cphbusiness

Performance

Today's Topics

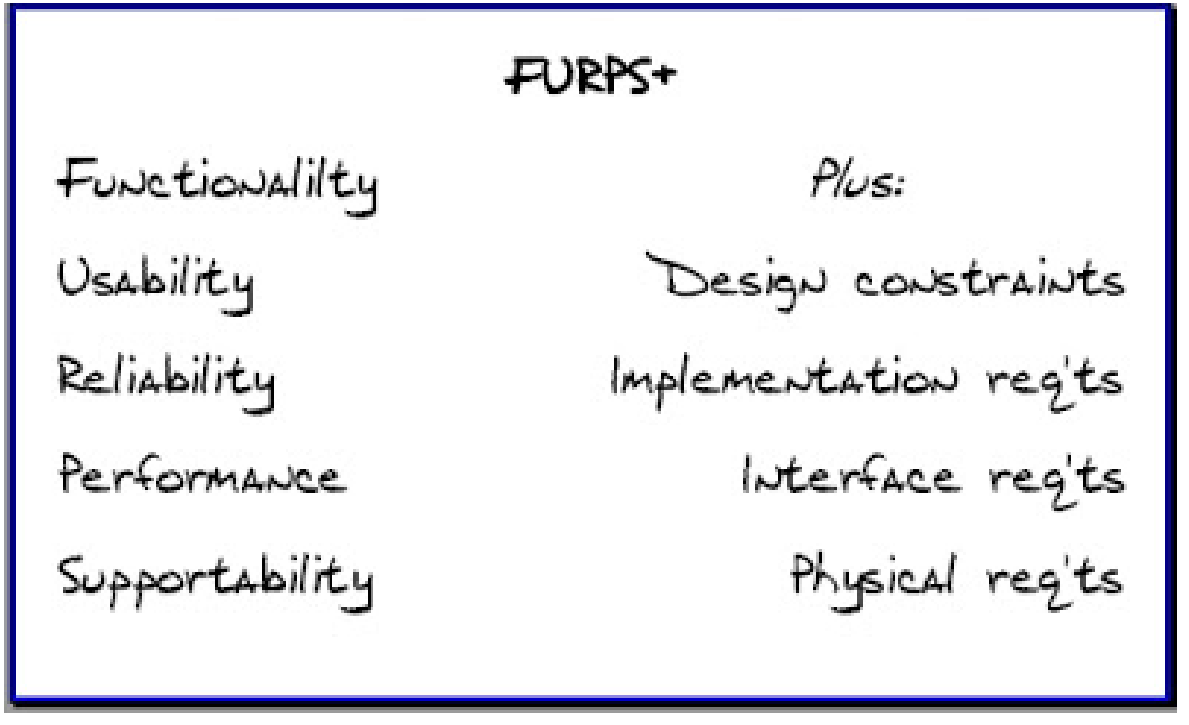
- Different types of requirements
- Performance
  - Stored procedures
  - Indexes
- Exercises

