

# Wayne State University



## Building an Integrated Campus Infrastructure with Sun ONE

### Key highlights

#### Institution

Wayne State University

#### Industry/Market

Education

#### The Goals

- Facilitate internal and external collaboration.
- Expedite the sharing of networked resources.
- Make it easy for people to do business with Wayne State.

#### Business Challenges

- Aligning long-term infrastructure decisions with business goals.
- Leveraging enterprise application investments.
- Creating an open messaging and middleware environment that can evolve with business needs.

#### Solutions

- Sun™ ONE architecture
- Sun ONE middleware
- Sun servers and storage
- SCT applications

*"To succeed in the future, universities will have to provide individuals with convenient, personalized, self-service access to information and services. The foundation for delivering these services is an absolutely reliable computing and networking infrastructure, period."*

*- John Camp, Associate Vice President, Wayne State University*

Wayne State University (WSU) is a Sun Center of Excellence for Administrative Systems for higher education. This case study describes how WSU built an integrated campus infrastructure based on open standards and cross-platform integration using the Sun Open Network Environment (Sun ONE).

Wayne State University is Michigan's only urban research university, fulfilling a unique niche in providing access to a "world-class education in the real world". Wayne State's 14 schools and colleges offer more than 350 major subject areas to about 32,000 graduate and undergraduate students.

Universities such as WSU are moving quickly to adjust to the realities of more competition and a greater focus on educational processes. Accordingly, leaders in higher education are enlisting all possible resources to meet these challenges and maintain their academic reputations. One of the key resources at their disposal is technology. At WSU, the Computing & Information Technology (C&IT) division's primary objective is "to enhance Wayne State University's teaching, learning, research, and service activities."

In the mid to late 1990s, C&IT convened two commissions charged with developing realistic and comprehensive technology plans to chart the division's strategic direction through the year 2005. Table 1 summarizes some of the core realities in education that drove the commissions' efforts.

The commissions developed plans that outlined the future of technology at the university and the IT infrastructure needed to support it. The bottom line was that WSU needed to act quickly to remain an educational front-runner.

### Three High Priority Goals

WSU's strategy included three high-priority goals: facilitate communication and collaboration, share networked resources, and make it easy to do business with the university.

#### Internal and External Collaboration

Universities are by nature collaborative institutions. One individual working alone rarely publishes academic papers; classes are often co-taught by professors; and projects are often assigned to teams. The advent of the Internet hastened the degree of university collaboration to the point where WSU faculty members now expect to work with their colleagues across the university to develop proposals, conduct research, and publish articles about their work. Faculty also actively engage in collaborative work with faculty at other universities, especially at Internet2 member institutions. (Internet2 is a consortium of more than 200 universities working in partnership with industry and government to develop and deploy next generation network applications and technologies.)

Used appropriately, electronic collaboration also can substantially enhance teaching and learning. For example, both faculty and students can use electronic systems, such as video conferencing or document management, to work together on projects best completed by teams.

#### Sharing Resources

In addition to collaboration, sharing resources within and among universities is vital, especially when budgets are constrained. The National Science Foundation's recent grant to connect the Gemini north and south telescopes in Hawaii and Chile, respectively, to the Internet2 backbone is a good example of sharing scarce resources with the Internet2 community. With

the explosive growth of the I2 backbone, more of these resources will be available at more locations, and Wayne State wants to give student and faculty access to them as required and appropriate.

#### Easy To Do Business With

With the 'broadbanding' of America, people will have capable connections to colleges and universities throughout the nation. As this occurs, universities that are easy to do business with will have a strategic advantage in attracting and retaining students, employees, and external support. However, acquiring this reputation requires that universities create a robust IT infrastructure and implement Internet-based, self-service (and hence personalized) systems to deliver conveniently available services to users.

