EPL342 –Databases

Lab 3

ER Modeling (Entities) in ERD+
Conceptual Modeling in SQL Server 2017

Before We Begin

- Visit https://erdplus.com/ and create an account

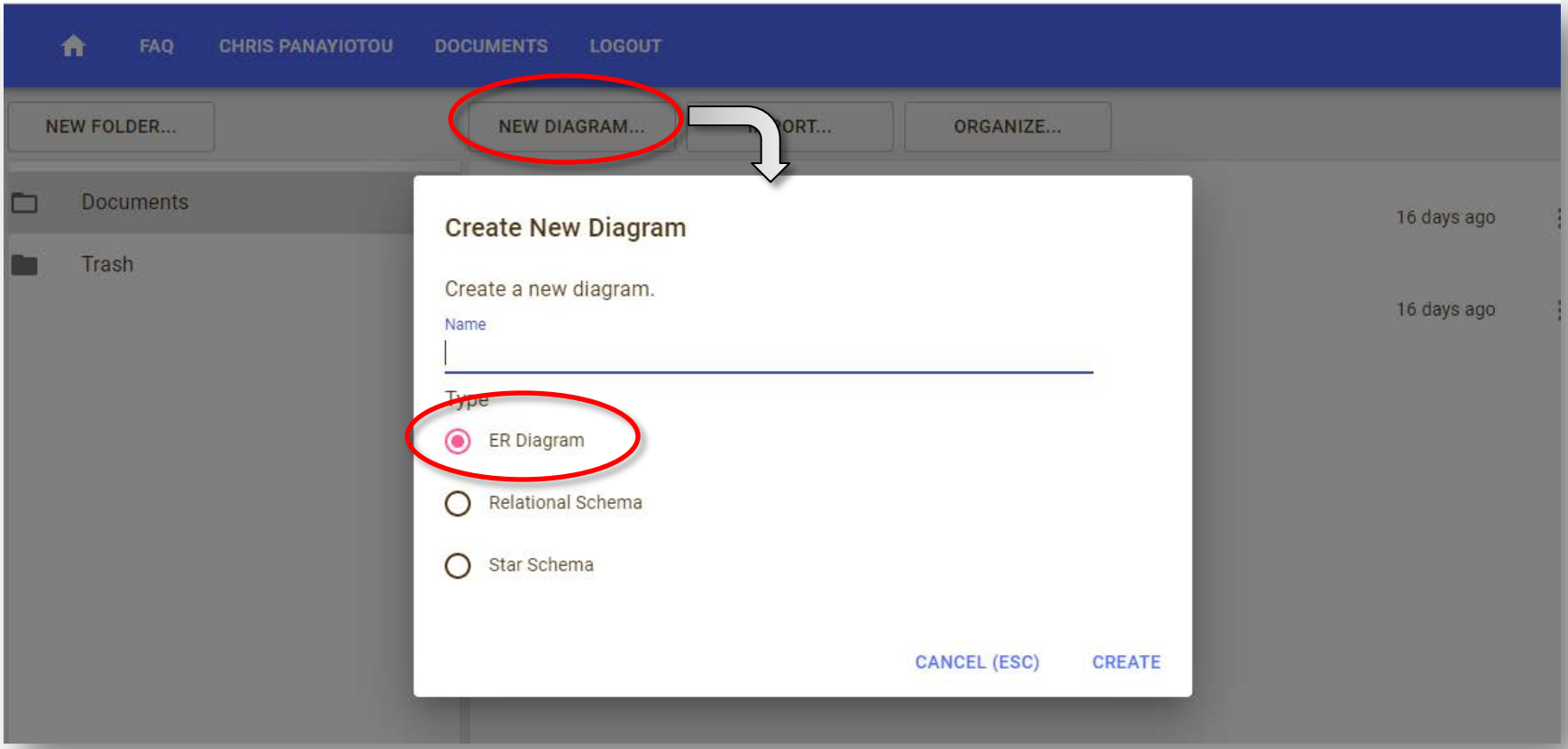
- Start the SQL Server Management Studio
  - Server: mssql.cs.ucy.ac.cy
  - Authentication: SQL Server Authentication

