

NVIDIA, NASDAQ:NVDA

NVIDIA belongs to the “integrated circuit and semiconductor” segment of the electronic information industry, with a primary focus on integrated circuit design, artificial intelligence, high-performance computing, graphics processing, and gaming technology. Known for pioneering the development of GPUs (graphics processing units), NVIDIA has become a leader in high-performance computing, with its GPUs widely used not only in gaming but also in AI, machine learning, and data centers for computationally intensive tasks. The company’s innovations in parallel computing and AI have positioned it as a critical player in the development of advanced computing systems, driving advancements in autonomous vehicles, scientific research, and cloud computing.

Revenue: \$60.9 billion in Fiscal 2024

Profit: \$33 billion in Fiscal 2024

Market Value: \$3.57 trillion at Nov.7th, 2024

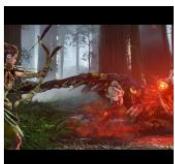
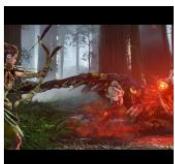
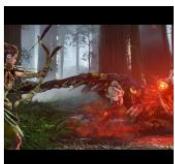
Business Overview																													
Fiscal 2024 was an extraordinary year. Revenue increased 126% year on year to \$60.9 billion on the strength of Data Center revenue, driven by higher shipments of the NVIDIA Hopper GPU computing platform for the training and inference of LLMs, recommendation engines and generative AI applications, as well as higher shipments of InfiniBand. Gross margin increased year on year to 72.7%. We drove strong operating leverage as operating income increased 681% year on year to \$33.0 billion and diluted earnings per share increased 586% year on year to \$11.93.																													
Fiscal 2024 Results																													
<table><thead><tr><th>Revenue</th><th>Gross Margin</th><th>Operating Income</th><th>Diluted Earnings Per Share</th></tr></thead><tbody><tr><td>\$60.9 billion</td><td>72.7%</td><td>\$33.0 billion</td><td>\$11.93</td></tr><tr><td>up 126% year on year</td><td>up 15.8 points year on year</td><td>up 681% year on year</td><td>up 586% year on year</td></tr></tbody></table>					Revenue	Gross Margin	Operating Income	Diluted Earnings Per Share	\$60.9 billion	72.7%	\$33.0 billion	\$11.93	up 126% year on year	up 15.8 points year on year	up 681% year on year	up 586% year on year													
Revenue	Gross Margin	Operating Income	Diluted Earnings Per Share																										
\$60.9 billion	72.7%	\$33.0 billion	\$11.93																										
up 126% year on year	up 15.8 points year on year	up 681% year on year	up 586% year on year																										
Fiscal 2024 Reportable Segments																													
Our two reportable segments are “Compute & Networking” and “Graphics”:																													
<table><thead><tr><th></th><th>Compute & Networking</th><th>Graphics</th><th>All Other*</th><th>Consolidated</th></tr></thead><tbody><tr><td>Revenue</td><td>\$47.4 billion</td><td>\$13.5 billion</td><td>—</td><td>\$60.9 billion</td></tr><tr><td></td><td>up 215% year on year</td><td>up 14% year on year</td><td></td><td>up 126% year on year</td></tr><tr><td>Operating Income (Loss)</td><td>\$32.0 billion</td><td>\$5.8 billion</td><td>\$(4.9) billion</td><td>\$33.0 billion</td></tr><tr><td></td><td>up 530% year on year</td><td>up 28% year on year</td><td>down 10% year on year</td><td>up 681% year on year</td></tr></tbody></table>						Compute & Networking	Graphics	All Other*	Consolidated	Revenue	\$47.4 billion	\$13.5 billion	—	\$60.9 billion		up 215% year on year	up 14% year on year		up 126% year on year	Operating Income (Loss)	\$32.0 billion	\$5.8 billion	\$(4.9) billion	\$33.0 billion		up 530% year on year	up 28% year on year	down 10% year on year	up 681% year on year
	Compute & Networking	Graphics	All Other*	Consolidated																									
Revenue	\$47.4 billion	\$13.5 billion	—	\$60.9 billion																									
	up 215% year on year	up 14% year on year		up 126% year on year																									
Operating Income (Loss)	\$32.0 billion	\$5.8 billion	\$(4.9) billion	\$33.0 billion																									
	up 530% year on year	up 28% year on year	down 10% year on year	up 681% year on year																									
* Includes expenses not assigned to either Compute & Networking or Graphics.																													
Fiscal 2024 Market Platforms																													
Our platforms address four large markets where our expertise is critical:																													
<table><tbody><tr><td></td><td></td><td></td><td></td></tr><tr><td>Data Center</td><td>Gaming</td><td>Professional Visualization</td><td>Automotive</td></tr><tr><td>\$47.5 billion revenue</td><td>\$10.4 billion revenue</td><td>\$1.6 billion revenue</td><td>\$1.1 billion revenue</td></tr><tr><td>up 217% year on year</td><td>up 15% year on year</td><td>up 1% year on year</td><td>up 21% year on year</td></tr></tbody></table>									Data Center	Gaming	Professional Visualization	Automotive	\$47.5 billion revenue	\$10.4 billion revenue	\$1.6 billion revenue	\$1.1 billion revenue	up 217% year on year	up 15% year on year	up 1% year on year	up 21% year on year									
																													
Data Center	Gaming	Professional Visualization	Automotive																										
\$47.5 billion revenue	\$10.4 billion revenue	\$1.6 billion revenue	\$1.1 billion revenue																										
up 217% year on year	up 15% year on year	up 1% year on year	up 21% year on year																										

Fig1. NVIDIA-Fiscal-Year-2024-Annual-Report P24



Fig2. Google-Financial NVDA

Qualcomm, NASDAQ:QCOM

Qualcomm belongs to the integrated circuit design and manufacturing in the electronic information industry classification. Its main business is the development and manufacture of chipsets for wireless communication and mobile computing, especially system-on-chips (SoCs) used in smartphones, tablets and other devices, as well as chips related to 5G communication technology. Qualcomm has strong technological innovation capabilities and core patents in the fields of communication protocols, modems and mobile processors, especially in the formulation of 4G and 5G standards. It is widely regarded as the world's leading supplier of chips and communications technologies.

