

Data

- int

Expressions

- I/O expressions
- Arithmetic expressions

Control Flow

- Sequential

Data

- int
- float
- double

Expressions

- I/O expressions
- Arithmetic expressions

Control Flow

- Sequential

float **and** double Data Types

float and double Data Types

Kind of data:

float and double Data Types

Kind of data: Real numbers (could have fractional part)

float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double - Each data uses 8 bytes (64 bits)

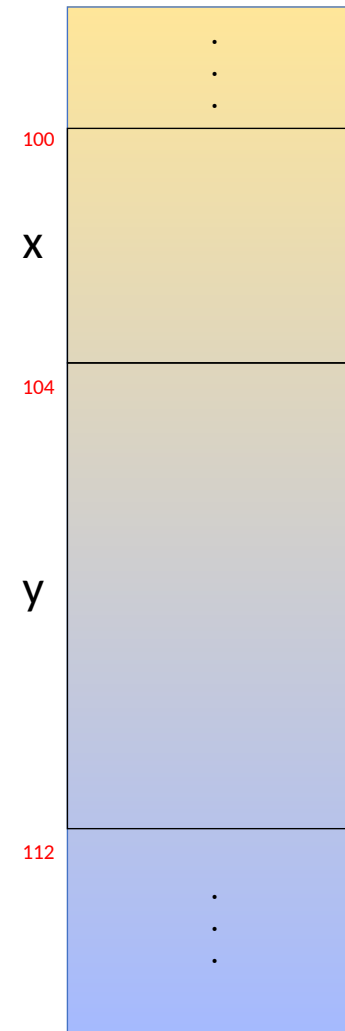
float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

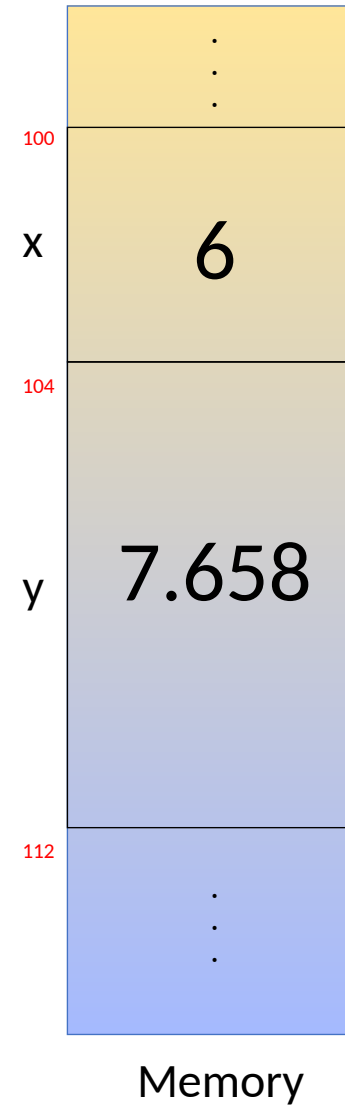
- double - Each data uses 8 bytes (64 bits)
float - Each data uses 4 bytes (32 bits)


```
int main() {  
    int x;  
    double y;  
  
    return 0;  
}
```



Memory

```
int main() {  
    int x;  
    double y;  
  
    x = 6;  
    y = 7.658;  
  
    return 0;  
}
```



float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double - Each data uses 8 bytes (64 bits)
float - Each data uses 4 bytes (32 bits)

