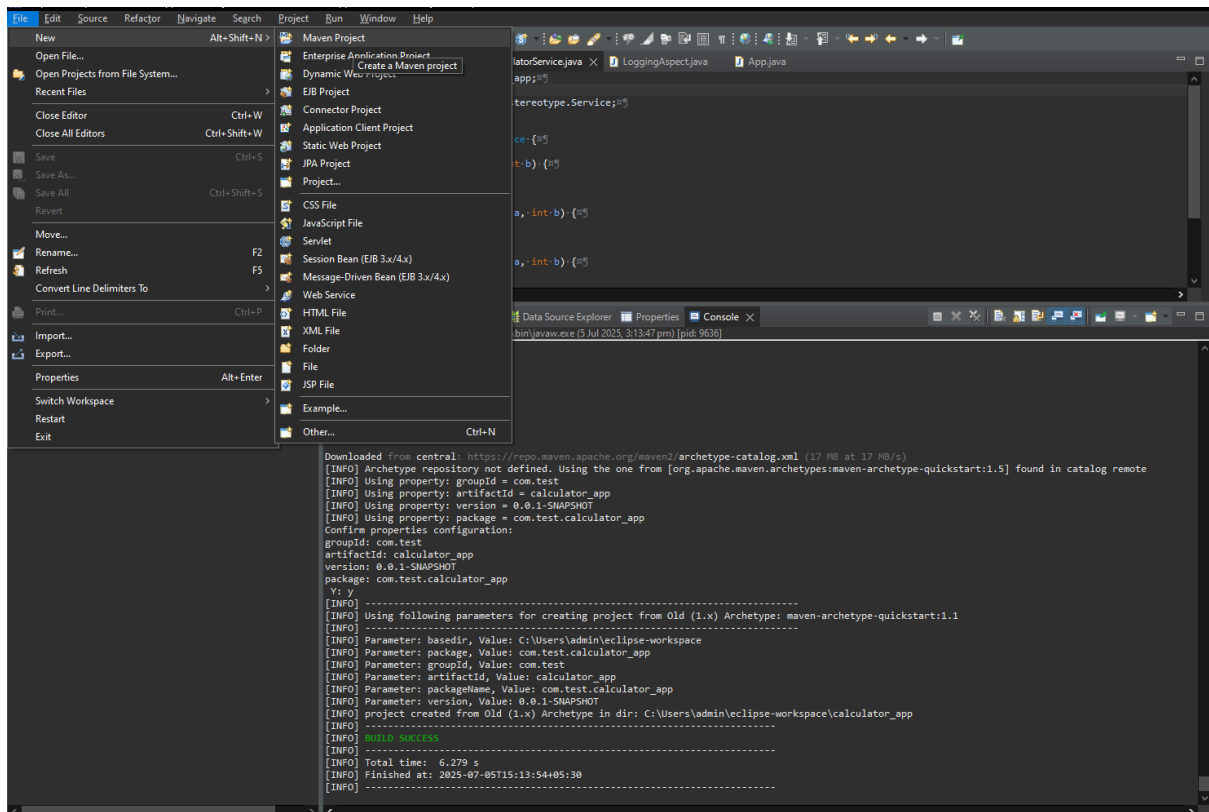
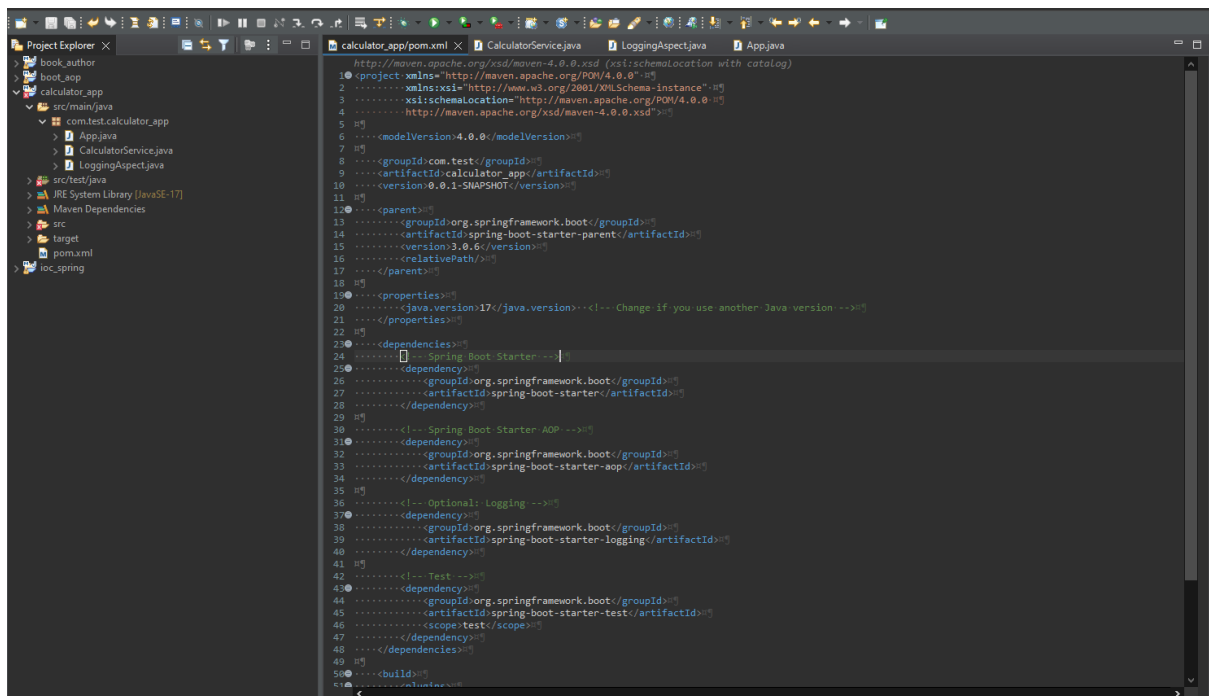


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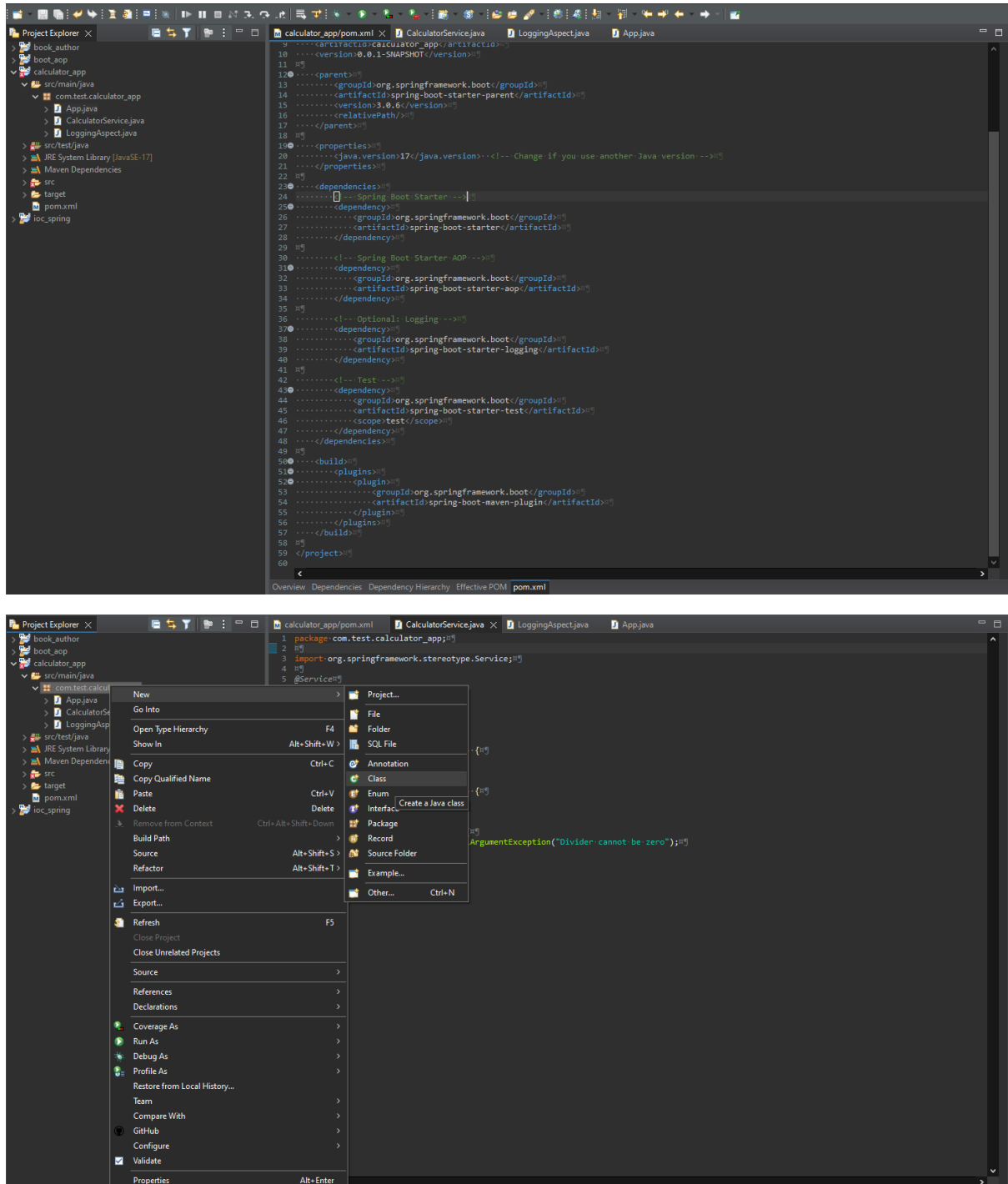


```
Downloaded from central: https://repo.maven.apache.org/maven2/archetype-catalog.xml (17 kB at 17 MB/s)
[INFO] Archetype repository not defined. Using the one from [org.apache.maven.archetypes:maven-archetype-quickstart:1.5] found in catalog remote
[INFO] Using property: groupId = com.test
[INFO] Using property: artifactId = calculator_app
[INFO] Using property: version = 0.0.1-SNAPSHOT
[INFO] Using property: package = com.test.calculator_app
Confirm properties configuration:
groupId: com.test
artifactId: calculator_app
version: 0.0.1-SNAPSHOT
package: com.test.calculator_app
Y: y
[INFO] -----
