



OPERATING SYSTEMS AND FILE SYSTEMS

WHAT WE WILL LEARN

WHAT IS AN OPERATING SYSTEM

MAIN OPERATIONS OF OPERATING SYSTEMS

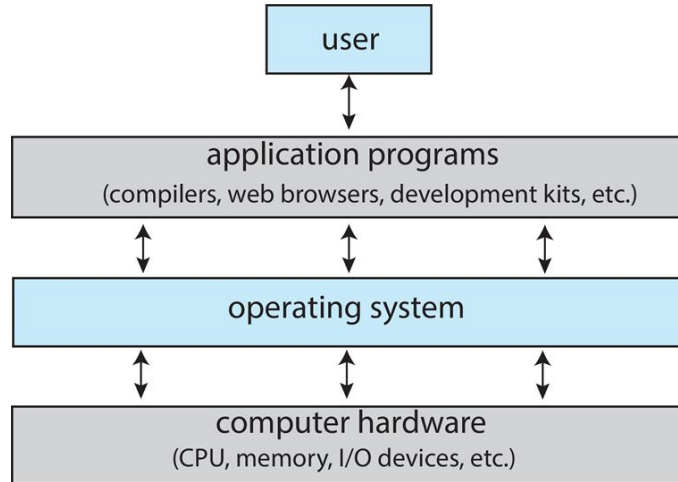
FILE SYSTEMS

FILE ATTRIBUTES AND OPERATIONS



OPERATING SYSTEMS: WHAT ARE THEY?

An operating system is a program that acts as the interface between the core computer hardware and utilities, such as memory, input output, the central processing system, storage devices, networking and wireless communications etc. etc. and the user of a computer and the tools they use, i.e. software applications



OPERATING SYSTEMS: RESPONSIBILITIES

Operating systems are responsible for managing the allocation of physical resources of a computer, the services it provides and any communication infrastructure. Amongst these responsibilities are:

Input/Output management, disk read write management

Device driver management

CPU core-management, scheduling

Schedule CPU cores to processes (multitasking)

