G2M RESEARCH

Enterprise Storage Newsletter

December 2021

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Thank you for a wonderful, engaging, productive year. Our Enterprise Storage Newsletters for 2021 focused on a variety of topics – ranging from startups to tried and true, established bigger players. Our articles about space exploration data analytics and chips and helium shortages (also impacting space), and anything related to cars garnered the most attention. Perhaps with all the remote work, people are thinking a lot about travel.

And, opportunities for travel are plentiful in the New Year with many conferences already scheduled. Everyone is looking forward to networking with colleagues after such a lengthy break and companies are definitely motivated to get directly in front of prospective customers. We wish everyone a healthy holiday season and we look forward to seeing all of you in person soon!

Addition of BG5 Series for Gamers and PC users

KIOXIA

[KIOXIA America, Inc.](#) announced the addition of the [BG5 Series](#) that is intended to bolster its lineup of PCIe® 4.0 solid state drives (SSDs). It is designed to balance performance, cost and power for gamers and PC users. The KIOXIA BG5 Series is built with a PCIe® 64 GT/s interface (Gen4 x4 lanes) and accelerated by the company's fifth-generation BiCS FLASH™ 3D flash memory technology and is available in capacities of 256, 512 and 1024 gigabytes (GB).

"Market adoption of DRAM-less SSDs is increasing steadily, thanks to HMB's ability to reduce the overall bill of materials without degrading the data read/write performance of the SSD," according to [Neville Ichhaporia](#), Vice President, SSD marketing and product management for KIOXIA. "The fact that KIOXIA realized PCIe 4.0 performance with a DRAM-less architecture is a win for mainstream client applications."

KIOXIA
BG5
BiCS FLASH™
Client   **NVMe™ SSD**

Key features include: 1) Up to 3,500 MB/s sequential read and 2,900 MB/s sequential write; 2) Up to 500,000 IOPS random read and 450,000 IOPS random write; 3) Support for the latest TCG Pyrite and Opal standards, as well as End-to-End Data Protection ensures data is secure whether at home or in the office; 4) Forward-looking support for the NVMe 1.4 feature set and basic management command over System Management Bus (SMBus); and 5) Power Loss Notification signal support to protect data against forced shut downs.

BG5 Series

In a compact form factor and based on 112-layer BiCS FLASH™ 3D flash memory, the BG5 Series is designed for thin and light performance-oriented use cases, such as ultra-mobile PCs, IoT devices and data center server boot. Available in capacities up to 1,024 GB, this series features Host Memory Buffer (HMB), PCIe® Gen4 x4 interface and supports the NVMe™ command set. The BG5 Series offers a Self-encrypting Drive (SED) option that supports TCG Opal version 2.01, under a different model number.

Model Number	Security Feature	Interface	Form Factor	User Capacity [1] (GB)	Performance (up to) [2]		Typical Power Consumption (W)	Operating Temperature (°C)	Dimensions [3] H / W / L (mm)	Maximum Weight (g)	Power Supply Voltage (V)
					Sequential Read (MB/s)	Sequential Write (MB/s)					
KBG50ZNS256G	-	PCIe® Gen4 x4	M.2 2230	256	3,400	1,900	4.0	0 to 85	2.23max / 22 / 30	2.8	3.3
KBG50ZNS512G				512	3,500	2,700	4.1			2.9	
KBG50ZNS1T02				1,024		2,900	4.3			3.0	
KBG50ZNV256G	-	PCIe® Gen4 x4	M.2 2280	256	3,400	1,900	4.0	0 to 85	2.23max / 22 / 80	5.8	3.3
KBG50ZNV512G				512	3,500	2,700	4.1			5.9	
KBG50ZNV1T02				1,024		2,900	4.3			6.0	

[1] : Definition of capacity: KIOXIA defines a megabyte (MB) as 1,000,000 bytes, a gigabyte (GB) as 1,000,000,000 bytes and a terabyte (TB) as 1,000,000,000,000 bytes. A computer operating system,however, reports storage capacity using powers of 2 for the definition of 1GB = 2^30 = 1,073,741,824 bytes and therefore shows less storage capacity. Available storage capacity (including examples of various media files) will vary based on file size, formatting, settings, software and operating system, such as Microsoft Operating System and/or pre-installed software applications, or media content. Actual formatted capacity may vary.

[2] : Read and write speed may vary depending on various factors such as host devices, software (drivers, OS etc.), and read/write conditions.

[3] : Dimensions represent the nominal values.

- Optional security feature compliant drives are not available in all countries due to export control and local regulations.

All information provided in this catalog is subject to change without any prior notice. For the latest and detail specification, please send an inquiry through the "Contact us" form in each region's website, https://business.kioxia.com/

- PCIe is a registered trademark of PCI-SIG.
- NVMe is a trademark of NVM Express, Inc.
- All other company names, product names and service names may be trademarks of their respective companies.

