Database Systems

Introduction of DB Design Support Tool

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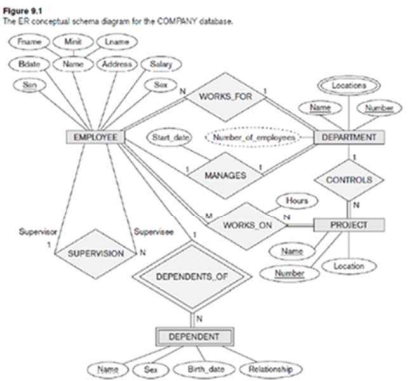
Outline

- Introduction
- Getting started with ER-win
- Choose model type and target database
- Basic screen configuration
- Choose data model diagram notation
- Choose data modeling phase
- Logical data modeling with ER-win (Company DB)
- Supplement

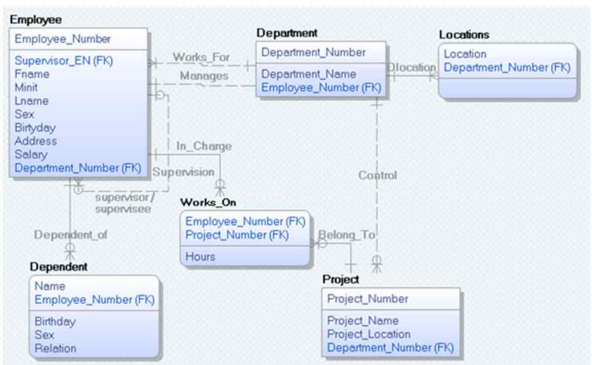
Introduction

- ER-win
  - Data modeling tool
    - One of most popular CASE tool for database design
    - It can support not only to conceptual design with ER diagram but also to convert the conceptual schema to logical schema and even for forward/backward engineering.



Example of conceptual diagram

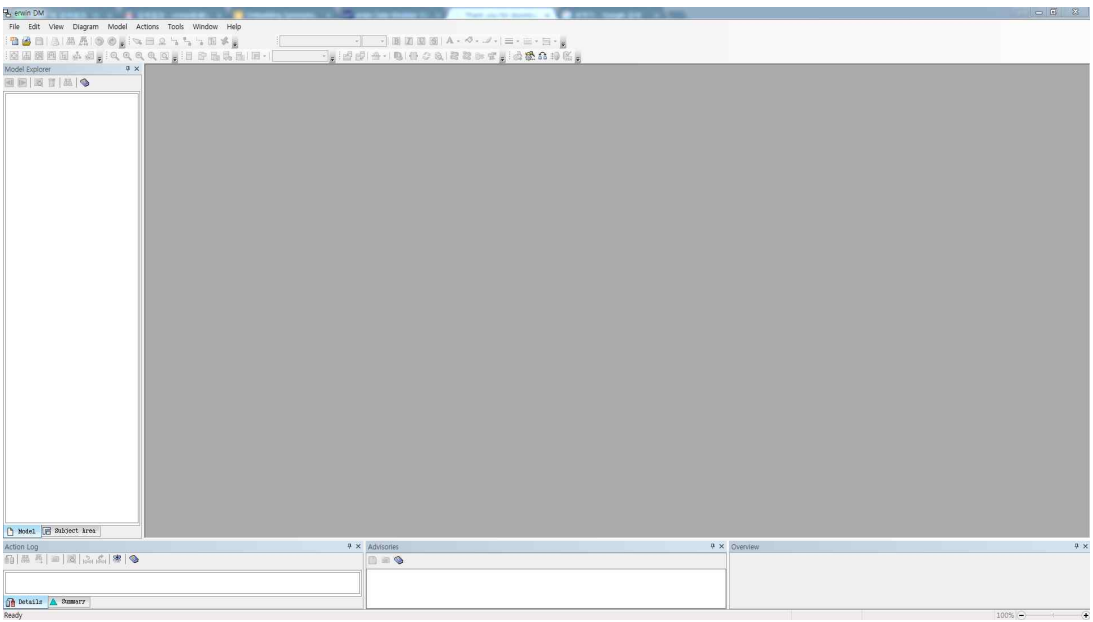
convert



Example of logical diagram

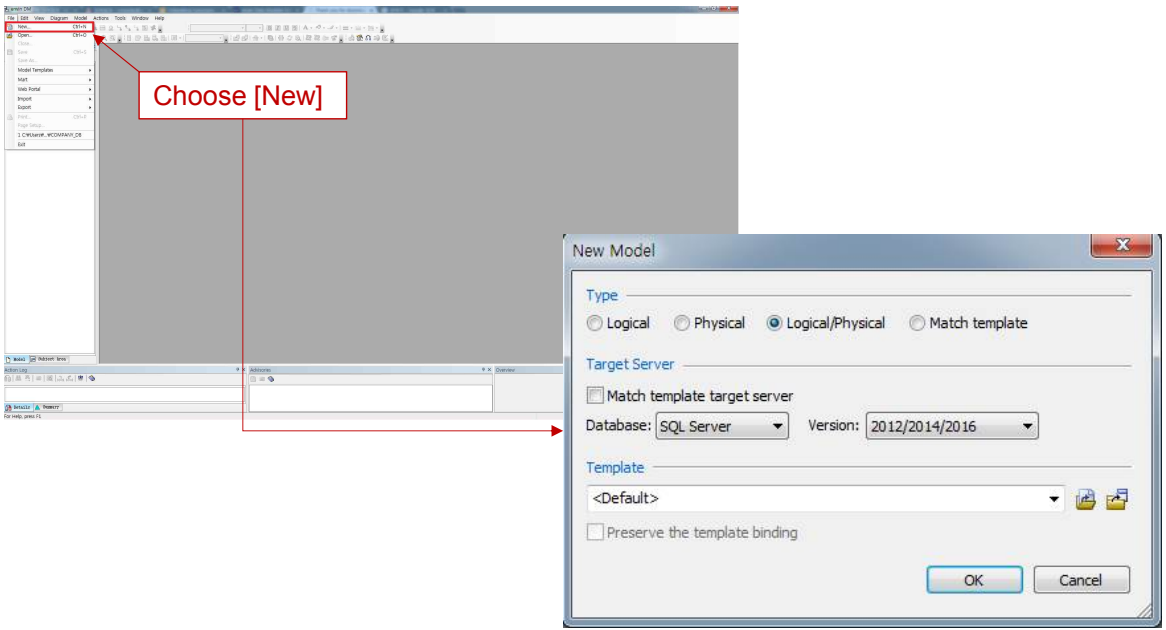
Getting started with ER-win

- Program execution
  - [start button] → [program] → [erwin] → [AllFusion] → [Erwin Data Modeler r9.7] → Execute [Erwin Data Modeler r9.7]



Choose model type and target database (cont'd.)

- Choose [**File**] in menu → choose [**New**] to open '**New Model**' dialog box.



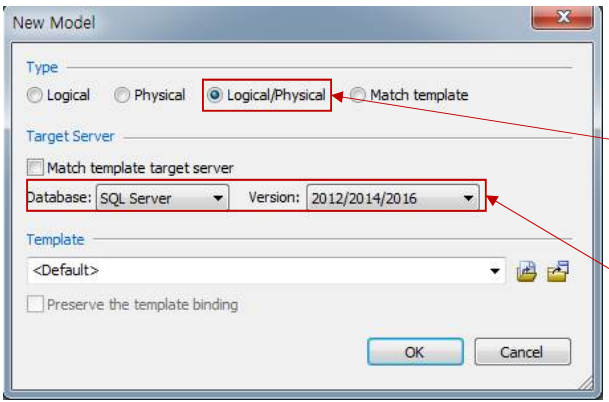
Choose model type and target database (cont'd.)

- Choose model type.
  - **'Logical'** model
    - For designing conceptual schema which contains the detailed information of entity types and relationship type such as attribute, primary key etc.
    - Not support to specify and design target DBMS and version, trigger, stored procedures etc.
  - **'Physical'** model
    - For designing physical schema which contains the features related with specified DBMS

➢ The '**logical/physical'** model type usually is used for normal and full design procedure.

Choose model type and target database (cont'd.)

- Choose model type and target DBMS.
  - In this class, we will use "**SQL Server 201X**".

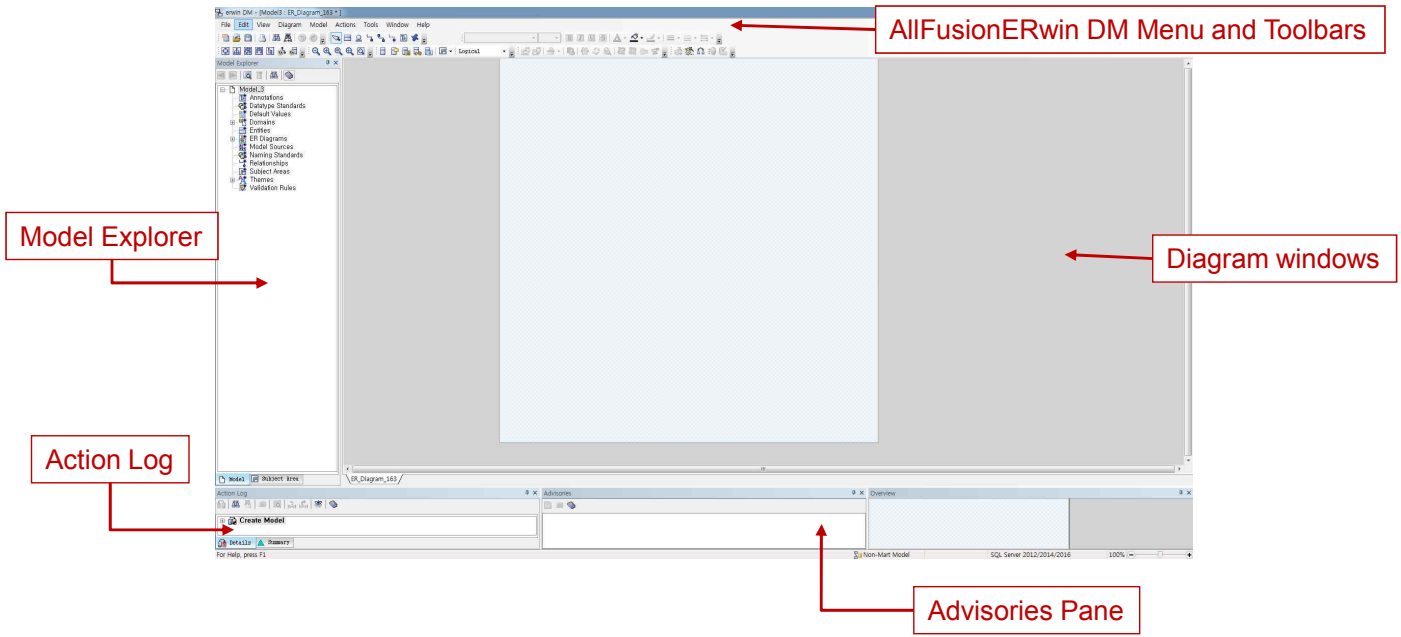


Click [Logical/Physical] type

Choose [SQL Server] database.
Choose [2012/2014/2016] version

Basic screen configuration

- It consists of one menu bar for user friendly interface and four sub windows for displaying different contents.

