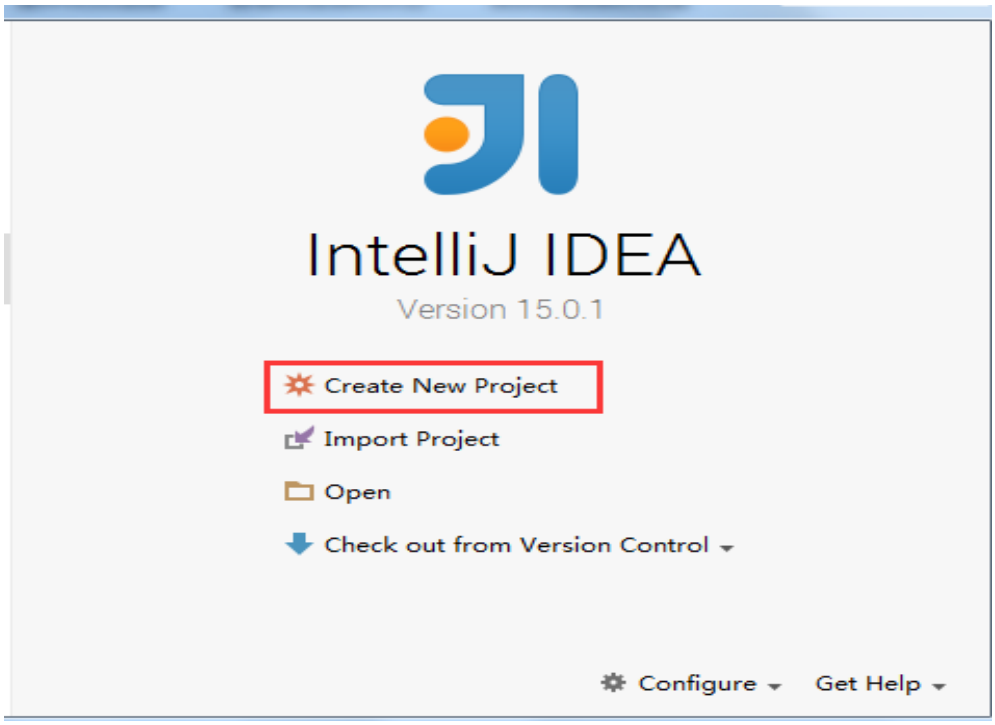
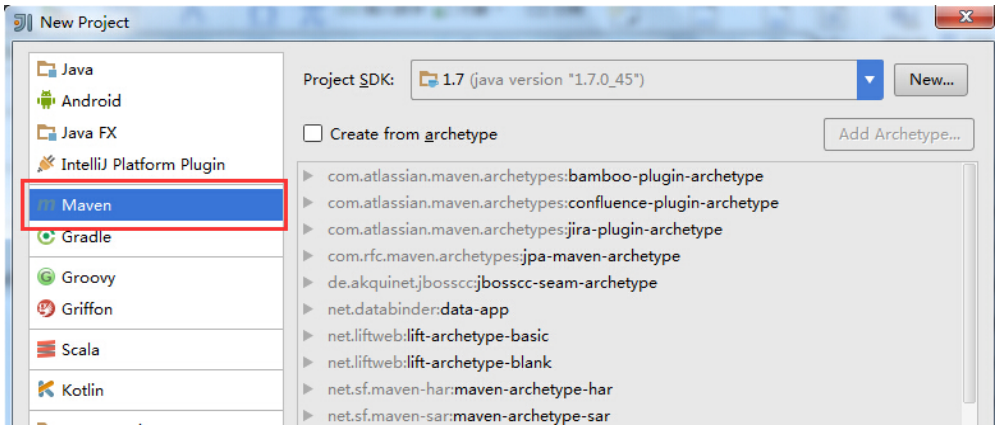
1. 在 IDEA 中编写 WordCount 程序

spark shell 仅在测试和验证程序时使用较多，而生产环境通常会在 IDEA 中编写程序，然后打成 jar 包提交到集群运行。最常用的是创建一个 Maven 项目，利用 Maven 来管理 jar 包的依赖。

