Webpersonals 20K Hardware Upgrade

Results and Conclusions

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Database Development, Support and Reporting

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# Background

This document outlines the results of the hardware upgrade which occurred on May 3, 2001 in an effort to increase Webpersonals online capacity to 20,000 concurrent users. This document also offers some conclusions and recommendations at a hardware level and a service level.

There are 4 basic types of users who access the Webpersonals System.

Guest Users

A Guest User is a user who enters the system without signing in. These users are typically the least taxing on the system. The number of guest sessions recorded on Webpersonals varies depending on the number and type of deals in effect at any given time. In general, Guest traffic is heaviest during the evening (7:00 pm to 2:00 am). During this time, Guest users can account for between 50% and 85% of all online traffic.

Free Members

A Free Member is a user who registers with Webpersonals and usually creates an identity. In general, this type of member generates over 6 times as many page requests as a Guest user which in turn has a greater impact across all of the Webpersonals components.

Paid Members

A Paid Member is a user who registers with Webpersonals, creates an identity and purchases credits. In general, this type of member generates over 9 times as many page requests as a guest user which in turn has an even greater stress across all of the Webpersonals components than a Free Member.

Administration/Associate Users

Administration and Associate Users represent less than 1% of the total site traffic. However, the activities that they execute are distinctly different from all of the other user types. Because of this fact, their online activities could potentially affect system performance in a negative fashion. This is especially true on the Administration database server (webdb1p).

The total number of concurrent users that Webpersonals can support is primarily dependent on the ratio of Guest/Free/Paid Users. The hardware upgrade that was done on May 3 was based on statistics that represented a high Guest to Member ratio. Statistics gathered after the upgrade are based on a lower Guest to Member ratio. This has lowered the estimated capacities across all of the Webpersonals components.

# Firewalls

Estimates in February showed that a new Firewall would not be required in order to support 20,000 concurrent users. These estimates did, however, show that the current 3 firewalls would be at capacity at 20,000 users.

A decision was made that a backup firewall would be necessary in the event of a failure. The new backup firewall was installed and configured in time for the May 3rd launch.

Webpersonals employs a simple fail-over strategy on the firewalls. If a firewall fails, all of the load normally directed to it is redirected to another firewall until it is fixed or a replacement is up and running. Under this strategy, if the new backup firewall was put into production and one of the 4 firewalls failed, one half of all of the traffic would be directed to a single firewall until the problem is resolved. This solution would not be effective at 20,000 users.

Conclusions

In order to support over 20,000 users at the Firewall level, a fourth firewall needs to be put into production. At this time a new Backup Firewall would have to be acquired.

It is also recommended that a more elegant method of load balancing be sourced that would spread the load evenly in the case of a Firewall failure. The current method is controlled by our service provider, doesn’t recognize a Firewall failure and balances incoming requests as opposed to outgoing traffic. Outgoing traffic is generally 5 times as great as incoming page requests.

# Apache Web Servers

Estimates in February showed that each Apache Web Server could handle a maximum of 1,400 concurrent users. This works out to a maximum of approximately 14,000 concurrent users across the initial 10 Apache Web Servers.

4 new Apache Web Servers were acquired and installed on April 25, 2001 in order to increase capacity at this level to 20,000 concurrent users.

Conclusions

Estimates after the upgrade show that the Apache Web Servers can now handle between 17,000 and 20,000 concurrent users. Extending capacity at the Web Server level with this hardware configuration would require one additional Apache Web Server for each additional 1,400 concurrent users.

Load testing on the Apache Web Servers has been inconclusive at this point as to whether or not the current 500 MB of RAM installed on each of these machines will be sufficient at peak levels. We will be investigating this issue further.

# Database Servers

## Results by Machine

### Webdb1p Results

Initially, this Database Server stored most of the Administration tables as well as all of the Manline and Womanline profiles. Estimates before the hardware upgrade showed that this Database Server could support a maximum of 19,000 concurrent users.

Conclusions

Estimates show that by removing the Manline and Womanline profiles from this server we were able to increase capacity by 35%. Statistics gathered after the hardware upgrade show that this server can now support up to 25,000 concurrent users.

### Webdb2p Results

Initially, this Database Server stored Astrology tables as well the heavily used Session Management tables. Estimates before the hardware upgrade showed that this Database Server could support a maximum of 18,000 concurrent users.

