**IS201 Fundamentals of Computing**

**H0S04 Dictionary, Set**

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 A white cat in a circle with a blue and black logo

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**Before You Start**

* The directory path shown in screenshots may be different from yours.
* Some steps are not explained in the tutorial**.** If you are not sure what to do:
  1. Consult the resources listed below.
  2. If you cannot solve the problem after a few tries, ask a SW for help.

**Learning Outcomes**

Students will be able to:

* Understand the Dictionary data type and Set data type in Python
* Write a Python program that can manipulate data stored in Dictionary and Set.

**Resources**

* Python crash course: a hands-on, project-based introduction to programming: Matthes, E. (2019): [Available online link](https://cityu.alma.exlibrisgroup.com/discovery/openurl?institution=01CITYUNIV_INST&rfr_id=info:sid%2Fsummon&rft_dat=ie%3D5152833400004251,language%3DEN&svc_dat=CTO&u.ignore_date_coverage=true&vid=01CITYUNIV_INST:Services)

**Dictionary Data Type**

A dictionary is a collection of many values. Unlike Lists, indices for dictionaries can use many different data types, it’s called keys, and a key with its associated value is called a key-value pair. Each key is separated from its value by a colon (:), the items are separated by commas and the whole thing is enclosed in curly braces. Keys are unique within a dictionary while values may not be. The values of a dictionary can be of any type, but the keys must be of an immutable data type such as strings, numbers, or tuples.

In the Dictionary functions like accessing values, updating the dictionary, adding new pairs and deleting the elements can be performed.

*Note: If the key you ask for doesn't exist, you'll get an error. More than one entry per key not allowed. Which means no duplicate key is allowed. When duplicate keys encountered during assignment, the last assignment wins.*

Dictionary is unordered. Thus, if you compare two dictionaries with the same content but not the same order, it will return true.

**Looping in Dictionary**

A single Python dictionary can contain just a few key-value pairs or millions of pairs. Python lets you loop through a dictionary. You can loop through all a dictionary's key-value pairs, through its keys, or through its values.

Note: For accessing only keys, use .keys() and for values use .values() in the loop.

**Set**

A set is a collection which is unordered and unindexed. In Python sets are written with curly brackets.

Example:

thisset = {"apple", "banana", "cherry"}

**Accessing items:** You cannot access items in a set by referring to an index, since sets are unordered the items have no index. But you can loop through the set items using a ‘for’ loop or ask if a specified value is present in a set, by using the in keyword.

**Modify items:** Once a set is created, you cannot change its items, but you can add new items.

**Add items:** To add one item to a set use the add() method. To add more than one item to a set use the update() method.

**Remove items:** To remove an item in a set, use the remove(), or the discard() method.

**Joining two sets:** There are several ways to join two or more sets in Python. You can use the union() method that returns a new set containing all items from both sets, or the update() method that inserts all the items from one set into another.

**Constructor:** It is also possible to use the set() constructor to make a set.

**Create a Project**

Follow HOS1 to set up the project in Codespaces, or use any other code editor you prefer, such as Visual Studio, Visual Studio Code, Sublime, Vim, etc…

We will create a Python project to cover all the learning outcomes.

1. Create a Python file named HOS04.py
2. The project simulates a book database by using a dictionary to store the title as the key, the author, and the year as a tuple for the value. The author's name will also be stored separately in a set to keep them unique.
3. Declare the class, store title: (author, year) in a dictionary, and authors in set().

A close-up of text

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1. Create an add book function and pass the title, author, and year as the arguments. Add a check to ensure not to add a duplicate book.

A close-up of a code

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1. Create a remove function by book title; please confirm the message if the book has been removed successfully or the book is not found in the database.

A computer code with many colored text

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1. Create a search book function to search the book by its title.

A computer code with text

Description automatically generated with medium confidence

1. Create a display book function to print all the books in the database, including their titles, authors, and published years.

A close-up of a computer code

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1. Create a function to display authors.

A screenshot of a computer code

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1. Create test data to verify all functions are working properly.

A screenshot of a computer code

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1. Expected output after executing the program.

A screenshot of a computer

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**Submit your Work to Brightspace**

Please upload your .py file to the HOS04 assignment on Brightspace.