

# GRAPHIC USER INTERFACE

Vinnitsia National Technical University

## Анотація

*В даній роботі було досліджено значимість графічного інтерфейсу історію виникнення графічних інтерфейсів та їх перші застосування, проведено порівняння з іншими інтерфейсами.*

**Ключові слова:** *графічний інтерфейс користувача, дослідження, інтерфейс, ОС, Windows, Linux, MacOS*

## Abstract

*The article deals with the importance of a graphical user interface, the history of graphic interfaces and their first applications are presented, the comparison with other interfaces is given.*

**Keywords:** *GUI, research, interface, OS, Windows, Linux, MacOS*

The graphical user interface (GUI) is a form of user interface that allows users to interact with electronic devices through graphical icons and visual indicators such as secondary notation, instead of text-based user interfaces, typed command labels or text navigation. GUIs were introduced in reaction to the perceived steep learning curve of command-line interfaces (CLIs), which require commands to be typed on a computer keyboard.

The actions in a GUI are usually performed through direct manipulation of the graphical elements. Beyond computers, GUIs are used in many handheld mobile devices such as MP3 players, portable media players, gaming devices, smartphones and smaller household, office and industrial controls. The term GUI tends not to be applied to other lower-display resolution types of interfaces, such as video games (where head-up display (HUD) is preferred), or not including flat screens, like volumetric displays because the term is restricted to the scope of two-dimensional display screens able to describe generic information, in the tradition of the computer science research at the Xerox Palo Alto Research Center.

Ivan Sutherland developed Sketchpad in 1963, widely held as the first graphical computer-aided design program. It used a light pen to create and manipulate objects in engineering drawings in realtime with coordinated graphics. In the late 1960s, researchers at the Stanford Research Institute, led by Douglas Engelbart, developed the On-Line System (NLS), which used text-based hyperlinks manipulated with a then new device: the mouse. In the 1970s, Engelbart's ideas were further refined and extended to graphics by researchers at Xerox PARC and specifically Alan Kay, who went beyond text-based hyperlinks and used a GUI as the main interface for the Xerox Alto computer, released in 1973. Most modern general-purpose GUIs are derived from this system.

The Xerox PARC user interface consisted of graphical elements such as windows, menus, radio buttons, and check boxes. The concept of icons was later introduced by David Canfield Smith, who had written a thesis on the subject under the guidance of Kay. The PARC user interface employs a pointing device along with a keyboard. These aspects can be emphasized by using the alternative term and acronym for windows, icons, menus, pointing device (WIMP). This effort culminated in the 1973 Xerox Alto, the first computer with a GUI, though the system never reached commercial production.

The first commercially available computer with a GUI was the 1979 PERQ workstation, manufactured by Three Rivers Computer Corporation. In 1981, Xerox eventually commercialized the Alto in the form of a new and enhanced system – the Xerox 8010 Information System – more commonly known as the Xerox Star. These early systems spurred many other GUI efforts, including Lisp machines by Symbolics and other manufacturers, the Apple Lisa (which presented the concept of menu bar and window controls) in 1983, the Apple Macintosh 128K in 1984, and the Atari ST with Digital Research's GEM, and Commodore Amiga in 1985. Visi On was released in 1983 for the IBM PC compatible computers, but was never popular due to its high hardware demands. Nevertheless, it was a crucial influence on the contemporary development of Microsoft Windows.

Apple, Digital Research, IBM and Microsoft used many of Xerox's ideas to develop products, and IBM's Common User Access specifications formed the basis of the user interfaces used in Microsoft Windows, IBM OS/2 Presentation Manager, and the Unix Motif toolkit and window manager. These ideas evolved to

create the interface found in current versions of Microsoft Windows, and in various desktop environments for Unix-like operating systems, such as macOS and Linux. Thus most current GUIs have largely common idioms.

### **Comparison to other interfaces**

#### Command-line interfaces

Since the commands available in command line interfaces can be many, complex operations can be performed using a short sequence of words and symbols. This allows greater efficiency and productivity once many commands are learned, but reaching this level takes some time because the command words may not be easily discoverable or mnemonic. Also, using the command line can become slow and error-prone when users must enter long commands comprising many parameters or several different filenames at once. However, windows, icons, menus, pointer (WIMP) interfaces present users with many widgets that represent and can trigger some of the system's available commands.

GUIs can be made quite hard when dialogs are buried deep in a system, or moved about to different places during redesigns. Also, icons and dialog boxes are usually harder for users to script.

WIMPs extensively use modes, as the meaning of all keys and clicks on specific positions on the screen are redefined all the time. Command line interfaces use modes only in limited forms, such as for current directory and environment variables.

Most modern operating systems provide both a GUI and some level of a CLI, although the GUIs usually receive more attention. The GUI is usually WIMP-based, although occasionally other metaphors surface, such as those used in Microsoft Bob, 3dwm, or File System Visualizer.

#### GUI wrappers

Graphical user interface (GUI) wrappers find a way around the command-line interface versions (CLI) of (typically) Linux and Unix-like software applications and their text-based user interfaces or typed command labels. While command-line or text-based application allow users to run a program non-interactively, GUI wrappers atop them avoid the steep learning curve of the command-line, which requires commands to be typed on the keyboard. By starting a GUI wrapper, users can intuitively interact with, start, stop, and change its working parameters, through graphical icons and visual indicators of a desktop environment, for example. Applications may also provide both interfaces, and when they do the GUI is usually a WIMP wrapper around the command-line version. This is especially common with applications designed for Unix-like operating systems. The latter used to be implemented first because it allowed the developers to focus exclusively on their product's functionality without bothering about interface details such as designing icons and placing buttons. Designing programs this way also allows users to run the program in a shell script.

## **СПИСОК ВИКОРИСТАНОЇ ЛІТЕРАТУРИ / REFERENCES**

1. Халитов Кирилл Универсальный GUI / Кирилл Халитов. – [Електронний ресурс] – [Режим доступу] <https://habrahabr.ru/post/244281/>.
2. Електронна бібліотека Вікіпедія [Електронний ресурс] UML – Вікіпедія – [Режим доступу] [https://en.wikipedia.org/wiki/Graphical\\_user\\_interface](https://en.wikipedia.org/wiki/Graphical_user_interface)
3. Benjamin David Lunt, The Graphical User Interface – CreateSpace Independent Publishing Platform, 2016

*Науковий керівник: Столяренко Оксана Василівна – кандидат педагогічних наук, доцент кафедри іноземних мов Вінницького національного технічного університету, заступник завідуючого кафедри іноземних мов ВНТУ з наукової роботи.*

*Магльона Віталій Валентинович – студент групи 2КН-17б, факультет інформаційних технологій та комп'ютерної інженерії, Вінницький національний технічний університет, м. Вінниця, [maglona2013@gmail.com](mailto:maglona2013@gmail.com)*

*Supervisor: Stolyarenko Oksana Vasylivna - candidate of pedagogical sciences, associate professor of Foreign Languages Department of Vinnitsa National Technical University, deputy head of department of foreign languages of VNTU on scientific work.*

*Mahlona Vitalii, group 2KN-17b, Faculty of Information Technologies and Computer Engineering, Vinnytsia National Technical University, Vinnytsia.*