sbt Reference Manual

Contents

Preface

sbt

sbt , sbt , ,

sbt

!

, .sbt ,scopes,

,

sbt !

sbt

sbt , :

- sbt
- hello world
  -
  -
- sbt sbt

- .sbt

, Jar Shell , , macOS,Windows, Linux

sbt , (terminal encoding),HTTP ,JVM

macOS sbt

ZIP TGZ

: ,

Homebrew

```
$ brew install sbt
```

SDKMAN!

```
$ sdk install sbt
```

Windows sbt

ZIP TGZ

Windows

msi

: ,

Scoop

```
$ scoop install sbt
```

Linux sbt

Installing from SDKMAN

To install both JDK and sbt, consider using SDKMAN.

```
$ sdk list java
$ sdk install java 11.0.4.hs-adpt
$ sdk install sbt
```

This has two advantages. 1. It will install the official packaging by AdoptOpenJDK, as opposed to the “mystery meat OpenJDK builds”. 2. It will install `tgz` packaging of sbt that contains all JAR files. (DEB and RPM packages do not to save bandwidth)

ZIP TGZ

Ubuntu Debian

DEB sbt

Ubuntu Debian DEB , DEB , , (`apt-get`,`aptitude`) (Synaptic) `sbt`(, `sudo`)

```
echo "deb https://dl.bintray.com/sbt/debian /" | sudo tee -a /etc/apt/sources.list.d/sbt.list
curl -sL "https://keyserver.ubuntu.com/pks/lookup?op=get&search=0x2EE0EA64E40A89B84B2DF73499
sudo apt-get update
sudo apt-get install sbt
```

sbt Bintray, Bintray APT `sbt`, `aptitude` Synaptic , `System Settings -> Software & Updates -> Other Software`:

Linux RPM

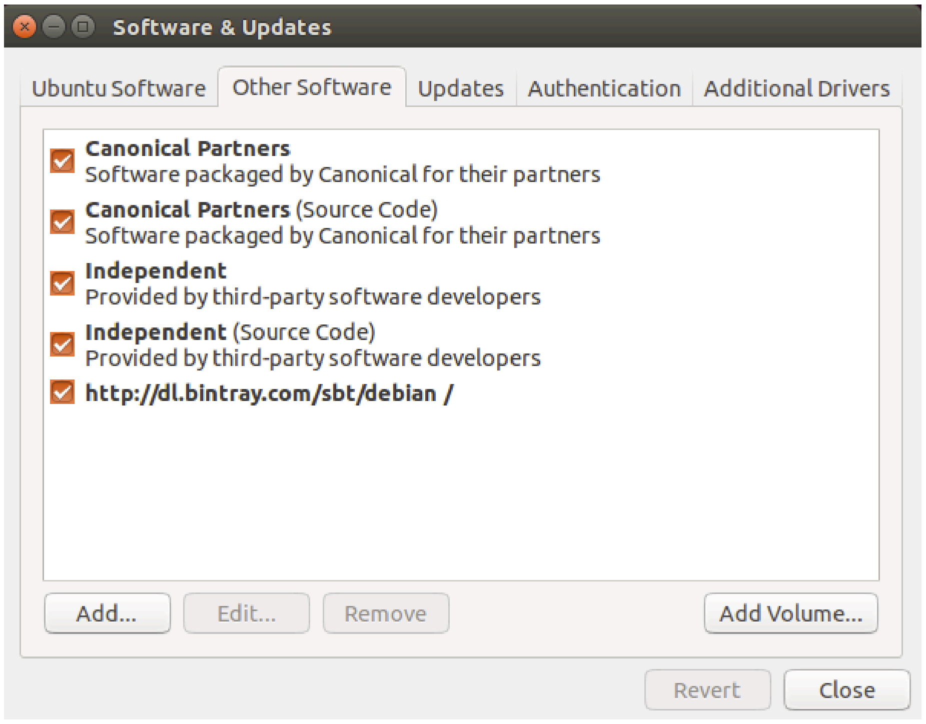
RPM sbt

Linux RPM RPM `sbt`(, `sudo`)

```
curl https://bintray.com/sbt/rpm/rpm > bintray-sbt-rpm.repo
sudo mv bintray-sbt-rpm.repo /etc/yum.repos.d/
sudo yum install sbt
```

sbt Bintray, Bintray RPM

: sbt-launcher-package



[✓] **Canonical Partners**
Software packaged by Canonical for their partners

[✓] **Canonical Partners** (Source Code)
Software packaged by Canonical for their partners

[✓] **Independent**
Provided by third-party software developers

[✓] **Independent** (Source Code)
Provided by third-party software developers

[✓] **http://dl.bintray.com/sbt/debian /**

Figure 1: Ubuntu Software & Updates Screenshot

Gentoo

sbt ebuild sbt ebuilds ebuilds sbt:

```
emerge dev-java/sbt
```

Hello, World

sbt

sbt hello , hw.scala:

```scala
object Hi {
  def main(args: Array[String]) = println("Hi!")
}
```

hello sbt, run sbt Linux OS X :

```
$ mkdir hello
$ cd hello
$ echo 'object Hi { def main(args: Array[String]) = println("Hi!") }' > hw.scala
$ sbt
...
> run
...
Hi!
```

,sbt sbt :

-
- src/main/scala src/main/java
- src/test/scala src/test/java
- src/main/resources src/test/resources
- lib jar

,sbt Scala sbt run sbt console Scala REPL sbt console classpath, Scala

build.sbt , hello , hello/build.sbt :

```scala
lazy val root = (project in file("."))
  .settings(
    name := "hello",
    version := "1.0",
    scalaVersion := "2.12.10"
  )
```

.sbt build.sbt

jar , `build.sbt` name version

sbt

`hello/project/build.properties` sbt , 1.3.4:

```
sbt.version=1.3.4
```

sbt release 99% `project/build.properties` sbt

sbt Hello, World

sbt ,“ ” , Hello, World `hello` , `hello/build.sbt` `hello/hw.scala`, `hello`

`hello/hw.scala` , , sbt Maven ( ):

```
src/
  main/
    resources/
       <files to include in main jar here>
    scala/
       <main Scala sources>
    scala-2.12/
       <main Scala 2.12 specific sources>
    java/
       <main Java sources>
  test/
    resources
       <files to include in test jar here>
    scala/
       <test Scala sources>
    scala-2.12/
       <test Scala 2.12 specific sources>
    java/
```

```
      <test Java sources>
```

`src/` ,

sbt

`build.sbt` sbt `project` `project` `.scala` , `.sbt`

```
build.sbt
project/
  Build.scala
```

`project/` `.sbt` , `.sbt` ,

(classes, jars, ,caches) `target`

`.gitignore` ( ) :

```
target/
```

: `/` ( ) `/` (`target/` `project/target/`)

sbt sbt Hello, World

sbt :

```
$ sbt
```

sbt (tab)

, sbt `compile`:

```
> compile
```

`compile`, , `run` `exit` Ctrl+D (Unix) Ctrl+Z (Windows) sbt, sbt , sbt :

```
$ sbt clean compile "testOnly TestA TestB"
```

,`testOnly` `TestA` `TestB` (`clean`, `compile`, `testOnly`)

`- -` , sbt `~` , , :

```
> ~ compile
```

`~`

sbt

clean

(target)

compile

(src/main/scala src/main/java)

test

console

classpath Scala :quit, Ctrl+D (Unix), Ctrl+Z (Windows) sbt

run < >*

sbt main class

package

src/main/resources src/main/scala src/main/java class jar

help < >

,

reload

(build.sbt, project/*.scala, project/*.sbt)

Tab

tab sbt , tab ,

, sbt :

!

