Practical Home Computing

Most of us have home computers but may not be exploring new opportunities for using them creatively. This presentation outlines suggestions for useful applications and home network improvements that you may not be aware of. The objective is to give you some new ideas to consider.

Topics covered include:

Graphics, video editing, media players, MS Office and alternatives, cloud document alternatives, PDF as a universal document format, Email clients, Browser settings, password managers.

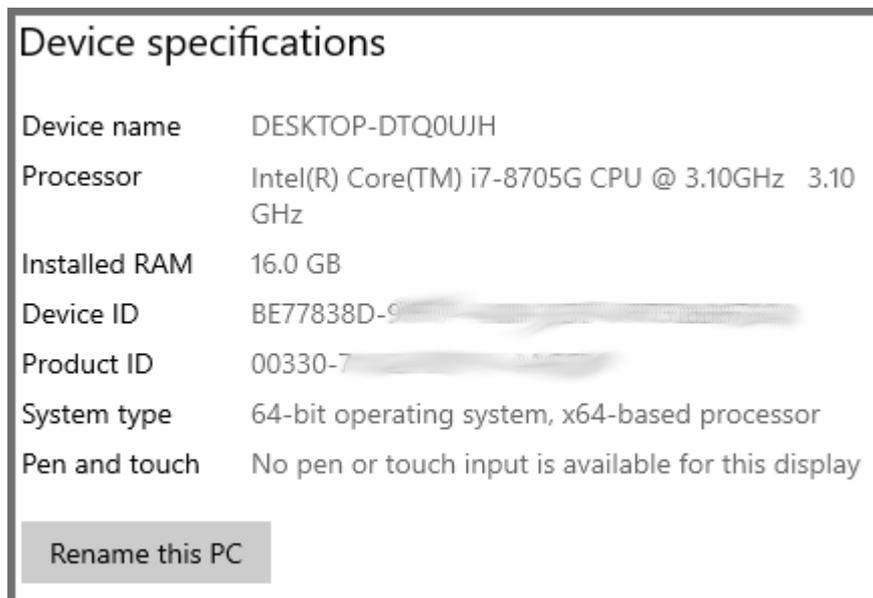What to look for in a new computer, form factor and hardware options, ports, cables. Virtual machines.

Bandwidth measurement and monitoring, system benchmarking.

Home network infrastructure, network switches, network attached storage (NAS), media servers, printer sharing, power support and smoothing (UPS).

Recommended Software Installations

The applications covered here mainly refer to Windows, but many are also applicable to Mac and Linux.

Most software downloads offer 64-bit or 32-bit versions. Most users would have 64-bit processors these days, but if you are unsure go to *Settings > System > About* to check, e.g.

Note: You can run 32-bit applications on a 64-bit system, but not the reverse.

Document Management

Microsoft 365 (formerly MS Office) (Windows and Mac)
(Word, Excel, PowerPoint, Outlook, OneNote. OneDrive, Teams)
Paid annual subscription ($99 p.a. individual, $129 p.a. family (up to 6 Windows or Mac PCs).
https://www.microsoft.com/en-au/microsoft-365

However, you can use most of the common Office products online for free. They don't have the full features, but do contain the most commonly-used functions. You can store documents in the cloud, or download to

your PC using MS document formats or PDF. These facilities are provided through office.com, also known as Microsoft Live. You need to establish a Microsoft account:
https://www.office.com/

LibreOffice (Windows and Mac)
LibreOffice is a free office suite (a successor to OpenOffice). It includes several applications that have MS Office equivalents: Writer (word processing), Calc (spreadsheets), Impress (presentations), Draw (vector graphics and flowcharts), Base (databases), and Math (formula editing).

LibreOffice is compatible with a wide range of document formats such as Microsoft® Word (.doc, .docx), Excel (.xls, .xlsx), PowerPoint (.ppt, .pptx) and Publisher. Its native file format is the open standard Open Document Format (ODF) but you can save files and export to many different formats including PDF.
https://www.libreoffice.org/

Transferring documents to others
There are occasionally incompatibilities between different versions of Word, or between Word and 3rd party products such as Libre Office. Some people may not be able to read a Word document on their computer or device. However, the PDF (Portable Document Format) gets around these problems by providing a consistent layout irrespective of source. You can easily export documents from most software packages in PDF format and they are often smaller in size than the original.

