

## News

Dr Jeff Drobman

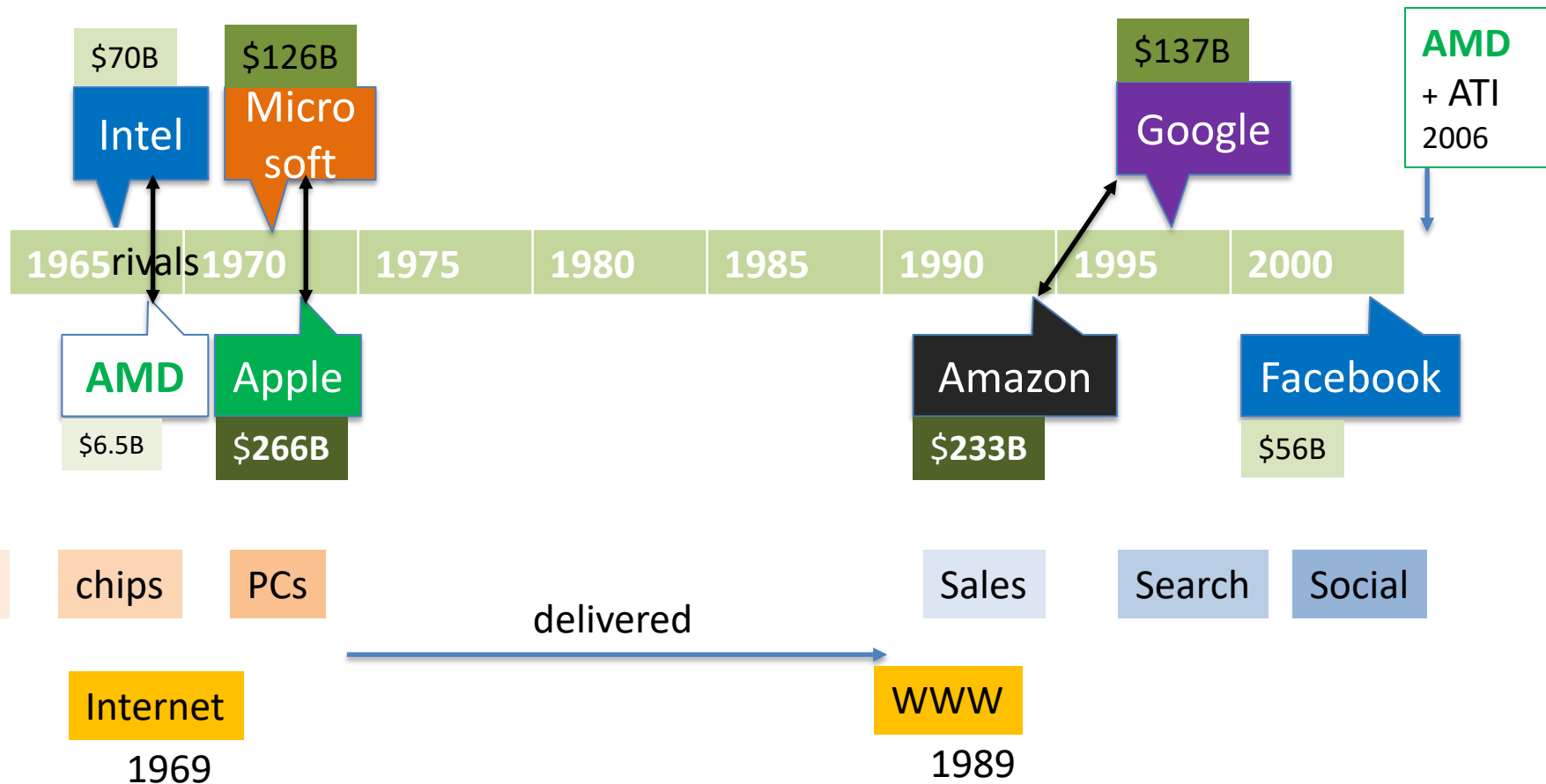
UCLA BS, MS, PhD

email → [jeffrey.drobman@csun.edu](mailto:jeffrey.drobman@csun.edu)

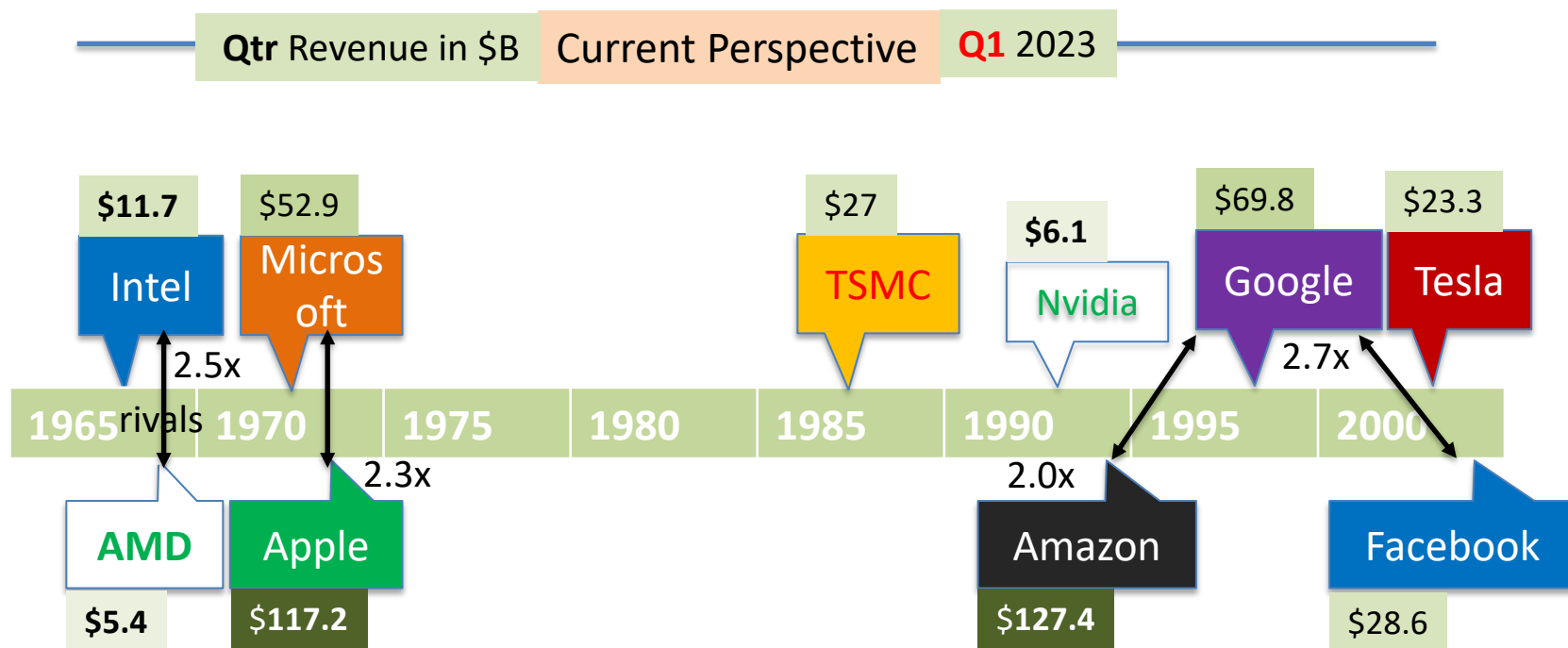
website → [drjeffsoftware.com/classroom.html](http://drjeffsoftware.com/classroom.html)

# Tech Titan Timeline

## Historical Perspective



# Tech Titan Timeline



## ❖ Other Industrials

- ❑ GM \$40.0 → 2x Tesla
- ❑ Ford \$39.1
- ❑ AT&T \$30.1
- ❑ IBM \$16.7 → ~Intel
- ❑ QCOM \$9.3
- ❑ TI \$4.2
- ❑ NXPI \$3.3

## ❖ Other Services

- ❑ Netflix \$8.2
- ❑ Visa \$7.9
- ❑ PayPal \$7.4

# Stock Prices 2020





# Section

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# Intel News

# Intel 2Q23 Results

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1Q23 Revenue = **\$12.9B** on **13 cents**/shr

1Q23 Revenue = **\$11.7B** on **-66 cents LOSS**/shr

4Q22 Revenue = **\$14.0B** on only **10 cents**/shr

3Q=> **\$15.3B** on **59 cents**/shr

# Intel New German Fabs

6-20-23

## Intel Signs Deal With **Germany** for Expanded Investment in Wafer Fabrication Site; Will Reportedly Get **\$10.9 Billion** Subsidy

5:36 AM ET, **06/20/2023** - MT Newswires05:36 AM EDT, 06/20/2023 (MT Newswires) -- Intel (INTC) said Monday it has entered into an agreement with the German federal government to expand the scope of the company's wafer fabrication project in the city of **Magdeburg**.

The investment, which is now expected to be more than 30 billion euros (**\$32.79 billion**), covers the establishment of **two** semiconductor facilities, with the first facility anticipated to start production in **four to five years** following European Commission approval of the associated incentive package, the chipmaker said.

The company and the German government have struck a deal for Intel to receive a larger subsidy package worth approximately 10 billion euros (\$10.9 billion) for a semiconductor facility, Bloomberg reported, citing people familiar with the deal.

The company said it expects the site to support **3,000** permanent high-tech workers.

# Intel 4Q22 Results

Intel CEO Pat Gelsinger

Intel 4Q22 Results" On Intel 20A and Intel 18A, the first nodes to benefit from **RibbonFETs** and **PowerVia**, internal test chips and those of a major potential foundry customer have taped out with the silicon running in the fab. We continue to be on track to regain transistor performance and power performance leadership by **2025**."

"Additionally, we continue to make progress on Intel **18A**, and I've already shared the engineering release of PDK0.5 with our lead customers and expect to have the **final production release in the next few weeks**."

"We will, one, deliver on **five nodes in four years**, achieving process performance **parity in 2024** and unquestioned **leadership by 2025** with Intel 18A.... and four, expand our **IFS** customer base to include large design wins on Intel 16, Intel 3 and 18A this year."

"**IFS** achieved record quarterly revenue of \$319 million, up 87% sequentially and 30% year-over-year on increased **automotive** shipments."

1Q23 Foundry revenue declined to only **\$118M**

# Intel at TSMC

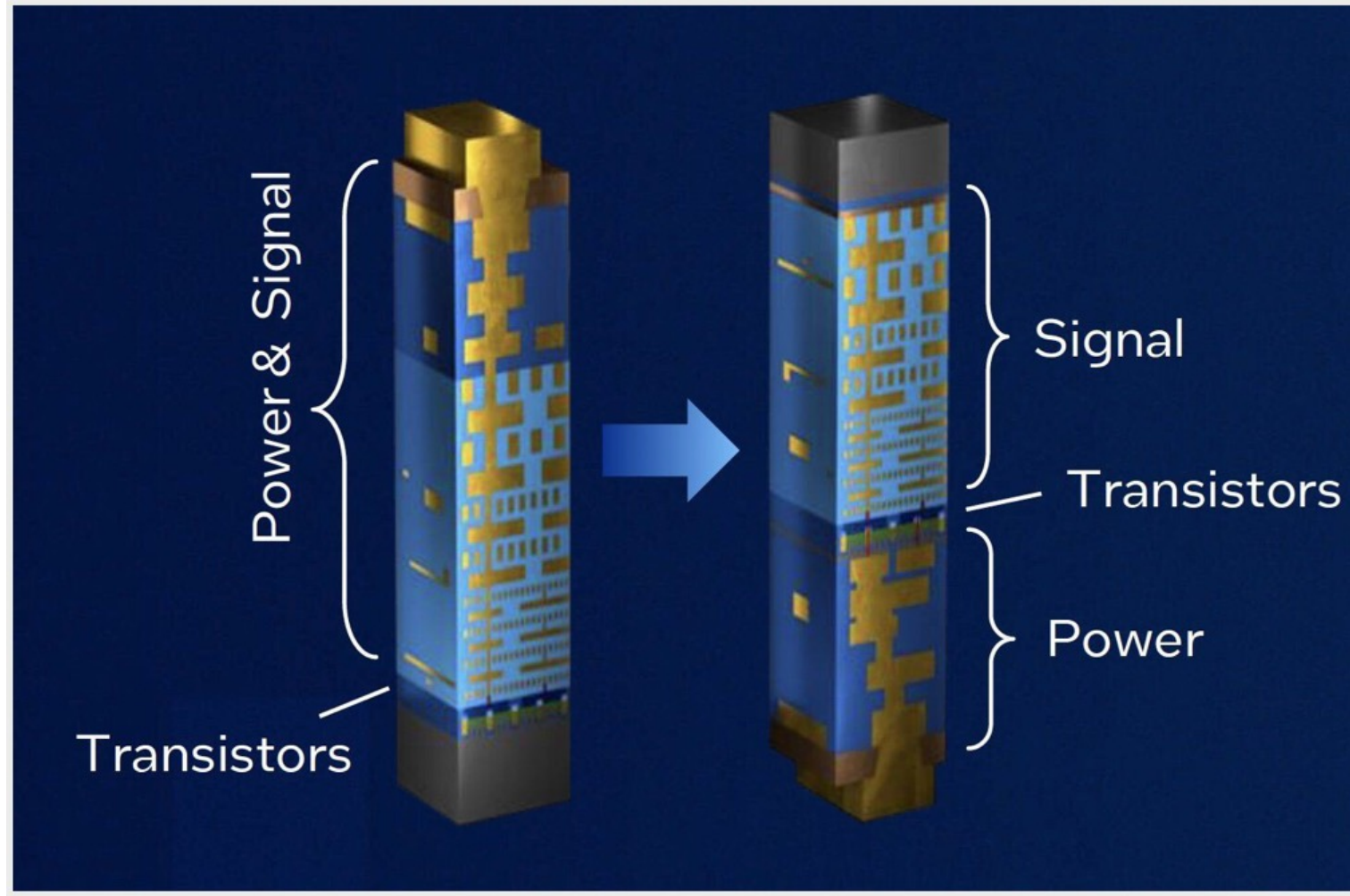
Intel podcast

Gelsinger Fires back at **Intel 3** and **TSMC N3** delay rumors, **Arrow Lake** on 20A on track for **2024**

"The **3nm** programs are on track, both that with **TSMC** as well as our **internal Intel 3** programs Granite Rapids and Sierra Forest in particular," [said](#) Gelsinger at the company's Intel Capital Allocation Update conference call. "I am somewhat amazed by some of these rumor mill discussions that come out. You might notice there were similar ones on **Intel 4** a few months ago, and also with some of our other **TSMC** programs, which were patently false at the time as well."

# Intel iPower

June 2023



# Intel Backside Power

Success would put Intel ahead of TSMC and Samsung, in offering both nanosheet transistors and back-side power. Samsung has already moved to a gate-all-around device, and it's unclear when it will integrate back-side power. TSMC is scheduled to offer gate-all-around devices in 2025, but it won't be adding back-side power delivery until at least 2026.

# Intel Tiger Lake



- ❖ Improved transistor design *SuperFin*

Intel's Tiger Lake processors are still scheduled for launch before the end of 2020. Some laptops manufacturers, such as [Acer, have already promised](#) 11th-gen Tiger Lake laptops before 2021 as well.

Intel has an event scheduled on September 2, where the [company is rumored](#) to provide more details on specific Tiger Lake chips, including some concrete performance data and specific information on the processor lineup.

Ice Lake → Tiger Lake



# Intel Tiger Lake



14nm → 10nm

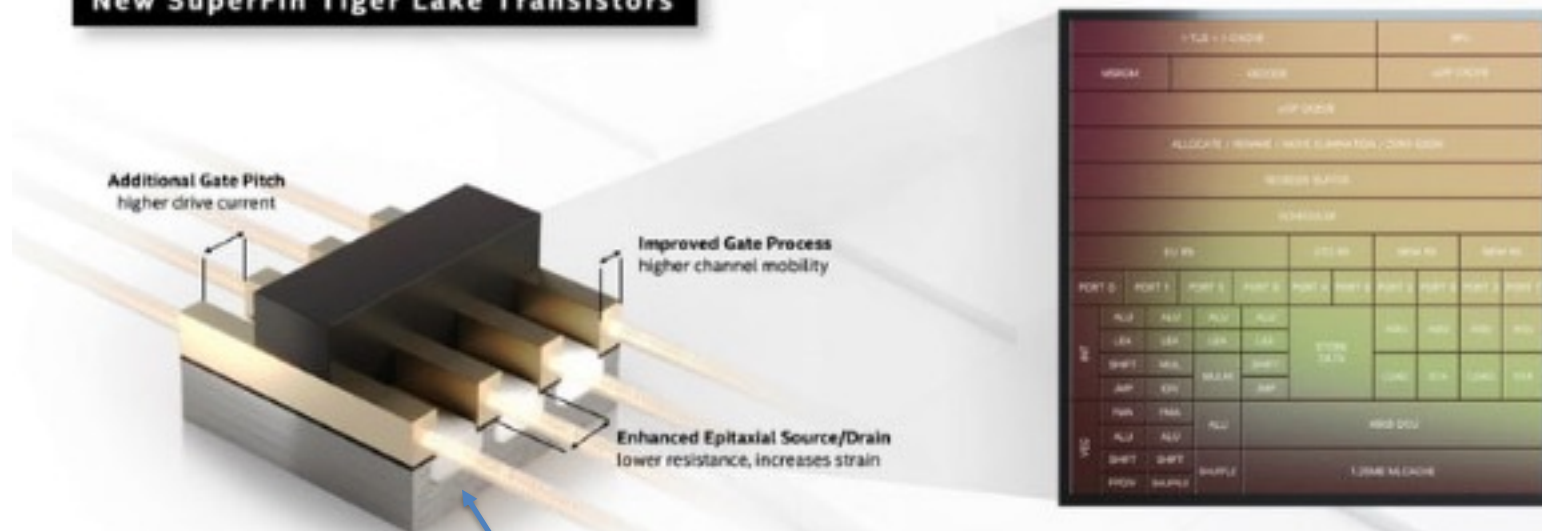
End of 2020

❖ Improved transistor design *SuperFin*

## New High-Performance Transistor

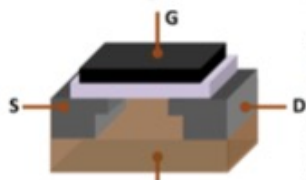
Innovation across the entire process stack, from channel to interconnects

### New SuperFin Tiger Lake Transistors



Under embargo until August 13th, 2020 at 6:00 a.m. Pacific Time.

Architecture Day 2020



# Intel Tiger Lake



digitaltrends®

14nm → 10nm

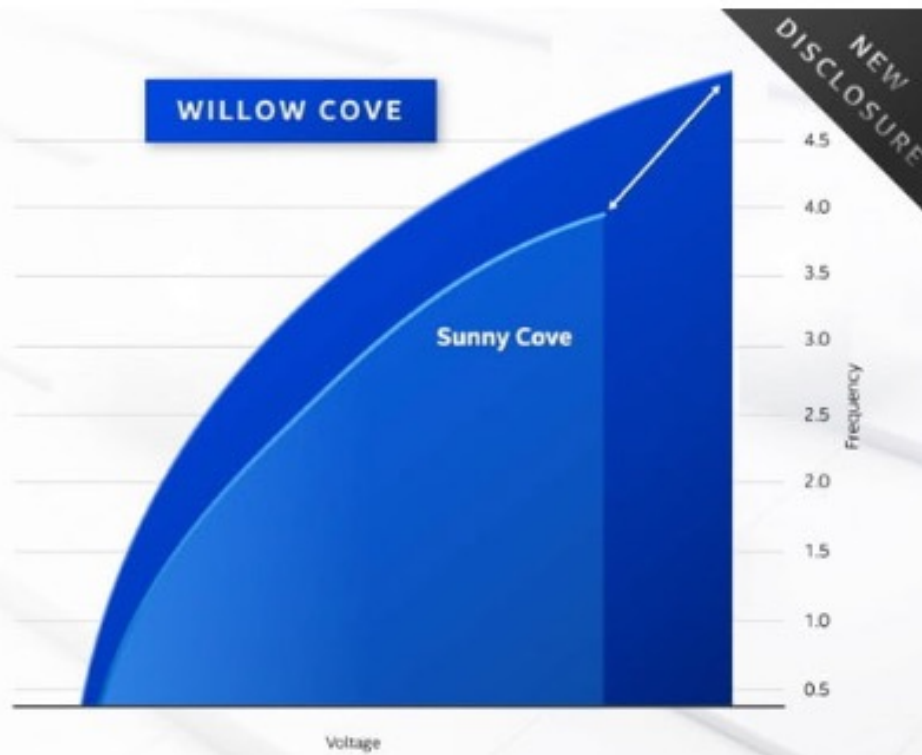
End of 2020

❖ Improved transistor design *SuperFin*

Higher frequencies with Willow Cove

## The Result

Greater Dynamic Range



TECHNOLOGY  
PILLARS

Under embargo until August 13th, 2020 at 6:00 a.m. Pacific Time.

Architecture Day 2020

# Intel Tiger Lake



14nm → 10nm

End of 2020

❖ Improved GPU – Xe graphics

## Xe graphics finally launch

The most exciting of the upgrades coming to Tiger Lake, by far, arrive in the graphics department. It's the first to use Intel's Xe GPUs, which promise a huge improvement to graphics, ranging from integrated graphics all the way up to the data center.

Tiger Lake graphics build on what was already a massive improvement in Ice Lake. Intel's integrated Gen11 "Iris Plus" graphics were offered in 10th-generation Ice Lake laptops, which doubled the performance of the terrible Intel UHD integrated graphics of yesteryear.

# Intel Tiger Lake



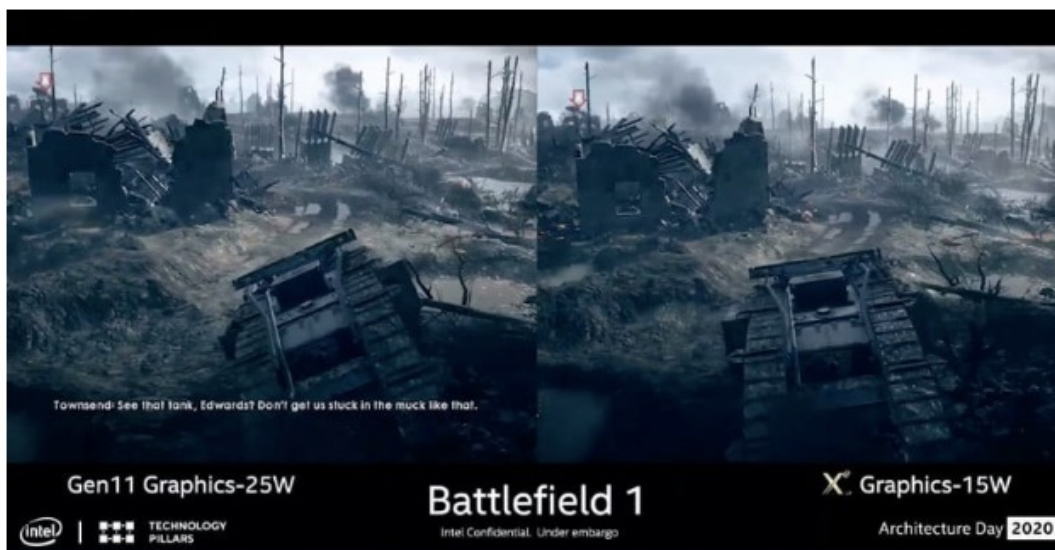
14nm → 10nm

End of 2020

## ❖ Improved GPU – Xe graphics

Tiger Lake takes it a step further, bumping up the number of EUs (execution units) from 64 up to 96. Intel emphasized the ability of these graphics even in restricted form factors, as low as 15 watts, which is the standard size for many 13-inch laptops. In *Battlefield 1*, the company showed how a 15-watt Tiger Lake system had smoother gameplay than a 25-watt Ice Lake system.

15-25W !



This increase in performance won't transform your laptop into a full-fledged gaming laptop — not by any means. But it looks to be a meaningful boost in frame rates, especially while playing games at low-quality settings (in 1080p, of course). Intel showed a number of games playing on Tiger Lake integrated graphics, including [Doom Eternal](#), *Battlefield V*, and *PlayerUnknown's Battlegrounds*. Intel



- Intel news:

- [The New York Times](#) reported that technology setbacks from Intel delayed the production of the Argonne National Laboratory Aurora supercomputer, which was originally predicted to be installed in facilities near Chicago in 2021.
- Intel director of quantum hardware, Jim Clarke, [discussed](#) the company's plans for the future of quantum computing.
- [Tom's Hardware](#) reported a [leak](#) related to the upcoming Intel Core i7-1185G7, highlighting that the iGPU clocks up to 1.55 GHz, which is 36.3% faster than the Core i7-1065G7 that it will replace. The article also included leaked [Geekbench 5 benchmarks](#) for the Core i5-1135G7, which has a 2.4 GHz base clock and 4.19 GHz boost clock.
- [VideoCardz](#) reported that press received another package from Intel this week about the Tiger Lake launch next week. The package included a JBL headset, another invitation to the September 2 event and a teaser for new branding, as posted on Twitter by Wccftech's [Hassan Mujtaba](#).

