Comp Tia A+ (220-1101) Day 6 Notes

Printers - Section 3.7

Laser printers use static electricity and a laser to transfer toner to paper.

The laser printing process consists of seven steps (Please Call Everyone During Training For Confirmation):

1. **Processing**
    - The printer receives a print job and translates it into a series of steps it must perform, typically storing it in the printer's memory.
2. **Charging**
    - A uniform negative charge is applied to the surface of the imaging drum by the corona wire (charging roller).
3. **Exposing**
    - A laser shines on the imaging drum. Any part exposed to the laser has its charge neutralized.
    - Unexposed areas maintain their strong, negative charge.
4. **Developing**
    - Toner is applied to the uncharged area of the drum.
    - Toner has a strong negative charge and will not "stick" to the negatively charged areas of the imaging drum.
    - Toner will be attracted to areas of the drum that the laser discharged.
5. **Transferring**
    - A strong, positive charge is applied to the paper.
    - The negatively charged toner is strongly attracted to the positively charged paper.
6. **Fusing**
    - The loose toner is melted into the paper with heat and pressure.
7. **Cleaning**
    - Residual toner left on the imaging drum must be scraped off and collected before the next rotation. Done by the cleaning blade or waste scraper.

Laser Printer Maintenance

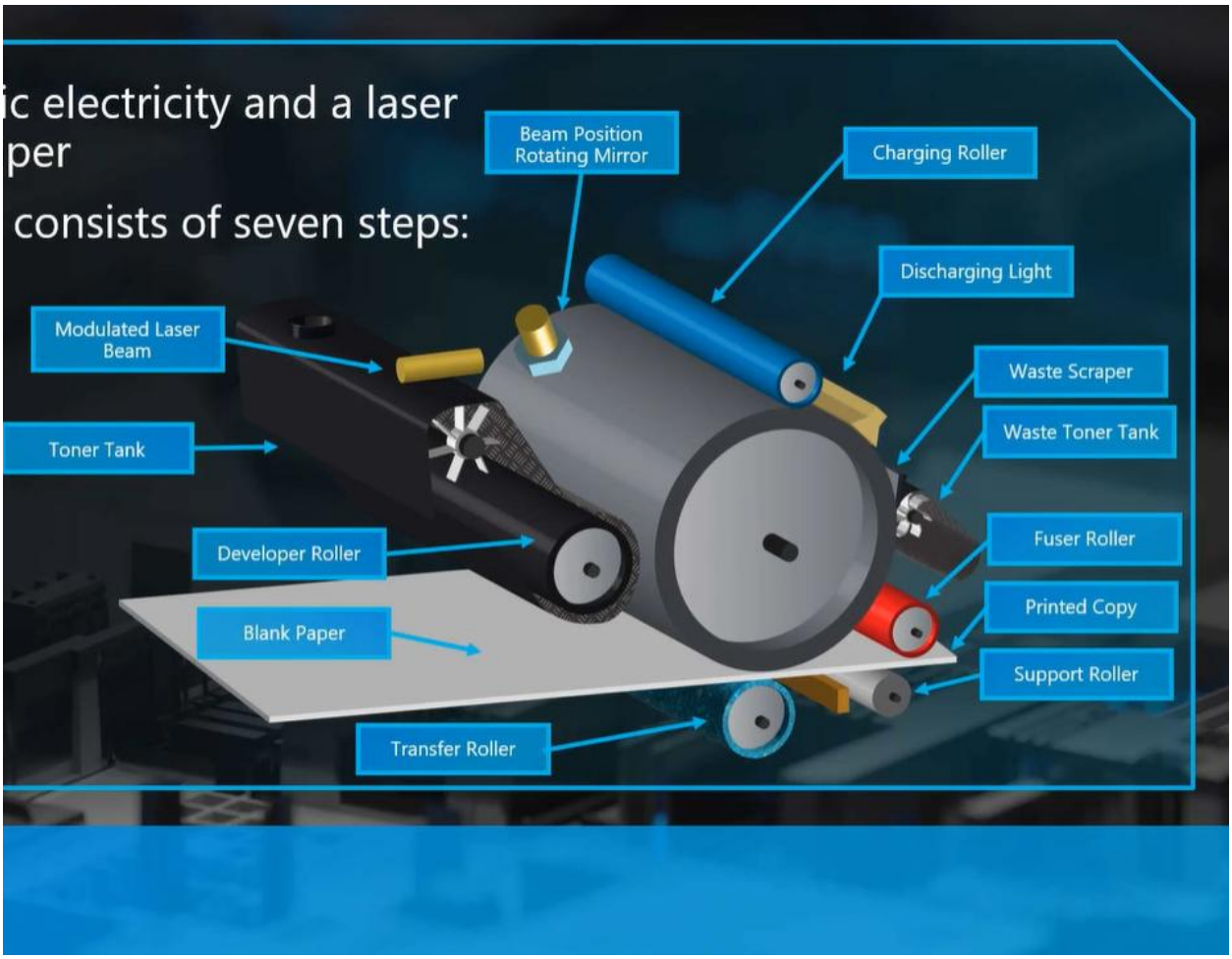
- Maintenance kits are usually applied after a certain number of pages have been printed. They may include:
    - Fusing assembly
    - Transfer roller (responsible for moving toner from cartridge to drum)
    - Separation pads and rollers
    - Charging components
- Toner cartridges are replaced as needed, and steps vary:

