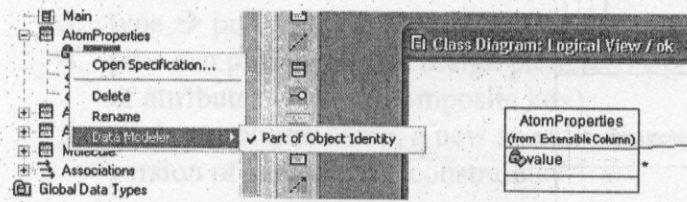


Detailing Keys, Indexes and Constraint in Rose

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

T_AtomProperties (from S_0)	
NNname :	SMALLINT
PKvalue :	SMALLINT
PKT_Molecule_ID :	INTEGER = CURRENT_TIMESTAMP
◆<<PK>> PK_T_AtomProperties20	
◆<<FK>> FK_T_AtomProperties10	
◆<<Index>> TC_T_AtomProperties30	
◆<<Check>> TC_T_AtomProperties140	

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

Table Specification for T_AtomProperties

General Columns Indexes Key Constraints Check Constraints Triggers Relationships

Name: T_AtomProperties Schema: S_0

SQL Name:

Mapped From: AtomProperties

Comment:

OK Cancel Apply Help

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

Table Specification for T_AtomProperties

General Columns Indexes Key Constraints Check Constraints Triggers Relationships

Name	PK	Domain	Type	Not Null	Unique	Default
name			SMALLINT	☒	☐	
value	PK		SMALLINT	☒	☐	
T_Molecule_ID	FK/PK		INTEGER	☐	☐	CURRENT...

Handwritten notes:

- NN icon activates (with arrow pointing to Not Null checkbox for 'name')
- prevents duplicates (with arrow pointing to Unique checkbox for 'name')

Buttons: OK Cancel Apply Help

4) Index tab

Specifies keys and composite keys for secondary indexes

The screenshot shows the 'Table Specification for T_AtomProperties' dialog box with the 'Indexes' tab selected. The 'Name' field is set to 'TC_T_AtomProperties3'. The 'SQL Name' field is empty. The 'Deferrable' checkbox is unchecked. The 'Unique' checkbox is unchecked. The 'PCTFree' value is set to 0. The 'Columns' list contains 'name' and 'value'. The 'Key Columns' list contains 'T_Molecule_ID'. The 'Clustered' checkbox is unchecked. The 'Comment' field is empty. The 'OK', 'Cancel', 'Apply', and 'Help' buttons are at the bottom.

General	Columns	Indexes	Key Constraints	Check Constraints	Triggers	Relationships
Name: TC_T_AtomProperties3						
SQL Name:						
☐ Deferrable						
☐ Unique						
PCTFree: 0						
Columns: name, value						
Key Columns: T_Molecule_ID						
☐ Clustered						
Comment:						
OK Cancel Apply Help						

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 →

Table Specification for T_AtomProperties

General Columns Indexes Key Constraints Check Constraints Triggers Relationships

Name: TC_T_AtomProperties14 New...

SQL Name: Rename...

