Python Chapter 6 Dictionary Activities

Contents

Time required: 60 minutes

How to Think Like a Computer Scientist (Interactive Edition)

Go through the following tutorials.

Dictionaries

Online Tutorials

Go through the following tutorials.

- Python Dictionaries
    - Access Items
    - Change Items
    - Add Items
    - Remove Items
    - Loop Dictionaries
    - Copy Dictionaries

Python Dictionaries

A dictionary in Python is an unordered, mutable collection of key-value pairs. It provides an efficient way to store and retrieve data, where each value is associated with a unique key.

Key Characteristics:

- **Unordered:** Elements in a dictionary are not stored in a specific order. Access is based on keys, not indices.
- **Mutable:** You can modify the content of a dictionary by adding, updating, or removing key-value pairs.
- **Unique Keys:** Each key in a dictionary must be unique. However, values can be duplicated.

Create a dictionary:

```
# Syntax: {key1: value1, key2: value2, ...}
my_dict = {'name': 'John', 'age': 25, 'city': 'New York'}
```

Access values:

```
# Accessing values using keys
print(my_dict.get('name')
Output: John
```

Adding and updating entries:

```
# Adding a new key-value pair
my_dict['occupation'] = 'Engineer'

# Updating an existing value
my_dict['age'] = 26
```

Removing entries:

```
# Removing a specific key-value pair
del my_dict['city']

# Clearing all entries
my_dict.clear()
```

Dictionary methods:

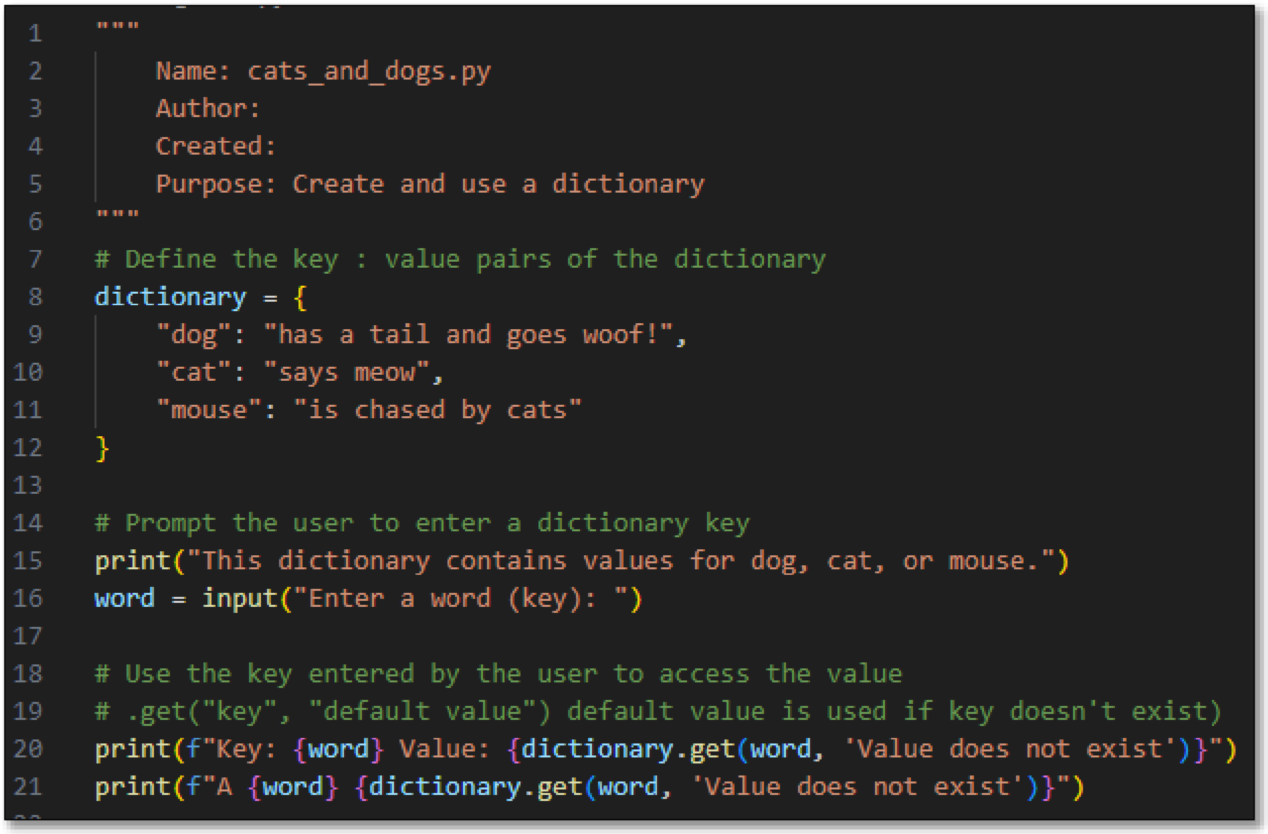
```
# Get a list of keys
keys = my_dict.keys()

# Get a list of values
values = my_dict.values()

# Check if a key exists
if 'name' in my_dict:
    print('Key "name" exists!')
```