Accelerating Revenue and Overtaking Cisco

Extreme Networks was established by three LAN switching industry veterans, Gordon Stitt, Herb Schneider, and Stephen Haddock, to target the development of third-generation LAN switches based on emerging Gigabit Ethernet technology. Extreme Networks is based in San Jose, with over 2700 employees and over 50k worldwide customers. Competitors include – Cisco, Juniper Networks, Arista Networks, HPE (Aruba), Dell Technologies, Huawei, VMware, NETGEAR. They are recognized as a leader in the Gartner Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure for the fourth year in a row, and for the first time came out ahead of Cisco in their rankings.

Revenue for 2020 was $948M with first quarter 2022 at $267.7M, up 14% year to year. The cloud networking specialist reports SaaS annual recurring revenue totaling $78 million, up 54 percent year over year. A record number of customers—43—booked more than $1 million in business with Extreme during first-quarter 2022, a 40% increase over fourth-quarter 2021. All of this growth, CEO Ed Meyercord said, was driven primarily by the Extreme Network's channel base. Extreme Network has a new SD-WAN offering and has added automation to simplify their licensing process. "Cloud in the networking space is the fastest-growing segment of our industry. In the distributed world that we live in now, this idea of enterprises supporting their workers, their patients, their students, wherever they are, has really taken hold."
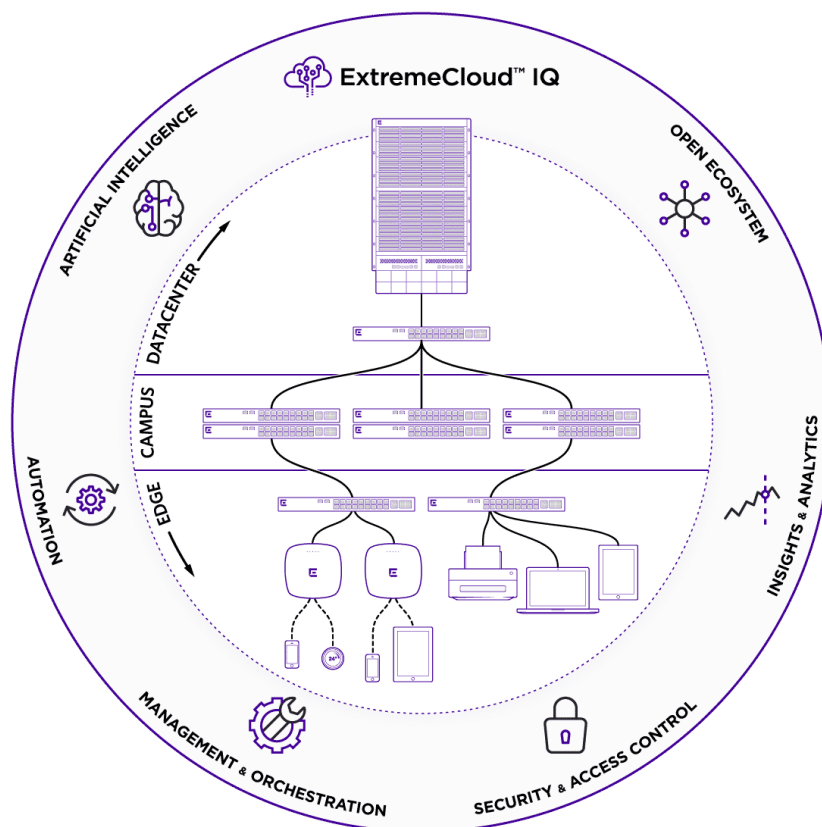
Some Extreme Network company milestones – 1) April 1999 – 1 millionth port shipped, in only two and a half years; 2) September 2000 – first gigabit switching to achieve 192M packets per second of throughput with its BlackDiamond 6816, performing wire-speed IP routing across a non-blocking 256 Gbps blackplane at NetWorld + Interop; 3) April 2003 – its first products of the new Unified Access Architecture for wired and wireless networks: the Summit® 300-48, the industry's only unified wired and wireless, layer 2/3 stackable switch with Power over Ethernet, and the Altitude 300™ wireless ports; 4) Jan 2004 – 10 millionth layer 3 ethernet ports shipped worldwide; 5) July 2018 – granted 1000th patent

Key aspects of their products and services include the following:

ExtremeCloud IQ was introduced as the only 4th-generation cloud platform on the market. It has a global footprint of 15 regional data centers hosted by Amazon, Google, and Microsoft and manages over 1M devices that feed its machine learning and artificial intelligence engine. With unlimited data, customers gain unprecedented access to historical data to inform future planning via a single, centralized management tool.