  - Username: <check your email>
  - Password: <check your email>

Lab Introduction

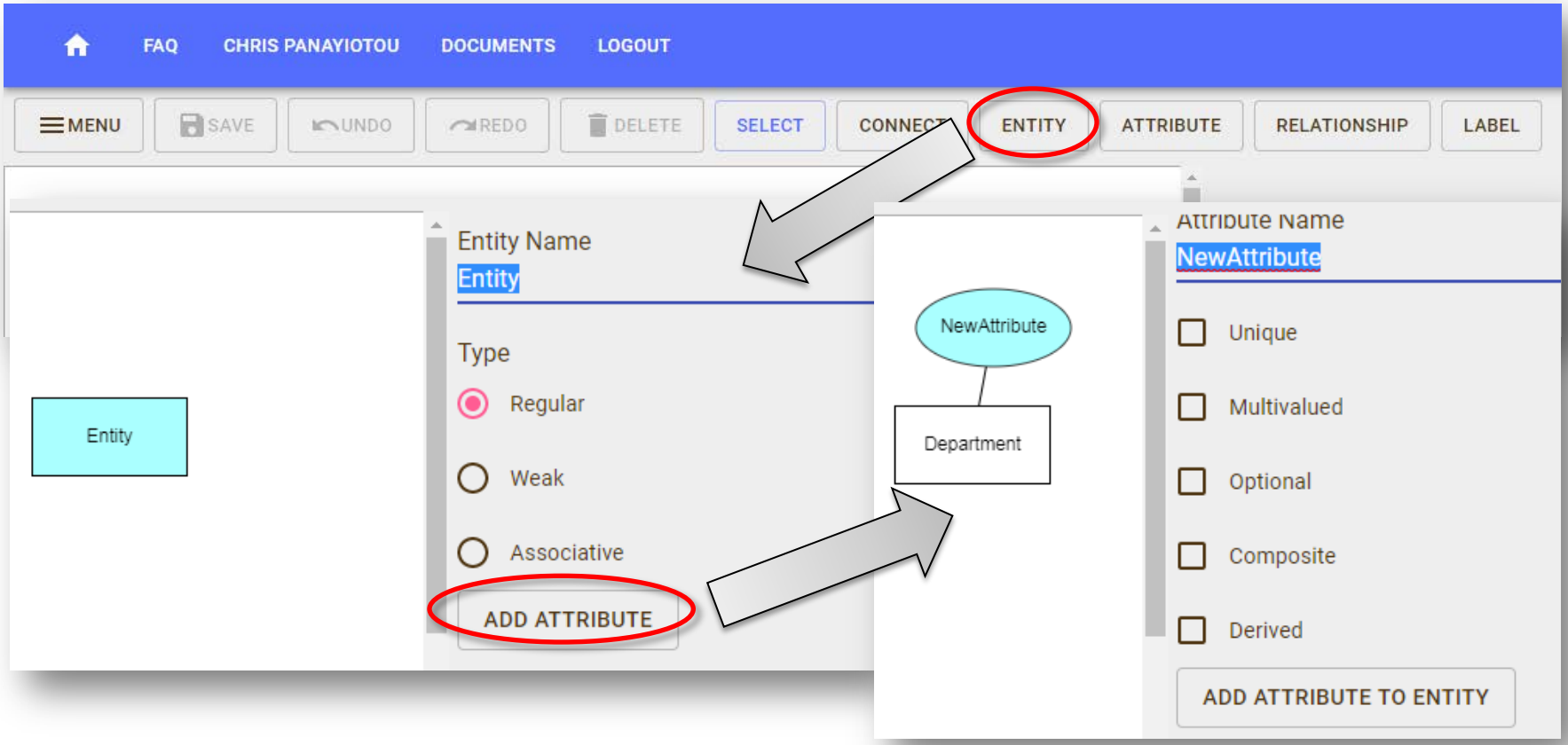
- COMPANY Database
- During your lecture 4, you have identified 4 entities consisting of the COMPANY db:
  - DEPARTMENT
  - PROJECT
  - EMPLOYEE
  - DEPENDENT
- Our job is to design the entities/tables based on the requirements

