MAKERERE UNIVERSITY

Virtual Portfolio Manager

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Software Requirements Specification Document

DEPARTMENT OF NETWORKS SCHOOL OF COMPUTING AND INFORMATICS TECHNOLOGY

A Software Requirements Specification Document submitted to the School of Computing and Informatics Technology

For the Study Leading to a Project Proposal in Partial Fulfillment of the

Requirements for the Award of the Degree of Bachelor Of Makerere University.

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1. Introduction

This Software Requirements Specifications document defines what the Virtual Start-up Portfolio is, and how it ought to work and provides a clear definition of the user stories in terms of system requirements.

The Virtual Start-up Portfolio will be a web and a mobile phone App system that integrates start-ups and investors designed and implemented to automatically link the investor's interested field of business with potential and authentic start-ups in the same field. The system helps startups to keep track of their financial progress from their profile and captures all daily and authentic activities of a startup it can rank all startups for investors to identify the best startups and it issues out annual Certificates.

The VSP shall contain blockchain technology programmed to manage and execute smart contracts between a startup and an investor. The electronic notary shall be used to affix the authorized seal and signatures to certified documents. The notary startup certificate issuing activity shall use cryptography and a secured public key to manage, create, store and distribute the digital certificate. The documents shall be saved on blockchain and any modifications on such documents are detected and easily traced through the timestamps placed on the documents. This technology shall ease investment in startups in a secured and authentic time-saving process.

1.1 Purpose

The purpose of the software requirement specification is to aid users in understanding the different components of the VST and software developers in understanding the system design, modules and intended functionality of the system.
This project shall collect data which can be used by other developers and researchers developing projects or researching the same topic. The target audience for this document includes Project designers, project developers, testers, project supervisors and researchers.

Table 1 Document Audience

Intended User	**SRS Document use scenario**
Development team	The development team will use the SRS as a guide in developing the common application.
Project Supervisor	The project supervisor uses it to evaluate whether the developed application meets the requirements and purpose it is meant to satisfy.
System testers	Will use it to get well versed with documented system features to develop meaningful test cases and give useful feedback to developers

Project designers	will base on the SRS to produce quality system designs and schemas.

1.2 Scope

The Virtual Start-up Portfolio (VSP) is a combination of a web and a mobile phone App system that integrates start-ups and investors. The VSP automatically links the investor's interested field of business with potential start-ups in the same field. The system helps startups to keep track of their financial progress from their profile and captures all daily and authentic activities of a startup and it can Rank all startups for investors to identify the best startups their issues out annual Certificates.

The VSP shall contain blockchain technology and manage and execute smart contracts between a startup and an investor. The electronic notary shall be used to affix the authorized seal and signatures to certified documents. The notary startup certificate issuing activity shall use cryptography and a secured public key to manage, create, store and distribute the digital certificate. The documents shall be saved on blockchain and any modifications on such documents are detected and easily traced through the timestamps placed on the documents. This technology shall ease investment in startups in a secured and authentic time-saving process.

The VSP system will be programmed in blockchain languages which include Solidity, JavaScript, and Python

The objective of the VSP system is to help improve the current state of investment protocols in the Business incubators in Uganda.

Benefits of the VSP system include:

- The system shall reduce risks of investing in non-potential startups who fake data and submits an authentic document to the investors leading to loss of money. The system will have the ability to certify existence and carry out the proof of existence function effortlessly by saving the documents in the blockchain which ensures privacy and proof of ownership on document release.

- The VSP shall improve the effectiveness of managing startups in the business incubators through real-time smart contracts between startups and investors which reduces time in processing investment deals.

- The VSP shall enable startups, investors and business incubators to improve their transparency and accountability. This is because no one will make any alteration in the logged data within a blockchain until he gets permission for the same.

- The VSP shall have an easier hiring process for business incubators. Better and faster hiring will be done if the data of all startups and employees are uploaded to a database. This is because at the moment hiring is a challenging task for higher managers as they need to call a

previous company of the employee to find the history of an employee or startup they want to hire or invest in. This technology will save countless human hours and resources which are used in verifying the resume of a job applicant or a startup.

The goals of the VSP system include:

- To reduce risks of investing in non-potential startups who fake data and submit an authentic document to the investors leading to loss of money
- To enable startups, investors and business incubators to improve their transparency and accountability.
- To easier hiring process for business, incubators
- To improve the current state of managing startups in the business incubators through real-time smart contracts between startups and investors which reduces time in processing investment deals.

1.3 Definitions, Acronyms, and Abbreviations.

Table 2 Definitions, Acronyms and Abbreviations

Abbreviation	Definition
VSP	Virtual Star-up Portfolio
SRS	Software requirement specification
UI	User Interface
UGX	Ugandan Shillings
USD	United States Dolla

1.4 References

Schumpeter, J. A. (1934), The theory of economic development (Cambridge, MA: Howard University Press)'

Website of Innovation Village, htttps://innovationvillage.co.ug by - Innovation Village accessed as on 27-May-2021.

