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Sixfold Development Technology Specification V1.0

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Version History

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Table of Contents

Executive Summary	3
Introduction	4
Project Overview	4
Why a Single-Page Web Application (SPA)?	4
Minimum User System Requirements	5
Technical Software Specifications	5
Development Tools	5
Integrated Development Environment (IDE)	5
Source Code Editor	6
Team Communication	6
Project Documentation	8
Project Management	9
Web Browser	10
Web Server Hosting	11
Web Development	11
Web Frameworks	11
JavaScript Web Framework	11
Database	12
Application Programming Interfaces	13

Executive Summary

Introduction

This document describes the technical specifications of our project. It details the technologies that we will be using for the development and deployment of our single-page web application, as well as define the requirements necessary for using it. In addition to ensuring optimal functionality for our application, we focused on two main goals for choosing our technologies:

- Free/budget-friendly
- Easy to moderate learning curve

Project Overview

Our application is a single-page web application that aims to alleviate problems stemming from cohabitation and searching for a home. It offers collaborative management tools fit for dealing with these issues, as well as a platform for searching for available households. Users will be able to search for available households in the Orange County, CA area that are registered within the application, from which they can connect with other users to discuss living arrangements. Additionally, they will be able to better manage household expenses, tasks, and supplies with the help of features such as due dates, notifications, and relevant descriptions.

Why a Single-Page Web Application (SPA)?

Our team is creating a single-page web application to ultimately improve user experience. Since this type of application implements dynamic loading, which allows new content to be refreshed onto a single page rather than on multiple pages, it improves the load speed and minimizes session interruptions. Progressive web applications offer these same features, but additionally utilizes service workers to offer offline support, as well as other tools to mimic native applications for those who are more partial to mobile device environments. Since these aren't necessary for our goals, we decided to go with the former. The table below compares some costs and benefits with a few alternative web application types.

Features	Web Application Types		
	Single-page Web Application (SPA)	Progressive Web Application (PWA)	Multiple-page Web Application (MPA)
Dynamic Loading	Yes	Yes	No
Offline Support	No	Yes	No
JavaScript Dependency	High	High	Low
Speed	Faster	Faster	Slower
References	<ul style="list-style-type: none"> - https://www.scalablepath.com/blog/single-page-applications/ - https://medium.com/@NeotericEU/single-page-application-vs-multiple-page-application-2591588efe58 	<ul style="list-style-type: none"> - https://blog.bitsrc.io/what-is-a-pwa-and-why-should-you-care-388afb6c0bad 	<ul style="list-style-type: none"> - https://rubygarage.org/blog/single-page-app-vs-multi-page-app

Minimum User System Requirements

OS: Windows 7 and later

Browser: Google Chrome Version 63.0.3239

RAM: 2 GB

Free Disk Space: 200MB

Language: English

Technical Software Specifications

Development Tools

Integrated Development Environment (IDE)

Visual Studio Community

Our IDE of choice is decidedly Microsoft's Visual Studio, Community Edition. It markets itself as the free and open-source version made suitable for students, in comparison to its counterparts, versions Professional and Enterprise, that have more features but require purchase. Arguably

the most popular of its kind, it has few alternatives that can offer the same community resource and version reliability. Since our team is comprised entirely of students working on a senior project, the software seemed most fitting for our development purposes.

Source Code Editor

Visual Studio Code

Since our web application requires front-end development, we decided to also use a code editor for any workload that doesn't require all the stacked features offered by the IDE. Microsoft's Visual Studio Code provides a faster and more lightweight environment for developers to write and edit source code. While this can be done on regular text editors such as Notepad or Wordpad, Visual Studio Code has tools such as Intellisense that suggests code completion and error sensing for simple syntax errors. It additionally has a large collection of extensions that can be installed at your discretion for the purposes that you need them for. One such extension is the LiveServer extension, which relieves the hassle of constantly refreshing your web page with live reload during development. Although unnecessary for the current scope of our project, it also offers cross-platform compatibility across Windows, macOS, and Linux systems, which will make it easier for us to integrate those systems further down the road. Some popular alternatives include Atom and Sublime.

Features	Source Code Editors		
	Visual Studio Code	Atom	Sublime
Latest Stable Version	1.39	1.40.1	3.2.2
Developed by	Microsoft	GitHub	Sublime HQ
License	MIT	MIT	Proprietary
Cost	Free	Free	<ul style="list-style-type: none"> - Free download - \$70 license purchase required for continued use
References	<ul style="list-style-type: none"> - https://code.visualstudio.com/updates/v1_39 	<ul style="list-style-type: none"> - https://atom.io/ 	<ul style="list-style-type: none"> - http://www.sublimetext.com/download - https://www.codementor.io/mattgoldspink/best-text-editor-atom-sublime-vim-visual-studio-code-du10872i7

Team Communication

Discord

Discord is a free, widely-used communication platform that is popular among the video gaming community as well as the software development community. Although initially developed for the former, it has become a useful tool for any teams who require remote communication through voice or chat. Its voice-chat feature makes it simple for audio channels to be created and connected to. Discord has a large cap on the amount of users who can be connected to a session at once, so it works well for our modest team of six.