## **Longtime Intel chairman Andy Bryant, near the end of four-decade career, says 'We have to take more risks'**

Fascinating article in the Oregonian (Intel is Oregon's largest employer) about attempting to correct the excesses of Grove's personality and choosing Intel's new leadership. This is a "subscriber only" article, but everyone gets one freeby.

Bryant recalled one of his last, in-person meeting with Intel engineers before the pandemic hit last spring. Intel's next-generation development team was discussing its plan to catch up technologically. And while the group's leader (whom Bryant would not name) appeared uncomfortable, Bryant said, younger engineers had full command of the issues and a clear path to overcome Intel's setbacks.

“‘No doubt,’ they said, ‘we have this stuff, we’re being held back,’” Bryant recalled. “It was quite a bold statement, in front of the boss, to say we’re being held back. But by watching them you suddenly had the confidence we do still have the talent to solve this problem.”

## Semiconductors in Science and Industry

### **Semiconductor Industry News**

- Intel news:
  - [Notebookcheck](#) and others reported System76 updated its Lemur Pro and Galago Pro laptops with 11<sup>th</sup> Gen Tiger Lake CPUs.
  - [SemiAccurate](#) reported Intel has delayed another mainstream server project, Ice Lake-SP. Noting that both dies, the HCC and XCC, are reportedly behind schedule, Demerjian stated “Intel is no longer a viable player in the server market, it is that bad.”
  - [The Wall Street Journal](#) discussed Intel’s past success and recent downfalls with creating its own chips.
  - Intel [debuted](#) its first discrete graphics processing unit (GPU) for the data center, based on the Xe-LP microarchitecture, and announced the gold release of Intel oneAPI toolkits coming in December.
- Nvidia news:
  - A supercomputer at Texas A&M University [will be powered](#) by Dell Technologies and come equipped with Intel Xeon Scalable processors, Nvidia A100 GPUs, Nvidia RTX 6000 GPUs and Nvidia T4 GPUs.
- Other semiconductor industry news:
  - TSMC’s Board of Directors [approved](#) spending \$3.5B on the company’s upcoming fab in Arizona.

# Intel etc News

## *Technology in Science and Industry*

### **Intel Previews WiFi 7**

Wi-Fi 7 will be an extension of Wi-Fi 6 and it will support current Wi-Fi bands. One key feature that Cordeiro highlighted was deterministic low latency for applications that require a quantifiable upper bound of low latency such as industrial and enterprise applications like augmented and virtual reality and VR.

He then pointed to a theoretical data rate when comparing Wi-Fi 6 to Wi-Fi 7: “We are talking about a data rate increase of almost five times [and]if you look at the client side [there is]an order of magnitude of two times,” he said.

## *Semiconductors in Science and Industry*

### **Micron Develops 176-layer NAND Memory**



--Micron

**Micron's 3D NAND Chip**

Eschewing floating gate in favor of a charge trap approach and combining it with its CMOS-under-array architecture enables Micron to significantly improve performance and density, said Derek Dicker, corporate vice president and general manager of Micron's storage business unit. The company's 176-layer NAND improves both read latency and write latency by more than 35% compared with the company's previous generation of high-volume 3D NAND and a layer count that is nearly 40% higher than its nearest competitor.

More: [Micron Leapfrogs to 176-Layer 3D NAND Flash Memory](#)

*From EE Times -- Contributed by STEVE ZELENICIK "Z" on 17 November 2020*



# Section

## AMD

## News





# AMD 2Q23 Results

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No Growth!

2Q23 Revenue = **\$5.4 B** on **\$0.58/shr**

1Q23 Revenue = **\$5.4 B** on **\$0.60/shr**

4Q22 Revenue = **\$5.6B** on **69 cents/shr**

3Q=> **\$5.6B** on **67 cents/shr**

# Radeon PRO

Aug 2023

## AMD launches new Radeon PRO W7000 series graphics cards

Aug 03, 2023 10:33 AM ET | **Advanced Micro Devices, Inc. (AMD)** | Ravikash, SA News Editor

Advanced Micro Devices (NASDAQ:[AMD](#)) made two additions to its AMD Radeon PRO W7000 Series product line — W7600 and W7500 workstation graphics cards.

The new graphics cards use the breakthrough AMD RDNA 3 architecture and feature 8GB of high-speed GDDR6 memory.

# AMD Update

❖ GPU for AI

MI300X

## AMD reveals new A.I. chip to challenge Nvidia's dominance

- AMD said its forthcoming most-advanced GPU for artificial intelligence, the MI300X, will start shipping to some customers later this year, the company said on Tuesday.
- AMD's announcement on Tuesday represents the strongest challenge to Nvidia, which currently dominates the market for AI chips.

# AMD Update

❖ GPU for AI

MI300X

## AMD reveals new A.I. chip to challenge Nvidia's dominance

GPUs are chips used by firms like OpenAI to build cutting-edge AI programs such as ChatGPT.

GPU for artificial intelligence, the MI300X, will start shipping to some customers later this year.

If AMD's AI chips, which it calls "accelerators," are embraced by developers and server makers as substitutes for Nvidia's products, it could represent a big untapped market for the

# AMD Update

❖ **GPU** for AI

**MI300X**

RDNA → CDNA

38-bit address  
→ 256GB

Nvidia  
A100 → **H100**

## AMD reveals new A.I. chip to challenge Nvidia's dominance

"At the center of this are GPUs. GPUs are enabling generative AI," Su said.

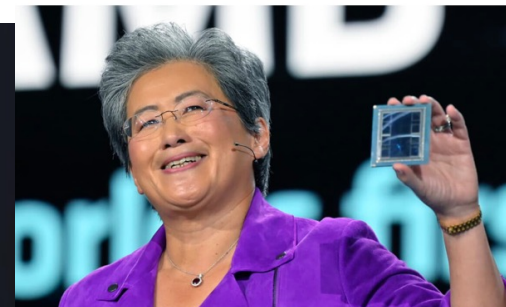
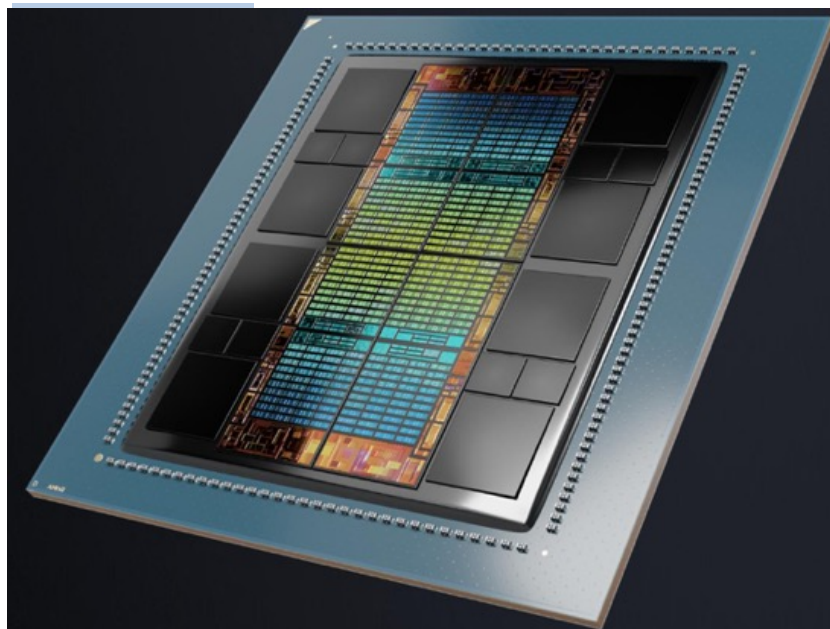
AMD said that its new MI300X chip and its CDNA architecture were designed for large language models and other cutting-edge AI models.

The MI300X can use up to 192GB of memory, which means it can fit even bigger AI models than other chips. Nvidia's rival H100 only supports 120GB of memory, for example.

# AMD Update

❖ GPU for AI

## AMD reveals new A.I. chip to challenge Nvidia's dominance



Introducing today

### AMD Instinct™ MI300X

Leadership generative AI accelerator

AMD  
CDNA 3

192 GB  
HBM3

5.2 TB/s  
Memory Bandwidth

896 GB/s  
Infinity Fabric™ Bandwidth

153 B  
Transistors

# AMD Update

❖ GPU for AI

MI300X

*Infinity*

AMD also said it would offer an Infinity Architecture that combines eight of its MI300X accelerators in one system. Nvidia and Google have developed similar systems that combine eight or more GPUs in a single box for AI applications.

Nvidia CUDA

*Software API*

One reason why AI developers have historically preferred Nvidia chips is that it has a well-developed software package called CUDA that enables them to access the chip's core hardware features.

AMD ROCm

AMD said on Tuesday that it has its own software for its AI chips that it calls ROCm.



April 2023

# AMD Introduces Ryzen™ Z1 Series Processors, Expanding the "Zen 4" Lineup into Handheld Game Consoles

Zen 4 CPU + RDNA 3

**AMD Ryzen Z1 and AMD Ryzen Z1 Extreme processors bring ultimate portability and battery life to handheld PC gaming consoles**

SANTA CLARA, Calif., April 25, 2023 (GLOBE NEWSWIRE) -- Today, **AMD** (NASDAQ: AMD) introduced the new Ryzen Z1 Series processors, the ultimate high-performance processor for handheld PC gaming consoles<sup>1</sup>. The Ryzen Z1 Series features two high performance processors, the Ryzen Z1 and Ryzen Z1 Extreme, both offering industry-leading gaming experiences, uncompromising battery life, and featuring AMD RDNA™ 3 architecture-based graphics. AMD is partnering with Asus to launch the first Ryzen Z1 Series device with the Asus ROG Ally, a premium handheld PC console, featuring up to a Ryzen Z1 Extreme processor.



# AMD Epyc 4<sup>th</sup> Gen

April 2023



## AMD Reimagines Cloud Performance with 4<sup>th</sup> Gen AMD EPYC Processors with AWS

— Previewing new Amazon EC2 M7a instance based on 4<sup>th</sup> Gen AMD EPYC processors —

### Next Generation of AMD and AWS Instances

The new Amazon EC2 M7a instances, using 4<sup>th</sup> Gen AMD EPYC processors are now available in preview. Amazon revealed EC2 M7a instances also offer new processor capabilities, such as AVX3-512, VNNI, and BFloat16, and allow customers to get up to 50 percent more compute performance than M6a instances and bring an even broader range of workloads to AWS.

**AVX3-512**

# AMD Buying Xilinx?

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Old News

❖ AMD buys Xilinx for \$30B!

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## Xilinx

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From Wikipedia, the free encyclopedia

**Xilinx**, Inc. ([\*<sup>i</sup>ˈzaɪlɪnks\*](#)/ *ZY-links*) is an American [technology company](#) that develops highly flexible and adaptive processing platforms. The company invented the [field-programmable gate array](#) (FPGA), programmable system-on-chips (SoCs), and the adaptive compute acceleration platform (ACAP). It is the [semiconductor company](#) that created the first [fabless manufacturing](#) model.<sup>[4][5]</sup> Xilinx's products are used across many industries and technologies, including the data center, wired & wireless communications, AI/ML, automotive, industrial, consumer, aerospace and defense and Broadcast & Pro-AV.

Co-founded by Ross Freeman, Bernard Vonderschmitt, and James V Barnett II in 1984, the company went public on the NASDAQ in 1989.

AMD announced its acquisition of Xilinx in October 2020.<sup>[6]</sup>

## Xilinx, Inc.



Xilinx headquarters in the United States

<b>Type</b>	Public
<b>Traded as</b>	NASDAQ: XLNX <a href="#">🔗</a> NASDAQ-100 Component S&P 500 Component
<b>Industry</b>	Integrated circuits
<b>Founded</b>	1984; 36 years ago <sup>[1]</sup>
<b>Founder</b>	Jim Barnett Ross Freeman Bernie Vonderschmitt
<b>Headquarters</b>	San Jose, California, U.S.
<b>Area served</b>	Worldwide

## Key people

Dennis Segers (chairman of the board)  
 Victor Peng (president, CEO)  
 Brice Hill (CFO)<sup>[2]</sup>  
 Ivo Bolsens (senior vice president, CTO)  
 Kevin Cooney (senior vice president, CIO)  
 Catia Hagopian (senior vice president, general counsel)  
 Vincent L. Tong (executive vice president, global operations and quality)  
 Liam Madden (executive vice president, hardware and systems product development)  
 Matt Poirier (senior vice president, corporate development and investor relations)  
 Salil Raje (executive vice president, software and IP products)  
 Marilyn Stiborek Meyer (senior vice president, global human resources)  
 Mark Wadlington (senior vice president, global sales)

## Products

FPGAs, CPLDs

## Revenue

▲ US\$ 3.16 billion (2020)<sup>[3]</sup>  
 ▲ US\$ 3.06 billion (2019)<sup>[3]</sup>

## Operating income

▼ US\$ 791.888 million (2020)<sup>[3]</sup>  
 ▲ US\$ 956.799 million (2019)<sup>[3]</sup>

## Net income

▼ US\$ 792.721 million (2020)<sup>[3]</sup>  
 ▲ US\$ 889.750 million (2019)<sup>[3]</sup>

## Total assets

▼ US\$ 4.693 billion (2020)<sup>[3]</sup>  
 ▲ US\$ 5.151 billion (2019)<sup>[3]</sup>



## AMD News in AMD

### **AMD News Report WW47**

- Announcements:
  - AMD and IBM [announced](#) a joint development agreement to advance confidential computing and artificial intelligence for the cloud. The announcement was covered by multiple outlets including [Anandtech](#), [Marketwatch](#), [ZDnet](#) and others.
  - AMD [announced](#) the new Ryzen Embedded V2000 processor. Coverage has appeared in outlets including [CNX Software](#), [HotHardware](#), [Serve The Home](#), [Tom's Hardware](#) and others.
- Press continued to cover the launch of the Ryzen 5000 Series desktop processors and post review content, praising the new processors' overall performance, the architectural advancements of "Zen 3" and AMD's dominance in the CPU market. New coverage included [Gamers Nexus](#), [Hardware Canucks](#), [MMORPG](#), [SemiAccurate](#) and others, with SemiAccurate concluding, "The 19% IPC uplift means that AMD wins at everything now."
- [Tom's Hardware](#) and others reported that the Ryzen 9 5950X set an overclock world record, hitting 6.362 MHz on all 16 cores.
- A number of press, including [HEXUS](#), [PCWorld](#), [TechRadar](#) and [Tom's Hardware](#), discussed the availability of the Ryzen 5000 Series given how quickly many of the SKUs sold out. Most press argued that just because the CPUs had high demand does not mean this was a "paper launch."
- [PCMag](#) reviewed the ASUS TUF gaming A17 highlighting how the system is "a welcome change from low-cost gaming laptops with a skimpy 256GB of storage, and its Ryzen 7 processor is a real powerhouse."
- [ServeTheHome](#) reviewed the AMD EPYC 7H12 processor, naming it "the fastest CPU you can get in 2020" for raw computational power.

## AMD News in AMD

### **AMD News Report WW46**

- Announcements:

- Following the reviews embargo lift of the AMD Ryzen 5000 Series desktop processors, sentiment has been overwhelmingly positive, with press praising the lineup's performance, the improvements of the "Zen 3" architecture and AMD's dominance at the top of the CPU market in gaming and content creation. Coverage appeared in [AnandTech](#), [Forbes](#), [HEXUS](#), [Linus Tech Tips](#), [PCWorld](#), [TechRadar](#), [TweakTown](#) and more.
  - [PCWorld](#): "many will see today as an historic shift in computing power...AMD has finally knocked Intel to the floor, and is raising its boxing gloves in victory as the flash bulbs pop and the ref declares a winner."
  - [ExtremeTech](#): "'Zen 3' is an unparalleled success for AMD," as the new architecture "has literally redefined what kind of performance is possible within a given desktop power envelope."
  - [JayzTwoCents](#): "the 5900X is quite honestly the best CPU you could possibly buy right now...for gaming, content creation, productivity, value – it's all there!"
- Lawrence Livermore National Labs announced the new AMD EPYC-based "Mammoth" supercomputer system for memory intensive research workloads, including COVID-19 simulations and analysis. News appeared on [The Next Platform](#), [HPC Wire](#) and [Silicon Angle](#).
- The reviews embargo lifted on Xbox Series X and S consoles, harnessing the power of "Zen 2" CPU cores and RDNA-based graphics to usher in the next generation of high-performance console gaming. AMD coverage sentiment has been positive, with press positioning the all-AMD hardware consoles as leaders in both raw performance and stunning, high fidelity visuals. Coverage appeared in [IGN](#), [WIRED UK](#), [PCMag](#) and more.
- Reviews of the PlayStation 5 began to appear, with positive sentiment around AMD hardware and press praising the faster load times, better frame rates and gorgeous visuals enabled by the all-AMD console platform. Coverage appeared in [The Verge](#), [PCGamer](#), [CNN](#) and more.

## Science and Industry

### Semiconductors in Science and Industry

#### **Semiconductor Industry News**

Semiconductor company news:

- Intel news:
  - Intel [announced](#) the launch of Intel Iris Xe MAX graphics and Intel Deep Link Technology. Coverage was neutral and factual in nature, focusing on which systems and markets Xe MAX and Deep Link are currently available in. Coverage appeared in [AnandTech](#), [CNET](#), [Forbes](#), [PCWorld](#), [The Verge](#) and others.
  - [HotHardware](#), [PC Gamer](#), [Wccftch](#) and others reported on leaked images of Intel's upcoming processors. [YuuKi\\_Ans](#) at Bilibili posted alleged photos of Intel's 11<sup>th</sup> Gen Rocket Lake Desktop CPUs, while [Videocardz](#) posted supposed shots of an Intel 12<sup>th</sup> Gen Alder Lake processor.
- Nvidia news:
  - [VideoCardz](#) shared photos of a GIGABYTE RTX 3060 Ti Eagle OC, claiming the card will feature 4864 CUDA cores, 182 Tensor Cores, 38 RT Cores and 8GB of GDDR6 clocked at 14Gbps. VideoCardz noted it can't confirm if Nvidia will offer an FE variant, but expects AIB cards to launch on December 2 for around \$400 USD.
    - According to [VideoCardz](#), ASUS RTX 3060 Ti cards have been recently submitted to the Eurasian Economic Commission website. The outlet notes that the EEC listings appear "weeks before the graphics cards are ready for launch," which is allegedly Dec. 2.
    - [TechRadar](#) reported that RTX 3060 Ti cards are on sale in Saudi Arabia, the only retailer market that has "ignored the official release scheduled" for the cards. A Twitter user [shared](#) a video clip of the GIGABYTE 3060 Ti Eagle graphics card packaging, which "would be difficult to fake."
  - [VideoCardz](#) claimed Nvidia will move forward with an RTX 3080 Ti, despite the card supposedly being cancelled about a month ago, as Nvidia looks "to counter the AMD Big Navi series." The card is expected to feature 10496 CUDA cores – mirroring the RTX 3090, so it "will certainly not be cheap" – and be supported by 20GB of GRR6X VRAM.
- Other semiconductor industry news:
  - Arm [has launched](#) the Arm Cortex-A78C CPU, a new CPU that can support up to eight cores and eight MB of cache to meet compute-intensive workloads.



## AMD News Report WW36

- [EnterpriseAI](#) reported on the AMD EPYC-powered Google Confidential VM, discussing how security is embedded through hardware and how the two companies' security approach enables the keys to be managed on-chip, "meaning only a user can view them."
- [ServeTheHome](#) reviewed the Dell EMC PowerEdge C6525 2U4N system, which features up to 512 AMD EPYC cores.
- [CSO Online](#) detailed the different routes to hardware-based encryption that AMD, IBM and Intel are taking. The article notes Google Cloud was the first cloud provider to offer AMD EPYC-powered confidential computing VMs with the launch in July.
- The U.S. Department of Defense [announced](#) a significant investment in data analytics and AI computing with the procurement of new HPC systems, two of which will feature 2<sup>nd</sup> Gen AMD EPYC processors and Nvidia V100 GPUs.
- [Notebookcheck](#) and [PCWorld](#) published reviews of the Ryzen-powered Lenovo Ideapad Slim 7.
  - Notebookcheck concluded the "results are insane for a 14-inch subnotebook to the point where it'd be tough to recommend an Intel counterpart when given the same price."
  - PCWorld stated "like a prize fight weigh-in, the AMD Ryzen 7 4800U in Lenovo's IdeaPad Slim 7 just flexed like no other ultrabook CPU we've ever seen," adding, "the early results we're seeing are gobsmackingly impressive."
- [HotHardware](#) reviewed the AMD-powered ThinkPad X13, concluding the "Ryzen 5 PRO 4650U processor delivers outstanding performance in this size class."
- [Linus Tech Tips](#) and [Wccftech](#) reported that [Yuri Bubliy](#) unveiled a new performance-boosting tool for AMD Ryzen 3000 CPUs called ClockTuner for Ryzen (CTR), which will be free to the public and aims to deliver increased performance and improved efficiency. Linus Tech Tips, which was able to test the tool early, concluded that, though "mileage may vary," based on the specific processor, CTR makes it easier to fine tune Ryzen performance the way enthusiasts do.
- AMD released AMD Battle Arena, a Fortnite Creative Islands multiplayer map in collaboration with modder MAKAMAKES. Alongside these maps, AMD and MAINGEAR announced a contest for Fortnite gamers to win a Ryzen- and Radeon-based MAINGEAR TURBO PC.



# AMD News

EPYC/Ryzen

Aug 21, 2020

- Amazon [launched](#) the extension of its Amazon EC2 C5a series based on 2<sup>nd</sup> Gen AMD EPYC processors, the Amazon EC2 C5ad instances. [Phoronix](#) posted benchmarks of the new lineup also based on 2<sup>nd</sup> Gen AMD EPYC processors, calling the initial tests “promising” and “indeed offering better value than the comparable Intel Xeon instances.”
- Microsoft Azure [announced](#) a new lineup of virtual machines aimed at “supercomputer-class AI,” the NDv4 VM instances. The new instances are powered by 2<sup>nd</sup> Gen AMD EPYC processors and Nvidia A100 ‘Ampere’ GPUs.
- [AnandTech](#) and [Notebookcheck](#) covered the AMD Ryzen 4000 APU Hot Chips 2020 presentation, with Notebookcheck highlighting how AMD engineers originally designed Ryzen 4000 Series Desktop Processors to top out at six cores, but, “thanks to the significant efficiency gains made possible by TSMC’s advanced 7nm process, AMD was able to implement a complete, 8-core Zen 2 design.”
- [Tom’s Hardware](#) reported on details of the 10nm Intel “Ice Lake” Xeon processors revealed at Hot Chips 2020, highlighting the approximate 18% IPC improvement and noting the new processors are “a badly needed addition,” as the company seeks to compete with the 2<sup>nd</sup> Gen AMD EPYC processor.
- Forbes [provided more details](#) and insight into the Nvidia Selene supercomputer, which is powered by the DGX A100 system that uses 2<sup>nd</sup> Gen AMD EPYC processors.

## IBM Q

Today marks an important milestone in the emerging world of quantum computing. IBM has accomplished the historic feat of a Quantum Volume of 64 on a 27-qubit client-deployed system, a first on a universal superconducting quantum computer, making it the most powerful system available to users.

# AMD PR

## EPYC/Ryzen

- AMD [announced](#) three new 2<sup>nd</sup> Gen AMD EPYC processors that deliver per-core performance leadership for database, commercial high-performance computing and hyperconverged infrastructure workloads. Coverage included:
  - Initial reviews from [Anandtech](#), [Hexus](#), [Phoronix](#), [Serve The Home](#), [Storage Reviews](#) and others highlighting per core performance leadership and capabilities for workloads needing high frequency, low core count processors.
  - Coverage from outlets including [CRN](#), [The Street](#), [Tom's Hardware](#), [ZDNet](#) and others highlighting the growth of the EPYC ecosystem and the workload leadership of the AMD EPYC 7Fx2 processors.
- [Lenovo](#) announced a number of new gaming notebooks, including the Ryzen Mobile-powered Legion 5, which will be available in May 2020. The company also noted the IdeaPad Gaming 3, IdeaCentre Gaming 5, and Legion Tower 5 will offer AMD processor options later this year. Coverage appeared in [CNET](#), [Engadget](#), [Gizmodo](#), [Laptop Mag](#), [Liliputing](#), [The Verge](#) and others.
- [HP](#) announced several updated notebook systems, including the HP Envy x360, featuring Ryzen 4000 Series Mobile Processors. Coverage appeared in [Laptop Mag](#), [Liliputing](#), [Neowin](#), [PCMag](#), [The Verge](#) and others.

