INFORMATICS
INSTITUTE OF
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Foundation Certificate in Higher Education

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Group	:F

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At the end, I want to thank my friends and relatives who displayed appreciation for my work and motivated me to continue my work.

With sincere gratitude,
J. Kabilan

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Questions and Describe

XYZ Company is a leading construction company in Sri Lanka. They undertake large housing construction projects through their known clients. The company is planning to have an information system to maintain the details of the projects it undertakes. The system should keep the details of all the ongoing projects, the details of completed projects, and the number of workers available to assign to new projects. Before undertaking a new project, the company always checks whether the required number of workers is available to assign. If not, the company does not undertake the project. Once a project is undertaken, it will be assigned to ongoing projects (with the relevant details) and when a project is completed, it will be taken out from the ongoing projects and assigned to completed projects. The workers who worked on the project are released and they are available to assign to a new project.

When the company gets a new project, the following details should be recorded and stored.
Project Code

Client’s Name

Start Date

Expected end date.

Number of workers working on the project

Project status (ongoing, on hold, or completed)

When a project is completed, the following details should be recorded and stored.

Project Code

Client’s name

Start Date

Expected end date.

Number of workers working on the project - Actual end date

Description of the problem statement

"XYZ Company, a construction company in Sri Lanka, is upgrading its project quoting process. First, they input worker details. Then, they save customer project plans. If a project needs changes, they use the upgrade option. Completed projects can be removed, and workers on those projects are replaced. The system shows the status of all projects for easy tracking."

Figures Outline

The provided code is a basic project management system for XYZ Company implemented in Python. It uses a menu-driven interface to perform various operations related to projects and workers. Here's a summary of the key functionalities:

1. **Menu Options**:

The program displays a menu with options to add a new project, remove a completed project, add new workers, update details on ongoing projects, view project statistics, and exit.

2. **Adding a New Project**:

Users can add a new project by entering details such as project code, number of workers, client name, start date, expected end date, and project status. If the status is 'completed', the actual end date is also entered. Workers are then assigned to the project, and the user can choose to save the project.

3. **Removing a Completed Project**:

Users can remove a completed project by entering the project code. If the project is completed, it is removed, and the workers are returned to the available workers group.

4. **Updating an Existing Project**:

Users can update details of an ongoing project by entering the project code. They can modify the client's name, start date, expected end date, and project status. If the project status is 'completed', the actual end date is updated.

5. **Adding New Workers**:

Users can add a specified number of new workers to the available workers group.

6. **Project Statistics**:

Users can view statistics, including the number of ongoing projects, completed projects, on-hold projects, and available workers. Users have the option to add a new project during this process.

7. **Exiting the Program**:

Users can choose to exit the program, which terminates the loop and ends the execute

Data Structure

The data structure used in your code involves two main lists: **projects** and **workers**. These lists store information about projects and workers.

Each project is stored as a dictionary with the following keys:

- **'project_code'**: Integer representing the project code.
- **'client_name'**: String representing the client's name.
- **'start_date'**: datetime object representing the project's start date.
- **'end_date'**: datetime object representing the expected end date of the project.
- **'num_workers'**: Integer representing the number of workers assigned to the project.
- **'status'**: String representing the project status ('ongoing', 'on hold', 'completed').
- **'actual_end_date'**: datetime object representing the actual end date of the project (if completed).

Used Data Types

'int' – Used to integer

'str' – Used to strings

'list' – List (For saving the values)

'datetime' – For date-time structure

'input' – To get input from the user

'boolean' – To get Ture and false

'none type' – Used for no value

'dict' – Used to store key and values

'while' – Used to a while loop

'for' – Used for loop

'if', **'else'**, **'elif'** – Used for conditional statements

'print' – Used to display or print messages

'try' – Used for exception handling

'+=' – Used for in-place addition

1. Algorithm

Step 1: Start

1.1. Setup

Step 2: Import the **'datetime'** module.

Step 3: Add empty lists for **'projects'** and **'workers**.

1.2. Add Workers

Step 4: Display the input question for user.

Step 5: Prompt the user to input the number of team members (nums_of_workers).

Step 6: Use a loop to add team members to the **'workers'** list

1.3. Add Project (Main Menu)

Step 7: Display the main menu in an infinite loop.

Step 8: Display options for different operations (1-6).

- **Step 8.1**. If the user input "1", execute code to 1.
- **Step 8.2**. If the user input "2", execute code to 2.
- **Step 8.3**. If the user input "3", execute code to 3.
- **Step 8.4**. If the user input "4", execute code to 4.
- **Step 8.5**. If the user input "5", execute code to 5.

