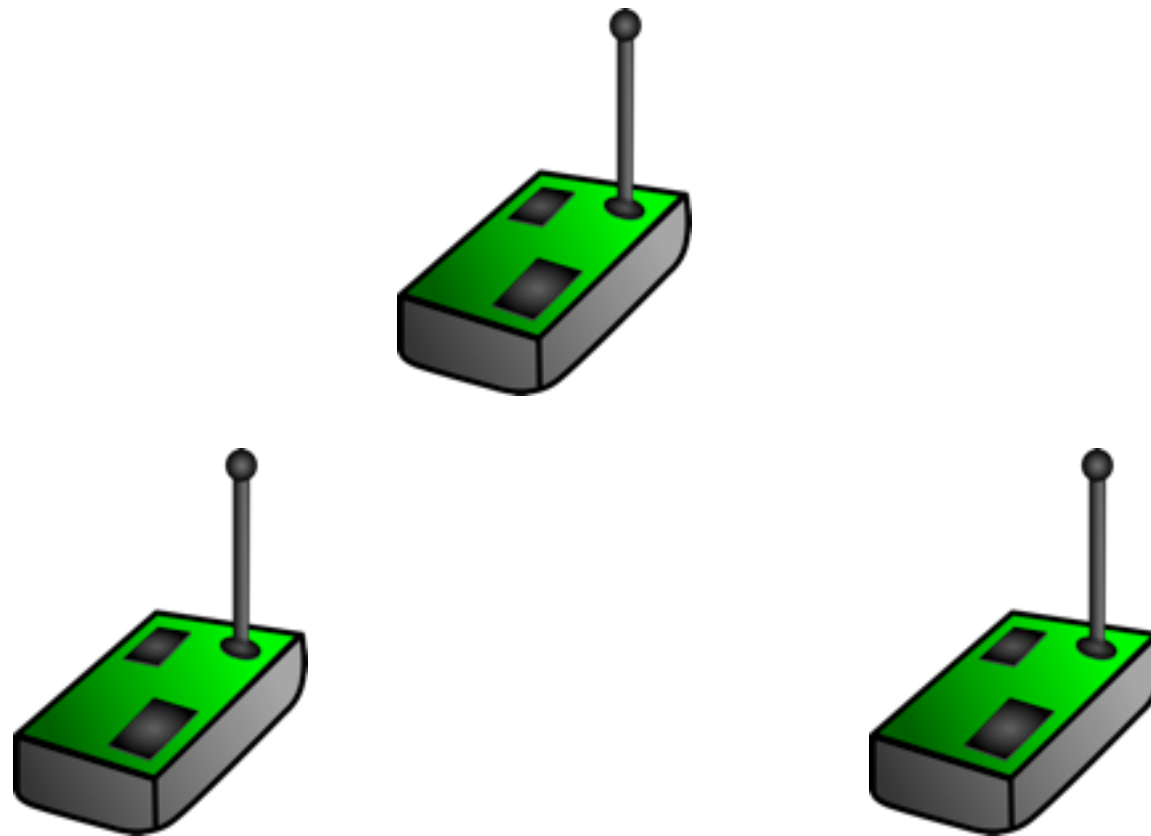
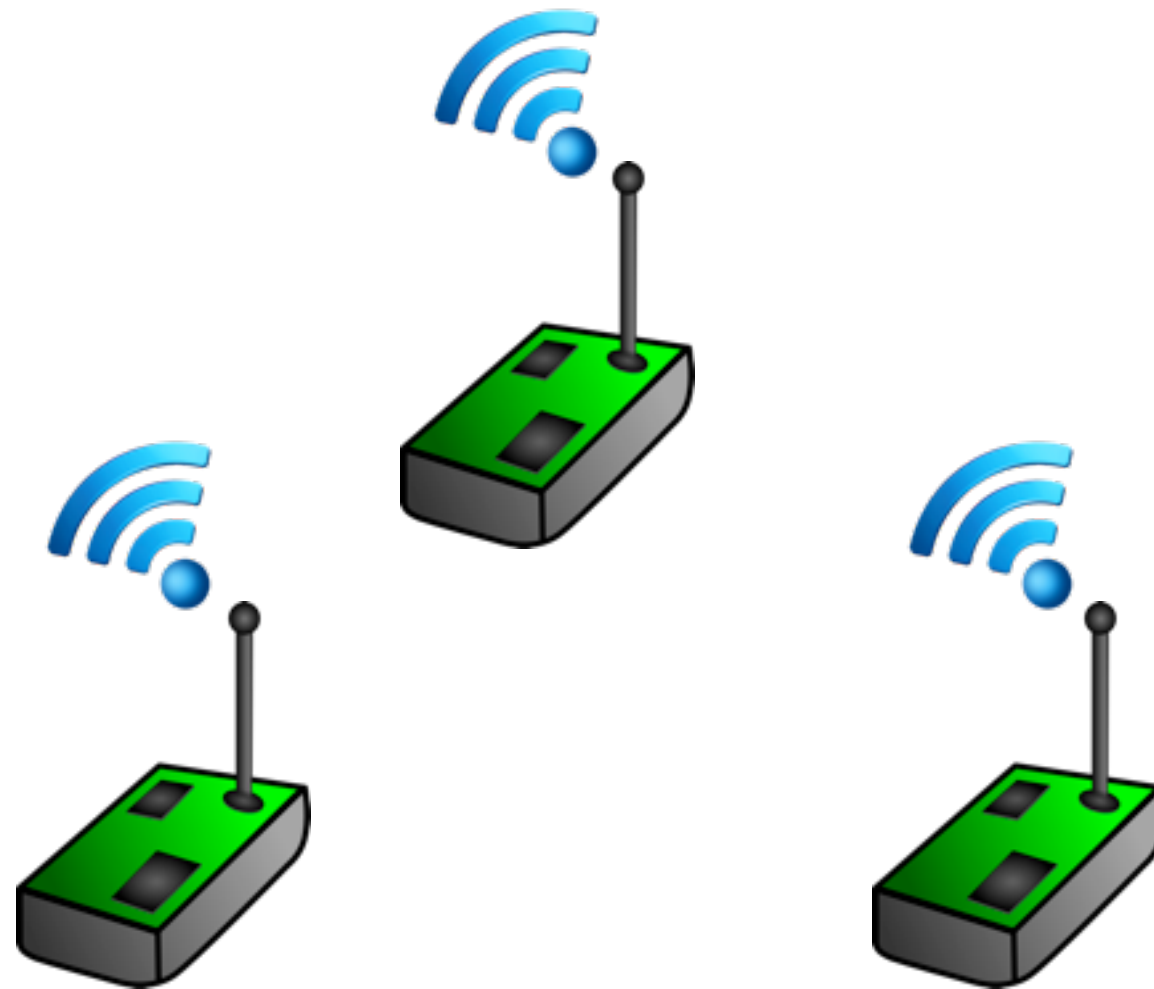


Vertex Coloring

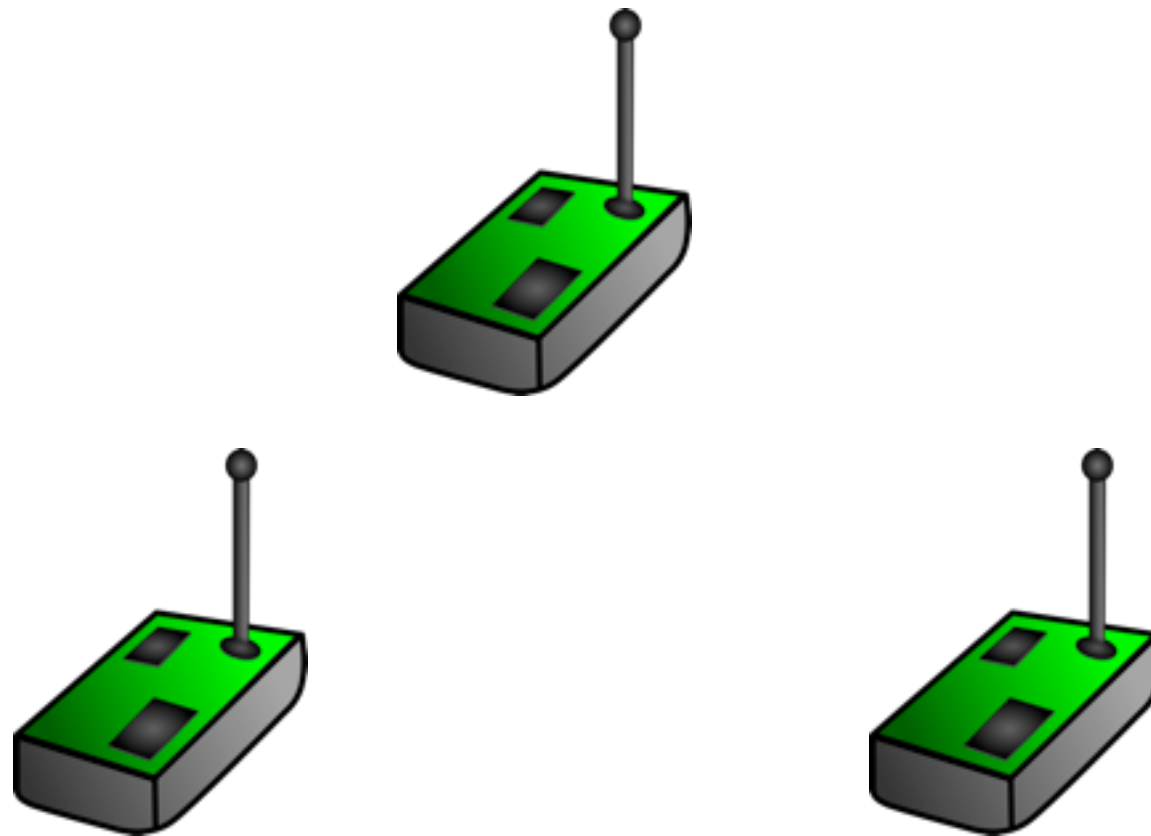
Why coloring ?



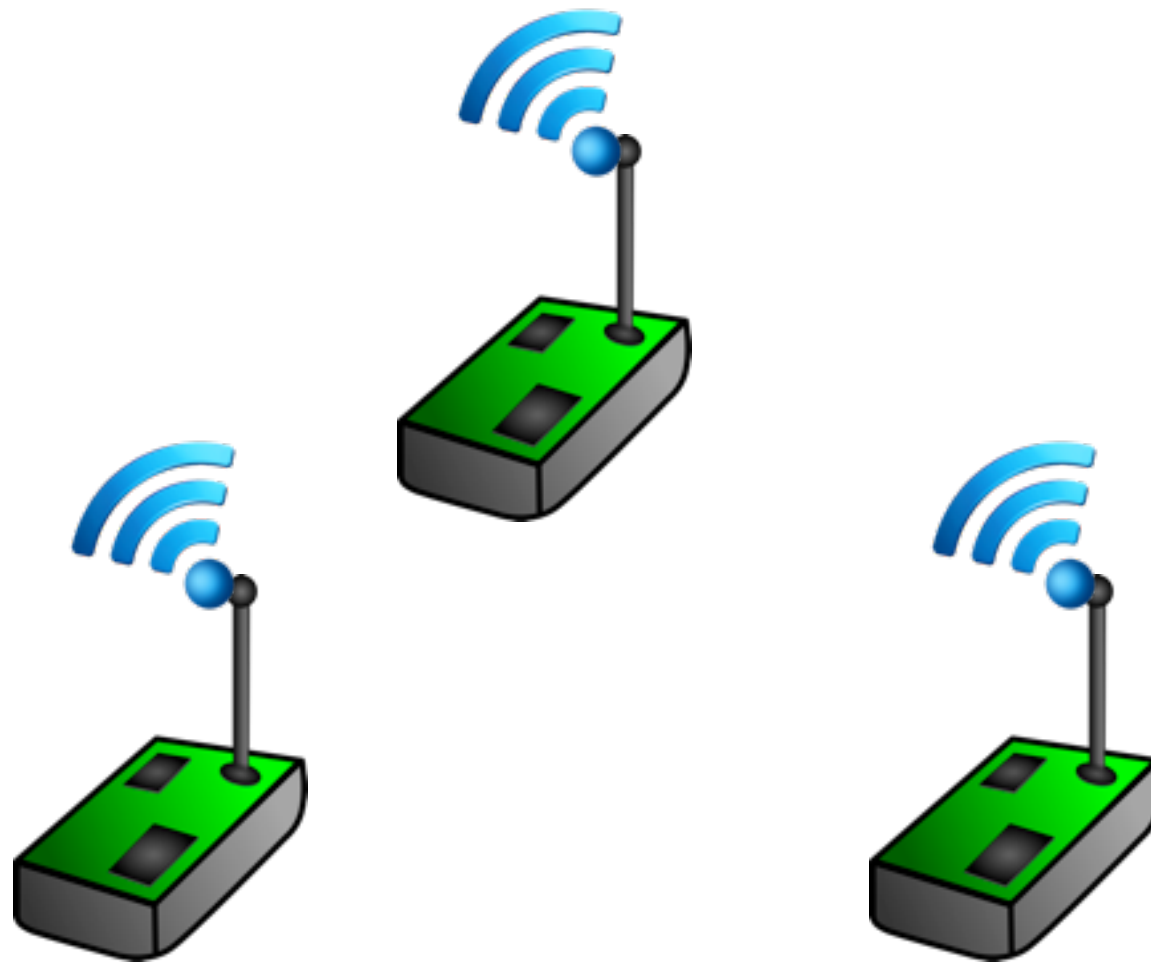
Why coloring ?



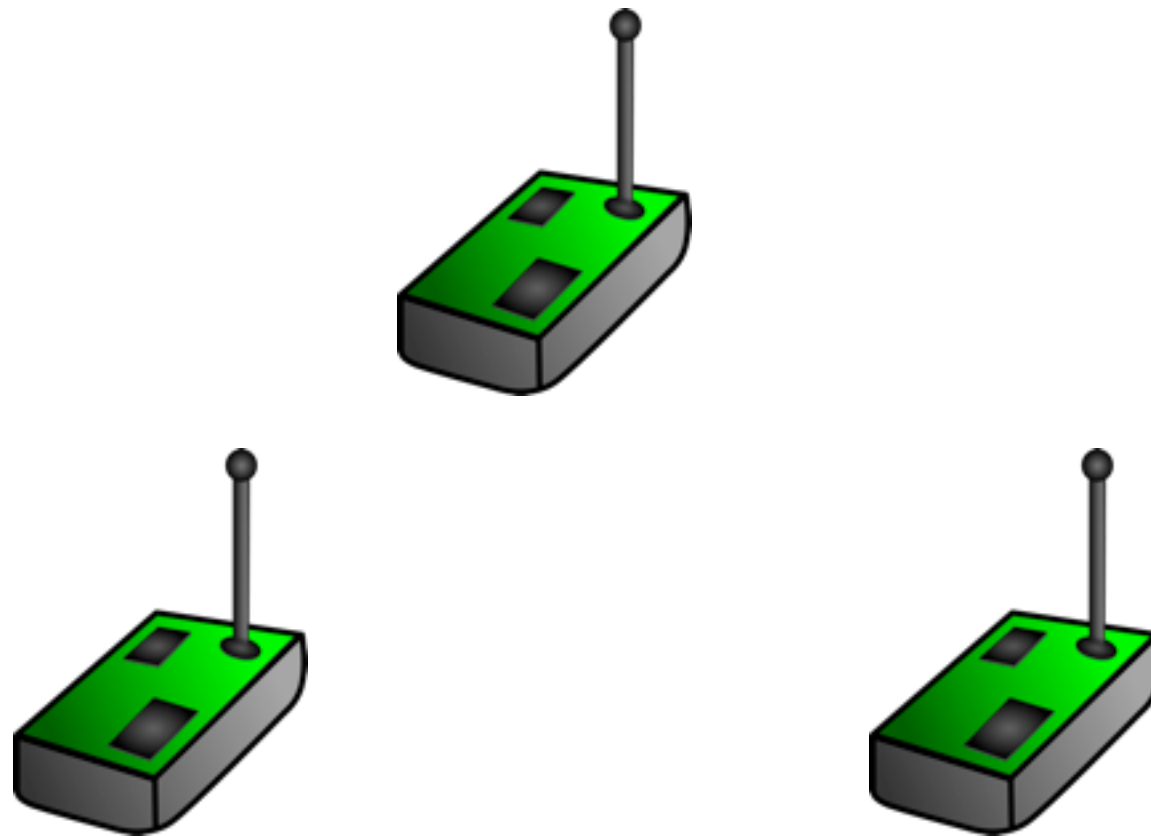
Why coloring ?



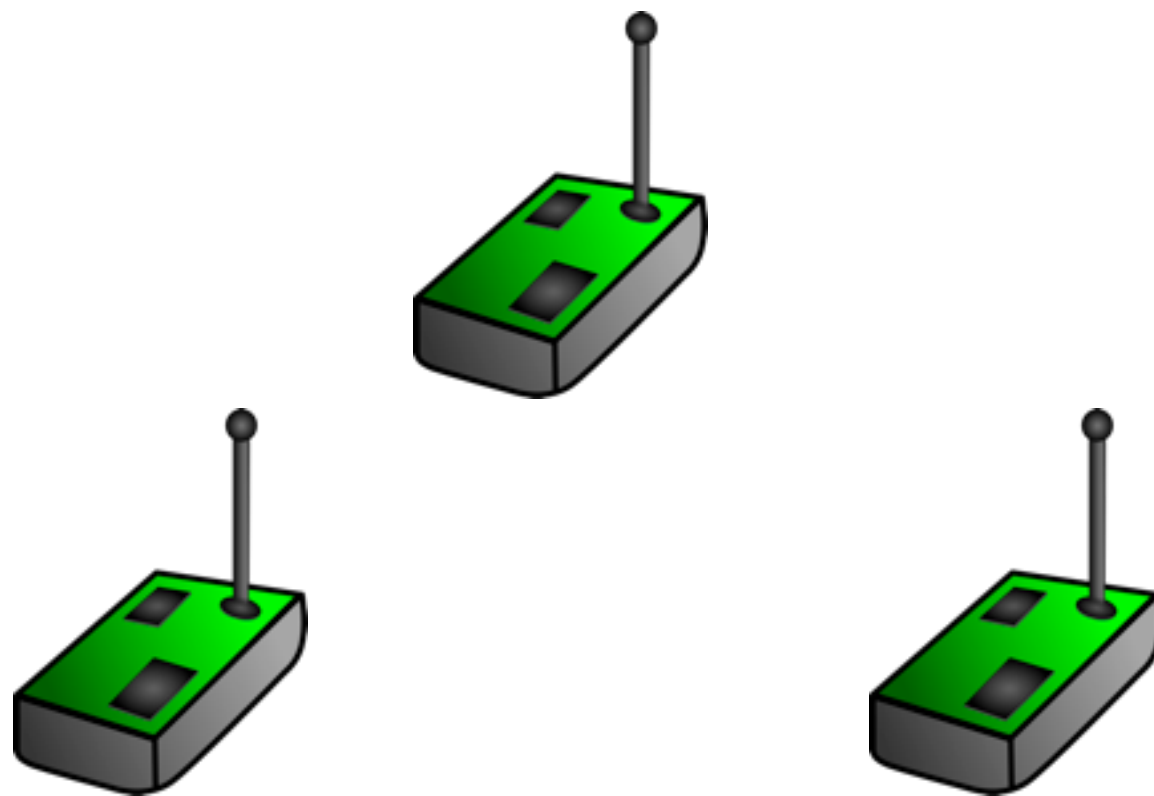
Why coloring ?



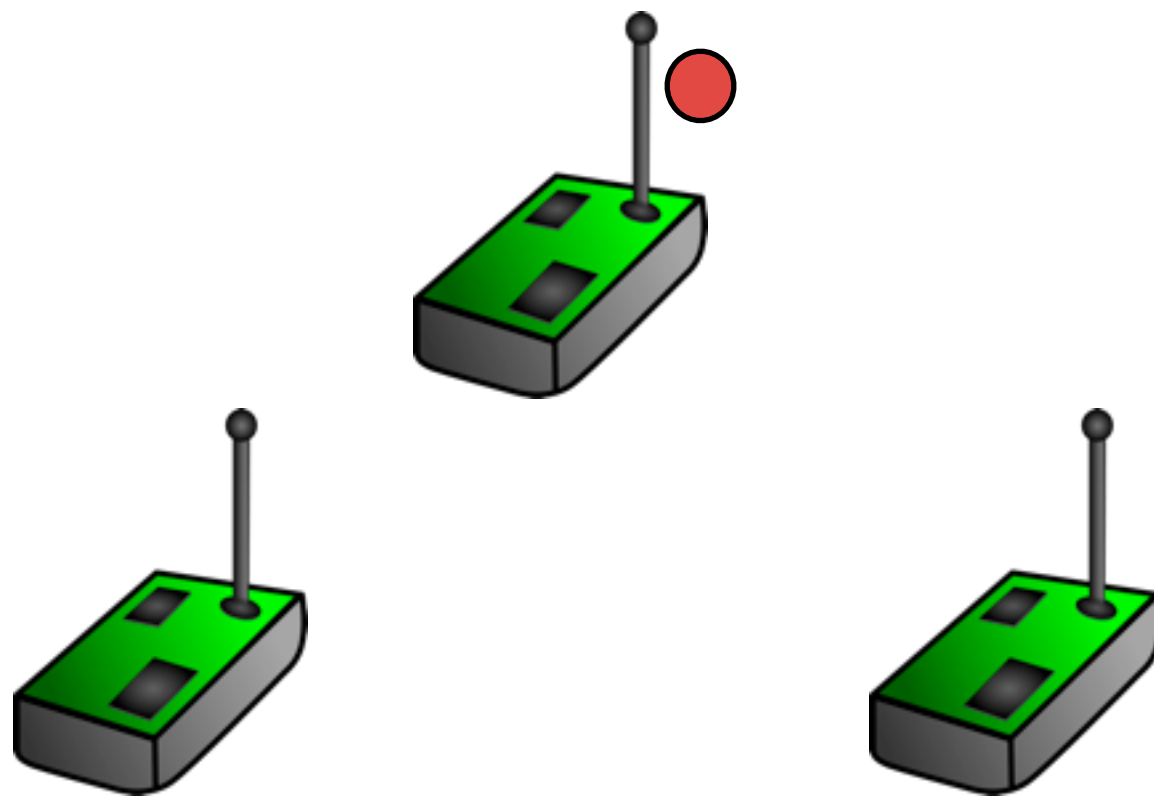
Why coloring ?



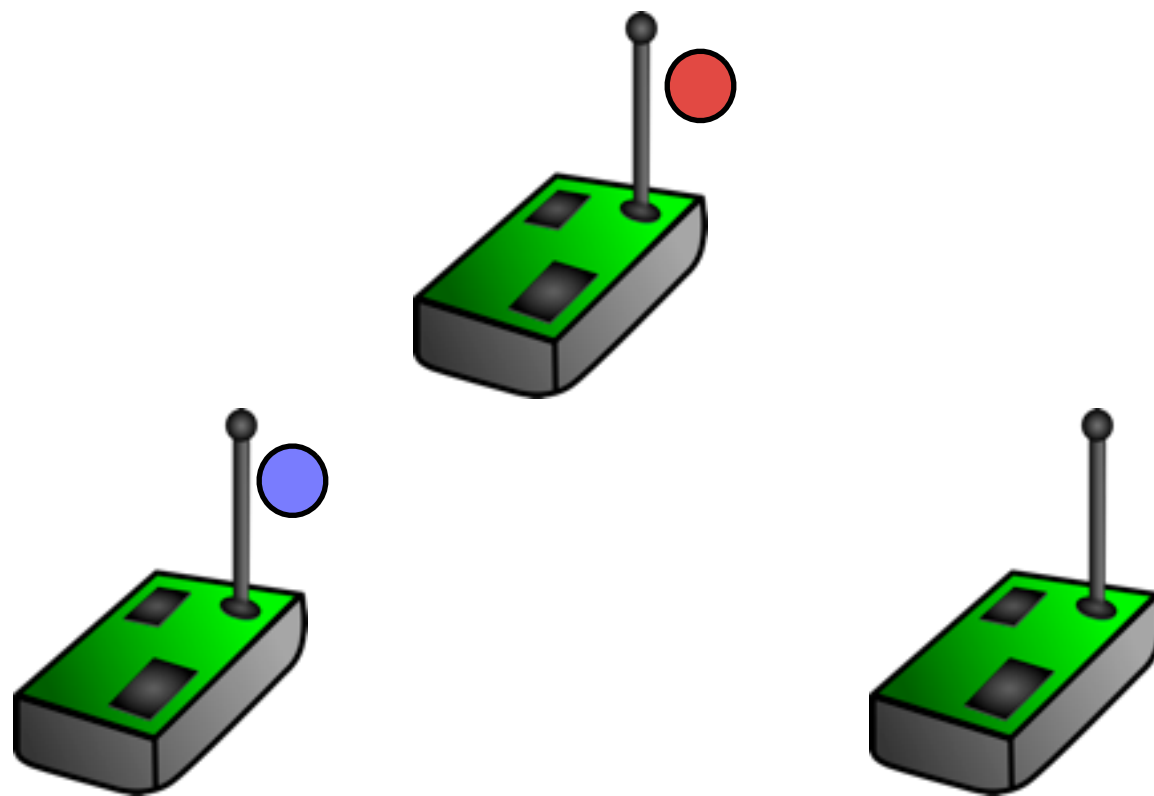
Why ones needs coloring ?



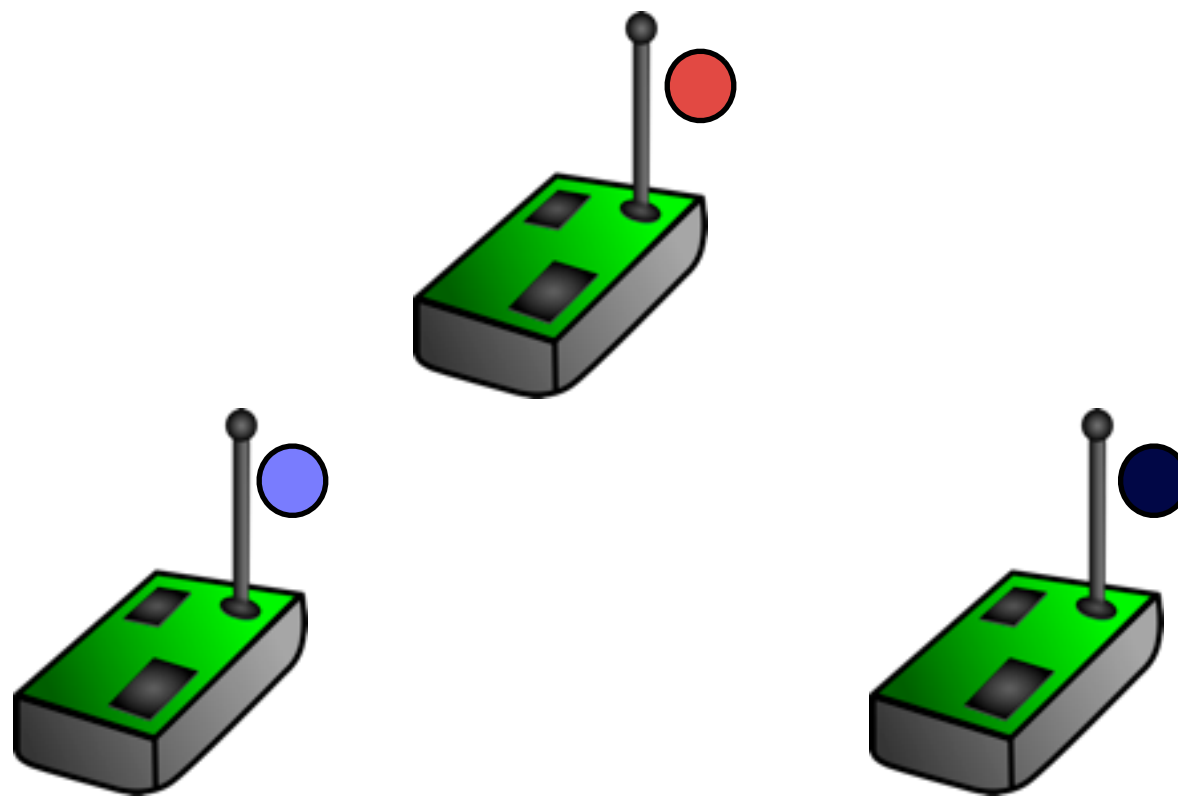
Why ones needs coloring ?



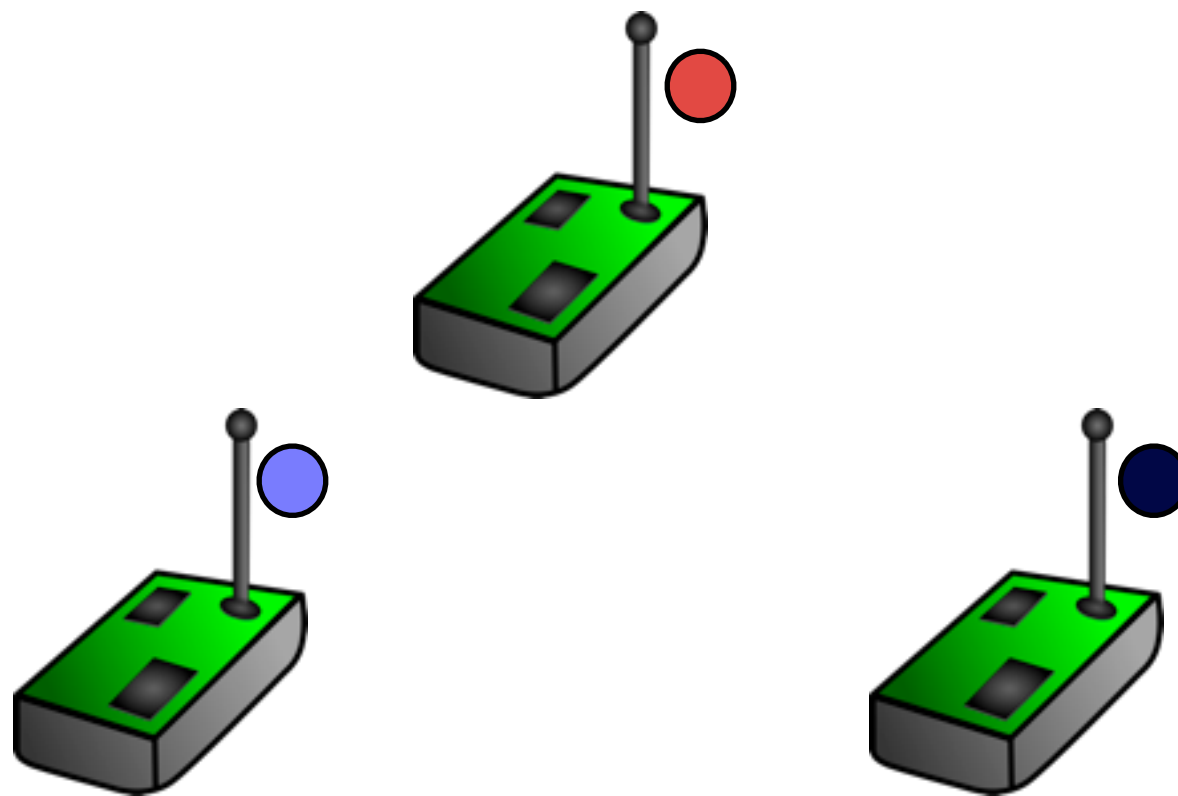
Why ones needs coloring ?



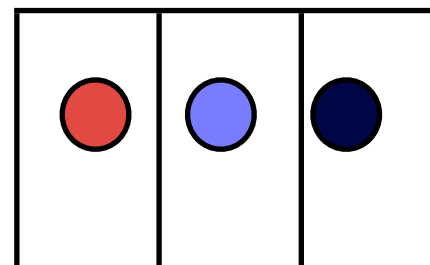
Why ones needs coloring ?



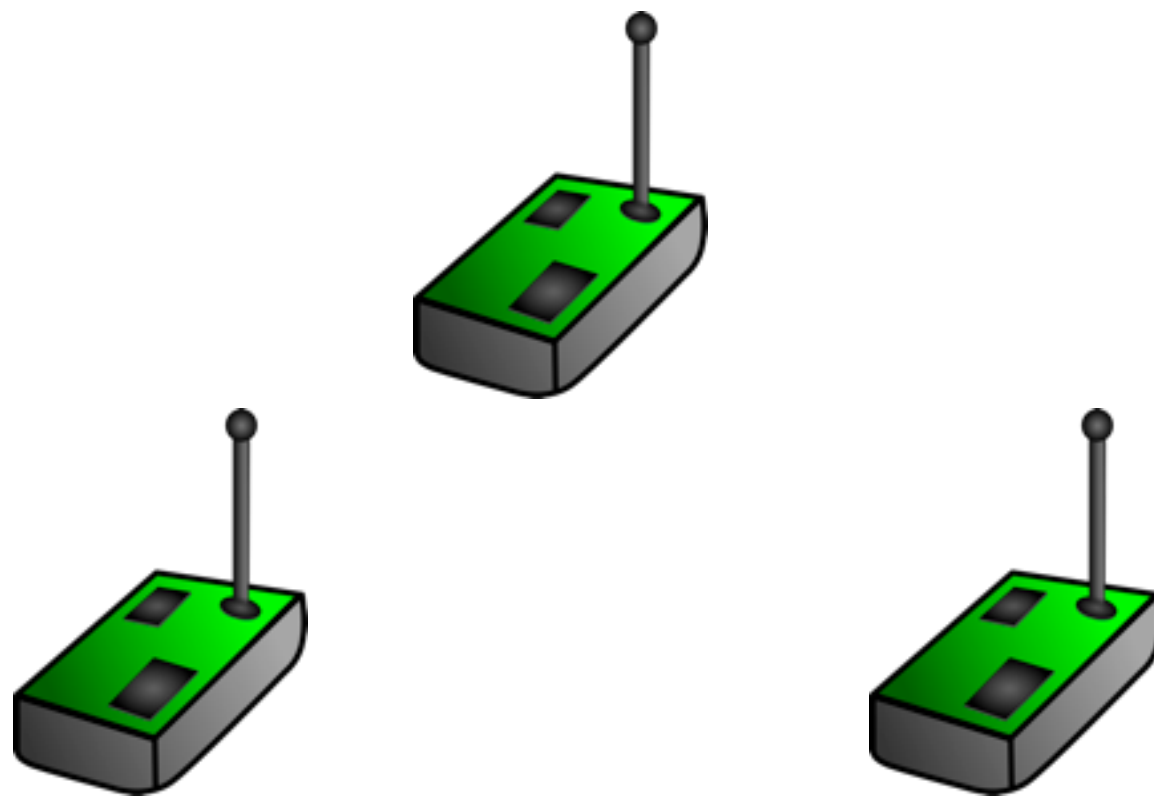
Why ones needs coloring ?



Transmission rule :



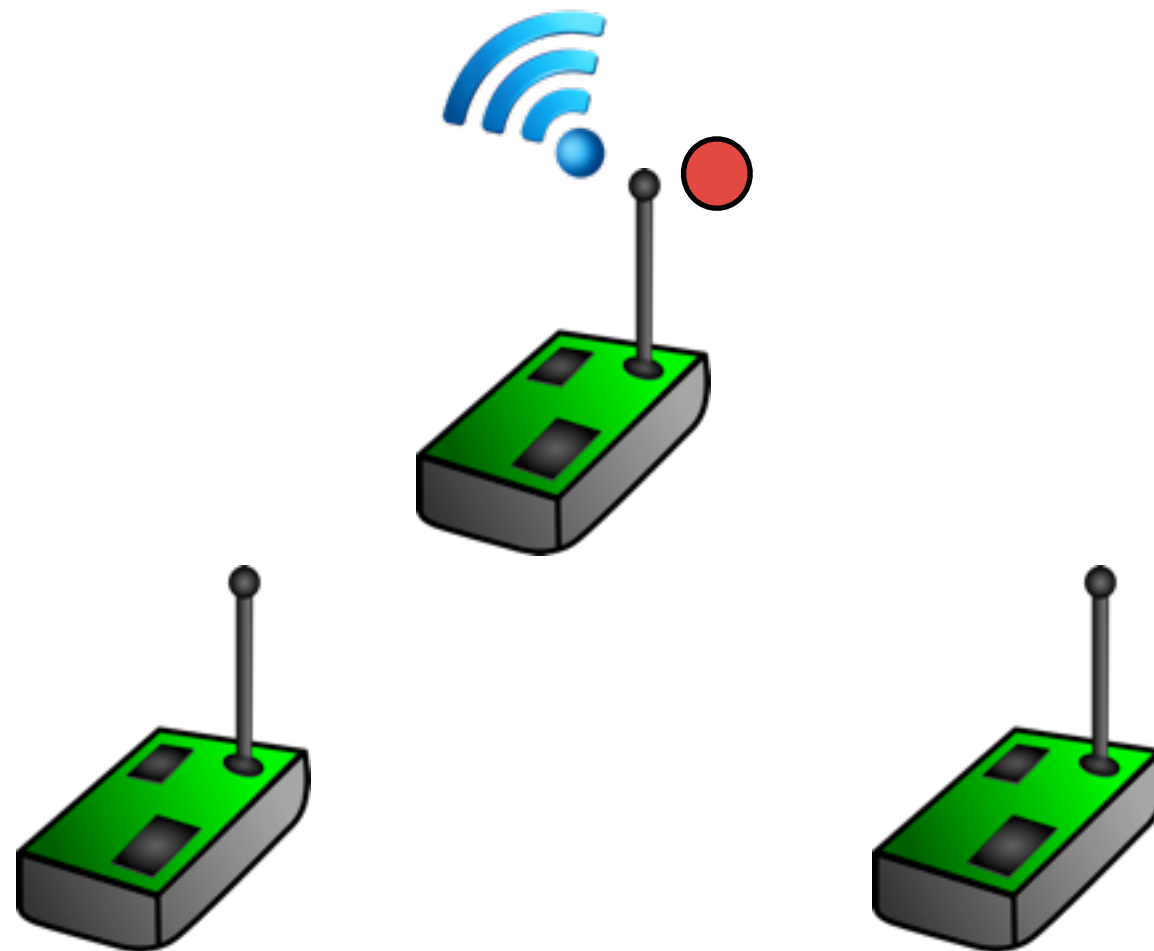
Why ones needs coloring ?



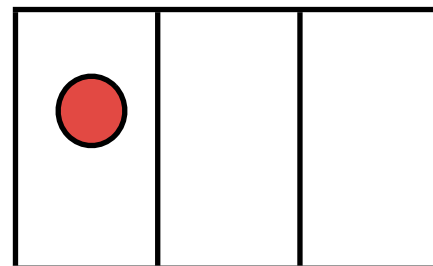
Transmission rule :

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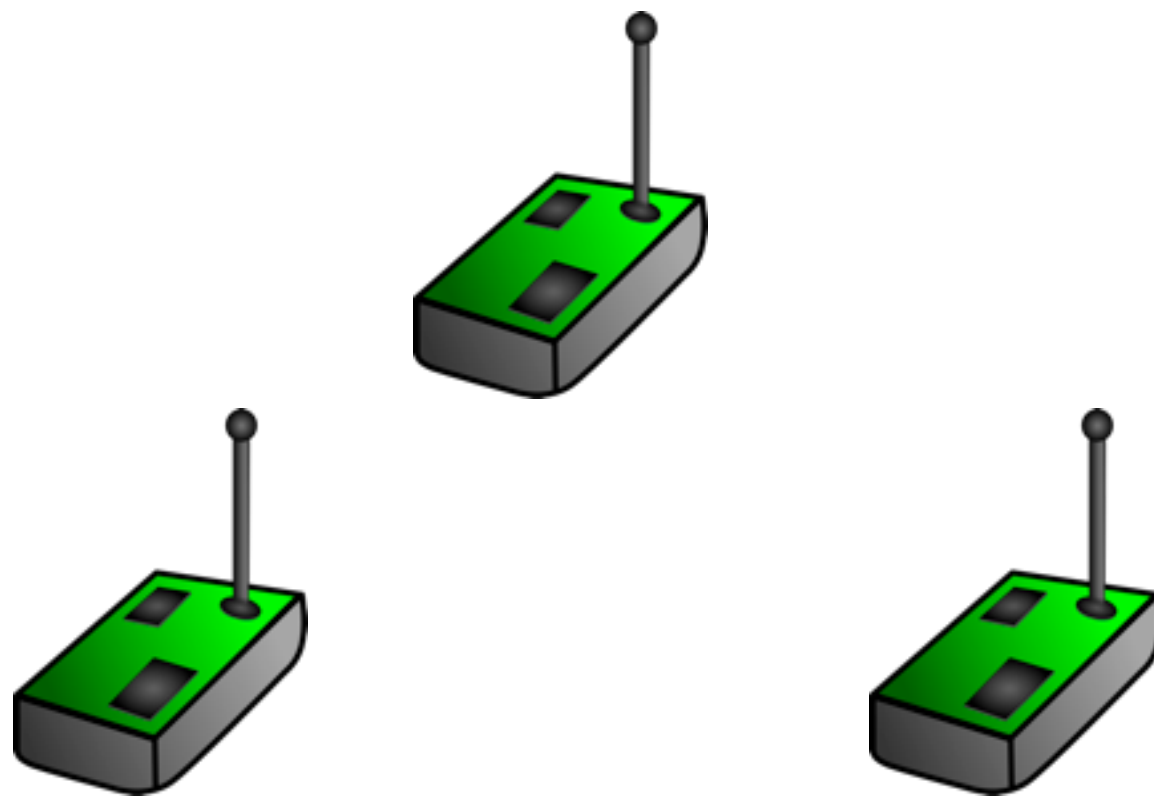
Why one needs coloring ?



Transmission rule :



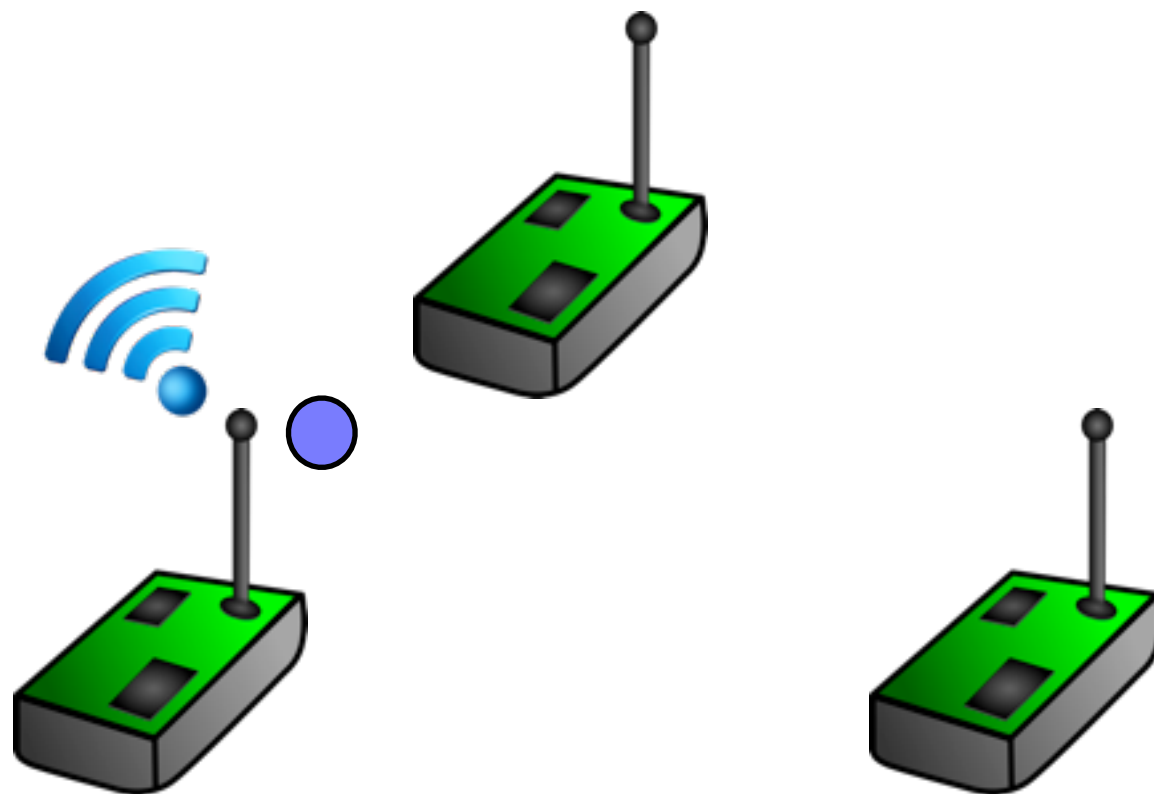
Why ones needs coloring ?



