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Кафедра англійської мови для технічних та агробіологічних спеціальностей

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Навчально-методичний посібник для студентів заочної форми навчання ОС «Бакалавр» спеціальності «Автоматизація, комп'ютерно-інтегровані технології та робототехніка»

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Укладач: **ТУЗЮК МИХАЙЛО ОЛЕКСАНДРОВИЧ**, асистент кафедри англійської мови для технічних та агробіологічних спеціальностей НУБіП України

Пропонується опрацювання фахових тем майбутніх спеціалістів з автоматизації, комп'ютерно-інтегрованих технологій та робототехніки різних форм навчання з проекцією на закріплення спеціалізованих лексичних одиниць, граматичних одиниць, розмовного та письмового мовлення у творчих вправах та тестових завданнях.

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Зміст

Introduction

Dear part-time students,

We are glad to welcome you on the long journey into the world of automatization, computer-integrated technologies, and robotics. As you embark on this long voyage of cutting-edge technologies that are used all over the world today, you will require a working knowledge of the English language, including the necessary technical vocabulary, grammar skills, and overall understanding of your field in a foreign language.

The course outlined in this workbook was created as a bridge between your technical expertise and the communication skills required in the modern English-speaking world. English is the primary language of technology, especially computer related technology, as most codebases and their instruction sets are written out almost exclusively in English. It is the language of scientific discourse, research, international collaborations, and career opportunities.

Throughout this course, you will explore a range of topics, from automation systems to robotics, each rich in technical vocabulary critical for understanding and discussing complex concepts. You'll engage in exercises aimed at improving your reading, writing, and oral communication skills, including presenting ideas, debating viewpoints, and articulating technical arguments.

The course begins with foundational topics in computer-integrated technologies to ease you into the terminology and concepts you may already be familiar with, then moving on to some of the more general topics, including operating systems, types of memory, and internet fundamentals, before advancing to more specialized areas such as computational theory and automation languages, both crucial in the fields of robotics and computer-integrated systems. By the end of this guide, you will have

acquired essential vocabulary and communication skills to confidently discuss and engage with topics in automation, computer-integrated technologies, and robotics.

Each of the three modules will have a sample module test at the end, which can be changed to suit your actual progress according to your lecturer’s opinion and expertise. At the end of the guide, you will find an example of a final control test that can be used as a sample of an exam test, as well as a general description of the outlines and aims of this course.

We hope you will have a great time with this course. Best of luck to all the future specialists in the field of automatization, computer-integrated technologies, and robotics!

Module 1 – Foundations of Computer Engineering and Related Technologies

Unit 1: Computer Science, Automation and Robotics

Introduction

Exercise 1: Before reading the article, please read and answer these questions.

1. What does the field of computer sciences encompass?
2. Are computer sciences important in the modern world?
3. What is another name for someone who specializes in computer sciences?
4. What is automation, what is it used for?
5. What is robotics and its applications?

Reading

Computer sciences is a field focused on understanding, designing, and implementing technologies to solve problems. **IT specialists** are trained in **analyzing** and **developing** systems, often using **mathematics** to create logical solutions. They are

also **proficient** in **code** and **software**, which allows them to build, **maintain**, and improve **electronic devices** that serve various functions. Understanding **computer functions** requires knowledge of **physics and electronics**, as these areas help specialists understand how computers operate at a technical level.

To keep systems running smoothly, IT specialists are responsible for **evaluating** and **fixing software** issues, as well as ensuring that all programs work correctly. This role can include **repairing** hardware and updating software to meet the latest technological standards. By carefully **analyzing** systems, they are able to identify areas for improvement and optimize processes for better performance. Their work is crucial for businesses that rely on electronic and computer-based systems.

Exercise 3: Read the text again and determine whether the following statements are true (T) or false (F).

1. IT specialists work with both hardware and software.
2. Computer sciences do not involve any mathematics.
3. Evaluating and fixing software are part of an IT specialist's job.
4. Knowledge of physics is irrelevant to understanding computer functions.
5. Analyzing systems helps specialists maintain and improve electronic devices.

Exercise 4: Name as many items in the following image as you can.

Grammar

Present Simple Tense: *Be*

Pronoun	Affirmative	Negative	Question
I	I am happy (I'm)	I am not happy (I'm not)	Am I happy?
You	You are happy (you're)	You are not happy (aren't)	Are you happy?
We	We are happy (we're)	We are not happy (aren't)	Are we happy?
They	They are happy (they're)	They are not happy (aren't)	Are they happy?
He/She/It	He is happy (he's) She is happy (she's) It is happy (it's)	He is not happy (isn't) She is not happy (isn't) It is not happy (isn't)	Is he happy? Is she happy? Is it happy?

Present simple may use the auxiliary verb 'be' in its 3 forms: **am, are, is**. When 'be' is used in the present simple tense, the sentence describes a **general or personal fact**. For example: *The sun is hot.*

Exercise 5: Put the correct form of the auxiliary verb 'be' in these sentences.

1. The robotics experts ___ ready to present their new project.
2. How many servers ___ there in this data center?
3. She ___ not a skilled programmer yet, but she is learning quickly.
4. Why ___ you still working on that algorithm? It’s almost perfect.
5. They ___ excited about the new updates to the operating system.
6. I ___ impressed by your troubleshooting skills. How did you learn them?
7. There ___ not many bugs in this program; it’s almost flawless!
8. What ___ the specifications of your new computer?
9. Where ___ you planning to install the new software?
10. We ___ not confident about presenting this prototype to the client.

Exercise 6: Using the present simple 'be' form, put together 10 sentences with the words from the vocabulary part of the unit.

Present Simple Tense: Verbs

Pronoun	**Affirmative**	**Negative**	**Question**
I	I work hard.	I don't work hard.	Do I work hard?
You	You work hard.	You don't work hard.	Do you work hard?
We	We work hard.	We don't work hard.	Do we work hard?
They	They work hard.	They don't work hard.	Do they work hard?
He/She/It	He/She/It works hard.	He/She/It doesn't work hard.	Does he/she/it work hard?

Present Simple may use non-auxiliary verbs to create the meaning of **regular action or general fact**. When a regular verb is used in present simple in plural, it remains in its basic form, when the noun or pronoun is singular, the verb gains the ending s.

Exercise 7: Put the correct form of the verb in brackets.

1. I _____ complex algorithms for various projects every week. (write)
2. She _____ on her programming skills by practicing daily. (improve)
3. Mike and Sarah _____ their prototypes carefully before presenting them. (test)
4. The technician often _____ tools when working on circuit boards. (misplace)
5. Jess _____ hardware issues for clients in her spare time. (diagnose)
6. ___ they _____ their tasks efficiently, or do they procrastinate? (complete)
7. He ____ _____ the importance of debugging, which causes frequent issues. (not realize)
8. ___ you always _____ online reviews before buying new hardware? (read)
9. Our team frequently _____ the latest technological advancements. (research)
10. This company _____ innovative software updates every six months. (release)

Exercise 8: Create 5 sentences using regular verbs in Present Simple.

Reading

Exercise 9: Find Present Simple in the following text, write down and translate the new vocabulary.

In **computer science**, **algorithms** are like **recipes** that provide a set of steps to **solve** problems. These **algorithms** guide computers to make calculations or perform tasks accurately and efficiently. They help computers work with **data**, which is raw facts and figures, and turn it into useful **information**. By following these step-by-step processes, computers **store**, **process**, and manage huge amounts of data every day. In programming, **loops** and **conditions** are common tools used in **algorithms**. **Loops** allow a program to repeat certain actions until a goal is reached, while **conditions** help the program decide what actions to take based on specific situations. **Variables** act as storage for information that a program might need to refer to or change as it runs.

Many **websites** use algorithms to provide personalized experiences for users, from social media feeds to online shopping recommendations. Automation, a branch of computer science, also relies heavily on algorithms. **Automation** allows tasks to be performed automatically without human intervention, which is especially useful in business processes and everyday tasks.

Finally, **robotics** combines **algorithms** with **automation** to create machines that can perform complex activities. Robots can follow programmed **recipes** to execute tasks with precision, which is invaluable in fields like manufacturing and healthcare. As technology advances, the role of **algorithms** in **robotics** becomes more crucial, allowing robots to adapt and respond to different environments.

Exercise 10: Read the text again and determine the correct answer.

1. In computer science, algorithms are similar to:

A) Machines

B) Recipes

C) Data

D) Websites

2. Loops in programming allow a program to:

A) Stop immediately

B) Change data permanently

C) Repeat actions until a goal is met

D) Store large amounts of information

3. Variables in a program are used to:

A) Store information that might change

B) Create websites

C) Process raw data

D) Control robots

Vocabulary

Exercise 11: Read the sentences and fill the missing part with the words in the box.

IT specialist, computer sciences, electronic devices, analyzing, programmer, repair, code, software, hardware, algorithms

1. An _____ often helps companies solve technical issues and improve their systems.

2. Many people use _____ like smartphones and tablets every day.

3. _____ involves looking closely at information to understand problems and find solutions.

4. My brother knows how to _____ computers when they stop working.

5. Programmers write _____ to create applications that people use on their phones.

6. _____ needs regular updates to keep it running smoothly and securely.

7. Computers rely on both _____ and software to function properly.

8. Many apps use _____ to perform tasks automatically based on user preferences.
9. We require the help of a good _____, our code is acting up.
10. I am an expert in _____, I know everything there is to know about computers!

Exercise 12: Connect the following words to their meanings.

1. Computer science	Physical components of a computer system.
2. Hardware	The design and operation of robots to perform tasks.
3. Software	Skilled and competent in a particular area or task.
4. Robotics	A professional with expertise in information technology.
5. Algorithm	The study of algorithms, data structures, and computational systems.
6. Proficient	Programs and instructions that run on a computer.
7. Data	A step-by-step procedure for solving a problem or performing a task.
8. IT specialist	Information in a form that can be processed or analyzed.

Speaking

Exercise 13: Discuss how computer sciences play a role in automation and robotics. Think about how knowledge of programming, data processing, and algorithms is applied to make automated systems and robots work effectively.

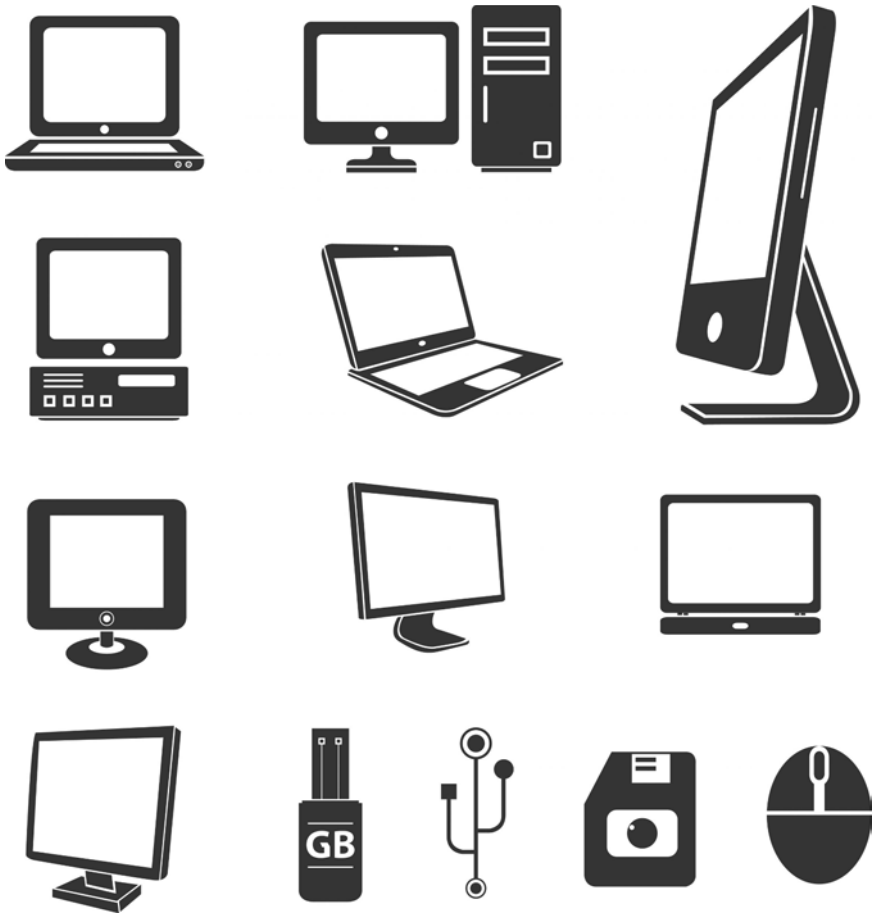
Example:
"Computer sciences are essential in automation because they provide the algorithms that allow machines to perform tasks on their own. For example, in a car manufacturing plant, robots use programmed code to assemble parts without human help. These robots follow specific instructions from computer programs to ensure each step is done correctly, making production faster and more efficient."

Take turns explaining one way computer sciences support automation or robotics in everyday technology. Try to include terms like software, hardware, or electronic devices in your response.

Writing

Exercise 14: Make a text in Present Simple tense about an automation specialist who studies Computer Sciences, write about the troubles and requirements of studying. 7-8 sentences.

Unit 2: Computers



Introduction

Exercise 1: Before reading the article, please read and answer these questions.

1. What kinds of computers can you name?
2. What functions do different computer types perform?
3. Which computers are mobile? Which are stationary?
4. Do you need the same type of skill set for all types of computers?
5. What differences in programs are there between types of computers?

Reading

Exercise 2: Please read the article and translate the words in bold text.

In today's world, computers come in a wide **variety** of forms, designed to meet different needs and purposes. **Stationary** computers, such as a **PC** or **desktop** computer, are typically used at home or in the office. These computers are powerful

and can handle complex tasks. A **supercomputer** or **cluster computer** is a type of **stationary** computer used for highly intensive processing, like scientific research or weather prediction.

On the other hand, **mobile computers** are designed for people who need technology on the go. A **laptop** and **smartphone** are common examples of **mobile computers**; they allow people to work, communicate, and enjoy **leisure** activities from almost anywhere. Another **category** of mobile technology is **wearable devices**, like the **smartwatch**. A **smartwatch** functions as a **wrist watch** but includes additional computer capabilities, allowing users to track health data, receive messages, etc.

Finally, some **computers** are not as visible because they are built into everyday **objects**. These **embedded computers** are found in cars, appliances, and industrial machines, helping these items perform specific tasks. A new, **experimental** type of computer, called a **quantum computer**, is under development to solve problems far beyond the capacity of traditional computers. Although it's still in early stages, the **quantum computer** has the potential to revolutionize how complex data is processed.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Desktop computers are a type of stationary computer.
2. Laptops and smartphones are examples of embedded computers.
3. A smartwatch is adevice that works as a wrist watch with additional functions.
4. Cluster computers are typically used for simple tasks.
5. Quantum computers are an experimental type of computer still in development.

Exercise 4: Connect the following images to their names.

Grammar

Past Simple

The Past Simple Tense is a verb tense used to talk about actions or events that **happened in the past** and are **completed**.

Regular verbs add "**-ed**" to the base form (e.g., walk -> walked), while **irregular verbs** have **unique** past tense forms (e.g., go -> went).

Affirmative Form (Positive): Subject + Past Tense Verb

Negative Form: Subject + Did + Not + Base Form Verb

Question Form: Did + Subject + Base Form Verb?

Pronoun	Affirmative	Negative	Question
I	I walked	I did not walk	Did I walk?
You	You walked	You did not walk	Did you walk?
We	We walked	We did not walk	Did we walk?
They	They walked	They did not walk	Did they walk?
He/She/It	He/She/It walked	He/She/It did not walk	Did he/she/it walk?

Affirmative:

She watched a movie yesterday.

They played soccer last weekend.

Negative:

I did not eat sushi for dinner.

He didn't visit the museum.

Question:

Did you go to the party last night?

Did she finish her homework on time?

Exercise 5: Fill in the blank parts of the sentence using the word in brackets in the Past Simple tense.

1. Yesterday, I _____ a new operating system on my computer. (install)
2. You _____ a great presentation about AI at the conference. (give)
3. She _____ her laptop after it stopped working suddenly. (repair)
4. The engineers _____ the problem with the hardware quickly. (solve)
5. When I was younger, I _____ about robotics in a science magazine. (read)
6. This professor _____ us how to debug code efficiently. (teach)
7. Where _____ you _____ the program you downloaded? (save)
8. The team _____ multiple experiments to test the robot's stability. (conduct)
9. This device _____ my favourite gadget until it broke last year. (be)
10. That course about programming _____ me the basics of computer languages. (show)

Present Perfect

The **Present Perfect Tense** is a verb tense used to describe actions or events that have a **connection to the present**, even though they occurred in the past.
Formed with the auxiliary verb "**have**" or "**has**" (depending on the subject) and the past participle of the main verb.
Affirmative Form (Positive): Subject + Have/Has + Past Participle Verb
Negative Form: Subject + Have/Has + Not + Past Participle Verb
Question Form: Have/Has + Subject + Past Participle Verb?

Pronoun	Affirmative	Negative	Question
I	I have eaten	I have not eaten	Have I eaten?
You	You have walked	You have not walked	Have you walked?
We	We have traveled	We have not traveled	Have we traveled?
They	They have studied	They have not studied	Have they studied?
He/She/It	He/She/It has seen	He/She/It has not seen	Has he/she/it seen?

Affirmative:

She has visited Paris several times.

They have completed the project.

Negative:

I have not read that book yet.

He hasn't finished his assignment.

Question:

Have you ever been to Japan?

Has she met the new manager?

Exercise 6: Transform the following sentences from Past Simple into Present Perfect.

1. I went to the park yesterday
2. I played computer games all night a week ago.
3. They did not see the sign.
4. They taught us how to make this code.
5. He gave his friend the best piece of cake.

Exercise 7: Determine which of the following sentences is in the Past Simple Tense and which is in the Present Perfect Tense.

1. I knew this was a very bad idea.
2. I have told you before that your computer is terrible at digital computing.
3. We have spoken before about this smartwatch, have we not?
4. There were not many people who knew i always played video games.
5. I sat by her as she explained what an embedded computer was.

Reading

Exercise 8: Read the text and translate the words in bold text. Transform 5 Present Simple sentences into the Past Simple Tense, or, if possible Present Perfect.

Analog computers and **digital computers** are two fundamental types of computing systems. **Analog computers** work with **continuous signals**, meaning they process data in a continuous flow, often representing values that vary smoothly over time.

These computers are less common today but still find use in specialized fields like scientific simulations and engineering where real-world variables, such as temperature or speed, change continuously. They often rely on **analog sensors** to measure these continuous values and convert them into signals the computer can use.

In contrast, **digital computers** process **discrete signals** and use **binary code**—a system of 0s and 1s—to represent data. Most computers we encounter daily, like PCs, laptops, and smartphones, are digital. These computers handle everything from basic calculations to complex tasks such as running software programs, streaming videos, and supporting online communication. Digital computing is more common because it offers higher precision and consistency, making it ideal for most personal and business applications.

There are also **hybrid computers**, which combine features of both analog and digital systems. Hybrid computers can process both continuous and discrete data, making them valuable in environments like hospitals, where they might monitor patients with analog sensors while also using digital components to store and analyze patient records. This combination allows hybrid computers to provide real-time responses while maintaining accurate data records.

Among digital computers, there are different types designed for specific functions. **Mainframe computers** and **minicomputers** are commonly used by large organizations for data processing and storage. Mainframes are extremely powerful, capable of handling large volumes of transactions simultaneously, while minicomputers are smaller but still serve multiple users, often within a specific department of a company. Meanwhile, **workstation computers** are often chosen by professionals in fields like **3D modeling** and **graphic design** because they offer high processing power and advanced graphic capabilities suited to creative and technical work.

Exercise 9: Read the text again and determine whether the following statements are True (T) or False (F).

1. Analog computers use continuous signals to process data.
2. Digital computers rely on binary code, represented by 0s and 1s, to handle information.
3. Hybrid computers are only used in digital data processing.
4. Mainframe computers are designed to handle large volumes of transactions at once.
5. Workstation computers are popular for tasks like 3D modeling and graphic design.

Vocabulary

Exercise 10: Please fill in the blanks with the most appropriate word from the box.

stationary, embedded, mobile, laptop, supercomputer, smartwatch, analog, mainframe, workstation, hybrid

1. I have worked with many _____ computers inside vehicles.
2. I have never seen a more useful piece of technology than this _____ on my wrist.
3. I often work with _____ computers, they're incredibly complex, because they combine features of two different types of machines.
4. _____ computers are exceptional at measuring real world data.
5. My home PC can be considered a _____ computer, even though it isn't.
6. I bring my _____ everywhere, it's so useful to have a computer always on hand.
7. A smartphone is just a small, _____ computer.
8. Nasa uses _____ to put people on the moon.
9. That _____ computer is pretty big, isn't it? Its database must be huge.
10. I often 3D model using my _____ at the office, but i also do it at home sometimes.

Speaking

Exercise 11: Imagine you are giving a presentation to your classmates about the different types of computers.

Describe each type briefly and give an example of where it is used. Use the example sentences below as a guide for structuring your presentation.

First, we have analog computers…

Next, digital computers are the most common type…

There are also hybrid computers…

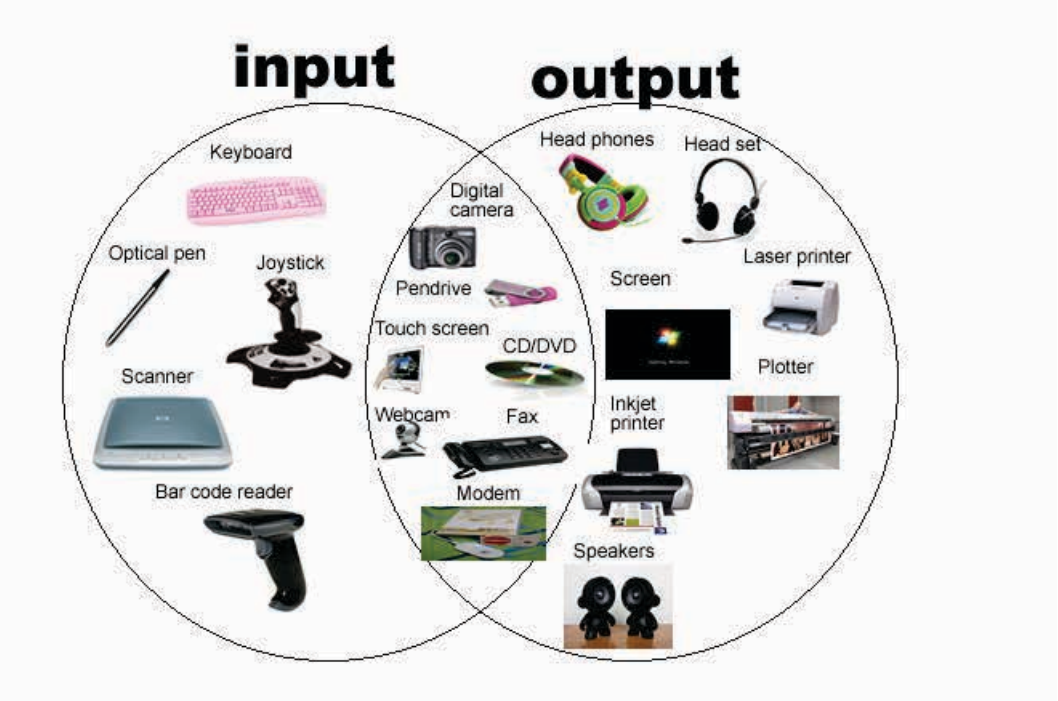
Now, let's talk about mainframe computers…

Finally, workstation computers…

Writing

Exercise 12: Please write 8-9 lines of dialogue between two friends, talking excitedly about new tablets and smartphones, and the differences between them.