Adobe Acrobat Reader
This is a free product that is virtually an essential for any home computer:
https://acrobat.adobe.com/au/en/acrobat/pdf-reader.html

Notepad (or TextEdit on Mac)
A standard component of Windows. Very useful for making notes, but with very limited formatting options (fonts, bold etc.). Files are saved in text (.txt) format.

7-zip (Windows)
7-zip is a free file compressions and archiving facility. It allows you to package a number of files into a single .zip or .7z archive file, e.g. for emailing. It also includes a high security encryption feature that enables you to securely send confidential documents through the Internet. Competitors are WinZip and WinRAR which have free trial version only.
https://www.7-zip.org/

System Security

Keepass (Password manager)
This is a well-recognised password manager. It basically stores passwords for websites in encrypted form accessible with a master password. (Free version limited to 20 passwords).
https://keepass.info/

Password Safe
Similar to KeePass. Free.
https://pwsafe.org/

Axcrypt
Axcrypt is a file encryption product. You create files containing private information and then encrypt them, typically with a common passphrase.
https://www.axcrypt.net/

BitDefender
One of many anti-malware products but requires a paid subscription (about $50 per annum). Can be a little complex to use but includes a built-in password manager.
https://www.bitdefender.com.au/

Media

IrfanView (Windows)
IrfanView is a free image/graphics editor which includes the most common features needed to modify photos and images, e.g. crop, re-size, rotate, color depth. Basic drawing facilities.
https://www.irfanview.com/

A good alternative is Paint.net:
https://www.getpaint.net/download.html

Gimp (Windows and Mac)
Gimp is a more powerful free image editor with features similar to Adobe PhotoShop. Highly recommended but there is a learning curve.
https://www.gimp.org/

Audacity (Windows and Mac)
Audacity is a free open-source, multi-track audio editor and recorder. It is particularly useful for recording sound files, music etc. from the web (subject to copyright restrictions of course).
https://www.audacityteam.org/

This is the YouTube clip I used in the demo:
https://www.youtube.com/watch?v=8kQZHYbZkLs

VLC (Windows and Mac)
VLC is a free and open source cross-platform multimedia player and framework that plays most multimedia files as well as DVDs, Audio CDs, VCDs, and various streaming protocols.
https://www.videolan.org/

Davinci Resolve (excellent free Video Editor) **(Windows and Mac)**
There are numerous excellent movie/video editors available these days, but most come at a significant cost. *Davinci Resolve* is a free download with many professional features. Most users have a video camera of some sort, even if it is only their mobile phone. You can use a video editor to join video segments together, cut unwanted scenes, add text overlays etc.
https://www.blackmagicdesign.com/au/products/davinciresolve/

MuseScore (Windows and Mac)
If you are involved in music as a performer, MuseScore is an excellent free program that enables you to create sheet music.
https://musescore.org/en

Zoom Videoconferencing
Download Zoom for any device from:
https://zoom.us/download

Browsers

You only need one web browser, but you can install more than one if you wish. You should regularly clear the browser history to remove old page downloads, images etc.

It is possible to store web address password within a browser but this is only recommended for non-critical sites. Such passwords are protected by the Windows password only, i.e. once the PC is logged in, anyone with access can view passwords saved in the browser. When you clear browser history you can opt to retain stored passwords.

Chrome

The most commonly-used browser. Download from:
https://www.google.com.au/chrome/

Microsoft Edge

The latest version is based on Chrome, but may not yet have been rolled out on all Windows PCs. It can be installed from:
https://support.microsoft.com/en-au/help/4501095/download-the-new-microsoft-edge-based-on-chromium

Firefox

Download from:
https://www.mozilla.org/en-US/firefox/new/

Email

Thunderbird (Windows and Mac)

Mozilla Thunderbird is recommended as an email client (free). Download from:
https://www.thunderbird.net/

Utilities

DU Meter (Windows)

This is bandwidth monitoring software that enables you to see what programs are uploading or downloading data at any time. There is a 30-day free trial period but after that it requires a paid license (about $40).
https://www.hageltech.com/dumeter/about

You can also obtain basic network utilization information from Windows Task Manager. There are some free alternatives to DU Meter but they may not have the full features, e.g. Bitmeter OS (not evaluated).

