

Sun™ ONE Application Server Always-On Technology

Enabling five 9s availability for application server session state persistence.

Sun™ ONE
Open Net Environment



INTRODUCTION

As more and more mission-critical applications move to the Internet as Web services, the need for uninterrupted, 24x7 access to those services increases. Organizations cannot afford any type of downtime — planned or unplanned — for services delivered to customers, partners, suppliers, and employees over the Web. The goal of this paper is to:

- Provide an overview of how the Java™ 2 Platform, Enterprise Edition (J2EE™) technology-compatible Sun™ ONE Application Server helps to deliver near continuous availability through the integration of the Sun ONE Application Server's patented Always-On Technology
- Focus on the benefits of the Always-On Technology component of the application server

THE SUN ONE APPLICATION SERVER

The Sun ONE Application Server (formerly iPlanet™ Application Server) is a key component of the Sun Open Net Environment (Sun ONE) — Sun's vision, architecture, platform, and expertise for delivering enterprise-class Services on Demand. The Sun ONE Application Server offers a unique, new modular architecture based on several of the industry's most proven, high-performance, standards-compliant components. And with the addition of Sun's Always-On Technology, the Sun ONE Application Server, Enterprise Edition will provide enterprises and service providers with extremely high quality of service and load-balanced performance for their mission-critical applications.

ALWAYS-ON TECHNOLOGY

Sun's unique Always-On Technology was developed by Clustra Systems, Inc., a company acquired by Sun Microsystems in March, 2002. Always-On Technology is designed to provide a massively scalable, highly available session state persistence infrastructure for deploying robust applications created using J2EE technology.

Capable of exceeding five 9s data availability, Clustra Systems' patented technology offers an ideal platform for delivering all types of session state persistence within a highly loaded enterprise application server environment. With the introduction of the new Sun ONE Application Server, Sun is fully integrating the Always-On Technology into the J2EE technology-based application server.

THE HIGH AVAILABILITY CHALLENGE

Early Web application server architectures achieved availability in the application tier by providing multiple redundant J2EE containers with a load-balancing mechanism. If an application or container should fail, there are other containers available online; the application can easily *fail over* to another container. This approach works well, providing the applications are stateless.

Most application sessions, however, have some stateful information, ranging from the contents of your shopping basket, your preferences, or work in progress. Without a mechanism to maintain session state, applications can lose information, and the entire user experience is compromised.

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Today, there are two approaches commonly used to address this issue. The first is to have some common storage for stateful information shared between pairs of containers. Should one container fail, applications can be restarted on the second container and can easily access the common state information. While this approach performs well, it is subject to failure if both containers are highly loaded at the time of initial failure.

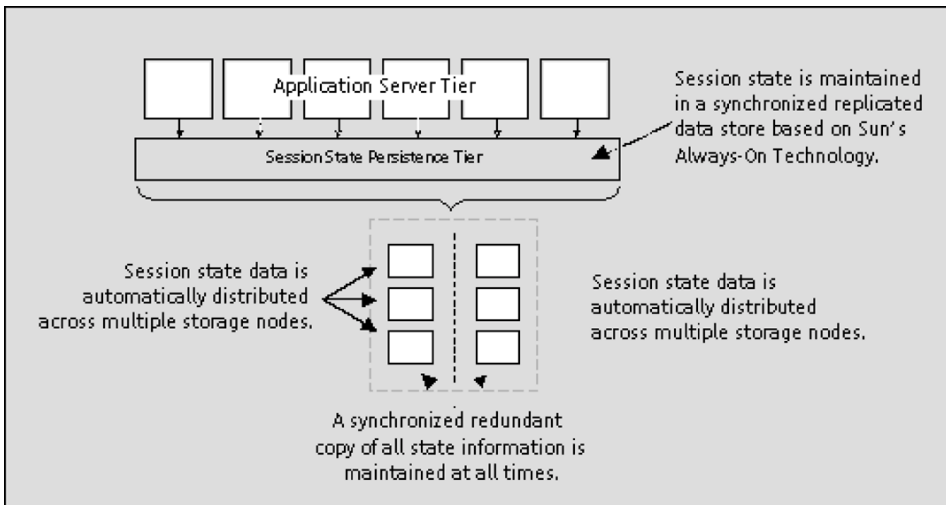
The alternative approach is to utilize a standard relational database as the persistence mechanism, using the database to store and retrieve all stateful information as needed. However, while robust, this approach introduces performance bottlenecks. And it also requires that the administrator install and manage a highly available implementation of the database.

