Federal Agency for
Cartography and Geodesy

## Session 7.2:

# Description of database characteristics

## V1

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# Content

## 7.2 Description of database characteristics – Database management

- Characteristics of databases
- Text file, Spreadsheet or Database?
- Data model – database modelling

# 1. Operating system

An operating system (OS) is a software program that manages the hardware and software resources of a computer. The OS performs basic tasks, such as controlling and allocating memory, prioritizing the processing of instructions, controlling input and output devices, facilitating networking, and managing files.

**Examples:**

- Microsoft Windows (proprietary)
- Linux (open source = free of charge and usage)

# 2. Database

One possible definition is that a database is a collection of records stored in a computer in a systematic way, so that a computer program can consult it to answer questions.

**Examples:**

- Microsoft Access, Oracle, etc. (proprietary)
- MySQL, PostGreSQL/PostGIS, etc. (open source)

# 3. Geographic Information System (GIS)

A **geographical information system** (GIS) is a system for creating, storing, analyzing and managing spatial data and associated attributes.

In a more generic sense, GIS is a tool that allows users to create interactive queries (user created searches), analyze the spatial information, and edit data.

**Examples:**

- ESRI ArcGIS, ViewMap, etc. (proprietary)
- Quantum GIS, etc. (open source)

# Characteristics of databases

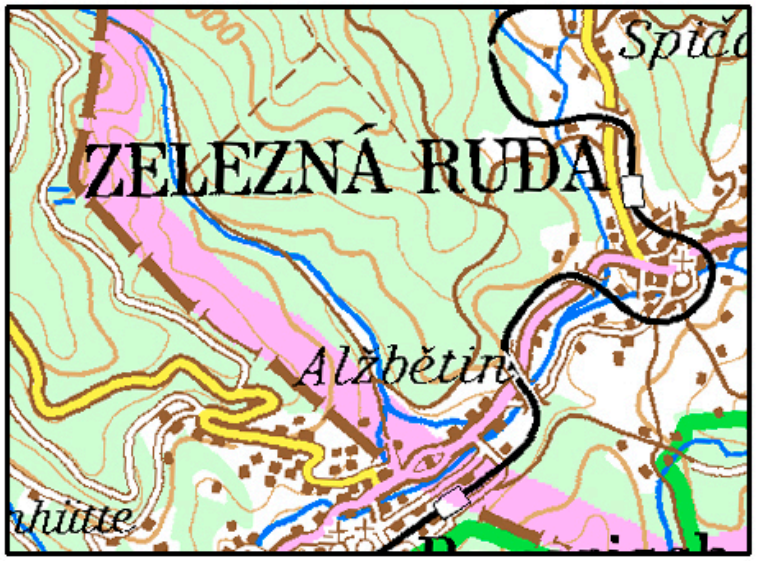
## e.g. Codepages!!!

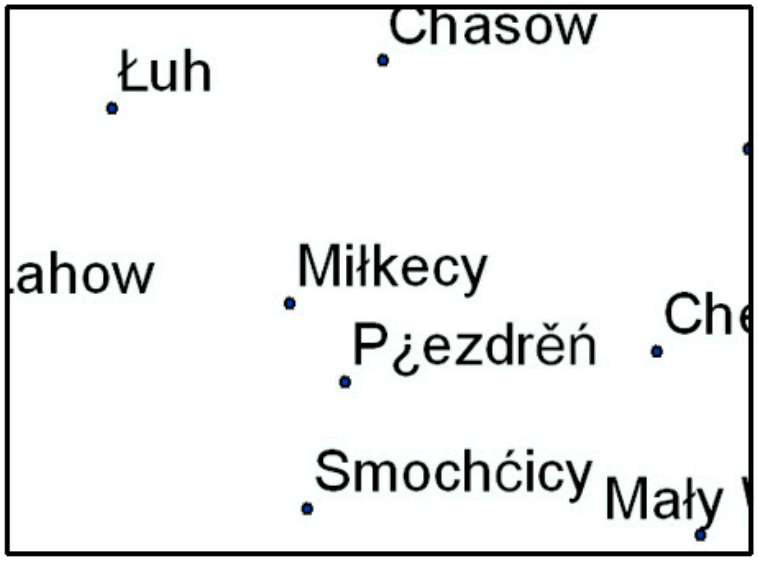
***ISO8859 character set*** or ***Unicode?***
in (Microsoft Windows) operating system

