



IUS
INSTITUT
UNIVERSITAIRE
DES SCIENCES

Faculté des Sciences et Technologie

(FST)

Niveau : L3-FST

Systemes

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Systèmes d'exploitation Linux

Programmation Avancée avec Bash.

TD 9

Objectif :

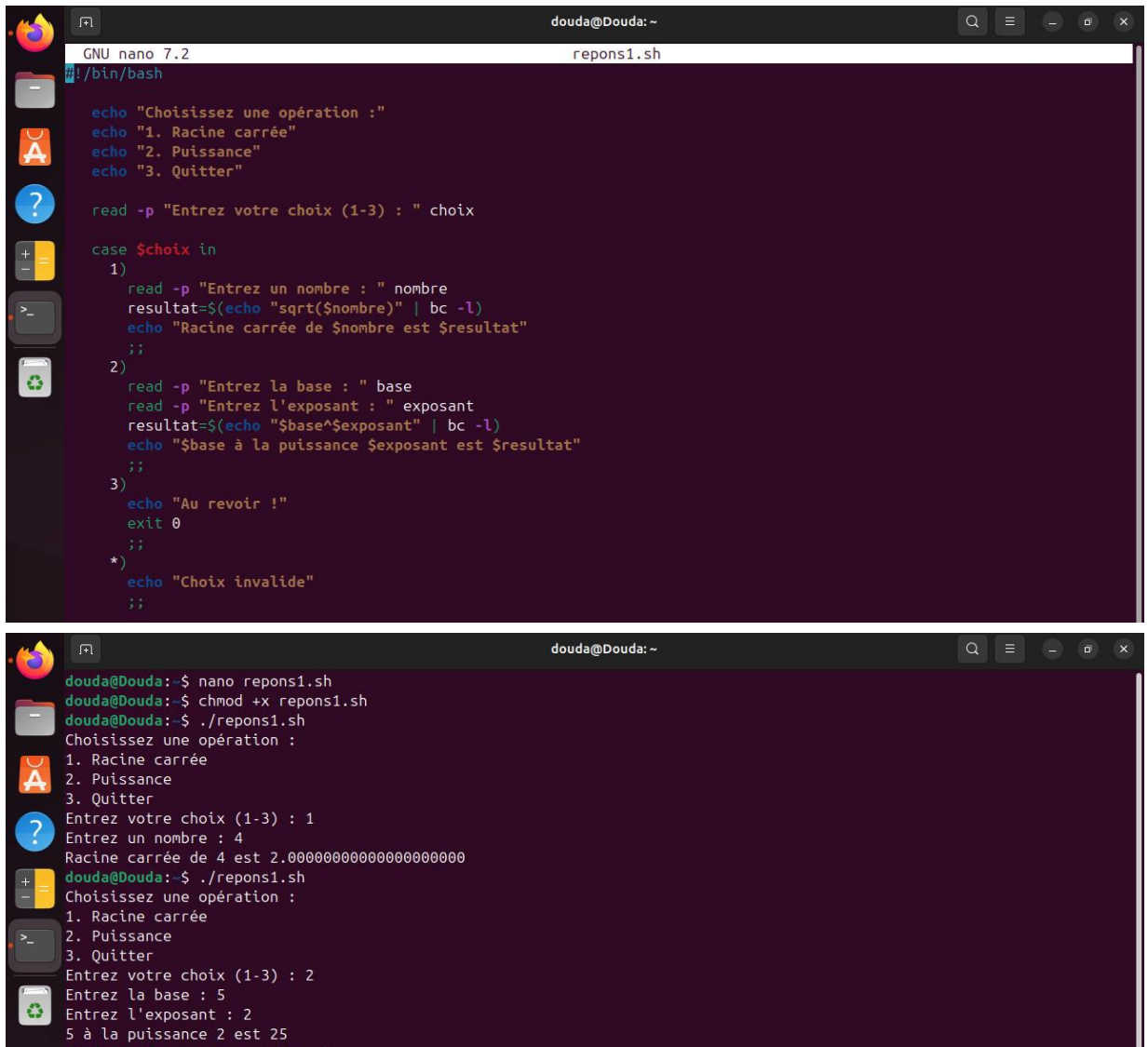
Ce TD explore les concepts avancés de programmation en Bash, tels que les fonctions, les opérations logiques, les graphes, et les bases de données.

Matériel Nécessaire :

- ♦ Un ordinateur avec Linux installé ou une machine virtuelle avec une distribution Linux (comme Ubuntu).
- ♦ Accès au terminal.
- ♦ Accès à Internet.

TD9

1. Créez un script avec un menu interactif permettant de choisir l'opération à effectuer (racine carrée, puissance, etc.).



