

5장–DATABASE



개요

용어 정리

- ❖ 데이터베이스(database)
 - 데이터의 저장 및 관리를 위한 데이터의 집합체
- ❖ DBMS(Database Management System)
 - 데이터베이스를 관리하기 위한 시스템
 - 주요 기능
 - 데이터의 추가/조회/변경/삭제
 - 데이터의 무결성(integrity) 유지
 - 트랜잭션 관리
 - 데이터의 백업 및 복원
 - 데이터 보안

용어 정리

❖ 테이블(Table)

- 데이터가 저장되는 가상의 장소

❖ 컬럼(Column)

- (보통 원형 석조) 기둥[원주];
- (인쇄된 페이지의) 세로단
- (페이지 아래로 나열한 숫자나 단어들의) 세로줄[열]
- 같은 의미로 속성(attribute)을 사용하기도 함.

	Column1	Column2	Column3

용어 정리

❖ 레코드(record)

- 테이블에서 단일 구조 데이터 항목을 의미함
- 같은 의미로 튜플(tuple) 또는 로우(row, 행)

	Column1	Column2	Column3
Record1			
Record2			

❖ 스키마

- (전문 용어) (계획 · 이론의) 개요[윤곽]
- 테이블 간의 관계 및 테이블의 구조를 정의해 놓은 것

용어 정리

❖ CRUD

- Create, Read, Update, Delete를 묶어서 일컫는 말
- 유사용어
 - ABCD: add, browse, change, delete
 - ACID: add, change, inquire, delete
 - BREAD: browse, read, edit, add, delete

❖ Primary Key

- 레코드 식별을 위해 사용하는 대표값
- 중복 불가, not null

❖ Foreign Key

- 다른 테이블에서 Primary Key를 참조하는 것.

설치

Oracle 다운로드

A screenshot of a Google search results page. The search query is "oracle 11g express edition download". The results are filtered by "전체" (All). The first result is a link to Oracle Database Express Edition 11g Release 2 Downloads.

Google search results for "oracle 11g express edition download":

- 전체 동영상 이미지 뉴스 지도 더보기
- 검색결과 약 1,030,000개 (0.67초)
- [Oracle Database Express Edition 11g Release 2 Downloads](#)
www.oracle.com/.../express-edition/downloads/index.html ▾ 이 페이지 번역하기

Oracle Database Express Edition 11g Release 2

June 4, 2014

Thank you for accepting the License Agreement; you may now download this si

[Oracle Database Express Edition 11g Release 2 for Windows x64](#)

- Unzip the download and run the DISK1/setup.exe

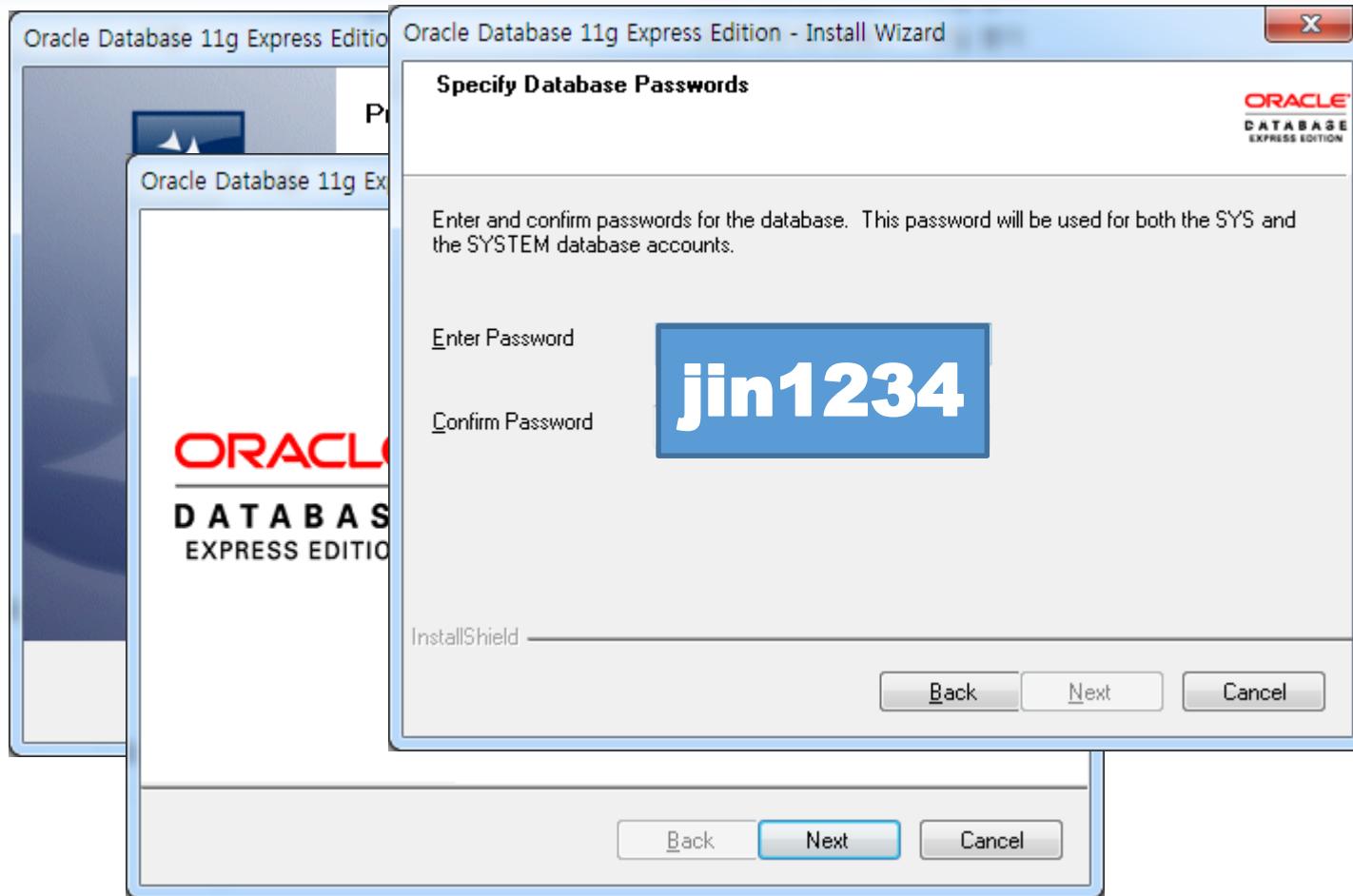
[Oracle Database Express Edition 11g Release 2 for Windows x32](#)

- Unzip the download and run the DISK1/setup.exe

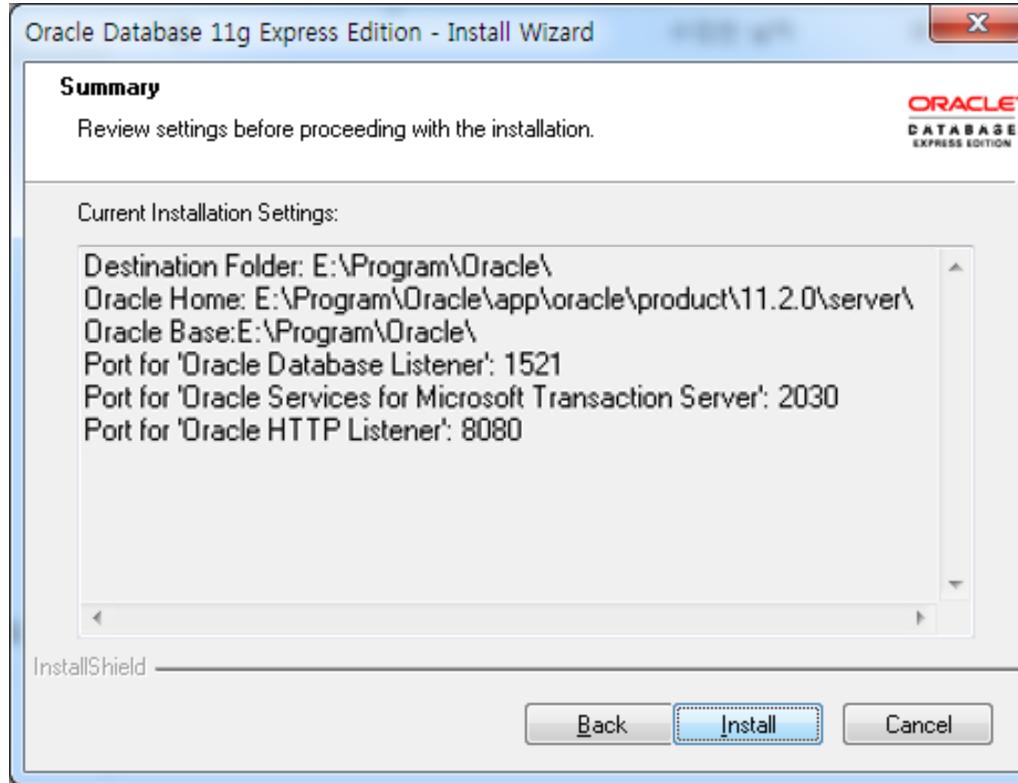
[Oracle Database Express Edition 11g Release 2 for Linux x64](#)

