## Aspect Oriented Programming

**Q.1) Write a program to demonstrate Spring AOP – before advice.**

**Beforeaop.java**

```
package bvimit.edu;

import org.aspectj.lang.JoinPoint;
import org.aspectj.lang.annotation.Aspect;
import org.aspectj.lang.annotation.Before;
import org.aspectj.lang.annotation.Pointcut;

@Aspect
public class beforeaop {
	@Pointcut("execution(int beforeoperation.*(..))")
	public void p() {
	}

	@Before("p()")
	public void myadvice(JoinPoint jp) {
		System.out.println("before advice");
	}
}
```

**Beforeoperation.java**

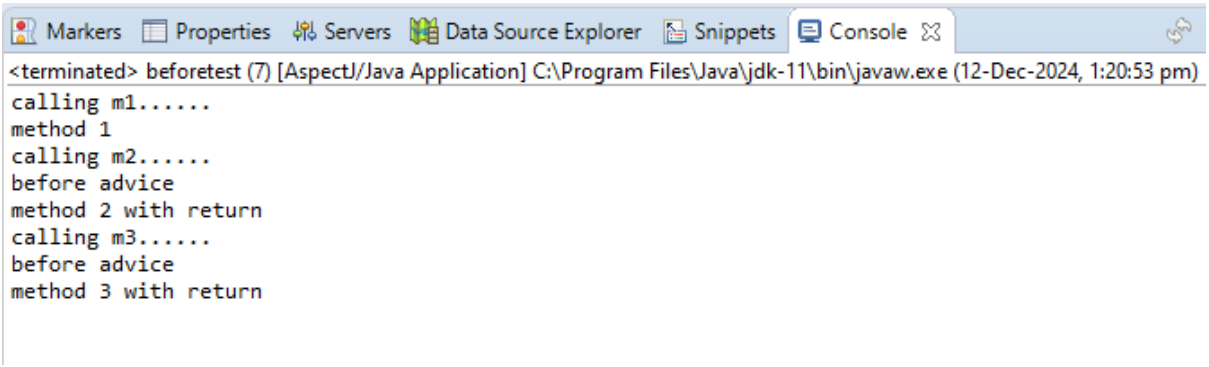
```
package bvimit.edu;

public class beforeoperation {
	public void msg() {
		System.out.println("method 1");
	}

	public int m() {
		System.out.println("method 2 with return");
		return 2;
	}

	public int k() {
		System.out.println("method 3 with return");
		return 3;
	}
}
```

**Beforetest.java**

```
package bvimit.edu;
```

```
import org.springframework.context.ApplicationContext;
import
org.springframework.context.support.ClassPathXmlApplicationContext;

public class beforetest {
      public static void main(String[] args) {
            ApplicationContext context = new
ClassPathXmlApplicationContext("aopctx1.xml");
            beforeoperation e = (beforeoperation)
context.getBean("opBean");
            System.out.println("calling m1......");
            e.msg();
            System.out.println("calling m2......");
            e.m();
            System.out.println("calling m3......");
            e.k();
           }
}
```

**Output :**



**Q.2)** Write a program to demonstrate Spring AOP – after advice.

**Afteraop.java**

```
package bvimit.edu;

import org.aspectj.lang.JoinPoint;

import org.aspectj.lang.annotation.After;

import org.aspectj.lang.annotation.Aspect;

import org.aspectj.lang.annotation.Pointcut;

@Aspect

public class afteraopdata {

	@Pointcut("execution(int afteroperation.*(..))")

	public void p() {

	}


	@After("p()")

	public void myadvice(JoinPoint jp) {

		System.out.println("after advice");

	}

}
```

**Afteroperation.java**

```
package bvimit.edu;

public class afteroperation {
	public void msg() {
		System.out.println("method 1");
	}

	public int m() {
		System.out.println("method 2 with return");
		return 2;
	}

	public int k() {
		System.out.println("method 3 with return");
```

```
            return 3;
      }
}
```

