Traceroute Lab

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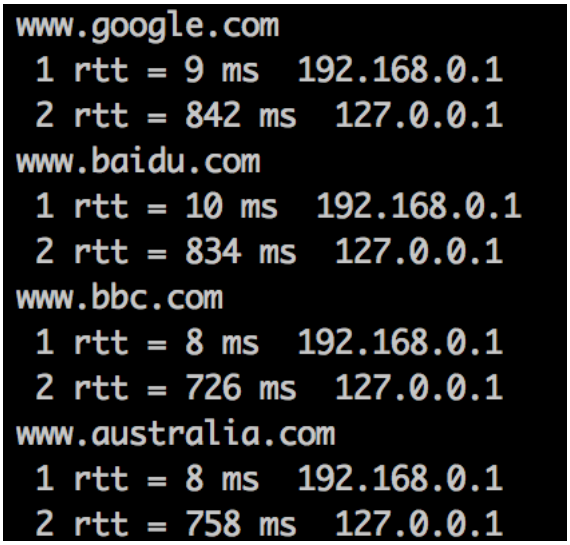

Code:

```
from socket import *
import socket
import os
import sys
import struct
import time
import select
import binascii

ICMP_ECHO_REQUEST = 8
MAX_HOPS = 30
TIMEOUT = 2.0
TRIES = 2
#ID = 1

def checksum(str):
    csum = 0
    countTo = (len(str) / 2) * 2

    count = 0
    while count < countTo:
        thisVal = ord(str[count+1]) * 256 + ord(str[count])
        csum = csum + thisVal
        csum = csum & 0xffffffffL
        count = count + 2
```

```
    if countTo < len(str):
        csum = csum + ord(str[len(str) - 1])
        csum = csum & 0xffffffffL

    csum = (csum >> 16) + (csum & 0xffff)
    csum = csum + (csum >> 16)
    answer = ~csum
    answer = answer & 0xffff
    answer = answer >> 8 | (answer << 8 & 0xff00)
    return answer

def build_packet():
     myChecksum = 0
     #global ID
     ID = os.getpid() & 0xFFFF
     header = struct.pack("bbHHh", ICMP_ECHO_REQUEST, 0, myChecksum, 0, 1)
     #ID += 1
     data = struct.pack("d", time.time())
     myChecksum = checksum(header + data)
     if sys.platform == 'darwin':
          myChecksum = socket.htons(myChecksum) & 0xffff
     else:
          myChecksum = socket.htons(myChecksum)

     header = struct.pack("bbHHh", ICMP_ECHO_REQUEST, 0, myChecksum, ID, 1)
     return header + data


def get_route(hostname):
     timeLeft = TIMEOUT

     for ttl in xrange(1,MAX_HOPS):
          for tries in xrange(TRIES):

               destAddr = gethostbyname(hostname)
               #fill in start
               #make a raw socket named mySocket
               myicmp = socket.getprotobyname("icmp")
               mySocket = socket.socket(socket.AF_INET, socket.SOCK_RAW, myicmp)

               #fill in end

               mySocket.setsockopt(IPPROTO_IP, IP_TTL, struct.pack('I', ttl))
```

```
                mySocket.settimeout(TIMEOUT)
                try:
                     d = build_packet()
                     mySocket.sendto(d, (hostname, 0))
                     t = time.time()
                     startedSelect = time.time()
                     whatReady = select.select([mySocket], [], [], timeLeft)
                     howLongInSelect = (time.time() - startedSelect)
                     if whatReady[0] == []:
                          print" * * * Request timed out"
                     recvPacket, addr = mySocket.recvfrom(1024)
                     timeReceived = time.time()
                     timeLeft = timeLeft - howLongInSelect
                     if timeLeft <= 0:
                          print "* * * Request timed out."
                except timeout:
                     continue
                else:
                     # fetch the icmp type from the IP packet
                     #fill in start
                     icmpHeader = recvPacket[20:28]
                     type, code, checksum, icmpid, sequence = struct.unpack("bbHHh", icmpHeader)
                     #fill in end
                     if type == 11:
                          bytes = struct.calcsize("d")
                          timeSent = struct.unpack("d", recvPacket[28:28 + bytes])[0]
                          print " %d rtt = %.0f ms  %s"  %(ttl,(timeReceived - t) *1000 , addr[0])
                     elif type == 3:
                          bytes = struct.calcsize("d")
                          timeSent = struct.unpack("d", recvPacket[28:28 + bytes])[0]
                          print " %d rtt = %.0f ms  %s"  %(ttl,(timeReceived - t) *1000 , addr[0])
                     elif type == 0:
                          bytes = struct.calcsize("d")
                          timeSent = struct.unpack("d", recvPacket[28:28 + bytes])[0]
                          print " %d rtt = %.0f ms  %s"  %(ttl,(timeReceived - t) *1000 , addr[0])
                          return
                     else:
                          print "error"
                     break
                finally:
                     mySocket.close()
print("www.google.com")
get_route("www.google.com")
print("www.baidu.com")
```

```
get_route("www.baidu.com")
print("www.bbc.com")
get_route("www.bbc.com")
print("www.australia.com")
get_route("www.australia.com")
```