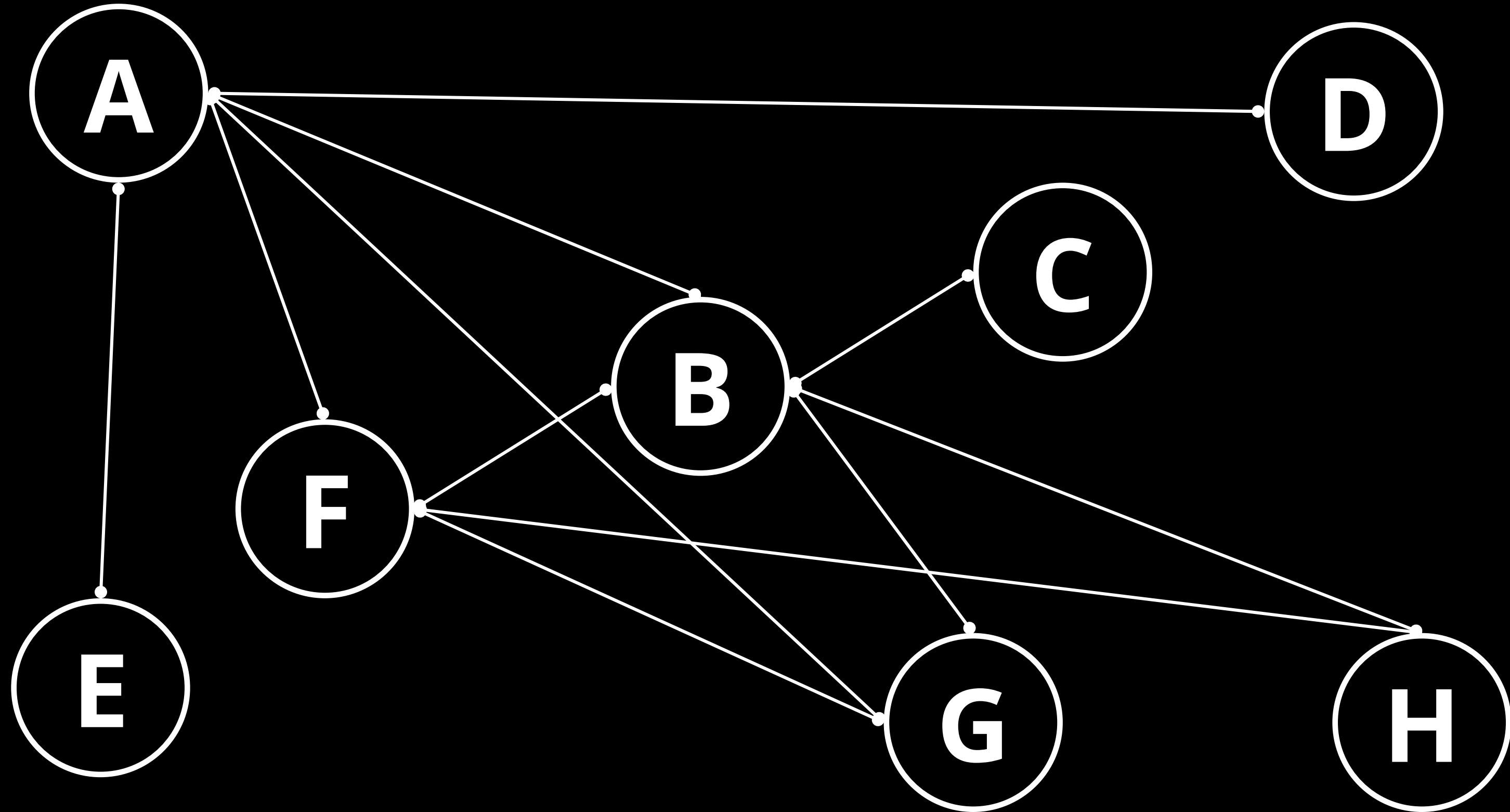


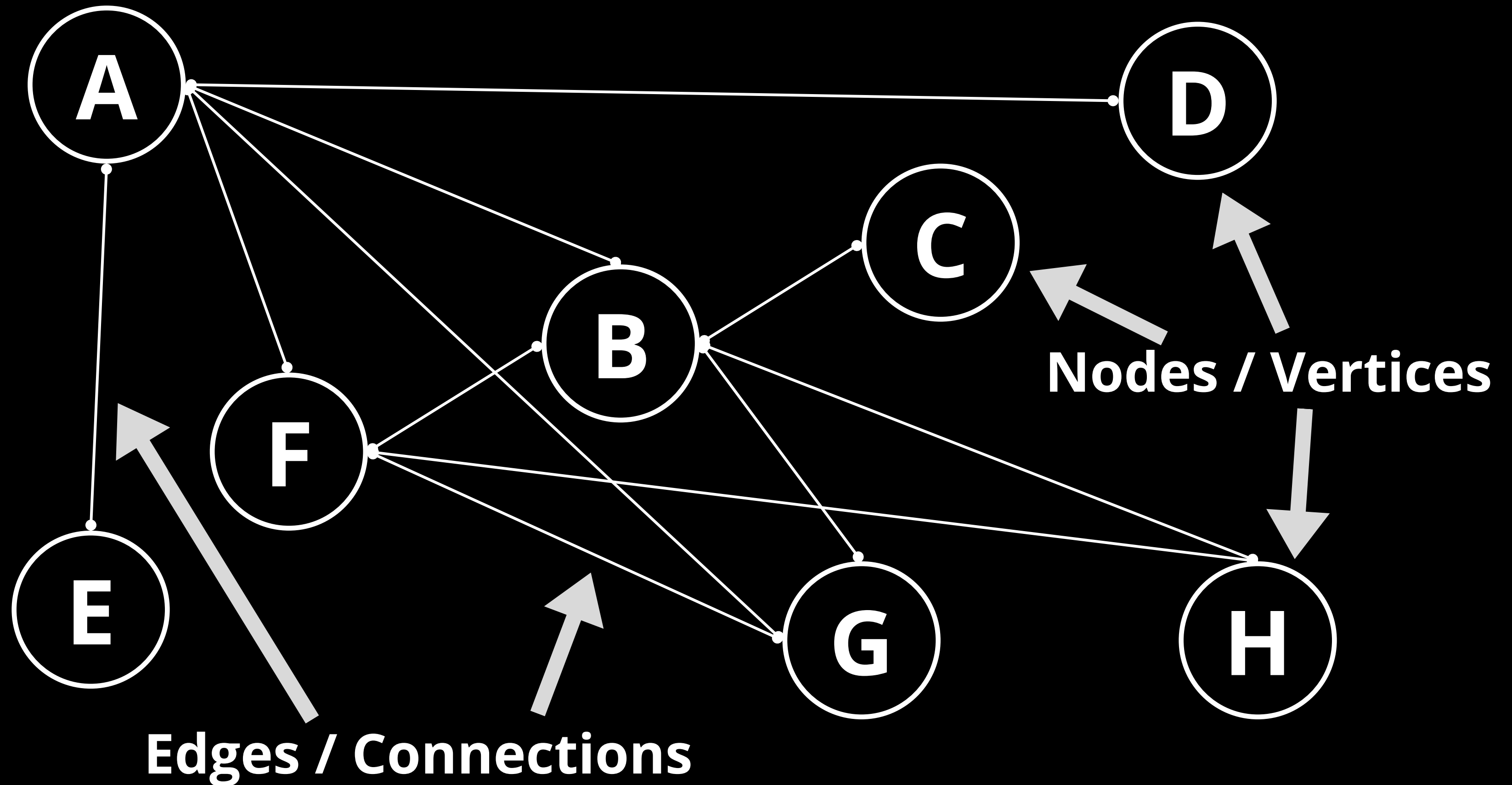
# Data Structures

## Undirected Graph

# Usual Graph Representation



# Main Graph Elements:



# Undirected Graph

## Representation with Linked Lists

Basically, we will have a linked list of pointers to linked lists, and within these linked lists, the head node will be the “node” itself, and the next values are the nodes that the head has a connection with.

