

BENEFIT FROM



Continuous Availability for SAP® Perfect Plant Solutions

Simplify your plant IT infrastructure and deliver robust availability with Stratus® fault-tolerant servers, storage and virtualization technology



Abstract

SAP AG has taken an innovative business approach to delivering manufacturing integration and intelligence to the shop floor through a program called the **Perfect Plant**. The Perfect Plant program brings together best-of-breed solution partners – creating a technology ecosystem that delivers the functionality, integration, data synchronization, and certified platforms that enable companies to optimize their performance. In this paper Stratus Technologies, an SAP Global Technology Partner with a singular focus on ensuring end-to-end availability, describes best practices for the IT infrastructure required to deploy SAP Perfect Plant solutions.

Global Challenges, IT Complexity

To achieve imperatives for efficiency, quality and regulatory compliance, manufacturing, oil, and utilities companies are implementing integrated IT solutions. Manufacturing Execution Systems (MES) are becoming commonplace, and islands of automation are disappearing now that interdependent systems are fundamental to running production and maintaining required records.

At the same time, in order to respond quickly to changing market demands, industrial companies need solutions that allow them to efficiently exchange data between their manufacturing plant floors and the rest of their enterprise in real time. Companies are turning to the SAP[®] Manufacturing Integration and Intelligence (MII) packaged composite application, which integrates their enterprise resource planning (ERP) applications with systems at the plant. A key component of the SAP Perfect Plant, SAP MII enables companies to make better business decisions by gathering real-time manufacturing intelligence using data pulled from plant operations.

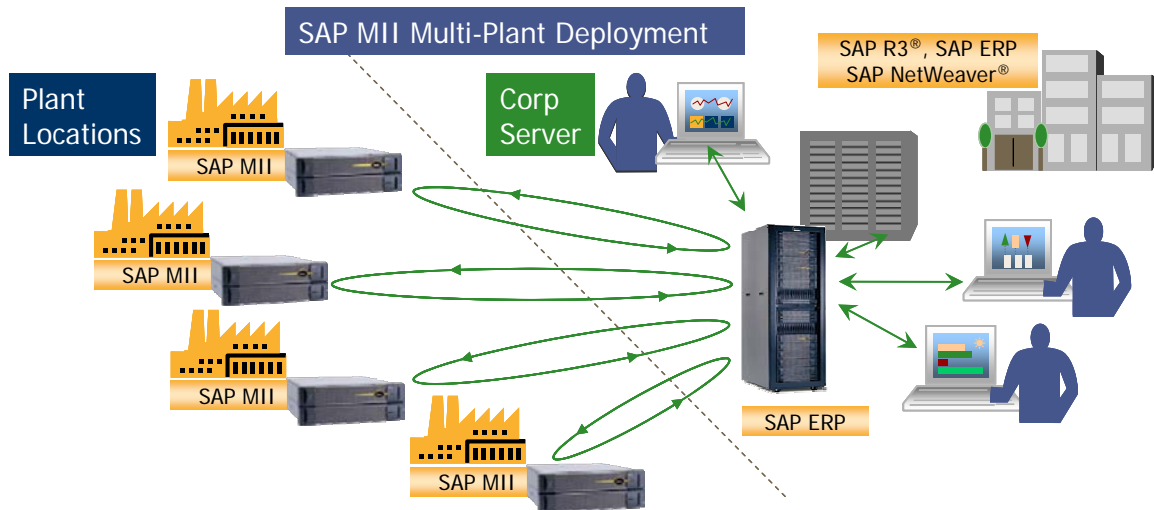
Creating an SAP Perfect Plant

The vision of the SAP Perfect Plant is to create a technology ecosystem that delivers the functionality, integration, data synchronization, and certified platforms that enable manufacturers, oil companies, and utilities to optimize their performance. Stratus plays a key role in this vision, delivering the platform of choice to support the SAP MII application, as well as other SAP and third-party applications, as they run on the plant floor.