ERD+ - Create a new Document



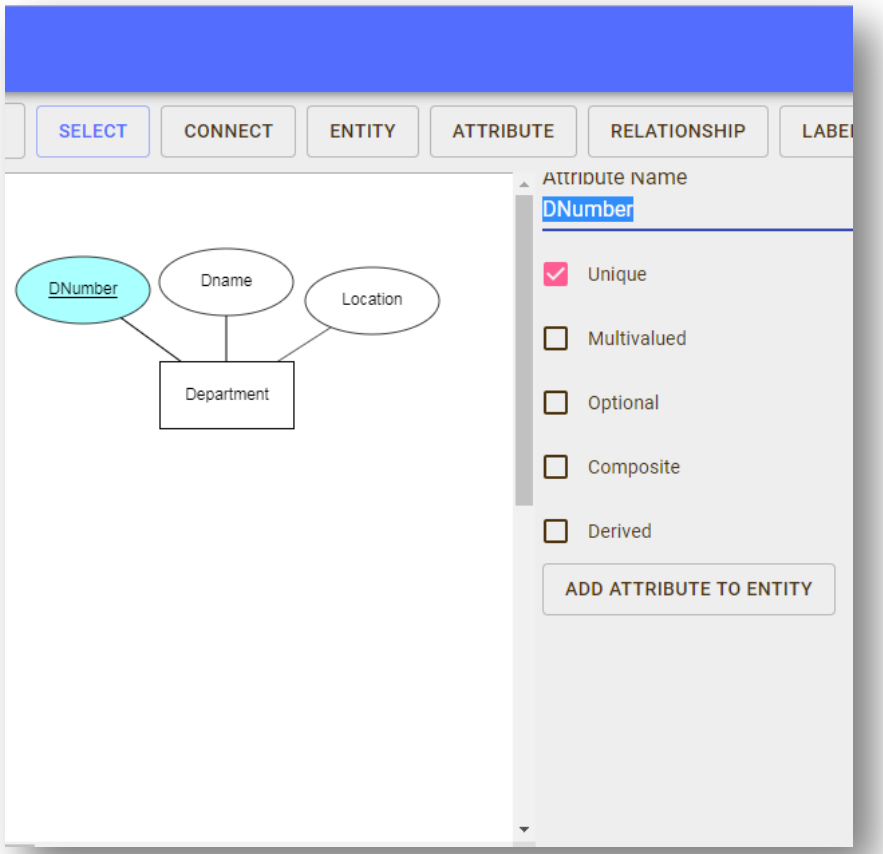
ERD+ - Create new Entity

- To create a new entity open the new diagram and from the menu select entity



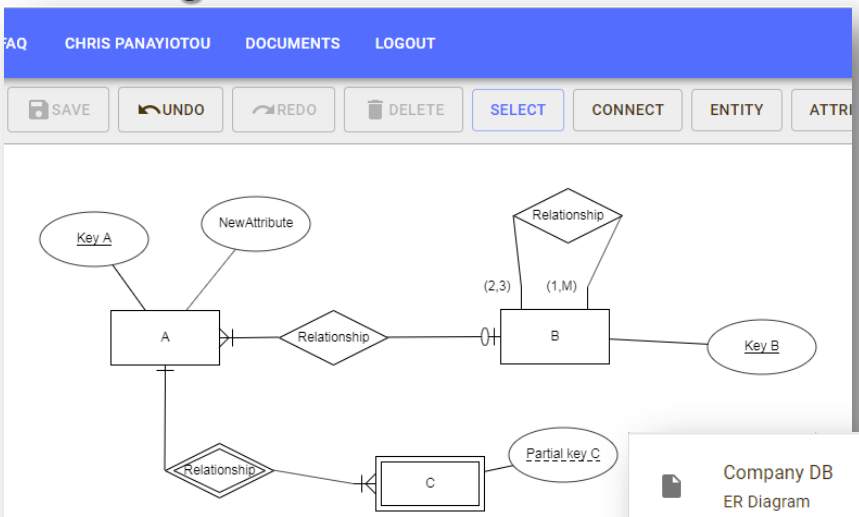
ERD+ - Entity Properties

- Rename the newly created entity to DEPARTMENT
- Add to it the following attributes:
  - DNumber (Key)
  - DName
  - Location

