

Vistula, IT Faculty, 2016

# **Operating Systems & Systems Programming**

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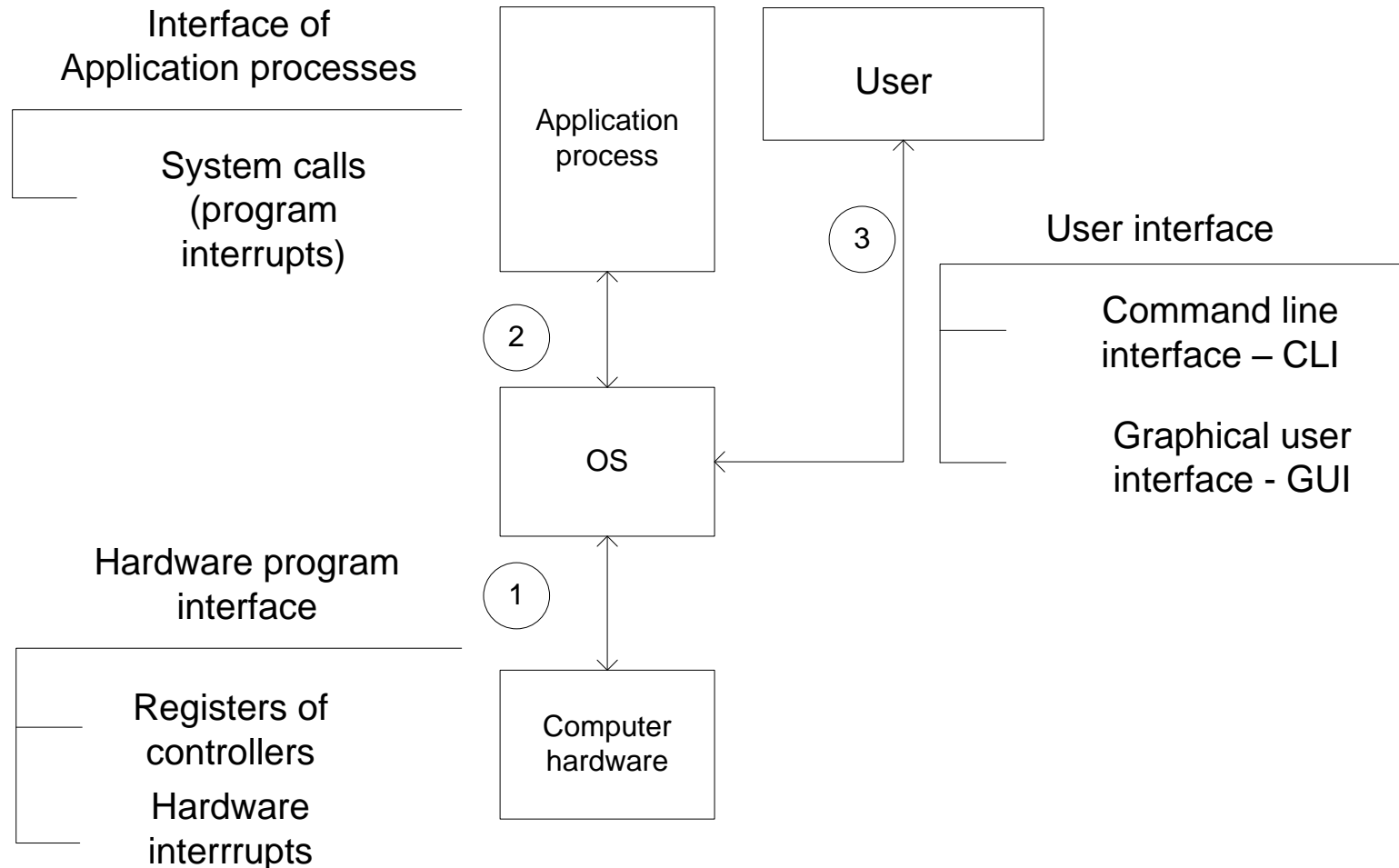
## **Lecture 1:**

