OPCUG

Users helping users
for over 40 years

How to buy a PC

Chris Taylor
Ottawa PC Users' Group
Chris.Taylor@opcug.ca

The presentation is available for downloading as a PDF file
https://opcug.ca/presentations/2025-02-BuyPC.pdf

OPCUG

Users helping users
for over 40 years

Agenda

- Laptop vs. desktop
- Components
  - CPU, memory, storage, video cards/ports, webcams, optical drives, ports, card readers, networking, printers
- Special form-factor computers
- Backup
- Narrowing decisions

OPCUG

Users helping users
for over 40 years

Laptop vs. Desktop

OPCUG

Users helping users
for over 40 years

Laptop

Advantages

- portable / compact
- low power consumption
- complete
  - monitor, keyboard, trackpad, speakers, webcam, microphone
- *Windows Hello* for authentication on mid to high-end (fingerprint or facial recognition)

Disadvantages

- more expensive
  - or less powerful for same $
- small screen
- cramped keyboard
- less expandable & more expensive to expand

OPCUG
Users helping users
for over 40 years

Desktop

Advantages

- less expensive
  - or more powerful for same $
- easier & less expensive to expand
- bigger keyboard & monitor
- easier to fix

Disadvantages

- not portable
- bigger & heavier
- high power consumption
- more to add
  - keyboard (usually incl.)
  - mouse (usually incl.)
  - monitor
  - speakers
  - microphone
  - webcam

OPCUG

Users helping users
for over 40 years

Components

OPCUG

Users helping users
for over 40 years

Components

- Processor (CPU)
- Memory
- Storage
- Video cards
- Webcams
- Optical drives
- Ports
- Card readers
- Networking
- Printers

OPCUG

Users helping users
for over 40 years

Central Processing Unit (CPU)

- Factors in performance
  - speed
    - faster is better
    - **2x faster processor ≠ 2x faster computer**
  - processing cores
    - more is better
    - more cores can smooth out experience: different programs can run on different cores
    - **2x number of cores ≠ 2x faster computer**
  - different **families** from one manufacturer have different performance
  - newer **generations** within a family generally perform better and have more features/capabilities

OPCUG

Users helping users
for over 40 years

Intel processor families

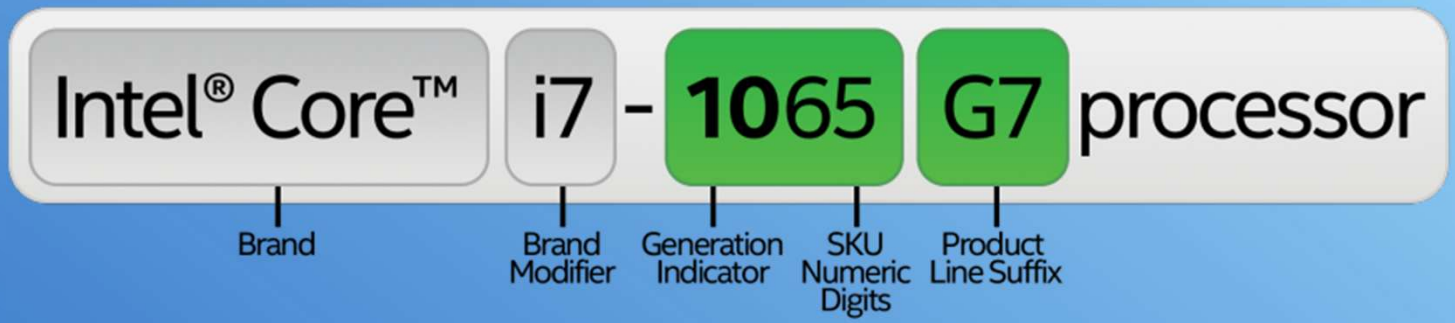
- Core (i3, i5, i7, i9)
  - mainstream to high-end
    - higher numbers better performance & additional features
    - i5 & i7 probably best option for most people
- Pentium, Celeron
  - budget line
    - lower performance than Core
    - for those who are trying to save the most money
- Xeon
  - high-end servers & workstations

https://www.intel.ca/content/www/ca/en/processors/processor-numbers.html

OPCUG

Users helping users
for over 40 years

Decoding Intel Core



Suffix	Meaning	Suffix	Meaning
G1-G7	Graphics level (processors with new integrated graphics technology only)	K	Unlocked
E	Embedded	S	Special edition
F	Requires discrete graphics	T	Power-optimized lifestyle
G	Includes discrete graphics on package	U	Mobile power efficient
H	High performance optimized for mobile	Y	Mobile extremely low power
HK	High performance optimized for mobile, unlocked	X/XE	Unlocked, High End
HQ	High performance optimized for mobile, quad core	B	Ball Grid Array (BGA)

OPCUG

Users helping users
for over 40 years

Decoding Intel Pentium & Celeron

https://www.intel.ca/content/www/ca/en/processors/processor-numbers.html

OPCUG

Users helping users
for over 40 years

Latest from Intel

- Core Ultra
  - launched first for mobile, later for desktop
- Includes a Neural Processing Unit (NPU)
  - aimed at artificial intelligence
- Very power-efficient
- Built-in Arc graphics for fast 3D graphics
- Next version of Windows highly likely to take advantage of an NPU
  - some advanced feature will only be available if the processor has an NPU

