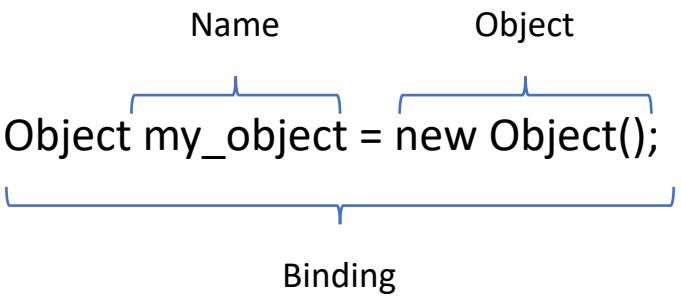
Computer Systems

Exercise 1

Admin

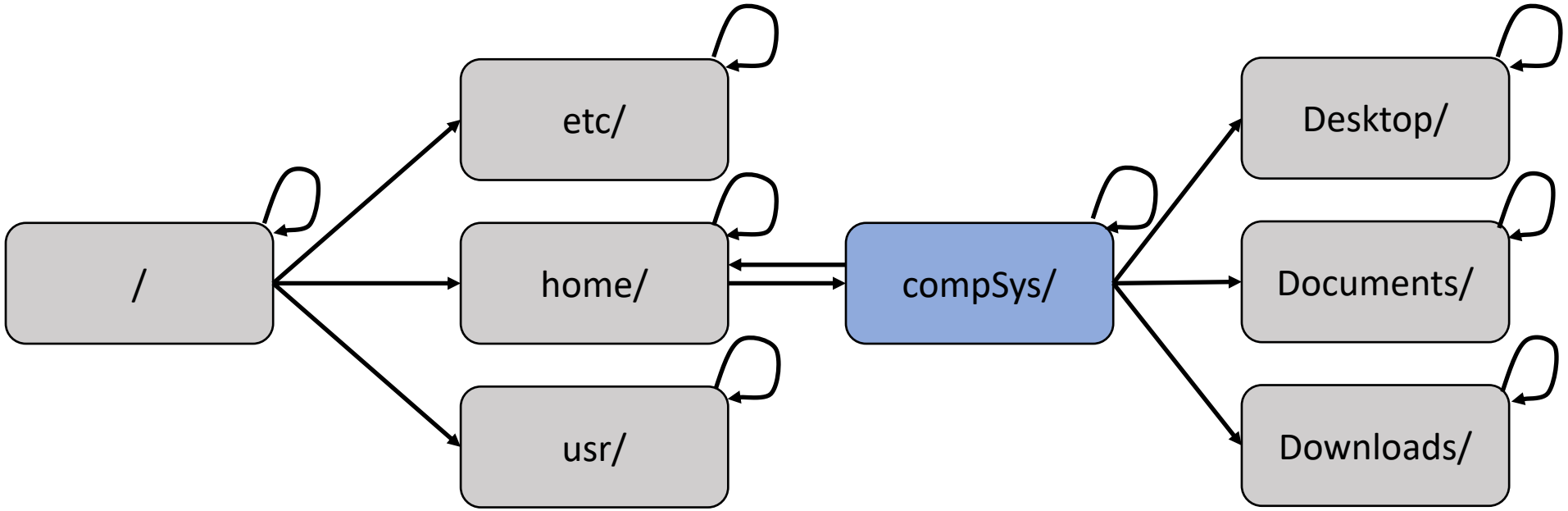
- Exercise sheet every week, not graded but you should do it (as always ☺)
- Structure of the exercise sessions:
  - Recap
  - Quiz
  - Going through last sheet
  - Preview for next sheet
- Slides on polybox (**https://polybox.ethz.ch/index.php/s/5mXMBOUoRqanfTH**)
- Give feedback!

