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1  """
2  Server.py
3
4  """
5
6  import select
7  import socket
8  import sys
9  import datetime
10 from packet import DT_Response, check_request, get_request
11
12 # get command line arguments
13 try:
14     ports = [int(sys.argv[1]), int(sys.argv[2]), int(sys.argv[3])]
15     for port in ports:
16         if port < 1024 or port > 64000:
17             raise ValueError
18 except IndexError:
19     print("Please enter three ports")
20     sys.exit(1)
21 except ValueError:
22     print("Please enter ports between 1024 and 64000")
23     sys.exit(1)
24 except:
25     print("Usage: python3 server.py port1 port2 port3")
26     sys.exit(1)
27
28 # te reo months list
29 te_reo_months = [
30     "Kohitātea",
31     "Hui-tanguru",
32     "Poutū-te-rangi",
33     "Paenga-whāwhā",
34     "Haratua",
35     "Pipiri",
36     "Hōngongoi",
37     "Here-turi-kōkā",
38     "Mahuru",
39     "Whiringa-ā-nuku",
40     "Whiringa-ā-rangi",
41     "Hakihea"
42 ]
43
44 # german months list
45 german_months = [
46     "Januar",
47     "Februar",
48     "März",
49     "April",
50     "Mai",
51     "Juni",
52     "Juli",
53     "August",
54     "September",
55     "Oktober",
56     "November",
57     "Dezember"
58 ]
59
60
61 def date(language):
62     """
63     return the text literal for the current date in the given language
64     """
65     date = datetime.date.today()
66     day = date.strftime("%d")
67     year = date.strftime("%Y")
68     if language == "te_reo":
69         month = te_reo_months[date.month - 1]
70         return "Ko te ra o tenei ra ko %s %s, %s" %(month, day, year)
71     elif language == "german":
72         month = german_months[date.month - 1]
73         return "Heute ist der %s. %s %s" %(day, month, year)
74     else:
75         month = date.strftime("%B")
76         return "Today's date is %s %s, %s" %(month, day, year)
77
78 def time(language):
79     """
80     return the text literal for the current time in the given language
81     """

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81     """
82     time = datetime.datetime.now().strftime("%H:%M")
83     if language == "te_reo":
84         return "Ko te wa o tenei wa %s" % time
85     elif language == "german":
86         return "Die Uhrzeit ist %s" % time
87     else:
88         return "The current time is %s" % time
89
90
91 class Server(socket.socket):
92     """
93     Server class
94     """
95     def __init__(self, port, language) -> None:
96         self.port = port
97         self.language = language
98         super().__init__(socket.AF_INET, socket.SOCK_STREAM)
99         self.bind(("", port))
100        self.listen(5)
101
102    def connection(self) -> None:
103        """
104        handle the connection
105        """
106        client, address = self.accept()
107        request = self.recvfrom(client)
108        if request: # if the request is valid, send the response, else, ignore the request
109            self.send(client, get_request(request))
110            client.close()
111
112    def receive(self, client) -> None:
113        """
114        receive the request from the client and check if it is valid
115        """
116        request = client.recv(1024).decode()
117        request = bytearray(request, "utf-8")
118        if check_request(request):
119            return request
120        return None
121
122    def send(self, client, request) -> None:
123        """
124        send the response to the client
125        """
126        date_time = list(map(int, datetime.datetime.now().strftime("%Y %m %d %H %M %S").split()))
127        data = time(self.language) if request == "time" else date(self.language)
128        data = data.encode("utf-8")
129        packet = DT_Response(self.language, date_time, data)
130        packet.pack()
131        client.send(packet.buffer)
132
133
134 #globals
135 server = Server(ports[0], "english")
136 server2 = Server(ports[1], "te_reo")
137 server3 = Server(ports[2], "german")
138 inputs = [server, server2, server3]
139
140
141 def main():
142     """
143     main function
144     """
145     while True: # loop forever
146         readable, writable, exceptional = select.select(inputs, [], []) # select the sockets that are ready to be read
147         for s in readable: # read the sockets
148             s.connection() # handle the connection
149
150 if __name__ == "__main__":
151     main()

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```

1  """
2  client.py
3  """
4
5  import select
6  import socket
7  import sys
8  from packet import DT_Request, check_response, get_whole_response
9
10 # get command line arguments
11 try:
12     request = sys.argv[1]
13     ip = sys.argv[2]
14     port = int(sys.argv[3])
15 except IndexError:
16     print("Please enter three arguments")
17     sys.exit(1)
18
19 if port < 1024 or port > 64000:
20     print("Please enter ports between 1024 and 64000")
21     sys.exit(1)
22
23 if request not in ["date", "time"]:
24     print("Argument 1 must be either 'date' or 'time'")
25     sys.exit(1)
26
27 if socket.getaddrinfo(ip, port)[0][0] != socket.AF_INET:
28     print("Argument 2 must be a valid IP address")
29     sys.exit(1)
30
31
32 def print_nicely(List):
33     """
34     print the list nicely
35     """
36     for (name, value) in List:
37         print(name + ":" + " " * (16 - len(name)), value)
38     print()
39
40 client = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
41 client.connect((ip, port))
42 packet = DT_Request(request)
43 packet.pack()
44 client.send(packet.buffer)
45 writeable, readable, exceptional = select.select([client], [], [], 1)
46
47 if writeable:
48     response = client.recv(1024)
49     if check_response(response):
50         print_nicely(get_whole_response(response))
51     elif response == b"":
52         print("Server timed out")
53     else:
54         print("Invalid response")
55 else:
56     print("Server timed out")

