

Managing Software Assets

Software

- A software program is a series of statements or instructions to the computer.
- The process of writing or coding programs is termed programming; and the individuals who specialize in this task are called programmers.

Major types of software

- **System Software** is a set of generalized programs, manages the resources of the computer such as the central processor, communication links and peripheral devices.
 - ◆ Programmers who write the system software are called *System Programmers*.
- **Application Software** describes the programs written to perform functions specified by end users to apply the computer to a specific task. Software for processing an order or generating a mailing list is application software.
 - ◆ Programmer who write application software are called *Application Programmers*.

BIOS

- **BIOS (Basic Input/Output System)** is the program uses to get the computer system started after you turn it on.
- It also manages data flow between the computer's Operating System and devices such as the hard disk, video adapter, keyboard, mouse, and printer.



System Software

- Program that deal directly with the hardware are called system software.
- Act as an interface between the user and the hardware, and
- Coordinates various parts of the computer system and mediates between application software and computer hardware.
- The most basic system software is the Operating System.



Operating System

- The system software that manages and controls the activities of the computer is called operating system.
- Functions of the operating system
 - ◆ Allocates and assigns system resources
 - ◆ Schedules use of computer resources
 - ◆ Monitors computer system activities
 - ◆ Provides locations in primary memory for data and programs
 - ◆ Controls the input and output devices

Types of Operating Systems

Stand-alone	<ul style="list-style-type: none"> • DOS • Windows 3.x • Windows 95 • Windows NT Workstation • Windows 98 • Windows 2000 Professional • Windows Millennium Edition • Windows XP Home Edition • Windows XP Professional Edition • Mac OS X • OS/2 Warp Client • UNIX • Linux
Network	<ul style="list-style-type: none"> • NetWare • Windows NT Server • Windows 2000 Server • Windows .NET Server • OS/2 Warp Server for E-business • UNIX • Linux • Solaris
Embedded	<ul style="list-style-type: none"> • Windows CE • Pocket PC 2002 • Palm OS

Features of Operating System

- Multiprogramming
 - ◆ Executes two or more programs concurrently using the same computer
 - ◆ CPU executes only one program but services the input/output needs of others
- Multitasking
 - ◆ Multiprogramming capability of single-user operating systems

Features of Operating System

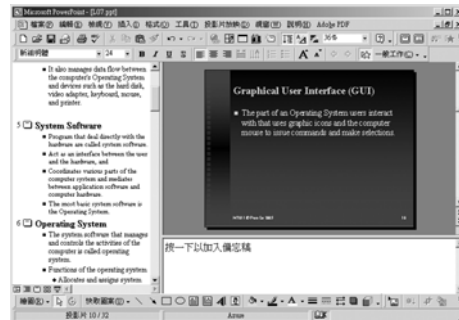
- Virtual Storage
 - ◆ Handles programs more efficiently by dividing the programs into small fixed or variable length with only a small part stored in primary memory at one time
- Time Sharing
 - ◆ Sharing of computer resources by many users simultaneously by having the CPU spend a fixed amount of time on each user's program before proceeding to the next
- Multiprocessing
 - ◆ Executing two or more instructions simultaneously in a single computer using multiple central processing units

Language Translation and Utility Software

- **Source Code** – Program instruction written in a high-level language that must be translated into machine language to be executed by the computer.
- **Compiler** – Special system software that translates a high-level language into machine language for execution by the computer.
- **Object Code** – Program instructions that have been translated into machine language so that they can be executed by the computer.
- **Interpreter** – A special translator of source code into machine code that translates each code statement into machine code and executes them, one at a time.
- **Utility Program** – A system software consisting of programs for routine, repetitive tasks can be shared by many users.

Graphical User Interface (GUI)

- The part of an Operating System users interact with that uses graphic icons and the computer mouse to issue commands and make selections.



Application Software

- Application software primarily concerned with accomplishing the tasks of end users.
- Many different languages can be used to develop application software.