Iterating through a dictionary:

```
# Iterate through keys and values
for key, value in my_dict.items():
    print(f'{key}: {value}')
```

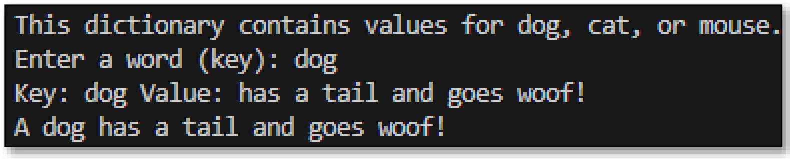
Tutorial 1: Cats and Dogs

A simple dictionary example with cats and dogs.

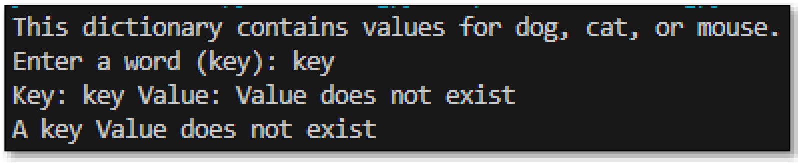


```python
"""
    Name: cats_and_dogs.py
    Author:
    Created:
    Purpose: Create and use a dictionary
"""
# Define the key : value pairs of the dictionary
dictionary = {
    "dog": "has a tail and goes woof!",
    "cat": "says meow",
    "mouse": "is chased by cats"
}

# Prompt the user to enter a dictionary key
print("This dictionary contains values for dog, cat, or mouse.")
word = input("Enter a word (key): ")

# Use the key entered by the user to access the value
# .get("key", "default value") default value is used if key doesn't exist)
print(f"Key: {word} Value: {dictionary.get(word, 'Value does not exist')}")
print(f"A {word} {dictionary.get(word, 'Value does not exist')}")
```

Example run:



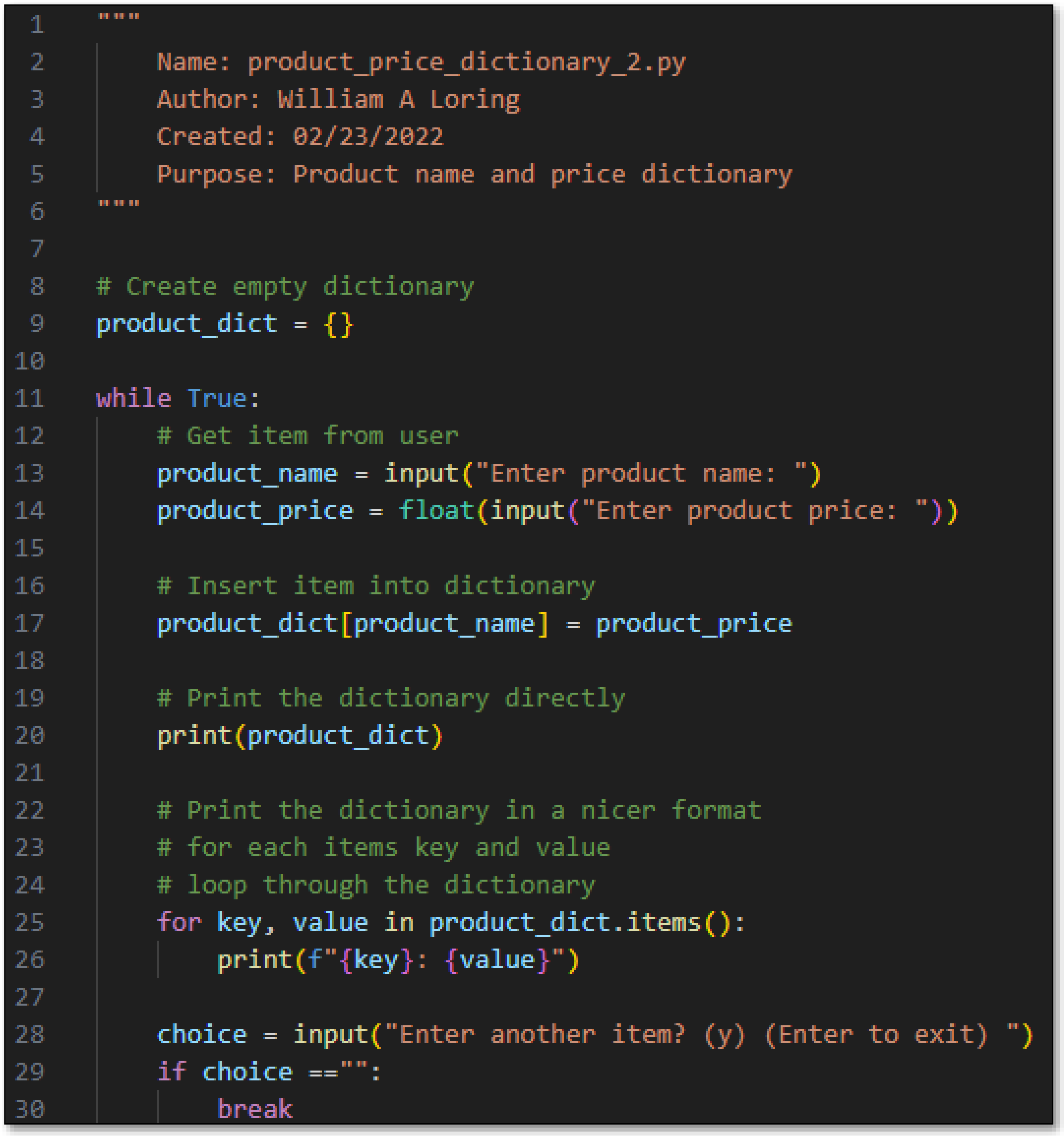
```
This dictionary contains values for dog, cat, or mouse.
Enter a word (key): dog
Key: dog Value: has a tail and goes woof!
A dog has a tail and goes woof!
```



```
This dictionary contains values for dog, cat, or mouse.
Enter a word (key): key
Key: key Value: Value does not exist
A key Value does not exist
```