# **An overview of Operating Systems Theory. Processes and Resources**

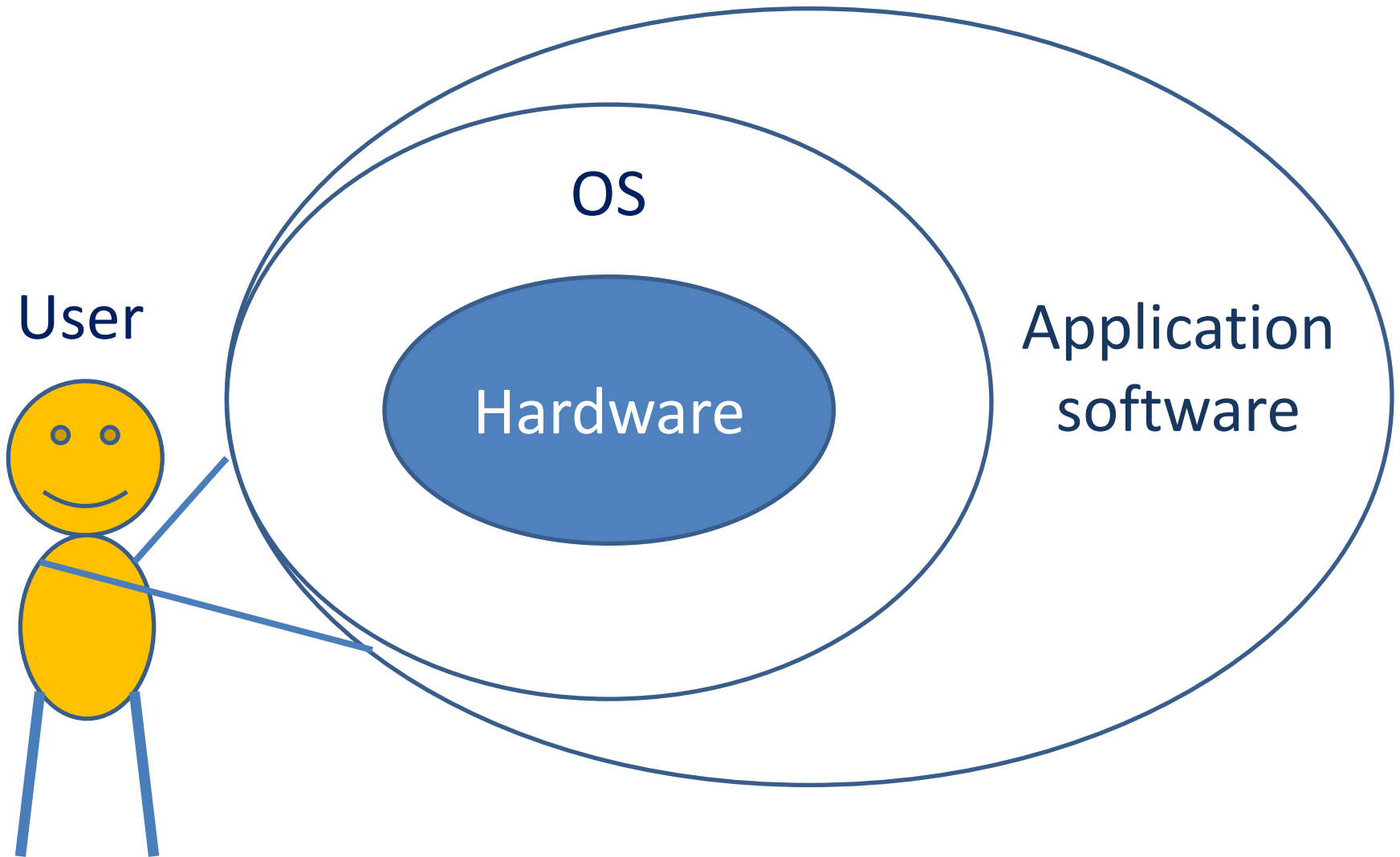
# Definitions of OS

- Operating system is a software complex for ***control*** of computer resources and ***interaction*** with hardware, programs, and users.
- Operating system is an extension of hardware.
- Operating system is an instrument to launch and run user programs on computer and store user data.
- etc

