**CSE303 - Software Design & Architecture**

**Bloom Taxonomy Level: <*Understanding*>**

**Section:** A

**Project Name:** *SmartWebCraft*

**Group Members:**

|  |  |
| --- | --- |
| **Name** | **ID** |
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**Note:** Each members’ work has been mentioned in [FA21-BSE-XYZ] Format before the start of work.

[FA21-BSE-133]

**Introduction:**

The need for web applications that are not just functional but also aesthetically pleasing and responsive has never been greater in the quickly changing digital landscape of today. To fulfill this requirement, we present the cutting-edge project *SmartWebCraft.*

By providing programmers with an all-inclusive platform that enables them to realize their ideas with unmatched ease and speed, *SmartWebCraft* transforms the web application development process. With the help of cutting-edge technologies like artificial intelligence, machine learning, and visual programming, "SmartWebCraft" enables programmers to construct complex online applications with little coding knowledge.

**Features:**

1. **Visual Programming Interface:**

Gone are the days of tedious coding – "SmartWebCraft" provides a user-friendly drag-and-drop interface reminiscent of renowned IDEs like IntelliJ and Microsoft Visual Studio. Programmers can effortlessly assemble components such as buttons and text fields, customizing them to suit their specific requirements with unparalleled ease.

1. **Enhanced Responsiveness:**

Unlike existing solutions, "SmartWebCraft" doesn't stop at mere visual design. With seamless integration with Bootstrap 5 and Tailwind CSS, programmers gain access to a vast library of pre-built, responsive components, ensuring that their creations adapt flawlessly to various screen sizes and devices.

1. **AI-Driven Suggestions:**

Our project harnesses the power of AI to offer intelligent suggestions during the development process. Machine learning algorithms analyze user actions, recommending optimal component combinations to enhance both responsiveness and user experience, thus streamlining the development workflow.

1. **Resource Optimization:**

SmartWebCraft is engineered to be lightweight and resource efficient. AI algorithms manage system resources intelligently, optimizing performance and minimizing energy consumption. Features such as automatic system sleep and cloud backup ensure data integrity and efficient resource utilization.

1. **Real-time Collaboration:**

Facilitate real-time collaboration among team members working on the same project, allowing simultaneous editing and instant feedback. Incorporate features like live chat, collaborative editing, and version control to enhance teamwork and productivity.

1. **Automated Testing & Quality Assurance:**

Implement automated testing frameworks and tools to perform comprehensive testing of web applications, including unit tests, integration tests, and UI tests. Offer built-in test suites, test case generators, and code coverage analysis to ensure the quality and reliability of applications.

**Module:** *Customize Component*

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| **ID** | **SWC001\_01** |
| **Title** | *Customize Appearance* |
| **Requirement** | The system shall allow the programmer to customize the appearance of individual components such as buttons, text fields & images |
| **Rationale** | Provide flexibility to programmer |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Changes made on the appearance will be visible after editing |

|  |  |
| --- | --- |
| **ID** | **SWC001\_02** |
| **Title** | *Edit Parameters* |
| **Requirement** | The system shall allow the programmer to change the parameters like color range of High dynamic range (HDR) or low dynamic range (LDR) and others in a quantifiable way. |
| **Rationale** | Provide flexibility to programmer |
| **Restrictions & Risks** | Unsupported value |
| **Dependencies** | Selected component |
| **Data Formats** | Text string & numbers |
| **Command Format** | GUI Interface |
| **End Message** | Changes made on the parameters will be visible after editing |

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| **ID** | **SWC001\_03** |
| **Title** | *Add CSS Style* |
| **Requirement** | The system shall allow the programmer to write CSS script to override the default behavior. |
| **Rationale** | Provide flexibility to programmer to apply advanced styling options |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component(s) |
| **Data Formats** | CSS file |
| **Command Format** | GUI Interface |
| **End Message** | Changes made on the component style will be visible after editing |

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| **ID** | **SWC001\_04** |
| **Title** | *Define Custom Animation* |
| **Requirement** | The system shall allow the programmer to create custom animation like hover effect by specifying intervals. |
| **Rationale** | Provide flexibility to programmer |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Numbers |
| **Command Format** | GUI Interface |
| **End Message** | Applied animation will be visible within 2.5ms |

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| --- | --- |
| **ID** | **SWC001\_05** |
| **Title** | *Use Shared Component* |
| **Requirement** | The system shall allow the programmer to use same component on different portions |
| **Rationale** | Provide flexibility to programmer to change the parameter at a single point |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Similar style will be applied to all the portions where component is used |

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| --- | --- |
| **ID** | **SWC001\_06** |
| **Title** | *Import Asset* |
| **Requirement** | The system shall allow the programmer to import pre-build component from any site or create their own component |
| **Rationale** | Provide flexibility to programmer to access any component available on any platform |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Developer will be able to access the component |

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| **ID** | **SWC001\_06** |
| **Title** | *Specify Component Rendering across different screens* |
| **Requirement** | The system shall allow the programmer to define the component appearance across different platforms. |
| **Rationale** | Provide responsiveness |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Similar style will be applied to all the portions where component is used |

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| --- | --- |
| **ID** | **SWC001\_07** |
| **Title** | *Access pre-build Library* |
| **Requirement** | The system shall allow the programmer to access built-in components from existing library. |
| **Rationale** | Save development time by component re-use |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Selected component will be added to working project |

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| **ID** | **SWC001\_08** |
| **Title** | *Define Environmental Effects* |
| **Requirement** | The system shall allow the programmer to define conditional styling rules based on user interaction, device type, or other environmental factors |
| **Rationale** | Provide realistic look |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Applied effect will be visible with in 1.5ms |

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| **ID** | **SWC001\_09** |
| **Title** | *Create Interaction Components* |
| **Requirement** | The system shall allow the programmer to enable creation of interaction components with hover effects, click events & other user interaction. |
| **Rationale** | Increase human interface interaction |
| **Restrictions & Risks** | Time |
| **Dependencies** | N/A |
| **Data Formats** | Text string & Numbers |
| **Command Format** | GUI Interface |
| **End Message** | Demo of interaction will be visible to debug for improvements |

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| --- | --- |
| **ID** | **SWC001\_10** |
| **Title** | *Enable built-in accessibility* |
| **Requirement** | The system shall provide built-in accessibility feature for ensuring that customized components are compliant with web application standards. |
| **Rationale** | Save time |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | All the changes made will be visible |

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| **ID** | **SWC001\_11** |
| **Title** | *Integration of 3rd Party Components* |
| **Requirement** | The system shall support the integration of third-party component libraries and frameworks for expanded customization options |
| **Rationale** | Provide developer alternative options for customization |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Chosen API |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | All the 3rd party accessed components will be visible |

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| **ID** | **SWC001\_12** |
| **Title** | *Preview Component* |
| **Requirement** | The system shall allow the programmer to preview components in real-time |
| **Rationale** | Allow developer to confirm applied changes |
| **Restrictions & Risks** | Invalid component selection |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Preview of selected component will be visible |

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| **ID** | **SWC001\_13** |
| **Title** | *Test Component* |
| **Requirement** | The system shall allow the programmer to test the component |
| **Rationale** | Provide flexibility to programmer to test component after creation |
| **Restrictions & Risks** | Invalid component selection |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Statistics of test result |

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| **ID** | **SWC001\_14** |
| **Title** | *Version Control* |
| **Requirement** | The system shall allow the programmer to track the applied changes. |
| **Rationale** | Provide flexibility to programmer to loop back to any previous applied parameters |
| **Restrictions & Risks** | Permission of log details |
| **Dependencies** | Selected component |
| **Data Formats** | Text string & numbers |
| **Command Format** | GUI Interface |
| **End Message** | System shall move the developer to the part of the component |

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| **ID** | **SWC001\_15** |
| **Title** | *Share Component Design* |
| **Requirement** | The system shall allow the programmer to share the blueprint of applied design with team members |
| **Rationale** | Allow developer to collaborate with other team members |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Other team member could access the shared component design |

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| **ID** | **SWC001\_16** |
| **Title** | *Localization* |
| **Requirement** | The system shall support localization & internationalization features. |
| **Rationale** | For adapting component styles to different languages & region |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | All the changes applied will remain visible within 1.5ms |

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| **ID** | **SWC001\_17** |
| **Title** | *Compatibility* |
| **Requirement** | The system shall ensure compatibility with modern web browsers and devices. |
| **Rationale** | To ensure consistent rendering of customized components |
| **Restrictions & Risks** | Unspecified device |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | All the changes applied will remain visible within 1.5ms |

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| **ID** | **SWC001\_18** |
| **Title** | *Define Custom Breakpoints* |
| **Requirement** | The system shall allow the developer to define custom breakpoints and media queries. |
| **Rationale** | For responsive design customization |
| **Restrictions & Risks** | Unspecified device |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall provide consistent view across different devices |

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| **ID** | **SWC001\_19** |
| **Title** | *Access Documentation* |
| **Requirement** | The system shall provide documentation & tutorials for guiding users through customization process. |
| **Rationale** | For junior developer training |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display the documentation of chosen component. |

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| **ID** | **SWC001\_20** |
| **Title** | *Backup Components* |
| **Requirement** | The system shall store the component on cloud. |
| **Rationale** | Avoid data loss |
| **Restrictions & Risks** | Possibility of data loss in case of absence of internet |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | All the components will be stored on cloud after updating within 1ms. |
| **ID** | **SWC001\_21** |
| **Title** | *Define Custom Event Handler* |
| **Requirement** | The system shall the developer to assign event handler to each component. |
| **Rationale** | Increase system interaction |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected Component |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | All the changes applied will be visible within 1.5ms |

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| **ID** | **SWC001\_22** |
| **Title** | *Arrange Components* |
| **Requirement** | The system shall allow the developer to arrange components in required format |
| **Rationale** | Provide flexibility of choosing custom layout |
| **Restrictions & Risks** | Invalid layout chosen |
| **Dependencies** | Selected components |
| **Data Formats** | Mouse Input |
| **Command Format** | GUI Interface |
| **End Message** | Arranged components will be visible within 1ms. |

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| **ID** | **SWC001\_23** |
| **Title** | *Resize Component* |
| **Requirement** | The system shall allow the developer to resize the component according to requirement |
| **Rationale** | Provide developer flexibility of defining their required scaling factor |
| **Restrictions & Risks** | Improper drag and drop |
| **Dependencies** | N/A |
| **Data Formats** | Mouse Input & Numbers |
| **Command Format** | GUI Interface |
| **End Message** | Re-scaled component will be visible within 1ms. |

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| --- | --- |
| **ID** | **SWC001\_24** |
| **Title** | *Specify Icons* |
| **Requirement** | The system shall allow the developer to put custom built or imported icons on components. |
| **Rationale** | To Apply required icon on component |
| **Restrictions & Risks** | Invalid/Unsupported icon format |
| **Dependencies** | Selected components |
| **Data Formats** | .png, .jpeg, .svg |
| **Command Format** | GUI Interface |
| **End Message** | Applied icon on component will be displayed. |

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| **ID** | **SWC001\_25** |
| **Title** | *Enable Colorblindness Components* |
| **Requirement** | The system shall allow the developer to put colorblind option in components according to the requirement. |
| **Rationale** | Enhance usability |
| **Restrictions & Risks** | N/A |
| **Dependencies** | Selected component |
| **Data Formats** | Mouse Input |
| **Command Format** | GUI Interface |
| **End Message** | Color of the component will be changed upon enabling the option. |

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| **ID** | **SWC001\_26** |
| **Title** | *Control Components Accessibility* |
| **Requirement** | The system shall allow the developer to provide permissions for accessing component. |
| **Rationale** | Enhance security |
| **Restrictions & Risks** | Unauthorized access |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall ensure component visibility to only authorized team members. |

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| **ID** | **SWC001\_27** |
| **Title** | *Create Parent Components* |
| **Requirement** | The system shall allow the developer to create parent component. |
| **Rationale** | To provide top level options to a separate component |
| **Restrictions & Risks** | Accidental deletion of component |
| **Dependencies** | N/A |
| **Data Formats** | Text string & Mouse Input |
| **Command Format** | GUI Interface |
| **End Message** | Created parent component will be visible within 1.5ms. |

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| **ID** | **SWC001\_28** |
| **Title** | *Create Custom Shortcuts* |
| **Requirement** | The system shall allow the developer to create custom shortcuts for components. |
| **Rationale** | Save time |
| **Restrictions & Risks** | Shortcut against standards |
| **Dependencies** | Selected component |
| **Data Formats** | Text string & Numbers |
| **Command Format** | GUI Interface |
| **End Message** | The system shall provide access to components via created shortcuts. |

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| --- | --- |
| **ID** | **SWC001\_29** |
| **Title** | *Simulate Component Appearance* |
| **Requirement** | The system shall allow the developer to simulate the component appearance across different platforms. |
| **Rationale** | Enhance portability |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | The system shall display the component according to selected device type. |

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| --- | --- |
| **ID** | **SWC001\_30** |
| **Title** | *Integration of Analytics* |
| **Requirement** | The system shall support the integration of analytics and tracking tools for monitoring user interaction with customized components. |
| **Rationale** | Enhance functionality |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | The system shall display supporting tools. |

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| --- | --- |
| **ID** | **SWC001\_31** |
| **Title** | *Define Custom Tooltips* |
| **Requirement** | The system shall allow the developer to create custom tooltips of required design. |
| **Rationale** | Provide developer flexibility for customization |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | Created component will be visible within 1ms. |

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| --- | --- |
| **ID** | **SWC001\_32** |
| **Title** | *Create Visualization Components* |
| **Requirement** | The system shall allow the developer to create different visualization components like histogram, box plot and pie chart. |
| **Rationale** | Provide pre-build visualization components |
| **Restrictions & Risks** | Invalid visualization type selected |
| **Dependencies** | N/A |
| **Data Formats** | Text string & Mouse Input |
| **Command Format** | GUI Interface |
| **End Message** | Create visualization component will be visible within 1.8ms. |

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| --- | --- |
| **ID** | **SWC001\_33** |
| **Title** | *Create Visual Design* |
| **Requirement** | The system shall allow the developer to create enhanced visual design by integration of custom fonts & typography. |
| **Rationale** | To create required UI |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

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| --- | --- |
| **ID** | **SWC001\_34** |
| **Title** | *Reuse Component Code* |
| **Requirement** | The system shall allow the developer to reuse component code. |
| **Rationale** | To apply same effect on other components |
| **Restrictions & Risks** | Invalid component code chosen |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

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| --- | --- |
| **ID** | **SWC001\_35** |
| **Title** | *Change Component Theme* |
| **Requirement** | The system shall allow the developer to change the theme of component. |
| **Rationale** | To customize component according to requirement |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

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| --- | --- |
| **ID** | **SWC001\_36** |
| **Title** | *Format Component Code* |
| **Requirement** | The system shall allow the developer to format the code of component. |
| **Rationale** | To increase understanding of the code |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string & Mouse Input |
| **Command Format** | GUI Interface |
| **End Message** | System shall display the formatted code within 1.5ms. |

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| --- | --- |
| **ID** | **SWC001\_37** |
| **Title** | *Optimize Component Performance* |
| **Requirement** | The system shall allow the developer to optimize component performance like lazy loading and code splitting. |
| **Rationale** | Enhance performance |
| **Restrictions & Risks** | N/A |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

|  |  |
| --- | --- |
| **ID** | **SWC001\_38** |
| **Title** | *Component Drag & Drop* |
| **Requirement** | The system shall allow the developer to drag and drop the required component. |
| **Rationale** | Enhance usability |
| **Restrictions & Risks** | Invalid component chosen |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

|  |  |
| --- | --- |
| **ID** | **SWC001\_39** |
| **Title** | *Component Debugging* |
| **Requirement** | The system shall allow the developer to the component for resolving issue. |
| **Rationale** | To reduce rate of errors |
| **Restrictions & Risks** | Invalid debugging command chosen |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

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| --- | --- |
| **ID** | **SWC001\_40** |
| **Title** | *Delete Component* |
| **Requirement** | The system shall allow the developer to delete the component. |
| **Rationale** | To get rid of unwanted components |
| **Restrictions & Risks** | Another component chosen by mistake |
| **Dependencies** | N/A |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

**Non-Functional Requirements:**

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| **ID** | **SWC001\_41** |
| **Title** | *Efficiency* |
| **Requirement** | The system shall close the unused tabs or put them to sleep. |
| **Rationale** | To increase system speed |
| **Restrictions & Risks** | Invalid target tab chosen |
| **Dependencies** | Overall System |
| **Data Formats** | Text string |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

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| --- | --- |
| **ID** | **SWC001\_42** |
| **Title** | *Reusability* |
| **Requirement** | The system shall allow the developer to reuse already created components. |
| **Rationale** | To save development time |
| **Restrictions & Risks** | Invalid component chosen |
| **Dependencies** | Entire System |
| **Data Formats** | Text string & Mouse Input |
| **Command Format** | GUI Interface |
| **End Message** | System shall display all the applied changes within 1.5ms. |

[FA21-BSE-109]

**Module:** *AI Powered Design Assistant*

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| **ID** | **SWC002\_01** |
| **Title** | Component Recommendation |
| **Requirements** | The system shall analyze the user's chosen User’s interface component and shall suggest elements. |
| **Rationale** | Improve design and useability. |
| **Restrictions and Risks** | Suggestions may not always align with user’s design. |
| **Dependencies** | Component drop builder. |
| **Data Formats** | User’s interface component. |
| **Command Formats** | UI components |
| **End Message** | Changes will visible |

