

# Lecture 04

Safe Lab Procedures and Tool used

**CT4005NI - Computer Hardware and  
Software Architectures**

# Lecture 04's

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This chapter covers basic safety practices for the workplace, hardware and software tools, and the disposal of hazardous materials.

## Objectives

- Explain the purpose of safe working conditions and procedures.
- Identify tools and software used with personal computer components and their purposes.
- Implement proper tool use.



NO FOOD OR DRINK



IN LAB

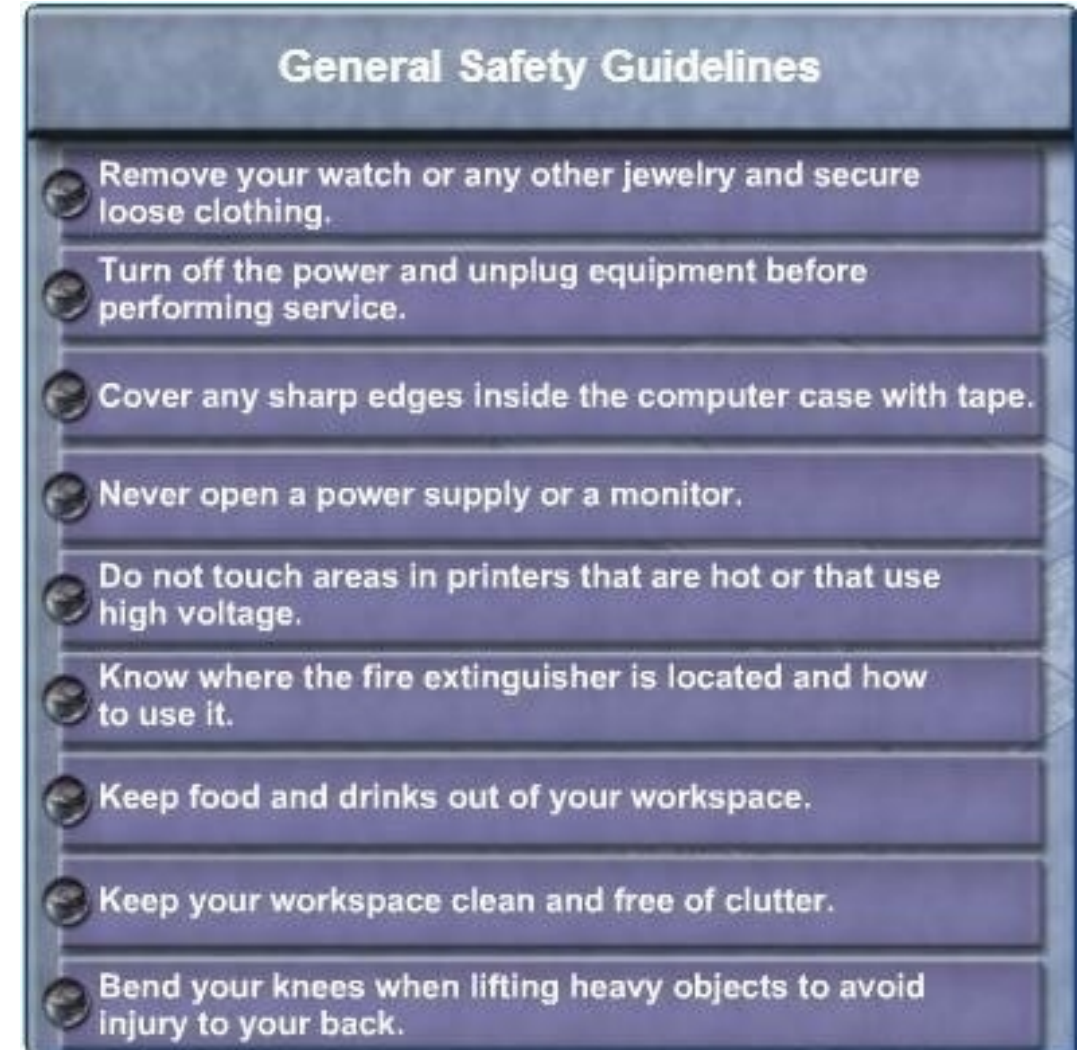


# 4.1 Explain the purpose of safe working conditions and Procedures

## 4.1.1 Identify safety procedures and potential *hazards* for users and technicians

### General Safety Guidelines:

Follow the basic safety guidelines to prevent **cuts, burns, electrical shock, and damage to eyesight.**



# 4.1 Explain the purpose of safe working conditions and Procedures

## 4.1.1 Identify safety procedures and potential *hazards* for users and technicians

### Electric Safety Guidelines:

- Follow electrical safety guidelines to prevent electrical fires, injuries, and fatalities in the home and the workplace.
- Power supplies and monitors contain very high voltage hence experienced technicians should attempt to repair it. Others should just replace it.
- Electrical devices have certain power requirements, hence exchanging power codes with different type of laptops or device may damage both adapter and device, for instance.