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1  """
2  packet.py
3  """
4
5  class Packet:
6      """
7      Base class for all packets.
8      """
9      magic_no = 0x497E
10
11     def __init__(self, length):
12         self.buffer = bytearray(length)
13         self.length = length
14
15
16     class DT_Request(Packet):
17         """
18         packet for requesting date or time
19         """
20         type = 0x0001
21
22         def __init__(self, request):
23             super().__init__(6)
24             self.request = 0x0001 if request == "date" else 0x0002
25
26         def pack(self):
27             """
28             pack the packet
29             """
30             self.buffer[0] = self.magic_no >> 8
31             self.buffer[1] = self.magic_no & 0xFF
32             self.buffer[2] = self.type >> 8
33             self.buffer[3] = self.type & 0xFF
34             self.buffer[4] = self.request >> 8
35             self.buffer[5] = self.request & 0xFF
36
37
38     def check_request(buffer):
39         """
40         check if the packet is a valid request packet
41         """
42         if buffer[0] << 8 | buffer[1] != 0x497E:
43             return False
44         if buffer[2] << 8 | buffer[3] != 0x0001:
45             return False
46         if buffer[4] << 8 | buffer[5] not in [0x0001, 0x0002]:
47             return False
48         return True
49
50     def get_request(buffer):
51         """
52         get the request type from a request packet
53         """
54         return buffer[4] << 8 | buffer[5]
55
56     class DT_Response(Packet):
57         """
58         packet for sending date or time
59         """
60         type = 0x0002
61
62         def __init__(self, language, datetime, data):
63             super().__init__(13 + len(data))
64             self.language = 0x0001 if language == "english" else 0x0002 if language == "te_reo" else 0x0003
65             self.datetime = datetime
66             self.data = data
67
68         def pack(self):
69             """
70             pack the packet
71             """
72             self.buffer[0] = self.magic_no >> 8
73             self.buffer[1] = self.magic_no & 0xFF
74             self.buffer[2] = self.type >> 8
75             self.buffer[3] = self.type & 0xFF
76             self.buffer[4] = self.language >> 8
77             self.buffer[5] = self.language & 0xFF
78             self.buffer[6] = self.datetime[0] >> 8
79             self.buffer[7] = self.datetime[0] & 0xFF
80

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80         self.buffer[8] = self.datetime[1]
81         self.buffer[9] = self.datetime[2]
82         self.buffer[10] = self.datetime[3]
83         self.buffer[11] = self.datetime[4]
84         self.buffer[12] = self.length - 13
85         for i in range(13, self.length):
86             self.buffer[i] = self.data[i - 13]
87
88
89 def check_response(buffer):
90     """
91     check if the packet is a valid response packet
92     """
93     if len(buffer) < 13:                                     # check if buffer is at least 13 bytes long
94         return False
95     if buffer[0] << 8 | buffer[1] != 0x497E:                # check magic number
96         return False
97     if buffer[2] << 8 | buffer[3] != 0x0002:                # check type
98         return False
99     if buffer[4] << 8 | buffer[5] not in [0x0001, 0x0002, 0x0003]: # check language
100         return False
101     if (buffer[6] << 8 | buffer[7]) > 2100:                  # check year is below 2100
102         return False
103     if not(0x1 <= (buffer[8]) <= 0x12):                      # check month is between 1 and 12
104         return False
105     if not(0x1 <= buffer[9] <= 0x1f):                        # check day is between 1 and 31
106         return False
107     if not(0x0 <= buffer[10] <= 0x18):                       # check hour is between 0 and 24
108         return False
109     if not(0x0 <= buffer[11] <= 0x3c):                       # check minute is between 0 and 60
110         return False
111     if len(buffer) != 13 + buffer[12]:                       # check length is correct
112         return False
113     return True
114
115 def get_whole_response(buffer):
116     """
117     return the whole response from a response packet in a list with the field names as the first element
118     """
119     temp = []
120     temp.append(("Magic Number", hex(buffer[0] << 8 | buffer[1]))) # magic number
121     temp.append(("type", hex(buffer[2] << 8 | buffer[3])))          # type
122     temp.append(("language", buffer[4] << 8 | buffer[5]))          # language
123     temp.append(("year", buffer[6] << 8 | buffer[7]))              # year
124     temp.append(("month", buffer[8]))                               # month
125     temp.append(("day", buffer[9]))                                 # day
126     temp.append(("hour", buffer[10]))                              # hour
127     temp.append(("minute", buffer[11]))                            # minute
128     temp.append(("length", buffer[12]))                            # length
129     temp.append(("data", str(buffer[13:], 'utf-8')))               # data
130     return temp

```