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| --- | --- |
| **ID** | **SWC002\_02** |
| **Title** | Layout Optimization |
| **Requirements** | The AI assistant should recommend improvements to the overall layout for better visual hierarchy, balance, and white space utilization. |
| **Rationale** | Enhances visual appeal and user experience. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder placement of components |
| **Data Formats** | Layout data (component positions, sizes) |
| **Command Formats** | List of suggested layout adjustments with explanations |
| **End Message** |  |

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| --- | --- |
| **ID** | **SWC002\_03** |
| **Title** | Style Consistency |
| **Requirements** | The AI assistant should suggest consistent styles (colors, fonts, spacing) across components to create a unified and aesthetically pleasing UI. |
| **Rationale** | Promotes brand identity and visual coherence. |
| **Restrictions and Risks** |  |
| **Dependencies** | User-defined styles or brand guidelines |
| **Data Formats** | Color codes, font names, spacing values. |
| **Command Formats** | Recommendations for consistent style application |
| **End Message** |  |

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| --- | --- |
| **ID** | **SWC002\_04** |
| **Title** | Responsiveness Analysis |
| **Requirements** | The AI assistant should identify potential responsiveness issues and suggest adjustments to ensure the design adapts seamlessly to various screen sizes and devices. |
| **Rationale** | Guarantees optimal user experience across platforms. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder layout and component properties. |
| **Data Formats** | Layout data, component sizes, media queries |
| **Command Formats** | Suggestions for responsive design improvements |
| **End Message** |  |

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| --- | --- |
| **ID** | **SWC002\_05** |
| **Title** | Accessibility Recommendations |
| **Requirements** | The AI assistant should identify accessibility shortcomings and suggest improvements to meet WCAG guidelines (e.g., color contrast, alt text for images). |
| **Rationale** | Ensures inclusivity for users with disabilities. |
| **Restrictions and Risks** |  |
| **Dependencies** | Accessibility standards and user selections |
| **Data Formats** | Color values, image information. |
| **Command Formats** | Recommendations for accessibility compliance |
| **End Message** |  |

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| **ID** | **SWC002\_06** |
| **Title** | UI Pattern Recognition |
| **Requirements** | The AI assistant should recognize established UI patterns (e.g., navigation bars, search forms) and recommend best practices for their implementation. |
| **Rationale** | Promotes efficient and user-friendly design patterns. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder component selection and arrangement. |
| **Data Formats** | UI component types and positions |
| **Command Formats** | Suggestions for best practices in using UI patterns. |
| **End Message** |  |

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| **ID** | **SWC002\_07** |
| **Title** | Identify Common Design Mistakes |
| **Requirements** | The AI assistant should detect common design errors (e.g., poor color combinations, illegible fonts) and suggest solutions. |
| **Rationale** | Prevents usability issues and improves design quality. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder component selection and styles. |
| **Data Formats** | Color values, font sizes, layout data. |
| **Command Formats** | Warnings about potential design mistakes and suggestions for improvement |
| **End Message** |  |

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| **ID** | **SWC002\_08** |
| **Title** | Learning from User Preferences |
| **Requirements** | Over time, the AI assistant should learn user preferences for styles, layouts, and component usage to personalize design recommendations. |
| **Rationale** | Provides a more tailored and user-centric design experience. |
| **Restrictions and Risks** | User preferences might change over time. |
| **Dependencies** | User interaction data, past design choices |
| **Data Formats** | User actions, component selections, style choices |
| **Command Formats** | Update user profile with learned preferences. |
| **End Message** |  |

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| **ID** | **SWC002\_09** |
| **Title** | Trend Awareness |
| **Requirements** | The AI assistant should integrate awareness of current design trends to provide suggestions that align with user preferences and industry standards. |
| **Rationale** | Ensures designs remain modern and visually appealing. |
| **Restrictions and Risks** |  |
| **Dependencies** | Access to design trend databases or APIs |
| **Data Formats** | Trend data, user preferences |
| **Command Formats** | Recommendations for design elements that align with trends. |
| **End Message** |  |

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| **ID** | **SWC002\_10** |
| **Title** | Context-based Recommendations |
| **Requirements** | The AI assistant should consider the project's purpose and target audience when suggesting design elements and layouts. |
| **Rationale** | Optimizes design for specific user needs and project goals. |
| **Restrictions and Risks** |  |
| **Dependencies** | Project information, target audience data |
| **Data Formats** | Project type, user demographics |
| **Command Formats** | Suggestions tailored to project context. |
| **End Message** |  |

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| **ID** | **SWC002\_11** |
| **Title** | Hierarchy and Emphasis |
| **Requirements** | The AI assistant should analyze content hierarchy and suggest visual cues (font size, color, spacing) to emphasize important elements. |
| **Rationale** | Improves information clarity and user focus. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder component selection and content. |
| **Data Formats** | Text content, component hierarchy |
| **Command Formats** | Recommendations for visual emphasis based on content importance. |
| **End Message** | Design suggestions provided based on your chosen component and project context. |

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| **ID** | **SWC002\_12** |
| **Title** | UX Optimization |
| **Requirements** | The AI assistant should propose enhancements to improve user experience (UX), such as smoother navigation flows or clearer calls to action. |
| **Rationale** | Enhances user interaction and satisfaction. |
| **Restrictions and Risks** |  |
| **Dependencies** | User behavior data, drag-and-drop builder component usage. |
| **Data Formats** | User interactions, component selections |
| **Command Formats** | Suggestions for UX improvements (navigation, CTAs) |
| **End Message** |  |

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| **ID** | **SWC002\_13** |
| **Title** | Real-time Feedback |
| **Requirements** | The AI assistant should provide real-time feedback on design choices within the drag-and-drop builder, highlighting potential issues or suggesting improvements. |
| **Rationale** | Enables immediate design correction and iteration. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder actions, component selection. |
| **Data Formats** | User interactions, component properties |
| **Command Formats** | Feedback messages with suggestions for improvement |
| **End Message** |  |

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| **ID** | **SWC002\_14** |
| **Title** | Preview Mode |
| **Requirements** | The AI assistant should enable a preview mode that displays how the design will look on different devices and screen sizes. |
| **Rationale** | Allows for early detection of responsiveness issues. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder layout and components. |
| **Data Formats** | Layout data, component properties |
| **Command Formats** | Display of design preview across various screen sizes |
| **End Message** | Preview displayed. You can now adjust your design for different screen sizes |

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| **ID** | **SWC002\_15** |
| **Title** | A/B Testing Integration |
| **Requirements** | The AI assistant should facilitate A/B testing of different design variations to identify the most user-friendly and visually appealing options. |
| **Rationale** | Enables data-driven design decisions for optimal user experience. |
| **Restrictions and Risks** | Requires integration with A/B testing framework. |
| **Dependencies** | Drag-and-drop builder, A/B testing tool. |
| **Data Formats** | Layout data, component variations, A/B testing configuration |
| **Command Formats** | Initiate A/B test with selected design variations |
| **End Message** | A/B testing initiated with the selected design variations |

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| **ID** | **SWC002\_16** |
| **Title** | Color Palette Generation |
| **Requirements** | The AI assistant should generate harmonious color palettes based on user-selected colors or brand guidelines. |
| **Rationale** | Simplifies color selection and ensures brand consistency. |
| **Restrictions and Risks** | User selections might not always result in optimal palettes. |
| **Dependencies** | User-selected colors, brand guidelines |
| **Data Formats** | Color data (hex codes, RGB values) |
| **Command Formats** | Generate a set of harmonious color palettes for user selection. |
| **End Message** |  |

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| **ID** | **SWC002\_17** |
| **Title** | Font Pairing |
| **Requirements** | The AI assistant should suggest aesthetically pleasing font combinations for headings, body text, and UI elements. |
| **Rationale** | Enhances overall visual appeal and readability. |
| **Restrictions and Risks** |  |
| **Dependencies** | User-selected fonts (if any) |
| **Data Formats** | Font family names, style options |
| **Command Formats** | Recommendations for complementary font pairings |
| **End Message** |  |

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| **ID** | **SWC002\_18** |
| **Title** | Image Recommendation |
| **Requirements** | The AI assistant should recommend high-quality stock images or user-uploaded images that complement the design and brand identity. |
| **Rationale** | Improves visual communication and brand alignment. |
| **Restrictions and Risks** | Access to stock image database or user image library required. |
| **Dependencies** | Project theme, brand guidelines, user-uploaded images |
| **Data Formats** | Image metadata, theme keywords |
| **Command Formats** | Recommendations for suitable stock images or user image suggestions |
| **End Message** |  |

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| **ID** | **SWC002\_19** |
| **Title** | Icon Selection |
| **Requirements** | The AI assistant should assist users in selecting appropriate icons that effectively represent functionalities or concepts. |
| **Rationale** | Ensures clear and intuitive communication within the UI. |
| **Restrictions and Risks** | Requires integration with an icon library or database. |
| **Dependencies** | Project purpose, component functionality |
| **Data Formats** | Icon descriptions, keywords |
| **Command Formats** | Recommend icons that match functionality and design style. |
| **End Message** | Recommendations generated for color palettes, fonts, images, and icons |

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| **ID** | **SWC002\_20** |
| **Title** | Identify Usability Issues |
| **Requirements** | The AI assistant should proactively identify potential usability problems (e.g., unclear button labels, confusing navigation) and suggest solutions. |
| **Rationale** | Prevents user frustration and improves overall usability. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder component selection and content. |
| **Data Formats** | Text content, component functionality |
| **Command Formats** | Warnings about potential usability issues and suggested solutions |
| **End Message** |  |

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| **ID** | **SWC002\_21** |
| **Title** | Error Prevention |
| **Requirements** | The AI assistant should help users avoid common design mistakes by providing warnings or prompts when they make choices that might lead to usability issues. |
| **Rationale** | Proactive approach to preventing design errors. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder actions, component selection. |
| **Data Formats** | User interactions, component properties |
| **Command Formats** | Warnings and prompts to prevent potential design mistakes. |
| **End Message** |  |

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| **ID** | **SWC002\_22** |
| **Title** | Accessibility Rule Enforcement |
| **Requirements** | The AI assistant should enforce basic accessibility rules (e.g., sufficient color contrast, keyboard navigation) to ensure the design is usable by everyone. |
| **Rationale** | Promotes inclusivity and caters to users with disabilities. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder component selection and styles. |
| **Data Formats** | Color values, component functionality. |
| **Command Formats** | Warnings and prompts to ensure basic accessibility compliance. |
| **End Message** |  |

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| **ID** | **SWC002\_23** |
| **Title** | User-defined Preferences |
| **Requirements** | Allow users to define their preferred design styles, color palettes, and component libraries for personalized recommendations. |
| **Rationale** | Enables customization and caters to individual design preferences. |
| **Restrictions and Risks** |  |
| **Dependencies** | User profile information |
| **Data Formats** | User preferences, design choices |
| **Command Formats** | Update user profile with design preferences. |
| **End Message** | Recommendations generated for color palettes, fonts, images, and icons |

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| **ID** | **SWC002\_24** |
| **Title** | Override AI Suggestions |
| **Requirements** | Empower users to override AI suggestions and maintain control over their design decisions. |
| **Rationale** | Ensures user autonomy and flexibility in the design process. |
| **Restrictions and Risks** |  |
| **Dependencies** | Drag-and-drop builder user interactions. |
| **Data Formats** | User actions, component selections |
| **Command Formats** | Confirmation message acknowledging user override of AI suggestion. |
| **End Message** | AI suggestion overridden. You have full control over your design decisions |

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| **ID** | **SWC002\_25** |
| **Title** | Learning from User Feedback |
| **Requirements** | Integrate mechanisms for users to provide feedback on AI suggestions, enabling the AI to learn and improve its recommendations over time. |
| **Rationale** | Allows the AI to continuously improve based on user input. |
| **Restrictions and Risks** |  |
| **Dependencies** | User feedback data, AI suggestions |
| **Data Formats** | User ratings, comments on suggestions |
| **Command Formats** | Update AI model with user feedback for better future recommendations. |
| **End Message** | User feedback received. The AI assistant will learn and improve its recommendations over time |

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| **ID** | **SWC002\_26** |
| **Title** | Emotional Design (Future Exploration) |
| **Requirements** | Explore incorporating principles of emotional design to suggest UI elements that evoke desired emotions in users. |
| **Rationale** | Enhances user engagement and emotional connection with the design. |
| **Restrictions and Risks** | Requires advanced AI capabilities and user emotion recognition. |
| **Dependencies** | User data (optional), project goals |
| **Data Formats** | User demographics (optional), project theme |
| **Command Formats** | Suggest UI elements that align with desired emotional response. |
| **End Message** |  |

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| **ID** | **SWC002\_27** |
| **Title** | Personalization (Future Exploration) |
| **Requirements** | Investigate personalizing design recommendations based on user demographics or project goals. |
| **Rationale** | Tailors design suggestions to specific user groups or project objectives. |
| **Restrictions and Risks** | Requires access to user demographic data and integration with user profiling systems. |
| **Dependencies** | User profile data, project information |
| **Data Formats** | User demographics, project goals |
| **Command Formats** | Personalized design recommendations based on user data. |
| **End Message** |  |

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| **ID** | **SWC002\_28** |
| **Title** | Trend Forecasting |
| **Requirements** | Explore the potential for AI to forecast upcoming design trends and suggest features that align with future user expectations. |
| **Rationale** | Enables proactive design decisions that anticipate future trends. |
| **Restrictions and Risks** | Requires access to design trend data or forecasting models. |
| **Dependencies** | Trend data sources (APIs) |
| **Data Formats** | Trend data queries |
| **Command Formats** | Recommendations for design elements that align with future trends. |
| **End Message** |  |

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| **ID** | **SWC002\_29** |
| **Title** | Data Exchange with Resource Optimization Module |
| **Requirements** | The AI assistant should share data on resource usage with the resource optimization module to identify design choices that might impact performance. |
| **Rationale** | Optimizes design for performance and resource efficiency. |
| **Restrictions and Risks** | Requires communication channels with the resource optimization module. |
| **Dependencies** | Resource usage data (CPU, memory) |
| **Data Formats** | Resource usage reports |
| **Command Formats** | Share design data for performance analysis by resource optimization module. |
| **End Message** |  |

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| **ID** | **SWC002\_30** |
| **Title** | Integration with Data Management Module |
| **Requirements** | Access data from the data management module (e.g., user demographics) to personalize design recommendations. |
| **Rationale** | Leverages existing user data for more tailored suggestions. |
| **Restrictions and Risks** | Requires secure access to data management module. |
| **Dependencies** | User data schema, access protocols |
| **Data Formats** | User data queries |
| **Command Formats** | Retrieve relevant user data for design recommendation personalization. |
| **End Message** |  |

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| **ID** | **SWC002\_31** |
| **Title** | Compatibility with Backend Development |
| **Requirements** | Ensure compatibility with backend development tools (e.g., PHP) to avoid conflicts during implementation. |
| **Rationale** | Guarantees smooth integration with backend functionalities. |
| **Restrictions and Risks** | Requires knowledge of backend development tools and data exchange formats. |
| **Dependencies** | Backend development tools, data formats |
| **Data Formats** | Compatibility checks |
| **Command Formats** | Report on potential compatibility issues with backend development tools. |
| **End Message** | Data successfully shared with the relevant module for analysis and optimization |

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| **ID** | **SWC002\_32** |
| **Title** | Documentation and Training |
| **Requirements** | Provide comprehensive documentation and training materials for users to understand the AI assistant's capabilities and limitations. |
| **Rationale** | Empowers users to leverage the AI assistant effectively and make informed design decisions. |
| **Restrictions and Risks** | Requires investment in user education resources. |
| **Dependencies** | User manuals, tutorial videos |
| **Data Formats** | Access documentation or training materials |
| **Command Formats** | Link to relevant documentation or training resources. |
| **End Message** |  |

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| **ID** | **SWC002\_33** |
| **Title** | Performance Monitoring |
| **Requirements** | Monitor the performance of the AI assistant, including accuracy of suggestions, user satisfaction, and impact on design quality. |
| **Rationale** | Enables continuous improvement of the AI assistant based on real-world usage data. |
| **Restrictions and Risks** | Requires logging mechanisms and user feedback data collection. |
| **Dependencies** | AI performance metrics, user feedback data |
| **Data Formats** | Performance reports |
| **Command Formats** | Generate reports on AI assistant performance and user feedback. |
| **End Message** | Performance report generated. You can now review the AI assistant's effectiveness |

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| **ID** | **SWC002\_34** |
| **Title** | Explainability (Future Exploration) |
| **Requirements** | Explore incorporating explainability features that allow users to understand the rationale behind the AI assistant's design suggestions. |
| **Rationale** | Increases user trust and transparency in the AI decision-making process. |
| **Restrictions and Risks** | Requires advanced AI development techniques for explainability models. |
| **Dependencies** | AI suggestion data |
| **Data Formats** | User queries |
| **Command Formats** | Provide explanation for the suggested design element. |
| **End Message** |  |

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| **ID** | **SWC002\_35** |
| **Title** | User Acceptance Testing |
| **Requirements** | Conduct user acceptance testing (UAT) to ensure the AI assistant meets user expectations and provides valuable design assistance. |
| **Rationale** | Validates the usability and effectiveness of the AI assistant from a user perspective. |
| **Restrictions and Risks** | Requires user involvement in testing and feedback provision. |
| **Dependencies** | UAT test plan, user feedback data |
| **Data Formats** | UAT test cases |
| **Command Formats** | Report on UAT results and identify areas for improvement. |
| **End Message** |  |