    1. Open laser printer access door
    2. Remove drum unit and toner cartridge assembly
    3. Replace the old toner cartridge with a new one

4. Replace the drum unit and toner cartridge assembly

- Calibration routines are built into some laser printers to maintain consistent performance:
    1. May be accessible via on-device controls or software utilities
    2. Most relevant to color laser printers
- Periodic cleaning of laser printers is needed:

    1. Don a mask and gloves
    2. Power down the unit, unplug it, and ensure it has time to cool down
    3. Remove components and wipe them down with a toner cloth
    4. If available, use a toner-safe vacuum to clean up messes
    5. Hard-to-reach areas may be cleaned with a soft-bristle paintbrush



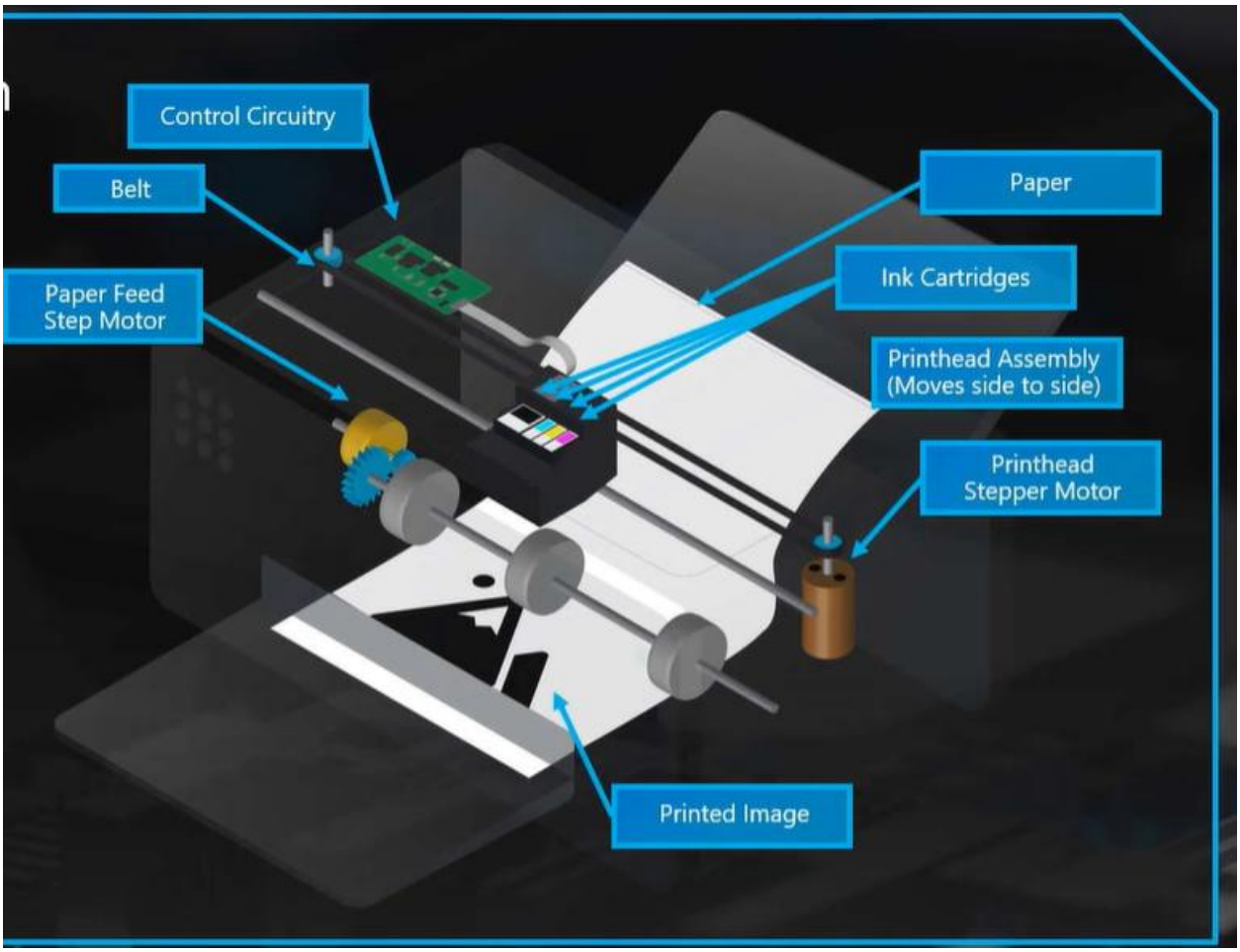
Inkjet Printers

- Inkjet printers are far simpler than laser printers:
    - Paper is passed through the printer
    - An assembly containing ink cartridges passes back and forth across the width of the paper, spraying ink where needed
    - The ink absorbs into the paper and dries (less quickly with glossy paper)

Inkjet Printer Maintenance

- Calibration is very important with inkjet printers:
  - The cartridge nozzles may shift slightly over time or during replacement
  - Most printers allow you to run a calibration routine from the printer panel or software
