

CSE 333 AA

Section 02

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Structures in C

Defining a struct:

```
struct orchard_st {  
    char name[20];  
};
```

Using a struct:

```
struct orchard_st my_orchard;
```

Does this work?

```
orchard_st my_orchard;
```

my_orchard:

In memory:

name:			
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??

Structures in C

Defining a struct:

```
struct orchard_st {  
    char name[20];  
};
```

Using typedef to create type name aliases:

```
typedef struct orchard_st Orchard, *OrchardPtr;
```

Now:

```
Orchard x;           is equivalent to: struct orchard_st x;  
OrchardPtr y;       struct orchard_st *y;
```

Structures in C

Combining structure definition with typedef:

```
typedef struct orchard_st {  
    char name[20];  
} Orchard, *OrchardPtr;
```

Structures are passed by value

```
void func(Orchard x) {  
    x.name[0] = 'B';  
}  
  
int main(int argc, char *argv[]) {  
    Orchard my_orchard;  
    strcpy(my_orchard.name, "A");  
    func(my_orchard);  
    return 0;  
}
```

Stack frame of main:

name:			
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??



Structures are passed by value

```
void func(Orchard x) {  
    x.name[0] = 'B';  
}  
  
int main(int argc, char *argv[]) {  
    Orchard my_orchard;  
    strcpy(my_orchard.name, "A");  
    func(my_orchard);  
    return 0;  
}
```

Stack frame of main:

name:			
'A'	0x00	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??

Structures are passed by value

```
void func(Orchard x) {  
    x.name[0] = 'B'; ← my_orchard:  
}
```

```
int main(int argc, char *argv[]) {  
    Orchard my_orchard;  
    strcpy(my_orchard.name, "A");  
    func(my_orchard);  
    return 0;  
}
```

Stack frame of main:

name:			
'A'	0x00	0x??	0x??
			0x??

Stack frame of func:

name:			
'A'	0x00	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??

Structures are passed by value

```
void func(Orchard x) {  
    x.name[0] = 'B';  
}
```

my_orchard:



```
int main(int argc, char *argv[]) {  
    Orchard my_orchard;  
    strcpy(my_orchard.name, "A");  
    func(my_orchard);  
    return 0;  
}
```

x:

Stack frame of main:

name:			
'A'	0x00	0x??	0x??
			0x??

Stack frame of func:

name:			
'B'	0x00	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??

Structures are passed by value

```
void func(Orchard x) {  
    x.name[0] = 'B';  
}  
  
int main(int argc, char *argv[]) {  
    Orchard my_orchard;  
    strcpy(my_orchard.name, "A");  
    func(my_orchard);  
    return 0;  
}
```

Stack frame of main:

name:			
'A'	0x00	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??
0x??	0x??	0x??	0x??

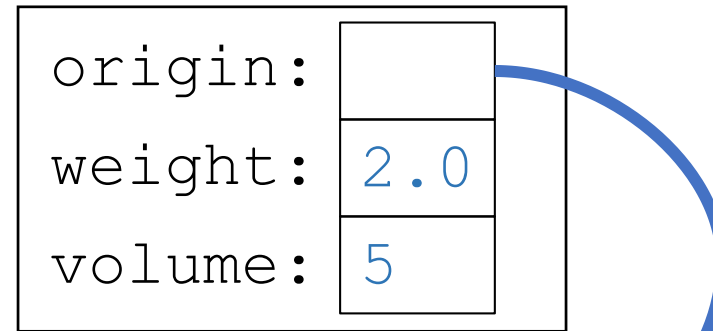
Worksheet Problem 1

```
typedef struct orchard_st {  
    char name[20];  
} Orchard, *OrchardPtr;
```

```
typedef struct fruit_st {  
    OrchardPtr origin;  
    double weight;  
    int volume;  
} Fruit, *FruitPtr;
```

Example usage:

a Fruit object:



an Orchard object:



Worksheet Problem 1

main:

bt: name:

??????????

apple:

origin:	<table border="1"><tr><td>???</td></tr></table>	???
???		
weight:	<table border="1"><tr><td>???</td></tr></table>	???
???		
volume:	<table border="1"><tr><td>???</td></tr></table>	???
???		

applePtr:

???

Worksheet Problem 1

main:

bt: name: Apple Orchard

apple:

origin:	???
weight:	???
volume:	???

applePtr: ???

Worksheet Problem 1

main:

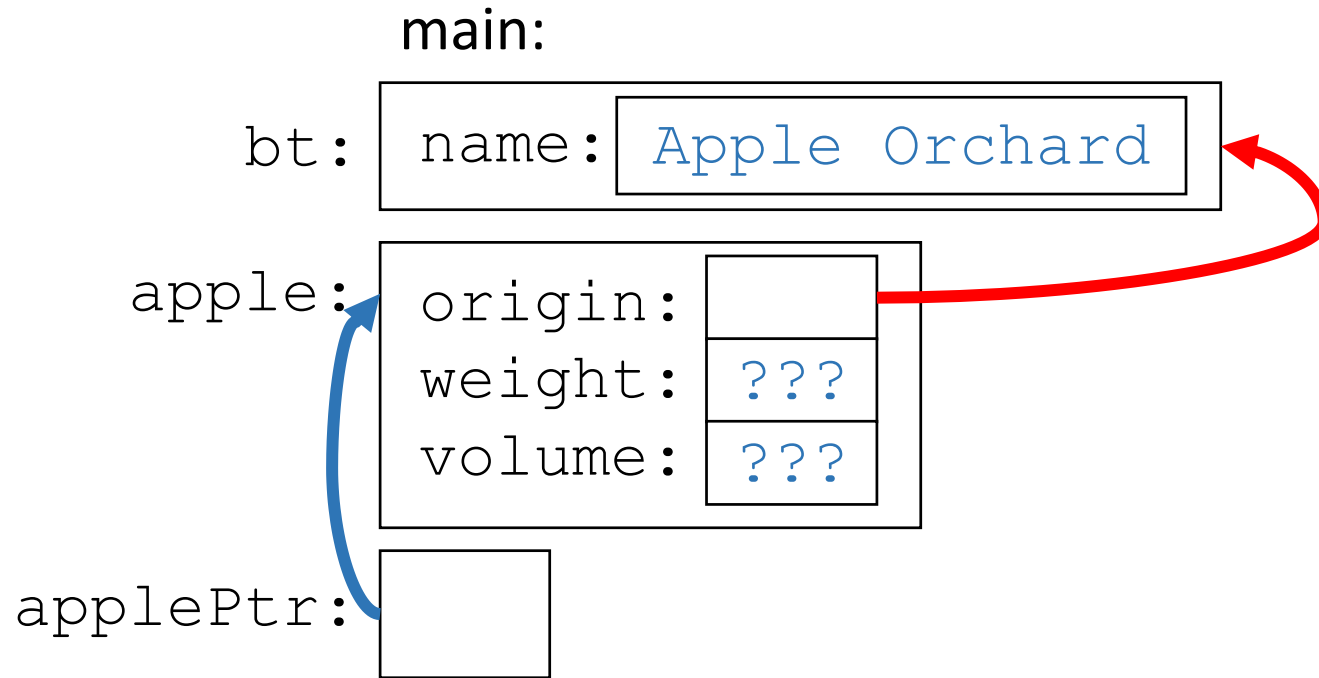
bt: name: Apple Orchard

apple: origin: ???
weight: ???
volume: ???

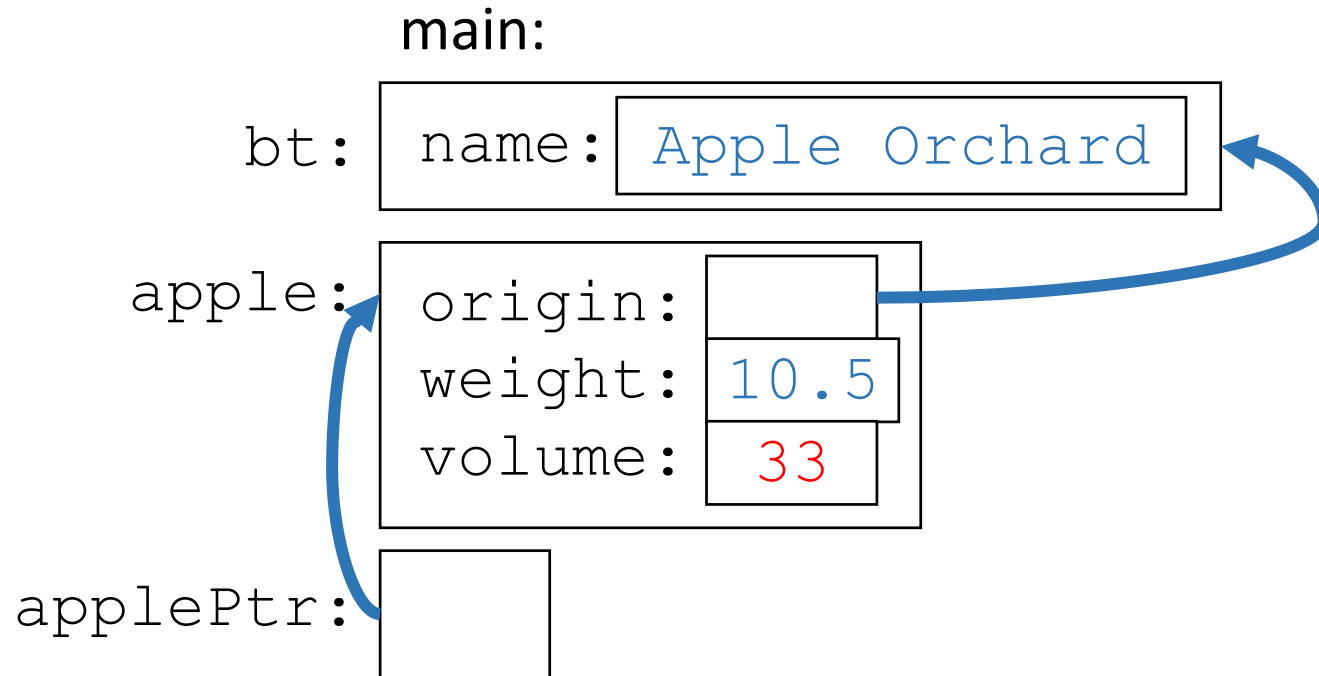
applePtr:



