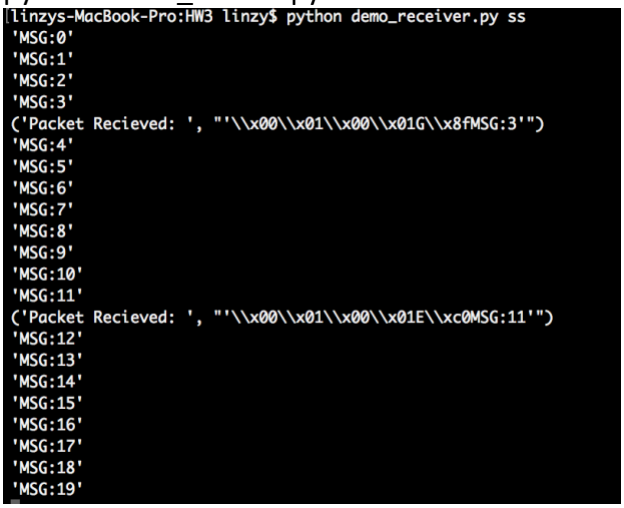
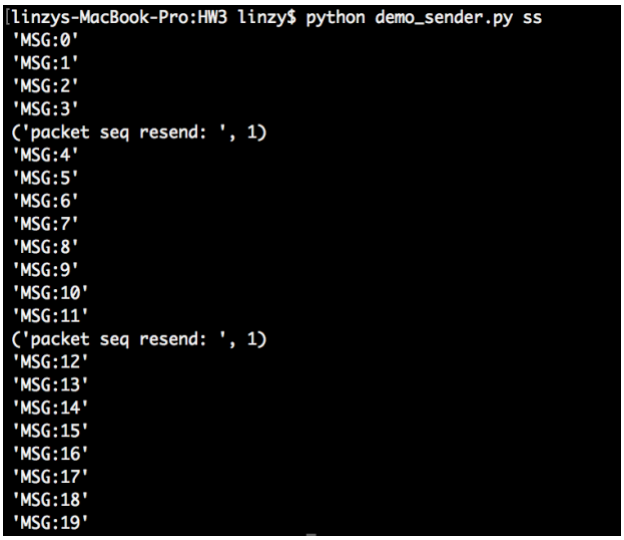
Stop and Wait

python demo_receiver.py ss
python demo_sender.py ss

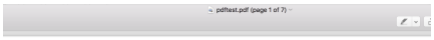




python file_receiver.py ss output.txt
python file_sender.py ss udt.py

```
linzys-MacBook-Pro:HW3 linzy$ python file_sender.py ss ch1introreview.pdf
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
('packet seq resend: ', 1)
length of message send 500
length of message send 500
('packet seq resend: ', 1)
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
('packet seq resend: ', 0)
length of message send 500
length of message send 500
length of message send 500
length of message send 500
('packet seq resend: ', 0)
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
('packet seq resend: ', 0)
length of message send 500
('packet seq resend: ', 1)
length of message send 500
length of message send 500
length of message send 500
length of message send 500
('packet seq resend: ', 1)
```

```
linzys-MacBook-Pro:HW3 linzy$ python file_receiver.py ss pdftest.pdf
('Packet Recieved: ', '\'\\x00\\x01\\x00\\x010\\xa7\\x15I\\xe3\\x02OA\\xb5\\xe0u\\xb2_\\xf2\\x81\\xe4\\xa9\\x94\\x90\\x94\\xa3)3\\x
x13\\xa2@\\xd1\\x91L(sYf\\xbb\\x98\\x8e\\xfeL\\xf5H\\x8c$\\x9b%\\x83Y\\x0b\\xb3j\\xb2\\xdegGe\\x9f\\xcaQ\\xcc\\x11\\xe6\\xf4\\xe4\
\\xdb\\xb9Nw]\\xc1\\xba\\xe1\\xf5\\xbe\\xeb\\x8fm mH\\xd9\\xf0\\xcbF\\xcb\\x8de\\x1b\\xdfn\\x8a\\xde\\xd4Q\\xa0Q\\xb0\\xbe`h\\xb3
\\xe2\\x8a\\xe2O%\\xdc\\x92\\xeb\\xdfY}W\\xf9\\xdd\\xcc\\xf6\\x84\\xed\\xbd\\xa5\\xf6\\xa5\\xfbw\\xe0v\\x08w\\xdc\\xdd\\xe9\\xba\\
xb42\\xa8\\xb2\\xbdJ\\xafjG\\xd5\\xa7\\xea\\xa4\\xea\\x81\\x1a\\x8f\\x9a\\xe6\\xbd\\xea{\\xb7\\xed\\x9d\\xda\\xc7\\xdb\\xd7\\xbf\\
c3\\xcf\\xeb\\xa2\\xea\\xba\\xbfg\\x7f_\\x7fD\\xedH\\xf1\\x91\\xcfG\\x85G\\xa5\\xc7\\xc2\\x8fu\\xd5;\\xd4\\xd77\\xa87\\x946\\xc2\\
\x1f\\xef\\x9e\\x0c<\\xd9y\\x8a}\\xaa\\xe9\\\'\\xfd\\x9f\\xf6\\xb6\\xd0Z\\x8aZ\\xa1\\xd6\\xdc\\xd6\\x89\\xb6\\xa46i{L{\\xdf\\xe9\\
9\\x9fw~\\xf2B\\xc6\\x85\\xf1\\x8b\\x89\\x17\\x87:Wt>\\xba\\xb4\\xe4\\xd2\\x9d\\xae\\xb0\\xae\\xde\\xcb\\x81\\x97\\xaf^\\xf1\\xb9r
\'')
('Packet Recieved: ', '\'\\x00\\x01\\x00\\x017\\r\\x12o\\xe7\\xbd\\xf7\\x16\\tv\\xfbbM\\xda\\xf9>!&}\\x19\\xd1\\xcb\\x18{\\xd8-6\\
ge /Parent 3 0 R /Resources 15 0 R /Contents 13 0 R /MediaBox\\n[0 0 960 540] >>\\nendobj\\n15 0 obj\\n<< /ProcSet [ /PDF /Text ]
lateDecode >>\\nstream\\nx\\x01}\\x90l\\x0f\\xc2 \\x10\\x85\\xf7\\xfe\\x8a7\\xc2P\\x047Z\\x99L4 nMH:\\x18\\x07\\xad6:\\xb4I\\xc5\\
```



