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**SOFTWARE REQUIREMENTS SPECIFICATION**

# for

**STOCK AND FLOW MODELING TOOL**

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**STOCK AND FLOW MODELING TOOL**

# INTRODUCTION

In today's complex and dynamic business environment, efficient management of stocks and flows is crucial for organizations to maintain operational effectiveness and optimize resource utilization. The Stock and Flow Modeling Tool is a cutting-edge software solution that empowers businesses to enhance their inventory management and resource utilization processes. With its intuitive interface and advanced features, this powerful tool allows organizations to visualize, analyze, and simulate stock movements and supply chain processes. By leveraging the tool's capabilities, businesses can drive operational effectiveness, reduce costs, and propel growth in today's competitive market.

## PURPOSE

The purpose of the Stock and Flow Modeling Tool is to provide businesses with an advanced software solution for optimizing inventory management and resource utilization. The tool aims to streamline stock movements and supply chain processes by offering intuitive visualization, analysis, and simulation capabilities. The primary goal is to enhance operational effectiveness, reduce costs, and drive growth for organizations operating in dynamic business environments. The tool will assist decision-makers in making data-driven decisions, identifying bottlenecks, and improving resource allocation strategies. The purpose of this document is to outline the hardware and software interface requirements, as well as provide detailed descriptions of functional and non-functional requirements specified by the client.

## DOCUMENT CONVENTIONS

* + - Entire document is *justified*.
    - Convention for *Main Title*

Font face: *Arial*

Font style: *Bold / Italics*

Font Size: 18

* + - Convention for *Sub Title*

Font face: *Arial*

Font style: *Bold / Italics*

Font Size: 14

* + - Convention for *Body*

Font face: *Arial*

Font Size: 12

Important keywords inside a *body* may be italicized. Indentation of text is done wherever required.

## INTENDED AUDIENCE AND READING SUGGESTIONS

The intended audience for this document includes software developers, testers, inventory managers, supply chain coordinators, and administrators involved in stock and flow management. It is recommended that any suggested changes to the requirements outlined in this document be provided on a separate page for reference by the development and validation teams.

Readers are advised to refer to section 1.5 REFERENCES for explanations of abbreviations, acronyms, and the standard SRS document format. Additionally, it is suggested to consult APPENDIX A: GLOSSARY to understand the meaning and context of keywords used throughout the document. This will aid in comprehending the requirements and specifications outlined in the Stock and Flow Modeling Tool SRS document.

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## PRODUCT SCOPE

The Stock and Flow Modeling Tool is a comprehensive software solution designed to optimize inventory management and resource utilization for businesses. It provides a user-friendly interface for visualizing, analyzing, and simulating stock movements and supply chain processes. With a focus on operational effectiveness and growth, the tool enables tracking of stock levels, identification of bottlenecks, prediction of demands, and resource optimization. It caters to organizations of all sizes and industries, offering flexibility and scalability. The tool empowers decision-makers, inventory managers, and supply chain coordinators to make informed decisions, improve processes, and drive sustainable growth.

## REFERENCES

* + - *Acronyms / Abbreviations*
      * API : Application Programming Interface
      * CPU : Central Processing Unit
      * DB : Database
      * DBMS : Database Management System
      * GB : GigaByte
      * GUI : Graphical User Interface
      * ID : Identity
      * IDE : Integrated Development Environment
      * MS : Microsoft
      * OS : Operating System
      * PC : Personal Computer
      * PS/2 : Personal System/2
      * R : Registered Trademark
      * RAM : Random Access Memory
      * RDBMS : Relational Database Management System
      * SQL : Structured Query Language
      * SRS : Software Requirement Specification
      * TM : Trademark
      * UML : Unified Modeling Language
    - *Texts*
      * *IEEE 830-1998 Standard* for writing SRS documents.
      * *I. Sommerville, Software Engineering, 8th ed. England: Addison-Wesley 2007*
    - *Links*

The  *Diagrams* were designed on [***Visual Paradigm Online***](https://online.visual-paradigm.com/)

# OVERALL DESCRIPTION

## PRODUCT PERSPECTIVE

The Stock and Flow Modeling Tool is a professional software solution designed to optimize resource utilization and inventory management. It empowers decision-makers, inventory managers, and supply chain coordinators to gain a comprehensive understanding of system dynamics. Through interactive visualizations and simulations, users can analyze key variables, relationships, and dynamics, enabling data-driven decision-making and improved operational effectiveness. The tool offers a user-friendly interface for customizing stock, source, variable, constant, link, and flow components. It supports developers in creating flexible and scalable solutions. Overall, the Stock and Flow Modeling Tool facilitates efficient inventory management, cost reduction, and sustainable growth in dynamic business environments.