cphbusiness

Requirements

FURPS+

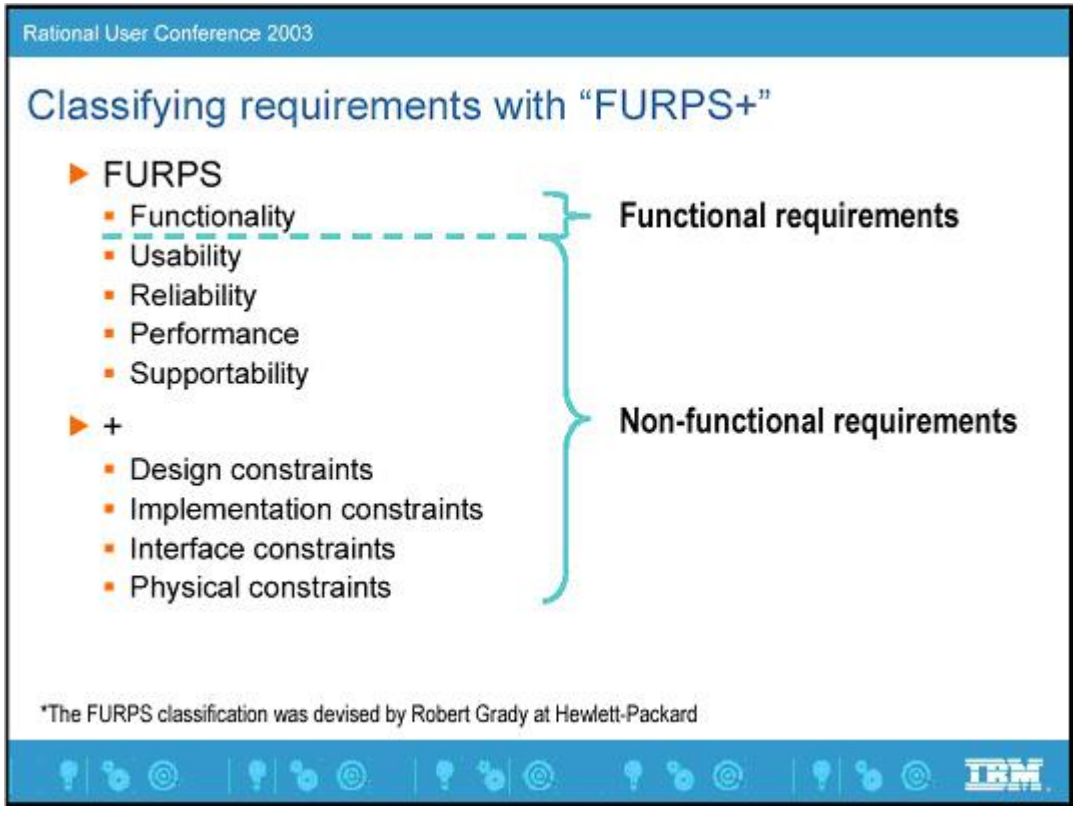
- What does FURPS acronym mean?



Source: https://en.wikipedia.org/wiki/FURPS &