# AMD PR

## EPYC/Ryzen

- Janet Morss of Dell Technologies wrote a piece for [insideHPC](#) about a new flagship supercomputer powered by Dell EMC PowerEdge servers, 2<sup>nd</sup> Gen AMD EPYC processors and Nvidia V100 Tensor Core GPUs.
- [CRN](#) shared that AMD has released the AMD EPYC Server Virtualization TCO Estimation Tool, which allows partners and customers the chance to compare the total cost of ownership for server virtualization workloads between AMD EPYC processors and Intel Xeon processors.
- [Engadget](#) posted a positive review of the ASUS Zephyrus G14 praising its all-around performance and design, giving the laptop a score of 90/100, calling it a “strong debut for AMD [and the] powerful Ryzen 4000 series chips.”

-- Contributed by [AMD Communications](#)

# Section

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## ARM News



# Tesla Computers

## Tesla designs

It began developing its own chips in 2016, before its first self-driving computer chip debuted in 2019. Tesla then looked to improve the chip with TSMC [Taiwan Semiconductor Manufacturing Co], using the manufacturer's 7nm process. New information has just surfaced to reveal Tesla has partnered with Samsung to develop a 5nm FSD chip.

Elon hits the genius Pete Bannon with a First Principle design opportunity, and Pete comes up with a chip that's 21 times faster, uses only 70 watts, and costs less to produce than what's out there, off the shelf.

## Hardware 3 [\[ edit \]](#)

According to Tesla's director of Artificial Intelligence [Andrej Karpathy](#), Tesla had as of Q3 2018 trained large neural networks that works very well but which could not be deployed to Tesla vehicles built up to that time due to their insufficient computational resources. HW3 provides the necessary resources to run these neural networks.<sup>[138]</sup>

HW3 includes a custom Tesla-designed [system on a chip](#). Tesla claimed that the new system processes 2,300 frames per second (fps), which is a 21x improvement over the 110 fps image processing capability of HW2.5.<sup>[139][140]</sup> The firm described it as a "neural network accelerator".<sup>[135]</sup> Each chip is capable of 36 trillion operations per second, and there are two chips for redundancy.<sup>[141]</sup> The company claimed that HW3 was necessary for "full self-driving", but not for "enhanced Autopilot" functions.<sup>[142]</sup>

The first availability of HW3 was April 2019.<sup>[143]</sup> Customers with HW2 or HW2.5 who purchased the Full Self-Driving (FSD) package are eligible for an upgrade to HW3 without cost.<sup>[144]</sup>

Tesla claims HW3 has 2.5x improved performance over HW2.5 with 1.25x higher power and 0.2x lower cost. HW3 features twelve [ARM Cortex-A72](#) CPUs operating at 2.6 GHz, two Neural Network Accelerators operating at 2 GHz and a [Mali GPU](#) operating at 1 GHz.<sup>[145]</sup>

## *Technology in Science and Industry*

### **DARPA's Near-zero Power Program**

DARPA has been working since 2015 on a program to build sensors that can be deployed with "coin" batteries and run for years. Arm chips also have the capability to run for decades on one set of batteries, as their power consumption is so low.

The N-ZERO program established asleep-yet-continuously-alert sensing capabilities for untethered, unattended systems that are triggered by specific physical or radio frequency [RF] signatures,

...

One move in a positive direction was the development of an ultra-low-power Arm processor. The Arm M0N0 processor achieved a 10-nW sleep power and 20- to 60- $\mu$ W/MHz active power level, depending on the application.

- Other semiconductor industry news:
  - Arm [unveiled](#) updates to its Neoverse roadmap, revealing two next-generation server CPU designs, the V1 core for maximum performance and the N2 core for scale-out performance, that are said to deliver significantly higher performance than x86 processors currently made by AMD or Intel. [CRN](#) reported Neoverse V1 is designed for 7nm and 5nm process technologies and will be the first design core from Arm to support Scalable Vector Extensions (SVE), with two vectors of 256-bit width. The N2 core, previously code-named Perseus, will be designed for 5nm process technologies and provide more than a 50% performance improvement over N1, in addition to supporting SVE and bfloat16. Both designs will also support PCIe 5.0 and DDR5.
  - [Silicon Valley Business Journal](#) reported that chip startup Nuvia secured \$240M in funding to “produce chips that make data center processors faster, more power efficient and more secure than what currently exists from its giant neighbors in Santa Clara.”
  - GlobalFoundries is [planning](#) to go public in 2022.



# Nvidia Buys ARM



# Nvidia Buys ARM

\$40B

## What will be the ramifications on ARM's business if NVIDIA acquires ARM from SoftBank?



**Jeff Drobman** · just now

Lecturer at California State University, Northridge (2016–present)

my guess is that the DOJ will lay a heavy hand (or arm) on this deal: permitting it only if Nvidia agrees to an "arms-length" (puns intended) management. Nvidia will likely have to agree to continue licensing its many core designs and ISA's, especially ARMv7 and ARMv8.

Actually the UK equiv

➤ Japanese conglomerate Softbank bought ARM Holdings in 2016 for \$32B

## What does Nvidia say?

Nvidia boss Huang has sought to allay such fears, promising to keep the Arm brand and expand its Cambridge HQ.

"We will expand on this great site and build a world-class artificial intelligence research facility, supporting developments in healthcare, life sciences, robotics, self-driving cars and other fields," he said.

AI



# ARM History

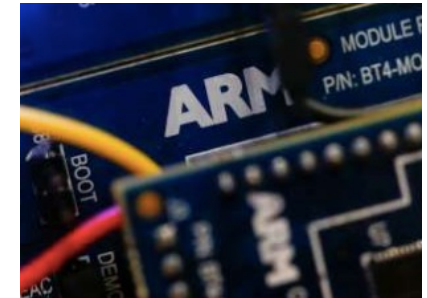
1990 joint venture

Cambridge-based Arm Ltd was founded in 1990 as a joint venture between Apple, Acorn Computers and VLSI Technology. It designs software and semiconductors – components of electrical circuits that are used to manage the flow of current.

It is not just the UK's largest tech company but a genuine global powerhouse that has, in the space of 30 years, grown into a \$40bn (£31bn) business with more than 6,000 employees.

## What's so great about it?

Its semiconductor chips are the building blocks of a string of consumer favourites. Apple uses them in its iPhone, iPad and Apple Watch products, but you'll also find Arm chips in the Playstation Vita and Nintendo DS and Wii gaming devices and Garmin satnavs, as well as Sony Ericsson and Samsung Galaxy phones. Its chips are increasingly used in the rapidly-expanding web of connected devices known as the "internet of things".




# Nvidia

# Nvidia 4Q22 Results

Revenue = **\$6.1B** on **88 cents**/shr

3Q=> **\$5.9B**

 **21% y/y**

CNBC REAL-TIME		
<b>NVIDIA</b>		
208.40		<b>+0.41%</b>
<b>Mkt Cap: \$513B</b>		
<b>INTEL</b>		
25.50		<b>+0.12%</b>
<b>Mkt Cap: \$105B</b>		



# Nvidia Super Chip

## Grace 100 + A100 TPU

The announcement of the Isambard 3 supercomputer for medical and scientific research is a significant development that has the potential to accelerate progress in a wide range of fields. The system, which will be built by Hewlett Packard Enterprise using Nvidia silicon, is expected to be one of the most energy-efficient supercomputers in Europe. This will make it ideal for use in research applications that require large amounts of computing power, such as drug discovery, climate modeling, and astrophysics.

The Isambard 3 supercomputer will be based on Nvidia's Grace CPU Superchip, which is a new generation of processor designed specifically for high-performance computing. The system will also feature Nvidia's A100 Tensor Core GPUs, which are the world's most powerful AI accelerators. This combination of hardware will give researchers access to a powerful tool that can be used to tackle some of the most challenging problems facing humanity.

Micron





July 2023

## **Micron Delivers Industry's Fastest, Highest-Capacity HBM to Advance Generative AI Innovation**

**First in industry to launch 8-high 24GB  
HBM3 Gen2 with bandwidth over 1.2TB/s  
and superior power efficiency enabled by  
advanced 1 $\beta$  process node**

# News

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TSMC

Apr 2023

BY [AMY EDELEN | PHOENIX BUSINESS JOURNAL](#)

Taiwan Semiconductor Manufacturing Co. is seeking up to **\$15 billion** in tax credits and grants from the federal government to support its **Arizona semiconductor plants** amid concerns about subsidy criteria, the Wall Street Journal reported Wednesday.

TSMC expects to receive \$7 billion to \$8 billion in tax credits under the **CHIPS Act**, in addition to \$6 billion to \$7 billion in grants for its Arizona plants, according to the WSJ, citing people familiar with the matter.

TSMC is investing more than **\$40 billion** in building **two fabs** in north Phoenix, marking one of the largest foreign direct investments in the state and U.S. history. It plans to employ more than **4,500 workers** at its Arizona campus where it will produce **3-and-4 nanometer** chips, the Phoenix Business Journal previously reported.

TSMC has expressed concern about CHIPS Act subsidy criteria,

# Industry News

## *Business News in Science and Industry*

### **Russians Attempt Heist At Tesla**

According to an FBI complaint, the feds thwarted Russian hackers from undertaking a massive ransomware hack and data breach at Tesla's Nevada Gigafactory. The plot involved reaching a Russian-speaking employee and offering him \$1 million to introduce malware into the company's internal computer systems.

- TSMC has reportedly [manufactured](#) 1B defect-free 7nm chips.
- TSMC [announced](#) that it expects its advanced 3nm process to enter mass production in H2 2022. The firm also [announced](#) plans to open a new R&D center focused on developing 2nm technology in Hsinchu next year.

## Other Tech Cos.



# Apple 2Q23 Results

---

2Q23 Revenue = **\$81.8B** on **\$1.26/shr**

4Q22 Revenue = **\$117.2B** on **\$1.88/shr**

3Q22=> **\$90.1B**

# Google 2Q23 Results

---

2Q23 Revenue = **\$74.6B** on **\$1.44/shr**

1Q23 Revenue = **\$69.8B** on **\$1.17/shr**

4Q22 Revenue = **\$76.1B** on **\$1.05/shr**

3Q22=> **\$69.1B**

# Qualcomm 1Q23 Results

---

1Q23 Revenue = **\$9.3B** on **\$2.15**/shr

4Q22 Revenue = **\$9.5B** on **\$2.37**/shr

3Q=> **\$11.4B**

# Amazon 2Q23 Results

---

2Q23 Revenue = **\$134.2B**

1Q23 Revenue = **\$127.4B**

4Q22 Revenue = **\$149.2B** on **\$0.03**/shr

# Microsoft



# MS Security Processor

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## Microsoft Develops Chip-to-Cloud Security Technology for PCs

1:31 PM 11/17/2020 - MT Newswires01:31 PM EST, 11/17/2020  
(MT Newswires) -- Microsoft (MSFT) said Tuesday it developed a chip-to-cloud security technology to boost the security advancements of future Windows PCs. The ***Pluton*** security processor will provide **hardware security** protection from cyber and physical attacks through future chips from Advanced Micro Devices (AMD), Intel (INTC) and Qualcomm (QCOM). Intel and AMD said chips with the new technology will be ready "within the next few **years.**" However, Qualcomm declined to say if it will incorporate the design in its chips while expressing support for the new technology,

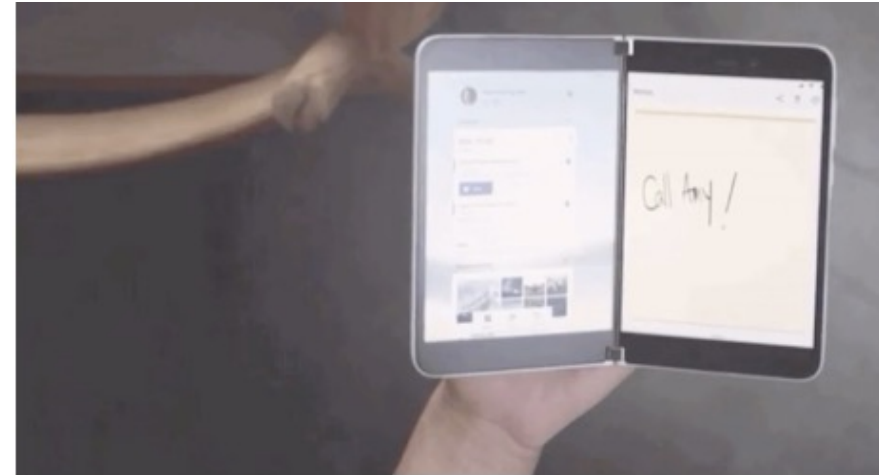
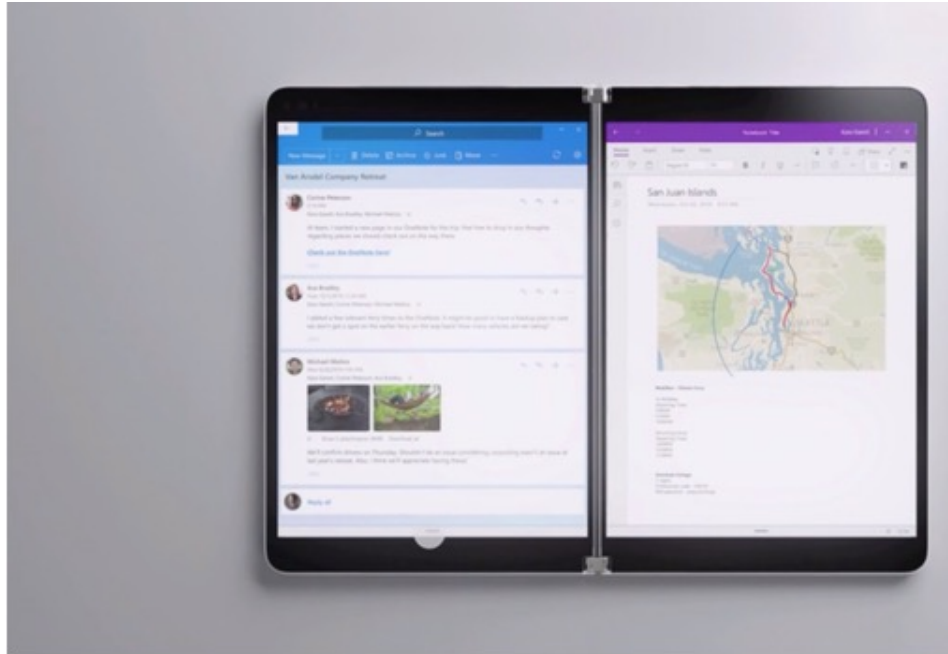
# Microsoft's New PC's



Microsoft's Surface Laptop 3 is 3x more powerful than a MacBook Air

See this

# Microsoft's New PC's



The new Microsoft phone, the Surface Duo.

Microsoft

Microsoft is making a phone. Again.

'This is Surface Duo': Yes, Microsoft will release a dual-screen phone

# Microsoft's New PC's

Microsoft is making a phone. Again.

The tech giant, which stopped producing phones years ago, is hoping to stage a comeback with the Surface Duo. As the name suggests, the device has two screens, connected by a hinge. (Here's how the Surface Duo compares to the Galaxy Fold.)

"This product brings together the absolute best of Microsoft, and we're partnering with Google to bring the absolute best of Android in one product," said Microsoft Product Chief Panos Panay. "This is industry-pushing technology."



**Now playing:** Microsoft unveils Surface Duo, a foldable Android phone

▶  
4:58

The whole thing is a bit of a surprise, considering Microsoft eventually gave up making phones after its troubled 2014 purchase of phone giant Nokia for more than \$7 billion. This time, Microsoft says its new innovations, like the dual-screen folding display and special technology it built for the Google Android software that powers the gadget, will help make the difference. We won't know for sure until the Surface Duo is released next year.

# Microsoft's New PC's

## Everything announced

- **Surface Duo:** Microsoft is making a dual-screen Android phone called Surface Duo. Yes, that Microsoft.  
The company known for its Windows operating system is getting back into smartphones by embracing its rival's ecosystem.
- **Surface Neo:** Dual-screen Microsoft Surface Neo is coming, eventually.  
Like other Windows 10 X systems, this dual-screen Surface isn't likely to be in stores till the 2020 holiday season.
- **Windows 10 X:** Windows 10 X OS will work with new dual-screen Surface Neo devices.  
The dual-screen Surface Neo gadgets will be out next year, says Microsoft.
- **Surface Laptop 3:** Microsoft announced a laptop 3x more powerful than the MacBook Air.  
Microsoft's Surface Laptop 3 has USB-C, a bigger screen and a modular design. It comes in 13.5- and 15-inch models and starts at \$999.
- **Surface Pro X and Surface Pro 7:** Microsoft unveils \$999 Surface Pro X, a tablet with a phonelike Windows experience.  
We also got a minimal update for the Surface Pro 7, now with USB-C.
- **SQ1 custom Arm chip:** Microsoft tries Windows on Arm chips again with the SQ1-powered Surface Pro X.  
The chips are designed to consume less power than those from Intel, Microsoft's traditional partner.

# Microsoft's New PC's

The Surface Laptop 3 has a custom Ryzen Surface Edition processor on the 15-inch model, while the Surface Pro X goes the ARM-powered route with a new SQ1 processor co-engineered with Qualcomm. It's a big change for the Surface line, even if Intel will still power the Surface Pro 7 and the smaller 13-inch Surface Laptop 3 models.

ARM



New Windows!

AMD

Ryzen

## Inside Microsoft's new custom Surface processors with AMD and Qualcomm

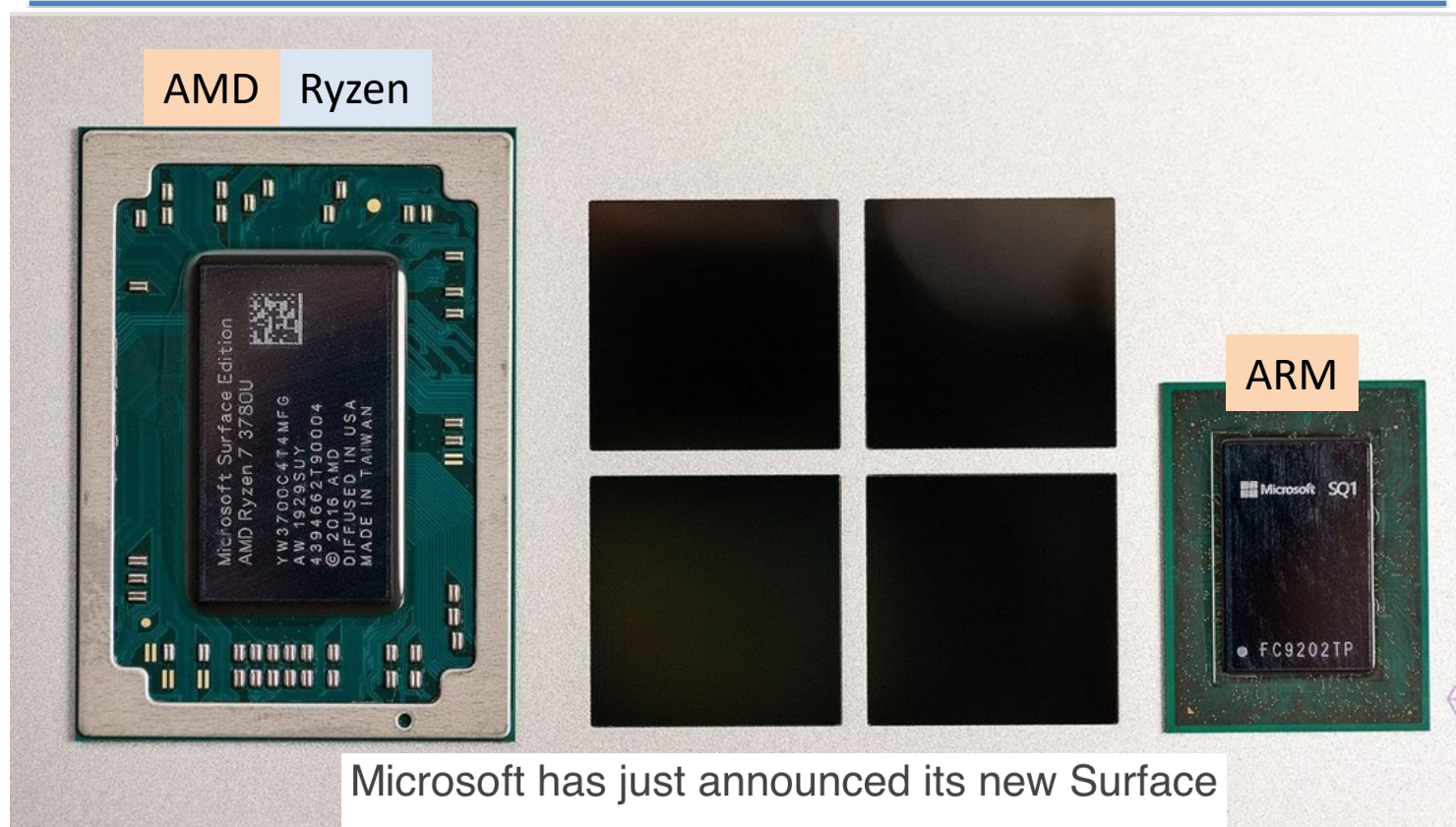
*Surface Ryzen Edition and SQ1 processors have been co-engineered*

By **Tom Warren** on October 2, 2019 11:30 am

On the AMD side, this Ryzen processor will be available exclusively in the 15-inch model of the Surface Laptop 3, a notebook that also has a metal finish instead of the fabric we've seen on previous Surface Laptop models. Microsoft has worked closely with AMD to add an additional graphics core on the 12nm Ryzen 5 and Ryzen 7 Surface parts that are built on Zen+, and to optimize the chip to fit inside the slim-and-light chassis it uses for the Surface Laptop 3.



# Microsoft's New PC's



Microsoft has just announced its new Surface Laptop 3 and Surface Pro X devices, and neither will come with an Intel processor. The software giant is diversifying its silicon for Surface this year by partnering closely with AMD and Qualcomm, respectively, to create custom processors for its Surface line.

# Microsoft Undersea Servers

Sep 15, 2020

## Microsoft Retrieves Its Sea Floor Data Center After 2 Years



PCMag [Follow](#)

Sep 15, 2020 · 2 min read ★



# Microsoft Undersea Servers

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By Matthew Humphries

In May 2018, Microsoft Research decided to test how well a self-sustaining underwater data center would work: The company sealed 12 racks of servers in a cylinder and dropped them in the ocean off Scotland's Orkney Islands. Two years later, the cylinder has been retrieved.

The experiment is called Project Natick, and as the BBC reports, it looks to have been a success. In total, 864 servers were contained in the cylinder, and only eight of them failed. According to project lead Ben Cutler, "Our failure rate in the water is one-eighth of what we see on land." As to why the failure rate was so much lower, Cutler speculates that, "We think it has to do with this nitrogen atmosphere that reduces corrosion and is cool, and people not banging things around."

One of the main reasons for attempting to run an underwater data center is the potential for huge energy savings, because cooling is naturally provided by the cold water surrounding the cylinder. But it seems that wasn't the only advantage, and the significantly lower failure rate is just another tick in the box for this type of data center being taken seriously in future.

