



System calls

Why?

Why?



compatibility

Why?

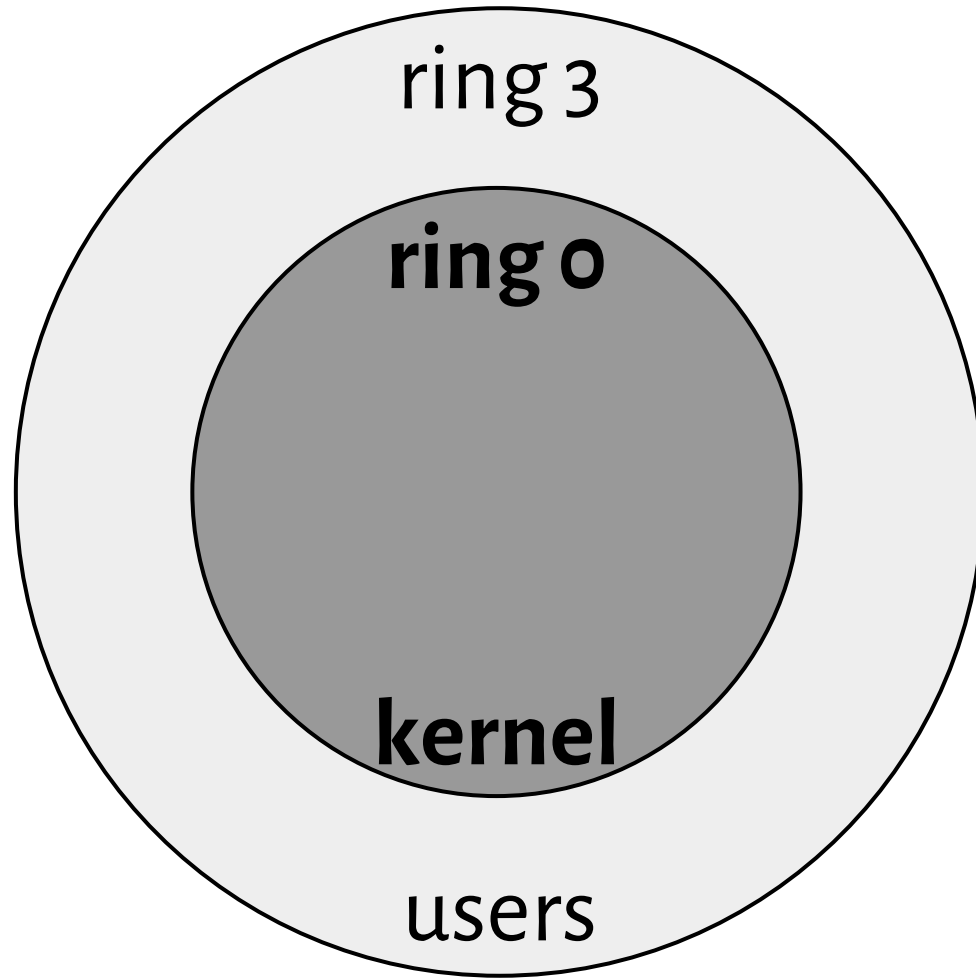


compatibility



users

Protection rings



What about rings 1 and 2?

