

Fifth-generation carrier grade operating system delivers high availability, field serviceability, and real-time performance for network equipment providers and telecommunications carriers

MontaVista, the leader in embedded Linux commercialization, provides Carrier Grade Edition 5.0 as a commercial-grade Linux development platform for developers working with RAS (reliability, availability, and serviceability) managed hardware (HPI, IPMI) or custom hardware, who require long-term support and high availability. Carrier Grade Edition 5.0 provides the time-to-market benefits normally only found in proprietary development platforms with the customizability and control of an open-source Linux environment.

The heart of MontaVista Linux Carrier Grade Edition 5.0 is an embedded Linux operating system designed for telecom and network equipment, including ATCA- and MicroTCA-based platforms, such as SGSNs, GGSNs, and softswitches. Because Carrier Grade Edition 5.0 supports Linux standards, designers can add functionality by including off-the-shelf Linux utilities without worrying about function loss due to incompatibility.

MontaVista Linux Carrier Grade Edition 5.0 includes features only available from MontaVista, including new field-serviceability features that give field engineers the ability to fix and upgrade live systems while they are running with little or zero downtime. Unlike non-commercialized open source code, MontaVista Linux CGE is a field-proven production-quality operating system, has been integrated, tested, and debugged by MontaVista's testing facilities, and is supported by MontaVista's experienced support organization.

Carrier Grade Edition 5.0 also includes a development environment that enables engineers to more quickly design new equipment and applications. MontaVista Linux CGE provides reliability, scalability, and real-time performance proven in the field by major voice and data carriers.

Run-Time Application Patcher

Available only from MontaVista, the Run-Time Application Patcher gives field engineers the ability to apply a binary patch to a live system while it runs, without incurring any downtime. Engineers can update software, fix bugs, and add new features to a live system without stopping it or rebooting.

Flight Recorder

When a system fails today, field engineers must wait until the next failure to investigate the first one. Engineers have no way of gathering enough data about what happened before and during a crash to conduct an effective post-crash diagnosis and take corrective action. CGE 5.0 includes new Flight Recorder, which acts like an airplane black box to track and log system history. It keeps a scheduler history, which provides more information than a crash dump snapshot, and is user-extensible for customized tracking.

Field-Safe Application Debugger

When issues arise in a live carrier grade system, bringing the system offline for debugging is not acceptable. MontaVista Field-Safe Application Debugger debugs a live system without halting execution or affecting services. A field engineer logs into a live system, uses the debugger to set tracepoints, and logs out. The debugger collects execution information and stores it for later retrieval. The debugger's small memory footprint and limited CPU usage have minimal impact on the live system, providing debugging without obstruction, and enabling critical processes to remain online and running to provide the high availability that carriers require. This capability, available only from MontaVista, has been enhanced and is easier to use.

Live application core dump

When field engineers need to perform a core dump to help them debug problems on a running application, MontaVista's live application core dump dramatically reduces the downtime required to make a core dump. With only a short (generally tens to hundreds of milliseconds) stop of the application, this new feature takes a snapshot of the running application. The application can continue running while engineers debug the snapshot to fix the application. MontaVista is the first to offer this capability.

Transparent Inter-Process Communication (TIPC)

Designed for clustered computer environments, the TIPC cluster communications protocol allows designers to create applications that can communicate quickly and reliably with other applications regardless of their location within a cluster. Using TIPC, a process can send messages to a service without having to know the location of the service, so the service location can move. TIPC also provides a basic membership handling to know which nodes are and are not available in the cluster.

Integrated real-time response

Carrier Grade Edition 5.0 is 100% native Linux with real-time performance features, including MontaVista enhancements plus integrated high resolution nanosecond timers (hrtimers) Additional real-time features include fast mutexes, threaded soft and hard IRQ handlers, and application-level priority inheritance and queuing, providing preemption response latency as low as 50 microseconds. Benchmark tests have proven that MontaVista's integrations of real-time features deliver much lower latency levels than non-MontaVista implementations.

Microstate accounting

For the first time in a commercial Linux product, engineers can accurately measure process and thread utilization on a CPU. CGE 5.0 performs high-resolution process accounting, so applications can be monitored to anticipate and prevent CPU overload situations. This enables engineers to design automated load balancing and graceful protocol degradation using reliable and accurate CPU load numbers. Engineers can accurately monitor and precisely predict

CPU loads, increasing the accuracy of worst-case planning, preventing downtime, and reducing the purchase of backup equipment for traffic surges. Older systems report CPU and thread activities based on statistical sampling estimates, which can be very inaccurate, instead of the actual measurement now enabled by microstate accounting. Microstate accounting in CGE 5.0 will improve the scalability, reliability, and cost of carrier networks.

NSA-level security for carriers

MontaVista Linux Carrier Grade Edition 5.0 is the first carrier grade operating system to include Security-Enhanced Linux (SELinux), developed by the National Security Agency (NSA). MontaVista SELinux protects the integrity of and controls access to files, network sockets, and all system objects by preventing an employee or external intruder from intentionally or accidentally taking control of the system.

Integrated development environment

Carrier Grade Edition 5.0 includes new runtime components that integrate with MontaVista DevRocket, an Eclipse-based IDE with development tools that enhance productivity for both kernel-level and application-level engineers. Integrated memory leak detection, performance profiling, memory usage analysis, and system tracing combine to accelerate system development and maintenance, and increase system availability.

Multicore and SMP support

Carrier Grade Edition 5.0 supports both single-core and multicore processors, and supports equipment built with multiple processing chips as well as synchronous and asynchronous multiprocessing on integrated chips.