**Aftertest.java**

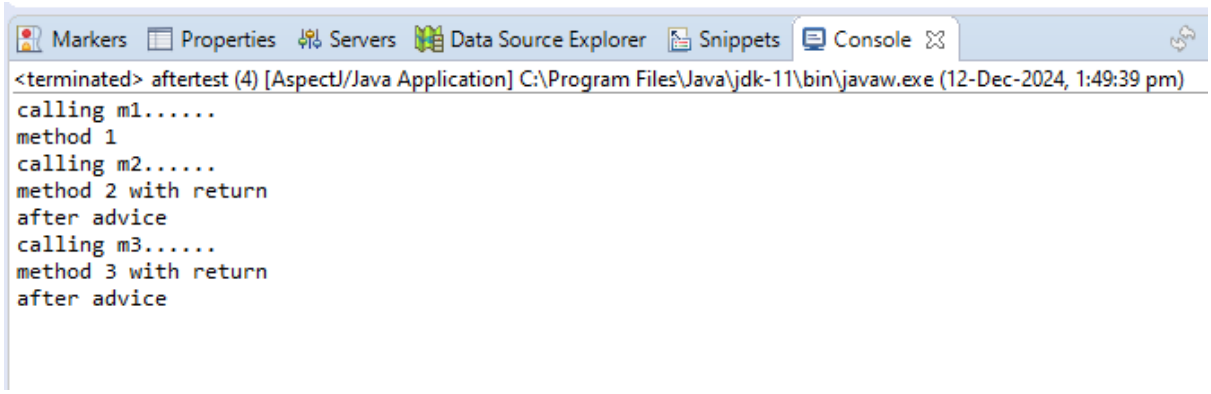
```
package bvimit.edu;

import org.springframework.context.ApplicationContext;

import org.springframework.context.support.ClassPathXmlApplicationContext;

public class aftertest {

      public static void main(String[] args) {

            ApplicationContext context = new
ClassPathXmlApplicationContext("aopctx1.xml");

            afteroperation e = (afteroperation) context.getBean("opBean");

            System.out.println("calling m1.....");

            e.msg();

            System.out.println("calling m2.....");

            e.m();

            System.out.println("calling m3.....");

            e.k();

           }

}
```

**Aopctx1.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="http://www.springframework.org/schema/bean
s http://www.springframework.org/schema/beans/spring-beans.xsd">
<bean id="opBean" class="bvimit.edu.afteroperation"> </bean>
<bean id="trackMyBean" class="bvimit.edu.afteraopdata"></bean>
<bean
class="org.springframework.aop.aspectj.annotation.AnnotationAwareAsp
ectJAutoProxyCreator"></bean>
```

```
</beans>
```

**Output :**



**Q.3) Write a program to demonstrate Spring AOP – around advice.**

**Bankaopdata.java**

```
package bvimit.edu;
import org.aspectj.lang.ProceedingJoinPoint;
import org.aspectj.lang.annotation.Around;
import org.aspectj.lang.annotation.Aspect;
import org.aspectj.lang.annotation.Pointcut;

@Aspect
public class Bankaopdata {
	@Pointcut("execution(* Bank.*(..))")
	public void a() {
	}

	@Around("a()")
	public Object myadvice(ProceedingJoinPoint p) throws Throwable
{
		System.out.println("Around concern Before calling actual
method");
		Object obj = p.proceed();
		System.out.println("Around Concern After calling actual
method");
		return obj;
	}
}
```

**Bank.java**

```
package bvimit.edu;

public class Bank {
	public void welcome() {
		System.out.println("welcome to bank");
	}

	public int icici() {
		System.out.println("icici bank interest rate");
		return 7;
	}

