Tecnologia e Applicazioni Internet 2011/12

Lezione 1 - Architettura di un applicazione web

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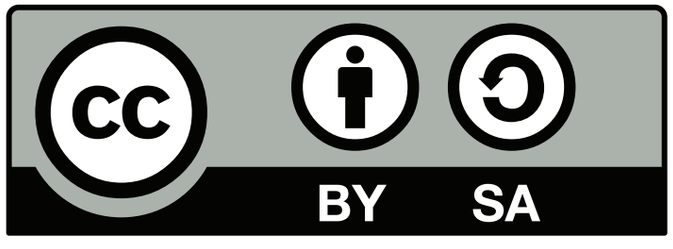

Che cosa rende il codice *difficile da testare?*

Mescolare *new* e *logica*

```
@Test
public void shouldRecognizeExpiredOption() {
    Date expiration = dateAt(1995, MAY, 28);

    Option option = new Option(expiration);

    assertTrue(option.isExpired());
}
```

```
public class Option {

    private final Date expiration;

    public Option(Date expiration) {
        this.expiration = expiration;
    }

    public boolean isExpired() {
        Date now = new Date();
        return expiration.before(now);
    }
}
```

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```java
@Test
public void shouldRecognizeExpiredOption() {
    Date expiration = dateAt(2008, MAY, 28);

    Option option = new Option(expiration);

    assertTrue(option.isExpired());
}
```

```java
public class Option {

    private final Date expiration;

    public Option(Date expiration) {
        this.expiration = expiration;
    }

    public boolean isExpired() {
        Date now = new Date();
        return expiration.before(now);
    }
}
```

```java
@Test
public void shouldRecognizeNonExpiredOption() {
    Date expiration = dateAt(2020, MAY, 28);

    Option option = new Option(expiration);

    assertFalse(option.isExpired());
}
```

Per quanto tempo funzionerà?

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```java
@Test
public void shouldRecognizeExpiredOption() {
    Date expiration = dateAt(2008, MAY, 28);

    Option option = new Option(expiration);

    assertTrue(option.isExpired());
}
```

```java
public class Option {

    private final Date expiration;

    public Option(Date expiration) {
        this.expiration = expiration;
    }

    public boolean isExpired() {
        Date now = new Date();
        return expiration.before(now);
    }
}
```

```java
@Test
public void shouldRecognizeNonExpiredOption() {
    Date expiration = dateAt(2020, MAY, 28);

    Option option = new Option(expiration);

    assertFalse(option.isExpired());
}
```

Per quanto tempo funzionerà?

Roberto Albertini, Sourcesense

```java
@Test
public void shouldRecognizeExpiredOption() {
    Date expiration = dateAt(2008, MAY, 28);

    Option option = new Option(expiration);

    assertTrue(option.isExpired());
}
```

```java
public class Option {

    private final Date expiration;

    public Option(Date expiration) {
        this.expiration = expiration;
    }

    public boolean isExpired() {
        Date now = new Date();
        return expiration.before(now);
    }
}
```

```java
@Test
public void shouldRecognizeNonExpiredOption() {
    Date expiration = dateAt(2020, MAY, 28);

    Option option = new Option(expiration);

    assertFalse(option.isExpired());
}
```

Per quanto tempo funzionerà?

Roberto Albertini, Sourcesense

```java
@Test
public void shouldRecognizeExpiredOption() {
    Date expiration = dateAt(2008, MAY, 28);

    Option option = new Option(expiration);

    assertTrue(option.isExpired());
}
```

```java
public class Option {

    private final Date expiration;

    public Option(Date expiration) {
        this.expiration = expiration;
    }

    public boolean isExpired() {
        Date now = new Date();
        return expiration.before(now);
    }
}
```

```java
@Test
public void shouldRecognizeNonExpiredOption() {
    Date expiration = dateAt(2020, MAY, 28);

    Option option = new Option(expiration);

    assertFalse(option.isExpired());
}
```

Per quanto tempo funzionerà?

Come posso testare i casi limite?

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`new Date()` non è programmabile

```
public boolean isExpired() {
  Date now = new Date();
  return expiration.before(now);
}
```

lo sostituisco con un collaboratore

```
public boolean isExpired() {
  Date now = clock.now();
  return expiration.before(now);
}
```

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```
private final Date expiration;

public Option(Date expiration) {
  this.expiration = expiration;
}
```

devo esplicitare la dipendenza rendere iniettabile il collaboratore

```
private final Date expiration;
private final Clock clock;

public Option(Date expiration, Clock clock) {
  this.expiration = expiration;
  this.clock = clock;
}
```

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Il codice di produzione

```
public class Option {

    private final Date expiration;
    private final Clock clock;

    public Option(Date expiration, Clock clock) {
        this.expiration = expiration;
        this.clock = clock;
    }

    public Option(Date expiration) {
        this(expiration, new RealClock());
    }
}
```

```
public interface Clock {
    Date now();
}
```

```
public class RealClock implements Clock {

    public Date now() {
        return new Date();
    }

}
```

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Il codice di test

```
public class OptionTest {

    @Test
    public void shouldRecognizeExpiredTask() {
        Clock clockAt2009028 =
            new ProgrammableClock(
                dateAt(2009, MAY, 28));

        Date expiration = dateAt(2009, MAY, 27);

