Experiment 9

Mapping of non-functional components with system requirements.

37_BE-COMP-B_Mihir-Gharat

Learning Objective: Student should be able to understand Mapping of non-functionalcomponents with system requirements.

Theory:

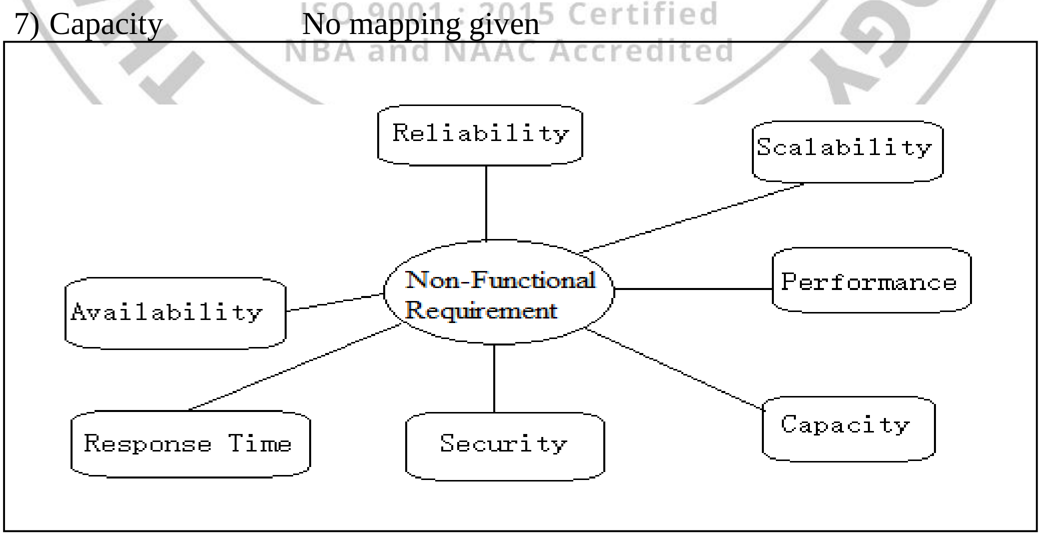
What is Non-Functional Requirement?

NON-FUNCTIONAL REQUIREMENT (NFR) specifies the quality attribute of a softwaresystem. They judge the software system based on Responsiveness, Usability, Security, Portability and other non-functional standards that are critical to the success of the software system.

NFRs define the system properties and specify the behavioral pattern under various operating conditions. The various estimation methods help in sizing the application based on the functionalrequirements. However, most of these methods have overlooked the influence of non-functional requirements.

The key NFRs that can be attributed to an application and their mapping as follows.

1) Reliability	Operation Ease
2) Response Time	No mapping given
3) Performance	Performance, Online Update, Online Date Entry
4) Security	No mapping given
5) Availability	No mapping given
6) Scalability	Transaction rate
7) Capacity	No mapping given



Middleware is a more effective program that acts as bridge in between various applications and other databases otherwise tools. It is placed in between operating system and other applications which run on it. Middleware allows making better communication, application services, messaging, authentication, API management and management of data between different kinds ofapplications which help to exchange data. The connectors sit between the two APIs or you can say and the ends of the connectors are APIs.The connectors receive data from one app/solution and process it to make it understandable and accessible in the other app/solution, regardless of whether any direct form of integration was available in the two apps.

Mapping of NFRs:

Operation Ease to Reliability:

An application or the software system once installed and configured on a given platform should require no manual intervention, except for starting and shutting down. The system should be ableto maintain a specified level of performance in case of software faults. It should also be able to re-establish its level of performance and to recover all the data directly affected in case of a failure in the minimum time and effort. This is mapped on to the reliability NFR. It may be defined as “a system which is capable of reestablishing its level of performance and recovering the data directly affected in case of a failure and on the time and effort needed for it. The design criteria for reliability can be defined as self-contained the system should have all the features necessary for all its operations including recovering it by itself; completeness- it should be complete in itself and not dependent on anything else; robustness/integrity- it should not easily breakdown; error tolerance- it should be able to tolerate errors and rectify them and continue in its operation. There are “numerous metrics for determining reliability: mean time to failure, defect reports and counts, resource consumption, stability, uptime percentage and even customer perception.”