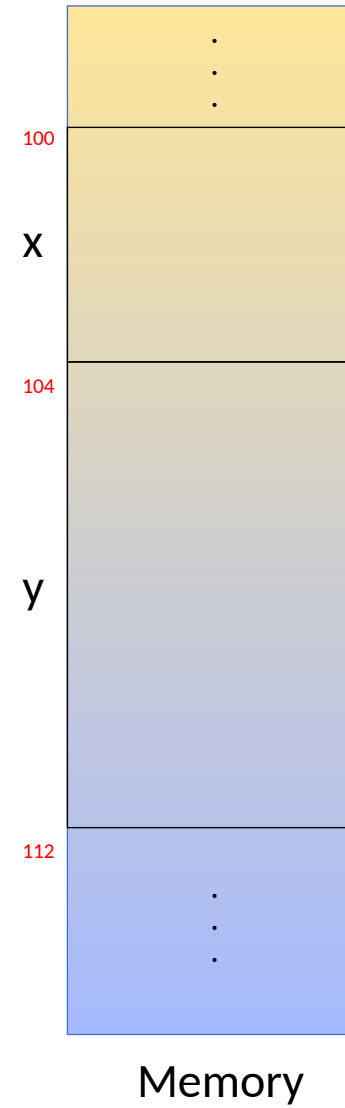
float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double - Each data uses 8 bytes (64 bits)
float - Each data uses 4 bytes (32 bits)
- The numbers are represented by the floating point method (IEEE-754)

```
int main() {  
    int x;  
    double y;  
  
    x = 6;  
    y = 7.658;  
  
    return 0;  
}
```



```

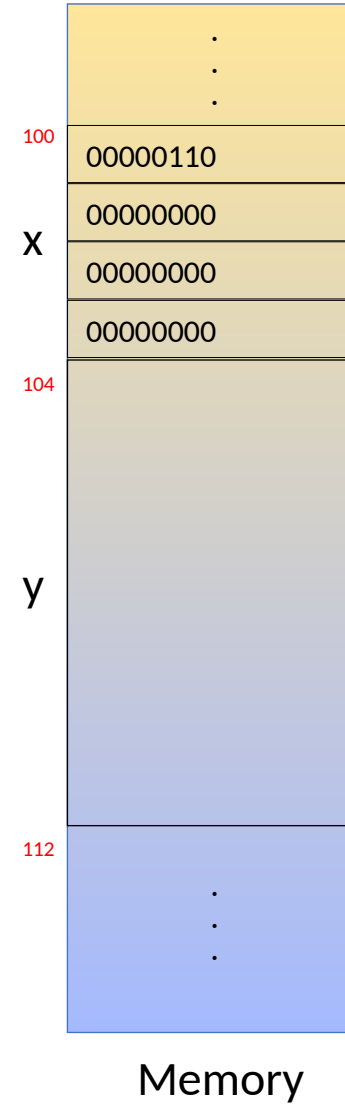
int main() {
    int x;
    double y;

    x = 6;
    y = 7.658;

    return 0;
}

```

$$(6)_{10} = (00000000\ 00000000\ 00000000\ 00000110)_{2's}$$



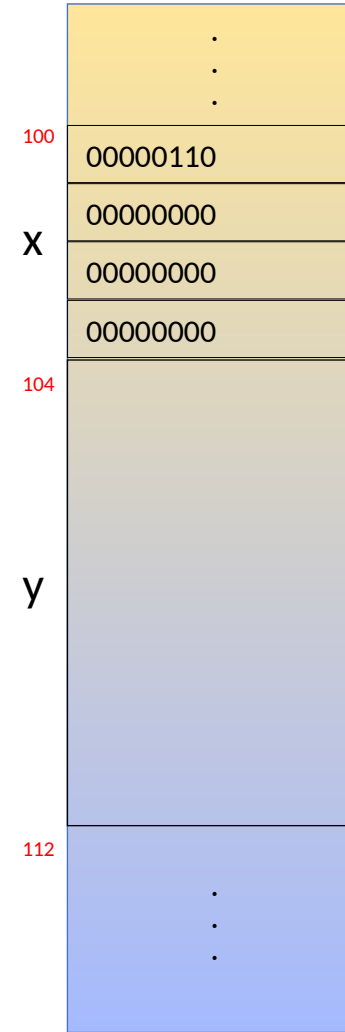
```

int main() {
    int x;
    double y;

    x = 6;
    y = 7.658;

    return 0;
}

```



Memory

$$(6)_{10} = (00000000\ 00000000\ 00000000\ 00000110)_{2's}$$

$$\begin{aligned}
 (7.658)_{10} &= \\
 &= (01000000\ 00011110\ 10100001\ 11001010\ 11000000\ 10000011\ 00010010\ 01101111)_{IEEE-754}
 \end{aligned}$$

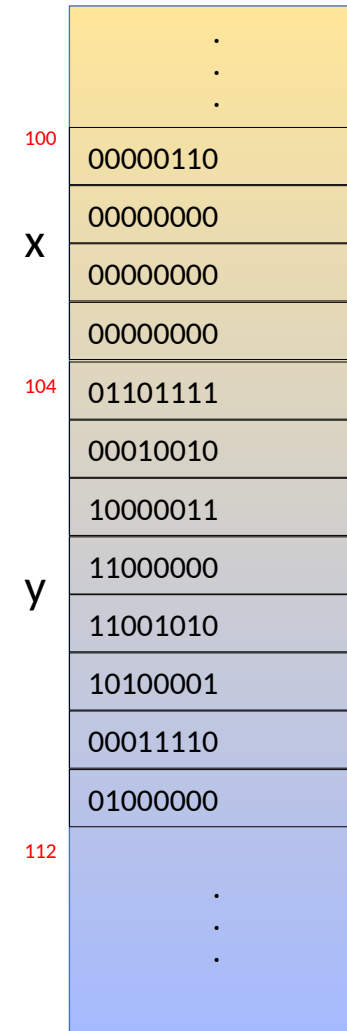
```

int main() {
    int x;
    double y;

    x = 6;
    y = 7.658;

    return 0;
}