Unit 3: Input/Output Devices



Introduction

Exercise 1: Before reading the text, please answer the following questions:

1. What is an I/O device?
2. Look at the image above and translate the devices listed.
3. What are I/O devices used for?
4. What are the types of I/O devices?
5. Which I/O devices have you personally connected to a computer?

Reading

Exercise 2: Read the text and translate the words in bold text.

In computer systems, **input and output devices** play **crucial roles** by allowing users to interact with technology and **perceive** information. **Monitors** are one of the most common output devices, providing visual feedback for tasks ranging from simple text reading to complex **video editing**. Early monitors used **cathode-ray tube** technology, which was bulky and less efficient. Today, most monitors use **liquid crystal display**

(LCD) technology, which is **energy-efficient** and provides clear, bright images suitable for professional work or home use.

Headphones are another important type of output device, offering **audio output** for personal listening. They come in different styles, such as **over-ear**, **on-ear**, and **in-ear**, depending on user preference and comfort. Headphones can also be **wired** or **wireless**, with **audiophiles** often preferring **high-end** models for superior sound quality. Wireless options have become increasingly popular due to their convenience, while wired versions are still favored by some for their stable connection and sound fidelity.

Microphones serve as an essential input device, allowing users to provide **feedback** through spoken communication. Many laptops and smartphones come with **built-in** microphones, which are ideal for casual use, such as video calls or voice memos. For professional use, however, external microphones are preferred as they offer higher sound quality. These devices are widely used in settings like podcasting, streaming, and recording music, where clarity and detail are critical.

Both headphones and microphones can have specialized features tailored for different needs. For instance, **high-end** headphones provide clear sound for **audiophiles** who appreciate deep, rich audio, while professional microphones reduce background noise to capture only the speaker's voice. By using these devices effectively, users can enhance their listening and recording experiences, whether for personal enjoyment or professional tasks.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Monitors are input devices used to provide visual feedback for tasks.
2. Liquid crystal display technology is more energy-efficient than cathode-ray tube technology.
3. Over-ear, on-ear, and in-ear are different styles of headphones.
4. Wired headphones are generally preferred over wireless options for their

convenience.

5. High-end headphones and professional microphones are often chosen for high-quality audio experiences.

Exercise 4: Name the following input/output devices and describe what they do when in contact with a computer.

Grammar

Articles

Articles are small words in the English language that are used before nouns to specify whether the noun is referring to something specific or something non-specific. There are **three** main types of articles: "the" (definite article), "a" or "an" (indefinite articles) and "zero article".

Indefinite Articles "a" and "an":

"A" and "an" are used when you are referring to a **non-specific** or **generic thing**.

Examples:

"I saw a cat in the garden." (referring to any cat, not a specific one)

"She bought an apple." (referring to any apple, not a specific one)

When to Use "a" vs "an":

Use "a" before words that begin with **consonant** sounds (e.g., a book, a dog, a car).
Use "an" before words that begin with **vowel** sounds (e.g., an apple, an umbrella, an hour).

Definite Article "the":

"The" is used when you are referring to a **specific** or **particular thing** that both the speaker and the listener are aware of or have in mind.

Examples:

"I saw the cat in the garden." (referring to a specific cat that both the speaker and the listener know)

"Please pass me the book." (referring to a specific book that is known to both the speaker and the listener)

Zero Article:

Sometimes, no article is used before a noun. This is known as the "zero article."
Used for **general statements** or when the noun is considered a category or concept.
Used with **proper nouns** (names of specific people, places, or things).

Examples:

"Cats are cute animals." (referring to cats in general)

"London is a beautiful city." (using the name of a specific city, London)

"I saw Mary at the park." (using the name of a specific person, Mary)

Exercise 5: Please fill in the gaps with the proper article (a, an, the, zero)

1. I am very happy that _____ monitors i requested have arrived.
2. There is no way I am going to use _____ CRT monitor in 2023.
3. _____ LCD type of monitor is more efficient and useful than _____ CRT type.
4. I wear _____ headphones in order to have privacy with my music.
5. There are many advantages to having _____ good, separate microphone, but most gamers prefer built-in microphones.

Exercise 6: Please choose which article fits the following sentences best.

1. I am very happy to have _____ LCD monitor.

A. a

B. an

C. the

D. zero

2. Video editing is incredibly important, thus you must choose _____ best monitor money could buy.

A. a

B. an

C. the

D. zero

3. There is no chance I will ever choose _____ wrong headphones, I just know it.

A. a

B. an

C. the

D. zero

4. Why would I ever want to have _____ built-in microphone?

A. a

B. an

C. the

D. zero

5. There is _____ big difference between in-ear headphones and on-ear headphones.

A. a

B. an

C. the

D. zero

Reading

Exercise 7: Read the excerpt and translate the words in bold text.

Keyboards are one of the primary input devices for computers, allowing users to type information and commands. The most common layout is the **QWERTY**

keyboard, named after the first six letters on the top row. However, there are other layouts like **AZERTY**, used mainly in French-speaking countries, and **DVORAK**, designed to increase typing speed and reduce strain. Keyboards often include **function keys** and **multimedia controls** that make it easier to adjust volume, skip songs, or even open specific applications directly.

Alongside keyboards, **mice** and **touchpads** are essential tools for interacting with a computer's **graphical user interface (GUI)**. Mice allow users to point, click, and select items on the screen, making it easy to **interact** with files, applications, and web pages. **Touchpads** serve the same function as mice but are typically built into laptops. Both tools help users navigate digital environments quickly and effectively, making them essential for everyday computer use.

Printers and **scanners** are output and input devices that bridge the digital and physical worlds. Printers, like **inkjet**, **laser**, and **dot matrix printers**, produce physical copies of documents, photos, and more. **Inkjet** printers are common for home use, while **laser** printers are often found in offices due to their speed and efficiency. Scanners, on the other hand, allow for **digitizing** documents and **archiving** photos. By converting physical items into digital files, scanners help users preserve important paperwork and memories in a format that can be stored, shared, and easily accessed on a computer.

Exercise 8: Please answer the following questions according to the excerpt.

1. The QWERTY keyboard layout is named after:

A) Its inventor's name

B) The first six letters on the top row

C) Its ease of use

D) The country of origin

2. AZERTY and DVORAK are examples of:

A) Printer types

B) Keyboard layouts

C) Types of scanners

D) Multimedia controls

3. Touchpads are typically found on:

A) Desktops

B) Printers

C) Laptops

D) Smartphones

Vocabulary

Exercise 9: Please fill in the blanks with the most appropriate words from the box.

monitors, video editing, audiophile, CRT, QWERTY, GUI, printer, archiving, touchpad, built-in

1. Last night, I used two _____ to work on my project because I needed extra screen space.
2. She finished her _____ project yesterday and was happy with the final product.
3. As an _____, he was thrilled when he received a high-quality sound system for his birthday.
4. My parents used an old _____ monitor when they first bought a computer; it was big and heavy.
5. He taught himself to type on a _____ keyboard, which he found quite different from his phone's layout.
6. The first time I used a _____, it was surprising how easy it was to click on icons to open programs.
7. The _____ ran out of ink when I tried to print my assignment last night.
8. Last year, she started _____ family photos, scanning and saving them on her computer for safekeeping.
9. I accidentally disabled the _____ on my laptop and had to use an external mouse.

10. My new laptop came with a _____ microphone, so I didn’t need to buy an external one for video calls.

Speaking

Exercise 10: Please talk about different input and output devices you have used in the past. Describe each device briefly, explain how you used it, and mention any experiences you had with it.

"I used an older CRT monitor when I was younger, but ..."

"I remember using a printer last year to print out a ...."

"On my first laptop, I had a touchpad that sometimes ...

"I learned to type on a QWERTY keyboard, and at first, I found it difficult, but ..."

"I used over-ear headphones for listening to music when I was ..."

"Last year, I used a scanner to digitize some old photos for ..."

Writing

Exercise 11: Please write 8-9 sentences about the pros and cons of different types of I/O devices and other types of periphery.

Unit 4: Storage Devices

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is a storage device?
2. What are storage devices used for?
3. What are the types of storage devices?
4. What kinds of storage devices were used before modern day?
5. Are modern storage devices different from the ones used in the past?

Reading

Exercise 2: Read the text and translate the worlds in bold text.

The history of **storage devices** is a fascinating journey through technological innovation, from early mechanical systems to today's digital solutions. One of the first **options** for storing information was the **punched card**, which was widely used in the 19th and early 20th centuries. Punched cards allowed computers to **represent** data by using a series of holes punched in specific positions. These cards were crucial

for early **data processing** and **programming**, as they enabled computers to interpret and **manipulate** information systematically.

With advancements in technology, **magnetic tape** emerged as a popular storage medium in the 1950s. This method allowed **sequential data access**, meaning information was read or written in a specific order. Magnetic tape was ideal for large-scale data storage but was slower than later methods for direct access. In the following decades, the **hard disk drive (HDD)** revolutionized storage by allowing direct access to data. Alongside HDDs, **floppy disks** became popular for personal data storage, offering portability and ease of use for early computer users.

The 1980s and 1990s introduced **optical** storage options like **Compact Discs (CDs)** and **Digital Versatile Discs (DVDs)**. These discs used laser technology to read and write data, providing more durability and capacity compared to floppy disks. **Blu-ray** discs, a later **optical** storage development, offered even greater storage capacity, allowing users to store high-quality videos and extensive files.

In more recent years, **solid-state drives (SSDs)** and **flash memory** have transformed data storage. Unlike traditional HDDs, SSDs have no moving parts, which makes them faster and more durable. **USB drives** are a common form of flash memory, providing users with portable, convenient storage for personal data. These devices offer reliable storage without the need for sequential access, making them a preferred choice for quick data transfers.

Today, **cloud storage** represents a major shift in how data is stored and accessed. Instead of relying on physical devices, users can store their data on remote servers accessible through the internet. This innovation allows individuals and businesses to store massive amounts of data securely and retrieve it from anywhere. From **punched cards** to **cloud storage**, the evolution of storage devices continues to shape how we manage and access information.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Punched cards were one of the first storage options and allowed computers to represent data.
2. Magnetic tape offered random data access, making it very fast.
3. Hard disk drives (HDDs) introduced direct access to data.
4. Compact Discs (CDs) and Digital Versatile Discs (DVDs) are types of optical storage.
5. Cloud storage requires physical devices to store data locally.

Exercise 4: Name the storage devices in the following image, try to name storage devices that do not appear in the image.

Grammar

Degrees of comparison: Adjectives

Adjectives in English can have different degrees of comparison, which allow us to describe the level or extent of a quality or characteristic. There are three main degrees of comparison for adjectives: positive, comparative, and superlative. They use different methods to create their forms, depending on how many syllables there are in the adjective.

Monosyllabic (1 syllable) adjectives are compared with the endings "-er, -est".

positive	**comparative**	**superlative**

strong	strong**er**	the strong**est**
small	small**er**	the small**est**
late	late**r**	the late**st**
nice	nice**r**	the nice**st**
big	bigge**r**	the bigge**st**
thin	thinne**r**	the thinne**st**
fat	fatte**r**	the fatte**st**

Disyllabic (2 syllables) adjectives ending with "y, er, ow, le" are compared with "-er, -est". With the ending "-y" turning into "-ier, -iest".

positive	**comparative**	**superlative**
eas**y**	eas**ier**	the eas**iest**
happ**y**	happ**ier**	the happ**iest**
clever	clever**er**	the clever**est**
narrow	narrow**er**	the narrow**est**

All other adjectives are compared with **more, the most**.

positive	**comparative**	**superlative**
careful	**more** careful	**the most** careful
expensive	**more** expensive	**the most** expensive
difficult	**more** difficult	**the most** difficult
tired	**more** tired	**the most** tired
terrible	**more** terrible	**the most** terrible

There are also several words which use irregular comparison forms:

positive	**comparative**	**superlative**

good	better	the best
bad	worse	the worst
much	more	the most
many	more	the most
little	less	the least

We use the **second degree of comparison** in order to compare things between each other, for example:

My dress is **more beautiful** than yours.

This cat is **faster** than my friend's.

We use the **third degree of comparison** in order to say that something is the best in some way, described by the adjective, for example:

My dress is **the most beautiful**.

This cat is **the fastest**.

Exercise 5: Please put the word in brackets into the proper form.

1. SSDs are a lot _____ than CDs and DVDs. (fast)
2. USBs are the _____ form of portable data storage. (useful)
3. Floppy disks are much _____ than magnetic tape. (good)
4. There is no denying the fact that a DVD is _____ than a CD. (spacious)
5. Some computers use their storage devices in a _____ way than others. (efficient)
6. A CD is _____ than a floppy disk, but a DVD is _____. (good, useful)
7. He uses punched cards for data processing _____ than for programming (often)
8. Cloud storage is _____ type of storage for programmers, but SSDs and HDDs are _____ . (useful, widespread)
9. There are many types of RAM, each has a _____ name than the last. (long)
10. DDR5 is _____ than DDR4. (rare)

Exercise 6: Please choose the most fitting option to complete the following sentences.

1. He went home without ever choosing which type of memory storage is _____.

A. the best

B. the goodest

C. the betterest

D. gooder

2. QWERTY keyboards are much _____ than any other type.

A. more common

B. commoner

C. commonest

D. more commander

3. A mouse is _____ for many people than a touchpad.

A. comfortabler

B. the most comfortable

C. comfortable

D. more comfortable

4. The history of memory storage is much _____ than the history of the mouse.

A. interesting

B. interestinger

C. most interesting

D. more interesting

5. A built-in microphone is _____ way to talk in online chats.

A. cheaper

B. the cheapest

C. more cheaper

D. cheapest

Exercise 7: Please write down the degrees of comparison for the following adjectives:

fast, private, incredible, experienced, stupid, easy, little, refreshing, volatile, comfortable, floppy

Reading

Exercise 8: Read the text and translate the words in bold text. Find and write down all degrees of comparison of adjectives used here.

Random Access Memory (RAM) is a key component in modern computers, responsible for temporarily storing data that a computer needs to access quickly. **RAM** is known as a **volatile** type of memory, which means it loses all stored information once the computer is **powered off**. Unlike permanent storage, such as a hard drive, **RAM** allows the system to quickly access active data, making it essential for running programs smoothly.

One common type of **RAM** is **DRAM (Dynamic Random Access Memory)**. DRAM is widely used due to its high **capacity** and **affordability**, although it requires continuous **refreshing** to **maintain** the data it holds. This means that the system must frequently recharge DRAM cells to keep the data stable. Despite this limitation, DRAM is efficient for general computing tasks and is found in most desktop and laptop computers.

Another type of **RAM** is **SRAM (Static Random Access Memory)**, which does not need the constant **refreshing** that DRAM requires. This type of memory uses a different internal structure to store data, making it faster and more reliable. However, **SRAM** is also more expensive and has a smaller **capacity** compared to **DRAM**, so it is typically used in smaller quantities, such as in cache memory within CPUs.

A popular version of DRAM in modern computers is **DDR SDRAM (Double Data Rate Synchronous Dynamic Random Access Memory)**, which improves performance by allowing data transfers to be **synchronized** with the computer's **bus speed**. DDR SDRAM has evolved through several generations, including **DDR3**, **DDR4**, and the newest version, **DDR5**. Each generation increases the **data transfer rate** and efficiency, with DDR5 offering the highest speeds and most energy efficiency among them.

For special applications, some computers use **ECC RAM (Error-Correcting Code RAM)**, which automatically detects and corrects minor **errors** in data. ECC RAM is

especially important in servers and scientific computers, where data accuracy is critical. While it is more expensive than standard RAM, ECC RAM adds an extra layer of reliability.

Another variation is **LPDDR (Low-Power Double Data Rate Synchronous Dynamic RAM)**, designed specifically for mobile devices. LPDDR uses less power than regular DDR RAM, helping to extend battery life in smartphones, tablets, and laptops. Although it is not as powerful as desktop RAM, LPDDR is effective in balancing **capacity** and power efficiency for portable electronics.

Exercise 9: Please answer the following questions according to the excerpt.

1. Which type of RAM requires constant refreshing to maintain data?

A) SRAM

B) DRAM

C) ECC RAM

D) LPDDR

2. DDR SDRAM improves performance by synchronizing with the computer's:

A) Data transfer rate

B) Error-correcting code

C) Bus speed

D) CPU

3. What type of RAM is commonly used in mobile devices due to its low power consumption?

A) ECC RAM

B) LPDDR

C) DDR5

D) DDR3

Vocabulary

Exercise 10: Please connect the following abbreviations with their full forms.

HDD	Random Access Memory
CD	Solid-State Drive
DVD	Compact Disc

SSD	Static Random Access Memory
RAM	Low-Power Double Data Rate Synchronous Dynamic RAM
DRAM	Error-Correcting Code Random Access Memory
SRAM	Double Data Rate Synchronous Dynamic Random Access Memory
DDR SDRAM	Dynamic Random Access Memory
ECC RAM	Digital Versatile Disc
LPDDR	Hard Disk Drive

Speaking

Exercise 11: Please act out a presentation about various types of memory storage, when they were created and the approximate amount of memory they can hold in the modern day.

I would like to introduce the topic of...

The history of memory storage is...

In the 1950s...

In the modern day...

RAM has a variety of different types, such as…

Writing

Exercise 12: Please write a short text (8-9) sentences explaining how memory affects artificial intelligence and robotics as concepts, and why memory is important for them.

Unit 5: Hardware Overview

Introduction

Exercise 1: Before reading the text, answer the following questions.

1. What is a computer's shell called, why is it important for any kind of machinery?
2. What are the types of hardware that can be inside of a computer case?
3. Which of these types of hardware are the most important?
4. Which of them are also vital for automation and robotics?
5. Do different types of computers use different hardware?

Reading

Exercise 2: Read the text and translate the words in bold text.

In a computer, certain pieces of **essential hardware** work together to ensure smooth performance. The **motherboard** is one of the most important parts, acting as a hub that connects all other components. It houses various slots and connectors, including **USB ports** and **audio jacks** that allow external devices to connect to the system. The **motherboard** also contains pathways that enable data to flow between the **CPU**, memory, and storage, making it a **critical component** for overall functionality.
The **CPU (Central Processing Unit)** is often considered the brain of the computer. It handles most of the **data processing** tasks and executes instructions needed to run programs. The **CPU** works with the **GPU (Graphical Processing Unit)**, which is responsible for **rendering** images and graphics. While some CPUs come with **integrated graphics** that can handle basic visual tasks, more demanding applications, like gaming or video editing, benefit from a dedicated **GPU**. Together, the **CPU** and **GPU** determine how well a computer can manage complex tasks and produce smooth visuals.

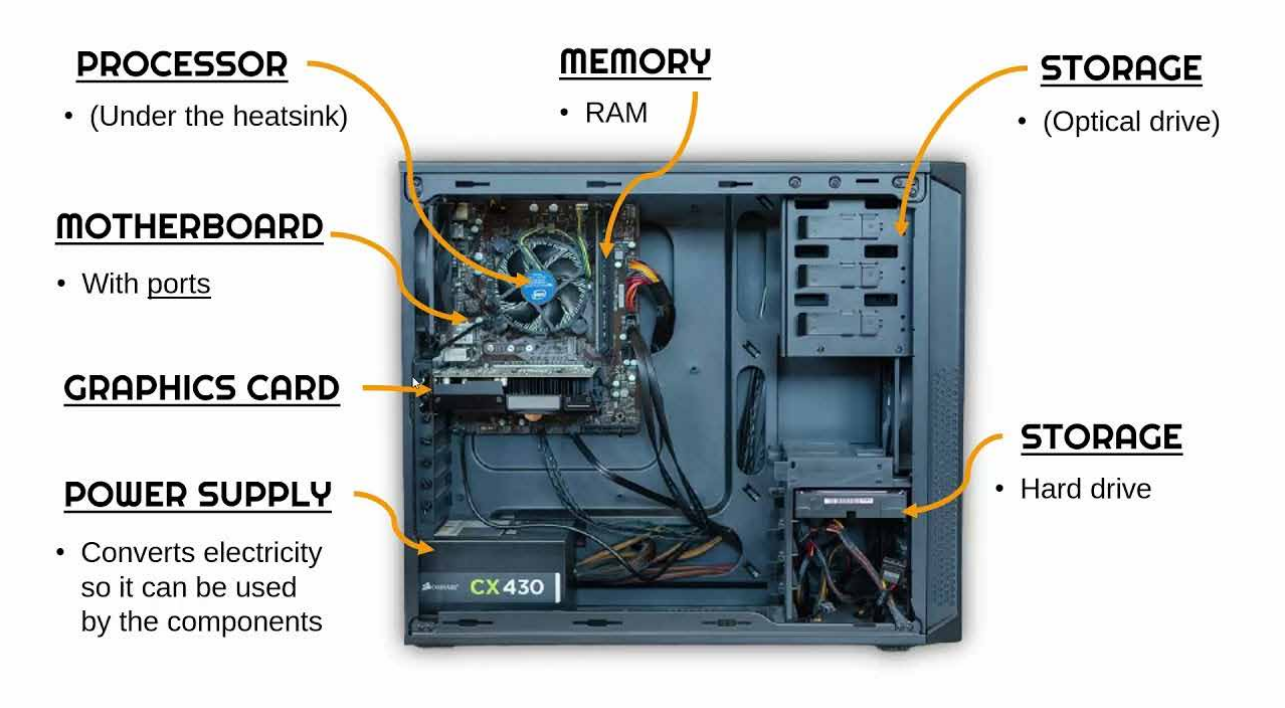
The **PSU (Power Supply Unit)** is another **critical component** of a computer, as it supplies the necessary power to each part. The **PSU** converts electricity from an outlet into a usable form and distributes it across the system based on each component's **wattage** requirements. Choosing the correct **wattage** for a **PSU** is crucial; if the power supply is too weak, the computer may not run efficiently or could even shut down unexpectedly.

Finally, **USB ports** and **audio jacks** provide connectivity options that are essential for everyday use. **USB ports** allow the connection of peripherals like keyboards, mice, and external drives, while **audio jacks** enable the use of headphones or speakers for sound output. These input and output options are part of what makes the **motherboard** so valuable, as they allow users to expand their computer's capabilities by easily adding external devices. Altogether, these **essential hardware** components work in unison to create a functional and powerful computing system.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. The motherboard acts as a hub, connecting all the essential hardware components.
2. The CPU is solely responsible for rendering images and graphics.
3. Integrated graphics can handle basic visual tasks without a separate GPU.
4. The PSU must match the correct wattage for the system to run efficiently.
5. Audio jacks and USB ports are typically found on the motherboard.

Exercise 4: Place the items inside the case in the following image in proper order of installation.