Self-service information systems have the potential to dramatically improve services, streamline processes, and reduce costs. For example, in the banking industry, ATM machines and online banking have changed the way bank employees interact with their customers. Customers are often able to handle routine tasks without assistance while bank employees deal with more challenging tasks and new opportunities.

At WSU, students, employees, and others can view information about the university and discover answers to a broad range of questions, track progress of requests, edit personal information, and perform many other tasks. To capitalize on self-service, WSU recently opened a welcome center that consolidates many student and employee services in one convenient location on campus. John S. Camp, WSU's CIO and vice president for information technology, said, "Wayne State's goal is to enable prospects, students, employees, alumni, and others to access information and services at their convenience, not ours."

#### Table 1: The New Realities of Education

- \* Colleges and universities are pressed to do more with less.
- \* Competition will become increasingly intense for students, employees, and external support.
- \* The future will have fewer universities reaching students worldwide.
- \* Technology must play a strategic role in shaping universities of tomorrow.

### Aligning Priorities with IT Decisions

Wayne State is working toward the goal of being collaborative and easy to do business with by rebuilding its network infrastructure, implementing communication solutions, and replacing its entire suite of legacy applications with SCT's Banner suite. To unify access to Banner and other IT resources and bring self-service to customers, WSU is using SCT's Campus Pipeline solutions including Luminis and Documentum. Because Sun Microsystems™ produces high-performance yet scalable and cost effective servers, storage and middleware products, WSU chose Sun and Sun ONE to 'optimize' SCT.

In addition to SCT Banner and Campus Pipeline, WSU has installed a base of collaborative products from Blackboard, Oracle, Mirapoint and other companies running on a collection of shared and dedicated servers from Sun.

To tie these disparate applications together, WSU needed to implement a middleware strategy that truly facilitated access to heterogeneous resources. The primary challenge facing Wayne State was how to design, test, and 'optimize' an

integrated solution for running all of these systems.

The university's IT team realized the critical nature of this endeavor. According to John Camp, Associate Vice President, "To succeed in the future, universities will have to provide individuals with convenient, personalized, self-service access to information and services. The foundation for delivering these services is an absolutely reliable computing and networking infrastructure, period."

After an evaluation of middleware providers, WSU adopted Sun ONE's open and standards-based vision, architecture, platform, and expertise for delivering its next-generation Web Services. Although Wayne State had been an early adopter of the Sun ONE architecture, the long-term goal is to ensure that its decisions are consistent with the trends in higher education. Figure 1 illustrates the key components of the WSU campus architecture and other university campus architectures being developed using Sun ONE. In the next section, we illustrate an important part of this architecture - middleware.

