

Chapter

02

변수와 타입

02-2. 기본 타입

혼자 공부하는 자바 (신용권 저)

- 시작하기 전에
- 정수 타입
- 실수 타입
- 논리 타입
- 키워드로 끝내는 핵심 포인트

0. 시작하기 전에

[핵심 키워드] :정수 타입, char 타입, string 타입, 실수 타입, boolean 타입

[핵심 포인트]

- 변수 타입에 따라 변수에 저장할 수 있는 값의 종류와 허용 범위가 달라진다.
- 그래서 타입의 종류와 허용 범위에 대해서 학습한다.

❖ 기본 타입 (Primitive Type)

- 자바 언어는 정수, 실수, 논리값 저장하는 총 8 개의 기본 타입을 제공

구분	저장되는 값에 따른 분류	타입의 종류
기본 타입	정수 타입	byte, char, short, int, long
	실수 타입	float, double
	논리 타입	boolean

1. 정수 타입

정수 타입

- 메모리 사용 크기와 저장되는 값의 허용 범위 각기 다름

타입	메모리 사용 크기		저장되는 값의 허용 범위	
byte	1byte	8bit	$-2^7 \sim (2^7-1)$	$-128 \sim 127$
short	2byte	16bit	$-2^{15} \sim (2^{15}-1)$	$-32,768 \sim 32,767$
char	2byte	16bit	$0 \sim (2^{16}-1)$	$0 \sim 65535$ (유니코드)
int	4byte	32bit	$-2^{31} \sim (2^{31}-1)$	$-2,147,483,648 \sim 2,147,483,647$
long	8byte	64bit	$-2^{63} \sim (2^{63}-1)$	$-9,223,372,036,854,775,808 \sim 9,223,372,036,854,775,807$

메모리

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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1. 정수 타입

❖ 리터럴 (literal)

- 소스 코드에서 프로그래머에 의해 직접 입력된 값
- 다음 경우를 자바에서 정수로 인식

2진수: 0b 또는 0B로 시작하고 0과 1로 구성됩니다.

0b1011	$\rightarrow 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$	$\rightarrow 11$
0b10100	$\rightarrow 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0$	$\rightarrow 20$

8진수: 0으로 시작하고 0~7 숫자로 구성됩니다.

013	$\rightarrow 1 \times 8^1 + 3 \times 8^0$	$\rightarrow 11$
0206	$\rightarrow 2 \times 8^2 + 0 \times 8^1 + 6 \times 8^0$	$\rightarrow 134$

10진수: 소수점이 없는 0~9 숫자로 구성됩니다.

12
365

16진수: 0x 또는 0X로 시작하고 0~9 숫자와 A, B, C, D, E, F 또는 a, b, c, d, e, f로 구성됩니다.

0xB3	$\rightarrow 11 \times 16^1 + 3 \times 16^0$	$\rightarrow 179$
0x2A0F	$\rightarrow 2 \times 16^3 + 10 \times 16^2 + 0 \times 16^1 + 15 \times 16^0$	$\rightarrow 10767$

실습: IntegerLiteralExample.java, ByteExample.java,
LongExample.java

1. 정수 타입

❖ char 타입

- 하나의 문자를 저장할 수 있는 타입 'A' '한'



- 작은 따옴표로 감싼 문자 리터럴은 유니코드로 변환되어 저장 => char 타입은 정수 타입

```
char var1 = 'A';    //유니코드: 65
char var2 = 'B';    //유니코드: 66
char var3 = '가';    //유니코드: 44032
char var4 = '각';    //유니코드: 44033
```

- char는 정수 타입이므로 10 진수 또는 16진수 형태의 유니코드 저장

```
char c = 65;        //10진수
char c = 0x0041;    //16진수
```



실습: CharExample.java

1. 정수 타입

❖ 문자열

- 큰따옴표로 감싼 문자들을 문자열이라고 함.
- 문자열은 char 타입에 저장할 수 없음

```
char var1 = "A";  
char var2 = "홍길동";
```

■ String 타입

- 문자열을 String 타입 변수에 저장

```
String var1 = "A";  
String var2 = "홍길동";
```

실습: StringExample.java

1. 정수 타입

❖ 이스케이프 문자 (escape)

- 문자열 내부에 \는 이스케이프 문자를 뜻함
- 이스케이프 문자를 사용하면 특정 문자를 포함시키거나, 문자열의 출력을 제어할 수 있음
- 예) 문자열 내부에 " 문자 포함

```
String str = "나는 \"자바\"를 좋아합니다.";
System.out.println(str);
```

→ 나는 "자바"를 좋아합니다.

