



Class Note: Introduction to Computers and Programming Tools

Session 1: Introduction to Computers

Overview

This session introduces the fundamental components of a computer system, including hardware, software, and the boot process. It also explores modern computing concepts like cloud, grid, and utility computing, which are shaping the future of technology.

Key Concepts

1. Computer System:

- A computer is an electronic device that processes data according to instructions (programs).
- **Hardware:** Physical components (e.g., CPU, RAM, storage, input/output devices).
- **Software:** Programs that instruct the hardware (e.g., operating systems, applications).

2. Hardware Components:

- **CPU (Central Processing Unit):** The "brain" of the computer, executing instructions.
- **RAM (Random Access Memory):** Temporary storage for active programs and data.
- **ROM (Read-Only Memory):** Stores permanent instructions, like the boot process.
- **Storage Devices:** Hard Disk Drives (HDD), Solid-State Drives (SSD) for long-term data storage.
- **Input Devices:** Keyboard, mouse for user input.
- **Output Devices:** Monitor, printer for displaying or producing results.

3. Software Types:

- **System Software:** Manages hardware (e.g., Windows, Linux).
- **Application Software:** Performs specific tasks (e.g., Microsoft Word, web browsers).
- **Utility Software:** Supports system maintenance (e.g., antivirus, disk cleanup).

4. Boot Process:

- The sequence of steps a computer follows to start up, loading the operating system

from ROM to RAM.

5. **Modern Computing Trends:**

- **Cloud Computing:** Accessing resources (storage, processing) over the internet (e.g., Google Drive).
- **Grid Computing:** Combining multiple computers to solve large problems.
- **Utility Computing:** Paying for computing resources as needed, like electricity.

Example

- **Hardware Example:** A laptop has a CPU (e.g., Intel i5), 8GB RAM, a 256GB SSD, a keyboard (input), and a screen (output).
- **Software Example:** Windows 11 (system software) runs a web browser like Chrome (application software) to access Google Docs (cloud computing).
- **Boot Process Example:** When you turn on a computer, the BIOS (stored in ROM) checks hardware, loads the operating system (e.g., Windows) into RAM, and starts the user interface.

Classwork Activity 1

1. **Identify Components:**

- List the hardware components of a classroom computer or laptop (e.g., monitor, keyboard, CPU).
- Categorize the following as hardware or software: Microsoft Word, mouse, Windows 10, hard drive.

2. **Discuss Cloud Computing:**

- In groups, discuss one example of cloud computing you use (e.g., Google Drive, Dropbox). How does it differ from storing files on a local hard drive?

3. **Boot Process Simulation:**

- Write a short sequence (3–5 steps) describing what happens when you turn on a computer, based on the boot process explanation.

Session 2: Introduction to Programming Tools

Overview

This session introduces the tools used in programming, such as text editors, compilers, and debuggers. These tools help programmers write, test, and run code efficiently.

Key Concepts

1. Programming Tools:

- **Text Editor:** Software for writing code (e.g., Notepad++, Visual Studio Code).
- **Integrated Development Environment (IDE):** Combines editor, compiler, and debugger (e.g., PyCharm, Eclipse).
- **Compiler:** Translates high-level code (e.g., Python, C++) into machine code the computer understands.
- **Interpreter:** Executes code line-by-line without full translation (e.g., Python interpreter).
- **Debugger:** Helps find and fix errors in code by stepping through it.

2. Purpose of Tools:

- Text editors and IDEs provide a user-friendly interface for coding.
- Compilers/interpreters convert human-readable code into machine-executable instructions.
- Debuggers identify logical or syntax errors (e.g., missing semicolons, incorrect logic).

3. Examples of Tools:

- **Notepad++:** A simple text editor for writing code.
- **Visual Studio Code:** A popular IDE with features like code highlighting and debugging.
- **Python Interpreter:** Runs Python code interactively.
- **GCC:** A compiler for C/C++ programs.

Example

- **Text Editor Example:** Writing a simple Python program in Notepad++:

```
print("Hello, World!")
```

Save the file as `hello.py` and run it using a Python interpreter.

- **Compiler Example:** In C++, a compiler (e.g., GCC) converts:

```
#include <iostream>
int main() {
    std::cout << "Hello, World!" << std::endl;
    return 0;
}
```

into an executable file (e.g., `hello.exe`).

- **Debugger Example:** If the above C++ code prints nothing, a debugger can step through each line to check if `std::cout` is correctly used.

Classwork Activity 2

1. Explore a Text Editor:

- Open Notepad++ or Visual Studio Code (if available) and type the following:

```
print("My first program")
```

Save it as `first.py` and discuss how to run it using a Python interpreter.

2. Tool Identification:

- Match the tool to its purpose:
 - A. Visual Studio Code
 - B. GCC
 - C. Python Interpreter
 - Options: i) Runs code line-by-line, ii) Writes and edits code, iii) Compiles C++ code.

3. Error Detection:

- Given the code:

```
print("Hello World"
```

Identify the error (missing closing parenthesis) and suggest how a debugger could help find it.

Objective Questions (Multiple Choice)

Test your understanding of Sessions 1 and 2 with the following questions:

1. What is the primary function of the CPU in a computer?
 - A) Store data permanently
 - B) Execute program instructions
 - C) Display output on the screen
 - D) Connect to the internet
 - **Answer: B**
2. Which of the following is an example of system software?
 - A) Microsoft Word
 - B) Windows 10
 - C) Google Chrome
 - D) Notepad++
 - **Answer: B**
3. What happens during the boot process?
 - A) The computer connects to the cloud
 - B) The operating system is loaded into RAM
 - C) Application software is installed
 - D) The monitor displays the desktop
 - **Answer: B**
4. Cloud computing allows users to:
 - A) Store data on a local hard drive
 - B) Access resources over the internet
 - C) Compile code into machine language
 - D) Debug programs automatically
 - **Answer: B**
5. Which device is considered an input device?
 - A) Monitor
 - B) Printer
 - C) Keyboard
 - D) Hard drive
 - **Answer: C**
6. What is the role of a compiler in programming?

- A) Writes code for the programmer
- B) Translates high-level code to machine code
- C) Runs code line-by-line
- D) Stores code in memory
- **Answer:** B

7. Which tool is best for writing and editing code?

- A) Debugger
- B) Compiler
- C) Text Editor
- D) Operating System
- **Answer:** C

8. An Integrated Development Environment (IDE) typically includes:

- A) Only a text editor
- B) A compiler, debugger, and text editor
- C) Only a debugger
- D) A web browser
- **Answer:** B

9. What does a debugger help with?

- A) Writing new code
- B) Finding and fixing errors in code
- C) Storing files in the cloud
- D) Running the operating system
- **Answer:** B

10. Which of the following is an example of a programming tool?

- A) Microsoft Excel
- B) Visual Studio Code
- C) Windows Explorer
- D) Adobe Photoshop
- **Answer:** B

Homework

1. Research one cloud computing service (e.g., Google Drive, AWS) and write a short paragraph explaining how it works.
2. Download and install Visual Studio Code (or use an online editor). Write a simple program

(e.g., print your name) in Python and save it.

3. Create a diagram of a computer's hardware components, labeling at least five parts (e.g., CPU, RAM, monitor).