Novabench (Windows and Mac)

Novabench is a widely-used free PC benchmarking tool. It enables you to obtain a performance score for your computer that can be compared with others.
https://novabench.com/

Network Speed Test

Use this online tool to determine how well your broadband connection is performing. You should choose a local server (usually selected by default) for consistent comparisons. (If you choose an overseas server for example the results will be affected by speed of international gateways etc.)
https://www.speedtest.net/

Virtual Machines

VirtualBox (Windows and Mac)

This is a specialized area but can be employed by anyone. The concept is that you can create another virtual computer that operates in a protected environment on your PC. It is typically used to evaluate another operating system, e.g. you can test a Linux distribution by installing it within Windows. (Windows actually has a facility called Windows Subsytem for Linux that can be installed but it can only be used with command line operations).

To enable this facility, you first install VirtualBox, then install the Linux distro of choice. It is necessary to assign a proportion of RAM memory (e.g. 4GB) while VirtualBox is running, and a dedicated area of disk (e.g. 10-20GB). Download VirtualBox from:
https://www.virtualbox.org/

This video explains the process:
How to Use VirtualBox to Try New Linux Distros
https://www.youtube.com/watch?v=4eRzl-M2HsQ

Buying a New Computer. Hardware options – what to look for

Traditonal tower desktop

Advantages:
Expansions slots (extra cards, drives etc.)
Modular
Easy to add memory
Generally used for power applications, e.g. gaming.

Disdavantages:
Bulky, takes up desk space
Higher power usage

Laptop, Notebook

Advantages:
Portable/mobile.
Screen built-in.

Disadvantages:
Less powerful
Keyboard built-in (susceptible to spills etc.)
Difficult to expand.

All-in-One PC (hardware built-in to back of monitor)

Advantages:
Single unit. More portable than a desktop.

Disadvantages:
Single unit, less accessible.
Difficult to expand.

2-in-one Tablets, e.g. Surface Pro

Advantages:
Can operate as a traditional tablet by separating keyboard from screen.

Small Form Factor PC (Dell, Lenovo, HP etc.)

Advantages
Much smaller than a desktop tower.
Somewhat expandable.

Disadvantages
Still requires more desk space than some alternatives.

NUC (Next Unit of Computing)

Advantages
Very compact and portable
Can be customized (disk, memory etc.)

Disadvantages:
Often sold as "bare bones". If so, you need to choose your own SSDs and memory sticks and install them.

Installing SSD and RAM in NUC:

Two M.2 SSDs on left, RAM sticks on right.

Not as daunting as it may look.
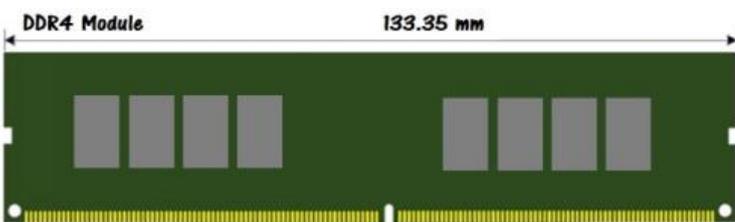
Points to consider in buying a new PC

Processor: Intel or AMD, i5, i7, i9, Celeron (processor power).

RAM: Generally 8GB is minimum for today's applications, but 16GB even better. More memory means more applications can run simultaneously without "page swapping". (Check Task manager).

 DDR3 or DDR4? DDR4 is newer and physically incompatible with DDR3.
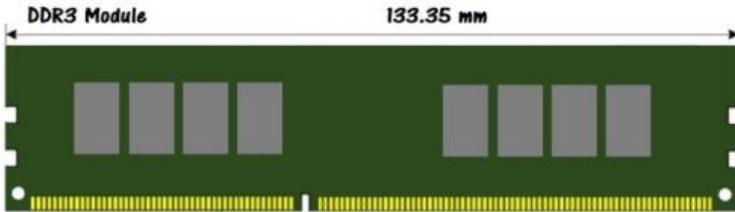
Disk capacity: Generally need 1TB (1000GB) minimum. Consider dual drives to separate programs and data, e.g. 250GB C drive and 1TB D drive.

