

Grundzüge der Wirtschaftsinformatik *Introduction to Business Information Systems*

Unit 6

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

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

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

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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

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

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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.

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

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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?

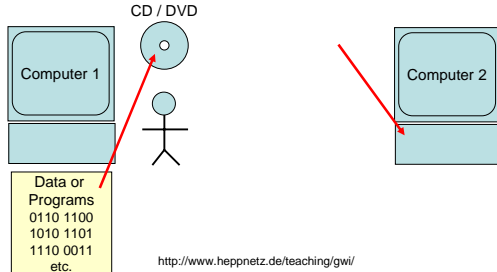
<http://www.heppnetz.de/teaching/gwi/>

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Data Communication

From Isolated Computers to Computer Networks

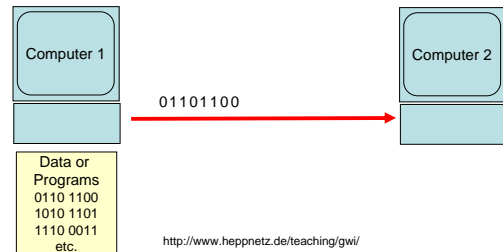
- Exchange of data via a portable storage media



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From Isolated Computers to Computer Networks (2)

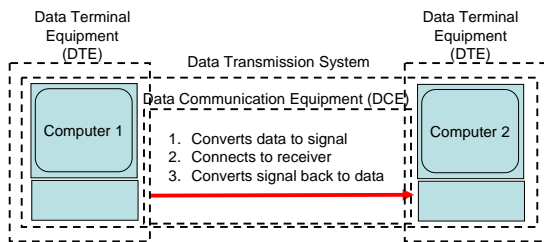
- Exchange of data via a direct technical link



8

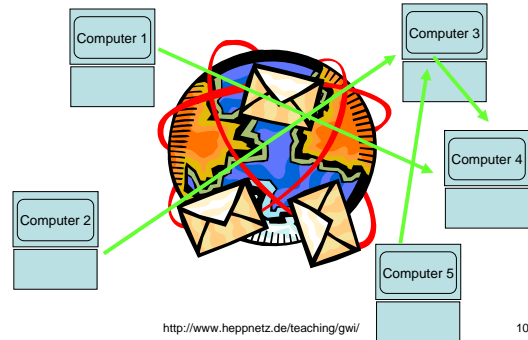
From Isolated Computers to Computer Networks (3)

- Exchange of data via a direct technical link



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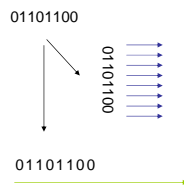
From Isolated Computers to Computer Networks (4)



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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

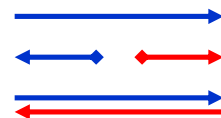


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Basic Communications Channel Characteristics

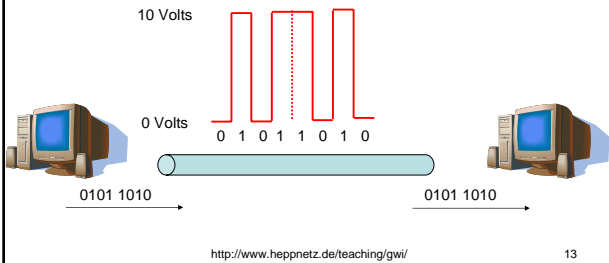
- Simplex channel
- Half-duplex
- Full-duplex channel



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

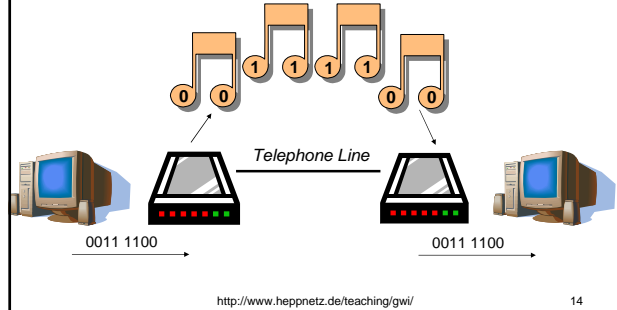
12

Direct Link via a Dedicated Digital Line



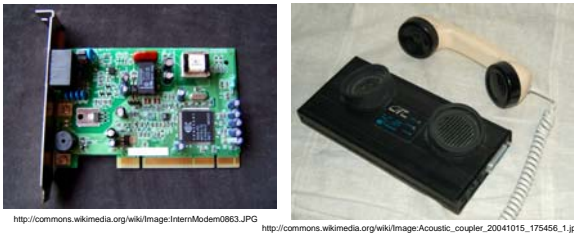
13

Exchanging Data over Telephone Lines: Modems and Acoustic Coupler



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Modems and Acoustic Couplers

