

## Open Source Software Standardization Trends—CGL and DCL

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### Abstract

This article describes how OSDL (Open Source Development Labs) is promoting the increased use of the Linux operating system, a typical example of open source software (OSS), and moving towards the standardization of Carrier Grade Linux (CGL) for communication carriers and Data Center Linux (DCL) for enterprise data centers.

### 1. OSDL

OSDL (Open Source Development Labs) is a non-profit organization established in 2000 to promote the development of Linux, a typical example of open source software (OSS), and its use in industry [1], [2]. It is currently moving forward with the standardization of various Linux implementations: CGL (Carrier Grade Linux), DCL (Data Center Linux), and DTL (Desktop Linux). To achieve this, OSDL is publishing these standards so that distributors and the developer community can begin working on their implementation. It is also making US and Japanese testing and development environments available to developers worldwide. NTT began participating in OSDL as a carrier in February 2004 and has played an active role in the standardization work being carried out by the CGL and DCL working groups. In September 2004, CGL and DCL meetings were held at NTT's Makuhari building.

### 2. Carrier Grade Linux

CGL [3] is a set of public documents that Linux distributors and Linux kernel developers can use to develop the kernel functions and associated libraries needed for the next generation of network infrastructure. The activities of the CGL working group are divided between three subgroups: a steering sub-

group that determines the overall strategy, a marketing subgroup that promotes CGL, and a technical subgroup that studies technical specifications.

The CGL working group was the first OSDL working group to be set up. It published CGL1.0 and CGL2.0 specifications in September 2002 and October 2003, respectively, and various companies are now offering distributions conforming to CGL2.0. The most recent specification is CGL3.0 (formally entitled *OSDL Carrier Grade Linux Requirements Definition, version 3.0*), which was published in February 2005. CGL3.0 was developed for application to kernel 2.6 and expands upon the CGL1.1 and 2.0 specifications to define requests relating to the following six functional fields:

- (1) *Availability*: The specification aims to achieve 99.999% system availability by eliminating downtime. This involves online operation, redundancy, monitoring, and software hardening.
- (2) *Serviceability*: This involves operating standards to facilitate remote management, including SNMP (simple network management protocol), CIM (common information model), WBEM (web-based enterprise management), IPMI (intelligent platform management interface), and HPI (hardware platform interface).
- (3) *Performance*: The specification supports real-time operation, SMP (symmetrical multi-processor) architectures for increased speed, hyperthreading, and systems with large-scale memories. This involves support for, among other things, communication functions with

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low latency.

- (4) *Clusters*: The specification restricts the scope to highly available clusters, which involves the elimination of single-point faults in both hardware and software.
- (5) *Standards*: This involves industry standards, such as Linux Standard Base (LSB) [4], the Service Availability (SA) Forum [5] interface specification, and POSIX, and standards that need to be followed to promote inter-operability.
- (6) *Hardware*: This involves supporting hot-swappable components and hardware components based on a standard module design.

NTT's contribution includes helping to draft the definitions of CGL3.0 requirements and working on an editor related to availability. This work is mainly being carried out at our network service system laboratories in cooperation with NTT Software and NTT Comware.

Distributions conforming to CGL3.0 are expected to become available from major distributors from the middle of 2006. At the time of writing, work is also continuing on rationalizing the CGL1.1 and CGL2.0 documentation and on preparations for the release of CGL3.1 with enhanced security features at SUPERCOMM 2005 in June.

### 3. Data Center Linux

The purpose of DCL [6] is to identify the capabilities necessary for using Linux as a platform for mission-critical enterprise applications and databases and to present technical and business approaches that meet these requirements. The DCL working group was established in January 2002. It has the same configuration as the CGL working group.

The technical issues that need to be addressed when using Linux to run a data center were published in a document entitled *DCL Technical Capabilities version 1.0* in February 2004. An additional section on marketing goals was later added based on feedback from end users and independent software vendors, leading to the most recent publication of *DCL Goals and Capabilities version 1.1* in February 2005.

The marketing goals are defined separately for seven categories:

- (1) *Linux awareness and confidence*: Provide end

users and the managers of corporate IT (information technology) divisions with a message advocating the use of Linux, etc.

- (2) *Global enterprise services and support*: Provide a distribution that supports localization and has worldwide support, etc.
- (3) *Workloads*: Provide software stacks required as standard, such as database and transaction management, HA (high availability) solutions, and EAI (enterprise application integration).
- (4) *Technical training and education*: Provide education programs and technical certification programs for Linux developers and administrators, etc.
- (5) *Development community*: Provide development environments and tools to facilitate the development of Linux kernels and applications, etc.
- (6) *Total cost of ownership*: Keep overall costs low, including not only the initial acquisition cost but also the cost of support and maintenance.
- (7) *Stability*: Make Linux kernel and software stacks stable, such as backward compatible at kernel upgrade.

Besides reflecting the new version 2.6 of the kernel, the "Technical Capabilities" section of *Goals and Capabilities version 1.1* was enhanced in four main areas: security, hot-plugging, clustering, and storage networking. In these technical fields, Special Interest Groups (SIGs) were formed to fill the gaps between the required capabilities and the existing technology available to the development community. At NTT, together with NTT DATA Intellilink Corporation, we are conducting tests on the reliability of file systems.

NTT will continue to play an active role in standardization centered on OSDL, and we plan to make further contributions to the development and promotion of open source software.

### References

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- [4] <http://www.linuxbase.org/>
- [5] <http://www.saforum.org/>
- [6] [http://www.osdl.org/lab\\_activities/data\\_center\\_linux](http://www.osdl.org/lab_activities/data_center_linux)



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