        Option option =
                new Option(expiration, clockAt20090528);

        assertTrue(option.isExpired());
    }
}
```

```
public interface Clock {
    Date now();
}
```

```
public class ProgrammableClock
                        implements Clock {
    private Date now;

    public ProgrammableClock(Date date) {
        this.now = date;
    }

    public Date now() {
        return now;
    }
}
```

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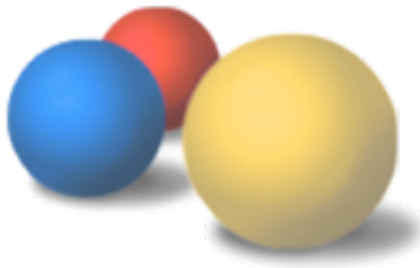
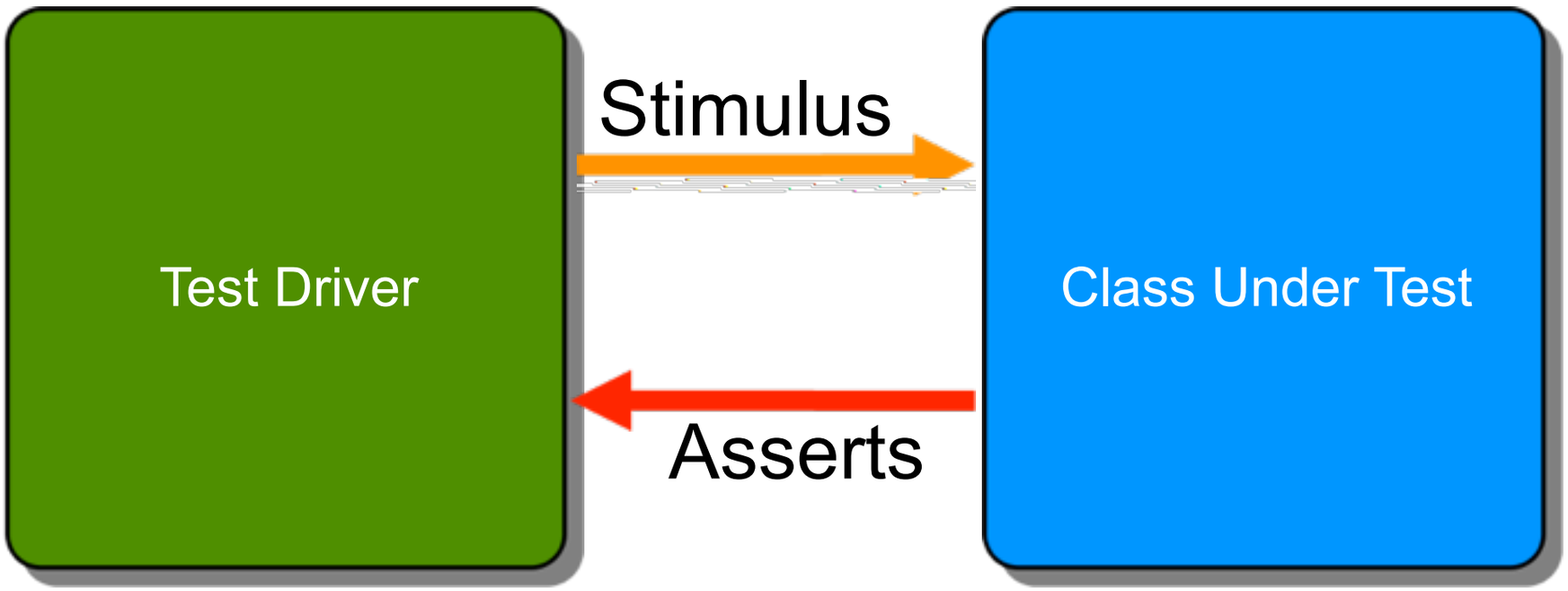
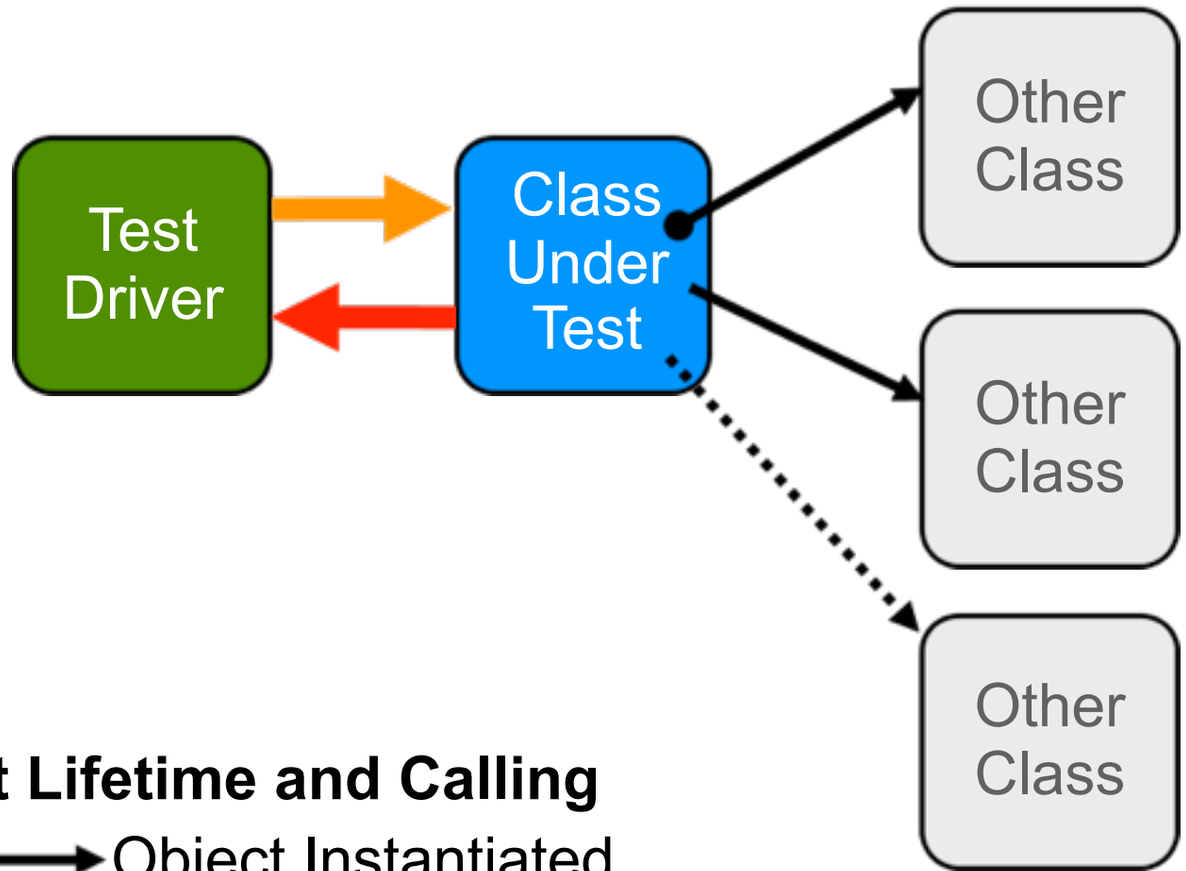
Unit Testing a Class





Unit Testing a Class



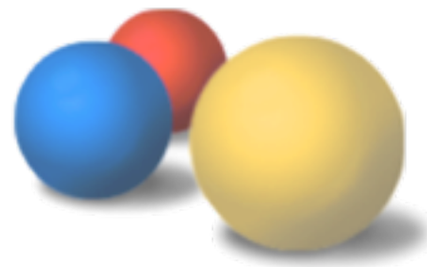
Object Lifetime and Calling

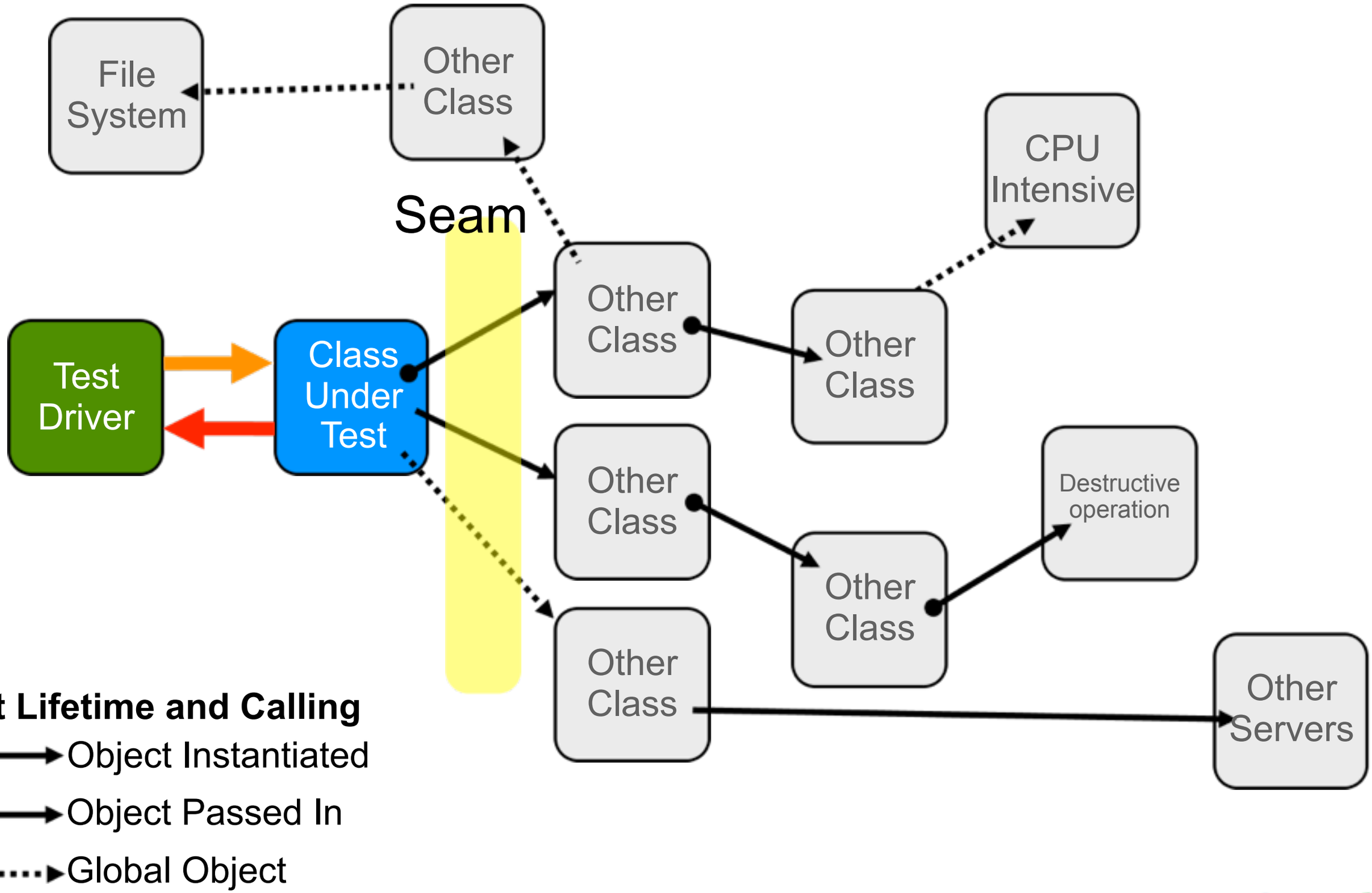
Object Instantiated

Object Passed In

Global Object

Unit Testing a Class





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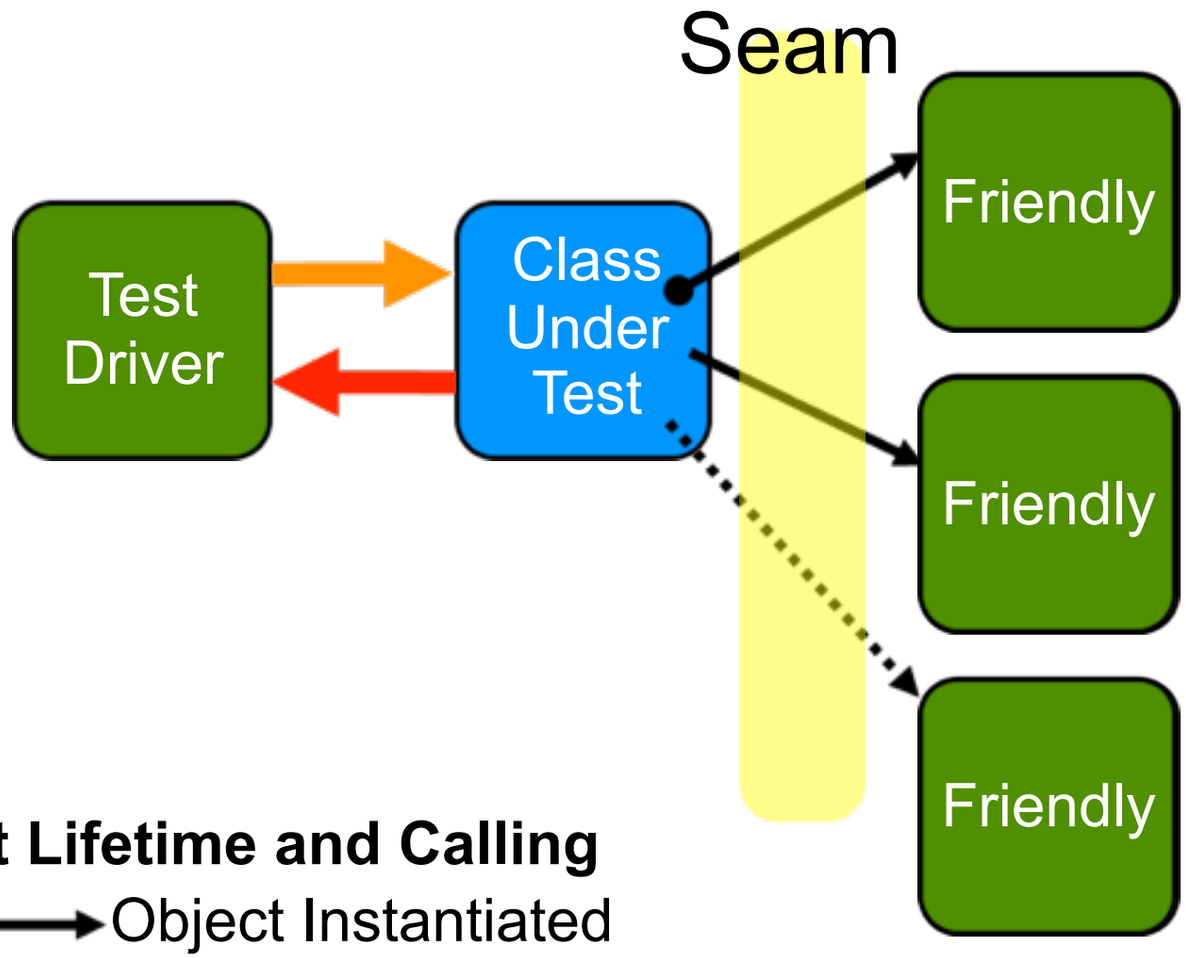
