Week 3 - Lab #1

Section: 103 Simge Tekin

Outline

- Announcements
 - Wednesday: Quiz-1
 - P1 is due on Tuesday
 - P2 will be out on Tuesday
- Questions about P-1 or Eclipse debugger
 - or anything that has been covered in class?
 - Quiz 2 will be about Eclipse debugger
- JUnit (you will need to write tests for Project 2 with assert statements)
- Memory Maps- Recap

JUnit

JUnit is a testing framework for Java

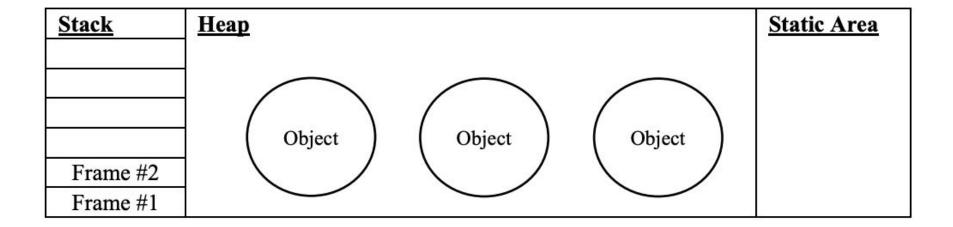
- 1. JUnit detects methods marked with @Test.
- 2. Runs them automatically.
- 3. Checks assertions (assertEquals, assertTrue, etc.).
- 4. Reports failures if an assertion fails.

Let's create some JUnit tests!

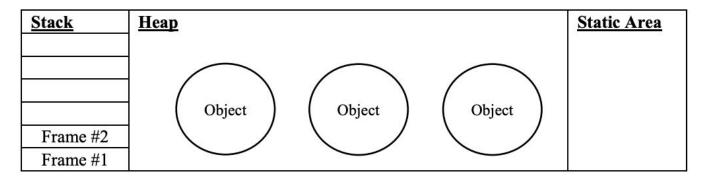
https://www.cs.umd.edu/~nelson/eclipse/junit/

- By default, JUnit runs tests in an arbitrary order
- You can enforce name-based ordering (or other orders) using MethodSorters
- Alphabetical order

Memory Maps



Memory Maps



Stack: parameters, local variables and the current object reference(if the method is not static)

Heap: Objects (Arrays are strings are objects too!)

Static area: values that are present throughout the duration of the program execution (static variables)

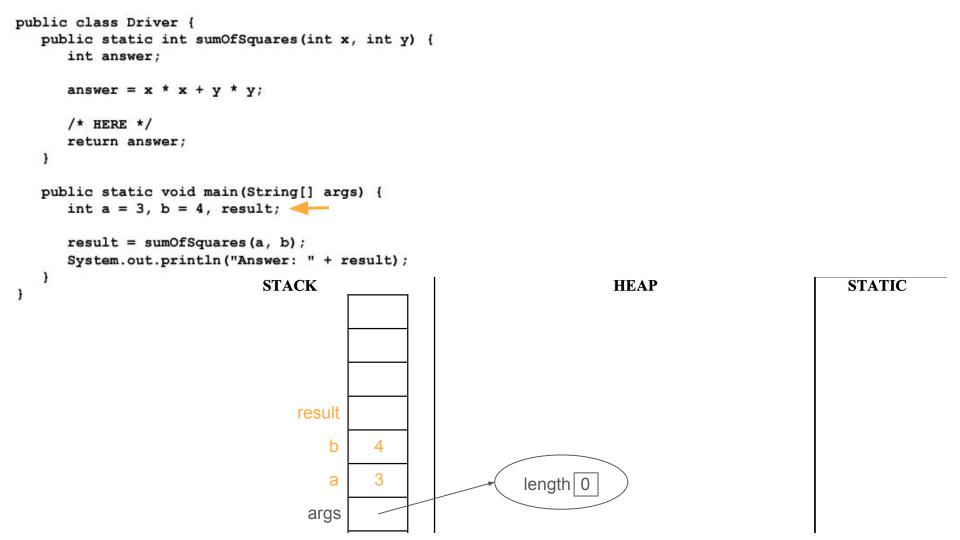
Code area: Where the code resides in memory. We don't draw the code area.