Revenue: \$35.8 billion in Fiscal 2023

Profit: \$7.2 billion in Fiscal 2023

Market Value: \$192.711 billion at Nov.7th, 2024

Fiscal 2023 Overview

Revenues were \$35.8 billion, a decrease of 19% compared to revenues of \$44.2 billion in fiscal 2022, with net income of \$7.2 billion, a decrease of 44% compared to net income of \$12.9 billion in fiscal 2022. Key items from fiscal 2023 included:

- Revenues were negatively impacted by the weakness in the macroeconomic environment (which negatively impacted consumer demand for smartphones and other devices that incorporate our products and technologies) and our customers drawing down on their inventory (which were at elevated levels).
- QCT revenues decreased by 19% in fiscal 2023 compared to the prior year, primarily due to lower handset and IoT revenues.
- QTL revenues decreased by 17% in fiscal 2023 compared to the prior year.
- We recorded other expenses of \$862 million in fiscal 2023, primarily related to restructuring and restructuring-related charges, compared to a \$1.1 billion benefit recorded to other income in fiscal 2022 resulting from the 2018 European Commission (EC) fine reversal.
- Our effective income tax rate was 1% in fiscal 2023 compared to 13% in the prior year, reflecting certain additional foreign-derived intangible income (FDII) deductions in fiscal 2023.

Fig3. Qualcomm-Fiscal-Year-2023-Annual-Report P40



Fig4. Google-Financial QCOM

Texas Instruments, NASDAQ:TXN

Texas Instruments belongs to the design and manufacture of integrated circuits in the electronic information industry classification, and its core business is the design and production of analog semiconductors and embedded processors, which are widely used in industrial, automotive, consumer electronics, communications and other fields. TI's products mainly include analog chips and microcontrollers, which are typical representatives of integrated circuits and have a wide range of applications in power management, signal amplification, data conversion, sensing, etc. In addition, TI not only designs integrated circuits, but also has complete manufacturing capabilities, with its own wafer manufacturing and packaging and testing plants, which makes it occupy an important position in the global integrated circuit industry chain.

Revenue: \$17.52 billion in Fiscal 2023

Profit: \$6.51 billion in Fiscal 2023

Market Value: \$196.099 billion at Nov.7th, 2024

Details of financial results – 2023 compared with 2022

Revenue of \$17.52 billion decreased \$2.51 billion, or 12.5%, primarily due to lower revenue from Analog, partially offset by higher revenue from Embedded Processing.

Gross profit of \$11.02 billion was down \$2.75 billion, or 20.0%, primarily due to lower revenue and, to a lesser extent, higher manufacturing costs associated with planned capacity expansion and reduced factory loadings. As a percentage of revenue, gross profit decreased to 62.9% from 68.8%.

Operating expenses (R&D and SG&A) were \$3.69 billion compared with \$3.37 billion. This increase was primarily due to higher employee-related costs as we invest to strengthen our competitive advantages.

Restructuring charges/other in the year-ago period was \$257 million due to preproduction costs at our Lehi, Utah, manufacturing facility. These costs transitioned primarily to cost of revenue after production began in December 2022. See Note 11 to the financial statements.

Operating profit was \$7.33 billion, or 41.8% of revenue, compared with \$10.14 billion, or 50.6% of revenue.

Other income and expense (OI&E) was \$440 million of income compared with \$106 million of income, due to higher interest income. See Note 11 to the financial statements.

Interest and debt expense of \$353 million increased \$139 million due to the issuance of additional long-term debt. See Note 8 to the financial statements.

Our provision for income taxes was \$908 million compared with \$1.28 billion. This decrease was due to lower income before income taxes. Our effective tax rate, which includes discrete tax items, was 12.2% in 2023 compared with 12.8% in 2022. See Note 4 to the financial statements for a reconciliation of the U.S. statutory corporate tax rate to our effective tax rate.

Net income was \$6.51 billion compared with \$8.75 billion. EPS was \$7.07 compared with \$9.41.

Fig5. Texas-Instruments-Fiscal-Year-2023-Annual-Report P20



Fig6. Google-Financial TXN

Luxshare Precision Industry, SHE: 002475

Luxshare Precision belongs to the electronic information industry in the electronic components manufacturing, its core business is the design and production of connectors, precision components, wireless charging modules and acoustic devices, these products are widely used in consumer electronics, communication equipment and automotive electronics. Luxshare Precision focuses on providing key components and assembly services for large technology companies, and is the world's leading connector supplier, so it occupies an important position in the field of electronic component manufacturing.

Revenue: ¥231.9 billion in Fiscal 2023

Profit: ¥10.95 billion in Fiscal 2023

Market Value: ¥312.172 billion at Nov.7th, 2024

	2023	2022	Y/Y % Change	2021
Operating income (RMB)	231,905,459,829.83	214,028,394,291.44	8.35%	153,946,097,790.40
Net profit attributable to shareholders of the listed company (RMB)	10,952,656,702.16	9,163,104,849.54	19.53%	7,070,520,386.57
Net profit attributable to shareholders of the listed company after deduction of non-recurring gain or loss (RMB)	10,185,553,553.99	8,442,052,945.85	20.65%	6,015,597,220.13
Net cash flow from operating activities (RMB)	27,605,060,411.16	12,727,610,319.34	116.89%	7,284,766,917.00
Basic earnings per share (RMB/share)	1.54	1.29	19.38%	1.01
Diluted earnings per (RMB/share)	1.53	1.28	19.53%	0.99
Weighted average return on equity	21.61%	23.00%	Decrease by 1.39 percentage points	22.35%
	December 31, 2023	December 31, 2022	Y/Y % Change	December 31, 2021
Total assets (RMB)	161,992,099,595.65	148,384,319,074.71	9.17%	120,572,098,167.88
Net assets attributable to shareholders of the listed company (RMB)	56,310,184,510.60	45,342,897,318.53	24.19%	35,288,554,748.72

Fig7. LUXSHARE-ICT-Fiscal-Year-2023-Annual-Report P8



Fig6. Google-Financial 002475

LONGCHEER, SHA: 603341

LONGCHEER focuses on the R&D, design and manufacturing of smart products, and has deep technical accumulation and extensive market layout in many smart product fields such as smart phones, tablet computers, AI PCs, AloT devices and automotive electronics, and has grown into a leading provider of smart products and services in the world. It belongs to the intelligent hardware and communication equipment manufacturing in the electronic information industry classification, especially in the field of intelligent hardware, involving the research and development and manufacturing of terminal equipment such as smart phones and tablet computers; In the field of communication equipment manufacturing, it covers wireless communication equipment and Internet of Things devices.

