A **distributed system** consists of a collection of autonomous computers, connected through a network and distribution middleware, which enables computers to coordinate their activities and to share the resources of the system, so that users perceive the system as a single, integrated computing facility.

	Centralised System	Distributed System
Characteristics	One component with non-autonomous parts Component shared by users all the time All resources accessible Software runs in a single process Single Point of control Single Point of failure	Multiple autonomous components Components are not shared by all users Resources may not be accessible Software runs in concurrent processes on different processors Multiple Points of control Multiple Points of failure

Certain common characteristics can be used to assess distributed systems : Resource Sharing, Openness, Concurrency, Scalability, Fault Tolerance, Transparency.

Resource Sharing

Ability to use any hardware, software or data anywhere in the system.

Resource manager controls access, provides naming scheme and controls concurrency.

Resource sharing model (e.g. client/server or object-based) describing how resources are provided, they are used and provider and user interact with each other.

Openness

Openness is concerned with extensions and improvements of distributed systems, detailed interfaces of components need to be published, new components have to be integrated with existing components. Differences in data representation of interface types on different processors (of different vendors) have to be resolved.

Concurrency

Components in distributed systems are executed in concurrent processes. Components access and update shared resources (e.g. variables, databases, device drivers). Integrity of the system may be violated if concurrent updates are not coordinated. Adaption of distributed systems to accomodate more users respond faster (this is the hard one).

Usually done by adding more and/or faster processors: components should not need to be changed when scale of a system increases. Design components to be scalable!

Fault Tolerance

Hardware, software and networks fail! Distributed systems must maintain availability even at low levels of hardware/software/network reliability. Fault tolerance is achieved by recovery/redundancy.

Transparency has different dimensions that were identified by ANSA: Access, Location, Concurrency, Replication, Failure, Migration, Performance, Scaling.

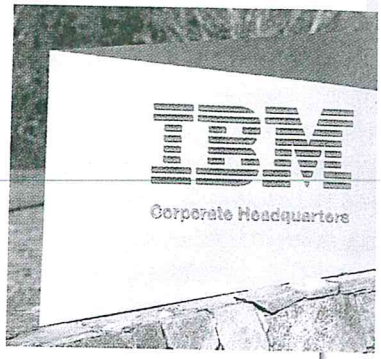
Technology companies

COMPETENCES: WORK CREATIVELY WITH OTHERS

23 Look at the company logos and talk to other students. What do you know about these technology firms? What activities are they each involved in?

CULTURE

IBM - Company profile



IBM's origins date back to 1896 when Herman Hollerith, a German immigrant to the USA, formed the Punch Card Tabulating Machine Co. which was employed by the US government to organise their census data into tables. The business grew and became the Computing-Tabulating-Recording Company in 1911 and then adopted the name International Business Machines Corporation in 1924. It was the leading office equipment manufacturer in the world with products such as calculating machines and electric typewriters.

The development of computers transformed the business. In 1951 IBM made the first commercially successful computer called UNIVAC (Universal Automatic Computer), adopted by many businesses. From the 1960s to the early 1980s, IBM dominated the office equipment and information technology industries, especially in the field of mainframe computers.

IBM began marketing its personal computer (PC) in 1981. This machine, much smaller and cheaper than mainframe computers, was soon popular for both business and home use. The IBM PC quickly became the standard, with many other companies manufacturing 'IBM clones', using the same microprocessors and running the same software. In the mid-1980s, growing competition from cheaper clones caused a decline in IBM's market share.

Today IBM remains the world's largest computer technology company. It produces mainframe computers, computer storage systems and peripheral devices. The company also offers computer services that help customers develop and operate information systems. In addition, IBM develops software products for business applications.

IBM headquarters are in Armonk, just outside New York City. Nicknamed 'Big Blue', it is one of the world's largest employers, with nearly 380,000 employees and operations in over 170 countries.

IBM is also a major research organisation. Its inventions include the automated teller machine (ATM), the floppy disc, the hard disc drive, the relational database and the SQL programming language. IBM employees have been awarded five Nobel Prizes and many other honours.

24 Read the IBM profile and answer the questions.

1 Who can be considered the founder of IBM?
2 What products was IBM originally famous for?
3 What invention changed the history of IBM?
4 Which two types of computer were fundamental for IBM?
5 What were IBM clones?
6 What does IBM now sell in addition to its hardware?
7 What is IBM popularly known as?
8 How many people work for IBM?

WATCH THE VIDEO AND LEARN MORE

YouTube ▸ 'The history of IBM: the personal computer to Watson (WatchMojo.com)'

Listen and note the important innovations that IBM has introduced during its history.

25 124 Listen to a short audio profile of BT. Make notes under the following headings

- The origins of the company
- How the company developed
- What the company does now

COMPETENCES: APPLY TECHNOLOGY EFFECTIVELY

26 Do some research on the Internet and write a profile of another technology company, either a famous business or a local firm in your area. Use the three headings in exercise 25.

Improving security as artificial intelligence moves to smartphones

Researchers unveil a tool for making compressed deep learning models less vulnerable to attack.

Kim Martineau | MIT Quest for Intelligence **April 23, 2019**

Smartphones, security cameras, and speakers are just a few of the devices that will soon be running more artificial intelligence software to speed up image- and speech-processing tasks. A compression technique known as quantization is smoothing the way by making deep learning models smaller to reduce computation and energy costs. But smaller models, it turns out, make it easier for malicious attackers to trick an AI system into misbehaving — a concern as more complex decision-making is handed off to machines. In a new study, MIT and IBM researchers show just how vulnerable compressed AI models are to adversarial attack, and they offer a fix: add a mathematical constraint during the quantization process to reduce the odds that an AI will fall prey to a slightly modified image and misclassify what they see.

