5.7 Assignments

Variables

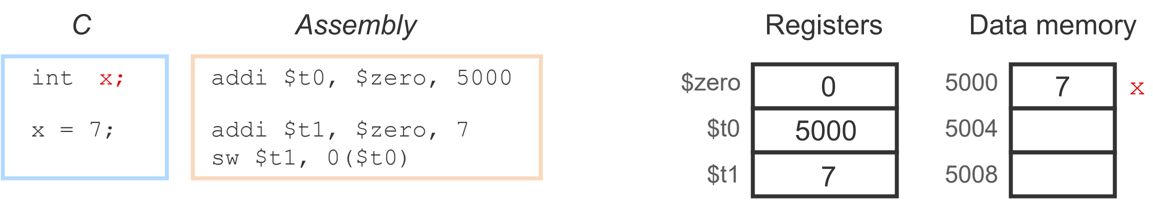
C is a popular high-level programming language. Some languages like C++, Java, C#, and Javascript have roots in C. A ***com***
high-level language like C into assembly. In this section and others, the reader is assumed to know C.

In C, a variable represents a location in memory. An assignment like `x = 7;` assigns x's memory location with the value 7.

In assembly, that variable's location can be written to a register. The value 7 can be written to another register. The assignm
carried out using a store word instruction with those two registers.

PARTICIPATION ACTIVITY 5.7.1: Assigning a value to a memory location.

Start □ 2x speed



```
int  x;

x = 7;
```

```
addi $t0, $zero, 5000

addi $t1, $zero, 7
sw $t1, 0($t0)
```

$zero	0
$t0	5000
$t1	7

5000	7
5004	
5008	

PARTICIPATION ACTIVITY 5.7.2: Assigning a value to a memory location.

Implement the C by completing the assembly.

1) C

```
int x;
x = 9;
```

Assembly

```
addi $t2, $zero, 6500  # x's address
addi $t1, $zero, 9
sw $t1, 0( _____ )
```

Check Show answer

2) C

```
int y;
y = 50;
```

Assembly

```
addi _____ , $zero, 6000  # y's address
addi $t1, $zero, 50
sw $t1, 0($t4)
```

Check Show answer

3) C

```
int y;
y = 99;
```

Assembly

```
addi $t0, $zero, 5000  # y's address
__________
sw $t2, 0($t0)
```

Check Show answer

4) C

```
int z;
z = 555;
```

Assembly

```
addi $t3, $zero, 5000  # z's address
```

____

____

NOTE: Use $t1.

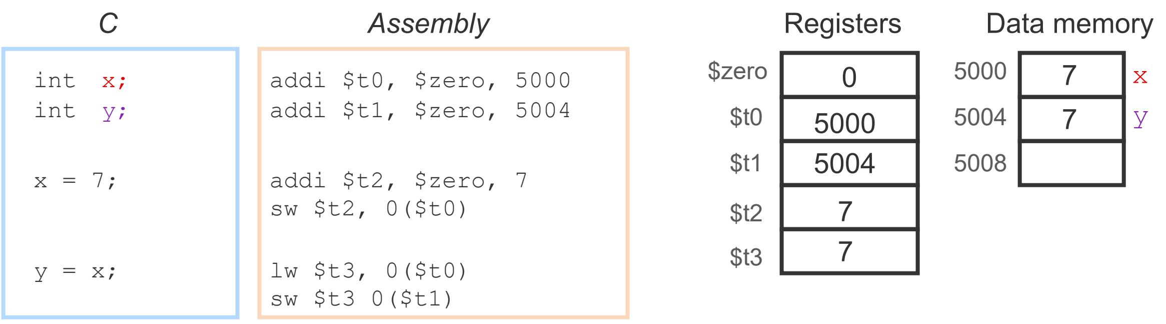
Check Show answer

Assignments

In C, `y = x;` assigns variable y with the value of variable x. In assembly, that assignment requires first loading a register wi storing that register's value into y. naming

PARTICIPATION ACTIVITY 5.7.3: Assigning a variable with the value of another variable.

Start □ 2x speed



C

```
int  x;
int  y;


x = 7;



y = x;
```

Assembly

```
addi $t0, $zero, 5000
addi $t1, $zero, 5004

addi $t2, $zero, 7
sw $t2, 0($t0)

lw $t3, 0($t0)
sw $t3 0($t1)
```

Registers

$zero	0
$t0	5000
$t1	5004
$t2	7
$t3	7

Data memory

5000	7	x
5004	7	y
5008		

PARTICIPATION ACTIVITY

5.7.4: Assigning a variable with the value of another variable.

Given int x and int y, and the initial assembly below, what C statement does the subsequent assembly carry out?

```
addi $t0, $zero, 5000   # x's address
addi $t1, $zero, 5004   # y's address
```

1)

```
addi $t2, $zero, 99
sw $t2, 0($t0)
```

○ `x = 99;`

○ `y = 99;`

○ `x = y;`

2)

```
lw $t3, 0($t0)
sw $t3, 0($t1)
```

○ `x = 5004;`

○ `x = y;`

○ `y = x;`

3)

```
lw $t3, 0($t1)
sw $t3, 0($t0)
```

○ `x = y;`

○ `y = x;`

4)

```
sw $t0, 0($t1)
```

○ `x = y;`

○ `y = x;`

○

```
y = 5000;
```

CHALLENGE ACTIVITY

5.7.1: Variable assignments.

Start

1

2

Convert the C to assembly. x is DM[5000].

```
int x;
x = 9;
```

```
addi ▼  $t4 ▼ ,  $t4 ▼ ,  0
addi ▼  $t4 ▼ ,  $t4 ▼ ,  0
addi ▼  $t4 ▼ ,  $t4 ▼ ,  0
```

Registers

$t4	0
$t5	0

Data memory

5000	0

1 2

Check Next

(*naming) Good programming practice uses descriptive variable names like personAge; this material uses short names like focus on the other concepts being taught.

Provide feedback on this section