

Grundzüge der Wirtschaftsinformatik *Introduction to Business Information Systems*

Unit 8

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

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

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Assignment from last week

- WI1, pp. 323-523
- Review the slides

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

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Link to the Previous Unit

- **Last Unit:**
 - Which security problems exist in networks, and what can we do to mitigate them?
 - Which methods and tools exist for designing and developing software for business problems?
 - Which notations exist for representing data structures and program execution?
- **Today:**
 - What kind of application software exists for typical office tasks?

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Structure of the Unit

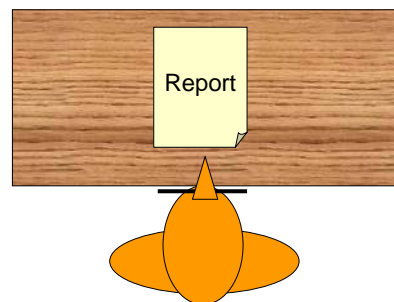
- Overview
- Word Processors
- Spreadsheet Software
- Graphics Software
- Databases and Database Management Systems
- Data Compression
- Computer-supported Collaborative Work (CSWC)

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Characteristics of Office Tasks

- Weakly structured
- Ad-hoc
- Substantial information processing by humans
- Collaboration with others
- Constrained by availability of resources
- Individual preferences

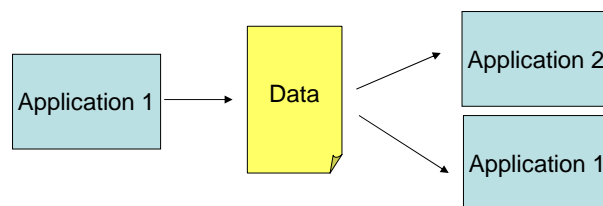


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Goals and Benefits of Office Software

- Improve
 - Efficiency
 - Timeliness
 - Quality of information and decisions
- Improve data and process integration



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Types of Office Tasks

- Exceptional cases that require individual solutions
 - Example: Planning a site visit by the CEO
- Domain-specific tasks that can only be modeled partially
 - Example: Preparing a quotation/offer
- Repetitive tasks that can completely be implemented as software
 - Example: Compute the total sales at the end of a day

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Data Integration

- **Traditional, but bad:** Each application stores its documents and data by itself
 - Example: Program 1 cannot access any data from program 2
- **Better:** As above, but the applications understand file formats of other applications
 - Example: Program 1 can read and import data from program 2 (but there are redundancies)
- **Best:** One fact in one place!
 - Example: Applications use a shared database for storing their data

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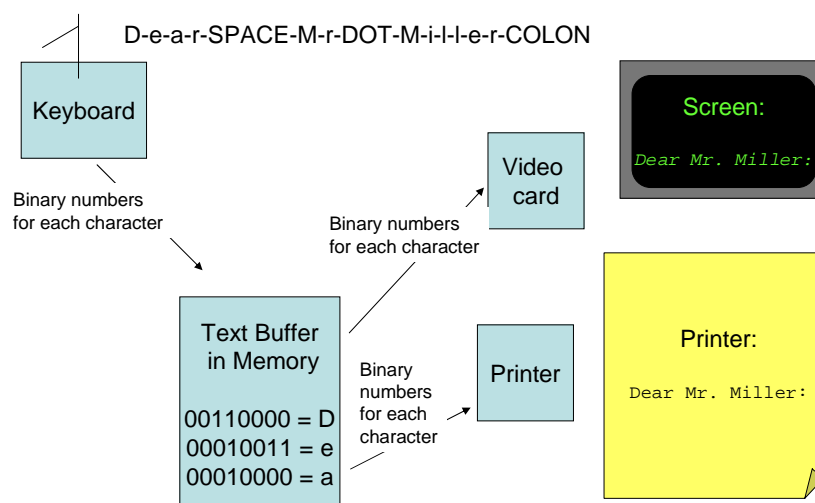
Word Processing

- Software for entering, editing, and rendering textual information
- One of the first applications for using computers in offices (~1970s)
- Basic principle:
 - Keyboard converts characters and symbols into binary numbers and stores them in a buffer
 - Software displays the buffer or a part of the buffer
 - Software sends final buffer to a printer

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Word Processing: Principle



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WYSIWYG – What you see is what you get

```
<
L<LARGE>This text is
A large<END_LARGE>,
R<ITALICS>this
G italicized<END_ITALICS>,
E and <BLUE>this one is
T set in blue<END_BLUE>.
H Here is a picture <IMAGE
h hepp.jpg, size 100x200>
```

Explicit formatting instructions

t
e
x
t



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Mail Merge

Template

Dear <NAME>:
I would like to invite you to my birthday party.
Mary

Data

Peter
Judy
Linda

Word Processor

Dear **Peter**:
I would like to invite you to my birthday party.
Mary

Dear **Judy**:
I would like to invite you to my birthday party.
Mary

Dear **Linda**:
I would like to invite you to my birthday party.
Mary

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Spreadsheet Fundamentals

- Spreadsheet: An application that stores values and expressions in a matrix.
- Each expression can refer to the content of another cell
 - Example: $A4 = A3 + A2$
- The software updates all computations immediately.

