

Oracle® Solaris 10 8/11 What's New

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Preface

Oracle Solaris 10 8/11 What's New summarizes all features in the Oracle Solaris 10 operating system (OS) that are new or have been enhanced in the Oracle Solaris 10 8/11 OS.

Note – This Oracle Solaris release supports systems that use the SPARC and x86 families of processor architectures. The supported systems appear in the *Oracle Solaris OS: Hardware Compatibility Lists*. This document cites any implementation differences between the platform types.

In this document, these x86 related terms mean the following:

- x86 refers to the larger family of 64-bit and 32-bit x86 compatible products.
- x64 relates specifically to 64-bit x86 compatible CPUs.
- "32-bit x86" points out specific 32-bit information about x86 based systems.

For supported systems, see the *Oracle Solaris OS: Hardware Compatibility Lists*.

Who Should Use This Book

This book provides introductory descriptions of the new Oracle Solaris features for users, developers, and system administrators who install and use the Oracle Solaris OS.

Related Books

For further information about the features that are summarized in this book, refer to the Oracle Solaris 10 documentation at <http://www.oracle.com/technetwork/documentation/solaris-10-192992.html>.

Related Third-Party Web Site References

Third-party URLs are referenced in this document and provide additional, related information.

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Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P-1 Typographic Conventions

Typeface	Description	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name% you have mail.</code>
AaBbCc123	What you type, contrasted with onscreen computer output	<code>machine_name% su</code> Password:
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <i>rm filename</i> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . <i>A cache</i> is a copy that is stored locally. Do <i>not</i> save the file. Note: Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for shells that are included in the Oracle Solaris OS. Note that the default system prompt that is displayed in command examples varies, depending on the Oracle Solaris release.

TABLE P-2 Shell Prompts

Shell	Prompt
Bash shell, Korn shell, and Bourne shell	\$
Bash shell, Korn shell, and Bourne shell for superuser	#
C shell	machine_name%
C shell for superuser	machine_name#

What's New in the Oracle Solaris 10 8/11 Release

This document summarizes all features that are new or have been enhanced in the current Oracle Solaris 10 8/11 release.

For a summary of all features in the Oracle Solaris operating system (OS) that were introduced or enhanced since the Solaris 9 OS was originally distributed in May 2002, see [Solaris 10 What's New](#).

Installation Enhancements

This section describes installation enhancements in this release.

ZFS Installation Enhancements

This section summarizes the installation enhancements in the ZFS file system in this release.

- You can use the text mode installation method to install a system with a ZFS flash archive.
- You can use the `luupgrade` command of the Live Upgrade feature of Oracle Solaris to install a ZFS root flash archive.
- You can use the Live Upgrade `lucrate` command to migrate a UFS boot environment or ZFS boot environment to a ZFS boot environment with a separate `/var` file system.

For more information about these new features, see the [Oracle Solaris ZFS Administration Guide](#).

Support for Two-Terabyte Memory Systems

You can install Oracle Solaris on systems with more than 2 TB of memory.

System Administration Enhancements

This section describes system administration enhancements in this release.

ZFS Features and Changes

This section summarizes new features in the ZFS file system in this release. For more information about these new features, see the *Oracle Solaris ZFS Administration Guide*.

- **Send stream enhancements** – You can set file system properties that are sent and received in a snapshot stream. These enhancements provide flexibility in the following areas:
 - Applying file system properties in a send stream to the receiving file system
 - Determining whether the local file system properties should be ignored when received, such as a mountpoint property value
- **Identifying snapshot differences** – You can determine ZFS snapshot differences by using the `zfs diff` command.

For example, assume that the first snapshot (`snap1`) is taken after `fileA` is created. Then, the second snapshot (`snap2`) is taken after `fileB` is created.

```
$ ls /tank/username
fileA
$ zfs snapshot tank/username@snap1
$ ls /tank/username
fileA fileB
$ zfs snapshot tank/username@snap2
```

You can identify the snapshot differences through the `zfs diff` command:

```
$ zfs diff tank/username@snap1 tank/username@snap2
M      /tank/username/
+      /tank/username/fileB
```

In this output, `M` indicates that the directory has been modified. The `+` indicates that `fileB` exists in the later snapshot.

