

CSE101-Lec 2

Components of C
Identifiers and Keywords
Data types

OUTLINE

- In this lecture we will cover
 - Character set
 - Identifiers
 - Keyword
 - Data types

Language: its influence in our life

- Let us look to what we are doing since our childhood, how did we learnt ENGLISH- A recap

A B C D X Y Z

RAT BAT CAT COW

COW EAT GRASS

ESSAY ON COW

Characters

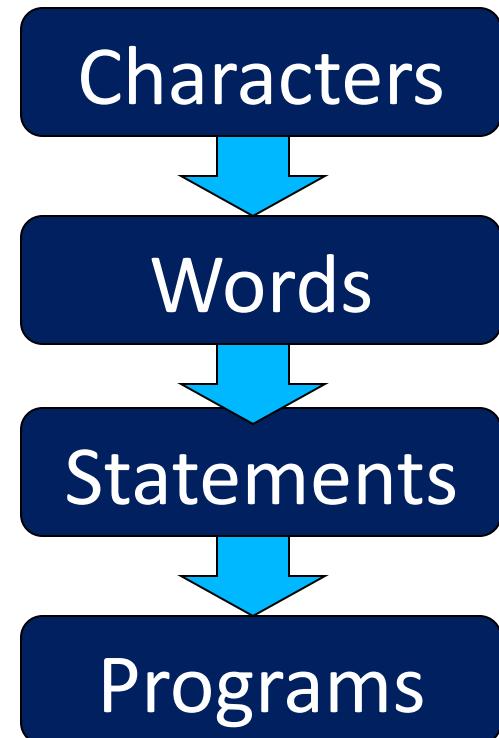
Words

Statements

Programs

Introduction to C

- Like every language C programming language requires basic building blocks to communicate with the computer.
- So we require
 - Character set
 - Words(keywords and identifiers)
 - Statement (instructions)
 - Program



Character Set

- The character set of C represents *alphabet, digit or any symbol* used to represent information.

