- In computer programming and operating systems, a file descriptor is a unique integer value that identifies an open file or I/O stream.
- It serves as an abstraction to interact with files, sockets, pipes, and other input/output resources in a uniform way.

When a process opens a file or creates a new one, the operating system assigns a file descriptor to that file, allowing the process to read from or write to the file. The file descriptor acts as a reference or handle to access the file's data and other attributes.

## Key points about file descriptors:

- 1. Integer Representation: File descriptors are represented as non-negative integers. In most systems, 0, 1, and 2 are reserved for standard input (stdin), standard output (stdout), and standard error (stderr), respectively.
- 2. Managing Open Files: The operating system maintains a table that maps file descriptors to the corresponding open files for each process. This table keeps track of file position, permissions, and other information related to the file.
- 3. Accessing Files: File descriptors are used in various system calls to interact with files. For example, the open(), read(), write(), close(), and other related functions take a file descriptor as an argument.
- 4. File Descriptor Duplication: Processes can duplicate file descriptors using the dup() or dup2() system calls. This feature allows a process to have multiple file descriptors pointing to the same open file, enabling concurrent access.
- 5. Standard I/O Redirection: File descriptors play a vital role in standard I/O redirection.For instance, the output of a program can be redirected to a file using the shell syntax(>) by changing the file descriptor associated with standard output.
- 6. Closing File Descriptors: It's essential for a process to close file descriptors properly

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after using them to free up system resources. Not closing file descriptors can lead to resource leaks.