



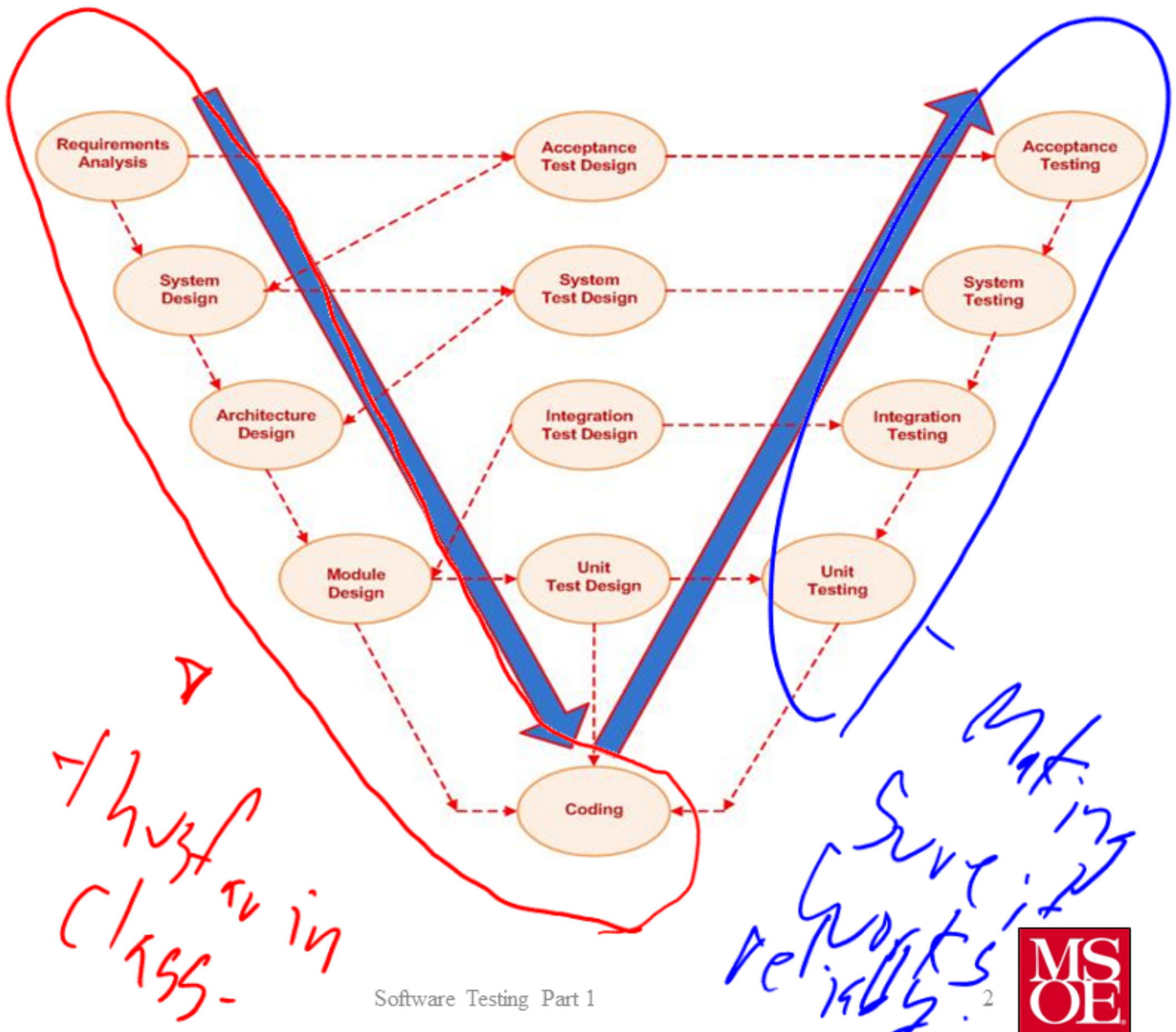
Software Testing Part 1

Objectives

- Explain the relationship between the various types of testing
- Explain the testing process
- Explain the relationship between test plans, test cases, and test procedures
- Develop Rudimentary test cases for a software package

Software development

Testing in the V Model



Unit Testing

Lowest level of testing

one piece of code

- Unit Testing checks that an individual program unit (subprogram, object class, package, module) behaves correctly.

There is some debate about what constitutes a “unit”. Here some common definitions of a unit:

- the smallest chunk that can be compiled by itself
- a stand alone procedure or function
- something so small that it would be developed by a single person

What is a Unit Test?

Another view

- A piece of source code written by a developer which exercises a very small, specific area of functionality within the source code.
 - Prove to the developer that a piece of code does what he thinks it does
- Systematic way of testing small portions of code
- A way to avoid accidentally breaking working code
 - Regression test

does what you'd think it does

Integration Testing

- You have built your software.
 - It is in n pieces
 - How will you check to make certain it goes together properly?
- Assumption -> Independent modules have already been unit tested


Give multiple
pieces together



System Testing

- You software has been built
 - And it is completely integrated.
 - How will you make certain everything works properly?
- Assumption -> All integration tests have been passed.

- *All put together*

- System Level Test Types
 - Functional testing
 - Performance / Load testing 
 - Scalability testing
 - How well does this system perform under increasing size?
 - Reliability testing
 - Stress Testing
 - Localization testing

Acceptance Testing

- Software has been built and is fully functional
- Testing is supposedly done
- Will the customer pay for it? 😊

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Developing Our Tests

- 3 main artifacts
 - Test Plan — *How we will test.*
 - Test Cases — *What we will test*
 - Test procedures — *specific instructions*
- These artifacts together yield the test results

How many people?