http://agileinaflash.blogspot.dk/2009/04/furps.html

FURPS+

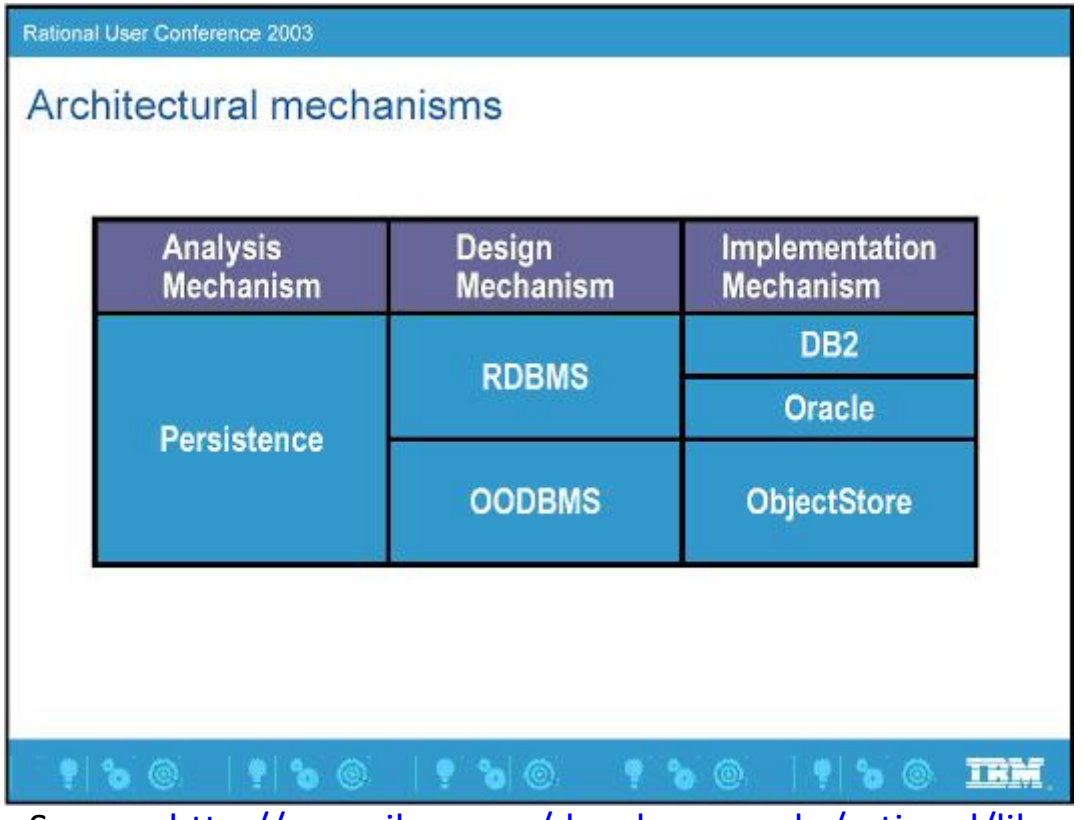
- What does FURPS acronym mean?



