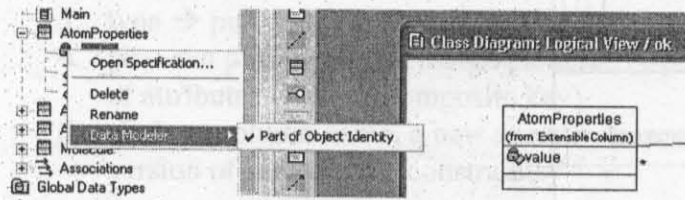


## Detailing Keys, Indexes and Constraint in Rose

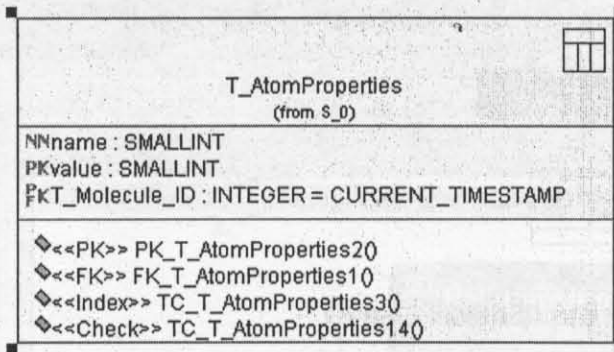
1) An attribute may be assigned to be the primary key at the logical/object model:



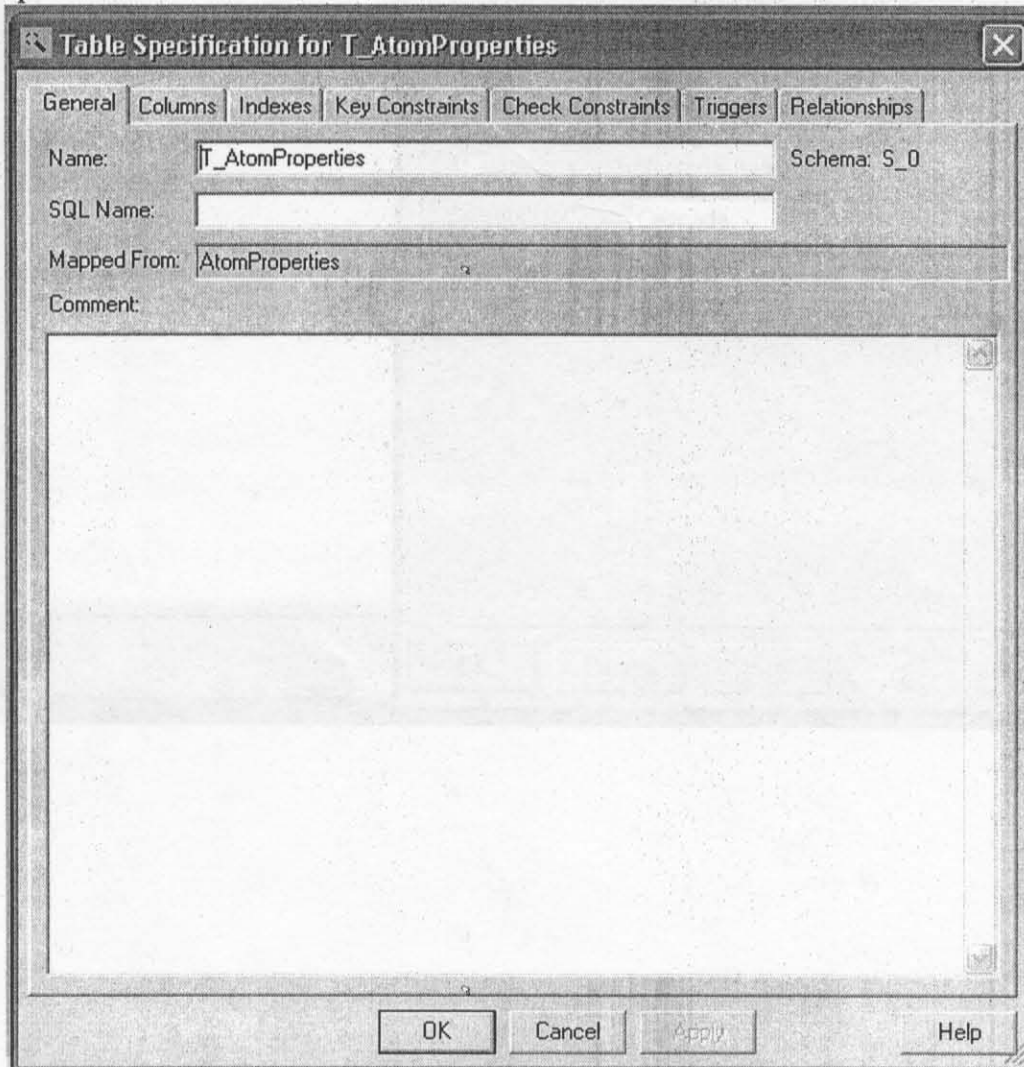
➤ select the attribute in the tree view

- right click -> data modeler -> part of object identity

2) Once a logical model is compiled there is a specification for physical/data model  
i.e. double click on these diagrams



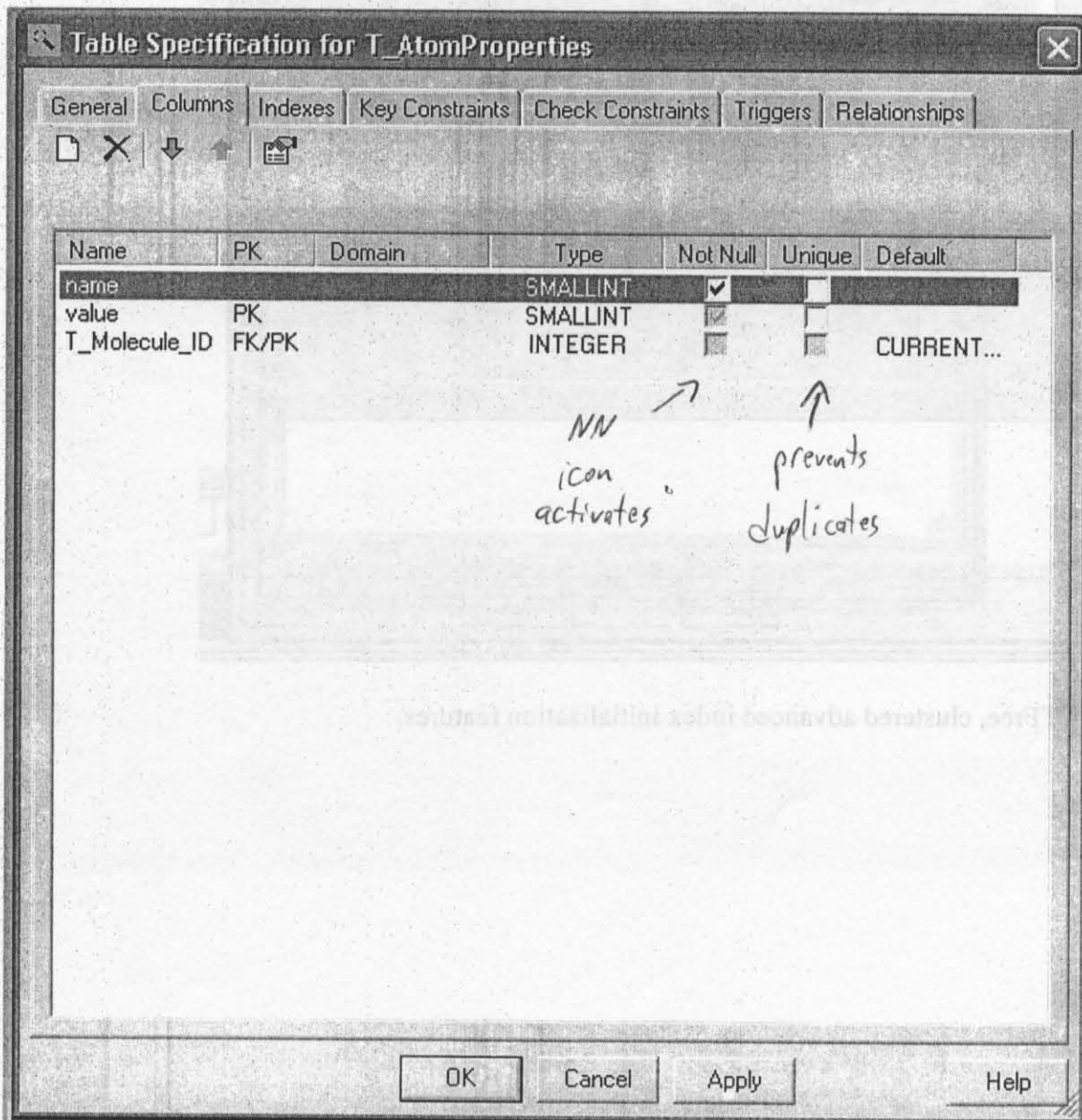
and an dialog box opens up with many tabs providing the ability to add considerable specification