!!

!:

!:n

n

!n

!: n

!-n

n

!string

string

!?string

string

.sbt

sbt , “ ” `build.sbt` sbt

1. `.sbt`
2. bare `.sbt`

.sbt , , [bare .sbt][Bare-Def] .scala ( )

, `.scala` , `project/` ,

?

sbt , `Project`

`build.sbt` Project , :

```
lazy val root = (project in file("."))
```

(immutable map)( )

, `name` key, ,

sbt map

, `Setting[T]` ,T (value) `Setting` *(map)* ,
value (, map —— map)

`Setting[String]`, :

```
lazy val root = (project in file("."))
  .settings(
    name := "hello"
  )
```

`Setting[String]` ( )`name` `"hello"` map map sbt map

map,sbt , key , value key, key , sbt
`Settings` , map

: `Project`, `Setting[T]` ,`Setting[T]` sbt map ,T
value

build.sbt

`build.sbt` `Project`, `settings` scala

:

```
ThisBuild / organization := "com.example"
ThisBuild / scalaVersion := "2.12.10"
ThisBuild / version      := "0.1.0-SNAPSHOT"

lazy val root = (project in file("."))
  .settings(
    name := "hello"
  )
```

`Setting` Scala `settings` , , Scala

`val`,`lazy val`,`def` `build.sbt` `object` `class` `project/`
Scala

,`name`, `version` `scalaVersion` *(keys)* (key) `SettingKey[T]`,`TaskKey[T]`
`InputKey[T]` ,T value key

(Keys) Setting[T] := Java :

```
lazy val root = (project in file("."))
  .settings(
    name.:=("hello")
  )
```

,Scala name := "hello" (Scala ,)

(key)name := Setting, Setting[String] String name SettingKey[String] , Setting[String] sbt map name , "hello"

value, :

```
lazy val root = (project in file("."))
  .settings(
    name := 42  //
  )
```

(Keys)

(Types)

key:

- SettingKey[T]: key value(,)
- TaskKey[T]: key *task* value, ,
- InputKey[T]: key task Input Tasks

Keys

keys Keys build.sbt import sbt.Keys._, name sbt.Keys.name

Keys

:settingKey,taskKey inputKey keys key value key val , task hello key,

```
lazy val hello = taskKey[Unit]("  task  ")
```

.sbt (settings) , vals defs (settings) vals defs (settings)

: , lazy val val

Task vs Setting keys

TaskKey[T] *task* Tasks compile package Unit(Unit Scala void), task , package TaskKey[File] task, jar

task, sbt compile,sbt task

sbt map (setting) , name; task , compile – ,

key *task* *(setting)* ,“taskiness” ( ) key (property), (value)

tasks settings

:= setting task setting, (value) task, task

, hello task:

```
lazy val hello = taskKey[Unit]("An example task")

lazy val root = (project in file("."))
  .settings(
    hello := { println("Hello!") }
  )
```

settings ,

```
lazy val root = (project in file("."))
  .settings(
    name := "hello"
  )
```

Tasks Settings

, task key Setting setting key Setting taskKey := 42 Setting[Task[T]] settingKey := 42 Setting[T] ;task key T (value)

T Task[T] : setting task, setting ,

sbt Keys

sbt , task name task compile compile task compile task key

setting key name task key name,setting key (value) task key name task (value); show <task name> <task name> task key name camelCase, name Scala key , sbt `inspect <keyname>` `inspect` , setting value setting

build.sbt

`import` `build.sbt` ;

:

```
import sbt._
import Keys._
```

(, .scala , `Build` `Plugin` .scala)

bare .sbt

bare `.sbt` `Setting[_]` , `Project`

```
name := "hello"
version := "1.0"
scalaVersion := "2.12.10"
```

jar `lib/(`) , `build.sbt` , :

```
val derby = "org.apache.derby" % "derby" % "10.4.1.3"

ThisBuild / organization := "com.example"
ThisBuild / scalaVersion := "2.12.10"
ThisBuild / version      := "0.1.0-SNAPSHOT"

lazy val root = (project in file("."))
  .settings(
    name := "hello",
    libraryDependencies += derby
  )
```

10.4.1.3 Apache Derby

key `libraryDependencies` :+= :=, `%` `+=` key , `%` Ivy ID ,

, ,

This page was translated mostly with Google Translate. Please send a pull request to improve it.

.sbt , `build.sbt`

`settings` , happens-before (DAG) (task graph)

,

- setting/task : `.settings(...)`
- key: setting `SettingKey[A]`,`TaskKey[A]` `InputKey[A]`
- setting: `SettingKey[A]` setting
- task: `TaskKey[A]` task

`build.sbt` DSL , `.value` method setting value method , `:=` (`+=` `++=`)

, `update` `clean` `scalacOption` key (Keys)

: `scalaOptions` `scalaOptions`, :

```
val scalacOptions = taskKey[Seq[String]]("Options for the Scala compiler.")
val update = taskKey[UpdateReport]("Resolves and optionally retrieves dependencies, producin
val clean = taskKey[Unit]("Deletes files produced by the build, such as generated sources, c
```

`scalacOptions`:

```
scalacOptions := {
  val ur = update.value  // update task happens-before scalacOptions
  val x = clean.value    // clean task happens-before scalacOptions
  // ---- scalacOptions begins here ----
  ur.allConfigurations.take(3)
}
```

`update.value` `clean.value` , `ur.allConfigurations.take(3)`

`.value` Scala method `build.sbt` DSL **`scalacOptions`** **`{`**, **, `update` `clean`**

:

```
ThisBuild / organization := "com.example"
ThisBuild / scalaVersion := "2.12.10"
ThisBuild / version      := "0.1.0-SNAPSHOT"

lazy val root = (project in file("."))
```

```
  .settings(
    name := "Hello",
    scalacOptions := {
      val out = streams.value // streams task happens-before scalacOptions
      val log = out.log
      log.info("123")
      val ur = update.value   // update task happens-before scalacOptions
      log.info("456")
      ur.allConfigurations.take(3)
    }
  )
```