[INFO] Using following parameters for creating project from Old (1.x) Archetype: maven-archetype-quickstart:1.1
[INFO] -----
[INFO] Parameter: basedir, Value: C:\Users\admin\workspace
[INFO] Parameter: package, Value: com.test.calculator_app
[INFO] Parameter: groupId, Value: com.test
[INFO] Parameter: artifactId, Value: calculator_app
[INFO] Parameter: packageName, Value: com.test.calculator_app
[INFO] Parameter: version, Value: 0.0.1-SNAPSHOT
[INFO] project created from Old (1.x) Archetype in dir: C:\Users\admin\workspace\calculator_app
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 6.279 s
[INFO] Finished at: 2025-07-05T15:13:54+05:30
[INFO] -----
```

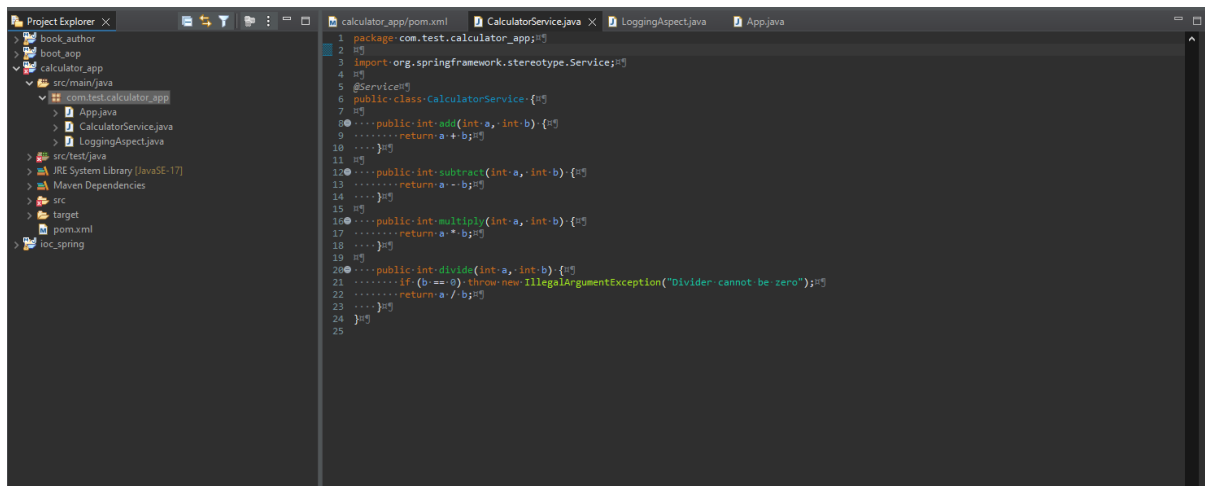


```
<?xml version="1.0" encoding="UTF-8" ?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>com.test</groupId>
