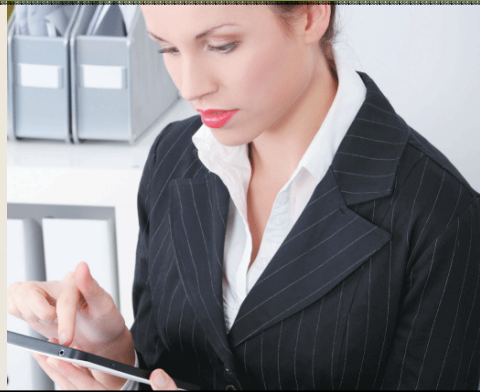


# Discovering Computers

Technology in a World of Computers,  
Mobile Devices, and the Internet

## Chapter 12

### Information Systems and Program Development



## Objectives Overview

Define system development  
and list the system  
development phases

Identify the guidelines for  
system development

Discuss the importance of  
project management,  
feasibility assessment,  
documentation, and data  
and information gathering  
techniques

Discuss the purpose of and  
tasks conducted in each  
system development phase

See Page 510  
for Detailed Objectives

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## Objectives Overview

Differentiate between low-level languages and procedural languages

Identify the benefits of object-oriented programming languages and application development tools

List other programming languages and application development tools

Describe various ways to develop webpages

See Page 510  
for Detailed Objectives

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## System Development

**System development** is a set of activities used to build an information system

System development activities are grouped into phases, and is called the **system development life cycle (SDLC)**

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# System Development



Page 511  
Figure 12-1

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# System Development

- System development should follow three general guidelines:

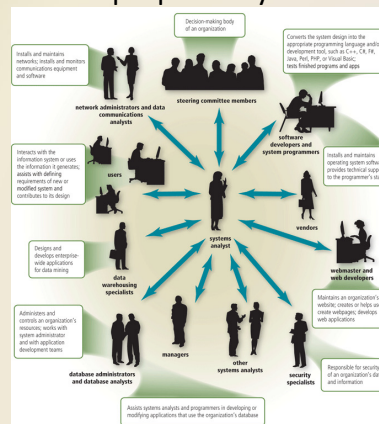
Group activities or tasks into phases

Involve users

Define standards

# System Development

- System development should involve representatives from each department in which the proposed system will be used

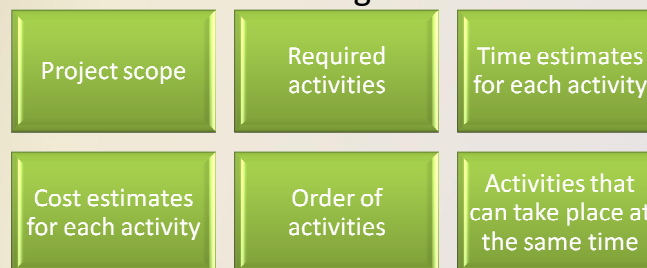


Pages 511 - 513  
Figure 12-2

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# System Development

- Project management** is the process of planning, scheduling, and then controlling the activities during system development
- To plan and schedule a project efficiently, the project leader identifies the following elements:

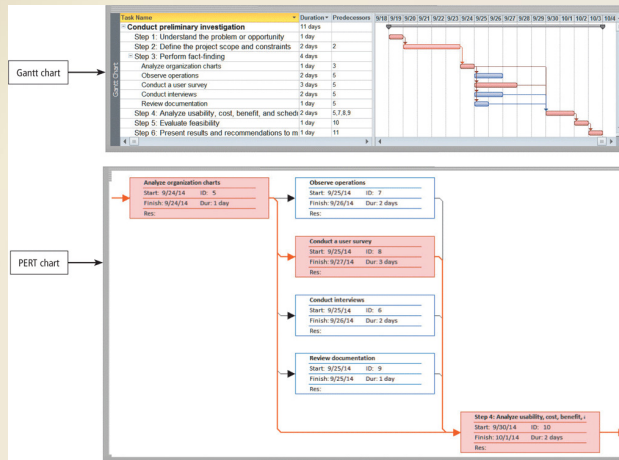


Pages 513 - 514

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# System Development

Popular tools used to plan and schedule the time relationships among project activities are Gantt and PERT charts

