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1 Exercise in Basic Python data structures.
2
3 Reproduce the following python interactive listing using different data of
4 your choosing, e.g., choose different variable names and data strings other
5 than 'Bob Smith' and 'Sue Jones'
6
7 >>> bob = ['Bob Smith', 42, 30000, 'software']
8 >>> sue = ['Sue Jones', 45, 40000, 'hardware']
9
10 >>> bob[0], sue[2]           # fetch name, pay
11 ('Bob Smith', 40000)
12
13 >>> bob[0].split()[-1]      # what's bob's last name?
14 'Smith'
15
16 >>> sue[2] *= 1.25          # give sue a 25% raise
17 >>> sue
18
19 ['Sue Jones', 45, 50000.0, 'hardware']
20
21 >>> people = [bob, sue ]    # reference in list of lists
22
23 >>> for person in people:
24     print(person)
25
26 ['Bob Smith', 42, 30000, 'software']
27 ['Sue Jones', 45, 50000.0, 'hardware']
28
29 >>> people[1][0]
30
31 'Sue Jones'
32
33 >>> for person in people:
34     print(person[0].split()[-1])           # print last names
35     person[2] *= 1.20                       # give each a 20% raise
36
37 Smith
38 Jones
39
40 >>> for person in people: print(person[2])  # check new pay
41
42 36000.0
43 60000.0
44
45 >>> pays = [person[2] for person in people] # collect all pay
46 >>> pays
47
48 [36000.0, 60000.0]
49
50 >>> pays = map((lambda x: x[2]), people)    # ditto (map is a generator in
51 3.X)
52
53 >>> list(pays)
54
55 [36000.0, 60000.0]

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56 >>> sum(person[2] for person in people)           # generator expression, sum
57 built-in
58
59 96000.0
60
61 >>> people.append(['Tom', 50, 0, None])
62 >>> len(people)
63
64 3
65
66 >>> people[-1][0]
67
68 'Tom'
69
70 >>> NAME, AGE, PAY = range(3)                     # 0, 1, and 2
71 >>> bob = ['Bob Smith', 42, 10000]
72 >>> bob[NAME]
73
74 'Bob Smith'
75
76 >>> PAY, bob[PAY]
77
78 (2, 10000)
79
80 >>> bob = [['name', 'Bob Smith'], ['age', 42], ['pay', 10000]]
81 >>> sue = [['name', 'Sue Jones'], ['age', 45], ['pay', 20000]]
82 >>> people = [bob, sue]
83
84 >>> for person in people:
85     print(person[0][1], person[2][1])           # name, pay
86
87 Bob Smith 10000
88 Sue Jones 20000
89
90 >>> [person[0][1] for person in people]         # collect names
91
92 ['Bob Smith', 'Sue Jones']
93
94 >>> for person in people:
95     print(person[0][1].split()[-1])           # get last names
96     person[2][1] *= 1.10                       # give a 10% raise
97
98 Smith
99 Jones
100
101 >>> for person in people: print(person[2])
102
103 ['pay', 11000.0]
104 ['pay', 22000.0]
105
106 >>> for person in people:
107     for (name, value) in person:
108         if name == 'name': print(value)       # find a specific field
109
110 Bob Smith

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111 Sue Jones
112
113 >>> def field(record, label):
114         for (fname, fvalue) in record:
115             if fname == label:                 # find any field by name
116                 return fvalue
117
118 >>> field(bob, 'name')
119 'Bob Smith'
120
121 >>> field(sue, 'pay')
122 22000.0
123
124 >>> for rec in people:
125         print(field(rec, 'age'))                # print all ages
126
127 42
128 45
129
130 >>> bob = {'name': 'Bob Smith', 'age': 42, 'pay': 30000, 'job': 'dev'}
131 >>> sue = {'name': 'Sue Jones', 'age': 45, 'pay': 40000, 'job': 'hdw'}
132
133
134 >>> bob['name'], sue['pay']                    # not bob[0], sue[2]
135
136 ('Bob Smith', 40000)
137
138 >>> bob['name'].split()[-1]
139
140 'Smith'
141
142 >>> sue['pay'] *= 1.10
143 >>> sue['pay']
144
145 44000.0
146
147 >>> bob = dict(name='Bob Smith', age=42, pay=30000, job='dev')
148 >>> sue = dict(name='Sue Jones', age=45, pay=40000, job='hdw')
149
150
151 >>> bob
152
153 {'pay': 30000, 'job': 'dev', 'age': 42, 'name': 'Bob Smith'}
154
155 >>> sue
156
157 {'pay': 40000, 'job': 'hdw', 'age': 45, 'name': 'Sue Jones'}
158
159 >>> sue = {}
160 >>> sue['name'] = 'Sue Jones'
161 >>> sue['age'] = 45
162 >>> sue['pay'] = 40000
163 >>> sue['job'] = 'hdw'
164 >>> sue
165