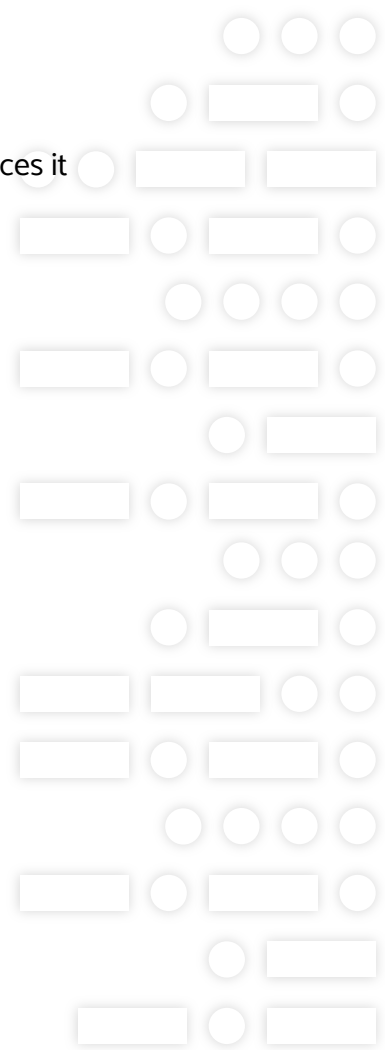
Memory management

Allocate, release memory for processes

Process management

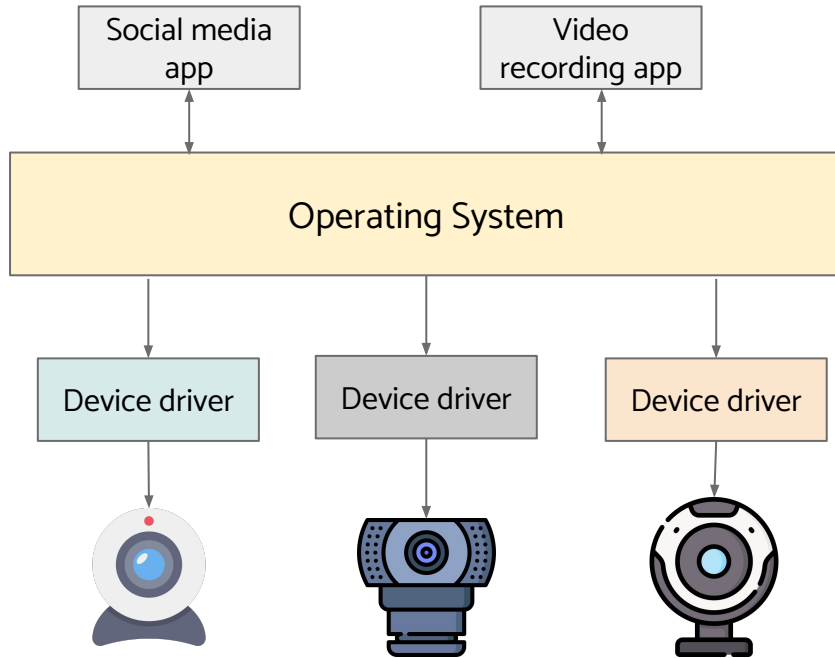
Create and terminate processes, interprocess communication

Peripheral Management



OPERATING SYSTEMS: DEVICE DRIVERS

Device drivers connect the operating system to different kinds of devices. It makes the OS work with lots of different devices of different brands. Device drivers are software components written by hardware manufacturers.

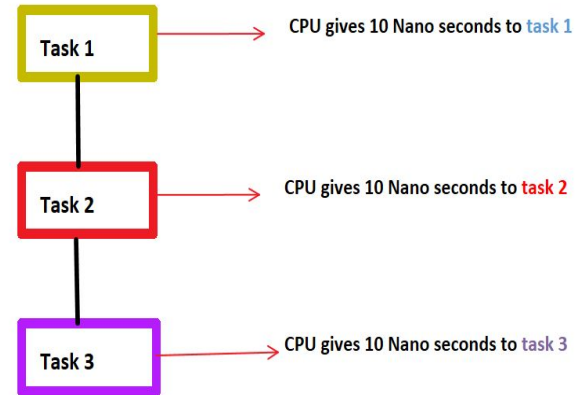
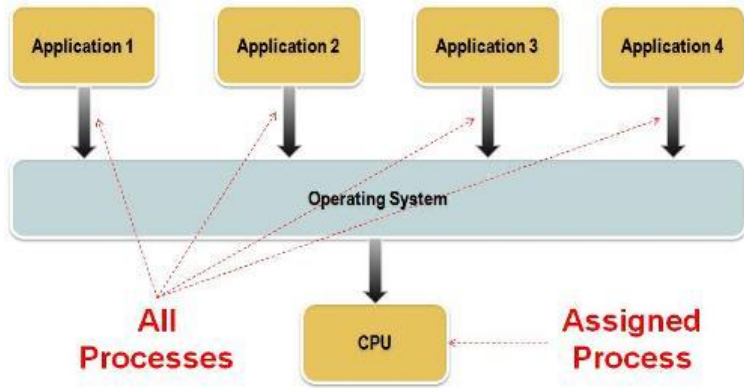


For example, an OS provides the application a generic interface to use the camera. Apps do not need to care about how to start or stop the camera and capture frames. Device drivers turn these commands to actual instructions for the specific devices they are written for.

OPERATING SYSTEMS: MULTITASKING

Even on a computer with one CPU and a single processing core the computer seems to switch between different tasks so fast that you think all apps are running in parallel when actually they are running sequentially. What is actually happening is the CPU is allocating time chunks for each process in rapid succession we don't notice the wait periods in between the different processes. This is known as multitasking. Each process uses system resources such as memory during the time it is running.