Traditionally SAP applications ran inside a controlled datacenter supported by a dedicated staff trained in managing and maintaining complex IT infrastructure. The datacenter, which is connected to a company's remote plants via a wide area network (WAN), receives data from the shop floor and stores it in a central location. Unfortunately, should the WAN go down, the remote plants are left stranded, disconnected from the main instance of the SAP application. In addition, when regular maintenance occurs, such as installing patches, production on the plant floor can grind to a halt as systems are taken offline to perform the necessary activities in the datacenter.

SAP Perfect Plant solutions can resolve these problems. In this scenario, SAP applications like SAP MII are deployed onto servers located at the plant. SAP MII provides real-time connectivity between the plant floor and business operations by linking a variety of plant floor applications to the ERP system. In addition, SAP MII offers manufacturing visualization and analytics tools that provide plant personnel with a single view of their operations via a role-based dashboard that delivers alerts, reports and key performance indicators.

Figure 1: Perfect Plant Implementation



This new way of working offers key business benefits to industrial companies. For example, business operations personnel now have access to real-time data – including information on orders, materials, costs, and product quality – that facilitates business decisions, improves asset performance and order fulfillment, and reduces operational costs.

Equally important, having servers running the SAP MII application located in each plant significantly reduces the costs associated with planned and unplanned system downtime. If a plant is disconnected from the main instance of SAP due to a WAN failure or because of maintenance activities in the datacenter, the SAP MII server in the plant can provide the required SAP screens and collect all the transactions taking place in the plant and then synchronize them with SAP in the datacenter when it becomes available.

Although SAP MII and other mission-critical production systems have arrived at the plant, the additional IT specialists to support them have not. Often, operating and maintaining the plant computing infrastructure is one more duty piled onto the already full workload of the plant engineer who oversees a facility's automation equipment. This is far from an ideal situation for critical SAP infrastructures that need to be available 24/7.

New Best Practices Required

When things go wrong, the benefits that advanced IT solutions bring to your production facility can be undone in a flash. Unplanned computer downtime can idle production lines and puts critical manufacturing data at risk of loss or corruption. For some manufacturers, government regulations may leave no choice but to destroy an entire batch of product when production data is lost. The potential impact ranges from thousands to millions of dollars.

As a result, platform robustness, security, disaster recovery practices, and change management of the computing infrastructure must also be retooled to meet the needs of an IT powered, perfect plant. In highly regulated industries such as life sciences and chemical processing, just keeping up with routine change management often overwhelms plant resources, entailing an expensive process to make sure no problems are introduced along with the patches and upgrades.

Figure 2: Impact of IT Complexity on Plant Environments

Complex Solutions Result in IT Pain	
▪	Unplanned application downtime
▪	Backup, Disaster recovery
▪	Change Management <ul style="list-style-type: none"> ▪ Ongoing qualification of infrastructure ▪ Patch management
▪	Monitoring and alerting of critical infrastructure and application parameters
▪	Incident management