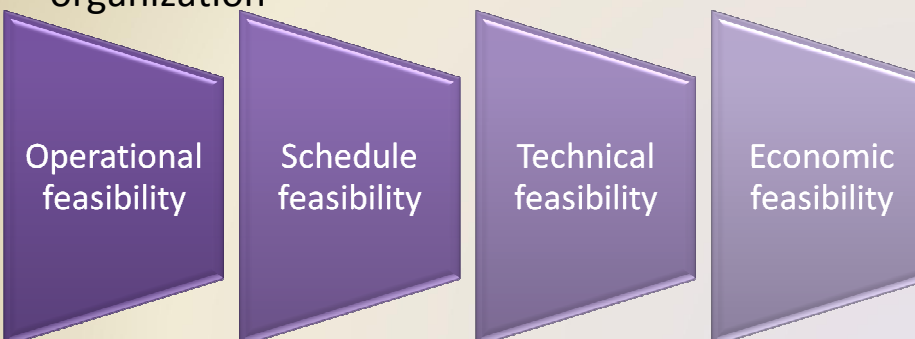


Page 514  
Figure 12-3

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# System Development

- Feasibility** is a measure of how suitable the development of a system will be to the organization



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## System Development

- **Documentation** is the collection and summarization of data, information, and deliverables.
- Maintaining up-to-date documentation should be an ongoing part of system development.

## System Development

- During system development, members of the project team gather data and information using several techniques

Review  
documentation

Observe

Survey

Interview

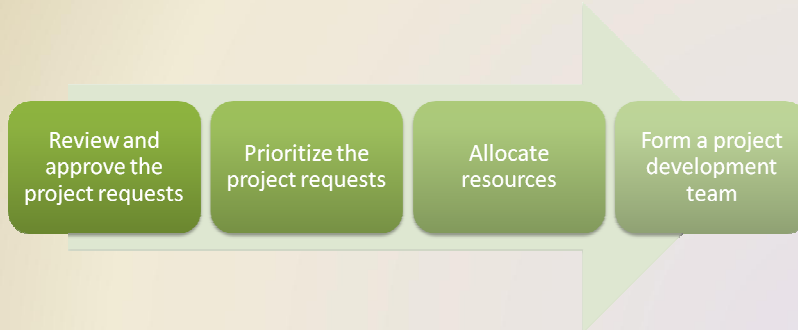
**JAD Sessions**

Research



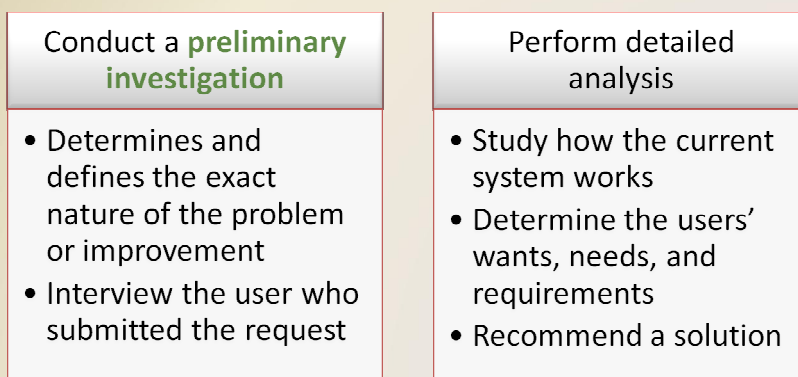
## System Development

- The **planning phase** for a project begins when the steering committee receives a project request
- Four major activities are performed:

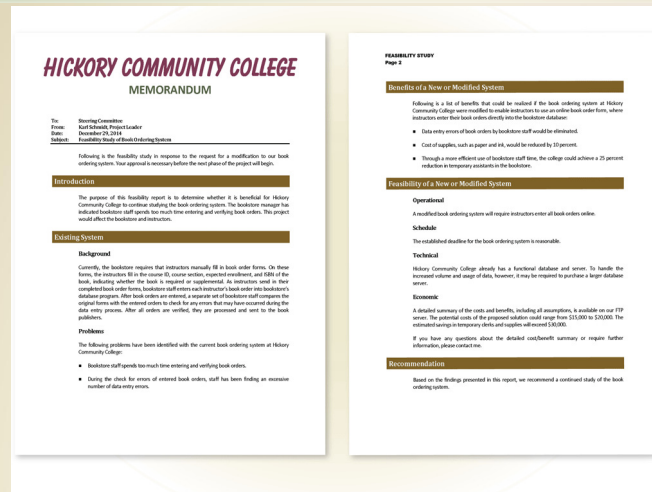


## System Development

- The **analysis phase** consists of two major activities:



# System Development



Page 521  
Figure 12-6

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# System Development

- The system proposal assesses the feasibility of each alternative solution
- The steering committee discusses the system proposal and decides which alternative to pursue

Modify existing system

Buy retail software

Use web apps

Build custom software

Outsource



## System Development

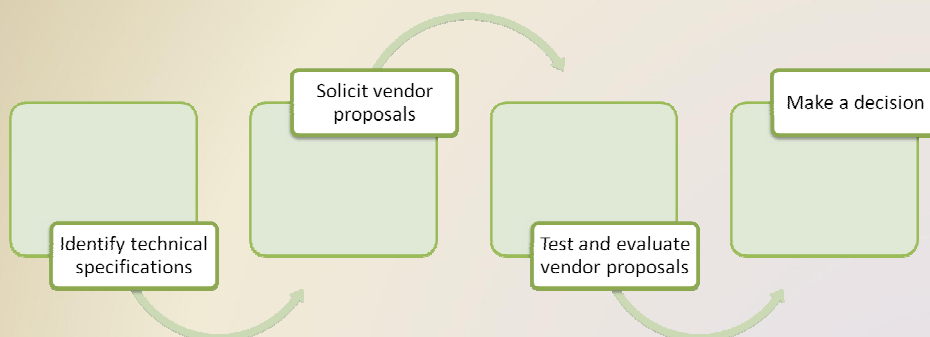
- The **design phase** consists of two major activities

Acquire hardware  
and software

Develop all of the  
details of the new  
or modified  
information system

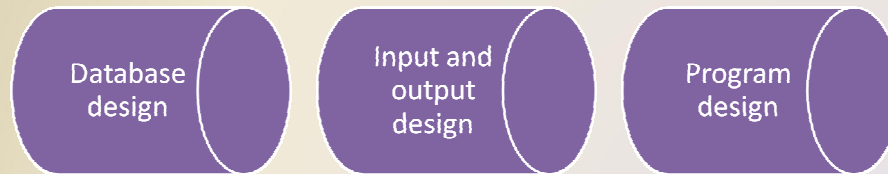
## System Development

- To acquire the necessary hardware and software:



## System Development

- The next step is to develop detailed design specifications



## System Development

- Systems analysts typically develop two types of designs for each input and output

Mock-up

A screenshot of a web application window titled "Instructor Maintenance". The main heading is "Instructor Maintenance Form". Below the heading, there are several input fields with labels and values: "Instructor ID" (380182), "First Name" (Bethany), "Last Name" (Ames), "Extension" (493), "Office" (D210), and "Email Address" (b.ames@hickory.edu). At the bottom, there is a status bar showing "Record: 1 of 4" and a "Search" button.