	A	B	C
1	No	Name	Price
2	1	Corvette	12056.00
3	2	Dodge	5000.72
4		Total	17056.72

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Spreadsheet Fundamentals

Column

Row

A1	B1	C1
A2	B2	C2
A3	B3	C3
A4	B4	C4

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References and Formulae

Column

Row

A1
A2
A3
= SUM(A1:A3)

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References and Formulae

	Column		
Row	A1	B1	C1
A2		=A1+B2	C2
A3		B3	C3
A4		B4	C4

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Instant Refresh

	Column		
Row	A1	B1	C1
A2		=A1+B2	C2
A3		B3	C3
A4		B4	C4

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Absolute and Relative References

- A1 – Column and Row are relative
- **\$A\$1** – Column and Row are absolute
– won't change when pasted into a new cell
- **\$A1** – Column absolute, Row relative
- **A\$1** – Column relative, Row absolute

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Absolute and Relative References

Column

Row

	A1	B1	C1
A2	=\$A\$1+B1	=\$A\$1+C1	=\$A\$1+D1
A3		B3	=\$A\$1+D2
A4	=\$A\$1+B3	=\$A\$1+C3	=\$A\$1+D3

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Absolute and Relative References

Column

Row

	A1	B1	C1
A2	$=\$A1+B1$	$=\$A1+C1$	$=\$A1+D1$
A3		B3	$=\$A2+D2$
A4	$=\$A3+B3$	$=\$A3+C3$	$=\$A3+D3$

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Absolute and Relative References

Column

Row

	A1	B1	C1
A2	$=\#REF!+B1$	$=A\$1+C1$	$=B\$1+D1$
A3		B3	$=B\$1+D2$
A4	$=\#REF!+B3$	$=A\$1+C3$	$=B\$1+D3$

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Formulae in MS Excel: AVERAGE

= AVERAGE (1,2,3,5)
= AVERAGE(B1:B5)
= AVERAGE (B1, A3, A4)

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Structure of the Unit

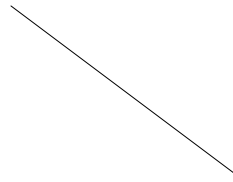
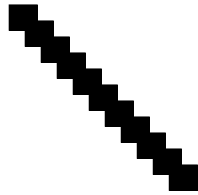
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Graphics Software

- Pixel-based
- Vector-based



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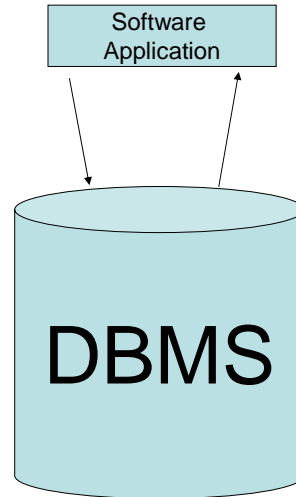
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Database Management Systems (DBMS)

- Software that allows storing and retrieving structured data
- The application or user does not have to think about how the data is actually stored.
- The database maintains additional structures that allow for quick access to the data.

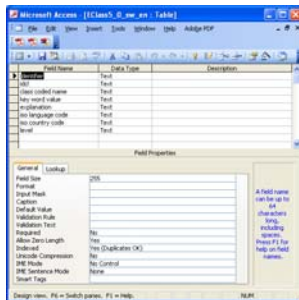


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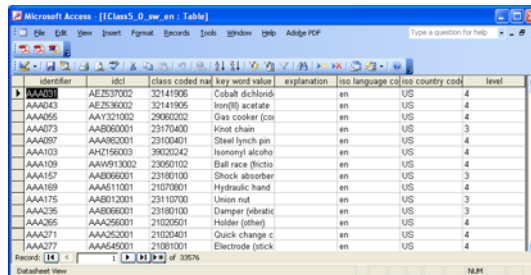
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Database Management Systems

1) Designing the schema (structure)



2) Entering data



3) Querying the database

„Return all last names and telephone numbers of those customers that have a total sales volume > 500 Euro.“