## PRODUCT FUNCTIONS

## ADD ELEMENT SECTION:

a) User-friendly Interface: The tool provides a side column with an intuitive interface, allowing users to easily navigate and interact with the application.

b) Icon-Based Element Addition: Users can add modeling elements, such as stocks, sources, flows, links, variables, and constants, to the canvas by simply clicking on the corresponding icons.

c) Drag-and-Drop Functionality: The tool enables users to drag and drop elements from the add element section directly onto the canvas, enhancing the ease of use and workflow efficiency.

## EDIT PROPERTY SECTION:

a) Interactive Property Editing: By clicking on an element within the canvas, users can access a pop-up window that allows them to edit the properties of the selected element.

b) Customizable Properties: The property editing section provides users with the flexibility to modify various properties of the elements, such as name, value, type, and appearance.

c) Real-Time Updates: Any changes made to the properties of an element in the property editing section are instantly reflected on the canvas, ensuring a seamless editing experience.

## CANVAS:

a) Stock and Flow Modeling Workspace: The canvas section serves as the primary workspace where users can create and manipulate stock and flow diagrams.

b) Zoom and Pan Controls: The canvas provides controls for zooming in and out, allowing users to focus on specific areas of the diagram with ease. Additionally, pan controls enable smooth navigation across the canvas.

c) Background Customization: Users can customize the background variant of the canvas, providing options for personalized visual preferences.

## MENUBAR:

a) Import and Export Functionality: The menubar offers options to import and export models in JSON format, facilitating easy sharing and collaboration.

b) Dark and Light Mode: Users can switch between dark and light mode, offering a comfortable viewing experience in different environments and personal preferences.

c) Additional Functionality: The menubar may include additional features such as saving models, managing project settings, and providing access to help and documentation.

## CONTROL PANEL AND MINIMAP:

a) Control Panel: The control panel offers various controls and options for manipulating the canvas, including zoom controls, fit-to-view functionality, and locking the canvas to prevent accidental changes.

b) Minimap: The minimap provides a compact representation of the entire canvas, allowing users to navigate large diagrams more efficiently and quickly locate specific areas of interest.

c) Enhanced User Experience: The combination of the control panel and minimap improves the overall user experience by providing convenient navigation and advanced control over the modeling process.

## USER CLASSES AND CHARACTERISTICS

## Users (Inventory Managers):

**Role:** Inventory managers and supply chain coordinators.

Characteristics: Responsible for managing stock levels and optimizing resource utilization.

**Privileges:** Access to features for tracking stock movements, identifying bottlenecks, and optimizing resource allocation strategies.

## Developers:

**Role:** Software developers and technical team.

Characteristics: Involved in designing and developing the Stock and Flow Modeling Tool.

**Privileges:** Access to development tools, APIs, and documentation to create flexible and scalable solutions.

## OPERATING ENVIRONMENT

The product would be operating in *Microsoft Windows 10* environment. The hardware configurations of the system on which this application would be used would include

*Hard Disk*: 512 GB

*System Type*: x64-based PC

*Processor*: Intel(R) Core(TM) i5-8265U [CPU@1.60GHz](mailto:CPU@1.60GHz) 1.80 GHz

*Installed RAM*: 8.00 GB (7.85 GB usable)

It should preferably be a *React* application with a *user interface* and *“” version* should be used. At the back end, it must preferably use *spring boot.*

## DESIGN AND IMPLEMENTATION CONSTRAINTS

## IMPLEMENTATION CONSTRAINTS:

**Technology Stack:**

**ReactJS:** The Stock and Flow Modeling Tool is implemented using ReactJS for the front-end development.

**Spring Boot:** The back-end is implemented using Spring Boot framework for seamless integration with the front-end.

**React Flow Library:**The React Flow library is used to implement stock and flow modeling functionality, providing an intuitive and interactive user interface.

## SECURITY / PRIVACY CONSTRAINTS:

**Password Security:**

Hashing: Passwords are securely stored in the database using cryptographic hashing algorithms to protect user privacy and business flow projects.

