Synopsis of Performance during Fall Term First Week of Classes

During the week of August 25, 2008, ten CSU campuses began their first week of fall classes, and during this period CMS performance fell well below expectations. Analysis of the week’s activities has shown that six campuses witnessed seriously degraded performance in the CMS Student system. This performance degradation was related to higher than anticipated demand on the shared CMS infrastructure and/or local configuration problems.

With respect to the CMS infrastructure, performance problems were the result of unusually high demand due to:

- A 100% increase in the number of campuses initiating start of classes for the Fall 2008 semester. During this week CMS supported 10 campuses in this activity compared to only 5 campuses for the same period last year.
- An increase of 392% in students served over the prior year. CMS supported 41,471 students in 2007 compared to 162,382 this week.
- A high volume of Financial Aid disbursement.
- A high volume of concurrent late registration activity.
- A high volume grade posting transactions.

Additionally, performance was further degraded on a few individual campuses because:

- One campus experienced a local portal problem that exacerbated the poor performance resulting from the high transaction volume
- One campus failed to install some code after the last Finance upgrade resulting in significantly degraded financial aid processing, and
- One campus discovered a very poorly performing query that impacted performance.

CMS Central, Unisys, and campus staff worked constantly through the week to resolve the campus and system issues. Various processes were tuned and retuned, resources were redistributed during the week, and fixes were applied where necessary. These efforts and the natural decrease in transaction volume resulted in gradual performance improvement over the week.

CMS Central and Unisys were fully aware of the number of campuses that would be engaged in Week 1 activities, and in preparation of the increased load, CMS central made several adjustments to handle the anticipated demand. Specifically:

- Two additional servers were added to the production application environment.
- Campus processing loads were redistributed across all existing processors
- Hardware and software configurations were adjusted to handle the expected increase in transaction loads
- Suggestions for temporary adjustments to business practices (e.g., suspending non-essential batch jobs or queries during peak demand periods, etc.) were distributed to the campuses.

Unfortunately, these measures proved to be insufficient for handling the actual transaction volume that materialized during this period.
To improve production performance before the remaining campuses started classes, CMS Technical Services and Unisys added two more servers into the application tier of the Production environment on September 3.

Over the following month, the remaining 13 campuses commenced Week 1 activities. Analysis of activities during this period indicated that several campuses experienced seriously degraded performance in the CMS Student system. This appears to be related to campus-specific problems and we continue to work with these campuses to identify and resolve the problems. The remaining campuses did not report serious problems, but some of them did experience periodic system slow-downs that dissipated as the first weeks of classes progressed.

Finally, during this period, Technical Services was also working with Unisys to define additional resource needs to meet anticipated demand in the spring semester. Based on their analysis, CMS has ordered a new server cluster (two machines) for the Application tier, and a new server cluster (three machines) for the Database tier. We anticipate placing these servers into production by November 15. In combination with the new servers described above, these additional machines will represent a 25% increase in Application tier resources and a 33% increase in Database tier resources since August 1.

**Future Activities**

CMS is a complex system and not all performance challenges are related to server availability. In the fall of 2007, CMS established the Performance Action Team to investigate performance problems and develop recommendations for managing CMS performance into the future. This coming year, the PAT’s activities will include the following:

- The PAT will work this fall with the Campus Directors to identify better mechanisms for collecting data more consistently, and over more representative time periods.
- Performance management is a dynamic process that is a function of countless variables. For example, CMS Central must ensure that adequate compute resources are in place and that campuses are spread appropriately across the available computer clusters. From the campus perspective, adjustments can be made to improve performance by altering business practices during periods of anticipated peak transaction loads. At present there is inconsistent information regarding business calendars across the system. A master calendar is in the early development stages and should be completed this fall.
- Data archiving is thought to have significant value with respect to improving performance by reducing the size of databases that must be searched to complete a given transaction. The PAT has prepared a feasibility study in order to release an RFP for data archiving solutions. If the feasibility study is approved, the RFP should be released this fall.
- The need to re-cache servers after routine maintenance activities remains one of the greatest obstacles to ensuring consistent CMS performance.
this in mind, the PAT has established a task group to investigate pre-caching strategies, and by October 15 will develop a recommendation for addressing this problem.

- The inability of CMS Central to “see” performance from the end-user's perspective is the single greatest obstacle to timely troubleshooting and maintaining end-user confidence in CMS. This fall, the PAT will partner with the Infrastructure Terminal Resources Project (ITRP) to identify and evaluate end-to-end performance management tools and develop recommendations for addressing this critical issue.