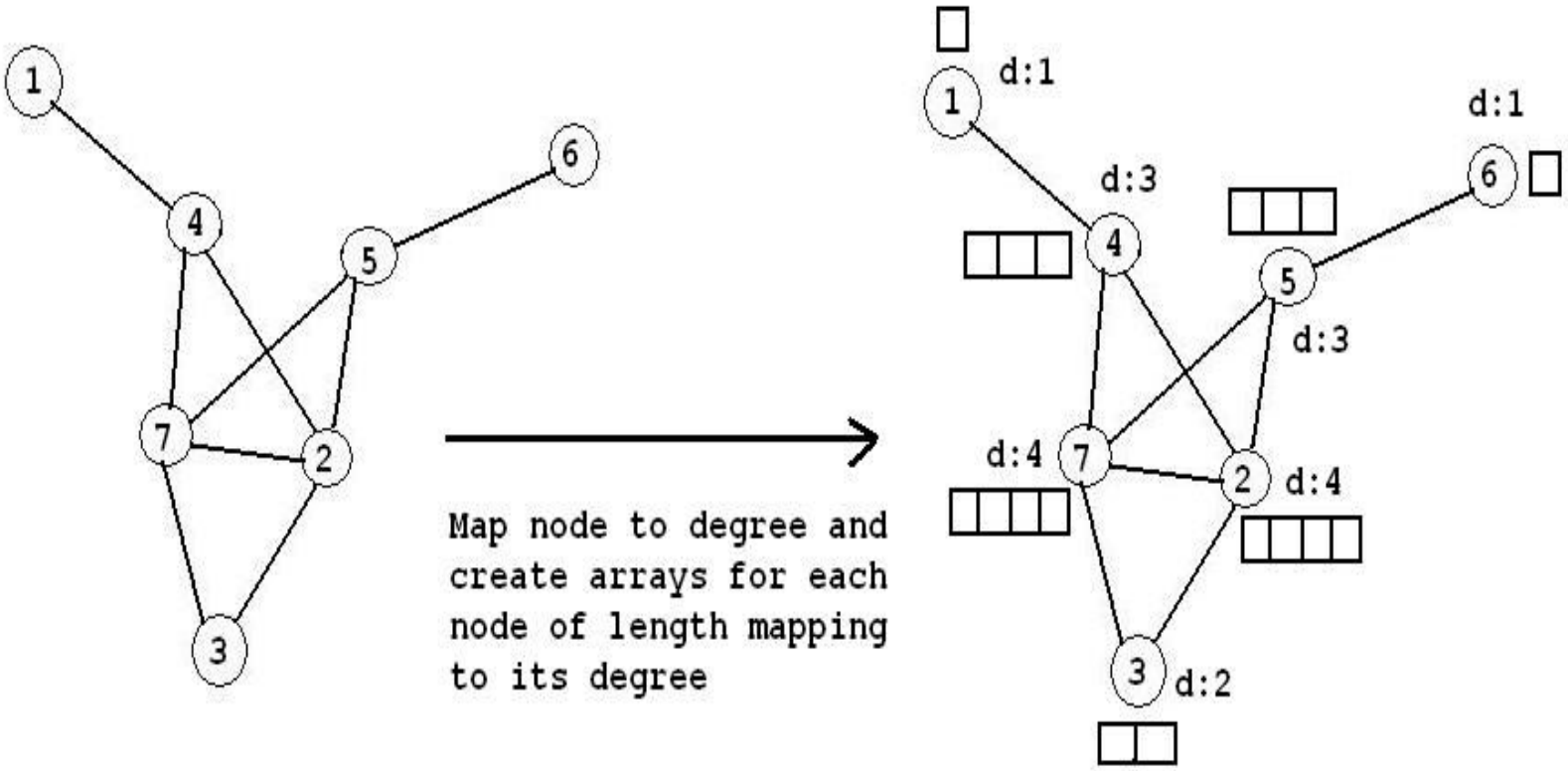
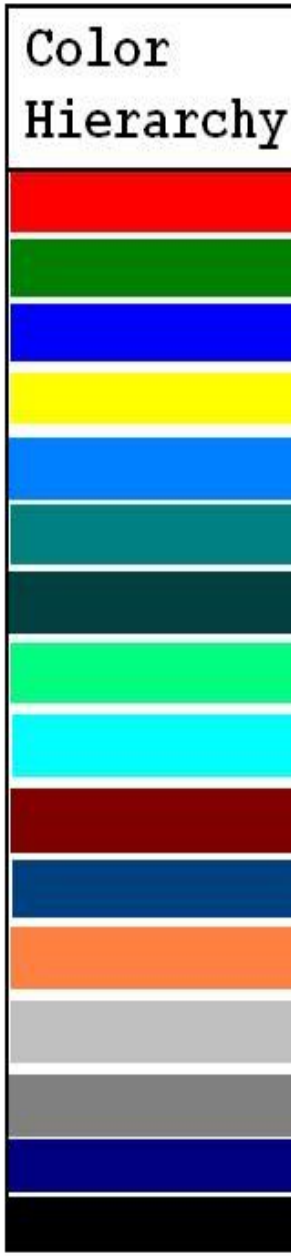
Chromatic Number of a Graph