- Unzip the download and the RPM file can be installed as normal

Oracle 설치



Oracle 설치



Oracle 계정 관리

❖ 접속

- E:\Oracle\app\oracle\product\11.2.0\server\bin>
- sqlplus "/as sysdba"

❖ 계정 추가

- CREATE USER 계정명 IDENTIFIED BY 패스워드;
- CREATE USER jin IDENTIFIED BY jin1234;

❖ 권한 부여

- GRANT CONNECT, RESOURCE, DBA TO 계정명
- GRANT CONNECT, RESOURCE, DBA TO jin;

Oracle 계정 관리

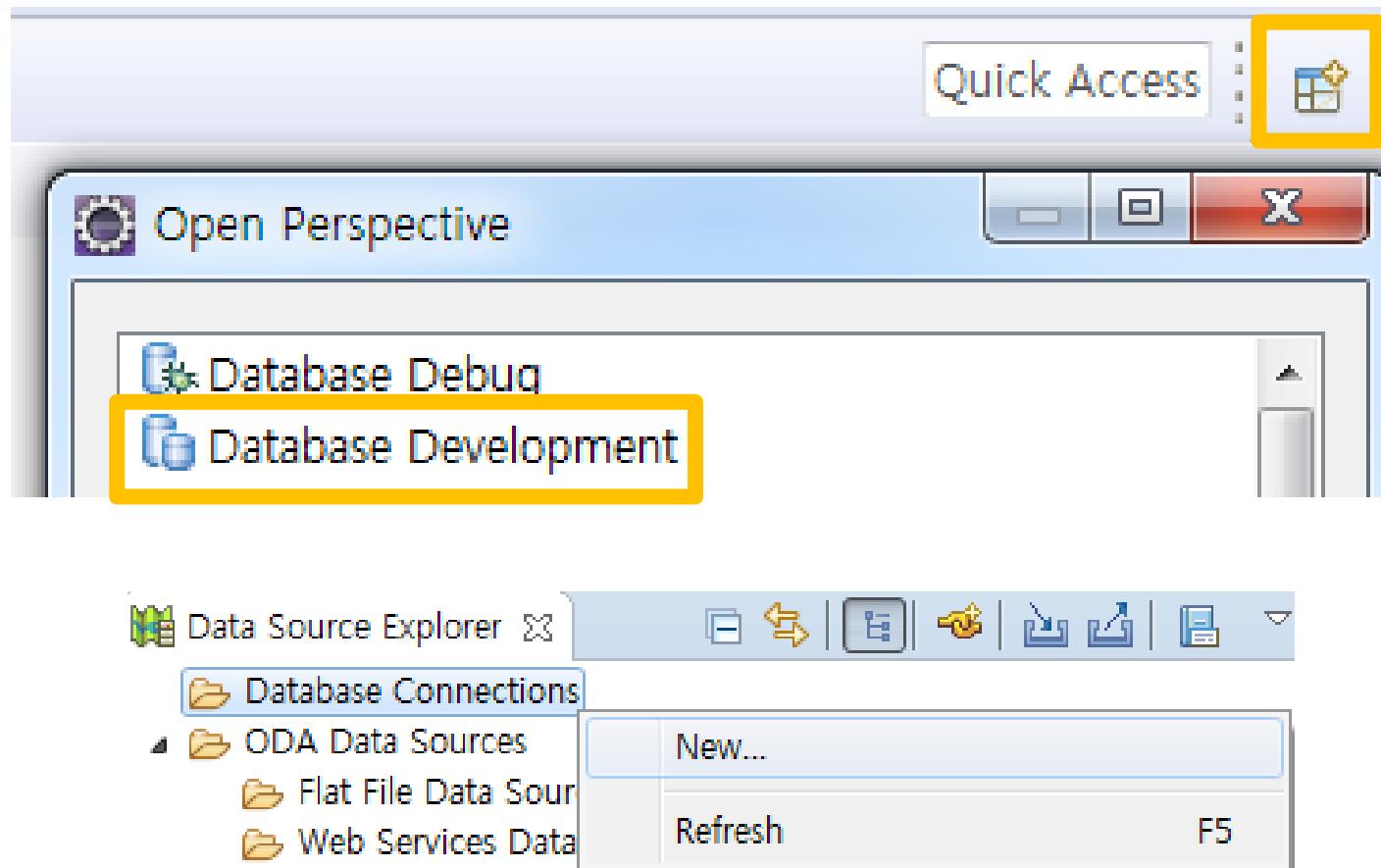
❖ 수정

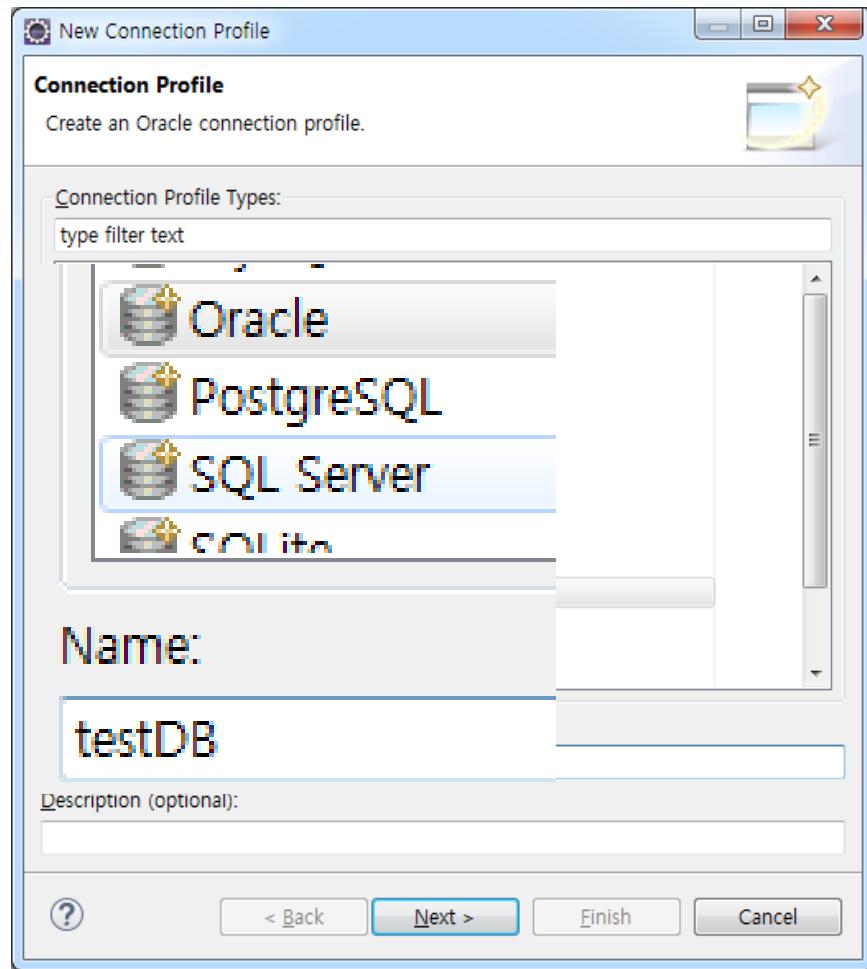
- ALTER USER 계정명 IDENTIFIED BY 변경할패스워드;
- ALTER USER jin IDENTIFIED BY jin12;