, sbt shell   `scalacOptions`:

```
> scalacOptions
[info] Updating {file:/xxx/}root...
[info] Resolving jline#jline;2.14.1 ...
[info] Done updating.
[info] 123
[info] 456
[success] Total time: 0 s, completed Jan 2, 2017 10:38:24 PM
```

`val ur = ...`   `log.info("123")` `log.info("456")`,`update`

:

```
ThisBuild / organization := "com.example"
ThisBuild / scalaVersion := "2.12.10"
ThisBuild / version      := "0.1.0-SNAPSHOT"

lazy val root = (project in file("."))
  .settings(
    name := "Hello",
    scalacOptions := {
      val ur = update.value  // update task happens-before scalacOptions
      if (false) {
        val x = clean.value  // clean task happens-before scalacOptions
      }
      ur.allConfigurations.take(3)
    }
  )
```

, sbt shell   `run`,   `scalacOptions`

```
> run
[info] Updating {file:/xxx/}root...
[info] Resolving jline#jline;2.14.1 ...
[info] Done updating.
[info] Compiling 1 Scala source to /Users/eugene/work/quick-test/task-graph/target/scala-2.12/
[info] Running example.Hello
```

```
hello
[success] Total time: 0 s, completed Jan 2, 2017 10:45:19 PM
> scalacOptions
[info] Updating {file:/xxx/}root...
[info] Resolving jline#jline;2.14.1 ...
[info] Done updating.
[success] Total time: 0 s, completed Jan 2, 2017 10:45:23 PM
```

, `target/scala-2.12/classes/`, , `if (false)` , `clean`

, `update` `clean` `update` `clean`,`clean` `update`

.value

,`.value` method, setting `build.sbt` , `.value`

, , `.value` , task/setting ,

:

```
scalacOptions := {
  val x = clean.value
  update.value.allConfigurations.take(3)
}
```

,`.value` ,

,`scalacOptions` `update` `clean` `build.sbt` sbt shell, `inspect scalacOptions`, ( ):

```
> inspect scalacOptions
[info] Task: scala.collection.Seq[java.lang.String]
[info] Description:
[info]  Options for the Scala compiler.
....
[info] Dependencies:
[info]  *:clean
[info]  *:update
....
```

sbt

, `inspect tree` `compile` key `incCompileSetup`, key, `dependencyClasspath` ,

```
> inspect tree compile
[info] compile:compile = Task[sbt.inc.Analysis]
[info]   +-compile:incCompileSetup = Task[sbt.Compiler$IncSetup]
[info]   | +-*/*:skip = Task[Boolean]
```

```
[info]  | +-compile:compileAnalysisFilename = Task[java.lang.String]
[info]   | | +-*/*:crossPaths = true
[info]   | | +-{.}/*:scalaBinaryVersion = 2.12
[info]   | |
[info]   | +-*/*:compilerCache = Task[xsbti.compile.GlobalsCache]
[info]  | +-*/*:definesClass = Task[scala.Function1[java.io.File, scala.Function1[java.lang.S
[info]  | +-compile:dependencyClasspath = Task[scala.collection.Seq[sbt.Attributed[java.io.Fi
[info]  | | +-compile:dependencyClasspath::streams = Task[sbt.std.TaskStreams[sbt.Init$Scoped
[info]  | | | +-*/*:streamsManager = Task[sbt.std.Streams[sbt.Init$ScopedKey[_ <: Any]]]
[info]   | | |
[info]  | | +-compile:externalDependencyClasspath = Task[scala.collection.Seq[sbt.Attributed[
[info]  | | | +-compile:externalDependencyClasspath::streams = Task[sbt.std.TaskStreams[sbt.I
[info]  | | | | +-*/*:streamsManager = Task[sbt.std.Streams[sbt.Init$ScopedKey[_ <: Any]]]
[info]   | | | |
[info]  | | | +-compile:managedClasspath = Task[scala.collection.Seq[sbt.Attributed[java.io.F
[info]  | | | | +-compile:classpathConfiguration = Task[sbt.Configuration]
[info]   | | | | | +-compile:configuration = compile
[info]   | | | | | +-*/*:internalConfigurationMap = <function1>
[info]   | | | | | +-*:update = Task[sbt.UpdateReport]
[info]   | | | | |
....
```

, `compile` sbt , `update` , `compile` sbt `update`

,sbt , key , key

setting

`scalacOptions` task key , 2.12 `"-Xfatal-warnings"` `"-deprecation"`

```
lazy val root = (project in file("."))
  .settings(
    name := "Hello",
    organization := "com.example",
    scalaVersion := "2.12.10",
    version := "0.1.0-SNAPSHOT",
    scalacOptions := List("-encoding", "utf8", "-Xfatal-warnings", "-deprecation", "-unchec
    scalacOptions := {
      val old = scalacOptions.value
      scalaBinaryVersion.value match {
        case "2.12" => old
        case _      => old filterNot (Set("-Xfatal-warnings", "-deprecation").apply)
      }
    }
  )
```

sbt shell :

```
> show scalacOptions
[info] * -encoding
[info] * utf8
[info] * -Xfatal-warnings
[info] * -deprecation
[info] * -unchecked
[success] Total time: 0 s, completed Jan 2, 2017 11:44:44 PM
> ++2.11.8!
[info] Forcing Scala version to 2.11.8 on all projects.
[info] Reapplying settings...
[info] Set current project to Hello (in build file:/xxx/)
> show scalacOptions
[info] * -encoding
[info] * utf8
[info] * -unchecked
[success] Total time: 0 s, completed Jan 2, 2017 11:44:51 PM
```

, key (Keys):

```
val scalacOptions = taskKey[Seq[String]]("Options for the Scala compiler.")
val checksums = settingKey[Seq[String]]("The list of checksums to generate and to verify fo
```

: `scalacOptions` `checksums` ,

`build.sbt` `checksums` `scalacOptions`, , :

```
// The scalacOptions task may be defined in terms of the checksums setting
scalacOptions := checksums.value
```

,setting key task key setting key subproject , ,

```
// Bad example: The checksums setting cannot be defined in terms of the scalacOptions task!
checksums := scalacOptions.value
```

setting setting

, setting

subproject

```
// name our organization after our project (both are SettingKey[String])
organization := name.value
```

Here's a realistic example. This rewires `scalaSource in Compile` key to a different directory only when `scalaBinaryVersion` is `"2.11"`.

```
scalaSource in Compile := {
  val old = (scalaSource in Compile).value
  scalaBinaryVersion.value match {
    case "2.11" => baseDirectory.value / "src-2.11" / "main" / "scala"
    case _      => old
  }
}
```

build.sbt DSL ?

build.sbt DSL , DAG setting setting,

Make (1976),Ant (2000), Rake (2003)

Make

Makefile :

```
target: dependencies
[tab] system command1
[tab] system command2
```

