

Software Testing

Inst. Nguyễn Minh Huy

Contents



- Verification and Validation.
- V & V Methods.
- V & V Process.



- **Verification and Validation.**
- V & V Methods.
- V & V Process.

Verification and Validation



■ Verification vs. Validation (V & V):

Criteria	Verification	Validation
Purpose	Does software meet user requirements?	Does software meet user expectations??
Approach	Find defects	Find misunderstandings
Role	Development team	Stakeholders
Methods	Operate/Not operate software	Must operate software
Question	Build the thing right??	Build the right thing??

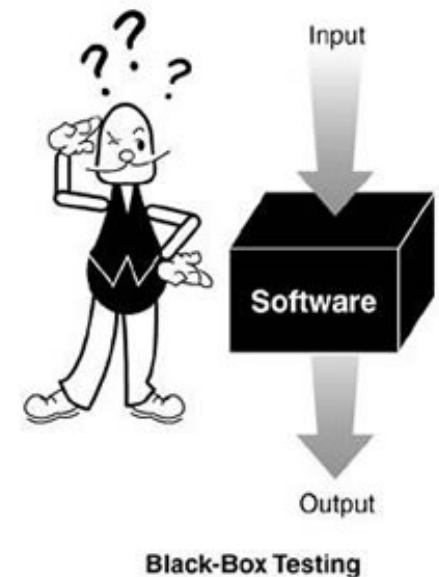
Verification and Validation



■ Types of Verification:

■ Dynamic verification:

- Verify by operating software.
 - ➔ Software testing.
 - ➔ Black-box testing.
- Based on Input/Output.
- Advantages:
 - Low cost for general purposed software.
 - Verify non-functional requirements.
- Disadvantages:
 - High cost for specific software.
 - Software must be finished.
 - Hidden bugs.





■ Types of Validation:

■ Alpha Testing:

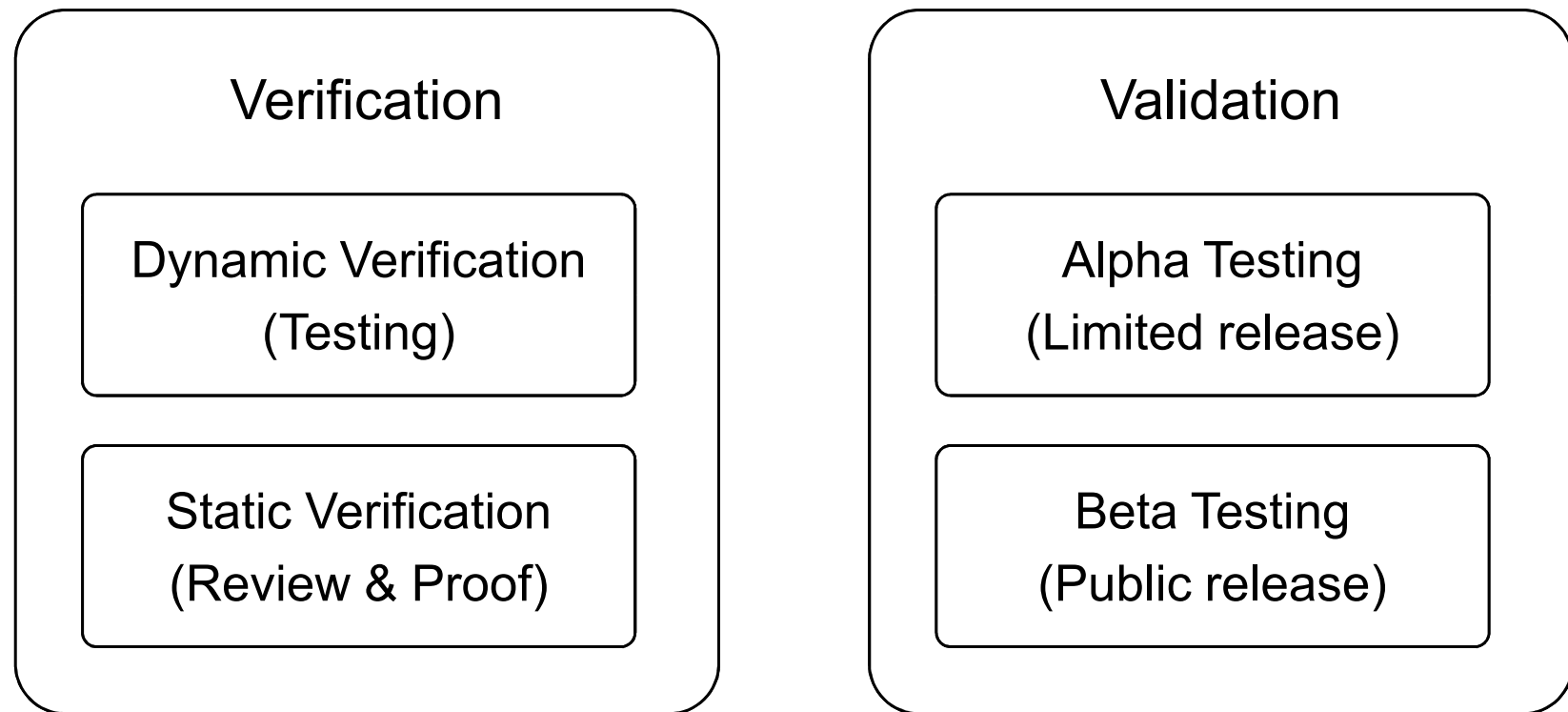
- Limited release.
- Selected users.
- Controlled operation.

