MSc Programming 2 Group Project

Weighting with unit 40%

Submission date 16.00 Friday 1st May 2015

Problem description

You have been allocated to a software development team which is engaged in designing and developing a Patient Administration System (PAS) for a booking and queuing system for an Accident and Emergency (A&E) department for a hospital. The product is to be developed in response to a product tender from a local Health Trust advertised for such a system. As part of the process all product solutions tendered shall be demonstrated to technical representatives of the Health Trust.

The finished system will enable A&E to perform better and safer management of patients in the department.

You have been allocated the task of implementing the part of the project which handles the booking in and queuing system for incoming patients. You will be required to design, implement and test an effective object-oriented solution.

When a patient arrives at the A&E Department, he/she will be booked into the PAS system and then assessed by an experienced and specially trained triage nurse according to the severity and nature of their medical condition. The triage system in use in the A&E Department helps determine the relative priority of individual patient needs. Emergency patients will be given immediate treatment, while those with non-acute symptoms should expect a longer waiting time.

Capacity of the A&E treatment area in the hospital is currently five treatment rooms but this is expected to change in the future.

Booking procedure –

The PAS system links with the NHS Database system of all UK NHS patients. Patient details include a unique NHS number, Title, First name, Last name, Address, Contact Telephone number, known allergies and Blood group. (For the proposes of implementing and demonstrating the PAS you should create a similar DB and consider that all patients that enter A&E will have been registered with the NHS).

When a patient arrives at the A&E department their details should be accessed from the DB. Patients are then divided into four triage categories according to their medical condition – emergency, urgent, semi-urgent and non-urgent.

Treatments

If a treatment room is available then a patient should be treated straight away. However if all treatment rooms are being used the patient should be placed in a waiting queue.

Emergency patients are accorded top priority and attended immediately by a team of medical and nursing staff without waiting. If all treatment rooms are being used then any non-emergency patients currently undergoing treatment will be removed temporary and placed back into the queue. They should be placed at the start of the queue. In this circumstance the decision on which patient is moved to the queue from the treatment rooms should be firstly based on their triage priority and then the time they entered the A&E department, with those who entered earliest given priority.

If it is not possible to treat a new emergency patient (i.e. all treatment rooms are occupied by emergency patients) then an automated alert should be sent to the On Call list (consists of team of two doctors and three nurses registered for that time period in the PAS). The automated alert should consist of an SMS message to the team. The On Call team treat patients in situ and do not use a treatment room. If all treatment rooms are being used and the On Call team is engaged with a patient (i.e. within 15 minutes of being called) then the patient should be directed to the nearest hospital and an alert sent to the Hospital manager.

The queuing system to be implemented has the following rules:

* Limited to 10 patients.
* Initial placement on the queue is dependent on triage category.
* When the queue reaches 10 then an automated emergency response is sent to the On Call Team. (SMS Message).
* The Health Trust has been set a target of waiting times (on the queue) to be no more than 30 minutes. Any patients that have been waiting for 25 minutes should be automatically moved to the front of the queue – regardless of triage priority.
* The Trust have targeted a treatment time of 10 minutes per patient. At this stage unless otherwise advised it is expected that a treatment area will be free to receive another patient. As such the queued system should automatically update every 1 minute. A message to call the next patient in the queue for treatment (including patient details should be displayed). It is possible for a treatment to go on longer than 10 minutes. In this case the system should allow an extension of treatment (5 minutes) to be added to an individual treatment.
* A record of when a patient leaves the Treatment room should be recorded.
* If the queue is full and a non-emergency patient arrives at A&E they should be immediately redirected to the nearest hospital.
* It should be possible for the triage category of a patient in the queue to be altered. If this is the case then the queue should be reordered based firstly on triage categories and then time spent in the queue.
* If more than two patients have been waiting longer than 30 minutes then an automated alert (SMS and email) should be sent to the Hospital manager.

The system should also

* Provide a list of the current patients within the queue.
* Enable a search for patients in the queue – by category, name or NHS number.
* Provide a status for the A&E that should be automatically updated depending on waiting times.

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| --- | --- |
| **Waiting time (minutes)** | **Status Code** |
| **0** | 1 |
| **10-19** | 2 |
| **20 or over** | 3 |
| **Unable to treat new patients** | 4 |

Technical implementation

A preference for a linked list data structure to be used for the underlying implementation of the queue system has been expressed by the Health Trust technical team in order to be compatible with possible future integrations with current systems.

**Marking**

This assignment shall include an element of peer marking. Each project team will be given an overall mark based on the Development Activities, Product produced and Presentation. Each member will also be given an opportunity to peer mark each team member on his/her contribution to the project.

For peer marking each team will have a number of points to be allocated throughout the team (dependant on the number of members in the team). The points shall be shared by the team members. Each team member’s contribution shall be weighted and his /her final mark will be adjusted dependant on the points allocated to the member by the other team members.

For example, a project team receives 60% as an overall total (based on 7 team members and 35 points distribution)

* Example weightings
  + A team member is awarded 5 points (an average contribution to the project) by the team he/she will receive 60%.
  + A team member is awarded 1 point (a very low contribution to the project) by the team he/she will receive 56 %.
  + A team member is awarded 10 points (a very high contribution to the project and maximum points limit) by the team he/she will receive 65%.

The peer marking may be reviewed by the lecturer in charge.

You will have regular meetings with the lecturer in change to report progress. Progress reports may be requested during the project.

In order to attempt to win the contact with the Health Trust you should at least fulfil the minimum criteria for the product. You are however encouraged to research relevant functionality in similar systems and include in your product.