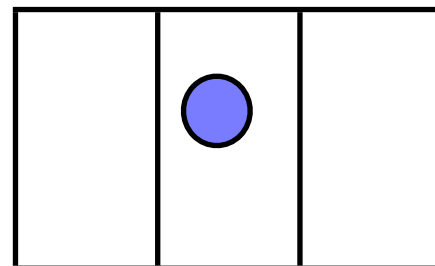
Transmission rule :

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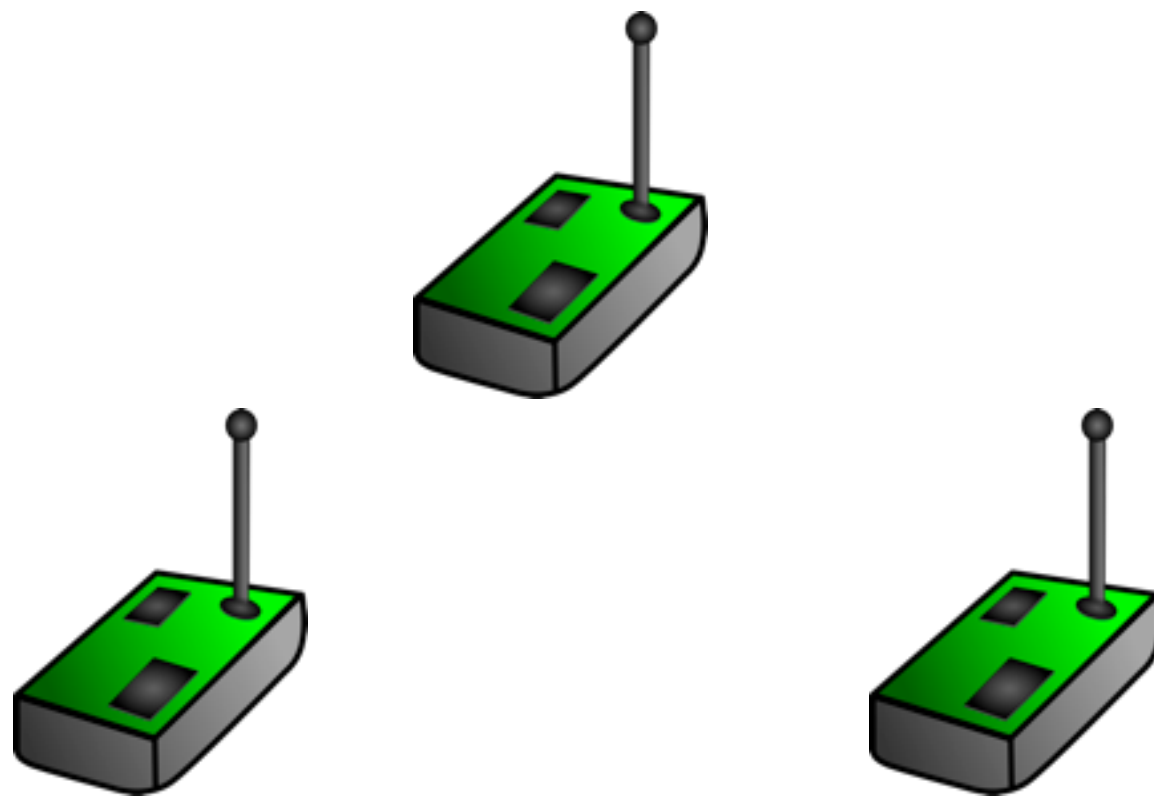
Why ones needs coloring ?



Transmission rule :



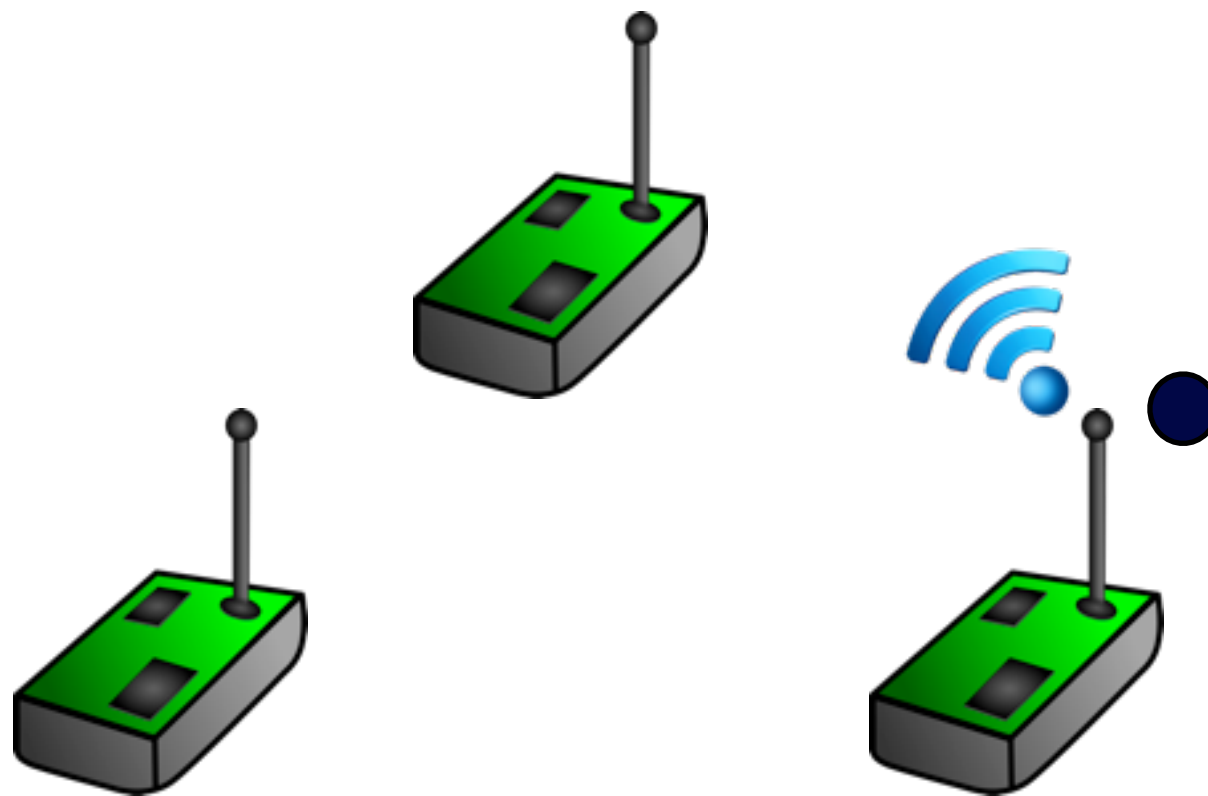
Why ones needs coloring ?



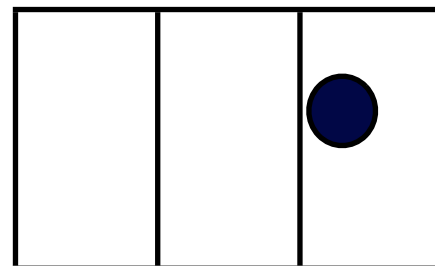
Transmission rule :

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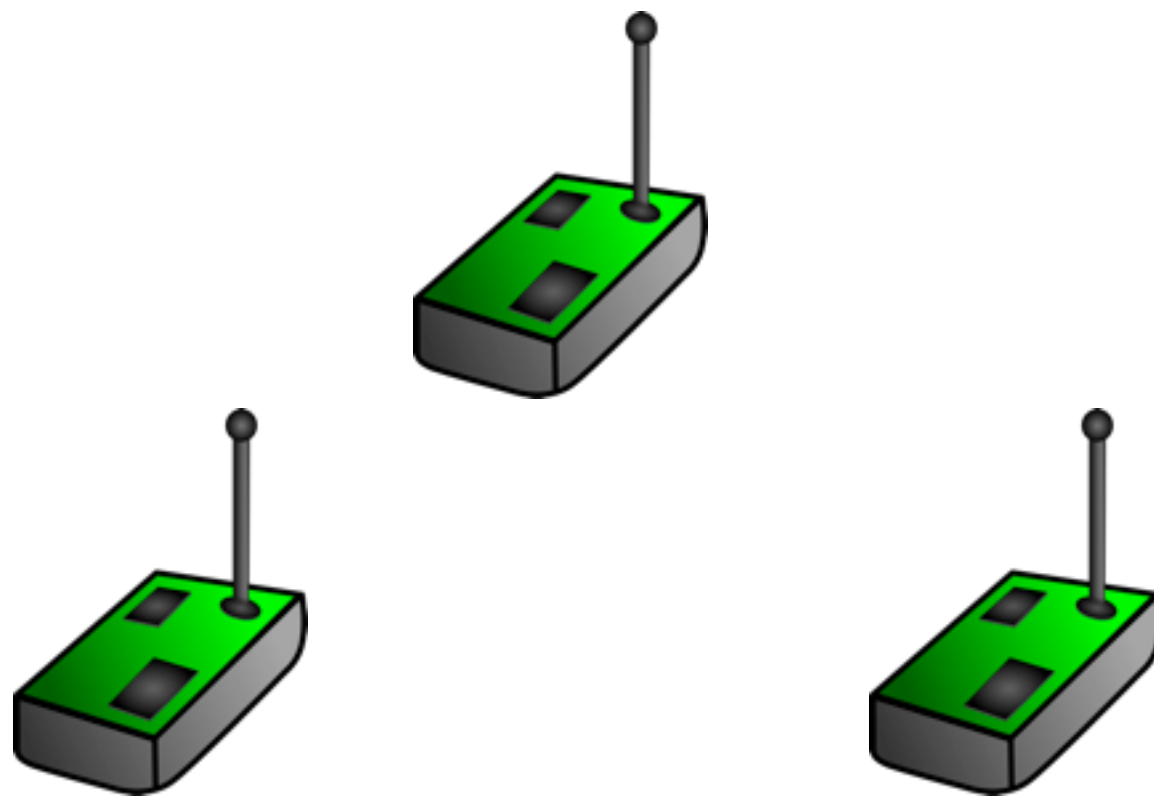
Why ones needs coloring ?



Transmission rule :



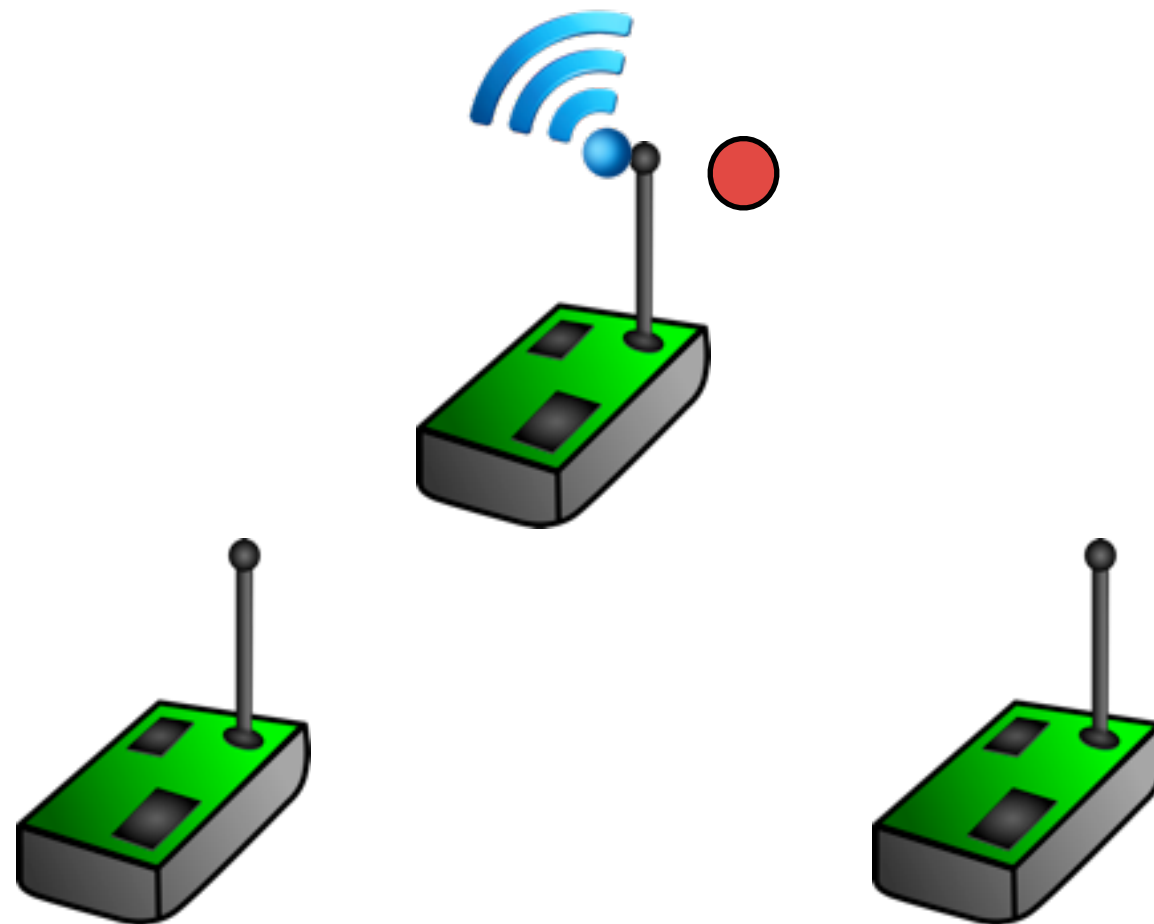
Why ones needs coloring ?



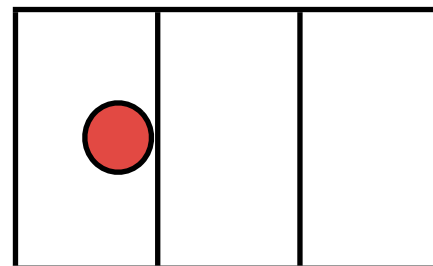
Transmission rule :

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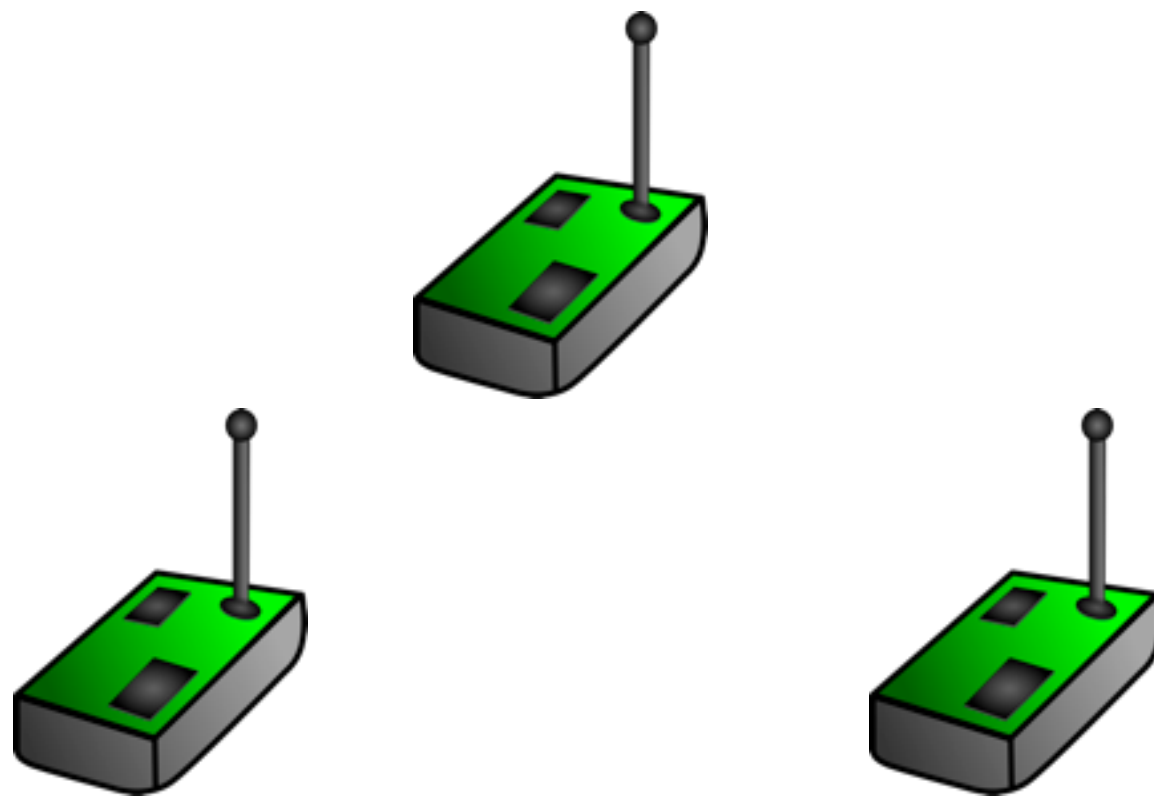
Why ones needs coloring ?



Transmission rule :



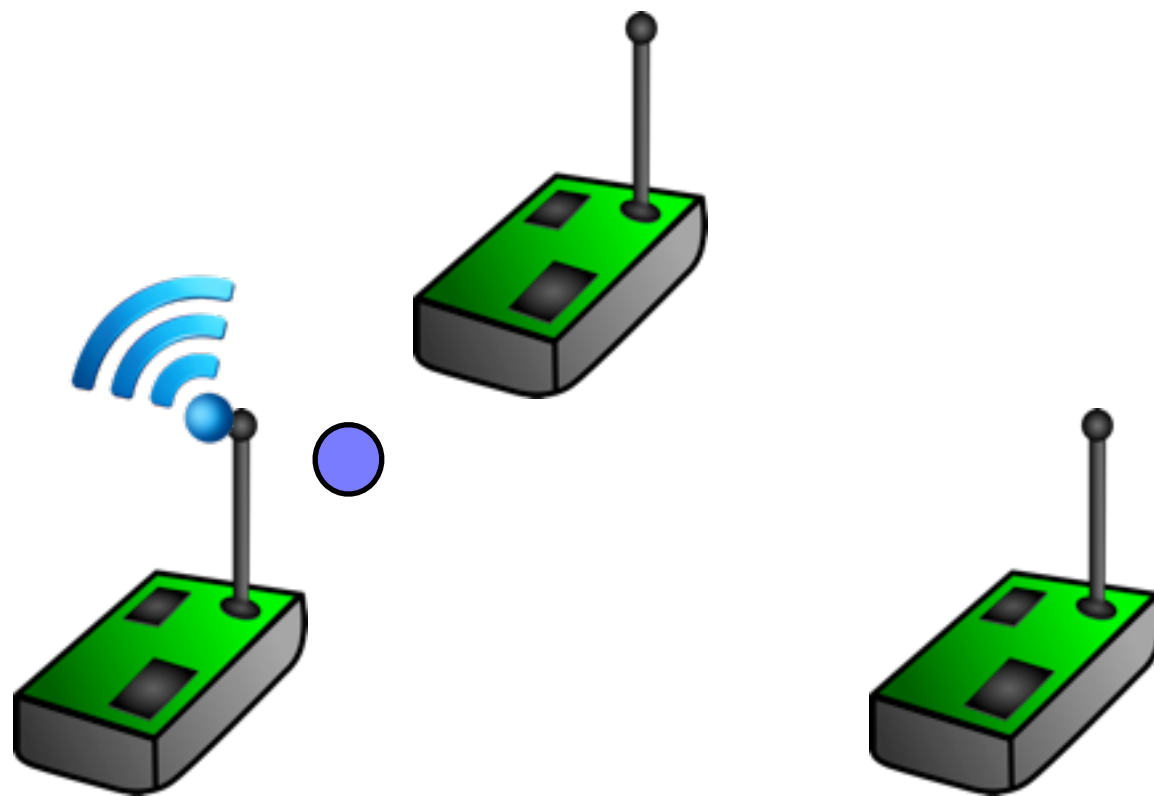
Why ones needs coloring ?



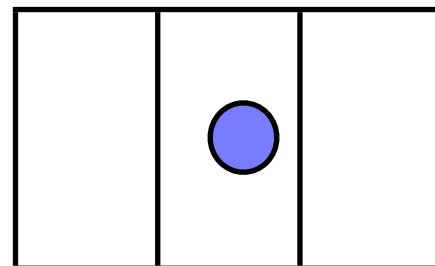
Transmission rule :

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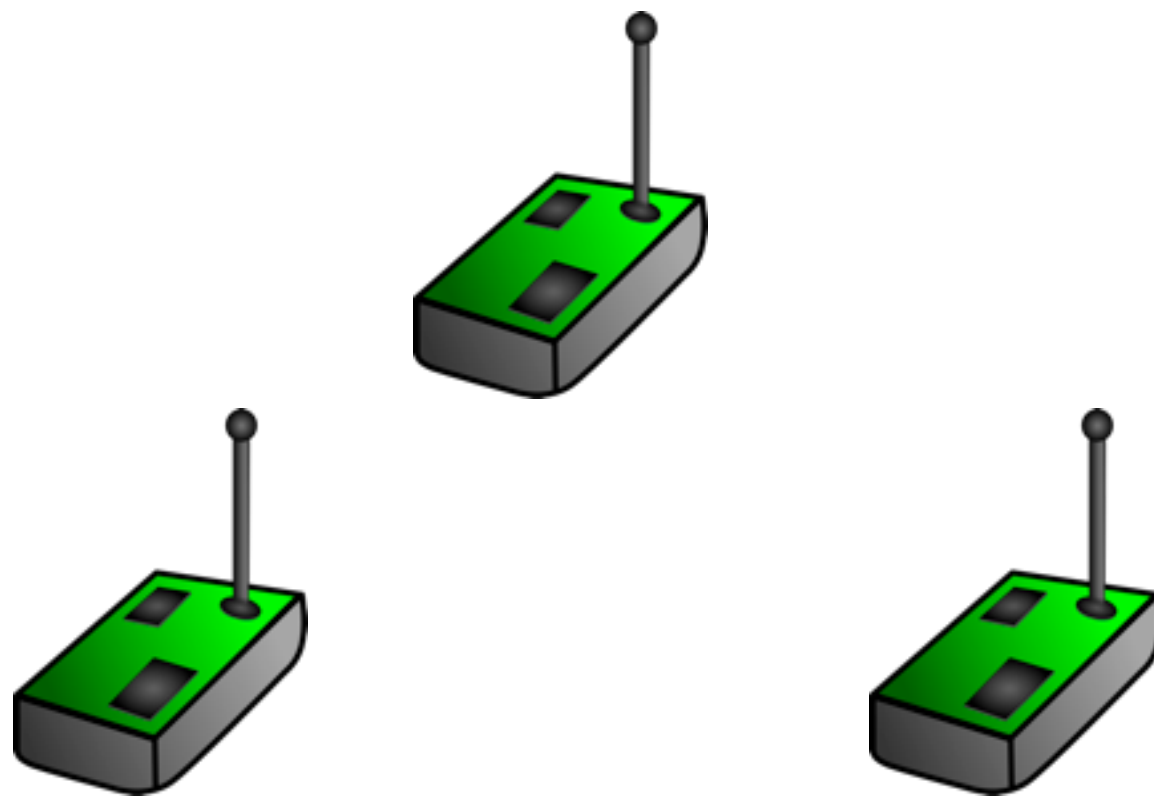
Why one needs coloring ?



Transmission rule :



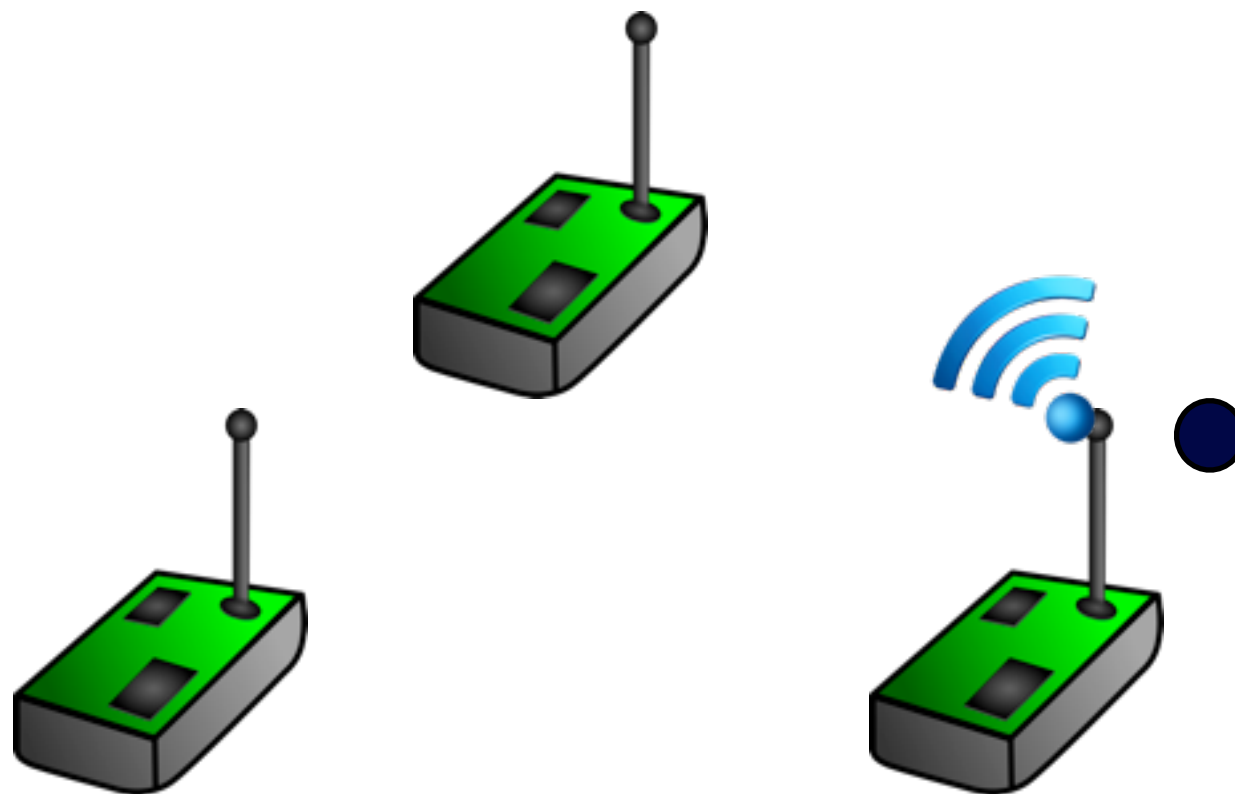
Why ones needs coloring ?



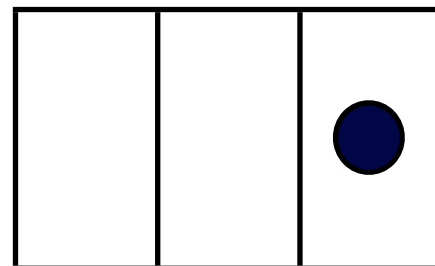
Transmission rule :

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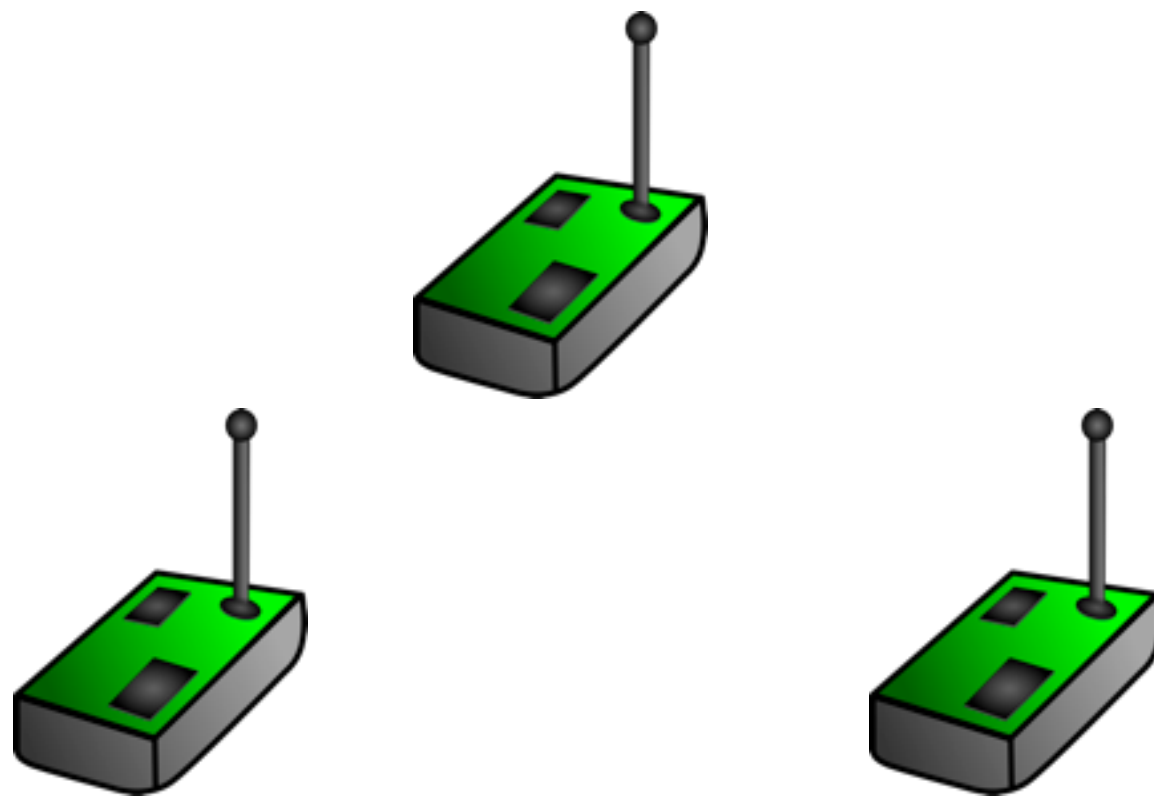
Why ones needs coloring ?



Transmission rule :



Why ones needs coloring ?

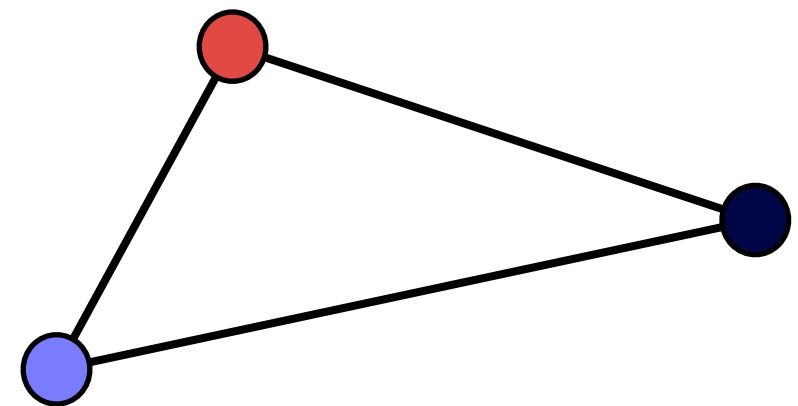


Transmission rule :

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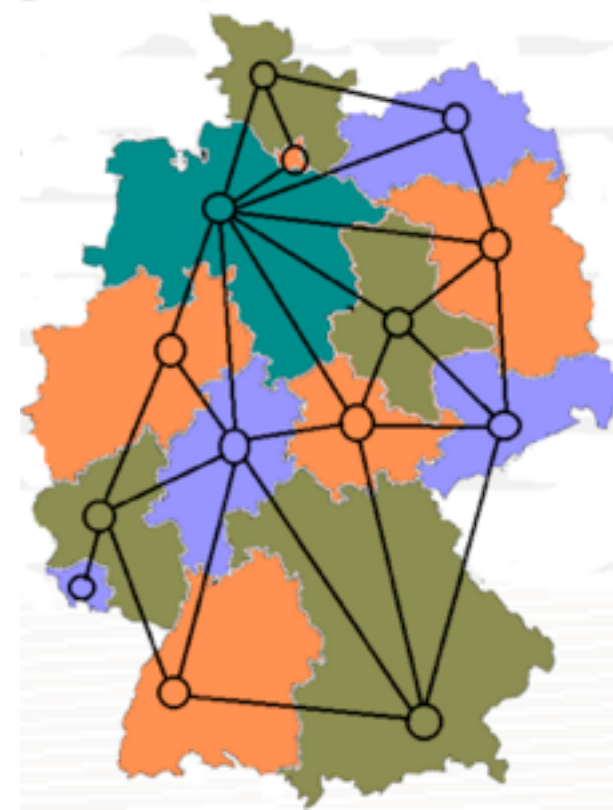
Vertex coloring

- No two neighboring nodes have the same color
- Use a minimal number of colors

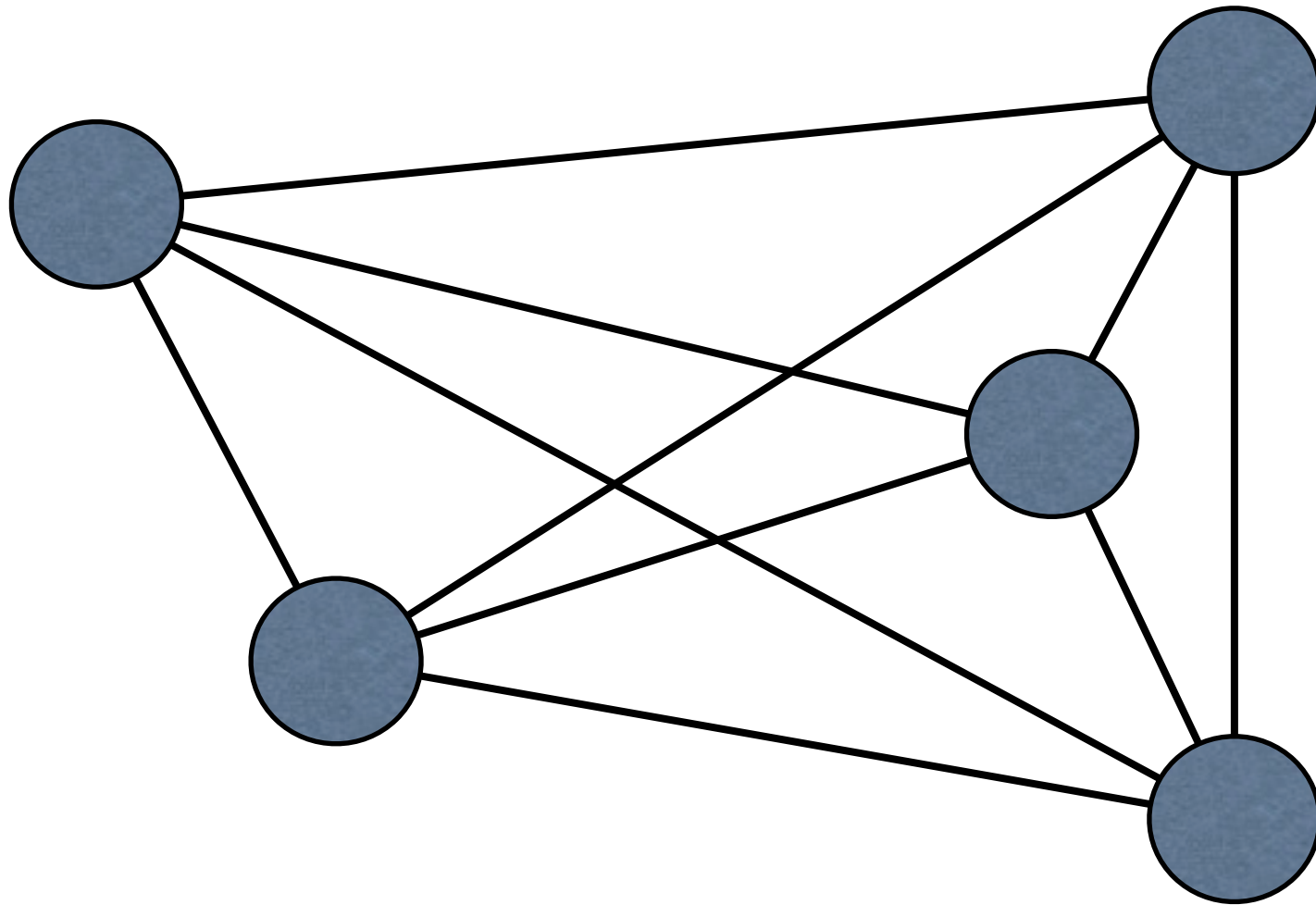


Vertex-coloring origins ... 1852

- One can color a map with 4 colors such that no two neighboring countries have the same color

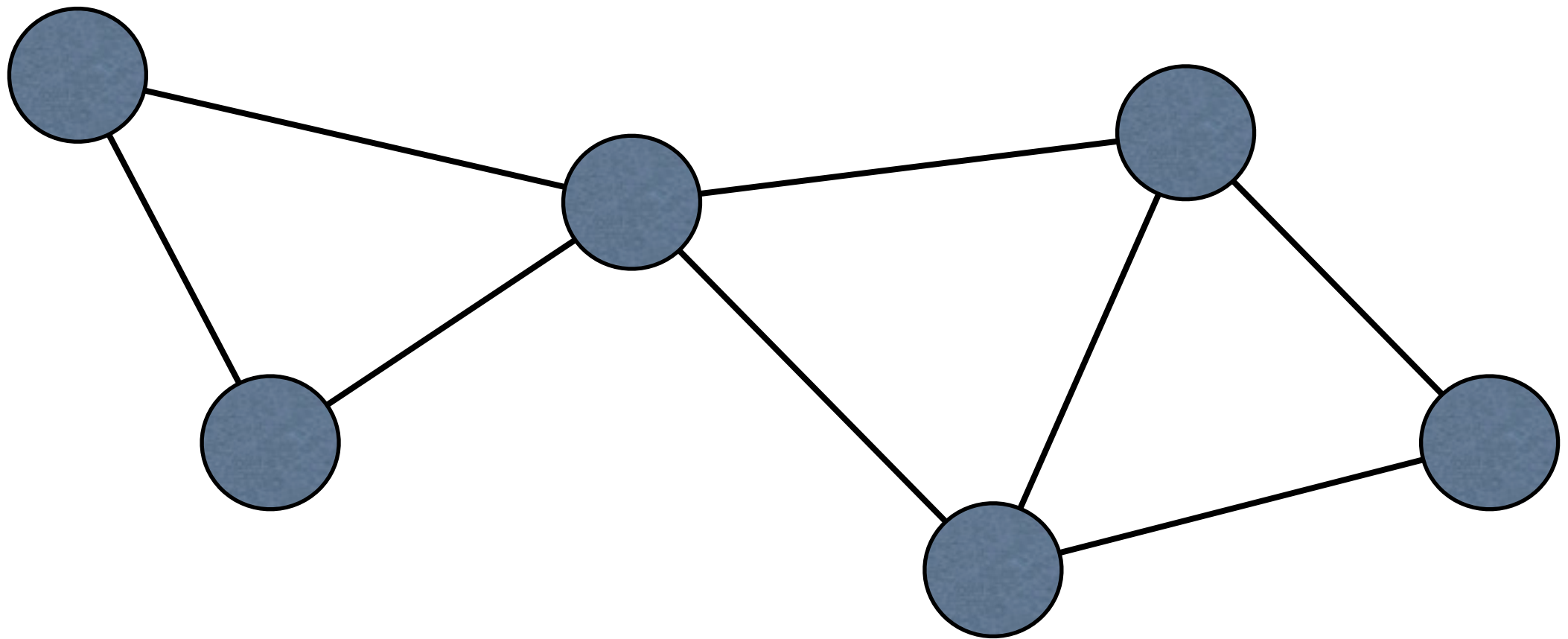


Centralized coloring



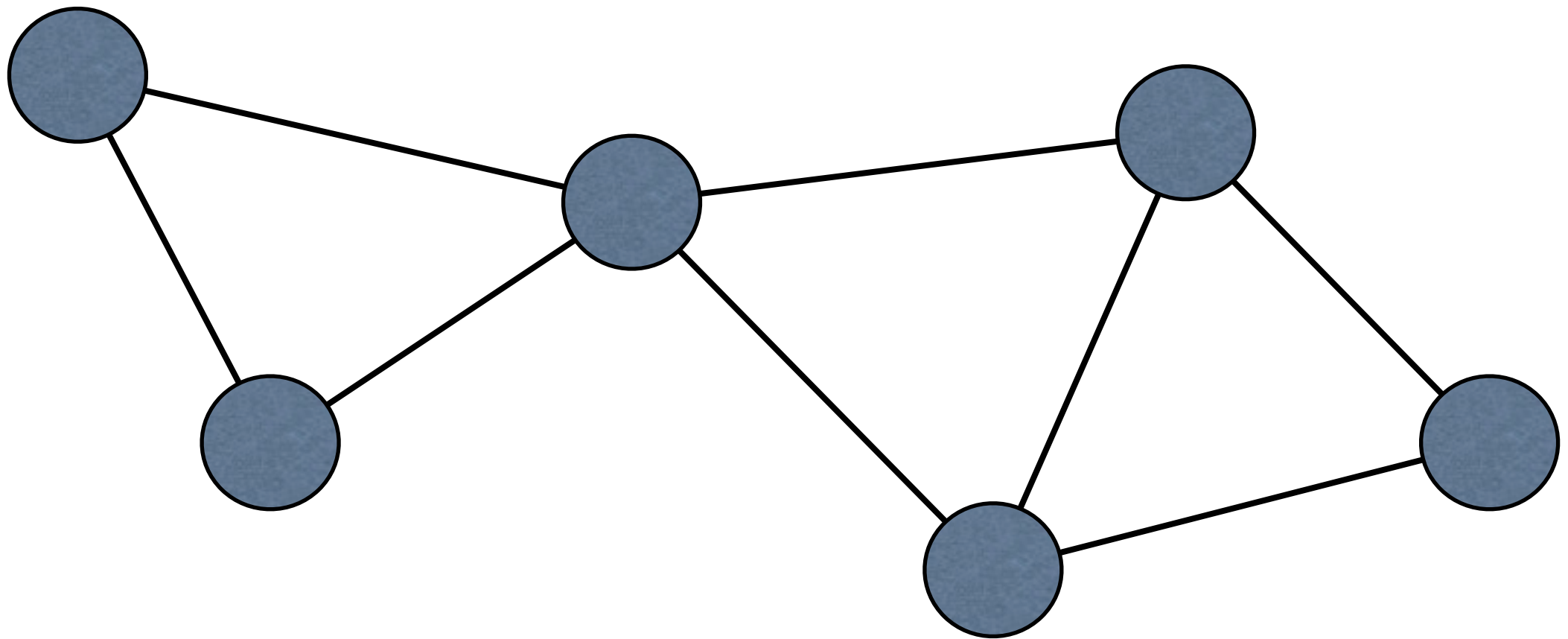
How many colors ?