- Print heads may require periodic cleaning:
  - As with calibration, most inkjet printers have built-in cleaning routines
  - If the cleaning routine fails, you may try to remove the inkjet cartridges and blot the printer heads with a warm, damp paper towel
- Replacing cartridges is among the most common tasks for inkjet printers:

  1. Open the access panel
  2. Allow the carriage to move to an accessible position
  3. Open the carriage and replace affected cartridges
- Jams are another common issue of inkjets:
  1. Slowly and firmly pull the paper out of the printer
  2. Some jams may require you to open front or rear panels to access the paper
  3. Constant jams may indicate issues with rollers or pads



Thermal Printers

- Thermal printers are commonly used for receipts and labels
- Come in different forms, but the most common is the direct thermal printer:
    - Paper is coated in a heat-sensitive compound
    - Wherever the printer applies heat, the paper darkens

Note: Thermal paper will darken in other circumstances, such as being left in a hot car.

Thermal Printer Maintenance

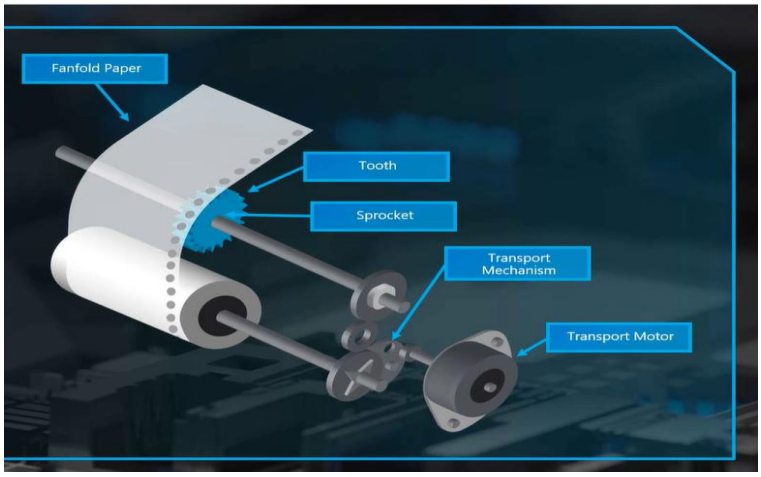
- Replacement of paper (ensure the roll is properly oriented)
- Cleaning the heating element (with isopropyl alcohol and a lint-free cloth)
- Remove debris, such as paper dust that accumulates due to serrated teeth

