Title: Assignment 1
Subtitle: Computer performance, reliability, and scalability calculation

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1.2

a. Data Sizes
Provide estimates for the size of various data items. Please explain how
you arrived at the estimates for the size of each item by citing
references or providing calculations.

Data Item	Size per Item
128 character message.	128 Bytes
1024x768 PNG image	1 MB
1024x768 RAW image	7.5 MB
HD (1080p) HEVC Video (15 minutes)	36 MB
HD (1080p) Uncompressed Video (15 minutes)	36000 MB
4K UHD HEVC Video (15 minutes)	228 MB
4k UHD Uncompressed Video (15 minutes)	228000 MB
Human Genome (Uncompressed)	1.5 GB

1. 1 character is 8 bits ? so 128 character message is 128 bytes.
2. Pixels 1024x768 = 786432 each pixel in an img needs 3 bytes in memory.
3. depth of 10 = 1024 * 768 * 1024 = 2.25mb png
4. 30 fps 8 bit depth x 15 mins= 900s *30*1290*1080*8/8/1000/1024 36 mb
5. 1000 x 4 = 36k mb
6. 4k x 15 mins: 30*900*4096*2160*8/8/1000/1024/1023 = 228mb
7. 1000x larger = 228000mb
8. 6*10^9 = genome x 1 byte/4 = 1.5 gb

b. Scaling
Using the estimates for data sizes in the previous part, determine how
much storage space you would need for the following items.

	Size	# HD
Daily Twitter Tweets (Uncompressed)	64 GB	1
Daily Twitter Tweets (Snappy Compressed)	43 GB	1
Daily Instagram Photos	75 TB	23
Daily YouTube Videos	104 TB	32
Yearly Twitter Tweets (Uncompressed)	23 TB	7
Yearly Twitter Tweets (Snappy Compressed)	15 TB	5
Yearly Instagram Photos	27375 TB	8213
Yearly YouTube Videos	37960 TB	11388

1. 500 million tweets sent per day = 500 million * 128 bytes = 64 GB

2. 1.5 - 1.7x ratio plain txt if use 1.5 = 43 gb
3. .75 *100000000*1mb = 75000000mb = 75TB
4. 500 hrs *60*24 = 72k hrs * 60 mins = 720000 * 4 / 15 mins. 72k hrs * 4 * 36mb = 103680000mb
5. 64gb *365 = 23360 = 23 tb
6. 43 gb * 365= 23360 gb = 23 tb
7. 75 tb *365 = 27375 = 15 tb
8. 104 tb * 365 = 27375 tb

c. Reliability
Using the yearly estimates from the previous part, estimate the number of hard drive failures per year using data from Backblaze's hard drive statistics.

	# HD	# Failures
Twitter Tweets (Uncompressed)	7	<1
Twitter Tweets (Snappy Compressed)	5	<1
Instagram Photos	8213	73
YouTube Videos	11388	101

d. Latency
Provide estimates of the one way latency for each of the following items. Please explain how you arrived at the estimates for each item by citing references or providing calculations.

	One Way Latency
Los Angeles to Amsterdam	30 ms
Low Earth Orbit Satellite	40 ms
Geostationary Satellite	600 ms
Earth to the Moon	1281 ms
Earth to Mars	3 minutes

2.
https://www.omniaccess.com/leo/#:~:text=The%20GEO%20latency%20is%20of,and%20an%20essential%20part%20if.