Centralized coloring

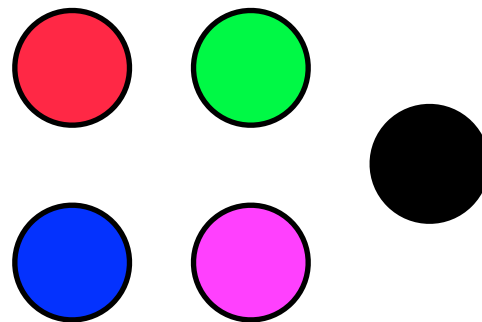


Available colors:

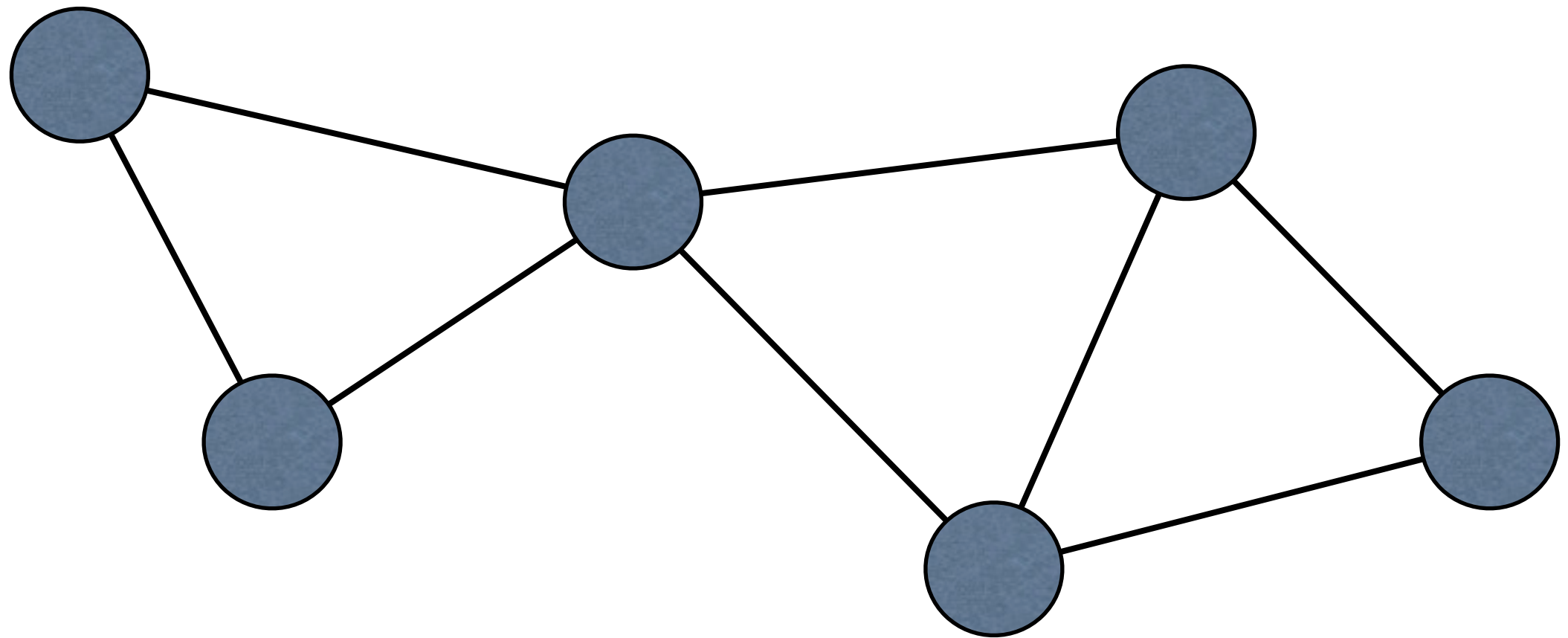
Centralized coloring



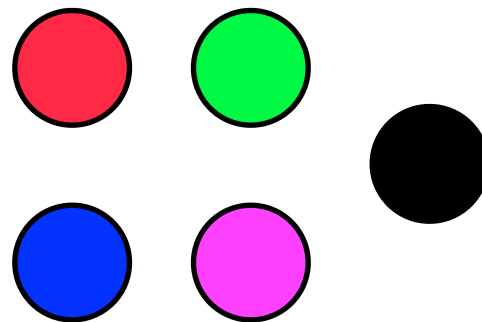
Available colors:



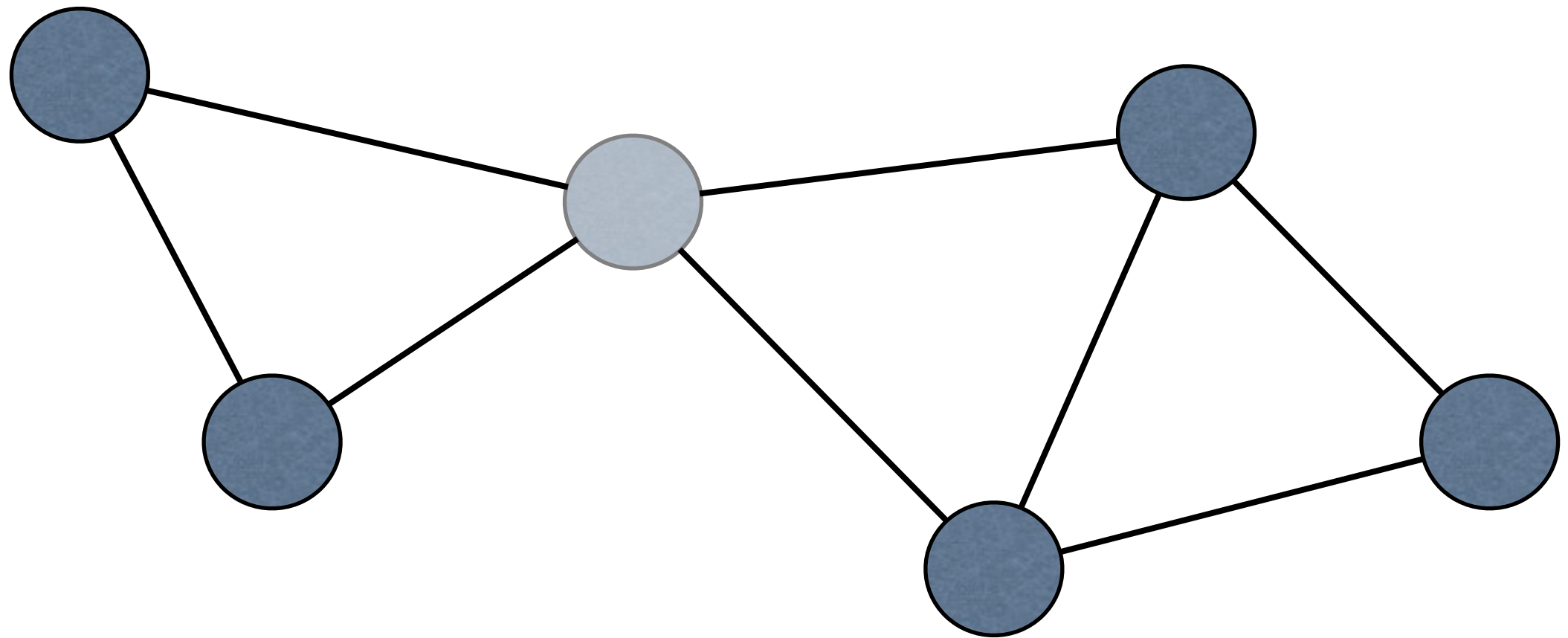
Centralized coloring



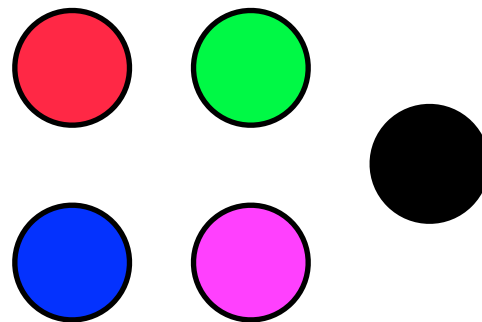
Available colors:



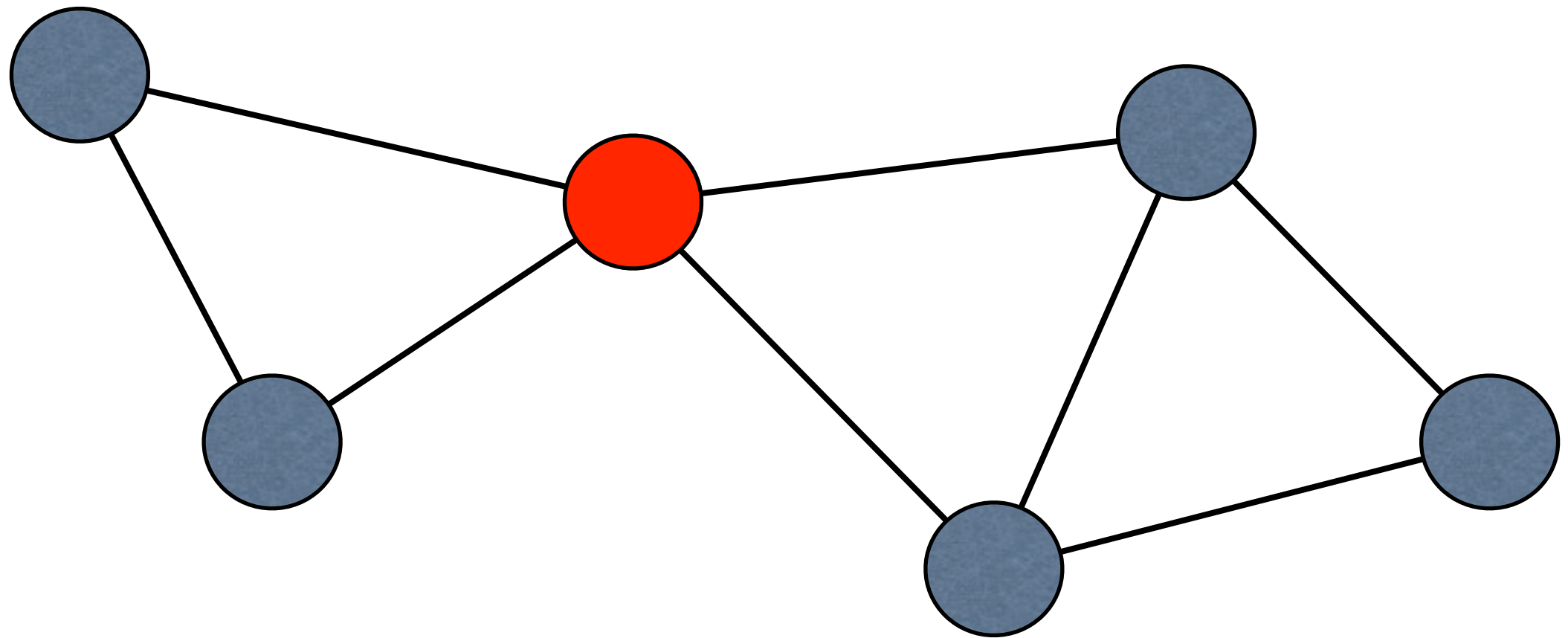
Centralized coloring



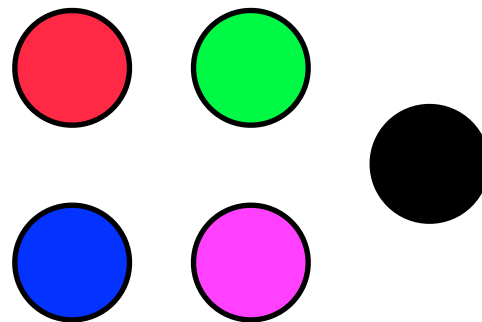
Available colors:



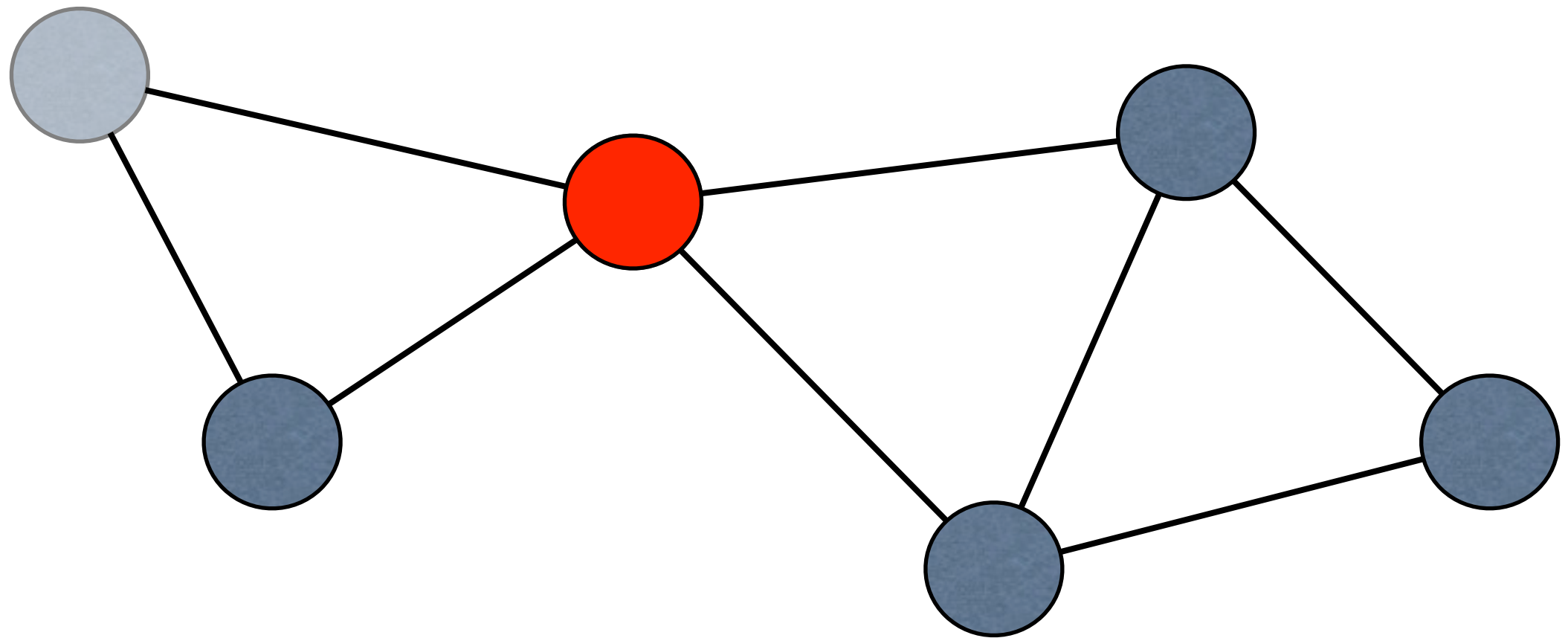
Centralized coloring



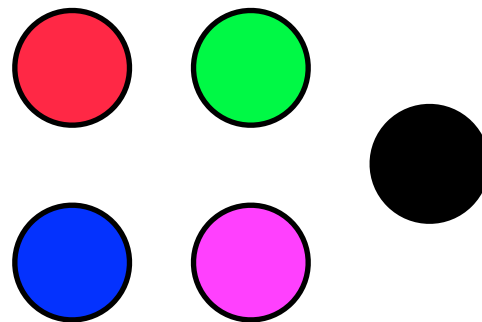
Available colors:



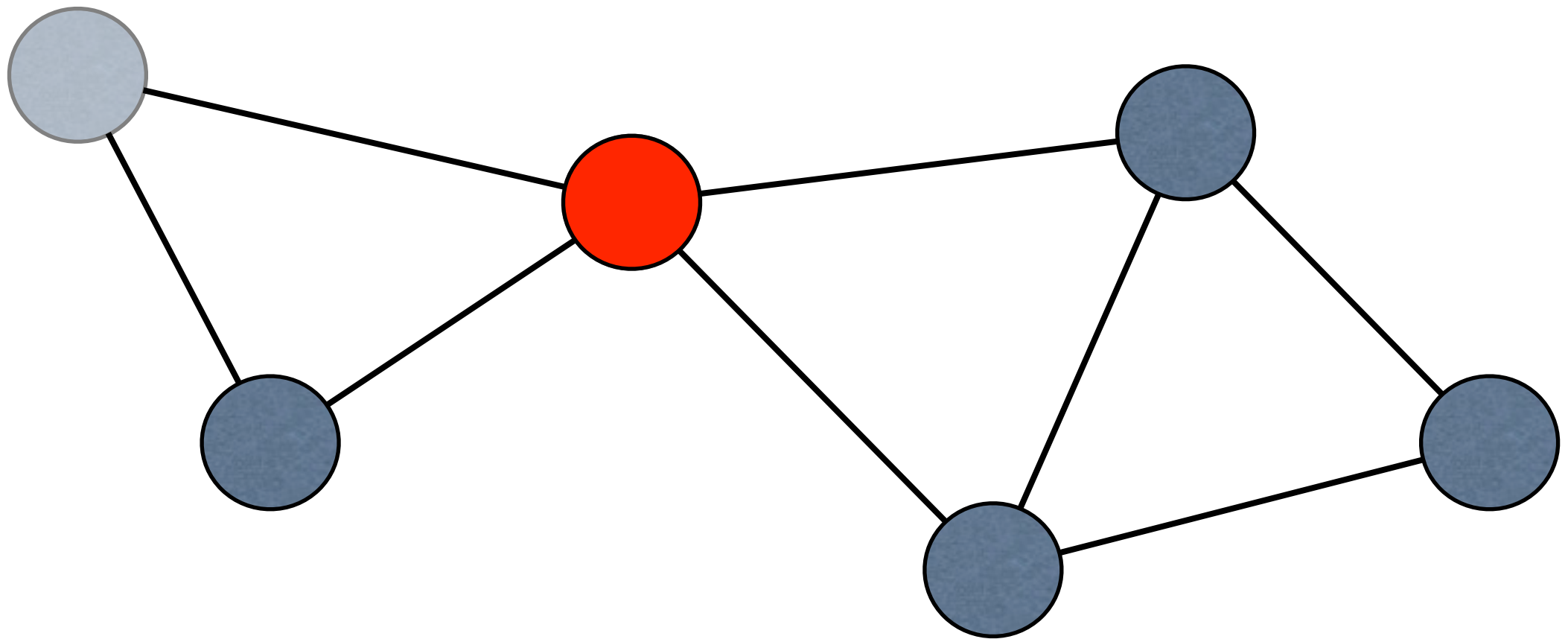
Centralized coloring



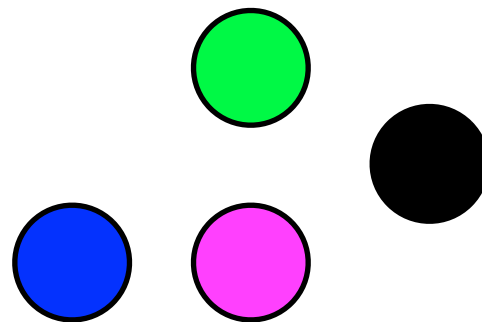
Available colors:



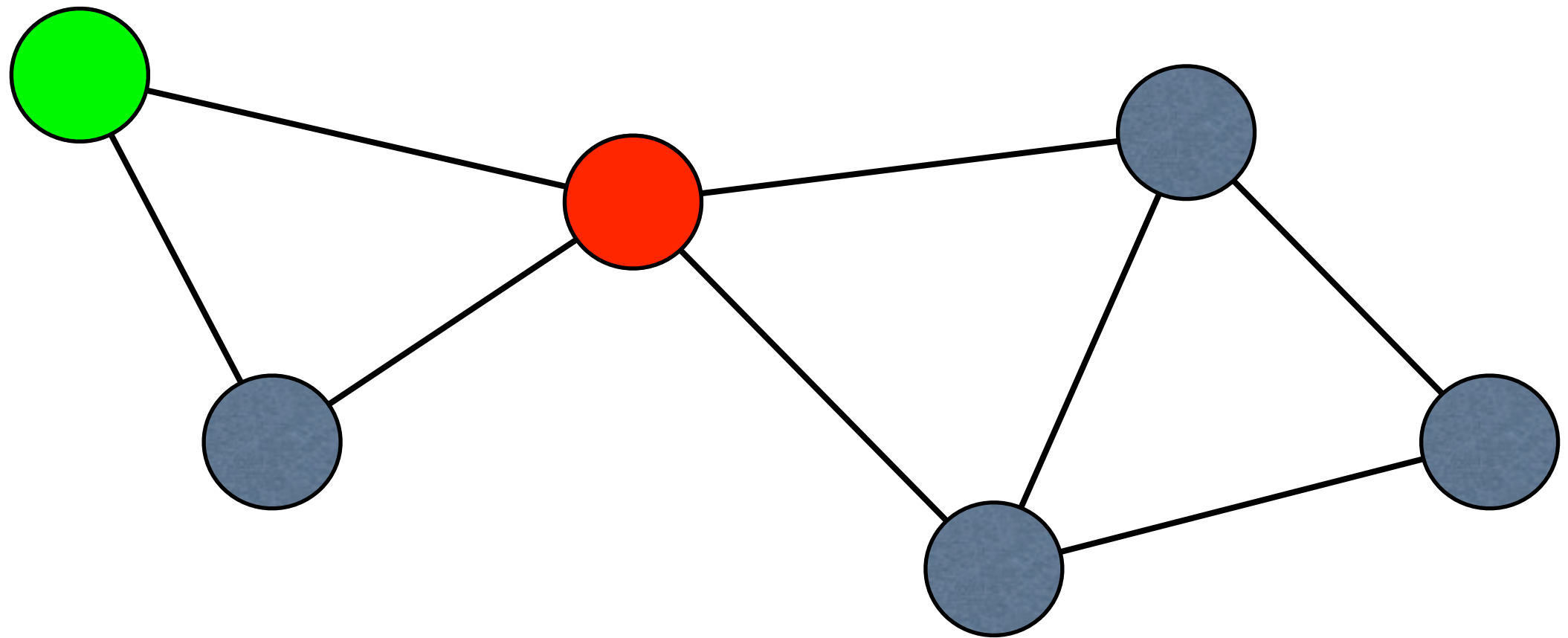
Centralized coloring



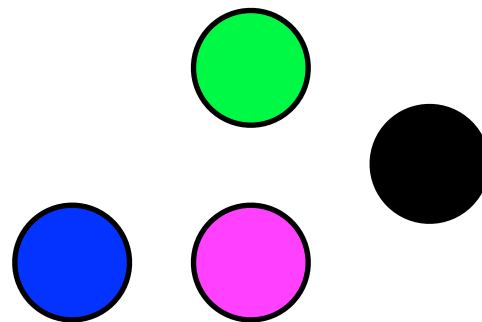
Available colors:



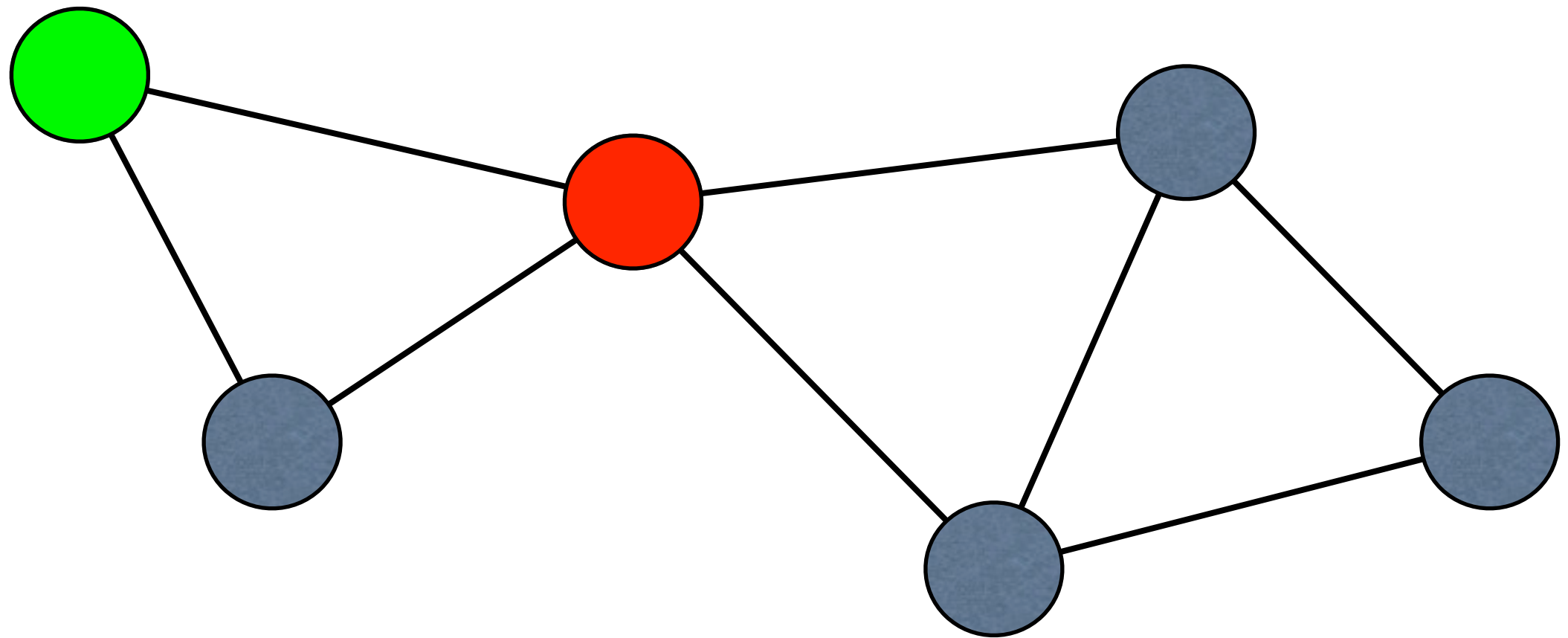
Centralized coloring



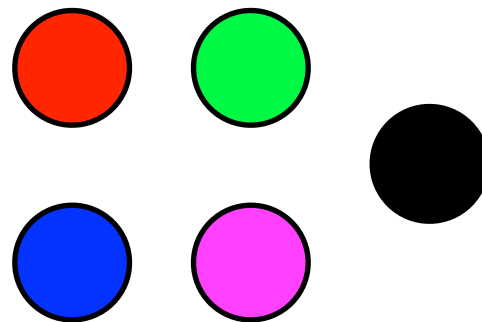
Available colors:



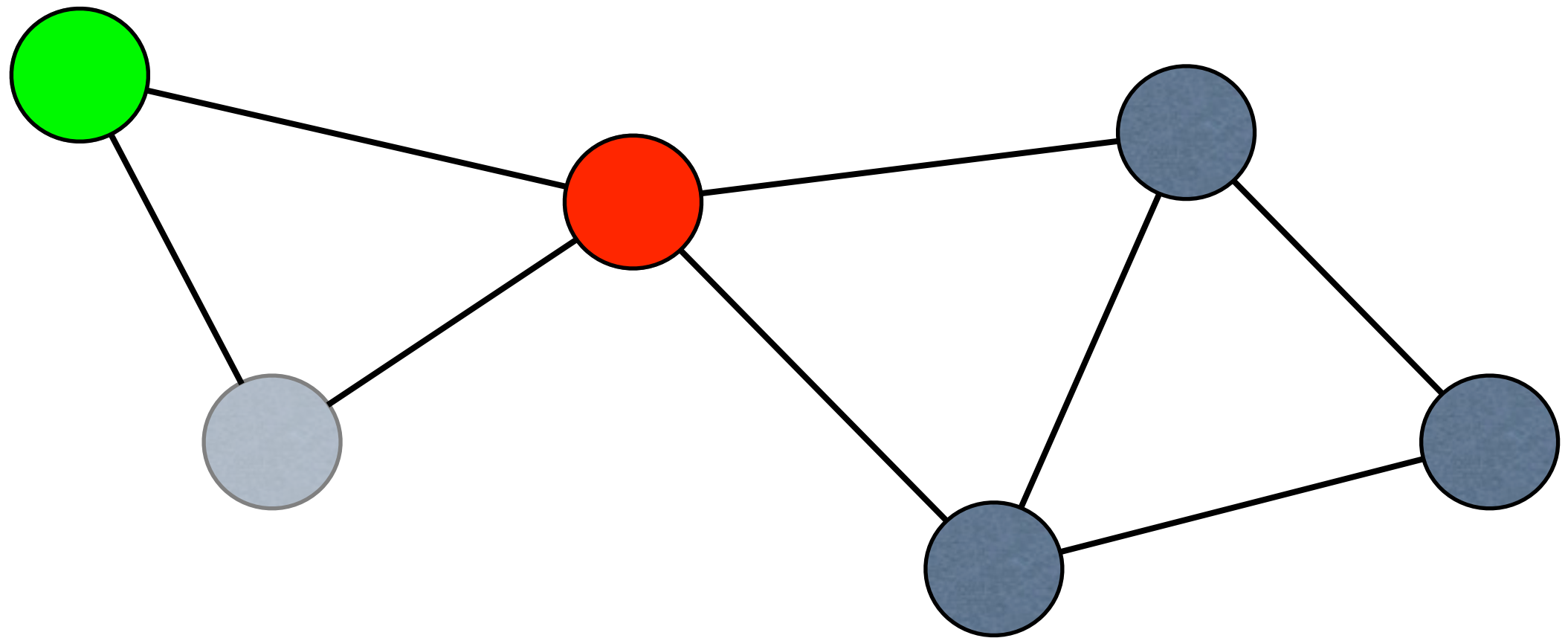
Centralized coloring



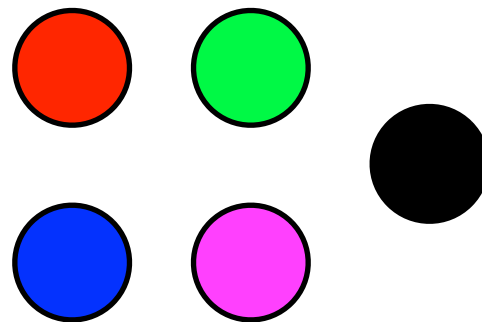
Available colors:



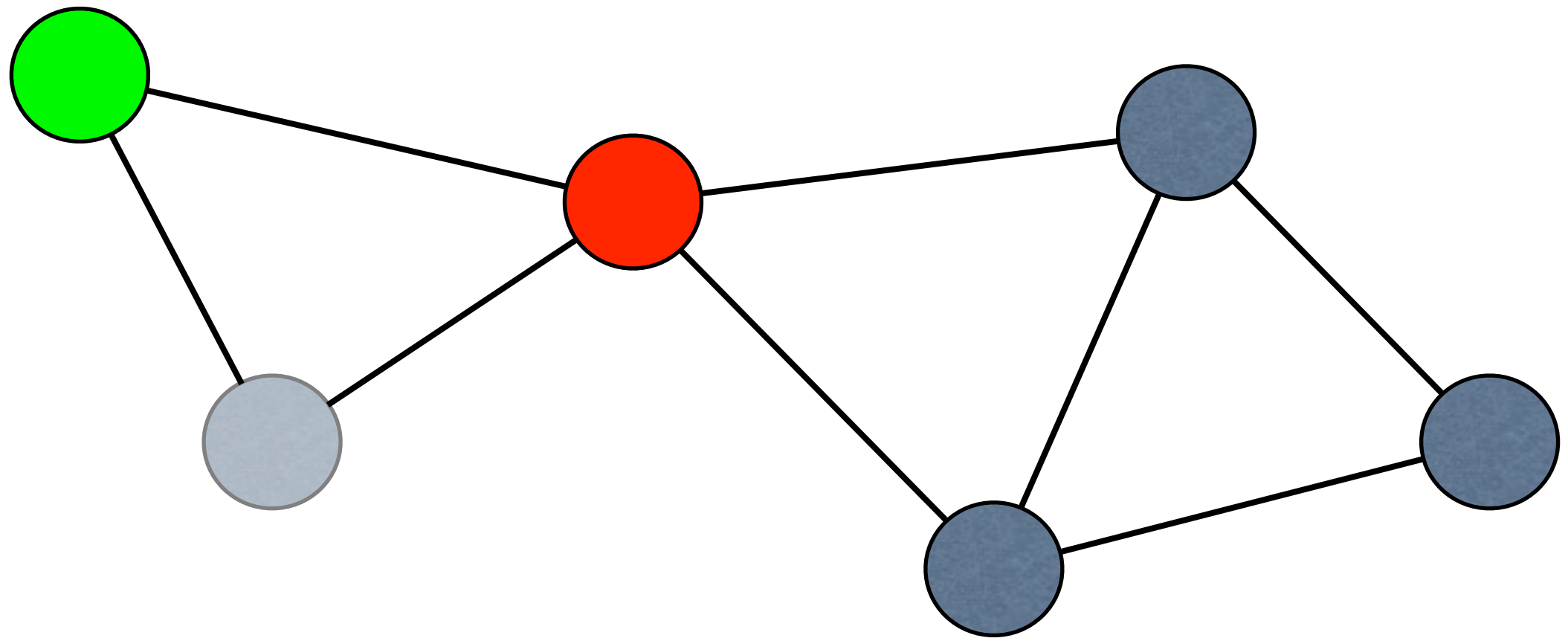
Centralized coloring



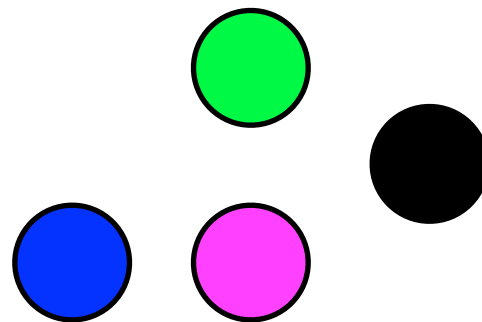
Available colors:



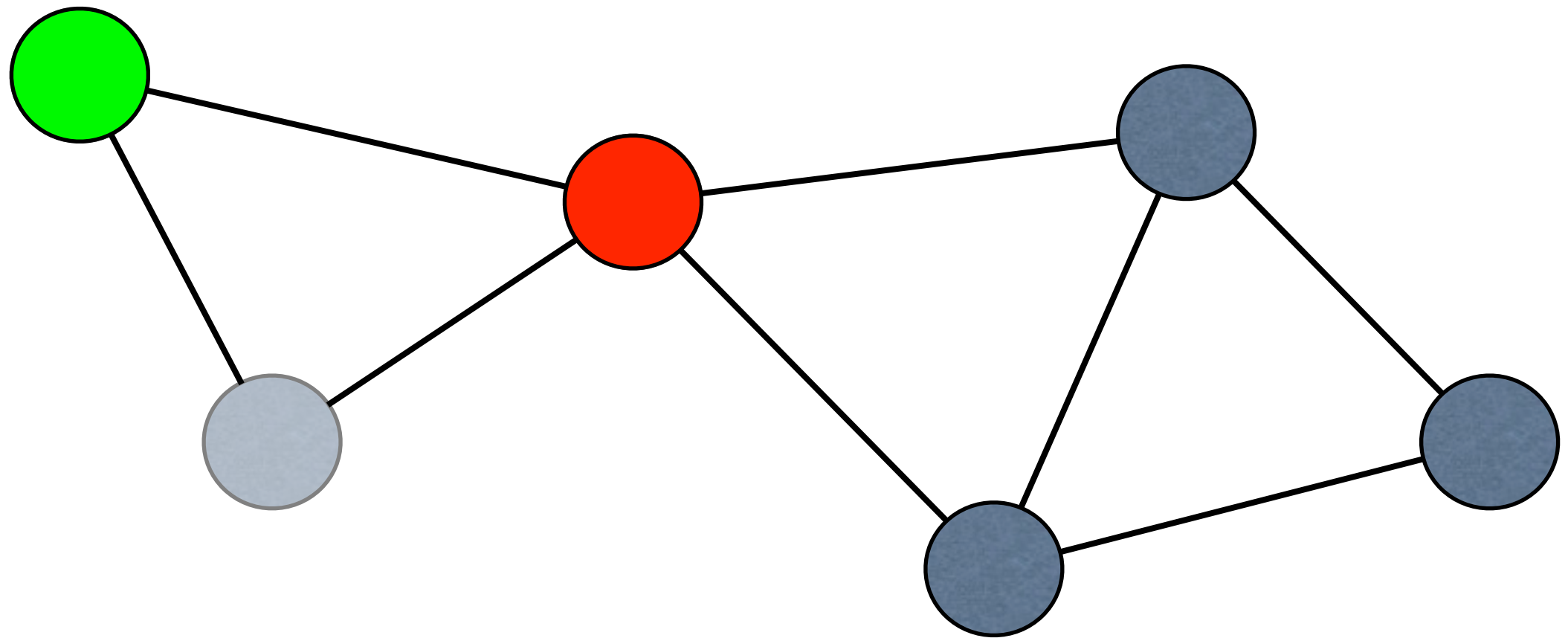
Centralized coloring



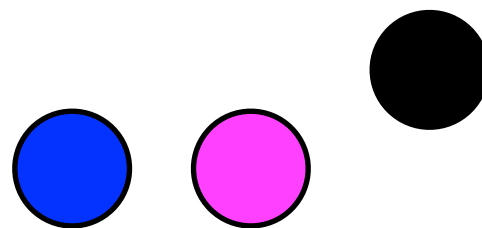
Available colors:



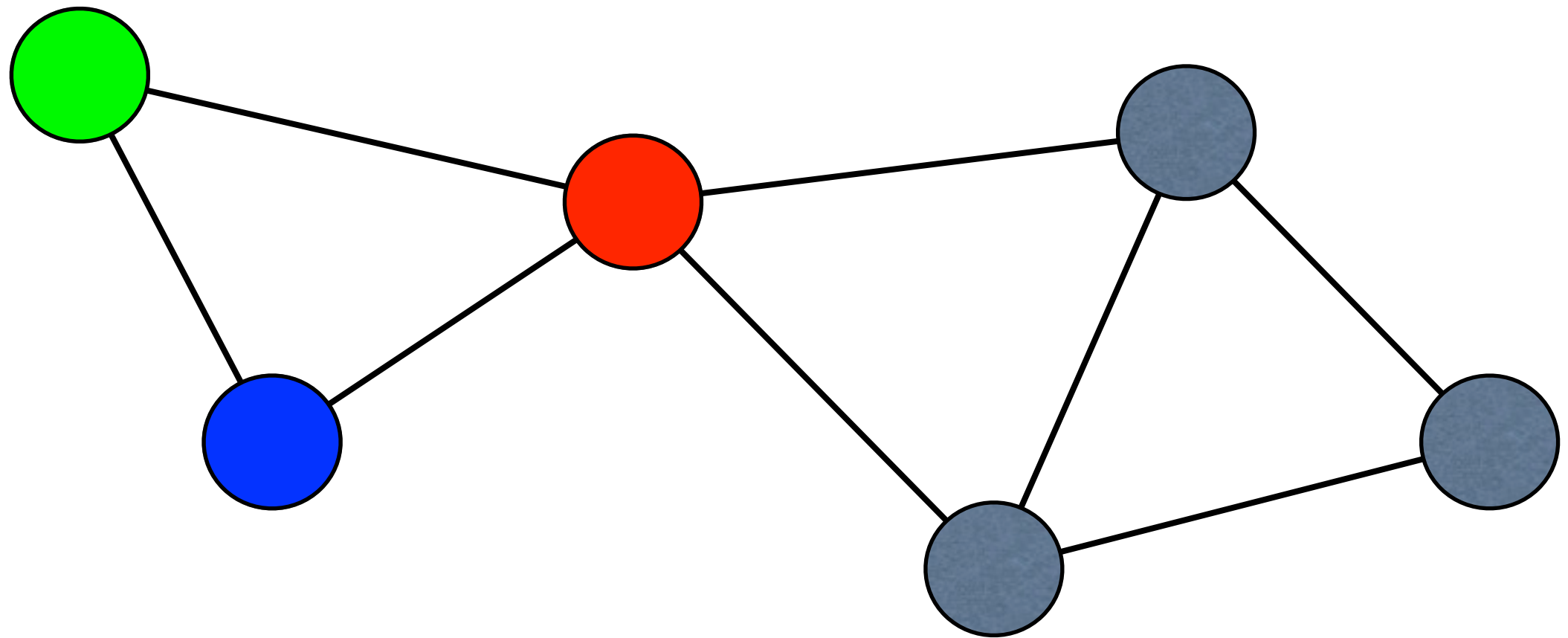
Centralized coloring



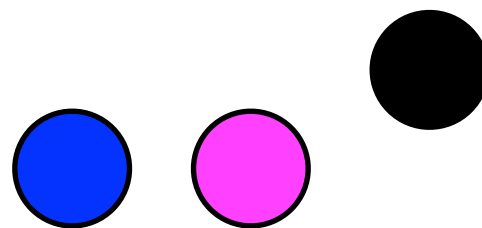
Available colors:



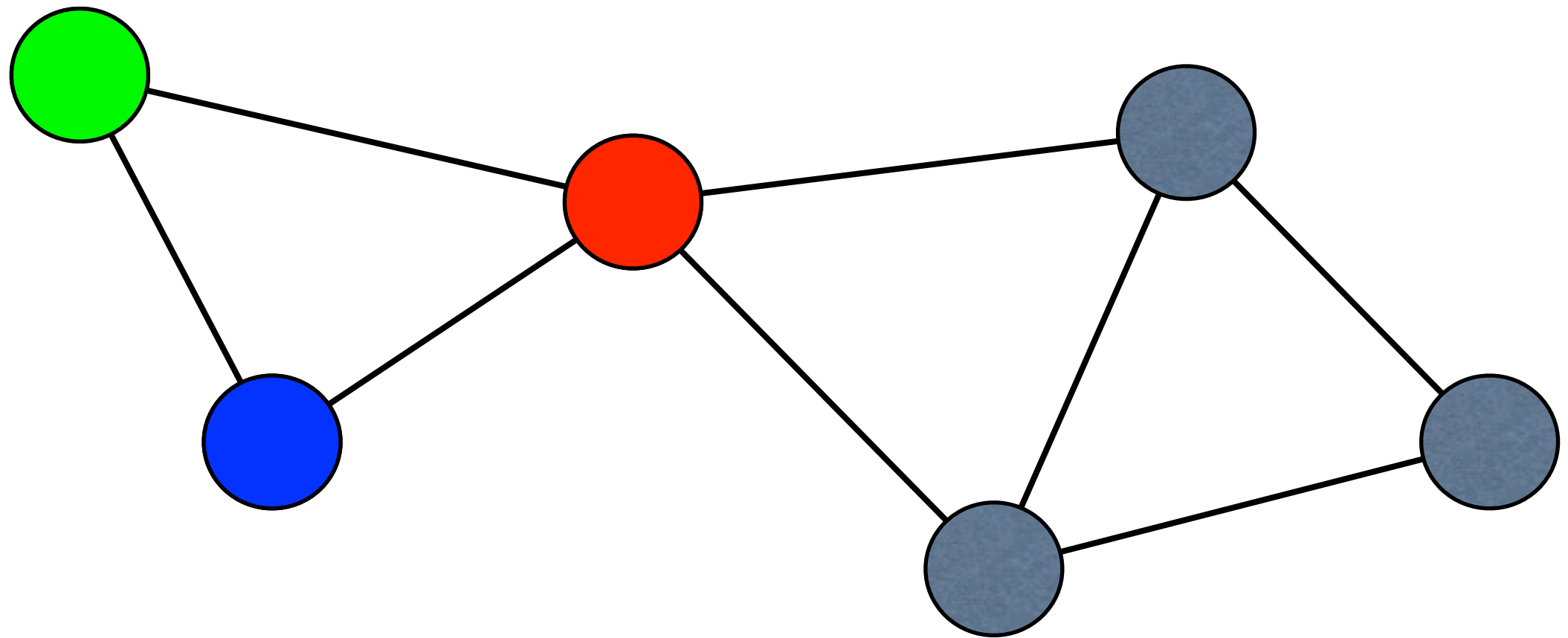
Centralized coloring



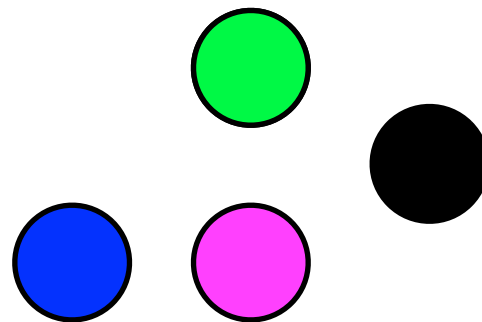
Available colors:



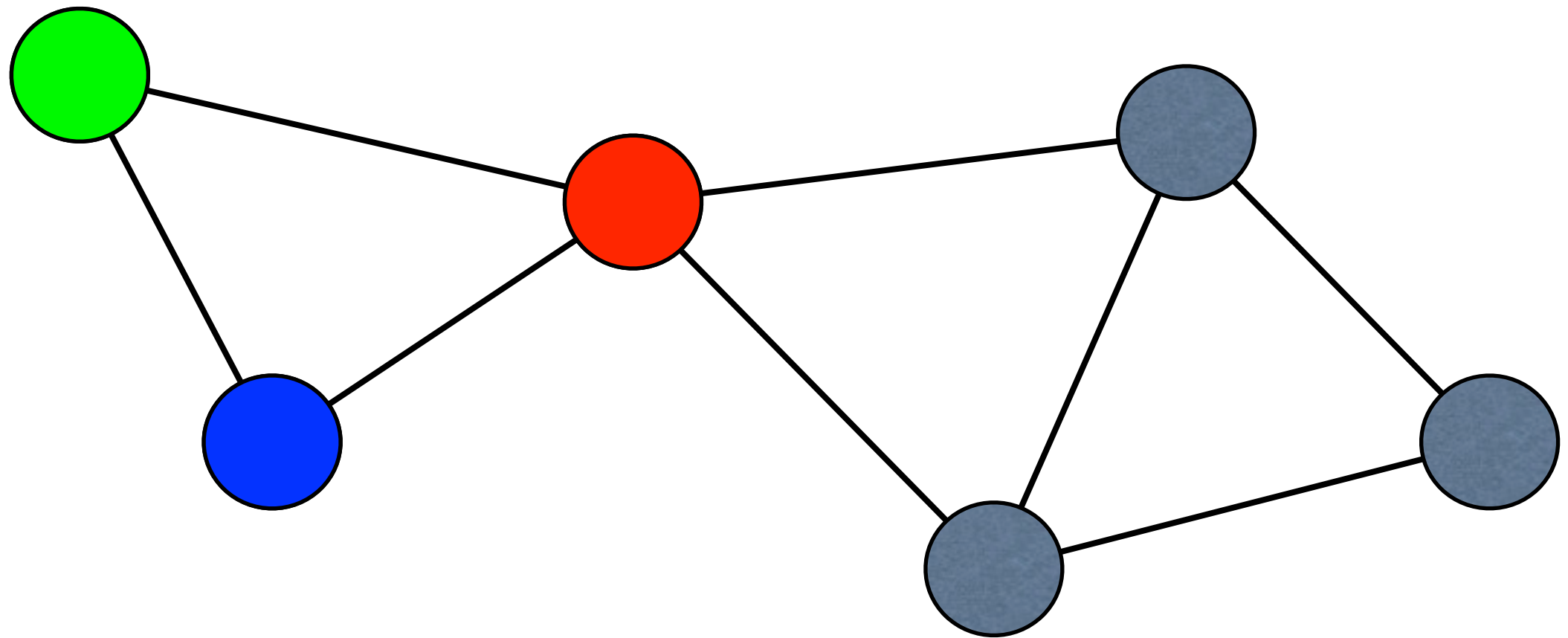
Centralized coloring



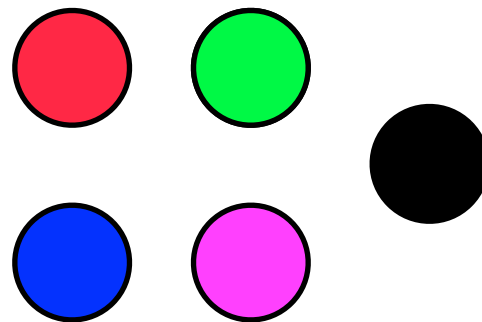
Available colors:



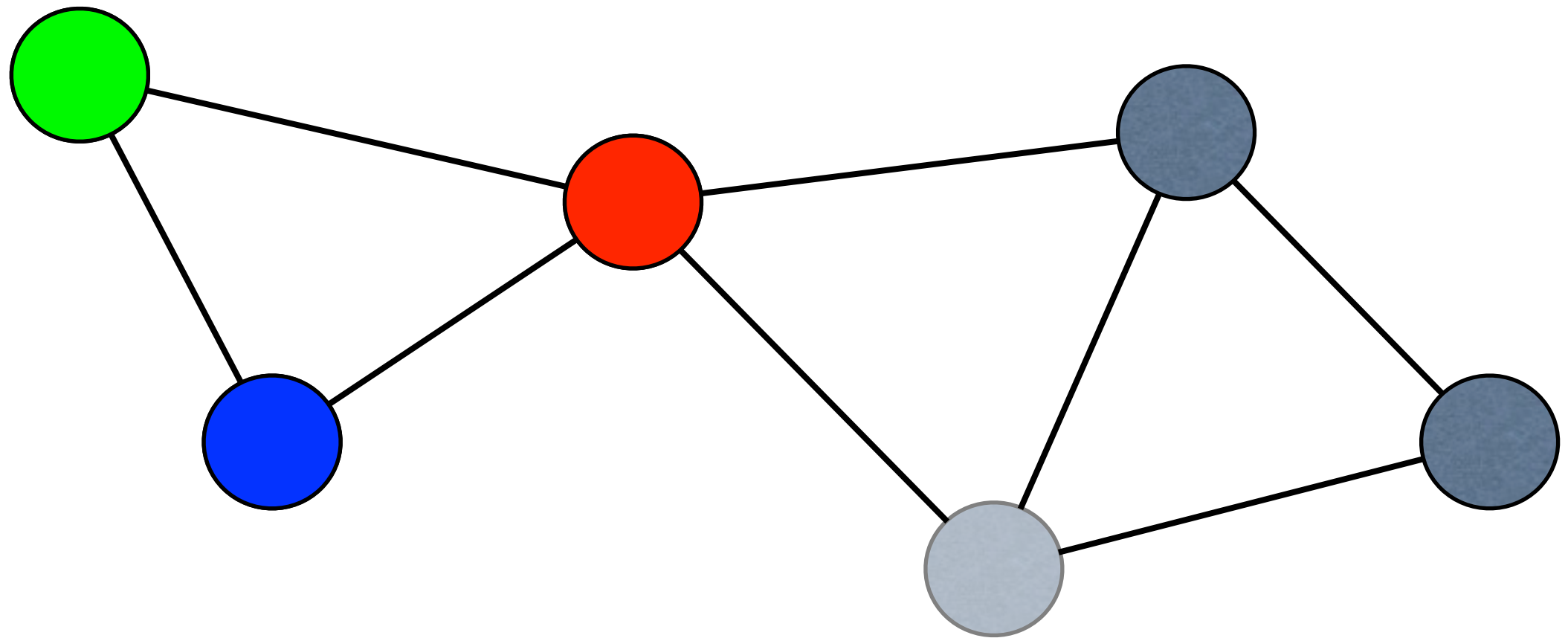
Centralized coloring



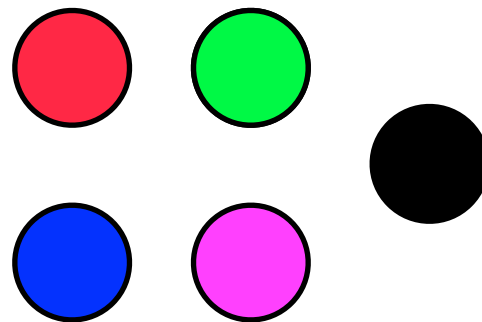
Available colors:



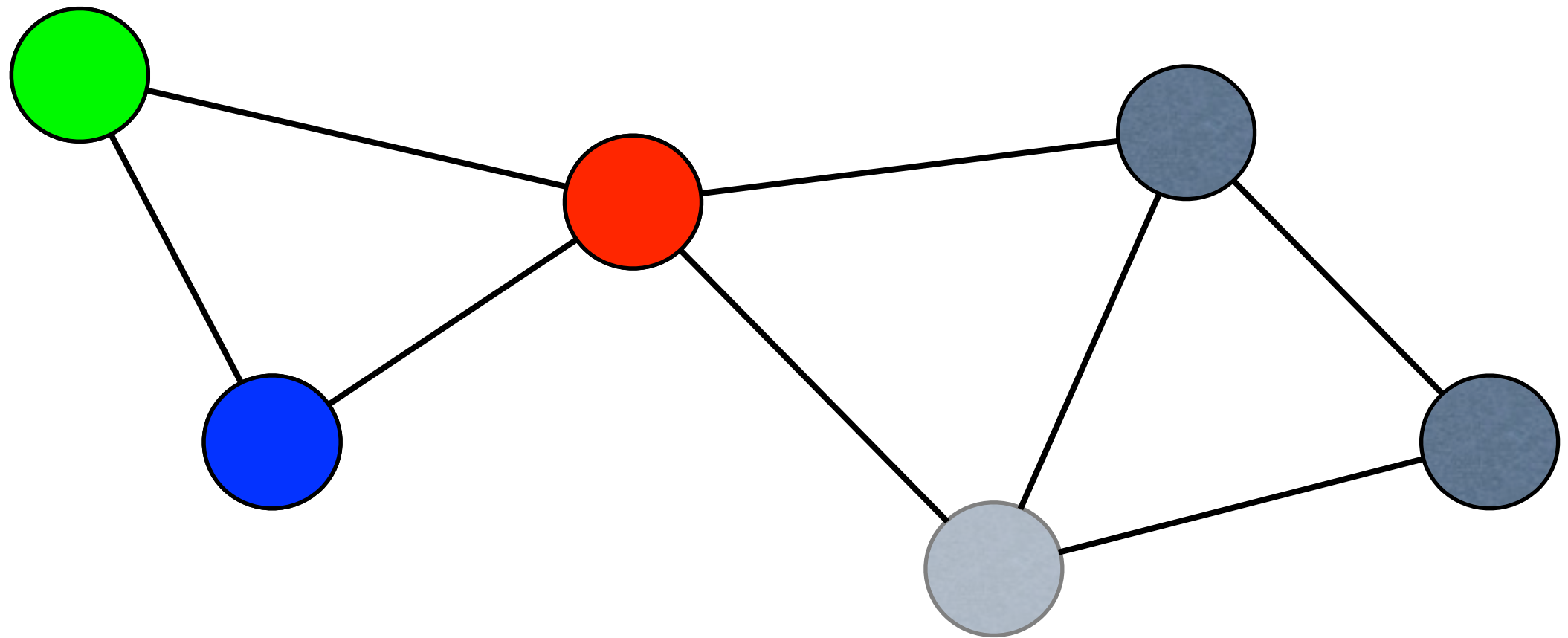
Centralized coloring



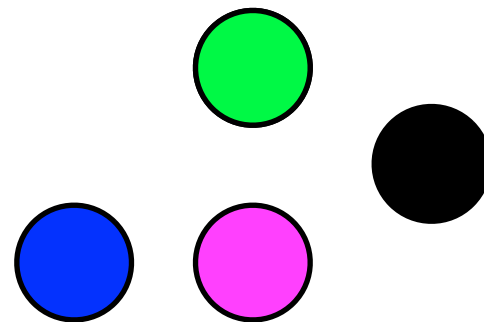
Available colors:



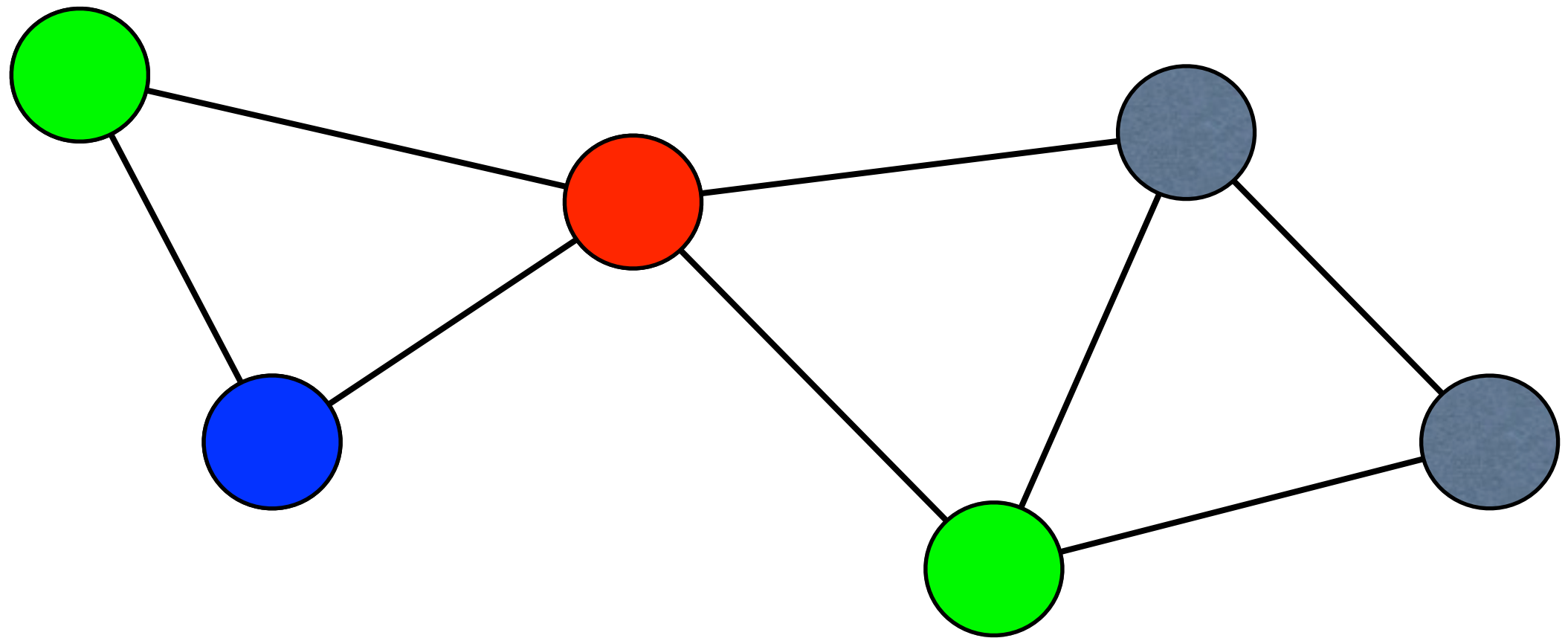
Centralized coloring



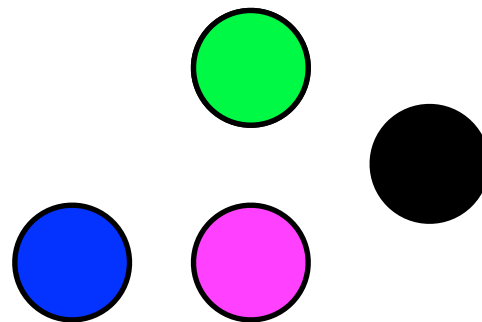
Available colors:



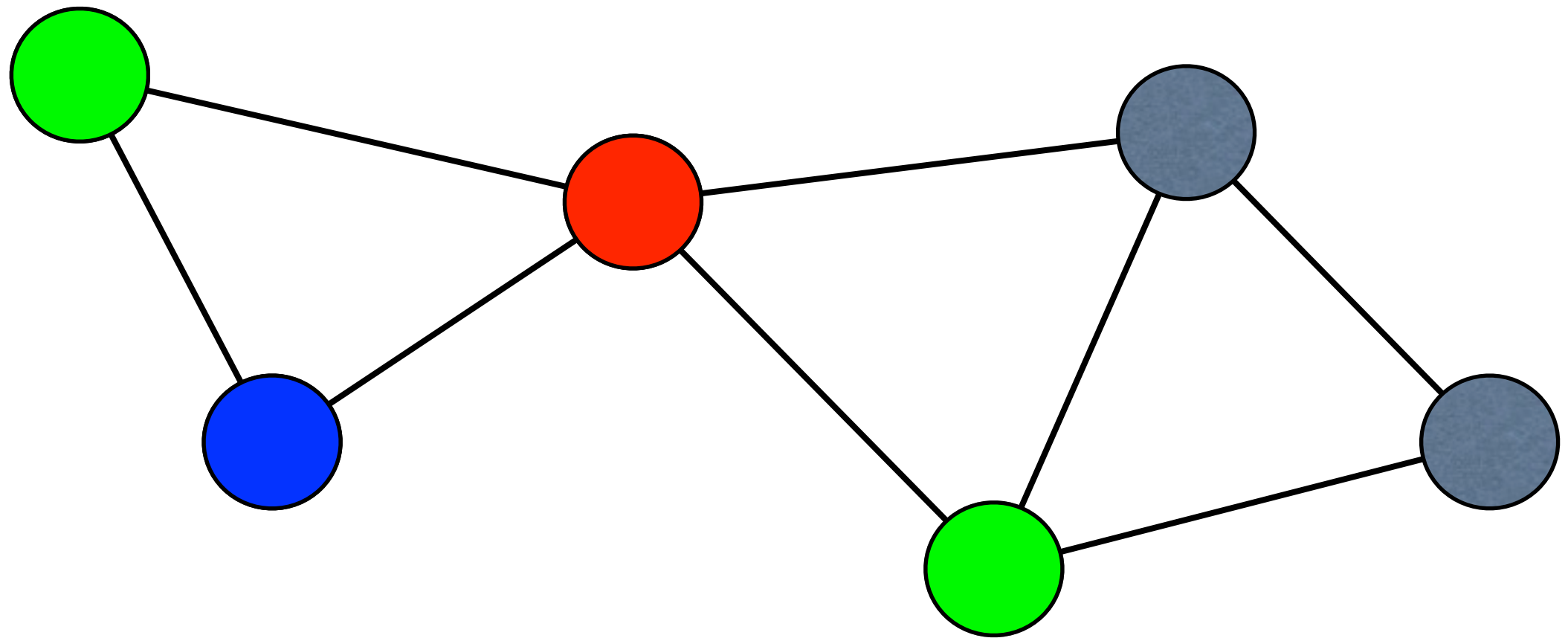
Centralized coloring



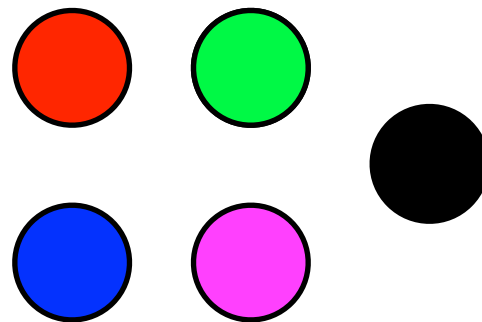
Available colors:



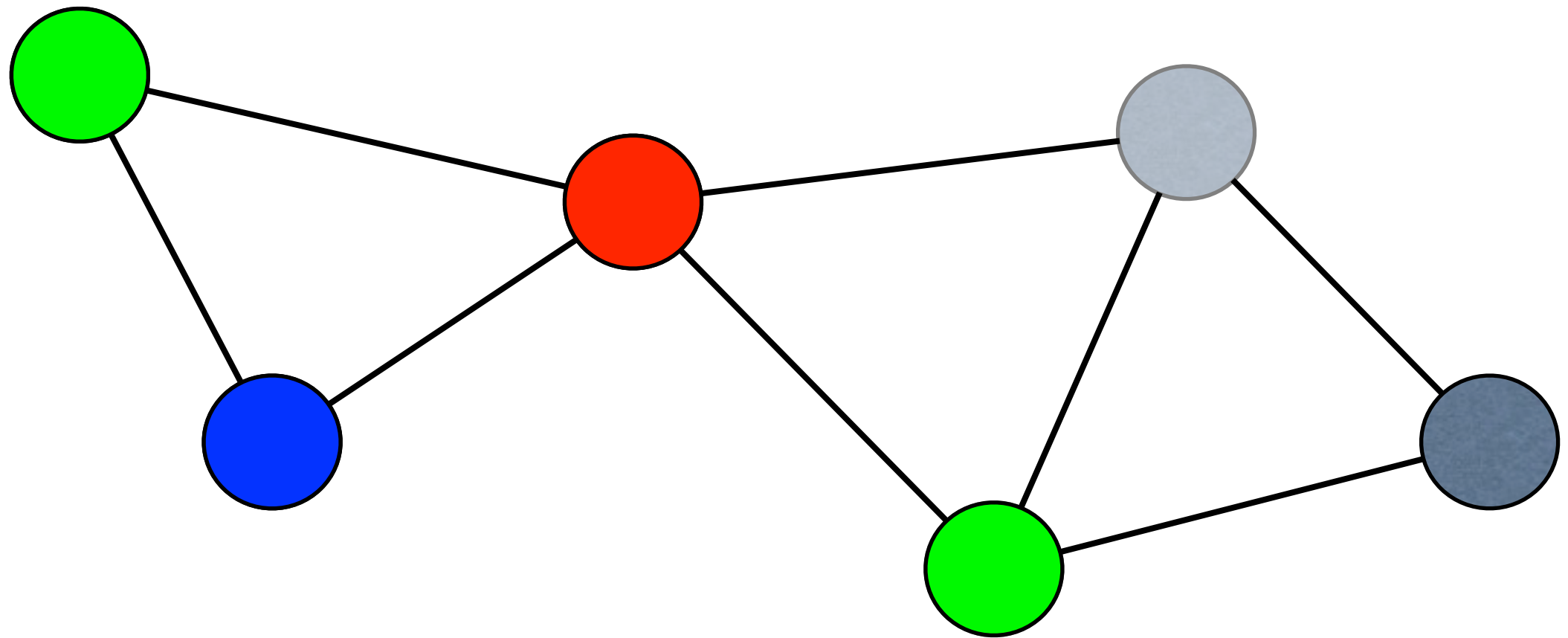
Centralized coloring



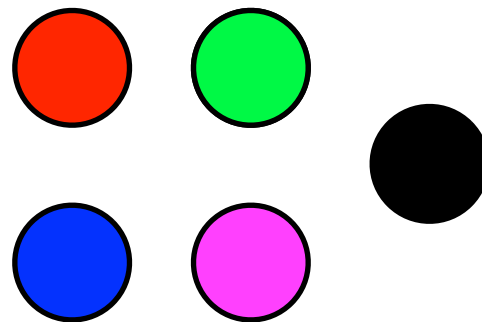
Available colors:



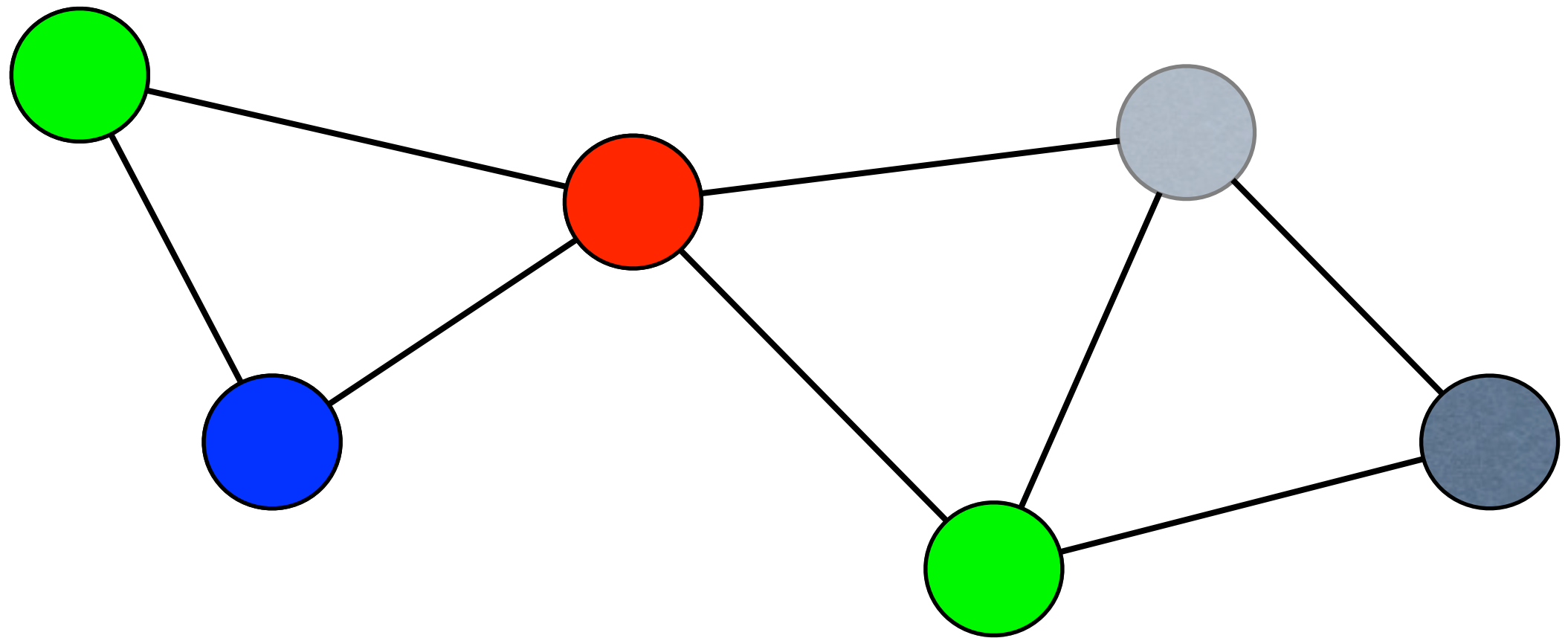
Centralized coloring



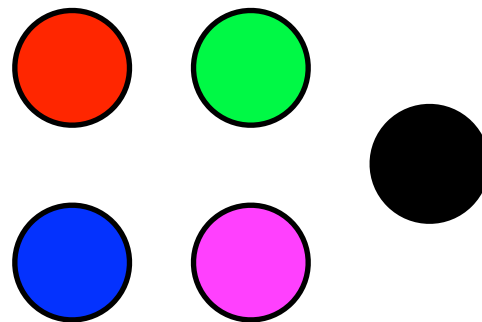
Available colors:



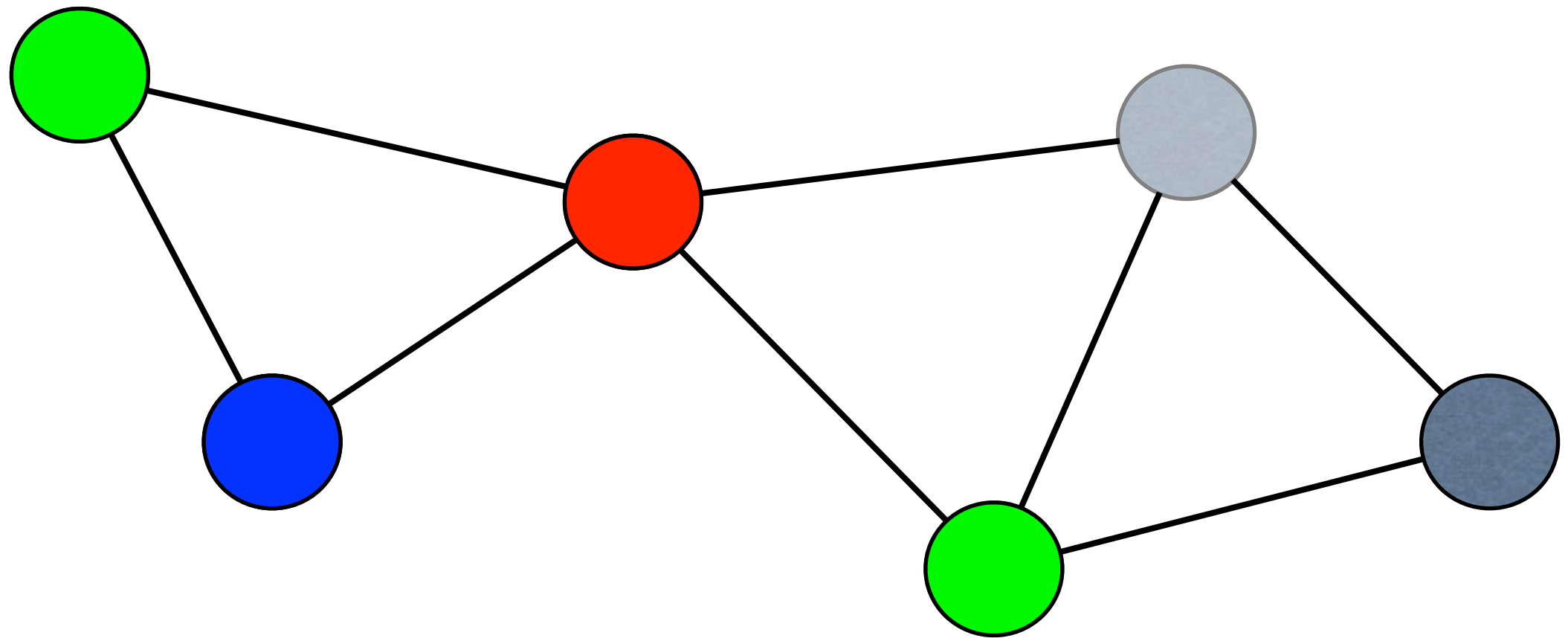
Centralized coloring



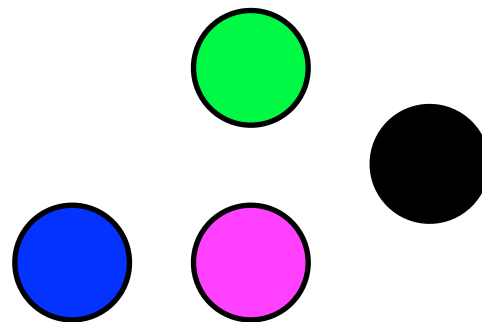
Available colors:



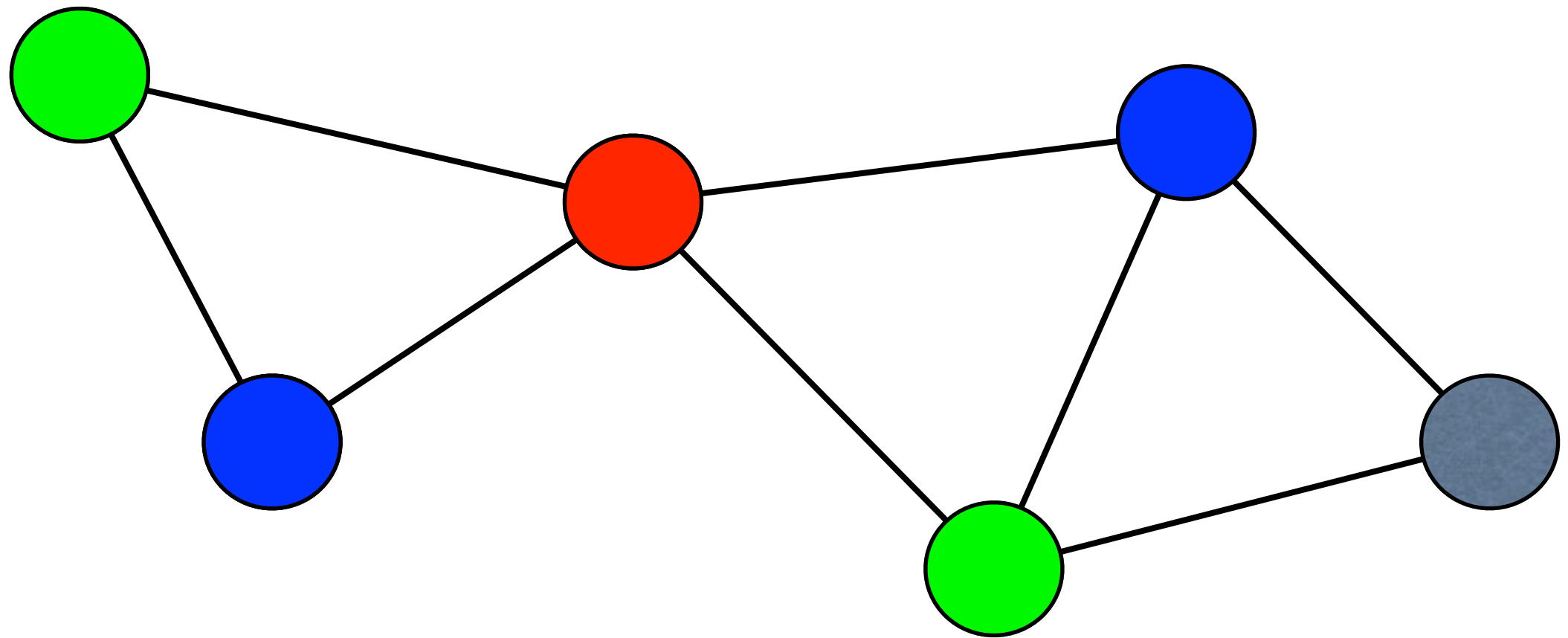
Centralized coloring



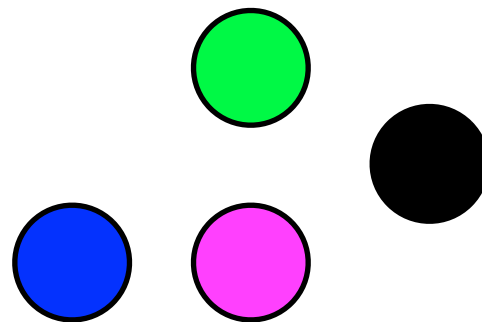
Available colors:



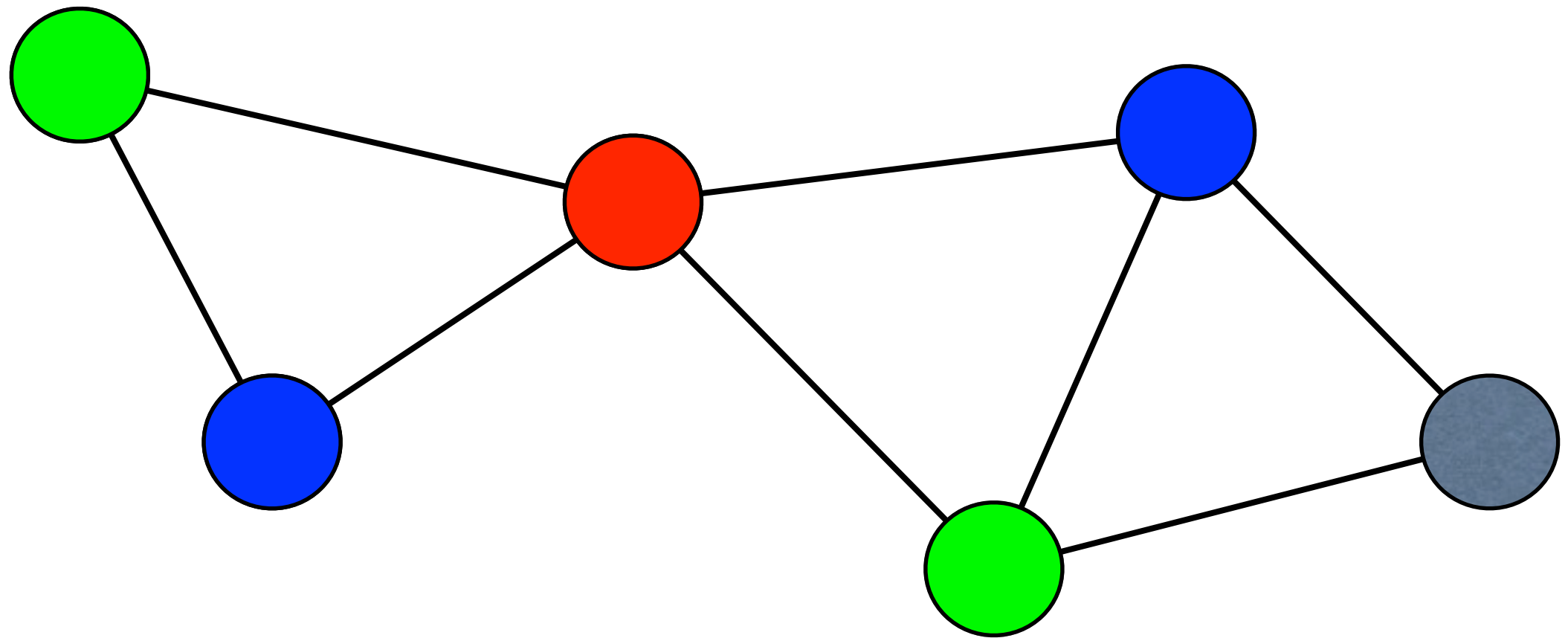
Centralized coloring



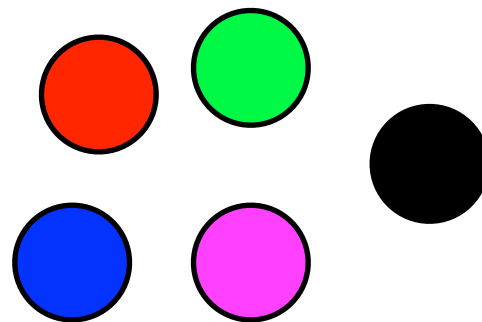
Available colors:



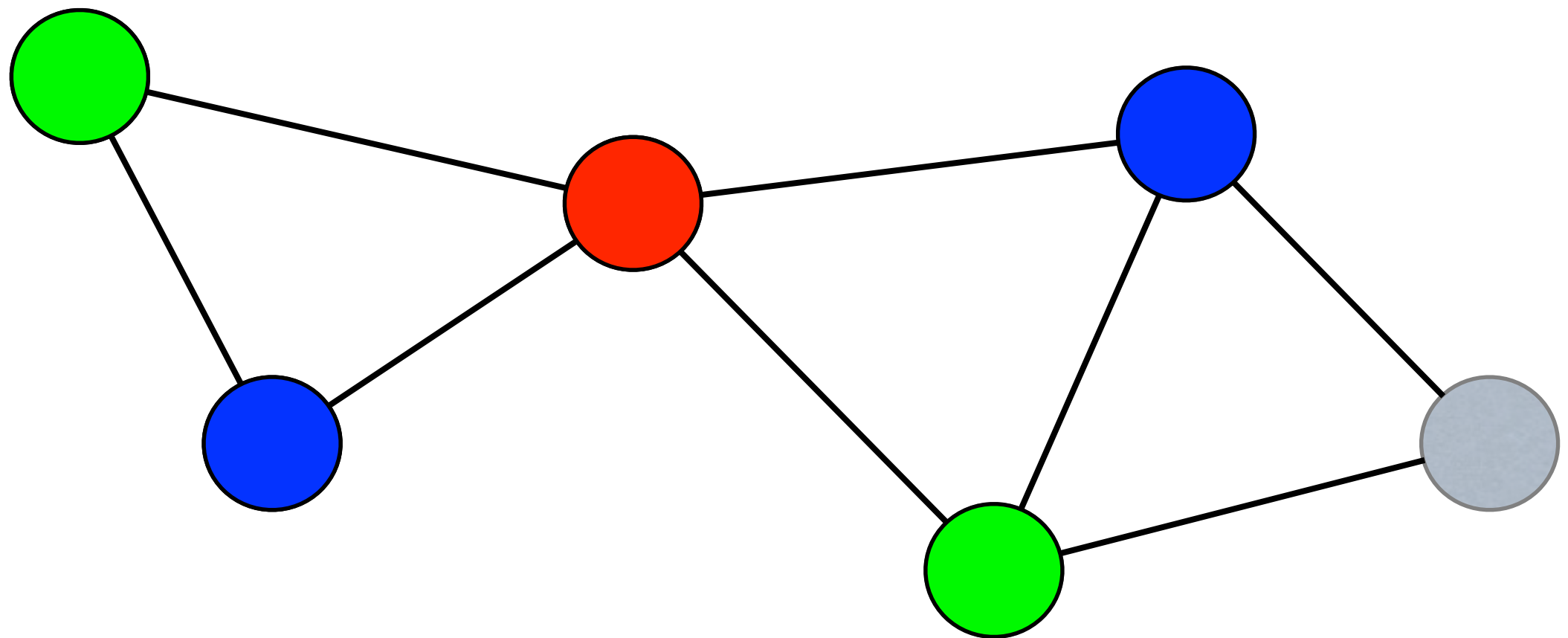
Centralized coloring



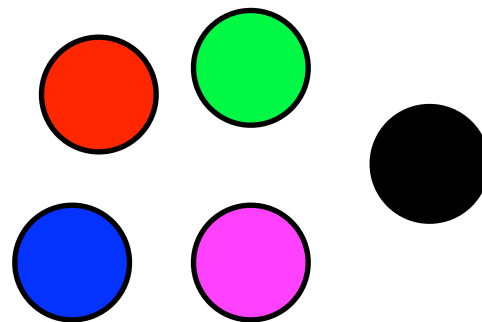
Available colors:



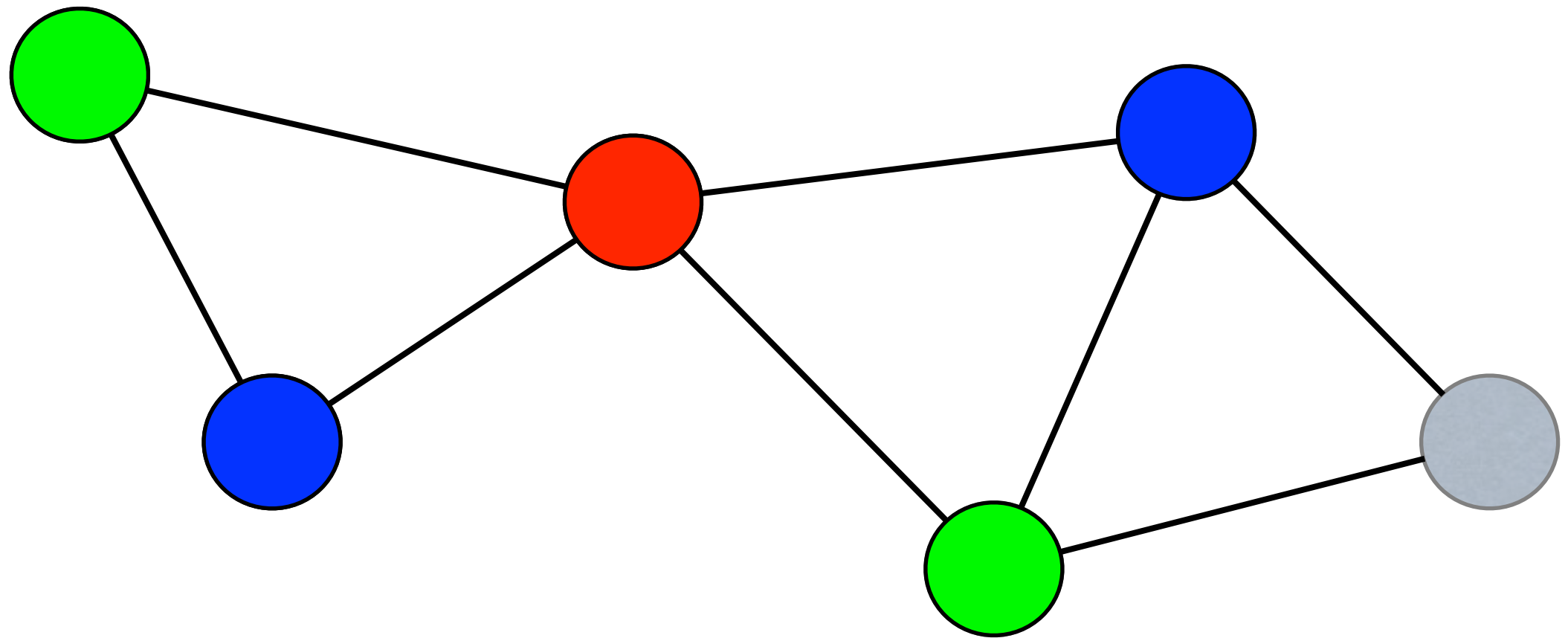
Centralized coloring



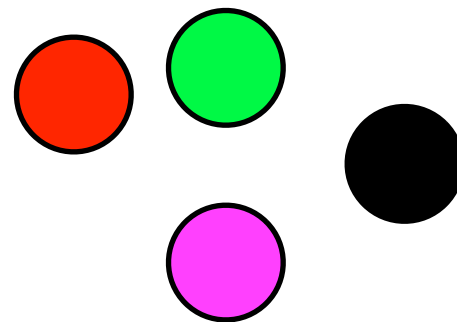
Available colors:



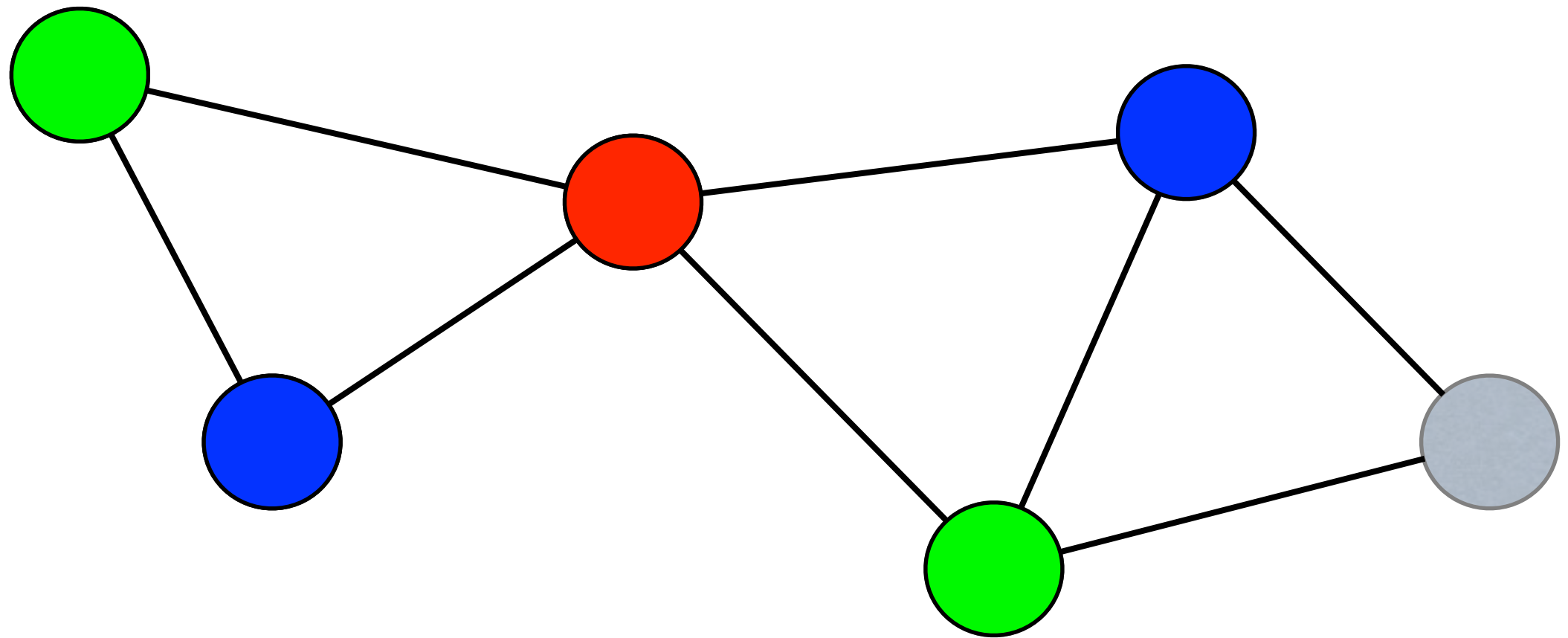
Centralized coloring



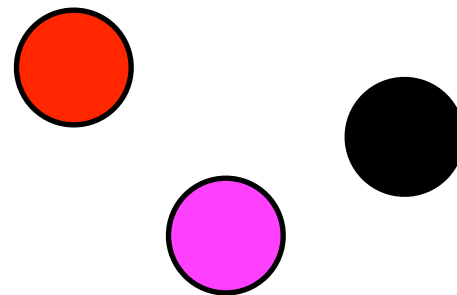
Available colors:



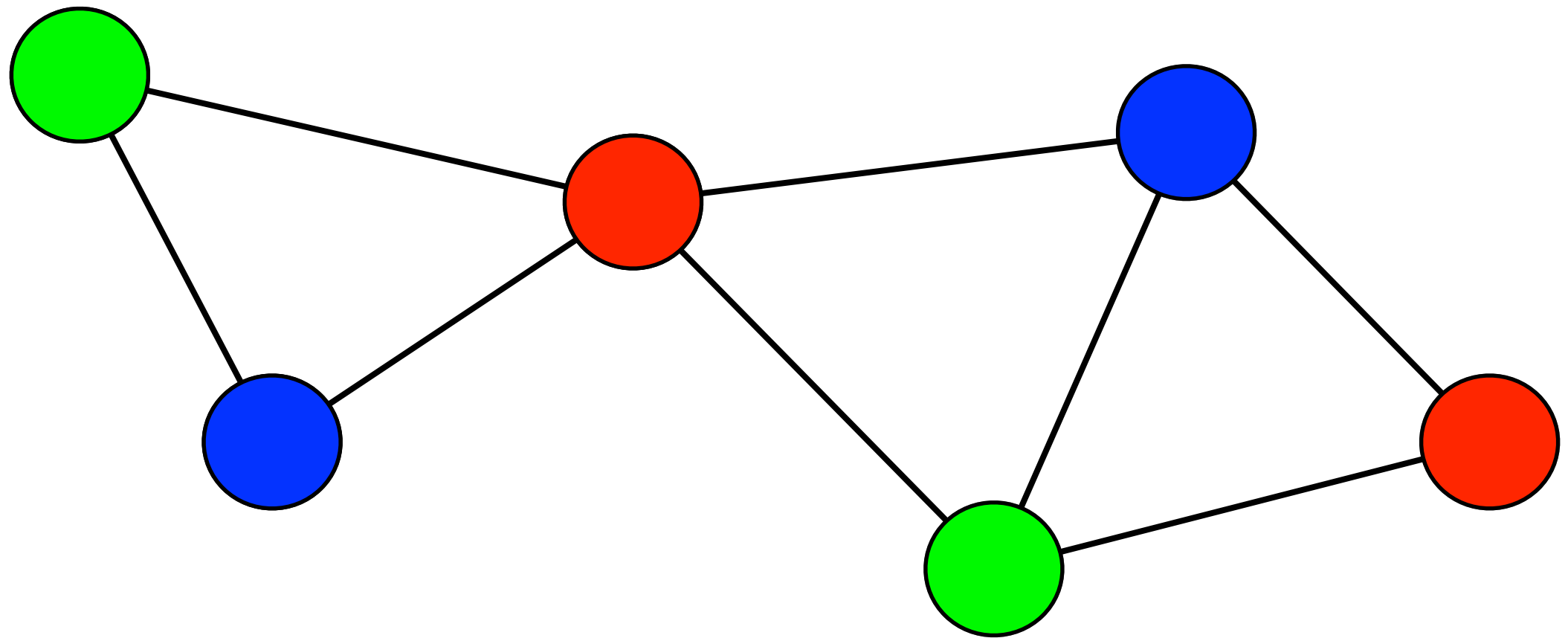
Centralized coloring



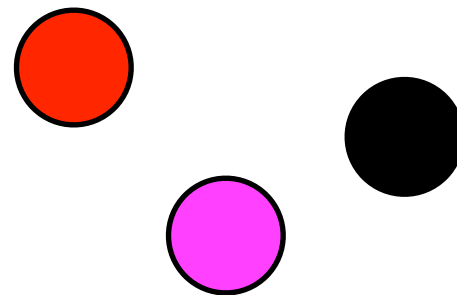
Available colors:



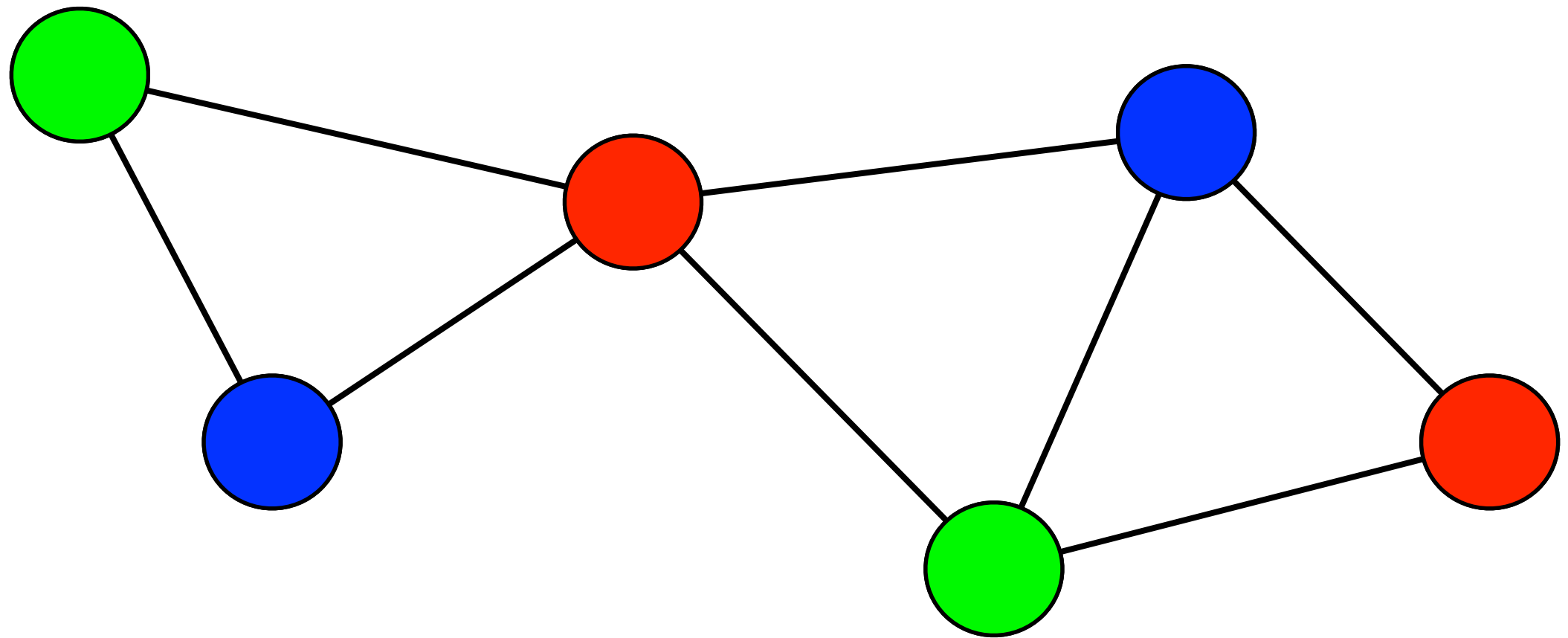
Centralized coloring



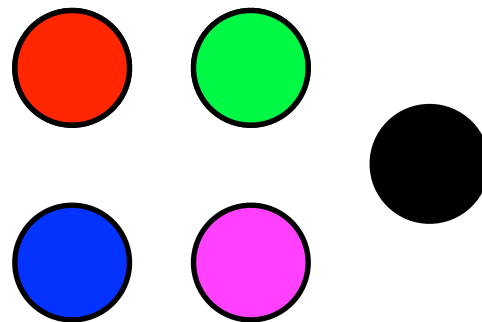
Available colors:



Centralized coloring



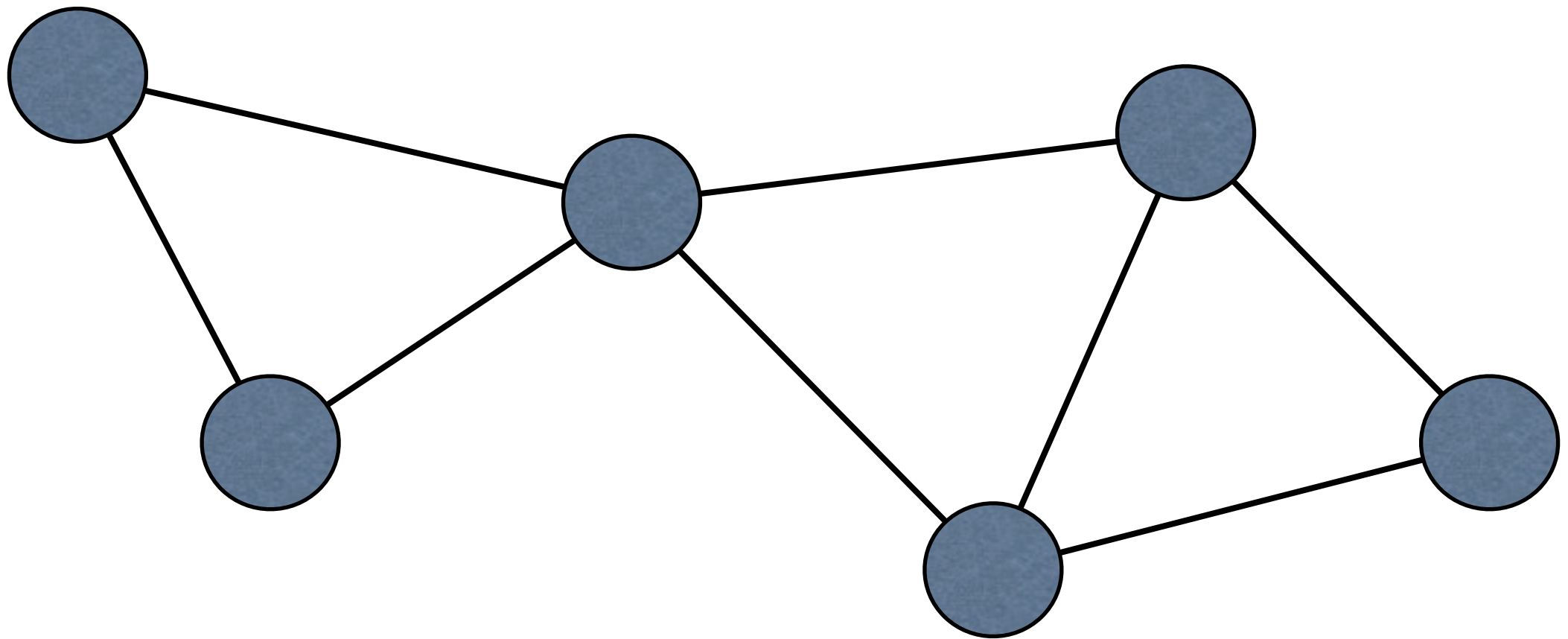
Available colors:



Centralized coloring

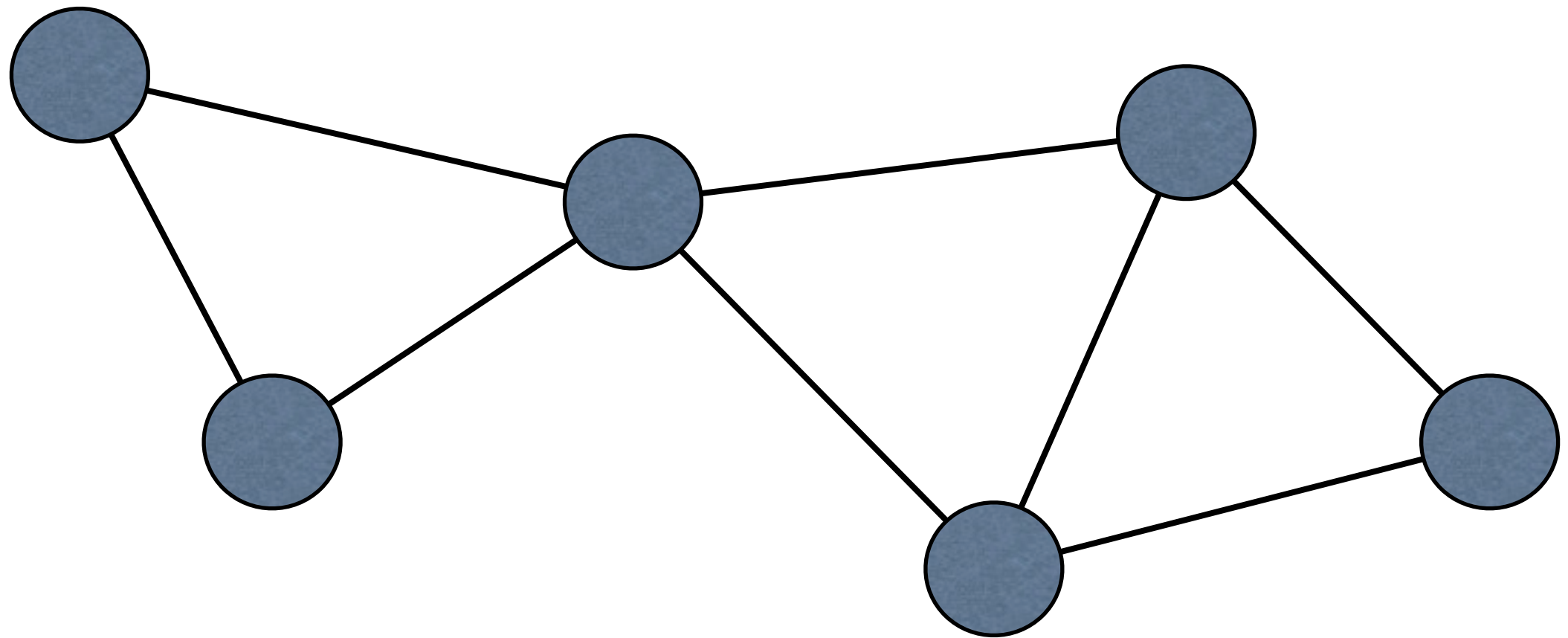
- Complexity
 - Number of steps ?
 - Number of colors ?

Distributed coloring

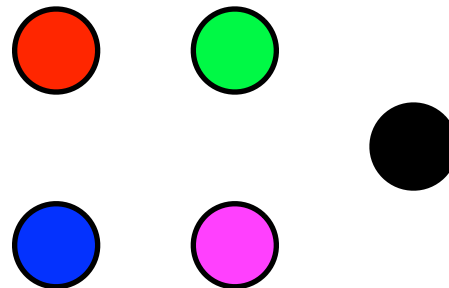


Available colors:

Distributed coloring

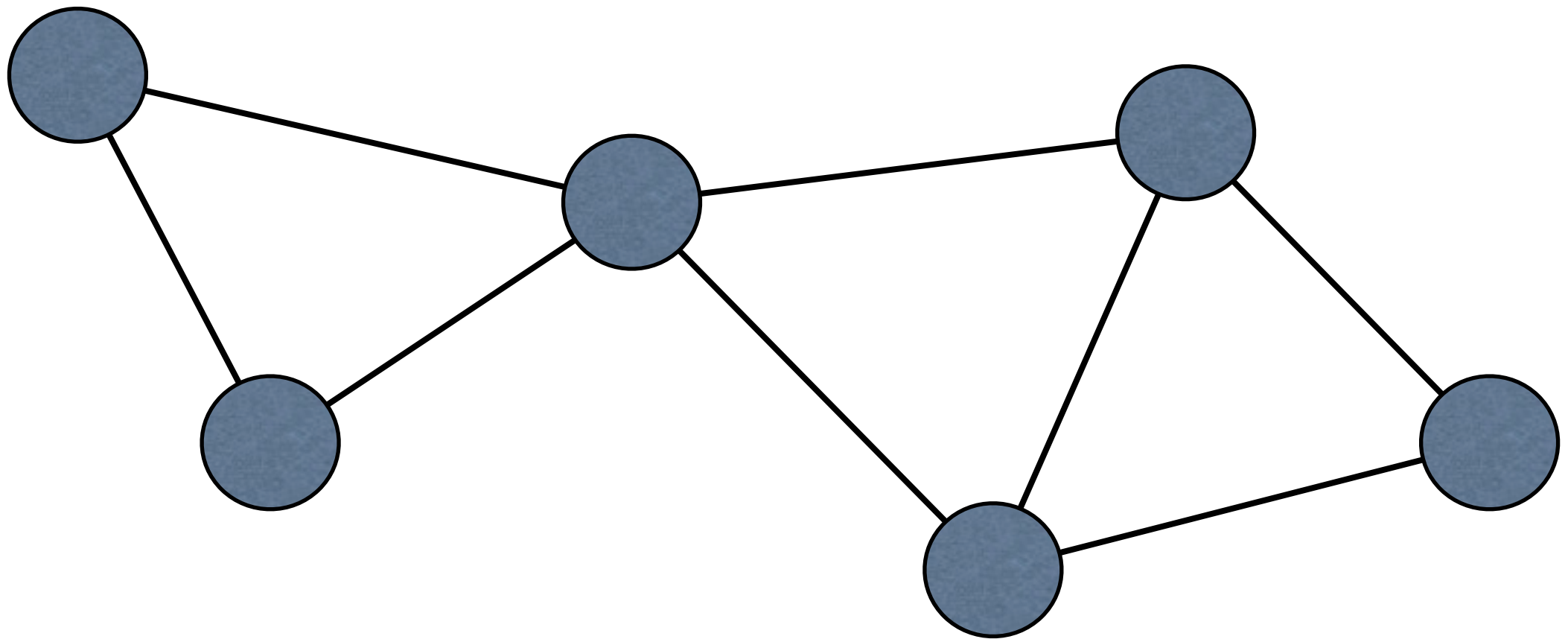


Available colors:

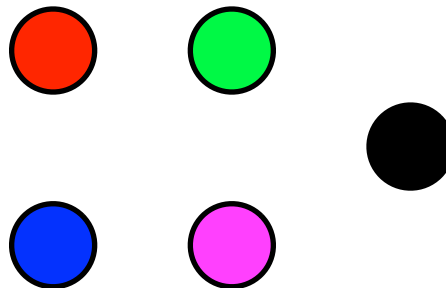


Distributed coloring

Pick the first available color !

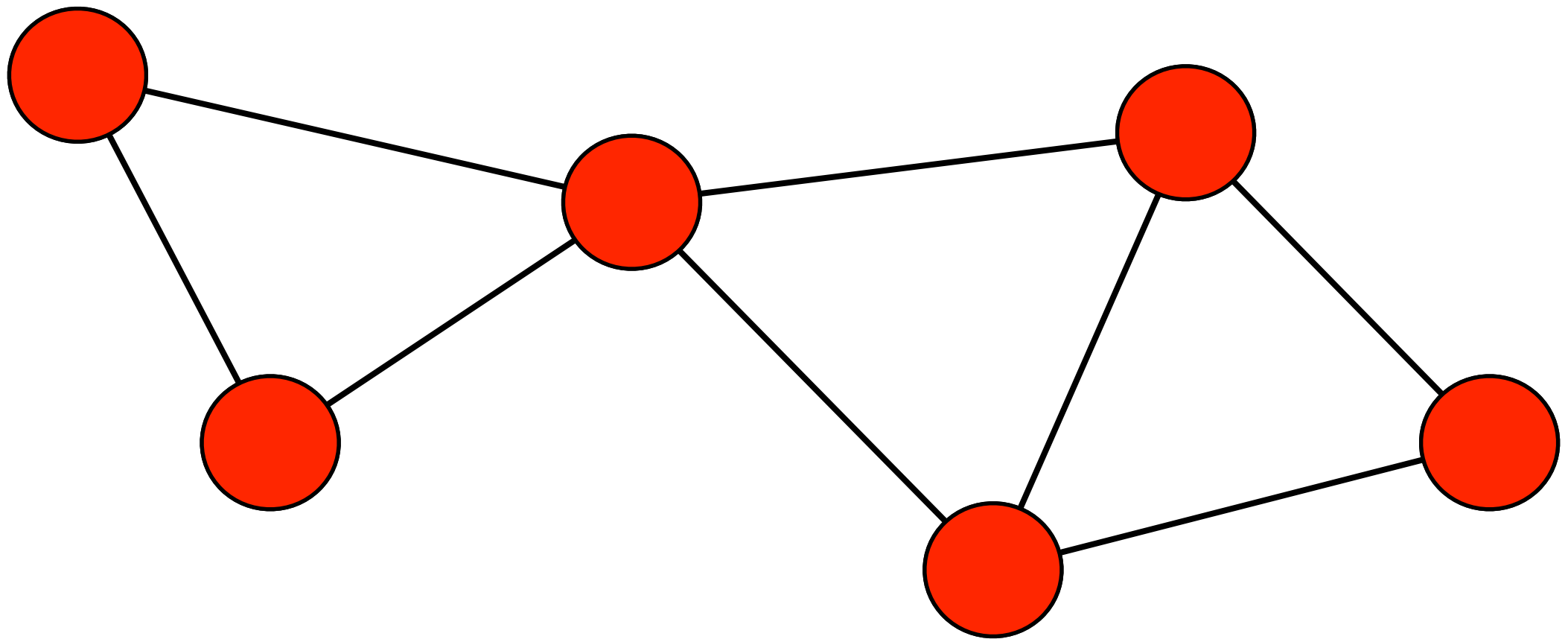


Available colors:

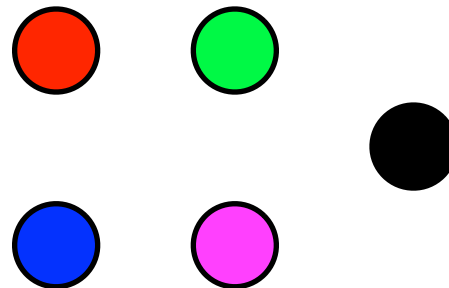


Distributed coloring

Pick the first available color !

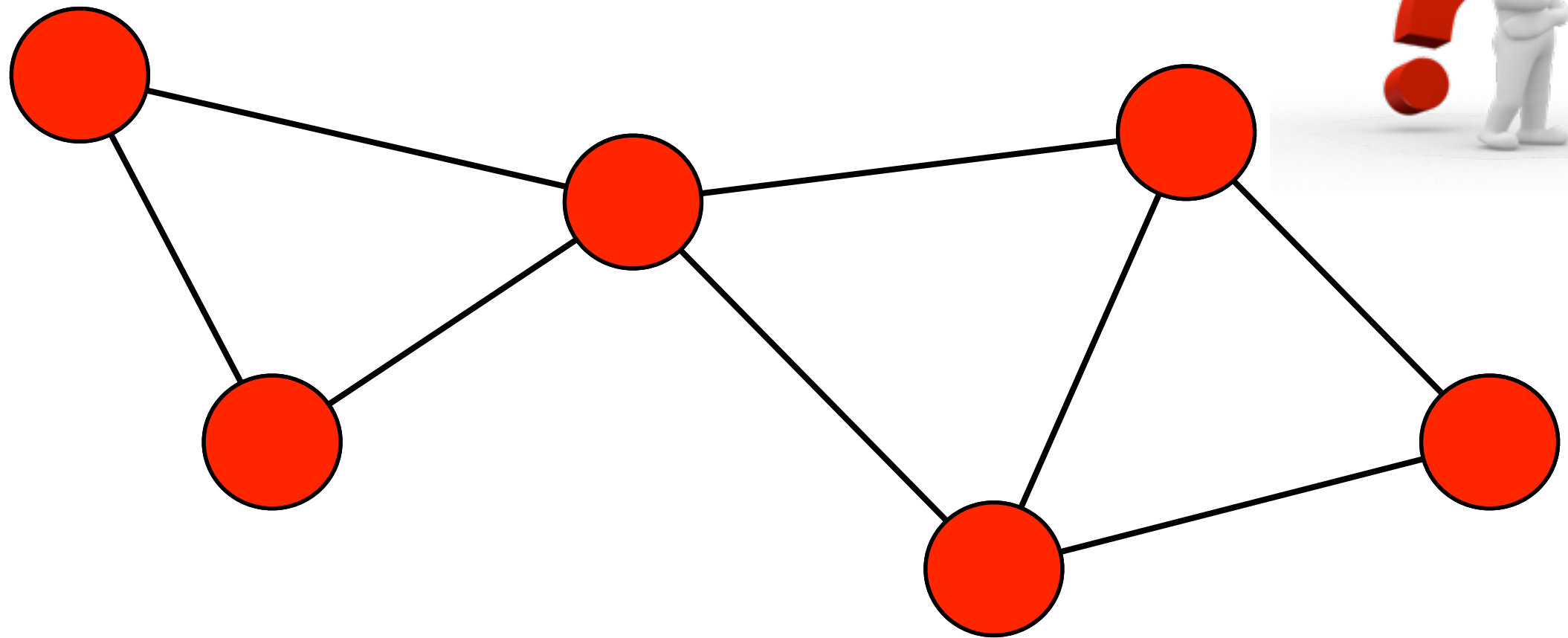


Available colors:

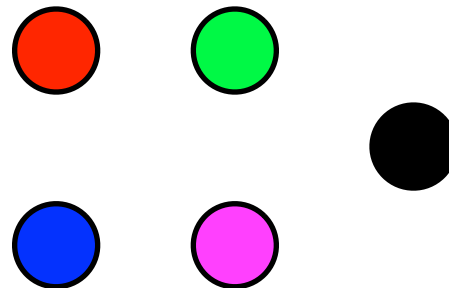


Distributed coloring

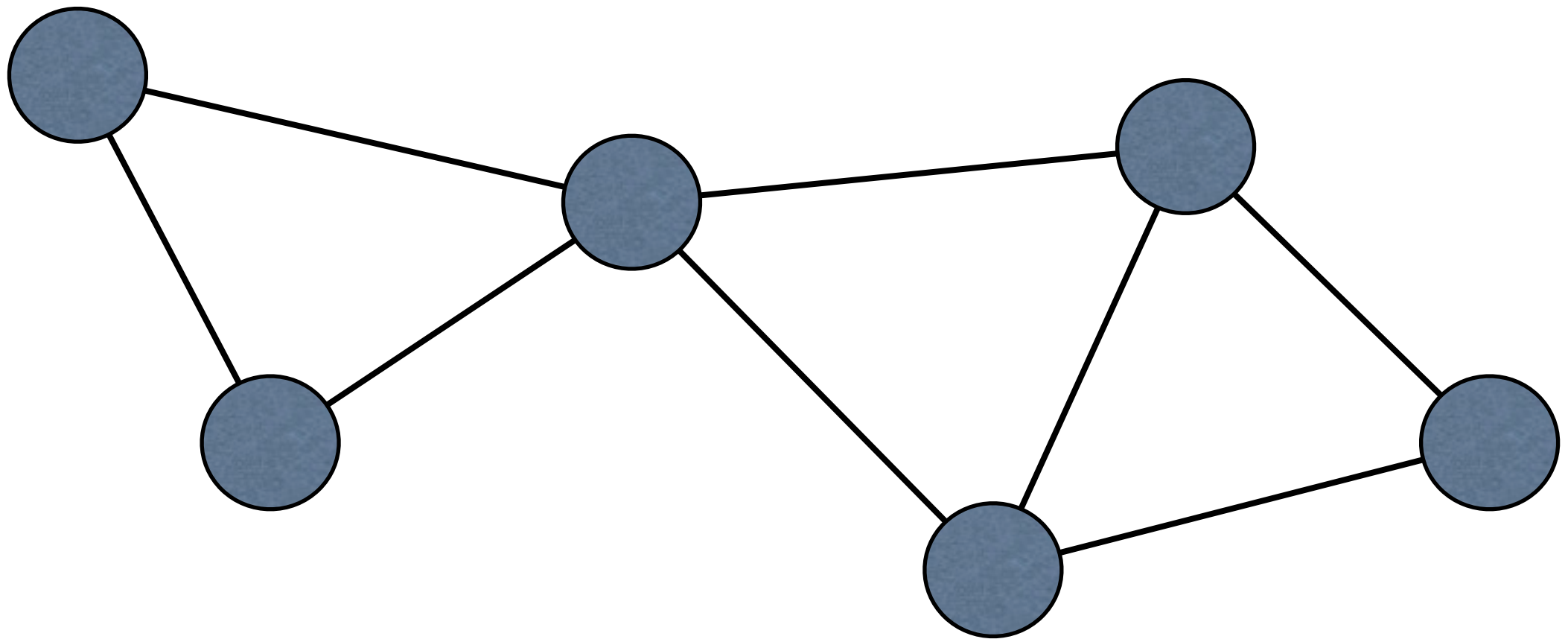
Pick the first available color !



Available colors:

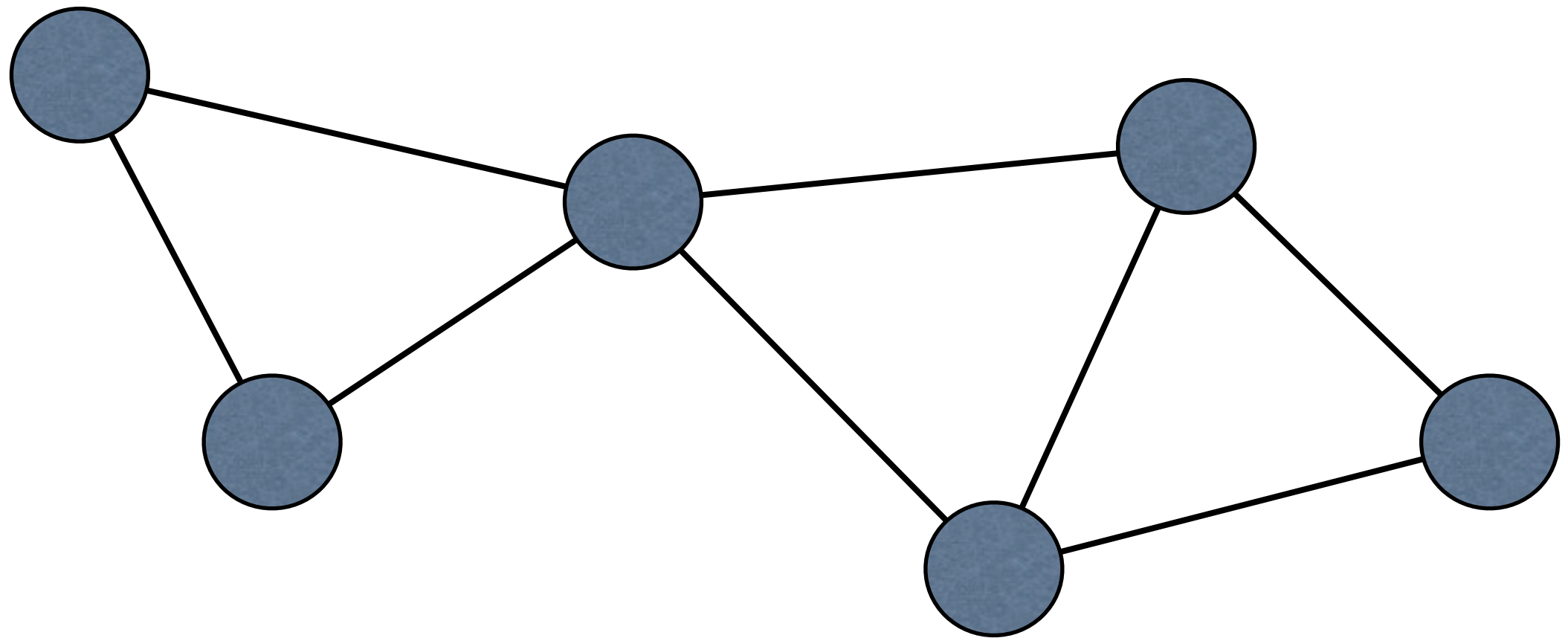


Distributed coloring

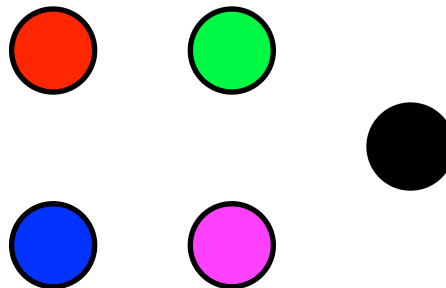


Available colors:

Distributed coloring

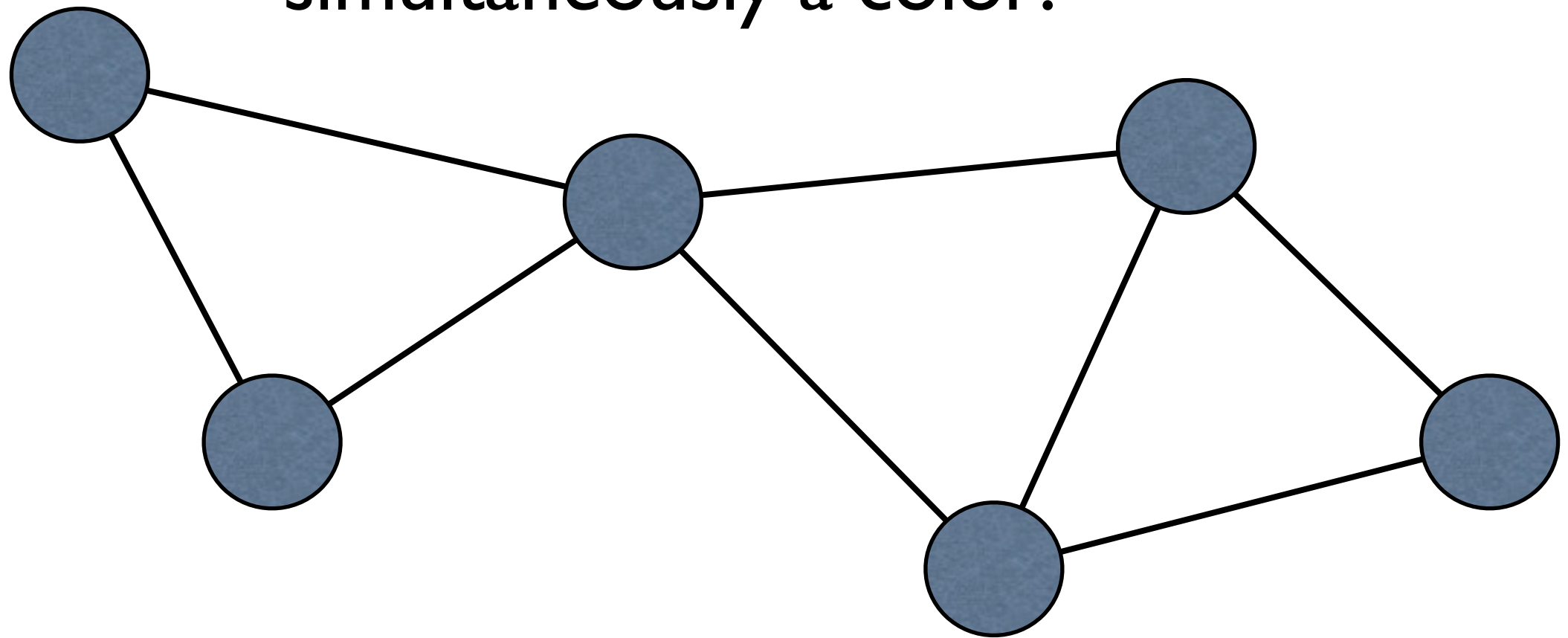


Available colors:

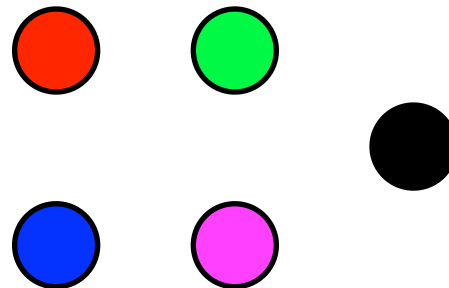


Distributed coloring

No two neighboring nodes pick simultaneously a color!

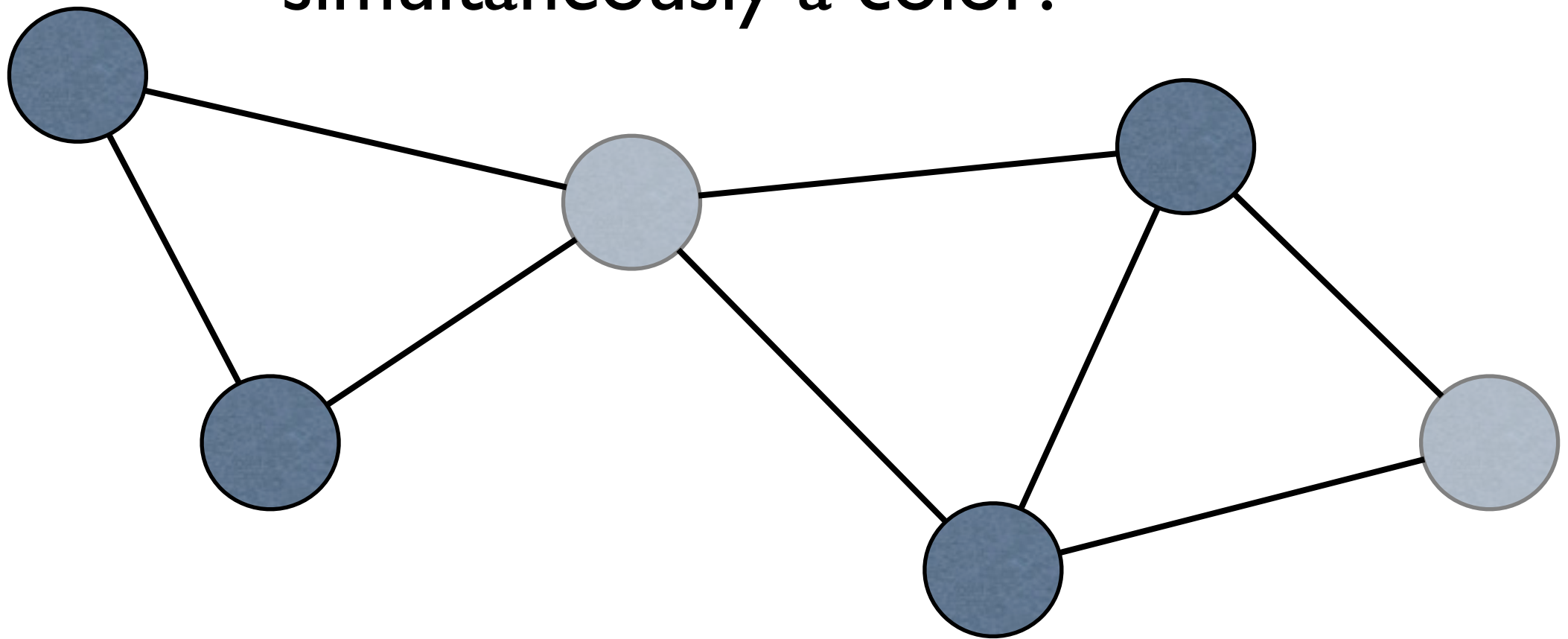


Available colors:

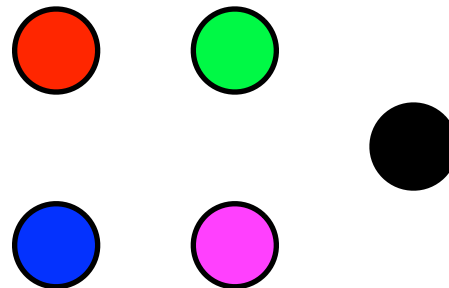


Distributed coloring

No two neighboring nodes pick simultaneously a color!

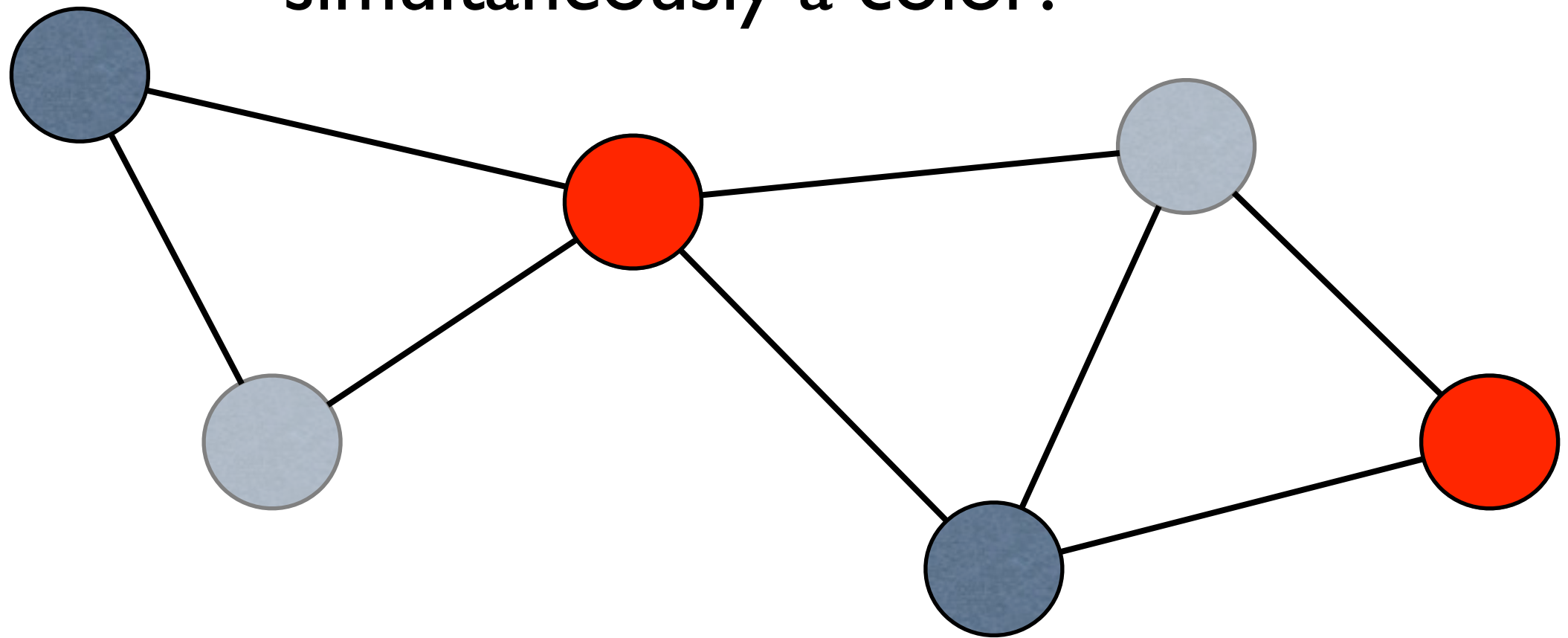


Available colors:

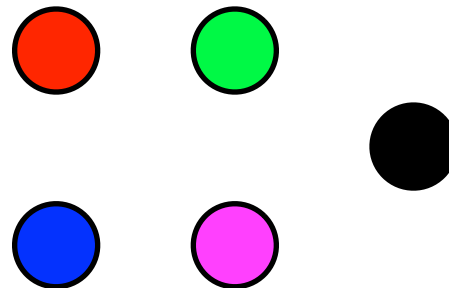


Distributed coloring

No two neighboring nodes pick simultaneously a color!

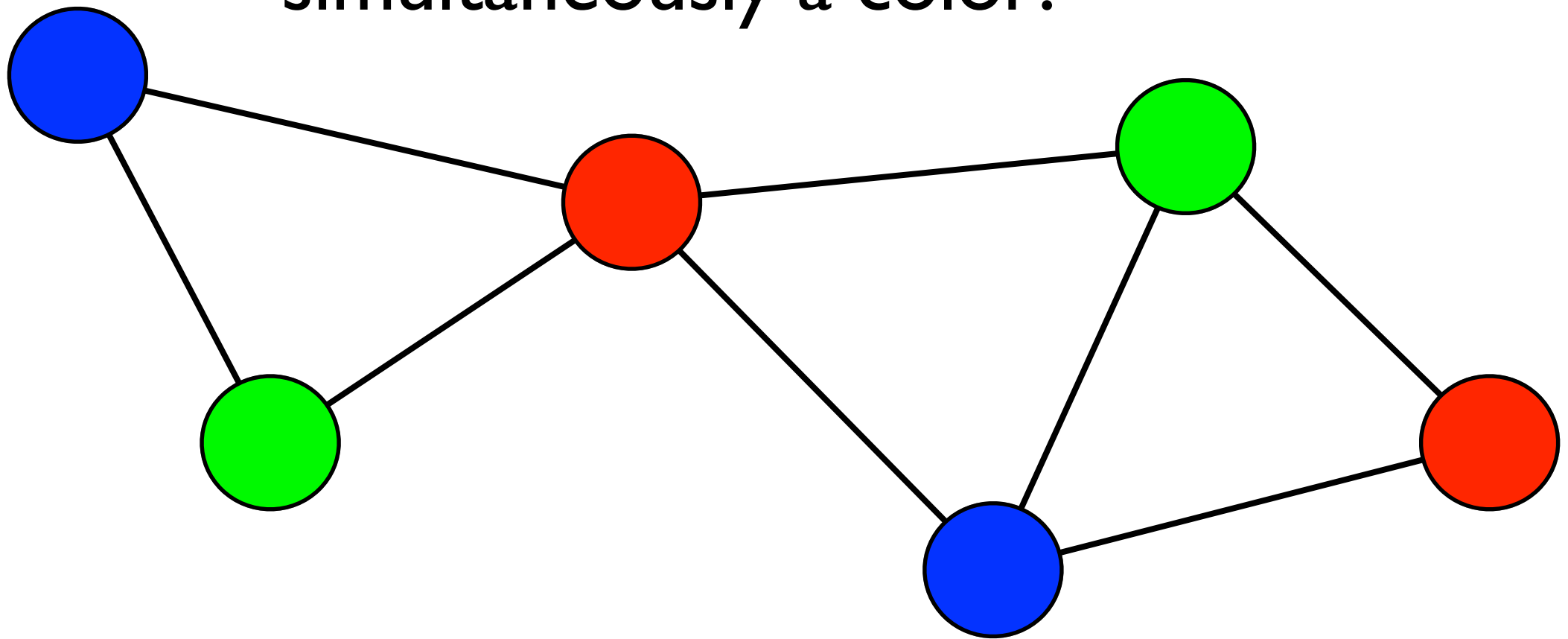


Available colors:

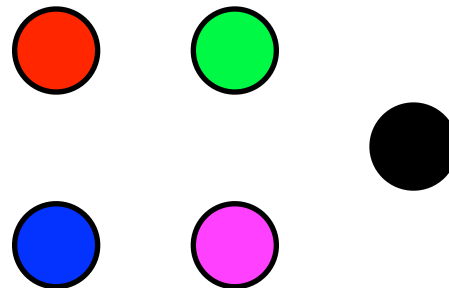


Distributed coloring

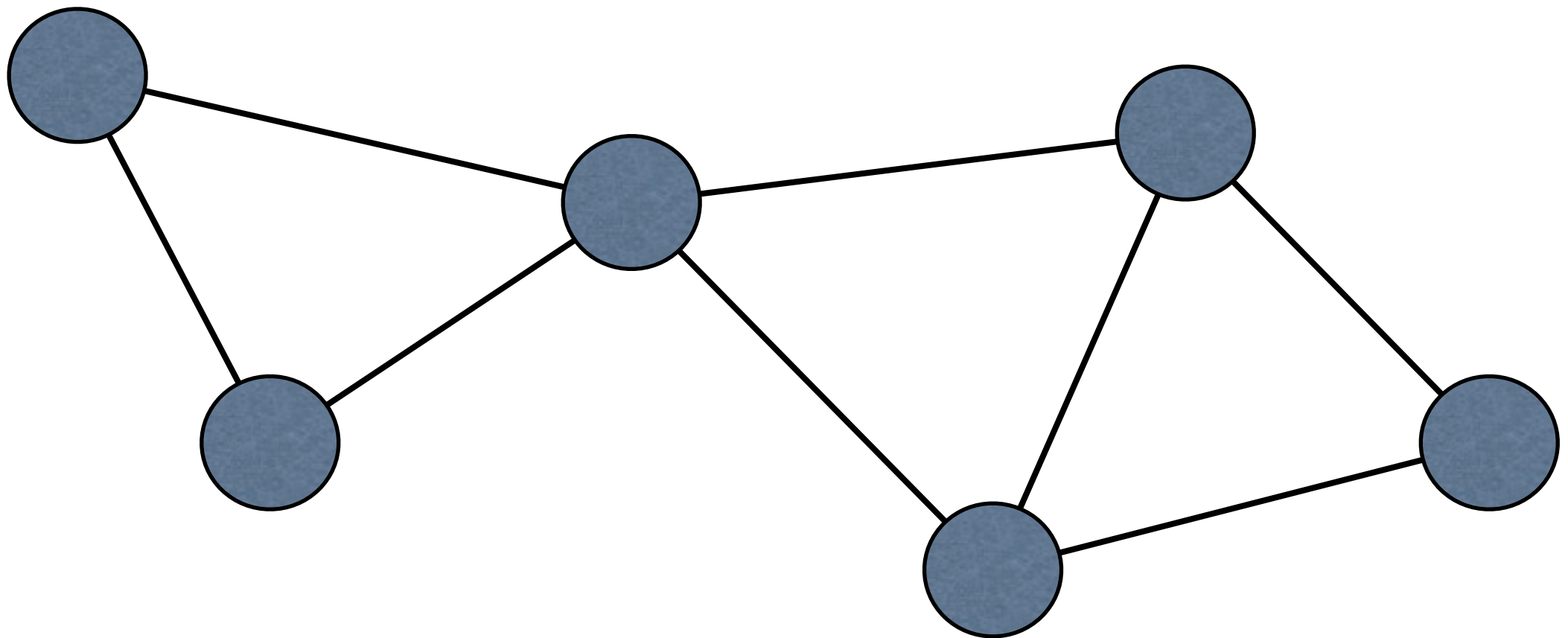
No two neighboring nodes pick simultaneously a color!



