CS 136 Assignment 10

Bitcoin

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Out Friday Apr 15, 2016
Due 5pm sharp: Wednesday Apr 20, 2016
Submissions to Canvas

Total points: 19. This is a single-person assignment. Points will be awarded for clarity, correctness and completeness of answers, and we encourage typed submissions. You are free to discuss the problem set with other students but you must not share your answers. Extra credit will ONLY be considered as a factor in deciding the grade of a student on a grade boundary.

1. [19 Points] Bitcoin

For part of this assignment you will need to visit http://blockexplorer.com/ or https://blockchain.info/. Take a snap shot of the screen and attach it to your assignment.

Do the following tasks:

(a) [1 Points] What is the current BTC to USD exchange rate? (e.g., look here http://bitcoincharts.com/)

(b) [2 Points] What was the average number of blocks generated per hour in the list of latest blocks at generated at http://blockexplorer.com/? How does this relate to the theoretical goal?

(c) [3 Points] [Briefly] What causes a new block to be formed in Bitcoin, why are there “bitcoin miners,” and how is double spending prevented in Bitcoin?

(d) [2 Points] Plot a histogram of the distribution of the total transaction value, in USD, of the new blocks generated in the view at http://blockexplorer.com/. Provide a couple of sentences of discussion on what you find.

(e) [3 Points] Click on a block ID and look at the transactions. Take a screen shot of just the first transactions you can see and include with your assignment. How many transactions are there in total in this block? What is the average USD value per transaction in this block? Provide a brief, qualitative description of the first three transactions.

(f) [3 Points] Visit http://blockchain.info/charts/hash-rate What is meant by the “hash rate” of the bitcoin network, and how can you explain the trend in hash rate over the past year? (Hint: you might find https://en.bitcoin.it/wiki/Difficulty and the USD market price trend useful for your explanation of the trend.)

(g) [2 Points] Look here

https://en.bitcoin.it/wiki/Mining_hardware_comparation#ASIC
at the ASIC comparison spreadsheet to find the best Mhash/s/$ rate amongst ASICs currently shipping.

What is an ASIC? How much would you need to spend on hardware to achieve the current hash rate?

(h) [3 Points] Look here \url{http://stats.rc.fas.harvard.edu/ganglia/RC/} to find the number of CPUs on the holyoke_compute_odyssey2 cluster (click on RC Grid > Holyoke Compute Grid > Holyoke Compute Odyssey2). Assume the machines are similar in hash rate to the 16 core, AMD Opteron 6128: \url{https://en.bitcoin.it/wiki/Non-specialized_hardware_comparison}

What is the total Ghash/s rate achievable on Harvard’s Odyssey 2 cluster? How does this compare to the current hash rate of Bitcoin? Do you think you could make money by harnessing all of these machines? [Please don’t try]