ORACLE COMMUNICATIONS SELFRELIANT

Oracle Communications SelfReliant is an all-encompassing, standards-based, carrier-grade, service-availability platform.

**KEY BENEFITS**

- Complete, integrated availability management, distributed messaging, and embedded systems management facilitate 99.999 percent or better availability.
- Preintegration with third-party hardware and software insulates development teams from changes in underlying hardware and software and enables resources to be focused on competitive differentiators.
- Support for the SA Forum HPI specification enables complete hardware platform management.
- Industry-proven software lowers overall project risk.
- Platform independence and support for multiple operating systems enables development teams to quickly respond to new technologies and platforms.
- Millisecond stateful failover, fast messaging, and low CPU usage ensure optimal system performance.
- An extensive library of APIs enables development teams to customize functionality to meet unique market requirements.

**Broad Array of Services**

Oracle Communications SelfReliant helps network equipment providers

- Build highly available systems faster
- Reduce initial development costs by leveraging commercial off-the-shelf technology
- React more quickly to technology and platform changes
- Focus development efforts on functionality that delivers competitive differentiation
- Reduce project risk by building on a platform that provides pretested, preintegrated hardware and software

With its modular design, Oracle Communications SelfReliant enables developers to select the level of availability management functionality that’s most appropriate for their products. Oracle Communications SelfReliant includes a broad array of services, including messaging services, platform services, and systems management services. With an extensive library of APIs, Oracle Communications SelfReliant can be completely customized to meet the unique market requirements of a project. In addition, user-written APIs can extend its capabilities even further.

Oracle Communications SelfReliant is platform-independent, so organizations aren’t locked into any particular hardware or software. It supports multiple operating systems as well as multiple CPU and system architectures. Oracle Communications SelfReliant supports the Service Availability (SA) Forum Hardware Platform Interface (HPI) specification, enabling availability management down to the hardware component level.

Oracle helps development teams avoid the resource drain of getting various commercial, off-the-shelf building blocks to work together. Applications built on Oracle Communications SelfReliant are largely insulated from changes in underlying hardware and software.

Oracle Communications SelfReliant manages redundant components, including applications, hardware, operating system, and other middleware—in addition to itself. It is a high-performance product featuring extremely fast failover and scalability of up to 64 nodes.

The product presents several options for availability management. For nonintrusive stateless application failover, Oracle Communications SelfReliant offers quick and easy service availability with no programming. With this method, applications can participate in the availability framework without code modification. In addition, a simple set of APIs enables developers to checkpoint applications to preserve state for paired applications and/or nodes. For multinode failure scenarios that preserve state, Oracle Communications SelfReliant provides the full Oracle Communications SelfReliant API libraries to control devices down to the hardware component and operating system levels.
Comprehensive Service Categories

Oracle Communications SelfReliant offers a complete range of standards-based services for reducing build time and lowering deployment costs.

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OPERATING SYSTEM

HARDWARE PLATFORM

Oracle Communications SelfReliant provides services that work together to deliver a comprehensive service-availability and systems-management solution.

Oracle Communications SelfReliant Kernel Services

Oracle Communications SelfReliant is built on a code base that provides the small, reliable foundation for all Oracle Communications SelfReliant services. This kernel feature of Oracle Communications SelfReliant is multithreaded, supporting thread creation, priorities, and synchronization. The kernel loads the other Oracle Communications SelfReliant services as well as customer-specific APIs. This portability layer limits users’ dependencies on the underlying operating system and hardware.

Messaging Services

Messaging services include basic functionality common to single-node as well as distributed systems. Because more-advanced services frequently depend on these underlying features, messaging and database services are often the first capabilities project teams implement.

The Distributed Messaging Service (DMS) provides the underlying inter- and intranode communications framework for distributed and single-node systems. High-performance DMS supports “heartbeat,” congestion detection, message prioritization, checkpointing, transparent network failover, and resource discovery. Communications methods include point-to-point, publish and subscribe, and server pooling. Routing options are one-to-one, one-to-many, many-to-one, and many-to-many. DMS does the following:

• Conducts event, fault, and error notification
• Manages client/server communication
• Automates communication monitoring
• Provides the framework for remote procedure calls
• Provides high-performance delivery (40,000-plus messages per second) with low resource requirements.

WHO USES ORACLE COMMUNICATIONS SELFRELIANT?

Oracle Communications SelfReliant can be used for many applications within the communications industry. Implementations span wireless base stations, base station controllers, media gateways and controllers, push-to-talk solutions, Session Initiation Protocol (SIP) servers, soft switches, and network storage devices.
System Model

Unique to Oracle Communications SelfReliant, the System Model feature enables each system resource to be represented as a managed object. The System Model is a key architectural component that is neglected in many projects. The Oracle Communications SelfReliant System Model can scale from a simple architecture to a model that captures the complexities of even the most sophisticated systems. It also reflects resource dependencies, including parent/child relationships that form a given service. The System Model ensures that project teams can easily maintain and update the system configuration in the future without modifying the hardware or the application. The System Model feature encompasses the following:

- **Managed objects.** These include
  - Representation of resources based on International Telecommunications Union (ITU) X.731 states
  - Attributes such as health, operation, administrative status, and role
  - Methods such as access/control, monitoring, and configuration
  - Scalability to 10,000-plus objects

- **States of managed objects.** Also known as the State Model feature of Oracle Communications SelfReliant, these include
  - Recording the state of each object (such as active/standby, locked/unlocked, and healthy/failed)
  - Enabling Availability Management Service (AMS) to make intelligent recovery decisions based on each resource’s attributes and methods
  - Replication of the System Model to the standby availability manager (via AMS) in case the active availability manager node fails

- **Service groups.** These are logical representations of redundant resources and service units.

