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2003/08/26

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Benefit of Extending Conceptual Tools Used in Effective Relational Database Design

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ABSTRACT

This paper aims to study the Conceptual Tools used in Conceptual Modeling of Database, so that Benefit of Extending these Tool used in Effective Relational Database Design could be found out.

In this study, we investigated two application examples, through which two Conceptual diagrams were used to build Relational Database.

The main result of this study was, the benefit from the extending the Conceptual Tools for designing a Relational Database could be achieved when this extension to Tools used in building is applicable to the Database. Since the Conceptual Modeling stage of the Database, has to be simple and clear, the extension is not recommended for modeling Conceptual diagrams of large systems, which has time limits.

Key Words: Conceptual Tools, Data Modeling, Conceptual Modeling, Relational Database Design, User Requirements, Analysis and design System Methodologies.

1

Analysis and Design System)

(Methodologies

(Relational Database)

(Data Modeling)

(Conceptual Tools)

and Notation) :

(Semantics

()

[3]

(User Requirements)

:

(Hierarchy plus Input, Process, and Output) HIPO

Data-) DFD

(System FlowCharts)

(Warnier-Orr Diagrams) Warnier Orr

(Flow Diagram

.HIPO

DFD Warnier-Orr

[3]

:

2

UML

:

(Class Diagram)
(Unified Modeling Language)

.[2]

(Entity Relationship Diagram) ERD

CASEMethod

.[1]

Personal Oracle8.0

3

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Personal Oracle8.0

.CASE Method

Personal Oracle 8.0

.UML

ERD

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-

-

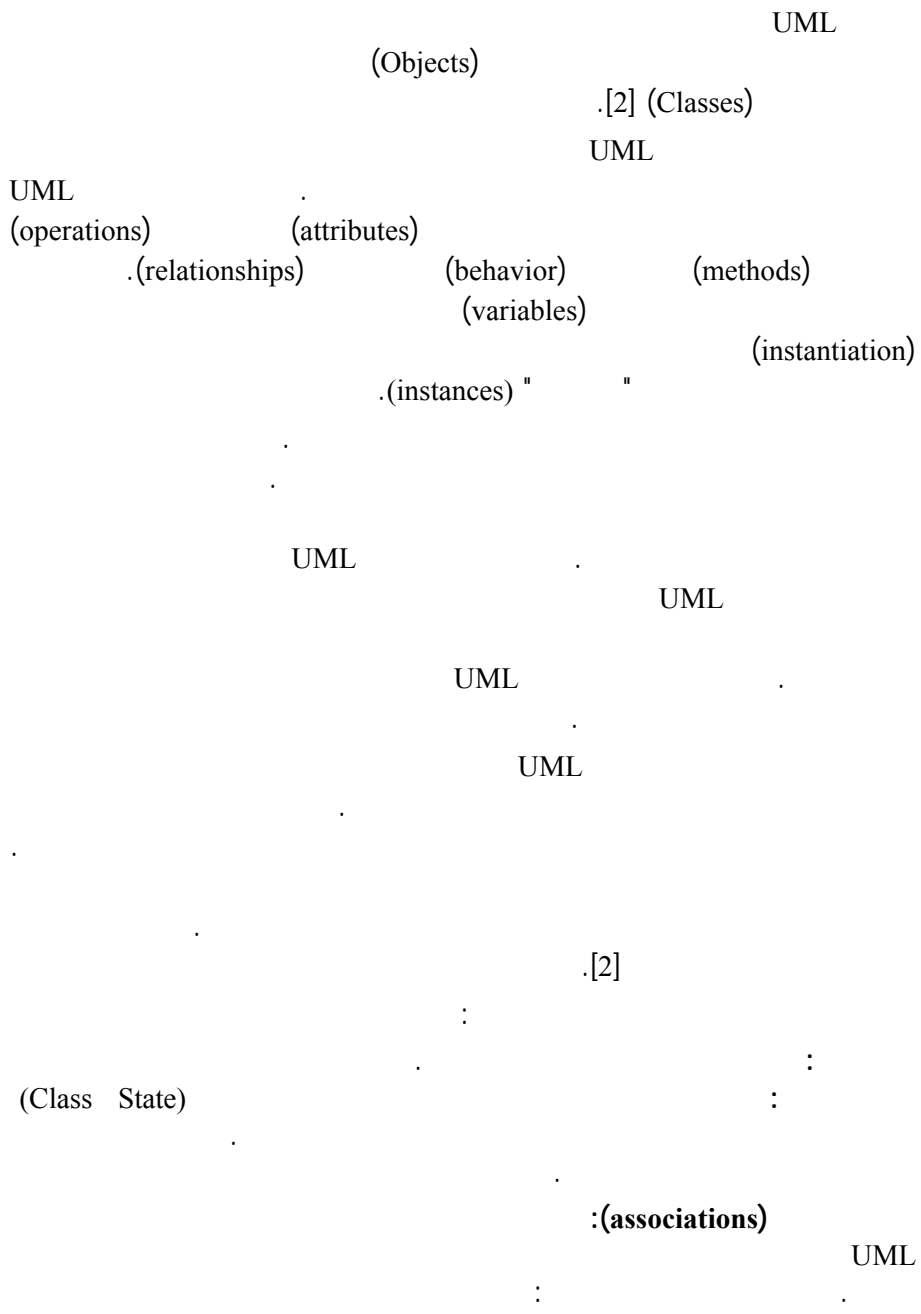
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:

1-3

:UML

1-1-3



(path)

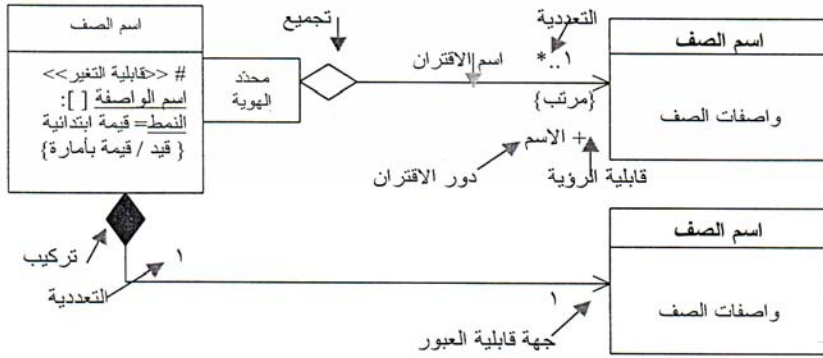
:(binary)

:(n-ary) n

(person)

(xor)

(1)



(1)

: UML

(default syntax)

= _____ : + _____ + { << / >> }

.[2]

(1)

(1)

| | | |
|--|--|--|
| | | |
| | | |

| | | | |
|-----------|---|-----------------------|------------------|
| (strings) | (numbers) | (data structure type) | (Attribute Type) |
| | | | (Initial Value) |
| [] | | () | (Multiplicity) |
| << >> | :(changeable) :(add only) :(frozen) | - - - | (changeability) |
| . | -(instance-scope attribute) -(class-scope attribute) | - - | (Owner Scope) |
| : | :(public view) :(Protect view) (descendants) :(private view) | - - - | (Visibility) |
| { } | { } | | (Constraint) |
| { = } : | = { } | | (Tagged Value) |

.[2]

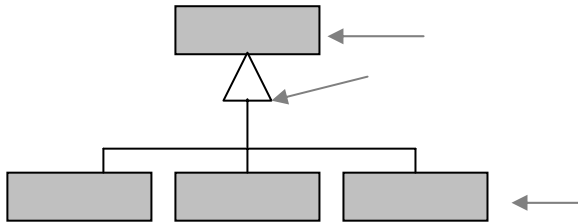
(2)

(2)

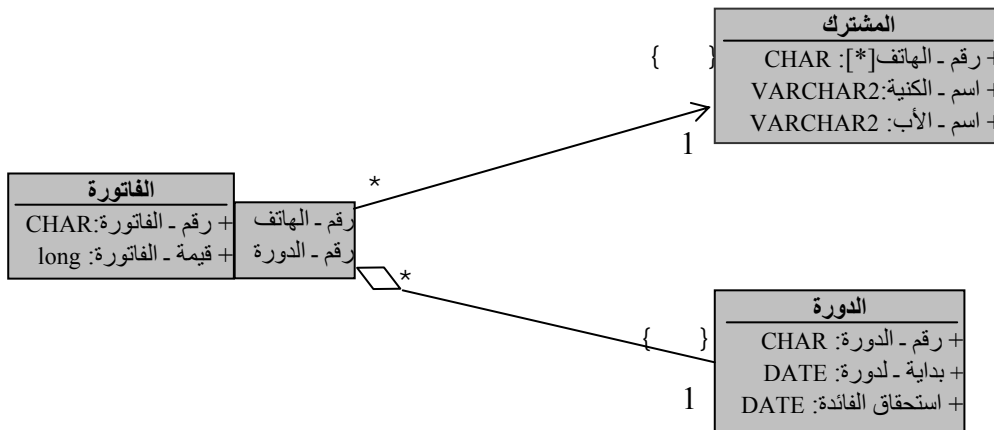
| | | |
|--|---|------------------------------------|
| | | |
| | : : " (recursive path) " : | / (Aggregation/ Composition) |
| " * " " 0..1 " " 1 " " 0..* " " 0..5 " | : :(many) :" .. " :" .. " " " | (Multiplicity) |
| | | (Navigability) |
| | | (Ordering) |
| | | (Qualifier) |
| | | (Rolename) |
| { - # + } : | } { | (Visibility) |

