Non-Functional requirement example

"For the following requirements–

Requirement ID: REQ002 - Enhance Customer Support Responsiveness

Business Value: Improved customer satisfaction and loyalty through responsive customer support.

Key Outcomes:

* Faster response times to customer inquiries.
* Consistent and accurate information provided by customer support.
* Extended support hours to accommodate customer availability.

Description: The e-commerce system shall enhance customer support responsiveness to address the following customer complaints:

* Slow Response Times: Implement a ticketing system that ensures customer inquiries via email and chat are responded to within [specified time frame].
* Inconsistent Information: Establish a centralized knowledge base accessible to customer support agents.
* Limited Hours of Availability: Extend customer support hours to [specified time frame].

Acceptance Criteria:

* Response times for customer inquiries via email and chat shall not exceed [specified time frame].
* A centralized knowledge base shall be created and accessible to customer support agents.
* Customer support hours shall be extended to [specified time frame].

Requirement ID: REQ003 - Enhance Website Performance and User Experience

Business Value: Increased sales revenue through an improved website that provides a seamless and engaging shopping experience.

Key Outcomes:

* Fast and reliable website performance.
* Improved search and navigation for easy product discovery.
* Streamlined checkout process for increased conversions.
* Enriched product listings with detailed information.
* Stable and user-friendly mobile app.

Description: The e-commerce website shall be optimized for performance and user experience based on the following customer complaints:

* Website Performance: Implement performance optimizations, including caching mechanisms, server response time improvements, and load testing to ensure fast and reliable performance.
* Search and Navigation: Redesign the search and navigation features to improve user-friendliness, including intuitive categorization and an enhanced search algorithm.
* Checkout Process: Streamline the checkout process, addressing issues related to cart management and payment processing.
* Incomplete Product Information: Enrich product listings with detailed specifications, customer reviews, and multimedia content.
* Mobile App Issues: Resolve mobile app crashes and bugs to ensure a seamless shopping experience.

Acceptance Criteria:

* Website performance shall meet the following benchmarks: page load time under [specified time], server response time under [specified time], and minimal downtime.
* The search and navigation redesign shall be tested with user feedback to ensure improved user-friendliness.
* Checkout process enhancements shall result in reduced cart abandonment rates.
* Product listings shall include detailed specifications, customer reviews, and multimedia content.
* Mobile app shall undergo testing to eliminate crashes, bugs, and performance issues.

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Generate a set of non-functional requirements (NFRs) for a software architecture project.

NFRs specify system attributes such as performance, scalability, security, and maintainability. Please adhere to the following rules when creating NFRs:

* Specify at least five distinct non-functional requirements.
* Ensure that the NFRs are measurable and quantifiable.
* Cover a range of system attributes, such as performance, reliability, security, and usability.
* Each NFR should have a clear impact on the overall system architecture.
* Provide clear acceptance criteria for each requirement."

Example Non-Functional Requirement (NFR):

NFR Title: Performance Efficiency

Description: The system shall demonstrate high-performance efficiency to ensure rapid response times and optimal resource utilization, even under peak load conditions.

Acceptance Criteria:

* The system response time for critical user interactions, such as login and data retrieval, shall not exceed 2 seconds under normal operating conditions.
* During peak load conditions, system response time shall remain below 5 seconds for critical user interactions.
* The system shall be capable of handling a minimum of 10,000 concurrent user sessions without performance degradation.
* Resource utilization (CPU, memory, network bandwidth) shall not exceed 70% of system capacity under peak load.
* Load testing results shall demonstrate that the system can sustain a sustained transaction rate of 1000 transactions per minute without performance degradation."

This example demonstrates an NFR related to performance efficiency and includes measurable criteria for acceptance, such as response times and capacity under different conditions. You can create similar NFRs for other system attributes like security, reliability, scalability, and more to guide the software architecture project.

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NFR 1: Performance Efficiency

Description: The system shall demonstrate high-performance efficiency to ensure rapid response times and optimal resource utilization, even under peak load conditions.

Acceptance Criteria:

* The system response time for critical user interactions, such as login and data retrieval, shall not exceed 2 seconds under normal operating conditions.
* During peak load conditions, system response time shall remain below 5 seconds for critical user interactions.
* The system shall be capable of handling a minimum of 10,000 concurrent user sessions without performance degradation.
* Resource utilization (CPU, memory, network bandwidth) shall not exceed 70% of system capacity under peak load.
* Load testing results shall demonstrate that the system can sustain a sustained transaction rate of 1000 transactions per minute without performance degradation.

NFR 2: Security

Description: The system shall ensure robust security measures to protect sensitive user data and prevent unauthorized access.