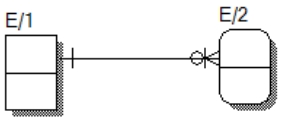


Basic screen configuration (cont'd.)

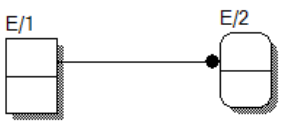
Division	Function
Toolbars	➢ The buttons to help modeling works are gathered. ➢ It can be rearranged with that user wants.
Advisories Pane	➢ The certain amount of information about processed works by current user is shown.
Model Explorer	➢ It is explorer window in model. ➢ Each object shown in explorer has hierarchical structure.
Action Log	➢ Processed works by current user are recorded in real time.
Diagram Windows	➢ After model generation, the name of window is basically set as 'Display1', and user can progress modeling process on this area.

Choose data model diagram notation

- **IE notation**
  - Information Engineering
  - Notation uses the combination of line and circle looks like crow's foot.
  - Widely used notation

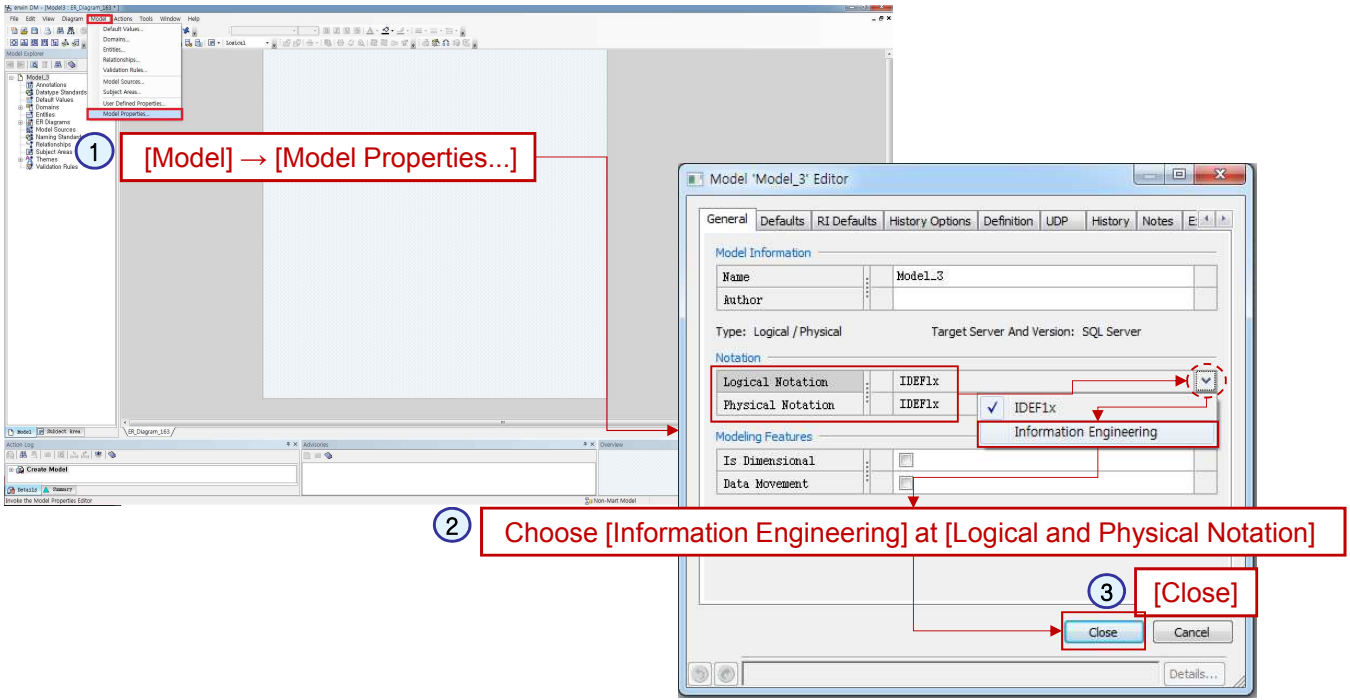


- **IDEF1X notation**
  - Notation uses circle and diamond.
  - Initial setup notation of ER-win



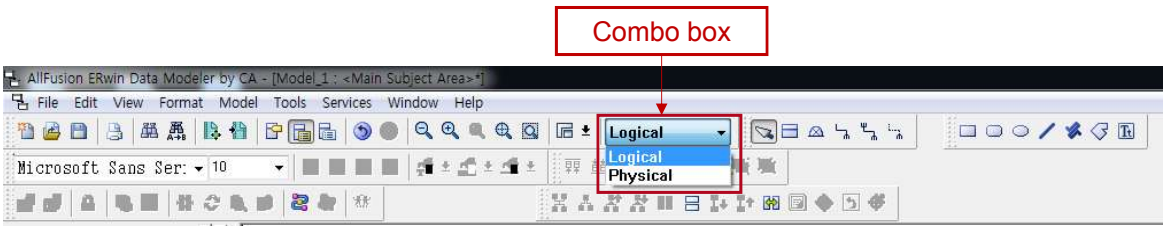
Choose data model diagram notation (cont'd.)

- **Change to IE from the initial IDEF1X notation.**



Choose data modeling phase

- User can choose ‘Logical’ or ‘physical’ data modeling
  - If user choose ‘Logical/Physical’ type model when they started data modeling.
  - At combo box in toolbar
  - Refer to slide 6 for the details of each mode type.



Logical data modeling with ER-win (Company DB)

- Logical data modeling with ER-win is generally performed by the following 5 steps.
  - Step 1: Draw entity types
  - Step 2: Arrange entity types
  - Step 3: Set relationship type between entity types
  - Step 4: Naming relationship types
  - Step 5: Set the cardinality and optionality of each relationship type

Logical data modeling with ER-win (Company DB) (cont'd.)

- This is conceptual diagram of company database as an example.

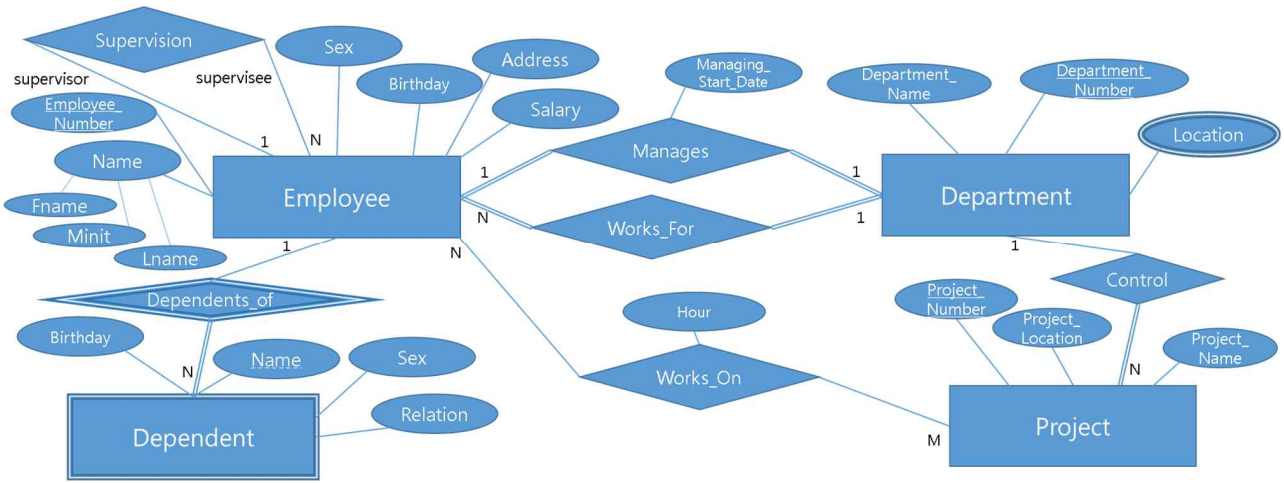
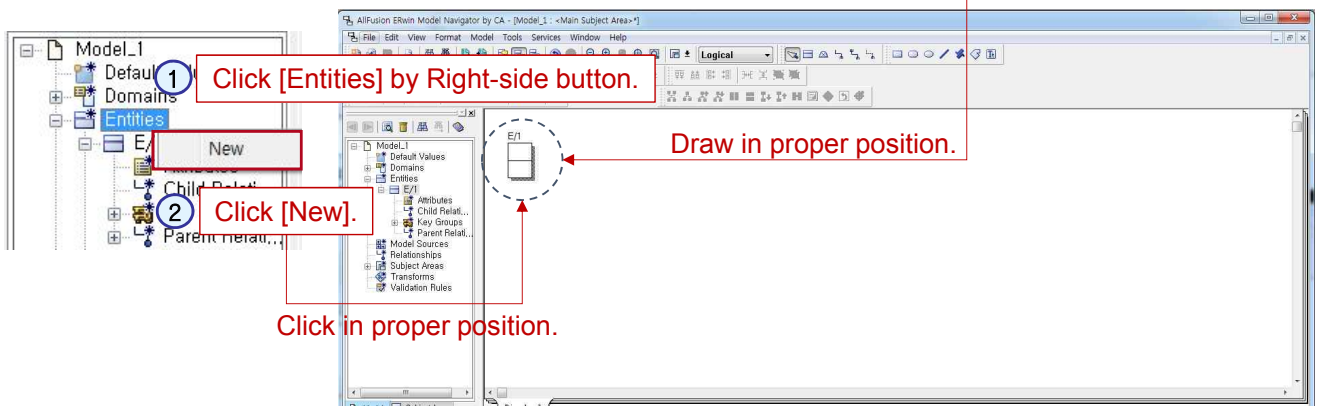


