Evidence for Implementation and Testing Unit.

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E-21

I.T 1- Demonstrate one example of encapsulation that you have written in a program.

```
public abstract class Room {

    private int capacity;
    private ArrayList<Guest> guests;

    public Room(int capacity){
        this.capacity = capacity;
        this.guests = new ArrayList<>();
    }

    public int getCapacity() {
        return this.capacity;
    }

    public ArrayList<Guest> getGuests() {
        return this.guests;
    }

    public int countGuests(){
        return this.guests.size();
    }

    public void addGuest(Guest guest) {
        if (this.capacity > this.countGuests()){
        this.guests.add(guest);
        }
    }

    public void removeGuest(Guest guest) {
        this.guests.remove(guest);
    }
```

I.T 2 - Example the use of inheritance in a program.

An abstract class called “Item”:

```
public abstract class Item implements ISell{

    private String name;
    private int buyPrice;
    private int sellPrice;

    public Item (String name, int buyPrice, int sellPrice) {
        this.name = name;
        this.buyPrice = buyPrice;
        this.sellPrice = sellPrice;
    }
```

Another abstract class called “instrument” which inherits the name, buyPrice and sellPrice from the parent class of “Item”:

```
public abstract class Instrument extends Item implements IPlay{

    private String type;
    private String material;
    private String colour;
    private String sound;

    public Instrument (String name, int buyPrice, int sellPrice, String type, String material, String colour, String sound) {
        super(name, buyPrice, sellPrice);
        this.type = type;
        this.material = material;
        this.colour = colour;
        this.sound = sound;
    }
```

Finally a class called “Guitar which inherits all the parameters from it’s parent class “instrument” in the super constructor:

```
public class Guitar extends Instrument {

    private int stringNumber;

    public Guitar (String name, int buyPrice, int sellPrice, String type, String material, String colour, String sound, int stringNumber) {
        super(name, buyPrice, sellPrice, type, material, colour, sound);
        this.stringNumber = stringNumber;
    }
```

An object in the inherited class:

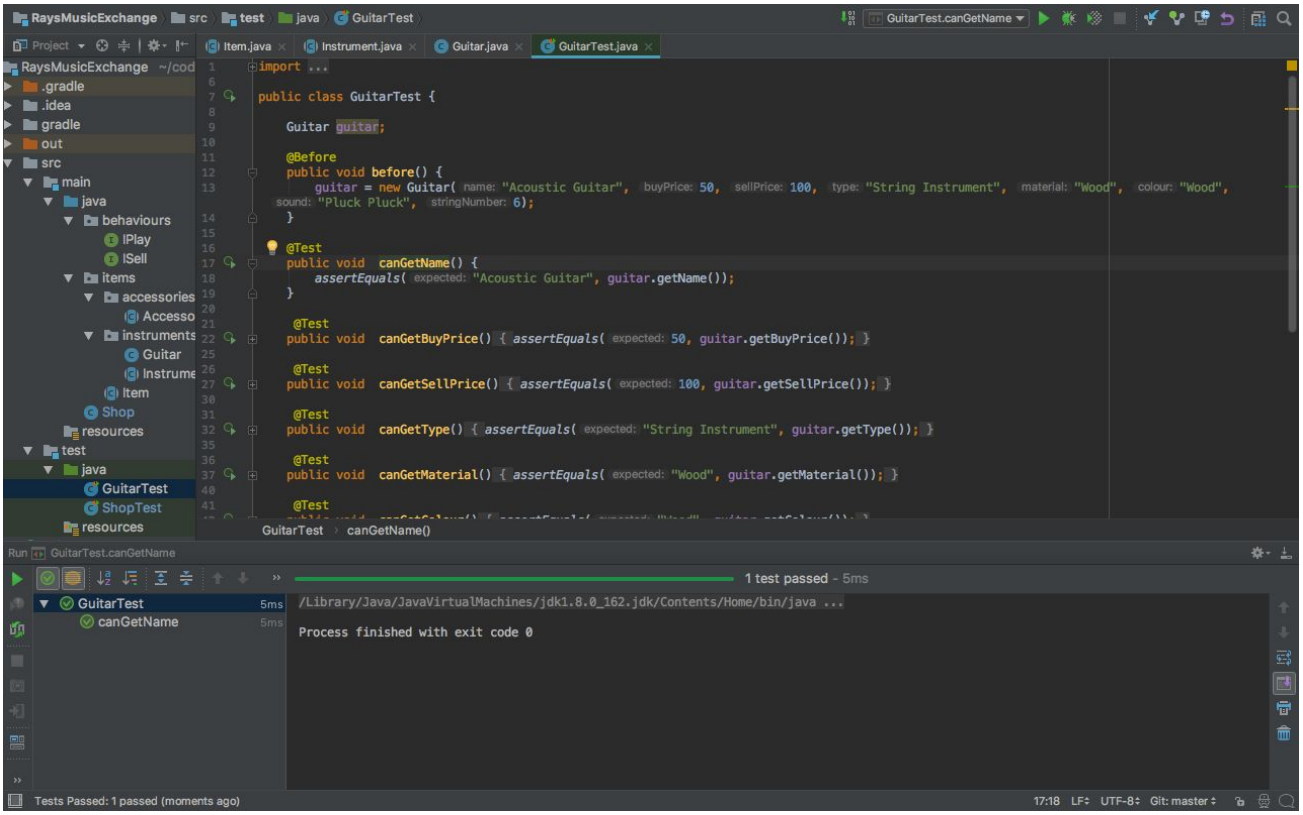
```
public class GuitarTest {

    Guitar guitar;

    @Before
    public void before() {
        guitar = new Guitar( name: "Acoustic Guitar",  buyPrice: 50,  sellPrice: 100,  type: "String Instrument",  material: "Wood",  colour: "Wood",
  sound: "Pluck Pluck",  stringNumber: 6);
    }
```

Name Method in Parent “Item” Class

```
public abstract class Item implements ISell{

    private String name;
    private int buyPrice;
    private int sellPrice;

    public Item (String name, int buyPrice, int sellPrice) {
        this.name = name;
        this.buyPrice = buyPrice;
        this.sellPrice = sellPrice;
    }

    public String getName() {
        return this.name;
    }
```

Testing Name Method in “Guitar” class inherited from “Item” class

```
public class GuitarTest {

    Guitar guitar;

    @Before
    public void before() {
        guitar = new Guitar( name: "Acoustic Guitar",  buyPrice: 50,  sellPrice: 100,  type: "String Instrument",  material: "Wood",  colour: "Wood",
  sound: "Pluck Pluck",  stringNumber: 6);
    }

    @Test
    public void  canGetName() { assertEquals( expected: "Acoustic Guitar", guitar.getName()); }
```



I.T 3 - Example of searching

(if you do not have a search and sort algorithm, write one up, take a screenshot. Remember to include the results as well.)

```
def self.all()
  sql = "SELECT * FROM players"
  player_data = SqlRunner.run(sql)
  return player_data.map { |hash| Player.new(hash) }
end
```

```
[2] pry(main)> Player.all
=> [#<Player:0x007ff859c79148 @ability=5, @id=1, @name="Ruri", @strength=2>,
 #<Player:0x007ff859c79030 @ability=1, @id=2, @name="Joe", @strength=4>,
 #<Player:0x007ff859c78f18 @ability=5, @id=3, @name="Ruri", @strength=2>,
 #<Player:0x007ff859c78e00 @ability=1, @id=4, @name="Joe", @strength=4>,
```

