

Private Cloud						
Component	Description	Citations	Price per unit(\$)	No of Items	Total Price(\$)	Calculation Description
Configuration 2						
Compute Servers	PowerEdge R230 Rack Server	http://www.dell.com/en-us/work/shop/servers-storage-and-networking/poweredge-r230-rack-server/spd/poweredge-r230/pe_r230_1346?selectionState=eyJGUHJpY2UiOjgxOC4zNCwiT0MiOiJwZV9yMjMwXzEzNDYiLCJRdHkiOiEsIk1vZHMlOi7IkkljoxNTc0LCJPcHRzljpbeyJJZCI6IiJ9XX0seyJJZCI6MTU2MCwiT3B0cyI6W3siSWQiOiIxNjI0MDAiLCJQcmliZSI6MjI1LjczfV19LHsiSWQiOiE1NzA5Ik9wdHMiOi7IkkljoiNTAwR0JTMylsIlByaWNlIjo0Ny4wNX1dfSx7IkkljoxNTE0LCJPcHRzljpbeyJJZCI6Ik9CTklDIn1dfSx7IkkljoxNTlwLCJPcHRzljpbeyJJZCI6Ik5k5PTUVEIn1dfV19	818.34	1000000	818340000	
Network Switches	Zyxel 48 Port 375W High Powered PoE+ Gigabit Ethernet L2 Managed Switch with 4 10G SFP+ Ports (XGS2210-52HP)	https://www.amazon.com/dp/B01GMY7QK4/ref=sspa_dk_detail_4?th=1	1047.17	20834	21816739.78	
Network Cables	Ethernet Cable 6.5ft	https://www.amazon.com/Ethernet-Cable-Vandesail-CAT7-LAN-Network-Cable-RJ45-High-Speed-Patch-Cord-STP-Gigabit-10-Gold-Plated-Lead-Patch-Panel-Black-1pack/dp/B01MFG3HIA?th=1	4.25	1000000	4250000	
Racks	CRUXIAL-COOL-42u-10K Rackmount Solutions Air Conditioned Racks	https://www.rackmountsolutions.net/rackmount-solutions-cruxial-cool-42u-10k-btu-air-conditioned-server-cabinet/	3463.98	24306	84195497.88	Total number of racks required = (Number of Compute Servers + Number of Network Switches + Number of Storage Servers)/42 = 24306
Storage Servers	Storage Server J4610S	http://www.pogolinux.com/quotes/editsys?sys_id=1118378	63563.62	9	572072.58	

Electric Power		https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a	0.0958		1380673100	
					1049010000	Compute Server Power Consumption. Per Server Per Hour = 0.25 kilo watts. Total Power Consumption for all Compute Servers over 5 years = $43800 \times 1000000 \times 0.25 = 10950000000$. Total Cost of Power Consumption = $10950000000 \times 0.0958 = 1049010000$.
					32782611.51	Network Switches Power Consumption. Per Server Per Hour = 0.375 kilo watts. Total Power Consumption for all Network Switches over 5 years = $43800 \times 0.375 \times 20834 = 342198450$. Total cost of power consumption = $342198450 \times 0.0958 = 32782611.51$
					52870.104	Storage Server Power Consumption. Per Server Per Hour = 1.4 kilo watts. Total Power Consumption for all Storage Servers over 5 years = $43800 \times 1.4 \times 9 = 551880$. Total Cost of Power Consumption = $551880 \times 0.0958 = 52870.104$
					298827618.3	Racks Power Consumption. Per Rack Per Hour = 2.93 kilo watts. Total Power Consumption for all racks over 5 years = $2.93 \times 43800 \times 24306 = 3119286204$. Total Cost of Power Consumption = $3119286204 \times 0.0958 = 298827618.343$
Cooling		Not Required as the racks already include cooling.				
Administration		https://www.glassdoor.com/Salaries/chicago-systems-administrator-salary-SRCH_IL.0.7_IM167_KO8.29.htm	72,000	1000	72000000	
TOTAL: 2381847410						
Configuration 1						
Compute Servers	Server Iris 1181-2GPU	http://www.pogolinux.com/quotes/editsys?sys_id=1118429	14877.24	5000	74386200	
Network Switches	Zyxel 48 Port 375W High Powered PoE+ Gigabit Ethernet L2 Managed Switch with 4 10G SFP+ Ports (XGS2210-52HP)	https://www.amazon.com/dp/B01GMY7QK4/ref=sspa_dk_detail_4?th=1	1047.17	105	109952.85	