■ Beta Testing:

- Unlimited release.
- Public users.
- Free operation.



■ Types of V & V (Summary):



Contents



- Verification and Validation.
- **V & V Methods.**
- V & V Process.



■ Static Verification:

■ Software Inspection:

- Michael Fagan, 1979.
- Verify by reading contents.
- Independent inspection team.
- Advantages:
 - Apply in each phase.
 - Efficient way to find bugs.
- Disadvantages:
 - Expert group.
 - Time & cost.

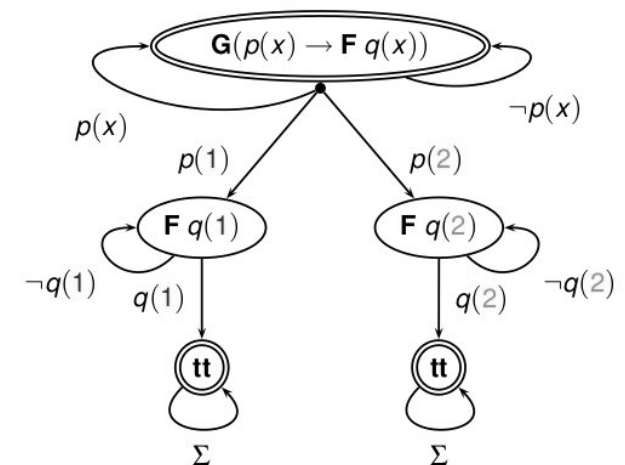




■ Static Verification:

■ Model Checking:

- Verify by proofs.
 - Create math models for system.
 - Prove the models correct.
- Apply in analysis/design phase.
- Advantages:
 - No bug guarantee.
 - Automatic proofs.
- Disadvantages:
 - Complex math models.
 - No efficient tools.

