

Quick Installation Guide for Layman: DSpace 4.x on Linux (CentOS 6.x)

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Disclaimer: This Guide has been adapted from <http://www.dspace.org> with an intension to provide set of instructions to participants of DSpace workshop as well as novice users, any feedback to author will be appreciated.

Preparing your System for DSpace(Pre-requisites).

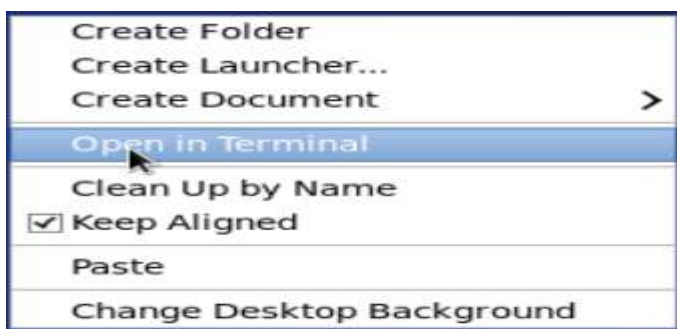
As per standard installation guide you will need Java(JDK), Apache Tomcat, Apache Maven, Apache Ant, PostgreSQL and DSpace source.

You can download the same from following URLS (Look for appropriate versions 32/64 bits as per your OS)

JAVA (JDK)	http://www.oracle.com/technetwork/java/javase/downloads/index.html (Choose JAVA SE 7xXX, JDK)
Apache Tomcat	http://tomcat.apache.org/download-70.cgi
Apache Maven	http://maven.apache.org/download.html
Apache Ant	http://ant.apache.org/bindownload.cgi
PostgreSQL	http://www.enterprisedb.com/products-services-training/pgdownload
DSpace	http://sourceforge.net/projects/dspace/files/DSpace%20Stable/4.0/dspace-4.0-src-release.zip/download

This files are available and kept in folder /opt/source

To reach to that folder “Right Click” on your Linux desktop and Choose “Open in Terminal”



In terminal window go to /opt/source directory

```
[root@centos Desktop]# cd /opt/source/
```

To see what all sources, perform list command

```
[root@centos source]# ls -al
total 185216
drwxr-xr-x. 2 root root      4096 Dec 18 15:12 .
drwxr-xr-x. 8 root root      4096 Dec 18 15:15 ..
-rw-r--r--. 1 root root 5512093 Dec 18 13:15 apache-ant-1.9.2-bin.tar.gz
-rw-r--r--. 1 root root 5494427 Dec 18 13:18 apache-maven-3.1.1-bin.tar.gz
-rw-r--r--. 1 root root 8234674 Dec 18 13:17 apache-tomcat-7.0.47.tar.gz
-rw-r--r--. 1 root root 11051801 Dec 18 13:06 dspace-4.0-src-release.zip
-rw-r--r--. 1 root root 122585894 Dec 18 13:20 jdk-7u45-linux-x64.rpm
-rw-r--r--. 1 root root 36757638 Dec 18 13:20 postgresql-9.3.2-1-linux-x64.run
[root@centos source]#
```

It is recommended to keep all source file intact, while installing we will copy each file to /opt directory and perform further steps.

First of all prepare your system for Java

Copy jdk installer file to /opt

```
[root@centos source]# cd /opt
[root@centos opt]# cp source/jdk-7u45-linux-x64.rpm .
```

Now we need to give “execute” permission to the source file (by default it is having only read permission)

```
[root@centos opt]# chmod a+x jdk-7u45-linux-x64.rpm
```

run the installer,

```
[root@centos opt]# rpm -ivh jdk-7u45-linux-x64.rpm
Preparing...                               ##### [100%]
 1:jdk                                       ##### [100%]
Unpacking JAR files...
  rt.jar...
  jsse.jar...
  charsets.jar...
  tools.jar...
  localedata.jar...
  jfxrt.jar...
```

and follow the instructions

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Now Check, Which Java you are running by

```
[root@centos opt]# java -version
java version "1.7.0_45"
OpenJDK Runtime Environment (rhel-2.4.3.3.el6-x86_64 u45-b15)
OpenJDK 64-Bit Server VM (build 24.45-b08, mixed mode)
[root@centos opt]# █
```

Is it the Java which you installed? Naaah..!, We have not installed OpenJDK, we attempted JAVA SE. **Where is JDK you have installed?**

