

Materials for Live-Thru Case Histories

Overdue Book Notice Project

Section C: the in- class exam

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This is the in- class exam during the eight week at the completion of the project. I found easiest to grade if you sit the students in alphabetical order since there are so many parts to the exam. Blue exam books were not used so that previous answers could not be changed.

Case History: Service Request System

BU&U is a statewide company with headquarters in Sunbathers Heights, NJ. Part of BU&U's business is satisfying service requests (for equipment installations, repairs, etc.) at customer sites. Each such request is handled by dispatching a BU&U technician to the customer site, from the BU&U Work Center nearest the customer location. BU&U has ten Work Centers.

Until recently, the Service Request System was completely manual. As a potentially cost-saving measure, the VP for Customer Service at BU&U contacted Lawrence Amberstone, boy wonder Director of BU&U's Software Development Team (SDT) to see if the SDT could design and implement a computerized version of the Service Request System.

The Service Request System operates as follows:

1. Customers request on-site service by phone. A transaction representing a service request is entered into BU&U's Central Service-Request Computer, in Sunbathers Heights as it is received, over the phone, from the customer. Each transaction requires some processing by the central computer.
2. Customers sometimes call to inquire about the progress made on their as-yet-unsatisfied service requests. Each call requires that an average of 2 inquiry transactions be input to the Service-Request Computer.
3. Each Work Center has 10 clerks. They process, on average, 4 service requests and 2 inquires per hour. Each Work Center is open daily from 8:00 AM until 10:00 PM.

4. At each BU&U Work Center a designated employee, called the Dispatcher, is responsible for scheduling service visits to customer sites by BU&U technicians. Each Dispatcher is given a new PC, connected via BU&U's intranet, to the BU&U central Service-Request Computer. The way the Dispatcher finds out about service requests for which his/her Work Center is responsible is by periodically requesting Service Request Reports from the central Service-Request Computer. A Service Request Report is a list of service requests that must be satisfied within 48 hours by the Work Center that requested the Service Request Report. Each work center is expected to request 2 Service Request Reports a day.

5. The Dispatcher uses the Service Request Report to dispatch specific technicians to specific customer sites, to decide which, if any, technicians will have to work overtime so that all service requests can be satisfied on time, etc.

6. At the end of each day a Daily Transaction Profile (DTP) is sent back to the SDT for analysis. A DTP is a list of all the transactions received and processed by the Service-Request System that day. For each transaction, the DTP includes, the transaction's type (service request, inquiry, etc.), its arrival time, and the time at which it's processing was completed.

The SDT has developed requirements for the Service Request System, and has, through the use of prototyping, developed a design. Both the requirements and design documents have proved satisfactory to the VP for Customer Service, and she signed off, officially accepting, them.

Finally, Amberstone's SDT has implemented and tested the Service Request System. The requirements document has been consulted to determine the server and PC configurations necessary to easily handle the projected transaction traffic as well as to produce the average of two Service Request Reports that will come from each Work Center each day.

The Service Request System (SRS) is scheduled to be tested, off-line, at the Work Centers for one week, to be brought online with one Work Center the second week, with a second Work Center the third week ... and with all ten Work Centers on the eleventh week. Until the end of eleventh week the manual system will be used for those Work Centers not yet online.

Recap of the customer site plan:

week 1 acceptance testing

week 2 beta testing with the first Work Center

week 3 operational use with an accepted system supporting Work Centers 1 and 2.

... and so on.

The system is delivered, and, at the end of the first week, acceptance testing went smoothly. No bugs were reported and system performance was well within specified requirements.

The first center is put online at the start of the second week. The system performs well.

The second center is put online at the beginning of the third week.

At the end of the third week, everything has gone smoothly, except that on Wednesday of that week the Operations Manager, the BU&U employee responsible for all ten Work Centers, reports to the SDT that the inquiry transactions are taking longer to be processed than they were during the first and second weeks. As far as the SDT can tell, all transactions are being processed well within the response time specified in the requirements document, but the average transaction is taking somewhat longer to be processed than it did during the previous weeks. There is no explanation for this subtle increase in response time. Other work demands distract the SDT and they do not pursue this glitch. So the Operations Manager signs the software acceptance form and praises Amberstone for a job well done -- on schedule and within budget.

At this point the SDT is diverted to another project and does no further work on the Service Request System.

