

The Status of Open Source Software (OSS) Development, Use, and Promotion in Korea

March 2003

Seongsoo Hong

Real-Time Operating Systems Lab.

School of Electrical Engineering and Computer Science

Seoul National University, Korea

Abstract

This paper presents a survey of the status of open source software (OSS) in Korea by examining its development, use, and promotion. We first examine the OSS development climate in the areas of embedded Linux distributions, GUI systems for embedded Linux, development environments, and etc. Next, we survey the use of OSS by investigating Linux usage in domains of (1) embedded, (2) desktop, and (3) server systems. Finally, we examine various OSS promotion organizations and the government policies focused on the promotion of OSS.

Korean companies have developed world-class Linux technology. Although much of this software is not open source software, it still serves to accelerate the penetration of Linux to a wide variety of domains. Linux has seen steady progress penetrating the embedded system and server markets. Although Linux has seen little success on the desktop, more and more public institutions are making use of Linux as a desktop platform due to Korean government policies. It is quite certain that the application domain of Linux will spread out further more constantly.

I. Introduction

This paper surveys the status of open source software (OSS) development, use, and promotion in Korea. Korean domestic OSS has prospered since the late 1980's, accompanying the spread of Unix in Korea and early OSS was developed largely by Unix users. As Linux gains ground in Korea, OSS development has accelerated as many Korean Language support OSS projects have been developed by PC users as well as existing UNIX users. The first and most successful OSS project in Korea is hanterm (www.hanterm.org), which is a full-featured terminal emulator with Korean language support.

Most early OSS projects in Korea have been mainly focused on support of the Korean language and alphabet. Among the many OSS projects in Korea, openHWP (www.openHWP.org), a Korean language word processor, aroused much interest in 1998, fueled in part by a growing sense of nationalism. However, this project would fold a mere two years later. As in most Asian-Pacific countries, OSS projects have not been prevalent or strongly supported in Korea.

Recently, Korea has seen quite a bit of successful commercial OSS development based on Linux. Korean companies that have developed their own technology based on Linux have been quite successful not only in achieving global recognition but also in making profits from their products¹. Success has come in the fields of embedded operating systems based on Linux, GUI (window) systems for embedded Linux, embedded and desktop applications, server Linux security solutions, and server Linux performance accelerator. Many of these commercial products are not open source software, but these efforts are worth noting as support for the Linux platform contributes to increasing the Linux user base. Therefore, we investigate closed-source commercial projects that support OSS platforms, such as Linux.

With these world-class Linux solutions, Linux has seen steady progress penetrating the embedded system and server markets in Korea. Korean embedded Linux products have been put into a variety of embedded systems including Korean and Chinese PDAs and real-time control systems. Server Linux is also now used in a Korean Internet banking system.

However, Linux has seen little success on the desktop in spite of government policies directed at promoting desktop Linux. Nevertheless, Hancor Linux Inc. (www.hancor.com), a Korean company, has developed office/groupware solutions for Linux desktops that have seen success throughout the world. Although these products are not open source software, they do serve to promote the spread of Linux to the desktop.

In the remainder of the paper, we present the development, use, and promotion status of Korea in Sections 2, 3, and 4, respectively. In Section 5, we conclude the paper.

II. OSS Development in Korea

We survey the status of OSS development in Korea in the areas of (1) embedded Linux distributions, (2) GUI systems for embedded Linux, (3) development environments, (4) embedded and desktop

¹ On the other hand, Korean domestic companies distributing Linux as it is (that is, server and desktop Linux) have had little success. The surviving Linux distributions are generally derivatives of foreign distributions from companies such as RedHat Inc. In fact, RedHat Linux is more widely used than any domestic Linux distributions in Korea.

applications, (5) server Linux solutions, and (6) other projects developed in Korean OSS communities.

II.1. Embedded Linux Distributions

Among all OSS developments, the developments of embedded Linux were the most successful in Korea producing world-class solutions. Korean embedded Linux solutions have been used in many products, from PDAs to Card approval systems. We summarize the Korean embedded Linux OS in the following table. As presented in the table, many Korean embedded Linux were exported to the Chinese market.

