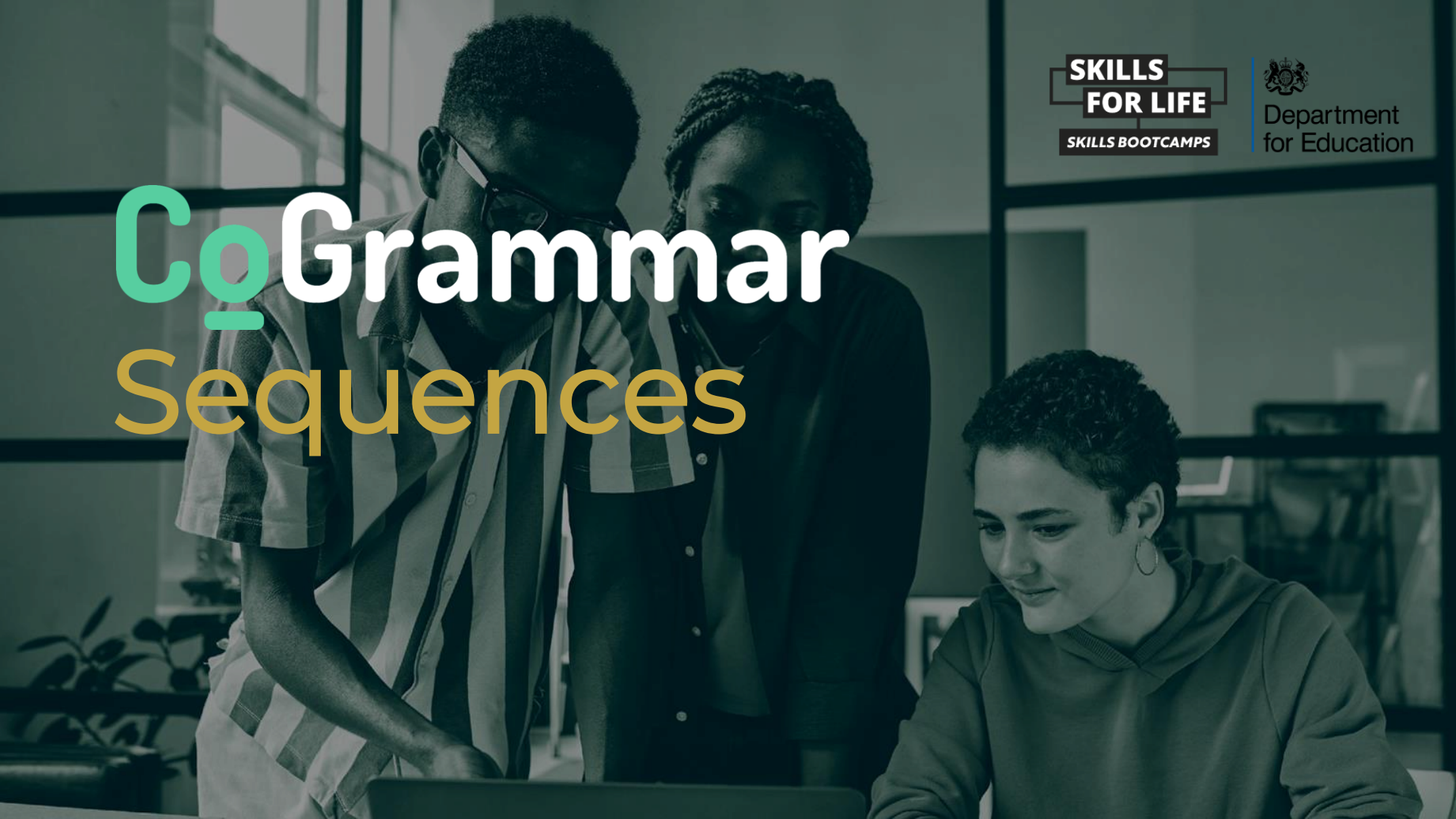
Welcome to this CoGrammar lecture:

Sequences

The session will start shortly...

Questions? Drop them in the chat.
We'll have dedicated moderators answering questions.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CoGrammar
Sequences

Software Engineering Session Housekeeping

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** throughout this session, should you wish to ask any follow-up questions.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: Questions

Software Engineering Session Housekeeping cont.