## Misc News



# Ethernet at 50

Meet the newest Turing Award winner

Bob Metcalf of Xerox PARC

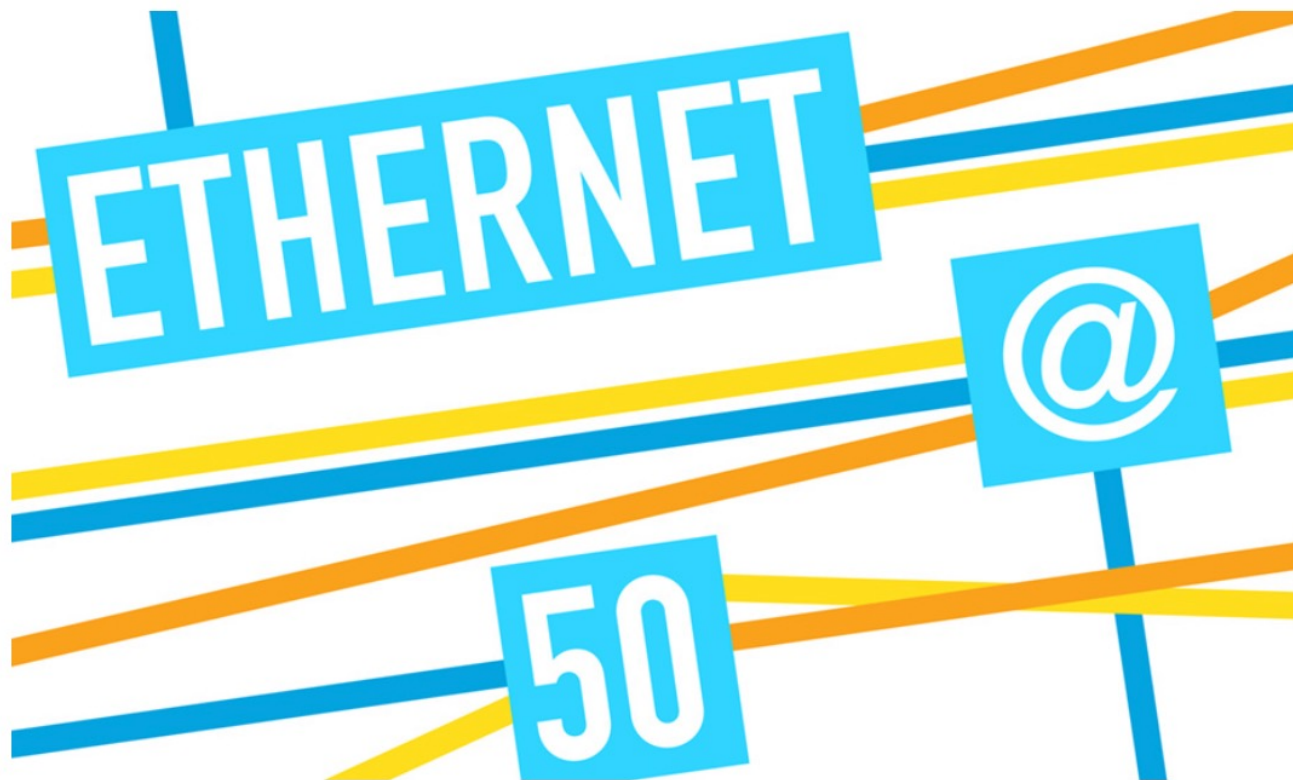


○ CHM <marcom@computerhist...

Thursday, April 27, 2023 at 1:46

To: ✕ Drobman, Jeffrey H

10/100/1000 BASE-T



Ethernet@50

Born May 22, 1973



# Amazon Chips





## Houssam Toutanji Named Dean of CSUN's College of Engineering and Computer Science

Media Contact: Carmen Ramos Chandler

[carmen.chandler@csun.edu](mailto:carmen.chandler@csun.edu)

(818) 677-2130 | on August 19, 2019 | in [Faculty and Staff News](#), [Media Releases](#), [Science and Technology](#)

 Like 15

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 Share

6



Houssam Toutanji

Houssam Toutanji, who has served as dean of the College of Engineering and Applied Sciences at Western Michigan University for the past four years, has been named dean of the [College of Engineering and Computer Science](#) at California State University, Northridge.

Toutanji will assume his new post Aug. 20. CSUN's [College of Engineering and Computer Science](#) is home to about 4,500 students and 66 full-time faculty members. The college graduates approximately 600 students annually with bachelor's and master's degrees in fields such as civil engineering, computer science, computer information technology, electrical engineering, computer engineering, manufacturing systems engineering, mechanical engineering, materials

engineering, software engineering and structural engineering.

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### UNKNOWN FEED

# 2 New Undersea Cables

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News Story

## Market Chatter: Facebook Teams Up With Google, Regional Companies for 2 New Undersea Cables

7:03 AM 3/29/2021 - MT Newswires07:03 AM EDT, 03/29/2021 (MT Newswires) - **Facebook** (FB) has entered into a partnership with **Alphabet** (GOOGL) unit **Google** and regional telecommunication companies for two new undersea cables to connect [Singapore, Indonesia and North America](#), Reuters reported Monday, citing an official statement. The undersea cables, called Echo and Bifrost, are expected to increase overall subsea capacity in the **trans-pacific by about 70%**, Facebook Vice President of Network Investments Kevin Salvadori reportedly said in a statement. Salvadori said Echo is being built in partnership with Google and Indonesian telecommunications' company XL Axiata. The cable is set to complete by **2023**. Bifrost is being developed in partnership with Indonesia's Telkom unit Telin, and Singapore's Keppel, with completion scheduled by **2024**.

(Market Chatter news is derived from conversations with market professionals globally. This information is believed to be from reliable sources but may include rumor and speculation.)

# Mars Clocks/Weather

Credit: NASA/JPL-Caltech/Cornell/CAB +

## Latest Weather at Elysium Planitia

InSight is taking daily weather measurements (temperature, wind, pressure) on the surface of Mars at Elysium Planitia, a flat, smooth plain near Mars' equator.

**Sol 656**  
September 30

**High: -3° F / °C**  
**Low: -143° F / °C**

**Sol 654**  
Sep. 28

High: 4° F  
Low: -140° F

**Sol 655**  
Sep. 29

High: 0° F  
Low: -139° F

**Sol 656**  
Sep. 30

High: -3° F  
Low: -143° F

Phil's Mars Weather page shows seasonal trends since March 2019.



# Mars Clocks

Phil wrote most of the software himself, with the exception of libraries for the keyboard and FTP which he pulled from GitHub. Here's [all the code](#).



The Mars Clock's various skins show details of missions to Mars, as well as the location's time and date

# Algorithms: Animation

We have rescheduled Dr Teran's IRIS seminar to November 7 (Thursday); 11:00 to noon in Nordhoff Hall (NH) 209.

\*Title: Snow Business: Scientific Computing in the Movies and Beyond\*

\*Speaker: Dr. Joseph Teran (Department of Mathematics, UCLA)

- ❖ Simulation
- ❖ Animation

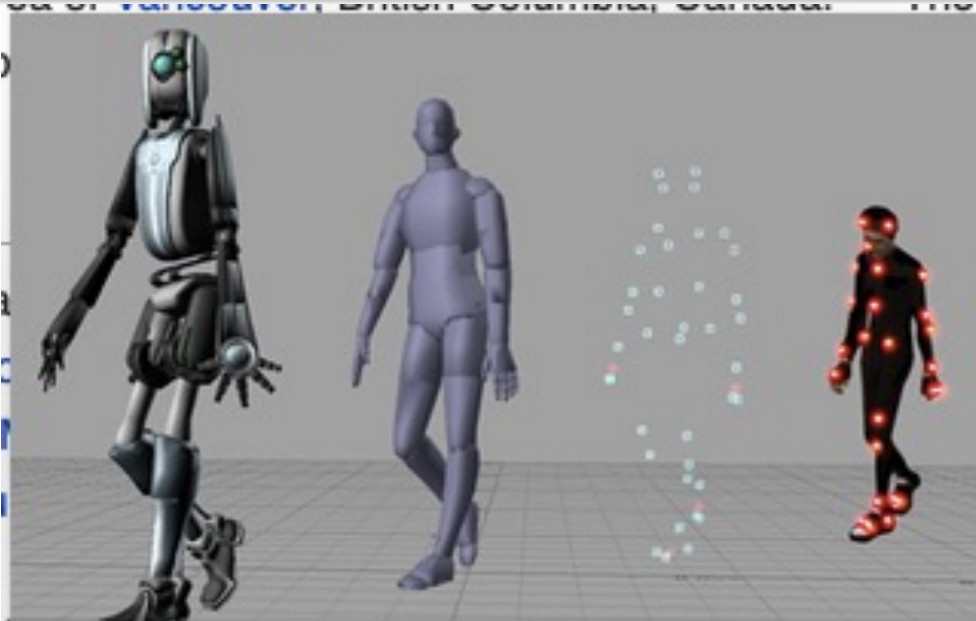
\*Abstract: \*New applications of scientific computing for solid and fluid mechanics problems include simulation of virtual materials in movie visual effects and virtual surgery. Both disciplines demand physically realistic dynamics for materials like water, smoke, fire, and soft tissues. New algorithms are required for each area. Teran will speak about the simulation techniques required in these fields and will share some recent results including: simulated surgical repair of biomechanical soft tissues; extreme deformation of elastic objects with contact; high resolution incompressible flow; and clothing and hair dynamics. He will also discuss a new algorithm used for simulating the dynamics of snow in Disney's animated feature film, "Frozen".

Frozen



# Animation

❖ CGI



**Computer animation** is the process used for digitally generating animated images. The more general term computer-generated imagery (CGI) encompasses both static scenes and dynamic images, while computer animation *only* refers to moving images. Modern computer animation usually uses



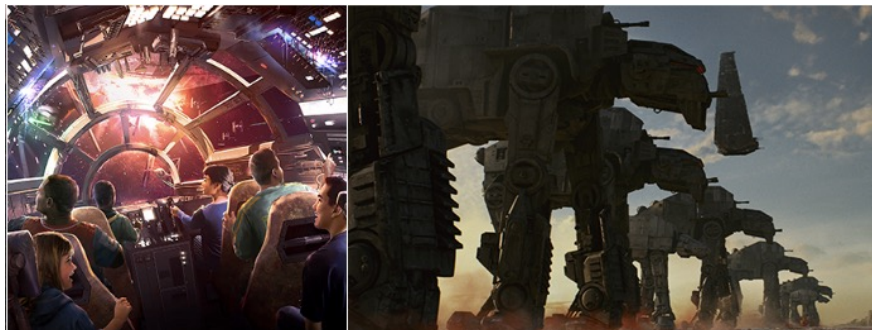
# Animation Studios

## ❖ Disney

- ☐ Disney Animation
- ☐ Cal Arts
- ☐ **Pixar**
  - Steve Jobs
  - John Lasseter

## ❖ ILM

- ☐ LucasFilm
- ☐ Skywalker Ranch
- ☐ Presidio
  - George Lucas



“There is no TRY ... there is only DO!”

### VISUAL EFFECTS

Industrial Light & Magic makes  
the impossible possible

### SOUND

Skywalker Sound continues to  
redefine aural immersion

# Animation Studios: Pixar

Steve Jobs



Jobs in 2010

**Born** Steven Paul Jobs  
February 24, 1955  
San Francisco, California, U.S.

**Died** October 5, 2011 (aged 56)

## PIXAR ANIMATION STUDIOS



Pixar's headquarters in Emeryville, California

**Type** Subsidiary

**Industry** Computer animation, motion pictures

**Predecessor** The Graphics Group of Lucasfilm Computer Division (1979–1986)

**Founded** February 3, 1986; 33 years ago in Richmond, California, United States

**Founders** Steve Jobs  
Edwin Catmull  
Alvy Ray Smith

**Headquarters** 1200 Park Avenue, Emeryville, California, United States

John Lasseter



Lasseter in 2011

**Born** John Alan Lasseter  
January 12, 1957 (age 62)  
Hollywood, California, U.S.

**Residence** Glen Ellen, California, U.S.

**Alma mater** California Institute of the Arts (BFA)

**Occupation** Animator, film director, screenwriter, producer, voice actor

**Years active** 1978–present

**Employer** Walt Disney Animation Studios



The Steve Jobs Building at the Pixar campus in Emeryville

Titles	Movies	First release
<i>Toy Story</i>	4	November 22, 1995
<i>Monsters, Inc.</i>	2	November 2, 2001
<i>Finding Nemo</i>	2	May 30, 2003
<i>The Incredibles</i>	2	November 5, 2004
<i>Cars</i>	3	June 9, 2006



John Lasseter appears with characters from *Up* at the 2009 Venice Film Festival.



# Animation Studios: ILM

LUCASFILM  
Ltd

George Walton Lucas Jr. is an American filmmaker and entrepreneur. Lucas is known for creating the *Star Wars* and *Indiana Jones* franchises and founding Lucasfilm, LucasArts and Industrial Light & Magic. He served as chairman of Lucasfilm before selling it to The Walt



SKYWALKER RANCH

CREDITS

SKYWALKER RANCH

❖ San Rafael  
➤ Lucas Valley Road

❖ Presidio



Skywalker Ranch, located 40 minutes north of San Francisco, is the pastoral home to Lucasfilm's celebrated sound design, mixing and audio post-production facility, Skywalker Sound.

Skywalker Sound occupies the 153,000-square-foot Technical Building, which features a world-class scoring stage, six feature mix stages, 15 sound design suites, 50 editing suites, an ADR stage, two Foley stages, and the 300-seat Stag Theater. The property also includes the iconic Main House and the beautiful Lake Ewok.



# Animation Studios: ILM



WHO WE ARE

WHAT WE DO

PRODUCTIONS

CAREERS



## SAN FRANCISCO

Located in San Francisco's historic Presidio National Park, the Letterman Digital Arts Center is the...

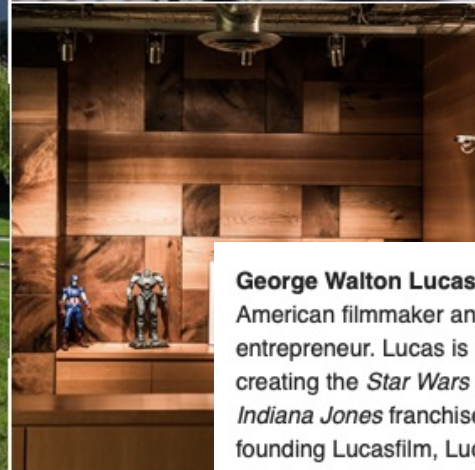
❖ Presidio

[ MORE ]



## VANCOUVER

In 2013, ILM planted roots in Vancouver, eventually expanding into a new 30,000 square-foot studio space...



**George Walton Lucas Jr.** is an American filmmaker and entrepreneur. Lucas is known for creating the *Star Wars* and *Indiana Jones* franchises and founding Lucasfilm, LucasArts and Industrial Light & Magic. He served as chairman of Lucasfilm before selling it to The Walt



## CHM Launches New Website

### New CHM Website Launches



(Click image for link.)

Hello World! Our New Digital Portal

CHM launches website with new visual identity and fresh content

We are excited to announce the launch of our new website! This will be the first redesign of the Museum's site in nearly a decade and we are thrilled to share the result of this first phase with you. As CHM has grown over the past 10 years, we have created new online content—from exhibits to blogs, expanded our live events and educational programming capacity, and broadened our research and archival efforts. Our new website will give audiences the opportunity to better engage with our content, programming, and collections, and will give CHM a state-of-the-art platform to explore topics at the intersection of technology and humanity on a global scale.

<https://computerhistory.org>

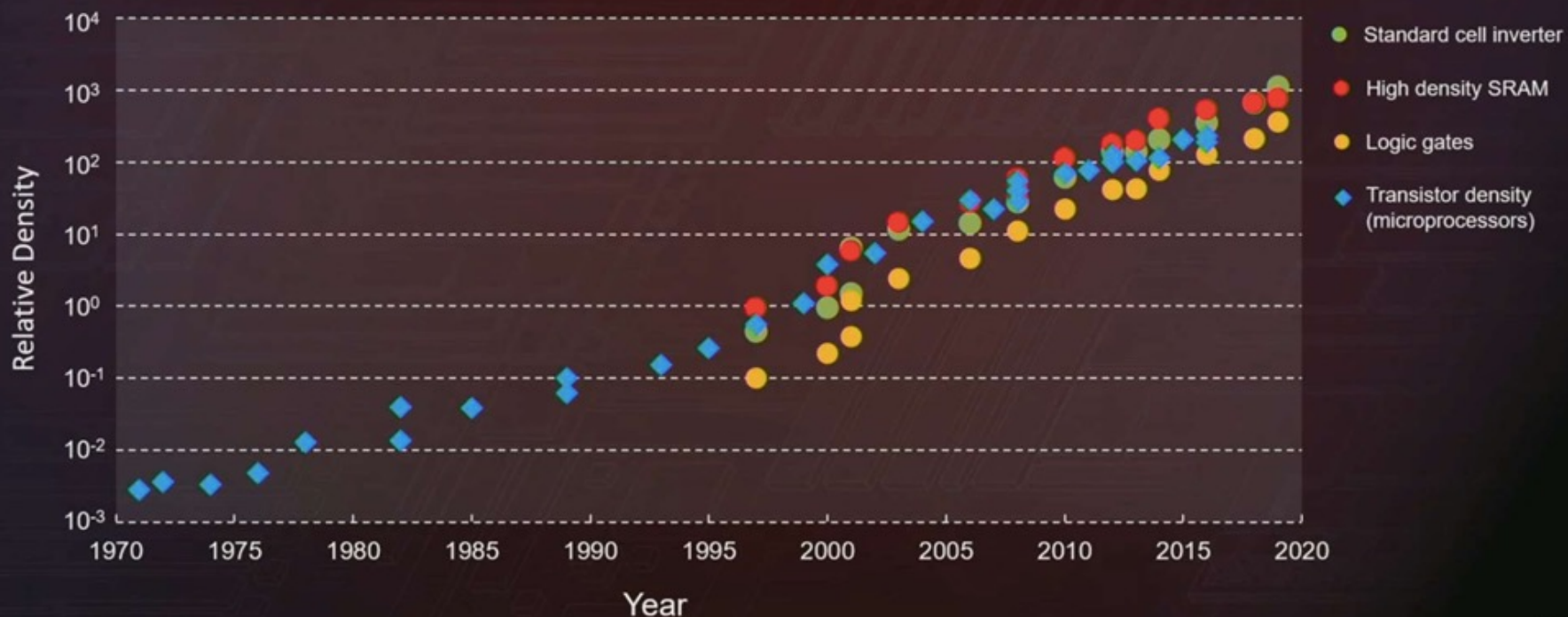
## Timeline of Computer History

<https://www.computerhistory.org/timeline/computers/>



# TSMC on Moore's Law

## MOORE'S LAW IS WELL AND ALIVE DENSITY: A NECESSARY ATTRIBUTE



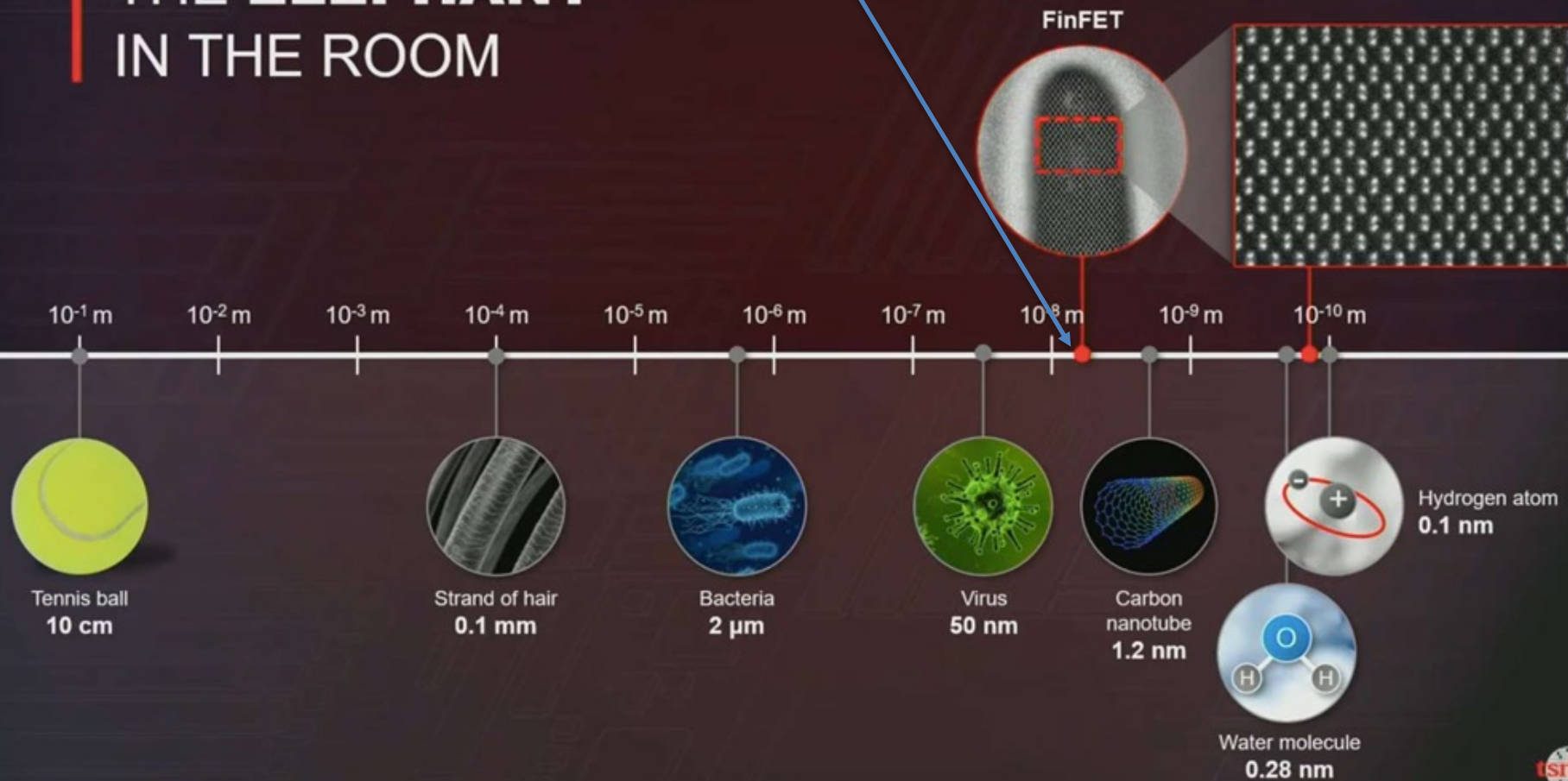
© 2019 TSMC, Ltd



# TSMC on Moore's Law

7-10 nm

## THE ELEPHANT IN THE ROOM



# Prices for Top CPU's

## THE BEST CPUS AT THE BEST PRICE

AMD Ryzen 7 2700X Processor with Wraith Prism LED Cooler – YD270XBGAFBOX



amazon.com

~~\$329.00~~  
**\$236.46**

[VIEW](#)

Intel Core i5-8500 Desktop Processor 6 Core up to 4.1GHz Turbo LGA1151 300 Series 65W



amazon.com

**\$239.97**

[VIEW](#)

Intel Core i9-9900K Desktop Processor 8 Cores up to 5.0 GHz Turbo unlocked LGA1151 300 Series 95W



amazon.com

**\$494.99**

[VIEW](#)

Sep 2019

## FORTUNE

Subscribe

**TECH • QUANTUM COMPUTING**

# Google Claims 'Quantum Supremacy,' Marking a Major Milestone in Computing

Robert Hackett

September 20, 2019

# Google QC

Sep 2019

The Google team, which first wrote about their goal in a [Nature article two years ago](#), appears to be more hopeful about the short-term prospects of its findings. “As a result of these developments, quantum computing is transitioning from a research topic to a technology that unlocks new computational capabilities,” the researchers write.

“We are only one creative algorithm away from

applications.” He added, “Quantum computers will never reign ‘supreme’ over classical computers, but will rather work in concert with them, since each have their unique strengths.”



