Concept 1: The "Green Computing" Initiative (Sustainability Focus)

This concept focuses on **E-Waste Reduction** and **Refurbishment**. It turns the disassembly/assembly process into an environmental case study.

- **Project Title:** *Sustainable Tech: Optimizing Legacy Hardware for Extended Lifecycles.*
- **The Core Concept:** Investigating how strategic maintenance (disassembly/cleaning) and minor upgrades (assembly) can prevent electronic waste.
- **Target Audience:** Schools, non-profits, or budget-conscious offices.

Project Implementation Plan

1. Problem Statement

"Electronic waste is a growing global issue. Many computers are discarded simply due to thermal throttling (dust buildup) or minor obsolescence (slow HDD), which can be resolved without buying a new system."

2. Methodology

- **Phase 1: Benchmarking (The Baseline):** Boot the existing old system. Run a benchmark (e.g., Cinebench, CrystalDiskMark). Record temperatures and boot times.
- **Phase 2: Disassembly (The Audit):**
    - Complete teardown of the system.
    - **Activity:** Deep cleaning of fans and heatsinks (demonstrating maintenance skills).
    - **Activity:** Inspecting capacitors on the motherboard for swelling (demonstrating diagnostic skills).
- **Phase 3: Component Upgrade (The Strategy):**
    - Replace the mechanical HDD with a cheap SATA SSD.
    - Repaste the CPU thermal compound.
- **Phase 4: Assembly (The Reconstruction):** Reassemble the system with the new drive and clean components. Cable manage for better airflow.
- **Phase 5: Re-Benchmarking:** Run the same tests. Compare the "Before" vs. "After" results.

3. Conclusion/Result

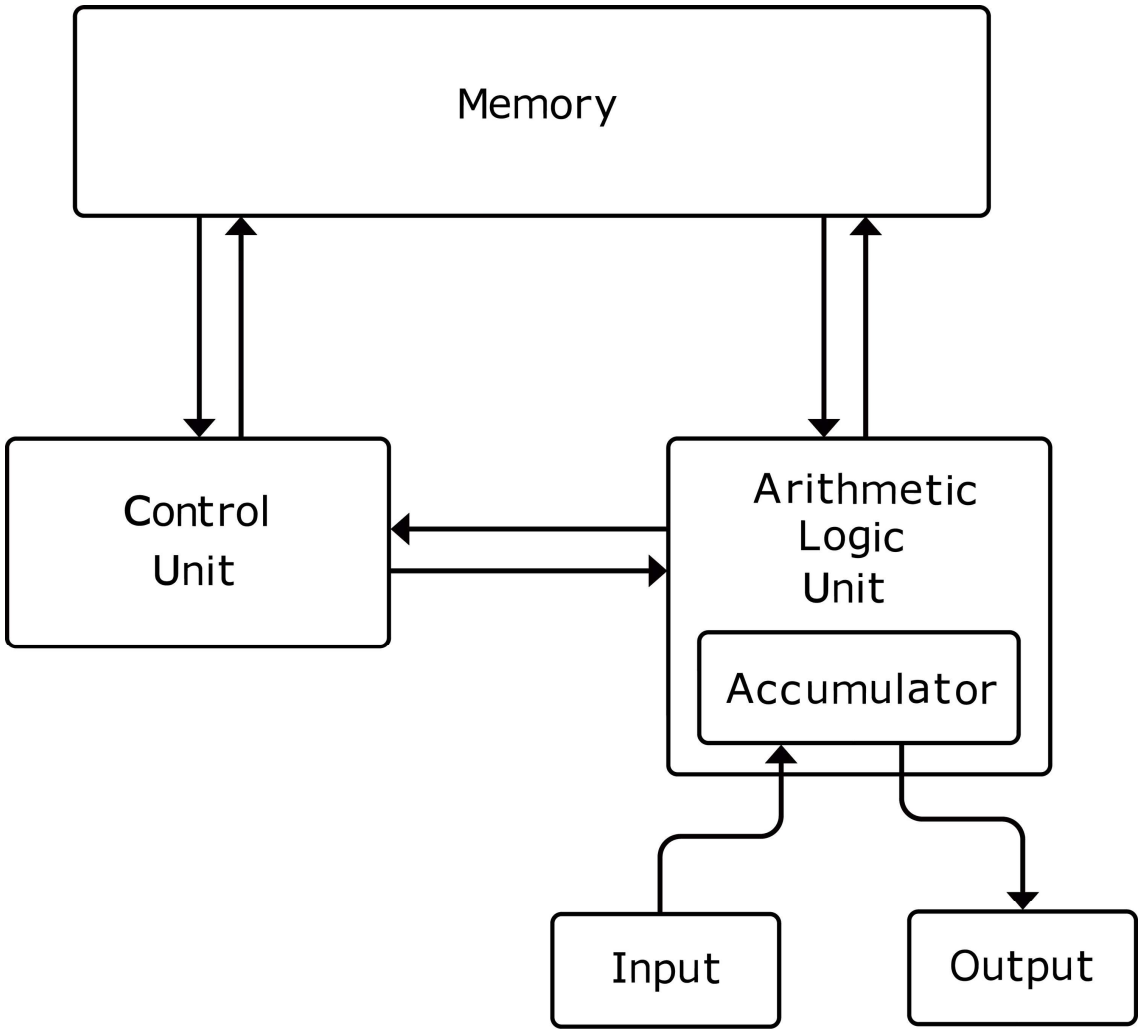
- *Data Point:* "Boot time reduced from 2 minutes to 15 seconds."
- *Data Point:* "CPU temperature reduced by 10°C due to cleaning and re-pasting."

