



ZTE NewStartCarrier-Grade Server Linux
product description

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CGSL product overview

Product overview

NewStart CGSL (NewStartCarrier-Grade Server Linux, hereinafter referred to CGSL) is a high availability, high performance, good security, manageability, and hardware and software compatibility and other features of the telecom operating system.

CGSL now the release version spans three major kernel versions, as follows:

CGSL version	Cover version	Kernel version
V3.0		
	V3.02	2.6.18-164
V4.0		
	V4.02	2.6.32-220
	V4.03	2.6.32-358
	V4.04	2.6.32-531
V5.0		
	V5.02	3.10.0-123
	V5.03	3.10.0-327

➤ CGSL V3

Based on the 2.6.18-164 kernel, compatible with X86 and x86-64 architecture, officially commercial in 2008 so far, 2016 into the life cycle back-end, is not shipping now, but continue to provide the customers who purchase the products with a certain period of time technical support service.

➤ CGSL V4

Based on the 2.6.32 kernel, is the most stable version of the current release, in the face of different customer needs, has released several small commercial version of the kernel.

CGSL V4 compatible with both X86 and domestic LOONGSON version.

➤ CGSL V5

CGSL series version the latest version of V5 is based on the 3.10 kernel, it is built around high availability and is suitable for a variety of cloud computing solutions, efficient centralized management server, supports a wide range of hardware platforms and a large number of third-party software, higher performance KVM kernel Virtualization support, enabling kernel-level isolation. Improve the security and compatibility of the machine, so that users can access to the traditional UNIX low cost and performance, the key applications for the product to provide better services.

CGSL V5 compatible with both X86 and domestic PHYTUM version.

CGSL series version unique open management capabilities, users can easily install, deploy, configure, protect and update CGSL servers anywhere on the network, significantly reducing IT costs.

Typical application scenarios

- Blade Server
- Rack Server
- Tower Server

CGSL product features

CGSL for different hardware platforms to provide good support, fully support the X86, EMT64T and AMD64, LOONGSON, PHYTUM platform. CGSL for such a hardware platform provides an entry-level application from the enterprise to the enterprise application of advanced server operating system. CGSL has the following characteristics:

- Highly compatible with mainstream Linux distributions, the vast majority of applications based on other Linux distributions can be run on CGSL without porting.
- Provides highly customizable systems for customization including software components, custom tools, deployment methods, etc.
- Delivers complete clustering and virtualization support, enhances system reliability and security, and saves IT costs
- Provides the automatic system promotion plan, facilitates the user in the movement environment to carry out the operating system promotion

- Integration of multiple applications, management components, to meet the diverse needs of users
- Enhanced system maintainability, debugability, real-time monitoring framework to improve the quality and efficiency of system management
- To provide users with efficient and strong technical support, including support for application migration, program design, technical advice, fault location, etc., and according to the needs of users to provide in-depth research and development cooperation
- We follow the open source development closely, Tracking open source development, tracking open source failure patches, security vulnerabilities patches, rapid integration of new open source functions and release bug fixes patch.

CGSL technical features

CGSL is different from the ordinary Linux operating system, in ensuring the performance and quality under the premise of a new technology for a careful choice, it not only has critical applications must have high-end performance, but also meet the carrier-class operating system requirements Of the high reliability, can adapt to a variety of demanding application environment requirements. CGSL has the following technical features:

High availability

CGSL is a high-availability-centric carrier-class server operating system, embodied as follows:

- meet the CGL (Carrier-Grade Linux) 5.0 technical indicators to meet the needs of carrier-class users..
- CGSL is based on the industry-stable kernel version, which provides reliable guarantee for the stable operation of the system.
- Provides a cluster kit for creating a cluster system, that combines redundant high-availability hardware components and software components to eliminate single points of failure and provide node failover to ensure high system availability.
- provide comprehensive virtualization support, enhance system reliability and security.