# Interfaces of OS



# OS as an extension of hardware



# Resources of computer

- Processors
- Memory
- Devices
- Information

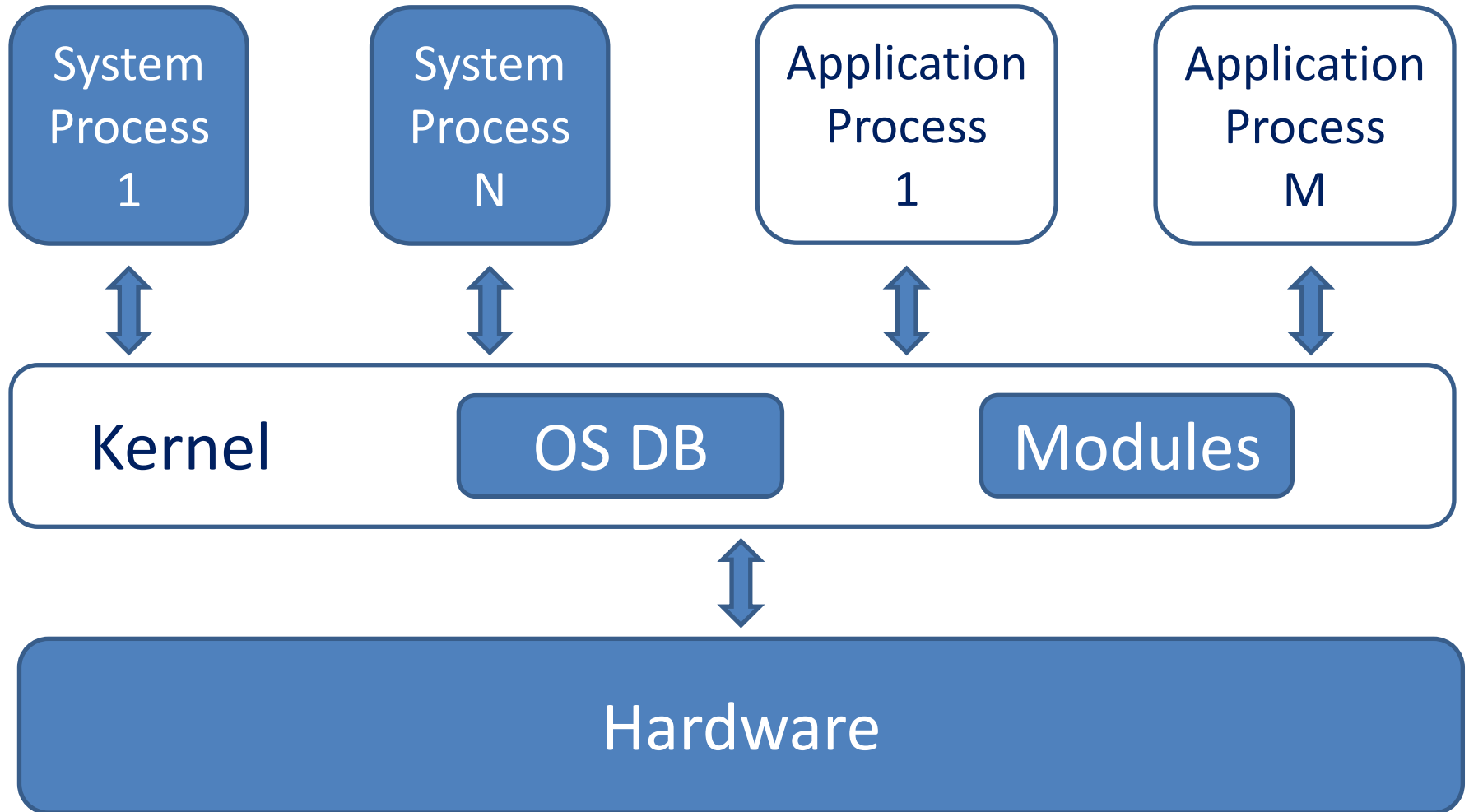
# Operation on resources

- Allocate
- Deallocate (free)
- Track (supervise)
- Schedule (plan)