Embedded Linux OS	Developers	Features and Achievements
Tynux	PalmPalm Technology Inc. (www.palmpalm.com)	<ul style="list-style-type: none"> • Intel Xscale, Strong Arm • Qt/E, Micro-X, Tiny-X, Microwindows, Nano-X, and GtkFB, etc. • JFFS2 flash memory file system • LCD, Touch screen, UART (for debugging and communication), USB, Audio, CF Card, Ethernet • Stereo audio and CCD camera, CF Card, CDMA, Firewire (IEEE 1394), Wireless LAN, USB, Bluetooth, and IrDA • RedBoot boot loader from RedHat, Inc. • GNU based tool chain • Power management: DPM and DVS
Linu@ (www.linute.com)	Mizi Research Inc. (www.mizi.com)	<ul style="list-style-type: none"> • ARM, Strong ARM, MIPS, and x86 • Qt/E (Qtopia GPL version) • Pared-down standard 2.4 kernel using glibc and gcc tool chain • Embedded in PDA of Group Sense Limited (GSL) (www.gsl.com.hk), China's fastest growing handheld manufacturer, • Exported 50 thousand copies to Red Flag Linux, a China's Linux company on April 2002.
Linupy (www.yopy.developer.org)	G.Mate Inc. (www.gmate.com)	<ul style="list-style-type: none"> • ARM processors • Pared-down X windows. • Embedded in PDA whose name is Yopy: Yopy is being sold not only in Korea, but also in EU and Australia by Tuxmedia (www.tuxmedia.com), a France company
Winy Linux (www.winy.co.kr)	Mococo ² Inc. (www.mococo.com)	<ul style="list-style-type: none"> • x86, ARM7TDMI, Strong ARM, MIPS, SH series etc. • Based on Linux 2.4.x • ELF file, Loadable module, Floating Point Emulation, Power Management • TCP/IP(v4, v6) , IPX , DHCP , PPP • Parallel port , Serial port, USB port ,Touch-Screen, 8/16/32 bit color, Modem , wireless LAN, Ethernet, IrDA , sound , CDMA, PCMCIA, CF • JFFS2 (Journaling Flash File System 2), FAT/VFAT, Ext2, Iso9660 • WSM (Winy System Manager) library: a kind of HAL

² MOBILE COmputing & COmmunication

		<ul style="list-style-type: none"> Embedded in smart phones of GigaSysNet Inc. (http://www.gigasysnet.co.kr), which are exported to China Embedded in Robocom, a robot for English conversation of DG-Tec Co. Ltd. (www.dg-tec.co.kr) Embedded in card approval terminals of TelQoS Inc. (www.mailshot.co.kr)
Embenix (www.embenix.com/)	Dasan Inc. (www.dasan.com)	<ul style="list-style-type: none"> PowerPC processors (7xx,8xx,82xx), ARM, and StrongARM processors gcc2.95.2 cross compiler, glibc2.1.2
Emplug	AstonLinux Inc. (www.astonlinux.com).	<ul style="list-style-type: none"> x86, StrongARMs, MPC, MIPS, ARM TCP/IP, network routing, firewall Ethernet, parallel, LCD, RS232C, touch panel, serial communication, USB, Audio, IrDA, Keyboard
		<ul style="list-style-type: none"> Supplied 20 thousand copies to Turbolinux, Inc. Beijing (www.turbolinux.com.cn) on September 2002.
PET ³	PenuroCom ⁴ Inc. (www.penurocom.co.kr/)	<ul style="list-style-type: none"> CPU without MMU (Memory Management Unit) FLT executable file format TCP/IP, IrDA, USB, SD Memory card, MMC card, memory stick, CF card PPW (PET Portable Windows) re-development environment
QPlus-P (qplus.etri.re.kr/qplus-p/)	ETRI ⁵ (www.etri.re.kr)	<ul style="list-style-type: none"> Supported BSPs: i386/generic, i386/ETRI-hestia, arm/iPAQ, arm/Zaurus, arm/SMDK2400 Tiny X based graphic server (Ver. Xfree86-4.2.0), GTK+ based Toolkit (Ver. GTK+ 1.2.10) Enhanced Flash File System (FFS) and multimedia file system supporting QoS Bluetooth, PLC, USB, IEEE1394, Wireless LAN Preemptive kernel through patching preemption points such as (1) after interrupt service, (2) after unlock the SMP spin lock, (3) per CPU data. Low power support: through real-time dynamic voltage scaling scheduler Fast ROM BIOS booting (x86): about 4 seconds (average was 14 seconds) Kernel debugger support (ARM9)
		<ul style="list-style-type: none"> Officially released at OSS development community (www.acl.lanl.gov/linuxbios/)

