
Office of Student Financial Assistance

SFA Modernization Partner

FAFSA on the Web Release 6.0
Production Management Report

Task Order #42

Deliverable 42.3.4

January 31, 2002

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1.0 Executive Summary

The U.S. Department of Education's Office of Student Financial Assistance Programs (SFA) administers and operates the "Free Application for Federal Student Aid" (FAFSA). While available in paper form, SFA also provides this service through a web site. U.S. college students seeking student financial aid use the FAFSA program. During the academic year 2001-2002, over three million students used the web site to apply for federal financial aid. SFA anticipates that the number of users/applicants will double during the 2002-2003 academic year, and will continue to rise in future years as the number of paper submissions decreases. This anticipated growth makes it imperative that SFA maximize the capacity and availability of the FAFSA web infrastructure while at the same time minimizing the amount of support SFA's representatives will have to provide for questions by students or difficulties with completing the form. The web FAFSA product is commonly referred to as FAFSA on the Web and incorporates all requirements related to the paper FAFSA for each school year.

The FAFSA on the Web application was moved into the Production environment on 1/1/02 once the DNS change was initiated at 1:00 am ET as scheduled. Depending on a student's location, there was potentially a 1-2 day delay for when the application became available to everyone. Once the DNS propagation was completed, everyone could access the site.

The number of FAFSA on the Web submissions has increased over 50% in January compared to last year. The performance of the FAFSA on the Web application and architecture has been very good. Utilization of the web and application servers has been measured with average utilization reports. CPU utilization on the web and application servers has averaged less than seven percent. Memory utilization has also been as expected. The application continues to be monitored closely while capacity planning is constantly revisited and updated as appropriate.

2.0 Introduction

The U.S. Department of Education's Office of Student Financial Assistance Programs (SFA) administers and operates the "Free Application for Federal Student Aid" (FAFSA). While available in paper form, SFA also provides this service through a web site. U.S. college students seeking student financial aid use the FAFSA program. During the academic year 2001-2002, over three million students used the web site to apply for federal financial aid. SFA anticipates that the number of users/applicants will double during the 2002-2003 academic year, and will continue to rise in future years as the number of paper submissions decreases. This anticipated growth makes it imperative that SFA maximize the capacity and availability of the FAFSA web infrastructure while at the same time minimizing the amount of support SFA's representatives will have to provide for questions by students or difficulties with completing the form. The web FAFSA product is commonly referred to as FAFSA on the Web and incorporates all requirements related to the paper FAFSA for each school year.

The primary objectives for redesigning FAFSA on the Web were to leverage industry best practices to improve usability and accessibility by customers, performance of the web application during peak periods of FAFSA submissions, and create the foundation for efficient enhancements, as necessary. The areas of focus were:

- Usability & Accessibility
- Technical Capacity (technical infrastructure and application performance)
- Leveraging industry best practices around human interaction models for Web-based solutions

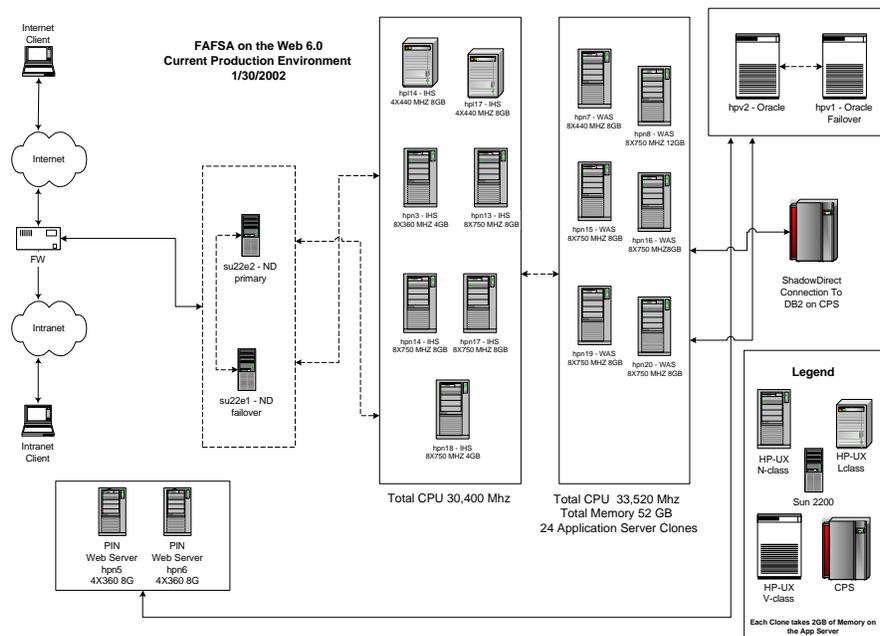
This Production Management Report includes the following:

- Section 3. Production Implementation. This section includes diagrams for the current production environment as of 1/31/02 as well as the planned production environment for peak capacity.
- Section 4. Production Status. This section provides a summary of the production status to include the number of FAFSA on the Web submissions and CPU utilization for web and application servers.
- Section 5. Recommendations. This section provides a summary of the recommendations from performance testing and analysis of the production performance for January.
- Section 6. Summary. This section provides a summary of the project and production status to conclude this task order.