# Undirected Graph

## Representation with Linked Lists

**\*GP1 → A → B → D → E → F → G**

**\*GP2 → B → A → C → F → G → H**

**\*GP3 → C → B**

**\*GP4 → D → A**

**\*GP5 → E → A**

**\*GP6 → F → A → B → G → H**

**\*GP7 → G → A → B → F**

**\*GP8 → H → B → F**

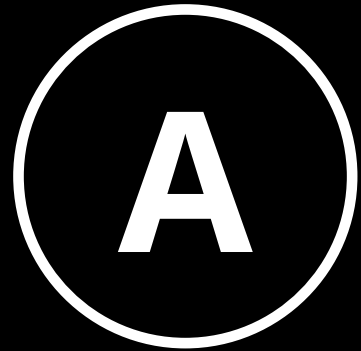
# Main Functions we will implement:

- **PrintGraph**
- **AddNode**
- **ConnectNodes**
- **RemoveConnection**
- **RemoveNode**
- **FreeGraph**

# Aux Functions we will implement:

- **PrintLLst**
- **InitLLst**
- **InitGraphNode**

# Once we AddNode(A):





# Once we AddNode(B):

A

B

# Once we AddNode(C):

A

B

C

# Once we AddNode(D):

A

D

C

B

**Once we AddNode(E):**

**A**

**D**

**C**

**B**

**E**

# Once we AddNode(F):

A

D

C

B

F

E