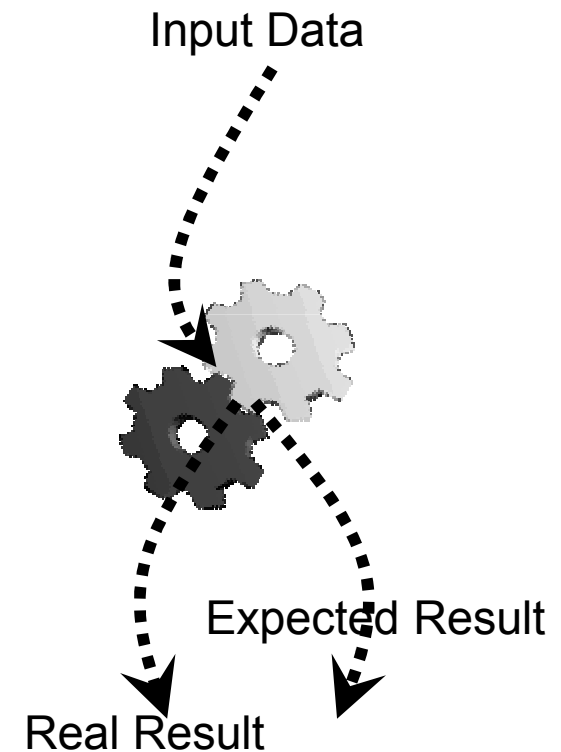


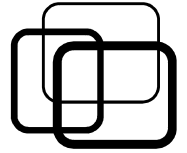


■ Dynamic Verification:

■ Test Case:

- Check input/output.
- Based on test steps.
- Tested items:
 - Code.
 - Use Case.
 - Functional requirement.
- Contents:
 - Context.
 - Input data.
 - Expected output.
 - Test steps.

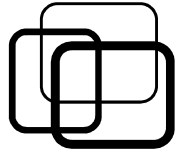




■ Test Case for “Add new book”:

Test Case	Nhập sách thất bại
Related Use Case	Add new book
Context	Login as Librarian
Input Data	Book title: Chiến tranh và Hòa bình Author: (empty) Publisher: (empty) Episode: 2 ...
Expected Output	Display error message “Invalid book information!”. The book is not stored in database.
Test Steps	1. Login: (username “nmhuy”, password “12345”) 2. Select “Add new book” on menu 3. Enter Input Data. 4. Click submit button.