Layout chart

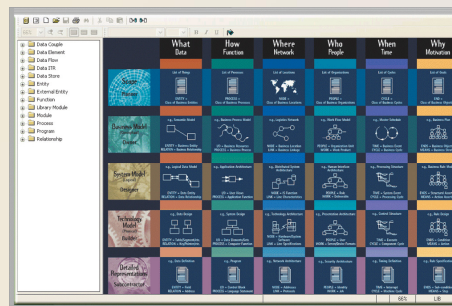
A screenshot of a web application window titled "Instructor Maintenance". The main heading is "Instructor Maintenance Form". Below the heading, there is a table with two columns. The first column contains labels: "Instructor ID", "First Name", "Last Name", "Extension", "Office", and "Email Address". The second column contains corresponding input fields with the same labels. At the bottom, there is a status bar showing "Record: 1 of 4" and a "Search" button.

## System Development

- A **prototype** (proof of concept) is a working model of the proposed system's essential functionality
  - Prototypes have inadequate or missing documentation
  - Users tend to embrace the prototype as a final system
  - Should not eliminate or replace activities

## System Development

- A **prototype** (proof of concept) is a working model of the proposed system's essential functionality
- **Computer-aided software engineering (CASE)** tools are designed to support one or more activities of system development



## System Development

- The purpose of the **implementation phase** is to construct the new or modified system and then deliver it to users

Develop  
programs and  
apps

Install and  
test the new  
system

Train users

Convert to  
the new  
system

## System Development

- Various tests should be performed on the new system

### Unit test

- Verifies that each individual program or object works by itself

### Systems test

- Verifies that all programs in an application work together properly

### Integration test

- Verifies that an application works with other applications

### Acceptance test

- Checks the new system to ensure that it works with actual data

## System Development

- **Training** involves showing users exactly how they will use the new hardware and software in the system
  - One-on-one sessions
  - Classroom-style lectures
  - Web-based training



Pages 528 - 529  
Figure 12-11

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## System Development

- One or more of four conversion strategies can be used to change from the old system to the new system
  - **Direct conversion**
  - **Parallel conversion**
  - **Phased conversion**
  - **Pilot conversion**

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## System Development

- The purpose of the **support and security phase** is to provide ongoing assistance for an information system and its users after the system is implemented



## Application Development Languages and Tools

- A **programming language** is a set of words, abbreviations, and symbols that enable a software developer to communicate instructions to a computer or mobile device
  - Low-level language
  - High-level language

## Application Development Languages and Tools

- **Machine language** is the first generation of programming languages
- Only language the computer directly recognizes

0000DE	5A50	35AA		00102	015AC
0000E2	47F0	2100			
000102	1B77				
000104	5870	304E			01050
000108	1C47				
00010A	4E50	30D6			010D8
00010E	F075	30D6	003E	010D8	0003E
000114	4F50	30D6			010D8
000118	5050	3052			01054
00011C	58E0	30B6			010B8
000120	07FE				
000122	50E0	30BA			00122
000126	1B55				010BC
000128	5A50	304E			01050
00012C	5B50	3052			01054
000130	5050	305A			0105C
000134	58E0	30BA			010BC
000138	07FE				

## Application Development Languages and Tools

```

* comments begin with an asterisk
THIS MODULE CALCULATES THE REGULAR TIME PAY
CALCSTPY EQU *
ST 14,SAVEPTPY
SR 4,4
SR 7,7
SR 5,5
PACK DOUBLE,RTNRSIN
CVB 4,DOUBLE
PACK DOUBLE,RATEIN
CVB 7,DOUBLE
ST 7,RATE
MR 4,7
ST 5,RTNRSIN
L 14,SAVEPTPY
BR 14

* THIS MODULE CALCULATES THE OVERTIME PAY
CALCOTPY EQU *
ST 14,SAVEOTPY
TEST1 CLI CODEIN,C'0'
BR 5,5
A 5,RTNRSIN
B 5,RTNRSIN
SR 4,4
SR 7,7
SR 5,5
PACK DOUBLE,OTNRSIN
CVB 4,DOUBLE
PACK DOUBLE,RATEIN
CVB 7,DOUBLE
ST 7,RATE
MR 4,7
ST 5,OTNRSIN
L 14,SAVEOTPY
BR 14

* THIS MODULE CALCULATES THE GROSS PAY
CALCGPY EQU *
ST 14,SAVEGPAY
SR 5,5
A 5,RTNRSIN
A 5,OTNRSIN
ST 5,GPAY
L 14,SAVEGPAY
BR 14