Grammar

Pronouns, personal and possessive pronouns

Pronouns are words that replace nouns in sentences to avoid repetition and make the language more concise and clear. There are various types of pronouns, including personal pronouns of subject, object and possessive.

Subject pronouns	Object pronouns	Possessive pronouns
I	Me	Mine

You	You	Yours
We	Us	Ours
They	They	Theirs
He	Him	His
She	Her	Hers
It	It	Its

Subject pronouns are used as the subject of the sentence, usually in the first position.
"**I** am happy"
Object pronouns are used as the object of the sentence, usually after the main parts of the sentence.
"I want to talk to **you**."
Possessive pronouns are often accompanied by possessive adjectives, which are formed from regular pronouns much like possessive pronouns. Whereas possessive pronouns are used individually, relying on context to complete their meaning, possessive adjectives require the use of a noun immediately after.

Possessive pronouns	**Possessive adjective**
Mine	My
Yours	Your
Ours	Our
Theirs	Their
His	His
Hers	Her
Its	Its

I ate my **food** slowly, but you ate all of **yours** quickly. (we use the possessive pronoun to avoid repeating the word 'food')

Exercise 5: Please put the appropriate pronoun forms in the missing parts of the following sentences:

1. _____ CPU is much better than his, but he might have a better GPU. (I)

2. The cat put _____ paws on _____ PSU, good thing it was powered down. (it, I)

3. She bought _____ keyboard on sale, I bought _____ full price. (she, I)

4. My computer case has many USB ports, _____ doesn't. (you)

5. There are many people who use CRT monitors, _____ computers must be very old. (they)

Exercise 6: Please choose the appropriate pronouns:

1. There are many ways I could use the RGB lighting here, but I don't want _____ computer to be too bright.

A. mine

B. my

C. I

D. me

2. When were _____ going to tell me you got a new GPU?

A. your

B. yours

C. you

D. you're

3. This monitor is _____, but that one is _____.

A. my, yours

B. mine, your

C. my, your

D. mine, yours

4. She built this PC with _____ own hands, it is _____.

A. she, her

B. hers, her

C. her, hers

D. hers, she

5. The statistics show that there are many people who consider _____ computers sentient.

A. there

B. there's

C. theirs

D. their

Reading

Exercise 7: Read the text, translate the words in bold text. Find every use of personal pronouns in this text and explain them.

When you first **embarked** on your PC-building **journey**, you probably didn't realize the range of choices available, from basic components to advanced, **non-standard hardware**. I remember when I helped a friend build his PC, he wanted it to stand out. We looked into **RGB LED** lighting for the case, which added a lot of visual appeal. Not only did it enhance the **aesthetics**, but it also allowed for a level of **personalization** that made the build unique. The end result was **mesmerizing**, with lights that changed colors in sync with his games, creating an immersive experience. We also discussed **cooling solutions** early on. Initially, we considered **fans**, which are reliable and generally easy to install, but they can be noisy under a heavy workload. My friend was interested in something more efficient, so we looked at a **liquid cooling system**. This option kept the CPU cooler, and the tubes filled with liquid gave his PC a **science fiction** vibe. The case we chose was **transparent**, which allowed the cooling system and RGB lighting to shine through, adding to the futuristic look.

For sound, we debated between using a dedicated **sound card** or relying on **onboard audio**. Since he planned to use his computer for music production, we opted for a high-quality sound card, which provided clearer audio and more output options. The investment in sound quality really paid off, as it elevated his entire experience beyond

what **onboard audio** could offer. It was a choice that he appreciated whenever he edited or listened to audio files.

Another element he wanted was a **secondary display**. His **primary display** served as his main monitor for gaming and work, while the secondary screen displayed system **statistics** and notifications. It became a **marquee** for real-time data, showing everything from CPU usage to chat notifications. This setup helped him stay organized and monitor his PC's performance without interrupting his primary tasks.

Finally, with all the customized components, his PC truly looked like a masterpiece. The RGB lighting, **cooling solution**, and personalized details made it one of a kind. Building a PC isn’t just about functionality; it’s about creating something that reflects your style and purpose. I highly recommend taking time to think about each part carefully, especially if you want a setup that’s both powerful and visually stunning.

Exercise 8: Please answer the following questions according to the text.

1. What initial cooling solution was considered before switching to liquid cooling?

A) Transparent case

B) Onboard audio

C) Fans

D) RGB LED

2. Why was a sound card chosen over onboard audio?

A) For improved cooling

B) To increase statistics display

C) For better audio quality

D) To match the RGB lighting

3. The secondary display primarily showed:

A) System statistics and notifications

B) RGB lighting options

C) Aesthetic features

D) Primary gaming screen

Vocabulary

Exercise 9: Please use the following words with their synonyms or non-abbreviated forms.

CPU	customization
GPU	go
PSU	unusual
critical	audio card
non-standard	water cooling
embark	graphics card
liquid cooling	processor
sound card	cooler
cooling solution	vital
personalization	power supply

Speaking

Exercise 10: Please act out a conversation between two friends about what kinds of main and additional hardware they installed in their PCs.

Hey, what kind of GPU did you...?

I installed a...

I got a cool cooler...

For non-standard hardware, I installed...

My sound card/liquid cooler/RGB is…

Writing

Exercise 11: Please write a text (10 sentences) about the benefits of non-standard hardware in a computer, and how these types of hardware can be used in robotics.

Module 1 Test

Task 1 - Translate the following sentences into Ukrainian.

1. The motherboard connects all the essential hardware components in a computer.
2. RAM allows data to be quickly accessed but loses data when powered off.
3. Liquid cooling provides efficient cooling and give the computer a sci-fi look.
4. RGB lighting can be customized to create a mesmerizing effect inside the case.
5. Solid-state drives are faster than hard disk drives and have no moving parts.

Task 2 - Fill in the gaps.

1. The CPU is the _____ that processes data in the computer.

A. GPU B. motherboard

C. power supply D. brain

2. RAM is a type of _____ memory, which is used for quick access.

A. permanent B. sequential

C. volatile D. stable

3. Magnetic tape is used for _____ data access, reading data in a specific order.

A. random B. dynamic

C. sequential D. integrated

4. CDs and DVDs, use _____ technology to read and write data.

A. mechanical B. laser

C. sound D. touchscreen

5. The PSU provides power to components based on their _____ requirements.

A. aesthetics B. wattage

C. graphics D. resolution

6. Integrated graphics are often enough for basic tasks but not for advanced _____.

A. coding B. audio output

C. video editing D. display settings

7. USB ports and audio jacks are typically found on the computer's _____.

A. monitor B. sound card

C. motherboard D. cooling solution

8. Cloud storage allows users to save data on ____ servers instead of local devices.

A. integrated B. volatile

C. remote D. sound

9. ECC RAM is used in applications where _____ correction is essential.

A. temperature B. error

C. graphics D. sequence

10. The secondary display can act as a ____ for system statistics and notifications.

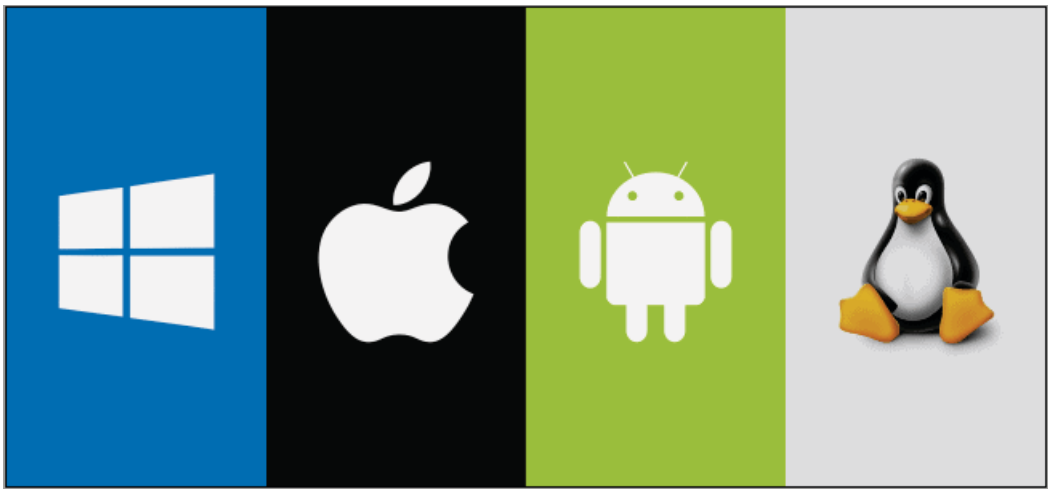
A. keyboard B. marquee

C. fan D. hub

Task 3 - Write a dialogue between two computer engineers, arguing whether HDD storage is better than SSD storage (12 lines of dialogue).

Module 2 – Internet, Operating systems, and Security

Unit 6: Operating systems



Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What are operating systems
2. What are some of the operating systems that you know of?
3. Which operating system do you prefer?
4. What are the differences between these systems?
5. Is an operating system required to work with a computer or computer-like machinery?

Reading

Exercise 2: Read the text and translate the words in bold text.

When it comes to automation, choosing the right **operating system (OS)** is a critical step. The **interface** of the OS plays a key role in how users interact with the system, and its capabilities must align with the specific demands of automation tasks. **Microsoft Windows** is a popular choice for many, thanks to its widespread **familiarity** and extensive **software compatibility**. This OS is commonly used in both personal and **enterprise environments**, making it a versatile option for various applications in automation.

For those seeking flexibility and customization, **Linux** is an excellent alternative. As an **open-source** OS, Linux allows users to modify and tailor the system to their needs. There are many **distros** (distributions) to choose from, such as **Ubuntu**, **Fedora**, and **CentOS**, each offering unique features. Ubuntu, for example, is user-friendly and well-suited for beginners, while Fedora focuses on cutting-edge software, and CentOS is popular in servers and automation for its stability and performance.

MacOS, developed by **Apple** for its **Macintosh** line of computers, is known for its **sleek** design and **seamless** integration with other Apple devices. While not as common in automation as Windows or Linux, **MacOS** can be a solid choice for creative professionals working on automation projects that involve design or multimedia tasks. Its smooth operation and reliable performance make it appealing to users who value aesthetics alongside functionality.

For lightweight and **web-centric** tasks, **Chrome OS** by **Google** is another option. Designed for **Chromebooks**, this **cloud-based** OS is ideal for users who rely on online applications and storage. Although it is more limited in software support than other systems, Chrome OS excels in simplicity and speed, making it a good choice for basic automation tasks that are primarily conducted online.

Finally, systems like **Unix**, **FreeBSD**, and **Solaris** are prevalent in specialized and high-level automation environments. Unix and its derivatives provide robust features for managing servers and running automation scripts. Additionally, mobile operating systems like **iOS** and **Android** are increasingly integrated into automation processes, especially in controlling IoT (Internet of Things) devices and mobile-centric systems. With so many options available, understanding the strengths of each OS helps ensure that the chosen system matches the needs of the automation project.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F):

1. Microsoft Windows is commonly used in enterprise environments because of its software compatibility.
2. Linux is an open-source OS with no available distributions.
3. MacOS is known for its sleek design and seamless integration with Apple devices.
4. Chrome OS is primarily cloud-based and designed for web-centric tasks.
5. Unix-based systems like FreeBSD are popular for managing servers and running automation scripts.

Exercise 4: Tell what you know of the operating systems in the following image.

Grammar

Past Continuous

The Past Continuous, also known as the Past Progressive, is a verb tense used to describe actions or events that were ongoing or in progress at a specific point in the past.

Formed with the past tense of the auxiliary verb "to be" (was/were) and the base form of the main verb with "-ing" added.

Affirmative Form (Positive): Subject + Was/Were + Base Form Verb + -ing

Negative Form: Subject + Was/Were + Not + Base Form Verb + -ing

Question Form: Was/Were + Subject + Base Form Verb + -ing?

Pronoun	Affirmative	Negative	Question

I	I was eating	I was not eating	Was I eating?
You	You were walking	You were not walking	Were you walking?
We	We were playing	We were not playing	Were we playing?
They	They were studying	They were not studying	Were they studying?
He/She/It	He/She/It was reading	He/She/It was not reading	Was he/she/it reading?

Examples:

Affirmative:

"I was reading a book yesterday at this time."

"They were watching a movie when I called."

Negative:

"He was not listening to music during the meeting."

"We weren't eating dinner when the power went out."

Question:

"Were you studying English when I phoned?"

"Was she working late last night?"

Exercise 5: Please transform the following sentences from Present Continuous or Past Simple into Past Continuous.

1. I used the operating system all day.
2. I am developing my program on Windows, due to a variety of support offered.
3. Developers designed various Linux distros to get away from the monopoly of Windows.
4. ChromeOS relied on cloud-based systems in order to work.
5. Mark is using his iPhone every day without knowing it uses iOS as an operating system.

Exercise 6: Please put the word in brackets into the correct Past Continuous form.

1. I _____ this device for 3 years before it broke. (use)
2. _____ it _____ as intended, or did it somehow malfunction? (work)

3. The smartphone's OS _____ the entire time I _____ it. (load, hold)
4. IBM's OS _____ new ground in the 1960s. (break)
5. In the 1970s, operating systems _____ at a breakneck speed. (develop)
6. Throughout the second half of the 20th century, most developers _____ for the top spot on the OS market. (compete)
7. My friend _____ a personalized Linux distro until he realized how difficult it was. (make)
8. They _____ to avoid using Windows, but it was becoming harder and harder. (try)
9. My cat _____ on top of my laptop for hours. (sleep)
10. I _____ with happiness when i got my new computer. (jump)

Exercise 7: Please transform the following sentences into questions and negative sentences.
1. Frank was using the computer all day.
2. The OS was working without a problem.
3. IBM were making many different operating systems in the 60s and 70s.
4. I was developing a new GUI for Windows when I worked for Microsoft.
5. They were celebrating the milestone we achieved in robotics.

Reading

Exercise 8: Read the text and translate the words in bold text. Find Past Simple and Past Continuous Tenses, transform them into each other and explain their uses.
The development of operating systems (OS) has been a story of **continuous evolution**, beginning with the **rudimentary** systems of the 1960s. During this era, computers were enormous machines that required simple operating systems to manage basic tasks. A significant advancement came with **IBM's OS/360**, a **groundbreaking** system introduced in 1964. It was among the first to allow different programs to run **simultaneously** on the same machine, marking a **milestone** in OS

development. This innovation laid the foundation for modern multitasking systems. By the 1970s, the rise of personal computers began to shape the operating system landscape. **CP/M (Control Program for Microcomputers)**, developed by Digital Research, was one of the first operating systems designed for microcomputers. Its portability and simplicity made it a popular choice for early personal computers. However, as technology advanced, CP/M began to lose ground to newer, more versatile systems.

The 1980s saw the emergence of **MS-DOS (Microsoft Disk Operating System)**, which became the dominant OS for personal computers. Introduced by Microsoft in 1981, MS-DOS built on the foundation of CP/M but offered greater functionality and support for a broader range of hardware. This system played a pivotal role in the success of IBM-compatible PCs and solidified Microsoft's place in the tech industry.

By the 1990s, operating systems had become far more sophisticated, with graphical user interfaces (GUIs) revolutionizing the way people interacted with computers. While MS-DOS was still widely used, it began to be phased out in favor of GUI-based systems like Windows. This era demonstrated how far operating systems had come, transforming from **rudimentary** tools to user-friendly environments capable of supporting complex applications and tasks.

Exercise 9: Please answer the following questions according to the text.

1. What was a major feature of IBM’s OS/360 that marked a milestone in OS development?

A) Support for graphical user interfaces

B) Ability to run programs simultaneously

C) Integration with personal computers

D) Simplified user commands

2. CP/M was popular in the 1970s because it:

A) Had a graphical interface

B) Was designed for microcomputers

C) Introduced multitasking features

D) Was developed by IBM

3. MS-DOS became the dominant operating system in the 1980s because it:

A) Was the first OS to support multitasking

B) Offered portability for microcomputers

C) Supported a wide range of hardware and was tied to IBM-compatible PCs

D) Replaced GUI-based systems with simpler tools

Vocabulary

Exercise 10: Please fill the missing parts of the following sentences with the words in the box.

groundbreaking, milestone, MS-DOS, rudimentary, Google, open-source, interface, operating system, sleek, compatibility

1. The launch of the first _____ smartphone was considered a major innovation in the tech industry.
2. Many developers contribute to _____ software because it allows for customization and collaboration.
3. A good _____ ensures that users can navigate a program easily and efficiently.
4. _____ revolutionized the personal computer market in the 1980s with its simple command-line system.
5. _____ is one of the most popular companies for internet-related services and products.
6. The first computers had _____ interfaces that were difficult for most people to use.
7. A modern _____ like Windows or macOS allows users to run multiple programs simultaneously.
8. Designers often prefer devices with a _____ appearance that looks professional and modern.
9. Software developers test their programs to ensure _____ with different

devices and operating systems.

10. The introduction of a graphical user interface in computing was a major _____ in technology history.

Speaking

Exercise 11: Please make a speech about one of the three most standard operating systems, explaining the benefits of it, and the drawbacks of the others.

Example:

I believe that Windows is…

Well Linux is more…

Many programs are made for…

There is no denying that…

I feel more comfortable with…

Writing

Exercise 12: Write out a dialogue in which several people argue amonst each other about their favourite operating systems. (10-12 sentences).

Unit 7: The Internet and its History

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What do you know of the internet?
2. Do you think the internet is vital?
3. What do you think it should be used for?
4. What kinds of websites do you know?
5. What do you know of the history of the internet?

Reading

Exercise 2: Read the text and translate the words in bold text.

The history of the internet is a **fascinating journey** that began with the creation of **ARPANET** in the late 1960s. ARPANET, developed by the U.S. Department of Defense, was a **precursor** to the modern internet. It allowed computers in different locations to connect and share information, using early **protocols** that standardized communication. Initially designed for **government agencies** and researchers,

ARPANET was a major step in transforming how information could be transmitted across distances.

In the 1970s and 1980s, the development of **email** marked a key **milestone** in the growth of **cyberspace**. Email made communication between individuals faster and more convenient, solidifying the value of connected networks. By the early 1990s, the introduction of the **World Wide Web (WWW)** made the internet more **user-friendly** and accessible to the general public. The WWW allowed users to access and navigate information using web browsers, which dramatically changed how people interacted with the internet.

The 1990s also saw the rise of web browsers like **Netscape Navigator** and **Internet Explorer**, which became essential tools for exploring the expanding online world. During this period, the internet evolved into a **dynamic** space for information, communication, and commerce. The emergence of **e-commerce** platforms allowed businesses to sell products and services online, creating a new **phenomenon** that reshaped global trade. These developments made the internet a **transformative** force in both daily life and business.

By the 2000s, the internet had become a global **network** connecting billions of users worldwide. With faster speeds and more reliable connections, the internet enabled social networking, streaming, and advanced e-commerce solutions. This era highlighted the transformative power of the internet, which had grown from its roots in ARPANET to a dynamic and indispensable part of modern life.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. ARPANET was developed in the 1960s as a precursor to the modern internet.
2. Email was one of the first features of the internet designed for general users.
3. The World Wide Web made the internet more user-friendly by introducing web browsers.
4. Netscape Navigator and Internet Explorer were early protocols used to connect

computers.

5. The internet became a global network connecting billions of users by the 2000s.

Exercise 4: Name some of the websites in the following image, explain what they are used for and why they may be important for engineering.

Grammar

Future Simple

The Future Simple Tense can be expressed in two common forms: the "**will**" form and the "**be going to**" form. Both are used to talk about actions or events that will happen in the future.

Will Form

Used to express actions or events that will happen in the future and are **not planned or certain**.

Formed with the modal verb "will" followed by the base form of the main verb.

Affirmative Form (Positive): Subject + Will + Base Form Verb

Negative Form: Subject + Will + Not + Base Form Verb (contracted as "won't")

Question Form: Will + Subject + Base Form Verb?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I will travel	I won't travel	Will I travel?

You	You will study	You won't study	Will you study?
We	We will work	We won't work	Will we work?
They	They will play	They won't play	Will they play?
He/She/It	He/She/It will eat	He/She/It won't eat	Will he/she/it eat?

Examples:

Affirmative:

"She will visit her grandmother tomorrow."

"We will meet at the park in the evening."

Negative:

"I won't be late for the appointment."

"They won't forget to bring the snacks."

Question:

"Will you join us for dinner tonight?"

"Will it rain tomorrow?"

Be going to Form

Used to express actions or events that are **planned or intended to happen** in the future.

Formed with the subject, the present tense of the verb "**to be**" (am, is, are), and "**going to**" followed by the base form of the main verb.

Affirmative Form (Positive): Subject + Am/Is/Are + Going To + Base Form Verb

Negative Form: Subject + Am/Is/Are + Not + Going To + Base Form Verb (contracted as "isn't" or "aren't")

Question Form: Am/Is/Are + Subject + Going To + Base Form Verb?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I am going to travel	I'm not going to travel	Am I going to travel?

You	You are going to study	You're not going to study	Are you going to study?
We	We are going to work	We aren't going to work	Are we going to work?
They	They are going to play	They aren't going to play	Are they going to play?
He/She/It	He/She/It is going to eat	He/She/It isn't going to eat	Is he/she/it going to eat?

Examples:

Affirmative:

"They are going to buy a new car next month."

"I am going to have lunch with Sarah."

Negative:

"She isn't going to attend the conference."

"We aren't going to visit the museum today."

Question:

"Are you going to join the gym?"

"Is he going to finish his project on time?"

Exercise 5: Fill in the blank with the appropriate form of the verb in brackets.

1. I _____ (visit) the new website tomorrow.
2. She _____ (send) an email to her boss later today.
3. We _____ (upgrade) our internet connection next month.
4. They _____ (download) the new software tomorrow morning.
5. He _____ (start) an online course next week.
6. The company _____ (launch) a new website in the near future.
7. Sarah _____ (post) an update on social media tomorrow.
8. We _____ (join) the online meeting in the evening.
9. They _____ (create) a website for their business next year.
10. The students _____ (research) their topics online.

Exercise 6: Rewrite each sentence using the Future Simple Tense, adding the words in the brackets.

1. He checks his email every morning. (tonight)
2. Jane watches movies online on the weekends. (tomorrow)
3. We use social media to keep in touch with friends. (today)
4. They buy books from online bookstores. (next week)
5. The company launches a new app next week. (next month)
6. Sarah posts pictures on Instagram every day. (next morning)
7. He downloads music from the internet. (later)
8. They communicate with their clients through email. (in a few hours)
9. We watch videos on YouTube every evening. (tonight)
10. The students research topics for their projects online. (next weekend)

Exercise 7: Choose the correct verb form to complete each sentence.

1. Tomorrow, he _____ (will browse / browses) the internet for new information.
2. They _____ (are going to upload / uploads) their photos on social media later.
3. We _____ (will download / downloads) the software from the official website.
4. The company _____ (launches / will launch) a new website next month.
5. She _____ (logs in / will log in) to her email account every morning.
6. They _____ (are going to post / posts) a video on YouTube tonight.
7. I _____ (will search / searches) for that article online.
8. Tomorrow, we _____ (are going to update / updates) our website.
9. The students _____ (will research / researches) the topic online for their assignment.
10. He _____ (will share / shares) the link with his friends on social media.