OPCUG

Users helping users
for over 40 years

AMD families

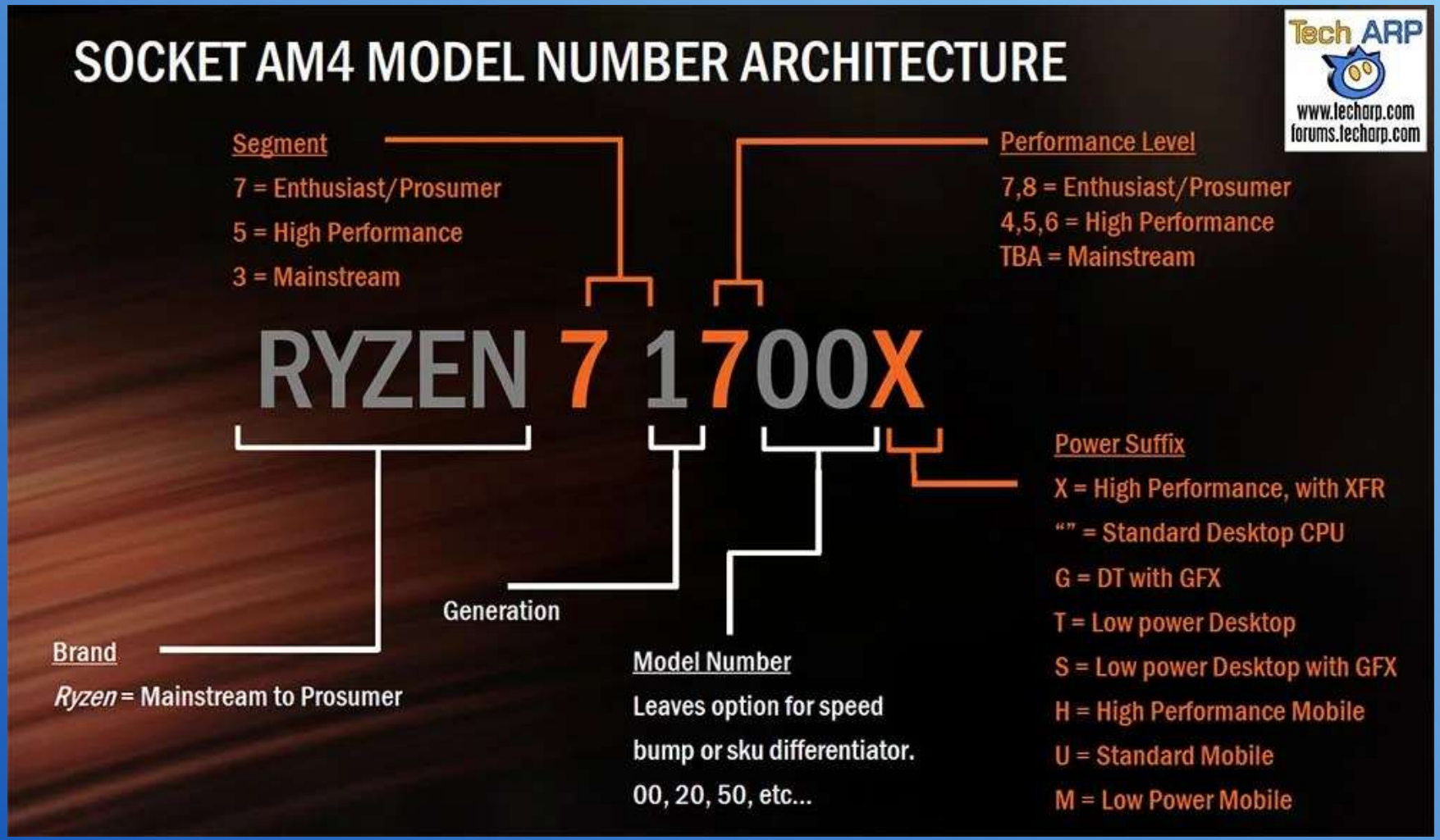
- Ryzen (3, 5, 7, 9, Threadripper)
  - mainstream to high-end
  - competes with Intel Core
- Athlon
  - budget line
  - competes with Intel Pentium & Celeron
- Epyc
  - high-end server & workstations
  - competes with Intel Xeon

https://en.wikipedia.org/wiki/List_of_AMD_processors

OPCUG

Users helping users
for over 40 years

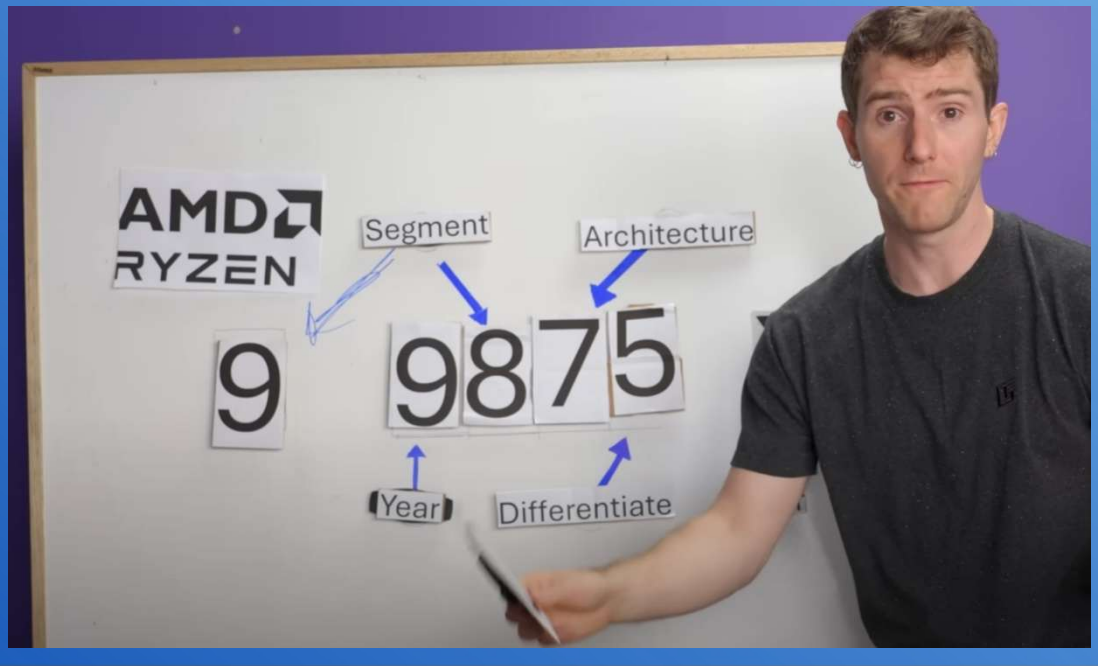
Decoding AMD Ryzen



OPCUG
Users helping users
for over 40 years

Naming conventions changing ...becoming much more confusing

- AMD & Intel
  - both messing with the product codes for processors
- Linus Sebastian (Linus Tech Tips)
  - https://www.youtube.com/watch?v=k3jDxPXZuPE



OPCUG
Users helping users
for over 40 years

Comparing CPUs

- Hard enough comparing within a manufacturer's line

  - **Intel 8-core Core-i7 10700K @ 3.8 GHz**

  Fewer cores, higher level, older generation, running faster

  vs

  - **Intel 14-core Core-i5 13600KF @ 3.5 GHz**

  More cores, lower level, newer generation, running slower

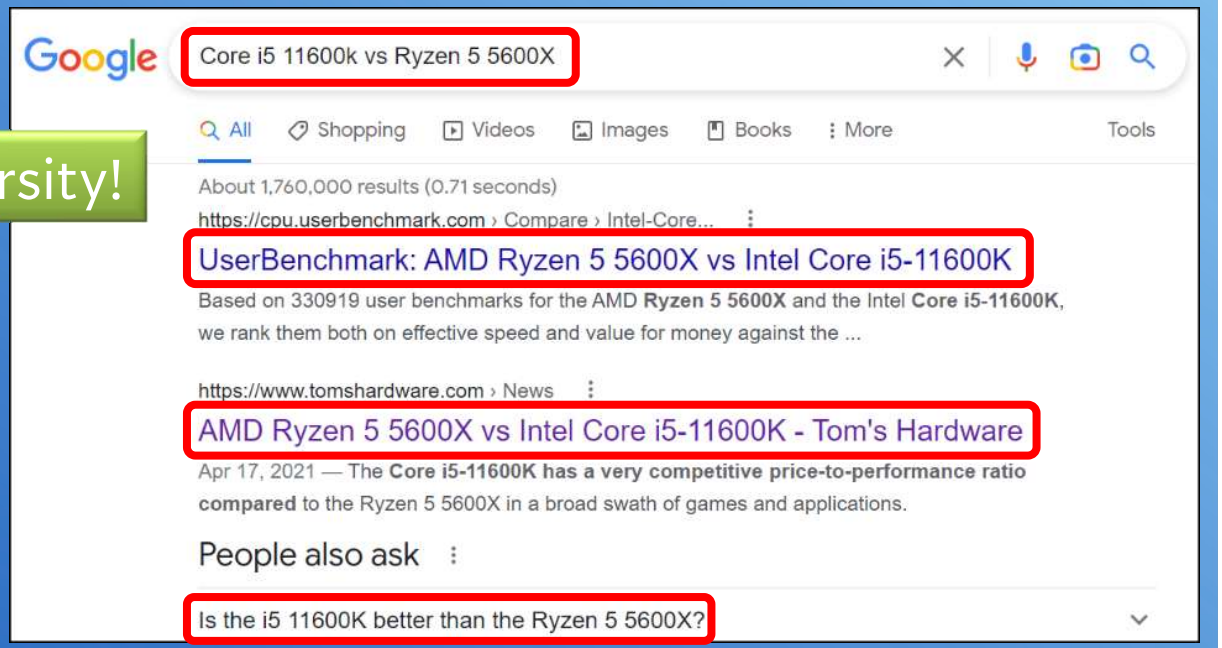
OPCUG
Users helping users
for over 40 years

Comparing CPUs

- Let alone across manufacturers

Intel 6-core Core i5 11600KF @3.9 GHz
or
AMD 6-core Ryzen 5 5600X @ 3.7 GHz

Go to Google University!



