Lab II

Representation of Reality

Database Laboratory
• For each object in reality about which we want to have information we define a relation whose attributes denote the most significant properties of these objects (code, name, …) in such a way that each tuple which is present in this relation must be interpreted as a particular instance of an object;

• In order to represent associations between objects we use explicit references through attributes which identify each object.
Interpretation of a Database Schema
- GEOGRAPHICAL INFORMATION

RIVER (rcod: d_rcod, name: d_nom, length: d_long, mcod: d_mcod)
  PK: {rcod}
  FK: {mcod} -> SEA
SEA (mcod: d_mcod, name: d_nom, details: d_det)
  PK: {mcod}
PROVINCE (pcod: d_pcod, name: d_nom, extension: d_ext)
  PK: {pcod}
CROSSES (rcod: d_rcod, pcod: d_pcod, km: d_km)
  PK: {pcod,rcod}
  FK: {pcod} -> PROVINCE
  FK: {rcod} -> RIVER
LIMITS_WIH (pcod1: d_pcod, pcod2: d_pcod)
  PK: {pcod1,pcod2}
  FK: {pcod1} -> PROVINCE
  FK: {pcod2} -> PROVINCE
Intepretation. Examples

- GEOGRAPHICAL INFORMATION

- PROVINCE
  - pcod
  - name
  - extension

- LIMITS_WITH
  - pcod1
  - pcod2

- CROSSES
  - rcod
  - pcod
  - km

- RIVER
  - rcod
  - name
  - length
  - mcod

- SEA
  - mcod
  - name
  - details
**Intepretation. Examples**

- **COMPANY**

  **SUPPLIER** (vcod: d_vcod, name: d_nom1, city: d_ciu)
  
  PK:{vcod}

  **PIECE** (zcod: d_zcod, name: d_nom2, colour: d_colour, weight: d_weight, city: d_ciu)
  
  PK:{zcod}

  **PROJECT** (ycod: d_ycod, name: d_nom3, city: d_ciu)
  
  PK: {ycod}

  **ORDER** (vcod: d_vcod, zcod: d_zcod, ycod: d_ycod, quant: d_quant)
  
  PK:{vcod, zcod, ycod}

  FK:{vcod} -> SUPPLIER

  FK:{zcod} -> PIECE

  FK:{ycod} -> PROJECT
Interpretation. Examples

• COMPANY

PIECE
zcod
name
colour
weight
city

ORDER
vcod
zcod
ycod
quant

SUPPLIER
vcod
name
city

PROJECT
ycod
name
city
Interpretation. Examples

• LIBRARY:

**USER** (scod: d_scod, name: d_nom, address: d_dir)
  PK: {scod}

**BOOK** (lcod: d_lcod, title: d_tit, author: d_author, topic: d_topic)
  PK: {lcod}
  FK: {topic} -> topic

**HAS_READ** (scod: d_scod, lcod: d_lcod)
  PK: {scod, lcod}
  FK: {scod} -> user
  FK: {lcod} -> book

**TOPIC** (topic: d_topic, description: d_desc)
  PK: {topic}

**FIELD** (topic: d_topic, subtopic: d_topic)
  PK: {topic, subtopic}
  FK: {topic} -> topic
  FK: {subtopic} -> topic
Intepretation. Examples

- LIBRARY:
  - BOOK
    - lcod
    - title
    - author
    - topic
  - HAS_READ
    - lcod
    - scod
  - TOPIC
    - topic
    - description
  - USER
    - scod
    - name
    - address
  - FIELD
    - topic
    - subtopic
Intepretation. Examples

• RECORD COLLECTION:

**COMPOSER** (comp_name: d_name, year: d_year, country: d_country)
  PK: {comp_name}

**CONDUCTOR** (cond_name: d_name, year: d_year, biography: d_bio)
  PK: {cond_name}

**WORK** (word_cod: d_work_cod, title: d_title, year: d_year, comp_name: d_name)
  PK: {work_cod}
  FK: {comp_name} -> COMPOSER