- For all **non-academic questions**, please submit a query: www.hyperiondev.com/support
- Report a **safeguarding** incident: www.hyperiondev.com/safeguardreporting
- We would love your **feedback** on lectures: Feedback on Lectures

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   - Look for the CC (Closed Captions) icon and click to enable.
2. **Browser Settings:**
   - Google Chrome: Go to *Settings > Accessibility > Live Captions* and toggle ON.
   - Edge: Enable captions in *Settings > Accessibility*.

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Polls

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Poll

1. **True or False: Strings in Python are mutable (i.e., they can be changed in place).**
   A. True
   B. False

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Poll

2. Which of these is the correct way to create a list?

A. list = {1, 2, 3}

B. list = (1, 2, 3)

C. list = [1, 2, 3]

D. list = <1, 2, 3>

Poll

3. What is an important feature of a dictionary in Python?

A. Keys can have multiple values.

B. Keys are unique, and values are stored as key-value pairs.

C. Keys must always be strings.

D. Dictionaries store data in a sorted order.

String Handling

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Learner Outcomes

- Define and construct strings in Python.
- Master key string methods for effective text manipulation in Python.
- Effectively extract characters and substrings from strings using indexing and slicing.
- Utilise string concatenation and formatting techniques in Python.

String Creation & Initialisation

Strings in Python are sequences of characters, enclosed within either single quotes (' '), double quotes (" "), or triple quotes (''' ''')

```
message = "This is a string"
print(message)
```

Basic String Methods

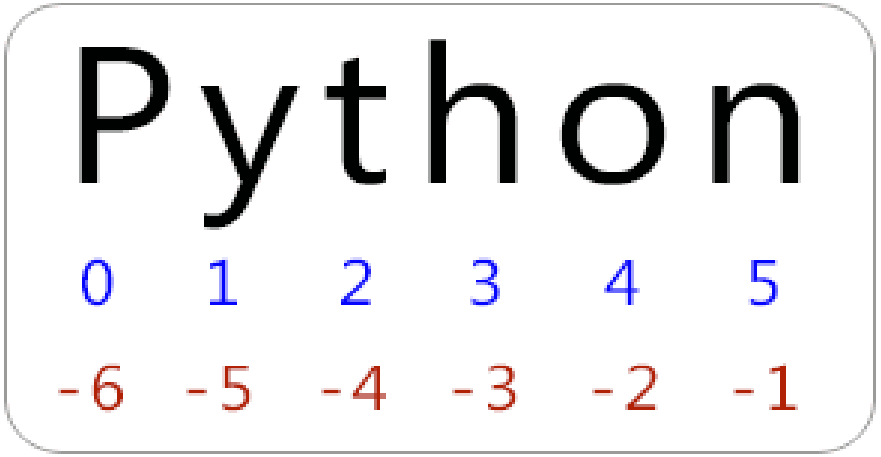
“coding for fun”	string.capitalize()	Coding for fun
“coding for fun”	string.isalpha()	True
“54369”	string.isnumeric()	True
“coding for fun”	string.isupper()	False
“coding for fun”	string.split()	[“coding”, “for”, “fun”]
“running for fun”	string.title()	Running For Fun
“£coding£”	string.strip()	coding
“coding for fun”	string.replace(‘f’, ‘s’)	coding sor sun

Strings cont.

Strings are Immutable

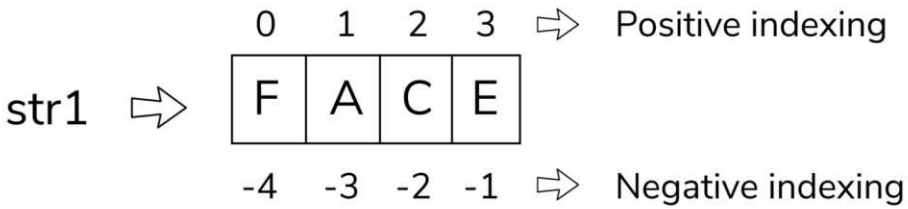
- When an object is immutable it means the object cannot be changed.
- When we apply methods to a string that appear to make changes, they are actually creating and returning new string objects.
- This means we have to store the changes we make in a variable to be reused.

