JNI Development on Spring

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IJ
IntelliJ IDEA
ULTIMATE 2019.2
JET
BRAINS

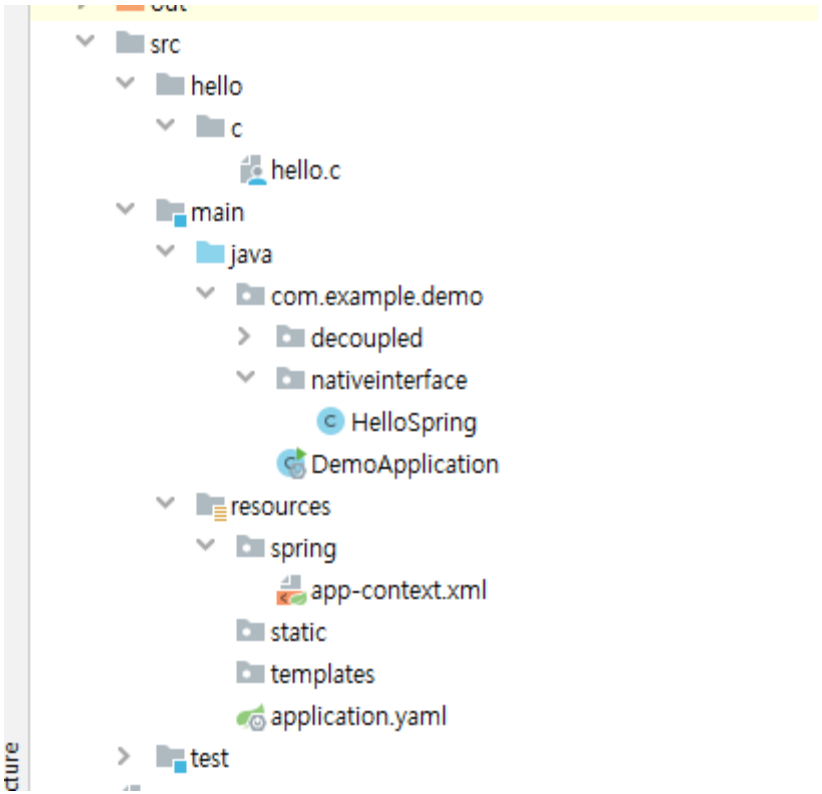
hello.c | app-context.xml | application.yaml | DemoApplication.java | build.gradle

```
plugins {
    id 'org.springframework.boot' version '2.2.1.RELEASE'
    id 'io.spring.dependency-management' version '1.0.8.RELEASE'
    id 'java'
}

apply plugin: 'application'
apply plugin: 'c'

group = 'com.example'
version = '0.0.1-SNAPSHOT'
sourceCompatibility = '1.8'

mainClassName = 'DemoApplication'

configurations {
    compileOnly {
        extendsFrom annotationProcessor
    }
}

repositories {
    mavenCentral()
}
```

```
dependencies {
    implementation 'org.springframework.boot:spring-boot-starter-data-jpa'
    implementation 'org.springframework.boot:spring-boot-starter-data-redis'
    implementation 'org.springframework.boot:spring-boot-starter-web'
    compileOnly 'org.projectlombok:lombok'
    runtimeOnly 'com.h2database:h2'
    runtimeOnly 'org.postgresql:postgresql'
    annotationProcessor 'org.projectlombok:lombok'
    testImplementation('org.springframework.boot:spring-boot-starter-test') {
        exclude group: 'org.junit.vintage', module: 'junit-vintage-engine'
    }
}

test {
    useJUnitPlatform()
}

test {
    systemProperty "java.library.path", file("${buildDir}/libs/hello/shared").absolutePath
}
```

```
model {
    platforms {
        x64 {
            architecture "x86_64"
        }
    }
    toolChains {
        gcc(Gcc) {
            target("x86_64") {
                cCompiler.executable = "D:/MinGW_x86_64/bin/gcc"
                linker.executable = "D:/MinGW_x86_64/bin/ld"
            }
        }
    }
```

```
    components {
        hello(NativeLibrarySpec) {
            sources {
                c {
                    source {
                        srcDir 'src/hello/c'
                        include "**/*.c"
                    }
                }
            }
            buildTypes {
                debug
                release
            }
            binaries.all {
                cCompiler.args "-c"
                cCompiler.args "-m64"
                cCompiler.args "-I${org.gradle.internal.jvm.Jvm.current().javaHome}/include"
                cCompiler.args "-I${org.gradle.internal.jvm.Jvm.current().javaHome}/include/win32"
                cCompiler.args "-LD:\\MinGW_x86_64\\mingw64\\lib"
                linker.args "-m64"
                linker.args "-LD:\\MinGW_x86_64\\mingw64\\lib"
                linker.args "-shared"
            }
        }
    }
}

test.dependsOn  'helloReleaseSharedLibrary'
```


src
hello
c
hello.c
main
java
com.example.demo
decoupled
nativeinterface
HelloSpring
DemoApplication
resources
spring
app-context.xml
static
templates
application.yaml
test

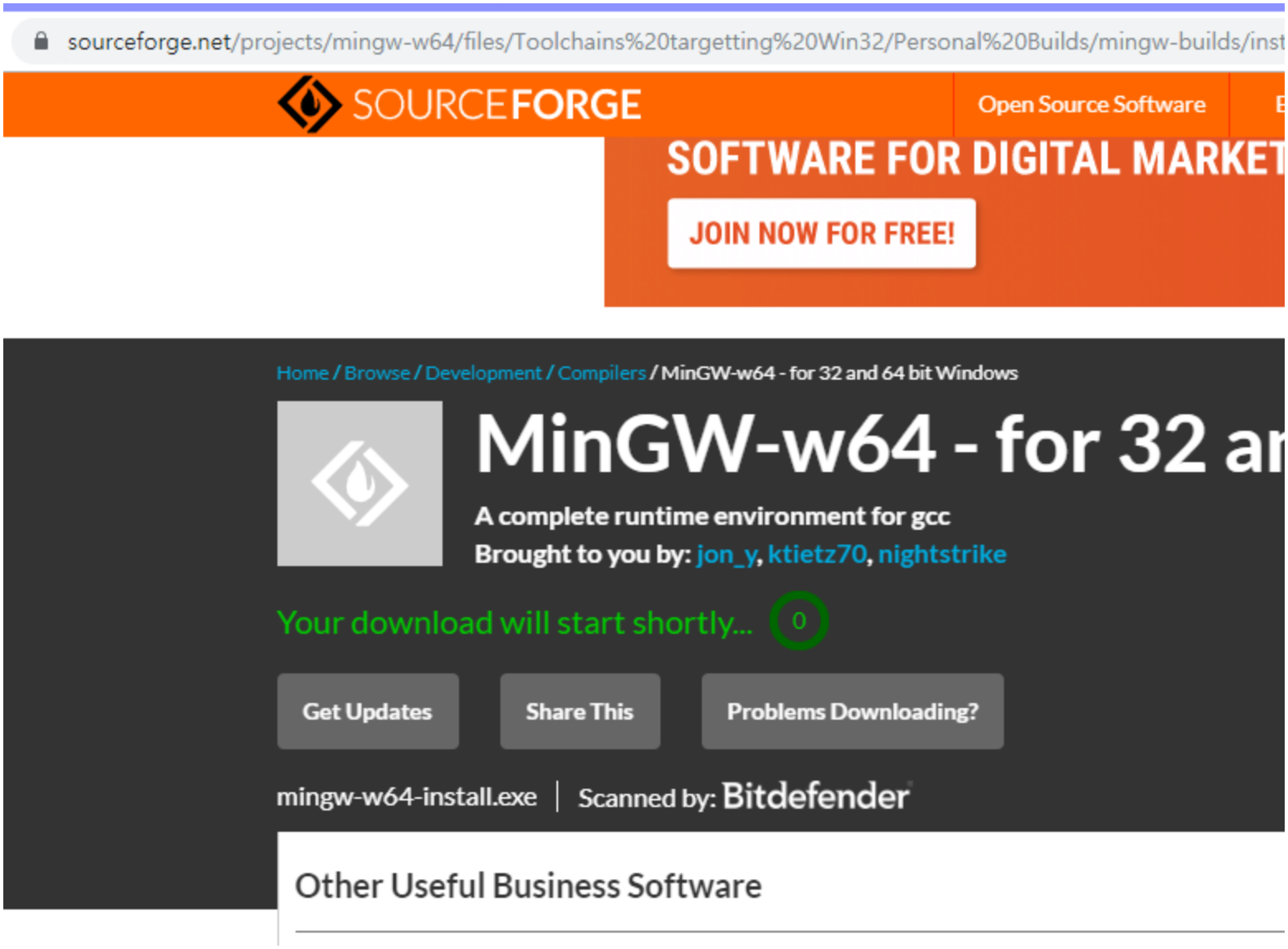
hello.c | app-context.xml | application.yaml | DemoApplication.java | build.gradle

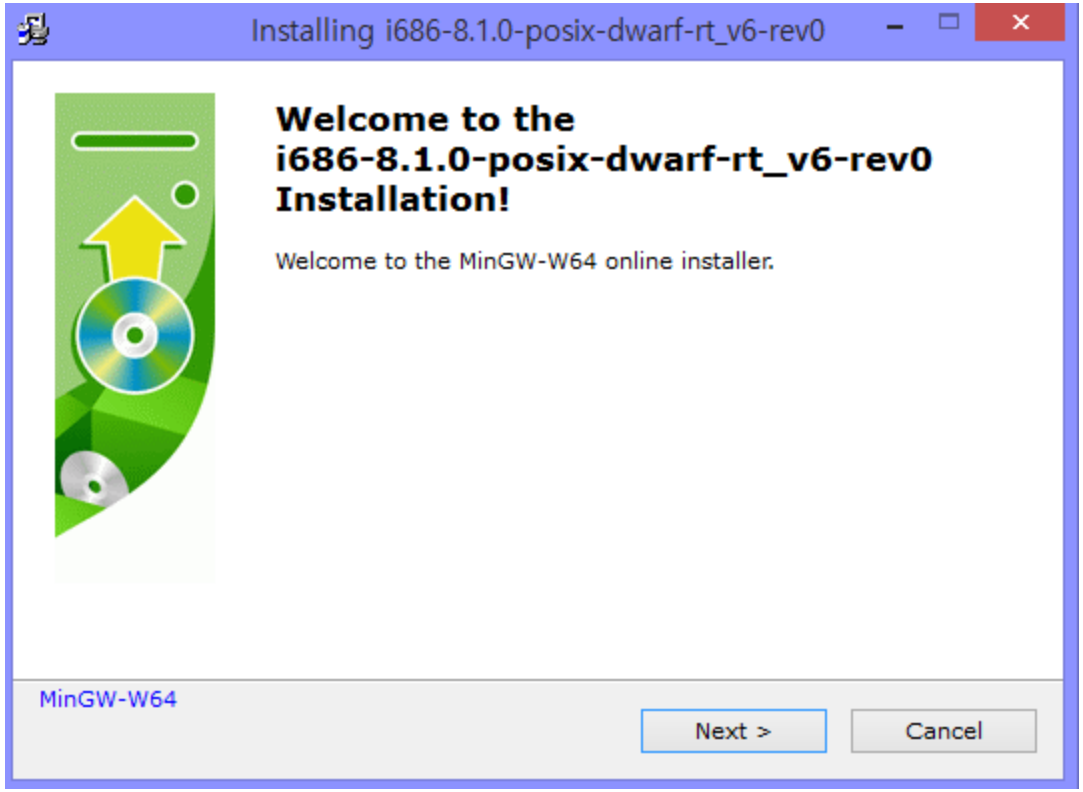
```c
#include <jni.h>
#include <stdio.h>

JNIEXPORT void JNICALL
Java_com_example_demo_nativeinterface_HelloSpring_print(JNIEnv *env, jobject obj)
{
    printf("Hello Spring!\n");
    return;
}
```

