such project 1

prospective computer configurations for a college student who wishes to mine much dogecoin

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what is dogecoin?

Dogecoin is a cryptocurrency inspired by the concept of the famous Bitcoin and the doge meme. While it was derived from Litecoin and shares the same type of crypto, scrypt, dogecoin has had extreme success due to its rapid acceptance among internet communities like Reddit.

Dogecoin recently has gained notoriety after a couple of events early this year. The first event was when a hacker managed to compromise a number of dogecoins from a dogecoin wallet website. This event caused a commotion on the internet spreading awareness of the currency. Not long after this, the dogecoin community raised $50,000 to send the Jamaican bobsled team to the 2014 Winter Olympics in Sochi.

Our reason for choosing this cryptocurrency is that dogecoin is still viable for profitable mining unlike the more popular and established Bitcoin.
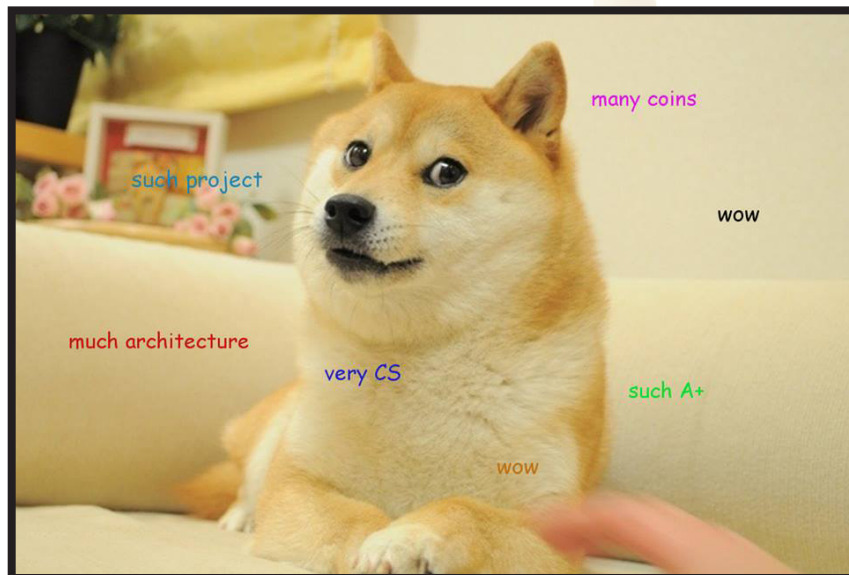
A standard doge meme featuring the prototypical Shibu Ina photo with comic sans exclamations.

overview

The project specifications were to assemble prospective computers for a typical college student who wishes to mine cryptocurrency (in our case, dogecoin). Given this somewhat vague description we've attempted to add some reasonable constraints.

First, we looked up the average cost of a PC as a baseline for what our budget should be. According to one source we've found that the average price of a PC is between $275 and $1600. We used the midpoint of this range to select a target price of $940 as an approximate mid-range budget.

Second, we decided which parts should be considered a priority. The student primarily uses his computer for music and videos, tasks which are not very taxing on a computer. The most taxing use would be the coin mining itself. Crypto coin mining is best done on GPU's, because of their high throughput. Sometimes highly efficient USB stick processors can be used, but none are specifically available for dogecoin. With all these things in mind, special attention and priority was paid to the selection of a video card that would mine dogecoin effectively.

So many
DOGES !!!

Price of PC's Source:
noblepcs.com/average-cost-of-pcs-today/

section 1: much parts, wow

Processors:
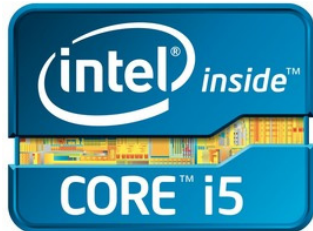
Manufacturer	# of Cores	Clock Speed	Model Number	Power Consumption	Price
Intel	4	2.3 GHz	i5-4670T	45W	$213
AMD	3	2.5 GHz	Phenom II x3 705E	65W	$170

The wattages shown here are the listed TDP's (Thermal Design Power) of the processors. These figures represent the amount of power the processors will draw under typical use.