Extendibility

- CGSL V4 maximum support logical CPU and memory as follows(Certified[/Theoretical]):

Architecture	CPU	Memory
X86	128/4096	2TB/64TB
AMD64, Intel64	128/4096	2TB/64TB
Loongson	128/4096	2TB/64TB

- CGSL V5 supports more physical CPUs, more CPU cores, more Hyper-Threading CPUs and more physical memory. The maximum supported logical CPU and memory are as follows (Certified [/ Theoretical]):

Architecture	CPU	Memory
X86_64	288/5120	6TB/64TB
Phytium	288/5120	6TB/64TB

- If supported by the CPU architecture, CGSL supports the addition of CPU and memory at runtime.

Security features

CGSL operating system security features include not limited to the following:

- Support the improved user authentication
- Supports logging of system-critical security events
- Support for mandatory access control
- Supports minimum service set
- Provides security auditing
- Provide a secure transmission channel
- Trusted path
- Data integrity, data confidentiality
- Support system tailoring customization
- Timely security patch updates

Maintainability

For the industry is difficult to locate the crash, deadlock, and other difficult problems, CGSL provides a rich and effective means to locate the problems, greatly improving the system maintainability. The following describes several common and effective means.

- **Kdump:** A kernel crash dump mechanism. In the event of a kernel crash, kdump preserves system consistency by booting another Linux kernel, which is known as the dump-capture kernel, and using it to export and save a memory dump and as an important data for fault analysis, positioning problems.
- **Black box:** CGSL for ZTE ATCA / ETCA blade hardware environment, developed a black box function, which is a fixed memory area, the operating system and hardware will not damage the contents of the region, the CPU hot restart the content of the region still exists . The information stored in this area can be used to analyze the cause of a fault after a system reset. If the customer has the same hardware server needs, can be negotiated common development.
- **Nmi_watchdog:** If it is related to the system crash caused by Off Interrupts deadlock, it will lead to including process scheduling, shell, network, etc. are unable to respond, this time the need for NMI function support. Nmi_watchdog through the nmi non-maskable interrupt detection deadlock situation, you can trigger a fault Kdump, save the scene to the black box or start emergency shell for debugging. It is a great tool to locate such a problem
- **Sysrq:** is a series of pre-defined key combinations, when the system hangs or dead (such as the kernel into a blocked or dead loop), but the keyboard also respond to the situation, you can use these key combination process running status information to locate exceptions .
- **Emergency Shell:** Independent with other kernel module. When the system has the abnormal circumstances such as dead loop, kernel deadlock and abnormal scheduling, the maintainer can login to Emergency Shell to interact with the system. Through the analysis of the memory, the CPU register and other information, the fault location can be analyzed.
- **Memory Filesystem:** The disk or network may cause the root file system to be unavailable due to a fault. The consequence is that the system command cannot be executed, make it difficult to analyze and debug the cause of the problem. To solve this problem, CGSL provides a memory filesystem, the system commonly used commands stored in the memory filesystem,.When the root filesystem is unavailable, you can use the command stored in the memory filesystem to analyse and debug the fault.
- **Software Watchdog:** CGSL provides Soft lockup (soft deadlock) software watchdog mechanism, An abnormal condition that system is not responding for a long time or dispatched exception can be detected by Software Watchdog.When detecting the abnormal, the current fault site can be saved, and the log can be recorded for post analysis.
- **Detection of Deep Sleep Task:** The task may be in a deep sleep state during runtime due to lack of resources. Task in this state can not be signal wake-up, can not be killed, can only wait for the release of resources and be awakened. This function detects that the task has been blocked for a long time and saves the site for later analysis when an exception is found.
- **Kernel with debugging information:** The kernel has a lot of debug switches, considering the

performance impact is not open by default. CGSL provides the standby kernel that opens the debug switch. In the event of a kernel failure, you can reduce the process of recompiling kernel and improve the efficiency of problem location.