II.2. GUI Systems for Embedded Linux

Qt Embedded, from Trolltech (www.trolltech.com), a Norwegian company, is a popular choice for Korean embedded system developers since Qt provides a simplified application development platform in exchange for the burden of royalty payment. A domestic competitor, Winy Win, developed by Mococo has emerged with an embedded GUI solution that has been gaining ground. It is not open source software but can be downloaded in a binary format. Winy Linux that includes Winy Win is being used in various embedded systems as explained in Section III.1.

Electronics and Telecommunications Research Institute (ETRI, www.etri.re.kr), a non-profit

³ Portable Embedded Technologies

⁴ 'Penuro' means 'with pen' in Korean.

⁵ Electronics and Telecommunications Research Institute. ETRI is a non-profit organization funded by the Korean government.

organization funded by the Korean government, is also developing its own GUI system whose name is GUI Builder. GUI Builder is open source software based on GTK. ETRI intends to propose a Linux embedded GUI platform standard based on the completed GUI Builder project. Following is a summary of GUI systems for embedded Linux in Korea.

GUI Systems	Developers	Features
Winy Win ⁶ (www.winy.co.kr/)	Mococo (www.mococo.com)	<ul style="list-style-type: none"> • WIN32 API • Client/server architecture • Executed as daemon process (deployed as executable file, source is not yet opened) • Internally, manages popup windows and I/O devices
GUI Builder	ETRI (www.etri.re.kr)	<ul style="list-style-type: none"> • Under development • Automatically generate GTK+ sources in host GUI environments

II.3. Development Environments

The products from Lineo, MontaVista, Red Hat, LynuxWorks, and REDSonic aim to replace proprietary embedded operating systems with Linux, though all use some proprietary tools themselves. The pure open source options for embedded Linux toolkits have been few in number, perhaps because constructing a usable system from scratch using the freely-available sources is prohibitively difficult for all but the most experienced Linux developer. Seeing this need, ETRI has developed an Open Source development toolkit for embedded Linux composed of Target Builder and Esto. These tools provide (1) help for inexperienced developers (2) integration of kernel and root file system configuration (3) a repository for open source packages important for embedded systems (4) a standard for the definition of embedded Linux BSPs.

Linuxdevices.com (www.linuxdevices.com) commented that these were already remarkable products even in their initial release under the GPL on Dec. 16, 2002. We summarize OSS projects or Linux related projects of development environments as follows.

Tools	Developers	Features
-------	------------	----------

⁶ This product is not open source.

Target Builder (qplus.etri.re.kr/qplus-p)	ETRI (www.etri.re.kr)	<ul style="list-style-type: none"> • A GUI-based tool for configuring QPlus-P kernel as well as system libraries and applications. • CML2 (Configuration Markup Language)-based Integrated configuration system (kernel, applications and system environment) • Automatic dependency checking and conflict resolution • Foot-print reporting, on-line help, project & configuration management
Esto (Embedded Systems Tool)	ETRI (www.etri.re.kr)	<ul style="list-style-type: none"> • GUI-based toolkit for developing embedded systems • Consisting of a cross compiler, remote debugger, remote monitor, etc. • Non-stop debugging feature: allowing development of time-critical software as well as accurate power estimates.
CodeMaker ⁷	AstonLinux Inc. (www.astonlinux.com/).	<ul style="list-style-type: none"> • IDE that operates in MS Windows • Remote-debugging
Atilla (mail.atilla.co.kr , atilla.sourceforge.net/)	Researchers of Daewoo Information Systems Co., Ltd. (www.daewoobrenic.com/)	<ul style="list-style-type: none"> • Under development • An XML and Python development environment • Atilla Core Engine - XPL, Preprocessor, AFC, Atilla Interpreter • Browser with Atilla support • IDE for supporting easy programming with Atilla.