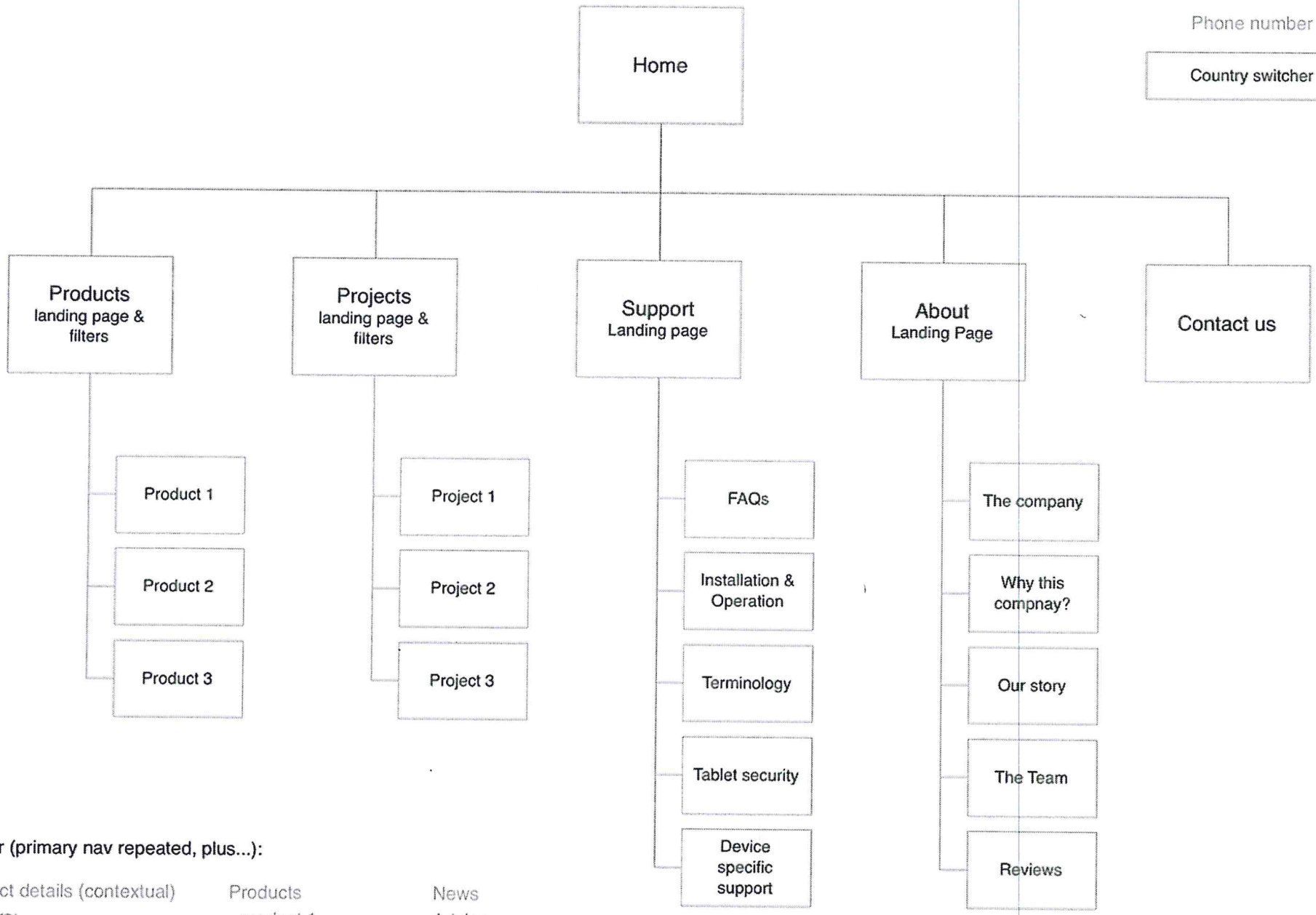
When a deep learning model is reduced from the standard 32 bits to a lower bit length, it's more likely to misclassify altered images due to an error amplification effect: The manipulated image becomes more distorted with each extra layer of processing. By the end, the model is more likely to mistake a bird for a cat, for example, or a frog for a deer. Models quantized to 8 bits or fewer are more susceptible to adversarial attacks, the researchers show, with accuracy falling from an already low 30-40 percent to less than 10 percent as bit width declines. But controlling the Lipschitz constraint during quantization restores some resilience. When the researchers added the constraint, they saw small performance gains in an attack, with the smaller models in some cases outperforming the 32-bit model.

"Our technique limits error amplification and can even make compressed deep learning models more robust than full-precision models," says Song Han, an assistant professor in MIT's Department of Electrical Engineering and Computer Science and a member of MIT's Microsystems Technology Laboratories. "With proper quantization, we can limit the error."

The team plans to further improve the technique by training it on larger datasets and applying it to a wider range of models. "Deep learning models need to be fast and secure as they move into a world of internet-connected devices," says study coauthor Chuang Gan, a researcher at the MIT-IBM Watson AI Lab. "Our Defensive Quantization technique helps on both fronts."

The researchers, who include MIT graduate student Ji Lin, present their results at the International Conference on Learning Representations in May.

In making AI models smaller so that they run faster and use less energy, Han is using AI itself to push the limits of model compression technology. In related recent work, Han and his colleagues show how reinforcement learning can be used to automatically find the smallest bit length for each layer in a quantized model based on how quickly the device running the model can process images. This flexible bit width approach reduces latency and energy use by as much as 200 percent compared to a fixed, 8-bit model, says Han. The researchers will present their results at the Computer Vision and Pattern Recognition conference in June.



Footer (primary nav repeated, plus...):

Contact details (contextual)
Sectors:
- sector 1
- sector 2
- sector 3

Products
- product 1
- product 2
- product 3

News
Advice
Newsletter signup
Terms of business
Social channel links

CLIL

Software testing

Test processes determine whether the development products of a given activity conform to the requirements of that activity and whether the system and software satisfies its intended use and user needs.
The document of the standards in software testing is IEEE Std 829-2008, *Software and System Test Documentation*.
The purpose of a testing process is to ensure that the implementation of each system requirement is tested for compliance and that the system is ready for delivery. The process includes the preparation of test cases, test data, test procedures, and test environment.
Test activities are performed in parallel with software and system development, not just at the conclusion of the development effort.

The different types of testing are defined below.

