

1. Introduction

Systems-Level Interactive Data Exploration (SLIDE) is a user-driven interactive visualization tool for large-scale -omics data. SLIDE can organize and visualize quantitative -omics data in expression based heatmaps on a standard web browser. It allows users to interactively navigate through the heatmaps and create sub-analyses of selected feature sets. It can be used to visualize the data at different levels of granularity through multiple simultaneous views.

This manual is a step-by-step installation and configuration guide for running SLIDE on macOS.

2. Installation

2.1 System requirements

SLIDE has been tested on various systems. The table below shows a typical system configuration that would work well with SLIDE:

Operating System	macOS 10.13 High Sierra
CPU	3.6GHz quad-core 7th-generation Intel Core i7 processor
Memory	16 GB RAM
Web browser	Safari, Chrome, Firefox for Mac

2.2 Prerequisites

SLIDE requires the following software to be available on the system before you can configure it to run. To install the prerequisites you must have administrative permissions. For detailed instructions with screen captures on installing the prerequisites, see [section 2.5](#). The process is also briefly described below.

Java Development Kit (JDK) <http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html>

For macOS, `jdk-8u151-macosx-x64.dmg` is the JDK installer

1. Double-click the downloaded Disk Image (DMG) file
2. Follow the screen instructions to install the JDK

GlassFish Server <http://download.oracle.com/glassfish/4.1.1/release/index.html>

1. Download `glassfish-4.1.1.zip`
2. Unzip the folder
3. Place it in your preferred installation directory

A detailed GlassFish server installation guide can be found in Page 12 of this [document](#).

MongoDB <https://www.mongodb.com/download-center#community>

To install MongoDB with the package manager Homebrew, issue the following commands at the *'Terminal'*

1. To install Homebrew
`/usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)"`
2. To update Homebrew
`brew update`
3. To install MongoDB
`brew install mongodb`

Detailed instructions to install MongoDB using Homebrew are available [here](#).

MongoDB requires creating a specific directory that it uses as its repository. The directory has to be created directly under root *'/'* directory. Enter the following commands at the *'Terminal'*:

1. To reach the root directory:
`cd ~`
2. To create the data directory
`sudo mkdir -p /data/db`
3. To change the directory permissions
`sudo install -m 0755 -o $USER -d /data/db`

Python

<https://www.anaconda.com/download/#macos>

Download Python 3.6 for macOS

Detailed installation instructions for Anaconda's implementation of Python are available [here](#).

Numpy (Python Package)

Anaconda's implementation of Python has Numpy pre-installed, so no additional configuration steps are required here. For other implementations of Python Numpy may have to be installed separately.

Scipy (Python Package)

<https://anaconda.org/anaconda/scipy>

To install Scipy:

1. Start *'Terminal'*.
2. Issue the following command:

```
conda install -c anaconda scipy
```

fastcluster (Python Package)

<https://anaconda.org/conda-forge/fastcluster>

To install fastcluster 1.1.23 use the following command in *'Terminal'*:

```
conda install -c conda-forge fastcluster
```

After the dependencies are installed, go to Section 2.3 for instruction on how to download and configure SLIDE.

2.3 SLIDE Download and Configuration

SLIDE can be downloaded from <https://github.com/soumitag/SLIDE/raw/master/application/slide.zip>. To install SLIDE unzip `slide.zip` into your preferred installation directory.

To setup SLIDE:

```
adminnuss-MacBook-Pro:slide adminnuss$ ./configure_slide.sh 1
Please provide path to java:
/Library/Java/JavaVirtualMachines/jdk1.8.0_151.jdk/Contents/Home/bin 2
/Users/adminnuss/Downloads/slide
/Library/Java/JavaVirtualMachines/jdk1.8.0_151.jdk/Contents/Home/bin
UNIX
Please Provide Path to Glassfish Server Installation Directory:
/Library/glassfish4/bin 3
Please Provide Path to the "bin" folder in MongoDB Installation Directory:
/usr/local/Cellar/mongodb/3.4.9/bin 4
Please Provide Path to python:
/Library/anaconda3/bin 5
Generating SLIDE configuration files...
Done.
Generating SLIDE web configuration files...
Done.
Checking python dependencies...
Python dependency check successful.
Done.
Creating executables...
Done.
Validating MongoDB storage...
Done.
Creating databases in MongoDB...
Importing collection 1 of 5...done
Importing collection 2 of 5...done
Importing collection 3 of 5...done
Importing collection 4 of 5...done
Importing collection 5 of 5...done
Done.
SLIDE configured successfully!
To start SLIDE run /Users/adminnuss/Downloads/slide/bin/start-slide.sh
To stop SLIDE run /Users/adminnuss/Downloads/slide/bin/stop-slide.sh
adminnuss-MacBook-Pro:slide adminnuss$
```