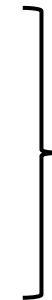
User space

0x00007fffffffffff

0x0000000000000000



User Space

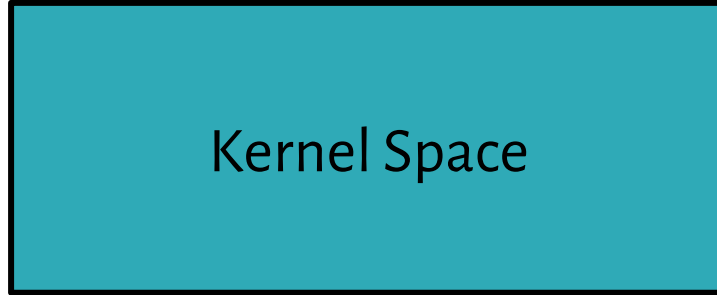


128 TiB

User space

0xffffffffffffffffffff

0xffff800000000000



128 TiB

0x00007fffffffffffff

0x0000000000000000



128 TiB

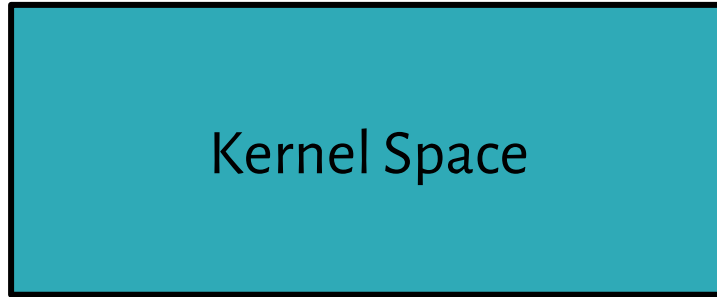
User space

0xffffffffffffffffffff

0xffff800000000000

0x00007fffffffffffff

0x0000000000000000



Kernel Space



User Space

128 TiB

> 16 000 000 TiB

128 TiB

What-and-why?

Operating systems offer processes running in *User Mode* **a set of interfaces** to interact with hardware devices such as the CPU, disks, printers, and so on.

System call

`brk()`

What-and-why?

Operating systems offer processes running in *User Mode* **a set of interfaces** to interact with hardware devices such as the CPU, disks, printers, and so on.

POSIX APIs (e.g. libc)

`malloc()`

`calloc()`

`free()`


System call

`brk()`

```
graph TD; subgraph POSIX_APIs ["POSIX APIs (e.g. libc)"]; M[malloc()]; C[calloc()]; F[free()]; end; subgraph System_Call ["System call"]; B[brk()]; end; M --> B; C --> B; F --> B;
```

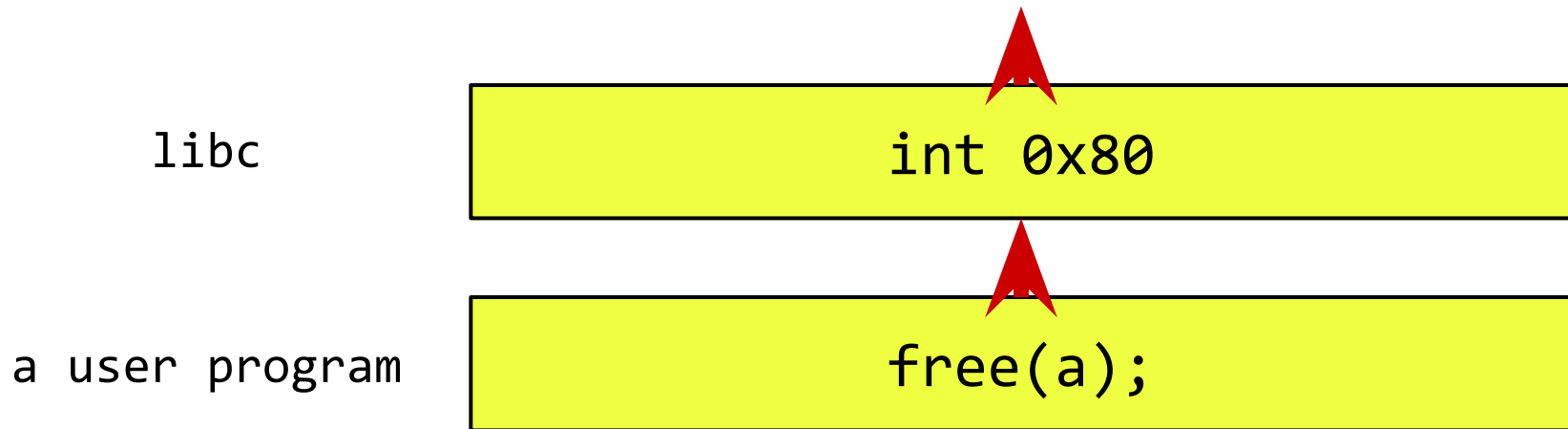
What-and-why?