Step 9: Get user input for the desired operation (choice).

1.4. Add a New Project

Step 10: If the choice is '1':

Step 11: Enter a loop to add a new project.

Step 12: Collect project details (project code, client's name, start date, end date, status).

Step 13: Check if there are enough team members available for the project.

Step 14: If not enough team members, display an error and return to the main menu.

Step 15: If the project is completed, collect the actual end date.

Step 16: Update the **‘projects’** list and remove workers from the **‘workers’** list.

Step 17: Ask the user if they want to save the project.

Step 18: If yes, display a success message.

Step 19: If no, display a message indicating the project was not saved.

1.5. Remove a completed Project

Step 20: If the choice is '2':

Step 21: Collect the project code to remove.

Step 22: Check if the project is completed.

Step 23: If not completed, display an error message.

Step 24: Remove the project from the **‘projects’** list and add workers back to the **‘workers’** list.

Step 25: Ask the user if they want to remove the project.

Step 26: If yes, display a success message along with removed project details.

Step 27: If no, display a message indicating the project was not removed.

1.6. Add New Workers

Step 28: If the choice is '3':

Step 29: Collect the number of new workers to add.

Step 30: Add new workers to the **‘workers’** list.

Step 31: Ask the user if they want to add workers.

Step 32: If yes, display a success message.

Step 33: If no, display a message indicating workers were not added.

1.7. Update Details on Ongoing Project

Step 34: If the choice is '4':

Step 35: Collect the project code to update.

Step 36: Check if there are enough team members available for the project update.

Step 37: If not enough team members, display an error and return to the main menu.

Step 38: Update the project details in the **‘projects’** list.

Step 39: Ask the user if they want to save the updated project.

Step 40: If yes, display a success message.

Step 41: If no, display a message indicating the project details were not updated.

1.8. Project Statistics

Step 42: If the choice is '5':

Step 43: Display project statistics.

Step 44: Count ongoing, completed, and on-hold projects.

Step 45: Display the number of available team members.

Step 46: Optionally, allow the user to view details of a specific project.

Step 47: If yes, display the project details.

Step 48: If no, proceed to the next step.

1.9. Exit

Step 49: If the choice is '6':

Step 50: Display an exit message.

Step 51: Break out of the loop.

1.10. Invalid choice

Step 52: If the user inputs an invalid choice:

Step 53: Display an error message.

Step 54: Prompt the user to enter a valid choice.

Step 55: End the program if the user chooses to exit.

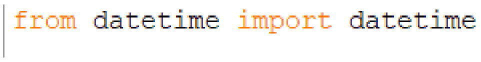
Step 56: End

2. instruction for Run the Code

1st you must enter the workers you have. Then you can remove workers from there and add them there.

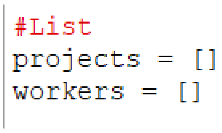
3. Python Code (Screenshots)

3.1. Date and Time



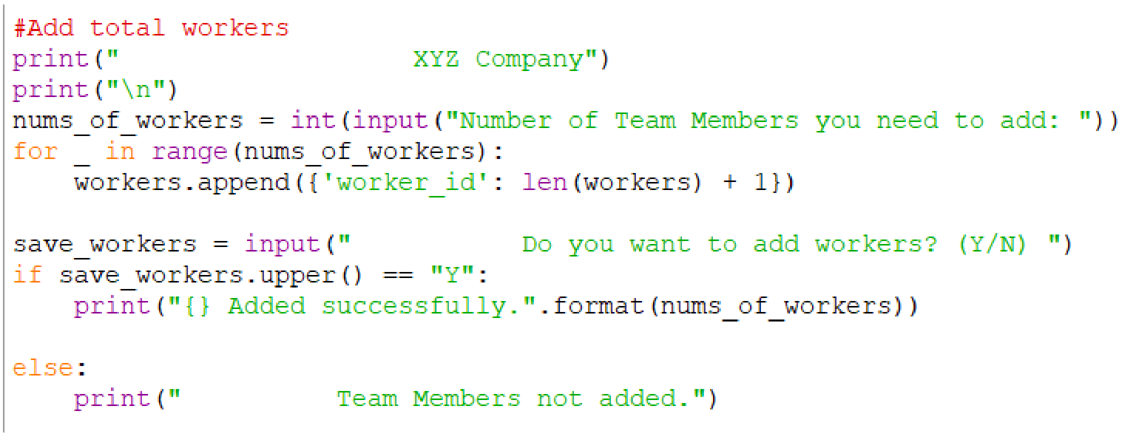
```python
from datetime import datetime
```