(`all`),

1. Make ,
2. Make

`Makefile`:

```
CC=g++
CFLAGS=-Wall

all: hello

hello: main.o hello.o
    $(CC) main.o hello.o -o hello

%.o: %.cpp
    $(CC) $(CFLAGS) -c $< -o $@
```

`make`, `all` `hello` , , Make `hello`

,Make `hello` `hello` : `main.o` `hello.o` , , `main.o` `hello.o` `hello`

`make`, , `Make` flow-based `Make` , DSL ,

Rake

Make (Ant,Rake sbt), Rakefile :

```ruby
task name: [:prereq1, :prereq2] do |t|
  # actions (may reference prereq as t.name etc)
end
```

Rake

flow-based

flow-based , , , `Compile / compile`
,
, sbt (,)

DAG, happens-before `build.sbt` DSL, flow-based
, `Makefile` `Rakefile`

flow-based ,

Scope

scope .sbt

Key

`name` key sbt map ,
, key , “scope”
:

- , key
- ,key `compile` main test
- Key `packageOptions`(jar) , class `packageBin`, `packageSrc`

key *`name`* , scope

, `scoped` key

,sbt map settings , map key *scope* key setting(`build.sbt`) scope key

scope , , `build.sbt` scope

Scope

Scope , scope(, key)

scope :

- Projects
- Configurations
- Tasks

Project Scope

, settings ,keys

Project , setting setting , setting

Configuration Scope

configuration , classpath, Configuration Ivy MavenScopes

sbt configurations:

- `Compile` (`src/main/scala`)
- `Test` (`src/test/scala`)
- `Runtime` task `run` classpath

, key configuration, configuration task key:`compile`,`package` `run`; key key(`sourceDirectories`,`scalacOptions` `fullClasspath`) configuration

Task Scope

Settings task ,task `packageSrc` setting `packageOptions`

, task key(`packageSrc`) key(`packageOptions`) scope

task(`packageSrc`,`packageBin`,`packageDoc`) key, `artifactName` `packageOptions` key task

Scope

scope (task task), `Global`

`Global` : setting task `Global`, setting task

scope key , key

scope,sbt scope , key scope ,sbt scope(`Global` scope scope)

scope , scope

`inspect` key “ ”

sbt scope key

,sbt ( )scope keys:

`{<build-uri>}<project-id>/config:intask::key`

- `{<build-uri>}/<project-id>` project project scope, `<project-id>`
- `config` configuration
- `intask` task
- `key` scope key

“*” , `Global` scope

scoped key, :

- project, project
- configuration task, key configuration

, Configuration

scoped key

- `fullClasspath` key, scope: project,key configuration task scope
- `test:fullClasspath` configuration, `fullClasspath` `test` configuration scope , scope
- `*:fullClasspath` configuration `Global`, configuration
- `doc::fullClasspath` key `fullClasspath` `doc` task ,project configuration
- `{file:/home/hp/checkout/hello/}default-aea33a/test:fullClasspath` project, `{file:/home/hp/checkout/hello/}default-aea33a` ,`{file:/home/hp/checkout/hello/}` project, project id `default-aea33a` configuration `test`, task
- `{file:/home/hp/checkout/hello/}/test:fullClasspath` `{file:/home/hp/checkout/hello/}` project
- `{.}/test:fullClasspath` `{.}` project `{.}` Scala `ThisBuild`
- `{file:/home/hp/checkout/hello/}/compile:doc::fullClasspath` scope

scope

sbt , inspect key scope `inspect test:fullClasspath`,

```
$ sbt
> inspect test:fullClasspath
[info] Task: scala.collection.Seq[sbt.Attributed[java.io.File]]
[info] Description:
```

```
[info] The exported classpath, consisting of build products and unmanaged and managed, internal
[info] Provided by:
[info]  {file:/home/hp/checkout/hello/}default-aea33a/test:fullClasspath
[info] Dependencies:
[info]  test:exportedProducts
[info]  test:dependencyClasspath
[info] Reverse dependencies:
[info]  test:runMain
[info]  test:run
[info]  test:testLoader
[info]  test:console
[info] Delegates:
[info]  test:fullClasspath
[info]  runtime:fullClasspath
[info]  compile:fullClasspath
[info]  *:fullClasspath
[info]  {.}/test:fullClasspath
[info]  {.}/runtime:fullClasspath
[info]  {.}/compile:fullClasspath
[info]  {.}/*:fullClasspath
[info]  */test:fullClasspath
[info]  */runtime:fullClasspath
[info]  */compile:fullClasspath
[info]  */*:fullClasspath
[info] Related:
[info]  compile:fullClasspath
[info]  compile:fullClasspath(for doc)
[info]  test:fullClasspath(for doc)
[info]  runtime:fullClasspath
```

, task(.sbt setting) task `scala.collection.Seq[sbt.Attributed[java.io.File]]`

"Provided by" scoped key, `{file:/home/hp/checkout/hello/}default-aea33a/test:fullClasspa` `test` configuration `{file:/home/hp/checkout/hello/}default-aea33a` project)

"Dependencies" ;

; ,sbt :

- configuration(`runtime:fullClasspath` `compile:fullClasspath`) scoped key ,project " project" task `Global`
- project " project" task `Global` ,configuration `Global(*:fullClasspath)`
- project ,project `{.}` `ThisBuild`
- project `Global(*/test:fullClasspath)`(, project current, `Global` ; :`*` " project" project ; :`*/test:fullClasspath` `test:fullClasspath`)

- project configuration Global(*/*:fullClasspath)(task Global, */*:fullClasspath Global)

inspect fullClasspath(inspect test:fullClasspath) configuration ,sbt compile inspect compile:fullClasspath inspect fullClasspath

inspect *:fullClasspath ,fullClasspath Global configuration

Configuration

scope

build.sbt bare key, project ,configuration task Global:

```
lazy val root = (project in file("."))
  .settings(
    name := "hello"
  )
```

sbt inspect name {file:/home/hp/checkout/hello/}default-aea33a/*:name , ,project {file:/home/hp/checkout/hello/}default-aea33a, configuration *( ),task ( )

Keys in scope in scope , name Compile configuration , :

```
name in Compile := "hello"
```

name packageBin task (!):

```
name in packageBin := "hello"
```

name scope , Compile configuration packageBin task :

```
name in (Compile, packageBin) := "hello"
```

Global :

```
name in Global := "hello"
```

(name in Global scope Global scope Global;task configuration Global, project Global, , */*:name {file:/home/hp/checkout/hello/}default-aea33a/*:name)

Scala, :in := , , Scala , Java :

```
name.in(Compile).:=("hello")
```

,

scope

key , scope ,`compile` task `Compile` `Test` configuration scope , scope

key `compile` , `compile in Compile` `compile in Test` `compile` project scope task, configuration scope `compile` task

“ ” , scope , scope key scope sbt ; “ compile:compile?”