II.4. Embedded and Desktop Applications

Although none of the embedded and desktop applications developed by Korean Linux companies are open source, we introduce them since they are in effect promoting the spreading of embedded and desktop Linux.

Hancom Linux, Inc., a subsidiary of Haansoft, which holds 80% of Korea's word processor market, has quite successful in developing embedded and desktop applications of Linux. Its office and groupware products support various languages, not only English or French, but also languages such as German, Greek, Russian, Spanish, Japanese and many more. Their products include not only word processor, but also spread sheets, graphics, and presentation processor for both desktop and embedded Linux. The developments of embedded and desktop applications for Linux in Korea are summarized as follows.

Category	Solutions	Developers	Features
Embedded (Mobile)	PIMS ⁸ , Web Browsers, Multimedia Players	Mococo (www.mococo.com)	<ul style="list-style-type: none"> • Optimized for Korean users (ex: lunar calendar, mobile phone support)
		PalmPalm Technology Inc. (www.palmpalm.com/)	<ul style="list-style-type: none"> • SyncAlways® technology: synchronization with MS Outlook • SteadyFlow® technology: MP3/MPEG4 codec technology optimized for ARM architecture

⁷ This product is not open source.

⁸ Personal Information Management System

	Office	Hancom Linux Inc. (www.hancom.com)	<ul style="list-style-type: none"> Product name: Hancom Mobile Office Mobile word processor, spreadsheet, presentation tool, and graphic editing tool Built on the Qt development tool
Desktop			<ul style="list-style-type: none"> Product name: Hancom Office Word processor, spreadsheet, presentation tool, and graphic editing tool
	Groupware		<ul style="list-style-type: none"> Product name: WorkDesk Electronic approval, e-mail, BBS, PIMS, document management, etc.

II.5. Server Linux Solutions

Many domestic server Linux distributors tried and failed in the Korean market. Most users of Linux for servers instead gravitated towards Red Hat Linux over all others. However, some Korean companies have developed server security solutions for Linux and have been quite successful. As the Linux server market continues to grow, fuelled largely by security concerns, these companies appear to have very promising futures. Among them, Linux Security Inc. (www.linuxsecurity.co.kr) has won contracts to supply its server Linux solutions for not only the Korean government but also departments in the Chinese government.

Nvergence (www.nvergence.com) has developed a solution that improves performance of Linux web servers. This kernel level solution has demonstrated a dramatic improvement in performance over conventional means. Developments of server Linux solutions in Korea are summarized as follows.

Tech. category	Server Linux Solutions	Developers	Features and Achievements
Security	NeoGuard@ESM	Inzen Inc. (www.inzen.com)	<ul style="list-style-type: none"> Linux host-based invasion detection systems (IDS) Detect invasion behavior occurring inside servers such as buffer overflow, race conditions, suspicious file operations Direct handling of invasion, such as process termination Minimal use of system resources
	BiMON	Linux Security Inc. (www.linuxsecurity.co.kr)	<ul style="list-style-type: none"> Linux-based software firewall Kernel-level stateful packet filtering Transparent and threaded proxy User authentication, Secure system management NAT (Network Address Translation) and multi-network support, NTP (Network Time Protocol), URL filtering, virus filtering SLB (Server Load Balancing) Used in information data centers of many Korean companies including SAIT (Samsung Advanced Institute of Technology) Contracts with Korean government. Contracted for supply with Chinese government