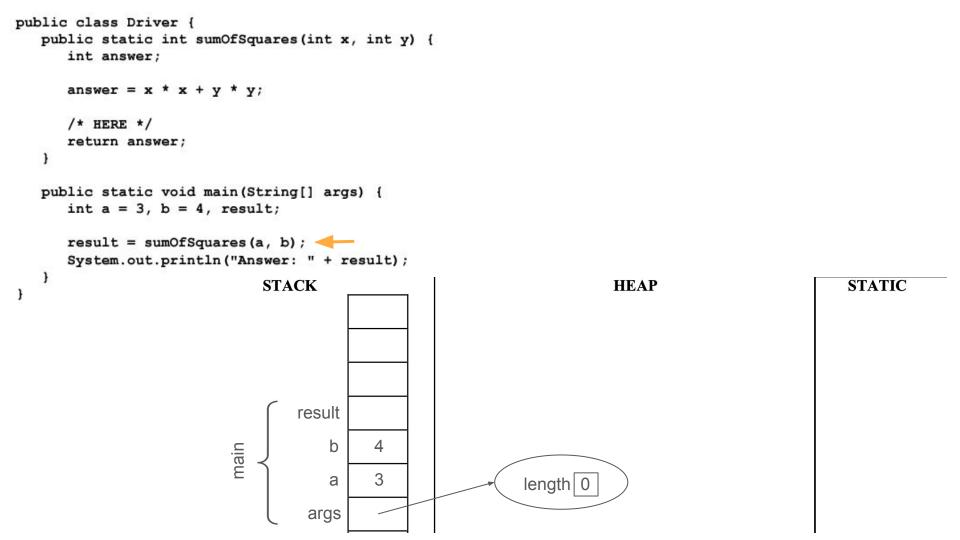
Example 1

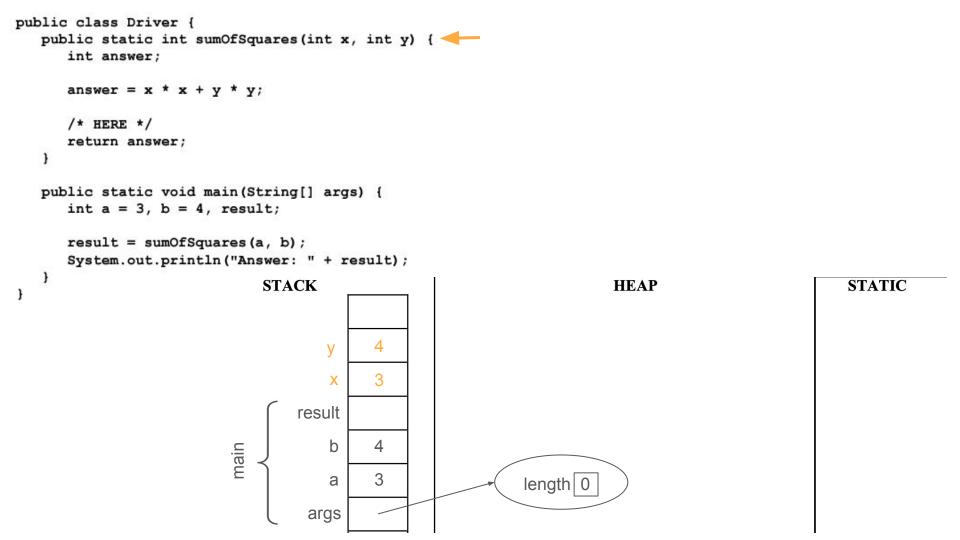
Slides from Kamala

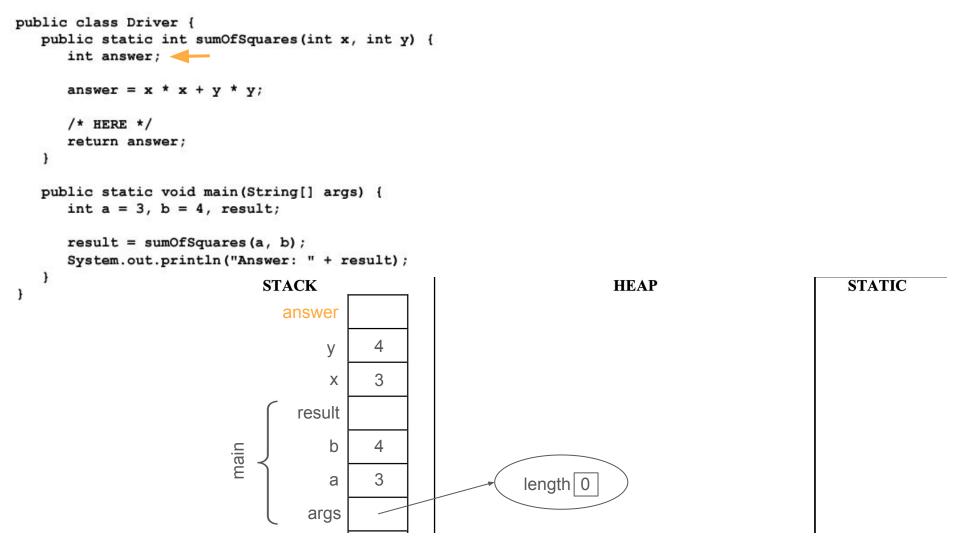
	c class Driver { blic static int sumOfSquares(int x, int y int answer;) {	
	answer = x * x + y * y;		
}	<pre>/* HERE */ return answer;</pre>		
pu	<pre>blic static void main(String[] args) { int a = 3, b = 4, result;</pre>		
920	<pre>result = sumOfSquares(a, b); System.out.println("Answer: " + result);</pre>		
}	STACK	НЕАР	STATIC

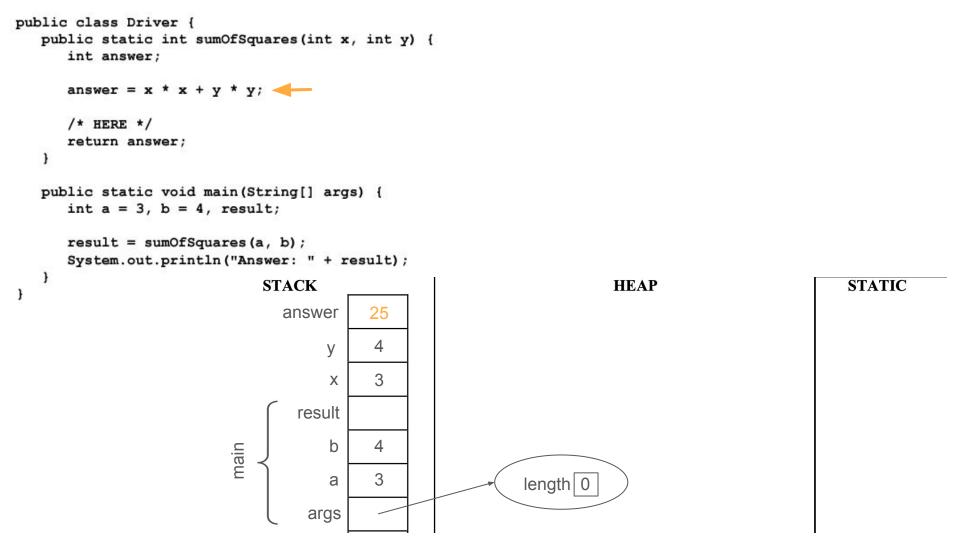
```
public class Driver {
   public static int sumOfSquares(int x, int y) {
      int answer;
      answer = x * x + y * y;
      /* HERE */
      return answer;
   public static void main(String[] args) {
      int a = 3, b = 4, result;
      result = sumOfSquares(a, b);
      System.out.println("Answer: " + result);
                            STACK
                                                                    HEAP
                                                                                                STATIC
                                                          length 0
                                 args
```

