Software Engineer Packet 2 – Problem Statements

(Handout to be given to candidate and returned at conclusion of interview)

Order Frequencies

Initial Problem Statement:

When you get a prescription from a pharmacy, there is a start date associated with the medication. Medications also have a scheduled frequency that tells you when to take the doses. There are fairly common patterns for the frequencies. You can take them every 4 hours. You can take them once a day. You can take them with meals or just before bed. You can also take them PRN or "as needed." Many medications also have a stop. You may need to take the medication for 7 days. You may need to take a certain number of doses. You may also take the medication for the rest of your life.

Assume you have to implement a system to tell nurses when a patient should receive medications. How would you model a schedule for a medication that handles start dates, end dates, and frequencies?

Date API for Order Frequency Question

CalendarBuilder (Class)

Constructor	CalendarBuilder	CalendarBuilder()	Constructs a CalendarBuilder.
Method	CalendarBuilder	setDate(int year, int month, int dayOfMonth)	Sets the date given the provided year, month, and day of month.
Method	CalendarBuilder	setTimeOfDay(int hourOfDay, int minute, int second)	Sets the time given the provided hour of day, minute, and second.
Method	Calendar	build()	Returns the calendar built from the setter methods.

Date API for Order Frequency Question Continued

***Calendar* (Class)**

Method	void	add(CalendarField field, int amount)	Adds or subtracts the amount of time given the Calendar field.
Method	int	get(CalendarField field)	Returns the value in the provided calendar field.
Method	boolean	after(Calendar cal)	Indicates if the provided calendar represent a date and time before the time represented by this calendar object.
Method	boolean	before(Calendar cal)	Indicates if the provided calendar represent a date and time before the time represented by this calendar object.
Method	void	clear()	Clears all the calendar field values.
Method	void	set(CalendarField field, int value)	Sets the given Calendar field to the provided value.
Method	void	set(int year, int month, ind date, int hourOfDay, int minute, int second)	Sets the values for the year, moth, day of month, hour of day, minute, and second fields.
Method	void	set(Calendar cal)	Sets the values for this calendar to the values of the fields for the provided calendar.
Static Method	Calendar	max()	Returns a calendar instance for which each field is set to the maximum allowed value.
Static Method	Calendar	min()	Returns a calendar instance for which each field is set to the minimum allowed value.
Static Method	Calendar	now()	Returns a calendar instance for which each field is set to current value in the system. (assumes the system timezone)

Date API for Order Frequency Question Continued

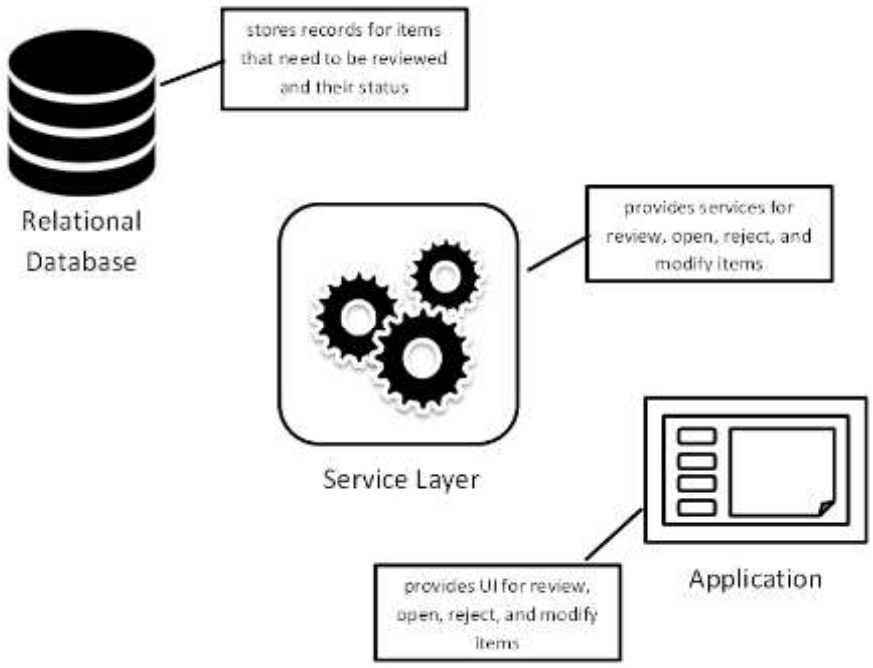
CalendarField (Enumeration)

SECOND
MINUTE
HOUR_OF_DAY
DAY_OF_MONTH
MONTH
YEAR

Log Files and Concurrency

The following diagram represents a typical 3-tier system. We have a client, a service layer, and a database backend. The purpose of this system is to generate a work list of items that a physician needs to review and allow the physician to review all the items. An item can be in one of the following states: Needs Review, Opened, Reviewed, or Rejected.

At the service layer, multiple servers are running, and they respond to requests for actions in the order they were received.



Log Files and Concurrency Continued

Two different users have reported a bug that item #2048 does not have the correct status in the system. The first user rejected the item and therefore expects the status to be "Rejected". However, he is seeing that item as still requiring review: "Needs Review". The other user reviewed and modified the item adding some missing data. He is also seeing the item as still requiring review. Luckily, the service layer makes use of a logging framework to log all actions that occur in the system. This is the log:

Time	Process Id	Thread Id	User Id	Severity	Message
09:06:59	0ab3c231	0db42101	32768	Information	User requested modify of item 2048 with a version of 2.
09:06:59	0ab4db67	0ca42526	65536	Information	User requested status changed to "Rejected" for item 2048 with a version of 2.
09:06:59	0ab3c943	0ef42120	32768	Information	User requested status changed to "Reviewed" for item 2048 with a version of 2.
09:07:00	0ab3c231	0db42101	32768	Information	Modification succeeded. Item 2048 version is now 3.
09:07:00	0ab4db67	0ca42526	65536	Warning	Failed to update status on 2048. Expecting version 3, received version 2.
09:07:03	0ab3c943	0ef42120	32768	Warning	Failed to update status on 2048. Expecting version 3, received version 2.