

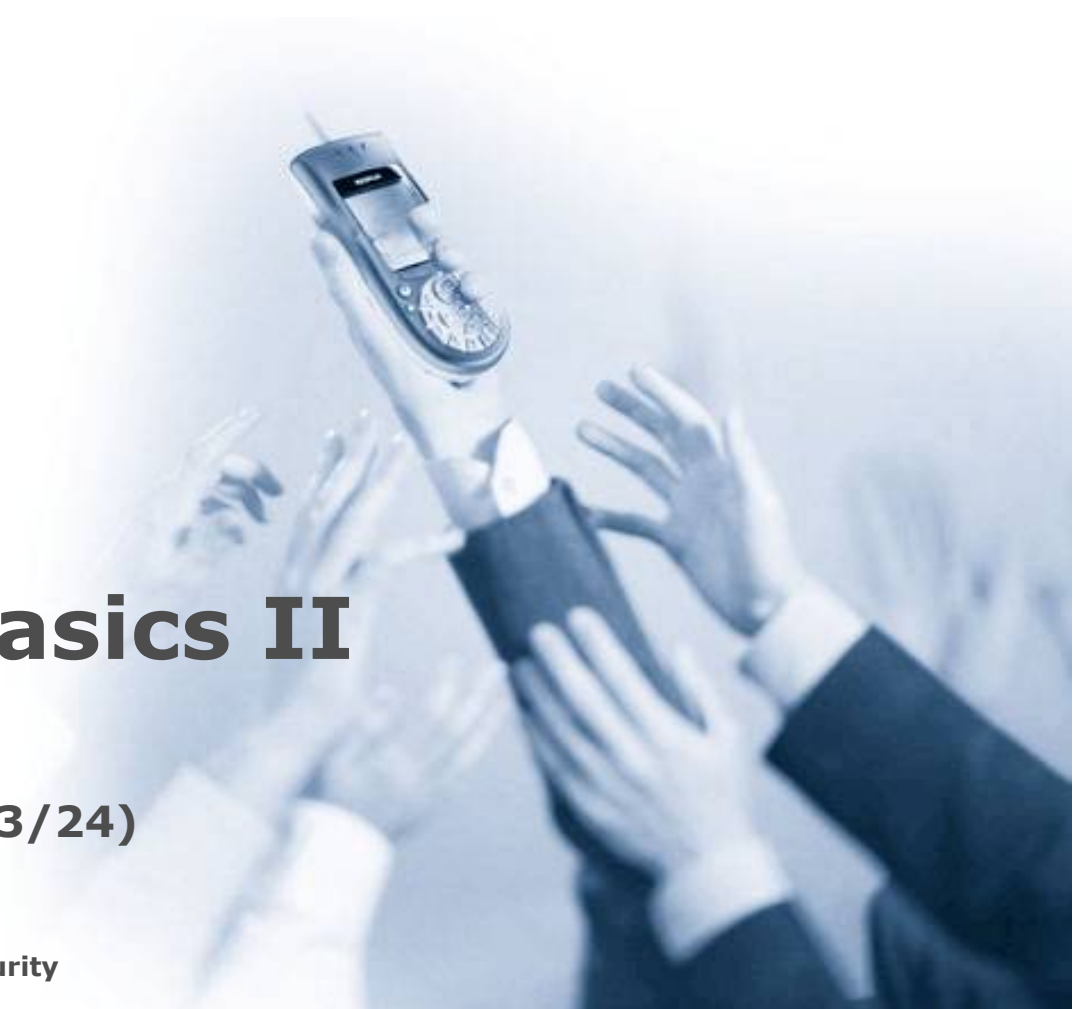
## *Exercise 3*

# Technology Basics II

**Mobile Business I (WS 2023/24)**

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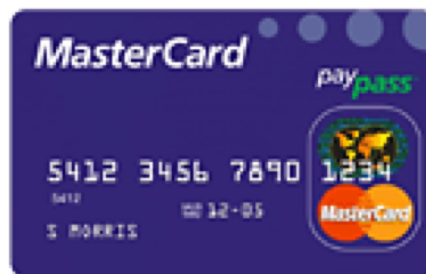
**QA Session:  
31.01.2024 (16:00-18:00)**