  <artifactId>calculator_app</artifactId>
  <version>0.0.1-SNAPSHOT</version>
  <parent>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-parent</artifactId>
    <version>3.0.6</version>
    <relativePath></relativePath>
  </parent>
  <properties>
    <java.version>17</java.version><!-- Change if you use another Java version -->
  </properties>
  <dependencies>
    <!-- Spring Boot Starter -->
    <dependency>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-starter</artifactId>
    </dependency>
    <!-- Spring Boot Starter AOP -->
    <dependency>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-starter-aop</artifactId>
    </dependency>
    <!-- Optional: Logging -->
    <dependency>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-starter-logging</artifactId>
    </dependency>
    <!-- Test -->
    <dependency>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-starter-test</artifactId>
      <scope>test</scope>
    </dependency>
  </dependencies>
  <build>
    <plugins>
      <plugin>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-maven-plugin</artifactId>
      </plugin>
    </plugins>
  </build>
</project>
```

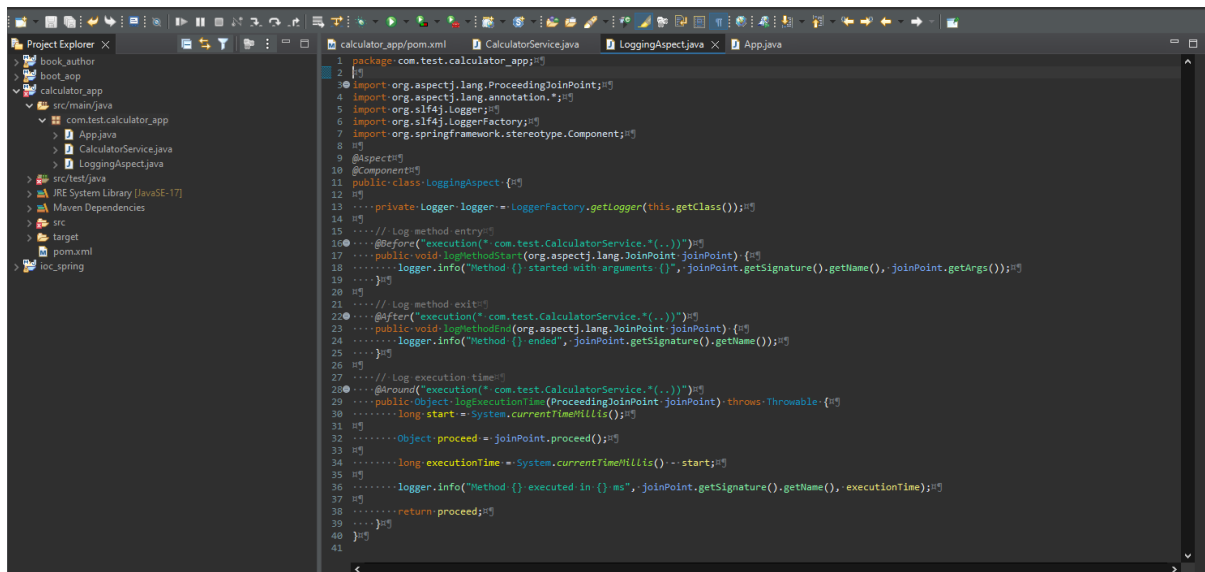
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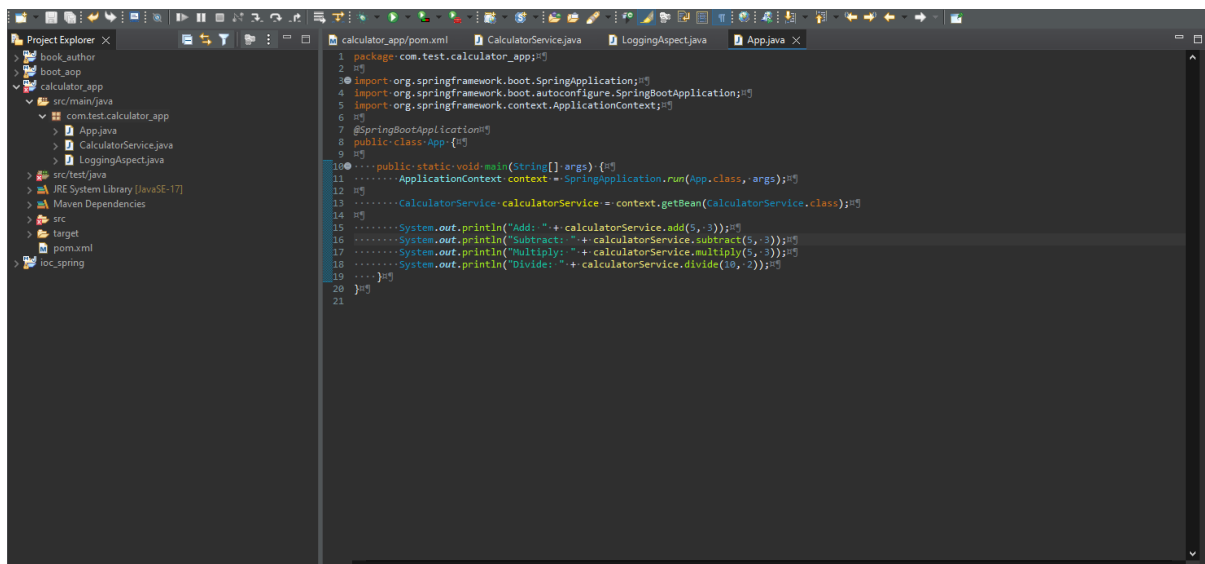
## Practical 2B Suraj S Kaduvetti 40772240015 F015



```
1 package com.test.calculator_app;
2
3 import org.springframework.stereotype.Service;
4
5 @Service
6 public class CalculatorService {
7
8     .... public int add(int a, int b) {