# Once we AddNode(G):

A

D

C

B

F

E

G

# Once we AddNode(H):

A

D

C

B

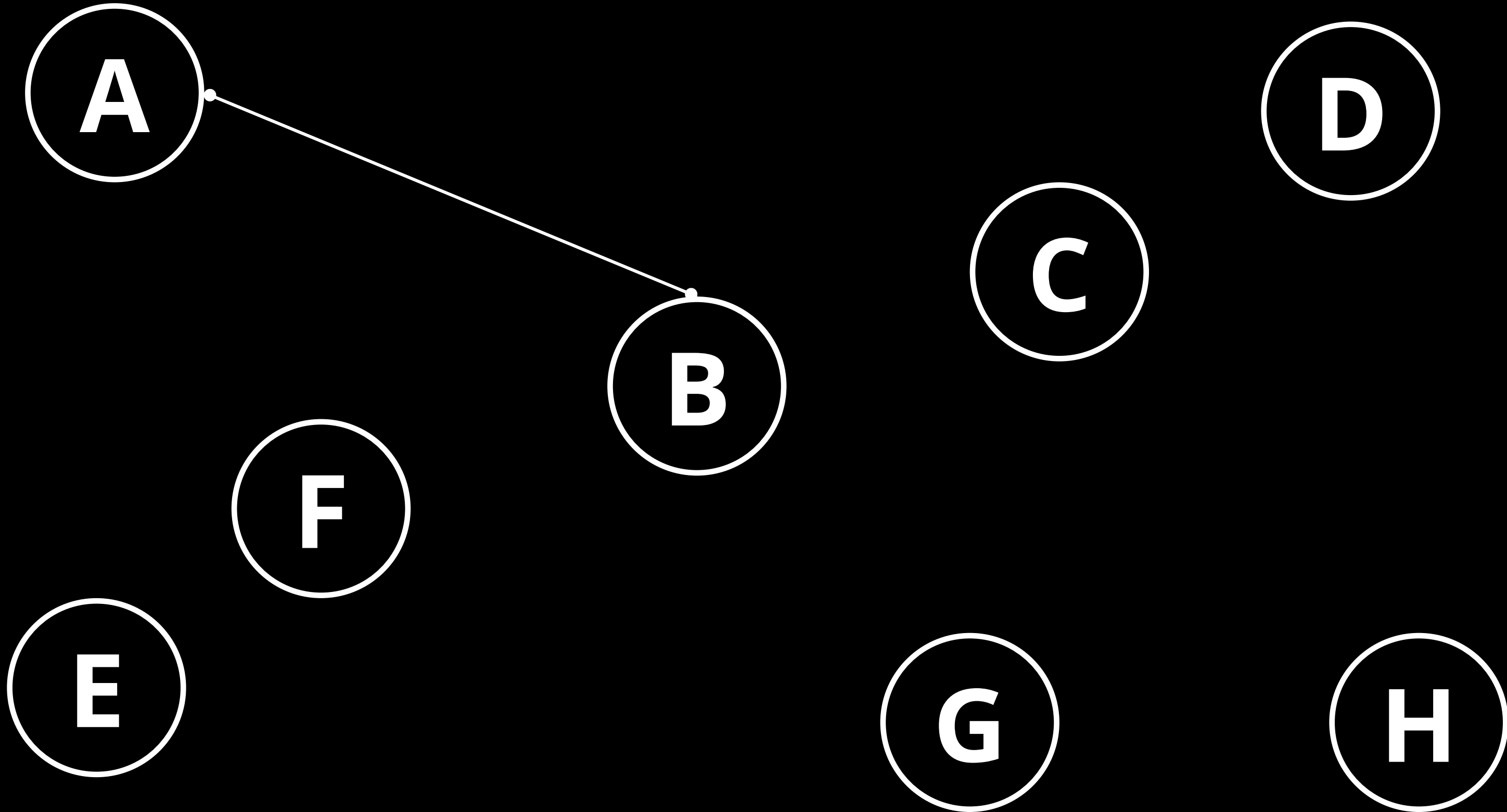
F

E

G

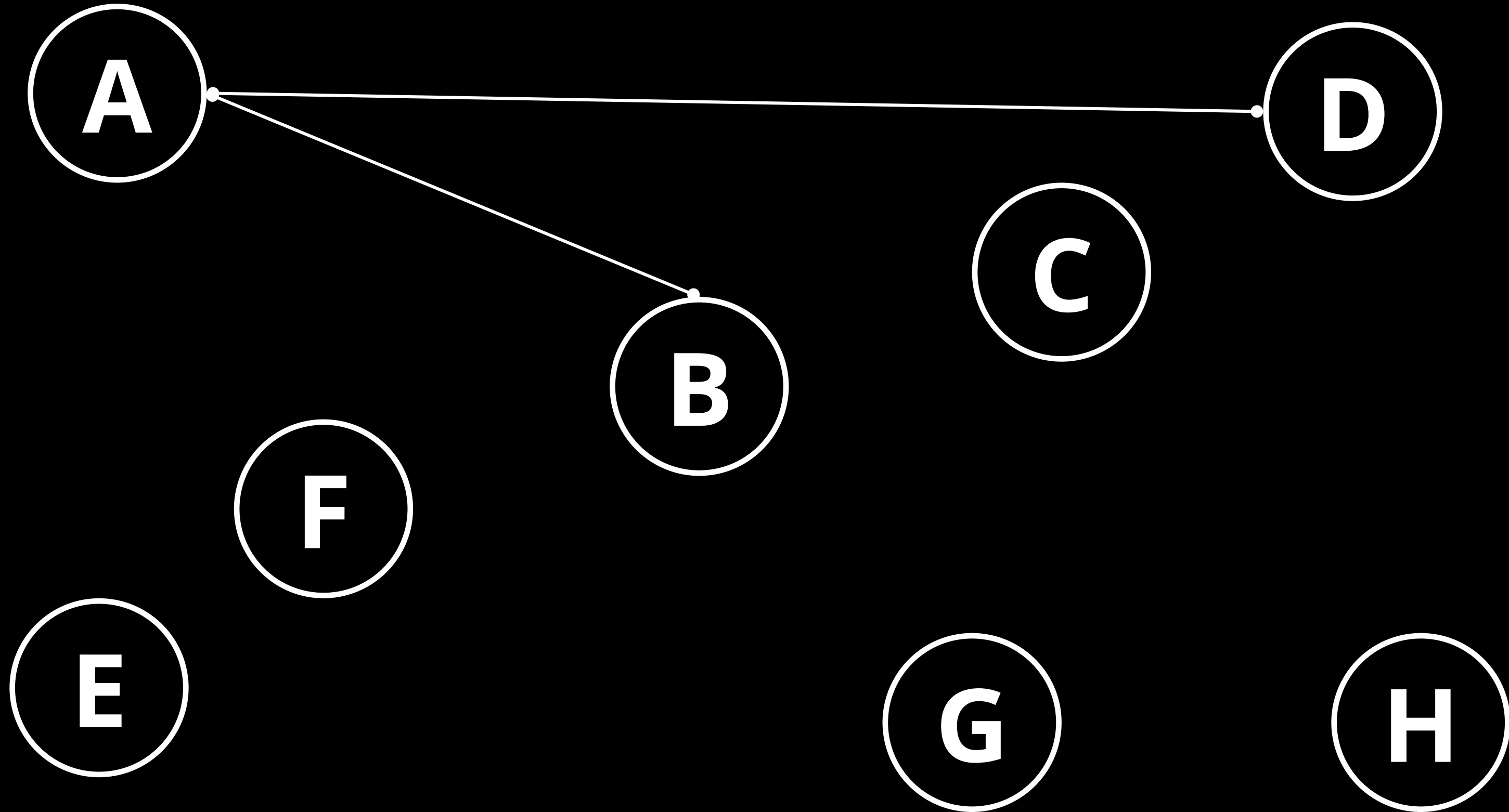
H

# Once we ConnectNodes(A,B):

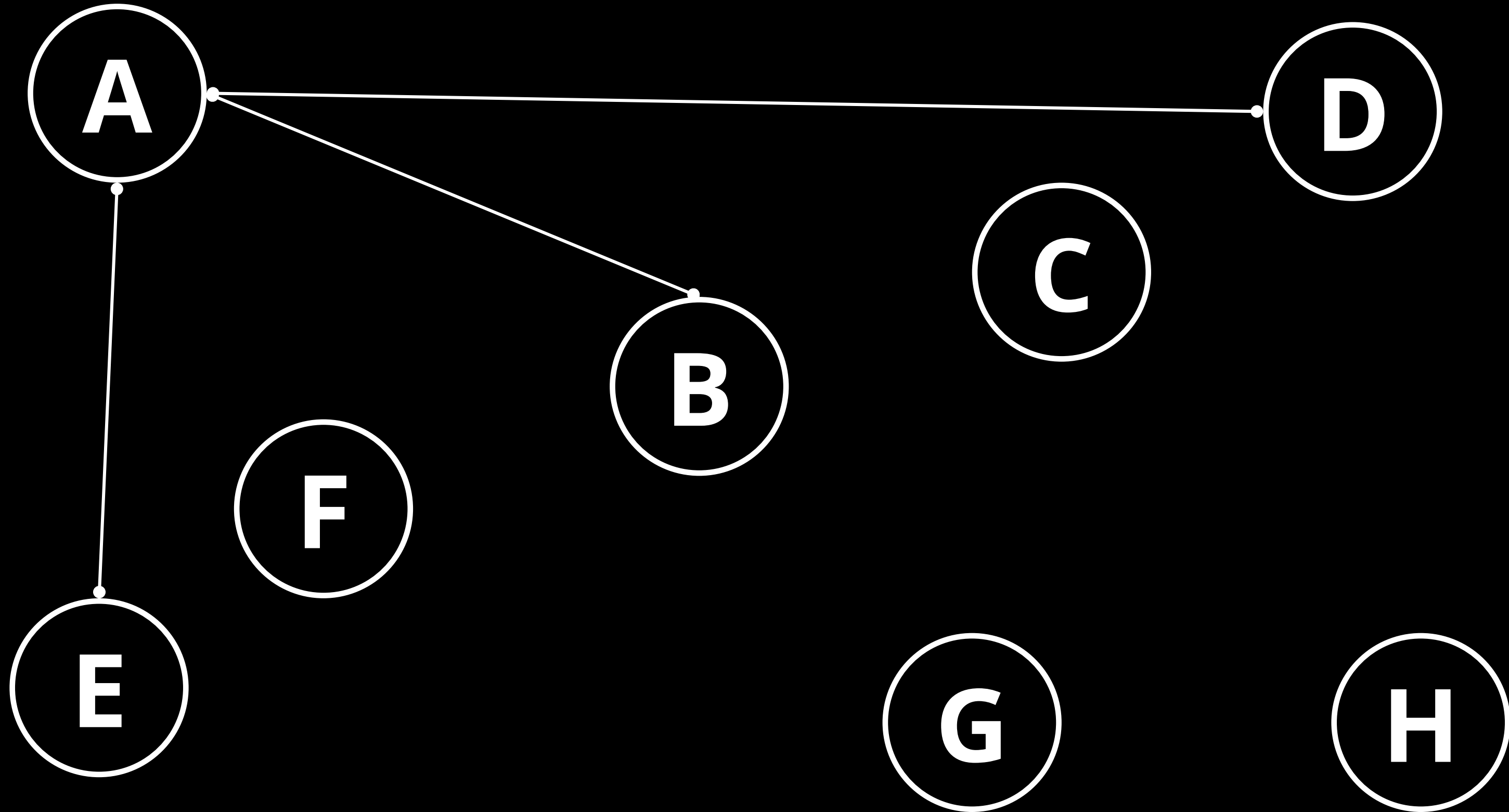




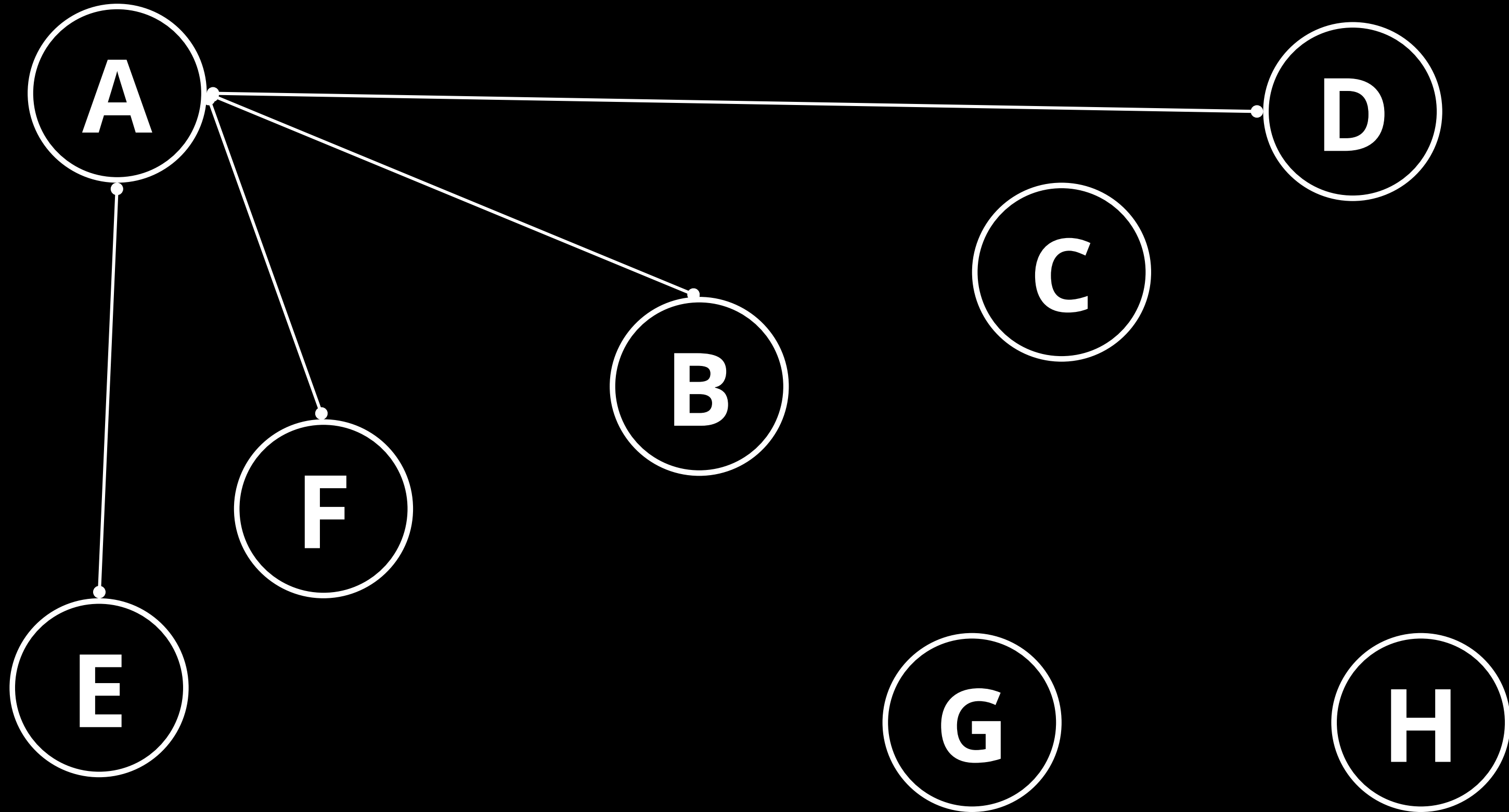
# Once we ConnectNodes(A,D):



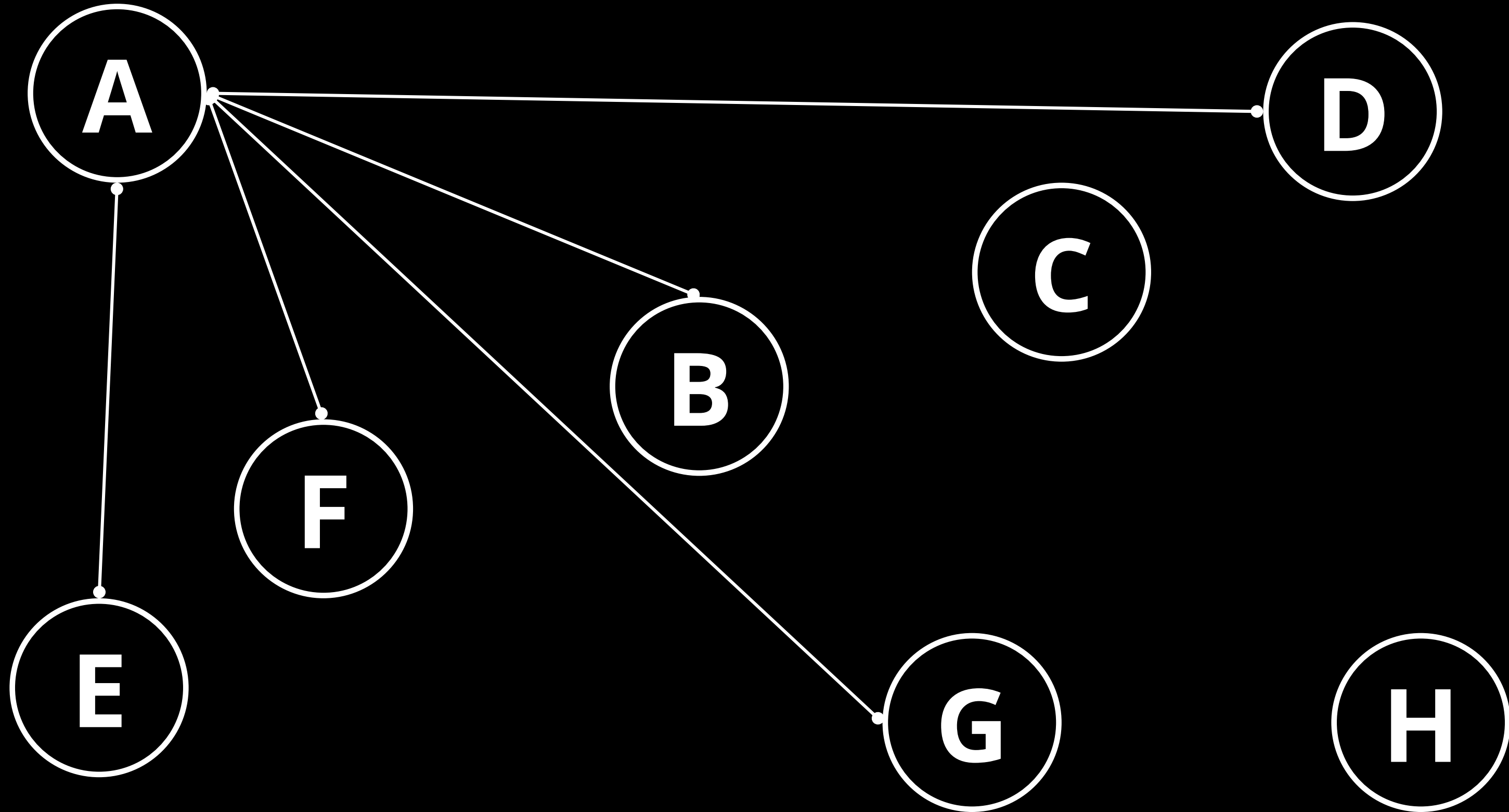
# Once we ConnectNodes(A,E):



