



Software Testing

MSAJCE



Objective

The objective of this presentation is to show the

- How to define Software Testing Principles
- What are the types of Software Tests
- What is Test Planning
- Test Execution and Reporting
- Real-Time Testing



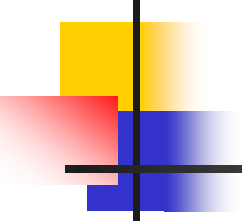
How to define Software Testing Principles

- **Testing**
The execution of a program to find its faults
- **Verification**
The process of proving the programs correctness.
- **Validation**
The process of finding errors by executing the program in a real environment
- **Debugging**
Diagnosing the error and correct it



Software Testing Principles

- To remove as many defects as possible before test since the quality improvement potential of testing is limited



What are the Types of Software Tests

- Unit Testing (White Box)
- Integration Testing
- Function Testing (Black Box)
- Regression Testing
- System Test
- Acceptance and Installation Tests



Unit Testing (White Box)

- Individual components are tested.
- It is a path test.
- To focus on a relatively small segment of code and aim to exercise a high percentage of the internal path
- **Disadvantage:** the tester may be biased by previous experience. And the test value may not cover all possible values.



Integration Testing

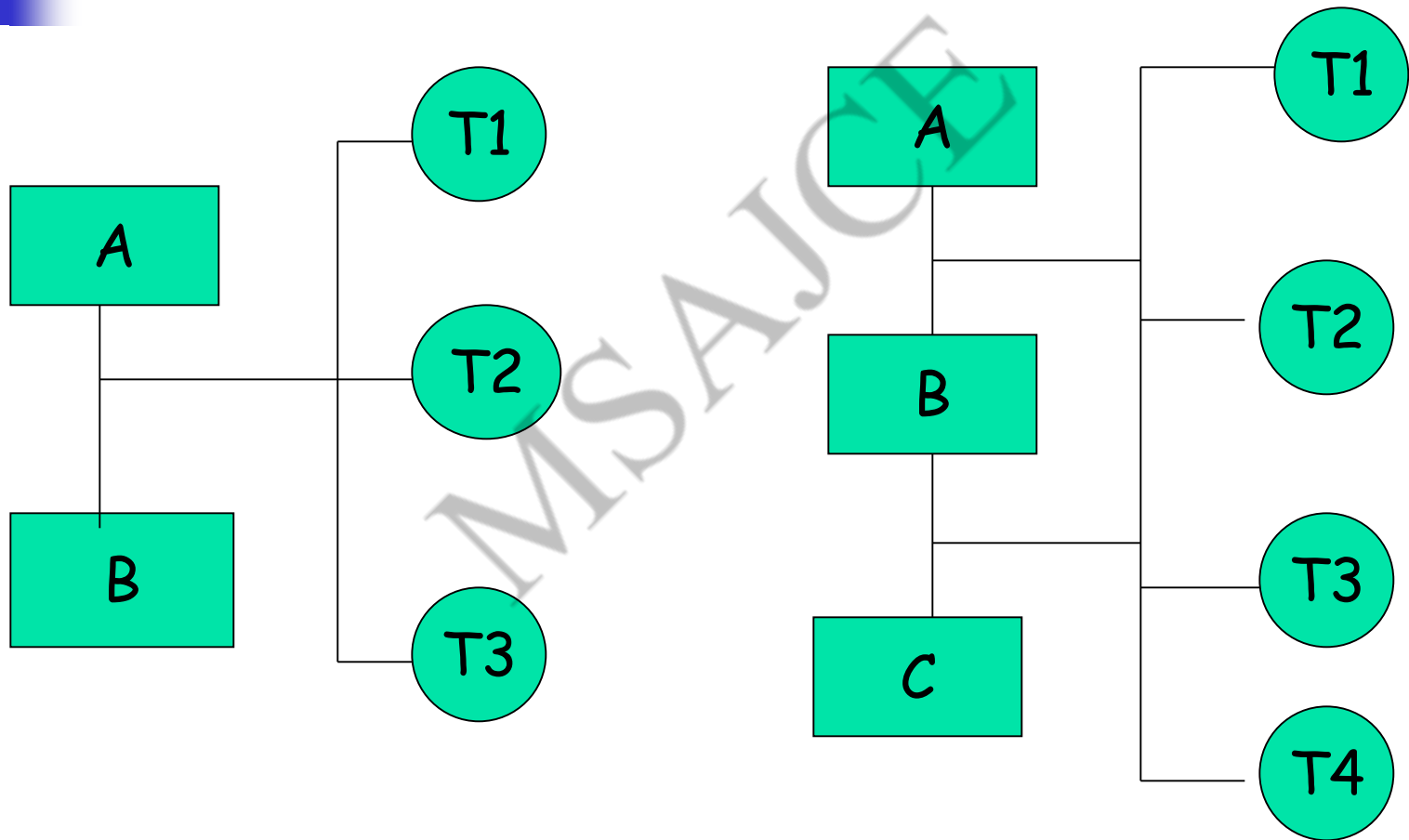
- Top-down Integration Test
 - Bottom-up Integration Test
- MSA.JC



Top-down Integration Test

- The control program is tested first. Modules are integrated one at a time. Emphasize on interface testing
- **Advantages:** No test drivers needed
Interface errors are discovered early
Modular features aid debugging
- **Disadvantages:** Test stubs are needed
Errors in critical modules at low levels are found late.