a user program

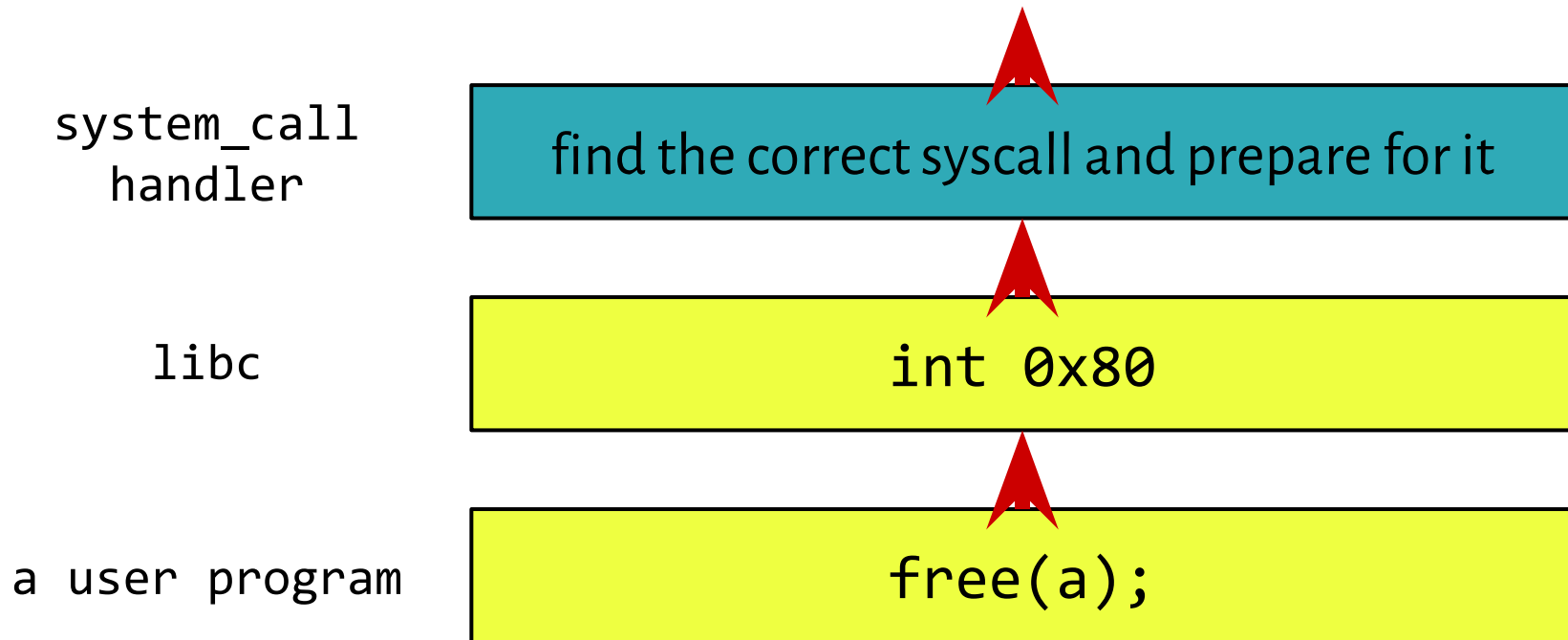


```