9         .... return a + b;
10    }
11
12    .... public int subtract(int a, int b) {
13        .... return a - b;
14    }
15
16    .... public int multiply(int a, int b) {
17        .... return a * b;
18    }
19
20    .... public int divide(int a, int b) {
21        .... if (b == 0) throw new IllegalArgumentException("Divider cannot be zero");
22        .... return a / b;
23    }
24 }
25
```

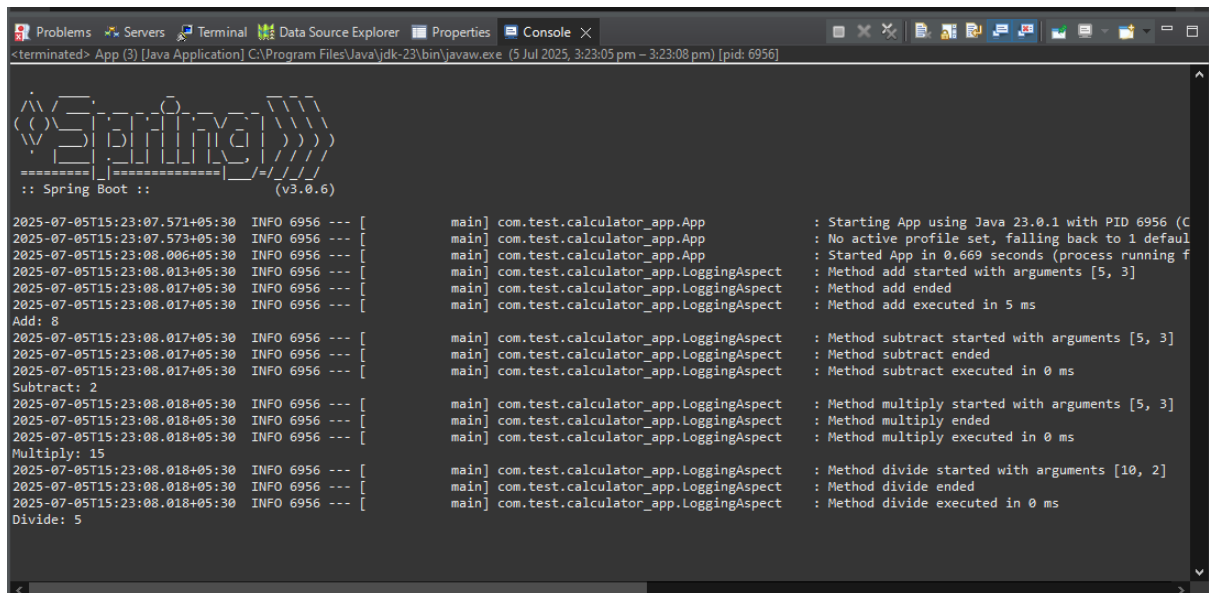
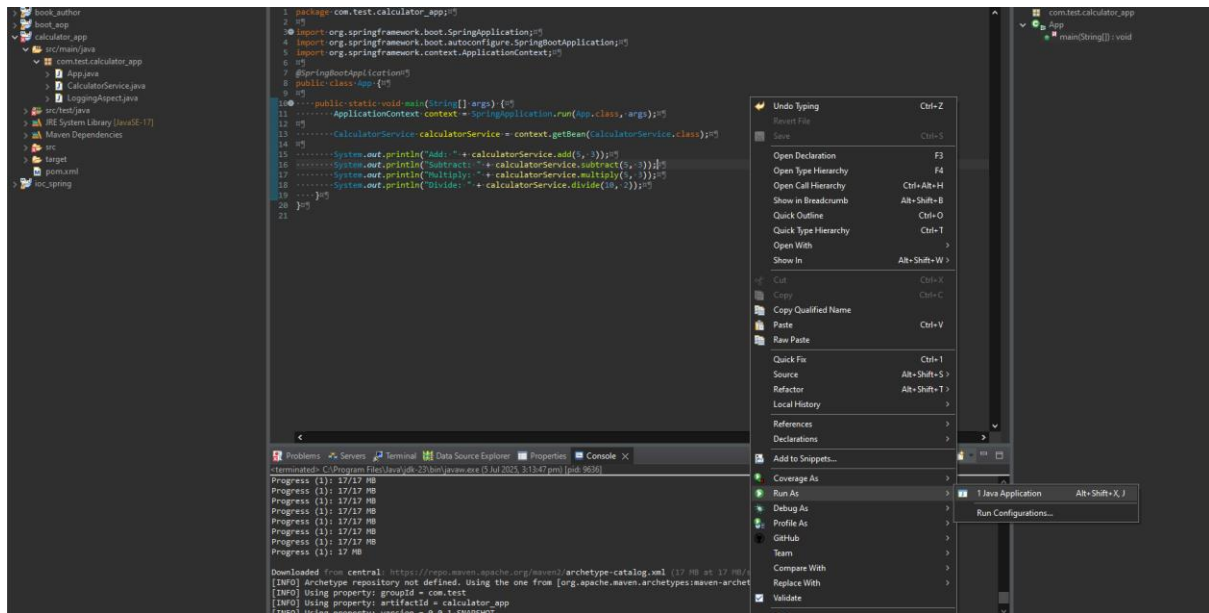


```
1 package com.test.calculator_app;
2
3 import org.aspectj.lang.ProceedingJoinPoint;
4 import org.aspectj.lang.annotation.*;
5 import org.slf4j.Logger;
6 import org.slf4j.LoggerFactory;
7 import org.springframework.stereotype.Component;
8
9 @Aspect
10 @Component
11 public class LoggingAspect {
12
13     .... private Logger logger = LoggerFactory.getLogger(this.getClass());
14
15     .... // Log method entry
16     .... @Before("execution(* com.test.calculator_app.*(..))")
17     .... public void logMethodStart(org.aspectj.lang.JoinPoint joinPoint) {
18         .... logger.info("Method {} started with arguments {}", joinPoint.getSignature().getName(), joinPoint.getArgs());
19     }
20
21     .... // Log method exit
22     .... @After("execution(* com.test.calculator_app.*(..))")
23     .... public void logMethodEnd(org.aspectj.lang.JoinPoint joinPoint) {
24         .... logger.info("Method {} ended", joinPoint.getSignature().getName());
25     }
26
27     .... // Log execution time
28     .... @Around("execution(* com.test.calculator_app.*(..))")