,name key , key name scope (scope) ,`packageOptions in (Compile, packageBin)` key name `packageOptions` key name, (in key, scope: project,global config,global task)

: += ++=

`:=` , key `SettingKey[T]` `T` , , key sequence,

- `+=`
- `++=`

, key `sourceDirectories in Compile` `Seq[File]` key `src/main/scala` source ( ), :

```
Compile / sourceDirectories += new File("source")
```

, sbt `file()` :

```
Compile / sourceDirectories += file("source")
```

(`file()` `File`)

`++=` :

```
Compile / sourceDirectories ++= Seq(file("sources1"), file("sources2"))
```

`Seq(a, b, c, ...)` Scala

source , `:=` :

```
Compile / sourceDirectories := Seq(file("sources1"), file("sources2"))
```

`:=`,`+=` `++=` key , ,sbt , “ ” , key scope

sbt , ; ,sbt

key task

task setting task task `Def.task` `:=`, `+=` `++=`

, classpath source generator

```
Compile / sourceGenerators += Def.task {
  myGenerator(baseDirectory.value, (managedClasspath in Compile).value)
}
```

`:+=` `++=`

setting task key, `:=` , , :

```
cleanFiles += file("coverage-report-" + name.value + ".txt")
```

Scope (.value)

This page was translated mostly with Google Translate. Please send a pull request to improve it.

scope .sbt scopes

scope , `.value` ,

:

- scope : subproject configuration task
- scope scope `Zero`
- subproject scope `ThisBuild`
- `Test` `Runtime`, `Runtime` `Compile` configuration
- , build.sbt key scope `${current subproject} / Zero / Zero`
- `/` key scope

, :

```
lazy val foo = settingKey[Int]("")
lazy val bar = settingKey[Int]("")

lazy val projX = (project in file("x"))
  .settings(
    foo := {
      (Test / bar).value + 1
    },
    Compile / bar := 1
  )
```

`foo` setting , scoped key `Test / bar` , `projX` `Test / bar`,sbt `Test / bar` scoped key, `foo` 2

sbt , **scope** scope , scope

scope

scope :

- 1: scope :subproject ,configuration , task
- 2: scope , task scope: task scope, `Zero` (scope task scope)
- 3: scope , configuration scope: configuration, , , `Zero`(configuration)
- 4: scope , subproject scope: subproject,`ThisBuild`, `Zero`
- 5: , scoped key settings/tasks

1: scope

- 1: scope :subproject ,configuration , task

, , subproject , configuration task scope , , subproject , task scope , configuration

2: task

- 2: scope , task scope: task scope, `Zero` (scope task scope)

key,sbt scope, , `(xxx / yyy).value`

A: :

```scala
lazy val projA = (project in file("a"))
  .settings(
    name := {
      "foo-" + (packageBin / scalaVersion).value
    },
    scalaVersion := "2.11.11"
  )
```

`projA / name` ?

1. `"foo-2.11.11"`
2. `"foo-2.12.10"`
3.

`"foo-2.11.11"` `.settings(...)` ,`scalaVersion` scope `projA / Zero / Zero`, `packageBin / scalaVersion` `projA / Zero / packageBin / scalaVersion` scoped key 2,sbt task `Zero` `projA / Zero / Zero` (`projA / scalaVersion`) scoped key `"2.11.11"`

3:configuration

- 3: scope , configuration scope: configuration, , , Zero(configuration)

projX:

```
lazy val foo = settingKey[Int]("")
lazy val bar = settingKey[Int]("")

lazy val projX = (project in file("x"))
  .settings(
    foo := {
      (Test / bar).value + 1
    },
    Compile / bar := 1
  )
```

scope,projX / Test / Zero Test Runtime ,Runtime Compile

Test / bar , 3,sbt scope projX / Test / Zero, projX / Runtime / Zero, projX / Compile / Zero , Compile / bar

4:subproject

- 4: scope , subproject scope: subproject,ThisBuild, Zero

B: :

```
ThisBuild / organization := "com.example"

lazy val projB = (project in file("b"))
  .settings(
    name := "abc-" + organization.value,
    organization := "org.tempuri"
  )
```

projB / name ?

1. "abc-com.example"
2. "abc-org.tempuri"
3.

abc-org.tempuri , 4, projB / Zero / Zero scope organization, projB "org.tempuri" setting ThisBuild / organization

scope

C: :

```
ThisBuild / packageBin / scalaVersion := "2.12.2"

lazy val projC = (project in file("c"))
  .settings(
    name := {
      "foo-" + (packageBin / scalaVersion).value
    },
    scalaVersion := "2.11.11"
  )
```

`projC / name` ?

1. `"foo-2.12.2"`
2. `"foo-2.11.11"`
3.

`foo-2.11.11` scope `projC / Zero / packageBin` `scalaVersion`

`scalaVersion` scoped to `projC / Zero / packageBin` is undefined. 2 `projC / Zero / Zero` 4 `ThisBuild / Zero / packageBin` , 1 subproject , `"2.11.11"` `projC / Zero / Zero`

D: :

```
ThisBuild / scalacOptions += "-Ywarn-unused-import"

lazy val projD = (project in file("d"))
  .settings(
    test := {
      println((Compile / console / scalacOptions).value)
    },
    console / scalacOptions -= "-Ywarn-unused-import",
    Compile / scalacOptions := scalacOptions.value // added by sbt
  )
```

`projD/test` ?

1. `List()`
2. `List(-Ywarn-unused-import)`
3.

`List(-Ywarn-unused-import)` 2 `projD / Compile / Zero`, 3 `projD / Zero / console`, 4 `ThisBuild / Zero / Zero` 1 `projD / Compile / Zero` subproject `projD`, configuration task

, `Compile / scalacOptions` `scalacOptions.value`, `projD / Zero / Zero` 4 `ThisBuild / Zero / Zero`, `List(-Ywarn-unused-import)`

inspect

inspect

```
sbt:projd> inspect projD / Compile / console / scalacOptions
[info] Task: scala.collection.Seq[java.lang.String]
[info] Description:
[info]  Options for the Scala compiler.
[info] Provided by:
[info]  ProjectRef(uri("file:/tmp/projd/"), "projD") / Compile / scalacOptions
[info] Defined at:
[info]  /tmp/projd/build.sbt:9
[info] Reverse dependencies:
[info]  projD / test
[info]  projD / Compile / console
[info] Delegates:
[info]  projD / Compile / console / scalacOptions
[info]  projD / Compile / scalacOptions
[info]  projD / console / scalacOptions
[info]  projD / scalacOptions
[info]  ThisBuild / Compile / console / scalacOptions
[info]  ThisBuild / Compile / scalacOptions
[info]  ThisBuild / console / scalacOptions
[info]  ThisBuild / scalacOptions
[info]  Zero / Compile / console / scalacOptions
[info]  Zero / Compile / scalacOptions
[info]  Zero / console / scalacOptions
[info]  Global / scalacOptions
```

,“Provided by” `projD / Compile / console / scalacOptions` `projD / Compile / scalacOptions` “Delegates” ( ), !

