Introductory Visualizing Technology

Seventh Edition



Chapter 12

Program Development



Describe the System Development Life Cycle





Getting from Idea to Product—System Development Life Cycle (1 of 8)

- Also called waterfall approach
- Each phase must be completed in order for the next phase to begin
- This method is rigid
- Process begins with request for new system or replacement for old one



Getting from Idea to Product—System Development Life Cycle (2 of 8)





Getting from Idea to Product—System Development Life Cycle (3 of 8)

- Planning phase of the SDLC
 - Project team
 - Stakeholders, software developers, and a project manager (PM)
 - Feasibility study
 - Economic
 - Technical
 - Operational
 - Political



Getting from Idea to Product—System Development Life Cycle (4 of 8)

- Analysis phase of the SDLC
 - Data flow diagram (DFD)
 - Shows data flow and highlights system deficiencies
 - Requirements analysis
 - Results in a system specification report
 - System specification report
 - A logical model of the new system



Getting from Idea to Product—System Development Life Cycle (5 of 8)

- Design phase of the SDLC
 - Select solution that meets the requirements
 - Cost-effective options
 - Design of system begins
 - Application specifications written, if system will be built instead of purchased





Getting from Idea to Product—System Development Life Cycle (6 of 8)

- Implementation and testing phase of the SDLC
 - Programmers use designs and specifications to create the system
 - Programs written in modules
 - Unit and integration or link testing
 - Volume testing
 - Acceptance testing
 - User training takes place



Getting from Idea to Product—System Development Life Cycle (7 of 8)

- Maintenance phase of the SDLC
 - System may change or be updated
 - Security holes and bugs fixed
 - New features added
 - Retraining as needed
 - Documentation updated



Getting from Idea to Product—System Development Life Cycle (8 of 8)

- Maintenance phase of the SDLC
 - Day-to-day operational maintenance
 - Monitoring performance
 - Installing updates and patches
 - Creating and restoring backups



Getting from Idea to Product—Other Development Models (1 of 2)

- Joint Application Development (JAD)
- Rapid Application Development (RAD)
- Agile Development





Getting from Idea to Product—Other Development Models (2 of 2)

- Waterfall SDL —best used when system requirements are clear and structured
- Spiral Method (SDM—best for high-risk proje
- V model (Verification and Validation)
- Incremental model
- Iterative model



Describe the Program Development Cycle





Coding the System Program Development Cycle (1 of 9)

- Defining the problem
 - What data will be provided (input)?
 - What will the program do (processing and output)?
- Designing the solution
 - Algorithm
 - Set of steps to solve problem
 - Each step performs a single task





Coding the System Program Development Cycle (2 of 9)

- Flowchart
 - Graphic view of algorithm
 - Arrows to show direction
 - Other symbols to show actions and data
- Control structures
 - Show logic and flow of data processing





Coding the System Program Development Cycle (3 of 9)

- Pseudocode
 - Steps of an algorithm
 - More detail
 - English-like statements
 - Focuses on logic, not syntax
 - Contains control structures
 - Not executable





Coding the System Program Development Cycle (4 of 9)

- Coding
 - Converting algorithm into instructions computer can understand
 - Considerations
 - Type of task
 - Platform
 - Expertise of the programmer



Coding the System Program Development Cycle (5 of 9)

- Choosing the right language
 - Procedural programming
 - Object-oriented programming
 - Syntax rules the correct construction of commands in a language



Coding the System Program Development Cycle (6 of 9)

- Debugging the process of detecting and fixing errors
 - Syntax error
 - Error in way code is written
 - Typo, missing parameter, incorrect use of symbols
 - Easy to spot by reviewing line-by-line



Coding the System Program Development Cycle (7 of 9)

- Logic error
 - Error in programming logic
 - Results in unexpected outcome
 - More difficult to detect
 - Does not prevent a program from running



Coding the System Program Development Cycle (8 of 9)

- Runtime error
 - Occurs when program is running and something entered causes it to crash
 - Memory issues are common cause of runtime errors



Coding the System Program Development Cycle (9 of 9)

- Testing and documentation
 - Beta testing
 - Testing done under actual working conditions
 - Documentation
 - Created throughout programming cycle
 - For users and programmers





Compare Various Programming Languages





Tools of the Trade—Programming Languages (1 of 4)

- Low-level
 - First-generation (1GL)
 - Machine language
 - Written in binary
 - Second-generation (2GL)
 - Assembly language
 - Closer to what humans speak



Tools of the Trade—Programming Languages (2 of 4)

- High-level
 - Third-generation (3GL)
 - Procedural and object-oriented languages
 - Require considerable amount of programming knowledge
 - Compiler converts code into machine language



Tools of the Trade—Programming Languages (3 of 4)

- Fourth-generation (4GL)
 - Closer to natural language than 3GL
- Fifth-generation (5GL)
 - Primarily used in artificial intelligence applications



Tools of the Trade—Programming Languages (4 of 4)

- Software development kit (SDK)
 - A bundle of libraries and tools for a particular platform
- Integrated development environment (IDE)
 - Complete system for developing software
- Platform-as-a-Service (PaaS)
 - Online programming environment
 - Develop, test, and deploy custom applications



Tools of the Trade—Web Programming (1 of 3)

- Select right language for task
- Simplest form of a webpage is a static HTML page
- Dynamic elements
 - Menus
 - Rollovers
 - Searches
 - Videos and animation



Tools of the Trade—Web Programming (2 of 3)

- Server-side
 - Processing takes place on server
 - Results sent to client as HTML
 - Client does not need special software other than a browser



Tools of the Trade—Web Programming (3 of 3)

- Client-side
 - Coding is within webpage
 - Downloaded to client computer
 - Compiled and executed by browser or plug-in



Tools of the Trade—Mobile App Features

- Work well
- Market appeal
- Generate income
 - Pay-per-download
 - Subscription
 - In-app purchases charge for other features
 - In-app advertising





Artificial Intelligence





Artificial Intelligence – Applications

- Branch of science
- Uses 5G languages
 - LISP
 - Prolog





Artificial Intelligence—Expert Systems

- Make decisions in real-life situations
- Simulate human judgment
- Use fuzzy logic
 - Answer questions that do not have clear yes-or-no answer
 - Recognizes that not everything can be broken down to a true-or-false answer





Artificial Intelligence—Machine Learning and Neural Networks

- Machine learning (ML)
- Deep learning
- Neural networks
 - -Emulate biological connections or neurons of the human brain
 - -Three layers Input, output, and middle

Questions





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