МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

КРЕМЕНЧУЦЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ

ІМЕНІ МИХАЙЛА ОСТРОГРАДСЬКОГО

МЕТОДИЧНІ ВКАЗІВКИ

ЩОДО ВИКОНАННЯ ПРАКТИЧНИХ ЗАНЯТЬ

З НАВЧАЛЬНИХ ДИСЦИПЛІН

«АНГЛІЙСЬКА МОВА ЗА ПРОФСПРЯМУВАННЯМ»,

«АНГЛІЙСЬКА МОВА»

ЗІ СПЕЦІАЛЬНОСТЕЙ:

122 – «КОМП'ЮТЕРНІ НАУКИ», 123 – «КОМП'ЮТЕРНА ІНЖЕНЕРІЯ»

ЗА ОСВІТНЬО-ПРОФЕСІЙНИМИ ПРОГРАМАМИ:

«КОМП'ЮТЕРНІ НАУКИ», «КОМП'ЮТЕРНА ІНЖЕНЕРІЯ»

ОСВІТНЬОГО СТУПЕНЯ «БАКАЛАВР»

(ЧАСТИНА 1)

КРЕМЕНЧУК 2020

Методичні вказівки щодо виконання практичних занять з навчальних дисциплін: «Англійська мова за профспрямуванням», «Англійська мова» для студентів денної форми навчання зі спеціальностей: 122 – «Комп'ютерні науки», 123 – «Комп'ютерна інженерія» за освітньо-професійними програмами «Комп'ютерні науки», «Комп'ютерна інженерія» освітнього ступеня «Бакалавр» (частина 1)

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Протокол № _____ від _____ 2020 р.

Голова методичної ради _____ проф. В. В. Костін

ЗМІСТ

ВСТУП

Дані методичні вказівки щодо практичних занять з навчальної дисципліни «Англійська мова за професійним спрямуванням» призначені для студентів денної форми навчання зі спеціальності 122 – «Комп'ютерні науки».

Мета вказівок – надати студентам допомогу у формуванні іншомовної комунікативної компетентності у сфері професійного спілкування, що обумовлюється метою викладання навчальної дисципліни «Спецкурс англійської мови» й основними завданнями вивчення цієї дисципліни, а саме: формування лексичного запасу з окреслених тематичними модулями тем; розвиток уміння висловлювати свою думку як усно, так і в письмовій формі; вести бесіду з професійних тем; презентувати результати своїх розробок; вільно читати, розуміти й обговорювати тексти з визначеної тематики.

Вправи та завдання спрямовані на активізацію лексичного та граматичного матеріалу, розширення словникового запасу за тематикою змістових модулів.

Згідно з вимогами освітньо-професійної програми студенти повинні

знати:

– загальновживані терміни та словосполучення з тем тематичних модулів;

– граматичні ресурси англійської мови;

– правила словотвору;

уміти:

– висловлювати свою думку як усно, так і у письмовій формі;

– вести бесіду на теми тематичних модулів;

– вільно читати, розуміти й обговорювати тексти професійної тематики;

– презентувати результати власних розробок.

1 ПЕРЕЛІК ПРАКТИЧНИХ ЗАНЯТЬ

Практичні заняття № 1–4

Тема 1. Operating System Concept. Present Simple and Present Progressive

Мета: ознайомити студентів з лексикою та теоретичними відомостями, закріпити знання студентів із зазначеної теми.

Короткі теоретичні відомості

Present Simple and Present Progressive

Uses of the simple present tense:

✓ Permanent truths. We use the simple present for statements that are always true.

✓ The present period. We use the simple present to refer to events actions or situations which are true in the present period of time and which for all we know may continue indefinitely What we are saying in effect, is 'this is the situation as it stands at present

✓ Habitual actions. The simple present can be used with or without an adverb of time to describe habitual actions, things that happen repeatedly. We can be more precise about habitual actions by using the simple present with adverbs of indefinite frequency (always never, etc.) or with adverbial phrases such as every day / sometimes.

✓ We commonly use the simple present to ask and answer questions which begin with How often.

✓ Future reference. This use is often related to timetables and programmes or to events in the calendar.

✓ Observations and declarations. We commonly use the simple present with stative and other verbs to make observations and declarations in the course of conversation e.g. hope/assume/suppose/promise.

Uses of the present progressive tense:

✓ Actions in progress at the moment of speaking. We use the present progressive to describe actions or events which are in progress at the moment of speaking. To

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emphasize this, we often use adverbials like now, at the moment, just, etc.

<div align="center">**Завдання до теми**</div>

**1. Match the labels to the four layers of this diagram with the help of the diagram caption.**

1. Applications programs; 2. User; 3. Hardware; 4. Operating system.

Closest to the user are applications programs – software that helps a user compute a payroll or play a game or calculate the trajectory of a rocket.

The operating system is the set of programs between the applications programs and the hardware.

Conceptual diagram of an operating system

a b c d
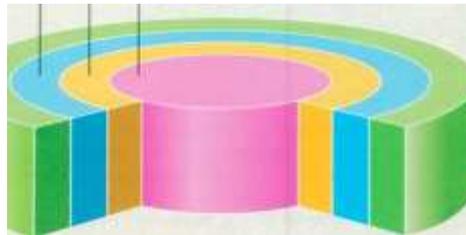
2. Now read this text to check your answer and to find the answers to these questions:

1. What difference is there between applications software and operating systems?

2. Why is the supervisor program the most important operating system program?

3. What is the difference between resident and non-resident programs?

4. What are the main functions of an operating system?

When a brand new computer comes off the factory assembly line, it can do nothing. The hardware needs software to make it work. Are we talking about applications software such as wordprocessing or spreadsheet software? Partly. But an applications software package does not communicate directly with the hardware. Between the applications software and the hardware is a software interface - an

operating system. An operating system is a set of programs that lies between applications software and the computer hardware.

The most important program in the operating system, the program that manages the operating system, is the supervisor program, most of which remains in memory and is thus referred to as resident. The supervisor controls the entire operating system and loads into memory other operating system programs (called non-resident) from disk storage only as needed.

An operating system has three main functions: (1) manage the computer's resources, such as the central processing unit, memory, disk drives, and printers, (2) establish a user interface, and (3) execute and provide services for applications software. Keep in mind, however, that much of the work of an operating system is hidden from the user. In particular, the first listed function, managing the computer's resources, is taken care of without the user being aware of the details. Furthermore, all input and output operations, although invoked by an applications program, are actually carried out by the operating system.

3. Complete the gaps in this summary of the text on operating systems using these linking words and phrases: although, in addition, because, such as, but, therefore.

The user is aware of the effects of different applications programs____operating systems are invisible to most users. They lie between applications programs, ____wordprocessing, and the hardware. The supervisor program is the most important. It remains in memory, ____it is referred to as resident. Others are called non-resident ____they are loaded into memory only when needed. Operating systems manage the computer's resources, ____the central processing unit. ____they establish a user interface, and execute and provide services for applications software. ____input and output operations are invoked by applications programs, they are carried out by the operating system.

4. Find the answers to these questions in the following text.

1. What did Linus Torvalds use to write the Linux kernel?
2. How was the Linux kernel first made available to the general public?

3. What is a programmer likely to do with source code?

4. Why will most software companies not sell you their source code?

5. What type of utilities and applications are provided in a Linux distribution?

6. What is X?

7. What graphical user interfaces are mentioned in the text?

Linux has its roots in a student project. In 1992, an undergraduate called Linus Torvalds was studying computer science in Helsinki, Finland. Like most computer science courses, a big component of it was taught on (and about) Unix. Unix was the wonder operating system of the 1970s and 1980s: both a textbook example of the principles of operating system design, and sufficiently robust to be the standard OS in engineering and scientific computing. But Unix was a commercial product (licensed by AT&T to a number of resellers), and cost more than a student could pay.

Annoyed by the shortcomings of Minix (a compact Unix clone written as a teaching aid by Professor Andy Tannenbaum) Linus set out to write his own 'kernel' – the core of an operating system that handles memory allocation, talks to hardware devices, and makes sure everything keeps running. He used the GNU programming tools developed by Richard Stallman's Free Software Foundation, an organisation of volunteers dedicated to fulfilling Stallman's ideal of making good software that anyone could use without paying. When he'd written a basic kernel, he released the source code to the Linux kernel on the Internet.

Source code is important. It's the original from which compiled programs are generated. If you don't have the source code to a program, you can't modify it to fix bugs or add new features. Most software companies won't sell you their source code, or will only do so for an eye-watering price, because they believe that if they make it available it will destroy their revenue stream.

What happened next was astounding, programmers (mostly academies and students) began using Linux. They found that it didn't do things they wanted it to do - so they fixed it. And where they improved it, they sent the improvements to Linus, who rolled them into the kernel. And Linux began to grow.

There's a term for this model of software development; it's called Open Source (see www.opensource.org/ for more information), so Anyone can have the source code – it's free. Anyone can contribute to it. If you use it heavily you may want to extend or develop or fix bugs in it – and it is so easy to give your fixes back to the community that most people do so.

An operating system kernel on its own isn't a lot of use; but Linux was purposefully designed as a near-clone of Unix, and there is a lot of software out there that is free and was designed to compile on Linux. By about 1992, the first 'distributions' appeared.

A distribution is the Linux-user term for a complete operating system kit, complete with the utilities and applications you need to make it do useful things - command interpreters, programming tools, text editors, typesetting tools, and graphical user interfaces based on the X windowing system. X is a standard in academic and scientific computing, but not hitherto common on PCs; it s a complex distributed windowing system on which people implement graphical interfaces like KDE and Gnome.

As more and more people got to know about Linux, some of them began to port the Linux kernel to run on non-standard computers. Because it's free, Linux is now the most widely- ported operating system there is.

5. Match the terms with the statements.

Kernel	a) A type of software development where any programmer can develop or fix bugs in the software.
Free Software Foundation	
Source code	
Open Source	b) The original systems program from which compiled programs are generated.
A distribution	
X	c) A complete operating system kit with the utilities and applications you need to make it do useful things.
	d) A standard distributed windowing system on which people implement graphical interfaces.
	e) An organisation of volunteers dedicated to making good software that anyone could use without paying.

	f) the core of an operating system that handles memory allocation, talks to hardware devices, and makes sure everything keeps running.

6. This description of the Mac OS X is drawn from the table below. Write a similar description of Linux

Mac OS X is a Unix-based operating system designed for use on Apple Mac computers. It includes memory-protection, pre-emptive multitasking and symmetric multiprocessing support. Graphics are provided by a graphics engine known as Quartz. It has advanced-PDF standards support, OpenGL and Quicktime integrated into the OS. The operating system features are accessed through a graphical user interface called Aqua.