3.2. List



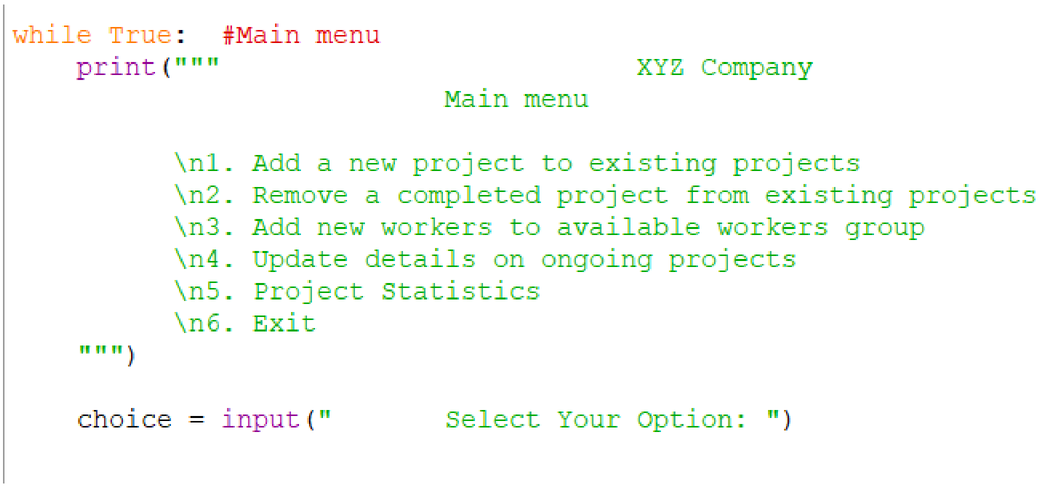
```python
#List
projects = []
workers = []
```

3.3. Add workers to the list



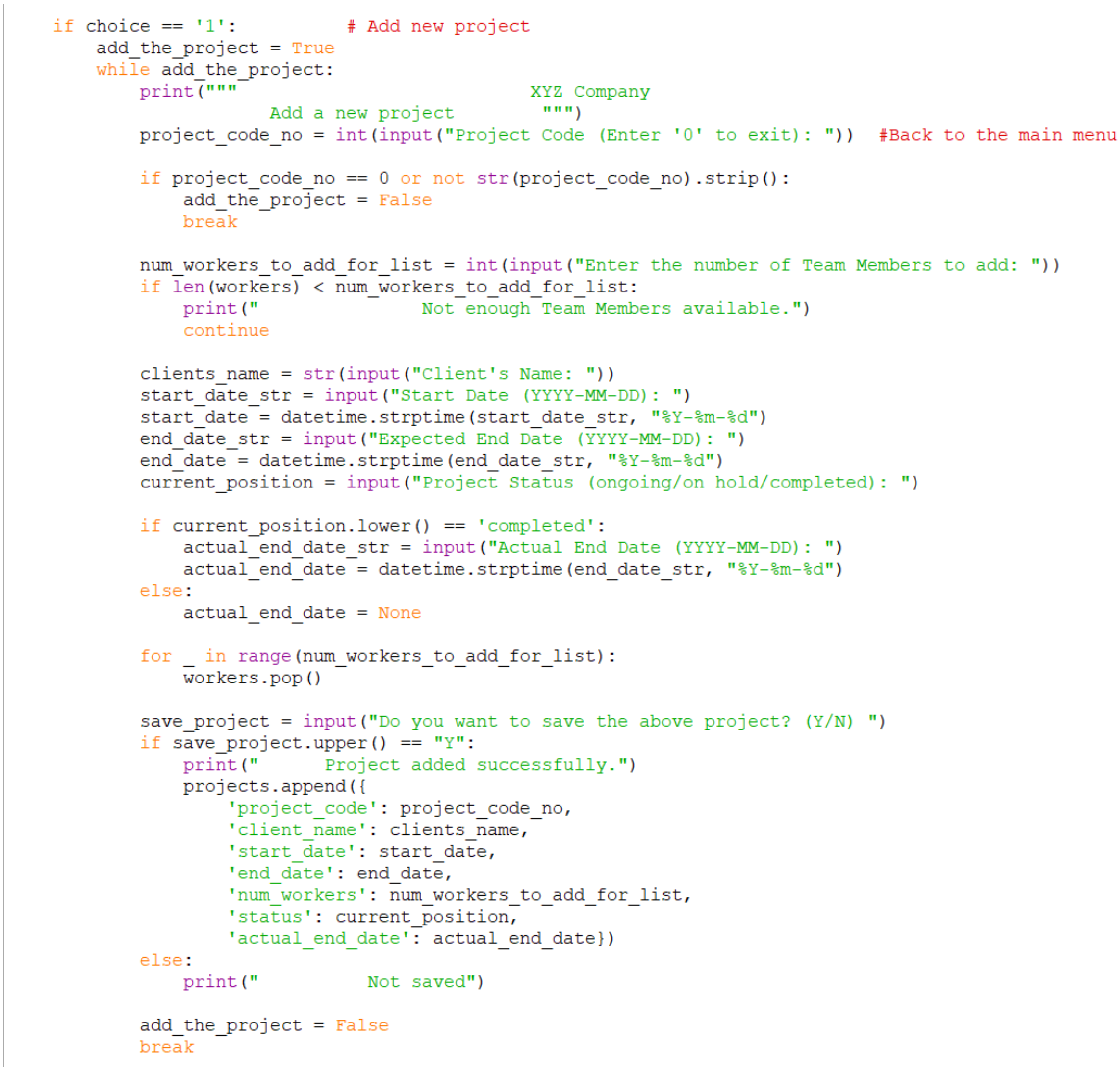
```python
#Add total workers
print("                   XYZ Company")
print("\n")
nums_of_workers = int(input("Number of Team Members you need to add: "))
for _ in range(nums_of_workers):
    workers.append({'worker_id': len(workers) + 1})

save_workers = input("           Do you want to add workers? (Y/N)  ")
if save_workers.upper() == "Y":
    print("{} Added successfully.".format(nums_of_workers))

else:
    print("          Team Members not added.")
```

