Task 1: Install the Clustershell (1 min)

Make sure the EPEL repository is enabled and install clustershell.

```
$ sudo yum install epel-release
$ sudo yum install clustershell
```

Task 2: The Clustershell (7 min)

In the following, I assume my cluster node hostnames are set to `n0` and `n1`. If you configured your cluster differently, please modify the nodesets (`-w <nodeset>`) accordingly.

Try out the following commands. What does each command do? Is the outcome what you expect?

```
$ clush -w n[0-1] 'hostname'
$ clush --pick=1 -w n[0-1] 'hostname'
$ clush -w n[0-1] 'echo "Hello World!"'
$ clush -b -w n[0-1] 'echo "Hello World!"'
$ clush -b -w n[0-1] 'systemctl restart sshd'
$ clush -b -w n[0-1] 'systemctl status sshd | head -n 3'
$ clush -b -w n[0-4] 'hostname | grep 1'
```

The clustershell can copy files for you in any direction required.

```
$ mkdir -p ~/files/remotes
$ touch ~/files/some.txt
$ clush -w n[0-1] --copy ~/files/somefile.txt
$ clush -w n[0-1] --rcopy ~/files/somefile.txt --dest ~/files/remotes
$ ls ~/files/remotes
```

Task 3: Nodesets (7 min)

Nodeset is a utility tool that manipulates strings. Very useful to conveniently construct sets of hostnames or maybe just count them.

Nodeset can expand folded nodeset definitions.

```
$ nodeset -e n[0-1]
$ nodeset -e n[00-01]
$ nodeset -e n[00-10]
$ nodeset -e n[00,10]
$ nodeset -e worker-[0-1]
$ nodeset -e worker-[1-2]
$ nodeset -e worker[1-2]-[0-1]
$ nodeset --pick=3 -e n[000-100]
```

Nodeset understands the most important set operations:

1. union `,`
2. difference (exclusion) `-x`
3. intersection `-i`
4. symmetric difference (XOR) `--xor`

```
$ nodeset -e n[05-08],n[06-09]
$ nodeset -e n[05-08] -x n[06-09]
$ nodeset -e n[05-08] -i n[06-09]
$ nodeset -e n[05-08] --xor n[06-09]
```

Nodeset can return its result in a folded format.

```
$ nodeset -f n0 n1 n3 n4 n5
$ nodeset -f n[00-10] -x n[06,08]
```

Nodeset can count the number of nodes in a nodeset definition.

```
$ nodeset -c n[00-10] -x n[06,08]
$ nodeset -c n[000-004,009-041,043-079,098-100]
```

Optional Task 4: Node Groups (5 min)

This is a difficult **additional** task which will support your understanding in the topic.

Open the config file `/etc/clustershell/groups.conf` and change the default group source to `roles`. Use the file `/etc/clustershell/groups.d/cluster.yaml.example` as a template to define node groups for your own cluster in a new file `/etc/clustershell/groups.d/cluster.yaml`. Afterward, you can use nodeset definitions, which contain groups in the following format:

```
$ clush -w @racks:rack1 'hostname'
$ clush -w @compute -x n1 'hostname'
$ clush -w @all 'hostname'
```