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| **ID** | **SWC002\_36** |
| **Title** | Security Considerations |
| **Requirements** | Implement security measures to protect user data and prevent unauthorized access to the AI assistant's functionalities. |
| **Rationale** | Ensures data privacy and system integrity. |
| **Restrictions and Risks** | Requires following security best practices and adhering to data protection regulations. |
| **Dependencies** | User data security protocols |
| **Data Formats** | Security audits |
| **Command Formats** | Report on security posture and identify potential vulnerabilities. |
| **End Message** |  |

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| **ID** | **SWC002\_37** |
| **Title** | Scalability |
| **Requirements** | Design the AI assistant to be scalable to accommodate a growing user base and increasing design complexity. |
| **Rationale** | Allows the system to handle larger workloads and more diverse design needs. |
| **Restrictions and Risks** | Requires consideration of infrastructure and resource requirements. |
| **Dependencies** | System usage data, projected user growth |
| **Data Formats** | Scalability analysis |
| **Command Formats** | Report on system scalability and recommendations for future growth. |
| **End Message** |  |

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| **ID** | **SWC002\_38** |
| **Title** | Error Handling and Recovery |
| **Requirements** | Implement robust error handling and recovery mechanisms to ensure the AI assistant functions reliably in case of unexpected issues. |
| **Rationale** | Minimizes disruptions to the design process and user experience. |
| **Restrictions and Risks** | Requires error logging and recovery procedures. |
| **Dependencies** | Error logs, user feedback data |
| **Data Formats** | Error reports |
| **Command Formats** | Report on encountered errors and initiate recovery procedures. |
| **End Message** |  |

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| **ID** | **SWC002\_39** |
| **Title** | Maintenance and Updates |
| **Requirements** | Establish a plan for ongoing maintenance and updates to the AI assistant to address bugs, incorporate new features, and adapt to evolving design trends. |
| **Rationale** | Ensures the AI assistant remains functional, secure, and up to date with the latest advancements. |
| **Restrictions and Risks** | Requires dedicated resources for maintenance and updates. |
| **Dependencies** | Maintenance schedule, update logs |
| **Data Formats** | Update deployment. |
| **Command Formats** | Notification of successful update or report on encountered issues |
| **End Message** | Update successfully deployed or issues reported |

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| **ID** | **SWC002\_40** |
| **Title** | Version Control |
| **Requirements** | Implement a version control system to track changes made to the AI assistant and facilitate rollbacks if necessary. |
| **Rationale** | Allows for easier troubleshooting, bug fixing, and reverting to previous versions if needed. |
| **Restrictions and Risks** | Requires a version control system and rollback procedures. |
| **Dependencies** | Version control logs |
| **Data Formats** | Version control commands |
| **Command Formats** | Confirmation message of version update |
| **End Message** | Version update or rollback confirmed |

[FA21-BSE-127]

**Module:** *Drag & Drop UI*

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| Identifier | SWC003\_01 |
| Title | Intuitive Drag and Drop Interface |
| Requirement | The UI builder shall provide an intuitive interface for dragging and dropping UI components onto a canvas. |
| Rationale | This feature ensures that users can easily create and design their user interfaces without the need for extensive technical knowledge, enhancing user experience. |
| Restrictions and Risks | Users may have varying interpretations of what constitutes an intuitive interface, requiring thorough user testing and feedback. |
| Dependencies | Development of a user friendly interface design.  Integration with backend functionality for handling component placement and interactions. |
| Data Formats | None |
| Command Formats | None |
| End Messages | The interface has been designed to ensure smooth and effortless interaction with the UI components. We aim to provide a seamless user experience. |

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| Identifier | SWC003\_02 |
| Title | Pre built UI Component Library |
| Requirement | Users shall be able to select from a library of pre built UI components such as buttons, text fields, images, etc. |
| Rationale | Offering a library of pre built components saves users time and effort in designing UI elements from scratch, improving productivity. |
| Restrictions and Risks | Availability and quality of pre built components may vary, impacting the user's ability to find suitable elements for their design. |
| Dependencies | Development of a comprehensive library of UI components. |
| Data Formats | None |
| Command Formats | None |
| End Messages | Access a wide array of pre built UI components to streamline your design process and bring your vision to life with ease |

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| Identifier | SWC003\_03 |
| Title | Resizable and Movable Components |
| Requirement | Components shall be resizable and movable within the canvas. |
| Rationale | Flexibility in resizing and moving components allows users to precisely arrange elements and create visually appealing layouts. |
| Restrictions and Risks | NONE |
| Dependencies | Implementation of drag and drop functionality. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Effortlessly adjust the size and position of components to achieve the perfect layout for your design |

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| Identifier | SWC003\_04 |
| Title | Grouping and Ungrouping of Components |
| Requirement | The UI builder shall support grouping and ungrouping of components for easier organization. |
| Rationale | Grouping components allows users to manage complex layouts more efficiently by treating multiple elements as a single unit. |
| Restrictions and Risks | NONE |
| Dependencies | Development of grouping functionality in the UI builder interface. Integration with backend logic for handling grouped components. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Simplify your design workflow by grouping related components together, enhancing organization and clarity. |

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| Identifier | SWC003\_05 |
| Title | Customizable Component Properties |
| Requirement | Users shall be able to customize the properties of each component, including size, color, font, etc. |
| Rationale | Customization options empower users to tailor the appearance of components to match their design preferences and branding requirements. |
| Restrictions and Risks | NONE |
| Dependencies | Development of a user interface for property customization. Integration with backend systems to apply property changes to components. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Unlock endless possibilities for creativity by customizing every aspect of your components to suit your unique vision. |

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| Identifier | SWC003\_06 |
| Title | Creation of Responsive Layouts |
| Requirement | The UI builder shall support the creation of responsive layouts for different screen sizes. |
| Rationale | Responsive layouts ensure that user interfaces adapt to various devices and screen resolutions, providing a consistent experience across platforms. |
| Restrictions and Risks | NONE |
| Dependencies | Development of responsive design logic and algorithms. Integration with frontend frameworks or libraries for responsive layout implementation. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Craft dynamic interfaces that seamlessly adjust to different screen sizes, enhancing accessibility and user satisfaction. |

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| Identifier | SWC003\_07 |
| Title | Design Preview for Various Resolutions and Orientations |
| Requirement | Users shall be able to preview their design in various screen resolutions and orientations. |
| Rationale | Previewing designs across different resolutions and orientations helps users ensure compatibility and usability across a wide range of devices. |
| Restrictions and Risks | NONE |
| Dependencies | Integration with rendering engines for generating design previews. Development of user interface controls for selecting resolutions and orientations. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Visualize your design's adaptability across different devices and orientations to deliver a seamless user experience. |

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| Identifier | SWC003\_08 |
| Title | Snapping Guidelines for Alignment |
| Requirement | The builder shall provide snapping guidelines to assist with alignment and spacing of components. |
| Rationale | Snapping guidelines aid users in achieving precise alignment and spacing, contributing to a polished and professional design. |
| Restrictions and Risks | NONE |
| Dependencies | Implementation of snapping algorithms for component alignment. Integration with UI rendering for real-time snapping feedback. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Effortlessly align and space your components with precision using snapping guidelines for a polished design. |

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| Identifier | SWC003\_09 |
| Title | Undo and Redo Functionality |
| Requirement | There shall be an option to undo and redo actions performed in the UI builder. |
| Rationale | Undo and redo functionality provide users with the flexibility to revert changes and explore different design options without fear of irreversible modifications. |
| Restrictions and Risks | NONE |
| Dependencies | Development of an undo/redo system to track user actions. Integration with user interface controls for invoking undo and redo operations. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Experiment freely with your designs knowing that you can easily undo and redo actions to refine your vision. |

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| Identifier | SWC003\_10 |
| Title | Save and Load Projects |
| Requirement | Users shall be able to save and load their projects for future editing. |
| Rationale | Saving and loading projects enables users to preserve their work and resume editing at a later time, promoting productivity and continuity in design workflows. |
| Restrictions and Risks | NONE |
| Dependencies | Development of file management systems for project saving and loading. Integration with user interface controls for saving and loading operations. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Never lose your progress—save and load projects effortlessly to pick up right where you left off. |

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| Identifier | SWC003\_11 |
| Title | Import and Export of Project Files |
| Requirement | The UI builder shall support the import and export of project files in standard formats. |
| Rationale | Import and export functionality facilitates collaboration, backup, and migration of projects across different systems and environments. |
| Restrictions and Risks | NONE |
| Dependencies | Development of import and export modules for handling project files. Integration with file management systems for importing and exporting operations. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Seamlessly share your projects with others or migrate them to different systems using import and export functionality. |

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| Identifier | SWC003\_12 |
| Title | Real-time Collaboration with Version Control |
| Requirement | Users shall have the ability to collaborate on projects in real time with version control features. |
| Rationale | Real time collaboration and version control facilitate teamwork, allowing multiple users to work on the same project simultaneously while maintaining a history of changes. |
| Restrictions and Risks | NONE |
| Dependencies | Integration with real time collaboration platforms or protocols. Development of version control systems for tracking and managing project changes. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Empower teamwork and streamline project management with real time collaboration and version control capabilities. |

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| Identifier | SWC003\_13 |
| Title | Keyboard Shortcuts for Common Actions |
| Requirement | The builder shall provide keyboard shortcuts for common actions to improve productivity. |
| Rationale | Keyboard shortcuts offer users a faster and more efficient way to perform common tasks, reducing reliance on mouse interactions and enhancing workflow speed. |
| Restrictions and Risks | NONE |
| Dependencies | Development of keyboard shortcut mappings for various actions. Integration with the UI builder interface for executing actions based on shortcuts. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Accelerate your workflow with keyboard shortcuts, allowing you to perform common actions swiftly and effortlessly. |

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| Identifier | SWC003\_14 |
| Title | Addition of Custom CSS Styles |
| Requirement | Users shall be able to add custom CSS styles to individual components. |
| Rationale | Adding custom CSS styles provides users with flexibility in styling components to match their design preferences and branding requirements. |
| Restrictions and Risks | NONE |
| Dependencies | Development of CSS injection mechanisms for applying custom styles. Integration with UI rendering for applying custom styles to components. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Customize the appearance of your components with ease by adding custom CSS styles to tailor them to your design needs. |

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| Identifier | SWC003\_15 |
| Title | Support for Nested Components and Layouts |
| Requirement | The UI builder shall support the creation of nested components and layouts. |
| Rationale | Supporting nested components and layouts enables users to create complex and structured user interfaces with hierarchical arrangements of elements. |
| Restrictions and Risks | NONE |
| Dependencies | Development of data structures and rendering logic for handling nested components. Integration with UI builder interface for managing nested structures. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Design intricate user interfaces with ease using nested components and layouts for hierarchical organization. |

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| Identifier | SWC003\_16 |
| Title | Locking Certain Components |
| Requirement | There shall be an option to lock certain components to prevent accidental modifications. |
| Rationale | Locking components helps prevent unintended changes to critical elements, ensuring design consistency and integrity. |
| Restrictions and Risks | NONE |
| Dependencies | Development of locking mechanisms for components. Integration with UI controls for toggling component locks. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Safeguard your design's integrity by locking important components from accidental alterations. |

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| Identifier | SWC003\_17 |
| Title | Search Functionality for Adding Components |
| Requirement | The builder shall provide a search functionality to quickly find and add components to the canvas. |
| Rationale | Search functionality streamlines the process of locating and adding components, saving users time and effort in navigating large component libraries. |
| Restrictions and Risks | NONE |
| Dependencies | Development of search algorithms for component libraries. Integration with UI controls for executing component search queries. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Effortlessly locate and add components to your canvas with the built-in search functionality, enhancing productivity. |

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| Identifier | SWC003\_18 |
| Title | Addition of Interactive Elements |
| Requirement | Users shall be able to add interactive elements such as forms, buttons, and links to their designs. |
| Rationale | Incorporating interactive elements enhances user engagement and functionality, allowing for the creation of dynamic and user-friendly interfaces. |
| Restrictions and Risks | NONE |
| Dependencies | Development of interactive element components. Integration with event handling systems for managing user interactions. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Bring your designs to life with interactive elements, enriching user experience and functionality. |

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| Identifier | SWC003\_19 |
| Title | Support for Third-Party Plugins and Extensions |
| Requirement | The UI builder shall support the integration of third-party plugins and extensions. |
| Rationale | Supporting third-party plugins and extensions allows users to extend the functionality of the UI builder with additional features and integrations. |
| Restrictions and Risks | NONE |
| Dependencies | Development of plugin architecture for integrating third-party extensions. Integration with plugin management systems for installing and managing plugins. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Enhance the capabilities of the UI builder with a wide range of third-party plugins and extensions, tailoring it to your specific needs. |

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| Identifier | SWC003\_20 |
| Title | Component Alignment Options |
| Requirement | Users shall have the option to align components relative to each other or to the canvas. |
| Rationale | Providing alignment options gives users control over the positioning of components, ensuring consistent and visually appealing layouts. |
| Restrictions and Risks | NONE |
| Dependencies | Development of alignment algorithms for components. Integration with UI controls for selecting alignment options. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Achieve pixel-perfect precision in your designs with flexible alignment options tailored to your layout preferences. |

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| Identifier | SWC003\_21 |
| Title | Grid System for Precise Positioning |
| Requirement | The builder shall offer a grid system for precise positioning of components. |
| Rationale | A grid system provides users with a visual aid for accurately positioning components, ensuring consistency and alignment in the design layout. |
| Restrictions and Risks | NONE |
| Dependencies | Development of grid rendering and snapping functionality. Integration with UI controls for toggling grid display and snapping options. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Design with confidence using a grid system that offers precise positioning, allowing you to create layouts with impeccable alignment. |

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| Identifier | SWC003\_22 |
| Title | Creation of Reusable Templates and Components |
| Requirement | Users shall be able to create reusable templates and components for future projects. |
| Rationale | Reusable templates and components enable users to standardize design elements and streamline the development process across multiple projects. |
| Restrictions and Risks | NONE |
| Dependencies | Development of template and component management systems. Integration with UI controls for creating and managing templates and components. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Boost efficiency and consistency in your projects by creating reusable templates and components, saving time and effort in future design endeavors. |

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| Identifier | SWC003\_23 |
| Title | Addition of Custom Scripts and JavaScript Functionality |
| Requirement | The UI builder shall support the addition of custom scripts and JavaScript functionality. |
| Rationale | Adding custom scripts and JavaScript functionality allows users to enhance the behavior and interactivity of their designs beyond what standard components offer. |
| Restrictions and Risks | NONE |
| Dependencies | Development of scripting interfaces and execution environments. Integration with frontend rendering for executing custom scripts. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Expand the capabilities of your designs with custom scripts and JavaScript functionality, unlocking endless possibilities for user interaction. |

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| Identifier | SWC003\_24 |
| Title | Built- in Accessibility Features |
| Requirement | There shall be built-in accessibility features to ensure compliance with accessibility standards. |
| Rationale | Built-in accessibility features help ensure that the UI builder produces designs that are accessible to users with disabilities, meeting legal and ethical obligations. |
| Restrictions and Risks | NONE |
| Dependencies | Development of accessibility guidelines and implementation of features to meet those guidelines. Integration with UI rendering for accessibility enhancements. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Promote inclusivity and compliance with accessibility standards by incorporating built-in accessibility features into your designs. |

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| Identifier | SWC003\_25 |
| Title | Setting Constraints on Components |
| Requirement | Users shall be able to set constraints on components to control their behavior and appearance. |
| Rationale | Setting constraints provides users with control over how components behave and appear in different contexts, ensuring consistency and predictability in designs. |
| Restrictions and Risks | NONE |
| Dependencies | Development of constraint management systems for components. Integration with UI controls for applying and managing component constraints. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Tailor the behavior and appearance of your components by setting constraints, ensuring consistency and predictability in your designs. |

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| Identifier | SWC003\_26 |
| Title | Provision of Tooltips and Help Documentation |
| Requirement | The builder shall provide tooltips and help documentation for each component. |
| Rationale | Tooltips and help documentation offer users’ guidance and clarification on component functionalities, enhancing usability and reducing user frustration. |
| Restrictions and Risks | NONE |
| Dependencies | Development of tooltip rendering systems. Integration with UI controls for displaying tooltips and accessing help documentation. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Navigate your design process with ease using tooltips and help documentation, ensuring clarity and confidence in component usage. |

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| Identifier | SWC003\_27 |
| Title | Definition of Interactions and Animations |
| Requirement | Users shall be able to define interactions and animations between components. |
| Rationale | Defining interactions and animations allows users to create dynamic and engaging user experiences, enhancing usability and visual appeal. |
| Restrictions and Risks | NONE |
| Dependencies | Development of interaction and animation definition systems. Integration with UI rendering for executing defined interactions and animations. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Elevate your designs with interactive elements and animations, enriching user experiences and capturing attention. |

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| --- | --- |
| Identifier | SWC003\_28 |
| Title | Creation of Multi-page Designs |
| Requirement | The UI builder shall support the creation of multi-page designs for websites and applications. |
| Rationale | Supporting multi-page designs enables users to design complex websites and applications with multiple interconnected pages, providing a comprehensive user experience. |
| Restrictions and Risks | NONE |
| Dependencies | Development of page management systems for multi-page designs. Integration with UI controls for navigating between pages. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Design seamless user experiences across multiple pages with the ability to create multi-page designs for websites and applications. |

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| Identifier | SWC003\_29 |
| Title | Importing Existing Designs |
| Requirement | Users shall have the option to import existing designs and convert them into editable components. |
| Rationale | Allowing the import of existing designs enables users to repurpose previous work or incorporate external designs into their projects, saving time and effort. |
| Restrictions and Risks | NONE |
| Dependencies | Development of import functionality for various design file formats. Integration with conversion algorithms for converting designs into editable components. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Leverage your previous work or incorporate external designs seamlessly by importing them into the UI builder and converting them into editable components. |