29     .... public Object logExecutionTime(ProceedingJoinPoint joinPoint) throws Throwable {
30         .... long start = System.currentTimeMillis();
31
32         .... Object proceed = joinPoint.proceed();
33
34         .... long executionTime = System.currentTimeMillis() - start;
35
36         .... logger.info("Method {} executed in {} ms", joinPoint.getSignature().getName(), executionTime);
37
38         .... return proceed;
39     }
40 }
41
```



```
1 package com.test.calculator_app;
2
3 import org.springframework.boot.SpringApplication;
4 import org.springframework.boot.autoconfigure.SpringBootApplication;
5 import org.springframework.context.ApplicationContext;
6
7 @SpringBootApplication
8 public class App {
9
10    .... public static void main(String[] args) {
11        .... ApplicationContext context = SpringApplication.run(App.class, args);
12
13        .... CalculatorService calculatorService = context.getBean(CalculatorService.class);
14
15        .... System.out.println("Add: " + calculatorService.add(5, 3));
16        .... System.out.println("Subtract: " + calculatorService.subtract(5, 3));
17        .... System.out.println("Multiply: " + calculatorService.multiply(5, 3));
18        .... System.out.println("Divide: " + calculatorService.divide(10, 2));
19    }
20 }
21
```

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## Practical 2B Suraj S Kaduvetti 40772240015 F015

The screenshot displays an IDE with a project named 'calculator\_app'. The Project Explorer on the left shows the directory structure: 'boot\_author' -> 'boot\_app' -> 'calculator\_app' -> 'src/main/java' -> 'com.test.calculator\_app' -> 'App.java', 'CalculatorService.java', and 'LoggingAspect.java'. The main editor shows the 'App.java' file with the following code:

```
1 package com.test.calculator_app;
2
3 import org.springframework.boot.SpringApplication;
4 import org.springframework.boot.autoconfigure.SpringBootApplication;
5 import org.springframework.context.annotation.*;
6
7 @SpringBootApplication
8 public class App {
9
10     public static void main(String[] args) {
11         ApplicationContext context = SpringApplication.run(App.class, args);
12     }
13     CalculatorService calculatorService = context.getBean(CalculatorService.class);
14
15     System.out.println("Add - 5 + 3 = : " + calculatorService.add(5, 3));
16     System.out.println("Subtract - 5 - 3 = : " + calculatorService.subtract(5, 3));
17     System.out.println("Multiply - 5 x 3 = : " + calculatorService.multiply(5, 3));
18     System.out.println("Divide - 10 / 2 = : " + calculatorService.divide(10, 2));
19 }
20
21
```

The Console window at the bottom shows the application output, including the Spring Boot logo and a series of log messages:

```

:: Spring Boot :: (v3.0.6)

2025-07-05T15:24:50.971+05:30 INFO 6244 --- [main] com.test.calculator_app.App : Starting App using Java 23.0.1 with PID 6244 (C
2025-07-05T15:24:50.972+05:30 INFO 6244 --- [main] com.test.calculator_app.App : No active profile set, falling back to 1 default
2025-07-05T15:24:51.410+05:30 INFO 6244 --- [main] com.test.calculator_app.App : Started App in 0.675 seconds (process running f
2025-07-05T15:24:51.417+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method add started with arguments [5, 3]
2025-07-05T15:24:51.420+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method add ended
2025-07-05T15:24:51.420+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method add executed in 4 ms
Add - 5 + 3 = : 8
2025-07-05T15:24:51.421+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method subtract started with arguments [5, 3]
2025-07-05T15:24:51.421+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method subtract ended
2025-07-05T15:24:51.421+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method subtract executed in 0 ms
Subtract - 5 - 3 = : 2
2025-07-05T15:24:51.421+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method multiply started with arguments [5, 3]
2025-07-05T15:24:51.421+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method multiply ended
2025-07-05T15:24:51.421+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method multiply executed in 0 ms
Multiply - 5 x 3 = : 15
2025-07-05T15:24:51.422+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method divide started with arguments [10, 2]
2025-07-05T15:24:51.422+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method divide ended
2025-07-05T15:24:51.422+05:30 INFO 6244 --- [main] com.test.calculator_app.LoggingAspect : Method divide executed in 0 ms
Divide - 10 / 2 = : 5

```