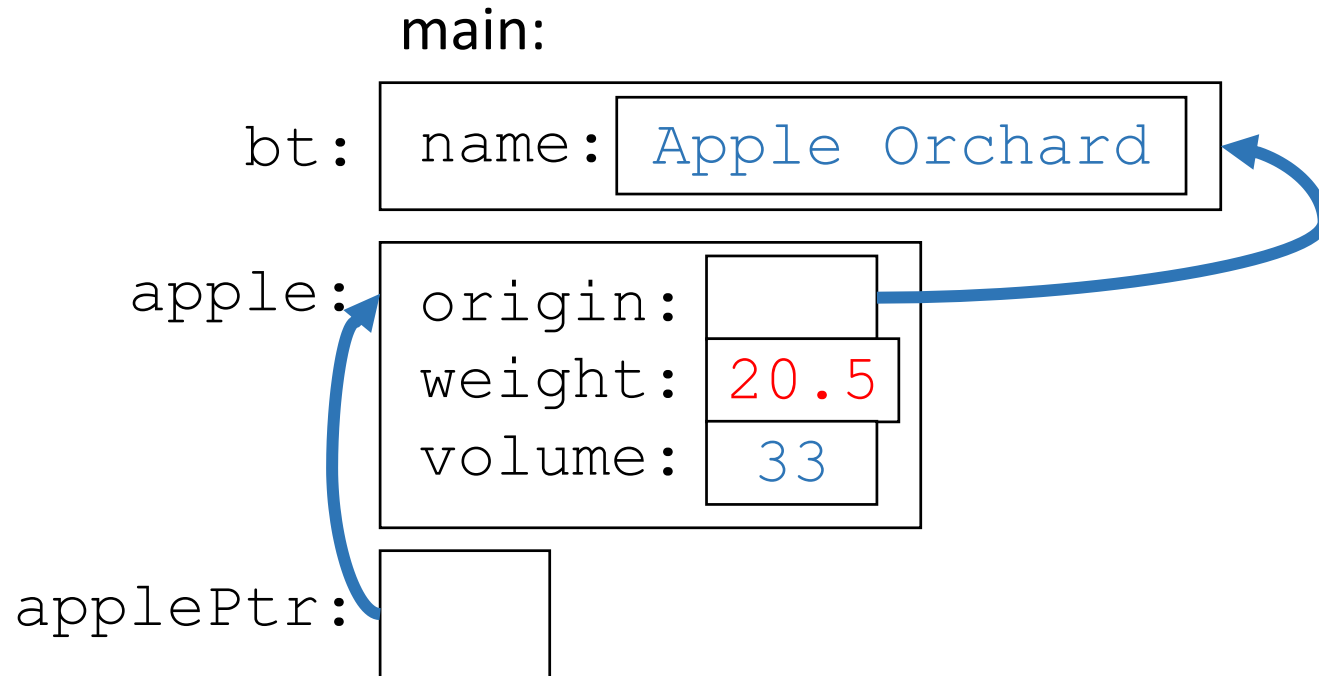
Worksheet Problem 1



Worksheet Problem 1

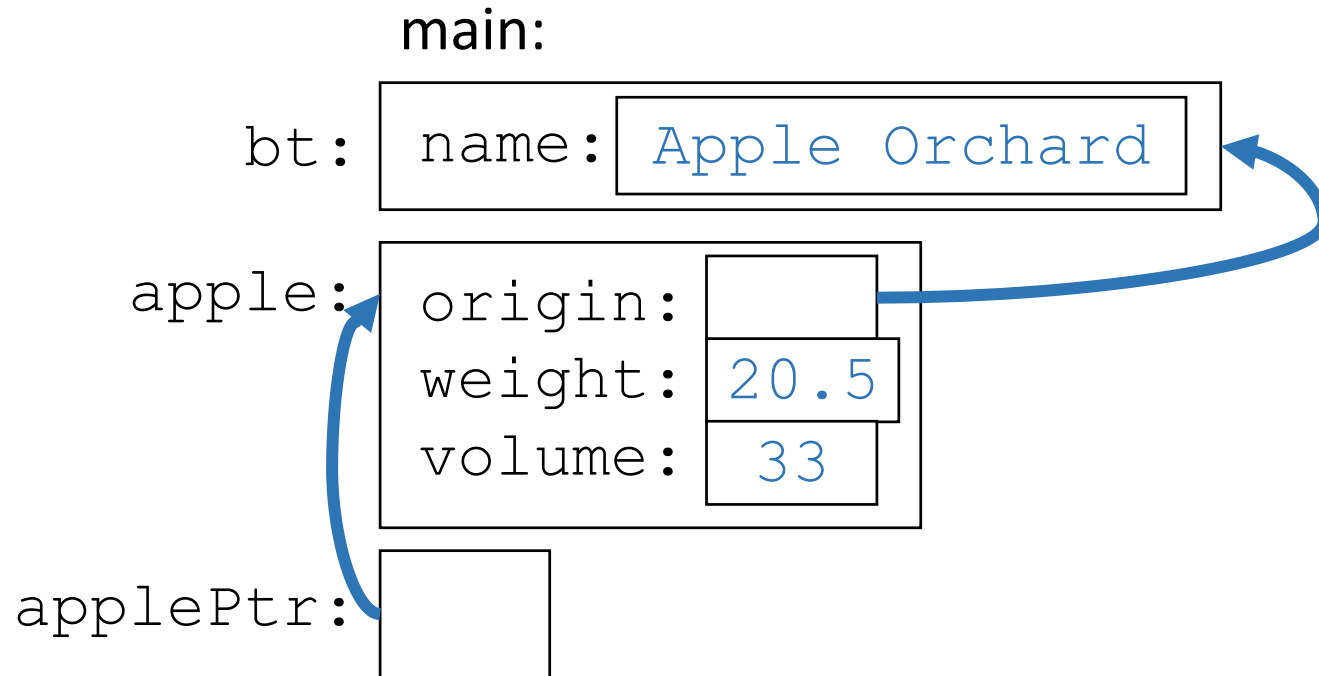


Worksheet Problem 1



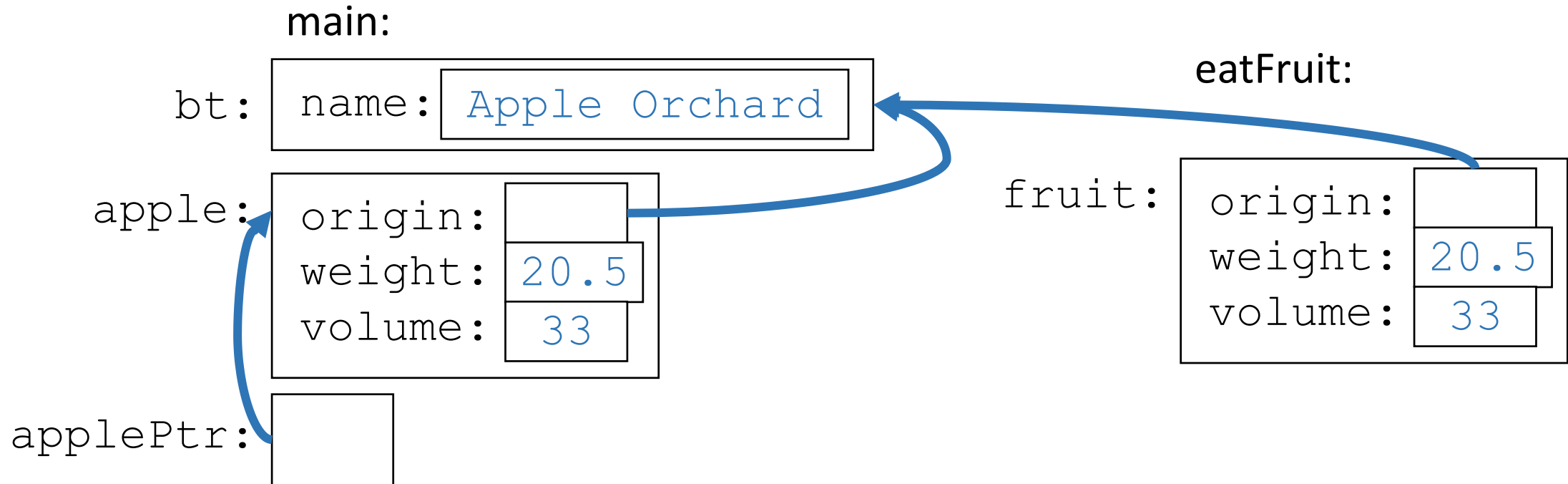
1. 20.5, 33, Apple Orchard

Worksheet Problem 1



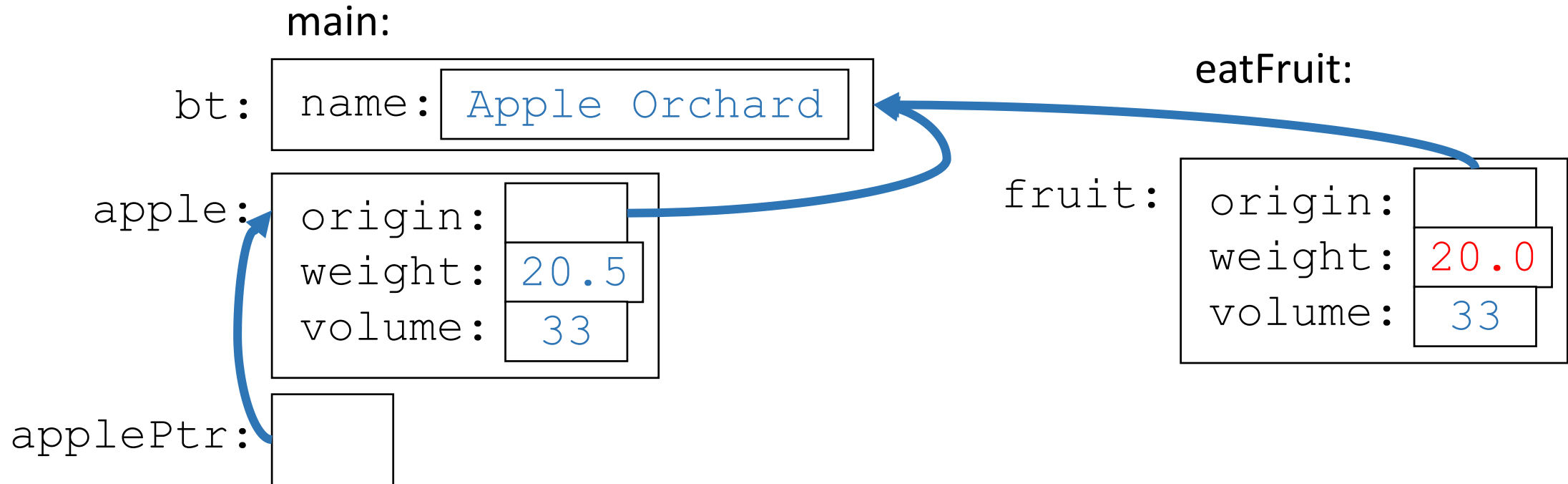
1. 20.5, 33, Apple Orchard

Worksheet Problem 1