Reading

Exercise 8: Read the text and translate the words in bold text. Find the use of Future Simple Tense and convert them to Present Simple or Present Continuous.

Tomorrow, I have a full day planned, and using websites will be an **integral** part of getting things done. I start my mornings by checking **Google** for the latest news and updates. It helps me stay informed and prepare for meetings. After that, I log into my email and calendar to confirm my schedule. These tools work **seamlessly** together, helping me organize my day without missing anything important.

During my lunch break, I'll probably watch a **YouTube** video or two. I've been following a new **tutorial** series about improving productivity, which I find really helpful. YouTube is also great for quick entertainment and learning, making it an ideal break-time activity. Afterward, I'll get back to work with fresh ideas and energy.

In the afternoon, I usually take a few minutes to check **Twitter** and **Instagram**. These **social media platforms** help me stay connected with industry **trends** and keep up with my network. Twitter is perfect for quick updates and conversations, while Instagram offers a more visual way to engage with colleagues and friends. The **interactivity** on these platforms makes it easy to participate in discussions and share ideas.

After work, I'll spend some time on YouTube again, but this time for **unwinding**. I enjoy watching travel vlogs and cooking shows to relax after a long day. Sometimes, I even discover new recipes to try on the weekend. It's a nice way to transition from work to personal time.

Social media and websites have become such a natural part of my routine that they feel almost invisible. They help me stay productive, informed, and entertained throughout the day. Without them, my daily activities would feel incomplete.

Exercise 9: Please answer the following questions according to the text.

1. What is the main purpose of checking Google in the morning?

A) Watching videos

B) Reading news and preparing for meetings

C) Unwinding

D) Watching tutorials

2. Which social media platform is described as being more visual?

A) Twitter

B) Google

C) Instagram

D) YouTube

3. How does the speaker in the text describe YouTube's role in their day?

A) A tool for productivity during meetings

B) A platform for checking trends and news

C) A source of both tutorials and relaxation

D) A seamless organizer for daily tasks

Vocabulary

Exercise 10: Please connect the matching terms between the following groups of words.

Internet	YouTube Twitter Instagram ARPANET
Social Media	WWW Google Yahoo Internet Explorer
Search Engine	Netscape Navigator Google Chrome Firefox E-commerse
Web Browser	Cyberspace

Speaking

Exercise 11: Talk about how you use the internet in your daily life, think about the different websites you visit and why you visit them. How often do you use it to gain new knowledge? Which websites do you use for that?

Example:

Every morning, I use my phone to check…

I often talk with my friends using…

To learn new things, I use…

There's no way I can ever go through the day without using…

Finishing the day, I go to...

Writing

Exercise 12: Write an email to a friend, talking about a new educational website you found. (10-11 sentences)

Unit 8: Internet Security

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is internet security?
2. Why does the modern world require internet security?
3. What kinds of internet security do you know?
4. What kinds of dangers are out there?
5. Do you follow the internet security practices?

Reading

Exercise 2: Read the article, translate the words in bold text.

Internet security is **paramount** in today's **interconnected** world, where our personal and professional lives often rely on online platforms. **Safeguarding** your information is essential to avoid **consequences** such as **identity theft**, **privacy breaches**, and **data loss**. Neglecting internet security measures can lead to serious problems, especially as **cyber threats** become more sophisticated. To protect yourself, it's important to follow best practices and stay informed about the latest risks.

Strong **passwords** are the foundation of internet security. Use a mix of **uppercase** and **lowercase letters**, numbers, and symbols to create a robust password for your **online accounts**. Avoid using easily guessable information like birthdays or names. Enabling **two-factor authentication (2FA)** adds an extra **layer** of protection by requiring a **verification code** in addition to your password. This makes it much harder for **hackers** to gain access, even if they manage to steal your password.

Staying vigilant about software updates is another crucial step. **Neglecting updates** can leave your devices vulnerable to new **malware** and exploits. Always update your operating systems and apps as soon as new versions are available. Additionally, avoid clicking suspicious **links** or **downloading** unknown files, as these are common ways hackers spread **malware**. Installing a reliable **antivirus** and **anti-malware** program provides an extra layer of defense, helping detect and block potential threats.

Backing up your data regularly is also essential. Whether it's photos, documents, or work files, **backups** ensure that your information is safe in case of hardware failure or a malware attack. Cloud storage services and external drives are excellent options for maintaining backups. These steps help minimize the risk of **data loss** and reduce the impact of a potential security breach.

Finally, always be cautious of **scams** like **phishing** attempts. Hackers often pose as trusted organizations to trick users into providing sensitive information or clicking malicious links. To avoid falling victim, never share personal details over email or click on unsolicited links. By following these practices, you can significantly improve your internet security and protect yourself from the growing number of online threats.

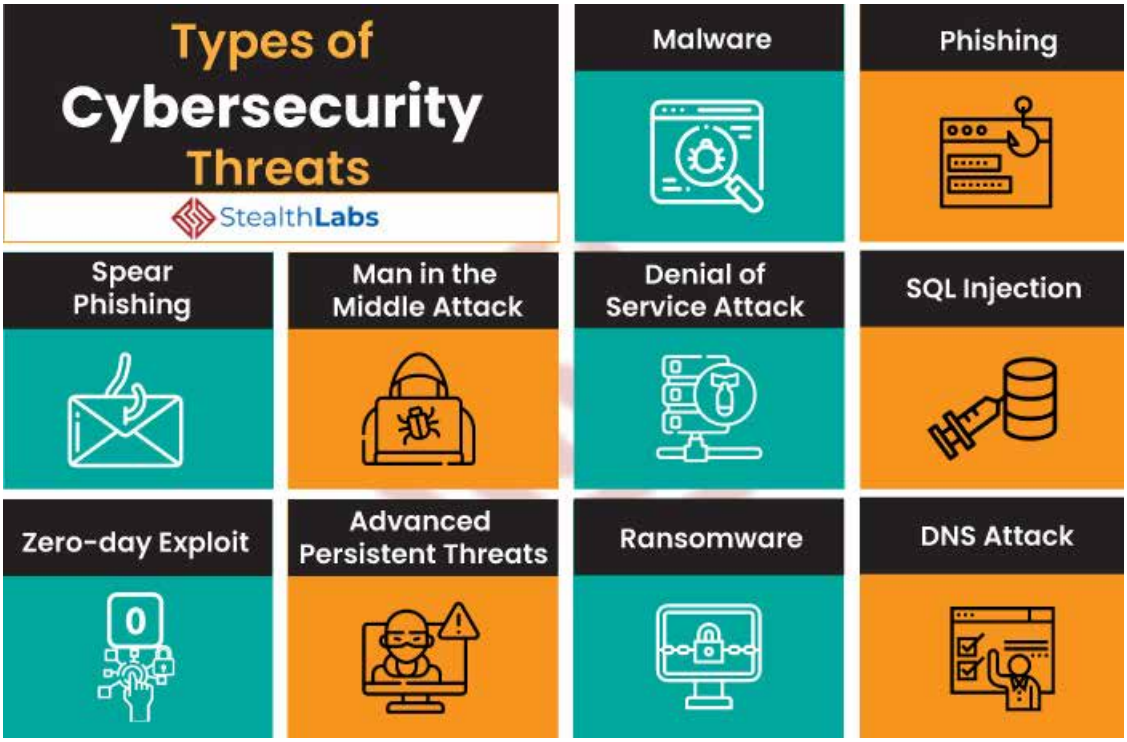
Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. Using passwords that include a mix of uppercase, lowercase letters, numbers, and symbols is a good practice for internet security.
2. Two-factor authentication requires only a password for access.
3. Neglecting software updates can make devices more vulnerable to malware.

4. Backups are unnecessary if antivirus software is installed.

5. Phishing scams often involve hackers pretending to be trusted organizations.

Exercise 4: Look at the following image and try to provide examples for some of these cybersecurity threats. Provide examples of which measures can protect you from them.



Grammar

Future Continuous

The Future Continuous Tense, like the Future Simple Tense, can also be expressed using both the "will" form and the "be going to" form. It is used to describe actions or events that will be in progress at a specific point in the future.

Will Form

Used to express actions or events that will be happening in the future at a specific moment or over a period of time.

Formed with the modal verb "will," the auxiliary verb "be," and the base form of the main verb with "-ing" added.

Affirmative Form (Positive): Subject + Will + Be + Base Form Verb + -ing

Negative Form: Subject + Will + Not + Be + Base Form Verb + -ing (contracted as "won't be")

Question Form: Will + Subject + Be + Base Form Verb + -ing?

Pronoun	Affirmative	Negative	Question
I	I will be studying	I won't be studying	Will I be studying?
You	You will be working	You won't be working	Will you be working?
We	We will be traveling	We won't be traveling	Will we be traveling?
They	They will be sleeping	They won't be sleeping	Will they be sleeping?
He/She/It	He/She/It will be playing	He/She/It won't be playing	Will he/she/it be playing?

Examples:

Affirmative:

"She will be studying all evening tomorrow."

"We will be working on the project during the conference."

Negative:

"I won't be attending the party tonight."

"They won't be using the old equipment anymore."

Question:

"Will you be waiting for me at the airport?"

"Will he be playing the guitar at the concert?"

Be going to Form

Used to express actions or events that are planned or intended to be in progress at a specific point in the future.

Formed with the subject, the present tense of the verb "to be" (am, is, are), "going to," and the base form of the main verb with "-ing" added.

Affirmative Form (Positive): Subject + Am/Is/Are + Going To + Be + Base Form Verb + -ing

Negative Form: Subject + Am/Is/Are + Not + Going To + Be + Base Form Verb + -ing (contracted as "isn't going to" or "aren't going to")

Question Form: Am/Is/Are + Subject + Going To + Be + Base Form Verb + -ing?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I am going to be studying	I'm not going to be studying	Am I going to be studying?
You	You are going to be working	You're not going to be working	Are you going to be working?
We	We are going to be traveling	We aren't going to be traveling	Are we going to be traveling?
They	They are going to be sleeping	They aren't going to be sleeping	Are they going to be sleeping?
He/She/It	He/She/It is going to be playing	He isn't going to be playing	Is he going to be playing?

Examples:

Affirmative:

"They are going to be rehearsing for the play tomorrow evening."

"I am going to be working on my project during the weekend."

Negative:

"She isn't going to be using her car next month."

"We aren't going to be attending the seminar."

Question:

"Are you going to be waiting for the train at the station?"

"Is he going to be playing in the football match?"

Exercise 5: Fill in the blank with the appropriate form of the verb in brackets.

1. Our IT team _____ (monitor) our network for potential threats tomorrow.
2. Hackers _____ (attempt) to breach our system during the weekend.
3. They _____ (implement) stronger password policies next month.
4. I _____ (update) our anti-malware software in the upcoming days.

5. The cybersecurity experts _____ (investigate) the recent data breach tomorrow.
6. She _____ (install) a VPN to enhance her online security measures.
7. We _____ (review) our backup systems for any potential vulnerabilities.
8. The company _____ (safeguard) customer data against identity theft.
9. Hackers _____ (target) unsuspecting users through phishing scams.
10. Users who _____ (neglect) their security practices may face severe consequences.

Exercise 6: Rewrite each sentence using the Future Continuous Tense while adding the words in the brackets.
1. Internet security is getting more important. (in the future)
2. We should safeguard our personal information online. (next week)
3. They download files from secure sources. (tonight)
4. Password protection started to sound crucial to prevent identity theft a while ago. (next month)
5. The company installs anti-malware software on all devices. (tomorrow)
6. She ignores suspicious links in emails. (next week)
7. We should encrypt our data to protect it from hackers. (within, next month)
8. They regularly update their antivirus software. (tonight)
9. Online scams grow as a problem every day. (soon)
10. Users need to learn risks of spyware. (too late)

Exercise 7: Choose the correct verb form to complete each sentence.
1. Tomorrow, the IT team _____ (will be monitoring / monitors) network traffic for any potential breaches.
2. They _____ (will be safeguarding / safeguard) customer data with advanced encryption techniques.
3. We _____ (will be updating / update) our antivirus software regularly.

4. The company _____ (will be implementing / implements) multi-factor authentication next month.
5. He _____ (will be downloading / downloads) important files from trusted sources.
6. Users _____ (will be neglecting / neglect) their security practices at their own risk.
7. I _____ (will be installing / install) a VPN for secure internet access.
8. Tomorrow, we _____ (will be reviewing / review) our firewall settings for any potential vulnerabilities.
9. The IT department _____ (will be investigating / investigates) the recent security breach.
10. They _____ (will be educating / educate) employees on phishing scams and how to avoid them.

Reading

Exercise 8: Read the text, translate the words in bold text. Find mentions of specific VPN, anti-malware and antivirus programs, replace them with other ones you know.
Hi! I wanted to share some tips about keeping your devices secure while using public **Wi-Fi networks**. A **VPN (Virtual Private Network)** is essential for protecting your data and browsing **anonymously**. **ExpressVPN** and **NordVPN** are two great options that offer fast connections and strong encryption. They act as a **digital shield**, ensuring that hackers can't intercept your data, even on unsecured networks.

You should also consider installing reliable antivirus software to protect your files and devices. Programs like **Norton** are excellent for detecting and removing **spyware**, **ransomware**, and other harmful threats. If you're dealing with potentially **corrupt files** or suspect malware, **Malwarebytes** is a great tool for scanning and cleaning up your system. It's easy to use and works well alongside other antivirus programs.

Lastly, always be cautious while downloading files or chatting online. Hackers can disguise **spyware** or **ransomware** as legitimate links or attachments. Using a **VPN** and antivirus together provides the best defense against these threats. Let me know if you have any questions—I'm happy to help you set them up!

Exercise 9: Please answer the following questions according to the information in the email.

1. What does a VPN do for users on public Wi-Fi networks?

A) Speeds up their internet connection

B) Protects data and allows anonymous browsing

C) Removes malware from devices

D) Replaces the need for antivirus software

2. Which antivirus software is recommended for removing spyware and ransomware?

A) ExpressVPN

B) NordVPN

C) Norton

D) Wi-Fi network

3. What is the purpose of Malwarebytes?

A) Acting as a digital shield for online browsing

B) Scanning and cleaning up malware and corrupt files

C) Encrypting internet connections

D) Chatting securely online

Vocabulary

Exercise 10: Connect the following words with their definition.

Word	Definition
1. antivirus	A. A person who gains unauthorized access to computer systems or networks for various purposes, including security testing and malicious activities.
2. VPN	B. A fraudulent scheme or deceptive action intended to deceive or defraud.
3. malware	C. A secret combination of characters or symbols used for

Word	Definition
	authentication and access control.
4. identity theft	D. Software that protects computer systems from viruses, malware, and other threats by scanning and removing malicious code.
5. internet security	E. The fraudulent acquisition and use of someone else's personal information for financial gain or other illegal activities.
6. hacker	F. A file that has become damaged or altered in a way that prevents it from being properly accessed or used.
7. password	G. A secure network connection that allows users to access the internet privately and securely.
8. scam	H. Without a known identity or source, often used to describe actions or communications that hide the identity of the sender.
9. corrupt file	I. Malicious software designed to harm, compromise, or gain unauthorized access to computer systems.
10. anonymous	J. Measures and practices designed to protect internet-connected systems and data from threats and vulnerabilities.

Speaking

Exercise 11: Please act out a dialogue between two friends who are sharing internet security tips

I use a great VPN called...

There's an antivirus I like called...

I prefer to just go with Windows Defender, because...

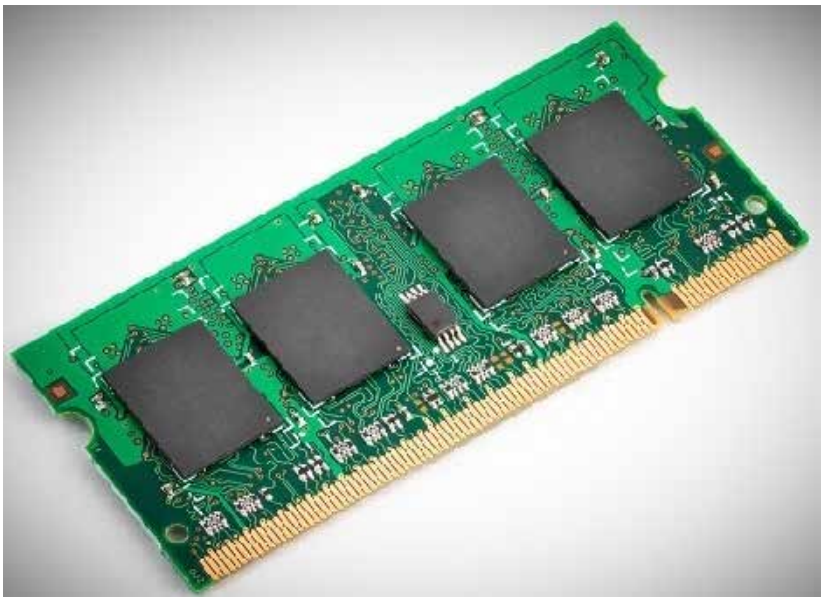
There is no replacing…

I recommend…

Writing

Exercise 12: Please write an argument piece on whether anti-virus or anti-spyware protection is more important in the modern world, and whether you need anything more than the bare minimum of protection. (11-12 sentences)

Unit 9: Types of memory



Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What are some types of memory you can name?
2. What does memory mean in terms of automation and robotics?
3. Is memory important in terms of machine learning?
4. Which is more important - short term memory or long term memory?
5. Can an artificial intelligence have both short term and long term memory?

Reading

Exercise 2: Read the text and translate the words in bold text.

Subject: Understanding Computer Memory in AI and Machine Translation

Hi Blake,

I hope this email finds you well! I wanted to give you a quick overview of how different types of computer memory work in AI, particularly in machine translation. Think of computer memory as a **multifaceted** system that mirrors aspects of human **cognition**. For example, just as we use **short-term memory** to hold thoughts while solving a problem, computers use memory to handle **real-time data** during

translation tasks. It's **analogous** to a mental **scratchpad** where temporary information is stored and processed.

Long-term memory in AI plays a vital role in **training models** and retaining information over time. This is where the system learns and stores complex patterns for future use. Some systems also mimic **episodic memory**, allowing them to recall specific **contextual details** from previous interactions. These **recollections** help AI provide more personalized translations by learning from past conversations or documents.

Another type of memory, **semantic memory**, is where machines store structured knowledge about the world, such as meanings of words or **ontologies**—the relationships between concepts. This is **indispensable** for ensuring translations are accurate and meaningful. Additionally, **procedural memory** is like the **predefined** rules for how things are done, such as grammatical structures or pronunciation patterns. Together, these memory types make the AI capable of handling complex language tasks.

Machine translation systems also depend on **declarative memory**, which enables them to store and recall factual information, like specialized terminology for legal or medical texts. Without this ability to retain key information, translations would lack precision. Declarative memory is complemented by episodic memory, which provides nuanced translations based on past interactions.

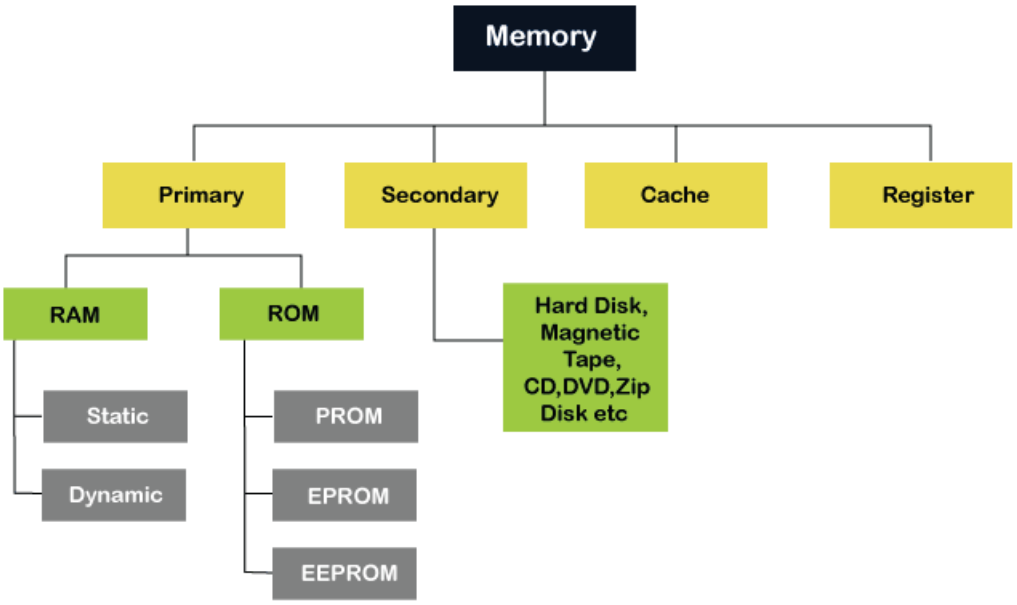
I hope this explanation helps clarify how computer memory works in AI systems! Please let me know if you have any questions or if you'd like further details about any of the concepts. Machine memory may seem technical, but it's fascinating how closely it parallels human thought processes.

Best regards,
John

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Short-term memory in computers is analogous to a scratchpad for real-time data processing.
2. Long-term memory in AI is not used for training models or storing patterns.
3. Semantic memory helps machines understand word meanings and relationships between concepts.
4. Procedural memory in AI deals with predefined rules, such as grammar.
5. Episodic memory enables AI to recall contextual details from past interactions.

Exercise 4: Describe how the different types of memory in the image work, how much they can store and for what purpose.



Grammar

Adverbs, degrees of comparison of adverbs

Adverbs are a type of word in English that provide more information about verbs, adjectives, other adverbs, or entire sentences. They often describe how, when, where, or to what extent an action or condition takes place.

Formation of Adverbs:

Adverbs can be formed in several ways:

Adding "-ly": Many adverbs are formed by adding "-ly" to an adjective. For example, "quick" becomes "quickly."

From Adjectives: Some adverbs are identical in form to adjectives. For example, "fast" can be both an adjective and an adverb.

Irregular Forms: A few adverbs have irregular forms that do not follow the "-ly" pattern. For example, "well" is the adverb form of "good."

Usage of Adverbs:

Adverbs can be used to modify verbs, adjectives, and other adverbs:

Modifying Verbs: Adverbs often describe how an action is performed. Example: "She sang beautifully."

Modifying Adjectives: Adverbs can intensify or weaken the meaning of an adjective. Example: "The movie was very entertaining."

Modifying Other Adverbs: Adverbs can further describe or modify other adverbs. Example: "He spoke extremely softly."

Degrees of comparison of Adjectives:

Like adjectives, adverbs can also form degrees of comparison, usually to compare the characteristics of 2 or more actions.

Example: "The movie looked more beautiful than the cartoon."

Most adverbs which end in "-ly" will create degrees of comparison using the words "more" and "the most"

positive	**comparative**	**superlative**
carefully	**more** carefully	**the most** carefully
beautifully	**more** beautifully	**the most** beautifully
timely	**more** timely	**the most** timely
intelligently	**more** intelligently	**the most** intelligently
terribly	**more** terribly	**the most** terribly

Exercise 5: Please transform the adjectives in the following sentences into adverbs, and change the sentence to match it.

1. The short-term memory function of the AI system is quite efficient, but it becomes even more efficient with continuous updates.

