

Lecture 14

Java – How to Read from User

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| The System Class

- **System.out.println();**
- **System** is a **class** that provides methods related to the system, or environment
- It also provides **System.out**, which is a special value that has **additional methods** (like **println**) for displaying output
- **System.out.println(System.out);**
— [java.io.PrintStream@5594a1b5](#)
- **System.out** is a **PrintStream**, which is defined in a package called **java.io**

| The System Class

- A **package** is a collection of **related classes**; **java.io** contains classes for I/O which stands for input and output
- The numbers and letters after the **@ sign** are the **address** of **System.out**, represented as a **hexadecimal** (base 16) number
- The **System class** also provides the special value **System.in**, which is an **InputStream** that has **methods for reading input from the keyboard**. These **methods are not convenient to use**, but, fortunately, Java provides other classes that make it easy to handle common input tasks - **Scanner**

| The System Class

Hello.java

```
public class Hello {  
    public static void main(String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

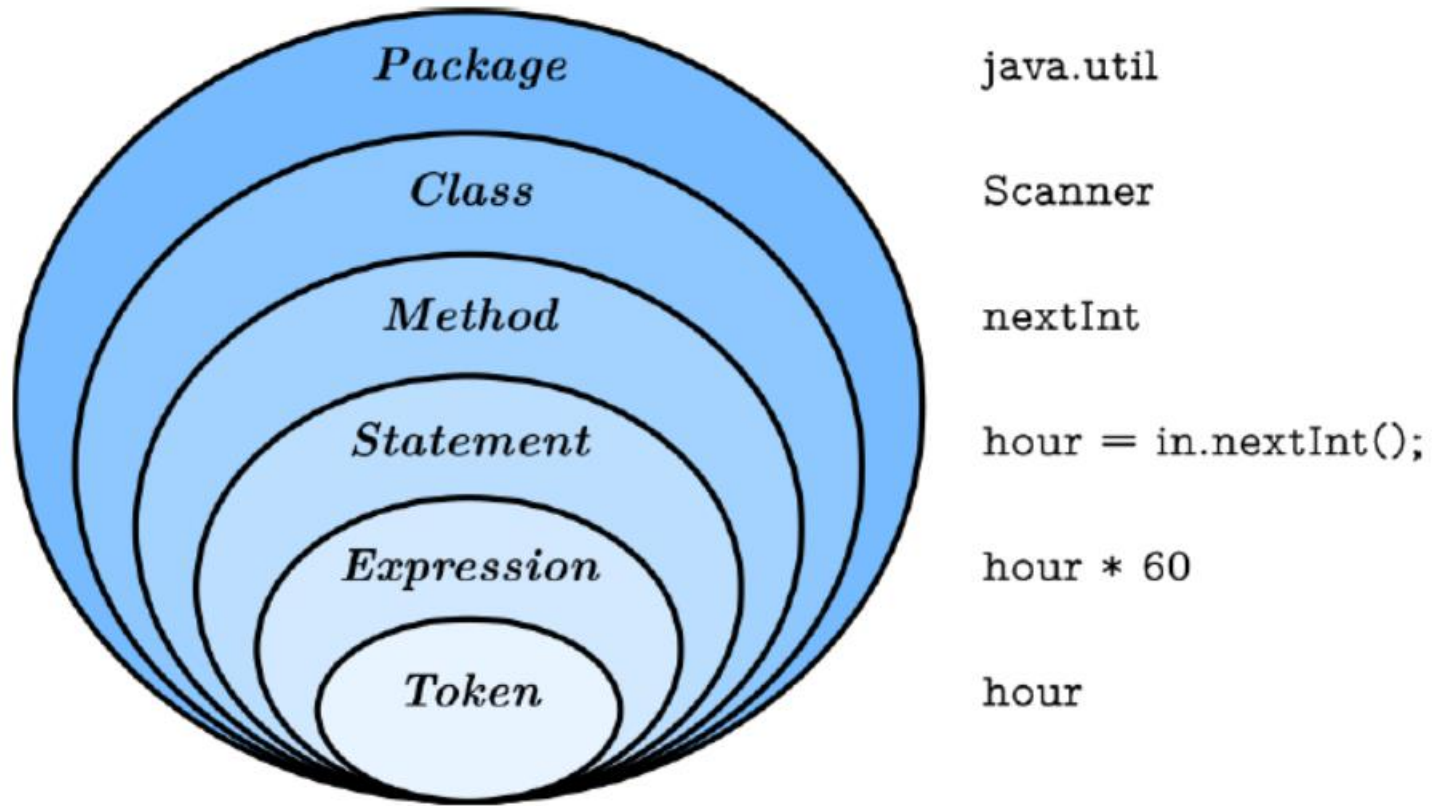
System.java