Extreme Elements is a combination of software, hardware and services that can be mixed and matched to create customized solutions for enterprises in every industry. Extreme Elements are components of Extreme's Smart OmniEdge™, Automated Campus™ and Agile Data Center™ solutions – underpinned by human and machine intelligence – that give customers the building blocks they need to create autonomous networks capable of learning and self-correcting, and an autonomous enterprise where architecture, automation, and human intelligence operate in harmony. www.ExtremeNetworks.com

"So, from our standpoint, despite a constrained supply chain, we hit our numbers and beat the street. From an earnings perspective, we've posted year-over-year revenue growth of 14 percent, which makes us the fastest-growing player in the enterprise space, driven by 54 percent growth in our cloud recurring revenue, and that really just showcased this phenomenon of people finding out about Extreme. Enterprise customers that haven't been in touch with Extreme for a while are being, I would say, surprised and really impressed about where we are today. Our batting average is going up and we are winning more and more business. Behind the curve is this backlog. At the end of Q4 earnings, we had built up a backlog of $100 million, which was an all-time record. And then just during the September quarter, we added another $100 million of backlog. And, by the way, we'll add yet more backlog this quarter just because of the strength of the demand."

Ed Meyercord, President and CEO, Extreme Networks

Brands 2021
Fastest Growing, Growth of Top 10, and Most Valuable

2021 ▬ 2020 ☐

TOP 10 FASTEST GROWING BRANDS

Brand	Growth
TESLA	▲ 275%
TIKTOK	▲ 158%
PINDUODUO	▲ 131%
MEITUAN	▲ 119%
MOUTAI	▲ 103%
INSTAGRAM	▲ 100%
UNIQLO	▲ 88%
LULULEMON	▲ 85%
CHIPOTLE	▲ 82%
JD	▲ 75%

$40B $80B $120B

GROWTH OF TOP 10 MOST VALUABLE BRANDS

Brand	Growth
AMAZON	▲ 64%
APPLE	▲ 74%
GOOGLE	▲ 42%
MICROSOFT	▲ 26%
TENCENT	▲ 60%
FACEBOOK	▲ 54%
ALIBABA	▲ 29%
VISA	▲ 2%
MCDONALD'S	▲ 20%
MASTERCARD	▲ 4%

$200B $400B $600B $800B
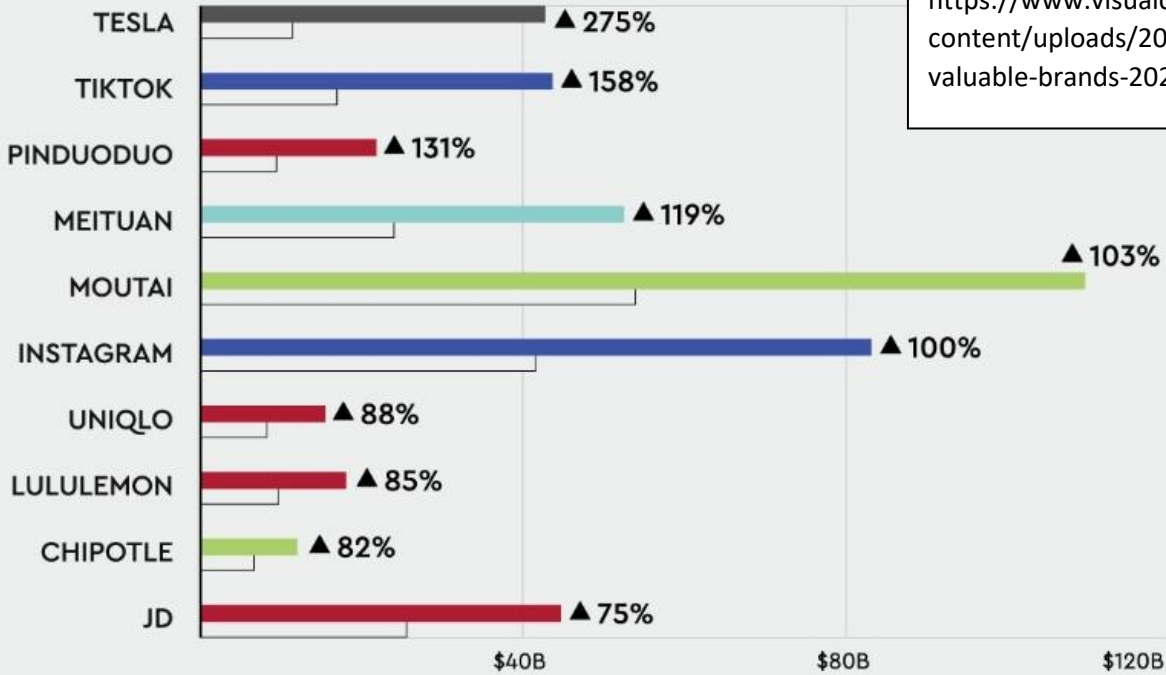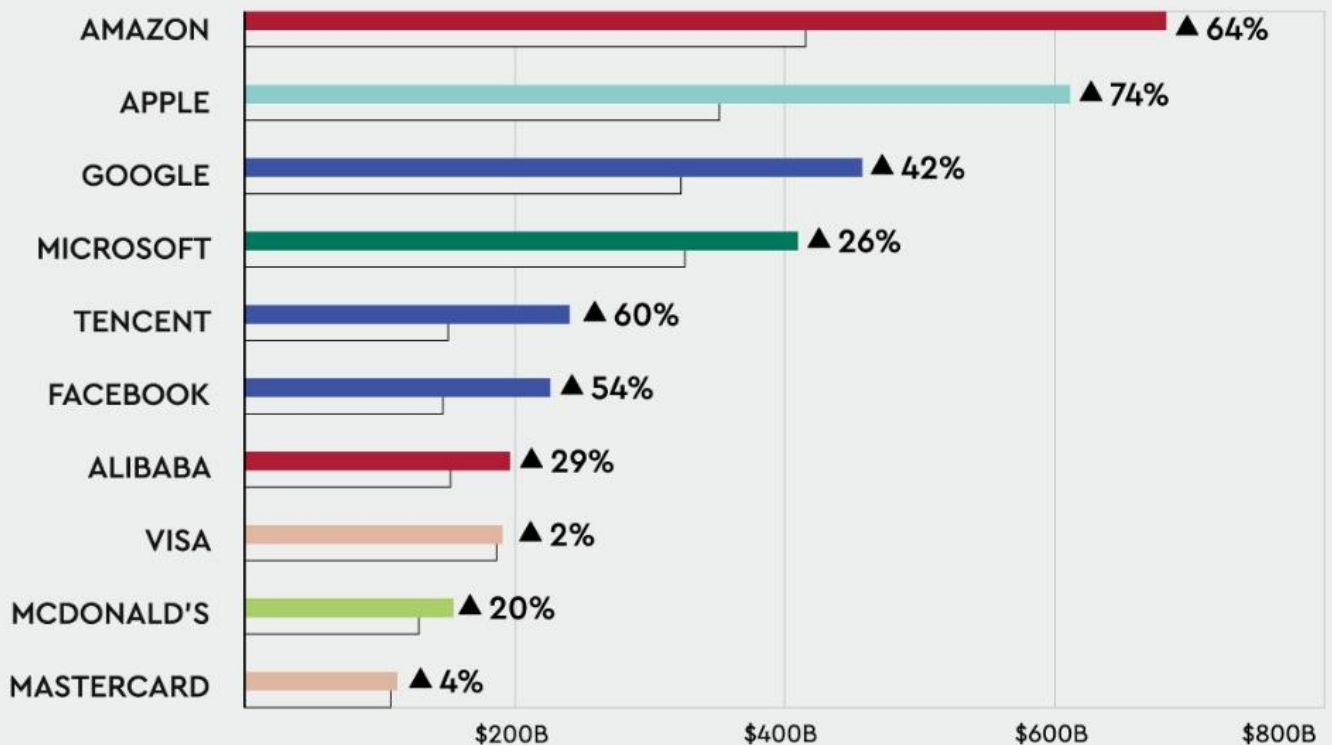
The World's Most Valuable Brands 2021

