

Practical 6: Iterator for Selection and Projection

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I. INTRODUCTION

Aim of this practical is to iterator for selection and join operation.

II. LOGIC

Prerequisite setup

- Created a data file and added dummy in it
- ⇒ Open data file
- ⇒ get attribute, value and condition from user ¹
- ⇒ also optional parameter can be passed for case sensitive match
- ⇒ start evaluating condition
- ⇒ display result satisfying condition
- ⇒ display summary of program
- ⇒ To implement program projection is considered as selection with no condition.

III. IMPLEMENTATION

The code is implemented in Python as below

```
1  #!/usr/bin/env python3
2  # -*- coding: utf-8 -*-
3  """
4  Author: Gahan Saraiya
5  Git: https://github.com/gahan9
6  StackOverflow: https://stackoverflow.com/users/story/7664524
7  """
8  import os
9
10 from faker import Faker
11
12 fak = Faker()
13
```

¹here just a function call/test case used

```

14
15 class Iterator(object):
16     """
17     Iterator class to add tuple in form of table
18     attributes -> <attrib1, attrib2, attrib3,...>
19     Adding values
20     values -> <val1, val2, val3, ....>
21     """
22
23     def __init__(self, attribute_tuple, file_path, *args, **kwargs):
24         """
25
26         :param attribute_tuple: attribute tuple in form of string containing attributes of
27         ↪ file (if to be created)
28         :param file_path: location of data file
29         :param args:
30         :param kwargs:
31         """
32         self.attributes = attribute_tuple
33         self.file_path = file_path
34         self.separator = "\t"
35         self.initialize_file()
36
37     def initialize_file(self):
38         # check if file exists or not
39         if os.path.exists(self.file_path):
40             pass
41         else:
42             # create file with header if file not exist
43             with open(self.file_path, "w") as f:
44                 f.write(self.separator.join(self.attributes))
45                 f.write("\n")
46
47     def add_dummy_data(self, number_of_record=100):
48         """
49         :param number_of_record: number of records to be inserted in given file path
50         :return:
51         """
52         with open(self.file_path, "a+") as file: # open file in append mode
53             for _ in range(number_of_record):
54                 f = fak.profile()
55                 data_tuple = (
56                     f['name'], f['ssn'], f['sex'], f['job'].replace("\n", ""),
57                     ↪ f['company'].replace("\n", ""), f['address'].replace("\n", "")
58                 )
59                 data_string = self.separator.join(data_tuple) + "\n"
60                 file.write(data_string)
61
62     @staticmethod
63     def _match(value, condition, record_val, case=False):

```

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64     dynamic evaluation of matching value
65     :param value: value to be match
66     :param condition: condition through which values to be compared
67     :param record_val: value of record in data file
68     :param case: case sensitive? (True or False)
69     :return: boolean value if condition satisfies or not
70     """
71     # exist in...
72     if eval("""{} {} {}""".format(value.lower(), condition, record_val.lower())):
73         if case and eval("""{} {} {}""".format(value, condition, record_val)):
74             # match case sensitive
75             return True
76         elif not case:
77             # match case insensitive
78             return True
79     return False
80
81 def select(self, attributes=None, condition="all", values=None, case_sensitive=False):
82     """
83     dynamic selection from data file with various operations
84     :param attributes: attribute/column name
85     :param condition: condition to be compared
86     :param values: value to be matched for attribute
87     :param case_sensitive: whether match should be case sensitive or not
88     :return:
89     prints matched data and summary
90     """
91     query = "{}\n{}\nSELECT * from {}".format("#"*50, self.file_path)
92     where_clause = " WHERE {} {} {}".format(attributes[0], condition, values[0])
93     query = query + where_clause if condition != "all" else query
94     print(query)
95     file = open(self.file_path, "r")
96     header = file.readline() # skip header
97     print(header)
98     total_results = 0
99     total_records = 0
100    for record in file.read().split("\n"):
101        total_records += 1
102        if record and condition == "all":
103            total_results += 1
104            print(record)
105        elif record:
106            record_lis = record.split("\t")
107            attribute, value = attributes[0], values[0]
108            record_val = record_lis[header.split("\t").index(attribute)]
109            # print(record_val, value, condition)
110            if condition.lower() in ("==", "equal", "equals", "equals to"):
111                if self._match(value, "==", record_val, case_sensitive):
112                    total_results += 1
113                    print(record)
114            elif condition.lower() in ("in", "contains", "contain"):
115                if self._match(value, "in", record_val, case_sensitive):

```