```

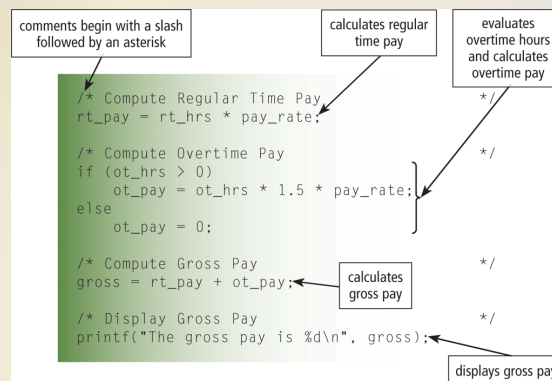
- **Assembly language** is the second generation of programming languages
- Programmer writes instructions using symbolic instruction codes
- A source program contains the language instructions, or code, to be converted into machine language

## Application Development Languages and Tools

- In a **procedural language**, the programmer writes instructions that tell the computer what to accomplish and how to do it

## Application Development Languages and Tools

- The **C** programming language is used to write many of today's programs





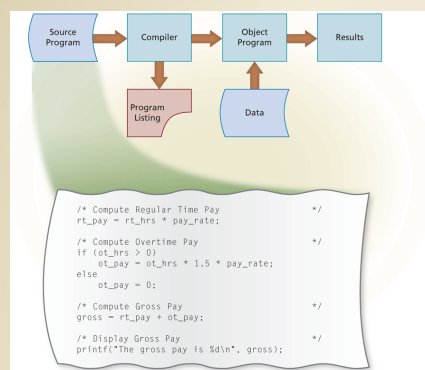
## Application Development Languages and Tools

A compiler translates an entire program before executing it

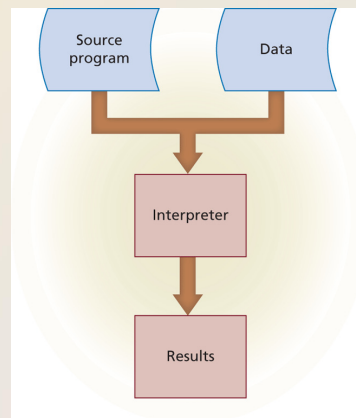
An interpreter converts and executes one code statement at a time

## Application Development Languages and Tools

### Compiler



### Interpreter



## Application Development Languages and Tools

- An **object-oriented programming (OOP)** language allows programmers the ability to reuse and modify existing objects
- Other advantages include:

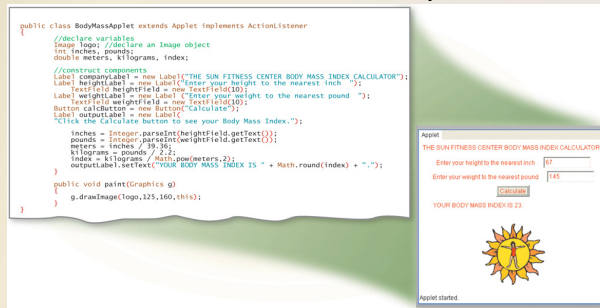
Objects can be reused

Programmers create applications faster

Most object-oriented application development tools are IDEs

## Application Development Languages and Tools

- **Java** is an object-oriented programming language developed by Sun Microsystems
- The Just-in-time (JIT) compiler to convert the machine-independent code into machine-dependent code