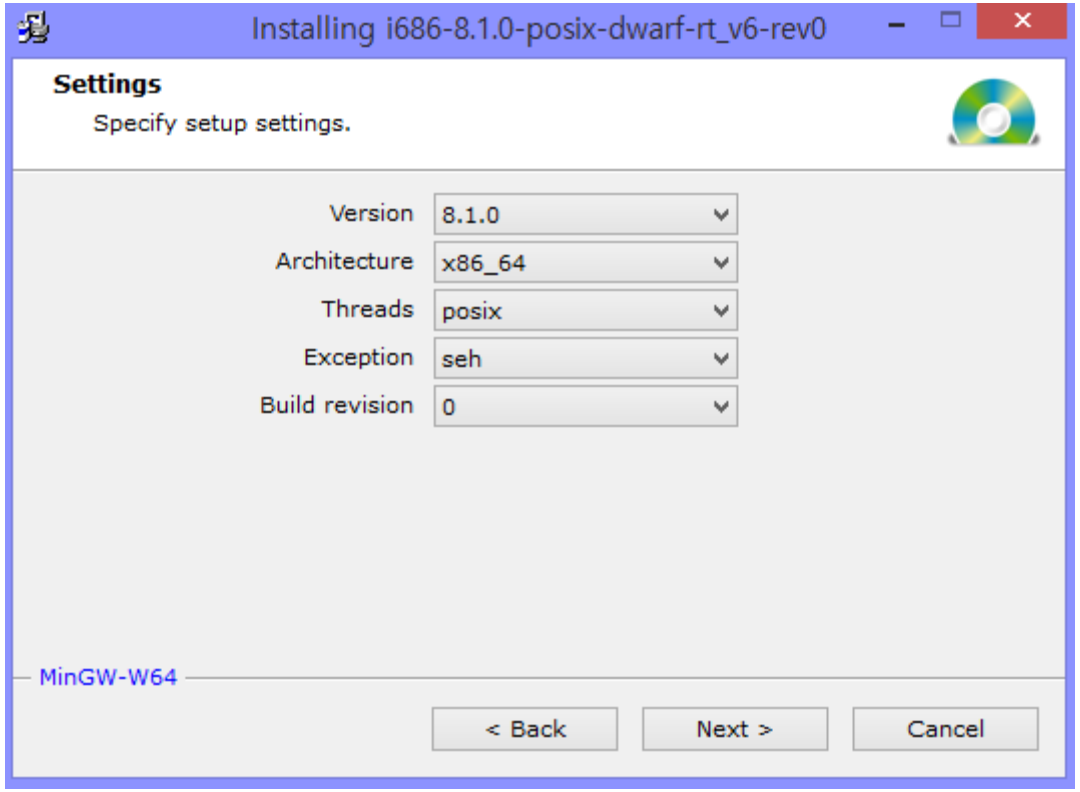
hello.c | app-context.xml | application.yaml | HelloSpring.java | DemoApplication.java | build.gradle | 192.7142.3

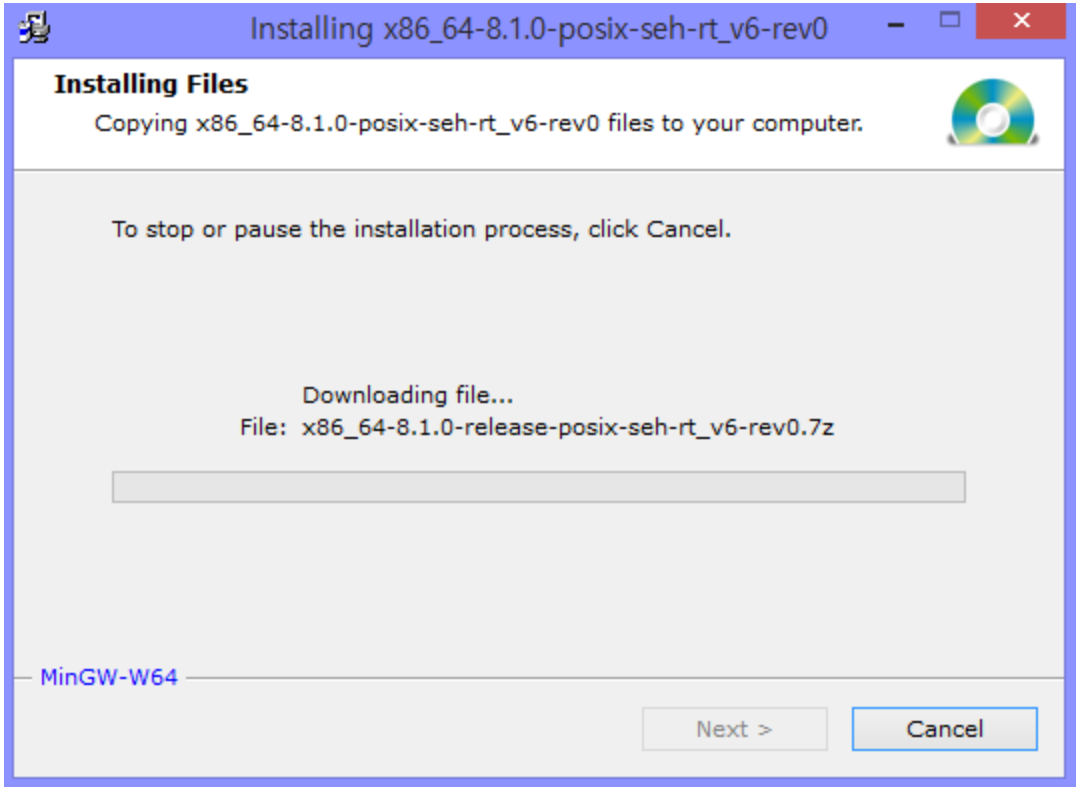
```java
package com.example.demo.nativeinterface;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;

public class HelloSpring {
    private final static Logger logger = LoggerFactory.getLogger(HelloSpring.class);

    public native void print();

    static {
        logger.info("********************************************************************************");
        logger.info("*** Native library initialization sequence beginning.  ");
        logger.info("*** java.library.path: " + System.getProperty("java.library.path"));

        try {
            System.loadLibrary("hello");
        } catch (Exception e) {
            logger.error("********************************************************************************");
            logger.error("*** Failed to load JNI bridge library: ", e);
            logger.error("********************************************************************************");
        }
    }
}
```

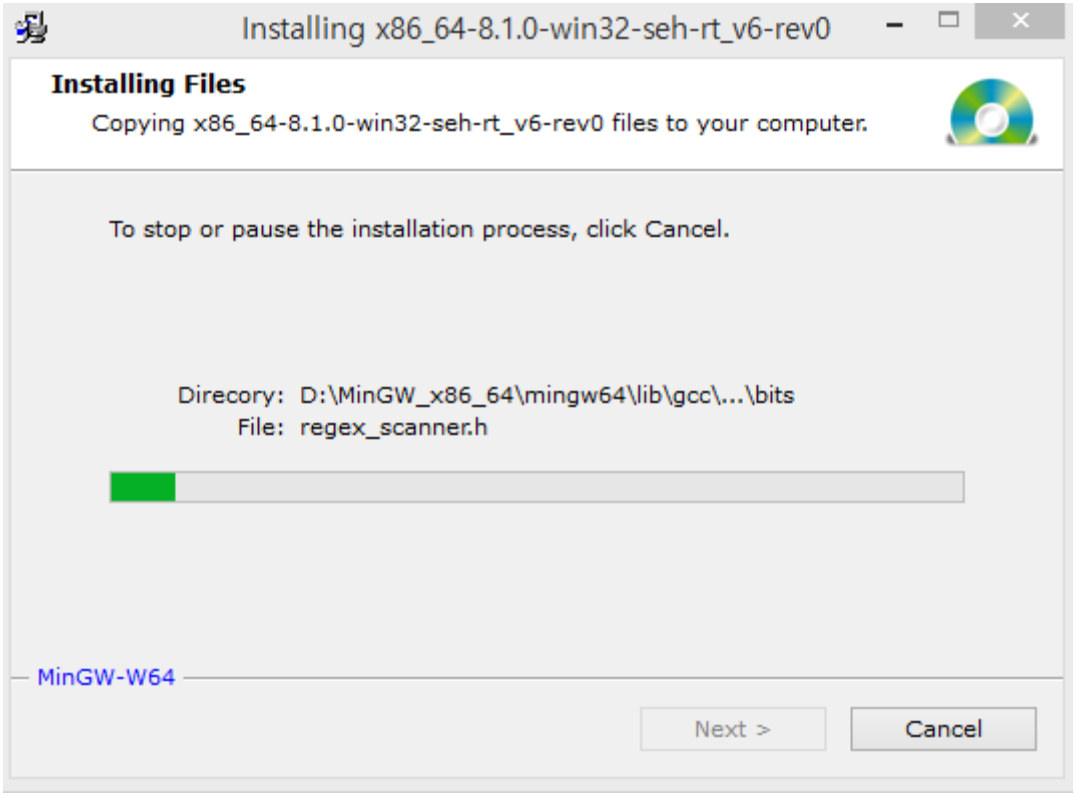

hello.c
app-context.xml
application.yaml
HelloSpring.java
DemoApplication.java
package com.example.demo;
import ...
@SpringBootApplication
public class DemoApplication {
public static void main(String[] args) {
HelloSpring hs = new HelloSpring();
hs.print();
SpringApplication.run(DemoApplication.class, args);
}
}