3.4. Main Menu



```
while True:  #Main menu
    print("""                           XYZ Company
                           Main menu

          \n1. Add a new project to existing projects
          \n2. Remove a completed project from existing projects
          \n3. Add new workers to available workers group
          \n4. Update details on ongoing projects
          \n5. Project Statistics
          \n6. Exit
    """)

    choice = input("       Select Your Option: ")
```

3.5. Add New Project

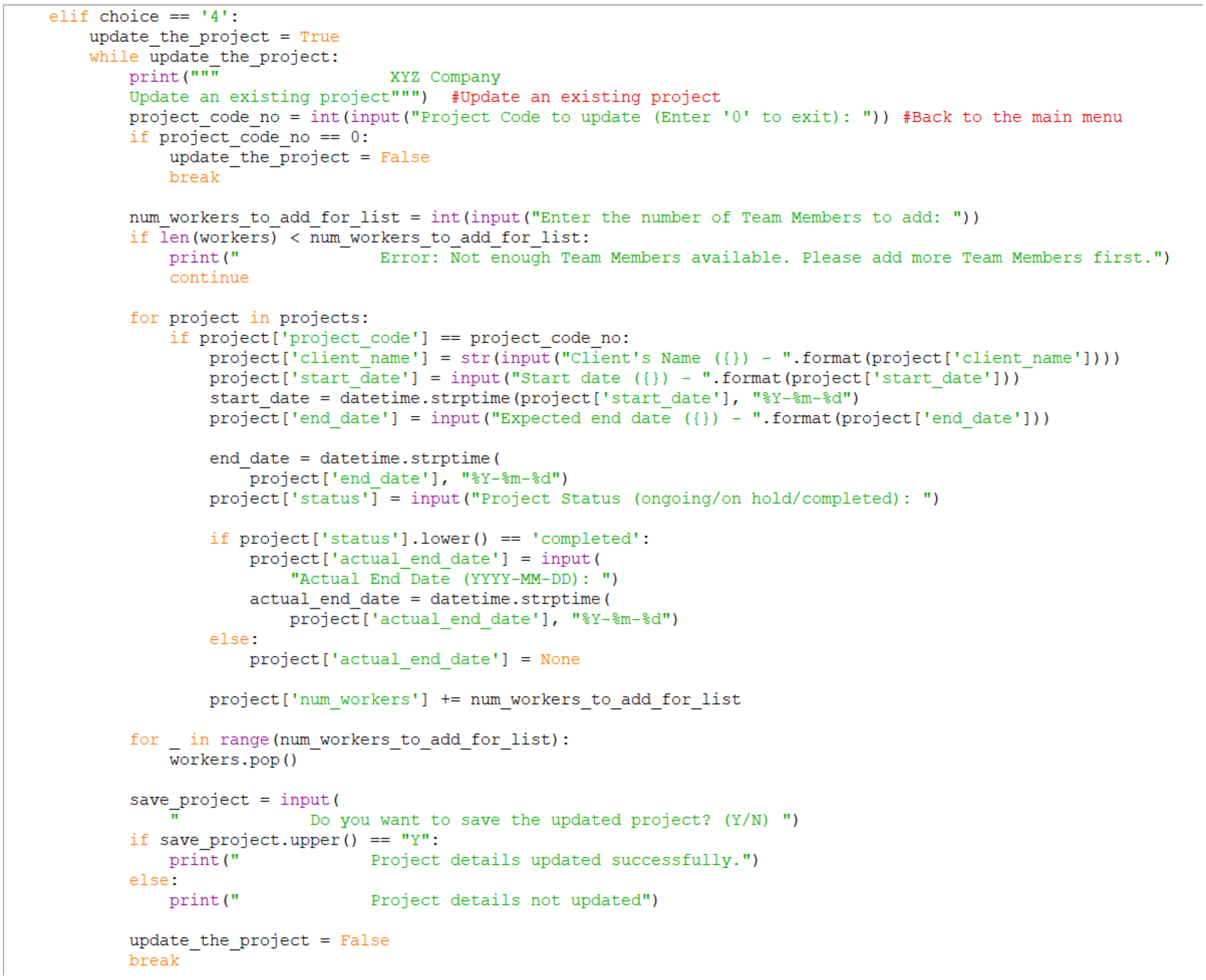


```
if choice == '1':          # Add new project
    add_the_project = True
    while add_the_project:
        print("""                           XYZ Company
                    Add a new project        """)
        project_code_no = int(input("Project Code (Enter '0' to exit): "))  #Back to the main menu

        if project_code_no == 0 or not str(project_code_no).strip():
            add_the_project = False
            break

        num_workers_to_add_for_list = int(input("Enter the number of Team Members to add: "))
        if len(workers) < num_workers_to_add_for_list:
            print("               Not enough Team Members available.")
            continue

        clients_name = str(input("Client's Name: "))
        start_date_str = input("Start Date (YYYY-MM-DD): ")
        start_date = datetime.strptime(start_date_str, "%Y-%m-%d")
        end_date_str = input("Expected End Date (YYYY-MM-DD): ")
        end_date = datetime.strptime(end_date_str, "%Y-%m-%d")
        current_position = input("Project Status (ongoing/on hold/completed): ")

        if current_position.lower() == 'completed':
            actual_end_date_str = input("Actual End Date (YYYY-MM-DD): ")
            actual_end_date = datetime.strptime(end_date_str, "%Y-%m-%d")
        else:
            actual_end_date = None

        for _ in range(num_workers_to_add_for_list):
            workers.pop()

        save_project = input("Do you want to save the above project? (Y/N)  ")
        if save_project.upper() == "Y":
            print("      Project added successfully.")
            projects.append({
                'project_code': project_code_no,
                'client_name': clients_name,
                'start_date': start_date,
                'end_date': end_date,