- 예) 문자열 출력 제어

```
String str = "번호\t이름\t나이";
System.out.println(str);
```

→ 번호 이름 나이
 tab 공간 tab 공간

```
String str = "홍길동\n감자바";
System.out.println(str);
```

→ 홍길동
 감자바

1. 정수 타입

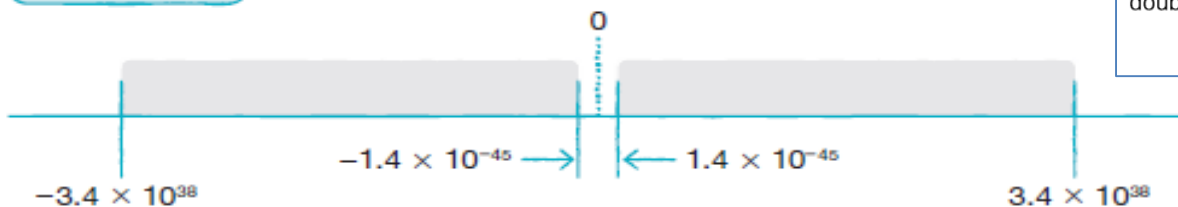
이스케이프 문자	출력 용도
\t	탭만큼 띄움
\n	줄 바꿈(라인 피드)
\r	캐리지리턴
\"	" 출력
\'	' 출력
\\	\ 출력
\u16진수	16진수 유니코드에 해당하는 문자 출력

2. 실수 타입

❖ 실수 타입

타입	메모리 사용 크기		저장되는 값의 허용 범위(양수 기준)	정밀도(소수점 이하 자리)
float	4byte	32bit	$(1.4 \times 10^{-45}) \sim (3.4 \times 10^{38})$	7자리
double	8byte	64bit	$(4.9 \times 10^{-324}) \sim (1.8 \times 10^{308})$	15자리

float 타입



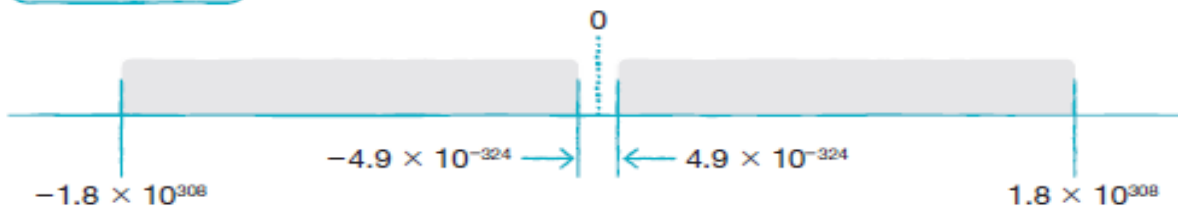
float: 소수점 이하자리 약 7 (6~9)

0.12345679

double: 소수점 이하자리 약 15 (15~18)

0.1234567890123457

double 타입



2. 실수 타입

❖ 실수 리터럴

- 소스 코드에서 소수점 있는 리터럴은 10진수 실수로 인식

```
0.25, -3.14
```

- 알파벳 e 또는 E 포함된 숫자 리터럴은 지수 및 가수로 표현된, 소수점 있는 10진수 실수로 인식

```
5e2    →  $5.0 \times 10^2 = 500.0$ 
```

```
0.12E-2 →  $0.12 \times 10^{-2} = 0.0012$ 
```

2. 실수 타입

- **double 타입** 변수에 저장: 자바는 실수 리터럴을 기본적으로 double 타입으로 해석

```
float var = 3.14; ← 컴파일 에러(Type mismatch: cannot convert from double to float)
```

```
double var = 3.14;  
double var = 314e-2;
```

- **float 타입**으로 저장하려는 경우: 리터럴 뒤 f 혹은 F 붙여 float 타입 표시

```
float var = 3.14f;  
float var = 3E6F;
```

- double 타입이 float 타입보다 2배 가량 정밀도 높아 정확한 데이터 저장 가능

- float: 소수점 이하자리 약 7 (6~9)

0.12345679

- double: 소수점 이하자리 약 15 (15~18)

0.1234567890123457

3. 논리 타입

❖ 논리 타입

- 참과 거짓에 해당하는 true와 false 리터럴을 저장하는 타입

```
boolean stop = true;  
boolean state = false;
```

- 두 가지 상태값에 따라 제어문의 실행 흐름을 변경하는데 사용

4. 키워드로 끝내는 핵심 포인트

- **정수 타입**: 정수를 저장할 수 있는 타입으로 byte, short, int, long 타입을 말함.
- **char 타입**: 작은따옴표(')로 감싼 하나의 문자 리터럴을 저장할 수 있는 타입.
- **String 타입**: 큰따옴표(")로 감싼 문자열을 저장할 수 있는 타입
- **실수 타입** : 실수를 저장할 수 있는 타입으로 float, double 타입을 말함.
- **boolean 타입** : 참과 거짓을 의미하는 true와 false를 저장할 수 있는 타입

Thank You !

혼자 공부하는 자바 (신용권 저)