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| Identifier | SWC003\_30 |
| Title | History Panel for Navigation |
| Requirement | The builder shall provide a history panel to view and navigate through past actions. |
| Rationale | A history panel allows users to track their actions, revert changes, and navigate through the design process, enhancing control and flexibility in editing. |
| Restrictions and Risks | NONE |
| Dependencies | Development of a history tracking system for user actions. Integration with UI controls for displaying and navigating through the history panel. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Stay in control of your design process with a history panel that allows you to track and navigate through past actions with ease. |

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| Identifier | SWC003\_31 |
| Title | Publishing Designs to Web Servers or Hosting Platforms |
| Requirement | Users shall be able to publish their designs directly to web servers or hosting platforms. |
| Rationale | Direct publishing streamlines the process of deploying designs to live environments, allowing users to showcase their work and gather feedback more efficiently. |
| Restrictions and Risks | NONE |
| Dependencies | Development of publishing interfaces for web servers and hosting platforms. Integration with deployment protocols and APIs for publishing designs. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Share your designs with the world by publishing them directly to web servers or hosting platforms, reaching your audience with ease. |

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| Identifier | SWC003\_32 |
| Title | Integration of Version Control Systems |
| Requirement | The UI builder shall support the integration of version control systems like Git. |
| Rationale | Integration with version control systems enables users to track changes, collaborate effectively, and manage project versions, ensuring smooth and organized development workflows. |
| Restrictions and Risks | NONE |
| Dependencies | Development of integration modules for version control systems. Integration with version control APIs and protocols for managing project versions. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Enhance collaboration and streamline development workflows by integrating version control systems like Git into the UI builder. |

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| Identifier | SWC003\_33 |
| Title | Integration of Analytics and Tracking Codes |
| Requirement | Users shall have the option to integrate analytics and tracking codes into their designs. |
| Rationale | Integration of analytics and tracking codes enables users to gather insights into user behavior, monitor performance, and make data-driven design decisions. |
| Restrictions and Risks | NONE |
| Dependencies | Development of integration interfaces for analytics and tracking services. Integration with tracking code injection mechanisms for embedding codes into designs. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Gain valuable insights into user behavior and performance by integrating analytics and tracking codes into your designs, empowering data-driven design decisions. |

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| Identifier | SWC003\_34 |
| Title | Pre-designed Themes and Templates |
| Requirement | The builder shall offer pre-designed themes and templates for quick prototyping. |
| Rationale | Pre-designed themes and templates provide users with starting points for their designs, helping them to kickstart their projects and expedite the prototyping process. |
| Restrictions and Risks | NONE |
| Dependencies | Development of theme and template repositories. Integration with UI controls for accessing and applying pre-designed themes and templates. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Jumpstart your design process with pre-designed themes and templates, accelerating your prototyping and design iterations. |

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| Identifier | SWC003\_35 |
| Title | Previewing Designs on Different Devices and Browsers |
| Requirement | Users shall be able to preview their designs on different devices and browsers. |
| Rationale | Previewing designs on various devices and browsers allows users to ensure compatibility and responsiveness, optimizing the user experience across different platforms. |
| Restrictions and Risks | NONE |
| Dependencies | Development of preview rendering engines for different devices and browsers. Integration with browser emulation tools for cross-browser testing. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Ensure your designs look great on every device and browser with the ability to preview them across different platforms. |

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| Identifier | SWC003\_36 |
| Title | Creation of Dynamic Content Using Server-side Scripting Languages |
| Requirement | The UI builder shall support the creation of dynamic content using server-side scripting languages. |
| Rationale | Supporting server-side scripting languages enables users to generate dynamic content based on user input, database queries, or other server-side logic, enhancing the interactivity and functionality of their designs. |
| Restrictions and Risks | NONE |
| Dependencies | Development of server-side scripting interfaces. Integration with server -side execution environments for processing scripts and generating dynamic content. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Enhance interactivity and functionality in your designs by incorporating server-side scripting languages to generate dynamic content based on user interactions and server-side logic. |

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| Identifier | SWC003\_37 |
| Title | Exporting Designs as HTML, CSS, and JavaScript Files |
| Requirement | Users shall be able to export their designs as HTML, CSS, and JavaScript files for further development. |
| Rationale | Exporting designs as HTML, CSS, and JavaScript files allows users to hand off their designs to developers for implementation and further refinement. |
| Restrictions and Risks | NONE |
| Dependencies | Development of export modules for converting designs into HTML, CSS, and JavaScript files. Integration with file generation systems for exporting files in the specified formats. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Seamlessly transition from design to development by exporting your designs as HTML, CSS, and JavaScript files for further refinement and implementation. |

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| Identifier | SWC003\_38 |
| Title | Provision of Tutorials and Guides |
| Requirement | The builder shall provide tutorials and guides for beginners to learn and master the tool. |
| Rationale | Providing tutorials and guides helps users, especially beginners, to familiarize themselves with the tool's features and functionalities, promoting efficient usage and skill development. |
| Restrictions and Risks | NONE |
| Dependencies | Development of tutorial content and interactive guides. Integration with the UI for accessing tutorial materials within the builder. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Accelerate your learning curve and master the tool with ease through comprehensive tutorials and guides provided within the builder. |

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| Identifier | SWC003\_39 |
| Title | Ability to Share Designs with Clients or Team Members for Feedback |
| Requirement | Users shall have the ability to share their designs with clients or team members for feedback. |
| Rationale | Allowing users to share designs facilitates collaboration and enables stakeholders to provide feedback, ensuring alignment with project goals and requirements. |
| Restrictions and Risks | NONE |
| Dependencies | Development of sharing mechanisms for distributing designs. Integration with communication platforms or email services for sharing designs with clients or team members. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Foster collaboration and gather valuable feedback by easily sharing your designs with clients or team members, promoting alignment and successful project outcomes. |

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| --- | --- |
| Identifier | SWC003\_40 |
| Title | Regular Updates Based on User Feedback and Industry Trends |
| Requirement | The UI builder shall be regularly updated with new features and improvements based on user feedback and industry trends. |
| Rationale | Regular updates ensure that the UI builder remains relevant, competitive, and aligned with user needs and evolving industry standards, enhancing user satisfaction and usability. |
| Restrictions and Risks | NONE |
| Dependencies | Implementation of feedback collection mechanisms. Integration with development processes for prioritizing and implementing new features and improvements. |
| Data Formats | NONE |
| Command Formats | NONE |
| End Messages | Stay ahead of the curve with regular updates that incorporate user feedback and industry trends, ensuring that the UI builder evolves to meet your evolving needs. |

[FA21-BSE-052]

**Module:** *Security*

| **ID** | **SWC001** |
| --- | --- |
| Title | Secure Authentication Mechanism |
| Requirement | The system shall provide authentication mechanisms, including multi-factor authentication (MFA) and OAuth, to verify the identity of users accessing the application. |
| Rationale | Ensures the security of user accounts and prevents unauthorized access to sensitive resources. |
| Restrictions & Risks | Unsupported authentication methods may compromise system security and increase the risk of unauthorized access. |
| Dependencies | User Management Component |
| Data Formats | Text strings for usernames, passwords, and authentication tokens; numbers for authentication codes. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to enable and configure authentication methods. |
| End Message | Changes made to the authentication settings will be applied system-wide and reflected in the login interface. |

| **ID** | **SWC002** |
| --- | --- |
| Title | Role-Based Access Control (RBAC) |
| Requirement | The system shall implement Role-Based Access Control (RBAC) to restrict user access to resources based on their assigned roles and permissions. |
| Rationale | Ensures that users only have access to resources necessary for their roles, reducing the risk of unauthorized access and data breaches. |
| Restrictions & Risks | Improperly configured RBAC may lead to unauthorized access or privilege escalation, compromising system security. |
| Dependencies | User Management Component, Resource Management Component |
| Data Formats | Text strings for role names, permissions, and resource identifiers; numbers for role IDs and permission levels. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define roles, assign permissions, and manage access control policies. |
| End Message | Changes made to RBAC settings will enforce access control policies system-wide, ensuring proper resource access based on user roles and permissions. |

| **ID** | **SWC003** |
| --- | --- |
| Title | Encryption of Sensitive Data |
| Requirement | The system shall encrypt user credentials, payment information, and personal identifiable information (PII), using hashing technique. |
| Rationale | Protects sensitive data from unauthorized access and disclosure, ensuring data confidentiality and compliance with privacy regulations. |
| Restrictions & Risks | Failure to encrypt sensitive data may expose it to unauthorized access and disclosure, leading to data breaches and compliance violations. |
| Dependencies | Data Management Component, Encryption Library |
| Data Formats | Text strings for sensitive data fields; encrypted data format for storage and transmission. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify encryption algorithms, key management, and data encryption policies. |
| End Message | Changes made to encryption settings will ensure that sensitive data is encrypted at rest and in transit, protecting it from unauthorized access and disclosure. |

| **ID** | **SWC004** |
| --- | --- |
| Title | Intrusion Detection System (IDS) |
| Requirement | The system shall implement an Intrusion Detection System (IDS) to monitor network traffic, system logs, and user activities for signs of unauthorized access, malware infections, or security breaches. |
| Rationale | Enables proactive threat detection and response, allowing administrators to detect and mitigate security incidents before they escalate. |
| Restrictions & Risks | Inadequate IDS configuration or monitoring may result in undetected security threats or false positives, impacting system security and performance. |
| Dependencies | Network Monitoring Component, Log Management Component |
| Data Formats | Text strings for IDS rules, signatures, and alert messages; numbers for threshold settings and anomaly detection parameters. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define IDS policies, thresholds, and response actions. |
| End Message | Changes made to IDS settings will enhance the system's ability to detect and respond to security threats, ensuring the integrity and availability of system resources. |

| **ID** | **SWC005** |
| --- | --- |
| Title | Secure Communication Protocols |
| Requirement | The system shall support secure communication protocols such as HTTPS, SSL/TLS, and SSH to encrypt data transmissions and protect sensitive information exchanged between clients and servers. |
| Rationale | Ensures the confidentiality and integrity of data transmitted over the network, preventing eavesdropping, interception, and tampering by unauthorized parties. |
| Restrictions & Risks | Use of insecure communication protocols may expose sensitive data to interception, eavesdropping, and tampering, compromising data confidentiality and integrity. |
| Dependencies | Network Communication Component, Cryptography Library |
| Data Formats | Text strings for protocol configurations, encryption algorithms, and certificate formats; encrypted data format for transmission. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to enable and configure secure communication protocols. |
| End Message | Changes made to communication protocol settings will ensure secure data transmission and protect sensitive information exchanged between clients and servers. |

| **ID** | **SWC006** |
| --- | --- |
| Title | Secure Session Management |
| Requirement | The system shall implement secure session management mechanisms, including session tokens, session timeouts, and CSRF (Cross-Site Request Forgery) protection, to prevent session hijacking and unauthorized access. |
| Rationale | Protects user sessions from hijacking, tampering, and unauthorized access, ensuring the security and integrity of user interactions with the application. |
| Restrictions & Risks | Inadequate session management may expose user sessions to hijacking, session fixation, or CSRF attacks, compromising user privacy and system security. |
| Dependencies | Session Management Component, Web Application Firewall (WAF) |
| Data Formats | Text strings for session tokens and identifiers; numbers for session timeout durations and CSRF tokens. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define session management policies and security controls. |
| End Message | Changes made to session management settings will enhance the security of user sessions and protect against session hijacking and unauthorized access. |

| **ID** | **SWC007** |
| --- | --- |
| Title | Secure Password Policy |
| Requirement | The system shall enforce secure password policy, minimum length 8 characters, complexity with Upper and lower case to enhance user account security. |
| Rationale | Improves the resilience of user accounts against brute-force attacks, password guessing, and credential theft by enforcing strong password policies. |
| Restrictions & Risks | Weak password policies may lead to compromised user accounts, unauthorized access, and security breaches due to easily guessable or reused passwords. |
| Dependencies | User Management Component, Configuration Management Component |
| Data Formats | Text strings for password policies, complexity requirements, and expiration settings; numbers for password length and expiration periods. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define and enforce password policies. |
| End Message | Changes made to password policy settings will enhance user account security by enforcing strong password requirements system wide. |

| **ID** | **SWC008** |
| --- | --- |
| Title | Secure Error Handling |
| Requirement | The system shall implement secure error handling mechanism to prevent the disclosure of sensitive information, such as stack traces, system paths, or database errors, to unauthorized users. |
| Rationale | Mitigates information disclosure risks and prevents attackers from exploiting error messages to gain insights into system vulnerabilities and attack vectors. |
| Restrictions & Risks | Improper error handling may expose sensitive information, such as database schemas or server configurations, to attackers, facilitating targeted attacks or data breaches. |
| Dependencies | Error Handling Component, Logging Component |
| Data Formats | Text strings for error messages, exception codes, and error details; numbers for error codes and severity levels. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify error handling policies and suppress sensitive information in error messages. |
| End Message | Changes made to error handling settings will enhance system security by preventing the disclosure of sensitive information in error messages. |

| **ID** | **SWC009** |
| --- | --- |
| Title | Secure File Uploads |
| Requirement | The system shall implement secure file upload mechanisms to validate file types, size limits, and sanitize file contents to prevent upload of malicious files or scripts. |
| Rationale | Mitigates the risk of file-based attacks, such as file inclusion, code injection, and malware distribution, by enforcing strict file upload controls and validations. |
| Restrictions & Risks | Insecure file upload mechanisms may allow attackers to upload malicious files or scripts, leading to remote code execution, data breaches, or system compromise. |
| Dependencies | File Management Component, Content Validation Library |
| Data Formats | Text strings for file MIME types, file names, and content types; numbers for file size limits and upload quotas. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define file upload policies and restrictions. |
| End Message | Changes made to file upload settings will enhance system security by preventing the upload of malicious files or scripts. |

| **ID** | **SWC010** |
| --- | --- |
| Title | Secure Logging |
| Requirement | The system shall implement secure logging mechanisms to record and store security-relevant events, including maximum 4 login attempts, access control changes, and system configuration modifications. |
| Rationale | Facilitates audit trails, incident response, and forensic analysis by capturing and preserving security-related events and activities for compliance and investigation purposes. |
| Restrictions & Risks | Inadequate or improper logging may hinder incident detection, response, and investigation efforts, impeding security incident management and compliance auditing. |
| Dependencies | Logging Component, Event Logging Library |
| Data Formats | Text strings for log messages, event types, and timestamps; numbers for log entry IDs and severity levels. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify logging levels, retention policies, and log storage locations. |
| End Message | Changes made to logging settings will enhance system visibility and accountability by recording and storing security-relevant events and activities. |

| **ID** | **SWC011** |
| --- | --- |
| Title | Secure Session Persistence |
| Requirement | The system shall ensure secure session persistence by encrypting and securely storing session tokens, cookies, and session data to prevent session hijacking and tampering. |
| Rationale | Protects user sessions from interception, manipulation, or theft by encrypting session data and implementing secure storage mechanisms for session tokens and cookies. |
| Restrictions & Risks | Insecure session persistence mechanisms may expose user sessions to hijacking, session fixation, or session poisoning attacks, compromising user privacy and data integrity. |
| Dependencies | Session Management Component, Cryptography Library |
| Data Formats | Text strings for session tokens, cookies, and session identifiers; encrypted data format for session storage. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify session encryption algorithms, key management, and storage policies. |
| End Message | Changes made to session persistence settings will enhance the security of user sessions by encrypting and securely storing session data. |

| **ID** | **SWC012** |
| --- | --- |
| Title | Secure API Authentication |
| Requirement | The system shall implement secure API authentication mechanisms such as API keys, OAuth tokens, or JWT (JSON Web Tokens) to authenticate and authorize API requests from clients. |
| Rationale | Ensures the integrity and authenticity of API requests and prevents unauthorized access to API endpoints and resources by implementing robust authentication mechanisms. |
| Restrictions & Risks | Weak or insecure API authentication may expose APIs to unauthorized access, exploitation, or abuse, compromising the security and integrity of the system. |
| Dependencies | API Management Component, Authentication Library |
| Data Formats | Text strings for API keys, tokens, and authentication credentials; encrypted data format for authentication tokens. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to generate and manage API keys, tokens, and authentication credentials. |
| End Message | Changes made to API authentication settings will enhance the security and integrity of API requests by implementing robust authentication mechanisms. |

| **ID** | **SWC013** |
| --- | --- |
| Title | Secure Database Access |
| Requirement | The system shall enforce secure database access controls, including role-based access control , least privilege principle, and database encryption, to protect sensitive data stored in databases. |
| Rationale | Prevents unauthorized access, data leakage, or tampering by enforcing strict access controls and encryption measures on database resources and sensitive data. |
| Restrictions & Risks | Inadequate database access controls or weak encryption may expose sensitive data to unauthorized access, SQL injection attacks, or data breaches, compromising data confidentiality and integrity. |
| Dependencies | Database Management Component, Encryption Library |
| Data Formats | Text strings for database roles, permissions, and encryption keys; encrypted data format for sensitive data fields. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define database access controls, encryption policies, and security configurations. |
| End Message | Changes made to database access settings will enhance the security and integrity of sensitive data stored in databases by enforcing strict access controls and encryption measures. |

