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# EXPLORE



**COVER STORY:**  
**ENTERPRISE CHOICE AWARDS 2022**

## Presenting the winning brands of post-pandemic 2022

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**Sunil Rajguru**

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*The Govt  
got into  
the act*

## 10 post-Covid Techcelerations

Now that the pandemic is firmly behind us, it is time to assess the long-term changes due to Covid. There has been a lot of technological acceleration that is now here to stay now.

**1. Ecommerce:** You name it: Groceries. Clothes. Make-up. Medicines. Swiggy. Zomato. Dunzo. This took off like nobody's business and shows no sign of declining. Who could have imagined such a large network of delivery boys crisscrossing every city and town day in and day out.

**2. Online payments:** If demonetization gave a fillip, then Covid was DeMo on steroids. It didn't matter whether you were in rural areas or urban, from the middle class or a small shopkeeper, everyone has embraced online money.

**3. Broadband:** The number of connections along their average speed and reliability saw a huge upswing. We are now the mobile broadband leaders of the world. The 5G rollout got accelerated towards the end of the pandemic.

**4. Collaboration tools:** They became faster, more seamless, and useful. An absolute lifeline for many professionals. It encompasses work, pleasure and business. A new Zoom Generation was born.

**5. Remote Work:** The concept was around for ages. Now both the technology and mainly attitudes changed. The Great Resignation has led the employee push against the management which wants a return to the old normal.

**6. Cloud adoption:** No business big or small can do without the cloud. It is vital for basic customer service, upscaling, innovation and ensuring business process continuity.

**7. HealthTech:** Hospitals moved heaven and Earth to cope with the influx and upgraded themselves. The tech here is still a work in progress but got its needed push to escape the lethargy of 2019.

**8. AgriTech:** India is a farming nation, and this was overlooked when it came to vital tech tools, but all that is changing now. The number of AgriTech startups and the role they are playing is quite heartening.

**9. Digital Literacy:** Reading and writing literacy is passe. Digital literacy is the in thing. Indians from all walks of life are embracing technology and their digital skills are getting better.

**10. Digital India:** The government took a lead and rolled out Arogya Setu in record time. CoWIN was a huge success and now that is expanding to other digital health solutions. UPI has emerged as a leader in the world. Rarely has a government got its act together and taken a lead in taking a nation forward.

We can look with some positivity as India gets ready to become the world's most populous nation with the largest global workforce and will overtake Germany, maybe even Japan in the decade to come, in terms of GDP.

*Sunil Rajguru*



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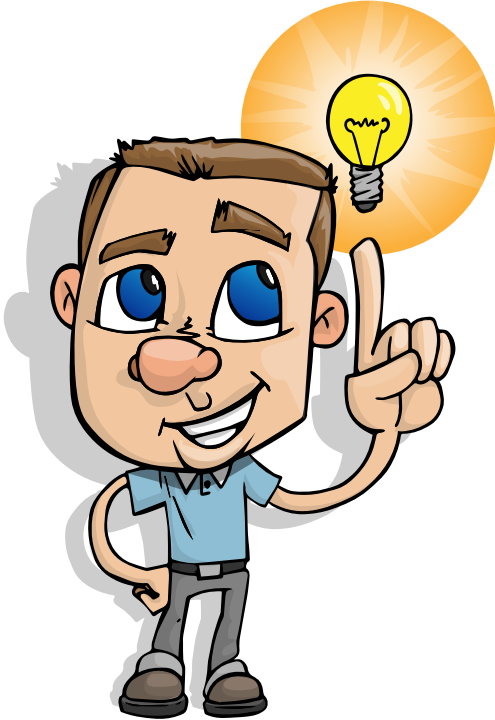
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### What are the best laptops for ethical hacking?

■ *Anshul Gumber*

For hacking job, mobile workstation would be a great choice. You can look at Dell Precision or HP ZBook series of mobile workstation. In terms of hardware combination, you should go for an Intel Xeon W processor, with 16 GB or higher RAM. Having this configuration, your laptop would be capable of doing multitasking and handling large 4K files. It will easily be able to run virtual machines that you might need for your hacking work.

### Why I opt for a dedicated GPU in laptop?

■ *Aditya Shrivastava*

A graphics card is an essential component of any device- mobile or laptop, that is responsible for rendering images to the display. All CPUs come with integrated graphics, but if you need to do gaming, graphics, animation, or other high-end graphics intensive applications, then you need a dedicated GPU.

## #PCQuestTroubleshoot

For instance, gaming laptops come with dedicated NVIDIA or AMD GPU to process intensive gaming graphics, while integrated GPU can render only computing graphics.

### Why SSD, when HDDs are available at lower cost?

■ *Maluk Mohamed*

SSDs are faster and more lightweight than HDDs. They have no moving parts and are therefore more reliable. They also consume lesser power. When you look for lightweight yet powerful laptop, you get a machine equipped with SSD.

### I am a student and looking for a laptop under ₹25,000?

■ *Sreejan Mohan*

You may not be able to find a decent laptop for this price, but you can get a Chromebook which is a great option for students.. Unlike laptops that run on various popular Operating Systems like Windows, Linux, etc. Chromebooks run on a web-based Chrome OS, which is skinned version of the Chrome browser with some additional features. The sleek Chromebook is perfect for various applications used for daily productivity and e-learning. With a good battery life, they are packed with an Intel Celeron CPU, coupled with a 64 GB eMMC card, expandable to 256 GB. It also comes with 100 GB of Cloud Storage and 4 GB RAM.

### What is the difference between a DOS laptop and Windows laptop?

■ *Raj Prajapati*

DOS is a very basic OS that works only has a



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THE TECHNOLOGY  
TRENDS IN EDU-TECH  
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CLI (Command Line Interfact). Windows on the other hand comes with a GUI (Graphical User Interface). DOS has very limited use nowadays as the number of applications for it are very limited. Manufacturers like HP provide their laptops with DOS or Windows. The idea of giving DOS is so that you can install an OS of your choice on it (like Linux).

### What upgrades can make my laptop good for games?

■ *Shritam Bhowmick*



There are several ways to do that. You could add more RAM and replace the HDD with an SSD (in case the laptop didn't come with the latter). You could buy a monitor to get a bigger screen to play games. However, the biggest difference you get in gaming performance is from the GPU. If the laptop doesn't have a dedicated GPU, then you can't upgrade to one. Onboard GPUs are not powerful enough to play the heavy duty AAA gaming titles. If you want to enjoy those, then you'll have to buy a new laptop.

### What are the ways to speed up my computer?

■ *Keshav Pandey*



There are two ways – first, identify the bottlenecks that are slowing down your PC. Old unnecessary files, data and temporary files, etc. clear them to boost the performance. Use the Task Manager and Resource Monitor to identify which components are just waiting and which components are overloaded. You can manage them by reducing their load.

The second option is upgrading your CPU, RAM and SSD, etc. Replacing the hard disk with a new SSD will likely be the best upgrade to speed up your computer.

### Is it safe to play games in laptop while charging?

■ *Faraz*



If you have an old gen gaming laptop, then it will hurt the battery and other components. However, in modern laptops, you can surely

play games while it's plugged in and charging, because it can smartly manage the power distribution without putting any burden on the battery life. Plus your laptop runs most efficiently while it's plugged in. Also when you run on power, your GPU delivers the peak performance.

### I am a medical student; can you please suggest the best laptop?

■ *Shreyas Prabhu*



You can check out the HP Spectre x360 13-aw2003TU Convertible. This laptop is a mobile powerhouse that's safer, smarter, and more secure for healthcare. It is a stylish machine with precision-crafted Aluminum design and a narrow-border IPS display.

HP has added many features that will be very useful for healthcare professionals like the Trusted Platform Module (TPM) support and Webcam kill switch. Since this laptop also offers a touch screen, you can also use it as a tablet if you need to. You will be able to Interact easily and accurately with the touchscreen. The laptop is priced at INR 99,999 and is powered by 11th Gen Intel Core i5 processor, 8 GB RAM, 512 GB SSD, and Intel Iris X<sup>e</sup> Graphics.

### How are Chromebooks different from "normal" laptops?

■ *Sai Kiran Gundreddy*



Chromebooks are designed and developed primarily for students and home users. They're affordable devices powered by moderate hardware components. Chromebooks run on Chrome OS, a Linux-based operating system designed by Google. It is derived from the open-source Chromium OS and uses the Google Chrome web browser as its principal user interface. Like Google Play Store, it also supports all the apps. This secure and versatile cloud-first operating system is easy to manage. While other laptops come with Windows operating system which is the most popular and widely used by home and business users.

Chromebooks usually don't require powerful hardware as they run on a cloud-based OS.

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 - Akhil Gupta, Vice Chairman, Bharti Enterprises



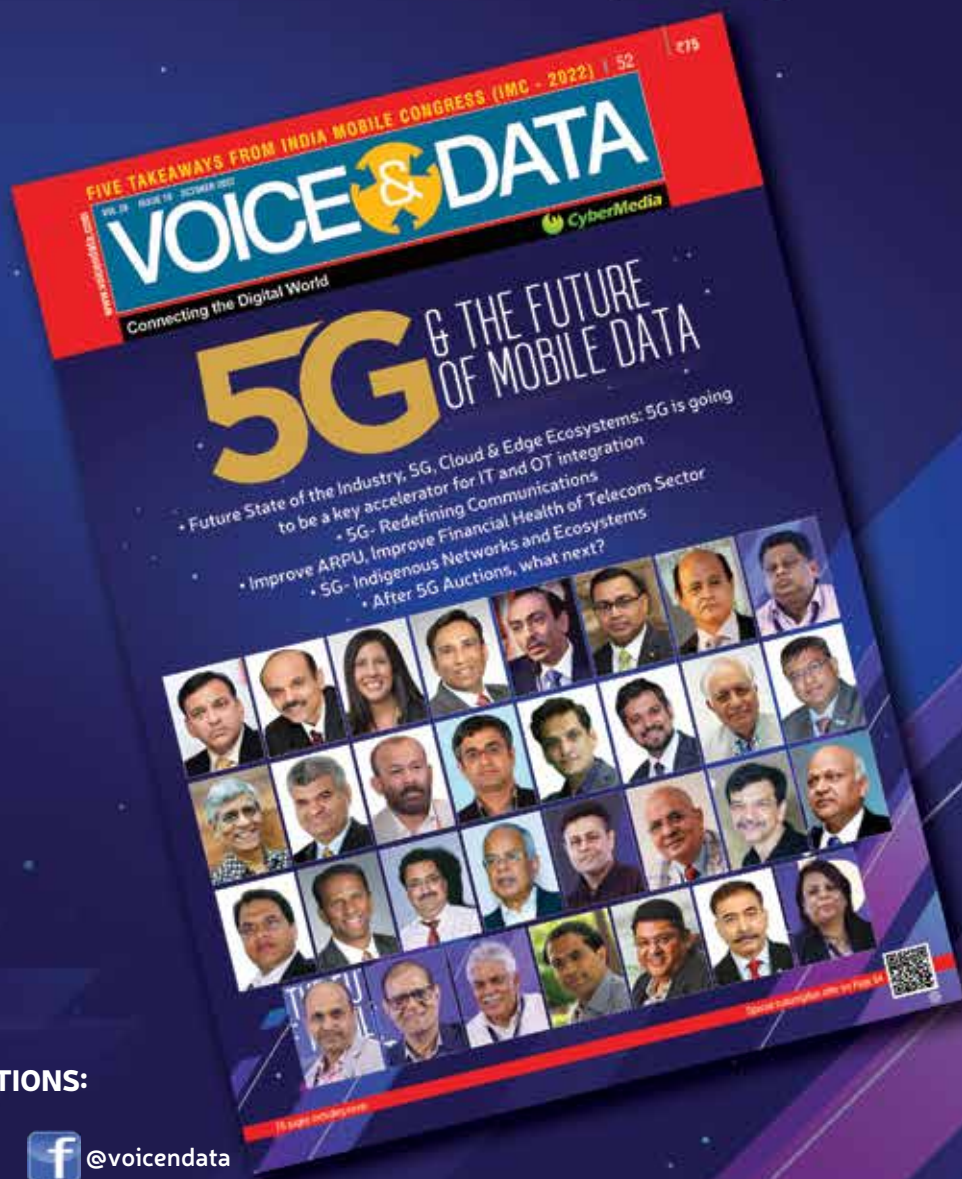
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# Presenting the winning brands of post-pandemic 2022

**Satya Sundar Mohanty, CyberMedia Research**  
**Ashok Pandey, PCQuest**

✉ [pcquest@cybermedia.co.in](mailto:pcquest@cybermedia.co.in)



The pandemic is over and the New Normal comes with a new set of challenges. Enterprises are ready to tackle them with their products and solutions. We reached out to them to understand all of this. So now we're back with our most comprehensive study—Enterprise Choice Awards 2022, the largest of its kind in India, undertaken by CyberMedia Research (CMR), covering as many as 1,024 enterprises

**T**he 2022 PCQuest Enterprise Choice Awards looks at the products and solutions that enterprises have gone in for and are likely to look at in the future. In this comprehensive study, the 1,024 enterprises cover all major verticals such as Manufacturing, BFSI, IT/ITeS, Education, Healthcare, Retail, Media, FMCG etc.

The selection of the winners is backed by the largest of its kind enterprise product survey in India, undertaken by CyberMedia Research (CMR).

EMPLOYEE SIZE OF ENTERPRISES	
< 100	98
100 - 250	145
250 - 500	113
500 - 1000	165
1000 - 2000	126
2000 - 5000	159
> 5000	218
<b>Total</b>	<b>1024</b>

We present a comprehensive analysis of awareness and usage of various brands with their reasons, future preferences, and familiarity index. Check out the winners in

each of the categories and the reasons to understand why they came out on top.

### Survey Methodology

The survey questionnaire sought information on the following parameters:

**Spontaneous awareness:** It is the percentage of users who could recall different brands spontaneously when asked about awareness of brands in a particular product category.

**Current usage:** It is the percentage of users who primarily use any particular brand.

**Future consideration:** It is the percentage

Dimensions	Weights
Awareness	30%
Usage	30%
Future Consideration	40%

of users who would consider any particular brand at the time of their next purchase.

The value of each parameter was standardised to represent all the parameters in one scale. The average of weighted score of all the parameters was calculated to derive familiarity index of all the brands in each category.

### Awards Categories

The survey was conducted to identify the top brands across 20 different categories. Based on the survey, the winners have been declared.





# HP and Dell rule

Satya Sundar Mohanty, CyberMedia Research  
Ashok Pandey, PCQuest

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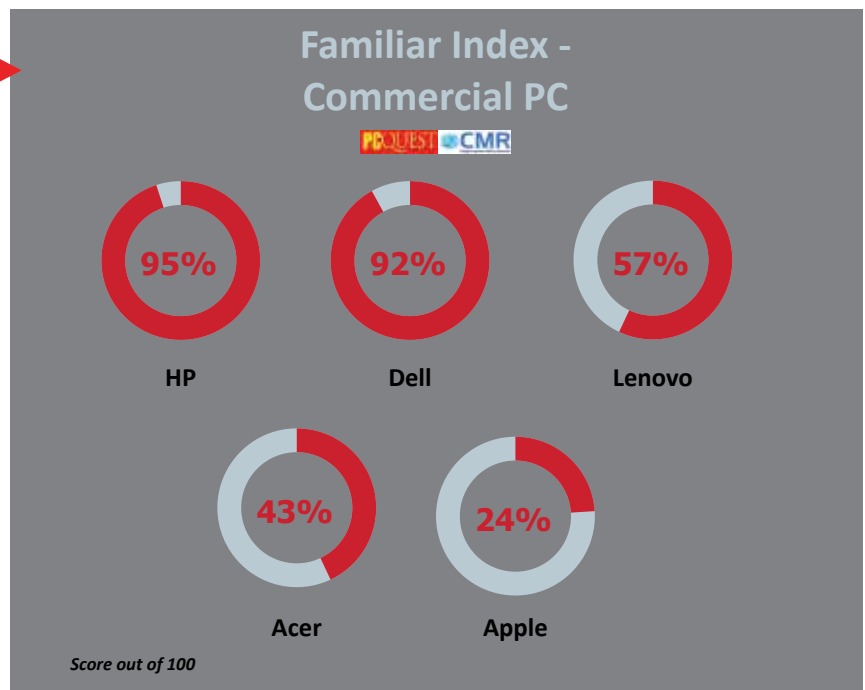
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Ten in every eleven users would consider HP while buying their next Commercial PC

**D**esktop PCs are not going anywhere. They are here and will be so in the future. The reasons for choosing a PC could be different. But we all know that when you need the ultimate computing power with expandability, then the PC remains the best choice.

The story got reversed in – last year, Dell was the champion in PC category and HP was in Laptop category. But this time Dell is winner of laptop and HP is holding the first spot in commercial PCs.

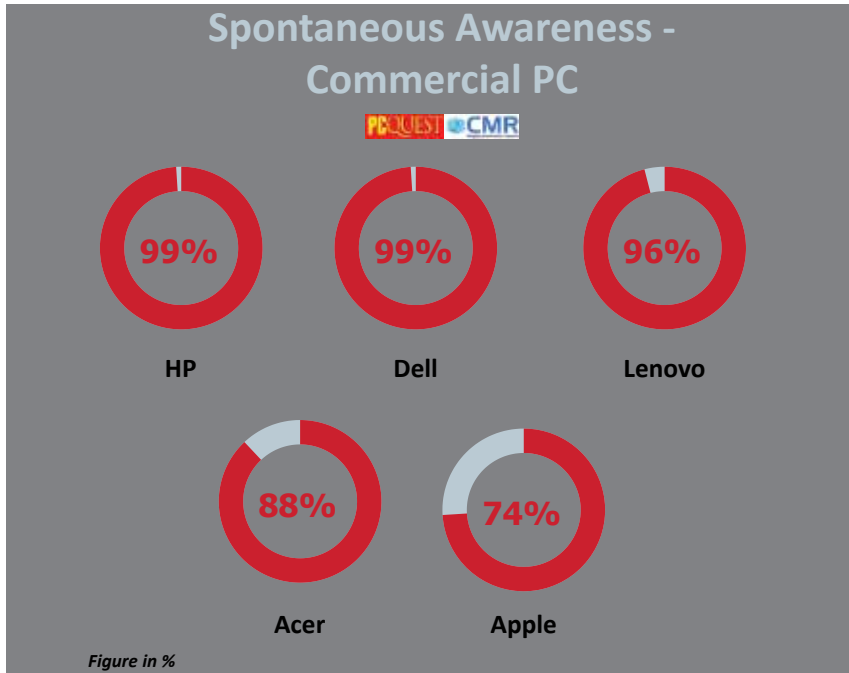
In the Familiarity Index, HP achieved the maximum score of 95 followed by its close competitor Dell at 92. Lenovo once again grabbed the third spot with a score of 57, followed by Acer and Apple at 43 and 24 respectively.