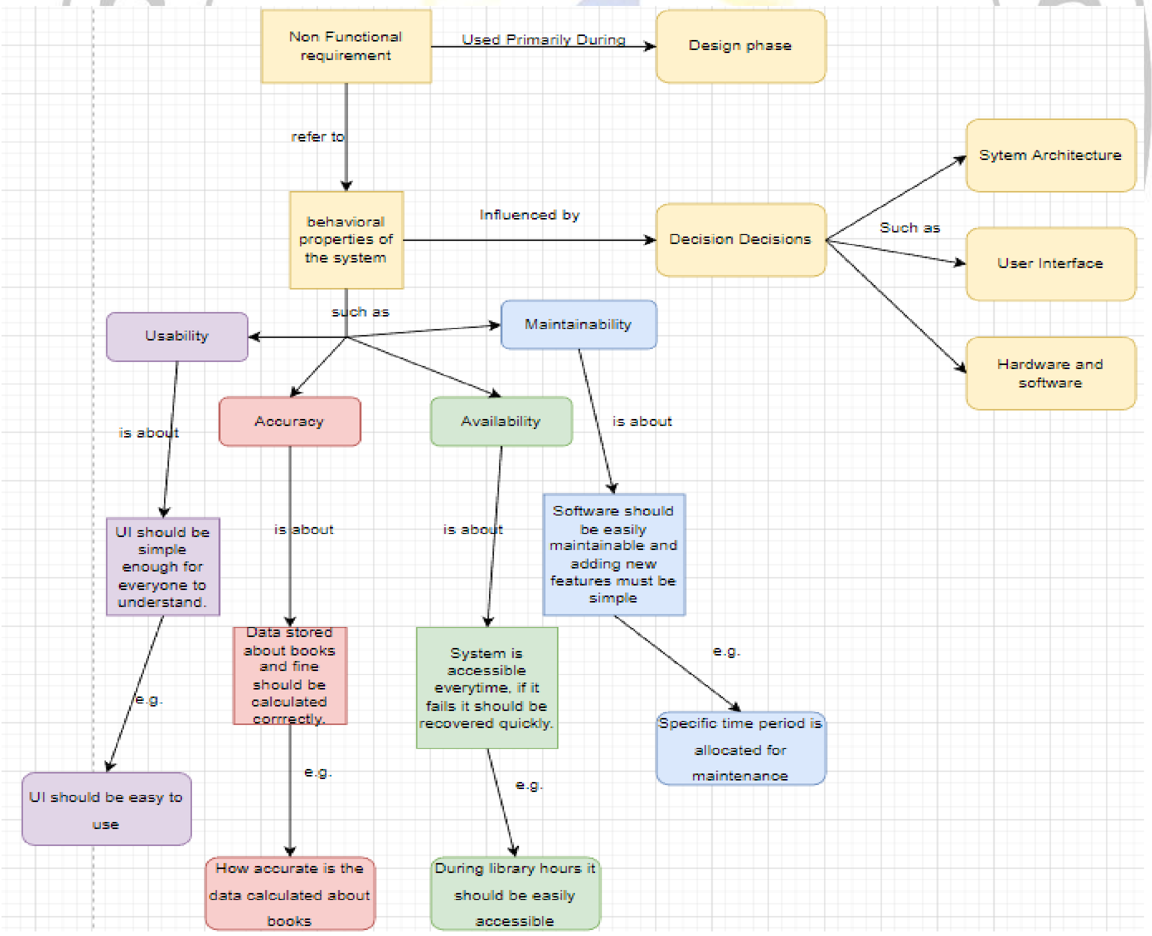
Performance:

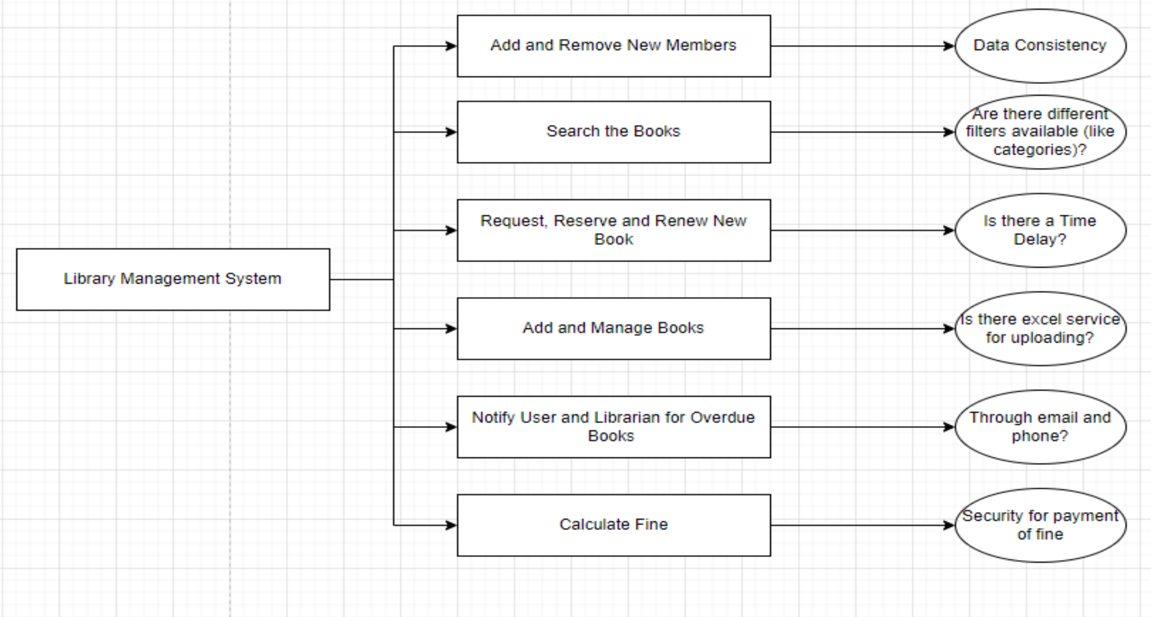
Real time systems have strict performance parameters like performing at the same level even during peak user times, producing high throughput, serving a huge user base, etc. The DI varies from no special performance requirements to response time being critical during all business hours and till performance analysis tools being used in the design. System should meet the desired performance expectation. Also, if online update has to take place, then the performance expectations to be met are very high – fast response, low processing time and high throughput rates. The performance NFR is also based on the Online Data Entry requirements of an application. The present-day trend is to have interactive and real-time data entry. The GUI development requires a lot of effort as help has to be provided, validation to be implemented, reference information for faster data entry operations, etc. Performance when related to this can be defined as “attributes of software that bear on response and processing times and on throughput rates in performing its function.

Transaction Rate to Scalability:

In many business applications the transaction rate increases to high peak levels once in a day or once in a week with the requirement remaining so that there has to be no dramatic increase in transaction time. This issue has to be looked into in the design, development and/or installation phases of a project. This GSC is mapped on to the scalability NFR. The term scalability implies "the ability to scale up to peak transaction loads. In order to achieve this the application has to bedesigned in such a way so that it should cater to the highest possible figures thus wasting resources when the transaction rate is low. The architecture should be designed in a multi-layered manner in complex algorithm-based applications to scale up to peak transaction rates. In today's systems, this GSC does not contribute much to the DI as present-day hardware and operating systems provide built-in features such as high bandwidth network, high speed storage disks with high-speed disk access timings and CPUs with high MHZ processing speed which when combined leads to build in high transaction rates.

OUTPUT:


Non Functional requirement
Used Primarily During
Design phase
refer to
behavioral properties of the system
Influenced by
Decision Decisions
Such as
Sytem Architecture
User Interface
Hardware and software
such as
Usability
Maintainability
Accuracy
Availability
is about
is about
is about
is about
UI should be simple enough for everyone to understand.
Data stored about books and fine should be calculated correctly.
System is accessible everytime, if it fails it should be recovered quickly.
Software should be easily maintainable and adding new features must be simple
e.g.
e.g.
e.g.
e.g.
UI should be easy to use
How accurate is the data calculated about books
During library hours it should be easily accessible
Specific time period is allocated for maintenance


Library Management System
Add and Remove New Members
Search the Books
Request, Reserve and Renew New Book
Add and Manage Books
Notify User and Librarian for Overdue Books
Calculate Fine
Data Consistency
Are there different filters available (like categories)?
Is there a Time Delay?
Is there excel service for uploading?
Through email and phone?
Security for payment of fine

FR to NFR Map

Result and Discussion:

Learning Outcomes: Students should have been able to

LO1: Define nonfunctional Requirement.

LO2: Identify different component of nonfunctional Requirement.

LO3: Explain mapping.

Course Outcomes: Upon completion of the course students will be able to understand mappingof non-functional components with system requirements.

Conclusion:

Viva Questions:

1. Define nonfunctional Requirement.
2. Explain nonfunctional Requirement component.
3. Explain Transaction Rate to Scalability mapping of NFR.

Correction Parameters	Formative Assessment [40%]	Timely completion of Practical [40%]	Attendance / Learning Attitude [20%]	