DIALOGUES WITH SPECIALISTS

Scientific article
UDC 004.45; DOI: 10.61260/2304-0130-2024-1-94-99

FEATURES OF ASTRA LINUX OPERATING SYSTEM

Labinsky Alexander Yu.
Saint-Petersburg university of State fire service of EMERCOM of Russia, Saint-Petersburg, Russia
Labinsciy@yandex.ru

Abstract. The features of the Astra Linux operating system developed by based on the kernel of the Linux operating system as part of the implementation of the state program on the creation and use of free software with a license for free copying and installation for an unlimited number of users, including the structure of the architecture of the Linux operating system, characteristics of its kernel, features of file and graphic systems, as well as office software packages Star Office and K Office. Distributions of the Astra Linux operating system are described, which are used as part of the implementation of the plan for the transition of federal budgetary institutions to the use of free software. The proprietary graphical system (Astra Linux user shell) Fly, which is conceptually a mixture of Windows and KDE graphical environments, is examined in detail. The features of different versions of the «MyOffice» office software package are considered, including a text editor, a spreadsheet processor, a presentation program, a server, and a data storage system and client applications.

Keywords: software, Astra Linux operating system, distribution, file system, office software package, graphical interface, Star Office, K Office, «MyOffice»

For citation: Labinsky A.Yu. Features of the Astra Linux operating system // Supervisory activities and forensic examination in the security system. 2024. № 1. С. 94–99. DOI: 10.61260/2304-0130-2024-1-94-99.

Introduction

Linux is an implementation of the Unix operating system (OS) for personal computers (PC) based on Intel microprocessors. Linux OS was developed in the early 1990 on the initiative of a Swedish student at the University of Helsinki, Linus Torvalds. In 1991, the first «official» version of the Linux OS 0.02, was released.

Linux is a family of multi-user network operating systems with a windowed graphical interface, the X Window System. All components of the system, including source code, are distributed under a license for free copying and installation for an unlimited number of users (GPL – General Public License), adopted for software developed within the framework of the Open Source movement. According to the license, such software can be further developed, modified, transferred or sold to others, provided that the result is also distributed under these terms.

The OS distribution consists of four parts: kernel, file system, shell and utilities. The OS kernel was developed under the general direction of L. Torvalds. The free distribution of the Linux OS was caused by the fact that a large number of companies in European countries began to produce OS distributions (currently more than a thousand distributions), differing in the structure of the file system, the OS installation program on a PC, the composition of utilities and application software.

To ensure Russia's technological independence in the field of software in the context of sanctions from «Western» countries, the Government of the Russian Federation has developed a plan for the transition of budgetary institutions to the use of free software.

In 2018, the Ministry of Defense of the Russian Federation decided to completely abandon from Microsoft Windows OS and switch to Astra Linux OS.

The purpose of the article is to review the features of the Astra Linux OS. The topic of the article is relevant, since the use of the domestic Astra Linux OS will ensure the technological independence of Russia in the field of software. In addition, software, including OS, is used to control complex and potentially dangerous objects, including nuclear power plants. The use of reliable domestic software will help prevent emergency situations, which are sometimes catastrophic in nature.

The novelty of the research lies in the fact that the article examines in detail the features of the Astra Linux OS, including the features of the Linux OS, the graphic system (user shell of the Astra Linux OS) Fly and various versions of the «MyOffice» office software package.

Features of Astra Linux OS

The Linux OS architecture is shown in Fig. 1.

