



National Textile University

Department of Computer Science

Subject:

Operating System

Submitted to:

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Submitted by:

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Reg number:

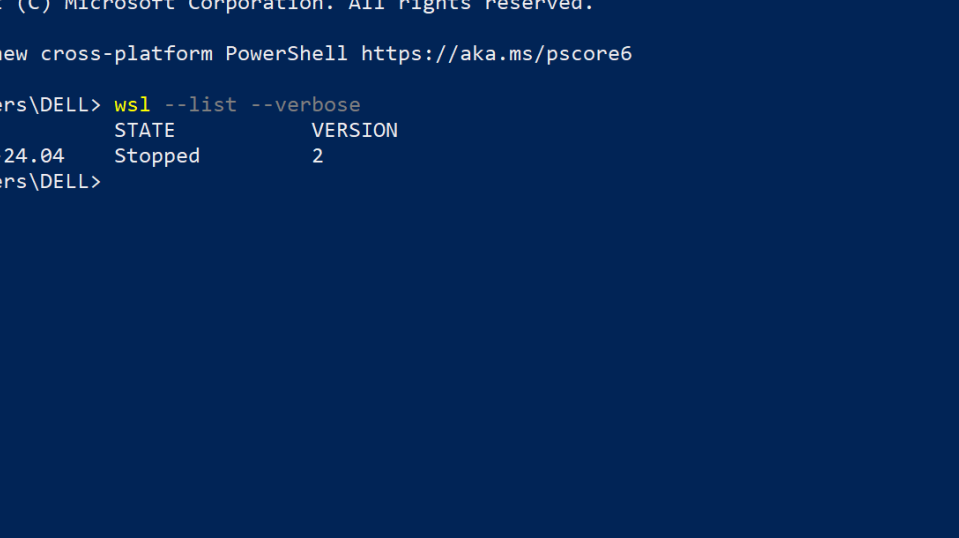
23-NTU-CS-1150

Semester:

05

Part A : Ubuntu and WSL setup

Verifying Ubuntu and WSL installation



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\DELL> wsl --list --verbose
   NAME                STATE              VERSION
*  Ubuntu-24.04         Stopped            2
PS C:\Users\DELL>
```

Updating Ubuntu environment

Command:

Sudo apt update && sudo apt upgrade -y

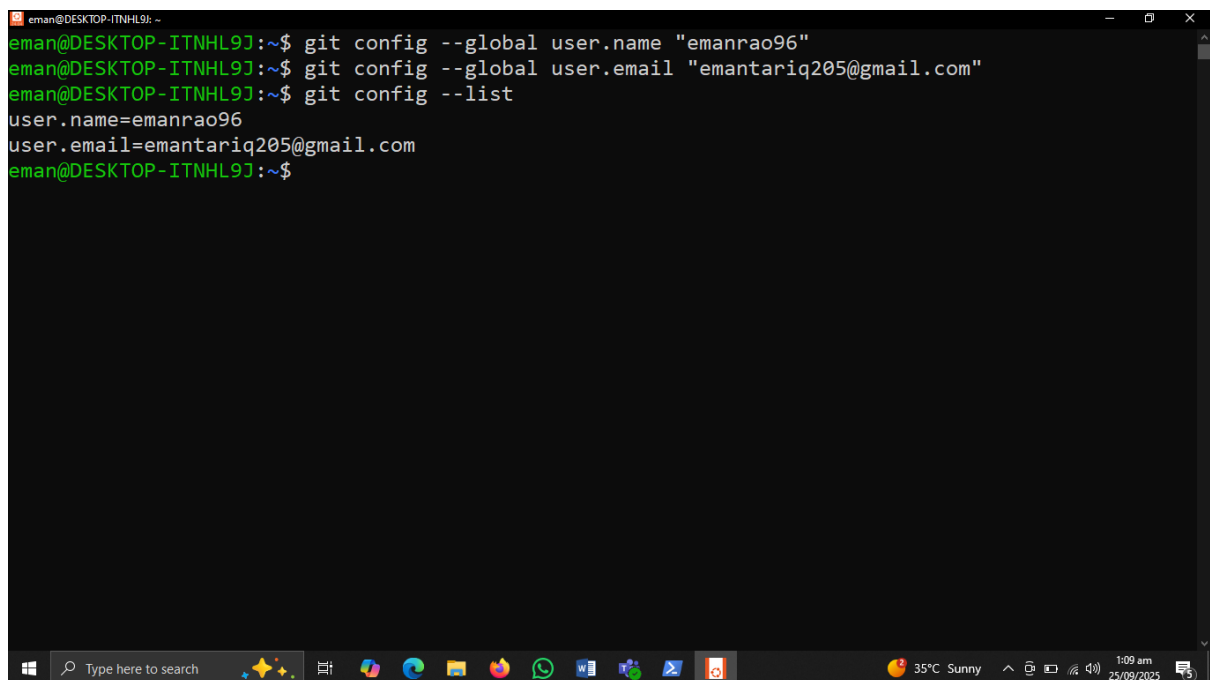
```