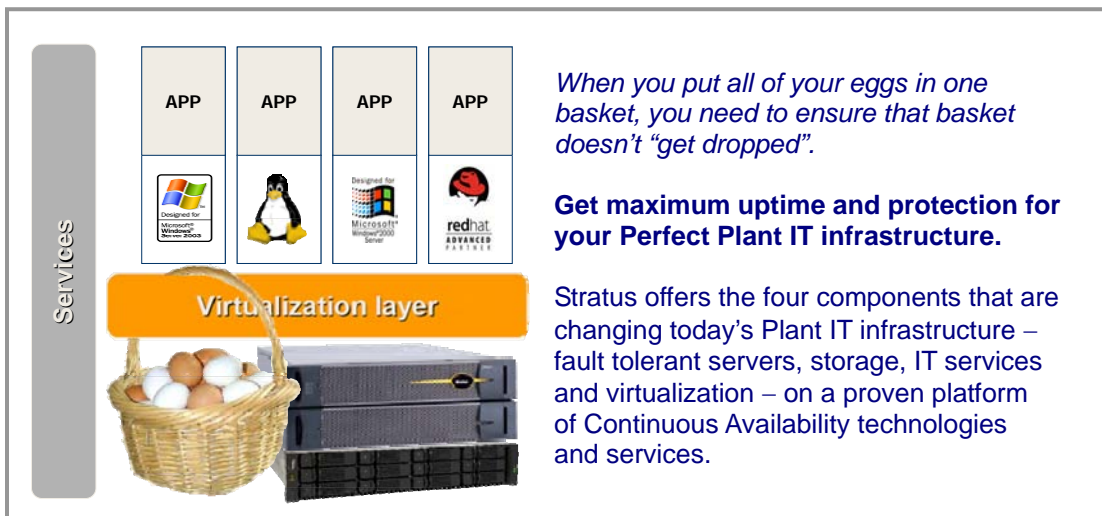
Monitoring and alerting on the status of critical systems and applications are an important consideration as well. To avert unplanned downtime and data loss, it is ideal to take preventive steps before issues result in outages. Yet most plant IT infrastructure environments do not have the monitoring tools to provide for this proactive approach. When informative monitoring data is available, a high level of skill is needed to use this data for preventative actions.

Incident management is another concern. Rebooting the system is a common response when a server crashes or blue screen occurs. However, restarting the typical server wipes out information about the system state. The issue and its consequences are likely to repeat because the details needed to identify and fix the root cause of the problem are lost.

Answering Perfect Plant Mandates for IT Availability and Simplicity

Companies deploying Perfect Plant solutions are looking to Stratus, an SAP Global Technology partner, for continuous availability servers, storage, IT services and virtualization capabilities that play an integral role in resolving these issues. Combining virtualization with Stratus® fault-tolerant infrastructure and services greatly reduces the cost and complexity of plant IT operations while providing an unprecedented level of uptime.

Figure 3: Virtualization of Plant Infrastructure



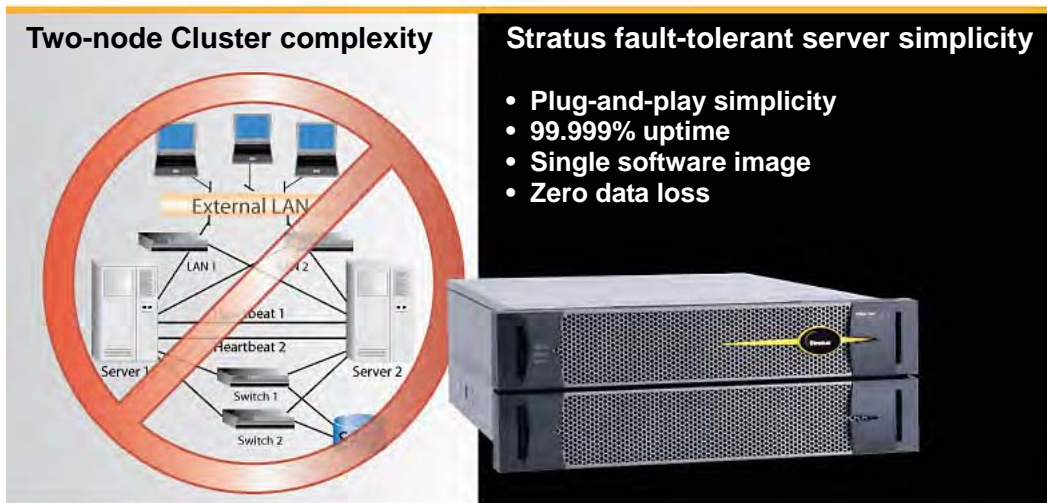
Fault-Tolerant Servers

The current generation of Stratus ftServer® systems makes continuous availability for traditional and virtualized applications easy to afford, install and maintain by taking advantage of standard Intel® server components and off-the-shelf Microsoft® Windows®, Red Hat® Enterprise Linux® and VMware® Infrastructure 3 ESX Server operating systems.