We chose our Intel processor because of its mid-range performance, price and low power consumption. For a user who isn't doing heavy CPU work, an i7 seemed like overkill. On the flip-side however, we avoided using a Celeron because the performance hit was significant and it tended to be less energy efficient.

We chose the AMD option to be our budget processor. Our reason for this is that they have a unique marketing practice of selling defective 4 core processors as perfectly fine 3 core processors. By doing so, they sell them at a significantly lower price point, allowing us to get more bang for our buck.

Because the mining will take place on the GPU, the processor is irrelevant for that task.

http://ark.intel.com/products/75050/Intel-Core-i5-4670T-Processor-6M-Cache-up-to-3_30-GHz

http://products.amd.com/en-us/DesktopCPUDetail.aspx?id=558&f1=AMD+Phenom%E2%84%A2+II+X3&f2=&f3=&f4=512&f5=AM3&f6=C2&f7=45nm+SOI&f8=&f9=4000&f10=&f11=&f12=True

http://www.amazon.com/dp/B002BIQC6U/?tag=extension-kb-20

http://www.cpu-world.com/CPUs/K10/AMD-Phenom%20II%20X3%20705e%20-%20HD705EOCK3DGI%20%28HD-705EOCGIBOX%29.html

http://www.cpubenchmark.net/power_performance.html

Memory:

Manufacturer	Model Number	Type	Speed	Capacity	Price
GSkill	F3-10600CL9D	DDR3	1333 Mhz	2x2GB	$44.99
Corsair	CMX8GX3M2A1333C9	DDR3	1333 Mhz	2x4GB	$75.99

Once again, because Dogecoin mining and simple multimedia tasks are not memory intensive, we chose to go with midrange memory options We wanted to have enough memory to be able to run Windows 8 smoothly. Microsoft recommends 2 GB of RAM, but sources such as Ars Technica point out that it really should be double that. With that in mind we chose to have at least 4GB.

We chose a 1333 Mhz model so that it would be a standard memory speed that fit within the memory speeds of both processors. We also to go with two stick sets as opposed to one stick to take advantage of dual channeling and thus double our memory bandwidth. For the budget computer we decided to go with a low price 4 GB set of GSkill sticks. For the Low Power and Max Performance options we chose to go with an 8 GB set of Corsair Sticks

http://arstechnica.com/information-technology/2012/05/recommended-system-requirements-for-windows-8/

http://www.newegg.com/Product/Product.aspx?Item=N82E16820231179
http://www.newegg.com/Product/Product.aspx?Item=N82E16820145315

Storage:

Manufacturer	Model Number	Type	Capacity	Power Consumption	Avg Seek	Read Bandwidth	Price
Western Digital	WD20EZRX	HDD	2TB	3W/4.1W	8.9 ms	147 MB/s	$84.99
Seagate	ST2000DX001	Hybrid	2TB+8GB	4.5W/6.7W	9.5 ms	156/190 MB/s	$119.99

The first drive we selected was a standard HDD from Western Digital's Green low power series. It's low price and low power consumption make it a good choice for our Low Budget and Low Power Configurations.

We chose a Hybrid drive manufactured by Seagate for our Max Performance configuration. In addition to its 2TB of traditional HDD storage it has 8GB of SSD disk space. This SSD space raises its bandwidth to 190 MB/s and, though not listed in its specs, should make seek time virtually non-existent by virtue of being an SSD.

We decided to avoid pure SSD's because our clients needs did not justify their high cost and low storage capacity.

http://www.newegg.com/Product/Product.aspx?Item=N82E16822236404
http://www.wdc.com/wdproducts/library/SpecSheet/ENG/2879-771438.pdf
http://www.grobakinfo.com/western-digital-wd20ezrx-green-2-tb-desktop-hard-drive-3-5%E2%80%B3-intellipower-sata-6-gbs-64mb-cache/
http://www.newegg.com/Product/Product.aspx?Item=N82E16822178380
http://www.seagate.com/www-content/product-content/barracuda-fam/desktop-sshd/en-us/docs/desktop-sshd-data-sheet-ds1788-2-1308us.pdf
http://en.wikipedia.org/wiki/Solid-state_drive

