

Assignment 1:

Understanding Binary Data

KTI, Knowledge Technologies Institute

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Binary Data

- Data stored as Bits (0 , 1)
- Machine readable
- Lowest abstraction layer



```
010000100100110100100110
001001100000100000000000
000000000000000000000000
000000000011011000000000
...
```

Bits, Bytes and Words

Problem: We can't express a value using a single bit

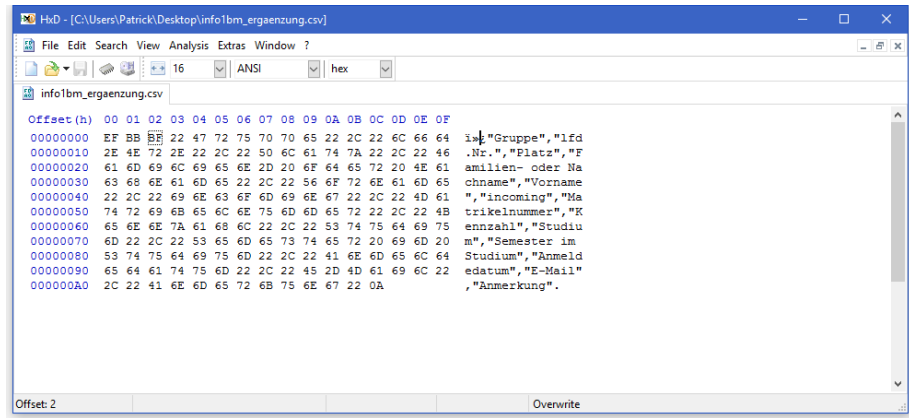
Solution: Group individual bits together

- by 8: byte
- 16, 32, or 64 bits: word (+ other sizes)

Example:

- 1 text character = 1 byte (2^8 values)
- "A" = 0100 0001(bin) = 41(hex)

Hex View of a CSV Document



HxD - [C:\Users\Patrick\Desktop\info1bm_ergaenzung.csv]

File Edit Search View Analysis Extras Window ?

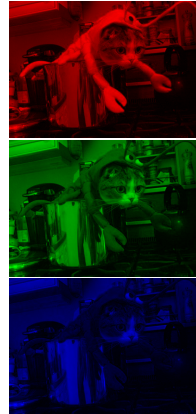
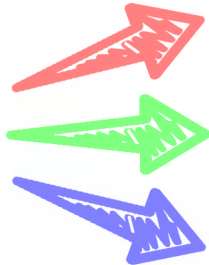
16 ANSI hex

info1bm_ergaenzung.csv

Offset(h)	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	
00000000	EF	BB	BF	22	47	72	75	70	70	65	22	2C	22	6C	66	64	i> "Gruppe", "lfd
00000010	2E	4E	72	2E	22	2C	22	50	6C	61	74	7A	22	2C	22	46	.Nr.", "Platz", "F
00000020	61	6D	69	6C	69	65	6E	2D	20	6F	64	65	72	20	4E	61	amilien- oder Na
00000030	63	68	6E	61	6D	65	22	2C	22	56	6F	72	6E	61	6D	65	chname", "Vorname
00000040	22	2C	22	69	6E	63	6F	6D	69	6E	67	22	2C	22	4D	61	", "incoming", "Ma
00000050	74	72	69	6B	65	6C	6E	75	6D	6D	65	72	22	2C	22	4B	trikelnnummer", "K
00000060	65	6E	6E	7A	61	68	6C	22	2C	22	53	74	75	64	69	75	ennzahl", "Studiu
00000070	6D	22	2C	22	53	65	6D	65	73	74	65	72	20	69	6D	20	m", "Semester im
00000080	53	74	75	64	69	75	6D	22	2C	22	41	6E	6D	65	6C	64	Studium", "Anmeld
00000090	65	64	61	74	75	6D	22	2C	22	45	2D	4D	61	69	6C	22	edatum", "E-Mail"
000000A0	2C	22	41	6E	6D	65	72	6B	75	6E	67	22	0A				", "Anmerkung".

Offset: 2 Overwrite

Storing Data



Storing Data – Serial or Parallel

Serial

R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	R
G	G	G	G	G	G	G	G	G	G	G	G
G	G	G	G	G	G	G	G	G	G	G	G
G	G	G	G	G	G	G	G	G	G	G	G
B	B	B	B	B	B	B	B	B	B	B	B
B	B	B	B	B	B	B	B	B	B	B	B
B	B	B	B	B	B	B	B	B	B	B	B


Parallel

R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B

Why do we need this?

1. Sensor data is often stored that way
2. Biomedical data is usually such sensor data
3. You will have to read biomedical data for Assignment 1
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Assignment Overview

- Load (open) source file
- Read data
- Store in better readable data-structure (provided!)
- Dump as pickle 
- Test your program
- Upload to the Palme