

Spark分布式计算引擎使用指南

1 商品说明

Apache Spark 是开源的分布式计算引擎，核心优势在于内存计算（比 **Hadoop** 快数十倍）和统一处理框架（批处理、流计算、机器学习等）。它通过弹性数据集（**RDD**）实现高效容错，支持多语言 **API**，广泛应用于实时分析、大规模 **ETL**、**AI** 训练等场景，是当前大数据生态的核心组件之一。

本商品通过鲲鹏服务器+Euler2.0 部署。

2 商品购买

您可以在云商店搜索“Spark分布式计算引擎”。

其中，地域、规格、推荐配置使用默认，购买方式根据您的需求选择按需/按月/按年，短期使用推荐按需，长期使用推荐按月/按年，确认配置后点击“立即购买”。

2.1 商品支持自定义 ECS 购买，具体见章节 3.1.1

2.2 使用 RFS 模板直接部署

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立即创建资源栈

1

选择模板

2

参数配置

3

资源配置设置

4

配置确认

* 创建方式

已有模板在可视化编辑器创建

* 模板来源

私有模板URL上传模板

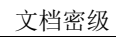
每个资源栈都是基于模板创建的。模板中心需要按 所需代码文件（扩展名为RDL.json）。

* 模板 URL

https://mtp-privatedata-cn.obs.cn-north-4.myhuaweicloud.com/mypri...
链接必须包含有效的访问凭证，文件大小不得超过1MB。

1 资源属性服务不会在管理资源之外的场景使用您上传的模板，我们不会对您的模板进行加密。控制台不支持自动使用AK/SK加密您的模板参数。

必填项填写后，点击 下一步



创建直接计划后，点击 确定

点击 部署

基本信息	资源	输出	事件	模板	执行计划
应用 请输入关键字					
执行计划ID	状态	操作链接	创建时间	描述	操作
executionPlan_20250324_1957_4e6a	创建成功, 待部署	查看部署详情	2025/03/24 10:58:08 GMT+08:00	-	部署

如下图 “Apply required resource success.” 即为资源创建完成

事件时间	事件类型	事件描述	资源名称/类型	关联资源ID
2025/03/24 11:00:06 GMT+08:00	日志	Apply required resource success.	-	-
2025/03/24 11:00:01 GMT+08:00	生成完成	module.ecs.huaweicloud_compute_instance.ecs[0]: Creation complete after 57s [id=aa08d528-dc2e-4095-b388-fb333cecb844]	ecs ECS	aa08d528-dc2e-4095-b388-fb333cecb844
2025/03/24 11:00:01 GMT+08:00	完成部署	Apply completed: Resources: 0 added, 0 changed, 0 destroyed.	-	-
2025/03/24 10:59:54 GMT+08:00	正在生成	module.ecs.huaweicloud_compute_instance.ecs[0]: Still creating... [50s elapsed]	ecs ECS	-
2025/03/24 10:59:44 GMT+08:00	正在生成	module.ecs.huaweicloud_compute_instance.ecs[0]: Still creating... [40s elapsed]	ecs ECS	-
2025/03/24 10:59:34 GMT+08:00	正在生成	module.ecs.huaweicloud_compute_instance.ecs[0]: Still creating... [30s elapsed]	ecs ECS	-
2025/03/24 10:59:24 GMT+08:00	正在生成	module.ecs.huaweicloud_compute_instance.ecs[0]: Still creating... [20s elapsed]	ecs ECS	-
2025/03/24 10:59:14 GMT+08:00	正在生成	module.ecs.huaweicloud_compute_instance.ecs[0]: Still creating... [10s elapsed]	ecs ECS	-
2025/03/24 10:59:04 GMT+08:00	生成完成	module.vpc.huaweicloud_vpc_subnet.subnet: Creation complete after 9s [id=4b3aceef-a475-4a7d-9e7c-000003b63763]	subnet Subnet	4b3aceef-a475-4a7d-9e7c-000003b63763
2025/03/24 10:59:04 GMT+08:00	正在生成	module.ecs.huaweicloud_compute_instance.ecs[0]: Creating...	ecs ECS	-