eman@DESKTOP-ITNHL97:~$
Setting up libatomic1:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libdpkg-perl (1.22.6ubuntu6.2) ...
Setting up libubsan1:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libwasan0:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libcrypt-dev:amd64 (1:4.4.36-4build1) ...
Setting up libasan8:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libtsan2:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libisl23:amd64 (0.26-3build1.1) ...
Setting up libde265-0:amd64 (1.0.15-1build3) ...
Setting up libc-dev-bin (2.39-0ubuntu8.5) ...
Setting up libalgorithm-diff-xs-perl:amd64 (0.04-8build3) ...
Setting up libc6-0:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up liblsan0:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libitm1:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libalgorithm-merge-perl (0.08-5) ...
Setting up cpp-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...
Setting up dpkg-dev (1.22.6ubuntu6.2) ...
Setting up libgcc-13-dev:amd64 (13.3.0-6ubuntu2~24.04) ...
Setting up libc6-dev:amd64 (14.2.0-4ubuntu2~24.04) ...
Setting up libstdc++-13-dev:amd64 (13.3.0-6ubuntu2~24.04) ...
Setting up cpp-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...
Setting up cpp-13 (13.3.0-6ubuntu2~24.04) ...
Setting up gcc-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...
Setting up gcc-13 (13.3.0-6ubuntu2~24.04) ...
Setting up cpp (4:13.2.0-7ubuntu1) ...
Setting up g++-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...
Setting up g++-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...
Setting up gcc (4:13.2.0-7ubuntu1) ...
Setting up g++-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...
Setting up g++-13 (13.3.0-6ubuntu2~24.04) ...
Setting up g++ (4:13.2.0-7ubuntu1) ...
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode
Setting up build-essential (12.10ubuntu1) ...
Setting up libheif1:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libgd3:amd64 (2.3.3-9ubuntu5) ...
Setting up libc-devtools (2.39-0ubuntu8.5) ...
Setting up libheif-plugin-aomdec:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-libde265:amd64 (1.17.6-1ubuntu4.1) ...
Setting up libheif-plugin-aomenc:amd64 (1.17.6-1ubuntu4.1) ...
Processing triggers for libc-bin (2.39-0ubuntu8.5) ...
Processing triggers for man-db (2.12.0-4build2) ...
eman@DESKTOP-ITNHL97:~$

```

Part B: Git & GitHub SSH

Set your name and email and show your config



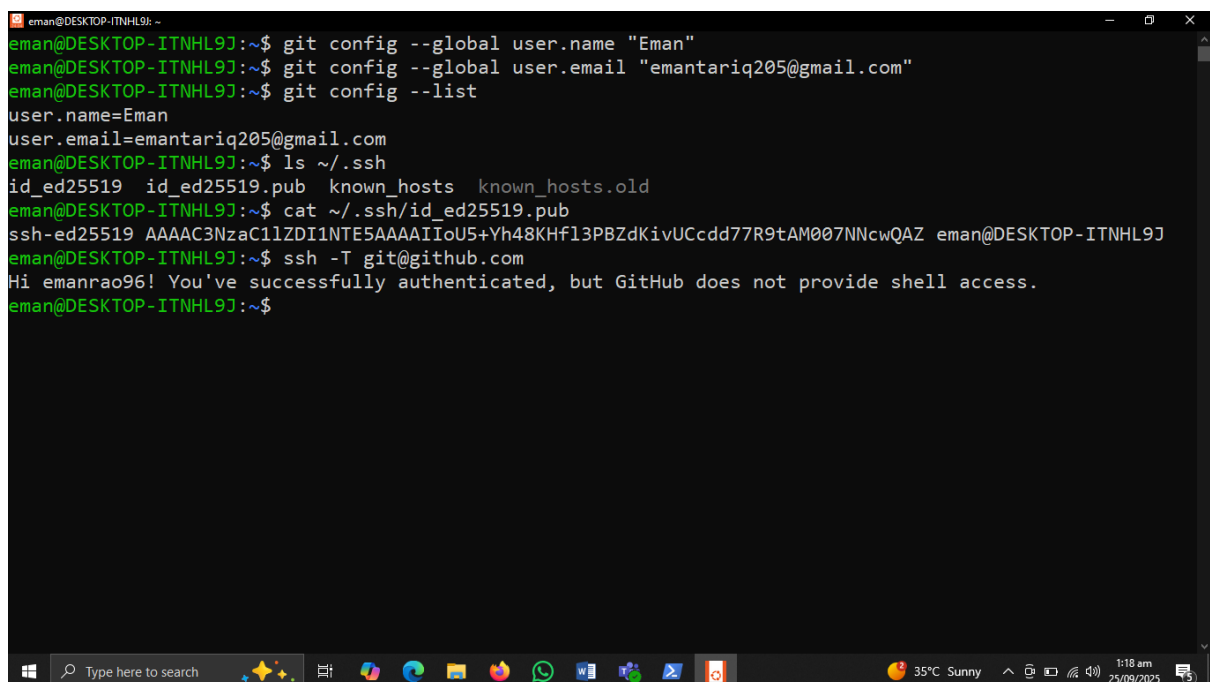
```
eman@DESKTOP-ITNHL9J: ~$ git config --global user.name "emanrao96"
eman@DESKTOP-ITNHL9J: ~$ git config --global user.email "emantariq205@gmail.com"
eman@DESKTOP-ITNHL9J: ~$ git config --list
user.name=emanrao96
user.email=emantariq205@gmail.com
eman@DESKTOP-ITNHL9J: ~$
```

The screenshot shows a Windows terminal window with a dark background. The user 'eman' is at the desktop 'DESKTOP-ITNHL9J'. They execute three commands: setting the global user name to 'emanrao96', setting the global user email to 'emantariq205@gmail.com', and listing the configuration. The output shows the configured values. The Windows taskbar is visible at the bottom with various icons and a system tray showing 35°C Sunny and the date 25/09/2025.

Testing Connection

Command:

`ssh -T git@github.com`