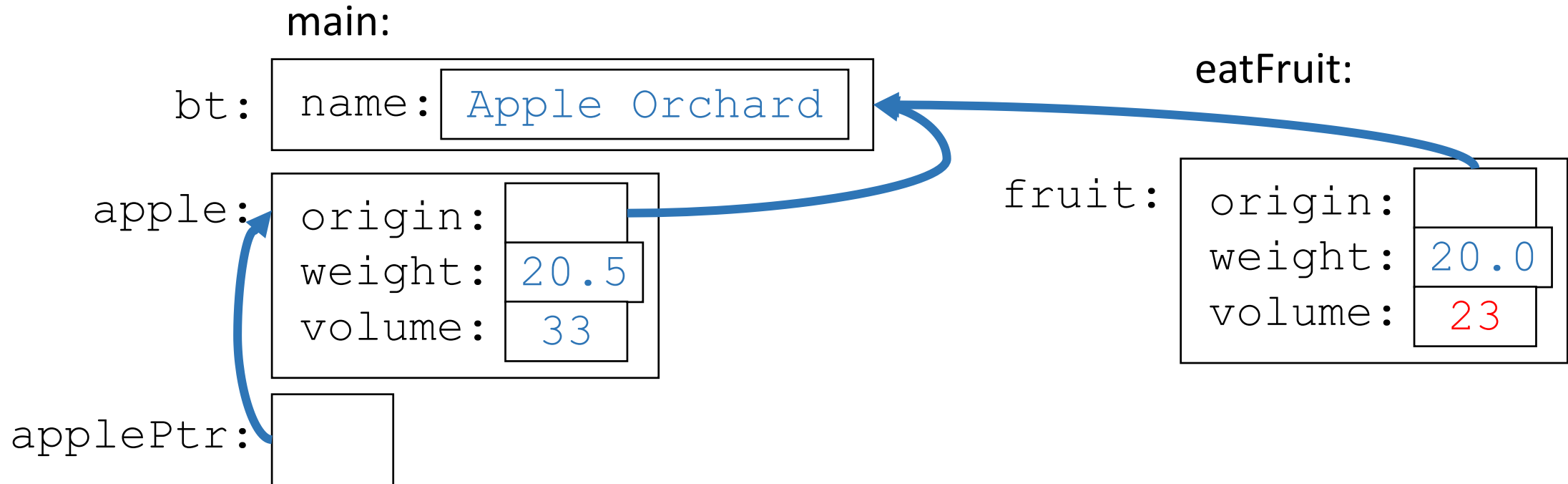
1. 20.5, 33, Apple Orchard

Worksheet Problem 1

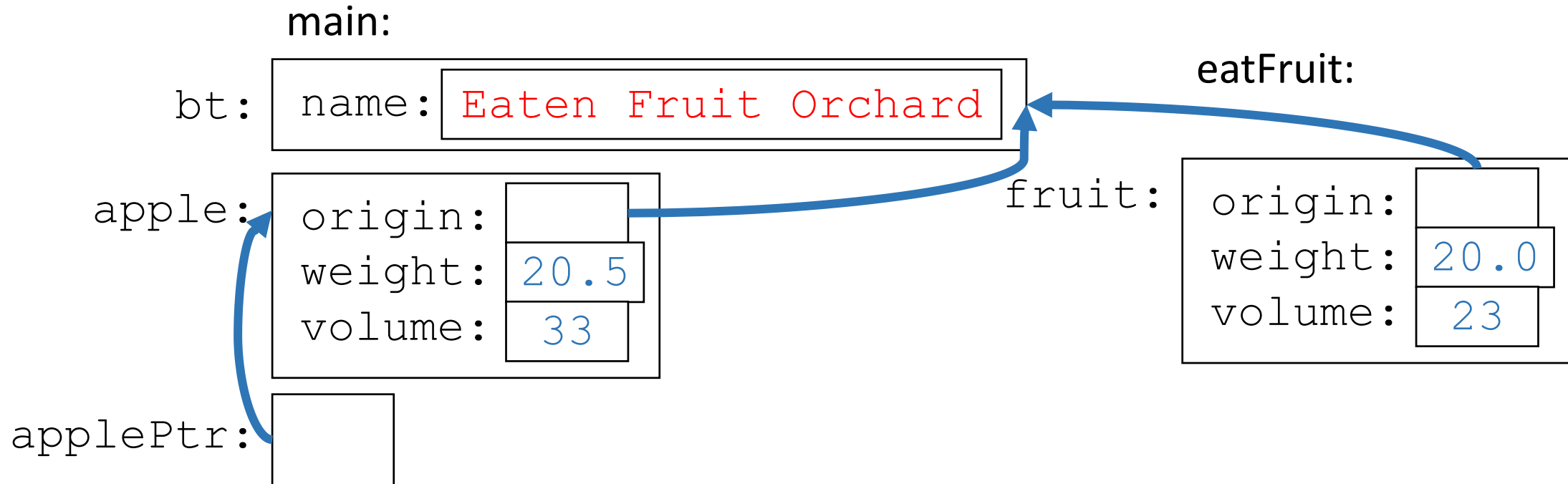


1. 20.5, 33, Apple Orchard

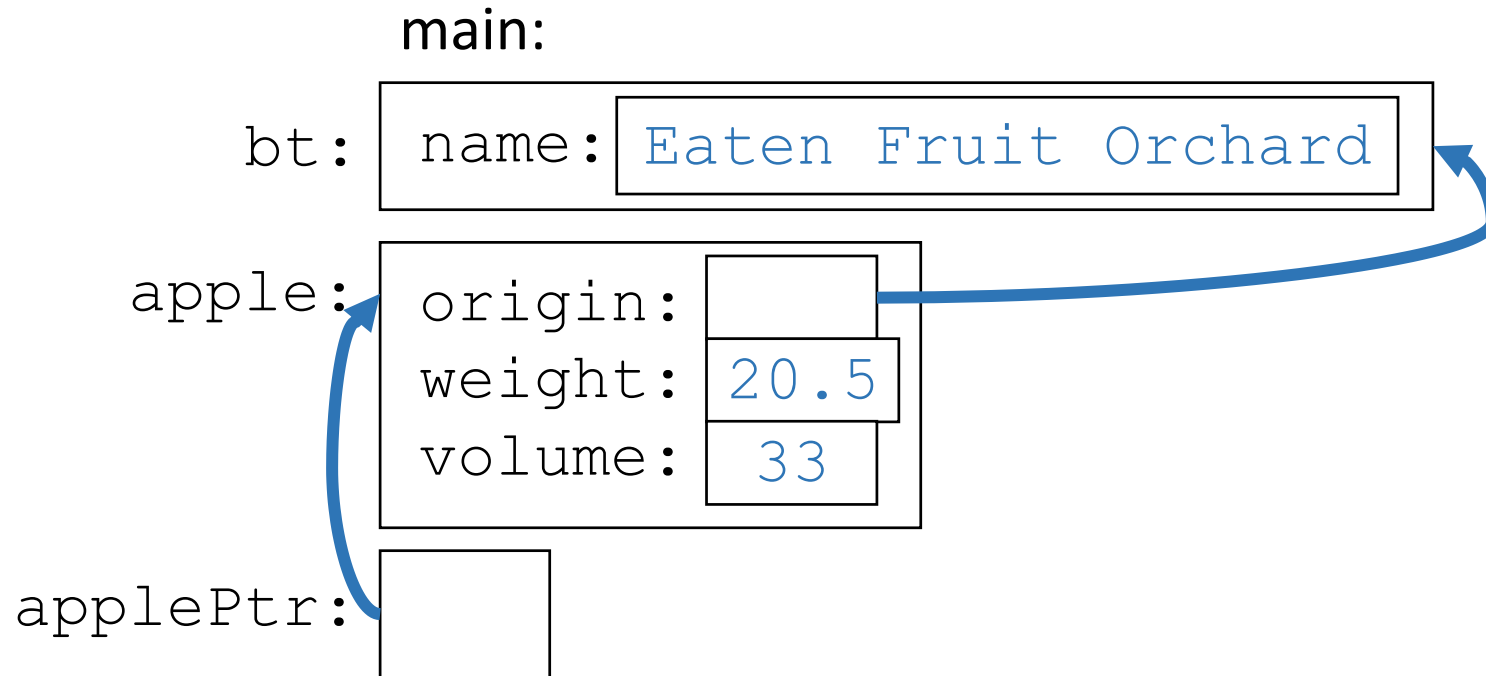
Worksheet Problem 1



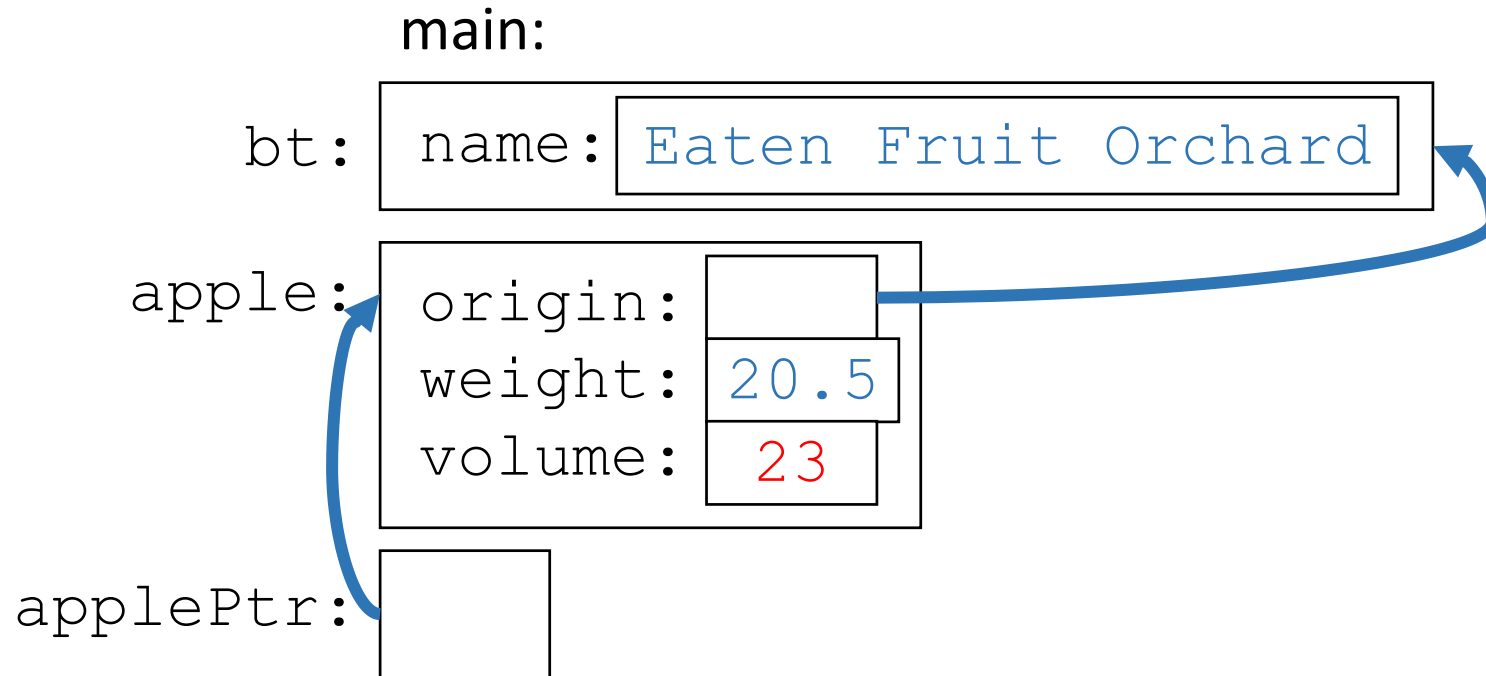
Worksheet Problem 1



Worksheet Problem 1

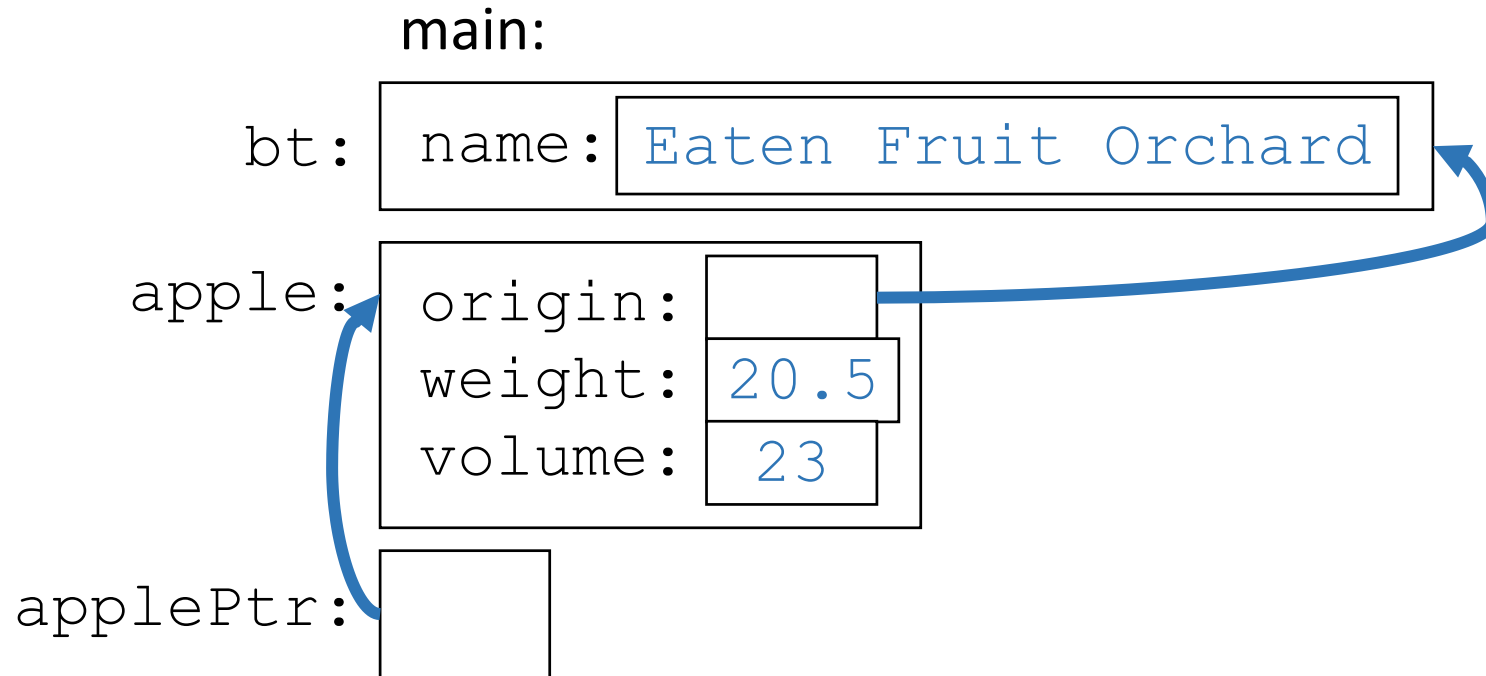


