Confirmation of qualifications

To get started on today's tasks, demonstrate your knowledge level.

Prove that you are ready for the brainstorm!

Confirmation of qualifications

What is a variable ?
How is it created?

Confirmation of qualifications

What is a variable ?
How is it created?

A **variable** is a data element that has its own name.

To use a variable in a program, you need to:

- create a variable by giving it a **name**;
- set the variable's **value**.

Example:

```
hours = 6
```

Confirmation of qualifications

Which operator can change the value of a variable?

Confirmation of qualifications

Which operator can change the value of a variable?

The **assignment operator** can change the value of an existing variable.

```
hours = 6

hours = 7.5

print(hours)
```

Changing the initial value

The program will print:
7.5

Confirmation of qualifications

Choose the good variable names. Explain your choice.

`a`

`encryption`

`username`

`WWW`

`total_amount_of_students`

`book_title`

`pr`

Confirmation of qualifications

Choose the good variable names. Explain your choice.

Confirmation of qualifications

Meaning is unclear

`a`

Name is unreadable

`encryption`

Meaning is unclear

`WWW`

`username`

Name is too long

`total_amount_of_students`

`book_title`

Meaning is unclear

`pr`

Which data types do you know?

Confirmation of qualifications

Which data types do you know?

We know three:

- **integer** numbers,
- **decimal** fractions,
- **strings**.

Numbers		*Strings*
144	Integer number (int)	`'John'` (str)
48.3	Decimal fraction (float)	`'256'`(str)
(2*11)	Integer number (int)	`'15.05.2007'` (str)
(4*8.2)	Decimal fraction (float)	`'Data received'` (str)

Confirmation of qualifications

Which function is used to input data from the keyboard?

Confirmation of qualifications

Which function is used to input data from the keyboard?

`input()` is a function to input data from the keyboard.

```
result = input('Phrase')
```

The result of the algorithm's execution: *a string variable*.

The name of the function that reads the data.

A hint for users.

Confirmation of qualifications

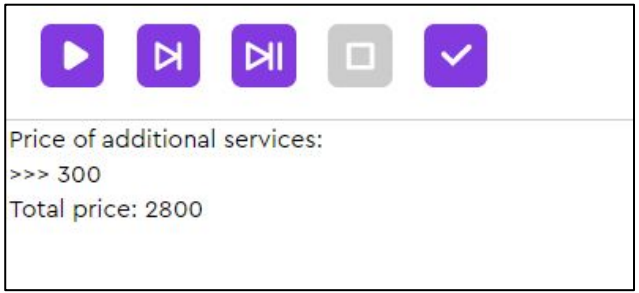
Which functions are used to switch from one data type to another ? When are they used?

Confirmation of qualifications

Which functions are used to switch from one data type to another ? When are they used?

`int()` and `str()` functions are used to switch from one data type to another.

```
add_services = input('Price of additional services:')
add_services = int(add_services)
total = 2500 + add_services
print('Total price:', total)
```



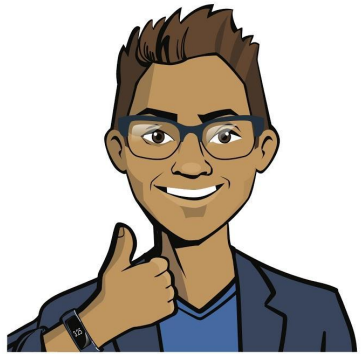
The **result** of the `input` function's execution is a **string**, not a number.

We need to switch from the string type to the integer.

Confirmation of qualifications

Qualifications confirmed!

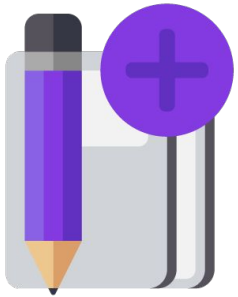
Great, you are ready to brainstorm and complete your work task!



Confirmation of qualifications

Brainstorm:

Strings



String variables

To learn to extract information from strings, let's begin by programming some simple cases for the "Sunflower" facility.