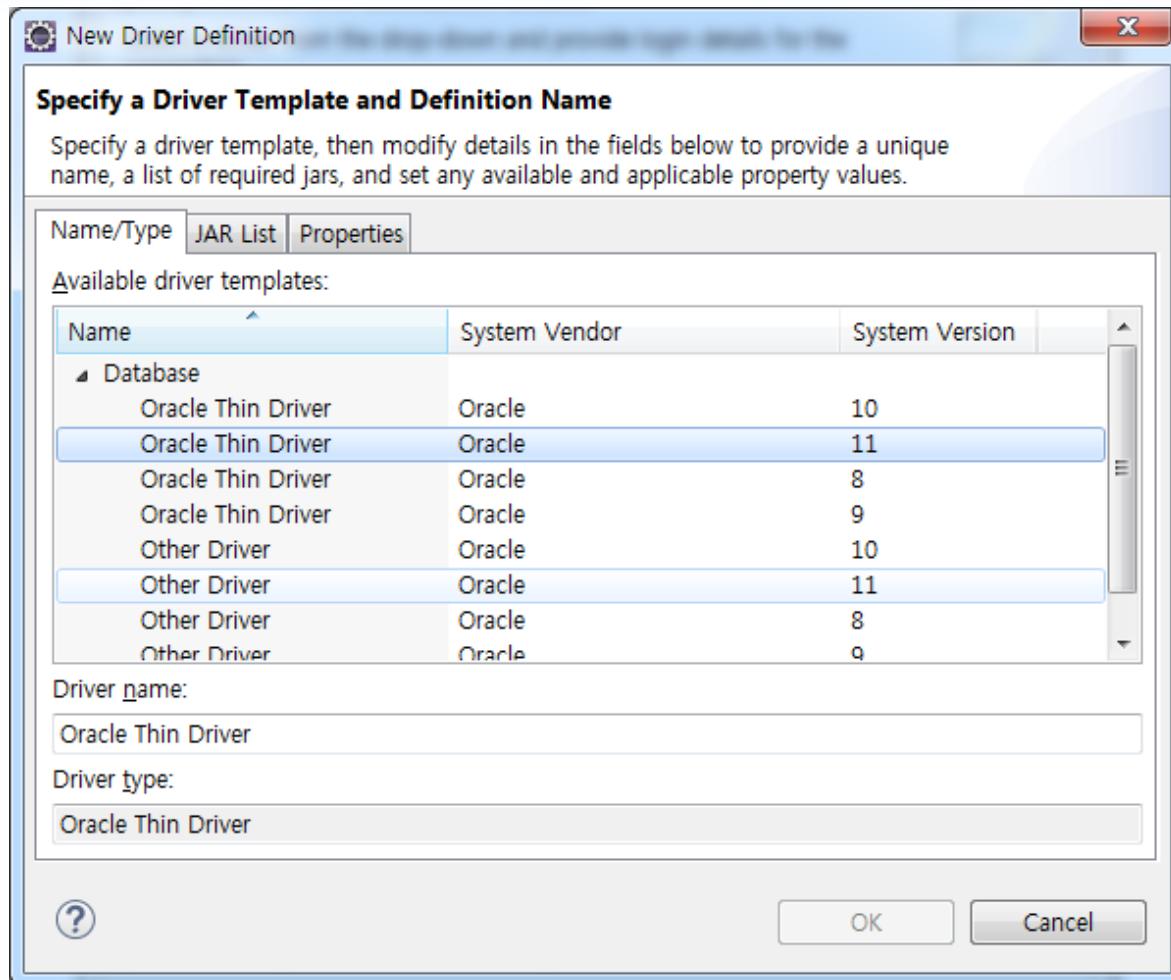
❖ 삭제

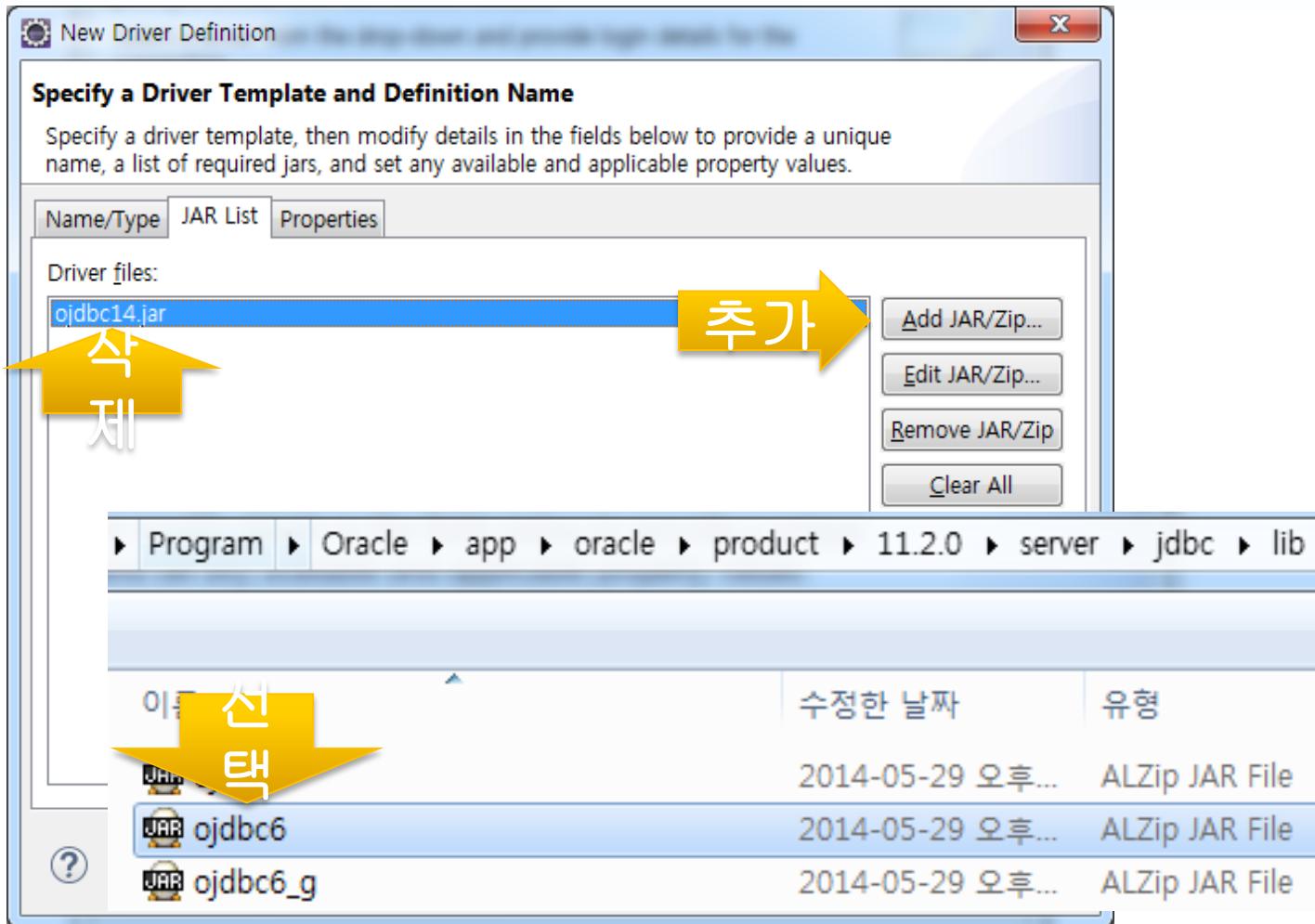
- DROP USER 삭제할 계정명;
- DROP USER jin;