(generalization relationship)
 (specific class) (generalizable class)
 ()
 .()
 (child class)
 : (parent class)
 : (Overlapping) -
 : (Disjoint) -

(2)



(2)



(3)

(3)

:

Oracle

Oracle

(3)

| (UML) | | | |
|-------|--|--|---|
| | | | (Tables) |
| | | | (Field) C: CHAR : V: VARCHAR2 D: DATE L: LONG |
| | | | (primary and foreign keys) : :P :F |
| | | | |

Personal
SQL

:

-3

SQL

Oracle 8.0
:Plus8.0

CREATE TABLE

(
 CHAR(5),
 DATE NOT NULL ENABLE,
 DATE);

ALTER TABLE ADD PRIMARY KEY () USING
 INDEX ;

```

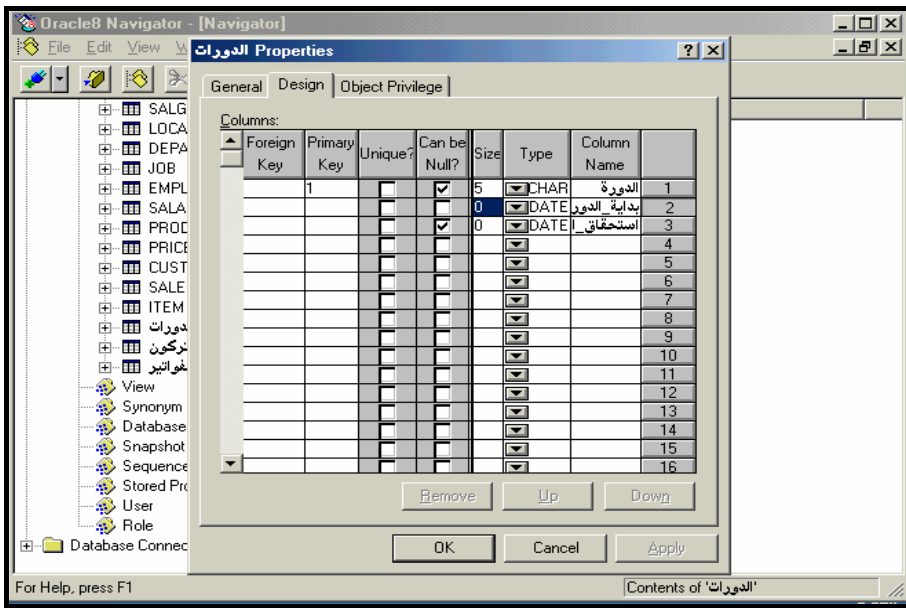
CREATE TABLE
(
