

CHAPTER 12: SOFTWARE DEVELOPMENT

12.1 PROGRAM DEVELOPMENT LIFECYCLE

12.1.1 Stages

1. **Analysis:** Understand problem, identify requirements
2. **Design:** Create solution structure, algorithms
3. **Coding:** Write actual program code
4. **Testing:** Find and fix errors
5. **Maintenance:** Update and improve after delivery

12.1.2 Development Models

Waterfall:

- Sequential phases
- Each phase completes before next begins
- Good for well-defined requirements

Iterative:

- Develop in cycles
- Each iteration produces working version
- Allows feedback and improvement

RAD (Rapid Application Development):

- Quick development using pre-built components
- Emphasis on prototyping
- Fast user feedback

12.2 PROGRAM DESIGN

12.2.1 Structure Chart

Purpose: Decompose problem into sub-tasks

Shows:

- Modules/procedures/functions
- Parameters passed between modules

12.2.2 State-Transition Diagrams

Purpose: Document algorithm behavior

Shows:

- Different states
- Transitions between states

12.3 PROGRAM TESTING AND MAINTENANCE

12.3.1 Error Types

Type	Description
Syntax	Violation of language rules
Logic	Incorrect algorithm implementation
Runtime	Error during execution

12.3.2 Testing Methods

Method	Description
Dry Run	Manual execution using test data
Walkthrough	Team reviews code
White Box	Tests internal structure

Method	Description
Black Box	Tests functionality only
Integration	Test combined components
Alpha	Testing by developers
Beta	Testing by users
Acceptance	Final testing by client

12.3.3 Test Data

Type	Description
Normal	Typical valid data
Extreme/Boundary	At limits of valid range
Abnormal/Invalid	Invalid data

12.3.4 Maintenance Types

Type	Description
Corrective	Fixing errors
Adaptive	Adapting to environment changes
Perfective	Improving performance/functionality