The first screenshot shows the creation of a Bash script named `repons1.sh` using the `nano` editor. The script prompts the user to choose an operation (1. Racine carrée, 2. Puissance, 3. Quitter) and then performs the selected operation using `bc`.

```
GNU nano 7.2 repons1.sh
#!/bin/bash

echo "Choisissez une opération :"
echo "1. Racine carrée"
echo "2. Puissance"
echo "3. Quitter"

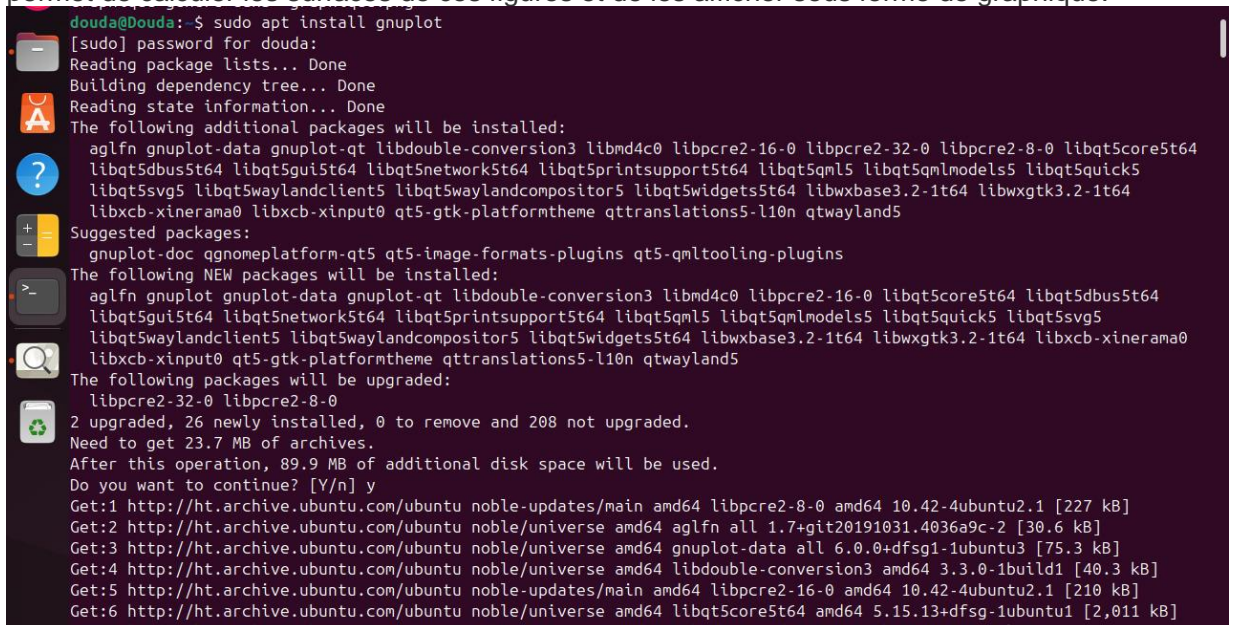
read -p "Entrez votre choix (1-3) : " choix

case $choix in
    1)
        read -p "Entrez un nombre : " nombre
        resultat=$(echo "sqrt($nombre)" | bc -l)
        echo "Racine carrée de $nombre est $resultat"
        ;;
    2)
        read -p "Entrez la base : " base
        read -p "Entrez l'exposant : " exposant
        resultat=$(echo "$base^$exposant" | bc -l)
        echo "$base à la puissance $exposant est $resultat"
        ;;
    3)
        echo "Au revoir !"
        exit 0
        ;;
    *)
        echo "Choix invalide"
        ;;
endcase
```

The second screenshot shows the execution of the script. The user enters '1' for the square root operation, then '4' for the number, resulting in '2.00000000000000000000'. Then the user enters '2' for the power operation, '5' for the base, and '2' for the exponent, resulting in '5 à la puissance 2 est 25'.

```
douda@Douda:~$ nano repons1.sh
douda@Douda:~$ chmod +x repons1.sh
douda@Douda:~$ ./repons1.sh
Choisissez une opération :
1. Racine carrée
2. Puissance
3. Quitter
Entrez votre choix (1-3) : 1
Entrez un nombre : 4
Racine carrée de 4 est 2.00000000000000000000
douda@Douda:~$ ./repons1.sh
Choisissez une opération :
1. Racine carrée
2. Puissance
3. Quitter
Entrez votre choix (1-3) : 2
Entrez la base : 5
Entrez l'exposant : 2
5 à la puissance 2 est 25
```

2. Créez un script Bash qui génère un graphique représentant les surfaces de figures géométriques simples (carré, trapèze, parallélogramme) à l'aide de `gnuplot`. Ce script permet de calculer les surfaces de ces figures et de les afficher sous forme de graphique.