Figure 1. Configuring SLIDE

1. Run the `configure_slide.sh` file located inside the `slide` directory. To run the `.sh` file use the following command (as marked in 1 of **Figure 1**):

```
./configure_slide.sh
```

2. On running the `.sh` file you will be prompted to enter the following information:

- a. Path to Java Installation Directory

Provide the path to the folder containing the target `java` on your system as shown in 2 of **Figure 1**.

- b. Path to GlassFish Server Installation Directory

Provide the path to the “bin” folder inside the GlassFish Server Installation Directory as shown in 3 of **Figure 1**.

- c. Path to MongoDB Installation Directory

Provide the path to the “bin” folder inside the target MongoDB installation directory as shown in 4 of **Figure 1**.

- d. Path to Python Installation Directory

Provide the path to the directory containing the target `python` file as shown in 5 of **Figure 1**.

```
# correctly unless the script happens to be run from the GlassFish
installation
# directory.
#
AS_IMQ_LIB="../../mq/lib"
AS_IMQ_BIN="../../mq/bin"
AS_CONFIG="../../config"
AS_INSTALL="."
AS_DEF_DOMAINS_PATH="../../domains"
AS_DEF_NODES_PATH="../../nodes"
AS_DERBY_INSTALL="../../javadb"
AS_JAVA="/Library/Java/JavaVirtualMachines/jdk1.8.0_151.jdk/Contents/Home"
```

Figure 2. Updating `asenv.conf` to set the Java used by GlassFish

3. Set JDK path used by GlassFish Server

Append the following line to the `asenv.conf` file as shown in **Figure 2**:

```
AS_JAVA=/Library/Java/JavaVirtualMachines/jdk1.8.0_151.jdk/Contents/
Home/
```

(where `/Library/Java/JavaVirtualMachines/jdk1.8.0_151.jdk/Contents/`
`Home/` is the path to your JDK installation. Note that this path does not include the “bin” folder)

The `asenv.conf` file can be found in the `glassfish/config` folder inside GlassFish installation directory. For instance, if GlassFish is installed on your system at:

```
/Library/glassfish4 the asenv.conf file can be found at
/Library/glassfish4/glassfish/config/asenv.conf.
```

2.4 Start and Stop SLIDE

To start SLIDE run `/slide/bin/start-slide.sh`.

To start using SLIDE open Safari and go to <http://localhost:8080/VTBox/>.

To stop SLIDE run `/slide/bin/stop-slide.sh`.

2.5 Installing Dependencies

2.5.1 JDK Installation

Download the appropriate JDK 1.8 from

<http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html>

In the following figure, `jdk-8u151-macosx-x64.dmg` is the JDK installer for macOS.

Java SE Development Kit 8 Downloads

Thank you for downloading this release of the Java™ Platform, Standard Edition Development Kit (JDK™). The JDK is a development environment for building applications, applets, and components using the Java programming language.

The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.

See also:

- [Java Developer Newsletter](#): From your Oracle account, select **Subscriptions**, expand **Technology**, and subscribe to **Java**.
- [Java Developer Day hands-on workshops \(free\) and other events](#)
- [Java Magazine](#)

JDK 8u151 [checksum](#)
JDK 8u152 [checksum](#)

Java SE Development Kit 8u151

You must accept the [Oracle Binary Code License Agreement for Java SE](#) to download this software.
Thank you for accepting the Oracle Binary Code License Agreement for Java SE; you may now download this software.

