SOFTWARE ENGINEERING

SOFTWARE REUSE

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## EXECUTIVE SUMMARY

OctoFlex Technologies is a start-up IT firm that is focused on creating innovative solutions for the businesses from small-sized to mid-sized enterprises. With the team of experienced software developers and designers, we are specialized in creating custom software applications to meet all the specific needs of our clients. With a focus on innovation and quality, OctoFlex Technologies is poised to stay forefront in the software development industry.

### The Company

OctoFlex Technologies is quickly gained some good reputation for delivering some high-quality products which provides high business value. We have proven track of records for developing the software applications which are reliable, efficient, and cost-effective.

### The Market

In the highly competitive software developing market, OctoFlex Technologies has a good stand for its commitment to excel and customer satisfaction. Our team works closely with our clients to understand the specific requirements of our clients to deliver a solution that is beyond their expectations.

## INTRODUCTION

In today’s fast-paced world, it is important for the companies like OctoFlex Technologies to develop and innovate so that they can keep up with their competitors in the market. However, this does not necessarily mean developing all the software systems from scratch. By reusing pre- built components, our company OctoFlex Technologies will be able to significantly development and delivery time, improve the quality of the software and reduce the cost. This report aims on discussing how to employ reuse within the company in its design process. This report will address how we will explore the combination of application frameworks, software product lines, component and object/function reuse. In addition, we will discuss the “not invented here” syndrome and how we will organize the software libraries for easy categorization and searchability.

## APPROACH TO THE SOFTWARE DEVELOPMENT WITH A FOCUS ON SOFTWARE REUSE

Software reuse is the process of creating software systems from existing software rather than building software systems from scratch. The goal of software reuse is to reduce the cost of software production by replacing creation with recycling.

**BENEFITS OF SOFTWARE REUSE**

* Improvement in Dependability & Reliability given previous testing and use
* Risk reduction as we avoid the elements of detailed software development
* Standards compliance accomplished with prior work
* Development time reduced by starting with blocks of reusable software
* Permits more resources for new functional elements of the system

**DOWNSIDE OF SOFTWARE REUSE**

* Maintenance cost increase
* Software tools require longer support.
* Software tools may become obsolete.
* “Not invented here” attitude reduces acceptance.
* Overhead of creating & maintaining a component library
* It takes time to select reusable software components.

# GENERAL DESIGN PROCESS THAT WE WILL USE TO DO SOFTWARE REUSE ON OUR BLOOD SUPPORT+ APPLICATION

* Identify Reusable Components
* Evaluate Reusable Components
* Store and Manage Reusable Components
* Develop a Reuse Strategy
* Implement Reusable Components
* Test and Validate
* Maintain and Update

Some of the reusable components available in the market when developing a blood donation app, some of the essential components required for the app include:

1. User authentication: A component that enables users to register and log in to the app securely. Authentication is the process of identifying users that request access to a system, network, or device. Access control often determines user identity according to credentials like username and password. Other authentication technologies like biometrics and authentication apps are also used to authenticate. We will be using the Firebase Authentication as it is easily accessible pre-existing user management component which provides secure authentication and account management functionalities.
2. User profile management: A component that enables users to manage their personal information, such as contact details and medical history. User profile management will be helpful in racking and maintaining applications, giving permissions within those applications, personal settings, and file servers, specific to each user, in the form of Attributes. We will be using Firebase for user profile management
3. Blood donation booking
4. Blood Inventory Management for the hospitals
5. Messaging: A component that allows users to communicate with each other, such as sending reminders about upcoming blood donation appointments or updates about the availability of blood at the blood bank.
6. Push Notifications: A component that sends push notifications to users, such as appointment reminders or updates about the availability of blood. We will be using pre- built push notification services, i.e., Firebase Cloud Messaging (FCM)
7. Payment gateway: A component that enables users to make payments for blood donations or other services provided by the app. The pre-built payment gateway component that we will be using for our Blood Support+ Application is Paypal and Stripe by integrating them into the application to fulfill the payment functionality of the application.
8. Data analytics
9. UI Components: The Blood Support+ Application requires various components like buttons, forms and lists, we will be using Material UI for the same reason.
10. Location-based services: We will require a pre-built component to track the blood donors and recipients, so, for that we will be using Google Maps API.
11. Testing and Debugging: Testing and Debugging is important to make sure that the Blood Support+ Application works as it is intended. For testing and debugging, we will use Selenium and TestComplete to automate our testing process and identify bugs.

