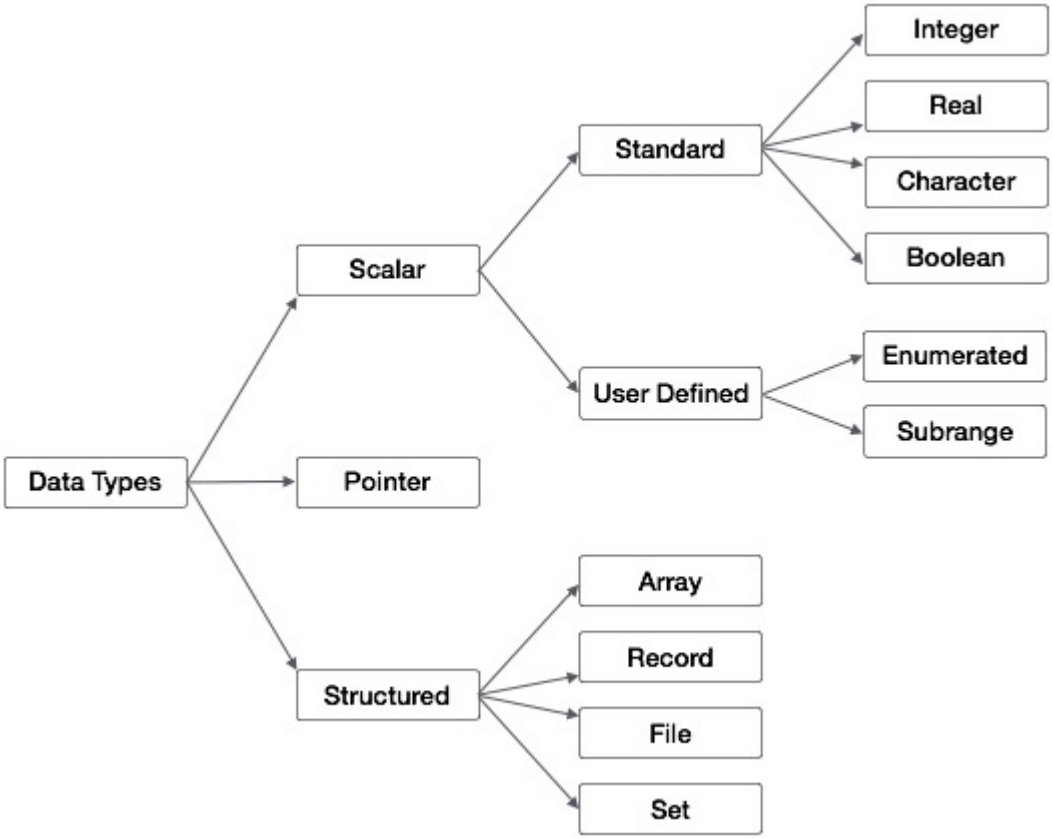
PASCAL - DATA TYPES

Data types of an entity indicates the meaning, constraints, possible values, operations, functions and mode of storage associated with it.

Integer, real, Boolean and character types are referred as standard data types. Data types can be categorized as scalar, pointer and structured data types. Examples of scalar data types are integer, real, Boolean, character, subrange and enumerated. Structured data types are made of the scalar types; for example, arrays, records, files and sets. We will discuss the pointer data types later.

Pascal Data Types

Pascal data types can be summarized as below in the following diagram −



Type Declarations

The type declaration is used to declare the data type of an identifier. Syntax of type declaration is −

```
type-identifier-1, type-identfier-2 = type-specifier;
```

For example, the following declaration defines the variables days and age as integer type, yes and true as Boolean type, name and city as string type, fees and expenses as real type.

```
type
days, age = integer;
yes, true = boolean;
name, city = string;
fees, expenses = real;
```

Integer Types

Following table gives you details about standard integer types with its storage sizes and value

ranges used in Object Pascal −

Type	Minimum	Maximum	Format
Integer	-2147483648	2147483647	signed 32-bit
Cardinal	0	4294967295	unsigned 32-bit
Shortint	-128	127	signed 8-bit
Smallint	-32768	32767	signed 16-bit
Longint	-2147483648	2147483647	signed 32-bit
Int64	-2^63	2^63 - 1	signed 64-bit
Byte	0	255	unsigned 8-bit
Word	0	65535	unsigned 16-bit
Longword	0	4294967295	unsigned 32-bit

Constants

Use of constants makes a program more readable and helps to keep special quantities at one place in the beginning of the program. Pascal allows *numerical, logical, string* and *character* constants. Constants can be declared in the declaration part of the program by specifying the **const** declaration.

Syntax of constant type declaration is follows −

```
const
Identifier = contant_value;
```

Following are some examples of constant declarations −

```
VELOCITY_LIGHT = 3.0E=10;
PIE = 3.141592;
NAME = 'Stuart Little';
CHOICE = yes;
OPERATOR = '+';
```

All constant declarations must be given before the variable declaration.

Enumerated types

Enumerated data types are user-defined data types. They allow values to be specified in a list. Only *assignment* operators and *relational* operators are permitted on enumerated data type. Enumerated data types can be declared as follows −

```
type
enum-identifier = (item1, item2, item3, ... )
```

Following are some examples of enumerated type declarations −

```
type
SUMMER = (April, May, June, July, September);
COLORS = (Red, Green, Blue, Yellow, Magenta, Cyan, Black, White);
TRANSPORT = (Bus, Train, Airplane, Ship);
```

The order in which the items are listed in the domain of an enumerated type defines the order of the items. For example, in the enumerated type SUMMER, April comes before May, May comes before June, and so on. The domain of enumerated type identifiers cannot consist of numeric or

character constants.

Subrange Types

Subrange types allow a variable to assume values that lie within a certain range. For example, if the *age* of voters should lie between 18 to 100 years, a variable named age could be declared as −

```
var
age: 18 ... 100;
```

We will look at variable declaration in detail in the next section. You can also define a subrange type using the type declaration. Syntax for declaring a subrange type is as follows −

```
type
subrange-identifier = lower-limit ... upper-limit;
```

Following are some examples of subrange type declarations −

```
const
P = 18;
Q = 90;
type
Number = 1 ... 100;
Value = P ... Q;
```

Subrange types can be created from a subset of an already defined enumerated type, For example −

```
type
months = (Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec);
Summer = Apr ... Aug;
Winter = Oct ... Dec;
```