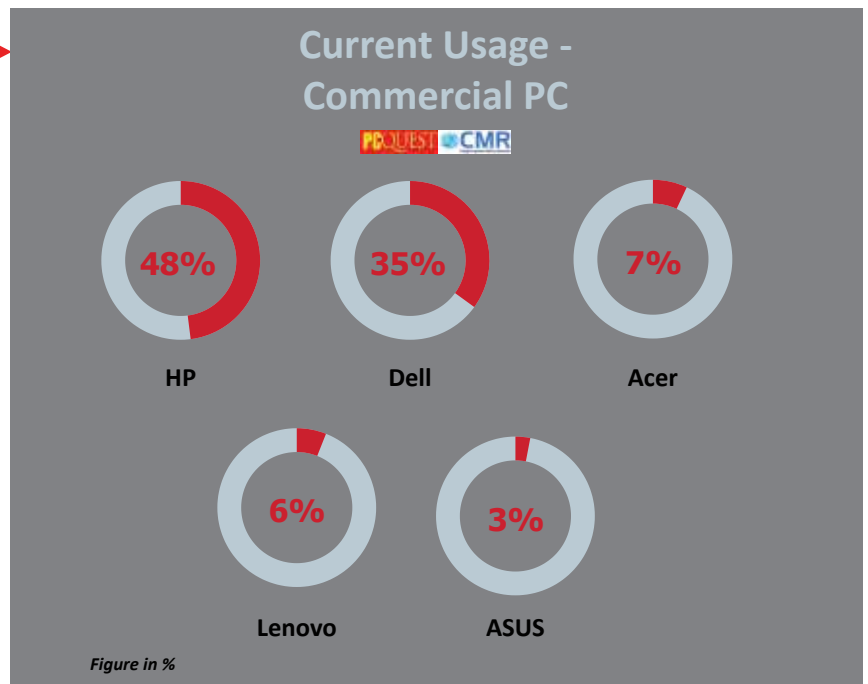
**Almost all the users could spontaneously recall HP, Dell and Lenovo**



When it comes to Spontaneous Awareness, both HP and Dell were on top with a score of 99. Lenovo was a bit behind with a score of 96, followed by Acer at 88 and Apple at 74. Acer did better in the spontaneous scoring this time. Last year, it was at fifth place and this time it's one better.

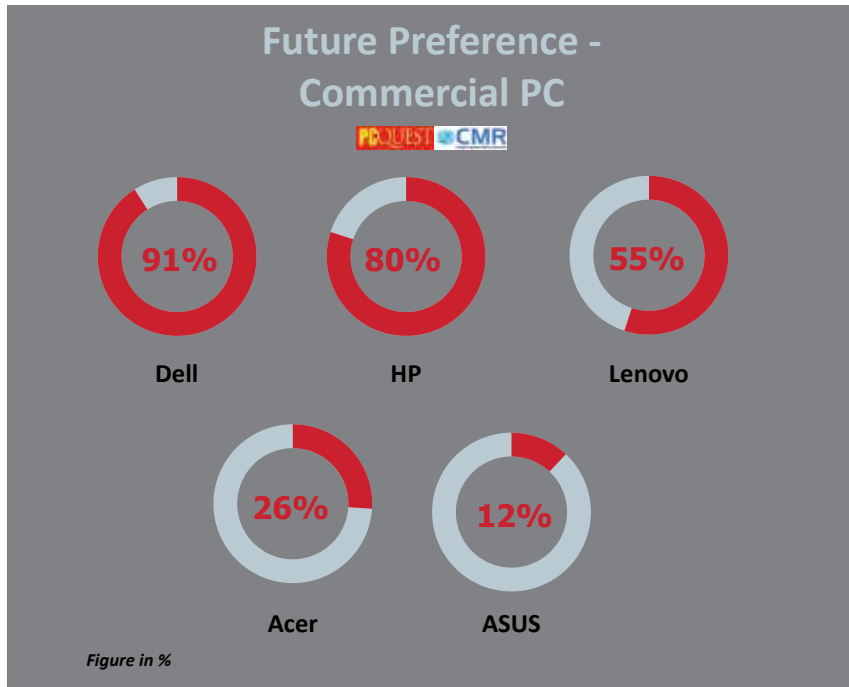


The Commercial PC market is still dominated by the two giants HP and Dell: HP is at 48% and Dell not far behind at 35%. Acer came in next with a score of 7% followed by Lenovo at 6%, and ASUS at 3%. Amazingly, the distribution of these brands in the market has tremendous gap. Without a doubt HP and Dell are dominating and if other brands wish to gain, they have to make some smart moves.





Who will rule the future? Our participants would prefer to consider Dell, the brand scored the highest: 91. This means, other brands can lose some of its customers in the near future. HP will also likely gain in future with a score of 80, followed by Lenovo with a score of 55, Acer with a score of 26 and ASUS with a score of 12.



Why are our participants are choosing these brands? Once again brand name and quality are top priorities and most the respondent trusted HP and Dell. Lenovo and Acer were preferred for their after sales support/service and ASUS for quality of product.

### Reasons for Using Current Commercial PC

	HP	Dell	Acer	Lenovo	ASUS
Brand Name	High	High			
Quality of Product					High
After Sales Support / Service			High	High	
Initial Price					

High

Illustration by Nadeem Anees



COMMERCIAL LAPTOP

# Dell beats HP

Satya Sundar Mohanty, CyberMedia Research  
Ashok Pandey, PCQuest

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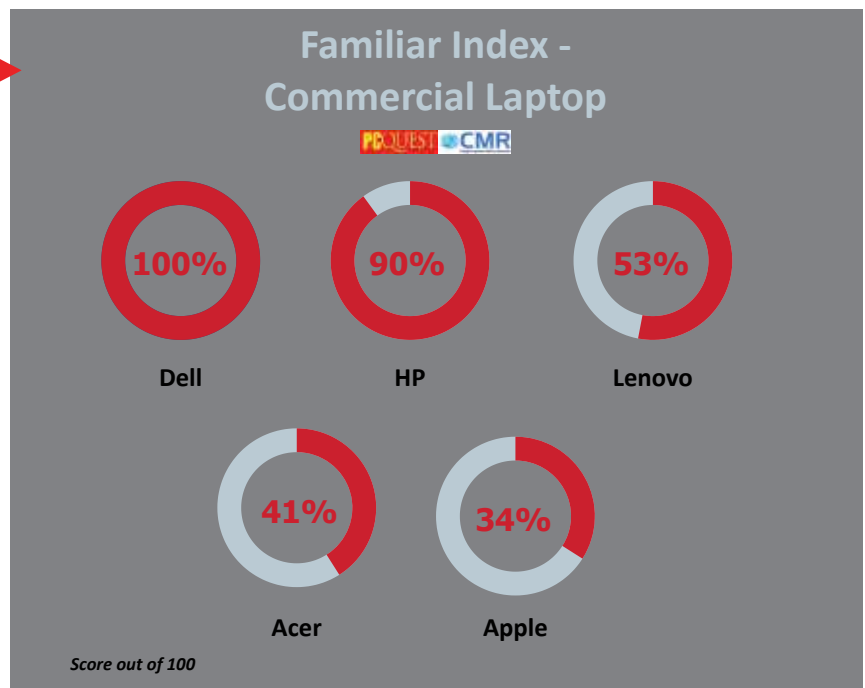
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Brand name and quality of product are the most important factors while selecting a Commercial Laptop

**T**hough the pandemic is over, many professionals are still working from home and enterprises have adopted hybrid work. These professionals require a powerful, yet portable laptop packed with numerous security features to protect them from various threats as they might be using an insecure network. So, let's have a look which brand is most popular and why among the professionals.

Last year, PCQ Enterprise Choice Awards 2021, HP was the champion brand, and this time Dell has come out on top in the commercial laptop segment. HP grabbed the 1st runner-up spot followed by Lenovo. Lenovo consistently manages to retain its second runner-up spot.

In the Familiarity Index, Dell grabbed the top spot with a score of 100. HP trailed with a score of 90. Lenovo was a distant third with a score of 53, followed by Acer and Apple at 41 and 34 respectively.

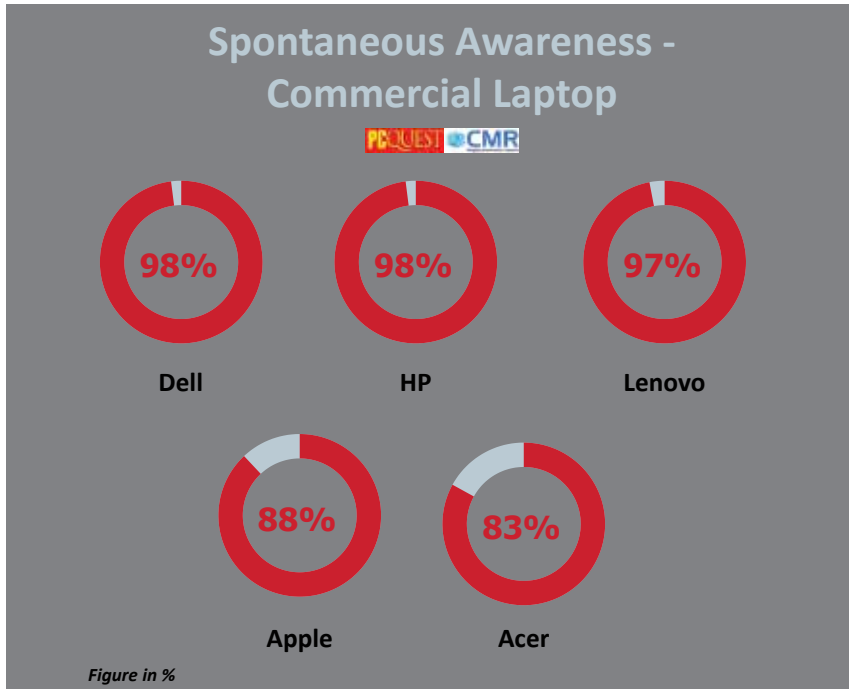


**Eight in every nine users would consider Dell while buying their next Commercial Laptop**

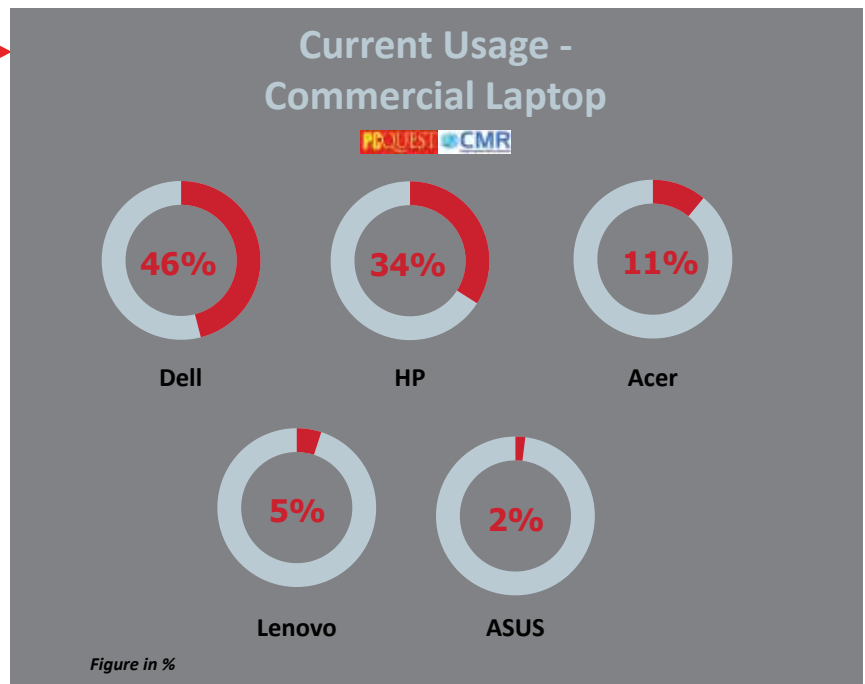


## COMMERCIAL LAPTOP

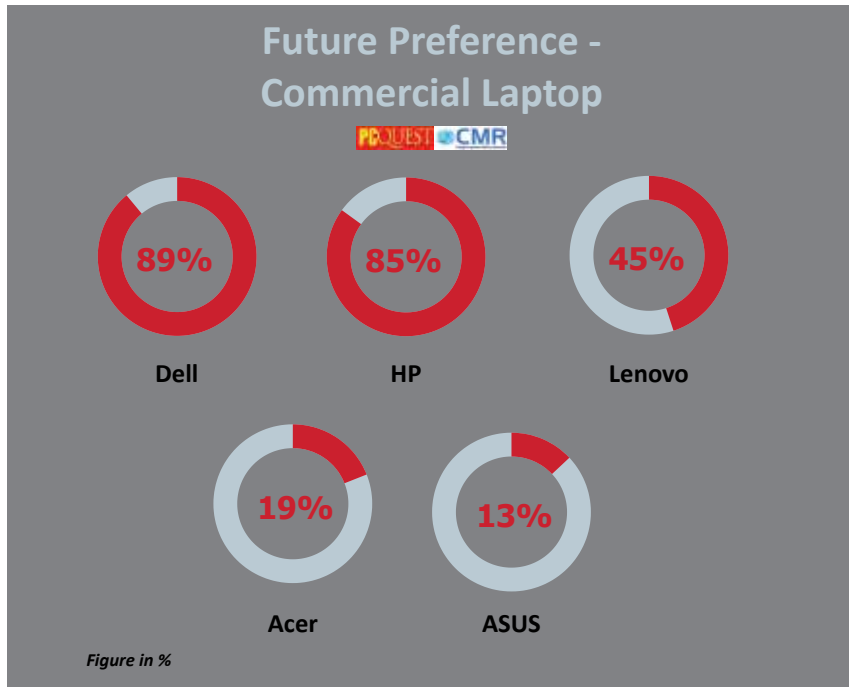
In the Spontaneous Awareness, each brand fought neck and neck. Both Dell and HP were on top with a score of 98, followed by Lenovo at 97, Apple at 88, followed by Acer at 83.



So last year, 31% of our survey respondents were using Dell laptops and this time it's up to 46%. HP has also gone up from 29 to 34%. However, Lenovo went down from 9% to 5%. Acer looks to have benefited and came in at the third spot with a score of 11%. ASUS is at the fifth place with only 2%.



When we asked our participants for their future preference, Dell again came on top with a score of 89. HP was strong at the second place with a score of 85. Lenovo seems gaining for the future, followed by Acer and ASUS.



What's the reason behind choosing the current commercial laptop brand? Most of the participants chose brand name and quality of the product as their top priority. Dell and HP both impressed with both of that. Acer and Lenovo were mostly preferred for after sales support/service, ASUS for quality and Apple for its brand name.

### Reasons for Using Current Commercial Laptop

	Dell	HP	Acer	Lenovo	ASUS
Brand Name	High	High			
Quality of Product	High	High			High
After Sales Support / Service			High	High	
Initial Price					

High

Illustration by Nadeem Anees



SERVER

# Dell remains on Top

Satya Sundar Mohanty, CyberMedia Research  
Ashok Pandey, PCQuest

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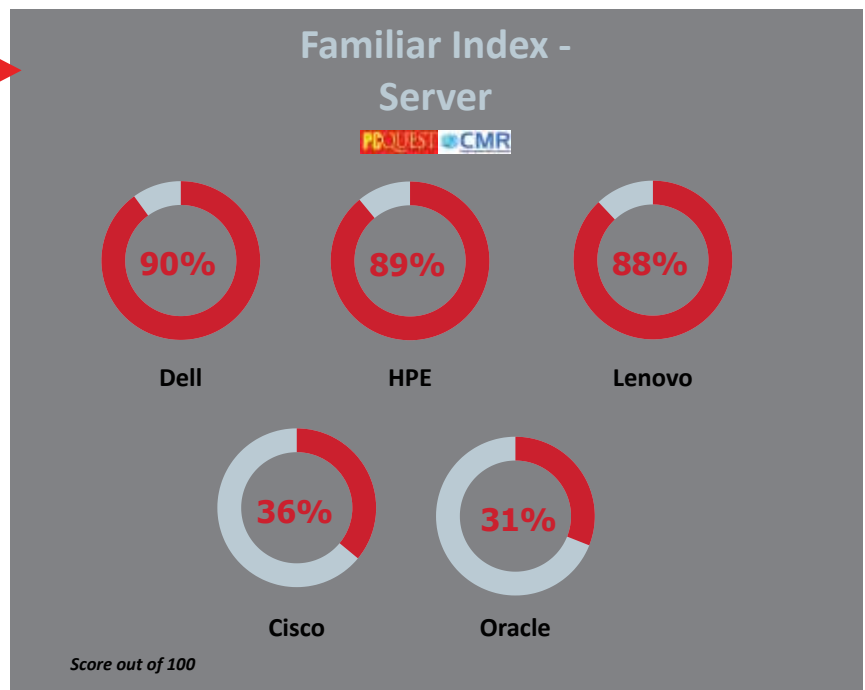
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Apart from brand name and quality of product, after sales service is more important than initial price while selecting any brand of Server

**W**hether the laptop, PC or server, Dell is the leading brand. Surely server isn't a thing to buy every year or so, once purchased it can run for many years. That's why you can see some of the old servers still being used.

Like last year, once again, Dell is the champion brand in the server category followed by HPE. So, in terms of winner and first runner up nothing has changed, but the second runner up is now Lenovo, ahead of Cisco.