                'num_workers': num_workers_to_add_for_list,
                'status': current_position,
                'actual_end_date': actual_end_date})
        else:
            print("          Not saved")

        add_the_project = False
        break
```

3.6. Remove a Project

```
elif choice == '2':
    print("""                 XYZ Company
        Remove a Completed Project""")  #Remove a completed project
    project_code_no = input("Project Code: ")

    project_code_no = int(project_code_no)

    project_index_to_remove = next(
        (index for index, project in enumerate(projects) if project['project_code'] == project_code_no), None)

    if project_index_to_remove is not None:

        if projects[project_index_to_remove]['status'].lower() == 'completed':

            remove_project = projects.pop(project_index_to_remove)
            for _ in range(remove_project['num_workers']):
                workers.append({'worker': len(workers) + 1})  #Add workers back to available workers

            save_project = input("Do you want to remove the project? (Y/N) ")

            if save_project.upper() == 'Y':
                print("Project removed successfully")

                print("Project Code: " + str(remove_project['project_code']))
                print("Client's Name: " + str(remove_project['client_name']))
                print("Start date: " + str(remove_project['start_date']))
                print("Expected end date: " + str(remove_project['end_date']))
                print("Number of workers: " + str(remove_project['num_workers']))
                print("Project Status: " + str(remove_project['status']))

            else:
                print("Project not removed.")
        else:
            print("Cannot remove. Project is not completed.")
    else:
        print("Project not found")

elif choice == '3':
    print("""                   XYZ Company
        Add new workers""")

    nums_of_workers = int(input("Number of Team Members to add: "))
    for _ in range(nums_of_workers):
        workers.append({'worker': len(workers) + 1})

    save_workers = input("           Do you want to add workers? (Y/N) ")
    if save_workers.upper() == "Y":
        print(str(nums_of_workers) + " workers added successfully.")

    else:
```