# 4.1 Explain the purpose of safe working conditions and Procedures

## 4.1.1 Identify safety procedures and potential *hazards* for users and technicians

### Fire Safety Guidelines:





- Follow fire safety guidelines to protect lives, structures, and equipment.
- Never fight a fire that is out of control or not contained.
- Get out of the building quickly.
- Contact emergency services for help.
- Be sure to locate and read the instructions on the fire extinguisher in your workplace before you have to use them.



# Fire extinguisher Types for the relevant class of Fire



# Cont....

		Ordinary Combustibles	Wood, Paper, Cloth, Etc.
		Flammable Liquids	Grease, Oil, Paint, Solvents
		Live Electrical Equipment	Electrical Panel, Motor, Wiring, Etc.
		Combustible Metal	Magnesium, Aluminum, Etc.
		Commercial Cooking Equipment	Cooking Oils, Animal Fats, Vegetable Oils



# 4.1 Explain the purpose of safe working conditions and Procedures

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4.1.2 Identify safety procedures to protect equipment from damage and data from loss.

What can damage a computer equipment?

- Electrostatic discharge (ESD), harsh climates, and poor quality sources of electricity can cause damage to computer equipment.

# 4.1 Explain the purpose of safe working conditions and Procedures

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Identify safety procedures to protect equipment from damage and data from loss

## Electrostatic Discharge

- When two electrically charged objects, such as the human body and an electronic device come into contact with each other, static electricity is discharged. This phenomenon is called ESD (Electrostatic Discharge).
- Static electricity is the buildup of an electric charge resting on a surface.
- This buildup may jump to a component and cause damage.
- Only takes place when two objects that store different amounts of static electricity (different potentials) come in contact.

# 4.1 Explain the purpose of safe working conditions and Procedures

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## 4.1.2 Identify safety procedures to protect equipment from damage and data from loss.

### Electromagnetic Interference (EMI)

- Is the intrusion of outside electromagnetic signals in a transmission media, such as copper cabling.
- In a network environment, EMI distorts the signals so that the receiving devices have difficulty interpreting them.

# 4.1 Explain the purpose of safe working conditions and Procedures

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## 4.1.2 Identify safety procedures to protect equipment from damage and data from loss.

### Radio Frequency Interference (RFI)

- RFI is the interference caused by radio transmitters and other devices transmitting in the same frequency.
- Wireless networks are affected by Radio Frequency Interference (RFI).



# 4.1 Explain the purpose of safe working conditions and Procedures

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## 4.1.2 Identify safety procedures to protect equipment from damage and data from loss.

### Climate

- If the environment temperature is too high, equipment can overheat.
- If humidity is too low, chances of ESD increases, if too high, equipment can suffer from moisture damage.

# 4.1 Explain the purpose of safe working conditions and Procedures

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4.1.2 Identify safety procedures to protect equipment from damage and data from loss.

## Power Fluctuation Types

The following types of AC power fluctuations can cause data loss or hardware failure:

- **Blackout** - complete loss of AC power.
- **Brownout** - reduced voltage level of AC (below 80%)
- **Spike** - Sudden increase in voltage that lasts for a very short time period
- **Power surge** - Dramatic increase in voltage above the normal flow of electrical current.

# 4.1 Explain the purpose of safe working conditions and Procedures

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4.1.2 Identify safety procedures to protect equipment from damage and data from loss.

## Power Protection Devices

- **Surge suppressor** - helps protect against damage from surges and spikes.
- **Uninterruptible Power Supply (UPS)** - helps protect against brownouts and blackouts.
- **Standby Power Supply (SPS)** - Helps protect against potential electrical power problems by providing a backup battery to supply power.

# 4.1 Explain the purpose of safe working conditions and Procedures

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## 4.1.3 Identify safety procedures to protect the environment from contamination

- Computers and peripherals contain materials like heavy metals such as cadmium, lead, or mercury that can be harmful to the environment.



# 4.1 Explain the purpose of safe working conditions and Procedures

## 4.1.3 Identify safety procedures to protect the environment from contamination

### Material Safety and Data Sheet

- A Material Safety and Data Sheet (MSDS) is a fact sheet that summarizes information about material identification, including hazardous ingredients that can affect personal health, fire hazards, and first aid requirements.