☐ Deferrable Delete

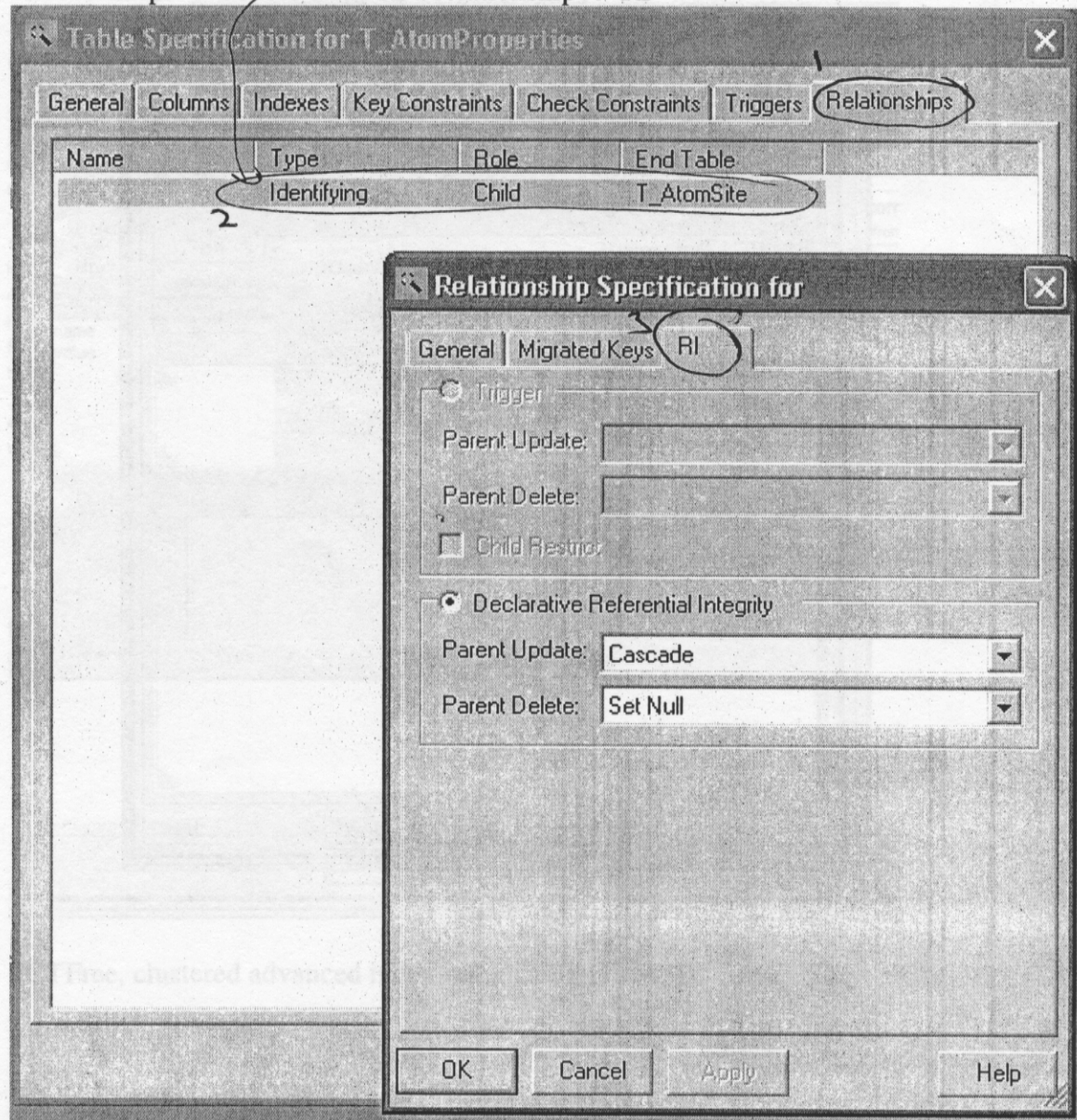
Expression:

Comment:

OK Cancel Apply 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

5 Extensible V2

Data Management

1

- 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

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Data Management

2

Anticipate Change

- Build in flexibility.
 1. Inheritance
 2. Property lists

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Data Management

3

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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4

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

5

- 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)

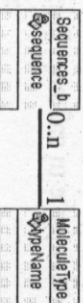
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6

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



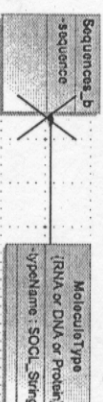
- Note: SQL-DDL does support enumerations (even if Rose does not). But then the list of legal values is hard coded in the schema

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7

Discussion * - Aggregation (?)



- implied multiplicity of 1, wrong direction

* diagrams from MagicDraw UML

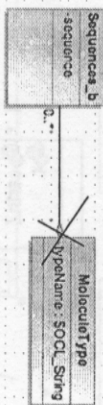
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8

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.