    CHAR(6),
    VARCHAR2(28),
    VARCHAR2(12));
ALTER TABLE      ADD UNIQUE (      ) USING INDEX ;

CREATE TABLE
(
    CHAR(10) NOT NULL ENABLE ,
    CHAR(6),
    CHAR(5),
    LONG,
CONSTRAINT      FOREIGN KEY(      ) REFERENCES
(      - ),
CONSTRAINT      FOREIGN KEY(      ) REFERENCES
(      ));

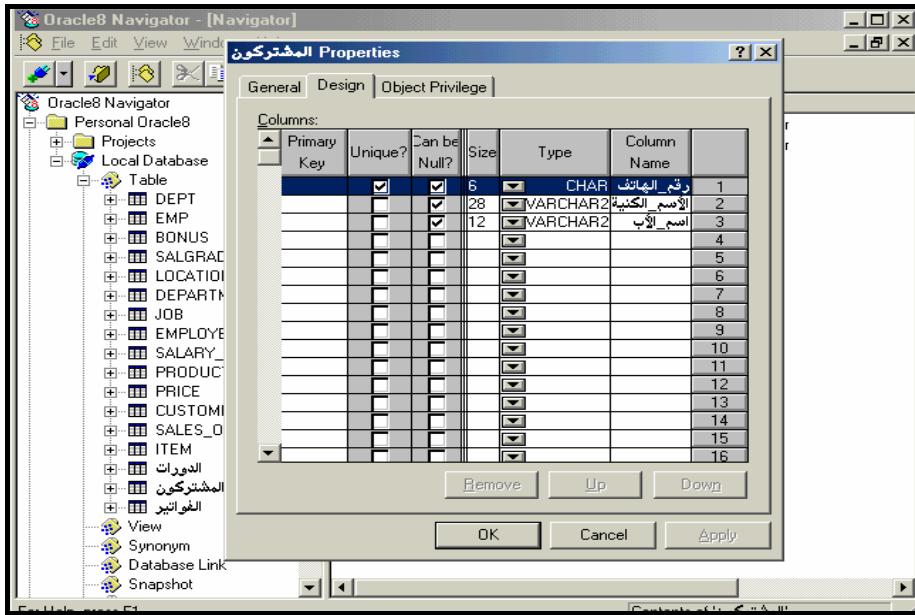
ALTER TABLE      ADD PRIMARY KEY(      )USING
INDEX;

"      "
      .Personal Oracle8      (Navigator)
Oracle      -4
:SQL Plus8.0      SQL

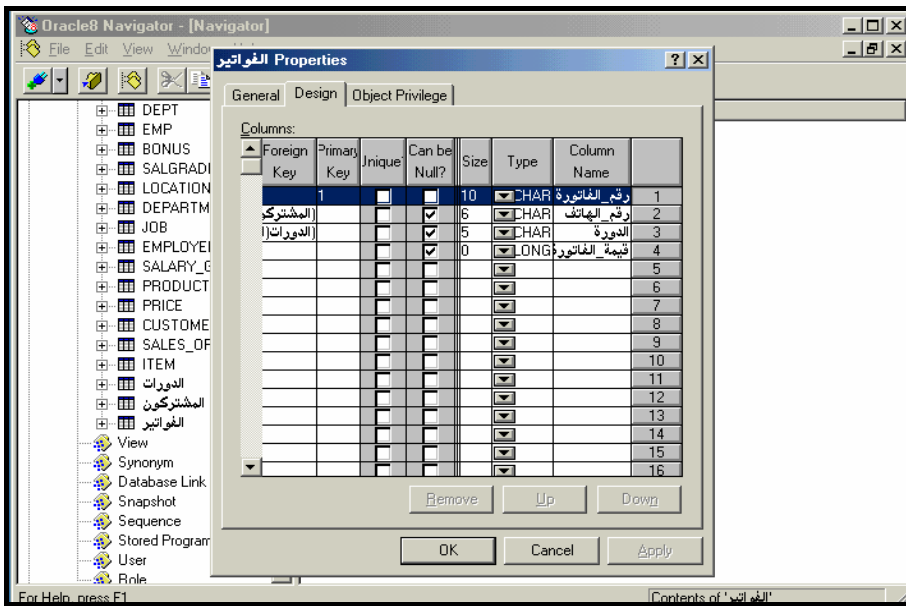
```



(4)



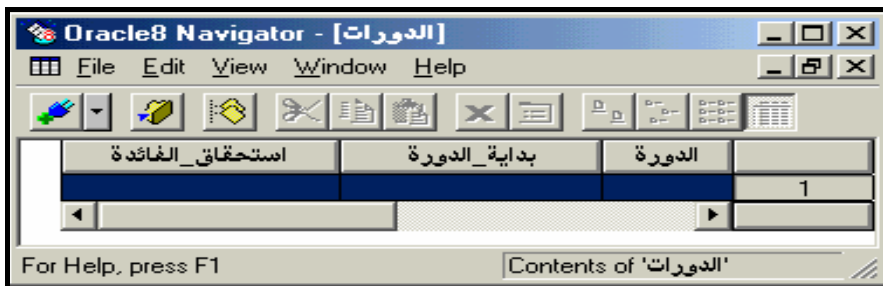
(5)