	Mac OS X	Linux
type	Unix-based	Unix-based
computer	Apple Mac	wide variety
features	memory-protection, pre-emptive multitasking, symmetric multiprocessing support	variety of distribution kits available
graphics engine	Quartz	XFree86
standard support	advanced-PDF, OpenGL, Quicktime	
user interface type	GUI	command line, GUI
user interface	Aqua	KDE, Gnome
source code availability	not available	freely available

Контрольні питання

1. What difference is there between applications software and operating systems?

2. Why is the supervisor program the most important operating system program?

3. What is the difference between resident and non-resident programs?

4. What are the main functions of an operating system?

Література: [2, с. 23–52; 3, с. 12–46].

Тема. Process Concept. Process Management. Non-Progressive Verbs

Мета: ознайомити студентів з лексикою та теоретичними відомостями, закріпити знання студентів із зазначеної теми.

Короткі теоретичні відомості

Non-progressive verbs are a group of verbs which give information about mental or emotional states or about fixed physical properties. We rarely use them in a continuous form.

- I agree.
- 'Nightmare means 'bad dream'.

Non-progressive verbs include:

✓ opinions and desires: love, hate, like, want, need, believe, prefer, agree

- Toby wants to go now.
- I don't need any help.

✓ Impressions and sensations: seem, appear, feel, see, hear, smell, sound, taste

- That doesn't seem right.
- Do you hear a bell ringing?

✓ mental processes: know, remember, understand, forget, realize, suppose, think

- Do you realize what day it is today?
- Ah yes, I remember now.

✓ values, properties and characteristics: contain, own, belong, cost, has/has got, mean, equal, depend (on), exist, weigh, measure, come from, matter

- Five plus five equals ten.
- How much does that ring cost?

Action verbs describe events and processes which happen and change. We can use them in a simple or continuous form.

- Linda cuts my hair. (= usually)
- Linda's cutting my hair. (= now)

Some verbs have a state meaning and an action meaning.

	State meaning	Action meaning
be	= property/characteristic She's funny.	= behaviour She's **being** funny.
have	= possession He **has** a phone.	= process/experience He's **having** a bath.
think	= belief/opinion I **think** she's here.	= mental process What **are you thinking** about?
appear	= impression It **appears** to be correct.	= public performance Jess **is appearing** on TV tonight.
taste / smell / look	= sensation That **smells** good.	= physical process She's **smelling** the flowers.
see	= vision and understanding I **see** land. I **see**!	= meeting I'm **seeing** the doctor tomorrow.
say	= written text What **does** that sign **say**?	= spoken text What's that man **saying**?

Завдання до теми

1. Read the text on a Process and give the definition of the process.

All modern computers can do several things at the same time. While running a user program, a computer can also be reading from a disk and outputting text to a screen or printer. In a multiprogramming system, the CPU also switches from program to program, running each for tens or hundreds of milliseconds. While, strictly speaking, at any instant of time, the CPU is running only one program, in the course of 1 second, it may work on several programs, thus giving the users the illusion of parallelism.

Associated with each process is its address space, a list of memory locations from some minimum (usually 0) to some maximum, which the process can read and write. The address space contains the executable program, the program's data, and its stack.

Also associated with each process is some set of registers, including the program counter, stack pointer, and other hardware registers, and all the other information needed to run the program.

The execution of a process must progress in a sequential fashion.

The easiest way to get a good intuitive feel for a process is to think about multiprogramming systems. Periodically, the operating system decides to stop running one process and start running another, for example, because the first one has had more than its share of CPU time in the past second.

When a process is suspended temporarily like this, it must later be restarted in exactly the same state it had when it was stopped. This means that all information about the process must be saved somewhere during the suspension. For example, the process may have several files open for reading at once. Associated with each of these files is a pointer giving the current position (i.e., the number of the byte or record to be read next). When a process is temporarily suspended, all these pointers must be saved so that a *read* call executed after the process is restarted will read the proper data. In many operating systems, all the information about each process is stored in an operating system table called the process table, which is an array (or linked list) of structures, one for each process currently in existence.

Thus, a (suspended) process consists of its address space, usually called the core image, and its process table entry, which contains its registers, among other things.

The key process management system calls are those dealing with the creation and termination of processes. Consider a typical example. A process called the command interpreter or shell reads commands from a terminal. The user has just typed a command requesting that a program be compiled. The shell must now create a new process that will run the compiler. When that process has finished the compilation, it executes a system call to terminate itself.

On Windows and other operating systems that have a GUI, (double) clicking on a desktop icon launches a program in much the same way as typing its name at the command prompt.

If a process can create one or more other processes (usually referred to as child processes) and these processes in turn can create child processes, we quickly arrive at the process tree structure of Fig. 1. Related processes that are cooperating to get some job done often need to communicate with one another and synchronize their activities. This communication is called interprocess communication.
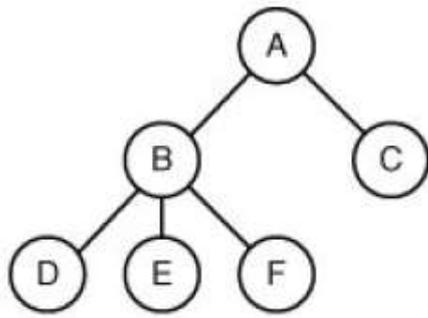
A process tree. Process A created two child processes, B and C. Process B created three child processes, D, E, and F.

Conceptually, each process has its own virtual CPU. In reality, of course, the real CPU switches back and forth from process to process, but to understand the system, it is much easier to think about a collection of processes running in (pseudo) parallel, than to try to keep track of how the CPU switches from program to program. This rapid switching back and forth is called multiprogramming.

In Fig. 2 (a) we see a computer multiprogramming four programs in memory. In Fig. 2 (b) we see four processes, each with its own flow of control (i.e., its own program counter), and each one running independently of the other ones. Of course, there is only one physical program counter, so when each process runs, its logical program counter is loaded into the real program counter. When it is finished for the time being, the physical program counter is saved in the process' logical program counter in memory. In Fig. 2 (c) we see that viewed over a long enough time interval, all the processes have made progress, but at any given instant only one process is actually running.

(a) Multiprogramming of four programs. (b) Conceptual model of four independent, sequential processes. (c) Only one program is active at any instant.
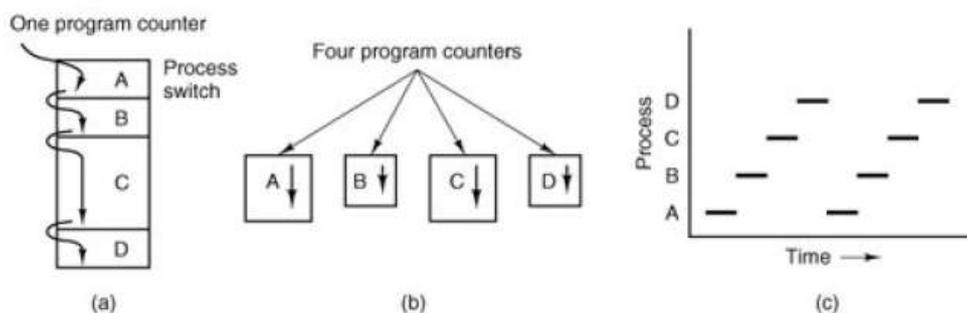
2. Read on the difference between a process and a program. Think of your own everyday-life example to explain this difference.

The difference between a process and a program is subtle, but crucial. An analogy may help make this point clearer. Consider a culinary-minded computer scientist who is baking a birthday cake for his daughter. He has a birthday cake recipe and a kitchen well stocked with the necessary input: flour, eggs, sugar, extract of vanilla, and so on. In this analogy, the recipe is the program (i.e., an algorithm expressed in some suitable notation), the computer scientist is the processor (CPU), and the cake ingredients are the input data. The process is the activity consisting of our baker reading the recipe, fetching the ingredients, and baking the cake.

Now imagine that the computer scientist's son comes running in crying, saying that he has been stung by a bee. The computer scientist records where he was in the recipe (the state of the current process is saved), gets out a first aid book, and begins following the directions in it. Here we see the processor being switched from one process (baking) to a higher priority process (administering medical care), each having a different program (recipe vs. first aid book). When the bee sting has been taken care of, the computer scientist goes back to his cake, continuing at the point where he left off.

The key idea here is that a process is an activity of some kind. It has a program, input, output, and a state. A single processor may be shared among several processes, with some scheduling algorithm being used to determine when to stop work on one process and service a different one.

3. Rewrite each of these sentences like this:

An important function of the operating system is to manage the computer's resources.

Managing the computer's resources is an important function of the operating system.

One task of the supervisor program is to load into memory nonresident programs as required.

1. The role of the operating system is to communicate directly with the hardware.

2. One of the key functions of the operating system is to establish a user interface.

3. An additional role is to provide services for applications software.

4. Part of the work of mainframe operating systems is to support multiple programs and users.

5. The task in most cases is to facilitate interaction between a single user and a PC.

6. One of the most important functions of a computer is to process large amounts of data quickly.

7. The main reason for installing more memory is to allow the computer to process data faster.

4. Complete these sentences with the correct form of the verb:

1. Don't switch off without_____(close down) your PC.

2. I want to _____ (upgrade) my computer.

3. He can't get used to_____ (log on) with a password.

4. You can find information on the Internet by _____ (use) a search engine.

5. He objected to _____ (pay) expensive telephone calls for Internet access.

6. He tried to_____ (hack into) the system without_____ (know) the password.

7. You needn't learn how to _____ (program) in HTML before _____ (design) webpages.

8. I look forward to _____ (input) data by voice instead of _____ (use) a keyboard.

Контрольні питання

1. What is a process?

2. What is a program?

3. What are differencies between a process and program?

Література: [2, с. 53–70; 3, с. 47–85].

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Практичні заняття № 9–12

Тема Memory Concept. Memory Management. Past Simple and Past Progressive

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Мета: ознайомити студентів з лексикою та теоретичними відомостями, закріпити знання студентів із зазначеної теми.

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Короткі теоретичні відомості

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Use Past Simple

• to talk about finished events in the past, when we think about a definite time.

Alexander's army marched beside the river and then stopped outside the city

• to describe the events in a story.

Oliver heard the 50und of a *bell. Soon afterwards, the door softly opened.*

• to describe habits and routines in the past. We usually use a time word or phrase.

Leonardo painted in his studio every day.

Subject and object questions are bot h possible with past simple (see Unit 1).

