פיתוח מערכות תוכנה מבוססות Java

כללי Extreme Programming

אוהד ברזילי

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Based on: K. Beck: Extreme Programming Explained.
E. M. Burke and B.M. Coyner: Java Extreme Programming Cookbook.
L. Crispin and T. House: Testing Extreme Programming
http://www.extremeprogramming.org

And slides of: Kent Beck and Ward Cunningham,
Laurie Williams, Vera Peeters and Pascal Van Cauwenberghe,
Ian Sommerville:
http://www.comp.lancs.ac.uk/computing/resources/IanS/SE7/Presentations/index.html

The Rules

1. On Site Customer

- At least one **customer is always present**.
- This **customer is available full-time** to:
  - Answer questions about the system.
  - Negotiate the timing and scheduling of releases.
  - Make all decisions that affect business goals.
- The customer writes functional tests (with the help of **Development)**.

2. Pair Programming

- All programming is done with **two coders at the same machine**.

- The **programmers must share** one mouse, keyboard, screen, etc.

→ At least two people are always intimately familiar with every part of the system, and every line of code is reviewed as it's written.

Here is how pair programming works:

- You pick out a user story for your next task
  - A user story is a requirement from the customer.
  - Stories are typically written on index cards, and the customer decides which stories are the most important
- You ask for help from another programmer.
- The two of you work together on a small piece of functionality:
  - Try to work on small tasks that take a few hours.
  - After the immediate task is complete, pick a different partner or offer to help someone else

Pair Programming

http://www.pairprogramming.com/

Pair-programming has been popularized by the eXtreme Programming (XP) methodology

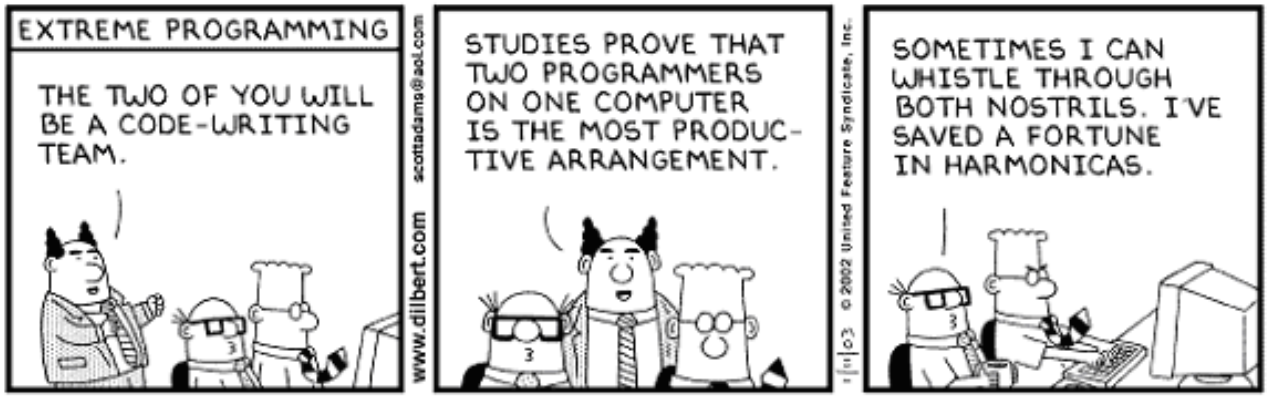
With pair-programming:

- **Two software engineers work on one task at one computer**
- **One engineer, the driver, has control of the keyboard and mouse and creates the implementation**
- **The other engineer, the navigator, watches the driver's implementation to identify defects and participates in on-demand brainstorming**
- **The roles of driver and observer are periodically rotated between the two software engineers**

Research Findings to Date

- Strong anecdotal evidence from industry
  - “We can produce near defect-free code in less than half the time.”
- Empirical Study
  - Pairs produced higher quality code
    - 15% **less defects** (difference statistically significant)
  - Pairs completed their tasks in about half the time
    - 58% of elapsed **time** (difference not statistically significant)
  - Most programmers reluctantly embark on pair programming
    - Pairs **enjoy** their work more (92%)
    - Pairs **feel more confident** in their work products (96%)
- India Technology Company
  - 24% increase in **productivity** (KLOC/Person-Month)
  - 10-fold reduction in **defects**.

Pair Programming



3. Coding Standards

- Agree upon **standards for coding styles**.
- Promotes **ease of understanding and uniformity**.
- **No idiosyncratic quirks** that could complicate understanding and refactoring by the entire team.

4. Metaphor

- Use metaphors to **describe how the system should work**.
- These **analogies** express the functionality of the system.
- Provides a simple way to remember naming conventions.