3.7. Update a Project

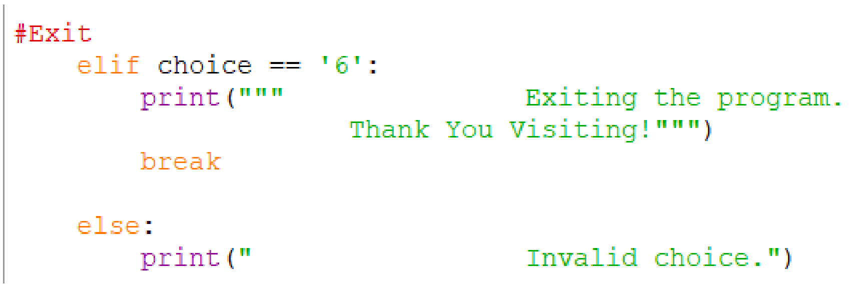


```
    elif choice == '4':
        update_the_project = True
        while update_the_project:
            print("""                 XYZ Company
            Update an existing project""")  #Update an existing project
            project_code_no = int(input("Project Code to update (Enter '0' to exit): ")) #Back to the main menu
            if project_code_no == 0:
                update_the_project = False
                break

            num_workers_to_add_for_list = int(input("Enter the number of Team Members to add: "))
            if len(workers) < num_workers_to_add_for_list:
                print("              Error: Not enough Team Members available. Please add more Team Members first.")
                continue

            for project in projects:
                if project['project_code'] == project_code_no:
                    project['client_name'] = str(input("Client's Name ({}) - ".format(project['client_name'])))
                    project['start_date'] = input("Start date ({}) - ".format(project['start_date']))
                    start_date = datetime.strptime(project['start_date'], "%Y-%m-%d")
                    project['end_date'] = input("Expected end date ({}) - ".format(project['end_date']))

                    end_date = datetime.strptime(
                        project['end_date'], "%Y-%m-%d")
                    project['status'] = input("Project Status (ongoing/on hold/completed): ")

                    if project['status'].lower() == 'completed':
                        project['actual_end_date'] = input(
                            "Actual End Date (YYYY-MM-DD): ")
                        actual_end_date = datetime.strptime(
                            project['actual_end_date'], "%Y-%m-%d")
                    else:
                        project['actual_end_date'] = None

                    project['num_workers'] += num_workers_to_add_for_list

            for _ in range(num_workers_to_add_for_list):
                workers.pop()

            save_project = input(
                "             Do you want to save the updated project? (Y/N) ")
            if save_project.upper() == "Y":
                print("             Project details updated successfully.")
            else:
                print("             Project details not updated")

            update_the_project = False
            break
```

3.8. Project Statistics

```
elif choice == '5':
    print("""XYZ Company
Project Statistics""") #Project Statistics

    ongoing_projects = 0

    completed_projects = 0
    on_hold_projects = 0

    for project in projects:
        if project['status'] == 'ongoing':
            ongoing_projects += 1
        elif project['status'] == 'completed':
            completed_projects += 1
        elif project['status'] == 'on hold':
            on_hold_projects += 1

        available_workers = len(workers)

        print("Number of ongoing projects: {}".format(ongoing_projects))
        print("Number of completed projects: {}".format(completed_projects))
        print("Number of on-hold projects: {}".format(on_hold_projects))
        print("Number of available Team Members: {}".format(available_workers))

    while True:
        view_details = input(
            "Do you want to see full details of a project? (Y/N) ")
        if view_details.upper() == "Y":
            print("Saved Project Codes:")
            for project in projects:
               print("Project Code: {}".format(project['project_code']))
            project_code_view = input("Enter the project code: ")
            for project in projects:
                if project['project_code'] == int(project_code_view):
                    print("Project Details:")
                    for key, value in project.items():
                        print("   {}: {}".format(key, value))
                    break
            else:
                print("Project with code " + str(project_code_view) + " not found.")

        else:
            break
```