2021 has been a year of economic recovery, as the world slowly transitions to a state of (relative) normalcy.

But some companies are rebounding faster than others. According to Kantar BrandZ™, a lot of it has to do with the strength of a company's brand.

With this in mind, here's a look at the world's most valuable brands in 2021.

How is a brand's value determined?

FINANCIAL VALUE $
Brand's financial contribution to the value of its parent company

X

BRAND CONTRIBUTION %
Brand's proportional impact on its parent company's sales

=

BRAND VALUE

Global rank •------ 10
Circle size based on brand value .... COMPANY
Market of origin •------ U.S.
$ Brand value

LOGISTICS

- 92 DHL GERMANY $20.1B
- 76 FedEx U.S. $23.6B

INSURANCE

- 87 HONG KONG $20.9B
- 95 $20.6B
- 73 INDIA $24.1B
- 68 Budweiser U.S. $25.6B
- 49 PING AN CHINA $38.1B

FOOD & BEVERAGES

- 64 JAPAN (Toyota) $26.9B
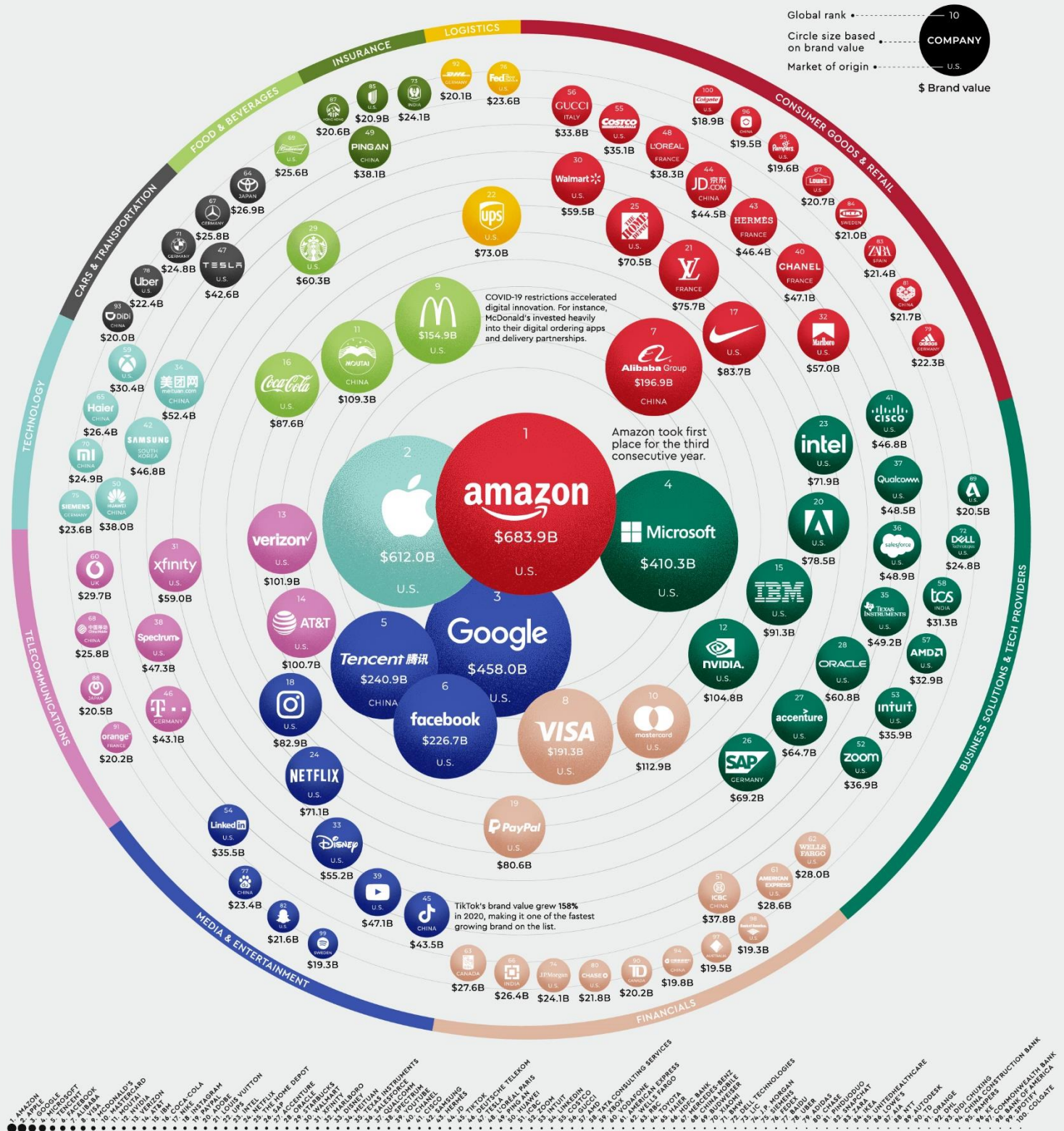- 29 (Starbucks) $60.3B
- 22 UPS U.S. $73.0B
- 9 McDonald's $154.9B
- 11 MOUTAI CHINA $109.3B
- 16 Coca-Cola U.S. $87.6B

CARS & TRANSPORTATION

- 67 GERMANY (Mercedes) $25.8B
- 71 GERMANY (BMW) $24.8B
- 47 TESLA U.S. $42.6B
- 78 Uber $22.4B
- 93 DIDI CHINA $20.0B

CONSUMER GOODS & RETAIL

- 56 GUCCI ITALY $33.8B
- 55 Costco U.S. $35.1B
- 48 L'ORÉAL FRANCE $38.3B
- 100 Colgate U.S. $18.9B
- 96 CHINA $19.5B
- 95 Pampers U.S. $19.6B
- 30 Walmart U.S. $59.5B
- 44 JD.COM CHINA $44.5B
- 43 HERMÈS FRANCE $46.4B
- 87 Lowe's $20.7B
- 84 SWEDEN (IKEA) $21.0B
- 25 THE HOME DEPOT $70.5B
- 21 LV FRANCE $75.7B
- 40 CHANEL FRANCE $47.1B
- 83 SPAIN (ZARA) $21.4B
- 81 CHINA $21.7B
- 7 Alibaba Group $196.9B CHINA
- 17 Nike U.S. $83.7B
- 32 Marlboro $57.0B
- 79 GERMANY (adidas) $22.3B

Amazon took first place for the third consecutive year.

COVID-19 restrictions accelerated digital innovation. For instance, McDonald's invested heavily into their digital ordering apps and delivery partnerships.