Figure 2. Conceptual diagram of company DB

Step 1: Draw entity types

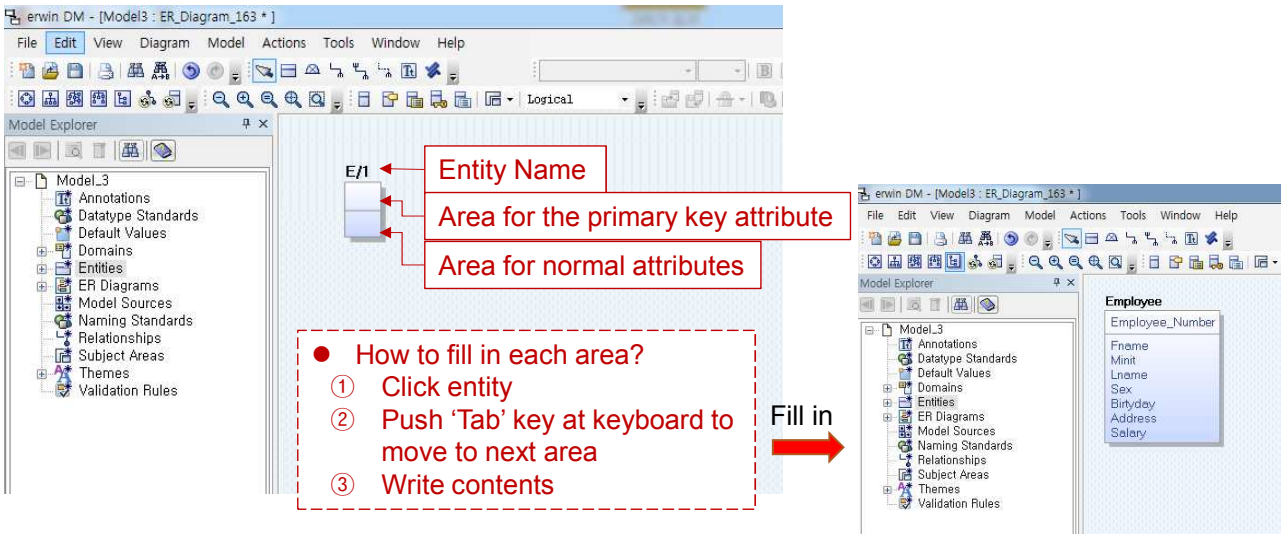
- Entity type can be created by either ‘Method 1’ or ‘Method 2’.
- **Method 1**: Using toolbar

- **Method 2**: Using model explorer



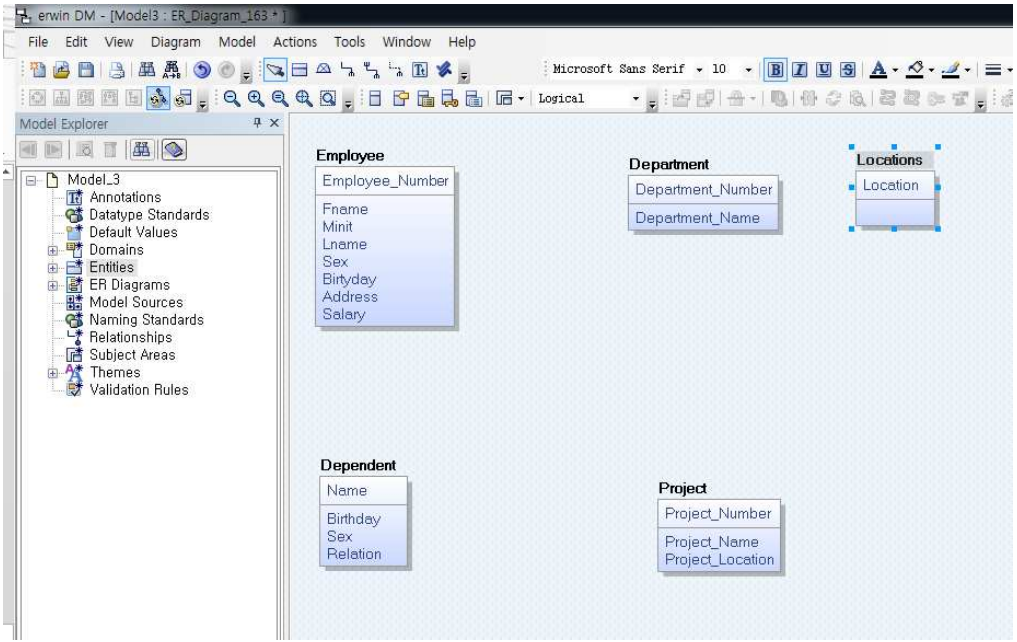
Step 1: Draw entity types (cont'd.)

- Entity type



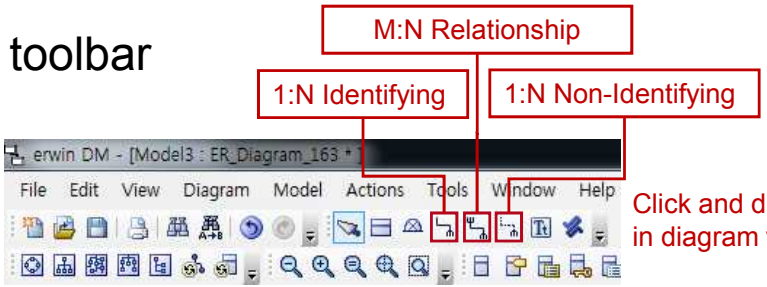
Step 2: Arrange entity types

- Entity types are placed properly by rearranging.



Step 3: Set relationship types

- **Method**: Using toolbar



- Relationship type
  - **Identifying** for between weak entity type and its owner:
    - Primary key of the owner is used as part of the primary key of the weak entity type.
    - The weak entity is represented by rounded rectangle in ER-win.
  - **Non-Identifying** for between strong entity types:
    - Primary key of the first entity type is used for normal attribute of the other.

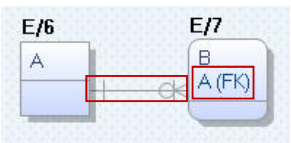


Figure 3. Example of identifying

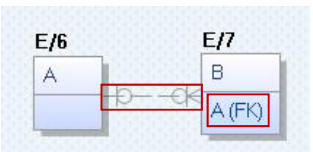
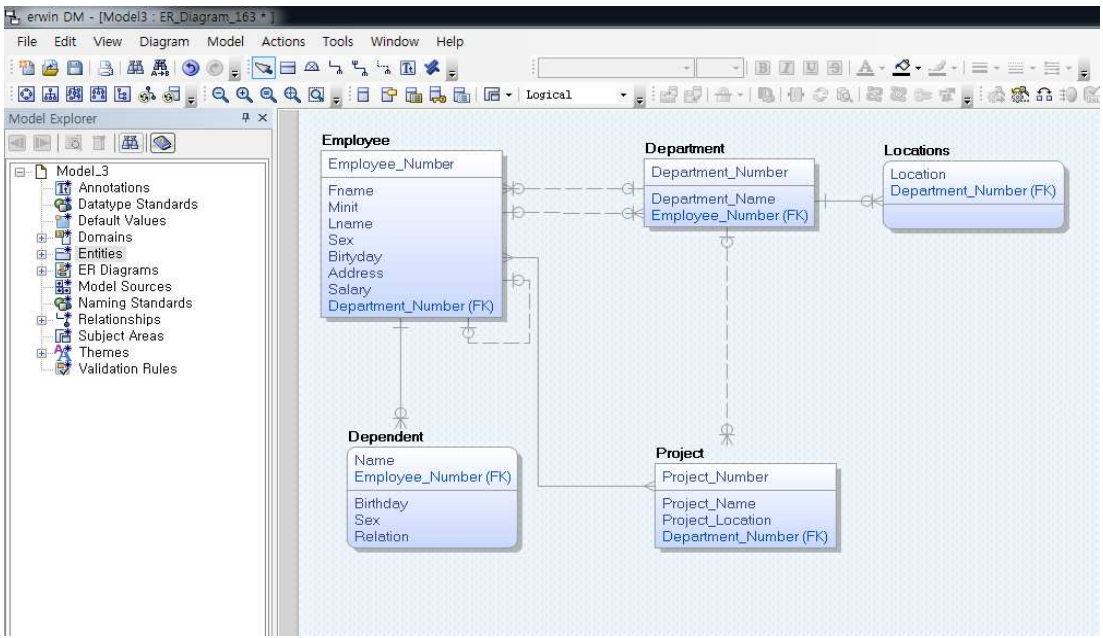


Figure 4.Example of non-identifying

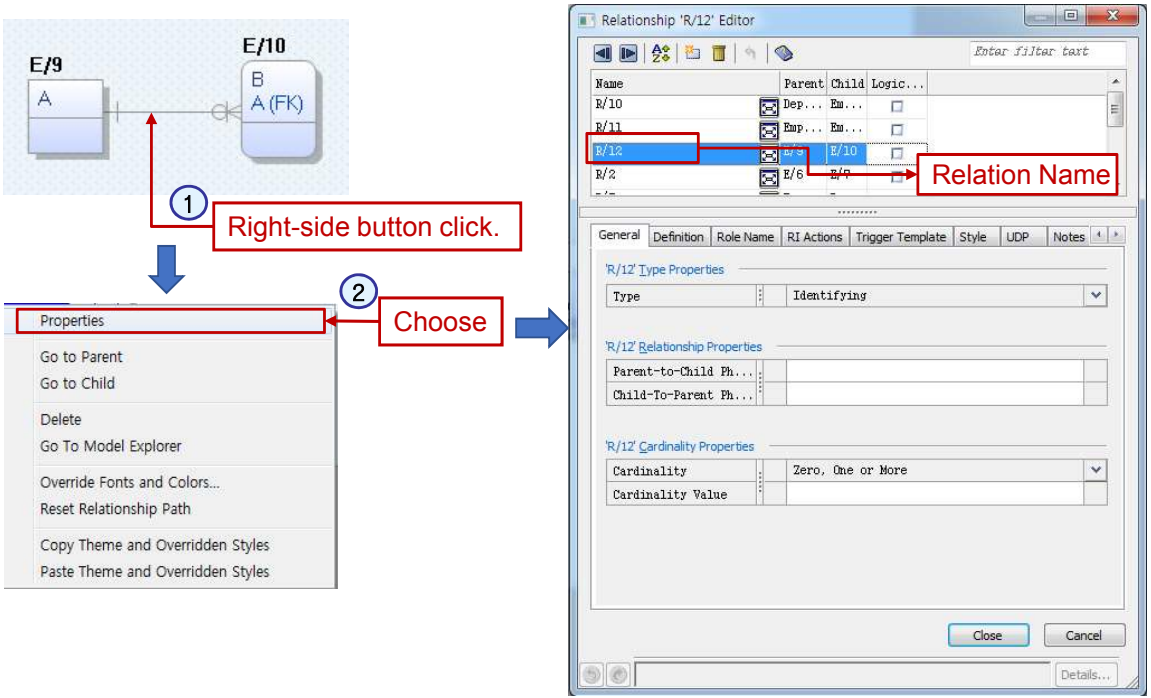
Step 3: Set relationship type (cont'd.)