Worksheet Problem 1



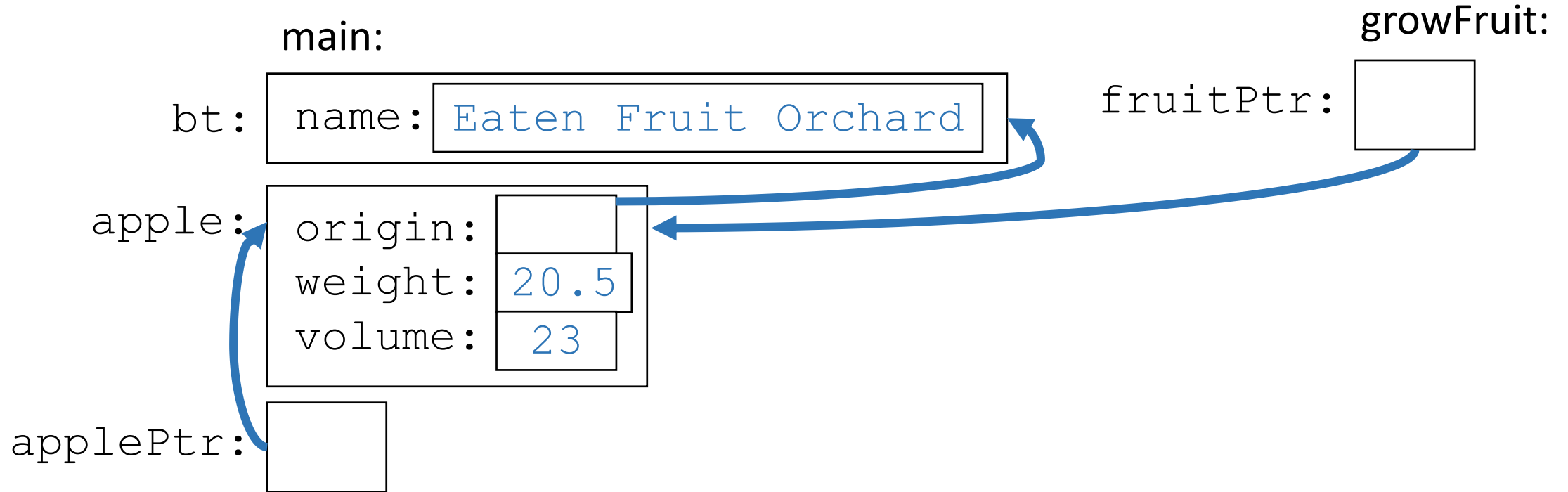
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard



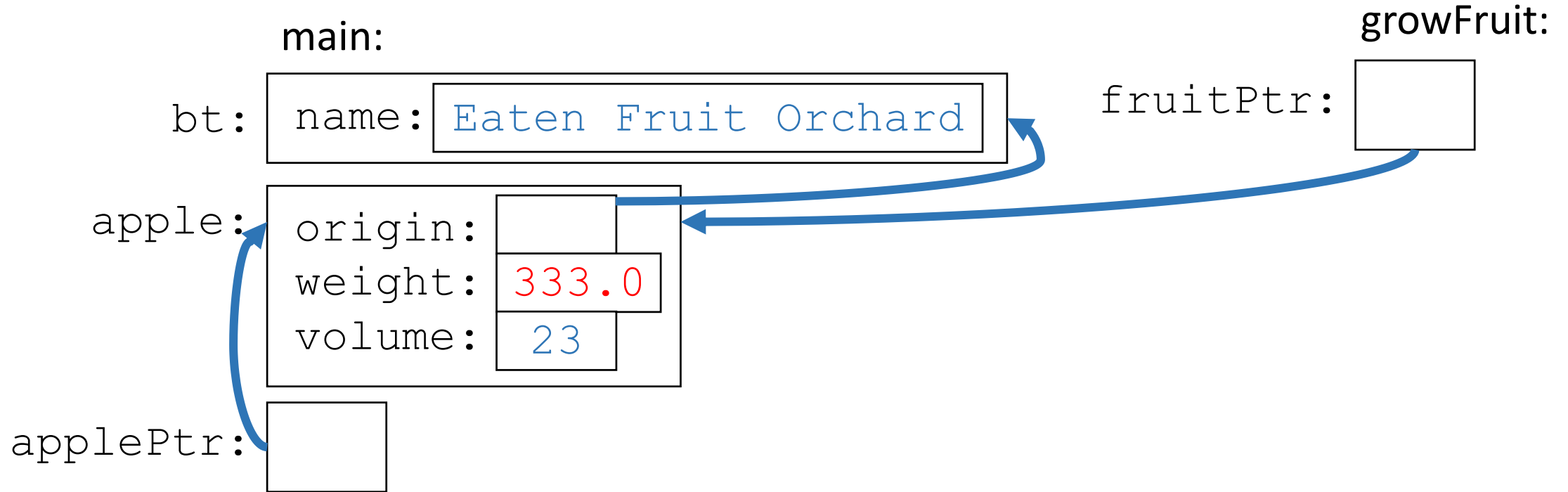
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard



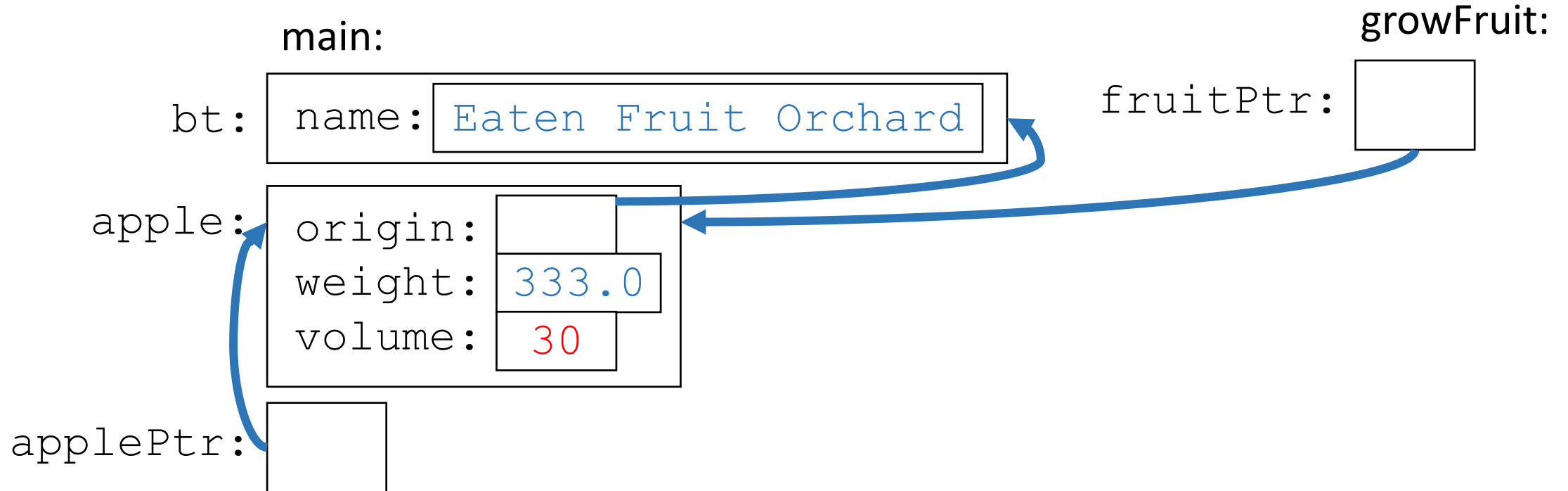
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard



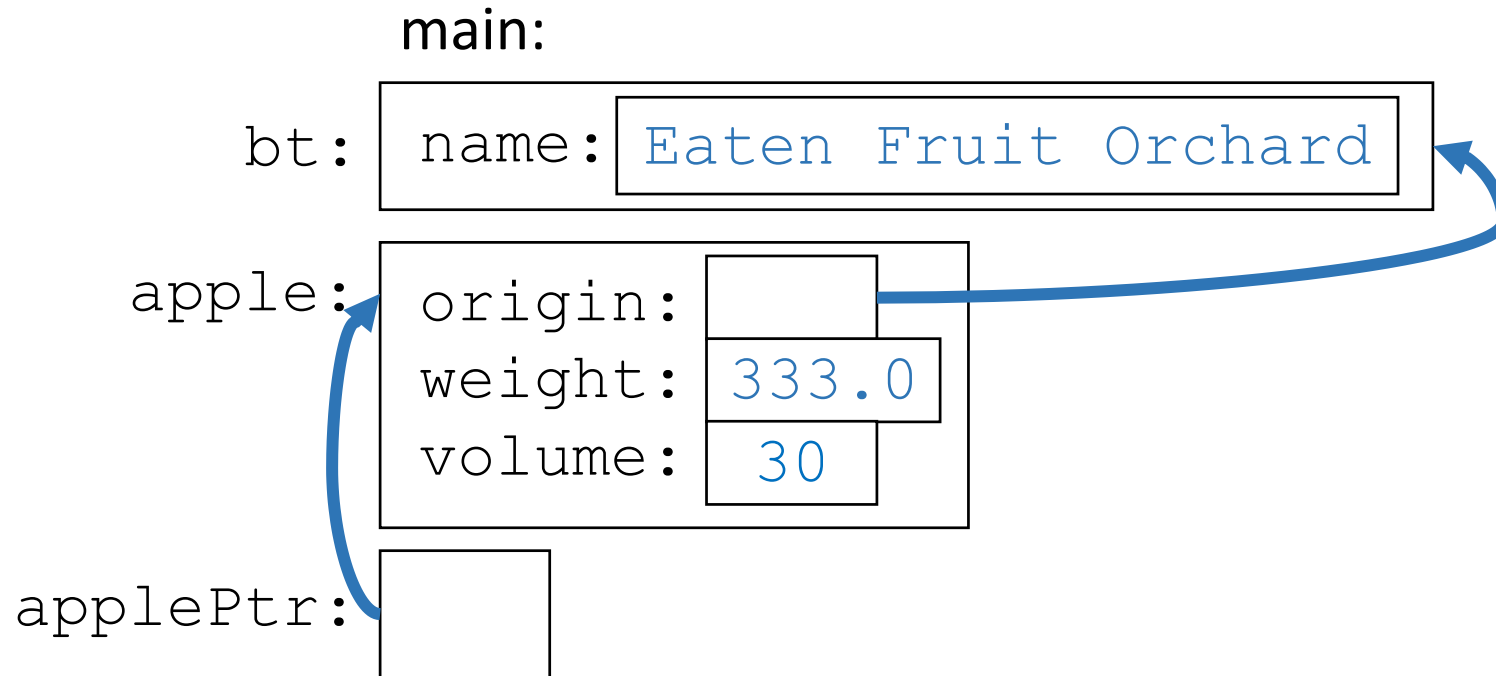
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard



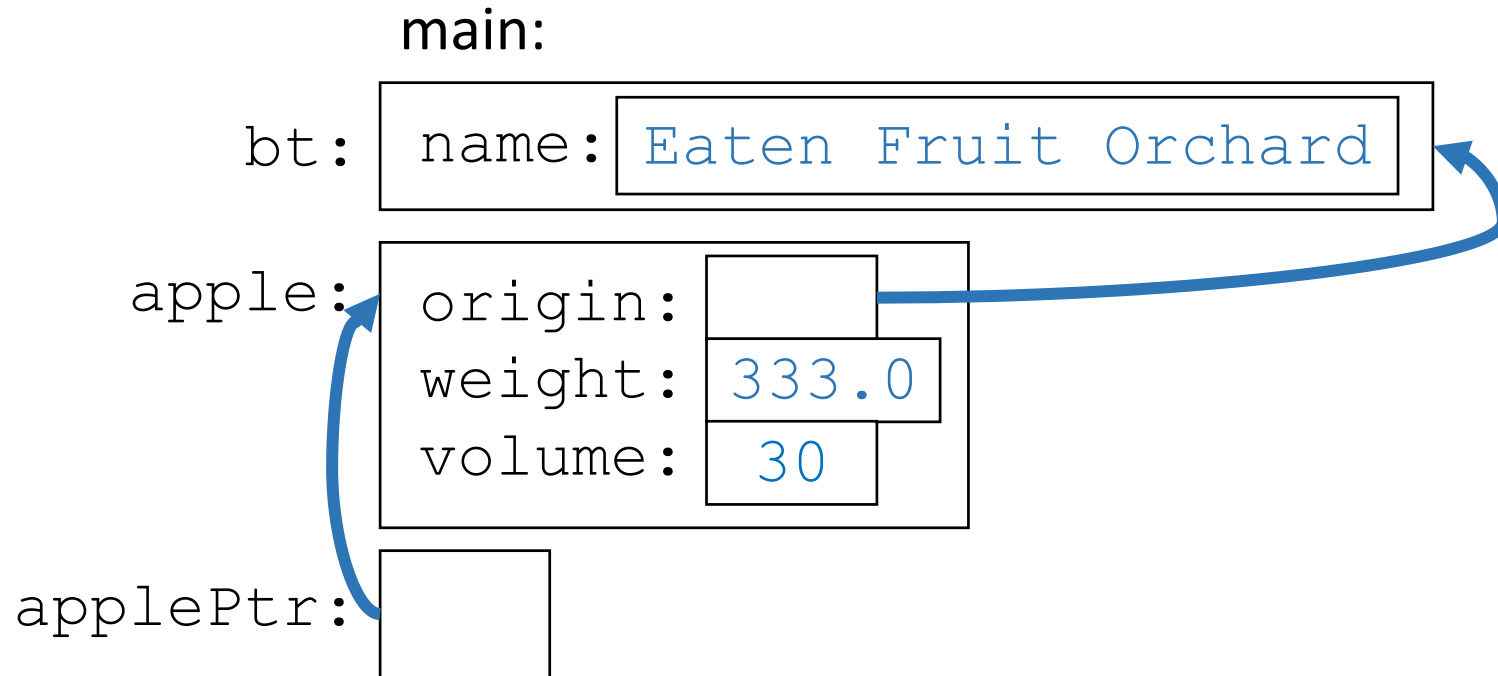
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard



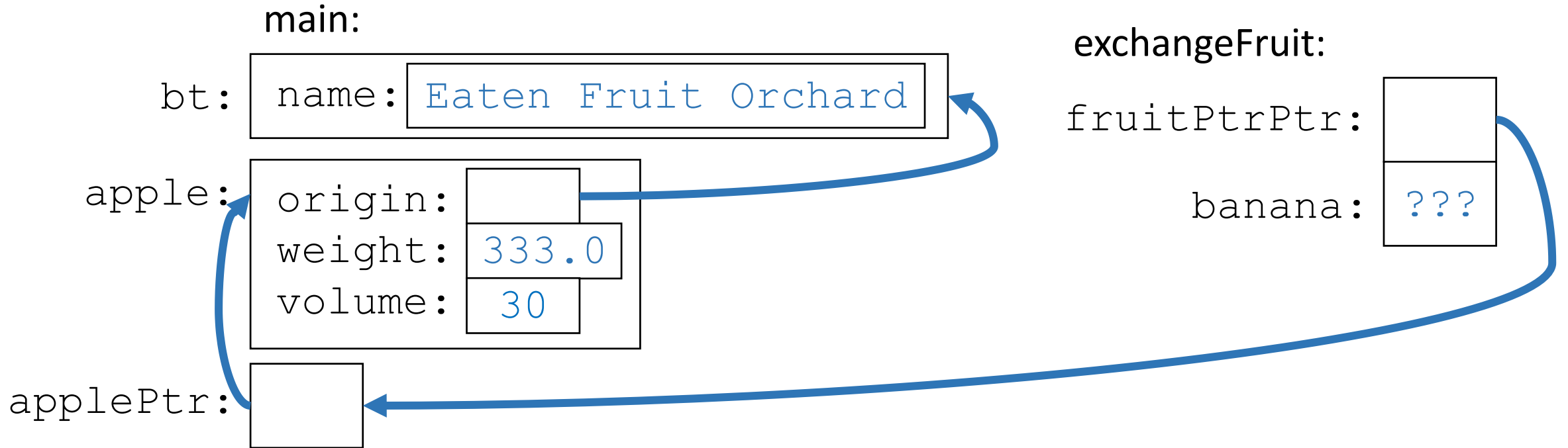
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