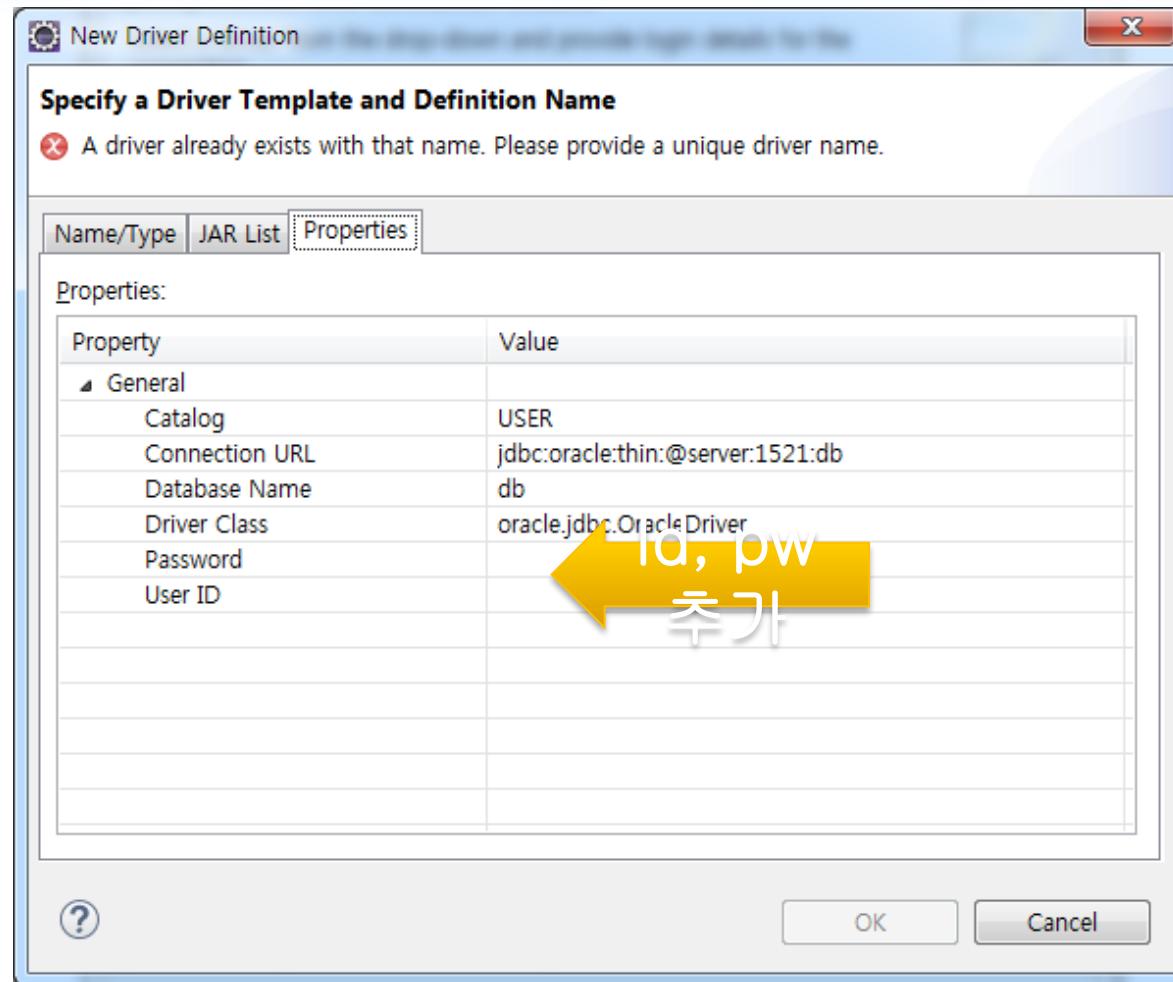
Oracle 이클립스 연동

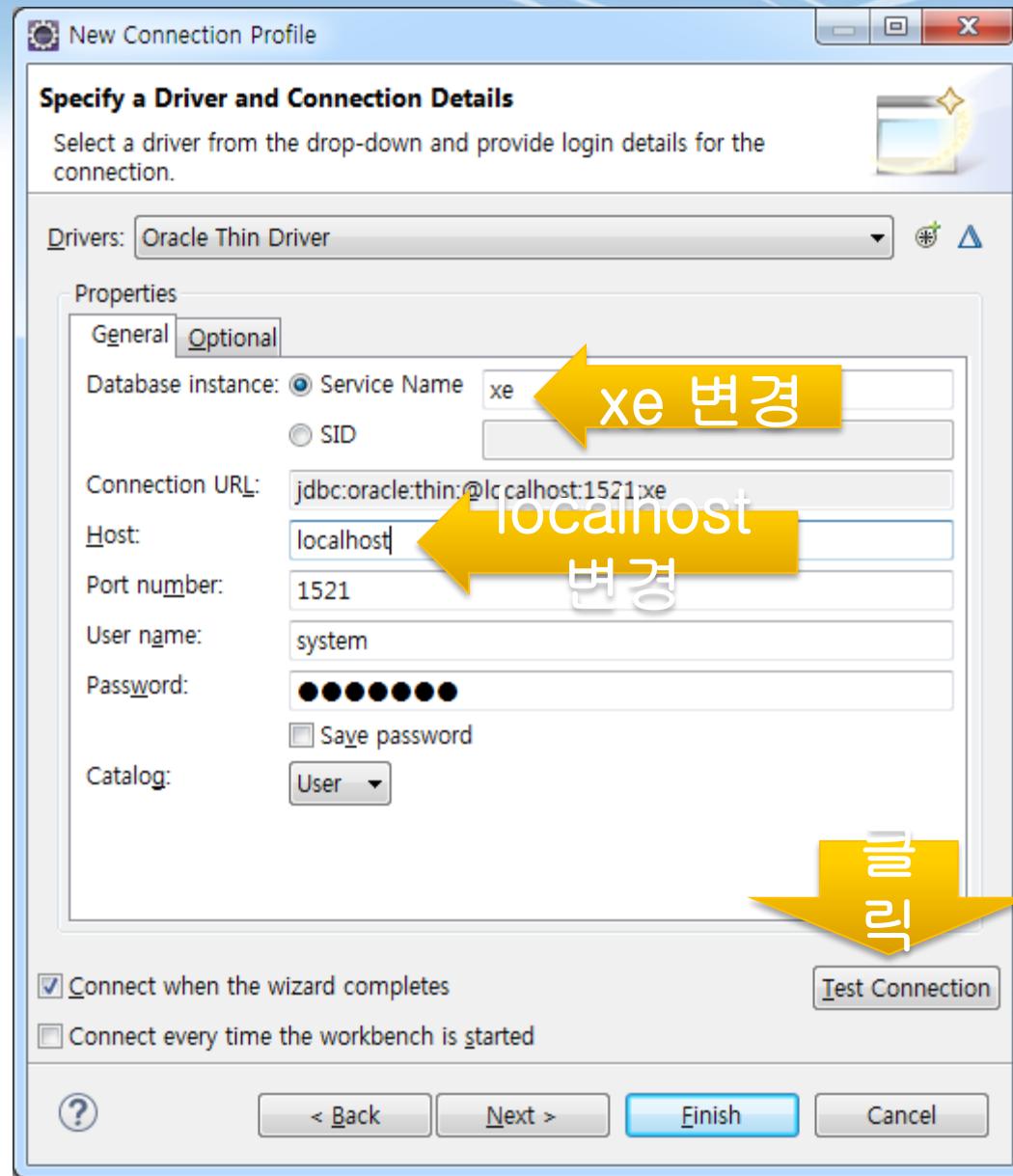


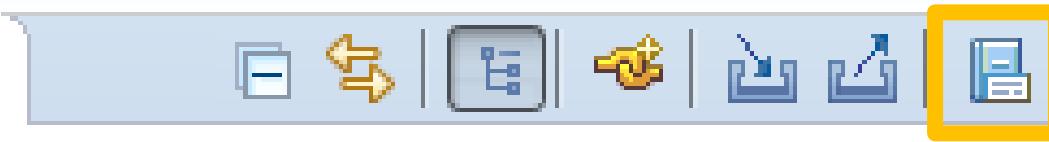












Connection profile

Type: Oracle_11

Name: testDB

Database: xe

1 SELECT * FROM dba_users

Status

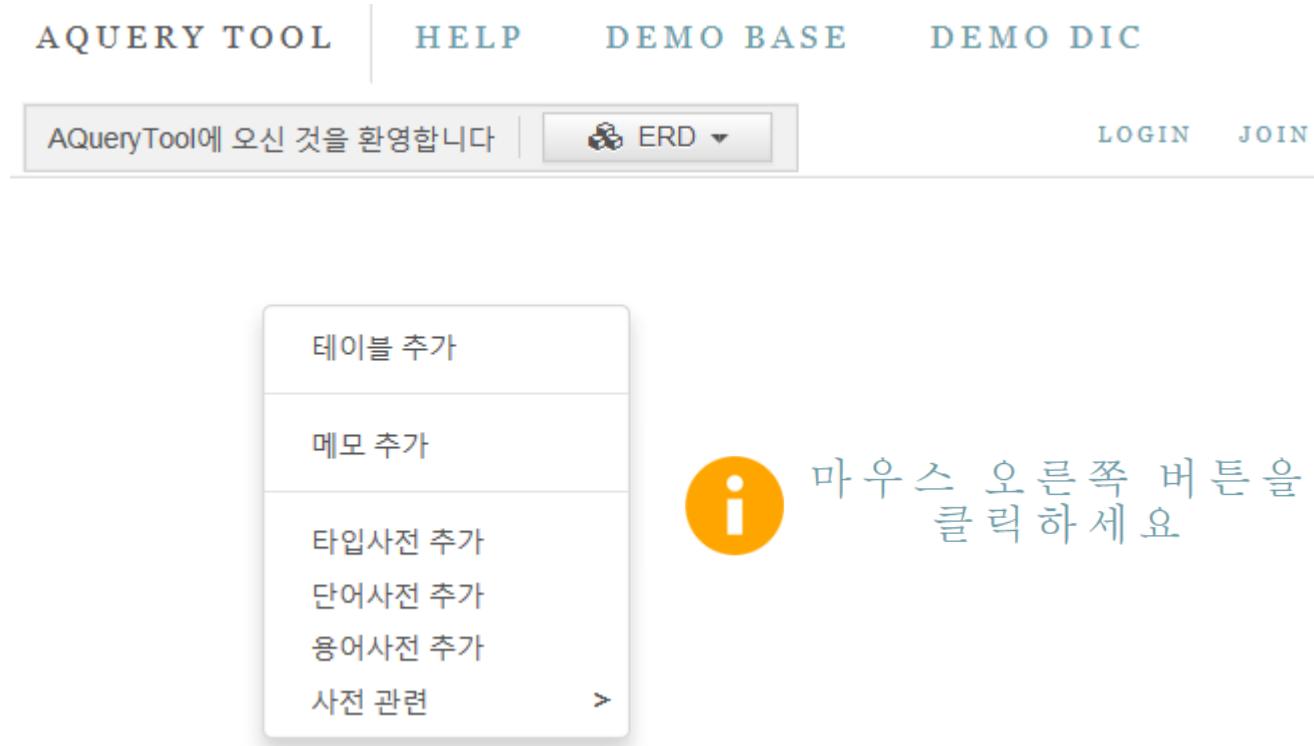
Result1

	USERNAME	USER_ID	PASSWORD	ACCOUNT_STATUS
1	JIN	52	NULL	OPEN
2	SYS	0	NULL	OPEN
3	SYSTEM	5	NULL	OPEN
4	ANONYM...	35	NULL	OPEN
5	APEX_PU...	45	NULL	LOCKED
6	FLOWS_FI...	44	NULL	LOCKED
7	APEX_04...	47	NULL	LOCKED
8	OUTLN	9	NULL	EXPIRED & LOCK...
9	DIP	14	NULL	EXPIRED & LOCK...
10	ORACLE...	21	NULL	EXPIRED & LOCK...
11	XS\$NULL	21474...	NULL	EXPIRED & LOCK...

DB 모델링

DB 모델링 툴

- ❖ DB를 설계하기 위해 사용되는 툴
- ❖ <http://aquerytool.com/>



SQL 구문

❖ 생성

```
create table TABLENAME (
    COL_NAME1      COL_TYPE1(LEN1),
    COL_NAME2      COL_TYPE2(LEN2),
    ...,
    COL_NAMEn      COL_TYPEn(LENn)
)
```

❖ 삽입

```
insert into [테이블이름] ([칼럼1], [칼럼2], ..., [칼럼n])
values ([값1], [값2], ..., [값n])
```

샘플 테이블 만들기

Number of Records: 91

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constituci?n 2222	M?xico D.F.	05021	Mexico
3	Antonio Moreno Taquer?	Antonio Moreno	Mataderos 2312	M?xico D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbk?r	Christina Berglund	Berguvsv?en 8	Lule?nbsp;	S-958 22	Sweden
6	Blauer See Delikatessen	Hanna Moos	Forsterstr. 57	Mannheim	68306	Germany
7	Blondel p?e et fils	Fr??ique Citeaux	24, place Kl?er	Strasbourg	67000	France

모델링 툴 활용

AQUERY TOOL | HELP | DEMO BASE | DEMO DIC | C

test(ORACLE) | --- 테이블 선택 --- | ERD | SQL / Model

PK	AI	FK	Null	Name	Type	+
✓	✓	+		CustomerID	INT	-
		+	✓	CustomerName	VARCHAR2(40)	-
		+	✓	ContactName	VARCHAR2(20)	-
		+	✓	Address	VARCHAR2(40)	-
		+	✓	City	VARCHAR2(20)	-
		+	✓	PostalCode	VARCHAR2(20)	-
		+	✓	Country	VARCHAR2(20)	-

SQL / Model | A Z |

SQL / Model

테이블 생성 SQL
즐겨쓰는 SQL
테스트 데이터 생성
Java 모델 생성
C# 모델 생성
Json 모델 생성

모델링 툴 활용

Create Table SQL(ORACLE)

Clipboard Copy

Table, Index, Foreign key(constraint) 생성 SQL

```
CREATE TABLE Customers
(
    CustomerID      INT          NOT NULL,
    CustomerName    VARCHAR2(40)   NULL,
    ContactName     VARCHAR2(40)   NULL,
    Address         VARCHAR2(100)  NULL,
    City             VARCHAR2(50)   NULL,
    PostalCode      NUMBER(10)    NULL,
    Country          CHAR(2)       NULL,
    CONSTRAINT CU_1 PRIMARY KEY (CustomerID)
)

```

Connection profile
Type: Oracle_11 Name: testDB Database:

1 CREATE TABLE Customers
2 (
3 CustomerID INT NOT NULL,