Software Application	Popular Packages
Integrated Software	• Microsoft Works
Personal Finance	• Intuit Quicken • Microsoft Money
Legal	• Broderbund Family Lawyer • Kiplinger's WILL Power • Quicken Lawyer
Tax Preparation	• Intuit TurboTax • Kiplinger TaxCut
Desktop Publishing (Personal)	• Broderbund Print Shop Pro Publisher • Microsoft Publisher
Paint/Image Editing (Personal)	• Adobe PhotoDeluxe • Broderbund Print Shop • Corel PHOTO-PAINT • Jasc Paint Shop Pro • Microsoft Picture It! Photo
Clip Art/Image Gallery	• Corel GALLERY • Nova Development Art Explosion
Home Design/Landscaping	• Broderbund 3D Home Design Suite • Quality Plans Complete LandDesigner
Reference	• American Heritage Talking Dictionary • Microsoft Encarta • Microsoft Pocket Streets • Microsoft Streets & Trips • Rand McNally StreetFinder • Rand McNally TripMaker

Programming Language

- **Machine Language:** A programming language consisting of the 1's and 0's of binary code.
- **Assembly Language:** A programming language developed in the 1950s that resembles machine language but substitutes mnemonics for numeric codes.
- **High-level Language:** Programming language in which each source code statement generates multiple statements at the machine language level.
- **Fourth-generation Language:** A programming language that can help end users develop software with little or no assistance from IS specialists.

First Generation Language

- Machine Language is the language that only computer understands directly

```

000098 58E0 3082 000090
000094 1844 01084
000096 1877
000098 1855
00009A F273 3006 2C81 01008 00C83
0000A0 4F50 3006 01008
0000A4 F275 3006 2C7B 01008 08C7D
0000AA 4F70 3006 01008
0000AE 5070 308A 0184C
0000B2 1C47
0000B4 5050 304E 01050
0000B8 58E0 3082 01084
0000BC 07FE

0000BE 50E0 3086 0008E
0000C2 8F81 2C85 00C87 01088
0000C6 4770 2002 000D4
0000CA 1855
0000CC 5A50 35A6 015A8
0000D0 47F0 2100 00102
0000D4 8F82 2C85 00C87
0000D8 4770 20E4 000E6
0000DC 1855
0000DE 5A50 35AA 015AC
0000E2 47F0 2100 00102
0000E6 1877
000104 5870 304E 01050
000108 1C47
00010A 4E50 3006 01008
00010E F075 3006 003E 01008 0803E
000114 4F50 3006 01008
000118 5050 3052 01054
00011C 58E0 3086 01088
000120 07FE

000122 50E0 308A 00122
000126 1855 0108C
000128 5A50 304E 01050
00012C 5850 3052 01054
000130 5050 305A 0105C
000134 58E0 308A 0108C
000138 07FE
    
```

Second Generation Language

- Assembly language is the instructions made up of symbolic instruction codes

```

* THIS MODULE CALCULATES THE REGULAR TIME PAY
CALCSTPY EQU 14,SAVERTPY
ST 4,4
SR 4,4
SR 7,2
SR 5,5
PACK DOUBLE,RTHRSIN
CVB 4,DOUBLE
PACK DOUBLE,RATEIN
CVB 7,DOUBLE
ST 7,SATE
MR 4,7
L 5,RTPAY
ST 14,SAVERTPY
BR 14

* THIS MODULE CALCULATES THE OVERTIME PAY
CALCOTPY EQU 14,SAVEDOTPY
TEST1 CLI CODEIN,C'0'
BH TESTZ
SR 5,5
A 5,RTPAY
ST 5,OTPAY
R AROUND
SR 4,4
SR 7,7
SR 9,9
PACK DOUBLE,OTHSIN
CVB 4,DOUBLE
PACK DOUBLE,RATEIN
CVB 7,SATE
MR 4,7
NR 4,RTPAY*1.5
ST 5,OTPAY
L 14,SAVEDOTPY
+
* THIS MODULE CALCULATES THE GROSS PAY
CALCGPAY EQU 14,SAVEGPAY
ST 5,5
A 5,RTPAY
A 5,OTPAY
ST 5,SRPAY
L 14,SAVEGPAY
BR 14
    
```

Third Generation Language (3GL)