Video Card:

Manufacturers	Model Number	kH/s	Processor Speed	Power	Capacity	Interface	Price
Asus + nVidia	ENGTX570 DCII	201	742 MHz	220W	1280 MB	PCI-E x16	$189.99
MSI +AMD	R9 270x GAMING2G	430	1030 MHz	180W	2048 MB	PCI-E x16	$351.36
Sapphire+AMD	R9 290X 100361SR	990	1250 MHz	300W	4096 MB	PCI-E x16	$623.99

Because of our client's desire to mine dogecoin, special care was taken into selecting video cards that were shown to be effective at dogecoin hashing. While these cards have varying amounts of RAM, it's not very relevant for mining cryptocurrency. Cryptocurrency mainly relies on the processing power of a GPU. Since graphics cards use complex processing elements, it's hard to tell from the manufacturer's specifications how effective any particular card could be. In order to get a reliable measure of effectiveness we consulted a list of known cards useful for hashing and their benchmarked kilohashes per second. This benchmark of kH/s directly corresponds to how well the GPU mines dogecoins.

The first video card in our list was chosen because of its low price with the drawback of its low kH/s. The second card was chosen for its low wattage, but medium range price and kH/s.
The third card was chosen for its impressive hashing at the cost of a high wattage and price tag.

While multi-card systems would be the most powerful choice for dogecoin mining, we decided to forgo using them due to the large wattage and cost.

https://litecoin.info/Mining_hardware_comparison
http://www.amazon.com/performance-ENGTX570-DCII-2DIS-1280MD5/dp/B004MN3HBA
http://www.amazon.com/MSI-R9-270X-DisplayPort-PCI-Express/dp/B00FR6XP6I
http://www.amazon.com/Sapphire-Version-PCI-Express-Graphics-11227-00-40G/dp/B00HJOXUKC
http://www.sapphiretech.com/presentation/product/?cid=1&gid=3&sgid=1227&pid=2151&psn=&lid=1&leg=0#

Motherboard:

The motherboard we chose for our AMD processor is an ASUS M5A78L-M/USB3 AM3+ AMD 760G + SB710 HDMI USB 3.0 uATX AMD Motherboard priced at $64.49

The motherboard we chose for our Intel processor is an MSI B85-G41 PC Mate LGA 1150 Intel B85 HDMI SATA 6Gb/s USB 3.0 ATX High Performance CF Intel Motherboard priced at $69.99

Each motherboard is compatible with their respective processor. Both motherboards have compatible SATA ports, PCI-Express x16 ports, a sufficiently small size and enough RAM slots to allow for future upgrades.

http://www.newegg.com/Product/Product.aspx?Item=N82E16813131942
http://www.asus.com/Motherboards/M5A78LMUSB3/#specifications
http://www.newegg.com/Product/Product.aspx?Item=N82E16813130699

Power Supply:

Diablotek PDA Series PDA-750BW 750W ATX12V v2.31 & EPS12V v2.92 SLI Ready CrossFire Ready 80 PLUS BRONZE Certified Modular Active PFC Power Supply $79.99

This 750W power supply meets the recommendations of our most powerful components and the calculated power needs of all three of our configurations. It has sufficient connectors for all of our components and will fit inside our chosen case.

http://www.newegg.com/Product/Product.aspx?Item=N82E16817822030

Case:

Corsair Carbide Series 200R Black Steel / Plastic compact ATX Mid Tower Case $59.99

We decided to choose a simple mid-tower size case with decent ventilation which should be a sufficient size for all of our components.

http://www.newegg.com/Product/Product.aspx?Item=N82E16811139018

Manufacturer	Model Number	Size	Supported Form Factors	External 5.25 Drive Bays	Internal 3.5 Drive Bays	Price
Corsair	Carbide Series 200R	Mid Tower	ATX + Micro ATX	3	5	$59.99

Blu-Ray Drive:

We decided to include a simple Blu-Ray / DVD Reader because of our client's movie and music interest.