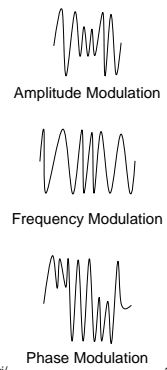


<http://www.heppnetz.de/teaching/gwi/>

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Modulation

- 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“



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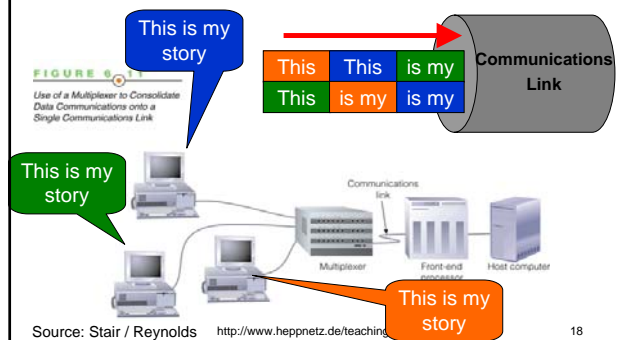
ISDN, DSL, Powerline Communication

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

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

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Multiplexing



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Computer Networks

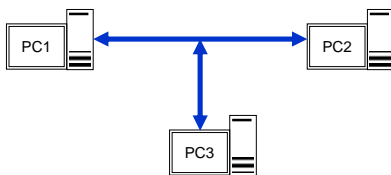
Network Concepts and Considerations

- 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/>

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A Simple Network



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

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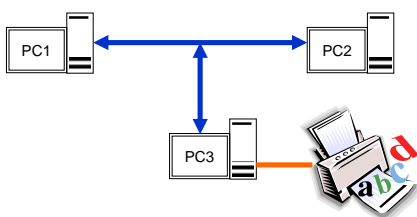
Advantages of a Network

- Share Peripherals
- Exchange Files and Messages

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

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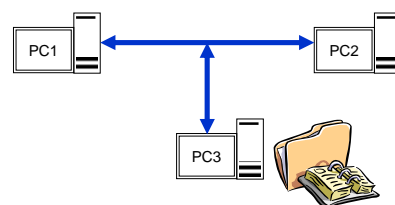
Sharing Access to Peripherals



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

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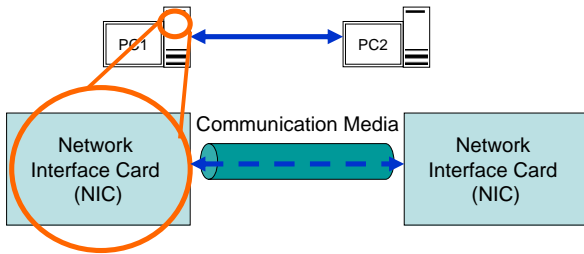
Exchange Files and Messages



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

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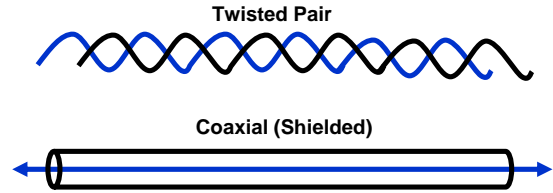
Network Components



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

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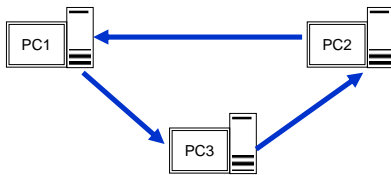
Network Cabling



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

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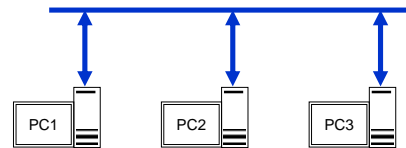
Topology: Ring



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

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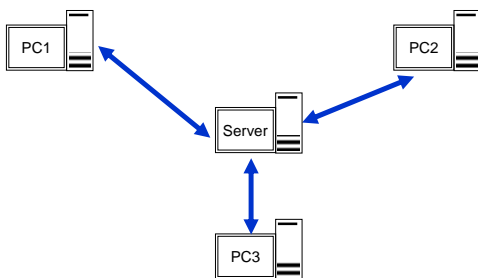
Topology: Bus