The screenshot shows the installation of `gnuplot` using `sudo apt install gnuplot`. The terminal output lists the additional packages to be installed, including `aglfm`, `gnuplot-data`, `gnuplot-qt`, `libdouble-conversion3`, `libmd4c0`, `libpcre2-16-0`, `libpcre2-32-0`, `libpcre2-8-0`, `libqt5core5t64`, `libqt5dbus5t64`, `libqt5gui5t64`, `libqt5network5t64`, `libqt5printsupport5t64`, `libqt5qml5`, `libqt5qmlmodels5`, `libqt5quick5`, `libqt5svg5`, `libqt5waylandclient5`, `libqt5waylandcompositor5`, `libqt5widgets5t64`, `libwxbase3.2-1t64`, `libwxgtk3.2-1t64`, `libxcb-xinerama0`, `libxcb-xinput0`, `qt5-gtk-platformtheme`, `qttranslations5-l10n`, and `qtwayland5`. The installation is successful, and the terminal shows the need to get 23.7 MB of archives and 89.9 MB of additional disk space.

```
douda@Douda:~$ sudo apt install gnuplot
[sudo] password for douda:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  aglfm gnuplot-data gnuplot-qt libdouble-conversion3 libmd4c0 libpcre2-16-0 libpcre2-32-0 libpcre2-8-0 libqt5core5t64
  libqt5dbus5t64 libqt5gui5t64 libqt5network5t64 libqt5printsupport5t64 libqt5qml5 libqt5qmlmodels5 libqt5quick5
  libqt5svg5 libqt5waylandclient5 libqt5waylandcompositor5 libqt5widgets5t64 libwxbase3.2-1t64 libwxgtk3.2-1t64
  libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme qttranslations5-l10n qtwayland5
Suggested packages:
  gnuplot-doc qgnomeplatform-qt5 qt5-image-formats-plugins qt5-qmltooling-plugins
The following NEW packages will be installed:
  aglfm gnuplot gnuplot-data gnuplot-qt libdouble-conversion3 libmd4c0 libpcre2-16-0 libqt5core5t64 libqt5dbus5t64
  libqt5gui5t64 libqt5network5t64 libqt5printsupport5t64 libqt5qml5 libqt5qmlmodels5 libqt5quick5 libqt5svg5
  libqt5waylandclient5 libqt5waylandcompositor5 libqt5widgets5t64 libwxbase3.2-1t64 libwxgtk3.2-1t64 libxcb-xinerama0
  libxcb-xinput0 qt5-gtk-platformtheme qttranslations5-l10n qtwayland5
The following packages will be upgraded:
  libpcre2-32-0 libpcre2-8-0
2 upgraded, 26 newly installed, 0 to remove and 208 not upgraded.
Need to get 23.7 MB of archives.
After this operation, 89.9 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ht.archive.ubuntu.com/ubuntu noble-updates/main amd64 libpcre2-8-0 amd64 10.42-4ubuntu2.1 [227 kB]
Get:2 http://ht.archive.ubuntu.com/ubuntu noble/universe amd64 aglfm all 1.7+git20191031.4036a9c-2 [30.6 kB]
Get:3 http://ht.archive.ubuntu.com/ubuntu noble/universe amd64 gnuplot-data all 6.0.0+dfsg1-1ubuntu3 [75.3 kB]
Get:4 http://ht.archive.ubuntu.com/ubuntu noble/universe amd64 libdouble-conversion3 amd64 3.3.0-1build1 [40.3 kB]
Get:5 http://ht.archive.ubuntu.com/ubuntu noble-updates/main amd64 libpcre2-16-0 amd64 10.42-4ubuntu2.1 [210 kB]
Get:6 http://ht.archive.ubuntu.com/ubuntu noble/universe amd64 libqt5core5t64 amd64 5.15.13+dfsg-1ubuntu1 [2,011 kB]
Get:7 http://ht.archive.ubuntu.com/ubuntu noble/universe amd64 libmd4c0 amd64 0.4.8-1build1 [42.3 kB]
```

```
Feb 6 11:00 AM
douda@Douda: ~
GNU nano 7.2 repons2.sh
#!/bin/bash

# Calcul des surfaces
surface_carre() {
    echo "Entrez la longueur du côté du carré : "
    read cote
    surface=$((cote * cote | bc))
    echo "Surface du carré : $surface"
    echo "1 $surface" > data.txt
}

surface_trapeze() {
    echo "Entrez la longueur de la base 1 du trapèze : "
    read base1
    echo "Entrez la longueur de la base 2 du trapèze : "
    read base2
    echo "Entrez la hauteur du trapèze : "
    read hauteur
    surface=$((($base1 + $base2) * $hauteur / 2 | bc))
    echo "Surface du trapèze : $surface"
    echo "2 $surface" >> data.txt
}

surface_parallelogramme() {
    echo "Entrez la base du parallélogramme : "
    read base
    echo "Entrez la hauteur du parallélogramme : "
    read hauteur

