

```

class PQueue():
    def __init__(self):
        self.dict = {}
        self.keys = []
        self.sorted = False
    def push(self, k, v):
        self.dict[k] = v
        self.sorted = False
    def _sort(self):
        self.keys = sorted(self.dict, key=self.dict.get, reverse=True)
        self.sorted = True
    def pop(self):
        try:
            if not self.sorted:
                self._sort()
            key = self.keys.pop()
            value = self.dict[key]
            self.dict.pop(key)
            return key, value
        except:
            return None

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def path_costs(path):
    c = {}
    with open(path, 'r') as file:
        for line in file:
            line = line.split(", ")
            v = int(line.pop())
            e1 = line.pop()
            e2 = line.pop()
            if e1 not in c:
                c[e1] = {}
            if e2 not in c:
                c[e2] = {}
            c[e1][e2] = c[e2][e1] = v
    return c

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def ucs(start, goal, g):
    frontier = PQueue()
    # pushing path and cost to pqueue
    frontier.push(start, 0)

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while True:
    # popping path with least cost
    path, cost = frontier.pop()
    print(path+ " " +str(cost))
    # splitting out end node in path
    end = path.split("->")[-1]
    if goal == end:
        break
    for node, weight in g[end].items():
    # adding edge weight(cost) to total cost
        new_cost = cost + weight
        new_path = path + "->" + node
    # adding new path and cost to pqueue
        frontier.push(new_path, new_cost)
ucs('Arad', 'Bucharest', path_costs('/home/Paths.txt'))

```

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Arad 0
Arad->Zerind 75
Arad->Timisoara 118
Arad->Sibiu 140
Arad->Zerind->Oradea 146
Arad->Zerind->Arad 150
Arad->Zerind->Oradea->Zerind 217
Arad->Sibiu->Rimnicu Vilcea 220
Arad->Zerind->Arad->Zerind 225
Arad->Timisoara->Lugoj 229
Arad->Timisoara->Arad 236
Arad->Sibiu->Fagaras 239
Arad->Zerind->Arad->Timisoara 268
Arad->Sibiu->Arad 280
Arad->Zerind->Oradea->Zerind->Oradea 288
Arad->Zerind->Arad->Sibiu 290
Arad->Sibiu->Oradea 291
Arad->Zerind->Oradea->Zerind->Arad 292
Arad->Zerind->Arad->Zerind->Oradea 296
Arad->Zerind->Oradea->Sibiu 297
Arad->Timisoara->Lugoj->Mehadia 299
Arad->Zerind->Arad->Zerind->Arad 300
Arad->Sibiu->Rimnicu Vilcea->Sibiu 300
Arad->Timisoara->Arad->Zerind 311
Arad->Sibiu->Rimnicu Vilcea->Pitesti 317
Arad->Sibiu->Fagaras->Sibiu 338
Arad->Timisoara->Lugoj->Timisoara 340
Arad->Timisoara->Arad->Timisoara 354
Arad->Sibiu->Arad->Zerind 355
Arad->Zerind->Oradea->Zerind->Oradea->Zerind 359
Arad->Sibiu->Oradea->Zerind 362
Arad->Sibiu->Rimnicu Vilcea->Craiova 366
Arad->Zerind->Arad->Zerind->Oradea->Zerind 367
Arad->Zerind->Oradea->Zerind->Arad->Zerind 367
Arad->Timisoara->Lugoj->Mehadia->Lugoj 369
Arad->Zerind->Arad->Sibiu->Rimnicu Vilcea 370
Arad->Timisoara->Lugoj->Mehadia->Dobreta 374
Arad->Zerind->Arad->Zerind->Arad->Zerind 375
Arad->Timisoara->Arad->Sibiu 376
Arad->Zerind->Oradea->Sibiu->Rimnicu Vilcea 377

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Arad->Zerind->Arad->Timisoara->Lugoj 379
Arad->Sibiu->Rimnicu Vilcea->Sibiu->Rimnicu Vilcea 380
Arad->Timisoara->Arad->Zerind->Oradea 382
Arad->Timisoara->Arad->Zerind->Arad 386
Arad->Zerind->Arad->Timisoara->Arad 386
Arad->Zerind->Arad->Sibiu->Fagaras 389
Arad->Zerind->Oradea->Sibiu->Fagaras 396
Arad->Sibiu->Arad->Timisoara 398
Arad->Sibiu->Rimnicu Vilcea->Sibiu->Fagaras 399
Arad->Zerind->Oradea->Zerind->Arad->Timisoara 410
Arad->Sibiu->Rimnicu Vilcea->Pitesti->Rimnicu Vilcea 414
Arad->Sibiu->Fagaras->Sibiu->Rimnicu Vilcea 418
Arad->Sibiu->Rimnicu Vilcea->Pitesti->Bucharest 418
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✓ 0s completed at 11:00 AM