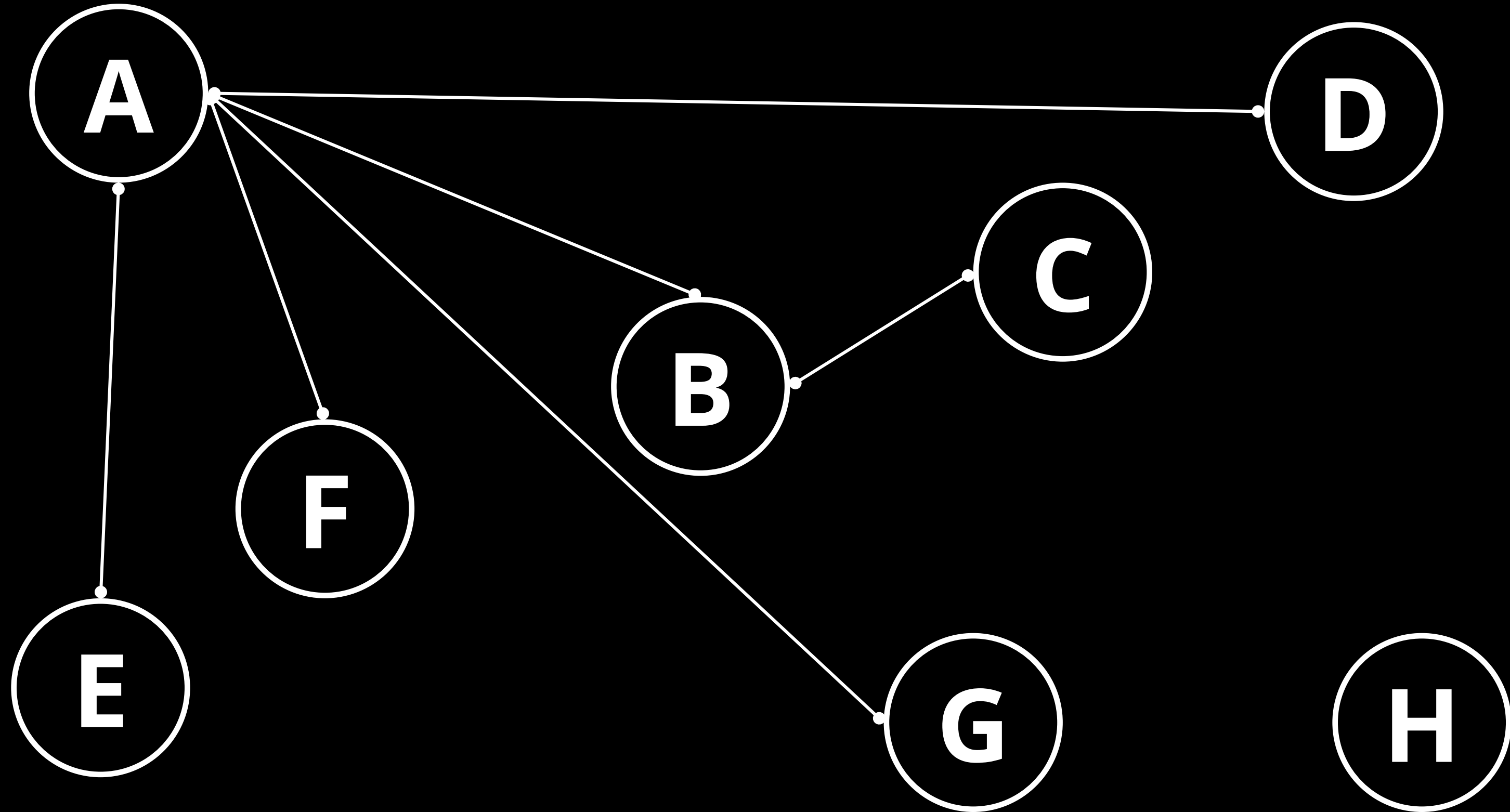
# Once we ConnectNodes(A,F):



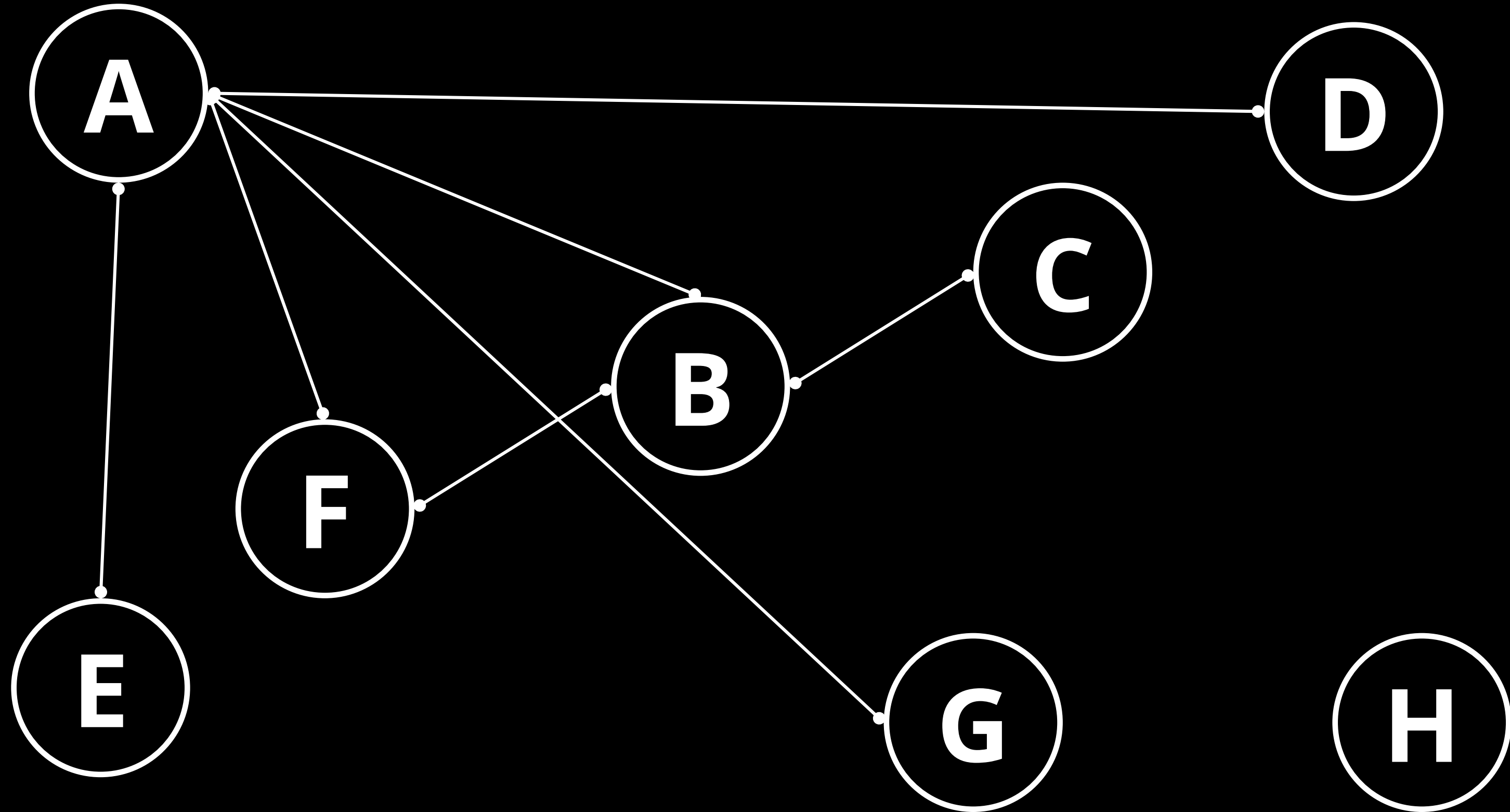
# Once we ConnectNodes(A,G):