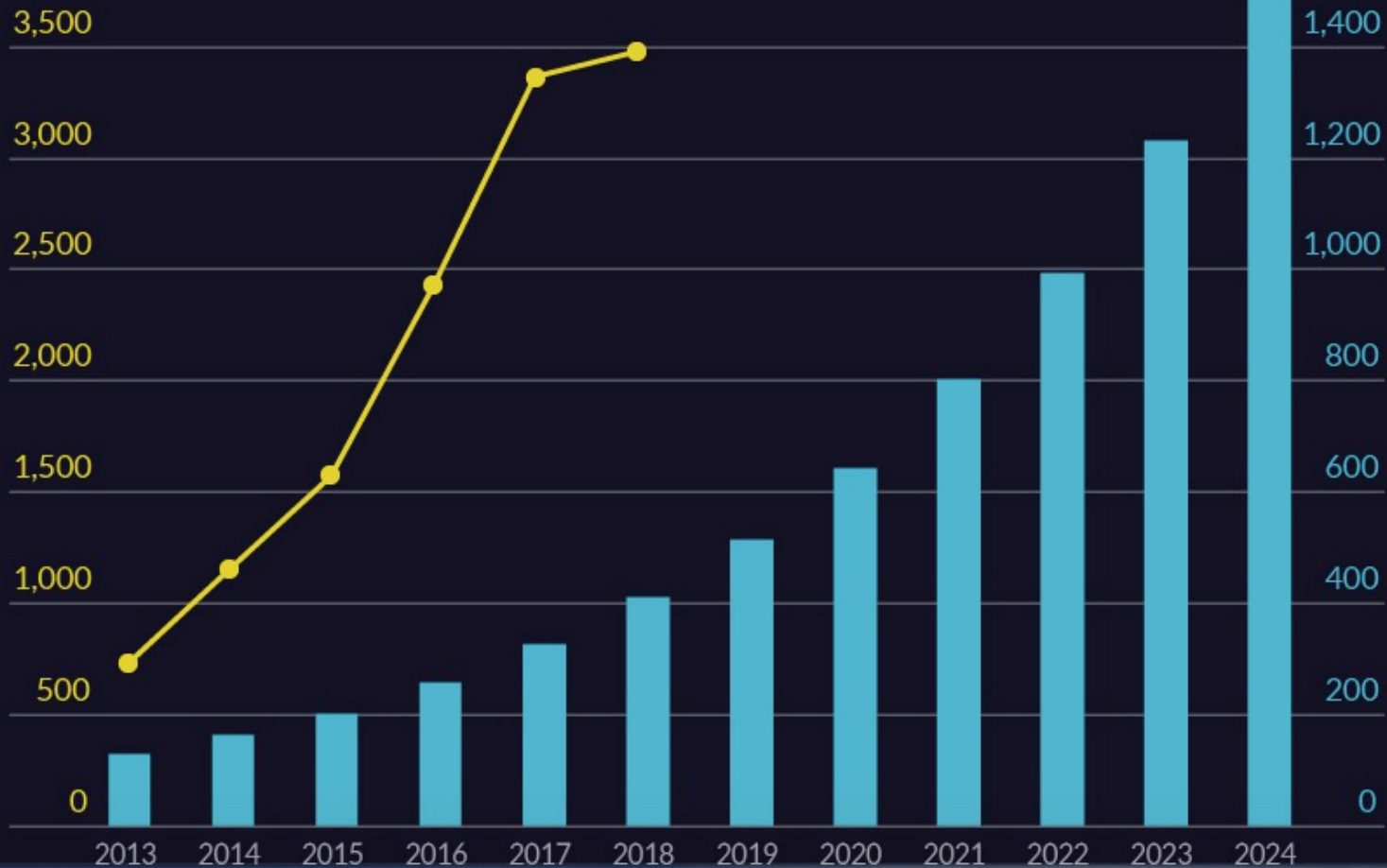
# Chinese Classroom Cameras

## China's Facial Recognition Technology is Developing Quickly

Number of facial recognition-related  
patents in China  
4,000

Facial Recognition

Scale of China's facial recognition market  
(millions of dollars)  
1,600



# Chinese Classroom Cameras

## Facial Recognition



A programmer at Hanwang Education's research center demonstrates the company's "Class Care System" in Beijing, Jan. 2, 2019. Xue Yujie/Sixth Tone

# HOW "CLASS CARE SYSTEM" WORKS



## Facial Recognition

### CAPTURING

Hanwang's camera takes a photo of the entire class once per second and sends the footage to a server housed elsewhere in the school.



### SCANNING

The server analyzes the footage and identifies each student's face



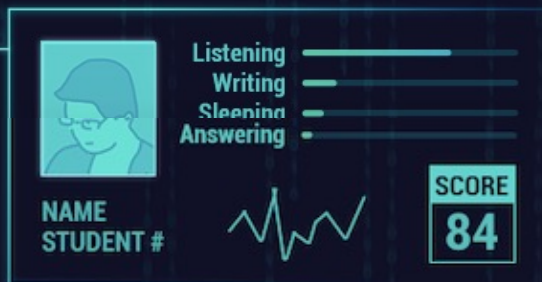
### STORING

The facial data is encrypted and stored in Hanwang's server



### CLASSIFICATION

Students' in-class behaviors are placed into five categories, powered by deep-learning neural networks



Hanwang's deep-learning algorithms then analyze each student's behavioral data and score each student between 0 to 100 every week. The scores are sent to teachers, parents, and school leaders through a mobile app.



# Chinese Classroom Cameras

## Facial Recognition

There are four stages in modern-day facial recognition:



### DETECTION

Identify faces in photos or videos

### ALIGNMENT

Standardize detected faces for qualities like orientation and size

### REPRESENTATION

Compute a “face signature” for each detected and aligned face, which is a “string of numbers that represent a particular image of a face.”

### CLASSIFICATION

Run face signatures through a stored database of user “face templates” to look for matches



Airports



Public  
transportation



Banks &  
financial  
institutions



Shopping  
malls



Stadiums



Educational  
institutions

**WHERE FACIAL RECOGNITION SYSTEMS  
ARE USED IN CHINA**

# Chinese Classroom Cameras

## Facial Recognition

Everyone I talked to at Hangzhou No. 11 Middle School and Niulanshan First Secondary School expressed skepticism about the accuracy and reliability of facial recognition technology. As part of their smart campus initiative, Hangzhou No. 11 uses Hikvision's facial recognition cameras to record the students' attendance rate and for on-campus payments, but it doesn't seem to work very well. A female student told me that Hikvision's system is particularly inaccurate for girls. "Once we change our hairstyles or wear glasses, the camera won't recognize [us] anymore," she says through text. The different lighting and angles of their faces also slow down the recognition process, making the lines during lunch extremely long.

"The technology is not perfect yet," admits Professor Wang Shengjin, "but you can't always wait for technology to become perfect before using it." Wang believes that practice makes perfect: The more we use facial recognition technology, the more problems we discover and solve, ultimately leading to perfected facial recognition systems.



IBM

Red Hat supplies our Linux



\$34B

# Women in Computing

---

## Debugging

The Eniac women were among the first coders to discover that software never works right the first time — and that a programmer's main work, really, is to find and fix the bugs. Their innovations included some of software's core concepts. Betty Snyder realized that if you wanted to debug a program that wasn't running correctly, it would help to have a "break point," a moment when you could stop a program midway through its run. To this day, break points are a key part of the debugging process.

# Gender Aware Software



## LEARNING Webinar

### April 25 ACM SIGSOFT Talk, "Gender-Inclusivity Software Engineering" with Margaret Burnett and Anita Sarma

Register now for the next free ACM SIGSOFT Learning Webinar, "**Gender-Inclusivity Software Engineering**" presented live on **Thursday, April 25 at 12 PM ET** by **Margaret Burnett**, Distinguished Professor at Oregon State University and **Anita Sarma**, Associate Professor at Oregon State University. **Alexander Serebrenik**, Associate Professor of software evolution at Eindhoven University of Technology, will moderate the questions and answers session.



*(If you'd like to attend but can't make it to the virtual event, you still need to register to receive a recording of the webinar when it becomes available.)*

Note: You can stream this and all ACM SIGSOFT Learning Webinars on your mobile device, including smartphones and tablets.

Gender inclusiveness in software companies is receiving a lot of attention these days, but it overlooks a potentially critical factor: software itself. Research shows that different people often work differently with software, and that some of these differences statistically cluster by gender. In this talk, we'll begin by presenting a method we call GenderMag, which can be used to find and fix "inclusivity bugs" — gender biases in software that support people of one gender less well than people of another gender. As we'll explain, at the core of the method are five facets of cognitive style differences that are also statistically gender differences, drawn from a large body of foundational



❖ Inclusivity bugs

# Autonomous Cars

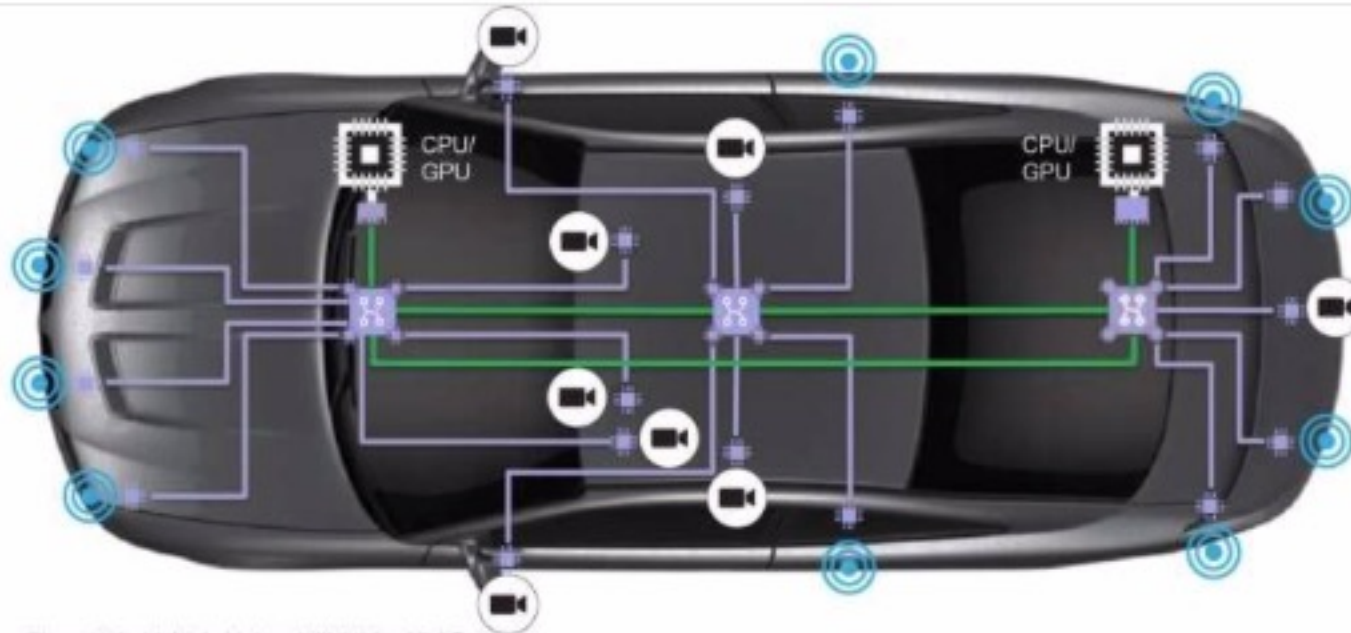


Figure 3: In-Vehicle Network (IVN) for ADAS



Switch with Multiple PHYs



Controller



PHYs/Bridges

Ethernet link – 2.5 / 5 / 10G

Ethernet link – 25G



Radar, Lidar, Sonar



Camera

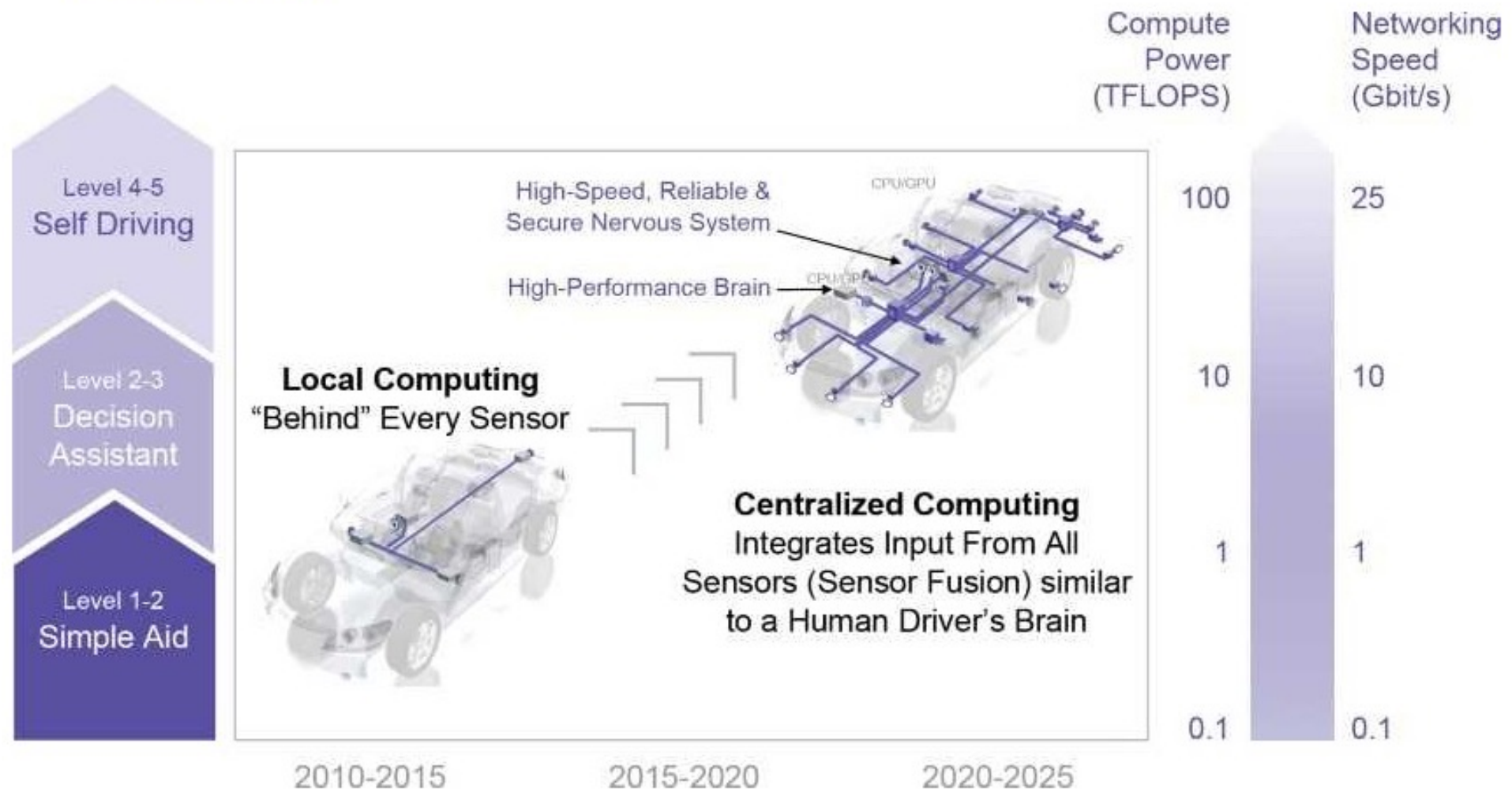


# Autonomous Cars

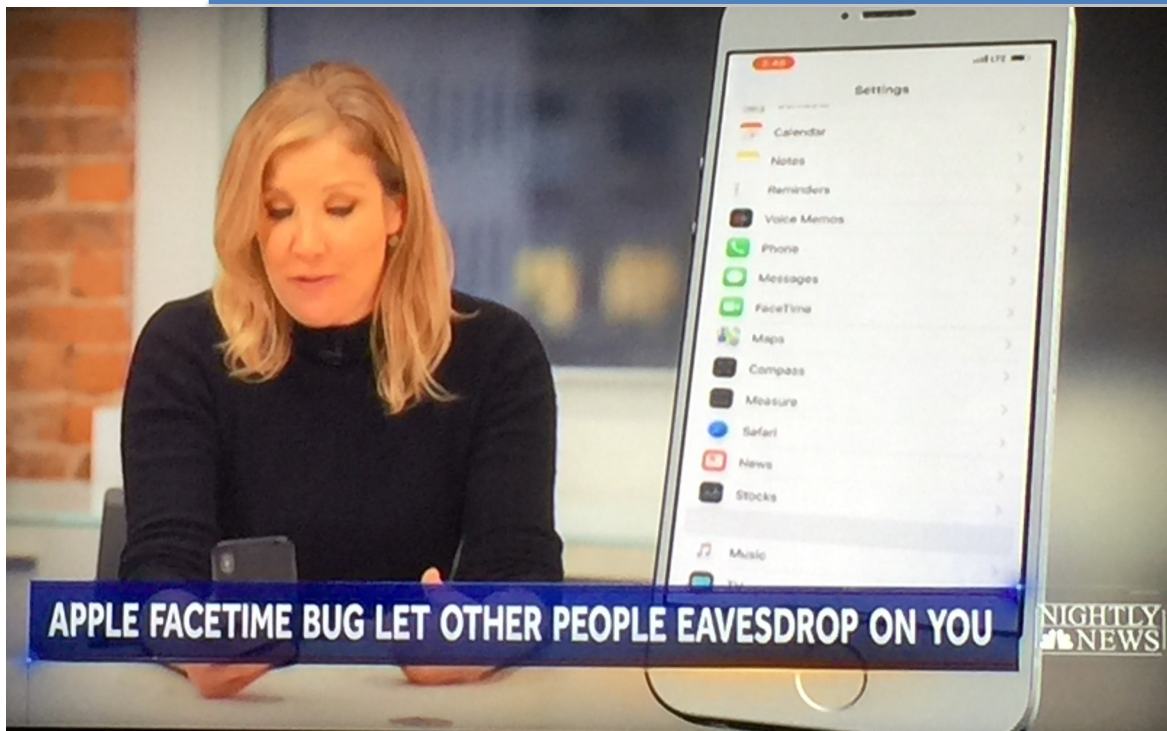
## In-Vehicle Network Demands

(Note: display size on this page is limited to 1024px wide. Use URL below to retrieve raw file.)

URL: </assets/files/4451.jpg>

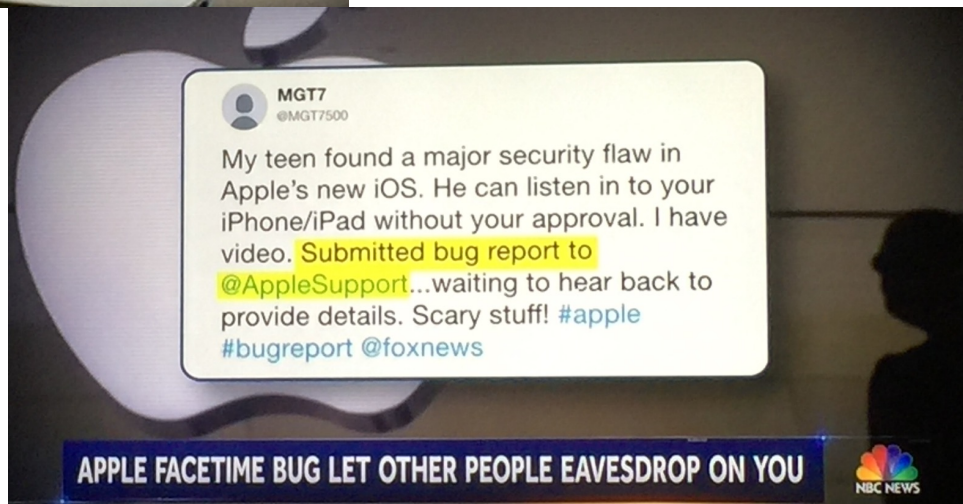


# Apple Facetime Bug



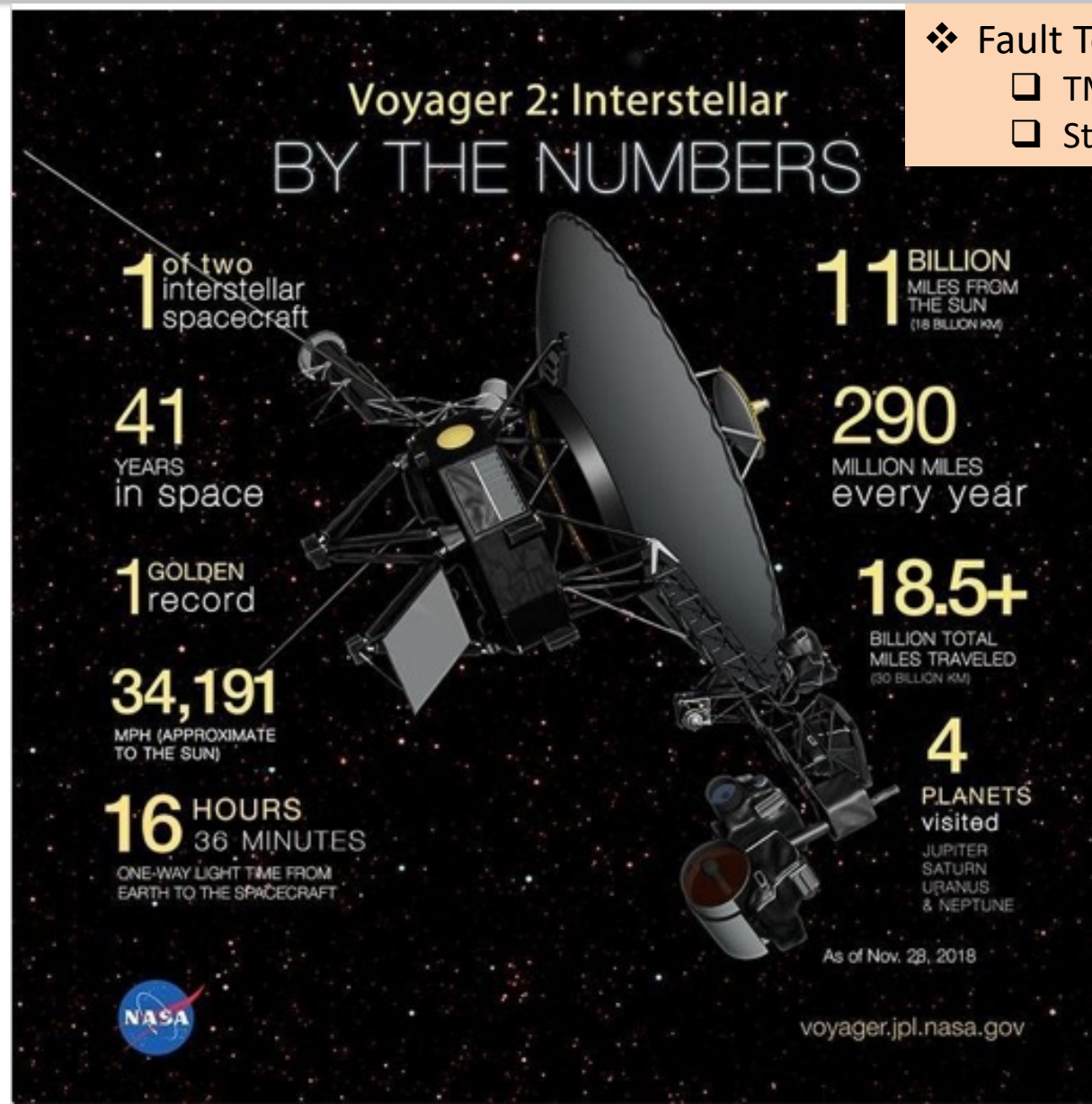
❖ Apple will issue a software update

✓ SDLC stages 4-6



# Hi-Rel Spacecraft

- ❖ Fault Tolerance
  - ❑ TMR
  - ❑ Standby spares





# Another Crash

## CRASH RENEWS BOEING JETLINER WORRIES

Ethiopian Airlines  
accident involves a  
737 Max, the same as  
in Indonesian failure.

BY RALPH VARTABEDIAN

The crash of an Ethiopian Airlines Boeing 737 Max jetliner on Sunday, which killed all 157 aboard, had uncanny similarities to a fatal accident in Indonesia five months earlier, raising disturbing questions about a mainstay aircraft that airlines have bought by the hundreds.

The flight left Ethiopia's capital, Addis Ababa, about



EPA/Shutterstock

**RESCUE WORKERS** remove debris from the site where an Ethiopian Airlines Boeing 737 Max crashed near Bishoftu, Ethiopia, killing all 157 aboard. Another 737 Max crashed after takeoff from Jakarta in October.



# Airplane Automation

## Milestones in aviation automation

**1917** — Sperry Corp. develops the first rudimentary autopilot that uses gyroscopes to reduce pilot workload.

HW

**1932** — First instrument landing at Berlin-Tempelhof Central Airport, using the Lorenz beam system.

**1949** — Bill Lear wins the Collier Trophy, aviation's most coveted award, for development of the Automatic Pilot and Automatic Approach Control System at Santa Monica. Two years earlier a U.S. Air Force C-54 made a transatlantic flight, including takeoff and landing, completely under the control of the Lear autopilot.

**1964** — First fully automatic landing using an instrument landing system, at Bedford Airport, United Kingdom.

**1982** — The first modern flight management system, including an autothrottle that operates like cruise

SW

control in a car, is introduced in the Boeing 767.

**1987** — The first use of a fly-by-wire system on a passenger jet on the Airbus 320. Fly-by-wire takes pilot input and calculates the control-surface movements required to deliver the result.

**1995** — Boeing's new 777 has a fly-by-wire system with flight envelope protection, which is supposed to prevent stalls or excessive stressful movements, though a pilot can override.

**2016** — Boeing introduces the 737 Max, which incorporates the maneuvering characteristics augmentation system, or MCAS. It helps control an aircraft's tendency to pitch up in certain conditions.

**2018** — Boeing announces a program to research a pilotless commercial jetliner.

But automated flight systems are also implicated in a series of incidents in which they made the wrong decisions and pilots did not fully understand the complex software that adjusts flight controls constantly during automated takeoffs, landings and high-altitude cruising.

Crash!

The two accidents also highlight the potential risks of basing automated flight control decisions on readings by only two sensors — which can create uncertainty when one fails.