```



$$(6)_{10} = (00000000 \ 00000000 \ 00000000 \ 00000110)_{2's}$$

$$\begin{aligned}
 (7.658)_{10} &= \\
 &= (01000000 \ 00011110 \ 10100001 \ 11001010 \ 11000000 \ 10000011 \ 00010010 \ 01101111)_{IEEE-754}
 \end{aligned}$$

float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double - Each data uses 8 bytes (64 bits)
float - Each data uses 4 bytes (32 bits)
- The numbers are represented by the floating point method (IEEE-754)

float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double - Each data uses 8 bytes (64 bits)
float - Each data uses 4 bytes (32 bits)
- The numbers are represented by the floating point method (IEEE-754)

C++ literals:

float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double - Each data uses 8 bytes (64 bits)
float - Each data uses 4 bytes (32 bits)
- The numbers are represented by the floating point method (IEEE-754)

C++ literals:

For double : 3.4, -8.975, 6.0, ...

float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double – Each data uses 8 bytes (64 bits)
float – Each data uses 4 bytes (32 bits)
- The numbers are represented by the floating point method (IEEE-754)

C++ literals:

For double : 3.4, -8.975, 6.0, ...

For float : 3.4f, -8.975f, ...

float and double Data Types

Kind of data: Real numbers (could have fractional part)

Inner representation:

- double – Each data uses 8 bytes (64 bits)
float – Each data uses 4 bytes (32 bits)
- The numbers are represented by the floating point method (IEEE-754)

C++ literals:

For double: 3.4, -8.975, 6.0, ...

For float: 3.4f, -8.975f, ...

Arithmetic Operators: +, -, *, /, =, ...

Area of a Circle

Write a program that reads from the user a radius of a circle.

The program will then print area of this circle.

Area of a Circle

Write a program that reads from the user a radius of a circle.

The program will then print area of this circle.

Example

Please enter the radius:

Area of a Circle

Write a program that reads from the user a radius of a circle.

The program will then print area of this circle.

Example

Please enter the radius:

2.6

Area of a Circle

Write a program that reads from the user a radius of a circle.

The program will then print area of this circle.

Example

Please enter the radius:

2.6

The area of a circle with radius of 2.6 is 21.2372

Area of a Circle

Area of a Circle

Area of a Circle

Area of a Circle

Area of a Circle

Area of a Circle

Area of a Circle

Area of a Circle

Area of a Circle

Area of a Circle

Theorem:

Let \mathbf{C} be a circle with a radius of length \mathbf{r} .

We have:

$$(\text{Area of } \mathbf{C}) = \pi \mathbf{r}^2$$

Type Casting

```
int main() {  
    int x1, x2;  
    double y1, y2;  
  
    x1 = 6;  
    y1 = 6.7;  
  
    return 0;  
}
```

Type Casting

```
int main() {  
    int x1, x2;  
    double y1, y2;  
  
    x1 = 6;  
    y1 = 6.7;  
  
    y2 = 6;  
  
    return 0;  
}
```

Type Casting

```
int main() {  
    int x1, x2;  
    double y1, y2;  
  
    x1 = 6;  
    y1 = 6.7;  
  
    y2 = 6;  
  
    return 0;  
}
```

Type Casting

```
int main() {  
    int x1, x2;  
    double y1, y2;  
  
    x1 = 6;  
    y1 = 6.7;  
  
    y2 = (double) 6;  
  
    return 0;  
}
```

Casting

converting the representation of a data from one type to another type

Type Casting

```
int main() {  
    int x1, x2;  
    double y1, y2;  
  
    x1 = 6;  
    y1 = 6.7;  
  
    y2 = (double) 6;  
    x2 = (int) 6.7;  
  
    return 0;  
}
```

Casting

converting the representation of a data from one type to another type

Expressions With Mixed Types

```
int main() {  
    int x;  
    double y;  
  
    cout<< 5 / 2 <<endl;  
    cout<< 5.0 / 2.0  
    <<endl;  
  
    return 0;  
}
```

Expressions With Mixed Types

```
int main() {  
    int x;  
    double y;  
  
    cout<< 5 / 2 <<endl;  
    cout<< 5.0 / 2.0  
    <<endl;  
    cout<< 5.0 / 2 <<endl;  
  
    return 0;  
}
```

Expressions With Mixed Types

```
int main() {  
    int x;  
    double y;  
  
    cout<< 5 / 2 <<endl;  
    cout<< 5.0 / 2.0  
<<endl;  
    cout<< 5.0 / 2 <<endl;  
  
    x = 5/2;  
  
    return 0;  
}
```

Expressions With Mixed Types

```
int main() {  
    int x;  
    double y;  
  
    cout<< 5 / 2 <<endl;  
    cout<< 5.0 / 2.0  
<<endl;  
    cout<< 5.0 / 2 <<endl;  
  
    x = 5/2;  
    y = 5/2;  
  
    return 0;  
}
```