Naming Basics




```c
#include <stdio.h>

/* global variable definition */
int x,y;

x = 0;
y = 0;

int main () {
    /* local variable definition and initialization */
    int y,z;

    y = 10;
    z = 10;

    printf ("value of x = %d, y = %d and z = %d\n", x, y, z);
    return 0;
}
```

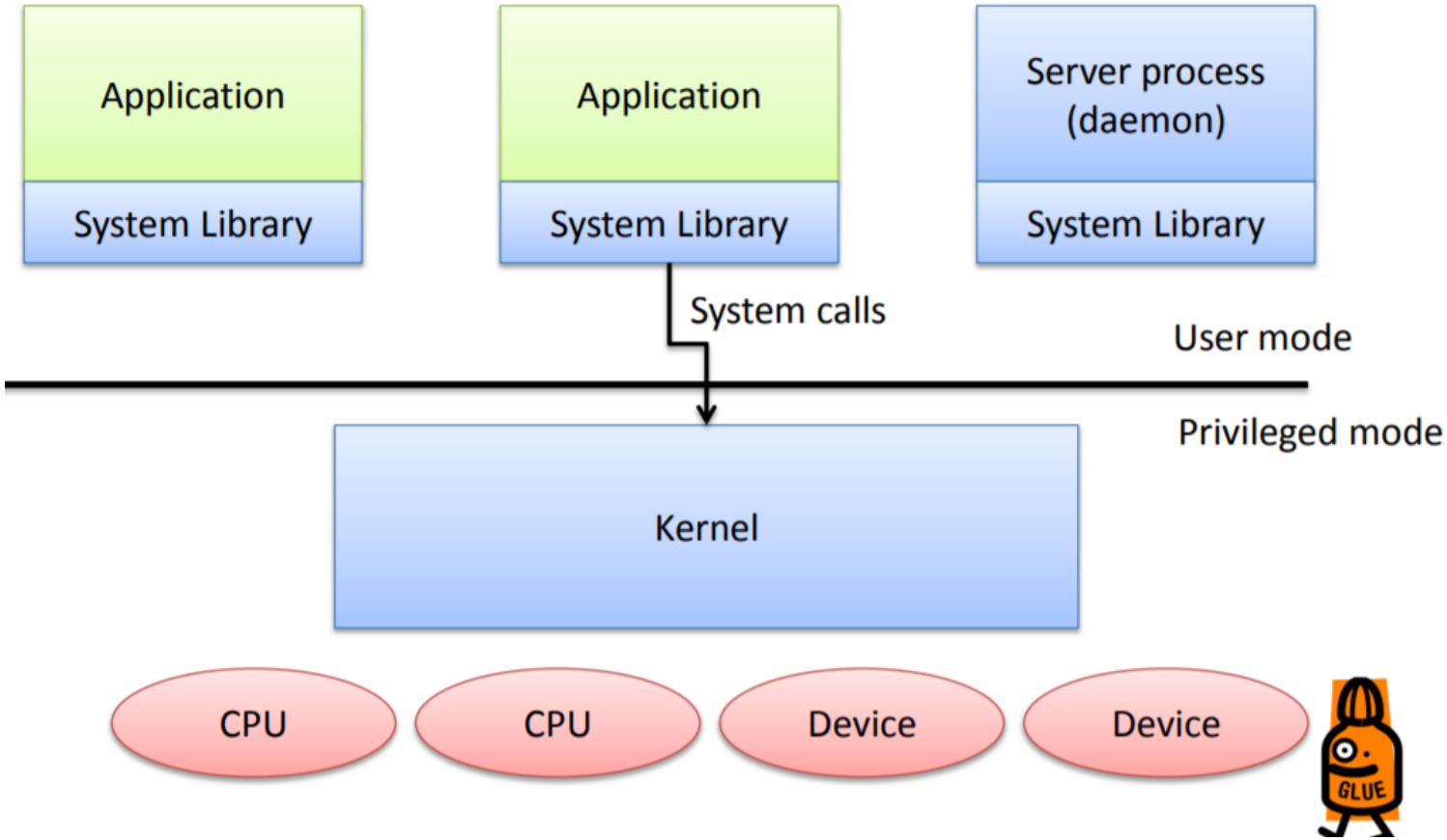
Naming Networks