It will be installed as default at...

```
/usr/java/jdk1.7.0_45/
```

You may need to **change Java configuration file and explicitly tell your system**, from where java should be executed, to do this install your flavor of java as alternatives.

```
[root@centos jdk1.7.0_45]# alternatives --install /usr/bin/java java /usr/java/jdk1.7.0_45/bin/java 2 █
```

And, tell your system, from where it should execute java..

```
[root@centos jdk1.7.0_45]# alternatives --config java
There are 3 programs which provide 'java'.

  Selection    Command
-----
*+ 1           /usr/lib/jvm/jre-1.7.0-openjdk.x86_64/bin/java
   2           /usr/lib/jvm/jre-1.6.0-openjdk.x86_64/bin/java
   3           /usr/java/jdk1.7.0_45/bin/java

Enter to keep the current selection[+], or type selection number: 3 █
```

Again, verify the version.

```
[root@centos bin]# java -version
java version "1.7.0_45"
Java(TM) SE Runtime Environment (build 1.7.0_45-b18)
Java HotSpot(TM) 64-Bit Server VM (build 24.45-b08, mixed mode)
[root@centos bin]# █
```

We have the java, the way we wanted..

Now its time to install Apache siblings i.e. Apache Maven, Apache Ant and Apache Tomcat.

To **Install Maven**, proceed with following step.

Copy to /opt

```
[root@centos opt]# cd /opt
[root@centos opt]# cp source/apache-maven-3.1.1-bin.tar.gz . █
```

Untar and inflate

```
[root@centos opt]# tar -xvf apache-maven-3.1.1-bin.tar.gz
```

You will have maven installed in /opt/apache-maven-3.1.1

To install **Apache Ant**, Same as above.

Copy to /opt and inflate by following command sequence

```
[root@centos opt]# cp source/apache-ant-1.9.2-bin.tar.gz .  
[root@centos opt]# tar -xvf apache-ant-1.9.2-bin.tar.gz
```

It will get installed in /opt/apache-ant-1.9.2

Same process will be applied for **Installing Apache Tomcat**.

```
[root@centos opt]# cp source/apache-tomcat-7.0.47.tar.gz .  
[root@centos opt]# tar -xvf apache-tomcat-7.0.47.tar.gz
```

It will get installed in /opt/apache-tomcat-7.0.47

Now it is time to tell your linux, that where it can find Maven, Ant and Tomcat. To do this, you will need to set environment of your linux system by putting **appropriate environment variables** (and PATHs).

Generally when a user logs in, environment variables are set from various places. That includes /etc/profile (for all users). /etc/profile.d/ is a good place to put your application specific setups. To do this go to

```
[root@centos opt]# cd /etc/profile.d/
```

Create a new file called java.sh (or any other file with “.sh” extension)

```
[root@centos profile.d]# vim java.sh
```

And place the following lines in that file (double check the paths you are entering)

```
#!/bin/bash  
JAVA_HOME=/usr/java/jdk1.7.0_45  
ANT_HOME=/opt/apache-ant-1.9.2  
CATALINA_HOME=/opt/apache-tomcat-7.0.47  
MAVEN_HOME=/opt/apache-maven-3.1.1  
  
PATH=$JAVA_HOME/bin:$ANT_HOME/bin:$MAVEN_HOME/bin:$PATH  
  
export PATH JAVA_HOME ANT_HOME MAVEN_HOME  
export CLASSPATH=.
```

exit the file with <esc>: wq! (Write and Quit)

```
:wq!
```

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Give execute the permission to the file which you have created

```
[root@centos profile.d]# chmod +x java.sh
```

Give the effect to the OS by executing following command

```
[root@centos profile.d]# source java.sh
```

Doing above process (i.e. putting shell script in /etc/profile.d) will also ensure that every time system boots up/user logs in, environment variable will be set.