	DynaRA DIUS ⁹	LinuxKorea Inc. (www.linuxkorea.co.kr)	<ul style="list-style-type: none"> • Wireless LAN authentication solution • Various compounding authentication methods for wireless network • Dynamic WEP (Wired Equivalent Privacy) key¹⁰, Proxy RADIUS, EAP-SRP (Extensible Authentication Protocol-Secure Remote Password) authentication algorithm, VPN interoperability
			<ul style="list-style-type: none"> • Applied to HanaFOS ANYWAY systems of Hanaro communication (www.hanaro.com)
Web server	SCALA-AX	Nvergence (www.nvergence.com)	<ul style="list-style-type: none"> • Linux kernel-level web accelerator • Performance: up to 600% improvement for static data such as HTML, Image, flash files; and up to 300% improvement for dynamic data such as CGI • Virtual hosting support
			<ul style="list-style-type: none"> • Applied to many Korean search web sites such as Naver (www.naver.com), Simmani (www.simmani.com)

II.6. Other Projects Developed in Korean OSS Communities

Most non-commercial open source projects in Korea are still focused into localization. Among them, KLDP (Korean Linux Documentation Project, kldp.org, kldp.net) is the most successful. KLDP.net includes more than 60 projects and has more than 1000 members participating in the effort. Following is a summary of the projects developed in Korean non-commercial OSS communities.

Projects	Features
J.S.P	<ul style="list-style-type: none"> • Jakarta-Seoul project, http://jakarta.apache-korea.org/index.html • Korean Language Jakarta
JASO	<ul style="list-style-type: none"> • Java Source Open, http://jaso.xdns.co.kr/ • Free services for developing java open source projects
KLDP	<ul style="list-style-type: none"> • Korean Linux Documentation Project: kldp.org, kldp.net • Free services for developing any kinds of open source projects
DocBook Korea	<ul style="list-style-type: none"> • http://docbook.kldp.net/
Korean GNU projects	<ul style="list-style-type: none"> • GNOME: http://news.gnome.or.kr/ • GNU Korea: http://korea.gnu.org/, http://gnu.kldp.org/
Korea FreeBSD User Group	<ul style="list-style-type: none"> • http://www.kr.freebsd.org/
Group of open minder	<ul style="list-style-type: none"> • Open PHP source SW projects • http://www.openphp.com/
Office Netplug development site	<ul style="list-style-type: none"> • http://www.netplug.org/

III. OSS Use in Korea

As is the trend world wide, Linux has first been adopted in servers and is now expanding from web servers to medical instruments. Embedded Linux has recently seen growing support and as more embedded Linux products reach the market this trend is bound to gather momentum. On the desktop,

⁹ Dynamic Remote Access Dial-In User Service

¹⁰ Key between a wireless LAN terminal and an access point (AP)

Linux has had little success, the market being almost completely dominated by Microsoft's desktop operating systems. However, due to Korean government policies promoting desktop Linux, more and more public institutions are making use of Linux as a desktop platform.

III.1. Embedded Linux Usage

On December 2001, G.Mate Inc (www.gmate.com), a Korean PDA company, released a PDA called Yopy, running its own Linux operating system, Linupy (www.yopydeveloper.org). Linupy is an ARM supporting embedded Linux that G.Mate itself had developed. Since then we have seen few commercial products based on embedded Linux. However, Korean embedded Linux has seen success in the Chinese market, as can be seen in the following table.

Embedded Systems	Adopters (Companies)	Features including used SW
PDA	SK Telecom (www.sktelecom.com)	<ul style="list-style-type: none"> Applications including browsers: SK Telecom develops itself PDA related Linux technologies: G.Mate (www.gmate.com)
Measuring Instruments	SoC Master of Huins (www.huins.com), which is a SoC verification system	LinuxOS (v 2.4) is embedded in the core of ARM9 processor of the Excaliber chip consisting of SoC master
Dedicated Terminals	Card approval terminal of TelQoS (www.mailshot.co.kr)	Winy of Mococo (www.mococo.com)
Home gateway	Samsung (www.sec.co.kr)	Qplus of ETRI (embenix.com/qplus)
Chip	ADchips (www.adc.co.kr)	Embedded Linux 2.4.6 is loaded in to EISC (Extended Instruction core)
Robot	Robocom, a robot for English conversation of DG-Tec Co. Ltd. (www.dg-tec.co.kr)	Winy Win, Mococo (www.mococo.com)
Control	Control system of the second hot rolling factory of Posco (www.posco.co.kr)	Vendor information of adopted Linux is not available.