```
eman@DESKTOP-ITNHL9J: ~$ git config --global user.name "Eman"
eman@DESKTOP-ITNHL9J: ~$ git config --global user.email "emantariq205@gmail.com"
eman@DESKTOP-ITNHL9J: ~$ git config --list
user.name=Eman
user.email=emantariq205@gmail.com
eman@DESKTOP-ITNHL9J: ~$ ls ~/.ssh
id_ed25519 id_ed25519.pub known_hosts known_hosts.old
eman@DESKTOP-ITNHL9J: ~$ cat ~/.ssh/id_ed25519.pub
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIIoU5+Yh48KHf13PBZdKivUCdd77R9tAM007NNcwQAZ eman@DESKTOP-ITNHL9J
eman@DESKTOP-ITNHL9J: ~$ ssh -T git@github.com
Hi emanrao96! You've successfully authenticated, but GitHub does not provide shell access.
eman@DESKTOP-ITNHL9J: ~$
```

The screenshot shows the same terminal window. The user has updated their name to 'Eman'. They then list the files in the ~/.ssh directory and view the contents of id_ed25519.pub. Finally, they execute the 'ssh -T git@github.com' command. The output shows a successful authentication message from GitHub: 'Hi emanrao96! You've successfully authenticated, but GitHub does not provide shell access.' The system tray at the bottom now shows 1:18 am on 25/09/2025.

Part C: C Programming Environment & Practice

Step 1: Install Build Tools Command:

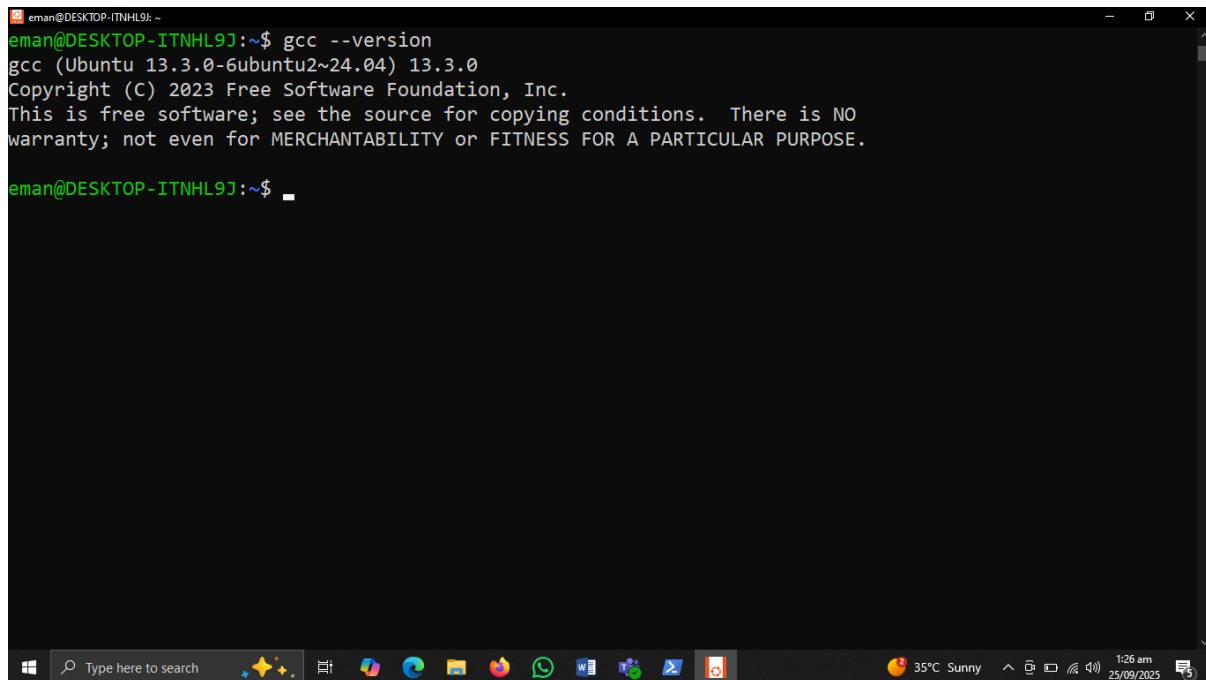
- `sudo apt update`