Please send me ([mob1@m-chair.de](mailto:mob1@m-chair.de)) your  
questions in this period:  
22.01.2024 (08:00) - 26.01.2023 (23:00)

- Exercise 1: L08 – Smartcards and Related Application Infrastructures
- Exercise 2: L09 – Mobile Devices
- Exercise 3: L10 – Concepts of Mobile OSs

a) What is a smartcard?

# Smartcards – Examples



- Small computers with **memory, operating system, software, processor, I/O and access control**
- **Chip protected against manipulation**
- After being **initialised with keys** and other data smartcards are distributed to their users.

b) Why are the smartcards used?

- Used when **security** of data (e.g. for keys, signatures, physical access control, payment) is needed in **insecure environments**
- **Examples:**
  - Phone cards of Deutsche Telekom
  - Smartcard applications for PC
  - Smartcards for mobile communication (SIMs)



- Exercise 1: L08 – Smartcards and Related Application Infrastructures
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a) What are Personal Area Networks (PANs)?

- Personal environment, short range
- **Purpose:** Connection of devices in short range, for example mobile device and printer.
- Replaces cable-connections:
  - Infrared Communications
  - Bluetooth
  - Near Field Communication (NFC)

b) How has the evolution of mobile devices been when it comes to device capabilities?



- **Development of device capabilities**
  - Near-field communication (NFC) module
  - Multimedia applications (MP4, radio, video, TV, etc.)
  - Possibility to execute 3rd party software
  - Sensors (microphone, camera, GPS, ...)
  - Data Services (Internet connectivity)
  - Short Message Service (SMS)
  - Interactive Voice Response (IVR)
  - General telephony capabilities

- Exercise 1: L08 – Smartcards and Related Application Infrastructures
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a) What is a process?

- A process is a program “in operation”.
- A process uses resources, such as CPU time, and memory.
- The resources of a process are allocated while it is created or when it is running.
- The operating system has to manage the process (creation, resource distribution, etc.).



**L10 – Concepts of Mobile OSs**

b) Describe the advantages of multi-programming.

## ▪ **Advantages:**

- Maximisation of the CPU usage
  - Enabling users to operate several programs simultaneously
  - Enabling several users to work on the same machine simultaneously
- On a CPU only one process is running at a time.
  - The process switching must be fast, to enable the user to interact with all running programs.
  - Queues are used to handle this task.

c) Describe the following scheduling algorithms:

- First Come, First Serve
- Shortest Job First
- Priority Scheduling
- Round Robin Scheduling

- Processes are executed by the CPU one after another in order of their occurrence.
- FIFO-principles (First In First Out)
- ***Pros/Cons:***
  - The throughput is not optimal.
  - Average response time is very high
  - No optimal utilisation of the CPU (Convoy-Effect)
  - Not appropriate for Time-Sharing-Systems

- The processes are executed in order of their execution time.
- Processes that can be finished fast are executed first.
- ***Pros/Cons:***
  - *Optimal* with regard to the average latency time
  - Not fair ➔ Complex processes can “starve to death”.

- Processes get an assigned priority number.
- Process execution in the order of the assigned priority.
- Deadlocks or “starvation” of processes with low priority numbers is possible.
- ➔ Aging: Gradually raising the priority of a process

- Especially used for Time-Sharing-Systems and one of the simplest scheduling algorithms
- Similar to FCFS, assigning time slices of a time interval to a process being held in the scheduling queue.
- After the time slice of a process is expired, the CPU is revoked from the process and the process is placed at the end of the scheduling queue.

- This set of slides is based upon the following lectures:
  - **Lecture 8:** Smartcards and Related Application Infrastructures
  - **Lecture 9:** Mobile Devices
  - **Lecture 10:** Concepts of Mobile OSs





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