Basic Operators in Bash

In Bash scripting, operators are used to perform operations on variables, strings, and files. There are several types of operators in Bash:

- 1. Arithmetic Operators
- 2. Relational Operators
- 3. Logical Operators
- 4. String Operators
- 5. File Test Operators

1. Arithmetic Operators

These operators are used to perform arithmetic operations like addition, subtraction, multiplication, and division.

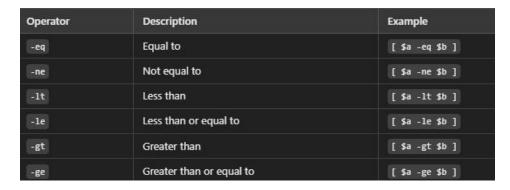
Operator	Description	Example
	Addition	result=\$((a + b))
E	Subtraction	result=\$((a - b))
	Multiplication	result=\$((a * b))
1	Division	result=\$((a / b))
x	Modulo (remainder)	result=\$((a % b))
**	Increment (by 1)	((a++))
	Decrement (by 1)	((a))

Example

```
#!/bin/bash
a=10
b=5
sum=$((a + b))
echo "Sum: $sum"
```

2. Relational Operators

These are used to compare two numbers.



Example

```
#!/bin/bash
a=10
b=5
if [ $a -gt $b ]
then
   echo "$a is greater than $b"
fi
```

3. Logical Operators

Logical operators are used to combine multiple conditions.

Operator	Description	Example
88	AND (both conditions must be true)	if [\$a -gt 5] && [\$b -lt 10]
		(2)
1	NOT (negates a condition)	if ! [-f "\$file"]

Example

```
#!/bin/bash
a=5
b=8
if [ $a -lt 10 ] && [ $b -gt 5 ]
then
echo "Both conditions are true"
fi
```

The statement if ! [-f "\$file"] is used to check if a file **does not exist** or is **not a regular file** in a Bash script.

Breakdown of the components:

```
[ -f "$file" ]:
```

- 1. This is a **file test** operator.
- 2. -f checks if the file specified by \$file exists and is a **regular file** (not a directory, symbolic link, or other types of file).
- 3. If the file exists and is a regular file, the expression returns true (exit status 0).

! (Logical NOT):

- 1. The ! negates the result of the test.
- 2. If [-f "\$file"] returns true, the ! makes it false. If it returns false (meaning the file doesn't exist or isn't a regular file), the ! makes it true.

How it works:

- True: The if block will execute if the file does not exist or is not a regular file.
- False: If the file exists and is a regular file, the if block will be skipped.

Example:

```
#!/bin/bash
file="/path/to/file.txt"

if ! [ -f "$file" ]; then
    echo "File does not exist or is not a regular file."
else
    echo "File exists and is a regular file."
fi
```

Explanation of the Example:

- The script checks if /path/to/file.txt is a regular file.
- If it **does not exist** or is not a regular file (e.g., a directory, symbolic link, etc.), it will output: "File does not exist or is not a regular file."
- If it exists and is a regular file, it will output: "File exists and is a regular file."

4. String Operators

String operators are used to perform operations on strings, like checking for equality, length, or pattern matching.

Operator	Description	Example
8	Equal to	["\$a" = "\$b"]
!=	Not equal to	["\$a" != "\$b"]
-Z	String is empty	[-z "\$string"]
-n	String is not empty	[-n "\$string"]
>	Greater than (lexicographically)	if [["\$a" > "\$b"]]
()	Less than (lexicographically)	if [["\$a" < "\$b"]]

Example

```
#!/bin/bash
a="hello"
b="world"
if [ "$a" != "$b" ]
then
   echo "Strings are different"
Fi
```

5. File Test Operators

These operators are used to check properties of files (e.g., if a file exists, if it's a directory, etc.).

Operator	Description	Example
-e	File exists	[-e "\$file"]
-f	File exists and is a regular file	[-f "\$file"]
-d	Directory exists	[-d "\$dir"]
-r	File is readable	[-r "\$file"]
-w	File is writable	[-w "\$file"]
-x	File is executable	[-x "\$file"]
-s	File is not empty (size > 0)	[-s "\$file"]
-L	File is a symbolic link	[-L "\$file"]

Example

```
#!/bin/bash
file="/path/to/file.txt"
if [ -f "$file" ]
then
    echo "File exists and is a regular file."
else
    echo "File does not exist."
Fi
```

Summary

Operator Type	Operator Example	Purpose
Arithmetic	+, -, +, /, x	Perform arithmetic operations
Relational	-eq , -ne , -lt , -gt	Compare numerical values
Logical	88,	
String	=, !=, -z, -n, <, >	Compare or test properties of strings
File Test	-e , -f , -d , -r , -x	Test file existence and properties