	public int pnb() {
		System.out.println("pnb bank interest rate");
		return 6;
	}
}
```

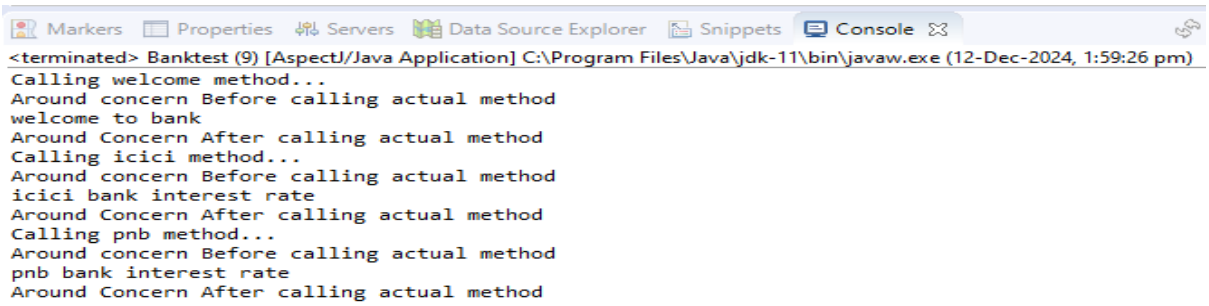
**Banktest.java**

```
package bvimit.edu;

import org.springframework.context.ApplicationContext;
import
org.springframework.context.support.ClassPathXmlApplicationContext;

public class Banktest {
	private static ApplicationContext context;

	public static void main(String[] args) {
		context = new
ClassPathXmlApplicationContext("Bankaopdata.xml");
		Bank e = (Bank) context.getBean("opBean");
		System.out.println("Calling welcome method...");
		e.welcome();
		System.out.println("Calling icici method...");
		e.icici();
		System.out.println("Calling pnb method...");
		e.pnb();
	}
}
```

**Bankaopdata.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
	xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xsi:schemaLocation="http://www.springframework.org/schema/bean
s http://www.springframework.org/schema/beans/spring-beans.xsd">
<bean id="opBean" class="bvimit.edu.Bank"> </bean>
<bean id="trackMyBean" class="bvimit.edu.Bankaopdata"></bean>
<bean
class="org.springframework.aop.aspectj.annotation.AnnotationAwareAsp
ectJAutoProxyCreator"></bean>
</beans>
```

**Output :**



**Q.4) Write a program to demonstrate Spring AOP – after returning advice.**

**Bankaopdata.java**

```
package bvimit.edu;

import org.aspectj.lang.JoinPoint;
import org.aspectj.lang.ProceedingJoinPoint;
import org.aspectj.lang.annotation.AfterReturning;
import org.aspectj.lang.annotation.Around;
import org.aspectj.lang.annotation.Aspect;
import org.aspectj.lang.annotation.Pointcut;

@Aspect
public class Bankaopdata {
	@AfterReturning(pointcut = "execution(* Bank.*(..))",
returning = "result")
	public void myadvice(JoinPoint jp, Object result) {
		System.out.println("AfterReturning concern");
		System.out.println("Result in advice" + result);
	}
}
```

**Bank.java**

```
package bvimit.edu;

public class Bank {
	public void welcome() {
		System.out.println("welcome to bank");
	}

	public int icici() {
		System.out.println("icici bank interest rate");
		return 7;
	}

	public int pnb() {
		System.out.println("pnb bank interest rate");
		return 6;
	}
}
```

**Banktest.java**

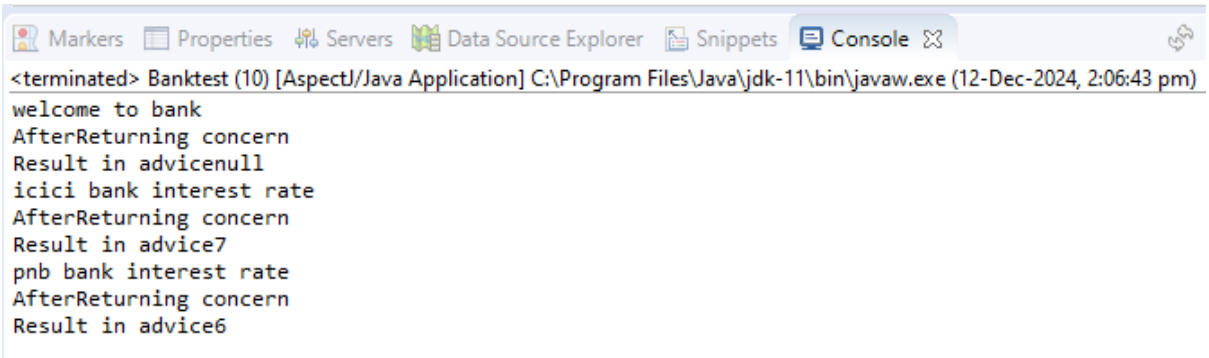
```
package bvimit.edu;

import org.springframework.context.ApplicationContext;
```

```
import
org.springframework.context.support.ClassPathXmlApplicationContext;

public class Banktest {
	private static ApplicationContext context;

	public static void main(String[] args) {
		context = new
ClassPathXmlApplicationContext("Bankaopdata.xml");
		Bank e = (Bank) context.getBean("opBean");
		e.welcome();
		e.icici();
		e.pnb();
	}
}
```