1.5 Overview

The SRS contains six sections as described below;

The first section is the introduction. The introduction of the software requirement specification for the Anti-wondering tracker contains the purpose scope definition acronyms and abbreviations

differences and an overview. This section gives a high-level explanation of what the software requirement specification document it's all about.

The second section is the overall description. This entails the product perspective product functions, user characteristics, constraints assumptions and dependencies, and apportioning of requirements. This section is aimed at explaining the anti-wondering tracker project in detail. It breaks down the product to ensure the system Interfaces hardware and software interfaces, communication Interfaces, Constraints, operations and site Adaptation Requirements. This clearly states how the product works, the assumptions made by its developers and the reasons for its design.

The third section entails the specific requirements. This explains in detail the external interfaces, functions, performance requirements, logical database requirements, design constraints, the software system Attributes (Reliability, availability, security, maintainability, portability), and additional comments. This section throws more light on the functional and non-functional requirements of the anti-wondering tracker project. It also tasks the design team to think through details of the project such as tuples in the database, data types and other language-specific details. A developer who reads this section of the software requirements specification should be able to build a project that solves the problem at hand.

The fourth section is the change management process. This section of the SRS shall direct the development team on how to go out changes to the project. It explains in detail the change management process from the point a change request is made to the point of evaluating the change that has been meant to the system. This section is important as it will prevent inconsistencies that come up due to several changes made to the system during maintenance over years.

The fifth section is the document approvals and the last section is supporting information. These two sections help to validate the content of the SRS. This confirms that all the information that is in the SRS is reliable.

2. The Overall Description

The VSP system will take in parameters such as a blockchain database that will save the data of startups, business incubators and investors to authentically process the investment in a real-time process with countless human hours used in verifying documents of startups and employees in the business incubator.

2.1 Product Perspective

The VSP shall be a group of system components separately built. These components include a MySQL database, a system API, a blockchain application, a web interface application and a mobile interface application.

The MySQL database shall store mutable content while the blockchain network shall store immutable content.

The system API shall be an intermediary between the blockchain application and the user to process and format the data to be stored.
The user interface shall be built to facilitate both mobile and web.

Below is the architecture of the system;

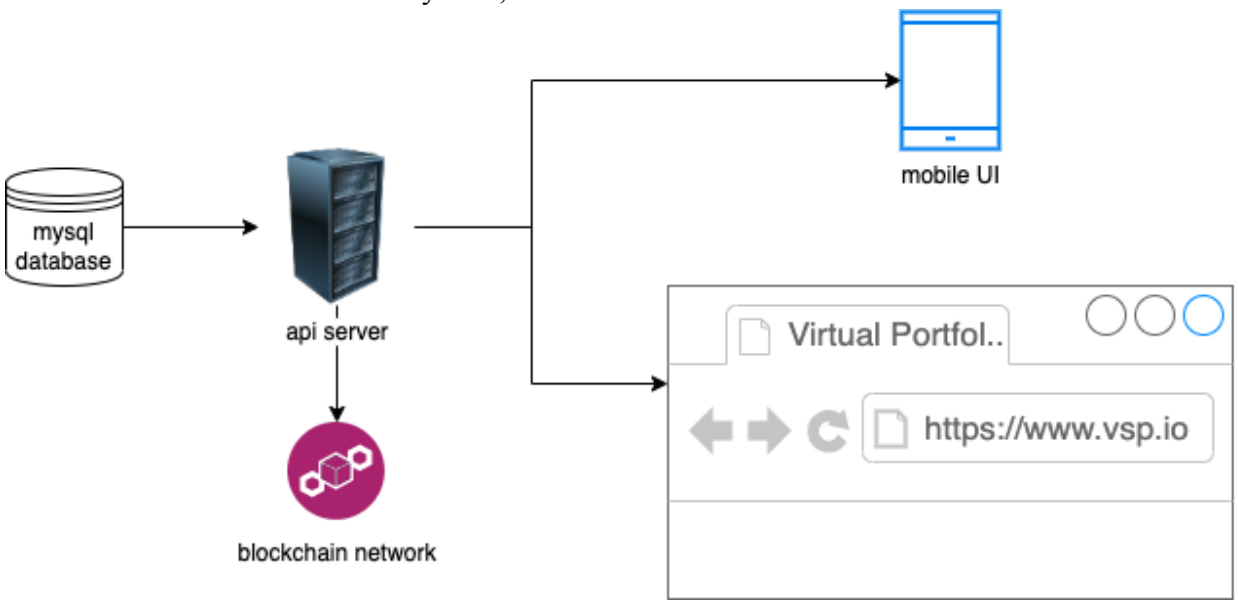

Figure 1 The VSP system Architecture

2.1.1 User Interfaces

2.1.1.1 Web Interfaces

2.1.1.1.1 Admin Interfaces

In this interface admin will have full control over this web application. Various information about businesses will be available on this screen. It gives full access to the user such as partial edit, deletes, update and add.

