S3_2
Variables and constants

Learning objectives!!!

To learn and appreciate the following concepts

- ✓ C Tokens
- ✓ C Character set
- ✓ Variables – declaration and initialization

Learning Outcomes

At the end of session the student will be able to

✓ Understand the C Tokens

✓ C Character set

✓ How to declare and initialize the variables

C Character set

➤ Character set is a set of valid characters that a language can recognize.

➤ C character set consists of **letters, digits, special characters, white spaces**.

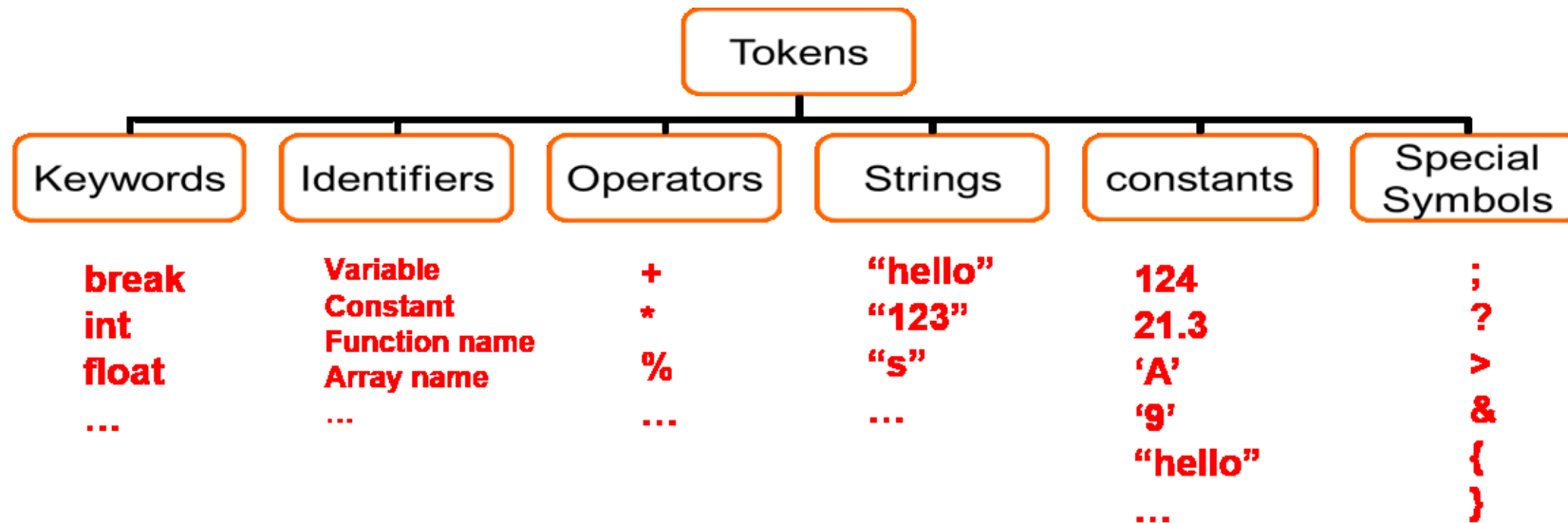**(i) Letters** → 'a', 'b', 'c',………..'z' Or 'A', 'B', 'C',……….'Z'

(ii) Digits → 0, 1, 2,…………………….9

(iii)Special characters → ;, ?, >, <, &,{, }, [,]……

(iv)White spaces → New line (\n), Tab(\t), Vertical Tab(\v) etc.

C Tokens

- ✓ A token is a group of characters that logically belong together.

- ✓ The programmer writes a program by using tokens.

- ✓ C uses the following types of tokens.

```
                          ┌──────────┐
                          │  Tokens  │
                          └──────────┘
   ┌──────────┬───────────┬──────┴─────┬──────────┬──────────────┐
┌────────┐ ┌──────────┐ ┌─────────┐ ┌────────┐ ┌──────────┐ ┌──────────┐
│Keywords│ │Identifiers│ │Operators│ │ Strings│ │ constants│ │ Special  │
└────────┘ └──────────┘ └─────────┘ └────────┘ └──────────┘ │ Symbols  │
                                                             └──────────┘
```

Keywords	Identifiers	Operators	Strings	constants	Special Symbols
break	Variable	+	"hello"	124	;
int	Constant	*	"123"	21.3	?
float	Function name	%	"s"	'A'	>
...	Array name	...	...	'9'	&
	...			"hello"	{
				...	}

Keywords

➤These are some reserved words in C which have predefined meaning to compiler called keywords.

➤Keywords are not to be used as variable and constant names.

➤All keywords have fixed meanings and these meanings cannot be changed.