What did Leonardo paint? object question: + auxiliary *did*

Who painted this portrait? subject question: no auxiliary *did*

Use Past Continuous

• for a continuing unfinished action in the past.

When Sue arrived at 930 am, *four people were waiting outside the office.*

• for a continuing unfinished action interrupted by a sudden past action.

While we *were doing the maths test, the fire alarm went off*

• for activities as background description.

The rainforest was fuli of saunds. Birds were calling from the trees and

thousands of insects were buzzing and humming.

• for two continuing events happening at the same time.

While Cortes was ta/king to the emperor; his army was taking over the palace.

while, when

• Use*while* with past continuous for the time the event was happening.

• Use*when* with past simple for actions.

• We can use other more descriptive time phrases instead of *when.*

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At the moment the earthquake struck, most people were going about thelr normallives.

<div align="center">**Завдання до теми**</div>

1. Read the text and answer the questions.

    1. What is memory?

    2. Why memory management is important?

    3. What is the difference in base and limit registers?

Memory is an important resource that must be carefully managed. While the average home computer nowadays has two thousand times as much memory as the IBM 7094 (the largest computer in the world in the early 1960s), programs and the data they are expected to handle have also grown tremendously. To paraphrase Parkinson's law, "Programs and their data expand to fill the memory available to hold them."

Ideally, what every programmer would like is an infinitely large, infinitely fast memory that is also nonvolatile, that is, does not lose its contents when the electric power fails. While we are at it, why not also ask for it to be inexpensive, too? Unfortunately technology cannot turn such dreams into memories. Consequently, most computers have a memory hierarchy, with a small amount of very fast, expensive, volatile cache memory, hundreds of megabytes of medium-speed, medium-price, volatile main memory (RAM), and tens or hundreds of gigabytes of slow, cheap, nonvolatile disk storage. It is the job of the operating system to coordinate how these memories are used.

The part of the operating system that manages the memory hierarchy is usually called the memory manager. Its job is to keep track of which parts of memory are in use and which parts are not in use, to allocate memory to processes when they need it and deallocate it when they are done, and to manage swapping between main memory and disk when main memory is too small to hold all the processes. In most systems it is in the kernel.

Memory management is the functionality of an operating system which handles or manages primary memory. Memory management keeps track of each and every

memory location either it is allocated to some process or it is free. It checks how much memory is to be allocated to processes. It decides which process will get memory at what time. It tracks whenever some memory gets free or unallocated and correspondingly it updates the status.

Memory management provides protection by using two registers, a base register and a limit register. The base register holds the smallest legal physical memory address and the limit register specifies the size of the range. For example, if the base register holds 300000 and the limit register is 1209000, then the program can legally access all addresses from 300000 through 411999.

Instructions and data to memory addresses can be done in following ways:

Compile time − When it is known at compile time where the process will reside, compile time binding is used to generate the absolute code.

Load time − When it is not known at compile time where the process will reside in memory, then the compiler generates re-locatable code.

Execution time − If the process can be moved during its execution from one memory segment to another, then binding must be delayed to be done at run time

2. Read the text and describe the figure.

Swapping

Swapping is a mechanism in which a process can be swapped temporarily out of main memory to a backing store, and then brought back into memory for continued execution.

Backing store is usually a hard disk drive or any other secondary storage which fast in access and large enough to accommodate copies of all memory images for all users. It must be capable of providing direct access to these memory images.

Major time consuming part of swapping is transfer time. Total transfer time is directly proportional to the amount of memory swapped. Let us assume that the user process is of size 100KB and the backing store is a standard hard disk with transfer rate of 1 MB per second. The actual transfer of the 100K process to or from memory will take 100KB / 1000KB per second = 1/10 second = 100 milliseconds
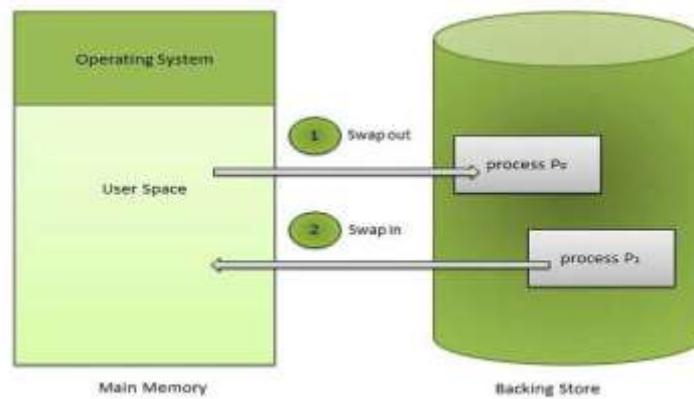
3. Please, compare single- and multiple-partition allocations.

Memory Allocation

Main memory usually has two partitions:

Low Memory -- Operating system resides in this memory.

High Memory -- User processes then held in high memory.

Operating system uses the following memory allocation mechanism.

S.N.	Memory Allocation	Description
1	Single-partition allocation	In this type of allocation, relocation-register scheme is used to protect user processes from each other, and from changing operating-system code and data. Relocation register contains value of smallest physical address whereas limit register contains range of logical addresses. Each logical address must be less than the limit register.
2	Multiple-partition allocation	In this type of allocation, main memory is divided into a number of fixed-sized partitions where each partition should contain only one process. When a partition is free, a process is selected from the input queue and is loaded into the free partition. When the process terminates, the partition becomes available for another process.

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4. Read and say what purposes of partition, paging, fragmentation, segmentation and virtual memory are.

Fragmentation

As processes are loaded and removed from memory, the free memory space is broken into little pieces. It happens after sometimes that processes can not be allocated to memory blocks considering their small size and memory blocks remains unused. This problem is known as Fragmentation.

Fragmentation is of two types.

| S.N.	Fragmentation	Description
1	External fragmentation	Total memory space is enough to satisfy a request or to reside a process in it, but it is not contiguous so it can not be used.
2	Internal fragmentation	Memory block assigned to process is bigger. Some portion of memory is left unused as it can not be used by another process.

Paging

External fragmentation is avoided by using paging technique. Paging is a technique in which physical memory is broken into blocks of the same size called pages (size is power of 2, between 512 bytes and 8192 bytes). When a process is to be executed, it's corresponding pages are loaded into any available memory frames. Logical address space of a process can be non-contiguous and a process is allocated physical memory whenever the free memory frame is available. Operating system keeps track of all free frames. Operating system needs n free frames to run a program of size n pages.

Address generated by CPU is divided into:

Page number (p) – page number is used as an index into a page table which contains base address of each page in physical memory.
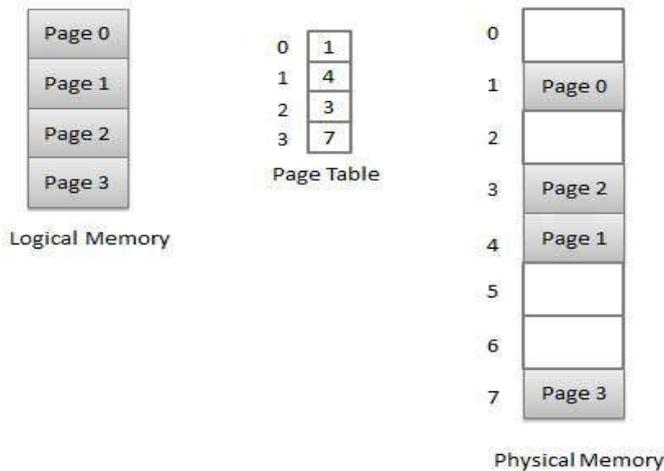
Page offset (d) – page offset is combined with base address to define the physical memory address.

Following figure shows the paging table architecture.
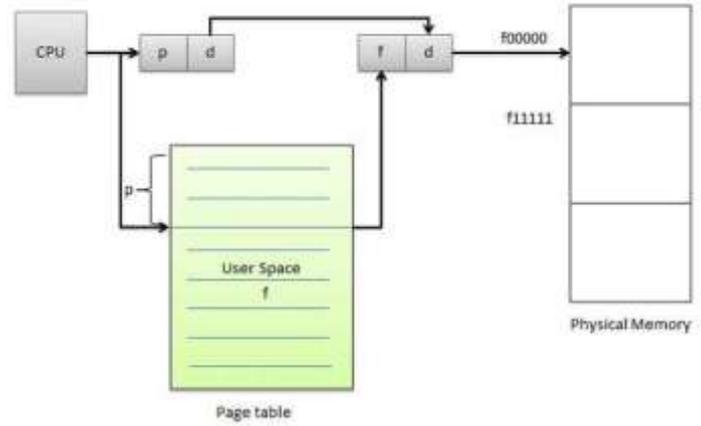
Segmentation

Segmentation is a technique to

Page table

break memory into logical pieces where each piece represents a group of related information. For example, data segments or code segment for each process, data segment for operating system and so on. Segmentation can be implemented using or without using paging.

Logical Memory / Page Table / Physical Memory

Unlike paging, segments are having varying sizes and thus eliminates internal fragmentation. External fragmentation still exists but to lesser extent.

Address generated by CPU is divided into:

Segment number (s) – segment number is used as an index into a segment table which contains base address of each segment in physical memory and a limit of segment.

Segment offset (o) – segment offset is first checked against limit and then is combined with base address to define the physical memory address.

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Segment Table
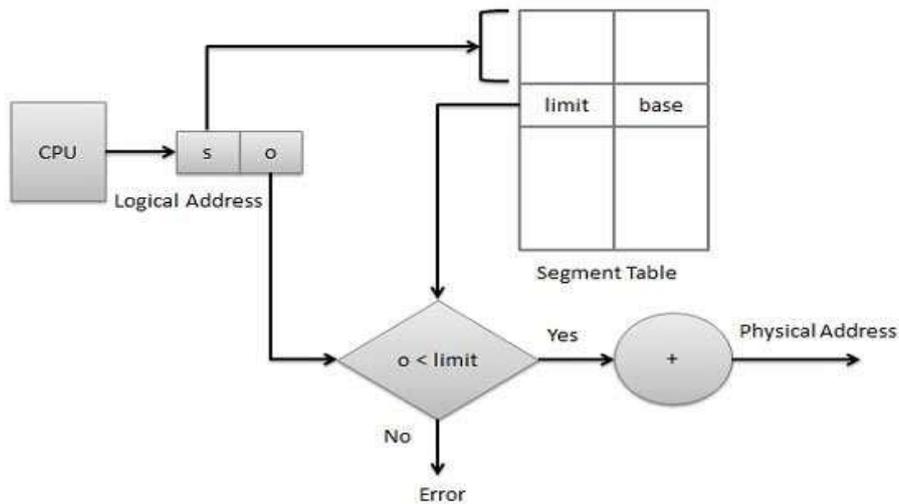
Virtual memory

Virtual memory is a technique that allows the execution of processes which are not completely available in memory. The main visible advantage of this scheme is that programs can be larger than physical memory. Virtual memory is the separation of user logical memory from physical memory. This separation allows an extremely large virtual memory to be provided for programmers when only a smaller physical memory is available. Following are the situations, when entire program is not required to be loaded fully in main memory.

