Based on handout:

Adaptable methodology for database design
by N. Roussopoulos and R.T. Yeh, IEEE Computer Vol. 17, no. 5, pp. 64-80. 1984

Goal

- Given an English description of an enterprise
- build a system to automate it and
- produce the documentation

In diagram form
- tasks
- documents
Requirement analysis

Turn English description into top level information flow diagram, where

- boxes -> documents (~ db tables)
- ovals -> tasks (= db programs)

Important: system boundary

Running example - ‘Mini-U’

- Students register
- Students enroll in courses
- Students ask for transcripts
- Administrator records grades
- Every semester: print class lists

Top level inf. flow diagram
System boundary

- internal documents -> db tables
- tasks -> db programs
- tasks: internal only

More on top level diagram

Example - Mini-U

- Students register
- Students enroll in courses
- Students ask for transcripts
- Administrator records grades
- every semester: print class rosters
Document + Task forms

Top level diagram: only half of the info - we also need:
- Document forms and document list
- Task forms and task list
Document list

- D1: registration form
- D2: enrollment form
- ...
- D7: student record
- D8: class record

Document forms

- D1: registration
  - ssn
  - name
  - address
- D2: enrollment
  - ssn
  - name
  List-of:
  - course id
  - course name

Document forms - cont’d

- D3: transcript request form
  - ssn
  - name

Document forms - cont’d

(Internal documents - VERY IMPORTANT)

- D4: transcript
  - ssn
  - name
  List-of:
  - class-id
  - class name
  - grade

- D7: student record
  - ssn
  - name
  - address
Document forms - cont’d

D8: class record
- class-id
- class-name
- syllabus
- List-of
  - ssn
  - grade

• IMPORTANT POINTS
  - avoid redundancy in internal documents: ie.,
    grades should be stored in ONE place only
  - there are many, different, correct solutions

Task List

• T1: Registration
• T2: Enrollment
• T3: Transcript
• ...

Task forms

• As in [R+Y]
• not required for this homework
• sub-tasks: probably there won’t be any
  - otherwise: ~3-7 sub-tasks per task
Database schema - E-R

- from the **internal** documents
- use their forms
  - “List-of” constructs -> relationships

Eg., for ‘Mini-U’:
- D7: Student record (ssn, name, address)
- D8: Class record (c-id, …, List-of … )

E-R diagram for Mini-U

![E-R diagram for Mini-U](image)

Relational schema

```
student(ssn, name, address)
class(c-id, c-name, syllabus)
takes(c-id, ssn, grade)
```

Make sure that
- Primary keys are underlined;
- tables are in BCNF (or 3NF at worst)
SQL DDL statements

create table student (ssn char(9), ...);
create table class (c-id char(5), ...);
...

Task emulation

T1: Registration
   read ssn, name and address
   if ( ssn does not exist in ‘student’){
      insert into student values ( :ssn, :name, :address);
   } else{print “error: duplicate ssn”}
Testing

- For T1 (registration), we check
  - duplicate ssn
  - ssn with 9 digits
- For T2 (enrollment) we check
  - for valid ssn (9 digits)
  - for registered ssn
  - for valid c-id
  - for duplicate (ssn, c-id) entry

User’s manual

Short (~1 page or less) - eg.,:

- copy myproject.tar
- do ‘make’
- follow the menu

<anything else the user should know, like OS, space requirements, etc etc>

Important points for Phase-I

- No redundancy in the fields of internal documents
- don’t forget the system boundary
- make sure the top level diagram agrees with the internal document forms
- explain if/when we deviate from BCNF