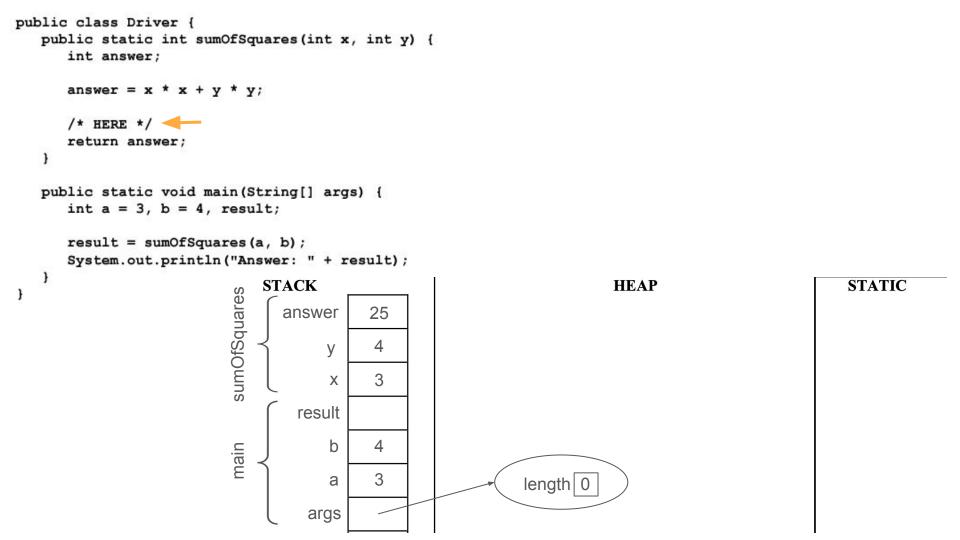












Example 3

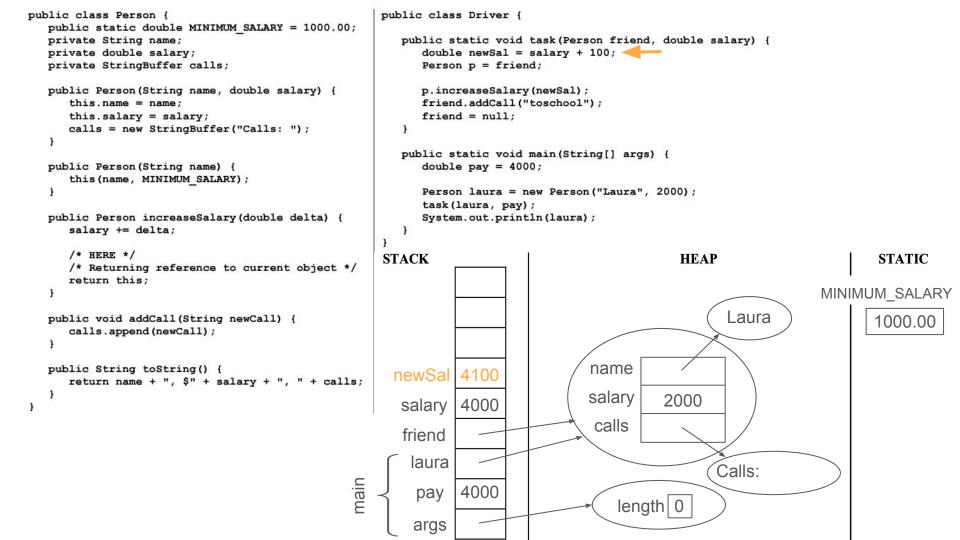
```
public class Person {
                                                     public class Driver {
   public static double MINIMUM SALARY = 1000.00;
   private String name;
                                                        public static void task (Person friend, double salary) {
                                                           double newSal = salary + 100;
   private double salary;
   private StringBuffer calls;
                                                           Person p = friend;
   public Person (String name, double salary) {
                                                           p.increaseSalary(newSal);
      this.name = name;
                                                           friend.addCall("toschool");
      this.salary = salary;
                                                           friend = null;
      calls = new StringBuffer("Calls: ");
                                                        public static void main(String[] args) {
                                                           double pay = 4000;
   public Person (String name) {
      this (name, MINIMUM SALARY);
                                                           Person laura = new Person("Laura", 2000);
                                                           task(laura, pay);
   public Person increaseSalary(double delta) {
                                                           System.out.println(laura);
      salary += delta;
      /* HERE */
                                                     STACK
                                                                                                  HEAP
                                                                                                                                STATIC
      /* Returning reference to current object */
      return this;
   public void addCall(String newCall) {
      calls.append(newCall);
   public String toString() {
      return name + ", $" + salary + ", " + calls;
                                                          args
```

```
public class Person {
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   public static double MINIMUM SALARY = 1000.00;
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                                                                 4000
                                                          pay
                                                                                        length|
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      salary += delta;
     /* HERE */
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                                                                                                                              STATIC
     /* Returning reference to current object */
     return this:
                                                                                                                     MINIMUM SALARY
                                                                                                        Laura
  public void addCall(String newCall) {
                                                                                                                             1000.00
     calls.append(newCall);
  public String toString() {
                                                                                   name
     return name + ", $" + salary + ", " + calls;
                                                                                   salary
                                                                                              2000
                                                                                    calls
                                                        laura
                                                                                                      Calls:
                                                                4000
                                                         pay
                                                                                       length 0
                                                         args
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                                                     newSal 4100
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                                                               4000
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      salary += delta;
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                                                    STACK
                                                                                                HEAP
                                                                                                                              STATIC
     /* Returning reference to current object */
     return this;
                                                                4100
                                                         delta
                                                                                                                     MINIMUM SALARY