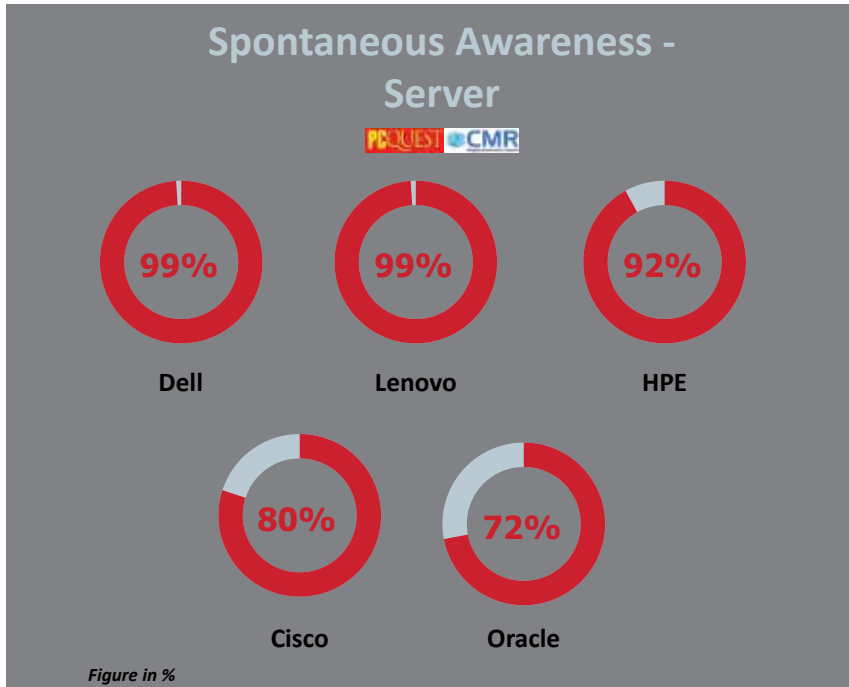
In the Familiarity Index for Server category, we got some interesting results. The first three brands are all apart by just one point each: Dell-90, HPE-89 and Lenovo-88. Cisco is next and way behind with a score of 36. Then comes Oracle with a score of 31.



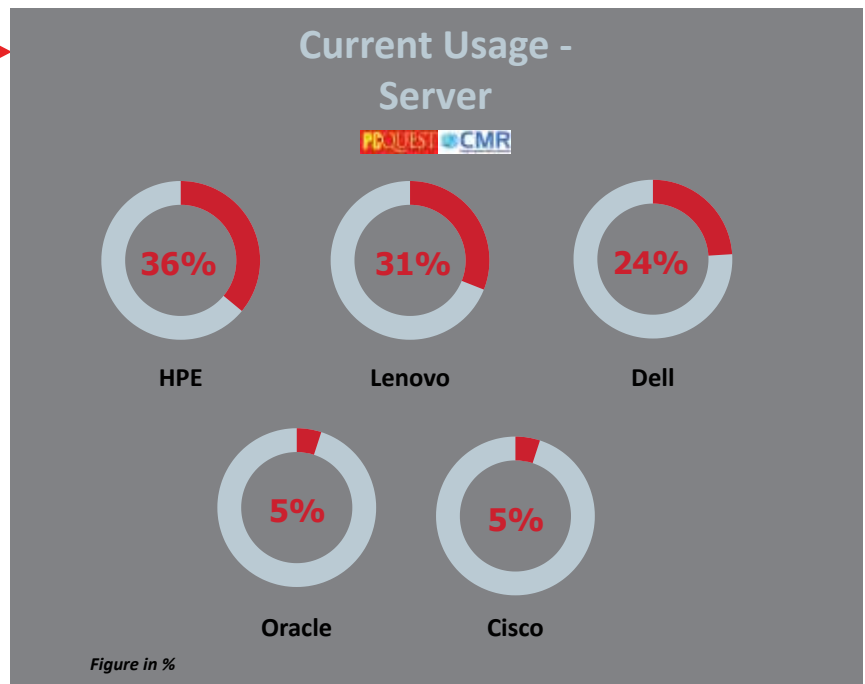
**Two in every three users would consider Dell while buying their next Server**



In the Spontaneous Awareness of brands, Dell shared the same score with Lenovo: 99%, meaning both the brands have great recognition in the market. HPE is a few steps behind, with a score of 92% followed by Cisco with a score of 80% and Oracle with a score of 72%.



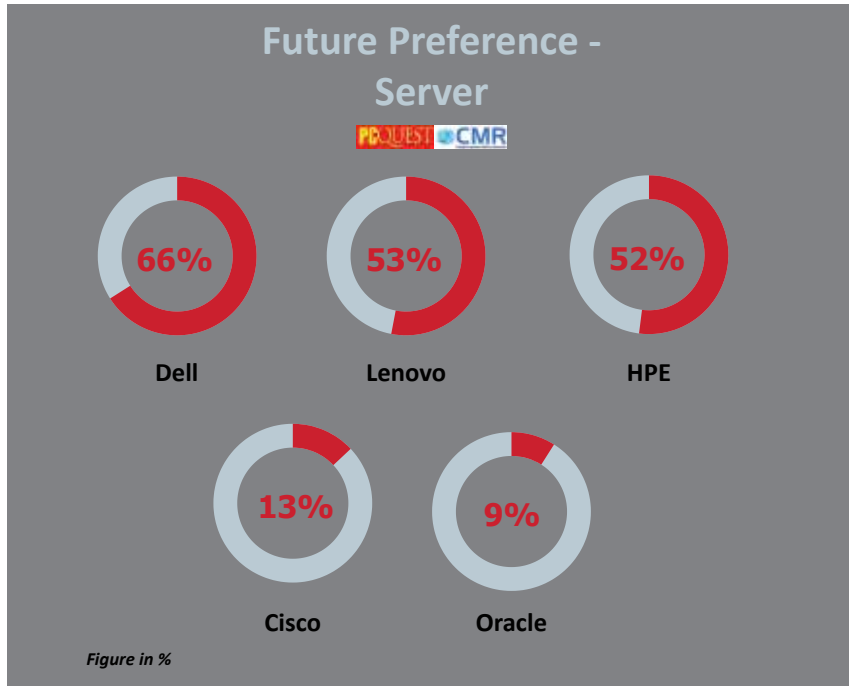
Which brand's server is dominating the current market? The answer is HPE. Interestingly, it is followed by Lenovo and Dell. Oracle and Cisco are sharing the same score: 5%. Does it mean that HPE can lead in the future? Let's find out!





Though, currently HPE has captured the maximum market share, the future looks to Dell. Lenovo seems like gaining more than HPE, but the difference is very marginal. Dell got the winner's spot with the score of 66% followed by Lenovo 53%, HPE 52%, Cisco 13% and Oracle 9%.

Even last year, Dell was the winner of future preference followed by HPE. This time HPE slipped to the third spot and Lenovo gained some ground.



Why is Dell the winner? Here is the answer: Our participants trust this brand, its quality, and even the price point of Dell servers is appealing. HPE is favoured for its brand name and quality, Lenovo for brand name and after sales support/service. Oracle and Cisco are considered for after sales support/service.



### Reasons for Using Current Server

	Dell	HPE	Lenovo	Oracle	Cisco
Brand Name					
Quality of Product					
After Sales Support / Service					
Initial Price					

High

Illustration by Nadeem Anees



# Cisco sweeps the competition in the enterprise networking space

Satya Sundar Mohanty, CyberMedia Research  
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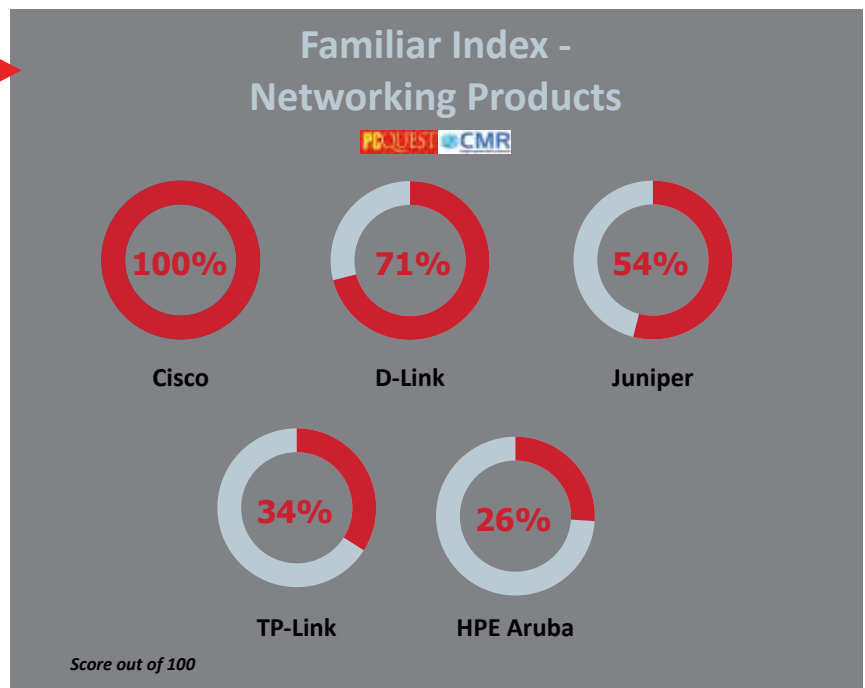
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Cisco is the clear winner with a lead on its closest competition. In future, seven in every eight users would consider Cisco while buying their next Networking Products

**T**oday, without internet connectivity, we can't even imagine the world, be it personal or professional. Connectivity required some bridges: It could be a switch, router, access point, etc. We are moving to the next gen 5G connectivity, and networking devices play an important role in making this possible.

Cisco is the winner in the networking category. D-Link was the 1st runner-up and Juniper Networks followed. Compared to the last year's results, D-Link and Juniper Networks exchanged their spots.

Cisco sweeps the competition in this category. It is a clear winner in all the segments. In the Familiarity Index, it achieved a cent per cent score. D-Link gained and is at 71%. Juniper came in third with 54%, followed by TP-Link 34% and HPE Aruba 26%.

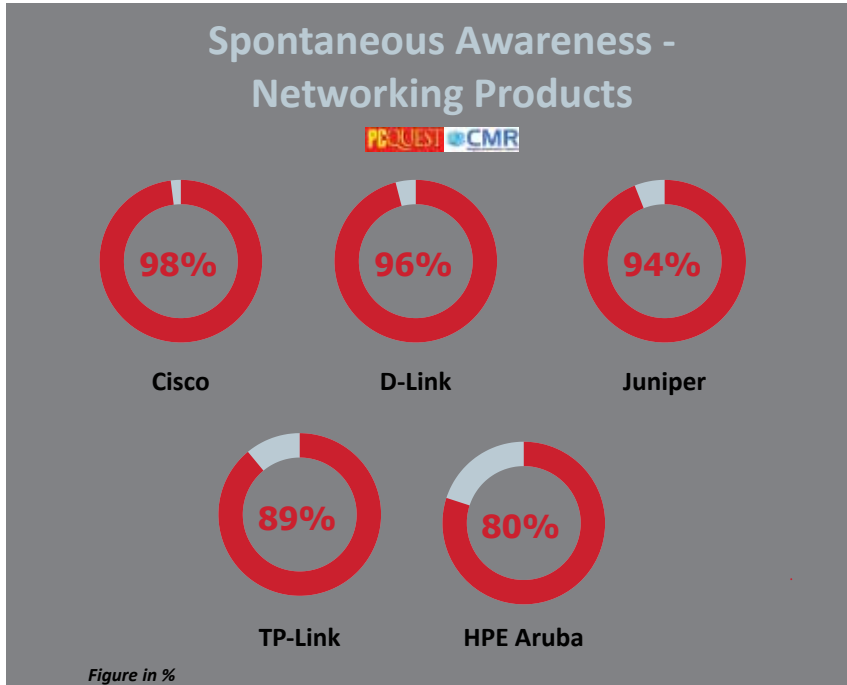


**Apart from brand name and quality of product, initial price and after sales service are equally important while selecting any brand of Networking Products**



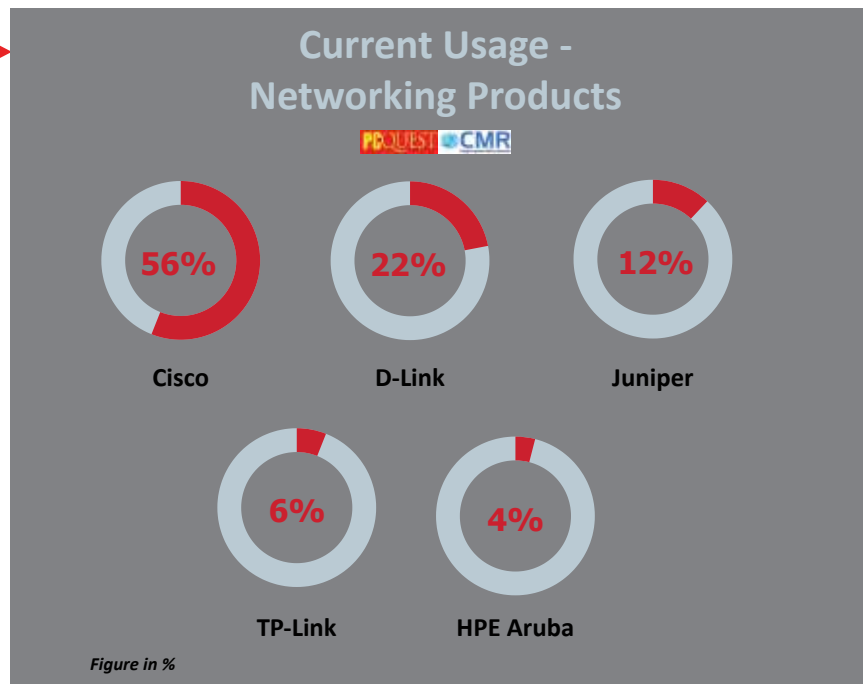
## NETWORKING PRODUCTS

In our Spontaneous Awareness of the brands survey, Cisco gets the maximum recall score of 98%. Last year it was 100%. Next is D-Link and Juniper with a marginal difference of 96% and 94% respectively, followed by TP-Link 89% and HPE Aruba 80%. D-Link gained a lot compared to last year, it was on fourth place and this time it jumped to second spot. It's a huge achievement.

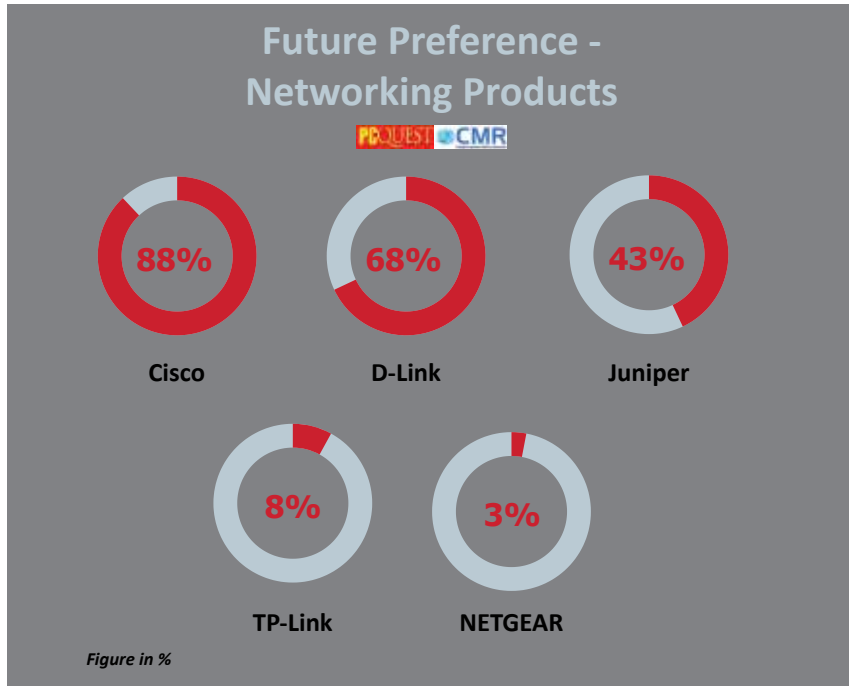


In the current usage as well, Cisco is on top at 59 per cent. D-Link is the second in the race with 23%. Juniper is at 12% followed by TP-Link 6% and HPE Aruba 4%.

Once again D-Link jumped two steps beating Juniper and TP-Link while last year it was on fourth place. Similarly, TP-Link moved to fourth place from fifth last year.



In the future as well, Cisco is strong at 88%. Though Cisco is on top, that's down from last year's 97%. So, who is gaining? Once again, it's D-Link at 68% a huge jump from 28% last year. Juniper also lost from 58% last year to 43% this time around. TP-Link is next at 8% followed by NETGEAR at 3%.



Why is Cisco on top? Because of its brand name and quality of product. D-Link and Juniper are considered for quality of product. TP-link for its pricing and HPE Aruba for its quality of product.

### Reasons for Using Current Networking Products

	Cisco	D-Link	Juniper	TP-Link	HPE Aruba
Brand Name	High				
Quality of Product		High	High		High
After Sales Support / Service	High				
Initial Price				High	

High

Illustration by Nadeem Anees

# Going beyond all the jargon

**Ashok Pandey**

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A laptop is your companion at work and play. You may spend several years working with this device and thus you need a perfect companion

**W**hether you are a professional, gamer or student, in this digital world everyone needs a laptop. But choosing one that fits to your computing requirement could be hard, even for those who understand all the tech terms and jargon.

PC manufacturers keep updating their devices with new hardware and adding new features easing our lives. We have prepared this laptop buying guide to help you make right decision.

### ▼ OS: Windows vs. Mac vs. Chrome

Choose your environment first if you are aware of any of OS – Windows, Mac or Chrome, then choice could be easier. If not, then understanding the basic difference between each can help you choosing the right one.

**Windows** – Windows is the most popular and flexible operating system. When you visit any PC store, most of PCs will come with



Windows' latest version, at present Windows 11. You would also get the widest variety of hardware combination with this as well as price range fitting anyone's budget. Windows offer a wide array of features from touch screens to fingerprint readers to dual graphics chips.

**Apple's Mac** – In terms of functionality,



Mac OS

it is different on UI and features. There are few major differences between Windows and Mac. All the Apple laptops come with Mac OS. It is higher on security and privacy, restricting you at some places which you may not like. You can't install any software not part of Apple ecosystem, while Windows won't restrict you from installing any app.