Strings Indexing



String Indexing

String Slicing



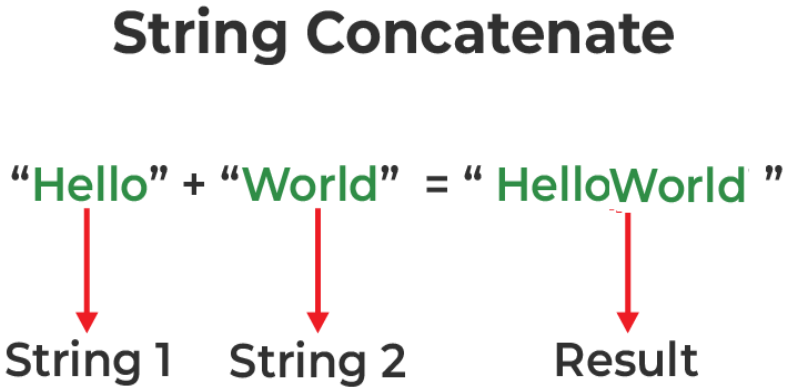
str1[1:3] = AC

str1[-3:-1] = AC

String Concatenation & Formatting

- String concatenation is the process of joining strings together, while formatting allows you to insert dynamic values into strings.
- String formatting in Python refers to the process of creating strings where dynamic values are inserted into predetermined locations within the string.

String Concatenation



String Formatting

.format() Method

```
name = "Inigo Montoya"
quantity = 51
formatted_string = "My name is {} and I would like {} muffins please.".format(name, age)
# Output: My name is Inigo Montoya and I would like 51 muffins please.
```

f-String

```
random_word = "Spanish Inquisition"
formatted_string = f"Nobody expects the {random_word}!"
# Output: Nobody expects the Spanish Inquisition!
```

Strings Recap

String Methods

- Built-in functions that operate on strings, providing various functionalities such as manipulating case, finding substrings, determining length and many more.

String Indexing and Slicing

- It's all about accessing characters within a string using their position and extracting a substring from a string.

String Formatting

- The process of inserting values and expressions into a string to create informative output.

Lists in Python

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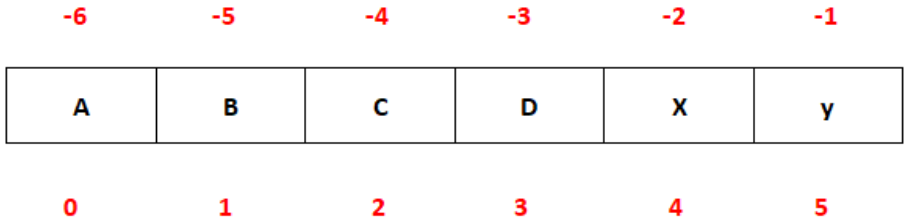
Learner Outcomes

- Recall the fundamental characteristics of Lists.
- Explain the concept of indexing in a list.
- Apply knowledge of lists to manipulate elements.

Lists

- A list is a data type that allows us to store multiple values of any type together and a list can contain duplicates.
- We can access individual values using indexing and multiple values using slicing.
- We can iterate over lists using a for loop.



Lists cont.

- Lists are mutable. This means the values inside a list can be changed and unlike a string won't return a new list when changes have been made.
- We can apply methods to our lists without having to restore them inside our variables.
- To create a list we can surround comma separated values with square brackets. []
    - E.g.
        - `my_list = [value1, value2, value3]`

Lists cont.

Key List functions

• Adding Elements	*append(), insert()*
• Removing Elements	*remove(), pop() and 'del'*
• Manipulating elements	sorting, reversing and slicing

Lists Examples

Creating lists

```
# Creating a list of numbers
numbers = [1, 2, 3, 4, 5]

# Creating a list of strings
fruits = ["apple", "banana", "orange"]

# Creating a list of mixed data types
mixed_list = [1, "apple", True, 3.14]
```

Lists Examples

Adding & Removing Items

```
# Adding a single item
fruits.append("grape")

# Adding multiple items
fruits.extend(["pineapple", "mango"])

# Removing an item by value
fruits.remove("banana")

# Removing an item by index and returning it
removed_item = fruits.pop(2)
```

Lists Examples

Sorting Lists

```
# Sorting the list in-place
numbers.sort()

# Sorting the list in descending order
fruits.sort(reverse=True)

# Sorting a list without modifying the original list
sorted_numbers = sorted(numbers)
```

Dictionaries in Python

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Learner Outcomes

- Distinguish between the functionality of a Lists and Dictionaries.
- Expand on key operations relevant to Dictionaries.
- Apply the above knowledge to improve data management in programs

Dictionaries

- In Python, dictionaries function akin to the dictionaries we commonly used in English class, such as those from Oxford.
- Python dictionaries are similar to a list, however each item has two parts, a key and a value.
- To draw a parallel, consider an English dictionary where the key represents a word, and the associated value is its definition.