- **Pool recovery enhancements** – The following new ZFS storage pool features are available:
 - You can import a pool with a missing log by using the `zpool import -m` command.
 - You can import a pool in read-only mode. This feature is primarily for pool recovery. If a damaged pool cannot be accessed because the underlying devices are damaged, you can import the pool read-only to recover the data.
- **Tuning ZFS synchronous behavior** – You can determine a ZFS file system's synchronous behavior by using the `sync` property. The `sync` property values are `standard`, `always`, and `disabled`.

The default synchronous behavior (`standard`) is to write all synchronous file system transactions to the intent log and to flush all devices to ensure that the data is stable.

Disabling the default synchronous behavior is not recommended. Applications that depend

on synchronous support might be affected and data loss could occur. For example, unwritten transactions could be lost during a power failure.

The property can be set before or after the data is created, and it takes effect immediately. For example:

```
# zfs set sync=always tank/perrin
```

This command makes the `zil_disable` parameter no longer available in Oracle Solaris releases that include the `sync` property.

- **Improved ZFS pool messages** – You can use the `-T` option to provide an interval and count value for the `zpool list` and `zpool status` commands to display additional information. In addition, more pool scrub and resilver information is provided in the `zpool status` command.
- **ACL interoperability improvements** – This release provides the following Access Control List (ACL) improvements:
 - Trivial ACLs do not require deny access entries except for unusual permissions. For example, a mode of 0644, 0755, 0664 does not need deny access entries but modes such as 0705, 0060 still require deny access entries.
 - ACLs are no longer split into multiple access entries during inheritance to try to preserve the original unmodified permission. Instead, permissions are modified as necessary to enforce the file creation mode.
 - The `aclinherit` property behavior includes a reduction of permissions when the property is set to `restricted`, which means ACLs are no longer split into multiple access entries during inheritance.
 - An existing ACL is discarded during `chmod(2)` operations by default. This change means that the ZFS `aclmode` property is no longer available.
 - A new permission mode calculation rule means that if an ACL has a *user* access entry that is also the file owner, then those permissions are included in the permission mode computation. The same rule applies if a *group* access entry is the group owner of the file.
- **Installation features** – For installation enhancements in the ZFS file system, see [“ZFS Installation Enhancements” on page 9](#).

SPARC: Support for Fast Reboot

The integration of the Fast Reboot feature of Oracle Solaris on the SPARC platform enables the `-f` option to be used with the `reboot` command to accelerate the boot process by skipping certain POST tests.

Fast Reboot on the SPARC platform is managed through the Service Management Facility (SMF) feature of Oracle Solaris and implemented through a boot configuration service, `svc:/system/boot-config`. The `boot-config` service provides a means for setting or changing the default boot configuration parameters. When the `config/fastreboot_default` property is

set to `true`, the system performs a fast reboot automatically, without the need to use the `reboot -f` command. By default, this property's value is set to `false` on the SPARC platform.

Note – On the SPARC platform, the `boot-config` service also requires the `solaris.system.shutdown` rights as the `action_authorization` and `value_authorization`.

To make Fast Reboot the default behavior on the SPARC platform, use the `svccfg` and `svcadm` commands. See “Support for Fast Reboot on the SPARC Platform” in *System Administration Guide: Basic Administration* and the `svccfg(1M)` and `svcadm(1M)` man pages for details.

For more information about Fast Reboot, see the [reboot\(1M\)](#) man page.

User-Level CMT Observability Tools

User-level CMT observability tools help users to get a better understanding of the loads on your system with Chip-Level Multithreading (CMT). The following commands have been added in this release:

- `pginfo` – Displays the OS view of the processor groups that share performance-relevant hardware
- `pgstat` – Displays hardware and software utilization of processor groups

For more information, see the [pginfo\(1M\)](#) and [pgstat\(1M\)](#) man pages.

diskinfo Utility

The `diskinfo` command-line utility enables system administrators to see the relationship between logical disk names (`cXtYdZ`) and bays in a JBOD or blade chassis.

The `diskinfo` utility depends on Fault Management Architecture (FMA) to provide label information. If certain prerequisites are met, the utility supports third-party JBODs or enclosures.