## LIMIT AND DUE-DATE CONSTRAINTS:

**Maximum Element Limit:**

Constraint: Define a maximum limit for the number of elements that can be added to the canvas to ensure optimal performance.

## ACCESS CONSTRAINTS:

**User Roles and Permissions:**

Roles: Implement different user roles such as administrators, contributors, and viewers with distinct levels of access and privileges.

Permissions: Control access to specific features and functionalities based on user roles and their associated permissions.

## COMMUNICATION CONSTRAINTS:

**Automated Notifications:**

Requirement: Implement an automated notification system to notify users about important events, such as updates to the model or changes in permissions.

Real-time Updates: Enable real-time communication between users to facilitate collaboration and timely feedback.

## DESIGN CONSTRAINTS:

**User Interface Design:**

Responsive Design: Implement a responsive and adaptive user interface to ensure optimal user experience across different devices and screen sizes.

Intuitive Layout: Design the user interface with a clear and intuitive layout, allowing users to easily navigate and interact with the tool's features.

Visual Hierarchy: Use appropriate visual cues, such as icons, colors, and typography, to establish a clear visual hierarchy and enhance usability.

Consistency: Maintain consistent design elements and patterns throughout the application for a cohesive and user-friendly interface.

## ASSUMPTIONS AND DEPENDENCIES

## ASSUMPTIONS:

Use Case Handling: The Stock and Flow Modeling Tool can handle all use cases effectively and handle errors and exceptions as required.

User Knowledge: All users have knowledge of their login credentials and how to access the application.

System Reliability: The application can run continuously without encountering major stability issues or crashes.

Role-Based Functionalities: The application provides specific functionalities to users based on their designated roles and permissions.

## DEPENDENCIES:

Backend Technology: The Stock and Flow Modeling Tool relies on the Spring Boot framework for the backend implementation.

Frontend Technology: The application is developed using ReactJS for the user interface.

Database: The application may require a database to store relevant data. The choice of database technology will depend on the specific requirements of the project.

User Familiarity: The success of the system depends on users being familiar with accessing and using applications built with ReactJS and Spring Boot.

System Performance: The performance and responsiveness of the application depend on the capabilities and resources available on the hosting environment.

External Libraries and Packages: The implementation may depend on external libraries or packages specific to ReactJS and Spring Boot to provide additional functionality or streamline development.

# EXTERNAL INTERFACE REQUIREMENT

## USER INTERFACES:

**Add Element Section:**

Implement a side column with two sections.

The upper section should contain icons for modeling elements such as stock, source, flow, link, variable, and constant.

Clicking on an icon should add the corresponding element to the canvas section.

**Property Edit Section:**

The lower section of the side column should provide functionality to edit properties of elements on the canvas.

Clicking on an element in the canvas should display a pop-up for editing its properties.

**Canvas Section:**

Create a central section for stock and flow modeling.

Implement functionalities for adding elements from the add element section and editing properties from the property edit section.

Include options to export the model as JSON and PNG formats.

Allow users to import a model from a JSON file.

Provide options for changing the visual theme, such as dark and light mode.

Allow users to customize the background variant.

Include controls for zooming in, zooming out, fitting the view, and locking the canvas.

## STANDARD BUTTONS / OPTIONS:

Include a log-out button to allow users to log out of the application.

Provide a "Go Back" button on appropriate pages to navigate back to the previous page.

Allow users to close the application at any point using standard window close functionality.

## ERROR MESSAGE DISPLAY STANDARDS:

Display error messages when tasks cannot be accomplished due to incorrect input formats, incompatible or irrelevant information, incorrect values, or missing required fields.

Show specific error messages for restricted actions, such as exceeding limits or violating rules.

## CONFIRMATION DIALOG BOXES:

Use confirmation dialog boxes for critical and irreversible actions to ensure users are aware of the consequences before proceeding.

## HARDWARE INTERFACES:

The stock and flow modeling tool primarily relies on standard hardware interfaces, including a keyboard and a mouse or trackpad. The application should support input from a standard PS/2 keyboard and mouse/trackpad.

## SOFTWARE INTERFACES:

The stock and flow modeling tool is built using ReactJS as the front-end framework and Spring Boot as the back-end framework. The application does not have direct dependencies on external software interfaces or databases.

## OPERATING SYSTEM:

The stock and flow modeling tool should be developed to be operating system agnostic. It should function effectively on different operating systems without relying on specific OS-related tools, libraries, or packages.