Unit Testing a Class



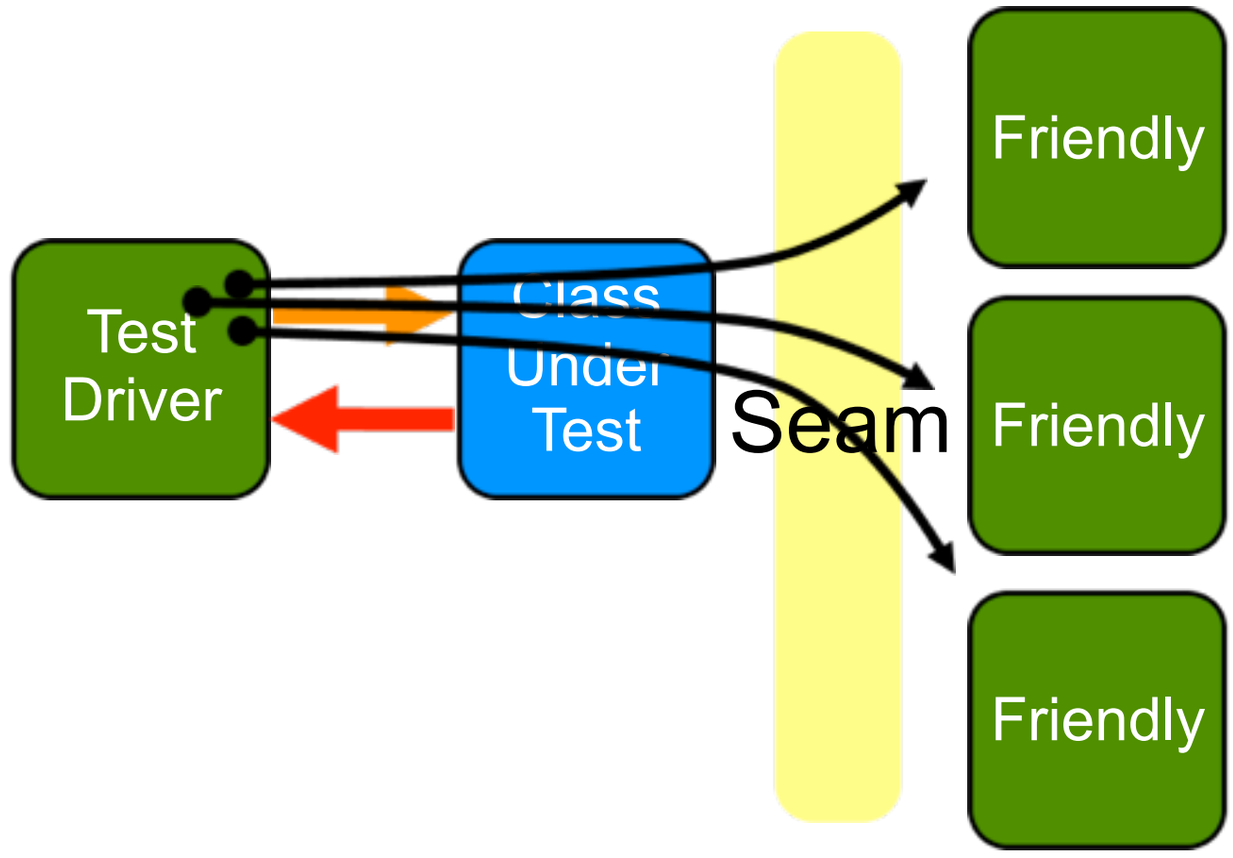
Object Lifetime and Calling

Object Instantiated

Object Passed In

Global Object

Unit Testing a Class



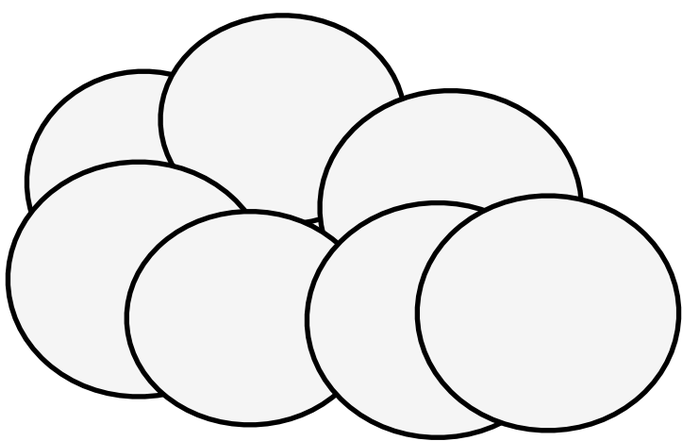
Object Lifetime and Calling

- Object Instantiated
- Object Passed In
- Global Object

Two piles

Pile of Objects

- Business logic
- This is why you're writing code



Pile of New Keywords

- Provider<T> objects