                                                         this
                                                                                                        Laura
  public void addCall(String newCall) {
                                                                                                                             1000.00
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                                                                4000
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                                                                                                                             1000.00
     calls.append(newCall);
                                                            p
  public String toString() {
                                                                                   name
                                                     newSal 4100
     return name + ", $" + salary + ", " + cal
                                                                                   salary
                                                                                              6100
                                                                4000
                                                       salary
                                                                                    calls
                                                       friend
                                                        laura
                                                                                                      Calls:
                                                main
                                                                4000
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                                                                                       length 0
                                                         args
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   private double salary;
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   public Person (String name, double salary) {
                                                           p.increaseSalary(newSal);
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                                                                                                 HEAP
                                                                                                                               STATIC
      /* Returning reference to current object
      return this:
                                                                4100
                                                         delta
                                                                                                                       MINIMUM SALARY
                                                 increase
                                                          this
                                                                                                         Laura
   public void addCall(String newCall) {
                                                                                                                               1000.00
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                                                쏭
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                                                                                    salary
                                                                                               6100
                                                                4000
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                                                                                     calls
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                                                                4100
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                                                                                                                       MINIMUM SALARY
                                                 increase
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                                                                                    salary
                                                                                               6100
                                                                4000
                                                        salary
                                                                                     calls
                                                        friend
                                                         laura
                                                                                                       Calls:
                                                main
                                                                4000
                                                          pay
                                                                                        length 0
                                                         args
```

