

**МИНИСТЕРСТВО ЦИФРОВОГО РАЗВИТИЯ СВЯЗИ И МАССОВЫХ
КОММУНИКАЦИЙ**

Ордена Трудового Красного Знамени

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Кафедра «Математическая кибернетика и информационные технологии»

**Лабораторная работа №1
по дисциплине
«Функциональное программирование»**

Выполнил: студент группы

БВТ2201

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Москва

2025

Цель работы

Установить язык программирования Scala и проверить его работу.

Ход работы

Первым делом глобально устанавливаем на устройство язык Scala.

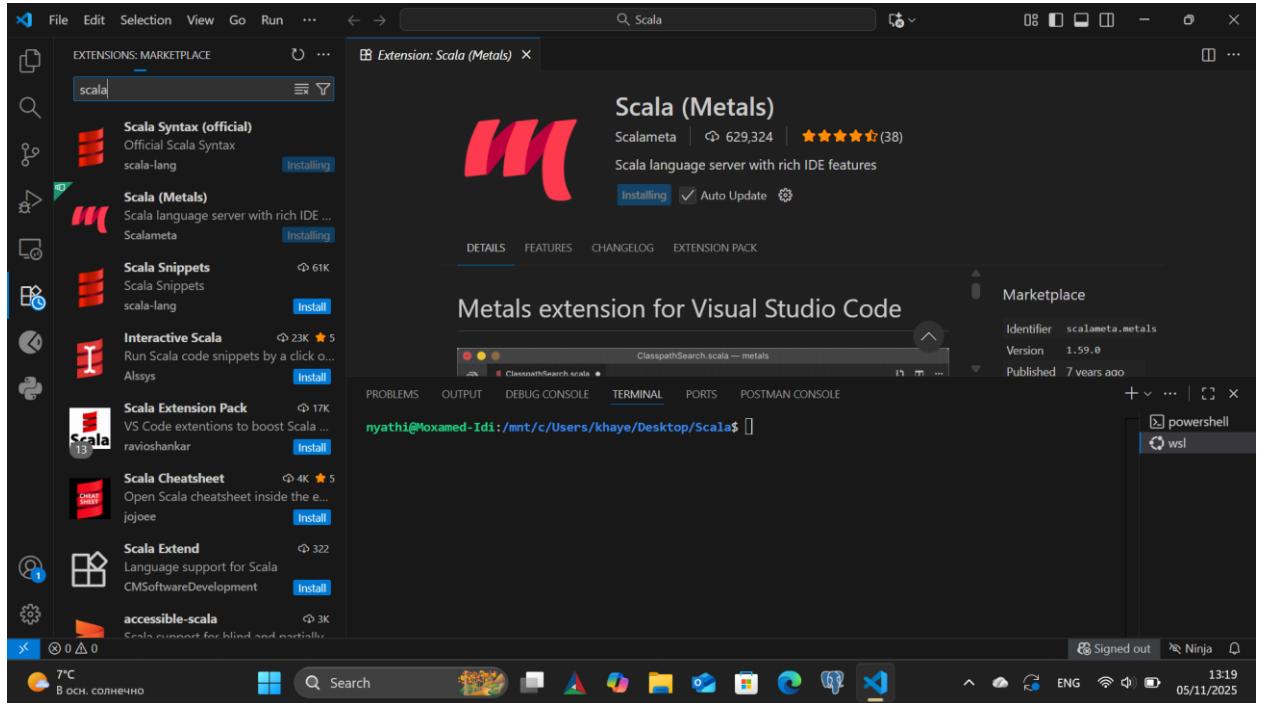


Рис 1. Scala Metals (VS Code)

The screenshot shows the VS Code interface with the following details:

- EXPLORER** sidebar: Shows a project structure under the **SCALA** folder, including `.metals`, `.vscode`, `hello-world-template` (selected), `project`, `src\main\scala` (containing `Main.scala`), and `target`.
- Editor**: The `build.sbt` file is open, displaying its contents:

```
1 // The simplest possible sbt build file is just one line:
2
3
4 scalaVersion := "2.13.12"
5 // That is, to create a valid sbt build, all you've got to do is define the
6 // version of Scala you'd like your project to use.
7
8 // =====
9
10 // Lines like the above defining 'scalaVersion' are called "settings". Settings
11 // are key/value pairs. In the case of 'scalaVersion', the key is "scalaVersion"
```
- TERMINAL**: Shows the command `nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$ sdk install sbt`.
- Bottom Status Bar**: Shows the current file is `Main.scala`, and other status indicators like `Signed out`, `no target`, `Ninja`, and `Prettier`.

