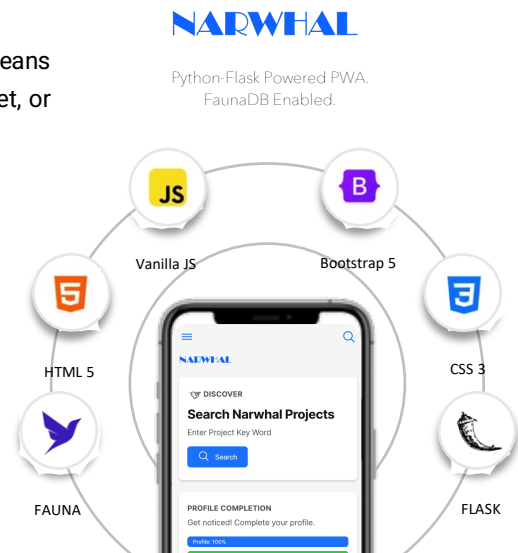
2. ABOUT

Narwhal is an interactive Progressive Web Application designed with the intent of creating employment connections for the Naval Workforce. Narwhal leverages novel concepts and new technologies currently being employed to create the emergent "Gig Economy". We have developed the internal capability for project managers to more effectively solicit short-term project needs while connecting them with skilled engineers to take their projects to the next level. This submission to project narwhal focuses on scalability and demonstration of technology which can be employed to fully deploy a gig-economy app for the naval workforce. While all the project requirements have been successfully met, it merely scratches the surface of the endless possibilities that can be quickly adapted to the scalable framework discussed herein.

3. TECHNOLOGY

Narwhal is an interactive Progressive Web Application (PWA) which means that you can use it through your browser on your computer, your tablet, or your smart phone. The core technology behind the PWA is based on:

- [Flask](#) - Python based web dev. micro-framework
- [Fauna](#) - distributed document relational database
- [S3](#) - high-speed web-based object storage service
- [WebPush](#) - web-based push notifications
- [SocketIO](#) - low latency bidirectional communication
- [HTML5](#) - latest HTML version validated by W3C
- [Bootstrap 5](#) - the most popular CSS framework
- [VanillaJS](#) - lightweight JavaScript framework



4. REASONING

PWA's are web apps developed using a number of specific technologies and standard patterns to allow them to take advantage of both web apps and native app features. PWA's are built and enhanced with modern APIs to deliver enhanced capabilities, reliability, and installability, *while reaching anyone, anywhere, on any device* with a single code-base. The best practical examples of PWA's can be found at Google as they created the concept. YouTube, Twitter, and the Chinese retail giant Alibaba serve all mobile traffic via PWAs.



You can start a PWA from the browser, and just like with a native app, you can install an icon on the home screen. The PWA is extremely fast and offers the ability for some features of the app to work offline or on slow networks. You don't have to download the PWA unlike a native app, and therefore, the PWA is always up to date. In terms of maintenance, a PWA means less work. You would normally maintain the website plus two apps (Android and iOS). With a PWA, the content is now delivered from a single platform.

For our web development framework, **Flask** was selected due to its lightweight yet expandable nature. Flask is considered a micro-framework because it only provides components that are essential for web development, but allows developers to add any number of libraries or plugins for a complete extension of the desired capabilities of the application.

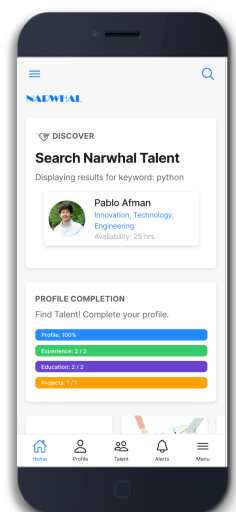
For user data and non-digital content, a distributed document-relational database named **Fauna** was selected due to its client-serverless technology. On the bottom layer, Fauna brings NoSQL, document databases and relational databases together, thus the name document-relational database. Above that, it provides the reliability of a traditional relational database with the flexibility and developer friendliness of this document database. Lastly, the Fauna database is delivered as a cloud API.

On the other hand, for fast and reliable digital content, we selected **Amazon's S3** scalable storage service since it provides a very high level of durability with high availability and high performance.

FEATURES: 5.1 PROGRAM MANAGER ACCOUNT

The Narwhal PWA has been conveniently split between two different types of users. On the program manager side, the narwhal app provides full functionality of the requirements laid out by the Narwhal challenge. We will now explain the architecture by starting with the Menu bar, which is composed of a home, my profile, talent, notifications, and menu options tab.