- Factories
- Builders
- This is how you get the code you write to work together

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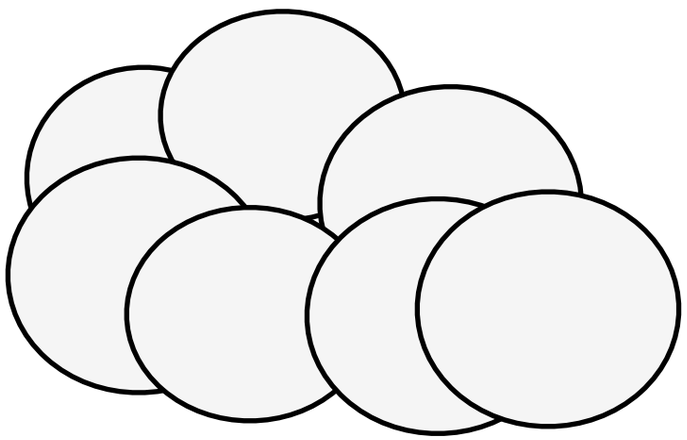
Two piles

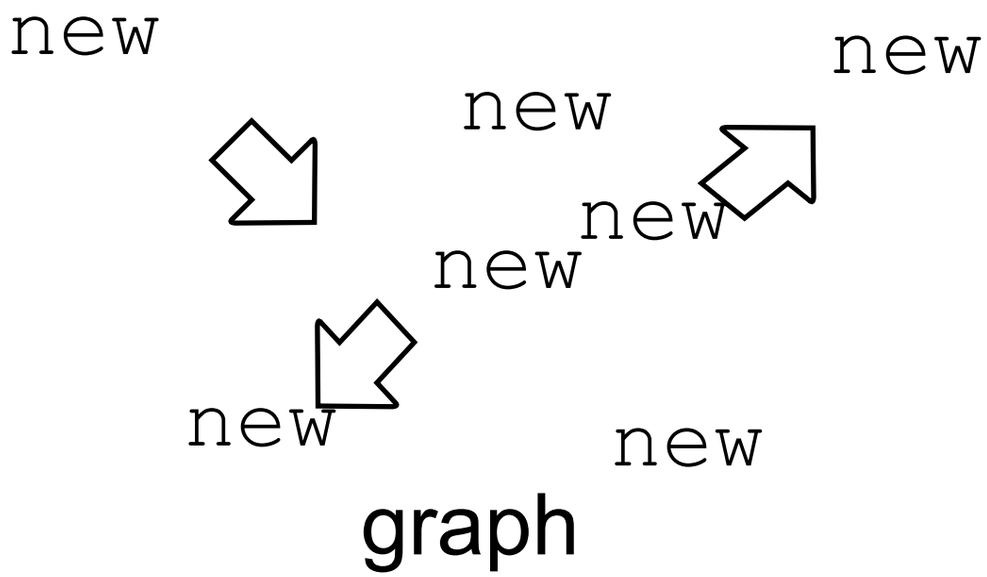
Pile of Objects

- Responsibility is business logic, domain abstractions



Pile of New Keywords

- Responsibility is to build object graphs



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La struttura di un *main*