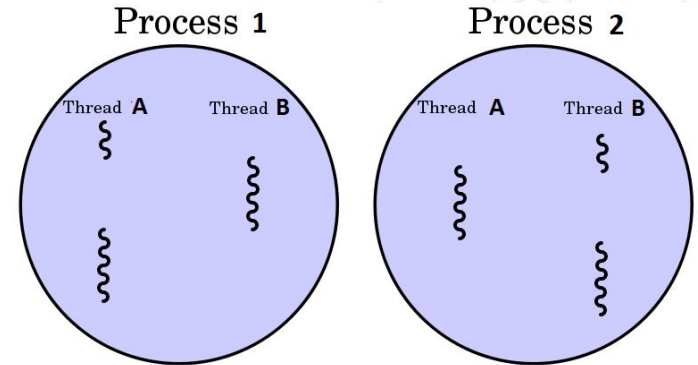
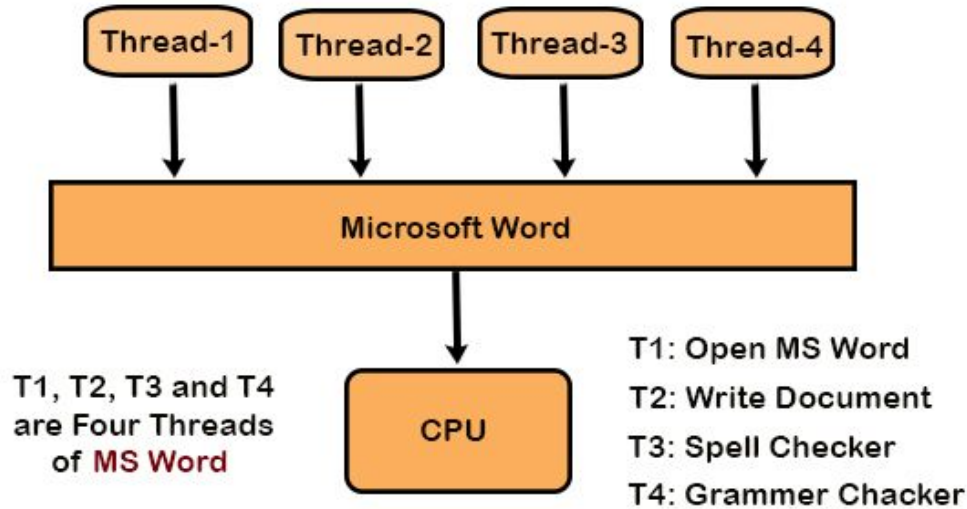
Multithreading is when a process is split into separate parts known as threads. These threads share the same system resources.