3.9. Exit



```
#Exit
    elif choice == '6':
        print("""               Exiting the program.
                     Thank You Visiting!""")
        break

    else:
        print("                 Invalid choice.")
```

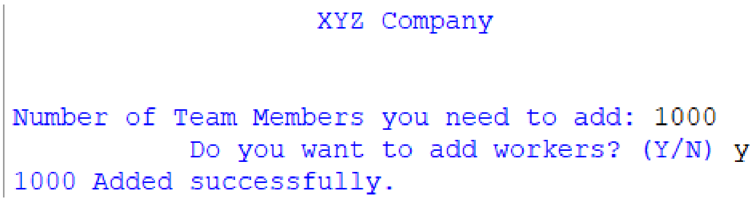
4. Test Cases Table

Option	Figure	Input	Expected output	Actual output	Result
		1000 *(workers)*	1000 *(Save in 'workers' list)*	1000 *(Saved in 'workers' list)*	Pass
	Figure 1 *(Main Menu)*				
1	Figure 2	Choice '1'	Open 'Add new project menu'	Opened 'Add new project menu'	Pass
		Project Code – 1 **No of workers** – 200 **Client's name** – kabi **Start Date** – 2023-07-14 **Expected Date** – 2023-10-03 **Project status** – (ongoing/on hold/completed)	**Project Code** – 1 **No of workers** – 200 **Client's name** – kabi **Start Date** – 2023-07-14 **Expected Date** – 2023-10-03 **Project status** – (ongoing/on hold/completed) *(It will need to be save)*	**Project Code** – 1 **No of workers** – 200 **Client's name** – kabi **Start Date** – 2023-07-14 **Expected Date** – 2023- 10-03 **Project status** – (ongoing/on hold/completed) *(It saved)*	Pass

Option	Figure	Input	Expected output	Actual output	Result
2		Choice ‘2’			
		Project Code - 1 (Its for 4th choice also)	Project code details need to be removed from the list	Project code details were removed from the list	Pass
3		Choice ‘3’	Add workers to the ongoing project – 100 workers	Workers successfully added – 100 workers *(Then total workers are 1100)*	Pass
4		Choice ‘4’	**Project code** – 1 **Enter no of team members** – 300 **Client name** – panda **Start date** – 2024 – 07 – 14 **Expected and date** – 2024 – 10 – 03 **Project Status** – on hold *(Old details need to be removed and these new details should be saved)*	**Project code** – 1 **Enter no of team members** – 300 **Client name** – panda **Start date** – 2024 – 07 – 14 **Expected and date** – 2024 – 10 – 03 **Project Status** – on hold *(New details saved)*	Pass
5		Choice ‘5’	If the user inputs ‘Y’ program should be ended	The program ended	

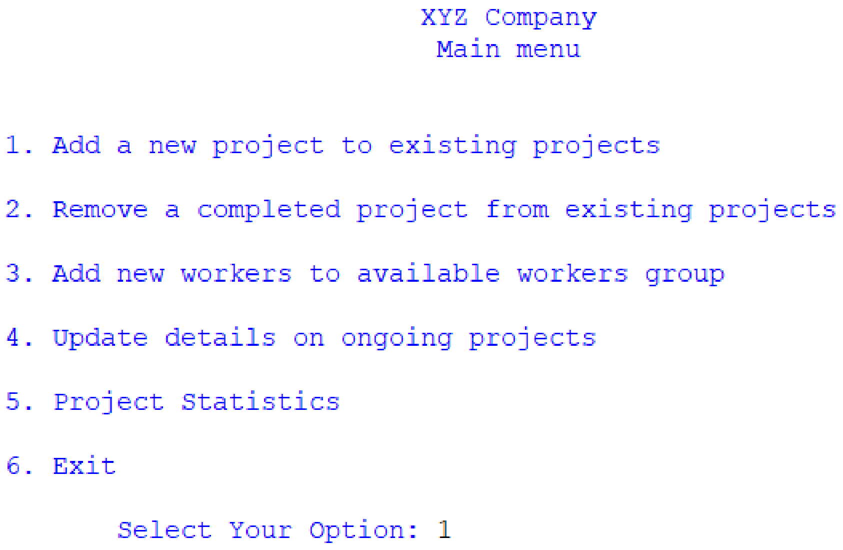
5. Output Screenshot

5.1. Add New Workers List



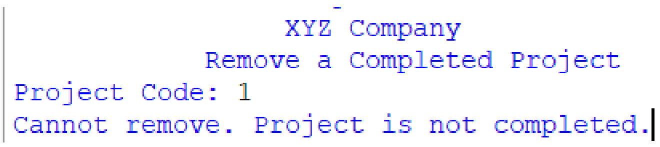
```
                    XYZ Company


Number of Team Members you need to add: 1000
           Do you want to add workers? (Y/N) y
1000 Added successfully.
```