...or https://nanoreview.net/en/cpu-compare

- **Intel 8-core Core-i7 10700K @ 3.8 GHz**

Fewer cores, higher level, older generation, running faster

vs

- **Intel 14-core Core-i5 13600KF @ 3.5 GHz**

More cores, lower level, newer generation, running slow

Review

General overview and comparison of the processors

Single-Core Performance

Performance in single-threaded apps and benchmarks

Core i7 10700K	53
Core i5 13600KF	77

Multi-Core Performance

Measure performance when all cores are involved

Core i7 10700K	32
Core i5 13600KF	59

Power Efficiency

The efficiency score of power consumption

Core i7 10700K	42
Core i5 13600KF	60

NanoReview Final Score

Generic CPU rating

Core i7 10700K	44
Core i5 13600KF	69

Key Differences

What are the key differences between 13600KF and 10700K

Advantages of Intel Core i7 10700K

- Includes an integrated GPU Intel UHD Graphics 630

Advantages of Intel Core i5 13600KF

- Newer - released 2 years and 6 months later
- Around 43.8 GB/s (96%) higher theoretical memory bandwidth
- Has 6 more physical cores
- Newer PCI Express version – 5.0
- 59% faster in a single-core Geekbench v6 test - 2713 vs 1711 points
- Has 8192 KB larger L3 cache size
- Supports up to 192 GB DDR5-5600 RAM
- More modern manufacturing process – 10 versus 14 nanometers

https://nanoreview.net/en/cpu-compare

Intel Core i5 11600KF vs AMD Ryzen 5 5600X

Review

General overview and comparison of the processors

Single-Core Performance

Performance in single-threaded apps and benchmarks

Core i5 11600KF	63
Ryzen 5 5600X	63

Multi-Core Performance

Measure performance when all cores are involved

Core i5 11600KF	30
Ryzen 5 5600X	31

Power Efficiency

The efficiency score of power consumption

Core i5 11600KF	46
Ryzen 5 5600X	56

NanoReview Final Score

Generic CPU rating

Core i5 11600KF	49
Ryzen 5 5600X	50

Key Differences

What are the key differences between 5600X and 11600KF

Advantages of Intel Core i5 11600KF

- Newer - released 5 months later
- 7% higher Turbo Boost frequency (4.9 GHz vs 4.6 GHz)
- Around 2.32 GB/s (5%) higher theoretical memory bandwidth

Advantages of AMD Ryzen 5 5600X

- Has 20480 KB larger L3 cache size
- More modern manufacturing process – 7 versus 14 nanometers

https://nanoreview.net/en/cpu-compare

Processor cost as portion of computer

		Retail price
Intel	Core i5 10400 6-Core (score 36)	$190
AMD	Ryzen 5 4500U 6-Core (score 34)	$110
Intel	Core i9 13900K 24 cores (score 86)	$920
AMD	Ryzen 9 7950X 16-Core (score 87)	$670

	…and just for laughs	**Retail price**

AMD	Ryzen PRO 5995WX Threadripper
	• 64 cores, 4.5 GHz, 32 MB L2 cache, 256 MB L3 cache
	  • (score 54) supports up to **2TB RAM**
	  • 16 times regular CPU (up to 128 GB)
		$7,300

Intel	Xeon Platinum 8280L
	• 28 cores, 4.0 GHz, 38.5 MB cache
	  • supports up to **4.5 TB RAM**
	  • 36 times regular CPU (up to 128 GB)
		$51,000

https://nanoreview.net/en/cpu-compare

OPCUG
Users helping users
for over 40 years

ARM
new...*for Windows*...kid on the block

- Popular processor architecture for smartphones/tablets
- Improved battery life and overall efficiency
  - compared to current Intel and AMD processors a.k.a. ***x86 architecture***
- Apple moved completely to ARM processors
  - iphone, ipad, MacBook starting late 2020
  - Mac Pro June 2023
- ARM architecture licensed to any company
  - dozens of manufacturers have licensed ARM technology

OPCUG

Users helping users
for over 40 years

What has ARM to do with Windows?

- **Copilot+ PC**
  - Microsoft branding for PCs with next-gen AI functions
- Must have:
  - Neural Processing Units (NPUs) w/at least 40 TOPS (Trillion Operations Per Second)
  - at least 16 GB RAM
  - at least 256 GB SSD
- Microsoft claims
  - up to 20x more powerful for AI workloads
  - up to 100x more efficient for AI tasks

OPCUG

Users helping users
for over 40 years

Copilot+ PCs

- Most common processor architecture for Copilot+ is ARM
  - introduced June, 2024
- Qualcomm ARM Snapdragon X Plus
  - 10 cores, speeds up to 3.4 Ghz
- Qualcomm ARM Snapdragon X Elite
  - 12 cores, speeds up to 3.8 GHz

OPCUG

Users helping users
for over 40 years

Fly in the ointment...for ARM PCs

- Copilot+ (ARM CPUs) currently only laptops
- For 39 years, Windows apps have run on ***x86 architecture*** CPUs
  - ARM (first “Copilot+” branded PCs)
    - is ***not*** x86 architecture
- Software vendors can either
  - recode & recompile programs for ARM architecture
    - not always simple and straightforward
  - run under emulation
    - performance hit
    - not all programs can run under emulation

OPCUG

Users helping users
for over 40 years

Fly in the ointment...for ARM PCs

- Microsoft claims
  - *over 90% of time spent in [programs compiled for ARM] including popular apps like Chrome, Zoom, Brave, Photoshop, Opera, Slack, Spotify, Private Internet Access, Surfshark, Windscribe, OpenVPN and many others*
  - note: they ***don't*** say ***90% of all apps are native ARM***
- Qualcomm list of native ARM apps
  - https://www.qualcomm.com/products/features/windowsapps
- Many non-native apps will run using emulation
  - https://www.pcmag.com/articles/how-well-does-windows-on-arms-prism-emulation-work-we-tested-with-31-apps
- For next while: some apps ***that you might depend on***
  - will **not** run on Windows Copilot+ PCs on ARM

OPCUG

Users helping users
for over 40 years

Should you choose x86 or ARM

- First Copilot+ PCs use Qualcomm Snapdragon ARM CPUs
  - first introduced June 2024
- Very long battery life
- Excellent performance (with native ARM apps)
- AI capabilities (still a bit of a promise)
- May have software compatibility problems
  - make sure the programs you need will run