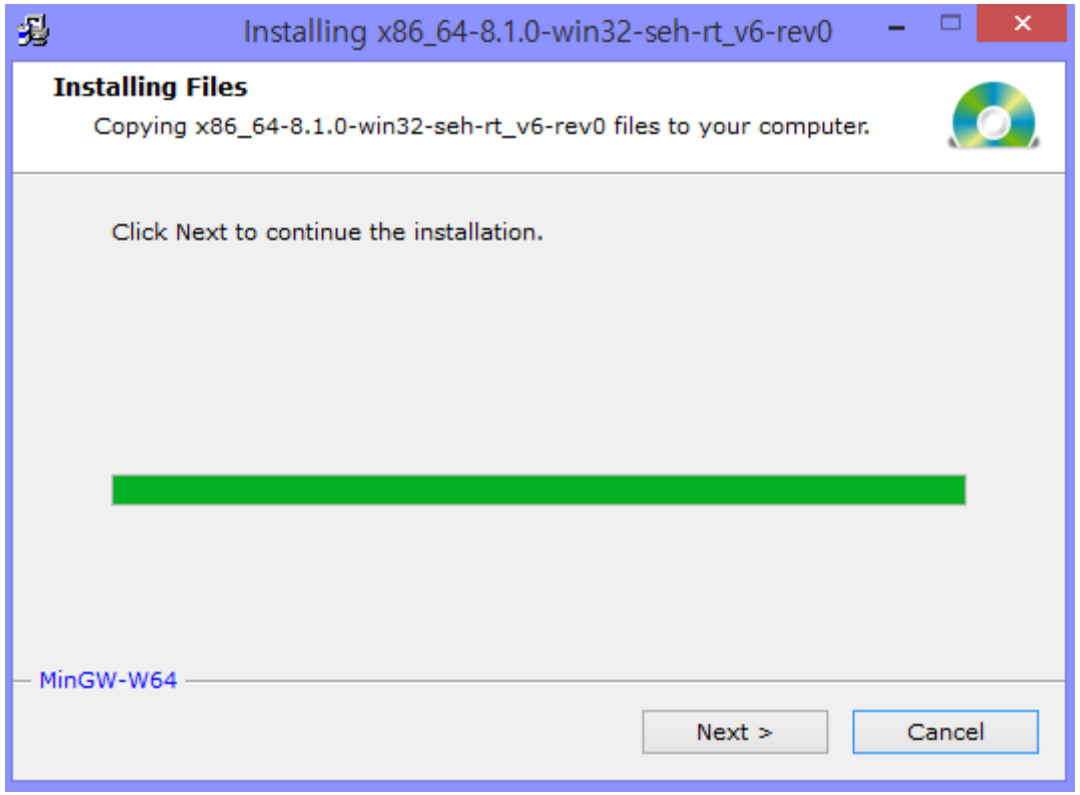

sourceforge.net/projects/mingw-w64/files/Toolchains%20targetting%20Win32/Personal%20Builds/mingw-builds/inst
SOURCEFORGE
Open Source Software
SOFTWARE FOR DIGITAL MARKET
JOIN NOW FOR FREE!
Home / Browse / Development / Compilers / MinGW-w64 - for 32 and 64 bit Windows
MinGW-w64 - for 32 ar
A complete runtime environment for gcc
Brought to you by: jon_y, ktietz70, nightstrike
Your download will start shortly...
0
Get Updates
Share This
Problems Downloading?
mingw-w64-install.exe | Scanned by: Bitdefender
Other Useful Business Software

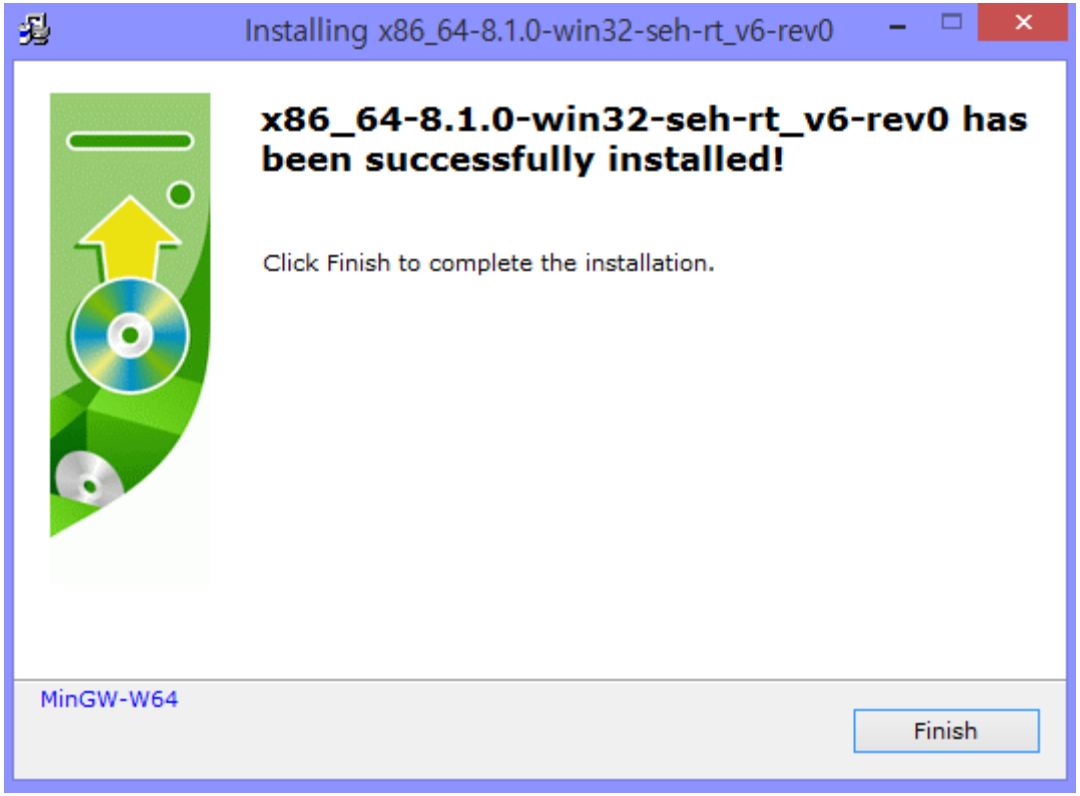

Installing i686-8.1.0-posix-dwarf-rt_v6-rev0
Welcome to the i686-8.1.0-posix-dwarf-rt_v6-rev0 Installation!
Welcome to the MinGW-W64 online installer.
MinGW-W64
Next >
Cancel

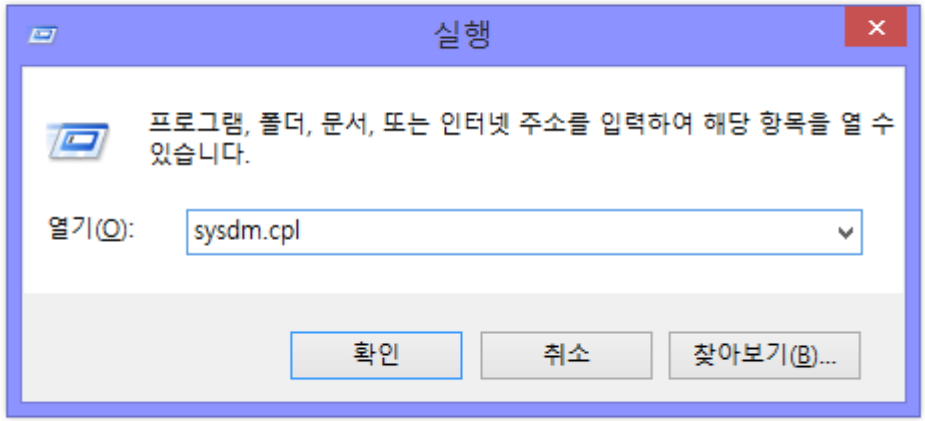

Installing i686-8.1.0-posix-dwarf-rt_v6-rev0
Settings
Specify setup settings.
Version
8.1.0
Architecture
x86_64
Threads
posix
Exception
seh
Build revision
0
MinGW-W64
< Back
Next >
Cancel

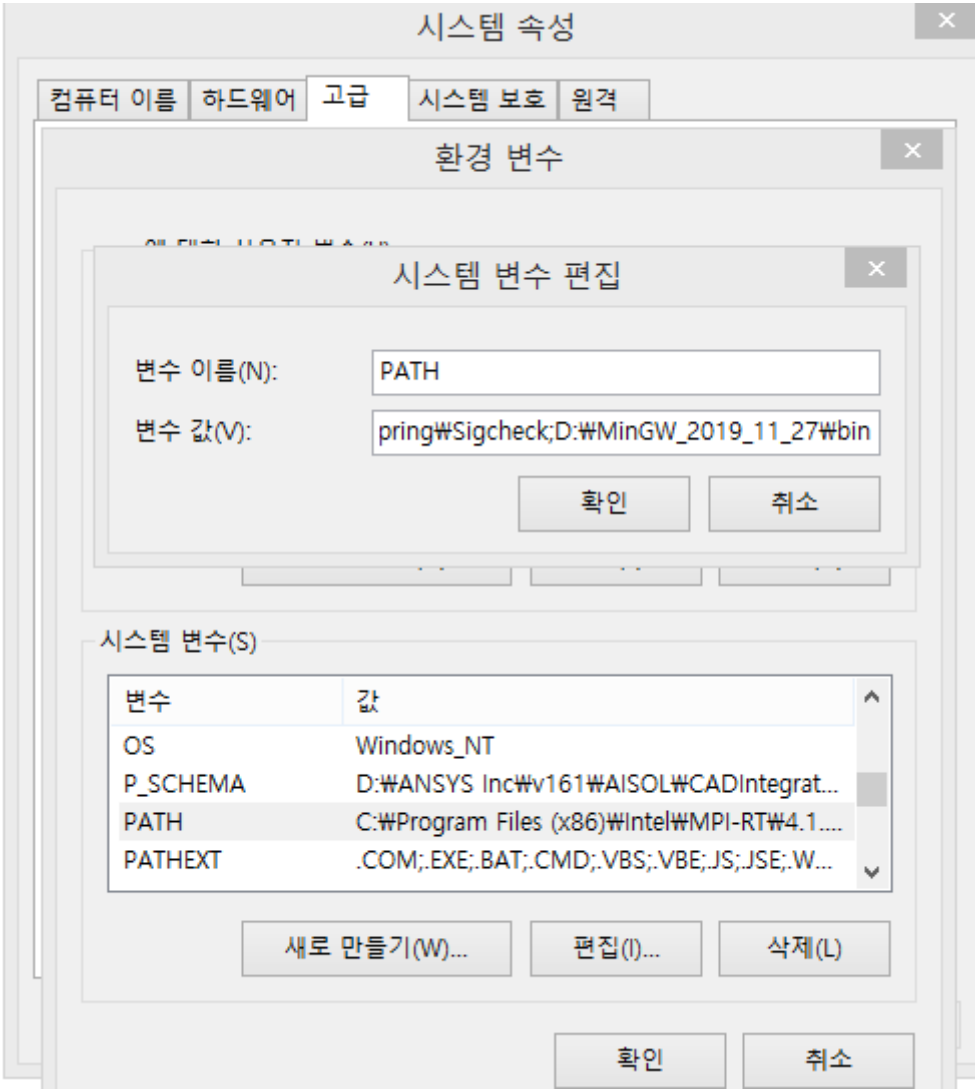

Installing x86_64-8.1.0-posix-seh-rt_v6-rev0
Installing Files
Copying x86_64-8.1.0-posix-seh-rt_v6-rev0 files to your computer.
To stop or pause the installation process, click Cancel.
Downloading file...
File: x86_64-8.1.0-release-posix-seh-rt_v6-rev0.7z
MinGW-W64
Next >
Cancel