```
eman@DESKTOP-ITNHL9J: ~$ sudo apt update
[sudo] password for eman:
Get:1 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Get:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:4 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [1164 kB]
Get:5 http://security.ubuntu.com/ubuntu noble-security/main Translation-en [197 kB]
Get:6 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [21.6 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/main amd64 c-n-f Metadata [3744 B]
Get:8 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Packages [880 kB]
Get:9 http://security.ubuntu.com/ubuntu noble-security/universe Translation-en [195 kB]
Get:10 http://archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:11 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.2 kB]
Get:12 http://security.ubuntu.com/ubuntu noble-security/universe amd64 c-n-f Metadata [18.0 kB]
Get:13 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Packages [1855 kB]
Get:14 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1443 kB]
Get:15 http://security.ubuntu.com/ubuntu noble-security/restricted Translation-en [419 kB]
Get:16 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]
Get:17 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 c-n-f Metadata [520 B]
Get:18 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [212 B]
Get:19 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n-f Metadata [384 B]
Get:20 http://archive.ubuntu.com/ubuntu noble-updates/main Translation-en [282 kB]
Get:21 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 Components [175 kB]
Get:22 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 c-n-f Metadata [15.3 kB]
Get:23 http://archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [1485 kB]
Get:24 http://archive.ubuntu.com/ubuntu noble-updates/universe Translation-en [299 kB]
Get:25 http://archive.ubuntu.com/ubuntu noble-updates/universe amd64 Components [377 kB]
Get:26 http://archive.ubuntu.com/ubuntu noble-updates/universe amd64 c-n-f Metadata [31.1 kB]
Get:27 http://archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Packages [1957 kB]
Get:28 http://archive.ubuntu.com/ubuntu noble-updates/restricted Translation-en [441 kB]
Get:29 http://archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Components [212 B]
Get:30 http://archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Components [940 B]
Get:31 http://archive.ubuntu.com/ubuntu noble-backports/main amd64 Components [7072 B]
Get:32 http://archive.ubuntu.com/ubuntu noble-backports/universe amd64 Components [19.2 kB]
Get:33 http://archive.ubuntu.com/ubuntu noble-backports/restricted amd64 Components [216 B]
Get:34 http://archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 Components [212 B]
Fetched 11.7 MB in 24s (496 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
18 packages can be upgraded. Run 'apt list --upgradable' to see them.
eman@DESKTOP-ITNHL9J:~$
```

- `sudo apt install build-essential -y`