Carrier standards compliance

MontaVista Linux CGE 5.0 is compliant with Carrier Grade Linux Specification 4.0 from the Linux Foundation as well as LSB 3.0 compliant. CGE 5.0 is also compliant with the SCOPE Alliance Linux Profile, and runs on hardware designed to support the PICMG Advanced Telecommunications Computing Architecture (ATCA) and MicroTCA specifications. CGE 5.0 supports Intel's Extensible Firmware Initiative (EFI).

MontaVista's carrier grade partners

Adax, Tresys Technology, Operax, Ulticom, SafeNet, Oracle, MySQL, Enea, VirtualLogix, and more than 70 additional MontaVista partners provide middleware, applications, and tools ready to use in carrier grade network equipment with MontaVista Linux Carrier Grade Edition.

About MontaVista Software

MontaVista Software, Inc. is the leader in embedded Linux commercialization. MontaVista helps embedded developers get the most from open source by adding commercial quality, integration, hardware enablement, expert support, and the resources of the MontaVista development community. Because MontaVista customers enjoy faster time to market, more competitive device functionality, and lower total cost, more devices have been deployed with MontaVista than with any other Linux. To learn more, please visit www.mvista.com

SPECIFICATIONS

Linux kernel

- First carrier grade operating system to support 2.6.21
- LSB 3.0 compliant
- Configurable OOM Killer
- posix_fadvise(2)
- Kexec for fast reboot
- LSM
- NBD
- DRBD
- Real-time kernel
- evlog
- rmon
- corefile naming
- IMQ
- fumount
- NAPI support for drivers
- Open file by inode
- Panic handler enhancements
- Asynchronous events (Libevent)
- Machine Check Architecture (MCA)
- RAID disk mirroring
- RAID multihost
- Preempt_none
- Preempt_desktop

Architectures supported

- Intel x86/x86_64 reference platforms
- PowerPC
- MIPS (early 2008)
- Multicore processor support as well as single-core

Connectivity and I/O

- TCP/IPv4
- IPv6 Certification Ready
- IPSec
- IKE
- VLAN Tagging (IEEE 802.1Q)
- SCTP
- TCP Abort
- Hotplug (ATCA, uTCA, AMC)
- Serial ATA
- USB2 Host
- USB Human Interface Device (HID) Input Core
- MTD
- ifenslave
- IPMI
- Logical Volume Management/Logical Volume Management2 (LVM/LVM2)
- Fibrechannel
- Proxy ARP
- AIC

High availability features

- SA Forum HPI compliance
- OpenAIS SA Forum Application Interface Specification (AIS) support
- TIPC
- Microstate accounting
- System device enumeration
- SCSI RAS
- SMART disk monitoring

Field serviceability features

- Real-Time Application Patcher
- Field-Safe Application Debugger
- Flight Recorder
- KDump
- Live application core dump
- Multithreaded Core Dump
- Performance statistics
- Forced block device removal (enables hot swap)
- Forced unmount (enables hot swap)
- SCSI hot swap

File systems

- ext2/ext3
- FAT
- VFAT
- SMB
- XFS
- NFS
- NFSv2
- NFSv3
- sysfs
- ramdisk (ramfs, tmpfs, and initramfs)
- JFS
- JFFS2 (dependent on flash)
- YAFFS (dependent on flash)
- YAFFS2 (dependent on flash)
- ISO9660
- Squashfs
- dosfstools

Kernel and application development tools

- MontaVista DevRocket 5 Eclipse-based IDE
- Many additional tools from MontaVista partners

System measurement tools:

- Kernel startup timing
- Execution tracing
- Performance profiling
- Memory usage

Application measurement tools:

- Performance profiling
- Memory usage
- Memory leak detection

Device management tools:

- View processes and change priority
- Remote file management
- Remote shell

Other development tools:

- Automated remote debug
- Platform image builder
- LTTng (Linux Trace Toolkit Next Generation) support
- Memory debugger
- KDB (x86 32/64 architecture only)
- KGDB
- KGDB over Ethernet
- GNU Compiler Collection (gcc) 4.2.0
- GNU C Library (glibc) 2.5.90
- GNU Binary Utilities (binutils) 2.17.50
- GNU Debugger (gdb) 6.6.50

Userland features

- pmttools
- tripwire
- MDADM
- scsirastools
- crash
- SMART
- SCTP tools
- NBD
- Extended Watchdog support
- ifenslave
- IMQ Tools

- openca
- libscsihotswap
- udev
- SNMP MIB support
- Wireshark (formerly Ethereal)
- Ethtool
- CUPS
- Elfutils
- hostDHCP
- Schedutils
- Dash
- net-snmp
- module-init-utils
- openOBEX

Integrated real-time response

- MontaVista Linux preemptible kernel technology (100% native Linux; no double-kernel non-Linux add-ons)
- High resolution POSIX timers
- Threaded soft and hard IRQ handlers
- Application-level priority inheritance
- Priority queuing
- Robust mutexes
- Futexes
- Userland support
- Preempt_RT

Development environment hosts:

- Red Hat Enterprise Linux 3, 4 (32-bit & 64-bit); 5 (2008, 32-bit & 64-bit)
- SUSE Linux Enterprise Server 9 SP2
- SUSE Linux Enterprise Desktop 10, 10.1 (32-bit & 64-bit)
- Microsoft Windows 2000 SP4+, Microsoft Windows XP SP2+

Support

- MontaVista Zone customer portal
- Hands-on training classes
- 24-hour email and phone support
- MontaVista Professional Services custom engineering
- Support and services from MontaVista partners



MontaVista Software, Inc.

Tel : 408.572.8000

Fax : 408.572.8005

email: sales@mvista.com

www.mvista.com