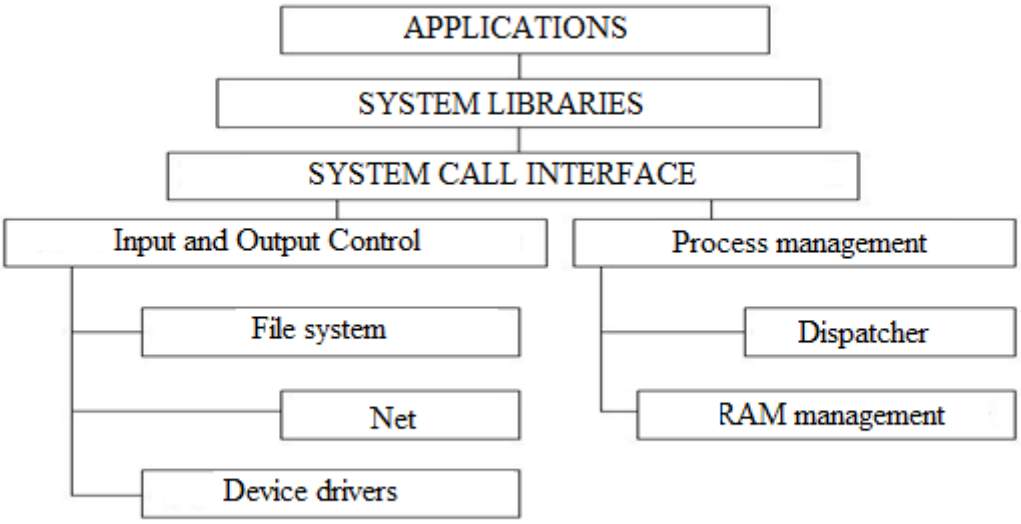

Fig.1. **Linux OS architecture**

The Linux OS kernel contains only the most necessary code to load the OS into the PC memory. Support for other PC devices is provided by modules that are built into the kernel when the OS boots. Characteristics of the kernel versions 2.4 and 2.6 are given in the table.

Table

Core Characteristics	Version 2.4	Version 2.6
Max. number of processors Max. amount of RAM Max. number of devices Max. file system size	16 16 Gb 255 2 Tb	64 64 Gb 4096 16 Tb
Supported file systems	FFS, HFS, FAT, MSDOS, VFAT, ISO9660 (CD-ROM), HPFS	FFS, HFS, FAT, MSDOS, VFAT, ISO9660 (CD-ROM), HPFS, NTFS

Linux OS can work with many file systems (FS), but Linux OS file system partitions are not accessible from Windows OS. Linux's own file systems are Ext2 and Ext3. These file systems use four types of files: files, directories (including drives CD-ROM, Zip, etc.), device files (input and

output ports, drives, sound devices, etc.) and links (direct and symbolic – analogous to shortcuts in Windows OS). The Linux FS is described in detail in [1–6].

The X Window System is a standard Unix OS environment developed by specialists from the Massachusetts Institute of Technology, USA. For PCs with Intel microprocessors, a version of X Window à X Free86 has been developed. However, starting with version 4.4 X Free86, it switched to a new license that is incompatible with the GPL license. Therefore, in the future, the Linux OS used the X Free86 àX Org version.

The X Window System consists of three components: the X server (hardware dependent, handles mouse and keyboard events), the X client (hardware independent), and the X protocol. Restarting the X Window system is done using the Ctrl + Alt + Backspace key combination.

The X Window Graphics System is used by various windowing environments, such as KDE (K Desktop Environment) and GNOME (GNU Network Object Model Environment), which are standard environments for many Linux distributions. Typically, a graphical environment based on the X Window System is loaded automatically when the Linux OS boots. Both KDE and GNOME desktop environments include a desktop (KDE has four desktops by default), an application bar, a file manager and system icons, a Web browser, an email client, a menu bar, and much more.

In the Linux OS, two office suites are most widely used: Open Office (a version of Sun's Star Office suite) and K Office, which are distributed free of charge under the GPL license. The K Office package can be considered as a simplified version of the Open Office package (Open Office is 240 MB in size, and K Office is 70 MB in size). The compatibility of these packages with MS Office, especially the K Office package, is incomplete.

Works [7–10] are devoted to the issues of software development for Linux OS.

Features of Astra Linux OS

Astra Linux – is a special-purpose operating system based on the Linux kernel, created for comprehensive information protection and construction of secure automated systems [5]. It is in demand primarily in Russian law enforcement agencies, special services and government agencies. Included in the Unified register of russian programs of the Ministry of telecom and mass communications of Russia.

The development of the Astra Linux OS based on the Linux kernel was started in 2008 by JSC NPO RusBITech. The Astra Linux OS was accepted for supply to the Ministry of Defense of the Russian Federation by order of the minister in 2013, the ministry also took part in finalizing the product. The system is being implemented in accordance with the order of the Government of the Russian Federation dated December 17, 2010 № 2299-r, approving the Plan for the transition of federal executive authorities and federal budgetary institutions to the use of free software.

Manufacturer JSC NPO RusBITech claims that «license agreements for the Astra Linux operating systems are developed in strict accordance with the provisions of the current legal documents of the Russian Federation, as well as international legal acts», while they «do not contradict the spirit and requirements of the GPL license».

The distribution includes such open source packages as the Libre Office office suite, the Firefox browser, the Thunderbird email client, the GIMP raster graphics editor, the VLC multimedia player etc.

In August 2017, the developers of Astra Linux and the MyOffice suite of office applications announced the launch of a joint product – a software platform that includes Astra Linux and «MyOffice».

Features of the Fly graphical shell

In Astra Linux OS, instead of standard graphical shells such as KDE, GNOME and so.on. uses its own graphical user interface (GUI – graphical user interface, windowed graphical environment) Fly, which is conceptually a mixture of the Windows and KDE graphical environments. There are very few such Linux distributions with their own GUI in the world.