Now, its time to check what we did.

```
[root@centos profile.d]# echo $JAVA_HOME
/usr/java/jdk1.7.0_45
[root@centos profile.d]# echo $CATALINA_HOME
/opt/apache-tomcat-7.0.47
[root@centos profile.d]# ant -version
Apache Ant(TM) version 1.9.2 compiled on July 8 2013
[root@centos profile.d]# mvn -version
Apache Maven 3.1.1 (0728685237757ffbf44136acec0402957f723d9a; 2013-09-17 20:52:22+0530)
Maven home: /opt/apache-maven-3.1.1
Java version: 1.7.0_45, vendor: Oracle Corporation
Java home: /usr/java/jdk1.7.0_45/jre
Default locale: en_US, platform encoding: UTF-8
OS name: "linux", version: "2.6.32-431.el6.x86_64", arch: "amd64", family: "unix"
[root@centos profile.d]#
```

Output of command sequence will first **check for JAVA_HOME**(which is necessary to run tomcat and some java applications), Then **CATALINA_HOME** will tell the system where your tomcat is, Next is to verify **Ant** version followed by **Maven** version, its installation path and which java it takes.

You can start default Tomcat server by executing following command sequence

```
[root@centos profile.d]# cd $CATALINA_HOME/bin
[root@centos bin]# ./startup.sh
Using CATALINA_BASE:   /opt/apache-tomcat-7.0.47
Using CATALINA_HOME:   /opt/apache-tomcat-7.0.47
Using CATALINA_TMPDIR: /opt/apache-tomcat-7.0.47/temp
Using JRE_HOME:        /usr/java/jdk1.7.0_45
Using CLASSPATH:       /opt/apache-tomcat-7.0.47/bin/bootstrap.jar:/opt/apache-tomcat-7.0.47/bin/tomcat-juli.jar
[root@centos bin]#
```

You can check whether your tomcat is running or not by putting <http://localhost:8080/> in address bar of your browser



To shut down your tomcat instance issue following command

```
[root@centos bin]# ./shutdown.sh
Using CATALINA_BASE:   /opt/apache-tomcat-7.0.47
Using CATALINA_HOME:   /opt/apache-tomcat-7.0.47
Using CATALINA_TMPDIR: /opt/apache-tomcat-7.0.47/temp
Using JRE_HOME:        /usr/java/jdk1.7.0_45
Using CLASSPATH:       /opt/apache-tomcat-7.0.47/bin/bootstrap.jar:/opt/apache-tomcat-7.0.47/bin/tomcat-juli.jar
[root@centos bin]#
```

We will attempt to install PostgreSQL (if your operating system doesn't contain it by default)

Copy installer file to /opt

Make it executable and execute. !

```
[root@centos bin]# cd /opt
[root@centos opt]# cp source/postgresql-9.3.2-1-linux-x64.run .
[root@centos opt]# chmod +x postgresql-9.3.2-1-linux-x64.run
[root@centos opt]# ./postgresql-9.3.2-1-linux-x64.run
```

You will get a GUI based installer



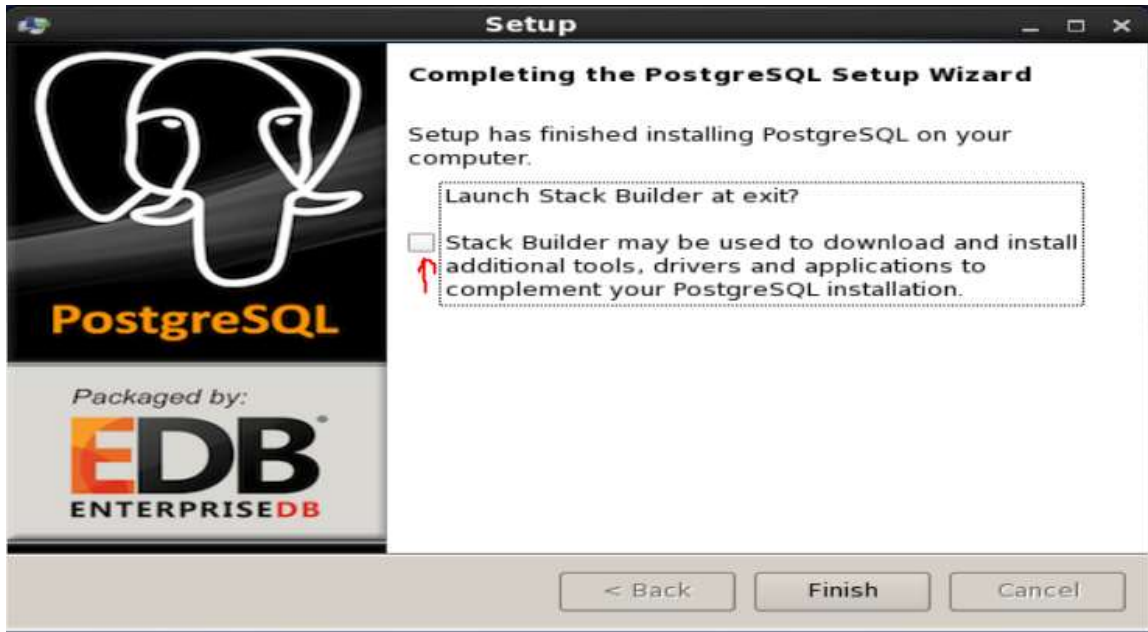
Please follow the interactive installation instructions for installation and data path (**Its better to note it down somewhere so we can find it later**), while proceeding you will be prompted to enter password for postgres account (Don't forget to remember!!), this will be superuser for your database.