4 CustomerName VARCHAR2(40) NULL,
5 ContactName VARCHAR2(40) NULL,
6 Address VARCHAR2(100) NULL,
7 City VARCHAR2(50) NULL,
8 PostalCode NUMBER(10) NULL,
9 Country CHAR(2) NULL,
10 CONSTRAINT CU_1 PRIMARY KEY (CustomerID)
11)

A screenshot of the Oracle SQL Developer interface. In the center, there's a code editor window containing the SQL code for creating a 'Customers' table. The code includes columns for CustomerID (INT, NOT NULL), CustomerName (VARCHAR2(40), NULL), ContactName (VARCHAR2(40), NULL), Address (VARCHAR2(100), NULL), City (VARCHAR2(50), NULL), PostalCode (NUMBER(10), NULL), and Country (CHAR(2), NULL). A primary key constraint named CU_1 is defined on the CustomerID column. To the right of the code editor, a context menu is open, showing various options such as Undo Typing, Cut, Copy, Paste, Execute All, and Save as Template... The 'Execute All' option is highlighted with a blue selection bar.

자동 증가(Auto Increment)

❖ 문법

- **CREATE SEQUENCE** 변수명
- **START WITH** 시작값
- **INCREMENT BY** 증감치
- **MAXVALUE** 최종값
- **CYCLE / NOCYCLE** 반복여부
- **NOCACHE** 캐쉬사용안함

❖ 사용예

- CREATE SEQUENCE autolnc
- START WITH 2 INCREMENT BY 4
- MAXVALUE 600
- CYCLE NOCACHE;

실습

- ❖ CREATE SEQUENCE autoInc

- ❖ select autoInc.nextval from dual;

실습

실습

- ❖ DROP SEQUENCE autoInc;
 - ❖ CREATE SEQUENCE autoInc;
 - ❖ START WITH 1;
 - ❖ INCREMENT BY 2;
 - ❖ MAXVALUE 5;
 - ❖ CYCLE NOCACHE;
 - ❖ NOCYCLE NOCACHE;
-
- ❖ select autoInc.nextval from dual;
 - ❖ select autoInc.nextval from dual;
 - ❖ select autoInc.nextval from dual;
 - ❖ select autoInc.nextval from dual;

데이터 삽입



Clipboard Copy

테이블 복사, 백업

```
-- 테이블 복사/백업
CREATE TABLE Customers_20170802_170714 AS
SELECT * FROM Customers;

-- 백업 테이블에서 원본 테이블로 데이터 복사 (Auto Increment 컬럼 제외)
INSERT INTO Customers
    (CustomerName, ContactName, Address, City, PostalCode, Country)
SELECT CustomerName, ContactName, Address, City, PostalCode, Country
FROM Customers_20170802_170714;
```

데이터 입력

- ❖ DROP SEQUENCE autoInc
- ❖ CREATE SEQUENCE autoInc
- ❖ START WITH 1

- ❖ INSERT INTO Customers(CustomerID, CustomerName, ContactName, Address, City, PostalCode, Country)
- ❖ VALUES (autoInc.nextval, '조윤기', '조윤기', '삼선동', '서울', '62350', '대한민국')

데이터 입력(생략)

- ❖ INSERT INTO Customers
- ❖ VALUES (autolnc.nextval, '조윤기', '조윤기', '삼선동', '서울', '62350', '대한민국')
- ❖ INSERT INTO Customers(CustomerID, CustomerName)
- ❖ VALUES (autolnc.nextval, '조윤기')

- ❖ INSERT INTO Customers
- ❖ VALUES (autolnc.nextval, '조윤기')