Revenue: ¥27.185 billion in Fiscal 2023

Profit: ¥605.3 million in Fiscal 2023

Market Value: ¥20.515 billion at Nov.8th, 2024

主要会计 数据	2023年	2022年		本期比上期 同期增减(%)	2021年	
		调整后	调整前		调整后	调整前
营业收入	27,185,064,077.92	29,343,151,526.41	29,343,151,526.41	-7.35	24,595,817,485.02	24,595,817,485.02
归属于上市公司股东的净利润	605,316,650.64	561,299,976.65	560,498,015.81	7.84	546,943,108.18	547,025,083.95
归属于上市公司股东的扣除非经常性损益的净利润	525,644,355.65	501,853,992.82	501,052,031.98	4.74	366,074,650.22	366,156,625.99
经营活动产生的现金流量净额	1,466,228,448.17	1,470,988,554.26	1,470,988,554.26	-0.32	1,262,174,176.31	1,262,174,176.31
	2023年末	2022年末		本期末比上 年同期末增 减(%)	2021年末	
		调整后	调整前		调整后	调整前
归属于上市公司股东的净资产	3,825,257,838.74	3,156,083,283.00	3,155,363,297.93	21.20	2,943,695,603.54	2,943,777,579.31
总资产	19,838,899,555.68	14,530,474,403.78	14,509,336,562.15	36.53	14,908,068,029.76	14,885,950,242.41

Fig9. LONGCHEER-Fiscal-Year-2023-Annual-Report P7



Fig10. Google-Financial 603341

ZTE, SHE: 000063

ZTE Corporation belongs to the field of communication equipment and network technology solutions in the electronic information industry. It is mainly engaged in the research and development, production and sales of communications equipment, including wireless base stations, routers, switches, fiber optic equipment, etc., for the construction and maintenance of telecommunications networks. In addition, ZTE provides comprehensive solutions including 5G, cloud computing, big data, artificial intelligence and other technologies to promote the convergence and innovation of information technology, covering a wide range of directions such as communication equipment, information technology and terminal equipment.

Revenue: ¥124.25 billion in Fiscal 2023

Profit: ¥9.325 billion in Fiscal 2023

Market Value: ¥140.093 billion at Nov.8th, 2024

项目	2023 年	2022 年	同比增减	2021 年
经营业绩				
营业收入	124,250.9	122,954.4	1.05%	114,521.6
归属于上市公司普通股股东的净利润	9,325.8	8,080.3	15.41%	6,812.9
归属于上市公司普通股股东的扣除非经常性损益的净利润	7,399.6	6,166.9	19.99%	3,305.9
经营活动产生的现金流量净额	17,405.7	7,577.7	129.70%	15,723.5
规模				
资产总额	200,958.3	180,953.6	11.06%	168,763.4
负债总额	132,626.9	121,410.4	9.24%	115,475.8
归属于上市公司普通股股东的所有者权益	68,008.3	58,641.2	15.97%	51,482.1

Fig11. ZTE-Fiscal-Year-2023-Annual-Report P10



Fig12. Google-Financial 000063

EDA

The core business of the EDA (Electronic Design Automation) industry is to provide electronic engineers and designers with **a variety of software tools to help them design and develop electronic products**, especially integrated circuits (IC), printed circuit boards (PCB), and system-on-chips (SoC). EDA tools can be used for designing circuit diagrams, simulating and verifying circuit functionality, generating physical layouts, and testing the reliability of a product design etc. With the continuous development of electronic products, especially in the field of mobile communications, computers, automotive electronics and consumer electronics, electronic design has become more and more complex, and the demand and application of EDA software has increased.

The core functions of EDA tools include:

Design automation: EDA tools can automatically generate the layout and design of the circuit, reducing the workload of hand-drawn drawings and improving design efficiency.

Verification and Simulation: In the design phase, EDA tools can simulate and verify the circuit to ensure the functional correctness of the circuit and the manufacturability of the design to avoid design defects leading to costly errors.

Layout and Optimization: EDA tools also provide physical design and layout functions to help designers optimize the layout of the board based on chip size, power consumption, thermal distribution and other requirements.

Test and production support: The final design can be tested with EDA tools to ensure product quality and provide final design data for production.

With the rapid development of technologies such as 5G, artificial intelligence, and autonomous driving, the demand for EDA market is increasing, especially the design of high-performance computing and high-density integrated circuits (e.g., AI chips, GPUs, etc.) requires more advanced EDA technologies.

Synopsys(新思科技): Founded in 1986 and headquartered in California, Synopsys is one of the world's largest EDA software companies. Synopsys' main products are related to digital IC design, analog design, verification, test, software security, IP core, and a variety of automation tools in the semiconductor manufacturing process. Synopsys has a wide range of services for Synopsys serves a wide range of semiconductor companies, automotive, communications, and consumer electronics industries, and is a key partner to many of the world's leading technology companies. Its main products include **Design Compiler** (synthesis tools), **HSPICE** (analog simulation tools), **Verilog/SystemVerilog** (hardware description language) and so on.

Revenue: \$1.526 billion in Fiscal Quarter 2024 Q3

Profit: \$535.5 million in Fiscal Quarter 2024 Q3



Solutions Products Support News Company

Search

Contact Sales

Our Mission Is to Power Innovation Today to Ignite the Ingenuity of Tomorrow

Three major technology trends—artificial intelligence, silicon proliferation, and software-defined systems—are shaping a new era of pervasive intelligence. For years, Synopsys has been a driving force of these trends, delivering the silicon to systems design solutions that have been essential to enabling them.

Synopsys is a valued partner for global silicon to systems design across a wide range of vertical markets, empowering technology innovators everywhere with the industry's most comprehensive and trusted solutions.