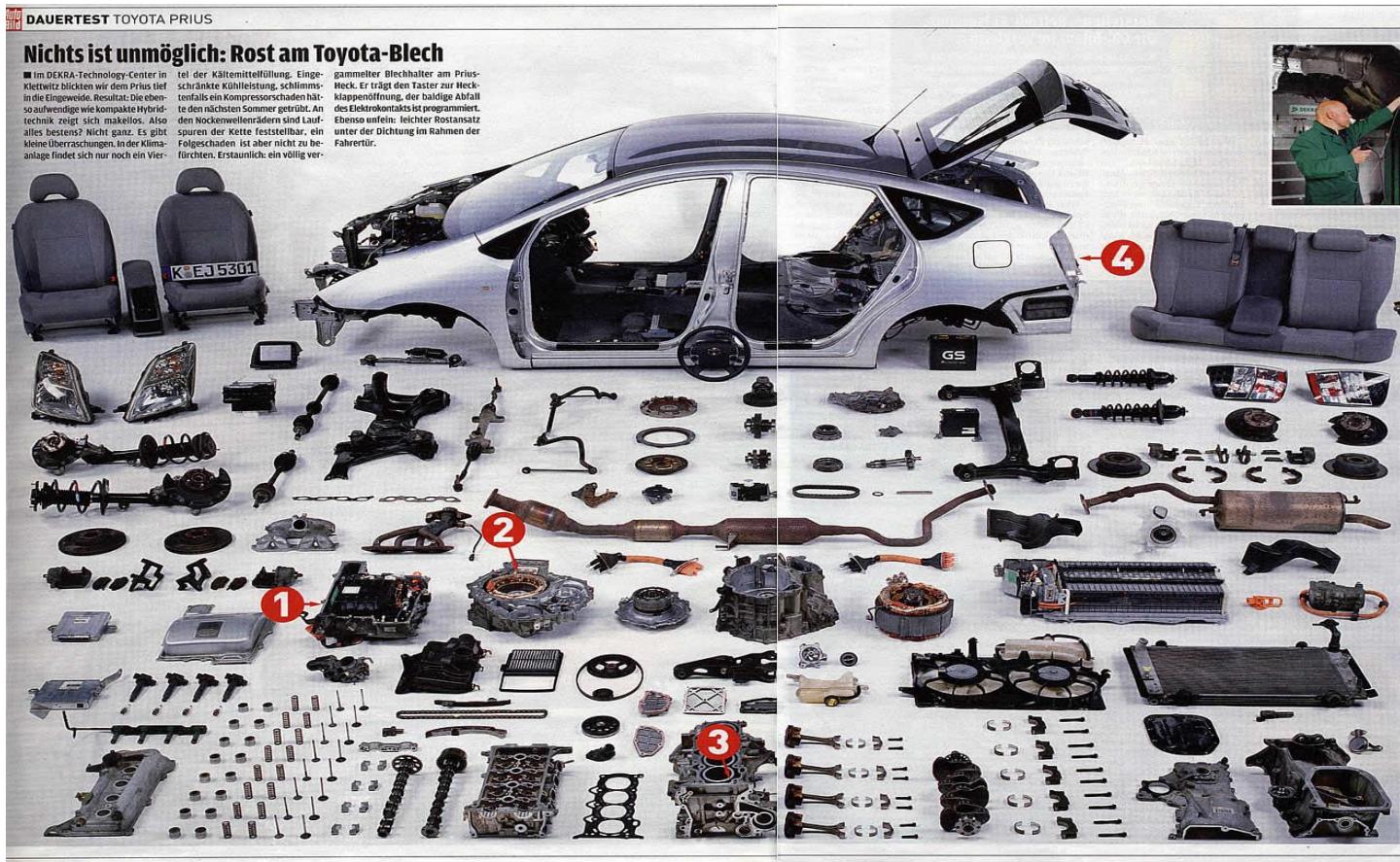
Types	Character Set
Uppercase Alphabets	A, B, C, ... Y, Z
Lowercase Alphabets	a, b, c, ... y, z
Digits	0, 1, 2, 3, ... 9
Special Symbols	~ ' ! @ # % ^ & * () _ - + = \ { } [] : ; " ' < > , . ? /
White spaces	Single space, tab, new line.

Meaningfulness

- Let us look to some words
- **saslc, enp, keib, rac, llab**
- Rearrange
- **Class, pen, bike, car, ball**
- This is the influence of adding **meaning** by logical and sensible grouping in mode of communication through **language**

Token

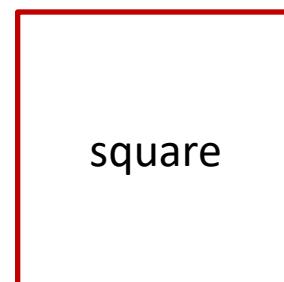
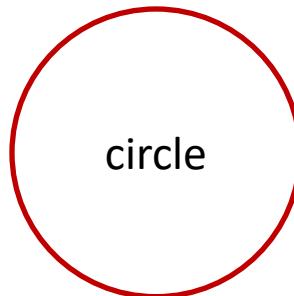
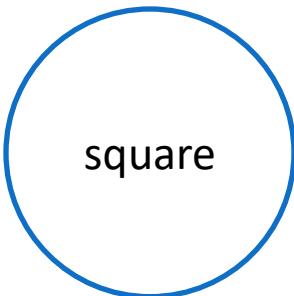
- Every single element in a C Program is Token



Token

- Smallest unit in a program/statement.
- It makes the compiler understand what is written in the program.
- Example: main, printf , name,), etc.
- Tokens are broadly classified as:
 - Identifiers
 - Keywords
 - Constants
 - Variables
 - Strings
 - Operators
 - Special character

Lets Identify the following:



Identifiers

- So to identify things we have some name given to them .
- *Identifiers* are the fundamental building blocks of a program
- Used to give **names** to variables, functions, constant, and user defined data.
- They are *user-defined names* and consist of a sequence of letters and digits

Rules for naming an Identifier

1. An identifier name is *any combination of 1 to 31 alphabets, digits or underscores.*
2. The *first character* in the identifier name *must be an alphabet or underscore.*
3. *No blanks or special symbol other than an underscore* can be used in an identifier name.
4. *Keywords are not allowed* to be used as identifiers.