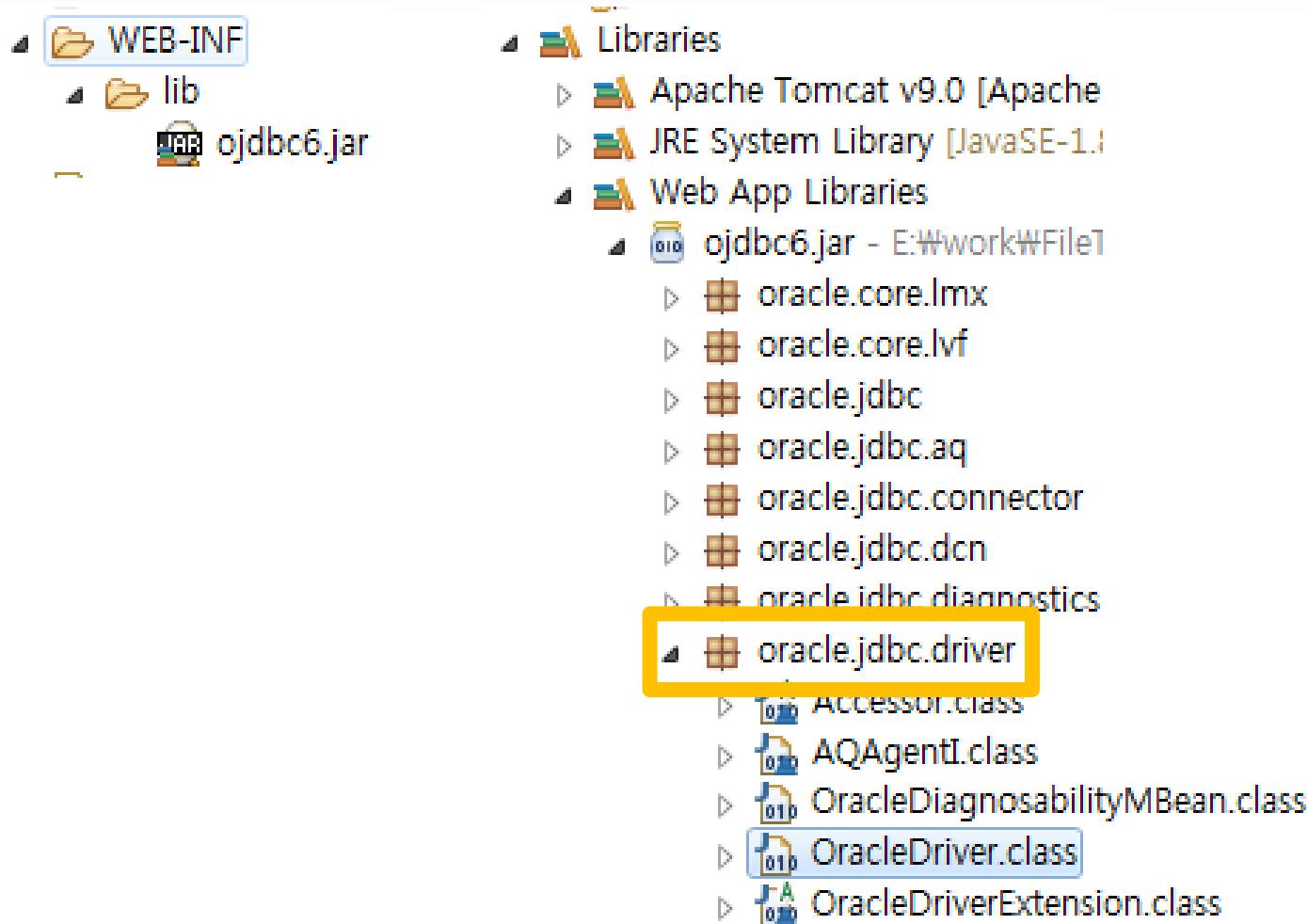
Port 변경

❖ Server.xml 수정

▶ [e] GlobalNamingResources	A "Service" is
!--	
◀ [e] Service	
@ name	Catalina
!--	The connector
!--	<Executor i
!--	A "Connector"
◀ [e] Connector	
@ connectionTimeout	20000
@ port	8081
@ protocol	HTTP/1.1
@ redirectPort	8443
!	

JSP 연동

DB 연동 – Driver 찾기

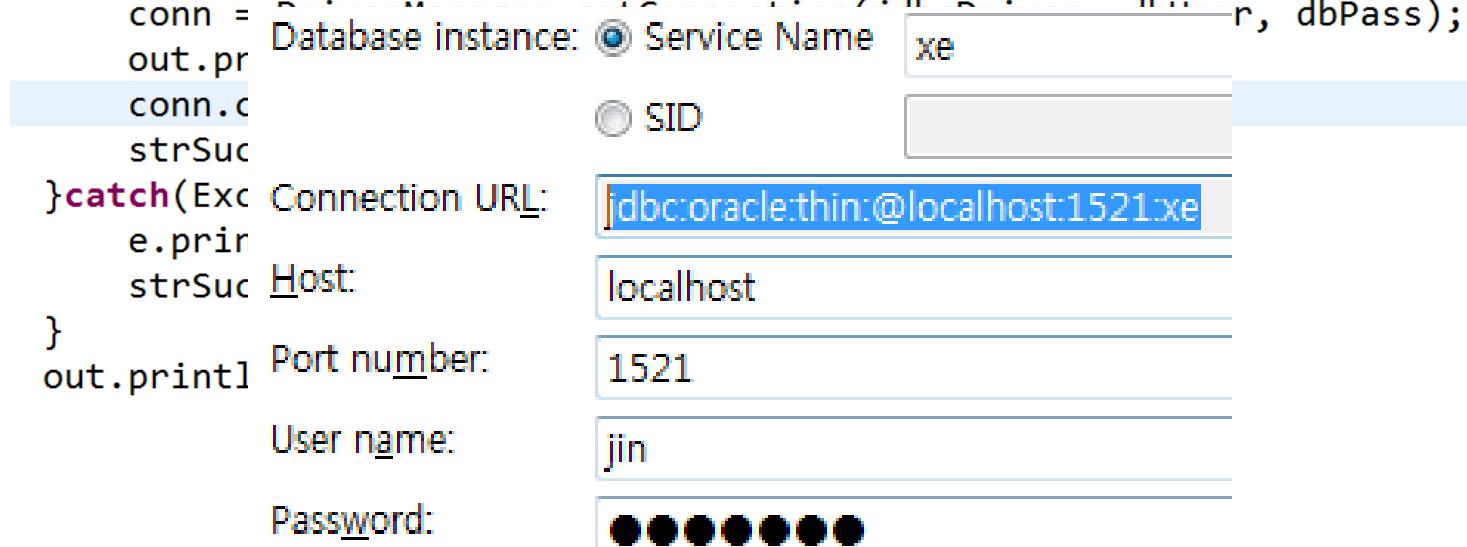


DB 연동 – 연결하기

```
Class.forName("oracle.jdbc.driver.OracleDriver");

Connection conn = null;
String strSuccess=null;
try{
    String jdbcDriver = "jdbc:oracle:thin:@localhost:1521:xe";
    String dbUser = "jin";
    String dbPass = "jin1234";

    conn = DriverManager.getConnection(jdbcDriver, dbUser, dbPass);
    out.println("Database instance: " + conn.getMetaData().getDatabaseProductName() + " " + conn.getMetaData().getDatabaseProductVersion());
    conn.close();
    strSuccess="Success";
} catch(Exception e){
    e.printStackTrace();
    strSuccess="Error";
}
out.print(strSuccess);
}
```



The screenshot shows the Oracle Database Connection dialog box. It has two tabs: 'Service Name' (selected) and 'SID'. The 'Service Name' tab contains the value 'xe'. The 'SID' tab is empty. Below the tabs, there are four input fields with the following values:

- Connection URL: jdbc:oracle:thin:@localhost:1521:xe
- Host: localhost
- Port number: 1521
- User name: jin
- Password: (redacted)

Insert 구현하기

- ❖ 1. Data Source Explorer를 이용하여 Insert 실행

```
INSERT INTO Customers  
(CustomerID, CustomerName, ContactName,  
Address, City, PostalCode, Country)  
VALUES (autoInc.nextval, '조윤기', '조윤기',  
'삼선동', '서울', '62350', '대한민국')
```



```
INSERT INTO Customers  
(CustomerID, CustomerName, ContactName,  
Address, City, PostalCode, Country)  
VALUES (?, ?, ?, ?, ?, ?, ?, ?)
```

```

String sql = "INSERT INTO Customers "+
    "(CustomerID, CustomerName, ContactName, "+
    "Address, City, PostalCode, Country) "+
    "VALUES (?, ?, ?, ?, ?, ?, ?)";

try{
    conn = DriverManager.getConnection(jdbcDriver, dbUser, dbPass);

    pstmt = conn.prepareStatement(sql);
    pstmt.setInt(1, 10);
    pstmt.setString(2, "younki.cho");
    pstmt.setString(3, "younki.cho");
    pstmt.setString(4, "Samsundong");
    pstmt.setString(5, "Seoul");
    pstmt.setString(6, "6235");
    pstmt.setString(7, "Korea");

    pstmt.executeUpdate();
}

```

	CUSTOMERID	CUSTOMERNAME	CONTACTNAME	ADDRESS	CITY	POSTALCODE	COUNTRY
1	1	조윤기	조윤기	삼선동	서울	62350	대한민국
2	2	조윤기	조윤기	삼선동	서울	62350	대한민국
3	3	조윤기	NULL	NULL	NULL	NULL	NULL
4	10	younki.cho	younki.cho	Samsundong	Seoul	6235	Korea