The Fly graphical shell supports two graphic modes:

– Desktop – the Astra Linux OS interface is as similar as possible to the Windows OS interface.

– Tablet – Astra Linux OS interface for devices equipped with touch screens. In addition to the obvious external differences, this mode has other features. The cursor is not visible in this mode, and the button to close applications is placed on the taskbar. The interface also has a built-in virtual keyboard.

The graphical interface in tablet mode is also intended for use on touchscreen all-in-one PC, information kiosks, self-service terminals and large-screen touchpads.

The Fly graphical shell allows you to customize the appearance of the operating system to suit your needs, namely:

– change desktop wallpaper;

– customize icon colors and design scheme;

– change the font and adjust its size;

– configure blocking parameters, sleep mode, end of session;

– customize graphic effects for windows, taskbar and menus;

– customize sounds for various actions;

– customize the appearance and interface of programs.

The Fly graphical shell includes the following programs:

File manager. The operating system file manager interface is very similar to the manager interface in Windows. It is quite simple, but at the same time functional and easy to use. The file manager interface is shown in Fig. 2:

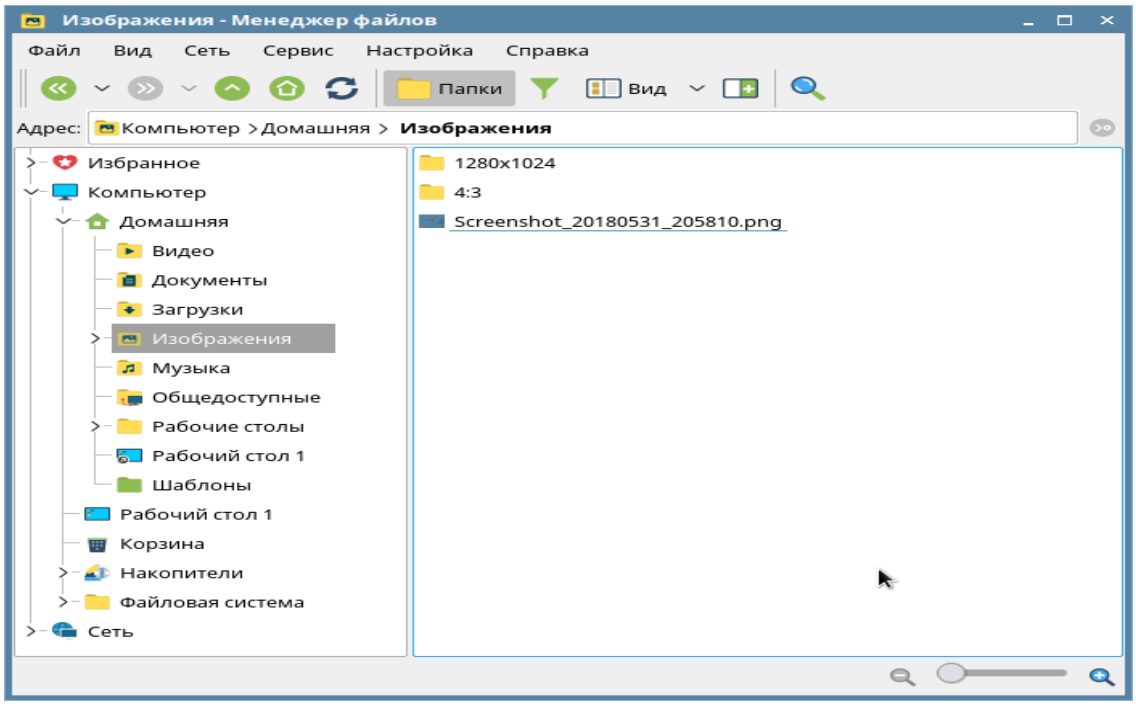

Fig. 2. **File manager of OS Astra Linux**

System monitor. To manage processes and tasks in the Astra Linux OS, there is a System Monitor utility, similar to the task manager from the Windows OS. The System Monitor utility allows you to manage processes and monitor the overall load on the system.

Internet browser. By default, the Mozilla Firefox browser is included with the OS.

Office packages. By default, the LibreOffice office suite is preinstalled with the OS.

Graphic editor. The following editors can be installed with the OS:

– Vector editor Inkscape is a freely distributed professional vector graphics editor that contains a huge number of possibilities and a wide range of tools.

– The Gimp image editor is a freely distributed graphic editor for primarily raster graphics, with partial support for vector graphics, and contains a wide range of tools.