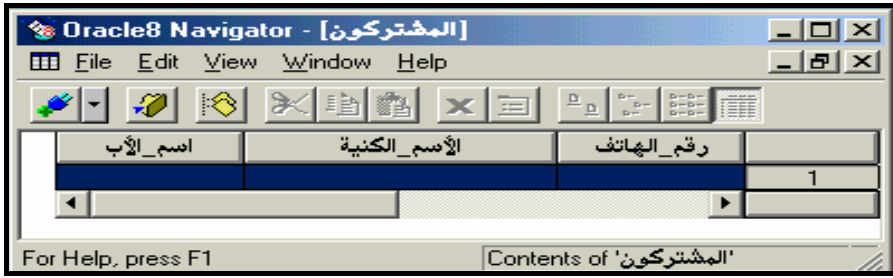
(6)

-5

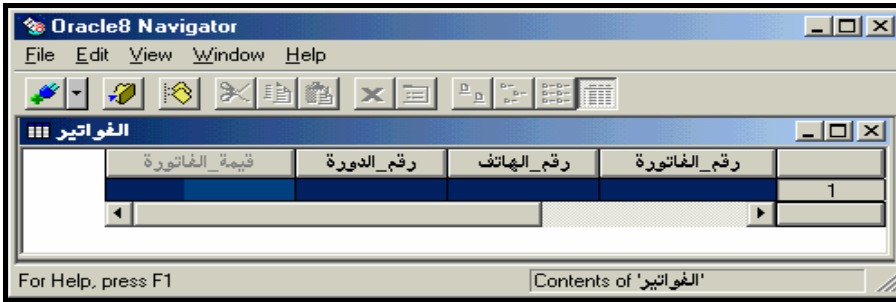
:Personal Oracle 8.0



(7)



(8)



(9)

: 3-1-3

:

-1

: Personal Oracle 8.0

can be)

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-
-
-
-
-

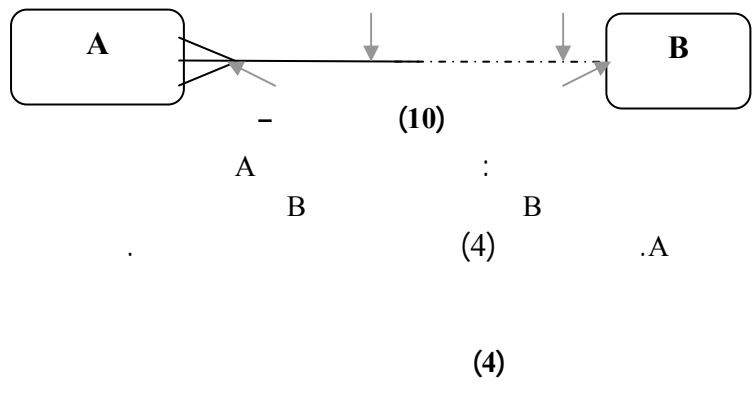
.(null?

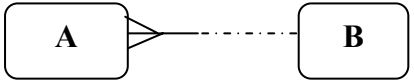

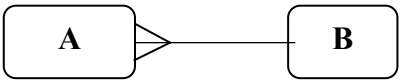
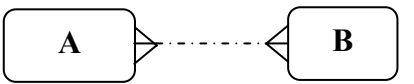
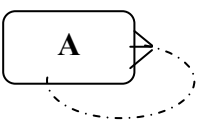
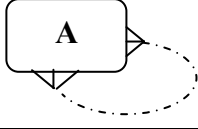
(Index)

-2

.key

: -2
 :
 :(mandatory attribute) -
 "*" :
 :(optional attribute) -
 "5"
 : -3
 CASEMethod
 :
 (many) (one) (degree) -
 :(optionality) -
 CASE Method
 :
 " "
 " "
 (10) (recursive relationship)
 .[1]



| | |
|---|-------|
|  | (-) |
|  | (-) |
|  | (-) |
|  | (-) |
|  | (:) |
|  | (:) |

:(identifier) -4

"# "

: [1]

:(Exclusivity) -

(mutually

.exclusion)

:(non-transferable relationships)