Source: http://www.ibm.com/developerworks/rational/library/3975.html

Capturing constraints

- Design and implementation constraint example
  - What database type to choose?
  - What database product to choose?



Source: http://www.ibm.com/developerworks/rational/library/3975.html

How to improve performance

- Techniques to improve response time
  - Indexes
  - Stored procedures

- Both are database techniques and both come at a price ☺

- In module 2, you will learn about performance improvement of your Java code

cphbusiness

Indexes

Indexing

- If you often search by certain non-key column(s), you can speed up response time by putting an index on the column(s).

Zipcodes example 1

- Get zipcodes from Danish postal service:
  - http://www.postnord.dk/da/Privat/Kundeservice/postnummerkort/Sider/postnummerkort.aspx

- We only need postnr + and bynavn in excel file. Remove rest of the fields.
- Remove duplicate zipcodes, e.g. 1055, 1165.

- Convert to UTF-8 format. Windows users might do this via Notepad.

Zipcodes example 2

- Create table in SQL Workbench:

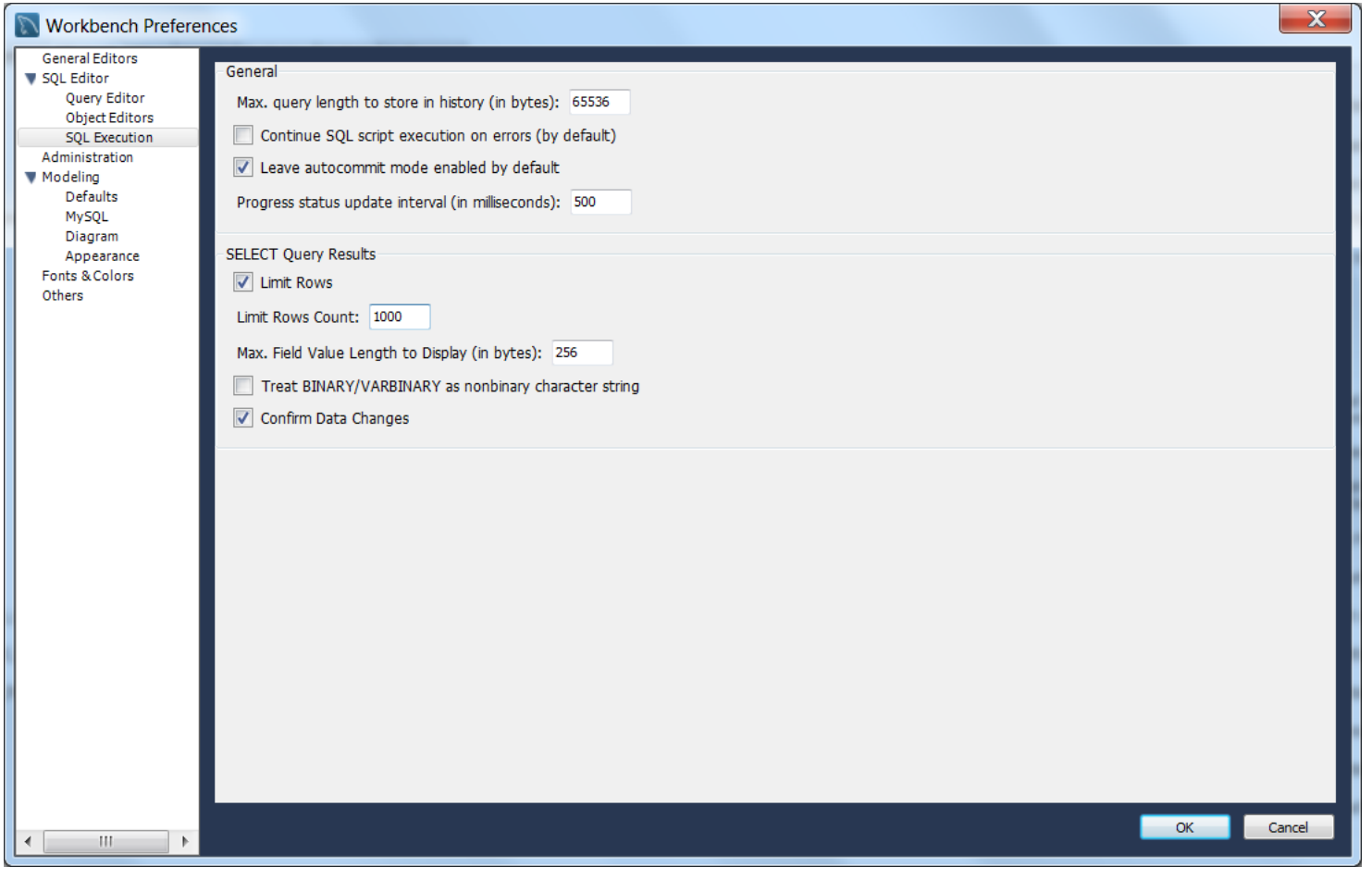
```
create table zipcodes(
    zip int(4) not null,
    city varchar(60) not null,
    primary key (zip)
)
```

- Import from file with LOAD DATA statement:

```
LOAD DATA INFILE 'C:/2sem2017/postnummerutf8.txt'
INTO TABLE zipcodes
FIELDS TERMINATED BY ';'
LINES TERMINATED BY '\r\n'
IGNORE 2 ROWS;
```

Zipcodes example 3

- **Workbench → Edit → Preferences – change Limit Rows Count to 2000.**



cphbusiness

Zipcodes example 4

- Create copy of zip codes table (notice, you don’t get any primary key!!!)

```
create table zipcodesindex as
select * FROM zipcodes;
```