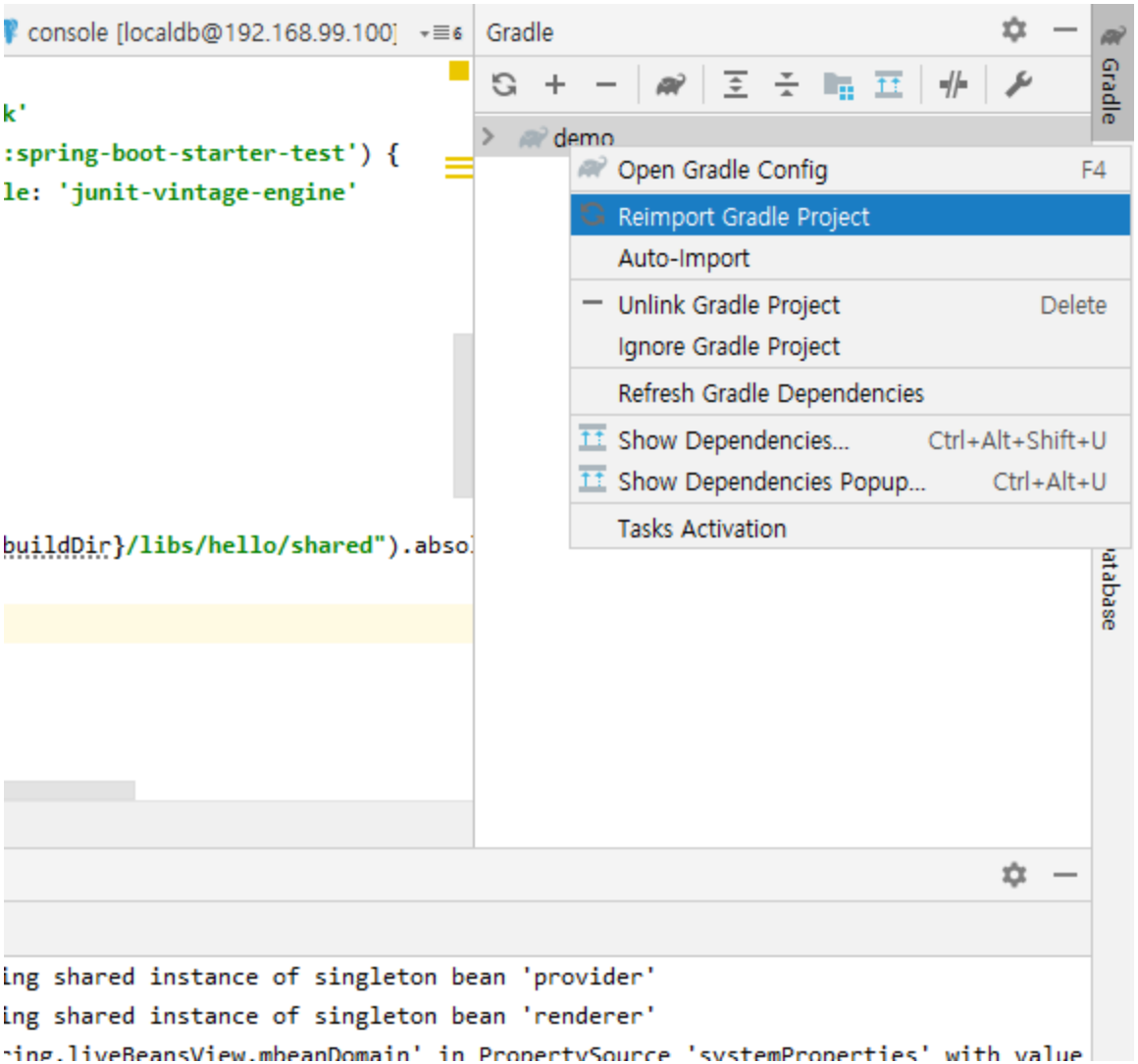

Installing x86_64-8.1.0-win32-seh-rt_v6-rev0
Installing Files
Copying x86_64-8.1.0-win32-seh-rt_v6-rev0 files to your computer.
To stop or pause the installation process, click Cancel.
Direcory: D:\MinGW_x86_64\mingw64\lib\gcc\...\bits
File: regex_scanner.h
MinGW-W64
Next >
Cancel

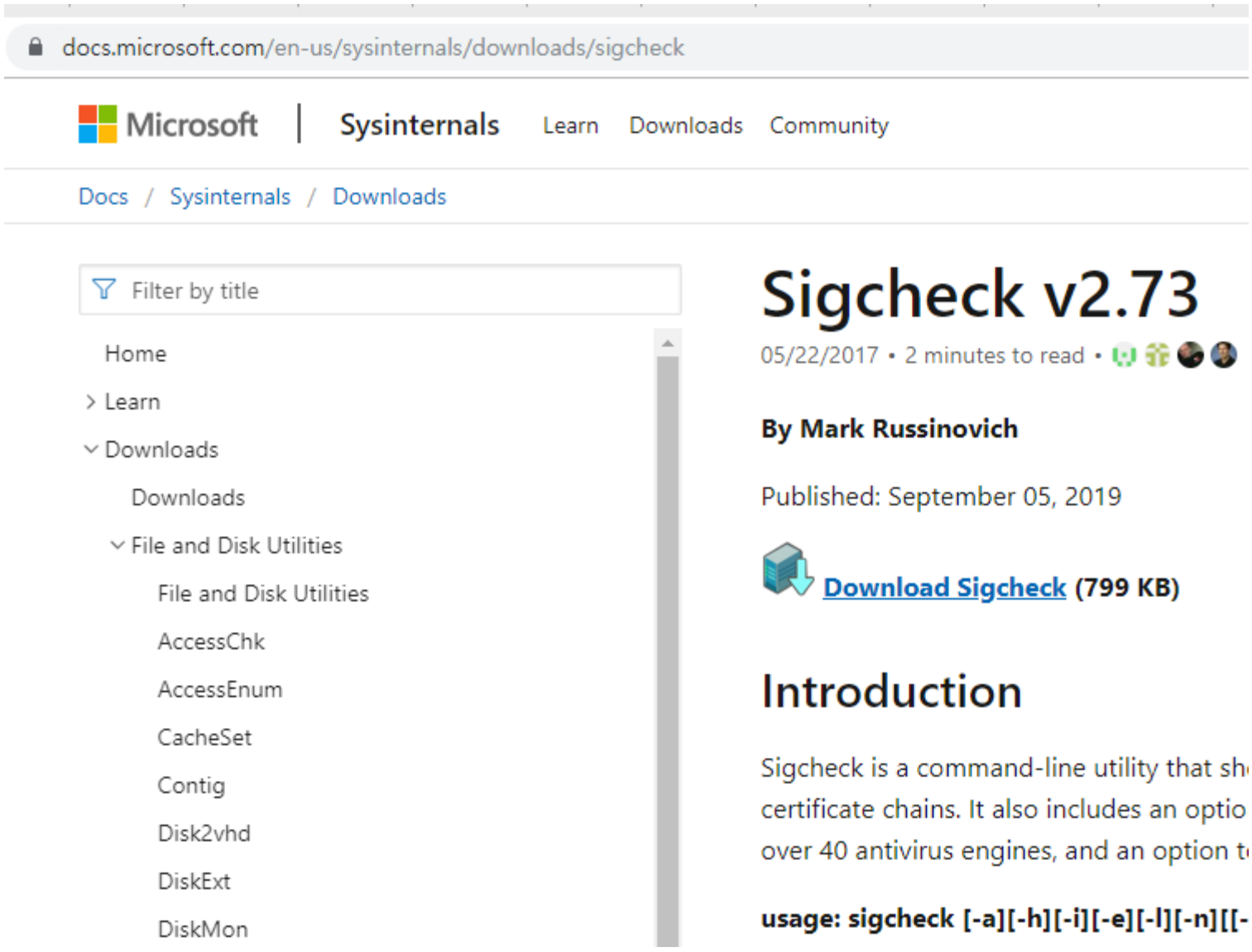

Installing x86_64-8.1.0-win32-seh-rt_v6-rev0
Installing Files
Copying x86_64-8.1.0-win32-seh-rt_v6-rev0 files to your computer.
Click Next to continue the installation.
MinGW-W64
Next >
Cancel

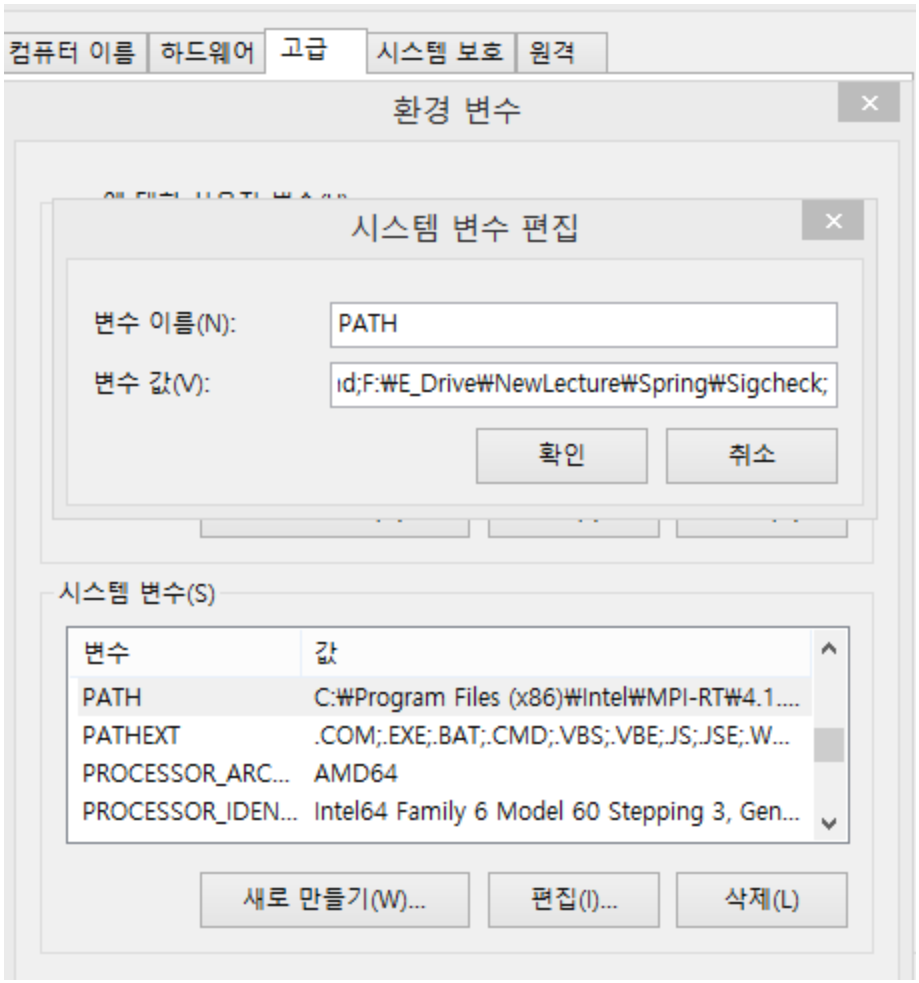

Installing x86_64-8.1.0-win32-seh-rt_v6-rev0
x86_64-8.1.0-win32-seh-rt_v6-rev0 has been successfully installed!
Click Finish to complete the installation.
MinGW-W64
Finish