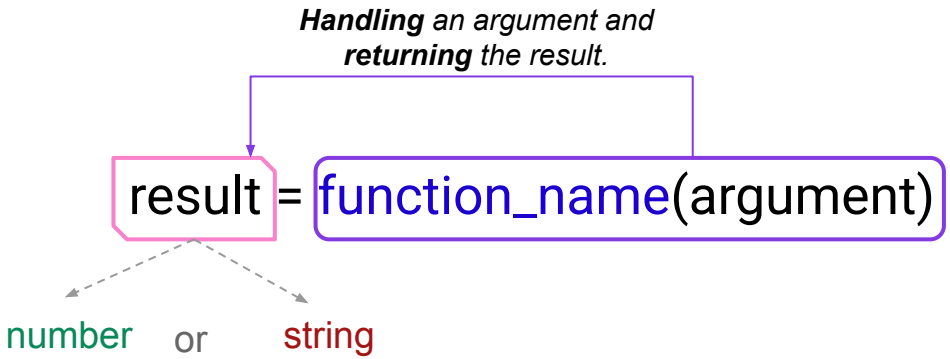
Query	*Required skills*
The manager offers a discount for large comments.	**Determine the length** of a string.
The gym part of the comment may be saved for advertising	**Cut a part out of** a string.
The chef is interested in mentions of the summer menu.	**Search for** a word or phrase in a string.
The manager appreciates comments containing the word “cozy”	**Search for** a word or phrase in a string.

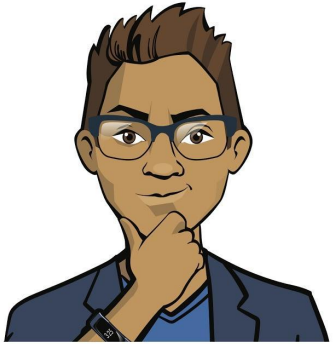
Brainstorm

String variables

All the functions we will look at later **return** a **value** of some kind as a result.

This makes sense, since we want to extract some information from a string. This information can be saved in a dedicated variable.





Brainstorm

Operations on string variables

Task 1: Customers who post large comments are rewarded with discounts. Write a program that prints the length of a comment:

"A fantastic place!"

```
length = len(string)
```

this function obtains the length of a string provided in parentheses.
The returned value is the number of characters in the string.

Program	*Program will print*
`feedback = 'A fantastic place!'` ?	`18`

Brainstorm

Operations on string variables

Task 1: Customers who post large comments are rewarded with discounts. Write a program that prints the length of a comment:

"A fantastic place!"

```
length = len(string)
```

this function obtains the length of a string provided in parentheses.
The returned value is the number of characters in the string.

Program	*Program will print*

`feedback = 'A fantastic place!'`
`length = len(feedback)`
`print(length)`
	`18`

Brainstorm

Operations on string variables

Task 2: The facility manager has asked us to cut out and save the part about the gym for advertising. Write a program that prints the required part of the comment:

“Went for boxing. A good beach”

Brainstorm

How can we print at least one character of the comment?

Operations on string variables

Task 2: The facility manager has asked us to cut out and save the part about the gym for advertising. Write a program that prints the required part of the comment:

“<u>Went for boxing</u>. A good beach”

W	e	n	t		f	o	r		b	o	x	i	n	g	.
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

...

Python enumerates characters starting from zero.

In Python, the string is an object consisting of multiple elements – characters.

Brainstorm

Operations on string variables

Task 2: The facility manager has asked us to cut out and save the part about the gym for advertising. Write a program that prints the required part of the comment:

“Went for boxing. A good beach”

W	e	n	t		f	o	r		b	o	x	i	n	g	.
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...

```
symbol = feedback[0]
```

this is a tool that obtains a single character based on its number.
A character's number is specified in [].

Brainstorm

Operations on string variables

Task 2: The facility manager has asked us to cut out and save the part about the gym for advertising. Write a program that prints the required part of the comment:

"Went for boxing. A good beach"

W	e	n	t		f	o	r		b	o	x	i	n	g	.
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

...

Program	*Program will print*

`feedback = 'Went for boxing. A good beach'`
`symbol = feedback[0]`
`print(symbol)`
	W

Brainstorm

Operations on string variables

Task 2: The facility manager has asked us to cut out and save the part about the gym for advertising. Write a program that prints the required part of the comment:

“<u>Went for boxing</u>. A good beach”

W	e	n	t		f	o	r		b	o	x	i	n	g	.
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

A		g	o	o	d		b	e	a	c	h
16	17	18	19	20	21	22	23	24	25	26	27

To obtain a part of a substring, you need to know the start and end numbers of the required part.