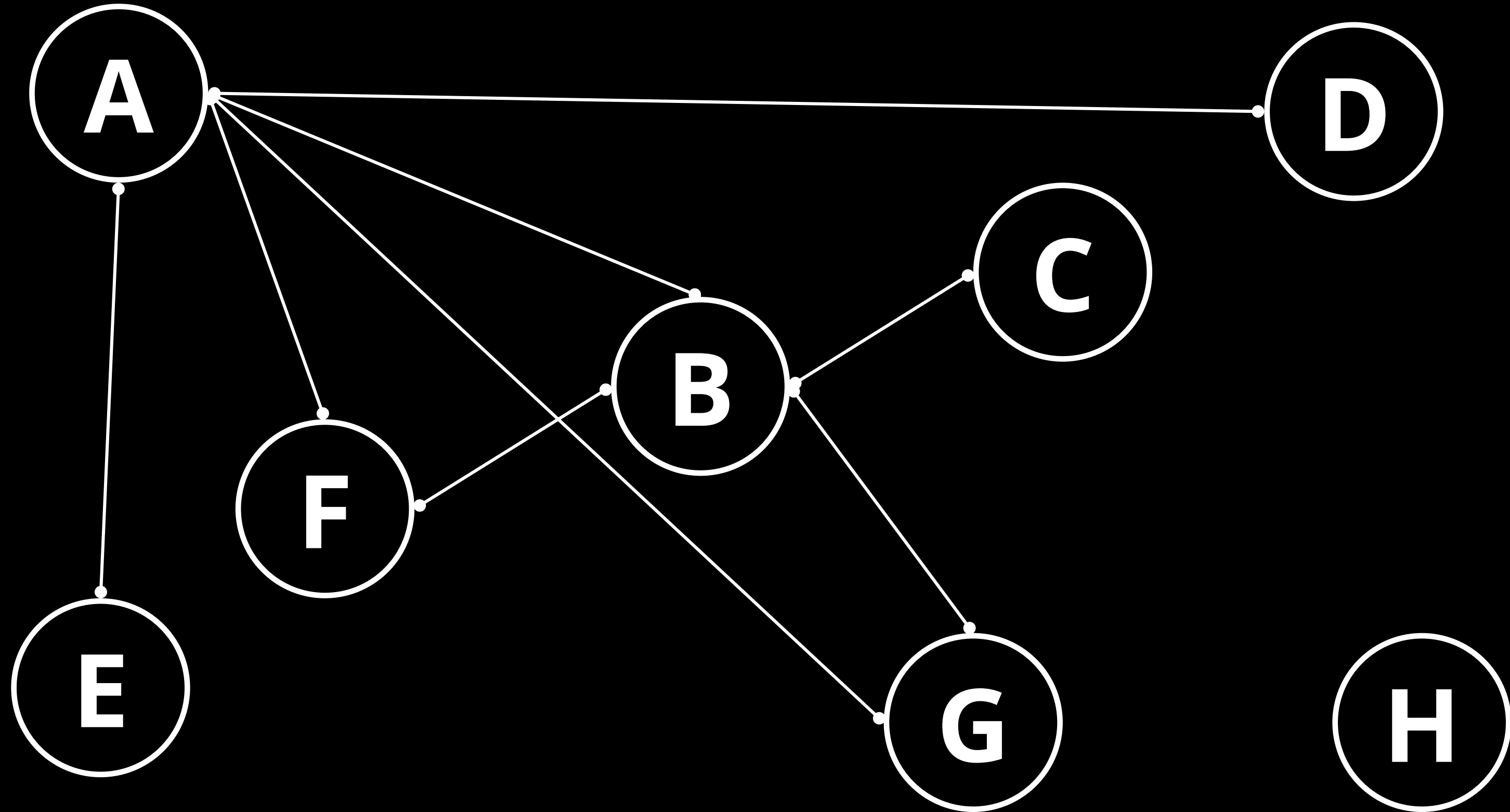
# Once we ConnectNodes(B,C):



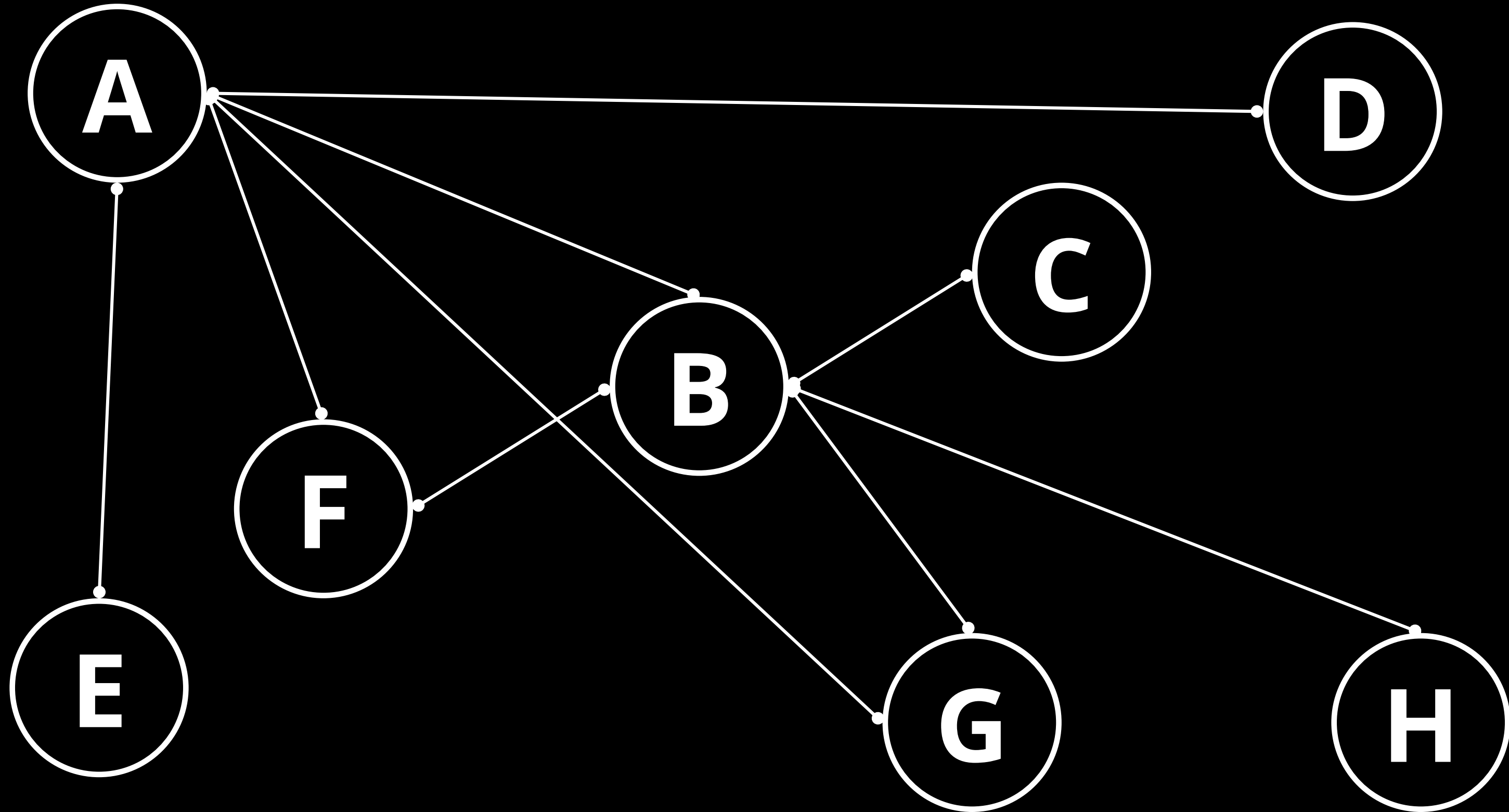
# Once we ConnectNodes(B,F):