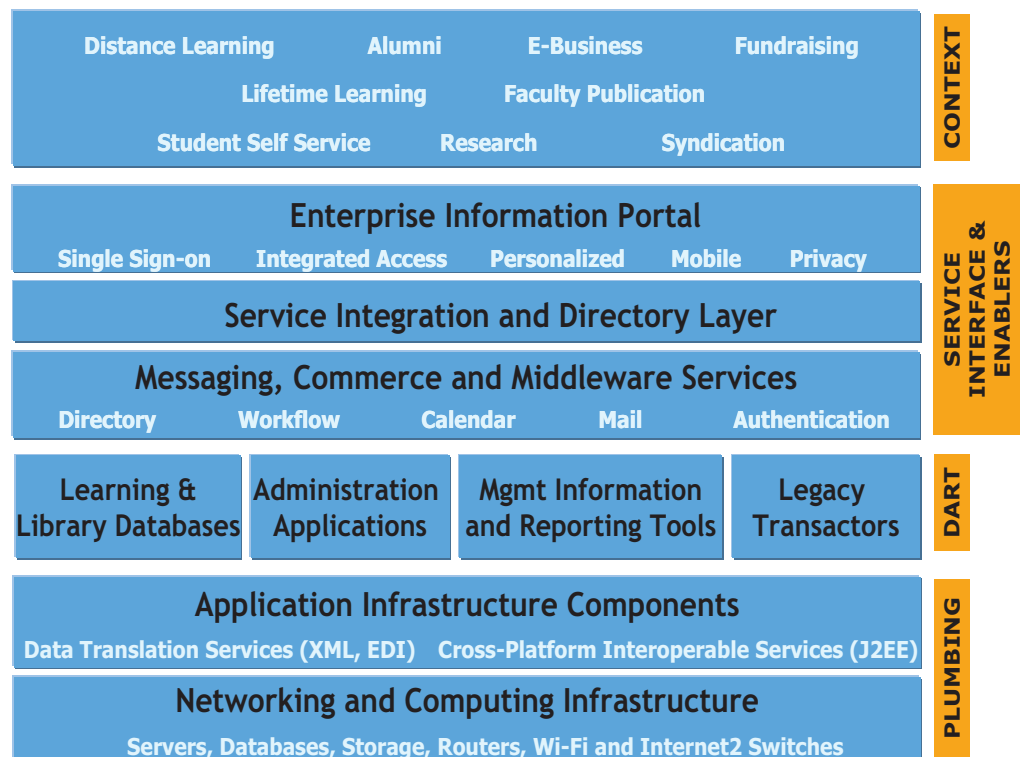


Figure 1. Wayne State University's Next-Generation Architecture

**Middleware Is the "Glue"**

Middleware is useful for meeting two objectives: 1) consolidating fragmented back-end servers, and 2) enabling new Internet-based services such as network identity management. These new services ensure that individuals who are authorized to access and use certain resources or services can do so on demand.

To meet these objectives, WSU engaged Sun and consultants from Internet2 universities to review the state of middleware at WSU, in particular directories, and make recommendations about next steps.

An important component of middleware is the directory server. Directories, especially, have and will continue to play major roles in supporting WSU's single sign-on initiatives and in improving collaboration and sharing between other

universities. They provide a means of authenticating and authorizing internal and external users by removing the requirement for applications to store their own authentication information. Instead of storing application-specific versions of authentication information, applications can use data stored in a highly available Sun ONE Directory Server. This provides not only a single password for users and possibly reduced or single sign-on, but also enables support for stronger authentication, using digital certificates.

Selecting a directory model and architecture is part of a much larger middleware decision. WSU carefully orchestrated this decision. Here are some of the key steps in this process.