"A lot of the optimization that the computer is doing is not made clear to the pilot," said Douglas Moss, an instructor at USC's Viterbi Aviation Safety and Security Program. He is a former United Airlines captain and before that, an Air Force test pilot, as well as an attorney. "The pilot is sitting there for 10 or 15 seconds trying to figure out why the computer is pitching up the nose or adjusting the throttle. I can think of thousands of times when the autopilot or flight management system would do something that caught me by surprise. Almost always, it is the right thing to do, but it is the pilot who is responsible for the safety of the flight."



# Another Crash



KCAL/CBSLA

**SEVERAL** U.S. airlines said the upgrades to the 737 Max announced by Boeing appeared to be adequate. Above, Southwest 737 Max jetliners in Victorville.

## Boeing says it'll update key 737 Max software

In response to crashes, it will also boost pilot training, make air flow data display standard.

ated features in the 737 Max's flight control system may have contributed to two fatal crashes: a Lion Air flight in Indonesia that killed 189 people in October and an Ethiopian Airlines flight in March that killed

slow response, one aviation safety expert said.

"Had all these mitigations that are now being identified been implemented in the initial release of the aircraft, then we would not be here," said

This just in ...

NIST

Search NIST

NEWS

## Historic Vote Ties Kilogram and Other Units to Natural Constants

November 16, 2018



The U.S. delegation at the 26th General Conference of Weights and Measures where more than 55 countries voted to redefine four of the seven base units for the International System of Units (SI). L-to-R: Eric Lin, director, Material Measurement Lab, NIST; Claire Saundry, director of International and Academic Affairs Office, NIST; Willie May, U.S. member of the International Committee on Weights and Measures and former NIST director; NIST Director and Undersecretary of Commerce Walter Copan; Barbara Cordero, finance analyst, Office of Management Policy and Resources, IO, Department of State and James Olthoff, Acting Associate Director of Laboratory Programs, NIST.

*Credit: G. Porter/NIST*



Undersecretary of Commerce for Standards and Technology Walter G. Copan votes yes on the resolution to redefine the International System of Measurements at the 26th General Conference on Weights and Measures today in Versailles, France. Delegates representing 60 nations passed the resolution unanimously.

*Credit: Hans Michel/Courtesy BIPM*

This just in ...

## Quantum Advantages

Scientists have dreamed of having an accurate and precise measurement system that could be realized anytime, anywhere, since the 1700s. Scientific advances in quantum science, many of which have occurred at NIST and other NMIs around the world, have finally made this possible.

Quantum phenomena that are identical everywhere are already used to define the second, which is the SI unit for time, and the meter, the SI unit for distance. The second is defined as 9,192,631,770 natural oscillations of microwave radiation released by the element cesium and the meter is defined as the distance traveled by light in vacuum in 1/299,792,458th of a second. These revised definitions, implemented in 1967 and 1983, respectively, were necessary for the invention of GPS and many other modern technologies.

In May 2019 when the revised definition of the kilogram is implemented, it will be based on three fundamental constants: the Planck constant, the speed of light and the cesium atom's natural microwave radiation. The Planck constant describes the size of the packets of energy or quanta that atoms and other particles use to absorb and emit energy.

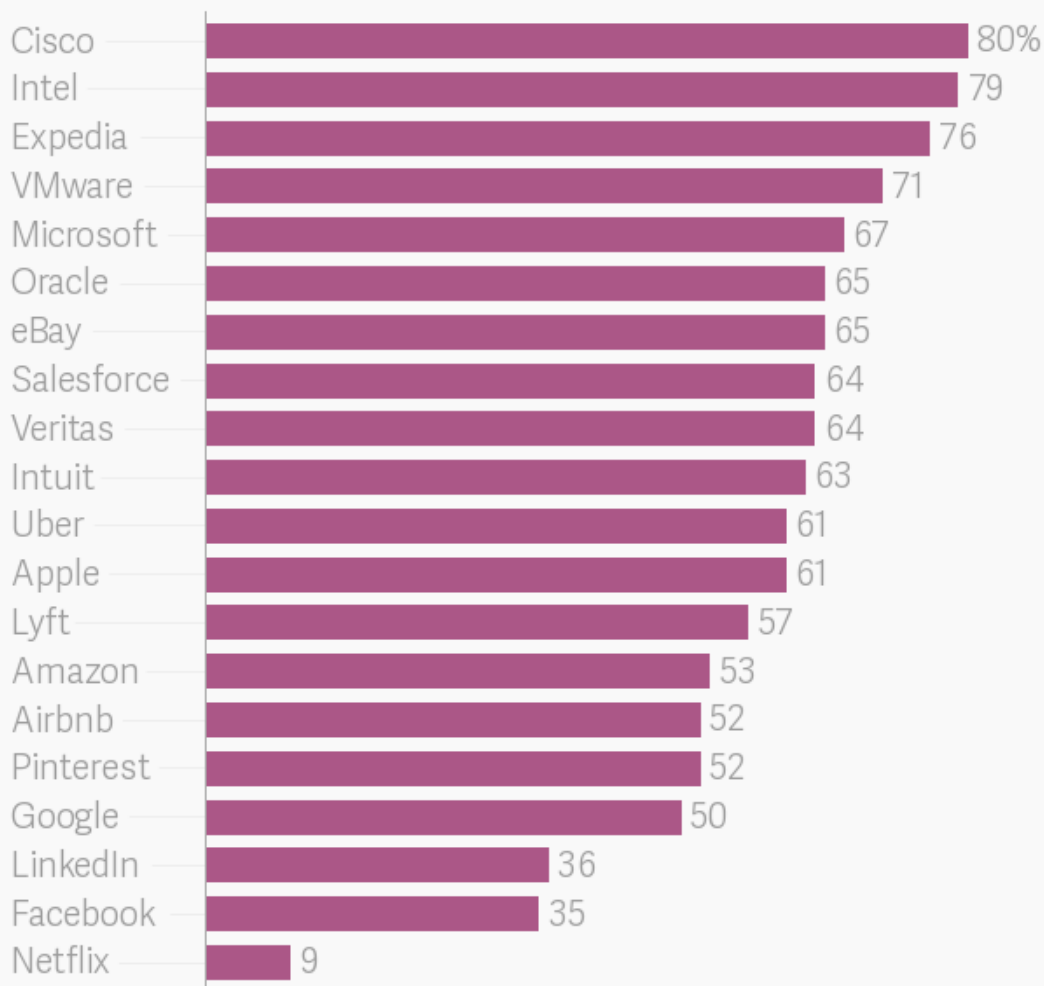
Kg

The current kilogram mass exerts a specific amount of force in Earth's gravity. The revised definition replaces this determination of mechanical force with an electromagnetic measurement tied to the Planck constant and based on electrical current and voltage. Using an instrument called a Kibble balance, after its inventor Bryan Kibble, an electric current is generated in a coil to produce a magnetic field strong enough to balance a mass of one kilogram. The method requires a precision measurement of local gravity, which varies depending on elevation and several other factors. It also requires moving the coil through a magnetic field of known strength and at a known speed, hence the tie as well to constants used to determine time and frequency.



# Tech Worker Pay

Percent of tech workers who believe they're underpaid



# Engineering Salaries

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## *Business News*

### **Engineering Salaries growing slowly**

New projections from the Bureau of Labor Statistics reveals lukewarm growth for engineering salaries and job growth.

Overall job prospects over the coming decades varies by engineering discipline. Some disciplines are expanding at a good clip, while others are declining. Overall employment of engineers is projected to grow 3% over the decade, adding about 67,200 new jobs.

The employment growth rate for engineers is slower than the average for all occupations, in part because several occupations in the group are projected to decline as improvements in technology, such as design software and plant automation, make workers more productive.

The median annual wage for engineers is currently \$76,870. That's more than twice the median annual wage for all occupations in the economy, which is \$36,200.

*Source: Design News (2016-09-07)*

[Engineering Salaries and Job Prospects Are Growing Slowly](#)

## **Who Would Win the Coding Olympics?**

*The Washington Post (08/30/16) Karen Turner*

U.S. programmers landed in 28th place among their international peers in a HackerRank compilation of the results of 1.4 million coding challenges by approximately 300,000 developers. China topped the list of the most accomplished coders, followed by Russia, Poland, Switzerland, and Hungary. The ranking found China's top coding category was algorithms, while Russia's was data structures. A key factor in these nations' coding success is likely the introduction of math and computer education at a much earlier age than occurs in the U.S., says HackerRank CEO Vivek Ravisankar. "In my opinion, the U.S.'s position here mirrors a lot of the other world ranking reports, such as STEM (science, technology, engineering, and math) education performance, or even other international coding competitions," he says. Last year's Pew Research Center analysis of STEM test scores found U.S. students were middle-of-the-pack underperformers compared to those in Singapore and South Korea. Moreover, this year's International Olympiad in Informatics was led by Chinese, Russian, and Eastern European contestants, while the highest-scoring U.S. coder came in 15th place. The Chinese and Russians also scored victories at the ACM International Collegiate Programming Contest, and at Google Code Jam.

# Agile (PM/SE)

August 2018

Seventeen years ago **agile** began as a simple manifesto. Now, with all the methods and frameworks formulated in its name, it has become fat and flabby. We have reached a point where what we set out to change (big prescriptive methods) has returned, but now under the banner of being agile. The **Heart of Agile** is an attempt to return to agile's real core. But are the four words collaborate, deliver, reflect, and improve enough to get practitioners to implement the true heart of agile?

**Essence**, a new common ground for **software engineering** is an attempt to find a middle ground between the very core of agile and all the multitude of competing implementations of agile. In this presentation you will learn how Essence can strengthen the Heart of Agile without getting into particular ways of doing agile.



# Engineering Salaries

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# Google Cloud Apps

## New version of Google App Engine supports all programming languages



Initially, it supports supports 7 languages including Java 8, Ruby, Go, Python 2/3, C#, PHP 5/7 and Node.js. But it also allows programmers to bring their own language runtimes, frameworks, and third party libraries and App Engine handles all the management for the developers giving them that flexibility to bring the tools they like to work with without having to deal with the management, the biggest advantage of using a cloud service in the first place.

Finally, the company will let developers bring a programming package (binary) to App Engine as a Docker image.

# Fed Govt Open Source

## OMB launches Code.gov repository for open source projects

Library of Reusable Code

After issuing policy encouraging agencies to release more custom-developed software for use by other agencies, OMB launched a new website to facilitate that all in one place.

The Obama administration launched Thursday [Code.gov](#), a new repository for government open source code now featuring nearly 50 open source projects from more than 10 agencies.

Coders can expect to see more projects on the site in the coming months as agencies implement the recently released [Federal Source Code Policy](#), U.S. CIO Tony Scott said in a [blog post](#) announcing the launch.

The [Federal Source Code Policy](#) seeks to get agencies to release more of their custom-developed software. The policy notably establishes a pilot program requiring agencies to release at least 20 percent of new custom-developed code as open source software.



# Data-Oriented Dev

---

Around 2008 I was being interviewed for a job in the finance industry. The guys at the interview were asking me to design classes for Animal/Dog/Cat and methods like Animal.Speak, etc. The classical OOP example. I was trying to explain them that you can do OOP, but if you're going to have thousands of objects it would make more sense to proceed [DOD \(data-oriented-development\)](#) and procedural programming, because that will run faster and will be more thread friendly in the end. I didn't get the job. As a feedback I was told that they thought that I didn't **get** OOP :) I laughed and I was glad to find a job elsewhere. I was coming from game development where DOD was a new trend (at least at DICE/Electronic Arts). If you wanted your game to work fast on PS3 you had to think about your data layouts. You had to slice up your data into minimal streams that are processed in one go in order to avoid jumping all over the memory. Writing code in procedural way goes hand in hand with that. It's much easier to parallelise your code if it's written in procedural, rather than OOP way.

I don't think this DOD and procedural programming will be a new trend. It never became one in mainstream development, because such top notch high-performance is not an issue in 99% of applications.

However, if anything were to replace OOP it can't be other than DOD. Nonetheless, I would highly recommend to familiarise yourself with DOD and procedural programming if you're interested in high performance computing.

# 47<sup>th</sup> Internet Anniversary

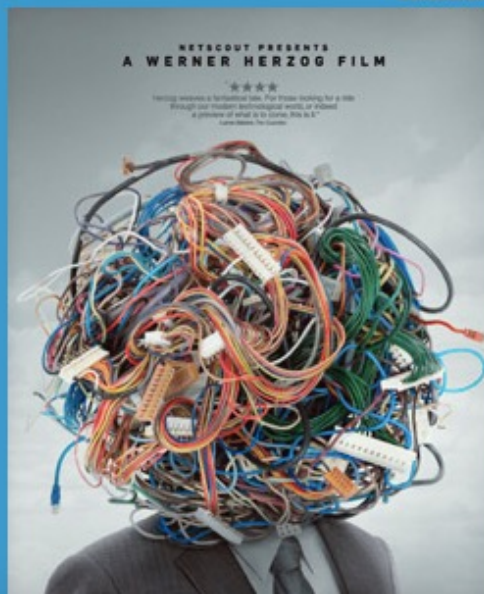
**UCLA ENGINEERING**  
Henry Samueli School of  
Engineering and Applied Science  
*Birthplace of the Internet*

**Happy Birthday, Internet!**

To help us celebrate the birthday of the Internet  
you and a guest are invited to attend a special screening of

## LO and BEHOLD

Featuring a Q&A session with  
**Leonard Kleinrock**  
Emeritus Distinguished Professor of Compute



**DATE**  
**Saturday, October 29, 2016**

**TIME**  
**2:30 p.m.**  
*Doors open at 2:00 p.m.*

**LOCATION**  
**Boelter Hall 3400**  
UCLA Henry Samueli School  
of Engineering and Applied Science  
Los Angeles, CA 90095

Movie snacks will be provided.

# Perspective

---

## Industry News

# Smartphones

## ❖ Samsung Galaxy Note 7

➤ ON FIRE!

### ❑ Biometrics for authentication

➤ Fingerprints

➤ Iris scan



## ❖ Apple iPhone 8/X

### ❑ Wireless headphones

### ❑ Biometrics for authentication

➤ Fingerprints

➤ Facial scan

### ❑ iOS 11

➤ 11.2.2



Apple intros totally wireless  
AirPods that use new W1 chip



<http://www.cnet.com/news/apple-unveils-new-iphone-7-is-a-familiar-phone-for-unfamiliar-challenges/?ftag=CAD-04-10aac3a&bhid=23599471486470272123438436875388&ftag=CAD-04-10aac3a>



# Neuralink

## Technology

### **Interfacing The Brain To A Computer**

<https://www.youtube.com/watch?v=0jOjh6lwp9w&feature=youtu.be&fbclid=IwAR1f6hb65is2zqKDJJ-xDuPnlqm7-O8vcRXX0q4dcFTMPUTgHIhaG-2Fqx4>

#### Neuralink



The brain-machine interface  
(Click image for link.)

Neuralink is a company set up by Elon Musk in 2016 that is exploring the human brain and how it can be connected to a computer interface. Operating at a much smaller scale than Tesla or SpaceX, this conceptual startup aims to use this brain-machine interface to integrate humans with artificial intelligence by surgically implanting processors into our brains with a procedure that is said to be no more invasive than something like LASIK surgery.

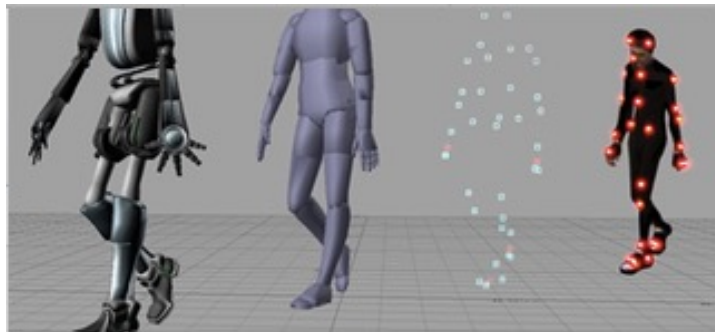
#### Neuralink

*Source: Interesting Engineering (26 Mar 2020)*



# 2020 Turing Award

- **Edwin Catmull** (*pictured*) and **Pat Hanrahan** are awarded the Turing Award for their work on **computer-generated imagery**.



**Computer-generated imagery (CGI)** is the application of computer graphics to create or contribute to images in art, printed media, video games, films, television programs, shorts, commercials, videos, and simulators. The visual scenes may be dynamic or static and maybe second-dimension (2D), though



**Patrick M. Hanrahan** is a computer graphics researcher, the Canon USA Professor of Computer Science and Electrical Engineering in the Computer Graphics Laboratory at Stanford University. His research focuses on rendering algorithms, graphics processing units, as well as



Edwin Catmull

**Edwin Earl Catmull** is a retired American computer scientist and former president of Pixar and Walt Disney Animation Studios. As a computer scientist, Catmull has contributed to many important advances in 3D computer graphics.

# Election Systems

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## Voting



# Elections – Voting

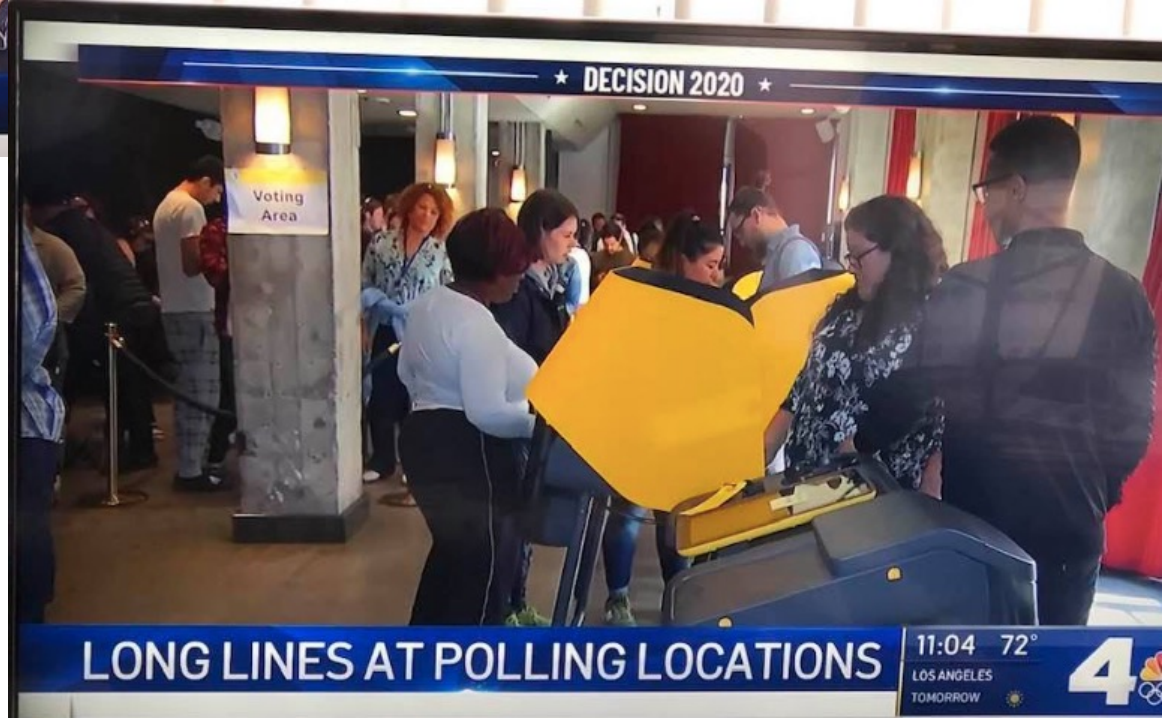
- ❖ New Vote Centers
- ❖ New Voting Machines



Online Voting!



Jeff Drobman really long lines too!





# Elections – Voting



## Interactive Sample Ballot

### Access your sample ballot

Your voter registration information is used to find your sample ballot.  
This information is not tied to your selections.

Last Name

Date of Birth

Example: January 12, 1964

PRESIDENTIAL PRIMARY ELECTION	
CORY BOOKER Democratic	
PETE BUTTIGIEG Democratic	
✓ Complete write-in selection at vote	
Language	
Spanish	中文
Tháng Việt	Tagalog
Tiếng Việt	Tagalog
Tiếng Việt	Tagalog
Tiếng Việt	Tagalog

Jeff Drobman Texas one of many southern states suppressing voting by minorities.



the Guardian  
Texas closes hundreds of polling sites, making it harder for minorities to vote

# Internet 50 – UCLA Medal

Prof. Leonard Kleinrock



Chancellor Block

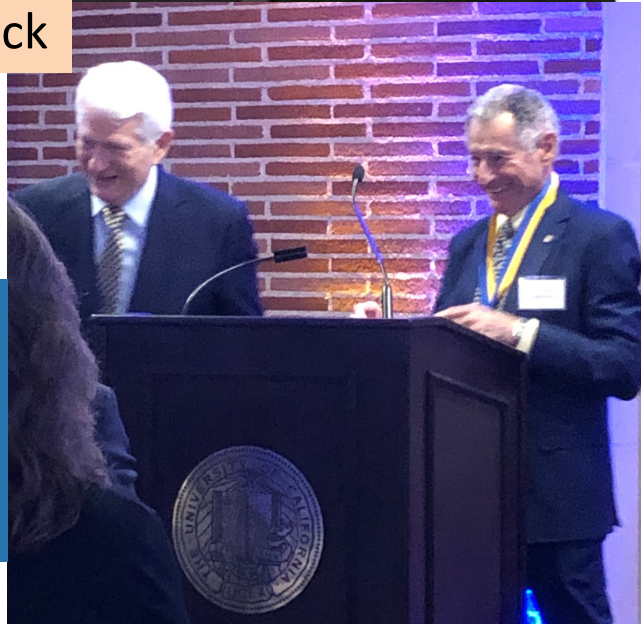


Chancellor Gene Block and Mrs. Carol Block  
cordially invite you to a dinner honoring

**Leonard Kleinrock**

with the presentation of the UCLA Medal  
in recognition of his extraordinary accomplishments

