## 1.2.4 Disassembling Computer system

### 1.2.4.1 Description of Computer system

A computer system is a complex arrangement of hardware and software designed to process, store, and manage data and perform various tasks or computations. It comprises different types, categories, and components that work together to enable its functionality.

#### 1.2.4.1.1 Type of Computer System

1. **Personal Computers (PCs)**:

Personal Computers is also known as a microcomputer. It is basically a general purpose computer designed for individual use. It consists of a microprocessor as a central processing unit (CPU), memory, input unit, and output unit

* + Intended for individual use and typically used in homes, offices, and educational institutions.
  + Include desktop computers, laptops, and tablets.

1. **Workstations**:
   * More powerful than personal computers and designed for specialized tasks like computer-aided design (CAD), video editing, and scientific simulations.
   * Used by professionals requiring high-performance computing.
2. **Servers**:
   * Designed to provide services and resources to other computers (clients) on a network.
   * Used for hosting websites, managing databases, file sharing, and more.
   * Offer high reliability, scalability, and redundancy.
3. **Mainframes**:
   * Extremely powerful and capable of handling complex and critical applications. • Commonly used in large organizations for handling massive volumes of data and transactions.
   * Known for high processing power, large storage, and robust security features.
4. **Supercomputers**:
   * The most powerful and high-performance computers available.
   * Used for complex scientific simulations, weather forecasting, and advanced research requiring massive computational power.
   * Consist of thousands of processors working in parallel.

#### *1.2.4.1.2 Categories of Computer system*

1. **By Purpose**:
   * **General-Purpose Computers**: Designed for a wide range of tasks and applications.
   * **Special-Purpose Computers**: Tailored for specific tasks or functions, often with optimized hardware and software.
2. **By Size and Portability**:
   * **Desktop Computers**: Stationary computers suitable for use at a single location.
   * **Laptops**: Portable computers with built-in screen and keyboard, suitable for on-the-go use.
   * **Tablets and 2-in-1s**: Highly portable devices with touchscreens, often used for browsing and multimedia consumption.

#### 1.2.4.1.3 Components

1. **Central Processing Unit (CPU)**:
   * Is The "brain" of the computer that executes instructions, performs calculations, and manages data.
   * It Responsible for controlling and coordinating the operations of other components.
2. **Memory (RAM - Random Access Memory)**:
   * Provides temporary storage for data and instructions that the CPU needs for immediate processing.
   * Volatile memory that is erased when the computer is powered off.
3. **Storage Devices**:
   * **Hard Disk Drive (HDD)**: Provides long-term storage for programs and data.
   * **Solid State Drive (SSD)**: Faster and more durable storage technology compared to HDDs.
4. **Motherboard**:
   * The main circuit board that holds and connects the CPU, memory, storage, and other essential components.
   * Contains connectors for peripheral devices and expansion slots.
5. **Input Devices**:
   * Devices used to input data and commands into the computer system, such as keyboards, mice, touchscreens, and scanners.
6. **Output Devices**:
   * Devices that display or output data processed by the computer, such as monitors, printers, and speakers.
7. **Peripheral Devices**:
   * Additional devices connected to the computer for specific functions, including printers, external drives, webcams, etc.
8. **Power Supply Unit (PSU)**:
   * Converts electrical energy from an outlet into usable power for the computer's components.
9. **Cooling Systems**:
   * Ensure that the computer system does not overheat during operation by dissipating excess heat generated by the components.
10. **Operating System (OS)**:
    * Software that manages hardware resources and provides an interface for users to interact with the computer.
    * Examples: Windows, macOS, Linux, iOS, Android.

### 1.2.4.2 Implementation of Computer system disassembling procedures

**Disassembling a computer system** involves safely taking apart the various components of the computer. This process may be necessary for maintenance, upgrades, repairs, or recycling. Here are general guidelines and steps for disassembling a computer system:

**Note**: Ensure you have proper knowledge, tools, and safety precautions before disassembling any computer system. If you are not confident, consider seeking assistance from a professional.

