12.3: RETRIEVING AN IMAGE OVER HTTP

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In the above example, we retrieved a plain text file which had newlines in the file and we simply copied the data to the screen as the program ran. We can use a similar program to retrieve an image across using HTTP. Instead of copying the data to the screen as the program runs, we accumulate the data in a string, trim off the headers, and then save the image data to a file as follows:

CODE 12.3.1 (PYTHON):

```
%%python3

import socket
import time

HOST = 'data.pr4e.org'
PORT = 80
mysock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
mysock.connect((HOST, PORT))
mysock.sendall(b'GET http://data.pr4e.org/cover3.jpg HTTP/1.0\r\n\r\n')
count = 0
picture = b''

while True:
    data = mysock.recv(5120)
    if (len(data) < 1): break
    time.sleep(0.25)
    count = count + len(data)
    print(len(data), count)
    picture = picture + data

mysock.close()

# Look for the end of the header (2 CRLF)
pos = picture.find(b'\r\n\r\n')
print('Header length', pos)
print(picture[:pos].decode())

# Skip past the header and save the picture data
picture = picture[pos+4:]
fhand = open('stuff.jpg', 'wb')
fhand.write(picture)
fhand.close()

# Code: http://www.py4e.com/code3/urljpeg.py
```

run restart

When the program runs it produces the following output:

```
$ python urljpeg.py
2920 2920
1460 4380
1460 5840
1460 7300
...
1460 62780
1460 64240
2920 67160
1460 68620
1681 70301
Header length 240
HTTP/1.1 200 OK
Date: Sat, 02 Nov 2013 02:15:07 GMT
Server: Apache
Last-Modified: Sat, 02 Nov 2013 02:01:26 GMT
ETag: "19c141-111a9-4ea280f8354b8"
Accept-Ranges: bytes
Content-Length: 70057
Connection: close
Content-Type: image/jpeg
```

You can see that for this url, the `Content-Type` header indicates that body of the document is an image (`image/jpeg`). Once the program completes, you can view the image data by opening the file `stuff.jpg` in an image viewer.

As the program runs, you can see that we don't get 5120 characters each time we call the `recv()` method. We get as many characters as have been transferred across the network to us by the web server at the moment we call `recv()` . In this example, we either get 1460 or 2920 characters each time we request up to 5120 characters of data.

Your results may be different depending on your network speed. Also note that on the last call to `recv()` we get 1681 bytes, which is the end of the stream, and in the next call to `recv()` we get a zero-length string that tells us that the server has called `close()` on its end of the socket and there is no more data forthcoming.

We can slow down our successive `recv()` calls by uncommenting the call to `time.sleep()` . This way, we wait a quarter of a second after each call so that the server can "get ahead" of us and send more data to us before we call `recv()` again. With the delay, in place the program executes as follows:

```
$ python urljpeg.py
1460 1460
5120 6580
5120 11700
...
5120 62900
5120 68020
2281 70301
Header length 240
HTTP/1.1 200 OK
Date: Sat, 02 Nov 2013 02:22:04 GMT
Server: Apache
Last-Modified: Sat, 02 Nov 2013 02:01:26 GMT
ETag: "19c141-111a9-4ea280f8354b8"
Accept-Ranges: bytes
Content-Length: 70057
Connection: close
Content-Type: image/jpeg
```

Now other than the first and last calls to `recv()`, we now get 5120 characters each time we ask for new data.

There is a buffer between the server making `send()` requests and our application making `recv()` requests. When we run the program with the delay in place, at some point the server might fill up the buffer in the socket and be forced to pause until our program starts to empty the buffer. The pausing of either the sending application or the receiving application is called "flow control".