Concept 2: The "Von Neumann Architecture" Study (Theoretical Focus)

This concept connects the physical hardware to standard Computer Science theory. It turns the build into an educational anatomy lesson.

- **Project Title:** *Physical Implementation of the Von Neumann Architecture.*

- **The Core Concept:** Mapping physical components to the theoretical "Five Components of Computer Organization" (Input, Output, Memory, Datapath, Control).



Project Implementation Plan

1. Objective To demonstrate how modern hardware physically instantiates the abstract Von Neumann model.

2. Methodology (The Mapping) In your project report, you do not just list "RAM"; you classify it by its architectural function.

- **Disassembly Phase:** As you remove parts, categorize them:
    - *Removal of SSD:* "Removing Secondary Storage (Non-volatile memory)."
    - *Removal of CPU:* "Removing the Central Processing Unit (ALU + Control Unit)."
- **Assembly Phase:** Build the system in the order of "Data Flow."
    1. **Motherboard (Bus System):** The communication highway.
    2. **CPU (Processing):** The brain.

3. **RAM (Primary Memory):** The workspace.
4. **I/O Devices:** The peripherals.

3. Analysis Explain how the "Bottleneck" works. (e.g., "The CPU (Control Unit) processes data faster than the HDD (Storage) can supply it, demonstrating the Von Neumann bottleneck.")

Concept 3: The "Thermal Dynamics" Study (Engineering Focus)

This concept focuses on physics and cooling efficiency.

- **Project Title:** *Impact of Cable Management and Airflow Pressure on System Stability.*
- **The Core Concept:** Comparing a "messy" build vs. a "clean" build to see how physical assembly affects hardware longevity.

Project Implementation Plan

1. Methodology

- **Build A (The Control):** Assemble the computer with messy cables blocking airflow. Close the case. Stress test for 30 mins. Record peak CPU/GPU temps.
- **Disassembly:** Take it apart.
- **Build B (The Variable):** Reassemble with strict cable management (zip ties) and optimal fan orientation (Positive vs. Negative pressure).
- **Test:** Run the same stress test.

2. Conclusion Demonstrate that *skillful* assembly (not just connecting parts, but managing them) results in lower temperatures and higher boost clocks.