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Faculty of Information Technology

Data Design

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Software Analysis and Design

Using Relational Database?

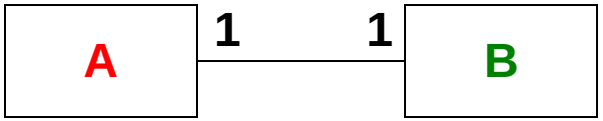
Rule #1

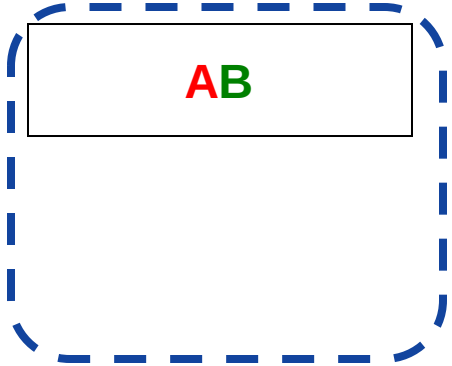
- A class is mapped to a table

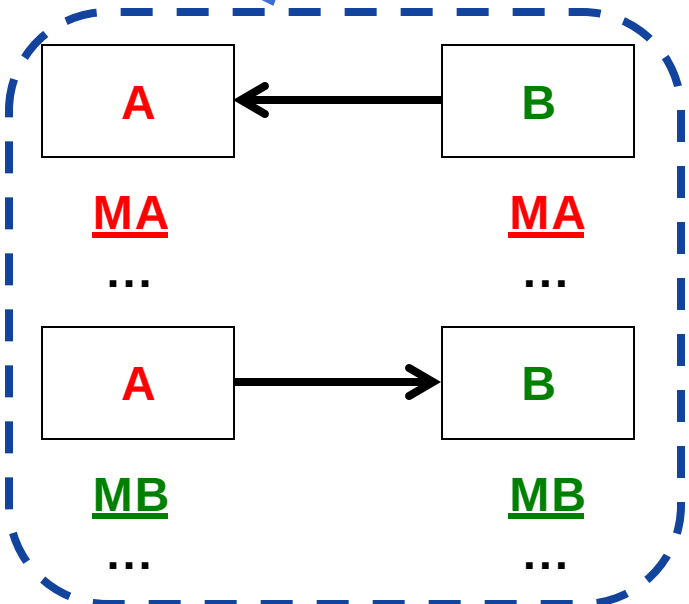
Examples?