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

9

What does this mean wrt B-tree^{to} and disk access?
with respect

```

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.

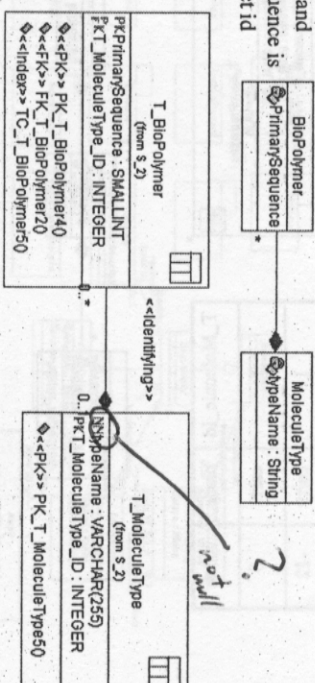
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Data Management

11

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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10

Enumeration

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

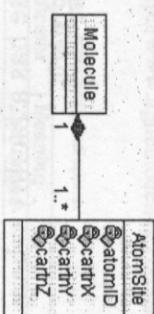
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12

“Dynamic/Runtime Columns”

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 Management

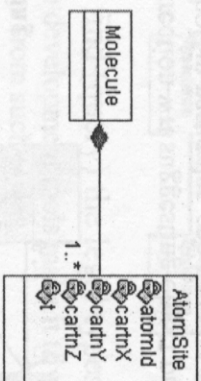
13

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14

New Model with Time



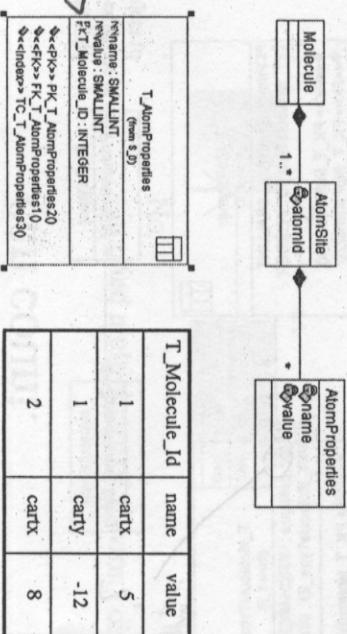
- No problem except the schema changes

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15

Data Model for Property List



Handwritten notes:
 + this is a new model
 not be unique and it's

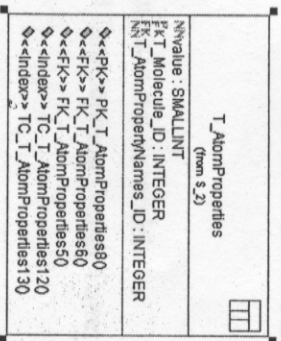
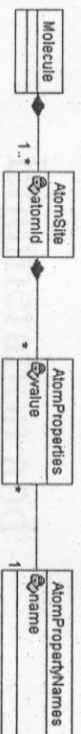
T_Molecule_Id	name	value
1	cartx	5
1	carty	-12
2	cartx	8

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16

Suppose We Want to Control
(enumerate) Properties



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

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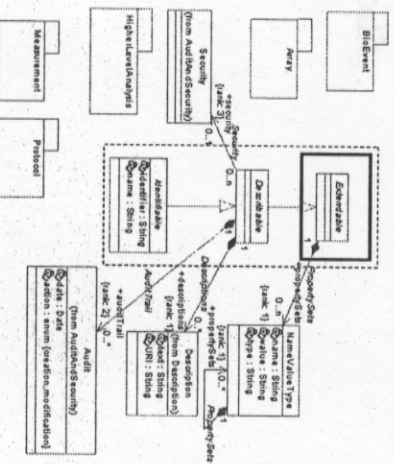
Data Management

17

MAGE-OM has “Extendable”

Note, this is part of a three
layer hierarchy

1. Extendable
2. Describable
3. Identifiable

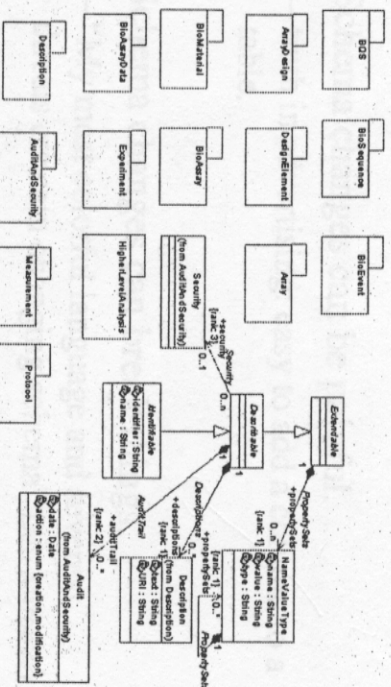


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19

MAGE-OM as an Example



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

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18