Market Simulator

What is the simulator used for?

Suppose you have a trading strategy you have been following.

You now have a bunch of executed trades for that strategy.

The simulator goes back in time and executes those orders and calculates statistics on the performance of the strategy.

Homework 3

You're provided with a file that has a bunch of orders for some strategy.

You need to design/develop a simulator that takes the file as an input and simulates the orders and calculates a few measures of performance.

Orders File

Year

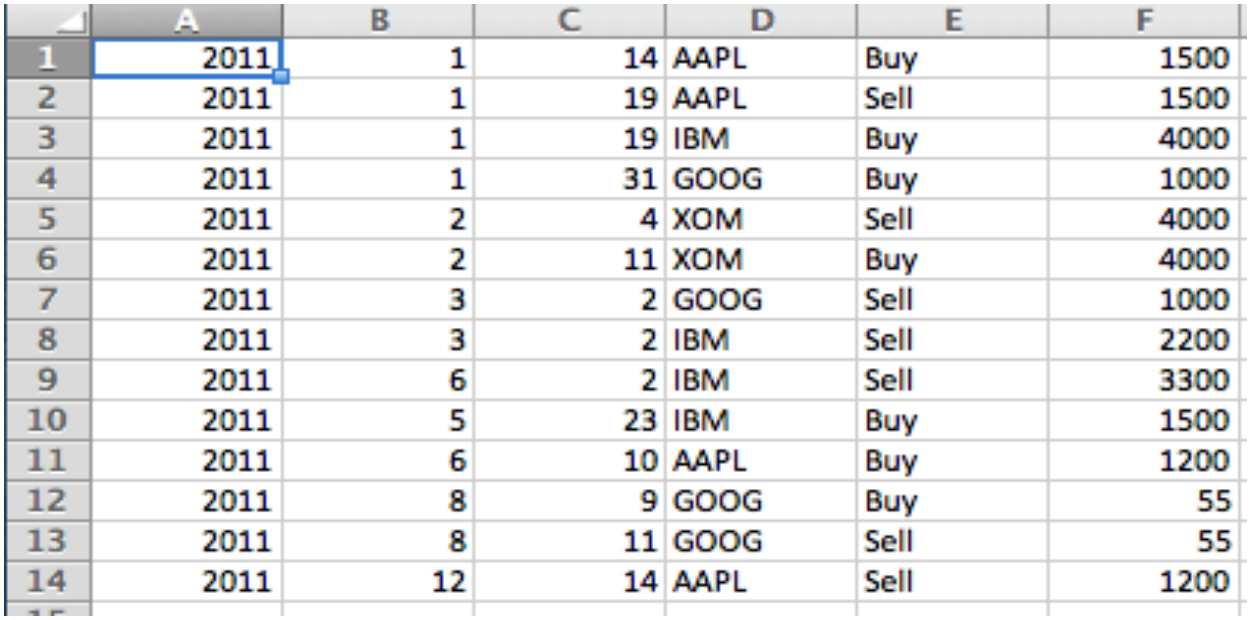
Month

Date

Symbol

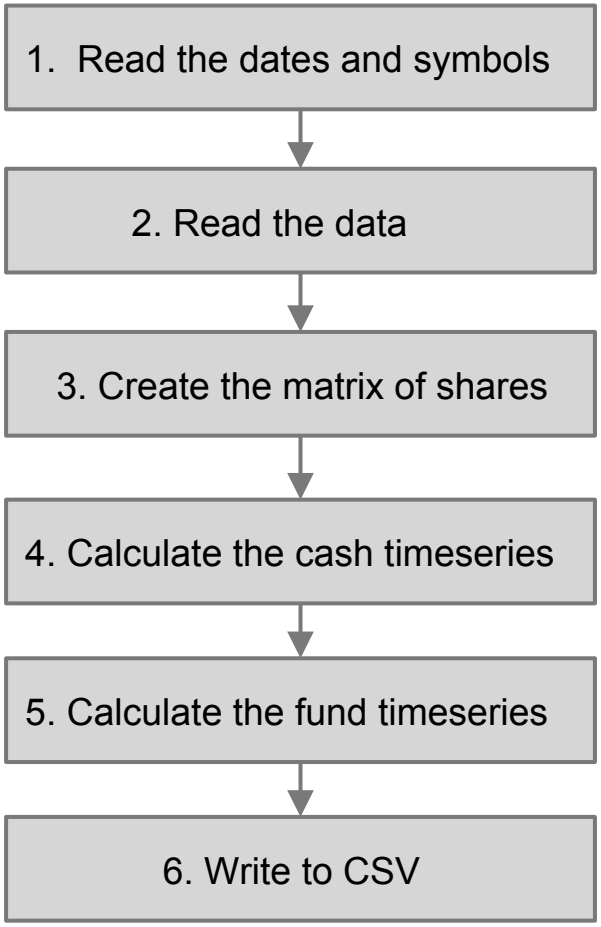
Buy/Sell

Quantity



	A	B	C	D	E	F
1	2011	1	14	AAPL	Buy	1500
2	2011	1	19	AAPL	Sell	1500
3	2011	1	19	IBM	Buy	4000
4	2011	1	31	GOOG	Buy	1000
5	2011	2	4	XOM	Sell	4000
6	2011	2	11	XOM	Buy	4000
7	2011	3	2	GOOG	Sell	1000
8	2011	3	2	IBM	Sell	2200
9	2011	6	2	IBM	Sell	3300
10	2011	5	23	IBM	Buy	1500
11	2011	6	10	AAPL	Buy	1200
12	2011	8	9	GOOG	Buy	55
13	2011	8	11	GOOG	Sell	55
14	2011	12	14	AAPL	Sell	1200

Flow chart for the simulator



What is a portfolio worth?

Price

Date\Sym	AAPL	MSFT	CASH
12/1	400.0	30.0	1.0
12/2	500.0	50.0	1.0

Holdings

Date\Shares	AAPL	MSFT	CASH
12/1	50.0	200.0	1000.0
12/2	100.0	50.0	200.0

Value

Date	Value
12/1	27,000.0
12/2	52,700.0

Value = Sum(Price*Hold)

How to read a csv ?

http://docs.python.org/2/library/csv.html

```
1   import csv
2   reader = csv.reader(open(filename, 'rU'), delimiter=',')
3   for row in reader:
4       print row
```

Step 1

- Read the csv file
- Create two lists for all dates and symbols
- Remove duplicates

Hint: uniqueList = list(set(listWithDuplicates))

- You now know what symbols and dates to read data for in Step 2.

Step 2

- Read the data just like we did in the tutorials and previous homeworks
- End date should be offset-ed by 1 day to read the close for the last date.

