System Analysis and Design

Eighth Edition

Alan Dennis, Barbara Wixom, Roberta M. Roth

Chapter 11

Moving into Implementation

Objectives

- Be familiar with the system construction process.
- Explain different types of tests and when to use them.
- Describe how to develop user documentation.

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Introduction

- As the implementation phase begins, foremost on people's minds is construction of the new system
- A major component of building the system is writing programs
- The implementation phase consists of developing and testing the system ' s software, documentation, and new operating procedures
- During this phase, it is also the responsibility of the systems analysts to finalize the system documentation and develop the user documentation

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Managing the Programming Process

- Assigning the programmers
- Coordinating the activities
- Managing the schedule

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The Programmer Paradox

- More is not always better than less!
- After the “right” number of people are assigned to a programming task, adding more people slows down rather than speeds up completion of the project
- Projects requiring a large team should be broken into a series of independent, smaller parts

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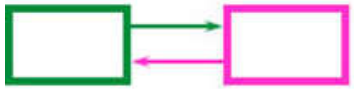
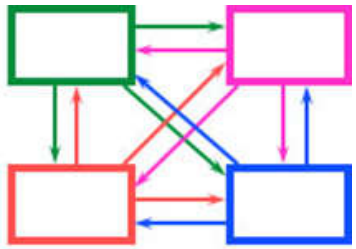
Assigning Programmers

- Minimize the number of programmers
- Match programming tasks with programmer capabilities
- When skills are deficient, apply mentoring and training



Two communication channels



Twelve communication channels

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Coordinating Activities

- Weekly (hopefully brief) meetings
- Create and follow standards
- Organize programmers' work areas
  - Development area
  - Testing area
  - Production area
- Implement change control mechanisms
- Use program log to monitor program changes
- Many CASE tools are set up to track the status of programs and help manage programmers as they work

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Managing the Schedule

- Use initial time estimates as a baseline
- Revise time estimates as construction proceeds
- Fight against scope creep
- Monitor “minor” slippage
- Create risk assessment and track changing risks
- Fight the temptation to lower quality to meet unreasonable schedule demands

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Avoid Classic Mistakes

- Research-oriented development
  - If you use state-of-the art technology, lengthen planned time
- Using “low-cost” personnel
  - If using a significant number of entry level personnel, lengthen planned time
- Lack of code control
  - Use source code library to keep programmers from changing the same code at the same time
- Inadequate testing
  - Always allocate sufficient time for formal testing

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Testing

- Writing programs is a fun, creative activity
- Testing and documentation are not fun
- Testing helps ensure that the system performs as outlined in the specifications
- It is dangerous to test early modules without an overall testing plan
- It may be difficult to reproduce sequence of events causing an error
- Testing must be done systematically and results documented carefully

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Test Planning

- Testing starts with the tester's developing a ***test plan*** that defines a series of tests that will be conducted
- Today, automated testing tools enable comprehensive testing of all relevant test conditions


Test Plan Page ___ of ___

Program ID: _____ Version number: ____

Tester: _____ Date designed: _____ Date conducted: _____

Results: ☐ Passed ☐ Open items:

Test ID: _____ Requirement addressed: _____

Objective:

Test cases

	Interface ID	Data Field	Value Entered
1.			
2.			
3.			
4.			
5.			
6.			

Script

Expected results/notes

Actual results/notes

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Categories of Testing

- Stub testing
  - Tests control structures before all modules are written
- Unit testing
  - Tests each module – Does it performs its function?
- Integration testing
  - Tests the interaction of modules - do they work together?
- System testing
  - Tests to assure that the software works well as part of the overall system
- Acceptance testing
  - Tests to assure that the system serves organizational needs