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Here, an account with username 'postgres' will be created in your OS with the password supplied by you. Proceed further and enter port and other information asked by installer (better to keep as it is !)

Once installation is completed you will be prompted with following screen. Uncheck the "Stack Builder...." Thing, we don't need anything additional at this point of time.



[Another Option to install Postgresql would be (This requires internet connection), Postgres installation files will be downloaded from online repository and will get installed to your OS. To do this
#yum install postgres*

Now we will tune postgres to suite our requirement for DSpace.

To do this first we need to edit host configuration file to allow access to dspace user to dspace database without hassle on localhost , perform the following command sequence

```
[root@centos Desktop]# cd /opt/PostgreSQL/9.3/data/  
[root@centos data]# vim pg_hba.conf
```

Add the line "host<tab> dspace<tab> dspace<tab>127.0.0.1/32<tab> md5 " as shown below,

```
# IPv4 local connections:  
host    dspace      dspace      127.0.0.1/32      md5  
host    all          all         127.0.0.1/32      md5  
# IPv6 local connections:
```

Please **restart postgres** service

```
[root@centos data]# service postgresql-9.3 restart  
Restarting PostgreSQL 9.3:  
waiting for server to shut down.... done  
server stopped  
waiting for server to start.... done  
server started  
PostgreSQL 9.3 restarted successfully  
[root@centos data]#
```

It would be also appropriate to add postgres to your PATH environment variable so you can execute various postgres commands, to do this , recall the file we have created earlier “java.sh” , open the same in editor

```
[root@centos data]# vim /etc/profile.d/java.sh
```

and edit PATH as following

```
PATH=/opt/PostgreSQL/9.3/bin:$JAVA_HOME/bin:$ANT_HOME/bin:$MAVEN_HOME/bin:$PATH
```

save java.sh and give effect to your system environment by

```
PATH=/opt/PostgreSQL/9.3/bin:$JAVA_HOME/bin:$ANT_HOME/bin:$MAVEN_HOME/bin:$PATH
```

Dspace Installation:

The first thing we need to do at this stage is to **create an operating system user** named “dspace”

```
[root@centos data]# useradd -m dspace
```

Now we will attempt to create “dspace” user for database and a database named “dspace” owned by “dspace” user,

To create user

```
[root@centos data]# createuser -U postgres -d -A -P dspace
Enter password for new role: enter password for dspace database
Enter it again: enter password for dspace database
Password: enter your postgres user's password
[root@centos data]#
```

To create database

```
[root@centos data]# createdb -U dspace -E UNICODE dspace
Password: put your dspace password
[root@centos data]#
```

Now we will attempt **actual installation**.

Copy your dspace file to your root (/) folder (you may choose any other folder too..)

```
[root@centos /]# cd /
[root@centos /]# cp /opt/source/dspace-4.0-src-release.zip .
[root@centos /]#
```

As the file is in zip format, inflate the same .

```
[root@centos /]# unzip dspace-4.0-src-release.zip
```

We will also required to create **one more directory at root** , named “dspace” , which will **contain actual DSpace** application files.(or your dspace installation).

```
[root@centos /]# mkdir dspace
```

Now we need to **change the ownership of both the directories** as they will get operated by “dspace” user. The present permissions are with root.

```
[root@centos /]# chown dspace.dspace dspace/ -R
[root@centos /]# chown dspace.dspace dspace-4.0-src-release/ -R
```



Now dspace user will have full permission for above mentioned directories and its sub directories you can verify the same by using “ls -al” command.

```
drwxr-xr-x.  2 dspace dspace    4096 Dec 18 17:51 dspace
drwxr-xr-x. 14 dspace dspace    4096 Dec 16 15:10 dspace-4.0-src-release
```

