Data Types, Operators and Control Statements

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Objectives

- Introduction
- Integer Data Types
- Operators
- Flow Control Statements
- Examples
- Summary

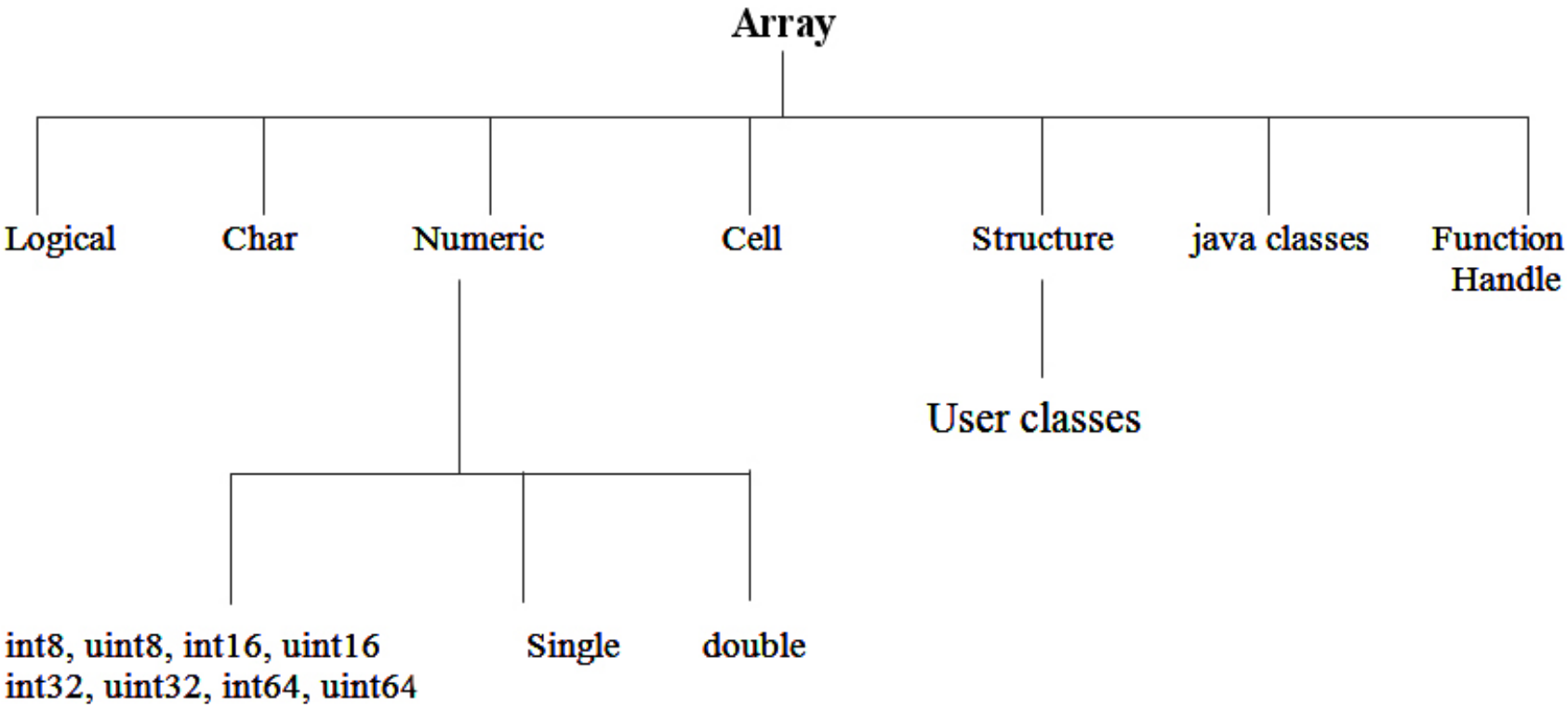
Introduction

- There are many fundamental data types or classes including user defined classes, object oriented classes and java classes in the MATLAB. Each of these is in the form of an array. This array is a minimum 0-by-0 in size. The two-dimensional versions of these arrays are called matrices. We can build matrices and arrays of floating point and integer data, characters and strings, logical true and false states etc. User defined classed are used to develop our own data type. The structure and cell array can store the dissimilar type of data. Following are the data types;

Cont..

- Logical
- char
- numeric
- cell
- single
- double
- int8
- uint8
- int16
- uint16
- int32
- uint32
- int64
- uint64
- Structures
- java classes
- User defined classes and function handle.