Impact Printers

- Impact printers work similarly to typewriters:
    - Paper is passed through the printer
    - A print head hits an ink ribbon into the paper, forming letters
- Most impact printers are dot matrix:
    - Single print head
    - Characters formed by extruding or retracting individual pins
- Slow and loud but can use impact paper

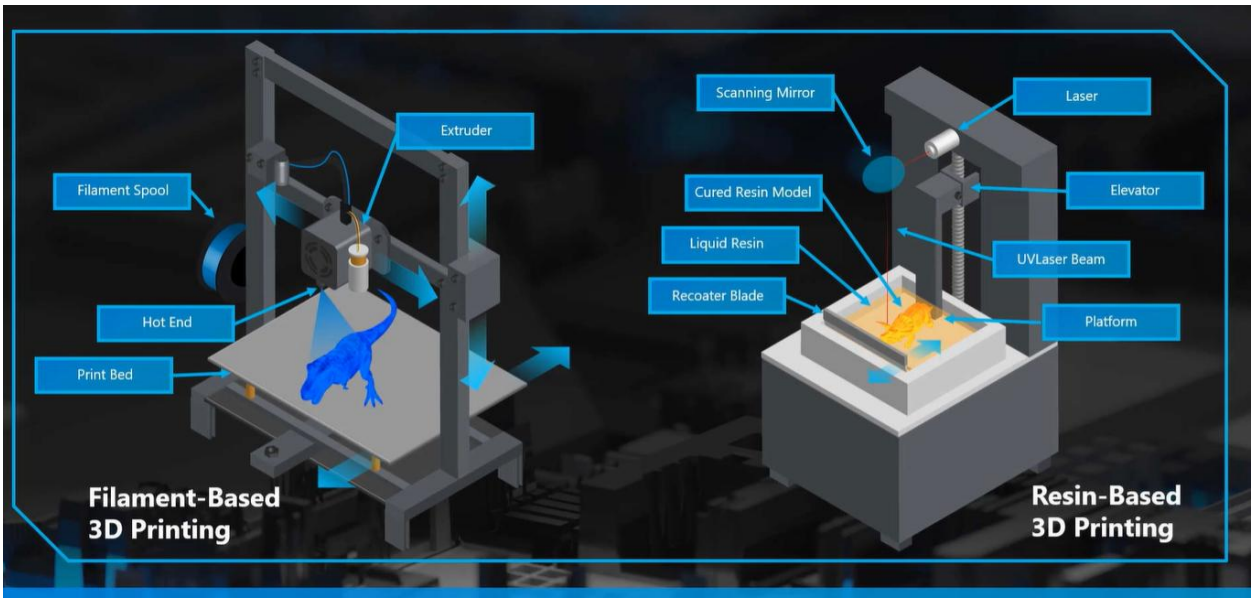
Impact Printer Maintenance

- Just like thermal printers, the simple printer mechanism translates to simple maintenance:
    - Replace ink ribbon as needed
    - Replace paper (ensure sprockets are aligned to the margin holes if using a tractor-fed printer)
    - The print head will wear down and need periodic replacement



3D Printers

- Can produce tangible objects using different substances:
  - Plastics
  - Resin
  - Metal
  - Carbon fiber
- Two common 3D printing technologies use either plastics or resin:
  - **Plastics** – an extruder melts plastic filament and deposits it as a series of stacked, two-dimensional layers
  - **Resin** – a vat of resin is exposed to UV light, causing the resin to cure and harden in layers as a platform is lowered



Cloud Computing Concepts - Section 4.1

Cloud Computing

"Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models."