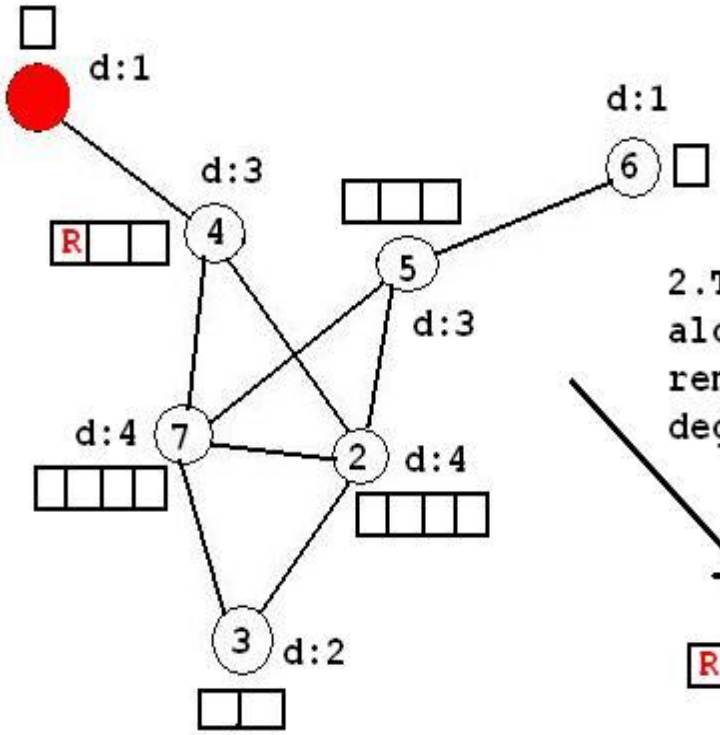
A computational solution

- **Chromatic Number** : It is the minimum set of colors by which nodes of a graph are colored exhaustively, such that no two adjacent nodes share the same color.

The Algorithm:



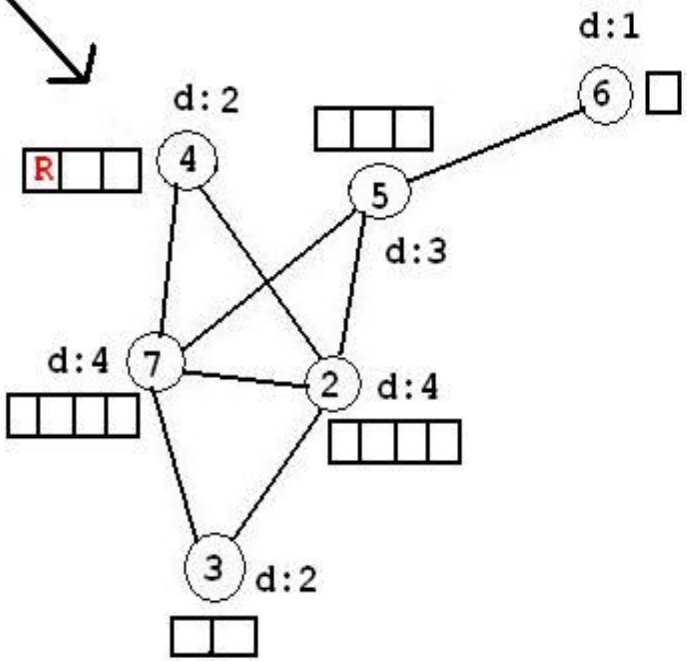




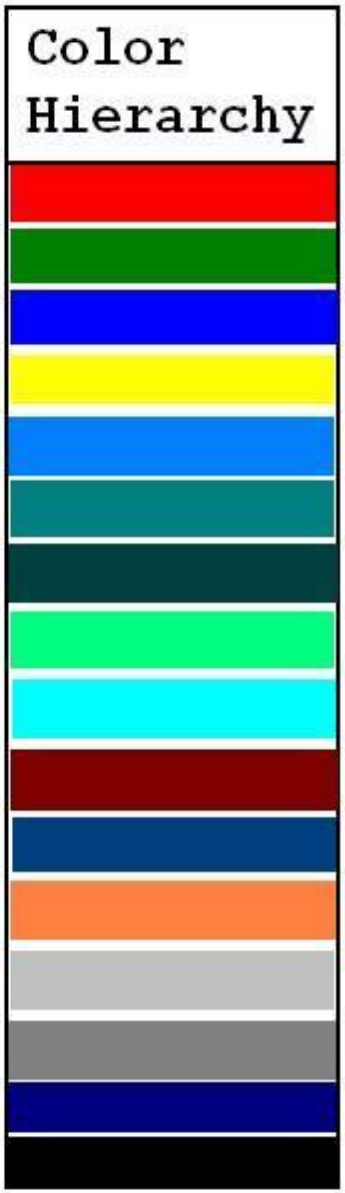
1.Put the 1st available color to the 1st available node following ascending order according to the node-map

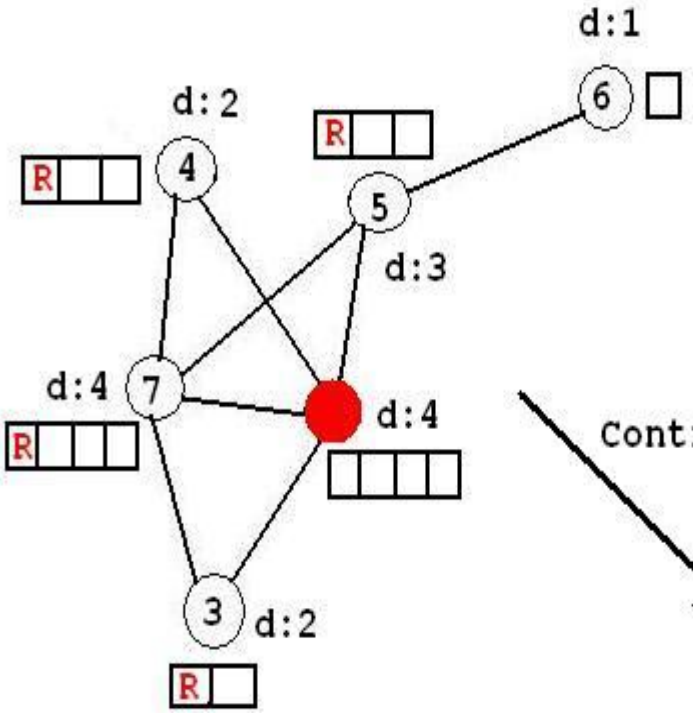
Put this color-info to each of its neighbor array, such that these neighbors can not be put the said color

2.Then delete that node along with all its edges and remap the new graph node to degree

