Use spark on SCITAS cluster

This how-to guide is based on the content of https://spark.apache.org/docs/latest/spark-standalone.html
We provide examples that should lead the user to successfully use spark on our cluster.
The examples are based on the git repository https://github.com/mcapuccini/spark-on-slurm.git and can be found here:
ssh://git@c4science.ch/diffusion/6824/spark-on-slurm.git

The example below is also available in our examples Git repository. To get it (and more!):

git clone https://c4science.ch/diffusion/SCEXAMPLES/scitas-examples.git
and then go to the Modules/spark directory.

Launching the cluster

The first step we have to take is to start a standalone master server. By default, when you submit a batch script asking multiple nodes, the linux hostname bash command will return the hostname of the first node allocated. It is only when the slurm command srun is invoked that the daemon propagate job to all the nodes.
Once the master is running we can start the worker as well. The script start-cluster.sh does exactly this job:

```bash
#!/bin/bash
MASTER=$1
HOST=$(hostname)
if [ "$HOST" == "$MASTER" ]; then
    $SPARK_ROOT/sbin/start-master.sh
fi
$SPARK_ROOT/sbin/start-slave.sh spark://$MASTER:7077
tail -f /dev/null #wait forever
```

Note that the start-master.sh script is launched only on the master node while the start-slave.sh is launched everywhere.

Testing the configuration on the provided examples

The following example shows how you can test the spark installation on SCITAS cluster. You can use the script below as template to build your own application.
Note that the start-cluster.sh is executed through srun.
#!/bin/bash
#SBATCH -N 3
#SBATCH -t 00:10:00

set -x

module load spark

MASTER=$(hostname)
echo $MASTER
export SPARK_LOCAL_DIRS=$(mktemp -d)
export SPARK_WORKER_DIR=$(mktemp -d)
export SPARK_LOG_DIR="spark-logs"
mkdir -p $SPARK_LOG_DIR

srun ../start-cluster.sh $MASTER &
sleep 60 #give the cluster some time to start

#submit your job
$SPARK_ROOT/bin/spark-submit \
  --master spark://$MASTER:7077 \
  pi.py

$SPARK_ROOT/sbin/stop-master.sh spark://$MASTER:7077