- Provide More Complete Memory Statistics: The usual system provides the basic memory statistics, but it is not enough to meet the needs of the problem location. CGSL provides more complete memory statistics, which is helpful to analyze and locate the related problems.
- Sosreport: Help diagnose system problems, collecting system information, such as: kernel version, loaded drivers, configuration of a variety service, and installed software package information. And generate a file that can be sent to another location.

Debugging Ability

- Systemtap: A powerful and easy use kernel and user mode debugging tools. It can be dynamically debugged without changing the kernel, monitoring function calls parameters and return values, querying or modifying the values of specified kernel variables, viewing process context information, monitoring system calls, and signal processing.
- Perf: The kernel comes with the system performance optimization tool, the advantage is closely integrated with the kernel.
- Abrt: An error detection and reporting tool, Abrt detailed error report log, can speed up the fault location and resolution.
- OProfile: A system-level performance tuning tool. CGSL V5 integrates a new version of the OProfile tool to add support for new Intel and AMD processors.
- strace: A process tracking tool. Able to display all system call issued by the user space program. intercept and record system calls as well as process signals. It is a very effective tool for detection, guidance and debugging.
- ltrace: Similar to strace, but tracking different objects, it is tracking the dynamic library function call.

In addition, CGSL also provides good support for KProfiler, a performance tuning tool developed by ZTE's OS platform. KProfiler is a low-overhead system global performance monitoring tool. It can help users get information such as system hot spot function and its call chain, cache /TLB hit rate, function execution efficiency, etc.. Help users troubleshoot CPU high and program performance issues.

Improved Monitoring Features

CGSL provides a real-time monitoring framework, a systematic, comprehensive, real-time monitoring tools and a unified graphical tools, with strong scalability. The monitoring objects include system resources such as memory, CPU, network, IO, process, file system, swap partition, and hardware information such as disk, RAID1, FC controller and memory MCE.

Manageability

CGSL provides a common system management tool to meet the user's common system management needs. Such as: time zone configuration, language configuration, user configuration, LVM configuration, network configuration, display configuration, service configuration, etc.

In addition, CGSL also provides ICT (Integrated Configuration Tool). According to the user's common and difficult to operate configuration function, develop the corresponding configuration tools, and integrated into ICT tool to maximize the convenience of system management. Currently ICT tool contains: package configuration tool, FTP configuration tool, crontab task configuration tool and NIC binding configuration tool. Subsequent versions of the update process, according to user needs to develop new features.

Good Compatibility with Third Party Software

CGSL system as a standard Linux server distribution, provides a good software compatibility, compatible with a large number of application software, including commercial software and open source software , such as:



Flexible deployment solution

CGSL provides a flexible and diverse deployment solution, allowing users to easily deploy any location in the CGSL network environment, the specific functions provided as follows.

- To support multiple boot mode, including CD-ROM ,hard disk and PXE.
- To support access to the installation source from CD-ROM, hard disk and network.
- To support automatic, manual and traditional installation mode. And we can customize the installation process according to user requirements.
- The installation of the CD-ROM provides rescue mode function, it can be used to repair the system when the operating system can not boot.

Automatic system upgrade solution

CGSL provides a fully automatic upgrade patch from the lower version to the higher version. Users only need to execute a simple command to update the system.

On-demand customization

CGSL can meet the special needs of the user customization requirements on many aspects such as the boot process, version, hardware and the applications. We can do on demand personalized customization

Cluster

Cluster is a task performed by two or more computers (also called nodes or members). Cluster can be divided into four categories, storage cluster, high availability cluster, high performance cluster and load balance cluster. CGSL provides powerful cluster suite, it can achieve the above four types of cluster functions, simple description as follows.