2. Real-time data processing is important, but the ability to process data in real-time is more important for certain applications.
3. The long-term memory capacity of the computer system is impressive, but as technology advances, it becomes more impressive with each new model.
4. The scratchpad provides a useful space for temporary data storage, making it more useful in situations where quick notes are essential.
5. The training model for the AI system is complex, but it becomes more complex as it learns from diverse datasets.
6. Automation is the most prevalent field in many industries, more so than robotics.
7. The AI system's ability to handle large datasets is indispensable, and its importance only becomes more indispensable as data volumes increase.
8. Episodic memory is crucial for personal experiences, but its significance becomes more crucial when considering its role in decision-making.
9. The iterative nature of developing AI models allows for continuous improvement, making the process more continuous with each iteration.
10. The use of buffers is at its most effective when preventing data loss.

Exercise 6: Please choose whether an adjective or an adverb fits better in the following sentences. Rewrite the sentences using the other option.
1. The training model for the AI system operates _____ (iterative/iteratively), refining its algorithms with each dataset.
2. The scratchpad is a _____ (convenient/conveniently) tool for temporary data storage during complex computations.
3. The long-term memory capacity of the computer system is an _____ (impressive/impressively) feature, allowing for vast data storage.
4. Analogous to human cognition, the AI system exhibits _____ (intricate/intricately) processes in information retrieval.
5. The AI system processes data _____ (analogous/analogously) to human cognition, demonstrating its adaptability.

Exercise 7: Please put the following adverbs into fitting degrees of comparison.

1. The iterative development of the training model enhances its performance _____. (consistently)
2. The AI system handles long-term memory _____ (efficiently) than traditional computing systems.
3. Among various memory functions, the AI system's semantic memory operates _____ (effectively), compared to any other.
4. The robotics professor replied to his colleague _____ (defiantly) out of anyone in the room.
5. The short-term memory comparison was understood far _____ (easily) than anyone had anticipated.
6. He hadn’t had any conflict with his fellow colleagues, which _____ (undoubtedly) made him confused.
7. The CPU and RAM worked far _____ (harmoniously) than they had anticipated.
8. The CPU handled these processes _____ (effortlessly).
9. The memory hierarchy is _____ (essentially) a set of blocks.
10. He _____ (ultimately) failed to achieve his goals.

Reading

Exercise 8: Read the text and translate the words in bold text. Find the adjectives in this text and transform them into adverbs.

Memory in computing is a fascinating and intricate system that determines how quickly and efficiently data is processed. Computers use a **memory hierarchy**, a structured approach that organizes memory into levels based on speed, cost, and size. The goal is to access data as fast as possible while balancing efficiency and cost. At the top of this hierarchy are registers, which are incredibly fast but limited in

capacity. Below them are caches, main memory, and secondary storage. Each layer serves a specific purpose, ensuring the system functions seamlessly.
A key concept in memory management is the **principle of locality**, which predicts how data is accessed. This principle has two main types: **temporal locality** and **spatial locality**. Temporal locality refers to the tendency of programs to access the same data repeatedly within a short time frame, such as in **iterative** loops. Spatial locality, on the other hand, refers to accessing data located near recently accessed memory addresses. These patterns allow the system to **minimize** the time spent searching for data by predicting access patterns effectively.

Cache memory, which lies between the CPU and main memory, plays a vital role in boosting performance. It acts as a **buffer**, holding frequently accessed data to reduce delays. A **cache line** is the smallest unit of data the cache handles, and how data is stored determines its efficiency. **Direct-mapped cache** assigns each memory block to exactly one cache line, making it simple but prone to **cache conflicts** when two blocks compete for the same space.

For more flexibility, a **fully associative cache** can store a memory block in any cache line, reducing **cache misses** but requiring more complex **tag checking** to locate data. A balanced approach is the **set-associative cache**, which divides the cache into sets, allowing multiple blocks to be assigned to each set. This approach increases **hit rates** while lowering the chance of **cache conflicts** compared to direct-mapped caches.

Cache misses, where data is not found in the cache, are categorized into three types. A **cold miss** occurs when data is accessed for the first time, as it has not been loaded into the cache. A **capacity miss** happens when the cache is too small to hold all the required data, and a **conflict miss** occurs when cache lines are occupied by other blocks, despite sufficient space being available elsewhere. Understanding these types helps optimize system performance and cache design.

The efficient design of caches is critical for modern computing. By leveraging the **principle of locality** and advanced caching techniques, systems can achieve high

performance with minimal delay. This careful layering in the **memory hierarchy**, combined with thoughtful cache management, creates a system that is both responsive and powerful.

Exercise 9: Please answer the following questions according to the text.

1. What does the principle of locality predict?

A) The physical location of cache memory

B) The access patterns of programs

C) The cost of memory systems

D) The size of the memory hierarchy

2. In a fully associative cache, where can a memory block be stored?

A) Only in its assigned cache line

B) In any available cache line

C) In the buffer space

D) In the direct-mapped region

3. What type of cache miss occurs when the cache is too small to hold all required data?

A) Cold miss

B) Conflict miss

C) Capacity miss

D) Tag miss

Exercise 10: Please fill the blanks with the appropriate words from the box.

Direct-mapped, cold miss, cache line, cache memory, cache conflicts, capacity conflicts, principle, memory hierarchy, temporal locality, fully associative

1. The _____ ensures that the most frequently accessed data is stored in faster memory levels for quicker retrieval.

2. Can you explain how the _____ of locality helps improve a program's performance?

3. I just learned that a _____ happens when data is accessed for the first time—

fascinating, isn't it?

4. A _____ cache assigns memory blocks to specific lines, but it can lead to conflicts if multiple blocks compete for the same spot.

5. Wow, this cache design uses a _____ approach, where memory blocks can go into any line, making it incredibly flexible!

6. Why is it so important to avoid _____ misses by ensuring the cache has enough capacity for the required data?

7. A good cache design balances hit rates and _____ to achieve optimal performance.

8. Don't forget that _____ acts as a buffer between the CPU and main memory to reduce latency!

9. Isn't it amazing how _____ predicts access patterns by assuming programs will repeatedly access recently used data?

10. When designing caches, how do engineers determine the size of each _____ to optimize storage efficiency?

Speaking

Exercise 11: Please act out a dialogue between people who are discussing what memory hierarchy is, and how it works.

Memory hierarchy is…

I believe that it…

Cache memory is very…

There are many different types of…, which…

There are also such concepts as...

Writing

Exercise 12: Write about which types of memory are used in the modern world, and why. (10-11 sentences)

Module 2 Test

Task 1 - Translate the following sentences into Ukrainian.

1. The operating system acts as the foundation for managing hardware and software.
2. Using a VPN is essential when connecting to public Wi-Fi networks for security.
3. Cache improves performance by storing frequently accessed data temporarily.
4. Phishing scams often trick users into sharing information through fake links.
5. Temporal locality in memory refers to re-accessing recently used data quickly.

Task 2 - Fill in the gaps.

1. The _____ ensures secure communication and data protection online.

A) Operating system B) VPN

C) Cache memory D) Password

2. _____ is a type of attack where hackers pose as trusted entities to steal sensitive data.

A) Malware B) Identity theft

C) Phishing D) Antivirus

3. In a _____, memory blocks can be stored in any available cache line.

A) Fully associative cache B) Direct-mapped cache

C) Temporal locality D) Memory hierarchy

4. _____ storage refers to saving frequently accessed data to speed up processing.

A) Long-term B) Sequential

C) Cache D) Procedural

5. Public Wi-Fi networks are less secure unless you use a _____.

A) Password B) VPN

C) Backup D) Malware scanner

6. _____ refers to reusing data stored near recently accessed memory addresses.

A) Temporal locality B) Spatial locality

C) Declarative memory D) Capacity miss

7. _____ ensures the proper functionality of an operating system by protecting against viruses.

A) Antivirus software B) Procedural memory

C) Phishing attacks D) Cache hierarchy

8. A _____ miss occurs when the cache is too small to hold all required data.

A) Conflict B) Cold

C) Capacity D) Hit

9. Secure _____ platforms allow seamless communication without privacy breaches.

A) Cloud storage B) Social media

C) Chat D) Browsing

10. A _____ like macOS integrates smoothly with hardware for a user-friendly experience.

A) Operating system B) Browser

C) VPN D) Memory hierarchy

Task 3 - Write an email to a colleague explaining different types of internet security tools and their importance, using at least three examples (15 lines).

Module 3 – Automation and Computational Systems in Robotics

Unit 10: Units of Measurement

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What types of measurement systems do you know?
2. Which measurements can be done in computer engineering?
3. Which units of measurement do you know?
4. What are the most commonly used prefixes used in these measurements?
5. What is the most common measurement of memory storage in the modern day?

Reading

Exercise 2: Read the text and translate the words in bold text.

In computer engineering, robotics, and automation, precise units of measurement are crucial for standardization, accuracy, and consistency in design, development, and operation. Here are some fundamental units commonly used in these fields:

Bits and **Bytes**: These are the most basic units of data measurement. A "bit" represents the smallest unit of information and can either be a 0 or a 1. Eight bits

make up a "byte," which is the standard unit for measuring file sizes, memory capacity, and data transfer rates.

Hertz (Hz): Hertz measures **frequency** and is often used in describing the **clock speed** of processors and the frequency of signals in communication systems. **Gigahertz** (GHz) is commonly used to denote billions of cycles per second in CPU clock speeds.

Volts (V) and **Amperes** (A): These units measure electrical voltage and current, respectively. They are essential for understanding the power supply requirements in electronic circuits and robotics systems.

Ohms (Ω): Ohms measure electrical resistance. In robotics and automation, Ohm's law (V = I * R) is used to calculate voltage, current, and resistance in electrical components and circuits.

Watts (W): Watts represent electrical power and are used to quantify the rate of energy consumption or production. In computer engineering and automation, it's essential to determine power requirements for devices and systems.

Meters (m): The meter is the standard unit for measuring distance and length in the **International System of Units (SI)**. It is used extensively in robotics to define the physical dimensions of robotic arms, sensors, and other components. This of course also includes **centimeters** and further measurements of length when precision is required.

Degrees **Celsius** (°C): Temperature measurement in degrees Celsius is essential for monitoring and controlling the operating temperature of computer systems, processors, and robotics components.

Newton (N): The Newton is a unit of **force** used in robotics to describe the forces exerted by motors, actuators, and sensors. Understanding these forces is crucial for designing robots that can move and interact with their environment effectively.

Radian (rad): Radians are used to measure angles in robotics and automation. They provide a more natural way to describe **rotational motion** and position, especially in control algorithms.

Seconds (s): Time measurement in seconds is vital for synchronization, timing, and scheduling in robotics and automation systems. Accurate timing is critical for tasks such as motion control and sensor data acquisition.

These units of measurement form the foundation of computer engineering, robotics, and automation. Engineers and developers rely on these standards to ensure precision, compatibility, and reliability in their designs and systems, enabling the seamless integration of technology into various applications.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. A byte consists of ten bits and is the standard unit for measuring file sizes and data transfer rates.
2. Hertz (Hz) is used to measure frequency, including CPU clock speeds, which are often described in gigahertz (GHz).
3. Ohms (Ω) measure electrical power, and Ohm's law is used to calculate voltage and resistance.
4. The meter (m) is a standard unit for measuring distance, widely used in robotics for defining physical dimensions.
5. Radians are used in robotics to measure angles, especially in control algorithms for describing rotational motion.

Exercise 4: Look at the image and speak on the difference between the decimal and binary systems of measuring data storage.

Multiple-byte units V·T·E

Decimal			Binary			
Value	Metric		Value	IEC		Legacy
1000	kB	kilobyte	1024	KiB	kibibyte	KB kilobyte
1000^2	MB	megabyte	1024^2	MiB	mebibyte	MB megabyte
1000^3	GB	gigabyte	1024^3	GiB	gibibyte	GB gigabyte
1000^4	TB	terabyte	1024^4	TiB	tebibyte	TB terabyte
1000^5	PB	petabyte	1024^5	PiB	pebibyte	–
1000^6	EB	exabyte	1024^6	EiB	exbibyte	–
1000^7	ZB	zettabyte	1024^7	ZiB	zebibyte	–
1000^8	YB	yottabyte	1024^8	YiB	yobibyte	–

Orders of magnitude of data

Grammar

Future Perfect, Future Perfect Continuous

The **Future Perfect Tense** is used to describe actions or events that will be **completed in the future before another action** or event takes place. It emphasizes the completion of an action at a specific point in the future.

Used to describe actions or events that will be completed in the future before a specific point or action occurs.

Formed with the auxiliary verb "will have" or "shall have" (less commonly used) and the past participle of the main verb. Much like all previous future tenses, it can also be created with the form "be going to"

Affirmative Form (Positive): Subject + Will have/be going to have + Past Participle Verb

Negative Form: Subject + Will not have/be not going to have + Past Participle Verb (contracted as "won't have")

Question Form: Will/be + Subject + Have/going to have + Past Participle Verb?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I will have finished I am going to have finished	I won't have finished I'm not going to have finished	Will I have finished? Am I going to have finished?
You	You will have learned You are going to have learned	You won't have learned You aren't going to have learned	Will you have learned? Are you going to have learned?
We	We will have completed We are going to have completed	We won't have completed We aren't going to have completed	Will we have completed? Are we going to have completed?
They	They will have eaten	They won't have eaten	Will they have eaten?

	They are going to have eaten	They aren't going to have eaten	Are they going to have eaten?
He/She/It	He/She/It will have arrived He/She/It is going to have arrived	He/She/It won't have arrived He/She/It isn't going to have arrived	Will he/she/it have arrived? Is he/she/it going to have arrived?

Examples:

Affirmative:

"By this time next year, I will have completed my degree."

"They are going to have finished their meal before the movie starts."

Negative:

"I won't have finished reading the book by tomorrow."

"She isn't going to have learned all the new vocabulary words by the end of the week."

Question:

"Will you have completed the project by the deadline?"

"Is he going to have arrived at the airport before you leave?"

Exercise 5: Fill in the blank with the appropriate form of the verb in brackets, as well as the unit of measurement most fitting according to the situation in the sentence.

1. By the end of the month, the data transfer rate _____ (reach) 10 _____ per second.
2. Next year, the temperature in the city _____ (rise) to 40 degrees _____.
3. By tomorrow, the circuit _____ (complete) its test. Its resistance will measure 50 _____.
4. In a week, the power consumption of the device _____ (reduce) to 5 _____.
5. By next month, the frequency of the radio signal _____ (increase) to 5 _____.
6. After a year of training, the runner _____ (cover) a distance of 1 _____.
7. By the end of the experiment, the voltage across the circuit _____ (reach) 100 _____.

8. Next week, the length of the cable _____ (extend) to 200 _____.
9. By tomorrow, the force applied to the object _____ (exert) 50 _____.
10. In a month, the time interval between events _____ (elapse) for 20 _____.

Exercise 6: Choose the correct verb form to complete each sentence, as well as the unit of measurement most fitting according to the situation in the sentence.
1. By next week, the computer's storage capacity _____ (will have increased / will increase) to 1 _____.
2. The frequency of the signal _____ (will have reached / will reach) 2 _____ by tomorrow.
3. The resistance in the circuit _____ (will have measured / will measure) 500 _____ by the end of the experiment.
4. By the time the repair is completed, the voltage _____ (will have reached / will reach) 220 _____.
5. In a month, the power consumption of the device _____ (will have decreased / will decrease) to 10 _____.
6. By the end of the race, he _____ (will have covered / will cover) a distance of 10 _____.
7. The temperature _____ (will have dropped / will drop) to -10 degrees _____ overnight.
8. I'm sure that I _____ (will have completed / will complete) the experiment within five hours.
9. By next year, the company aims to achieve data transfer rates of 1 _____ (megabyte / megahertz) per _____.
10. She believes that she _____ (will have exerted / will exert) a force of 50 _____ by the end of the workout.

The **Future Perfect Continuous Tense** is used to describe actions or events that **will have been ongoing for a duration up to a specific point in the future**. It

emphasizes both the duration of an action and its completion before another action or event in the future.

Used to describe actions or events that will have been in progress for a duration leading up to a specific point or action in the future.

Formed with the auxiliary verb "will have been" and the base form of the main verb with "-ing" added. Like all other future tenses, it can also be formed with the form "be going to"

Affirmative Form (Positive): Subject + Will have been/be going to have been + Base Form Verb + -ing

Negative Form: Subject + Will not have been/be not going to have been + Base Form Verb + -ing (contracted as "won't have been")

Question Form: Will/be + Subject + Have been/going to have been + Base Form Verb + -ing?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I will have been working I am going to have been working	I won't have been working I'm not going to have been working	Will I have been working? Am I going to have been working?
You	You will have been studying You are going to have been studying	You won't have been studying You aren't going to have been studying	Will you have been studying? Are you going to have been studying
We	We will have been traveling We are going to have been traveling	We won't have been traveling We aren't going to have been traveling	Will we have been traveling? Are we going to have been traveling?
They	They will have been cooking They are going to have been cooking	They won't have been cooking They aren't going to have been cooking	Will they have been cooking? Are they going to have been cooking?

He/She/It	He/She/It will have been playing He/She/It is going to have been playing	He/She/It won't have been playing He/She/It isn't going to have been playing	Will he/she/it have been playing? Is he/she/it going to have been playing?

Examples:

Affirmative:

"By next year, I will have been working here for a decade."

"They are going to have been studying English for six months by then."

Negative:

"I won't have been living in this city for a year yet."

"He isn't going to have been playing the piano for very long."

Question:

"Will you have been waiting for a long time by the time they arrive?"

"Is she going to have been gardening all morning when I visit?"

Exercise 7: Fill in the blank with the appropriate form of the verb in brackets.

1. By the end of the week, she _____ (work) on the project for 50 hours.
2. In a month's time, they _____ (study) the subject for 1000 hours.
3. By next year, the temperature _____ (rise) for 365 days.
4. The speed of light _____ (travel) at a constant rate for billions of years.
5. In two hours' time, he _____ (run) on the treadmill for 120 minutes.
6. By next week, the voltage _____ (fluctuate) between 110 and 220V.
7. The clock _____ (tick) for 24 hours straight by midnight.
8. By the end of the experiment, the weight _____ (decrease) for 10kg.
9. In six months' time, the length _____ (extend) by 1000m.
10. By next month, they _____ (measure) the distance at 50km.

Exercise 8: Choose the correct verb form to complete each sentence.

1. By next year, the company _____ (will have been producing / will have produced) 1 million microchips.

2. The temperature _____ (will have been dropping / will have dropped) to -10 degrees Celsius by tomorrow morning.
3. The volume of the liquid _____ (will have been decreasing / will have decreased) steadily for the past hour.
4. By the end of the day, I _____ (will have been working / will have worked) on the project for 8 hours.
5. In a week's time, they _____ (will have been studying / will have studied) the subject for 50 hours.
6. The weight of the object _____ (will have been increasing / will have increased) steadily since morning.
7. The length of the wire _____ (will have been extending / will have extended) to 10 meters by the end of the month.
8. By next week, the speed of the vehicle _____ (will have been reaching / will have reached) 100 kilometers per hour.
9. In six months' time, the frequency of the signal _____ (will have been fluctuating / will have fluctuated) between 1 and 2 megahertz.
10. By the end of the experiment, the power consumption _____ (will have been decreasing / will have decreased) to 5 watts.

Reading

Exercise 9: Read the text and translate the words in bold text. Use the listed prefixes to transform the words *meter, second* and *gram*.

In engineering and science, precision in measurement is essential, particularly when dealing with quantities that span a wide range. To address this, a system of **prefixes** is used to modify standard units, making them larger or smaller as needed. These prefixes simplify the representation of measurements and ensure consistency in communication across various domains. Below are some of the most commonly used prefixes, categorized by their scaling factors.

Prefixes for Larger Quantities

Kilo- (k): Represents a factor of 1,000.

A kilobyte (KB) equals 1,000 bytes.

A kilohertz (kHz) equals 1,000 hertz.

Mega- (M): Signifies a factor of 1,000,000 (one million).

A megabyte (MB) equals one million bytes.

A megahertz (MHz) equals one million hertz.

Giga- (G): Denotes a factor of 1,000,000,000 (one billion).

A gigabyte (GB) equals one billion bytes.

A gigahertz (GHz) equals one billion hertz.

Tera- (T): Represents a factor of 1,000,000,000,000 (one trillion).

A terabyte (TB) equals one trillion bytes.

Prefixes for Smaller Quantities

Milli- (m): Signifies a factor of 1/1,000 (0.001).

A millisecond (ms) equals one-thousandth of a second.

Micro- (μ): Denotes a factor of 1/1,000,000 (0.000001).

A microsecond (μs) equals one-millionth of a second.

Nano- (n): Represents a factor of 1/1,000,000,000 (0.000000001).

A nanometer (nm) equals one-billionth of a meter.

Pico- (p): Signifies a factor of 1/1,000,000,000,000 (0.000000000001).

A picosecond (ps) equals one-trillionth of a second.

These prefixes are invaluable for simplifying complex measurements and ensuring standardized communication in technology, science, and engineering. Whether measuring processor speeds in gigahertz or sensor precision in **nanometers**, these prefixes provide clarity and consistency, enabling professionals to work efficiently across various scales and domains.

Exercise 10: Please answer the following questions according to the text.

1. What does the prefix kilo- (k) represent?

A) 1,000,000

B) 1,000

C) 1/1,000

D) 1/1,000,000

2. Which prefix corresponds to a factor of 1/1,000,000?

A) Milli-

B) Micro-

C) Nano-

D) Pico-

3. What is an example of a unit measured in tera- (T) which is commonly used?

A) Terapound (TP)

B) Terabyte (TB)

C) Terameter (Tm)

D) Terasecond (Ts)

Vocabulary

Exercise 11: Please fill in the blanks using the words in the box.

Hertz, ohms, watts, meters, newtons, seconds, radian, SI system, force, nanometers

1. The _____ is a standard framework for scientific measurement.
2. _____ is a unit used to measure angles in circular motion.
3. _____ represent the force exerted by objects like motors and actuators.
4. _____ measure the electrical resistance in circuits.
5. _____ are commonly used units for measuring distance in the International System of Units.
6. _____ quantify the rate of energy consumption or production.
7. _____ measures frequency, often used for describing clock speed or signal frequency.
8. _____ denote a very small unit of length, commonly used in nanotechnology.
9. _____ is a physical quantity measured in newtons.
10. _____ are crucial for precise timing and synchronization in various applications.

Speaking

Exercise 12: Please speak with another person about measurements which you use daily, mention them and their prefixes, what they denote, and what you use them for.

I often use…

This measurement is used because…

When I buy this, I use…

Writing

Exercise 13: Please write a list of measurements you use in your specialty, what you use them for and when. Which ones are the most used? (10-12 measurements)

Unit 11: Theory of computation

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is the theory of computation?
2. How and why is this theory relevant to modern day computer engineering, robotics and automation?
3. How do we apply this theory in practice?
4. Do you know how this theory developed?
5. What are the main points of the theory?

Reading

Exercise 2: Read the text and translate the words in bold text.

Good afternoon, everyone. Today, we'll delve into the fascinating **theory of computation**, a cornerstone of computer science that examines the limits and possibilities of what can be solved **algorithmically**. This field seeks to understand the very nature of **computation** and how problems can be approached systematically. Its origins date back to the early 20th century, with pioneering contributions from brilliant minds such as Alan Turing and Alonzo Church. These two **logicians** laid the groundwork for formalizing computation and designing abstract models to test its limits.