### 3) column tab;

From right to left –

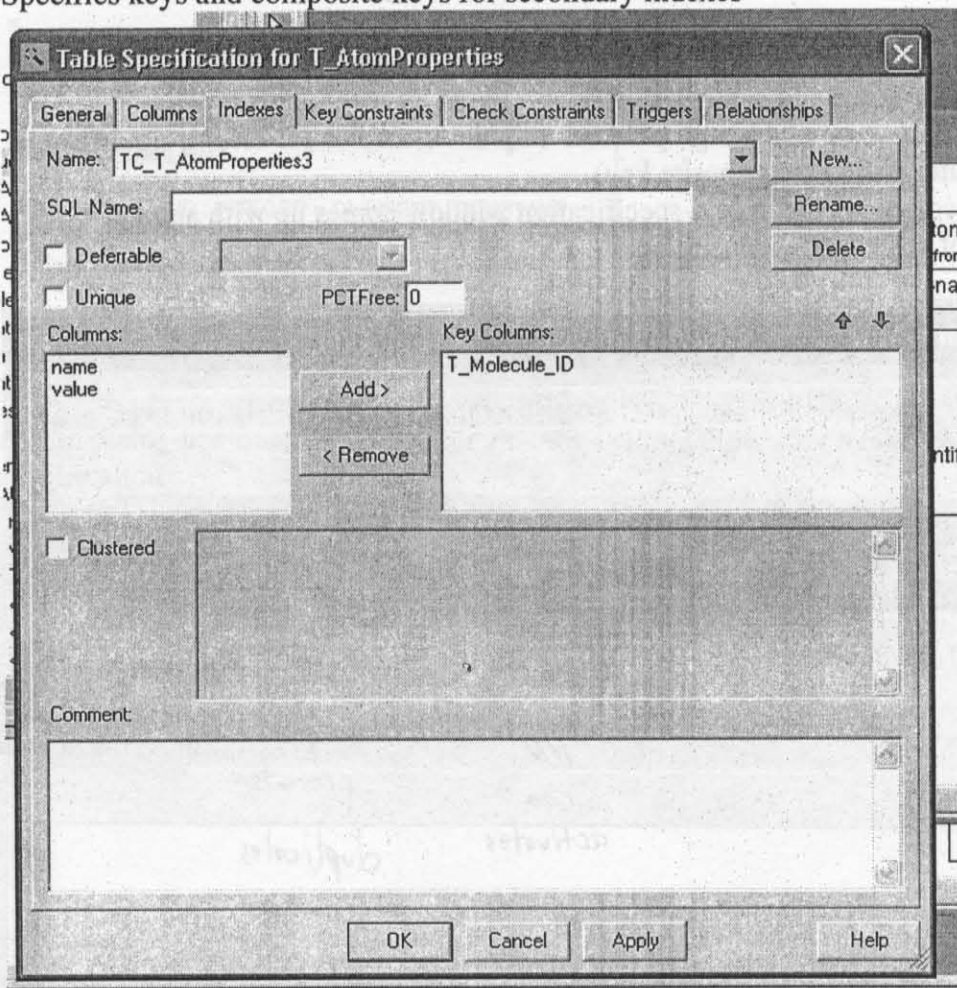
1. Default value
2. radio boxes for not null and unique constraints
3. type → pull-down and can reassign
4. pk – can pull down and assign pk here. (Up/down arrows for setting significance of attributes within a composite key)
5. click on column name, a new specification window comes up with another version of same info + constraints





#### 4) Index tab

Specifies keys and composite keys for secondary indexes



PCTFree, clustered advanced index initialization features.