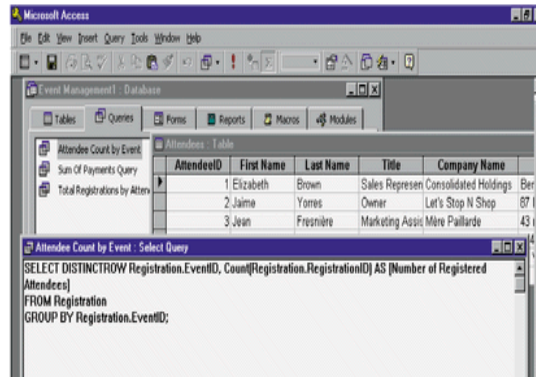
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Structured Query Language (SQL)

FIGURE 5 15

Structured Query Language
SQL has become an integral part of most relational database packages, as shown by this screen from Microsoft Access.



cf. Stair / Reynolds

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Open Database Connectivity (ODBC)

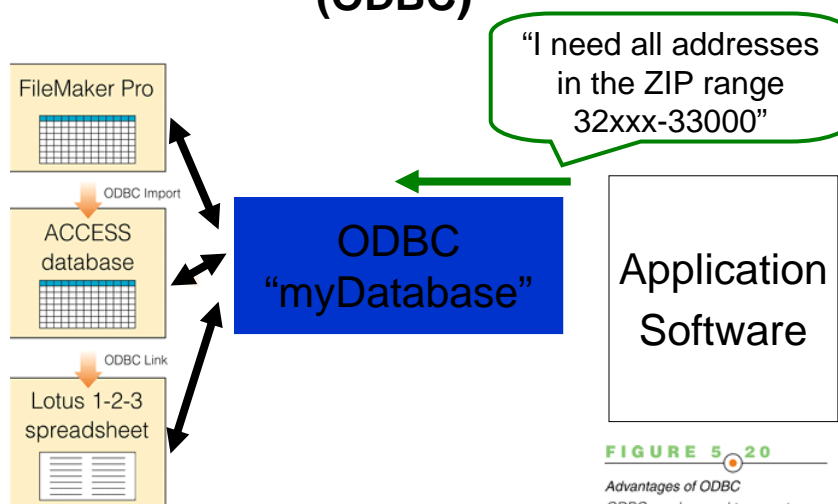


FIGURE 5 20

Advantages of ODBC
ODBC can be used to export, import, or link tables between different applications.
cf. Stair / Reynolds

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Confused?

DBMS
SQL Database
ODBC

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Database

DBMS

ODBC

SQL

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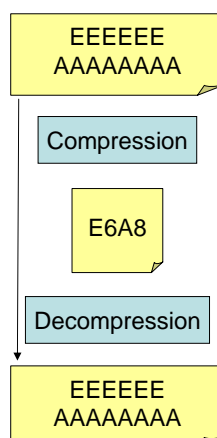
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Data Compression

- A lot of data contains *redundancy*, i.e. repetitive patterns.
- Those can be abbreviated in order to reduce the file size.
- Simple algorithm: **Run-length encoding**
- Example:
 - EEEEEEA8AAAAAAA could be written as E6A8 (= 6*E,8*A)



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Lossless vs. Lossy Data Compression:

- **Lossless**: All details of the original data can be restored
- **Lossy**: Some details are lost during the compression
- Example: ZIP
- Example: MP3, JPEG

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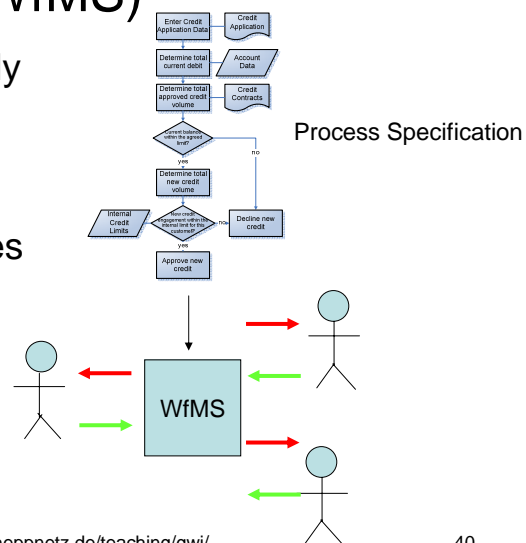
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CSWC

- How can computers support the collaboration of human actors?
 - Communication
 - Teamwork
 - Knowledge Management

Workflow Management Systems (WfMS)

- Software that actively coordinates the collaboration of individuals and systems in processes



