Assignment - 1

Topic :

PIONEER

Page : 1

Date : 9 / 1 / 24

Q.1) Familiarization of Hardware assembling for a digital.

Ans:- Digital hardware assembly theory involves understanding digital logic, Boolean algebra, number systems logic circuit, registers, microprocessors, circuit design using HDLs, clocking, synchronization. FSMs, DSP, testing, and components. Learn the basics before practical assembly, emphasizing logic gates, memory and sequential circuits

Familiarization of hardware assembling for a digital device. such as a computer, here's basic ~~gate~~ guide:

1. Components:
   - Processor (CPU): The brain of the computer
   - Motherboard: The main circuit board connecting all components.
   - RAM (Random Access Memory): Tempory storage for running programs.
   - Storage (HDD/SSD): Permanent storage for the operating system and data.
   - Power Supply Unit (PSU): Supplies power to the components.
   - Graphics Card (GPU): Handles graphics processing.
   - Cooling System: Keeps components from overheating.
   - Casing: Encloses and protects the components.
2. Tools:
   - Screwdrivers (Phillips and flathead).
   - Antistatic wrist ~~step~~ strap to prevent static electricity damage.
   - Cable ties for cable management.
   - Thermal paste for the CPU.

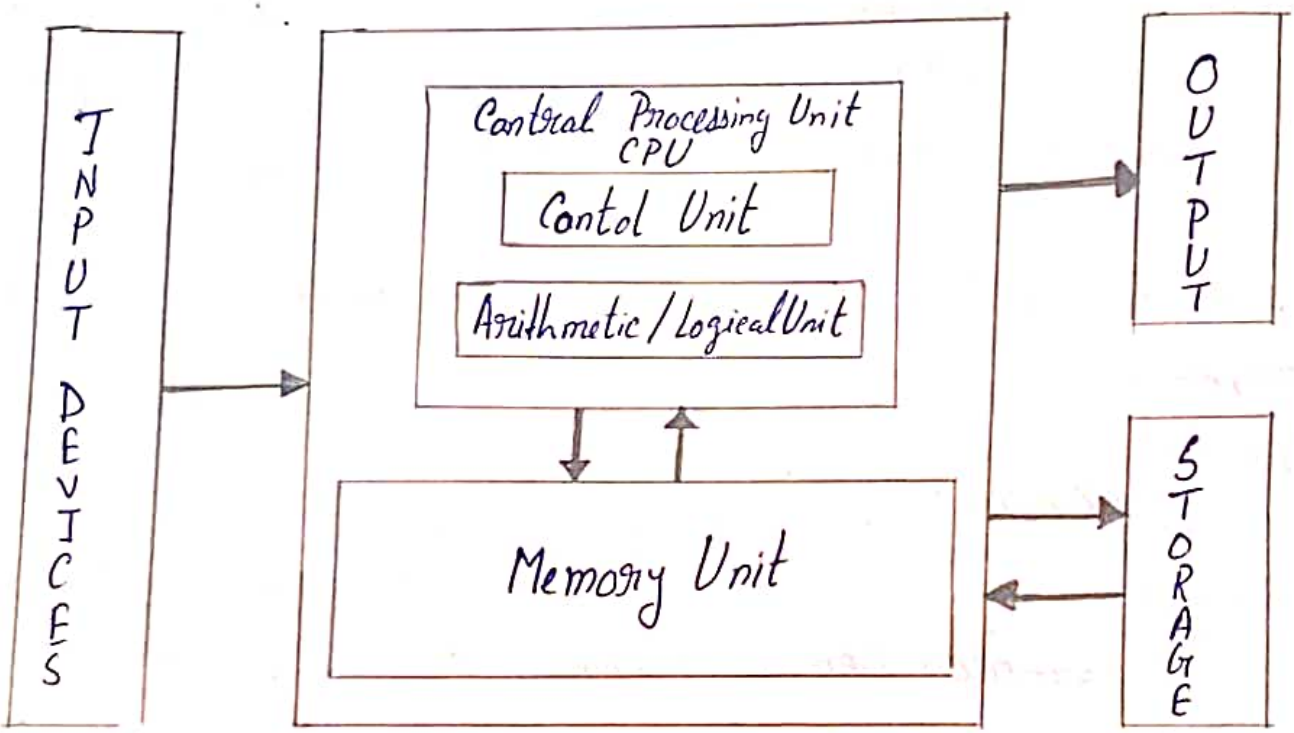

Fig: Hardware Assembling

3. Assembly Steps:
- Prepare the Workspace : Work on a clean, well-lit, and static-free surface.
- Install CPU : Align and insert the CPU into the motherboard socket.
- Mount RAM : Install RAM into the designated slots.
- Install Storage : Connect HDD/SSD to the motherboard.
- Install GPU : If you have a separate graphics card, install it into the PCI slot.
- Connect Power Supply : Attach power cables to the motherboard, CPU, GPU, and drives.
- Connect Front Panel Cables : Connect power button, reset button, LEDs and USB ports to the motherboard.
- Install Cooling System : Attach the CPU cooler and any additional case fans.
- Double-check Connections : Ensure all components are securely connections.
- Cable Management : Organize and secure cables for good airflow are aesthetics.
- Close the Case : Securely close the computer case.