Autonomous machines. Data centers. Billions of smart, connected technologies. The innovations we are powering today are helping to ignite the ingenuity of tomorrow.

Our Technology. Your Innovation™

35+

years in business

\$5+ billion

annual revenue

19,000+

employees



Fig 13. SYNOPSYS

- Record quarterly revenue of \$1.526 billion, up approximately 13% year over year.
- Quarterly GAAP earnings per diluted share of \$2.73; non-GAAP earnings per diluted share of \$3.43, up approximately 27% year over year and exceeding guidance.
- Expecting record full-year revenue with growth of approximately 15% driven by continued, strong execution and business momentum.

GAAP Results

On a U.S. generally accepted accounting principles (GAAP) basis, net income for the third quarter of fiscal year 2024 was \$425.9 million, or \$2.73 per diluted share, compared to \$335.7 million, or \$2.17 per diluted share, for the third quarter of fiscal year 2023.

Non-GAAP Results

On a non-GAAP basis, net income for the third quarter of fiscal year 2024 was \$535.5 million, or \$3.43 per diluted share, compared to non-GAAP net income of \$419.0 million, or \$2.70 per diluted share, for the third quarter of fiscal year 2023.

Fig 14. SYNOPSYS-Fiscal-Quarter-2024-Q3-Report

Cadence(楷登电子): Cadence was founded in 1988, located in California, is also one of the world's leading EDA companies. Cadence's products include integrated circuit design, verification, PCB design, system-level design and other aspects of the software tools. Cadence special emphasis on integrated circuits in the whole process of design, including front-end design (such as logic design and verification), the back-end design (such as

physical design, layout, system-level design). Cadence's main products include **Allegro** (PCB design tools), **Virtuoso** (analog design tools), **Incisive** (verification tools), etc. Cadence is a leading provider of software tools for IC design, PCB design, and system-level design.

Revenue: \$1.215 billion in Fiscal Quarter 2024 Q3

Profit: \$352 million in Fiscal Quarter 2024 Q3

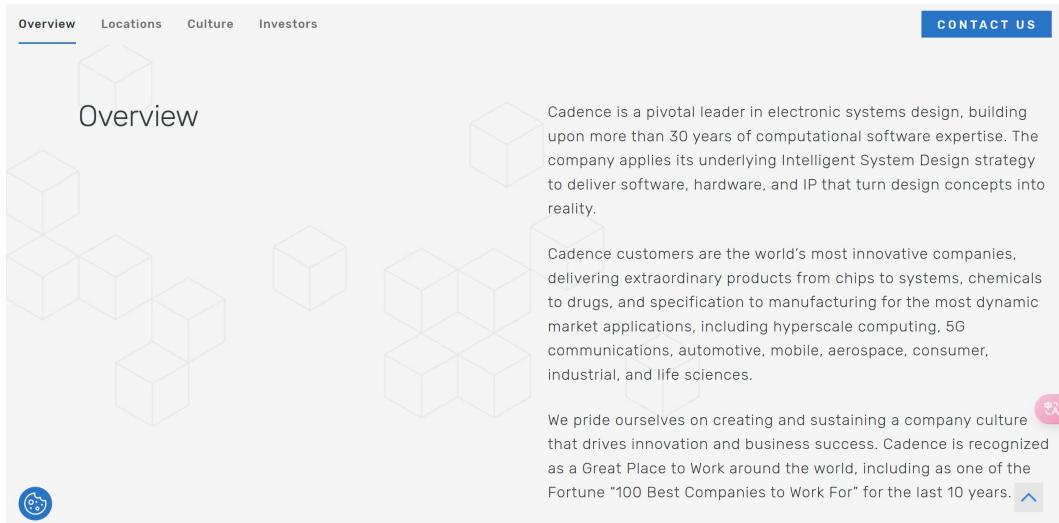


Fig 15. CANDENCE

Third Quarter 2024 Financial Results

- Revenue of \$1.215 billion, compared to revenue of \$1.023 billion in Q3 2023
- GAAP operating margin of 29%, compared to 29% in Q3 2023
- Non-GAAP operating margin of 45%, compared to 41% in Q3 2023
- GAAP diluted net income per share of \$0.87, compared to \$0.93 in Q3 2023
- Non-GAAP diluted net income per share of \$1.64, compared to \$1.26 in Q3 2023
- Quarter-end backlog was \$5.6 billion and current remaining performance obligations ("cRPO"), contract revenue expected to be recognized as revenue in the next 12 months, was \$2.9 billion

Fig 16. CANDANCE-Fiscal-Quarter-2024-Q3-Report

Shell Programming

Write a shell script (using vi or other editors you like) that displays the following menu and prompts for one-character input to invoke a menu option, as shown.

- a. List all files in the present working directory
- b. Display today's date and time
- c. Display whether a file is a "simple" file or a "directory"
- d. Create a backup for a file using "tar" command
- e. Compress the tar file
- f. Start an ftp session
- g. Start your LED control program
- x. Exit

echo "a. List all files in the present working directory"

case \$choice in

 a) ls -la ;;

ls can list the files, -l use long listing format, -a show all files, including hidden files.

The screenshot shows a MobaXterm terminal window titled 'pi@raspberrypi:~ \$./menu.sh'. The terminal displays a menu of options:

```
pi@raspberrypi:~ $ ./menu.sh
Menu:
a. List all files in the present working directory
b. Display today's date and time
c. Display whether a file is a 'simple' file or a 'directory'
d. Create a backup for a file using 'tar' command
e. Compress the tar file
f. Start an ftp session
g. Start your LED control program
h. Check disk usage
i. Display network configuration
j. Search for a keyword in files
x. Exit

Enter option: a
```

