**Objective:**

- Use SMTP to generate email message
- Use files to store, retrieve, process, update and upload data in file
- Conditional and Control Statements
- Passing values in functions and functions returning values
- Use of date and time function
- Displays formatted information in the form of report display

**Introduction:**

Using email messages and emailing the invoice is very common feature in most of the sales events in businesses, retail or wholesale.

In this lab assignment, customer buys items from inventory (warehouse) and information is not only displayed but also, information emailed using SMTP protocol.

Invoice is saved in file and it is to-date sales for the customer.

Invoice shows when each item was purchased along with the quantity and price per item.

Non-volatility of inventory storage is important that once application ends, inventory items still are kept in storage and these items may be available after the application runs again.

This application is implemented to check items in the inventory, add items, display all items, search specific items and it requires item's serial number (or item code) to search an item. Information about the item that is stored in the inventory includes item name, item serial number/code, number of items in the inventory and the price per item in the inventory.

This application uses dictionary to store inventory and invoice application and once validity of item is confirmed the dictionary of item is saved in file. Similarly, all sales items are also stored in the invoice file.

**Application execution:**

Menu options are displayed until user chooses to end the application. Following shows the menu options:

a)  Inventory items are displayed in the inventory:

```
Enter your choice:      2
                                                                    Muhammad Khan
                                                              Student ID: N01234567

              Item Name              Item Serial ID      Item Quantity in stock           Price per item

               Acer PC                   A123                        7                       $846.29
               Dell PC                   D123                       12                       $695.39
               Sony PC                   S123                       12                       $999.89
               MacBook                   M123                       10                      $1299.39


     1.  Add inventory items
     2.  Display all inventory items
     3.  Search an item
     4.  Sales Invoice
     5.  End application
```

This section was implemented in Lab 4.

b)  If there was NO item in the inventory (warehouse does not have any items) then message to that effect is displayed because there cannot be any sales if there are no items in the inventory.

c)  If customer tries to buy an item that does not exist in the inventory, following message is displayed:

```
     1.  Add inventory items
     2.  Display all inventory items
     3.  Search an item
     4.  Sales Invoice
     5.  End application

Enter your choice:      4
Enter Item serial code, of item to purchase:    B123
Enter quantity of items having serial number B123 to buy:      2
Item not in stock ... ... ... Please connect later ... ... ...
There are no invoices in the system yet ... ... ...
```

d) If customer tries to buy items from the inventory but the number of items in the inventory are less than the quantity that the customer wants to purchase, then following message is displayed:

```
1.  Add inventory items
2.  Display all inventory items
3.  Search an item
4.  Sales Invoice
5.  End application

Enter your choice:      4
Enter Item serial code, of item to purchase:     S123
Enter quantity of items having serial number S123 to buy:        15
Not enough quantity in stock ... ... ... ....
There are no invoices in the system yet ... ... ...
```

"Not enough quantity in stock  ……… ……"

```
1.  Add inventory items
2.  Display all inventory items
3.  Search an item
4.  Sales Invoice
5.  End application

Enter your choice:      4
Enter Item serial code, of item to purchase:     M123
Enter quantity of items having serial number M123 to buy:        7
Not enough quantity in stock ... ... ... ....
```

e) As the customer purchases items from the inventory – if items were available with sufficient quantity, then following table (Sales Invoice) is displayed (and same information is also emailed to the customer as invoice):

```
*******************************************************************************************
                                                                          Muhammad Khan
                                                              Student ID:  N01234567
###########################################################################################
                                         Sales Invoice

-------------------------------------------------------------------------------------------
        Time of Sale           Item Name         Item Serial ID   Item Quantity in stock          Price per item

    8-2-2023 at 14:49:24         MacBook               M123                    8                        $1299.39


-------------------------------------------------------------------------------------------
                                                Total Price for all items purchased:        $10395.12
                                                              Tax amount paid:        $1351.37
                                                            Total amount paid:        $11746.49
*******************************************************************************************
```

f)   Emailed sales invoice is shown below:



Note here:

Subject is "My Sales Invoice – to-date"

It shows "Time of Sale" (both day and time)

It also shows Total price of items, Tax amount, and Total amount paid.

g) From the existing inventory (shown below) customer buys more items:

```
Enter your choice:      2
                                                                    Muhammad Khan
                                                            Student ID: N01234567

              Item Name            Item Serial ID       Item Quantity in stock         Price per item

                Acer PC                 A123                        7                         $846.29
                Dell PC                 D123                       12                         $695.39
                Sony PC                 S123                       12                         $999.89
                MacBook                 M123                        2                        $1299.39
                Google C                G123                       13                         $256.38


    1.  Add inventory items
    2.  Display all inventory items
    3.  Search an item
    4.  Sales Invoice
    5.  End application

Enter your choice:
```

```
    1.   Add inventory items
    2.   Display all inventory items
    3.   Search an item
    4.   Sales Invoice
    5.   End application

 Enter your choice:      4
 Enter Item serial code, of item to purchase:      S123
 Enter quantity of items having serial number S123 to buy:      10
```

In this scenario, 10 Sony PCs are purchased (Serial Code: S123)