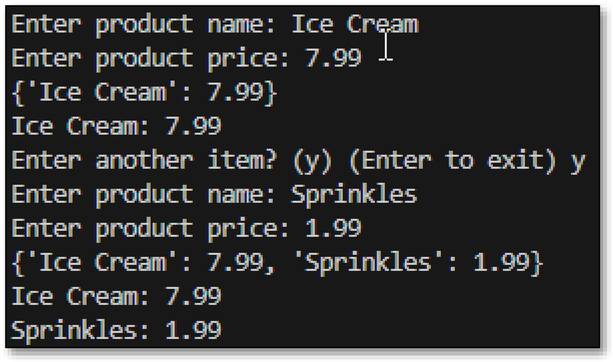
Tutorial 2: Add Items to a Dictionary

You can add items to a dictionary from user input.



```python
"""
    Name: product_price_dictionary_2.py
    Author: William A Loring
    Created: 02/23/2022
    Purpose: Product name and price dictionary
"""

# Create empty dictionary
product_dict = {}

while True:
    # Get item from user
    product_name = input("Enter product name: ")
    product_price = float(input("Enter product price: "))

    # Insert item into dictionary
    product_dict[product_name] = product_price

    # Print the dictionary directly
    print(product_dict)

    # Print the dictionary in a nicer format
    # for each items key and value
    # loop through the dictionary
    for key, value in product_dict.items():
        print(f"{key}: {value}")

    choice = input("Enter another item? (y) (Enter to exit) ")
    if choice =="":
        break
```

Example run:



```
Enter product name: Ice Cream
Enter product price: 7.99
{'Ice Cream': 7.99}
Ice Cream: 7.99
Enter another item? (y) (Enter to exit) y
Enter product name: Sprinkles
Enter product price: 1.99
{'Ice Cream': 7.99, 'Sprinkles': 1.99}
Ice Cream: 7.99
Sprinkles: 1.99
```

Tutorial 3: Pickle a Dictionary

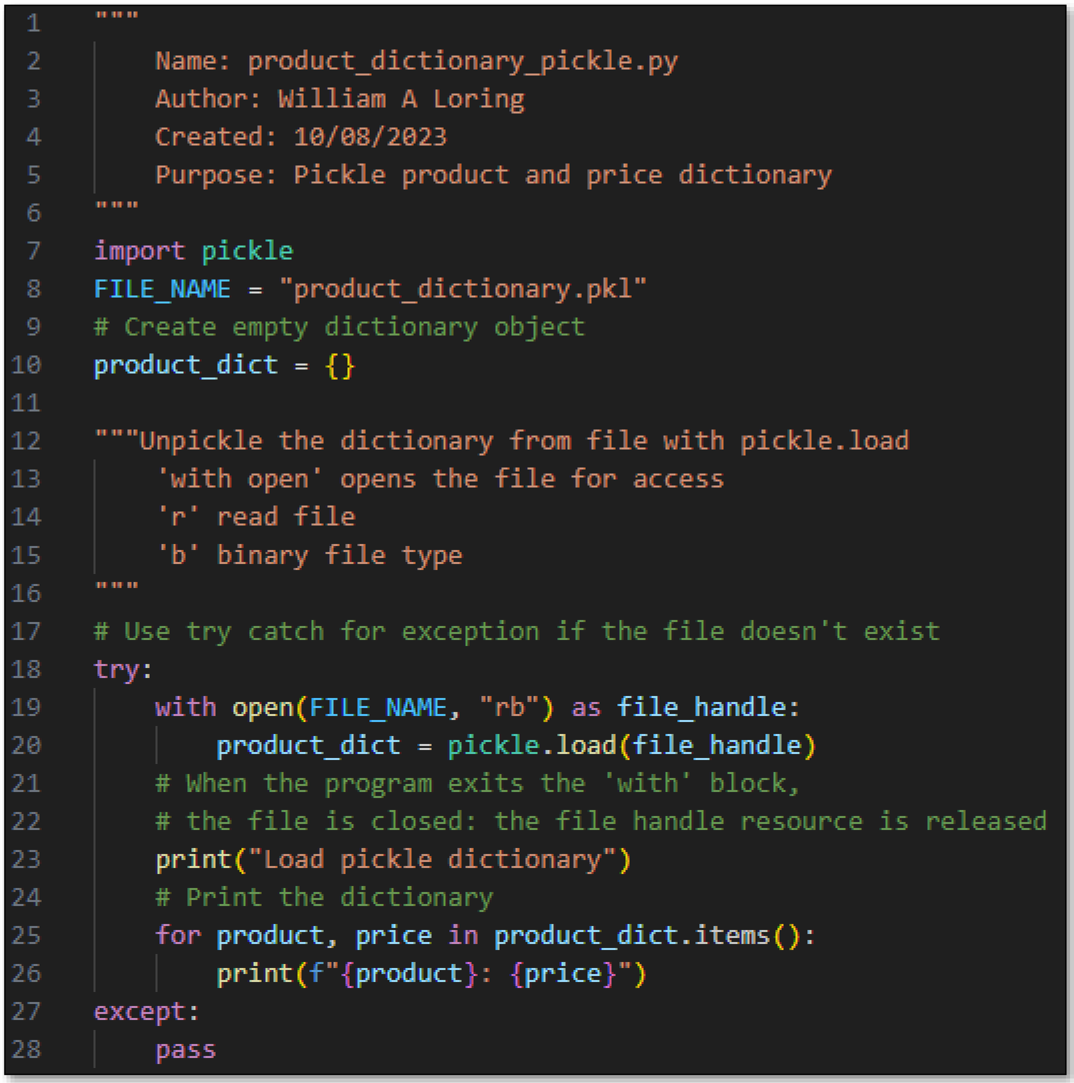
Pickling in Python refers to the process of serializing objects, converting them into a byte stream. To pickle a dictionary, use the built in Python **pickle** module. Import it, open a file in binary mode, and use the **dump** function to serialize (convert to a byte stream) the dictionary.