The white-box and black-box testing are based on the knowledge of *how* the system is implemented.
The *white-box testing* (or structural testing) is based on an analysis of the internal structure of a component.
The *black-box testing* (or functional testing) is based on an analysis of the specification of the component without reference to its internal workings.

Acceptance testing is conducted to establish whether a system satisfies its acceptance criteria and to enable the customer to determine whether to accept the system. An alternative definition is: the formal testing conducted to enable a user, customer, or other authorized entity to determine whether to accept a system or component.
The acceptance testing is analogous to *qualification testing* in IEEE Std 12207-1996, defined as the testing, conducted by the developer and witnessed by the acquirer, to demonstrate that a software product meets its specifications and is ready for use in its target environment or integration with its containing system

Static testing is the testing of an object without execution on a computer.
Dynamic testing is used to test the software behaviour by executing it.

Unit testing (or component testing) is the testing of individual software components.

Integration testing is the testing performed to expose faults in the interfaces and in the interaction between integrated components.
System testing is the process of testing an integrated system to verify that it meets specified requirements.

Security testing is the testing to determine whether the system or the software meets the specified security requirements.
A software *vulnerability* is a defect in the software construction that can be exploited by an attacker in order to obtain some privileges in the system. The vulnerability offers a possible unauthorized entry point to the system.

Performance testing is the testing conducted to evaluate the compliance of a system or component with specified performance requirements.
Load testing ensures that a given function, program, or system can handle an increased workload on the system.
Stress testing is the testing conducted to evaluate a system or component at or beyond the limits of its specified requirements.

CULTURE

The man who invented the web

The world wide web is basically the work of a single man, Tim Berners-Lee, a computer scientist born in London in 1955.

It all started in 1980 when Berners-Lee was working as a software engineer at CERN, the European Laboratory for Particle Physics, in Geneva. He wrote a simple program called 'Enquire' to help him remember the connections among the various people, computers, and projects at the lab. He could type in a page of information about a person, a device, or a program and each page became a 'node' in the program, a little like an index card. Enquire developed into a kind of 'hypertext' notebook. Words in one document could be 'linked' to other files on his computer; he could follow a link by typing in a number (there was no mouse to click back then) and automatically pull up the related document.

It worked well on his own computer. But what if he wanted to add things that were on someone else's computer? First he would need that person's permission, and then he would have to do the tedious work of adding the new material to a central database. He realised that it would be much easier if he, and all his colleagues, simply opened up their documents – and their computers – to each other and allowed all the material to be interlinked. Access could be limited to the people working at CERN, but why stop there? Why not open it up to scientists everywhere? This was a revolutionary idea. 'Suppose all the information stored on computers everywhere were linked... Suppose I could program my computer to create a space in which anything could be linked to anything. All the bits of information in every computer at CERN, and on the planet, would be available to me and to anyone else. There would be a single, global information space.' In Berners-Lee's scheme there would be no central manager, no central database. The thing could grow like the Internet itself, open-ended and infinite. It could spread like a spider's web.

In order to be able to do this, he put together a relatively easy-to-learn coding system - HTML (HyperText Mark-up Language) - that has become the lingua franca of the web. This is how website creators put those little underlined links in their text, add images and so on. He designed an addressing scheme that gave each web page a unique location, or URL (Universal Resource Locator). And he established a set of rules that permitted these documents to be linked together on computers across the Internet: HTTP (HyperText Transfer Protocol). Finally he designed the web's first browser which allowed users anywhere to view and navigate around his creation on their computer screens.

When the world wide web appeared in 1991, it brought order and clarity to the chaos of cyberspace. From that moment on, the web and the Internet grew almost as a single entity. Within five years the number of users jumped from 600,000 to 40 million. The impact of the global system he created has been enormous. He took a powerful communications system that only the elite could use and turned it into a mass medium.

8 **Read the article and answer the questions.**

1 How old was Berners-Lee when he started working at CERN?
2 How was it possible to call up specific documents using his Enquire program?
3 What was the problem about extending Enquire to other computers?
4 What solution did Berners-Lee adopt?
5 What enormous opportunity did this solution make theoretically possible?
6 What were the four basic tools that Berners-Lee invented to create the web?
7 Why was the web such an important invention?

9 **Match the names (1-6) with the corresponding descriptions (a-f).**

1 ☐ browser
2 ☐ Enquire
3 ☐ HTML
4 ☐ HTTP
5 ☐ hypertext
6 ☐ URL

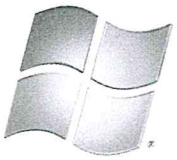
a A language for creating documents to be placed on the web
b A program to allow users to view and move around the web on computer screens.
c A program to make connections between pieces of information stored in a computer.
d A set of rules to enable documents to be linked together computers across the Internet.
e A storage system that allows direct links between related pieces of text or other data.
f a system to establish a precise location for each page or the web.

WATCH THE VIDEO AND LEARN MORE

YouTube ▸ 'Dom Joly - Sir Tim Berners-Lee (BBC)'

What practical problem inspired Berners-Lee to create the web? How did he do it?

How the Windows OS works



The role of Windows

Application programs depend on Windows to communicate with the computer's hardware. Since Windows acts as a 'middleman' it is not necessary to duplicate the same basic features into every application. Each application can focus on its own specific task. When you save files, for example, using the 'Save As...' dialogue box, this is an element of Windows, not the program you are using.

What happens when you switch on the PC

Windows starts automatically and is loaded into the computer's RAM memory from the hard disc. Now you can carry out some very basic tasks like adjusting your PC's settings or checking which files are on the hard disc. But in order to do other things you have to get access to application programs. Even Windows accessories, such as Paint or Edge, are separate programs dedicated to their own jobs of drawing pictures and web browsing.

Opening programs

When you open programs they are also loaded into the computer's RAM memory. They can then use Windows to communicate with the computer's hardware. Windows allows you to run several programs at the same time and to move between them.

Why RAM is important

As each new program is opened it joins the other software already running and takes up more space in the RAM memory. That is why it is important for a computer to have a large store of RAM. If there isn't enough free space in RAM to run a particular program, the computer stores the excess data on its hard disc. However, this makes all the programs which are open run much more slowly. When you have finished working with a program, you should immediately close it. The program then unloads from RAM freeing space for the other programs which can then run faster.