Hard Disk (HDD) or Solid State (SSD) drives? (SSD has no moving parts).

This diagram illustrates a traditional hard drive (rotating magnetic disks), vs SATA SSD vs M.2 SSD.


M.2 SSD drives are generally found in more compact form factors and use a faster data transfer mechanism. SSD was once quite expensive but they are now more reasonably priced.

Compatibility with existing equipment, especially monitors.

If you plan to use existing monitor(s), it is important to check the interface ports on the back. Technology changes over time, and the most common ports used today are HDMI, Mini DisplayPort and USB Type-C (Thunderbolt-compatible).

You may find that a new PC cannot connect to an old monitor because the ports aren't compatible, but you can often find adaptor cables.
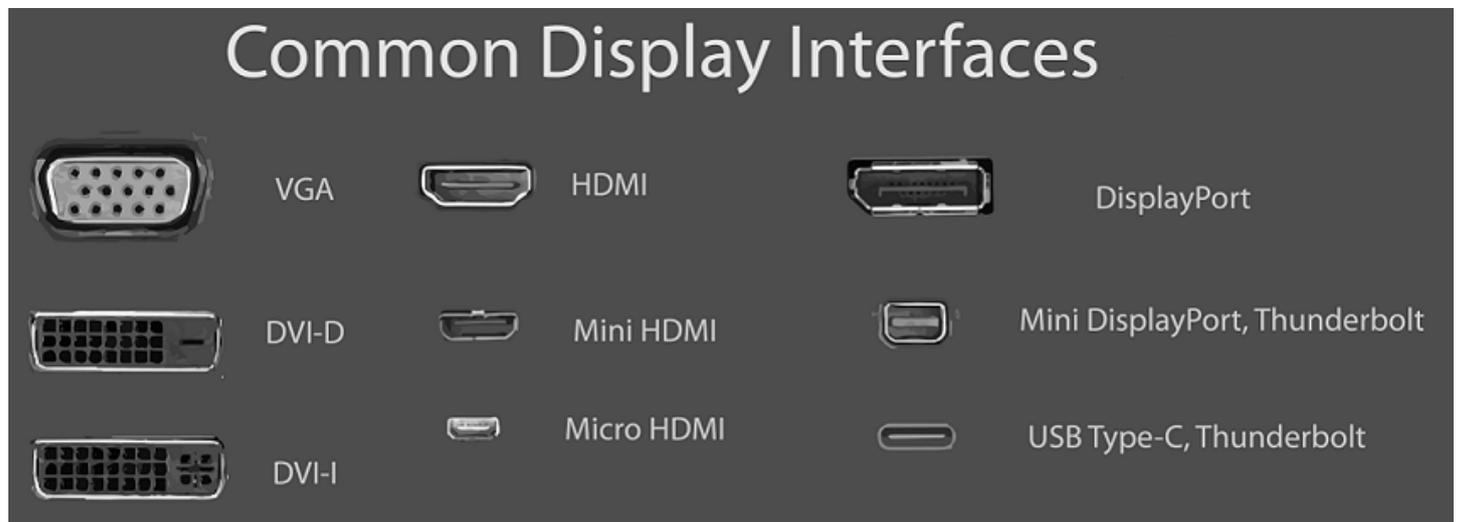
If your monitor has built-in speakers, be aware that not all interface ports can carry sound, e.g.
  HDMI – video and sound
  DVI – sound only
  VGA – sound only (not often used any more)
  Mini DisplayPort – sound and video

If your monitor doesn't have built-in speakers, you will need to have USB or analogue external speakers. (Analogue typically uses 3.5in stereo jack).

USB ports
You need lots of USB ports because there are so many attachments that use USB (cameras, headphones, external DVD drives, external disk drives etc.). Check how many USB ports are available on a PC, or use a USB hub to extend the number of USB ports.

Touch screens
Not particularly useful on a desktop computer. Best suited to tablets.

Chromebooks
A Chromebook is a useful alternative to a traditional PC. It is essentially a computer that only runs a browser. This may sound limiting but there are many applications that run through browsers.