Cont..


Array
Logical
Char
Numeric
Cell
Structure
java classes
Function Handle
User classes
int8, uint8, int16, uint16
int32, uint32, int64, uint64
Single
double

Integer Data Types and their Ranges

- Table : Integer Data Types and their Ranges:

Conversion function and Data Type	Description	Range of Values
int8	Signed 8-bit integer	-128 to 127
uint8	Unsigned 8-bit integer	0 to 255
int16	Signed 16-bit integer	-215 to 215 - 1
uint16	Unsigned 16-bit integer	0 to 216 - 1
int32	Signed 32-bit integer	-231 to 231 - 1
uint32	Unsigned 32-bit integer	0 to 232 - 1

Operators

- There are three fundamental types of operators in MATLAB programming:

  1) Relational Operators

  2) Logical Operators

  3) Arithmetic Operators

Cont..

1) Relational Operators:

Operation:	MATLAB command:
Strictly less than	<
Less than or equal to	<=
Strictly greater than	>
Greater than or equal to	>=
Equal to	==
Not equal to	~=

Cont..

2) Logical Operators:

Logical Operator	MATLAB command
Logical AND	&
Logical OR	|
Logical NOT	~

Cont..

3) Arithmetic Operators:

Sr. No	Operator	MATLAB Command
1	Addition	+
2	Subtraction	-
3	Matrix Multiplication	*
4	Matrix Right Division	/
5	Matrix Left Division	\
6	Colon Operator	:
7	Matrix Power	^

Sr. No	Operator	MATLAB Command
8	Power	.^
9	Transpose	.'
10	Complex Conjugate Transpose	'
11	Multiplication	.*
12	Division	./
13	Left Division	.\

Flow Control Statements

- There are eight flow-control statements in MATLAB:

  1) if (with else and else if)

  2) switch-case

  3) while

  4) for

  5) continue

  6) break

  7) try….catch

  8) return

Examples

1) if (with else and else if)

- **Syntax**

  If *(logical condition)*

  Commands

  elseif *(logical condition)*

  commands

  else

  commands

  end

- **Example**

```
N = input('Give numerator: ');
D = input('Give denominator: ');
if D==0
'Sorry, cannot divide by zero'
else
ratio = N/D
disp(ratio);
end
```

Examples

2) Switch-case

- **Syntax**

```
switch expression
   case value1
        commands
   case value2
        commands
   .
   .
   .
   otherwise
        commands
end
```

- **Example**

```
x = ceil(10*rand); % Generate a
% random integer in {1, 2, ... , 10}
switch x
case {1,2}
disp('Probability = 20%');
case {3,4,5}
disp('Probability = 30%');
otherwise
disp('Probability = 50%');
end
```

Examples

3) While

- **Syntax**

  while *expression*

  Commands

  end

- **Example**

  q = pi;

  while q >= 0.01

  q = q/2

  end

- **Output**

  q

  q =0.0061

Examples

4) For Loop

- **Syntax**

  For *index= start: increment: end*
  Commands
  end

- **Example**

```
for n = 0:10
x(n+1) = sin(pi*n/5);
end
```

- **Output**

```
x

x =

  Columns 1 through 8

         0    0.5878    0.9511    0.9511
    0.5878    0.0000   -0.5878   -0.9511

  Columns 9 through 11

   -0.9511   -0.5878   -0.0000
```

Examples

5) Continue

- **Example**

```
x=-10;
while x<0
    x=x+2;
    if x = = -2
    continue;
    end
 end
```

Examples

6) Break

- **Example**

```
x=-10;
while x<0
    x=x+2;
    if x = = -2
    break;
    end
end
```

Examples

7) Try…Catch

- **Syntax**

```
try
        commands
catch
        commands
end
```

- **Example**

```
tryX = A * B
catch
errmsg = lasterr;
if(strfind(errmsg, 'Inner matrix dimensions'))
disp('** Wrong dimensions for matrix multiply')
end
```

Examples

8) Return

- **Example**

```
if x == 0
        m = 0;
        r = 0;
        return
end
u = log10(x)/log10(4);
        if u < 0
        m = floor(u)
        else
        m = ceil(u);
        end
r = x/4^m;
```

Summary

A function handle of MATLAB is used to hold information to be used in referencing a function. There are three fundamental types of operators in MATLAB programming: Relational Operators, Logical Operators, and Arithmetic Operators.

Thank You