```

```
Feb 6 11:01 AM
douda@Douda: ~
GNU nano 7.2 repons2.sh
    echo "Surface du trapèze : $surface"
    echo "2 $surface" >> data.txt
}

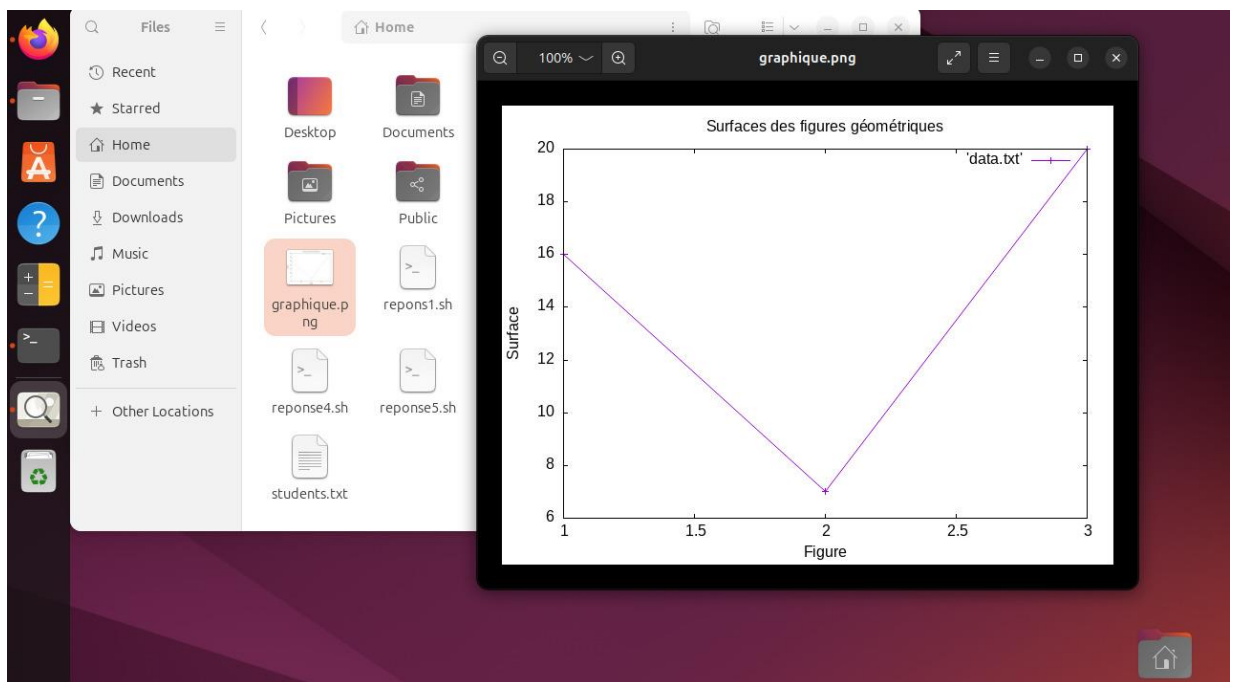
surface_parallelogramme() {
    echo "Entrez la base du parallélogramme : "
    read base
    echo "Entrez la hauteur du parallélogramme : "
    read hauteur
    surface=$((base * hauteur | bc))
    echo "Surface du parallélogramme : $surface"
    echo "3 $surface" >> data.txt
}

surface_carre
surface_trapeze
surface_parallelogramme

# Génération du graphique avec gnuplot
echo "set terminal png
set output 'graphique.png'
set title 'Surfaces des figures géométriques'
set xlabel 'Figure'
set ylabel 'Surface'
plot 'data.txt' with linespoints" | gnuplot

echo "Graphique généré dans 'graphique.png'"

douda@Douda:~$ ./repons2.sh
Entrez la longueur du côté du carré :
4
Surface du carré : 16
Entrez la longueur de la base 1 du trapèze :
3
Entrez la longueur de la base 2 du trapèze :
4
Entrez la hauteur du trapèze :
2
Surface du trapèze : 7
Entrez la base du parallélogramme :
5
Entrez la hauteur du parallélogramme :
4
Surface du parallélogramme : 20
Graphique généré dans 'graphique.png'
```



3. Créez un script Bash pour comparer deux nombres en utilisant ces opérateurs et affichez un message à la fin du script.

```

GNU nano 7.2                                repons3.sh
#!/bin/bash

read -p "Entrez le premier nombre : " nombre1
read -p "Entrez le deuxième nombre : " nombre2

if [ $nombre1 -gt $nombre2 ]; then
    echo "$nombre1 est plus grand que $nombre2"
elif [ $nombre1 -lt $nombre2 ]; then
    echo "$nombre1 est plus petit que $nombre2"
else
    echo "$nombre1 est égal à $nombre2"
fi

[ Read 12 lines ]

douda@douda:~$ nano repons3.sh
douda@douda:~$ chmod +x repons3.sh
douda@douda:~$ ./repons3.sh
Entrez le premier nombre : 12
Entrez le deuxième nombre : 43
12 est plus petit que 43
douda@douda:~$
  