Brainstorm

Operations on string variables

Task 2: The facility manager has asked us to cut out and save the part about the gym for advertising. Write a program that prints the required part of the comment:

*"**W**ent for boxin**g**. A good beach"*

w	e	n	t		f	o	r		b	o	x	i	n	g	.
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
															...

`feedback[0:15]` – you can get a part of the string by specifying in square brackets the number of the beginning and the number following the end of the substring.

Numbers are separated by a colon.

Brainstorm

Operations on string variables

Task 2: The facility manager has asked us to cut out and save the part about the gym for advertising. Write a program that prints the required part of the comment:

"Went for boxing. A good beach"

w	e	n	t		f	o	r		b	o	x	i	n	g	.
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

...

Program	*Program will print*

`feedback = 'Went for boxing. A good beach'`
`sport = feedback[0:15]`
`print(sport)`
	Went for boxing

Brainstorm

Operations on string variables

Task 3a : The chef wants to know if their summer menu is mentioned in the comments. Write a program that determines if a comment contains the word “paella”:

“We liked Chef's paella”

```
position = feedback.find('paella')
```

is a function for searching a string for a word specified in parentheses.

Brainstorm

Operations on string variables

Task 3a : The chef wants to know if their summer menu is mentioned in the comments. Write a program that determines if a comment contains the word “paella”:

“We liked Chef's paella”

```
position = feedback.find('paella')
```

is a function for searching a string for a word specified in parentheses.

Number of the first character in “paella”.

W	e		l	i	k	e	d		C	h	e	f	'	s		p	a	e	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	...

Brainstorm

Operations on string variables

Task 3a : The chef wants to know if their summer menu is mentioned in the comments. Write a program that determines if a comment contains the word “paella”:

“We liked Chef's paella”

```
position = feedback.find('paella')
```

is a function for searching a string for a word specified in parentheses.

Program	*Program will print*

`feedback = 'We liked Chef's paella'`
`position = feedback.find('paella')`
`print(position)`
	`16`

Brainstorm

Operations on string variables

Task 3b : The chef wants to know if their summer menu is mentioned in the comments. Write a program that determines if a comment contains the word “paella”:

“We liked the pizza with pineapples”

```
position = feedback.find('paella')
```

is a function for searching a string for a word specified in parentheses.

Program	*Program will print*

`feedback = 'We liked the pizza with pineapples'`
`position = feedback.find('paella')`
`print(position)`
	`-1`
	
	This word is absent.

Brainstorm

Operations on string variables

Task 4. The manager also requested a search for comments containing the word “cozy”. When leaving, they noticed that some visitors' comments contain the single word “cozy”.

“Cozy”, “hotel's cozy”

Program	*Program will print*

`feedback1 = 'Cozy!'`
`feedback2 = 'Hotel's cozy'`
`position1 = feedback1.find('cozy')`
`position2 = feedback2.find('cozy')`
`print(position1)`
`print(position2)`
	What will the program print?

Brainstorm

Operations on string variables

Task 4. The manager also requested a search for comments containing the word “cozy”. When leaving, they noticed that some visitors' comments contain the single word “cozy”.

“Cozy”, “hotel's cozy”

Program	*Program will print*

`feedback1 = 'Cozy!'`
`feedback2 = “Hotel's cozy”`
`position1 = feedback1.find('cozy')`
`position2 = feedback2.find('cozy')`
`print(position1)`
`print(position2)`
	`-1`
	`8`
	
	Why?!

Brainstorm

Operations on string variables

Task 4. The manager also requested a search for comments containing the word “cozy”. When leaving, they noticed that some visitors' comments contain the single word “cozy”.

“Cozy”, “hotel's cozy”

Compare:

C	o	z	y		!
0	1	2	3	4	5

H	o	t	e	l	'	s		c	o	z	y
0	1	2	3	4	5	6	7	8	9	10	11

Brainstorm

Operations on string variables

Task 4. The manager also requested a search for comments containing the word “cozy”. When leaving, they noticed that some visitors' comments contain the single word “cozy”.