```
eman@DESKTOP-ITNHL9J:~$ sudo apt install build-essential -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
build-essential is already the newest version (12.10ubuntu1).
The following packages were automatically installed and are no longer required:
  libdrm-nouveau2 libdrm-radeon1 libgl1-amber-dri libglapi-mesa libllvm17t64 libxcb-dri2-0
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 18 not upgraded.
eman@DESKTOP-ITNHL9J:~$
```

- gcc --version

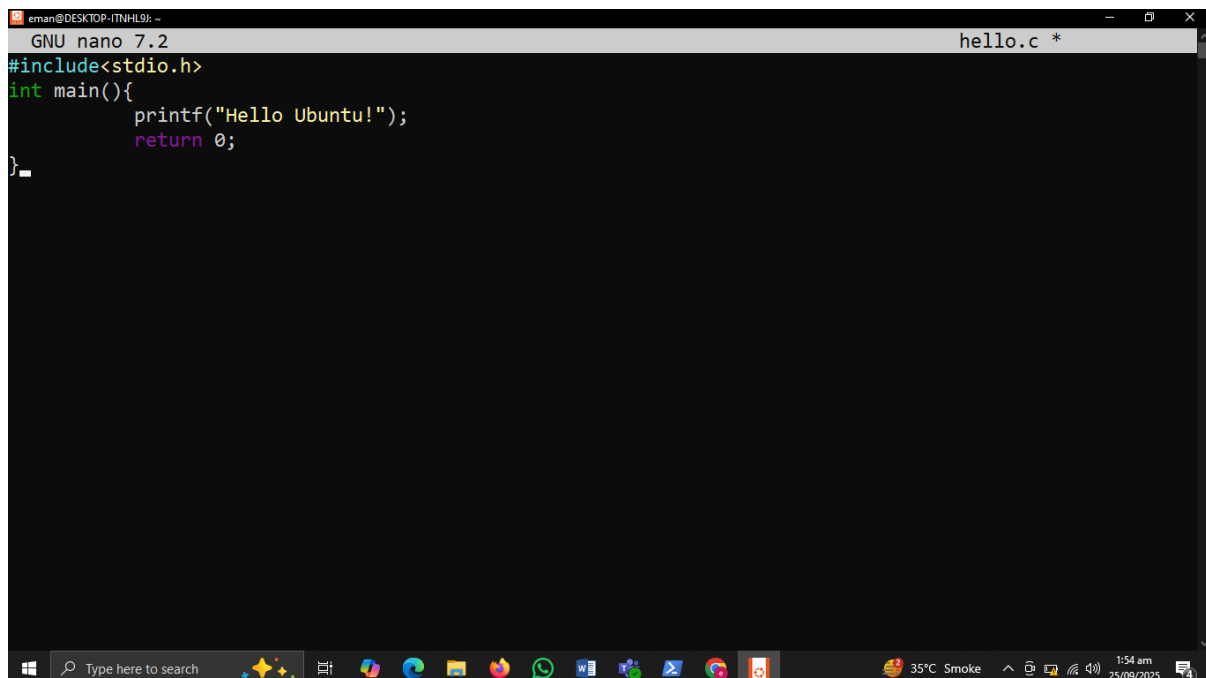
A terminal window titled 'eman@DESKTOP-ITNHL9J: ~' showing the output of the 'gcc --version' command. The output displays the GCC version as 13.3.0, the Ubuntu version as 13.3.0-6ubuntu2~24.04, and the copyright information for the Free Software Foundation, Inc. The prompt returns to 'eman@DESKTOP-ITNHL9J:~\$' after the command execution. The terminal window is part of a desktop environment with a taskbar at the bottom showing various application icons and system status information like '35°C Sunny' and the time '1:26 am 25/09/2025'.