The third Work Center goes online on the first day of the fourth week. On the second day of the fourth week, Amberstone receives an irate phone call from the Operations Manager. "The system died yesterday at about 3:00PM, and nobody at the Work Centers has any idea why," says the Operations Manager. "When the system was restarted, it worked, but very sluggishly; transaction response times were sometimes not within specification. The system returned to satisfactory transaction times late in the day." The Operations Manager hints to Amberstone exactly how she would like to re-arrange his anatomy, and demands an immediate solution or she will return to the old manual system. "We can't run our business this way," she says.

You are SDT Director Amberstone and you reply, "This is a surprise to me. We noted some slow response times two weeks ago, from that week's DTPs, but have not been able to explain why. I will look into the situation and get back to you in two hours."

Student Name:

Student ID:

1. What are the first things you, as Amberstone, do to try to solve the problem? (10 points)

Student Name:

Student ID:

What are the first things you, as Amberstone, do to try to solve the problem?

What Amberstone actually does is to drop all other activities and to consult the SDT and the support staff; he finds that they did not even know that the problem had occurred.

He declares the problem to be Priority 1, and focuses his entire staff on it. The staff runs the previous day's DTP and they find that the DTP ends just before the system hung. What there is of the DTP shows that the system performed normally until the point at which the DTP ended, so Amberstone's staff still has no idea what happened. Because there is no reason to believe that the crash resulted from a software error, Amberstone does not start a frantic debugging effort.

Rather, he dispatches staff to the four online Work Centers to gather more data. He then calls the Operations Manager, reports on the actions taken, and arranges to visit one of the sites of the Service-Request System the next day.

2. What do you, as Amberstone, do when you visit the site? (10 points)

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Student ID:

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Rather, he dispatches staff to the four online Work Centers to gather more data. He then calls the Operations Manager, reports on the actions taken, and arranges to visit one of the sites of the Service-Request System the next day.

What do you, as Amberstone, do when you visit the site?

Amberstone looks over the data collected, reviews status with his people on-site and calls the other two sites to make sure his people are properly deployed. He also checks with his people observing operations at the computer center. He then observes the use of the system by listening to customer phone calls and seeing how the transactions are entered into BU&U's Central Service-Request Computer.

He gets frequent updates on computer CPU utilization and response times.

At about 3PM on the day of your visit the system hangs again.

3a. What is the most logical question for you, as Amberstone, to ask the people at BU&U headquarters and at the Work Centers? (5 points)

3b. What answer does Amberstone get, from BU&U staff, to the "most logical question" that he asked. (5 points)

3c. What short term actions do you take? (5 points)

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Student ID:

At about 3PM on the day of your visit the system hangs again.

What is the most logical question for you, as Amberstone, to ask the people at BU&U headquarters and at the Work Centers?

Amberstone asks, "What is so special about what happens in the work centers at 3PM?" Using the data from the computer center he sees the transactions that were requested just before the hang as his people have now instrumented the computer with special debugging data capture tools.

What answer does Amberstone get, from BU&U staff, to the "most logical question" that he asked.

The answer is that the Dispatcher at each of the four online Work Centers asked the system for a Service Request Report at almost exactly 3PM. When you ask the Operations Manager why they all happened to request Service Request Reports at about 3PM, she replies that "we need to find out how many technicians will have to stay to do overtime work each night so that we can meet service request due dates. Dispatchers schedule overtime at about 3PM every day so that technicians can call their families to let them know if they'll be home late. The Service Request Report is the only document that tells us how much work we need to do to meet the 48 hour service commitment."

What short-term actions do you take?

As a temporary expedient you ask the Operations Manger to stagger the report requests with a system administrator monitoring CPU usage to avoid a hang. You stop putting the other Work Centers online.

4a. Compare this situation to what you learned in the Overdue Book Notice Project. (5 points)

4b How could you have avoided this crises? (5 points)

Student Name:

Student ID:

Compare this situation to what you learned in the Overdue Book Notice Project.

The 3PM triggering of the reports is a hidden requirement just like the need to keep the Overdue Notice exactly as specified in the Overdue Book Notice Project.

Both systems are very sensitive to the business workflows or scenarios that causes bursts of certain high resource consuming transaction, such as producing the report.

How could you have avoided this crisis?

Get all the stakeholders, that is the VP for Customer Service, the Operations Manager, and the technicians, involved in the requirements definition process. Make sure the requirements engineers visit the manual operation sites and understand the business scenarios.

5. How would you change the architecture of the system to provide a stable solution and to avoid the hangs while honoring the need for the 3PM running of the Service Request Reports for all Work Centers? (5 points)