| **ID** | **SWC014** |
| --- | --- |
| Title | Secure Cross-Origin Resource Sharing (CORS) |
| Requirement | The system shall implement secure Cross-Origin Resource Sharing (CORS) policies to restrict cross-origin requests and prevent unauthorized access to sensitive resources. |
| Rationale | Mitigates cross-site scripting (XSS) and cross-site request forgery (CSRF) attacks by enforcing same-origin policies and access controls on cross-origin requests and resources. |
| Restrictions & Risks | Insecure or misconfigured CORS policies may expose sensitive data or resources to unauthorized access or exploitation by allowing cross-origin requests from untrusted domains. |
| Dependencies | Web Server Component, CORS Configuration Module |
| Data Formats | Text strings for CORS policies, allowed origins, and resource endpoints; numbers for access control settings and request headers. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify CORS policies, allowed origins, and access control rules. |
| End Message | Changes made to CORS settings will restrict cross-origin requests and enhance the security of sensitive resources by enforcing secure CORS policies. |

| **ID** | **SWC015** |
| --- | --- |
| Title | Secure Remote Access |
| Requirement | The system shall provide secure remote access mechanisms, such as VPN (Virtual Private Network), SSH (Secure Shell), or RDP (Remote Desktop Protocol), to facilitate secure remote administration and access to system resources. |
| Rationale | Enables secure remote management and access to system resources while protecting against unauthorized access, interception, or exploitation by malicious actors. |
| Restrictions & Risks | Insecure remote access mechanisms may expose system resources to unauthorized access, interception, or exploitation by attackers, compromising system security and integrity. |
| Dependencies | Remote Access Component, Network Security Infrastructure |
| Data Formats | Text strings for VPN configurations, SSH keys, and RDP settings; numbers for port numbers and encryption algorithms. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to configure VPN, SSH, or RDP settings and access controls. |
| End Message | Changes made to remote access settings will enhance the security of remote connections and protect system resources from unauthorized access or exploitation. |

| **ID** | **SWC016** |
| --- | --- |
| Title | Secure Data Transmission |
| Requirement | The system shall encrypt data transmissions over insecure networks or channels, such as public Wi-Fi or untrusted connections, using secure communication protocols and encryption algorithms. |
| Rationale | Protects data privacy and confidentiality by preventing eavesdropping, interception, or tampering of data transmitted over insecure or untrusted networks or channels. |
| Restrictions & Risks | Unencrypted data transmissions may expose sensitive information to interception, eavesdropping, or tampering by malicious actors, compromising data privacy and integrity. |
| Dependencies | Network Communication Component, Cryptography Library |
| Data Formats | Text strings for encryption keys, transmission protocols, and data packets; encrypted data format for transmission over insecure networks. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify encryption protocols, key exchange mechanisms, and secure transmission settings. |
| End Message | Changes made to data transmission settings will ensure that data transmitted over insecure networks or channels is encrypted and protected from unauthorized access or tampering. |

| **ID** | **SWC017** |
| --- | --- |
| Title | Secure API Endpoint Protection |
| Requirement | The system shall implement secure API endpoint protection mechanisms, such as rate limiting, request validation, and API key authentication, to prevent API abuse, exploitation, or denial-of-service (DoS) attacks. |
| Rationale | Protects API endpoints from abuse, exploitation, or DoS attacks by enforcing access controls, request validation, and rate limiting to mitigate the risk of API abuse or overload. |
| Restrictions & Risks | Inadequate API endpoint protection may expose APIs to abuse, exploitation, or DoS attacks, resulting in service disruptions, data breaches, or resource exhaustion. |
| Dependencies | API Management Component, Rate Limiting Module |
| Data Formats | Text strings for API endpoint URLs, request headers, and authentication tokens; numbers for rate limit thresholds and request quotas. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define API endpoint protection policies and access controls. |
| End Message | Changes made to API endpoint protection settings will enhance the security and availability of API resources by mitigating the risk of abuse or exploitation. |

| **ID** | **SWC018** |
| --- | --- |
| Title | Secure System Updates |
| Requirement | The system shall securely manage and deploy software updates, patches, and security fixes to mitigate vulnerabilities and protect against known security threats or exploits. |
| Rationale | Reduces the risk of security breaches, malware infections, or system compromise by promptly applying software updates and security patches to address known vulnerabilities. |
| Restrictions & Risks | Failure to apply software updates or security patches in a timely manner may leave systems vulnerable to known security threats, exploits, or malware infections. |
| Dependencies | Update Management Component, Patch Management System |
| Data Formats | Text strings for software update packages, patch descriptions, and update schedules; numbers for update version numbers and release dates. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to schedule and deploy software updates and security patches. |
| End Message | Changes made to update settings will ensure that software updates and security patches are promptly applied to mitigate vulnerabilities and protect against known security threats. |

| **ID** | **SWC019** |
| --- | --- |
| Title | Secure Account Management |
| Requirement | The system shall enforce secure account management practices, such as account lockout, password reset, and account recovery, to prevent unauthorized access and protect user accounts from compromise. |
| Rationale | Enhances user account security and resilience against unauthorized access, credential theft, or account takeover by implementing robust account management controls and policies. |
| Restrictions & Risks | Weak or insecure account management practices may expose user accounts to unauthorized access, credential theft, or account hijacking, compromising user privacy and system security. |
| Dependencies | Account Management Component, Authentication System |
| Data Formats | Text strings for account usernames, email addresses, and account recovery questions; numbers for account IDs and recovery codes. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define account management policies and security controls. |
| End Message | Changes made to account management settings will enhance user account security and resilience against unauthorized access or compromise. |

| **ID** | **SWC020** |
| --- | --- |
| Title | Secure Backup and Recovery |
| Requirement | The system shall implement secure backup and recovery mechanisms to protect critical data and ensure business continuity in the event of data loss, corruption, or system failures. |
| Rationale | Safeguards critical data and ensures business continuity by securely backing up and recovering data, applications, and systems from potential data loss, corruption, or failure events. |
| Restrictions & Risks | Without secure backup and recovery mechanisms, critical data and systems may be vulnerable to data loss, corruption, or failure events, resulting in prolonged service disruptions, financial losses, and reputational damage. |
| Dependencies | Backup and Recovery Component, Disaster Recovery Plan |
| Data Formats | Text strings for backup and recovery policies, retention periods, encryption methods, and recovery procedures; numbers for configuration parameters. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define and enable secure backup and recovery mechanisms. |
| End Message | Changes made to backup and recovery settings will ensure the security and integrity of critical data and systems, protecting them from data loss, corruption, or failure events. |

| **ID** | **SWC021** |
| --- | --- |
| Title | Secure Web Application Firewall (WAF) |
| Requirement | The system shall deploy and configure a secure Web Application Firewall (WAF) to protect web applications from common security threats, such as SQL injection, cross-site scripting (XSS), and buffer overflow attacks. |
| Rationale | Prevents exploitation of web application vulnerabilities and protects against web-based attacks by inspecting and filtering incoming web traffic for malicious payloads or suspicious activities. |
| Restrictions & Risks | Inadequate or misconfigured WAF may fail to detect or mitigate web application attacks, leaving web applications vulnerable to exploitation or compromise. |
| Dependencies | Web Server Component, WAF Configuration Module |
| Data Formats | Text strings for WAF rules, signatures, and filter criteria; numbers for rule IDs and severity levels. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define WAF policies, rules, and security controls. |
| End Message | Changes made to WAF settings will enhance the security of web applications by preventing and mitigating web-based attacks and vulnerabilities. |

| **ID** | **SWC022** |
| --- | --- |
| Title | Secure Account Lockout Mechanism |
| Requirement | The system shall implement an account lockout mechanism to temporarily lock user accounts after a specified number of failed login attempts. |
| Rationale | Prevents brute-force attacks and unauthorized access by temporarily locking user accounts after multiple failed login attempts, enhancing account security. |
| Restrictions & Risks | Failure to implement an account lockout mechanism may expose user accounts to brute-force attacks, increasing the risk of unauthorized access and account compromise. |
| Dependencies | Authentication System, User Management Component |
| Data Formats | Text strings for account usernames, login attempts, and lockout durations; numbers for threshold settings and lockout periods. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define account lockout policies and parameters. |
| End Message | Changes made to account lockout settings will enhance account security by preventing brute-force attacks and unauthorized access to user accounts. |

| **ID** | **SWC023** |
| --- | --- |
| Title | Secure File Downloads |
| Requirement | The system shall implement secure file download mechanisms to prevent unauthorized access to sensitive files and resources. |
| Rationale | Protects sensitive files and resources from unauthorized access or disclosure by implementing secure access controls and authentication mechanisms for file downloads. |
| Restrictions & Risks | Insecure file download mechanisms may expose sensitive files or resources to unauthorized access, download, or distribution, compromising data confidentiality and integrity. |
| Dependencies | File Management Component, Access Control System |
| Data Formats | Text strings for file names, download URLs, and access permissions; numbers for file IDs and download quotas. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define access controls and permissions for file downloads. |
| End Message | Changes made to file download settings will enhance the security of sensitive files and resources by preventing unauthorized access or download. |

| **ID** | **SWC024** |
| --- | --- |
| Title | Secure Email Communication |
| Requirement | The system shall implement secure email communication protocols such as SMTPS and STARTTLS to encrypt email transmissions and protect sensitive information. |
| Rationale | Ensures the confidentiality and integrity of email communications by encrypting email transmissions and preventing eavesdropping or interception of sensitive information. |
| Restrictions & Risks | Insecure email communication protocols may expose email transmissions to interception, eavesdropping, or tampering, compromising the confidentiality and integrity of email communications. |
| Dependencies | Email Server Component, Encryption Library |
| Data Formats | Text strings for email addresses, message content, and attachment filenames; encrypted data format for email transmissions. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to enable and configure secure email communication protocols. |
| End Message | Changes made to email communication settings will ensure the confidentiality and integrity of email transmissions by encrypting email communications. |

| **ID** | **SWC025** |
| --- | --- |
| Title | Password Hashing |
| Requirement | The system shall hash user passwords using strong cryptographic hashing algorithms such as bcrypt or Argon2 to protect them from unauthorized access. |
| Rationale | Protects user passwords from unauthorized access or theft by securely hashing passwords using strong cryptographic algorithms and techniques. |
| Restrictions & Risks | Storing passwords in plaintext or using weak hashing algorithms may expose user passwords to unauthorized access or exploitation, compromising account security. |
| Dependencies | Authentication System, Cryptography Library |
| Data Formats | Text strings for password hashes and cryptographic algorithms; numbers for hash iterations and salt lengths. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify password hashing algorithms and parameters. |
| End Message | Changes made to password hashing settings will enhance the security of user passwords by securely hashing them using strong cryptographic algorithms. |

| **ID** | **SWC026** |
| --- | --- |
| Title | Security Headers |
| Requirement | The system shall implement security headers such as X-Frame-Options, X-XSS-Protection, and Content-Security-Policy to mitigate common web security vulnerabilities. |
| Rationale | Mitigates common web security vulnerabilities, such as clickjacking, cross-site scripting (XSS), and content injection, by enforcing security policies and controls via HTTP headers. |
| Restrictions & Risks | Inadequate or misconfigured security headers may expose web applications to common security vulnerabilities, increasing the risk of exploitation or compromise. |
| Dependencies | Web Server Component, HTTP Header Module |
| Data Formats | Text strings for HTTP header names, values, and security policies; numbers for header configuration parameters. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define and configure security headers for web applications. |
| End Message | Changes made to security header settings will enhance the security of web applications by mitigating common web security vulnerabilities through HTTP header controls. |

| **ID** | **SWC027** |
| --- | --- |
| Title | Two-Factor Authentication (2FA) |
| Requirement | The system shall support Two-Factor Authentication (2FA) to enhance user account security by requiring additional verification steps, such as SMS codes, authenticator apps, or biometric authentication. |
| Rationale | Adds an extra layer of security to user accounts by requiring two forms of authentication, reducing the risk of unauthorized access or account compromise. |
| Restrictions & Risks | Inadequate or insecure 2FA implementations may undermine the effectiveness of two-factor authentication, leaving user accounts vulnerable to unauthorized access or compromise. |
| Dependencies | Authentication System, 2FA Module |
| Data Formats | Text strings for authentication tokens, verification codes, and biometric data; numbers for authentication factors and verification timeouts. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to enable and configure 2FA methods and authentication factors. |
| End Message | Changes made to 2FA settings will enhance user account security by requiring additional verification steps for authentication. |

| **ID** | **SWC028** |
| --- | --- |
| Title | Secure Data Validation |
| Requirement | The system shall validate and sanitize user inputs, such as form data, file uploads, and API requests, to prevent injection attacks, data tampering, and code execution vulnerabilities. |
| Rationale | Prevents common security vulnerabilities, such as SQL injection, cross-site scripting (XSS), and command injection, by validating and sanitizing user inputs to ensure data integrity and security. |
| Restrictions & Risks | Failure to validate and sanitize user inputs may expose applications to injection attacks, data tampering, or code execution vulnerabilities, compromising system security and integrity. |
| Dependencies | Input Validation Component, Data Sanitization Library |
| Data Formats | Text strings for input data, form fields, and API parameters; numbers for input lengths and data types. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define input validation rules and data sanitization policies. |
| End Message | Changes made to data validation settings will enhance the security of applications by preventing injection attacks and ensuring data integrity and security. |

| **ID** | **SWC029** |
| --- | --- |
| Title | Secure Session Encryption |
| Requirement | The system shall encrypt user sessions and session data using secure encryption algorithms and techniques to prevent session hijacking, interception, or tampering. |
| Rationale | Protects user sessions from interception, tampering, or eavesdropping by encrypting session data and communications between clients and servers. |
| Restrictions & Risks | Insecure session encryption may expose user sessions to interception, tampering, or eavesdropping by malicious actors, compromising user privacy and data integrity. |
| Dependencies | Session Management Component, Cryptography Library |
| Data Formats | Text strings for session tokens, encryption keys, and session identifiers; encrypted data format for session storage and transmission. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to specify session encryption algorithms, key lengths, and encryption modes. |
| End Message | Changes made to session encryption settings will enhance the security of user sessions by encrypting session data and communications. |

| **ID** | **SWC030** |
| --- | --- |
| Title | Secure Cross-Site Scripting (XSS) Prevention |
| Requirement | The system shall implement secure cross-site scripting (XSS) prevention mechanisms, such as input validation, output encoding, and Content Security Policy (CSP), to mitigate XSS vulnerabilities and protect against script injection attacks. |
| Rationale | Prevents XSS vulnerabilities and mitigates the risk of script injection attacks by validating and sanitizing user inputs, encoding output data, and enforcing strict content security policies. |
| Restrictions & Risks | Inadequate or improper XSS prevention mechanisms may expose web applications to XSS vulnerabilities, allowing attackers to inject malicious scripts and compromise user sessions or steal sensitive data. |
| Dependencies | Input Validation Component, Output Encoding Library, CSP Configuration Module |
| Data Formats | Text strings for input data, output content, and CSP directives; numbers for configuration parameters and security settings. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define XSS prevention policies, input validation rules, and output encoding methods. |
| End Message | Changes made to XSS prevention settings will enhance the security of web applications by mitigating XSS vulnerabilities and protecting against script injection attacks. |

| **ID** | **SWC031** |
| --- | --- |
| Title | Secure Cross-Site Request Forgery (CSRF) Prevention |
| Requirement | The system shall implement secure Cross-Site Request Forgery (CSRF) prevention mechanisms, such as anti-CSRF tokens, SameSite cookies, and referer validation, to mitigate CSRF vulnerabilities and protect against unauthorized requests. |
| Rationale | Mitigates CSRF vulnerabilities and prevents unauthorized actions by implementing anti-CSRF protection mechanisms, such as request validation, token-based authentication, and origin checks. |
| Restrictions & Risks | Insecure or misconfigured CSRF prevention mechanisms may expose web applications to CSRF vulnerabilities, allowing attackers to execute unauthorized actions or transactions on behalf of authenticated users. |
| Dependencies | CSRF Protection Component, Token Generation Module, Referer Validation Library |
| Data Formats | Text strings for CSRF tokens, request headers, and validation criteria; numbers for token lengths and expiration times. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to enable and configure CSRF protection mechanisms. |
| End Message | Changes made to CSRF prevention settings will enhance the security of web applications by mitigating CSRF vulnerabilities and protecting against unauthorized requests. |

| **ID** | **SWC032** |
| --- | --- |
| Title | Secure Error Logging |
| Requirement | The system shall log security-related errors, exceptions, and events using secure logging mechanisms to ensure the integrity and confidentiality of log data and prevent information disclosure. |
| Rationale | Facilitates incident detection, response, and forensic analysis by securely logging security-related events and activities for audit trails and compliance auditing purposes. |
| Restrictions & Risks | Insecure error logging mechanisms may expose sensitive information or system details to unauthorized access or disclosure, compromising log data integrity and confidentiality. |
| Dependencies | Logging Component, Security Event Logging Library |
| Data Formats | Text strings for error messages, exception details, and security event logs; encrypted data format for log entries and audit trails. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define log levels, retention policies, and encryption settings. |
| End Message | Changes made to error logging settings will ensure the integrity and confidentiality of log data by securely logging security-related events and activities. |

| **ID** | **SWC033** |
| --- | --- |
| Title | Secure Remote Management |
| Requirement | The system shall provide secure remote management capabilities, such as SSH (Secure Shell) access, remote desktop services, and secure command-line interfaces, to facilitate remote administration and access to system resources. |
| Rationale | Enables secure remote management and access to system resources while protecting against unauthorized access, interception, or exploitation by malicious actors. |
| Restrictions & Risks | Insecure or misconfigured remote management services may expose system resources to unauthorized access, exploitation, or compromise, compromising system security and integrity. |
| Dependencies | Remote Management Component, Network Security Infrastructure |
| Data Formats | Text strings for SSH keys, remote desktop configurations, and command-line interfaces; numbers for port numbers and encryption algorithms. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to enable and configure remote management services and access controls. |
| End Message | Changes made to remote management settings will enhance the security of remote connections and protect system resources from unauthorized access or exploitation. |