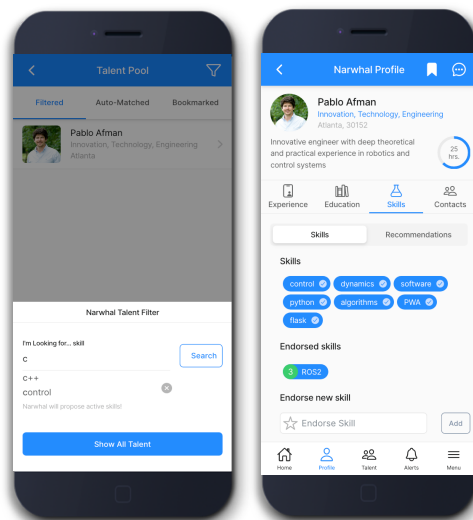
The **home page** was designed with the intent of acting as a dashboard, where program managers can see high level stats about their projects, their profile, and even perform a quick search through active talent profiles via talent key words. With its stylish design, the home is intended to act in equivalence to a more commonly known "Facebook" wall.



The **my profile** page serves as the tool where program managers can manage their presence on Narwhal. Through an engaging UI, they have the option to customize their profile photo, mission statement, and most importantly, create, edit and manage their projects. Like any other professional network, this page allows them to add and edit both professional experience and education, as well as manage their internal Narwhal contacts. Furthermore, it is through this page where they can access their projects details page, view the list of interested applicants on each project, as well as edit active projects and create new ones.

The **project details** page is rendered in the form of a “blog-style post” using the information provided by the program manager. Through this page, interested talent can learn about the project, bookmark it, apply for it, and connect with the program manager. Future integrations will allow you to share the project on other professional social media platforms such as LinkedIn. This will not only increase the traffic and awareness to the project itself, but it will naturally bring awareness to the Narwhal tool.

A new project entry is composed of a project banner for which the intent is to accurately characterize the project in question, project details, and talent details section. The project details request information about the project sponsor, title, headline, an external link to another site which may contain additional project information, the expected working location, and a summary of the project with start and end dates. The talent details section allows a program manager to describe the type of talent that the project requires, as well as key words that can be used to easily match the project with relevant talent options.

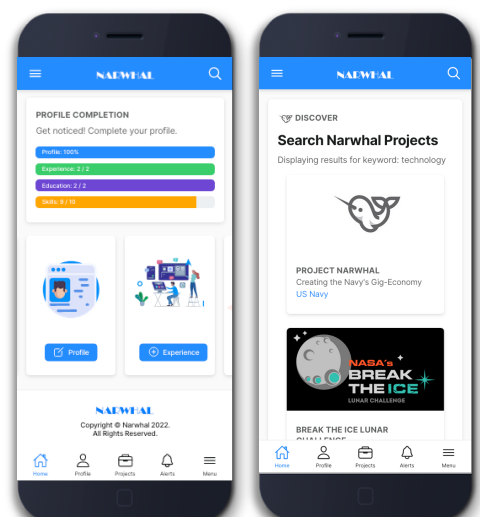
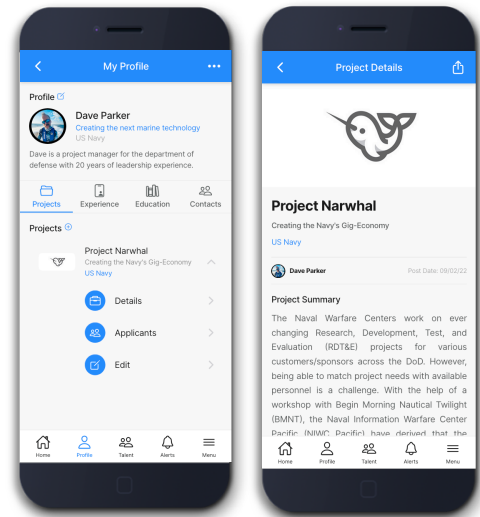


The **talent pool** page is perhaps the most interesting and where the most potential for the app remains to be tapped. In its current form, it allows program managers to browse through all of the talent profiles (100 profiles at a time), search for talent by skill through an intelligent suggested-text form which employs all the skills available in the database. In addition, it provides access to bookmarked profiles, provides an auto-matched category employing an algorithm that automatically connects them with talent profiles that specifically match one or more of their project needs. Match relevance will be implemented in future releases. This automatic feature does not require input from the user. The profiles displayed here are linked elements that enable a user to visit each individual talent profile page. Upon accessing a **talent profile** page, program managers have the ability to view the talent’s availability, view and endorse skills, review talent’s education and experiences, as well as view their list of contacts. Ultimately, this last feature can provide instant and direct communication with some of the talent’s references. Lastly, program managers are able to bookmark, create contact, and once created, directly communicate through the internal Narwhal messaging feature.