## Application Development Languages and Tools

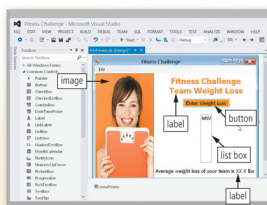
- **C++** is an extension of the C programming language
  - Additional features for working with objects
- **Visual Studio** is Microsoft's suite of object-oriented application development tools that assists software developers in building programs and apps for Windows or any operating system that supports the Microsoft .NET Framework

## Application Development Languages and Tools

### Creating a Visual Basic Desktop App

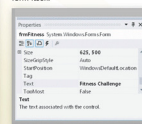
#### Step 1

The software developer designs the user interface, such as for the desktop app shown here. Enter Weight Loss is a button that, when tapped or clicked, displays a dialog box into which the user enters a weight loss value. The app then displays all weight loss values that the user enters in a list box, along with the team's average weight loss in a label. An image and label for the app's title (Fitness Challenge Team Weight Loss) adds visual appeal to the user interface.



#### Step 2

The software developer assigns properties to each object. Objects include text boxes, list boxes, images, buttons, labels, and the form itself.



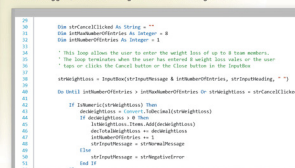
#### Step 4

The software developer tests the app. After the user enters a weight loss value, the app displays the value below any other values in the list box, calculates the average of the weight loss values shown in the list box, and displays the average in the Average Weight Loss label.



#### Step 3

The software developer writes code to define the action of each event that the user triggers, such as clicking a button or entering a value.



## Application Development Languages and Tools

- A **4GL** (fourth-generation language) is a nonprocedural language that enables users and programmers to access data in a database
  - One popular 4GL is SQL

## Application Development Languages and Tools

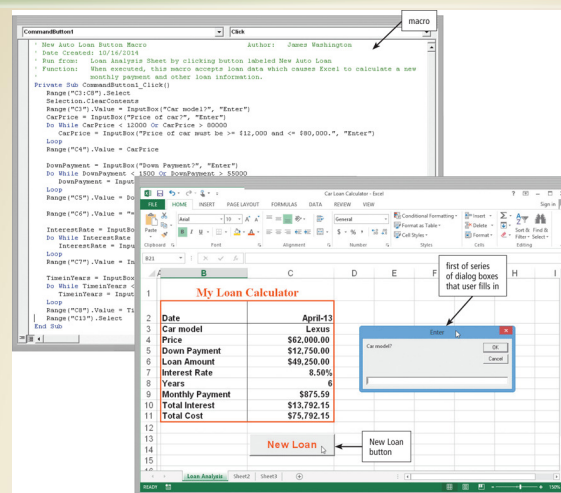
- Classic programming languages include:

Ada	ALGOL	APL	BASIC	COBOL
Forth	FORTTRAN	HyperTalk	LISP	Logo
Modula-2	Pascal	PILOT	PL/1	Prolog
	RPG	Smalltalk		

## Application Development Languages and Tools

- An application generator is a program that creates source code or machine code from a specification of the required functionality
  - Often bundled as part of a DBMS
- A **macro** is a series of statements that instructs an application how to complete a task
- You usually create the macro in one of two ways:
  - Record the macro with a macro recorder
  - Write the macro

## Application Development Languages and Tools





## Application Development Languages and Tools

- Software developers write scripts, applets, servlets, or ActiveX controls using a variety of languages

**JavaScript**

**Perl**

**PHP**

## Application Development Languages and Tools

**Ruby on Rails** provides technologies for developing object-oriented, database-driven websites

## Summary

System development  
phases

Guidelines for system  
development

Activities that occur  
during system  
development

Various programming  
languages and  
program  
development tools

Web development  
tools

## Discovering Computers

Technology in a World of Computers,  
Mobile Devices, and the Internet

### **Chapter 12** **Information Systems and Program Development**

Chapter 12 Complete