**Bankaopdata.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
	xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xsi:schemaLocation="http://www.springframework.org/schema/bean
s http://www.springframework.org/schema/beans/spring-beans.xsd">
<bean id="opBean" class="bvimit.edu.Bank"> </bean>
<bean id="trackMyBean" class="bvimit.edu.Bankaopdata"></bean>
<bean
class="org.springframework.aop.aspectj.annotation.AnnotationAwareAsp
ectJAutoProxyCreator"></bean>
</beans>
```

**Output :**



**Q.5) Write a program to demonstrate Spring AOP – after throwing advice.**

**Operation_at.java**

```
package bvimit.edu;

public class Operation_at {
	public void validate(int att) throws Exception {
		if (att < 75) {
			throw new ArithmeticException("Not eligible for
exam");
		} else {
			System.out.println("Eligible for exam");
		}
	}
}
```

**Operationaop_at.java**

```
package bvimit.edu;
import org.aspectj.lang.JoinPoint;
import org.aspectj.lang.annotation.AfterThrowing;
import org.aspectj.lang.annotation.Aspect;

@Aspect
public class Operationaop_at {
	@AfterThrowing(pointcut = "execution(* Operation_at.*(..))",
throwing = "error")
	public void myadvice(JoinPoint jp, Throwable error) {
		System.out.println("AfterThrowing concern");
		System.out.println("Exception is: " + error);
		System.out.println("end of after throwing advice....");
	}
}
```

**OperationTest_at.java**

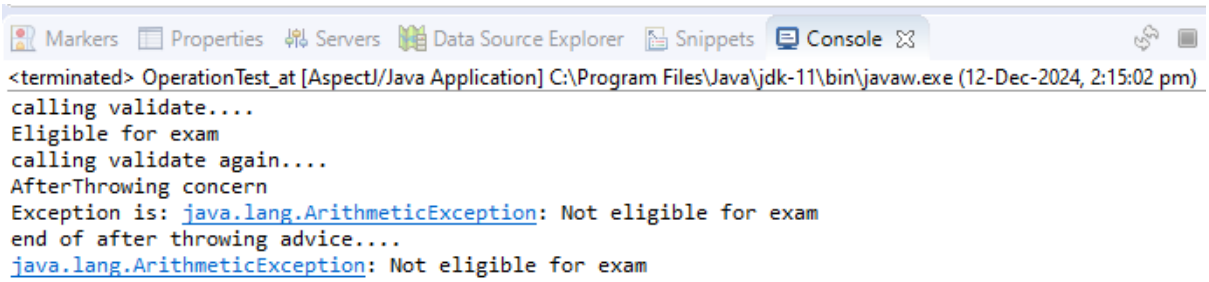
```
package bvimit.edu;

import org.springframework.context.ApplicationContext;
import
org.springframework.context.support.ClassPathXmlApplicationContext;

public class OperationTest_at {
	private static ApplicationContext context;

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

```
            ApplicationContext context = new
ClassPathXmlApplicationContext("validctx.xml");
            Operation_at op = (Operation_at)
context.getBean("opBean");
            System.out.println("calling validate....");
            try {
                  op.validate(85);
            } catch (Exception e) {
                  System.out.println(e);
            }
            System.out.println("calling validate again....");
            try {
                  op.validate(25);
            } catch (Exception e) {
                  System.out.println(e);
            }
      }
}
```