Now take control as dspace user and go to source folder (/dspace-4.0-src-release)

```
[root@centos ~]# su dspace
[dspace@centos ~]$ cd /dspace-4.0-src-release
```

Edit build.properties to tell dspace, about configuration settings.

```
[dspace@centos dspace-4.0-src-release]$ vim build.properties
```

Change at least following things

```
dspace.url = ${dspace.baseUrl}/jspui
dspace.name = DSpace at INFLIBNET Workshop
db.username = dspace
db.password = dspace (or whatever you have chosen)
mail.server = <will tell you in lab>
mail.from.address : your@email.com
feedback.recipient: your@email.com
mail.admin: your@email.com
```

and save your file.

Its time for compilation now, to do this go to dspace release folder. And execute

```
[dspace@centos dspace-4.0-src-release]$ mvn package
```

begin the compilation by (Please ensure that your system is connected to internet otherwise, things will not work as you want)

```
[dspace@centos dspace-4.0-src-release]$ mvn package
[INFO] Scanning for projects...
Downloading: http://oss.sonatype.org/content/repositories/releases/org/sonatype/oss/oss-parent/7/oss-parent-7.pom
Downloading: http://repo.maven.apache.org/maven2/org/sonatype/oss/oss-parent/7/oss-parent-7.pom
Downloaded: http://repo.maven.apache.org/maven2/org/sonatype/oss/oss-parent/7/oss-parent-7.pom (5 KB at 2.3 KB/sec)
[INFO] -----
[INFO] Reactor Build Order:
[INFO]
[INFO] DSpace Parent Project
[INFO] DSpace Services Framework :: API and Implementation
[INFO] DSpace Kernel :: API and Implementation
[INFO] DSpace Addon Modules
[INFO] DSpace Kernel :: Additions and Local Customizations
[INFO] DSpace XML-UI (Manakin)
[INFO] DSpace XML-UI (Manakin) :: Local Customizations
[INFO] DSpace LNI
```

It should begin the downloading

Wait for confirmation....!

```
[INFO] DSpace SWORD ..... SUCCESS [10.531s]
[INFO] DSpace SWORD :: Local Customizations ..... SUCCESS [13.253s]
[INFO] DSpace SWORD v2 ..... SUCCESS [57.074s]
[INFO] DSpace SWORD v2 :: Local Customizations ..... SUCCESS [13.253s]
[INFO] Apache Solr Webapp ..... SUCCESS [2:38.416s]
[INFO] DSpace SOLR :: Local Customizations ..... SUCCESS [24.337s]
[INFO] DSpace OAI 2.0 ..... SUCCESS [28.695s]
[INFO] DSpace OAI 2.0 :: Local Customizations ..... SUCCESS [24.623s]
[INFO] DSpace Assembly and Configuration ..... SUCCESS [1:29.220s]
[INFO] DSpace LNI :: CLI Client Application ..... SUCCESS [32.889s]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 23:41.895s
[INFO] Finished at: Wed Dec 18 18:22:06 IST 2013
[INFO] Final Memory: 59M/241M
[INFO] -----
[dspace@centos dspace-4.0-src-release]$
```

Now, go to build directory,

```
[dspace@centos dspace-4.0-src-release]$ cd /dspace-4.0-src-release/dspace/target/dspace-4.0-build/
```

issue “ant fresh_install” command.

```
[dspace@centos dspace-4.0-build]$ ant fresh install
```

wait for most “awaited” message...!

```
BUILD SUCCESSFUL
Total time: 2 minutes 15 seconds
[dspace@centos dspace-4.0-build]$
```

We need to proceed for **administrator account for dspace**.

```
[root@centos dspace-4.0-build]# /dspace/bin/dspace create-administrator
```

```
Creating an initial administrator account
E-mail address: yatrik@inflibnet.ac.in
First name: Yatrik
Last name: Patel
WARNING: Password will appear on-screen.
Password: password
Again to confirm: password
Is the above data correct? (y or n):
```