Рис 2. Scala Version

The screenshot shows the VS Code interface with the following details:

- EXPLORER** sidebar: Shows a project structure under the **SCALA** folder, including `.metals`, `.vscode`, `hello-world-template` (selected), `project`, `build.properties`, and `src\main\scala` (containing `Main.scala`).
- Editor**: The `Main.scala` file is open, displaying its contents:

```
1 object Main extends App {
2   |   println("Hello, World!")
3 }
```
- TERMINAL**: Shows the command `nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala$ sbt new scala/hello-world.g8` being run, followed by the output of the sbt build process.
- Bottom Status Bar**: Shows the current file is `Main.scala`, and other status indicators like `Signed out`, `no target`, `Ninja`, and `Prettier`.

Рис 3. Установка sbt и запуск приложение

The screenshot shows the Scala IDE interface with the 'Main.scala' file selected in the Explorer view. The terminal window displays the output of the 'sbt about' command, which provides detailed information about the sbt version, Java version, and the Maven repository used for dependencies.

```
hello-world-template > src > main > scala > Main.scala > {} Main
1 object Main extends App {
}
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS POSTMAN CONSOLE
hello-world-template
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala$ cd hello-world-template
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$ sbt about
[info] welcome to sbt 1.11.7 (Ubuntu Java 11.0.24)
[info] loading project definition from /mnt/c/Users/khaye/Desktop/Scala/hello-world-template/project
[info] Updating hello-world-template-build
https://repo1.maven.org/maven2/jline/jline/2.14.6/jline-2.14.6.pom
100.0% [#####] 19.4 KiB (32.4 KiB / s)
[info] Resolved hello-world-template-build dependencies
[info] Fetching artifacts of hello-world-template-build
[info] Fetched artifacts of hello-world-template-build
[info] loading settings for project hello-world-template from build.sbt...
[info] set current project to hello-world (in build file:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template/)
[info] Updating hello-world_2.13
https://repo1.maven.org/maven2/org/scala-lang/scala-library/2.13.12/scala-library-2.13.12.pom
100.0% [#####] 1.6 KiB (11.9 KiB / s)
https://repo1.maven.org/maven2/org/scala-lang/modules/scala-parser-combinators_2.13/2.3.0/scala-parser-combinators-2.3.0.pom
100.0% [#####] 2.2 KiB (12.9 KiB / s)
[info] Resolved hello-world_2.13 dependencies
[info] Updating hello-world_2.13
https://repo1.maven.org/maven2/org/scala-lang/scala-compiler/2.13.12/scala-compiler-2.13.12.pom
100.0% [#####] 2.5 KiB (28.1 KiB / s)
https://repo1.maven.org/maven2/io/github/java-diff-utils/java-diff-utils/4.12/java-diff-utils-4.12.pom
100.0% [#####] 2.6 KiB (35.7 KiB / s)
https://repo1.maven.org/maven2/org/jline/jline/3.22.0/jline-3.22.0.pom
100.0% [#####] 17.3 KiB (192.1 KiB / s)
https://repo1.maven.org/maven2/net/java/dev/jna/jna/5.13.0/jna-5.13.0.pom
100.0% [#####] 2.0 KiB (13.5 KiB / s)
```