**Chrome OS** – If you are a student or want to stick to Android, then choose Chrome OS its similar to your Android smartphone but on your laptop with some changes in UI. It's



Chrome OS

simple to use and offers better security than Windows and Mac but with more limitation than both OSes. It is perfect for day-to-day tasks like surfing, checking email, navigating social networks and chatting etc.

### ▼ Form factor

Depending on what you plan to be doing with your next laptop, you'll want to make sure you pick the size that's the right fit for you. Size isn't like the RAM or ROM of a laptop. You can't upgrade it later. You're locked into whatever form-factor you select up-front, so choose wisely.

Laptop sizes typically start at 11.6-inches and go all the way up to 17.3 inches. If portability is your priority, you should go for a smaller-sized laptop. They tend to be thinner and lighter than their larger counterparts.

However, keep in mind that smaller-sized

machines often don't support the same high-end Intel Core CPUs or discrete graphics cards you can find in their larger counterparts.

You need to understand that when you choose a lightweight and thin laptop, you might compromise with wide selection of ports. Thus, you need to choose your laptop as per your requirements.

**Ultrabooks** – A slim and lightweight form-factor over high-end performance.



**Notebook** – A good mix of power and portability.

**Convertibles** – Also known as 2-in-1 laptops/PCs, comes with ability to fold away (or remove) the keyboard to use as a tablet.

### ▼ Display

You will be staring at the screen for hours while working or playing. This can harm your eyes so apart from considering the resolution, brightness and other features, you must also check for blue light filter and anti-glare kind of features.

What about resolution? Again higher is better, however you should not go below FHD 1920X080pixel resolution. When you are splurging on something sharper then go for higher, you can get up to 4K resolution laptops as well. However, 4K screen laptop would put additional cost on your pocket, and it would be worth it for those who really need it such as content creation professionals.



**Clamshell and gaming** – Boasting bulkier form-factors but significantly beefier specs.



Gamers should consider the refresh rate of the screen along with resolution. A faster



refresh rate can often provide a competitive advantage in online games, as it enables a smoother and more responsive play experience. Ideally, you should go for less than 5ms response time or a refresh rate greater than 144Hz.

Also, while working, people often forget how long they've been sitting in front of their screen or the distance from it. Modern-day laptops come with screen reminders that would alert you to take a screen break, or alert you to maintain a safe distance if you are sitting too close to the device.

### ▼ Computing power

Whether you are a professional, gamer or a home user, without having a competent set of hardware you won't be able to run your desired application.

**CPU** – Processor, the most important thing and brain of your PC, takes care of “thoughts,” receiving inputs and processing data to generate results. It's essential therefore that you get the right CPU for your needs. This is easier said than done, as there are so many to choose from.

We all know about Intel's line-up of CPUs, namely the Core i series. It has so many different processors skews to start with e.g. Intel Core i3, i5, i7, i9, etc. Within each, there are multiple generations available, with the latest being 12th Gen. Before you make your choice, it's important to understand a few terms related to CPUs in general. This will help you understand CPUs better.

### ▼ Clock Speed

A CPU having a clock speed of 2.4 GHz executes 2.4 billion cycles per second. Depending on the instructions, a single clock may complete multiple instructions or one instruction handled over multiple clock cycles.

But You can't compare it with different CPU architecture, since each CPU design handles the instructions differently. So you can compare within the same CPU brand and generation.

A CPU with higher clock speed from a previous-gen might perform better than the latest CPU with lower clock speed. So, choose the clock speed accordingly.

**Cores** – A CPU core refers to one processor in a chip. Earlier, one CPU had only one core in a chip, while modern CPUs can have anywhere from 2 to 18 cores per chip, each of which can work on different tasks. So a quad-core processor means a CPU with 4 processors in the same chip or packaging, octa-core means eight cores, etc. The higher number of cores will result in faster performance, provided the application that uses them is able to utilize all the cores.

**Threads** – Once again higher is better, thread is a virtual version of a processor core designed to increase performance. Depending on the processing of software application, it can utilise the all of them to perform better. Threads improve throughput, computational speed-up and manage the tasks.

**Fabrication process** – NM stands for nanometres and refers to the elements that

Model number	Cores (threads)	Frequency	Turbo Boost all-core/2.0 (/max. 3.0)	L2 cache	L3 cache	Socket	I/O bus
Core i9-10900X	10 (20)	3.7 GHz	4.3/4.5 GHz 4.7 GHz	10 × 1024 KB	19.25 MB	LGA 2066	DMI 3.0
Core i9-11900	8 (16)	2.5 GHz	5.1 GHz (5.2 w/ TVB)	8 × 512 KB	16 MB	LGA 1200	DMI 3.0 × 8
Core i9-12900	8 (16)	2.4 GHz	5.0/5.1 GHz	8 × 1.25 MB	30 MB	LGA 1700	DMI 4.0 × 8

make up the structure of a chip. A smaller number means more elements can be packed inside the same chip, reduce power consumption, and improve overall processor efficiency. So, smaller number is better here and means it's of a newer generation.

**GPU** –All the laptops come with “integrated graphics” which are fine for most users to watch HD movies and even play casual games. Discrete graphics are required when you are a gamer or do a lot of video editing, graphics designing, 3D modelling, etc. AMD and Nvidia make most of the graphics cards you'll find in laptops.

Nvidia graphics card line called GeForce, Max-Q,

Quadro, etc. AMD's GPU line is called Radeon and ranges from Vega and RX cards down to R-series cards that mirror the Ryzen naming scheme. Here again you need to choose a GPU as per your graphics processing requirement. The 2 GB memory GPU would be good for graphic and video editing. For architecture and 3D muddling would require 6 GB or higher memory graphics.

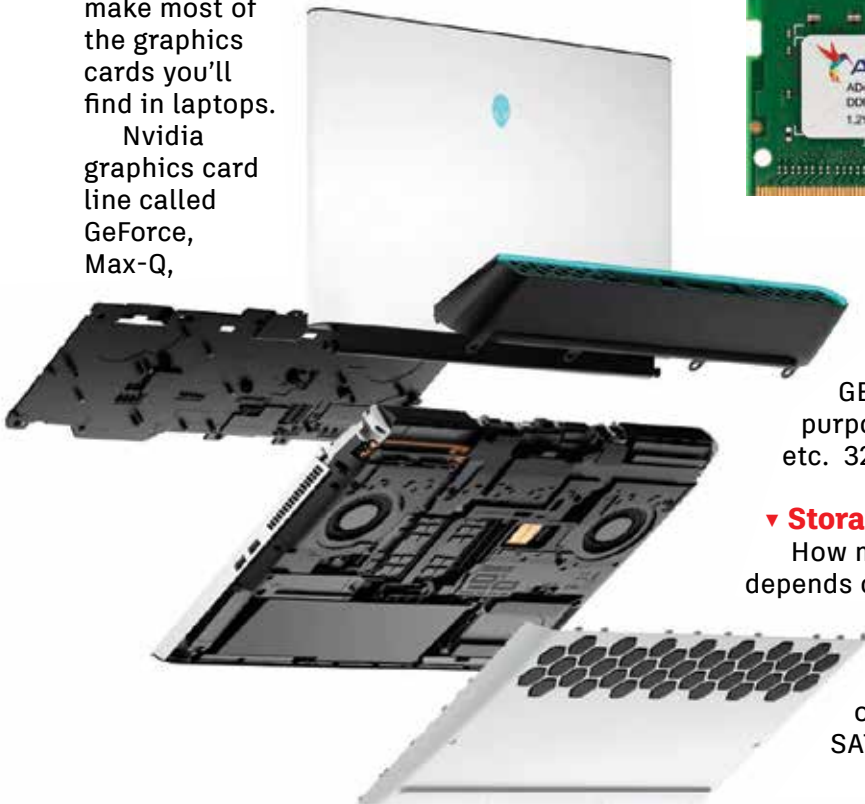
**RAM** –8 GB RAM has become a standard nowadays, but that's not enough for everyone.



You should choose higher memory depending on your computational requirements. For daily productivity, 8 GB is good, for higher computing, 16 GB is recommended and for creative purposes, graphics design, 3D modelling, etc. 32 GB would be a right choice.

#### ▼ Storage

How much storage space is required that depends on your profession, but you should opt for SSD for better overall performance. Among SSDs, the newer PCIe x4 (aka NVME) units offer triple the speed of traditional SATA drives.



### ▼ Battery life

Manufacturer can claim for hours of battery life, but in real world it won't happen. There are too many variables that affect battery life, from screen brightness, resolution, to the number of applications you are running in the background plus how many wireless devices you have connected to the laptop using the Wi-Fi networks or Bluetooth devices.

When you will run programs that need lots of processing, or stream online video, play graphics-intensive games, etc. it will consume higher battery. Similarly, transferring lots of files over a wireless network, would drain a lot of battery.

While choosing your laptop, you should look at the rating of the battery in Watt-hours (Wh) or milliamp-hours (mAh). Once again higher is better, delivering longer battery life. Another key feature that you should look for is fast-charging. So when you are in hurry, you can get some juice quickly.

### ▼ Ports and connectivity

The amount and types of ports on your laptop, lets you connect different peripheral and other device to your PC, like USB devices, or recharging it. The modern ultrabooks come with less ports, but you need at least one 1 USB-C, at least one 1 USB-A, and a microphone/headset jack. Look into USB-C charging and an SD reader too.

Wireless connectivity is important to

use your laptop on the go. Consider buying a notebook with Wi-Fi 6 support. Wi-Fi 6 offers increased theoretical throughputs and a more stable connection than 802.11ac.



We also suggest looking for a laptop with Bluetooth 5, the latest standard that offers improved connectivity with Bluetooth-enabled devices, like mice and headphones.

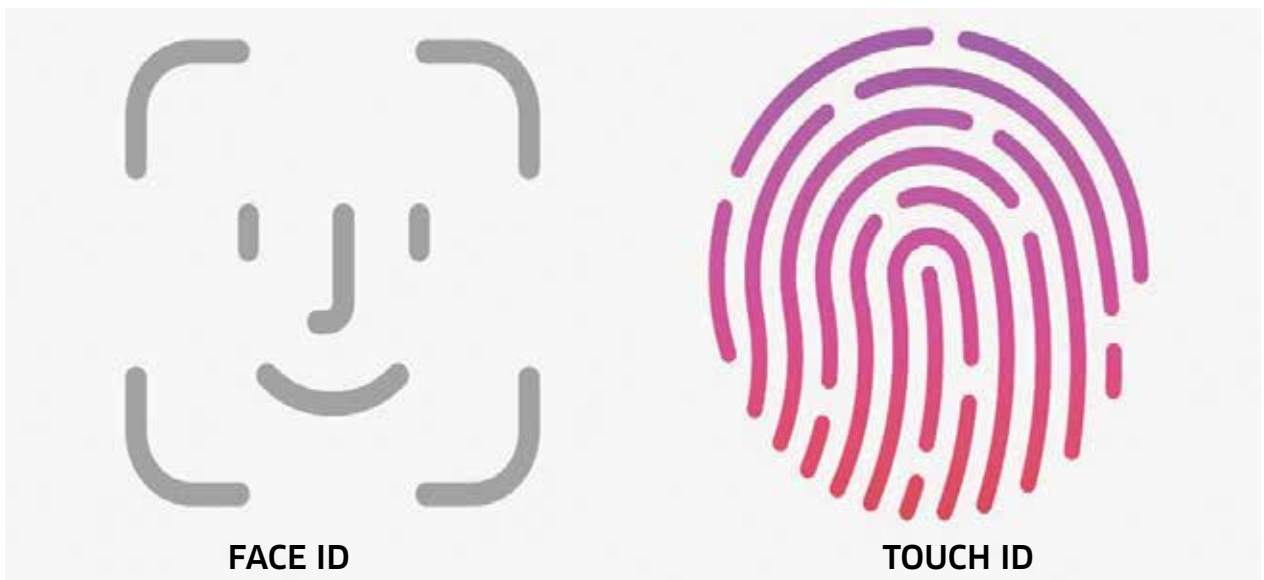


### ▼ Security

An intruder can try to access your PC by guessing your password, but can't create a copy of your fingerprint. In order to keep the contents of your laptop secure, you should go for a PC with a fingerprint reader. It is great for logging into your laptop and the latest Windows 11 OS takes it to the next level with its Windows Hello system.

If you want even higher security, then choose a laptop with Face ID. The facial recognition tech enables you to unlock your laptop with a glance, as you were doing with your smartphone.

Additionally, if you are a professional check for added security features that protects your from various external threats. OEMs are equipping their laptops with numerous security features which are capable of detecting different attacks in real time. ■

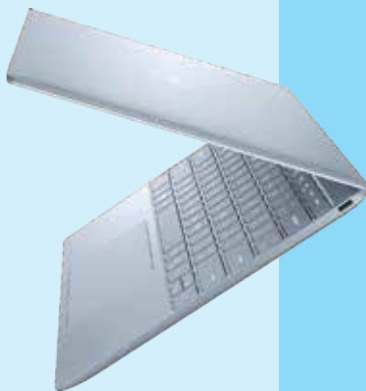


<https://PRODUCT>

# Top business laptops

**Ashok Pandey**

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## DELL XPS 13

The latest Dell XPS 13 is thinner and lighter laptop than its predecessor. Packed with latest 12th Gen Intel processors, along with 16 GB RAM, offers the option of a discrete graphics card. The XPS 15 is not only one of the most elegant looking laptops out there, but also the most powerful in its segment.

Price: ₹1,20,372

## HP EliteBook 840 G8

A powerful business laptop is built with a new AI-based audio experience. The ultralight and thin business PC comes with an 85-percent screen-to-body ratio and a quiet and comfortable keyboard to work on. Packed with pro security features such as HP Sure Click Pro with HP Sure Sense Pro providing more in-depth coverage than the standard versions.



Price: ₹1,20,372



## Yoga Slim 7i Carbon

Constructed from high-strength carbon fiber, the Yoga Slim 7i Carbon's top cover is carefully layered and bonded via high-precision manufacturing processes. It delivers exceptional computing power, with the Intel Evo platform. It comes packed with 11th Gen Intel Core processors, lightning-fast Gigabit speeds with Intel WiFi 6, and a Thunderbolt 4 port for speedy transfers and charging.

Price: ₹1,24,990

## Acer Swift X

The sliced metal body encapsulates the mobility of modern creatives at just 1.39 kg and 17.9 mm sharp. The mobility is carried by its 59Wh battery, with up to 17 hours of use and fast charging support. Packed with AMD Ryzen 5000 Series Mobile Processors, the laptop also featuring the supercharged NVIDIA GeForce RTX 3050 Ti graphics card, along with 16GB RAM, and up to 2TB SSD's.



Price: ₹86,999

## Apple MacBook Pro 14

The new MacBook Pro is configured with the M1 Pro or M1 Max chip and offers unprecedented levels of pro performance. The first Apple silicon designed for pros – you get groundbreaking performance and amazing battery life. Add to that a stunning Liquid Retina XDR display, the best camera and audio ever in a Mac notebook, and all the ports you need. The first notebook of its kind, this MacBook Pro is a beast.



Price: ₹1,94,900

## LG gram 16

Immerse yourself with the 16:10 aspect ratio display that's 11% larger than the 16:9 ratios. So you can scroll less and spend more time on your hustle. This slim, and portable, LG gram is build to deliver the powerful performance with 12th Gen Intel Core processor which is 40% more robust than its predecessors. It comes packed with smart functions including Smart Player, Posture Warning, 20-20-20, etc.



Price: ₹1,28,000



## MSI Modern 15 - B12M

The Modern Series features the latest 12th Gen Intel Core i7 processor and Intel Iris Xe graphics, offering higher performance on multi-tasking and entertainment. The extremely portable and ultra slim chassis weighing at 1.7kg, but to ensure the best of the best, the product meets the MIL-STD-810G military standard for reliability and durability. For your multi-tasking, the MSI Center Pro takes optimization to the next level with easily adjustable system modes and

**Expected Price: ₹70,000**

resources for a wide range of scenarios and needs.

## MacBook Air (M2)

Redesigned around the next-generation M2 chip, the strikingly thin laptop brings exceptional speed and power efficiency within its durable all-aluminium enclosure. Thanks to the efficiency of the M2 chip, MacBook Air can deliver amazing performance without a fan – so it stays completely silent no matter how intense the task.



**Price: ₹1,19,900**



## Asus ExpertBook B9

The ExpertBook B9 is encased in a durable, magnesium-lithium alloy chassis. Having the superslim bezels enable a 14 inch display to fit into ExpertBook B9's 13 inch class chassis, making it extremely compact. ExpertBook B9 will never let you down throughout the business day or a long-haul flight. It provides all-day battery life on a single charge, aided by energy-efficient Panel Self Refresh technology.

**Price: ₹1,65,990**

## HP ProBook 635 Aero G8 Notebook PC

The ultralight laptop with a durable all metal chassis, is powered by AMD Ryzen 5000 Series Mobile Processor along with a reliable connectivity, and HP Wolf Security for Business to match the needs of each user. Easy to carry around the office or the home office, this PC helps you stay productive wherever work takes you.



**Price: ₹89,988**

# RANKING OF TOP 100 ENGINEERING COLLEGES IN INDIA ON “DIGITAL INDEX”

December 2022 edition



This December, Dataquest is coming up with the market analysis of the higher education sector primarily engineering colleges in India on basis of Digital Index”. Digital indexing will evaluate the overall “**DIGITAL INFRASTRUCTURE, DIGITAL TEACHING & LEARNING PRACTICES, ADOPTING NEW TECHNOLOGIES, NEW AGE SKILL DEVELOPMENT & SUPPORT, ATTRIBUTING NEW DIGITAL CULTURES** among students & teachers.

## KEY HIGHLIGHTS OF DIGITAL INDEX




- 100+ Engineering colleges to be surveyed
- Digital teaching and learning practices
- Digital Infrastructure
- Digital skill development
- Digital environment and culture
- Attitudes to digitalisation
- Interviews of Dean/Directors, leading HR Leaders, CEO's/CXO's.