Some Identifiers

```
Tool_spinner;  
tool_spinner;
```

both are different

```
FORMULA1;
```

```
engine_1;
```

Wrong identifiers name

1_engine;	<i>//starts with number</i>
break;	<i>//it's a keyword</i>
@car-roof;	<i>//only _ is allowed at beginning</i>

Keywords

- **Keywords** are the **reserved words** whose meaning has already been explained to the C compiler.
- We ***cannot use these keywords as variables.***
- Each keyword is meant to perform a specific function in a C program.
- There are **32 keywords** in C language.
- All keywords are written in ***lowercase only***



Eg: The **name** of person can never be **home, eat, sleep, run**, etc because these words have some predefined meaning to perform some task.

Quick yak
Ask students some of the keywords i.e. words which are by themselves and cannot be used for anything else ex: left, right...

List of C Keywords

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

Data Types

- Data type means the **type of value a variable will have.**
- It also defines memory space for a particular variable in computer.
- The type of value of variable can be alphabets or numbers.
- The numbers can be further divided as the integer or rational number.

Lets see a mathematics problem:

My-Car

- If the radius of car wheel is 15inch then what will the distance traveled after one rotation of that wheel?

Sol: Given-

radius = 15

15 Integer(int in C)

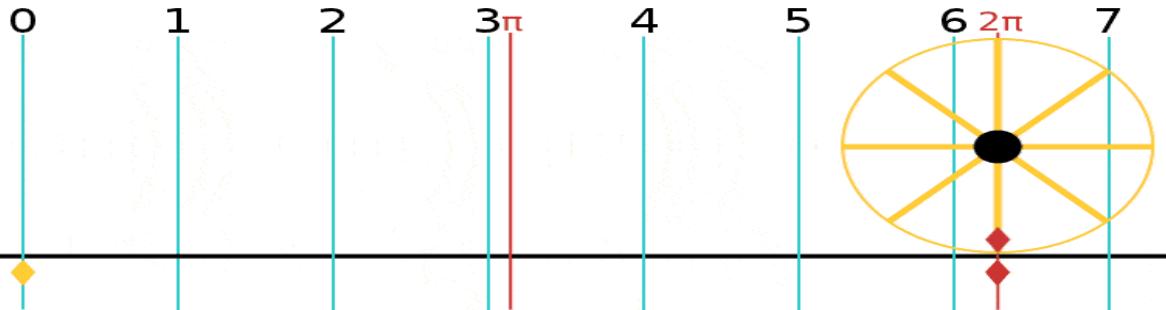
dist_travelled = ?

So, Circumference of circle = $2 * \pi * r$

dist_travelled = $2 * 3.14 * \text{radius}$ 3.14 Real (float in C)

dist_travelled = $6.28 * 15$

dist_travelled = 94.2 Ans. 94.2 Real (float in C)



My-Grades

2. Five students have appeared for Mathematics exam and their respective marks are

84,34,97,58,64

consider the rank bands and their respective grades as

80 to 100 – A

60 to 79 – B

40 to 59 – C

less than 40 – D

So find the grade for each students?

Sol: Given-

M1=84, G1=?

Marks as **integer**

84

A

char in C

M2=34, G2=?

34

D

char in C

M3=97, G3=?

97

A

char in C

M4=58, G4=?

58

C

char in C

M5=64, G5=?