On May 3, 2001, the Session Management tables were removed from this server. This change increased its capacity by over 450%. In order to balance processing over the database servers, another modification was made on May 8, 2001 in which the Picture table and Session History table were added to this server.

Conclusions

Estimates show that after the change on May 8th we were able to increase capacity on this server by over 240% compared to pre-May 3rd estimates. Statistics gathered after the May 8th upgrade show that this server can now support up to 63,000 concurrent users.

### Webdb3p Results

Initially, this Database Server stored all of the Instant Messaging tables as well the heavily used Jump User table. Estimates before the hardware upgrade showed that this Database Server could support a maximum of 13,000 concurrent users.

On May 3, 2001, tables relating to A\_Intimate Instant Messaging were removed from this server. This one user community accounts for over 65% of all Instant Messages sent within Webpersonals.

Conclusions

Estimates show that after the change on May 3rd we were able to increase capacity on this server by 50%. Statistics gathered after the upgrade show that this server can now support up to 19,000 concurrent users.

### Webdb4p Results

Initially, this Database Server stored profiles for the A\_Dating community and A\_Romance community as well user Picture information and Session History. Estimates before the hardware upgrade showed that this Database Server could support a maximum of 12,000 concurrent users.

On May 3, 2001, Picture information and Session History data were removed from this server. This was the only change that could be accomplished without significant impact to the Perl Code. Unfortunately, this change did little to increase capacity on this server.

It became apparent that in order to get the capacity that was required, the Dating and Romance communities would have to be split across separate database servers. The Web Programming team reviewed the Perl Code base and made the changes to accomplish this task. On May 8th, 2001 the code changes were successfully implemented and the A\_Dating community was removed from this server.

Conclusions

Estimates show that after the change on May 8th we were able to increase capacity on this server by 50% compared to pre-May 3rd estimates. Statistics gathered after the May 8th upgrade show that this server can now support up to 18,000 concurrent users.

### Webdb5p Results

This Database Server was not altered in any way during the hardware upgrade.

Conclusions

Statistics show that the capacity on this server has dropped from an average of over 20,000 maximum users before May 3rd to 15,000 maximum users after May 8th.

This has occurred because the ratio of Guest users to Members has dropped since the beginning of May.

### Webdb7p Results

Webdb7p is a new Database Server which went into production on May 3rd, 2001. All of the Manline and Womanline community profile tables were installed on this server.

Conclusions

Statistics show the estimated capacity on this server at over 80,000 concurrent users. This estimate should remain accurate as long as Webpersonals maintains a constant ratio of gay to straight users.

### Webdb8p Results

Webdb8p is a new Database Server which went into production on May 3rd, 2001. All of the tables relating to Instant Messaging for the A\_Intimate community were installed on this server.

Conclusions

Statistics show the estimated capacity on this server at over 75,000 concurrent users.

### Webdb9p Results

Webdb9p is a new Database Server that went into production on May 3rd, 2001. Initially, user Pictures information and Session History were installed on this server.

Utilization on this Server after May 3rd was extremely low. On May 8th, 2001,

these tables were moved to database server webdb2p and the A\_Dating profile tables from webdb4p were installed on this server.

Conclusions

Statistics gathered after the May 8th upgrade show that this server can now support up to 50,000 concurrent users.

### Webdb10p Results

Webdb10p is a new Database Server that was originally earmarked for the upcoming Friends Community. It went into production on May 3rd, 2001, as a benchmarking exercise, with tables relating to Session Management.

The Session Management tables are used heavily by all users in the system. Performance problems on these tables can have a dramatic effect on overall performance across the Webpersonals system.

Conclusions

Statistics gathered after the May 3rd upgrade show that this server can support up to 27,000 concurrent users.

## Results by Service

The upgrades executed on May 3rd and May 8th were intended primarily as a means to extend online capacity but they were also structured in such a way as to give an indication of capacity by Service as well.

Components of the Webpersonals system can be broken down into specific functional groups or Services. The main Services provided by the application are: Administration, Session Management, User Tracking, Instant Messaging and Profile Searching and Maintenance.

By examining the limitations of a Service, we can begin to see where our ‘hard’ bottlenecks are. These ‘hard’ bottlenecks are our absolute capacities. Increasing capacity beyond these limits can only be achieved by re-engineering the application or hardware architecture.

### Administration

Major components of the Administration Service include Account transactions (sales and consumption), general User Information and Associate Information. Currently most of the Administration data is stored on Database Server webdb1p.