http://www.newegg.com/Product/Product.aspx?Item=N82E16827136268

Manufacturer	Model Number	Blu-Ray Read	DVD Read	Price
LG	UH12NS30	12x	16x	$39.99

section 2: very assemblage

Low Power System:

Processor	Motherboard	GPU	Memory	Storage	PSU	Removable Media	Case
Intel Core i5-4670T	MSI B85-G41	MSI AMD Readon R9 270x	Corsair XMS3	Western Digital Drive	Diablotek PDA-750	LG Blu-Ray	Carbide Series 200R
1 CPU, 4 Cores	1 Board	1 Card	2 x 4gb sticks	1 x 2TB Drive	1 Unit	1 Drive	1 Case

The processor is compatible with the motherboard because they are the same socket type, LGA 1150. The motherboard is compatible with the memory because it has the correct 240 pin memory slot. The GPU is compatible with the motherboard because they have both have a PCI-Express x16 interface. The memory is a good fit with the processor because it has one of the processors ideal memory speeds. The drives are compatible with the motherboard because they all have a SATA interface. The PSU is compatible because it has all of the needed SATA, PCI-Express, Motherboard, and Processor plugs as well as a sufficient wattage for all of the components. The case is of a sufficient width to fit our PSU, length to fit our video card, and overall size to fit our motherboard.

Budget System:

Processor	Motherboard	GPU	Memory	Storage	PSU	Removable Media	Case
AMD Phenom II	ASUS M5A78L-M	Asus nVidia GTX 570	GSKILL F3	Western Digital Drive	Diablotek PDA-750	LG Blu-Ray	Carbide Series 200R
1 CPU, 3 Cores	1 Board	1 Card	2 x 2gb sticks	1 x 2TB Drive	1 Unit	1 Drive	1 Case

The processor is compatible with the motherboard because the processor is an AM3 socket and the motherboard is an AM3+ which is back compatible. The motherboard is compatible with the memory because it has the correct 240 pin memory slot. The GPU is compatible with the motherboard because they have both have a PCI-Express x16 interface. The memory is a good fit with the processor because it matches the processor's 1333 MHz supported memory speed. The drives are compatible with the motherboard because they all have a SATA interface. The PSU is compatible because it has all of the needed SATA, PCI-Express, Motherboard, and Processor plugs as well as a sufficient wattage for all of the components. The case is of a sufficient width to fit our PSU, length to fit our video card, and overall size to fit our motherboard.

Max Performance System:

Processor	Motherboard	GPU	Memory	Storage	PSU	Removable Media	Case
Intel Core i5-4670T	MSI B85-G41	Sapphire ATI R9 290X	Corsair XMS3	Seagate Hybrid Drive	Diablotek PDA-750	LG Blu-Ray	Carbide Series 200R
1 CPU, 4 Cores	1 Board	1 Card	2 x 4gb sticks	1 x 2TB Drive	1 Unit	1 Drive	1 Case