# Formula of OS: 4x4

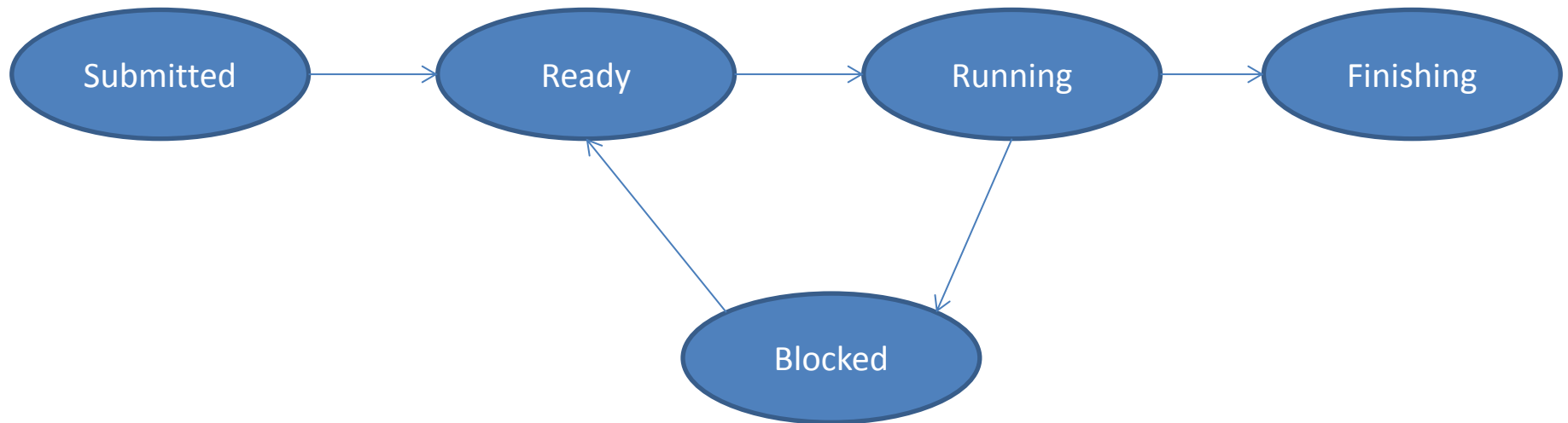
	Processors	Memory	Devices	Information
Allocate	PA	MA	DA	IA
Free	FP	FM	FD	FI
Track	TP	TM	TD	TI
Schedule	SP	SM	SD	SI

# Structure of OS





# Diagram of process's states



Modes:  
Multiprogramming  
Time-slicing  
Priorities

IPC:  
Flags of Events  
Semaphores  
Messages  
Shared memory

# Virtual Memory Concept

Process virtual memory



Memory  
mapping



Physical  
RAM



Swapping



Swapping  
Area of HD

# Drivers of Devices

- Byte devices
- Block devices
- Graphical devices
- Controllers and Channels
- Asynchronous IO
- Interrupts of Devices
- Driver Interfaces

# File System

- Volume, Directory, and File
- File Structure of HD
- Allocation of device space
- Mapping of files
- File Descriptor
- Basic operations: read, write, seek
- Buffering

# Security of OS

- Hardware features: processor modes, protection of memory, privileged IO instructions
- Identification of users and groups
- Access rights and access lists
- Data Encryption
- Secure Protocols