III.2. Desktop Linux Usage

Figure 1 shows the desktop OS distribution for Korean public institutions as of December 2002. As shown even in public institutions, the portion of Linux usage in desktop computers was very small (4%).

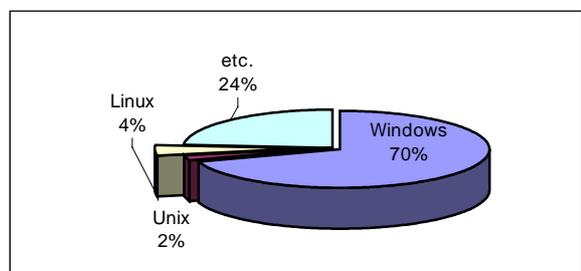


Figure 1. Desktop OS distribution for Korean public institutions as of December 2002.

The Public Procurement Service (PPS,

www.pps.go.kr), a department of the Korean government, has started a migration from MS Windows to Linux for desktop PCs. PPS procured 2600 copies of Linux from WOW Linux (www.wowlinux.com) on 2001 and has plan to procure more than 10,000 Linux PCs. In the private sector, Anam Electronics Co. Ltd. (www.aname.co.kr) adopted Linux for its groupware systems.

III.3. Server Linux Usage

Linux Users Group (LUG)¹¹ investigated the status of Linux usage in Korean public institutions on December 2002. It reported that Linux was the preferred OS for server computers (Figure 2), primarily for use as web servers. Cost reduction was the prime motivator for Linux adoption. The difficulty encountered when using Linux were mostly lack of knowledge on how to use Linux (Figure 7). In addition, the perception of Linux as insecure and difficult to maintain were major inhibitors to adoption. Lack of knowledge about Linux systems was shown to be the dominant reason for not using Linux. RedHat was the dominant distribution and all Korean Linux distributions hold less than 40% market share (Figure 6).

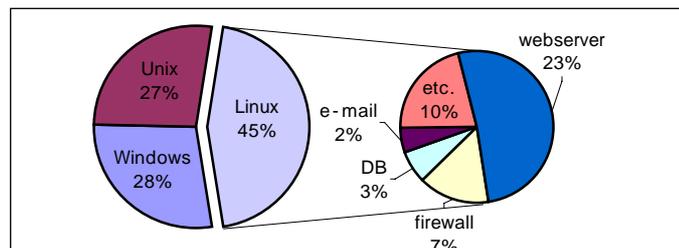


Figure 2. Server OS distributions for Korean public institutions and Linux use as of December 2002

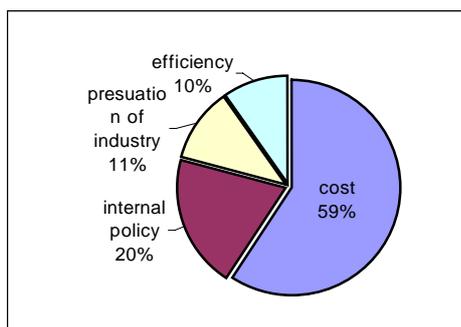


Figure 3. Motivations for adopting Linux.

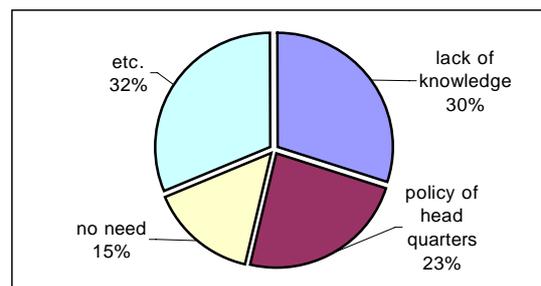


Figure 4. Reasons for not using Linux.

