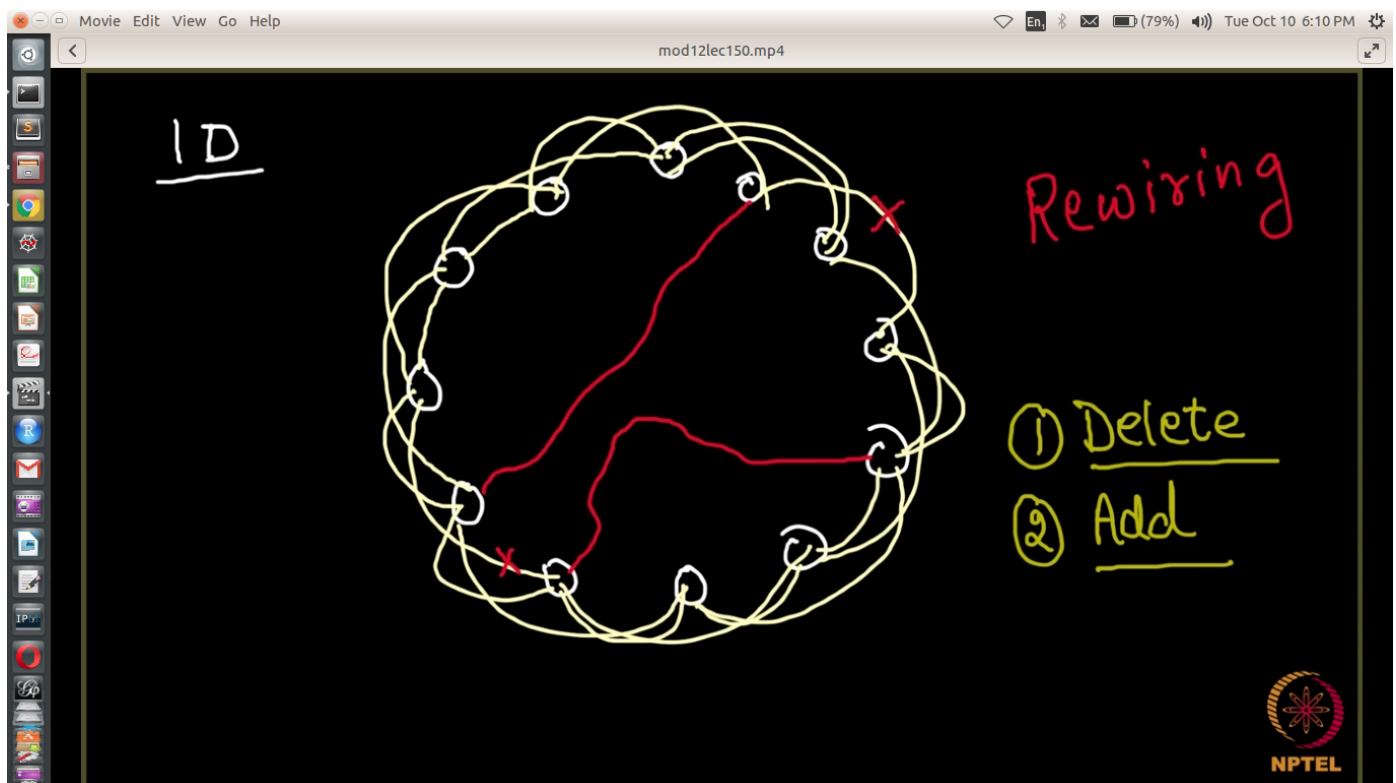
