

СОФТВЕРСКИ КВАЛИТЕТ И ТЕСТИРАЊЕ

ДОМАШНА ЗАДАЧА 8




























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1. Број на изгенерирани мутанти од страна на PIT Mutation Test:

```
=====
- Statistics
=====
```

```
>> Generated 22 mutations Killed 0 (0%)
>> Ran 0 tests (0 tests per mutation)
```

2. Изгенерирани мутанти од страна на PIT Mutation Test:







```
✓  NO_COVERAGE (22)
  ✓  Domashna8 (22)
    ✓  domashna8 (22)
      ✓  domashna8.Item (5)
         28: Replaced double multiplication with division
         28: replaced return value with "" for domashna8/Item::toString
         36: replaced double return with 0.0d for domashna8/Item::getPrice
         44: replaced return value with "" for domashna8/Item::getName
         52: replaced int return with 0 for domashna8/Item::getQuantity
      ✓  domashna8.ShoppingCart (17)
         28: Replaced integer addition with subtraction
         29: Replaced double addition with subtraction
         29: Replaced double multiplication with division
         30: negated conditional
         31: removed call to domashna8/ShoppingCart::increaseSize
         43: Changed increment from 1 to -1
         43: changed conditional boundary
         43: negated conditional
         47: replaced return value with "" for domashna8/ShoppingCart::toString
         55: Replaced integer multiplication with division
         57: Changed increment from 1 to -1
         57: changed conditional boundary
         57: negated conditional
         62: Changed increment from 1 to -1
         62: changed conditional boundary
         62: negated conditional
         74: replaced double return with 0.0d for domashna8/ShoppingCart::getTotalPrice
```

3. Тестови

3.1. Првиот тест

```
@Test
public void testItemToString() {
    item = new Item("item", 2.0, 2);
    assertEquals("item\t$2.00\t2\t$4.00", item.toString());
}
```








Мутанти убиени од овој тест (2 мутанти):

- ✓  KILLED (2)
 - ✓  Domashna8 (2)
 - ✓  domashna8 (2)
 - ✓  domashna8.Item (2)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString

3.2. Вториот тест

```
@Test
public void testItemGetPrice() {
    item = new Item("item", 2.0, 2);
    assertEquals(2.0, item.getPrice());
}
```









Мутанти убиени од овој тест (1 мутант):

- ✓  KILLED (3)
 - ✓  Domashna8 (3)
 - ✓  domashna8 (3)
 - ✓  domashna8.Item (3)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString
 -  36: replaced double return with 0.0d for domashna8/Item::getPrice

3.3. Третиот тест

```
@Test
public void testItemGetName() {
    item = new Item("item", 2.0, 2);
    assertEquals("item", item.getName());
}
```










Мутанти убиени од овој тест (1 мутант):

- ✓  KILLED (4)
 - ✓  Domashna8 (4)
 - ✓  domashna8 (4)
 - ✓  domashna8.Item (4)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString
 -  36: replaced double return with 0.0d for domashna8/Item::getPrice
 -  44: replaced return value with "" for domashna8/Item::getName

3.4. Четвртиот тест

```
@Test
public void testItemGetQuantity() {
    item = new Item("item", 2.0, 2);
    assertEquals(2, item.getQuantity());
}
```














Мутанти убиени од овој тест (1 мутант):

- ✓  KILLED (5)
 - ✓  Domashna8 (5)
 - ✓  domashna8 (5)
 - ✓  domashna8.Item (5)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString
 -  36: replaced double return with 0.0d for domashna8/Item::getPrice
 -  44: replaced return value with "" for domashna8/Item::getName
 -  52: replaced int return with 0 for domashna8/Item::getQuantity

3.5. Петтиот тест

```
@Test
public void testTotalPriceForOneItem() {
    shoppingCart.addToCart("item", 2.0, 2);
    assertEquals(4.0, shoppingCart.getTotalPrice());
}
```




















Мутанти убиени од овој тест (3 мутанти):