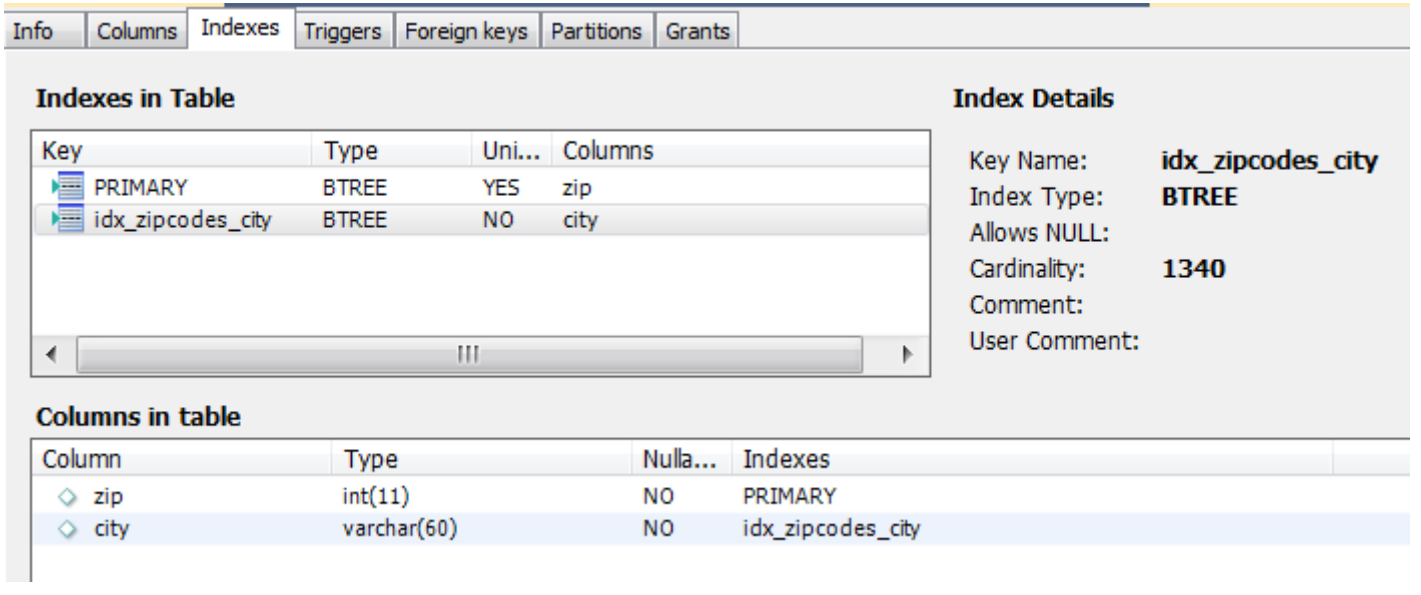
- Alternative create table as normally in order to get a primary key and insert copy of data afterwards with this statement:

```
insert into zipcodesindex
select * from zipcodes
```

Zipcodes example 5

- Create index on new table

```
CREATE INDEX idx_zipcodes_city
ON zipcodesindex (city)
```



cphbusiness

Zipcodes example 6

How to measure search with/without index

Without index

SELECT * FROM zipcodes
where city like 'M%';

Timing (as measured at client side):
Execution time: 0:00:0.00000000

Timing (as measured by the server):
Execution time: 0:00:0.00062948
Table lock wait time: 0:00:0.00000000

Errors:
Had Errors: NO
Warnings: 0

Rows Processed:
Rows affected: 0
Rows sent to client: 28
Rows examined: 1340

Joins per Type:
Full table scans (Select_scan): 1
Joins using table scans (Select_full_join): 0
Joins using range search (Select_full_range_join): 0
Joins with range checks (Select_range_check): 0
Joins using range (Select_range): 0

Sorting:
Sorted rows (Sort_rows): 0
Sort merge passes (Sort_merge_passes): 0
Sorts with ranges (Sort_range): 0
Sorts with table scans (Sort_scan): 0

Index Usage:
No Index used

With index

SELECT * FROM zipcodesindex
where city like 'M%';

Timing (as measured at client side):
Execution time: 0:00:0.00000000

Timing (as measured by the server):
Execution time: 0:00:0.00024974
Table lock wait time: 0:00:0.00000000