1. **Preparation and Safety Measures**:

1. **Shut down the computer**: Power off the computer and unplug it from the electrical outlet. Disconnect all peripheral devices.
2. **Ground Yourself**: Use an anti-static wrist strap or touch a grounded metal surface to discharge any static electricity from your body, reducing the risk of damaging sensitive components.
3. **Prepare the Workspace**: Choose a clean and well-lit area with enough space to organize and place the components.

**2.** **Document the Configuration**:

1. **Take Pictures**: Before disassembly, take photos of the computer system to document the configuration and connections.
2. **Label Cables and Connections**: Use labels or tape to mark the cables and connections to ensure proper reassembly later.

**3**. **Remove Peripheral Devices**:

a. **Disconnect External Devices**: Remove any USB drives, external hard drives, printers, or other peripheral devices connected to the computer.

**4. Open the Computer Case**:

1. **Desktop Computers**:
   * Loosen screws: Typically, desktop computer cases have screws securing the side or top panels. Use a screwdriver to remove them.
   * Slide off the panel: Carefully slide or lift off the side or top panel to access the interior components.
2. **Laptop Computers**:
   * **Remove screws:** Refer to the laptop's user manual to identify the screws securing the bottom cover. Unscrew and set them aside.
   * **Remove the bottom cover:** Gently pry or slide off the bottom cover to access the internal components.
3. **Disconnect Power Supply and Cables**:

❖ **Desktop Computers**:

* + Disconnect power cables: Unplug the power cables connected to the motherboard, drives, and graphics card.
  + Unplug data cables: Disconnect SATA or IDE cables from the hard drives, SSDs, and optical drives.
    - **Laptop Computers**:
  + Disconnect the battery: If possible, remove the laptop's battery to eliminate power.
  + Disconnect other internal cables: Carefully disconnect any other cables connecting internal components.

1. **Remove Expansion Cards and Drives**:

❖ **Expansion Cards**:

* + Remove graphics card, sound card, or any other expansion cards by unscrewing and gently pulling them from their slots.
    - **Drives**:
  + Unscrew and disconnect hard drives, SSDs, or optical drives.

1. Remove RAM and CPU:

❖ **RAM**:

* + Press the tabs on the sides of the RAM modules to release them and gently remove.
    - **CPU**:
  + If necessary, unclip or unlock the CPU socket and carefully lift the CPU from its socket.

1. **Separate the Motherboard**:

❖ **Desktop Computers**:

* + Unscrew the motherboard from the case and carefully lift it out.
    - **Laptop Computers**:
  + In most cases, the motherboard is not easily removable without extensive disassembly. Proceed cautiously or seek professional help if necessary.

1. **Organize and Store Components**:
   * + **Label and Sort Components**: Label each component and organize them to make reassembly easier.
     + **Use Anti-Static Bags**: Place components in anti-static bags to prevent damage from static electricity.
2. **Dispose or Store Properly**:
   * **Dispose of Old Components**: Follow proper recycling or disposal procedures for electronic waste, adhering to local regulations.
   * **Store for Reassembly or Recycling**: Store components for reassembly, upgrades, or recycling as needed.

Disassembling a computer system should be done with caution and precision to avoid damage to the components. Always follow safety guidelines and take note of how the components are connected and assembled for smooth reassembly.

## 1.2.5 Installation of New hardware component

### 1.2.5.1 Identification of the new hardware component

Identifying new hardware components in a computer system involves recognizing and verifying newly installed or attached hardware devices. These components can include anything from a new graphics card or memory module to an additional hard drive or peripheral. Here's a step-by-step process to identify new hardware components:

**1.** **Check Physical Appearance and Connections**:

1. Inspect the Exterior:
   * Look for any visible new hardware components attached to the computer, such as a new graphics card, external hard drive, or expansion cards.
2. Check Ports and Connections:
   * Examine ports on the back and sides of the computer to identify any new connections. New USB devices, audio cables, or HDMI/VGA/DVI connectors may indicate new hardware.
3. **Access Device Manager (Windows)**:

 Press Win + X and select "Device Manager" from the menu. Alternatively, right-click on "This PC" or "My Computer," choose "Manage," and then select "Device Manager."