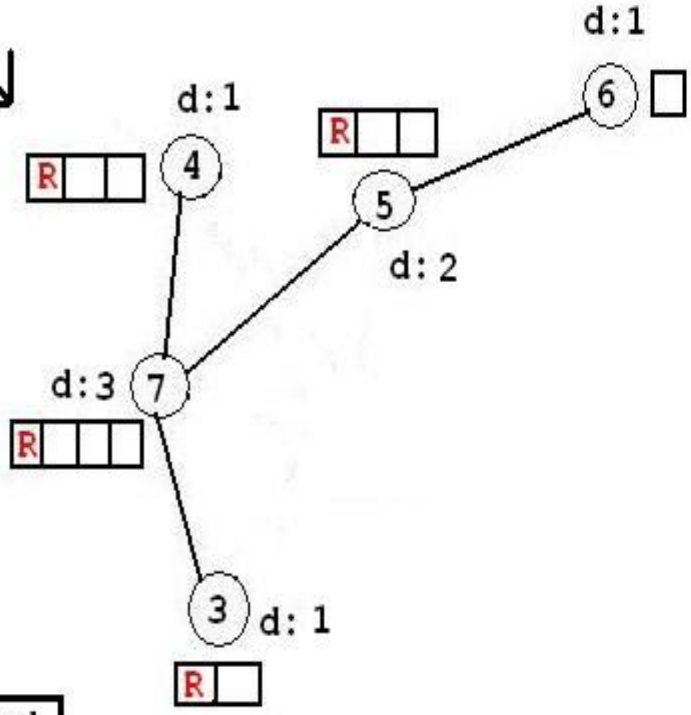


Store : node1 -> red



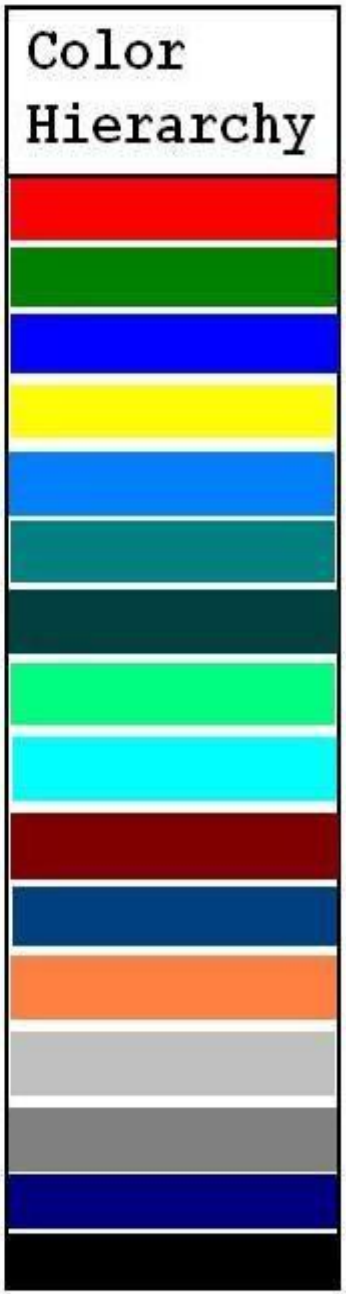


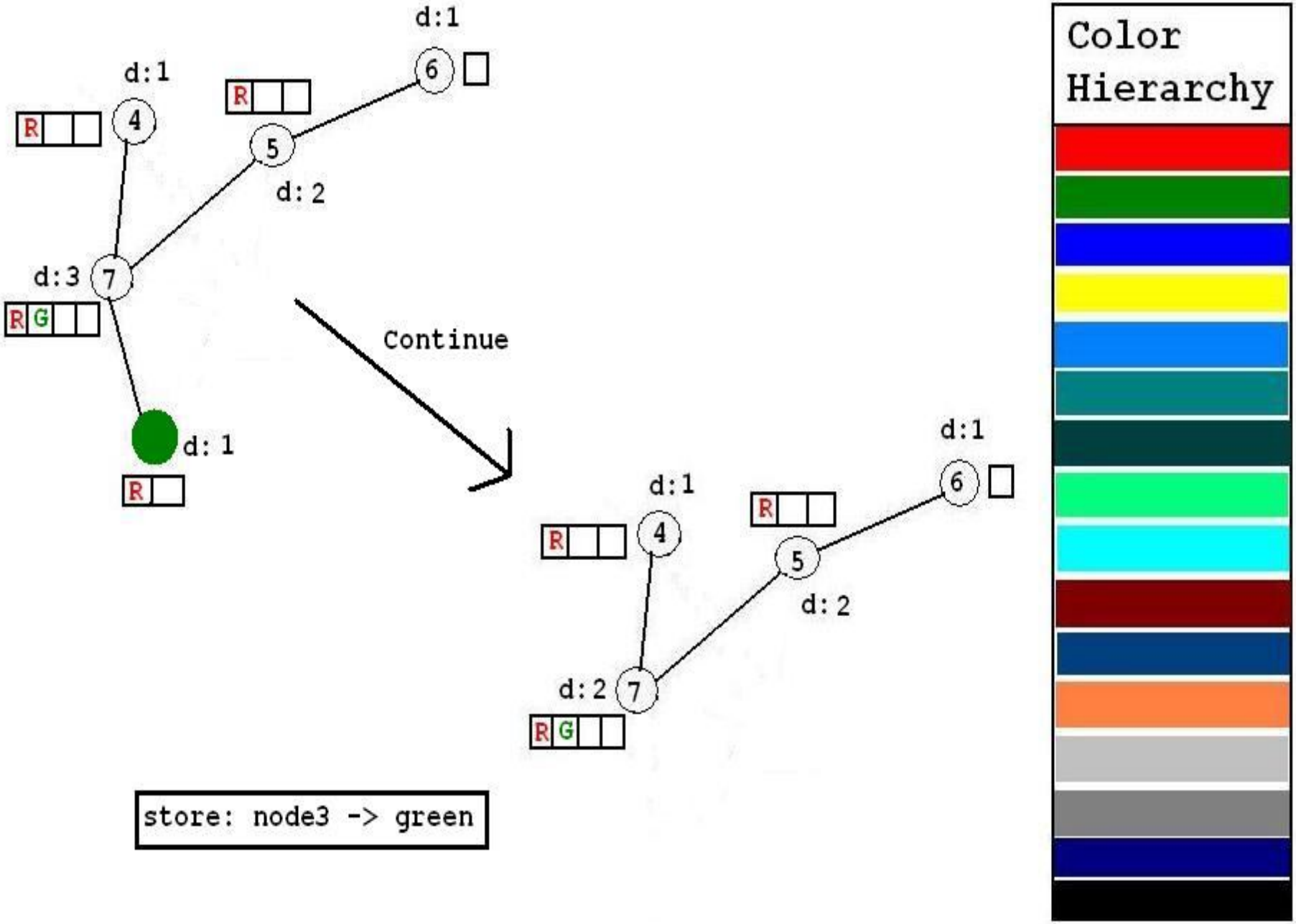
Continue in the same manner

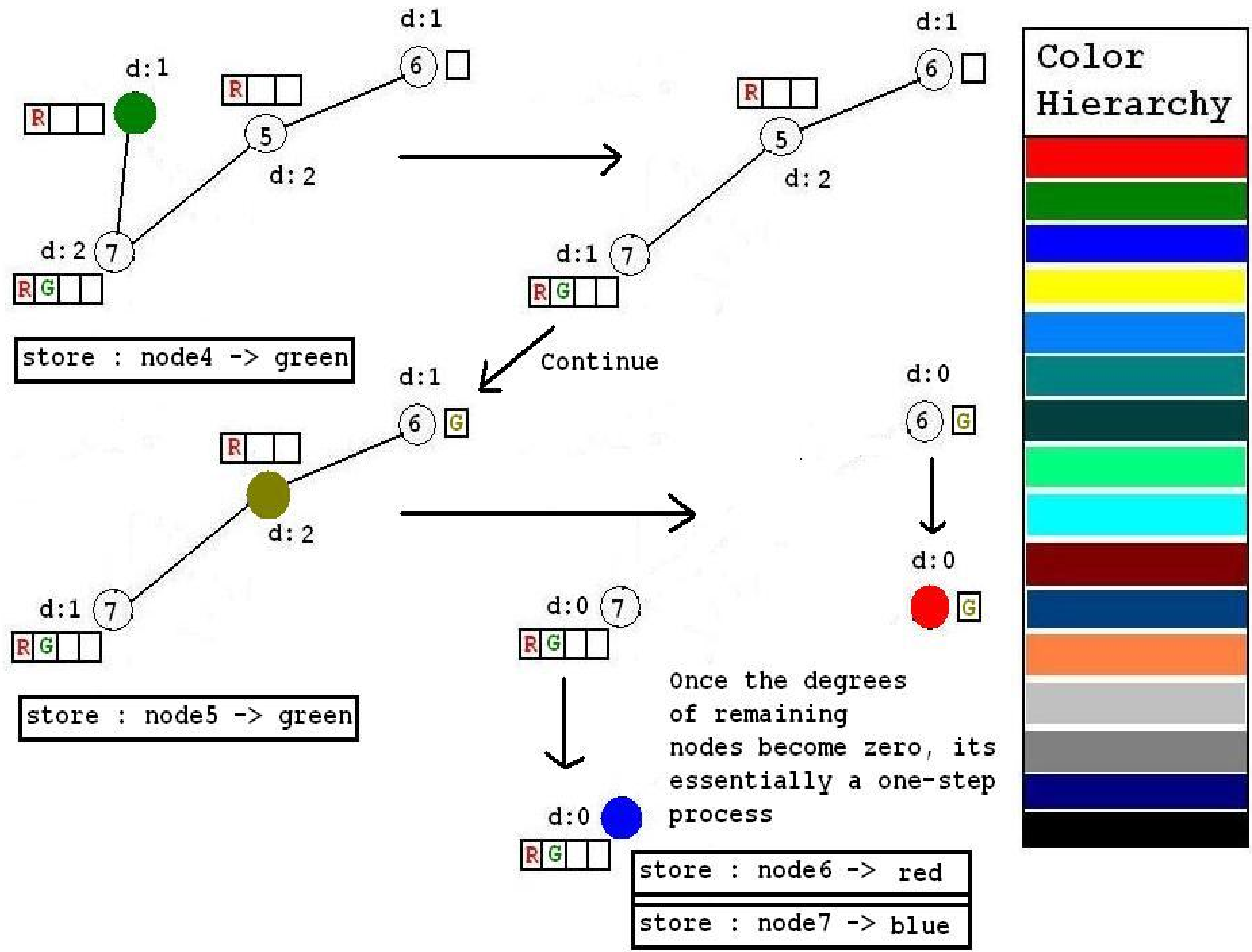


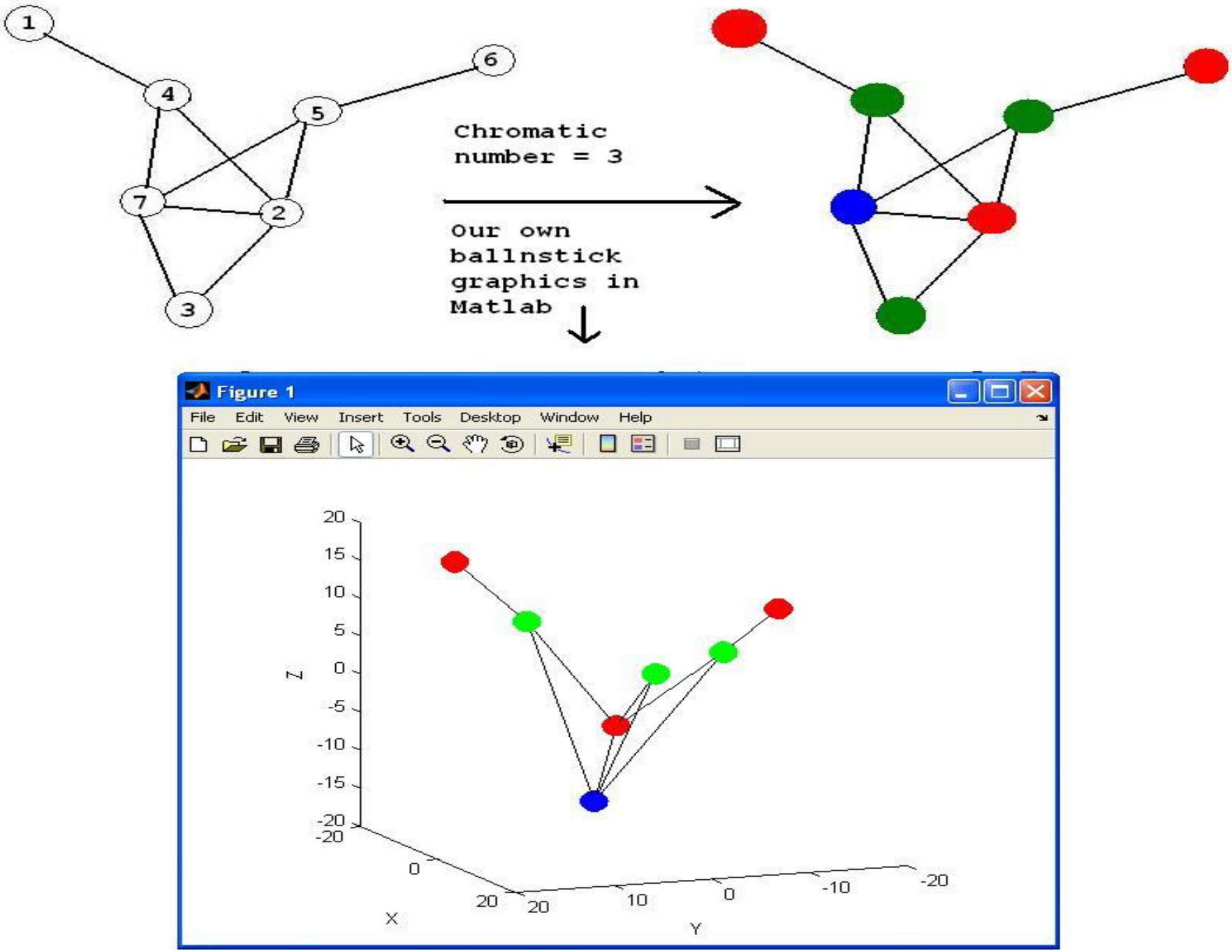
Here, node 4 doesn't require another red (R) to be further put into the info array since it has already been assaigned "not to be colored by red"

store: node2 -> red




d:1
6
d:1
4
R
5
d:2
d:3
7
