# IT WORKSHOP
# GXESL 208

# Lab Record

## Semester 2

Name of Student : . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

KTU ID : . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

Branch : . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**
**COLLEGE OF ENGINEERING TRIVANDRUM**

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# CERTIFICATE

Certified that this is a bonafide record of work done by

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in the **GXESL208 - IT Workshop** during the academic year . . . . . . . . . . . . .

Signature of Faculty

# List of Experiments

# Experiment 1

# Computer Hardware Familiarization

**Experiment Objective:**

**Equipment/Material required:**

# CPU Box (Chassis)

1. List the typical materials used for constructing a CPU chassis.

2. Identify the form factor of the CPU case provided to you.

3. Identify the types of form factors supported by different chassis.

4. List the cooling mechanisms commonly integrated into a CPU chassis.

| Feature | Details |
|---|---|
| Materials Used | |
| Form Factor | |
| Supported Form Factors | |
| Cooling Mechanisms | |

# Motherboard

1. Identify your motherboard model.

2. Google your motherboard model number and list the technical specifications of the motherboard, including form factor, chipset, and socket type.

| Feature | Details |
|---|---|
| Motherboard model | |
| Form factor | |
| Chipset | |
| Socket type | |

3. Identify the types and number of RAM slots available.

4. Describe the input/output ports provided on the motherboard.

5. Identify components on the motherboard provided and draw a layout.

6. Refer to the website https://motherboarddb.com/motherboards/ choose a motherboard manufactured after the year 2010 and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Year of Manufacture | |
| Form Factor | |
| Chipset | |
| Memory | |
| Number and Type of USB Ports | |
| Video Outputs | |
| Network Ports | |
| Audio Ports | |
| Audio Chipset | |
| Expansion Slots | |
| Power Connectors | |

# CPU and Chipset

1. List the key specifications of a typical CPU (like clock speed, core count, and cache size).

2. Explain the terms power consumption and thermal design power (TDP) of a
   CPU.

3. Refer to the website https://www.techpowerup.com/cpu-specs/ choose a CPU
   manufactured after the year 2010 and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Year of Manufacture | |
| Socket | |
| Process Size | |
| Frequency | |
| Number of Cores | |
| Cache | |
| Memory Support | |
| TDP | |
| Production Status | |

# Storage Devices

## Hard Disk Drive

1. List the technical specifications of the hard disk provided to you including stor-
   age capacity, RPM, and interface type.

2. Explain the differences between SATA, SAS, and IDE hard disks.

3. Refer to the website https://smarthdd.com/database/ choose a Hard Disk Drive (HDD) and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Model | |
| Capacity | |
| Interface | |
| Maximum Interface Speed | |
| Maximum Read Speed | |

## Solid State Drive

1. Refer to the website https://smarthdd.com/database/ choose a Solid State Drive (SSD) and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Model | |
| Capacity | |
| Interface | |
| Maximum Interface Speed | |
| Maximum Read Speed | |

2. Compare the features of the HDD's and SSD's.

# Interface Cards

1. List the technical specifications of a graphics card, including VRAM, clock speed.

2. Identify the ports available on interface cards, such as HDMI, DisplayPort, or audio jacks.

3. Describe the cooling mechanisms for interface cards.

4. Refer to the website https://www.techpowerup.com/gpu-specs/ choose a GPU manufactured in the year 2003 and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Year of Manufacture | |
| GPU Name | |
| GPU Clock | |
| Memory Size | |
| Graphics Features | |
| Bus Interface | |
| Production Status | |

5. Refer to the website https://www.techpowerup.com/gpu-specs/ choose a GPU manufactured after the year 2020 and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Year of Manufacture | |
| GPU Name | |
| GPU Clock | |

| Memory Size | |
|---|---|
| Graphics Features | |
| Bus Interface | |
| Production Status | |

# Card Slots

1. List the types of card slots available on a motherboard and their respective uses.

# Cables

1. Refer to the website https://www.cablestogo.com/learning/connector-guides/internal and list the types of cables used in a computer and their specific purposes.

| Cable Type | Purpose |
|---|---|
| Power Cables | |
| Molex Connectors | |
| SATA Power Connectors | |
| SATA Data Cables | |
| IDE/PATA Cables | |
| Floppy Drive Cables | |
| Front Panel Connectors | |
| Power Switch Connector | |
| Reset Switch Connector | |
| LED Indicators | |