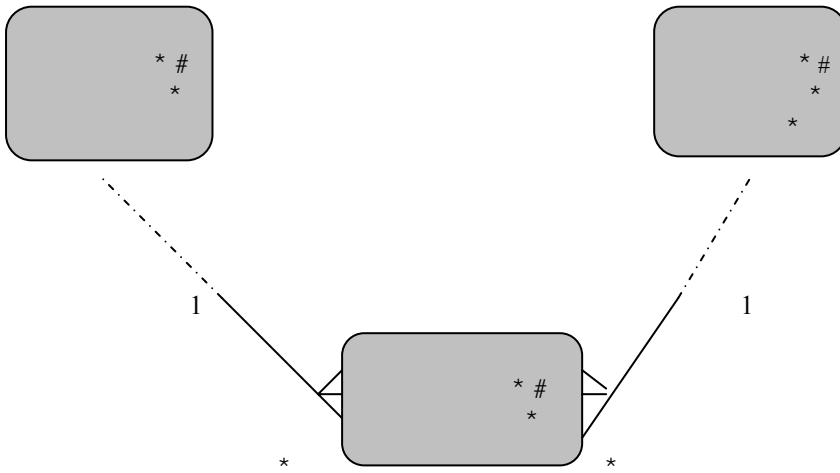
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2-2-3

CASEMethod
(10)

ERD

-1

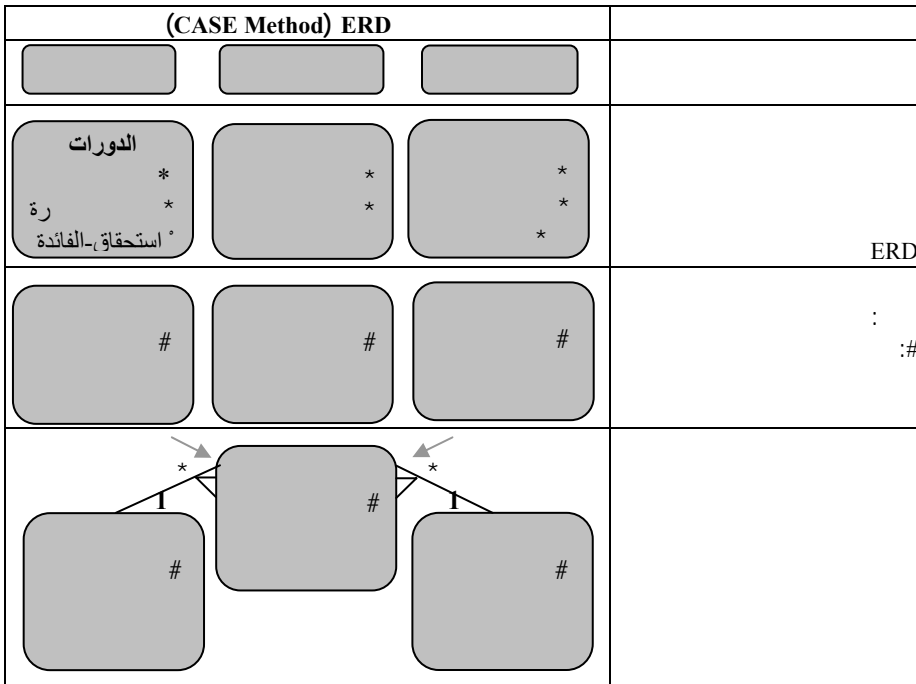


(11)

Oracle personal Oracle8.0
(5)

-2

:ERD



ERD

Oracle

(5)

CASEMethod

[1]

:(12)

| | | | |
|----------|----|----------|---|
| not null | 6 | Char | P |
| not null | 28 | Varchar2 | |
| not null | 12 | Varchar2 | |

| | | | |
|----------|----|------|---|
| not null | 5 | Char | P |
| not null | 10 | Date | |
| null | 10 | Date | |

| | | | |
|----------|----|------|---|
| not null | 10 | Char | P |
| not null | 6 | Char | F |
| not null | 5 | Char | F |
| not null | 10 | Char | |

(12)

