

Non-Functional Requirements Sample

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Introduction

The purpose of this document is to define a template with which to document **Non-Functional Requirements** (NFRs) for a system.

Non-Functional Requirements (NFRs)

NFRs should be aligned to the Seven Pillars of Software Performance and Capacity.

Capacitas's	Seven Pillars o	f Software Perfe	ormance			
Performance isn't just about	t speed					
You can't accurately measure perform That's why we replaced traditional to response time, with our Seven Plans	mance using just a fraction of the informat rating methods that only measure through of Software Performance.	ion available. sput and				
If any pillar fails, performance and en revenue, increased costs, and unhap	id-user experience will suffer, potentially i py customers.	eading to lost				
ð	<u></u>	(@)	1.000	⊟Ø		3%
~4	U		<u> </u>		-0	20
Response Time	Capacity	Efficiency	Scalability	Stability	Resilience	Instrumentation
Definition	Definition	Definition	Definition	Definition	Definition	Definition
Throughput: the rate at which requests are successfully completed Response time. The time taken to	Capacity: the amount of resources required to support demand	Efficiency: the amount of compute resource reguined to complete a business transaction, for example, the	Scalability: this is a measure of whether the software scales linearly with increasing domand and can use	Stability: This is a measure of the variation in response time and throughput over prolonged periods.	Resilience: is how throughput and response time behave when an internal or external interface slows	Instrumentation: Ensuring you have well-monifold tool set that emprove you to test across the other six pills
successfully complete a request Business Rates	Business Relevance	CPU time needed to search for a product in an e-commerce application	all the available capacity.	of load	down or becomes unavailable	Individually, APM Teels are an invaluable source of data, but with the right mix of teels you only arise
Business Relevance	Capacity consumption drives cost of service	Business Belevance	Business Relevance	Business Relevance	Business Relevance	a very namow understanding of sufficiale performance - therefore the
Response time drives conversion	How is it Measured?	Indicant software Increase cost of service	CC Scalatie untwork enables rapid business change	State software reduces sait of ownership and increases customer	President software reduces operational cost and risk of failure during peak periods	Seventh Pillar is vital to your succes
How is it Measured?	The level of infrastructure (an		How is it Measured?			Business Relevance
Web-user experience manifacting tasks APM tasks	 The obligation of that infrastructure 	How is it Measured? • By absenting production or in test conditions	 The key metrics to measure are response time, throughput and utilisation. Measure utilisation, acress the service, e.g. servers, retreask and 	How is it Measured? • The law metrics are response time, throughput and the utilization of the platform that	How is it Measured? The key metrics are response times and throughput of software components which do not directly call interfaces	Good instrumentation promotes agite change are reduces the risk of service instage
Batch maniforing basis	APM tools deliver great insight					

The following table is a template example of a NFR definition. The list is not intended to be exhaustive, rather to provide an example from which the reader can build their own definition for their system.

Note there is a separate column for Production (live) and Test. We do this because we often have to performance test in environments which are of a lower scale compared to production. In this case, we use modelling techniques to transpose a production NFR to a test NFR.

NFR Type	NFR Category	NFR in Production	NFR in Test
Performance	Peak Business throughput	5 widgets per second	2.5 widgets per second ^[1]
Performance	Peak Business concurrency	10,000 users	5,000 users
Performance	Server-side Response Time	less than 1.5 seconds, 95% of the time ^[2]	less than 1.5 seconds, 95% of the time
Performance	Client-side Response Time	The Time to Interact should be less than 2.0 seconds, 95% of the time ^[3]	The Time to Interact should be less than 2.0 seconds, 95% of the time
Capacity	Database server CPU capacity	The server should be loaded up to 90% utilisation without any degradation in response time ^[4]	The server should be loaded up to 70% utilisation without any degradation in response time
Efficiency	System Capacity	Page size must be less than 1MB ^[5]	Page size must be less than 1MB
Efficiency	AWS Cloud Compute ^[6]	The time to process any web server request should consume no more than 100ms of CPU time on an AWS t2.medium instance	The time to process any web server request should con- sume no more than 100ms of CPU time on a AWS t2.medi- um instance
Scalability	Scalable Efficiency	Average web Service CPU time should not vary by more than 20%	Average web CPU service times ^[7] for different load stages should not vary by more than 20%
Scalability	Scalable Performance	Hourly average booking funnel response time should not vary by more than 20%	Average booking funnel response time at different load stages should not vary by more than 20%

[1] Detailed work required to understand scaling differences between Production and Test

[2] Data source APM tools or application log files

[3] Can be expanded to look at different client contexts, e.g. browser types or mobile vs. desktop

[4] Dependent on the server hardware architecture and number of CPU cores configured

- [5] Consideration should be given to caching strategies in use, e.g. content delivery networks
- [6] The reason for this NFR is ensure cost optimisation in the cloud
- [7] The CPU time expended to process a single transaction

NFR Type	NFR Category	NFR in Production	NFR in Test
Stability	Stable Efficiency Inter-day	Average memory usage for the second day should be less than 10% higher than the first day	Average memory utilisation for the last hour of the soak test should be less than 10% higher than the first hour
Stability	Stable Performance Inter-day	Average response times for the second day should be less than 10% higher than the first day	Average response times for the last hour of the test should be less than 10% higher than the first hour
Stability	Stable Performance Intra-day	Within a working day, the coefficient of variation for response time should be no more than 15%	During a load test, the coeffi- cient of variation for response time should be no more than 15%
Resilience	Return to stability	All servers should recover previous levels of load after a restart within 2 minutes	All servers should recover previous levels of load after a restart within 2 minutes
Resilience	Continue on fail	No user errors should occur on failure of a batch process	No user errors should occur on failure of a batch process
Resilience	Not affected by external system ^[8]	Performance NFRs hold when 3 rd party response times increase to 2 seconds	Performance NFRs hold when stub response times increase to 2 seconds
Resilience	Not affected by exceptions	Performance NFRs hold when 3 rd party fails	Performance NFRs hold when stub fails
Instrumentation	Measurement ^[9]	All measurements described above should be monitored and recorded in a database at collection intervals up to 1-minute	All measurements described above should be monitored and recorded in a database at collection intervals up to 1-minute
Instrumentation	Retention	Measurements recorded on the defined peak days should be retained for 5-years	Measurements recorded on valid test runs should be retained for 2-years

[8] This NFR is particularly important in loosely coupled systems, e.g. systems based on a microservices architectures

[9] Should be expanded out to include additional performance metrics from server operating system, network and application



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