Unpickling is the reverse process, where the byte stream is converted back into a Python object using the **load** function.

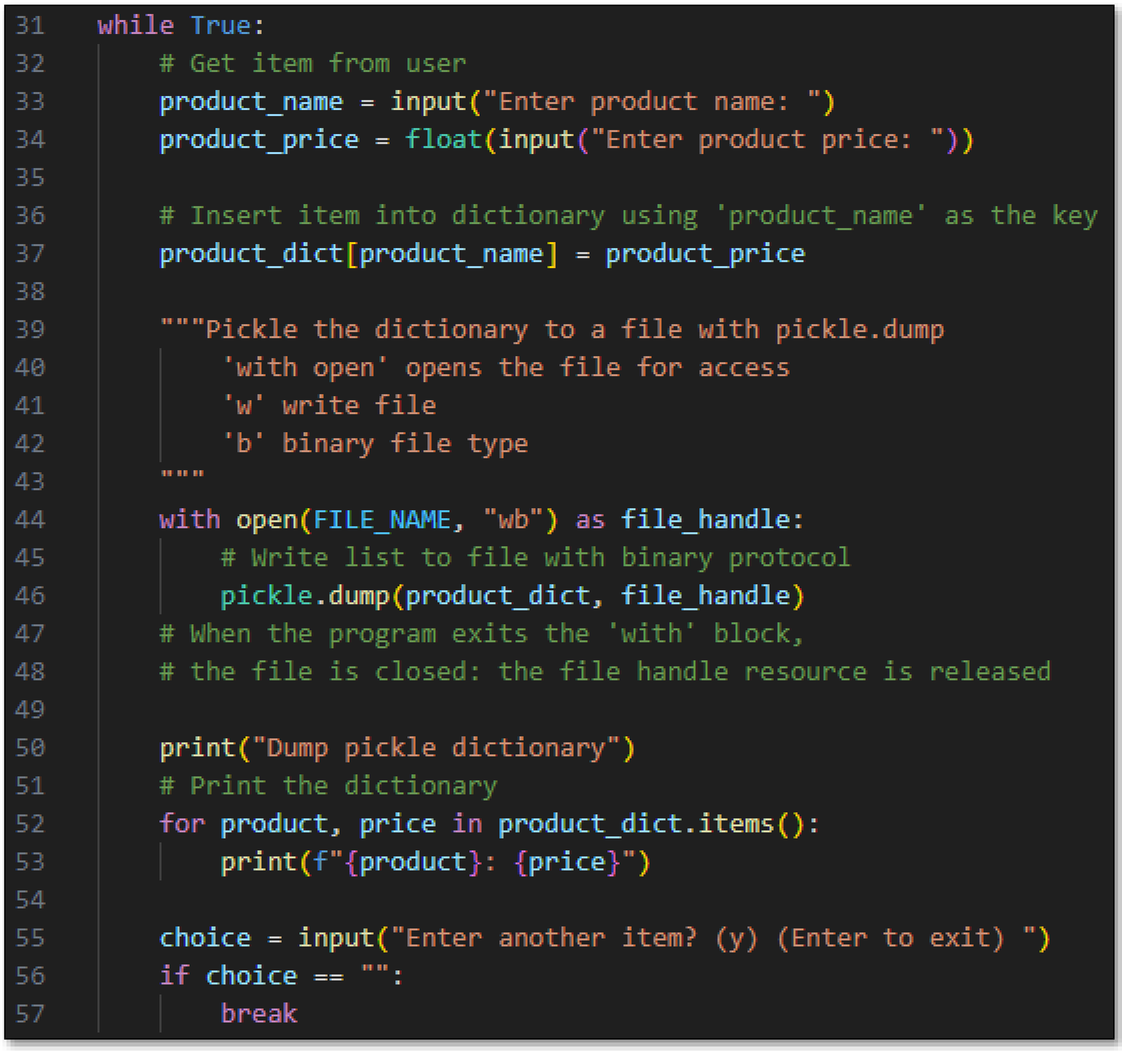
Example:

```
import pickle

# Pickling a dictionary
data = {'key': 'value'}
with open('filename.pkl', 'wb') as file:
    pickle.dump(data, file)

# Unpickling the dictionary
with open('filename.pkl', 'rb') as file:
    unpickled_data = pickle.load(file)

print(unpickled_data)
```

Update the previous tutorial to pickle and unpickle a dictionary.

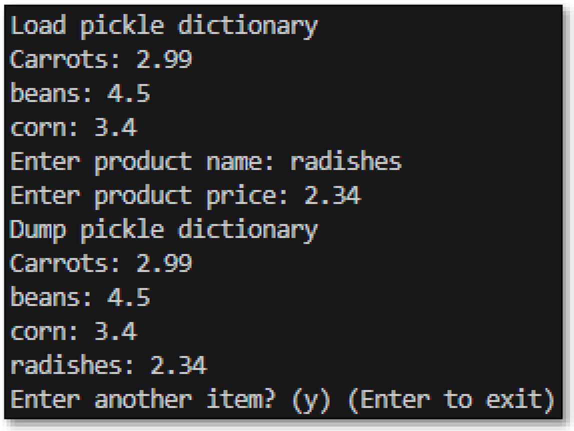


```python
"""
    Name: product_dictionary_pickle.py
    Author: William A Loring
    Created: 10/08/2023
    Purpose: Pickle product and price dictionary
"""
import pickle
FILE_NAME = "product_dictionary.pkl"
# Create empty dictionary object
product_dict = {}

"""Unpickle the dictionary from file with pickle.load
    'with open' opens the file for access
    'r' read file
    'b' binary file type
"""
# Use try catch for exception if the file doesn't exist
try:
    with open(FILE_NAME, "rb") as file_handle:
        product_dict = pickle.load(file_handle)
    # When the program exits the 'with' block,
    # the file is closed: the file handle resource is released
    print("Load pickle dictionary")
    # Print the dictionary
    for product, price in product_dict.items():
        print(f"{product}: {price}")
except:
    pass
```



```python
while True:
    # Get item from user
    product_name = input("Enter product name: ")
    product_price = float(input("Enter product price: "))

    # Insert item into dictionary using 'product_name' as the key
    product_dict[product_name] = product_price

    """Pickle the dictionary to a file with pickle.dump
        'with open' opens the file for access
        'w' write file
        'b' binary file type
    """
    with open(FILE_NAME, "wb") as file_handle:
        # Write list to file with binary protocol
        pickle.dump(product_dict, file_handle)
    # When the program exits the 'with' block,
    # the file is closed: the file handle resource is released

    print("Dump pickle dictionary")
    # Print the dictionary
    for product, price in product_dict.items():
        print(f"{product}: {price}")

    choice = input("Enter another item? (y) (Enter to exit) ")
    if choice == "":
        break
```