- ✓  KILLED (8)
 - ✓  Domashna8 (8)
 - ✓  domashna8 (8)
 - ✓  domashna8.Item (5)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString
 -  36: replaced double return with 0.0d for domashna8/Item::getPrice
 -  44: replaced return value with "" for domashna8/Item::getName
 -  52: replaced int return with 0 for domashna8/Item::getQuantity
 - ✓  domashna8.ShoppingCart (3)
 -  29: Replaced double addition with subtraction
 -  29: Replaced double multiplication with division
 -  74: replaced double return with 0.0d for domashna8/ShoppingCart::getTotalPrice

3.6. Шестиот тест

```
@Test
public void testAddToCart3Items() {
    for(int i = 1; i <= 3; ++i) {
        shoppingCart.addToCart("item" + i, 2.0, 2);
    }
}
```





















Мутанти убиени од овој тест (6 мутанти):

- ✓  KILLED (14)
 - ✓  Domashna8 (14)
 - ✓  domashna8 (14)
 - ✓  domashna8.Item (5)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString
 -  36: replaced double return with 0.0d for domashna8/Item::getPrice
 -  44: replaced return value with "" for domashna8/Item::getName
 -  52: replaced int return with 0 for domashna8/Item::getQuantity
 - ✓  domashna8.ShoppingCart (9)
 -  28: Replaced integer addition with subtraction
 -  29: Replaced double addition with subtraction
 -  29: Replaced double multiplication with division
 -  55: Replaced integer multiplication with division
 -  57: Changed increment from 1 to -1
 -  57: changed conditional boundary
 -  62: Changed increment from 1 to -1
 -  62: changed conditional boundary
 -  74: replaced double return with 0.0d for domashna8/ShoppingCart::getTotalPrice

3.7. Седмиот тест

```
@Test
public void testAddToCart4Items() {
    for(int i = 1; i <= 4; ++i) {
        shoppingCart.addToCart("item" + i, 2.0, 2);
    }
}
```

Мутанти убиени од овој тест (1 мутант):

- ✓  KILLED (15)
 - ✓  Domashna8 (15)
 - ✓  domashna8 (15)
 - ✓  domashna8.Item (5)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString
 -  36: replaced double return with 0.0d for domashna8/Item::getPrice
 -  44: replaced return value with "" for domashna8/Item::getName
 -  52: replaced int return with 0 for domashna8/Item::getQuantity
 - ✓  domashna8.ShoppingCart (10)
 -  28: Replaced integer addition with subtraction
 -  29: Replaced double addition with subtraction
 -  29: Replaced double multiplication with division
 -  31: removed call to domashna8/ShoppingCart::increaseSize
 -  55: Replaced integer multiplication with division
 -  57: Changed increment from 1 to -1
 -  57: changed conditional boundary
 -  62: Changed increment from 1 to -1
 -  62: changed conditional boundary
 -  74: replaced double return with 0.0d for domashna8/ShoppingCart::getTotalPrice



























3.8. Осмиот тест

```
@Test
public void testShoppingCartToStringWith3Items() {
    for(int i = 1; i <= 3; ++i) {
        shoppingCart.addToCart("item" + i, 2.0, 2);
    }






    StringBuilder sb = new StringBuilder();
    sb.append("\nShopping Cart\n");
    sb.append("\nItem\tPrice\tQty\tTotal\n");
    sb.append("item1\t$2.00\t2\t$4.00\n");
    sb.append("item2\t$2.00\t2\t$4.00\n");
    sb.append("item3\t$2.00\t2\t$4.00\n");
    sb.append("\nTotal Price: $12.00\n");

    assertEquals(sb.toString(), shoppingCart.toString());
}
```

Мутанти убиени од овој тест (6 мутант):