Multi-Tasking In Operating System

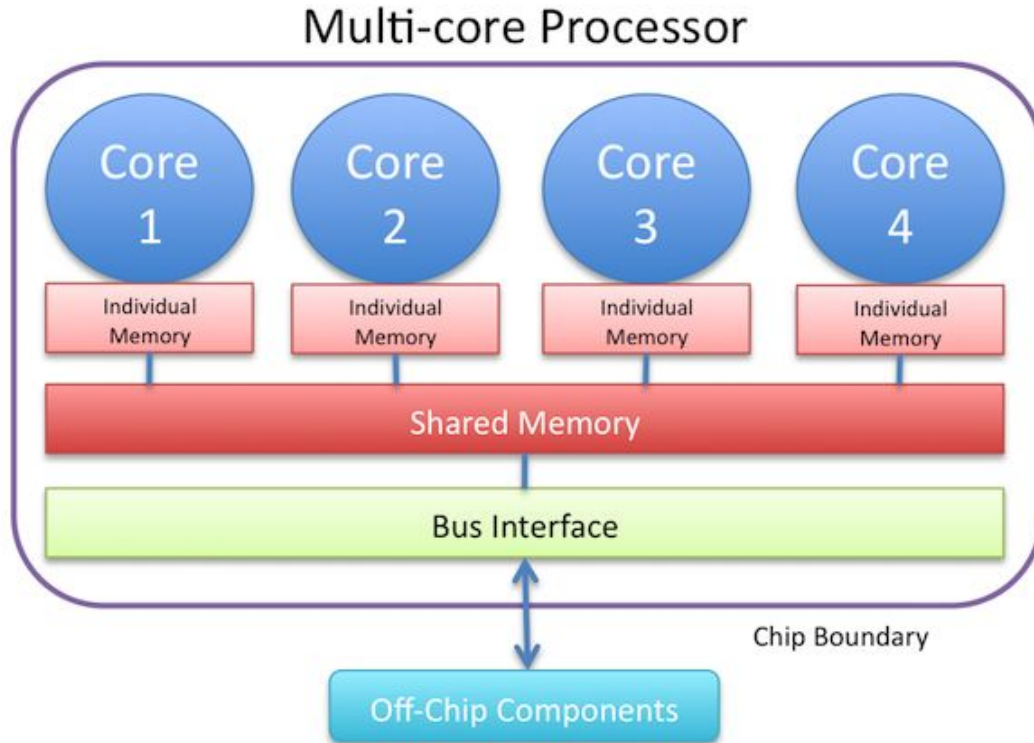
OPERATING SYSTEMS: MULTI-THREADING

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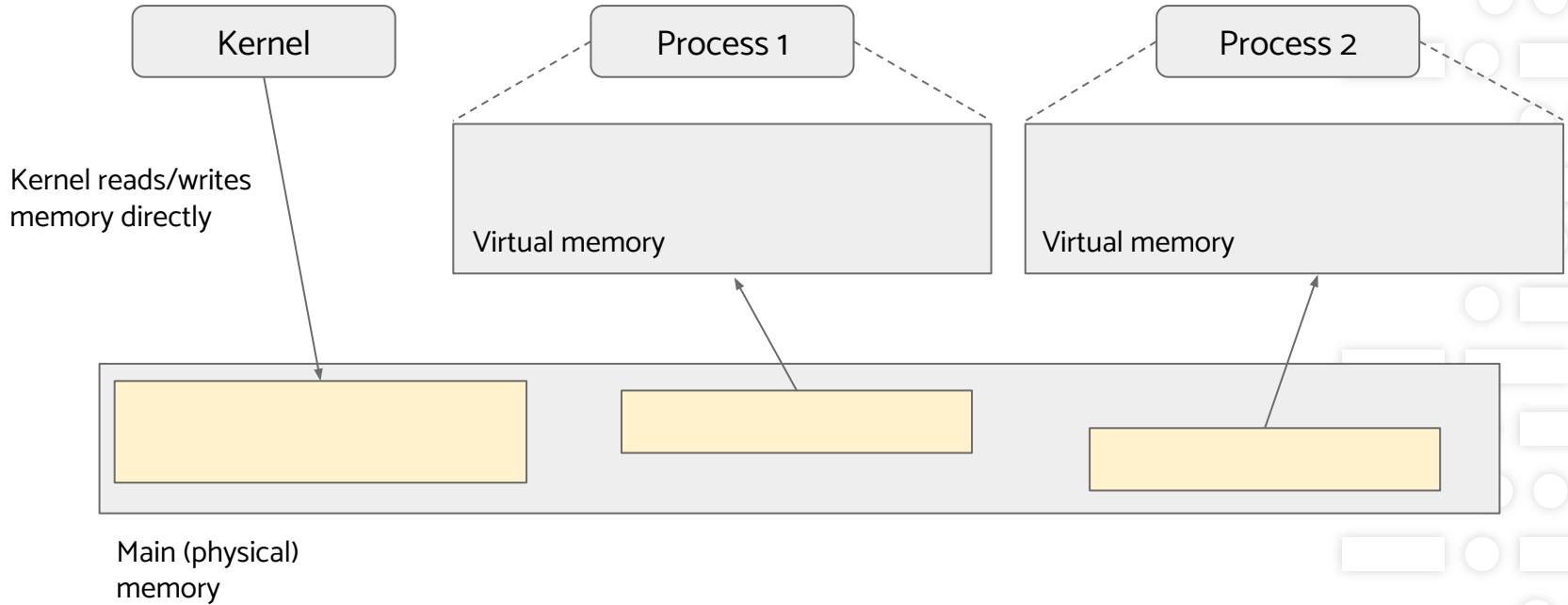


OPERATING SYSTEMS: MULTI PROCESSING

A computer with more than one CPU or multiple processing cores within a single CPU is capable of running multiple processes simultaneously through each core.