“Cozy”, “hotel's cozy”

Compare:

C	o	z	y	_	!
0	1	2	3	4	5

Uppercase letter

H	o	t	e	l	'	s		c	o	z	y
0	1	2	3	4	5	6	7	8	9	10	11

Lowercase letter

Right! We know from the code style rules that the case matters! What could help us with this issue?

Brainstorm

Operations on string variables

Task 4. The manager also requested a search for comments containing the word “cozy”. When leaving, they noticed that some visitors' comments contain the single word “cozy”.

“Cozy”, “hotel's cozy”

`feedback = feedback.lower()` — this function converts all the letters in a string into lowercase.

C	o	z	y	_	!
0	1	2	3	4	5

→

c	o	z	y	_	!
0	1	2	3	4	5

Brainstorm

Operations on string variables

Task 4. The manager also requested a search for comments containing the word “cozy”. When leaving, they noticed that some visitors' comments contain the single word “cozy”.

“Cozy”, “hotel's cozy”

`feedback = feedback.lower()` — this function converts all the letters in a string into lowercase.

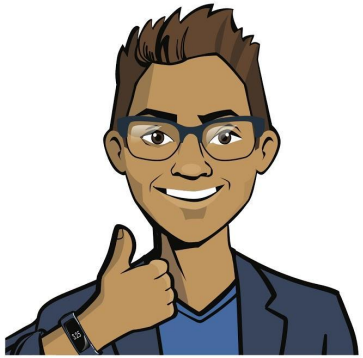
Program	*Program will print*

`feedback1 = 'Cozy!'`
`feedback1 = feedback1.lower()`
`position1 = feedback1.find('cozy')`
`print(position1)`
	`0`

Brainstorm

Conclusions:

1. String variables allow a number of operations, from calculating a string's length to searching for a word in a string.
2. All the characters in a string are numbered. The first character's number is 0.
3. To master those functions, you need to practice them!



Brainstorm

Weird program

A junior developer has written a program to calculate a service's quality rating. Is it absolutely correct?

```
point1 = input('Rate the hotel's convenience from 1 to 5:')
point2 = input('Rate the restaurant's food from 1 to 5:')
total_rating = point1 + point2
print('Total rating:', total_rating)
```

Brainstorm

Weird program

A junior developer has written a program to calculate a service's quality rating. Is it absolutely correct?

```
point1 = input('Rate the hotel's convenience from 1 to 5:')
point2 = input('Rate the restaurant's food from 1 to 5:')
total_rating = point1 + point2
print('Total rating:', total_rating)
```

The junior developer forgot to switch from the string type to integer using int()!

The program will generate an error!

Brainstorm

Weird program

A junior developer has written a program to calculate a service's quality rating. Is it absolutely correct?

```
point1 = input('Rate the hotel's convenience from 1 to 5:')
point2 = input('Rate the restaurant food from 1 to 5:')
total_rating = point1 + point2
print('Total rating:', total_rating)
```

Weird, the program works...

*Where did the number **34** come from?*

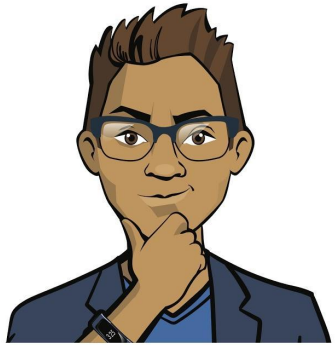
Brainstorm

Weird program

The computer has recognized the entered data as strings.

Since strings cannot be added to one another, the computer merged them!

```
point1 = input('Rate the hotel's convenience from 1 to 5:')
point2 = input('Rate the restaurant food from 1 to 5:')
total_rating = point1 + point2
print('Total rating:', total_rating)
```

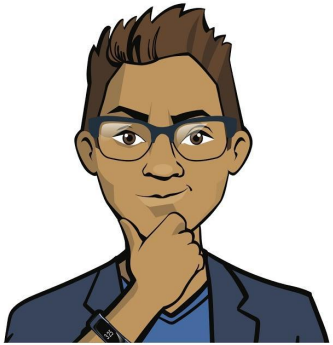


Brainstorm

Weird program

Junior developers, you should figure out how a computer interprets programs so these simple things do not give you a nasty surprise!