3 商品资源配置

商品支持ECS控制台配置，下面对资源配置的方式进行介绍。

3.1 ECS 控制台配置

3.1.1 准备工作

在使用ECS控制台配置前，需要您提前配置好安全组规则。

安全组规则的配置如下：

- 入方向规则放通端口8080，源地址内必须包含您的客户端ip，否则无法访问
- 入方向规则放通端口7077，源地址内必须包含您的客户端ip，否则无法访问
- 入方向规则放通CloudShell连接实例使用的端口22，以便在控制台登录调试。
- 出方向规则一键放通

3.1.2 创建 ECS

前提工作准备好后，选择ECS控制台配置跳转到购买ECS页面，ECS资源的配置如下图所示：

The screenshot displays the 'Purchase Elastic Cloud Server' (购买弹性云服务器) page in the Huawei Cloud console. The page is divided into several sections for configuring the ECS instance.

Step 1: Basic Information (基础配置)

- Region (区域):** 华北-北京四 (North China-4)
- Availability Zone (可用区):** 华北-北京四-可用区A (North China-4-Zone A)
- Payment Method (计费模式):** 包年包月 (Prepaid)
- Payment Cycle (支付周期):** 12个月 (12 months)
- Payment Method (支付方式):** 银行卡 (Credit Card)
- Payment Method (支付方式):** 支付宝 (Alipay)
- Payment Method (支付方式):** 微信支付 (WeChat Pay)

Step 2: Network Configuration (网络配置)

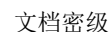
- VPC (虚拟私有云):** vpc_kettle_app (192.168.10.0/24)
- Subnet (子网):** subnet_kettle_app (192.168.10.0/24)
- IP Address (IP地址):** 192.168.10.10
- Private IP Address (私有IP地址):** 192.168.10.10

Step 3: Security Group Configuration (安全组配置)

- Security Group (安全组):** secgroup_kettle_app (4b014374-5380-42c7-a371-6456c1...)
- Security Group Rules (安全组规则):** 入方向规则 (Inbound Rules)
- Rule Name (规则名称):** secgroup_kettle_app
- Priority (优先级):** 1
- Direction (方向):** 入方向 (Inbound)
- Protocol (协议):** TCP
- Port Range (端口范围):** 8080
- Type (类型):** IPv4
- Source Address (源地址):** 0.0.0.0

Step 4: Elastic IP Configuration (弹性公网IP配置)

- Elastic IP (弹性公网IP):** 现在购买 (Purchase Now)
- Bandwidth (带宽):** 5, 10, 20, 50, 100, 自定义 (Custom)
- Bandwidth (带宽):** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 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1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 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1679, 1680, 1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 20



值得注意的是:

- VPC您可以自行创建
- 安全组选择3.1.1章节中配置的安全组
- 弹性公网IP选择现在购买，推荐选择“按流量计费”，带宽大小可设置为5Mbit/s
- 其余默认或按规则填写即可。

4 商品使用

4.1 启动 Spark 依赖组件及服务

1. 更新机器名称和ip映射

```
vim /etc/hosts
```

```
*.*.*.*  hadoop1
```

```
*.*.*.*  hadoop2
```

```
*.*.*.*  hadoop3
```

**** 修改成本机实际ip 如192.168.10.2

2. 重新生成免密登录

重置用户hadoop 密码 例如:123456 ,建议采用符合密码复杂度的密码

2.1、删除文件

```
su - hadoop
```

```
cd ~/.ssh/
```

```
rm -rf id_rsa id_rsa.pub known_hosts
```

2.2、生成免密

```
su - hadoop
```

```
ssh-keygen -t rsa
```

```
ssh-copy-id -i ~/.ssh/id_rsa.pub hadoop1 -- hadoop 密码例如:123456
```

```
ssh-copy-id -i ~/.ssh/id_rsa.pub hadoop2 -- hadoop 密码例如:123456
```

```
ssh-copy-id -i ~/.ssh/id_rsa.pub hadoop3 -- hadoop 密码例如:123456
```

注意: 本机(hadoop1)也要执行!