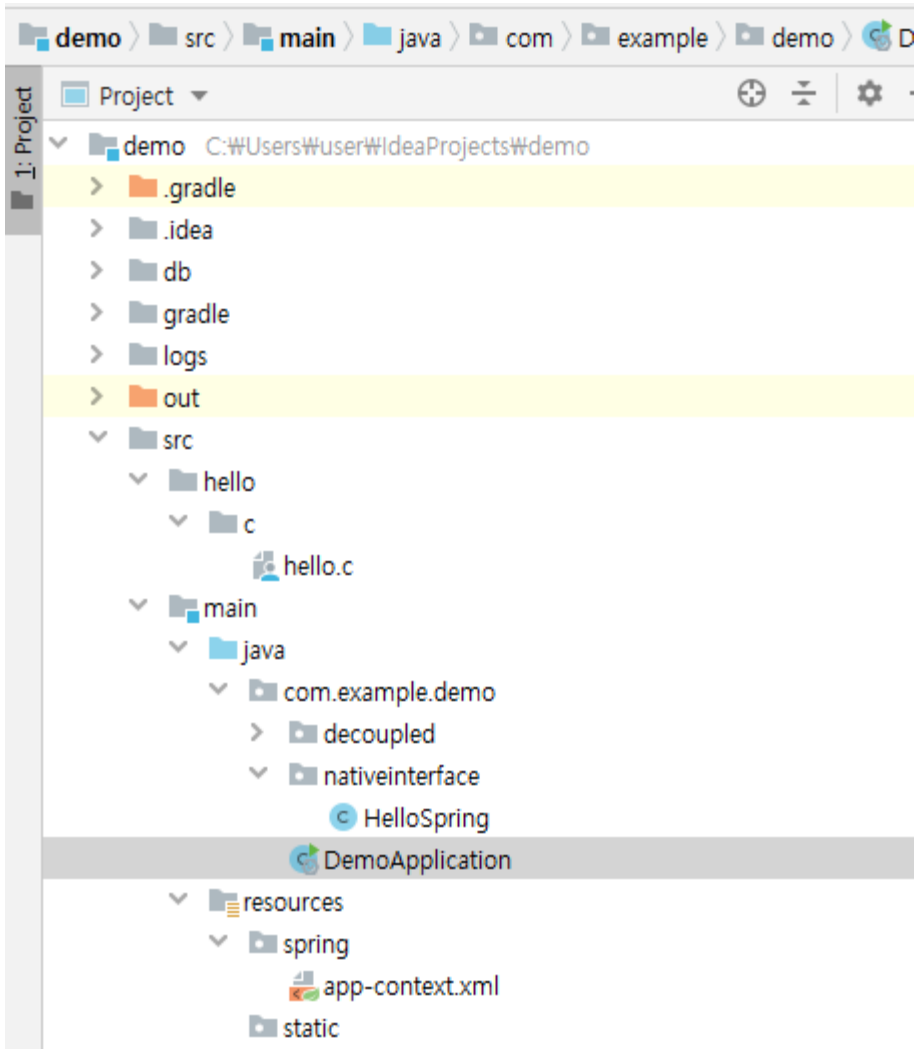

실행
프로그램, 폴더, 문서, 또는 인터넷 주소를 입력하여 해당 항목을 열 수 있습니다.
열기(O):
sysdm.cpl
확인
취소
찾아보기(B)...

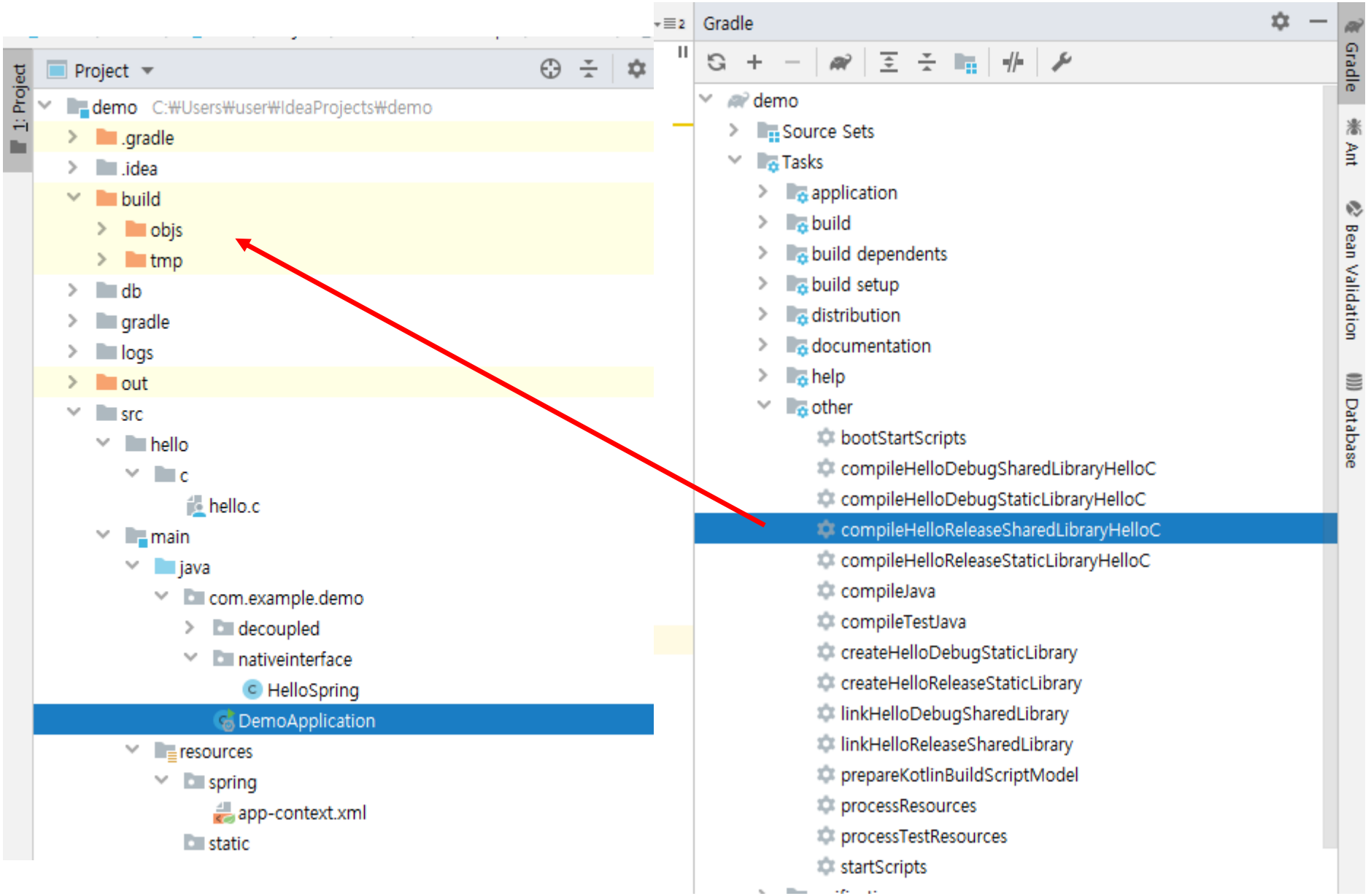

시스템 속성
컴퓨터 이름
하드웨어
고급
시스템 보호
원격
환경 변수
시스템 변수 편집
변수 이름(N):
PATH
변수 값(V):
pring₩Sigcheck;D:₩MinGW_2019_11_27₩bin
확인
취소
시스템 변수(S)
변수
값
OS
Windows_NT
P_SCHEMA
D:₩ANSYS Inc₩v161₩AISOL₩CADIntegrat...
PATH
C:₩Program Files (x86)₩Intel₩MPI-RT₩4.1....
PATHEXT
.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.W...
새로 만들기(W)...
편집(I)...
삭제(L)
확인
취소

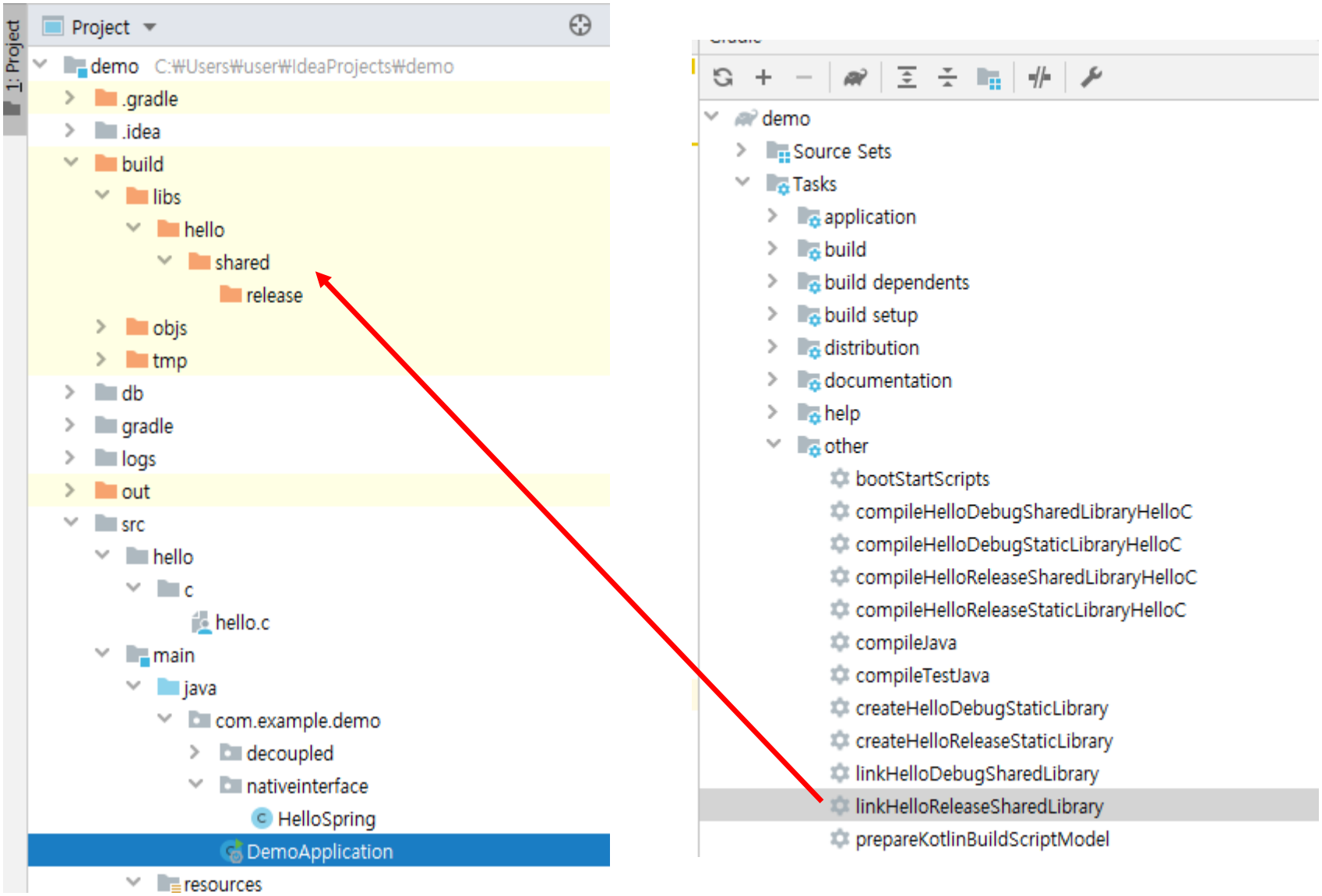

console [localdb@192.168.99.100]
k'
:spring-boot-starter-test') {
le: 'junit-vintage-engine'
buildDir}/libs/hello/shared").abso
Gradle
demo
Open Gradle Config F4
Reimport Gradle Project
Auto-Import
Unlink Gradle Project Delete
Ignore Gradle Project
Refresh Gradle Dependencies
Show Dependencies... Ctrl+Alt+Shift+U
Show Dependencies Popup... Ctrl+Alt+U
Tasks Activation
Gradle
atabase
ing shared instance of singleton bean 'provider'
ing shared instance of singleton bean 'renderer'
ing.liveBeansView.mbeanDomain' in PropertySource 'systemProperties' with value