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

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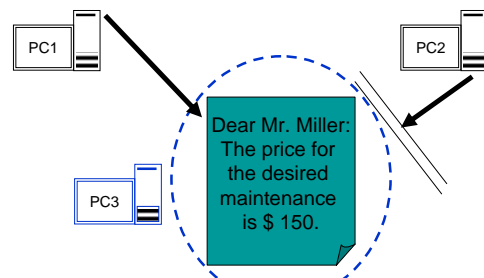
Topology: Star



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

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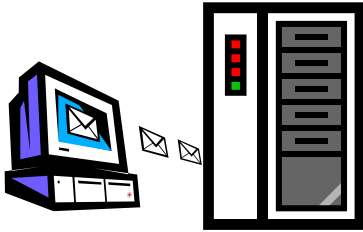
File Locking Mechanism



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

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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.

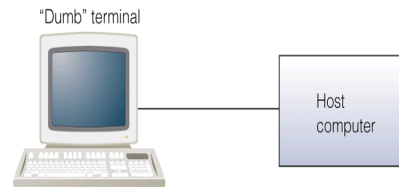
<http://www.heppnetz.de/teaching/gwi/>

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Terminal-to-Host / "Thin Clients"

FIGURE 6.18

Terminal-to-Host Connection

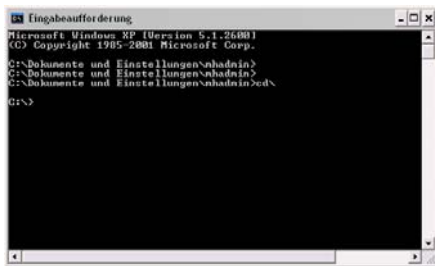


Source: Stair/Reynolds

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

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Terminal-to-Host

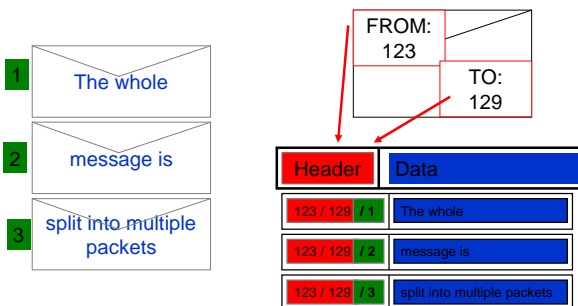


<http://www.heppnetz.de/teaching/gwi/>

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The Internet

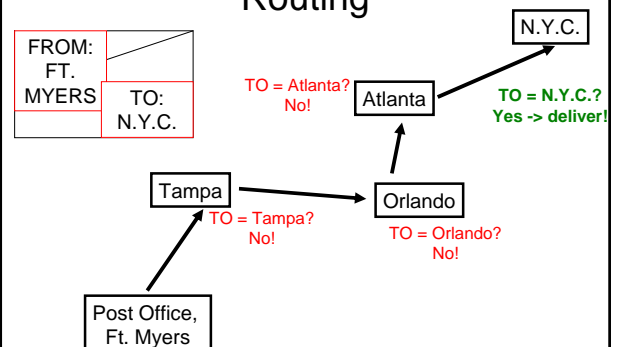
Packet-based Transmission



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

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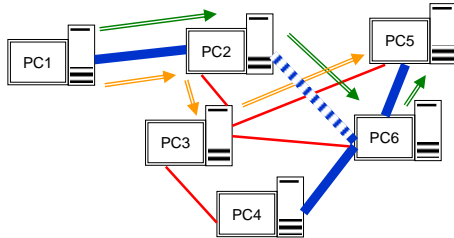
Routing



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

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Internet: The Basic Idea



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

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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.