Available colors:

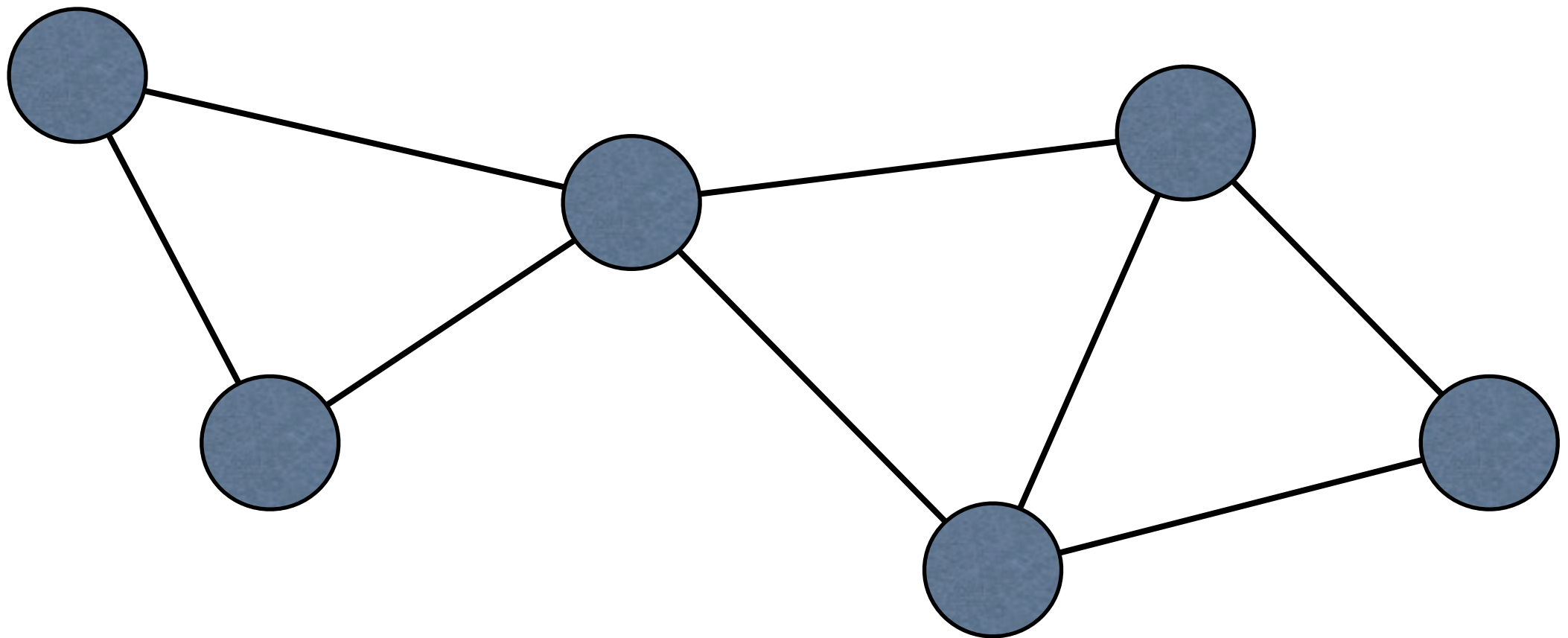


Distributed coloring



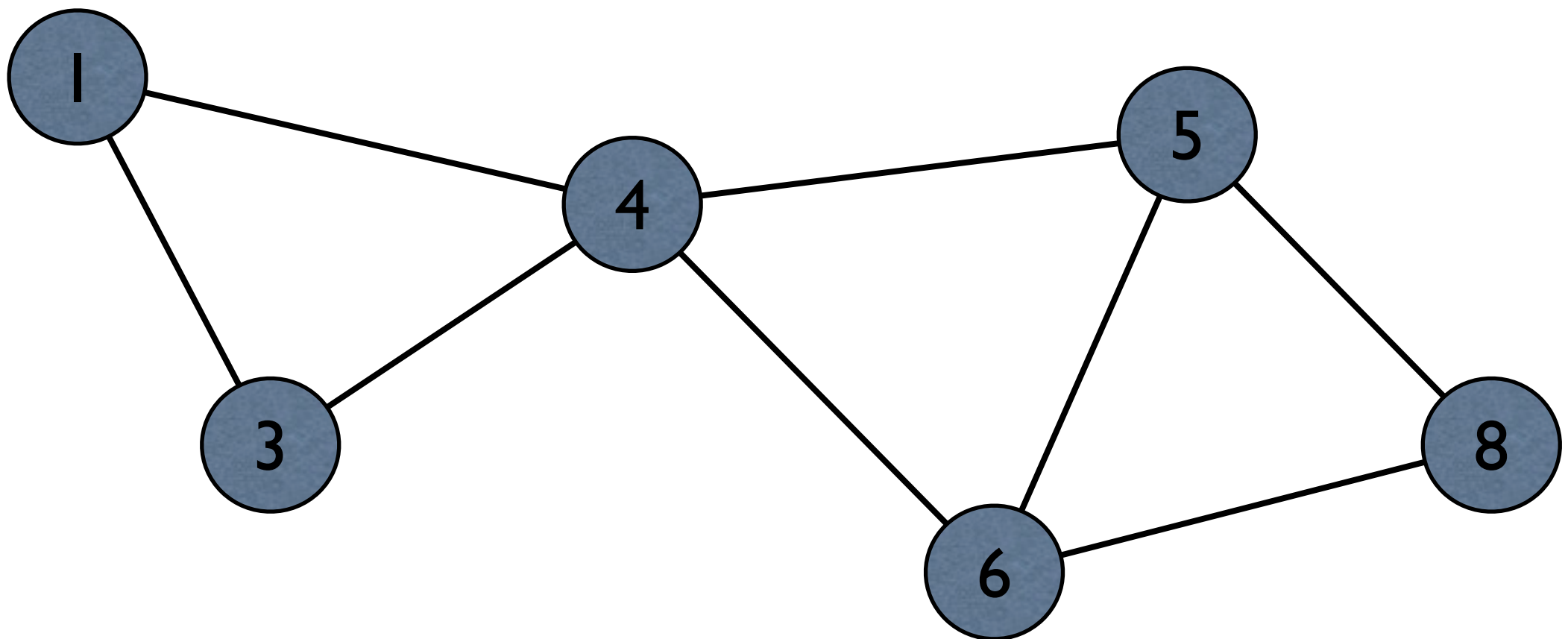
Distributed coloring

No two neighboring nodes execute ???

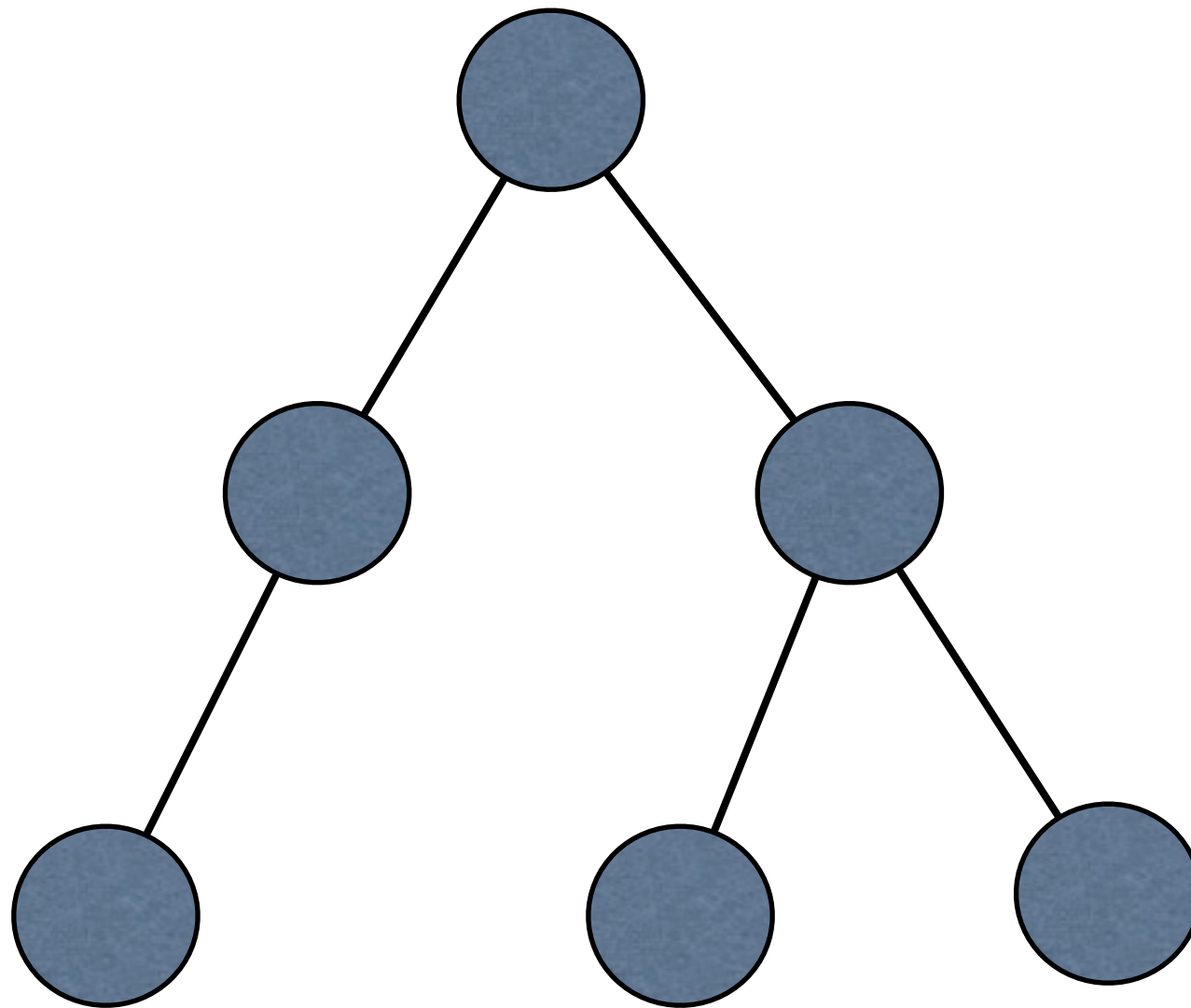


Distributed coloring

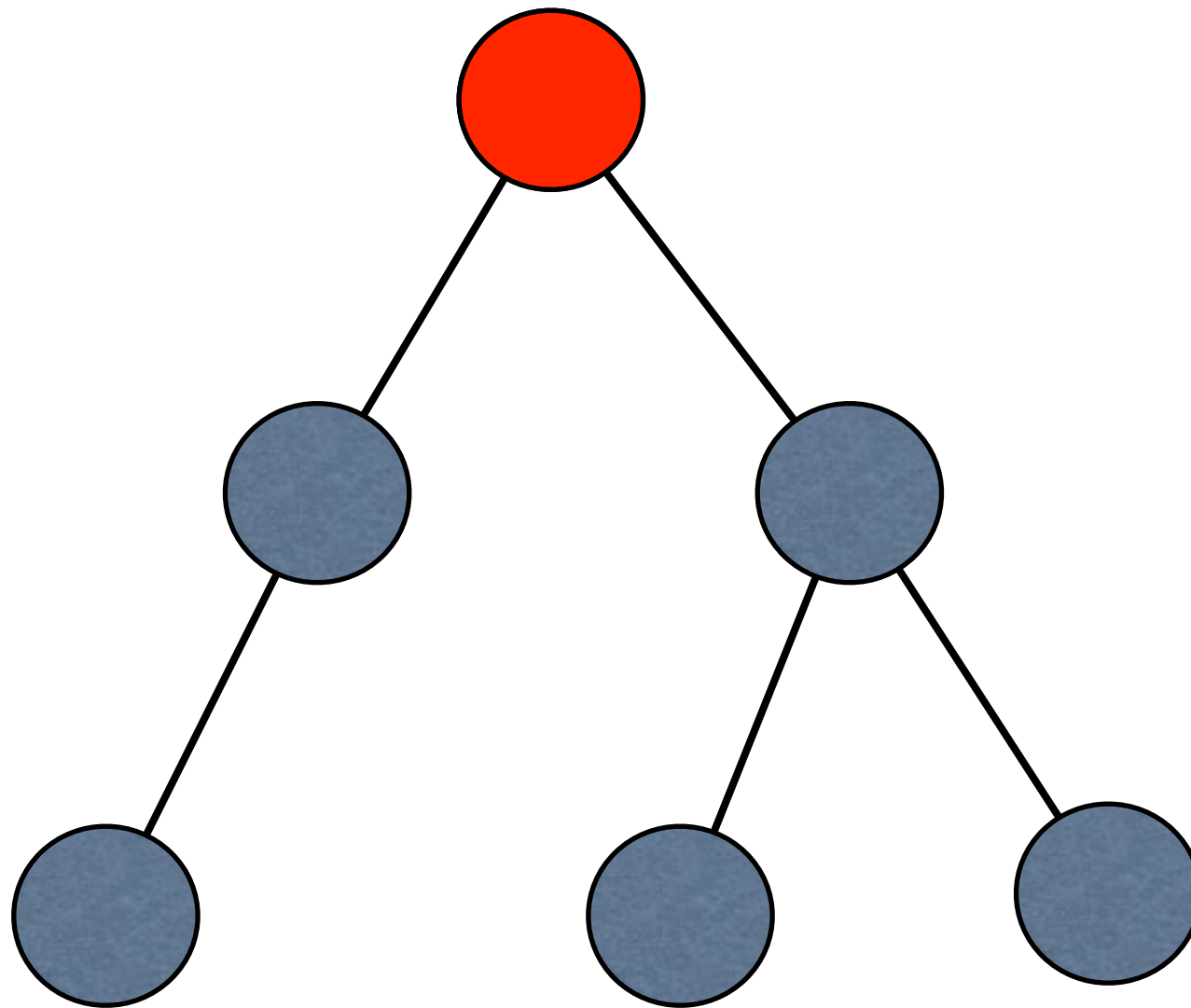
No two neighboring nodes execute ???