5. Simple Design

- The code should **pass all tests** and fulfill certain functionality while maintaining:
  - **Best communicate the intention (cohesion).**
  - **No duplicate code.**
  - **Fewest possible classes and methods.**
  - **“Say everything once and only once.” (DRY)**

Simplest thing:

- XP developers always do **the simplest thing that could possibly work**.
- They never solve a more general problem than the specific problem at hand.
- They never add functionality sooner than needed.

6. Refactoring

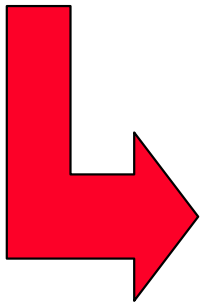
- The code may be changed at any time to provide:
  - **Simplification.**
  - **Flexibility.**
  - **Reduced redundancy.**
- Automated unit tests are used to verify every change.

שרותים והפשטה

דוגמא:

```
public static void printOwing(double amount) {
        //printBanner
        System.out.println("**********************");
        System.out.println("*** Customer Owes **");
        System.out.println("**********************");

        //print details
        System.out.println ("name:" + name);
        System.out.println ("amount" + amount);
}
```



```
public static void printOwing(double amount) {
      printBanner();
      printDetails(amount);
}

public static void printBanner() {
      System.out.println("**********************");
      System.out.println("*** Customer Owes **");
      System.out.println("**********************");
}

public static void printDetails(double amount) {
      System.out.println ("name:" + name);
      System.out.println ("amount" + amount);
}
```

When to refactor?

- Refactor constantly, throughout the lifetime of a project.
- Each time you fix a bug or add a new feature, look for overly complex code. Look for:
  - Chunks of logic that are duplicated and refactor them into a shared method.
  - Try to rename methods and arguments so they make sense.
  - Try to migrate poorly designed code towards better usage of design patterns.
- Writing unit tests is a great way to identify portions of code that need refactoring. When you write tests for a class, your test is a client of that class.

How to refactor?

1. Make sure you have a working unit test for the feature you are about to refactor.

2. Do the refactoring, or a portion of the refactoring.

3. Run the test again to ensure you did not break anything.

4. Repeat steps 2-4 until you are finished with the refactoring.

מקורות

- האנשים שזיהו את חשיבות הרעיון :
  - Ward Cunningham, Kent Beck
- ספר:
  - Martin Fowler, Refactoring, Improving the Design of Existing Code, Addison Wesley 2000. (2nd edition 2005)
- אתר:
  - http://www.refactoring.com/

דוגמאות מקטלוג ה **refactorings**

- extract method / inline method
- Introduce Explaining Variable
- Move method/Field
- Rename method
- Add/Remove Parameter
- Pull up/Push down Field/Method
- Extract Subclass/Superclass/Interface
- Collapse Hierarchy
- Replace Inheritance with Delegation / vice versa

7. Testing

- Tests are **continuously written** with the system.
- **All tests are run together at every step**.
- **Customers write tests** that will convince them the system works.
- Don’t proceed until current **system passes ALL tests**.

Testing

- Every piece of code has a set of automated unit tests, which are released into the code repository along with the code.
- The programmers write the unit tests before they write the code, then add unit tests whenever one is found to be missing.
- No modification or refactoring of code is complete until 100% of the unit tests have run successfully.
- Acceptance tests validate larger blocks of system functionality, such as user stories.
- When all the acceptance tests pass for a given user story, that story is considered complete.

Unit tests

- A unit test is a programmer-written test for a single piece of functionality in an application.
- Unit tests should be fine grained, testing small numbers of closely-related methods and classes.
- Unit tests should not test high-level application functionality.
- Testing application functionality is called acceptance testing, and acceptance tests should be designed by people who understand the business problem better than the programmers.

Writing tests

All tests must be pass/fail style tests.

Grouping tests into test suites:

```
Now Testing Person.java:
    Failure: Expected Age 2, but was 1 instead
Now Testing Account.java:
    Passed!
Now Testing Deposit.java:
    Passed!
Summary: 2 tests passed, 1 failed.
```

- The entire suite of unit tests must always pass at 100% before any code is integrated into the source repository.
- Acceptance tests do not have to pass at 100%.

8. Continuous Integration

- Newly finished code is **integrated immediately**. Unit tests must run 100% successfully, both before and after each integration.
- System is **rebuilt from scratch** for every addition.
- New system must **pass all tests** or new code is discarded.
- Additions and modifications to the code are integrated into the system on at least a daily basis.

9. Small Releases

- A **functional system is produced** after a few months.
- System is released **before the whole problem is solved**.
- New **releases regularly** (daily to monthly).