This will help you understand why + can add numbers and concatenate strings.



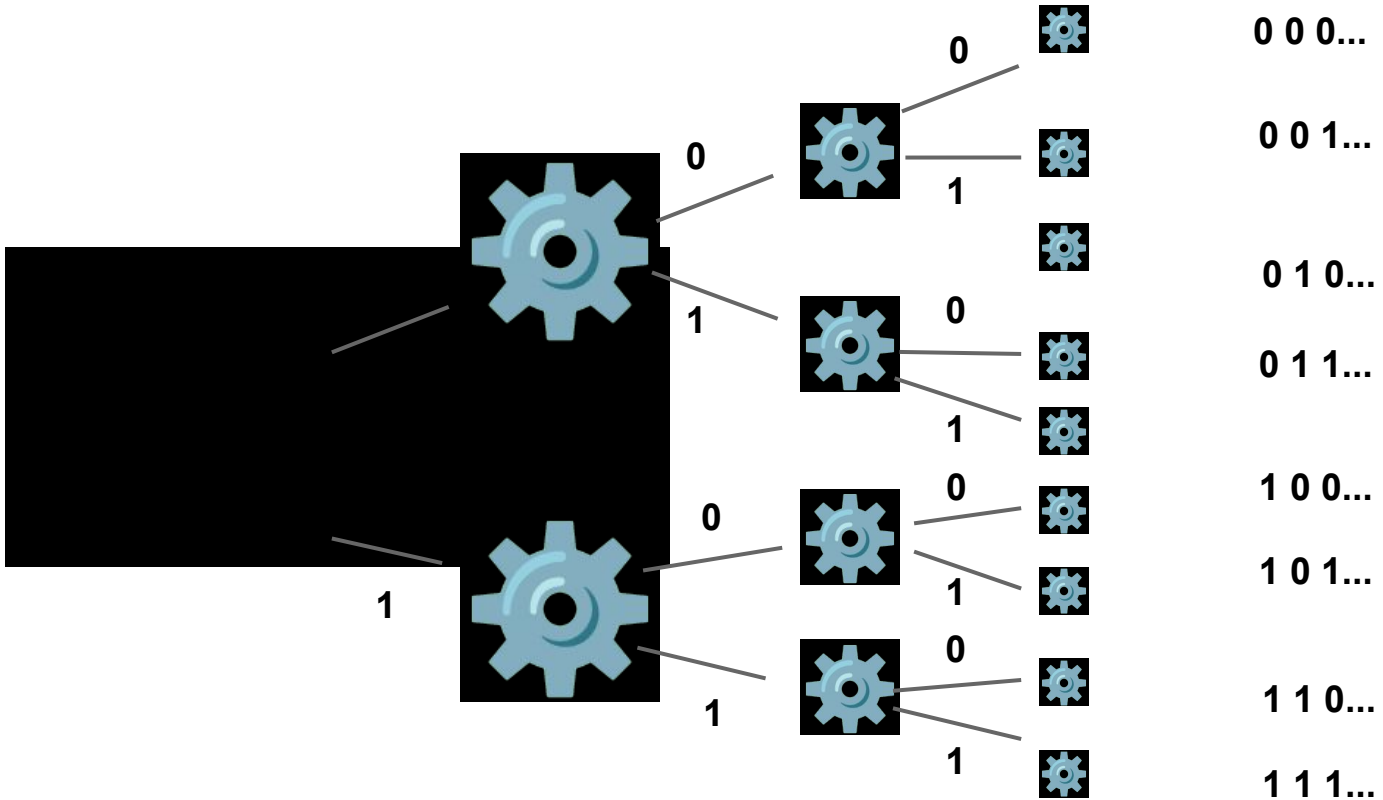
Brainstorm

Computers only understand electric signals

1 — signal is present
0 — signal is absent

Brainstorm

Computer consists of numerous parts. Each one can recognize signals.



Brainstorm

To get a computer to perform an action, you need to submit a command consisting of 0s and 1s.

0 0 0... *will perform* → *Action 1*

0 0 1... *will perform* → *Action 2*

0 1 0... *will perform* → *Action 3*

"Programming" a computer with these kinds of signals is very inconvenient! No one can remember commands composed of 0 and 1.