Now its **time to tell tomcat where your dspace is**, there are several approaches to do this, we will create use “context path”, **get back as root, go to your tomcat’s** installations config folder and create a new file jspui.xml as following (**Ensure that your tomcat is stopped! You know how to stop...**)

```
[root@centos /]# vim /opt/apache-tomcat-7.0.47/conf/Catalina/localhost/jspui.xml
```

add the lines as shown below.. and save

```
<?xml version='1.0'?>
<Context
  docBase="/dspace/webapps/jspui"
  debug="0"
  reloadable="true"
  cachingAllowed="false"
  allowLinking="true"/>
```

Do the same thing for "solr"

```
[root@centos ~]# vim /opt/apache-tomcat-7.0.47/conf/Catalina/localhost/solr.xml
```

```
<?xml version='1.0'?>
<Context
  docBase="/dspace/webapps/solr"
  debug="0"
  reloadable="true"
  cachingAllowed="false"
  allowLinking="true"/>
```

[You can use same approach for other interfaces like xmlui,oai etc.]

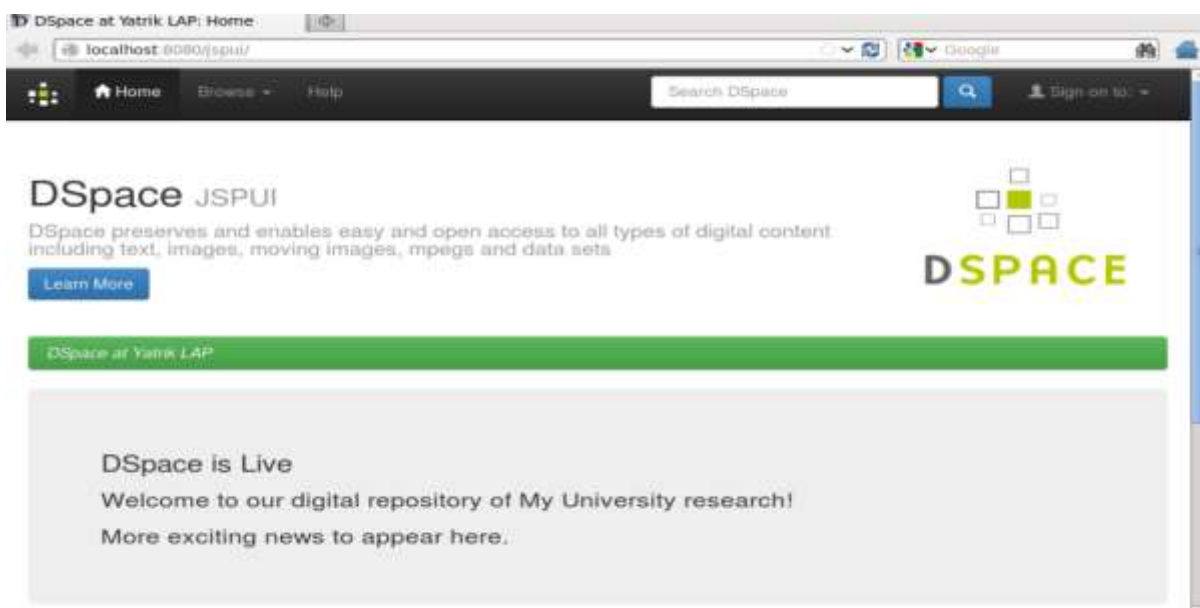
Now it's time to **change permission of tomcat owner**, so the **tomcat can be executed by dspace user**

```
[root@centos opt]# chown dspace.dspace apache-tomcat-7.0.47/ -R
```

Again **take control as dspace**, and **start tomcat**

```
[root@centos opt]# su dspace
[dspace@centos opt]$ $CATALINA_HOME/bin/startup.sh
Using CATALINA_BASE:   /opt/apache-tomcat-7.0.47
Using CATALINA_HOME:   /opt/apache-tomcat-7.0.47
Using CATALINA_TMPDIR: /opt/apache-tomcat-7.0.47/temp
Using JRE_HOME:        /usr/java/jdk1.7.0_45
Using CLASSPATH:       /opt/apache-tomcat-7.0.47/bin/bootstrap.jar:/opt/apache-tomcat-7.0.47/bin/tomcat-juli.jar
[dspace@centos opt]$
```

Finally The moment of truth



As per theory of “karma” every action produces an equal and opposite reaction. Every time we think or do something, we create a cause, which in time will bear its corresponding effects. So, if you don’t get desired results or effect, re-think about your “karma” of installing dspace, try to correct your “karma” and you will get the result.