Small releases

- The smallest useful feature set is identified for the first release.
- Releases are performed as early and often as possible.
- Each release: a few new features added each time.

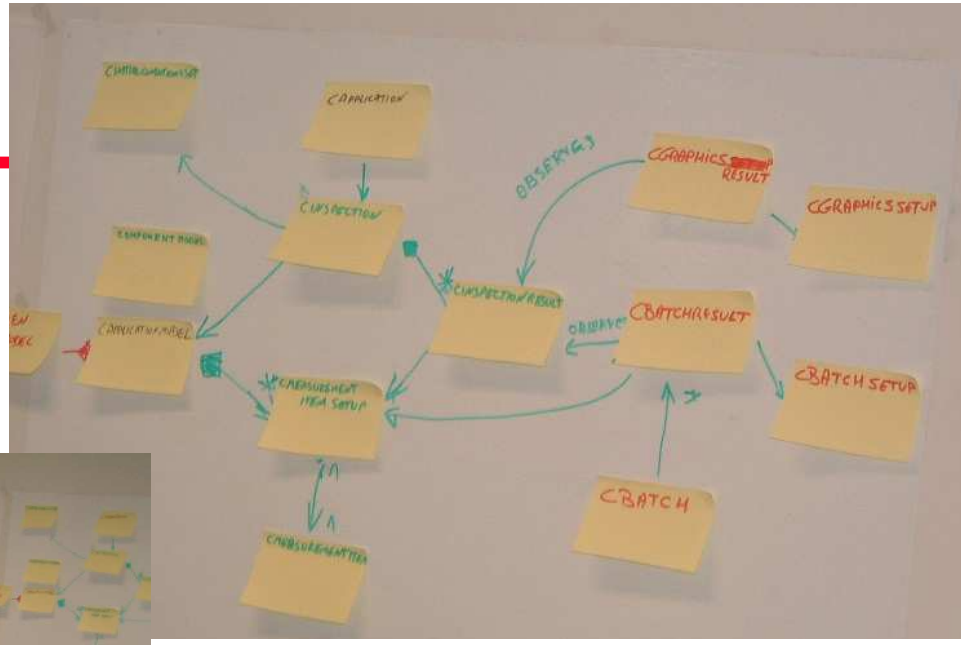
10. The Planning Game

- Schedule small tasks to be completed during the current completed iteration.
- Programmers will focus their attention on the tasks at hand.
- List of tasks is updated regularly.

11. Collective Ownership

- All workers **can access any of the code**.
- **Any programmer can change any part of the system** if an opportunity for improvement exists.
- The TEAM makes the product.
- It works…
- … in disciplined XP teams.