Product / File Description	File Size	Download
Linux ARM 32 Hard Float ABI	77.9 MB	jdk-8u151-linux-arm32-vfp-hflt.tar.gz
Linux ARM 64 Hard Float ABI	74.85 MB	jdk-8u151-linux-arm64-vfp-hflt.tar.gz
Linux x86	168.95 MB	jdk-8u151-linux-i586.rpm
Linux x86	183.73 MB	jdk-8u151-linux-i586.tar.gz
Linux x64	166.1 MB	jdk-8u151-linux-x64.rpm
Linux x64	180.95 MB	jdk-8u151-linux-x64.tar.gz
macOS	247.06 MB	jdk-8u151-macosx-x64.dmg
Solaris SPARC 64-bit	140.06 MB	jdk-8u151-solaris-sparcv9.tar.Z
Solaris SPARC 64-bit	99.32 MB	jdk-8u151-solaris-sparcv9.tar.gz
Solaris x64	140.65 MB	jdk-8u151-solaris-x64.tar.Z
Solaris x64	97 MB	jdk-8u151-solaris-x64.tar.gz
Windows x86	198.04 MB	jdk-8u151-windows-i586.exe
Windows x64	205.95 MB	jdk-8u151-windows-x64.exe

Figure 3. JDK1.8 download

2.4.2 GlassFish Server Installation

To download GlassFish Server go to <http://download.oracle.com/glassfish/4.1.1/release/index.html> and follow the steps shown in Figures 5 and 6.





	Name	Last modified	Size
	Parent Directory		-
	nightly/	Jan 12 2017	-
	promoted/	Sep 19 2015	-
	release/	Sep 24 2015	-

Figure 4. GlassFish Server download step 1






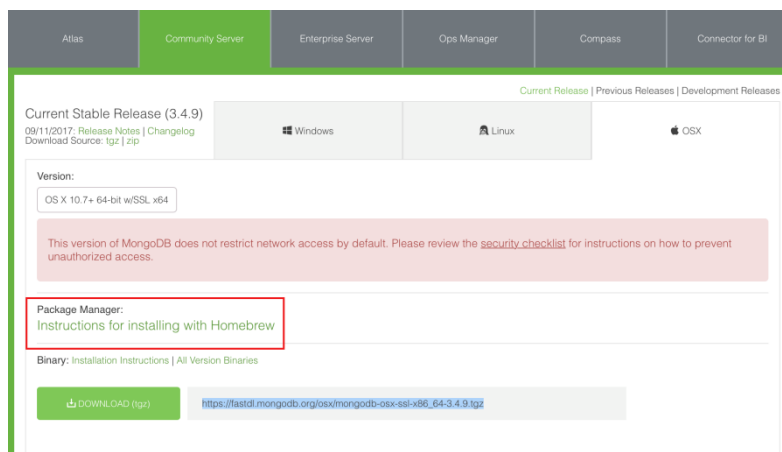
	Name	Last modified	Size
	Parent Directory		-
	version-info-4.1.1.txt	Sep 24 2015	112
	nucleus-4.1.1.zip	Sep 24 2015	20M
	glassfish-4.1.1.zip	Sep 24 2015	105M
	glassfish-4.1.1-web.zip	Sep 24 2015	58M

Figure 5. GlassFish Server download step 2

2.4.3 MongoDB Installation

Download the OSX MongoDB installation from <https://www.mongodb.com/download-center#community> as shown in **Figure 6**.



The screenshot shows the MongoDB download page for the community server. The 'Community Server' tab is selected. Under 'Current Stable Release (3.4.9)', the 'OSX' platform is chosen. A red box highlights the 'Package Manager' section, which includes the text 'Instructions for installing with Homebrew'. Below this, there is a 'Binary' section with a link to the installation instructions. At the bottom, there is a 'DOWNLOAD (tgz)' button and a direct download link: https://fastdl.mongodb.org/osx/mongodb-osx-ssl-x64_64-3.4.9.tgz.