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166 {'job': 'hdw', 'pay': 40000, 'age': 45, 'name': 'Sue Jones'}
167
168
169 >>> names = ['name', 'age', 'pay', 'job']
170 >>> values = ['Sue Jones', 45, 40000, 'hdw']
171 >>> list(zip(names, values))
172
173 [('name', 'Sue Jones'), ('age', 45), ('pay', 40000), ('job', 'hdw')]
174
175 >>> sue = dict(zip(names, values))
176 >>> sue
177
178 {'job': 'hdw', 'pay': 40000, 'age': 45, 'name': 'Sue Jones'}
179
180 >>> fields = ('name', 'age', 'job', 'pay')
181 >>> record = dict.fromkeys(fields, '?')
182 >>> record
183
184 {'job': '?', 'pay': '?', 'age': '?', 'name': '?'}
185
186 >>> bob
187
188 {'pay': 30000, 'job': 'dev', 'age': 42, 'name': 'Bob Smith'}
189
190 >>> sue
191
192 {'job': 'hdw', 'pay': 40000, 'age': 45, 'name': 'Sue Jones'}
193
194 >>> people = [bob, sue] # reference in a list
195 >>> for person in people:
196     print(person['name'], person['pay'], sep=', ') # all pay
197
198 Bob Smith, 30000
199 Sue Jones, 40000
200
201 >>> for person in people:
202     if person['name'] == 'Sue Jones': # fetch sue's pay
203         print(person['pay'])
204
205 40000
206
207 >>> names = [person['name'] for person in people] # collect names
208 >>> names
209
210 ['Bob Smith', 'Sue Jones']
211
212 >>> list(map((lambda x: x['name']), people)) # ditto, generate
213
214 ['Bob Smith', 'Sue Jones']
215
216 >>> sum(person['pay'] for person in people) # sum all pay
217
218 70000
219
220 >>> for person in people:

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221         print(person['name'].split()[-1])           # last name
222         person['pay'] *= 1.10                       # a 10% raise
223
224     Smith
225     Jones
226
227     >>> for person in people: print(person['pay'])
228
229     33000.0
230     44000.0
231
232     >>> bob2 = {'name': {'first': 'Bob', 'last': 'Smith'},
233                'age': 42,
234                'job': ['software', 'writing'],
235                'pay': (40000, 50000)}
236
237     >>> bob2['name']                                 # bob's full name
238
239     {'last': 'Smith', 'first': 'Bob'}
240
241     >>> bob2['name']['last']                         # bob's last name\
242
243     'Smith'
244
245     >>> bob2['pay'][1]                               # bob's upper pay
246
247     50000
248
249     >>> for job in bob2['job']: print(job)           # all of bob's jobs
250
251     software
252     writing
253
254     >> bob2['job'][-1]                               # bob's last job
255
256     'writing'
257
258     >>> bob2['job'].append('janitor')                # bob gets a new job
259
260     >>> bob2
261
262     {'job': ['software', 'writing', 'janitor'], 'pay': (40000, 50000), 'age': 42,
263     'name':
264
265     {'last': 'Smith', 'first': 'Bob'}}
266
267     >>> bob = dict(name='Bob Smith', age=42, pay=30000, job='dev')
268     >>> sue = dict(name='Sue Jones', age=45, pay=40000, job='hdw')
269     >>> bob
270
271     {'pay': 30000, 'job': 'dev', 'age': 42, 'name': 'Bob Smith'}
272
273     >>> db = {}
274     >>> db['bob'] = bob                               # reference in a dict of dicts
275     >>> db['sue'] = sue

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276 >>> db['bob']['name']                # fetch bob's name
277
278 'Bob Smith'
279
280 >>> db['sue']['pay'] = 50000          # change sue's pay
281 >>> db['sue']['pay']                  # fetch sue's pay
282
283 50000
284
285 >>> db
286
287 {'bob': {'pay': 30000, 'job': 'dev', 'age': 42, 'name': 'Bob Smith'}, 'sue':
288 {'pay': 50000, 'job': 'hdw', 'age': 45, 'name': 'Sue Jones'}}
289
290 >>> import pprint
291 >>> pprint.pprint(db)
292
293 {'bob': {'age': 42, 'job': 'dev', 'name': 'Bob Smith', 'pay': 30000},
294  'sue': {'age': 45, 'job': 'hdw', 'name': 'Sue Jones', 'pay': 50000}}
295
296
297 >>> for key in db:
298     print(key, '=>', db[key]['name'])
299
300 bob => Bob Smith
301 sue => Sue Jones
302
303 >>> for key in db:
304     print(key, '=>', db[key]['pay'])
305
306 bob => 30000
307 sue => 50000
308
309 >>> for key in db:
310     print(db[key]['name'].split()[-1])
311     db[key]['pay'] *= 1.10
312
313 Smith
314 Jones
315
316 >>> for record in db.values(): print(record['pay'])
317
318 33000.0
319 55000.0
320
321 >>> x = [db[key]['name'] for key in db]
322 >>> x
323
324 ['Bob Smith', 'Sue Jones']
325
326 >>> x = [rec['name'] for rec in db.values()]
327 >>> x
328
329 ['Bob Smith', 'Sue Jones']
330

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```
331 >>> db['tom'] = dict(name='Tom', age=50, job=None, pay=0)
332 >>> db['tom']
333
334 {'pay': 0, 'job': None, 'age': 50, 'name': 'To'}
335
336 >>> db['tom']['name']
337
338 'Tom'
339
340 >>> list(db.keys())
341
342 ['bob', 'sue', 'tom']
343
344 >>> len(db)
345
346 3
347
348 >>> [rec['age'] for rec in db.values()]
349
350 [42, 45, 50]
```