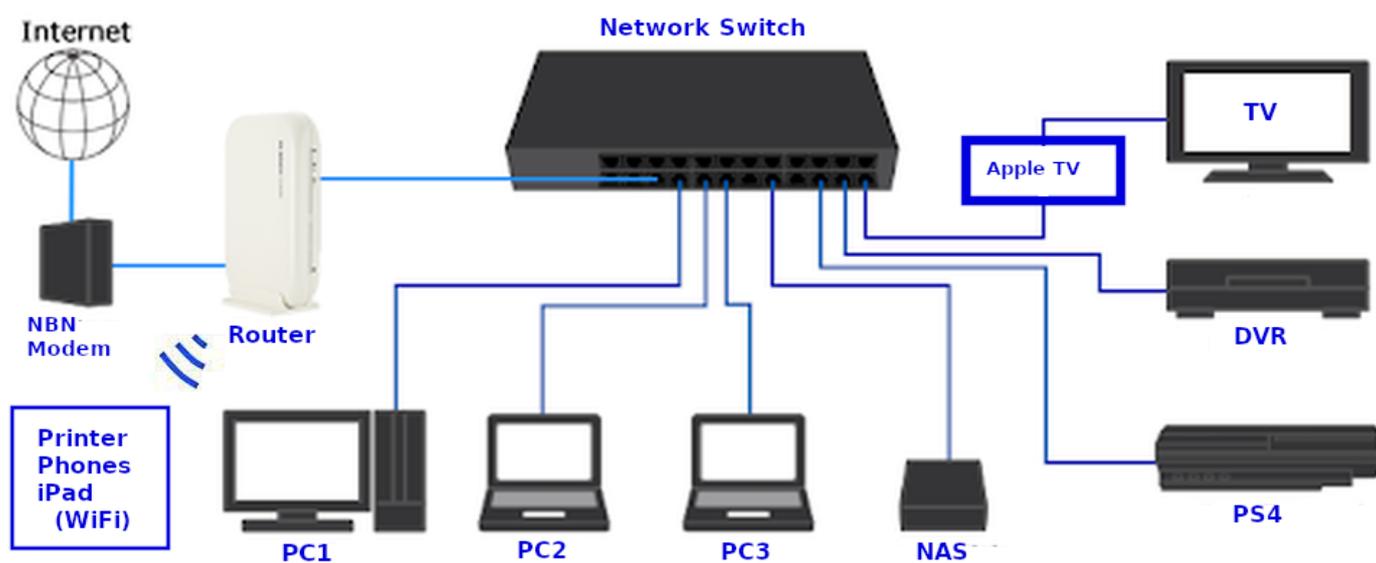**Bandwidth measurement and monitoring, system benchmarking.**
Use Novabench to provide a system score on several criteria (CPU, GPU, memory speed, disk speed).

Home network infrastructure (LAN – local area network)

(My home network hub):
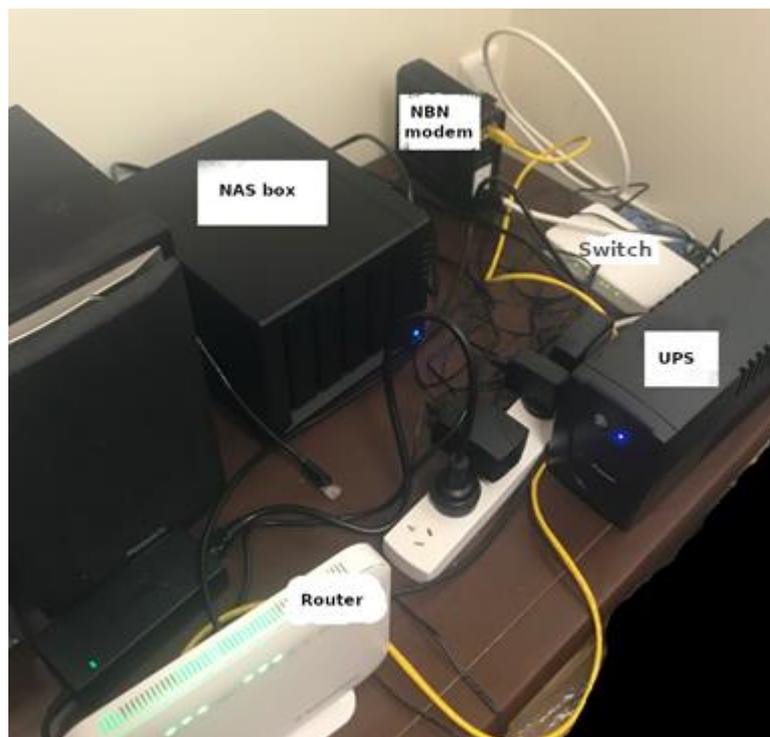
Home Network layout:

Connection of entertainment devices (TV etc.) to the network enables you to use media servers to distribute content throughout the house. All the above devices are connected by in-wall Ethernet cabling, but you can use WiFi if device locations have good signal.