3. 在hadoop家目录下(\$HADOOP_HOME)启动hadoop集群

```
cd /home/hadoop-3.3.1/sbin/
```

以下服务的启动顺序需要按顺序执行!

```
# 启动hdfs
```

```
./start-dfs.sh
```

```
# 启动yarn
```

```
./start-yarn.sh
```

```
# 启动历史服务(只执行一种即可)
```

```
mapred --daemon start historyserver --优先
```

```
mr-jobhistory-daemon.sh start historyserver -- 会提示已过时,次选
```

4. 启动Hive服务

```
nohup hive --service metastore & -- Hive元数据管理
```

```
nohup hive --service hiveserver2 & -- Hive远程登录
```

在其它节点Hive家目录(\$HIVE_HOME)下使用hadoop账户进行Hive远程登录:

```
./bin/beeline -u jdbc:hive2://hadoop1:10000 -n hadoop
```

5. 启动Spark服务

```
cd $SPARK_HOME/sbin
```

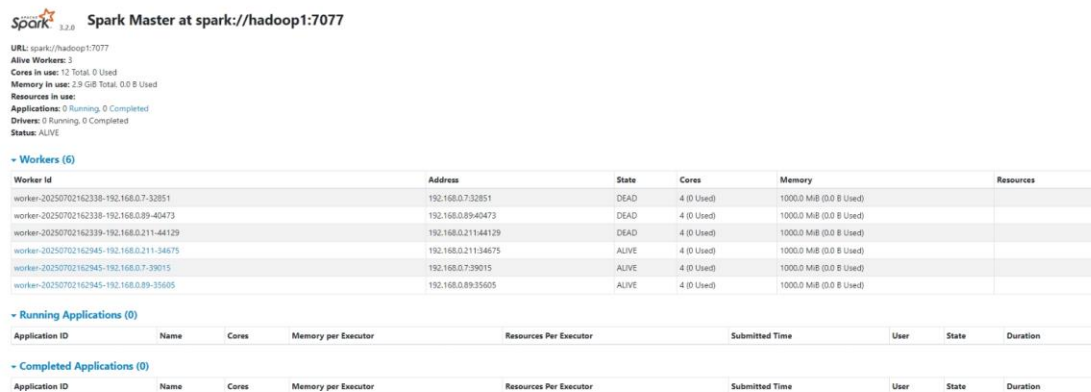
```
./start-all.sh
```

至此 可以使用jps命令查看已启动的所有服务以作检查确认。

注意:因系统已经配置完成了路径的映射关系 (具体可查看 /etc/profile) , 以上3,4,5步骤的命令可以在任意路径下执行, 但为保证命令的执行成功, 建议在各组件的家目录下确认命令后执行(或者带上路径执行), 避免因部分组件的命令存在重复导致执行错误。例如\$HADOOP_HOME/sbin 和\$SPARK_HOME/sbin 都存在 start-all.sh 但是含义不同, 注意甄别。