Slack is another popular option for remote team communication, and has an interface similar to that of Discord's. But while both applications have free and paid plans, Discord's free plan has more to offer for the purposes of our project. The table below illustrates the differences between the two for the free plans.

Features	Communication Platforms	
	Discord	Slack
Latest Stable Version	0.0.9	4.0.2 (Windows)
Developed by	Discord Inc.	Slack Technologies
License	Proprietary	Proprietary
Cost	Free	Free
Message History Storage and Access	Unlimited	10,000
Text Chats	Public and private	Public and private
Voice Chats	1-to-1 and Group	1-to-1
Video Chats	1-to-1 and Group (up to 8 users)	1-to-1
File Storage	Unlimited	5GB per user
References	<ul style="list-style-type: none">- https://discordapp.com/nitro- https://zapier.com/blog/slack-vs-discord/	<ul style="list-style-type: none">- https://www.slack.com/plans- https://slack.com/help/articles/360016548313-about-slacks-features

Gmail

Since its initial release in 2004, Gmail has had huge traction over its competitors just with storage space alone. At the time, competitors like Yahoo! Mail and Hotmail (now Outlook) were only offering up to 5MB of storage, but Gmail's first launch offered up to 1GB. Today, Yahoo

Mail actually offers more storage space than Gmail, but the latter still beats it in security and compatibility with other services that our team is utilizing (Google Drive and Google Docs). The table below illustrates the differences among the three for the free basic plans.

Features	Email Services		
	Gmail	Yahoo! Mail	Outlook
Developed by	Google	Yahoo!	Microsoft
License	Proprietary Software	Proprietary Software	Proprietary Software
Cost	Free	Free	Free
Storage Space	15GB (shared across Gmail, Google Drive, and Google Photos)	1TB	15GB
References	- https://support.google.com/mail/answer/6374270?hl=en	- https://help.yahoo.com/kb/SLN22068.html	- https://support.office.com/en-us/article/storage-limits-in-outlook-com-7ac99134-69e5-4619-ac0b-2d313bba5e9e

Project Documentation

Google Drive

Google Drive is an online service developed by Google that offers free cloud file storage and synchronization. It offers up to 15GB of free storage shared across Google Drive, Gmail, and Google Photos, and is arguably the most popular of cloud storage services on the market. Our team utilizes Google Drive to share documents as well as other relevant project material with each other. It offers access to multiple Google software office suites such as Google Docs, Google Sheets, and Google Slides. Our team specifically uses Google Docs to collaborate and work on documents together simultaneously. All documentation for this project will be created and updated through Google Docs.

Draw.io

Draw.io is a free and open-source diagram software that provides a stacked but simple interface for creating diagrams. It makes diagramming easier with popular templates for different document needs, as well as commonly used containers and shapes for different modeling purposes. Its online web version allows users to save their work on their devices or in the cloud, including services like Google Drive, Dropbox, and GitHub. Our team takes advantage of these tools to create our sitemaps and other design documents.

Time.graphics

Time.graphics is a free, online timeline creator that allows quick and easy access to basic timeline tools. Utilizing the free version limits the amount of customization allowed on the project; the system only allows for a certain amount of events to be added in a single timeline. This tool will become less useful to us as we reach more low-level development. However, for preliminary, high-level timelines, the available features create an effective timeline that will fulfill our project needs.

Project Management

GitHub

GitHub is an open-source, web-based repository developed by Microsoft that provides a collaborative space for developers to manage source code, version control, documentation, and other code tracking. Using the Git system, it is easily one of the most popular free platforms available for teams that have to simultaneously work on projects together. It offers features such as forking, pull requests, commits and commit history, and branching.

Our team will utilize this platform for these features to simplify the development process of this entire project. On occasions where meeting up in person to work is not possible, GitHub will allow us to remotely send in updates and other contributions so that our progress is not impeded. While updates by default are made to a master branch that will reflect the current project progress, developers can also create their own branches to work on the code separately to avoid accidental commits. From there, final commits can be made to the master branch.

While there are multiple alternatives on the web that offer similar capabilities, our team ultimately decided on GitHub for cost and familiarity reasons. It offers free unlimited repositories, both public and private, that are more than sufficient to support the scope of our project. However, because private repositories have a limit of 3 collaborators, our project will be public access. Bitbucket, on the other hand, offers free unlimited private repositories with no cap on collaborators, but enforces a user limit of 5. Since our team consists of 6 developers, this offers little extra benefit. The table below illustrates the differences between the two for the free plans.