- **Resiliency.** The System Model is replicated to a hot standby node.

- **Redundancy policies.** These include 2N, N+1, N+M, active/active, and custom.

- **System Model export/import tool.** With this tool, you can extract managed object data from an existing System Model, update the model as desired, and import the updated version to provision all or parts of a new System Model. It greatly simplifies the System Model provisioning process, encourages collaborative development, and assists with debugging.

Availability Services

Availability services interact with messaging services, the System Model, and systems management services to ensure 99.999 percent or better availability of equipment and applications. Oracle Communications SelfReliant operates in heterogeneous hardware environments including pedestal, rack, and blade servers as well as Compact PCI (cPCI) and Advanced Telecommunications Computing Architecture (ATCA) chassis and proprietary hardware.

- **Availability Management Service (AMS).** This service provides Oracle Communications SelfReliant’s core availability management framework. Using the System Model and State Model, AMS centrally manages abstractions of the hardware and software to eliminate downtime. Managed resources can include applications, operating system, chassis, I/O cards, redundant CPUs, networks, peripherals, clusters, and other middleware. Virtual IP addresses can be dynamically assigned to these active resources. AMS also supports administrative operations such as initiating a node-level switchover, enabling resources to
gracefully transition work in progress to standby resources. The availability manager is redundant with a hot standby on a separate node. Recovery actions and notifications are based on business rules, event priority structures, and user-defined policies. AMS is responsible for role assignments (N+M) and active/standby/spare identification. It also conducts health monitoring and uses very little overhead.

• **Cluster Management Service (CMS).** This service manages the physical nodes or instances of Oracle Communications SelfReliant, whereas AMS manages virtual elements. Using DMS, it monitors the health and status of each node, reporting any failures to AMS and interested users. CMS supports redundant network interfaces as well as multiple network topologies. A cluster can be assigned a virtual IP address.

• **Replicated Database Service (RDBS).** This service provides replication of the database in a redundant system, supporting AMS’s ability to conduct fast, seamless switchover. RDBS includes a configurable replication throttle to control the data rate of the replication process.

• **Transparent Application Management Service (TAMS).** This service delivers availability to applications that do not require modification or are impossible to modify. Examples include legacy applications, commercial applications with no access to source code, and applications that preserve state through other methods. TAMS supports virtual IP address switchover and can also be used with modified applications to provide application startup, monitoring, shutdown, and so on.

• **Simplified Availability Management Service (SAMS).** This service provides fast failover with preservation of application state. Simple availability APIs enable start, stop, restart, and millisecond switchover for pairs of applications and/or nodes in active/standby and active/active configurations. SAMS includes support for individual, group, service group, and dependency failover scenarios.

• **Platform Resource Management Service (PRMS).** Oracle Communications SelfReliant supports the SA Forum’s HPI specifications. This industry-driven standard provides APIs for managing platform availability to reduce development time and effort. On platforms that supply an HPI service, PRMS provides automated discovery of HPI-enumerated hardware resources and populates those resources in the System Model. Using HPI hardware management capabilities, it defines and provides the default behavior for hardware resources.

**Systems Management Services**

Systems management services provide the fundamental building blocks for developers creating their own system-specific management solutions. These services can be used in either standalone or redundant systems. Along with messaging and database services, project teams often design and implement this set of services early in a project.

• **Oracle Communications SelfReliant management console.** This service provides a browser-based single point of management for the entire cluster. It includes straightforward configuration of cluster topologies and recovery policies.

• **Simple Network Management Protocol (SNMP) agent.** This service provides two agent integration methods: a master/subagent implementation and a standalone SNMP agent. A management information base (MIB) compiler and other tools are also provided.

• **HPI MIB module.** This service extends the existing system’s management provided by the Object MIB module to expose HPI data for hardware resources through an SNMP interface. This enables an external system manager to access hardware data and functionality without preknowledge of or integration with the hardware.

• **Embedded Web server.** This service leverages an open source Web server to provide HTML remote access, control, and status/alert display.
**Management Data Store Service.** This service provides a high-performance in-memory data store that standardizes data via XML in a hardware-independent manner. Intended for system management functions (not application database use), the data store is optimized for read and access times (<3 μsec) while preserving a small memory footprint. It supports background persistence to disk and peer-to-peer replication.

**Clusterwide logging.** This service enables clusterwide logging of data to a central repository. The logging is broken up into logical log streams: alarm, system, and application.

### Integrated Platform Services

These services include the following:

**Hot Swap Management Service.** This service provides built-in, extensible hot-swap management policies for your system, ensuring a graceful transition when resources are inserted or extracted.

**Alarm Management Service.** This service provides built-in extensible alarm management policies for hardware as well as software resources that can be configured to match the overall system’s alarm management policies.

**Storage Management Service (SMS).** This service is built to handle storage subsystems as managed resources to be easily included in a system’s availability management policies.

**Application Interface Specification (AIS) Timer (TMR) Service.** This service provides a mechanism that enables client processes to create different types of timers and receive notifications when a timer they have created expires.

### Customer-Created Services

Oracle Communications SelfReliant provides open access to all of its APIs. Developers can extend its built-in features with customized functions, and users can manage each resource at a more granular level, further improving reliability and availability. Other advanced features include the ability to increase the number of states and create custom service groups unique to your application. Because Oracle Communications SelfReliant was built in collaboration with a large network equipment provider for all types of network equipment, its flexibility, depth, and breadth enable it to handle the toughest availability challenges.

**Contact Us**

For more information about Oracle Communications SelfReliant, visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.