Quiz

❖ Customer 파일을 읽어서 DB에 저장하는 프로그램을 작성하시오

Number of Records: 91

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constituci? 2222	M?ico D.F.	05021	Mexico
3	Antonio Moreno Taquer?	Antonio Moreno	Mataderos 2312	M?ico D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbk?	Christina Berglund	Berguvsv?en 8	Lule?nbsp;	S-958 22	Sweden
6	Blauer See Delikatessen	Hanna Moos	Forsterstr. 57	Mannheim	68306	Germany
7	Blondel p?e et fils	Fr??que Citeaux	24, place Kl?er	Strasbourg	67000	France
8	B?ido Comidas preparadas	Mart? Sommer	C/ Araquil, 67	Madrid	28023	Spain
9	Bon app'	Laurence Lebihans	12, rue des Bouchers	Marseille	13008	France
10	Bottom-Dollar Marketse	Elizabeth Lincoln	23 Tsawassen Blvd.	Tsawassen	T2F 8M4	Canada
11	B's Beverages	Victoria Ashworth	Fauntleroy Circus	London	EC2 5NT	UK
12	Cactus Comidas para llevar	Patricia Simpson	Cerrito 333	Buenos Aires	1010	Argentina
13	Centro comercial Moctezuma	Francisco Chang	Sierras de Granada 9993	M?ico D.F.	05022	Mexico
14	Chop-suey Chinese	Yang Wang	Hauptstr. 29	Bern	3012	Switzerland
15	Com?cio Mineiro	Pedro Afonso	Av. dos Lus?das, 23	S? Paulo	05432-043	Brazil
16	Consolidated Holdings	Elizabeth Brown	Berkeley Gardens 12 Brewery	London	WX1 6LT	UK

문제 발생

```
iche.catalina.startup.Catalina start  
9: value too large for column "JIN"."CUSTOMERS"."ADDRESS" (actual: 42, maximum: 40)
```

```
ALTER TABLE CUSTOMERS  
MODIFY (address VARCHAR2(50))
```



마우스 오른쪽
클릭 하세

ERD 기본 정보를 설정하세요.

ORACLE

Categories

캔버스의 크기를 설정하세요

Width

1670

Height

871

테이블 추가

메모 추가

타입사전 추가

단어사전 추가

용어사전 추가

사전 관련

>

ERD



ERD 불러오기

ERD 저장

ERD 다른 이름으로 저장

SQL로 테이블 생성

모든 테이블 생성 SQL

논리 모델 형태

논리 & 물리 형태

테이블 생성

Categories

PK	AI	FK	Null	Logical Name	Name	Type	+
✓	✓	✚		분류식별	CategoryID	INT	-
		✚	✓	분류명	CategoryName	VARCHAR2(20)	-
		✚	✓	설명	Description	ARCHAR2(100)	-

SQL / Model ▾

테이블 생성 SQL

즐겨쓰는 SQL

테스트 데이터 생성

Java 모델 생성

C# 모델 생성

Json 모델 생성

CREATE TABLE Categories
(
 CategoryID INT NOT NULL,
 CategoryName VARCHAR2 (20) NULL,
 Description VARCHAR2 (100) NULL,
 CONSTRAINT CATEGORIES_PK PRIMARY KEY (CategoryID)
)

Bean 생성



Clipboard Copy Java 모델 생성 - Camel case naming

```
public class Categories {  
  
    // 분류식별  
    private Integer categoryid;  
  
    // 분류명  
    private String categoryname;  
  
    // 설명  
    private String description;  
  
    public Integer getCategoryid() {  
        return categoryid;  
    }  
  
    public void setCategoryid(Integer categoryid) {  
        this.categoryid = categoryid;  
    }  
  
    public String getCategoryname() {  
        return categoryname;  
    }
```

SQL 익히기 – select

❖ SELECT 문법 익히기

- SELECT 컬럼명1, 컬럼명2
- FROM 테이블명;

❖ 사용 예

- SELECT * FROM Customers;
- SELECT CustomerName, City FROM Customers;
- SELECT Country FROM Customers;

SQL 익히기 – select

- ❖ 중복값 제거
 - SELECT *DISTINCT* 컬럼명1, 컬럼명2
 - FROM 테이블명;
- ❖ 사용 예
 - SELECT DISTINCT City FROM Customers;
 - SELECT DISTINCT Country FROM Customers;
 - SELECT DISTINCT Country, City FROM Customers;
- ❖ 여러 컬럼일 경우 많은 것을 표현

이중 select 문

```
SELECT Country AS 국가명  
      FROM (  
        SELECT DISTINCT  
          Country, City  
        FROM Customers
```

	COUNTRY	CITY
1	UK	London
2	Germany	Mannheim
3	Spain	Barcelona
4	Canada	Vancouver
5	Germany	Frankfurt a.M.

국가명
1 UK
2 Germany
3 Spain
4 Canada
5 Germany

사용 예

```
SELECT COUNT(DISTINCT Country)  
FROM Customers;
```

```
SELECT Count(*) AS DistinctCountries  
FROM (  
    SELECT DISTINCT Country  
    FROM Customers  
);
```

SQL 익히기 – select

❖ 문법

```
SELECT column1, column2, ...
  FROM table_name
 WHERE condition;
```

❖ 사용 예

```
SELECT * FROM Customers
 WHERE Country='Mexico';
```

❖ 기본 문법

Operator	Description
=	Equal
<>	Not equal.
>	Greater than

Operator	Description
<	Less than
>=	Greater than or equal
<=	Less than or equal

SQL 익히기 – select

- ❖ 날짜 구하기
 - `SELECT sysdate FROM DUAL;`
- ❖ 오늘 날짜 구하기
 - `SELECT TO_CHAR(sysdate, 'yyyymmdd hh24:mi:ss')`
 - `AS "오늘날짜"`
 - `FROM dual`

SQL 익히기 – select

- ❖ 날짜 구하기

```
SELECT TO_CHAR(sysdate - 1, 'yyyymmdd hh24:mi:ss')  
FROM dual;
```

```
SELECT TO_CHAR(sysdate - 1/24, 'yyyymmdd hh24:mi:ss')  
FROM dual;
```

```
SELECT TO_CHAR(sysdate - 1/24/60, 'yyyymmdd hh24:mi:ss')  
FROM dual;
```

quiz

- ❖ CUSTOMERS 테이블에서 도시가 Bern보다 작은 도시들을 출력하시오

	도시명
1	Aachen
2	Barcelona
3	Berlin
4	Barquisimeto
5	Bergamo
6	Anchorage
7	Albuquerque

정답

- ❖ **SELECT city as 도시명**
- ❖ **FROM CUSTOMERS**
- ❖ **WHERE city<'Bern'**

Quiz

- ❖ Orders 테이블에서 1996년 7월 한 달간 물건을 구매한 고객은 몇 명인가?

정답

```
SELECT DISTINCT customerid  
FROM orders  
WHERE TO_CHAR(orderdate, 'yyyymmdd') < '19960801'
```

```
SELECT DISTINCT customerid  
FROM orders  
WHERE orderdate < TO_DATE('1996-08-01','YYYY-MM-DD')
```

SQL 익히기 – select

❖ 문법

```
SELECT column1, column2, ...
FROM table_name
WHERE condition1 AND condition2 AND condition3 ...;
SELECT column1, column2, ...
FROM table_name
WHERE condition1 OR condition2 OR condition3 ...;
SELECT column1, column2, ...
FROM table_name
WHERE NOT condition;
```

Quiz

- ❖ 독일의 베를린에서 구매한 고객의 명단을 Customers 테이블에서 찾아 출력하시오
- ❖ 멕시코나 마드리드에서 구매한 고객이 몇 명인지 Customers 테이블에서 찾아 출력하시오
- ❖ Customers 테이블에서 독일과 멕시코를 제외한 국가를 출력하시오

정답

```
SELECT * FROM Customers  
WHERE Country='Germany'  
AND City='Berlin';
```

```
SELECT COUNT(DISTINCT CustomerName)  
FROM Customers  
WHERE Country='Mexico'  
OR City='Madrid';
```

```
SELECT DISTINCT Country FROM Customers  
WHERE NOT Country='Germany'  
AND NOT Country='Mexico';
```

SQL 익히기 – select

❖ 문법

```
SELECT column1, column2, ...
FROM table_name
ORDER BY column1, column2, ... ASC|DESC;
```

❖ 사용 예

```
SELECT * FROM Customers
ORDER BY Country DESC;
```

```
SELECT * FROM Customers
ORDER BY Country, CustomerName;
```

```
SELECT * FROM Customers
ORDER BY Country ASC, CustomerName DESC;
```

SQL 익히기 – update

❖ 문법

```
UPDATE table_name
SET column1 = value1, column2 = value2, ...
WHERE condition;
```

❖ 사용 예

```
SELECT ContactName, City
FROM Customers
WHERE CustomerID = 1;
```

```
UPDATE Customers
SET ContactName = 'Alfred Schmidt', City= 'Frankfurt'
WHERE CustomerID = 1;
```

```
SELECT CITY  
FROM Customers  
WHERE Country = 'Mexico'
```

위의 코드를 실행하면 왼쪽과
같이 나타난다.
도시명을 Mexico D.F.로 변경하라

	CITY
1	M?xico D.F.
2	M?xico D.F.
3	M?xico D.F.
4	M?xico D.F.
5	M?xico D.F.