— NIST Special Publication 800-145

Essential Characteristics of Cloud Computing

- **On-demand Self Service**
  Anyone can request or receive service without human interaction.
- **Broad Network Access**
  Cloud resources are accessible from a wide variety of network locations and devices.
- **Measured Service**
  All resources used are measured and charged for on a minute-by-minute or even second-by-second basis (pay for what you use). This includes resources such as compute time, storage, and bandwidth.
- **Rapid Elasticity**
  It is trivial to add or remove cloud resources to meet demand.
- **Resource Pooling**
  The physical resources a cloud provider offers are pooled and provided to many consumers.

Further Characteristics of Cloud Computing

- **High Availability**
  Provisions are taken by both the cloud provider and consumer to ensure the resiliency of systems and data.
    - Consumers may deploy cloud resources across several geographic regions to mitigate disasters.
    - Cloud providers may transparently provide storage and network resiliency with no customer action required.
- **File Synchronization**
  Files are updated and kept current across different systems and applications. Commonly seen in offerings like Office365.

Cloud Deployment Models

NIST defines four cloud deployment models:

- **Private Cloud**
  Cloud infrastructure is provisioned for exclusive use by a business organization. May be managed internally or externally, and on- or off-premises.
- **Public Cloud**
  Cloud infrastructure is provisioned for open use by the public.
- **Community Cloud**
  Cloud infrastructure is provisioned and jointly managed by an exclusive group of organizations with shared goals, policies, or security requirements.
- **Hybrid Cloud**
  Combination of other deployment models (private, public, or community clouds).

Cloud Service Models

NIST defines three cloud service models:

- **Infrastructure as a Service (IaaS)**
  Consumer provisions compute resources (processing, storage, networks) in the form of virtual machines.
    - Personal Responsibilities include:
        - Applications
        - Data
        - Runtime
        - Middleware
- **Platform as a Service (PaaS)**
  Consumer deploys applications on a cloud-hosted platform (libraries, languages, environments, etc.).
    - Personal Responsibilities include:
        - Applications
        - Data
- **Software as a Service (SaaS)**
  Consumer uses applications running on cloud infrastructure.
    - Provider handles:
        - Applications
        - Data
        - Runtime
        - Middleware
        - Operating System
        - Virtualization
        - Servers
        - Storage
        - Networking

Desktop Virtualization

Virtual Desktop Infrastructure (VDI)

- Instead of installing desktop operating systems on client hardware, they are installed in VMs on a server.
- Employees remotely access their desktops over a network.
- Potential management and cost benefits.

In on-premises VDI, an organization deploys and manages VDI locally (e.g., with Citrix, Horizon).

In cloud VDI, the organization provisions virtual desktops with a provider such as AWS.

- **DaaS (Desktop as a Service)** is a form of cloud-based VDI where virtual desktops are hosted by a third-party provider.

Client-Side Virtualization - Section 4.2

- Virtual Machines emulate computer hardware for running operating systems and applications.
    - VM components usually include:
        - vCPU
        - vRAM
        - vNICs
        - Virtual hard disks

Hypervisors

- **Type 1 Hypervisor**: Runs directly on hardware (bare-metal), without needing a host OS.
- **Type 2 Hypervisor**: Installed on top of an existing OS environment.

Client-Side Virtualization (Type 2)

1. Install a Type 2 hypervisor:
    - VirtualBox
    - VMware Workstation (Player)
    - Parallels
2. Within the hypervisor, create a VM:
    - CPU cores
    - RAM
    - Disk
    - vNIC
3. Insert OS installation media (commonly an ISO file) into the virtual optical drive and install the OS.

Common Reasons to Create a Type 2 Hypervisor

- **Sandboxing**
  Providing a segmented environment in which to run applications.
- **Development and Testing**
  Virtualization allows a developer to test their applications in multiple OSs and environments on a single system.
- **Application Virtualization**
  - **Legacy Software Compatibility**: An application written for Windows XP might not work in Windows 11.
  - **Cross-Platform Compatibility**: An application written for Windows won't run in Linux.

Client-Side Virtualization Requirements

- **Resources**
  Enough resources must be allocated to a VM to run both the operating system and any applications therein.
  - vCPU
  - vRAM
  - Virtual hard disks
- **Security**
  VMs must be secured in the same way a physical host is.
  - Network segmentation between VMs
  - OS hardening (e.g., removing guest accounts, disabling services, and using encryption)
  - Security agents like anti-malware
  - Audit and monitoring of VMs