```

116         total_results += 1
117         print(record)
118     elif condition.lower() in ("<", "lt"):
119         if self._match(value, "<", record_val, case_sensitive):
120             total_results += 1
121             print(record)
122     elif condition.lower() in (">", "gt"):
123         if self._match(value, ">", record_val, case_sensitive):
124             total_results += 1
125             print(record)
126     elif condition.lower() in ("<=", "lte"):
127         if self._match(value, "<=", record_val, case_sensitive):
128             total_results += 1
129             print(record)
130     elif condition.lower() in (">=", "gte"):
131         if self._match(value, ">=", record_val, case_sensitive):
132             total_results += 1
133             print(record)
134     file.close()
135     print("-"*30)
136     print("Total Results: {}".format(total_results))
137     print("Total Records: {}".format(total_records))
138
139
140 if __name__ == "__main__":
141     table = Iterator(attribute_tuple=("name", "ssn", "gender", "job", "company",
142     ↪ "address"),
143                       file_path="iterator.dbf")
144     table.select(attributes=["name"], values=["William Jensen"], condition "==",
145     ↪ case_sensitive=False)
146     # table.select(attributes=["gender"], values=["M"], condition "==",
147     ↪ case_sensitive=False)
148     table.select(attributes=["name"], values=["William"], condition="in",
149     ↪ case_sensitive=True)
150     table.select(attributes=["ssn"], values=["441-31-5305"], condition "==",
151     ↪ case_sensitive=False)
152     table.select(attributes=["ssn"], values=["-511"], condition="in", case_sensitive=False)

```

1 Output