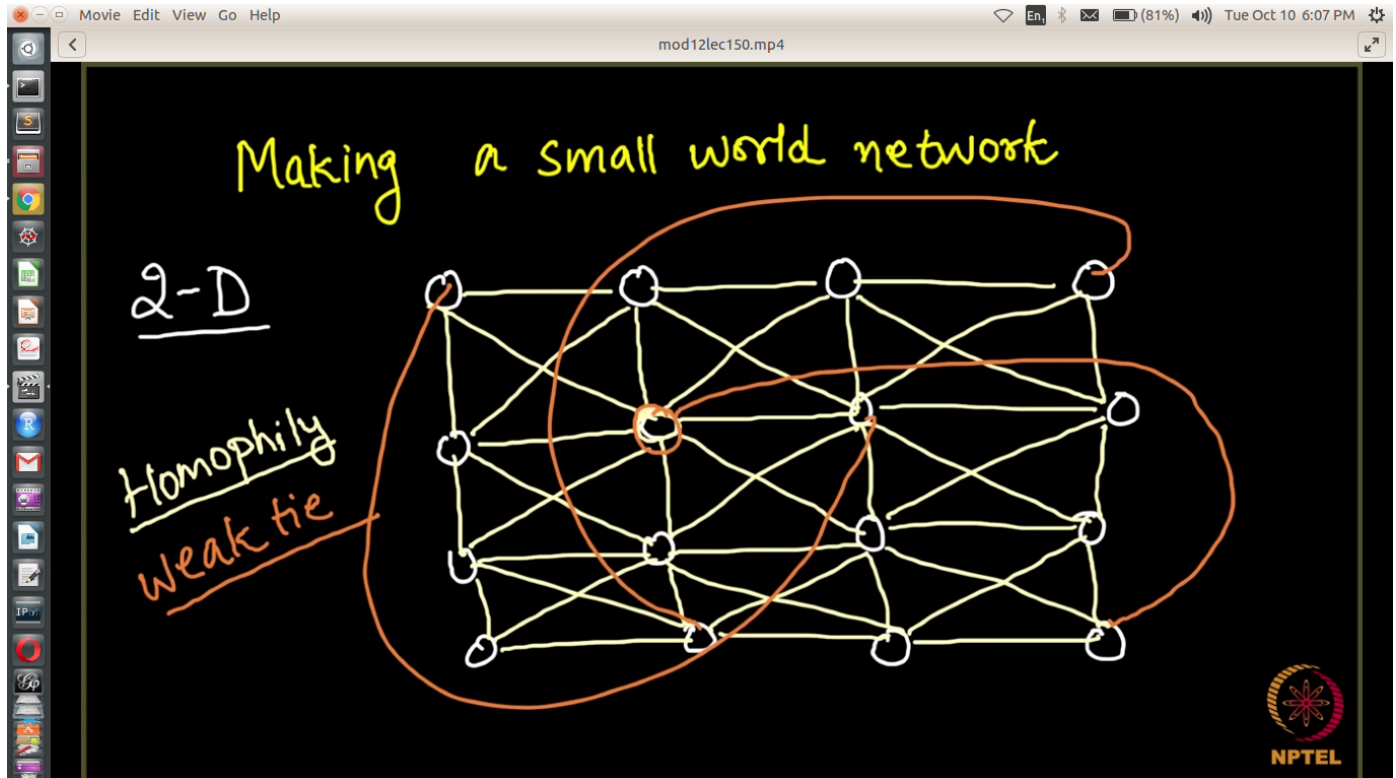