Test Plan

- A document describing the scope, approach, resources, and schedule of intended testing activities.
- identifies test items, the features to be tested, the testing tasks, who will do each task, and any risks requiring contingency planning.
- Ref IEEE Std 829.



- Commonly used term for a specific test.
 - Usually the smallest unit of testing.
 - consists of information such as requirements testing, test steps, verification steps, prerequisites, outputs, test environment, etc.
- Alternate Definition
 - A set of inputs, execution preconditions, and expected outcomes developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement.

testing
all
(2,2) => 4

Test Case

(32767, 1) => 32768

Test Procedure

- A document providing detailed instructions for the execution of one or more test cases.

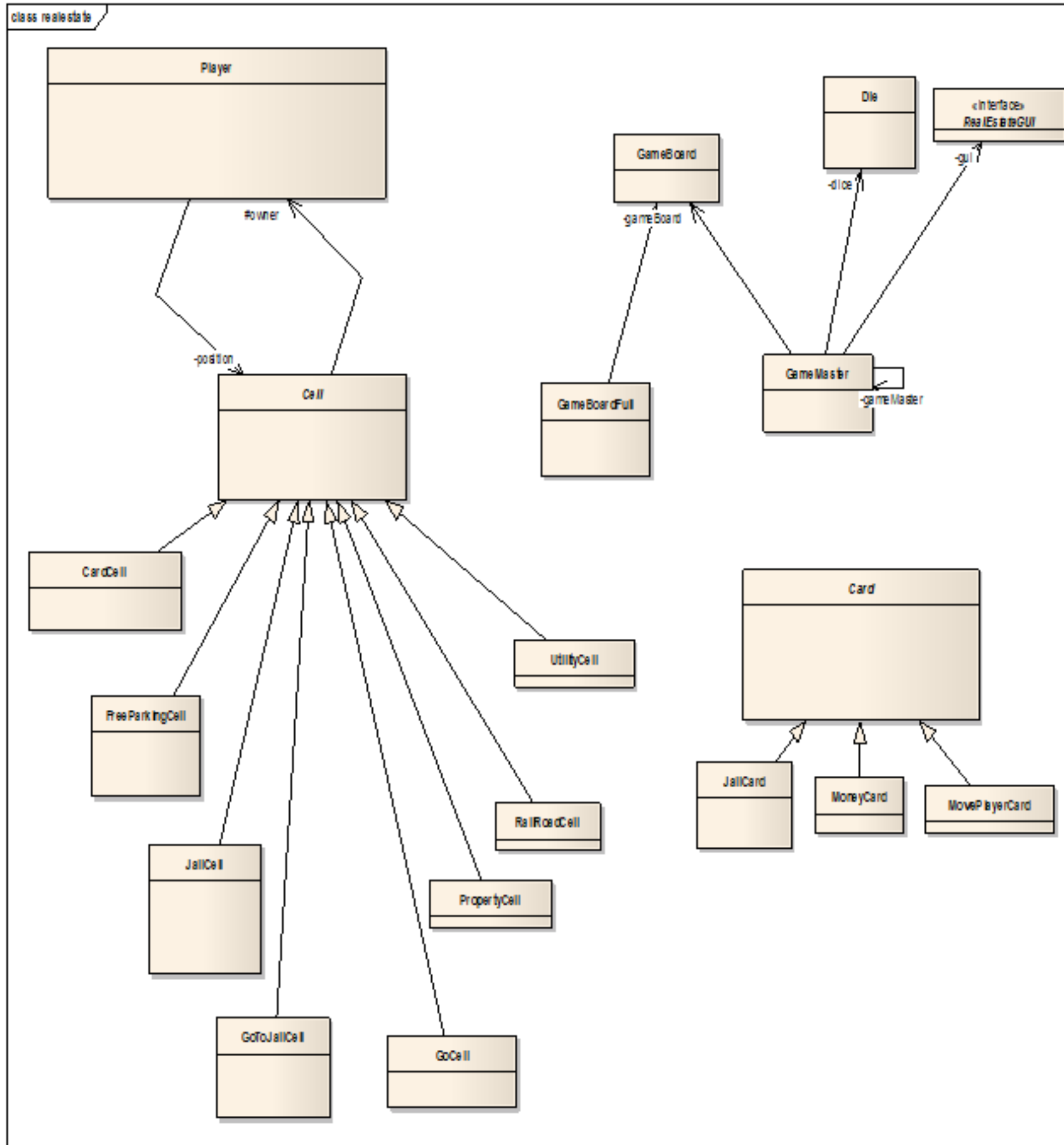
Developing Test Conditions

- Description of the test
 - What are you trying to test for
- What initial conditions may need to be present before running the test?
- What are the input values for the test?
 - What parameter(s) will be passed into the routine
- What is the expected output from running the test
 - Will an exception be generated?
 - Will the code run properly?

An Example

- The triangle Problem
 - A program accepts three integers, a, b, and c, as input representing the sides of a triangle
 - The output of the program is the type of triangle determined by the three sides
 - Isosceles, Scalene, Equilateral, or not a Triangle
 - Sides are between 1 and 200 units in length
- Write a set of test cases and expected results to fully test this program

Real Estate Example



Lets start thinking about
how we would test this...

- We'll start by playing the game a bit...