¹¹ Refer to Section IV.1.

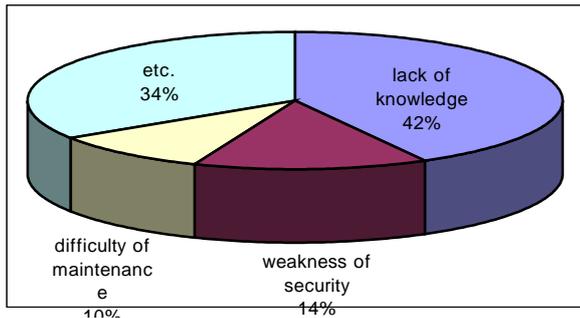


Figure 5. Difficulties using Linux.

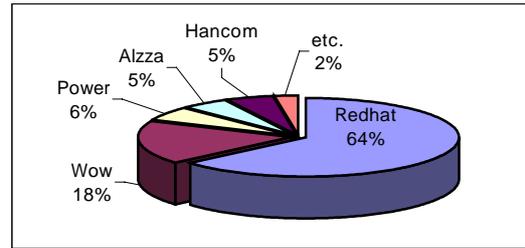


Figure 6. Installed Linux distributions.

The adoption of Linux for servers is expanding to a wide variety of domains continuously in Korea. The adoption of Linux for Korean Internet banking systems is most notable. Following table summarizes just some notable small example cases.

Domain	Adopters (Companies or Institutions)	Applications
Finance	Korean Federation of Community Credit Cooperatives (www.kfcc.co.kr)	Internet banking system
Airline	Korean Air (www.koreanair.co.kr)	Revenue management system and flight service management system
Medical Care	National Cancer Center, Kangdong Sacred Heart Hospital, Hallym Sacred Heart Hospital	Radiation diagnosis
	Konkuk University College of Medicine	MRI diagnosis
	Seoul National University Hospital	Inductor structure analysis
Communication	SKTelecom	System building of 'NATE Campus', wireless LAN service geared with CDMA 1x
	Korea VAN communications	Additional service system for pocket telephone
	I Mobile Computing	Internet data service
Education	Korean Educational Development Institute	Image meeting system
Entertainment	Dreamball, On-line game development company	On-line MUG game: Soccer game 'Dream soccer' (www.vworldcup.com)
	Lotto.com	Internet lottery service
Super Computer	POSdata	Cluster super computer
Electric power	Korean Electronic Power Corporation	Labor management system

IV. OSS Promotion in Korea

To promote both the development and use of OSS, various organizations have been formed and various Government policies have been planned and executed. Korea has also a monthly Korean

language magazine dedicated to Linux, Linux Magazine (www.linuzine.com/). There is also the Linux lovers group (linux.sarang.net)¹² and a growing proliferation of on-line Linux education sites, such as a-linux.net. We summarize OSS promotion organizations and government policies in the following tables.