OPERATING SYSTEMS: MEMORY MANAGEMENT

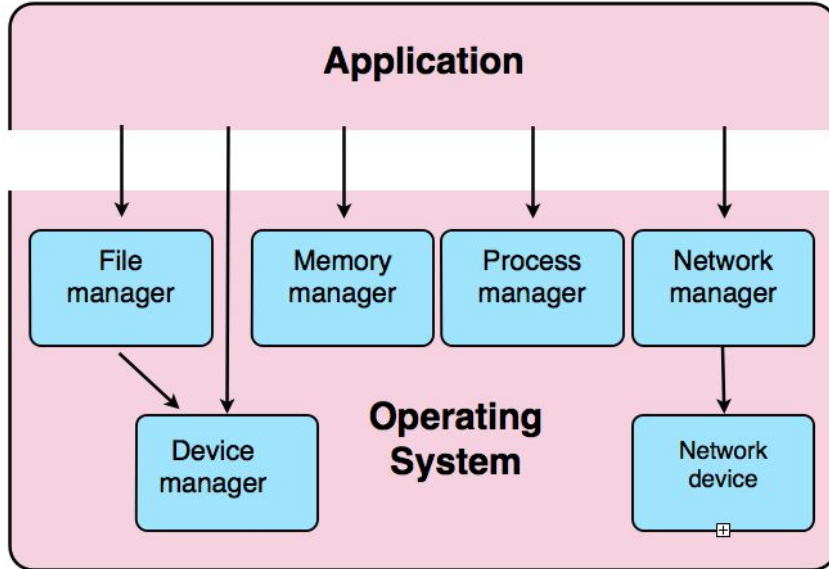


OPERATING SYSTEMS:PROCESS MANAGEMENT

Program is code at rest. Process is code in execution. Similarly: A still frame from a movie vs. movie playing.

Create processes and allocate memory, CPU, I/O bus, network ports to processes.

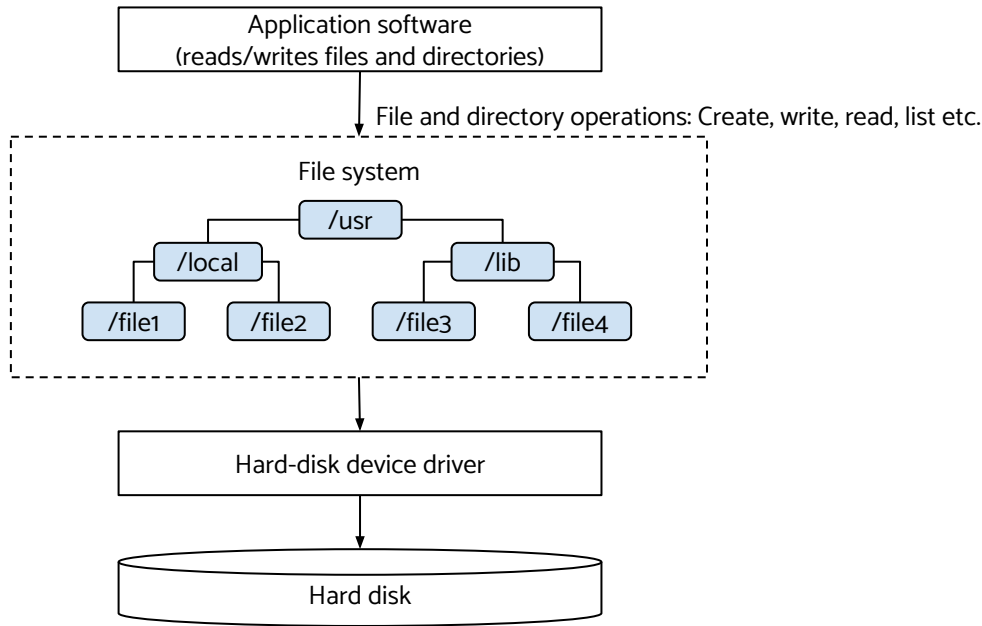
Processes talk to each other: Inter-process communication.



FILE SYSTEMS

A file system is an allocated area of disk space that is used to store core operating system files and application files. The file system is managed by the operating system through a file management system. Files can be grouped in Folders/Directories for semantic separation, also managed by the file management system.