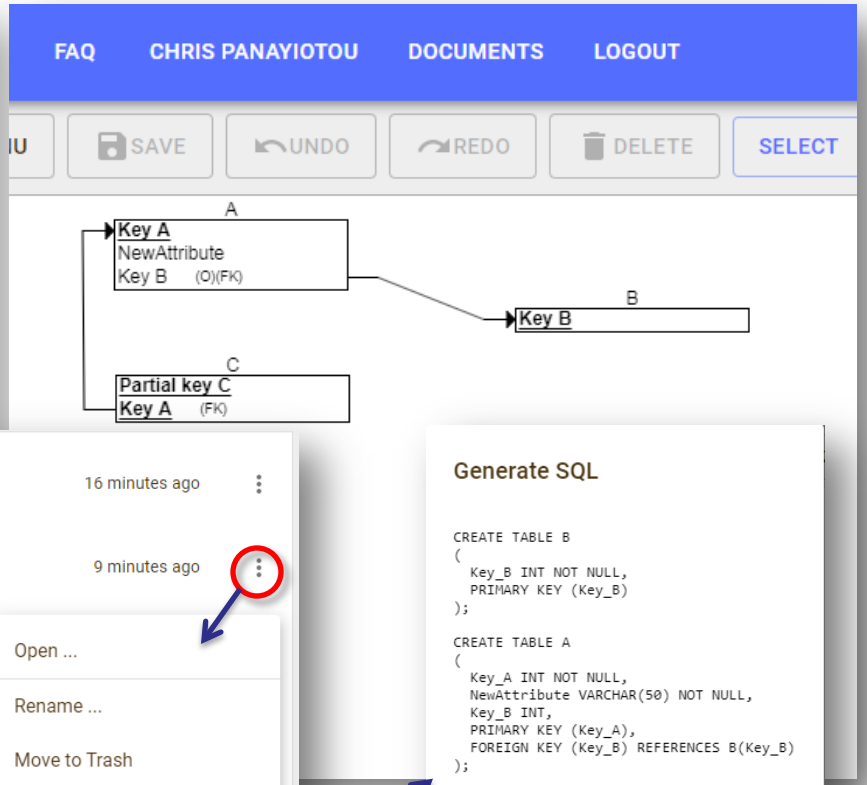


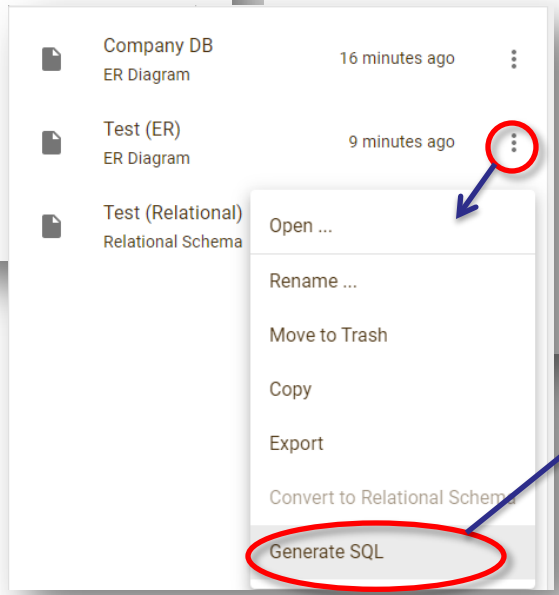
ERD+ - Different Documents Types

ER Diagram



Relational Schema





For Relational Schema documents you can also generate the corresponding SQL statements that create it!

ERD+ - Practice (15 minutes)

- Create Entities and Attributes in ERD+ for the following:

EMPLOYEE
- Ssn (key, unique)
- Bdate
- Fname
- Minit
- Lname
- Address
- Salary
- Sex

PROJECT
- Number (key, unique)
- Name
- Location
- Department

DEPENDENT
- Employee
- Name
- Relationship
- Bdate
- Sex

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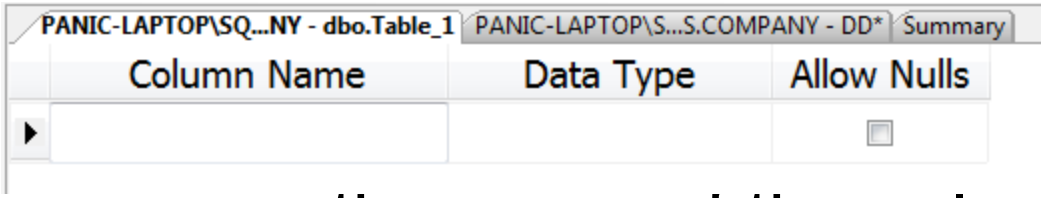
ER Modeling (Entities) in ERD+

Conceptual Modeling in SQL Server 2017

Creating Tables

- First, navigate to your database and right-click on Tables→New Table

The designer provides you with 3 columns:



Column name: the name of the column (e.g., Name, Birth Date, Salary)

Data type: the data type for the column (e.g., int, varchar(30), bit)

Allow nulls: if checked then you must supply a value for each row (nulls are not allowed)

DEPARTMENT

- Specification I - Each department has the following fields:
  - Name
  - Number
  - Manager
  - Start date of the department manager
  - Multiple locations

Creating Table DEPARTMENT

- You must select the appropriate data type for each column
  - **number:** is an integer (e.g., tinyint, smallint, int, bigint)
  - **name:** is a string (e.g., char, varchar)
  - **Manager:** is the name of an employee (i.e., a string)
  - **Manager start date:** is a date (e.g., datetime, smalldatetime)

Creating Table DEPARTMENT

- Create table department using the following specifications

Column Name	Data Type	Allow Nulls
number	int	No
name	nvarchar(50)	No
Manager	nvarchar(50)	No
Manager start date	Smalldatetime	No

- Save the table with the name DEPARTMENT

Column Names

- Column names can only contain valid characters (i.e., letters, digits and underscores)
- When you saved the DEPARTMENT table note that *Manager start date* is now saved as *[Manager start date]*. This is because white spaces are considered invalid characters.

Column Names Limitations

- To ensure maximum database compatibility
  - **Avoid using special characters**
    If you use these characters < [,], ’, ” > then it is more difficult not only to reference that object but also to read code that contains the name of that object
  - **Avoid using reserved keywords**
    SQL Server uses reserved keywords for manipulating and accessing databases.
  - When you use special characters or reserved keywords the column name is saved using brackets

