

TI III: Operating Systems & Computer Networks

Organization

Prof. Dr.-Ing. Jochen H. Schiller Computer Systems & Telematics Freie Universität Berlin, Germany

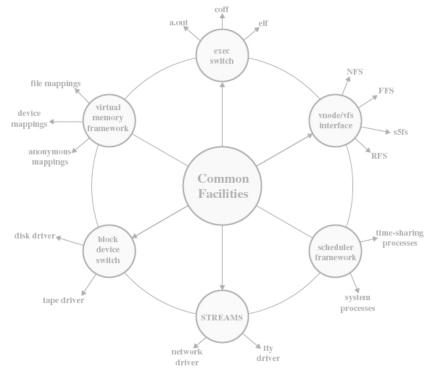


Figure 2.16 Modern UNIX Kernel [VAHA96]



Structure/content of CST-Lectures

SW/HW-Lab mobile, embedded Systems

SDR, security architectures, IoT, localization, bring your own topic...

Microprocessor Lab

Programming of embedded systems, IoT, mobile/wireless devices

Seminar Computer Systems

Presentation & discussion of current topics from all lectures

Modeling and Simulation

Modeling, Simulation and Evaluation of Systems

Embedded Internet and the IoT

Wireless sensor networks, wireless mesh networks, Internet of Things, etc.

Mobile Communications

Wireless transmission, media access, GSM, 3G, LTE, WLAN, mobile IP, ad-hoc networks

Telematics / Advanced Computer Networks

Protocols, services, standards, LAN, Internet, TCP/IP, WWW, security, quality of service, DNS, routing, applications, IPv6, MPLS

Master Bachelor

Computer Systems Lab (TI IV)

Embedded systems, interfaces, drivers, operating systems, networking, integration

Operating Systems and Computer Networks (TI III)

Input/output, DMA/PIO, interrupts, buffer, process/thread, UNIX/Windows, networks, media access, protocols, TCP/IP, Internet

Computer Architecture (TI II)

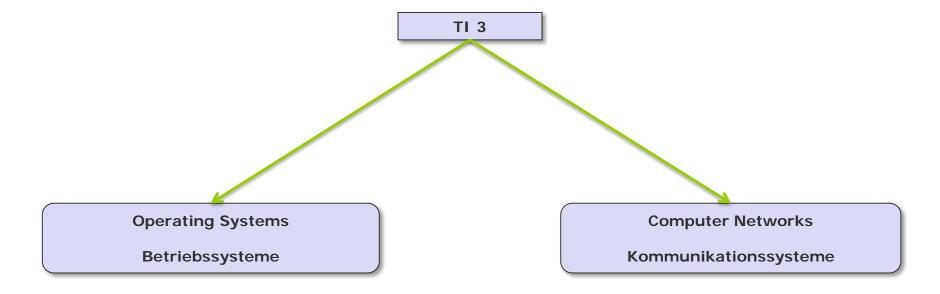
Harvard/v. Neumann, micro architecture, RISC/CISC, branch prediction, pipelining, cache, memory hierarchy, assembler, multi-processor systems

Basics of Computer Systems (TII)

Boolean algebra, circuits, minimization, gates, memory, semiconductors, transistors, CMOS, AD/DA conversion

You are here!







- Introduction and Motivation
 - Tasks
 - Services
 - Virtual Resources
 - Historical Perspective
 - Examples
 - Tools
- 2. Subsystems, Interrupts and System Calls
 - System Structure
 - Flow of Control
 - System Library
 - POSIX
- 3. Processes
 - Definition
 - Implementation
 - State Model

- 4. Memory
 - Paging & Segmentation
 - Virtual Memory
 - Swap Policies
- 5. Scheduling
 - Types of Scheduling
 - Decision Modes
 - Process Priorities
 - Scheduling Policies
- 6. I/O and File System
 - Devices
 - Buffering and Caching
 - Files and Directories
- 7. Booting, Services, and Security
 - System Startup
 - System Services
 - Security Issues