Personal : 3
 SQL SQL Oracle 8.0
 :Plus8.0

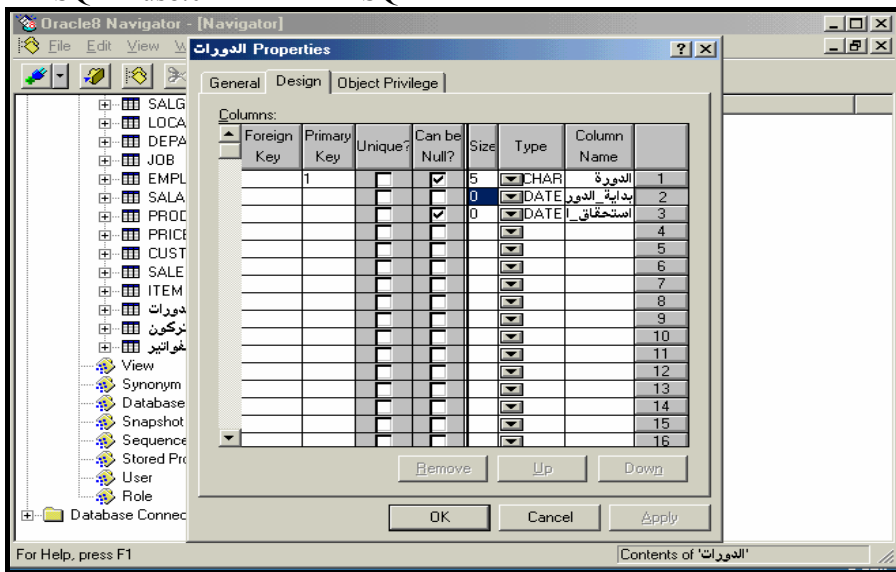
```
CREATE TABLE
(
  CHAR(5),
  DATE NOT NULL ENABLE ,
  DATE);
ALTER TABLE ADD PRIMARY KEY ( ) USING
INDEX ;
```

```
CREATE TABLE
(
  CHAR(6),
  VARCHAR2(28),
  VARCHAR2(12));
ALTER TABLE ADD UNIQUE ( ) USING INDEX ;
```

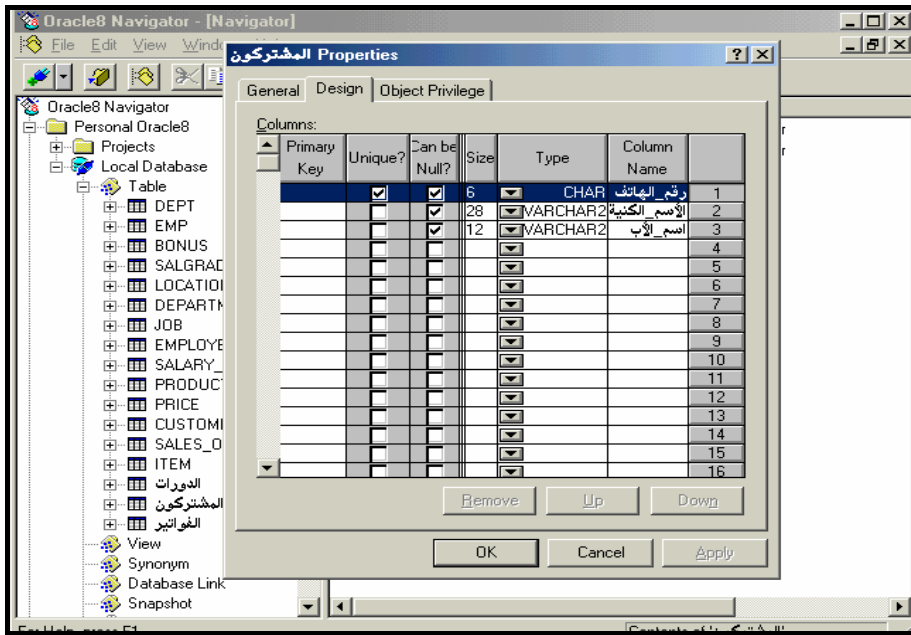
```
CREATE TABLE
(
  CHAR(10) NOT NULL ENABLE ,
  CHAR(6),
  CHAR(5),
  LONG ,
CONSTRAINT FOREIGN KEY ( ) REFERENCES
```

```
( ),
CONSTRAINT FOREIGN KEY ( )
REFERENCES
( ));
```