Alan Turing introduced the concept of the **Turing machine**, an abstract mathematical model designed to simulate any conceivable computational process. The Turing machine became a central tool in the theory of computation, allowing researchers to explore which problems are solvable and which are inherently unsolvable. Turing's work also influenced the development of the **stored-program** paradigm, which underpins modern computing systems. Around the same time, Alonzo Church developed **lambda calculus**, another foundational model for computation. Lambda calculus formalized the notion of functions and served as the theoretical basis for functional programming languages.

As the field progressed, new challenges emerged, particularly in understanding computational efficiency. In 1971, Stephen Cook introduced the concept of **NP-completeness**, a classification for problems that are solvable in non-deterministic polynomial time but not necessarily in deterministic polynomial time. Richard Karp later expanded on this idea, showing how multiple problems could be transformed into one another, creating a framework for comparing their computational difficulty. The study of NP-completeness remains central to understanding computational complexity and practical problem-solving.

Beyond the classic contributions of Turing, Church, Cook, and Karp, the theory of computation has grown to encompass areas such as **automata theory**, **distributed computing**, and even **quantum computing**. Automata theory examines the behavior of machines and systems through mathematical models, while distributed computing focuses on solving problems across multiple interconnected systems. Quantum computing, on the other hand, represents a revolutionary shift in **paradigms**, challenging the limits of classical computation with entirely new approaches to processing information.

The practical applications of these theoretical foundations are vast. From optimizing algorithms to designing efficient distributed systems, the theory of computation continues to influence everything from search engines to cryptography. It provides

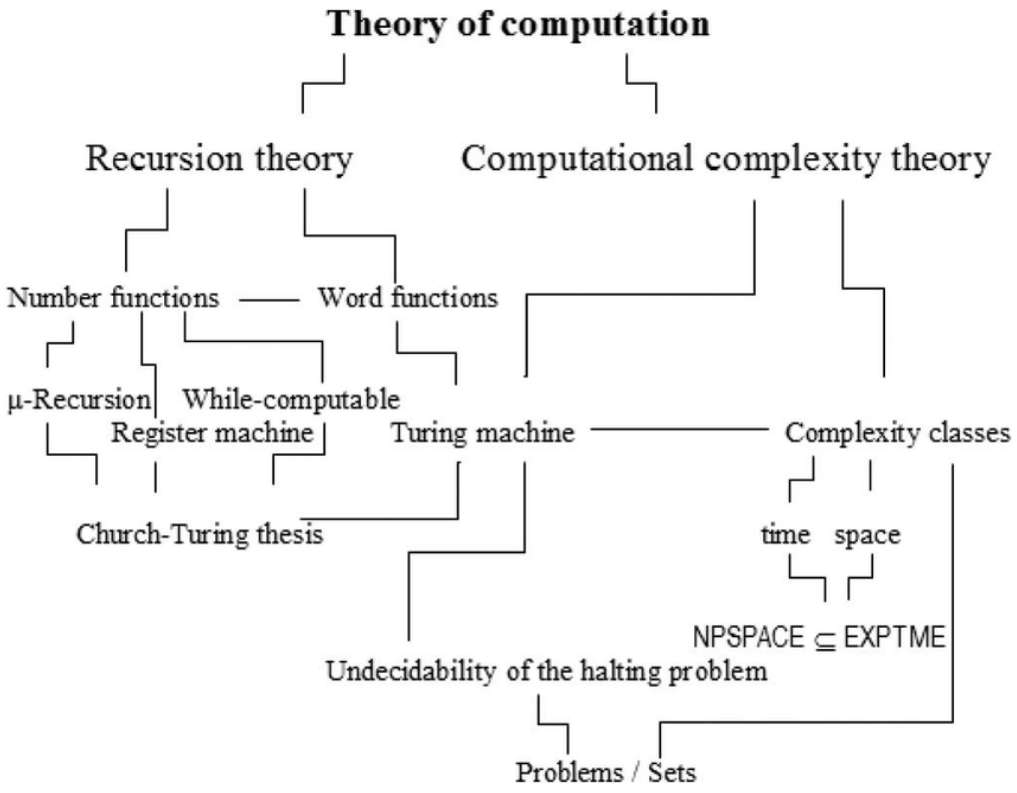
the tools to distinguish between problems that are solvable, those that are only solvable within specific timeframes, and those that are unsolvable altogether.

The history of the theory of computation is rich with innovation and discovery. The contributions of Alan Turing, Alonzo Church, Stephen Cook, and Richard Karp have shaped how we understand and approach computation today. As we look to the future, advancements in areas like quantum computing promise to redefine our understanding of what is **algorithmically** possible, ensuring that this field remains as exciting and dynamic as ever.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. Alan Turing introduced the Turing machine to simulate any conceivable computational process.
2. Alonzo Church developed automata theory to study the behavior of machines.
3. NP-completeness was introduced by Stephen Cook in 1971 to classify problems based on their computational efficiency.
4. Distributed computing focuses on solving problems using a single computing system.
5. Quantum computing represents a new paradigm that challenges classical computation methods.

Exercise 4: Try to describe the progression of the theory of computation according to the image below.



Grammar

Modal Verbs

Modal verbs are a special category of auxiliary verbs used in English to express a variety of meanings, including **ability, possibility, necessity, permission, requests**, and more. They add nuance to the main verb in a sentence.

"Can" and "Could":

Can: Used to express ability or capability in the present.

Example: "I can swim."

Could: The past form of "can" used for past ability or to make a polite request.

Example: "Could you pass the salt, please?"

"May" and "Might":

May: Used to express permission or possibility.

Example: "You may go to the party."

Might: Used to express a smaller degree of possibility or a more tentative suggestion.

Example: "It might rain later."

"Must":

Used to express necessity, obligation, or strong certainty.

Example: "You must finish your homework."

"Shall" and "Should":

Shall: Used primarily in formal or legal contexts to express future action or make suggestions.

Example: "We shall meet tomorrow."

Should: Used to give advice, make recommendations, or express an obligation that is not as strong as "must."

Example: "You should eat more vegetables."

"Will" and "Would":

Will: Used to express future actions or predictions.

Example: "She will arrive at 3 PM."

Would: Often used as a conditional verb to express a hypothetical situation or a polite request.

Example: "Would you like some tea?"

Additional Forms:

"Ought To":

Used to express moral obligation, duty, or strong recommendation.

Example: "You ought to apologize for your behavior."

"Had Better":

Used to give strong advice or a warning about potential consequences.

Example: "You had better study for the exam if you want to pass."

Modal verbs are versatile and can be used in various ways to convey different shades of meaning in sentences. It's important to understand their specific functions in different contexts to use them effectively in English communication.

Exercise 5: Complete the following sentences by choosing the correct modal verb according to the meaning in the brackets.

1. The theory of computation _____ (will/would) encompass various models and approaches.
(Expressing a definite assertion about the future.)
2. Lambda calculus _____ (can/could) serve as a foundation for functional programming languages.
(Expressing a general capability or possibility.)
3. Quantum computing _____ (shall/should) revolutionize the speed at which certain problems are solved.
(Expressing a strong assertion about a future outcome.)
4. Automation in robotics _____ (can/could) significantly improve efficiency in industrial processes.
(Expressing a general capability or possibility.)
5. NP-completeness _____ (will/would) pose challenges in developing efficient algorithms for specific problems.
(Expressing a definite assertion about the future.)
6. Machine learning _____ (may/might) involve the use of complex algorithms for pattern recognition.
(Expressing a possibility or likelihood.)
7. Meticulous planning _____ (shall/should) underpin the development of cost-effective computational solutions.
(Expressing a strong recommendation or necessity.)
8. The turing machine _____ (can/could) simulate the computation of any algorithmic process.
(Expressing a general capability or possibility.)
9. Artificial intelligence _____ (will/would) play a pivotal role in shaping the future of technology.
(Expressing a definite assertion about the future.)
10. Questions in automata theory _____ (may/might) lead to innovative solutions in computational complexity.

(Expressing a possibility or likelihood.)

Exercise 6: Complete the following sentences by choosing the correct modal verb according to the meaning in the brackets.

1. The paradigm shift in quantum computing _____ (can't/couldn't) be ignored by researchers.

(Expressing the impossibility or inability.)

2. NP-completeness _____ (shouldn't/should) be underestimated when designing algorithms.

(Expressing a recommendation against an action.)

3. Automation _____ (may not/might not) always result in a decrease in labor requirements.

(Expressing the possibility of something not happening.)

4. Meticulous attention to detail _____ (won't/wouldn't) be necessary for all computational tasks.

(Expressing the negation of a future necessity.)

5. Lambda calculus _____ (can't/couldn't) be easily understood without a solid foundation in mathematical logic.

(Expressing the impossibility or inability.)

6. _____ (can/could) the application of lambda calculus extend beyond theoretical computer science?

(Asking about the possibility.)

7. _____ (might/must) cost-effective solutions in computation be achieved without meticulous planning?

(Asking about a necessity.)

8. _____ (might/must) automata theory provide insights into the limits of computation?

(Asking about a possibility.)

9. _____ (will/would) quantum computing fundamentally change the landscape of computational power?
(Asking about a future outcome.)
10. _____ (should/must) machine learning algorithms be deployed in real-world scenarios?
(Asking about the advice.)

Exercise 7: Complete the following sentences by using the correct modal verb according to the meaning in the brackets.
1. Quantum computing _____ rely solely on traditional computational principles.
(Expressing a prohibition or necessity to avoid something.)
2. The turing machine _____ be applicable to certain classes of problems.
(Expressing the possibility of something not happening.)
3. Artificial intelligence solutions _____ disregard ethical considerations.
(Expressing a recommendation against an action.)
4. Computation _____ always provide instantaneous solutions to complex problems.
(Expressing the impossibility or inability.)
5. The theory of computation _____ exclude interdisciplinary perspectives.
(Expressing a prohibition or necessity to avoid something.)
6. _____ the turing machine be considered the theoretical foundation of computation?
(Asking about a general capability.)
7. _____ artificial intelligence eventually surpass human cognitive abilities?
(Asking about a future outcome.)
8. _____ robotics revolutionize the way industries handle automation?
(Asking about a future outcome.)

9. _____ NP-completeness pose challenges for algorithmic efficiency in various domains?
(Asking about the likelihood.)
10. _____ meticulous attention to detail always underpin cost-effective computational solutions?
(Asking about a general recommendation.)

Reading

Exercise 8: Read the excerpt and translate the words in bold text. Find any modal verbs and add modal verbs to 5 sentences that do not have them, use words such as *may, can, might, could, will*, etc.

Computational theory may not always seem directly linked to automation and **artificial intelligence (AI)**, but it undeniably **underpins** these technologies. Without the concepts and models from this field, AI and automation systems might struggle to function efficiently or reliably. For example, understanding how algorithms work and optimizing them ensures that AI systems can operate with speed and accuracy.

Computational theory must serve as the **backbone** of modern technologies to support the growing demands of these fields. Automation and AI must depend on computational theory for more than just basic functionality. These systems often require **meticulous planning** to solve complex tasks. **Machine learning** models, which are at the **core** of AI, must analyze vast amounts of data to identify patterns and make predictions. Similarly, in **autonomous** technologies like **self-driving** cars, decision-making algorithms must calculate millions of possible scenarios to ensure safety. Without this solid theoretical foundation, such advanced and **sophisticated** systems could fail to meet real-world challenges.

Another area where computational theory should play a **pivotal role** is **cost-effectiveness**. By optimizing resources and reducing redundant computations, developers can design systems that perform efficiently without overusing hardware. For example, companies may focus on improving algorithms to ensure faster

decision-making while minimizing the computational power required. This approach could save significant resources, making automation and AI technologies more accessible and scalable. Additionally, computational theory might be essential for improving decision-making processes in AI systems. By studying how machines process and evaluate data, researchers could create smarter systems that handle uncertainties better. For example, in dynamic environments such as healthcare or logistics, AI systems must rely on sound theoretical principles to make accurate predictions or recommendations. These capabilities should continue to evolve as the field of computational theory advances.

Computational theory has to remain the **backbone** of automation and AI. From ensuring **cost-effectiveness** to enabling **sophisticated** decision-making, its impact can be seen across all facets of modern technology. Whether it's powering **self-driving** cars or enhancing machine learning, the insights from computational theory could shape the future of how we build and use intelligent systems.

Exercise 9: Please answer the following questions according to the information in the excerpt.

1. How does computational theory underpin AI and automation?

A) By replacing human operators

B) By optimizing algorithms for speed and accuracy

C) By limiting the use of sophisticated systems

D) By avoiding meticulous planning

2. Why must machine learning rely on computational theory?

A) To predict simple patterns

B) To ensure safety in physical environments

C) To analyze data and identify patterns for predictions

D) To replace decision-making algorithms

3. What pivotal role does computational theory play in cost-effectiveness?

A) Reducing data analysis requirements

B) Optimizing resources and minimizing redundant computations

C) Allowing self-driving cars to operate without planning

D) Avoiding scalability issues in AI systems

Vocabulary

Exercise 10: Please fill in the blanks with the appropriate words from the box.

Cost-effective, artificial intelligence, pivotal, autonomous, robotics, backbone, automata theory, turing machine, computation, algorithm

1. _____ systems like self-driving cars must make quick decisions to ensure safety on the road.

2. Could a _____ like the one Alan Turing invented solve this type of problem efficiently?

3. _____ plays a pivotal role in ensuring AI systems operate smoothly and accurately!

4. To create efficient robots, engineers should rely on concepts from _____ to model behaviors and responses.

5. How might a well-designed _____ improve the speed of a program's decision-making process?

6. _____ is becoming the backbone of industries like healthcare, logistics, and finance.

7. Could _____ be the future of manufacturing, replacing repetitive tasks with machines?

8. To remain cost-effective, companies must carefully manage resources while implementing automation technologies.

9. The study of _____ explores the limits of what problems can and cannot be solved by machines.

10. Should _____ in robotics focus more on human collaboration or complete independence?

Speaking

Exercise 11: Please speak about the importance of the theory of computation in your field of study, why it is vital and how it affects your outlook.

I believe the theory of…

It is the backbone of…

This theory has been…

Throughout the last century…

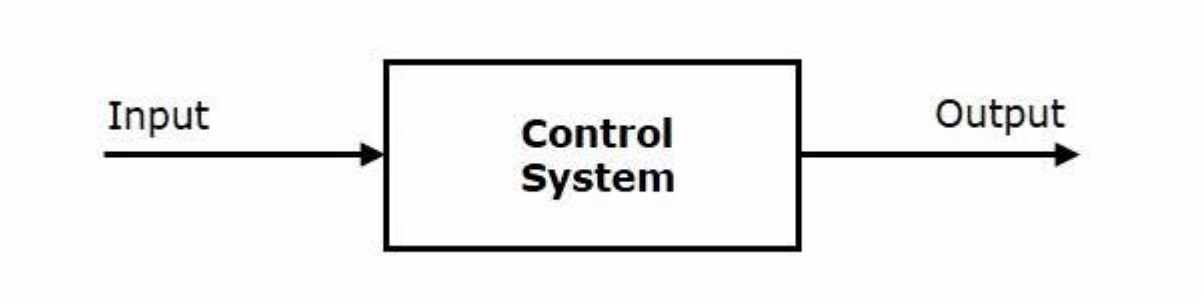
Its influence on robotics…

There is no denying that...

Writing

Exercise 12: Please write a dialogue in which two scientists argue which development in the history of the theory of computation was the most important one. (11-12 lines)

Unit 12: Control systems



Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is a control system?
2. Why are control systems important?
3. What are control systems used in?
4. How is your specialty related to control systems?
5. What are some examples of control systems?

Reading

Exercise 2: Read the text and translate the words in bold text.

A control system is a fundamental concept in technology and engineering that plays a critical role in regulating, managing, and influencing the behavior of various processes and devices. At its core, a control system comprises components that work together to maintain desired conditions or responses within a system, often in the face of external disturbances or variations.

Here are some of the various control systems that exist within the field of technology:

Feedback Control System: This is one of the most common types of control systems. It continuously monitors the output of a system and compares it to a desired reference value (**setpoint**). If there is any deviation, the system applies **corrective actions** to bring the output back to the desired state. An example is the **thermostat** in your home, which regulates temperature by turning the heating or cooling system on or off as needed.

Open-Loop Control System: Unlike feedback control systems, open-loop control systems do not continuously monitor the output. Instead, they use **predefined** input commands to achieve desired outputs. These systems lack the ability to adjust to changes or disturbances in the system.

Digital Control System: Digital control systems use digital components, such as **microcontrollers** or **digital signal processors (DSPs)**, to manage and process control signals. They offer precise control and can easily incorporate complex algorithms for tasks like data processing or automation.

Analog Control System: Analog control systems, on the other hand, use analog components like operational **amplifiers** and continuous signals to regulate processes. While less precise than digital systems, they are still used in applications where continuous control is necessary.

Hybrid Control System: Hybrid control systems combine elements of both analog and digital control. They leverage the precision of digital components while maintaining continuous control through analog elements.

Adaptive Control System: Adaptive control systems have the ability to adjust their parameters in real-time to account for changes in the system or disturbances. They are commonly used in applications where the environment or system dynamics are variable, such as in **aerospace** or robotics.

Nonlinear Control System: Nonlinear control systems deal with processes where the relationship between inputs and outputs is not linear. These systems require advanced mathematical techniques and algorithms to achieve control objectives.

Predictive Control System: Predictive control systems use predictive models to anticipate future system behavior and make control decisions accordingly. These systems are often used in complex industrial processes where optimizing performance is critical.

Hierarchical Control System: In complex systems, hierarchical control is employed, where multiple layers of control are used to manage various aspects of the system.

This approach ensures that high-level goals are met while addressing specific **subsystem** requirements.

These are just some examples of the diverse control systems in technology. They are integral in applications ranging from manufacturing and robotics to aerospace and automotive industries, enabling precise and automated control of processes and systems.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. The open-loop control system continuously monitors system outputs.
2. Digital control systems lack the ability to incorporate complex algorithms.
3. Adaptive control systems are commonly used in static environments.
4. Analog control systems use digital components like microcontrollers.
5. Hierarchical control systems involve multiple layers of control.

Grammar

Prepositions of time and place

Prepositions of time and place help provide context and information about when and where an action or event is taking place. They share 3 major prepositions, "at, in, on", here are some examples and explanations for their meanings depending on what they describe.

Prepositions of Time:

At:

Used to specify a precise point in time or a particular time of day.

Example (Time): "I have a meeting at 3 PM."

Example (Time of Day): "They usually have dinner at 7 o'clock."

In:

Used to indicate a general period of time, such as a month, year, season, or a longer duration.

Example (Month): "My birthday is in July."

Example (Year): "They got married in 2020."

Example (Season): "I love skiing in winter."

Example (Longer Duration): "She'll finish her project in a week."

On:

Used to pinpoint a specific date or day of the week.

Example (Date): "Our anniversary is on May 15th."

Example (Day of the Week): "We'll meet on Friday."

During:

Used to indicate a period or range of time.

Example: She studied hard during the exam week.

For:

Used to express the duration of an action or event.

Example: They have been living in the city for five years.

Since:

Indicates the starting point of an action or the beginning of a specific time.

Example: He has been working here since January.

By:

Indicates a deadline or the latest possible time for the completion of an action.

Example: Please submit your report by Friday.

From...to/until:

Indicates the starting and ending points of a particular time period.

Example: The store is open from 9 a.m. to 6 p.m.

Prepositions of Place:

At:

Used to specify a particular point or location.

Example: "I'm waiting for you at the bus stop."

In:

Used to indicate an enclosed or more general area.

Example (Enclosed Space): "He's in the kitchen."

Example (General Area): "They live in a small town."

On:

Used to indicate a surface or a position in contact with a surface.

Example (Surface): "The book is on the table."

Example (Position): "She's sitting on the chair."

Above:

Used to indicate a higher position or level.

Example: The birds were flying above the clouds.

Below:

Indicates a lower position or level.

Example: The treasure chest was buried below the sand.

Under:

Signifies a position beneath or covered by something.

Example: The cat is under the table.

Over:

Indicates a position that is higher or covering.

Example: The plane flew over the mountains.

Between:

Used when something is in the middle of two things or two points.

Example: The park is between the library and the school.

Exercise 4: Fill in the blanks with the correct preposition of time.

1. The seminar is scheduled to start _____ 10 AM.
2. We will be on vacation _____ two weeks.
3. The project must be completed _____ the end of the month.
4. The conference is happening _____ October 15th to 17th.
5. They have been working on the project _____ last Monday.

6. We are planning to meet _____ the morning.
7. The company has been operating _____ 2005.
8. The meeting is scheduled _____ 3 PM.
9. They will be away _____ the weekend.
10. The workshop will take place _____ Friday.

Exercise 5: Fill in the blanks with the correct preposition of place.
1. The thermostat is strategically located _____ the wall.
2. The hybrid control system integrates components both _____ and below the surface.
3. User input is crucial in achieving optimal performance _____ the system.
4. The airplane is flying _____ the clouds.
5. The predefined parameters were set _____ the control panel during the initial stages.
6. The research and development lab is located _____ the cutting-edge technology park.
7. The analog components are usually housed _____ the top layer of the control panel.
8. The digital display is mounted _____ the control panel.
9. The basement is _____ the ground floor.
10. The setpoint is typically defined _____ the initial stages of system design.

Exercise 6: Fill in the blanks with the correct preposition of place and/or time.
1. The advanced layer operates _____ the control system, ensuring precision _____ real-time.
2. The predefined parameters are usually set _____ the control panel _____ the initial stages.
3. The research and development endeavor has been ongoing _____ a decade _____ the cutting-edge technology park.

4. The control system has been operational _____ user input _____ its implementation.
5. The thermostat is strategically placed _____ the center of the room _____ the advanced layer of the control system.

Reading

Exercise 7: Please read the text, translate the words in bold text and use them with the prepositions in the grammar section to create 5 sentences.

Control systems have always been the **linchpin** of robotics and automation, serving as the backbone of technological **endeavours** in various industries. These systems allowed machines to monitor and adjust their operations automatically, making them essential for achieving precision and reliability. In the past, their implementation marked a significant shift in how tasks were approached, especially in **manufacturing** and logistics.

The **adoption** of control systems in **manufacturing** was a **game-changer**. Factories that previously relied on manual labor began integrating robotic systems controlled by sophisticated algorithms. These systems could be **fine-tuned** to produce consistent quality, reduce waste, and improve efficiency. This transformation also enabled companies to allocate their human workforce to more complex and creative tasks, fostering a new **division** of labor.

Control systems also played a significant role in **research and development (R&D)**. Engineers and scientists designed automated systems that could adapt to **dynamic environments**, such as self-driving cars or drones. These systems demonstrated their **prowess** in responding to **external factors** like obstacles or changing conditions. Their **responsiveness** to the environment ensured their reliability in real-world applications, paving the way for further innovation.

In robotics, control systems were particularly crucial for enabling precise movements and interactions. Robotic arms in factories could handle delicate objects with extreme

accuracy, while medical robots assisted surgeons in performing minimally invasive procedures. By adjusting to **cutting-edge** demands, these systems proved their versatility across multiple domains.