User written error handling routines are used only when an error occured in the data or computation. Certain options and features of a program may be used rarely. Many tables are assigned a fixed amount of address space even though only a small amount of the table is actually used. The ability to execute a program that is only partially in memory would counter many benefits. Less number of I/O would be needed to load or swap each user program into memory. A program would no longer be constrained by the amount of physical memory that is available. Each user program could take less physical memory, more programs could be run the same time, with a corresponding increase in CPU utilization and throughput.

Контрольні питання

1. What is memory?

2. Why memory management is important?

3. What is the difference in base and limit registers?

Література: [2, с. 71–101; 3, с. 86–132].

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Практичні заняття № 13–15

Тема. I/O Devices. Device Management. Past Simple and Present Perfect

</div>

Мета: ознайомити студентів з лексикою та теоретичними відомостями, закріпити знання студентів із зазначеної теми.

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Короткі теоретичні відомості

</div>

Past Simple and Present Perfect

Study these examples of the Present Perfect from the recording of the artist.

1. I've scanned in about a third of these photographs.

2. I've organised the paintings into themes.

3. I've added a sound track.

Why doesn't the speaker use the Past Simple?

4. I scanned in about a third of these photographs.

5. I organised the paintings into themes.

6. I added a sound track.

We use the Present Perfect to describe past actions with present relevance.

The artist uses the Present Perfect because he is describing a CD he has just made and what he is going to do with it in the near future.

Use Present Perfect Simple

• to describe an event in the past without a definite time.

Someone has broken a *window in our c1assroom.*

• to describe what sameone has completed ar achieved in a period of time.

I*'ve finished my homework, and I've c1eaned my room.*

• to describe how many things someane has done.

Scientists have found more than 30 *unknown insects.*

• to describe someone's experiences, what he ar she has dane in life.

I*'ve travelled by piane, but I haven't f/own in* a *helicopter.*

• to describe changes, comparing past and present.

Our climate has become much warmer.

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We use the Past Simple to describe completed actions in the past. It is often used with time expressions such as *last year, before PCs were introduced, in 1998.*

Note these examples from the recording:

7. I made one for Mary's birthday last week.

8. We tried it out last term.

Завдання до теми

1. Read the text and answer the questions.

1. Which functions of Operating System do you know?

2. What is a block device?

3. What is a character device?

4. Is there other classification of computer devices? Which one?

5. How do devices communicate with the computer?

6. What is a daisy chain?

7. What is a controller?

One of the main functions of an operating system is to control all the computer's I/O (Input/Output) devices. It must issue commands to the devices, catch interrupts, and handle errors. It should also provide an interface between the devices and the rest of the system that is simple and easy to use. To the extent possible, the interface should be the same for all devices (device independence). The I/O code represents a significant fraction of the total operating system. Thus to really understand what an operating system does, you have to understand how I/O works.

I/O devices can be roughly divided into two categories: block devices and character devices. A block device is one that stores information in fixed-size blocks, each one with its own address. Common block sizes range is from 512 bytes to 32,768 bytes. The essential property of a block device is that it is possible to read or write each block independently of all the other ones. Disks are the most common block devices.

The other type of I/O device is the character device. A character device delivers or accepts a stream of characters, without regard to any block structure. It is not addressable and does not have any seek operation. Printers, network interfaces, mice

(for pointing), rats (for psychology lab experiments), and most other devices that are not disk-like can be seen as character devices.

This classification scheme is not perfect. Some devices just do not fit in. Clocks, for example, are not block addressable. *Nor do they generate or accept* character streams. All they do is cause interrupts at well-defined intervals. Still, the model of block and character devices is general enough that it can be used as a basis for making some of the operating system software dealing with I/O device independent. The file system, for example, deals only with abstract block devices and leaves the device-dependent part to lower-level software called device drivers.

Computers operate on many kinds of devices. General types include storage devices (disks, tapes), transmission devices (network cards, modems), and human-interface devices (screen, keyboard, mouse). Other devices are more specialized. A device communicates with a computer system by sending signals over a cable or even through the air.

The device communicates with the machine via a connection point termed a *port* (for example, a serial port). If one or more devices use a common set of wires, the connection is called a bus. In other terms, a bus is a set of wires and a rigidly defined protocol that specifies a set of messages that can be sent on the wires.

Daisy chain

When device A has a cable that plugs into device B, and device B has a cable that plugs into device C, and device C plugs into a port on the computer, this arrangement is called a daisy chain. It usually operates as a bus.

Controller

A controller is a collection of electronics that can operate a port, a bus, or a device. A serial-port controller is an example of a simple device controller. This is a single chip in the computer that controls the signals on the wires of a serial port.

The SCSI bus controller is often implemented as a separate circuit board (a host adapter) that plugs into the computer. It contains a processor, microcode, and some private memory to enable it to process the SCSI protocol messages. Some devices have their own built-in controllers.

2.   Read the text and put the verbs into the right form.

Polling

Polling is a process by which a host _____(wait) for controller response.

It is a looping process, reading the status register over and over until the busy bit of status register _____(become) clear.

The controller _____(use/set) the busy bit when it is busy working on a command, and _____(clear) the busy bit when it is ready to accept the next command.

The host _____(signal) its wish via the command-ready bit in the command register.

The host _____(set) the command-ready bit when a command is available for the controller to execute.

In the following example, the host _____(write) output through a port, coordinating with the controller by handshaking:

The host repeatedly _____(read) the busy bit until that bit _____(become) clear.

The host _____(set) the write bit in the command register and _____(write) a byte into the data-out register.

The host _____(set) the command-ready bit.

When the controller _____(notice) that the command-ready bit is set, it _____(set) the busy bit.

The controller _____(read) the command register and ___(see) the write command.

It _____(read) the data-out register to get the byte, and does the I/O to the device.

The controller clears the command-ready bit, clears the error bit in the status register to indicate that the device I/O is succeeded, and clears the busy bit to indicate that it is finished.

3.   Read the text and complete the sentences with words from the box.

disk and tape drives, printers, modems, video display terminals, actuators,sensors, keyboard, controllers, digital line drivers

I/O devices

I/O Devices can be categorized into following category.

S.N.	Category & Description
1	Human readable Human Readable devices are suitable for communicating with the computer user. Examples are _____
2	Machine readable Machine Readable devices are suitable for communicating with electronic equipment. Examples are _____
3	Communication Communication devices are suitable for communicating with remote devices. Examples are_____

4. Read the text and put active sentences into passive and vice versa.

Direct Memory Access (DMA)

Many computers avoid burdening the main CPU with programmed I/O by offloading some of this work to a special-purpose processor. This type of processor is called, a Direct Memory Access (DMA) controller. A special control unit is used to transfer block of data directly between an external device and the main memory, without intervention by the processor. This approach is called Direct Memory Access(DMA).

DMA can be used with *either polling or interrupt software*. DMA is particularly useful on devices like disks, where many bytes of information can be transferred in single I/O operations. When used with an interrupt, the CPU is notified only after the entire block of data has been transferred. For each byte or word transferred, it must provide the memory address and all the bus signals controlling the data transfer. Interaction with a device controller is managed through a device driver.

Handshaking is a process between the DMA controller and the device controller. It is performed via wires using terms DMA request and DMA acknowledge.

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Контрольні питання

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1. Which functions of Operating System do you know?

2. What is a block device?

3. What is a character device?

4. Is there other classification of computer devices? Which one?

5. How do devices communicate with the computer?

6. What is a daisy chain?

7. What is a controller?

Література: [2, с. 102–175; 3, с. 87–187].

Практичні заняття № 16–20

Тема 5. Computer Network Concept and Architecture. Present Perfect and Past Perfect

Мета: ознайомити студентів з лексикою та теоретичними відомостями, закріпити знання студентів із зазначеної теми.

Короткі теоретичні відомості

Use Past Perfect Simple to deseribe a past event whieh happens before another event in the past. Only use it when it is important to make elear that one event in the past happened before another.

On 12*July* 1771, *Cook's ship* The Endeavour *arrived back in Britain. Cook had not*

discovered a new continent, but he had visited places never seen before.

In this example, *'not discovered'* happened before *'arrived'*.

forgot, remembered, realized

With *forgot, remembered, realized, knew,* we use **Past Perfect Simple** to deseribe the past events that happened before the moment we forgot, remembered ar realised something.

When Franklin checked the ship's position, he realized he had made a *mistake.*

Завдання до теми

1. Read the text about Computer Networks.

A computer network or data network is a telecommunications network which allows computers to exchange data. In computer networks, networked computing devices exchange data with each other along network links (data connections). The

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connections between nodes are established using either cable media or wireless media. The best-known computer network is the Internet.

Network computer devices that originate, route and terminate the data are called network nodes. Nodes can include hosts such as personal computers, phones, servers as well as networking hardware. Two such devices can be said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other.

Computer networks differ in the transmission media used to carry their signals, the communications protocols to organize network traffic, the network's size, topology and organizational intent. In most cases, communications protocols are layered on (i.e. work using) other more specific or more general communications protocols, except for the *physical layer* that directly deals with the transmission media.

Computer networks support applications such as access to the World Wide Web, shared use of application and storage servers,printers, and fax machines, and use of email and instant messaging applications.

Wired technologies

Fiber optic cables are used to transmit light from one computer/network node to another. The orders of the following wired technologies are, roughly, from slowest to fastest transmission speed.

Coaxial cable is widely used for cable television systems, office buildings, and other work-sites for local area networks. The cables consist of copper or aluminum wire surrounded by an insulating layer (typically a flexible material with a high dielectric constant), which itself is surrounded by a conductive layer. The insulation helps minimize interference and distortion. Transmission speed ranges from 200 million bits per second to more than 500 million bits per second.

ITU-T G.hn technology uses existing home wiring (coaxial cable, phone lines and power lines) to create a high-speed (up to 1 Gigabit/s) local area network.