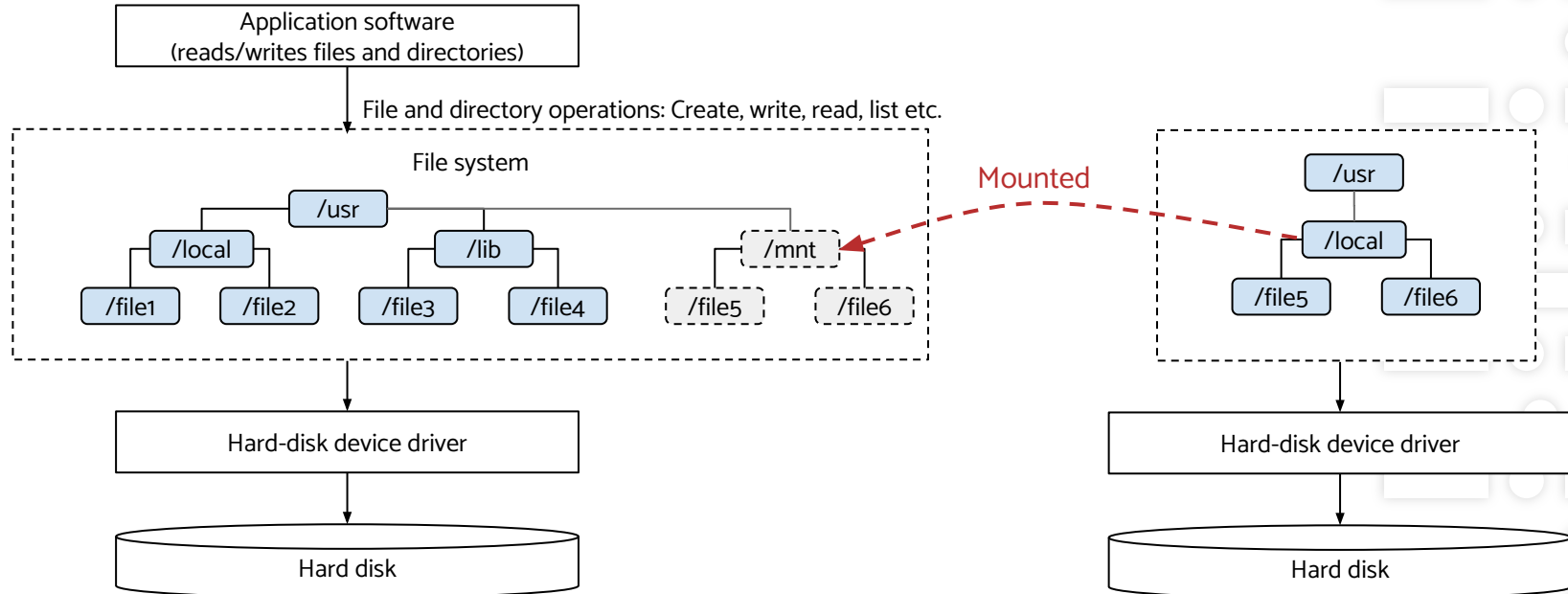
Filesystems allow the creation, reading, writing and deleting of a file (by file name), copying and moving files.



NFS: NETWORK FILE SYSTEMS

The file system abstracts the details of where the actual files are located. For example, a file system from another computer can be mounted to a local directory. The file operations (create, write, read, list) all happen as if the files are local, but all these operations are performed at the remote machine.

In the following example, `/usr/local` remote directory is mounted on `/mnt` directory, so the application can write to `file5` and `file6` as if they are on the local disk, but they are actually on the remote machine.



FILE SYSTEMS: FILE OPERATIONS

A file is an allocated area of disk space that contains 0s and 1s that represents some text, picture, video, program, PDF and so on. A file typically consists of a name and an extension which describes the type of file it is. The file

Filesystems facilitate operations on files such as creation, reading, writing and deleting of a file, copying and moving of files. The running of files is controlled by association. The extension of a file determines what application/program is able to run the file.

For every programming language there are libraries that enable file operations.

FILE SYSTEMS: FILE ATTRIBUTES

| Who? | Can read from file? | Can write to file? | Can execute file? |
|--------------------|---------------------|--------------------|-------------------|
| Owner user | r | w | x |
| Owner group | root | root | root |
| Other users/groups | | | |