Mock Objects and Test Driven Development

Your friendly assistant

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Chair of Programming Methodology

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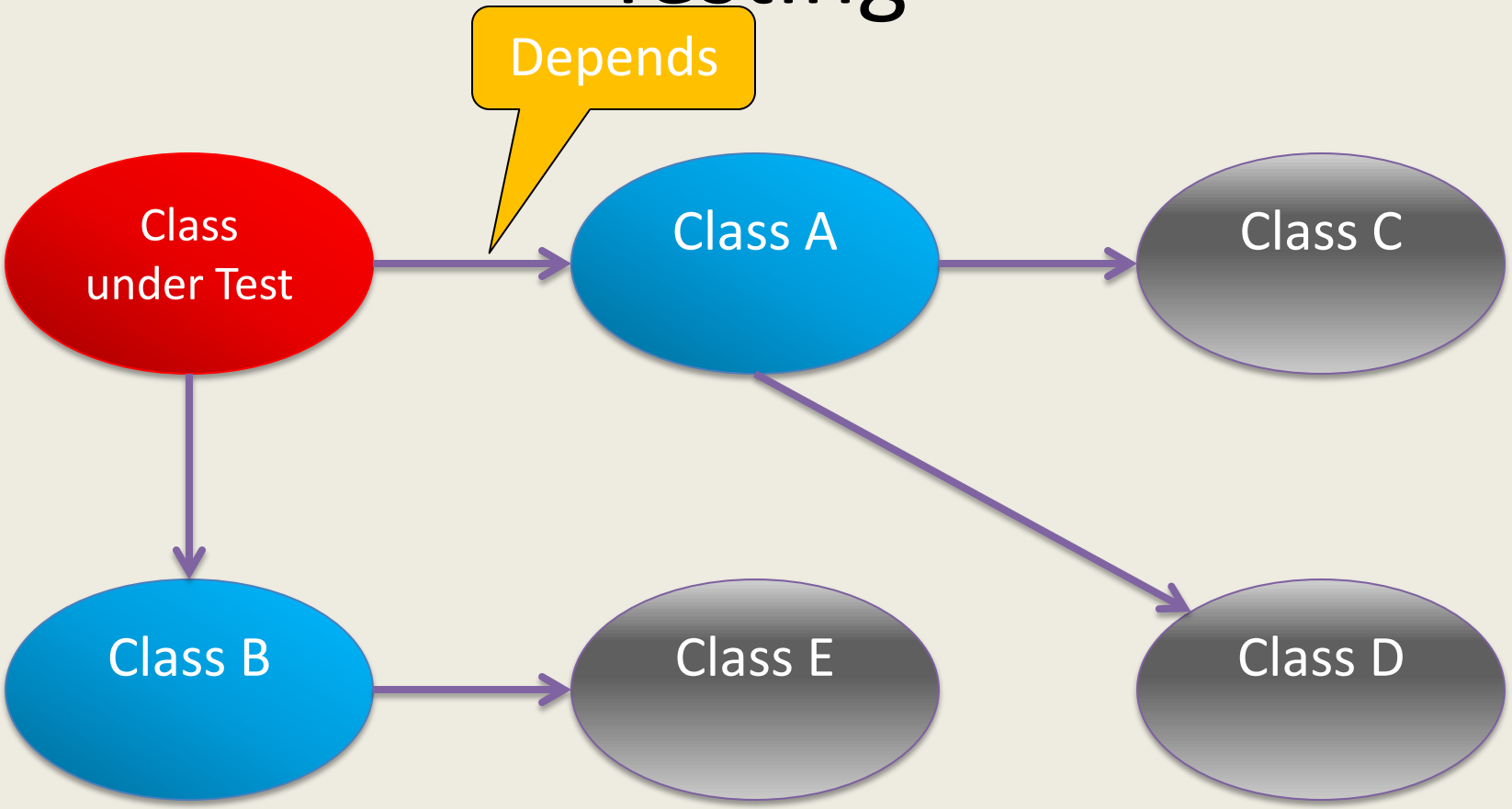
Testing