**Validctx.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="http://www.springframework.org/schema/bean
s http://www.springframework.org/schema/beans/spring-beans.xsd">
<bean id="opBean" class="bvimit.edu.Operation_at"></bean>
<bean id="trackMyBean" class="bvimit.edu.Operationaop_at"></bean>
<bean
class="org.springframework.aop.aspectj.annotation.AnnotationAwareAsp
ectJAutoProxyCreator"></bean>
</beans>
```

**Output :**



**Q.6) Write a program to demonstrate Spring AOP –pointcuts.**

**Aopdata_pc.java**

```
package bvimit.edu;

import org.aspectj.lang.JoinPoint;
import org.aspectj.lang.annotation.After;
import org.aspectj.lang.annotation.Pointcut;
import org.aspectj.lang.annotation.Aspect;
import org.aspectj.lang.annotation.Before;

@Aspect
public class Aopdata_pc {
	@Pointcut("execution(int Operation.*(..))")
	public void p() {
	}

	@After("p()")
	public void myadvice(JoinPoint jp) {
		System.out.println("After advice");
	}

	@Pointcut("execution(* Operation.*(..))")
	public void i() {
	}

	@Before("i()")
	public void myadvice1(JoinPoint jp) {
		System.out.println("Before advice");
	}
}
```

**Operation_pc.java**

```
package bvimit.edu;

public class Operation_pc {
	public void msg() {
		System.out.println("method 1");
	}

	public int m() {
		System.out.println("method 2 with return");
		return 2;
	}

	public int k() {
		System.out.println("method 3 with return");
```

```
            return 3;
      }
}
```

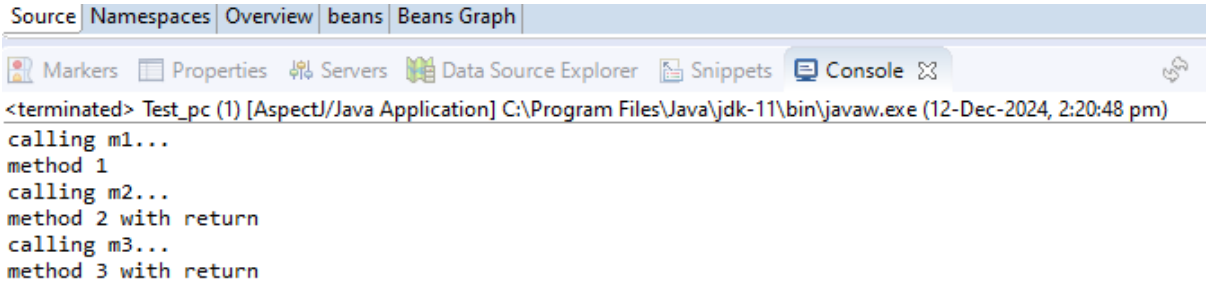
**Test_pc.java**

```
package bvimit.edu;

import org.springframework.context.ApplicationContext;
import
org.springframework.context.support.ClassPathXmlApplicationContext;

public class Test_pc {
      public static void main(String[] args) {
            ApplicationContext context = new
ClassPathXmlApplicationContext("aopctx_pc.xml");
            Operation_pc e = (Operation_pc)
context.getBean("opBean");
            System.out.println("calling m1...");
            e.msg();
            System.out.println("calling m2...");
            e.m();
            System.out.println("calling m3...");
            e.k();
      }
}
```

**Aopctx.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="http://www.springframework.org/schema/bean
s http://www.springframework.org/schema/beans/spring-beans.xsd">
<bean id="opBean" class="bvimit.edu.Operation_pc"></bean>
<bean id="trackMyBean" class="bvimit.edu.Aopdata_pc"></bean>
<bean
class="org.springframework.aop.aspectj.annotation.AnnotationAwareAsp
ectJAutoProxyCreator"></bean>
</beans>
```

**Output :**


Source
Namespaces
Overview
beans
Beans Graph
Markers
Properties
Servers
Data Source Explorer
Snippets
Console
<terminated> Test_pc (1) [AspectJ/Java Application] C:\Program Files\Java\jdk-11\bin\javaw.exe (12-Dec-2024, 2:20:48 pm)
calling m1...
method 1
calling m2...
method 2 with return
calling m3...
method 3 with return