OPCUG

Users helping users
for over 40 years

Copilot+ PCs powered by Intel & AMD

- Copilot+ capable x86 CPUs from Intel & AMD
  - Intel: Core Ultra 200V series
  - AMD: Ryzen AI 300 series & Ryzen AI PRO 300 series
- First appeared in laptops in November 2024
- **Compatible with all Windows 11-compatible apps**
- Initial releases do not support all Co-pilot features
  - vendors say *Copilot+ PC experiences are coming. Requires free updates available starting late November 2024. Timing varies by device and region. See aka.ms/copilotpluspcs*
- Likely not gain the extended battery life of ARM
  - but improved over previous processors

OPCUG

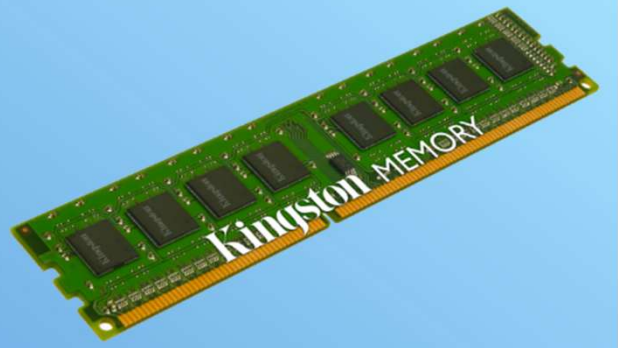
Users helping users
for over 40 years

Comparing x86 and ARM CPUs

- Perhaps best approach in deciding x86 or ARM
  - pick based on their strengths and weaknesses
    - battery life
    - overall performance assessments
    - **app compatibility**
- ARM currently has two options for Copilot+ PCs
  - Qualcomm ARM Snapdragon X Plus (10 cores, up to 3.4 Ghz)
  - Qualcomm ARM Snapdragon X Elite (12 cores, up to 3.8 GHz)
- x86 options from Intel and AMD in their infancy
  - Intel: Core Ultra 200V series
  - AMD: Ryzen AI 300 series & Ryzen AI PRO 300 series

OPCUG
Users helping users
for over 40 years

Memory requirements



- Windows 7, 8, 10 remained pretty similar
- Windows 11 pretty much doubled

	Windows 8 & 10	Windows 11
Minimum	2 GB	4 GB
Okay	4 GB	8 GB
Best	8 GB or more	16 GB or more

Minimum: if on a strict budget & very light computing

Okay: web browsing, word processing, light gaming

Best: video editing, advanced photo editing, many apps open at once, advanced computing

OPCUG

Users helping users
for over 40 years

Storage (internal)

- Laptops
  - vast majority have a single Solid State Drive (SSD)
    - <$400 budget PCs to >$3,000 powerhouses
  - typically 512 GB SSD to 1 TB SSD
    - avoid 128 GB

- Desktop
  - most have an SSD (at least 512 GB)
  - some have 512 GB or 1 TB SSD and a HDD (1 TB or larger)

OPCUG

Users helping users
for over 40 years

Storage (external)

- Great for:
  - backup
  - adding storage (most useful for desktops)

Desktop drives

- capacity 2 TB to 20 TB

Portable drives

- capacity 1 TB to 5 TB
- no power supply required
  - very useful for offsite backups

Solid State Drives (SSD)

- capacity 1 TB to 4 TB

OPCUG

Users helping users
for over 40 years

Storage (external)

Flash drives/memory cards

- Inexpensive but normally not huge capacities: (~4-256 GB)
- Typically slow
- Not designed for constant writing
- Can be a “no-cost” option

  e.g. reuse camera SD card
- Uses:
  - limited file backup

    (laptops - space-saving

    nano-USB and SD cards)
  - portable file transfer medium
  - bootable OS & utilities (reusable)

OPCUG

Users helping users
for over 40 years

Video/graphics card

- Integrated graphics
  - uses part of the computer's memory (RAM)
  - cost savings
  - appropriate for general computer use
- Dedicated/discrete graphics card
  - dedicated on-board memory (typically 2-8 GB)
  - more expensive
  - may be ***required*** for advanced video editing/photo editing/gaming
    - check software for system requirements
  - think you need a dedicated graphics card?
    - research it!

Laptop dedicated graphics card

Desktop dedicated graphics card

OPCUG

Users helping users
for over 40 years

Video ports

- Modern computers typically have HDMI and/or DisplayPort (DP)
- Both can transfer video and audio signals
- HDMI is often used to connect a PC to a monitor, TV, projector, game console, TV set-top box, etc.
- DP used mostly for PC/monitor
- Many modern laptops can also output video signals to Type-C USB (with adapter to various video ports)

https://opcug.ca/qa_recordings/20221130_PowerPoint.pdf

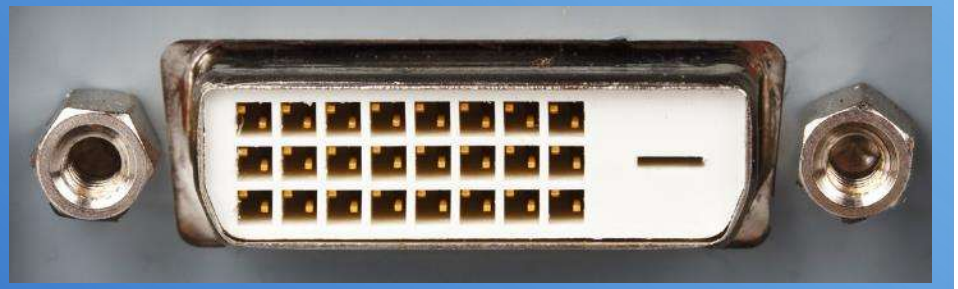
OPCUG

Users helping users
for over 40 years

VGA & DVI – legacy ports

VGA

DVI



OPCUG

Users helping users
for over 40 years

HDMI & DisplayPort – uses

	HDMI	DisplayPort
Monitor	**Yes**	**Yes**
Computer	**Yes**	**Yes**
TV	**Yes**	No
Projector	**Yes**	No
Game console	**Yes**	No
Blu-ray player	**Yes**	No
Streaming device	**Yes**	No
Cable box	**Yes**	No

https://www.rtings.com/monitor/learn/hdmi-vs-displayport

OPCUG

Users helping users
for over 40 years

HDMI/DP capabilities & release dates

Likely found in new computers

Jun 2009 Sep 2013 Nov 2017 Jan 2010 Sep 2014 Mar 2016 Jun 2019 Oct 2022

	HDMI 1.4	HDMI 2.0	HDMI 2.1	DP 1.2	DP 1.3	DP 1.4	DP 2.0	DP 2.1
1080p at 120Hz	✓	✓	✓	✓	✓	✓	✓	✓
1440p at 30Hz	✓	✓	✓	✓	✓	✓	✓	✓
1440p at 60Hz	✓	✓	✓	✓	✓	✓	✓	✓
1440p at 120Hz	✗	✓	✓	✓	✓	✓	✓	✓
4k at 30Hz	✓	✓	✓	✓	✓	✓	✓	✓
4k at 60Hz	✗	✓	✓	✓	✓	✓	✓	✓
4k at 120Hz	✗	✗	✓	✗	✓	✓	✓	✓
8k at 30Hz	✗	✗	✓	✗	✓	✓	✓	✓
8k at 60Hz	✗	✗	✓	✗	✗	✓	✓	✓
8k at 120Hz	✗	✗	✓	✗	✗	✗	✓	✓
HDR	✗	✓	✓	✗	✗	✓	✓	✓

All *DisplayPort 2.0* products are certified to meet *DisplayPort 2.1* specs

OPCUG

Users helping users
for over 40 years

Converting video ports

HDMI to DisplayPort

Type-C to DisplayPort

Type-C to HDMI

HDMI splitter

DisplayPort splitter

Type-C to VGA

HDMI to VGA
DisplayPort to VGA
...