For more information about the prerequisites and limitations of this utility, see the [diskinfo\(1M\)](#) man page.

Oracle Configuration Manager

Oracle Configuration Manager (OCM) is integrated into the Oracle Solaris OS. OCM collects configuration information from the server running Oracle Solaris and uploads it to the Oracle repository. This data helps to reduce the time needed to resolve support issues.

By default, OCM is installed in the `/opt/ocm/ccr` directory (considered as `OCM_HOME`) in a disconnected mode. A user or an administrator has to manually enable the OCM collector daemon to start collecting the configuration information.

For more information about OCM, see http://download.oracle.com/docs/cd/E18041_01/doc.103/e18035/toc.htm. Chapter 5 provides information about how to enable OCM.

Flash Archive Integrity Check

You can now create a flash archive by specifying the `/mnt` directory with the `-x` (exclude) option of the `flarcreate` command. For example:

```
# flarcreate -n test -x /mnt /export/test.flar
```

For more information, see the [flar\(1M\)](#) man page.

Solaris Volume Manager Data Recovery

The `metaimport` command now supports diskset import when running an Oracle Solaris Cluster configuration. This enhancement enables data recovery for traditional and multi-owner SVM disksets in clustered and non-clustered configurations.

The `metaimport` command provides a mechanism to import disksets for data recovery by replicating disksets into an existing Solaris Volume Manager (SVM) configuration.

For more information, see the Solaris Volume Manager Administration Guide and the [metaimport\(1M\)](#) man page.

Oracle Solaris Groups Functionality

A user can now be a member of up to 1024 groups. This functionality must be enabled with the system tunable parameter `ngroups_max` in the `/etc/system` configuration file. For example:

```
set ngroups_max=1024
```

Note – NFS operations are not affected by increasing the value of `ngroups_max` to 1024 groups. NFS operations still support a user to be a member of only 16 groups. When increasing `ngroups_max` to a number greater than 16, the following message will appear to alert administrators that NFS operations for a user are still restricted to only 16 groups.

WARNING: `ngroups_max` of 1024 > 16, NFS AUTH_SYS will not work properly

LDAP Name Service

This section summarizes enhancements that have been made to the LDAP name service in this release.

- **LDAP name service stand-alone support** – This enhancement enables the LDAP name service tools `ldapclient`, `ldapaddent`, and `ldaplist` to populate and test an LDAP directory without having to configure the name service switch to use LDAP.
- **Configure LDAP name service by using a secure port** – This enhancement enables the LDAP name service to be configured to use only the LDAP secure port 636. As a result, the restriction that the LDAP naming service always requires access to the LDAP unsecure port 389 has been removed.

x86: Generic FMA Topology Enumerator

`x86pi.so` is a FMA topology enumerator that creates system topology from System Management BIOS (SMBIOS) compliant structures. The following enhancements have been made to the FMA topology enumerator:

- Ability to provide serial numbers for field replaceable units (FRUs) that can be tracked automatically by FMA when they are replaced by the repair depot.
- Ability to enumerate direct attached Serial Advanced Technology Attachment (SATA) disks. This enhancement enables the diagnosis of bad disks and the possibility of Automated System Recovery (ASR) for the replacement of a bad disk.

Oracle VTS 7.0 ps11

This section summarizes enhancements in the Oracle VTS 7.0 ps11 in this release.

Oracle Validation Test Suite (Oracle VTS) is a comprehensive hardware diagnostic tool that tests and validates the connectivity and functionality of most controllers and devices on Oracle platforms. The VTS tests are targeted for each hardware component or function in a system. The tool supports three user interfaces (UIs) – a graphical UI (GUI), a terminal-based UI, and a command-line interface (CLI).

Memory and CPU diagnostics include the following enhancements:

- The VTS kernel uses its own methods to access options and values in the `sunvts.conf` file from the VTS library. Changes in the configuration file for the `option-value format` parameter standardize the format of the configuration file and provide centralized accessibility from the code.
- An additional member of the execution mode, for example `functional`, `exclusive`, and `online`, has been added to the structure `TEST_ENV_INFO_T (/include/testinfo.h)`. Individual test owners can use this member to decide the test's memory usage for a logical test and return an appropriate value to `vt sk` to aid in making better scheduling decisions.