Errors:
Had Errors: NO
Warnings: 0

Rows Processed:
Rows affected: 0
Rows sent to client: 28
Rows examined: 28

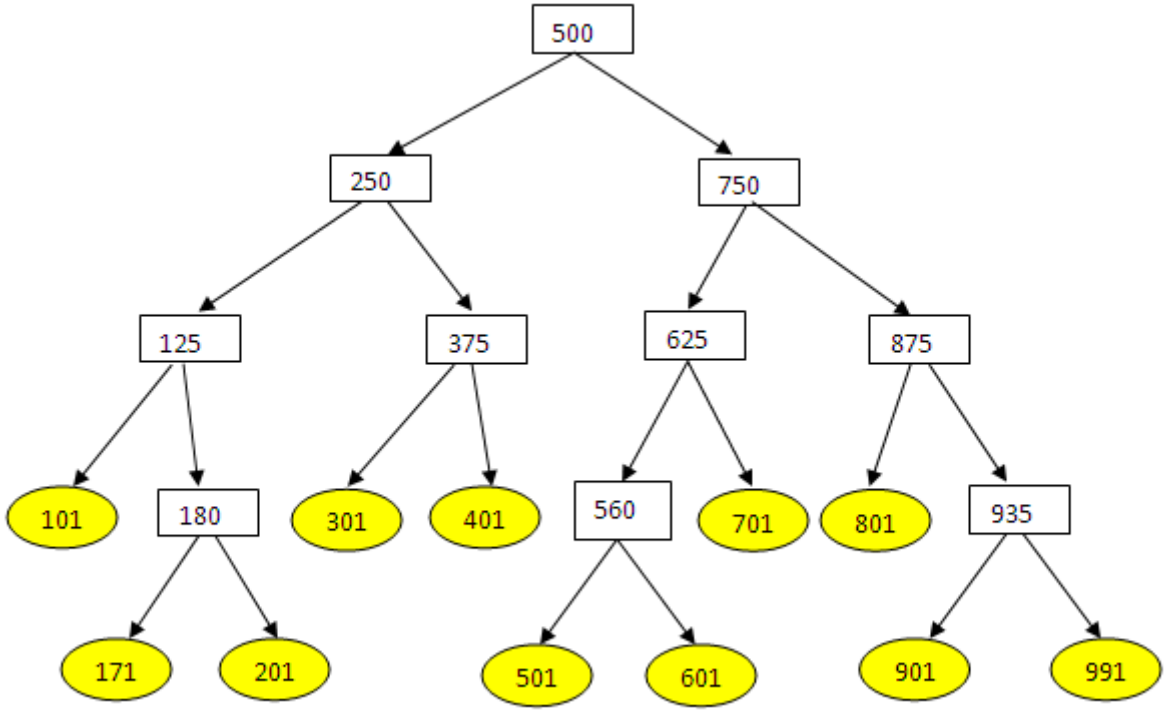
Joins per Type:
Full table scans (Select_scan): 0
Joins using table scans (Select_full_join): 0
Joins using range search (Select_full_range_join): 0
Joins with range checks (Select_range_check): 0
Joins using range (Select_range): 1

Sorting:
Sorted rows (Sort_rows): 0
Sort merge passes (Sort_merge_passes): 0
Sorts with ranges (Sort_range): 0
Sorts with table scans (Sort_scan): 0

Index Usage:
At least one Index was used

Zipcodes example 7

- Indexing comes at a price: every time a data record is changed or inserted, the B tree must be updated



cphbusiness



Stored procedures

Stored procedure example 1

- Create stored procedure that retrieves all zip codes

```
DELIMITER //
CREATE PROCEDURE GetAllZipcodes()
BEGIN
SELECT *  FROM zipcodes;
END //
DELIMITER ;
```

Resource: http://www.mysqltutorial.org/getting-started-with-mysql-stored-procedures.aspx

Stored procedure example 2

- Call stored procedure (in MySQL Workbench):

```
call GetAllZipcodes()
```

Stored procedure example 3

Call stored procedure from jdbc code:

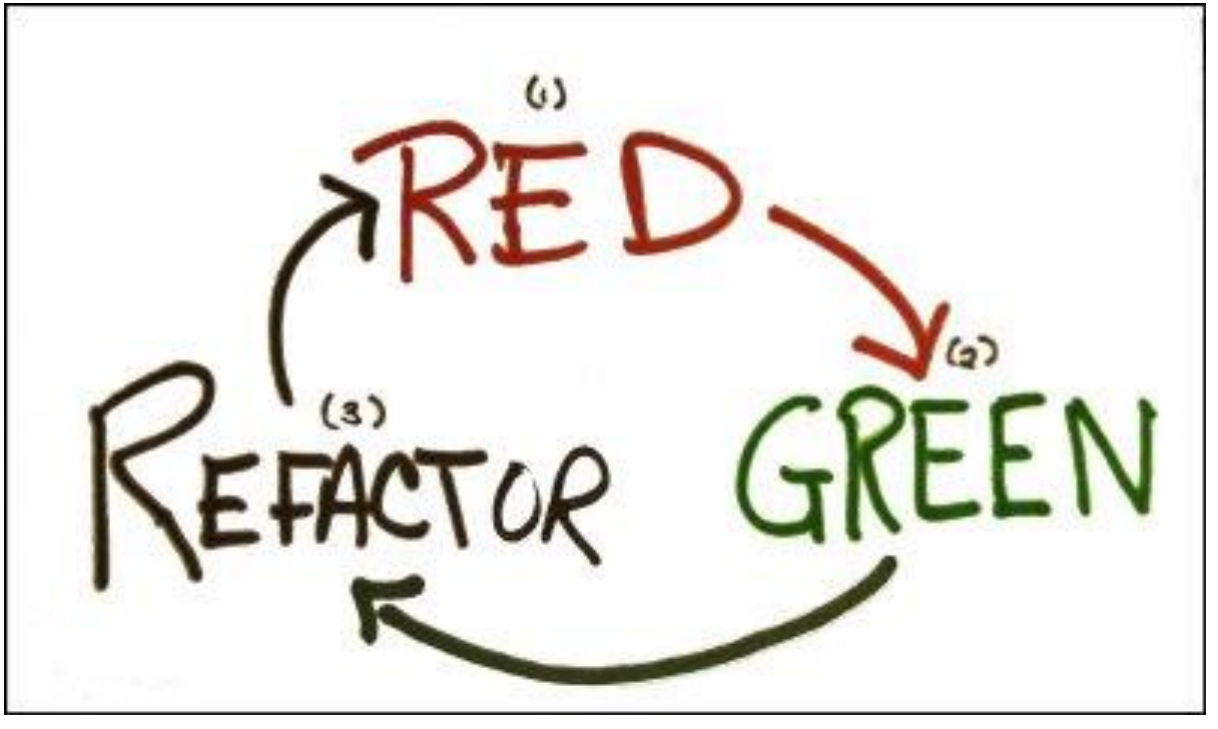
```
...
CallableStatement call = null;
try {
 call = con.prepareCall("{call GetAllZipcodes()}");
 boolean hadResults = call.execute();
 if (hadResults) {
    rs = call.getResultSet();
    while (rs.next()) {
        city = rs.getString("city");
        zip = rs.getInt("zip");
        codes.add(new Zipcode(zip, city));
    }
}
...
```

Stored procedure example 4

```
...
CallableStatement call = null;
try {
 call = con.prepareCall("{call GetAllZipcodes()}");
 boolean hadResults = call.execute();
 if (hadResults) {
    rs = call.getResultSet();
    while (rs.next()) {
        city = rs.getString("city");
        zip = rs.getInt("zip");
        codes.add(new Zipcode(zip, city));
    }
}
…
```

Test-Driven Development

- Let’s see the stored procedure run for real!
- Let’s do it in a JUnit test (tests give us confidence that our code is on the right track)



Stored procedure parameters

```
DELIMITER //
CREATE PROCEDURE GetZipcodes(IN cityName varchar(50))
BEGIN
SELECT *  FROM zipcodes
 where city like cityName;
END //
DELIMITER ;
```

Call in JDBC code:

```
call = con.prepareCall("{call GetZipcodes(?)}");
call.setString(1, city);
```

Exercises

- See document in exercise folder