OPCUG

Users helping users
for over 40 years

Multi-monitor

- Ability to output to multiple displays
  - mirror display or extend desktop
  - almost all laptops
    - built-in display and one external monitor through a port
  - many desktops
    - often 3 or more possible displays
  - extend to more displays through splitter
- Connection to external display varies
  - modern ports: HDMI, DisplayPort
  - legacy ports: DVI, VGA
- Some laptops have Miracast for wireless connection to display

OPCUG

Users helping users
for over 40 years

Webcams

- Laptops almost always have a webcam
- Desktops never have a webcam
- Easily added to
  - desktop
    or
  - laptop
    - if you don't like the included one

OPCUG

Users helping users
for over 40 years

Webcams

- Common resolutions
  - 1280 x 720 pixels (720p - HD)
  - 1920 x 1080 pixels (1080p - full HD)
  - 3840 x 2160 pixel (4K - UHD)
    - probably overkill for vast majority
- Frame rates
  - 30 fps to 120 fps
  - higher frame rate give less jerky look when there is movement
  - higher fps = lower resolution (usually)

OPCUG

Users helping users
for over 40 years

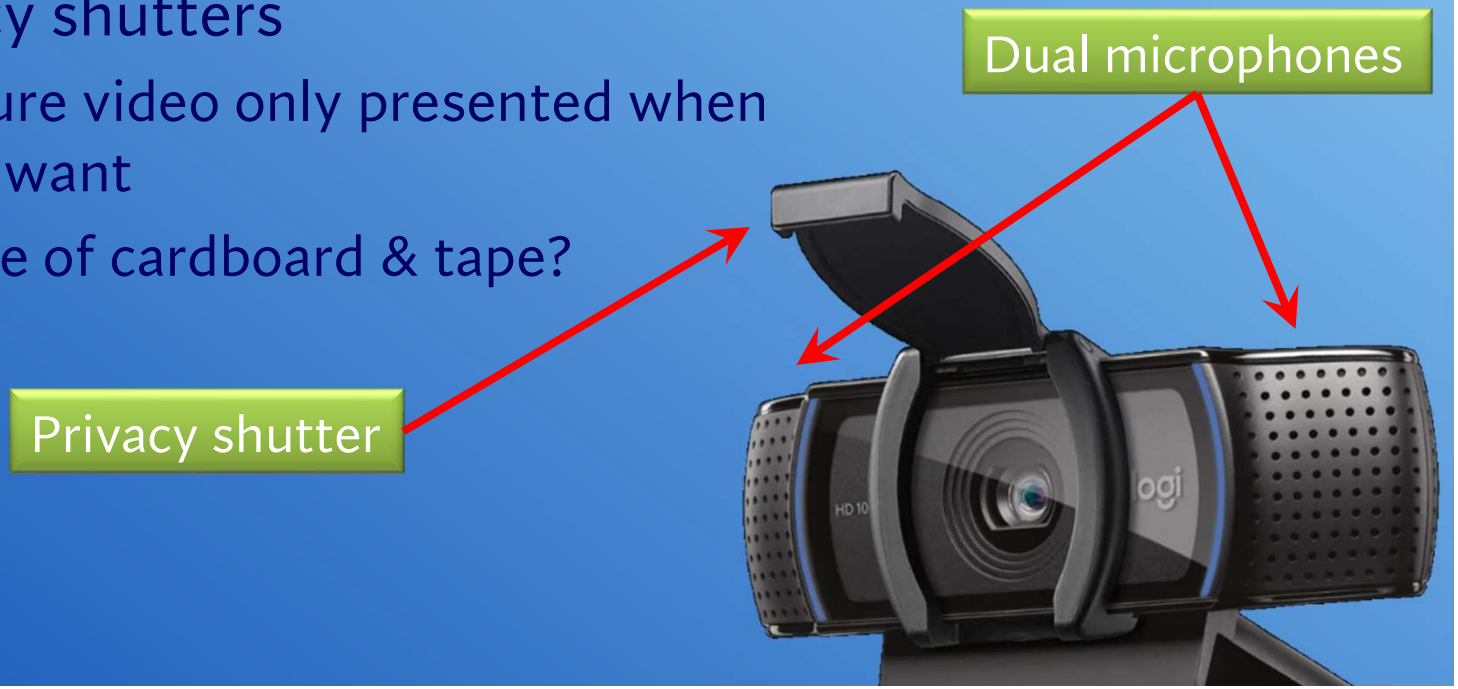
Webcams

- Field of view
  - 60 degrees
    - good for single person
  - 78 degrees
    - good for two people
  - 90 degrees
    - good for a group
- Autofocus
  - almost all webcams
  - faster autofocus and better subject selection on higher-end webcams

OPCUG
Users helping users
for over 40 years

Webcams

- Built-in microphone
  - almost all webcams have at least one microphone
  - dual microphones: more natural sound
  - **for best sound, consider a headset**
- Privacy shutters
  - ensure video only presented when you want
  - piece of cardboard & tape?

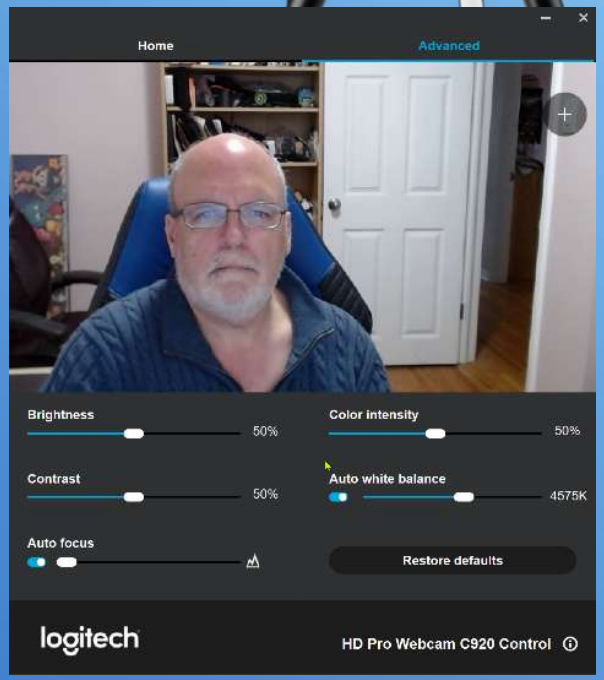


OPCUG

Users helping users
for over 40 years

Webcams

- Mount
  - almost all can be mounted on monitor
  - some can be mounted on mini-tripod
- Software controls
  - higher-end webcams
  - control zoom, pan, tilt, brightness, contrast, auto-focus, white balance
- Windows sign-in
  - a few support Windows Hello for facial recognition



OPCUG

Users helping users
for over 40 years

Optical drive

- Rarely needed
- DVD burner on most desktops
  - but becoming rarer
- DVD burner on some larger laptops
  - but becoming rarer
- External USB optical drives available