# Once we ConnectNodes(B,G):

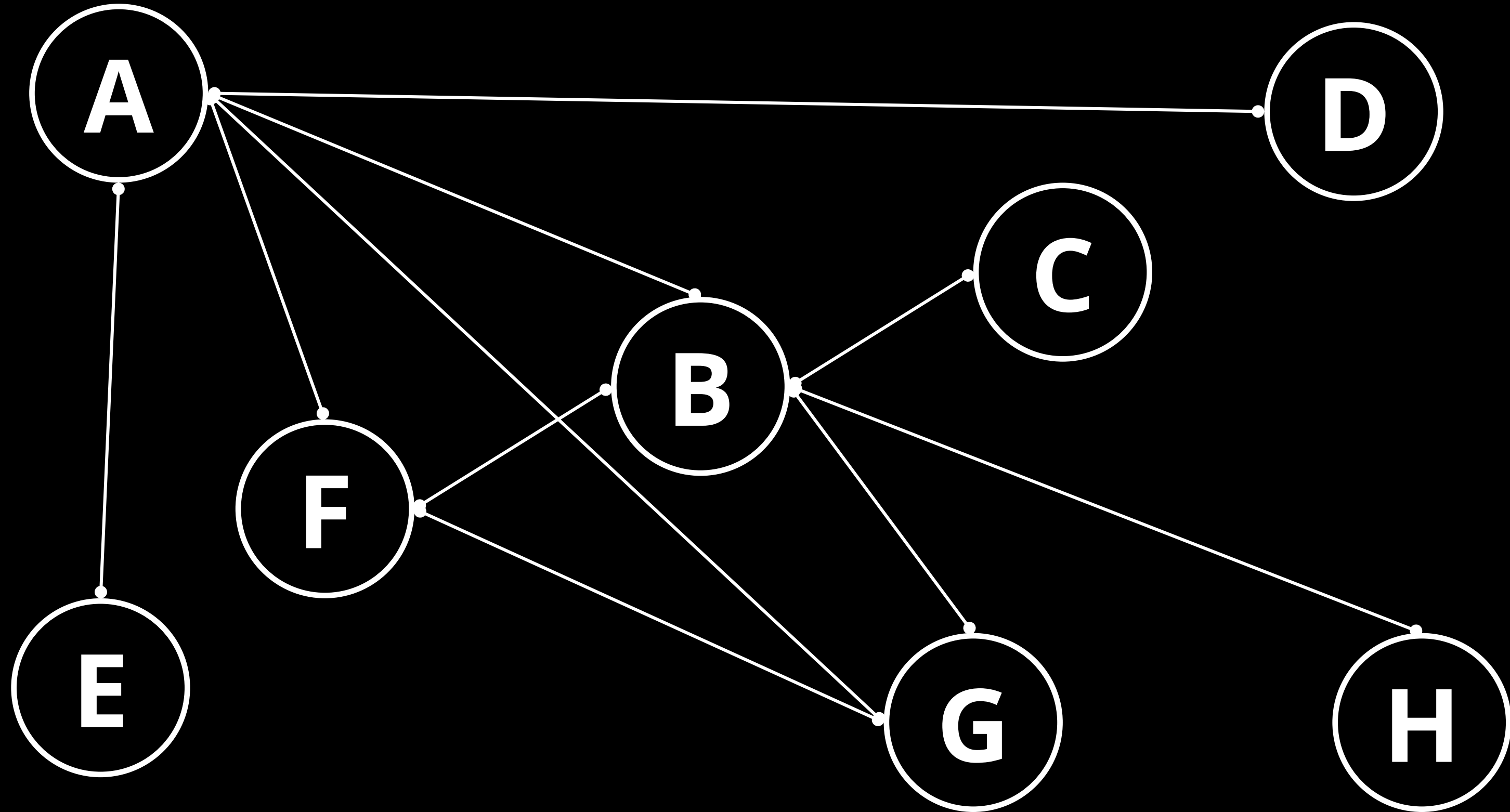


# Once we ConnectNodes(B,H):

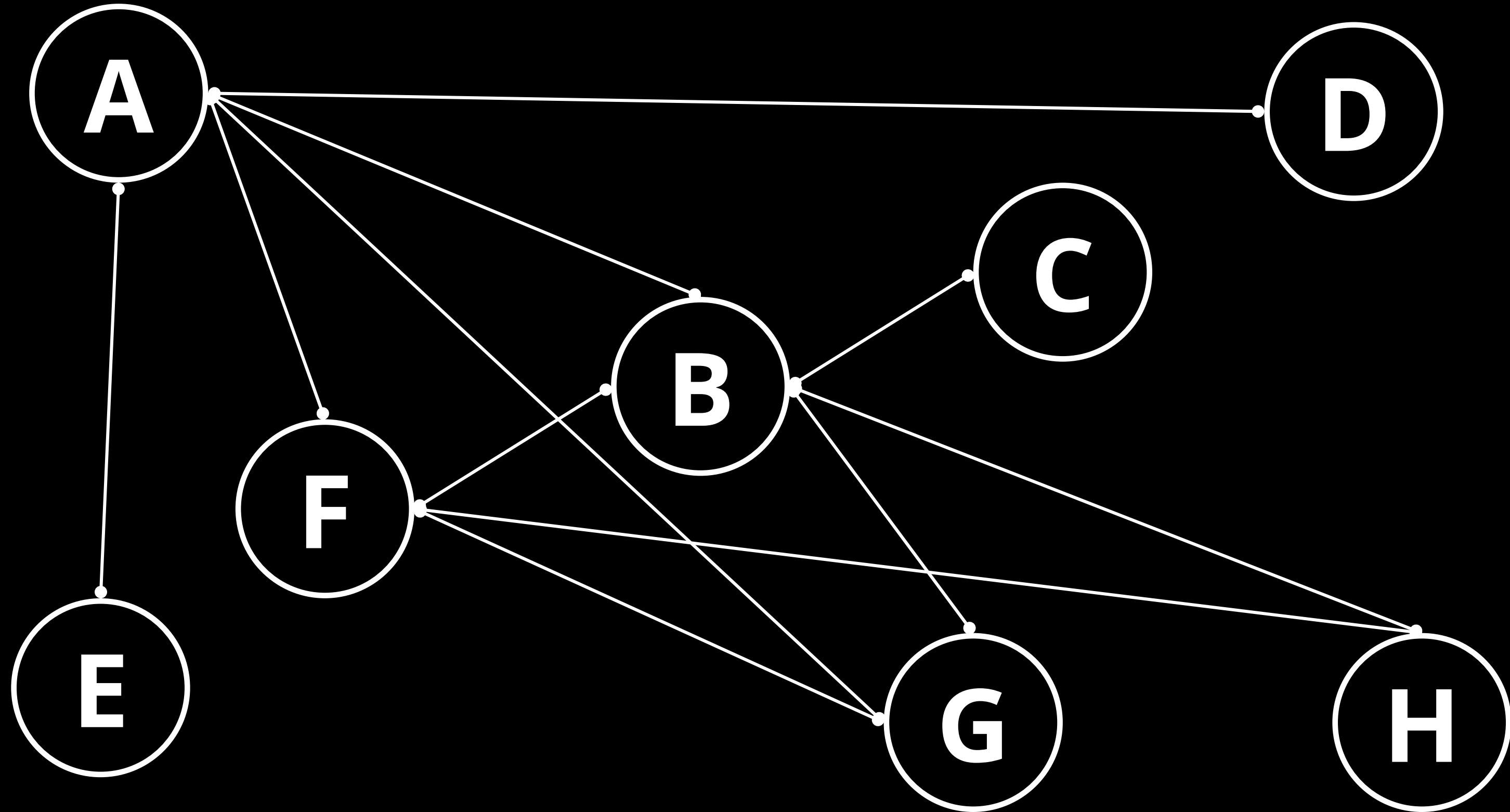




# Once we ConnectNodes(F,G):



# Once we ConnectNodes(F,H):



**This behavior will be  
reflected in a similar  
fashion in our linked lists**

# Once we AddNode(A):



**\*GP1 → A**

The diagram consists of a dark gray vertical rectangle on the left side of the slide. To the left of this rectangle is a thin white vertical line. At the top of the rectangle, the text **\*GP1 → A** is written in white. The arrow is red.

# Once we AddNode(B):

**\*GP1 → A**

**\*GP2 → B**

# Once we AddNode(C):

**\*GP1 → A**

**\*GP2 → B**

**\*GP3 → C**

# Once we AddNode(D):

**\*GP1 → A**

**\*GP2 → B**

**\*GP3 → C**

**\*GP4 → D**

# Once we AddNode(E):

**\*GP1 → A**

**\*GP2 → B**

**\*GP3 → C**

**\*GP4 → D**

**\*GP5 → E**



# Once we AddNode(F):

**\*GP1 → A**

**\*GP2 → B**

**\*GP3 → C**

**\*GP4 → D**

**\*GP5 → E**

**\*GP6 → F**

# Once we AddNode(G):

**\*GP1 → A**

**\*GP2 → B**

**\*GP3 → C**

**\*GP4 → D**

**\*GP5 → E**

**\*GP6 → F**

**\*GP7 → G**

# Once we AddNode(H):

**\*GP1 → A**

**\*GP2 → B**

**\*GP3 → C**

**\*GP4 → D**

**\*GP5 → E**

**\*GP6 → F**

**\*GP7 → G**

**\*GP8 → H**

# Once we ConnectNodes(A, B):

\*GP1 → A → B

\*GP2 → B → A

\*GP3 → C

\*GP4 → D

\*GP5 → E

\*GP6 → F

\*GP7 → G

\*GP8 → H

# Once we ConnectNodes(A, D):

\*GP1 → A → B → D

\*GP2 → B → A

\*GP3 → C

\*GP4 → D → A

\*GP5 → E

\*GP6 → F

\*GP7 → G

\*GP8 → H