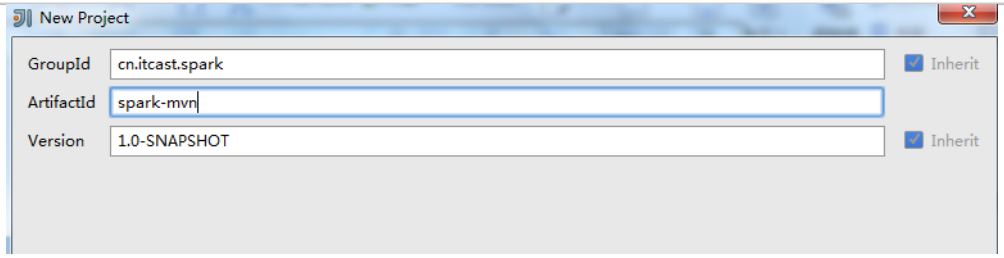
1.创建项目



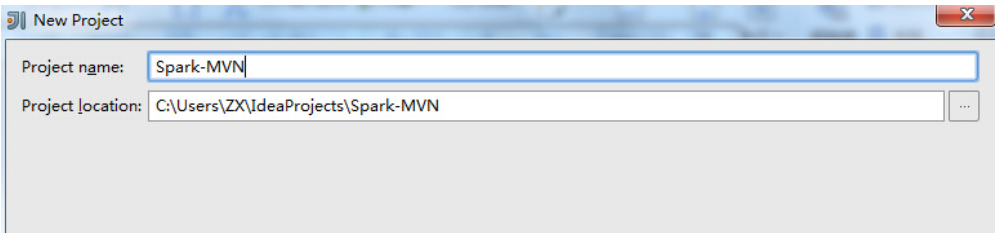
2.选择 Maven 项目，然后点击 next



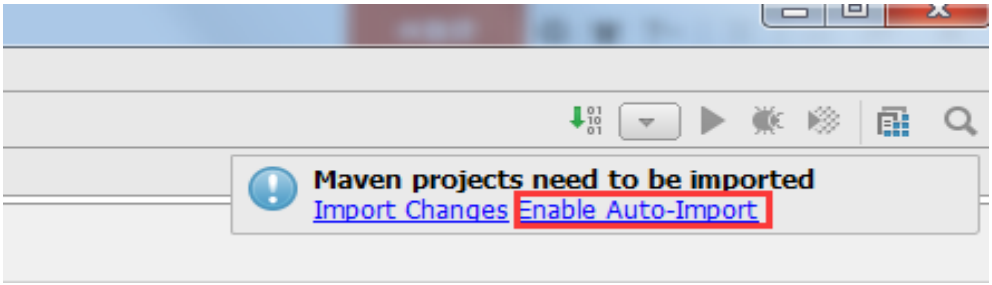
3.填写 maven 的 GAV，然后点击 next



4.填写项目名称，然后点击 finish



5.创建好 maven 项目，点击 Enable Auto-Import



6.配置 Maven 的 pom.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>

    <groupId>cn.itcast.spark</groupId>
    <artifactId>spark-mvn</artifactId>
    <version>1.0-SNAPSHOT</version>

    <properties>
        <maven.compiler.source>1.7</maven.compiler.source>
        <maven.compiler.target>1.7</maven.compiler.target>
        <encoding>UTF-8</encoding>
        <scala.version>2.10.6</scala.version>
        <scala.compat.version>2.10</scala.compat.version>
    </properties>
```

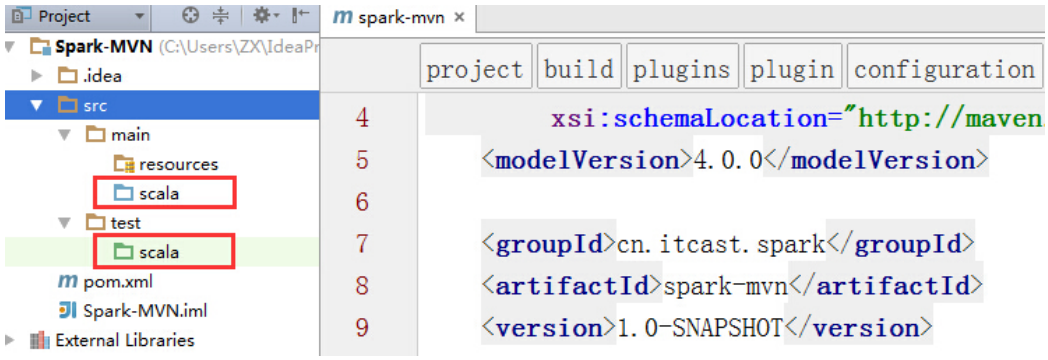
```
<dependencies>
    <dependency>
        <groupId>org.scala-lang</groupId>
        <artifactId>scala-library</artifactId>
        <version>${scala.version}</version>
    </dependency>

