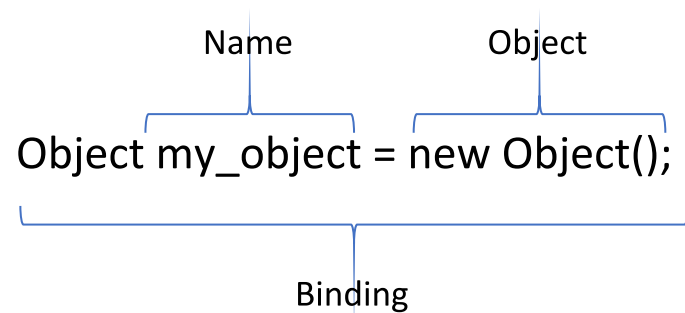# Computer Systems

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

Name   Object

Object my_object = new Object();

Binding

```
 1 #include <stdio.h>
 2
 3 /* global variable definition */
 4 int x,y;
 5 |
 6 x = 0;
 7 y = 0;
 8
 9 int main () {
10     /* local variable definition and initialization */
11     int y,z;
12
13     y = 10;
14     z = 10;
15
16     printf ("value of x = %d, y = %d and z = %d\n", x, y, z);
17     return 0;
18 }
```
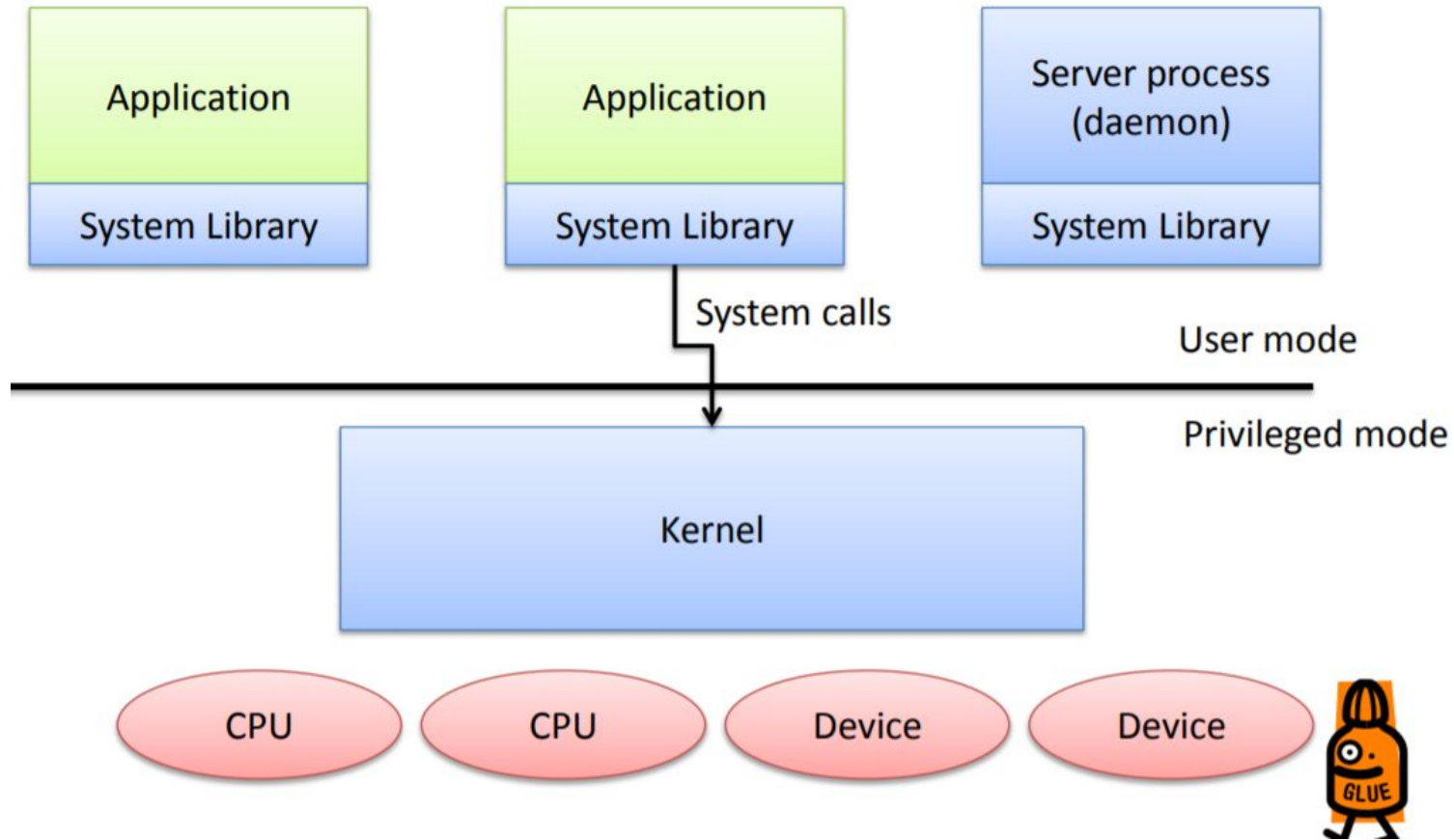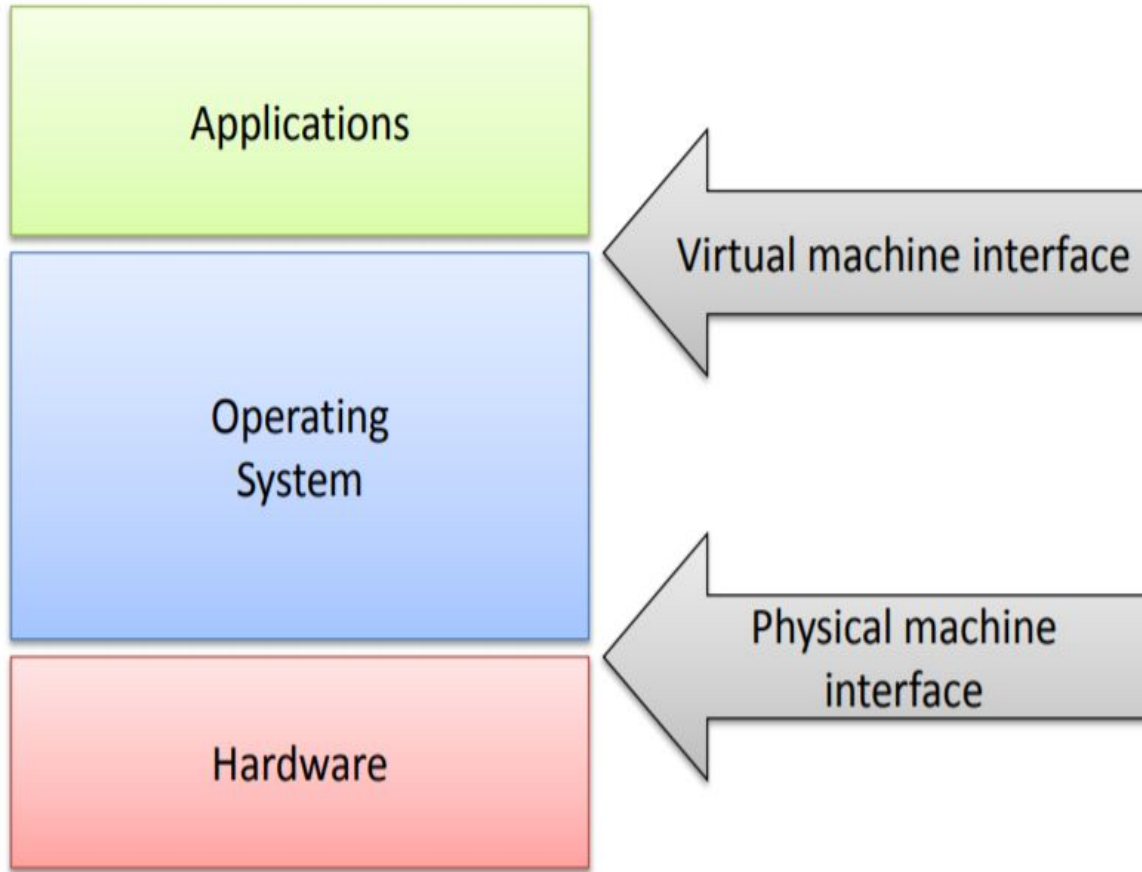
Naming Networks
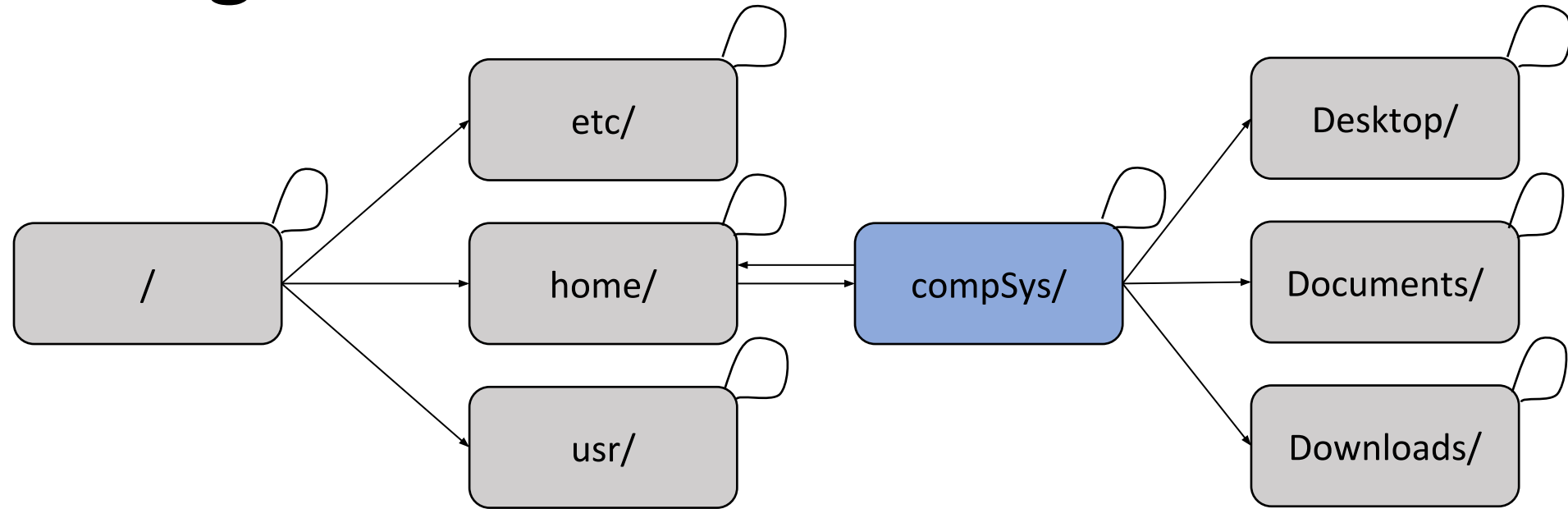
Context matters:

✔	cd Desktop
✘	cd home
✔	cd /home/compSys/Downloads

General OS Structure

The Role of the OS

Applications

Operating System

Hardware

← Virtual machine interface

← Physical machine interface

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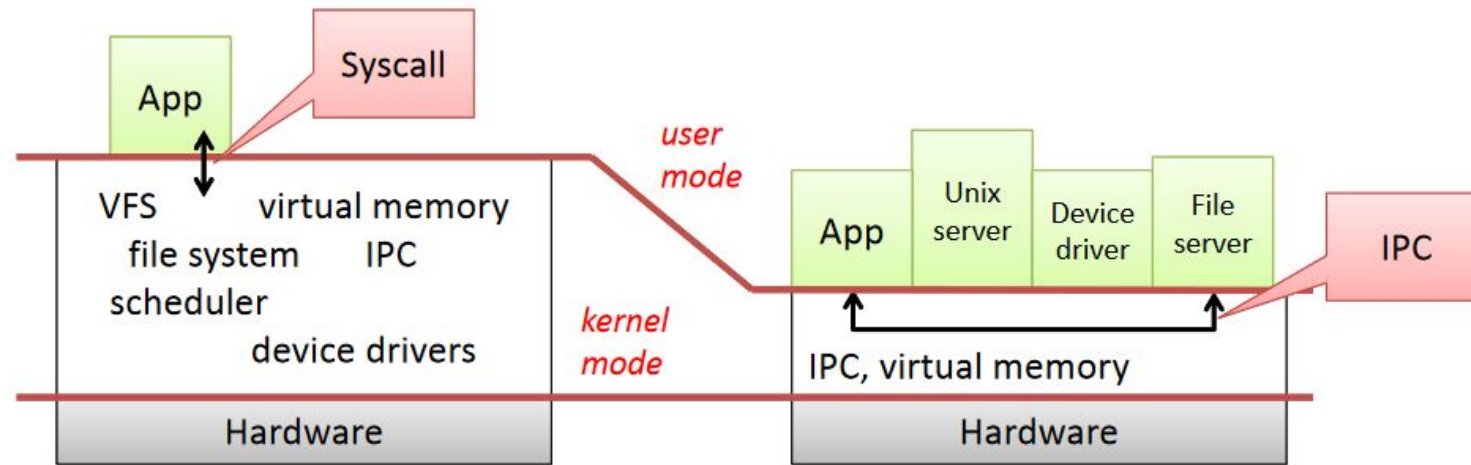- Example: scheduling, memory allocation, memory protection

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
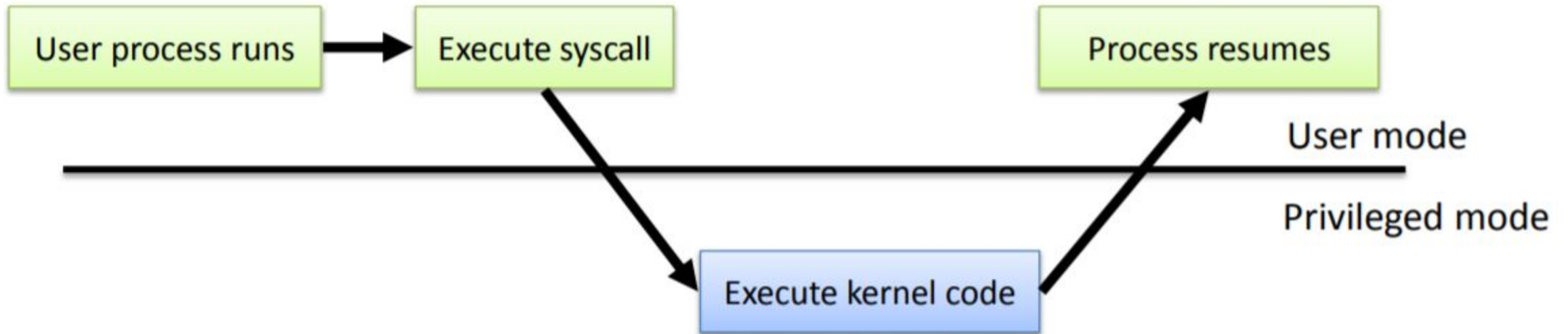
Quiz

- **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