Depends
Class under Test
Class A
Class C
Class B
Class E
Class D

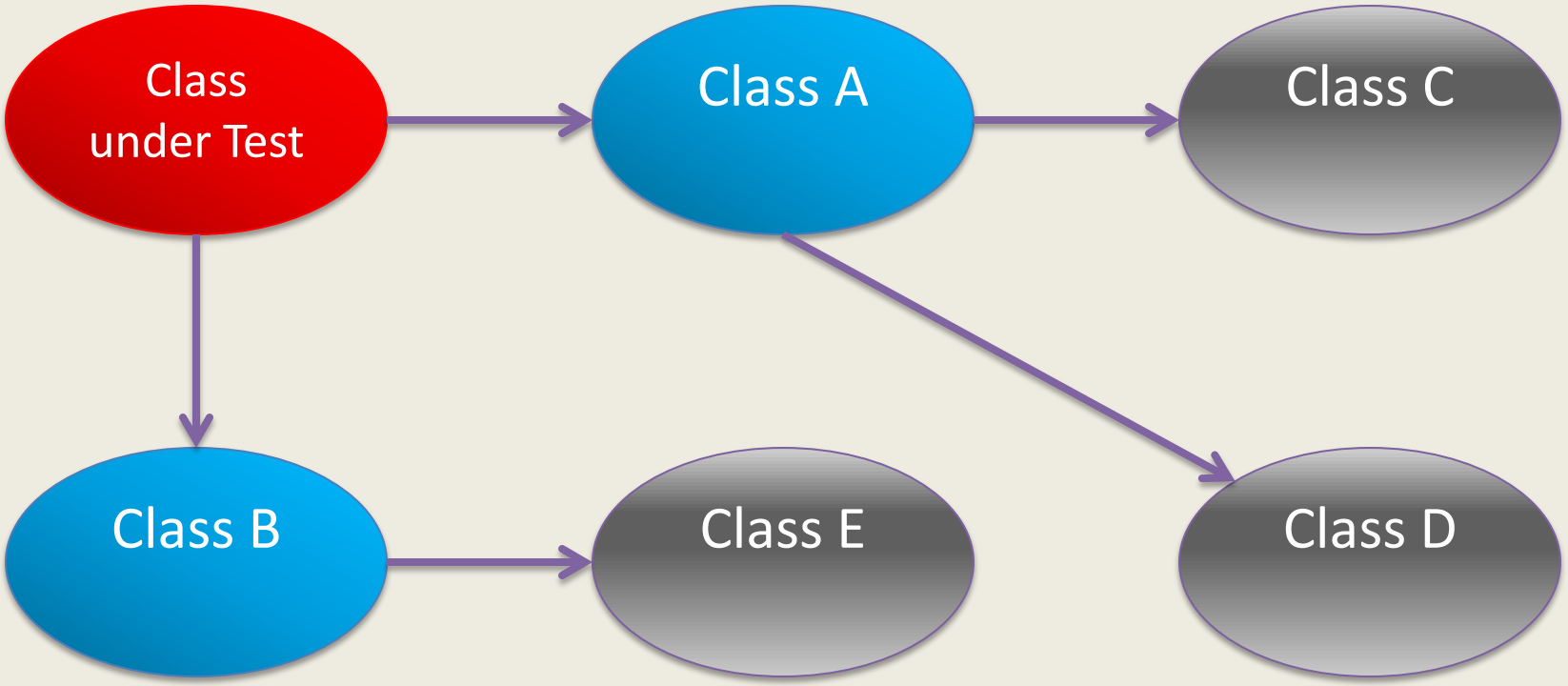
Motivation

- How do we test an object that depends on objects that do not exist yet?
- How do we test an object that depends on objects on which invocation is too time-consuming to pass the tests quickly? (e.g. databases)
- How do we test objects that depend on components that we don't have access to? (e.g. code developed by some third party)