    <dependency>
        <groupId>org.apache.spark</groupId>
        <artifactId>spark-core_2.10</artifactId>
        <version>1.5.2</version>
    </dependency>

    <dependency>
        <groupId>org.apache.spark</groupId>
        <artifactId>spark-streaming_2.10</artifactId>
        <version>1.5.2</version>
    </dependency>

    <dependency>
        <groupId>org.apache.hadoop</groupId>
        <artifactId>hadoop-client</artifactId>
        <version>2.6.2</version>
    </dependency>
</dependencies>

<build>
    <sourceDirectory>src/main/scala</sourceDirectory>
    <testSourceDirectory>src/test/scala</testSourceDirectory>
    <plugins>
        <plugin>
            <groupId>net.alchim31.maven</groupId>
            <artifactId>scala-maven-plugin</artifactId>
            <version>3.2.0</version>
            <executions>
                <execution>
                    <goals>
                        <goal>compile</goal>
```

```
                    <goal>testCompile</goal>
                </goals>
                <configuration>
                    <args>
                        <arg>-make:transitive</arg>
                        <arg>-dependencyfile</arg>
                        <arg>${project.build.directory}/.scala_dependencies</arg>
                    </args>
                </configuration>
            </execution>
        </executions>
    </plugin>
    <plugin>
        <groupId>org.apache.maven.plugins</groupId>
        <artifactId>maven-surefire-plugin</artifactId>
        <version>2.18.1</version>
        <configuration>
            <useFile>false</useFile>
            <disableXmlReport>true</disableXmlReport>
            <includes>
                <include>**/*Test.*</include>
                <include>**/*Suite.*</include>
            </includes>
        </configuration>
    </plugin>

    <plugin>
        <groupId>org.apache.maven.plugins</groupId>
        <artifactId>maven-shade-plugin</artifactId>
        <version>2.3</version>
        <executions>
            <execution>
                <phase>package</phase>
                <goals>
                    <goal>shade</goal>
                </goals>
                <configuration>
                    <filters>
```

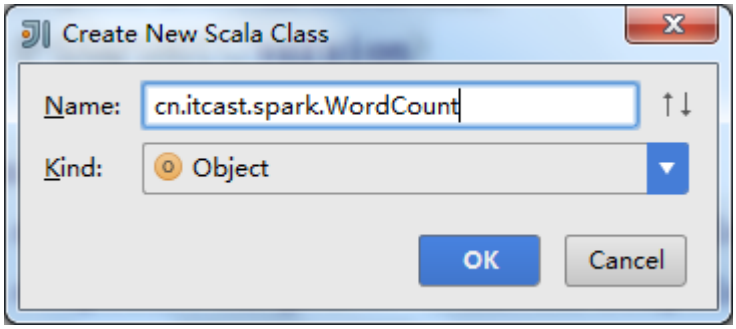
```
                                <filter>
                                    <artifact>*:*</artifact>
                                    <excludes>
                                        <exclude>META-INF/*.SF</exclude>
                                        <exclude>META-INF/*.DSA</exclude>
                                        <exclude>META-INF/*.RSA</exclude>
                                    </excludes>
                                </filter>
                            </filters>
                            <transformers>
                                <transformer
implementation="org.apache.maven.plugins.shade.resource.ManifestResourceTransformer">
                                    <mainClass>cn.itcast.spark.WordCount</mainClass>
                                </transformer>
                            </transformers>
                        </configuration>
                    </execution>
                </executions>
            </plugin>
        </plugins>
    </build>
</project>
```

7.将 src/main/java 和 src/test/java 分别修改成 src/main/scala 和 src/test/scala，与 pom.xml 中的配置保持一致