Therefore, our approach to software development for Blood Support+ Application is comprehensive such that a product is created via pre-built components because all the components are available in the market for the application to successfully develop. This also makes it easier for the development of our software application to be built using wholesale software reuse.

## DEVELOPING A REUSABLE STRATEGY

For developing Software systems from pre-built components, the company will address reuse by focusing at four levels of software reuse which are:

* **System Reuse**: Reusability is the utilization of pre-existing assets in some way throughout the creation of a software product. These resources include code, software components, test suites, designs, and documentation and are by-products and products of the software development life cycle. Reusing a full software system, including its hardware and software components, to build a new application is known as system reuse. System reuse in the context of developing blood donation apps may entail using already-existing blood donation systems, such as blood bank administration systems, to create the app. Although many of the necessary features and functionalities, like inventory management, may already be included in the current system, this can save time and resources.
* **Application Reuse**: Using current healthcare applications, such as electronic medical record systems, can be done while developing blood donation apps. While many of the necessary features and functionalities, such user authentication and medical record management, may already be included in the existing program, this can save time and resources.
* **Component reuse:** Using pre-existing components, such as authentication libraries, location-based services APIs, and messaging APIs, can be done while developing blood donation apps. As many of the necessary components might already be available as open- source libraries or APIs, this can save time and resources.
* **Object and function reuse**: While developing blood donation apps, object/function reuse may entail writing reusable code for jobs like push alerts, data validation, and error handling. Several of the necessary tasks may be repeated in many portions of the program, thus doing so can save time and resources.

**APPLICATION FRAMEWORKS AND SOFTWARE PRODUCT LINES THAT WE WILL BE USING**

Application Framework: For the development of our Blood Support+ Application, We will use the hybrid approach. Cross-platform mobile app development is made possible by hybrid mobile application development frameworks like React Native, which support both the iOS and Android operating systems. We will be using React Native as our application framework. This frame-work will help us as it provides a pre build user interface and severe build components.

Software product lines: Software product lines (SPLs), also known as software product line development, refer to the strategies, tools, and processes used in software engineering to build a group of related software systems from a common base of software assets. Using SPLs we can build a core set of features and functionality. Like we can build the user authentication, blood donation booking, and management that can be reused in different platforms. There are several software product line tools we will be using through the development and design process which are:

* FeatureIDE: It is an open-source management tool use for management and configuration of software product lines. This tool will be useful in developing the Blood Support+

Application in a way that supports different donor types, blood types and other kind of variations.

* ProductLine Architecture Tools (PLA): It is also an open-source tool for the development of a software product line. With PLA, we will be creating reusable components which will be assembled into different product variants, i.e., the Blood Support+ Application will have more of the different features and options.
* Pure::Variants: It is a commercial tool we will be using for managing the software product lines. It will be helpful in developing the Blood Support+ Application in a way that it supports rapid iteration and frequent updates.

## “NOT INVENTED HERE” SYNDROME

The “not invented here” syndrome is a common issue that arises when a company prefers to develop everything, every component by themselves without using pre-built components because they did not make them. The companies are hesitant in using those existing software components. To address such issue throughout the company, we will establish a culture of reuse where we will let others know the benefits of reusing pre-built components. Further, we will be encouraging knowledge-sharing among our teammates to identify reusable components which will further reduce the development time and cost and improve the quality of the software.

## ORGANIZING SOFTWARE LIBRARIES FOR CATEGORIZING AND SEARCHING

To allow easy access for categorizing and searching of existing functionality, OctoFlex Technologies must organize software libraries systematically in a right order. We will be using metadata to organize the software libraries by categorizing the existing functionality on the basis of its type, its purpose and the at what level it is used so that it is easily searchable. As it will be easier to find the pre-built components in this way, it will be also useful for us in further reducing the development time and cost with improvement in software quality.

## CONCLUSION

In conclusion, software reuse can significantly improve the development process of the software applications like Blood Support+ Application by reducing the development time and costs and improving the software quality. OctoFlex technologies employ software reuse in the development of the Blood Support+ Application by using various pre-built components like Firebase Authentication, Material UI, and Google Maps API. To ensure the implementation is effective, the company OctoFlex technologies should be developing a reusable strategy that includes system, application, component and object or function reuse. The company should also make sure that the software libraries are well-organized and easily searchable. The company should also address the “not invented here” syndrome. By implementing the software reuse strategy, OctoFlex Technologies can improve its competitive advantage and have a good stand for itself in the software development industry.

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