docs.microsoft.com/en-us/sysinternals/downloads/sigcheck
Microsoft | Sysinternals Learn Downloads Community
Docs / Sysinternals / Downloads
Filter by title
Home
Learn
Downloads
Downloads
File and Disk Utilities
File and Disk Utilities
AccessChk
AccessEnum
CacheSet
Contig
Disk2vhd
DiskExt
DiskMon
Sigcheck v2.73
05/22/2017 • 2 minutes to read •
By Mark Russinovich
Published: September 05, 2019
Download Sigcheck (799 KB)
Introduction
Sigcheck is a command-line utility that sh
certificate chains. It also includes an optio
over 40 antivirus engines, and an option t
usage: sigcheck [-a][-h][-i][-e][-l][-n][[-


컴퓨터 이름
하드웨어
고급
시스템 보호
원격
환경 변수
시스템 변수 편집
변수 이름(N):
PATH
변수 값(V):
ıd;F:₩E_Drive₩NewLecture₩Spring₩Sigcheck;
확인
취소
시스템 변수(S)
변수
값
PATH
C:₩Program Files (x86)₩Intel₩MPI-RT₩4.1....
PATHEXT
.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.W...
PROCESSOR_ARC...
AMD64
PROCESSOR_IDEN...
Intel64 Family 6 Model 60 Stepping 3, Gen...
새로 만들기(W)...
편집(I)...
삭제(L)


demo
src
main
java
com
example
demo
D
1: Project
Project
demo C:₩Users₩user₩IdeaProjects₩demo
.gradle
.idea
db
gradle
logs
out
src
hello
c
hello.c
main
java
com.example.demo
decoupled
nativeinterface
HelloSpring
DemoApplication
resources
spring
app-context.xml
static


Project
demo C:₩Users₩user₩IdeaProjects₩demo
.gradle
.idea
build
objs
tmp
db
gradle
logs
out
src
hello
c
hello.c
main
java
com.example.demo
decoupled
nativeinterface
HelloSpring
DemoApplication
resources
spring
app-context.xml
static
Gradle
demo
Source Sets
Tasks
application
build
build dependents
build setup
distribution
documentation
help
other
bootStartScripts
compileHelloDebugSharedLibraryHelloC
compileHelloDebugStaticLibraryHelloC
compileHelloReleaseSharedLibraryHelloC
compileHelloReleaseStaticLibraryHelloC
compileJava
compileTestJava
createHelloDebugStaticLibrary
createHelloReleaseStaticLibrary
linkHelloDebugSharedLibrary
linkHelloReleaseSharedLibrary
prepareKotlinBuildScriptModel
processResources
processTestResources
startScripts
1: Project
Gradle
Ant
Bean Validation
Database


1: Project
Project
demo C:₩Users₩user₩IdeaProjects₩demo
.gradle
.idea
build
libs
hello
shared
release
objs
tmp
db
gradle
logs
out
src
hello
c
hello.c
main
java
com.example.demo
decoupled
nativeinterface
HelloSpring
DemoApplication
resources
demo
Source Sets
Tasks
application
build
build dependents
build setup
distribution
documentation
help
other
bootStartScripts
compileHelloDebugSharedLibraryHelloC
compileHelloDebugStaticLibraryHelloC
compileHelloReleaseSharedLibraryHelloC
compileHelloReleaseStaticLibraryHelloC
compileJava
compileTestJava
createHelloDebugStaticLibrary
createHelloReleaseStaticLibrary
linkHelloDebugSharedLibrary
linkHelloReleaseSharedLibrary
prepareKotlinBuildScriptModel

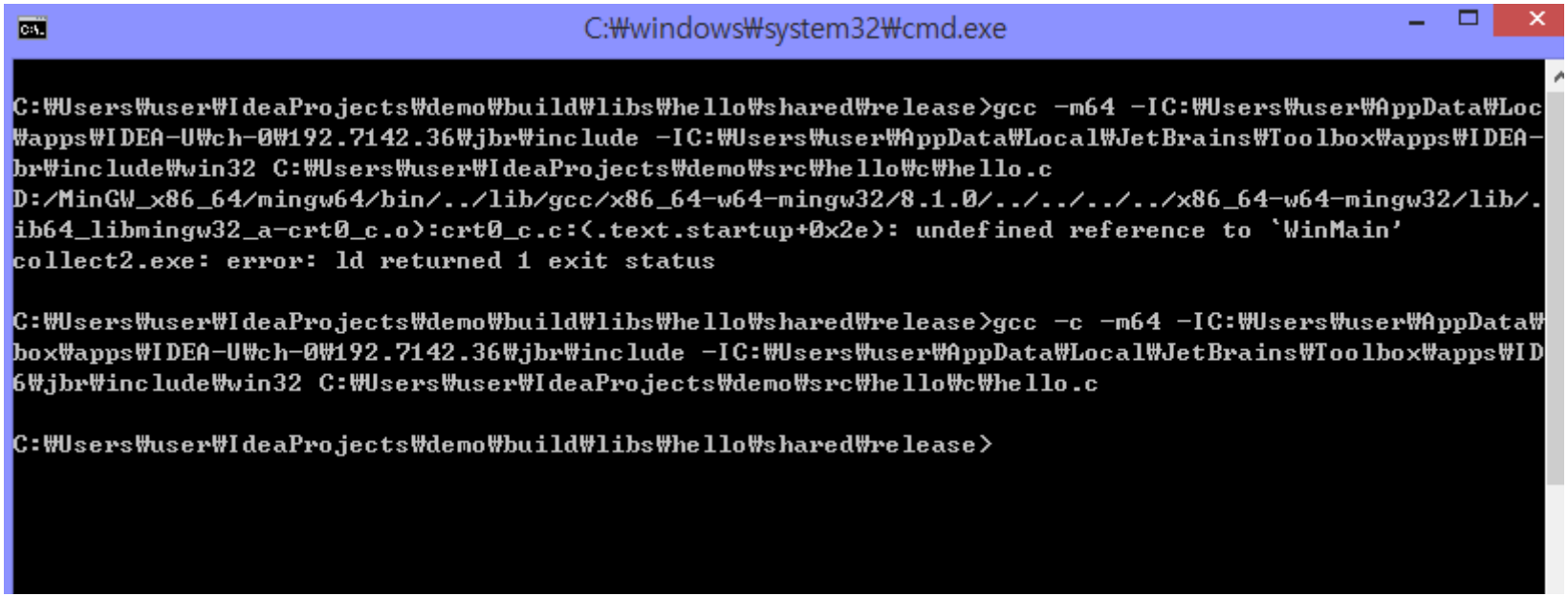
55.2. Tool chain support

Gradle offers the ability to execute the same build using different tool chains. When you build
"Tool chains" for details.

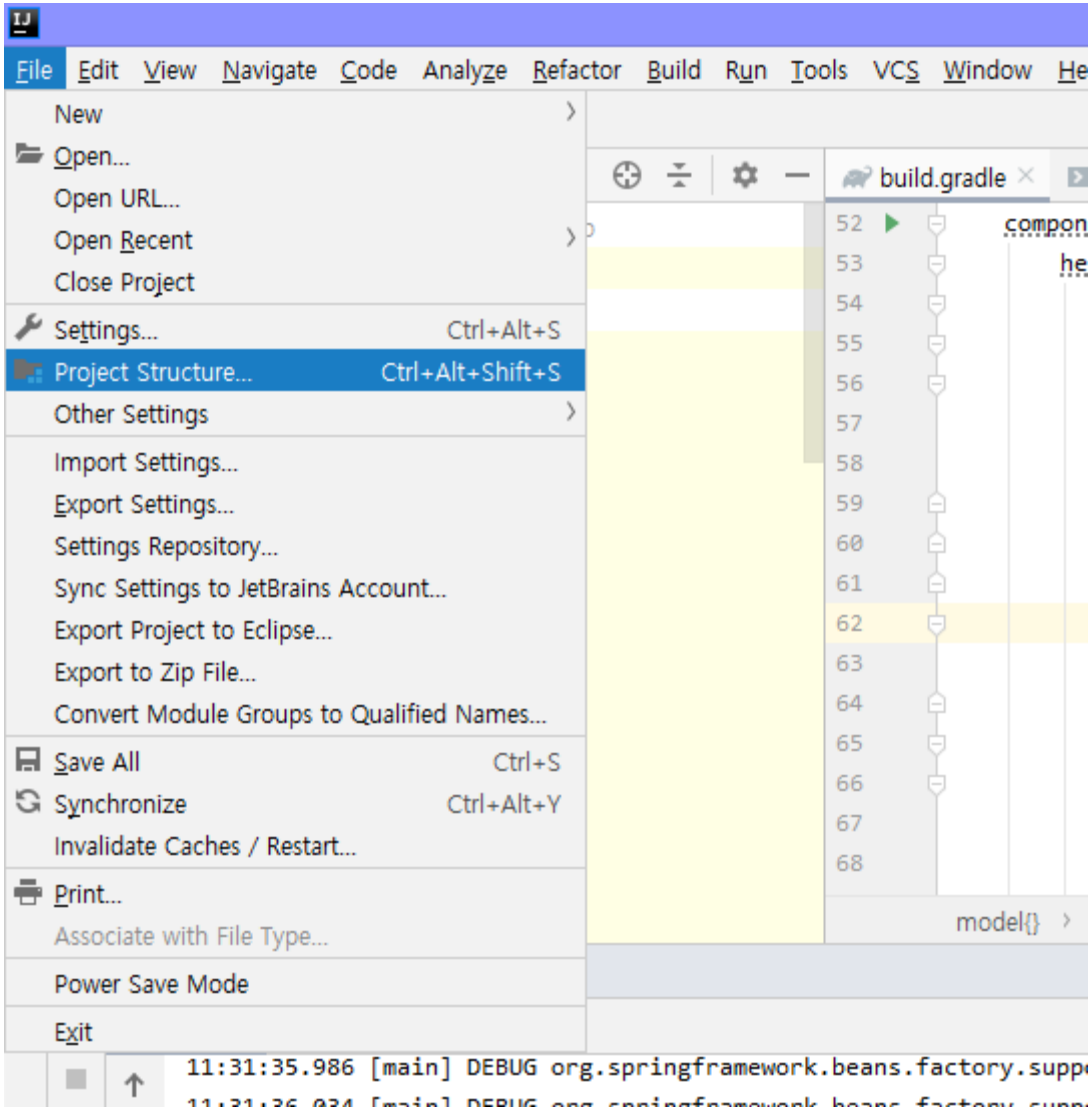
The following tool chains are supported:

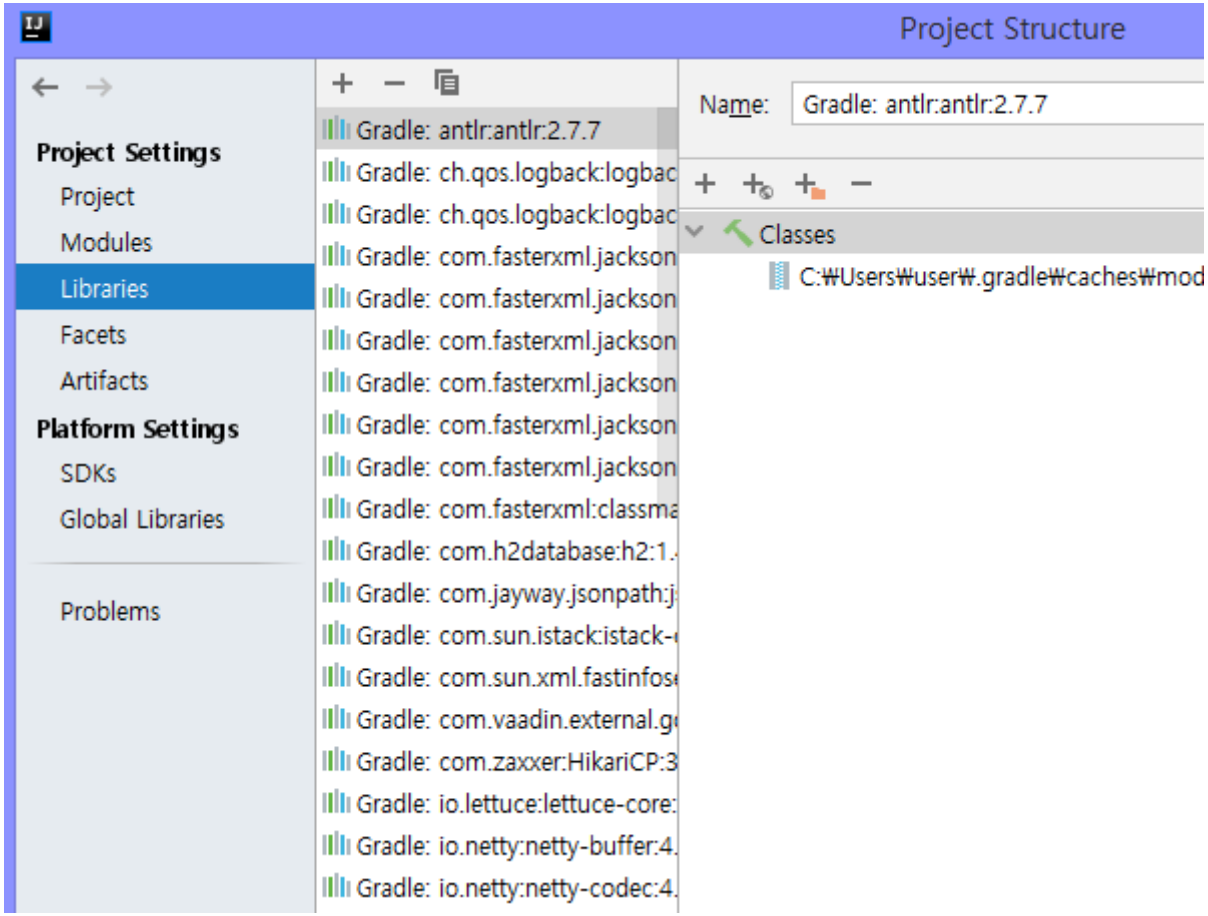
Operating System	Tool Chain	Notes
Linux	GCC	
Linux	Clang	
Mac OS X	XCode	Uses the Clang tool chain bundled wit
Windows	Visual C++	Windows XP and later, Visual C++ 20
Windows	GCC with Cywin 32	Windows XP and later.
Windows	GCC with MinGW	Windows XP and later. Mingw-w64 is