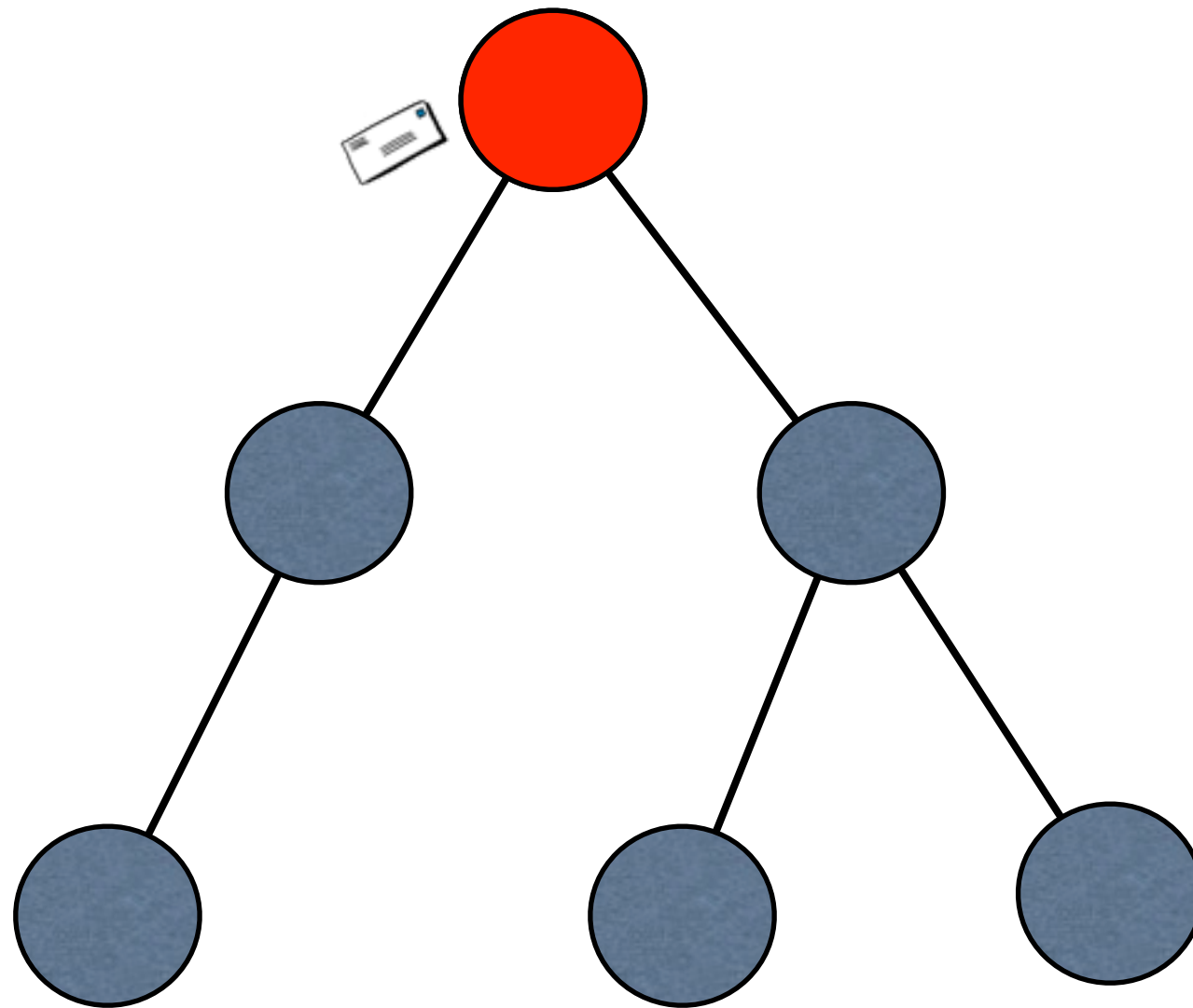
Trees binary coloring



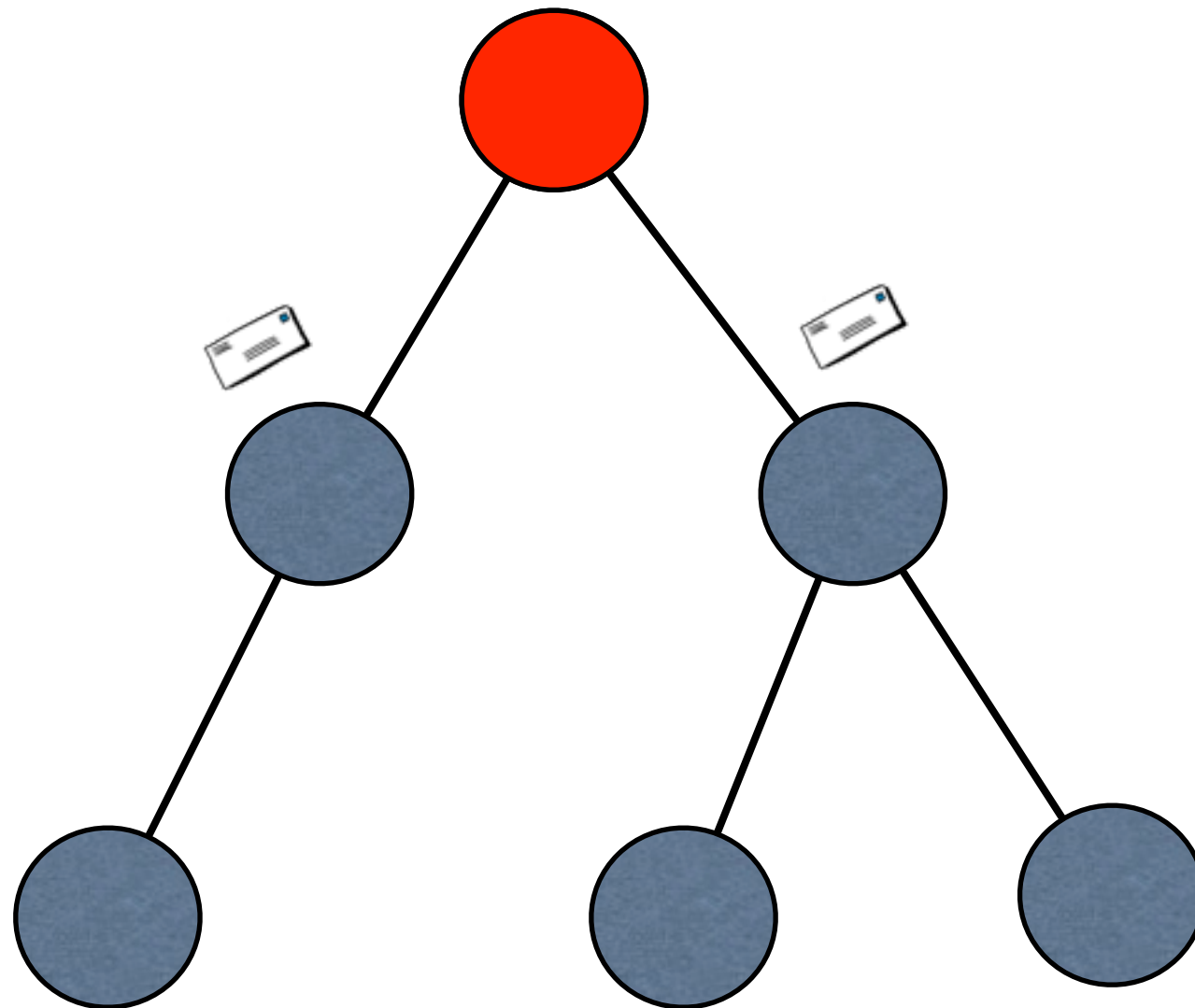
Trees binary coloring



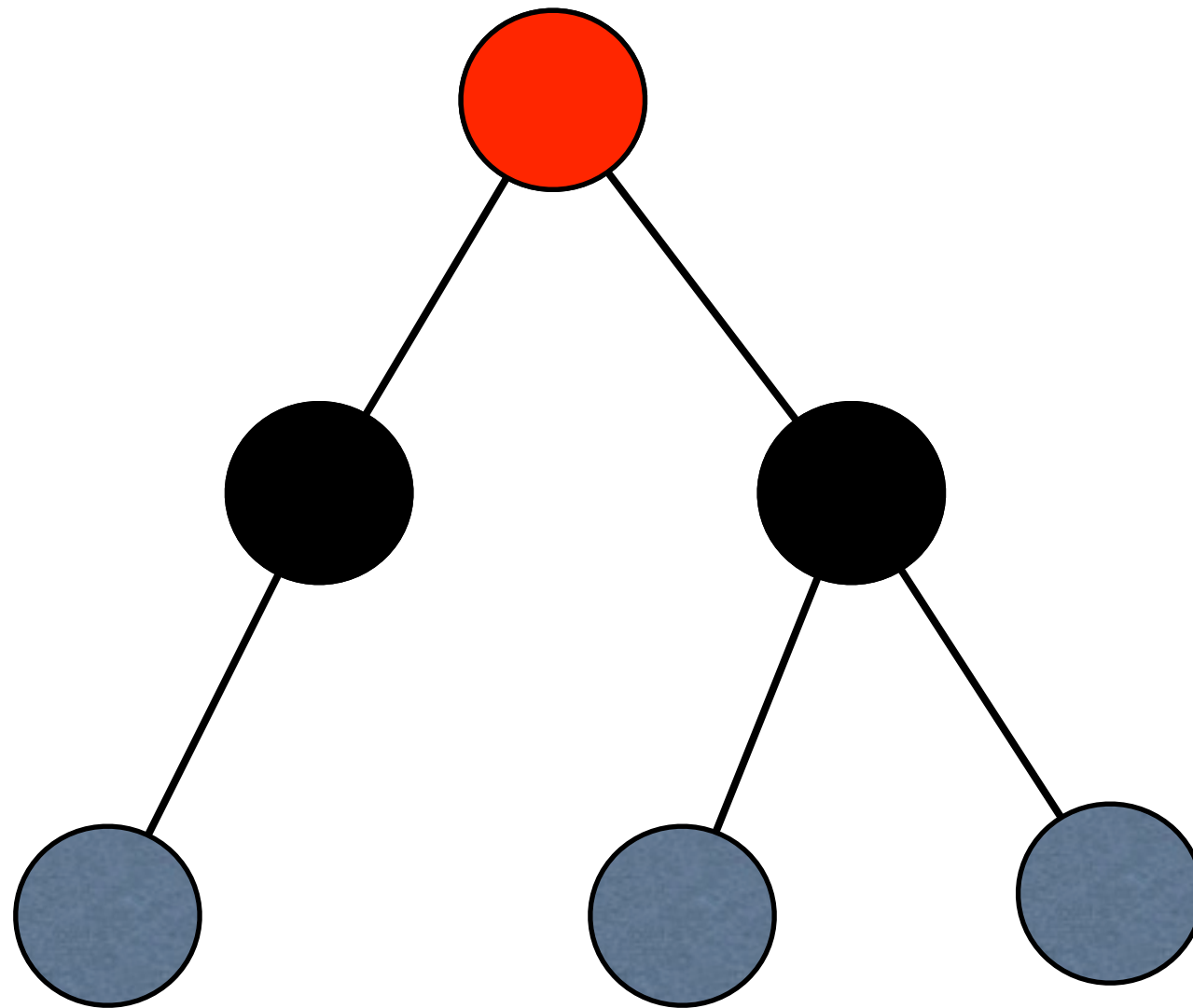
Trees binary coloring



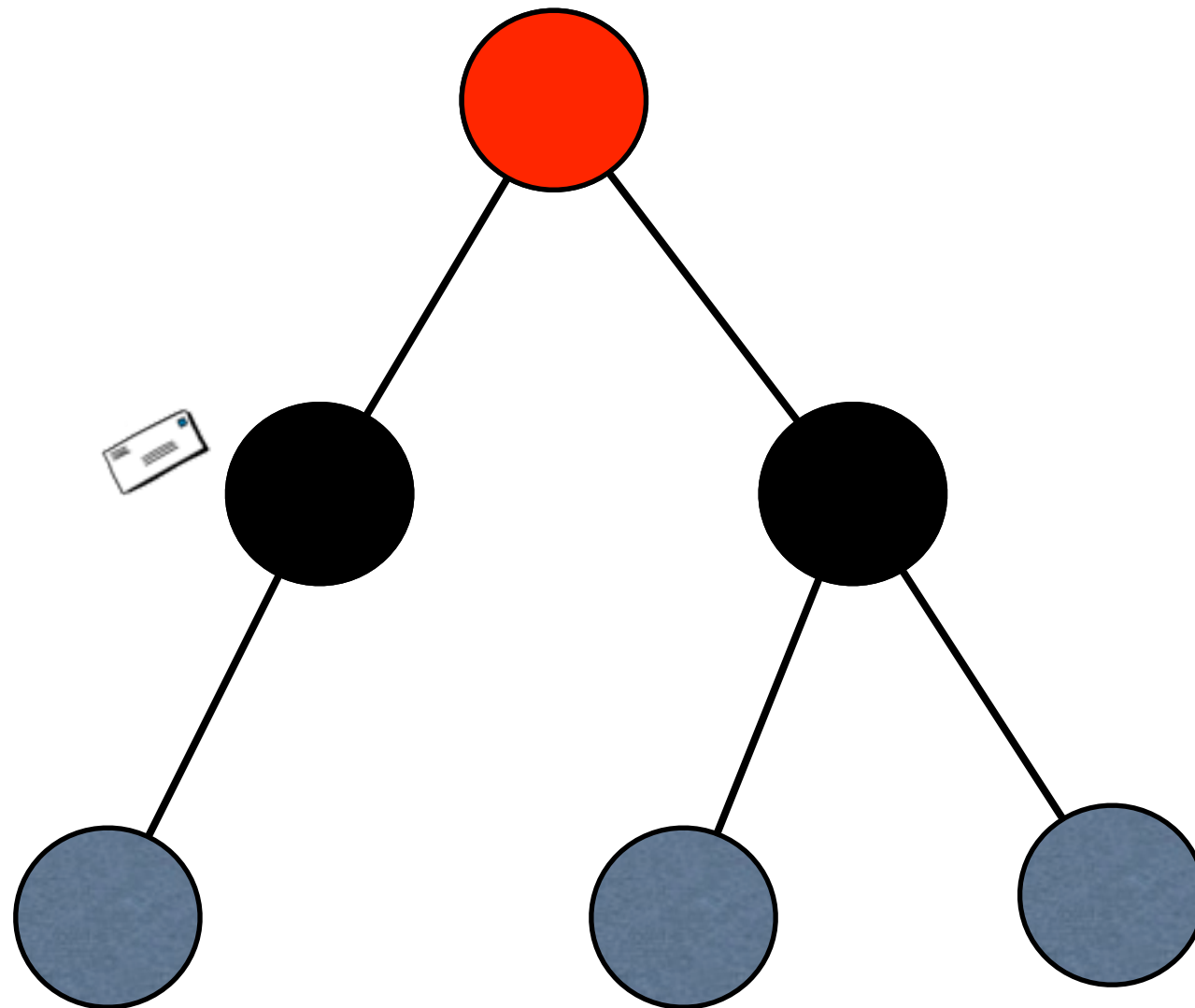
Trees binary coloring



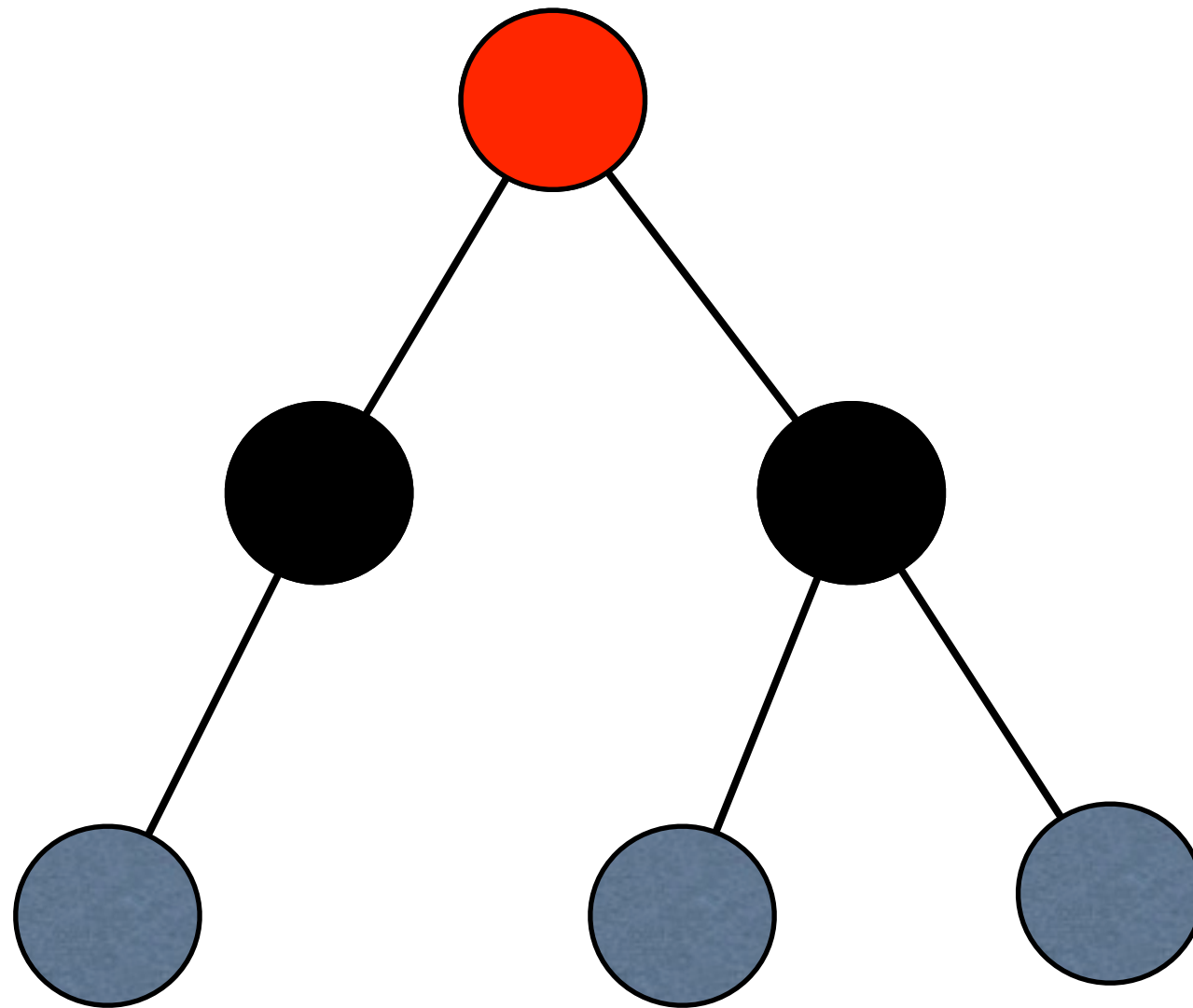
Trees binary coloring



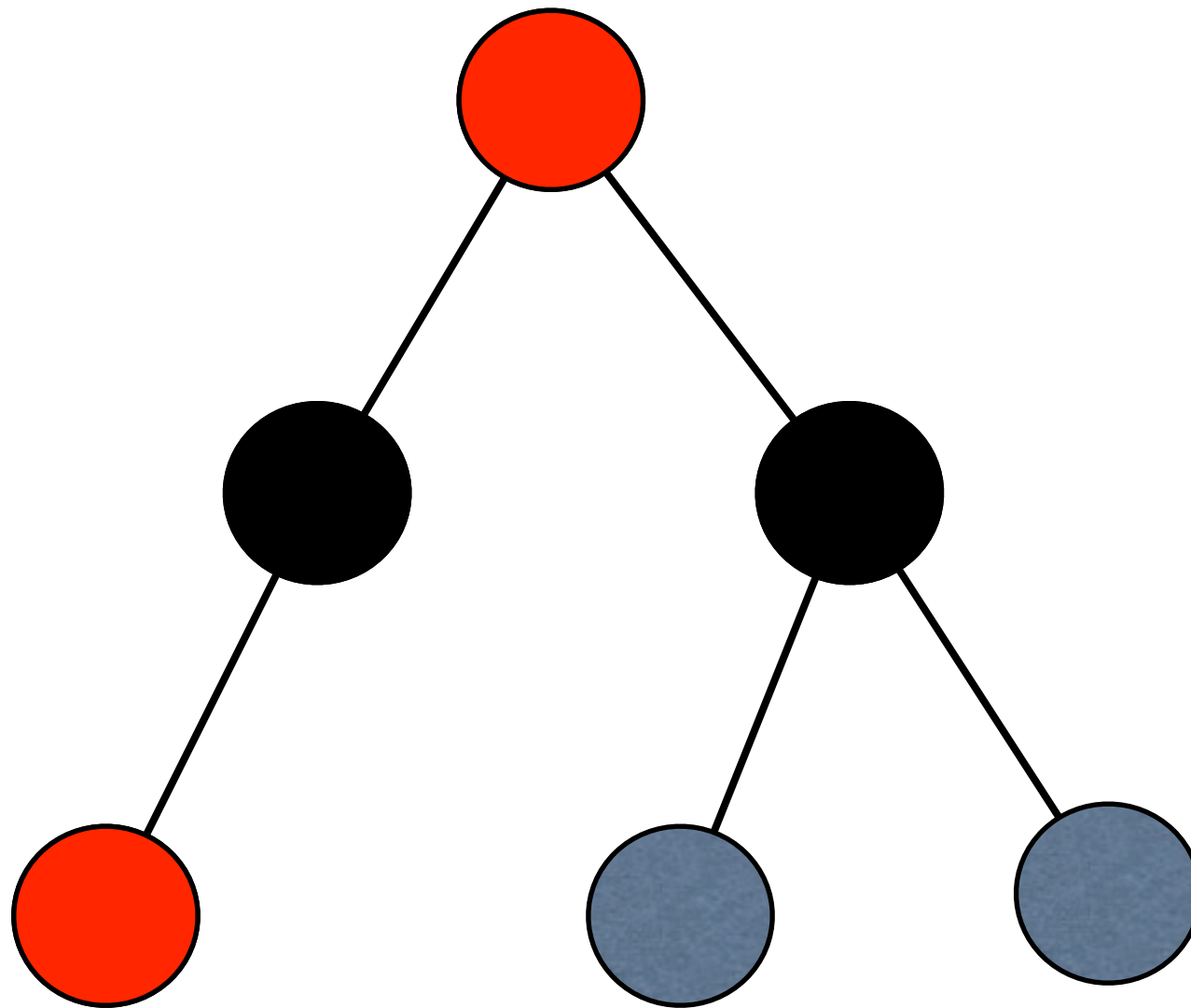
Trees binary coloring



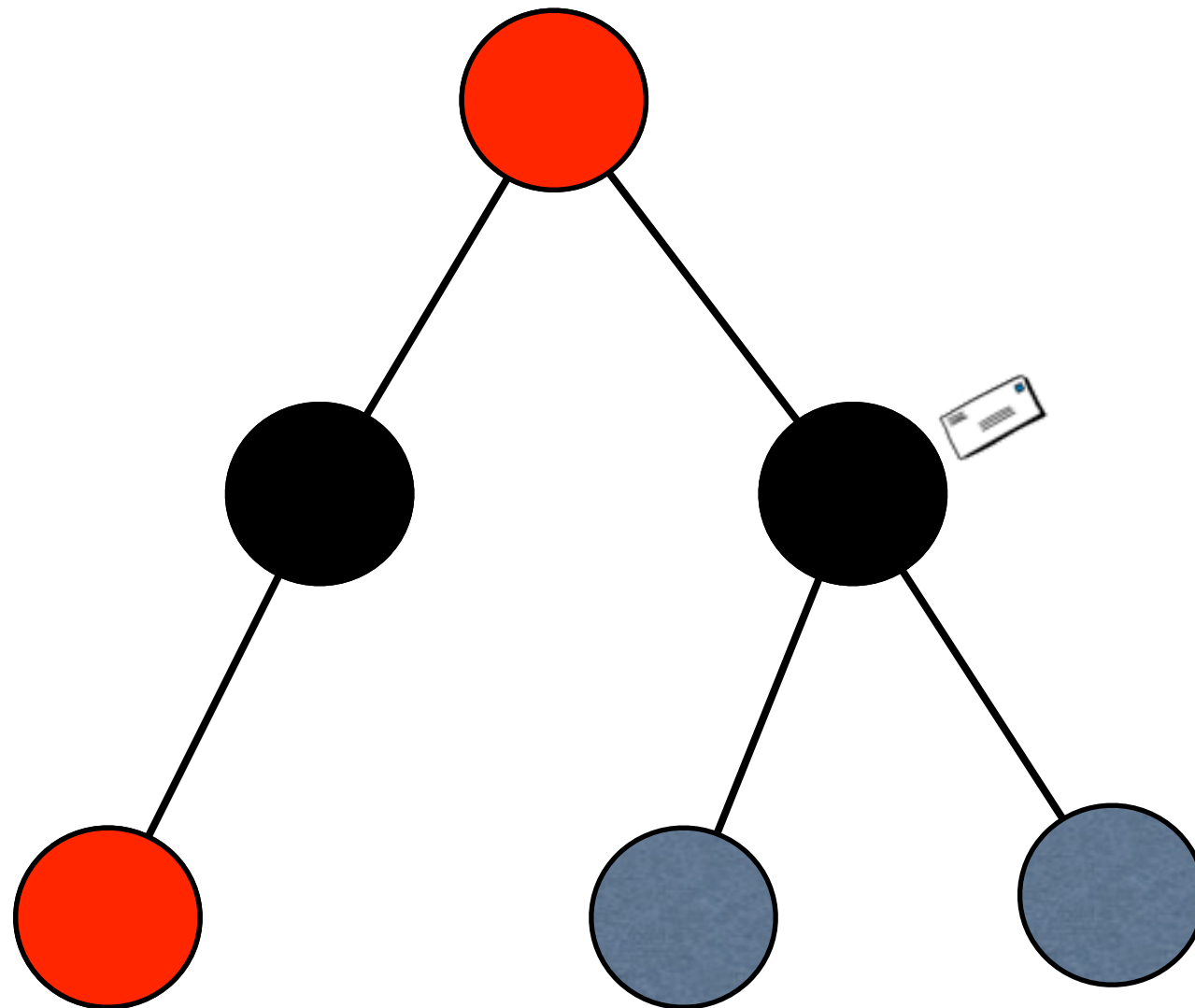
Trees binary coloring



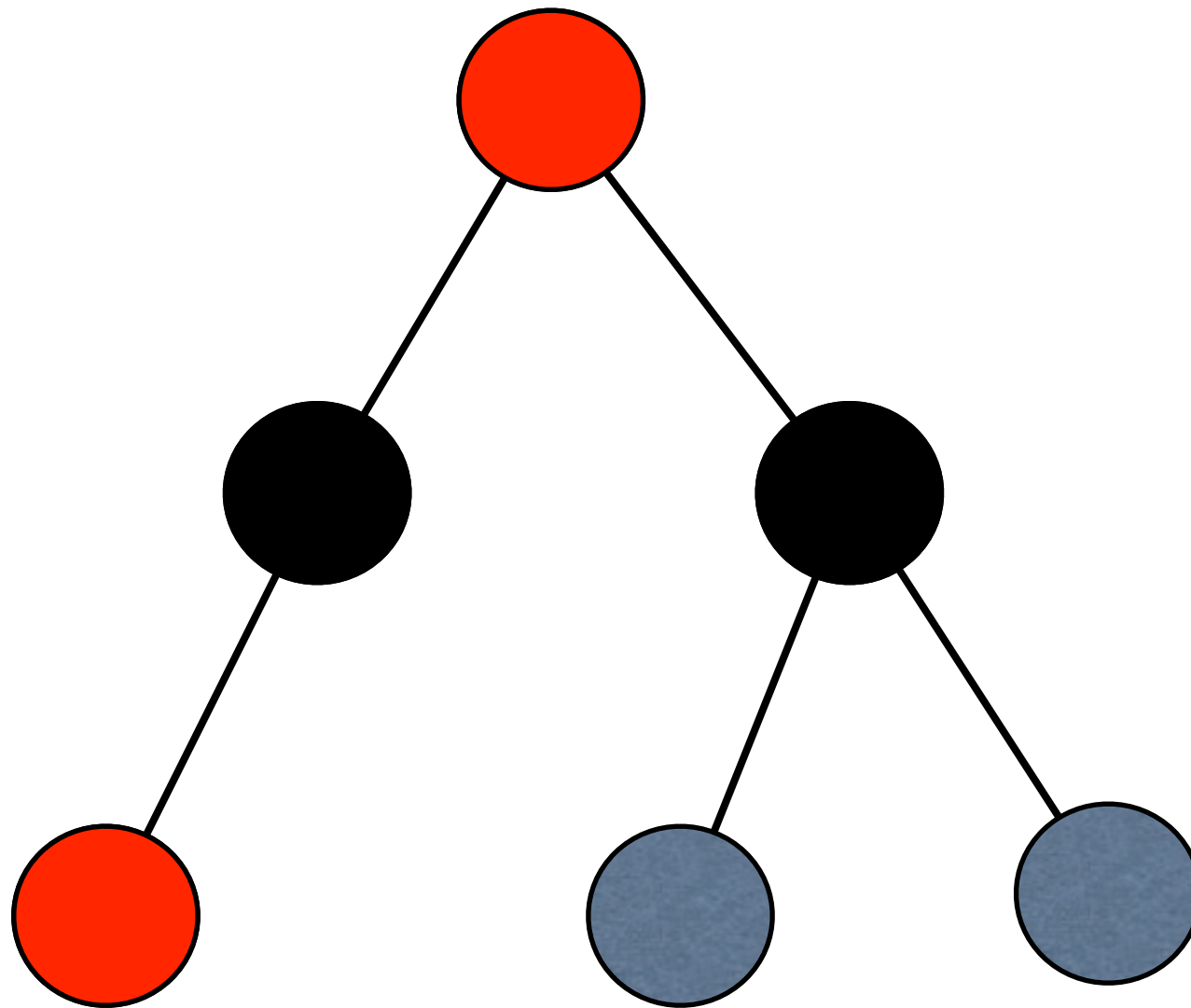
Trees binary coloring



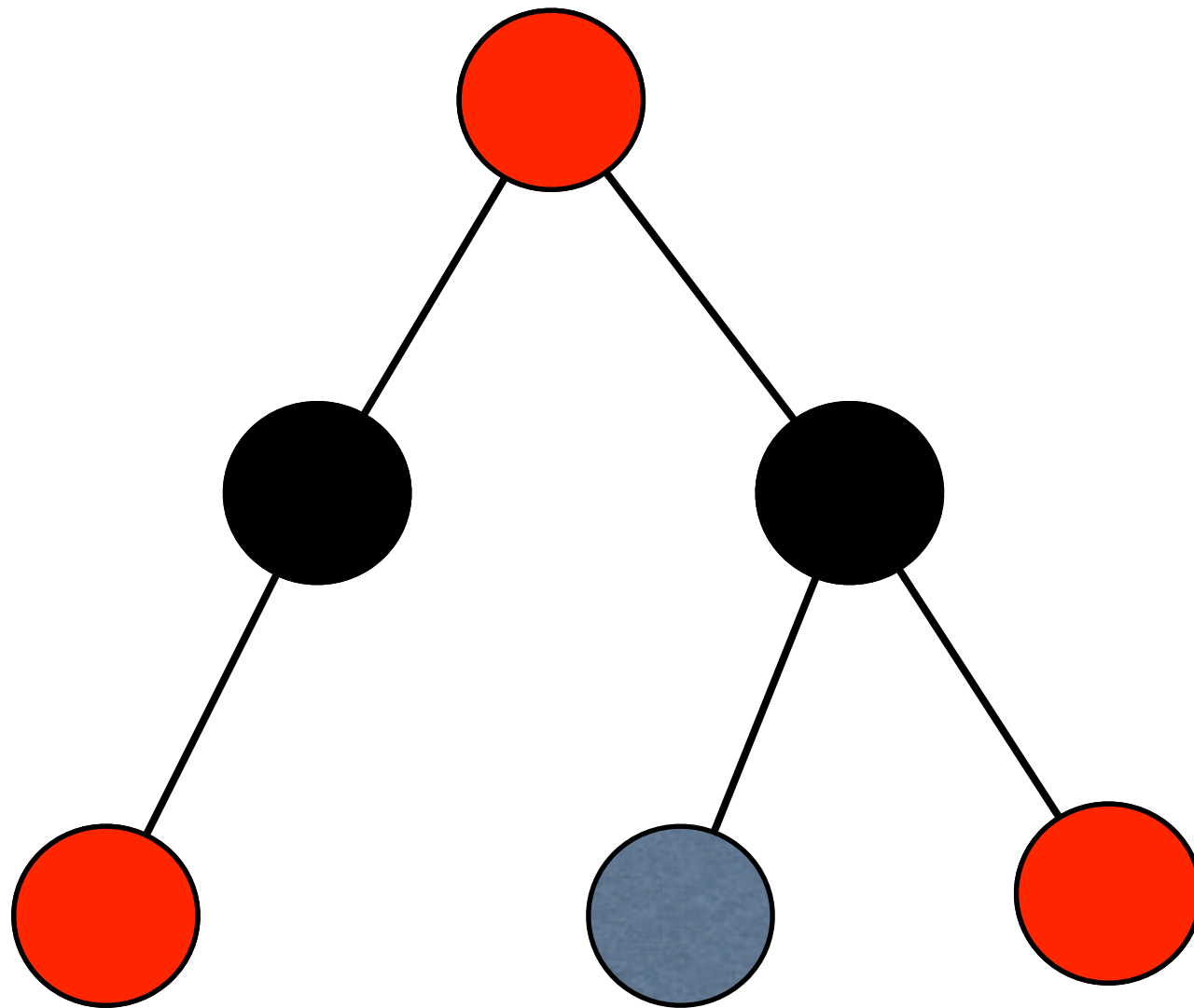
Trees binary coloring



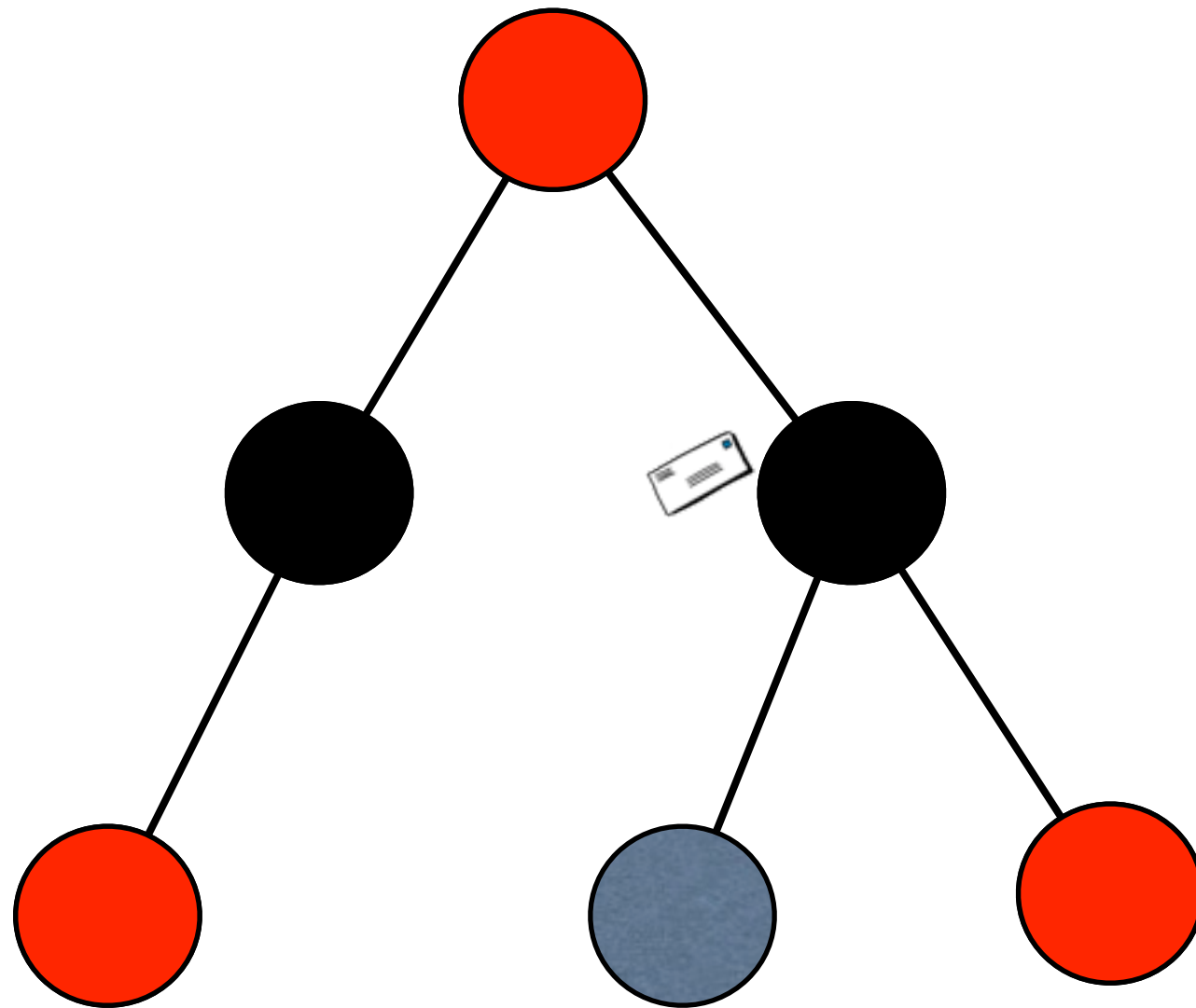
Trees binary coloring



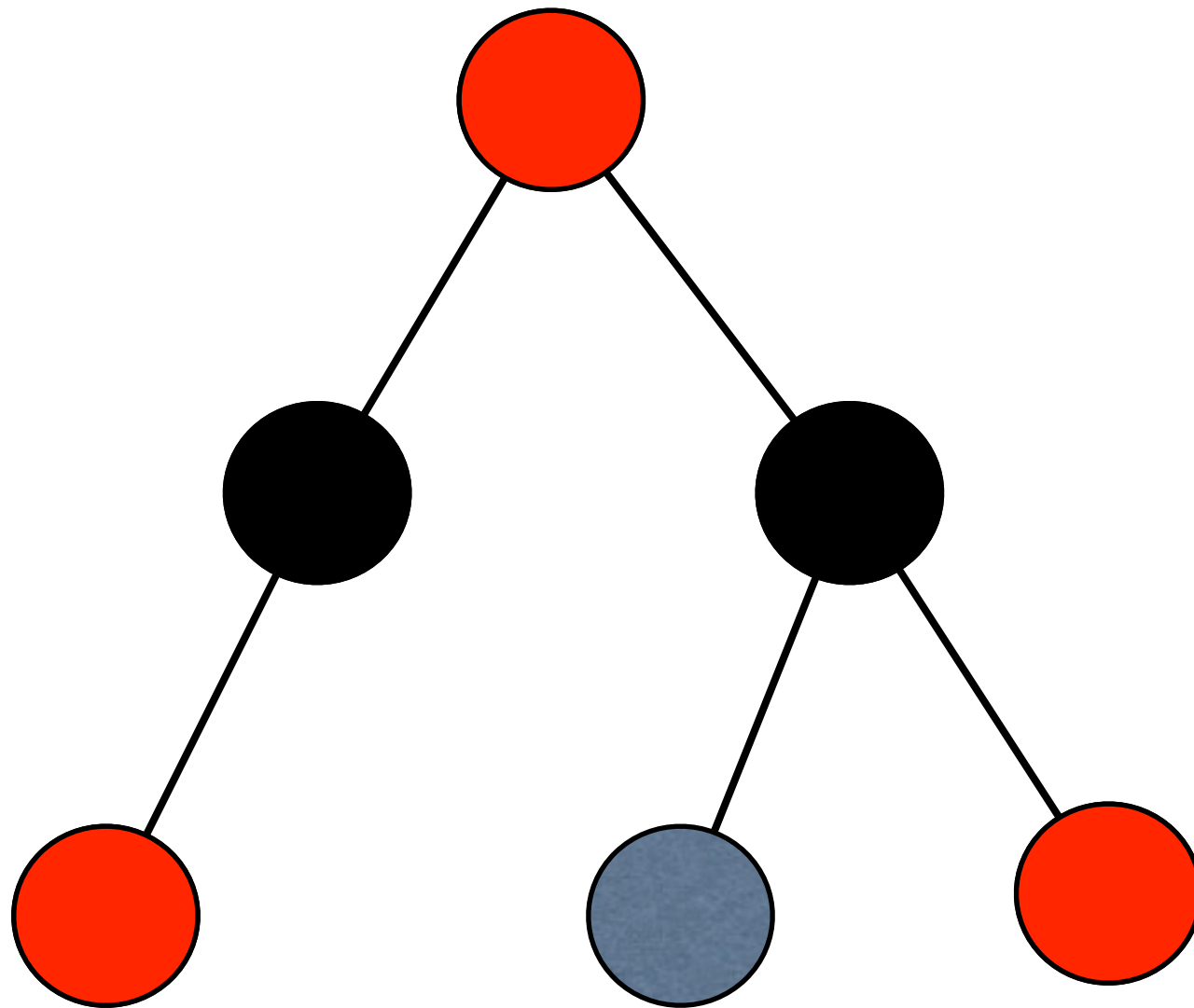
Trees binary coloring



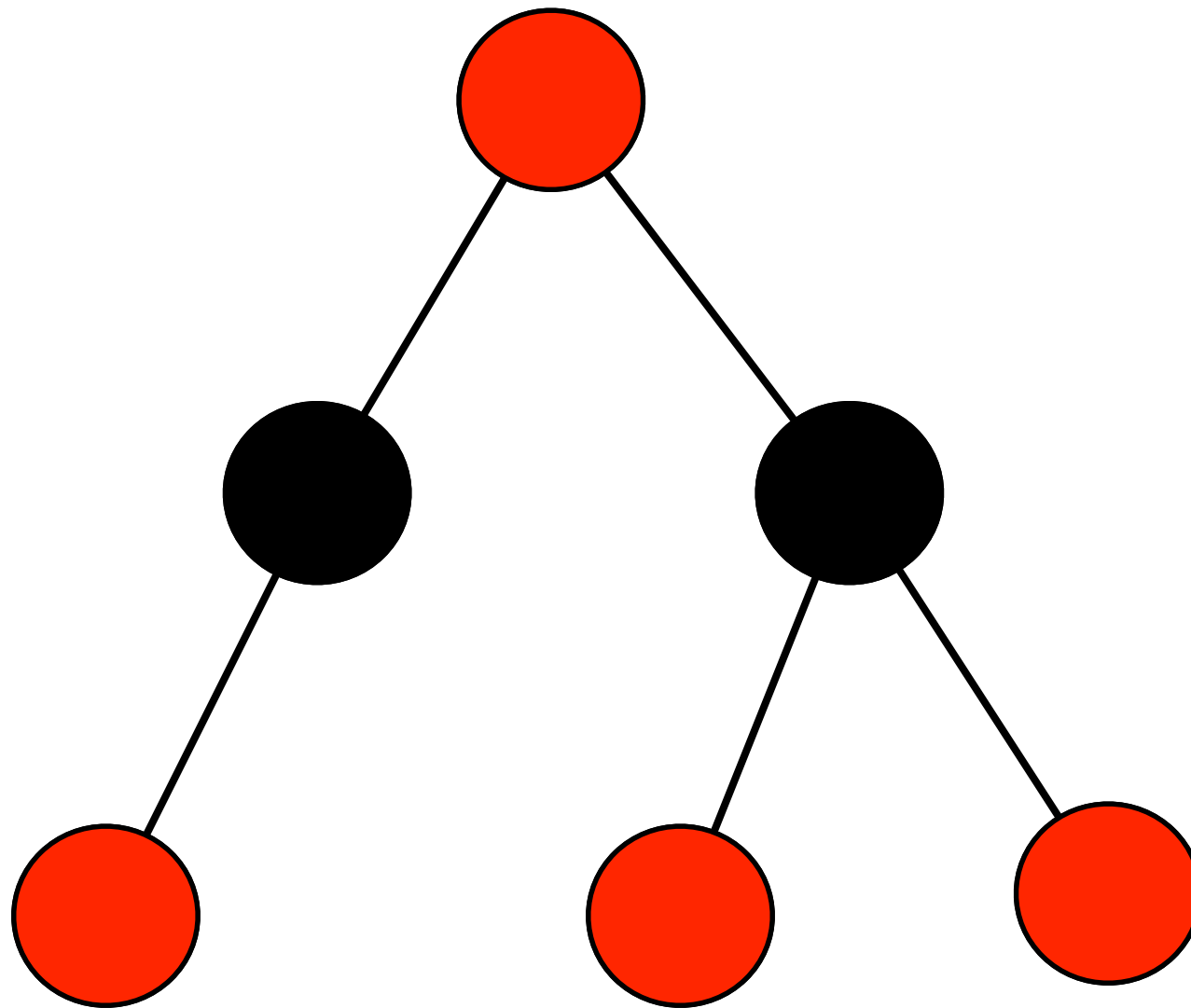
Trees binary coloring



Trees binary coloring



Trees binary coloring



Trees binary coloring

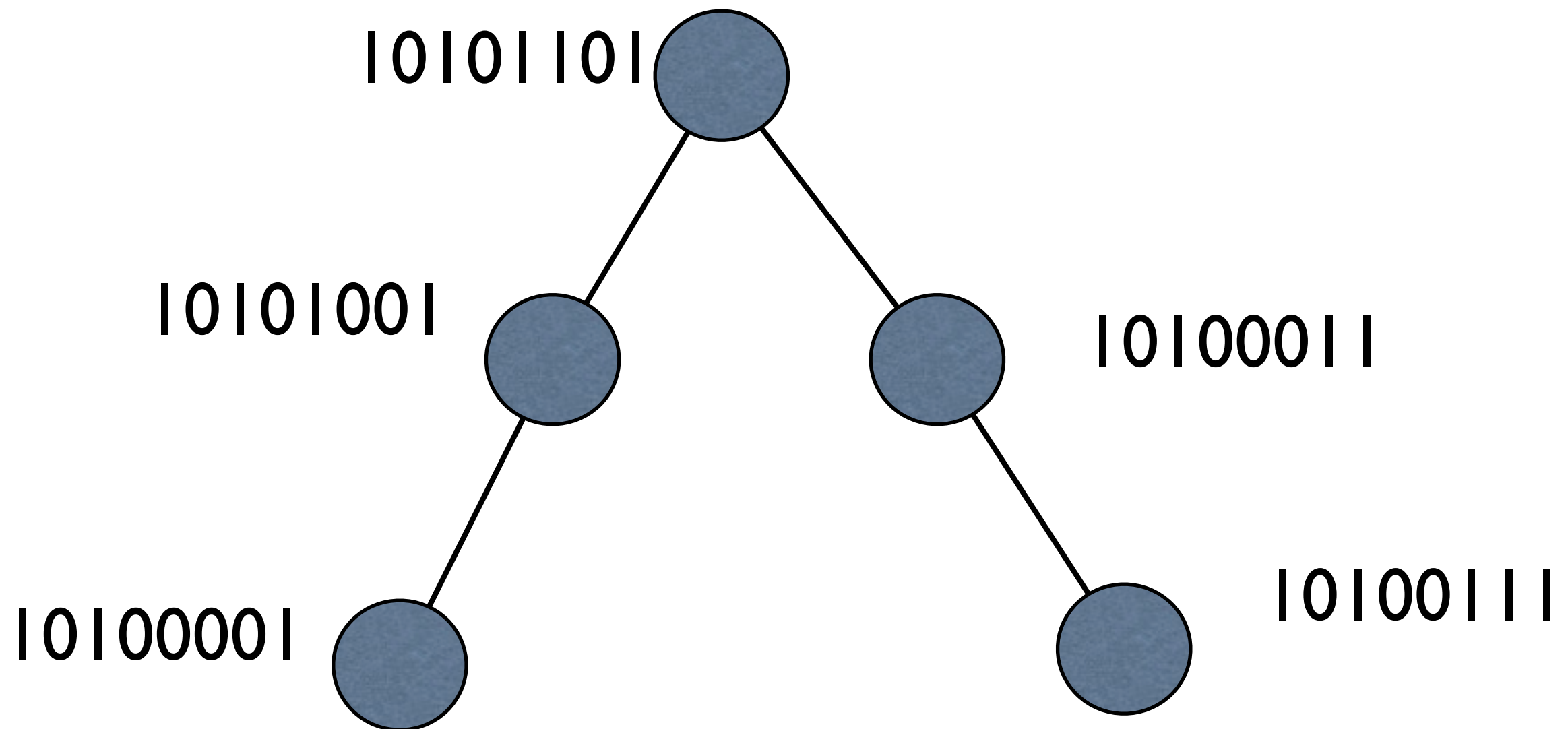
- Local or Congest ?
- Complexity
 - time
 - number of messages

Trees binary coloring

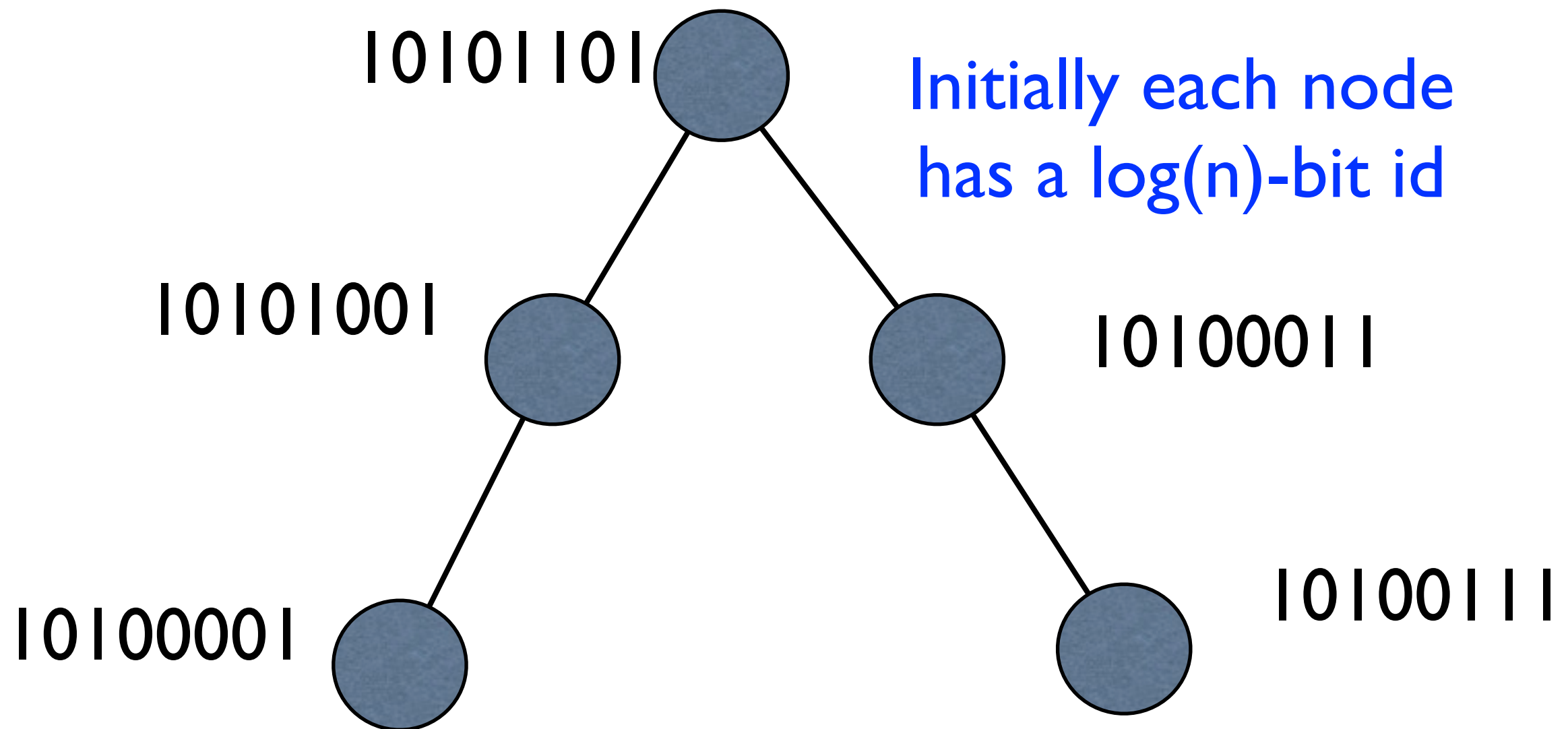
- Local or Congest ?
- Complexity
 - time
 - number of messages