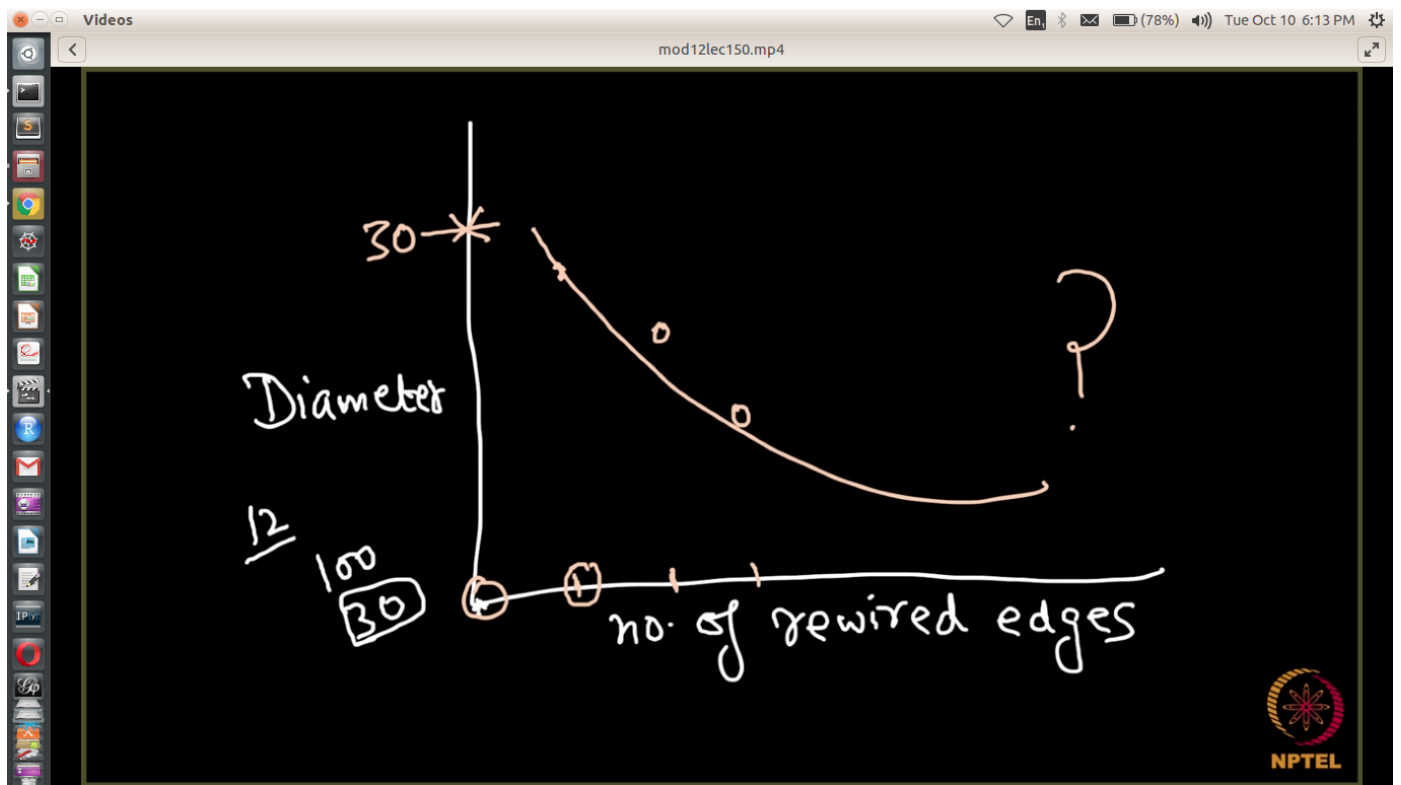


