Logistics

- **Lecture**
  - Tuesdays, 13:15 - 14:45, Auditorium Maximum (Building 33)

- **Tutorial and Exercises**
  - Wednesdays, 11:30 – 13:00, Building 33 Room 2401 (in German)
  - Thursdays, 09:45 - 11:15, Building 43 Room 4/126 (in German)
  - Thursdays, 15:00 - 16:30, Building 33 Room 2216 (in German)
  - Thursdays, 16:45 - 18:15, Building 33 Room 2116 (in German)

- **Exam**
  - In conjunction with the exam in „Accounting“
  - Date: January 18, 2008
  - Time: 13:00 – 15:00 (120 minutes – 60/60)
  - Classroom: Building 35 R, rooms 1210 A und 1210 B
Structure of the Lecture

Unit 1: Introduction
Unit 2: Central Processing Units
Unit 3: Storage and Data Structures
Unit 4: Input and Output Devices
Unit 5: Software
Unit 6: Networks, Data Interchange, and the Internet
Unit 7: Design, Development, Deployment, and Operations of Information Systems
Unit 8: Office Applications
Unit 9: Enterprise Applications
Unit 10: Supply Chain Applications and E-Business
Unit 11: Management Support Systems
Unit 12: Exam Review

Assignment from last week

• WI2, pp. 517-749; IBIS, pp. 34-51
• Review the slides

WI1 = Hansen/Neumann: Wirtschaftsinformatik 1; WI2 = Hansen/Neumann: Wirtschaftsinformatik 2; IBIS = Wigand et al: Introduction to Business Information Systems.
Link to the Previous Unit

• Last Unit:
  – How can we tell a computer what to do?
  – What is a program? What is an operating system? How do they interact?
  – What languages and tools exist for developing software?

• Today:
  – How can one computer send data and instructions to another computer?
  – How can data be transmitted over wires, radio communication, or fiber optic cables?
  – How do the Internet and its services work?
  – What security problems exist in networks, and what can we do to mitigate them?
From Isolated Computers to Computer Networks

- Exchange of data via a portable storage media

From Isolated Computers to Computer Networks (2)

- Exchange of data via a direct technical link
From Isolated Computers to Computer Networks (3)

- Exchange of data via a direct technical link

From Isolated Computers to Computer Networks (4)
Serial vs. Parallel Data Transfer

- **Parallel**: Multiple bits at a time
- **Serial**: One bit at a time
- Parallel data transfer is **unsuitable for long distances**
- Serial data transfer must be synchronized – Start / Stop bits

Basic Communications Channel Characteristics

- Simplex channel
- Half-duplex
- Full-duplex channel
Direct Link via a Dedicated Digital Line

Exchanging Data over Telephone Lines: Modems and Acoustic Coupler
Modems and Acoustic Couplers

Moderation

- Varying a periodic waveform ("carrier") in order to convey a signal
- Three popular approaches:
  - **Amplitude Modulation:** "Varying the volume"
  - **Frequency Modulation:** "Varying the frequency"
  - **Phase Modulation:** "Varying the timing of the original signal"
ISDN, DSL, Powerline Communication

- ISDN: Integrated Services Digital Network
- DSL / ADSL
  - Principle: More download than upload
- Powerline Communication

Multiplexing

Source: Stair / Reynolds
http://www.heppnetz.de/teaching/gwi/
Computer Networks

Network Concepts and Considerations

• Network topology
  – Ring network
  – Bus network
  – Hierarchical
  – Star network
  – Hybrid network

• Network types
  – Local Area Networks
  – Wide Area Networks
  – International networks
  – Home and small business networks

http://www.heppnetz.de/teaching/gwi/
A Simple Network

PC1 ------PC2
    |         |
    |         |
    v         v
PC3

Advantages of a Network

• Share Peripherals
• Exchange Files and Messages
Sharing Access to Peripherals

Exchange Files and Messages
Network Components

PC1

Communication Media

Network Interface Card (NIC)

PC2

Network Interface Card (NIC)

Network Cabling

Twisted Pair

Coaxial (Shielded)
Topology: Ring

![Ring Topology Diagram]

Topology: Bus

![Bus Topology Diagram]
Topology: Star

PC1

Server

PC2

PC3

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File Locking Mechanism

Dear Mr. Miller: The price for the desired maintenance is $150.

PC1

PC2

PC3

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Server

A server is a computer that offers services. Those services can be accessed remotely by other computers, which are called clients.

http://www.heppnetz.de/teaching/gwi/

Terminal-to-Host / “Thin Clients”

FIGURE 6.18

Terminal-to-Host Connection

“Dumb” terminal

Host computer

Source: Stair/Reynolds

http://www.heppnetz.de/teaching/gwi/
Terminal-to-Host

http://www.heppnetz.de/teaching/gwi/
Packet-based Transmission

1. The whole message is
2. split into multiple packets

FROM: 123
TO: 129

Header | Data
123 / 129 / 1 | The whole
123 / 129 / 2 | message is
123 / 129 / 3 | split into multiple packets

Routing

FROM: FT. MYERS
TO: N.Y.C.