1. **Identify Hardware Components in Device Manager**:

 Expand Categories:

* + Expand categories such as "Display adapters," "Sound, video and game controllers," "Storage controllers," etc., to view hardware components.

 Scan for New or Unknown Devices:

Look for devices marked with a yellow exclamation mark or labeled as "Unknown device." These indicate new or unrecognized hardware components.

 View Properties:

Right-click on a hardware component and select "Properties" to view details, such as the manufacturer and device status.

1. **Check System Information (Windows)**:

 Press Win + R to open the Run dialog.

 Type msinfo32 and press Enter to open System Information. c. Navigate through the categories to view information about installed hardware components.

1. **Use System Profiler (Mac)**:

 Go to the Apple menu and select "About This Mac.

 Click on "System Report" to access detailed information about the hardware components installed on your Mac.

1. **Check BIOS/UEFI Settings**:

 Restart the computer and enter the BIOS or UEFI settings (usually by pressing a specific key during startup, such as Del, F2, F10, or Esc).

 Look for information about detected hardware components in the BIOS/UEFI menus.

### 1.2.5.2 Check hardware component compatibility

To check hardware component compatibility, especially when considering upgrades or new installations, you need to ensure that the hardware components you're planning to use will work together effectively without any conflicts. Here's how you can check compatibility.

1. **Check Manufacturer Specifications and Documentation**
   * Refer to the specifications and user manuals provided by the manufacturers of the hardware components (e.g., CPU, motherboard, GPU, RAM). These documents typically detail the compatible hardware configurations.
2. **Motherboard Compatibility**:
   * **Check Socket Compatibility**: Ensure that the CPU you plan to use is compatible with the motherboard's CPU socket.
   * **Check RAM Compatibility**: Verify the type (e.g., DDR4), speed (e.g., 3200MHz), and maximum supported RAM capacity by the motherboard. Also, ensure that the RAM slots match the RAM type (e.g., DDR4).
   * **Check GPU Compatibility**: Check if the motherboard supports the GPU interface (e.g., PCIe x16) and has sufficient PCIe slots for your graphics card.
3. **Power Supply (PSU) Compatibility**:
   * **Check Wattage and Connectors**: Ensure that the power supply unit (PSU) has sufficient wattage to support all your components and the necessary connectors for your GPU, CPU, motherboard, and other devices.

### 1.2.5.3 Implementation of new hardware installation procedures

**Installing new hardware components into a computer system** involves physically integrating and configuring the new hardware to ensure it functions properly.

**Below are the general steps for installing new hardware:**

1. **Prepare for Installation**:
   * **Power Off and Unplug the Computer**:
   * **Wear an Anti-Static Wrist Strap**:

 To prevent static electricity discharge that can damage sensitive components, wear an anti-static wrist strap and attach it to a grounded metal part of the computer case.

* + **Gather Tools and Documentation**:

• Collect the necessary tools such as screwdrivers, pliers, and any specific tools required for the installation. Also, have the hardware manuals and any supporting documentation on hand.

1. **Open the Computer Case**:
2. **Install the New Hardware Component**:
3. **Expansion Cards (e.g., GPU, Sound Card)**:
   * Align the card with the corresponding slot on the motherboard.
   * Gently push the card into the slot until it fits snugly.
   * Secure the card by tightening the screws or clips provided.
4. **RAM (Memory Modules)**:
   * Align the notches on the RAM module with the slots on the motherboard.
   * Gently push down on both ends of the RAM module until it clicks into place.
5. **CPU (Central Processing Unit)**:
   * Open the CPU socket by releasing the latch or lever (consult the motherboard manual).
   * Align the notches on the CPU with those on the socket and gently place it in.
   * Close the latch to secure the CPU in place.