The screenshot displays the U.S. Department of Labor's website for Hazardous Materials Warning Placards. The page features the OSHA logo and the text "U.S. Department of Labor Occupational Safety & Health Administration". Below this, it states "Material Safety Data Sheet" and "May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements." The form includes sections for "IDENTITY (As Used on Label and List)", "Section I" (Manufacturer's Name, Address, Emergency Telephone Number, etc.), and "Section II - Hazardous Ingredients/Identity Information". The form is titled "Response begins with identification!" at the bottom.

# 4.1 Explain the purpose of safe working conditions and Procedures

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## 3.1.3 Identify safety procedures to protect the environment from contamination

### Proper Disposal of Batteries and CRTs

- Batteries and CRTs often contain rare earth metals that are harmful to the environment like lead, mercury, lithium and others.
- Mercury is commonly used in the manufacturing of batteries and is extremely toxic and harmful to humans.

## 4.2 Hardware tools and their purpose

A toolkit should contain all of the tools necessary to complete hardware repairs.

### ESD Tools - Antistatic wrist strap and Antistatic mat

- An antistatic wrist strap is used to prevent ESD damage to computer equipment.
- An antistatic mat is used to stand on or place hardware on to prevent static electricity from building up.



# 4.2 Hardware tools and their purpose

## Hand Tools

- Most tools used in the computer assembly process are small hand tools.

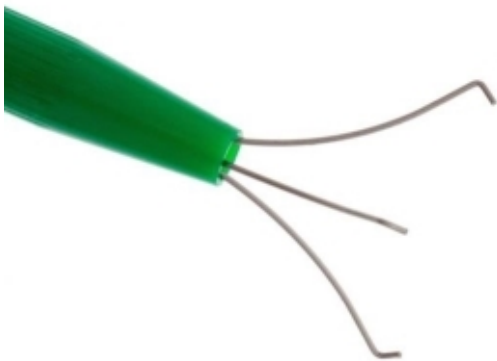




# 4.2 Hardware tools and their purpose

## Hand Tools

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# 4.2 Hardware tools and their purpose

## Cleaning Tools

- Appropriate cleaning tools ensures that computer components are not damaged during cleaning.



# 4.2 Hardware tools and their purpose

## Diagnostic Tools

- A digital Multimeter and a loopback adapter are used to test hardware.



# 4.3 Software tools and their purpose

## Disk Management Tools

- **Fdisk or Disk Management** - creates and deletes partitions on a hard drive.
- **Format** - prepares a hard drive to store information.
- **Scandisk or chkdsk** - Checks the integrity of files and folders on a hard drive by scanning the file system. These tools may also check the disk surface for physical errors.
- **Defrag** - Optimizes space on a hard drive to allow faster access to programs and data



# 4.3 Software tools and their purpose

## Disk Management Tools

- **Disk Cleanup** - Clears space on a hard drive by searching for files that can be safely deleted
- **Disk Management** - Initialize disks, creates partitions, and formats partitions
- **System File Checker (SFC)** - Scans the operating system critical files and replaces any files that are corrupted.
- One can use Windows bootable disk for troubleshooting and repairing corrupted files.

# 4.3 Software tools and their purpose

## Protection Software Tools

- Viruses, Spyware, and other types of malicious attacks can damage an OS, application and data.
- **Windows Security Center** - it ensure software firewall; antivirus programs are running.
- **Antivirus Program** - protects against virus attacks.
- **Antispyware Program** - Protects against software that sends information about web surfing habits to an attacker.
- **Firewall Program** - Runs continuously to protect against unauthorized communications to and from your computer.

# 4.3 Software tools and their purpose

## Organizational tools and their purpose

- It is important that a technician document all services and repairs.
- These documents need to be stored centrally and made available to all other technicians.
- The documentation can then be used as reference material for similar problems that are encountered in the future.

# 4.4 Implement the use of proper tool

Use of Antistatic mat






Use of Antistatic wrist strap



# 4.4 Implement the use of proper tool

## Different tools and their usefulness

Clean With:	
 Computer case and outside of monitor	Mild cleaning solution and lint-free cloth
 LCD Screen	LCD cleaning solution or distilled water and lint-free cloth
 CRT Screen	Distilled water and lint-free cloth
 Heat Sink	Compressed air
 RAM	Isopropyl alcohol and lint-free swab
 Keyboard	Hand-held vacuum cleaner with a brush attachment
 Mouse	Mild cleaning solution and lint-free cloth

End of Lecture for week 04

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**Any question ?**