```

#####
#####
SELECT * from iterator.dbf WHERE name == William Jensen
name      ssn      gender  job      company      address
-----
William Jensen      879-23-3557      M      Structural engineer      Ramsey, Walker and Jordan      788 Mueller AvenueBlackberg, WA 22816
-----
Total Results: 1
Total Records: 2002
#####
#####
SELECT * from iterator.dbf WHERE name in William
name      ssn      gender  job      company      address
-----
William Novak      054-78-8142      M      Music therapist      Williams LLC      648 Ballard Courts Suite 214Taylorhaven, CA 45271
William Stevens      349-58-8376      M      Air traffic controller      Walker-Swanson      1929 Cole Plaza Suite 599Wendymouth, NH 21110
Tyler Williams      136-87-2807      M      Lobbyist      Santos and Sons      101 Jones Unions Suite 142West Christopher, IL 25773
Billy Williams      746-93-0554      M      Fitness centre manager      Cruz, Johnson and Rodriguez      482 Jones RiverHernandeztown, NC 54985
William Richards      585-70-6924      M      Land      Clarke-Ortiz      90118 Cody Valleys Apt. 089South Kennethstad, FW 57190
Robert Williams      031-17-3671      M      Video editor      Clarke, Turner and Torres      16908 Miller Locks Suite 233Herrerahaven, OH 90870
Justin Williams      802-37-3926      M      Historic buildings inspector/conservation officer      Scott, Wilson and Barron      PSC 2707, Box 7786APO
↪ AP 32119

```

William Morton	680-12-4746	M	Magazine journalist	Morgan-Garcia	3620 Howe Fall	East Jamie, MT 30927
Eric Williams	667-51-8088	M	Actuary	Sandoval, White and Davis	9858 Steven Squares Suite 106	East Wanda, IN 65419
Nicole Williams	493-93-6001	F	Nurse, children's	Wilson, Abbott and Garcia	33188 Meghan Trail Apt. 798	Amberstown, PA 25023
William Bryan	284-57-0935	M	Scientist, audiological	King PLC	2348 Barbara Prairie Apt. 695	New Ginaburgh, MO 36411
Shannon Williams	147-72-5963	F	Air traffic controller	Green-Jones	32994 Tommy Stream	South Michael, KS 70874
Tonya Williams	546-39-5744	F	Development worker, international aid	Parker, Lee and Butler	65329 Hale Gateway Apt.	
← 246Howellhaven, MA 05636						
Kathryn Williams	062-62-2669	F	Product manager	Mueller, Orr and Foster	73922 Melissa Mission Apt. 383	North Gary, PR 71662
William George	043-59-7405	M	Brewing technologist	Bernard, Carrillo and Burns	651 Michelle Centers Suite 318	North Tracy, WV
← 80389						
William James	843-27-5322	M	Licensed conveyancer	Patel, Knapp and Jackson	398 David Port	North Nicholas, NM 29137
Mary Williams	587-89-9236	F	Dramatherapist	Rivera Inc	5595 Laura Well Apt. 188	Lake Amy, MI 26964
Suzanne Williams	754-64-5690	F	Chiropractor	Ross, Cox and Rivera	198 Ruiz Bridge	Johnsonchester, IA 37612
Andrew Williams	339-39-2981	M	Banker	Hodge, Hernandez and Smith	03701 Miller Port Apt. 832	Goodwinfurt, TX 56573
Brian Williams	218-04-0846	M	Translator	Clark-Johnson	USNV Daniels	FPO AP 83755
Dana Williams	094-02-7435	F	Social researcher	Anderson-Copeland	71095 Davis Ways Suite 421	New Saraside, NE 19271
Mr. Christopher Williams	191-09-2291	M	Conservation officer, nature	Ruiz-Christian	2176 Samantha Island Apt. 254	West Garytown, WV
← UT 65665						
Deborah Williams	527-69-5808	F	Illustrator	Nguyen-Harris	564 Brown Drives Apt. 338	New Christopherstad, CT 68441
Jason Williams	861-90-9973	M	Academic librarian	Hall-Washington	05576 Shelton Cliff Suite 622	North Gregorychester, MI 98432
William Moses	489-79-6356	M	Public relations account executive	Webb, Smith and Ramirez	34037 Christensen Isle	Marcusview, DC
← 50394						
Reginald Williams	578-59-2241	M	Designer, graphic	Hogan Inc	68786 Joseph Tunnel Apt. 062	South Michael, KY 69123
William Hampton	383-49-3998	M	Technical sales engineer	Levy-Ward	39538 Lori Port	South Drew, NY 52747
Rachel Williams	037-11-7788	F	Research scientist (physical sciences)	Tucker, Pacheco and Lopez	1398 Crystal Inlet	Lewisburgh,
← WV 51755						