free(a);
```

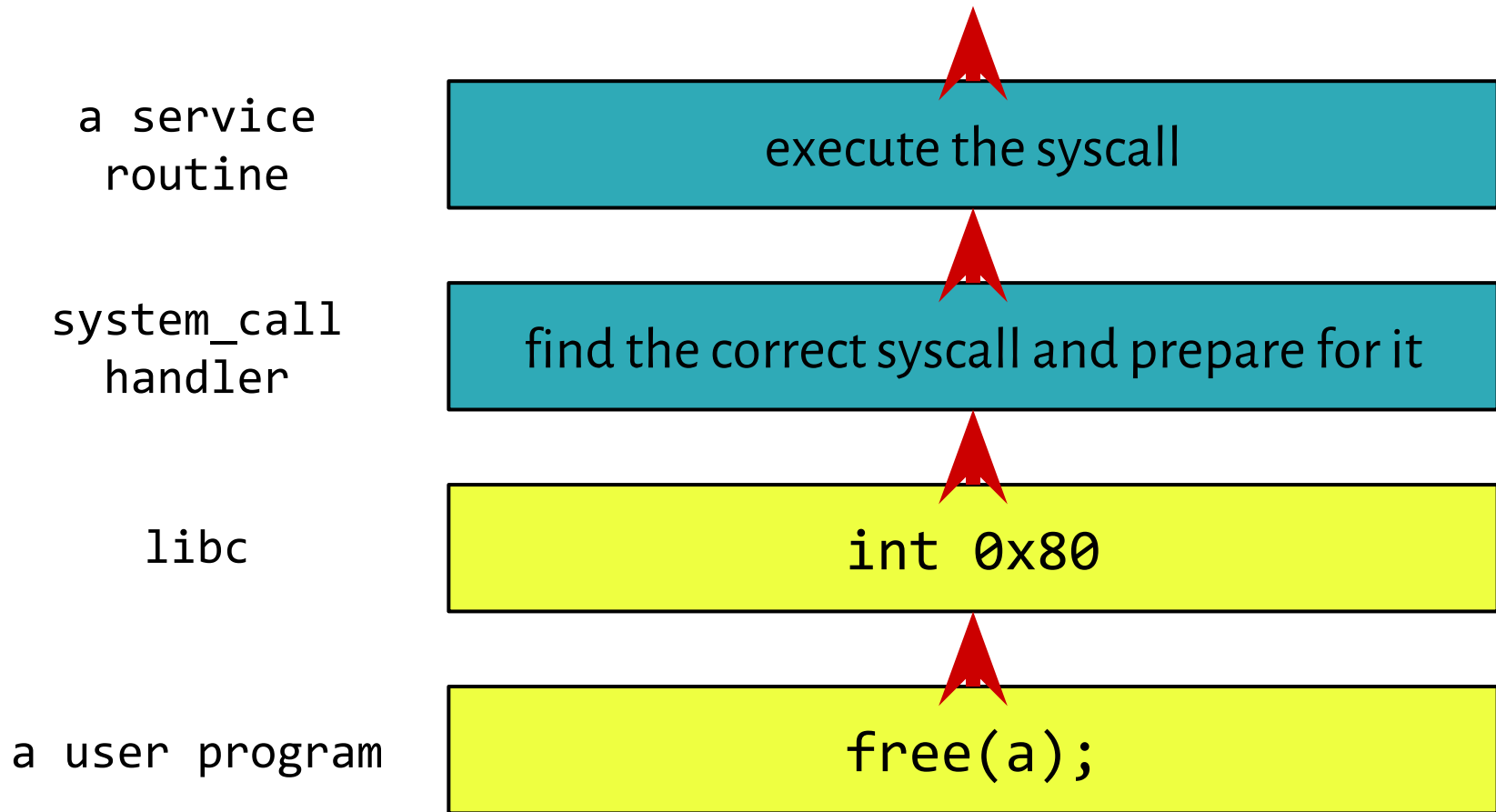
What-and-why?