The terminal then lists all files in the current directory using the command 'ls -la'.

```
total 91280
drwx----- 19 pi  pi  4096 Nov  7 23:08 .
drwxr-xr-x  3 root root  4096 Jul  4 08:27 ..
-rw----- 1 pi  pi  6301 Nov  7 22:50 .bash_history
-rw-r--r-- 1 pi  pi  220 Jul  4 08:06 .bash_logout
-rw-r--r-- 1 pi  pi  3523 Jul  4 08:06 .bashrc
drwxr-xr-x  2 pi  pi  4096 Jul  4 08:13 Bookshelf
-rw-r--r-- 1 pi  pi  356 Oct  3 20:05 breath.py
drwx----- 9 pi  pi  4096 Oct  3 21:36 .cache
-rw-r--r-- 1 pi  pi  93183322 Sep 22 22:47 code_1.93.1-1726078001_armhf.deb
drwx----- 15 pi  pi  4096 Oct  3 21:36 .config
drwxr-xr-x  2 pi  pi  4096 Sep 18 20:43 Desktop
drwxr-xr-x  2 pi  pi  4096 Jul  4 08:27 Documents
drwxr-xr-x  2 pi  pi  4096 Sep 22 22:48 Downloads
drwx----- 4 pi  pi  4096 Nov  7 21:59 .gnupg
-rw-r--r-- 1 pi  pi  259 Oct  3 20:28 input_led.py
-rw-r--r-- 1 pi  pi  361 Nov  6 20:32 led_control.py
-rw-r--r-- 1 pi  pi  1314 Sep 25 20:24 led_key.py
-rw-r--r-- 1 pi  pi  361 Sep 25 19:10 led.py
-rw-r--r-- 1 pi  pi  299 Nov  6 20:29 led.py.tar.gz
prw-rw-r-- 1 pi  pi  0 Sep 18 20:18 .lgd-nfy0
drwxr-xr-x  4 pi  pi  4096 Jul  4 08:27 .local
-rw-r--r-- 1 pi  pi  643 Nov  7 23:07 Makefile
-rw-r--r-x  1 pi  pi  2014 Nov  7 22:59 menu.sh
-rw-r--r-- 1 pi  pi  1245 Oct  3 18:47 module.py
```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

echo "b. Display today's date and time"

case \$choice in

 b) date ;;

The command date can easily get the date and time.

```

x. EXIT
Enter option: b
Thu 7 Nov 23:11:36 CST 2024
Menu:
a. List all files in the present working directory
b. Display today's date and time
c. Display whether a file is a 'simple' file or a 'directory'
d. Create a backup for a file using 'tar' command
e. Compress the tar file
f. Start an ftp session
g. Start your LED control program
h. Check disk usage
i. Display network configuration
j. Search for a keyword in files
x. Exit

```

echo "c. Display whether a file is a 'simple' file or a 'directory'"
 case \$choice in

c)

```

read -p "Enter file name: " filename
if [ -f "$filename" ]; then
    echo "$filename is a simple file."
elif [ -d "$filename" ]; then
    echo "$filename is a directory."
else
    echo "$filename does not exist."
fi
;;

```

Here we need to read input. And use -f -d to check the file type.

```

.xauthority
.xsession-errors
.xsession-errors.old
breath.py
code_193.1-1726078001_arm
input_led.py
led.py
led.py.tar.gz
led_control.py
led_key.py
Makefile
menu.sh

Remote monitoring
Follow terminal folder

x. EXIT
Enter option: c
Enter file name: led.py
led.py is a simple file.
Menu:
a. List all files in the present working directory
b. Display today's date and time
c. Display whether a file is a 'simple' file or a 'directory'
d. Create a backup for a file using 'tar' command
e. Compress the tar file
f. Start an ftp session
g. Start your LED control program
h. Check disk usage
i. Display network configuration
j. Search for a keyword in files
x. Exit
Enter option: c
Enter file name: Videos
Videos is a directory.

```

echo "d. Create a backup for a file using 'tar' command"
 case \$choice in

d)

```

read -p "Enter file name to backup: " filename
tar -cvf "${filename}.tar" "$filename"
echo "Backup created as ${filename}.tar"
;;

```

In the example, we type in breath.py, and it generates breath.py.tar

```

led_control.py
led_key.py
Makefile
menu.sh
module.py
motor.py

x. EXIT
Enter option: d
Enter file name to backup: breath.py
breath.py
Backup created as breath.py.tar
Menu:

```

echo "e. Compress the tar file"
 case %choice in

e)

```
read -p "Enter tar file name to compress: " tarfile
gzip "$tarfile"
echo "$tarfile compressed to ${tarfile}.gz"
;;
```

In the example, we type in breath.py.tar, and it generates breath.py.tar.gz



A screenshot of a terminal window. On the left, there is a file browser showing files like breath.py, code_1.93.1-1726078001_arm1, input_led.py, led.py, and breath.py.tar.gz. The main terminal area shows the command 'breath.py.tar compressed to breath.py.tar.gz'.

echo "f. Start an ftp session"

f)

```
read -p "Enter FTP domain or IP: " domain
ftp "$domain"
;;
```

We setup an ftp sever at my windows, and it's ip is 10.27.103.141. Using ftp 10.27.103.141 can establish the ftp connection.



A screenshot of a terminal window. On the left, there is a file browser showing files like .profile, .sudo_as_admin_successful, viminfo, Xauthority, .xsession-errors, .xsession-errors.old, breath.py, breath.py.tar.gz, code_1.93.1-1726078001_arm1, input_led.py, and led.py. The main terminal area shows an FTP session connecting to 10.27.103.141, logging in as wendy, and then disconnecting.

echo "g. Start your LED control program"

case \$choice in

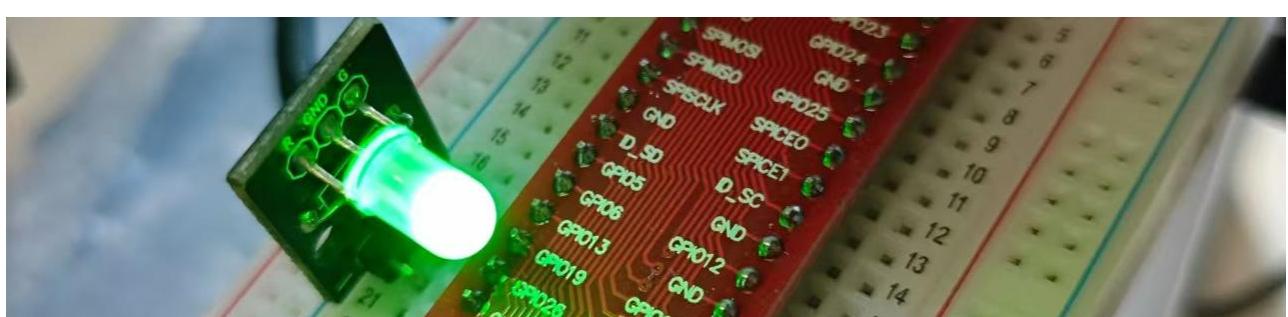
g)

```
python led_control.py
;;
```

led_control.py is the python scripts we wrote in the first lab, it can realize the red light and green light to shine alternately.