- After creating the relationship types between entity types.

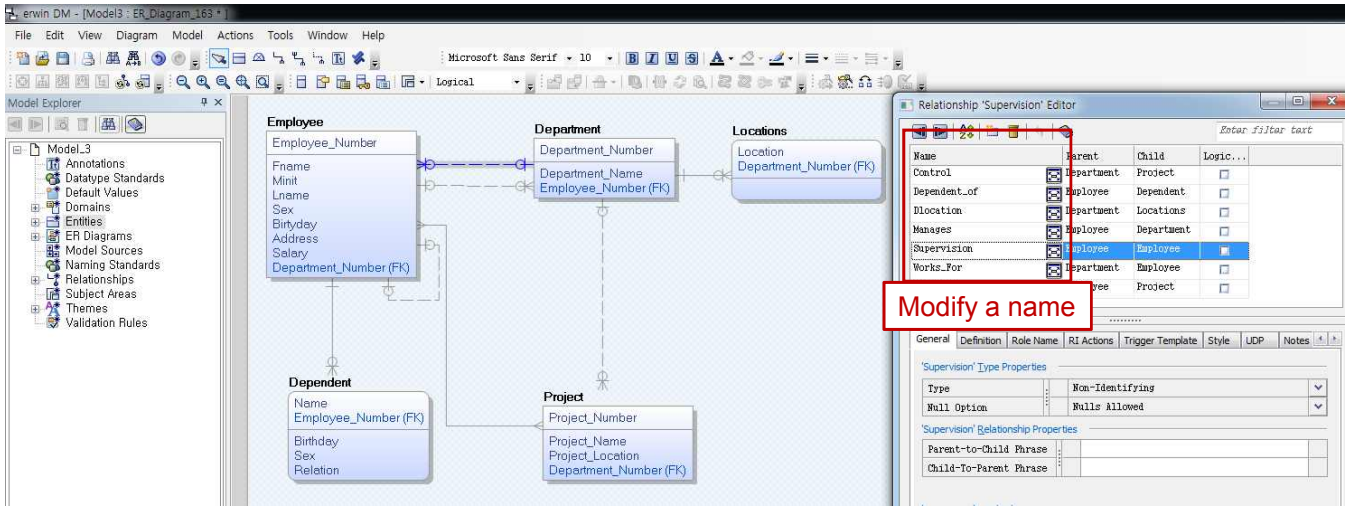


Step 4: Naming relationship types

- **Method**: Using relationship property dialog box

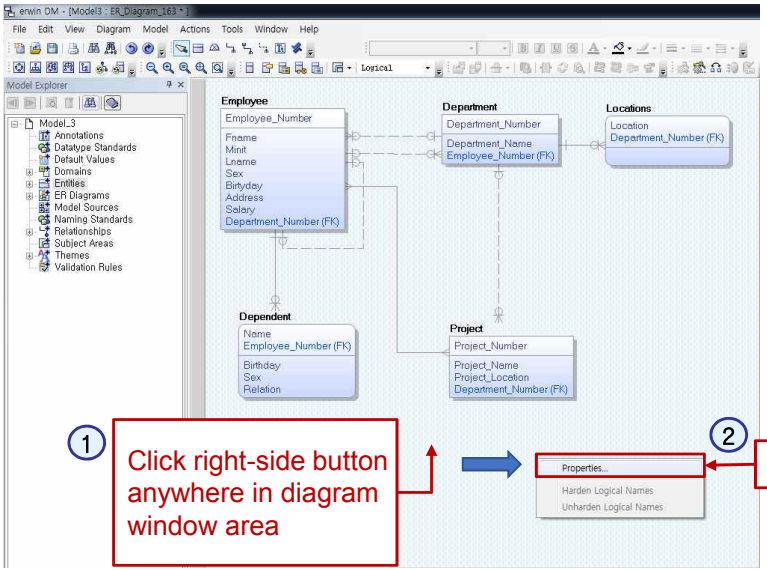


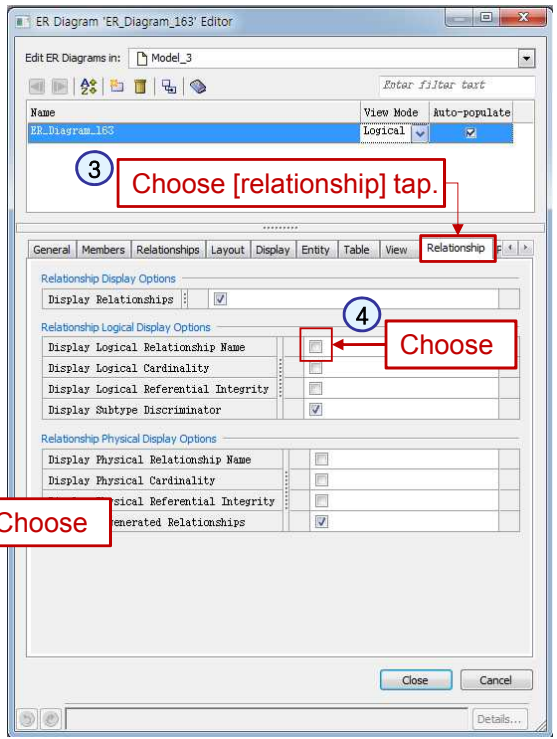
Step 4: Naming relationship types (cont'd.)



Step 4: Naming relationship types (cont'd.)

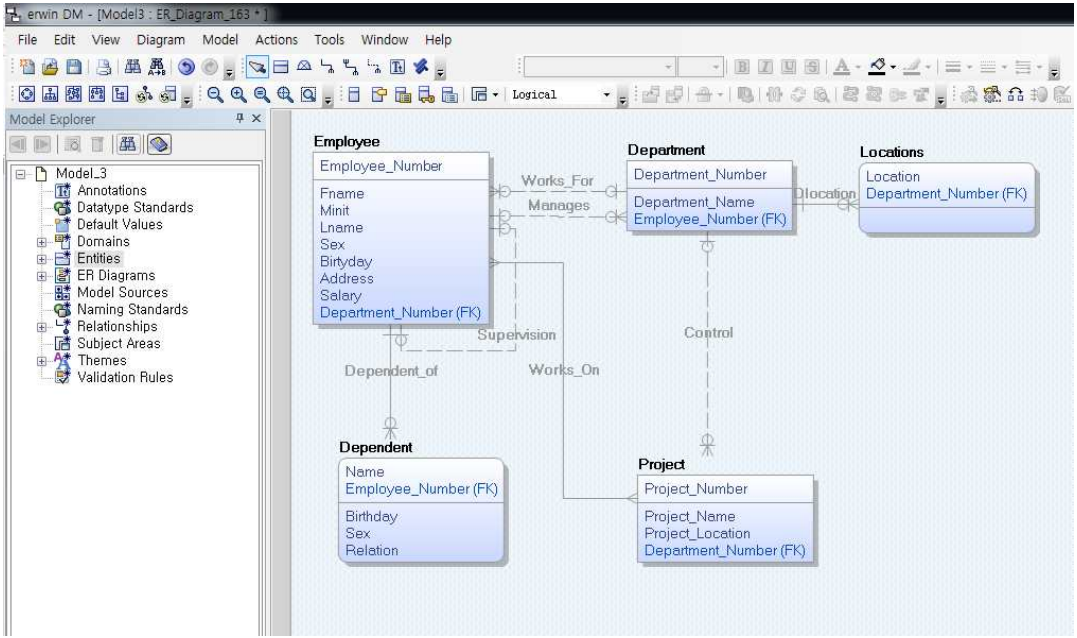
- To show name of relationship type in diagram
  - Using model property dialog box





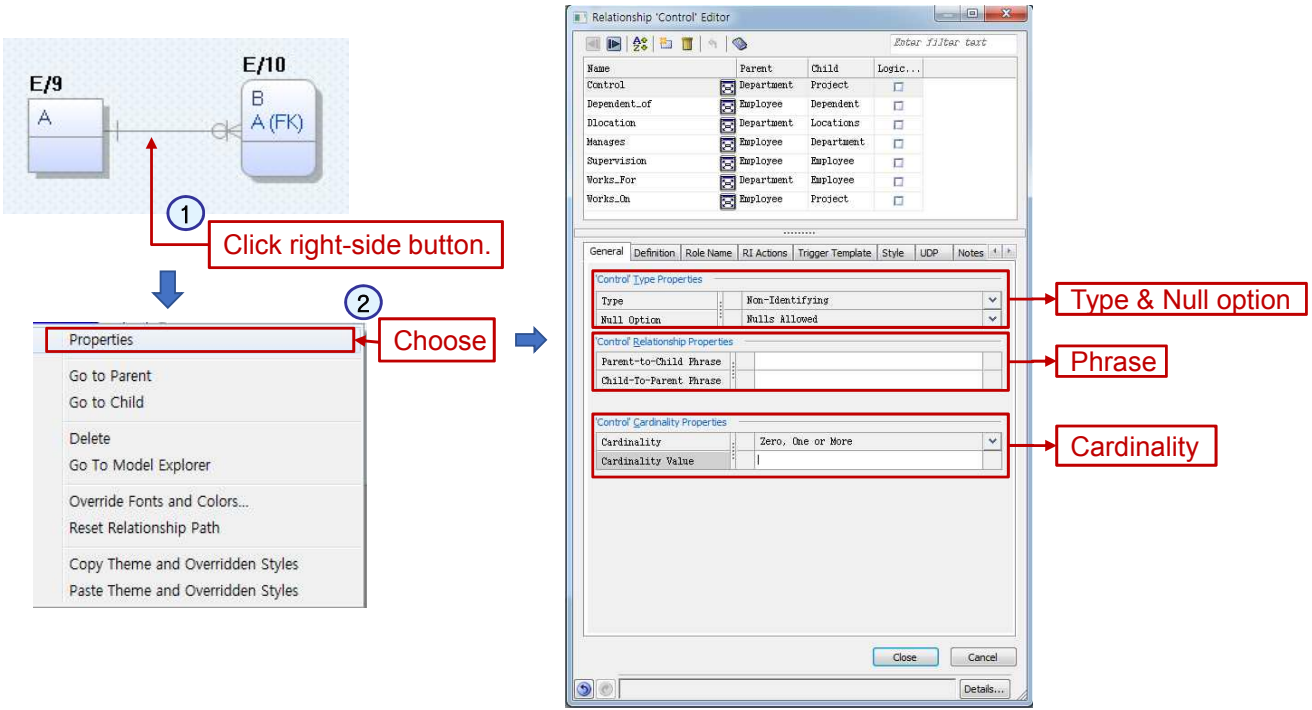
Step 4: Naming relationship types (cont'd.)