4.2 Web 查看 Spark UI

IP+8080访问UI



运行示例程序:

```
【spark-submit --master yarn \
```

```
--deploy-mode client \
```

```
--class org.apache.spark.examples.SparkPi \
```

```
$SPARK_HOME/examples/jars/spark-examples_2.12-3.2.0.jar 2000】
```

```
hadoop@hadoop1 log1s spark-submit --master yarn \
> --deploy-mode client \
> --class org.apache.spark.examples.SparkPi \
> $SPARK_HOME/examples/jars/spark-examples_2.12-3.2.0.jar 2000
SLF4J: Class path contains multiple SLF4J Bindings.
SLF4J: Found binding in [jar:file:/home/spark/jars/slf4j-log4j12-1.7.30.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: Found binding in [jar:file:/home/hadoop-3.3.1/share/hadoop/common/lib/slf4j-log4j12-1.7.30.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.spark.unsafe.Platform (file:/home/spark/jars/spark-unsafe_2.12-3.2.0.jar) to constructor java.nio.DirectByteBuffer(long,int)
WARNING: Please consider reporting this to the maintainers of org.apache.spark.unsafe.Platform
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
2025-07-02 17:09:27,541 INFO spark.SparkContext: Running Spark version 3.2.0
2025-07-02 17:09:27,560 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
2025-07-02 17:09:27,631 INFO resource.ResourceUtils: =====
2025-07-02 17:09:27,631 INFO resource.ResourceUtils: No custom resources configured for spark.driver.
2025-07-02 17:09:27,632 INFO resource.ResourceUtils: =====
2025-07-02 17:09:27,633 INFO spark.SparkContext: Submitted application: Spark Pi
2025-07-02 17:09:27,651 INFO resource.ResourceProfile: Default ResourceProfile created, executor resources: Map(cores -> name: cores, amount: 1, script: , vendor: , memory -> name: memory, amount: 1024, script: , vendor: , offHeap -> name: offHeap, amount: 0, script: , vendor: ), task resources: Map(cpu -> name: cpu, amount: 1.0)
2025-07-02 17:09:27,662 INFO resource.ResourceProfile: Limiting resource is cpus at 1 tasks per executor
2025-07-02 17:09:27,664 INFO resource.ResourceProfileManager: Added ResourceProfile id: 0
2025-07-02 17:09:27,707 INFO spark.SecurityManager: Changing view acls to: hadoop
2025-07-02 17:09:27,707 INFO spark.SecurityManager: Changing modify acls to: hadoop
2025-07-02 17:09:27,707 INFO spark.SecurityManager: Changing view acls groups to:
```

```
2025-07-02 17:10:05,832 INFO scheduler.TaskSetManager: Finished task 1997.0 in stage 0.0 (TID 1997) in 8 ms on hadoop1 (executor 2) (1998/2000)
2025-07-02 17:10:05,835 INFO scheduler.TaskSetManager: Finished task 1998.0 in stage 0.0 (TID 1998) in 11 ms on hadoop2 (executor 1) (1999/2000)
2025-07-02 17:10:05,840 INFO scheduler.TaskSetManager: Finished task 1999.0 in stage 0.0 (TID 1999) in 8 ms on hadoop1 (executor 2) (2000/2000)
2025-07-02 17:10:05,841 INFO cluster.YarnScheduler: Removed TaskSet 0.0, whose tasks have all completed, from pool
2025-07-02 17:10:05,842 INFO scheduler.DAGScheduler: ResultStage 0 (reduce at SparkPi.scala:38) finished in 28.778 s
2025-07-02 17:10:05,844 INFO scheduler.DAGScheduler: Job 0 is finished. Cancelling potential speculative or zombie tasks for this job
2025-07-02 17:10:05,844 INFO cluster.YarnScheduler: Killing all running tasks in stage 0: Stage finished
2025-07-02 17:10:05,846 INFO scheduler.DAGScheduler: Job 0 finished: reduce at SparkPi.scala:38, took 28.841770 s
Pi is roughly 3.1416298357881494
2025-07-02 17:10:05,857 INFO server.AbstractConnector: Stopped Spark@6d175f0d(HTTP/1.1, (http/1.1)){0.0.0.0:4040}
2025-07-02 17:10:05,857 INFO ui.SparkUI: Stopped Spark web UI at http://hadoop1:4040
2025-07-02 17:10:05,860 INFO cluster.YarnClientSchedulerBackend: Interrupting monitor thread
2025-07-02 17:10:05,873 INFO cluster.YarnClientSchedulerBackend: Shutting down all executors
2025-07-02 17:10:05,873 INFO cluster.YarnSchedulerBackendsYarnDriverEndpoint: Asking each executor to shut down
2025-07-02 17:10:05,877 INFO cluster.YarnClientSchedulerBackend: YARN client scheduler backend Stopped
2025-07-02 17:10:05,895 INFO spark.MapOutputTrackerMasterEndpoint: MapOutputTrackerMasterEndpoint stopped!
2025-07-02 17:10:05,913 INFO memory.MemoryStore: MemoryStore cleared
2025-07-02 17:10:05,913 INFO storage.BlockManager: BlockManager stopped
2025-07-02 17:10:05,919 INFO storage.BlockManagerMaster: BlockManagerMaster stopped
2025-07-02 17:10:05,921 INFO scheduler.OutputCommitCoordinator$OutputCommitCoordinatorEndpoint: OutputCommitCoordinator stopped!
2025-07-02 17:10:05,924 INFO spark.SparkContext: Successfully stopped SparkContext
2025-07-02 17:10:05,925 INFO util.ShutdownHookManager: Shutdown hook called
2025-07-02 17:10:05,926 INFO util.ShutdownHookManager: Deleting directory /tmp/spark-ae08d6da-1f20-4c00-a1ac-80b5e09da53d
2025-07-02 17:10:05,928 INFO util.ShutdownHookManager: Deleting directory /tmp/spark-8c0926c7-2c5f-4f2c-ad4f-1cd4d42c1576
[hadoop@hadoop1 logs]$
```

4.3 参考文档

- [Spark官网](#)