```
public class System {  
    ...  
    public final static PrintStream out;  
    ...  
}
```

PrintStream.java

```
public class PrintStream {  
    ...  
    public void println(String x) {  
        ...  
    }  
}
```

| Language Elements



| Language Elements

- **Java applications** are typically organized into **packages** (like java.io and java.util) that include multiple **classes** (like PrintStream and Scanner). Each class defines its own **methods** (like println and nextLine), and each method is a sequence of **statements**
- Each **statement** performs one or more computations, depending on how many **expressions** it has, and each expression represents a single value to compute

| Language Elements

- **Tokens are the most basic elements of a program, including numbers, variable names, operators, keywords, parentheses, braces, and semicolons**
- **Knowing this terminology** is helpful, because error messages often say things like **not a statement or illegal start of expression or unexpected token**

| Java Library

- There is a big difference between the **Java language** and the **Java library**, which provides the **built-in classes** that you can **import**.
 - **public** and **class** are part of the Java language, but
 - **PrintStream** and **Scanner** are not
- A **great strength of Java** is its rich **set of predefined classes** that you can reuse rather than “**reinventing the wheel**.”

| Java Library

- These **classes are grouped** into **packages**—named groups of related classes—and are collectively referred to as the **Java class library**, or the **Java Application Programming Interface (Java API)**
- The standard edition of Java comes with several thousand classes you can use, which can be both exciting and intimidating
- <https://docs.oracle.com/en/java/javase/11/docs/api/>

| import

- **import declaration** that **helps the compiler locate** a class that's used in this program.
- **import java.util.Scanner;**
- It indicates that the program **uses** the predefined **Scanner** class from the **package** named **java.util**
- All **import declarations** must **appear before the first class declaration** in the file.
- Placing an import declaration inside or after a class declaration is a syntax error

| import

- **Forgetting** to include an import declaration for a class that must be imported results in a **compilation error** containing a message such as “**cannot find symbol**”

| Scanner

- **Scanner input = new Scanner(System.in);**
- **variable declaration statement** that specifies the name (input) and type (Scanner) of a variable that's used in this program
- A **Scanner** (package **java.util**) enables a program to read data (e.g., numbers and strings) for use in a program.
- The data can come from many sources, such as the user at the keyboard or a file on disk.
- **Before using a Scanner**, you must **create it** and specify the source of the data

| Scanner

- **Scanner input = new Scanner(System.in);**
- The **= in** indicates that **Scanner variable** input should be **initialized**
- **new** keyword to **create a Scanner object** that reads characters typed by the user at the keyboard.
- The standard input object, **System.in**, enables applications to read bytes of data typed by the user.
- The **Scanner translates** these bytes into types (like ints) that can be used in a program
- **You might wonder why we can use the System class without importing it.** System belongs to the **java.lang** package, which is imported automatically

| Adding Two Numbers

```
import java.util.Scanner;
public class seko {
    public static void main(String[] args)
    {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter first integer: ");
        int number1 = input.nextInt();
        System.out.print("Enter second integer: ");
        int number2 = input.nextInt();
        int sum = number1 + number2;
        System.out.print("sum = "+sum);
    }
}
```

| References

- Java: How to Program, 9th Edition (Deitel) 9th Edition by Paul Deitel , Harvey M. Deitel
- Head First Java, 2nd Edition 2nd Edition by Kathy Sierra, Bert Bates
- Think Java: How to Think Like a Computer Scientist 1st Edition by Allen B. Downey, Chris Mayfield