Walkthrough of a Method Call

CS 99 – Summer 2000

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This is the code this example will use:

```
class MethodCall {
     static int combine(int x, int y) {
            x = y – x;
            y = x + y;
            System.out.println(x);
            System.out.println(y);
            return x;
     }

     public static void main(String[] args) {
            int a = 1, b = 3;
            System.out.println(a);
            System.out.println(b);
            a = combine(a, b);
            System.out.println(a);
            System.out.println(b);
     }
}
```

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This is where we'll keep track of the values of variables that are in scope:

a	
b	
x	
y	

This arrow will show where we are in the code.

This is where we'll record the output from the program:

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Execution always starts with the method called main:

a	
b	

```
class MethodCall {
     static int combine(int x, int y) {
            x = y – x;
            y = x + y;
            System.out.println(x);
            System.out.println(y);
            return x;
     }

→    public static void main(String[] args) {
            int a = 1, b = 3;
            System.out.println(a);
            System.out.println(b);
            a = combine(a, b);
            System.out.println(a);
            System.out.println(b);
     }
}
```

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The first statement declares and initializes two variables:

a	1
b	3

```
class MethodCall {
     static int combine(int x, int y) {
            x = y – x;
            y = x + y;
            System.out.println(x);
            System.out.println(y);
            return x;
     }

     public static void main(String[] args) {
→           int a = 1, b = 3;
            System.out.println(a);
            System.out.println(b);
            a = combine(a, b);
            System.out.println(a);
            System.out.println(b);
     }
}
```

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The next two statements print the values of those variables:

a	1
b	3

```
class MethodCall {
     static int combine(int x, int y) {
            x = y – x;
            y = x + y;
            System.out.println(x);
            System.out.println(y);
            return x;
     }

     public static void main(String[] args) {
            int a = 1, b = 3;
            System.out.println(a);
→           System.out.println(b);
            a = combine(a, b);
            System.out.println(a);
            System.out.println(b);
     }
}
```

```
1
3
```

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Then we call a method.

a	1
b	3
x	
y	

```
class MethodCall {
        static int combine(int x, int y) {
                x = y - x;
                y = x + y;
                System.out.println(x);
                System.out.println(y);
                return x;
        }

        public static void main(String[] args) {
                int a = 1, b = 3;
                System.out.println(a);
                System.out.println(b);
                a = combine(a, b);
                System.out.println(a);
                System.out.println(b);
        }
}
```

```
1
3
```

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When we start executing the method, the parameters are initialized to the arguments.

x	1
y	3

```
class MethodCall {
        static int combine(int x, int y) {
                x = y - x;
                y = x + y;
                System.out.println(x);
                System.out.println(y);
                return x;
        }

        public static void main(String[] args) {
                int a = 1, b = 3;
                System.out.println(a);
                System.out.println(b);
                a = combine(a, b);
                System.out.println(a);
                System.out.println(b);
        }
}
```

```
1
3
```

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We do the first assignment…

x	1 2
y	3

```
class MethodCall {
        static int combine(int x, int y) {
                x = y - x;
                y = x + y;
                System.out.println(x);
                System.out.println(y);
                return x;
        }

        public static void main(String[] args) {
                int a = 1, b = 3;
                System.out.println(a);
                System.out.println(b);
                a = combine(a, b);
                System.out.println(a);
                System.out.println(b);
        }
}
```

```
1
3
```

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Then the second assignment…

x	2
y	3 5

```
class MethodCall {
        static int combine(int x, int y) {
                x = y - x;
                y = x + y;
                System.out.println(x);
                System.out.println(y);
                return x;
        }

        public static void main(String[] args) {
                int a = 1, b = 3;
                System.out.println(a);
                System.out.println(b);
                a = combine(a, b);
                System.out.println(a);
                System.out.println(b);
        }
}
```

```
1
3
```

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We print out the values again:

x	2
y	5

```
class MethodCall {
        static int combine(int x, int y) {
                x = y - x;
                y = x + y;
                System.out.println(x);
                System.out.println(y);
                return x;
        }

        public static void main(String[] args) {
                int a = 1, b = 3;
                System.out.println(a);
                System.out.println(b);
                a = combine(a, b);
                System.out.println(a);
                System.out.println(b);
        }
}
```

```
1
3
2
5
```

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Now we return to where we were called from:

x	2
y	5

```
class MethodCall {
        static int combine(int x, int y) {
                x = y - x;
                y = x + y;
                System.out.println(x);
                System.out.println(y);
                return x;
        }

        public static void main(String[] args) {
                int a = 1, b = 3;
                System.out.println(a);
                System.out.println(b);
                a = combine(a, b);
                System.out.println(a);
                System.out.println(b);
        }
}
```

```
1
3
2
5
```

And the return value gets substituted for the method call:

a	~~1~~ 2
b	3
combine returned	2

```
class MethodCall {
    static int combine(int x, int y) {
        x = y - x;
        y = x + y;
        System.out.println(x);
        System.out.println(y);
        return x;
    }

    public static void main(String[] args) {
        int a = 1, b = 3;
        System.out.println(a);
        System.out.println(b);
        a = combine(a, b);
        System.out.println(a);
        System.out.println(b);
    }
}
```

```
1
3
2
5
```

Finally, we print out the variables again:

a	2
b	3

```
class MethodCall {
    static int combine(int x, int y) {
        x = y - x;
        y = x + y;
        System.out.println(x);
        System.out.println(y);
        return x;
    }

    public static void main(String[] args) {
        int a = 1, b = 3;
        System.out.println(a);
        System.out.println(b);
        a = combine(a, b);
        System.out.println(a);
        System.out.println(b);
    }
}
```

```
1
3
2
5
2
3
```