ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΥΠΡΟΥ

ΤΜΗΜΑ ΠΛΗΡΟΦΟΡΙΚΗΣ

ΕΠΛ 362 Τεχνολογίες Λογισμικού ΙΙ
Διδάσκων: Γ. Παπαδόπουλος

Για τους σκοπούς του project θα δουλέψετε σε ομάδες εργασίας 3 ατόμων. Το project θα υλοποιηθεί στην γλώσσα Java με την χρήση του Eclipse.

Γενικά Παραδοτέα:

Με την ολοκλήρωση του project σας πρέπει να παραδώσετε/επιδείξετε τα απαραίτητα στοιχεία χρήσης ευέλικτων μεθοδολογιών (agile methodologies).

Συγκεκριμένα κατά την υλοποίηση του project σας αναμένεται ότι θα χρησιμοποιήσετε κάποια τεχνολογία υποστήριξης ομάδων προγραμματιστών, π.χ. SVN ή GIT (SVN repositories παρέχονται από το τμήμα μας – αν θα χρησιμοποιήσετε GIT είσαστε εσείς υπεύθυνοι για την εύρεση κάποιου GIT repository). Επιπρόσθετα, μπορείτε να χρησιμοποιήσετε το Mylyn για την καταγραφή των διάφορων ενεργειών (task) που πρέπει να γίνουν/ολοκληρώθηκαν στην υλοποίηση σας σε συνδυασμό με το σύστημα υποστήριξης ομάδας που έχετε διαλέξει. Εναλλακτικά για την καταγραφή των ενεργειών μπορείτε να χρησιμοποιήσετε οποιοδήποτε σύστημα συνδέεται με το Mylyn (π.χ. Bugzilla), αλλά θα είσαστε εσείς υπεύθυνοι για την εύρεση και χρήση του.

Πέρα από τη χρήση τεχνολογιών υποστήριξης ομάδας, πρέπει να ακολουθήσετε και κάποια μεθοδολογία αυτόματου ελέγχου του κώδικά σας. Συγκεκριμένα, μαζί με τον κώδικα του project σας πρέπει να παραδώσετε τον κώδικα ελέγχου JUnit που γράψατε κατά την υλοποίηση σας.

Προφανώς (ως μέρος των ευέλικτων μεθοδολογιών), ο κώδικάς πρέπει να ακολουθεί κάποιες συμβάσεις κωδικοποίησης (coding conventions) και να είναι κατάλληλα τεκμηριωμένος. Για αυτό το σκοπό πρέπει να παραδώσετε ένα έγγραφο που να δείχνει τις ακολουθούμενες συμβάσεις και το Javadoc που περιγράφει και τεκμηριώνει τον κώδικά σας.

Τέλος, πρέπει να παραδώσετε τον κώδικα Ant που κτίζει και ελέγχει το project σας.

Βαθμολογία:

Χρήση ευέλικτων μεθοδολογιών	40%
Σωστή χρήση εξειδικευμένων τεχνολογιών/μοντέλων	
(π.χ. OSGi, web services, REST, RMI ή μοντέλου client/server)	20%
Σωστή υλοποίηση συστήματος	40%

A regional health authority wishes to procure an information system to help manage the care of patients suffering from mental health problems. The overall goals of the system are twofold:

- To generate management information that allows health service managers to assess performance against local and government targets.
- To provide medical staff with timely information to facilitate the treatment of patients.

The health authority has a number of clinics that patients may attend in different hospitals and in local health centres. Patients need not always attend the same clinic and some clinics may support 'drop in' as well as pre-arranged appointments.

The nature of mental health problems is such that patients are often disorganised so may miss appointments, deliberately or accidentally lose prescriptions and medication, forget instructions and make unreasonable demands on medical staff. In a minority of cases, they may be a danger to themselves or to other people. They may regularly change address and may be homeless on a long-term or short-term basis. Where patients are dangerous, they may need to be confined to a secure hospital for treatment and observation.

Users of the system include clinical staff (doctors, nurses, health visitors), receptionists who make appointments and medical records staff. Reports are generated for hospital management by medical records staff. Management have no direct access to the system.

The system is affected by two pieces of legislation one that governs the confidentiality of personal information and one that governs the compulsory detention of patients deemed to be a danger to themselves or others.

The system is NOT a complete medical records system where all information about a patients' medical treatment is maintained. It is solely intended to support mental health care so if a patient is suffering from some other unrelated condition (such as high blood pressure) this would not be formally recorded in the system.

