CS 4244: Internet Programming

Network Programming in Java
Standard Java files

- **source files: *.java**
  Java source files contain the source code in readable form, as typed in by the programmer.

- **class files: *.class**
  Java class files contain byte code (a machine readable version of the class). They are generated by the compiler from the source file.
The edit-compile-execute cycle

source file

class file

editor

compiler (javac)

virtual machine (java)
Editing

- A file can be edited in any text editor
  - Notepad, emacs, PFE, ...
- Be careful with using Word: by default, Word does not save in text format
- Make sure to save before compiling!
Command line invocation

- compilation and execution of Java in JDK are done from a command line
- On Microsoft systems: DOS shell
- On Unix: Unix shell
- Must make sure that the commands for compiler and runtime are in the command path.
Compiling

- Name of the JDK compiler: `javac`
- To invoke:
  ```
  javac <source name>
  ```
- Compiles `<source name>` and all classes it depends on
- Example:
  ```
  cd C:\bluej\zuul
  javac Game.java
  ```
Error messages

C:\bluej\zuul> javac Game.java
Game.java:22: ';' expected.
   private Parser parser
          ^

1 error
C:\bluej\zuul>

The programmer has to open the file in the editor, find the line number, fix the error and recompile.
Execution

- C:\bluej\zuul> java Game
- “java” starts the Java virtual machine.
- The named class is loaded and execution is started.
- Other classes are loaded as needed.
- Only possible if class has been compiled.
Problem: Execute what?

- If we try:

  ```
  C:\bluej\zuul> java Game.java
  Exception in thread "main"
  java.lang.NoSuchMethodError: main
  ```

- The problem: how does the system know which method to execute?
The main method

- The answer: The java system always executes a method called main with a certain signature:

```java
public static void main(String[] args) {
    ...
}
```

- For this to work, such a method **must exist!**
The main method (2)

- “main” must exist
- “main” must be public
- “main” must be static (class method)
- “main” must have a String array parameter
- Only “main” can be invoked
Main method - example

```java
public static void main(String[] args) {
    Game game = new Game();
    game.play();
}
```

- The main method should
  - create an object
  - call the first method
Java platform

- Comprises of various packages, each containing related classes
- Some key packages are
  - java.util
  - java.io
  - java.lang
  - java.net
  - ...

Java Network Programming

- Main package is java.net
- Contains various classes including
  - Socket
  - DatagramPacket
  - URLConnection
  - HTTPURLConnection
  - ...

Socket class

- Socket s = new Socket(\textit{hostname, port});
- Java abstraction of network socket
- Used to connect to machine/ip address with specified port number
- Depending on port number you connect on, you need to send more information
ServerSocket class

- ServerSocket srv = new ServerSocket(port)
- Used to create a Server socket
- Key method here is accept() of type Socket
  - Makes server wait for connection and opens socket on valid request