2.1.1.1.2 Registration Interface

In this interface the user has to enter certain details and choose from an option whether he wants to register as a business owner, auditor, business hub manager or an investor. The various fields available on this screen will be:

- Email
- Password
- Contact
- Address-
- Gender-user id

2.1.1.1.2 Login Interface

This is the interface where the user can fill up some details to log in to his/her profile page. The various fields available on this screen will be:

- Email
- Password

2.1.1.1.2 Dashboard Interface

In this interface other users such as auditors, hub managers and business owners will have view access to the analysis of the business. Various information about businesses will be available on this screen. The users can move forward to access other functionality from this screen.

2.1.1.2 Mobile Interfaces

This interface is limited to business owners.

2.1.1.1.1 Login Interface

This is the interface where the user can fill up some details to log in to his/her profile page. The various fields available on this screen will be

- Email
- Password

2.1.1.2.2 Registration Interface

In this interface the user has to enter certain details and choose from an option whether he wants to register as a business owner. The various fields available on this screen will be

- Email
- Password
- Contact
- Address-
- Gender-user id

2.1.1.2.3 Analysis Interface

In this interface the business owners will have view access to the analysis of the business. Various information about businesses will be available on this screen. The users can move forward to access other functionality from this screen.

2.1.1.2.4 Other Interfaces

Include adding business information. Editing information about a business.

2.1.1.3 Blockchain Interfaces

This interface is predefined by the Ethereum blockchain network built on open-source information.

2.1.2 Hardware Interfaces

Screen resolution of at least 800X600 is required for proper and complete viewing of screens. A higher resolution will be accepted. The user will need pointing and a typing interface for the proper functioning of the application.

2.1.3 Software Interfaces

Client: Web Browser, IOS and Android Mobile App

Web Server: Apache Tomcat

Database Server: MYSQL, Blockchain

Development End: PHP, Laravel, OS(Linux), Web Server

2.1.4 Communication Interfaces

Clients on the Internet will be using HTTP/HTTPS protocol.

Firewall security is required for securing the server.

TCP/IP protocol is a basic need for the client-side.

2.1.5 Operations

Users of the mobile and web application will have to register their details on a registration page. An account is then created for the user and when he logs in, he will be able to view his business details. Different user levels will have different views and access levels of the system.

The system shall be expected to run 24/7. It will be inaccessible during updates only.

2.1.6 Site Adaptation Requirements

The users of the system must connect to the internet at least once a day to synchronize the details collected.

2.2 Product Functions

This application will allow the user to do various things such as

- The system shall notify the stakeholders about critical events in the system.
- The system shall record information about businesses.
- The system shall display raw and analyzed information about businesses.
- All the details should be stored in the blockchain in such a manner in future if the user wants to see all the transactions he will see them

2.3 User Characteristics

This system will have four categories of users;

1. Investor
2. Startups
3. Administrator
4. Auditor

The investor shall have to create his or her profile on the investor portal and can access the profiles for startups in his interesting field of business.

A startup will have to create his or her profile on the startup's profile and can upload his documents where financial data shall have to be approved by the auditor.

The auditor shall have access to the financial data for every startup in the business hub and approve the authenticity of the data before updating the financial records of a startup.

The administrator of the system is also known as its superuser. They shall have access to all users' portals to be able to add a user or delete him or her from the system. They also have access to system-wide information like the number of registered users. They can also make changes to the database structure.

2.4 Constraints

2.4.1. Software constraints

Due to infrastructure constraints, we shall deploy a localized testing Ethereum blockchain to store data. We shall also validate transactions on the blockchain using the in-built test validator since it would be costly to do otherwise.

2.4.2 Language Requirement:

The system shall strictly use English as the standard language.

2.5 Assumptions and Dependencies

The web app shall depend on the data inputs from the mobile app. We do assume that business owners shall faithfully provide valid data.

Assumptions are that the user should have some basic knowledge of computers.

2.6 Apportioning of Requirements.

Version 1.0 of the VSP mobile and web application is available only in English while we may have potential users that lack proficiency in the English language. While the key stakeholders including business owners, investors, and business hub managers among others await future versions of the system, major functions in other categories are available in version one.

3. Specific Requirements

This will entail information about all the functional, performance and logical database requirements of the VSP web and mobile application.

3.1 Functions

3.1.1 The system shall authenticate all users.

3.1.2 The system shall provide a mobile app interface to register business owners that will capture their name, email and centre.