4. **Connect Cables and Peripherals**

a. **Power Cables**

• Connect power cables from the power supply to the motherboard, drives, GPU, and other components as needed.

c. **Peripheral Connections**:

• Connect peripherals (keyboard, mouse, monitor, etc.) to the appropriate ports on the computer.

5. Close the Computer Case and Power On:

1. **Desktop Computers**:
   * Securely reattach the case panel or cover and tighten the screws.
2. **Laptop Computers**:
   * Reattach the bottom cover and tighten the screws.
3. **Power on and Test**:
   * Plug in the computer and power it on to test the newly installed hardware components.
   * Ensure that the computer recognizes and functions with the new hardware.

6. **Install Drivers and Configure Settings**:

1. **Download Drivers**:
   * If needed, download and install the latest drivers for the new hardware from the manufacturer's website.
2. **Configure BIOS/UEFI Settings**:
   * Access the BIOS/UEFI settings to configure settings related to the new hardware, if required.

7. Test and Ensure Functionality:

1. **Run Tests**:
   * Test the functionality of the new hardware component(s) to ensure they work correctly.
2. **Troubleshoot if Necessary**:
   * If any issues arise, troubleshoot based on error messages or unexpected behavior.

## 1.2.6 Assembling Computer system

### 1.2.6.1 Implementation of Computer system assembling procedures

Assembling a computer system involves physically putting together all the hardware components to create a functioning computer.

**Here are the general steps to assemble a computer system:**

**1**. **Prepare the Workspace and Tools:**

1. **Workspace Setup**:
   * Choose a clean, well-lit, and spacious area to assemble the computer.
   * Use an anti-static mat or work on a non-static surface to prevent damage to sensitive components.
2. **Gather Tools**:
   * Collect the necessary tools, including a screwdriver (usually Phillips-head), cable ties, and any specialized tools for specific components.

**2.** **Organize the Components**:

1. **Check Components**:
   * Verify that you have all the necessary components for the build, including the CPU, motherboard, RAM, GPU, storage drives, power supply, case, cooling system, and other peripherals.
2. **Lay Out Components**:
   * Lay out all the components on a clean, flat surface, and organize them based on the order of installation.
3. **Install the CPU and CPU Cooler**:
4. **Install RAM (Memory)**:
5. **Identify RAM Slots**:
   * Locate the RAM slots on the motherboard.
6. **Install RAM Modules**:
   * Unlock the RAM slots.
   * Align the notches on the RAM module with those on the slot.
   * Gently press down on both ends of the module until it clicks into place.

**5.** **Install the Motherboard into the Case**:

1. **Prepare the Computer Case**:
   * Lay the computer case on a flat surface with the open side facing up.
   * Ensure that the motherboard standoffs (screws) are correctly installed to match the holes on the motherboard.
2. **Align and Secure the Motherboard**:
   * Carefully align the I/O shield on the case with the motherboard's rear I/O ports.
   * Gently lower the motherboard into the case and align the mounting holes with the standoffs.
   * Secure the motherboard to the case using screws.

**6. Install Storage Drives and Expansion Cards**:

1. **Install Storage Drives**:
   * Securely mount hard drives, SSDs, or other storage drives into the drive bays in the case using screws.
2. **Install Expansion Cards (e.g., GPU)**:
   * Align the expansion card with the appropriate slot on the motherboard.
   * Gently press the card into the slot until it clicks into place.
   * Secure the card using screws.
3. **Connect Cables and Power Supply**:
4. **Close the Computer Case and Power On**:
5. **Secure the Case**:
   * Close and secure the computer case by tightening the screws.
6. **Power On and Test**:
   * Plug in the computer, power it on, and check if the system boots up properly.
   * Check if all components are recognized and functioning correctly.