Storage and Networking diagnostics include the following enhancements:

- Ability to specify inner, middle, and outer seek points, which enhances the disk test capability.
- `diskmediatest` enables you to specify whether the disk type is a Solid State Disk (SSD) in the `/etc/sunvts/conf/sunvts.conf` file.
- An additional `iobustest` option, `target`, which enables you to indicate a specific target machine to run the live network test.

System Performance Enhancements

This section describes system performance enhancements in this release.

smt_pause API

The `smt_pause()` function can be used by applications on CMT systems that do a busy-wait or idle loop. The function enables other hardware strands sharing the same core to run faster during the busy wait.

For more information, see the `smt_pause(3C)` man page.

libmtmalloc Improvements

`libmtmalloc` has undergone a performance improvement that specially targets 64-bit applications with a large number of threads. `libmtmalloc` now has the following enhancements:

- The default configuration has eliminated many locks in favor of atomic operations, which cannot be interrupted. They guarantee a consistent state.
- Linked list searches are replaced with matrix lookups.

- Options have been added to eliminate additional locks (MTEXCLUSIVE) and make the threshold of an oversize allocation a tunable parameter (MTMAXCACHE). For more information, see the [mtmalloc\(3MALLOC\)](#) man page.
- A new switch, MTREALFREE, uses `madvise` to return memory to the operating system.

The enhancements result in reduced lock contention and increased performance, especially for applications with a large number of allocating threads. However, single-threaded applications that use `libmtmalloc` in its default configuration show a 20 percent degradation in performance.

`libc` is recommended for single-threaded applications. `libumem` gives superior performance for low thread-count applications. For thread counts that are greater than or equal to 16, `libmtmalloc` provides superior performance.

For more information, see the [libmtmalloc\(3LIB\)](#), and [mallocctl\(3MALLOC\)](#) man pages.

Tunable Parameter for Flash Devices in the `sd.conf` Configuration File

For flash devices in the emulation mode, a new tunable parameter, `emulation-rmw`, has been added to the `sd.conf` configuration file. This tunable parameter enables you to turn read-modify-write (RMW) to `on` or `off` in the configuration file. For solid-state drives (SSD) that have a bad RMW algorithm, you can assign RMW emulation to the `sd` driver rather than using the firmware.

By configuring this tunable parameter, the performance of raw disk I/O improves significantly as compared to performing RMW inside the SSD firmware.

x86: Oracle Solaris I/O Interrupt Framework Enhancement for Nehalem-EX Platforms

The Oracle Solaris I/O interrupt framework is enhanced for Nehalem-EX platforms to provide a large number of MSI/MSI-X interrupt vectors that scale with the number of processors configured in the system. These enhancements provide the following advantages:

- Support for configuration of a large number of devices in the system
- Support for device drivers to use a large number of the available MSI/MSI-X interrupts to achieve better performance of the device operations

Although these enhancements are largely transparent, better I/O performance might be achieved depending on the platform and devices used in the system. In addition, the [pcitool\(1M\)](#) command has been updated with revised syntax and options.

x86: Intel AVX Support

Oracle Solaris supports the Intel AVX (Advanced Vector Extensions) instruction set. Intel AVX is a 256-bit instruction set extension to SSE (Streaming SIMD Extensions). The instruction set is designed for applications that are floating-point intensive. Intel AVX helps to improve performance of tasks such as audio/video processing, simulations, financial analysis, and 3D modeling. Intel AVX is a part of the Intel SandyBridge processor family.

For more information about Intel AVX, see <http://software.intel.com/en-us/avx/>.

Shared Memory Enhancements

Changes in creating, locking, unlocking, and destroying Intimate Shared Memory (ISM) and Dynamic Intimate Shared Memory (DISM) have resulted in significant performance improvement in the startup and shutdown of the Oracle database.

For more information, see the `mlock(3C)`, `shmop(2)`, and `shmctl(2)` man pages.

Networking Enhancements

This section describes networking enhancements in this release.

Support for IPv6 NAT on IPFilter

The IPFilter Network Address Translator (NAT) has been extended to support IPv6 addresses.