- subproject `projD` scope scope, `ThisBuild` `Zero`
- subproject , configuration `Compile` scope scope, `Zero`
- task task scope `console /` scope, task scope `console /` scope

.value

- 5: , scoped key settings/tasks

,scope , Scala OO , trait `Shape` `drawShape` method, `Shape` trait method `drawShape`, ,

, sbt ,scope scope scope, project-level setting build-level setting, build-level setting project-level setting

E: :

```scala
lazy val root = (project in file("."))
  .settings(
    inThisBuild(List(
      organization := "com.example",
      scalaVersion := "2.12.2",
      version      := scalaVersion.value + "_0.1.0"
    )),
    name := "Hello"
  )

lazy val projE = (project in file("e"))
  .settings(
    scalaVersion := "2.11.11"
  )
```

`projE / version` ?

1. "2.12.2_0.1.0"
2. "2.11.11_0.1.0"
3.

2.12.2_0.1.0 projE / version ThisBuild / version, ThisBuild / scalaVersion ,build-level setting

F: :

```scala
ThisBuild / scalacOptions += "-D0"
scalacOptions += "-D1"

lazy val projF = (project in file("f"))
  .settings(
    compile / scalacOptions += "-D2",
    Compile / scalacOptions += "-D3",
    Compile / compile / scalacOptions += "-D4",
    test := {
      println("bippy" + (Compile / compile / scalacOptions).value.mkString)
    }
  )
```

`projF / test` ?

1. "bippy-D4"
2. "bippy-D2-D4"
3. "bippy-D0-D3-D4"
4.

"bippy-D0-D3-D4" Paul Phillips , someKey += "x"

```scala
someKey := {
  val old = someKey.value
  old :+ "x"
}
```

, 5, scoped key +=, :

```
ThisBuild / scalacOptions := {
  // Global / scalacOptions <- Rule 4
  val old = (ThisBuild / scalacOptions).value
  old :+ "-D0"
}

scalacOptions := {
  // ThisBuild / scalacOptions <- Rule 4
  val old = scalacOptions.value
  old :+ "-D1"
}

lazy val projF = (project in file("f"))
  .settings(
    compile / scalacOptions := {
      // ThisBuild / scalacOptions <- Rules 2 and 4
      val old = (compile / scalacOptions).value
      old :+ "-D2"
    },
    Compile / scalacOptions := {
      // ThisBuild / scalacOptions <- Rules 3 and 4
      val old = (Compile / scalacOptions).value
      old :+ "-D3"
    },
    Compile / compile / scalacOptions := {
      // projF / Compile / scalacOptions <- Rules 1 and 2
      val old = (Compile / compile / scalacOptions).value
      old :+ "-D4"
    },
    test := {
      println("bippy" + (Compile / compile / scalacOptions).value.mkString)
    }
  )
```

:

```
ThisBuild / scalacOptions := {
  Nil :+ "-D0"
}

scalacOptions := {
  List("-D0") :+ "-D1"
}
```

```
lazy val projF = (project in file("f"))
  .settings(
    compile / scalacOptions := List("-D0") :+ "-D2",
    Compile / scalacOptions := List("-D0") :+ "-D3",
    Compile / compile / scalacOptions := List("-D0", "-D3") :+ "-D4",
    test := {
      println("bippy" + (Compile / compile / scalacOptions).value.mkString)
    }
  )
```

, , .sbt ,Scopes

:

- `lib` jar
- , (repository)

: jar `lib` , classpath !

jar `lib` , ScalaCheck,Specs2,ScalaTest

`lib` classpaths(`compile`, `test`, `run` `console`) classpath, , `Compile / dependencyClasspath` `Runtime / dependencyClasspath`

, `build.sbt` , `unmanagedBase` key, `lib`

`custom_lib` `lib`:

```
unmanagedBase := baseDirectory.value / "custom_lib"
```

`baseDirectory` , `baseDirectory` `unmanagedBase`, `value`

`unmanagedBase` jar task `unmanagedJars` , task `unmanagedJars` task, `Compile` configuration , `lib` :

```
Compile / unmanagedJars := Seq.empty[sbt.Attributed[java.io.File]]
```

sbt Apache Ivy , Ivy Maven ,

libraryDependencies Key

, libraryDependencies Maven POM Ivy , sbt

, groupId, artifactId revision :

```
libraryDependencies += groupID % artifactID % revision
```

, Configuration val (Test) configuration:

```
libraryDependencies += groupID % artifactID % revision % configuration
```

libraryDependencies Keys :

```
val libraryDependencies = settingKey[Seq[ModuleID]]("Declares managed dependencies.")
```

% ModuleID , ModuleID libraryDependencies

, sbt(Ivy) sbt , ,Apache Derby Maven2 :

```
libraryDependencies += "org.apache.derby" % "derby" % "10.4.1.3"
```

build.sbt , update,sbt Derby ~/.ivy2/cache/org.apache.derby/ (, compile update, update)

, ++= :

```
libraryDependencies ++= Seq(
  groupID % artifactID % revision,
  groupID % otherID % otherRevision
)
```

, libraryDependencies :=

%% Scala

groupID %% artifactID % revision groupID % artifactID % revision(groupID %%),sbt Scala %%:

```
libraryDependencies += "org.scala-tools" % "scala-stm_2.11" % "0.3"
```

scalaVersion 2.11.1, ("org.scala-tools" %%):

```
libraryDependencies += "org.scala-tools" %% "scala-stm" % "0.3"
```

Scala , jar

Ivy

groupID % artifactID % revision revision Ivy "latest.integration","2.9.+" "[1.0,)", , "1.6.1" Ivy

,sbt Maven2 , *resolver* Ivy

:

```
resolvers += name at location
```

at

:

```
resolvers += "Sonatype OSS Snapshots" at "https://oss.sonatype.org/content/repositories/snap
```

`resolvers` key Keys :

```
val resolvers = settingKey[Seq[Resolver]]("           ")
```

`at` `Resolver`

sbt Maven :

```
resolvers += "Local Maven Repository" at "file://"+Path.userHome.absolutePath+"/.m2/reposit
```

, :

```
resolvers += Resolver.mavenLocal
```

`resolvers` ,

sbt `resolvers` `externalResolvers`

, , `externalResolvers` `resolvers`

Per-configuration dependencies

(`src/test/scala` , `Test` configuration)

`Test` configuration classpath `Compile` configuration, `% "test"`:

```
libraryDependencies += "org.apache.derby" % "derby" % "10.4.1.3" % "test"
```

`Test` configuration:

```
libraryDependencies += "org.apache.derby" % "derby" % "10.4.1.3" % Test
```