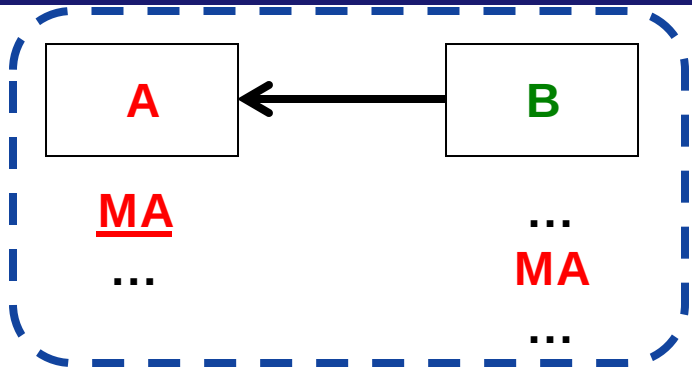
Rule #2

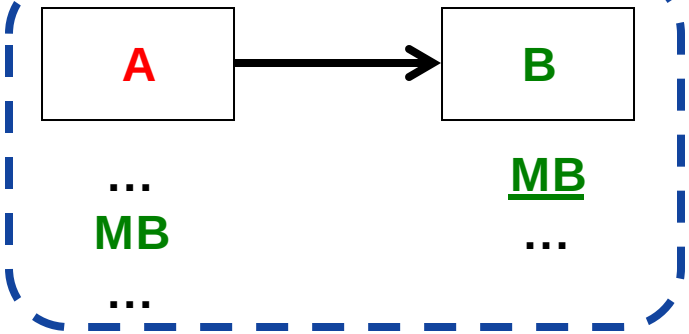
- One-to-one relationship

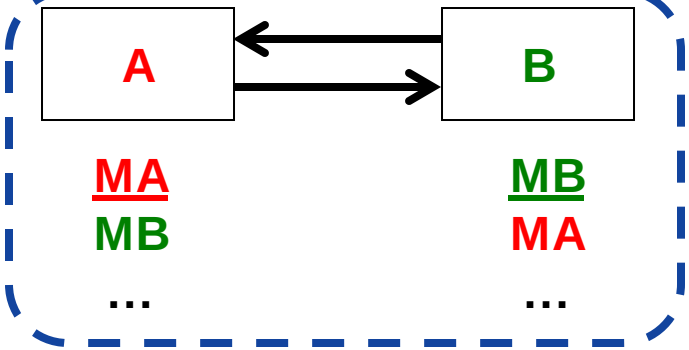








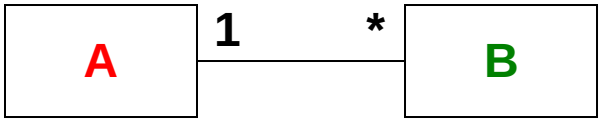


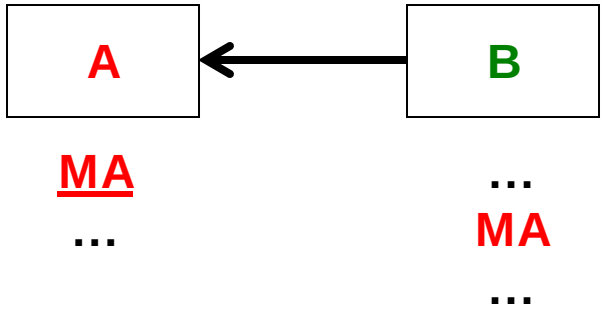


Examples?

Rule #3

- One-to-many relationship

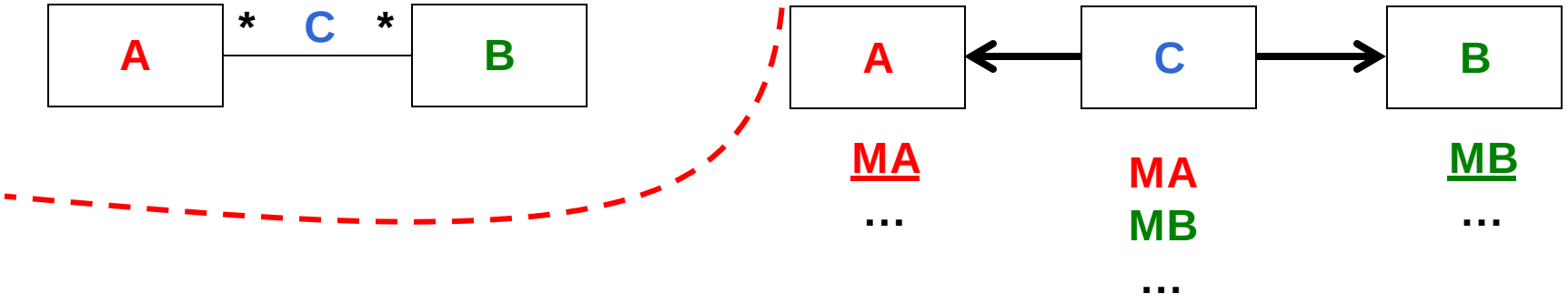




Examples?