For more information, see the `ipnat(7I)` and `ipnat(4)` man pages.

x86: Jumbo Frame Support in the bnx Driver

The bnx driver supports Jumbo Frames.

Security Enhancements

This section describes security enhancements in this release.

PKCS#11 Provider for Oracle Key Manager

The new PKCS#11 provider provides access to Oracle Key Manager (OKM) functionality using standard Cryptographic and Key Management Framework interfaces in Oracle Solaris. The functionality includes:

- Creating and storing private Advanced Encryption Standard (AES) keys in the OKM
- Encrypting and decrypting the data using the generated keys
- Deleting the stored keys

You can use the stored AES keys for symmetric cryptographic operations.

Support for AES Cipher Suites in the KSSL

Oracle Solaris supports the following AES cipher suites in the kernel SSL (Secure Sockets Layer):

- `TLS_RSA_WITH_AES_128_CBC_SHA`
- `TLS_RSA_WITH_AES_256_CBC_SHA`

These suites are defined in RFC 3268 (AES cipher suites for Transport Layer Security). For more information, see the [ksslcfg\(1M\)](#) man page.

Assigning a New Password Does Not Unlock a Locked Account

Assigning a new password no longer unlocks a locked account. This feature helps system administrators avoid inadvertently enabling a locked account.

Prior to this release, when a user account was locked (either by a system administrator or after a number of failed login attempts), the account could be unlocked in one of the following ways:

- Using the `passwd -u` option
- Deleting the password entry using the `passwd -d` option
- Assigning a new password

You can still use `passwd -u` to unlock an account or `passwd -d` to delete the password entry and unlock the account. After deleting the password entry to unlock an account, you can then assign a new password.

For more information, see the [passwd\(1\)](#) man page.

Password Construction Policy Applies to the root User by Default

Prior to this release, the root user (user id 0) was exempt from any password policy constraints configured in the `/etc/default/passwd` file. Starting with this release, by default, the configured password policy is applied to the root user. This configuration helps system administrators to avoid setting passwords accidentally that do not comply with the configured policy set for the system.

For more information, see the [passwd\(1\)](#) man page and the description of the `force_check` option in the [pam_authtok_check\(5\)](#) man page.

chroot Capability

Starting with this release, the Oracle SSH supports the chroot capability. This feature allows the administrator to change the apparent root directory for a current running process and its children. A program running in the chroot environment cannot access directories or files outside the designated directory tree.

For more information, see the description of the `ChrootDirectory` option in the [sshd_config\(4\)](#) man page.

Freeware Enhancements

This section describes freeware enhancements in this release.

Samba Upgrade to Version 3.5.8

Samba, which provides file and print services to SMB/CIFS (Server Message Block/Common Internet File System) clients, has been upgraded to version 3.5.8.

x86: Bash Upgrade to Version 3.2

The Bash shell has been upgraded to version 3.2.

Apache C++ Standard Library Version 4 Support

The Apache C++ Standard Library (`stdcxx`) provides programmatic access to numerous standard C++ library features that are currently unavailable with the default Oracle Solaris `libcstd.so.1` or the `STLport4` Standard Library implementations. Starting with Oracle Solaris Studio 12 Update 1, the Oracle Solaris Studio C++ compilers support the Apache C++ Standard Library.

A complete documentation set for the Apache C++ Standard Library is delivered with the installation of the `SUNWlibstcxx4` Oracle Solaris package. The documentation is also available at:

- <http://stdcxx.apache.org/doc/stdlibref/index.html>
- <http://stdcxx.apache.org/doc/stdlibbug/index.html>

The source code for the Apache C++ Standard Library is available by installing the `SUNWlibstdcxx45` package.

New Device Support

This section describes new devices that have been added in this release.