- Third-generation Language uses a series of English-like words to write instructions
- **Procedural Language:** requires program instructions to tell computer what to accomplish and how to do it.

```

* COMPUTE REGULAR TIME PAY
MULTIPLY REGULAR-TIME-HOURS BY HOURLY-PAY-RATE
GIVING REGULAR-TIME-PAY.

* COMPUTE OVERTIME PAY
IF OVERTIME-HOURS > 0
    COMPUTE OVERTIME-PAY = OVERTIME-HOURS * 1.5 * HOURLY-PAY-RATE
ELSE
    MOVE 0 TO OVERTIME-PAY.

* COMPUTE GROSS PAY
ADD REGULAR-TIME-PAY TO OVERTIME-PAY
GIVING GROSS-PAY.

* PRINT GROSS PAY
MOVE GROSS-PAY TO GROSS-PAY-OUT.
WRITE REPORT-LINE-OUT FROM DETAIL-LINE
AFTER ADVANCING 2 LINES.
    
```

Fourth Generation Language (4GL)

- Syntax is closer to human language than that of a 3GL (E.g. SQL)
- **Nonprocedural Language:** Programmer specifies only what the program should accomplish; it does not explain how

```
SELECT LAST_NAME, FIRST_NAME, GROSS_PAY
FROM EMPLOYEE
WHERE OVERTIME_HOURS > 0
ORDER BY LAST_NAME;
```

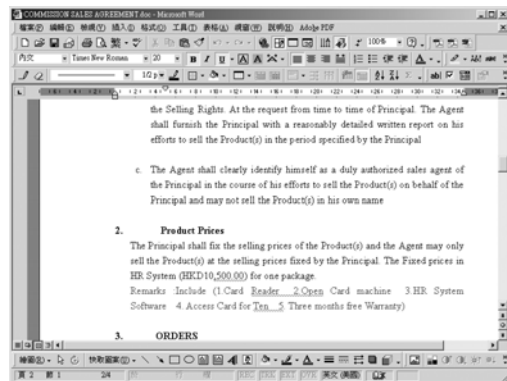
LAST_NAME	FIRST_NAME	GROSS_PAY
Antiqua	Martin	780.00
Charles	Leslie	715.00
Guillan	Anita	847.50
.	.	.
.	.	.

Programming Language

- **Natural Languages:** Programming language is very close to human language.
- **Query Languages:** A high level computer language used to retrieve specific information from database or files.
- **Report Generator:** Software that creates customized reports in a wide range of formats that are not routinely produced by an Information System .
- **Application Generator:** Software that can generate entire Information System applications.

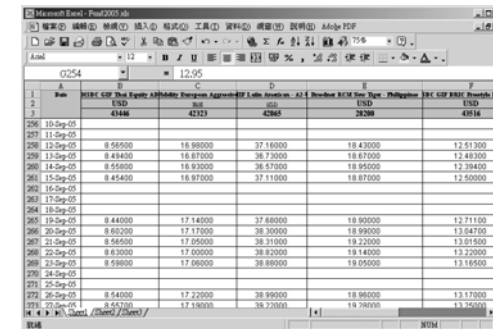
PC Software Tools – Word Processing Software

- Software that handles electronic storage, editing and printing of documents.



PC Software Tools – Spreadsheet

- Electronic spreadsheet software displaying data in a grid of columns and rows with the capability of easily recalculating numerical data.



PC Software Tools – Data Management Software

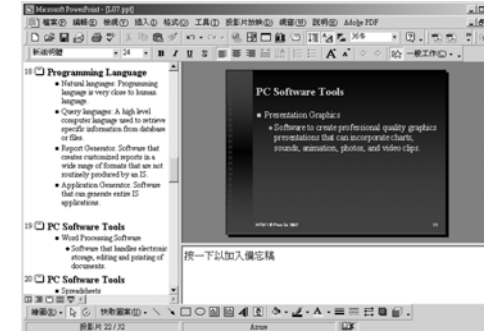
- Software used for creating and manipulating lists, creating files and databases to store data and combining information for reports.



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PC Software Tools – Presentation Graphics

- Software to create professional quality graphics presentations that can incorporate charts, sounds, animation, photos, and video clips.