, sbt `show compile:dependencyClasspath`, derby jar `show test:dependencyClasspath`, derby jar

, , ScalaCheck, Specs2 ScalaTest `% "test"`

, .sbt

, ,

, jar ,

Project lazy val , :

```scala
lazy val util = project

lazy val core = project
```

val ID ID in , :

```scala
lazy val util = project.in(file("util"))

lazy val core = project in file("core")
```

To factor out common settings across multiple projects, create a sequence named `commonSettings` and call `settings` method on each project. , `commonSettings` , `settings`

```scala
lazy val commonSettings = Seq(
  organization := "com.example",
  version := "0.1.0",
  scalaVersion := "2.12.10"
)

lazy val core = (project in file("core"))
  .settings(
    commonSettings,
    // other settings
  )

lazy val util = (project in file("util"))
  .settings(
    commonSettings,
    // other settings
  )
```

`version`, ,

, :aggregate classpath

Aggregation

Aggregation aggregate task aggregated ,

```
lazy val root = (project in file(".")).aggregate(util, core)

lazy val util = project

lazy val core = project
```

,root `util` `core` , sbt,

, root , task , `update` task:

```
lazy val root = (project in file("."))
  .aggregate(util, core)
  .settings(
    aggregate in update := false
  )
```

```
[...]
```

`aggregate in update` `update` task scope key (scopes)

: task,task

Classpath

`dependsOn` , core classpath util, core:

```
lazy val core = project.dependsOn(util)
```

`core` `util` ; core ,`util`

, `dependsOn(bar, baz)` `dependsOn`

configuration classpath

`foo dependsOn(bar)` `foo` `compile` configuration `bar` `compile` configuration :`dependsOn(bar % "compile->compile")`

`"compile->compile"` `->` “depends on”, `"test->compile"` `foo` `test` configuration `bar` `compile` configuration

`->config` `->compile`, `dependsOn(bar % "test")` `foo` `test` configuration `bar` `Compile` configuration

`"test->test"` `test` `test` , `bar/src/test/scala` , `foo/src/test/scala` , configuration, , :dependsOn(bar % "test->test;compile->compile")

root

,sbt

hello-foo base = file("foo"), foo foo , foo/Foo.scala, foo/src/main/scala sbt foo

sbt , projects , project <projectname> task compile, root ,

ID task, subProjectID/compile

.sbt .sbt .sbt , project/ Scala

Appendix: Subproject build definition files

foo .sbt , foo/build.sbt, , hello-foo scope

hello , hello/build.sbt,hello/bar/build.sbt hello/foo/build.sbt (version := "0.6") sbt show version ( ):

```
> show version
[info] hello-foo/*:version
[info]  0.7
[info] hello-bar/*:version
[info]  0.9
[info] hello/*:version
[info]  0.5
```

hello-foo/*:version hello/foo/build.sbt ,hello-bar/*:version hello/bar/build.sbt ,hello/*:version hello/build.sbt scoped keys version key scope , build.sbt build.sbt

Style choices:

- Each subproject's settings can go into *.sbt files in the base directory of that project, while the root build.sbt declares only minimum project declarations in the form of lazy val foo = (project in file("foo")) without the settings.

- We recommend putting all project declarations and settings in the root **build.sbt** file in order to keep all build definition under a single file. However, it up to you.

, `project/*.scala` `foo/project/Build.scala`

, build.sbt

, task , `codeCoverage` task

`hello` , sbt-site , `hello/project/site.sbt` Ivy ID `addSbtPlugin`:

```
addSbtPlugin("com.typesafe.sbt" % "sbt-site" % "0.7.0")
```

sbt-assembly, `hello/project/assembly.sbt` :

```
addSbtPlugin("com.eed3si9n" % "sbt-assembly" % "0.11.2")
```

, :

```
resolvers += Resolver.sonatypeRepo("public")
```

,

0.13.5 sbt, , ,

, `build.sbt` :

```
lazy val util = (project in file("util"))
  .enablePlugins(FooPlugin, BarPlugin)
  .settings(
    name := "hello-util"
  )
```

`enablePlugins`

`disablePlugins` , `util` `IvyPlugin` , `build.sbt` :

```
lazy val util = (project in file("util"))
  .enablePlugins(FooPlugin, BarPlugin)
  .disablePlugins(plugins.IvyPlugin)
  .settings(
    name := "hello-util"
  )
```

, sbt plugins

:

```
> plugins
In file:/home/jsuereth/projects/sbt/test-ivy-issues/
        sbt.plugins.IvyPlugin: enabled in scala-sbt-org
        sbt.plugins.JvmPlugin: enabled in scala-sbt-org
        sbt.plugins.CorePlugin: enabled in scala-sbt-org
        sbt.plugins.JUnitXmlReportPlugin: enabled in scala-sbt-org
```

, plugins sbt sbt 3 :

1. CorePlugin: task
2. IvyPlugin:
3. JvmPlugin: Java/Scala

,JUnitXmlReportPlugin junit-xml

, , ,

, sbt-site , , site.sbt

```
site.settings
```

, :

```
// `util` site
lazy val util = (project in file("util"))

// `core` site
lazy val core = (project in file("core"))
  .settings(site.settings)
```

, $HOME/.sbt/1.0/plugins/ $HOME/.sbt/1.0/plugins/ classpath sbt , $HOME/.sbt/1.0/plugins/ .sbt .scala project/

, $HOME/.sbt/1.0/plugins//build.sbt addSbtPlugin() ,

:

- IDE (sbt IDE)
- web , xsbt-web-plugin

, , ,

, sbt , .sbt

SettingKey TaskKey .sbt InputKey

Keys :

```
val scalaVersion = settingKey[String]("scala  ")
val clean = taskKey[Unit]("     ,    source   ,      ")
```

: ("scalaVersion") (" scala ")

.sbt , T SettingKey[T] T TaskKey [T] .sbt , , “ ”(batch)

.sbt ,.scala autoImport val .sbt

, , ; := :

```
val sampleStringTask = taskKey[String]("A sample string task.")
val sampleIntTask = taskKey[Int]("A sample int task.")

ThisBuild / organization := "com.example"
ThisBuild / version      := "0.1.0-SNAPSHOT"
ThisBuild / scalaVersion := "2.12.10"

lazy val library = (project in file("library"))
  .settings(
    sampleStringTask := System.getProperty("user.home"),
    sampleIntTask := {
      val sum = 1 + 2
      println("sum: " + sum)
      sum
    }
  )
```

, , value

sbt ; Scala , , , HTML, , HTML (HTML)

sbt , API IO

value , ,

sampeIntTask , :

```
sampleIntTask := {
  val sum = 1 + 2        // first
  println("sum: " + sum) // second
  sum                    // third
}
```