19 086 **Read or listen to the article. Then choose the correct answers.**

1 Applications are able to concentrate on their own particular jobs because...
- a ☐ they can communicate directly with the computer's hardware.
- b ☐ Windows acts as a middleman between the operating system and the hardware.
- c ☐ Windows carries out all the most basic work.
- d ☐ Windows duplicates the essential features of each program.

2 When the PC is switched on...
- a ☐ the operating system is loaded from the hard disc into the RAM memory.
- b ☐ Windows automatically adjusts the PC's settings.
- c ☐ Windows automatically loads applications from the hard disc.
- d ☐ Windows loads the operating system into the computer's RAM memory.

3 Programs like Paint and Edge...
- a ☐ are an essential part of the Windows operating system.
- b ☐ are not part of the basic operating system.
- c ☐ are separate programs but, without them, Windows cannot work.
- d ☐ are Windows accessories needed to open drawing or browsing applications.

4 It is important for a computer to have a large RAM because...
- a ☐ if several programs are open, they can run faster.
- b ☐ it allows the computer to store more programs.
- c ☐ it allows Windows to open more quickly.
- d ☐ it makes it easier to store excess data on the hard disc.

WATCH THE VIDEO AND LEARN MORE

YouTube ▸ 'Microsoft Windows: entire history in 3 minutes (Bloomberg)'

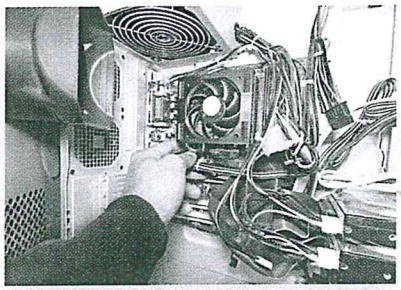
What versions of Windows have there been? What changes did each one bring?

COMPETENCES: COMMUNICATE CLEARLY

20 EXAM PRACTICE **Using your own words, explain how a typical operating system like Windows works.**

Upgrading an older computer

If you have an older computer you can upgrade different parts of the hardware to make it perform better. A new monitor or new speakers can be installed easily to improve sound and vision. Other common upgrades are described below but they require work inside the system unit.



Memory

Installing extra RAM is a very cost-effective upgrade. If your computer operates very slowly or the hard disc light flickers constantly, it will almost certainly benefit from additional RAM. Buying extra RAM is quite cheap and fitting it is easy. Just remove the cover from the system unit and insert the RAM chip into the appropriate slot; the computer manual will show the exact location. Make sure that you buy the correct memory type. PCs use RAM chips with different sizes and pin configurations.

Graphics cards and sound cards

If you work with very detailed images or want to run 3D games at top speed and high resolution, you may need to upgrade to a faster graphics card. Graphics cards may also improve the picture quality when watching movies.
A new higher quality sound card will give improved audio output. These cards can provide a surround sound environment for computer games or home cinema. They may also allow recording from several sources and sound-mixing, useful for video / audio editing.

Hard discs

Programs working with graphics, sound or video take up a lot of hard disc space. As the hard disc becomes full, a computer will work more slowly. It is possible to add a new hard disc internally. An easier alternative is to connect an external hard disc through the USB port.

CPU

The CPU, the main chip on the motherboard, can be upgraded to make the computer work more efficiently. A faster processor will improve the general performance of the computer and especially the speed of computer games and other processor-intensive activities such as video editing. However, a new processor can be expensive and it may also require upgrading of the motherboard. If the PC is old, it may be better to buy a completely new system.

WATCH THE VIDEO AND LEARN MORE

YouTube ▸ 'How to install memory in your desktop PC (Kingston Technology)'

Watch the video and then describe how to do the upgrade step by step.

18 079 **Read or listen to the article. Then explain why...**

1 you can get improved performance without having to buy a new computer.
2 it is possible to improve picture or sound quality without even opening the system unit.
3 you need to be careful when buying extra RAM memory for your computer.
4 it is possible to install a new hard disc without working inside the system unit.
5 in some cases it may not be advisable to upgrade the CPU.

COMPETENCES: SOLVE PROBLEMS

19 SCUOLA › LAVORO **The following people have computers which are a few years old. What upgrades would you recommend? Write a brief solution for each problem.**

1 **Sonia**: 'I like watching films on my computer but the image quality is very poor.'
2 **Anna**: 'Every time I open a program I can see that my computer is in difficulty and the hard disc light keeps flashing on and off.'
3 **Nick**: 'I work as a DJ in a youth club. I want to mix recordings and make new compilations
4 **Dave**: 'I'd like to play new computer games but they don't work properly on my computer. It's just too slow.'

GLOSSARY

flickers: tremola
surround sound: effetto *surround*

CLIL

Client-server
The client-server model is a computing model that acts as a distribuited application with partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients.

Enterprise applications
"Enterprise applications are about the display, manipulation, and storage of large amounts of often complex data and the support or automation of business processes with that data."

Benefits of the Client-Server Model
Divides Application Processing across multiple machines.
Optimizes Client Workstations for data input and presentation (e.g., graphics and mouse support).
Optimizes the Server for data processing and storage (e.g., large amount of memory and disk space).
Scales Horizontally: multiple servers, each server having capabilities and processing power, can be added to distribute processing load.
Scales Vertically: can be moved to more powerful machines, such asminicomputer or a mainframe to take advantage of the larger system's performance.
Reduces Data Replication: data stored on the servers instead of each client, reducing the amount of data replication for the application.

2 – Tier Pros and Cons

Advantages	Disadvantages
Development Issues: • Simple structure; • Easy to setup and maintain.	Development Issues: • Complex application rules difficult to implement in database server – requires more code for the client ; • Complex application rules difficult to implement in client and have poor performance; • Changes to business logic not automatically enforced by a server – changes require new client side software to be distributed and installed; • Not portable.
Performance: • Adequate performance for low to medium volume environments; • Business logic and database are physically close.	Performance: • Inadequate performance for medium to high volume environments, since database server is required to perform business logic. This slows down database operations on database server.