Compiler specific keywords

- Some commonly used keywords are given below:

auto	double	int	struct
break	else	long	switch
case	enum	register	typedef
char	extern	return	union
const	float	short	unsigned
continue	for	signed	void
default	goto	sizeof	volatile
do	if	static	while

Variables

Variables are data storage locations in the computer's memory.

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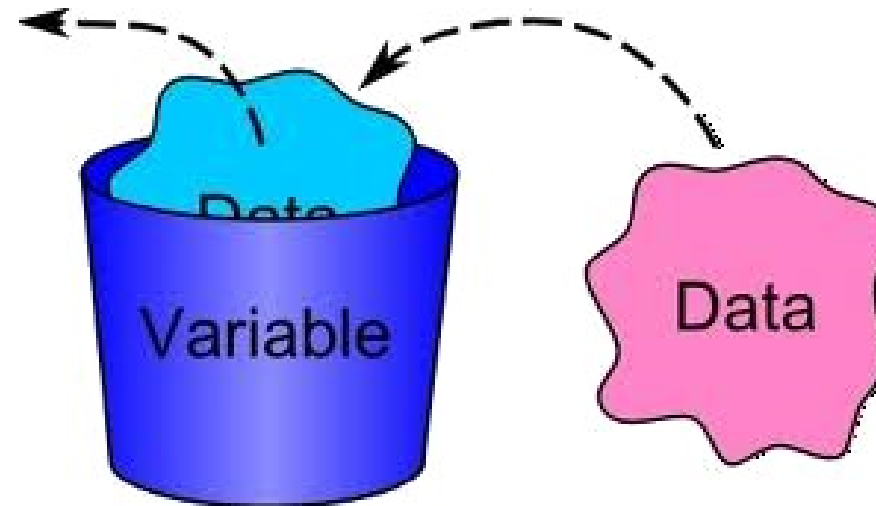
Variables

- Variables are the symbolic names for storing computational data.

- Variable: a *symbolic name* for a memory location

- In C variables have to be *declared* before they are used

     Ex: int x

- A variable may take different values at different times during execution.

- *Declarations* reserve storage for the variable.

- Value is assigned to the variable by *initialization* or *assignment*

Variable declarations

Data type	Variable name

Which data types
are possible in C ?

Which variable names
are allowed in C ?

Variable Names- Identifiers

➢ Symbolic names can be used in C for various data items used by a programmer.

➢ A symbolic name is generally known as an identifier. An identifier is a name for a variable, constant, function, etc.

➢ The identifier is a sequence of characters taken from C character set.

Variable names

Rules for valid variable names (*identifiers*) :

• Name must begin with a letter or underscore (_) and can be followed by any combination of letters, underscores, or digits.

• Key words cannot be used as a variable name.

• C is **case-sensitive**: sum, Sum, and SUM each refer to a different variable.

• Variable names can be as long as you want, although only the first 63 (or 31) characters might be significant.

• Choice of meaningful variable names can increase the readability of a program

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Variable names

- **Examples of *valid* variable names:**

1) **Sum**

2) **_difference**

3) **a**

4) **J5x7**

5) **Number_of_moves**

- **Examples of *invalid* variable names:**

1) **sum$value**

2) **3val**

3) **int**

Declaring variables

- C imposes to declare variables before their usage.

- Advantages of variable declarations:

  - Putting all the variables in one place makes it easier for a reader to understand the program.

  - Thinking about which variables to declare encourages the programmer to do some planning before writing a program.

  - The obligation to declare all variables helps prevent bugs of misspelled variable names.

  - Compiler knows the amount of memory needed for storing the variable.

  - Compiler can verify that operations done on a variable are allowed by its type.

Variables (Video)