정답

- ❖ UPDATE Customers
- ❖ SET City= 'Mexico D.F.'
- ❖ WHERE Country = 'Mexico'

SQL 익히기 – INSERT

❖ 문법

```
INSERT INTO table_name (column1, column2, column3, ...)  
VALUES (value1, value2, value3, ...);
```

❖ 사용 예

```
INSERT INTO Shippers(ShipperID, ShipperName, Phone)  
VALUES (4, '윤기익스프레스', '010-8505-6235')
```

```
INSERT INTO Shippers  
VALUES (5, '용 이사짐', '010-8505-6235')
```

```
INSERT INTO Shippers(ShipperID, ShipperName)  
VALUES (6, '망했으이사짐')
```

SQL 익히기 – NULL Value

❖ 문법

```
SELECT column_names
  FROM table_name
 WHERE column_name IS NULL;
```

❖ 사용 예

```
SELECT * FROM Shippers
 WHERE PHONE IS NULL
```

```
SELECT * FROM Shippers
 WHERE PHONE IS NOT NULL
```

SQL 익히기 – DELETE

❖ 문법

```
DELETE FROM table_name  
WHERE condition;
```

❖ 사용 예

- `SELECT * FROM Shippers WHERE PHONE IS NULL`
- `DELETE Shippers WHERE PHONE IS NULL`

- `SELECT * FROM Shippers WHERE ShipperID>=4`
- `DELETE Shippers WHERE ShipperID>=4`

SQL 익히기 – ROWNUM

❖ 문법

```
SELECT column_name  
FROM table_name  
WHERE ROWNUM <= number;
```

❖ 사용 예

```
SELECT * FROM Customers  
WHERE ROWNUM <= 3
```

```
SELECT * FROM Customers  
WHERE ROWNUM <= 3  
ORDER BY CUSTOMERID DESC
```

SQL 익히기 – 내장 함수

❖ 문법

```
SELECT MIN(column_name)
FROM table_name
WHERE condition;
```

```
SELECT MAX(column_name)
FROM table_name
WHERE condition;
```

❖ 사용 예

- **SELECT MIN(Price) AS 최소가격**
- **FROM Products;**

- **SELECT MAX(Price) AS 최대가격**
- **FROM Products;**

SQL 익히기 – 내장 함수

❖ 문법

```
SELECT COUNT(column_name), AVG(column_name),  
SUM(column_name)  
FROM table_name  
WHERE condition;
```

❖ 사용 예

```
SELECT COUNT(ProductID)  
FROM Products;
```

```
SELECT AVG(Price)  
FROM Products;
```

```
SELECT SUM(Quantity)  
FROM OrderDetails;
```

Quiz

- ❖ 주문 세부 명세서에서 상위 5개의 주문 개수에 대한 합과 평균을 구하시오

	합	평균
1	470	94

정답

```
SELECT SUM(Quantity) AS 합, AVG(Quantity) AS 평균
FROM(
    SELECT * FROM OrderDetails
    ORDER BY Quantity DESC
)
WHERE ROWNUM<=5
```

Quiz

- ❖ 제품 테이블에서 CategoryID가 2인 제품 중 하위 10개의 가격에 대한 최소값, 최대값, 평균값을 출력하시오

	최대값	최소값	평균
1	28.5	10	19.285

정답

```
SELECT MAX(PRICE) AS 최대값,  
MIN(PRICE) AS 최소값, AVG(PRICE) AS 평균  
FROM(  
    SELECT *  
    FROM Products  
    WHERE CategoryID=2  
    ORDER BY PRICE  
)  
WHERE ROWNUM<=10
```

SQL 익히기 – LIKE

❖ 문법

```
SELECT column1, column2, ...
FROM table_name
WHERE columnN LIKE pattern;
```

❖ Pattern

- % : 모든 값
- _ : 한 개의 값

사용 예

```
SELECT * FROM Customers  
WHERE CustomerName LIKE 'A%';  
WHERE CustomerName LIKE '%a';  
WHERE CustomerName LIKE '%or%';  
WHERE CustomerName LIKE '_r%';  
WHERE ContactName LIKE 'A%o';  
WHERE CustomerName NOT LIKE 'A%';
```

SQL 익히기 – IN

❖ 문법

```
SELECT column_name(s)
FROM table_name
WHERE column_name IN (value1, value2, ...);
WHERE column_name IN (SELECT STATEMENT);
```

❖ 사용 예

```
SELECT * FROM Customers
WHERE Country IN ('Germany', 'France', 'UK');
WHERE Country NOT IN ('Germany', 'France', 'UK');
WHERE Country IN (SELECT Country FROM Suppliers);
```

SQL 익히기 – BETWEEN

❖ 문법

```
SELECT column_name(s)
  FROM table_name
 WHERE column_name BETWEEN value1 AND value2;
```

❖ 사용 예

```
SELECT * FROM Products
 WHERE Price BETWEEN 10 AND 20;
 WHERE Price NOT BETWEEN 10 AND 20;
```

사용 예

```
SELECT * FROM Products  
WHERE (Price BETWEEN 10 AND 20)  
AND NOT CategoryID IN (1,2,3);
```

```
SELECT * FROM Products  
WHERE ProductName  
      BETWEEN 'Carnarvon Tigers'  
      AND 'Mozzarella di Giovanni'  
ORDER BY ProductName;
```

SQL 익히기 – Group By

❖ 문법

```
SELECT column_name(s)
FROM table_name
WHERE condition
GROUP BY column_name(s)
```

❖ 사용 예

```
SELECT COUNT(CustomerID), Country
FROM Customers
GROUP BY Country
ORDER BY COUNT(CustomerID) DESC;
```

SQL 익히기 – Having

❖ 문법

```
SELECT column_name(s)
FROM table_name
WHERE condition
GROUP BY column_name(s)
HAVING condition
ORDER BY column_name(s);
```

❖ 사용 예

```
SELECT COUNT(CustomerID), Country
FROM Customers
GROUP BY Country
HAVING COUNT(CustomerID) > 5
ORDER BY COUNT(CustomerID) DESC;
```

Inner join vs Self join

❖ 문법

```
SELECT column_name(s)
FROM table1
INNER JOIN table2 ON table1.column_name = table2.column_name;
SELECT column_name(s)
FROM table1 T1, table1 T2
WHERE condition;
```

❖ 사용 예

```
SELECT Orders.OrderID, Customers.CustomerName, Orders.OrderDate
FROM Orders
JOIN Customers ON Orders.CustomerID=Customers.CustomerID;
```

```
SELECT o.OrderID, c.CustomerName, o.OrderDate
FROM Orders o, Customers c
WHERE o.CustomerID=c.CustomerID;
```

참고 사이트

- ❖ <https://ko.wikipedia.org/wiki/CRUD>
- ❖ <http://dic.naver.com/>
- ❖ <https://www.w3schools.com>
- ❖ [http://www.hanbit.co.kr/\(교수 전용 자료실\)](http://www.hanbit.co.kr/)
- ❖ <http://egloos.zum.com/jangchil2/v/2488030>

주석 설정 및 확인

- ❖ COMMENT ON COLUMN Categories.CategoryID IS '분류식별'
- ❖ COMMENT ON COLUMN Categories.CategoryName IS '분류명'
- ❖ COMMENT ON COLUMN Categories.Description IS '설명'

- ❖ COMMENT ON TABLE Categories IS '테이블 설명'

- ❖ SELECT *
- ❖ FROM ALL_COL_COMMENTS
- ❖ WHERE TABLE_NAME = 'CATEGORIES';

- ❖ SELECT *
- ❖ FROM USER_COL_COMMENTS
- ❖ WHERE TABLE_NAME = 'CATEGORIES';

- ❖ 테이블명 입력 시 대문자로 입력해야 함.