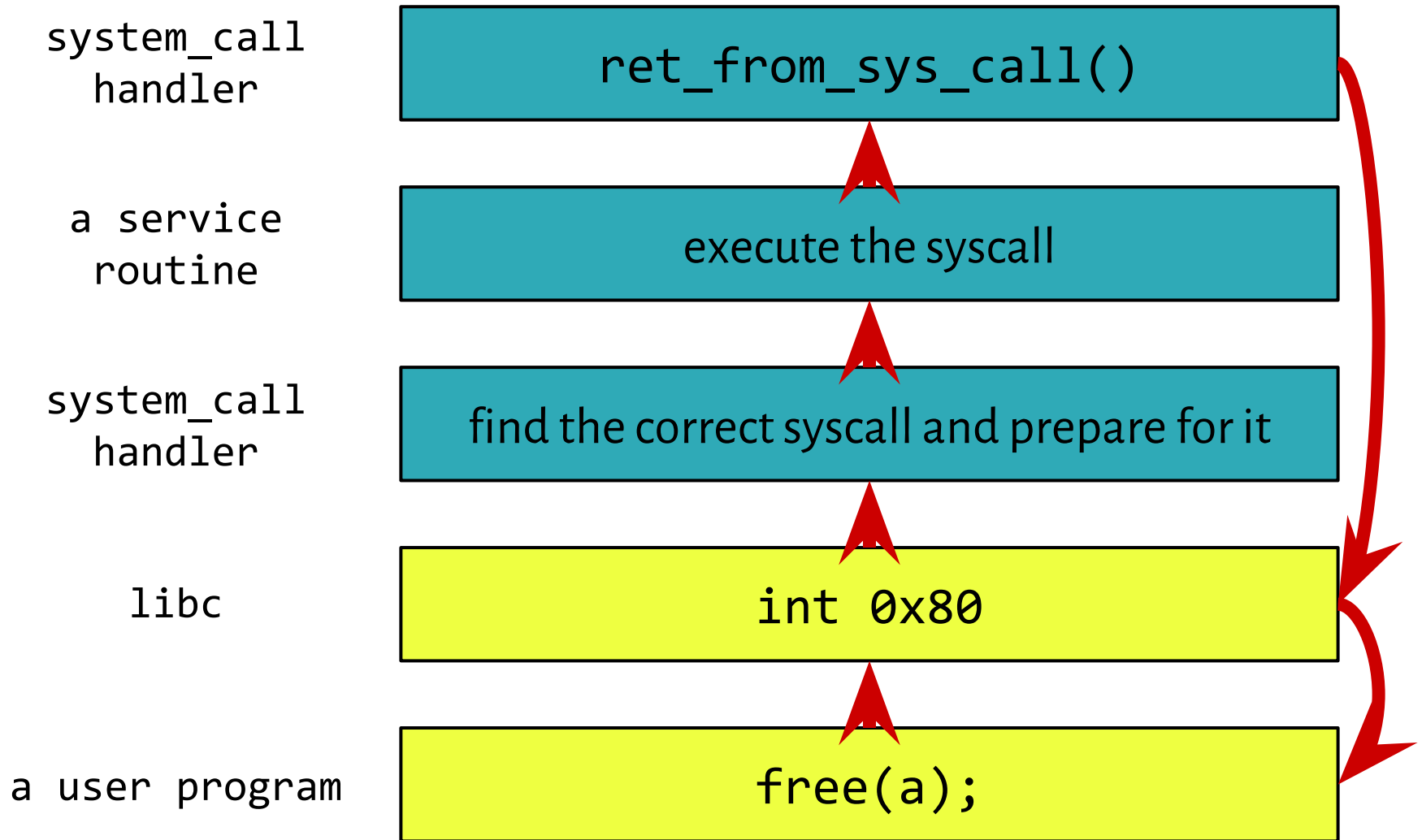
What-and-why?



What-and-why?



What-and-why?



Efficiency

The less switching, the better.

Results of a syscall are cached, e.g.: `getpid()`

<https://manybutfinite.com/post/system-calls/>

Operations are vectorized, e.g.: `readv()`

https://en.wikipedia.org/wiki/Vectored_I/O

Examples

Process Management

fork, waitpid, exit, ptrace...

Signals

sigaction, sigreturn, kill, alarm, pause...

File Management

create, open, seek, read, write, stat, rename...

File System Management

mkdir, link, unlink, mount, chdir, chroot...

Protection

chmod, setuid, chown, umask...

Time Management

time, stime, utime...

Assignment #3

</home/students/inf/PUBLIC/SO/zadania/3/zad3.html>