(Prepared By Channu Kambalyal)

3 – Tier Pros and Cons

Advantages	Disadvantages
Development Issues: • Complex application rules easy to implement in application server; • Business logic off-loaded from database server and client, which improves performance; • Changes to business logic automatically enforced by server – changes require only new application server software to be installed; • Application server logic is portable to other database server platforms by virtue of the application software.	Development Issues: • More complex structure; • More difficult to setup and maintain.
Performance: • Superior performance for medium to high volume environments.	Performance: • The physical separation of application servers containing business logic functions and database servers containing databases may moderately affect performance.

(Prepared By Channu Kambalyal)

UK ministers urge internet users to increase online security

Written by **Nicholas Mairs** on 22 April 2019 in **News**

National Cyber Security Centre analysis reveals most commonly breached passwords

UK ministers have urged internet users to better protect themselves online after a survey revealed the most commonly breached passwords across the world.

Ministers called on internet users to avoid passwords such as '123456', after analysis released by the National Cyber Security Centre (NCSC) found it to be the most breached worldwide, on 23.2 million occasions.

The survey of the 100,000 most commonly re-occurring passwords also included 'qwerty' and 'password', which were illicitly accessed by third parties 3.8 million and 3.6 million times respectively.

It also revealed 'ashley' to be the most commonly used name in breaches, with 432,276 examples, followed by 'michael' and 'daniel'.

Elsewhere 'liverpool' topped the examples of English Premier League football teams used to access accounts, with 280,723 examples, followed by 'chelsea' on 216,677 and 'arsenal' on 179,095.

It also revealed 'ashley' to be the most commonly used name in breaches, with 432,276 examples, followed by 'michael' and 'daniel'.

~~Elsewhere 'liverpool' topped the examples of English Premier League football teams used to access accounts, with 280,723 examples, followed by 'chelsea' on 216,677 and 'arsenal' on 179,095~~. "Blink182' topped the list of passwords based on musicians which were breached, followed by '50cent' and 'eminem'.

The data, which was collected and published on website 'Have I Been Pwned' by international web security expert Troy Hunt, was released alongside a poll carried out on behalf of the NCSC and the Department for Digital, Media and Sport (DCMS).

It found 42 per cent of Brits expect to lose money to online fraud.

The survey also revealed just 15 per cent of the UK public say they know a 'great deal' about how to protect themselves from harmful activity, despite 89 per cent using the internet to make online purchases.

Meanwhile almost half (46 per cent) agree that most information about how to keep secure online is confusing, while 18 per cent agree strongly.

And less than half of those surveyed do not always use a strong, separate password for their main email account.

Speaking ahead of a major cybersecurity conference in Glasgow this week, Cabinet Office minister David Lidington said the findings underline the "importance of using strong passwords at home and at work", amid a "growing global threat from cyberattacks".

"This is a message we look forward to building on at CYBERUK 2019, an event that reaffirms our commitment to make Britain both the safest place in the world to be online and the best place to run a digital business.

Digital and Creative Industries Minister Margot James said: "Cyber security is a serious issue, but there are some simple actions everyone can take to better protect against hackers.

"We shouldn't make their lives easy so choosing a strong and separate password for your email account is a great practical step.

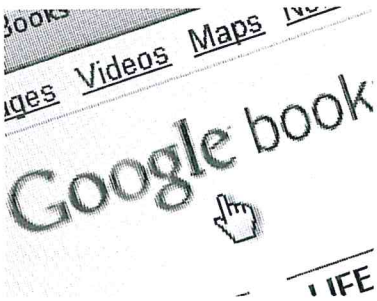
"Cyber breaches can cause huge financial and emotional heartache through theft or loss of data which we should all endeavour to prevent."

NCSC's Technical Director Dr Ian Levy added: "Password re-use is a major risk that can be avoided - nobody should protect sensitive data with something that can be guessed, like their first name, local football team or favourite band.

"Using hard-to-guess passwords is a strong first step and we recommend combining three random but memorable words. Be creative and use words memorable to you, so people can't guess your password."

Is Information Technology making us more stupid?

GLOSSARY
flies in the face: va contro
snippets: pezzettini



No self-respecting London taxi driver would ever use a sat-nav. Their ability to know every twist and turn of the capital's streets is legendary. But now, with satellite-navigation technology well established, experts warn that we may lose the ability to remember vast amounts of information such as tricky routes through a city.

'The part of our brain that stores mental images of space is enlarged in London cab drivers,' explains Paul Owen, author of *What technology is doing to our brains*. 'The longer you've been a cab driver the larger that part of your brain is. Almost certainly we'll see a decline in that special skill.'

According to Owen, technology, and particularly the web, has lasting effects on our brains, altering our ability to carry out certain tasks. He points to a recent study in which people with no previous experience of the web began to use Google for searching and surfing for just an hour a day. The results showed varying patterns of brain activity. On the one hand, a lot of the decision-making parts of the brain were activated, which means it can help people to keep their mind sharp. But it also indicated patterns of activity that make it hard for people to concentrate. If you are always solving problems and making decisions, you don't achieve the calmness of mind that you get when you read a book.

The key to making us concentrate, Owen says, is to make tasks more difficult - a theory which flies in the face of software designers constantly trying to make their programs easier. Google, in particular, has a narrow view of the way we should use our minds.

'Google focuses on how efficiently you can find particular bits of information you need - and then move on to the next. This even applies to projects like Google Books designed to make the world's knowledge more accessible. They're scanning these books, not to absorb the book as a whole, but as fragments of content for their search engine. It's information always delivered as brief snippets. When you go to a Google Books page, you're not involved in the long narrative of the whole book.'

In his book Owen describes an experiment where a puzzle had to be solved using a computer program. One half of participants were given a 'good' program - it gave hints, was intuitive and helped the user to their goal. The other half had the same puzzle, but with 'poor' software which offered little to make the task easier.

'The people who had the weak software and had to struggle with the problem, learned much more than the people with the helpful software,' Owen explains. 'Months later, they could remember how to do the puzzle, whereas the people with the helpful software couldn't. As software becomes easier to use, making complicated tasks easier, we risk losing the ability to learn things properly.'

