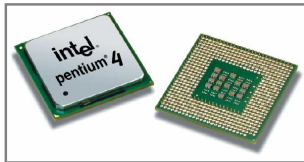## Anatomy of a Computer

- Central processing unit
  - Chip
  - Transistors
- Component that carries out logical and arithmetic instructions

Anatomy of a Computer

- Storage
  - Primary storage: Random-access memory (RAM)
  - Secondary storage: e.g. hard disk
  - Removable storage devices: e.g.: floppy disks, tapes, CDs

Machine Code

- Machine instructions are encoded as numbers:

  ```
  21 40
  16 100
  163 240
  ```

- Java Virtual Machine (JVM) – a typical sequence of machine instructions is:
  1. Load the contents of memory location 40.
  2. Load the value 100.
  3. If the first value is greater than the second value, continue with the instruction that is stored in memory location 240. *Continued…*

Machine Code

- Compiler translates high-level language to machine code
- Machine code is platform-dependent
  - Depends on the CPU (e.g., Intel Pentium 4, etc)
- In general high-level language must be compiled to the machine code for your platform….
- Java can be compiled for only one platform---the Java virtual machine (JVM)….

Virtual Machines

- The Java Virtual Machine (JVM) is a special program that resides on your computer
- The Java compiler translates your Java programs into machine code for the JVM
- Can then be executed anywhere a JVM exists… independent of the physical computer platform

The Java Programming Language

- Simple (compared to other high-level programming languages)
- Safe
- Platform-independent ("write once, run anywhere")
- Rich library (packages)
- Designed for the internet
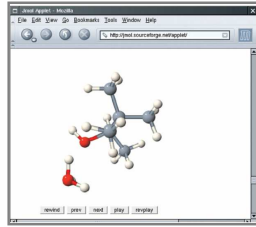
Applets on a Web Page

Figure 7:
Applets on a Web Page

Let's look at a few examples of Java applets

Let's look at an example Java program

- First, in a textfile…
- We'll look at the different elements of the program…
- We'll see how to compile it from the command line…
- We'll see how to run it from the command line…
- Then, we'll look at all of this in an IDE

Syntax 1.1: Method Call

```
object.methodName(parameters)

Example:
 System.out.println("Hello, Dave!");

Purpose:
To invoke a method of an object and supply any additional parameters
```

Errors

- Syntax errors
  ```
  System.ouch.print(". . .");
  System.out.print("Hello);
  ```
  – Detected by the compiler
- Logic errors
  ```
  System.out.print("Hell");
  ```
  – Detected (hopefully) through testing
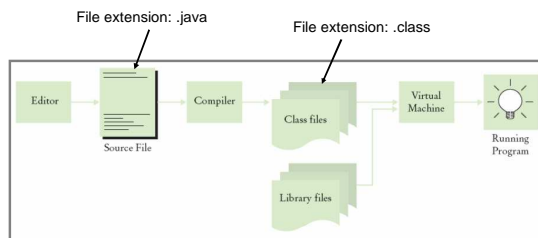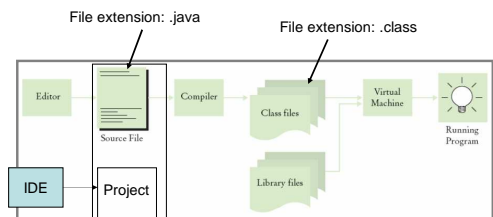

The Compilation Process

File extension: .java   File extension: .class

Figure 14:
From Source Code to Running Program

The Compilation Process

File extension: .java   File extension: .class

IDE includes:
- Editor
- Compiler (sometimes)
- Debugger
- Documentation tools

IDE dependent
Not required to write java
File extension: depends on IDE
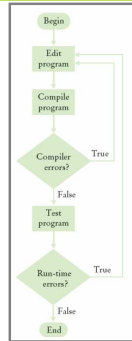
The Edit—Compile—Loop Test

Figure 15:
The Edit—Compile—Loop Test