Your router usually comes with an inbuilt network switch but it typically has only 4 ports. If you need additional ports you need a network switch.

NAS (Network Attached Storage)
(Synology and QNAP are the main brands)

A NAS can have multiple bays (2,4,6,8 common) containing high capacity disk drives.

A key feature is RAID redundancy which means one or more drives can fail without losing data.

As well as being used as a network-accessible data store, the NAS can act as a server of various types, e.g. media server for movies, videos, music, photos.

Printers
If there are multiple users in the household, a network-attached printer provides easiest way to share printing.

UPS (Uninterruptible Power Supply)

The UPS provides battery backup power in the event of a power failure. It can also "clean" the power by blocking surges and keeping power at a stable level in a brown-out, thus protecting valuable electronic equipment.

Models vary in capacity but a common setup provides power for about 60 minutes power backup. The UPS includes software that enables you to monitor UPS performance (voltage, battery status).
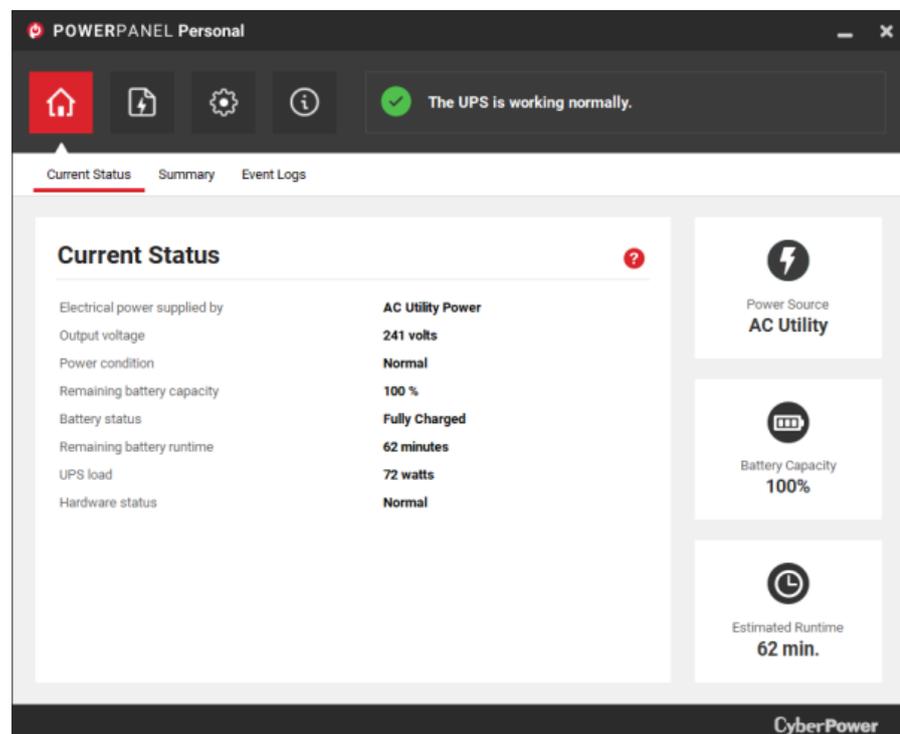
Turing Tumble

This device was demonstrated at the end of the talk. It's a game where players (ages 8 to adult) build mechanical computers powered by marbles to solve logic puzzles of increasing complexity. It teaches how the logic gates that power computers actually work.

Turing Tumble demo:
https://www.youtube.com/watch?v=Bi1d-Rw-6b4

(The device is named after Alan Turing, a famous mathematician who was influential in the development of computer science. During the Second World War, Turing worked for the Government Code and Cypher School at Bletchley Park, Britain's codebreaking centre.)

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