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Documentation: Non-Functional Requirements

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# 1. NON-FUNCTIONAL REQUIREMENTS

According to AltexSoft (2023), non-functional requirements are used to describe how an application works that primarily focuses on user expectations. Furthermore, they aim to define product properties and are desirable to implement, but are not mandatory (AltexSoft, 2023).

* Performance

AltexSoft (2023) defines performance as the speed in which a software system or its components can respond to certain users’ actions under a given workload. OpenAI (2024) and AltexSoft (2023) have assisted in determining some of the following requirements.

Requirements:

* All pages and all functionality within the application must have a maximum response time of 7 seconds across all browsers for up to 5000 concurrent users, across any type of internet connection (AltexSoft, 2023).
* The application must be able to handle at least 100 concurrent transactions per second (OpenAI, 2024).
* The application should automatically re-fetch data from the database to refresh any stale cached data at least once every 5 minutes to ensure that the user has the most recent up to date information. This functionality should be changed to refresh stale data at least once every 2 minutes to accommodate high concurrent users and transactions.
* The application should time out a user if they have been inactive for more than 15 minutes to reduce unnecessary bandwidth consumption.
* During peak load, the application should not use more than 70% of its CPU and RAM (OpenAI, 2024).
* The system should offer seamless and responsive user interactions, with short loading times and delays (OpenAI, 2024).
* Scalability

According to AltexSoft (2023), scalability is the system’s ability to handle the growth and expansion of both data volume and user load. OpenAI (2024) and AltexSoft (2023) have assisted in determining some of the following requirements.

Requirements:

* The application must scale to support 5000 concurrent users while retaining optimal performance (AltexSoft, 2023).
* The program must scale to handle a tenfold increase in transaction volumes and data storage over a 2-year period (AltexSoft, 2023).
* To optimise performance and cost effectiveness, the application should dynamically scale resources up and down in response to demand (OpenAI, 2024).
* As the user base expands, the application should facilitate horizontal scaling, enabling the installation of new nodes to share the load and enhance capacity (OpenAI, 2024).
* The application should be able to autonomously scale resources depending on predetermined thresholds or metrics (OpenAI, 2024).
* The application should implement session management mechanisms that enable load balancing and failover while preserving user sessions (OpenAI, 2024).
* The application should utilise its cloud scalability features such as auto-scaling and on-demand resources (OpenAI, 2024).
* Reliability

According to AltexSoft (2023), reliability is the likelihood that a system or one of its parts would function as intended for a specific amount of time and under specified circumstances. OpenAI (2024) and AltexSoft (2023) have assisted in determining some of the following requirements.

Requirements:

* During a month, the application must function flawlessly in 95 percent of all use scenarios (AltexSoft, 2023).
* All functionalities should be processed with 100% accuracy, and the system must always ensure data integrity (AltexSoft, 2023).
* The application must be capable of handling and recovering from failures without causing data loss or inaccurate data processing (AltexSoft, 2023).
* The critical components of the application must have redundant backups that will enable continuous operation if failures were to occur (OpenAI, 2024).
* Data and configuration backups should be performed on a regular basis, and a solid recovery strategy should be in place to restore the system if data loss occurs (OpenAI, 2024).
* Even if a component fails, the application should continue to work and offer vital functions (OpenAI, 2024).
* The application’s Mean Time to Recovery (MTTR) for restoring service after a failure should be less than 1 hour (OpenAI, 2024).
* Before a critical failure happens, the application’s Mean Time Between Failures (MTBF) should be at least 10,000 hours (OpenAI, 2024).
* Maintainability

AltexSoft (2023) defines maintainability as the time needed for a solution or its components to be fixed or updated. OpenAI (2024) and AltexSoft (2023) have assisted in determining some of the following requirements.