General system requirements

1. The records of patients who have a history of deliberate self-harm shall be highlighted in some way to bring them to the attention of clinical system users.
2. The system shall be able to generate warning letters to clinic staff and patient relatives about a patient indicating the possibility of deliberate self- harm.
3. The system shall provide fields that allow details of incidents or threats of deliberate self-harm to be maintained.
4. Information about incidents of accidental self-harm shall only be maintained when these are directly related to the treatment prescribed (e.g. over or underdosing of medication).
5. When treatment details are entered in the system, the system shall display details of previous treatment. This will make it easier for clinical staff to check that treatment prescription errors have not been made.

6. The system shall allow information about adverse reactions to treatment to be maintained. If a patient is known to be allergic to any particular medication, then prescription of that medication shall result in a warning message being issued.
7. Prescribers may overrule warning messages from the system. In such situations, the system shall maintain a record of the warning issued and the identity of the prescriber who overruled the warning.
8. The system shall generate a daily list of patients who were expected to attend a consultation but who failed to attend. This list shall be automatically e-mailed to the consultants responsible for the care of these patients.
9. To reduce the probability of over-prescription of medication, the system shall highlight the date of the patient's previous consultation when a patient attends a drop-in consultation session. (Note: some patients attend several sessions to try to get extra medication which they can then sell on).
10. The system shall generate a daily list of patients where the patient has attended a consultation and where the medical records have not been updated. This list shall be emailed to the clinic where the patient has attended the consultation. Each record on this list shall be highlighted in the system until an update has been made. (Note: this is intended to help detect records which, through human or system failure, have not been updated after a consultation).
11. The system shall ensure that access to personal information on patient records is only permitted by accredited staff.
12. The system shall support differential access to patient information depending on the role of the information user. Initial roles supported are a clinical role, a receptionist role and a medical records role.
13. Access to the functionality of the system shall be controlled according to the role of the information user.
14. The system shall only allow the transmission of personal patient information to accredited staff and to the patient themselves.
15. The system shall provide a facility for patients to request personal information and to request changes to that information.
16. A change procedure to accept or reject changes to personal information shall be established by the medical records office.
17. The system shall record that information has been deleted or changed according to a patient change request. The patient record shall not be linked to any change requests made for that record.
18. When notified of the death of a patient, the patient record shall be locked as read-only.

System Viewpoints

Viewpoints are a means of structuring the collection and documentation of requirements from classes of system stakeholder. Each viewpoint represents a partial specification of the system so the complete specification is created by integrating the requirements from each viewpoint. Viewpoints may either be interactor viewpoints representing stakeholders who interact directly with the system, indirect viewpoints representing stakeholders that require information from the system or are involved with the system management.

There are four principal viewpoints that place requirements on this system.

- *Clinical staff*. Clinical staff interact directly with the system, looking up and modifying patient information. They are particularly concerned with maintaining a history of consultations and recording the treatment and medication prescribed to patients.

- *Receptionists*. Receptionists interact directly with the system and use it in conjunction with a generic appointments system to record information about patient appointments. They need to record when appointments were made, the appointment date and whether or not patients attended appointments.

- *Medical records staff*. Medical records staff interact with the system to generate management reports and to link information in the system with more general patient health records.

- *Health service management*. These are indirect viewpoints as health service managers do not directly interact with the system. However, they do require reports generated from the system and so generate information requirements.

There is no explicit viewpoint representing other computer-based systems that may interact with this system. It is assumed that any requirements of this type will come from one of the principal viewpoints.

Clinical staff viewpoint

Clinical staff use the system directly when patients attend for a consultation. They access and read individual patient records and, for every consultation, update the patient record with details of the consultation and the treatment prescribed. Individual doctors (but not normally nurses or other staff) may also access the system outside of consultations. For example, a doctor who is reading a paper about a new drug treatment may use the system to see if she has any patients for whom this may be useful.

Requirements derived from this viewpoint are:

1. The patient record in the system shall include fields to record the diagnosis of the patient's condition and the treatment prescribed. If these are unchanged from a previous consultation, then only a confirmation shall be required. (Staff should not be required to re-enter information already in the system).
2. It shall be possible to update a patient record during a consultation when the record has been opened or at a later date. Records which have not been updated during a consultation should be flagged to indicate that they are not completely up-to-date. (This allows for system failure or for individual doctors, for whatever reason, being unable to update the record at the time of a consultation. An example of such a situation is where a patient threatens or commits violence and has to be forcibly restrained).
3. Free form text input fields shall be provided to allow comments on the patient by individual clinicians to be recorded.
4. It shall be possible, from within the system, to consult the known side- effects for any drug that may be prescribed using the system.

5. The system shall provide a risk indicator field that allows the risk status of the patient to be recorded. Risk status reflects the clinical assessment of whether the patient is likely to be a danger to themselves or others.
6. Nurses visiting patients at home should be able to download patient records in advance to a laptop computer, modify these records then upload the records to the server.

Receptionist viewpoint

Receptionists use the system to record when appointments are made, who the patient should see during these appointments and to record if patients keep or miss appointments. They also use the system to generate repeat prescriptions for patients when these are requested.