FEATURES: 5.2 ENG. TALENT ACCOUNT

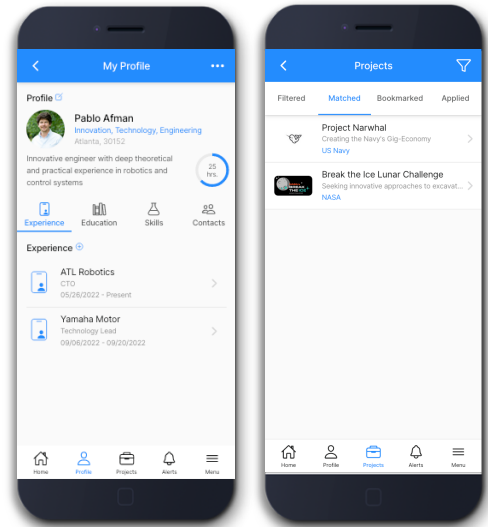
For the engineering talent accounts, the narwhal app provides full functionality of the requirements laid out by the Narwhal challenge. We will now explain the architecture by starting with the Menu bar, which is similar to the program manager’s menu bar, but as one may expect, the talent tab is now replaced with a projects tab.

The **home navigation** page was designed with the intent of acting as a dashboard, where engineering talent can see high level stats about their profiles, and perform quick searches through Narwhal’s database of active projects via project requirement keywords. In order to engage talent into creating complete profiles, whose information can be used to match them with active projects, a stylish profile completion dashboard is provided upon entry to the Narwhal application. Future developments may include a list of promoted projects, which talent can see upon opening the Narwhal PWA.

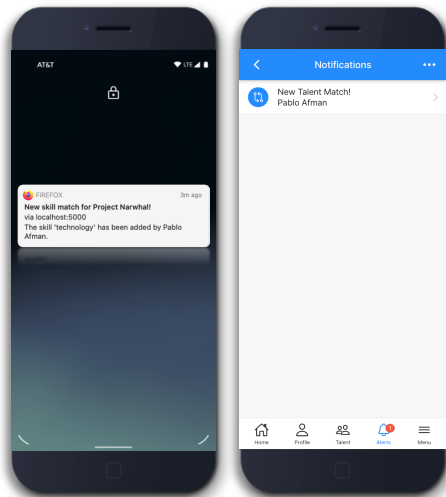


The **my profile** page serves as the tool where engineering talent can view and edit the way their presence will be displayed on the Narwhal PWA. Through an engaging UI, they have the option to customize their profile photo, mission statement, input their current availability, as well as create and manage their skills, professional experiences, and education. Since complete profile submissions requires major overhead for the talent, yet are required for successful matches, future integrations will allow you to autofill based on the LinkedIn API simply by providing credentials.

For the talent account, the **projects** page is perhaps the most interesting and where the most potential for the Narwhal application remains to be tapped. In its current form, it allows talent to filter projects by requirement, see all active projects on Narwhal, access bookmarked projects, and see every project that they have applied to. In addition to this, the matched category employs an algorithm to automatically connect them with project profiles that specifically match one or more of their skills. Note that this is done automatically, without the need of any input from the user. The projects displayed in all four tabs are linked elements that allow the user to visit each of the individual project detail pages.



FEATURES: 5.3 COMMON ACROSS ACCOUNTS

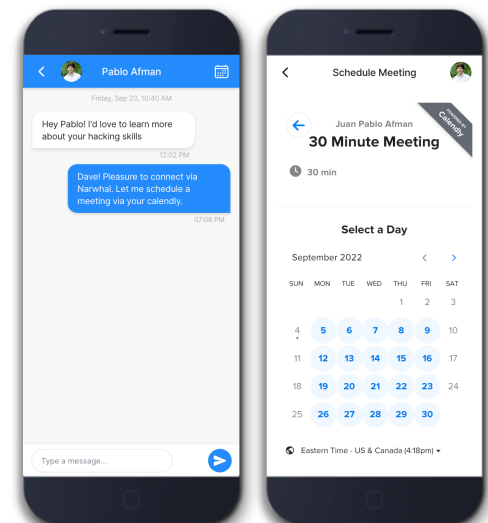


Narwhal Notifications: Having the ability to cache the contents of an online app to work offline is a great feature for the Narwhal PWA. Allowing the user to install the web app on their home screen is even better. More importantly, instead of relying only on user actions, Narwhal can do more! Using both an internal notification system, as well as web-push messages and notifications, Narwhal can automatically re-engage with the user and deliver new content whenever it is available. New content may occur in the form of a new contact, a new project-talent match, new project application, or a new message.