```

4. Créez un script Bash pour résoudre une équation sous la forme

$$ax + b = 0$$


```
GNU nano 7.2                                repons4.sh
#!/bin/bash

read -p "Entrez la valeur de a : " a
read -p "Entrez la valeur de b : " b

if [ $a -eq 0 ]; then
    if [ $b -eq 0 ]; then
        echo "L'équation a une infinité de solutions."
    else
        echo "L'équation n'a pas de solution."
    fi
else
    x=$(echo "scale=2; -$b / $a" | bc)
    echo "La solution de l'équation est x = $x"
fi

^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location   M-U Undo      M-A Set Mark
^X Exit      ^R Read File  ^_ Replace    ^U Paste      ^J Justify    ^_ Go To Line M-E Redo      M-G Copy

douda@douda:~$ nano repons4.sh
douda@douda:~$ chmod +x repons4.sh
douda@douda:~$ ./repons4.sh
Entrez la valeur de a : 4
Entrez la valeur de b : 5
La solution de l'équation est x = -1.25
douda@douda:~$
```

5. Créez une base de données contenant des informations sur les voitures, y compris les marques, les numéros de plaques d'immatriculation et les informations sur les propriétaires. Vous pouvez utiliser SQL, PostgreSQL ou SQLite.

```
douda@douda:~$ sudo apt update
Warning: The unit file, source configuration file or drop-ins of apt-news.service changed on disk. Run 'systemctl daemon
-reload' to reload units.
Warning: The unit file, source configuration file or drop-ins of esm-cache.service changed on disk. Run 'systemctl daemo
n-reload' to reload units.
Get:1 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Hit:2 http://ht.archive.ubuntu.com/ubuntu noble InRelease
Get:3 http://ht.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:4 http://ht.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:5 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [616 kB]
Get:6 http://ht.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [853 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [8,988 B]
Get:8 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]
Get:9 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Packages [803 kB]
Get:10 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.0 kB]
Get:11 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]
Get:12 http://ht.archive.ubuntu.com/ubuntu noble-updates/main Translation-en [193 kB]

douda@douda:~$ sqlite3 --version
3.45.1 2024-01-30 16:01:20 e876e51a0ed5c5b3126f52e532044363a014bc594cfefa87ffb5b82257ccalt1 (64-bit)
douda@douda:~$ sqlite3 voitures.db
SQLite version 3.45.1 2024-01-30 16:01:20
Enter ".help" for usage hints.

douda@douda:~$ sudo apt install sqlite3
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libsqlite3-0
Suggested packages:
  sqlite3-doc
The following NEW packages will be installed:
  sqlite3
The following packages will be upgraded:
  libsqlite3-0
1 upgraded, 1 newly installed, 0 to remove and 218 not upgraded.
Need to get 845 kB of archives.
After this operation, 583 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ht.archive.ubuntu.com/ubuntu noble-updates/main amd64 libsqlite3-0 amd64 3.45.1-1ubuntu2.1 [701 kB]
Get:2 http://ht.archive.ubuntu.com/ubuntu noble-updates/main amd64 sqlite3 amd64 3.45.1-1ubuntu2.1 [144 kB]
Fetched 845 kB in 3s (247 kB/s)
(Reading database ... 149065 files and directories currently installed.)
Preparing to unpack .../libsqlite3-0_3.45.1-1ubuntu2.1_amd64.deb ...
Unpacking libsqlite3-0:amd64 (3.45.1-1ubuntu2.1) over (3.45.1-1ubuntu2) ...
Selecting previously unselected package sqlite3.
Preparing to unpack .../sqlite3_3.45.1-1ubuntu2.1_amd64.deb ...
Unpacking sqlite3 (3.45.1-1ubuntu2.1) ...
Setting up libsqlite3-0:amd64 (3.45.1-1ubuntu2.1) ...
Setting up sqlite3 (3.45.1-1ubuntu2.1) ...
```

```
sqlite> INSERT INTO voitures (marque, plaque_immatriculation, proprietaire) VALUES
('Toyota', 'AB-123-CD', 'Dominique Jameson'),
('Nissan', 'EF-456-GH', 'Badio Robaldo'),
('Ford', 'IJ-789-KL', 'Byron Naguiby Pierre');
sqlite> SELECT * FROM voitures;
1|Toyota|AB-123-CD|Dominique Jameson
2|Nissan|EF-456-GH|Badio Robaldo
3|Ford|IJ-789-KL|Byron Naguiby Pierre
sqlite>

sqlite>
CREATE TABLE voitures (
  id INTEGER PRIMARY KEY AUTOINCREMENT,
  marque TEXT NOT NULL,
  plaque_immatriculation TEXT NOT NULL,
  proprietaire TEXT NOT NULL
);

douda@douda:~$ sqlite3 --version
3.45.1 2024-01-30 16:01:20 e876e51a0ed5c5b3126f52e532044363a014bc594cfefa87ffb5b82257ccalt1 (64-bit)

douda@douda:~$ ls -la
total 152
drwxr-xr-x 12 douda douda 4096 Jan 30 16:01
-rw-r--r--  1 douda douda  100 Jan 30 16:01 data.txt
-rw-r--r--  1 douda douda  100 Jan 30 16:01 graphique.png
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse1.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse2.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse3.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse4.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse5.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse6.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse7.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse8.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 reponse9.sh
-rw-r--r--  1 douda douda  100 Jan 30 16:01 students.txt
-rw-r--r--  1 douda douda  100 Jan 30 16:01 voitures.db
-rw-r--r--  1 douda douda  100 Jan 30 16:01 voitures.db

sqlite> SELECT * FROM voitures;
1|Toyota|AB-123-CD|Dominique Jameson
2|Nissan|EF-456-GH|Badio Robaldo
3|Ford|IJ-789-KL|Byron Naguiby Pierre
sqlite>
```