2. Describe the data transfer rates of different generations of SATA cables.

# SMPS (Switch Mode Power Supply/PSU)

1. List the power ratings and efficiency certifications of SMPS units.

2. Identify the types of connectors provided by an SMPS for various components.

| Connector Type | Purpose |
|---|---|
| 24-Pin ATX Connector | |
| 4-Pin/8-Pin EPS (CPU Power) Connector | |
| 6-Pin/8-Pin PCIe Power Connector | |
| SATA Power Connector | |
| Molex 4-Pin Connector | |
| Floppy Drive Power Connector (Berg Connector) | |

3. Describe the cooling mechanisms and protections (e.g., overvoltage) in an SMPS.

4. Refer to the website https://www.cybenetics.com/index.php?option=power-supplies choose a Power Supply Unit (PSU) and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Form Factor | |
| Wattage | |
| Efficiency Rating | |

# NIC (Network Interface Card)

1. List the technical specifications of a NIC, including speed and connection type.

2. Describe the difference between wired and wireless NICs.

3. Refer to the website https://www.scan.co.uk/shop/computer-hardware/network-cards-accessories/rj45-network-cards choose a network card and list the following features :

| Feature | Details |
|---|---|
| Manufacturer | |
| Interface | |
| Supported Data Rates | |

# Various Ports

1. Refer to the website https://newnex.com/usb-connector-type-guide.php and list the technical specifications of USB ports, including version and data rates.

| USB Version | Data Rate |
|---|---|
| USB 1.0 | |
| USB 1.1 | |
| USB 2.0 | |
| USB 3.0 | |
| USB 3.1 | |
| USB 3.2 | |
| USB4 | |
| USB4 Version 2.0 | |

2. Refer to the website https://www.xenarc.com/different-types-of-monitor-ports.html and list the common display ports in a computer and their typical applications.

| Display Port | Typical Application |
|---|---|
| VGA (Video Graphics Array) | |
| DVI (Digital Visual Interface) | |
| HDMI (High-Definition Multimedia Interface) | |
| DisplayPort | |
| USB-C | |

| Thunderbolt 3 / 4 | |
|---|---|
| SDI (Serial Digital Interface) | |

# I/O Devices

1. List the specifications of common input devices, such as DPI for mice or key travel for keyboards.

2. Refer to the website https://www.displaydb.com/brands and list the following features of a computer monitor :

| Feature | Details |
|---|---|
| Brand | |
| Model | |
| Size | |
| Panel Type | |
| Refresh Rate | |
| Screen Aspect Ratio | |
| Screen Resolution | |

3. List the connectivity options available for computer printers.

# Buses

1. Explain the function of the address bus, data bus and control bus in a computer system.

# Firmware

1. List the features of BIOS and UEFI firmware.

| Feature | BIOS | UEFI |
|---------|------|------|
| Boot Method | | |
| Maximum Drive Size Support | | |
| Secure Boot Support | | |
| Boot Speed | | |
| User Interface | | |

2. Explain how firmware updates improve hardware functionality.

3. Describe the role of firmware in initializing hardware during startup.

Result :

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# Experiment 2

# Familiarizing Basic Unix/Linux Commands

**Experiment Objective:**

**Equipment/Material required:**

**Command:** `ls`
Function:

Sample Command:

Output:

**Command:** `mkdir`
Function:

Sample Command:

Output:

**Command:** `cp`
Function:

Sample Command:

Output:

**Command:** `mv`

Function:

Sample Command:

Output:

**Command:** grep
Function:

Sample Command:

Output:

**Command:** rmdir
Function:

Sample Command:

Output:

**Command:** chmod
Function:

Sample Command:

Output:

**Command:** useradd
Function:

Sample Command:

Output:

**Command:** `passwd`
Function:


Sample Command:


Output:


**Command:** `history`
Function:


Sample Command:


Output:


**Command:** `dmesg`
Function:


Sample Command:


Output:


**Command:** `cpuinfo`
Function:


Sample Command:


Output:


**Command:** `uname`
Function:


Sample Command:


Output:

**Command:** du
Function:

Sample Command:

Output:

**Command:** time
Function:

Sample Command:

Output:

**Command:** write
Function:

Sample Command:

Output:

**Command:** fdisk
Function:

Sample Command:

Output:

Result :

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# Experiment 3

# Familiarization of Boot process

**Experiment Objective:**

**Equipment/Material required:**

Perform the experiment and record answers to the questions below:

1. List the steps in boot process of a computer

2. Explain the purpose of POST in the boot process?

3. Pressing which key during startup on the computer provided to you provides access to BIOS/UEFI settings.

4. List the BIOS version and the name of manufacturer

5. Under the boot devices listed in Boot settings of the BIOS

6. Is the BIOS in the given PC a Legacy BIOS or UEFI. Where is this information displayed in the BIOS settings

7. List the Boot Device order

8. Identify the bootloader and boot options it provides.

9. Explain the function of bootloader in boot process

10. Record any error messages or warnings displayed on-screeen during boot.

11. Record the approximate time taken for the system to boot.

Result :

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# Experiment 4

# Familiarizing installation of Linux and Windows OS

**Experiment Objective:**

**Equipment/Material required:**

Perform the experiment and record answers to the questions below:

1. Identify the tool used to create a multi-OS bootable USB.

2. Define GParted and explain how it is used in partition management.

3. Compare between MBR and GPT partitioning schemes.

4. Compare ext4, NTFS, and FAT32 file systems. When should each be used?

5. Describe the partitioning scheme used for dual-boot Windows10/Ubuntu installation.

6. Analyze the role of the GRUB bootloader.

7. Justify the advantages of using a separate '/home' partition in Linux.

8. How do you modify the default boot OS in a dual-boot system.

Result :

```
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# Experiment 5

# Shell programming in Linux

**Experiment Objective:**

**Equipment/Material required:**

**Exercise 1: Basic Shell Script**

Write a shell script that prints `"Hello, World!"` to the terminal.

**Questions**

1. What is the significance of `#!/bin/bash` in a script?

2. How do you make a script executable?

3. What command is used to execute a script?

**Exercise 2: Using Variables**

Write a shell script that takes a user's name as input and displays a greeting message.

**Questions**

1. What is the purpose of the `read` command?

2. How are variables used in shell scripting?

3. How do you define and use environment variables?

**Exercise 3: Conditional Statements**

Write a script to check whether a given number is even or odd.

**Questions**

1. What are the different types of conditional statements in shell scripting?

2. How do you compare numerical values in a shell script?

3. How do you use `if-elif-else` statements?

**Exercise 4: Loops**
Write a script to print numbers from 1 to 10 using a loop.

**Questions**

1. What are the different types of loops in shell scripting?

2. How does a `for` loop differ from a `while` loop?

3. How can you break out of a loop prematurely?

**Exercise 5: Functions**

Write a script with a function that calculates the square of a number.

**Questions**

1. How do you define and call a function in a shell script?


2. What is the significance of passing arguments to functions?


3. How can functions improve code reusability in shell scripting?


Result :


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# Experiment 6

# Familiarizing Basic Networking Commands

**Experiment Objective:**

**Equipment/Material required:**

**Exercise 1: ifconfig**
Use the `ifconfig` command to display the network configuration of your system.
**Command:**

**Sample Output:**

**Questions**

1. What information does `ifconfig` provide?

2. How can you enable or disable a network interface using `ifconfig`?

3. What alternative command is used in modern Linux distributions to replace `ifconfig`?

**Exercise 2: ping**
Use the `ping` command to check the connectivity to a remote server (e.g., google.com).
**Command:**

**Sample Output:**

**Questions**

1. What does the `ping` command do?

2. How can you specify the number of packets to be sent using `ping`?

3. How can `ping` help in diagnosing network issues?

## Exercise 3: traceroute

Use the `traceroute` command to trace the path packets take to reach a remote host.

**Command:**

**Sample Output:**

**Questions**

1. What information does `traceroute` provide?

2. How does `traceroute` determine the route to a destination?

3. What alternative command is available on Windows systems?

## Exercise 4: nslookup

Use the `nslookup` command to find the IP address of a given domain.

**Command:**

**Sample Output:**

**Questions**

1. What is the purpose of the `nslookup` command?

**Exercise 5: ssh**
Use the `ssh` command to connect to a remote machine.
**Command:**

**Sample Output:**

**Questions**

1. What is the primary purpose of `ssh`?

2. How does SSH ensure secure communication?

3. What is the default port number for SSH?

Result :

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# Experiment 7

# Familiarization of Visual Studio Code

**Experiment Objective:**

**Equipment/Material required:**

- Computer with Windows/Linux/macOS