30 **Read the article and decide if these sentences are true (T) or false (F).**

		T	F
1	London taxi cabs do not usually have sat-nav equipment.	☐	☐
2	Taxi driving helps to expand the part of the brain that stores spatial images.	☐	☐
3	Using Google seems to have overall negative effects on the brain.	☐	☐
4	Software designers try to write programs which help us to concentrate.	☐	☐
5	Google concentrates on making pieces of information more accessible.	☐	☐
6	The aim of Google Books is to encourage people to read entire books.	☐	☐
7	Using helpful intuitive software makes it harder to solve problems.	☐	☐
8	People seem to learn things better when they are forced to make an effort.	☐	☐

WATCH THE VIDEO AND LEARN MORE

YouTube ▸ 'What the Internet is doing to our brains (Epipheo)'

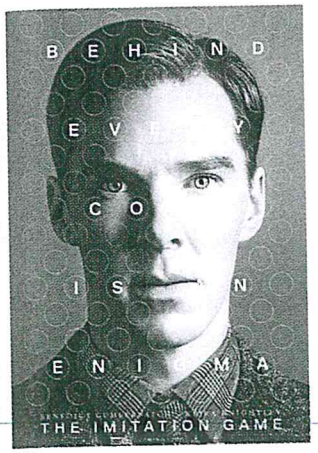
What is the danger of overdependence on the Internet? What should we do?

COMPETENCES: COLLABORATE WITH OTHERS

31 **Talk to other students.**

1 In what ways do you think information technology, and the Internet, are changing human brains?
2 What are some positive effects? What negative effects are also possible?

Alan Turing's 'intelligent machines'



Alan Turing is often described as the father of modern computer science. His idea of creating a machine to turn thought processes into numbers was a turning point in the history of computers.

Turing, born in London in 1912, developed some of his most significant theories while studying mathematics at Cambridge in the 1930s. However, despite his brilliance, he suffered from a feeling of isolation, and found it difficult to make friends.

After graduating, Turing went to Princeton in the US, where he began work on what was later to become the first digital computer program: the 'Turing Machine'. His revolutionary idea was for a machine that would read a series of 1s and 0s from a tape describing the steps needed to solve a problem or task. It was only years later that technology had advanced sufficiently to transfer these ideas into real machines.

Back in England, Turing helped the Allies win World War II by decoding encrypted German communications. The German Enigma machine generated a constantly changing code to make it impossible to decipher. But Turing's creation of Colossus - the first fully electronic digital computer - managed to crack the Enigma's codes and reveal secret Nazi war plans. The story is told in the film *The Imitation Game*.

After the war, Turing continued research into digital computers. In 1946 he developed the Automatic Computing Engine, a revolutionary electronic computer with a high-speed memory and stored programs. In 1950 he wrote an article entitled 'Computing machinery and intelligence', which was one of the first to deal with the concept of artificial intelligence. He believed an intelligent machine could be created by following the model of the human brain. He compared devices such as cameras and microphones to parts of the human body and his views often landed him in controversy with other scientists.

His 'Turing Test' has become a standard measure of artificial intelligence. In the test an interrogator asks questions via keyboard to a human being and to an intelligent machine, both unseen. If the interrogator is unable to distinguish the human from the machine, based on their answers, then the machine can be described as 'thinking'.

Turing refused to conform to accepted ideas. Always an outsider, he also felt marginalised because of his homosexuality. He died mysteriously of poisoning, possibly suicide, in June 1954, but he left the world a permanent legacy.

WATCH THE VIDEO AND LEARN MORE

YouTube ▸ 'The Turing test: Can a computer pass for a human? - Alex Gendler (TED-Ed)'

How does the Turing test work? What are the problems with this test?

YouTube ▸ 'The Imitation Game - official trailer (The Weinstein Company)'

What difficulties did Turing face in trying to develop Colossus?

24 Read the text and decide if the following sentences are true (T) or false (F).

		T	F
1	Turing had the idea of using binary numbers to program computers.	☐	☐
2	His ideas on programming were immediately applied to the computers of the time.	☐	☐
3	Colossus created secret messages that Enigma could not decipher.	☐	☐
4	Turing believed that the computers of his time were identical to the human brain.	☐	☐
5	The Turing Test is to find out if computers are more intelligent than human beings.	☐	☐
6	At first many of Turing's ideas were not accepted by other scientists.	☐	☐

25 Explain what the following were:

1 Turing Machine
2 Enigma
3 Colossus
4 Automatic Computing Engine
5 Computing machinery and intelligence
6 Turing Test

COMPETENCES: COMMUNICATE CLEARLY

26 EXAM PRACTICE Using your own words, summarise Turing's contributions to...

1 computer programming 2 the development of the computer 3 the study of artificial intelligence