TO = Atlanta? No!
TO = N.Y.C.? Yes -> deliver!

TO = Tampa? No!
TO = Orlando? No!

Tampa
Atlanta
Orlando
Post Office, Ft. Myers
N.Y.C.
Internet: The Basic Idea

IP Address

- Unique, numerical address for a computer (a connection) in a network.
- Example:
  - 170.124.233.14
- IP represents position in the network
  - changes, when a service moves or the structure of the grid is being modified.
The Web is an application built on top of the Internet

A Cornerstone of the Web: Unique Resource Identifiers (URIs)

Source: W3C
http://www.heppnetz.de/teaching/gwi/

Source: W3C
http://www.heppnetz.de/teaching/gwi/
Key Features of the Web

- "Document"-based (resources)
- Hyperlinks between resources
- Support of multiple content types:
  - Text, pictures, sound,…

Domain

- Name for a host or service
  - e.g. www.unibw.de
- Is being translated by a Domain Name Server into an IP address
  - www.unibw.de -> 207.203.214.28
Domain Names

www.unibw.de

• Top Level Domain
  – de, com, gov, mil, de, it, ca etc.

• Subdomains
  – Name of the organization (e.g. “unibw”)
  – Host name
  – others

Protocols

http://www.unibw.de

• Defines the type and content of the transmission
  – HTTP: Hypertext Transfer Protocol
  – FTP: File Transfer Protocol
  – SMTP: Send Mail
  – POP3: Retrieve Mail
  – TELNET: Terminal protocol
Web Server

A web server stores web pages. Those pages can be requested by any remote computer.

Web Browser

The web browser is the program that requests and displays a web page.
Sending eMail: SMTP

user id = psmith
password = sample
1 message following

Receiving eMail: POP3

user id = psmith
password = sample
do I have new mail?
Hypertext Markup Language

```html
<html>
<head>
<title>Page Title</title>
</head>
<body>
This is my FIRST HTML page...
</body>
</html>
```

Browser

A Simple HTML Document

```html
<html>
<head>
<title>Page Title</title>
</head>
<body>
This is my FIRST HTML page...
</body>
</html>
```
Browser View

This is my FIRST HTML page...

Important HTML Tags

<h1>Headline 1</h1>
<h2>Headline 2</h2>
<h3>Headline 3</h3>
<h4>Headline 4</h4>
<h5>Headline 5</h5>
<h6>Headline 6</h6>
How does Google work?

Search Engines / Spiders

myPage
Link1
Link2

Peter
Link3

Paul
Link5

Mary
Link4

Linda
Link6

http://www.heppnetz.de/teaching/gwi/
Network Security
Threats and Protection

Your Data is at Risk

• Loss
• Manipulation and Corruption
• Unauthorized Access and Usage
• Abuse of your computer for attacking others
Malware (Malicious Software)

- Computer Viruses
- Trojan Horses
  - Password sniffer, Keyboard logger
  - FTP clients
- Worms
- (Advertising) Spyware

Computer Virus

Virus Routines

Original Application Program

Replication & Propagation

Malicious Activity
Trojan Horses

Program that appears to be a useful tool but secretly performs malicious activities

How Malware Propagates

• Media exchange (floppy disk, ZIP, CDR, memory stick, …)
• E-mail attachments
• Infected documents
• Network drives
• Security leaks in the Operating System or Application software
Propagation

Floppy Disks

Local Files

Shared Network Drives

E-Mails with Infected Attachments

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Computer Worm

A self-replicating computer program. Computer viruses attach themselves to, and becomes part of, another executable program; a worm is self-contained and does not need to be part of another program to propagate itself.

(http://en.wikipedia.org/wiki/Computer_worm)

http://www.heppnetz.de/teaching/gwi/
Malicious Internet Traffic

Searching for Vulnerabilities

http://www.heppnetz.de/teaching/gwi/

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Security Leaks in Commercial Software

http://www.heppnetz.de/teaching/gwi/

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Spyware

• Collect information from your computer and transmit it without telling you to a remote computer
• Usage patterns, credit card details, passwords, …

Protect Yourself!

• Backups
• Firewall
• Anti-Virus Software
• Software Updates
• Behavior
Firewall

Searching for Vulnerabilities

http://www.heppnetz.de/teaching/gwi/

Virus Scanner

Checks files for known viruses before opening them

Hard disk

http://www.heppnetz.de/teaching/gwi/
Updates for Windows and MS Office

http://windowsupdate.microsoft.com
http://office.microsoft.com/productupdates

Hoaxes

• Malicious Code (Virus and Trojan) Warnings
• Urban Myths
• Sympathy Letters and Requests to Help Someone
• Traditional Chain Letters
• Threat Chains

Information about hoaxes:
http://hoaxbusters.ciac.org
Assignment for Next Week

• **WI1**, pp. 151-322; IBIS, pp. 169-194
• Review the slides

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http://www.heppnetz.de/teaching/gwi/

Thank you!

The slides and additional materials will be available at
http://www.heppnetz.de/teaching/gwi/