- After naming relationship types



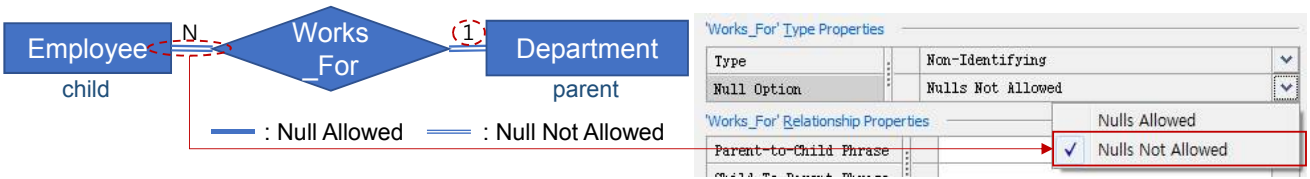
Step 5: Set the cardinality and optionality

- **Method**: Using relationship property dialog box

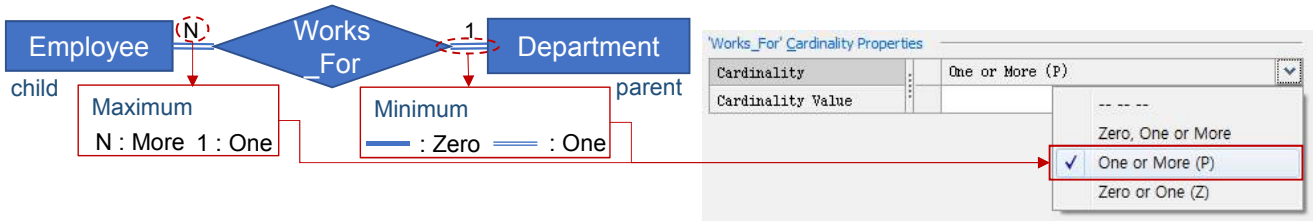


Step 5: Set the cardinality and optionality (cont'd.)

- **Null option**
  - Ascertain whether an instance at child entity type must have the relationship with the instance at parent entity type or not

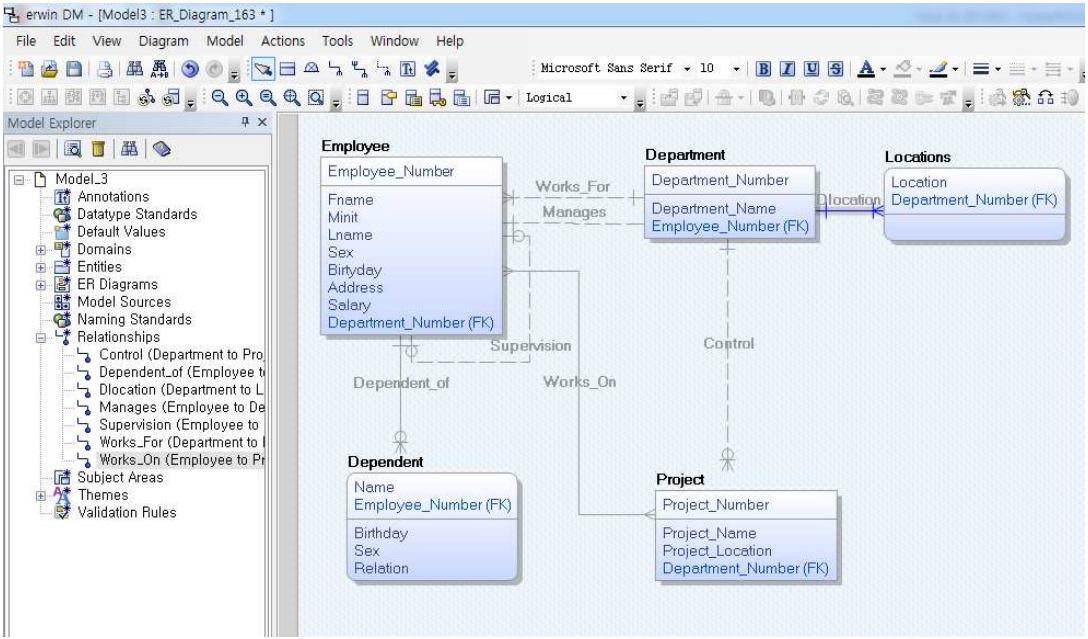


- **Cardinality**
  - The limit number of instances at child entity type which have the relationship with one instance at parent entity type



Step 5: Set the cardinality and optionality (cont'd.)

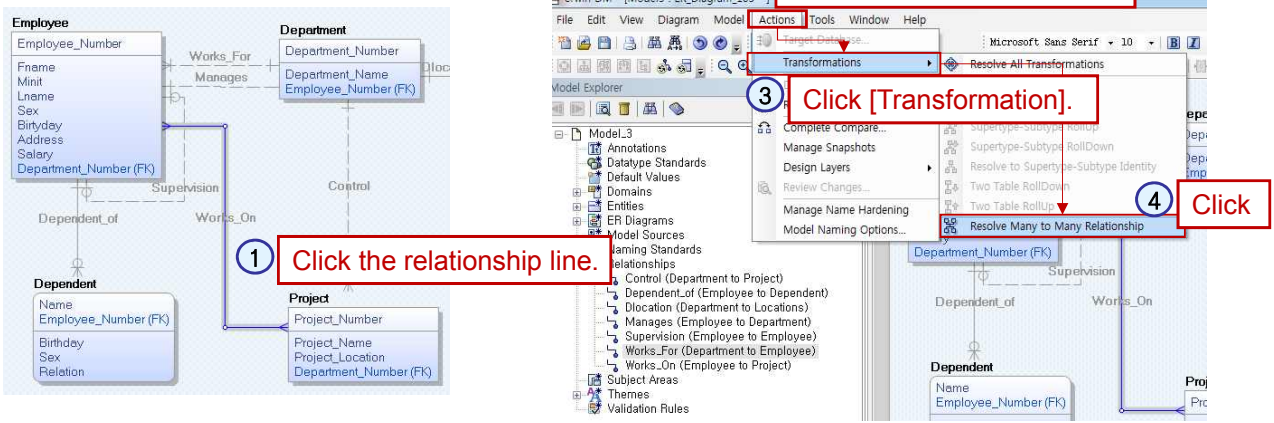
- After specifying the proper cardinality and optionality for relationship types (compared with the figure in slide 23)



Step 5: Set the cardinality and optionality (cont'd.)

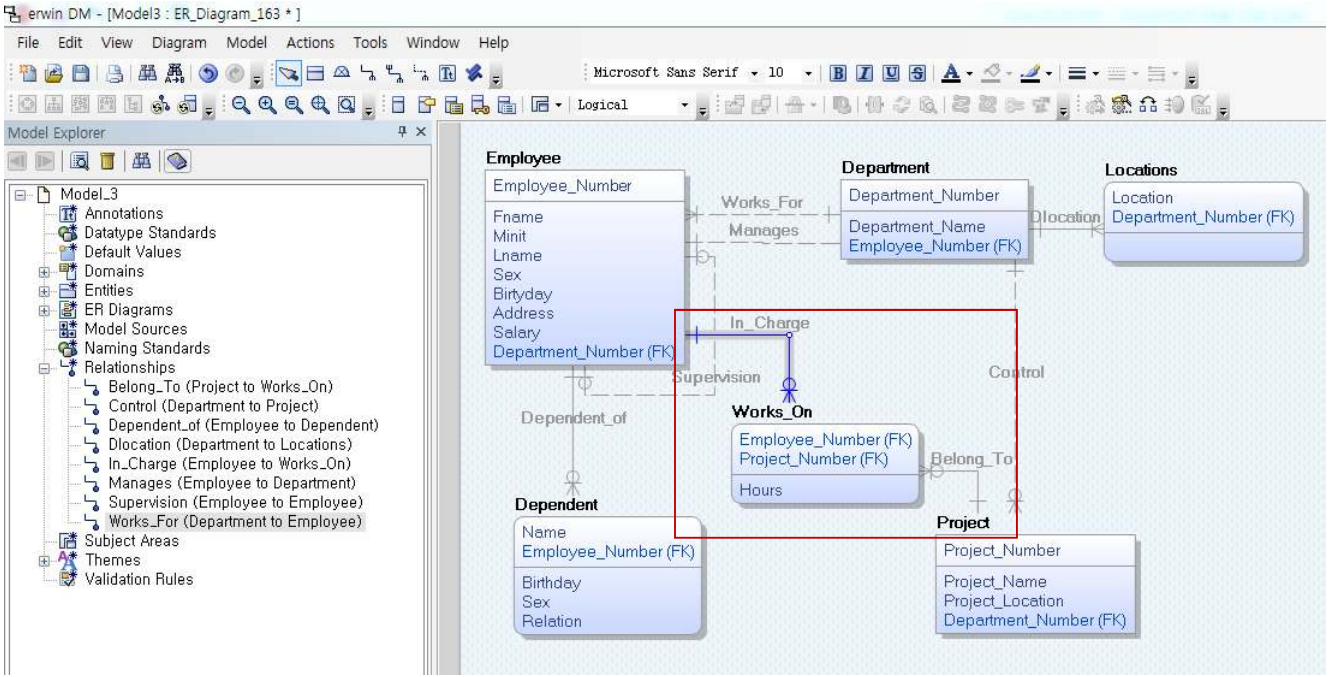
- **For M:N relationship**
  - **Method**: Transformation

M:N relationship type



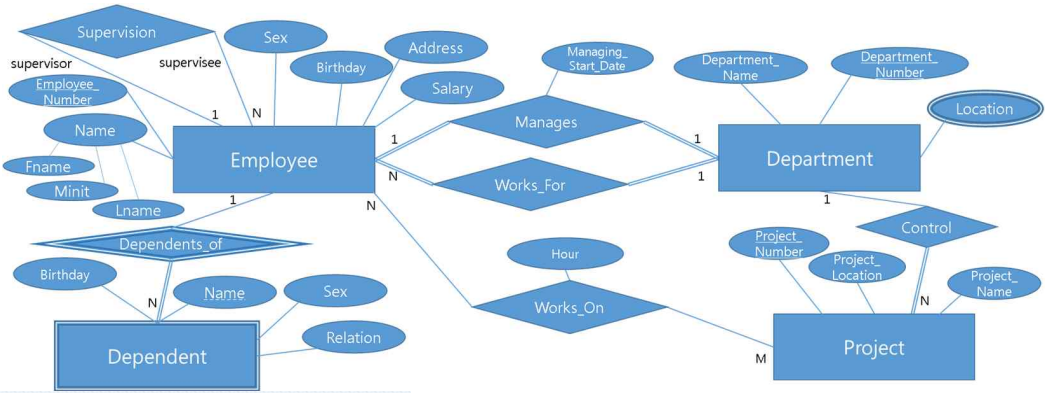
Step 5: Set the cardinality and optionality (cont'd.)