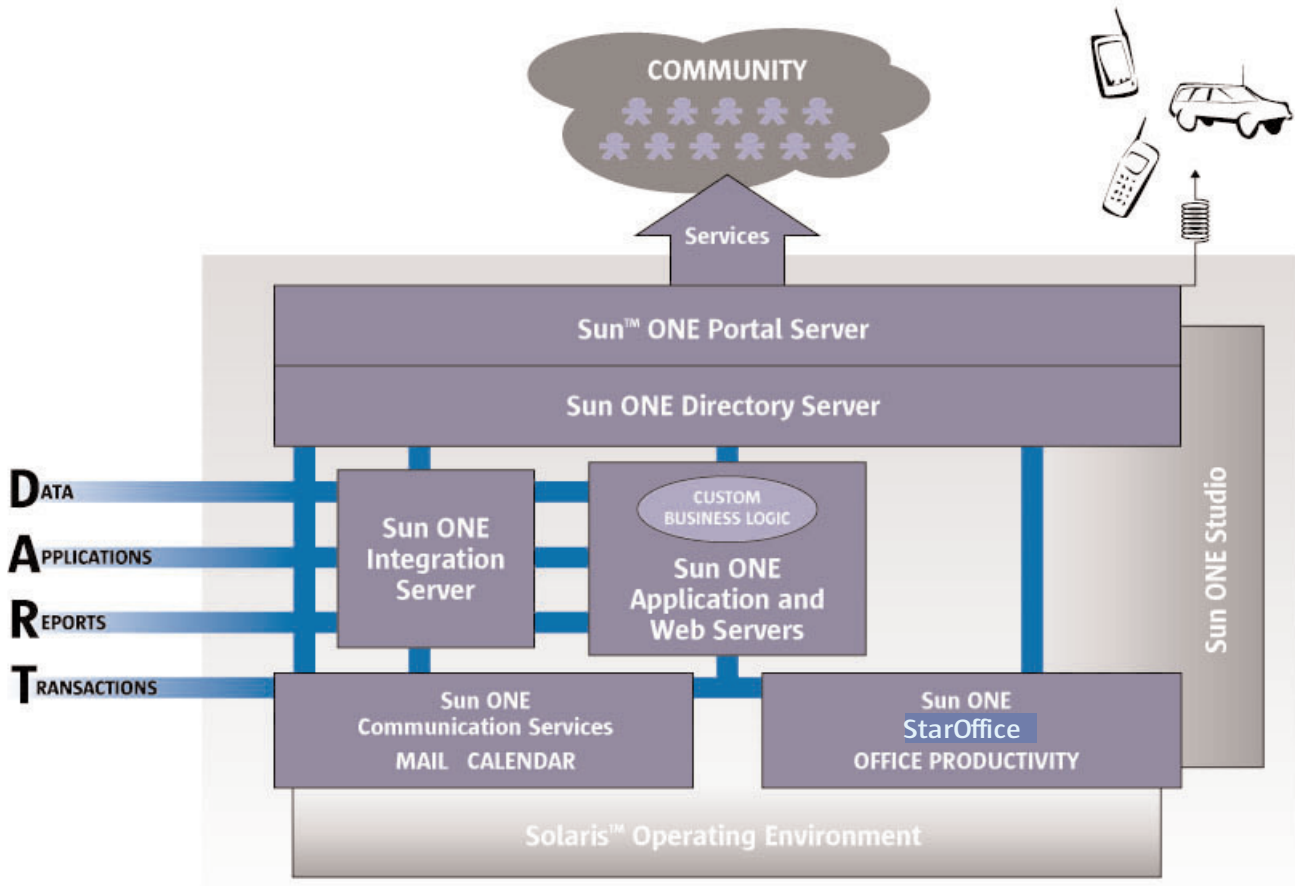


Figure 2 Sun ONE Services On Demand Platform

*Table 2: Sun ONE Products at Wayne State*

- \* Sun ONE Directory Server
- \* Sun ONE Meta-Directory Server
- \* Sun ONE Proxy Server
- \* Sun ONE Calendar Server
- \* Sun ONE Web Server

### Middleware Selection Process

The first step in the middleware process involved a thorough inventory of WSU's enterprise and school/college directory activities, basically, an assessment of the university's current state of middleware - architecture, products, and support. While the review project is still in progress, the project's team submitted preliminary recommendations that are underway. They include:

- \* Enterprise directory decision. Use Sun ONE directory servers for both enterprise directories and, as appropriate, secondary directories. Sun's directory server is highly scalable and satisfies the performance expectations of large organizations. In addition, standardizing directory servers will enable WSU to better support and organize directory services campus-wide.
- \* Secure identity management decision. Select Sun ONE Identity, Meta, and Proxy directory servers to manage secure access to web-based resources, consolidate and aggregate identity information from disparate sources, and route requests from clients to the appropriate directory server, respectively.
- \* User Information Consolidation Decision. Use the Sun ONE Meta-Directory and the standards-based Sun ONE Directory Server to provide a consolidated directory repository and the tools to merge disparate directories and information sources.
- \* Integration Decision. Use the Sun ONE Meta-Directory product to support integration of multiple, heterogeneous directory environments, and to provide the next generation of functionality to its existing directory services environment. Capitalizing on the fact that Campus Pipeline uses Sun ONE products as the foundation for self-service and for provid-

ing "personalized" information to students, employees, alumni, and others.