3.0 Production Implementation

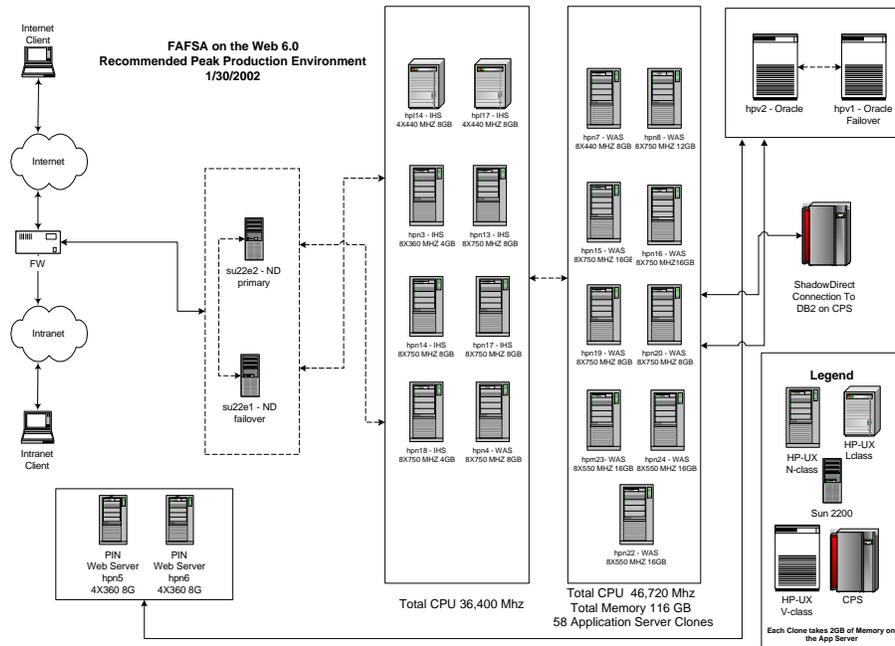
3.1 Current Production Environment

The following diagram represents the current production environment. Additional servers are being configured to support the peak loads as outlined in the following section.



3.2 Recommended Peak Production Environment

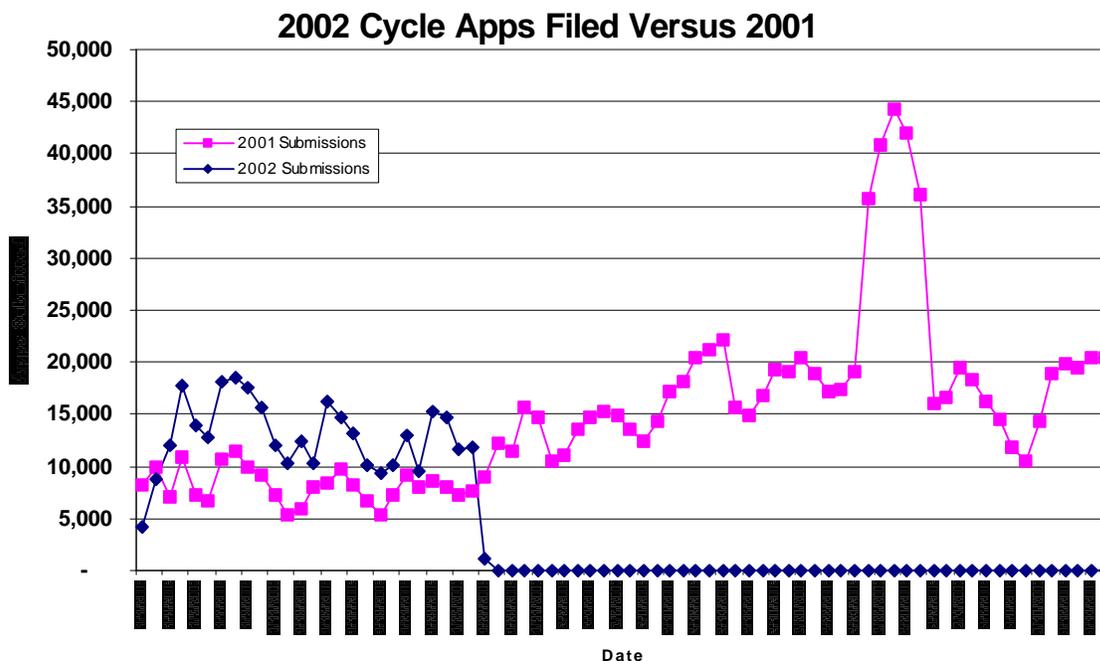
The following diagram represents the recommended production environment to support 2002 estimated peak volumes. We assume our volume will increase 100% from peak 2001.