Twisted pair wire is the most widely used medium for all telecommunication. Twisted-pair cabling consist of copper wires that are twisted into pairs. Ordinary

telephone wires consist of two insulated copper wires twisted into pairs. Computer network cabling (wired Ethernet as defined byIEEE 802.3) consists of 4 pairs of copper cabling that can be utilized for both voice and data transmission. The use of two wires twisted together helps to reduce crosstalk and electromagnetic induction. The transmission speed ranges from 2 million bits per second to 10 billion bits per second. Twisted pair cabling comes in two forms: unshielded twisted pair (UTP) and shielded twisted-pair (STP). Each form comes in several category ratings, designed for use in various scenarios.

An *optical fiber* is a glass fiber. It carries pulses of light that represent data. Some advantages of optical fibers over metal wires are very low transmission loss and immunity from electrical interference. Optical fibers can simultaneously carry multiple wavelengths of light, which greatly increases the rate that data can be sent, and helps enable data rates of up to trillions of bits per second. Optic fibers can be used for long runs of cable carrying very high data rates, and are used for undersea cables to interconnect continents.

Price is a main factor distinguishing wired- and wireless-technology options in a business. Wireless options command a price premium that can make purchasing wired computers, printers and other devices a financial benefit. Before making the decision to purchase hard-wired technology products, a review of the restrictions and limitations of the selections is necessary. Business and employee needs may override any cost considerations.

2. With the help of this diagram, try to describe the function of these components of a typical network system:

1. a file server; 2. bridge; 3. a router; 4. a backbone; 5. a LAN; 6. a gateway; 7. a modem

Now read these definitions to check your answers.

A bridge is a hardware and software combination used to connect the same type of networks. Bridges can also partition a large network into two smaller ones and connect two LANs that are nearby each other.

A router is a special computer that directs communicating messages when several networks are connected together. High-speed routers can serve as part of the Internet backbone.

A gateway is an interface that enables dissimilar networks to communicate, such as two LANs based on different topologies or network operating systems.

A backbone is the main transmission path, handling the major data traffic, connecting different LANs together.

A LAN is a network contained within a small area, for example a company department.

A modem is a device for converting digital signals to analogue signals and vice versa to enable a computer to transmit and receive data using an ordinary telephone line.
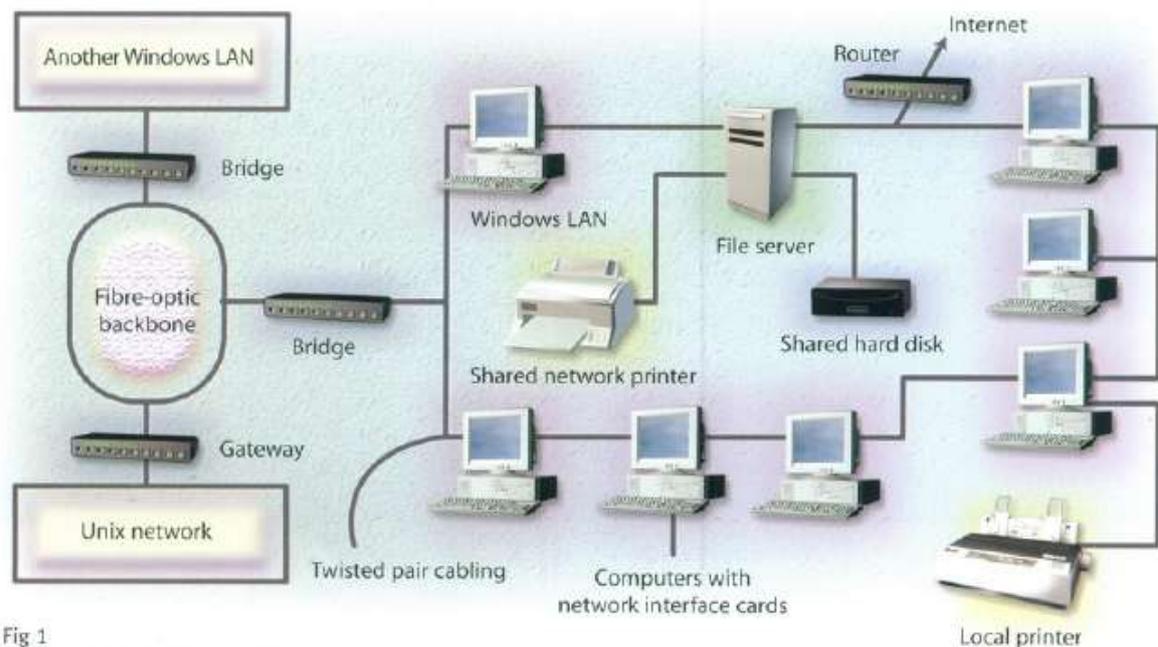
Fig 1
Components of a typical LAN

2. Now study this text and the diagram of a wireless network setup. Match the diagram key to the components of the network.
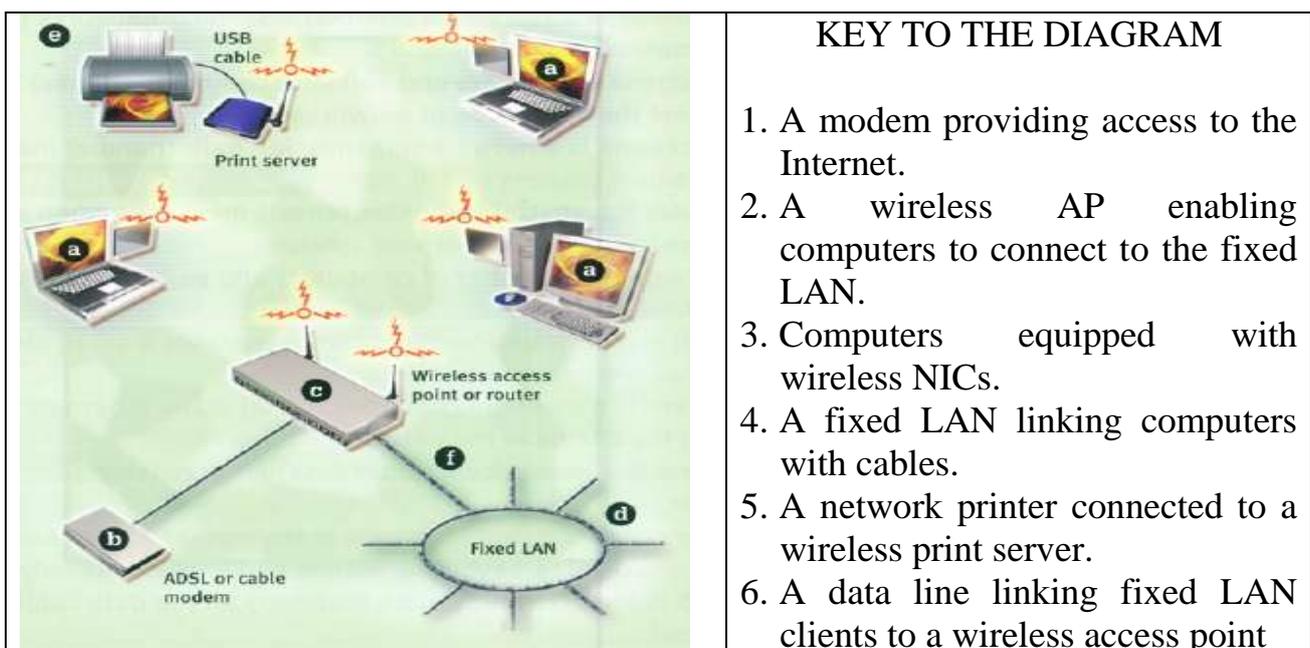
Wireless (WiFi) networks are just like fixed LANs but instead of using cables, devices are linked by radio waves.

Each computer in a wireless network requires a wireless network interface card (NIC). These can be built in or you can use plug-in adaptors. These allow each component in the network to communicate with a wireless access point (AP) to create

a wireless local area network (WLAN). The AP operates like a router in a fixed LAN. It also provides a bridge which plugs into the hub of a fixed LAN allowing both fixed and wireless users to talk to each other. If your LAN is connected to the Internet, the WLAN can also use it. If not, you can connect the WLAN to the Internet via an ADSL or cable modem.

What are the advantages of a wireless network? You don't need cabling. In older buildings, it can be expansive to install cables and access points. With WiFi, one access point can cover an entire floor or even a building. You can work anywhere within range of the access point. On a sunny day, you could work outside. You can make any room in the house your study. There are now WiFi hotspots in hotels, libraries and airports so you can link to a network away from home or your office.

There are disadvantages. Fixed LANs can run at 1000 Mbps. Wireless networks are much slower and the further you are from an access point, the slower the rate. Although there are savings on the cost of cabling, wireless NICs are more expensive than the wired versions. Then there is the problem of interference, if a neighbour is using the same channel, and security. Other users may be able to intercept your data. Encryption programs like Wired Equivalent Privacy (WEP) can help.

KEY TO THE DIAGRAM

1. A modem providing access to the Internet.
2. A wireless AP enabling computers to connect to the fixed LAN.
3. Computers equipped with wireless NICs.
4. A fixed LAN linking computers with cables.
5. A network printer connected to a wireless print server.
6. A data line linking fixed LAN clients to a wireless access point

3. Complete the gap in each sentence with the correct form of the verb in brackets.

1. The Help facility enables users_____(get) advice on most problems.

2. Adding more memory lets your computer_____(work) faster.

3. Windows allows you_____(display) two different folders at the same time.

4. The Shift key allows you_____(type) in upper case.

5. The MouseKeys feature enables you _____(use) the numeric keypad to move the mouse pointer.

6. ALT + TAB allows you_____(switch) between programs.

7. The StickyKeys feature helps disabled people _____(operate) two keys simultaneously.

8. ALT + PRINT SCREEN lets you_____(copy) an image of an active window to the Clipboard.

4. Complete the sentences with the words in the box.

allow	provide	enable

1. Process scheduling is an essential part of a Multiprogramming operating system. Such operating systems_____ more than one process to be loaded into the executable memory at a time and loaded process shares the CPU using time multiplexing.

2. An operating System is an intermediary between users and computer hardware.

It _____users an environment in which a user can execute programs conveniently and efficiently.

3. Time sharing is a technique which _____many people, located at various terminals, to use a particular computer system at the same time.

4. Network Operating System runs on a server and _____server the capability to manage data, users, groups, security, applications, and other networking functions.

5. Threads _____ a suitable foundation for parallel execution of applications on shared memory multiprocessors.

6. Virtual memory is the separation of user logical memory from physical memory. This separation _____ an extremely large virtual memory to be provided for programmers when only a smaller physical memory is available.

Контрольні питання

1. What is a LAN?

2. What is a WLAN?

3. What are differencies, benefits and lacks of LAN and WLAN?

Література: [1, с. 53–85; 2, с. 345–380].

