Kalafong Provincial
Tertiary Hospital

Gynaecological Patient Information management System:

Architectural Requirements

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Final Version

May 29, 2015

Contents

1   Introduction

This is Arch requirements introducations

2   Critical Architectural Requirements

Description

Scalability is an essential aspect of a system and is the ability of a system to be easily enlarged in order to accommodate a growing amount of work.

Justification

The PIMS should allow for hundreds of concurrent users, as such the system must be able to handle such a number without breaking down or reducing performance.

Mechanism

1. Strategy:

   - Clustering: using more resources by running many instances of the application over a cluster of servers or instances, to ensure system resources are not strained by a high workload.

   - Efficient use of storage: data storage can be efficiently used through compression of the data (reducing data size to make room for more) paging (ensuring that primary storage is used only for more crucial data) as well as de-fragmentation (organizing the data into continuous fragments and free more storage space). by ensuring that no data duplications occur, storage space can be conserved, thus the load on system resources will be reduced.

   - Efficient persistence: through indexing and query optimization, the amount of system power used to persist a database will be reduced, as data retrieval will be quicker and costly queries will be done without, thus also reducing system load. In addition, connections can be grouped and accessed via a central channel in order to aid persistent storage to the database.

   - Load Balancing: by spreading the systems load across time or across resources the load on the system can be distributed, therefore no system resource will be heavily strained. In the case that the limit for a server has been reached, a new instance or so will

have to be created in order to handle the number of increasing requests. On the other hand, if the usage of a server is way below the capacity, the number of instances will have to be reduced.

- Caching: to ensure no duplication or repeated retrieval of frequent objects or queries; a separate module can facilitate caching; thus system resources will not be used up unnecessarily.

2.1 Usability

2.1.1 Description

This ensures that a user will be able to use the system, with ease. The system should provide support to the user.

2.1.2 Justification

Patient information management system is user-oriented. How the users interact with the system is a critical, and this should be done with little to no effort. The system should appear easy to use and should not, at any point, baffle the users.

2.1.3 Mechanism

1. Strategy:

   - A tutorial on how the patient information management system works. A user can be initiated into the system, the first time they use it. Or they can enable the tutorial until they're familiar with the functionality.

   - Enable the user to troubleshoot their problems. Frequently asked questions or frequent problems could assist with this aspect. A user will be provided with predefined help options such that they will not need to contact the system's administrator, for assistance.

   - Provide descriptive headings that make navigation easier. Headings should not be ambiguous. A user should know what to expect when they select a certain heading.

   - Error signals should be displayed to the user, if some user-inflicted error occurs. The necessary steps to rectify this problem must be provided.

   - A user should be able to undo their action, should they be aware of their mistake.

2. Architectural Pattern(s):

- Model-View-Controller: This separates the user interface from the rest of the system (Bass and John). A user should only interact with a simple interface that was designed for them. This is describable for patient information management system because the users don't necessary have an adept understanding of the lower levels of the system.

2.2 Scalability

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2.3   Reliability and Availability

Description

The PIMS should be accessible at almost all times, in particular during the peak operational hours of the hospital. This accessibility will be limited to the hospital network only, so as to ensure no information can be changed without approval.

Justification

The reliability and availability requirements are very important seeing as the information to be kept on the system is highly valuable to the medical staff, as the need up-to-date information concerning the patients they are dealing with (lives could be at risk). With this in mind, only a downtime of less than 2 hours, at most twice a month will be allowed, so as too allow for the medical staff to maximally use the system. A high reliability rate is recommended to ensure that users do not encounter any errors and/or data corruption in their use of the system. The only leeway that will be given for errors, is to have at most one.

Mechanism

1. Strategy:

   - Clustering: using more resources by running many instances of the application over a cluster of servers or instances; therefore if any server should fail, the reliability and availability of the system will not be compromised.

   - For reading from and writing to the database, we will ensure that no parallel updates are possible through enforcing the use of a

single object to stream all database transactions; thus reducing inaccuracy that would be a result of data redundancy.

- Use of more resources: This would heavily reduce system downtime, as a temporary server can be run while the other is maintained.