5)

Check constraint require typing out correct SQL that goes inside the parenthesis of the a check statement

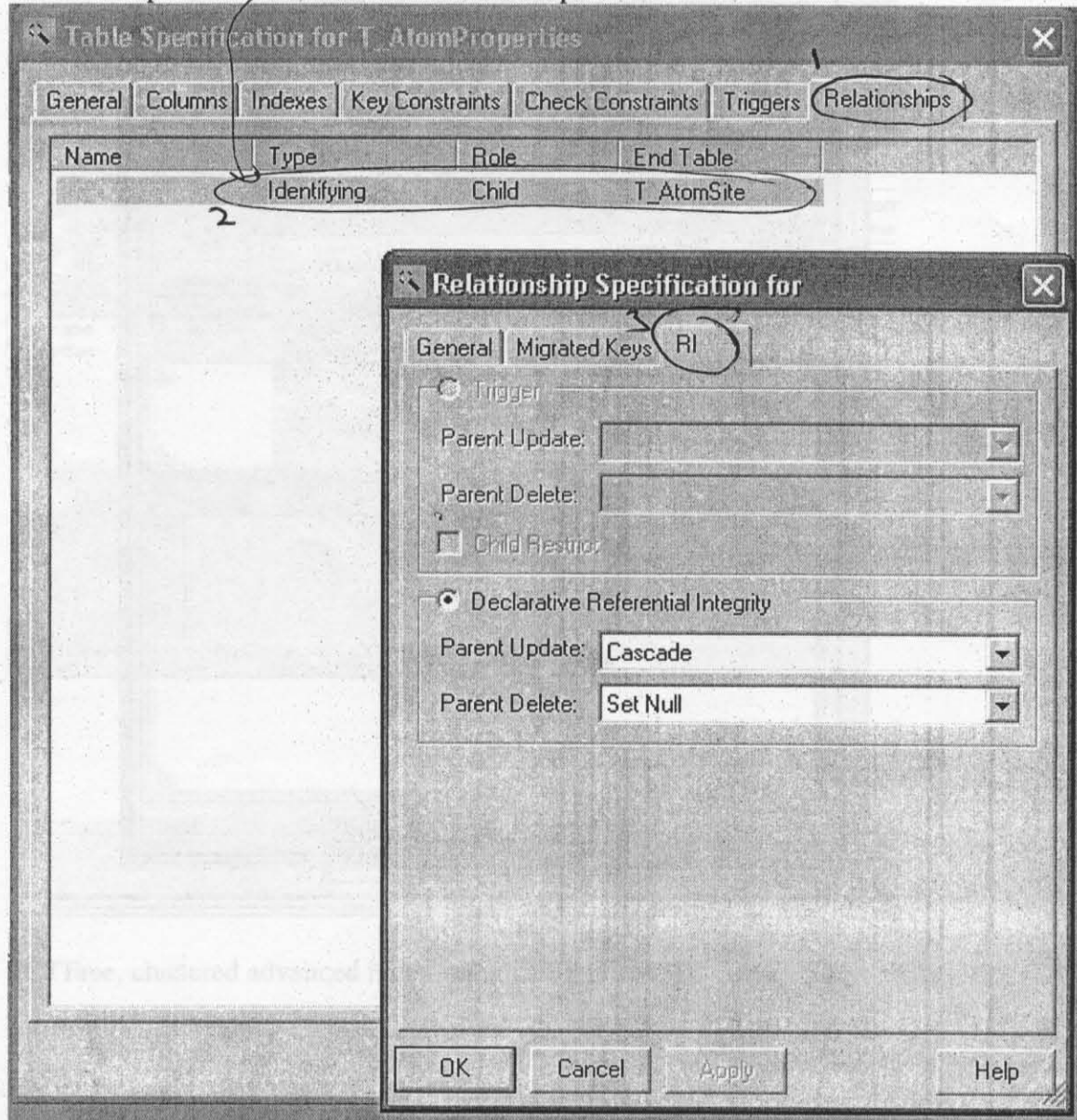
Note this is only one of several ways to get to a panel where such statements can be written.

type SQL  
fragment →

The image shows a screenshot of a software dialog box titled "Table Specification for T\_AtomProperties". The dialog has several tabs: "General", "Columns", "Indexes", "Key Constraints", "Check Constraints", "Triggers", and "Relationships". The "Check Constraints" tab is currently selected. Inside this tab, there is a "Name" field containing "TC\_T\_AtomProperties14" and a "New..." button. Below that is an "SQL Name" field and a "Rename..." button. There is also a "Deferable" checkbox and a "Delete" button. The main area of the dialog is a large text box labeled "Expression:" where a SQL check constraint would be typed. Below the expression box is a "Comment:" field. At the bottom of the dialog are buttons for "OK", "Cancel", "Apply", and "Help".

