-------Week 4: Test-driven development   
What is a unit test?

It is a small code fragments 代码段written by developers to ensure that a particular特别的 piece of code functions as intended 准备. A unit test tests a unit of code, could be a class or a method. Verifies 证实 the correctness of individual parts of the program.

unit tests ensures that components work independently

What information do we need to write a unit test? That is, what SE work must be done before we are in a position to start writing unit tests for a class?

What is test-driven development?

Start by writing tests. Only add product code when a test fails. [p.3]  
Add a test, just enough code to fail. Next you run your tests or a subset of related tests. Then update your functional code to make it pass the new tests. The fourth step is to run your tests again. Repeat until test passes.

Write code in small increments and never write code before there is a test to exercise this code.

What are the advantages of writing the unit tests for a class C before writing the code for a class C?

**(TDD slides p.3)**

* Writing tests captures your understanding of the requirements
* Tests actually get written
* Programmer satisfaction when all tests pass (why?)
* Repeatable 可重复 and automated 自动化 validation 确认 of correctness
* Confidence 信任 to change/refactor 重构

What are the advantages of writing a test suite for the requirements before writing the code.

Explain how a test suite can be used as a substitute for uses cases when coming to agreement with a customer as to what the system should deliver in terms of functionality.

How does test-driven development avoid redundant work in design and coding?

What is refactoring?

* It is a change made to the internal structure of S/W to make it easier to understand and less expensive to modify, without changing its observable behavior.
* Behaviour preserving code transformation.

How does refactoring support test-driven development?

* Refactoring is part of a TDD micro-iteration
* An executable test for a particular feature, is designed, written and shown to fail
* The code is extended to pass the test while continuing to pass all other existing tests
* The code and tests are refactored to eliminate redundancy

Why does the software need to be well-structured and well-organized? Isn't it enough that the code works?

* Code with high structural quality make it more approachable 接近 to others (understand, extend).
* Higher Quality
* Allow for easier extensions 扩展 and adding new functionality.

Week 4: Software process

**Activities:** Communication – Planning – Modeling – Construction – Deployment

What is a software process?

Collection of activities, actions & tasks performed when a software system is created with the purpose of delivering on time and with sufficient足够的 quality.

In SE. it is an adaptable approach to choose appropriated activities to complete the task.

The objective of software development is to e\_ciently and

predictably deliver a software product that meets the needs of the

community of its stakeholders.

A process is a set of ordered steps intended to reach an objective.

What does it process?

A software development process (or model) is an approach to

building, deploying and maintaining software. The motivation

behind de\_ning a process for software development is to manage

the size and complexity of software systems.

Who or what perform the steps in the process?

What information is needed during the software process?

Common principle

Breakdown of a project into manageable components.

Breakdown by Activity:

Linear Process Model

1 month requirements

1 month analysis

2 month design

2 month coding & testing

Breakdown by Functionality:

Iterative Process Model

1st iteration has 20% functionality

2nd iteration adds 30%

etc.

What is a stakeholder? Give some examples of stakeholders. What concerns do the different stakeholders have?

Customer

solves problems at an acceptable

cost in terms of money paid and

resources used

Developer

easy to design;

easy to maintain;

easy to reuse its parts

User

easy to learn;

e\_cient to use;

helps get work done

Development Manager

sells more and pleases customers

while costing less to develop and maintain

Explain the differences between linear and iterative software processes?

Breakdown by Activity:

Linear Process Model

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How do the waterfall model and the spiral model act as baselines for comparing different approaches to software development?

Explain the following terms: phase, activity, iteration, release, deliverable, milestone.

Suppose that you are doing a small project using *code and fix* approach. How do you measure your progress towards completion? That is, how can you determine a completion date to tell to the customer?

no planning activities, Historical data, by Luck. At random

Suppose that you are doing a small project using *test-driven development*approach. How do you measure your progress towards completion? That is, how can you determine a completion date to tell to the customer?

Requirements is the basis

What is agile software development?

<https://en.wikipedia.org/wiki/Agile_software_development>

What are the advantages and disadvantages of agile software development?

**Advantages: efficient communication, short cycle/feedback, quality focus, incremental/iterative**