Rule #4

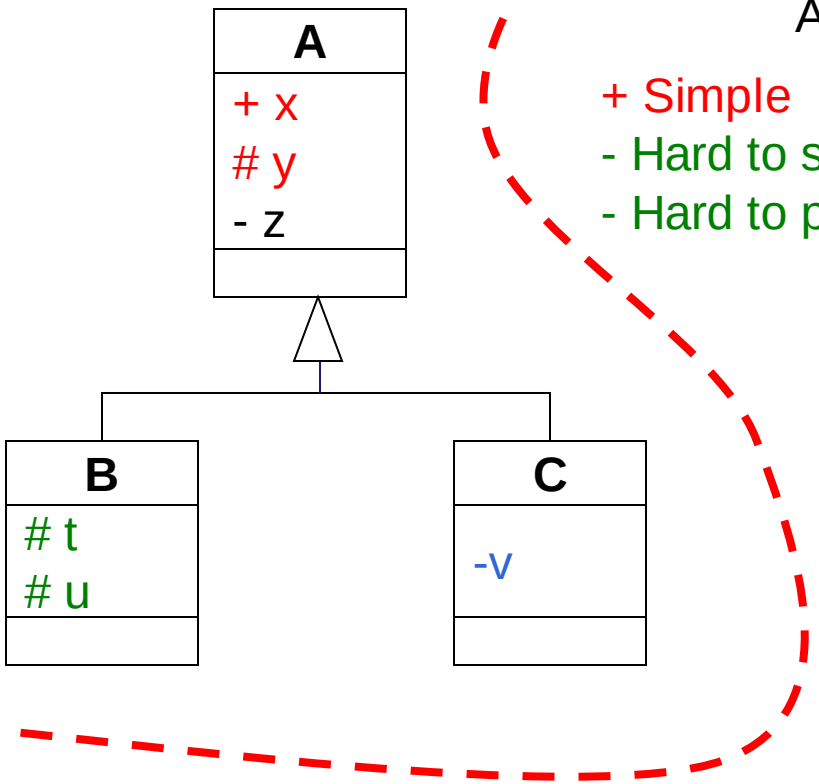
❖ Many-to-many relationship



✍ Examples?

Rule #5

❖ Generalization



A	B	C

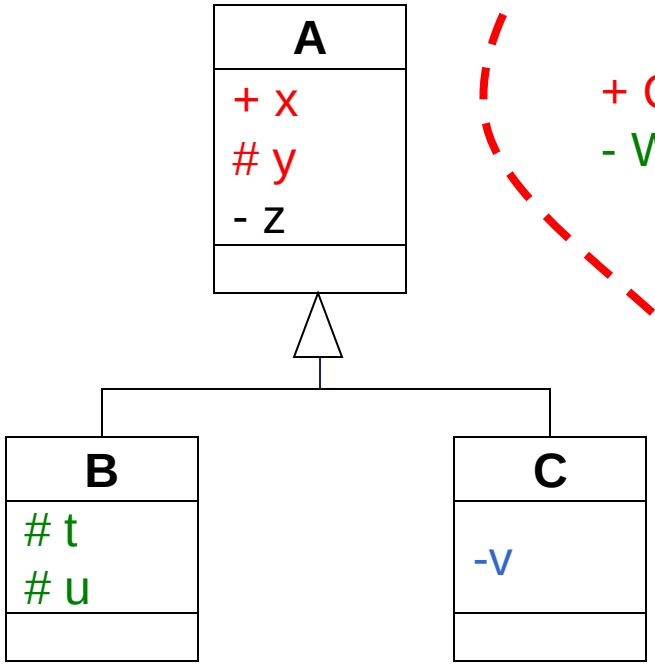
A(MA, x, y, z) B(MB, x, y, t, u) C(MC, x, y, v)

+ Simple
- Hard to see the relationships between entities of A, B, C
- Hard to process general queries

✍ Examples?

Rule #5

❖ Generalization



A

A(M, Type, x, y, z, t, u, v)

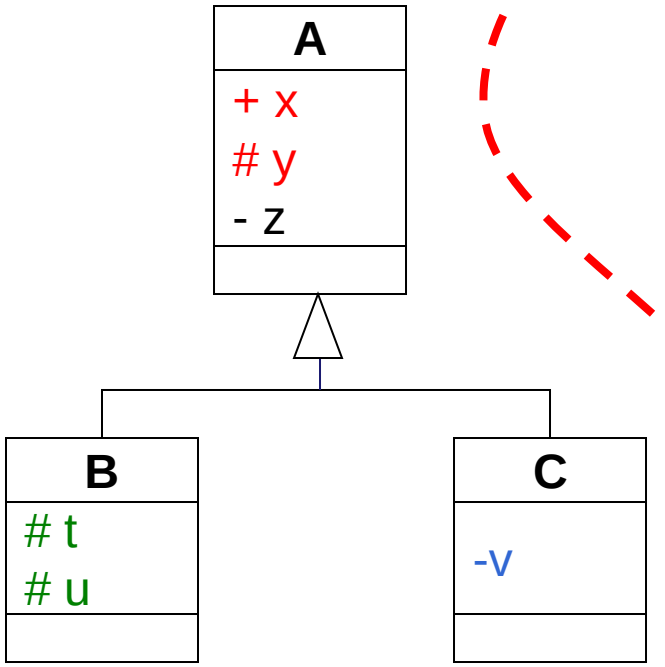
+ Overview of all entities of different subtypes
- Waste of storage