MITIGATING DOWNTIME WITH THE UNIQUE ALWAYS-ON ARCHITECTURE

Sun's solution, based upon Always-On Technology, shares the best characteristics of traditional solutions — without the corresponding weaknesses. Session state information is stored in a separate, but tightly integrated persistent storage tier, with a number of key architectural elements:

- **Separate Business Logic and Persistence Tiers** — Unlike approaches that manage session state persistence in the business logic tier, the Sun ONE Application Server Always-On Technology either logically or physically separates J2EE application logic from the underlying session state persistence tier (see Figure 1). This enables greater scalability across both business logic and persistence tier while allowing for integrated installation and administration.
- **Distributed, Replicated State Information** — Application session state data is automatically replicated and distributed across multiple servers. Any individual component can fail without affecting an application's ability to retrieve the session state.
- **Inherent Data Availability** — Always-On Technology delivers near-continuous availability for application session state data without the management and hardware requirements of a traditional relational database. With the Always-On Technology, application session state data is synchronously replicated.
- **Horizontal Scalability** — As the load and throughput requirements grow, additional servers for application support and session state maintenance can be easily added without downtime — yielding near linear horizontal scaling.
- **Self-Repair** — Sun's Always-On Technology identifies failed servers and can automatically repair to alternative servers, raising overall system availability.
- **Shared-Nothing Architecture** — The underlying architecture used by Sun's Always-On Technology is inherently distributed, eliminating bottlenecks and facilitating high throughput across multiple servers.

FIGURE 1: ALWAYS-ON TECHNOLOGY ARCHITECTURE



During normal operation, application session state is automatically replicated — in a transparent fashion — to the persistent storage tier. Unless a failure occurs, failover is not required because state information is still maintained in the application tier. Should an application session fail for any reason, or need to be restarted in an alternative container, any container within the cluster can rapidly retrieve the state information — with no user perceived difference in responsiveness.

ALWAYS-ON TECHNOLOGY DELIVERS

Sun's unique approach provides several benefits over traditional solutions.

- **Simplified Management** — The session state persistence mechanism is integrated into the overall solution, simplifying management and eliminating the need to manage a separate database product.

- **High Performance** — The distributed shared-nothing architecture ensures high throughput and low latency — even when recovering session state by alternative containers.
- **Scalability** — The application server and persistence tier can scale online across dozens of servers, enabling customers to right-size their solutions and grow rapidly as their needs expand.

With the built-in Always-On Technology delivered in the Sun ONE Application Server, Enterprise Edition, organizations can minimize downtime. In conjunction with Sun's overall commitment to the high-availability of an enterprise environment, the Sun ONE Application Server takes the next step forward in providing substantial improvements in the area of high availability for J2EE technology-enabled applications.

Sun™ ONE Application Server Always-On Technology

ABOUT SUN ONE

The Sun Open Net Environment (Sun ONE) is Sun's vision, architecture, platform, and expertise for delivering Services on Demand today and in the future. Based on open standards such as Java and XML technology, Sun ONE provides a highly scalable and robust framework for building and deploying a variety of Services on Demand — from traditional Web-based applications to future context-aware Web services. By simplifying the way Web services are created, assembled, and deployed, the Sun ONE platform can enhance productivity, speed time to market, and increase business opportunities for enterprises worldwide.

Sun Microsystems, Inc. 901 San Antonio Road, Palo Alto, CA 94303-4900 USA Phone 800 786-7638 or +1 512 434-1577 Web sun.com



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Sun Worldwide Sales Offices: Africa (North, West and Central) +33-13-067-4680, Argentina +5411-4317-5600, Australia +61-2-9844-5000, Austria +43-1-60563-0, Belgium +32-2-704-8000, Brazil +55-11-5187-2100, Canada +905-477-6745, Chile +56-2-3724500, Colombia +571-629-2323, Commonwealth of Independent States +7-502-935-8411, Czech Republic +420-2-3300-9311, Denmark +45 4556 5000, Egypt +202-570-9442, Estonia +372-6-308-900, Finland +358-9-525-561, France +33-134-03-00-00, Germany +49-89-46008-0, Greece +30-1-618-8111, Hungary +36-1-489-8900, Iceland +354-563-3010, India-Bangalore +91-80-2298989/2295454; New Delhi +91-11-6106000; Mumbai +91-22-697-8111, Ireland +353-1-8055-666, Israel +972-9-9710500, Italy +39-02-641511, Japan +81-3-5717-5000, Kazakhstan +7-3272-466774, Korea +822-2193-5114, Latvia +371-750-3700, Lithuania +370-729-8468, Luxembourg +352-49 11 33 1, Malaysia +603-21161888, Mexico +52-5-258-6100, The Netherlands +00-31-33-45-15-000, New Zealand-Auckland +64-9-976-6800; Wellington +64-4-462-0780, Norway +47 23 36 96 00, People's Republic of China-Beijing +86-10-6803-5588; Chengdu +86-28-619-9333; Guangzhou +86-20-8755-5900; Shanghai +86-21-6466-1228; Hong Kong +852-2202-6688, Poland +48-22-8747800, Portugal +351-21-4134000, Russia +7-502-935-8411, Singapore +65-6438-1888, Slovak Republic +421-2-4342-94-85, South Africa +27 11 256-6300, Spain +34-91-596-9900, Sweden +46-8-631-10-00, Switzerland-German 41-1-908-90-00; French 41-22-999-0444, Taiwan +886-2-8732-9933, Thailand +662-344-6888, Turkey +90-212-335-22-00, United Arab Emirates +9714-3366333, United Kingdom +44 0 1252 420000, United States +1-800-555-9SUN or +1-650-960-1300, Venezuela +58-2-905-3800

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