Central brands

- 1 amazon $683.9B U.S.
- 2 Apple $612.0B U.S.
- 3 Google $458.0B U.S.
- 4 Microsoft $410.3B U.S.
- 5 Tencent 腾讯 $240.9B CHINA
- 6 facebook $226.7B U.S.
- 8 VISA $191.3B U.S.
- 10 mastercard U.S. $112.9B
- 13 verizon $101.9B U.S.
- 14 AT&T U.S. $100.7B
- 12 NVIDIA U.S. $104.8B
- 15 IBM $91.3B
- 23 intel $71.9B
- 41 CISCO $46.8B
- 37 Qualcomm $48.5B
- 89 $20.5B
- 20 U.S. $78.5B
- 36 salesforce $48.9B
- 72 DELL Technologies $24.8B
- 35 TEXAS INSTRUMENTS $49.2B
- 58 tcs INDIA $31.3B
- 28 ORACLE $60.8B
- 57 AMD $32.9B
- 27 accenture $64.7B
- 53 intuit $35.9B
- 52 zoom U.S. $36.9B
- 26 SAP GERMANY $69.2B

TECHNOLOGY

- 59 $30.4B
- 34 美团网 meituan.com CHINA $52.4B
- 65 Haier CHINA $26.4B
- 42 SAMSUNG SOUTH KOREA $46.8B
- 60 $24.9B (Xiaomi)
- 75 SIEMENS GERMANY $23.6B
- 50 HUAWEI CHINA $38.0B

TELECOMMUNICATIONS

- 31 xfinity $59.0B
- 60 UK (Vodafone) $29.7B
- 68 CHINA $25.8B
- 38 Spectrum U.S. $47.3B
- 88 JAPAN $20.5B
- 46 T··· GERMANY $43.1B
- 91 orange FRANCE $20.2B

MEDIA & ENTERTAINMENT

- 18 Instagram $82.9B
- 24 NETFLIX U.S. $71.1B
- 54 LinkedIn U.S. $35.5B
- 33 DISNEY U.S. $55.2B
- 77 $23.4B
- 82 (Snapchat) $21.6B
- 99 SWEDEN (Spotify) $19.3B
- 39 YouTube $47.1B
- 45 CHINA (TikTok) $43.5B

TikTok's brand value grew 158% in 2020, making it one of the fastest growing brand on the list.

FINANCIALS

- 19 PayPal $80.6B
- 62 WELLS FARGO U.S. $28.0B
- 61 AMERICAN EXPRESS $28.6B
- 51 ICBC CHINA $37.8B
- 98 $19.3B
- 94 $19.5B
- 63 CANADA $27.6B
- 66 INDIA $26.4B
- 74 JPMorgan $24.1B
- 80 CHASE $21.8B
- 90 TD CANADA $20.2B
- 96 $19.8B

BUSINESS SOLUTIONS & TECH PROVIDERS

Data Analytics – Make it Efficient, Make it Simple

Firebolt, founded in 2018, is based in Israel with offices in SF and Munich, raised $164M total, with $127M of it raised this summer. Firebolt, which has built a new kind of cloud data warehouse that promises much more efficient, and cheaper, analytics around whatever is stored within it. Touted as the world's fastest cloud data warehouse, purpose-built for delivering a new grade of analytic experiences over big data and providing tech companies with a modern data stack, an order of magnitude faster query performance at a fraction of the cost of the alternatives by combining the simplicity, elasticity and low cost of the cloud with the latest innovations in analytics.

Excerpts from Firebolt CEO Eldad Farkash from Software Engineering Daily podcast:

"Absolutely, med tech, FinTech, EdTech, cyber, all of those industries are reinventing legacy with data basically. So if you look at those types of companies, every company will be this type of company one way or another way forward. The way they operate on data is just different. It's not reactive. It starts with the data. They build everything around it. It's not a side, an afterthought. It's not something we connect to our company so you can build something. It's something that we built our company on. And yeah, it drives different culture. It builds different – Built differently. I think the market is going to explode like crazy. Everything is everything needs to analyze the data. No matter what you're going to build, you'll need something to crunch your data. And we will see more companies, much more competition, much more innovation. There are amazing companies and startups out there. Definitely, I think we're super lucky to have been kind of building what we're building at this period. It's exciting. We've been building this company remotely. Everything is distributed, from the way your culture works. We have five offices. We're just 70 people. Your product is distributed. It's on the cloud. And yeah, as we see, the market really needs more, more of that. So yes, we're also lucky to be building what we're building at these times. Doing that 10 years ago would be very boring. By the way, my previous startup, Sisense, was also started as a database company, an HPC database. Nobody even thought about buying the database from us. They looked at us in a weird way. It was 20 years ago. And it was just different. Today, you go online, you talk