64

B

char in C

Classification of Data Types

- In C data type is broadly classified as:
 - Basic data types
 - Derived data types
 - User defined data types

Derived Data Type

- Pointers
- Functions
- Array

Basic Data Type

- Integer
- Character
- Float
- Double

User Defined Data Type

- Structure
- Union
- Enumeration

Data Type

List of Data Types

Type	Size (bytes)	Minimal range
char	1	-128 to 127
unsigned char	1	0 to 255
int	2 or 4	-32768 to 32767
unsigned int	2 or 4	0 to 65535
short int	2	-32768 to 32767
unsigned short int	2	0 to 65535
long int	4	-2147483648 to 2147483647
unsigned long int	4	0 to 4294967295
float	4	3.4e-38 to 3.4e+38 with 6 digits of precision
double	8	1.7e-308 to 1.7e+308 with 15 digits of precision
long double	10	3.4e-4932 to 1.1e+4932 with 20 digits of precision

Integer

- It is used to store positive and negative counting numbers, as well as zero.

{..., -2, -1, 0, 1, 2, ...}

- The numbers written in green box are the integers.

15

84

34

97

- The **type modifiers** for the integer data type are: *signed, unsigned, short, long* .
- **Signed** types represent positive and negative numbers.
- **Unsigned** represent zero and positive numbers only.
- **Long** and **short** represent the range of integer number

Short Integer

- Occupies 2 bytes in memory.
- Format specifier is %d or %i.
- Range is -32768 to 32767.
- By default int variable is short signed int.

```
int cost=100;  
short int si;
```

Long Integer

- Occupies 4 bytes in memory.
- Format specifier is %ld.
- Range is -2147483648 to 2147483647

```
long radius=123456;  
long int value;
```

Signed Integer

- Occupies 2 bytes in memory
- Format specifier is %d or %i
- There are also long signed integers having range from -2147483648 to 2147483647
- Example:
int firstvalue=10;
long int WaterLevel;

Unsigned Integer

- Occupies 2 bytes in memory
- Format specifier is %u.
- There are also long unsigned int with range 0 to 4294967295
- Example:
unsigned long count=567898;
unsigned short int page;

Float

- Floating point numbers are real numbers that, unlike integers, may contain fractional parts of numbers, like **1.446, -112.972, 3.267e+27**.
- It is used to store real numbers with single precision i.e. a precision of one decimal point.



- Format specifier is **%f**.
- The **type modifier** for float are *float*, *double* and *long double*.
- The rational numbers written in red box of My-Car problem are the float numbers.

3.14

94.2

Type	Float	Double	Long double
Storage Size	4 byte	8 byte	10 byte
Value range	3.4e-38 to 3.4e+38	1.7e-308 to 1.7e+308	3.4e-4932 to 1.1e+4932
Precision	6 decimal places	15 decimal places	20 decimal places
Example	pi=3.141592	3.141592741012573	3.14159265358979323846

Character

- It stores a single character of data belonging to the C character set.
- The alphabets written in blue box of My-Grades problem are the character.

A

D

A

B

C

- It occupies **1 byte** of memory.
- Format specifier is **%c**.
- The range is **0 to 255** for **unsigned char**.
- The range is **-127 to 127** for **signed char**.
- Each char type has an equivalent integer interpretation, ASCII value, so that a char is really a special kind of short integer.

char choice='y';

