

sbt Reference Manual

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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



Figure 1: Ubuntu Software & Updates Screenshot

Gentoo

```
sbt          ebuild          sbt ebuilds          ebuilds  sbt:
emerge dev-java/sbt
```

Hello, World

```
sbt
```

```
      sbt              hello ,          hw.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      :

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 (Win-
dows)

```

```

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 (prop-
erty), (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, producing the update report")
val clean = taskKey[Unit]("Deletes files produced by the build, such as generated sources, class files, etc.")

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.String, Boolean]]]
[info] | +-compile:dependencyClasspath = Task[scala.collection.Seq[sbt.Attributed[java.io.File]]]
[info] | | +-compile:dependencyClasspath::streams = Task[sbt.std.TaskStreams[sbt.Init$ScopedKey[_ <: Any]]]
[info] | | | +-*/:streamsManager = Task[sbt.std.Streams[sbt.Init$ScopedKey[_ <: Any]]]
[info] | | |
[info] | | +-compile:externalDependencyClasspath = Task[scala.collection.Seq[sbt.Attributed[java.io.File]]]
[info] | | | +-compile:externalDependencyClasspath::streams = Task[sbt.std.TaskStreams[sbt.Init$ScopedKey[_ <: Any]]]
[info] | | | | +-*/:streamsManager = Task[sbt.std.Streams[sbt.Init$ScopedKey[_ <: Any]]]
[info] | | | |
[info] | | | +-compile:managedClasspath = Task[scala.collection.Seq[sbt.Attributed[java.io.File]]]
[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", "-unchecked"),
  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 for

: 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      :

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 set-
ting( 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:fullClasspath
    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(*/*:fullClasspath)( ,      project      cur-
      rent,      Global      ; :*      “      project”      project      ; /*/*:fullClasspath
      test:fullClasspath      )

```

```

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

    inspect fullClasspath( inspect test:fullClasspath ) con-
figuration ,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, configu-
ration *( ),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 se-
quence,
    • +=
    • +=

, 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: :

```
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 set-
ting,    build-level setting    project-level setting

E:      :
```



```

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:      :

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"

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/snapshots"
    resolvers key Keys :
    val resolvers = settingKey[Seq[Resolver]]("resolvers")
    at Resolver
    sbt Maven :
    resolvers += "Local Maven Repository" at "file://" + Path.userHome.absolutePath + "/.m2/repository"
    , :
    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 , :
lazy val util = project

lazy val core = project
val      ID      ID      in      ,      :
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

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 config-
uration :dependsOn(bar % "compile->compile")
"compile->compile" -> "depends on", "test->compile" foo test
configuration bar compile configuration
->config ->compile, dependsOn(bar % "test") foo test configu-
ration 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 ,    ,
sampleIntTask ,    :
sampleIntTask := {
    val sum = 1 + 2    // first
    println("sum: " + sum) // second
    sum                // third
}

,JVM    sum 3,

    startServer stopServer, sampleIntTask, :

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  :

```

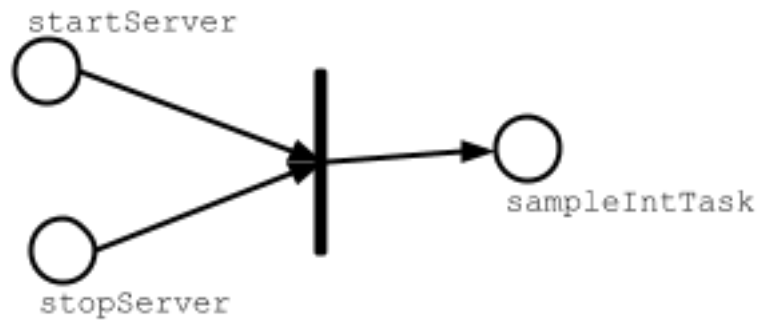


Figure 2: task-dependency

```

Scala> val startServer = sampleIntTask
val stopServer = sampleIntTask
val 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 :

```

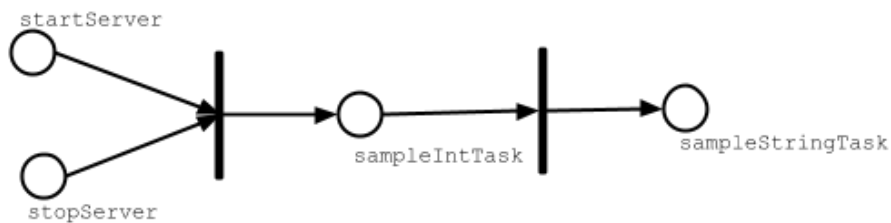


Figure 3: task-dependency

```

, 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

```

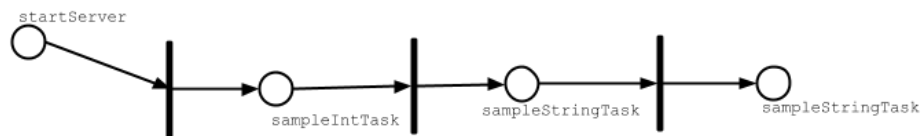


Figure 4: task-dependency

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
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 , !