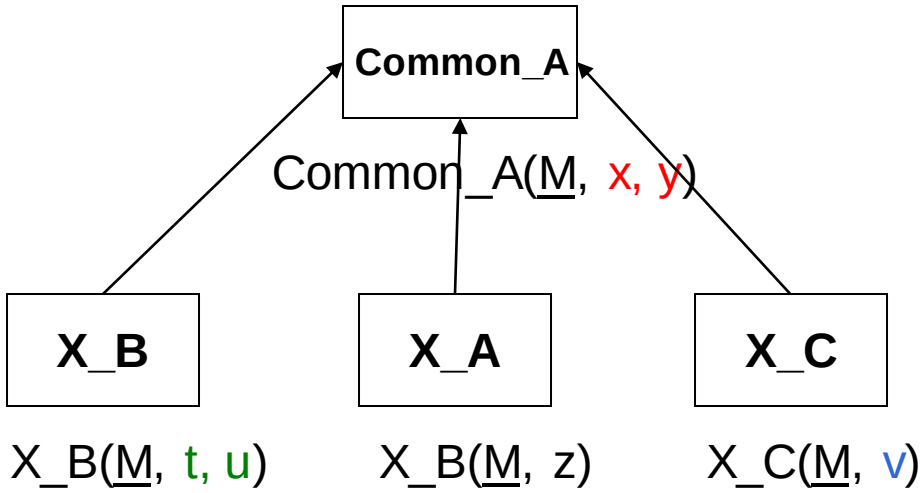
Type	x	y	z	t	u	v
A						
B						
C						

Examples?

Rule #5

❖ Generalization





+ Efficient storage
+ Overview of all entities
- Complexity

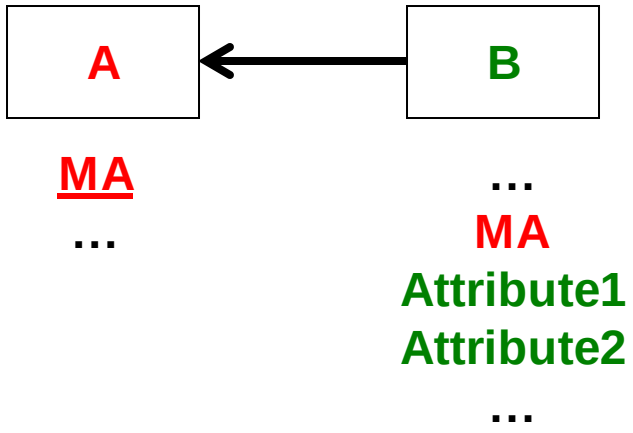
Examples?

Rule #6

- A class with a structured attribute

```
class A
{
…
    B     x;
…
}
```

Structure of B:
Attribute 1
Attribute 2
…

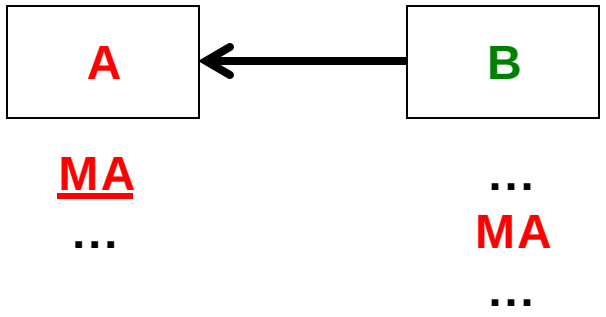


Examples?

Rule #7

- A class with an attribute as an array/set/bag/list

```
class A
{
…
    B[]     x;
…
}
```



Examples?

Rule #8

- Discrete values: Create a new table for a list of categories
  - Examples?

Rule #9

- Parameters
  - Type 1

PK	Param#1	Param#2	…	Param#N
…	…	…	…	…

Each parameter corresponds to a column in Parameters
Parameters: only one record (row) to store the current values of parameters

? Add a new parameter?
Disable a parameter?