6) Detailed specification of referential integrity.

Relationships → double click on a relationship → RI





## Change Happens

## Enumeration and Extensible Data Models

Objectives:

- Anticipating changes in a data model
- Property List and Enumeration Design Patterns

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- Schema changes can be painful.
  - truth in advertising: easy to add a column to a table.
- Schema changes can break things.
  - “My most colorful language and severest threats concern changing schema” Dan Miranker

## Anticipate Change

- Build in flexibility.

1. Inheritance
2. Property lists

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## Motivation: Enumerated Data Types

```
CREATE TABLE Mailing_list (  
  name VARCHAR(50),  
  ...  
  zipcode VARCHAR(5)  
CHECK (zipcode IN ('78712', '78746', ...));  
  
// could be days of week, months, symbols of atomic elements  
  
// brittle
```

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# Enumeration Pattern

FYI

Example: Sequences can be DNA, RNA, protein



Model 1:  
Anyone can write any type into the table



Model 2:  
A separate table of "legal" molecule types  
multiplicity?

Data Management

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- from <http://www.agilemodeling.com/artifacts/classDiagram.htm>

Table 1. Multiplicity Indicators.

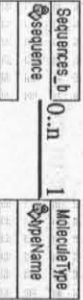
Indicator	Meaning
0..1	Zero or one
1	One only
0..*	Zero or more
1..*	One or more
n	Only n (where n > 1)
0..n	Zero to n (where n > 1)
1..n	One to n (where n > 1)

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## Advantages of an Explicit Table



- A place to find (query) the legal types
  - some web development tools make it trivial to populate pull-downs from such tables
- An application can add new molecule types

Note: SQL-DDL does support enumerations (even if Rose does not). But then the list of legal values is hard coded in the schema

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## Discussion \* - Aggregation (?)



No.  
- implied multiplicity of 1, wrong direction

\* diagrams from MagicDraw UML

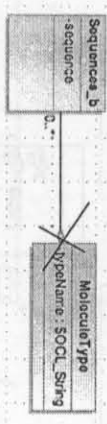
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## Discussion - Aggregation?

Non-identifying



- No
- 1) Wrong direction wrt suggesting object property
- 2) This symbol, in particular, can be quite subjective

When deciding whether to use composition over association, Craig Larman (2002) says it best: if in doubt, leave it out. Unfortunately many modelers will agonize over when to use composition when the reality is little difference exists among association and composition at the coding level.

5 Extensible V2 <http://www.agilemodeling.com/artifacts/classDiagram.htm>

*with respect*

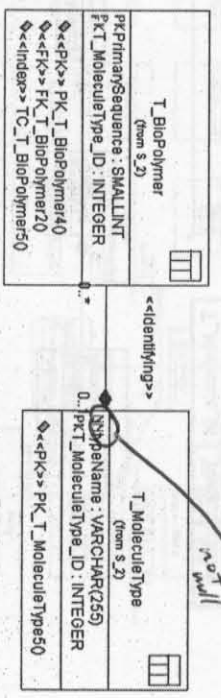
## What does this mean wrt B-tree and disk access?

```
CREATE TABLE T_BioPolymer (
  PrimarySequence SMALLINT NOT NULL,
  T_MoleculeType_ID INTEGER,
  CONSTRAINT PK_T_BioPolymer4 PRIMARY KEY (T_MoleculeType_ID, PrimarySequence)
);
```

- MoleculeType is high order key value --> molecules clustered on disk by molecule type.