Практичні заняття № 21–25

Тема. Computer Network Types. Present Perfect Progressive and Past Perfect Progressive

Мета: ознайомити студентів з лексикою та теоретичними відомостями, закріпити знання студентів з зазначеної теми.

Короткі теоретичні відомості

Use Present Perfect Continuous

• to talk about recent continuing activities.

What have you been doing /ate/y?

I've been revising for my exams.

• to explain how recent continuing activities have caused the present situation.

My eyes ache. I've been reading al! day

• to talk about recent continuing activities which will probably continue in the future.

This diagram shows how the climate has been changing.

• with *how /ong* questions.

How /ong have you been studying French?

(this is a continuing process,and isn't finished)

• with time words */ate/y, recent/y, al! (day), every (morning), for, since.*

Use Past Perfect Continuous

• in a past tense narrative, to describe a continuing action in a period of time before something

else happened.

Anna returned from France, where she had been studying French.

• to explain a past situation, by describing the events happening before.

80th boys were wet and muddy. They had been playing football in the rain.

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Завдання до теми

</div>

1. Read the information on the types of network connections and compare them. Put the verbs into correct form of Participle. If there is a that-phrase, change it into Participle

Local Area Network (LAN)

A Local Area Network is a network _____(confine) to one building or site. Often a LAN is a private network _____(belong) to an organisation or business. Because LANs are geographically small, they usually use cables or low-power radio (wireless) for the connections.

Wireless Local Area Network (WLAN)

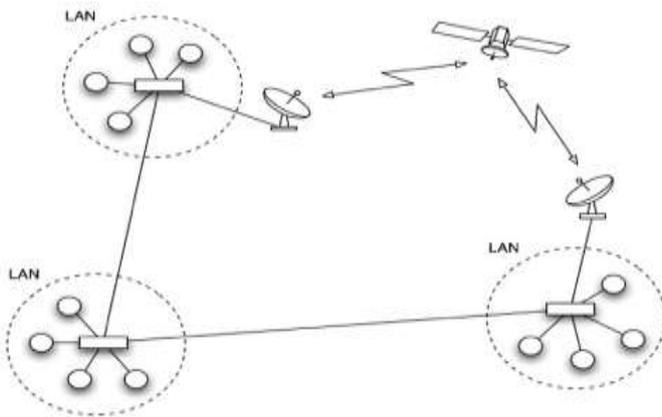A wireless LAN (WLAN) is a LAN that uses radio signals (WiFi) to connect computers instead of cables. At the centre of the WLAN is a wireless switch or router - a small box with one or two antennas _____(stick) out the back - used for sending and receiving data to the computers. (Most laptops have a wireless antenna _____(build) into the case.)
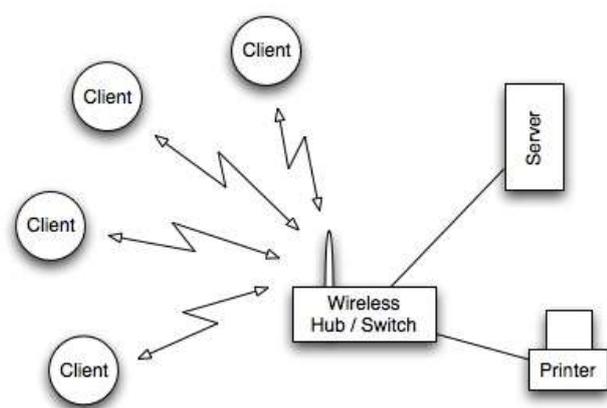
It is much more convenient to use wireless connections instead of _____(run) long wires all over a building. However, WLANs are more difficult to make secure since other people can also try to connect to the wireless network. So, it is very important to have a good, hard-to-guess password for the WLAN connections. Typically,

the range of a wireless connection is about 50m, but it depends how many walls, etc. are in the way.

Wide Area Network (WAN)

A Wide Area Network is a network _____that extends over a large area. A WAN is often created by _____(join) several LANs together, such as when a business _____that has offices in different countries links the office LANs together. Because WANs are often geographically spread over large areas and links between computers are over long distances, they often use quite exotic connections technologies: optical fibre (glass) cables, satellite radio links, microwave radio links, etc.

The Internet is an example of a global WAN. In fact it is the world's largest WAN. Computers on the International Space Station are linked to the Internet, so we could say the Internet is now the first off-planet WAN!

Bluetooth (Personal Area Network)

Bluetooth is a wireless networking technology _____(design) for very short-range connections (typically just a few metres).The idea of Bluetooth is to get rid of the need for all of those cables (e.g. USB cables) _____that connect our computer to peripheral devices such as printers, mice, keyboards, etc. Bluetooth devices contain small, low-power radio transmitters and receivers. When devices are in range of other Bluetooth devices, they detect each other and can be 'paired' (connected).
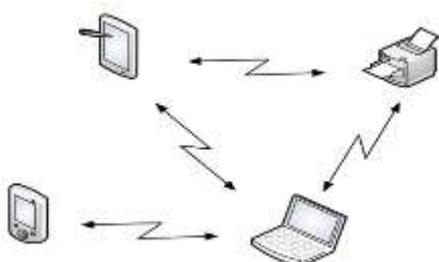
Typical uses of Bluetooth:

- Connecting a wireless keyboard to a computer.
- Connecting a wireless mouse to a computer.
- Using a wireless headset with a mobile phone.
- Printing wirelessly from a computer or PDA.

- Transferring data / music from a computer to an MP3 player.
- Transferring photos from a phone / camera to another device.
- Synchronising calendars on a PDA and a computer.

Because Bluetooth networking only works over very short distances, and with devices _____(belong) to one user, this type of network is sometimes called a 'Personal Area Network'

2. Find the answers to these questions in the following text.

1. What purpose does the Internet address have apart from identifying a node?
2. What data-delivery systems are mentioned in the text?
3. What do IP modules need to know about each other to communicate?
4. How many Internet addresses does a gateway have?
5. What does UDP software do?
6. When does the TCP part of TCP/IP come into operation?
7. What processes are performed by TCP software to provide reliable stream service?
8. What standard protocols are mentioned which are used to deal with the data after TCP brings it into the computer?

How TCP/IP Links Dissimilar Machines

At the heart of the Internet Protocol (IP) portion of TCP/IP is a concept called the Internet address. This 32-bit coding system assigns a number to every node on the network. There are various types of addresses designed for networks of different sizes, but you can write every address with a series of numbers that identify the major network and the sub-networks to which a node is attached. Besides identifying a node, the address provides a path that gateways can use to route information from one machine to another.

Although data-delivery systems like Ethernet or X.25 bring their packets to any machine electrically attached to the cable, the IP modules must know each other's Internet addresses if they are to communicate. A machine acting as a gateway connecting different TCP/IP networks will have a different Internet address on each

network. Internal look-up tables and software based on another standard - called Resolution Protocol - are used to route the data through a gateway between networks.

Another piece of software works with the IP-layer programs to move information to the right application on the receiving system. This software follows a standard called the User Datagram Protocol (UDP). You can think of the UDP software as creating a data address in the TCP/IP message that states exactly what application the data block is supposed to contact at the address the IP software has described. The UDP software provides the final routing for the data within the receiving system.

The Transmission Control Protocol (TCP) part of TCP/IP comes into operation once the packet is delivered to the correct Internet address and application port. Software packages that follow the TCP standard run on each machine, establish a connection to each other, and manage the communication exchanges. A data-delivery system like Ethernet doesn't promise to deliver a packet successfully. *Neither IP nor UDP knows anything about recovering packets that aren't successfully delivered*, but TCP structures and buffers the data flow, looks for responses and takes action to replace missing data blocks. This concept of data management is called reliable stream service.

After TCP brings the data packet into a computer, other high-level programs handle it. Some are enshrined in official US government standards, like the File Transfer Protocol (FTP) and the Simple Mail Transfer Protocol (SMTP). If you use these standard protocols on different kinds of computers, you will at least have ways of easily transferring flies and other kinds of data.

Conceptually, software that supports the TCP protocol stands alone. It can work with data received through a serial port, over a packet-switched network, or from a network system like Ethernet. TCP software doesn't need to use IP or UDP, it doesn't even have to know they exist. But in practice TCP is an integral part of the TCP/IP picture, and it is most frequently used with those two protocols.

3. Match the terms with the statements.

1. Internet address	a) Standard used for software that routes data through a gateway
2. Resolution Protocol	b) Standard used by software that moves information to the correct application on the receiving system of a network
3. Look-up table	c) Standard used by software that manages communication exchanges between computers on the Internet
4. Gateway	d) A 32-bit number identifying a node on an IP network
5. User Datagram Protocol	e) Stored information used to route data through a gateway
6. Transmission Control Protocol	f) A device for connecting dissimilar networks

Контрольні питання

1. What do IP modules need to know about each other to communicate?

2. How many Internet addresses does a gateway have?

3. What does UDP software do?

4. When does the TCP part of TCP/IP come into operation?

Література: [1, с. 86–150; 2, с. 381–420].

Практичні заняття № 26–30

Тема. Computer Networks Topologies and Components. Future Tenses

Мета: ознайомити студентів з лексикою та теоретичними відомостями, закріпити знання студентів із зазначеної теми.

Короткі теоретичні відомості

Use *will*

• to say what we expect to happen in the future.

It will take 50 years for temperatures to return to normal.

• with *definite/y, probably, possibly* to show how certain ar uncertain we are.

less certain – *probably /* uncertain – *possibly*

It will probab/y take 50 years for the climate to stabilize.

The climate will definitely change before then.

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• to make a social arrangement.

I'll see you tomorrow

• to make a promise, warning or threat.

I'11give you my homework on Monday (promise)

Careful! You'lI fali. (warning)

I'l1deal with you later! (threat)

• to make an offer.

I'11carry the projector for you. Shalll I carry it for you?

• in a formai rule.

5tudents will wear protective clothing at all times.

• to make a decision in a situation.

Which pullover do you want? I'l1have this one, I think.

Use *won't*

• to mean 'refuse'.

Jack won 't give me back my ruler!

Use *shall*

• in formai speech ar writing with *l/we*.

• to make offers .

Use *going* to

• to talk about a personal plan ar intention.

We're going to try and recycle more of our household rubbish.

• to make a prediction about the future, especially when this has already started to happen.

Most people can see that the Internet is going to be just as much a part of the future for us all as the telephone or electricity is taday

Something strange is happening to the computer screen. The program is going to crash!

• to make a decision with a result in the distant future, not 'instant', as with *will*.