# SYSTEM FEATURES

## SYSTEM FEATURES:

**Element Library:**

The tool should provide a comprehensive library of stock and flow modeling elements, including stocks, sources, flows, links, variables, and constants.

Users should be able to easily access and select elements from the library to add to the canvas.

**Drag-and-Drop Functionality:**

The tool should support drag-and-drop functionality, allowing users to add elements from the library directly onto the canvas.

Users should be able to drag elements within the canvas to reposition them as needed.

**Property Editing:**

Users should be able to edit the properties of elements added to the canvas.

The tool should provide a pop-up window or a sidebar panel that allows users to modify properties such as name, value, type, appearance, and other relevant attributes.

Changes made to element properties should be reflected in real-time on the canvas.

**Canvas Controls:**

The tool should provide controls for zooming in and out, allowing users to adjust the view of the canvas.

Users should have the option to fit the entire model within the canvas view for better visualization.

A lock canvas feature should be available to prevent accidental modifications to the model.

**Minimap:**

The tool should display a minimap that provides an overview of the entire canvas.

Users should be able to navigate to different areas of the canvas by interacting with the minimap, facilitating easy navigation in large models.

**Model Import and Export:**

The tool should support the import of stock and flow models in JSON format.

Users should be able to import previously saved models into the tool for further editing.

The tool should also allow users to export their models as JSON files for sharing or backup purposes.

**Dark and Light Mode:**

The tool should provide users with the option to switch between dark and light mode to accommodate their visual preferences and different environments.

**Background Customization:**

Users should be able to customize the background variant of the canvas, allowing them to choose different colors or patterns for a personalized look.

**Error Handling and Validation:**

The tool should perform error handling and validation to ensure the integrity and consistency of the stock and flow models created.

Users should be notified of any errors or inconsistencies in their models and provided with suggestions or guidance to resolve them.

**Help and Documentation:**

The tool should include a comprehensive help section, providing users with documentation, tutorials, and examples to support their usage of the tool.

Contextual help or tooltips may be provided to guide users in understanding and utilizing different features and functionalities.

**Responsiveness and Compatibility:**

The tool should be responsive and compatible with different web browsers, ensuring a consistent user experience across platforms.

# OTHER NON-FUNCTIONAL REQUIREMENTS

## ERROR HANDLING REQUIREMENTS

* The stock and flow modeling tool shall handle expected and unexpected errors effectively, ensuring that no critical information is lost and avoiding prolonged downtime.
* The tool should implement robust error handling mechanisms to prevent the input of erroneous data, such as invalid formats or incompatible data types.
* Proper error messages and notifications should be provided to users, guiding them on how to rectify or resolve errors.

## PERFORMANCE REQUIREMENTS

* The stock and flow modeling tool should be capable of efficiently handling a significant number of elements, allowing users to create complex models without performance degradation.
* The tool's response time for viewing information and performing operations should be optimized to ensure a smooth user experience. Responses should be displayed within a reasonable timeframe, ideally within a few seconds.

## SECURITY REQUIREMENTS

* The stock and flow modeling tool must prioritize user privacy and data security. All user data, including models and personal information, should be appropriately protected.
* Access control mechanisms should be implemented to differentiate between administrative and non-administrative users. Non-administrative users should have read-only access, preventing them from modifying any data except their own personal information.
* The tool should enforce access constraints for different user roles, ensuring that users only have access to the functionalities and data relevant to their roles.