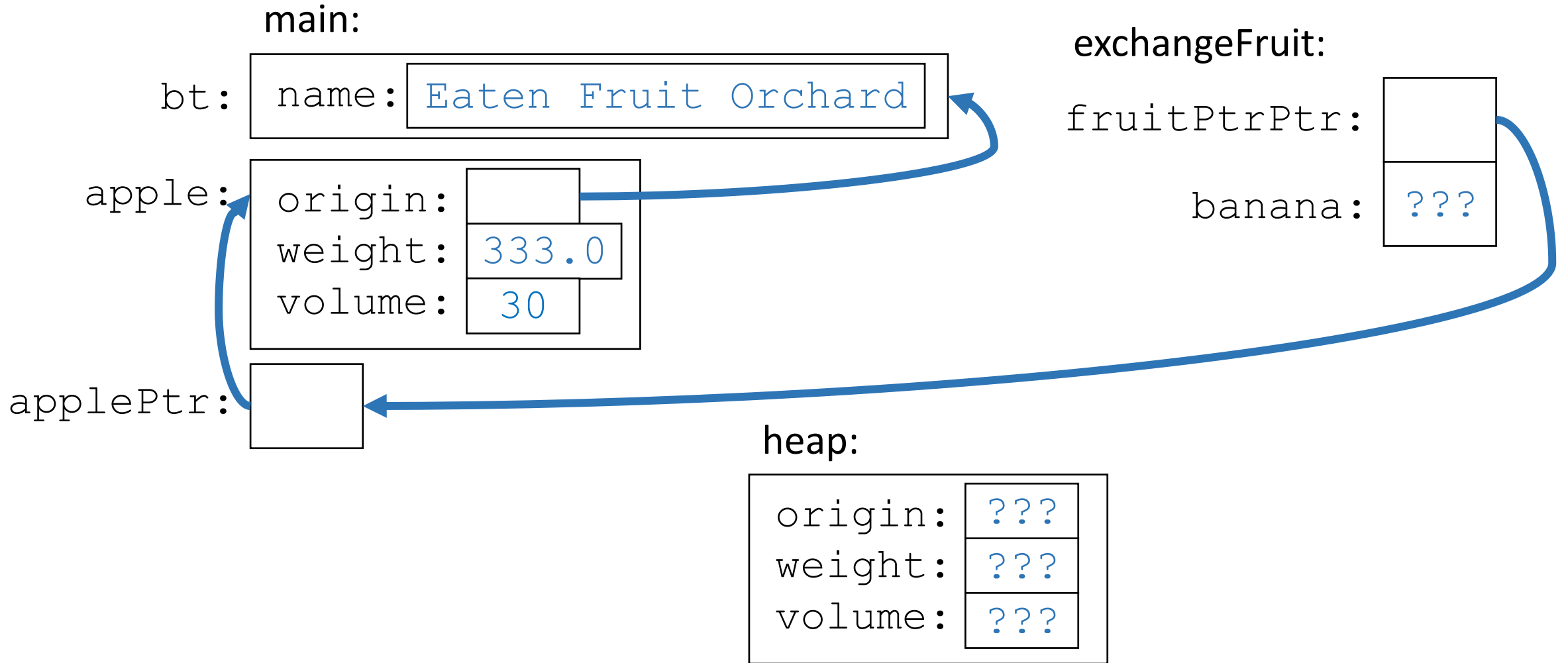
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



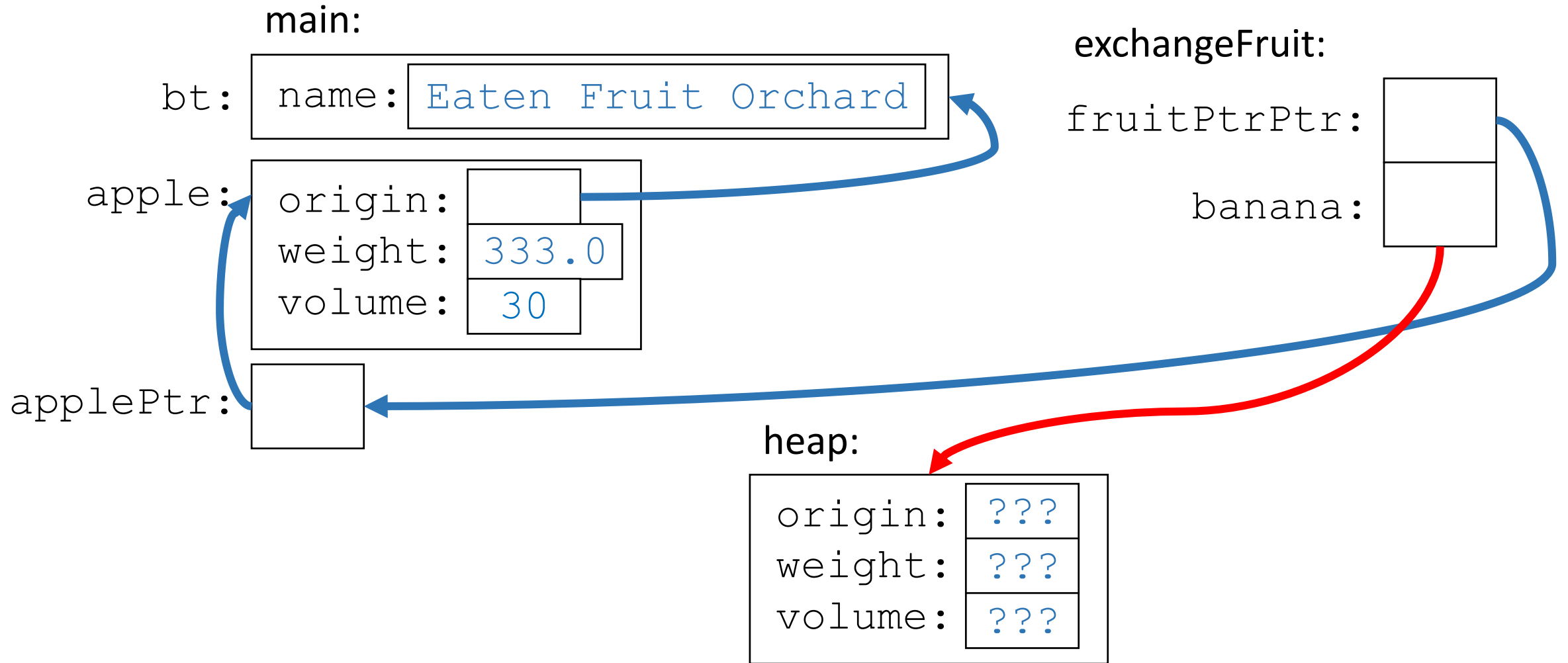
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



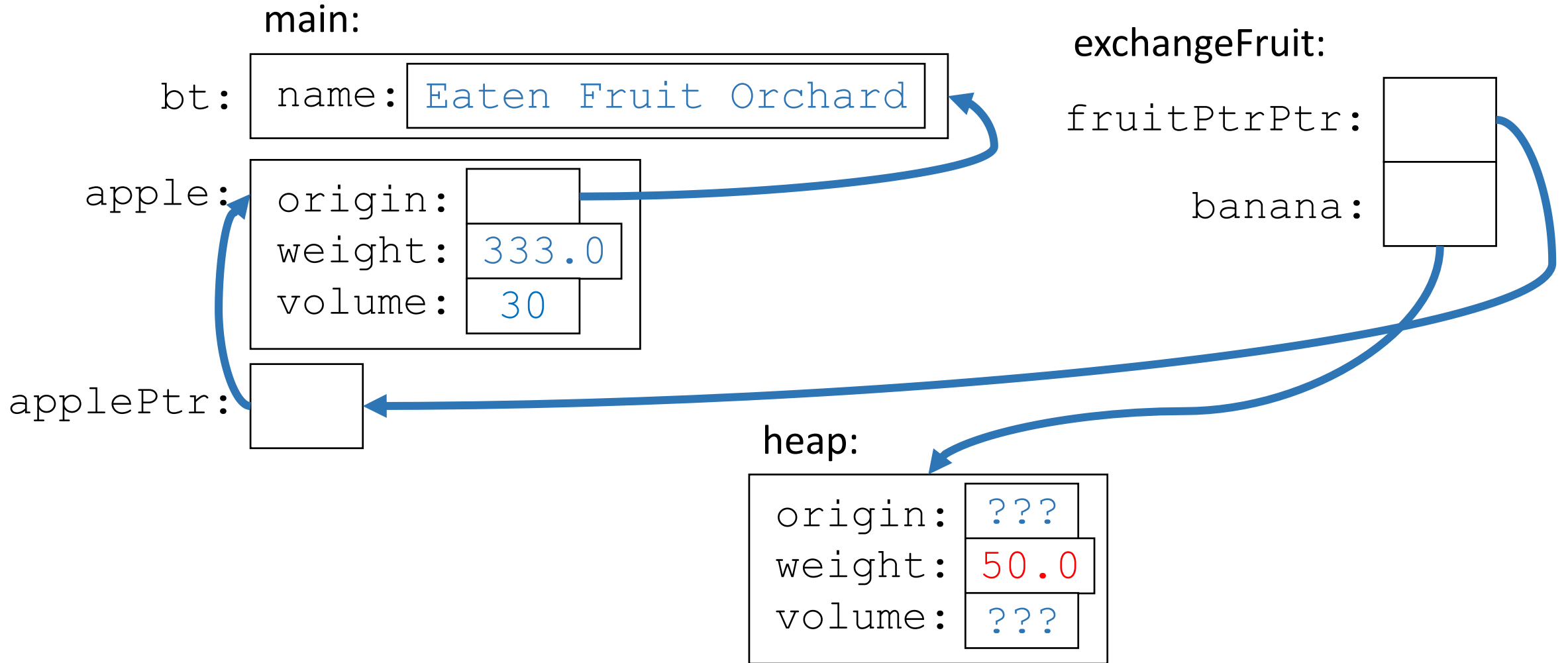
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



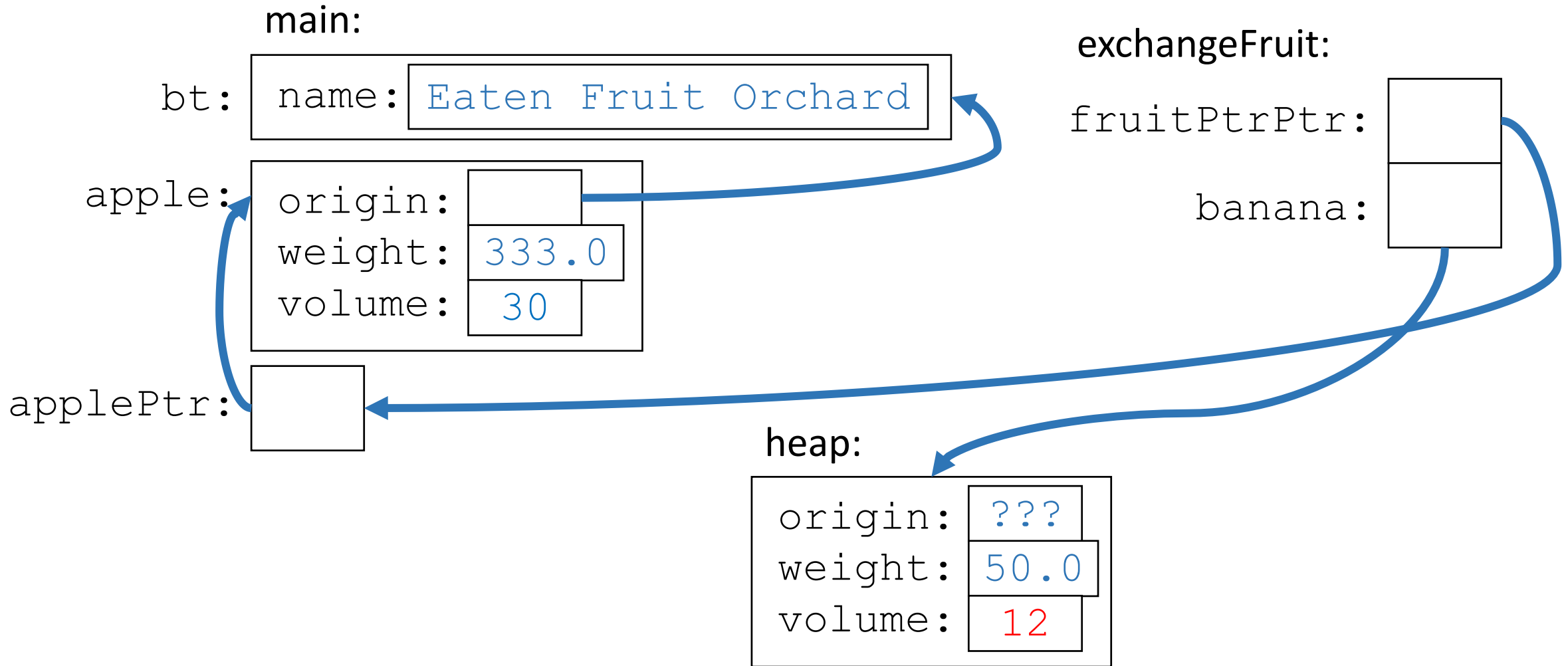
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