Figure 6. MongoDB download

Follow the instructions for installing MongoDB with the package manager Homebrew

To install Homebrew copy and paste the following command in 'Terminal' as shown in **Figure 7**

```
/usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)" "
```

After Homebrew installation issue the following command in ‘Terminal’ as shown in **Figure 8**

```
brew update
```

```
brew install mongodb
```

```
adminnuss-MacBook-Pro:~ adminnuss$ brew update
-bash: brew: command not found
adminnuss-MacBook-Pro:~ adminnuss$ /usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)"
==> This script will install:
/usr/local/bin/brew
/usr/local/share/doc/homebrew
/usr/local/share/man/man1/brew.1
/usr/local/share/zsh/site-functions/_brew
/usr/local/etc/bash_completion.d/brew
/usr/local/Homebrew
==> The following new directories will be created:
/usr/local/Cellar
/usr/local/Homebrew
/usr/local/Frameworks
/usr/local/bin
/usr/local/etc
/usr/local/include
/usr/local/lib
/usr/local/opt
/usr/local/sbin
/usr/local/share
/usr/local/share/zsh
/usr/local/share/zsh/site-functions
/usr/local/var
```

Figure 7. Homebrew installation

```
==> Installation successful!

==> Homebrew has enabled anonymous aggregate user behaviour analytics.
Read the analytics documentation (and how to opt-out) here:
https://docs.brew.sh/Analytics.html

==> Next steps:
- Run 'brew help' to get started
- Further documentation:
https://docs.brew.sh
adminnuss-MacBook-Pro:~ adminnuss$ brew update
Already up-to-date.
adminnuss-MacBook-Pro:~ adminnuss$ brew install mongodb
==> Installing dependencies for mongodb: openssl
==> Installing mongodb dependency: openssl
==> Downloading https://homebrew.bintray.com/bottles/openssl-1.0.21.high_sierra.bottle.tar.gz
##### 79.0%
```

Figure 8. MongoDB installation

2.4.4 Anaconda Python Installation

Download Python 3.6 from <https://www.anaconda.com/download/#macos>.

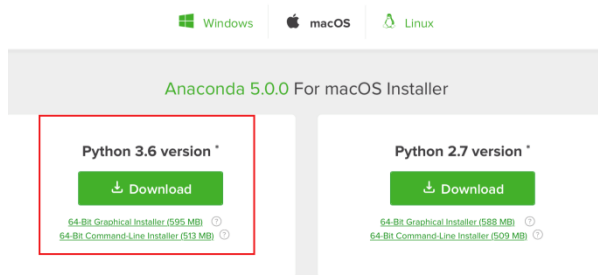


Figure 9. Anaconda download

2.4.5 Scipy Installation

For the installation of Python package Scipy, open a ‘Terminal’ and issue the command as highlighted in red in **Figure 10**.

```

[adminnuss-MacBook-Pro:~ adminnuss$ conda install -c anaconda scipy
Fetching package metadata .....
Solving package specifications: .

Package plan for installation in environment /Library/anaconda3:

The following packages will be UPDATED:

    conda:         4.3.27-py36hb556a21_0 --> 4.3.30-py36h173c244_0 anaconda

The following packages will be SUPERSEDED by a higher-priority channel:

    conda-env: 2.6.0-h36134e3_0 --> 2.6.0-h36134e3_0 anaconda
    scipy:      0.19.1-py36h3e758e1_3 --> 0.19.1-py36h3e758e1_3 anaconda

Proceed ([y]/n)? y

conda-env-2.6. 100% |#####|
scipy-0.19.1-p 100% |#####|
conda-4.3.30-p 100% |#####|

```

Figure 10. Conda install Anaconda Scipy

2.4.6 fastcluster Installation

For the installation of Python package fastcluster, open a *Terminal* and issue the command as highlighted in red in **Figure 11**.

```

[adminnuss-MacBook-Pro:~ adminnuss$ conda install -c conda-forge fastcluster
Fetching package metadata .....
Solving package specifications: .

Package plan for installation in environment /Library/anaconda3:

The following NEW packages will be INSTALLED:

    fastcluster: 1.1.23-np113py36_0 conda-forge

The following packages will be SUPERSEDED by a higher-priority channel:

    conda:         4.3.30-py36h173c244_0 anaconda --> 4.3.29-py36_0 conda-forge
    conda-env:     2.6.0-h36134e3_0 anaconda --> 2.6.0-0 conda-forge

Proceed ([y]/n)? y

conda-env-2.6. 100% |#####|
fastcluster-1. 100% |#####|
conda-4.3.29-p 100% |#####|
adminnuss-MacBook-Pro:~ adminnuss$ █

```

Figure 11. Conda install fastcluster package