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

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The Web is an application built on top of the Internet

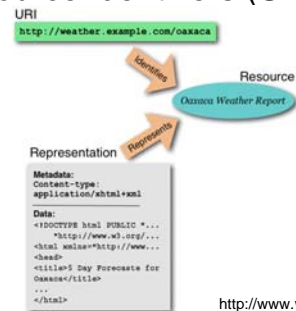


Source: W3C

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

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



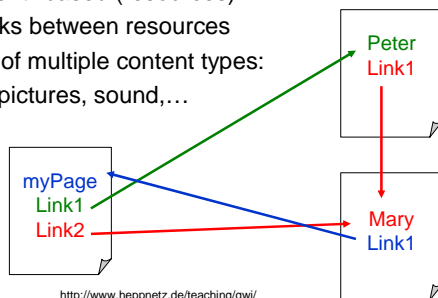
Source: W3C
<http://www.w3.org/TR/webarch/>

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

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Key Features of the Web

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



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

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

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

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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

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

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Protocols

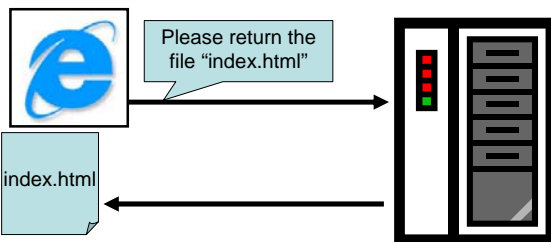
`http://www.unibw.de`

- 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

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

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Web Server



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

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

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Web Browser

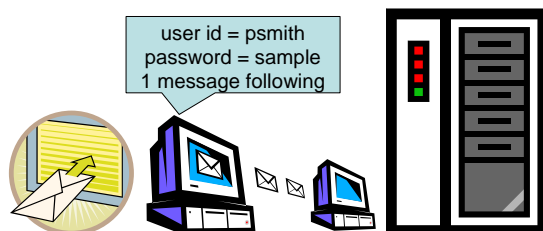


The web browser is the program that requests and displays a web page.

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

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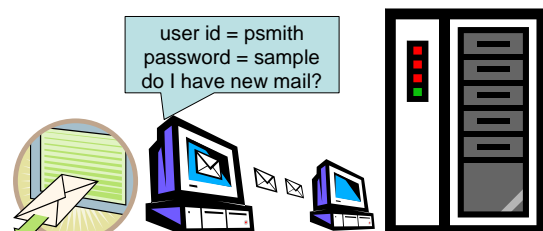
Sending eMail: SMTP



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Receiving eMail: POP3

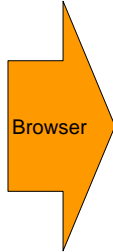


<http://www.heppnetz.de/teaching/gwi/>

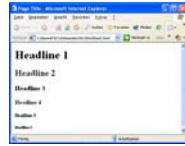
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Hypertext Markup Language