Support for New Devices in the `ixgbe` Driver

The Intel 10 Gigabit Ethernet `ixgbe(7D)` driver supports the following two devices:

- Intel 82599 (Niantic) Copper 10GBase-T devices (8086, 151c)
- Intel x540/x540T series (Twinville) 10GbE devices (8086, 1512 and 8086, 1528)

Support for New Devices in the `igb` Driver

The Intel 1 Gigabit Ethernet `igb(7D)` driver supports the following devices:

- Intel 82576 (Kawela) Quad-port Copper ET2 1000Base-T devices (8086, 1526)
- Intel 82580 (Barton Hills) Quad-port Fibre 1GbE devices (8086, 1527)
- Intel i350 (Powerville) Copper 1000Base-T devices (8086, 1521)
- Intel i350 (Powerville) Fibre 1GbE devices (8086, 1522)
- Intel i350 (Powerville) SERDES 1GbE devices (8086, 1523 and 8086, 1524)

Support for LAN-On-Motherboard (LOM) Devices in the `e1000g` Driver

The Intel 1 Gigabit Ethernet `e1000g(7D)` driver supports the following Intel 82579LM/LF (Lewisville) 1 GbE LOM controllers:

- 8086, 1502
- 8086, 1503
- 8086, 1506
- 8086, 1519

Support for New Devices in the `bge` Driver

The Broadcom 1 Gigabit Ethernet `bge(7D)` driver supports the following network devices:

- Broadcom NetXtreme/NetLink BCM5717 Dual-Port Copper device (0x1655)
- Broadcom NetXtreme/NetLink BCM5724 Single-Port Copper device (0x165C)

- Broadcom NetLink BCM57780 device

Support for New Device in the qlcnict Driver

The QLogic P3+ FCoE CNA Ethernet qlcnict(7D) driver supports the QLogic P3+ FCoE CNA device.

Support for New Device in the mcxnex/mcxe Driver

The Mellanox ConnectX-2 10 Gigabit Ethernet mcxnex/mcxe(7D) driver supports the Mellanox ConnectX-2 GLDv3 based networking device. The device ID for the current support is pciex15b3,6750.

Support for New Devices in the scu Driver

The Intel Patsburg Storage Controller Unit scu(7D) driver supports the following Intel SCU SAS/SATA devices:

- 8086, 1d60
- 8086, 1d61
- 8086, 1d64
- 8086, 1d65
- 8086, 1d68
- 8086, 1d69

x86: Support for LSI MegaRAID Falcon SAS 2.0 HBA Device

The imraid_sas(7D) driver supports the LSI MegaRAID Falcon SAS 2.0 HBA device.

Support for LSI SAS 2308 HBA Device

The mpt_sas(7D) driver supports the LSI SAS 2308 HBA storage device.

Support for LSI SAS 2208 HBA Device

The mr_sas(7D) driver supports the LSI SAS 2208 HBA device.

Driver Enhancements

This section describes the driver enhancements in this release.

Support for Public GLD Interfaces in the bge Driver

The bge driver supports public Generic LAN Driver (GLD) interfaces.

For more information about GLD interfaces, see the following man pages:

- [gld\(7D\)](#)
- [dlpi\(7P\)](#)
- [gld\(9E\)](#)
- [gld\(9F\)](#)
- [gld_mac_info\(9S\)](#)
- [gld_stats\(9S\)](#)

Support for MSI in the bge Driver

The bge driver supports Message Signalled Interrupts (MSI). This support increases the number of available interrupts, thereby potentially increasing the performance of the system.

For more information, see the [bge\(7D\)](#) man page.

Jumbo Frame Support for BCM5718

The bge driver supports Jumbo Frames for Broadcom BCM5718. This feature provides the following advantages:

- Increases throughput by enabling the system to concentrate on data in the frames
- Reduces CPU utilization because the number of interrupts are reduced

For more information, see the [bge\(7D\)](#) man page.

Support for RDSv3 RDMA Interfaces

Oracle Solaris supports the RDSv3 interfaces required by Oracle for RAC 11g. Oracle has defined Remote Direct Memory Access (RDMA) interfaces for Reliable Datagram Sockets (RDS). These interfaces have been available on Linux platforms since OpenFabrics Enterprise Distribution (OFED) version 1.3. This feature is primarily for the InfiniBand transport.

In RDSv1, the RDS driver copies data from userland to the kernel to transport data to a remote destination. This copying of large data is expensive and time consuming. The support for RDSv3 with InfiniBand eliminates this problem by providing direct memory access (DMA), thereby decreasing response time.