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PC Software Tools – Integrated Software Packages

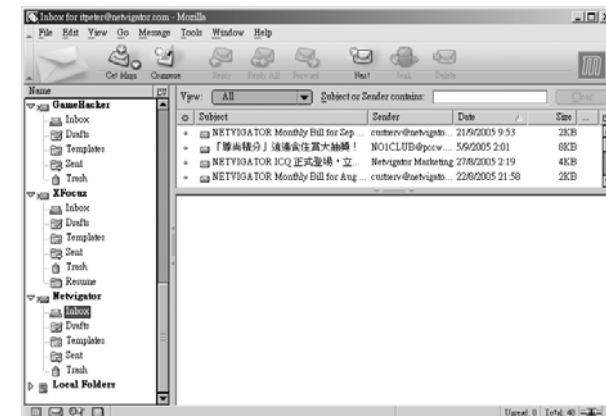
- A software that provides one or more applications such as word processing and spreadsheets providing easy transfer of data between them.



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PC Software Tool – Email

- The computer-to-computer exchange of messages.



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PC Software Tool – Web Browser

- An easy-to-use software tools for accessing the World Wide Web on the Internet.

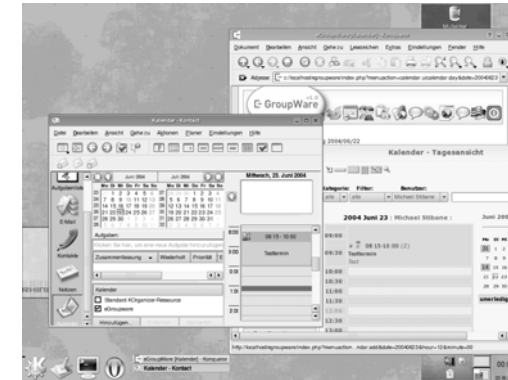


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PC Software Tool – Groupware

- Software that provides functions and services that support the collaborative activities of work groups.



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New Software Tools - Object-oriented Programming

- An approach to software development that combines data and procedures into a single object.
- OO Programming is based on the concepts of class and inheritance.
- Class is a collection of similar objects.
- Inheritance: Class of objects can inherit all the structure and behaviors of a more general class (superclass) and then add new variables and behaviors for itself.
- Classes are organized hierarchically into superclasses and subclasses.
- Instead of passing data to procedures, programs send messages for an object to perform a procedure (method).
- Encapsulation: An object's data are hidden from other parts of the program and can only be manipulated from inside the object.
- OO programming is expected to reduce the time & cost of writing software by producing reusable program code that can be reused.

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New Software Tools – Java

- An Object-Oriented Language, combining data with the functions for processing the data.
- Platform Independent.
- Can be used to create “Applets” which is designed to reside on centralized network servers. It often are used to provide interactive capabilities for Web pages.
- Java can also be used to create applications that can run over the Internet.
- To run Java software, a computer needs **Java Virtual Machine (JVM)**.
- Example
 - ◆ J2EE (Java 2nd Edition Enterprise Edition)
 - ◆ J2ME (Java 2nd Edition Medium Edition)
 - ◆ J2SE (Java 2nd Edition Small Edition)

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New Software Tools – Others

- Visual programming
 - ◆ Construction of software programs by selecting and arranging programming objects
- Hypertext Markup Language (HTML)
 - ◆ Page description language, creates Web pages and other hypermedia documents
- XML (eXtensible Markup Language)
 - ◆ Describes the structure of a document, supports links to multiple documents, allowing data to be manipulated by the computer.

Enterprise Software

- Enterprise software
 - ◆ Set of integrated modules for major business functions.
 - ◆ Allows data to be used by multiple functions and business processes.
- Enterprise Application Integration (EAI) software
 - ◆ Ties together multiple applications to support enterprise integration.
- Middleware
 - ◆ Allows two disparate applications to communicate to exchange data.
- Web server
 - ◆ Manages requests for Web pages on the computer where they are stored.

On-line Storage Service Providers

- Third-party Providers
 - ◆ rent out storage space to subscribers over the Web. Allow customers to store and access data.
- Application Service Provider (ASP)
 - ◆ Provide software that can be rented by other companies.