Features	Communication Platforms	
	GitHub	Bitbucket
Latest Stable Version	0.0.9	4.0.2 (Windows)
Developed by	Microsoft	Atlassian
Cost	Free	Free
Public Repositories	Unlimited	Unlimited
Private Repositories	Unlimited (up to 3 collaborators)	Unlimited
File Storage	1GB	1GB
References	- https://github.com/pricing	- https://bitbucket.org/product/pricing?tab=cloud-tab

Web Browser

Google Chrome V. 63.0.3239

One of the most widely-used browsers, Google Chrome provides compatibility with multiple services utilized in our project. It offers an abundance of extensions to users, some of which are development tools suitable for web development. Aside from Chrome DevTools

Features	Web Browsers		
	Google Chrome	Firefox	Safari
Latest Stable Version	77.0.3865.120	69.0.2	12.1 (OS X)
Developed by	Google	Mozilla	Apple
License	Proprietary Freeware	- GNU General Public License - GNU LGPL - Mozilla Public License	- Proprietary Freeware - GNU LGPL
Platforms	Cross-platform	Windows, Linux, macOS X	macOS X
Cost	Free	Free	Free
References	- https://chromereleases.googleblog.com/	- https://www.mozilla.org/en-US/firefox/releases/	- https://developer.apple.com/documentation/saf

	- https://www.google.com/intl/en/chrome/privacy/eula_text.html		ari_release_notes/safari_12.1_release_notes
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Web Server Hosting

Microsoft Internet Information Services (IIS)

Microsoft's Internet Information Services (IIS) is a Windows web server developed by Microsoft that allows us to deploy and host web applications and handle http requests. It allows for scripts and applications in our project to be handled and sent to the requesting user. IIS also supports many valuable extensions for features such as advanced logging, log analyzers, and database management that will support our single-page web application. Since our entire team is developing on Windows systems, access to IIS and its features

There are other web servers including Apache, nginx, and Google Web Server, Apache being the most popular option. While Apache is popular for its free open-source software, its flexible configuration settings may lead to security flaws if mishandled. IIS also comes with a variety of GUIs which reduces the learning curve for the web server.

Web Development

Web Frameworks

.NET Framework V. 4.7.2

Developed by Microsoft, .NET is an object-oriented framework that utilizes a common language runtime that automatically guarantees certain aspects of an application, similar to that of Java. This allows for strong access and control of web applications. .NET can be used to create applications with multi-platform support alongside cross-server support, allowing for implementation of our system across most platforms. The large amount of features offered by .NET, including libraries, compilers, and API, assist developers by providing easy access to resources to assist them during development. Most importantly, .NET saves developers time by removing a large portion of the required coding, thereby increasing production speeds, and ultimately saving time and money that could be spent elsewhere.

ASP.NET V. 4.7.1 (PENDING APPROVAL)

ASP.NET is an extension of .NET that includes tools and libraries used specifically in web application development. ASP allows for programming in C# while still providing access to the libraries and packages provided by .NET. Using HTML and C# also allows for web pages to be created dynamically, evaluating code on the server and sending content to the user. JavaScript frameworks are integrated within ASP alongside templates for single-page web application frameworks.

JavaScript Web Framework

Vue 2.6.10

Compared to its popular counterparts, React and Angular, Vue is the newest JavaScript web framework on the market. To ease the learning process of software during development, we decided to implement the Vue framework, version 2.6.10. Its website offers an extensive guide and introduction to the software, as well as a free video course to learn Vue basics. Unlike React (which is actually a library and not a framework), Vue implements more traditional methods for web application development by separating its HTML, JavaScript, and CSS. Its development style will provide more flexibility for junior developers like us, so that conversion to React and Angular in the future is simpler.

Features			
	Vue	React	Angular
Latest Stable Version	2.6.10	16.9.0	1.7.8
Developed by	Evan You and Active Core Team	Facebook and Community	Google
License	MIT	MIT	MIT
Cost	Free	Free	Free
References	- https://vuejs.org/v2/guide/	- https://reactjs.org/docs/getting-started.html	- https://angularjs.org/

Database

Structured Query Language (SQL) Server 2017 Developer Edition

Our team has decided to use SQL Server for our project's database platform. Developed by Microsoft, it is a free relational database management system that offers high compatibility with Windows systems. Microsoft's website provides an abundant amount of information, including release notes, installation help, and tutorials for those who are beginning to learn the software. As junior developers, this software will provide an easy learning curve that will allow for efficient progress of our project during the development phase.

One of the alternatives that we decided against was DBeaver, another database management application. DBeaver is free and open-source, and offers many of the same features as SQL Server, such as statement generation and handling of a variety of server and database types. However, DBeaver is developed by the open-source community. Since Microsoft SQL Server is developed by a larger, more-trusted corporation, we decided this would be the best option.

Structured Query Language (SQL) Server Management Studio (SSMS) V. 18.3.1

SQL Server Management Studio is a free environment for handling all SQL servers and databases. It allows for database management, and it includes tools that can assist in this, such as row selection and statement generation. Our team has decided to use this for its abundance of functionality and coverage, as it is able to handle many different databases, ranging from Azure SQL Databases to SQL Server.

Application Programming Interfaces

Google Maps Static API

Google Maps Static API is an application programming interface that allows embedding of a static map supplied by Google. Our team plans to use this to assist in finding the locations of different households. It allows for easy searching by address and radius due to its well-documented functions. This is an easy to implement API, which benefits us as developers due to its simplicity.