IV.1. OSS Promoting Organizations

OSS Organizations	Background, Objective, and Activities
Open Source Software Activation Forum	<ul style="list-style-type: none"> Organized on May 2002 by both the Government and civil organizations Objective: to open hoarded software to the public and to promote sharing of source software
Linux User Group (LUG) (www.lug.or.kr , www.linux.or.kr)	<ul style="list-style-type: none"> A representative Linux community in Korea Inaugurated OSS fair competition measurement committee (May 2002) <ul style="list-style-type: none"> Find cases of unreasonably discriminating against Linux and institute a suit for violation of Fair Trade Act
Korea Linux Council (www.linuxkr.or.kr)	<ul style="list-style-type: none"> Role of central body of industrial-educational-research institutes for Linux activation Deliberations on the direction of development of Linux technologies and regulation of roles Promote of establishment of a law of open SW promotion Make efforts to foster industry base by excavating open software and drawing up a plan utilization and remuneration
Linux Technique Education Center (www.linuxcenter.or.kr)	<ul style="list-style-type: none"> Founded on September 2001 by Myongi college (www.mjc.ac.kr) Objective: to raise professional Linux manpower, expand Linux base, and activate the spread of Linux. A 17 weeks (5 month) Linux course. It is composed of Linux, embedded systems, and industry practical business training, etc.
Korea Embedded Linux Project (kelp.or.kr/)	<ul style="list-style-type: none"> A private organization mainly managed by young embedded Linux users Share Korean tutorial and lecture documentations for the development and use of embedded Linux Promote seminars related to embedded Linux
Korea Embedded System of Linux (kesl.org)	<ul style="list-style-type: none"> A private organization mainly managed by embedded Linux developers Promote the development of embedded system using Linux
Linux Hub Center	<ul style="list-style-type: none"> Organized on December 2002. Located in Seoul National University Fourth such center, following United States, United Kingdom, and Japan and funded by IBM. Supports: Linux faculty research, Linux student education, development of Linux curriculum and education courses, etc
LiCoNet (Linux Co-working Network)	<ul style="list-style-type: none"> Korean IBM Linux business corporation network (organized by IBM Korea Inc. on October 2002) Participants: Linux specialty companies such as RedHat and SI (System Integration) companies such as POSdata, IBM corporation companies such as ANAM, and solution companies such as SAPKorea (www.sap.co.kr/).
Linux Cluster Competency Center	<ul style="list-style-type: none"> Founded by PosData and IBM Korea (September 2002) Execute professional benchmark on Linux cluster solutions such as DW (Data Warehouse), ERP, and CRM. Promote the advance of Linux cluster techniques and create business opportunities

¹² 'Sarang' means love in Korean

Linux GUI Platform Standardization	<ul style="list-style-type: none"> Started by more than 10 specialized embedded Linux enterprises such as Mococo, Mizi Research, and AstonLinux Mutual agreement to unify GUI platforms for embedded Linux developed by each company Promote development of embedded Linux products by preventing application developers to develop products separately per platform
Linux Master Qualifying Test part of IHD	<ul style="list-style-type: none"> Managed by Information & Telecommunication Human Resources Development Center of Korea (IHD, www.ihd.or.kr) Started October 2001. More than ten thousand persons certified.

IV.2. OSS Promotion Policies of Government

Driving Strategies	Details
Base formation of fair competition	<ul style="list-style-type: none"> Destroy the structure of monopoly and oligopoly Abrogate bid restrictions that prevent introducing OSS when building information system for public institutions
Base formation of law/system for OSS activation	<ul style="list-style-type: none"> Creation of OSS demands of public fields Finding OSS and accelerating the usage of OSS Improving laws related with SW purchase Development/propagation of OSS license model most suitable to the domestic industrial environments Organization and operation of pan-governmental conference group for OSS activation (2003. 7 ~) <ul style="list-style-type: none"> Ministry of information and communication, ministry of planning and budget, ministry of finance and economy, ministry of government administration and home affairs, and public procurement service etc.
Construction of global cooperating system	<ul style="list-style-type: none"> Promoting OSS cooperation system among Korea, China and Japan

V. Conclusion

We have surveyed the status of OSS development, use, and promotion in Korea. Many Korean companies have succeeded in developing their own solutions for embedded, desktop, and server Linux. Although many of their developments are not open source software, their efforts and success are promoting the use and development of OSS since they are accelerating the penetration of Linux to a wide variety of domains.

As is the global trend, in Korea, Linux is widely used in server computers mainly for web servers. Recently, Linux was also adopted for Korean Internet banking systems. Linux is also expanding its application domain in embedded systems from PDA to Card approval terminals. Although Linux has seen steady progress penetrating the embedded system and server markets, Linux has seen little success on the desktop. However, due to Korean government policies promoting desktop Linux, more and more public institutions are making use of Linux as a desktop platform.

The future of OSS in Korea looks promising. The Korean people's interest in Linux and OSS is continuously increasing. The Korean government is also making efforts to promote OSS through government policy. Moreover, Korean companies have developed world-class Linux technology and are continuously doing their best to improve their solutions. It is quite certain that the application domain of Linux will spread out further more constantly.