# Lec150: Programming Illustration - Small World Network (Introduction)

1. Making a small world world
2. Myopic Search





rewiring -> Removing one edge and Adding the weak ties

## Lec151: Small World Network (Base Code)

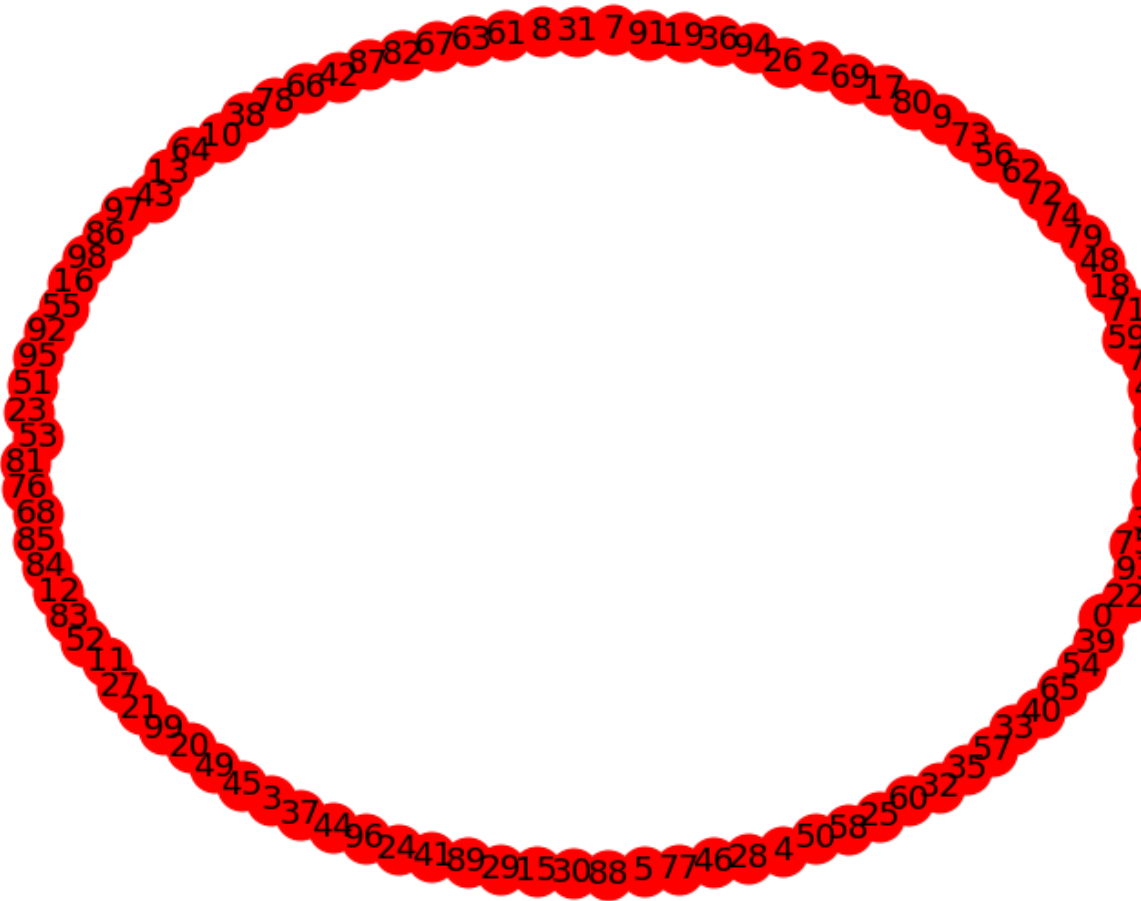
In [28]:

```
import networkx as nx
import matplotlib.pyplot as plt
%matplotlib notebook

G = nx.Graph()
G.add_nodes_from(range(100))

plt.figure()
nx.draw(G, with_labels = 1)
```

Figure 1



Stop Inte

## Lec152: Small World Network (Making Homophily based edges)

In [29]:

```
def add_edges(G):
    list_nodes = G.nodes()
    print list_nodes
    for i in range(0, len(list_nodes)):
        print list_nodes[i], list_nodes[(i+1)%len(list_nodes)], list_nodes[i-1], list_nodes[(i-1)%len(list_nodes)]
        G.add_edge(list_nodes[i], list_nodes[(i+1)%len(list_nodes)])
        G.add_edge(list_nodes[i], list_nodes[(i+2)%len(list_nodes)])
        G.add_edge(list_nodes[i], list_nodes[i-1])
        G.add_edge(list_nodes[i], list_nodes[i-2])
    return G
```

```
G = add_edges(G)
```

```
plt.figure()
nx.draw(G, with_labels = 1)
```

```
36 37 35 38 34
37 38 36 39 35
38 39 37 40 36
39 40 38 41 37
40 41 39 42 38
41 42 40 43 39
42 43 41 44 40
43 44 42 45 41
44 45 43 46 42
45 46 44 47 43
46 47 45 48 44
47 48 46 49 45
48 49 47 50 46
49 50 48 51 47
50 51 49 52 48
51 52 50 53 49
52 53 51 54 50
53 54 52 55 51
54 55 53 56 52
55 56 54 57 53
```