# Once we ConnectNodes(A, E):

**\*GP1 → A → B → D → E**

**\*GP2 → B → A**

**\*GP3 → C**

**\*GP4 → D → A**

**\*GP5 → E → A**

**\*GP6 → F**

**\*GP7 → G**

**\*GP8 → H**

# Once we ConnectNodes(A, F):

**\*GP1 → A → B → D → E → F**

**\*GP2 → B → A**

**\*GP3 → C**

**\*GP4 → D → A**

**\*GP5 → E → A**

**\*GP6 → F → A**

**\*GP7 → G**

**\*GP8 → H**

# Once we ConnectNodes(A, G):

**\*GP1 → A → B → D → E → F → G**

**\*GP2 → B → A**

**\*GP3 → C**

**\*GP4 → D → A**

**\*GP5 → E → A**

**\*GP6 → F → A**

**\*GP7 → G → A**

**\*GP8 → H**



# Once we ConnectNodes(B, C):

\*GP1 → A → B → D → E → F → G

\*GP2 → B → A → C

\*GP3 → C → B

\*GP4 → D → A

\*GP5 → E → A

\*GP6 → F → A

\*GP7 → G → A

\*GP8 → H

# Once we ConnectNodes(B, F):

**\*GP1 → A → B → D → E → F → G**

**\*GP2 → B → A → C → F**

**\*GP3 → C → B**

**\*GP4 → D → A**

**\*GP5 → E → A**

**\*GP6 → F → A → B**

**\*GP7 → G → A**

**\*GP8 → H**

# Once we ConnectNodes(B, G):

\*GP1 → A → B → D → E → F → G

\*GP2 → B → A → C → F → G

\*GP3 → C → B

\*GP4 → D → A

\*GP5 → E → A

\*GP6 → F → A → B

\*GP7 → G → A → B

\*GP8 → H

# Once we ConnectNodes(B, H):

\*GP1 → A → B → D → E → F → G

\*GP2 → B → A → C → F → G → H

\*GP3 → C → B

\*GP4 → D → A

\*GP5 → E → A

\*GP6 → F → A → B

\*GP7 → G → A → B

\*GP8 → H → B

# Once we ConnectNodes(F, G):

**\*GP1 → A → B → D → E → F → G**

**\*GP2 → B → A → C → F → G → H**

**\*GP3 → C → B**

**\*GP4 → D → A**

**\*GP5 → E → A**

**\*GP6 → F → A → B → G**

**\*GP7 → G → A → B → F**

**\*GP8 → H → B**

# Once we ConnectNodes(F, H):

\*GP1 → A → B → D → E → F → G

\*GP2 → B → A → C → F → G → H

\*GP3 → C → B

\*GP4 → D → A

\*GP5 → E → A

\*GP6 → F → A → B → G → H

\*GP7 → G → A → B → F

\*GP8 → H → B → F

# This is the final Graph Representation

**\*GP1 → A → B → D → E → F → G**

**\*GP2 → B → A → C → F → G → H**

**\*GP3 → C → B**

**\*GP4 → D → A**

**\*GP5 → E → A**

**\*GP6 → F → A → B → G → H**

**\*GP7 → G → A → B → F**

**\*GP8 → H → B → F**