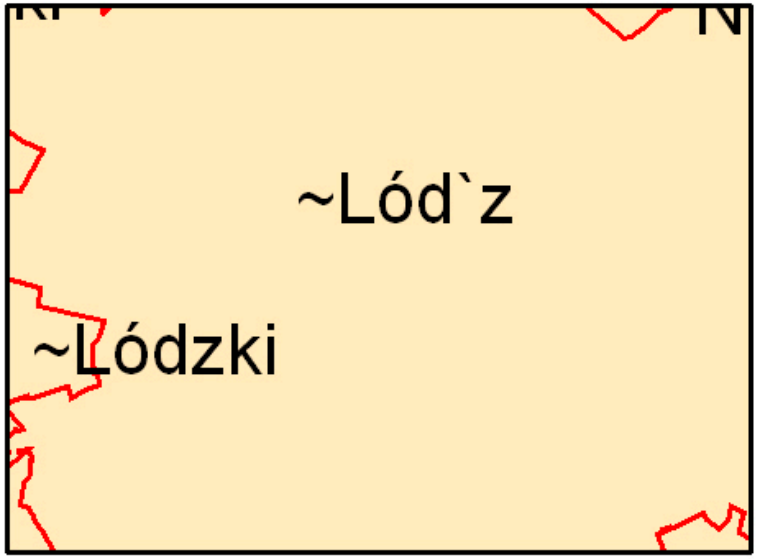
Different interpretation of characters possible in

- Database products: MS Access or similar
- GIS software:  ESRI ArcGIS or similar

# Characteristics of databases




# Characteristics of databases

- According to this codepage, the character “**B**” is displayed as decimal number 66

- **Examples of Codepages**:
  - **ASCII-Code** (American Standard Code for Information Interchange),
  - **ANSI-Code** (American National Standards Institute),
  - **ISO-Codepages**,
  - **Unicode**

## character B

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 32 | ! 33 | " 34 | # 35 | $ 36 | % 37 | & 38 | ' 39 | ( 40 | ) 41 | * 42 | + 43 | , 44 | - 45 | . 46 | / 47 |
| 30 | 0 48 | 1 49 | 2 50 | 3 51 | 4 52 | 5 53 | 6 54 | 7 55 | 8 56 | 9 57 | : 58 | ; 59 | < 60 | = 61 | > 62 | ? 63 |
| 40 | @ 64 | A 65 | B 66 | C 67 | D 68 | E 69 | F 70 | G 71 | H 72 | I 73 | J 74 | K 75 | L 76 | M 77 | N 78 | O 79 |
| 50 | P 80 | Q 81 | R 82 | S 83 | T 84 | U 85 | V 86 | W 87 | X 88 | Y 89 | Z 90 | [ 91 | \ 92 | ] 93 | ^ 94 | _ 95 |
| 60 | ` 96 | a 97 | b 98 | c 99 | d 100 | e 101 | f 102 | g 103 | h 104 | i 105 | j 106 | k 107 | l 108 | m 109 | n 110 | o 111 |
| 70 | p 112 | q 113 | r 114 | s 115 | t 116 | u 117 | v 118 | w 119 | x 120 | y 121 | z 122 | { 123 | \| 124 | } 125 | ~ 126 | • 127 |
| 80 | € 128 | • 129 | ‚ 130 | ƒ 131 | „ 132 | … 133 | † 134 | ‡ 135 | ˆ 136 | ‰ 137 | Š 138 | ‹ 139 | Œ 140 | • 141 | Ž 142 | • 143 |
| 90 | • 144 | ‘ 145 | ’ 146 | “ 147 | ” 148 | • 149 | – 150 | — 151 | ˜ 152 | ™ 153 | S 154 | › 155 | œ 156 | • 157 | ž 158 | Ÿ 159 |
| A0 | 160 | ¡ 161 | ¢ 162 | £ 163 | ¤ 164 | ¥ 165 | ¦ 166 | § 167 | ¨ 168 | © 169 | ª 170 | « 171 | ¬ 172 | - 173 | ® 174 | ¯ 175 |
| B0 | ° 176 | ± 177 | 2 178 | 3 179 | ´ 180 | µ 181 | ¶ 182 | · 183 | ¸ 184 | 1 185 | º 186 | » 187 | ¼ 188 | ½ 189 | ¾ 190 | ¿ 191 |
| C0 | À 192 | Á 193 | Â 194 | Ã 195 | Ä 196 | Å 197 | Æ 198 | Ç 199 | È 200 | É 201 | Ê 202 | Ë 203 | Ì 204 | Í 205 | Î 206 | Ï 207 |
| D0 | Đ 208 | Ñ 209 | Ò 210 | Ó 211 | Ô 212 | Õ 213 | Ö 214 | × 215 | Ø 216 | Ù 217 | Ú 218 | Û 219 | Ü 220 | Ý 221 | Þ 222 | ß 223 |
| E0 | à 224 | á 225 | â 226 | ã 227 | ä 228 | å 229 | æ 230 | ç 231 | è 232 | è 233 | ê 234 | ë 235 | ì 236 | í 237 | î 238 | ï 239 |
| F0 | ð 240 | ñ 241 | ò 242 | ó 243 | ô 244 | õ 245 | ö 246 | ÷ 247 | ø 248 | ù 249 | ú 250 | û 251 | ü 252 | ý 253 | þ 254 | ÿ 255 |