## Lec153: Small World Network (Adding Weak Ties)

In [30]:

```
import random

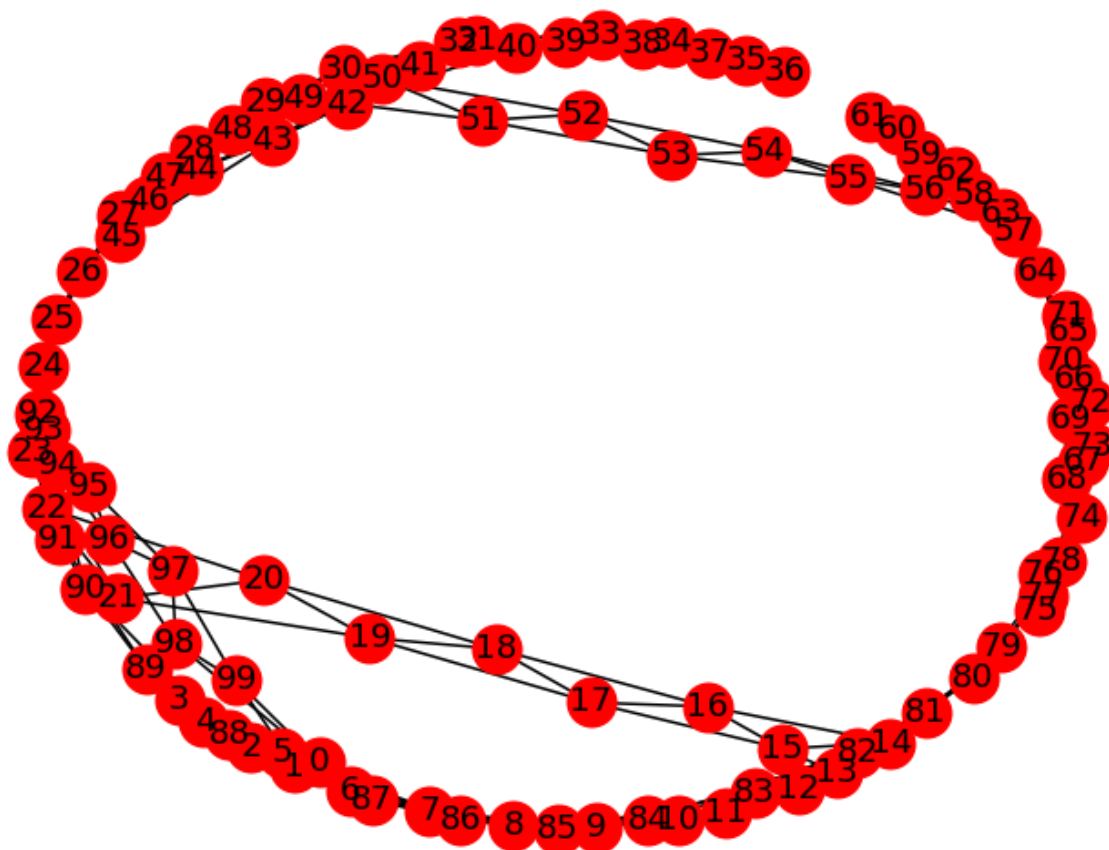
def add_long_link(G):
    v1 = random.choice(G.nodes())
    v2 = random.choice(G.nodes())
    while v1 == v2:
        v1 = random.choice(G.nodes())
        v2 = random.choice(G.nodes())
    G.add_edge(v1, v2)
    print "Edge Added : ", v1, v2

    return G

G = add_long_link(G)
plt.figure()
nx.draw(G, with_labels = 1)
```

