Homework 9

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"I pledge my honor that I have abided by the Stevens Honor System." - JM, EO, DB, MM

Summary:

For this assignment, the team considered a theater ticket reservation system. Given an operation duration and component uptime, the team calculated the system's continuous availability and calculated the impact of system upgrades on said availability. The team also came up with a degraded mode plan in an attempt to reduce the severity and scope of a system outage, as well as a way to improve user satisfaction with respect to system response time.

Consider the theater ticket reservation system. You have built this system, and now you are responsible for the operation. Your customer is quite happy with the system, except for the availability and, occasionally, the response time. You've been in operation for 10 weeks. To date, the availability of the system components have been:

hardware: 99.9% - scheduled maintenance

software: 99.8% - software problems

external credit card verification and billing system: 99.0% - unscheduled, unplanned

The credit card system is required on only 30% of all transactions, and the implementation allows other transactions and the system to work even if the credit card system is unavailable.

a) Calculate the system's continuous availability percentage.

Total hours = 1680 hours
Hardware downtime = 1680(.001) = 1.68 hours
Software downtime = 1680(.002) = 3.36 hours
External credit card verification downtime = 1680(.01) = 16.8 hours

- Only has a 30% chance of causing a problem for availability
- 16.8(.3) = 5.04 hours

Hours of downtime = 1680 - 1.68 - 3.36 - 5.04 = 1669.92 hours
Continuous availability % = 1669.92/1680 = **99.40%**

b) What would be the change in availability if you implement a hot backup system to reduce the scheduled maintenance time by 90%?

Hardware (scheduled) downtime percentage is reduced from .001 to .0001
Total hours = 1680 hours
Hardware downtime = 1680(.0001) = .168 hours
Software downtime = 1680(.002) = 3.36 hours
External credit card verification downtime = 1680(.01) = 16.8 hours

- Only has a 30% chance of causing a problem for availability
- 16.8(.3) = 5.04 hours

Hours of downtime = 1680 - .168 - 3.36 - 5.04 = 1671.43 hours
Continuous availability % = 1671.43/1680 = **99.49%**
Change in continuous availability % = **.09%**

c) You know you need to improve the credit card vendor availability. You search hard to find another credit card system vendor but can only find one whose availability is much worse (80%). still, you consider implementing it in addition to the first; that is, it is called if the first is unavailable. What would be the savings if you implemented this plan?

External credit card verification downtime percentage = .01 * .2 = .002

Total hours = 1680 hours
Hardware downtime = 1680(.001) = 1.68 hours
Software downtime = 1680(.002) = 3.36 hours
External credit card verification downtime = 1680(.002) = 3.36 hours

- Only has a 30% chance of causing a problem for availability
- 3.36(.3) = 1.01 hours

Hours of downtime = 1680 - 1.68 - 3.36 - 1.01 = 1673.95 hours
Continuous availability % = 1673.95/1680 = **99.64%**

d) If you implement both improvement plans, what is the projected availability of the system?

Hardware (scheduled) downtime percentage is reduced from .001 to .0001
External credit card verification downtime percentage = .01 * .2 = .002

Total hours = 1680 hours
Hardware downtime = 1680(.0001) = .168 hours

Software downtime = 1680(.002) = 3.36 hours
External credit card verification downtime = 1680(.002) = 3.36 hours

- Only has a 30% chance of causing a problem for availability
- 3.36(.3) = 1.01 hours

Hours of downtime = 1680 - .168 - 3.36 - 1.01 = 1675.46 hours
Continuous availability % = 1675.46/1680 = **99.73%**

e) How might you use the concept of degraded mode to further improve the effective availability?

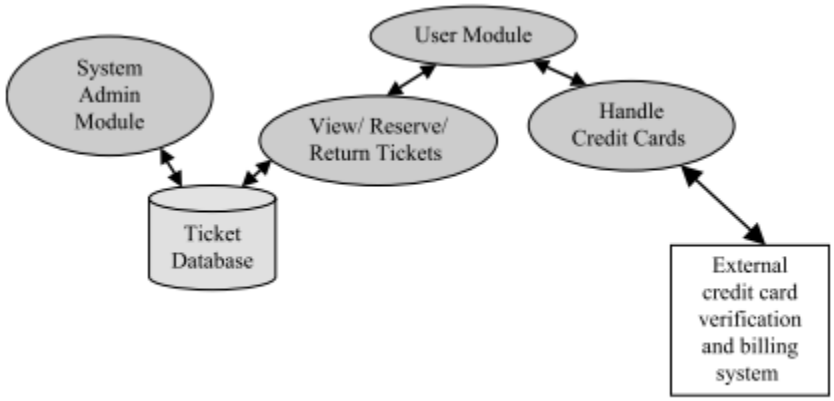

Figure 9.5. *Theater tickets architecture.*

The concept of degraded mode could be used to improve effective availability in several ways. First, degraded mode could be seen within the view/reserve/return tickets aspect of the architecture. If one of those three functions are experiencing downtime, the other data can be partitioned in a way that allows a customer to still view their ticket for example, even if returning the ticket is unavailable. Additionally, a common way to combat credit card verification system downtime is to offer several payment methods that use different verification steps, or designating a certain ticket booth as "cash only". A way to partition payment verification on a mobile platform could be to have different partitioned verification databases based upon card providers.

f) For the response time, the only problem seems to be that the credit card system responds either very quickly (< 1 second) or very slowly (15-20 seconds). What should you do to improve your user satisfaction with the response time?

Provide a percent completed bar when the function is happening so the user will understand the system is working on their transaction and does not have a delay due to system failure. This will provide the user with confidence that the system will be able to complete the task.