- 8. Networked Computer & Internet
 - Sockets
 - Internet
 - Layers
 - Protocols
- Host-to-Network I
 - Physical Layer
 - Media
 - Signals
 - Modems
- 10. Host-to-Network II
 - Data Link Layer
 - Framing, Flow Control
 - Error Detection / Correction
 - Point-to-Point Protocol

11. Host-to-Network III

- Topologies
- Medium Access
- Local Area Networks
 - Ethernet, WLAN

12. Internetworking

- Switches, Routers
- Routing
- Internet Protocol
- Addressing

13. Transport Layer

- Protocol Mechanisms
- TCP, UDP
- Addressing, Ports



14. Applications

- Domain Name System
- Email
- World Wide Web

15. Network Security

- Basic Concepts & Terms
- Cryptology
- Examples
 - Firewalls
 - Virtual Private Networks (VPNs)
 - IP Security
 - Email Security with PGP

16. Example

Under the Hood of Surfing the Web

Programming in C as part of the exercises



Course Organization



General:

Lecture

- Available online
- Flipped-classroom: Q&A, discussions, Friday, 10-12h, via Webex (invitations see KVV)

Office Hours

- Jochen Schiller: Tue 14:00-15:00, https://fu-berlin.webex.com/meet/jochen.schiller or via email
- Tutors: during tutorials

News and Updates

- KVV course site (via announcements)

Tutorials

- Groups of approx. 25-30 students
- Time depends on group
- Registration via KVV

Assignments:

New assignments each week

- Available in KVV

Discussion

- During the tutorials

Practical assignments

- @home, should work on all platforms
- More during Q&A/tutorials

Handing in

- > Right on time!
- Complete electronic workflow!
- Solutions handed in too late will be ignored!

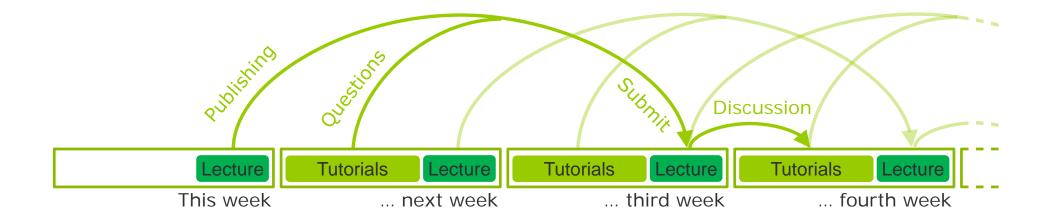


Assignments

Übungsblätter: Available on Fridays in KVV after Q&A

Submission: Two weeks later until start of class (Fri, 10:15)

Discussion: Three weeks later in tutorials





Criteria for Successful Participation

Active participation in the tutorials is essential!

- Minimum n-2 times present

Hand in your assignments on time

- Teamwork is required with 2 students per team

Successful submission of at least n-2 assignments

Each student with a correct answer must be able to present the assignment during the tutorials

- At least one presentation during the tutorials

At least 50% of the max. number of points in the exam are required

Only the exam counts for grading!

Exam: to be announced



Literature

Archive of the lectures! – see KVV for links

- Prepare yourself! Follow the lecture BEFORE Q&A
- Prepare a list of questions & discuss during Q&A

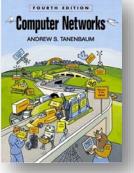
The course is based on:

- William Stallings, Operating Systems: Internals and Design Principles, Prentice Hall International
- Larry L. Peterson, Bruce S. Davie, Computernetze Eine systemorientierte Einführung, dpunkt Verlag

Additional literature:

- Andrew S. Tanenbaum, Modern Operating Systems, Prentice Hall
- Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, John Wiley & Sons









RIOT-OS

The friendly Operating System for the Internet of Things.







http://riot-os.org/



OS-support for HPC (Grids)