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To be part of the Survey and Get your Copy, Write to:  
Rajiv Pathak | Sr. Manager, Marketing | rajivp@cybermedia.co.in | +91 8010757100

# Top 10 gaming laptops

**Ashok Pandey**

✉ ashokpa@cybermedia.co.in



## Dell Alienware m15 R7



Price: ₹2,24,989

Experience smooth, fast, and stunning graphics as the developers intended with more contrast and vivid colors that go beyond the traditional high dynamic range (HDR) with Dolby Vision. Hexagonal-shaped vents boost intake efficiency and maximize air movement to maintain performance while rear stadium AlienFX lighting allow you to customize the colors to match your style. Packed with “holy grail” of gaming graphics, the NVIDIA GeForce RTX 30 series graphics, experience textures, complex lighting, and the most realistic environments imaginable within the gaming world.

## OMEN by HP Laptop 17-ck1022TX

Take your gaming experience to the next level with the OMEN by HP 17.3 Gaming Laptop PC, powered by a 12th Gen Intel Core Processor and NVIDIA GeForce RTX Graphics. It stays cool with OMEN Tempest Cooling technology that prevents overheating, even when your game play heats up. The floating hinge design and high-res, fast refresh rate display lets you play at your best from anywhere.



Price: ₹2,09,999





## Asus ROG Strix Scar 17 SE (2022)

Tackle any enemy with an Intel Core i9-12950HX processor, paired with an NVIDIA GeForce RTX3080 Ti Laptop GPU. The NVIDIA GPU is fully unleashed with a max TGP of 175W, thanks to the extra 25W available with Dynamic Boost. Leave loading screens behind thanks to PCIe Gen4x4 solid state storage in a RAID 0 array. With DDR5 memory bringing more bandwidth than ever before, the SCAR is ready to leave the competition in the dust.

Price: ₹3,99,990

## Acer Nitro 5

Reign over the game world with the combined power of a 11th Gen Intel Core i7 processor and NVIDIA GeForce RTX 30 Series GPUs. The processors is designed to push frames , now clocking up to 5.0GHz,Turbo with up to 4 cores and 8 threads, you get all the performance you need and the freedom to game anywhere.Enjoy smooth blur-free gameplay with a 144Hz refresh rate and a 3ms response time.



Price: ₹59,999



## HP Victus Gaming Laptop 15 (39.62 cm) fa0351TX

Made for peak PC gaming, this sleek machine touts a 12th Gen Intel Core processor and a modern graphics card. By squeezing a larger screen into a smaller frame, this ultra-thin, barely visible bezel revolutionises your display's appearance with a beautifully efficient design.Meet your gaming demands with advanced RT Cores and Tensor Cores graphics along with updated thermals, a full all-in-one gaming keyboard, and an HD camera with Temporal Noise Reduction.

Price: ₹93,999

## Lenovo Legion 5i Pro Gen 7 (16, Intel)

With revolutionary performance and efficiency cores, 12th Gen Intel Core processors enable seamless streaming and gaming. Experience ultimate performance with the latest NVIDIA GeForce RTX 30 Series Laptop GPUs for gamers and creators with maximum graphical power. Play over 100 high-quality games with your new Lenovo Legion laptop and three months of Xbox Game Pass—including EA Play.

Price: ₹1,50,720





## MSI Titan GT77 - 12U

Packed with the latest high performing up to latest 12th Gen Intel Core i9-12900HX processor and NVIDIA GeForce RTX 30 Series Graphics, and the luxury aesthetics of the Mystic Light bar, the Titan GT77 highlights top of the line performance and design. Get more immersive experience with Ray tracing that simulates how light behaves in the real-world to produce the most realistic and immersive graphics for gamers and creators.

Price: ₹4,99,990

## Asus ROG Zephyrus M16 GU603ZM-K8035WS

Get immersive and deep gaming experience with near-rimless at a 94% screen-to-body ratio, and up to QHD 165Hz/3ms display. See full-spectrum color accuracy thanks to Pantone validation and 100% of the DCI-P3 color space, ideal for gamers who also create. Its ultra-slim frame houses a powerful 12th Gen Intel Core i9-12900H CPU with NVIDIA GeForce RTX3080 Ti Laptop GPU. Liquid Metal thermal compound keeps your CPU cool, while redesigned Arc Flow Fans spin 84 blades to generate impressive airflow and minimal noise.



Price: ₹1,79,990



Price: ₹89,990

## Dell G15 Gaming Laptop

The gaming laptop has Alienware-inspired thermal design that features optimal cooling thanks to dual air-intake, ultra-thin fan blades, copper pipes and four strategically-placed vents. As a result, you can expect your system to stay cool when the action heats up. Packed with up to 12th Gen Intel i5 12-core or i7 14-core processors plus optimized performance profiles, you can revel in powerful and consistent high-end performance during every gaming experience. Get fully immersed in every experience from discrete NVIDIA graphics and vivid colors of the FHD display panel.

## MSI Bravo 15 B5DD-043IN

The gaming laptop is powered by an AMD Ryzen 5 Hera Core 5600H mobile processor that is built on 7nm technology and the Radeon RX 5500M Graphics card to deliver desktop-caliber gaming performance. It features an AMD FreeSync Premium display for fluid and tear-free gameplay with a high refresh rate, low latency, and low framerate compensation.



Price: ₹69,990

## NOVEMBER 2022 EDITION OF DATAQUEST HIGHLIGHTS “WHY OR WHY NOT QUANTUM COMPUTING FOR ENTERPRISES?”

### ALSO READ MORE ABOUT

- How IT experience plays crucial role in work experience for students
- Rural Transformation for sustainable growth

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#### BLENDED LEARNING IS A WAY FORWARD

- Prof. Rangan Banerjee,  
Director,  
IIT Delhi



#### CHANNELS TO ENHANCE SKILLS HAVE WIDENED

- Prof. Ramabhadran  
Thirumalai, Deputy Dean,  
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#### ISOLATED ATTEMPTS CAN CAUSE DISASTER

- Amarendu Prakash,  
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# India, wake up! An Assistive Technology market awaits to be tapped

Anusha Ashwin

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Two billion people is the number of people who are going to need at least 1 assistive product by 2030, with many older people needing 2 or more. This is the prediction made by the World Health Organization (WHO)

**T**he fact is that today, only 1 in 10 people in need have the required access to assistive products. In India, the need for our geriatric and our physically challenged population is much more than predicted.

WHO defines Assistive technology or AT as an umbrella term covering the systems and services related to the delivery of assistive products and services that aim at improving an individual's functioning and independence, thereby promoting better well-being in their life. Not only that, the availability of ATs instil a large sense of inclusivity and provide equal opportunities for the needy in society.

India, dominated by an aging population and with the rise in several non-communicable diseases, has a 'totally available market' for its potential startups and innovators to foray into the AT space. Integrating smart digital technology into AT will, no doubt, be the icing on the cake. The market value expectedly triples with the scope it provides in India for both domestic uses as well as for export purposes. But it's unfortunate that this space is less forayed in India, with very limited innovations and product development, thereby

mismatching the volume of requirements.

The glaring gap cannot be put forth any better than **Prof. Ashok Jhunjunwala, President of IITM Research Park, IITM Incubation Cell & RTBI**. He says India houses the world's most aging population and their need for Assistive Technology products is humungous versus the poor development and availability of the products. Prof. Jhunjunwala understands the pulse of the needs in the AT vertical and therefore hosted the EMPOWER Conference – an annual technical event, organized with the objective of bringing together all stakeholders in the Assistive Technology sector and to present to the world that there is a huge need for the confluence of minds and works under this space. His experience from attending all the past editions of the event (two of which were conducted virtually) gave him a sense of determination to host it at IITM Research Park this year in Chennai.

#### ▼ **EMPOWER – A platform to show India as an emerging leader in AT**

Spearheaded by Prof. Ashok Jhunjunwala, this year, the IITM Research Park was the



host of the 5th EMPOWER Conference, which was held between the 13th and 15th of October, 2022 at Chennai. The motto of this event, according to the Professor, is to 'drive affordable and quality assistive technology and to make India a leader in the sphere of Assistive Technology's product innovation and development. Just as the Professor and his team had planned, 2022 EMPOWER brought together the industry, academia, startups, and students to share their expertise, inspire individuals, and collaborate towards a stronger, innovation-driven AT ecosystem in India.

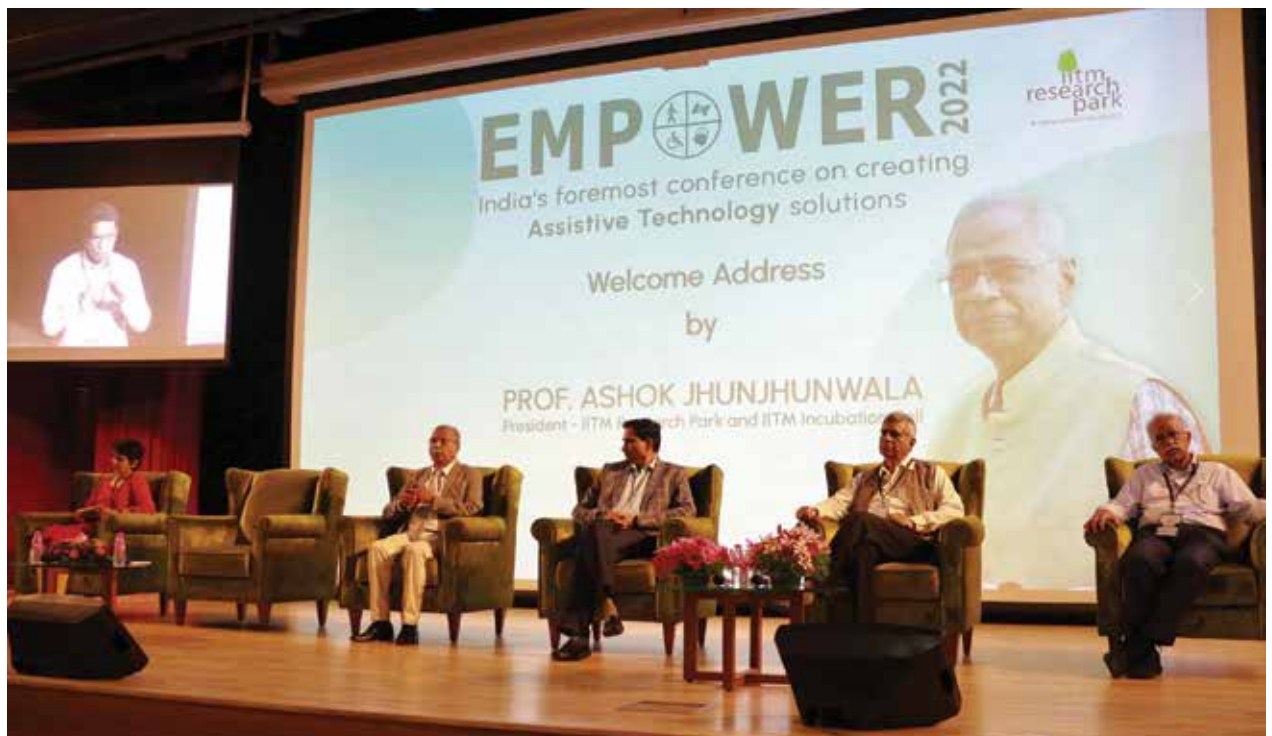
Prof. Ashok Jhunjhunwala, while inaugurating EMPOWER said, "IIT Madras Research Park, as part of the 10X program is pursuing an ambitious vision to make India a global leader in Assistive Technology to enable inclusion for 'People with Disabilities (PwD) and geriatrics, empowering them to live healthy, productive, independent, and dignified lives. India is a large market, and the volume of production can help bridge this gap given that R&D and commercialization happen in India."

At every edition, EMPOWER, the 3-day conference, uses a mix of keynote talks,

invited papers, posters, user forums, panel discussions, and a product exhibition and provides opportunities for discussions around current solutions, and seeds ideas for research and beyond in AT. The Program Committee of EMPOWER consists of globally-located members from premier academic institutions, NGOs, and technology incubators. The participants are engaged with the issues involved in the creation, production, and dissemination of Assistive Technology solutions.

Chief guests of this year's EMPOWER – **Chapal Khasnabis, Head (a.i) of the Access to Assistive Technology and Medical Devices Unit at World Health Organization, Pradeep Gupta, Chairman, CyberMedia Group, and C K Ranganathan, Founder Chairman, CavinKare** resonated the aim of the conference to encourage and promote research and development of indigenous Assistive Technology of global standards.

**M. Balakrishnan, Honorary Professor, CSE Department, IIT Delhi and Principal Investigator & Mentor at Assistive Technologies Group**, who is a key researcher in AT and an active dignitary at EMPOWER said, "India must rapidly progress in ideation,



R&D of affordable assistive devices and technologies for independent mobility, education and for a less dependent living of people with disabilities. Students, and start-up entrepreneurs must capitalize such events as EMPOWER to network, showcase their innovation, and lure investors to ensure that India moves ahead in AT innovation and products.”

Pradeep Gupta, Chairman, CyberMedia Group, in his inaugural address said, “Events like EMPOWER have the potential to pave the way to address the key factors of accessibility, availability, affordability, and consumer awareness of AT. A large gap that persists today in the AT space can only be addressed by deploying meaningful user-friendly technology to people with disabilities. A food delivery app addresses accessibility to a large extent. But when apps fail to address accessibility then technology must be dug deep to use it and deploy solutions. We are in the age of Metaverse – a technology that overcomes several accessibility issues. So, India’s tech start-ups must gear up. Stakeholders of this sector are compelled to come together to create an ecosystem that is conducive for more innovative products to come to fore. Startups have tremendous scope to accelerate this sector’s growth for India, just like how other sectors like healthcare and e-commerce have undergone a major transformation in the last 2 decades.”

Pradeep Gupta also dons the hat of a Trustee of the National Centre for Promotion of Employment for Disabled People (NCPEDP).

At EMPOWER, Gupta stressed on the fact that he is particularly looking forward to the AT sector growing as the NCPEDP is on a mission to set up a hub and several spokes for the development of AT products. He says the AT sector requires acceleration at a pace that can change the way the world looks at India. For startups to set foot in this space will bring glory to India and the at the same time serve the people of India who are in dire need of meaningful solutions to their disability problems.

Giving the right impetus to the country’s AT start-ups, EMPOWER set the platform for more than 90 start-ups to exhibit parallelly along the knowledge-packed conference sessions. A database, titled ‘Driving Affordable & Quality Assistive Technology (DAQAT)’, of companies involved in AT was also released at the event. Workshops, paper presentations for and by start-ups and tech conglomerates like Microsoft, Google and TCS brought forth various facets to accomplishing global AT goals during the 3-day event.

#### ▼ How wide is the gap in the AT sphere?

**Assistive Technology (AT) enables people with disabilities** to live a healthy, productive, independent, and dignified lives, and to participate in education, the labour market and in civic life. Assistive technology reduces the need for formal health and support services, long-term care, and the work of caregivers. Without assistive technology, people are often excluded, isolated, and locked into poverty, thereby increasing the impact



**K ANANTH KRISHNAN, TCS**

of disease and disability on a person, their family, and society. The products range from hearing aids, wheelchairs, communication aids, spectacles, prostheses, pill organizers to memory aids. In fact, 1 in every 6 of us is differently-abled in some way and we need some AT product, like a smartphone, an Alexa, or e-commerce platforms or as simple as a pair of glasses for our day-to-day chores.

For geriatric individuals with physical, sensory, communication or cognitive disabilities, AT devices facilitate independence in accomplishing activities (i.e., the ability to execute tasks or actions such as reading, writing, walking/moving, dressing, and eating). The core objective of AT is that by enabling a person to perform desired tasks, AT offer the potential to provide a sense of autonomy as well as connection to the community. By accommodating a person's weaknesses and supporting his or her strengths, assistive technologies can reduce emotional and psychosocial as well as physical stress on individuals and their caregivers.

Across the globe, many people who need assistive technology do not have access to it. Lack of affordability in low-income countries is a major reason people in need do not possess assistive products. Data from WHO cites few examples of the unmet global need for assistive technology, which includes:

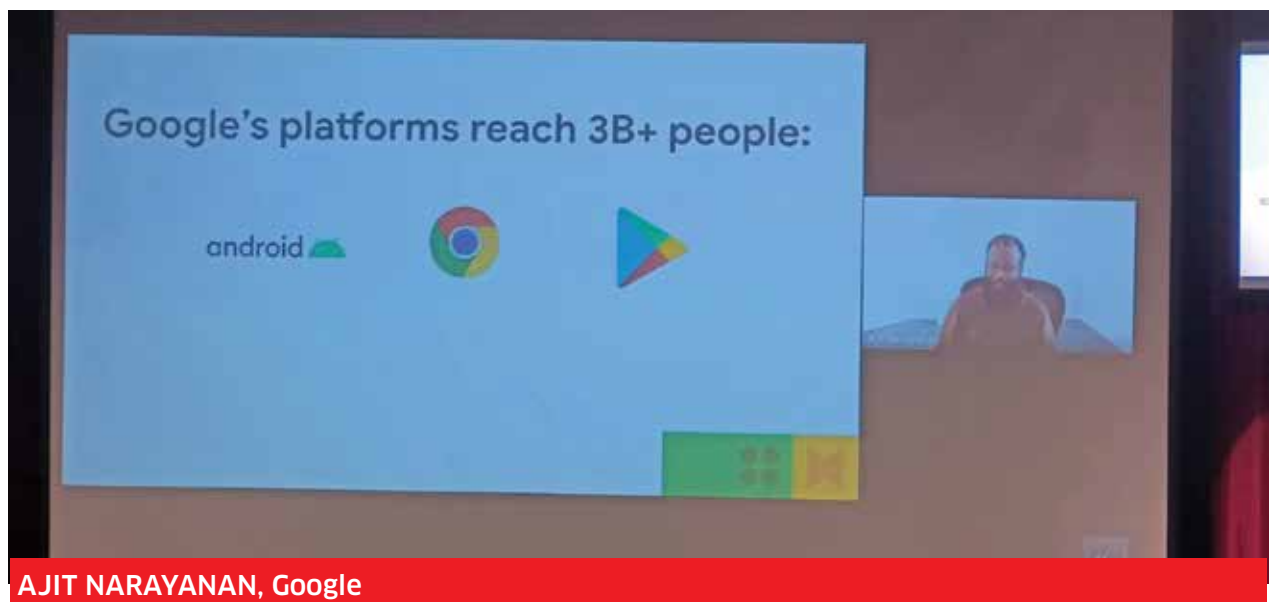
- 200 million people with low vision who

do not have access to assistive products for low-vision.

