Incident Report – George Mason University

2/12/10
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1. Introduction

The purpose of this document is to provide information regarding client
downtime associated with our Maintenance Window which occurred on
February 12, 2010 in our VA2 datacenter.

2. Executive Summary

On February 12, 2010 scheduled maintenance work was being conducted in
our VA2 facility between the hours of 2AM EST and 6AM EST. This work had
gone through our Change Review Process and was approved. The
appropriate notification was sent to all clients in our VA2 facility stating

“This maintenance is not expected to be service
impacting however we are performing the work
during the normal maintenance window to
minimize any potential risk of service
interruption.”

During the router maintenance, the information provided to us by the vendor
suggested that the upgrade of the code would happen in the background
while traffic continued to pass through the router and allow clients access to
their environment. This maintenance work had been successfully
implemented prior to this in other Blackboard datacenters. There are two
supervisor cards on the switches. The first (primary) card upgraded
successfully, and according to procedure it switched control to the secondary
card. The secondary card hung during the upgrade process.

We began troubleshooting the switch and determined that the secondary
card had failed to upgrade and was hung, preventing the switch from
operating. An engineer removed the secondary card which allowed the
switch to return to service. It was then discovered that additional cards in
the switch were hung and would not forward packets. To ensure the
maintenance was completed within the window it was decided that the
switch needed to be rebooted. All associated cards were reloaded and all
came back operational. By 5:00AM the routers were passing traffic as
designed.

At 5:00 AM EST client environments were in the process of being brought
back online and the necessary QA performed. By the end of the
maintenance window (6:00 AM) most clients were brought back online and
engineers believed that these clients were able to access their sites with the
exception of a known few that were still being looked into. It was at this
time that client feedback notified us that they were experiencing intermittent
periods of connectivity.

It is now believed that a gateway router may have been holding packets and
not allowing traffic through for periods of time while at other times traffic
was flowing with no issues. This appeared to begin after 6:00 AM and lasted
until approximately 10:15AM when the routers were rebooted. It was
determined at that time that the SSL certificate for George Mason University
was not being recognized by the load balancer. The certificate was reapplied
and the site began loading correctly.

3. Root Cause Analysis

The scheduled upgrade work on the core routers was finished before the
6:00AM EST deadline. At this time we are not aware if that work could have
been a catalyst for the additional downtime experienced by some clients.

Blackboard Managed Hosting and the vendor are continuing to research to
identify the root cause.

The load balancer not recognizing the SSL certificate added an additional
layer of complexity and resulted in an extra 15 minutes of inaccessibility.

4. Summary of Corrective Actions

The outage was resolved by rebooting the core routers which refreshed the
cards that were in a hung state. Once this was completed, all of the internal
components were able to communicate with each other (i.e. application
servers, databases, filers, etc). With internal traffic moving successfully,
client servers were brought back up successfully.

After extensive troubleshooting we were able to resolve the problem of
intermittent connectivity issues by rebooting the gateway routers.

Reapplying the SSL certificate was the final step in allowing users to access
the site.
5. Lessons Learned / Conclusion

We will continue to analyze logs and work with vendors to determine what may have prevented the secondary card from upgrading successfully and also what may have caused traffic issues with the gateway routers.

Again, the work had been successfully tested and implemented in other data center facilities leading us to believe, along with the input from our vendors, that there would be no client impact. Although we did do this during our maintenance window, we will revisit our processes around core infrastructure maintenance as the impact can be greater and more difficult to isolate should a problem arise.