## Aggregation - But here coding can count.

Identifying, and PrimarySequence is part of object id



```
CREATE TABLE T_BioPolymer (
  PrimarySequence SMALLINT NOT NULL,
  T_MoleculeType_ID INTEGER,
  CONSTRAINT PK_T_BioPolymer4 PRIMARY KEY (T_MoleculeType_ID, PrimarySequence)
);
```

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## Enumeration

- Note: your text assume enumerations are built in.
- Rose has a facility where you can type a SQL fragment.

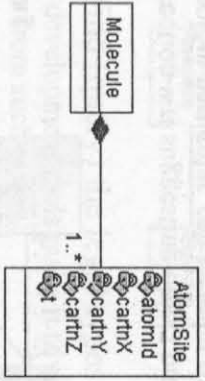
# “Dynamic/Runtime Columns”

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## New Model with Time



- No problem except the schema changes

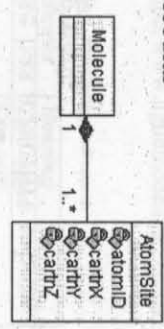
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# Motivating Property Lists

## 3D Molecular Model



That's a static model.

What about a dynamic model?

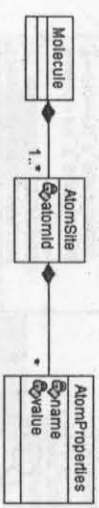
- atoms have points in space and time
- add a time attribute

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## Data Model for Property List



T_AtomProperties	
PK	FK
name	SMALLINT
value	SMALLINT
FK	T_Molecule_ID
FK	T_AtomProperties20
FK	T_AtomProperties10
FK	T_AtomProperties30

T_Molecule_Id	name	value
1	cartx	5
1	carty	-12
2	cartx	8

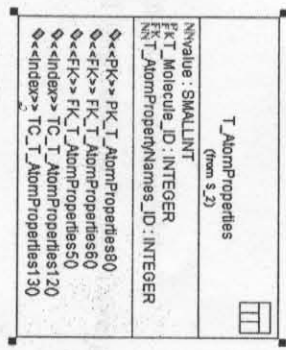
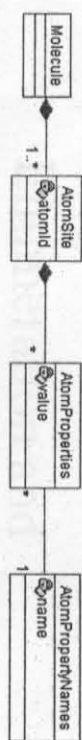
*Handwritten notes:*  
 this is mass bc we are not  
 →

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Suppose We Want to Control  
(enumerate) Properties



a class cannot  
be the composite  
member of more  
than one class

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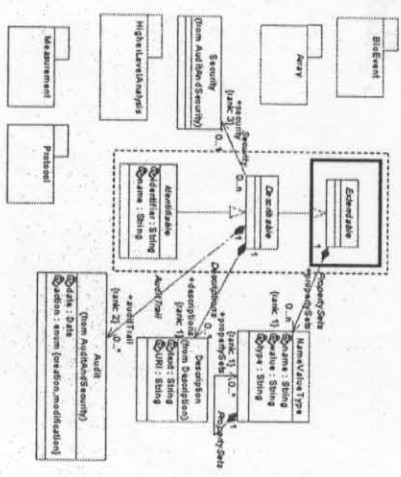
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MAGE-OM has "Extendable"

Note, this is part of a three  
layer hierarchy

1. Extendable
2. Describable
3. Identifiable

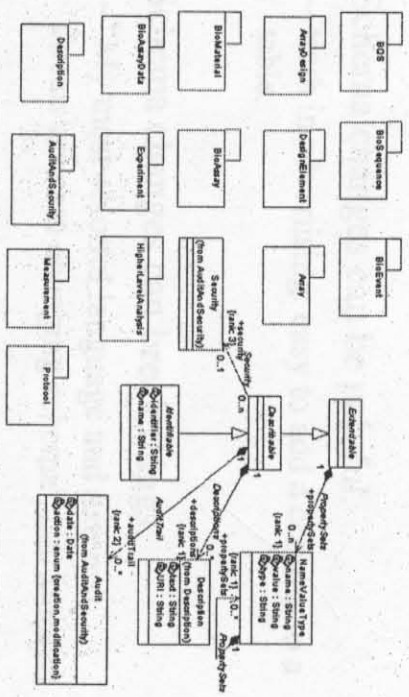


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MAGE-OM as an Example



<http://www.ebi.ac.uk/microarray/doc/software/schema/MAGE/MAGE.htm>

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