- 75 million people who need a wheelchair and only 5% to 15% of those in need who have access to one.
- 466 million people globally experience hearing loss. Hearing aid production currently meets less than 10% of the global need.
- Huge workforce shortages in assistive technology: over 75% of low-income countries have no prosthetic and orthotics training programs.
- Countries with the highest prevalence of disability-related health conditions tend to be those with the lowest supply of health workers skilled in the provision of assistive technology (as low as 2 professionals per 10 000 population).

#### ▼ How to address the gap? Is technology the lifeline for AT?

**Chapal Khasnabis, Head (a.i) of the Access to Assistive Technology and Medical Devices Unit at the World Health Organization** is determined to see a marriage take place between Digital Technology and Assistive Technology. He believes that the need is so much but the pace at which solutions are brought out is severely slow. Khasnabis is certain that the more digital technology integrates the faster will be the outcome of





product innovations and developments. He is personally involved in overseeing projects that can incorporate ICT and digital technology to better AT products, make them more user-friendly, and more specifically make them an asset for people with disabilities. According to Khasnabis, India has a lot to learn from countries like China, Japan, and Korea, where they give a lot of importance to the design and accessibility of spaces, things, and other comforts to all their citizens based on age and disabilities. But he is glad, EMPOWER-like events have seeded the thought about AT and that there is some headway in AT product innovations with the help of start-ups, tech conglomerates, and academic institutions like the IITs and IIMs.

For India to progress in the AT sector

and to emerge as a leader, Khasnabis has 2 suggestions. He implies, "If India must succeed in AT, then just like the western countries, AT products must come under the insurance ambit. Once the cost of AT products gets reimbursed by insurance companies, the entire AT industry will undergo a paradigm shift. This will in turn bring world-class quality products to the market, boost the market value of those products, and their potential to export, and thus impact the country's economic conditions in a big way. The more export happens, the better subsidy for local products can be achieved."

Well, his other take is that technologies like AI and ML for AT products must be proactively developed in AT. According to him, new-age technologies will overcome challenges like



**MANOHAR SWAMINATHAN, Microsoft Research India**

resource constraints. Khasnabis says human resource challenges are going to be immense in India and the rest of the world. We are going to rely more on technology to do our jobs day by day. Therefore, an increased adoption, integration, and implementation of technology into AT products will make the sector grow for benefits to reap. Khasnabis also suggests that Indian startup entrepreneurs must increasingly collaborate with foreign counterparts to acquire knowledge and co-create international standard products while establishing their presence in foreign markets.

Likewise, Keynote Speaker of EMPOWER, **Professor Catherine Holloway, Co-Founder, Academic Director of Global Disability Innovation Hub** and Professor at UCL's Interaction Centre, says she travels to India to attend EMPOWER each edition to satisfy her desire in her to improve the quality of

Assistive Technologies and the lives of the people who use them. At EMPOWER, Holloway fulfills the mandate laid down by GDI Hub, i.e., to accelerate the development of AT products that are viable in the market, deliver specific use cases to the people in India, evaluate them for clinical trials, conduct impact studies and establish joint research, cross-country opportunities. The startups that exhibited at the event impressed her and she says India is on the right path to make a significant presence and forefront in AT innovations.

### ▼ AT: A potential gateway for startups to succeed

Startups in the AT space serve a very niche but very fragmented market. The conventional approach to selling to the masses does not exist in this vertical, mainly because the consumers are different, there



**PROF. CATHERINE HOLLOWAY, Global Disability Innovation Hub**

are special needs for varied disabilities, and the challenges therefore associated with all stages of product development i.e., from prototyping to selling a finished product in the market is not an easy wave to tide. These may seem like deterrents to success but the scope under AT is far less competitive and has a huge headroom to accommodate several start-ups. **C K Ranganathan, Founder Chairman, CavinKare**, in his inaugural address iterated that it is essential for start-ups to think out-of-the-box. 'Metoo' or a copycat version of any existing product with poor use case will take products nowhere in specific to AT.

**Siddarth Daga, Co-Founder, Head - Sales & Outreach at wheelchairs developing start-up, NeoMotion**, says, "Startups in AT are unique and we need a platform to connect, network, co-learn and reach out to a potential market. The major advantage of participating at EMPOWER is the ability to connect with leaders in this space. It gives us the scope to connect with key people like from WHO and UK's GDI Hub. We can display and demonstrate the user-friendliness of our products to potential buyers and distributors, which is otherwise not possible for start-ups of our scale. Also, through EMPOWER we learn how to penetrate global similar markets like Africa and other Asian countries where the need for AT products is high. Above all, as engineers, we are expected to create products that serve a purpose. EMPOWER gave us a chance to connect with fellow engineers and understand the specific needs of wheelchair-specific users, which is very important for product improvisation." NeoMotion is an IIT Madras incubated start-up, that creates life-transformative personalized wheelchairs.

Similarly, a wide range of products and services suitable for the visually impaired, hearing impaired, speech difficulties, and slow learners were on display at this year's EMPOWER. Applications suitable for virtual learning and teaching were the highlight. Several start-ups developing prosthetics were also among the exhibitors.

### ▼ How are the big players contributing to AT

Tech giants like Google, TCS, Microsoft, Cisco, Accenture, and several others have

begun to realize that an extensively inclusive and diverse workforce offers businesses a competitive advantage. EMPOWER's keynote speaker **K Ananth Krishnan, the Chief Technology Officer of Tata Consultancy Services (TCS)**, says his company considers accessibility as a business strategy and therefore, has invested heavily in the Accessibility domain of research and innovation.

"The industry looks at the AT domain from a disability front however TCS's perspective is different to look at Accessibility. TCS has a strong belief that Accessibility is no more just a social aspect but beyond. Accessibility leads to inclusion and inclusion leads to innovation, business growth, and brand experience. Accessibility is a key strategic pillar in the United Nations' 17 sustainability development goals, taking this domain to the next level, to dream and realize a more sustainable and inclusive world, for everyone to live with. Also, persons with disability (PwD) face several serious challenges when it comes to accessibility – whether it is to physical infrastructure, logistics, or information and communication technology (ICT). With voice recognition, text-to-voice, and audiobook technologies – created as access solutions for PwDs – coming into routine use, the gap between accessible and mainstream technology is slowly blurring. The demarking lines are further blurring with the advent of Metaverse technology."

It is true that AI-based virtual assistants such as Siri, Alexa, and Cortana have many accessibility features built into them. This advancement in speech technology and AI can be used to provide a new way of interaction—multi-modal—to interact with devices and appliances for home automation, indoor navigation, identifying products in shopping malls, navigation, and controlling room temperature in an environment. Either way such technology advancements blur the lines of accessibility.

Researchers are also exploring AI with a brain-computer interface (BCI) which will allow control of devices, computers without keyboard and mouse, changing of TV channels, and access to apps and data, all by our thoughts, which we believe will create



a revolutionary impact on PWDs including people with motor disability (cerebral palsy or spinal cord injuries which affect body movement and muscle coordination).

Google's Ajit Narayanan, inventor of FreeSpeech, a picture language with a deep grammatical structure and the inventor of Avaz, India's first Augmentative and Alternative Communication device for children with disabilities, was the 3rd keynote speaker at EMPOWER. At the event, he laid down the fact that the search engine behemoth, Google, by itself reaches more than 3 billion people because of its ability to create AT experiences. Google platforms like Android, Chrome, Playstore, and games have all catered to the domain of AT using Machine Language and Artificial Intelligence. Some of the ATs become mainstream features like the:

- a. Action blocks: Android app for people with cognition disabilities to complete everyday tasks using simple commands. A multi-step functionality converted into single command action.
- b. Lookout: Android app for people with vision difficulties and one that offers hands-free operation. Uses the phone's camera as a lens to perceive the environment. Hence images get converted into the narration.
- c. Activate: Android app for people with severe motor difficulties communicating. A portable and affordable solution that uses facial gestures to express oneself. Each gesture can be aligned with a communication command, which can be activated using one's own phone camera.

### ▼ A large headroom to foray and succeed

India is undoubtedly poised to be the game changer of Assistive Technology and can emerge as a market leader in this space. All it requires is the concerned policy makers paying heed to the voices of the global AT experts, industry, academia, students, and start-ups to establish conducive ecosystems that nurture their innovations until they see success in their endeavors. The country needs more organizations like AssisTech Foundation (ATF) – India's first Assistive Technology-focused

ecosystem that supports and promotes disability-focused start-ups. **Ravi Narayan, Board Member of ATF**, at EMPOWER's panel discussion said that his organization is built to help those change-makers in the space of AT. "ATF offers a 3-pronged approach to see start-ups succeed in AT. In 4 years since its inception, our organization today houses 32 startups that have so far touched 4.6 lakh people in need of AT. We cannot limit the estimate of requirement to just 2 billion people requiring AT in the future. Our estimate is that some sort of AT will be used by every individual on this planet, therefore there is enough room for budding innovators to explore the AT vertical with accessibility as the focal point of service."

Keynote speaker, **Manohar Swaminathan, Principal Researcher at Microsoft Research**, has a piece of advice to offer. He says, "Technology solutions for accessibility have long been created using a narrow utilitarian lens, especially in the Global South due to multi-dimensional challenges and resource constraints—an emphasis on purely functional outcomes supported by a sterile cost-benefit analysis that ignores the fact that people with disability are people first with their own aspirations for leisure and enjoyment in addition to skills and employment. Microsoft proposes an alternate design methodology called the Ludic Design for Accessibility (LDA) that puts play and playfulness at the center of all assistive technology design and use. We then describe a seven-step framework for designers to apply this methodology to create impactful solutions. Though LDA is universally applicable, we highlight the factors that make it especially relevant in the context of accessibility in the Global South. LDA has been introduced in several schools for Visual impaired students to teach computational thinking in a playful manner."

It's fair to conclude that technology plays a pivotal role in accomplishing the goals of Assistive technology not only for the benefit of People with Disabilities but for a common aging person who requires AT to live a life of dignity and autonomy. Of course, it's also a social responsibility to make workplaces, homes, and the entire outdoor environment suitable for PwDs. ■

# Redefining The Online Gaming Experience with High-Speed Low Latency Infrastructure

**Nikhil Rathi**

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With the advent of low-cost Internet tariffs, the online gaming industry has evolved at a breakneck speed over the last few years

**W**hat started as a simple on-screen bouncing ball game in the 1970s has turned into a USD 79 billion industry in 2020. And with 5G just lurking around the corner, the online gaming industry is projected to grow at 18% CAGR to surpass \$182 billion by 2025.

In today's Cloud-first world, gaming corporations seek low-latency infrastructure to seamlessly support complex RAM-hungry games.

### ▼ Setting The Context

Today, the online gaming industry comprises creative, independent minds leveraging boundary-pushing technologies to develop innovative and immersive stories. Delivering an alluring cinematic experience, these technologies are driving community engagement like never before.

Creativity and immersive stories play second fiddle to digital infrastructure. This calls for voluminous data and seamless access to applications. Yet another aspect is the need for superfast, uninterrupted connectivity. Even short spurts of downtime can be detrimental to player progress and loss of interest. Low-latency connectivity thus becomes critical for online gaming.

### ▼ The Dynamics and Emerging Tech

Software DNA is becoming more complicated and technical. Developers seeking to offer immersive experiences acknowledge the need for mission-critical infrastructure.

With the burgeoning gaming market, the need for additional power and network connectivity shall accelerate. Today, the latest games feature Virtual Reality (VR) and back-end Artificial Intelligence (AI) to process voluminous data backed by an agile infrastructure.

Data Centers are poised to shape the next generation of games. The founding factors for this next leap shall involve in-house technical expertise, bespoke services, and global partnerships. Next are network and connectivity that behest on resilient power and uptime, rendering seamless gaming across multiple devices.



**NIKHIL RATHI**, Founder & CEO, Web Werks

### ▼ 5G, Cloud Gaming and Low Latency

The 5G connectivity makes online gaming feel like one is in the same room as their opponent.

Edge computing and 5G combined enable the rapid turnaround from a gamer's action to an in-game response. Now, this is where latency requirements come to the fore, with 5G-enabled games getting backed by Edge computing for instant processing.

Packets dispensed over 5G can suffer from latency, especially if they need to bounce to the Cloud and back. Edge computing reduces the turnaround rate and helps with powerful local processing, a key ingredient for VR and AR games. As data processing gets closer to the end-users, gamers can avail of low latency and high bandwidth.

Given the strikingly realistic graphics of games today, it is evident that enormous data gets transported from the server to the output medium. Accordingly, another trend is the growing demand for the "Cloud-as-a-Service" model.

In online or Cloud gaming, the providers select servers and Internet nodes for transporting the game data. For this, the server and the nodes are closer to the gamers. In this way, the data path gets considerably shortened. One can choose servers located

in the same country or city as the users for a prolific gaming experience.

### ▼ So, What Do Gaming Companies Need?

It is natural to expect higher Data Center capacity given the boom in e-Commerce, streamed content, and virtual meetings. Never before has this need become more apparent since the pandemic.

The core of business success is a high-density, hybrid Colocation hosting environment for GPU-intensive applications in the Cloud.

Online gaming leaders today are challenged by the triumvirate of exponential data growth, a multitude of platforms and devices, and the call for instant data on demand. Another crucial aspect is proximity to customers for a real-time gaming experience.

In essence, what gamers need is a lot similar to high-frequency traders. So, high-performance, low-latency solutions ensure the delivery of games to consoles and mobile devices with minimal lag time and the best possible gaming experience.

### ▼ To Sum It Up

Gaming organisations partnering with Edge Data Centers could tremendously benefit from the on-demand proximity of the servers in a high-bandwidth, low-latency ecosystem. This comes from the leverage that aspects such as repetitive lag determine the overall gaming experience, especially for multiplayer games. Even a minute delay can have the deck stacked against the players, ruining the play.

Another factor is the load endured by the Data Centers. The gaming scenario behests upon player actions. Games such as Fortnite precipitate about 92 million events per minute! And data consumption rises by two petabytes per month. The massive success rests upon the support provided by reliable Data Centers. DCs offer high uptime that renders ease of game consumption, enabling players to cherish seamless online expeditions. Another renowned game that relies on Data Centers is “World of Warcraft”, wherein about 17 Data Centers globally support 100GB of data. ■

The author is Founder & CEO, Web Werks





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# Digital Forensics in Today's World

**Lt Col (Dr.) Santosh Khadsare**

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Time has come to move from reactive to proactive and predictive digital forensics

**D**uring and post COVID 19 work from home is a new normal. The attack surface has increased and the number of attacks as well as attack vectors have multiplied manifold. With technology occupying a prominent place in our daily lives, cybercriminals have become hyperactive to execute their nefarious designs and steal sensitive information from users. From corporate houses to individual users and from government officials to small traders, no category today is immune from hacking attempts. India faces around 3700 cyber-attacks every day. The National Crime Record Bureau (NCRB) data suggests 11 per cent jump in cybercrime cases in 2020 and an exponential increase in 2021. The Indian Computer Emergency Response Team (CERT-In) reported more than 2.12 Lakhs cybersecurity incidents in first 2 months of 2022 while the total number of incidents in 2021 was 14.02 Lakhs.

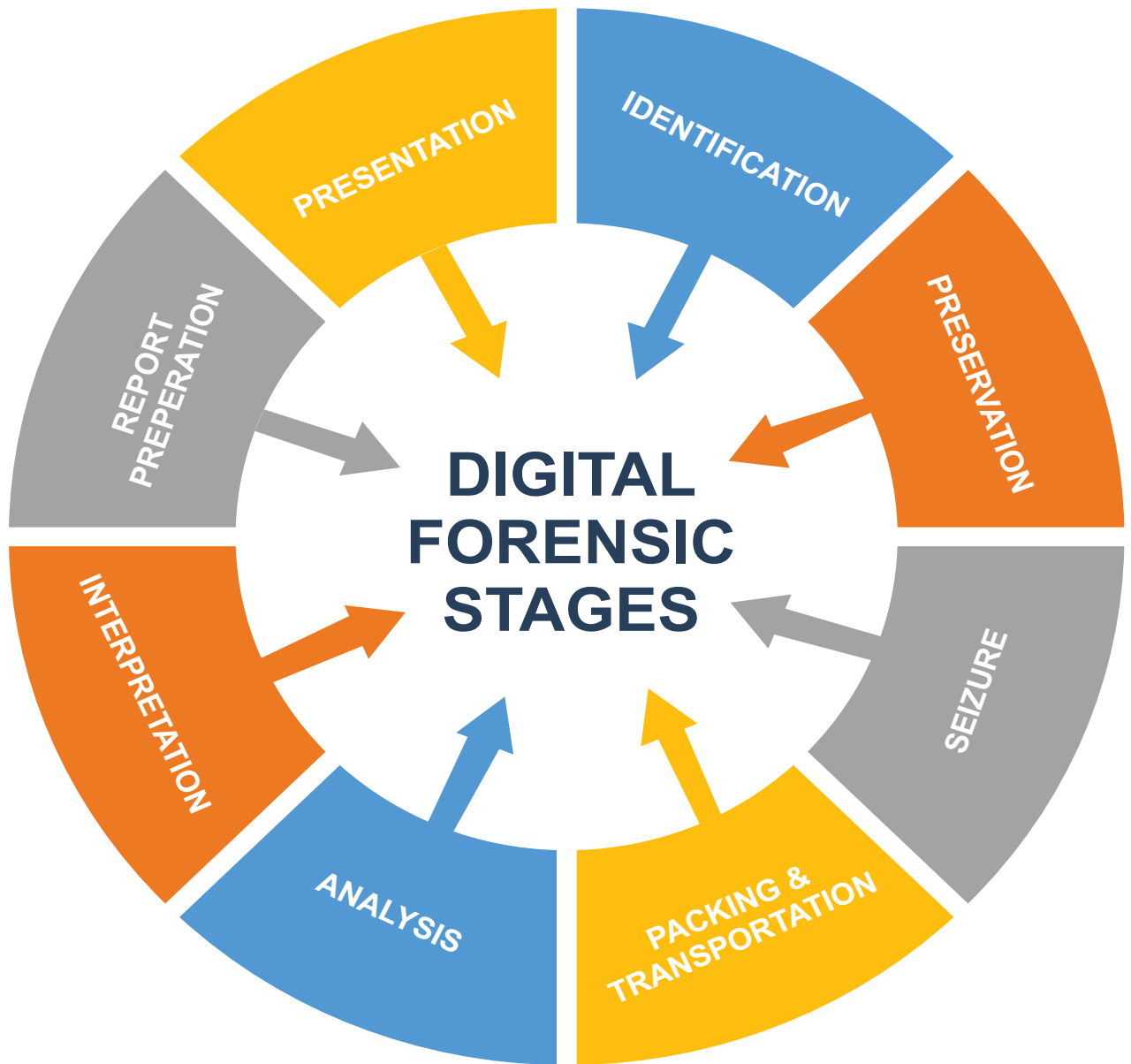
Every cybercrime incident requires



**LT COL (DR.) SANTOSH KHADSARE,**  
VP (DFIR), eSec Forte Technologies

Ciardhuáin	Henry Lee	E. Casey	DFRWS	Reith, Carr and Gunsch
Awareness				Identification
Authorisation				
Planning				Preparation
Notification				
Search/ Identification	Recognition, Identification	Recognition	Identification	
Collection	Collection and Preservation	Preservation, Collection, Documentation	Preservation, Collection	Preservation, Collection
Transport				
Storage				
Examination	Individualization	Classification, Comparison, Individualization	Examination	Examination
Hypothesis	Reconstruction	Reconstruction	Analysis	Analysis
Presentation	Reporting and Presentation		Presentation	Presentation
Proof/Defence				
Dissemination			Decision	

**Comparison of Frequently Used Procedures (Ciardhuáin, 2004)**



### Various stages involved while carrying out digital forensics analysis

investigation which can assist the law enforcement to bring perpetrators to justice. Every crime is associated with one or many digital assets which needs to be analysed. This analysis is carried out by digital forensics.