Example run:



```
Load pickle dictionary
Carrots: 2.99
beans: 4.5
corn: 3.4
Enter product name: radishes
Enter product price: 2.34
Dump pickle dictionary
Carrots: 2.99
beans: 4.5
corn: 3.4
radishes: 2.34
Enter another item? (y) (Enter to exit)
```

Assignment 1: Create a Sports Team Roster

Create a Python dictionary representing a sports team roster. Choose any sport, be creative with your team!

This is a hard coded, you don’t need to have any input.

Each player will have:

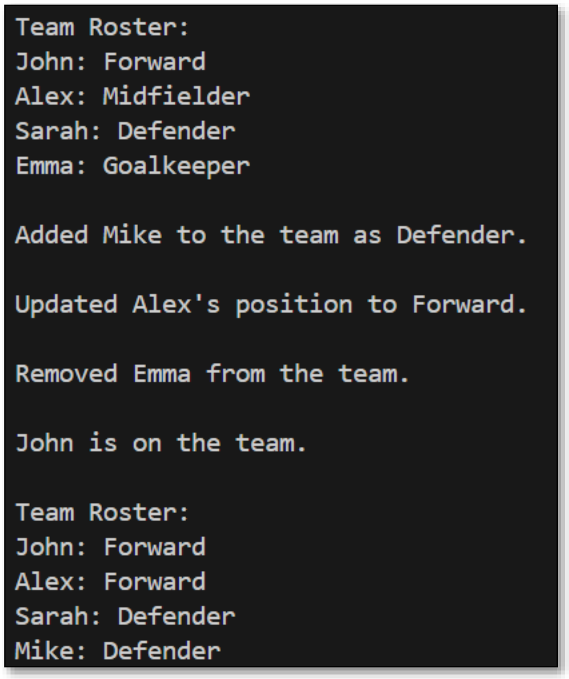
- **Name** (key)
- **Position** (value) – Choose from positions relevant to the sport you choose (e.g., soccer: "Forward", "Midfielder", etc.).

Example dictionary.

```
team_roster = {
    "John": "Forward",
    "Alex": "Midfielder",
    "Sarah": "Defender",
    "Emma": "Goalkeeper"
}
```

- **Display the team roster** in a clear format, showing each player's name and position.
- **Add a new player** to the team, specifying their name and position. Print the updated roster.
- **Update a player's position** (choose any player), and print the updated roster.
- **Remove a player** from the team by name, and print the updated roster.
- **Check if a player** (choose a name) is on the team. Print a message indicating whether they are on the roster or not.

Example run:



```
Team Roster:
John: Forward
Alex: Midfielder
Sarah: Defender
Emma: Goalkeeper

Added Mike to the team as Defender.

Updated Alex's position to Forward.

Removed Emma from the team.

John is on the team.

Team Roster:
John: Forward
Alex: Forward
Sarah: Defender
Mike: Defender
```

Assignment Submission

1. Attach the program files.
2. Attach screenshots showing the successful operation of the program.
3. Submit in Blackboard.