Рис 4. sbt about

The screenshot shows the Scala IDE interface with the 'Main.scala' file selected in the Explorer view. The terminal window displays the output of the 'sbt compile' command, which shows the compilation process of the Scala code into Java bytecode.

```
hello-world-template > src > main > scala > Main.scala > {} Main
1 object Main extends App {
}
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS POSTMAN CONSOLE
hello-world-template
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$ sbt compile
[info] Available Plugins
[info] - sbt.ScriptedPlugin
[info] - sbt.plugins.CorePlugin
[info] - sbt.plugins.Giter8TemplatePlugin
[info] - sbt.plugins.IvyPlugin
[info] - sbt.plugins.JUnitXmlReportPlugin
[info] - sbt.plugins.JvmPlugin
[info] - sbt.plugins.MiniDependencyTreePlugin
[info] - sbt.plugins.SbtPlugin
[info] - sbt.plugins.SbtPlugins
[info] - sbt.plugins.SemanticdbPlugin
[info] sbt, sbt plugins, and build definitions are using Scala 2.12.20
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$ sbt compile
[info] welcome to sbt 1.11.7 (Ubuntu Java 11.0.24)
[info] loading project definition from /mnt/c/Users/khaye/Desktop/Scala/hello-world-template/project
[info] loading settings for project hello-world-template from build.sbt...
[info] set current project to hello-world (in build file:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template/)
[info] Executing in batch mode. For better performance use sbt's shell
[info] Updating temp-module-bde07663ebf5029c876e7b57097cc1dc9cf60cf3
https://repo1.maven.org/maven2/org/scala-lang/scala2-sbt-bridge/2.13.12/scala2-sbt-bridge-2.13.12.pom
100.0% [#####] 1.9 KiB (3.3 KiB / s)
[info] Resolving temp-module-bde07663ebf5029c876e7b57097cc1dc9cf60cf3
[info] Fetching artifacts of temp-module-bde07663ebf5029c876e7b57097cc1dc9cf60cf3
[info] Fetched artifacts of temp-module-bde07663ebf5029c876e7b57097cc1dc9cf60cf3
[info] compiling 1 Scala source to /mnt/c/Users/khaye/Desktop/Scala/hello-world-template/target/scala-2.13/classes ...
[success] Total time: 6 s, completed Nov 5, 2025, 2:06:45 PM
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$
```

Рис 5. sbt compile

```

Main.scala X
hello-world-template > src > main > scala > Main.scala > {} Main
1 object Main extends App {
[info] - sbt.plugins.SbtPlugin
[info] - sbt.plugins.SemanticdbPlugin
[info] sbt, sbt plugins, and build definitions are using Scala 2.12.20
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$ sbt compile
[info] welcome to sbt 1.11.7 (Ubuntu Java 11.0.24)
[info] loading project definition from /mnt/c/Users/khaye/Desktop/Scala/hello-world-template/project
[info] loading settings for project hello-world-template from build.sbt...
[info] set current project to hello-world (in build file:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template/build.sbt)
[info] Executing in batch mode. For better performance use sbt's shell
[info] Updating temp-module-bde07663ebf5029c076e7b57097cc1dc9cf60cf3
https://repo1.maven.org/maven2/org/scala-lang/scala2-sbt-bridge/2.13.12/scala2-sbt-bridge-2.13.12.pom
100.0% [#####] 1.9 Kib (3.3 Kib / s)
[info] Resolved temp-module-bde07663ebf5029c076e7b57097cc1dc9cf60cf3 dependencies
[info] Fetching artifacts of temp-module-bde07663ebf5029c076e7b57097cc1dc9cf60cf3
[info] Fetched artifacts of temp-module-bde07663ebf5029c076e7b57097cc1dc9cf60cf3
[info] compiling 1 Scala source to /mnt/c/Users/khaye/Desktop/Scala/hello-world-template/target/scala-2.13/classes ...
[success] Total time: 6 s, completed Nov 5, 2025, 2:06:45 PM
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$ sbt run
[info] welcome to sbt 1.11.7 (Ubuntu Java 11.0.24)
[info] loading project definition from /mnt/c/Users/khaye/Desktop/Scala/hello-world-template/project
[info] loading settings for project hello-world-template from build.sbt...
[info] set current project to hello-world (in build file:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template/build.sbt)
[info] running Main
Hello, World!
[success] Total time: 3 s, completed Nov 5, 2025, 2:07:20 PM
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala/hello-world-template$ 

```

Рис 6. Sbt run

```

File Home Insert Draw Design Layout References Mailings Review View
create-scala-project.sh
/mnt/c/Users/khaye/Desktop/Scala
58 }
59
60 # Create project structure
61 create_project_structure() {
62     local project_name=$1
63     local project_dir=$2
64
65     print_message "Creating project structure for '$project_name' in '$project_dir'..."
66
67     # Create directory structure
68     mkdir -p "$project_dir/src/main-scala"
69     mkdir -p "$project_dir/src/test-scala"
70     mkdir -p "$project_dir/project"
71
72     # Create build.sbt
73     cat > "$project_dir/project/build.sbt" << EOF
74 ThisBuild / version := "0.1.0"
75 ThisBuild / scalaVersion := "2.13.12"
76
77 lazy val root = (project in file("."))
78   .settings(
79     name := "$project_name",
80     libraryDependencies += "org.scalatest" %% "scalatest" % "3.2.15" % Test
81   )
82 EOF
83
84 # Create main Scala file
85 cat > "$project_dir/src/main-scala/Main.scala" << EOF
86 object Main {
87   def main(args: Array[String]): Unit = {
88     println("Hello, Scala!")
89     println(s"Running $project_name")
90   }
91
92   // Example functionality
93   val numbers = List(1, 2, 3, 4, 5)
94   val sum = numbers.sum
95   val doubled = numbers.map(_ * 2)