William Ryan DDS	219-15-4709	M	Farm manager	Duran and Sons	477 Victor Mall Apt. 991	New Ernest, VA 83123
William Morton PhD	791-03-6643	M	Programme researcher, broadcasting/film/video	Lopez-Huffman	6917 Kimberly Mission	Aaronborough,
← OK 54142						
William Morales	678-96-2937	M	Public relations account executive	Jackson Inc	3647 Sean Tunnel	Dorseyburgh, VA 77505
William Cooper	406-05-9991	M	Podiatrist	Thompson-Andrews	390 Higgins Keys	Mooreland, IA 23967
Francisco Williams	333-73-7777	M	Scientist, audiological	Vance Group	87146 Barbara Rue	Corybury, MO 46953
William Webb	311-46-2097	M	Engineer, aeronautical	Kim Ltd	1769 Smith Road Apt. 973	North Jacksonmouth, ID 34496
Riley Williams	751-77-2938	M	Engineer, chemical	Ferguson, Montgomery and Payne	68046 Paul Crossroad	West Katelyntown, SC 87641
William Davis	627-70-6635	M	Barista	Boyle-Smith	3083 Fuller Village Suite 500	Hansenburgh, VI 32746
William Santos	288-99-9646	M	Producer, television/film/video	Walker-Ford	883 Justin Park	Justinside, NV 96475
Mrs. Debra Williams	818-99-6152	F	Chief Technology Officer	Walker-Martin	9678 Richardson Motorway	North Justin, SD 66047
Betty Williams	897-29-0739	F	Land/geomatics surveyor	Brandt, Simmons and Vaughn	86682 Shane Spring Apt. 276	Clementsview, KS
← 77870						
William Johnson	029-89-0376	M	Broadcast presenter	Bailey PLC	1453 Vasquez Street Suite 638	South John, OK 51897
William McIntosh	319-83-1012	M	Ecologist	Weiss LLC	800 Larry Forest Suite 292	West Rebecca, KY 11405
William Weaver	393-76-9493	M	Hospital doctor	Smith-Pugh	840 Brown Mountain	Katherineborough, PR 31455
William Beck	087-77-9700	M	Licensed conveyancer	Wright-White	680 Gallegos Rue Suite 870	North Thommasside, MS 17956
Michele Williams	520-79-4333	F	Seismic interpreter	Cardenas-Ingram	11131 Kaitlyn Manors Suite 304	West Angela, FL 10488
William Jensen	879-23-3557	M	Structural engineer	Ramsey, Walker and Jordan	788 Mueller Avenue	Blackberg, WA 22816
Keith Williams	672-08-6246	M	Risk manager	Velez-Stevens	USS Romero	FPO AP 48575
Elaine Williams	584-98-7244	F	Orthoptist	Hill Group	517 Norman Mills	North Kellychester, WV 04905
William Ramirez	223-62-6204	M	Surveyor, rural practice	Watts Group	12948 Jones Inlet	Port Kathrynchester, AL 95444
Amy Williams	108-75-3167	F	Acupuncturist	Smith-Welch	652 William Roads	Port Devintown, AZ 40043
Joseph Williams	353-92-8608	M	Chartered loss adjuster	Bird Ltd	017 Molina Landing Apt. 371	Ea David, PW 84965
William Alvarez	441-31-5305	M	Hospital doctor	Martin, Adams and Lewis	28676 Harvey Shoal Suite 075	South Catherine, AL 69231

Total Results: 51						
Total Records: 2002						

SELECT * from iterator.dbf WHERE ssn == 441-31-5305						
name	ssn	gender	job	company	address	
William Alvarez	441-31-5305	M	Hospital doctor	Martin, Adams and Lewis	28676 Harvey Shoal Suite 075	South Catherine, AL 69231

Total Results: 1						
Total Records: 2002						

SELECT * from iterator.dbf WHERE ssn in -511						
name	ssn	gender	job	company	address	
Thomas Taylor	616-02-5113	M	Teacher, adult education	Garcia, Alvarado and Kirk	0623 Margaret Stravenue	South Keithfurt, SC
← 43695						
Karen Ramirez	309-51-5110	F	Production assistant, radio	Andrews-Perez	8324 Kristi Islands	Port Debraland, WA 88458

Total Results: 2						
Total Records: 2002						

IV. SUMMARY

- Iterator is used to iterate over all data from file storage.
- For projection program won't use any condition to filter out data and displays all the data which exists in data file.
- For select operation conditions are to be matched as case insensitive (default implementation) and supports case sensitive operation if optional parameter passed to function.
- Program also contains function of creating dummy data as much as needed.

- Easier to use for small scale system without any overhead of setup and configuration.
- Program is made modular so that it's functionality can be further updated vary easily for large scale.