The most remarkable aspect of control systems was their ability to be **fine-tuned** over time. As new challenges emerged, engineers enhanced these systems to meet evolving requirements. For example, the integration of artificial intelligence allowed machines to learn from past mistakes and optimize their operations, making them even more reliable and efficient.

In summary, control systems revolutionized robotics and automation, becoming a **linchpin** for progress in **manufacturing** and beyond. Their application in **dynamic environments** showcased their adaptability and responsiveness, while their contribution to **R&D** pushed the boundaries of what machines could achieve. This combination of precision and innovation ensured their lasting impact across industries.

Exercise 8: Please answer the following questions according to the text.

1. How did control systems act as a game-changer in manufacturing?

A) By replacing control systems with manual labor

B) By improving consistency, reducing waste, and enhancing efficiency

C) By creating a division between engineers and workers

D) By removing the need for quality checks

2. What role did control systems play in dynamic environments?

A) They remained static to avoid external factors

B) They demonstrated responsiveness and adaptability to changing conditions

C) They reduced the complexity of external environments

D) They only operated in controlled laboratory settings

3. What made control systems suitable for use in robotics?

A) Their inability to handle delicate tasks

B) Their fine-tuned precision and adaptability to cutting-edge demands

C) Their reliance on external factors for operation

D) Their lack of flexibility in handling complex tasks

Vocabulary

Exercise 9: Please connect the following words with their definitions.

Word	Definition
1. analog	A. Able to adjust or change in response to different conditions or environments.
2. feedback	B. A device used to control temperature by regulating heating or cooling systems.
3. thermostat	C. At the forefront of technology or innovation, often referring to the latest advancements.
4. predefined	D. Information or responses provided in response to a process or action, often used for improvement.
5. hybrid	E. A self-contained part of a larger system with specific functions and interactions.
6. adaptive	F. Referring to continuous or non-digital data, often in the form of a continuous electrical voltage.
7. subsystem	G. A separate or distinct area or category within a larger context.
8. division	H. Already established or determined in advance.
9. cutting-edge	I. Skill or expertise in a particular activity or field.
10. prowess	J. Combining or integrating elements from two different sources or technologies.

Speaking

Exercise 10: Please speak about the importance of control systems in automation and robotics, share your thoughts and experiences with various control systems.

I believe that control systems…

They are important because…

I've had a lot of experience with…

Hybrid control…

Analog control systems…

...they have been a game changer…

...relies on Predictive Control Systems...

Writing

Exercise 11: Please write about the future of using control systems in automation and robotics. (11-12 sentences)

Unit 13: Computer languages

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is language to a computer?
2. Which such languages do you know of?
3. How are computer languages used in automation and robotics?
4. What can a computer language do?
5. What are the differences between computer languages?

Reading

Exercise 2: Read the text and translate the words in bold text.

Computer languages form the backbone of software development, enabling developers to create diverse systems ranging from basic applications to complex robotics. These **programming languages** serve as tools for writing instructions that computers can interpret and execute. **Codebases**, which are collections of code written in one or more languages, can vary significantly depending on the project's requirements. Some languages, known as **high-level languages**, prioritize simplicity and readability, making them ideal for a broad range of applications.

Python is one such high-level language, renowned for its ease of use and versatility. It is commonly used in data analysis, **image recognition**, web development, and even

machine learning. Another high-level language, **Java**, is widely employed for building cross-platform applications thanks to its "write once, run anywhere" philosophy. On the other hand, **C++**, a language known for its speed and efficiency, is often used in performance-critical applications, such as gaming engines and financial systems.

In robotics and automation, the need for **real-time languages** is crucial. These languages, like **C** and **Ada**, ensure tasks are performed within strict timing constraints, making them essential for systems that demand reliability, such as aerospace and medical devices. Additionally, **robot-specific languages** like the **Robot Operating System (ROS)** cater to the unique needs of robotic systems. ROS provides a flexible framework for writing software that controls robots, supporting integration with various sensors and actuators.

Scripting languages like **Lua** and **JavaScript** play an important role in automating tasks and creating dynamic applications. **JavaScript** is ubiquitous in web development, enabling interactive user experiences, while **Lua** is widely used for game development and **prototyping** due to its lightweight and fast execution. These languages allow developers to create modular and adaptive systems.

For specialized applications, **domain-specific languages** (DSLs) are tailored to specific industries or tasks. In engineering and simulation, tools like **MATLAB** and **Simulink** enable precise modeling and visualization of systems. These tools are indispensable for developing control systems, testing algorithms, and designing prototypes in fields such as aerospace, automotive, and robotics. Their ability to integrate with **simulation and visualization tools** ensures engineers can test systems in virtual environments before deployment.

As such, **Computer languages** range from general-purpose programming languages like Python and C++ to domain-specific languages like MATLAB. Whether for real-time languages in robotics, scripting languages for automation, or simulation and visualization tools for engineering, the variety of languages ensures that developers

can choose the best tools for their projects. Understanding the strengths and applications of these languages is essential for building efficient and innovative systems.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Python is a high-level programming language commonly used for image recognition and machine learning.
2. JavaScript is a real-time language frequently used in aerospace systems.
3. Robot Operating System (ROS) is a robot-specific language that provides a framework for controlling robots.
4. MATLAB and Simulink are domain-specific tools widely used in engineering and simulation.
5. Lua is a scripting language often employed in game development and prototyping.

Exercise 4: Look at the following image and describe what the code languages named in it do, and what they are primarily used for.

Grammar

Forming questions

In order to form questions with question words in the English language, one must first determine which part of the sentence the question is directed to. Different question words are directed to different types of questions and have different meanings, therefore replace different words in a sentence when asking. After all, there is no way to ask a question about who did something while also mentioning the very person that did it in the same position. Therefore, the question word must replace a part of the sentence which denotes that meaning. These are the meanings various question words replace and their examples:

Who - asking for a person and animal;

Replaces **subject;**

Do not use do, does, did after question word

Example:

Jane opened the door. - Who opened the door?

Tom helped in the garden. - Who helped in the garden?

Who - asking for a person and animal;

Replaces **object;**

Use do, does, did after question word

Example:

They greet their teacher. - Who do they greet?

He asked Mary about the burglary. - Who did they ask about the burglary?

What - asking for a thing;

Replacing **subject;**

Do not use do, does, did after question word

Example:

His ankle hurts. - What hurts?

The flower pot fell on the floor. - What fell on the floor?

What - asking for a thing;

Replaces **object;**

Use do, does, did after question word

Example:

She usually wears jeans. - What does she usually wear?

They built a castle in the sand. - What did they build in the sand?

Which - asking for a limited number of items;

Replaces **subject;**

Do not use do, does, did after question word

Example:

She likes visiting foreign countries. - Which countries has she already visited?

We should take the bus to the center. - Which bus should we take to get to the center?

Whose - asking for the 2nd case

Example:

This is Peter’s pencil. - Whose pencil is this?

Carol’s father was a drummer. - Whose father was a drummer?

When - asking for the time

Example:

I saw her yesterday. - When did you see her?

They came home at midnight. - When did they come home?

Where - asking for the place

Example:

He flew to Manchester. - Where did he fly?

He lives in a big house. - Where does he live?

Why - asking for a reason

Example:

He stayed at home because he was ill. - Why did he stay at home?

They like him because he is always friendly. - Why do they like him?

How - asking for the manner

Example:

He drove fast. - How did he drive?

My holidays were great. - How were your holidays?

How long - asking for a period of time

Example:

They stayed there for a week. - How long did they stay there?

He lived in London for a year. - How long did he live in London?

How many - asking for an exact amount

Example:

In this factory work 500 people. - How many people work in this factory?

50 kids were at his party. - How many kids were at his party?

How much - asking for not an exact amount

Example:

He gets 10 pounds pocket money a month. - How much pocket money does he get a month?

She bought three bottles of wine. - How much wine did she buy?

How often - asking for frequency

Example:

They play tennis twice a week. - How often do they play tennis?

She meets him every Friday. - How often does she meet him?

Exercise 5: Please transform the following sentences into questions using the words ‘who, whose, what’.

1. Jake never expected to write the letter with his keyboard.
2. Jenny has never been a very good poet, but her voice synthesizer is exceptional.
3. He always tries to use his own code in the program, but it never works.
4. Many companies try to create their own codebases.
5. My data set is organized neatly into blocks.

Exercise 6: Please transform the following sentences into questions using the words ‘how much, how many, how’.

1. I have created a lot of codebases over the last 10 years.
2. There is a lot of money riding on me making this program in C++.
3. There is no way I can do it properly, there is too much at stake.
4. I organized the data into blocks and automated its transfer, there was a lot of involved.
5. These instruction sets were extremely useful in organizing the processor's functions.

Exercise 7: Please put the appropriate question word at the beginning of the following sentences:

1. _____ computer is this? And _____ did it appear here?
2. _____ are you asking me about C+? It's a dead language!
3. _____did you make this program? I can't make heads or tails of its code.
4. _____ have you been standing there, watching me work?
5. _____of these is your program?
6. _____do you want from me, a program made in 3 different languages? That's impossible.
7. _____ have you already used for this project? Surely not all codebases have been accounted for.
8. _____ do you use this computer? There is so much dust here!
9. _____ is your supplier? This keyboard is top notch!
10. _____ was the last time you slept? Go to bed!

Reading

Exercise 8: Read the text and translate the words in bold text. Find sentences with question words and explain how they are used there.

How do computers process information? At the core of every computing system lies an **instruction set**, which serves as the foundation for all operations. This set defines the basic commands that a processor can execute. But what does it mean for a

computer to execute commands? It means translating high-level programming languages into machine-readable instructions, breaking complex tasks into simpler steps.

What role do **conditional branches** play in decision-making? Conditional branches are critical for determining how a program flows. They allow a computer to make decisions based on **logical comparisons**. For instance, if a condition is true, the program may execute one **block** of code; if false, it executes another. Without this branching, how could a computer adapt to dynamic situations? Think of a weather app: how does it decide whether to show sunny or rainy icons? It relies on **logical comparisons** and conditional statements to interpret the data.

Where does the data go during this process? Information is divided into **segments** or smaller chunks that the system processes sequentially or simultaneously. Each segment contains specific instructions, variables, or **data** necessary for computation. As the processor handles each segment, **code execution** takes place step by step. This organized division ensures that even large tasks can be managed efficiently. Have you ever wondered how streaming services load videos so quickly? The answer lies in how data segments are processed seamlessly.

Why is understanding code at a **code level** important for optimization? Developers often analyze code at a detailed level to identify inefficiencies. By reviewing how blocks of code interact and ensuring smooth transitions between **conditional branches**, they can improve performance. Why is this crucial? Because optimized code means faster execution and less resource consumption, making applications more efficient for users.

In summary, how do computers manage such complex tasks with apparent ease? It all boils down to the **instruction set**, **conditional branches**, and the division of tasks into **blocks** and **segments**. Every step of **code execution** relies on careful planning and execution. By understanding the intricacies of processing information, we gain insight into the remarkable capabilities of modern computing systems.

Exercise 9: Please answer the following questions according to the text.

1. What is the role of an instruction set in a computer?

A) To define the commands a processor can execute

B) To manage large amounts of data storage

C) To translate data into visual graphics

D) To divide tasks into segments

2. How do conditional branches affect code execution?

A) They divide data into equal parts for processing

B) They allow the program to make decisions based on logical comparisons

C) They define the commands in the instruction set

D) They load external data into the processor

3. Why is reviewing code at a code level important?

A) To improve the efficiency and performance of the code

B) To reduce the number of conditional branches

C) To analyze how data is stored in segments

D) To rewrite the instruction set completely

Vocabulary

Exercise 10: Connect existing code languages with computer language types as outlined in the unit.

High-Level Language	C Ada
Real-Time Language	Lua C++
Scripting Language	Java DSL
Robot-Specific Language	Python ROS
Domain-Specific Language	MATLAB Simulink
Simulation and Visualization Tool	JavaScript

Speaking

Exercise 11: Please talk about the code language you're most familiar with.

I've worked with… before…

I've studied about…

I can tell you that…

This code language is… (better/worse/different)

When comparing these codebases...

Writing

Exercise 12: Write out the differences between different levels of code languages. (10-12 sentences)

Unit 14: How Computers do Arithmetic

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is arithmetic?
2. How does a computer do arithmetic?
3. What are the basic numbers computers use for their functions?
4. What does a computer use to do math?
5. What hardware contributes the most to calculations?

Reading

Exercise 2: Read the text and translate the words in bold text.

Have you ever wondered how computers manage to do **arithmetic**? Unlike us, they don't use the **decimal system** (our usual way of counting with digits 0-9). Instead, computers rely on **binary representation**, which uses only two **digits**: 0 and 1. It's fascinating to think that everything from simple **addition** to complex algorithms is built upon these basic **binary sets**.

Let's start with **addition** and **subtraction**. When a computer adds two numbers, it stacks them like we do, almost as if they were in a **column**. For example, adding 1 and 1 in binary results in 10 (just as adding 9 and 1 in decimal gives us 10). The computer also handles **borrowing** during subtraction in a similar way, shifting values

to the left to ensure accurate results. These operations form the foundation for more complex calculations.

Now think about **multiplication** and **division**. Computers treat these operations as repeated additions or subtractions. If you ask a computer to multiply two numbers, it essentially adds one number to itself as many times as needed. Division, on the other hand, involves repeated subtraction. Can you imagine how quickly a computer has to do this to handle **millions** or even **billions** of calculations per second?

What happens when numbers get too large or too small for the system to handle? That's where **overflow** and **underflow** come in. **Overflow** occurs when a number exceeds the maximum value the computer can represent, while **underflow** happens when a number is too small to be represented accurately. These are common issues in programming, especially when dealing with very large datasets or precise scientific calculations.

Finally, there's the concept of **floating-point representation**, which allows computers to work with very large or very small numbers by representing them in a specific format. This makes it easier to perform calculations like those required in physics simulations or financial modeling. However, even with floating-point, precision can be tricky, leading to tiny rounding errors that programmers need to watch for.

In the end, while computers handle math differently from humans, their methods are incredibly efficient. From basic **binary representation** to complex **floating-point arithmetic**, they ensure we can tackle problems that require **millions** of calculations, making modern computing an essential part of our world.

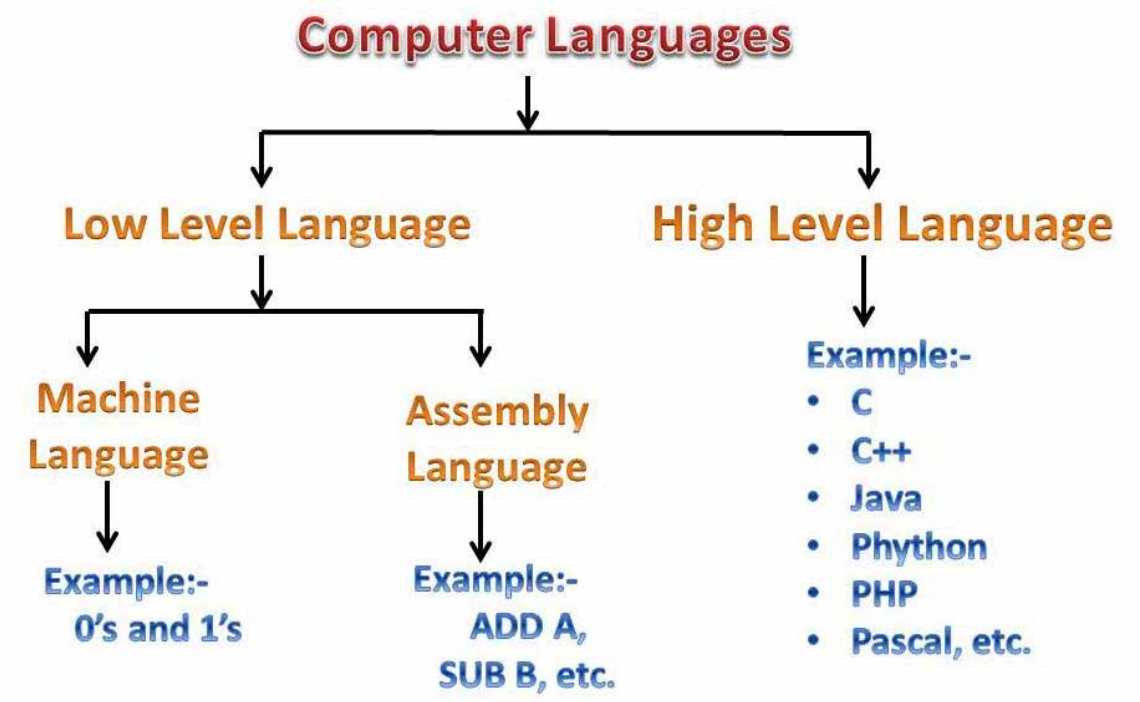
Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. Computers use the decimal system to perform arithmetic operations.
2. Binary representation involves only two digits: 0 and 1.
3. Overflow occurs when a number is too small to be represented by the computer.

4. Multiplication in computers is essentially repeated addition.

5. Floating-point representation helps computers work with very large or very small numbers.

Exercise 4: Look at the following image and describe the difference between low level languages and high level languages, and their uses.



Grammar

Conjunctions

Conjunctions are an essential part of the English language. They are connecting words that join words, phrases, clauses, or sentences together. Conjunctions serve various purposes and are used to establish relationships between different parts of a sentence or between multiple sentences.

Coordinating Conjunctions:

Usage: Coordinating conjunctions connect words, phrases, or clauses of equal importance. They are often used to join similar elements.

Words such as: "and," "but," "or," "nor," "for," "so," "yet."

Example:

"I like tea, and she prefers coffee."

"He wanted to go to the park, but it started raining."

Subordinating Conjunctions:

Usage: Subordinating conjunctions introduce dependent clauses (subordinate clauses) that cannot stand alone as complete sentences. They establish a relationship of dependence between the main clause and the subordinate clause.

Words such as: "although," "because," "while," "if," "since," "unless," "until," "after," "before."

Example:

"Although it was raining, we went for a walk."

"I'll come if I have time."

Correlative Conjunctions:

Usage: Correlative conjunctions work in pairs to join similar sentence elements. They are used to emphasize the relationship between these elements.

Words such as: "both...and," "either...or," "neither...nor," "not only...but also."

Example:

"She is both intelligent and hardworking."

"You can have either tea or coffee."

Conjunctive Adverbs:

Usage: Conjunctive adverbs are used to connect independent clauses and provide transitions between ideas. They can often be used with a semicolon or a comma.

Words such as: "however," "therefore," "meanwhile," "moreover," "nevertheless," "consequently."

Example:

"He was late; nevertheless, he made it to the meeting."

"I wanted to go; however, I couldn't find a ride."

Subordinating Conjunctions in Time Clauses:

Usage: Subordinating conjunctions like "when," "while," "as," and "since" are often used to introduce time-related clauses.

Example:

"I'll call you when I get home."

"While I was reading, the phone rang."

Conjunctions are crucial for creating clear and coherent sentences and for showing the relationships between different parts of a text. Using the appropriate conjunctions helps writers and speakers convey their ideas more effectively and maintain the flow of their language.

Exercise 5: Please put the appropriate coordinating conjunction into the following sentences.

1. The CPU performs calculations, _____ the GPU handles graphical tasks.
2. You can use either a for loop _____ a while loop for repetitive tasks.
3. Addition is fundamental _____ subtraction is its inverse operation.
4. The algorithm is efficient, _____ it requires more memory.
5. You can optimize code for speed, _____ you can optimize it for readability.
6. Multiplication is a basic arithmetic operation, _____ is division.
7. The data is stored in the array, _____ the program retrieves it when needed.
8. You can use bitwise operators to manipulate individual bits, _____ you can perform logical operations.
9. The loop runs until a certain condition is met, _____ it continues indefinitely.
10. Floating-point arithmetic allows for precise decimal calculations, _____ it may introduce rounding errors.

Exercise 6: Please put the appropriate subordinating conjunction into the following sentences.

1. _____ the algorithm is efficient, it is widely used in computer science.
2. You should debug the code _____ you run the final version.
3. _____ bitwise operations are fast, they may be hard to understand.
4. The function executes _____ a specific condition is satisfied.
5. _____ the early days of computing, addition and subtraction have been essential operations.

6. You can use a conditional statement _____ you need to execute code based on a condition.
7. _____ loops are useful when you want to repeat a block of code multiple times.
8. The CPU fetches instructions from memory _____ it needs to execute them.
9. The program executed successfully _____ all the conditions were met.
10. _____ the variable is null, an error may occur during execution.

Exercise 7: Please put the appropriate correlative conjunctions into the following sentences.
1. _____ addition and subtraction are fundamental operations in arithmetic.
2. _____ the CPU nor the GPU can function without proper cooling.
3. _____ does the program compile quickly, but it _____ runs efficiently.
4. _____ optimize the code for speed, or optimize it for readability.
5. _____ you use a for loop or a while loop depends on the specific task.
6. _____ the RAM and the hard drive contribute to a computer's memory.
7. _____ the algorithm nor the data structure was well-suited for the task.
8. _____ did the program crash, but also it caused data loss.
9. _____ you prefer Linux or Windows, the programming language remains the same.
10. _____ the user input is valid, or an error message is displayed.

Reading

Exercise 8: Read the text and translate the words in bold text. Find all existing conjunctions, rewrite the text connecting as many sentences using conjunctions as possible.

When working with **number bases**, such as binary, computers need a way to represent both **positive numbers** and **negative numbers**, and they do this using **signed numbers**. Although there are several methods to handle this, **two's complement** is the most commonly used because it simplifies arithmetic operations. In two's complement, the **most significant bit** (MSB) acts as the **sign bit**, indicating

whether a number is positive or negative. If the MSB is 0, the number is positive; if it is 1, the number is negative.

Additionally, the **least significant bit** (LSB) holds the smallest value in the number's binary representation, which contributes to its total value. While **leading 0's** in a binary number indicate padding or extra space, **leading 1's** in two's complement signify a negative value. This clever system makes it possible for computers to handle signed arithmetic operations efficiently and reliably, even though it might seem complex at first.

Exercise 9: Please answer the following questions according to the text.

1. What does the most significant bit (MSB) represent in two's complement?

A) The smallest value in the binary number

B) The sign bit indicating positivity or negativity

C) The total sum of all bits

D) The value of leading 0’s

2. How does two's complement indicate a negative number?

A) With the least significant bit set to 1

B) By using leading 0's

C) With the most significant bit set to 1

D) By adding a sign bit to the LSB

3. What is the role of the least significant bit (LSB) in a binary number?

A) It represents the sign of the number

B) It contributes the smallest value to the total

C) It indicates the magnitude of leading 1's

D) It determines whether the number is positive or negative

Vocabulary

Exercise 10: Please connect the following words with their definitions.