Stratus ftServer systems prevent unplanned downtime caused by server component failure and incorporate unique software and serviceability features that also address planned downtime. Our Continuous Processing® technology and services reduce downtime ten-fold or more over competing cluster alternatives without burdening your staff with operational complexities or high costs. Absolutely no modifications to software or special configuration changes are necessary to take advantages of the ftServer system's advanced availability features.

Built into every ftServer system, lockstep technology uses replicated fault-tolerant hardware components that process the same instructions at the same time. In the event of a component malfunction, the partner component acts as an active spare that continues normal operation. This occurs automatically without any human intervention. There is no downtime, no transaction or data loss, and no performance degradation.

Figure 4: Stratus Offers a Smarter Approach to Uptime



Failsafe system software works in concert with lockstep technology to prevent many software issues, including transient errors, from escalating into outages. The ftServer hardware and software handle most errors transparently – shielding the operating system, middleware, and applications software.

ActiveService™ architecture comprises management and diagnostic features that capture, analyze, and report on system hardware and software issues and facilitate problem source identification. Automatic “call home” technology alerts users of issues without any impact on your computing environment. The global ActiveService Network provides a worldwide infrastructure that, with the proper authorization, enables service experts to remotely investigate and resolve critical problems 24/7. Replacing a failed hardware component is a simple process of removing the failed part and plugging in the replacement – without any specialized training or tools.

Active Upgrade™ technology mitigates planned downtime by enabling users to perform online software upgrades and operating system hot fixes and patches without taking the server or application offline.

Fault-tolerant Storage

Stratus' ftScalable™ storage array adds another level of fault-tolerant protection for plant environments. Configurable to 10.8 TB of data storage, this economical, compact array addresses dedicated, shared, and networked storage requirements. Advanced technologies within the system provide up to 50% better cache performance, RoHS- and WEEE-compliant battery-free backup, and point-in-time snapshot protection against data loss or corruption. And, like Stratus servers, ftScalable storage is simple to operate and maintain – even in remote plants without fulltime IT support.

Virtualization for Plant IT Infrastructures

Virtualization refers to a concept in which an additional software layer, like VMware® ESX Server, enables multiple operating systems (virtual machines) and applications to interact with a single underlying pieces of hardware – without being aware that they are actually sharing the hardware. And, because the virtualization layer itself has the potential to be a single point of failure for all of the virtual machines and applications it supports, the availability of the underlying hardware is more important than ever before. That's why organizations are counting on Stratus solutions for uninterrupted availability of their virtual environments.

Though virtualization is most frequently associated with the data center — due to the high concentration of servers, applications and IT expertise present there — the benefits of virtualization are just as great, if not greater, in the manufacturing plants.

These sites, often distant from the corporate data center, have rigorous availability requirements that VMware and Stratus address while simplifying many of the IT support tasks involved in deploying and maintaining complex IT solutions.

VMware Infrastructure 3 and Stratus Continuous Availability ftServer systems together offer outstanding capabilities for handling unplanned outages, planned downtime, disaster recovery/business continuity and ongoing support. This extremely reliable base likewise lets manufacturers benefit from sought-after advantages of virtualization with the highest possible confidence:

- **Server consolidation.** Among the applications that have become integral to daily production and recordkeeping at manufacturing facilities are MES, data historian and distributed human-machine interface (HMI) software. Today each of these applications may be deployed on its own physical server hardware, even though a given application tends to use only a small percentage of the hardware's computing capacity. Virtualization provides a path to server consolidation, but unacceptable exposure exists if the underlying platform — including hardware, virtualization software layer and drivers — is not robust enough.
- **Extended application lifecycles.** Manufacturing companies want to ensure stability and reduce risk by avoiding changes to the software application and the operating system for as long as possible. Virtualization removes hardware dependencies, permitting older OS versions to run as virtualized guests with the newest processors and I/O devices. The ability to upgrade to newer hardware allows the lifecycles of applications to be readily extended.