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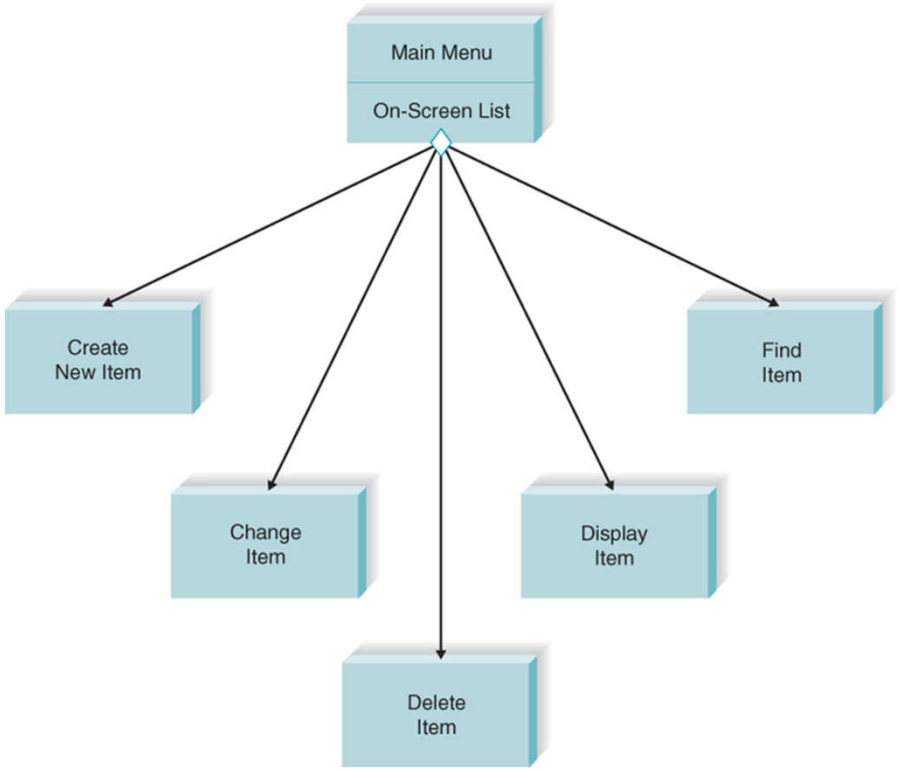
Stub Testing

- Not all program modules are likely to be finished at the same time
- Programmer usually writes stubs for the unfinished modules to enable the modules around them to be tested
- A stub displays a simple test message on the screen or returns some hardcoded value



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Four General States of Tests

1. Unit tests
2. Integration tests
3. System tests
4. Acceptance tests

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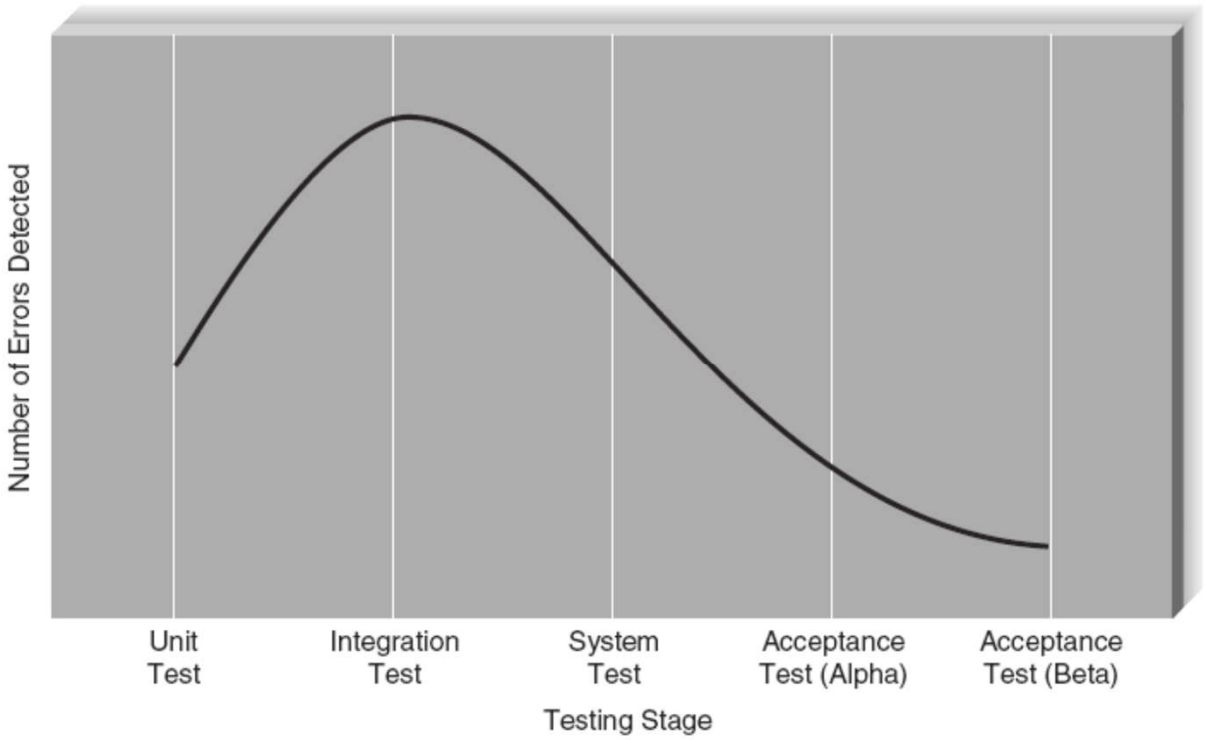
Error Discovery Rates for Different Stages of Tests