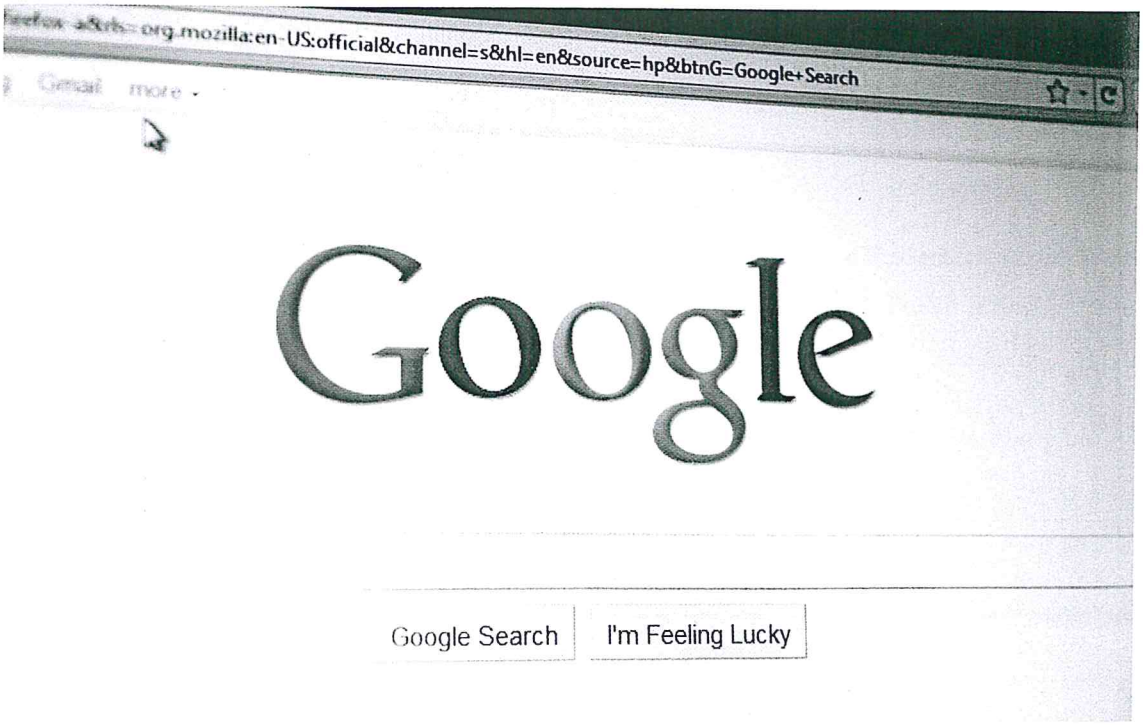
Google

Search engines are internet directories like virtual address books and Google is a search engine that began to operate in 1998 thanks to two students: Sergey Brin and Larry Page of Stanford University.
At first, the Internet was a mass of information with no reliable way to find what you wanted, but then Google's computers have catalogued a lot of internet pages and now it is the world's top search engine by pioneering:

a. a simple page style,
b. page rankings, ordering results in order of relevance and popularity,
c. associated website functions developed by employees.

Google, not only, can search for words, find videos and images, but it can do a lot of other things that are almost all free for users; for example: Google Earth zooms in on interactive satellite pictures of the planet; Google scholar helps you study, Froogle helps you shop while today the new generation of Google software operates phones, MP3/4 players and mobile computers. But, how does Google pay for it? The answer is: advertising.
Advertising in newspapers, billboards and TV is very important, but the Internet is much more powerful than this kind of ads because you can buy things and services with a click of your mouse. So, if you look up "restaurants", it makes sense for restaurants to advertise on that page; that is the reason why companies spend more on internet advertising than television. But not everyone loves Google, in fact someone says that they should restrict information.
Google earns money giving users detailed statistics about who is searching for what and how many people see that ad. or the other one; Google has a lot of databanks that are precious for advertisers and at this point some questions should have an answer:

- when does freedom of information become invasion of our privacy?
- will our needs be predicted?
- will our desires be dictated?



Windows 10 now requires a minimum of 32GB storage space

Time to clean out some disk space?

By Humza Aamir on April 30, 2019, 7:58 AM 19 comments

Something to look forward to: Microsoft's latest Windows 10 update (version 1903), coming out in May will need almost double the storage space than it did last time for its October 2018 Update (version 1809). Users running the 32-bit version see the requirement jump from 16GB to 32GB and those running the 64-bit version also need a minimum of 32GB, an additional 12GB of space from the previous baseline of 20GB.

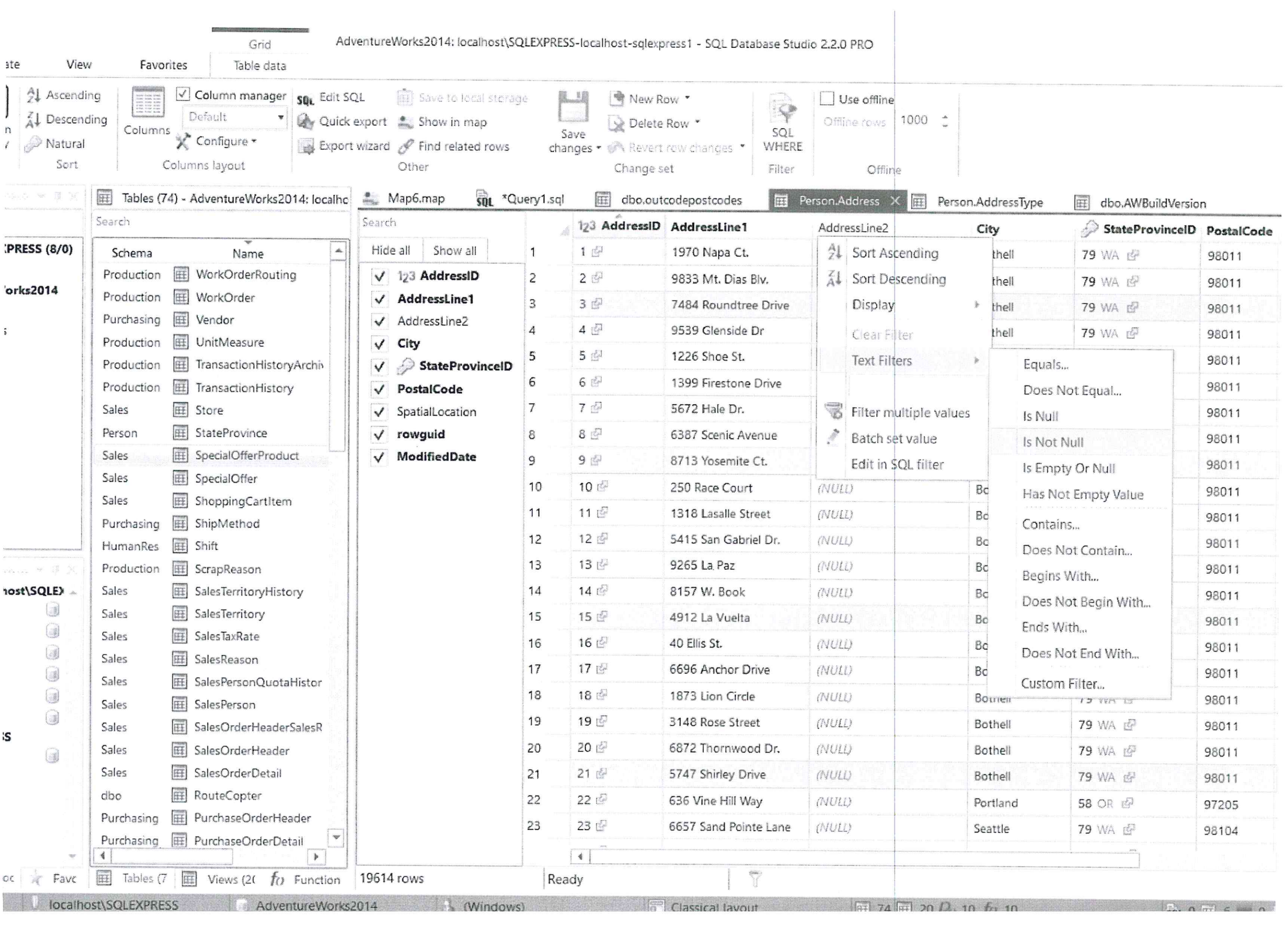
In preparation for the Windows 10 May 2019 update, Microsoft has refreshed its minimum hardware requirements page to inform users about the operating system's increased storage needs to perform an upgrade, a change not entirely unexpected by users as the company aims to make the update process smoother in exchange for some gigabytes.