**DISC** (ref: d_ref, name: d_name, year: d_year, company: d_comp)
  PK: {ref}

**IS_IN** (workd_cod: d_work_cod, ref: d_ref, cond_name: d_name)
  PK: {work_cod, ref}
  FK: {work_cod} -> WORK
  FK: {ref} -> DISC
  FK: {cond_name} -> CONDUCTOR
Intepretation. Examples

- RECORD COLLECTION:

  - DISC
    - ref
    - name
    - company

  - CONDUCTOR
    - cond_name
    - year
    - biography

  - WORK
    - work_cod
    - ref
    - cond_name

  - IS_IN
    - work_cod
    - ref
    - cond_name

  - COMPOSER
    - comp_name

    - year
    - country
Intepretation. Examples

• TRAVEL AGENCY:

TRIP: d_code, date: d_date, price: d_pri, dni_g: d_dni)
   PK: {code}
   FK: {dni_g} -> GUIDE
   NNV: {date}
GUIDE(dni_g: d_dni, name: d_name, language: d_lan, age: d_age)
   PK: {dni_g}
DRIVER(dni: d_dni, name: d_name, address: d_ad, age: d_age, gender: d_gen)
   PK: {dni}
CITY(city_name: d_name1, history: d_his, inhabitants: d_inh)
   PK: {city_name}
VISIT(code: d_code, city_name: d_nom1)
   PK: {code, city_name}
   FK: {code} -> TRAVEL
   FK: {city_name} -> CITY
DRIVES(dni: d_dni, code: d_code)
   PK: {dni, code}
   FK: {code} -> TRAVEL
   FK: {dni} -> DRIVER
Interpretation. Examples

• TRAVEL AGENCY:

CITY
  - city_name
  - history
  - inhabitants

DRIVER
  - dni
  - name
  - address
  - age
  - gender

VISIT
  - cod
  - nom_ciu

DRIVES
  - cod
  - dni

TRIP
  - cod
  - fecha
  - precio
  - dni_g

GUIDE
  - dni
  - name
  - idioma
  - edad
Modelling of Reality

Reality

Design / Modelling

Representation of Reality

D.B.
Modelling (examples)

CICLISMO

Objects: EQUIPO, CICLISTA, PUERTO, MAILLOT, ETAPA

For each EQUIPO (TEAM): name ("nombre"), the coach ("director") and the racers ("ciclistas") who compose the team.

For each CICLISTA (RACING CYCLIST): "dorsal" number (cyclist number assigned to the cyclist during the race), name, age, name of the team he belongs to, stages ("etapas") he has won, mountain passes ("puertos") he has gone through on the first position and the maillots ("maillots") which has worn in each stage.

For each PUERTO (MOUNTAIN PASS): name, maximum height, category ("1ª", "especial", ...), slope ("pendiente"), stage where it is located and the cyclist who has passed it on first position.

For each MAILLOT (JERSEY): maillot code, prize level of the maillot ("tipo"), colour, prize for wearing it ("premio") and cyclists who have worn it.

For each ETAPA (STAGE): stage number, length of the stage in kms, departure city ("salida"), arrival city ("llegada") and the cyclist who has won the stage.
Modelling (examples)

CICLISMO

EQUIPO
\[d_eq, d_nom\]
\[nomeq\]

CICLISTA
\[d_dor, d_nom, d_edad, d_eq\]
\[dorsal\]
\[nombre\]
\[edad\]
\[nomeq\]

ETAPA
\[d_nº, d_km, d_ciu, d_dor\]
\[netapa\]
\[dorsal\]

PUERTO
\[d_nom, d_alt, d_cat, d_pen, d_nº, d_dor\]
\[nompuerto\]
\[netapa\]

MAILLOT
\[d_cod, d_tipo, d_pre, d_col\]
\[codigo\]

LLEVAR
\[integer, d_nº, d_tipo\]
\[netapa\]
\[dorsal\]
\[codigo\]
Modelling (examples)

MUSIC

Objects: COMPAÑÍA, DISCO, GRUPO, ARTISTA, CANCIÓN, CLUB

For each COMPAÑÍA (COMPANY): code, name, address ("dirección"), fax, telephone and discs which have been published by the company.