- **Speed and ease of provisioning.** Standardized virtual machine(s) can be created that consist of software files including the application and an operating system. The virtual machine can be copied onto a server in a matter of minutes when additional capacity is required, or when an identical application configuration is needed at another site. The virtual machine can be qualified and tested in advance to verify it will work as expected.
- **Application development and testing.** Development and testing have traditionally required separate hardware for each different software environment and hardware configuration used in production. With virtualization, using a much smaller set of hardware — or perhaps even shared use of production hardware — becomes possible. Test and development environments can be isolated on their own virtual machine(s); separate virtual environments can be set up for each unique software configuration.
- **Disaster recovery/business continuity.** VMware ESX Server virtualization removes the configuration dependencies of servers at the backup site by abstracting the underlying hardware. In a traditional environment, servers at the production and backup sites must be identical to assure application compatibility and a smooth failover in the case of an outage with the production machine. In a virtualized environment, a single set of equipment can be used to provide backup for applications running at multiple production sites and the underlying hardware platform does not need to be a duplicate of the production system. System performance should be considered to assure that the backup hardware can meet the minimum needs for running the applications.

With VMware Infrastructure 3 and Stratus ftServer systems, manufacturers are gaining new options for leveraging server capacity, increasing uptime and decreasing the complexity of IT solutions across their lifecycles. The bottom line benefits don't hurt either, Fewer servers, lower energy costs, and reclamation of expensive square footage are all part of the virtualization package.

Stratus Professional and Managed Services

Stratus Continuous Availability Lifecycle Management (CALM™) Services offer you a holistic approach to maximizing uptime, performance, and integrity of a mission-critical IT infrastructure that can span hardware and software solutions from multiple vendors and extend to entire business processes.

Addressing server availability is an important step, but many additional components in the IT infrastructure are also required to deliver a service to the end user. For example, a Perfect Plant application might consist of several servers, virtualized applications, and any number of network components that all have to work properly. Stratus Continuous Availability Lifecycle Management (CALM) Services respond to this requirement with a portfolio of consulting offerings and a subscription-based, scalable managed services platform. The CALM methodology and service delivery mechanism support mission-critical IT environments more effectively and cost-efficiently than traditional onsite service models. Furthermore, a CALM Service subscription lets you get started quickly, without heavy expenditures for additional in-house personnel and enterprise management technology.

Role of Stratus in the SAP Perfect Plant

As an SAP Global Technology Partner, Stratus provides the plant IT infrastructure and services that enable continuously-available solutions without adding complexity. Stratus infrastructure solutions are perfect for running the applications that help you achieve “perfect plant” status.

From a technology perspective, the Stratus ftServer platform allows companies to reduce complexity by delivering out-of-the-box, fault-tolerant capabilities that enable you to simply plug in the system and turn it on. The 99.999% uptime availability and operational simplicity delivered by ftServer systems are essential to realizing the potential of today’s powerful plant applications. The ftServer platform, which is SAP certified, integrates seamlessly into existing Windows (or Linux[®]) environments, helping to protect existing investments.

End-to-end continuous availability is best approached by looking at the IT environment holistically. To that end, Stratus provides comprehensive professional services that can assess, design, size, build, deploy, manage, and support an IT infrastructure running the most demanding applications.

Once implemented, Stratus support services are available to provide ongoing support and performance assessment services to ensure your solution continues to operate optimally and that necessary improvements are made over time. We provide proactive monitoring support services that enable our availability experts to remotely review the performance of your IT infrastructure, identify any critical problems, and then assist in rectifying those problems before outages occur.

Through focused professional services, ftServer-based solutions and expert support services, Stratus helps you: lower the cost and complexity of your plant IT infrastructure; reduce the amount of downtime within your operations; simplify the administration of traditional and virtual environments; and improve your business agility.

See the Perfect Plant in Action

Stratus ftServer systems are powering the Perfect Plant Center of Excellence, located in SAP’s U.S. headquarters in Newtown Square, Pennsylvania. Manufacturers can experience extensive scenarios designed to show the benefits of true ERP to shop-floor integration running on a continuously available platform.

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