# Characteristics of databases

Data Capture

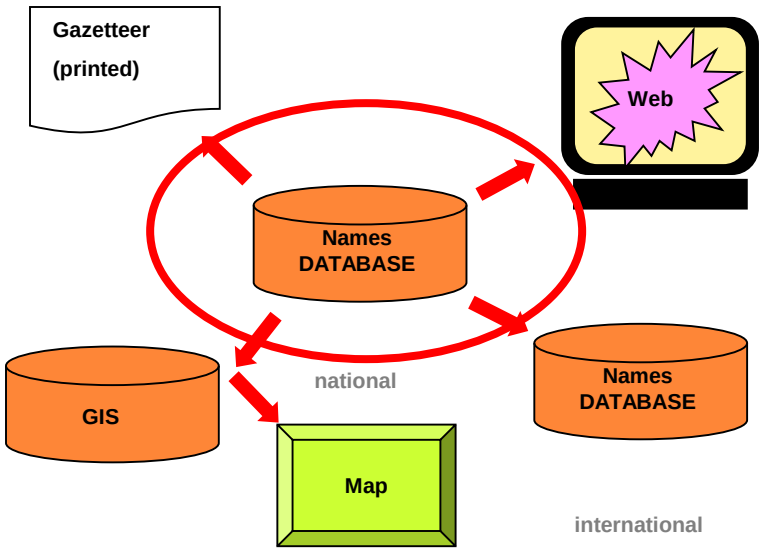
from cards, lists, books, fieldwork, maps, other databases, ....

Data Storage

in a database

Data Processing

Data Output



# Text file, Spreadsheet or Database?

Explanations and short demos to be arranged by Pier-Giorgio

# Text file, Spreadsheet or Database?

1) Text file
(software: e.g. Microsoft Word)

*advantage*: easy to print

*disadvantages*:
very limited capabilities in digital processing,
not suitable for large amount of data

# Text file, Spreadsheet or Database?

2) Spreadsheet
(software: e.g. Microsoft Excel)

*advantage*:
extended processing capabilities

*disadvantage*:
digital processing limited to operations within the spreadsheet

# Text file, Spreadsheet or Database?

3) Database
(software: e.g. Microsoft Access)

*advantages*:
data can be connected with other databases,
complex processing capabilities

*disadvantages*:
some programming and/or user skills required

# Data model – database modelling

## INSPIRE GN schema: elements

**mandatory**

- name(s) (text, spelling)
- geomety
- feature type
- unique identifier

**‘voidable’**

- language {three letter codes from ISO 639-3 or -5}
- nameStatus {official, standardised, historical, other}
- link to relatedSpatialObject
- script {four letters codes defined in ISO 15924}
- nativeness {endonym, exonym}
- transliterationScheme
- grammatical gender {masc., fem., neuter, common}
- grammatical number {singular, plural, dual}
- pronunciation
- sourceOfName
- typeLocal
- lifeCycleInfo (begin/end of the object in the source DB)
- …