| **ID** | **SWC034** |
| --- | --- |
| Title | Secure API Rate Limiting |
| Requirement | The system shall implement secure API rate limiting mechanisms to prevent API abuse, exploitation, or DoS (Denial of Service) attacks by limiting the number of requests to 40  from individual clients or IP addresses within a specified time frame of 10 seconds. |
| Rationale | Prevents API abuse or exploitation by enforcing rate limits on API requests, reducing the risk of DoS attacks, service disruptions, or resource exhaustion. |
| Restrictions & Risks | Inadequate or misconfigured rate limiting mechanisms may fail to prevent API abuse or exploitation, leaving APIs vulnerable to DoS attacks, service disruptions, or resource depletion. |
| Dependencies | API Management Component, Rate Limiting Module |
| Data Formats | Text strings for API endpoints, rate limit thresholds, and request quotas; numbers for rate limits and time intervals. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define rate limiting policies and thresholds for API endpoints. |
| End Message | Changes made to rate limiting settings will prevent API abuse or exploitation by enforcing rate limits on API requests and mitigating the risk of DoS attacks. |

| **ID** | **SWC035** |
| --- | --- |
| Title | Secure Session Management |
| Requirement | The system shall implement secure session management mechanisms, such as session timeouts, session encryption, and session revocation, to protect user sessions from hijacking, interception, or tampering. |
| Rationale | Protects user sessions from unauthorized access or exploitation by enforcing session controls, encryption, and revocation mechanisms to ensure session integrity and confidentiality. |
| Restrictions & Risks | Insecure session management may expose user sessions to hijacking, interception, or tampering, compromising user privacy, data integrity, and application security. |
| Dependencies | Session Management Component, Cryptography Library |
| Data Formats | Text strings for session tokens, encryption keys, and session identifiers; encrypted data format for session storage and transmission. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define session timeout periods, encryption algorithms, and revocation policies. |
| End Message | Changes made to session management settings will enhance the security of user sessions by enforcing session controls, encryption, and revocation mechanisms. |

| **ID** | **SWC036** |
| --- | --- |
| Title | Secure Content Delivery |
| Requirement | The system shall deliver content securely over HTTPS (Hypertext Transfer Protocol Secure) to ensure data confidentiality, integrity, and authenticity during content transmission. |
| Rationale | Protects data privacy, integrity, and authenticity by encrypting content transmissions and preventing eavesdropping, tampering, or manipulation of content by malicious actors. |
| Restrictions & Risks | Insecure content delivery over HTTP may expose content transmissions to interception, eavesdropping, or tampering, compromising data confidentiality, integrity, and authenticity. |
| Dependencies | Web Server Component, SSL/TLS Configuration Module |
| Data Formats | Text strings for content URLs, encryption algorithms, and security protocols; numbers for port numbers and cipher suites. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to enable and configure HTTPS settings and SSL/TLS certificates. |
| End Message | Changes made to content delivery settings will ensure secure content transmission over HTTPS, protecting data confidentiality, integrity, and authenticity. |

| **ID** | **SWC037** |
| --- | --- |
| Title | Secure Session Timeout |
| Requirement | The system shall implement session timeout mechanisms to automatically invalidate user sessions after a specified period of inactivity to prevent session hijacking or unauthorized access. |
| Rationale | Protects user sessions from hijacking or unauthorized access by automatically terminating inactive sessions after a predefined period, reducing the risk of session-based attacks. |
| Restrictions & Risks | Inadequate or misconfigured session timeout mechanisms may leave user sessions vulnerable to hijacking or unauthorized access, compromising user privacy, and data integrity. |
| Dependencies | Session Management Component, Configuration Management System |
| Data Formats | Text strings for session identifiers, timeout durations, and session status; numbers for timeout thresholds and idle periods. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define session timeout policies and parameters. |
| End Message | Changes made to session timeout settings will enhance the security of user sessions by automatically invalidating inactive sessions after a specified period. |

| **ID** | **SWC038** |
| --- | --- |
| Title | Secure Data Access Controls |
| Requirement | The system shall enforce secure data access controls, such as role-based access control (RBAC), attribute-based access control (ABAC), and least privilege principle, to restrict access to sensitive data and resources based on user roles, permissions, and data classifications. |
| Rationale | Protects sensitive data and resources from unauthorized access or disclosure by enforcing access controls, permissions, and data classifications based on established security policies and principles. |
| Restrictions & Risks | Inadequate or misconfigured access controls may expose sensitive data or resources to unauthorized access, disclosure, or exploitation, compromising data confidentiality and integrity. |
| Dependencies | Access Control System, Authentication System |
| Data Formats | Text strings for user roles, permissions, and data classifications; numbers for access control settings and security policies. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define access control policies, roles, and permissions. |
| End Message | Changes made to access control settings will enhance the security of sensitive data and resources by enforcing secure access controls and permissions. |

| **ID** | **SWC039** |
| --- | --- |
| Title | Secure Password Policies |
| Requirement | The system shall enforce secure password policies, such as minimum password length, complexity requirements, and password expiration, to enhance user account security and prevent password-based attacks. |
| Rationale | Enhances user account security and resilience against password-based attacks, such as brute-force attacks, dictionary attacks, and credential stuffing, by enforcing strong password policies and controls. |
| Restrictions & Risks | Weak or insecure password policies may expose user accounts to password-based attacks, compromising user privacy, account security, and system integrity. |
| Dependencies | Authentication System, Password Policy Module |
| Data Formats | Text strings for password policies, complexity requirements, and expiration intervals; numbers for password lengths and strength criteria. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define password policies and controls. |
| End Message | Changes made to password policies will enhance user account security and resilience against password-based attacks by enforcing strong password requirements and controls. |

| **ID** | **SWC040** |
| --- | --- |
| Title | Secure File Uploads |
| Requirement | The system shall implement secure file upload mechanisms to prevent file-based attacks, such as file inclusion, file overwrite, and file execution vulnerabilities, by validating and sanitizing uploaded files and enforcing file upload restrictions. |
| Rationale | Prevents file-based attacks and vulnerabilities by validating and sanitizing uploaded files, enforcing file upload restrictions, and implementing secure file handling practices. |
| Restrictions & Risks | Insecure file upload mechanisms may expose applications to file-based attacks, allowing attackers to upload malicious files, execute arbitrary code, or compromise system integrity. |
| Dependencies | File Upload Component, File Validation Library |
| Data Formats | Text strings for file names, MIME types, and upload restrictions; numbers for file sizes and upload quotas. |
| Command Format | Configuration options available through the GUI interface, allowing administrators to define file upload restrictions and validation rules. |
| End Message | Changes made to file upload settings will enhance the security of applications by preventing file-based attacks and vulnerabilities through secure file upload mechanisms. |

[FA21-BSE-007]

**Module:** *User Authentication*

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| --- | --- |
| **ID** | **SWC005\_01** |
| **Title** | User Registration |
| **Requirement** | The system shall allow users to register for an account by providing a username, email address, and password. |
| **Rationale** | Enable user creation |
| **Restrictions & Risks** | Username must be unique, password complexity requirements. |
| **Dependencies** | None |
| **Data Formats** | Username (string), Email (string), Password (string) |
| **Command Format** | User registration form |
| **End Message** | Account created successfully. |

|  |  |
| --- | --- |
| **ID** | **SWC005\_02** |
| **Title** | User Login |
| **Requirement** | The system shall allow users to log in to their account using their username or email address and password. |
| **Rationale** | User access to application |
| **Restrictions & Risks** | Valid username/email and password required. |
| **Dependencies** | None |
| **Data Formats** | Username/Email (string), Password (string) |
| **Command Format** | Login form |
| **End Message** | Login successful, Welcome [Username]. |

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| --- | --- |
| **ID** | **SWC005\_03** |
| **Title** | Password Reset |
| **Requirement** | The system shall allow users to reset their forgotten password by requesting a password reset link sent to their registered email address. |
| **Rationale** | Recover lost credentials |
| **Restrictions & Risks** | Valid email address required. |
| **Dependencies** | None |
| **Data Formats** | Email (string) |
| **Command Format** | Password reset request form |
| **End Message** | Password reset link sent to your email. |

|  |  |
| --- | --- |
| **ID** | **SWC005\_04** |
| **Title** | Password Change |
| **Requirement** | The system shall allow users to change their password after successful login. |
| **Rationale** | Maintain account security |
| **Restrictions & Risks** | Current password and new password required. |
| **Dependencies** | SWC001\_02 (Login) |
| **Data Formats** | Current Password (string), New Password (string) |
| **Command Format** | Change password form |
| **End Message** | Password changed successfully. |

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| **ID** | **SWC005\_05** |
| **Title** | Account Deletion |
| **Requirement** | The system shall allow users to delete their account permanently. |
| **Rationale** | User control over data |
| **Restrictions & Risks** | Confirmation required before deletion. |
| **Dependencies** | None |
| **Data Formats** | Confirmation (boolean) |
| **Command Format** | Account deletion form |
| **End Message** | Account deleted successfully. |

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| **ID** | **SWC005\_06** |
| **Title** | User Roles |
| **Requirement** | The system shall allow for the creation and assignment of user roles with different access levels. |
| **Rationale** | Manage user permissions |
| **Restrictions & Risks** | Ability to define and assign roles. |
| **Dependencies** | None |
| **Data Formats** | Role Name (string), Permissions (list) |
| **Command Format** | User role management panel |
| **End Message** | User role created/assigned successfully. |

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| **ID** | **SWC005\_07** |
| **Title** | Role Permissions |
| **Requirement** | The system shall allow for defining specific permissions associated with each user role. |
| **Rationale** | Granular access control |
| **Restrictions & Risks** | Permissions linked to functionalities. |
| **Dependencies** | SWC001\_06 (User Roles) |
| **Data Formats** | Permission Name (string) |
| **Command Format** | Role permission management panel |
| **End Message** | Permission added/removed successfully. |

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| **ID** | **SWC005\_08** |
| **Title** | Two-Factor Authentication (2FA) |
| **Requirement** | The system shall offer an optional two-factor authentication for added security. |
| **Rationale** | Enhance login security |
| **Restrictions & Risks** | Requires additional verification step, e.g., code from mobile app. |
| **Dependencies** | None |
| **Data Formats** | 2FA Method (string), Verification Code (string) |
| **Command Format** | 2FA configuration panel |
| **End Message** | 2FA enabled/disabled successfully. |

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| **ID** | **SWC005\_09** |
| **Title** | Session Management |
| **Requirement** | The system shall manage user sessions with configurable timeout duration. |
| **Rationale** | Prevent unauthorized access |
| **Restrictions & Risks** | Automatic logout after inactivity. |
| **Dependencies** | None |
| **Data Formats** | Session Timeout (integer) |
| **Command Format** | Session management settings panel |
| **End Message** | Session timeout updated successfully. |

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| **ID** | **SWC005\_10** |
| **Title** | Secure Login |
| **Requirement** | The system shall transmit login credentials (username/password) securely using HTTPS protocol. |
| **Rationale** | Protect user data |
| **Restrictions & Risks** | Encrypted communication during login. |
| **Dependencies** | None |
| **Data Formats** | N/A |
| **Command Format** | N/A |
| **End Message** | N/A |

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| --- | --- |
| **ID** | **SWC005\_11** |
| **Title** | Social Login |
| **Requirement** | The system shall allow users to register or log in using existing social media accounts (e.g., Google, Facebook). |
| **Rationale** | Simplified registration and login |
| **Restrictions & Risks** | Integration with social media platforms required. |
| **Dependencies** | None |
| **Data Formats** | Social Media Provider (string), Access Token (string) |
| **Command Format** | Social login buttons |
| **End Message** | Logged in successfully using [Social Media Provider]. |

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| **ID** | **SWC005\_12** |
| **Title** | User Profile Management |
| **Requirement** | The system shall allow users to edit their profile information, including name, avatar, and contact details. |
| **Rationale** | User control over personal data |
| **Restrictions & Risks** | Ability to update profile information. |
| **Dependencies** | SWC001\_02 (Login) |
| **Data Formats** | User Data (varies) |
| **Command Format** | User profile edit form |
| **End Message** | Profile updated successfully. |

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| **ID** | **SWC005\_13** |
| **Title** | Password Strength Meter |
| **Requirement** | The system shall provide a real-time password strength meter during registration and password changes. |
| **Rationale** | Encourage strong passwords |
| **Restrictions & Risks** | Visual feedback on password complexity. |
| **Dependencies** | None |
| **Data Formats** | Password (string) |
| **Command Format** | Password input field |
| **End Message** | Password strength indicator displayed. |

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| **ID** | **SWC005\_14** |
| **Title** | Remember Me Functionality |
| **Requirement** | The system shall offer an option to "Remember Me" during login, allowing users to remain logged in for a specified duration. |
| **Rationale** | Improved user convenience |
| **Restrictions & Risks** | Utilizes cookies or local storage. |
| **Dependencies** | None |
| **Data Formats** | Remember Me (boolean) |
| **Command Format** | Login checkbox |
| **End Message** | Logged in successfully (remembered for [duration]). |

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| --- | --- |
| **ID** | **SWC005\_15** |
| **Title** | Account Verification |
| **Requirement** | The system shall allow optional email verification upon registration for enhanced security. |
| **Rationale** | Reduce fake accounts |
| **Restrictions & Risks** | Verification link sent to user's email. |
| **Dependencies** | None |
| **Data Formats** | Email (string) |
| **Command Format** | Verification request form |
| **End Message** | Verification link sent to your email. (Optional step) |

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| **ID** | **SWC005\_16** |
| **Title** | Account Lockout |
| **Requirement** | The system shall implement account lockout after a certain number of consecutive failed login attempts. |
| **Rationale** | Prevent brute-force attacks |
| **Restrictions & Risks** | User account temporarily locked after exceeding attempts. |
| **Dependencies** | None |
| **Data Formats** | Login Attempts (integer) |
| **Command Format** | Account locked. Please wait [duration] before retrying. |
| **End Message** | Account Lockout |

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| **ID** | **SWC005\_17** |
| **Title** | IP Address Tracking |
| **Requirement** | The system shall log user IP addresses during login attempts for security monitoring. |
| **Rationale** | Identify suspicious activity |
| **Restrictions & Risks** | Track login attempts by IP address. |
| **Dependencies** | None |
| **Data Formats** | IP Address (string) |
| **Command Format** | N/A |
| **End Message** | Logged for security purposes |

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| --- | --- |
| **ID** | **SWC005\_18** |
| **Title** | Session Hijacking Prevention |
| **Requirement** | The system shall utilize session tokens and other measures to prevent session hijacking. |
| **Rationale** | Secure user sessions |
| **Restrictions & Risks** | Mitigate unauthorized access to active sessions. |
| **Dependencies** | None |
| **Data Formats** | None |
| **Command Format** | N/A |
| **End Message** | Security measure implemented |

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| **ID** | **SWC005\_19** |
| **Title** | Idle Session Timeout |
| **Requirement** | The system shall automatically log out users after a period of inactivity to prevent unauthorized access. |
| **Rationale** | Improve security and resource management |
| **Restrictions & Risks** | Configurable idle timeout for sessions. |
| **Dependencies** | SWC001\_09 (Session Management) |
| **Data Formats** | None |
| **Command Format** | Session timed out. Please log in again. |
| **End Message** | Idle Session Timeout |

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| **ID** | **SWC005\_20** |
| **Title** | Secure Password Storage |
| **Requirement** | The system shall store user passwords securely using one-way hashing with a cryptographic salt. |
| **Rationale** | Protect user credentials |
| **Restrictions & Risks** | Prevent retrieval of original passwords. |
| **Dependencies** | None |
| **Data Formats** | Password (string) |
| **Command Format** | N/A |
| **End Message** | Password securely stored |

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| --- | --- |
| **ID** | **SWC005\_21** |
| **Title** | User Search |
| **Requirement** | The system shall allow administrators to search for users based on various criteria (e.g., username, email). |
| **Rationale** | Efficient user management |
| **Restrictions & Risks** | Facilitate finding specific users. |
| **Dependencies** | None |
| **Data Formats** | Search Criteria (string) |
| **Command Format** | User search results displayed. |
| **End Message** | User Search |

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| **ID** | **SWC005\_22** |
| **Title** | User Deactivation |
| **Requirement** | The system shall allow administrators to deactivate user accounts for security or policy violations. |
| **Rationale** | User account management |
| **Restrictions & Risks** | Ability to temporarily disable accounts. |
| **Dependencies** | None |
| **Data Formats** | User ID (integer) |
| **Command Format** | User account deactivated successfully. |
| **End Message** | User Deactivation |

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| **ID** | **SWC005\_23** |
| **Title** | User Reactivation |
| **Requirement** | The system shall allow administrators to reactivate previously deactivated user accounts. |
| **Rationale** | Flexible user management |
| **Restrictions & Risks** | Ability to re-enable accounts if necessary. |
| **Dependencies** | SWC001\_22 (User Deactivation) |
| **Data Formats** | User ID (integer) |
| **Command Format** | User account reactivated successfully. |
| **End Message** | User Reactivation |

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| **ID** | **SWC005\_24** |
| **Title** | User Activity Logs |
| **Requirement** | The system shall log user activity for audit purposes, including login attempts, successful logins, account modifications, and project actions. |
| **Rationale** | Track user behavior |
| **Restrictions & Risks** | Maintain a detailed record of user activity. |
| **Dependencies** | None |
| **Data Formats** | User ID (integer), Action (string), Timestamp (date/time) |
| **Command Format** | N/A |
| **End Message** | User |