Brainstorm

Programming languages and interpreters

One solution to this problem is to use a programming language and an **interpreter.**

The programmer enters a command **in a programming language**

↓

The programmer clicks the "Run the program" button

↓

The command is **translated** into the language of signals (1's and 0's)

↓

The command **is executed**

Interpreter

Brainstorm

An interpreter

is a special program that recognizes and executes commands.

Brainstorm

An interpreter

is a special program that recognizes and executes commands.

Let's go back to the example with data types:

```
point1 = input('Rate the hotel's convenience from 1 to 5:')
point2 = input('Rate the restaurant's food from 1 to 5:')
total_rating = point1 + point2
```

Recognition: there is an operator between the strings.

Command: concatenate the strings.

Brainstorm

An interpreter

is a special program that recognizes and executes commands.

Consider another example:

```
point1 = 4
point2 = 5
total_rating = point1 + point2
```

Recognition: there is an operator between the numbers.

Command: add the two numbers.

Brainstorm

An interpreter

is a special program that recognizes and executes commands.

The interpreter can be told explicitly which data type it is dealing with. You already know these functions: `int()` and `str()`.

```
point1 = input('Rate the hotel's convenience from 1 to 5:')
point1 = int(point1)
point2 = input('Rate the hotel's convenience from 1 to 5:')
point2 = int(point2)
total_rating = point1 + point2
```

Recognition: there is an operator between the numbers.

Command: add the two numbers.

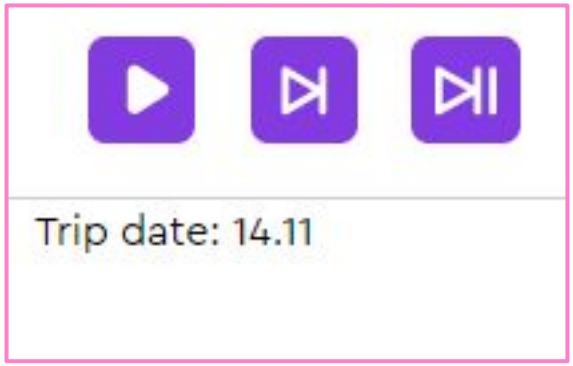
Brainstorm

An interpreter

is a special program that recognizes and executes commands.

Programmers tend to call `int()` and `str()` datatype switching functions.

```
day = 14
month = 11
day = str(day)
month = str(month)
date = day + '.' + month
print('Trip date:', date)
```



Recognition: there is an operator between the strings.

Command: concatenate the strings.

Brainstorm

Thanks to the smart interpreter, some operators handle different types differently.

Operator	*Meaning for strings*	*Meaning for numbers*
+	Concatenation of strings	The sum of the numbers
*	Multiple repetitions of a string	Multiplication of numbers

Brainstorm

Thanks to the smart interpreter, some operators handle different types differently.

Operator	*Meaning for strings*	*Meaning for numbers*
+	Concatenation of strings	The sum of the numbers
*	Multiple repetitions of a string	Multiplication of numbers

'Great' + ' place'	Great place	Concatenation of two strings
3 * 'Cool '	Cool Cool Cool	Repetition of a string 3 times
'Great' * ' place'	can't multiply sequence by non-int of type 'str'	The interpreter does not understand how many times to repeat the string

Brainstorm

Thanks to the smart interpreter, some operators handle different types differently.

Operator	*Meaning for strings*	*Meaning for numbers*
+	Concatenation of strings	The sum of the numbers
*	Multiple repetitions of a string	Multiplication of numbers

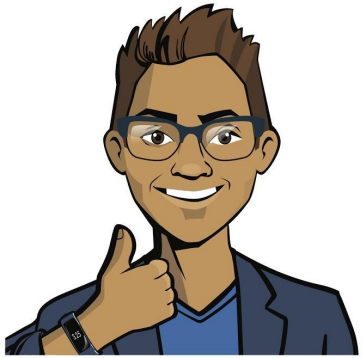
Also, keep in mind that many functions and operators only work with certain types.

The len() function cannot be used to determine a number's length.

Brainstorm

Conclusions:

1. **The interpreter** is a special program to recognize and execute commands.
2. In recognition, the interpreter focuses on the types of data it interacts with.
3. When necessary, we can change data types using int() and str().



Brainstorm