OPCUG
Users helping users
for over 40 years

USB Ports

- Universal Serial Bus
- Generally 1 – 8 ports
- Front and rear (desktops)
- Limited on ‘thin’ laptops and tablets
- Data transfer and power delivery
- Multiple flavours
  - USB 2.0 480 Mbps 2.5 W
    - Type-A connectors
  - USB 3.x 5-20 Gbps 4.5-15 W
    - Type-A and Type-C connectors
  - USB 4.0 40-80 Gbps
    - Type-C connectors only
  - USB PD 100-240 W
    - Type-C connectors only

OPCUG

Users helping users
for over 40 years

Audio ports

Line-out (Speakers/headphones)

Microphone

Line-in (e.g. media player)

Desktops

Combination port
(Microphone and Audio-out)

Laptops

OPCUG

Users helping users
for over 40 years

Card readers

- Mostly useful for digital cameras
  - & some smart phones
- Some laptops and many desktops
- Laptops limited in formats (normally SD)
- Desktops more likely to support multiple formats
- Inexpensive USB card readers available

OPCUG

Users helping users
for over 40 years

Desktop networking

- Wired gigabit Ethernet
  - some 2.5 gigabit Ethernet
- Some desktops
  - Wireless WiFi 5 (802.11ac) or WiFi 6 (802.11 ax)

OPCUG

Users helping users
for over 40 years

Laptop networking

- Wireless
  - WiFi 5 (802.11ac)
  - WiFi 6 (802.11 ax)
  - WiFi 7 (802.11 be)
- Wired Ethernet
  - some laptops (larger or gaming)
    - gigabit (or 2.5 gigabit)

USB (Type-A or Type-C) to Ethernet adapters available

OPCUG

Users helping users
for over 40 years

Wireless standards

Generation	IEEE Standard	Maximum Linkrate (Mbit/s)	Adopted	Radio Frequency (GHz)
Wi-Fi 7	802.11be	1376 to 46120	(2024)	2.4/5/6
Wi-Fi 6E	802.11ax	574 to 9608[1]	2020	2.4/5/6
Wi-Fi 6			2019	2.4/5
Wi-Fi 5	802.11ac	433 to 6933	2014	5[2]
Wi-Fi 4	802.11n	72 to 600	2008	2.4/5
(Wi-Fi 3)*	802.11g	6 to 54	2003	2.4
(Wi-Fi 2)*	802.11a	6 to 54	1999	5
(Wi-Fi 1)*	802.11b	1 to 11	1999	2.4
(Wi-Fi 0)*	802.11	1 to 2	1997	2.4
*: (Wi-Fi 0, 1, 2, 3, are unbranded common usage.[3][4])				

https://en.wikipedia.org/wiki/IEEE_802.11ac-2013

OPCUG
Users helping users
for over 40 years

Printers

Inkjet

- Inexpensive hardware
- Expensive ink
- Good to excellent quality
- Print at least weekly
  - prevent clogged print head

Laser

- Moderately priced hardware
- Relatively inexpensive toner
- Very good to excellent quality
- Colour pretty expensive

OPCUG

Users helping users
for over 40 years

Special form factor computers

OPCUG

Users helping users
for over 40 years

Special form factor computers

- Thin-and-light (ex-Ultrabook)
- Convertible / Hybrid
- All-in-one
- Tablet
- Chromebook
- Gaming
- NUC
- Single Board Computers

OPCUG

Users helping users
for over 40 years

Thin and Light

- High performance
- Expensive
- Powerful (processor, memory)
- Large capacity SSD
- WiFi & (sometimes) wired networking
- 2-4 USB ports, video out, web cam
- Card reader (sometimes)
- Battery life generally good

OPCUG

Users helping users
for over 40 years

Convertible / Hybrid

- Can be used as laptop or tablet
- Touchscreen
- Keyboard removable or flips over
- Somewhat more expensive than regular laptop

OPCUG

Users helping users
for over 40 years

All in one

- Essentially a big laptop
  - all of the **disadvantages** of a desktop
    - large, not portable
    - must be plugged in
  - all of the **disadvantages** of a laptop
    - confined space (heat, difficulty upgrading)
    - higher cost
- Niche product

OPCUG

Users helping users
for over 40 years

Tablet

- Usually Android rather than Windows
  - but there are some Windows tablets (e.g. Surface, Slate)
- Great for consuming information
- Not so great for creating information
- Keyboard and mouse among most popular accessories
  - but doesn't that make it a laptop?

OPCUG

Users helping users
for over 40 years

Chromebook

- Laptop running Google's ChromeOS
  - can't run Windows programs
- Inexpensive
  - usually
- Low performance to quite capable
- Online focus (browser-based apps)
  - but can do a lot offline

OPCUG

Users helping users
for over 40 years

Gaming

- High performance
  - especially for graphics
- Falcon Northwest Talon
  - AMD Threadripper PRO 5965WX
    - 24 cores, 48 threads, 4.5 GHz
  - 128GB RAM DDR4-3200
  - 4 TB Kingston Fury Renegade SSD
  - NVIDIA GeForce RTX 4090 w/24 GB VRAM
    - video card alone worth $2,500
  - 12 USB ports
  - **US $10,569**

PC PCMAG.COM BEST of THE YEAR 2022

CONS

✕ May require a second mortgage

OPCUG
Users helping users
for over 40 years

NUC

- *Next Unit of Computing*—small form-factor PC
  - designed by Intel beginning 2013
    - Intel announced departing market July 2023
  - other vendors still marketing NUCs
- Delivers full desktop PC experience
- Contains everything a standard PC does
  - processor
  - memory
  - SSD
  - LAN or Wi-Fi
  - integrated or discrete graphics

Powerhouse PC
- 13 x 13 x 3.4cm
- 0.53kg

ASUS—world's 1st ***Copilot+*** NUC (2025)
- Intel Core Ultra, up to 32GB RAM, up to 2 TB SSD, HDMI, WiFi7 & 2.5G Ethernet, Bluetooth 5.4, 2xUSB 4 Type-C w/Thunderbolt, 4xUSB 3.2 Type-A, speaker/microphone

OPCUG

Users helping users
for over 40 years

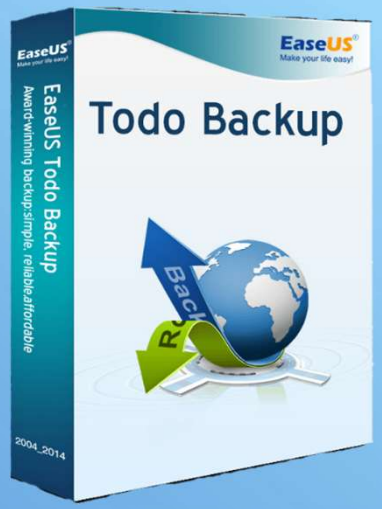
Single Board Computers (SBC)

- Raspberry Pi, BeagleBoard
- Inexpensive (Raspberry Pi Zero, $5)
- Processors: ARM, x86, RISC-V
- Linux (typically)
- Low power consumption
- HDMI, Wi-Fi, Ethernet
- General-purpose input/output (GPIO)
- Specific applications
  - learn programming (e.g. Python)
  - experimentation (Robots)
  - network attached storage
  - media server

