SQL Injection Attacks

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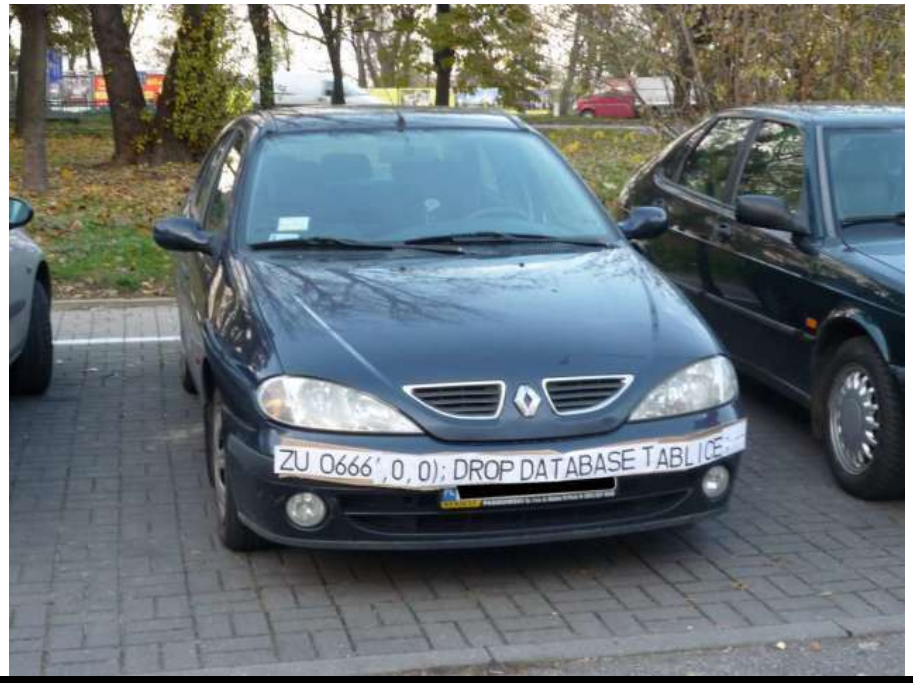
Overview

- Sql injection attacks are one of the top attacks against web based applications.
- Example: License plate recognition system

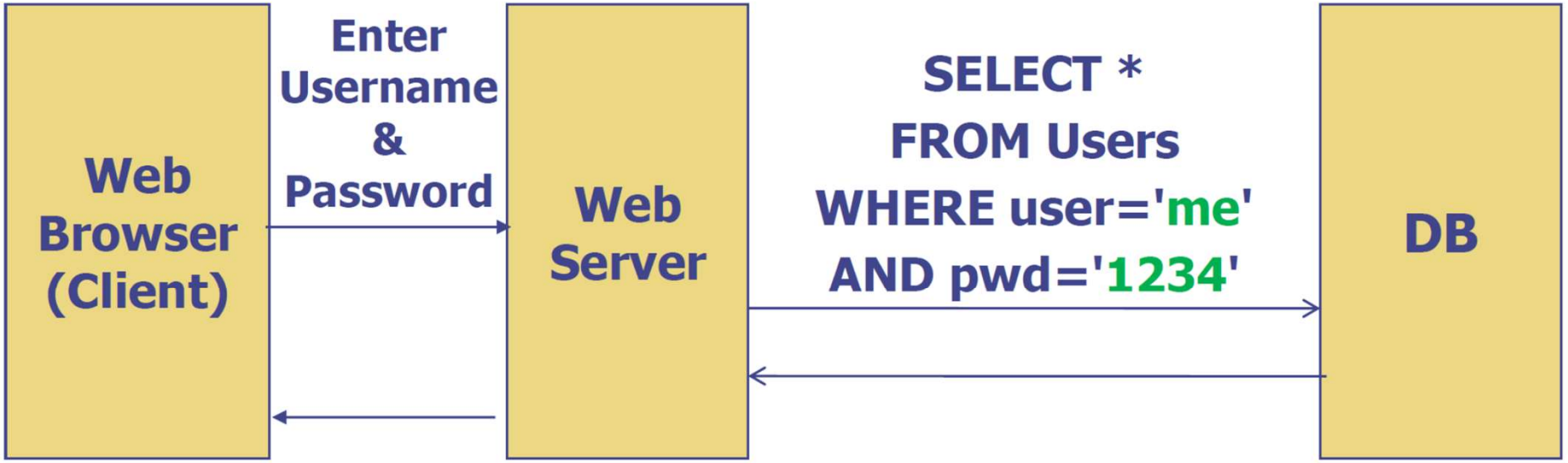


Example Attack in ASP

```
set ok = execute( "SELECT * FROM Users
                     WHERE user=' " & form(“user”) &
                   " 'AND pwd=' " & form(“pwd”) & “ '”
                  );
   if not ok.EOF
      login success
   else fail;
```

Is this exploitable?

Normal Query



Normal Query

Bad Input

Suppose user = " ' or 1=1 - -" (URL encoded)

Then scripts does:

ok = execute(SELECT ...
WHERE user= ' ' or 1=1 - - ...)

- The "- -" causes rest of line to be ignored.
- Now ok.EOF is always false and login succeeds.

The bad news: easy login to many sites this way.

Examples in Java:

- String pw = "123456";
  - // this would come from the user

```
String query = "SELECT * from users where
 name = 'USER' " + "and password = '" + pw +
   "'";
stmt = conn.createStatement();
rs = stmt.executeQuery(query);
```

Solution: my favorite one ☺

- Never every create query by combining strings coming from the user.
- Instead use Prepared statements
- Other options such as sanitization could be considered if prepared statements do not work.

Java Prepared Statement Example

```
public void updateCoffeeSales(HashMap<String, Integer> salesForWeek) throws SQLException {
  String updateString =
    "update COFFEES set SALES = ? where COF_NAME = ?";
  String updateStatement =
    "update COFFEES set TOTAL = TOTAL + ? where COF_NAME = ?";

  try (PreparedStatement updateSales = con.prepareStatement(updateString);
       PreparedStatement updateTotal = con.prepareStatement(updateStatement))

  {
    con.setAutoCommit(false);
    for (Map.Entry<String, Integer> e : salesForWeek.entrySet()) {
      updateSales.setInt(1, e.getValue().intValue());
      updateSales.setString(2, e.getKey());
      updateSales.executeUpdate();

      updateTotal.setInt(1, e.getValue().intValue());
      updateTotal.setString(2, e.getKey());
      updateTotal.executeUpdate();
      con.commit();
    }
  } catch (SQLException e) {
    JDBCTutorialUtilities.printSQLException(e);
    if (con != null) {
      try {
        System.err.print("Transaction is being rolled back");
        con.rollback();
      } catch (SQLException excep) {
        JDBCTutorialUtilities.printSQLException(excep);
      }
    }
  }
}
```