https://youtu.be/fO4FwJOShdc
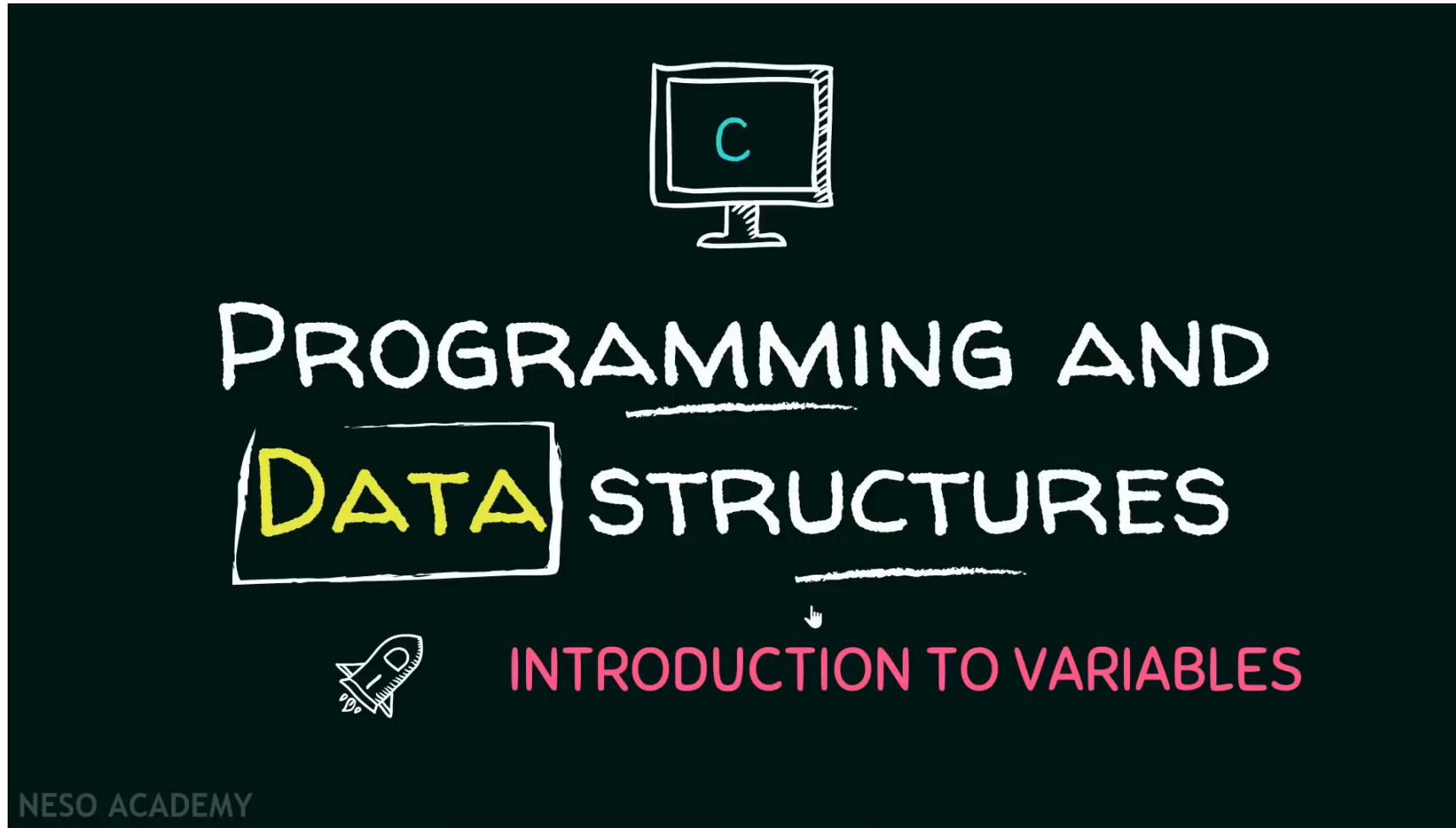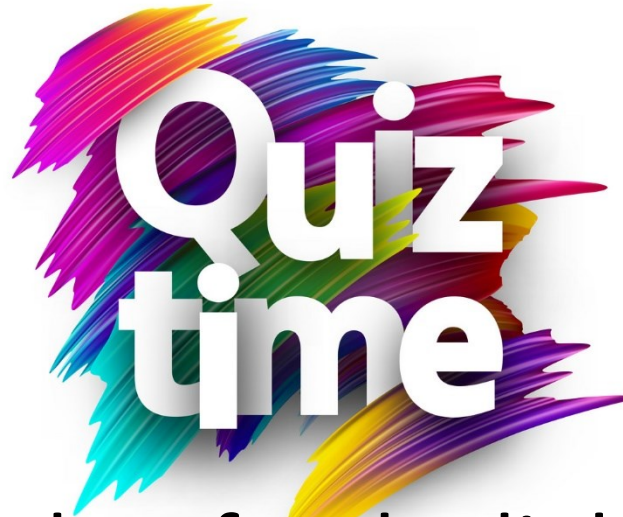
Go to posts/chat box for the link to the question
submit your solution in next 2 minutes
The session will resume in 3 minutes

Variables – summary

- Variables are named memory locations.

- Helps us to store data and retrieve data

- In C language , some rules are to be followed while declaring the variables and while naming them.

- It is better to use the variable names which are meaningful and helps the user to know what data might have been stored in that variable

Session **3** Summary

✓ Draw the flowcharts for simple problems

✓ Use the RAPTOR tool to write, run and check the output of flowchart

✓ C Tokens and Character set

✓ C Variables

✓ Variable declaration and initialization