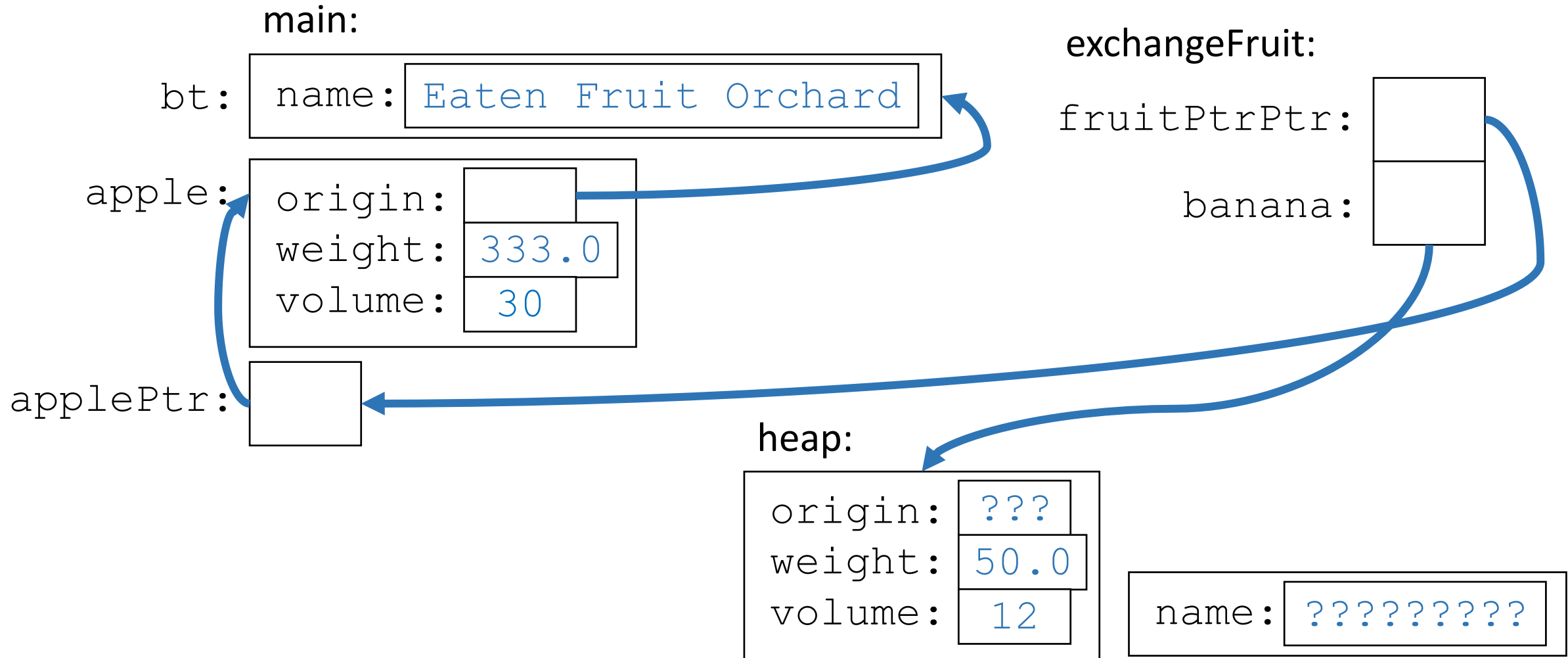
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



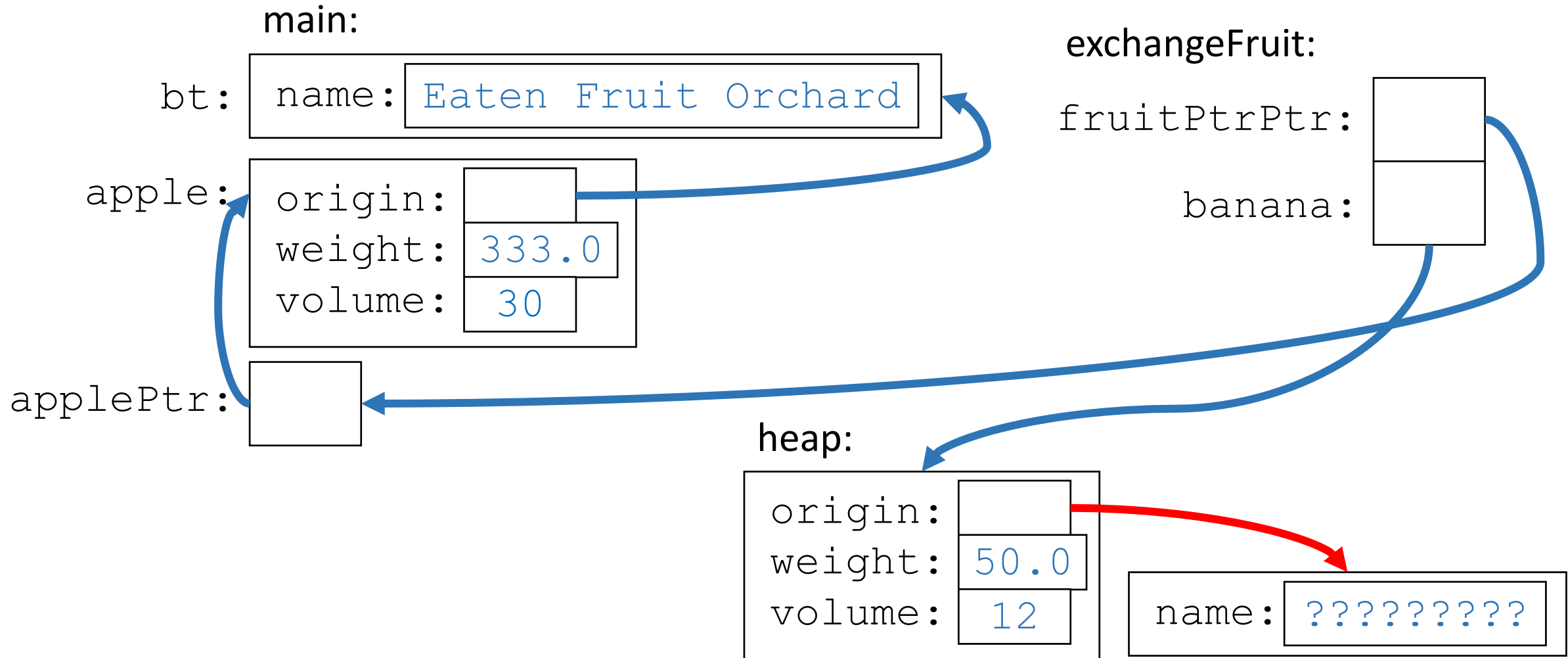
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



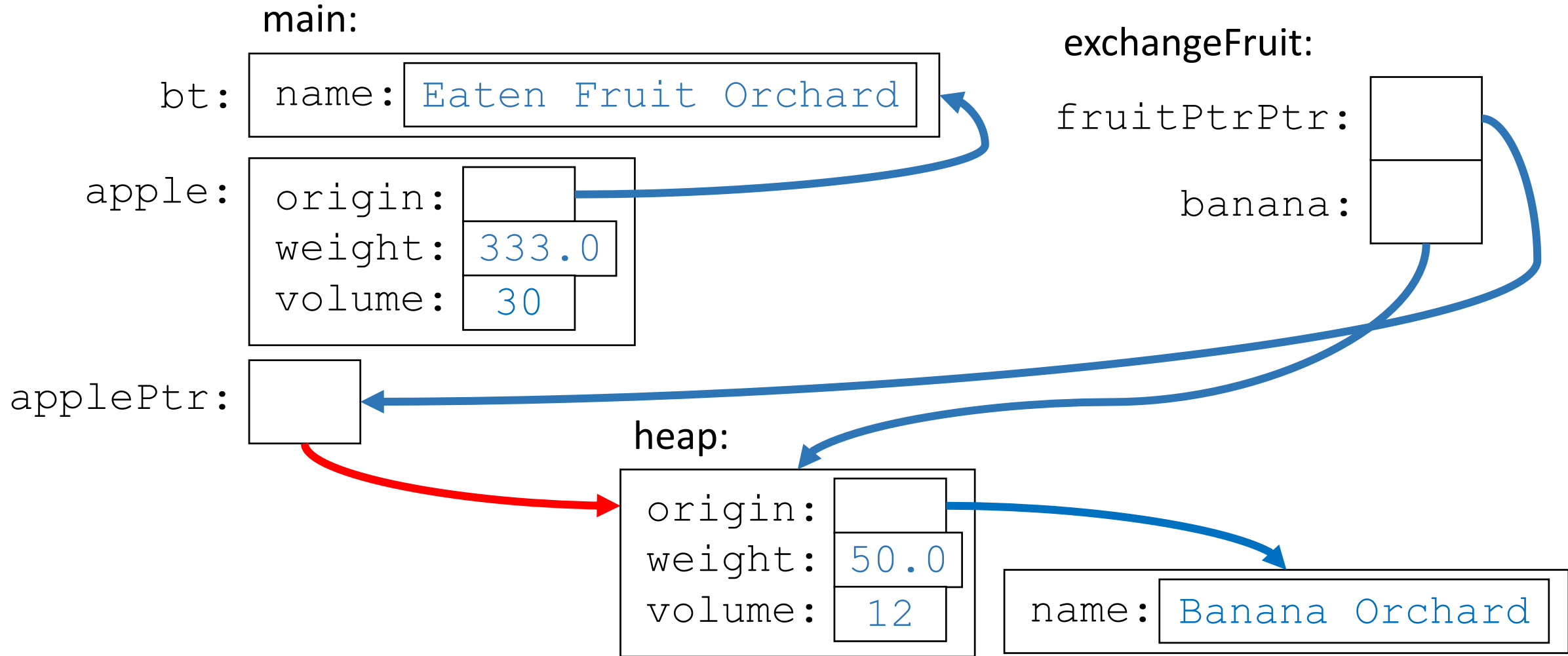
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