Requirements from this viewpoint are:

1. The system shall keep a diary system for scheduling appointments. Beyond that the receptionists are also responsible for noting whether a patient kept his appointment or not.
2. The system shall include a search component that allows a receptionist to discover the record for individual patients.
3. The system shall support the generation of repeat prescriptions given a patient identifier.

Medical records staff viewpoint

The medical records office is responsible for ensuring the overall integrity and security of the data in the system, with updating the system in response to externally requested changes (normally from a patient) and with generating regular management reports. They are also responsible for integrating the system with other patient record systems.

Requirements from the medical records staff viewpoint are:

1. The system shall include a role-based access control system that allows access to information to be specified in terms of the role of the system user.
2. The system shall be maintained on a central server and records shall be accessed and updated in place by staff using the system.
3. A record of all transactions during a clinic session shall be maintained.

Health service management viewpoint

Health service managers do not use the system directly but require regular reports on the treatment process for mental health patients. These reports do not contain individual patient details but might record information such as the numbers of patients who attended each clinic each month, a summary of the drugs prescribed each month, a summary of the times that patients have had to wait for appointments, etc.

1. The system shall maintain lists of patient conditions and treatments and clinicians shall select the patient condition and treatment from menus generated from these lists. The

rationale for this is consistency of terminology for management reporting. If free form input is allowed then different users of the system may refer to the same thing in different ways (e.g. a drug may be available under several different brand names).

2. The system shall generate weekly reports for each clinic showing the number of patients attending the clinic on each day that it runs and the total number of patients who have attended for mental health treatment. The report should also summarise the number of patients suffering from each condition and the total amounts of each drug prescribed as medication.

Υλοποίηση συστήματος

Κάθε ομάδα θα υλοποιήσει το πιο πάνω πρόβλημα χρησιμοποιώντας διαφορετικές τεχνολογίες.

- Η πρώτη ομάδα (3 άτομα) θα υλοποιήσει το σύστημα χρησιμοποιώντας web services. Κάθε όψη θα υλοποιείται από ένα web service. Παρομοίως αν χρειάζεται κάποιο κομμάτι πληροφορίας από κάποιο web service, αυτό θα παρέχεται από ένα άλλο web service. Τα δεδομένα του συστήματος μπορούν να αποθηκεύονται σε μια βάση δεδομένων (οποιαδήποτε βάση – π.χ. MySQL, SQL server, Oracle κτλ.)

- Η δεύτερη ομάδα (3 άτομα) θα υλοποιήσει το σύστημα χρησιμοποιώντας RESTFull services. Κάθε όψη θα υλοποιείται από ένα REST service. Παρομοίως αν χρειάζεται κάποιο κομμάτι πληροφορίας από κάποιο REST service, αυτό θα παρέχεται από ένα άλλο REST service. Τα δεδομένα του συστήματος μπορούν να αποθηκεύονται σε μια βάση δεδομένων (οποιαδήποτε βάση – π.χ. MySQL, SQL server, Oracle κτλ.)

- Η τρίτη ομάδα (3 άτομα) θα υλοποιήσει το σύστημα χρησιμοποιώντας OSGi components. Για το/τα συστατικά που ανακτούν και αποθηκεύουν τα δεδομένα του συστήματος πρέπει να δώσετε 2 υλοποιήσεις (που έχουν την ίδια διαπροσωπεία) αλλά η μια θα υποστηρίζει μια βάση δεδομένων (όποια θέλετε) και η άλλη απλά αρχεία (σημειώστε ότι αυτό δεν είναι απαραίτητο για όλα τα δεδομένα – θα μπορούσε να γίνει π.χ. μόνο για την καταγραφή των ραντεβού των ασθενών).

- Η τέταρτη ομάδα (3 άτομα) θα υλοποιήσει το σύστημα χρησιμοποιώντας RMI. Ο πελάτης θα επικοινωνεί με τον εξυπηρετητή ο οποίος θα περιέχει ουσιαστικά την βάση δεδομένων που κρατά όλη την πληροφορία του συστήματος.

- Η πέμπτη ομάδα (3 άτομα) θα υλοποιήσει το σύστημα ακολουθώντας το μοντέλο client/server. Όπως και στην περίπτωση της τέταρτη ομάδας, ο πελάτης θα επικοινωνεί με τον εξυπηρετητή ο οποίος θα περιέχει ουσιαστικά την βάση δεδομένων που κρατά όλη την πληροφορία του συστήματος.

Όλες οι ομάδες πρέπει να υλοποιήσουν ένα γραφικό περιβάλλον εργασίας για το σύστημα μέσω του οποίου οι χρήστες θα μπορούν να δουλεύουν μαζί του.