The processor is compatible with the motherboard because they are the same socket type, LGA 1150. The motherboard is compatible with the memory because it has the correct 240 pin memory slot. The GPU is compatible with the motherboard because they have both have a PCI-Express x16 interface. The memory is a good fit with the processor because it has one of the processors ideal memory speeds. The drives are compatible with the motherboard because they all have a SATA interface. The PSU is compatible because it has all of the needed SATA, PCI-Express, Motherboard, and Processor plugs as well as a sufficient wattage for all of the components. The case is of a sufficient width to fit our PSU, length to fit our video card, and overall size to fit our motherboard.
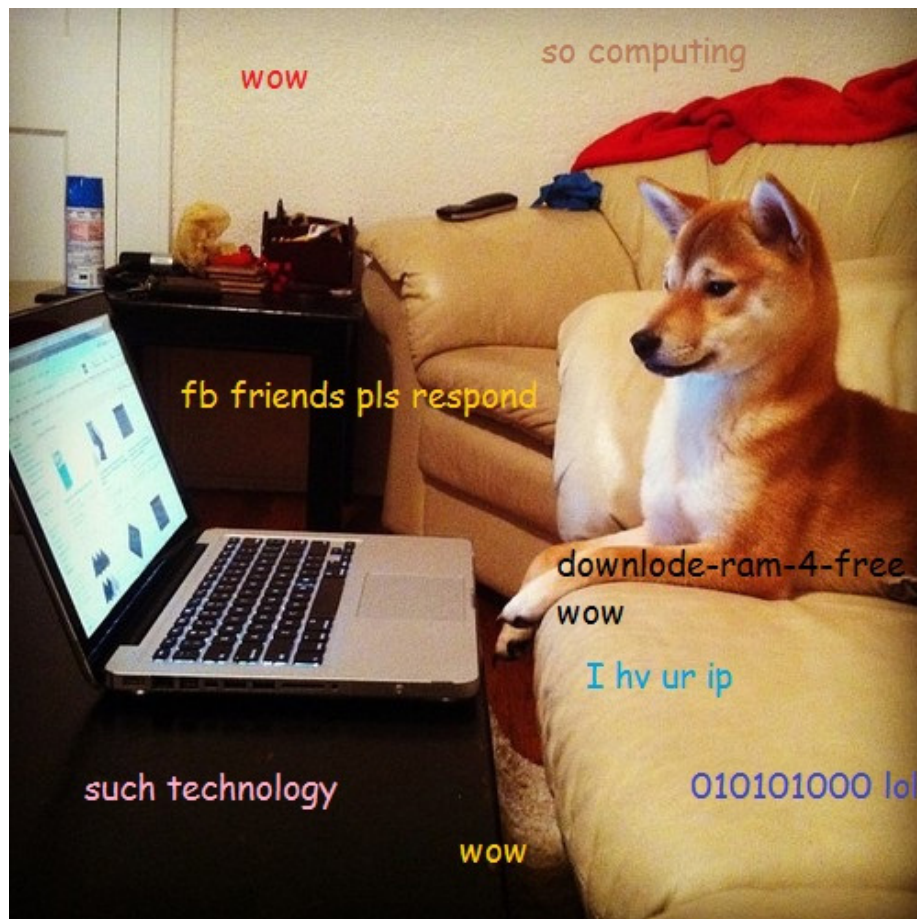
section 3: much evaluation

Performance:

In ranking the performance of our systems, we focused on their ability to mine Dogecoin. Because this is dependent solely on the Graphics Card, it is sufficient to look at only this part to grade their performance. The metric we used is Kilo Hashes per Second. In Dogecoin, each hash generated has a chance of earning Dogecoins. Thus, the more hashes completed, the more money a computer can generate.

Our budget computer's Graphics Card generates 201 kH/s.
This makes it our weakest performer.

Our low-power computer's Graphics Card generates 430 kH/s.
This makes it our mid-range performer.

Our max performance computer's Graphics Card generates 990 kH/s.
This makes it our best performer.

Price:

Low Power Configuration

Processor	Motherboard	GPU	Memory	Storage	PSU	Removable Media	Case
Intel Core i5-4670T	MSI B85-G41	MSI AMD Readon R9 270x	Corsair XMS3	Western Digital Drive	Diablotek PDA-750	LG Blu-Ray	Carbide Series 200R
$213	$69.99	$351.36	$75.99	$84.99	$79.99	$39.99	$59.99
						Total:	$975.30

Budget Configuration

Processor	Motherboard	GPU	Memory	Storage	PSU	Removable Media	Case
AMD Phenom II	ASUS M5A78L-M	Asus nVidia GTX 570	GSKILL F3	Western Digital Drive	Diablotek PDA-750	LG Blu-Ray	Carbide Series 200R
$159.99	$64.49	$189.99	$44.99	$84.99	$79.99	$39.99	$59.99
						Total:	$724.42

Max Performance Configuration

Processor	Motherboard	GPU	Memory	Storage	PSU	Removable Media	Case
Intel Core i5-4670T	MSI B85-G41	Sapphire ATI R9 290X	Corsair XMS3	Seagate Hybrid Drive	Diablotek PDA-750	LG Blu-Ray	Carbide Series 200R
$213	$69.99	$623.99	$75.99	$119.99	$79.99	$39.99	$59.99
						Total:	$1,282.93

From the prices above we see:
The lowest priced machine is the Budget configuration at $724.42
The middle ground priced machine is the Low Power configuration at $975.30
The highest priced machine is the Max Performance configuration at $1,282.93
We would like to note that these fall within the range of the average cost of a computer stated earlier.

