CS-152: Running a manual program trace

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Hailstone Sequence

```java
import java.util.Scanner;

public class Collatz {
    /**
     * http://en.wikipedia.org/wiki/Collatz_conjecture#Program_to_calculate_Hailstone_sequence
     * This program takes a positive whole number as input
     * and prints the number's Hailstone sequence from the Collatz Conjecture.
     */
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);

        System.out.println("Choose a number and we will " +
                          "calculate its Hailstone sequence:" +
                          System.out.println("Finished");
    }
}
```
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);

        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();

        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }

        System.out.println("Finished");
    }
}
Scope
Imports

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```
```java
import java.util.Scanner;

public class Collatz {

    public static void main(String[] args) {
        Scanner in;

        in = new Scanner(System.in);

        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();

        while (n>1){
            System.out.println(n);
            if (n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }

        System.out.println("Finished");
    }
}
```
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);

        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");

        int n;
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        while (n>1){
            System.out.println(n);
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                n = 3*n+1;
            }
        }

        System.out.println("Finished");
    }
}
import java.util.Scanner;

public class Collatz {

    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                        "calculate its Hailstone sequence: ");

        int n;
        n = in.nextInt();
        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
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        }
        System.out.println("Finished");
    }
}
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence: ");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
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        System.out.println("Finished");
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}
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
        "calculate its Hailstone sequence: ");
        int n;
        n = in.nextInt();
        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
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                n = 3 * n + 1;
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        System.out.println("Finished");
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import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
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        in = new Scanner(System.in);
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        int n;
        n = in.nextInt();
        while(n>1){
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                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                           "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while (n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
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                n = 3*n+1;
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        }
        System.out.println("Finished");
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import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will "+
                          "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
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                n = n/2;
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        }
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    }
}
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
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        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
Input from Keyboard

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                          "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();
        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```
While Block

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                          "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```
While Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                          "calculate its Hailstone sequence:");
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import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
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        int n;
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        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```

If Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
        "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
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                n = 3*n+1;
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import java.util.Scanner;

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            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
Bottom of the Loop

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
in = Scanner
n = 16
While Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                       "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            } else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}```

System object
Scanner Class
in = Scanner
n = 16
```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                           "calculate its Hailstone sequence:");
        int n;
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        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
in = Scanner
n = 16
import java.util.Scanner;

public class Collatz {
    
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
         "calculate its Hailstone sequence:");
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System object
Scanner Class
in = Scanner
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import java.util.Scanner;

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    public static void main(String[] args) {
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Bottom of the Loop

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import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
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```
While Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
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            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
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                n = 3*n+1;
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        System.out.println("Finished");
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            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
in = Scanner
n = 8
If Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
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            else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```
If Block

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
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        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence: ");
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            if (n % 2 == 0) {
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                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
in = Scanner
n = 8
Bottom of the Loop

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will "+"calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
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            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
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        System.out.println("Finished");
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import java.util.Scanner;

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import java.util.Scanner;

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    public static void main(String[] args) {
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        n = in.nextInt();
        while (n>1){
            System.out.println(n);
            if(n%2 == 0){
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            }
        }
        System.out.println("Finished");
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```
If Condition

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import java.util.Scanner;

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    public static void main(String[] args) {
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            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
```
in = Scanner
n = 4
```
import java.util.Scanner;

public class Collatz {

    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();
        while (n > 0) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
Bottom of the Loop

```java
import java.util.Scanner;

public class Collatz {

    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
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        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
in = Scanner
n = 2
While Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                          "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            } else {
                n = 3*n+1;
            }
        }
    }
    System.out.println("Finished");
}
```
```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");
        int n;
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            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```
If Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                           "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
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        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
in = Scanner
n = 2
If Block

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                         "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```

System object
Scanner Class
in = Scanner
n = 2
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
While Condition

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
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        int n;
        n = in.nextInt();
        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
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        System.out.println("Finished");
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```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " +
                "calculate its Hailstone sequence:");
        int n;
        n = in.nextInt();
        while(n>1){
            System.out.println(n);
            if(n%2 == 0){
                n = n/2;
            }else{
                n = 3*n+1;
            }
        }
        System.out.println("Finished");
    }
}
```
The End

```java
import java.util.Scanner;

public class Collatz {
    public static void main(String[] args) {
        Scanner in;
        in = new Scanner(System.in);
        System.out.println("Choose a number and we will " + "calculate its Hailstone sequence:");

        int n;
        n = in.nextInt();
        while (n > 1) {
            System.out.println(n);
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = 3 * n + 1;
            }
        }
        System.out.println("Finished");
    }
}
```