RG
Continue
d: 1
R
store: node3 -> green
d:1
6
d:1
4
R
5
d:2
d:2
7
RG
Color
Hierarchy


d:1
d:1
R
R
5
6
d:2
d:2
7
R G
store : node4 -> green
d:1
6
d:1
5
R
d:2
d:1
7
R G
Continue
d:1
6
G
R
d:2
d:1
7
R G
store : node5 -> green
d:0
6
G
d:0
G
d:0
7
R G
d:0
R G
Once the degrees
of remaining
nodes become zero, its
essentially a one-step
process
store : node6 -> red
store : node7 -> blue
Color
Hierarchy

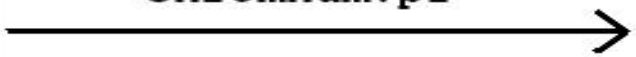

1
2
3
4
5
6
7
Chromatic
number = 3
Our own
ballnstick
graphics in
Matlab
Figure 1
File Edit View Insert Tools Desktop Window Help
20
15
10
5
0
-5
-10
-15
-20
Z
-20
0
20
X
20
10
0
-10
-20
Y

1-0 adjacensy matrix

```
1       4       1
2       3       1
2       4       1
2       5       1
2       7       1
3       7       1
4       7       1
5       6       1
5       7       1
```

input

chromnum.pl



```
1   ->      red
2   ->      red
3   ->    green
4   ->    green
5   ->    green
6   ->      red
7   ->     blue
```

output

```
G:\CHROMNUM>type map.graph
1       4       1
2       3       1
2       4       1
2       5       1
2       7       1
3       7       1
4       7       1
5       6       1
5       7       1
```

```
G:\CHROMNUM>chromnum.pl map.graph > chrm.out
```

```
G:\CHROMNUM>type chrm.out
  1   ->      red
  2   ->      red
  3   ->    green
  4   ->    green
  5   ->    green
  6   ->      red
  7   ->     blue
```