A screenshot of a terminal window. On the left, there is a file browser showing files like Name and Downloads. The main terminal area shows the command '^CMMenu:' followed by 'Enter option: g'.

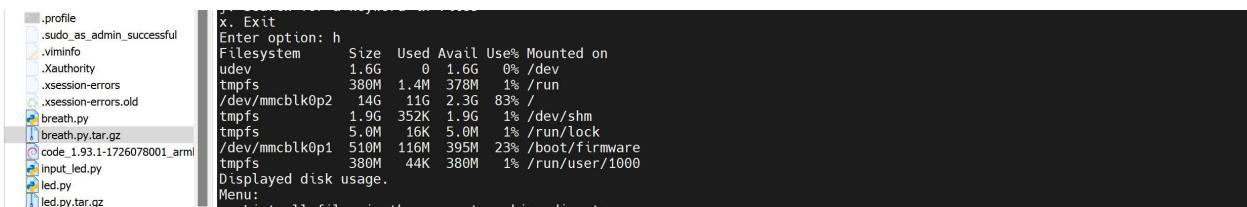


```

echo "h. Check disk usage"
case $choice in
    h)
        df -h
        echo "Displayed disk usage."
        ;;

```

It's important for us to monitor the disk usage, especially for a server (as linux device is often used as server), etc.



```

.x. Exit
Enter option: h
Filesystem      Size  Used Avail Use% Mounted on
udev            1.6G   0  1.6G  0% /dev
tmpfs           380M  1.4M 379M  1% /run
/dev/mmcblk0p2  14G  11G  2.3G  83% /
tmpfs           1.9G  352K 1.9G  1% /dev/shm
tmpfs           5.0M  16K  5.0M  1% /run/lock
/dev/mmcblk0p1  510M 116M 395M  23% /boot/firmware
tmpfs           380M  44K  380M  1% /run/user/1000
Displayed disk usage.
Menu:

```

echo "i. Display network configuration"

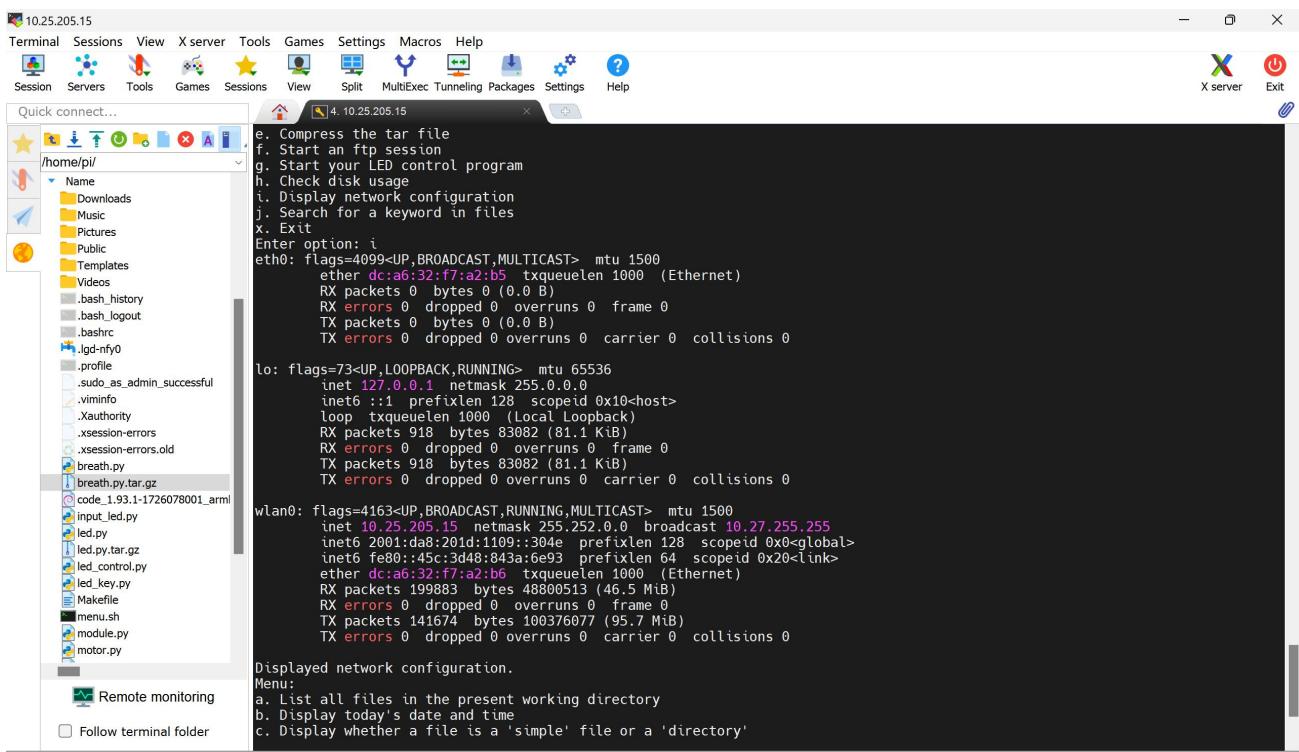
case \$choice in

```

    i)
        ifconfig
        echo "Displayed network configuration."
        ;;