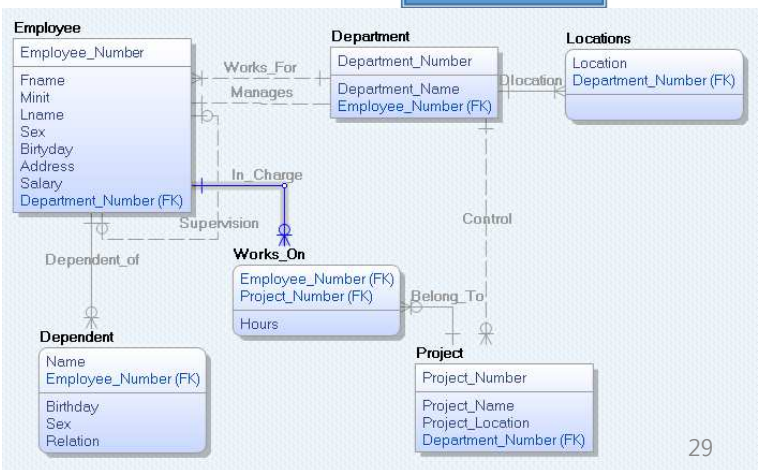
- After transformation and naming M:N relationship type



Step 5: Set the cardinality and optionality (cont'd.)

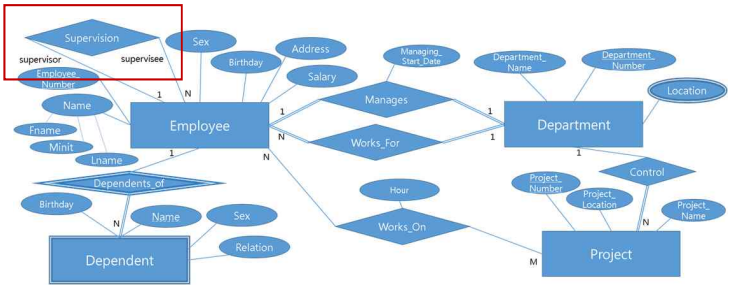
- Final result

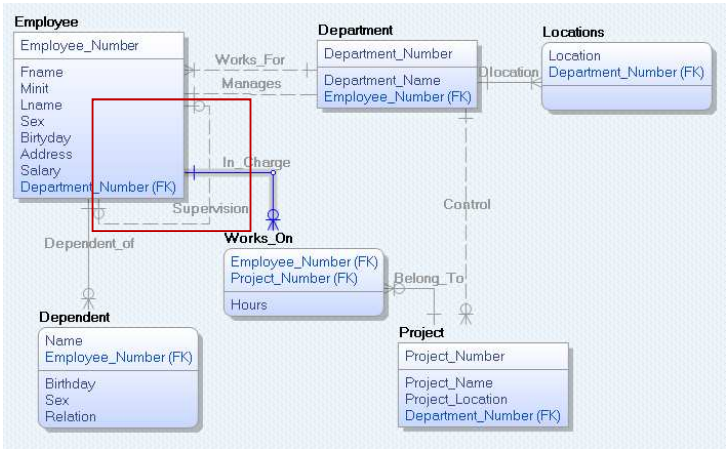




Supplement

1. How to show **self-relationship**





Supplement (cont'd.)

1. How to show **self-relationship**
   - **Method**: Using relationship property dialog box

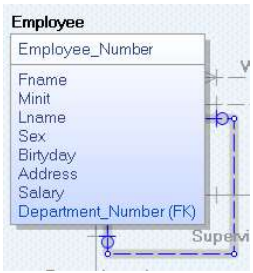
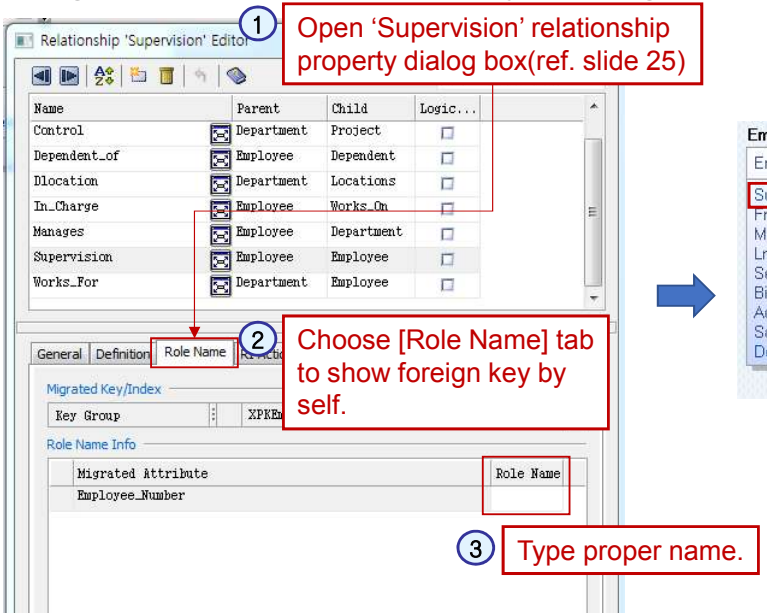


Figure 6. Employee entity before dealing self-relationship



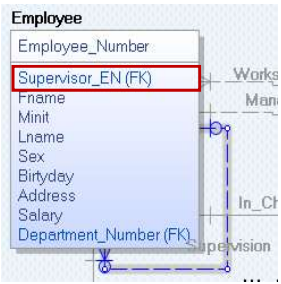


Figure 7. Employee entity after dealing self-relationship by typing [Role Name]

Supplement (cont'd.)

1. How to show **self-relationship**
   - **Method**: Using relationship property dialog box

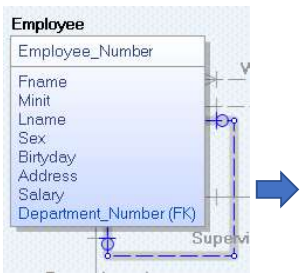
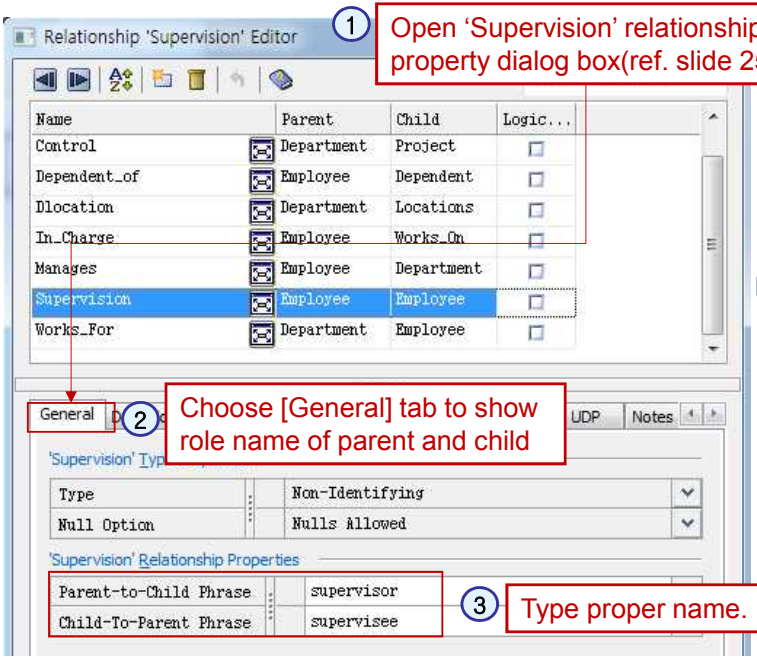


Figure 6. Employee entity before dealing self-relationship



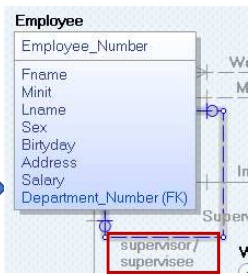
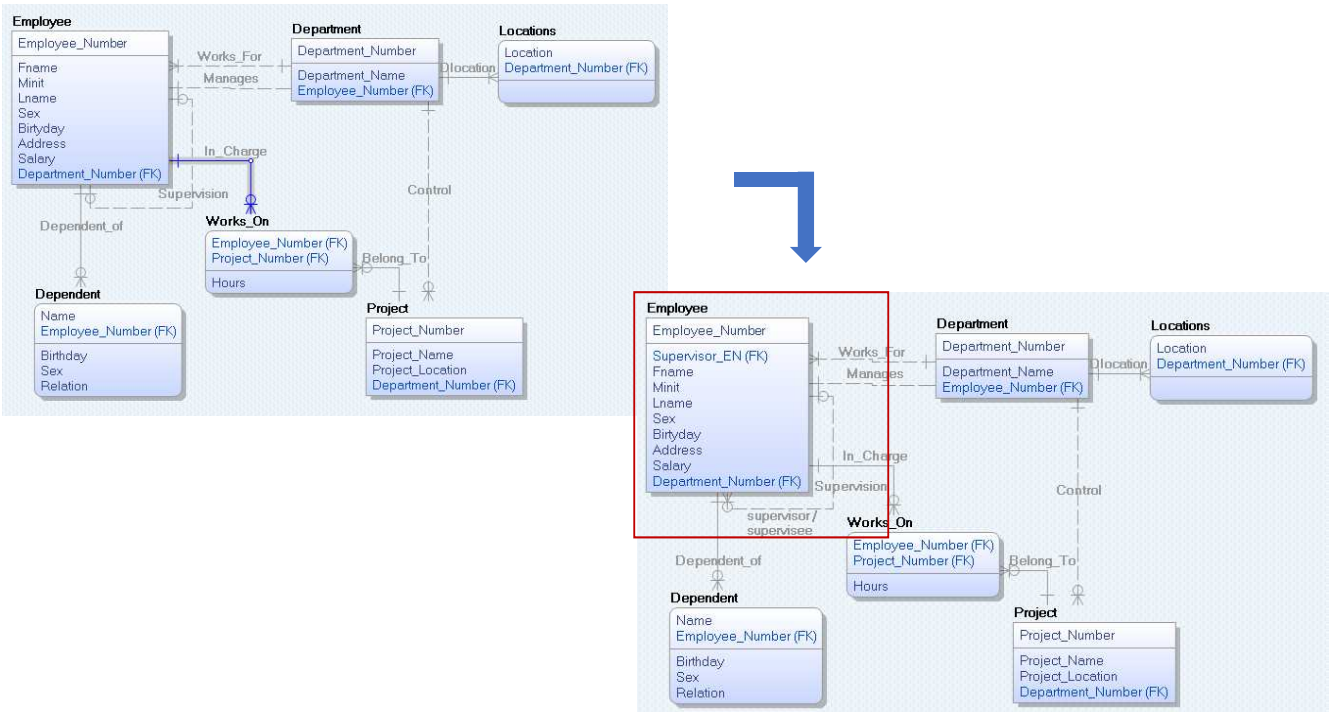


Figure 8. Employee entity after dealing self-relationship by typing name of between parent and child

Supplement (cont'd.)