## SOFTWARE QUALITY ATTRIBUTES

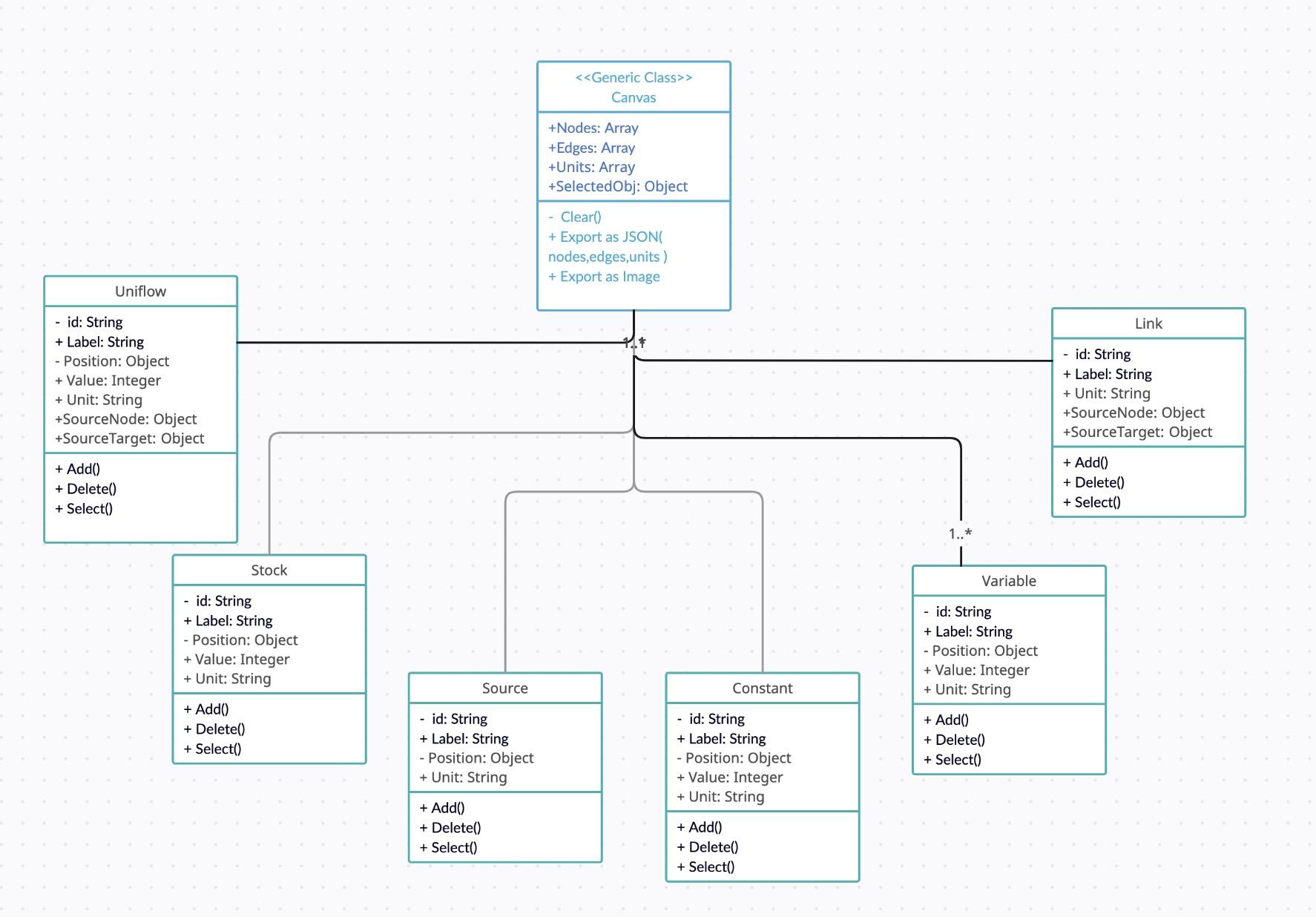
* The stock and flow modeling tool should prioritize ease of understanding and usability. The interface and interactions should be intuitive, allowing users to quickly grasp and utilize the tool's features.
* The tool should be reliable in handling human errors, providing safeguards and validation checks to prevent accidental input errors and inconsistencies.
* The correctness and robustness of the tool's functionality should take precedence over ease of reusability and extensibility in subsequent versions. The focus should be on delivering a stable and accurate modeling tool.

# APPENDIX A : GLOSSARY

* *Administrator*: A person who is responsible for the upkeep, configuration, and reliable operation of computer systems; especially multi-user computers, such as servers.
* *Class Diagram*: A type of static structure diagram in UML that describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects.
* *IEEE*: A professional association for electronic engineering and electrical engineering with its corporate office in New York City and its operations center in Piscataway, New Jersey.
* *Operating System*: A system software that manages computer hardware, software resources, and provides common services for computer programs.
* *Random Access Memory*: A form of computer memory that can be read and changed in any order, typically used to store working data and machine code.
* *Regular Expression*: A sequence of characters that specifies a search pattern.
* *Use Case Diagram*: A representation of a user's interaction in UML with the system that shows the relationship between the user and the different use cases in which the user is involved.

# APPENDIX B : ANALYSIS MODEL

***B.1. CLASS DIAGRAM***

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