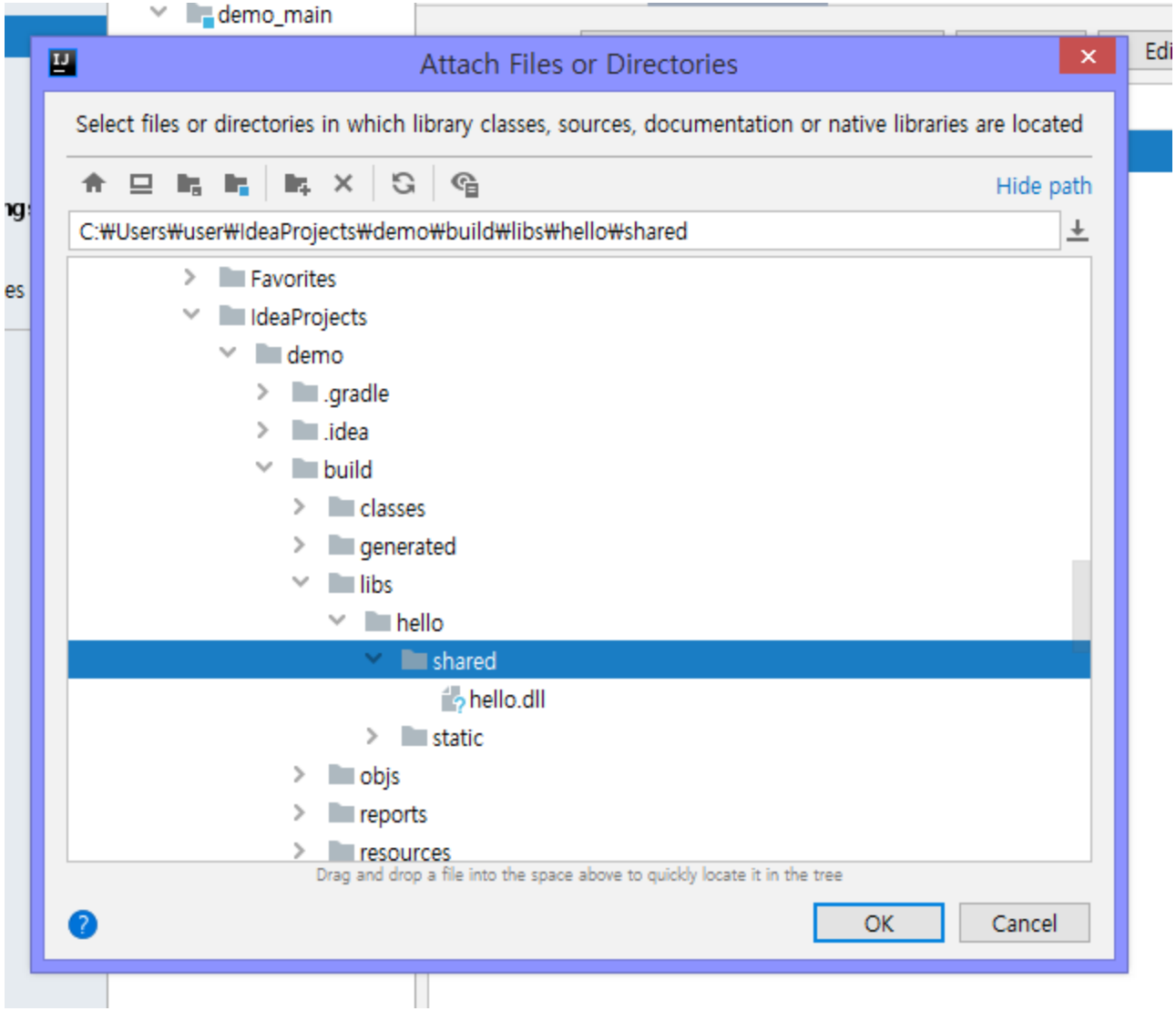
본인의 경로에 맞게 작성해야함

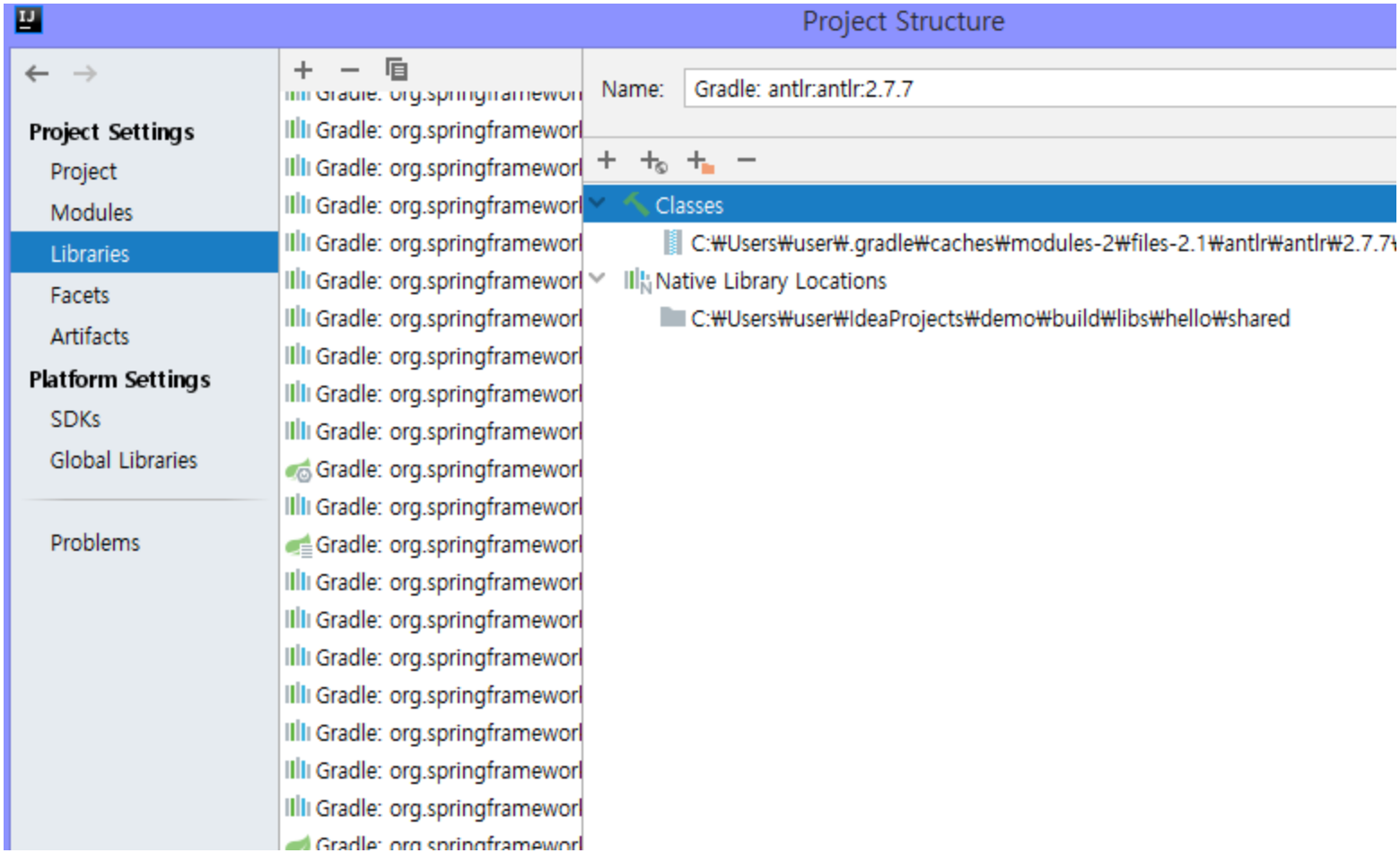


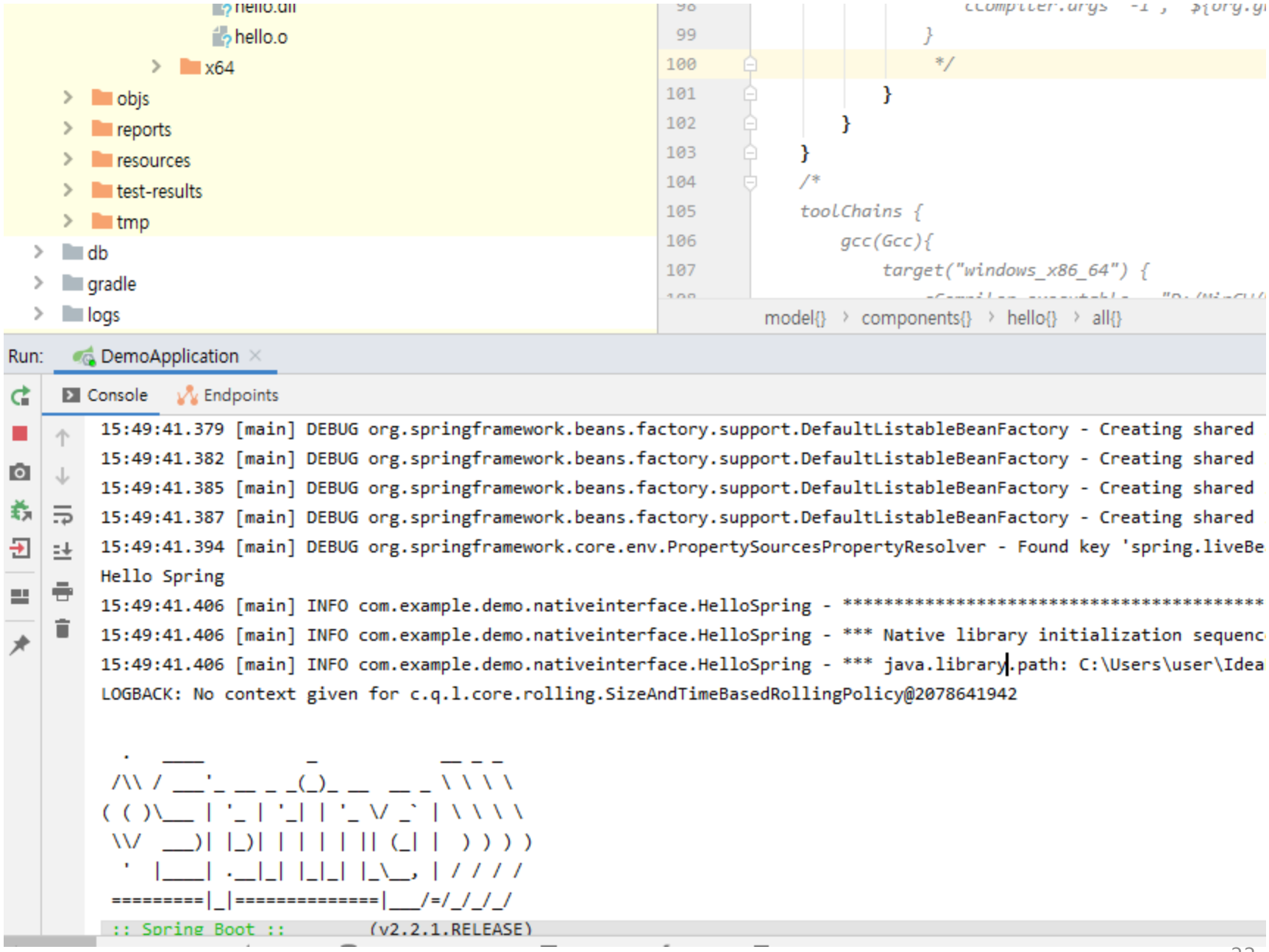
```
C:\Users\user\IdeaProjects\demo\build\libs\hello\shared\release>gcc -shared -o hello.dll hello.o

C:\Users\user\IdeaProjects\demo\build\libs\hello\shared\release>dir
 C 드라이브의 볼륨에는 이름이 없습니다.
 볼륨 일련 번호: EA43-F6F0

 C:\Users\user\IdeaProjects\demo\build\libs\hello\shared\release 디렉터리

2019-11-27  오후 03:49    <DIR>          .
2019-11-27  오후 03:49    <DIR>          ..
2019-11-27  오후 03:49            48,055 hello.dll
2019-11-27  오후 03:47             1,070 hello.o
               2개 파일              49,125 바이트
               2개 디렉터리  16,677,482,496 바이트 남음

C:\Users\user\IdeaProjects\demo\build\libs\hello\shared\release>sigcheck.exe hello.dll

Sigcheck v2.73 - File version and signature viewer
Copyright (C) 2004-2019 Mark Russinovich
Sysinternals - www.sysinternals.com

C:\Users\user\IdeaProjects\demo\build\libs\hello\shared\release\hello.dll:
        Verified:       Unsigned
        Link date:      ?? 3:49 2019-11-27
        Publisher:      n/a
        Company:        n/a
        Description:    n/a
        Product:        n/a
        Prod version:   n/a
        File version:   n/a
        MachineType:    64-bit

C:\Users\user\IdeaProjects\demo\build\libs\hello\shared\release>
```


File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window He
New
Open...
Open URL...
Open Recent
Close Project
Settings... Ctrl+Alt+S
Project Structure... Ctrl+Alt+Shift+S
Other Settings
Import Settings...
Export Settings...
Settings Repository...
Sync Settings to JetBrains Account...
Export Project to Eclipse...
Export to Zip File...
Convert Module Groups to Qualified Names...
Save All Ctrl+S
Synchronize Ctrl+Alt+Y
Invalidate Caches / Restart...
Print...
Associate with File Type...
Power Save Mode
Exit
build.gradle
model{}
11:31:35.986 [main] DEBUG org.springframework.beans.factory.supp


Project Structure
Project Settings
Project
Modules
Libraries
Facets
Artifacts
Platform Settings
SDKs
Global Libraries
Problems
Gradle: antlr:antlr:2.7.7
Gradle: ch.qos.logback:logbac
Gradle: ch.qos.logback:logbac
Gradle: com.fasterxml.jackson
Gradle: com.fasterxml.jackson
Gradle: com.fasterxml.jackson
Gradle: com.fasterxml.jackson
Gradle: com.fasterxml.jackson
Gradle: com.fasterxml.jackson
Gradle: com.fasterxml:classma
Gradle: com.h2database:h2:1.
Gradle: com.jayway.jsonpath:j
Gradle: com.sun.istack:istack-
Gradle: com.sun.xml.fastinfos
Gradle: com.vaadin.external.g
Gradle: com.zaxxer:HikariCP:3
Gradle: io.lettuce:lettuce-core:
Gradle: io.netty:netty-buffer:4.
Gradle: io.netty:netty-codec:4.
Name:
Gradle: antlr:antlr:2.7.7
Classes
C:₩Users₩user₩.gradle₩caches₩mod


demo_main
Attach Files or Directories
Select files or directories in which library classes, sources, documentation or native libraries are located
Hide path
C:₩Users₩user₩IdeaProjects₩demo₩build₩libs₩hello₩shared
Favorites
IdeaProjects
demo
.gradle
.idea
build
classes
generated
libs
hello
shared
hello.dll
static
objs
reports
resources
Drag and drop a file into the space above to quickly locate it in the tree
OK
Cancel


Project Structure
Project Settings
Project
Modules
Libraries
Facets
Artifacts
Platform Settings
SDKs
Global Libraries
Problems
Gradle: org.springframeworl
Name:
Gradle: antlr:antlr:2.7.7
Classes
C:₩Users₩user₩.gradle₩caches₩modules-2₩files-2.1₩antlr₩antlr₩2.7.7
Native Library Locations
C:₩Users₩user₩IdeaProjects₩demo₩build₩libs₩hello₩shared


hello.dll
hello.o
x64
objs
reports
resources
test-results
tmp
db
gradle
logs
}
*/
}
}
}
/*
toolChains {
gcc(Gcc){
target("windows_x86_64") {
model{} › components{} › hello{} › all{}
Run: DemoApplication
Console
Endpoints
15:49:41.379 [main] DEBUG org.springframework.beans.factory.support.DefaultListableBeanFactory - Creating shared
15:49:41.382 [main] DEBUG org.springframework.beans.factory.support.DefaultListableBeanFactory - Creating shared
15:49:41.385 [main] DEBUG org.springframework.beans.factory.support.DefaultListableBeanFactory - Creating shared
15:49:41.387 [main] DEBUG org.springframework.beans.factory.support.DefaultListableBeanFactory - Creating shared
15:49:41.394 [main] DEBUG org.springframework.core.env.PropertySourcesPropertyResolver - Found key 'spring.liveBe
Hello Spring
15:49:41.406 [main] INFO com.example.demo.nativeinterface.HelloSpring - **
15:49:41.406 [main] INFO com.example.demo.nativeinterface.HelloSpring - *** Native library initialization sequenc
15:49:41.406 [main] INFO com.example.demo.nativeinterface.HelloSpring - *** java.library.path: C:\Users\user\Idea
LOGBACK: No context given for c.q.l.core.rolling.SizeAndTimeBasedRollingPolicy@2078641942
:: Spring Boot :: (v2.2.1.RELEASE)