Figure 1. Firebolt decoupled storage-compute architecture
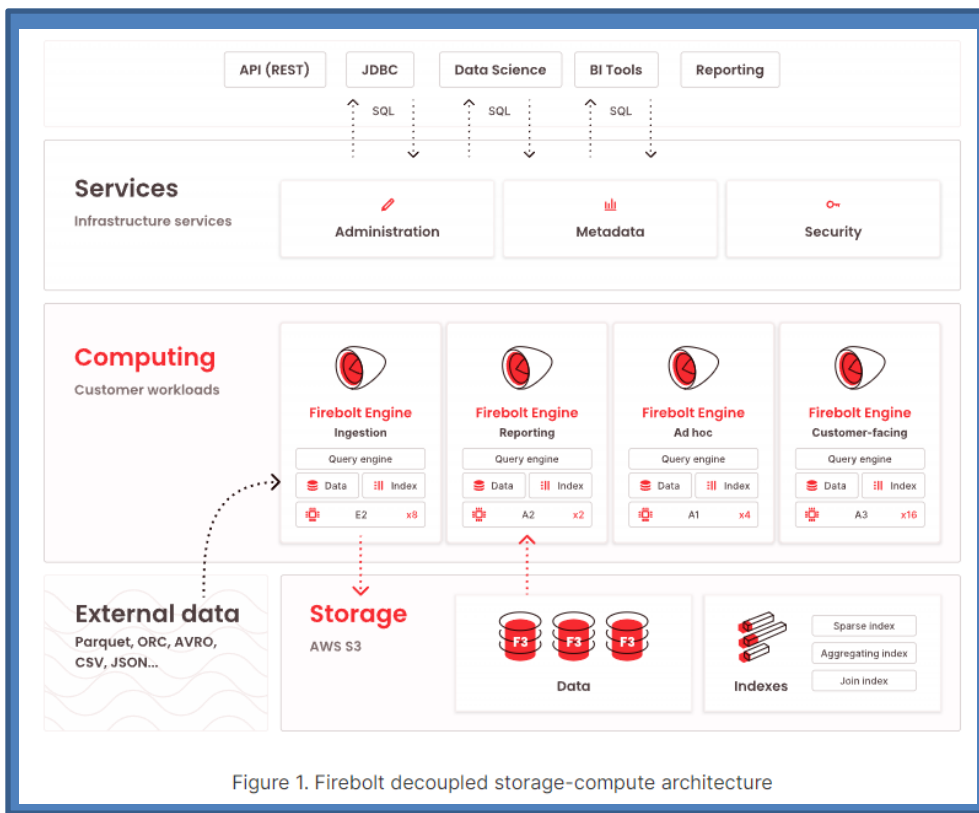
to the team, to the data engineering team. They're able to make a decision and try you out after 40 minutes. There's nothing else to do. It's consumption. There's no risk. So they can use their own budgets, and they can just move forward quicker. You use Slack to support customers immediately. Everything is different. And SQL drives most of it, and will drive most of it going forward."

"So I think one of the biggest things that will come in the next few years is hardware changes, actually, for a change. We've been looking at hardware on the cloud for the last five years at least. Nothing happened. FPGAs, and more importantly, GPUs, or more precisely, kind of the future of how GPUs are going to be built is going to change analytics as well. GPUs weren't really valuable for data warehousing for many technical reasons. And if you look enough, the grace architecture, for example, it's coming in, I don't know, a year or two years from NVIDIA. This is completely new. This gives us memory bandwidth to use the GPU for stuff that we hadn't been able to use before in our domain, analytics, OLAP, data warehousing. A hash lookup, which basically is kind of half of your challenge when you run a query. So a lot of technical stuff that can be done much better on a GPU will start happening. And it fits cloud native data warehouse, because you decouple the compute, kind of the physical compute for the user. So you need to know whether you're using a GPU and when precisely. So if I'm de-serializing Parquet with a GPU or using a GPU RAM LSM to do compaction, or if I'm using my GPU to decompress a table scan and then move that to the CPU to do kind of higher high-end operators, this is the data warehouse's job. And I think it's exciting. Firebolt, personally, there's tremendous kind of knowhow and background around HPC, GPUs, and we've been exploiting that with Firebolt. And we plan on doing that. And I think that's kind of a big exciting thing that we haven't been used to before in the cloud. So I think big change is coming. It might take a year or two, but definitely we'll start seeing GPUs doing a big comeback. So this is not a niche GPU-driven data warehouse anymore. Like if you look at the

benchmark, right? But it's really, really something else. This is one thing. I think the other thing is self-service of data. Really taking those eight months you need to go to production and be data-driven and turn that into a two-week sprint. Make it efficient. Make it simple. I think that's something everyone appreciates. And we actually forgot how important it is when you're using data, data on a daily basis. So we need that a lot more. And yes, I think the ecosystem is evolving as well. So you don't need to talk to kind of those just huge legacy partners anymore. You're talking to tens of startups, whether they're kind of more mature startups or new startup like, from the Monte Carlos, the DBTs. So many interesting things happening on the ecosystem now that is exciting to see how it will evolve going forward."

RS RIVERSTONE TECHNOLOGY

10 Emerging Trends for Datacenters for 2022

The ten emerging trends for datacenters for 2022, per Riverstone Technology:

1) Distributed Enterprises/Decentralization – Gartner reports by 2023 "75% of organizations that exploit the benefits of distributed enterprises will realize revenue growth 25% faster than competitors."

2) Hybrids – Fewer organizations will use purely on-premises or purely public networks, primarily for increased security and control.

3) Even More AI – primarily to automate mundane processes.

4) "Small" Data – Forbes describes small data as "a paradigm to facilitate fast, cognitive analysis of the most vital data in situations where time, bandwidth, or energy expenditure are of the essence." Riverstone explains that as distributed enterprises rise, so will the need for data processing that does not rely on unlimited bandwidth.