Friday, February 21, 2020



# Health

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## Viruses



❖ Defense: antioxidants

❖ Offense: immune system

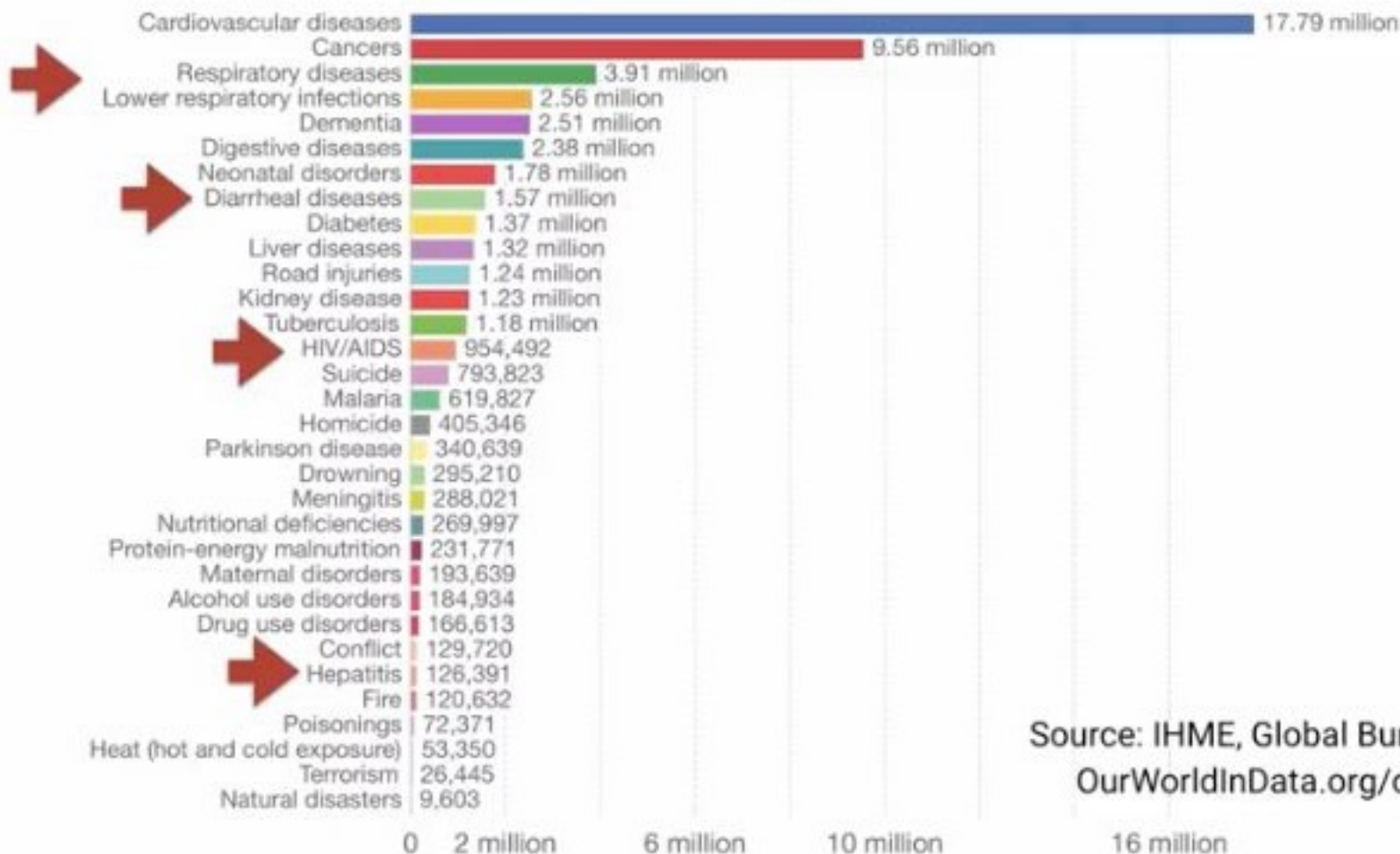




# Viruses

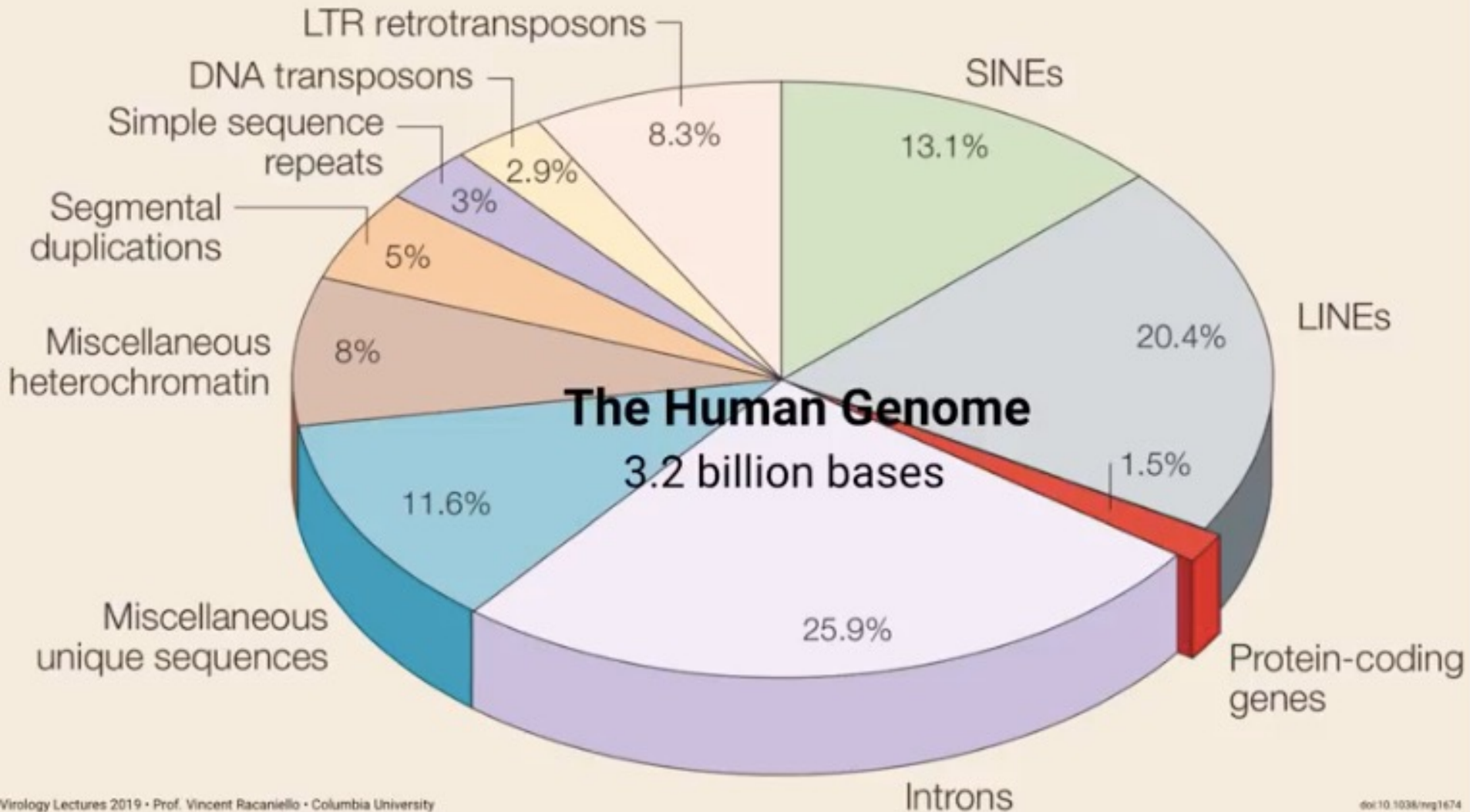
perspective on ALL causes of death

## Causes of 2017 global deaths



Source: IHME, Global Bur  
OurWorldInData.org/c

# Viruses



# Viruses



**Jeff Drobman** this follow up video on viruses in general is really good too:

[https://www.youtube.com/watch?v=wUgEhfo\\_qxU](https://www.youtube.com/watch?v=wUgEhfo_qxU)



YOUTUBE.COM

**Viruses: Molecular Hijackers**

Like · Reply · Remove Preview · 47m



**Jeff Drobman** and if you have 2 hrs for a thorough video from UCSF, here you go:

<https://www.youtube.com/watch?v=bt-BzEve46Y>



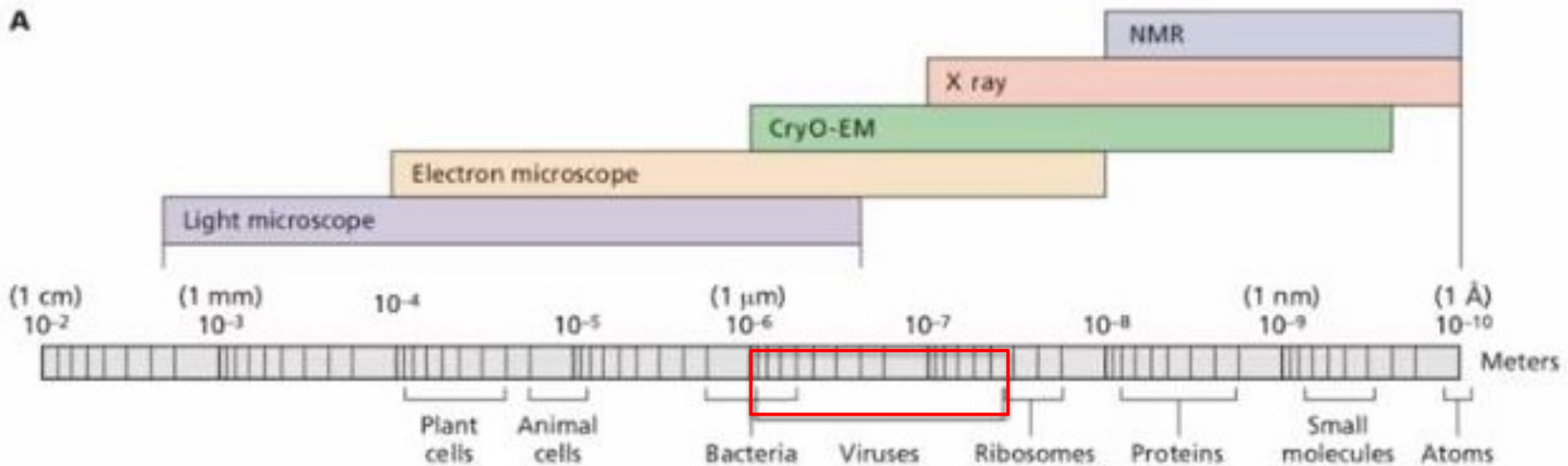
YOUTUBE.COM

**UCSF Experts on the Epidemiology,  
Science, & Clinical Manifestations of...**

# Viruses

size scale shows how small viruses can be. but he said there is a wide range in size, from  $<0.2\mu\text{m}$  to  $>1.2\mu\text{m}$ .

A



Virus  $\approx$  1/100 size of cells



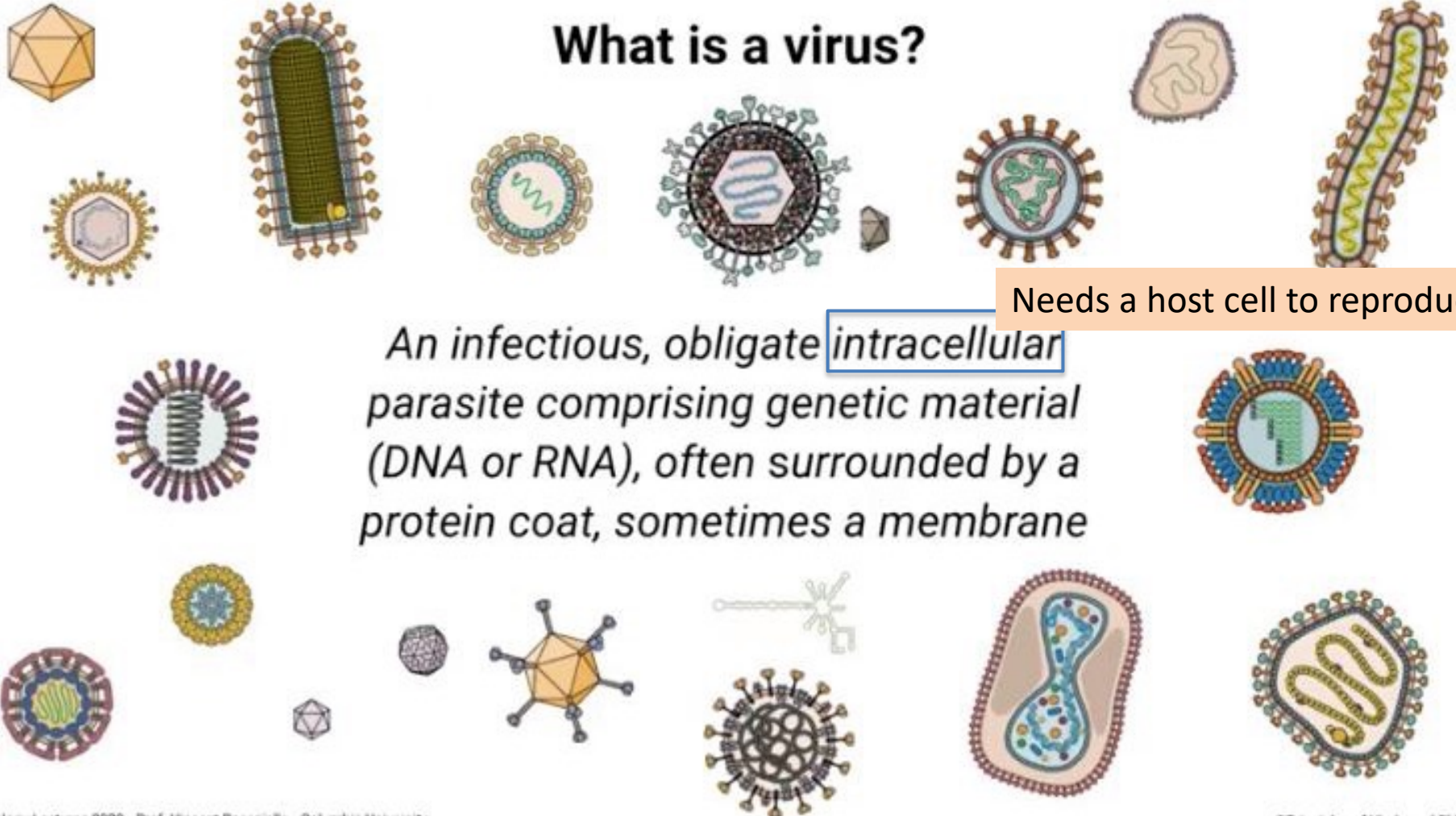
# Viruses

— prof seeking to define a "virus". is it "living" he asks. says there are 2 phases of living/not. —

## What is a virus?

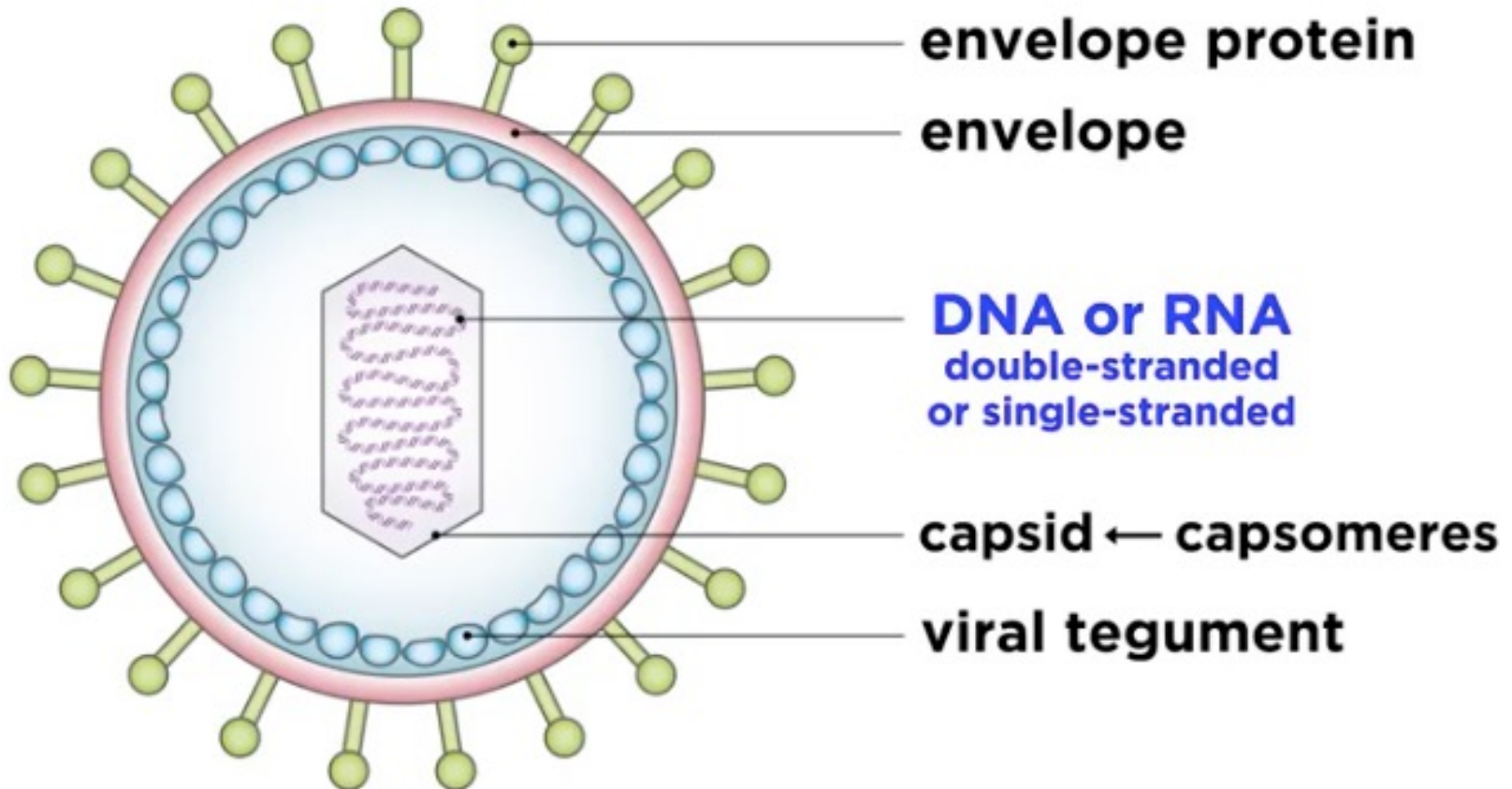
Needs a host cell to reproduce

*An infectious, obligate intracellular parasite comprising genetic material (DNA or RNA), often surrounded by a protein coat, sometimes a membrane*

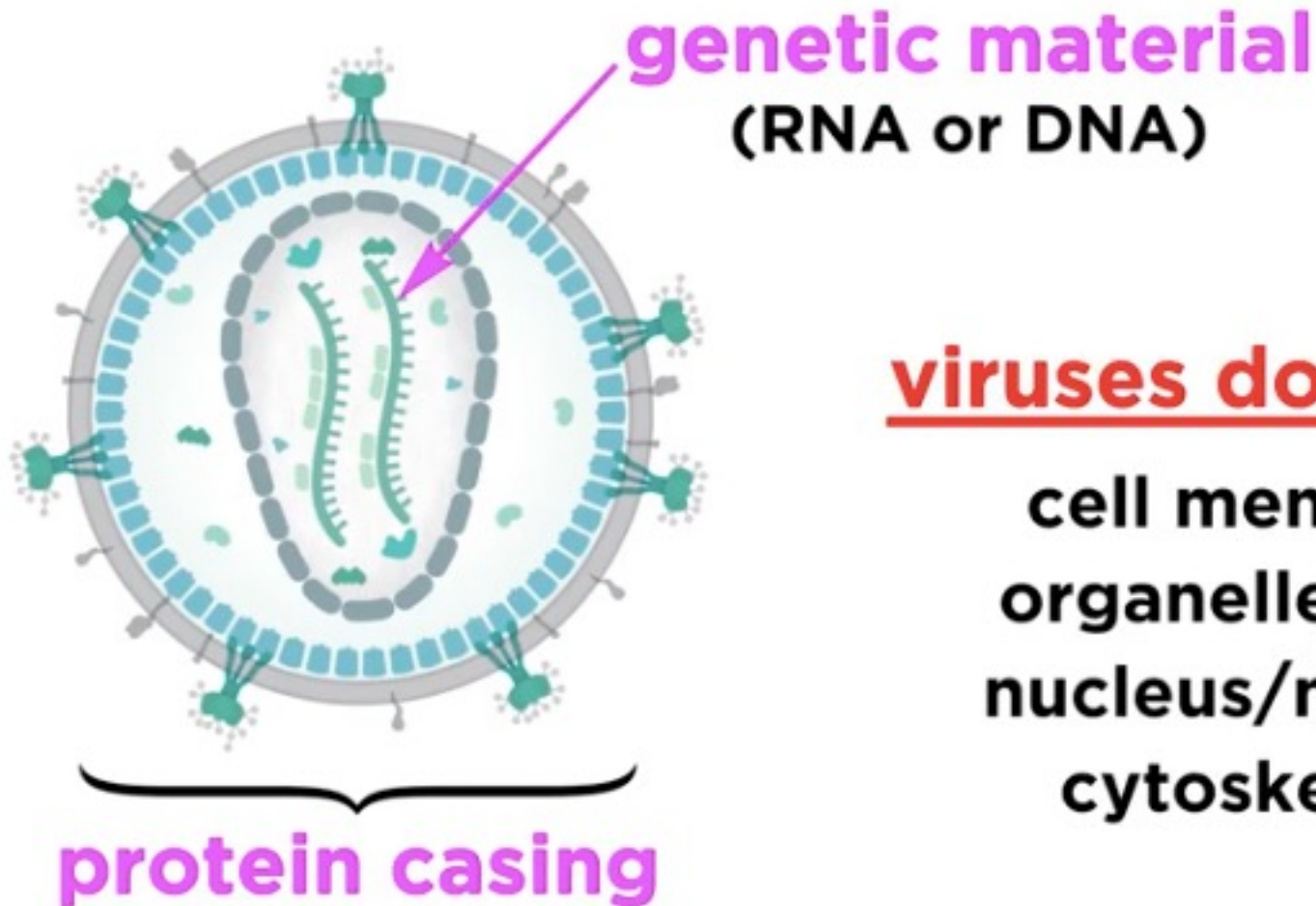


# Viruses

all viruses carry their own **genetic material**



# Viruses

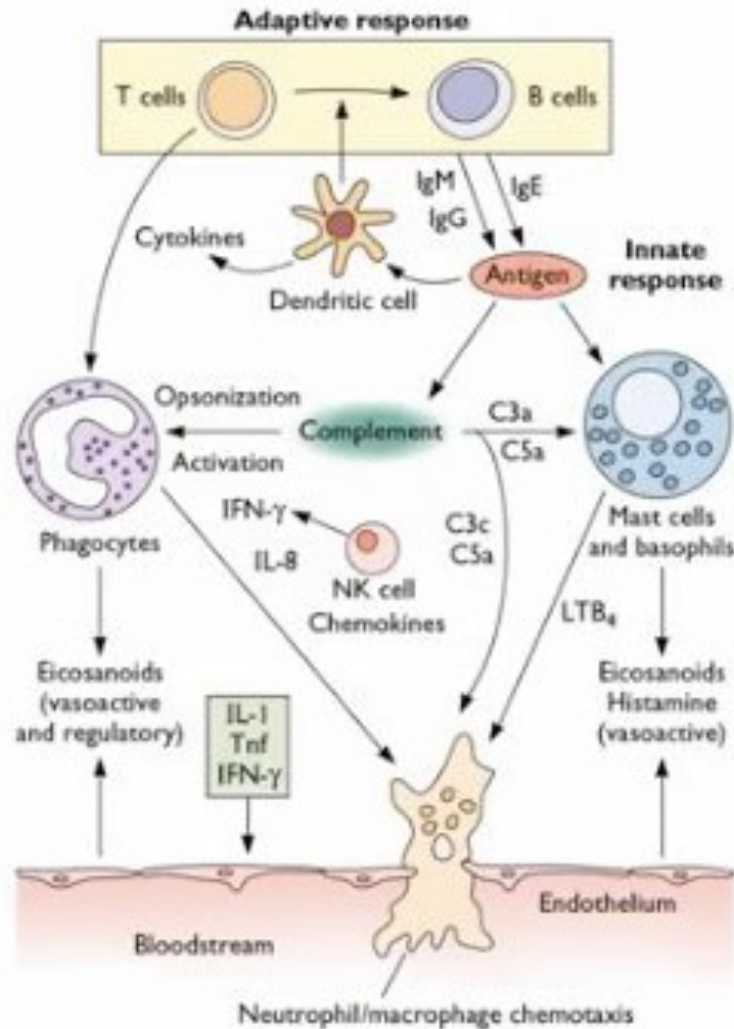


**viruses don't have:**

**cell membrane  
organelles (any)  
nucleus/nucleoid  
cytoskeleton**

# Viruses

our immune system is composed of T cells and B cells.





# Viruses

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COVID-19

**Severe Acute Respiratory  
Syndrome-Related  
Coronavirus 2**

# COVID-19 Viruses



**Jeff Drobman**

55 mins · 2 people

a truly great video on the COVID-19 virus. watch it.

