**Department of Electrical and Computer Engineering**

**University of Massachusetts Dartmouth**

**ECE 369 Computer Networks**

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**Project Assignment: Network Programming Framework**

Chinese proverb, "One who gains mastery will create his own opportunities."

To create rich network apps, students master the fundamentals of socket programming and study the two essential network application architectures, Client/Server or Peer2Peer. Client/Server model, with always-on infrastructure, requires the server advertise a fixed IP address and a well-known port # so that clients know where to initiate communications. Peer2Peer model, with intermittent connections, is suitable to traffic intensive applications.

This project contains six parts: conduct three experiments to understand socket programming in Python, extend etiquette from Client/Server to Peer2Peer as design decision, integrate codes in different programming languages, and finally, invent your own networking app! Revisit HW#3 and Quiz#2. Feel free to adopt the codes in “ECE369ProjHints.zip” file. If you test on eng-svr-1 or eng-svr-2 in class, use port # 80GX where G = your team #.

Part I. Experiment 1: Client/Server Framework [Kurose&Ross: Sec 2.7: Socket Program]

1. TCPserver.py & TCPclient.py [Socket Program: HW#3 & Quiz#2]
2. UDPerver.py & UDPclient.py [Wireshark Lab 1: HW#2]

Part II. Experiment 2: Multithreaded Server [[python.org](http://www.python.org/): [Thread Interface](http://docs.python.org/2/library/thread.html)]

TCPserverMultithread.py [ECE369ProjHints.zip]

Part III. Experiment 3: Timer Client [[python.org](http://www.python.org/): OS Services−[Time Access](http://docs.python.org/2/library/time.html)]

UDPclientTimer.py [ECE369ProjHints.zip]

Part IV. Extension: Peer2Peer Framework [Kurose&Ross: Section 2.6: P2P App]

Code your TCPpeer.py & UDPpeer.py by combing each client/server pair of Part I-A & B.

Part V. Integration: Code UDPclientTimer.py in another language [ECE369ProjHints.zip]

SocketProgram-OtherLanguages subfolder contains sample echo codes in C, Java, and Perl.

Part VI. Creation: Propose your Own App in any language [Kurose&Ross: Ch7 Multimedia]

Invent a network app with a nice GUI; justify your choice of client/server or P2P model.

Resources:

* Wireshark ([wireshark.com](http://wireshark.com/))
* Code Management with GitHub ([github.com](https://github.com/))
* Teach yourself Python ([www.python.org](http://www.python.org/)): But first decide [Python 2 or Python 3](https://wiki.python.org/moin/Python2orPython3)?
* Socket Interface: [How](http://docs.python.org/2/howto/sockets.html) [To](http://docs.python.org/3/howto/sockets.html); standard library ([v2.7.6](http://docs.python.org/2/library/socket.html) or [v3.4.0](http://docs.python.org/3/library/socket.html)); [SocketServer module](http://docs.python.org/2/library/socketserver.html)
* Thread Interface: [threaded echo server](http://ilab.cs.byu.edu/python/threadingmodule.html); standard library ([v2.7.6](http://docs.python.org/2/library/thread.html) or [v3.4.0](http://docs.python.org/3/library/_thread.html) & [threading](http://docs.python.org/3/library/threading.html?highlight=thread#threading))
* Network/Web Programming: [Django](http://www.djangoproject.com/) & [Pyramid](http://www.pylonsproject.org/); [Bottle](http://bottlepy.org) & [Flask](http://flask.pocoo.org/); [Django CMS](https://www.django-cms.org/) & [Plone](http://www.plone.org/).
* GUI Development: [TkInter](https://wiki.python.org/moin/TkInter) ([v2.7.6](http://docs.python.org/2/library/tk.html?highlight=tkinter) or [v3.4.0](http://docs.python.org/3/library/tk.html?highlight=tkinter)); [wxPython](http://www.wxpython.org/), [PyGtk](http://www.pygtk.org), [PyQt](http://www.riverbankcomputing.co.uk/software/pyqt/intro)
* Multimedia Service: [v2.7.6](http://docs.python.org/2/library/mm.html) or [v3.4.0](http://docs.python.org/3/library/mm.html); [PyMedia](http://pymedia.org/tut/); [Guzdial of Georgia Tech](http://www.cc.gatech.edu/~guzdial/); [MIT Media Lab](http://www.processing.org/)