- Internet connection

- Visual Studio Code installed

**Procedure**
**1. Installation of Visual Studio Code**

1. Visit `https://code.visualstudio.com/` and download VS Code.

2. Install the software following the on-screen instructions.

3. Launch VS Code after installation.

Q1: What are the minimum system requirements necessary for the installation of Visual Studio Code?

**2. Exploring the Interface**

- Activity Bar (Left Sidebar)

- Editor Window (Main Editing Area)

- Sidebar (File Explorer, Search, Extensions, etc.)

- Status Bar (Bottom Bar)

Q2: Explain the purpose and functionality of the Activity Bar in Visual Studio Code.

### 3. Running Code in VS Code

1. Open the integrated terminal using `Ctrl +` .

2. Install required extensions (e.g., Python, C/C++).

3. Run a script directly from the editor.

Q3: Outline the procedure to execute a Python script within Visual Studio Code.

### 4. Extensions and Plugins

- Open the Extensions panel (`Ctrl + Shift + X`).

- Search for and install required extensions (e.g., Jupyter, Remote SSH, Code Runner).

Q4: Identify and describe two essential extensions used for web development in Visual Studio Code.

Result :

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# Experiment 8

# Familiarization of LaTeX

**Experiment Objective:**

**Materials Required**

- Computer with Windows/Linux

- Internet connection

- LaTeX editor (TeXstudio, Overleaf, VS Code with LaTeX Workshop)

## 1. Basic Document Structure

Q1: Write a basic LaTeX document structure. Include comments for all lines of the code.

## 2. Text Formatting in LaTeX

Q2: Write LaTeX code to format text as bold, italicized, underlined and changing the font colour.

### 3. Ordered and Unordered Lists
Write LaTeX code to create an unordered list and an ordered list of items

### 4. Figures
Write LaTeX code to add an image file to the document

### 5. Mathematical Equations
Write LaTeX code for the quadratic formula using mathematical notation.

**6. Latex document**

Write LaTeX code to prepare a document including the concepts learned in steps 1 to 5. Give the document a title, use `lipsum` package to generate dummy text for your document.

Result :

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# Experiment 9

# Introducing Repositories - Git

**Experiment Objective:**

**1. Introduction to Git and Version Control**
Q1: What is the purpose of version control in software development?

**2. Installing and Configuring Git**
Q2: Write the Git commands to check the installed version.
Command:

Output:

Q3: Write the Git commands to set user credentials.
Commands:

Output:

**3. Creating and Managing Repositories**
Q4: Write the Git commands to initialize a new local repository and check its status.

Commands:

Output:

## 4. Staging and Committing Changes

Q5: Write the Git command to add files to the staging area
Command:

Output:

Q6: Write the Git command to commit changes
Command:

Output:

Q7: What is the difference between the staging area and a commit in Git?

Q8: Write the Git command to view commit history

## 5. Branching and Merging

Q9: Write the Git command to create a new branch
Command:

Output:

Q10: Write the Git command to switch branches
Command:


Output:


Q11: Write the Git command to merge branches
Command:


Output:


Q12: Explain the significance of branches in Git and how they help in collaboration.




## 6. Pushing and Pulling Changes
Q13: Write the Git command to connect to a remote repository
Command:


Output:


Q14: Write the Git command to push changes to a remote repository
Command:


Output:


Q15: Write the Git command to pull latest changes from a remote repository
Command:


Output:


Q16: What is the difference between `git push` and `git pull`?

Q17: Write the Git command to clone a remote repository
Command:

Output:

Result :

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# Experiment 10

# Familiarizing Networking Hardware

**Experiment Objective:**

**Equipment/Material required:**

**RJ 45 Connector**

Q1: What is the function of an RJ45 connector?

Q2: Refer to the this website Cat6/6A Standard RJ45 Connectors or similar websites and list the typical electrical, mechanical and constructional features of RJ45 connectors.

**Unshielded Twisted Pair (UTP) Cable**

Q3: What is the function of Unshielded Twisted Pair (UTP) Cable?

Q4: Refer to the this website https://www.firewall.cx/networking/network-cabling/network-cabling-utp.html or similar websites and list the UTP cable types, Max Data rate (over x distance) and typical applications .

**Optical Fibre**

Q5: Why is optic fibre cable preferred for long-distance communication?

**Networking Devices**

Q6: Explain the function of a Network Interface Card (NIC) in a computer network

Q7: Differentiate among a hub, switch and a router

Q8: Explain the role of a modem in networking

Result :

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