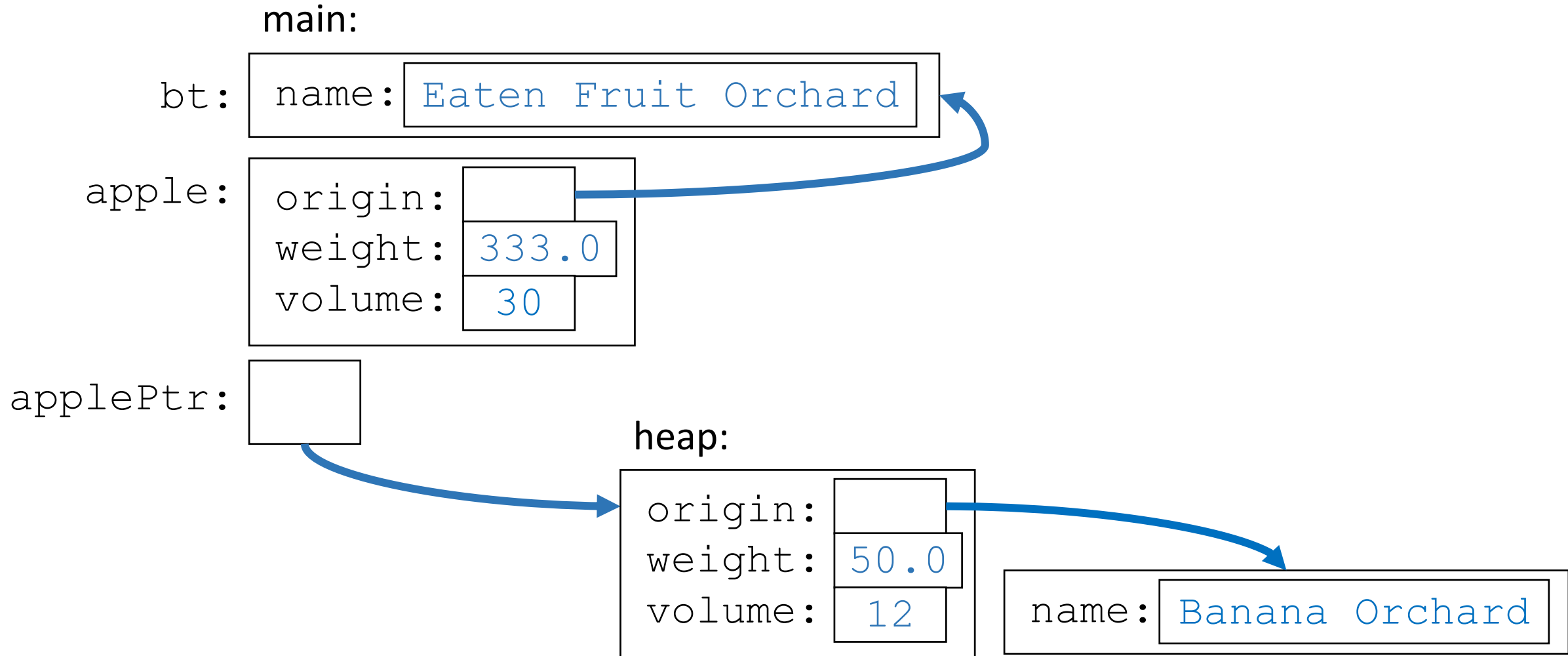
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



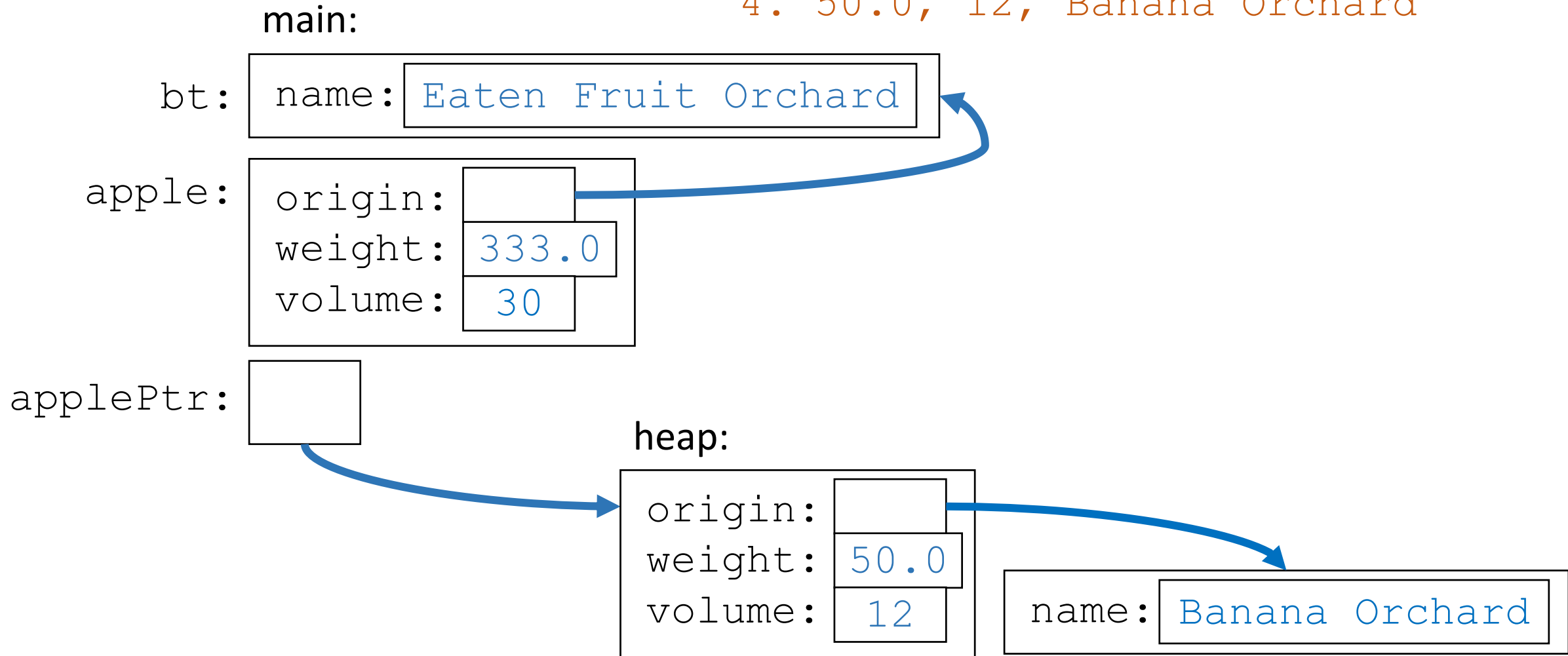
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard



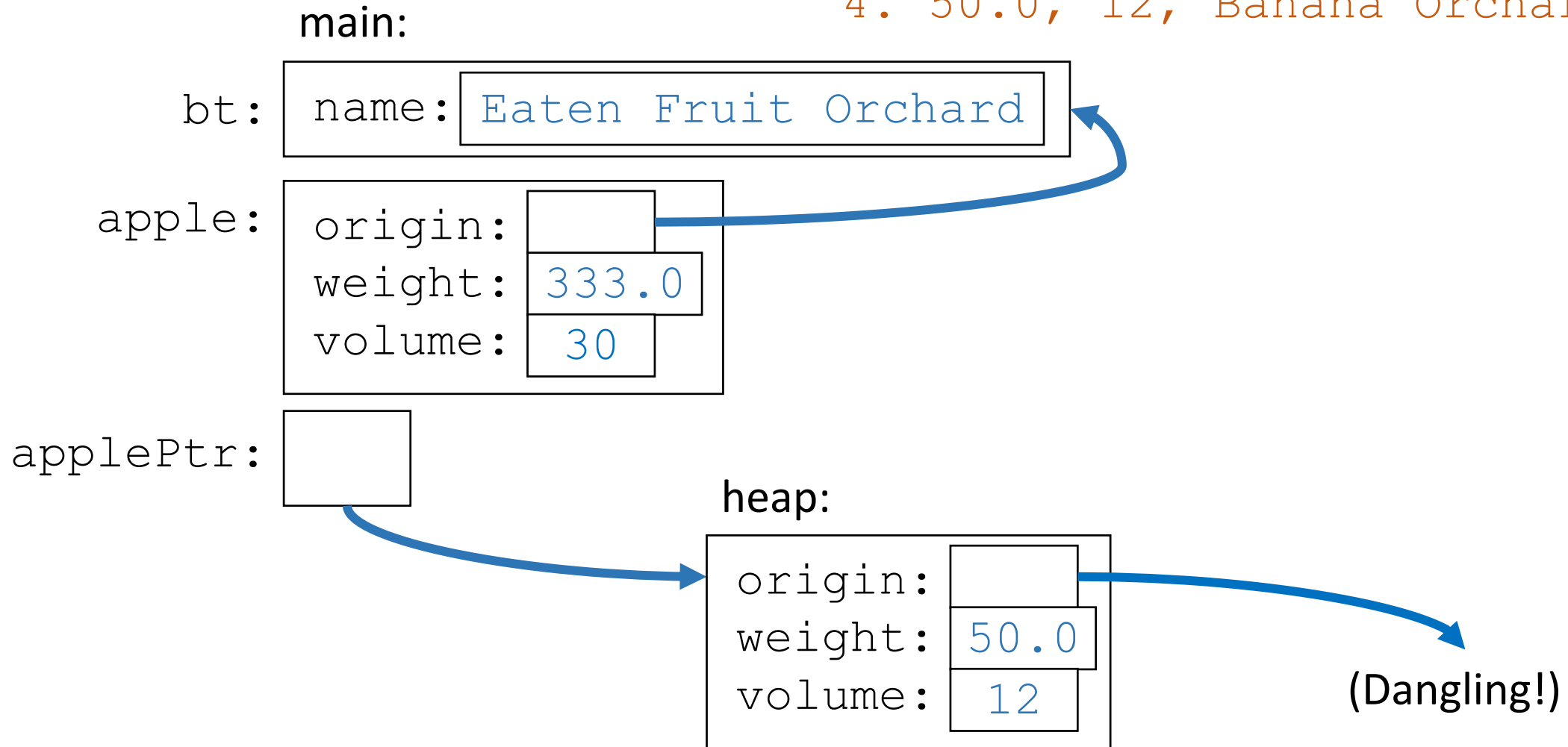
Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard
4. 50.0, 12, Banana Orchard



Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard
4. 50.0, 12, Banana Orchard



Worksheet Problem 1

1. 20.5, 33, Apple Orchard
2. 20.5, 23, Eaten Fruit Orchard
3. 333.0, 30, Eaten Fruit Orchard
4. 50.0, 12, Banana Orchard

main:

bt:

name: Eaten Fruit Orchard

apple:

origin:

weight: 333.0

volume: 30

applePtr:

(Dangling!)