,JVM sum 3,

startServer stopServer, sampeIntTask, :

```
val startServer = taskKey[Unit]("start server")
val stopServer = taskKey[Unit]("stop server")
val sampleIntTask = taskKey[Int]("A sample int task.")
val sampleStringTask = taskKey[String]("A sample string task.")

ThisBuild / organization := "com.example"
ThisBuild / version      := "0.1.0-SNAPSHOT"
ThisBuild / scalaVersion := "2.12.10"

lazy val library = (project in file("library"))
  .settings(
    startServer := {
      println("starting...")
      Thread.sleep(500)
    },
    stopServer := {
      println("stopping...")
      Thread.sleep(500)
    },
    sampleIntTask := {
      startServer.value
      val sum = 1 + 2
      println("sum: " + sum)
      stopServer.value // THIS WON'T WORK
      sum
    },
    sampleStringTask := {
      startServer.value
      val s = sampleIntTask.value.toString
      println("s: " + s)
      s
    }
  )
```

sbt sampleIntTask :

```
> sampleIntTask
stopping...
starting...
sum: 3
[success] Total time: 1 s, completed Dec 22, 2014 5:00:00 PM
```

, sampleIntTask :

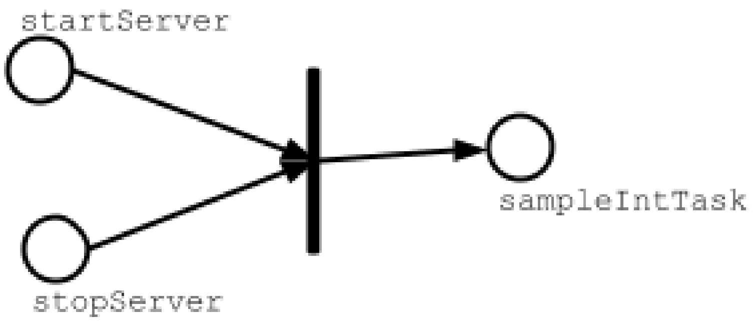


Figure 2: task-dependency

Scala , value , sampleIntTask startServer stopServer sampleIntTask ,sbt :

- sampleIntTask ( )
- , ( )
- , ( )

, sbt sampleStringTask

```
> sampleStringTask
stopping...
```

```
starting...
sum: 3
s: 3
[success] Total time: 1 s, completed Dec 22, 2014 5:30:00 PM
```

sampleStringTask startServer sampleIntTask , sampleIntTask startServer ,
Scala , , value , sampeStringTask :

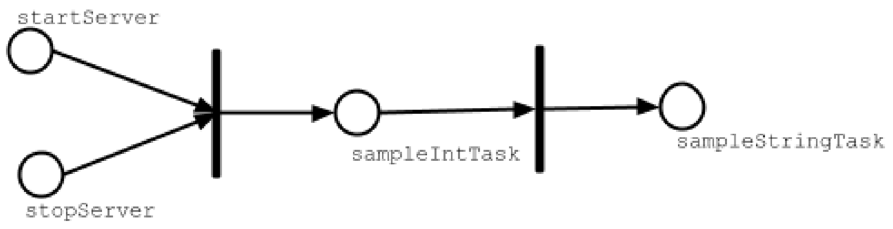


Figure 3: task-dependency

, test , Test / compile Test / test

stopServer ? , stopServer sampleStringTask, stopServer sampleStringTask

```
lazy val library = (project in file("library"))
  .settings(
    startServer := {
      println("starting...")
      Thread.sleep(500)
    },
    sampleIntTask := {
      startServer.value
      val sum = 1 + 2
      println("sum: " + sum)
      sum
    },
    sampleStringTask := {
      startServer.value
      val s = sampleIntTask.value.toString
      println("s: " + s)
      s
    },
    sampleStringTask := {
      val old = sampleStringTask.value
      println("stopping...")
      Thread.sleep(500)
      old
    }
  )
```

, sampleStringTask:

```
> sampleStringTask
starting...
sum: 3
s: 3
stopping...
[success] Total time: 1 s, completed Dec 22, 2014 6:00:00 PM
```

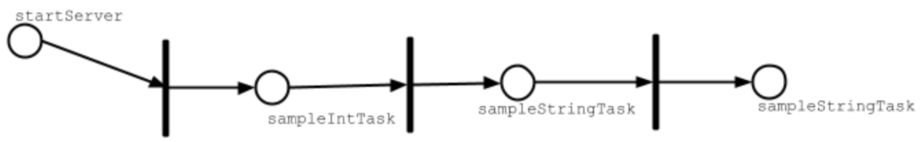


Figure 4: task-dependency

Scala

Scala , project/ServerUtil.scala , :

```
sampleIntTask := {
  ServerUtil.startServer
  try {
    val sum = 1 + 2
    println("sum: " + sum)
  } finally {
    ServerUtil.stopServer
  }
  sum
}
```

, ,

, ,

,

;

, build.sbt,

sbt

`build.sbt` , sbt sbt Scala sbt ?

`project` , , , `project` *sbt*

, `project/project/`

:

```
hello/                  #

    Hello.scala         #     (  src/main/scala)

    build.sbt           # build.sbt  project/

    project/            #

        Build.scala     #       ,

        build.sbt       #     --project/project  ;

        project/        #       ;

            Build.scala # project/project/
```

! `project/project/`

, `.scala` `.sbt` , `build.sbt` `Build.scala`

`project` `.scala` `project/Dependencies.scala`

```scala
import sbt._

object Dependencies {
  // Versions
  lazy val akkaVersion = "2.3.8"

  // Libraries
  val akkaActor = "com.typesafe.akka" %% "akka-actor" % akkaVersion
  val akkaCluster = "com.typesafe.akka" %% "akka-cluster" % akkaVersion
  val specs2core = "org.specs2" %% "specs2-core" % "2.4.17"

  // Projects
  val backendDeps =
    Seq(akkaActor, specs2core % Test)
}
```

Dependencies build.sbt val , Dependencies._

```
import Dependencies._

ThisBuild / organization := "com.example"
ThisBuild / version      := "0.1.0-SNAPSHOT"
ThisBuild / scalaVersion := "2.12.10"

lazy val backend = (project in file("backend"))
  .settings(
    name := "backend",
    libraryDependencies ++= backendDeps
  )
```

, ,

.scala

.scala , Scala ,

build.sbt , project/*.scala .scala scala

, project/*.scala ,

sbt, , , sbt sbt

,

sbt:

- Scala , Scala Programming in Scala,Scala
- .sbt
- Setting ,sbt Setting task

- `Setting`, key ::=,`+=` `++=`
- , ; , `Setting` sbt
- , key
- *tasks* , key value task Non-task
- Scopes
- key value, scope
- scope :configuration,project,task
- scope task configuration
- configuration , `Compile` `Test`
- project “ ” scope
- scopes scope
- `build.sbt` , `.scala` task
- sbt ,
-
- `addSbtPlugin` `project/plugins.sbt` (`build.sbt`)

, , sbt

!

sbt , !