Case Study #1: Online Shopping Cart: You are tasked with building a simple online shopping cart system using Python lists. Implement the following functionalities:

1. **Add Products:**
   a. Create an empty list to represent the user's shopping cart.
   b. Allow the user to add products to the cart by entering the product name and price.
   c. Store each product as a dictionary with keys for the name and price.

2. **Display Cart:**
   a. Provide an option for the user to display the contents of their shopping cart.
   b. Display each product's name and price in a readable format.

3. **Remove Product:**
   a. Implement a feature to remove a specific product from the cart.
   b. Allow the user to enter the product name to remove.
   c. If the product is found, remove it from the cart.
   d. If the product is not found, inform the user.

4. **Calculate Total Price:**
   a. Provide an option to calculate and display the total price of all products in the cart.

5. **Checkout:**
   a. Allow the user to "checkout," which will simulate completing a purchase.
   b. Display a summary of the purchased items and the total price.
   c. Clear the shopping cart after checkout.

6. **Exit System:**
   a. Allow the user to exit the system.

Ensure that your program is user-friendly, handles errors gracefully, and provides clear instructions to the user.

```
l = []
pList = {"atta":50, "milk":30, "wheat":40, "book":30}
total = 0

def showList():
    print("products list :")
    print("name\tprice")
    for i in pList: print(i,"\t",pList[i])
```

```python
def add():
  global total
  pn = input("Enter ur product name: ")
  if(pn in pList.keys()):
      l.append({"name":pn,"price":pList[pn]})
      total+=pList[pn]
  else:
      print("invalid product name")

def showCart():
  print("my cart :")
  print("name\tprice")
  for i in l: print(i["name"],"\t",i["price"])

def remove():
  global total
  pn = input("Enter ur product name: ")
  initialLen=len(l)
  for i in range(len(l)):
      if(l[i]["name"]==pn):
          print("deleted product ",pn," of price ",l[i]["price"])
          total-=l[i]["price"]
          # print("after del total price is ",total)
          l.pop(i)
          break
  if(len(l)==initialLen):print("product not found ")

def checkout():
    global total
    print("completed purchase. here's ur bill")
    print("name\tprice")
    for i in l :
      print(i["name"],"\t",i["price"])
    print("total price = ",total)
    total=0
    l.clear()

while(True):
  print("************************************")
  print("welcome to the online shopping cart!")
  print("0. View products")
  print("1. Add product")
  print("2. display cart")
  print("3. remove product")
  print("4. calculate total price")
  print("5. checkout")
  print("6. exit")
  c = int(input("Enter ur choice: "))
  if c==0:
    # show list
```

```python
        showList()
    elif(c==1):
        # add
        add()
    elif c==2:
        # show cart
        showCart()
    elif c==3:
        # remove
        remove()
    elif c==4:
        # price
        print("total price is ",total)
    elif c==5:
        # checkout
        checkout()
    elif c==6:
        # exit
        print("thank u. come again")
        break
    else:
        print("invalid input")
```

OUTPUT :

```
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 0
products list :
name    price
atta     50
milk     30
wheat    40
book     30
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 1
Enter ur product name: atta
************************************
```

```
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 1
Enter ur product name: milk
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 2
my cart :
name    price
atta    50
milk    30
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 4
total price is  80
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 3
Enter ur product name: atta
deleted product  atta  of price  50
after del total price is  30
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
```

```
Enter ur choice: 4
total price is  30
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 5
completed purchase. here's ur bill
name    price
milk     30
total price =  30
************************************
welcome to the online shopping cart!
0. View products
1. Add product
2. display cart
3. remove product
4. calculate total price
5. checkout
6. exit
Enter ur choice: 6
thank u. come again
```

Q2:

Case Study #2: Network Device Management System: You are tasked with building a program to manage network devices using Python, specifically focusing on nested lists and list comprehensions. Implement the following functionalities:

1. **Add Devices:**
    a. Create an empty list to represent the network.
    b. Allow the user to add devices by entering the device name, type (e.g., router, switch), and IP address.
    c. Store each device as a list within the network list.