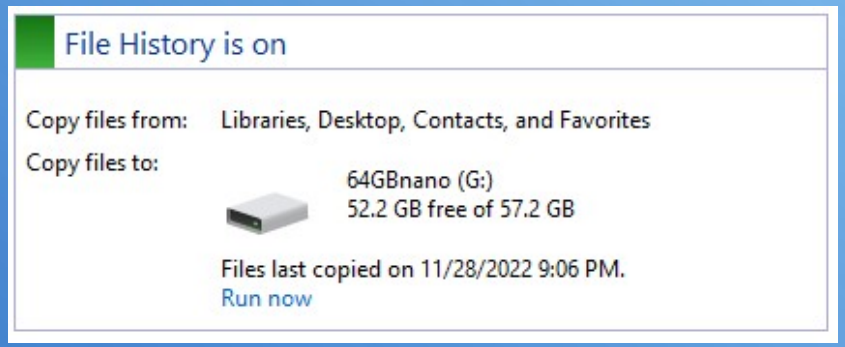
OPCUG

Users helping users
for over 40 years

Backups



- Image backups
  - high-capacity USB drives
    - disk images can be large
    - multiple full backups need space
  - archive of many/large files (e.g. digital photos.)
- File and folder synchronization
  - “Active” folders
  - frequently updated
  - real-time backup
  - file versioning



https://www.google.com/search?q=backup&sitesearch=opcug.ca

https://biblioottawalibrary.ca/en/program?text=backup

OPCUG

Users helping users
for over 40 years

Narrowing the field

OPCUG

Users helping users
for over 40 years

Narrowing the field

Get a good idea of the features
- you absolutely need
- nice to have

Look for makes/models that have those features

Lots of reviews available

OPCUG

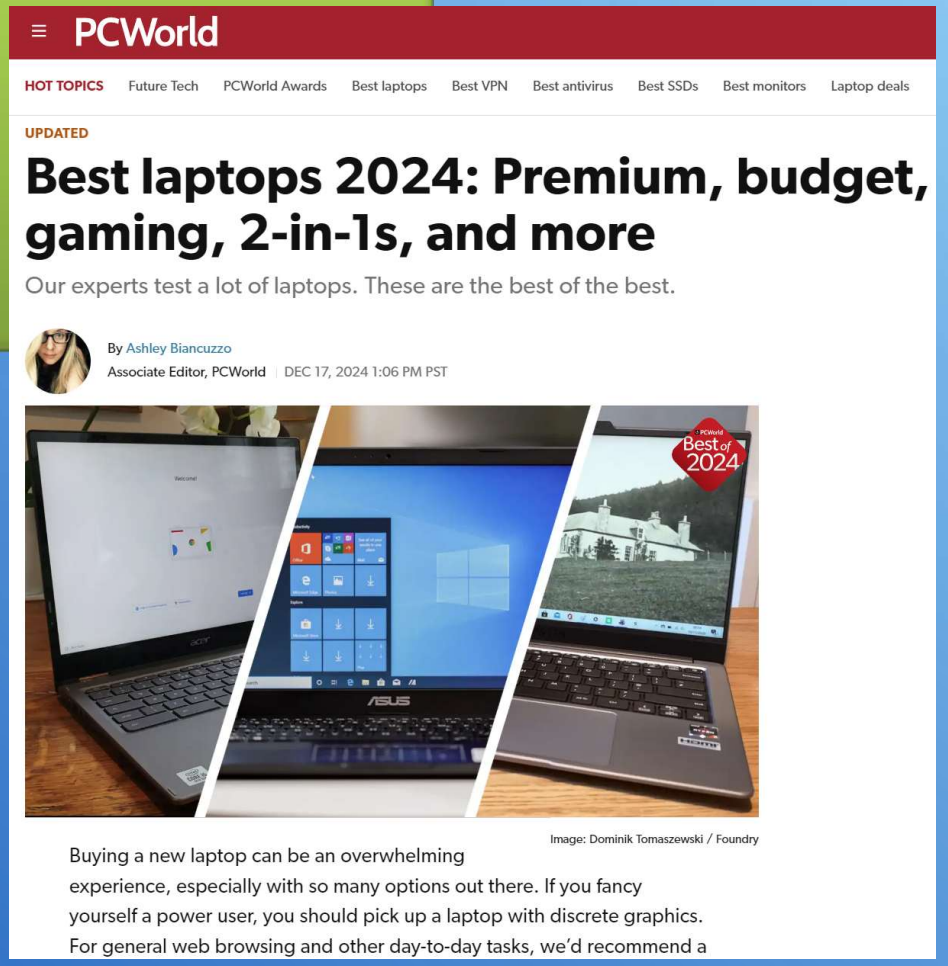
Users helping users
for over 40 years

Google can help find round-ups of categories

- desktop
- laptop
- gaming
- light
- everyday computing

Or shop at your favourite computer store and look for computers with your required/desired features

And talk to your fellow OPCUG members!



PCWorld

HOT TOPICS Future Tech PCWorld Awards Best laptops Best VPN Best antivirus Best SSDs Best monitors Laptop deals

UPDATED

Best laptops 2024: Premium, budget, gaming, 2-in-1s, and more

Our experts test a lot of laptops. These are the best of the best.

By Ashley Biancuzzo
Associate Editor, PCWorld | DEC 17, 2024 1:06 PM PST

Image: Dominik Tomaszewski / Foundry

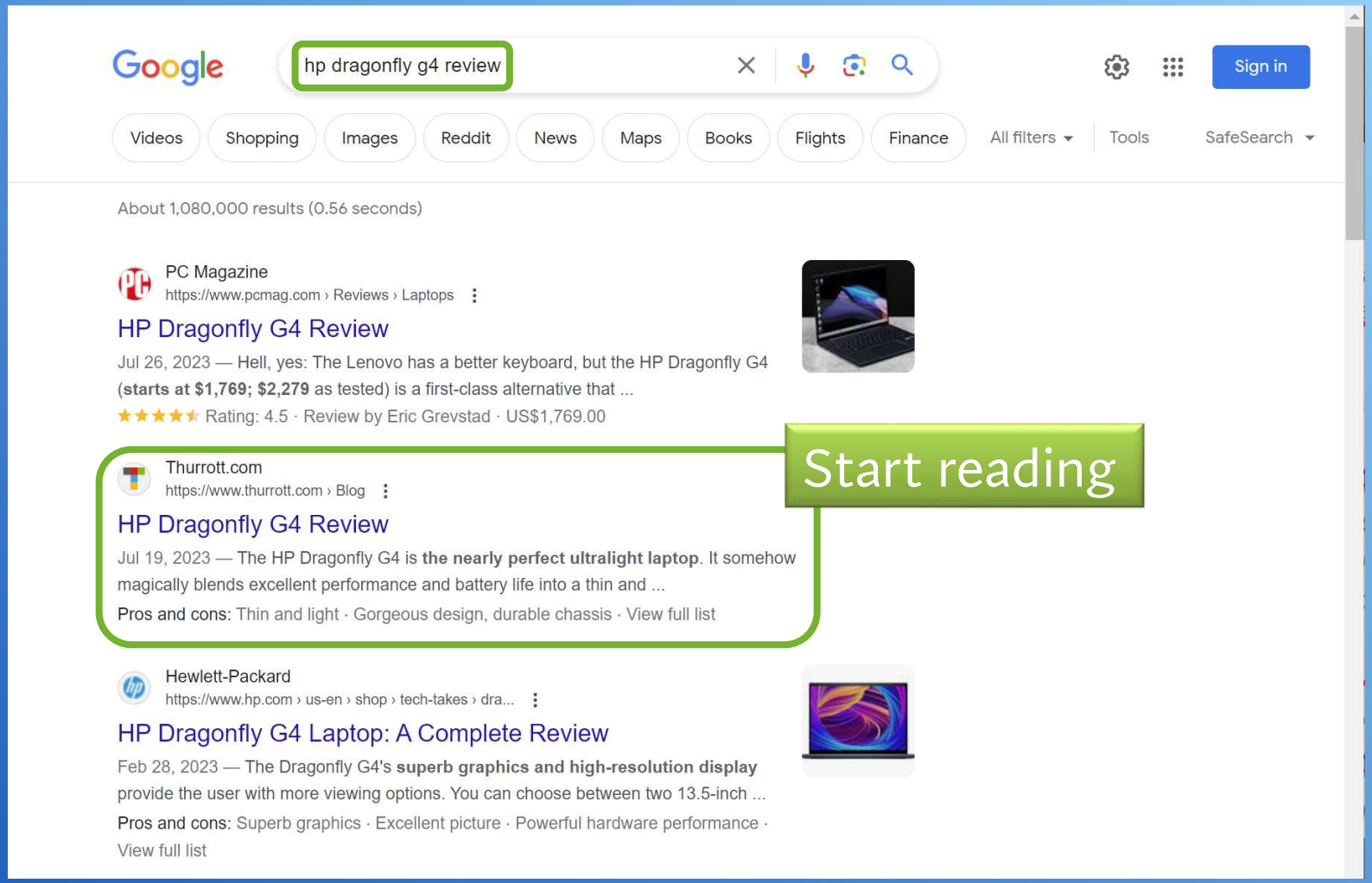
Buying a new laptop can be an overwhelming experience, especially with so many options out there. If you fancy yourself a power user, you should pick up a laptop with discrete graphics. For general web browsing and other day-to-day tasks, we'd recommend a