Reserved Storage, as Microsoft calls it, will take at least a 7GB chunk of space from the OS drive to make room for updates, temporary files, apps and system cache so there's little to no chance of *cough* deleting user files again, a problem which the company quickly fixed for "one one-hundredth of one percent of version 1809 installs." The new storage requirement seems to indicate that Windows 10 will now take more space in general.

While it may not affect everyone, users with entry-level PCs and those who upgraded from HDDs to costly SSDs just for boosting Windows performance and essential programs may start to feel short on disk space. With this new storage requirement, Microsoft has also made it official and won't allow partners to sell laptops or tablets with less than 32GB of storage.

It is a good idea to invest in at least 128GB or 256GB of SSD storage for the OS and essentials when looking for a new PC or assembling one as any future updates could possibly raise this minimum requirement to 64GB or more.

If you're looking to clear up some space to prepare for the next Windows update or otherwise, check out these tips & tricks to squeeze out some precious gigabytes.


Grid
AdventureWorks2014: localhost\SQLEXPRESS-localhost-sqlexpress1 - SQL Database Studio 2.2.0 PRO
View
Favorites
Table data
Ascending
Descending
Natural
Sort
Columns
Column manager
Default
Configure
Columns layout
Edit SQL
Quick export
Export wizard
Save to local storage
Show in map
Find related rows
Other
Save changes
New Row
Delete Row
Revert row changes
Change set
SQL WHERE
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Use offline
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Tables (74) - AdventureWorks2014: localhc
Search
Schema
Name
Production WorkOrderRouting
Production WorkOrder
Purchasing Vendor
Production UnitMeasure
Production TransactionHistoryArchi
Production TransactionHistory
Sales Store
Person StateProvince
Sales SpecialOfferProduct
Sales SpecialOffer
Sales ShoppingCartItem
Purchasing ShipMethod
HumanRes Shift
Production ScrapReason
Sales SalesTerritoryHistory
Sales SalesTerritory
Sales SalesTaxRate
Sales SalesReason
Sales SalesPersonQuotaHistor
Sales SalesPerson
Sales SalesOrderHeaderSalesR
Sales SalesOrderHeader
Sales SalesOrderDetail
dbo RouteCopter
Purchasing PurchaseOrderHeader
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Map6.map
*Query1.sql
dbo.outcodepostcodes
Person.Address
Person.AddressType
dbo.AWBuildVersion
Search
Hide all
Show all
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AddressLine2
City
StateProvinceID
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1 1 1970 Napa Ct. (NULL) Bothell 79 WA 98011
2 2 9833 Mt. Dias Blv. (NULL) Bothell 79 WA 98011
3 3 7484 Roundtree Drive (NULL) Bothell 79 WA 98011
4 4 9539 Glenside Dr (NULL) Bothell 79 WA 98011
5 5 1226 Shoe St. (NULL) Bothell 79 WA 98011
6 6 1399 Firestone Drive (NULL) Bothell 79 WA 98011
7 7 5672 Hale Dr. (NULL) Bothell 79 WA 98011
8 8 6387 Scenic Avenue (NULL) Bothell 79 WA 98011
9 9 8713 Yosemite Ct. (NULL) Bothell 79 WA 98011
10 10 250 Race Court (NULL) Bothell 79 WA 98011
11 11 1318 Lasalle Street (NULL) Bothell 79 WA 98011
12 12 5415 San Gabriel Dr. (NULL) Bothell 79 WA 98011
13 13 9265 La Paz (NULL) Bothell 79 WA 98011
14 14 8157 W. Book (NULL) Bothell 79 WA 98011
15 15 4912 La Vuelta (NULL) Bothell 79 WA 98011
16 16 40 Ellis St. (NULL) Bothell 79 WA 98011
17 17 6696 Anchor Drive (NULL) Bothell 79 WA 98011
18 18 1873 Lion Circle (NULL) Bothell 79 WA 98011
19 19 3148 Rose Street (NULL) Bothell 79 WA 98011
20 20 6872 Thornwood Dr. (NULL) Bothell 79 WA 98011
21 21 5747 Shirley Drive (NULL) Bothell 79 WA 98011
22 22 636 Vine Hill Way (NULL) Portland 58 OR 97205
23 23 6657 Sand Pointe Lane (NULL) Seattle 79 WA 98104
Sort Ascending
Sort Descending
Display
Clear Filter
Text Filters
Filter multiple values
Batch set value
Edit in SQL filter
Equals...
Does Not Equal...
Is Null
Is Not Null
Is Empty Or Null
Has Not Empty Value
Contains...
Does Not Contain...
Begins With...
Does Not Begin With...
Ends With...
Does Not End With...
Custom Filter...
19614 rows
Ready
localhost\SQLEXPRESS
AdventureWorks2014
(Windows)
Classical layout