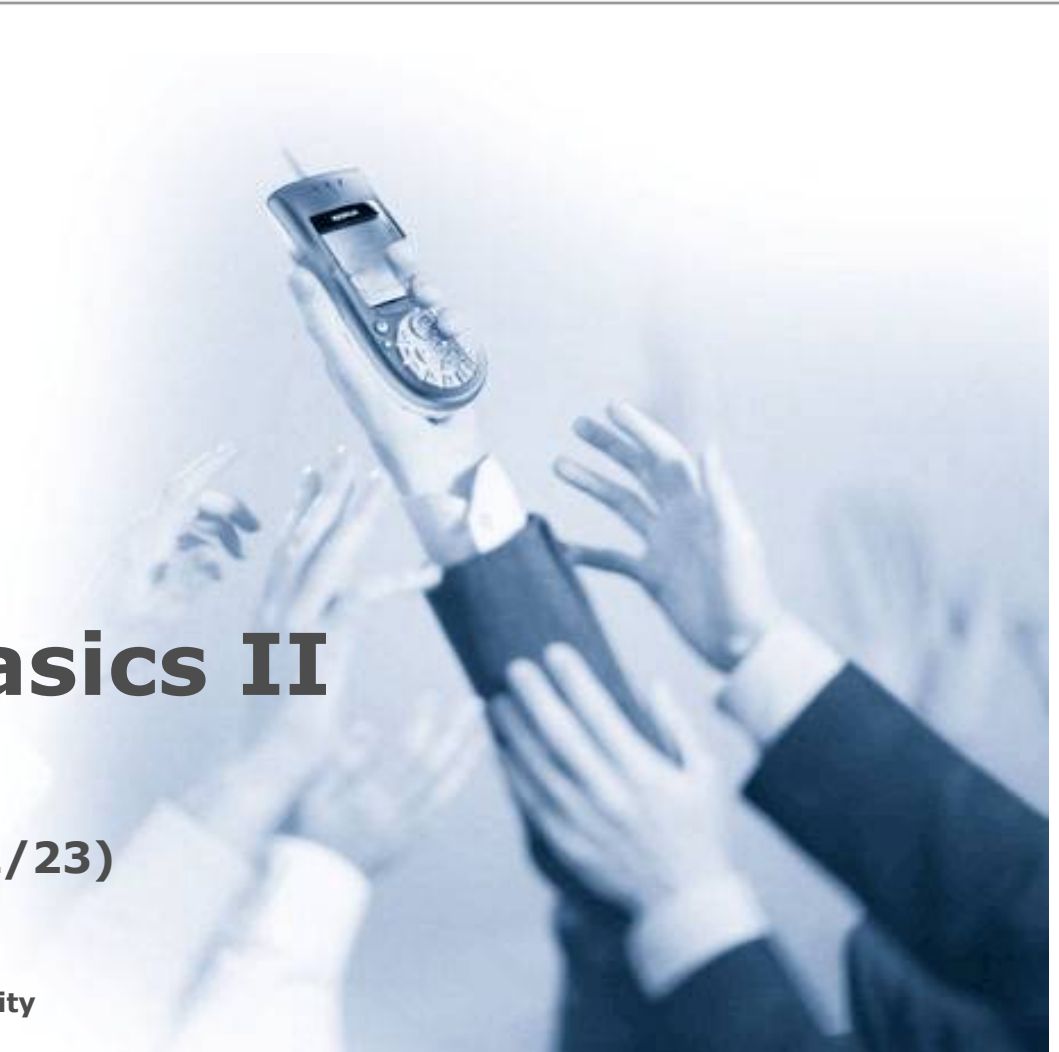*Exercise 3*

Technology Basics II

Mobile Business I (WS 2022/23)

Ahad Niknia,

Chair of Mobile Business & Multilateral Security
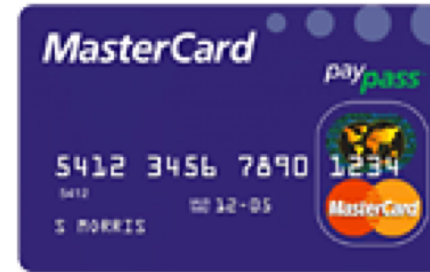**Goethe University Frankfurt a. M.**

QA Session:
31.01.2023 (14:00-16:00)

Please send me (mob1@m-chair.de)
your questions by
24.01.2023 (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?

- 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

- Exercise 2: L09 – Mobile Devices

- Exercise 3: L10 – Concepts of Mobile OSs

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

Complexity

- Exercise 1: L08 – Smartcards and Related Application Infrastructures

- Exercise 2: L09 – Mobile Devices

- Exercise 3: L10 – Concepts of Mobile OSs

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.).

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

mobile business

Thank you!

Contact: mob1@m-chair.de

GOETHE UNIVERSITÄT
FRANKFURT AM MAIN