```
44
45      <build>
46          <sourceDirectory>src/main/scala</sourceDirectory>
47          <testSourceDirectory>src/test/scala</testSourceDirectory>
48          <plugins>
49              <plugin>
50                  <groupId>net.alchim31.maven</groupId>
51                  <artifactId>scala-maven-plugin</artifactId>
52                  <version>3.2.0</version>
53                  <executions>
```



8.新建一个 scala class，类型为 Object



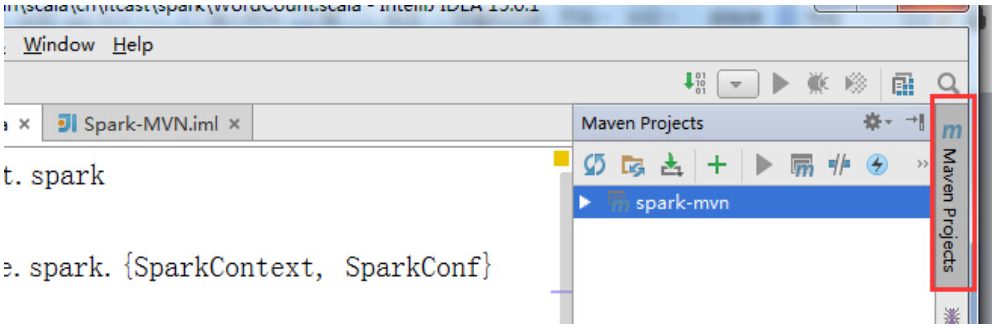
9.编写 spark 程序

```
package cn.itcast.spark


import org.apache.spark.{SparkContext, SparkConf}


object WordCount {
  def main(args: Array[String]) {
    //创建 SparkConf()并设置 App 名称
    val conf = new SparkConf().setAppName("WC")
    //创建 SparkContext，该对象是提交 spark App 的入口
    val sc = new SparkContext(conf)
    //使用 sc 创建 RDD 并执行相应的 transformation 和 action
    sc.textFile(args(0)).flatMap(_.split(" ")).map((_, 1)).reduceByKey(_+_, 1).sortBy(_._2,
false).saveAsTextFile(args(1))
    //停止 sc，结束该任务
    sc.stop()
  }
}
```

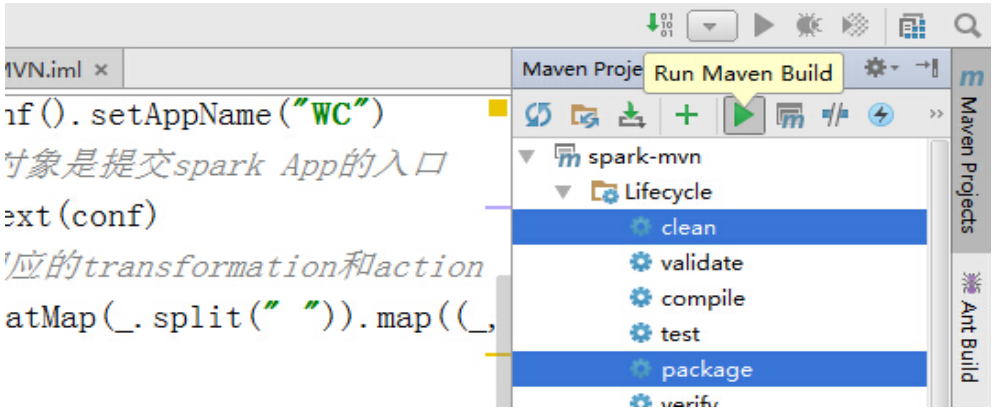
10.使用 Maven 打包：首先修改 pom.xml 中的 main class