Dictionary Example

- Dictionaries are enclosed in curly brackets; key value pairs are separated by colon and each pair is separated by a comma.

```
# Dictionary Example

my_dictionary = {
    "name": "Terry",
    "age": 24,
    "is_funny": False
}
```

- On the left is the key, on the right is the value.

Dict() Functions

- The dict() function in Python is a versatile way to create dictionaries.
- Create dictionaries through assigning values to keys by passing in keys and values separated by an = sign.

```
# Creating a dictionary with direct key-value pairs
my_dict = dict(name="Kitty", age=25, city="Belarus")
print(my_dict)
# Output: {'name': 'Kitty', 'age': 25, 'city': 'Belarus'}
```

Dictionary Update()

- To append or add elements to a dictionary in Python, you can use the update() method or simply use the square bracket notation.

```
my_dict = dict(name="Kitty", age=25, city="Belarus")
# Adding or updating a key-value pair
my_dict.update({'breed': 'Shorthair'})
print(my_dict)
# Output: {'name': 'Kitty', 'age': 25, 'city': 'Belarus', 'breed': 'Shorthair'}
```

```
my_dict = dict(name="Kitty", age=25, city="Belarus")
# Adding or updating a key-value pair
my_dict['breed'] = 'Shorthair'
print(my_dict)
# Output: {'name': 'Kitty', 'age': 25, 'city': 'Belarus', 'breed': 'Shorthair'}
```

Dictionaries cont.

Key Dictionary functions

• Key-Value Pairs	*items(), keys(), values()*
• Fetching	*get()*
• Updating	*update()*
• Deleting	*pop(), popitem()*

Let’s take a short break

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Let’s get coding!

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Polls

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Poll

1. **Which of the following lines correctly creates a string, a list, and a dictionary?**

   A. my_string = "Hello", my_list = [1, 2, 3], my_dict = {"key": "value"}

   B. my_string = 123, my_list = "abc", my_dict = (1, 2)

   C. my_string = "Hello", my_list = {1, 2, 3}, my_dict = ["key", "value"]

   D. my_string = "Hello", my_list = [1, 2, 3], my_dict = {"key": 1}

Poll

2. **Which snippets correctly concatenate two strings, merge two lists, and add a key-value pair to a dictionary?**

   A. "Hello" + "World", list1 + list2, my_dict.update({"new_key": "new_value"})

   B. "Hello" & "World", list1.append(list2), my_dict["new_key"] = "new_value"

   C. "Hello".append("World"),list1.extend(list2), my_dict.add({"new_key": "new_value"})

   D. "Hello".concat(" World"), list1.insert(0, list2), my_dict.add("new_key": "new_value")

Lists and Dictionaries Recap

- Lists
  - Lists in Python offer a powerful mechanism for organising and manipulating data in a structured manner.
- Indexing
  - We can access elements in our list with indexing and can use slicing to grab multiple values.
- Dictionaries
  - Dictionaries in Python are mutable collections of key-value pairs, allowing efficient storage and retrieval of data.
  - They provide a mapping between unique keys and their associated values.

Learner Challenge

- Title: Employee Onboarding System with String, List, and Dictionary Operations
- Objective: Build a system to manage employee onboarding details, applying string manipulation, list operations, and dictionary usage to handle employee data efficiently.
  - **Lists:**
    - Store a list of employee hobbies.
    - Manipulate the hobbies list through basic operations: indexing, slicing, appending, and removing.
    - Manage sales data for multiple weeks in a 2D list and perform operations on the weekly sales.
  - **String Manipulation:**
    - **Concatenation:** Combine employee first name and last name into a full name.
    - **Slicing:** Extract initials from employee names for identification.
    - **Formatting:** Display employee data (name, age, department, hobbies) in a clear format.
  - **Dictionaries:**
    - Store employee details like name, age, department, address, and hobbies as key-value pairs.
    - Manage employee information, allowing updates to specific fields like department or address.

Questions and Answers

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Thank you for attending

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