Top-down Testing

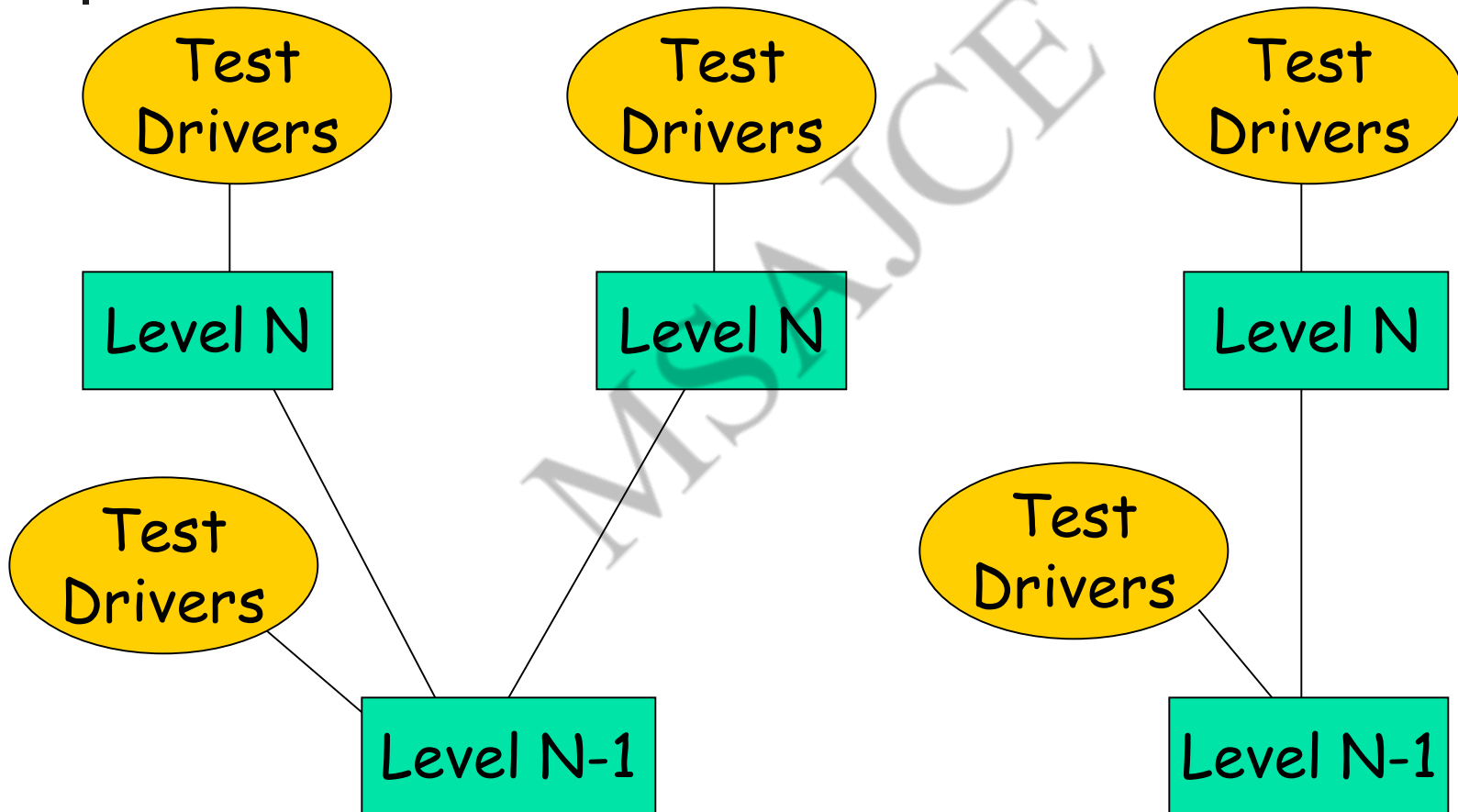




Bottom-up Integration Test

- Allow early testing aimed at proving feasibility
Emphasize on module functionality and performance
- **Advantages:** No test stubs are needed
Errors in critical modules are found early
- **Disadvantages:** Test drivers are needed
Interface errors are discovered late

Bottom-up testing





Function Testing (Black Box)

- Designed to exercise the to its external specifications
- Testers not biased by knowledge of the program's design.
- **Disadvantages:**
 1. The need for explicitly stated requirements
 2. Only cover a small portion of the possible test conditions.



Regression Testing

- Test the effects of the newly introduced changes on all the previously integrated code.
- The common strategy is to accumulate a comprehensive regression bucket but also to define a subset.
- The full bucket is run only occasionally, but the subset is run against every spin.
- **Disadvantages:**
 1. To decide how much of a subset to use and which tests to select.



What is Test Planning

- Define the functions, roles and methods for all test phases.
- Test planning usually start during the requirements phase.
- Major test plan elements are:
 1. Objectives for each test phase
 2. Schedules and responsibilities for each test activity
 3. Availability of tools, facilities and test libraries.
 4. Set the criteria for test completion



Test Execution & Reporting

- Testing should be treated like an experiment.
- Testing require that all anomalous behavior be noted and investigated.
- Big companies keep a special library with all copies of test reports, incident forms, and test plans



Real-Time Testing

- Real-Time testing is necessary because the deployment system is usually more complicated than development system
- Rules apply for testing real time system
 1. Evaluate possible deadlocks, thrashing to special timing conditions
 2. Use tests to simulate hardware faults.
 3. Use hardware simulation to stress the software design.
 4. Design ways to simulate modules missing in the development system.



References

- DeMillo, Software Testing and Evaluation Benjamin/Cummings Publishing Company, Inc California, 1987.
- Sommerville, Software Engineering Addison-Wesley Publishing Company, 1996
- Humphrey, Managing the Software Process, Addison-Wesley Publishing Company, 1990.