For each DISCO (DISC): code, name, date, company which publishes the disc, group that has recorded the disc and the songs it contains.

For each GRUPO (GROUP): code, name, date in which the group was created, country ("país"), artists who compose the group, company that has published it and fans club.

For each ARTISTA (ARTIST): dni, name and group that s/he belongs to.

For each CANCIÓN (SONG): code, title, duration and disc where it is found.

For each CLUB (FAN CLUB): code, name, main office ("sede"), number of fans and group which they admire.
Modelling (examples)

“MUSIC”

**CANCIÓN** (cod: d_can, título: d_tit, duración: d_dur)
- CP: {cod}
- VNN: {título}

**COMPAÑÍA** (cod: d_comp, nombre: d_nom, dir: d_dir, fax: d_tel, tfno: d_tel)
- CP: {cod}
- VNN: {nombre}

- CP: {cod}
- CAj: {cod_comp} → COMPAÑÍA
- VNN: {cod_comp}
- CAj: {cod_gru} → GRUPO
- VNN: {cod_gru}

**ESTÁ** (can: d_can, cod: d_dis)
- CP: {can, cod}
- CAj: {can} → CANCIÓN
- CAj: {cod} → DISCO
Modelling (examples)

“MUSIC” (cont.)

**GRUPO**(cod: d_gru, nombre: d_nom, fecha: d_fecha, pais: d_pais)
   CP: {cod}
   VNN: {nombre}
**ARTISTA**(dni: d_dni, nombre: d_nom)
   CP: {dni}
   VNN: {nombre}
**CLUB**(cod: d_club, nombre: d_nom, sede: d_dir, num: d_num, cod_gru: d_gru)
   CP: {cod}
   CAj: {cod_gru} → GRUPO
   VNN: {cod_gru}
   VNN: {nombre}
**PERTENECE**(dni: d_dni, cod: d_gru, funcion: f_fun)
   CP: {dni, cod}
   CAj: {dni} → ARTISTA
   CAj: {cod} → GRUPO
Modelling (examples)

“LIBRARY”

Objects: AUTOR, LIBRO, TOPIC, WORK, AMIGO

For each AUTOR ("author"): author's identifier, name, nationality and works ("obras") s/he has written.

For each OBRA ("work"): code of the work, title, year, area, author and works in which it is included.

For each TEMA ("topic"): identifier of the topic and a brief description.

For each LIBRO ("book"): identifier of the book, title, year, works it contain and its number, and the friends who have borrowed it.

For each AMIGO ("friend"): identifier number, name, telephone and books s/he has borrowed.
Modelling (examples)

“LIBRARY”

**AUTOR** (autor_id: string(4), nombre: string(35), nacionalidad: string(20))
  Clave Primaria: {autor_id}

**LIBRO** (id_lib: string(10),titulo: string(80), año: integer, num_obras: integer)
  Clave Primaria: {id_lib} VNN: {titulo}

**TEMA** (tematica: string(20), descripcion: string(50))
  Clave Primaria: {tematica}

**OBRA** (cod_ob: integer, titulo: string(80), año: d_cat, tematica: string(20))
  Clave Primaria: {cod_ob}
  Clave Ajena: {tematica} → TEMA
  Valor No Nulo: {titulo}

**AMIGO** (num: integer, nombre: string(60), telefono: string(10))
  Clave Primaria: {num}
  Valor No Nulo: {nombre}
Modelling (examples)

LIBRARY

PRÉSTAMO(num: integer, id_lib: string(10))

Clave Primaria: {num,id_lib}
Clave Ajena: {num} → AMIGO
Clave Ajena: {id_lib} → LIBRO

ESTÁ_EN(cod_ob: integer, id_lib: string(10))

Clave Primaria: {cod_ob,id_lib}
Clave Ajena: {cod_ob} → OBRA
Clave Ajena: {id_lib} → LIBRO

ESCRIBIR(cod_ob: integer, autor_id: string(4))

Clave Primaria: {cod_ob,autor_id}
Clave Ajena: {cod_ob} → OBRA
Clave Ajena: {autor_id} → AUTOR