5) Greener Datacenters

6) Focus on Security (such as Chip-Level Security)

7) Ultra-Scalability

8) Virtual Storage/Software-Defined Datacenters

9) Datacenters will Need to Invest in New Hardware and Software to Benefit from 5G.

10) Storage will be Faster, Smaller, and Have More Capabilities.

Poll Results for The Explosion in Imagery from Radiometry, Cryo-EM, and Other Imaging Technologies: Can Storage Keep Pace?

with sponsors KIOXIA, WEKA, and NetApp

How large are the imagery training data sets that you and/or your customers typically field (pick one answer):

Greater than 5 PB:	10%
Between 1PB and 5PB:	25%
Between 250TB and 1PB:	35%
Between 50TB and 250TB:	15%
Less than 50TB:	5%
Don't know	10%

When looking at storage solutions for medical/bio imagery, what are the critical factors that drive your technology and architecture choices (check all that apply):

Performance (bandwidth and latency):	30%
Performance consistency (esp. latency consistency):	30%
Storage networking performance:	20%
Storage costs:	10%
Ease of deployment/"turnkey" solutions:	15%
Don't know/no opinion:	30%

G2M Research Multi-Vendor Webinar Series

November 17, KIOXIA presented the second webinar in their four-part webinar series, "The Next Flash Revolution at Scale: Open Source Software + Software-Enabled Technology." Each webinar stands alone and collectively provides an overview of the innovation, direction, and leadership KIOXIA provides in this enterprise storage space. The video is available to view and a copy of the slidedeck is available here. KIOXIA webinar Part 1, "Why Flash Memory At Scale Should be Software-Defined" is available to view here along a copy of the slidedeck here.

Our webinar schedule is below. Click on the topics to get more information about that specific webinar. You can view all our webinars and access all the slide deck presentations. To sponsor any of our webinars, contact G2M for a prospectus.

Feb 1:	Storage Architectures for High-Performance Computing
Feb 15:	Cybersecurity: Zero Trust or Trust Your People
March 8:	Storage Architectures for AI & ML
March 29:	Storage Technologies for Datacenters in Space
April 26:	Effective Architectures for Edge Computing & Storage
May 24:	Data, Networking, & Storage Acceleration
June 21:	Scaling Storage Capacity & Bandwidth Effectively
July 19:	Hot Semiconductor Startups: Changing the Rules
Aug 23:	Advanced NVMe SSDs
Sept 13:	Public/Private Storage Architectures for CSPs
Oct 11:	Storage Fabrics for Mega-Datacenters
Nov 8:	Securing Cloud Datacenters Resources
Dec 13:	What was Hot (or Not) in 2022, and Predictions for 2023

Conferences

January 5-8	CES 2022, Vegas
Jan 11-13	FloCon 2022, Virtual
January 26-28	SNIA 2021 Annual Members Symposium, Virtual
January 27- Feb 5	Cyber Threat Intelligence Summit & Training, Bethesda
February 2-4	IT DEFENSE 2022, Berlin
February 7-10	RSA Conference, San Francisco & Virtual
February 7-11	Cisco Live, Amsterdam
February 8-11	ITExpo, Fort Lauderdale
February 14-15	Gartner Security & Risk Management Summit, Dubai
February 17-18	Deep Learning Hybrid Summit, San Fran & Virtual
February 28- March 3	MWC Barcelona
March 2-3	Big Data & AI World, London
March 2-3	Cloud Expo Europe, London
March 11-12	SXSW 2022, Austin
March 14-16	Gartner Identity & Access Management, Vegas
March 14-17	Gartner Data & Analytics Summit, Orlando
March 23-24	Paubox SECURE 2022, Vegas
March 28-31	Data Center World, Austin
April 19-21	ODSC East, Boston
April 23-27	NAB, Vegas
April 26-28	Smart NICs Summit, San Jose

May 4-5	World Summit AI Americas, Montreal	
May 9-11	Gartner Data & Analytics Summit, London	
May 10-13	Black Hat Asia, Singapore	
May 11-12	AI & Big Data Expo, Santa Clara	
May 18-19	Gartner Digital Workplace Summit, London	
June 7-10	Women in Tech Global Conference 2022, TBA & Virtual	
June 12-16	Cisco Live, Vegas	
June 14-16	Digital Enterprise Show, Malaga	
June 21-22	Gartner Security & Risk Management Summit, Sydney	
June 21-22	Gartner Digital Workplace Summit, San Diego	
June 29- July1	Mobile World Congress, Shanghai	
August 6-11	Black Hat USA, Vegas	
August 11-14	DEF CON 30, Vegas	
September 19-20	Industry of Things World, Berlin	
September 28-29	IoT World, Santa Clara	
October 5-6	Evolve, Vegas	
November 18-19	Data Strategy & Insights (Forrester Research), Virtual	
December 1-2	AI & Big Data Expo Global, London	

G2M RESEARCH

Effective Marketing & Communications
with Quantifiable Results