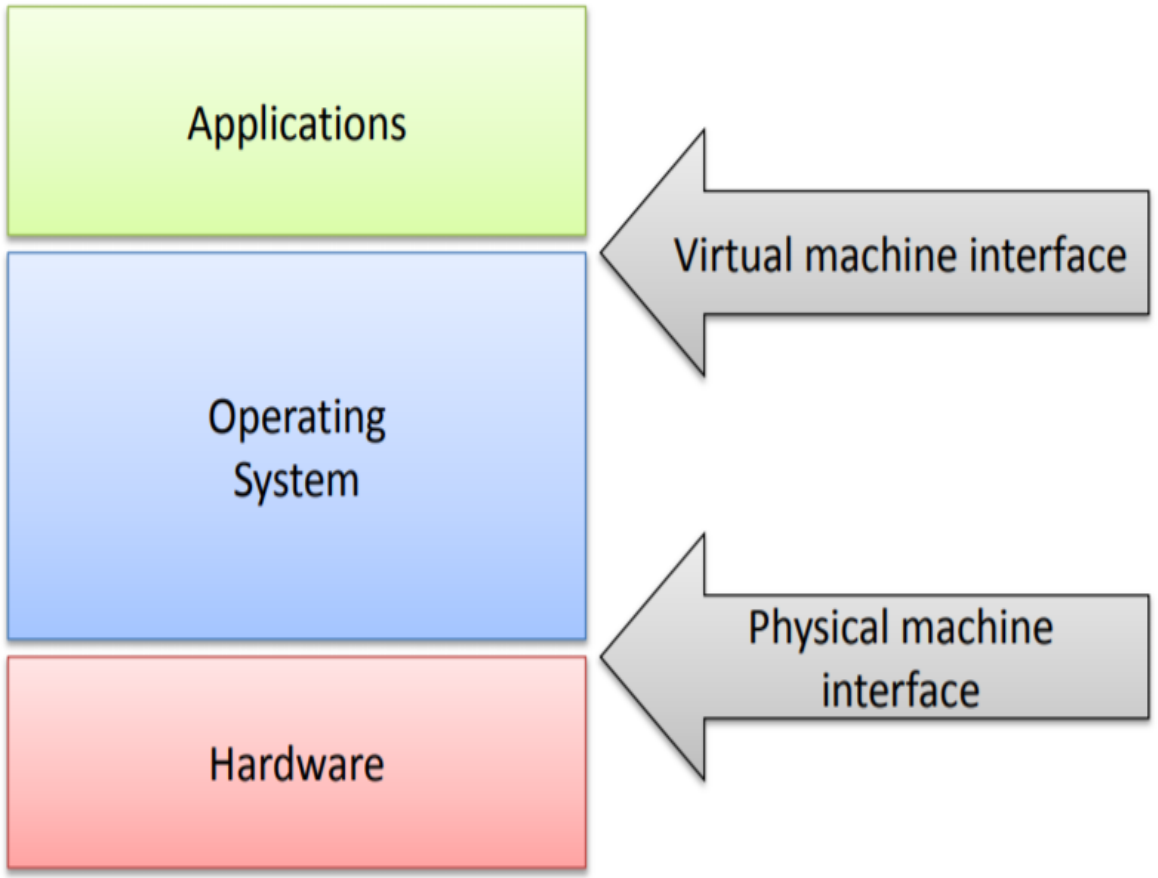
Context matters:

- ✓ cd Desktop
- ✗ cd home
- ✓ cd /home/compSys/Downloads

General OS Structure



The Role of the OS



Referee:

- Ensure resource sharing
- Ensure protection (mem protection, process isolation)
- Example: scheduling, memory allocation, memory protection

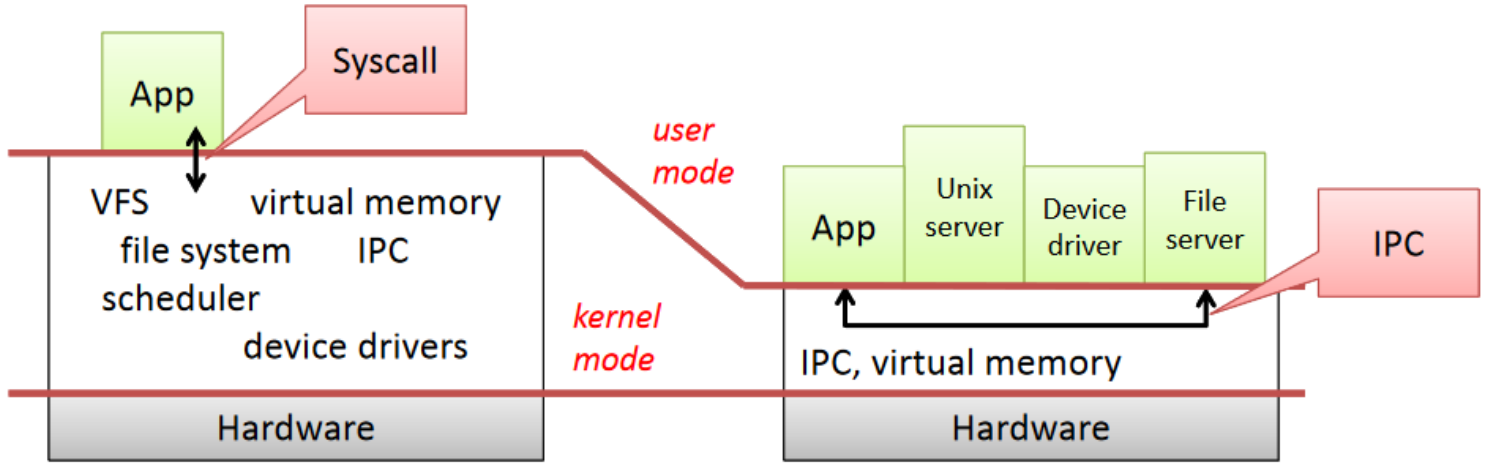
Illusionist:

- provide virtual resources to user-space processes
- Virtual Memory (full address space)
- Shared network interface
- Example: paging, vm

Glue:

- Provide high-level abstraction to user-space applications
- Example: device access, program execution

Monolithic vs. Microkernel

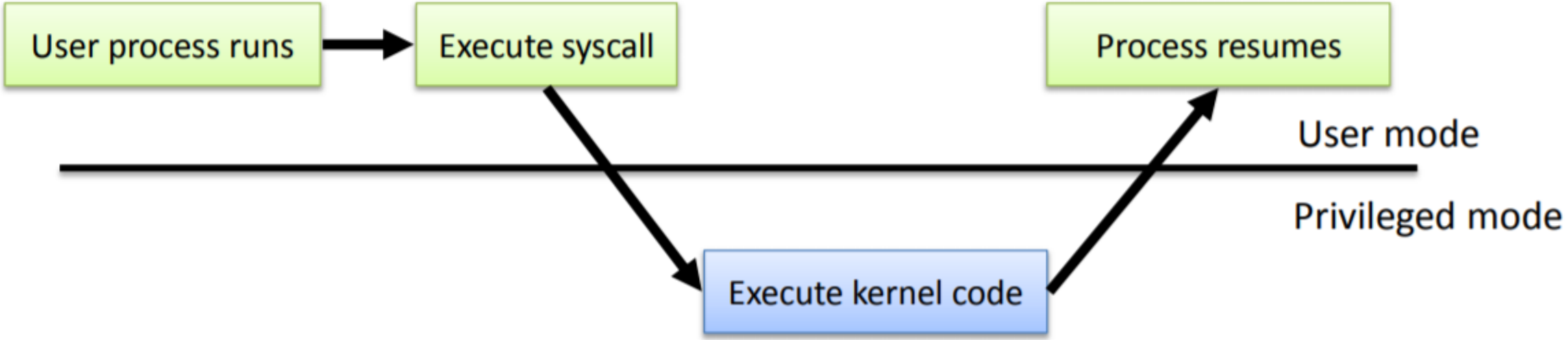


- Monolithic OS
  - lots of privileged code
  - services invoked by syscall
- Microkernel OS:
  - little privileged code
  - services invoked by IPC
  - "horizontal" structure

Exokernel: move functionality into system libraries instead of user-space

Entering and Leaving the Kernel

- on Start-Up
- Exception occurs(caused by program)
- Interrupt occurs (caused by “something else)
- upon a System Call



Quiz

- **What is the difference between synonym and homonym?**
  - synonym different name for one object
  - homonym same name for different objects
- **Is an IP address a pure name?**
  - no, because it contains routing information
- **To what does a symbolic link point?**
  - a name/another link
- **What is the difference between monolithic kernel and microkernel?**
  - monolithic: everything in kernel
  - micro: as little as possible in kernel (move functionalities to user space process)

- **What are the pros and cons of microkernel and monolithic kernel?**
  - microkernel: more entering/exiting kernel, potentially faster to do that since kernel is way smaller
  - monolithic: less entering/exiting kernel
- **What is the advantage of running a process in userspace?**
  - failing process easier to handle in user space easier to handle than in kernel
- **Look at algorithm 3.15, write down in what order the individual steps will happen**
  - 1,2,3,6-14,4,5