#### Understanding Digital Forensics

It is the newest branch of forensic science approximately three decades old, But the most rapidly evolving one With change in technology. Digital forensics is study of traces. An event is a result of trace modification which is

observable. Cyber forensics or digital forensics is one and the same as the terminology is being interchangeably used by different experts. The outcome of digital forensics is the report which should not only be accurate, but credible and also stand legal scrutiny.

“Digital Forensics is the use of scientifically derived and proved methods towards the of digital evidence derived from digital sources for the purpose of facilitating and furthering the reconstruction of events found to be criminal or helping to anticipate unauthorised actions

shown to be disruptive to planned actions” This was coined during first Digital Forensics Research workshop (DFRWS 2001).

In simple language digital forensics is producing digital evidence in the sound forensic manner to the court of law such that it stands legal scrutiny.

Digital forensics involves processes and procedures. Processes such as identification, reservation, collection, examination, analysis, presentation and a few more. Most commonly used procedures are those formulated by DFRWS, Henry Lee , Reith / Carr/Gunsch and Ciardhuáin.

When performing digital forensics, we try to answer the following questions

- What: are the evidence related to the case
- Why: Intent
- How: Modus Operandi
- Who / Which: Assets are involved
- Where: Location
- When: Timeline of events

### **Present Scenario of Digital Forensics**

With proliferation of the internet, cheap devices and enabling technologies, the challenges while carrying out digital forensics have increased manifold. Being niche field, skilled manpower is required for carrying out these tasks which are resource intensive. Establishing a digital forensic laboratory is a costly affair and hence only the government or big entities can afford the same.

Threat vectors are also changing with time and technology. Ransomware attacks and financial frauds are the new normal. Most of the devices which needs to be analysed are smart devices with proprietary encryption and compression techniques. Incident response teams need to be well equipped and trained to handle such kind of cyber incidents and collect evidence from the incident scene.

### **Indian Government Approach**

Under the section 70B of the Indian IT Act 2000, Indian Computer Emergency Response



Team is notified as national agency for incident response and under section 79A tot IT Act Central Government can notify any Department, body or agency of the Central Government or a State Government as an Examiner of Electronic Evidence (EEE) for the purposes of providing expert opinion on electronic form evidence before any court. Ministry of Electronics and Information Technology is running a scheme for notification of laboratories as Examiner of Electronic Evidence. Till date, eleven government laboratories have been notified and in future many more will be. There is a strong possibility that private labs also may be notified in the near future, hence the industry should be ready for the same.

### **Conclusion**

As per various global market researchers, digital forensics market is expected to grow at a compound annual growth rate of 11% to 17% by 2026 with revenue of approximate USD 10 billion. Maximum growth is to be seen in the APAC region. All these estimates are on the basis of the Government initiatives, internet penetration and the rise in the. cyber incidents.

India will be a leader in providing skilled man power in this particular niche field. With impetus building indigenous software and hardware we will shortly see the market with Indian products. The services sector in digital forensics will also see an exponential growth. Overall in the dark cloud of cybercrimes, there is a silver lining for the digital forensics field to flourish and prosper. ■

The author is VP (DFIR), eSec Forte Technologies

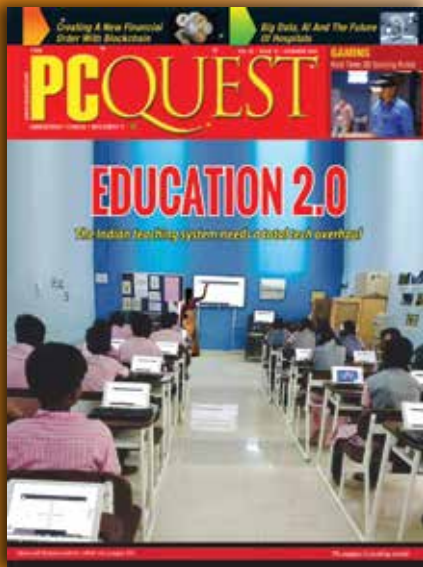
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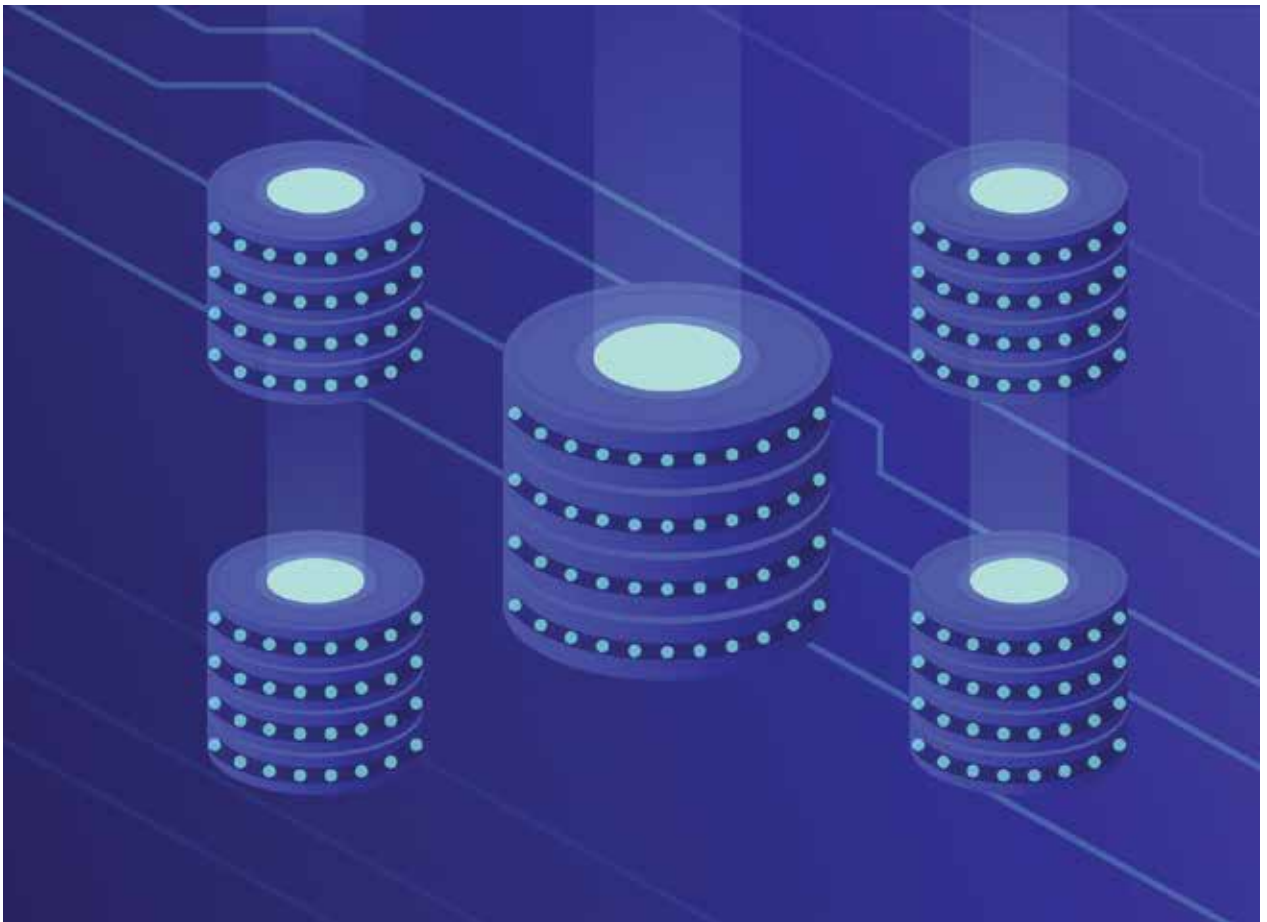
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# The steam of Open Source databases – On all cylinders, almost!

**Pratima H**

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Enterprises need to smell the coffee on what's happening in this side of the development world- with the rise of modularity, the appetite for cloud-native apps, the new needs of SMEs, the advent of Web 3.0 and more



**A**llen Terleto, Field CTO, Redis takes us through what makes open source databases relevant and handy-to-use – like less-flashy but critical enterprise-grade features, dedicated vendors and GRC policies. He also addresses many doubts around community constraints, security holes, the rise of NoSQL and web 3.0 orientation.

### What is the current scenario of adoption, scalability and developer ecosystem of Open Source databases?

When open source databases first gained prominence, the developer ecosystem was primarily dominated by self-motivated individuals that were empowered to bring their art to the world and solve new problems. At that time the ecosystem was small, since most programmers still worked directly for enterprises and hence were only approved to use a specific set of database technologies. This limited their opportunity for open source development to personal time on nights and/or weekends, which left the majority disenfranchised from the process.

Today things are very different. Enterprises have embraced open source and even promote for their employees to work on open source projects during business hours. Additionally, the viability and demand for open source databases has led to the creation of private consulting businesses for their support and product companies which add enterprise features/versions.

### So it has become better for the enterprise milieu now?

What was once perceived as a business risk for large enterprises has now evolved into an opportunity to attract top talent

▼ Enterprises were once forced to go through a prolonged procurement cycle and technology on-boarding process before any development could begin



ALLEN TERLETO, Field CTO, Redis

and a reduction in software licensing costs. By embracing the open source developer ecosystem, enterprises that invested in the right skill sets and GRC policies are today benefitting from reduced operational expenditures and are fostering a continuous learning culture.

### How strong has this segment become for new-age applications, for customization, for Cloud workloads?

Open source databases provide cloud-native and modern applications with a competitive advantage on time-to-market, community support, fail-fast innovation, and optimised operational expenditure.

Enterprises were once forced to go through a prolonged procurement cycle and technology onboarding process before any development could begin. Today, this paradigm has been completely flipped with developers empowered to seek out technology that best fits their use-cases and deploy it as a managed service with a few clicks on a button. This is a game changer in terms of innovation and business agility.

And it's not just enterprises. Potentially the largest beneficiaries of this movement are the small and medium businesses which, formerly, required too much start-up capital to deploy their innovative ideas. By leveraging the Cloud, these new start-ups could scale their operational expenditure in alignment

with their revenue growth and be prepared to hyperscale without pausing to re-platform their architecture. This combination of business value to enterprises and start-ups has rewarded Cloud Service Providers and the entire cloud-native ecosystem with explosive growth and sustainable annual recurring revenues for years to come.

### What makes any open source venture achieve enterprise-grade functionality?

The common misconception about open source projects is that the aggregate strength and ingenuity of the community will ultimately drive product maturity and deliver on the features required for mission-critical deployments. While the community does provide innovative new ideas, valuable code contributions, and invaluable QA resources; it still requires strong project leadership to curate and drive the democratic process towards a unified vision. For Redis, this project leader and visionary was Salvatore Sanfilippo.

With that said, even with strong leadership the majority of successful open source projects required at least one dedicated product company for investment towards less-flashy however critical enterprise-grade features. Dedicated vendors additionally provide contract-based SLA assurances on the maintenance and support of these features which mitigates the risks of using the open source project in a production environment.

### How can decentralised databases, Blockchains affect this industry?

The headwinds of globalisation and decentralisation of capital resources has influenced the need for democratisation of data. If “data is the new oil” then similarly its value is derived by its owner. However, unlike oil, data is not as easily restricted by physical constraints. Therefore its decentralisation can give power to the many instead of the few and provide assurances that there is no one arbiter of its veracity.

As a consequence, decentralised databases and blockchain technologies stand to disrupt the legacy monolithic database market since its inherent properties were developed during, and for, a generation constrained by physical limitations. While the sun hasn't set on mainframes, and other monoliths, the demand and trend towards decentralisation bodes well for distributed cloud-native databases.

### Would Open Source databases be ready to evolve for Web3 applications?

Absolutely. Similar to the dot.com era when the internet became mainstream, Web3 will be a catalyst for a new generation of open source distributed databases. This doesn't necessarily mean that today's databases will go away, however as we have seen throughout the cloud-native movement many databases will be forced to evolve in order to maintain their relevance once the earth begins to shift beneath their digital feet.

▼ Although relational databases are not going away, architectures that rely on one, or only a couple, monoliths are rapidly becoming a relic of the past.

### What's the outlook for this market - would it be chiefly divided among PostgreSQL, Cassandra, MySQL and NoSQL? What is the traction and future of NoSQL?

Modern applications are predominantly moving towards modularity and in many cases physical isolation of their architectural stack i.e. microservice architectures. A recent IDC InfoBrief, “The Impact of Application Modernization on the Data Layer”, found that 89 per cent of respondents are already using microservices and 84 per cent of them are using NoSQL databases. This momentum is driven by the competitive advantage of increased business agility and a higher propensity to deploy on the Cloud. Although relational databases are not going away, architectures that rely on one, or only a couple, monoliths are rapidly becoming a relic of the past.

This bodes very well for the NoSQL market since developers are empowered to influence the choice of which database is best suited for their microservice/application's needs.

Therefore as we progress towards a digital-economy, new-age NoSQL databases, like Redis, that prioritise ease of use and performance, will continue to see their popularity accelerate.

Most popular NoSQL databases are open source however with so many options in today's market, once popular early entrants such as Cassandra and HBase are experiencing a decline in adoption. With the only constant being change, we cannot know for sure which NoSQL database will eventually be a mainstay however it's safe to assume that those with the highest name-brand association to major categories (i.e. MongoDB, Redis, Kafka) will remain de facto standards across architectures for at least a decade.

**Are Open Source databases more vulnerable to security worries? How serious are concerns around vulnerabilities specific to open-source databases - as seen with a peak of 91,200 instances in Q1 2022 - With Redis, MondoDB and Elastic dominating these exposed instances?**

With regards to unauthorised data access, the majority of fraud continues to be social engineering and misconfiguration by users; however, this does not mean that security should be treated as a second-class citizen within open source projects. A great example of this is the recent log4j vulnerability which exposed a myriad of enterprises to nefarious

▼ Security should be treated as a second-class citizen within open source projects

actors.

The solution to reducing risk is a shared responsibility model around security, constant education for developers on its importance, and proper GRC policies focused on open source software deployment. This means that a trust-but-verify relationship must always exist between users and open source project maintainers including vendor-backed proprietary extensions. Furthermore, even in a Managed Service deployment, keen awareness of proper configurations and best practices must be exhibited to reduce the risk of unauthorised access by both external and internal bad actors.

**What next in this world is exciting for you - any peek into your future portfolio or plans?**

We expect enterprises will continue to progress in their cloud journeys and as a consequence come to the conclusion that they do not want to be coupled to any one Cloud Service Provider (CSP). This will escalate the need for platform-agnostic and cloud-native databases to not only be supported on every Cloud but also available across CSP marketplaces and even as 1st party partner-led native services. To this end we are constantly investing in our customer's availability to consume Redis Enterprise on any Cloud, Hybrid, PaaS, on-premises, and everywhere in between.

We are also investing towards supporting the ever-evolving

AI/ML market with innovations around online feature-store, vector-similarity-search, and partnerships with innovators across the space so Redis' in-memory real-time performance is available ubiquitously. ■



# Open-Source model: The right prescription for curing data duplication?

Pratima H

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Interoperable, opensource and modular approaches can help a lot when the challenges of healthcare hinge on the ability to swiftly, smoothly and safely manage a lot of data. Here's an X-Ray

**N**on-communicable diseases (NCDs) such as diabetes and hypertension are a serious concern. In fact, according to an ASSOCHAM report, over two-thirds of individuals suffering from NCDs are in the most productive-life age groups-between 26 and 59 years. What's worrisome is that the burden of NCDs on India is long-lasting given-with 65 per cent of the country's population in the below 35 years age-bracket. Can access to data help in making

informed decisions and preventing the rise in cases?

**Mallari Kulkarni - Head, Digital LifeCare, Dell Technologies** has some interesting prognosis here as he explains about Digital LifeCare, based on an open-source platform, that aims to aid healthcare staff in population enumeration and risk assessments, screenings and follow-ups, and the management of simple and complex NCD cases, while administrative officials can manage users and track performance.

### ▼ What triggered this idea—any reference points, any goalposts that you can share here?

At Dell Technologies, we create technologies that drive human progress. As part of our moonshot goals for 2030, Dell aims to transform lives by advancing technology opportunities in health, education, and economics for 1 billion people, globally.