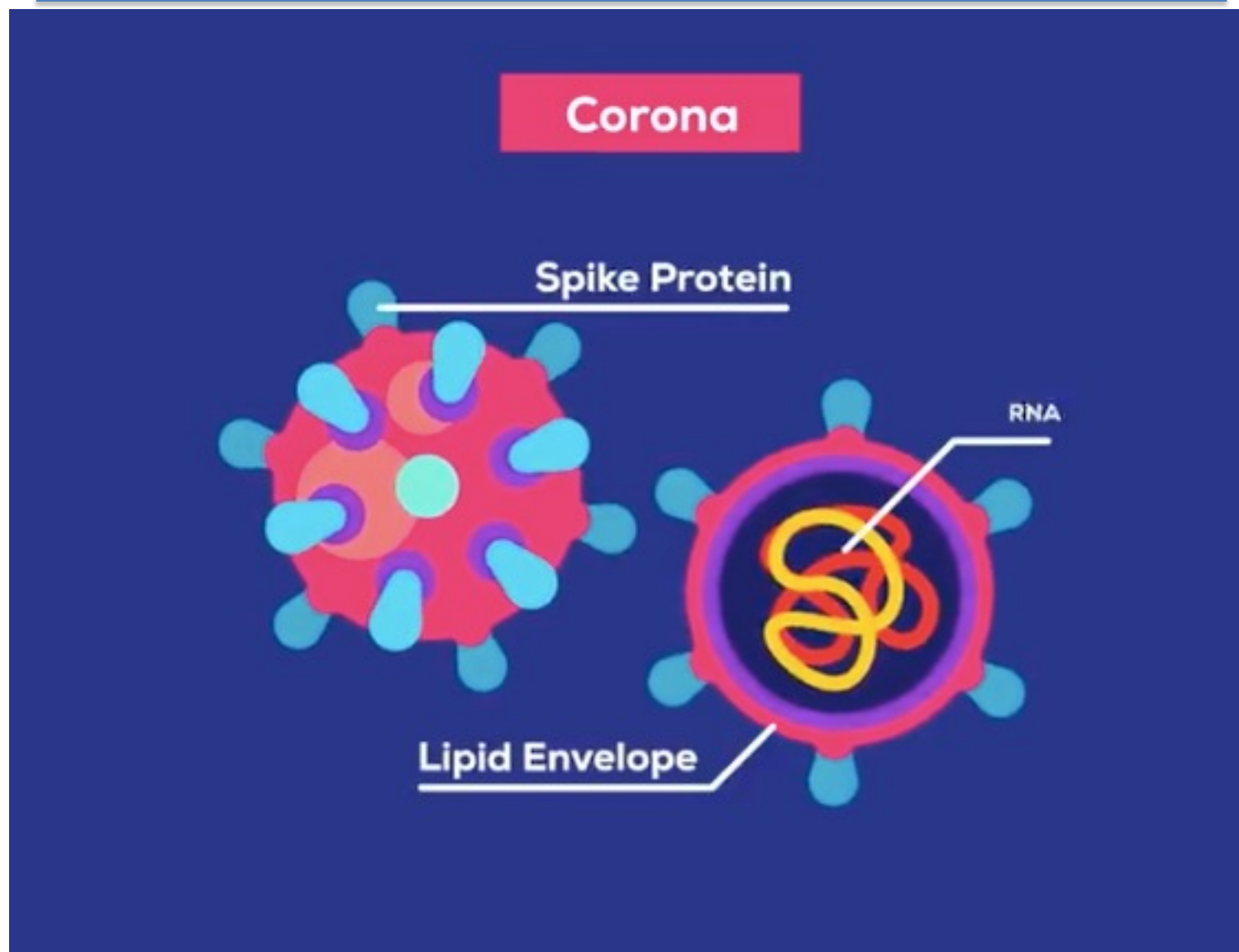


YOUTUBE.COM

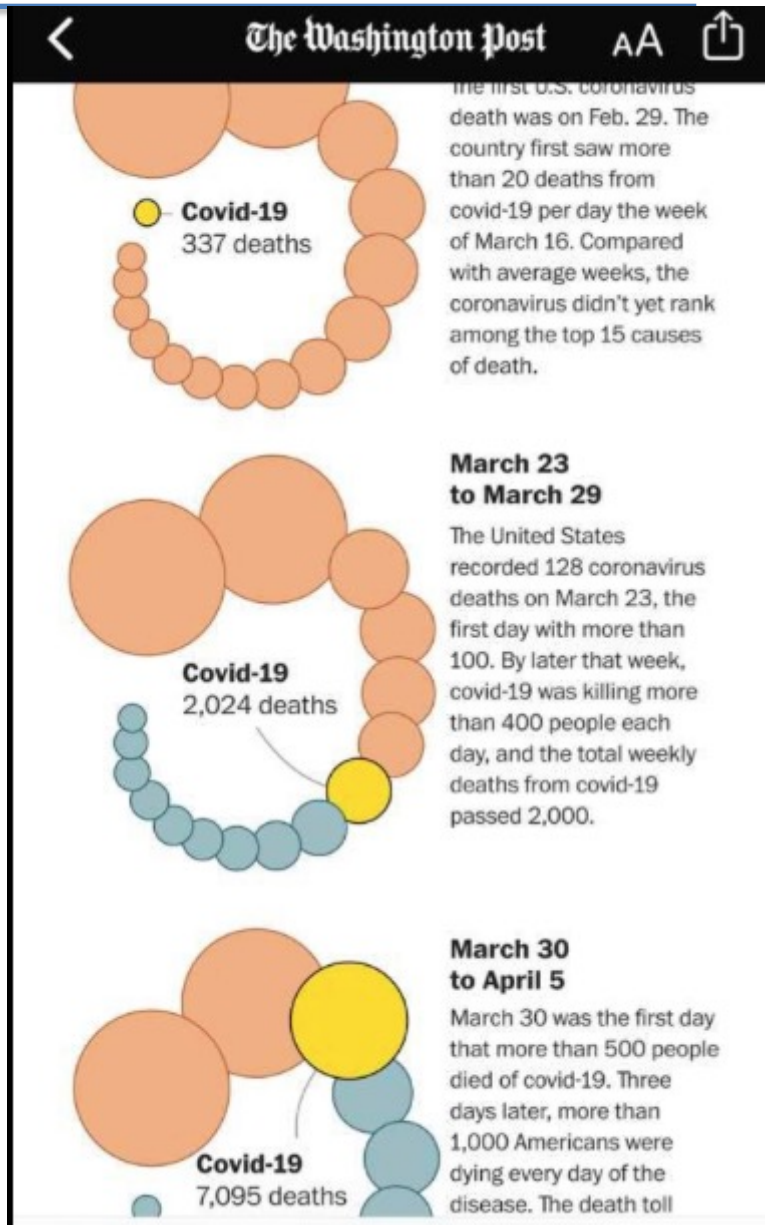
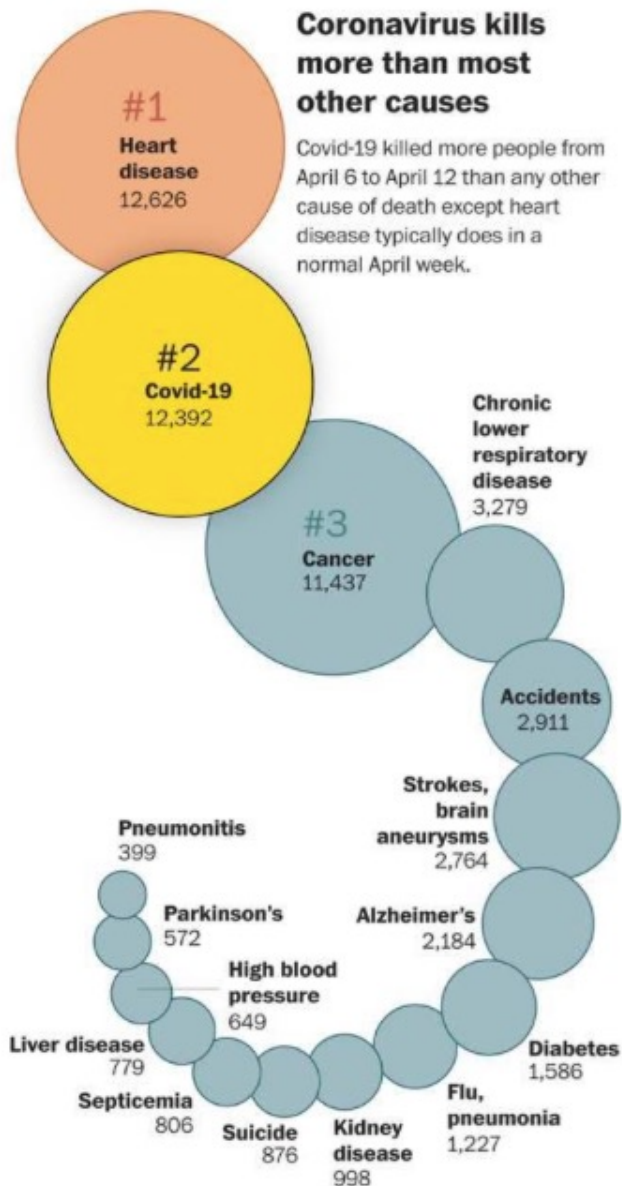
**The Coronavirus Explained & What You Should Do**

<https://www.youtube.com/watch?v=BtN-goy9VOY&fbclid=IwAR0Ee0CcB6uaSJga9pT74qj5K6ygbk6TTQAFF-5auLQJaOu6yMypvWZBB34>

# Viruses



# COVID-19





# Section

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## Key Slides

- ❖ Numbers
- ❖ ASCII Codes

# Ordinals

## Technical ordinals

$10^{(-24)}$	yacto
$10^{(-21)}$	zepto
$10^{(-18)}$	atto
$10^{(-15)}$	femto
$10^{(-12)}$	pico
$10^{(-9)}$	nano
$10^{(-6)}$	micro
$10^{(-3)}$	milli
$10^{(-2)}$	centi
$10^{(-1)}$	deci
$10^{(+1)}$	deka
$10^{(+2)}$	hecto
$10^{(+3)}/2^{(10)}$	kilo
$10^{(+6)}/2^{(20)}$	mega
$10^{(+9)}/2^{(30)}$	giga
$10^{(+12)}/2^{(40)}$	tera
$10^{(+15)}/2^{(50)}$	peta
$10^{(+18)}/2^{(60)}$	exa
$10^{(+21)}/2^{(70)}$	zetta
$10^{(+24)}/2^{(80)}$	yotta

## Gazillions

$10^{(+6)}$	million
$10^{(+9)}$	billion
$10^{(+12)}$	trillion
$10^{(+15)}$	quadrillion
$10^{(+18)}$	quintillion
$10^{(+21)}$	sexillion
$10^{(+24)}$	septillion
$10^{(+27)}$	octillion
$10^{(+30)}$	nonillion
$10^{(+33)}$	decillion
$10^{(+36)}$	undecillion
$10^{(+39)}$	duodecillion
$10^{(+42)}$	tredecillion
$10^{(+45)}$	quattuordecillion
$10^{(+48)}$	quindecillion
$10^{(+51)}$	sexdecillion
$10^{(+54)}$	septendecillion
$10^{(+57)}$	octodecillion
$10^{(+60)}$	novemdecillion
$10^{(+63)}$	vigintillion
$10^{(+100)}$	googol
$10^{(+303)}$	centillion
$10^{(10^{(+100)})}$	googolplex

Ordinal	Power of 2	Power of 10	Actual
1K	$2^{10}$	$10^3$	1024
1M	$2^{20}$	$10^6$	1,048,576
1G	$2^{30}$	$10^9$	$1.074 \times 10^9$
1T	$2^{40}$	$10^{12}$	$1.0995 \times 10^{12}$

Name	$2^n$	M/G	Actual
byte	$2^8$	--	256
short	$2^{16}$	64K	65,536
word	$2^{32}$	4B	$4.3 \times 10^9$
long	$2^{64}$	16 Q	$1.84 \times 10^{19}$
IPv6	$2^{128}$	340 <u>uD</u>	$3.4 \times 10^{38}$

# GiB/TiB Ordinals

Decimal	Abbreviation	Value	Binary term	Abbreviation	Value	% Larger
kilobyte	KB	$10^3$	kibibyte	KiB	$2^{10}$	2%
megabyte	MB	$10^6$	mebibyte	MiB	$2^{20}$	5%
gigabyte	GB	$10^9$	gibibyte	GiB	$2^{30}$	7%
terabyte	TB	$10^{12}$	tebibyte	TiB	$2^{40}$	10%
petabyte	PB	$10^{15}$	pebibyte	PiB	$2^{50}$	13%
exabyte	EB	$10^{18}$	exbibyte	EiB	$2^{60}$	15%
zettabyte	ZB	$10^{21}$	zebibyte	ZiB	$2^{70}$	18%
yottabyte	YB	$10^{24}$	yobibyte	YiB	$2^{80}$	21%

**Actual**

**1024**

**1,048,576**

**$1.074 \times 10^9$**

**$1.0995 \times 10^{12}$**

# ASCII Codes- Letters

**Table 1-3 ASCII Conversion Chart for Letters**

Hex	Character	Hex	Character
41	A	61	a
42	B	62	b
43	C	63	c
44	D	64	d
45	E	65	e
46	F	66	f
47	G	67	g
48	H	68	h
49	I	69	i
4a	J	6a	j
4b	K	6b	k
4c	L	6c	l
4d	M	6d	m
4e	N	6e	n
4f	O	6f	o
50	P	70	p

1963



# ASCII Codes- 7-bit

USASCII code chart

<div> <div> b<sub>7</sub> b<sub>6</sub> b<sub>5</sub> </div> <div> b<sub>4</sub> b<sub>3</sub> b<sub>2</sub> b<sub>1</sub> </div> <div> Row </div> </div>					0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
					0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENO	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

\n=\u000A  
sp=\u0020

char ch=0xA  
char sp=0x20

# Old Mac Char Codes

16-bit

Second digit	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	space	0	@	P	`	p	Ä	ê	†	∞	¿	-		
1	SOH	DC1	!	1	A	Q	a	q	Å	ë	•	±	ı	—		
2	STX	DC2	"	2	B	R	b	r	Ç	í	‡	≤	¬	“		
3	ETX	DC3	#	3	C	S	c	s	É	ì	£	≥	√	”		
4	EOT	DC4	\$	4	D	T	d	t	Ñ	î	§	¥	ƒ	‘		
5	ENQ	NAK	%	5	E	U	e	u	Ö	ï	●	μ	≈	’		
6	ACK	SYN	&	6	F	V	f	v	Ü	ñ	¶	∂	Δ	÷		
7	BEL	ETB	'	7	G	W	g	w	á	ó	ß	Σ	«	◊		
8	BS	CAN	(	8	H	X	h	x	à	ò	®	Π	»	ÿ		
9	HT	EM	)	9	I	Y	i	y	â	ô	©	π	...			
A	LF	SUB	*	:	J	Z	j	z	ä	ö	™	∫	—			
B	VT	ESC	+	;	K	[	k	{	å	õ	’	æ	À			
C	FF	FS	,	<	L	\	l		å	ú	”	ø	Ã			
D	CR	GS	-	=	M	]	m	}	ç	ù	≠	Ω	Õ			
E	SO	RS	.	>	N	^	n	~	é	û	Æ	æ	Œ			
F	SI	US	/	?	O	_	o	DEL	è	ü	Ø	ø	œ			

unique  
special chars

— stands for a nonbreaking space, the same width as a digit.

The shaded characters cannot normally be generated from the Macintosh keyboard or keypad.

Figure 1. Macintosh Character Set

# MS Windows (1252)

<b>1</b>	!	1	A	Q	a	q	NOT USED	'	;	±	Á	Ñ	á	ñ
	33	49	65	81	97	113	129	145	161	177	193	209	225	241
<b>2</b>	"	2	B	R	b	r	,	'	ø	²	Â	Ò	â	ò
	34	50	66	82	98	114	130	146	162	178	194	210	226	242
<b>3</b>	#	3	C	S	c	s	f	“	£	³	Ã	Ó	ã	ó
	35	51	67	83	99	115	131	147	163	179	195	211	227	243
<b>4</b>	\$	4	D	T	d	t	„	”	¤	´	Ä	Ô	ä	ô
	36	52	68	84	100	116	132	148	164	180	196	212	228	244
<b>5</b>	%	5	E	U	e	u	...	•	¥	µ	Å	Õ	å	õ
	37	53	69	85	101	117	133	149	165	181	197	213	229	245
<b>6</b>	&	6	F	V	f	v	†	-	!	¶	Æ	Ö	æ	ö
	38	54	70	86	102	118	134	150	166	182	198	214	230	246
<b>7</b>	'	7	G	W	g	w	‡	-	§	·	Ç	×	ç	÷
	39	55	71	87	103	119	135	151	167	183	199	215	231	247
<b>8</b>	(	8	H	X	h	x	^	~	¨	ˆ	È	Ø	è	ø
	40	56	72	88	104	120	136	152	168	184	200	216	232	248
<b>9</b>	)	9	I	Y	i	y	%o	™	©	¹	É	Ù	é	ù
	41	57	73	89	105	121	137	153	169	185	201	217	233	249
<b>A</b>	*	:	J	Z	j	z	Š	š	Ž	ž	Ê	Ú	ê	ú
	42	58	74	90	106	122	138	154	170	186	202	218	234	250
<b>B</b>	+	;	K	[	k	{	<	>	«	»	Ë	Û	ë	û
	43	59	75	91	107	123	139	155	171	187	203	219	235	251
<b>C</b>	,	<	L	\	l		Œ	œ	¬	¼	Ì	Û	ì	ü
	44	60	76	92	108	124	140	156	172	188	204	220	236	252
<b>D</b>	-	=	M	]	m	}	NOT USED	NOT USED	SHY	½	Í	Ý	í	ý
	45	61	77	93	109	125	141	157	173	189	205	221	237	253
<b>E</b>	.	>	N	^	n	~	NOT USED	NOT USED	®	¾	Î	Þ	î	þ
	46	62	78	94	110	126	142	158	174	190	206	222	238	254
<b>F</b>	/	?	O	_	o		NOT USED	ÿ	-	;	Ï	ß	ï	ÿ
	47	63	79	95	111	127	143	159	175	191	207	223	239	255



## *The Art of Computer Programming*

From Wikipedia, the free encyclopedia

***The Art of Computer Programming*** (sometimes known by its initials **TAOCP**) is a comprehensive [monograph](#) written by [Donald Knuth](#) that covers many kinds of [programming algorithms](#) and [their analysis](#).

Knuth began the project, originally conceived as a single book with twelve chapters, in 1962. The first three volumes of what was then expected to be a seven-volume set were published in 1968, 1969, and 1973. The first published installment of Volume 4 appeared in paperback as [Fascicle 2](#) in 2005. The hardback Volume 4A, combining Volume 4, Fascicles 0–4, was published in 2011. Volume 4, Fascicle 6 ("Satisfiability") was released in December 2015; Volume 4, Fascicle 5 ("Mathematical Preliminaries Redux; Backtracking; Dancing Links") is planned for release in September 2019. Fascicles 5 and 6 are expected to comprise the first two thirds of Volume 4B.

### Contents [\[hide\]](#)

- 1 [History](#)
- 2 [Assembly language in the book](#)
- 3 [Critical response](#)
- 4 [Volumes](#)
  - 4.1 [Completed](#)
  - 4.2 [Planned](#)
- 5 [Chapter outlines](#)
  - 5.1 [Completed](#)
    - 5.1.1 [Volume 1 – Fundamental Algorithms](#)
    - 5.1.2 [Volume 2 – Seminumerical Algorithms](#)
    - 5.1.3 [Volume 3 – Sorting and Searching](#)
    - 5.1.4 [Volume 4A – Combinatorial Algorithms, Part 1](#)
  - 5.2 [Planned](#)
    - 5.2.1 [Volume 4B, 4C, 4D – Combinatorial Algorithms](#)
    - 5.2.2 [Volume 5 – Syntactic Algorithms](#)
    - 5.2.3 [Volume 6 – The Theory of Context-free Languages](#)<sup>[7]</sup>
    - 5.2.4 [Volume 7 – Compiler Techniques](#)

Sorting & Searching

### *The Art of Computer Programming*

THE CLASSIC WORK  
NEWLY UPDATED AND REVISED

## The Art of Computer Programming

VOLUME 1

Fundamental Algorithms  
Third Edition

DONALD E. KNUTH

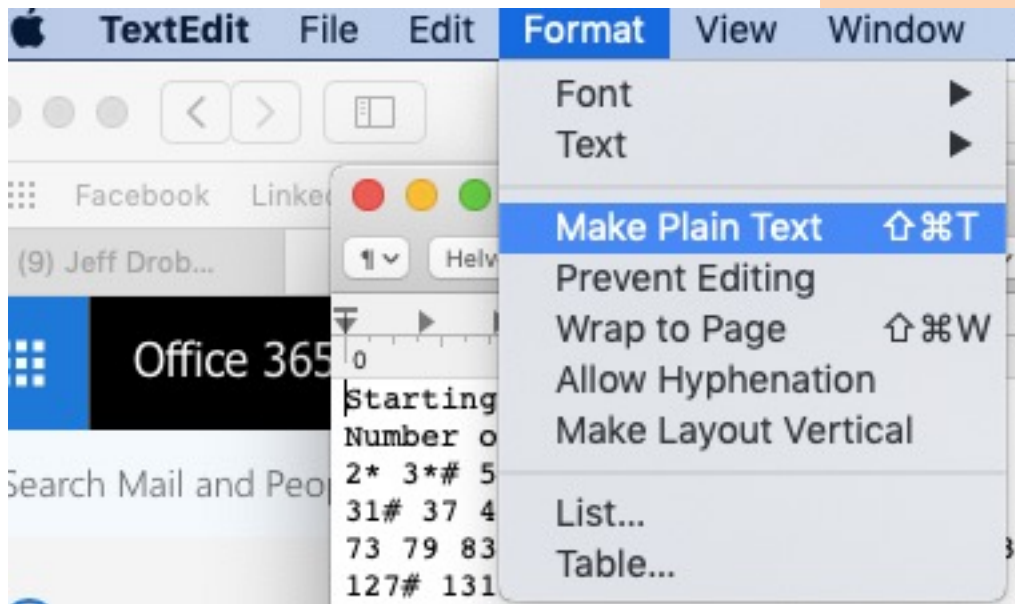
The Art of Computer Programming, Volume 1:  
Fundamental Algorithms

<b>Author</b>	<a href="#">Donald Knuth</a>
<b>Country</b>	<a href="#">United States</a>
<b>Language</b>	<a href="#">English</a>
<b>Genre</b>	<a href="#">Non-fiction</a> <a href="#">Monograph</a>
<b>Publisher</b>	<a href="#">Addison-Wesley</a>
<b>Publication date</b>	1968– (the book is still incomplete)
<b>Media type</b>	Print ( <a href="#">Hardcover</a> )

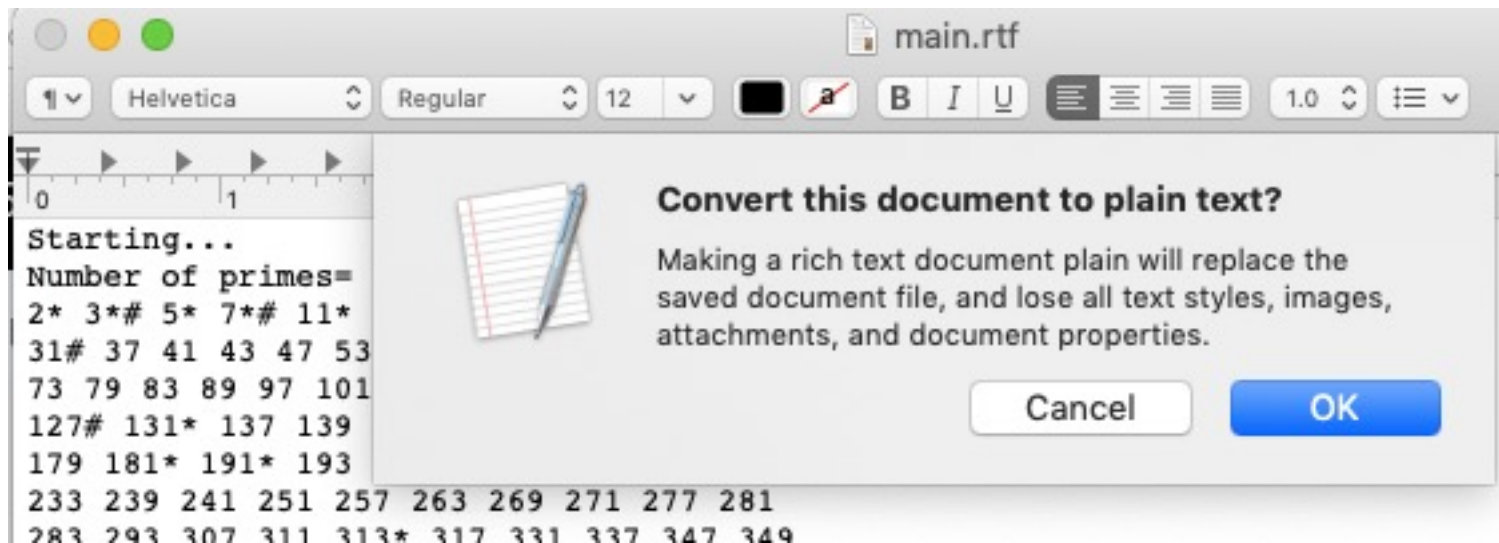


# Mac Files

.rtf → .txt



```
Starting...Number of primes= 168
2* 3*# 5* 7*# 11* 13 17 19 23 29
31# 37 41 43 47 53 59 61 67 71 73 79 83 89 97 101* 103 107 109
113 127# 131* 137 139 149 151* 157 163 167 173 179 181* 191* 193
197 199 211 223 227 229 233 239 241 251 257 263 269 271 277 281 283
293 307 311 313* 317 331 337 347 349 353* 359 367 373* 379 383* 389
397 401 409 419 421 431 433 439 443 449 457 461 463 467 479 487
491 499 503 509 521 523 541 547 557 563 569 571 577 587 593 599 601
607 613 617 619 631 641 643 647 653 659 661 673 677 683 691 701
709 719 727* 733 739 743 751 757* 761 769 773 787* 797* 809 811
821 823 827 829 839 853 857 859 863 877 881 883 887 907 911 919*
929* 937 941 947 953 967 971 977 983 991 997 Count per 100 numbers
checked:[25, 21, 16, 16, 17, 14, 16, 14, 15, 14]
```



# Mac OS Updates



**macOS Mojave**  
Version 10.14

**Cmd+shift+5**

Newer version of 3-4

## Screenshots

### Capture what's on your screen

The powerful new Screenshot utility makes it easier to capture screenshots or recordings. Press Shift + Command + 5, then click an option, like  to capture a still selection or  to record your whole screen.