```

Рис 7. Вариант 1_script

The screenshot shows a Scala project structure in the Explorer sidebar. The project root is 'my-project' containing 'src' and 'target'. Under 'src', there are 'main.scala' and 'test\scala'. 'main.scala' contains a Main class, and 'test\scala' contains a MainTest class. The 'PROBLEMS' tab in the bottom left shows a warning about a missing theme icon. The 'TERMINAL' tab displays the output of running 'create-scala-project.sh' in WSL, which installs Scala and creates the project structure.

```
my-project > src > test > scala > MainTest.scala ...
1 import org.scalatest.funsuite.AnyFunSuite
2
3 class MainTest extends AnyFunSuite {
4   test("print should return hello message") {
5     assertEquals("hello", print())
6   }
7 }

** (gedit:4035): WARNING **: 14:25:41.198: Could not load theme icon text-x-generic: Icon 'text-x-generic' not present in theme Yaru

** (gedit:4035): WARNING **: 14:26:15.693: Set document metadata failed: Setting attribute metadata::gedit-position not supported
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala$ chmod +x create-scala-project.sh
nyathi@loxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala$ ./create-scala-project.sh my-project
=====
Scala Project Creator - Variant 1
=====
[INFO] Checking dependencies...
[WARNING] Scala is not installed, but sbt will download it.
[SUCCESS] Dependencies checked
[INFO] Creating project structure for 'my-project' in './my-project'...
[SUCCESS] Project structure created
[INFO] Building project...
[info] Updated file /mnt/c/Users/khaye/Desktop/Scala/my-project/project/build.properties: set sbt.version to 1.11.7
[info] welcome to sbt 1.11.7 (Ubuntu Java 11.0.24)
[info] loading project definition from /mnt/c/Users/khaye/Desktop/Scala/my-project/project
[info] loading settings for project root from build.sbt...
[info] set current project to my-project (in build file:/mnt/c/Users/khaye/Desktop/Scala/my-project/)
[info] Executing in batch mode. For better performance use sbt's shell
[info] Updating my-project_2.13
https://repo1.maven.org/maven2/org/scalatest/scalatest_2.13/3.2.15/scalatest_2.13-3.2.15.pom
100.0% [#####] 4.6 KiB (2.3 KiB / s)
```

Рис 8. Права в скрипте и его запуск

my-project > src > test > scala > MainTest.scala > ...

```
1 import org.scalatest.funsuite.AnyFunSuite
2
3 class MainTest extends AnyFunSuite {
4   test("greet should return hello message") {
5     assertEquals("Hello, world!", greet())
6   }
7 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS POSTMAN CONSOLE

```
[info] set current project to my-project (in build file:/mnt/c/Users/khaye/Desktop/Scala/my-project/)
[info] compiling 1 Scala source to /mnt/c/Users/khaye/Desktop/Scala/my-project/target/scala-2.13/test-classes ...
[info] MainTest:
[info] - greet should return hello message
[info] - sum should calculate correctly
[info] Run completed in 1 second, 130 milliseconds.
[info] Total number of tests run: 2
[info] Suites: completed 1, aborted 0
[info] Tests: succeeded 2, failed 0, canceled 0, ignored 0, pending 0
[info] All tests passed.
[success] Total time: 10 s, completed Nov 5, 2025, 2:28:28 PM
[SUCCESS] Tests passed

[SUCCESS] Project 'my-project' created successfully!
```

Next steps:

```
cd ./my-project
sbt run
sbt test
```

Project location: ./my-project
=====

```
nyathi@Moxamed-Idi:/mnt/c/Users/khaye/Desktop/Scala$
```

Рис 9. Результаты

Вывод

Проделав работу, я установил язык программирования Scala и проверил его работу на примере стандартного кода.