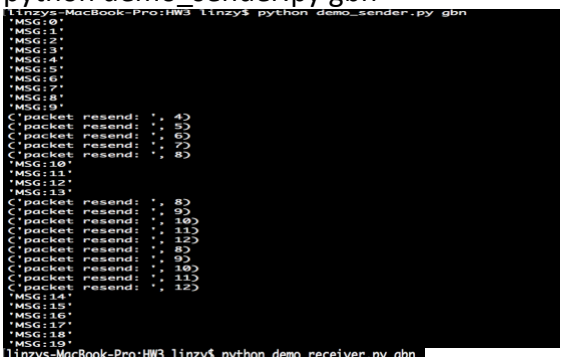
Introduction Review

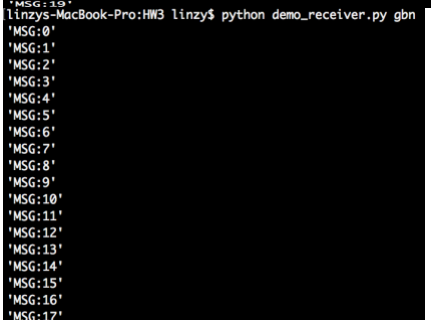
md5 of original file and output file

```
linzys-MacBook-Pro:HW3 linzy$ md5 pdftest.pdf
MD5 (pdftest.pdf) = 9d2de46ad6ffc1470a1ffa57faee03eb
linzys-MacBook-Pro:HW3 linzy$ md5 ch1introreview.pdf
MD5 (ch1introreview.pdf) = 9d2de46ad6ffc1470a1ffa57faee03eb
```

gbn

python demo_receiver.py gbn
python demo_sender.py gbn





python file_receiver.py gbn output2.txt
python file_sender.py gbn udt.py

```
linzys-MacBook-Pro:HW3 linzy$ python file_sender.py gbn ch1introreview.pdf
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
('packet resend: ', 17)
('packet resend: ', 18)
('packet resend: ', 19)
('packet resend: ', 20)
('packet resend: ', 21)
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
length of message send 500
```

```
linzys-MacBook-Pro:HW3 linzy$ python file_receiver.py gbn pdftest2.pdf
```

md5

```
linzys-MacBook-Pro:HW3 linzy$ md5 ch1introreview.pdf
MD5 (ch1introreview.pdf) = 9d2de46ad6ffc1470a1ffa57faee03eb
linzys-MacBook-Pro:HW3 linzy$ md5 pdftest2.pdf
MD5 (pdftest2.pdf) = 9d2de46ad6ffc1470a1ffa57faee03eb
```

(2)
Description:
Stop- And-Wait:
after send each package, it will wait for a certain time(while loop). If it got ack (seq == ackSeq) during the certain time interval, then it proceeds to next package(break while loop), else it resends current package

Go-back-N
it continuously sends Window_Size's number of packages. Once it receives ack from previous package, baseSeq will be updated and so it can send more package. However, if timeout and it hasn't receive ack from previous Window_Size's ack, it will resend packages indexed from baseSeq to currSeq.

(3)

a. higher error rate will lead to more frequent resend actions and thus slow down the process
b. Less RTT will accelerates the process.
c. large window size sometimes accelerates the process while sometimes slows down the process. Since with large window size, we can continuously send more packages. But once error happens, we also possibly need to resend more packages.