```

Command ifconfig can get the network information on the device, like ip, netmask, flow, etc.



```

10.25.205.15
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect... 4. 10.25.205.15
e. Compress the tar file
f. Start an ftp session
g. Start your LED control program
h. Check disk usage
i. Display network configuration
j. Search for a keyword in files
x. Exit
Enter option: i
eth0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
      ether dc:a6:32:f7:a2:b5  txqueuelen 1000  (Ethernet)
      RX packets 0 bytes 0 (0.0 B)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 0 bytes 0 (0.0 B)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
      inet 127.0.0.1  netmask 255.255.255.0  broadcast 127.0.0.1
          inet6 ::1  prefixlen 128  scopeid 0x10<host>
          loop  txqueuelen 1000  (Local Loopback)
          RX packets 918 bytes 83082 (81.1 KiB)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 918 bytes 83082 (81.1 KiB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
      inet 10.25.205.15  netmask 255.252.0.0  broadcast 10.27.255.255
          inet6 2001:da8:201d:1:304e:prefixlen 128  scopeid 0x0<global>
          inet6 fe80::45c:3d48:843a:6e93  prefixlen 64  scopeid 0x20<link>
          ether dc:a6:32:f7:a2:b6  txqueuelen 1000  (Ethernet)
          RX packets 199883 bytes 48800513 (46.5 MiB)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 141674 bytes 100376077 (95.7 MiB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

Displayed network configuration.
Menu:
a. List all files in the present working directory
b. Display today's date and time
c. Display whether a file is a 'simple' file or a 'directory'

```

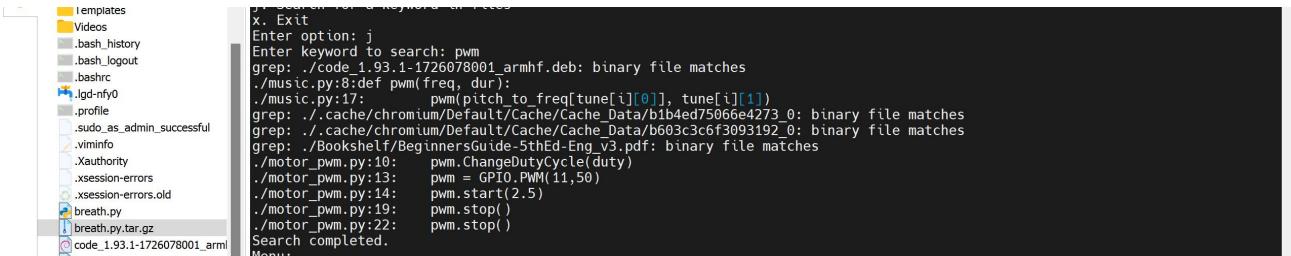
UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

```
echo "j. Search for a keyword in files"
```

j)

```
read -p "Enter keyword to search: " keyword
grep -rnw '.' -e "$keyword"
echo "Search completed."
```

We can use this to search a specific key word in every file. In this test, we use 'pwm'.



The screenshot shows a file tree on the left with various files and folders. On the right, a terminal window displays the results of a grep search for the keyword 'pwm'. The output shows multiple matches across several files, including 'code_1.93.1-1726078001_armhf.deb', 'music.py', 'motor_pwm.py', and 'breath.py'.

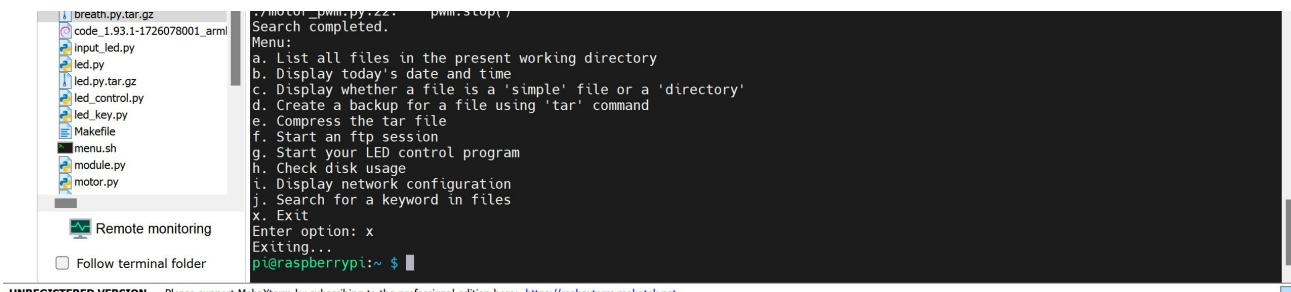
```
j) search for a keyword in files
x. Exit
Enter option: j
Enter keyword to search: pwm
grep: ./code_1.93.1-1726078001_armhf.deb: binary file matches
./music.py:8:def pwm(freq, dur):
grep: ./cache/chromium/Default/Cache/Cache_Data/b1b4ed75066e4273_0: binary file matches
grep: ./cache/chromium/Default/Cache/Cache_Data/b603c3c6f3093192_0: binary file matches
grep: ./Bookshelf/BeginnersGuide-5thEd-Eng_v3.pdf: binary file matches
./motor_pwm.py:10:    pwm.ChangeDutyCycle(duty)
./motor_pwm.py:13:    pwm = GPIO.PWM(11,50)
./motor_pwm.py:14:    pwm.start(2.5)
./motor_pwm.py:19:    pwm.stop()
./motor_pwm.py:22:    pwm.stop()
Search completed.
Menu:
```

```
echo "x. Exit"
```

x)

```
echo "Exiting..."
break
;;
```

There should also be an exiting command to do break.



The screenshot shows a file tree on the left. On the right, a terminal window shows the search results for 'pwm' and then the user enters 'x' to exit the menu. The terminal prompt changes to 'pi@raspberrypi:~ \$'.

```
./motor_pwm.py:22:    pwm.stop()
Search completed.
Menu:
a. List all files in the present working directory
b. Display today's date and time
c. Display whether a file is a 'simple' file or a 'directory'
d. Create a backup for a file using 'tar' command
e. Compress the tar file
f. Start an ftp session
g. Start your LED control program
h. Check disk usage
i. Display network configuration
j. Search for a keyword in files
x. Exit
Enter option: x
Exiting...
pi@raspberrypi:~ $
```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

Makefile

Write a Makefile, include these functions:

1. Make sort_file: list the file/directories with respect to the file size
2. Make find_log: find the log file in your home directory (you may create some dummies)
3. Make delete_lock_file: find the lock files in your home directory and then delete them.