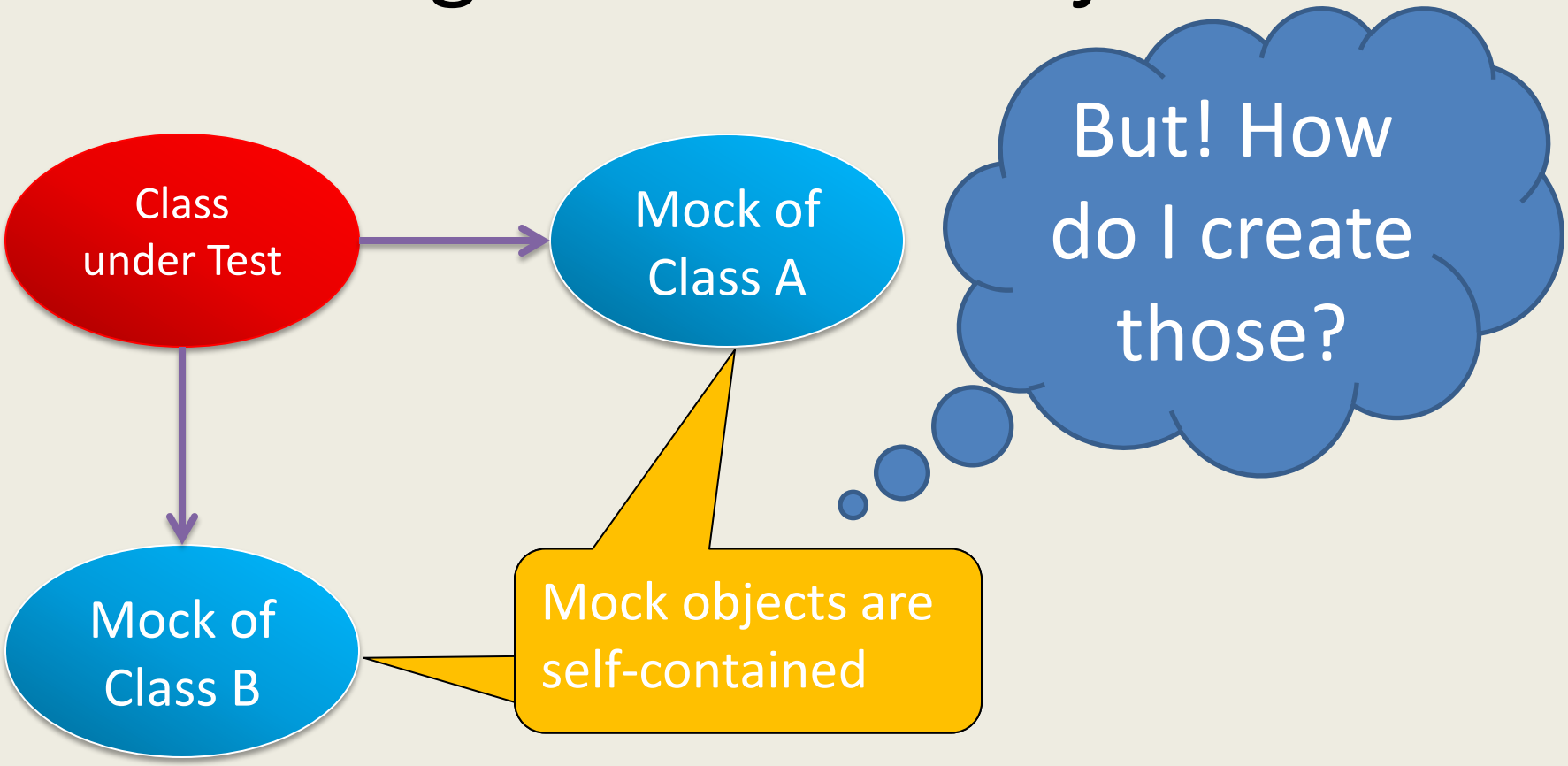
Mock Objects

- Objects simulating behaviour of concrete (real) objects in a controlled way
- Used when the real object is not available or when it is impractical to use
  - E.g. databases, interfaces, mocks of remote objects for local testing
- Speed up tests.

Testing with mock objects



Testing with mock objects



Mocking Frameworks

- jMock 2
  - http://jmock.org/
- EasyMock
  - http://easymock.org/
- Mockito
  - http://code.google.com/p/mockito
- JMockit
  - https://jmockit.dev.java.net
- …

JMock 2

- Most recent versions are:
  - Unstable: 2.6.0-RC2
  - Stable: 2.5.1
- Easy to use and more expressive than e.g. Easy Mock
- Simple library using loads of reflection
- Allows: creation of mock objects, expectations set-up, interaction execution (expect-run-verify)

JMock 2 – Mockery

- Serves as a context of a tested object (i.e. it contains objects that the object under test is dependent on/ communicates with)

```
import org.jmock.Mockery;

public class TestClassTest {
        // we create the context
        Mockery context = new Mockery();

        final ClassA mockClassA =

        context.mock(ClassA.class);

        final ClassB mockClassB =

        context.mock(ClassB.class);
        …
}
```

Objects that the class under test communicates with

JMock 2 – Expectations

- For each mock object we need to define the behaviour that we expect from it.
- This allows us to simulate behaviour of the real object in a controlled way.

```
import org.jmock.Expectations;

…

final ClassA mo
            conte

Object result =

context.checking(new Expecta    ns() {{
    oneOff(mockClassA).doSth();
        will(returnValue(result));
}});
```

We anticipate that doSth() will return object result when invoked

Method doSth() is called on mockClassA only once

JMock 2 – Expectations (cont'd)

- We can introduce arbitrary many expectations in the expectation block.
- There can be an arbitrary number of expectation block in a test and they are appended to each other sequentially.
- For more constructs that can appear in an expectation block, see:
  - http://www.jmock.org/cheat-sheet.html

Example (taken from http://www.jmock.org/getting-started.html)

```
import org.jmock.Mockery;
import org.jmock.Expectations;

class PublisherTest extends TestCase {
   Mockery context = new Mockery();

   public void testOneSubscriberReceivesAMessage() {
      // set up
      final Subscriber subscriber = context.mock(Subscriber.class);

      Publisher publisher = new Publisher();
      publisher.add(subscriber);

      final String message = "message";

      // expectations
      context.checking(new Expectations() {{
         oneOf (subscriber).receive(message);
      }});

      // execute
      publisher.publish(message);

      // verify
      context.assertIsSatisfied();
   }
}
```

```
interface Subscriber {
   void receive(String message);
}
```