Wikis

- Collaborative editing of documents over the Web with
 - with no need for software other than a Web browser
 - by everybody (without mandatory registration)
- First demonstrated by Ward Cunningham in 1994

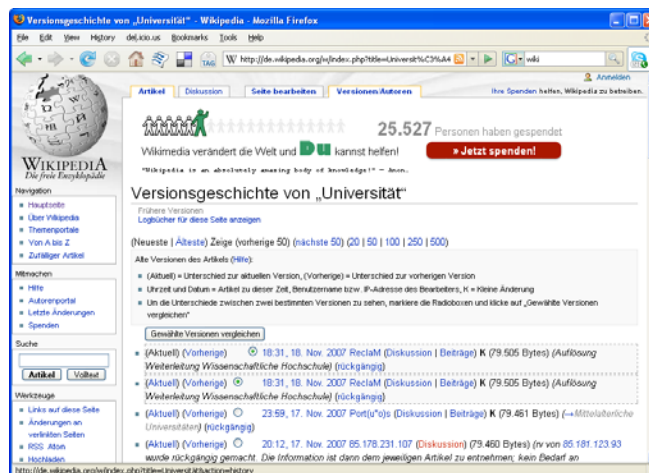


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Why do Wikis work?

- Clever distribution of power between constructive and destructive users
 - Simple undo / revert
 - Large user base

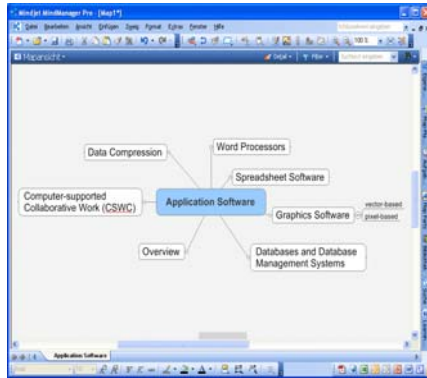


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Mindmapping

- Visual representation of terms and relations, mostly used for brainstorming and discussion
- Based on work by Tony Buzan (1971)



cf. Tony Buzan: An Encyclopedia of the Brain and Its Use, 1971

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Assignment for Next Week

- WI1, pp. 525-605; IBIS, pp. 93-168
- Review the slides

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

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Thank you!

The slides and additional materials will
be available at

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Bonus Track 😊

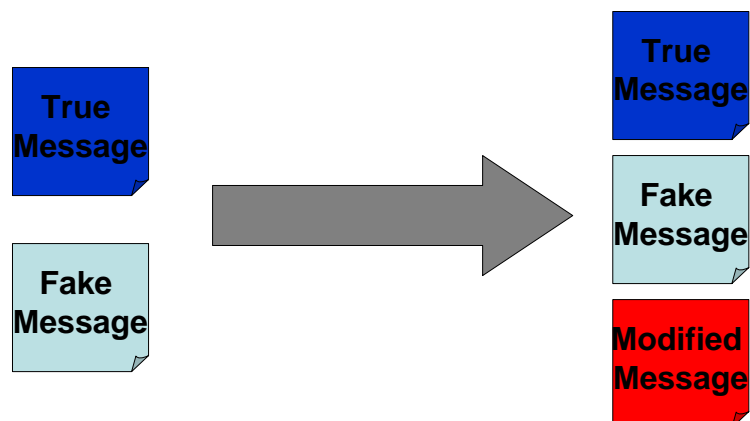
Encryption and Digital Signatures

1. Protect your files and e-mails from unauthorized access.
2. Be sure that a message actually comes from the respective sender.
3. Make sure that the message has not been changed along the way.

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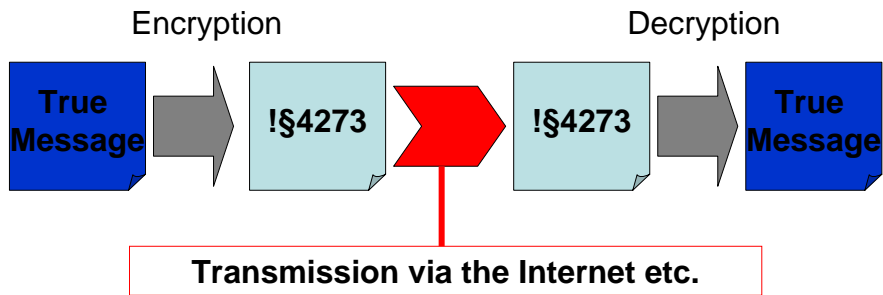
Risks in Open Networks



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Basic Principle of File Encryption