Word	Definition
1. Multiplication	A. A mathematical operation that combines numbers to find their product.
2. Decimal system	B. A numerical value that includes information about its sign (positive or negative).
3. Column	C. The base or radix used in a numeral system, such as base 10 (decimal) or base 2 (binary).
4. Overflow	D. In data and databases, a vertical arrangement of data elements within a table.
5. Digit	E. A digit '1' appearing at the beginning of a numerical value.
6. Number base	F. A numerical symbol (0-9) used in numeral systems, including the decimal system.
7. Signed number	G. A base-10 numbering system that uses ten digits (0-9) to represent numbers.
8. Leading 1's	H. The rightmost bit in a binary number, representing the smallest value.
9. Most significant bit	I. When data exceeds the capacity of a container or system, causing errors or unexpected behavior.
10. Least significant bit	J. The leftmost bit in a binary number, representing the largest value.

Speaking

Exercise 11: Please speak about how you could revolutionize the way computers use math.

With this, I could…

Computers can use the following…

I believe that…

Writing

Exercise 12: Write about how a computer's mathematical system works, from the point of view of their processor. (10-11 sentences)

Module 3 Test

Task 1 - Translate the following sentences into Ukrainian.

1. The Turing machine is a fundamental concept in the theory of computation.
2. Control systems rely on feedback to ensure stability in dynamic environments.
3. Python and JavaScript are widely used computer languages for automation tasks.
4. Computers perform arithmetic operations in binary, using only two digits: 0 and 1.
5. The decimal system and units of measurement like meters and seconds are essential in robotics calculations.

Task 2 - Fill in the gaps.

The _____ is a theoretical model used to define the limits of what can be computed.

A) Decimal system B) Turing machine

C) Control system D) Algorithm

_____ languages like Python are easy to read and widely used in software development.

A) Real-time B) High-level

C) Arithmetic D) Feedback

In binary arithmetic, numbers are represented using only two _____.

A) Units B) Systems

C) Digits D) Columns

_____ measure frequency and are often used to describe processor speeds.

A) Bytes B) Hertz

C) Meters D) Ohms

Control systems use _____ to adjust operations in response to external factors.

A) Feedback B) Overflow

C) Algorithms D) Units

_____ comparisons allow computers to decide between different paths in a program.

A) Logical B) Control

C) Arithmetic D) Feedback

In the _____, the most significant bit determines whether a number is positive or negative.

A) Decimal system B) Floating-point system

C) Two's complement D) Feedback loop

_____ is used to process large datasets efficiently in simulation and modeling tasks.

A) MATLAB B) Turing machines

C) Feedback systems D) Units of measurement

The principle of _____ helps optimize the performance of algorithms in control systems.

A) Overflow B) Automation

C) Locality D) Arithmetic

The _____ language is designed specifically for modeling and simulating control systems.

A) Python B) Simulink

C) JavaScript D) Binary

Task 3 - Write a text explaining how computer code interacts with control systems to manage tasks like feedback, automation, and dynamic adjustments. (15 sentences)

Glossary

3D design	3D дизайн
3D modeling	3D моделювання
3D rendering	3D рендеринг
actuator	виконавчий пристрій
adaptive	адаптивний
addition	додавання
adoption	ухвалення
aerospace	аерокосмічний
aesthetics	естетика
affordability	доступність
agriculture	сільське господарство
algorithm	алгоритм
algorithmic	алгоритмічний
ampere (A)	ампер (A)
amplifier	підсилювач
analog	аналоговий
analog computer	аналоговий комп'ютер
analog sensor	аналоговий датчик
analogous	аналогічний
analyze	аналізувати
anonymous	анонімний
anti-malware	антивірус
antivirus	антивірус
application software	застосункове програмне забезпечення
archive	архів
artificial intelligence (AI)	штучний інтелект (ШІ)
assembly	асемблер
assist	допомагати

audio	аудіо
audio jack	аудіороз'єм
audiophile	аудіофіл
automata theory	теорія автоматів
automation	автоматизація
autonomous	автономний
autonomous weapon	автономна зброя
avenue	шлях
backbone	основа
backup	резервне копіювання
bias	відхилення
billion	мільярд
binary code	двійковий код
binary representation	двійкове представлення
binary set	двійковий набір
bit	біт
borrow	позичати
brimming	переповнений
buffer	буфер
built-in	вбудований
burgeoning	стрімкий ріст
bus speed	швидкість шини
byte	байт
cache	кеш
cache conflict	конфлікт кешу
cache line	лінія кешу
cache miss	промах кешу
capacity	потужність
capacity miss	втрата потужності
category	категорія
Cathode-Ray Tube (CRT)	катодно-променева трубка (КПТ)

celsius (°C)	градус Цельсія (°C)
centimeter (cm)	сантиметр (см)
Central Processing Unit (CPU)	центральний процесор (ЦП)
chat	чат
clock speed	тактова частота
cloud storage	хмарне сховище
cloud-based	заснований на хмарі
cluster	кластер
code	код
code execution	виконання коду
code level	рівень коду
codebase	кодова база
cognition	когніція
cold miss	промах за низької температури
column	колонка
Compact Disc (CD)	Компакт-диск (CD)
comprehensive	всебічний
computation	обчислення
computer arithmetic	комп'ютерна арифметика
computer cluster	комп'ютерний кластер
computer function	функція комп'ютера
computer language	мова програмування
computer science	інформатика
conceivable	уявний
condition	умова
conditional branch	умовний перехід
conflict miss	конфлікт кеш-промаху
consequence	наслідок
consolidate	консолідація
contextual detail	контекстуальний деталь
contiguous	суміжний

continuous	безперервний
continuous signal	неперервний сигнал
convergence	збіжність
cooling solution	система охолодження
core	ядро
corrective action	виправний захід
corrupt file	пошкоджений файл
cost-effectiveness	вартість та ефективність
critical component	критичний компонент
crucial role	ключова роль
cutting-edge	передовий
cyber threat	кіберзагроза
cybersecurity threat	кібербезпека загроза
cyberspace	кіберпростір
data	дані
data block	блок даних
data loss	втрата даних
data processing	обробка даних
data segment	сегмент даних
data transfer rate	швидкість передачі даних
decentralized system	децентралізована система
decimal system	десяткова система
decision-making	прийняття рішень
declarative memory	декларативна пам'ять
defragmentation	дефрагментація
desktop	робочий стіл
develop	розробляти
digit	цифра
digital computer	цифровий комп'ютер
digital shield	цифровий щит
Digital Signal Processor (DSP)	цифровий сигнальний процесор

	(DSP)
Digital Versatile Disc (DVD)	цифровий універсальний диск (DVD)
digitize	цифрувати
direct-mapped cache	прямодоступний кеш
discrete signal	дискретний сигнал
discrimination	дискримінація
disk cleanup	очищення диска
display	дисплей
distributed computing	розподілена обчислювальна система
distro	дистрибутив
division	ділення
domain-specific language	мова, специфічна для області
dot matrix printer	точковий матричний принтер
Double Data Rate Synchronous Dynamic Random Access Memory (DDR SDRAM)	Динамічна оперативна пам'ять з подвійною частотою передачі даних і синхронною динамікою доступу (DDR SDRAM)
download	завантажити
driver	драйвер
driver	драйвер
drone	безпілотник
DVORAK	ДВОРАК
dynamic	динамічний
dynamic environment	динамічне середовище
Dynamic Random Access Memory (DRAM)	Динамічна оперативна пам'ять (DRAM)
E-commerce	Електронна комерція (е-комерція)
e-mail	електронна пошта
editing	редагування
electronic device	електронний пристрій

electronics	електроніка
email client	поштовий клієнт
embark	почати, розпочати
embedded computer	вбудований комп'ютер
empower	надавати можливість
enabler	засіб, що дозволяє
endeavour	намагання, зусилля
energy-efficient	енергоефективний
enterprise environment	підприємницьке середовище
episodic memory	епізодична пам'ять
error	помилка
Error-Correcting Code RAM (ECC RAM)	RAM із кодом коригування помилок (ECC RAM)
essential	важливий, необхідний
evaluate	оцінювати
experimental	експериментальний
external factor	зовнішній фактор
failure	відмова
familiarity	знайомство
fans	вентилятори
fascinating	захоплюючий
Fedora	Федора
feedback	зворотний зв'язок
fine-tuned	дотонко налаштований
firewall	брандмауер
fix	виправляти
flash memory	флеш-пам'ять
floating-point	рухома кома
floating-point representation	представлення рухомої коми
floppy disk	гнучкий диск

force	сила
fragmentation	фрагментація
frequency	частота
fully associative cache	повністю асоціативний кеш
function key	клавіша функції
game-changer	гравець, який міняє гру (змінююча величина)
giga (G)	гіга
gigahertz (GHz)	гігагерц (GHz)
Google	Google
government agency	урядова агенція
graphic design	графічний дизайн
Graphical User Interface (GUI)	Графічний інтерфейс користувача (GUI)
Graphics Processing Unit (GPU)	Графічний процесор (GPU)
groundbreaking	першопрохідний
hacker	хакер
hands-on experience	практичний досвід
Hard Disk Drive (HDD)	Жорсткий диск (HDD)
hardware	апаратне забезпечення
harmoniously	гармонійно
headphones	навушники
healthcare	охорона здоров'я
herz (Hz)	герц (Гц)
hierarchical	ієрархічний
high-end	висококласний
high-level language	мова високого рівня
hit rate	частота попадань
human intervention	втручання людини
hybrid	гібридний
hybrid computer	гібридний комп'ютер
identity theft	крадіжка ідентичності

image recognition	розпізнавання зображень
in-ear	внутрішньовушний
index	індекс
indispensable	невід'ємний
industrial automation	промислова автоматизація
information	інформація
inkjet printer	струменевий принтер
Input/Output (I/O) device	пристрій введення/виведення (I/O)
Instagram	Instagram
instruction set	набір інструкцій
integral	інтегральний
integrated graphics	вбудована графіка
interact	взаємодіяти
interactivity	взаємодія
interconnected	взаємопов'язаний
interface	інтерфейс
International System of Units (SI)	Міжнародна система одиниць (SI)
Internet of Things (IoT)	Інтернет речей (IoT)
internet security	інтернет-безпека
interplay	взаємодія
intertwined	переплетений
IT specialist	IT-спеціаліст
iterative	ітеративний
job displacement	втрата робочих місць
journey	подорож
keyboard	клавіатура
kilo	(k) кіло
lambda calculus	лямбда-ісчислення
laptop	ноутбук
laser printer	лазерний принтер

layer	шар
leading 0	провідний 0
leading 1	провідний 1
least significant bit	менший значущий біт
leisure	дозвілля
life-and-death decision	рішення життєвого і смертельного характеру
linchpin	опора, головна ланка
link	посилання
liquid cooling system	рідинна система охолодження
Liquid Crystal Display (LCD)	рідкокристалічний дисплей (LCD)
logical comparison	логічне порівняння
logical thinking	логічне мислення
logician	логік
logistics	логістика
long-term memory	довгострокова
loop	цикл
Low-Power Double Data Rate Synchronous Dynamic RAM (LPDDR)	Динамічна оперативна пам'ять з подвійною частотою передачі даних і синхронізацією
lowercase	рядковий регістр (LPDDR)
machine learning (ML)	машинне навчання (ML)
magnetic tape	магнітна стрічка
mainframe computer	мейнфрейм
maintain	утримувати
malware	вредоносний код (малвар)
managing	управління
manipulate	маніпулювати
manufacturing	виробництво
marquee	маркіз
mathematics	математика

media player	медіапрогравач
medical robot	медичний робот
mega	(M) мега
memory hierarchy	ієрархія пам'яті
mesmerizing	захоплюючий
meter (m)	метр (м)
meticulous	дбайливий
micro	(μ) мікро
microcontroller	мікроконтролер
microphone	мікрофон
milestone	важливий етап
milli	(m) мілі
million	мільйон
minicomputer	мінікомп'ютер
minimize	мінімізувати
mobile computer	мобільний комп'ютер
monitor	монітор
most significant bit	найбільш значущий біт
motherboard	материнська плата
mouse	миша
multidisciplinary	багатодисциплінарний
multifaceted	багатогранний
multimedia	мультимедіа
multimedia controls	елементи управління мультимедіа
multiplayer	багатокористувацький
multiplication	множення
nano	(n) нано
nanometers	нанометри
navigation	навігація
negative number	від'ємне число

neglect	нехтувати
network	мережа
network traffic	мережевий трафік
newton (N)	ньютон (Н)
non-standard	нестандартний
nonlinear	нелінійний
NP-completeness	NP-повнота
nuance	відтінок
number base	система числення
object	об'єкт
ohm (Ω)	ом (Ω)
on-ear	на вухо
on-the-go	в русі, на ходу
onboard	вбудований
online account	онлайн-акаунт
ontology	онтологія
open-loop	відкритий цикл
open-source	відкритий код
Operating System (OS)	операційна система (ОС)
optical technology	оптична технологія
optimization	оптимізація
option	опція
output	вивід
over-ear	навколо вуха
overflow	переповнення
painting	малювання
paradigm	парадигма
paramount	найважливіший
password	пароль
PC	ПК (персональний комп'ютер)
perceive	сприймати

personalization	персоналізація
phenomenon	явище
phishing	фішинг
physics	фізика
pico	(p) піко
pivotal	ключовий
poised	готовий
positive number	додатне число
Power Supply Unit (PSU)	блок живлення (БЖ)
powered off	вимкнений
precursor	передвісник
predefined	передбачений
predictive	передбачуваний
prefix	префікс
presentation software	програмне забезпечення для презентацій
principle of locality	принцип локальності
printer	принтер
privacy breach	порушення конфіденційності
problem-solving skills	навички вирішення проблем
procedural memory	процедурна пам'ять
process	процес
process control	управління процесом
proficient	вправний
programming	програмування
programming language	мова програмування
protocol	протокол
prototyping	прототипування
prowess	майстерність
punched card	перфокартка
quantum	квантовий

quantum computing	квантове обчислення
radian (rad)	радіан (rad)
Random Access Memory (RAM)	оперативна пам'ять (ОЗП)
ransomware	викупне програмне забезпечення
real-time data	дані в реальному часі
real-time language	мова реального часу
rearrange	перестановка
recipe	рецепт
recollection	відтворення
refreshing	оновлення
registry	реєстр
rehabilitation	реабілітація
render	відтворювати
reorganize	переорганізація
repair	ремонт
represent	представляти
Research and Development (R&D)	науково-дослідницька робота (НДР)
reshuffle	переміщення
resource-demanding	вимогливий до ресурсів
resource-intensive	вимагаючий багато ресурсів
responsiveness	реактивність
risk	ризик
Robot Operating System (ROS)	Робототехнічна операційна система (ROS)
robot-specific language	мова, специфічна для роботів
robotics	робототехніка
rotational motion	обертальний рух
rudimentary	примітивний
safeguard	захист
scalability	масштабованість

scam	шахрайство
scanner	сканер
science fiction	наукова фантастика
scratchpad	блокнот
Scripting language	мова сценаріїв
seamless	безшовний
seamless integration	безшовна інтеграція
seamlessly	безперервно
second (s)	секунда (с)
self-driving	автономний
semantic memory	семантична пам'ять
sensor	сенсор
sequential	послідовний
sequential data access	послідовний доступ до даних
set-associative cache	кеш асоціативного типу
setpoint	задане значення
short-term memory	короткострокова пам'ять
sign bit	біт знака
signed number	знакове число
simulation tool	інструмент симуляції
simulink	simulink
simultaneous	одночасний
skills	навички
sleek	елегантний
smart robotics	розумна робототехніка
smartphone	смартфон
smartwatch	смарт-годинник
social media	соціальні мережі
soft-robotics	м'яка робототехніка
software	програмне забезпечення
software compatibility	сумісність програмного забезпечення

Solid-State Drive (SSD)	твердотільний накопичувач (SSD)
solve	вирішувати
sophisticated	вишуканий
sound card	звукова карта
spatial locality	просторова локальність
specialist	спеціаліст
spreadsheet	електронна таблиця
spyware	шпигунське програмне забезпечення
Static Random Access Memory (SRAM)	Статична оперативна пам'ять (SRAM)
stationary computer	стаціонарний комп'ютер
statistics	статистика
storage device	пристрій зберігання
store	зберігати
stored-program	програмний метод
streamline	оптимізувати
subfield	підгалузь
subsystem	підсистема
subtraction	віднімання
supercomputer	суперкомп'ютер
superintelligent AI	суперінтелект ШІ
swarm robotics	ройова робототехніка
synchronize	синхронізувати
tag check	перевірка тегу
temporal locality	часова локальність
tera	(T) тера
theory	теорія
theory of computation	теорія обчислень
thermostat	термостат
touchpad	сенсорна панель
training model	модель навчання
transferable	передавальний

transformative	трансформаційний
transforming	трансформація
transparent	прозорий
transportation	транспорт
trend	тенденція
Turing machine	машина Тьюрінга
tutorial	навчальний посібник
Twitter	Твіттер
Two-Factor Authentication (2FA)	двофакторна аутентифікація (2FA)
two's complement	двійкова доповнювальна форма
underflow	недоповнення
underpin	підтримувати
unwind	розгортати
upload	завантаження
uppercase	прописні літери
USB drive	USB-накопичувач
USB port	USB-порт
user-driven	користувацько-орієнтований
user-friendly	зручний для користувача
vacuum	вакуум
variable	змінна
variety	різноманіття
vehicle	транспортний засіб
verification code	код підтвердження
video editing	відеомонтаж
Virtual Private Network (VPN)	віртуальна приватна мережа (VPN)
visualization tool	інструмент візуалізації
volatile	летючий
volt (V)	вольт (В)
watt (W)	ватт (Вт)
wattage	потужність

web-centric	зорієнтований на веб
website	веб-сайт
welding	зварювання
Wi-Fi network	бездротова мережа Wi-Fi
wired	з'єднаний дротом
wireless	бездротовий
workstation	робоча станція
World Wide Web (WWW)	всесвітня мережа (WWW)
wristwatch	наручний годинник
YouTube	Ютуб

Methodological recommendations

This English language workbook is developed and recommended primarily for part-time students enrolled in the course “Automation, Computer-Integrated Technologies, and Robotics”. This field deals with computer technologies as a primary specialty, therefore knowledge of the English language, as the lingua franca of the technical world, is incredibly important to learn. It is the basis for nearly every computer language popular in the modern world. By mastering special English vocabulary and grammar in their field, students will be able to communicate with specialists from other nations and enter the global community of experts.

This guide is divided into three primary modules. They are designed to gradually introduce students to concepts from the specialty by drawing on their existing experience with computer technologies, and introducing them into a broader context.

The first module is focused primarily on the basics of computer engineering technologies and its integration with automation and robotics. It is the foundation for all later modules.

The second module is a transitionary module between the first and the third, and integrates other things that students of this specialty must know about the basics of computers, such as the internet and how to use it, how operating systems affect work with automation and robotics, and what types of memory there are, building on the storage devices learned in the first module.

The third module focuses entirely on the advanced topics connected to the students’ specialty, such as precise units of measurement in automation, the theory of computation, control systems, and how computers process information.

Unit/Topic	Expected amount of hours per unit/topic according to type of learning	
	part-time learning	
	practical	individual
Module 1 - Foundations of Computer Engineering and Related Technologies		
Unit 1: Computer Science,	2	13

Automation and Robotics		
Unit 2: Computers	2	13
Unit 3: Input/Output Devices	2	13
Unit 4: Storage Devices	2	13
Unit 5: Hardware Overview	1	11
Test for module 1	1	
Total for module 1	10	63
Module 2 - Internet, Operating systems, and Security		
Unit 6: Operating systems	2	13
Unit 7: The Internet and its History	2	13
Unit 8: Internet Security	2	13
Unit 9: Types of memory	2	13
Test for module 2	1	
Total for module 2	9	52
Module 3 - Automation and Computational Systems in Robotics		
Unit 10: Units of Measurement	2	13
Unit 11: Theory of computation	2	13
Unit 12: Control Systems	2	13
Unit 13: Computer languages	2	13
Unit 14: How Computers do Arithmetic	2	13
Test for module 3	1	
Total for module 3	11	65
Total	30	180

Each unit is constructed following a similar structure, which introduces the topic with questions related to it, texts which introduce relevant lexical units, grammatical rules and exercises related to them, using the previously learned words and phrases, and creative exercises that focus on the use of the vocabulary.

This workbook is structured in such a way that it can be used both online and offline, however, it is focused on giving part-time students a chance to learn everything at their own pace.

The primary focus of this guide is individual learning, focusing on exercises which can be completed alone, without collaboration with other students. However, some of the more creative writing and speaking assignments recommend working in pairs to create dialogues or debates on certain topics, which is aimed at groups of students, rather than individuals. In case collaborative work is impossible, these exercises can be modified for individual completion.

Suggested methods of testing include by-unit tests, in which students complete tests after each unit, and by-module tests, in which students complete tests after each completed module. Examples of by-module tests can be found on the next page. Specific vocabulary and grammar tested must be determined by the teacher. Exam control can be similar to by-module tests, only encompassing both modules.

This book can be used as both primary and secondary study material which the teacher and part-time students of this specialty can use to acquire and practice their knowledge of English in relation to the specialty "Automation, computer-integrated technologies and robotics".

Exam Test Sample

I. Speak on the following topic.
The modern field of automation and robotics is increasing in complexity each year, requiring new specialists in the field to have more knowledge before entering the field. What do you think about this rise in complexity? Should we expect this field to become even more complex? What could help us deal with this problem?

II. Choose the correct words to complete the text.
In 1965, computer engineer Gordon Moore made a remarkable **1.** _____. He said that computer processing power should **2.** _____ every two years. While the rate **3.** _____, the overall trend actually follows it quite closely. This theory is known as **4.** _____.
Moore's law is based on various factors. As manufacturing improves, the cost of **5.** _____ decreases. The decline in cost corresponds to a rise in production. Engineers can afford to place more transistors on each circuit. As a result, computing power increases at a steady rate.
However, not everyone benefits from such rapid **6.** _____. As computing power expands, older models fade quickly into **7.** _____. Even though costs have decreased, computers are still expensive for some. Many **8.** _____ cannot afford a new computer every two years.
Some **9.** _____ predict that the trend will not last. They suggest that growth will begin to stabilize in a few years. If predictions are correct, **10.** _____ may double in three years instead of two.

obsolescence, Moore's law, prediction, double, transistors, analysts, growth, improvements, fluctuates, average consumers

III. Choose the word that fits the definition best.
1. A(n) _____ is a mouse that uses LEDs to track hand movements across a surface.
A. electromechanical B. laser C. optical D. ball
2. A(n) _____ is an electrical current that changes the direction it flows in at regular intervals.
A. direct current B. alternating current C. changing current D. steady current
3. A(n) _____ is a general course of study that students take to prepare for a degree program.
A. national course B. intensity C. foundation D. basic course
4. If something is _____, it is new, creative, and advanced.
A. cool B. smart C. innovative D. outdated
5. _____ is the amount of power in an electrical current.
A. Newton B. Ampere C. Ohm D. Wattage
6. A(n) _____ is a place where a user enters and receives information from a computer system.
A. keyboard B. UI C. terminal D. interface
7. A(n) _____ is a part of a whole number, such as a quarter or half.
A. frame B. bit C. morpheme D. fraction
8. A(n) _____ is a piece of hardware that directs information around a network.
A. router B. modem C. antenna D. network
9. _____ is a force that attracts bodies with mass towards each other.
A. Newton B. Speed C. Resistance D. Gravity
10. A(n) _____ is a unit of measurement with a prefix based on factors of ten.
A. IEC unit B. IBM unit C. SI unit. D. CRT unit

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