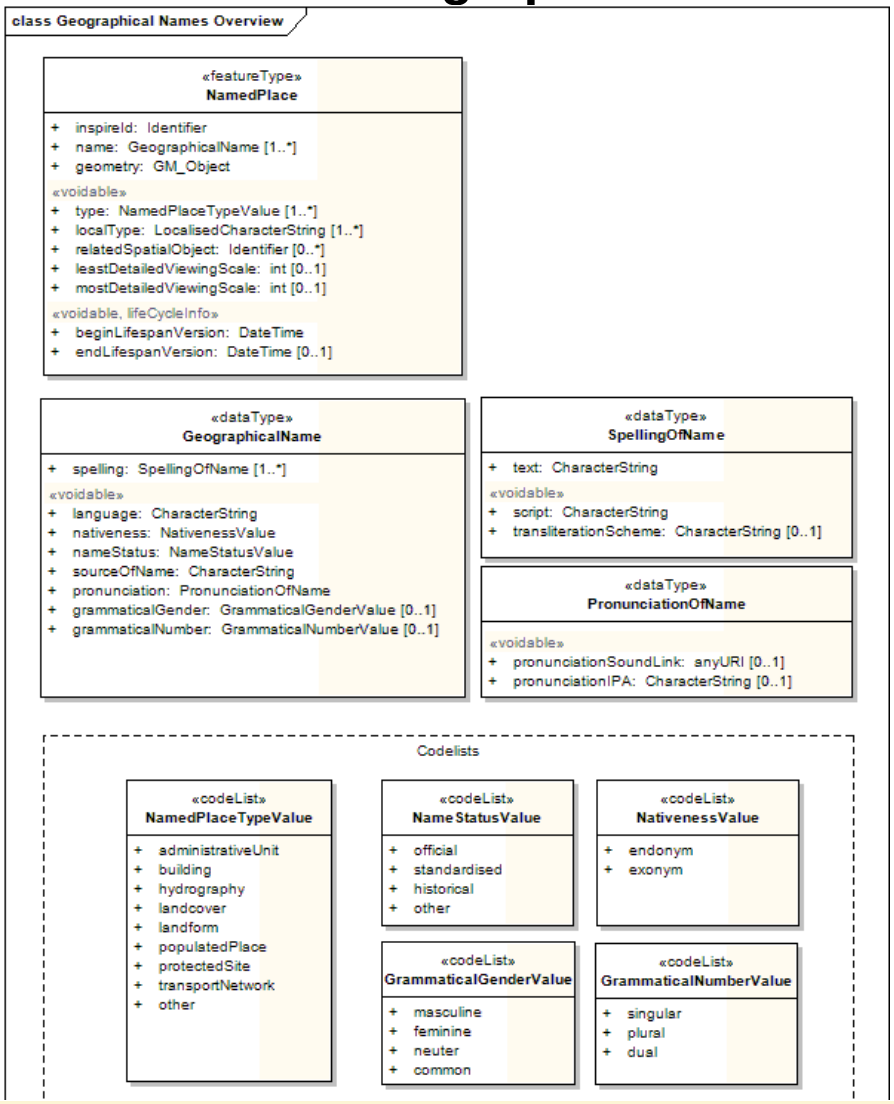
# Data model – database modelling

## INSPIRE Geographical Names – UML Schema v3.1


UML = Unified Modelling Language

# Data model – database modelling

## INSPIRE Geographical Names – UML Schema




***A <u>Named Place</u>***,
representing a real world entity referred to by a Geographical Name
e.g "the City of Athens" type = built-up area
geometry = {X, Y}

***is associated with one or several <u>Geographical Names</u>***,
i.e. proper noun applied to the feature

(1) "Athína" language = Greek
nativeValue = Endonym
(2) "Athens" language = English
nativeValue = Exonym

***and may have one or several <u>Spellings of Name.</u>***
i.e. proper way of writing the name

(1.1) text = **Aθnva**
script = Greek
(1.2) text = **Athína**
script = Latin

(2.1) text = **Athens**
script = Latin

# Data model – database modelling

## Geographical names in production database – GN-DE

## Example: 1 spatial object/feature → *Bautzen/Budyšin*

GNObjekt

| nnid | landescode | beschreibung | geolaenge | geobreite | hoehe | groesse | ewz | rs | objektartlink_id |
|---|---|---|---|---|---|---|---|---|---|
| DEBKGGND00000IUD | 276 | | 142539 | 511051 | 220 | 67 | 42131 | 146250000020 | 22 |

Endonym

| nnid | name | geschlecht | sprache_id | status_id |
|---|---|---|---|---|
| DEBKGGND00000IUD | Bautzen | | 1 | 1 |
| DEBKGGND00000IUD | Budyšin | | 2 | 1 |

DLMLink

| nnid | ui_id | modell_id | layer_id |
|---|---|---|---|
| DEBKGGND00000IUD | DEBKGDL200000WJK | 1 | 12 |
| DEBKGGND00000IUD | DEBKGDL2000015N8 | 1 | 13 |

PLZ

| nnid | plz |
|---|---|
| DEBKGGND00000IUD | 02625 |

Status 1 = amtlich

Sprache 1 = Deutsch
Sprache 2 = Sorbisch

**Entities for both languages**
"Bautzen" (German) and "Budyšin" (Sorbian)