Changes made on May 3rd included removing Manline and Womanline profiles from this server. This has given us a true indication as to the amount of processing required for the Administration Service.

Current capacity estimates for the Administration Server show 25,000 concurrent users, however, this is not necessarily a ‘hard’ limit. By examining each component of this service it should be possible to distribute the Administration Service over multiple Database Servers without significantly re-architecting the application.

### Session Management

This service tracks users who are currently online.

Changes made on May 3rd included isolating the Session Management tables on a separate Database Server (webdb10p). Capacity estimates on this server show a maximum of 27,000 concurrent users. This number is the ‘hard’ limit for the Session Management Service since the tables that make up this service can not be distributed over multiple Database Servers.

There are a couple of simple options that will allow us to extend online capacity of this Service without the need to radically re-architect the application.

1. Change the Platform

A significant increase in capacity may be found by simply porting this service to Sybase on Sun. This would be simple to benchmark since there is little data in these tables and this data is not required for reporting purposes.

1. Scale the Service

Currently Session data is stored in a single table on a single server. It would be fairly easy to scale to multiple servers, each with a sub-set of the session data. For example, even numbered sessions could be stored on Session Server A and odd numbered sessions could be stored on Session Server B. This change would impact the Application Code base slightly but would allow for open-ended capacity on this Service.

### User Tracking

This Service tracks a user’s progression over time from a guest to a member. It is required both for internal reporting and reporting to ad partners and associates. Most of this service is accomplished through the Jump User table on database server webdb3p.

Webdb3p also stores Instant Messaging data. By examining Instant Messaging resource requirements on webdb8p we can get a fairly accurate picture of Jump User processing requirements on webdb3p. Our estimates show that if Jump User were isolated on its own Database Server, it would be able to handle up to 22,000 concurrent users.

Work is currently underway in 2 main areas to improve this process:

1) Re-architecting Jump User logic

The Web programmers have recently discovered some inefficiencies in how the Jump User table is accessed by the Webpersonals application. Programming is already underway to re-architect this service in order to make it more efficient. This will be done mainly by reducing the number of times the Jump User table needs to be accessed.

2) Reduce Online Data

The Web Business has agreed recently to reduce the amount of Production Jump User data from its current 3 years down to 90 days. Data older than 90 days will be archived on the reporting server. Reducing this data in production should mean that Sybase won’t need to search through as much data cache in order to find what it needs which should ultimately reduce CPU requirements, thus extending capacity.

Once the application changes and archiving processes have been implemented, the ‘hard’ limit of this process will be re-calculated.

### Instant Messaging

This Service allows members to message each other in real time.

As part of the May 3rd upgrade, the Instant Messaging Service for the Straight Intimate community was isolated on its own database server (webdb8p). Since this community represents 65% of all Instant Messaging, the absolute ‘hard’ limit of this community represents the ‘hard’ limit of the current Instant Messaging Architecture.

Statistics gathered from this server show an estimated capacity of 77,000 concurrent users. Since this service is due to be replaced long before Webpersonals reaches this volume of concurrent users, current IM architecture is not an issue.

### Profile Searching and Maintenance

Searching for and displaying profiles is the most extensively used service in the Webpersonals application. Most of the ongoing database and application tuning efforts have been put towards optimizing these processes. Although the tuning process is still underway it is not expected to increase capacity dramatically.

As of May 8th, 2001, all of the straight community profiles have been isolated on their own database servers. They cannot be distributed further under the current application architecture.

Estimated capacities for these communities are as follows:

|  |  |
| --- | --- |
| Community | Estimated Capacity |
| A Dating | 49,000 concurrent users |
| A Romance | 18,000 concurrent users |
| A Intimate | 18,000 concurrent users |
| Manline/Womanline | 82,000 concurrent users |

The business would like to offer even more intensive searching abilities to its Webpersonals customers (for example ordering results by best match), however the impact on performance under the current architecture would be too severe.

There are two options that will allow us to extend online capacity of this Service.

1. Change the Platform

A significant increase in capacity may be found by simply porting this service to Sybase on Sun. This solution would extend the life of this service under the current architecture. There would be an impact to reporting but this can be resolved fairly easily.

1. Scale the Service

In order to ensure long-term growth of Webpersonals, this service will need to be scalable. The best way to do this would be to replicate community profiles over multiple database servers with each database server supporting X number of concurrent users.