Digital LifeCare is a flagship digital inclusion initiative of Dell Technologies, developed to help India address the rising burden of non-communicable diseases (NCDs), such as hypertension, diabetes, oral, breast and cervical cancers, at population scale. NCDs in India have witnessed a rising trend, with 1 out of 5 persons suffering from an NCD, thus becoming a key focus of improvement for the government. In 2018, the platform was integrated with the Ministry of Health and Family Welfare's national NCD program and its comprehensive primary healthcare IT system.

### ▼ How does it work?

Built as a suite of mobile, cloud and analytics applications, Digital LifeCare collectively provides a unified view of patients over time, across all levels of care, through seamless and secure data-sharing. Effectively, the technology platform assists our healthcare community in the delivery of preventive and curative NCD services. Today, our team at Digital LifeCare along with Tata Trusts works with government, research and academic partners in the healthcare ecosystem to continue to address these issues by digitally transforming healthcare. Tata Trusts has enhanced program design for specific segments (or geographies), driven capacity building of the large workforce on ground and monitored efficacy for the NCD program that has been deployed at scale in the country.

### ▼ Why is there a focus on interoperability and data sharing in this initiative?

Manual data collection and the use of portals to report aggregate data on NCDs has often led to challenges such as poor quality and duplication of data. To address this problem, Digital LifeCare has been built with 'plug and play' architecture and designed to be interoperable, using open source, modular, scalable and secure technology that allows varied users to engage with patients,



**MALLARI KULKARNI**, Head, Digital LifeCare, Dell Technologies

capture data and deliver assessments with regard to patient care. It features distributed data warehouse and analytics capabilities to provide data driven actionable intelligence to Center, State and District officials to make timely policy decisions for running the program effectively. Integrating interoperability not only helps to expand coverage and continuity of NCD services but also plays a key role in the growth of the country's healthcare landscape.

### ▼ How do you navigate the associated security and privacy aspects here?

The Indian government is the custodian of all data that moves on broader CPHC (Comprehensive Primary Healthcare) NCD IT System program, which is built upon the Digital LifeCare platform. The data from the digital platform is hosted in the government's cloud that follows all security guidelines as per the Ministry of Electronics and Information Technology (MeitY), and is built with 'privacy by design' principle, strong user authentication mechanisms and granular role-based data access. Since the data center is managed as a government of India IT unit, the security and data privacy aspects have been well managed.

### ▼ Any specific advantages that have come through the use of design thinking?

Collaborative design thinking has been vital to Digital LifeCare's rapid adoption across India. The process of designing this solution has been deep, engaging and insightful, and has led to good usage and acceptance across the country. We have adopted the standard design thinking model of Dell Technologies with some customization for the public health context in India. There are three key elements of design thinking that we employed, which has proven beneficial to us.

First: Empathy and user-centric design. Dell and Tata Trusts teams spend time with the health workers (ASHAs, ANMs), Medical officers and program co-coordinators through regular field visits every month to gain a deep understanding of the public health systems and the local context of the end users that we are designing the platform for. Second: Research and deep collaboration. We have regular focused discussions with clinical and public health experts from institutions like AIIMS, ICMR and NICPR and policymakers and domain experts in organizations like NHSRC, WHO and the NCD division at MoHFW at least once a month. Post each discussion, we conceptualize the solution, validate it with state deployment teams and then present it back to the experts with additional findings. And third: Rapid build, validate, iterate loops. The approach has always been to start small, deploy it, understand the adoption and then continue to evolve the feature/solution, engaging in rapid course correction.

### ▼ Leveraging Open Source—what it brings and what is the flip side, as experienced so far?

The adoption of open-source technology can help in developing a robust healthcare ecosystem in the country by providing the sector with flexibility and scalability, and at the same time, bringing down the cost of IT infrastructure for healthcare companies, making it more accessible.

More importantly, open-source technologies can provide access to business intelligence, as a result of which, actionable insights play a key role in facilitating consistent patient care – which is the ultimate objective. The technology eliminates errors and enables more active treatment. Open Source accelerates faster development and increases ownership. For few business problems, use of Open-Source technologies requires extra

effort initially and time to market may be longer. But, in the long run, it reduces maintenance cost as the skills required are easily available in market.

It aids healthcare staff in population enumeration and risk assessments, screenings and follow-ups, and the management of simple and complex NCD cases, while administrative officials can manage users

and track performance.

### ▼ Does India face an ecosystem gap on healthcare—when we look at the quality/accuracy of devices, the lack of integration among various bodies, the issues with telemedicine, and the problem of fragmentation of data?

Over the years, the Indian government has put in place various concrete measures to build a comprehensive healthcare system. The Ayushman Bharat Digital Mission (ABDM) is a great example, which aims to build the infrastructure required to support the country's integrated digital health infrastructure and bridge existing gaps between different stakeholders via digital highways. Furthermore, through the Health and Wellness Centers established under this mission, the government has done an outstanding job of ensuring that citizens can reach a specific facility in the shortest amount of time. This has also resulted in less overcrowding, making it easier for healthcare workers to treat patients. In my view, the government has made significant strides in ensuring that health records have standardization, accuracy, and interoperability. As the ABDM evolves, it will ensure faster delivery of healthcare services while also enabling data-driven policy making. ■

▼ For few business problems, use of open-source technologies requires extra effort initially and time to market may be longer. But, in the long run, it reduces maintenance cost as the skills required are easily available in market.

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# EPSON PICTUREMATE PM-520

PHOTO PRINTER

Price: ₹ 17,799

In the current digital world, we capture hundreds or even more photos and memories and store them digitally. Photo printing is a kind of old-school fashion that has gone still the printed photos have their own charm. But no one wants to take the picture to the studio to get a printed copy. Having a portable and easy-to-connect printer could be the solution. Epson brings PictureMate PM-520 that can connect wirelessly to print photos instantly.

## ▼ Portability

We have seen printers of different types, but the PictureMate is entirely different. It's a small and portable photo printer that you can carry along when traveling. It comes with a carry handle and a built-in rechargeable battery, enabling you to print photos anywhere, anytime. Its not a regular photo printer and can't print on regular A4-sized paper, it's a photo printer with a limited paper size of 5 x 7 inches.

Having a typical printer design, the input tray is at the back whereas the output tray is at the front. You can fold these trays when not in use. The control panel has a 2.7-inch LCD display with a few buttons for navigation, and power among others. The USB port is at the front along with two LED indicators. It has an SD card slot on the side of the printer. The USB port also supports PictBridge, enabling you to connect compatible cameras to it using a cable and print out your photos. It comes with two detachable dirt containers, one just collects the dirt, and another one also functions as a mop. The mop container has two parts, one to collect dirt and another to fill water and cleaning agents. The dust box has a 600 ml capacity and the mop has a water tank capacity of 370 ml. When the dust box is filled you can detach it from the Dustor and clear it easily by opening it.

## ▼ Smart connectivity and app

PM-520 has built-in Wi-Fi and supports various



Overall: **8/10**

## SCORE

PRICE: **7/10**  
PERFORMANCE: **9/10**  
FEATURES: **8/10**

## KEY SPECS

On-demand inkjet (Piezoelectric) Print Method; 5,760 x 1,440 dpi Maximum Print Resolution; 6.9cm (2.7") LCD screen; 5X7 inches Maximum Paper Size; USB 2.0; Wi-Fi IEEE 802.11b/g/n, Wi-Fi Direct

## PROS:

Multiple connectivities; Print Quality

## CONS:

Longer print time

wireless printing technologies such as Wi-Fi Direct, Apple AirPrint, Google Cloud Print, and Epson's own Connect. Meaning you can also print directly from your smartphone as well. Using the Epson smartphone apps – Epson iPrint and Epson Creative Print (available on both Android and iOS) one can trigger the print process directly from the phone. The app lets you set printing quality, specific paper size, and type, and set other printer parameters before firing off a print.

## ▼ Performance

The PictureMate printer boasts piezoelectric tech that piezoelectric tech to print out sharp, vibrant-looking images. We printed a bunch of photos using different print settings and the print quality of all the images was impressive. All the photos come with clarity and sharpness. The print speed is a bit slow, which can take over a minute or more depending on your chosen print quality.

**Bottomline:** Epson PictureMate PM-520 isn't a regular printer so before you plan to buy this, be very sure. It is designed to perform photo printing nothing else. It brings portability and flexibility along with the highest quality print but it isn't for everyone. It might be a good investment if you prefer printing photos quite frequently.



**VACUUM CLEANER**

# DUSTOR BOT X PRO ROBOT- IC CLEANER

Price: ₹ 31,990

It all began with manufacturing, where robots replaced humans for many operations, but now they are ready to change our lives as well. Robot vacuum cleaners are not new to the industry, but they have got new capabilities and skills. The next-gen robots are smart to make our lives easy.

Dustor, a Mumbai-based company, introduced BOT X Pro vacuum cleaner with IoT capabilities. Previously we reviewed iRobot Roomba i7+, this time we got Dustor BOT which is affordable and offers almost similar functionalities but what about performance, let's find out.

## ▼ Build and features

This is a round design robot that looks similar to iRobot Roomba. Carrying weight of around 3 KG, this portable vacuum cleaner is easy to move. Its round design gives it advantage to reach out to corners easily. The entire body is made out of solid plastic, the top features a glossy finish that is prone to dirt, fingerprint and smudges.

It comes with two detachable dirt containers, one just collects the dirt, and another one also functions as a mop. The mop container has two parts, one to collect dirt and another to fill water and cleaning agents. The dust box has a 600 ml capacity and the mop has a water tank capacity of 370 ml. When the dust box is filled you can detach it from the Dustor and clear it easily by opening it. The mop container can't be open, though you can clean that with little struggle. You get two detachable containers, a mop cloth and brushes along with the Dustor. The centre vacuum roller is also detachable this helps to clean the roller.

It has a compact charging dock, but like Roomba, it doesn't suck out the dirt. It is just a charging station where our robot takes rest. Being compact is good but this also creates a problem for the BOT X Pro, it moves easily from



Overall: **10/10**

## SCORE

PRICE: **10/10**

PERFORMANCE: **9/10**

FEATURES: **10/10**

### KEY SPECS

Li-ion 2600mAh battery; Hepa Filter; Slim - only 9.8cm; Wireless 802.11 g/b/n; Voice Alert; LDS (Lidar) Navigation; Up to 2880pa Suction Power

### PROS:

Different control options – App, Remote; Accurate floor mapping; Sweeping and mopping function; Various cleaning modes; Detachable cleaning parts

### CONS:

The top panel prone is to smudges and dirt; A bit noisy when using max vacuum efficiency

the spot when the vacuum cleaner tries to find its way back to dock.

## ▼ Setup

Setting up the device is fairly easy; you just need to plug in the charging dock. Then you need to attach the dust container and side brushes. After that place the robot to the charging dock and it will take around five hours to be fully charged. On top of the robot, there are two buttons – Power/clean and home/charging dock.

On the side, you get a switch to power on the device, then you can press the power button that will activate the device to start cleaning. Once done, the robot gets back to the charging station automatically. In case you want to stop in between then press the home button, and the

Dustor would stop cleaning and get back to the dock.

Press and hold the power button to activate the wi-fi, install WeBack app on your phone/tablet, and follow the instructions to set up the device to your wi-fi network. The only restriction is that it supports 2.5 GHz wireless connectivity. Once wireless connectivity is done you can, schedule the cleaning time, check the cleaning area (how the device sees your house, a kind of map), you can adjust the mop water level, define a specific cleaning location, zone, etc. The App also shows the cleaning time, area and battery level of the device. It also gets two buttons for cleaning and a charging station.

You get a remote along with the device that comes with different action buttons to sweep and clean. You can activate pre-set modes, or can manage the robot manually, helpful if you want to clean a specific area. The remote also lets you schedule a cleaning time.

### ▼ Performance

Once setup is over, the vacuum cleaner is ready to clean your home or office. You can set up schedules to kick start the cleaning or mopping any a particular time when you are not at home, for instance, you can pick a schedule of early morning when you go for a walk, till the time you are home, BOT X Pro will clean your place. The slim robot has a height of 9.8 cm plus a hood holding a LIDAR sensor, meaning it can clean under your table or bed if the gap is more than 11 cm. It was able to go under the bed but stuck under the TV unit.

The app enhances the functionality, in case it is stuck inside the bed, using the app you can locate it easily. Definitely, it won't go under any furniture which is less than the required height, but sometimes when it tries to suck some bigger objects and is unable to, the robot stops there. In that situation, you can use the app to track it and then remote to take it out manually.

Now, the core functionality – sweeping and

mopping. The Dustor did better than Roomba because it has dual brushes, on both sides, and it can capture a wider area. Both brushes are easy to detach, so in case it is stuck with any thread, hair, etc. you can easily remove and clean it. The same goes with the centre vacuum roller, easy to detach and clean.

The floor cleaning performance is somehow similar to Roomba which had two rollers moving at the inner core, made of rubber and Dustor has one roller combining rubber grip and brush. Roomba was better in suck even some large objects, here BOT X Pro majorly failed. It efficiently sucks dirt particles and other small objects, but with paper or wrapper, it is hit or miss.

When it comes to mopping, Roomba doesn't have that functionality. With BOT you need to just change the dust container, you can fill plain water or can mix floor cleaning liquid. All the functions are the same, it will keep sucking dirt and other things, just the mop function would spray the liquid on the mopping cloth. The cloth touches the floor gently to get the mopping done.

It is good for mopping, though if your floor has some footprints or other marks of any spilt liquid, might it won't be able to clean them. May manual function help you there, push the BOT to go again and again at the same place to clean. Also while using the max water you can see water marks at the end, with medium marks are fairly less and with low, you hardly find any marks.

The LIDAR sensor helps Dustor BOT X Pro to map the house thoroughly, even though it is capable of detecting the positions of furniture, doors and other large objects accurately. BOT cleans the floor and sides efficiently, but the corners are still a miss. The two brushes tried to capture the maximum carpet area, but due to the round design corners are hard to clean. It's not so silent robot, yet negligible when you get used to it, but while using the max suction power, it's noisy. The battery delivers decent life of 1 hour and 50 mins, and a floor area of around 1000 square feet can be cleaned in one charge. ■



**Bottomline:** Dustor BOT X Pro is overall a better robot for home cleaning compared to Roomba. Having remote and mopping functions, it gains an edge over other rivals. This BOT can be operated by anyone at home or office, child and the elderly who are not too tech-savvy. Apart from some large objects, it delivers excellent cleaning plus mopping function making it a better choice. Moreover, it is fairly low priced compared to Roomba.



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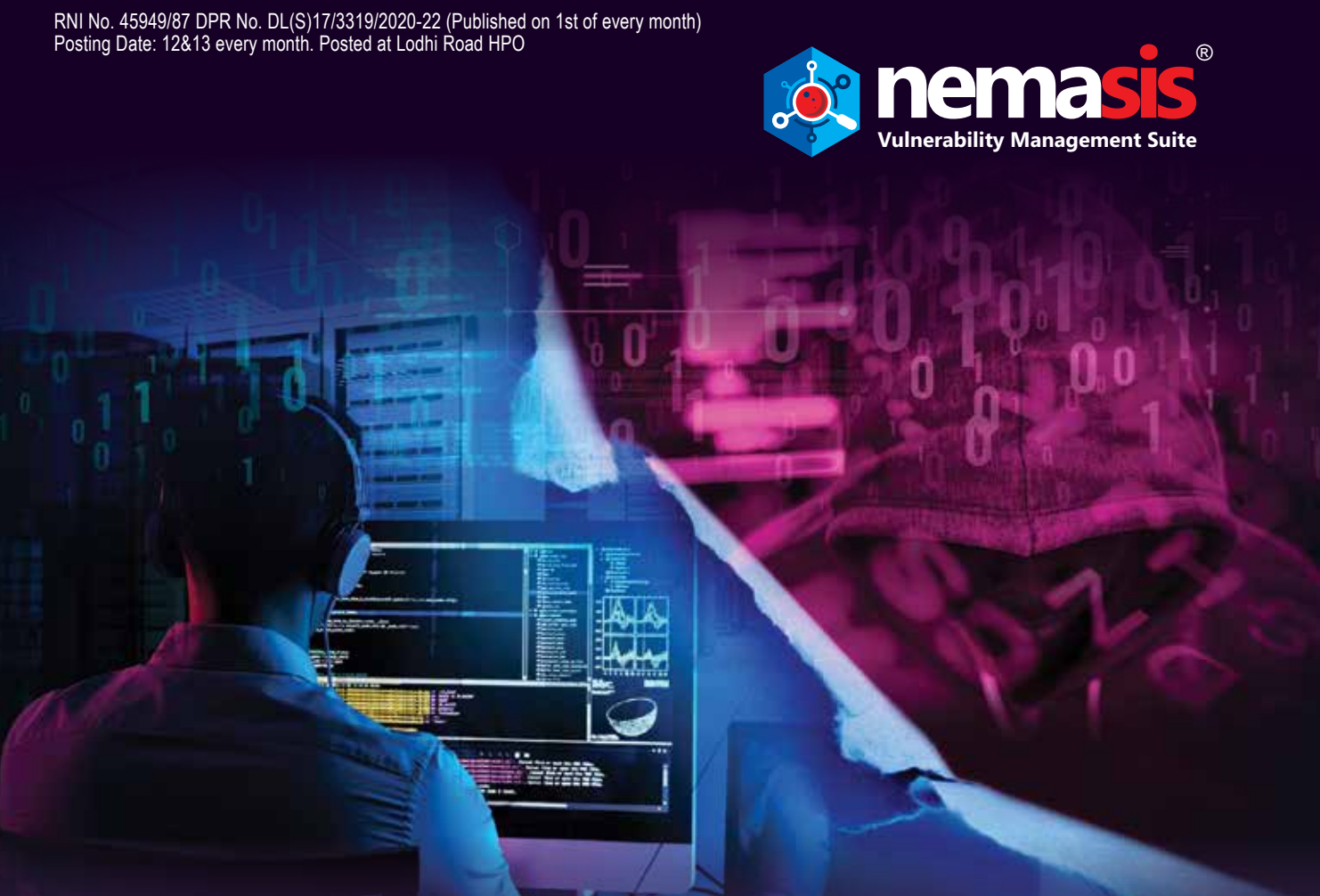


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