I've decided about my future. I'm going to study law at university

Present Continuous for future

• Usefor a fixed arrangement in the future eg an event already written in a diary.

I'm coming back next Thursday

We're having a *party next Friday Would you like to come?*

Note that there is usually a time reference.

What are you doing next week?

Present Simple for future

• Usefor an event that always happens at a certain time, or is part of a timetable.

The conference begins on Tuesdayat 10.00.

will, going to or present continuous?

When we make predictions *will* and *going to* are both possible.

I think Helen is going to *win. I think Helen will win.*

We use *going* to when we talk about plans.

We're going to *go to France next year.* (a plan)

We use present continuous when we talk about an arrangement that is definitely fixed.

We're /eaving for France on Monday (we've bought the tickets)

When we see that an event has already started to happen, we use *going to.*

Look at *that ship! It's going* to *hit the rocks!*

<div align="center">**Завдання до теми**</div>

1. Read about network topologies and define the network topology on diagrams. Put the verbs into correct form of Participle. If there is a that-phrase, change it into Participle. Ask as many questions as you can.

A Network Topology is the way computer systems or network equipment are connected to each other. Topologies may define both physical and logical aspect of the network. Both logical and physical topologies could be same or different in a same network.

Point-to-point

Point-to-point networks contains exactly two hosts (computer or switches or routers or servers) _____(connect) back to back using a single piece of cable. Often, the receiving end of one host is connected to sending end of the other end and vice-versa. If the hosts are connected point-to-point logically, then may have multiple intermediate devices. But the end hosts are unaware of underlying network and see each other as if they are connected directly.

Bus Topology

In contrast to point-to-point, in bus topology all device share single communication line or cable. All devices are connected to this shared line. Bus topology may have problem while more than one hosts _____(send) data at the same time. Therefore, the bus topology either uses CSMA/CD technology or recognizes one host has Bus Master to solve the issue. It is one of the simple forms of networking where a failure of a device does not affect the others. But failure of the shared communication line make all other devices fail.

Both ends of the shared channel have line terminator. The data is sent in only one direction and as soon as it reaches the extreme end, the terminator removes the data from the line.

Star Topology

All hosts in star topology are connected to a central device, known as Hub device,_____ (use) a point-to-point connection. That is, there exists a point to point connection between hosts and Hub. The hub device can be Layer-1 device (Hub / repeater) or Layer-2 device (Switch / Bridge) or Layer-3 device (Router / Gateway).

As in bus topology, hub acts as single point of failure. If hub fails, connectivity of all hosts to all other hosts fails. Every communication happens between hosts, goes through Hub only. Star topology is not expensive as to connect one more host, only one cable is required and configuration is simple.

Ring Topology

In ring topology, each host machine connects to exactly two other machines, _____(create) a circular network structure. When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all

intermediate hosts. To connect one more host in the existing structure administrator may need only one more extra cable. Failure of any host results in failure of the whole ring. Thus every connection in the ring is point of failure. There exists methods which employs one more backup ring.

Mesh Topology

In this type of topology, a host is connected to one or two or more than two hosts. This topology may have hosts ____(have) point-to-point connection to every other hosts or may also have hosts which are having point-to-point connection to few hosts only.

Hosts in Mesh topology also work as relay for other hosts which do not have direct point-to-point links. Mesh technology comes into two flavors:

Full Mesh: All hosts have a point-to-point connection to every other host in the network. Thus for every new host $n(n-1)/2$ cables (connection) are required. It provides the most reliable network structure among all network topologies.

Partially Mesh: Not all hosts have point-to-point connection to every other host. Hosts connect to each other in some arbitrarily fashion. This topology exists where we need to provide reliability to some host whereas others are not as such necessary.

Tree Topology

Also known as Hierarchical Topology is the most common form of network topology in use present day. This topology imitates as extended Star Topology and inherits properties of Bus topology. This topology divides the network in to multiple levels/layers of network. Mainly in LANs, a network is bifurcated into three types of network devices. The lowest is access-layer where user's computer are attached. The middle layer is known as distribution layer, _____which works as mediator between upper layer and lower layer. The highest layer is known as Core layer, and is central point of the network, i.e. root of the tree from which all nodes fork.

All neighboring hosts have point-to-point connection between them. Like bus topology, if the root goes down, the entire network suffers. Though it is not the single point of failure. Every connection serves as point of failure, failing of which divides the network into unreachable segment and so on.

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Daisy Chain

This topology connects all its hosts in a linear fashion. Similar to Ring topology, all hosts in this topology are connected to two hosts only, except the end hosts. That is if the end hosts in Daisy Chain are connected then it represents Ring topology. Each link in Daisy chain topology represents single point of failure. Every link failure splits the network into two segment. Every intermediate host works as relay for its immediate hosts.

Hybrid Topology

A network structure whose design contains more than one topology is said to be Hybrid Topology. Hybrid topology inherits merits and demerits of all the incorporating topologies. The combining topologies may contain attributes of Star, Ring, Bus and Daisy-chain topologies. Most WANs are connected by means of dual Ring topology and networks _____(connect) to them are mostly Star topology networks. Internet is the best example of the largest Hybrid topology.

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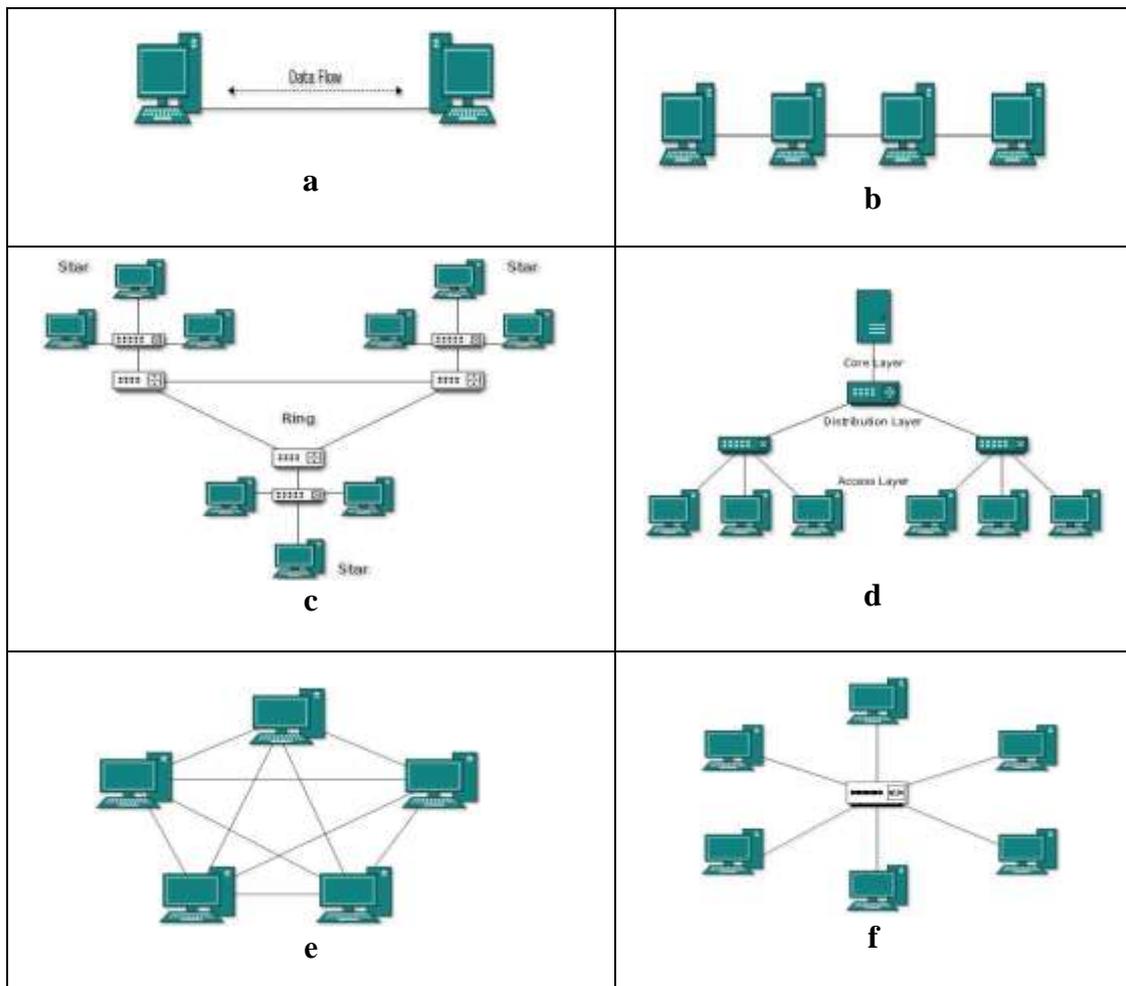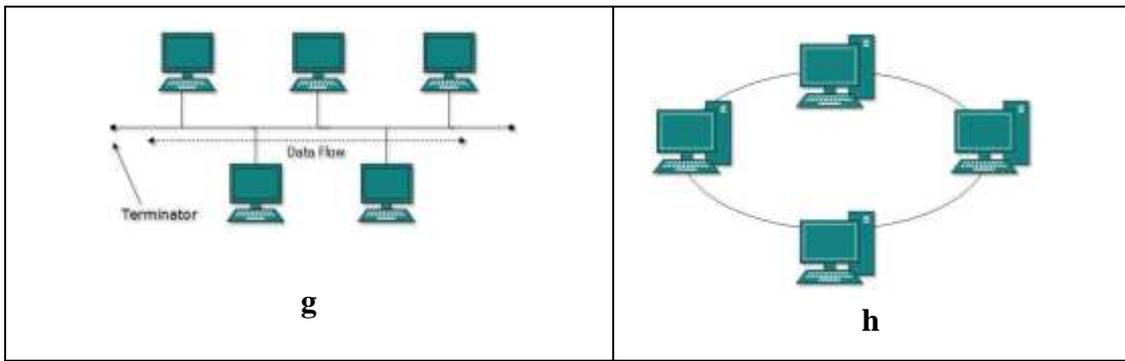
2. Read some information on network hardware. Put the verbs into correct form of Participle. If there is a that-phrase, change it into Participle.

Networking hardware may also be known as network equipment or computer networking devices.

Network Interface Card (NIC)

Any computer that is to be connected to a network, needs to have a network interface card (NIC). Most modern computers have these devices _____(build) into the motherboard, but in some computers you have to add an extra expansion card (small circuit board). Some computers, such as laptops, have two NICs: one for wired connections, and one for wireless connections (which uses radio signals instead of wires). In a laptop, the wireless radio antenna is usually built into the side of the screen, so you don't need to have a long bit of plastic _____(stick) out the side of your computer!