```
public static void main(String[] args) throws Exception {
    // Creation Phase
    Server server = new ServerFactory(args).createServer();

    // Run Phase
    server.start();
}
```

Introduction to Java I/O

Streams

byte streams

character streams

InputStream,
OutputStream

Reader, Writer

java.io.InputStream

```
public abstract class InputStream {
    /**
     * @return     the next byte of data, or <code>-1</code> if the end of the
     *             stream is reached.
     */
    public abstract int read() throws IOException;

    /**
     * Closes this input stream and releases any system resources associated
     * with the stream.
     */
    public void close() throws IOException {}

    // ...
}
```

java.io.Reader

```
public abstract class Reader {
    /**
     * Read characters into a portion of an array.  This method will block
     * until some input is available, an I/O error occurs, or the end of the
     * stream is reached.
     *
     * @param      cbuf  Destination buffer
     * @param      off   Offset at which to start storing characters
     * @param      len   Maximum number of characters to read
     *
     * @return     The number of characters read, or -1 if the end of the
     *             stream has been reached
     *
     * @exception  IOException  If an I/O error occurs
     */
    abstract public int read(char cbuf[], int off, int len) throws IOException;
```

java.io.Reader

```
public abstract class Reader {
    /**
     * Read a single character.  This method will block until a character is
     * available, an I/O error occurs, or the end of the stream is reached.
     *
     * @return     The character read, as an integer in the range 0 to 65535
     *             (<tt>0x00-0xffff</tt>), or -1 if the end of the stream has
     *             been reached
     */
    public int read() throws IOException {
        char cb[] = new char[1];
        if (read(cb, 0, 1) == -1)
            return -1;
        else
            return cb[0];
    }

    /**
     * Close the stream.  Once a stream has been closed, further read(),
     * ready(), mark(), or reset() invocations will throw an IOException.
     * Closing a previously-closed stream, however, has no effect.
     *
     * @exception  IOException  If an I/O error occurs
     */
    abstract public void close() throws IOException;
```

java.io.Writer

```
public abstract class Writer {
    /**
     * Write a single character.
     */
    public void write(int c) throws IOException {
        writeBuffer[0] = (char) c;
        write(writeBuffer, 0, 1);
    }

    /**
     * Write an array of characters.
     */
    public void write(char cbuf[]) throws IOException {
        write(cbuf, 0, cbuf.length);
    }

    /**
     * Write a portion of an array of characters.
     */
    abstract public void write(char cbuf[], int off, int len) throws IOException;

    /**
     * Write a string.
     */
    public void write(String str) throws IOException {
        write(str, 0, str.length());
    }
```

java.io.Writer

```
    /**
     * Flush the stream.
     */
    abstract public void flush() throws IOException;

    /**
     * Close the stream, flushing it first.  Once a stream has been closed,
     * further write() or flush() invocations will cause an IOException to be
     * thrown.  Closing a previously-closed stream, however, has no effect.
     */
    abstract public void close() throws IOException;
}
```

Example: copying a character stream

```
import java.io.FileReader;
import java.io.FileWriter;
import java.io.IOException;

public class CopyCharacters {
    public static void main(String[] args) throws IOException {
        Reader inputStream = null;
        Writer outputStream = null;

        try {
            inputStream = new FileReader("xanadu.txt");
            outputStream = new FileWriter("characteroutput.txt");

            int c;
            while ((c = inputStream.read()) != -1) {
                outputStream.write(c);
            }
        } finally {
            if (inputStream != null) {
                inputStream.close();
            }
            if (outputStream != null) {
                outputStream.close();
            }
        }
    }
}
```

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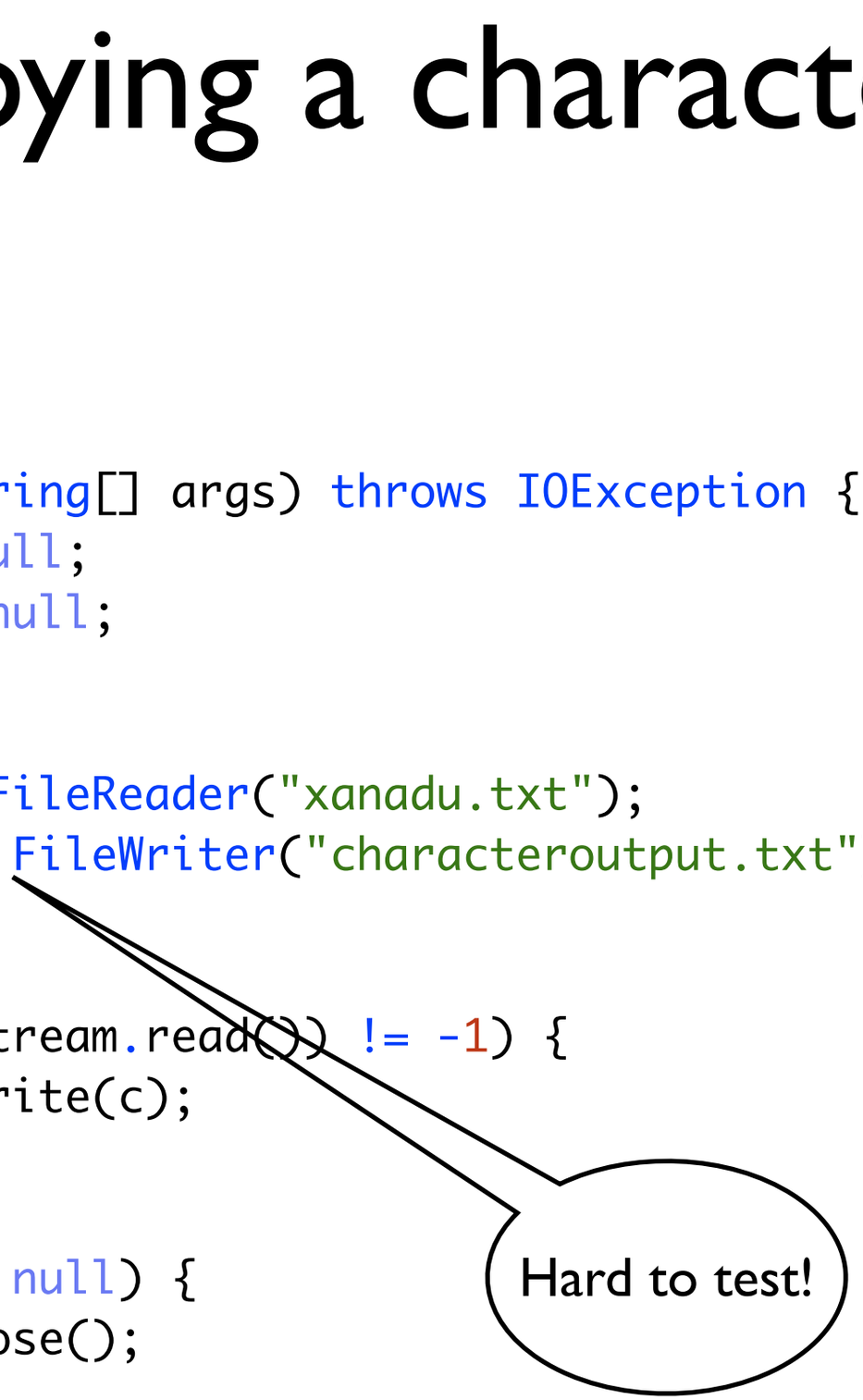
                outputStream.write(c);
            }
        } finally {
            if (inputStream != null) {
                inputStream.close();
            }
            if (outputStream != null) {
                outputStream.close();
            }
        }
    }
}
```