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



Browser



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

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A Simple HTML Document

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

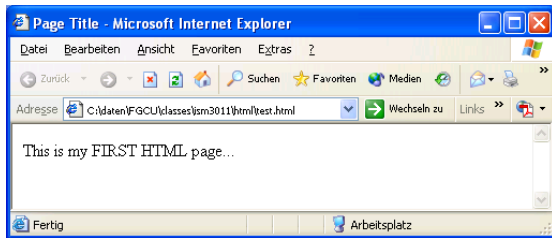
Tags

Content

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

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Browser View

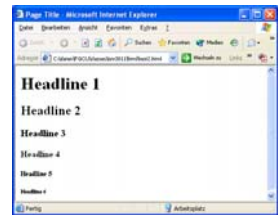


<http://www.heppnetz.de/teaching/gwi/>

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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>
```



Browser view

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

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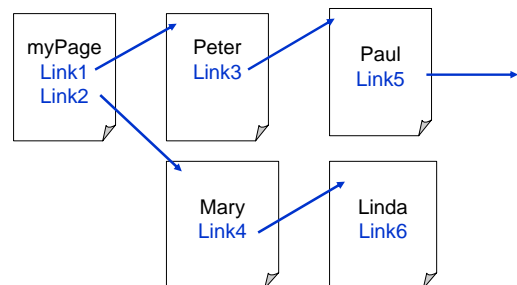
How does Google work?



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

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Search Engines / Spiders



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

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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

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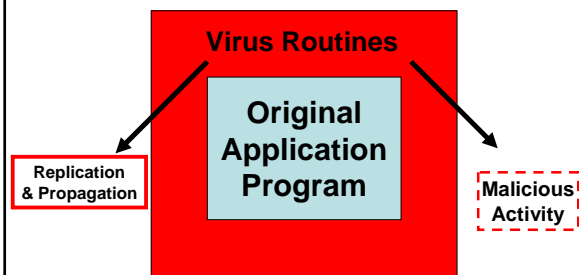
Malware (Malicious Software)

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

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

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Computer Virus



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

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Trojan Horses

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



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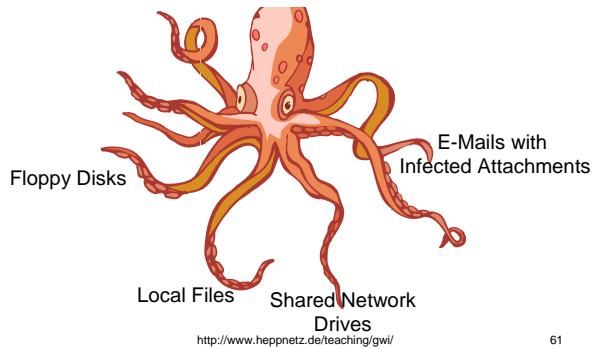
How Malware Propagates

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

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

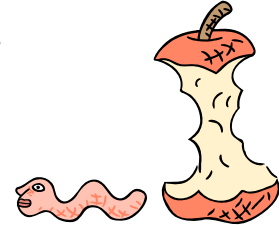
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Propagation



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.

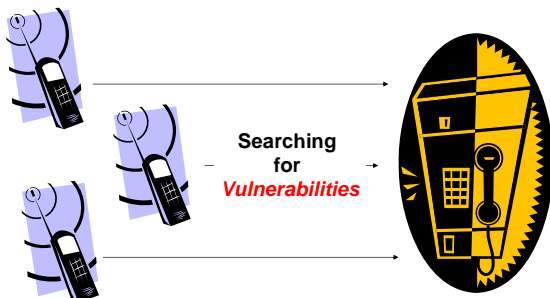


(http://en.wikipedia.org/wiki/Computer_worm)

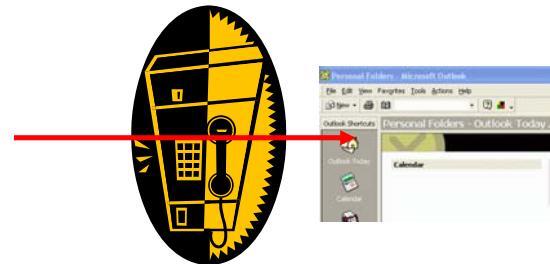
<http://www.heppnetz.de/teaching/gwi/>

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Malicious Internet Traffic



Security Leaks in Commercial Software



Spyware

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

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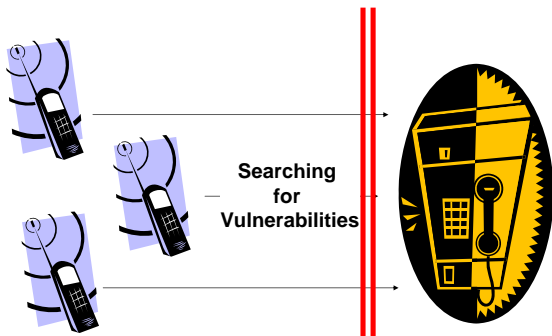
Protect Yourself!

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

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

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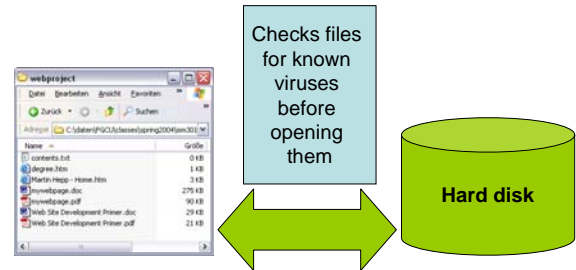
Firewall



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

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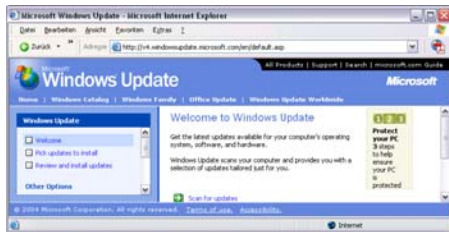
Virus Scanner



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

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Updates for Windows and MS Office



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

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

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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>

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

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Assignment for Next Week

- **W11**, pp. 151-322; IBIS, pp. 169-194
- Review the slides

W11 = Hansen/Neumann: Wirtschaftsinformatik 1; W12 = Hansen/Neumann: Wirtschaftsinformatik 2; IBIS = Wigand et al: Introduction to Business Information Systems.

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

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Thank you!

The slides and additional materials will be available at

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