3.1.3 The system shall provide a web app interface to register investors, business owners, auditors and business hub owners that will capture name, email and centre.

3.1.4 The system shall operate the mobile app offline.

3.1.5 The system shall collect different data about the businesses.

3.1.6 The system shall display data collected about the businesses.

3.1.7 The system shall have different permission levels such as auditor, guest, business owner, admin, and investor.

3.1.8 The system shall synchronize the mobile app data when connected to the internet.

3.1.9. The system shall send alerts to specific events through email and notification popups.

3.1.10 The system shall provide an interface to analyze business performance for the investor, auditor, business owner and business hub manager.

3.1.11 The system shall log data collected to the Ethereum blockchain.

3.2 Performance Requirements

3.2.1. The VSP system shall collect data about businesses offline without an internet connection.

3.2.2. The VSP system shall ensure that once the mobile app is connected to the server synchronizing details are handled within 10 -50 seconds on connection to the internet.

3.2.3. The VSP system shall send alerts to all stakeholders about critical information such as email within 30 - 60 seconds.

3.3 Design Constraints

Due to the proof of ownership and authenticity constraints they shall contain a blockchain database for saving the documents.

The VSP mobile App shall be able to work offline in capturing the details of the user and then the app synchronizes when online to save the updates.

All saved documents shall be given a timestamp to trace any alteration on them.

3.3.1 Standards and compliance.

(a) Audit tracing

All audited documents must be updated and saved to the blockchain database. The saved documents must not be altered but can be used for visualizing and reporting. Any changes made to the database should be strictly by the administrator and the timestamps placed on these documents updated and recorded immediately.

(b) Report format

Blockchain database shall be developed in blockchain languages which include Solidity, JavaScript, and Python

the database shall be embedded on both the web and mobile application of the system.

The system shall be developed to work in the English language.

(c) Data Format.

The financial data must not be rounded off when stored in the database and should be recorded in USD or UGX.

All documents should be zipped before uploading.

3.4 Software System Attributes

The document alteration notifications should be real-time for the owner of the document and the administrator to react responsibly in time.

3.4.1. Usability

The VSP system written instructions in simple language with minimal complexity that is limited jargon or too much functionality.

3.4.2. Availability:

Considering that VSP is to avert financial risks, the system is expected to be available 99.89 of the time.

3.4.3. Flexibility:

The VSP, when built, can be used by startups, investors and business incubator managers to complete the smart investment contracts.it shall be accessed by any web browser for web applications and the mobile app from the app store. The mobile app can be used offline and then synchronizes when online.

3.4.4. Interoperability:

Due to the functionality of capturing the daily authentic activities of a startup the system shall be properly integrated with perfect financial applications.

3.4.5. Portability:

The system is intended to have a mobile app that can be accessed from anywhere at any time on any portable device such as a smartphone.

3.5 Organizing the Specific Requirements

3.5.1 User Class

Users will be split into two classes:

1. Admin users (investor and business incubation managers)
    - In charge of managing users of the system i.e., view, delete and update users' details
2. Normal users (Auditor and Start-ups)
    - The auditor validates the authenticity of financial statements and updates audited financial details.
    - The startup creates the business profile and provides financial data running daily in the business.

4. Change Management Process

The stakeholders who can propose changes to this SRS include:

- BSE22-26 Group members
- Project supervisor
- Course coordinator
- Potential clients

Changes to this SRS will be made by any of the members of the BSE22-26 Group.

The changes will be categorized into two - Major and Minor changes. Major changes are concerned with addition/deletion/modification of functional/non-functional requirements.

Minor changes are concerned with any general edition of the SRS content - tables, diagrams, and definitions.

The SRS includes a Revision History page that describes the Name of the member making the change, the Date of change, the Reason for change and the Document Version.

For any change to be made, a communication will be sent out to the BSE22-26 Group by email. The BSE22-26 Group will collectively review the change proposal and look for the best way to apply the change.

The SRS will then be modified to include the change. The Review History table will be updated accordingly.

The project supervisor will review the changes made to make an approval or propose a modification. On approval, the project supervisor will sign off the SRS as approved and it will be ready for stakeholders to use.

Approved by	Signature
……	……
Dr Mary Nsabagwa	Date: March 29th, 2022

Appendix A: Glossary of Terms

Software Requirements Specification (SRS) Describes what the software will do and how it will be expected to perform.

Global Positioning System (GPS) It allows accurate determination of geographical locations by users. It is based on the use of satellites in Earth orbit that transmit the information which allows them to measure the distance between the satellites and the user.

Global System for Mobile Communications (GSM) is a digital mobile network that is widely used by mobile phone users in the world for transmitting mobile voice and data services.

Structured Query language (SQL) is a domain-specific language used in programming and designed for managing data held in a relational database management system, or for stream processing in a relational data stream.