2. **Display Devices:**
    a. Provide an option for the user to display the list of all devices in the network.
    b. Display each device's name, type, and IP address in a readable format.

3. **Search for a Device:**
    a. Implement a search functionality where the user can enter a device name to find its information.
    b. If the device is found, display its name, type, and IP address.
    c. If the device is not found, inform the user.

4. **Filter Devices by Type:**
   a. Allow the user to filter devices based on their type.
   b. Display the names of devices that match the specified type.

5. **Remove Device:**
   a. Implement a feature to remove a specific device from the network.
   b. Allow the user to enter the device name to remove.
   c. If the device is found, remove it from the network list.
   d. If the device is not found, inform the user.

6. **Exit System:**
   a. Allow the user to exit the system.

Ensure that your program is user-friendly, handles errors gracefully, and provides clear instructions to the user.

```python
l = []

def add():
  dn = input("Enter device name: ")
  dt = input("Enter device type: ")
  di = input("Enter device ip: ")
  l.append({"name":dn,"type":dt,"ip":di})

def show():
  print("devices :")
  print("name\ttype\tip")
  for i in l: print(i["name"],"\t",i["type"],"\t",i["ip"])

def search():
  dn = input("Enter device name: ")
  found=False
  for i in l:
    if i["name"]==dn:
      print(i["name"],"\t",i["type"],"\t",i["ip"])
      found=True
  if found==False:
    print("device not found")

def filter():
  dn = input("Enter device type: ")
  found=False
  for i in l:
    if i["type"]==dn:
      print(i["name"],"\t",i["type"],"\t",i["ip"])
```

```python
        found=True
  if found==False:
    print("device not found")

def remove():
  pn = input("Enter device name: ")
  found=False
  for i in range(len(l)):
      if(l[i]["name"]==pn):
        print("removed device ",str(l[i]))
        l.pop(i)
        found=True
        break
  if(not found):print("device not found ")

while(True):
  print("***********************************")
  print("welcome to network device management system")
  print("1. Add devices")
  print("2. display devices")
  print("3. search for a device")
  print("4. filter devices by type")
  print("5. remove device")
  print("6. exit")
  c = int(input("Enter ur choice: "))
  if(c==1):
    add()
  elif c==2:
    show()
  elif c==3:
    search()
  elif c==4:
    filter()
  elif c==5:
    remove()
  elif c==6:
    # exit
    print("Exit")
    break
  else:
    print("invalid input")
```

OUTPUT:

```
***********************************
welcome to network device management system
1. Add devices
2. display devices
3. search for a device
4. filter devices by type
5. remove device
```

```
6. exit
Enter ur choice: 1
Enter device name: r1
Enter device type: router
Enter device ip: 123.23.23.4
************************************
welcome to network device management system
1. Add devices
2. display devices
3. search for a device
4. filter devices by type
5. remove device
6. exit
Enter ur choice: 1
Enter device name: s1
Enter device type: switch
Enter device ip: 234.4.2.3
************************************
welcome to network device management system
1. Add devices
2. display devices
3. search for a device
4. filter devices by type
5. remove device
6. exit
Enter ur choice: 2
devices :
name    type    ip
r1      router          123.23.23.4
s1      switch          234.4.2.3
************************************
welcome to network device management system
1. Add devices
2. display devices
3. search for a device
4. filter devices by type
5. remove device
6. exit
Enter ur choice: 3
Enter device name: r1
r1      router          123.23.23.4
************************************
welcome to network device management system
1. Add devices
2. display devices
3. search for a device
4. filter devices by type
5. remove device
6. exit
Enter ur choice: 4
Enter device type: switch
s1      switch          234.4.2.3
************************************
welcome to network device management system
1. Add devices
2. display devices
3. search for a device
```

```
4. filter devices by type
5. remove device
6. exit
Enter ur choice: 5
Enter device name: r1
removed device  {'name': 'r1', 'type': 'router', 'ip': '123.23.23.4'}
*************************************
welcome to network device management system
1. Add devices
2. display devices
3. search for a device
4. filter devices by type
5. remove device
6. exit
Enter ur choice: 6
Exit
```