**10.** **Install the Operating System and Drivers**:

**1.2.6.1 Perform appearance customization.**

Appearance customization involves changing aspects like desktop wallpaper, themes, icons, colors, and more.

**Here are steps to perform appearance customization on a typical operating system like Windows:**

1. Change Desktop Wallpaper**:**
2. Change Themes and Colors:
3. Customize Icons:
4. Customize Taskbar and Start Menu:
5. Change Cursor and Mouse Pointer:
6. Install and Apply Custom Themes or Skins:
7. Customize File and Folder Appearance:
8. Customize Browsers and Apps:
9. Use Custom Backgrounds for Video Calls:
10. Customize Lock Screen:
11. Customize Notification Settings:
12. Customize System Sounds:
13. Customize Start Menu (Windows):
14. Customize Font Settings:

## 1.2.7 Installation of Computer system drivers and software

### 1.2.7.1 Perform software compatibilities checking

**C**hecking software compatibility involves ensuring that the software you intend to install or use is compatible with your operating system and other installed software.

**Here's a step-by-step approach to checking software compatibilities:**

1. **Check System Requirements**:
   * + **Review Software Documentation**:
     + Check the system requirements mentioned in the software's official documentation, user manual, or website.
2. **Operating System Compatibility**:
   * Ensure the software is compatible with your operating system (e.g., Windows, macOS, Linux, iOS, Android).

**3**. **Check Hardware Compatibility**:

* + Verify if the software requires specific hardware components or features that your system must have to function correctly.

**4. Check Software Version**:Confirm that you are using a version of the software that is compatible with your system.

**5.** **Check Dependencies and Prerequisites**:

* Ensure any required software frameworks, libraries, or runtime environments are installed and compatible.
* **6.** **Check Internet Connectivity Requirements**:

Confirm if the software needs an internet connection for activation, updates, or specific features.

### 1.2.7.2 Implementation of software installation procedures

#### 1.2.7.2.1 System software

System software installation involves the installation of crucial software that manages and facilitates the functioning of computer hardware. This typically includes the operating system and essential system-related software.

**Below are the general steps to install system software:**

1. **Preparation and Backup**:

1. **Check Compatibility**:
   * Ensure that the system software you intend to install is compatible with your computer's hardware specifications.
2. **Backup Data**:
   * Back up all important data from your computer to an external storage device or a cloudbased backup service.

**2.** **Create Installation Media**:

* **Operating System Installation**:
* For operating system installation, create a bootable installation USB or DVD using the official ISO file from the operating system provider's website. **3.** **Configure BIOS/UEFI Settings**:
* Restart your computer and access the BIOS/UEFI settings by pressing the designated key during startup (e.g., F2, Del, F12).
* Set the boot order to prioritize the installation media (USB or DVD) to allow booting from it.

1. **Boot from Installation Media**:
   * Insert the bootable installation USB or DVD into the respective drive.
2. Install Operating System (OS)**:** 
   * Follow the on-screen instructions of the OS installer:
     1. Select the language, time, currency, and keyboard preferences.
     2. Choose the installation type (e.g., custom, upgrade, clean install).
     3. Select the partition where you want to install the operating system.
3. **Follow Installation Wizard**:
4. **Accept License Agreement**:
5. **Complete Installation and Setup**:
   * Allow the installer to copy files, configure settings, and finalize the installation.
   * Set up your user account, password, and any other preferences requested during the setup process.
6. **Install Device Drivers and Updates**:

#### 1.2.7.2.2 Application Software

Installing application software involves the process of setting up specific programs or applications on a computer to perform various tasks and functions.

**Below are the general steps to install application software:**

1. Preparation:

1. **Check System Requirements**:
2. **Backup Data**:

• It's a good practice to back up important data to prevent any potential loss or corruption during the installation process.