Column Names/Identifier Rules

- The first character must be one of the following:
  - A letter as defined by the Unicode Standard 3.2. The Unicode definition of letters includes Latin characters from a through z, from A through Z, and also letter characters from other languages.
  - The underscore (_), at sign (@), or number sign (#).
    Certain symbols at the beginning of an identifier have special meaning in SQL Server. A regular identifier that starts with the at sign always denotes a local variable or parameter and cannot be used as the name of any other type of object. An identifier that starts with a number sign denotes a temporary table or procedure. An identifier that starts with double number signs (##) denotes a global temporary object. Although the number sign or double number sign characters can be used to begin the names of other types of objects, we do not recommend this practice.
    Some Transact-SQL functions have names that start with double at signs (@@).
- Subsequent characters can include the following:
  - Letters as defined in the Unicode Standard 3.2.
  - Decimal numbers from either Basic Latin or other national scripts.
  - The at sign, dollar sign ($), number sign, or underscore.
- The identifier must not be a Transact-SQL reserved word. SQL Server reserves both the uppercase and lowercase versions of reserved words.
- Embedded spaces or special characters are not allowed.
- Supplementary characters are not allowed
- More info here

Column Properties

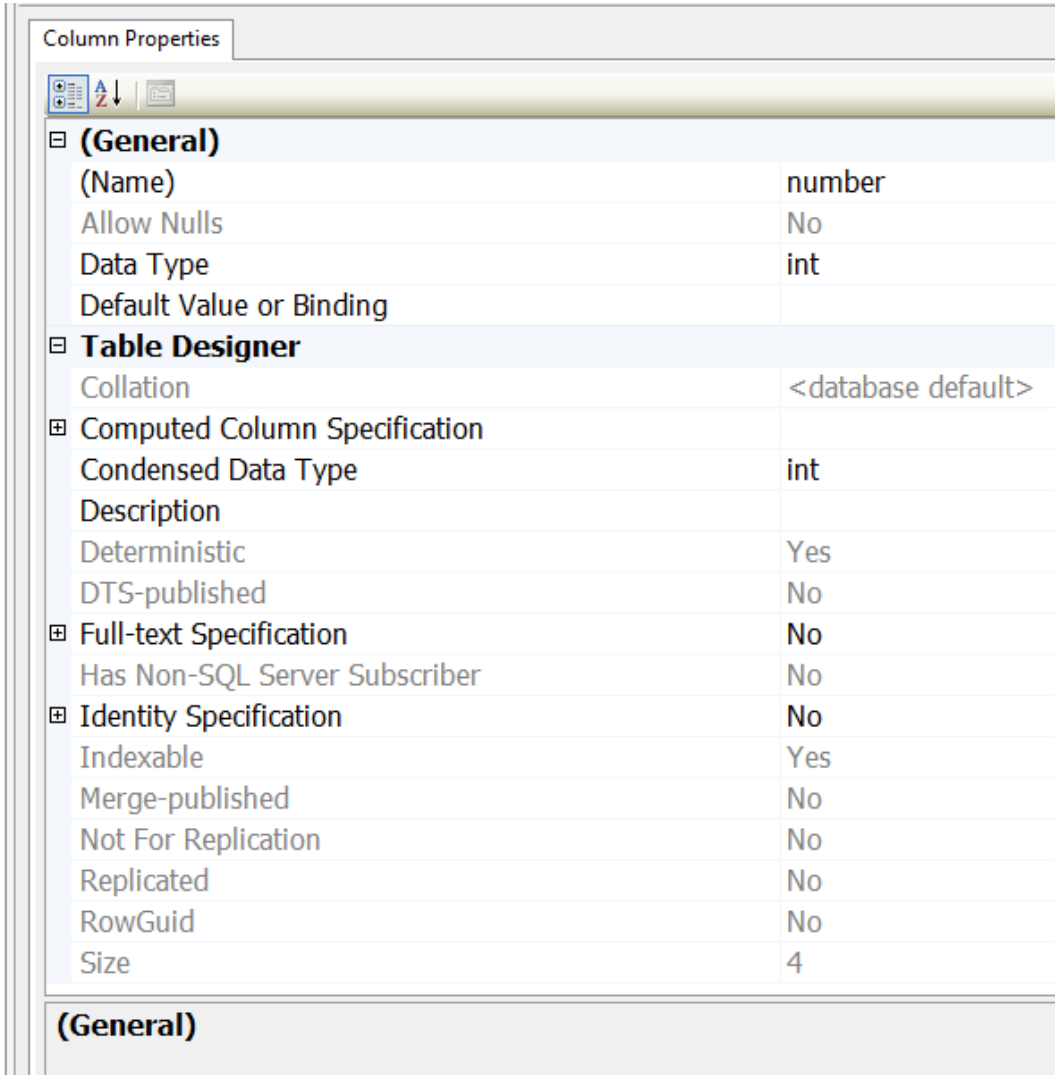


Table: Department

Column: number

COMPANY Database

- Create the COMPANY database using the following specifications

EMPLOYEE

Column Name	Data Type	Allow Nulls
SSN	int	☐
Bdate	smalldatetime	☐
Fname	nvarchar(20)	☐
Minit	nvarchar(1)	☐
Lname	nvarchar(30)	☐
Address	nvarchar(100)	☐
Salary	smallmoney	☐
Sex	bit	☐
Department	nvarchar(50)	☐
Supervisor	int	☐

DEPENDENT

Column Name	Data Type	Allow Nulls
Relationship	nvarchar(30)	☐
Birth_date	smalldatetime	☐
Sex	bit	☐
Employee	int	☐
Dependent_name	nvarchar(50)	☐

PROJECT

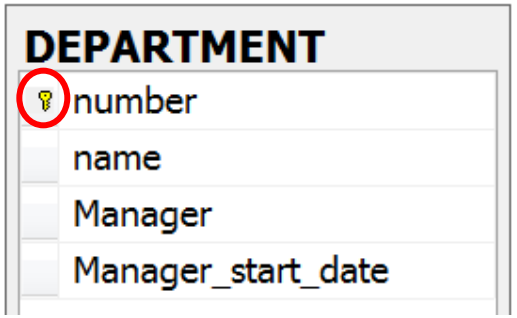
Column Name	Data Type	Allow Nulls
number	int	☐
name	nvarchar(50)	☐
location	nvarchar(50)	☐
controlling_department	nvarchar(50)	☐

Primary Keys

- A **Primary key** is a candidate key to uniquely identify each row in a table
- Candidate keys:
- DEPARTMENT: name, number
- PROJECT: name, number
- EMPLOYEE: ssn
- DEPENDENT: ???

Creating Primary Keys

- To create a Primary Key, open the table design and select a column.
- Use the  icon to assign the column as the primary key
- Set the following Primary Keys
- DEPARTMENT: number
- PROJECT: number
- EMPLOYEE: ssn