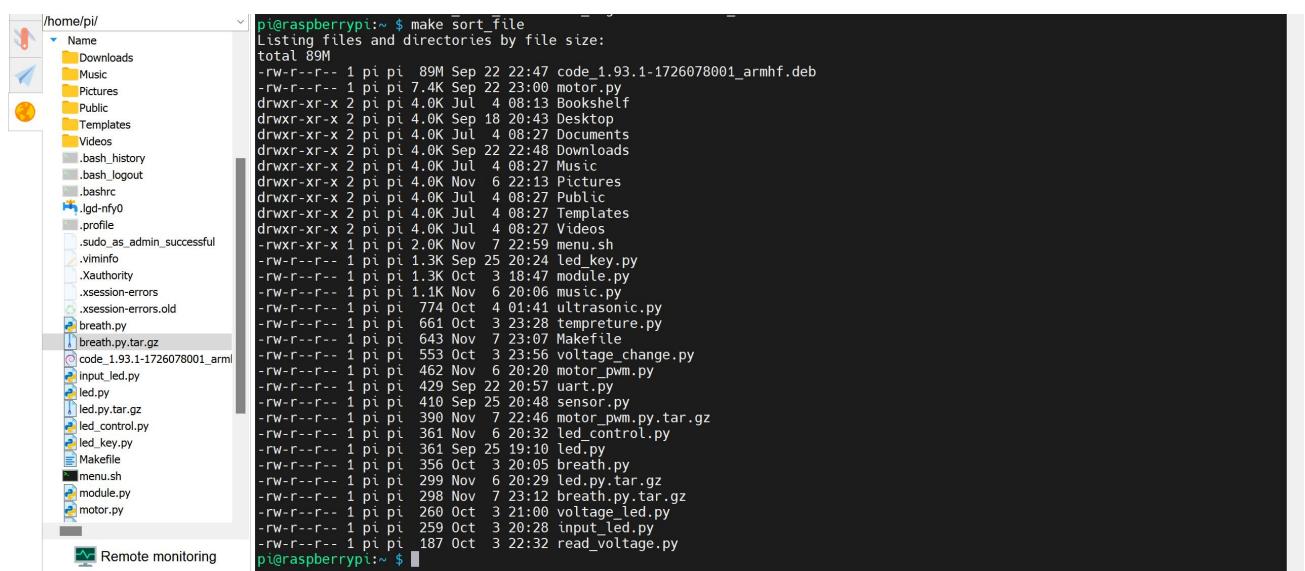
```
# Default target  
all: sort_file find_log delete_lock_file
```



1. Make sort_file: list files/directories by file size

sort_file:

```
@echo "Listing files and directories by file size:"  
@ls -lhS
```



2. Make find_log: find log files in the home directory

find_log:

```
@echo "Finding log files in the home directory:"  
@find ~/ -name "*.log"
```

```

pi@raspberrypi:~ $ make find log
Finding log files in the home directory:
/home/pi/.config/chromium/Default/shared_proto_db/000003.log
/home/pi/.config/chromium/Default/shared_proto_db/metadata/000003.log
/home/pi/.config/chromium/Default/Local Storage/leveldb/000003.log
/home/pi/.config/chromium/Default/Extension Scripts/000003.log
/home/pi/.config/chromium/Default/GCM Store/Encryption/000003.log
/home/pi/.config/chromium/Default/File System/Origins/000003.log
/home/pi/.config/chromium/Default/File System/000/t/Paths/000003.log
/home/pi/.config/chromium/Default/Session Storage/000003.log
/home/pi/.config/chromium/Default/Site Characteristics Database/000003.log
/home/pi/.config/chromium/Default/Sync Data/LevelDB/000003.log
/home/pi/.config/chromium/Default/Extension Rules/000003.log
/home/pi/.config/chromium/Default/Extension State/000003.log
/home/pi/.config/Code/Service Worker/Database/000003.log
/home/pi/.config/Code/Local Storage/leveldb/000003.log
/home/pi/.config/Code/Session Storage/000003.log
/home/pi/.config/Code/logs/20240922T225507/window1/output_20240922T225730/tasks.log
/home/pi/.config/Code/logs/20240922T225507/window1/network.log
/home/pi/.config/Code/logs/20240922T225507/window1/exthost/vscode.json-language-features/JSON Language Server.log
/home/pi/.config/Code/logs/20240922T225507/window1/exthost/exthost.log
/home/pi/.config/Code/logs/20240922T225507/window1/exthost/extensionslemetry.log
/home/pi/.config/Code/logs/20240922T225507/window1/exthost/github/GitHub.log
/home/pi/.config/Code/logs/20240922T225507/window1/exthost/vscode.git/Git.log
/home/pi/.config/Code/logs/20240922T225507/window1/notebook.rendering.log
/home/pi/.config/Code/logs/20240922T225507/window1/output_20240922T225527/tasks.log
/home/pi/.config/Code/logs/20240922T225507/window1/views.log
/home/pi/.config/Code/logs/20240922T225507/window1/renderer.log
/home/pi/.config/Code/logs/20240922T225507/editSessions.log
/home/pi/.config/Code/logs/20240922T225507/main.log
/home/pi/.config/Code/logs/20240922T225507/network.log
/home/pi/.config/Code/logs/20240922T225507/terminal.log
/home/pi/.config/Code/logs/20240922T225507/userDataSync.log
/home/pi/.config/Code/logs/20240922T225507/sharedprocess.log
/home/pi/.config/Code/logs/20240922T225507/telemetry.log
/home/pi/.config/Code/logs/20240922T225507/remoteTunnelService.log
/home/pi/.vnc/vncviewer.log
/home/pi/.local/share/gvfs-metadata/home-ca9420ba.log
pi@raspberrypi:~ $

```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

3. Make delete_lock_file: find and delete lock files in the home directory delete_lock_file:

```

@echo "Finding and deleting lock files in the home directory:"
@find $(HOME) -name "*.lock" -print -exec rm -f {} \;
@echo "All lock files deleted."

```

```

pi@raspberrypi:~ $ touch example.lock
pi@raspberrypi:~ $ make delete_lock_file
Finding and deleting lock files in the home directory:
/home/pi/example.lock
All lock files deleted.
pi@raspberrypi:~ $

```