**2. Acquire the Application**:

1. **Download from the Internet**:
2. **Use App Stores**:
   * If the application is available on an app store (e.g., Microsoft Store, Apple App Store, Google Play Store), download it directly from the store.
3. **Use Physical Media**:
   * If the application is available on a CD, DVD, or other physical media, insert the disc into the appropriate drive.

3. Run the Installer:

1. **Software Downloaded from the Internet**:
   * Locate the downloaded application file (e.g., .exe, .dmg) in your downloads folder or the specified download location.
   * Double-click the file to start the installation process.
2. **Software from Physical Media**:

The installation usually starts automatically. If not, navigate to the drive containing the installation media and double-click the setup file.

1. **Follow Installation Wizard**:
2. **Choose Installation Options**:
   * **Typical Installation**: Installs the standard features and settings recommended by the software developer.
   * **Custom Installation**: Allows you to customize the installation, choosing specific components, features, or installation directory.

**6**. **Accept License Agreement**:

* + Read and accept the software's license agreement, if prompted. You must agree to the terms and conditions to proceed with the installation.

**7. Installation Process**:

* + The installer will start copying files and configuring the application based on your chosen options. This process may take some time, depending on the complexity of the application.

**8.** **Complete Installation**:

* + Once the installation is complete, you may be prompted to restart your computer.

Follow the instructions provided by the installation wizard.

**9.** **Post-Installation Configuration**:

* Some applications may require post-installation setup, such as creating an account, setting preferences, or configuring initial settings. Follow the prompts to complete this step.
* **10. Verify Installation**:
* Launch the application to ensure that it has been installed correctly and is functioning as expected.

By following these steps, you can successfully install application software on your computer and begin using it for your specific needs. Always ensure you download software from reputable sources to maintain the security and integrity of your system

## 1.2.8 Perform computer system test

### 1.2.8.1 System functionality

Testing computer system functionality is essential to ensure that all components and software are working correctly and efficiently.

**Here are steps to test the functionality of a computer system:**

1. **Power On and Boot Test:**

 **Start the Computer**:

* + Power on the computer and observe if it starts up without any unusual noises or errors.

 **Boot-up Test**:

* + Verify that the operating system loads correctly, and the desktop or login screen appears.

1. **Hardware Test**:

 **Check Peripheral Devices**:

* + Ensure that keyboard, mouse, monitor, and other connected devices are functioning properly.

 **Check Ports and Connectivity**:

* + Test all ports (USB, HDMI, audio, etc.) to confirm they can recognize devices.

 **Memory (RAM) Test**:

* + Run a memory test using built-in diagnostic tools or third-party software to check for any memory issues.

 **CPU and Temperature Check**:

* + Monitor the CPU temperature and performance using diagnostic tools to ensure the CPU is not overheating.

 **Storage Test**:

* + Use disk diagnostic tools to check the status and health of hard drives and other storage devices.

 **Graphics Test**:

* + Run a graphics stress test to check the performance and stability of the GPU.

**3** **Network Functionality Test**: a. **Local Network Test**:

• Test file sharing and communication within the local network to ensure network devices are properly configured.

1. **Internet Connectivity Test**:

• Verify internet connectivity by accessing different websites and online services.

1. **Wireless Connectivity Test**:

Test Wi-Fi connectivity and speed by accessing the internet wirelessly.

5. Security and Virus Scan:

1. **Anti-Virus Scan**:
   * Run a thorough scan of the system to detect and remove any malware, viruses, or security threats.
2. **Firewall and Security Settings Check**:
   * Ensure that the firewall and other security settings are configured correctly to protect the system.

6. User Account and Profile Test:

a. **User Login and Access**:

* Test user logins and account access to confirm that users can sign in without issues. b. **Profile Settings Check**:
* Verify that user profiles and settings are functioning correctly and customized preferences are retained.