- ✓  KILLED (21)
 - ✓  Domashna8 (21)
 - ✓  domashna8 (21)
 - ✓  domashna8.Item (5)
 -  28: Replaced double multiplication with division
 -  28: replaced return value with "" for domashna8/Item::toString
 -  36: replaced double return with 0.0d for domashna8/Item::getPrice
 -  44: replaced return value with "" for domashna8/Item::getName
 -  52: replaced int return with 0 for domashna8/Item::getQuantity
 - ✓  domashna8.ShoppingCart (16)
 -  28: Replaced integer addition with subtraction
 -  29: Replaced double addition with subtraction
 -  29: Replaced double multiplication with division
 -  31: removed call to domashna8/ShoppingCart::increaseSize
 -  43: Changed increment from 1 to -1
 -  43: changed conditional boundary
 -  43: negated conditional
 -  47: replaced return value with "" for domashna8/ShoppingCart::toString
 -  55: Replaced integer multiplication with division
 -  57: Changed increment from 1 to -1
 -  57: changed conditional boundary
 -  57: negated conditional
 -  62: Changed increment from 1 to -1
 -  62: changed conditional boundary
 -  62: negated conditional
 -  74: replaced double return with 0.0d for domashna8/ShoppingCart::getTotalPrice

4. Неубиени мутанти

- ✓  SURVIVED (1)
 - ✓  Domashna8 (1)
 - ✓  domashna8 (1)
 - ✓  domashna8.ShoppingCart (1)
 -  30: negated conditional

или

```
public void addToCart(String itemName, double price, int quantity)
{
    cart[itemCount++] = new Item(itemName, price, quantity);
    totalPrice += price * quantity;
    if(itemCount == capacity) // if full, increase the size of the cart
        increaseSize();
}
```

Каде се зголемува капацитетот (се дуплира) на низата кога се полни со ставки

Овој ни претставува еквивалентен мутант, бидејќи со "еднаквост" низата ќе дуплира кога ќе се пополни со ставки, а со "нееднаквост" тогаш ќе се дуплира секогаш кога ќе се додава нова ставка.

Но ова би било можно да се убие со додавање на повеќе ставки (бидејќи секој пат се дуплира, нема да биде доволно меморијата).

Пр. После 30 додавања на ставки низата на ставки ќе стане со 3 221 225 472 алоцирани позиции за елементи (а само првите 30 позиции се искористени)

Деветтиот тест

```
@Test
public void testAddToCartWithALotOfItems() {
    for(int i = 1; i <= 100; ++i) {
        shoppingCart.addToCart("item" + i, 2.0, 2);
    }
}
```

Тука имаме TIMED_OUT:

- ✓ KILLED (21)
 - ✓ Domashna8 (21)
 - ✓ domashna8 (21)
 - ✓ domashna8.Item (5)
 - 28: Replaced double multiplication with division
 - 28: replaced return value with "" for domashna8/Item::toString
 - 36: replaced double return with 0.0d for domashna8/Item::getPrice
 - 44: replaced return value with "" for domashna8/Item::getName
 - 52: replaced int return with 0 for domashna8/Item::getQuantity
 - ✓ domashna8.ShoppingCart (16)
 - 28: Replaced integer addition with subtraction
 - 29: Replaced double addition with subtraction
 - 29: Replaced double multiplication with division
 - 31: removed call to domashna8/ShoppingCart::increaseSize
 - 43: Changed increment from 1 to -1
 - 43: changed conditional boundary
 - 43: negated conditional
 - 47: replaced return value with "" for domashna8/ShoppingCart::toString
 - 55: Replaced integer multiplication with division
 - 57: Changed increment from 1 to -1
 - 57: changed conditional boundary
 - 57: negated conditional
 - 62: Changed increment from 1 to -1
 - 62: changed conditional boundary
 - 62: negated conditional
 - 74: replaced double return with 0.0d for domashna8/ShoppingCart::getTotalPrice
- ✓ TIMED_OUT (1)
 - ✓ Domashna8 (1)
 - ✓ domashna8 (1)
 - ✓ domashna8.ShoppingCart (1)
 - 30: negated conditional