- The storage cluster provides a consistent file system image for services, allowing service at the same time to read and write a shared file system. The storage cluster eliminates the trouble of copying data between applications by putting the data in a shared file system, and provides a single backup and recovery point.
- The high availability cluster by eliminating single points of failure and node failover function (services will be transferred to other cluster nodes when cluster node is failed) to provide high availability. Cluster provides high availability cluster functionality through high availability service management components.
- The load balancing is a low cost and high availability cluster, the service request scheduling to achieve load balancing of multiple nodes in the cluster. Cluster through LVS (Linux Virtual Server) to provide load balancing cluster function.

- High performance cluster support applications to perform parallel computing on multiple nodes, thereby improving application performance.

New system service manager for CGSL (CGSL V5)

systemd is a system and service manager for Linux, and replaces SysV and Upstart used in previous releases of Red Hat Enterprise Linux. systemd is compatible with SysV and Linux Standard Base init scripts.

systemd offers, among others, the following capabilities:

- Aggressive parallelization capabilities;
- Use of socket and D-Bus activation for starting services;
- On-demand starting of daemons;
- Managing of control groups;
- Creating of system state snapshots and restoring of the system state.

Virtualization

Virtualization technology allows multiple virtual machines with different operating system independent parallel running on the same physical machine, each virtual machine has a set of virtual hardware itself, can be in these hardware to load the operating system and applications. Virtualization technology can not only greatly reduce the cost of IT, but also enhance the security and reliability of the system.

CGSL provides the excellent virtualization support, CGSL KVM and XEN V3 version also provides two kinds of virtual technology; CGSL V4/V5 version mainly provides KVM virtual technology, KVM virtualization technology based on the kernel, can be directly run Linux and Windows operating system, completely compatible with the VMware vSphere architecture, and convenient management and maintenance, at the same time CGSL V4/V5 support openstack, docker etc..

Support of multifile systems

CGSL supports multifile systems, including the following mainstream file systems:

- XFS: The default file system for an Anaconda-based installation of CGSL V5 is now XFS, which compared to Ext4 the larger capacity, then higher efficiency, better performance. XFS supports metadata journaling, which facilitates quicker crash recovery. XFS file system can also be defragmented and expanded while mounted and active. Note that it is not possible to shrink XFS file system;

- Ext4/Ext3/Ext2: The file system is widely used for Linux, Mount local block device;
- NFS: NFS is used to mount the remote directory file system;
- ISO9660: ISO9660 is used to mount the CD-ROM's file system;
- VFAT: VFAT is used to mount the FAT32 file system which is widely used for the windows;
- NTFS: NTFS is used to mount the NTFS file system which is mainstream used for the windows.

Support of file systems also includes:adfs, affs, autofs, cifs,coda,coherent, cramfs,debugfs, devpts, efs, hfs, hpfs, iso9660, jfs, minix, msdos, ncpfs, nfs4, proc, qnx4, ramfs, reiserfs, romfs, smbfs, sysv, tmpfs, udf, ufs, umsdos, usbfs, xenix, xfs, xiafs。

In addition, CGSL also provides LVM (logical volume management) function. LVM allows multiple storage devices to be combined and flexible control, according to the needs of the system to dynamically adjust the size of the disk partition.

Drive optimization

CGSL on a number of current common device driver has been modified and optimized, such as: e1000 NIC, sas controller driver.In addition, the latest hardware devices in each server, through the integration of existing drivers or to optimize the drive, provide a comprehensive support program.

Optimized desktop environment

CGSL provides an easy-to-use desktop environment, and optimize it, including Linux and Windows to solve the problem of sharing Chinese files when the garbled; provide automatic login function; provide a variety of remote control means.

Powerful integrated development environment

CGSL integrates a wealth of development tools, including GCC4, gdb, valgrind, autoconf, automake, make, expect, jdk, python2.7, perl, glade, subversion and a variety of editors, for developers from design to release Of the entire software development process of strong support.

In addition, CGSL can fully support the ZTE OS platform development EMBSYS KDIE products - KIDE is a simple, powerful, easy to use graphical integrated development environment. So as to provide developers with a sound and practical editing, compiling, linking, debugging and other tools and means.