```
eman@DESKTOP-ITNHL9J:~$ gcc --version
gcc (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
Copyright (C) 2023 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

eman@DESKTOP-ITNHL9J:~$
```

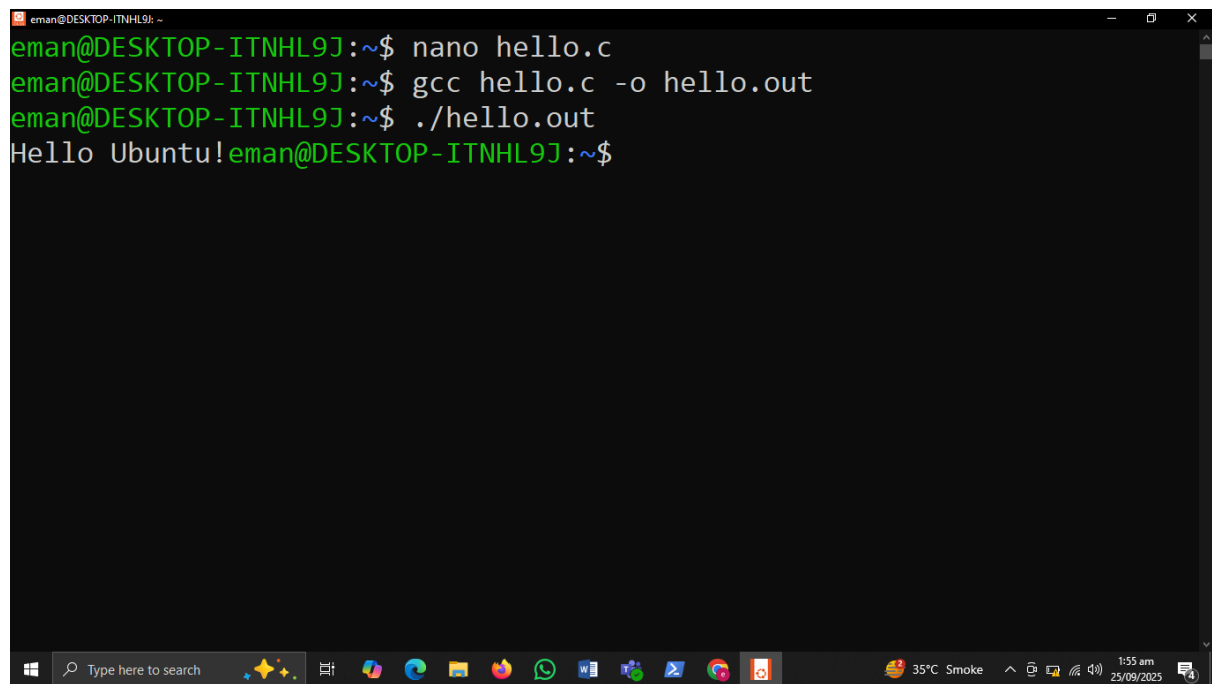
Step 2: How to run a C Program

The C source code (.c file).

A terminal window titled 'eman@DESKTOP-ITNHL9J: ~' showing the GNU nano 7.2 text editor editing a file named 'hello.c'. The code in the editor includes the standard input/output header, defines a main function, and uses printf to output 'Hello Ubuntu!'. The prompt returns to 'eman@DESKTOP-ITNHL9J:~\$' after the command execution. The terminal window is part of a desktop environment with a taskbar at the bottom showing various application icons and system status information like '35°C Smoke' and the time '1:54 am 25/09/2025'.

```
eman@DESKTOP-ITNHL9J: ~
GNU nano 7.2 hello.c *
#include<stdio.h>
int main(){
    printf("Hello Ubuntu!");
    return 0;
}
```

Screenshot of Execution:



The screenshot shows a Windows terminal window with a black background and green text. The window title bar indicates the user is 'eman' on a system named 'DESKTOP-ITNHL9J'. The terminal displays the following commands and output:

```
eman@DESKTOP-ITNHL9J:~$ nano hello.c
eman@DESKTOP-ITNHL9J:~$ gcc hello.c -o hello.out
eman@DESKTOP-ITNHL9J:~$ ./hello.out
Hello Ubuntu!eman@DESKTOP-ITNHL9J:~$
```

The Windows taskbar is visible at the bottom, showing the search bar, task view button, and several application icons including File Explorer, Microsoft Edge, and various utility programs. The system tray on the right shows the temperature as 35°C, a 'Smoke' alert, and the time as 1:55 am on 25/09/2025.