See the Sales invoice below:

```
**********************************************************************************************
                                                                         Muhammad Khan
                                                                   Student ID:  N01234567
##############################################################################################
                                      Sales Invoice


----------------------------------------------------------------------------------------------
      Time of Sale              Item Name        Item Serial ID    Item Quantity Sold      Price per item

  8-2-2023 at 14:49:24           MacBook              M123                 8                   $1299.39
  8-2-2023 at 15:2:48            Sony PC              S123                10                   $999.89


----------------------------------------------------------------------------------------------
                                                Total Price for all items purchased:      $20394.02
                                                            Tax amount paid:              $2651.22
                                                            Total amount paid:            $23045.24
**********************************************************************************************
```

Same information is emailed as well:



With this purchase of 10 Sony PCs, following is the updated inventory:

```
Enter your choice:      2
                                                                    Muhammad Khan
                                                          Student ID: N01234567

            Item Name            Item Serial ID      Item Quantity in stock           Price per item

             Acer PC                   A123                         7                      $846.29
             Dell PC                   D123                        12                      $695.39
             Sony PC                   S123                         2                      $999.89
             MacBook                   M123                         2                     $1299.39
            Google C                   G123                        13                      $256.38
```

Only 2 Sony PCs are left in the inventory.


Following shows that two MacBooks are purchased, again:

```
****************************************************************************************************
                                                                    Muhammad Khan
                                                          Student ID:  N01234567
####################################################################################################
                              Sales Invoice

------------------------------------------------------------------------------------------------
      Time of Sale          Item Name        Item Serial ID      Item Quantity Sold       Price per item

  8-2-2023 at 14:49:24       MacBook              M123                      8                  $1299.39
   8-2-2023 at 15:2:48       Sony PC              S123                     10                   $999.89
  8-2-2023 at 15:30:39       MacBook              M123                      2                  $1299.39

------------------------------------------------------------------------------------------------
                                    Total Price for all items purchased:      $22992.80
                                                          Tax amount paid:       $2989.06
                                                        Total amount paid:      $25981.86
****************************************************************************************************
```

h) With purchase of 2 MacBooks, there will be no MacBook left in the inventory:

```
                Item Name            Item Serial ID      Item Quantity in stock            Price per item

                Acer PC                    A123                       7                         $846.29
                Dell PC                    D123                      12                         $695.39
                Sony PC                    S123                       2                         $999.89
                Google C                   G123                      13                         $256.38


      1.  Add inventory items
      2.  Display all inventory items
      3.  Search an item
      4.  Sales Invoice
      5.  End application

  Enter your choice:      4
  Enter Item serial code, of item to purchase:    D123
  Enter quantity of items having serial number D123 to buy:      12
  Item with Serial Code D123 is now out of stock and removed from inventory
```

Now if customer purchases 12 Dell PCs, then there will be no more left in the inventory:

Sales Invoice is shown below:

```
******************************************************************************************************
                                                                                        Muhammad Khan
                                                                               Student ID:  N01234567
######################################################################################################
                                                   Sales Invoice

      ----------------------------------------------------------------------------------------------
            Time of Sale            Item Name        Item Serial ID     Item Quantity Sold      Price per item

        8-2-2023 at 14:49:24         MacBook             M123                   8                    $1299.39
         8-2-2023 at 15:2:48         Sony PC             S123                  10                     $999.89
        8-2-2023 at 15:30:39         MacBook             M123                   2                    $1299.39
        8-2-2023 at 15:43:18         Dell PC             D123                  12                     $695.39


      ----------------------------------------------------------------------------------------------
                                                   Total Price for all items purchased:     $31337.48
                                                                       Tax amount paid:      $4073.87
                                                                      Total amount paid:     $35411.35
******************************************************************************************************
```

Emailed Sales Invoice is shown below:



After the sales, inventory is shown below:

**Reports submission:**

Lab report to be submitted:

a) Complete source code (filename) having filename extension ".py"
b) Inventory is stored in dictionary and dictionary structure is saved in data file. Similarly, invoice is stored in file and each sale item is saved in dictionary structure.
c) Execute application and take screenshots of all valid and invalid test cases to test the boundary conditions (as shown in the problem definition above). Crop the screenshots and paste them in a document. Upload PDF format of the document.

The conditions to be tested:

a) When there is NO inventory in the warehouse, what is the message and screenshot
b) When user tries to purchase item that is NOT in stock (inventory)
c) Screen shot of inventory and screenshot if Sales Invoice and Emailed Sales Invoice when there are items in inventory (in enough quantity to be sold)
d) Screenshot of inventory and purchase if the quantity in stock is NOT enough to be purchased
e) If customer purchases items and the quantity in stock becomes ZERO – the item information is removed from the inventory Stock (So ZERO items are NOT displayed in the inventory)

These screenshots (with various options shown above) are pasted and cropped in the document and PDF is uploaded.

**Rubric for Lab 3:**

| | |
|---|---|
| Creating and Storing Sales Invoice | **2 Marks** |
| Different test conditions for Sales (demonstrating sales invoice display on the terminal) | |
| | **4 Marks** |
| Formatting and emailing the Sales invoice to the customer's email | **2 Marks** |
| Updates in the invoice section for updating and storing information | **2 Mark** |
| Total: | **10 Marks** |