5.2. Main Menu



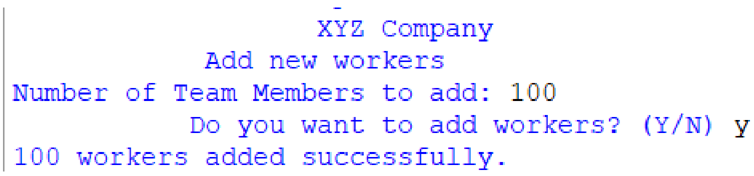
```
                           XYZ Company
                            Main menu


1. Add a new project to existing projects

2. Remove a completed project from existing projects

3. Add new workers to available workers group

4. Update details on ongoing projects

5. Project Statistics

6. Exit

       Select Your Option: 1
```

5.3. Remove a Project



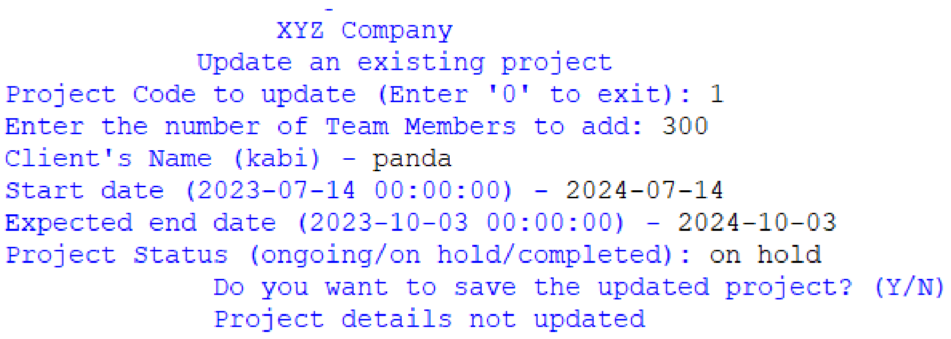
```
                  -
                 XYZ Company
            Remove a Completed Project
Project Code: 1
Cannot remove. Project is not completed.
```

5.4. Add New Workers



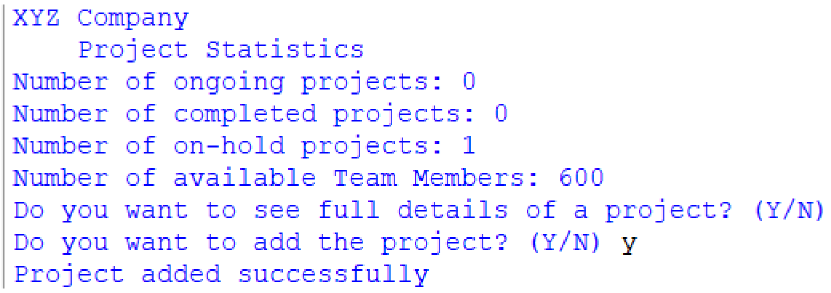
```
                  -
                   XYZ Company
            Add new workers
Number of Team Members to add: 100
           Do you want to add workers? (Y/N) y
100 workers added successfully.
```

5.5. Update Details



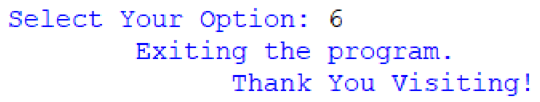
```
                  -
                 XYZ Company
            Update an existing project
Project Code to update (Enter '0' to exit): 1
Enter the number of Team Members to add: 300
Client's Name (kabi) - panda
Start date (2023-07-14 00:00:00) - 2024-07-14
Expected end date (2023-10-03 00:00:00) - 2024-10-03
Project Status (ongoing/on hold/completed): on hold
             Do you want to save the updated project? (Y/N)
             Project details not updated
```

5.6. Project Statistics



```
XYZ Company
    Project Statistics
Number of ongoing projects: 0
Number of completed projects: 0
Number of on-hold projects: 1
Number of available Team Members: 600
Do you want to see full details of a project? (Y/N)
Do you want to add the project? (Y/N) y
Project added successfully
```

5.7. Exit



```
Select Your Option: 6
        Exiting the program.
              Thank You Visiting!
```