I.T 4 – Example of sorting

```ruby
def self.sort_by_wins
  player_wins = self.all
  sorted_players = player_wins.sort { |a, b| b.wins <=> a.wins
  }
  return sorted_players
end
```

```
[1] pry(main)> Player.sort_by_wins
=> [#<Player:0x007ff859b63240 @ability=5, @id=1, @name="Ruri", @strength=2>,
 #<Player:0x007ff859b63060 @ability=5, @id=3, @name="Ruri", @strength=2>,
 #<Player:0x007ff859b62d18 @ability=5, @id=5, @name="Ruri", @strength=2>,
 #<Player:0x007ff859b63150 @ability=1, @id=2, @name="Joe", @strength=4>,
 #<Player:0x007ff859b62f70 @ability=1, @id=4, @name="Joe", @strength=4>,
 #<Player:0x007ff859b62c00 @ability=1, @id=6, @name="Joe", @strength=4>]
```

Highscores

Name	Wins
Ruri	2
Ruri	2
Ruri	2
Joe	0
Joe	0
Joe	0

I.T 5 - Example of an array, a function that uses an array and the result

Array of passengers in Bus

```ruby
class Bus
  attr_reader(:route, :destination, :passengers)
  def initialize(route, destination)
    @route = route
    @destination = destination
    @passengers = ["Ruri", "Luis"]
  end
```

Function using the array

```ruby
def number_of_passengers
  return @passengers.length
end
```

Testing the function

```ruby
def test_get_passengers
  assert_equal(2, @bus.passengers.length())
end
```

```
1 runs, 1 assertions, 0 failures, 0 errors, 0 skips
```

I.T 6 - Example of a hash, a function that uses a hash and the result

hashes.rb

```ruby
def pets_by_type(shopname, type)
  count = []
  for pets in shopname[:pets]
    if (pets[:pet_type] == type)
      count.push(pets)
    end
  end
  return count
end
```

hashes_spec.rb

```ruby
class MyHashTest < MiniTest::Test
  def setup
    @le_shop = {
      pets: [
        {
          name: "Lupe",
          pet_type: :cat,
          breed: "Lupidiam",
          price: 50
        },
        {
          name: "Basilius",
          pet_type: :cat,
          breed: "Bastium",
          price: 500
        },
        {
          name: "Le manche",
          pet_type: :doggo,
          breed: "Good boy",
          price: 1000,
        }
      ]
    }
  end

  def test_all_pets_by_type
    pets = pets_by_type(@le_shop, :doggo)
    assert_equal(1, pets.count)
  end
end
```

Test result:

```
# Running:

.

Finished in 0.001169s, 855.4320 runs/s, 855.4320 assertions/s.

1 runs, 1 assertions, 0 failures, 0 errors, 0 skips
```

I.T 7 - Example of polymorphism in a program

“Guitar” and “Ukulele” classes inherit from “Instrument” Class

```
public class Guitar extends Instrument {

    private int stringNumber;

    public Guitar (String name, int buyPrice, int sellPrice, String type, String material, String colour, String sound, int stringNumber) {
        super(name, buyPrice, sellPrice, type, material, colour, sound);
        this.stringNumber = stringNumber;
    }
```

```
public class Ukulele extends Instrument {

    private int stringNumber;

    public Ukulele (String name, int buyPrice, int sellPrice, String type, String material, String colour, String sound, int stringNumber) {
        super(name, buyPrice, sellPrice, type, material, colour, sound);
        this.stringNumber = stringNumber;
    }
```

“Instrument” superclass implements the interface IPlay

```
public abstract class Instrument extends Item implements IPlay{

    private String type;
    private String material;
    private String colour;
    private String sound;

    public Instrument (String name, int buyPrice, int sellPrice, String type, String material, String colour, String sound) {
        super(name, buyPrice, sellPrice);
        this.type = type;
        this.material = material;
        this.colour = colour;
        this.sound = sound;
    }
```

In the “Item” superclass which is the “Instrument’s” parent class you can see that it implements the interface ISell