Network Cables	Ethernet Cable 6.5ft	https://www.amazon.com/Ethernet-Cable-Vandesail-CAT7-LAN-Network-Cable-RJ45-High-Speed-Patch-Cord-STP-Gigabit-10-Gold-Plated-Lead-Patch-Panel-Black-1pack/dp/B01MFG3HIA?th=1	4.25	5000	21250	
Racks	CRUXIAL-COOL-42u-10K Rackmount Solutions Air Conditioned Racks	https://www.rackmountsolutions.net/rackmount-solutions-cruxial-cool-42u-10k-btu-air-conditioned-server-cabinet/	3463.98	5187	17967664.26	
Storage Servers	Storage Server J4610S	http://www.pogolinux.com/quotes/editsys?sys_id=1118378	63563.62	82	5212216.84	
Electric Power		https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a	0.0958		93790242.74	
					29372280	Compute Server Power Consumption. Per Server Per Hour: 1.4 kilo watts. Total Power Consumption Cost for all Servers for 5 years: $43800 * 1.4 * 0.0958 * 105 = \29372280
					165219.075	Network Switches Power Consumption. Per Switch Per Hour: 0.375 kilo watts. Total Cost for all switches for 5 years: $43800 * 0.375 * 0.0958 * 105 = \165219.075
					481705.392	Storage Servers Power Consumption. Per Server Per Hour: 1.4 kilo watts. Total Cost for all servers for 5 years: $43800 * 1.4 * 0.0958 * 82 = \481705.392
					63771038.28	Racks Power Consumption. Per Rack Per Hour: 2.93 kilo watts. Total Cost for all racks over 5 years: $5187 * 43800 * 2.93 * 0.0958 = \63771038.2764
Cooling						Not Required as the racks already include cooling.
Administration		https://www.glassdoor.com/Salaries/chicago-systems-administrator-salary-SRCH_IL.0.7_IM167_KO8.29.htm	72000	6	432000	Per System Administrator Cost: 72000. Total Number of Servers: Compute Servers + Storage Servers = $5000 + 82 = 5082$. Total Number of System Administrators Required = $5082 / 1000 = 6$. Total Cost for System Administrators = $6 * 72000 = 432000$.
TOTAL:					191919526.7	
Configuration 3						

Compute Server	8-GPU/512GB DGX-1 DL WITH V100	http://nextwarehouse.com/item/?2707240	164986.46	1000	164986460	Total Number of Compute Servers Required = 1 exaflop/mixed precisionperformance per server = 1 exaflop/1 petaflop = 1000
Network Switches	Zyxel 48 Port 375W High Powered PoE+ Gigabit Ethernet L2 Managed Switch with 4 10G SFP+ Ports (XGS2210-52HP)	https://www.amazon.com/dp/B01GMY7QK4/ref=sspa_dk_detail_4?th=1	1047.17	21	21990.57	Total Number of Network Switches Required = (Number of Compute Servers + Number of Storage Servers)/48 = 21
Network Cables	Ethernet Cable 6.5ft	https://www.amazon.com/Ethernet-Cable-Vandesail-CAT7-LAN-Network-Cable-RJ45-High-Speed-Patch-Cord-STP-Gigabit-10-Gold-Plated-Lead-Patch-Panel-Black-1pack/dp/B01MFG3HIA?th=1	4.25	1001	4254.25	Total Number of Cables Required = Number of Compute Servers + Number of Storage Servers = 1001
Racks	CRUXIAL-COOL-42u-10K Rackmount Solutions Air Conditioned Racks	https://www.rackmountsolutions.net/rackmount-solutions-cruxial-cool-42u-10k-btu-air-conditioned-server-cabinet/	3463.98	25	86599.5	Total number of racks required = (Number of Compute Servers + Number of Storage Servers + Number of Network Switches)/42=25
Storage Servers	Storage Server J4610S	http://www.pogolinux.com/quotes/editsys?sys_id=1118378	63563.62	1	63563.62	Each Server Storage Capacity = 1224TB. Total Storage Server Capacity Required = 1 PB / 1000 TB. Total Number of Storage Servers Required = 1.
Electric Power		https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a	0.0958		13773606.2	
					13427328	Compute Server Power Consumption. Per Hour Per Server = 3.2 kilo watts. Total Power Consumption for all Compute Servers Over 5 years = 43800*1000*3.2 = 140160000. Total Cost for Power Consumption = 140160000*0.0958 = \$13427328.
					33043.815	Network Switches Power Consumption. Per Hour Per Switch = 0.375 kilo watts. Total Power Consumption for all network switches over 5 years = 43800*21*0.375 = 344925. Total Cost for Power Consumption = 344925*0.0958 = \$33043.815
					5874.456	Storage Server Power Consumption. Per Server Per Hour = 1.4 kilo watts. Total Power Consumption for all Storage Servers over 5 years = 43800*1*1.4 = 61320. Total Cost of Power Consumption = 61320*0.0958 = \$5874.456.