Example 2

```
public class Person {
                                                    public class Driver {
  public static double MINIMUM SALARY = 1000.00;
  private String name;
                                                       public static void task(Person friend, double salary) {
  private double salary;
                                                          double newSal = salary + 100;
  private StringBuffer calls;
                                                          Person p = friend;
  public Person(String name, double salary) {
                                                          p.increaseSalary(newSal);
     this.name = name;
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     calls = new StringBuffer("Calls: ");
                                                          /* HERE */
  public Person(String name) {
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                                                          System.out.println(laura);
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     return this;
                                                    STACK
                                                                                               HEAP
                                                                                                                            STATIC
  public void addCall(String newCall) {
     calls.append(newCall);
                                                                                                                   MINIMUM_SALARY
                                                                                                      Laura
                                                                                                                           1000.00
  public String toString() {
     return name + ", $" + salary + ", " + calls;
                                                            p
                                                                                  name
                                                      newSal 4100
                                                                                  salary
                                                                                             6100
                                                       salary
                                                               4000
                                                                                   calls
                                                       friend
                                                        laura
                                                                                                     Calls:
                                                main
                                                               4000
                                                         pay
                                                                                      length 0
                                                         args
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                                                            p
                                                                                  name
                                                      newSal 4100
                                                                                  salary
                                                                                             6100
                                                       salary
                                                               4000
                                                                                   calls
                                                       friend
                                                        laura
                                                                                                     Calls: toschool
                                                main
                                                               4000
                                                         pay
                                                                                      length 0
                                                         args
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                                                          friend.addCall("toschool");
     this.salary = salary;
                                                          friend = null;
     calls = new StringBuffer("Calls: ");
                                                          /* HERE */
  public Person(String name) {
     this (name, MINIMUM SALARY);
                                                      public static void main(String[] args) {
                                                          double pay = 4000;
  public Person increaseSalary(double delta) {
                                                          Person laura = new Person("Laura", 2000);
     salary += delta;
                                                          task(laura, pay);
                                                         System.out.println(laura);
     /* Returning reference to current object */
     return this;
                                                    STACK
                                                                                              HEAP
                                                                                                                           STATIC
  public void addCall(String newCall) {
     calls.append(newCall);
                                                                                                                   MINIMUM_SALARY
                                                                                                      Laura
                                                                                                                          1000.00
  public String toString() {
     return name + ", $" + salary + ", " + calls;
                                                            p
                                                                                  name
                                                     newSal 4100
                                                                                  salary
                                                                                            6100
                                                       salary
                                                               4000
                                                                                  calls
                                                                null
                                                       friend
                                                        laura
                                                                                                    Calls: toschool
                                                main
                                                               4000
                                                         pay
                                                                                      length 0
                                                        args
```

```
public class Person {
                                                    public class Driver {
  public static double MINIMUM SALARY = 1000.00;
  private String name;
                                                      public static void task(Person friend, double salary) {
  private double salary;
                                                          double newSal = salary + 100;
  private StringBuffer calls;
                                                          Person p = friend;
  public Person(String name, double salary) {
                                                         p.increaseSalary(newSal);
     this.name = name;
                                                          friend.addCall("toschool");
                                                         friend = null;
     this.salary = salary;
     calls = new StringBuffer("Calls: ");
                                                          /* HERE */
  public Person(String name) {
     this (name, MINIMUM SALARY);
                                                      public static void main(String[] args) {
                                                          double pay = 4000;
  public Person increaseSalary(double delta) {
                                                          Person laura = new Person("Laura", 2000);
     salary += delta;
                                                          task(laura, pay);
                                                         System.out.println(laura);
     /* Returning reference to current object */
     return this;
                                                    STACK
                                                                                              HEAP
                                                                                                                           STATIC
  public void addCall(String newCall) {
     calls.append(newCall);
                                                                                                                   MINIMUM_SALARY
                                                                                                      Laura
                                                                                                                          1000.00
  public String toString() {
     return name + ", $" + salary + ", " + calls;
                                                            p
                                                                                  name
                                                     newSal 4100
                                                                                  salary
                                                                                            6100
                                                       salary
                                                               4000
                                                                                  calls
                                                                null
                                                       friend
                                                        laura
                                                                                                    Calls: toschool
                                                main
                                                               4000
                                                         pay
                                                                                      length 0
                                                        args
```