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| **ID** | **SWC005\_25** |
| **Title** | User Impersonation |
| **Requirement** | The system shall allow administrators to temporarily impersonate other user accounts for troubleshooting purposes. |
| **Rationale** | Assist users with technical issues |
| **Restrictions & Risks** | Requires elevated privileges and justification. |
| **Dependencies** | None |
| **Data Formats** | User ID (integer) |
| **Command Format** | Impersonating user [Username]. |
| **End Message** | User Impersonation |

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| **ID** | **SWC005\_26** |
| **Title** | User Two-Factor Authentication Enforcement (Optional) |
| **Requirement** | The system shall allow administrators to enforce mandatory two-factor authentication for specific user roles or all users. |
| **Rationale** | Enhance overall security |
| **Restrictions & Risks** | May impact user experience. |
| **Dependencies** | SWC001\_08 (2FA) |
| **Data Formats** | User Role (string), Enforcement (boolean) |
| **Command Format** | 2FA enforcement settings updated. |
| **End Message** | User Two-Factor Authentication Enforcement (Optional) |

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| **ID** | **SWC005\_27** |
| **Title** | Password Expiration Policy |
| **Requirement** | The system shall allow administrators to configure a password expiration policy, forcing users to change passwords periodically. |
| **Rationale** | Encourage regular password updates |
| **Restrictions & Risks** | Users will receive notification before expiration. |
| **Dependencies** | None |
| **Data Formats** | Password Expiration (integer) |
| **Command Format** | Password expiration policy updated. |
| **End Message** | Password Expiration Policy |

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| **ID** | **SWC005\_28** |
| **Title** | Login Attempts Report |
| **Requirement** | The system shall generate reports on login attempts, including successful and failed logins by user and IP address. |
| **Rationale** | Monitor suspicious activity |
| **Restrictions & Risks** | Identify potential security breaches. |
| **Dependencies** | None |
| **Data Formats** | Report Period (date range) |
| **Command Format** | Login attempts report generated. |
| **End Message** | Login Attempts Report |

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| **ID** | **SWC005\_29** |
| **Title** | User Registration CAPTCHA |
| **Requirement** | The system shall implement a CAPTCHA challenge during user registration to prevent automated bot registrations. |
| **Rationale** | Mitigate spam and bot activity |
| **Restrictions & Risks** | May slightly inconvenience legitimate users. |
| **Dependencies** | None |
| **Data Formats** | None |
| **Command Format** | CAPTCHA challenge displayed. |
| **End Message** | User Registration CAPTCHA |

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| **ID** | **SWC005\_30** |
| **Title** | User Self-Service Password Reset |
| **Requirement** | The system shall allow users to initiate password reset without requiring administrator intervention. |
| **Rationale** | Convenient password recovery |
| **Restrictions & Risks** | Requires valid email address or security questions. |
| **Dependencies** | SWC001\_03 (Password Reset) |
| **Data Formats** | None |
| **Command Format** | Password reset instructions sent to your email. |
| **End Message** | User Self-Service Password Reset |

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| **ID** | **SWC005\_31** |
| **Title** | Accessible Login Interface |
| **Requirement** | The system shall ensure the login interface is accessible to users with disabilities, adhering to WCAG guidelines. |
| **Rationale** | Inclusive user experience |
| **Restrictions & Risks** | Supports assistive technologies. |
| **Dependencies** | None |
| **Data Formats** | None |
| **Command Format** | N/A (Accessibility implemented) |
| **End Message** | Accessible Login Interface |

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| **ID** | **SWC005\_32** |
| **Title** | Multi-Language Support (Optional) |
| **Requirement** | The system shall offer an option to switch the user interface language. |
| **Rationale** | Cater to a global audience |
| **Restrictions & Risks** | Requires translation resources. |
| **Dependencies** | None |
| **Data Formats** | Language (string) |
| **Command Format** | User interface language changed to [Language]. |
| **End Message** | Multi-Language Support (Optional) |

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| **ID** | **SWC005\_33** |
| **Title** | Password Visibility Toggle |
| **Requirement** | The system shall provide an option to toggle password visibility during login and password changes. |
| **Rationale** | User convenience and security |
| **Restrictions & Risks** | Users can choose between masked and plain text passwords. |
| **Dependencies** | None |
| **Data Formats** | None |
| **Command Format** | Password visibility toggle displayed. |
| **End Message** | Password Visibility Toggle |

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| **ID** | **SWC005\_34** |
| **Title** | Informative Error Messages |
| **Requirement** | The system shall display clear and informative error messages during login attempts, registration, and other user actions. |
| **Rationale** | Guide users towards resolving issues |
| **Restrictions & Risks** | Messages should be specific and actionable. |
| **Dependencies** | None |
| **Data Formats** | Error Code (string) |
| **Command Format** | Error message displayed (e.g., "Invalid username or password"). |
| **End Message** | Informative Error Messages |

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| **ID** | **SWC005\_35** |
| **Title** | Account Lockout Notification |
| **Requirement** | The system shall notify users when their account is locked due to failed login attempts. |
| **Rationale** | Inform users about account status |
| **Restrictions & Risks** | Includes instructions on unlocking their account. |
| **Dependencies** | None |
| **Data Formats** | None |
| **Command Format** | Your account has been locked. Please wait [duration] before retrying. |
| **End Message** | Account Lockout Notification |

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| **ID** | **SWC005\_36** |
| **Title** | Password Reset Confirmation |
| **Requirement** | The system shall send a confirmation email after a successful password reset. |
| **Rationale** | Verify password change and prevent unauthorized access |
| **Restrictions & Risks** | Informs user about the password change. |
| **Dependencies** | None |
| **Data Formats** | Email (string) |
| **Command Format** | Password reset confirmation sent to your email. |
| **End Message** | Password Reset Confirmation |

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| **ID** | **SWC005\_37** |
| **Title** | User Data Export Format |
| **Requirement** | The system shall allow users to choose the format for their exported personal data (e.g., CSV, JSON). |
| **Rationale** | User control over data format |
| **Restrictions & Risks** | Different formats may be useful for different purposes. |
| **Dependencies** | SWC001\_40 (User Data Export) |
| **Data Formats** | Export Format (string) |
| **Command Format** | Data export format selected. |
| **End Message** | User Data Export Format |

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| **ID** | **SWC005\_38** |
| **Title** | Integration with External Authentication Providers |
| **Requirement** | The system shall allow integration with external authentication providers (e.g., LDAP, SAML). |
| **Rationale** | Centralized user management |
| **Restrictions & Risks** | Requires configuration and compatibility with external systems. |
| **Dependencies** | None |
| **Data Formats** | Provider Name (string), Configuration Details (varies) |
| **Command Format** | Integration with [Provider Name] configured successfully. |
| **End Message** | Integration with External Authentication Providers (Optional) |

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| **ID** | **SWC005\_39** |
| **Title** | User Activity Logging Retention Policy |
| **Requirement** | The system shall define a policy for retaining user activity logs, balancing security needs with data storage requirements. |
| **Rationale** | Maintain a balance between security needs and data storage |
| **Restrictions & Risks** | None |
| **Dependencies** | None |
| **Data Formats** | N/A |
| **Command Format** | N/A |
| **End Message** | User Activity Logging Retention Policy |

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| --- | --- |
| **ID** | **SWC005\_40** |
| **Title** | User Login Attempts Throttling |
| **Requirement** | The system shall allow administrators to configure login attempt throttling to limit the number of login attempts per user within a specific timeframe. |
| **Rationale** | Reduce impact of brute-force attacks |
| **Restrictions & Risks** | May inconvenience legitimate users experiencing connectivity issues. |
| **Dependencies** | None |
| **Data Formats** | Throttling Limit (integer), Timeframe (string) |
| **Command Format** | Login attempt throttling settings updated. |
| **End Message** | User Login Attempts Throttling (Optional) |

[FA21-BSE-152]

**Module:** *Database Management*

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| ID | SWC001\_02\_FR01 |
| Title | Store User Information |
| Requirement | The system shall store user information including username, email, and encrypted passwords |
| Rationale | Storing user information is essential for user authentication and personalized user experiences. |
| Restrictions & Risks | Ensure that sensitive user data is securely encrypted to mitigate the risk of data breaches. |
| Dependencies | User registration and authentication modules. |
| Data Format | JSON, encrypted passwords. |
| Command Format | INSERT INTO Users (username, email, password) VALUES (?, ?, ?); |
| End Massage | User information stored successfully. |

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| ID | SWC001\_02\_FR02 |
| Title | Manage Product Catalog |
| Requirement | The system shall provide functionality to manage a catalog of products including adding, updating, and deleting product information. |
| Rationale | A product catalog is essential for e-commerce websites to display available products to users. |
| Restrictions & Risks | Ensure that only authorized users can perform catalog management operations to prevent unauthorized modifications. |
| Dependencies | Product management module. |
| Data Format | JSON, product attributes. |
| Command Format | INSERT INTO Products (name, price, description) VALUES (?, ?, ?); |
| End Massage | Product catalog updated successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR03 |
| Title | Track Order History |
| Requirement | The system shall track order history including order details, status, and delivery information. |
| Rationale | Order history helps users track their purchases and provides insights for business analytics. |
| Restrictions & Risks | Ensure that order history is accessible only to authorized users to maintain data privacy. |
| Dependencies | Order processing module. |
| Data Format | JSON, order details. |
| Command Format | INSERT INTO Orders (user\_id, product\_id, quantity, status) VALUES (?, ?, ?, ?); |
| End Massage | Order history updated successfully. |

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| --- | --- |
| ID | SWC001\_02\_FR04 |
| Title | Implement User Profile Management |
| Requirement | The system shall allow users to update their profile information including name, address, and contact details. |
| Rationale | Users need the ability to manage and update their personal information to ensure accurate communication and shipping details. |
| Restrictions & Risks | Validate user input to prevent malicious data injection or incorrect updates. |
| Dependencies | User authentication module. |
| Data Format | JSON, user profile data |
| Command Format | UPDATE Users SET name = ?, address = ?, contact = ? WHERE user\_id = ?; |
| End Massage | User profile updated successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR05 |
| Title | Support for Product Reviews |
| Requirement | The system shall allow users to submit reviews for products, including ratings and comments. |
| Rationale | Product reviews provide valuable feedback for other users and help in decision-making during purchases. |
| Restrictions & Risks | Implement moderation tools to manage and filter inappropriate or spam reviews. |
| Dependencies | Product details module. |
| Data Format | JSON, review data. |
| Command Format | INSERT INTO ProductReviews (product\_id, user\_id, rating, comment) VALUES (?, ?, ?, ?); |
| End Massage | Product review submitted successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR06 |
| Title | Integration with Payment Gateways |
| Requirement | The system shall integrate with payment gateways for processing online transactions securely. |
| Rationale | Integration with payment gateways allows users to make purchases and complete transactions conveniently. |
| Restrictions & Risks | Ensure compliance with Payment Card Industry Data Security Standard (PCI DSS) for handling sensitive payment information. |
| Dependencies | Payment processing module. |
| Data Format | JSON, transaction details. |
| Command Format | N/A |
| End Massage | Payment processed successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR07 |
| Title | Implement Search Functionality |
| Requirement | The system shall provide users with the ability to search for products based on keywords, categories, and filters. |
| Rationale | Search functionality enhances user experience by enabling quick and efficient product discovery. |
| Restrictions & Risks | Ensure search queries are optimized for performance, especially in large product catalogs. |
| Dependencies | Product catalog module. |
| Data Format | JSON, search query parameters. |
| Command Format | SELECT \* FROM Products WHERE name LIKE '%keyword%' AND category = 'category'; |
| End Massage | Search results retrieved successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR08 |
| Title | Support for Multiple Images per Product |
| Requirement | The system shall allow products to have multiple images associated with them for visual representation. |
| Rationale | Multiple images provide users with a comprehensive view of products, enhancing their purchasing decisions. |
| Restrictions & Risks | Implement image storage solutions capable of handling large volumes of image data. |
| Dependencies | Product details module. |
| Data Format | JSON, image URLs. |
| Command Format | N/A |
| End Massage | Images associated with the product successfully uploaded. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR09 |
| Title | Implement Cart Management |
| Requirement | The system shall provide functionality for users to add, remove, and update items in their shopping cart. |
| Rationale | Cart management allows users to organize their intended purchases before checkout. |
| Restrictions & Risks | Ensure that cart data is persisted and synchronized across user sessions. |
| Dependencies | Product catalog module, user authentication module. |
| Data Format | JSON, cart items. |
| Command Format | N/A |
| End Massage | Cart updated successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR10 |
| Title | Generate Sales Reports |
| Requirement | The system shall generate sales reports based on order data, including total sales, top-selling products, and revenue trends. |
| Rationale | Sales reports provide insights into business performance and help in decision-making and strategic planning. |
| Restrictions & Risks | Ensure that sales data is accurate and up-to-date to facilitate informed analysis. |
| Dependencies | Order history module. |
| Data Format | JSON, sales report data. |
| Command Format | N/A |
| End Massage | Sales report generated successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR11 |
| Title | Implement Wishlist Functionality |
| Requirement | The system shall allow users to create and manage wishlists of products they intend to purchase in the future. |
| Rationale | Wishlists provide users with a way to save and track products they are interested in, promoting engagement and future sales. |
| Restrictions & Risks | Ensure wishlists are accessible only to registered users to maintain privacy and prevent misuse. |
| Dependencies | User authentication module, product catalog module. |
| Data Format | JSON, wishlist items. |
| Command Format | N/A |
| End Massage | Wishlist updated successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR12 |
| Title | Implement Inventory Management |
| Requirement | The system shall track inventory levels for each product and update them based on purchases and restocks. |
| Rationale | Inventory management ensures |
| Restrictions & Risks | Implement mechanisms to handle concurrent updates and prevent inventory discrepancies. |
| Dependencies | Order processing module, product catalog module. |
| Data Format | JSON, inventory data. |
| Command Format | N/A |
| End Massage | Inventory updated successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR13 |
| Title | Provide Data Export Functionality |
| Requirement | The system shall allow administrators to export database data in common formats such as CSV or Excel for analysis and backup purposes. |
| Rationale | Data export functionality enables administrators to perform data analysis, generate reports, and create backups for disaster recovery. |
| Restrictions & Risks | Ensure data export functionality adheres to data privacy regulations and access controls. |
| Dependencies | Administrator access module. |
| Data Format | CSV, Excel. |
| Command Format | N/A |
| End Massage | Data exported successfully. |

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| --- | --- |
| ID | SWC001\_02\_FR14 |
| Title | Implement Product Recommendations |
| Requirement | The system shall provide personalized product recommendations based on user browsing history, purchase behavior, and preferences. |
| Rationale | Product recommendations enhance user engagement, increase sales, and improve overall user experience. |
| Restrictions & Risks | Ensure recommendations are relevant and non-intrusive, respecting user privacy preferences. |
| Dependencies | User activity tracking module, product catalog module. |
| Data Format | : JSON, recommendation data. |
| Command Format | N/A |
| End Massage | Recommendations generated successfully. |

|  |  |
| --- | --- |
| ID | SWC001\_02\_FR15 |
| Title | Enable Localization Support |
| Requirement | The system shall support localization by allowing users to view content in different languages and currencies based on their preferences. |
| Rationale | Localization enhances accessibility and usability for users from diverse linguistic and cultural backgrounds, expanding the target audience. |
| Restrictions & Risks | Ensure accurate translation and currency conversion to provide a seamless user experience across different locales. |
| Dependencies | Localization module, user preferences module. |
| Data Format | JSON, language and currency settings. |
| Command Format | N/A |
| End Massage | Localization settings applied successfully. |

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| ID | SWC001\_02\_FR16 |
| Title | Implement Data Backup and Recovery |
| Requirement | The system shall perform regular backups of the database to ensure data integrity and facilitate recovery in case of system failures or data loss. |
| Rationale | Data backups are essential for mitigating risks associated with hardware failures, software bugs, or accidental data deletion. |
| Restrictions & Risks | Ensure backups are stored securely and can be easily restored when needed. Test backup and recovery procedures regularly. |
| Dependencies | Backup and recovery module. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | Data backup completed successfully. |

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| ID | SWC001\_02\_FR17 |
| Title | Support for Multiple Payment Methods |
| Requirement | The system shall support multiple payment methods such as credit/debit cards, digital wallets, and bank transfers to accommodate diverse user preferences. |
| Rationale | Offering multiple payment options increases convenience for users and improves conversion rates. |
| Restrictions & Risks | Ensure compliance with payment industry standards and regulations for each supported payment method. |
| Dependencies | Payment gateway integration module. |
| Data Format | JSON, payment transaction details. |
| Command Format | N/A |
| End Massage | Payment processed successfully. |

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| ID | SWC001\_02\_FR18 |
| Title | Implement User Permissions and Access Control |
| Requirement | The system shall enforce role-based access control (RBAC) to manage user permissions and restrict access to sensitive data and administrative functions. |
| Rationale | RBAC ensures that users have appropriate access rights based on their roles and responsibilities, enhancing security and data confidentiality. |
| Restrictions & Risks | Regularly review and update user roles and permissions to reflect changes in organizational structure and security policies. |
| Dependencies | User management module, authentication module. |
| Data Format | JSON, user roles and permissions. |
| Command Format | N/A |
| End Massage | Access granted successfully. |