Create a mock Subscriber object

Register a mock Subscriber with a Publisher

We set up our expectations

The method is expected to be called once

verify that the mock Subscriber was called as expected

Test Driven Development (TDD)

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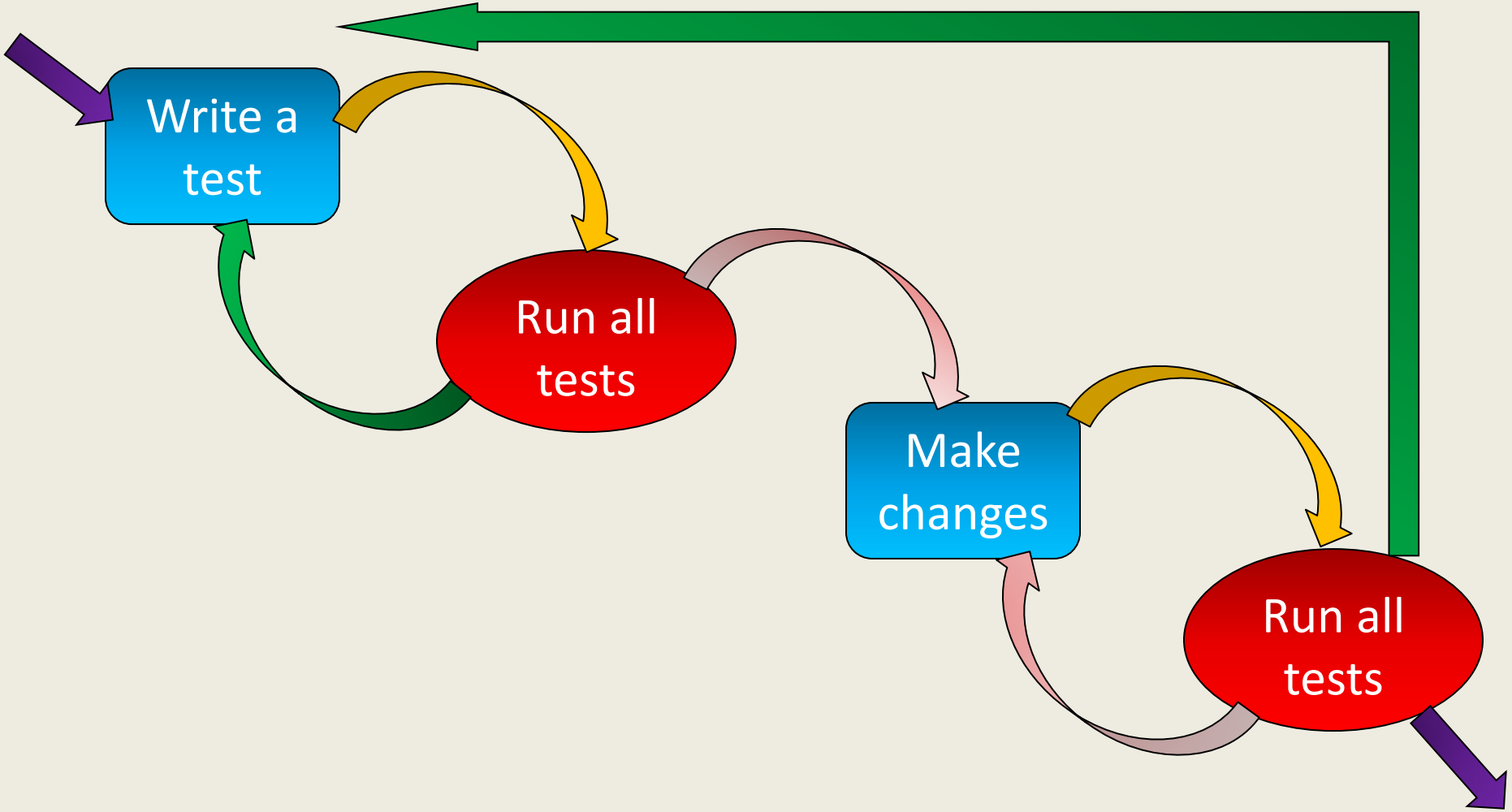
Test Driven Development (TDD)

- We do not start directly with the implementation.
- Write tests first that test some piece of functionality.
- Write code that implements this functionality and keep refining it until all the tests pass.
- Complies to extreme programming – test first and short development cycles.

TDD – Work Flow



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