To make the web-push notifications possible, Narwhal requests a subscription to a server that will then send the data back to the app. The Narwhal Service Worker will receive data from the push server, which can then be shown using the notifications system. The technology supports VAPID (Voluntary Application Identification), which offers an extra layer of security. Web-Push notifications already work on most browsers and android devices and are a new major delivery from iOS 16!

Narwhal Messenger: Taking full advantage of the low latency bidirectional communication provided by SocketIO, Narwhal contains its very own internal communication system!

We hope such functionality can improve user acquisition and interaction for the Narwhal tool since both program managers and talent can remain engaged in the Narwhal platform without the reason to ever leave the Narwhal tool for any communication purpose. Future integrations may include voice and video over IP. In Today's release, the messaging tool includes a link to an internal scheduling page, where users can easily schedule zoom meetings (addressing the current platform limitations of no video over IP) by taking full advantage of the **Calendly API** Integration



6. COMPLIANCE MATRIX

The project objectives are laid out by the following 7 feature requests:

- Talent profiles:** Narwhal provides an *intuitive and fun UI* that allows talent to create profiles where they
 - can visualize an overview of their profile progress to *engage users* to fully complete their profiles!
 - can easily input both *pre-populated and manually entered* content.
 - can provide information about their *availability, skills, objective*, and much more!
 - automatically get matched with projects that meet one or more of their skills and talents.
- Program manager profiles:** Intuitive and fun UI for PMs that enables them to
 - create blog-post style projects that talent can then bookmark, share, and apply to
 - input both *free text and suggest text* while searching for talent
 - automatically get matched with active talents that meet one or more of their project requirements.
- Matching algorithm:** Narwhal provides the ability for both talent and program managers to
 - perform searches for active projects or talent, respectively, via both *free-text and suggested-text*
 - be proposed automatic matches of projects or talent, respectively, *without the need for user input*
 - enter and endorse skills, respectively. Every skill endorsement results in a +1 for the skill in question. This information will be employed in future versions to prioritize search results.
- Intuitive and user-friendly homepage:** Includes an intuitive navigation architecture and robust search algorithm that
 - enables program managers to easily search through engineer profiles via keywords
 - allows talent to search for active projects via keywords.
- Push notifications:** Narwhal supports both web-push notifications and in-app notifications that ping users when
 - a new match between a project and a talent has been *automatically detected* by Narwhal
 - a new contact has been requested
 - a new application to a project has been submitted
- Docker Container:** The Narwhal PWA builds both from source and a DockerFile has been provided.
- Shared Repository:** The Narwhal PWA code repository has been provided for review.

This Narwhal submission hence meets the requirements as summarized below

	Requirement	Status	Notes
1	Talent Profiles	Success	Intuitive and fun UI for engaging talent to create robust profiles
2	Program Manger Profiles	Success	Intuitive and fun UI for program managers to create project posts
3	Matching Algorithm	Success	Basic but fully scalable demonstration. Automatic and Keyword Based
4	Intuitive Homepage and Navigation	Success	Talent can find projects and program managers can find talent
5	Notifications & User Engagement	Success	Both in-app notifications and web-push
6	Web-App Containerization	Success	docker pull jafman3/narwhal_web:submission
7	Shared Repository	Success	git@github.com:jafman33/narwhal.git
8	Bonus: Narwhal Messenger!	Success	Users communicate directly through Narwhal and schedule meetings

* DockerHub and GitHub repositories are private. Please request access per instructions by Dr. Jamie R. Lukos

7. DEMO

A fully functional online demo of this project is provided through the barcode provided. The objective of this demo is to provide you with the complete experience of the Narwhal progressive web application directly through your smartphone. You may log in using an engineering talent account, or a program manager account, or create your own profile. Be sure to select the type of account you'd like to build while registering through the Narwal PWA.

While browsing under the program manager account, both your profile and projects will be setup and you'll be able to browse through a set of two talent accounts, each with slightly different skills.

While browsing under the engineering talent account, your profile will be setup and you'll be able to browse through projects from two different program managers, each with one or more active projects.



Program Manager Account
Email: pm@narwhal.app
Password: NarwhalApp

Engineering Talent Account
Email: talent@narwhal.app
Password: NarwhalApp