Requirements:

* After a system failure, the mean time to restore the system (MTTRS), including delay time and corrective repair time, cannot be longer than 1 hour (AltexSoft, 2023).
* The application should be modular, consisting of clear and well-defined components that are easily modified or replaced without interfering other system components (OpenAI, 2024).
* To assist in understanding and maintaining the system, comprehensive documentation should be created, providing thorough code comments, system architecture diagrams, and user manuals (OpenAI, 2024).
* To guarantee consistency and readability of the codebase and to make it easier to maintain, coding standards should be adhered to, and best practices should be enforced (OpenAI, 2024).
* Version control systems must be utilized to track changes, collaborate on code, and roll back to earlier versions if the need arises (OpenAI, 2024).
* Code complexity should be limited to ensure better readability, understandability, debugging, and modification (OpenAI, 2024).
* Automated tests should be implemented to facilitate regression testing and to prevent the introduction of new bugs or issues when any code changes (OpenAI, 2024).
* Dependencies should be managed to avoid version conflicts whilst providing a simple manner to update or integrate external libraries and frameworks (OpenAI, 2024).
* Security

AltexSoft (2023) states that the non-functional requirements of security are used to establish specific threats that will be addressed and elaborated on by the functional requirements of security. AltexSoft (2018), AltexSoft (2023), and AltexSoft (2024) have assisted in determining some of the following requirements.

Requirements:

* The application must include authentication, authorization, and role-based access control (RBAC) to prevent unauthorized access to the application and its functionality.
* The application must incorporate encryption to protect its at rest and in transit data. Additionally, encryption standards such as ISO must be followed (AltexSoft, 2023).
* The application should implement audit logging to monitor what is happening within the application (AltexSoft, 2018).
* The application must implement session management and an active timeout session controller to better reduce and secure the available number of active sessions that attackers can potentially take control of.
* Vulnerability management principles and tools must be incorporated to assess the vulnerabilities that might occur in the application to ensure that the system is fault proof and is regularly kept up to date from new attacks (AltexSoft, 2024).
* The system must include input validation and sanitization to ensure that all data input into the application is valid, authentic, and reliable.
* Advanced defensive programming and error handling procedures should be implemented to avoid any erroneous data from entering the application.
* Usability

AltexSoft (2023) simplifies the definition of usability to being all about user-friendliness, ensuring the applications user interface is intuitive and easy to navigate, with the applications features being easy to find and understandable whilst meeting the user’s needs. OpenAI (2024) and AltexSoft (2023) have assisted in determining some of the following requirements.

Requirements:

* According to AltexSoft (2023) and OpenAI (2024), the application must have design that is consistent, pleasant to use, easy to learn and intuitive.
* The application must provide a simple and easy way to quickly reach their desired features of the application (AltexSoft, 2023).
* The application must provide clear and consistent instructions at all times to prevent users from making mistakes within the application (AltexSoft, 2023).
* The application must provide clear and consistent instructions and error handling when users make a mistake within the application, to ensure that they know what to do within the application (AltexSoft, 2023).
* Usability testing should be conducted to assess user experience, quantify usability, and ensure that the application satisfies the desired usability requirements (AltexSoft, 2023).
* The application should enable complete activities quickly and with the fewest possible steps or interactions (OpenAI, 2024).
* The application should provide regular feedback to the user for their actions in the form of alerts, progress indicators, and success or error messages (OpenAI, 2024).
* The application should provide strong search capabilities to enable users to quickly locate relevant information within the system (OpenAI, 2024).
* The application’s design must be responsive and accommodated for all devices, allowing all users on any device to use the application (OpenAI, 2024).
* The application must be accessible to users with disabilities and should adhere to accessibility guidelines (OpenAI, 2024).
* Interoperability

AWS (n.d.) defines interoperability as the ability of applications and systems to be able to securely and automatically exchange data irrespective of geographical, political, or organizational boundaries. Also, according to AltexSoft (2023), compatibility additionally contributes to the definition of how interoperable the system is. AltexSoft (2023) has assisted in determining some of the following requirements.

Requirements:

* There must be an API that will enable communication between the application and its database as they may be hosted on different platforms.
* The application does not have to expose the API to the public as it will not be necessary for any other application or software to consume the applications data.
* As the application will be developed for the web, it must be compatible with all internet browsers, and it must have a responsive design so that any device can use the application (AltexSoft, 2023).
* Internationalisation / Localisation

Wilcock and O’Brien (2024) define internationalisation as designing and developing an application in such a manner that it can support users in different global markets. Moreover, localisation is defined by Wilcock and O'Brien (2024) as modifying or translating an application's localisable resources to satisfy the linguistic, cultural, and political demands of the local markets the app is meant to serve.

Requirements:

* The application does not have to support internationalisation as the application will be developed and used only within the South African context.
* The application must provide support for the South African locale as it will be primary place of usage.

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