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| ID | SWC001\_02\_FR19 |
| Title | Implement Email Notifications |
| Requirement | The system shall send email notifications to users for order confirmations, shipping updates, account activities, and promotional offers. |
| Rationale | Email notifications keep users informed about important events, encourage engagement, and drive repeat business. |
| Restrictions & Risks | Ensure compliance with email marketing regulations and provide opt-out options for promotional emails. |
| Dependencies | Email notification module, order processing module, user management module. |
| Data Format | JSON, email content and recipients. |
| Command Format | N/A |
| End Massage | Email notification sent successfully. |

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| ID | SWC001\_02\_FR20 |
| Title | Provide API for External Integrations |
| Requirement | The system shall expose APIs (Application Programming Interfaces) to allow integration with external systems such as third-party applications, CRM (Customer Relationship Management) systems, and analytics platforms. |
| Rationale | APIs enable seamless data exchange and interoperability between the system and external services, expanding functionality and facilitating automation. |
| Restrictions & Risks | Implement authentication and authorization mechanisms to control access to APIs and protect sensitive data. |
| Dependencies | API integration module, security module. |
| Data Format | JSON, API endpoints and parameters. |
| Command Format | N/A |
| End Massage | API request processed successfully. |

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| ID | SWC001\_02\_FR21 |
| Title | Implement Abandoned Cart Recovery |
| Requirement | The system shall automatically send reminder emails to users who have abandoned their shopping carts, encouraging them to complete their purchase. |
| Rationale | Abandoned cart recovery helps in recovering potential lost sales by reminding users about their pending purchases. |
| Restrictions & Risks | Ensure that reminder emails are sent at appropriate intervals and do not overwhelm users with excessive notifications. |
| Dependencies | Cart management module, email notification module. |
| Data Format | JSON, abandoned cart data. |
| Command Format | N/A |
| End Massage | Reminder email sent successfully. |

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| ID | SWC001\_02\_FR22 |
| Title | Implement Social Media Integration |
| Requirement | The system shall integrate with popular social media platforms to allow users to share products, reviews, and promotions on their social networks. |
| Rationale | Social media integration facilitates word-of-mouth marketing, increases brand visibility, and drives traffic to the website. |
| Restrictions & Risks | Ensure compliance with social media platform policies and provide options for users to manage sharing preferences. |
| Dependencies | Social media integration module, product details module. |
| Data Format | JSON, shared content data. |
| Command Format | N/A |
| End Massage | Content shared successfully. |

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| ID | WC001\_02\_FR23 |
| Title | Implement Product Bundling and Discounts |
| Requirement | The system shall allow the creation of product bundles and offer discounts for bundled purchases to incentivize users to buy multiple items together. |
| Rationale | Product bundling and discounts encourage upselling, increase average order value, and enhance customer satisfaction. |
| Restrictions & Risks | Ensure that discounts are applied accurately and reflected in the final order total during checkout. |
| Dependencies | Product catalog module, pricing and discounting module. |
| Data Format | JSON, bundled product data. |
| Command Format | N/A |
| End Massage | Bundle created successfully. |

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| ID | SWC001\_02\_FR24 |
| Title | Implement Guest Checkout |
| Requirement | The system shall allow users to complete purchases without creating an account by providing guest checkout functionality. |
| Rationale | Guest checkout reduces friction in the purchasing process, improves conversion rates, and caters to users who prefer not to register. |
| Restrictions & Risks | Collect only essential information from guest users to streamline the checkout process and maintain data privacy. |
| Dependencies | Checkout module, order processing module. |
| Data Format | JSON, guest checkout data. |
| Command Format | N/A |
| End Massage | Guest checkout completed successfully. |

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| ID | SWC001\_02\_FR25 |
| Title | Implement Product Availability Notifications |
| Requirement | The system shall allow users to subscribe to product availability notifications to receive alerts when out-of-stock items are back in stock. |
| Rationale | Product availability notifications help users stay informed about restocks, reduce frustration, and improve user experience. |
| Restrictions & Risks | Ensure that notification emails are sent promptly when products become available again to prevent users from seeking alternatives elsewhere. |
| Dependencies | Product catalog module, email notification module. |
| Data Format | JSON, notification subscription data. |
| Command Format | N/A |
| End Massage | Notification subscription created successfully. |

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| ID | SWC001\_02\_FR26 |
| Title | Implement Product Comparison |
| Requirement | The system shall provide functionality for users to compare multiple products side by side, displaying key attributes and features for easy comparison. |
| Rationale | Product comparison helps users make informed purchasing decisions by evaluating the differences and similarities between products. |
| Restrictions & Risks | Ensure that product attributes are accurately displayed for comparison and that the comparison feature is user-friendly. |
| Dependencies | Product details module, user interface module. |
| Data Format | JSON, comparison data. |
| Command Format | N/A |
| End Massage | Products compared successfully. |

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| ID | SWC001\_02\_FR27 |
| Title | Implement Gift Cards and Vouchers |
| Requirement | The system shall support the purchase and redemption of gift cards and vouchers, allowing users to gift store credit or apply discounts to their purchases. |
| Rationale | Gift cards and vouchers are popular promotional tools that increase sales, attract new customers, and encourage repeat purchases. |
| Restrictions & Risks | Ensure that gift cards and vouchers are securely generated, validated, and redeemed to prevent fraud and abuse. |
| Dependencies | Payment processing module, order processing module. |
| Data Format | JSON, gift card/voucher details. |
| Command Format | N/A |
| End Massage | Gift card/voucher redeemed successfully. |

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| ID | SWC001\_02\_FR28 |
| Title | Implement User Reviews Moderation |
| Requirement | The system shall provide moderation tools for administrators to review, approve, edit, or delete user-submitted product reviews to maintain quality and integrity. |
| Rationale | User reviews moderation ensures that only relevant and appropriate content is displayed to users, improving trust and credibility. |
| Restrictions & Risks | Implement clear guidelines and criteria for moderating reviews and ensure transparency in the moderation process. |
| Dependencies | User reviews module, administrator access module. |
| Data Format | JSON, review moderation actions. |
| Command Format | N/A |
| End Massage | Review moderated successfully. |

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| ID | SWC001\_02\_FR29 |
| Title | Implement Product Filtering and Sorting |
| Requirement | The system shall allow users to filter and sort product listings based on various criteria such as price, popularity, ratings, and categories. |
| Rationale | Product filtering and sorting enhance user experience by enabling users to quickly find relevant products and make informed decisions. |
| Restrictions & Risks | Ensure that filtering and sorting options are intuitive, responsive, and accurately reflect product attributes. |
| Dependencies | Product catalog module, user interface module. |
| Data Format | JSON, filter and sort parameters. |
| Command Format | N/A |
| End Massage | Products filtered and sorted successfully. |

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| ID | SWC001\_02\_FR30 |
| Title | Implement Order Tracking |
| Requirement | The system shall provide functionality for users to track the status and delivery progress of their orders in real-time, including shipment tracking information. |
| Rationale | Order tracking enhances transparency and trust by keeping users informed about the status of their purchases and estimated delivery dates. |
| Restrictions & Risks | : Integrate with shipping carriers' APIs to retrieve and display accurate tracking information and ensure a seamless tracking experience. |
| Dependencies | Order processing module, shipping integration module. |
| Data Format | JSON, order tracking details. |
| Command Format | N/A |
| End Massage | Order tracking information retrieved successfully. |

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| --- | --- |
| ID | SWC001\_02\_FR31 |
| Title | Implement Discount Coupons |
| Requirement | The system shall support the creation and application of discount coupons, allowing users to redeem discounts during checkout. |
| Rationale | Discount coupons are effective marketing tools for attracting customers, increasing sales, and promoting customer loyalty. |
| Restrictions & Risks | Ensure that discount coupons are generated securely and are validated accurately to prevent misuse and fraud. |
| Dependencies | Pricing and discounting module, checkout module. |
| Data Format | : JSON, discount coupon details. |
| Command Format | N/A |
| End Massage | Discount coupon applied successfully. |

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| ID | SWC001\_02\_FR32 |
| Title | Implement Return and Refund Processing |
| Requirement | The system shall facilitate return and refund processing for users, allowing them to initiate returns, track return status, and receive refunds for eligible products. |
| Rationale | Return and refund processing enhances customer satisfaction by providing a hassle-free resolution process for product-related issues. |
| Restrictions & Risks | Define clear return and refund policies, ensure timely processing of returns, and maintain accurate records of return transactions. |
| Dependencies | Order processing module, refund management module. |
| Data Format | JSON, return and refund requests. |
| Command Format | N/A |
| End Massage | Return and refund processed successfully. |

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| ID | SWC001\_02\_FR33 |
| Title | Implement Product Availability Alerts |
| Requirement | The system shall allow users to subscribe to product availability alerts to receive notifications when out-of-stock items are back in stock. |
| Rationale | Product availability alerts notify users when desired items become available again, reducing missed sales opportunities and enhancing user experience. |
| Restrictions & Risks | Ensure that availability alerts are sent promptly and that users can easily manage their subscription preferences. |
| Dependencies | Product catalog module, notification management module. |
| Data Format | JSON, availability alert subscriptions. |
| Command Format | N/A |
| End Massage | Availability alert subscription created successfully. |

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| ID | SWC001\_02\_FR34 |
| Title | Implement One-Click Purchasing |
| Requirement | The system shall provide one-click purchasing functionality for logged-in users, allowing them to complete purchases with a single click without re-entering payment and shipping information. |
| Rationale | One-click purchasing streamlines the checkout process, reduces friction, and improves conversion rates by simplifying the buying experience. |
| Restrictions & Risks | Ensure that one-click purchasing is secure, requires user consent, and adheres to applicable privacy and data protection regulations. |
| Dependencies | User authentication module, checkout module. |
| Data Format | JSON, purchase transaction details. |
| Command Format | N/A |
| End Massage | Purchase completed successfully. |

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| ID | SWC001\_02\_FR35 |
| Title | Implement Product Recommendations Based on Collaborative Filtering. |
| Requirement | The system shall provide personalized product recommendations to users based on collaborative filtering algorithms, analyzing user behavior and preferences to suggest relevant products. |
| Rationale | Collaborative filtering recommendations enhance user engagement and satisfaction by offering personalized product suggestions tailored to individual preferences. |
| Restrictions & Risks | Ensure that collaborative filtering algorithms are accurate, transparent, and respect user privacy preferences. |
| Dependencies | User activity tracking module, recommendation engine module. |
| Data Format | JSON, recommendation data. |
| Command Format | N/A |
| End Massage | Recommendations generated successfully. |

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| ID | SWC001\_02\_FR36 |
| Title | Implement Subscription Management |
| Requirement | The system shall allow users to subscribe to newsletters, product updates, and promotional offers, and manage their subscription preferences. |
| Rationale | Subscription management enables users to stay informed about relevant updates and promotions, fostering engagement and loyalty. |
| Restrictions & Risks | Ensure compliance with email marketing regulations, provide clear opt-in and opt-out options, and respect user preferences for communication frequency. |
| Dependencies | User management module, email notification module. |
| Data Format | JSON, subscription preferences. |
| Command Format | N/A |
| End Massage | Subscription preferences updated successfully. |

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| ID | SWC001\_02\_FR37 |
| Title | Implement Customizable Product Options |
| Requirement | The system shall support customizable product options such as size, color, and configuration, allowing users to select and customize products according to their preferences. |
| Rationale | Customizable product options cater to diverse user preferences and increase product personalization, leading to higher customer satisfaction and conversion rates. |
| Restrictions & Risks | : Ensure that customizable options are accurately represented, and user selections are validated to prevent errors during order processing. |
| Dependencies | Product catalog module, user interface module. |
| Data Format | JSON, customizable product options. |
| Command Format | N/A |
| End Massage | Product options selected successfully. |

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| ID | SWC001\_02\_FR38 |
| Title | Implement Express Checkout |
| Requirement | The system shall offer an express checkout option for returning users, allowing them to complete purchases quickly by bypassing the cart and entering minimal information. |
| Rationale | Express checkout streamlines the purchasing process, reduces cart abandonment rates, and improves user experience for returning customers. |
| Restrictions & Risks | Ensure that express checkout is secure, requires user consent, and adheres to privacy and data protection regulations. |
| Dependencies | User authentication module, checkout module. |
| Data Format | JSON, purchase transaction details. |
| Command Format | N/A |
| End Massage | Express checkout completed successfully. |

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| ID | SWC001\_02\_FR39 |
| Title | Implement Bulk Import/Export of Products |
| Requirement | The system shall provide functionality for administrators to bulk import/export product data using standard file formats such as CSV or Excel. |
| Rationale | Bulk import/export capabilities streamline product management tasks, facilitate data migration, and support efficient catalog management. |
| Restrictions & Risks | Ensure that import/export processes are robust, handle large datasets efficiently, and validate data integrity to prevent errors. |
| Dependencies | Administrator access module, product catalog module. |
| Data Format | CSV, Excel. |
| Command Format | N/A |
| End Massage | Bulk import/export completed successfully. |

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| ID | SWC001\_02\_FR40 |
| Title | Implement Product Ratings and Reviews |
| Requirement | The system shall allow users to rate and review products, providing feedback on product quality, features, and overall satisfaction. |
| Rationale | Product ratings and reviews help other users make informed purchasing decisions, build trust, and improve product discoverability. |
| Restrictions & Risks | Implement moderation tools to manage and filter reviews, prevent spam or abusive content, and ensure review authenticity and credibility. |
| Dependencies | Product catalog module, user interface module. |
| Data Format | JSON, rating and review data. |
| Command Format | N/A |
| End Massage | Rating and review submitted successfully. |

**Non-Functional Requirements**

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| ID | SWC001\_02\_NFR01 |
| Title | Performance |
| Requirement | The system shall handle database queries efficiently, with response times under 500 milliseconds. |
| Rationale | Fast query response times are crucial for providing a responsive user experience. |
| Restrictions & Risks | Optimize database schema and indexes to improve query performance. |
| Dependencies | Database server hardware specifications and network latency. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |

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| ID | SWC001\_02\_NFR02 |
| Title | Scalability |
| Requirement | The system shall be capable of handling a minimum of 1000 concurrent database connections. |
| Rationale | Scalability ensures that the system can accommodate growth in user traffic and data volume. |
| Restrictions & Risks | Implement database connection pooling and vertical scaling strategies to handle increased load. |
| Dependencies | Database server resources and network bandwidth. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |

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| ID | SWC001\_02\_NFR03 |
| Title | Security |
| Requirement | The database system shall enforce role-based access control (RBAC) to restrict access to sensitive data and operations based on user roles and permissions. |
| Rationale | Protecting data confidentiality and integrity is paramount to prevent unauthorized access, data breaches, and malicious activities. |
| Restrictions & Risks | Implement encryption for sensitive data at rest and in transit, enforce strong password policies, and regularly audit user access permissions. |
| Dependencies | Authentication and authorization mechanisms, encryption algorithms. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |

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| ID | SWC001\_02\_NFR04 |
| Title | Reliability |
| Requirement | The database system shall maintain a minimum uptime of 99.9% to ensure continuous availability and reliability of data access. |
| Rationale | High availability and reliability are critical for minimizing downtime, ensuring business continuity, and maintaining user trust. |
| Restrictions & Risks | Implement failover mechanisms, automated backups, and disaster recovery strategies to mitigate risks of data loss and service interruptions. |
| Dependencies | : Redundant hardware infrastructure, backup and recovery procedures. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |

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| ID | SWC001\_02\_NFR05 |
| Title | Compliance |
| Requirement | The database system shall comply with relevant data protection regulations and industry standards, such as GDPR, HIPAA, or PCI DSS, depending on the nature of data stored. |
| Rationale | Compliance with regulatory requirements and industry standards is essential to protect user privacy, prevent legal liabilities, and maintain business credibility. |
| Restrictions & Risks | Regularly audit and validate compliance with applicable regulations, implement data anonymization and pseudonymization techniques where necessary, and maintain documentation of compliance measures. |
| Dependencies | Legal and regulatory frameworks, compliance audits. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |

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| --- | --- |
| ID | SWC001\_02\_NFR06 |
| Title | Data Integrity |
| Requirement | The database system shall ensure data integrity by implementing mechanisms such as constraints, foreign key relationships, and transactions to maintain consistency and accuracy of data. |
| Rationale | Data integrity guarantees that the data stored in the database is accurate, valid, and reliable, preventing data corruption and ensuring data quality. |
| Restrictions & Risks | Enforce referential integrity constraints, use transactions for atomicity and consistency, and regularly perform data validation and cleansing processes. |
| Dependencies | Database schema design, transaction management. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |

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| ID | SWC001\_02\_NFR07 |
| Title | Disaster Recovery |
| Requirement | The database system shall have robust disaster recovery mechanisms in place, including regular backups, off-site storage, and recovery procedures, to minimize data loss and downtime in the event of disasters or system failures. |
| Rationale | Disaster recovery ensures business continuity and minimizes the impact of unexpected events such as hardware failures, natural disasters, or cyberattacks. |
| Restrictions & Risks | Implement automated backup routines, conduct periodic disaster recovery drills, and ensure that recovery procedures are documented, tested, and updated regularly. |
| Dependencies | Backup and recovery procedures, off-site storage infrastructure. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |

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| ID | SWC001\_02\_NFR10 |
| Title | Documentation |
| Requirement | The database system shall be well-documented, providing comprehensive documentation covering system architecture, data models, schemas, APIs, configuration settings, and maintenance procedures. |
| Rationale | Documentation facilitates system understanding, onboarding of new personnel, troubleshooting, and maintenance tasks, contributing to efficient system management and support. |
| Restrictions & Risks | Maintain up-to-date documentation, organize information logically, and provide clear explanations, examples, and usage guidelines to facilitate comprehension and usability. |
| Dependencies | Documentation tools, version control systems. |
| Data Format | N/A |
| Command Format | N/A |
| End Massage | N/A |