OPCUG

Users helping users
for over 40 years

Once you find something interesting

- Google it + “review”



Start reading

OPCUG

Users helping users
for over 40 years

Read many reviews

- pay special attention to
  - conclusions
  - recommendations
  - pros & cons

Blog / Windows / Windows 11 / Post

HP Dragonfly G4 Review

Paul Thurrott JUL 19, 2023 3

Recommendations and conclusions

What can I say? The HP Dragonfly G4 is the nearly perfect ultralight laptop. It somehow magically blends excellent performance and battery life into a thin and light chassis that remains inexplicably cool and quiet no matter the use case. The improvements over its predecessor seem minor, but they're all useful and appreciated, from the Smart Sense power and thermal performance optimizations to the terrific hybrid work enhancements. The typing experience is the best I've ever had, the connectivity and expansion options are top-notch, and it's even more sustainable than previous models. I can't identify any major faults, leaving only its deservedly high asking price in the "cons" column.

The HP Dragonfly G4 is highly recommended. If you can get one on sale as of the time of this writing, be sure to do so.

At-a-glance

Pros

- Thin and light
- Gorgeous design, durable chassis
- Excellent performance for productivity work
- Dual camera support, other video control enhancements are spectacular
- Nearly perfect typing experience
- Terrific port selection, with one USB-C port on each side
- Long-lasting battery life

Cons

- Can be expensive

OPCUG

Users helping users
for over 40 years

Summary

- Narrow choice to laptop or desktop (or other)
- Identify **your** computing needs
  - light-duty vs. high-power
    - will determine factors such as CPU and RAM
  - ports you need for video & USB
    - hub or conversion cable can often take care of these needs
- Most users don't need separate graphics card
  - on-board graphics sufficient unless
    - **high-end** video/photo editing, gaming
- Make provision for backups
  - external storage & software
- Ask friends (& OPCUG members!)
- Consult reviews

Ottawa PC Users' Group

Users helping users

- Zoom meetings open to members & non-members
  - club meetings held 2nd Wednesday of the month, 7:30-9:30
  - weekly Q&A sessions (except 2nd Wed of month)
  - check out what's coming! https://opcug.ca/#upcoming
- Join the OPCUG - https://opcug.ca/join-or-renew/
  - why join? - https://opcug.ca/why-join/
- Ottawa Public Library presentations schedule
  - https://opcug.ca/opl-presentations/
  - register at the OPL website
    - https://biblioottawalibrary.ca/en/program

OPCUG

Users helping users
for over 40 years

OPCUG online

- Web Site
  - http://opcug.ca
- **Member only services**
  - discussion forum
  - one-on-one remote assistance
- Monthly newsletter
  - articles, reviews, notices, & more
- Archives
  - past presentations & Q&A
- Fraud Watch
  - stay safe online
- Digital photography “how-to”s

OTTAWA PC NEWS

Volume 40, Number 7 — September 2023

ARTICLE

Really, *really*, deleting files

by Chris Taylor

When you delete a file in Windows, the actual on-disk data is not removed. The file is usually moved to the Recycle Bin where it can be easily recovered. Even if you empty the Recycle Bin or bypass the Recycle Bin by holding down the Shift key while deleting files, the data remains on disk. All that happens is the pointers to the file are removed, making the space available for new files.

Recovering deleted files

Utilities to recover deleted files date back to ***Unerase*** in the first version of the Norton Utilities in 1982. They continue to this day with dozens of free and commercial programs available for Windows, macOS, Linux, Android, and iOS.

If you are in a high-security situation, please ignore this article. It is intended for the average home or business user whose adversaries are not about to use magnetic force microscope techniques to recover data. If you are likely to have CSIS looking for your deleted data, you need to go well beyond what I recommend here.

Making data unrecoverable

When you want to dispose of a storage device, you should ensure all sensitive data is deleted and ***unrecoverable***. This can be achieved by physical destruction of the storage device: hard disk drive (HDD), solid state drive (SSD), flash drive, etc. or—if you want the storage device to be reusable—by over-writing the data areas of the disk with random data, obliterating the original data.

Some secure deletion programs boast of capabilities such as the Gutmann algorithm, which overwrites all data with 35 passes. For the average computer user, I wouldn't worry beyond a single pass.

There are many programs available, both free and commercial, for secure data removal. The programs I list are not necessarily the best—they are simply programs that have been around quite a while (have stood the test of time), are free, and have been used successfully either by me or other members of OPCUG.

Be careful using secure deletion programs. By their very nature, there is no "undo" button! There are several levels of overwriting data: individual files, free space on the drive, and the entire disk.

Individual files

If you just want to make a few files unrecoverable, there are programs that can target individual files or folders of files. One example is the free and open-source program File Shredder (https://www.fileshredder.org/). It is very simple and straightforward to use.

Free space

Storage devices eventually end up with data in all locations on the device. The free space has data that was used for files that have since been deleted. You have no way of knowing what recoverable data might be there. Some programs can target free space and securely overwrite data there. File Shredder is one program that can wipe free space.

Entire disks

If you want to securely delete all data on an entire storage device, IIDShredder (https://www.miray-software.com/products/applications/hdshredder.html) is available in free and commercial versions. The free version should be sufficient for the vast majority of users. The website details the additional capabilities in the commercial versions.

Another popular program for securely erasing all data on storage devices is the free and open-source DBAN

(Continued on page 7)

Inside this issue:

Next Meeting: WEDNESDAY, September 13th, 2023

Chris.Taylor@opcug.ca

The presentation is available for downloading as a PDF file
https://opcug.ca/presentations/2025-02-BuyPC.pdf