Feasibility Analysis for Application of Domestic NeoKylin Operating System in Radar Measurement and Control System

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ABSTRACT

In these years, domestic operating systems have been developed and some representative achievements are obtained, including NeoKylin operating system. Application of safe operating system of NeoKylin in military industry field is more and more mature. The requirements of radar measurement and control system on operating system and the advantages of radar measurement and control system based on NeoKylin operating system are briefly analyzed in the paper and the technical analysis in paper can be used as important reference for promotion of operating system domestication transformation by radar measurement and control system.

KEYWORDS
Domestic operating system, NeoKylin, radar measurement and control system.

INTRODUCTION

Radar measurement and control system is important. Core requirements of military computer operating system must be security and stability. Radar measurement and control system equipped currently is researched and developed based on Microsoft Windows operating system platform. Because Windows operating system is not made in China, source code is closed, and equipment information may be disclosed easily. Radar measurement and control system based on Windows operating system has serious potential safety hazard.

Aimed at numerous requirements of radar measurement and control system on operating system platform, this paper briefly analyzes features of operating system often used currently, describes advantages of independent and controllable domestic NeoKylin operating system and briefly analyzes research and development feasibility of radar measurement and control system based on domestic NeoKylin operating system.

DOMESTIC NEOKYLIN OPERATING SYSTEM

As an imaging operating system, NeoKylin operating system is mainly oriented to desktop application. Its advantage lies in that it can meet customer’s demand sufficiently; based on specific soft hardware environment, effective solution can

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be developed; personalized function with pertinence can be developed simultaneously and performance optimization can be guaranteed. NeoKylin desktop operating system is widely applied to military and civil purpose, and it obtains “Nuclear Takamoto” special fund. The set of system has passed assessment of national authoritative department currently, which promotes research and development of China in operating system effectively.

Reinforced Linux kernel is adopted in operating system and the system has been widely applied to industry fields, such as energy, finance, traffic, government and central enterprise etc.

OVERVIEW ON RADAR MEASUREMENT AND CONTROL SYSTEM BASED ON NEOKYLIN OPERATING SYSTEM

Based on SELinux safe subsystem frame, NeoKylin operating system provides numerous functional services, and possesses uniform safety management center SMC and power separation mechanism jurisdiction set management function, developing corresponding security policy for certain application with free switch to safety management mode. In addition, it can be compatible with main soft hardware in market; it possesses long-term sustainable safety guarantee function; it protects safety of application and operating system in all-around and real-time way, avoids hostile attack to system and prevents data disclosure, thus making application steady, safe and controllable; it possesses numerous safety functions, including TCM support, trusted path, safe deletion, network security protection, high-strength access control, double-factor authentication and encrypted storage to core data etc. Therefore, based on domestic NeoKylin safe operating system, completely independent and controllable radar measurement and control system is constructed [1].

Overall structure of NeoKylin operating system

In operating system, the most important part is kernel. Kernel structure affects expandability, security and other performances of system. Kernel structure has always been mainly researched by people. At present, there are mainly 2 kinds of kernel
structures, i.e., Micro Kernel structure and Monolithic Kernel structure. The former can realize more ideal expandability and is quite flexible; however, because of frequent switch operation between user kernel mode and user mode, its operating efficiency is greatly affected. Relatively speaking, although Monolithic Kernel structure does not possess good expandability, it has higher operating efficiency, which embodies strong system function, and the disadvantage is that its performance in network or distributed computing environment is not good.

Based on reference to kernel technology of various operating systems, NeoKylin operating system integrates advantages of 2 kinds of kernel structures, and considers security application, network service, and calculated performance factor etc. as much as possible under the CPU polymorphic support premise, thus realizing design to layering kernel structure. In terms of constituent element, the structure mainly includes system service layer and basic kernel layer, and specific detail is as shown in Fig.3.1.

System service layer provides service to each interface by optimizing and improving FreeBSD, including file system and industrial standard network etc., and has various kernel security mechanisms, high-availability module and Linux binary system compatibility module, so that each industrial standard interface can be utilized well and BSD operating system stability is stressed.

Basic kernel layer mainly consists of interruption and exception handling, basic task management, and hardware initialization etc. It can provide various upward functions, such as memory management and task management etc., and make abstract management aimed at hardware platform downward. In addition, it uses modular design method, so it possesses many advantages, such as simple code, no strong dependency between modules and clear structure, and effective transportation and maintenance can be made to kernel [2].

**Technical advantage of NeoKylin operating system**

NeoKylin operating system has diversified development tasks, such as environmentally friendly task, real-time task, performance, safety, Linux object code compatibility and layering kernel structure. For evaluation work to the system, representatives of the military and civil, i.e., its technical advantages are as follows:

1) Improvement of service layer and basic kernel layer. When confronted with new hardware, it is obvious that traditional basic kernel layer cannot meet relevant requirements easily. Therefore, NeoKylin operating system makes change and upgrading with pertinence, and memory management based on object, Port communication mechanism of Mach based on RDMA and scheduling and optimization of processor are involved.

2) Realization of Linux object code compatibility layer. Linux is open source software, and after continuous enrichment and improvement, relatively improved software systems have been formed with much application and tool software. To employ the software better, NeoKylin operating system realizes compatibility with Linux object code, and forms Linux object code compatibility layer in kernel, and provides standard Portable Operating System Interface of Unix (POSIX), conforming to LSB specification.

3) Realization of characteristic and structured protection-level security mechanism. NeoKylin operating system attaches much importance to security problem, and it integrates kernel and cipher mechanism, and stresses process security
mechanism, including process behavior and capability control and process protection. In addition, integrated security of application and operating system is realized.

(4) Realization of strong instantaneity. For real-time operating system, significance of the maximum task switch time and the maximum interrupt inhibition time index etc. is great, which can be used as standard to evaluate its performance efficiency. To guarantee strong instantaneity, numerous technologies are used by NeoKylin server operating system, such as ultra real-time processing function, rapid interrupt response, rapid threading/process switch and accurate real-time clock, etc.

(5) Improvement of usability. No matter in system installation or desktop environment, NeoKylin operating system attaches much importance to usability experience of user. System installation is quite simple and convenient, and 2 kinds of installation way are provided, i.e., character and image. At the same time, the system control panel embodies Windows style sufficiently, desktop environment is Gnome and X-Window is used for basic graphics environment, and therefore, for Windows user, transition can be realized conveniently.

CONCLUSION

System platform based on NeoKylin safe operating system has boomed in civil and military fields. Its high performance and security advantages are obvious. Requirements of radar measurement and control system on operating system are briefly analyzed, and a series of advantages of NeoKylin safe operating system are described; thus, feasibility of using NeoKylin operating system in radar measurement and control system is analyzed, to provide technical guidance and reference for subsequent project practice.

REFERENCES