					307359.93	Racks Power Consumption. Per Rack Per Hour = 2.93 kilo watts. Total Power Consumption for all Racks over 5 years = $43800 \times 2.93 \times 25 = 3208350$. Total Cost for Power Consumption = $3208350 \times 0.0958 = \307359.93 .
Cooling						Not Required as the racks already include cooling.
Administration		https://www.glassdoor.com/Salaries/chicago-systems-administrator-salary-SRCH_IL.0.7_IM167_KO8.29.htm	72000	1	72000	Total number of servers = Number of Compute Servers + Number of Storage Servers = $1000 + 1 = 1001$. Total number of Administrators required = 1.
Total:					179008474.1	

Public Cloud			
Configuration 1			
			Total Cost for Configuration 1: \$377930592
Compute Server: d2X.large			
Cores		5 years = 43800 hours. d2X. large cost per hour = \$5.52. d2X.large cost over 5 year = 1042 * 43800 * 5.52 = \$251930592	
Number of Cores Available Per Instance	36 cores		
Total Number of Cores Required	32000		
Total number of instances required to meet the number of cores	889		
Memory			
Memory available per instance	244 GiB / 262 GB		
Total Memory Required	256 TB/256000 GB		
Total number of Instances required to meet the memory requirement	978		
Internal Memory			
Internal Memory available per instance	24*2000 GB / 48000 GB		
Total Internal Memory Required	50000000 GB		
Total number of Instances required to meet the Internal Memory requirement	1042		
Storage Node S3			
Storage Required	100 PB / 100000000 GB	S3 Total Cost Over 5 years: \$126000000	
Storage Cost	Over 500 TB per month \$0.021 GB		

Total Storage Cost Per Month	\$2,100,000	\$12000000	
Configuration 2			
Compute Server: r3.large			Total Cost for Configuration 2 = Total Compute Cost + Total Storage Cost = 7665000000+12600000 = \$7677600000
Compute Server Cost Per Hour	0.175	Total Compute Cost over 5 years = 43800*175000 = \$7665000000	
Number of VM's required	1000000		
Total Cost Per Hour for the VM's	1000000*0.175 = \$175000		
Storage: S3			
Total Storage Required	10 PB/10000000 GB	Total Storage Cost over 5 years = \$12600000	
Storage Cost	Over 500 TB/month = \$0.021/GB		
Total Storage Cost Per Month	210000		
Configuration 3			
Compute Server: P3.large			Total Cost for Configuration 3 = Total Storage Cost + Total Compute Cost = 1072224000+1260000 =\$1073484000
Mixed Precision Per Instance	1 petaflop	Total Cost = Number of Hours over 5 years * Number of Instances * Price per hour per Instance = 43800*1000*24.48 = \$1072224000	
Total Mixed Precision Required	1 exaflop		
Total Number of Instances Required	1 exaflop/1petaflop = 1000		
P3.large Price Per Instance	\$24.48 per hour		
Storage Server: S3			
Total Storage Required	1PB/1000000GB	Total Storage Cost over 5 years = 1000000*0.021*60	
Storage Cost	Over 500TB/Month = \$0.021/GB		

Comparison of Public and Private Cloud			
	Configuration 1	Configuration 2	Configuration 3
Public Cloud (including EC2 and S3) Cost over 5 years, 24/7 operation, with 100% usage	377930592	7677600000	1073484000
Private Cloud cost over 5 years, 24/7 operation, with 100% usage	191919526.7	2381847410	179008474.1
Cost Difference	186011065.3	5295752590	894475525.9
What utilization must be achieved with the private cloud to make the private cloud option more attractive than the public cloud?	50.78168604	31.02333295	16.67546737

Screenshots

Network Switch

3 Review items and shipping



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Guaranteed delivery date: April 25, 2018

Items shipped from Amazon.com



**Zyxel 48 Port 375W High Powered PoE+
Gigabit Ethernet L2 Managed Switch with
4 10G SFP+ Ports (XGS2210-52HP)**

\$949.81 ✓prime

Qty: 1 ▾

Sold by: Amazon.com Services, Inc.

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Cables

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Quantity

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Compute Server for Configuration 1

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System

Description

1

Iris 1181-2GPU

view components

\$14,877.24

\$14,877.24

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CPU: 1x Intel Xeon E5-2693v4 16C 2.1GHz 40MB Cache

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Review Summary

Compute Server Configuration 3

NVIDIA CORP

8-GPU/512GB DGX-1 DL WITH V100

Mfg Part Number: **920-22787-2510-000** , Item #: 2707240



Price: \$164,986.46 + Free Shipping

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