Acceptance Criteria:

* All data transfers between the client and server shall be encrypted using industry-standard cryptographic protocols.
* User authentication and authorization mechanisms shall be implemented to restrict access to authorized users only.
* Security audits and penetration testing shall be conducted annually to identify and address vulnerabilities.
* The system shall comply with relevant data protection regulations, including GDPR and HIPAA, where applicable.
* Intrusion detection and prevention systems (IDPS) shall be deployed to monitor and mitigate security threats in real-time.

NFR 3: Scalability

Description: The system architecture shall support horizontal and vertical scalability to accommodate future growth and increased user demand.

Acceptance Criteria:

* The system shall be designed to scale horizontally by adding new server instances dynamically to distribute the load.
* Vertical scalability shall be achieved by allowing the system to scale up by upgrading server hardware resources without downtime.
* During load testing, the system shall demonstrate linear scalability, with performance improving as additional resources are added.
* Auto-scaling rules shall be defined to automatically adjust resource allocation based on traffic patterns.
* The system shall support clustering and load balancing to evenly distribute requests among servers.

NFR 4: Reliability

Description: The system shall maintain high reliability, minimizing downtime and data loss.

Acceptance Criteria:

* The system shall have a documented disaster recovery plan, including regular backups and data replication.
* Mean Time Between Failures (MTBF) for critical components shall exceed 10,000 hours.
* Mean Time To Recovery (MTTR) for system failures shall not exceed 4 hours.
* Redundancy shall be implemented for critical system components to ensure failover capabilities.
* Monitoring and alerting systems shall be in place to proactively detect and address system failures.

NFR 5: Usability

Description: The user interface shall prioritize usability to ensure an intuitive and user-friendly experience.

Acceptance Criteria:

* Usability testing shall be conducted with representative user groups to identify and address usability issues.
* The user interface shall adhere to established user experience (UX) design principles.
* Navigation shall be intuitive, with clear and consistent menus, buttons, and labels.
* Accessibility standards, including WCAG compliance, shall be followed to ensure inclusivity.
* User feedback mechanisms shall be incorporated to gather input for ongoing usability improvements.

These NFRs address performance, security, scalability, reliability, and usability aspects, providing measurable criteria for acceptance. They will guide the software architecture project to ensure that these critical attributes are considered and implemented effectively.

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Level 2 for NFR 1: Performance Efficiency:

NFR 1.1: Response Time for Critical User Interactions

Description: The system shall ensure rapid response times for critical user interactions, such as login and data retrieval, to enhance user experience.

Acceptance Criteria:

* The system response time for user login operations shall not exceed 2 seconds under normal operating conditions.
* Data retrieval operations, such as searching for products, shall have a response time of less than 2 seconds under typical usage.
* Response times for critical user interactions shall be monitored continuously, and any deviations from the specified limits shall trigger alerts for immediate investigation and resolution.

NFR 1.2: Peak Load Performance

Description: The system shall maintain efficient performance even under peak load conditions to accommodate high user traffic.

Acceptance Criteria:

* During peak load conditions, the system response time for critical user interactions, including login and data retrieval, shall remain below 5 seconds.
* The system shall undergo load testing to simulate peak traffic scenarios, and performance shall be evaluated against the defined criteria.
* Load testing shall be conducted with a load corresponding to the expected peak concurrent user sessions, ensuring that performance remains within acceptable limits.

NFR 1.3: Concurrent User Handling

Description: The system shall be capable of efficiently handling a large number of concurrent user sessions to support scalability.

Acceptance Criteria:

* The system shall be designed to handle a minimum of 10,000 concurrent user sessions without performance degradation.
* Load testing scenarios shall simulate concurrent user sessions to verify that the system can meet this capacity requirement.
* Scalability mechanisms, such as load balancing and horizontal scaling, shall be in place to distribute user sessions effectively.

NFR 1.4: Resource Utilization

Description: The system shall manage resource utilization, including CPU, memory, and network bandwidth, to ensure optimal performance.

Acceptance Criteria:

* Resource utilization, including CPU usage, memory consumption, and network bandwidth, shall not exceed 70% of system capacity under peak load conditions.
* Continuous monitoring of resource utilization shall be implemented to proactively identify and address resource bottlenecks.
* Resource scaling strategies, such as automatic provisioning of additional resources, shall be employed to maintain resource utilization within acceptable limits.

NFR 1.5: Load Testing Results

Description: Load testing results shall be used to validate the system's performance under heavy loads and sustained transaction rates.

Acceptance Criteria:

* Load testing shall be conducted to validate that the system can sustain a sustained transaction rate of 1000 transactions per minute without performance degradation.
* Load testing reports shall be generated, documenting response times, resource utilization, and system stability under various load scenarios.
* Any performance issues or deviations from the defined criteria identified during load testing shall be addressed and resolved before deployment.

These level 2 requirements provide more detailed specifications for NFR 1: Performance Efficiency, breaking down the performance-related aspects into specific areas for measurement and validation. They ensure that the system's performance is thoroughly tested and meets the defined criteria.