– Blender 3D editor is a freely distributed multi-platform 3D and 2D graphics editor. Includes tools for modeling, animation, simulation, rendering, processing and editing video with sound, as well as creating 2D animations.

Technical support and documentation system. Unlike many Linux-based operating systems, Astra Linux distributions have good technical support and a knowledge base in Russian.

Features of the MyOffice office software package

«MyOffice» is a suite of office programs for collaborating with documents. Consists of applications for working with text, spreadsheets and presentations, email client, mail server, cloud storage, work services with personal and corporate contacts, online calendar, messenger with audio and video communication. Each application is designed to solve different problems – from free document management apps for home use before creating a functional working environment, including within the secure perimeter of the information system.

The «MyOffice» office suite is based on the concept of cross-platform collaboration. Applications support work on all popular platforms and various devices and can be installed in both the customer's private and public clouds. The product is compatible with most modern software and hardware platforms.

The following versions of the «MyOffice» office software packages are available:

– «MyOffice Standard» – a software package for working with office documents and by mail. Includes a text editor, a spreadsheet processor, a presentation program, and an application for managing mail, calendar, and contacts.

– «MyOffice Standard. Home version» – software package for work with electronic documents specifically for private users. Includes a free text editor and spreadsheet processor.

– «MyOffice Private Cloud» – a software package for organizing a virtual work environment based on the customer's server infrastructure. Includes a collaboration server, mail system and data storage, as well as a text editor, spreadsheet processor, presentation program and application for managing mail, calendar and contacts.

– «MyOffice Professional» – is a comprehensive solution for organizing a corporate environment and collaborating with documents.

– «MyOffice Secure Cloud» – is a comprehensive solution for secure processing of confidential information, cloud data storage and collective work on documents in real time. Includes a text editor, a spreadsheet processor, a presentation program, as well as a collaboration server and data storage system.

– «MyOffice Mail» – a software package for creating and managing a corporate email system. Includes mail server and work applications with emails, contacts and calendar. Includes a collaboration server, mail server and data storage system, text editor, spreadsheet processor, presentation program, as well as client applications for managing mail, calendar and contacts.

– «MyOffice Education» – a software package consisting of a text editor and spreadsheets, as well as applications for working with graphical presentations. This software package meets the requirements of the Federal State Educational Standard and is intended for use in educational organizations.

The applications of this package have a special «Education» panel, which provides quick access to popular educational services and tools. The package of programs is available at a reduced cost for state and municipal schools, kindergartens, colleges, additional education systems and education authorities.

– «MyOffice Documents» – a free software package available for download in the App Store and Google Play. The package's applications support work capabilitieswith documents in *.doc, *.docx, *.odt, *.xls, *.xlsx, *.ods, *.rtf, *.txt formats, as well as viewing presentation files and graphic files in *.ppt, * formats .pptx, *.odp, *.jpg, *.gif and *.tiff.

Conclusion

The features of the Astra Linux operating system are considered, including its own Fly graphic system and various versions of the «MyOffice» office software package. The topic of the article is relevant, since the use of reliable domestic software helps prevent emergency situations, which are sometimes catastrophic in nature.

Referencies

1. Reichard K., Foster E. Unix: a reference book. SPb.: Peter, 2003.
2. Baratov R.A. ASPLinux 11. Russian version. M.: Triumph, 2007.
3. Kolesnichenko D.N. Linux tutorial. SPb.: Science and Technology, 2016.
4. Granneman S. Linux Phrasebook. Sams Publishing, 2017.
5. Taylor D., Mishel J. Linux Power Solutions. Coriolis, 2019.
6. Labinsky A.Yu. Organization of information protection in the Linux operating system // Natural and man-made risks. 2021. № 1. P. 4–8.
7. Panigrahy N. Development for Linux. Hermes, 2018.
8. Labinsky A.Yu. Modern software development tools. monograph. SPb.: S.-Petersb. university of the State fire service of EMERCOM of Russia, 2018.
9. Labinsky A.Yu. On the issue of creating programs for domestic operating systems // Problems of risk management in the technosphere. 2019. № 4. P. 45–52.
10. Security of the special-purpose operating system Astra Linux Special Edition / P.V. Burenin [et al.]. M.: Hotline – Telecom, 2016.

Information about the article: the article was received by the editor: 26.02.2024;
accepted for publication: 05.03.2024

Information about the authors
Labinsky Alexander Yu., associate professor of the department of applied mathematics and information technologies of the Saint-Petersburg university of State fire service of EMERCOM of Russia (196105, Saint-Petersburg, Moskovsky ave., 149), candidate of technical sciences, associate professor, e-mail: Labinsciy@yandex.ru, https://orcid.org/0000-0001-2735-4189, SPIN: 8338-4230