More info: http://www.xp.be/



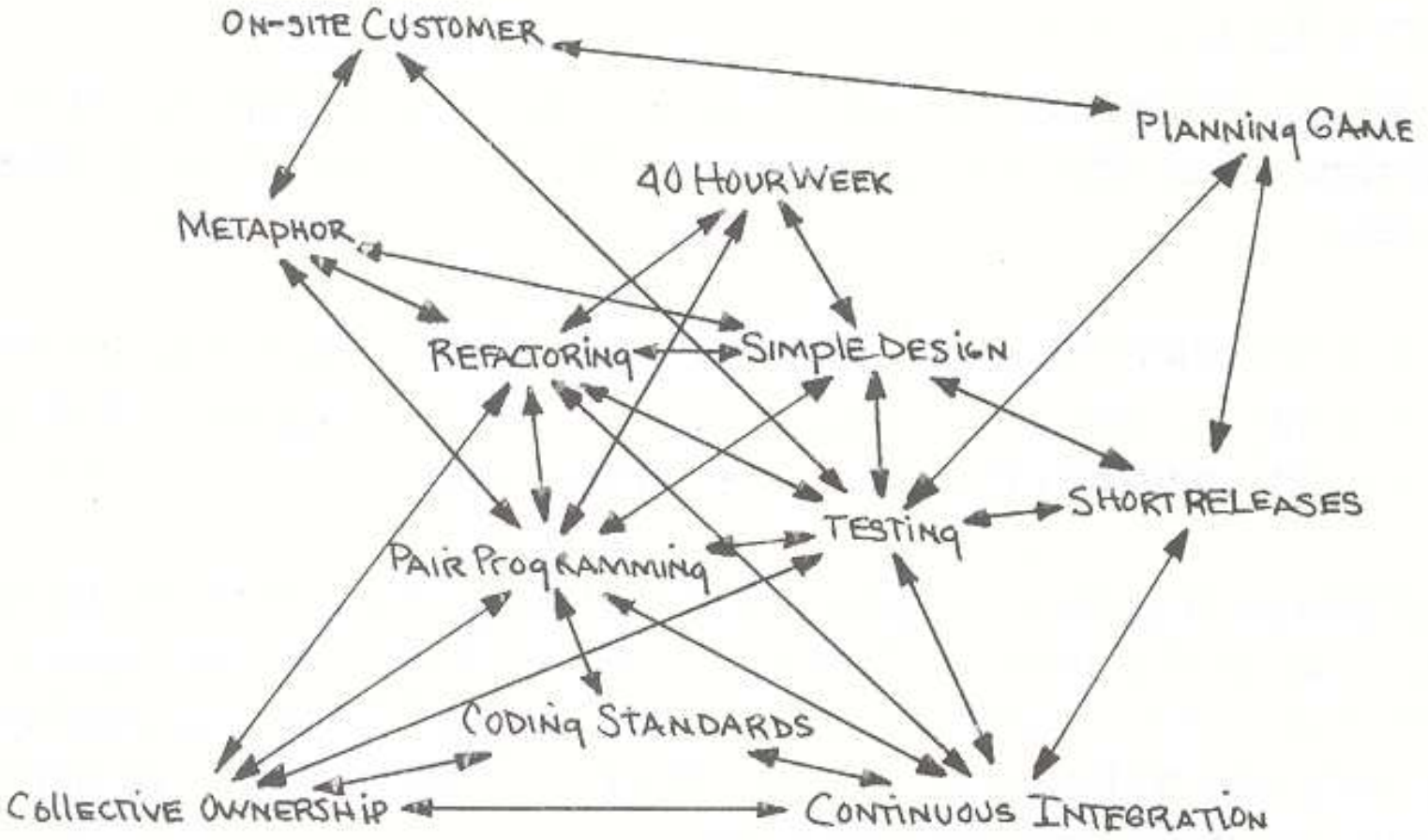
12. Sustainable pace: 40 Hour Weeks

- **Consecutive weeks of overtime is not allowed**.
- The need for overtime is a **symptom of a deeper problem**.

Just Rules

- These rules are **just rules**.
- XP teammates agree to **follow all of the rules**.
- An agreement can be made **to change the rules**.
  - Must address side effects of rule change.

Dependency of Practices



Source: Beck, K. (2000). *eXtreme Programming explained*, Addison Wesley.

Open Workspace

- Work on computers set up in the **middle of a large room** with cubicles around the edges.

- Question: With how many people do you want to work in one room?

Daily Standup Meeting

- Stand up to keep it short.
- Everybody
  - Agrees what they will work on
  - Raises problems & difficulties
  - Knows what's going on
- Initial pairing.

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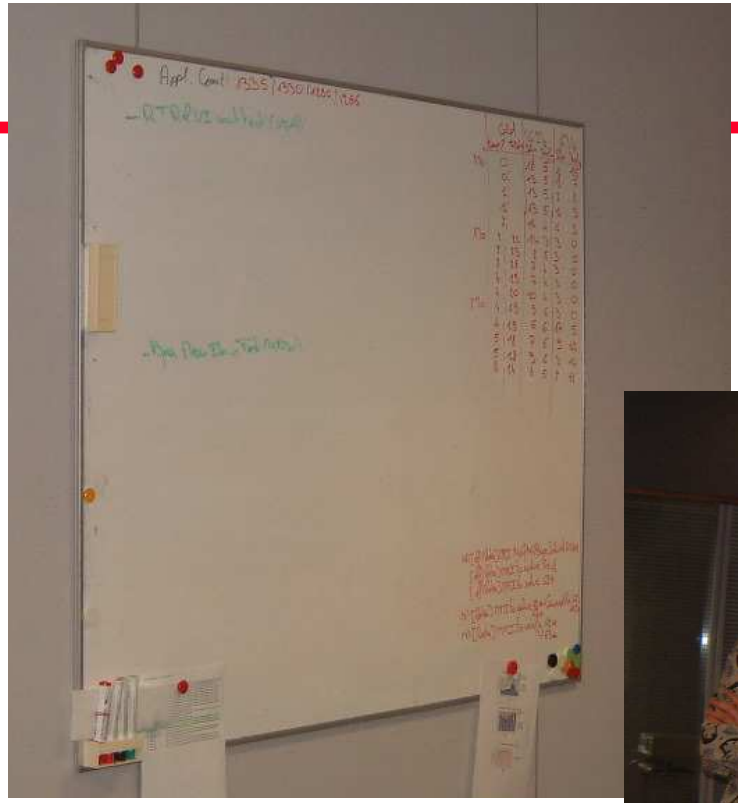

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