Rule #9

- Parameters
  - Type 2

Stored as a string

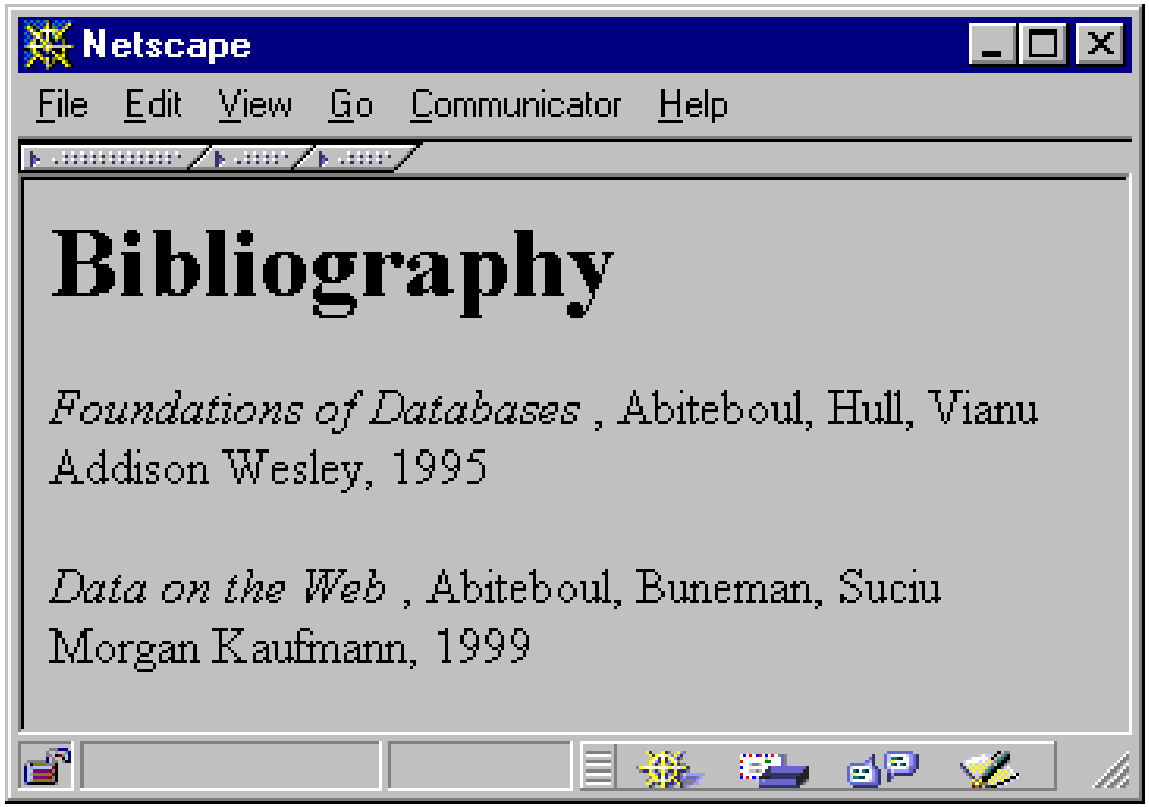
ParamID	ParamName	Type	Value	Status
…	…	…	…	…

Each parameter is a single record (row) in Parameters
The current value of a parameter is stored as a string
Parameter values are stored as strings and the application must "interpret" exactly the current values of parameters.

? Add a new parameter?
Disable a parameter?

Data as XML?

HTML vs XML



HTML specifies how to display/present

HTML

```
<h1> Bibliography </h1>
<p> <i> Foundations of Databases </i>
        Abiteboul, Hull, Vianu
        <br> Addison Wesley, 1995
<p> <i> Data on the Web </i>
        Abiteoul, Buneman, Suciu
        <br> Morgan Kaufmann, 1999
```

XML

```
<bibliography>
    <book>
        <title> Foundations… </title>
        <author> Abiteboul </author>
        <author> Hull </author>
        <author> Vianu </author>
        <publisher> Addison Wesley </publisher>
        <year> 1995 </year>
    </book>
    …
</bibliography>
```

XML specifies content

XML

```
<bibliography>
    <book>
        <title> Foundations… </title>
        <author> Abiteboul </author>
        <author> Hull </author>
        <author> Vianu </author>
        <publisher> Addison Wesley </publisher>
        <year> 1995 </year>
    </book>
    …
</bibliography>
```

Start tag

End tag

XML

```
<bibliography>
        <book>
                <title> Foundations… </title>
                <author> Abiteboul </author>
                <author> Hull </author>
                <author> Vianu </author>
                <publisher> Addison Wesley </publisher>
                <year> 1995 </year>
        </book>
        …
</bibliography>
```

Basic Concepts on XML

- tag: book, title, author, …
- start tag: <book>, end tag: </book>
- element: <book>…<book>,<author>…</author>
- Nested element
- Empty element : <red></red> hay <red/>
- Each XML document has a unique *root element*

"Well formed" document?

XML: Attribute

```
<book price = “55” currency = “USD”>
   <title> Foundations of Databases </title>
   <author> Abiteboul </author>
    …
   <year> 1995 </year>
</book>
```

Relational Database vs XML

In-class Discussion

- Relational Database
- Advantages

- Disadvantages

- Should be used in…

- XML
- Advantages

- Disadvantages

- Should be used in…