- \* Interoperability Decision. Implement the Internet2 requirements for enterprise and secondary directories to ensure interoperability within the university and with Internet2 member universities. To make this happen, WSU quickly formed an Internet2 Advisory Group that includes members of the LDAP Directory and Campus Pipeline technical staff.
- \* Education and Acceptance. Increase membership of the cross-functional LDAP development directory team and continue to build close relationships with possible middleware customers on campus.
- \* Directory Architecture Decision. Develop a strategy for the directory information model, including: creation of principles and guidelines; communicating the model's benefits to the university community; developing a catalog of repositories (initial mapping of attributes and authoritative sources), and of directory-related initiatives; refining the definition of "globally interesting" data.
- \* Develop a design and implementation runbook document that details the schema design; the access control design; attribute/object synchronization flow definitions; directory management processes (including DIT modifications); backup and restore procedures; replication agreements; the security policy; and synchronization scripts.

Other Important Management Activities include: Developing a directory upgrade deployment strategy document, providing training, initiating a pilot phase, preparing for an early production phase, consolidating legacy directories and eliminating redundant procedures.

All these decisions combined represent a proposed path towards establishing consistent directory services and consolidating multiple directories into a single logical directory service.

WSU recognizes that the management of directory-centric information is based on well-founded principles in both automated and manual environments. What is new is the capability of bringing together large quantities of related yet diverse information in ways that will help to improve efficiency today and position WSU for the future, particularly in areas that focus attention on Internet2 relationships.

Perfect configuration and appropriate hardware alone will not guarantee that WSU will run reliable directory and other middleware services. As a result, the university is considering changes to staffing, organization, and training for those responsible for middleware at the university. Even these measures are not enough to propel the university to its final goal of being easy to do business with. A partner in the middleware project was deemed critical, laying the foundation for a closer WSU-Sun Center of Excellence.

### Beyond Middleware: Moving to Services on Demand

Middleware is the means to the end. The end is enabling increased collaboration, the sharing of networked resources, and making it easy to do business with the university. To

make all of these objectives real, other components of the Sun ONE architecture will be necessary.

Sun ONE is the acronym for Sun Open Net Environment. Sun ONE represents the vision, products, services, and expertise of Sun to enable the delivery of Web Services today and Services on Demand tomorrow. It is Sun's Web Services strategy. Web Services are self-describing applications that can discover and build on DARTs - data, applications, reports, and transactions that collectively form the invaluable information assets of an organization or university. WSU's learning and library databases, as well as its administration applications are examples of DARTs.

The underlying ideas of Services on Demand are to understand user context, traverse multiple networks, and provide a rich user experience, all in an open architecture. Sun ONE is a platform that enables higher education to create, assemble, and deploy XML-based Web Services (see Figure 2).

### Wayne State University & Sun: Lessons Learned

Wayne State and Sun first began working closely together when Sun designated the university a Sun Center of Excellence for Administrative Systems in fall 2000. (A Sun Center of Excellence is an academic or other not-for-profit institution that has distinguished itself as a leader in technology and research,

and is furthering the advancement of knowledge in an industry.)

The Sun Centers of Excellence program is helping to define and advance the future of computing and information technology. As a Center of Excellence, WSU's most important work deals with facilitating collaboration, sharing resources, and making it easy to do business with the university. To accomplish these goals, the university chose Sun and Sun ONE to provide integrated access to heterogeneous information resources in the form of self-service Services on Demand.

Since being designated a Sun Center of Excellence for Administrative Systems, WSU has demonstrated that the information technology environment for high quality E-Services is much different than the environment for mainframe (legacy) systems that evolved over decades of experience. The basic requirements for E-Services are that they be Internet based, always available, self-service and have the performance and integrity that customers expect. In addition, when problems occur, they have to be detected before customers do, and they have to be solved quickly. As WSU continues its quest to implement highly available, self-service information systems, the university will continue to share its experiences and 'lessons learned' with others in higher education.

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