Edge Added : 43 50

Figure 3



x=1.02879 y=0.0

## Lec154: Small World Network (Plotting Change in Diameter)

In [31]:

```
limit = 11

x = [i for i in range(1, limit)]
y = [nx.diameter(G)]

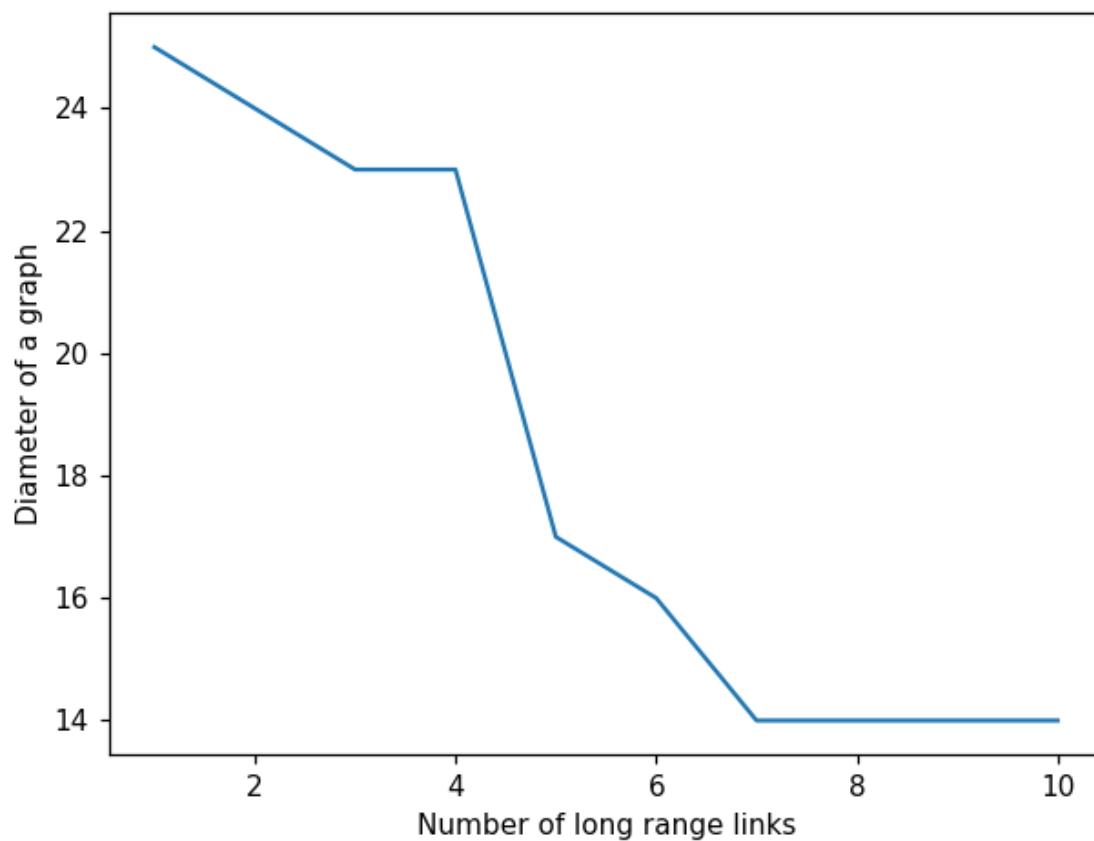
for _ in range(2, limit): #1 long range edge is already added
    G = add_long_link(G)
    y.append(nx.diameter(G))
```

```
Edge Added : 54 60
Edge Added : 52 89
Edge Added : 86 61
Edge Added : 17 55
Edge Added : 53 36
Edge Added : 62 71
Edge Added : 33 81
Edge Added : 25 22
Edge Added : 0 28
```

In [32]:

```
plt.figure()
plt.plot(x, y)
plt.xlabel("Number of long range links")
plt.ylabel("Diameter of a graph")
```

**Figure 4**



Out[32]:

<matplotlib.text.Text at 0x7f9fc87e7a50>