6. Exécuter ces commandes

```
df -h
du -sh
free -h
ps aux
lspci
sudo apt install traceroute
traceroute google.com
netstat -tuln
ss -tuln
journalctl
journalctl -f
journalctl -b
journalctl -n 10
```

```
douda@douda:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs            1.1G  1.7M  1.1G   1% /run
/dev/sda2        49G   5.5G   41G  12% /
tmpfs            5.5G   0  5.5G   0% /dev/shm
tmpfs            5.0M  8.0K  5.0M   1% /run/lock
tmpfs            1.1G  184K  1.1G   1% /run/user/1000

douda@douda:~$ du -sh
151M

douda@douda:~$ free -h
              total        used        free      shared  buff/cache   available
Mem:           10Gi        2.4Gi        6.4Gi        62Mi       2.4Gi       8.5Gi
Swap:           0B           0B           0B
```

```

douda@douda:~$ ps aux
USER          PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.1  0.1 23248 14284 ?        Ss   06:44   0:20 /sbin/init splash
root           2  0.0  0.0      0     0 ?        S    06:44   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        S    06:44   0:00 [pool_workqueue_release]
root           4  0.0  0.0      0     0 ?        I<   06:44   0:00 [kworker/R-rcu_g]
root           5  0.0  0.0      0     0 ?        I<   06:44   0:00 [kworker/R-rcu_p]
root           6  0.0  0.0      0     0 ?        I<   06:44   0:00 [kworker/R-slub_]
root           7  0.0  0.0      0     0 ?        I<   06:44   0:00 [kworker/R-netns]
root          12  0.0  0.0      0     0 ?        I<   06:44   0:00 [kworker/R-mm_pe]
root          13  0.0  0.0      0     0 ?        I    06:44   0:00 [rcu_tasks_kthread]
root          14  0.0  0.0      0     0 ?        I    06:44   0:00 [rcu_tasks_rude_kthread]
root          15  0.0  0.0      0     0 ?        I    06:44   0:00 [rcu_tasks_trace_kthread]
root          16  0.0  0.0      0     0 ?        S    06:44   0:14 [ksoftirqd/0]
root          17  0.1  0.0      0     0 ?        I    06:44   0:31 [rcu_preempt]
root          18  0.0  0.0      0     0 ?        S    06:44   0:01 [migration/0]
root          19  0.0  0.0      0     0 ?        S    06:44   0:00 [idle_inject/0]
root          20  0.0  0.0      0     0 ?        S    06:44   0:00 [cpuhp/0]
root          21  0.0  0.0      0     0 ?        S    06:44   0:00 [cpuhp/1]
root          22  0.0  0.0      0     0 ?        S    06:44   0:00 [idle_inject/1]
root          23  0.0  0.0      0     0 ?        S    06:44   0:02 [migration/1]

douda@douda:~$ lspci
00:00.0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)
00:01.0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]
00:01.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)
00:02.0 VGA compatible controller: VMware SVGA II Adapter
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Service
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Controller (rev 01)
00:06.0 USB controller: Apple Inc. KeyLargo/Intrepid USB
00:07.0 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
00:0b.0 USB controller: Intel Corporation 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB2 EHCI Controller
00:0d.0 SATA controller: Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode] (rev 02)

douda@douda:~$ sudo apt install traceroute
[sudo] password for douda:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  traceroute
0 upgraded, 1 newly installed, 0 to remove and 218 not upgraded.
Need to get 60.5 kB of archives.
After this operation, 162 kB of additional disk space will be used.
Get:1 http://ht.archive.ubuntu.com/ubuntu/noble/universe amd64 traceroute amd64 1:2.1.5-1 [60.5 kB]
Fetched 60.5 kB in 1s (108 kB/s)
Selecting previously unselected package traceroute.
(Reading database ... 149071 files and directories currently installed.)
Preparing to unpack .../traceroute_1%3a2.1.5-1_amd64.deb ...
Unpacking traceroute (1:2.1.5-1) ...
Setting up traceroute (1:2.1.5-1) ...
update-alternatives: using /usr/bin/traceroute.db to provide /usr/bin/traceroute (traceroute) in auto mode
update-alternatives: using /usr/bin/traceroute6.db to provide /usr/bin/traceroute6 (traceroute6) in auto mode
update-alternatives: using /usr/bin/lft.db to provide /usr/bin/lft (lft) in auto mode
update-alternatives: using /usr/bin/traceproto.db to provide /usr/bin/traceproto (traceproto) in auto mode
update-alternatives: using /usr/sbin/tcpttraceroute.db to provide /usr/sbin/tcpttraceroute (tcpttraceroute) in auto mode
Processing triggers for man-db (2.12.0-4build2) ...

douda@douda:~$ traceroute google.com
traceroute to google.com (142.250.217.238), 30 hops max, 60 byte packets
 1  10.0.2.2 (10.0.2.2)  15.391 ms  14.007 ms  2.510 ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *

```



```
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *

douda@douda:~$ netstat -tuln
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 127.0.0.1:631          0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.1:5353         0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.54:53          0.0.0.0:*               LISTEN
tcp6       0      0 :::1:631               :::*                    LISTEN
udp        0      0 0.0.0.0:37946          0.0.0.0:*               *
udp        0      0 0.0.0.0:5353           0.0.0.0:*               *
udp        0      0 127.0.0.54:53          0.0.0.0:*               *
udp        0      0 127.0.0.53:53          0.0.0.0:*               *
udp6       0      0 :::5353                :::*                    *
udp6       0      0 :::34734                :::*                    *

douda@douda:~$ ss -tuln
Netid      State      Recv-Q     Send-Q       Local Address:Port      Peer Address:Port      Process
udp        UNCONN     0           0             0.0.0.0:37946          0.0.0.0:*
udp        UNCONN     0           0             0.0.0.0:5353           0.0.0.0:*
udp        UNCONN     0           0             127.0.0.54:53         0.0.0.0:*
udp        UNCONN     0           0             127.0.0.53%lo:53      0.0.0.0:*
udp        UNCONN     0           0             [::]:5353             [::]:*
udp        UNCONN     0           0             [::]:34734            [::]:*
tcp        LISTEN     0           4096          127.0.0.53%lo:53      0.0.0.0:*
tcp        LISTEN     0           4096          127.0.0.1:631         0.0.0.0:*
tcp        LISTEN     0           4096          127.0.0.54:53         0.0.0.0:*
tcp        LISTEN     0           4096          [::1]:631             [::]:*

douda@douda:~$ journalctl
Feb 05 21:24:11 Douda kernel: Linux version 6.8.0-52-generic (buildd@lcy02-amd64-046) (x86_64-linux-gnu-gcc-13 (Ubuntu >
Feb 05 21:24:11 Douda kernel: Command line: BOOT_IMAGE=/boot/vmlinuz-6.8.0-52-generic root=UUID=ddafe2cc-b834-4265-8742>
Feb 05 21:24:11 Douda kernel: KERNEL supported cpus:
Feb 05 21:24:11 Douda kernel: Intel GenuineIntel
Feb 05 21:24:11 Douda kernel: AMD AuthenticAMD
Feb 05 21:24:11 Douda kernel: Hygon HygonGenuine
Feb 05 21:24:11 Douda kernel: Centaur CentaurHauls
Feb 05 21:24:11 Douda kernel: zhaoxin Shanghai
Feb 05 21:24:11 Douda kernel: BIOS-provided physical RAM map:
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000000000000-0x000000000009fbff] usable
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x000000000009fc00-0x000000000009ffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000000f0000-0x00000000000fffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000000100000-0x00000000000dffff] usable
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000000dfff0000-0x0000000000dfffff] ACPI data
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000fec00000-0x00000000fec0ffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000fee00000-0x00000000fee0ffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000fffc0000-0x00000000ffffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000010000000-0x000000002f07ffff] usable
Feb 05 21:24:11 Douda kernel: NX (Execute Disable) protection: active
Feb 05 21:24:11 Douda kernel: APIC: Static calls initialized

douda@douda:~$ journalctl -f
Feb 06 12:26:58 Douda systemd[1]: Started packagekit.service - PackageKit Daemon.
Feb 06 12:27:01 Douda sudo[25874]: pam_unix(sudo:session): session closed for user root
Feb 06 12:29:11 Douda pkexec[26128]: pam_unix(polkit-1:session): session opened for user root(uid=0) by douda(uid=1000)
Feb 06 12:29:11 Douda pkexec[26128]: douda: Executing command [USER=root] [TTY=unknown] [CWD=/home/douda] [COMMAND=/usr/
lib/update-notifier/package-system-locked]
Feb 06 12:30:01 Douda CRON[26176]: pam_unix(cron:session): session opened for user root(uid=0) by root(uid=0)