4. BIOS/UEFI Setup:
- Power on the computer and enter the BIOS/UEFI.
- Configure boot order, date, time, and other settings.

5. Operating System Installation:
- Insert the OS installation media.
- Follow the on-screen instructions to install the operating

Topic :

PIONEER

Page : 6

Date : / /

7. Select → Preferred Language [VHDL] and Select → Next.
8. Click on New Source
9. Select → VHDL Module
10. Click → Next
11. Click → Finish
12. Click → Next → Finish
13. Now program window will open and click on Synthesis - XST.
14. For simulation, test bench is required. Right click on program file in "Source - Pane" and click on "New Source".
15. Give a file name and click on VHDL Test Bench. Click → Next.
16. Click → Next → Finish.

Topic :

PIONEER
Page : 5
Date : / /

Q.3) Familiarization of HDL & Xilinx ISE Simulator.

Ans :- Hardware Description Language (HDL) is a specialized programming language for describing the structure and behavior of digital circuit. Commonly used HDLs, like Verilog and VHDL, enable engineers to models electronic system at various abstraction levels, from basic gates to complex modules. HDL facilitates simulation, allowing designers to verify functionality before physical implementation. It plays a crucial role in the design and synthesis of digital circuit, supporting the creation of scalable, efficient, and error-free designs. HDL code can be synthesized to generate netlists for FPGA or ASIC devices, contributing to the development of advanced electronics and integrated circuits.

- Xilinx ISE is a software tool produced by Xilinx for synthesis and analysis of HLD design, which enable the developer to synthesize their designs, performing timing analysis, examine RTL diagrams, simulate a design with different set of data and configure the target device with the program.

Steps required for Xilinx ISE Simulator :

1. Double click on icon Xilinx 9.1i.
2. Press OK.
3. Go to FILE → New Project.
4. (i) Put a Project Name and assign a Project Location
   (ii) Top-Level Source Type must be HDL.
   → Next.
5. Select → Family, Device, Package, Speed as per available Xilinx Board.
6. Select → Simulator [ISE Simulator (VHDL/Verilog)].

Topic :

PIONEER
Page : 4
Date : / /

SPECfp : • Evaluates floating-point performance, simulating applications with floating-point computations.

• Represents workloads involving scientific simulations, 3D rendering, and other math-intensive tasks.

Benchmark Components : • Each SPEC CPU benchmark includes a set of standardized program or workloads that mimic real-world applications.

• Benchmarks are designed to be portable across different architectures and platforms.

Metrics : • Result are typically reported in SPEC Rate or SPEC Speed metrics.

• SPEC Rate measures throughput, representing the number of program executions per unit of time.

• SPEC Speed measures the time it takes to complete a single program execution.

Normalization : • Results are often normalized against a reference machine to allow performance comparison across different hardware configurations.

Interpreting Results : • Lower execution times and higher throughput values indicate better performance.

• Compare results across different ~~hardware~~ CPUs or architectures for performance analysis.

Documentation : • Refer to the official SPEC documentation for each benchmark to understand the workloads, metrics, and proper usage.

system.

6. Driver Installation:
   - Install drivers for motherboard, GPU, and other components.

7. Testing:
   - Power on the system and check for any error messages.
   - Run system diagnostic tools to ensure everything is functioning correctly.

The specific guidelines provided in the manuals for each component and refer to any additional resources available. If you're assembling a specific type of digital device, please provide more details for a more tailored guide.

Q.2) Familiarization of SPEC Benchmark Application for CPU.

Ans:- SPEC (Standard Performance Evaluation Corporation) Benchmark Applications involves understanding industry-standard performance tests. SPEC benchmarks measure the performance of computer systems and components. Explore specific benchmarks like SPECint, SPECfp, SPECjvm and SPECweb to evaluate CPU, floating-point, Java, and web server performance respectively.

SPEC CPU Benchmarks: • SPEC provides two main CPU benchmark suites: SPECint (for integer performance) and SPECfp (for floating-point performance).

SPECint: • Measures integer performance, simulating applications with integer-based computations.

• Represents a range of real-world workloads, including scientific, financial, and media application.