**PC Upgrade and Rebuild Report**

**Overview**

This report documents the upgrade and rebuild of an Alienware Aurora R7 desktop PC. The primary goals were to address thermal performance issues, improve system reliability, and create a platform that is easier to maintain and upgrade. This project reflects my growth in IT skills, as I purchased the Alienware system before starting my journey in the field.

**Initial Issues**

1. **Thermal Problems:**
   * The Alienware Aurora R7 case had poor airflow, leading to dangerously high CPU temperatures (90–100°C).
   * The GPU also ran warmer than ideal but was partially mitigated by its dedicated fan.
2. **Design Limitations:**
   * The case had minimal unused space, and the PSU was mounted on a hinge that swung out, positioned very close to the CPU.
   * The cramped design made removing components, especially the top fans, extremely difficult.
3. **Power Supply Failure:**
   * The original PSU failed earlier, necessitating replacement as part of this rebuild.
4. **Compatibility Challenges:**
   * The Dell DVD drive used a non-standard power setup, requiring a SATA Power Adapter Cable (SATA 15-Pin Male to SATA 6-Pin Slimline).

**Key Upgrades**

1. **Case:** Corsair 4000D Airflow ATX Mid Tower Case
   * A spacious, well-ventilated case with excellent cable management features, including zip ties and cable slots.
2. **Motherboard:** Gigabyte Z390 AORUS PRO WIFI ATX LGA1151 Motherboard
   * A feature-rich motherboard that supports the Intel Core i7-8700 processor and future upgrades.
3. **Power Supply:** Corsair RM850 850 W 80+ Gold Certified Fully Modular ATX Power Supply
   * Ensures reliable power delivery and modular cables for clean and efficient cable management.
4. **Cooling System Adjustment:**
   * Initially used the Corsair H60 AIO liquid cooler but switched to the Noctua NF-A8 PWM Premium Quiet Fan (80mm) paired with the OEM heat sink after noticing persistent high CPU temperatures.
   * This adjustment resolved thermal issues, and the AIO cooler was returned to Corsair for a refund.

**Tools and Preparation**

* **Tools Used:**
  + iFixit Toolset, including a wrist strap to prevent static discharge.
  + Compressed Air Duster (Portable 45,000 RPM Cordless Dust Blower) for cleaning components.
  + PCPartPicker to verify component compatibility and ensure the PSU could handle the power requirements.
  + Computer PC Power Supply Tester (with 1.8" LCD screen) to verify the new PSU’s functionality.
* **Research:**
  + Planned cable routing and component placement to optimize airflow.
  + Identified the need for a SATA power adapter for the Dell DVD drive.

**Rebuild Process**

**Disassembly**

* Removed all components from the Alienware Aurora R7 case, taking care not to force anything to avoid damage.
* Encountered challenges with the cramped design, especially when removing the top fans and managing the PSU hinge mechanism.

**Cleaning and Preparation**

* Used the compressed air duster to clean dust and debris from all components, including the CPU cooler, GPU, and fans.

**Reassembly**

1. **Case Setup:** Installed the Gigabyte Z390 motherboard into the Corsair 4000D case.
2. **Component Installation:**
   * Transferred the Intel Core i7-8700 CPU and initially installed the Corsair H60 liquid cooler.
   * Installed all storage devices and the Dell OEM GTX 1070 Ti GPU.
   * Added a SATA power adapter cable to connect the Dell DVD drive.
3. **Cable Management:** Used the Corsair case’s built-in cable management features, including zip ties, to ensure a neat and obstruction-free layout.
4. **Power Supply Testing:** Verified the new Corsair RM850 PSU’s functionality using the power supply tester before connecting it to components.

**Final Cooling Adjustment**

* After rebuilding, observed that CPU temperatures remained slightly high.
* Switched to a Noctua NF-A8 PWM Premium Quiet Fan paired with the OEM heat sink.
* This resolved thermal issues, and the Corsair H60 AIO cooler was returned for a refund.

**Performance Testing**

* Verified the system using the NZXT Cam app and 3DMark, confirming improved thermal performance and stability.

**Results**

1. **Thermal Improvements:**
   * **Before Rebuild:** CPU temperatures were consistently between 90–100°C.
   * **After Rebuild with AIO Cooler:** Temperatures were still higher than desired.
   * **Final Results with Noctua Fan:** CPU temperatures stabilized at safe levels, ensuring optimal performance.
2. **Ease of Maintenance:**
   * The spacious Corsair 4000D case made reassembly and future upgrades far easier compared to the original Alienware case.
3. **System Stability:**
   * The upgraded PSU provides stable power delivery and headroom for future upgrades.

**Lessons Learned**

1. **Prebuilt Systems Have Limitations:**
   * The Alienware Aurora R7’s design made upgrades and maintenance far more difficult than working with a custom-built system.
2. **Case Design is Critical:**
   * Investing in a quality case like the Corsair 4000D significantly improved airflow, usability, and overall thermal performance.
3. **Cooling System Knowledge Matters:**
   * AIO liquid coolers may lose efficiency after being removed and reinstalled. Switching to an air cooler with the OEM heat sink solved persistent thermal issues.
4. **Plan Ahead for Compatibility:**
   * Researching and planning component compatibility, such as identifying the need for a SATA power adapter, saved time and avoided delays.
5. **Always Test Components:**
   * Using a power supply tester and cleaning components thoroughly ensured the rebuild went smoothly and minimized the risk of errors.