Feb 06 12:30:01 Douda CRON[26177]: (root) CMD ([ -x /etc/init.d/anacron ] && if [ ! -d /run/systemd/system ]; then /usr/
sbin/invoke-rc.d anacron start >/dev/null; fi)
Feb 06 12:30:01 Douda systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
Feb 06 12:30:01 Douda CRON[26176]: pam_unix(cron:session): session closed for user root
Feb 06 12:30:01 Douda systemd[1]: sysstat-collect.service: Deactivated successfully.
Feb 06 12:30:01 Douda systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
Feb 06 12:37:28 Douda systemd-resolved[369]: Clock change detected. Flushing caches.

douda@douda:~$ journalctl -b
Feb 05 21:24:11 Douda kernel: Linux version 6.8.0-52-generic (buildd@lcy02-amd64-046) (x86_64-linux-gnu-gcc-13 (Ubuntu >
Feb 05 21:24:11 Douda kernel: Command line: BOOT_IMAGE=/boot/vmlinuz-6.8.0-52-generic root=UUID=ddafe2cc-b834-4265-8742>
Feb 05 21:24:11 Douda kernel: KERNEL supported cpus:
Feb 05 21:24:11 Douda kernel: Intel GenuineIntel
Feb 05 21:24:11 Douda kernel: AMD AuthenticAMD
Feb 05 21:24:11 Douda kernel: Hygon HygonGenuine
Feb 05 21:24:11 Douda kernel: Centaur CentaurHauls
Feb 05 21:24:11 Douda kernel: zhaoxin Shanghai
Feb 05 21:24:11 Douda kernel: BIOS-provided physical RAM map:
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000000000000-0x000000000009fbff] usable
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x000000000009fc00-0x000000000009ffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000000f0000-0x00000000000fffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000000100000-0x00000000000dffff] usable
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000000dfff0000-0x0000000000dfffff] ACPI data
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000fec00000-0x00000000fec0ffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000fee00000-0x00000000fee0ffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x00000000fffc0000-0x00000000ffffff] reserved
Feb 05 21:24:11 Douda kernel: BIOS-e820: [mem 0x0000000010000000-0x000000002f07ffff] usable
Feb 05 21:24:11 Douda kernel: NX (Execute Disable) protection: active
Feb 05 21:24:11 Douda kernel: APIC: Static calls initialized
Feb 05 21:24:11 Douda kernel: SMBIOS 2.5 present.
Feb 05 21:24:11 Douda kernel: DMI: innotek GmbH VirtualBox/VirtualBox, BIOS VirtualBox 12/01/2006
Feb 05 21:24:11 Douda kernel: Hypervisor detected: KVM
```

```
douda@douda:~$ journalctl -n 10
Feb 06 12:29:11 Douda pkexec[26128]: pam_unix(polkit-1:session): session opened for user root(uid=0) by douda(uid=1000)
Feb 06 12:29:11 Douda pkexec[26128]: douda: Executing command [USER=root] [TTY=unknown] [CWD=/home/douda] [COMMAND=/usr
Feb 06 12:30:01 Douda CRON[26176]: pam_unix(cron:session): session opened for user root(uid=0) by root(uid=0)
Feb 06 12:30:01 Douda CRON[26177]: (root) CMD ([ -x /etc/init.d/anacron ] && if [ ! -d /run/systemd/system ]; then /usr
Feb 06 12:30:01 Douda systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
Feb 06 12:30:01 Douda CRON[26176]: pam_unix(cron:session): session closed for user root
Feb 06 12:30:01 Douda systemd[1]: sysstat-collect.service: Deactivated successfully.
Feb 06 12:30:01 Douda systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
Feb 06 12:37:28 Douda systemd-resolved[369]: Clock change detected. Flushing caches.
Feb 06 12:37:28 Douda systemd[1]: anacron.service - Run anacron jobs was skipped because of an unmet condition check (C
```

Conclusion

À travers ce TD, j'ai exploré des compétences essentielles en scripting Bash, en gestion de bases de données, et en utilisation de commandes système. Je sais désormais :

- Créer des scripts interactifs pour des opérations mathématiques ou des comparaisons.
- Générer des graphiques avec gnuplot pour visualiser des données.
- Résoudre des équations mathématiques simples via l'automatisation.
- Structurer une base de données SQL pour stocker et gérer des informations.
- Utiliser des commandes système avancées pour analyser les ressources, les processus, et le réseau.