Concepts and principles of IT

- Aim
  - Identify the IT concepts and principles for Assignment 2
- Literature:
  - Chapter 4. IT concepts

Which concepts and principles?

- Suitable for users to understand IT

http://itteach202.wikispaces.com/

An **Information Technology (IT) system**

concerns the processing, storage and/or transfer of information.

Information can take many different forms such as words, numbers, pictures, sounds or video.

An **IT system** can consist of computers, the telecommunications network and other programmable electronic devices.

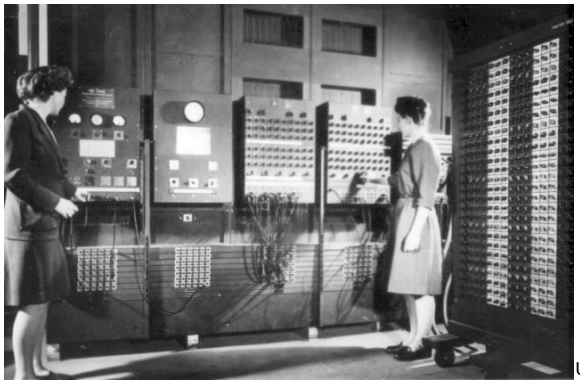
Basic Concepts of I.T. – University of London

Which concepts/principles will you include in Assignment 2?

Computers – Sequence

- Manipulating symbols
- Automatic
- Computationally universal
  - All finite calculations
  - Replace all special IT
    - Turing completeness

Alan Turing



U.S. Army Photo

ENIAC 1946

- Automatic and universal
- Programs stored by plugging cables

Structure: the von Neumann architecture

Computers

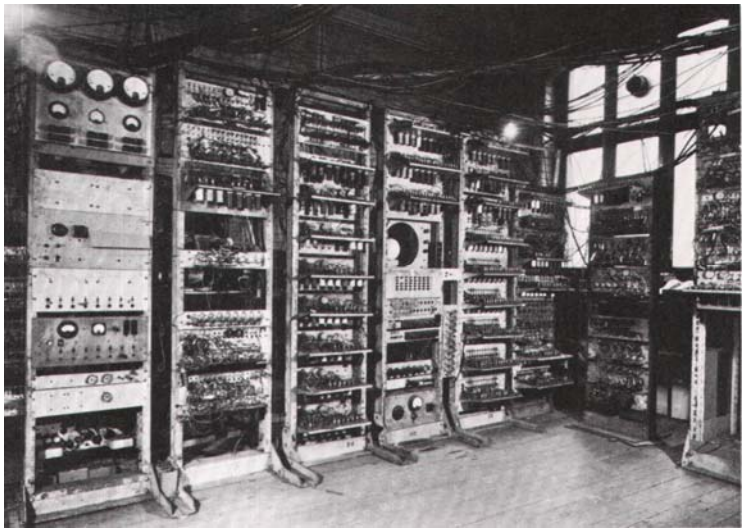
- Programs stored in the same way as data
  - von Neumann architecture

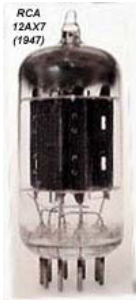
János Lajos Margittai Neumann
Photo: Los Alamos National Laboratory

The first von Neuman computer

Manchester Mark 1, 1948

– Programs and data
stored in 6000 vacuum tubes





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von Neumann architecture enables

- Download, install and run new software
  – The app market
- Programs can change themselves and other programs
  – Compilers generating executable code
- Data files can contain programs
  – Macros
  – Virus
- Layers
  – Data can be processed by different programs
  – Each program addresses certain aspects of the data