1. How to show **self-relationship**
   - Result



Supplement (cont'd.)

2. [Physical] modeling mode
   - The modeling mode to design physical schema for the specified DBMS
   - ER-Win helps to design physical data model.
     - How choose?

Click [Physical] to change mode.

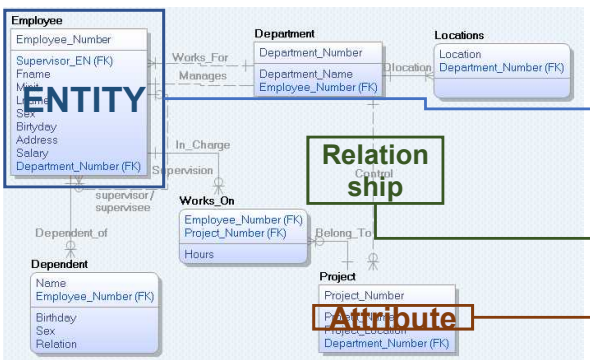


Figure . Logical diagram of company DB

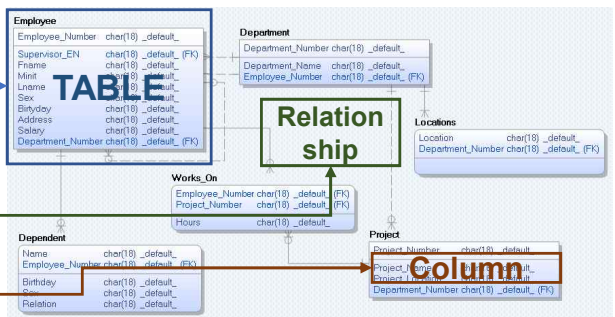
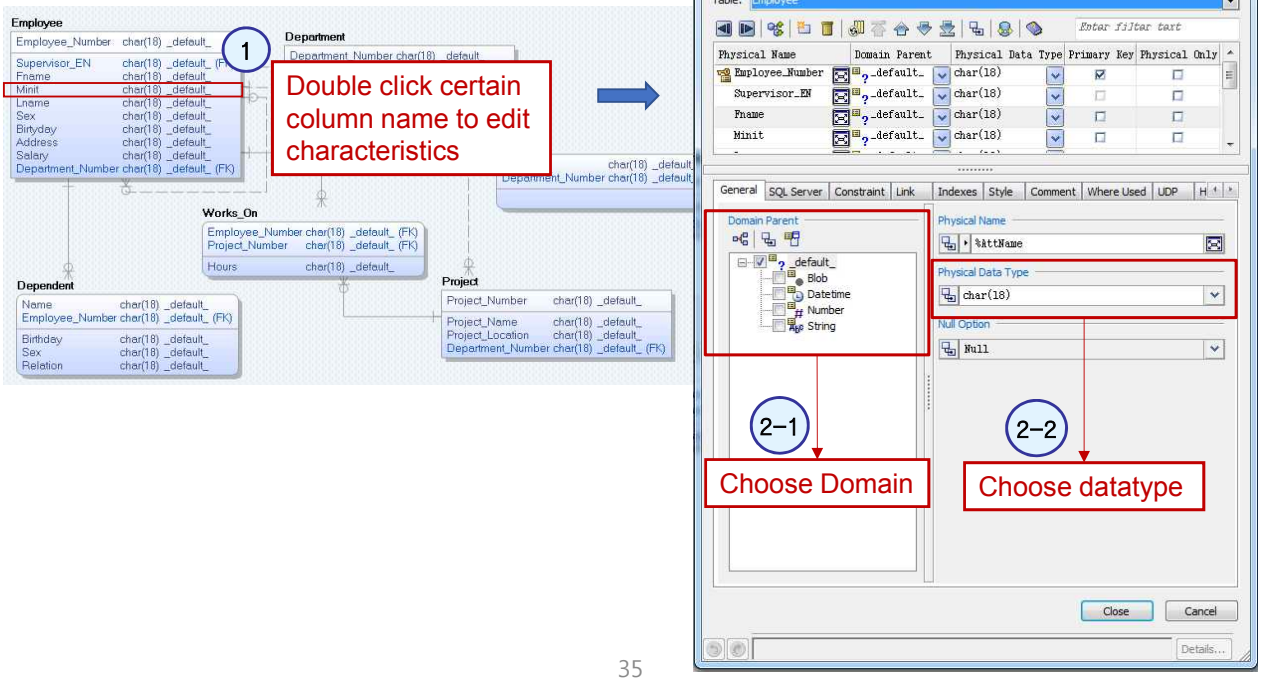


Figure . Physical diagram of company DB

Supplement (cont'd.)

2.[Physical] modeling mode

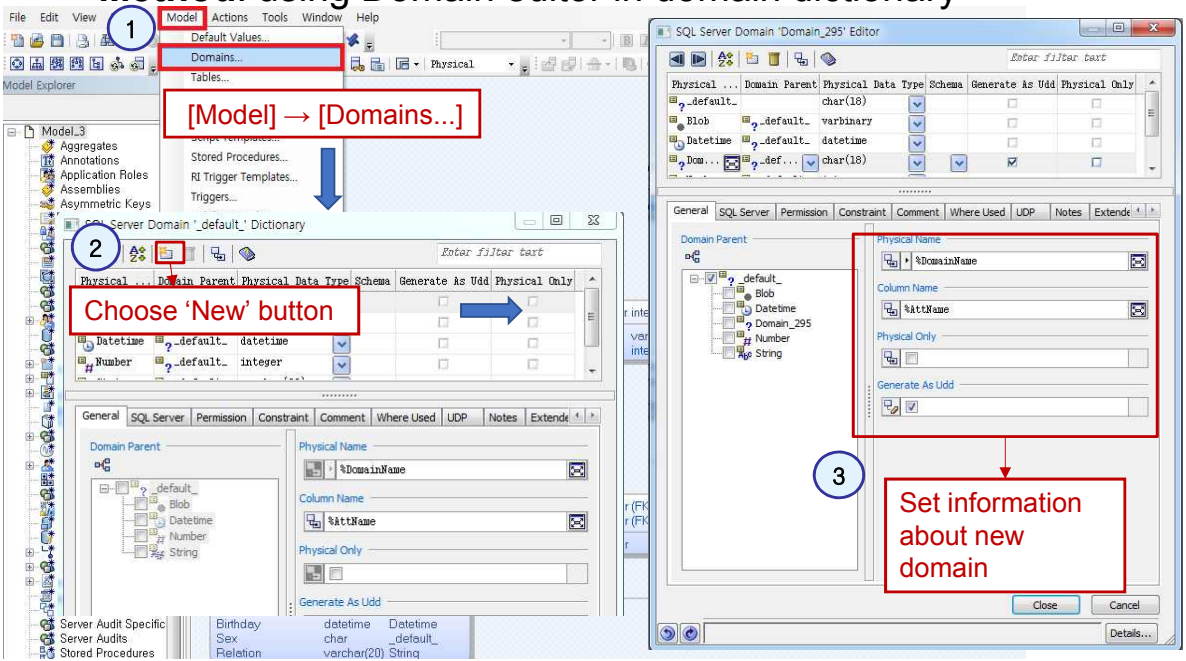
- How to set domain or datatype for columns?
  - **Method**: using column editor



Supplement (cont'd.)

2.[Physical] modeling mode

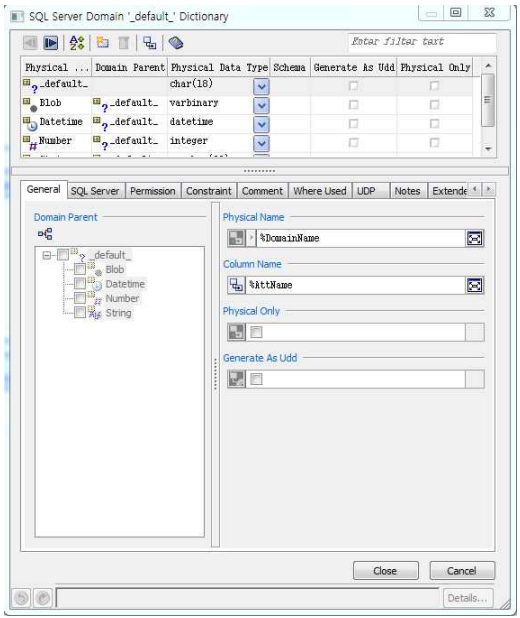
- How to make new domain for columns?
  - **Method**: using Domain editor in domain dictionary



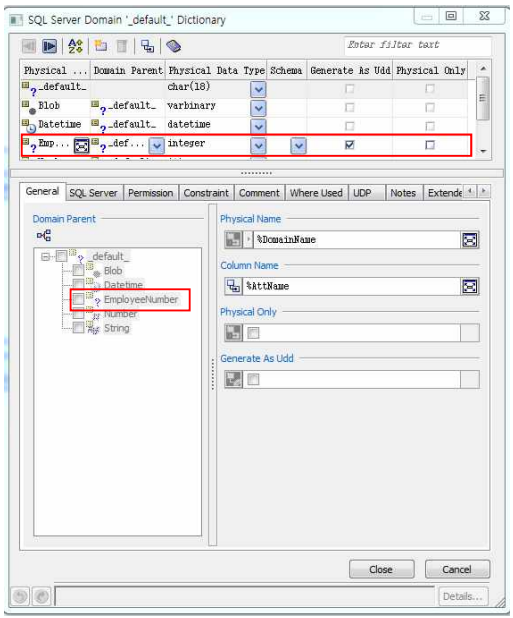
Supplement (cont'd.)

2.[Physical] modeling mode

- How to make new domain for columns?