**7**. **Backup and Restore Test**: 8. **Performance Benchmarking**:

• Use performance benchmarking tools to assess the overall performance of the computer, including CPU, GPU, memory, and storage performance.

By following these steps and conducting thorough testing, you can ensure that the computer system is functioning optimally and meets the desired performance and usability standards

### 1.2.8.2 System performance

Testing computer system performance involves evaluating its speed, responsiveness, and efficiency.

**Here are steps to test computer system performance:** 1. **Benchmarking**:

* Use benchmarking tools to measure and compare the performance of various hardware components, including CPU, GPU, memory, and storage. Examples include:
* **CPU Benchmarking**: Use tools like PassMark, Cinebench, or Geekbench to assess CPU performance.
* **Memory Benchmarking**: Use tools like UserBenchmark or SiSoftware Sandra to assess memory (RAM) performance.
* **Storage Benchmarking**: Tools like CrystalDiskMark or ATTO Disk Benchmark can evaluate storage performance.

1. **Speed and Responsiveness Test**:
   * Measure the speed and responsiveness of the system during various tasks, including opening applications, loading web pages, and performing file transfers.
2. **Startup and Shutdown Times:** 
   * Measure the time it takes for the computer to start up and shut down. This can be an indicator of system performance and potential improvements.
   * **4. Application Performance Test**:
   * Launch and run various applications simultaneously to observe system behavior under load.

**5.** **Multitasking Test**:

Open multiple applications and perform various tasks simultaneously to test the system's ability to handle multitasking.

**6. Network Performance Test**:

Use network diagnostic tools to measure internet speed, latency, and packet loss to ensure optimal network performance.

**7.** **Audio Performance Test**:

* + Evaluate audio quality and performance using audio test files, checking for clarity, volume, and distortion levels.

### 1.2.8.2 System stress test

Testing a computer system under stress involves putting the hardware and software components through intense workloads to evaluate stability, performance limits, and potential issues under heavy usage.

**Here's how to stress test a computer system:**

|  |
| --- |
| CPU Stress Testing |

1. :

1. **Prime95**:

• Run Prime95 to stress-test the CPU and memory. It's a widely used tool to evaluate stability and performance under heavy computational loads.

1. **Intel BurnTest or Linpack**: • Use IntelBurnTest or similar tools that utilize the Intel Linpack test to stress the CPU and memory.

**2.** **GPU Stress Testing**:

1. **FurMark**: • Run FurMark to stress the GPU. It pushes the graphics card to its limits, testing stability and cooling.
2. **3DMark**:

Use 3DMark to benchmark and stress the GPU, providing an overall assessment of graphics performance.

1. **Memory (RAM) Stress Testing**:
   * **Windows Memory Diagnostic**:

• Use the built-in Windows Memory Diagnostic tool to perform a memory test without the need for external bootable media.

1. **Storage Stress Testing**:
   * **CrystalDiskMark**:

• Use CrystalDiskMark to stress-test the storage drive (HDD/SSD) and measure its read and write speeds under load.

1. **Software Stress Testing**:
   * **Heavy Multitasking**:

• Open multiple resource-intensive applications simultaneously to stress both CPU and memory.

* + **Compile Code**:

• Compile a large codebase using a development environment to stress the CPU, memory, and storage.

1. **Network Stress Testing**: ❖ **iPerf**:
   * Use iPerf to stress-test network performance by simulating high data transfer rates between network devices.
2. **Temperature and Cooling Test**:
   * Monitor hardware temperatures using tools like **HWMonitor** or **Open Hardware Monitor** during stress tests to ensure that components are not overheating and causing instability.

By performing these stress tests, you can identify potential weaknesses, stability issues, or overheating problems within the computer system, enabling you to address them and optimize performance. Always monitor temperatures and other critical parameters during stress testing to prevent hardware damage.

***End of first Learning Outcome***