2.1

|  |  |  |
| --- | --- | --- |
| Program | Stack | Heap |
| Point myPoint = new Point(); | myPoint -> Heap 01 | 01: Point { x = unknown ; y = unknown } |
| myPoint.x = 0; |  | 01: Point { x = 0 ; y = unknown } |
| myPoint.y = 0; |  | 01: Point { x = 0 ; y = 0 } |
| int myInt = 0; | myInt = 0  myPoint -> Heap 01 |  |
| println "The integer is now " + myInt; |  |  |
| println "The point is now " + myPoint.x + "," + myPoint.y; |  |  |
| println "Calling method increment(Point, int)..." |  |  |
| increment(myPoint, myInt); |  |  |
| Entering increment | point -> Heap 01  n = 0  myInt = 0  myPoint -> Heap 01 |  |
| n = n + 1; | point -> Heap 01  n = 1  myInt = 0  myPoint -> Heap 01 |  |
| point.x = point.x + 1; |  | 01: Point { x = 1 ; y = 0 } |
| point = null; | point -> null  n = 0  myInt = 0  myPoint -> Heap 01 |  |
| println " At the end of the method..." |  |  |
| println " The integer is " + n; |  |  |
| println " The point is " + point; |  |  |
| Leaving increment | myInt = 0  myPoint -> Heap 01 |  |
| println "The integer is now " + myInt; |  |  |
| println "The point is now " + myPoint.x + "," + myPoint.y; |  |  |

2.2

| Program | Stack | Heap |
| --- | --- | --- |
| Person john = new Person(); | john -> Heap 01 | 01: Person  age = unknown  name = unknown  father = unknown  mother = unknown |
| john.name = "John Smith"; |  | 01: Person  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith” |
| john.age = 35 |  | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith” |
| Person mary = new Person(); | john -> Heap 01  mary -> Heap 03 | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = unknown  name -> unknown  age = unknown  mother = unknown  father = unknown |
| mary.name = "Mary Smith"; |  | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = unknown  name -> Heap 04  age = unknown  mother = unknown  father = unknown  04: String  “Mary Smith” |
| mary.age = 32; |  | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = 32  name -> Heap 04  age = unknown  mother = unknown  father = unknown  04: String  “Mary Smith” |
| Person student = new Person(); | john -> Heap 01  mary -> Heap 03  student -> Heap 05 | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = 32  name -> Heap 04  age = unknown  mother = unknown  father = unknown  04: String  “Mary Smith”  05: Person  age = unknown  name = unknown  age = unknown  mother = unknown  father = unknown |
| student.name = "John Smith, Jr."; |  | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = 32  name -> Heap 04  age = unknown  mother = unknown  father = unknown  04: String  “Mary Smith”  05: Person  age = unknown  name -> Heap 06  age = unknown  mother = unknown  father = unknown  06: String  “John Smith, Jr.” |
| student.age = 5; |  | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = 32  name -> Heap 04  age = unknown  mother = unknown  father = unknown  04: String  “Mary Smith”  05: Person  age = 5  name -> Heap 06  age = unknown  mother = unknown  father = unknown  06: String  “John Smith, Jr.” |
| student.father = john |  | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = 32  name -> Heap 04  age = unknown  mother = unknown  father = unknown  04: String  “Mary Smith”  05: Person  age = 5  name -> Heap 06  age = unknown  mother = unknown  father -> Heap 01  06: String  “John Smith, Jr.” |
| student.mother = mary |  | 01: Person  age = 35  name -> Heap 02  age = unknown  mother = unknown  father = unknown  02: String  “John Smith”  03: Person  age = 32  name -> Heap 04  age = unknown  mother = unknown  father = unknown  04: String  “Mary Smith”  05: Person  age = 5  name -> Heap 06  age = unknown  mother -> Heap 03  father -> Heap 01  06: String  “John Smith, Jr.” |
| println "TEACHER: How old are you, " + student.name + "?" |  |  |
| println "LITTLE JOHN: I am " + student.age + " years old, sir."; |  |  |
| println "TEACHER: Who is your mother?" |  |  |
| println "LITTLE JOHN: " + student.mother.name + ", sir."; |  |  |