Record of Programs

plotDirectory.py: This program defines a function that takes a directory of files in miniseed format and a list containing the names of previously checked files and plots them, without plotting the same file twice.

from obspy.core import read

import os

checkedfiles = []

def plotDirectory (directory, previousfiles):

isfirst = 0

isfirst += 1

for f in os.listdir(directory):

alreadychecked = False

for fil in previousfiles:

if f == fil:

alreadychecked = True

if not alreadychecked and f.endswith('.mseed') and isfirst == 1:

totalstream = read(directory+'/'+f)

previousfiles += f

elif not alreadychecked and f.endswith('.mseed'):

stream = read(directory+'/'+f)

totalstream += stream

previousfiles += f

totalstream.plot()

plotDirectory("mseed",[])

Seis1.py: This reads data from a serial port and prints it.

# a first script to print what is coming from the digitser

# we need to import an external library to read the data

import serial

# the original SEP serial port digitser appers as devive /dev/ttyUSB0

# the new SEP USB digitiser appears as device /dev/ttyACMO

#port\_name = '/dev/ttyACM0'

port\_name = '/dev/ttyUSB0'

port = serial.Serial(port\_name, 9600, timeout=1)

# this looprints all the data appearing on this port

while(port.isOpen()):

sample = port.readline().strip()

print sample

Seis2.py: This reads data from a serial port, records it in miniseed format and plots it to a graph-DOESN’T WORK

import serial

import numpy

from obspy.core import read,Trace,Stream,UTCDateTime

port\_name= '/dev/ttyACM0'

port = serial.Serial(port\_name, 9600, timeout=1)

datapoints = 100

data=numpy.zeros([datapoints],dtype=numpy.int32)

x=1

starttime=UTCDateTime()

print(starttime)

while(port.isOpen()) and x<datapoints:

sample = port.readline().strip()

#if sample != '':

data[x]=sample

x=x+1

timenow=UTCDateTime()

print sample,timenow

stats= {'netwrok': 'UK',

'station': 'Test',

'location': '00',

'channel': 'BHZ',

'npts': datapoints,

'sampling\_rate': '20',

'mseed' : {'dataquality' : 'D'},

'starttime': starttime}

st =Stream([Trace(data=data, header=stats)])

st.write('test.mseed',format='MSEED',encoding='INT32',reclen=512)

st.plot()

Seis3.py: This program reads data from a serial port, over a period of time and records it as sample miniseed data into a queue.

import serial

import numpy

from obspy.core import read,Trace,Stream,UTCDateTime

#import hashlib

import Queue

from threading import Thread

import time

#serial input spec

port\_name='/dev/ttyACM0'

port = serial.Serial(port\_name, 9600, timeout=1)

#array of zeros to write data into

#block\_length=0

#iterator for writing files

block\_id=1

q = Queue.Queue()

#this is the thread

def save\_data():

#it wait as there won't be anything to save in the first 5 seconds

time.sleep(5)

global block\_id

while True:

#'if' not essential but wil allow waiting to save processing

if not q.empty():

to\_save = q.get()

#write block with id from iterator

to\_save.write('mseed/PHYS' + str(block\_id) + '.mseed',format='MSEED')

block\_id=block\_id+1

q.task\_done()

else:

print 'nothing to save...'

#to save processing bit

time.sleep(5)

def read\_data(block\_length):

starttime=UTCDateTime()

x=1

data=numpy.zeros([block\_length],dtype=numpy.int16)

while (port.isOpen()) and x<block\_length:

#loop continues for block size

sample = port.readline().strip()

data[x]=sample

x=x+1

#'timenow' not essential and isn't stored

timenow=UTCDateTime()

print sample,timenow

stats = {'network': 'UK', 'station': 'PHYS', 'location': '00',

'channel': 'BHZ', 'npts': block\_length, 'sampling\_rate': 20,

'mseed': {'dataquality': 'D'},'starttime': starttime}

#create strem of data and queue it

st =Stream([Trace(data=data, header=stats)])

q.put(st)

for x in range(1):

worker = Thread(target=save\_data)

#worker.Daemon = True

worker.start()

for x in range(50):

read\_data(128)

Seis4.py: This does the same thing as seis2 but uses a jitter to record the time differences between samples to see if the digitiser is sending information at the correct rate.

import serial

import numpy

from obspy.core import read,Trace,Stream,UTCDateTime

#import hashlib

import Queue

from threading import Thread

import time

#serial input spec

port\_name='/dev/ttyACM0'

port = serial.Serial(port\_name, 9600, timeout=1)

#array of zeros to write data into

#block\_length=0

#iterator for writing files

sample\_block\_id=1

jitter\_block\_id=1

samplequeue = Queue.Queue()

jitterqueue = Queue.Queue()

#this is the thread

def save\_data\_sample():

#it wait as there won't be anything to save in the first 5 seconds

time.sleep(5)

global sample\_block\_id

while True:

#'if' not essential but wil allow waiting to save processing

if not samplequeue.empty():

to\_save = samplequeue.get()

#write block with id from iterator

to\_save.write('mseed/PHYS' + str(sample\_block\_id) + '.mseed',format='MSEED')

sample\_block\_id=sample\_block\_id+1

samplequeue.task\_done()

else:

print 'nothing to save...'

#to save processing bit

time.sleep(5)

def save\_data\_jitter():

#it wait as there won't be anything to save in the first 5 seconds

time.sleep(5)

global jitter\_block\_id

while True:

#'if' not essential but wil allow waiting to save processing

if not jitterqueue.empty():

to\_save = jitterqueue.get()

#write block with id from iterator

to\_save.write('mseed/JTR' + str(jitter\_block\_id) + '.mseed',format='MSEED')

jitter\_block\_id=jitter\_block\_id+1

jitterqueue.task\_done()

else:

print 'nothing to save...'

#to save processing bit

time.sleep(5)

def read\_data(block\_length):

starttime=UTCDateTime()

x=1

data=numpy.zeros([block\_length],dtype=numpy.int16)

jitter=numpy.zeros([block\_length],dtype=numpy.int16)

firsttime=True

totaltime=0

lastsample=UTCDateTime()

while (port.isOpen()) and x<block\_length:

#loop continues for block size

sample = port.readline().strip()

data[x]=sample

timenow=UTCDateTime()

sample\_time=timenow-lastsample

jitter[x]=sample\_time

totaltime=totaltime+sample\_time

lastsample=timenow

x=x+1

print sample,timenow

avg\_samplingrate=totaltime/block\_length

print avg\_samplingrate

stats = {'network': 'UK', 'station': 'PHYS', 'location': '00',

'channel': 'BHZ', 'npts': block\_length, 'sampling\_rate': avg\_samplingrate,

'mseed': {'dataquality': 'D'},'starttime': starttime}

#create strem of data and queue it

st =Stream([Trace(data=data, header=stats)])

jt =Stream([Trace(data=jitter)])

samplequeue.put(st)

jitterqueue.put(jt)

for x in range(1):

worker\_sample = Thread(target=save\_data\_sample)

worker\_jitter = Thread(target=save\_data\_jitter)

worker\_sample.start()

worker\_jitter.start()

for x in range(5):

read\_data(32)

Questions:

What’s a jitter?

The jitter is used to record the time differences between the samples to make sure the sample rate is correct

What’s a Thread?

A Thread is a separate line of code being run that can gather data whilst the main code is doing something else, like submitting data from an array to a file.

What’s a Queue?

A Queue is the computational structure that allows two threads to be running at the same time and submitting data to the same file.