```
dt_end_read = dt_last + dt.timedelta(days=1)
```

Step 3

- Create a dataframe which has all values as zero with index as dates and columns as symbols.
- Iterate the orders file and fill the number of shares for that particular symbol and date.
- Remember : Sell is same as buying negative shares.
- Now you have a trade matrix.

Step 3

Trade Matrix

Date	AAPL	MSFT
12/1	100	0
12/2	0	20
12/3	0	-20
12/4	0	0
12/5	-100	0

This lacks two things :

1. Cash
2. We need to convert this to holdings.

Step 4

Date	Cash
12/1	10000
12/2	-500
12/3	-200
12/4	200
12/5	500

What is the CASH value on day 1 ?

Create a timeseries zero value and index as dates.

For each order subtract the cash used in that trade.

- Selling actually gives you cash.
- Two trades on one day.

Step 5

Append ‘_CASH’ into the price date.

df_close[‘_CASH’] = 1.0

Append the cash time series into the trade matrix

df_trade[‘_CASH’] = ts_cash

Convert trade matrix to holding matrix.

-- HOW ??

Step 5

Use cummulative sum to convert the trade matrix into holding matrix.

Now we have both the price and holding matrix.

Use dot product to calculate value of portfolio on each date.

Step 6

Writing the time-series to csv.

```
1  import csv
2  writer = csv.writer(open(filename, 'wb'), delimiter=',')
3  for row_index in ts_fund.index:
4      print row_index # This is a datetime object
5      print ts_fund[row_index] # This is a single value
6      row_to_enter = ['JUNK', 'DATA']
7      writer.writerow(row_to_enter)
```

row_to_enter is a list of strings

Next Steps

You now have the simulator code ready.

Analyze.py can be written using what you learnt from the simulator code as well as from homework1.

Hints

Use sys.argv for reading arguments from command line.

Write one step at a time and check manually.

This assignment will take sometime to finish so please start early.

Questions ??