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        try {
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            int c;
            while ((c = inputStream.read()) != -1) {
                outputStream.write(c);
            }
        } finally {
            if (inputStream != null) {
                inputStream.close();
            }
            if (outputStream != null) {
                outputStream.close();
            }
        }
    }
}
```

Hard to test!

Hard to test!

Line I/O

```
public class CopyLines {
    public static void main(String[] args) throws IOException {
        BufferedReader inputStream = null;
        PrintWriter outputStream = null;

        try {
            inputStream = new BufferedReader(new FileReader("xanadu.txt"));
            outputStream = new PrintWriter(new FileWriter("characteroutput.txt"));

            String l;
            while ((l = inputStream.readLine()) != null) {
                outputStream.println(l);
            }
        } finally {
            if (inputStream != null) {
                inputStream.close();
            }
            if (outputStream != null) {
                outputStream.close();
            }
        }
    }
}
```

Bridging byte streams to char streams

```
// reading chars from an input stream of bytes
public void fromBytesToChars(InputStream byteStream)
                throws UnsupportedEncodingException {
   InputStreamReader charStream = new InputStreamReader(byteStream, "UTF-8");
   // read from charStream
}

// writing chars to an output stream of bytes
public void fromCharsToBytes(OutputStream byteStream)
                throws UnsupportedEncodingException {
   OutputStreamWriter charStream = new OutputStreamWriter(byteStream, "UTF-8");
   // write to charStream
}
```

Standard charsets

Every implementation of the Java platform is required to support the following standard charsets.

US-ASCII

Seven-bit ASCII, a.k.a. ISO646-US, a.k.a. the Basic Latin block of the Unicode character set

`ISO-8859-1`
ISO Latin Alphabet No. 1, a.k.a. `ISO-LATIN-1`

`UTF-8`
Eight-bit UCS Transformation Format

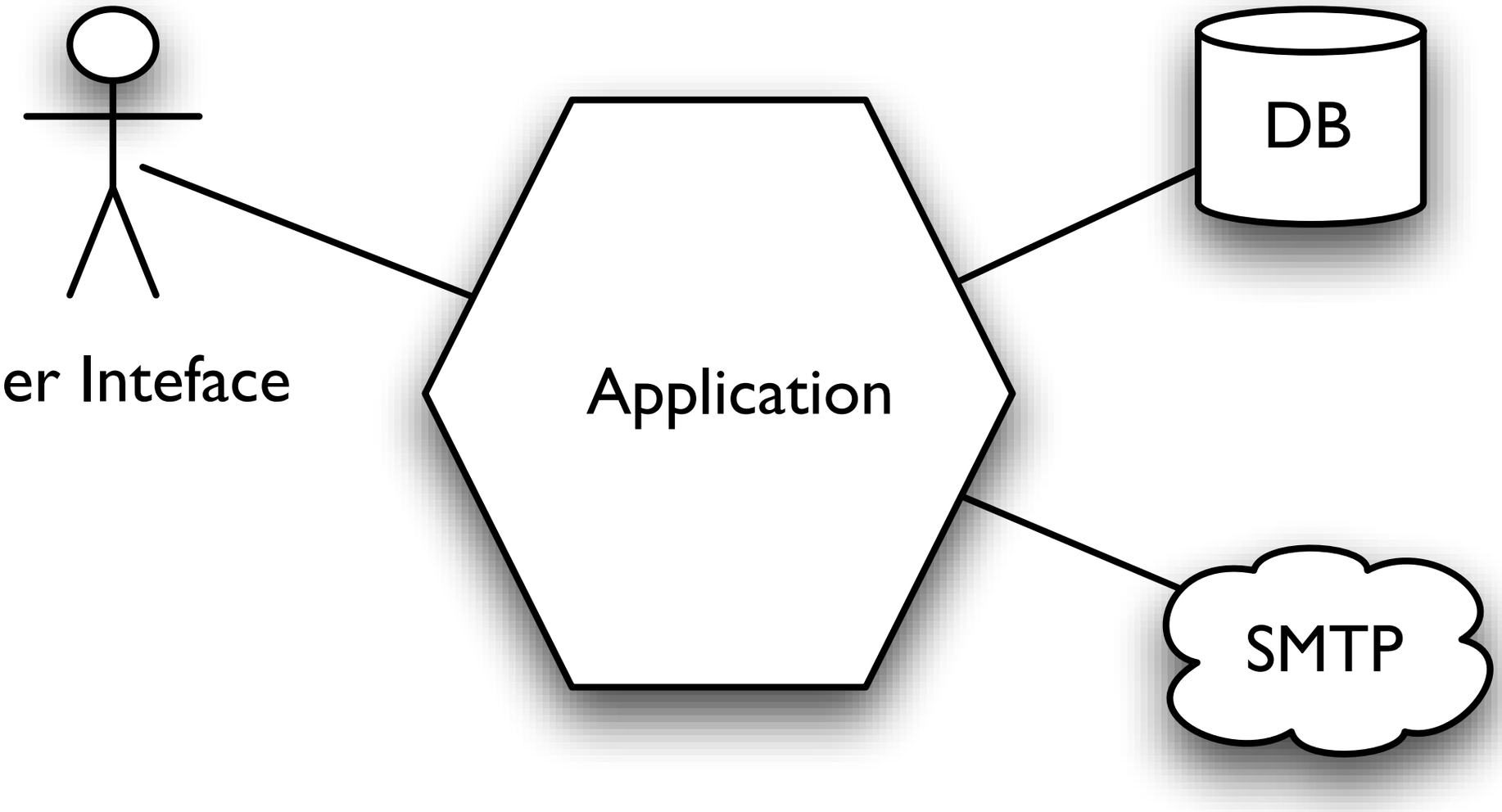
`UTF-16BE`
Sixteen-bit UCS Transformation Format, big-endian byte order

`UTF-16LE`
Sixteen-bit UCS Transformation Format, little-endian byte order

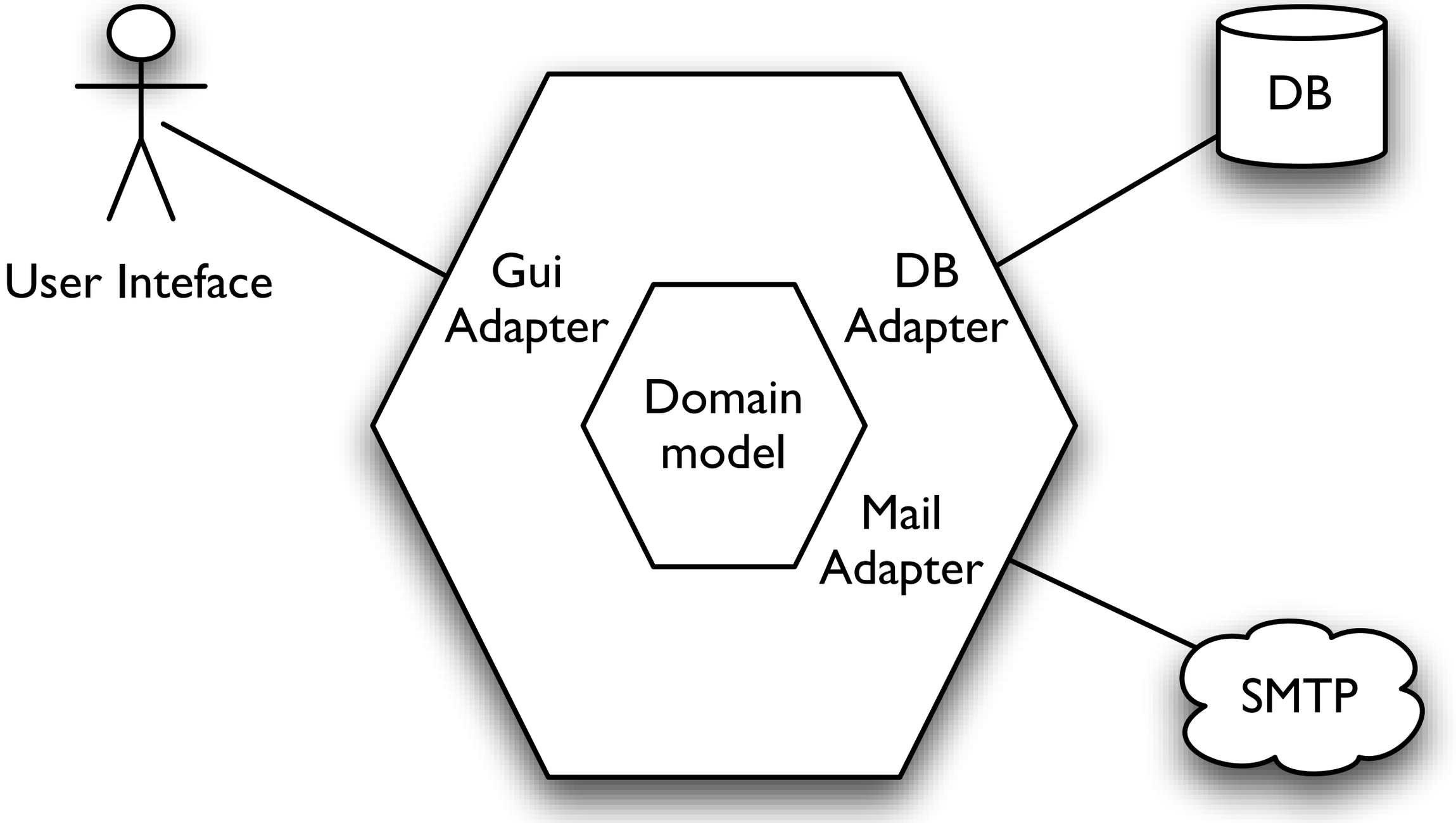
`UTF-16`
Sixteen-bit UCS Transformation Format, byte order identifiableied by an optional byte-order mark

http://download.oracle.com/javase/6/docs/api/java/nio/charset/Charset.html

The hexagonal architecture



Term coined by Alistair Cockburn


User Inteface
Gui
Adapter
Domain
model
DB
Adapter
DB
Mail
Adapter
SMTP

In the hexagonal architecture

- Domain Model depends on nothing
- Everything depends on the domain model