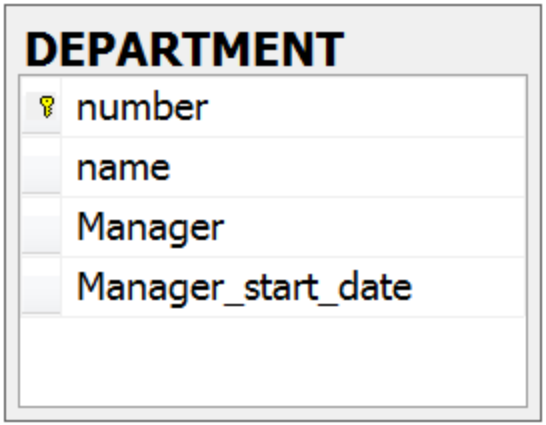
Creating Identities

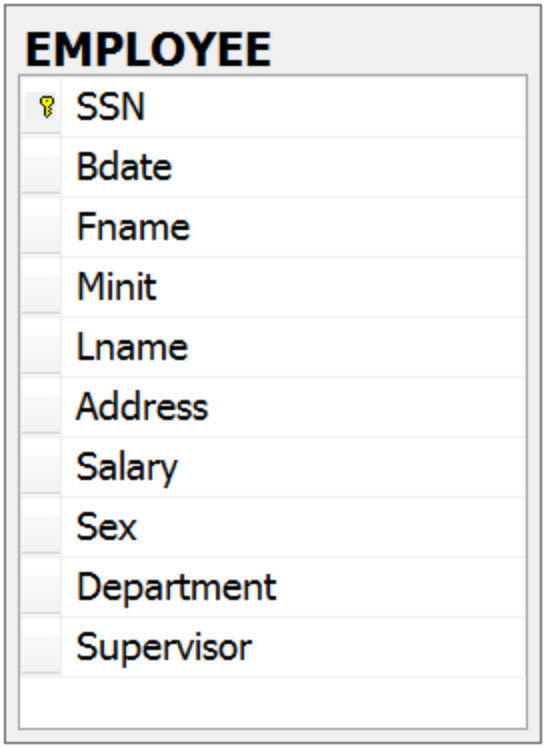
- Identities are columns with unique values produced automatically from SQL Server
- You can set the following properties:
  - **Is Identity:** Indicates whether or not this column is an identity column
  - **Identity Seed:** The value that will be assigned to the first row in the table
  - **Identity Increment:** This value is the increment that will be added to the **Identity Seed** for each subsequent row

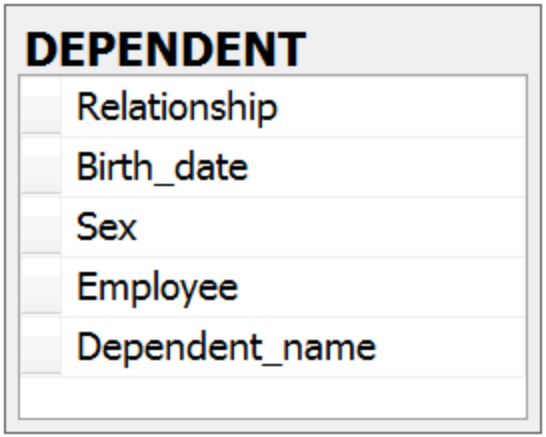
Database Diagram

- Right-click on Database Diagrams and select ***New Database Diagram***
- Use the add button ton add all tables to the diagram
- Right-click on a table to see Table View options (e.g.,Standard, Keys, Custom, etc)
- Save the diagram as DD
- In the future we are going to add relationships to the database diagram

COMPANY database diagram







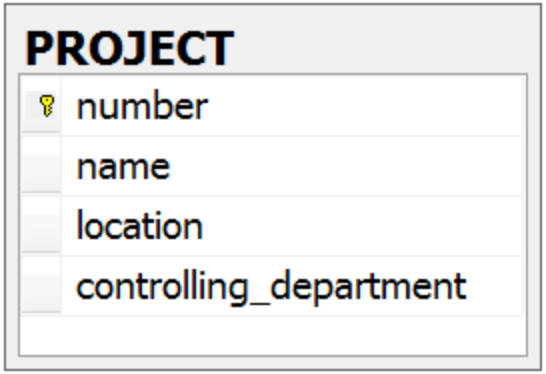


Table Views

Column Names

DEPARTMENT

number
name
Manager
Manager_start_date

Standard

DEPARTMENT

	Column Name	Data Type	Allow Nulls
	number	int	
	name	nvarchar(50)	
	Manager	nvarchar(50)	
	Manager_start_date	smalldatetime	

Keys

DEPARTMENT

number

Custom

DEPARTMENT

	Column Name	Nullable	Data Type	Length	Default Value	Description
	number	No	int	4		
	name	No	nvarchar(50)	50		
	Manager	No	nvarchar(50)	50		
	Manager_st...	No	smalldatetime	4		