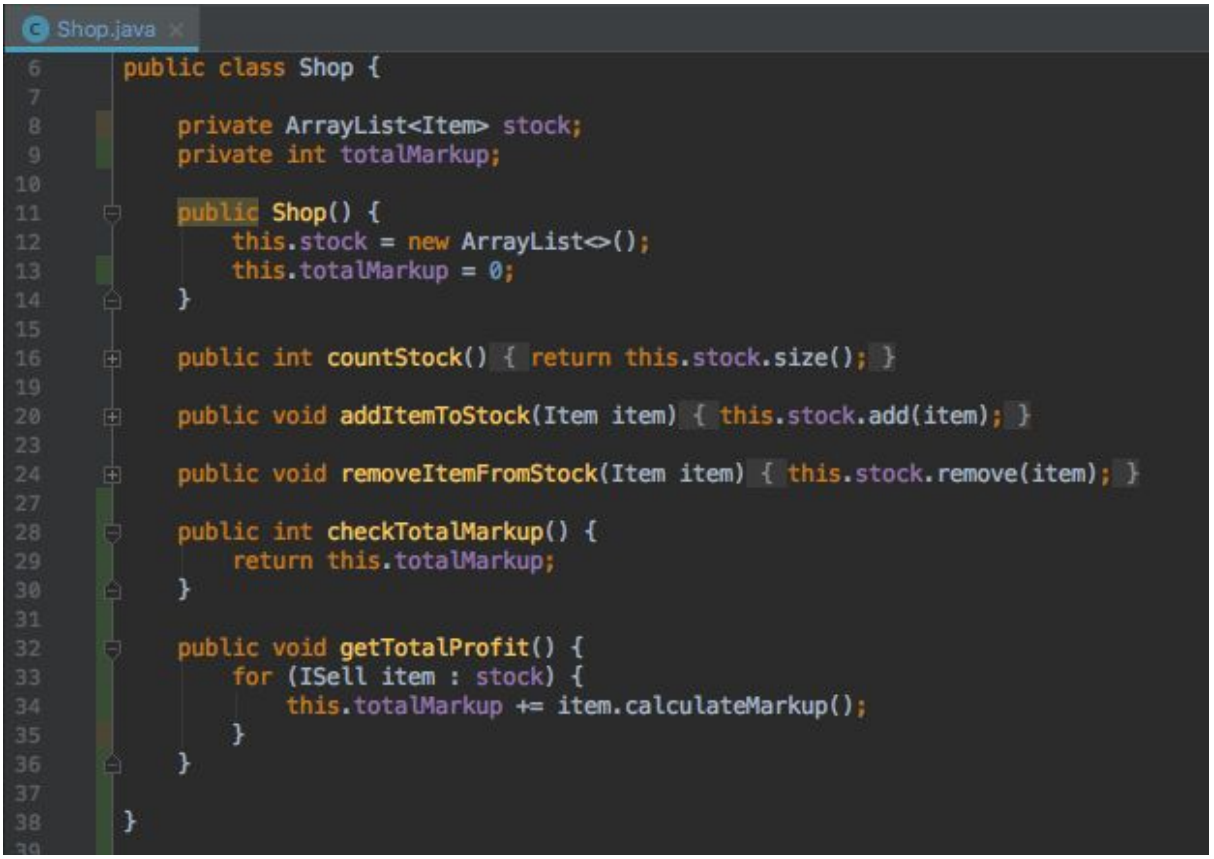
```
public abstract class Item implements ISell{

    private String name;
    private int buyPrice;
    private int sellPrice;

    public Item (String name, int buyPrice, int sellPrice) {
        this.name = name;
        this.buyPrice = buyPrice;
        this.sellPrice = sellPrice;
    }
```

Isell interface:

ISell.java

```
1  package behaviours;
2
3  public interface ISell {
4
5      public int calculateMarkup();
6
7  }
8
```

Shop Class:



The Guitar and the Ukulele are Polymorphic as they can be considered as Instrument objects, Item objects, Isell objects or even Iplay objects.