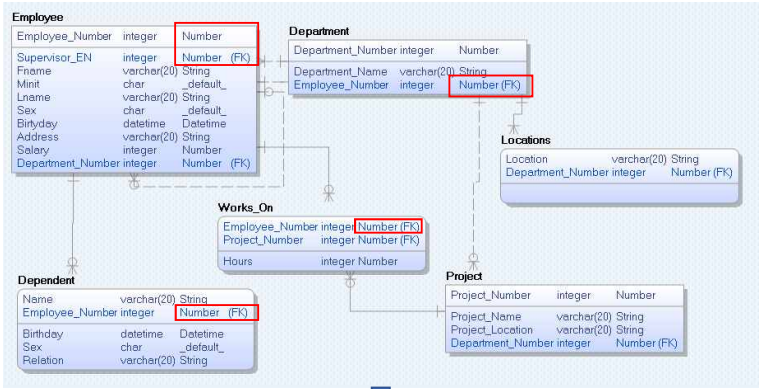


Domain dictionary before make new domain

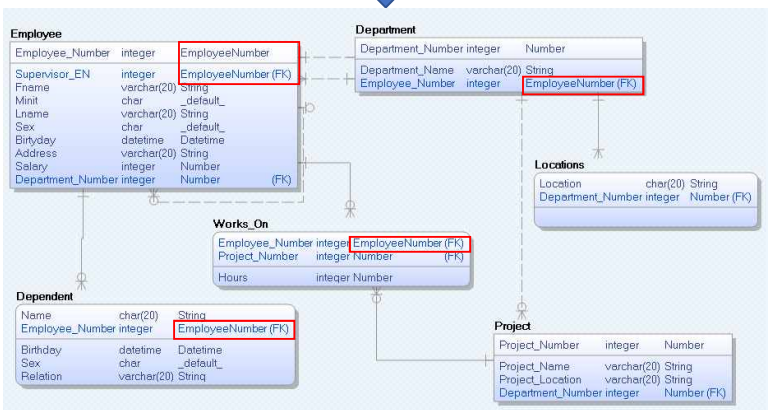


Domain dictionary after make new domain

Supplement (cont'd.)



Physical diagram before setting new domain



Physical diagram after setting new domain at appropriate position

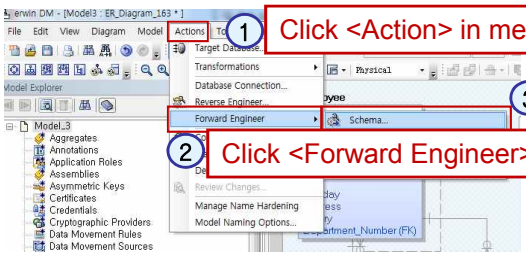
Supplement (cont'd.)

3. Forward engineering
   - The process of building from a high-level model to the actual database within the specified DBMS
   - ER-win can support the forward engineering.
   - How?

1)

Click [Physical] to change mode.

2)



1 Click <Action> in menu bar.

2 Click <Forward Engineer>.

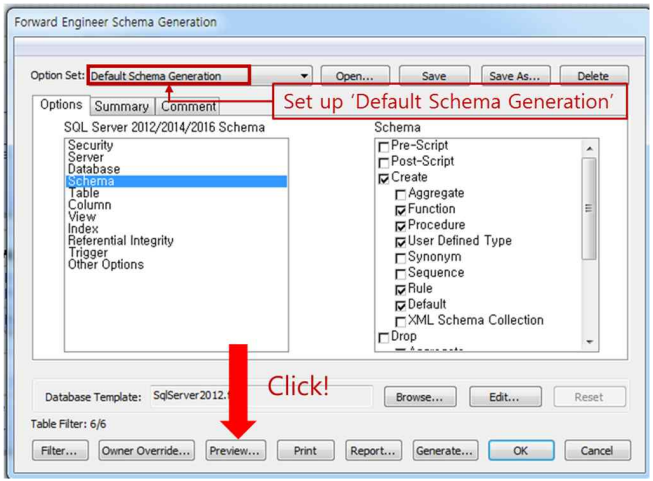
3 Click <Schema>.

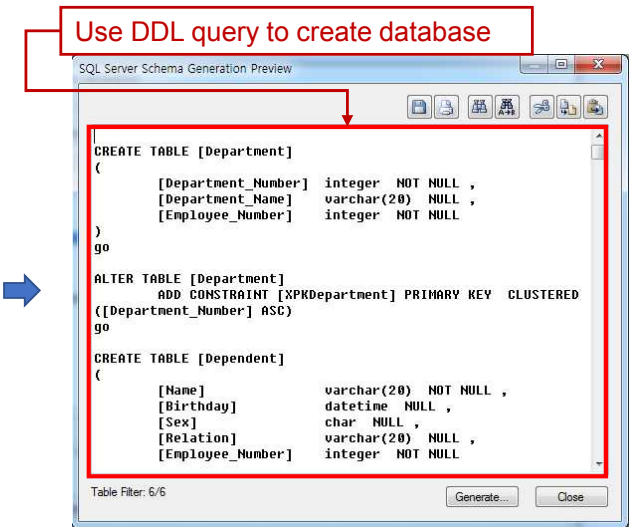
Supplement (cont'd.)

3. Forward engineering

– How?

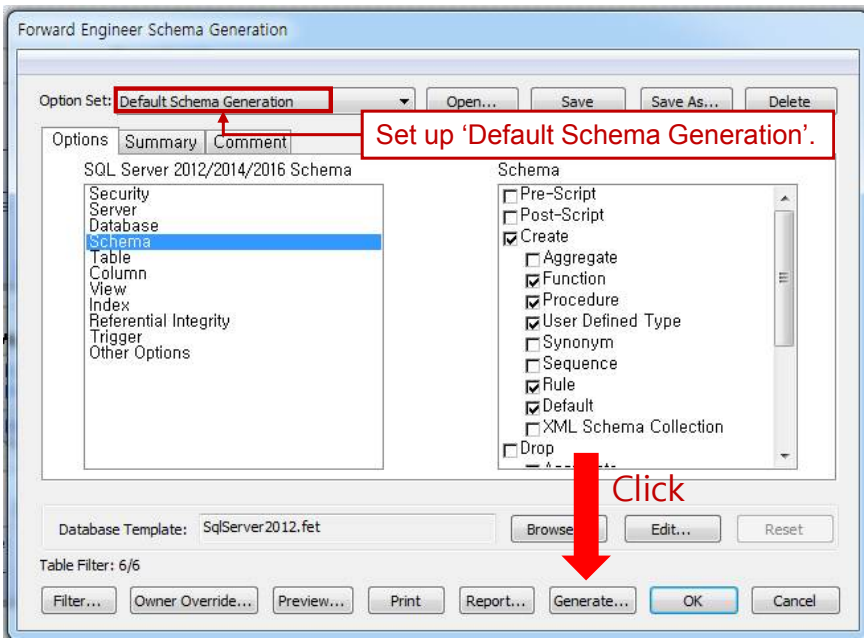
3) **DDL script previewing**





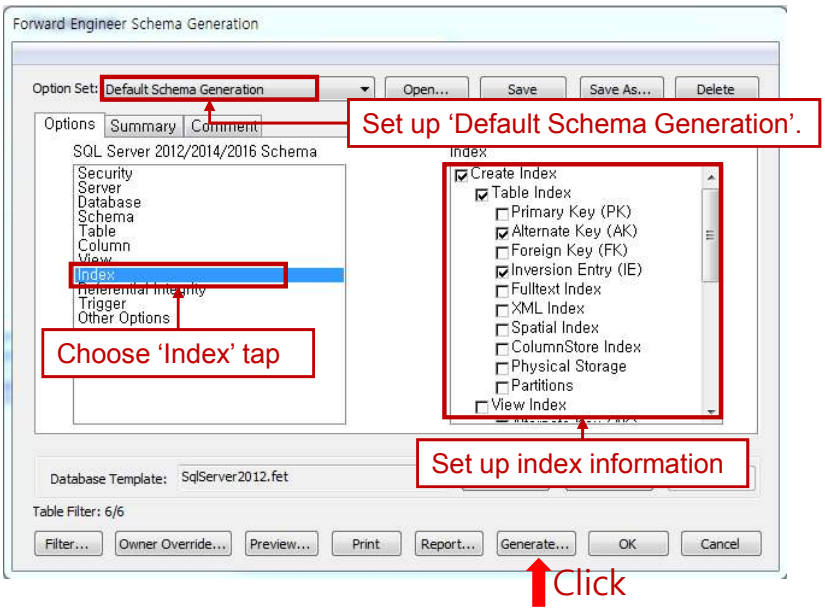
Supplement (cont'd.)

3. Forward engineering
   - How?
     4) **DB schema generation**



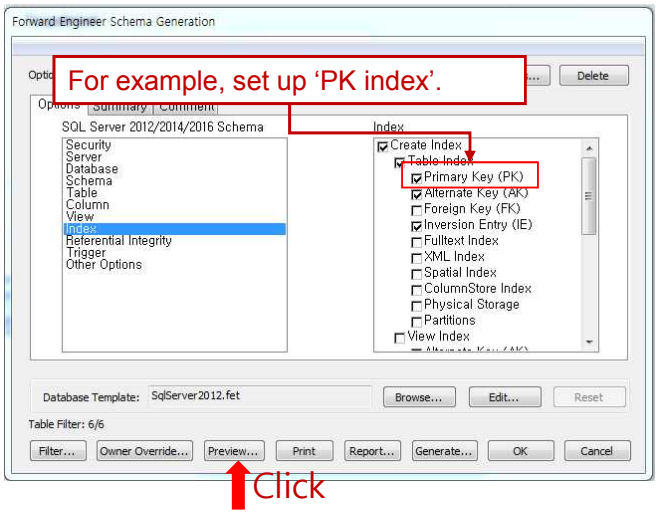
Supplement (cont'd.)

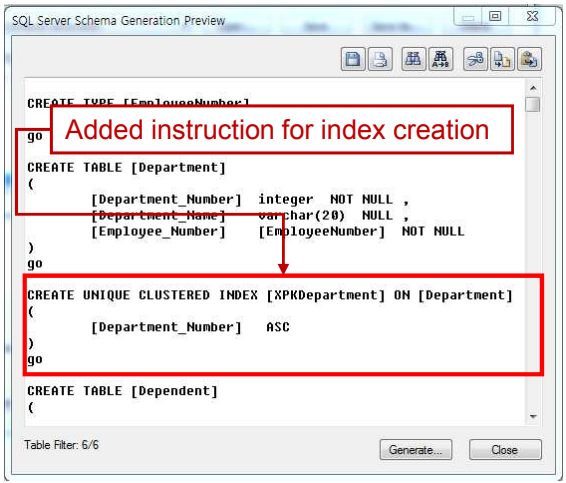
3. Forward engineering
   - How?
     4) **Index generation**



Supplement (cont'd.)

3. Forward engineering
   - How?
     4) **Index generation**





THANK YOU

인하대학교