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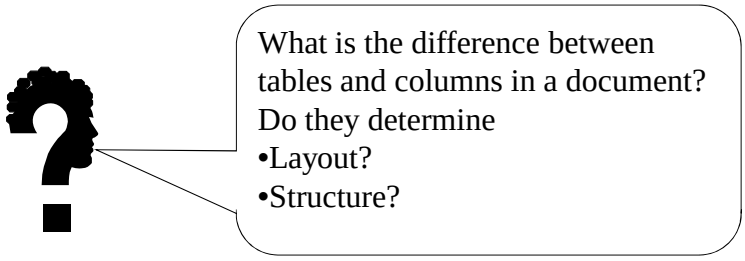
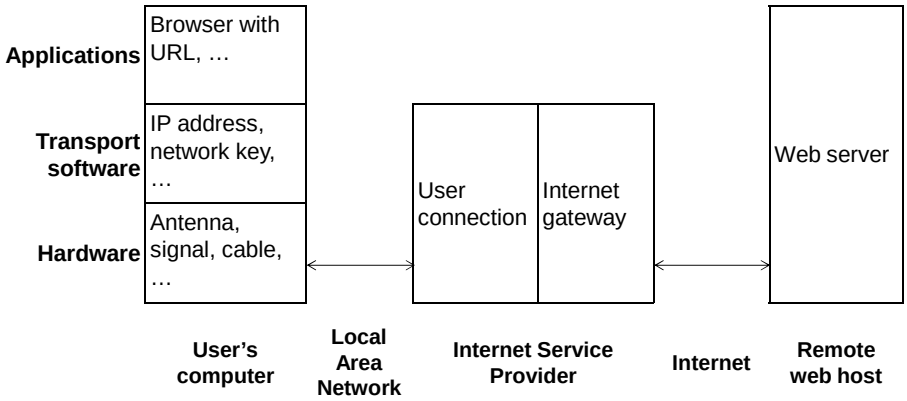
Structure: The layered architecture of IT

- Layers can be changed independently of each other
  - Internet can work on
    - Data transmission cables
    - Phone lines
    - Mobile phone network
  - Layout separated from contents and structure



Layered network model



Structures of sequences of operations

Synch \ Mode	**Point-to-point**	**Mass**
Synchronous	Chat	TV
Asynchronous	E-mail	Web

Communication modes and synchronization

Types and Instances

- Type
  - Description of a common set of properties and operations
- Instance
  - A unit of data adhering to the type

Type **Instances**

Integer

234 $_{-2}$ 1 000 000

Number without decimals

Calculation operators

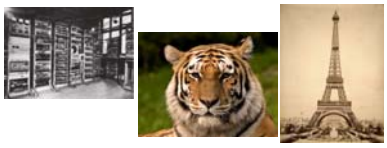
Class

Account
Balance
Owner
Deposit
Withdraw

Objects

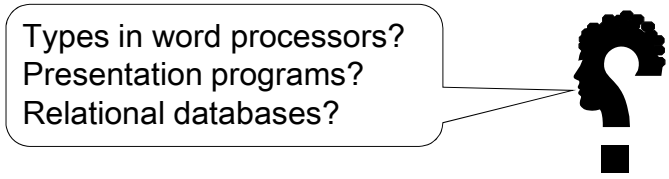
:Account
18 473.32
Kari

:Account
3 292.00
Ola

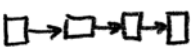
Type	Instances
jpg file type – Compresses image – Enables editing	
Heading 2 paragraph style – Determines layout – Enables ToC entry	**2.1. Learning IT skills** **2.2. Instruction sheets**

Selecting the type influences

- Information
  - Complete tiff
  - Loss, compression jpeg
- Business fit
  - Manipulate picture jpeg or tiff
  - Search through text pdf



Data structures



Sequence

Part followed by part

Grid (array, matrix)

Multi-dimensional sequences

Addressed by coordinates (indexes)

Hierarchy

Units inside each other

Aggregation: Whole-parts

Network

Linked parts without any strict topology

What is the structure of the file system?

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Functional dependency

- Data structures enable consistency
  - Data stored one place only
  - If the value of one component changes when the value of another component changes, the former is functionally dependent on the latter

Which mechanisms for achieving functional dependency are found in
•Office applications
•The web
•The operating system?

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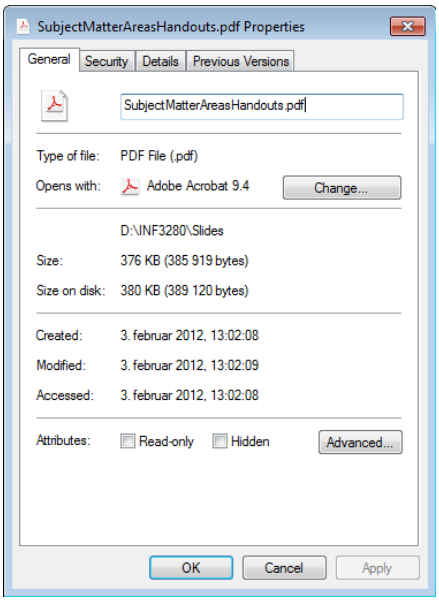
Structure: metadata – data **about** data



← Descriptive data
  - Derived from a file
- Constraining data
  - Specification of structures
    - Data Type Definitions – DTD
    - XML schema
  - Specification of format
    - Cascading Style Sheets – CSS
  - Catalogues in databases
    - Table of all tables