Network Cable

To connect together different devices to make up a network, you need cables. Cables are still used in most networks, rather than using only wireless, because they can carry much more data per second, and are more secure (less open to hacking).
Inside the cable are several copper wires (some used for sending data in one direction, and some for the other direction).

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3. Read the information on a hub and switch. Which benefits and lacks do they have?

Hub   A hub is a device that connects a number of computers together to make a LAN. The typical use of a hub is at the centre of a star network (or as part of a hybrid network) - the hub has cables _____(plug) into it from each computer.
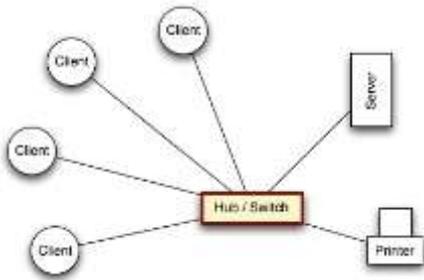
A hub is a 'dumb' device: if it receives a message, it sends it to every computer on the network. This means that hub-based networks are not very secure - everyone can listen in to communications.

Hubs are pretty much obsolete now (you can't buy them any more), having been superseded by cheap switches.

Switch   A switch, like a hub, is a device that connects a number of computers together to make a LAN. The typical use of a switch is at the centre of a star network (or as part of a hybrid network) - the switch has cables _____(plug) into it from each computer. A switch is a more 'intelligent' device than a hub: if it receives a message, it checks who it is addressed to, and only sends it to that specific computer. Because of this, networks that use switches are more secure than those that use hubs, but also a little more expensive.

4. Read the text and ask as many questions as you can about a router, proxy server, bridge and firewall.
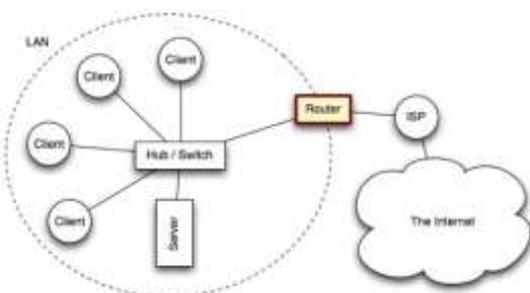
Router   A router is a network device that connects together two or more networks. A common use of a router is to join a home or business network (LAN) to the Internet (WAN). The router will typically have the Internet cable _____(plug) into it, as well as a cable, or cables to computers on the LAN. Alternatively, the LAN connection might be wireless (WiFi), _____(make) the device a wireless router. (A wireless router is actually a router and wireless switch combined). Routers are the devices that join together the various different networks

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that together make up the Internet. These routers are much more complex than the one you might have in your home.

Proxy Server A proxy server is a computer setup to share a resource, usually an Internet connection.
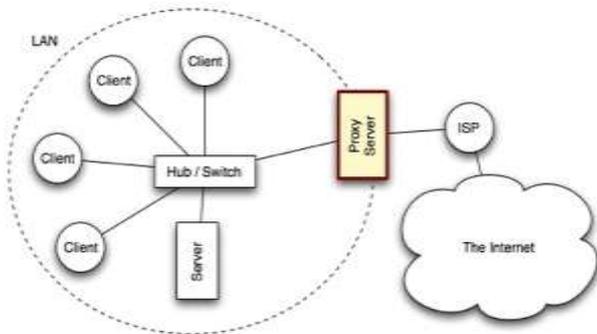
Other computers can request a web page via the proxy server. The proxy server will then get the page _____(use) its Internet connection, and pass it back to the computer who asked for it. Proxy servers are often used instead of router since additional software can be easily installed on the computer such as anti-virus, web filtering etc.

Bridge A bridge is a network device that typically links together two different parts of a LAN.
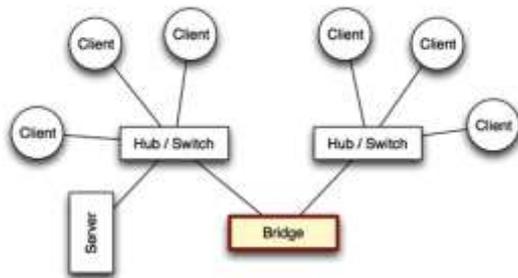
Whereas a router is usually used to link a LAN to a WAN (such as the Internet), a bridge links independent parts of a LAN so that they act as a single LAN.

Firewall A firewall is a device, or a piece of software that is placed between your computer and the rest of the network (where the hackers are!) If you wish to protect your whole LAN from hackers out on the Internet, you would place a firewall between the LAN and the Internet connection.
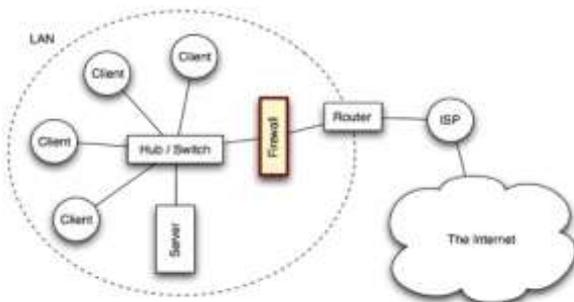
A firewall blocks unauthorised connections being made to your computer or LAN. Normal data is allowed through the firewall (e.g. e-mails or web pages) but all other data is blocked.
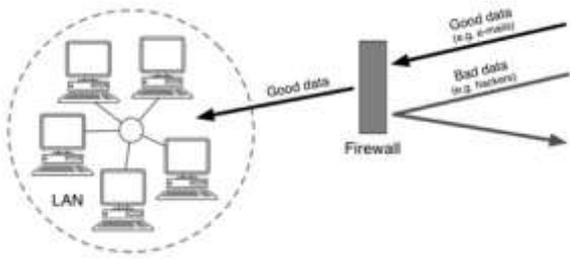
In addition to physical devices, firewalls can also be software. In fact most computer operating systems have a software firewall ____(build) in (e.g. Windows, Linux and Mac OS)

Modem Before the days of broadband Internet connections, most computers connected to the Internet via telephone lines (dial-up connections).The problem with using telephone lines is that they are designed to carry voices, which are analogue signals. They are not designed for digital data. The solution was to use a special device to join the digital computer to the analogue telephone line. This device is known as a modem. A modem contains a DAC and an ADC.

The DAC in the modem is required so that the digital computer can send data down the analogue telephone line (it converts digital data into noise swhich is exactly what the telephone line is designed to carry.) The ADC in the modem is required so that the analogue signals (noises) _____that arrive via the telephone line can be converted back into digital data.

The reason telephone lines were used is that almost every building in the world is already joined to every other via the telephone system. Using the telephone system for connecting computers meant that people didn't have to install new wires to their houses and offices just for computer use. In the last few years however, this is exactly what people have done. Special cables have been installed just for Internet access. These special cables are designed to carry digital data, so no modem is required.

The word modem is an abbreviation of MOdulator DEModulator. A modulator acts as a DAC, and a demodulator acts as an ADC.
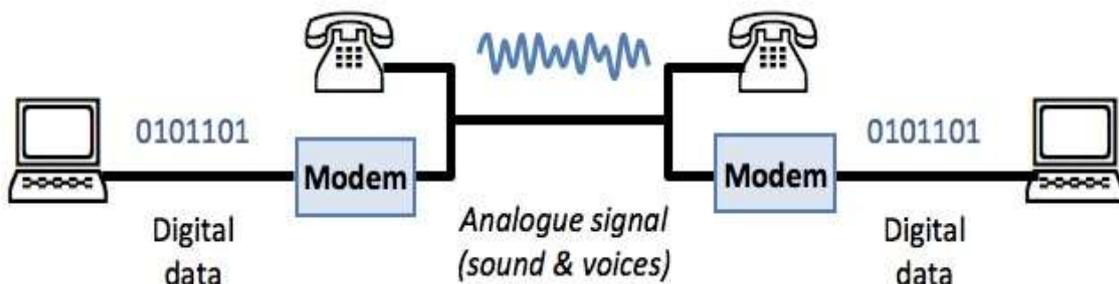
So, simply put, a modem is required because computers are digital devices and the telephone system is analogue. The modem converts from digital to analogue and from analogue to digital.

If you have ever used a dial-up connection, you have probably heard the noises sent by the modem down the telephone line.

5. Match Networking terms with their definitions.

Network Interface Card (NIC)	is a hardware and software combination _____(use) to connect the same type of networks.
	is a special computer that directs communicating messages when several networks are connected together.
Network Cable	is a device for converting digital signals to analogue signals and vice versa to enable a computer to transmit and receive data _____(use) an ordinary telephone line.
Hub	is used to connect one network device to other network devices or to connect two or more computers to share printer, scanner etc.
Switch	is a computer networking device _____that connects devices together on a computer network, by using a form of packet switching to forward data to the destination device.
Router	
Proxy Server	is a device for connecting multiple Ethernet devices together and making them act as a single network segment.
Bridge	is a server (a computer system or an application) that acts as an intermediary for requests from clients _____(seek) resources from other servers.
Firewall	is a network security system that controls the incoming and outgoing network traffic _____(base) on applied rule set.
Modem	

Контрольні питання

1. Which computer network topologies do you know?

2. Compare computer network topologies?

3. What is computer network hardware?

Література: [1, с. 151–195; 2, 421–470].

2 КРИТЕРІЇ ОЦІНЮВАННЯ ЗНАНЬ СТУДЕНТІВ

Об'єктивне оцінювання знань студентів у межах кредитно-модульної системи в умовах упровадження ідей Болонського процесу має сприяти підвищенню якості підготовки та конкурентоспроможності фахівців, стимулювати самостійну та систематичну роботу студента протягом навчального семестру. Досягається така об'єктивність запровадженням відповідних критеріїв оцінювання, тобто системи вимог до рівня знань і вмінь студента, які він повинен продемонструвати для підтвердження набутих ним компетенцій за 100-бальною шкалою (100 %).

Перелік практичних занять складається з тридцяти занять, які спрямовані на перевірку знань студентів з теорії і практики розв'язання прикладних задач.

Виконання практичних занять є обов'язковим для всіх студентів. За тридцяти робіт студент може отримати 60 балів.

За кожне практичне заняття виставляють:

– 2 бали, якщо студент виконав практичне заняття і захистив його, тобто правильно та вичерпно відповів на всі питання. Допускаються незначні неточності під час відповіді на одне з контрольних питань;

– 1 бал виставляють, якщо студент виконав практичне заняття, але не відповів на контрольні питання;

– у решті випадків виставляють 0 балів.

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