4.0 Production Status

The FAFSA on the Web application was moved into the Production environment on 1/1/02 once the DNS change was initiated at 1:00 am ET as scheduled. Depending on a student's location, there was potentially a 1-2 day delay for when the application became available to everyone. Once the DNS propagation was completed, everyone could access the site.

The number of FAFSA on the Web submissions has increased over 50% in January compared to last year. The graph below outlines the total applications filed to date versus 2001 statistics.



The performance of the FAFSA on the Web application and architecture has been very good. Utilization of the web and application servers has been measured with average utilization reports. CPU utilization on the web and application servers has averaged less than seven percent. Memory utilization has also been as expected. The application continues to be monitored closely while capacity planning is constantly revisited and updated as appropriate.

The following issues have been identified, documented, and resolved since 1/1/02:

- The Oracle temporary save database required additional storage space (previously requested).

- The Oracle session database archive log was removed since it is not required. This was causing the table to become unnecessarily larger than needed.
- The Oracle parameter setting “extents” needed to be changed to unlimited to allow more temporary saves to be made.
- A hung process on the web server was identified and fixed.
- An imbalance of the CPU utilization was detected. There was an SSL permission issue that was subsequently fixed.
- A code change was made to fix reference from “index.html” to “index.htm.”

5.0 Recommendations

The performance testing effort found areas for potential performance improvements in the application, architecture, and infrastructure. Outlined below is the list of items that can be evaluated as future enhancements to the system:

- Optimize the redirection from the FAFSA on the Web site to the PIN site when authenticating. During our performance tests we found that the network communication from the FAFSA Site to the PIN Site took a significant amount of time, when redirecting for authentication.
- Additional tuning and testing of the load balancer. Although we never found any specific bottlenecks on the IBM Network Dispatcher and SUN Solaris operating system, tweaking Solaris and/or Network Dispatcher may give some additional performance gains. Applying patches and tweaking the HPUX OS improved performance.
- Test a higher number of application server clones on the Websphere server. Our test environment was limited to 4 clones per server because of our server memory configurations (8GB per server). Testing and implementing a higher number of clones per server will verify a more cost effective configuration, with a lower number of servers supporting more clones.
- Optimize the FAFSA on the Web HTML. The site's look and feel and HTML was redesigned and is performing at acceptable response times. Experts recommend continued optimization of HTML for improved response times. Reducing the number of images on the Home Page and other FAFSA on the Web forms will result in better network throughput. Some of the images can be combined into two or three groups of images. This will also reduce the number of hits on the web server. The number of links on the Home Page should also be revisited.
- Future testing of CPS (Stored Procedures and DB2) is recommended. FAFSA performance testing found the outlined areas for improvement in the backend. Although the changes listed below were implemented for production, continued testing will help achieve an optimized backend configuration.
 - FAFSA performance testing resulted in a change to the WLM service definition for production. The order of importance for CPS services was modified.
 - FAFSA Performance testing resulted in a change to the buffer pool (EDM) in DSN1 DB2 for production. This change was made to help deal of an increase in threads to DB2.
- Production testing with test data. Ideally, there should be a way to stress test high volumes in the Production environment during off hours using test data. Testing in the production environment guarantees that no issues will be encountered at defined loads.
- The areas listed below were evaluated, but no immediate benefit was identified. They are, however, areas for future consideration.

- Introducing a Cache Engine to improve the performance of the web servers. Since our environment does not contain a significant amount of dynamic data. A cache engine would allow us to cache much of our html.
- Introducing and testing a supported SSL accelerator card or appliance. Currently, there are no accelerator cards that support our Websphere/HP architecture.

The FAFSA application and infrastructure should continue to be tested and tuned as appropriate. Future performance tests should target an integrated system (possibly in production) including FAFSA on the Web, PIN Site, and CPS.

6.0 Summary

The FAFSA on the Web 6.0 project is on schedule with many planned activities completed. The detailed project work plan, CRAD, Functional Specification, High-Level Design, and Detailed Design Documents (DDD's) have been documented and delivered. Development, unit testing, functional testing, usability testing, and ED accessibility testing were completed on schedule. System and ED acceptance testing were also completed. Additional performance test cycles were planned, conducted, and completed. The Modernization Partner team worked with the VDC team to have the production environment configured and available for beta testing and production deployment on schedule.

All known issues and risks have been identified, and are being monitored closely. Specific action required for resolution is being taken. The Modernization Partner has successfully met the following guiding principles:

1. Production Delivery by 01/01/02 to support the 2002 – 2003 school year.
2. New look and feel for easier usability and enhanced accessibility of the application.
3. N-Tiered Integrated Technical Architecture (ITA) that conforms to SFA's infrastructure standard and forms the foundation for effective upgrades and enhancements. These SFA standards include WebSphere, IHS, and Oracle.
4. Improved performance and scalability to meet customer demands and technical capacity.
5. Maximum re-use from the Release 5.x design, code, and documentation to meet the goals of the FAFSA on the Web initiative.

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