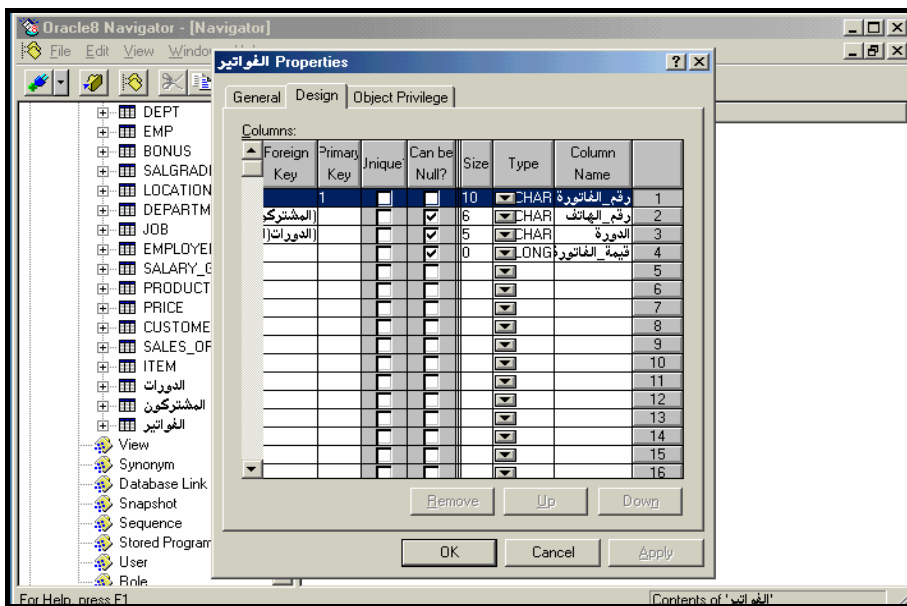
```
ALTER TABLE ADD PRIMARY KEY ( ) USING
INDEX ;
```



(13)



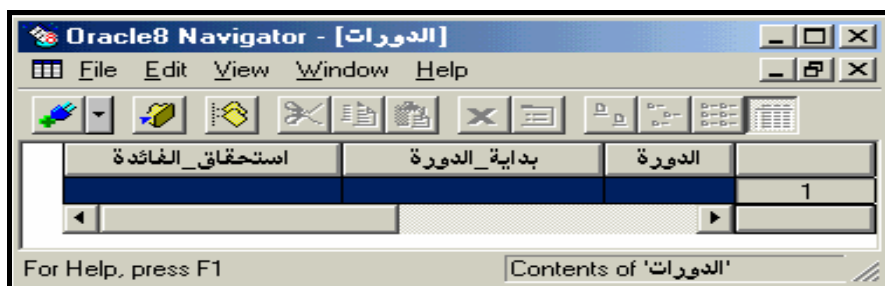
(14)



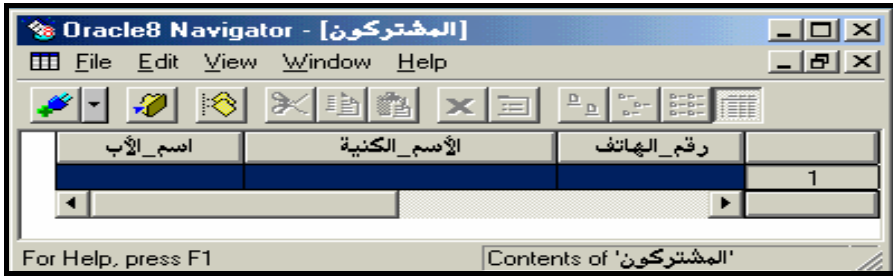
(15)

-5

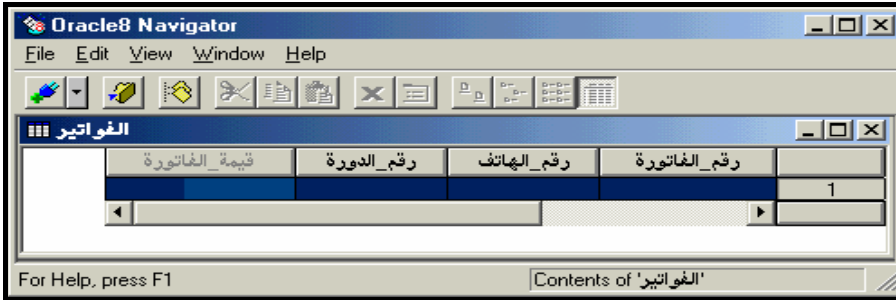
:Personal Oracle8



(16)



(17)



(18)

3-2-3

ERD :
 -1
 : Personal Oracle8.0

() ()
 .(can be null?)
 -
 -
 -
 -

| | |
|------------|----|
| ERD | -2 |
| CASEMethod | -3 |

CASEMethod :

CASEMethod

() () -
 :
 () -
 .())

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