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Unit Testing

- ***Unit tests*** focus on one unit—a program or a program module that performs a specific function that can be tested
  - Performed after programmer has developed and tested the code and believes it to be error free
- Black Box Testing
  - Focuses on whether the unit meets requirements stated in specification
- White-Box Testing
  - Looks inside the module at actual code

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Integration Tests

- User interface testing
  - Tests each interface function
- Use-scenario testing
  - Ensures that each use scenario works correctly
- Data flow testing
  - Tests each process in a step-by-step fashion
- System interface testing
  - Ensures data transfer between systems

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System Tests

- Requirements testing
  - Ensures that integration did not cause new errors
- Usability testing
  - Tests how easy and error-free the system is in use
- Security testing
  - Assures that security functions are handled properly
- Performance testing
  - Assures that the system works under high volumes of activity (example: simultaneous users, peak transaction volume)
- Documentation testing
  - Analysts check the accuracy of documentation

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Acceptance Tests

- Alpha testing
  - Performed by users to assure they accept the system; frequently repeats earlier tests
- Beta testing
  - Uses real data, not test data. Actual users monitor for errors or needed improvements.
- User sign-off following acceptance testing indicates the system is ready to be placed into production

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Developing Documentation

- Documentation provides information to make the system easier to use and repair
- System documentation
  - Intended to help programmers and analysts understand and maintain the system after it is installed
- User documentation
  - Intended to help users operate the system

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Producing Documentation

- High quality documentation takes about 3 hours per page or 2 hours per screen
- The task should not be left to the end of the project
- Time required to develop, and test user documentation should be built into project plan
- On-line documentation is predominant today

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Value of Online Documentation

1. Searching is simplified
2. Information can be presented in multiple formats
3. New methods of interacting with documentation are possible (example: tool tips, animated demos, narrated demos)
4. Less costly than paper documentation

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Types of User Documentation

Type of Documentation	Use
Reference documents	Designed to be used when the user needs to learn how to perform a specific function
Procedures manuals	Describe how to perform business tasks
Tutorials	Teach people how to use major components of the system

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Guidelines for Crafting Documentation Topics

- Do not omit any step because you “assume” the user knows how to do that step
- Use the active voice with direct instructions
- Use consistent terms
- Use simple, friendly language
- Use parallel grammatical structure
- Use steps correctly (as actions)
- Use short paragraphs

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Chapter Review

- Identify and describe the essential aspects of managing the programming process.
- Identify and describe the elements of a test plan.
- Identify and describe the focus and types of unit testing.
- Identify and describe the focus and types of integration testing.
- Identify and describe the focus and types of system testing.
- Identify and describe the focus and types of acceptance testing.
- Identify and describe the focus and types of user documentation.

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Key Terms

- Acceptance tests
- Alpha testing
- Beta testing
- Black-box testing
- Change control
- Construction
- Data flow testing
- Documentation navigation control
- Documentation testing
- Documentation topic
- Hardcoded
- Integration tests
- Performance testing
- Procedures manuals
- Program log
- Reference documents
- Requirements testing
- Scope creep
- Security testing
- Stub
- System documentation
- System interface testing
- System tests
- Test case
- Test plan
- Tutorials
- Unit tests
- Usability testing
- User documentation
- User interface testing
- Use scenario testing

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