Power:

Low Power Configuration

Processor	Motherboard	GPU	Memory	Storage	Removable Media	Total Power after 80% efficiency adjustment
Intel Core i5-4670T	MSI B85-G41	MSI AMD Readon R9 270x	Corsair XMS3	Western Digital Drive	LG Blu-Ray	
45W	45W	180W	6W	3W	25W	**380W**

Budget Configuration

Processor	Motherboard	GPU	Memory	Storage	Removable Media	Total Power after 80% efficiency adjustment
AMD Phenom II	ASUS M5A78L-M	Asus nVidia GTX 570	GSKILL F3	Western Digital Drive	LG Blu-Ray	
65W	45W	220W	6W	3W	25W	**455W**

Max Performance Configuration

Processor	Motherboard	GPU	Memory	Storage	Removable Media	Total Power after 80% efficiency adjustment
Intel Core i5-4670T	MSI B85-G41	Sapphire ATI R9 290X	Corsair XMS3	Seagate Hybrid Drive	LG Blu-Ray	
45W	45W	300W	6W	6.7W	25W	**535W**

As we can see from our charts, the system with the least power efficiency is our Max Performance system at 535W.

Our Mid-Range power usage system is the Budget configuration at 455W.

Lastly, our lowest power system is the Low Power configuration at 380W.

Any power specs not found in the citations within section one are approximations gleaned from this system power estimator:
http://support.asus.com/powersupply.aspx

Overall Analysis

Metric 1:

With this metric we will consider a power conscientious comparison of performance per watts.
 (Note that we remove a "/s" because Watts is already a per second unit of measurement.)
With these figures, higher is better.
Our **Low Power configuration** is (430kH/s)/380W giving us a score of **1.13kH per watt.**
Our **Budget configuration** is (201kH/s)/455W giving us a score of **.44kH per watt.**
Our **Max Performance** configuration is (990kH/s)/535W giving us a score of **1.85kH per watt.**

While one might expect the Low Power system to win in terms of power efficiency, the high
performance of the Max Performance configuration far outweighs its high power consumption.
If our client can afford this, it is the best choice according to this metric. The Low Power
choice comes in second place and the Budget choice comes in last.

Metric 2:

With this metric we will consider how much profit is generated per day from dogecoin mining
after subtracting the cost of electricity. Average kW/h cost of electricity in the Bay Area
is $0.20 per kWH. According to online calculators, at current exchange rates 100kH/s will
generate $0.38 USD per day.
Higher is better.
Our **Low Power configuration** will cost (380W/1000WH) *$0.20 * 24hours = $1.82 per day.
It will generate (430kH/s)/(100kH/s) *$0.38 = $1.63 per day.
$1.63-$1.82 = **$-0.19 per day**

Our **Budget configuration** will cost (455W/1000WH) *$0.20 * 24hours = $2.18 per day.
It will generate (201kH/s)/(100kH/s) *$0.38 = $0.76 per day.
$0.76-$2.18 = **-$1.42 per day**

Our **Max Performance configuration** will cost (535W/1000WH) *$0.20 * 24hours = $2.57 per day.
It will generate (990kH/s)/(100kH/s) *$0.38 = $3.76 per day.
$3.76-$2.57 = **$1.19 per day**

Once again our Max Performance configuration is the winner at generating $1.19 per day. It is
also the only one to outpace the cost of electricity (in the bay area of course) and actually turn
a profit. In second place we have the Low Power configuration, losing $0.19 a day. In last place is
the Budget configuration ironically losing $1.42 per day.

http://www.bls.gov/ro9/cpisanf_energy.pdf
http://www.minedogecoin.com/dogecoin-mining-profitability-calculator/