

Java Native Interface (JNI) – DLL Program Execution Guide

Program Overview

This guide demonstrates how to perform arithmetic operations (addition, subtraction, multiplication, and division) using C functions called from Java through the Java Native Interface (JNI).

Files Involved

1. ArithmeticOperations.c

```
#include <jni.h>
#include "ArithmeticOperations.h"

JNIEXPORT jint JNICALL Java_ArithmeticOperations_add(JNIEnv *env, jobject obj, jint a, jint b) {
    return a + b;
}

JNIEXPORT jint JNICALL Java_ArithmeticOperations_subtract(JNIEnv *env, jobject obj, jint a, jint b) {
    return a - b;
}

JNIEXPORT jint JNICALL Java_ArithmeticOperations_multiply(JNIEnv *env, jobject obj, jint a, jint b) {
    return a * b;
}

JNIEXPORT jint JNICALL Java_ArithmeticOperations_divide(JNIEnv *env, jobject obj, jint a, jint b) {
    if (b == 0) return 0; // Handle division by zero
    return a / b;
}
```

2. ArithmeticOperations.java

```
public class ArithmeticOperations {
    public native int add(int a, int b);
    public native int subtract(int a, int b);
    public native int multiply(int a, int b);
    public native int divide(int a, int b);

    static {
        System.loadLibrary("ArithmeticOperations");
    }

    public static void main(String[] args) {
        ArithmeticOperations ops = new ArithmeticOperations();
        int a = 10, b = 5;
        System.out.println("Addition: " + ops.add(a, b));
        System.out.println("Subtraction: " + ops.subtract(a, b));
        System.out.println("Multiplication: " + ops.multiply(a, b));
        System.out.println("Division: " + ops.divide(a, b));
    }
}
```

Commands for Execution (Linux Terminal)

```
javac ArithmeticOperations.java
javac -h . ArithmeticOperations.java
gcc -I /lib/jvm/java-11-openjdk-amd64/include \
    -I /lib/jvm/java-11-openjdk-amd64/include/linux \
    -shared -o libArithmeticOperations.so ArithmeticOperations.c
java -Djava.library.path=. ArithmeticOperations
```

Note: Ensure consistent naming of files and classes. The library name and class name must match exactly (case-sensitive).