Hello Dolly

ID1206 OPERATING SYSTEMS

Intro - processes

- A process is a running program, an execution of instructions and a set of resources
- Can be represented by a unique number called process id (pid)

fork()

- Function that creates a new process
- Creates a copy (child process) of the current process (parent process)
- Returns twice

  - child’s pid to the parent

  - 0 to the child
- Child process has its own address space

Example – fork()

```
int pid = fork();
if (pid == 0) {
      printf(”I’m the child”);
}
else {
     printf(”I’m the parent ”);
}
```

Zombie

- Child process that has finished executing but still exists in the process table
- Happens if parent does not call wait()

```
else  {                                  //parent process
      printf(”I’m the parent”);
      wait(NULL);                        //wait for child process to terminate, prevent zombie
}
```

Orphan

- Child process that is still running but the parent process has finished executing or terminated
- Will be ”adopted” by another process, get a new parent process
- In UNIX the new parent process is the *init* or *systemd* process
  - parent of all processes
  - process id 1

Daemon

- Process that runs automatically in the background instead of under direct control of a user
- Performs operations at predefined times or in response to events
- Runs most of the tasks in a system

exec()

- Runs an executable file in the context of an existing process, replacing the previous execution context
- execlp(”ls”, ”ls”, NULL);
  - check if ’ls’ exists
  - run it with the rest of the arguments
- exec functions do not return when successful

exec() family of functions

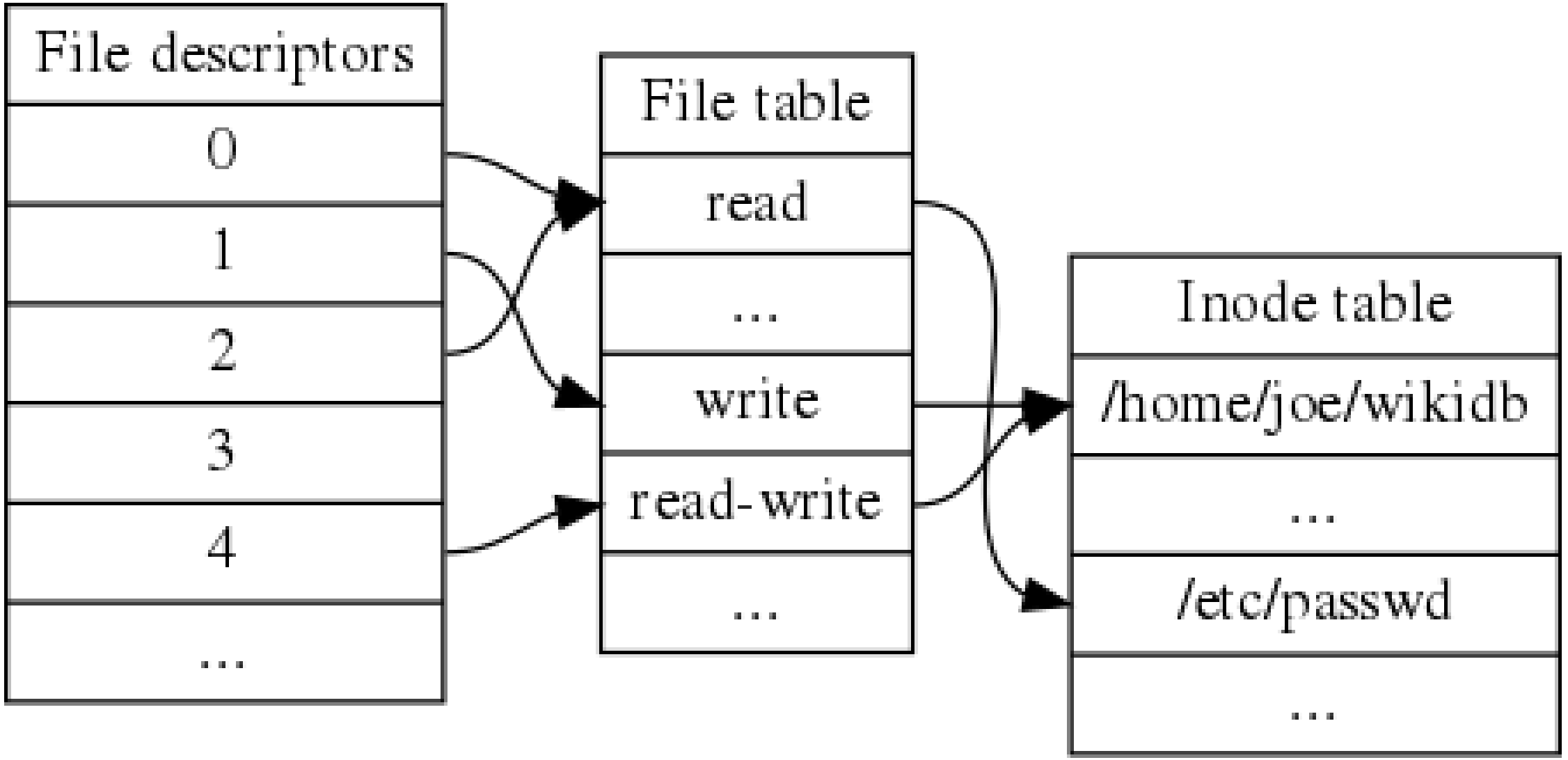
- execl, execlp, execle, execv, execvp, execvpe

- e: pass an array of pointers to environment variables

- l: arguments are passed individually to the function

- v: arguments are passed as an array of strings

- p: uses PATH environment variable to find the file that is to be executed


File descriptors
0
1
2
3
4
...
File table
read
...
write
read-write
...
Inode table
/home/joe/wikidb
...
/etc/passwd
...

Pipes

- Sends the output of one program to another programs input
- Denoted by symbol ’|’
- Piping in the shell: combine several commands
  - Ex: cat countries.txt | grep a | sort
  - Displays all countries that start with an ’a’ and sorts them in alphabetic order