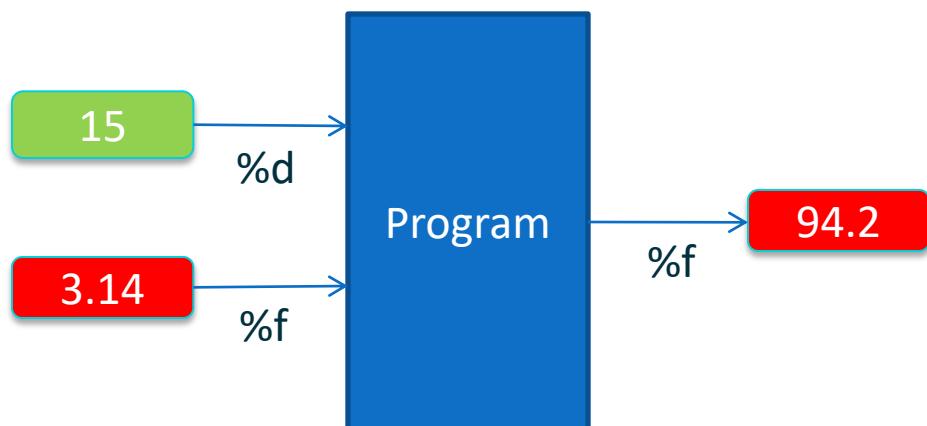
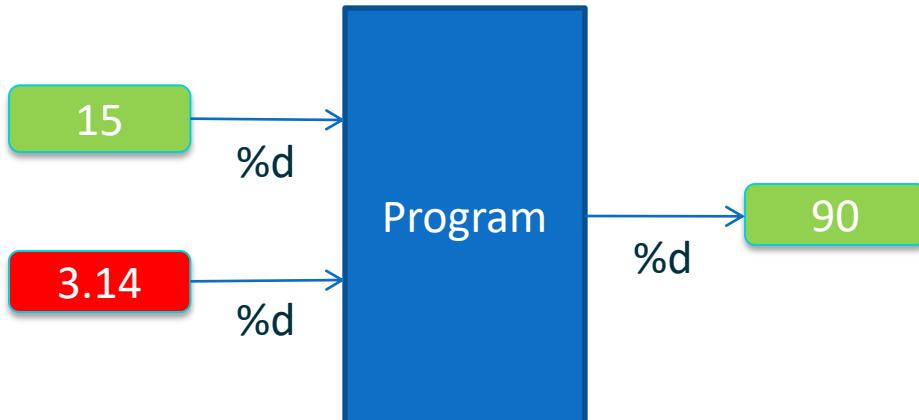
Format Specifier

- Specifies the format according to which the value will be printed on screen in C.

Example:

- %d : signed integer
- %ld: long integer
- %u : unsigned integer
- %c : single character
- %f : float
- %s : string
- %i : int

- Remember car example?



My-Car

- If the radius of car wheel is 15inch then what will the distance travelled after one rotation of that wheel?

Sol: Given-

radius = 15 inch 15 Integer([int in C](#))

dist_travelled = ?

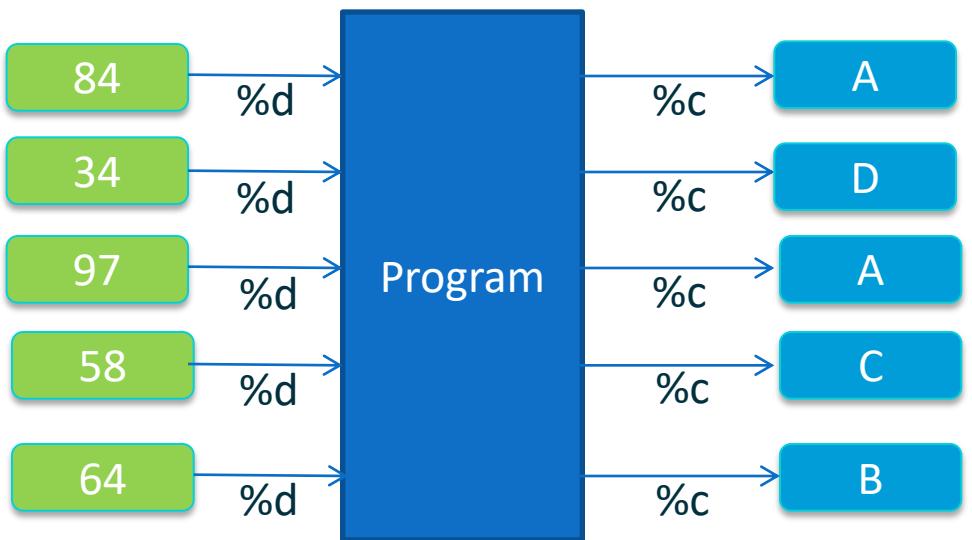
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dist_travelled = 94.2 inch Ans. 94.2 Real ([float in C](#))

• Grade example:



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Next Lecture: Constants Variables Expressions

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