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Simple Encryption Table

$A=B, B=C, C=D, D=E, \dots, Z=A$

ABBA → BCCB → ABBA

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Frequency of Characters

A = 2 %

E = 20 %

I = 13 %

x = 0.04 %

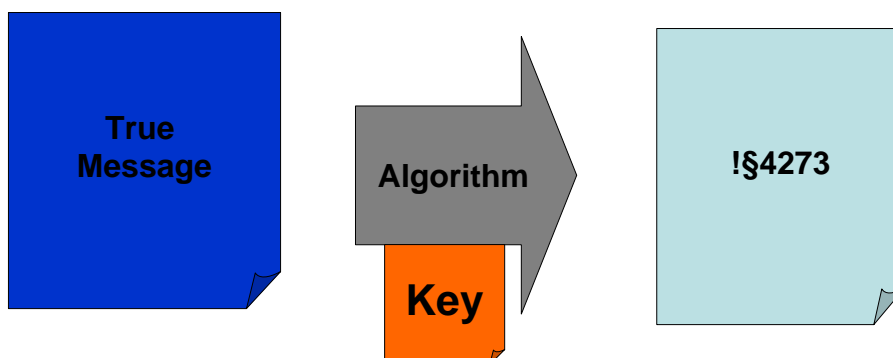
Y = 0.2 % etc.

**Simple Character Substitution
can be deciphered easily, as
the frequency of each
character remains available
and can be used to
reconstruct the code table.**

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Professional Encryption



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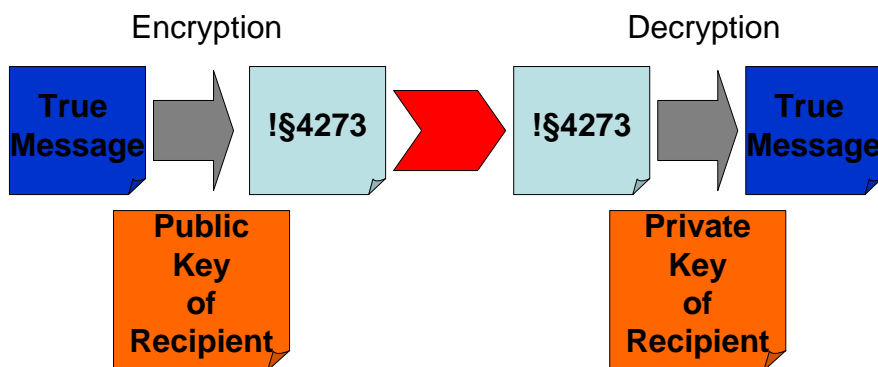
How do you transmit the private key?



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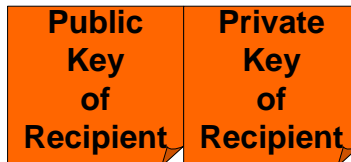
Asymmetric Encryption



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Pair of Keys



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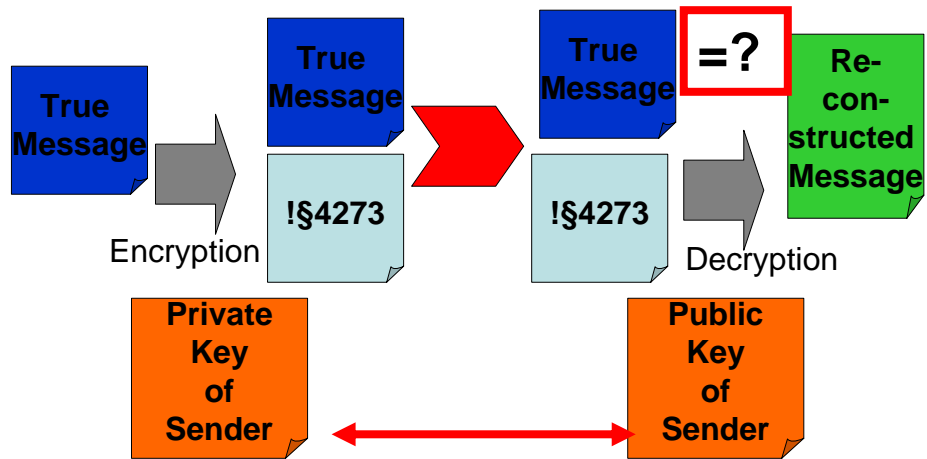
Hybrid Approach

- Use asymmetric encryption to transmit a private key.
- Then use the private key for communications.
- Advantage: Much better performance.

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Digital Signature



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How do you know that the public key is from the right person?



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Certifying Authority (CA)

CA uses its **Private Key** to sign that Public Key A is the Public Key of Martin Hepp

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