```
<transformers>
    <transformer implementation="org.apache.maven.plugins.shade.resource.ManifestRes
        <mainClass>cn.itcast.spark.WordCount</mainClass>
    </transformer>
</transformers>
```

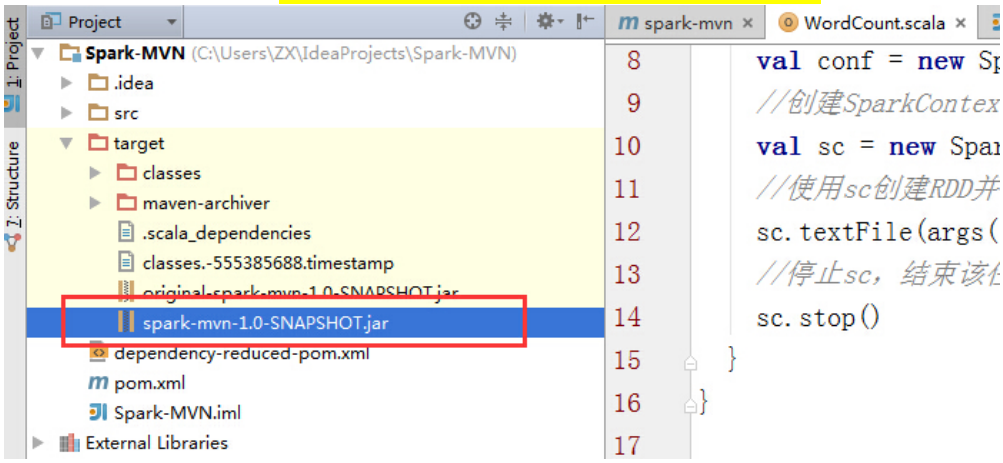
点击 idea 右侧的 Maven Project 选项



点击 Lifecycle，选择 clean 和 package，然后点击 Run Maven Build



11.选择编译成功的 jar 包，并将该 jar 上传到 Spark 集群中的某个节点上



12.首先启动 hdfs 和 Spark 集群

启动 hdfs

```
/usr/local/hadoop-2.6.1/sbin/start-dfs.sh
```

启动 spark

```
/usr/local/spark-1.5.2-bin-hadoop2.6/sbin/start-all.sh
```

13.使用 spark-submit 命令提交 Spark 应用（注意参数的顺序）

```
/usr/local/spark-1.5.2-bin-hadoop2.6/bin/spark-submit \
--class cn.itcast.spark.WordCount \
--master spark://node1.itcast.cn:7077 \
```

```
--executor-memory 2G \
--total-executor-cores 4 \
/root/spark-mvn-1.0-SNAPSHOT.jar \
hdfs://node1.itcast.cn:9000/words.txt \
hdfs://node1.itcast.cn:9000/out
```

14.查看程序执行结果

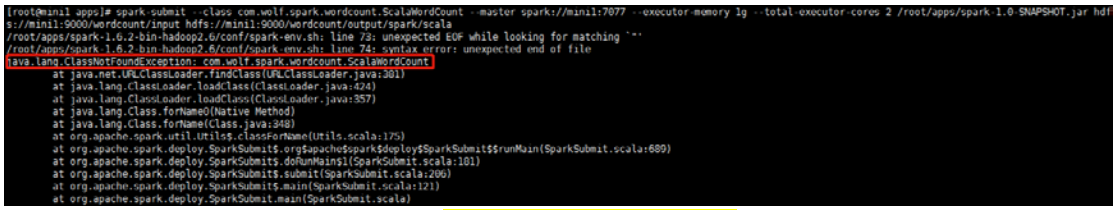
```
hdfs dfs -cat hdfs://node1.itcast.cn:9000/out/part-00000
```

(hello,6)

(tom,3)

(kitty,2)

(jerry,1)



在 spark 集群提交任务运行时报错：找不到 scala 程序的主类。

解决方案：pom 文件中添加 scala 插件。

```
<build>
    <sourceDirectory>src/main/scala</sourceDirectory>
    <testSourceDirectory>src/test/scala</testSourceDirectory>
    <plugins>
    <plugin>
        <groupId>net.alchim31.maven</groupId>
        <artifactId>scala-maven-plugin</artifactId>
        <version>3.2.0</version>
        <executions>
            <execution>
                <goals>
                    <goal>compile</goal>
                     <goal>testCompile</goal>
                </goals>
            </execution>
        </executions>
    </plugin>
    </plugins>
</build>
```