Figure 1: System calls act as a bridge between user space and operating system space.

specific purpose. For example, desktop operating systems are designed for personal computers and workstations, such as Windows, macOS and Linux. They provide a graphical user interface and support a wide range of applications. On the other side, server operating systems are designed for servers and data centers, such as Windows Server, Linux Server and many other Unix-based operating systems (e.g., RedHat, Fedora, FreeBSD, Solaris, etc.). They provide functions such as multi-user support, remote access and resource management.

With the advances in computing technologies, smart mobile devices proliferated, such as smartphones and tablets. With them, mobile operating systems appeared, which are designed for these devices. Presently, the most popular are iOS/iPadOS and Android. They provide touch interfaces and support a whole ecosystem of mobile applications and services.

Embedded operating systems are designed for embedded devices, such as Internet of Things (IoT) (Atzori, Iera, & Morabito, 2010) devices, wearable devices, automotive systems and medical appliances. Some examples are FreeRTOS, WearOS or Android Things. They provide real-time and low-power capabilities, among other features.

Operating systems evolve over time, and their evolution was conditioned by the technologies in use at the time for the construction of computers. The first generations of operating systems were developed in the 1950s-1960s, when computers were based on vacuum tubes and later on transistors, and communicated with the outside world via punched cards. Early operating systems, such as GM-NAA I/O (Surhone, Tennoe, & Henssonow, 2010) or IBSYS (Corporation, 1963), were designed for large computers and used batch processing. The tasks to be performed by the computer were encoded on a set of cards, and these cards were ingested into the computer. The fundamental tasks of the operating system were to read these cards and perform the tasks encoded on them in sequence, presenting the results to a line printer.

The 1970s-1980s were characterized by the introduction of the integrated circuit in computer manufacturing. Time-sharing and the command-line interface appeared in addition to batch processing. In addition to operating systems for large computers, operating systems such as Unix (Ritchie & Thompson, 1984), CP/M (Kildall, 1974) and MS-DOS (Corporation, 2002) were designed having personal computers and personal workstations in mind.