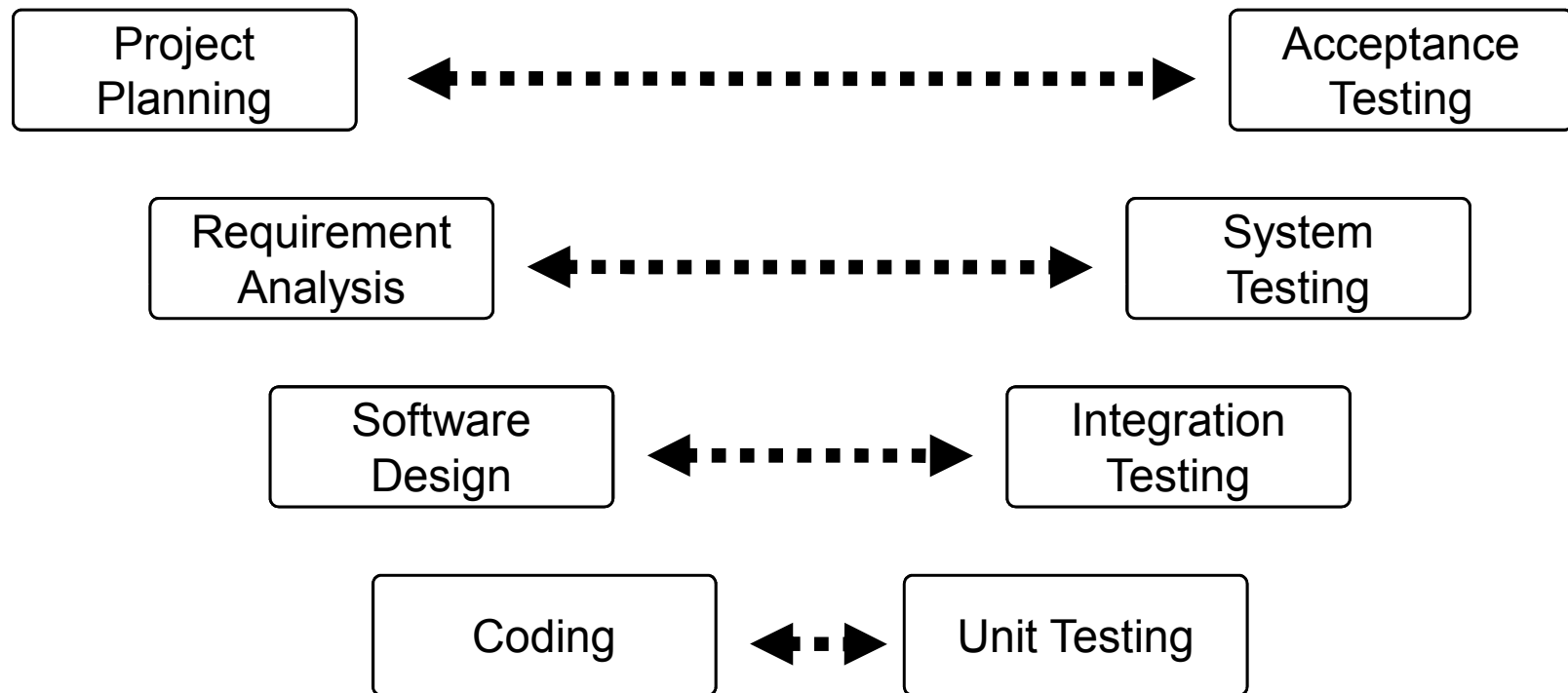
Contents



- Verification and Validation.
- V & V Methods.
- **V & V Process.**



■ V-Model in Software Process:



V & V Process



■ V & V Phases:

■ Unit Testing:

- Verify small units in software.
 - ➔ Programming Functions.
- Test each unit in isolation.
- Role: developer.
- Document: unit test case.



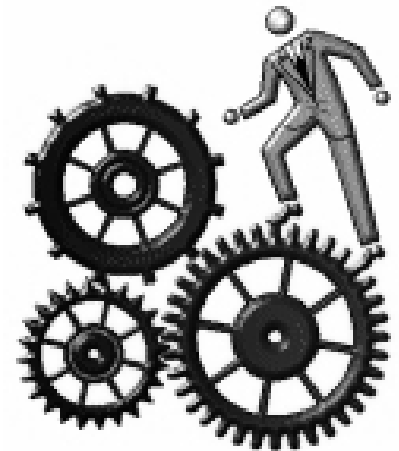
Unit Test Case	Division By Zero
Context	Project ABC / Class Number
Method	divide(float a, float b)
Input Data	a = 5 b = 0
Expected Output	Exception: Divided by zero
Test Steps	float c = Number.divide(5, 0)



■ V & V Phases:

■ Integration Testing:

- Verify group of units in software.
- Test collaboration of programming functions.
 - ➔ Dancing testing.
- Role: developer.
- Document: integration test case.



V & V Process



■ V & V Phases:

■ System Testing:

- Verify whole system in operation.
- Test system meets user requirements
- Operate in simulation environment.
- Types:
 - Functional Testing.
 - Non-functional Testing.

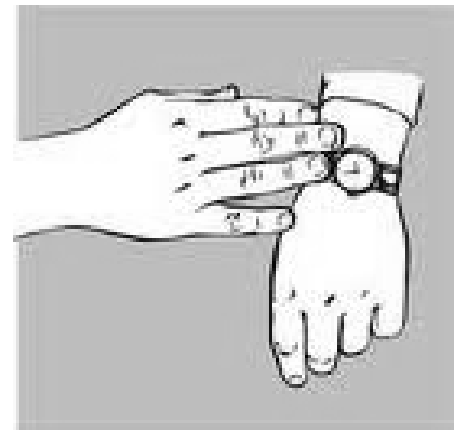




■ V & V Phases:

■ Acceptance Testing:

- User testing.
- Test system meets user expectations.
- Operate in real-time environment.
- Types:
 - Alpha Testing.
 - Beta Testing.





■ Test Case:

- “Online Bookstore” Project.
- Tasks: write all test cases for:
 - “Check out an order”.
 - “Add new items to store”.