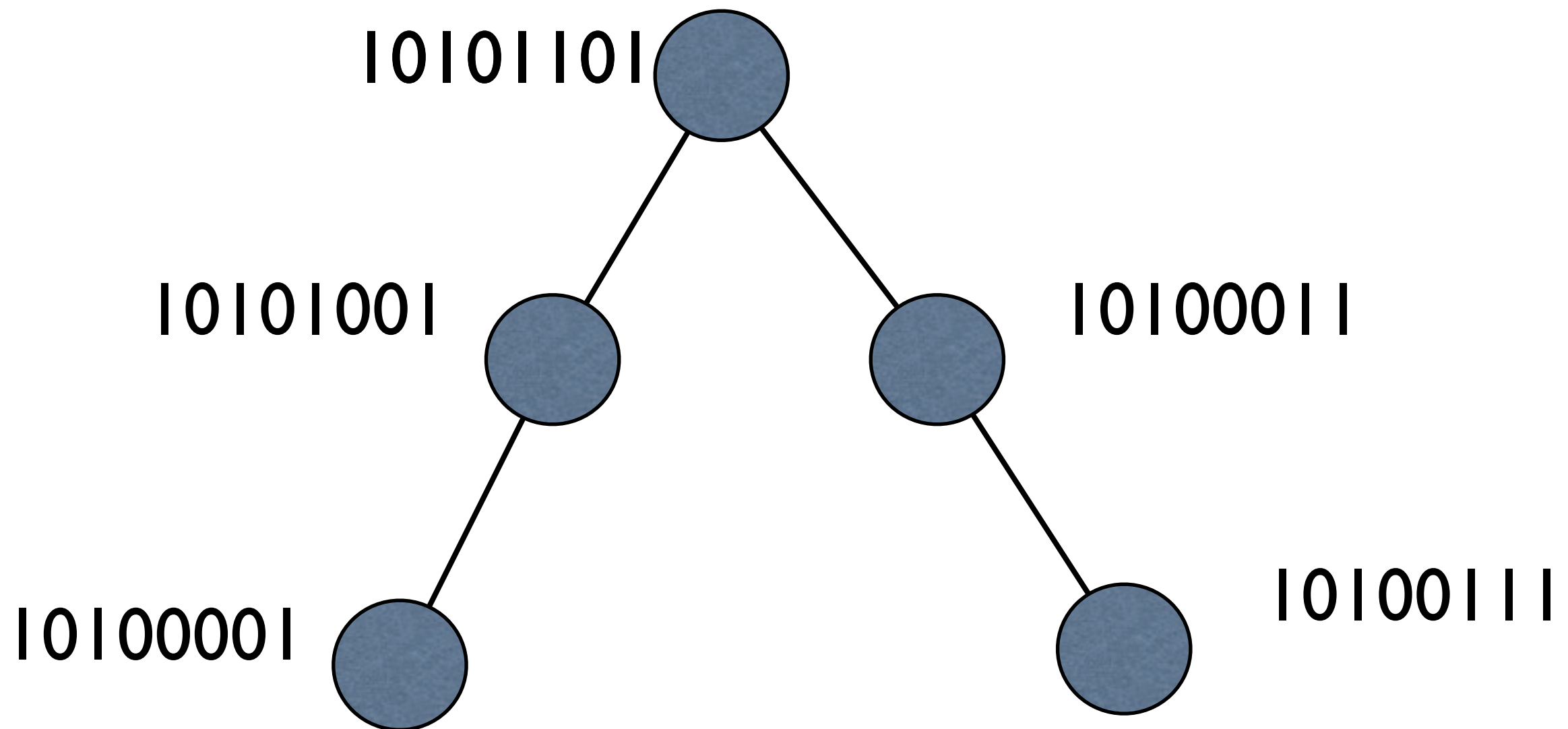
Faster tree coloring



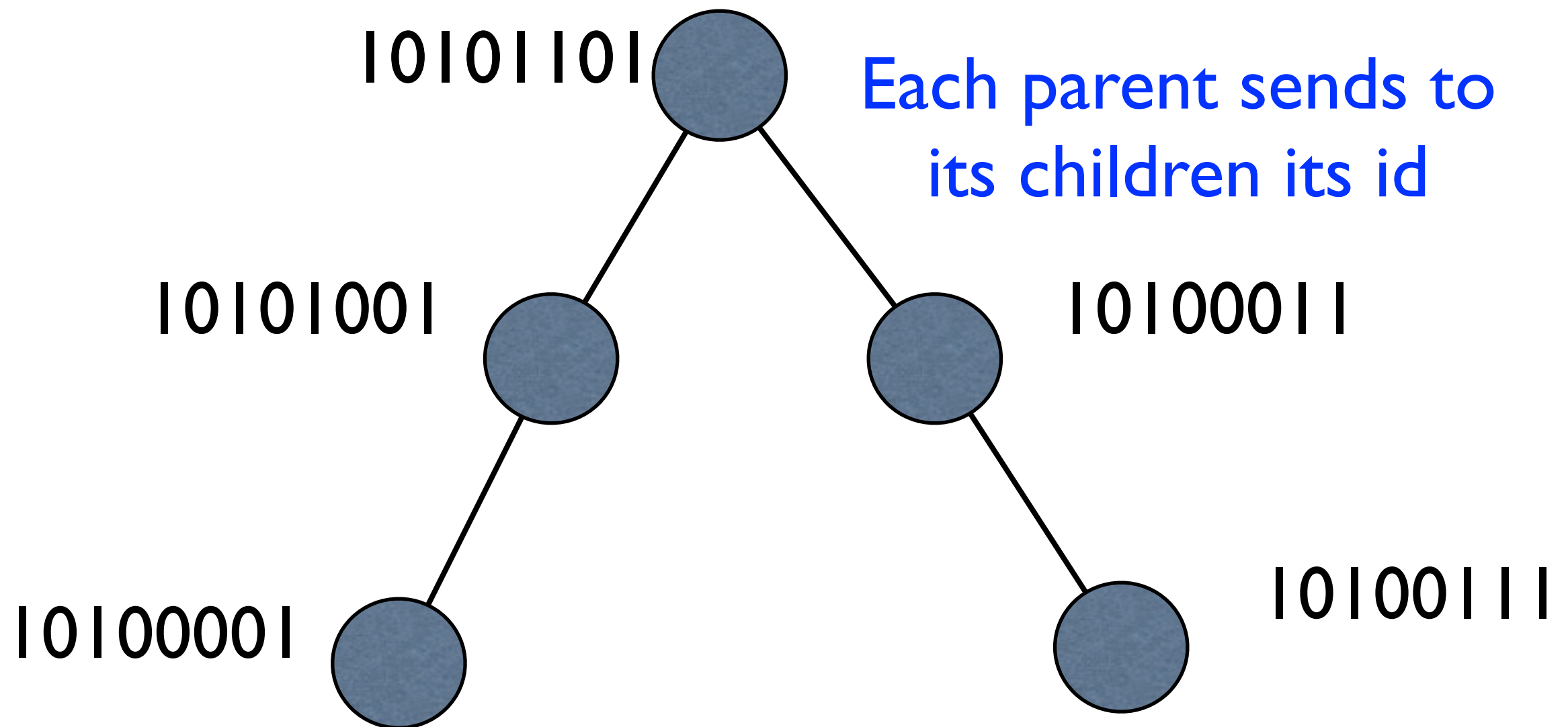
Faster tree coloring



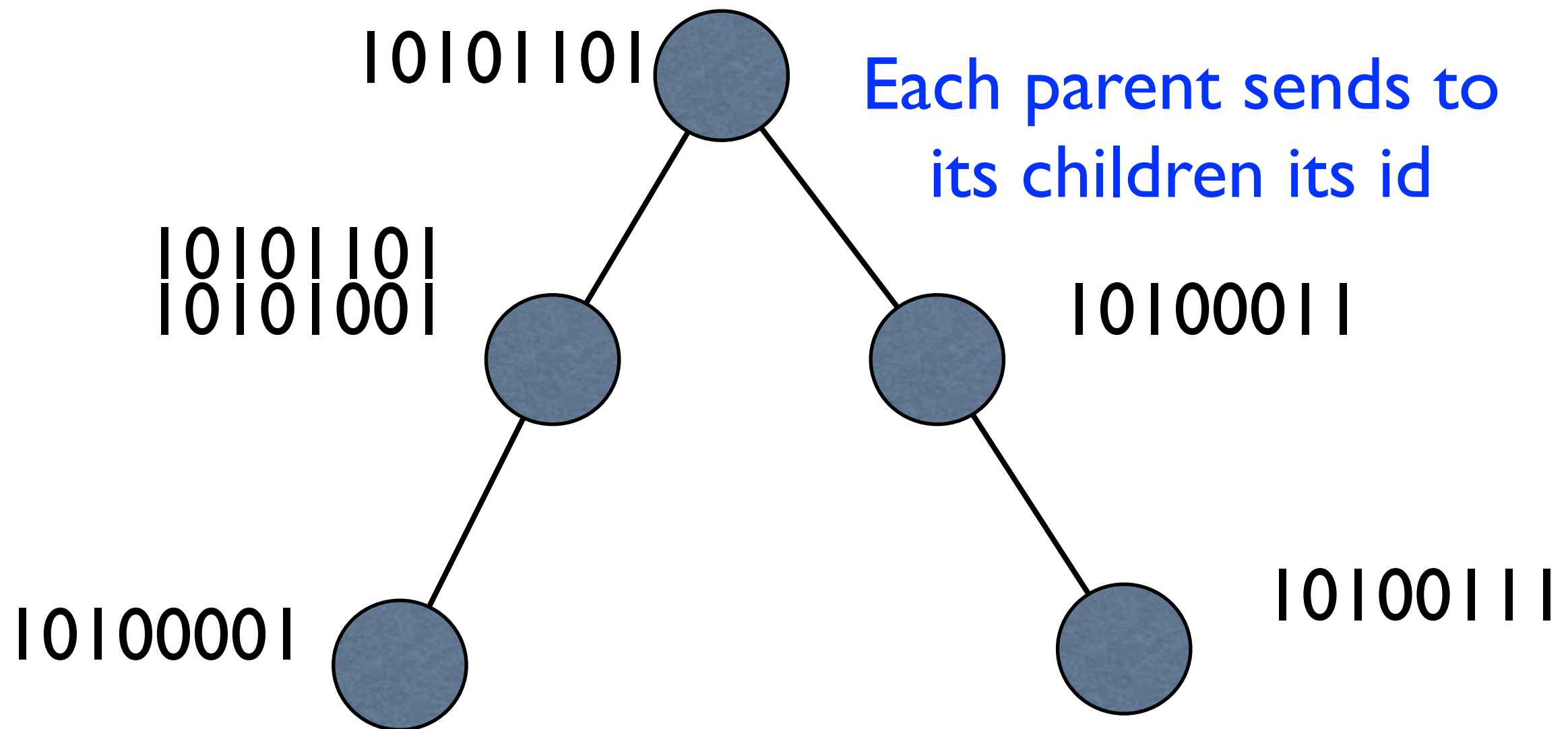
Faster tree coloring



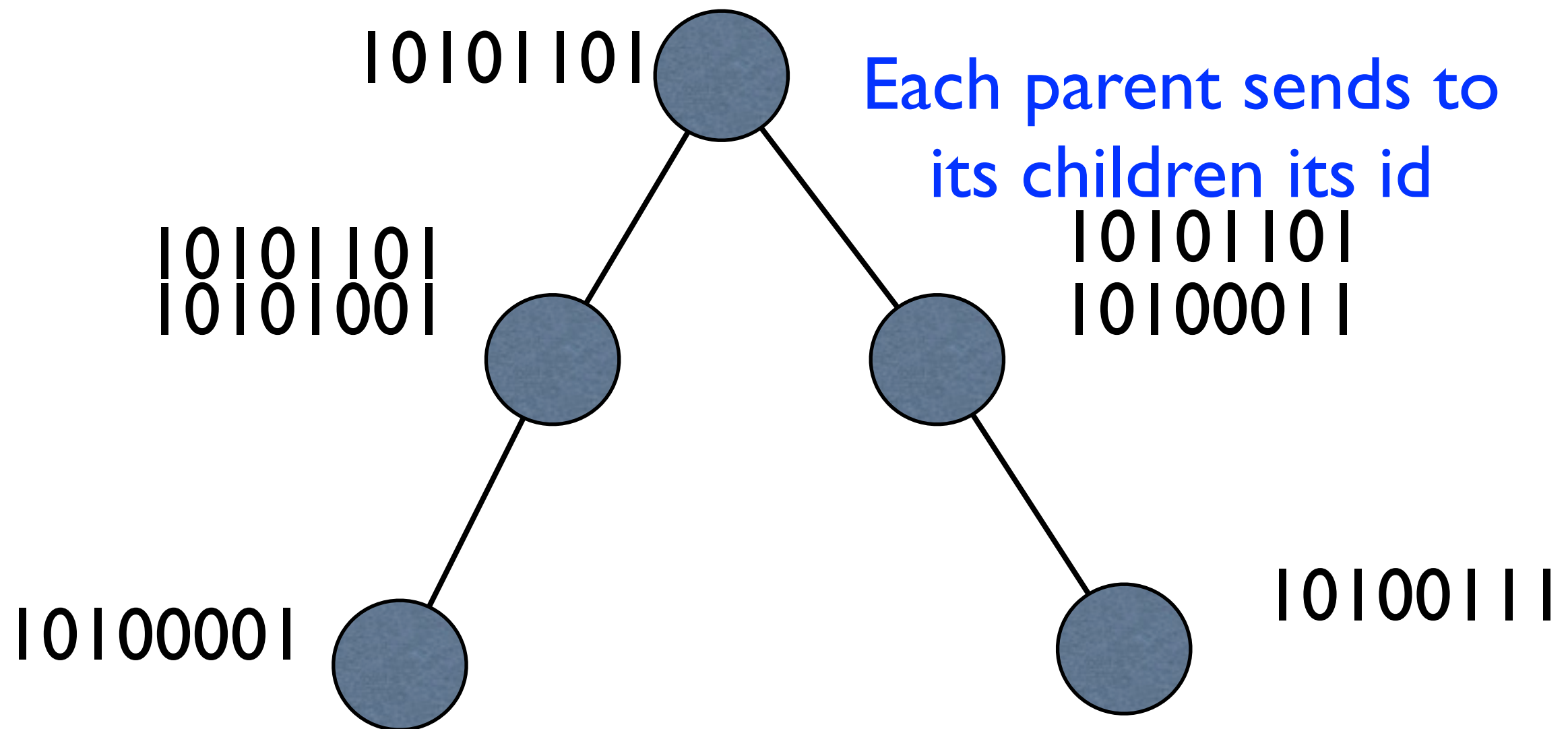
Faster tree coloring



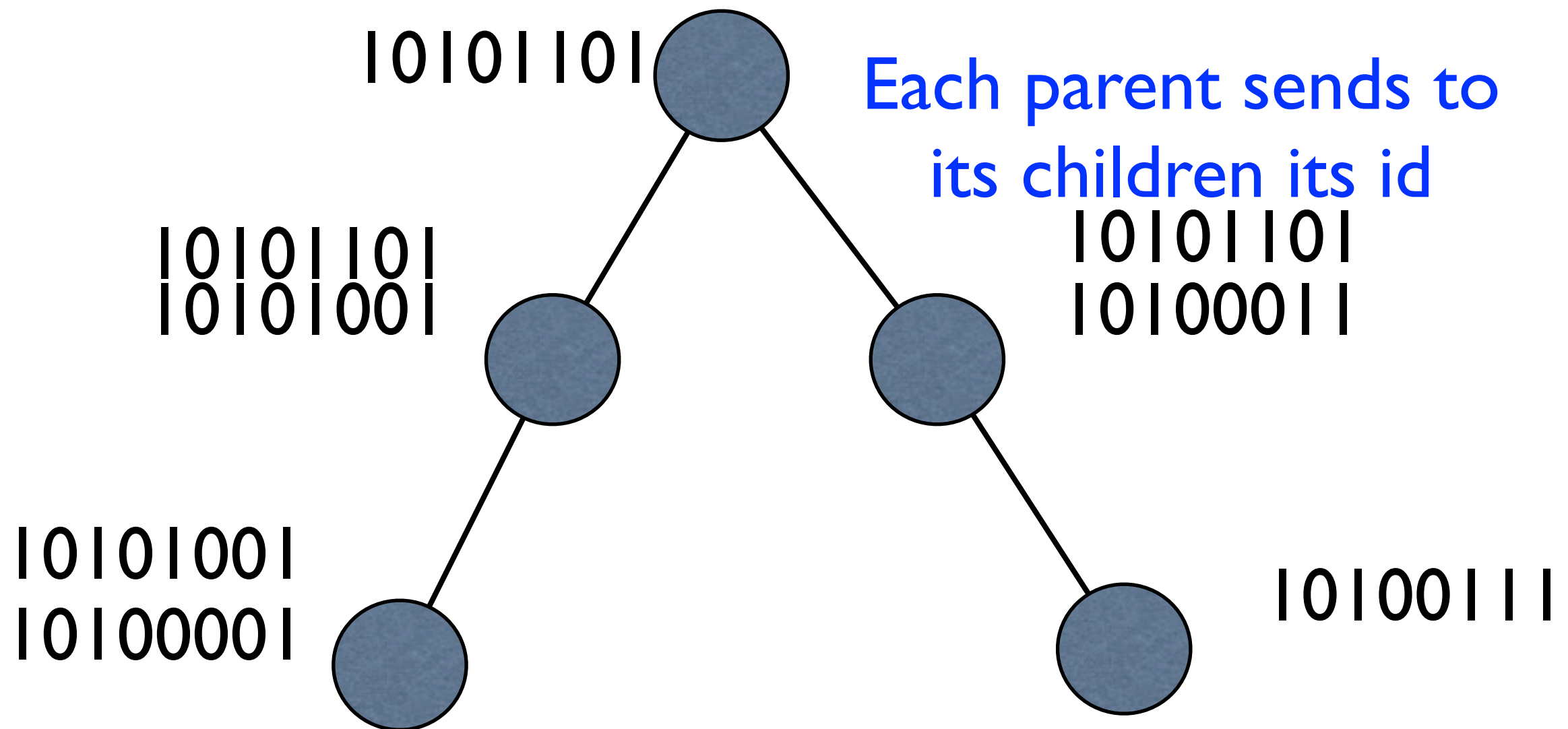
Faster tree coloring



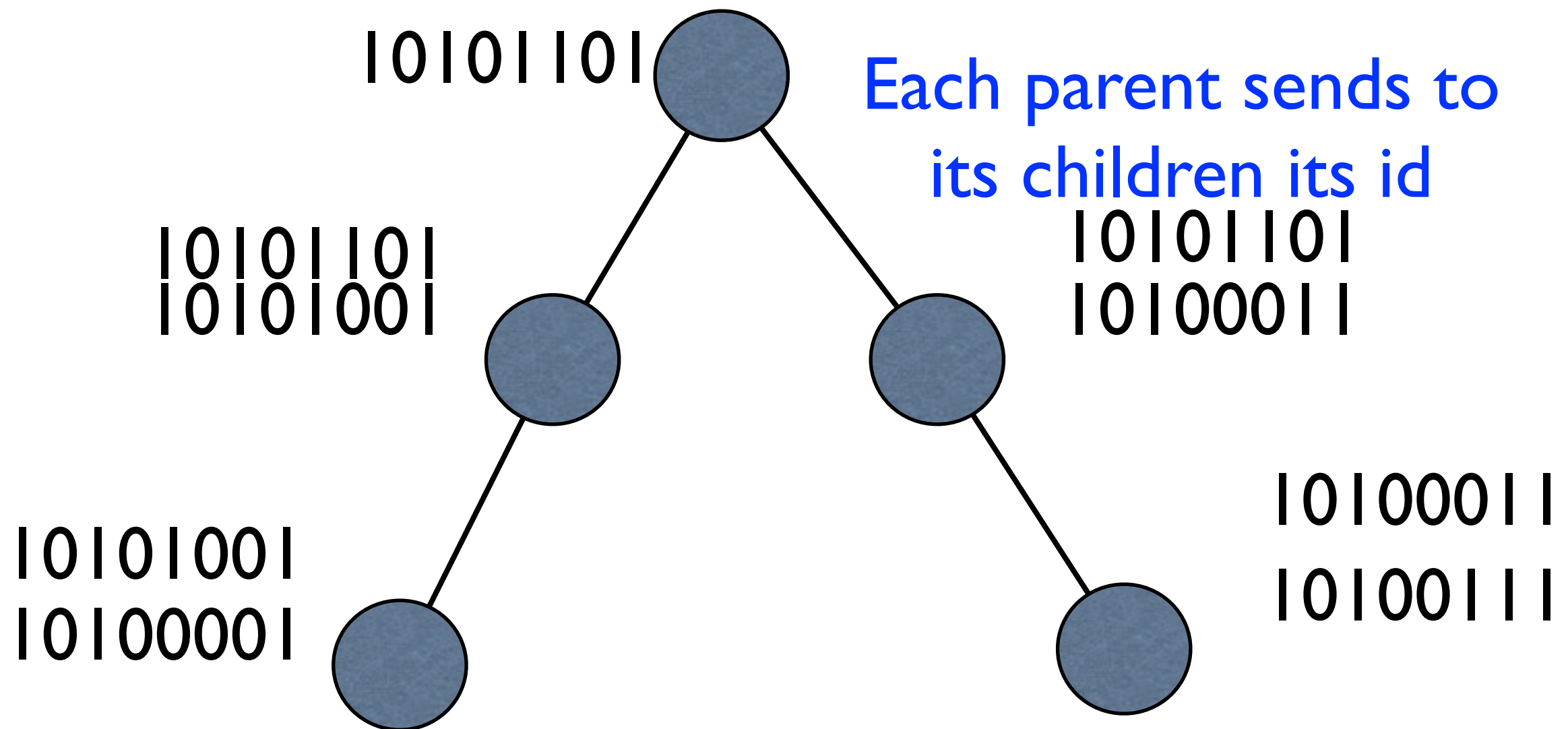
Faster tree coloring



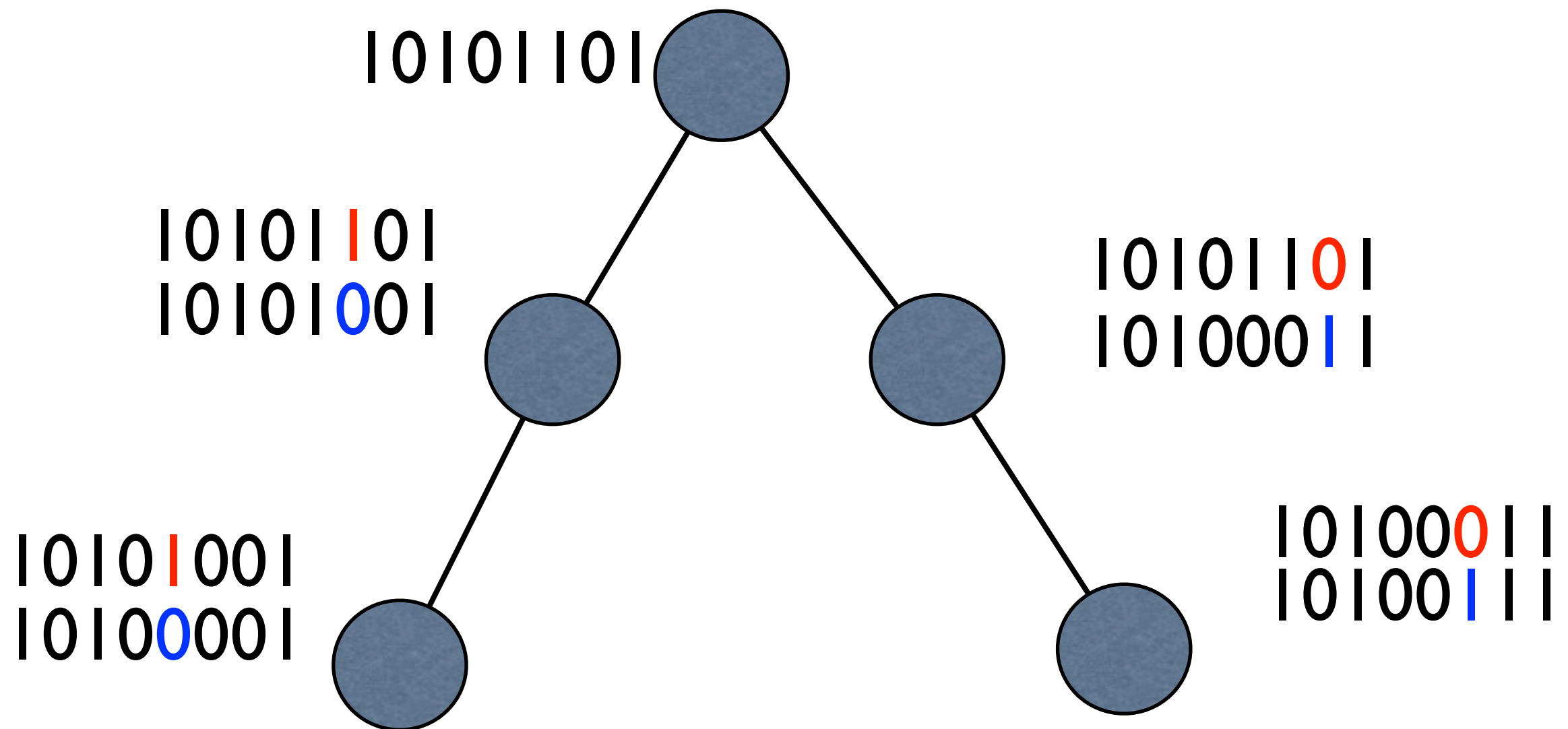
Faster tree coloring



Faster tree coloring

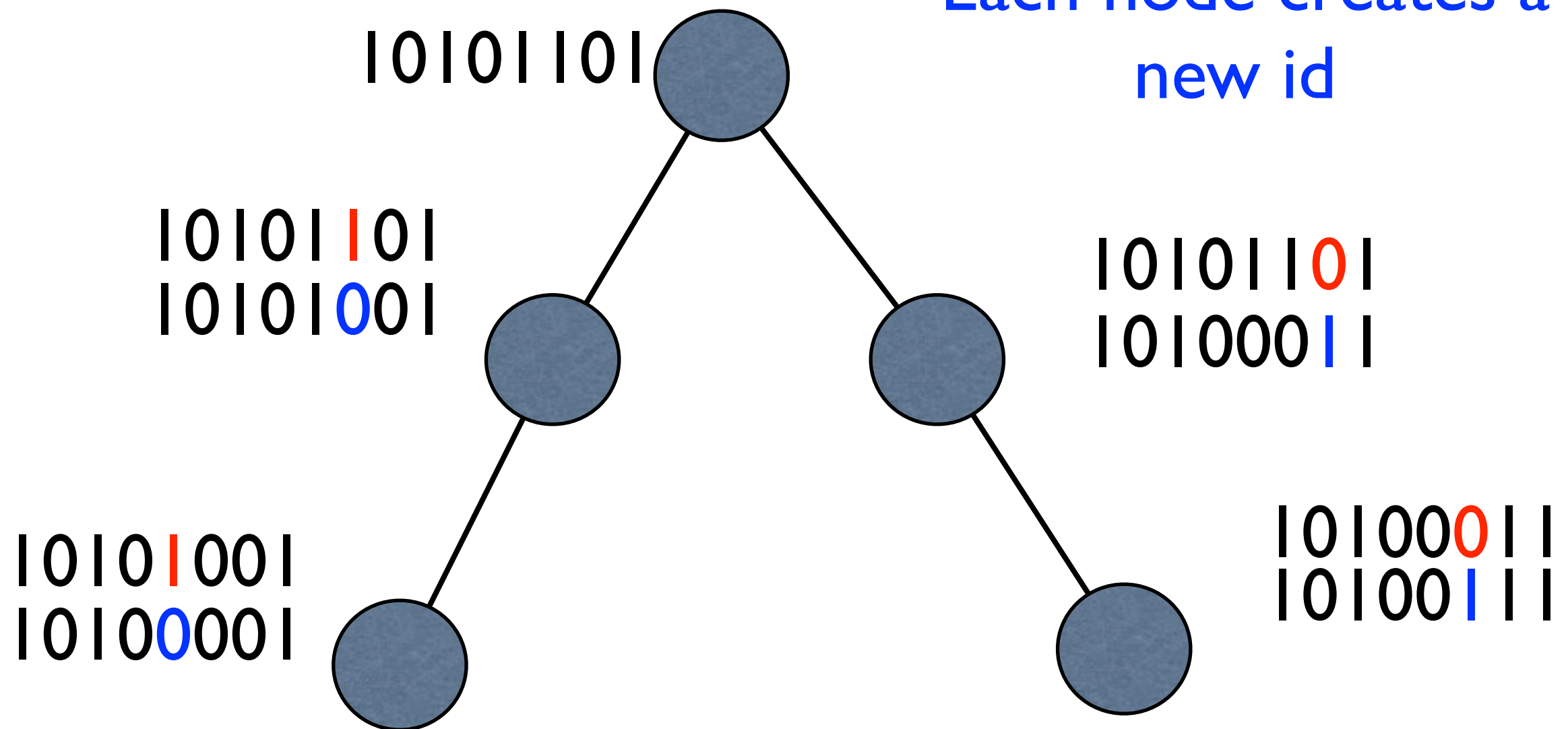


Faster tree coloring



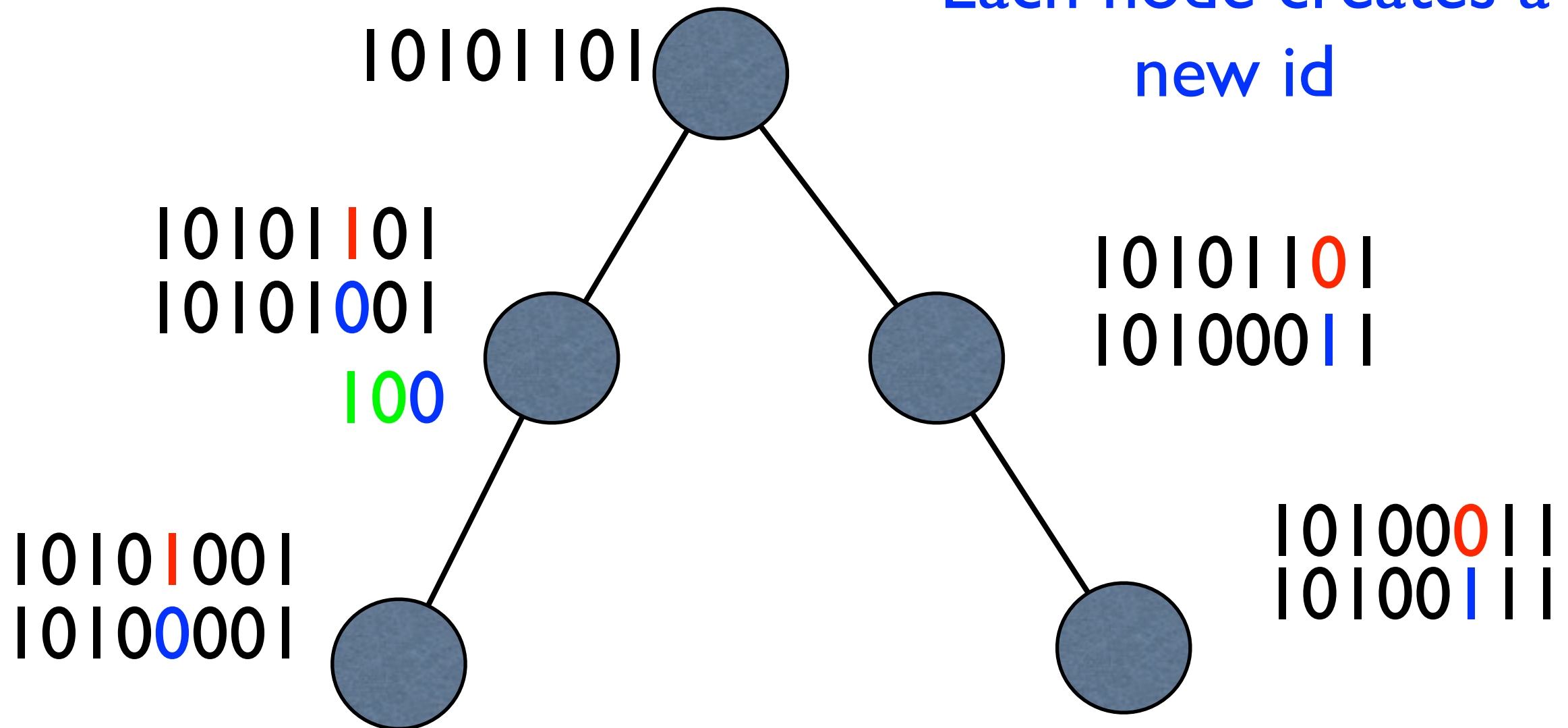
Faster tree coloring

Each node creates a
new id



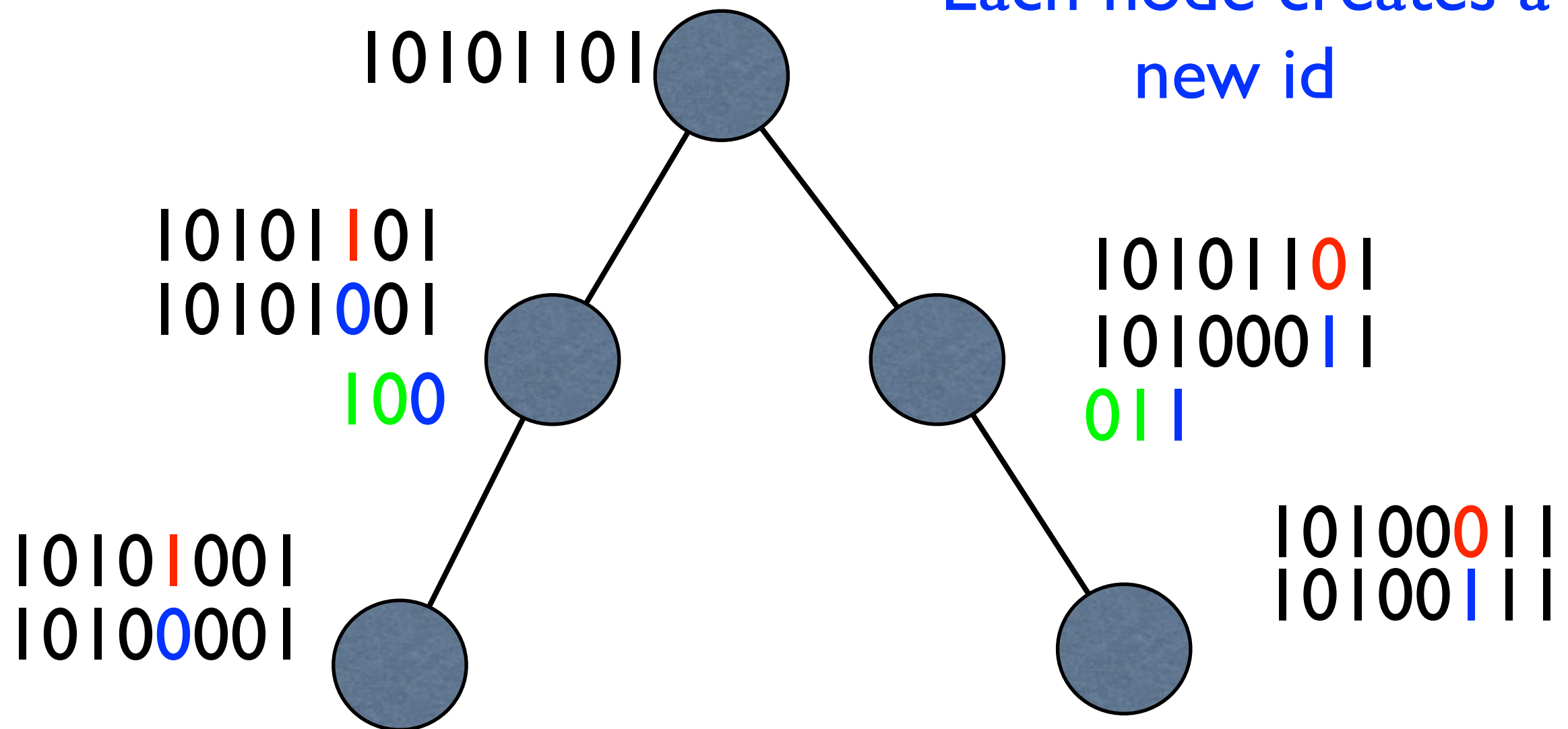
Faster tree coloring

Each node creates a
new id



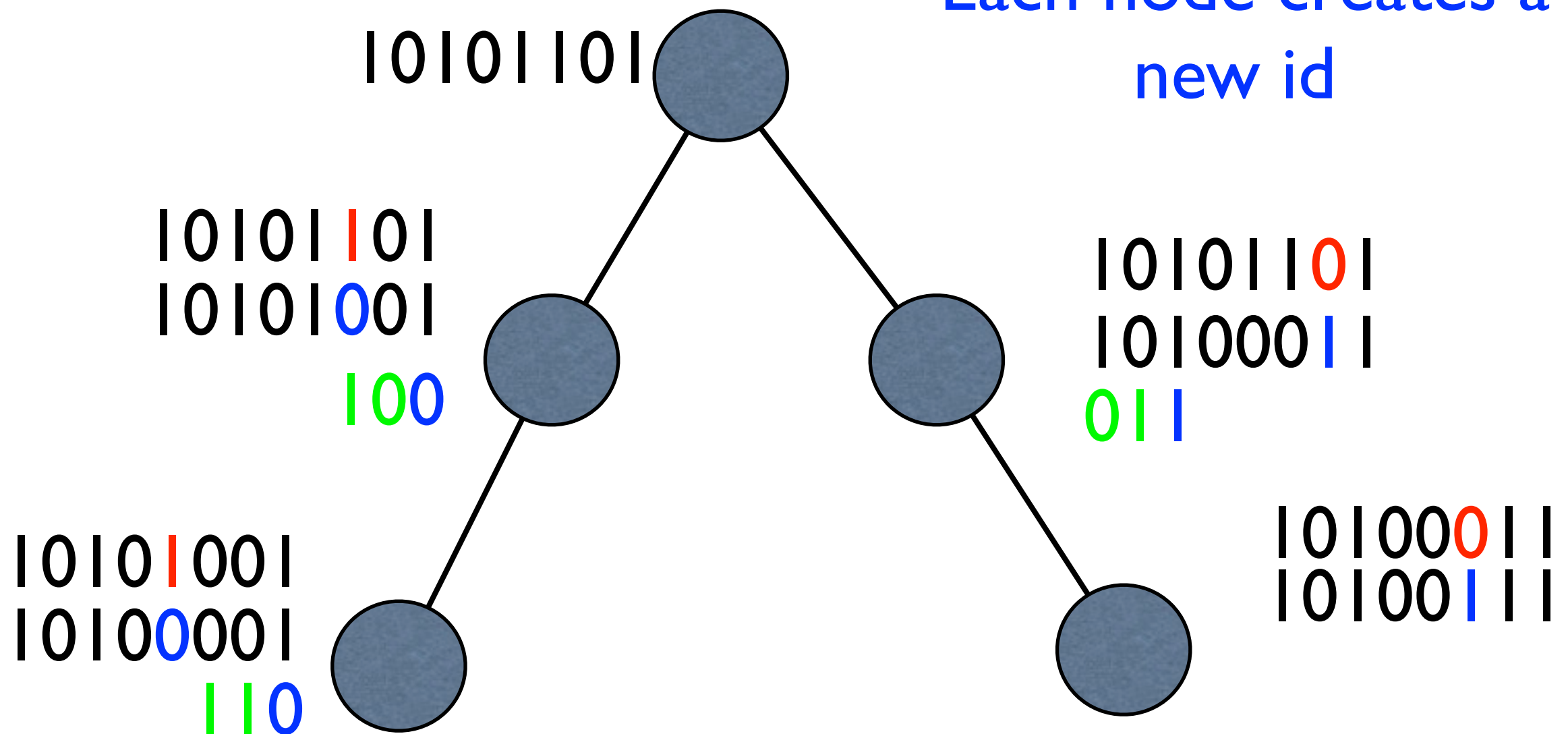
Faster tree coloring

Each node creates a
new id



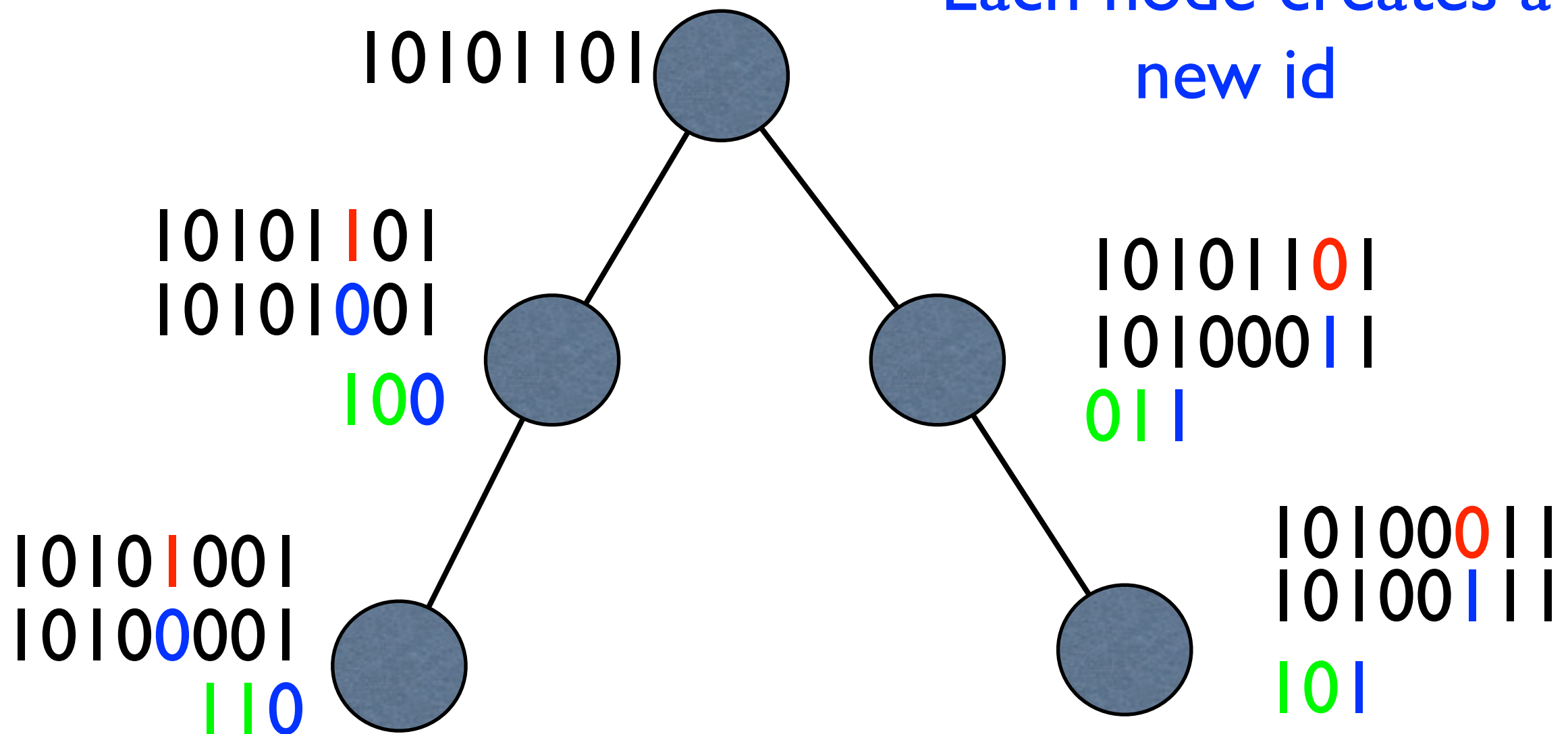
Faster tree coloring

Each node creates a
new id



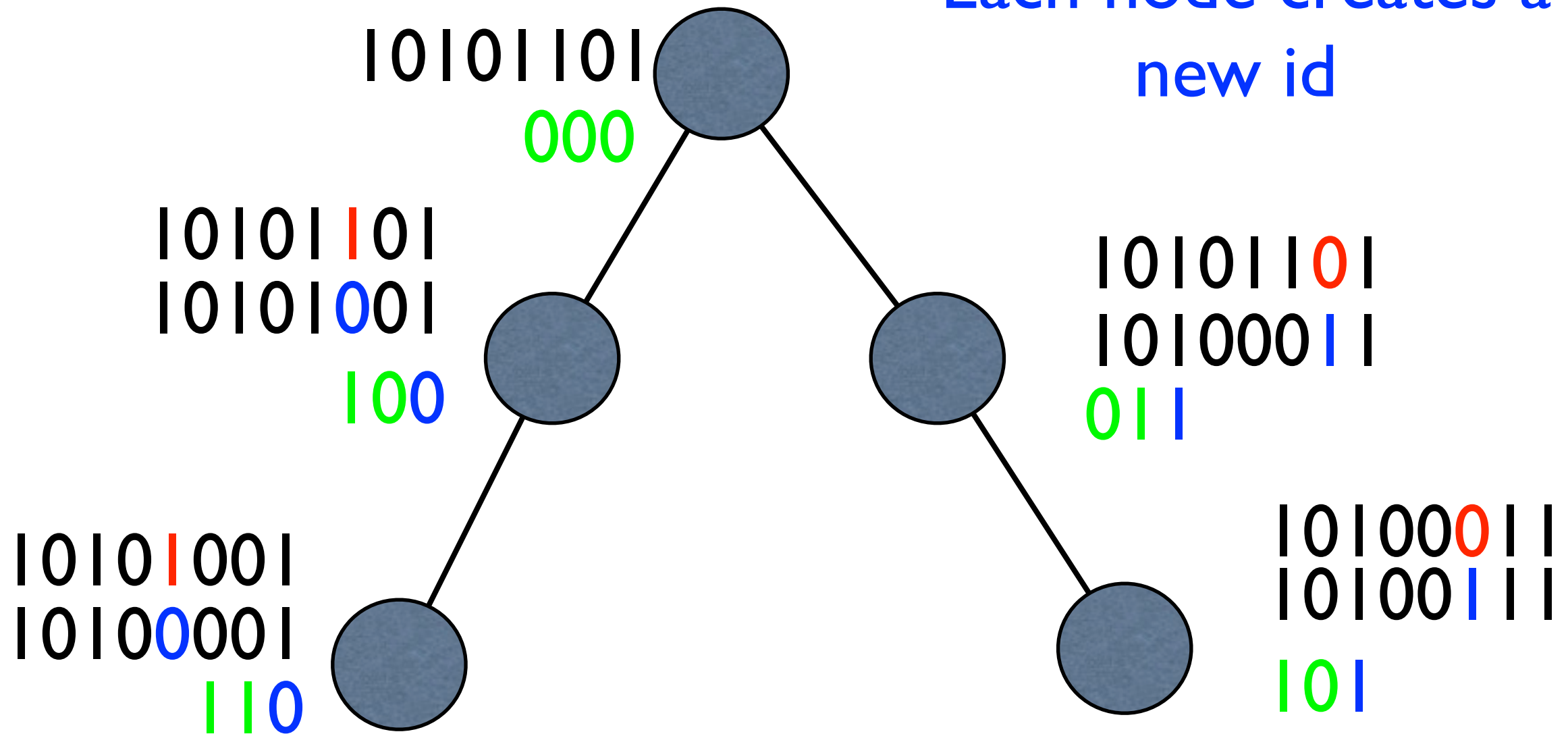
Faster tree coloring

Each node creates a
new id

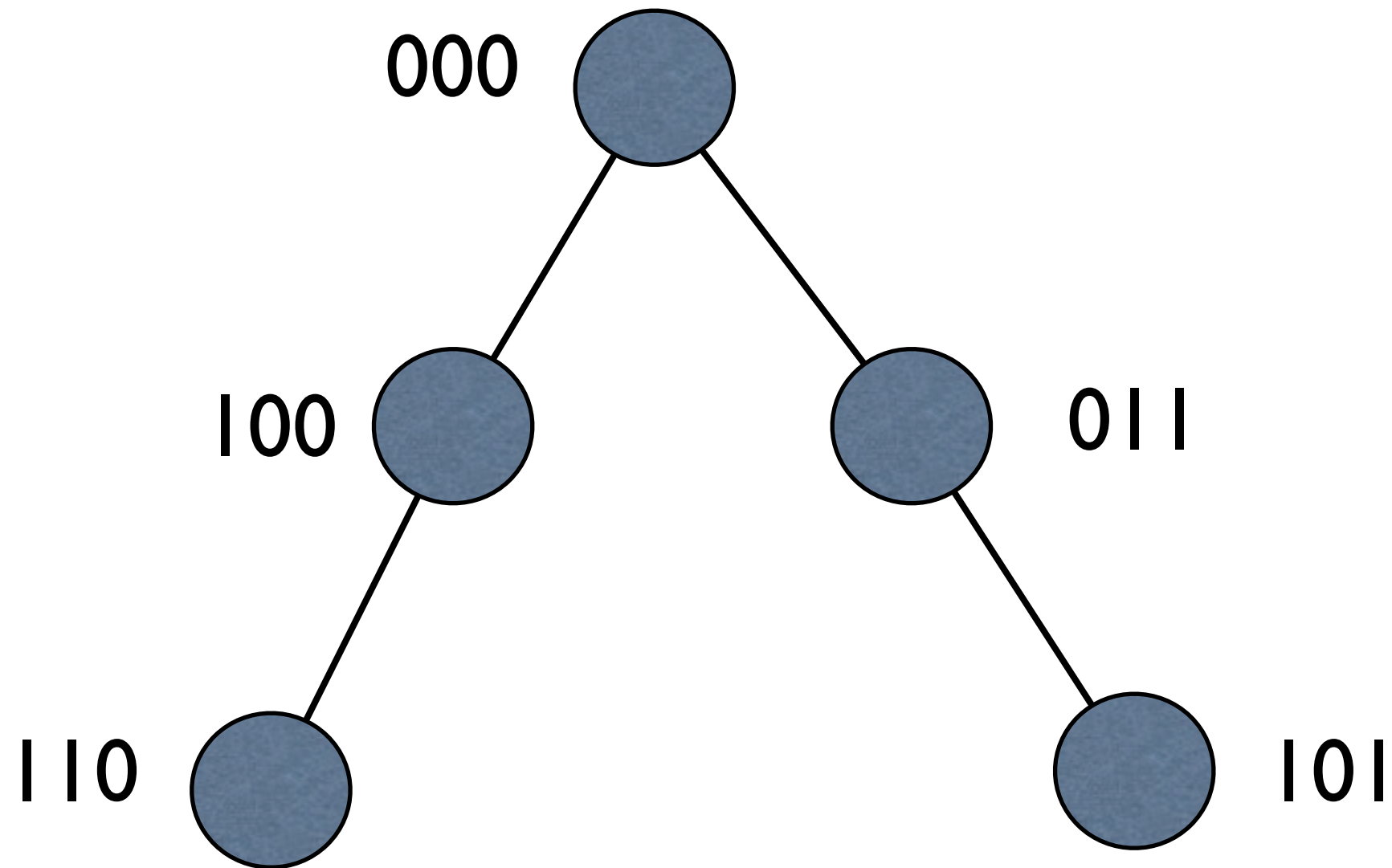


Faster tree coloring

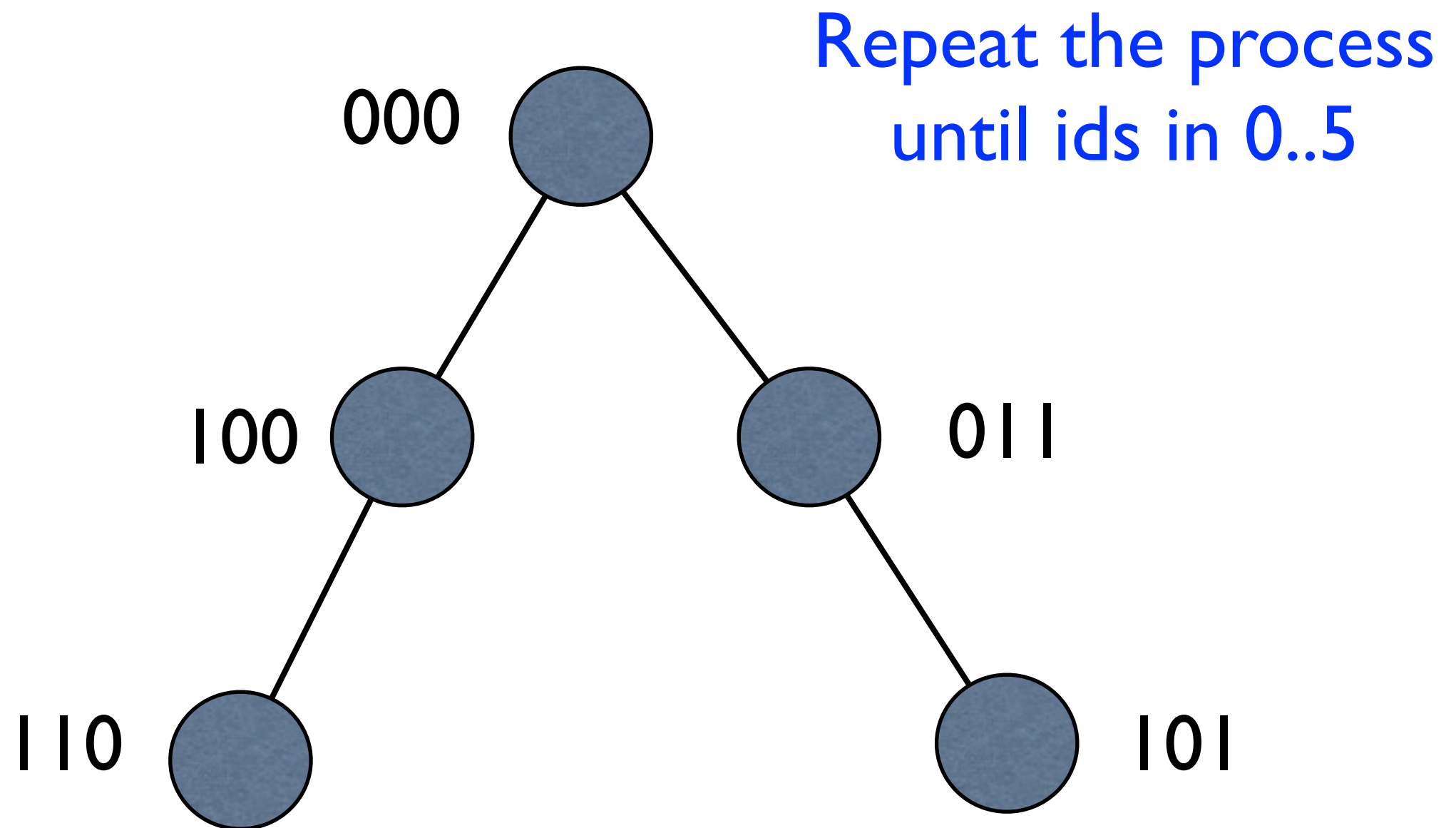
Each node creates a
new id



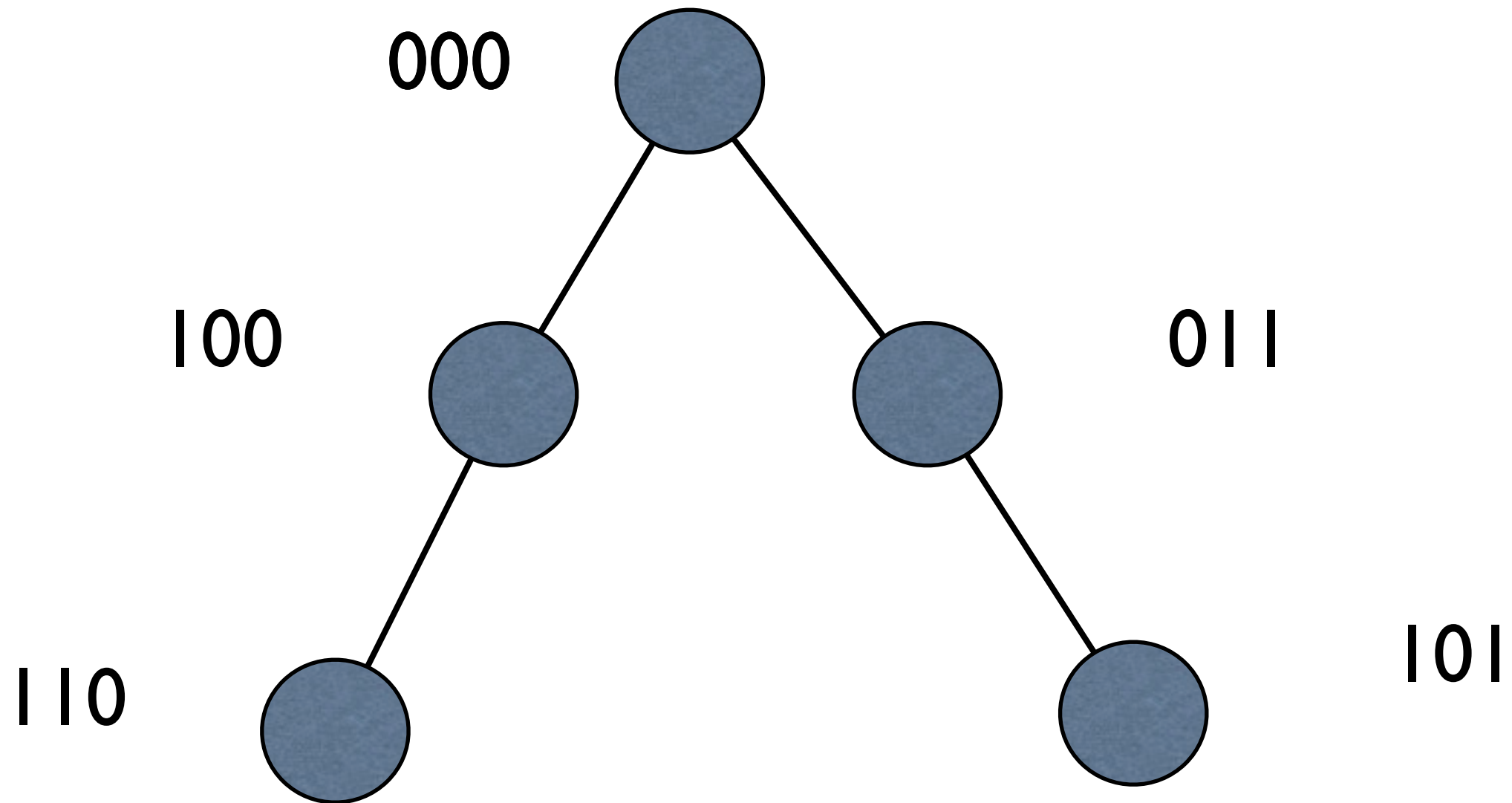
Faster tree coloring



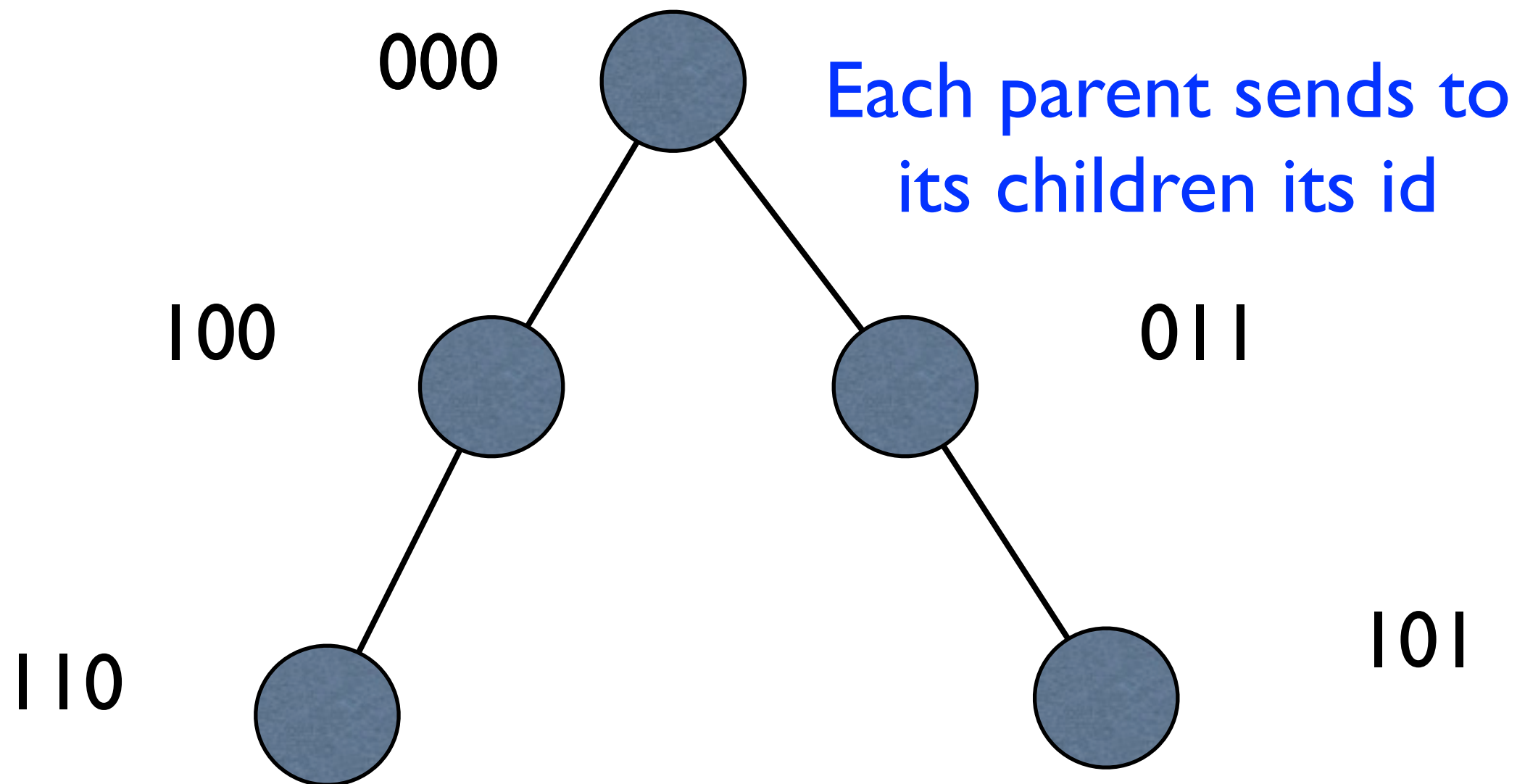
Faster tree coloring



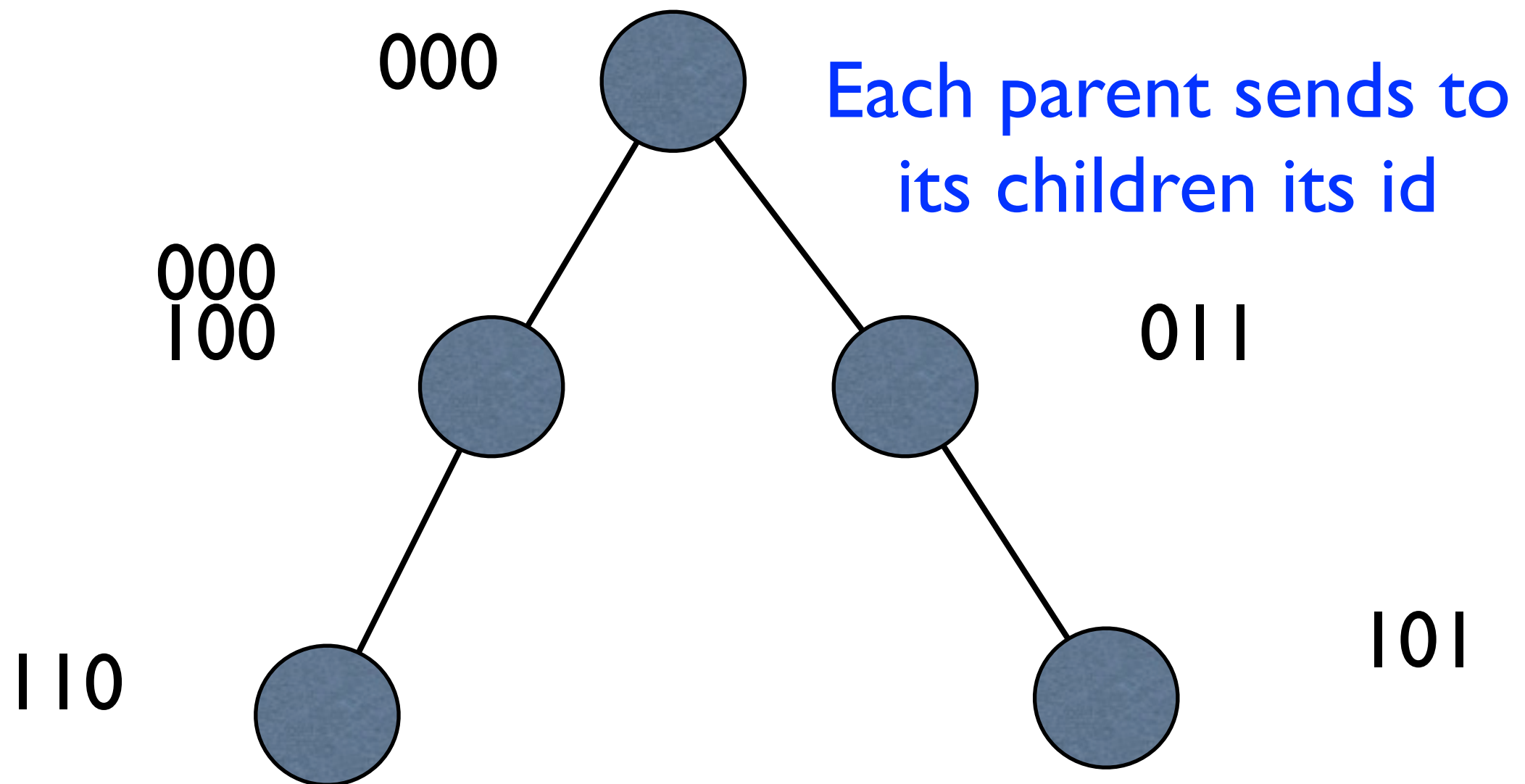
Faster tree coloring



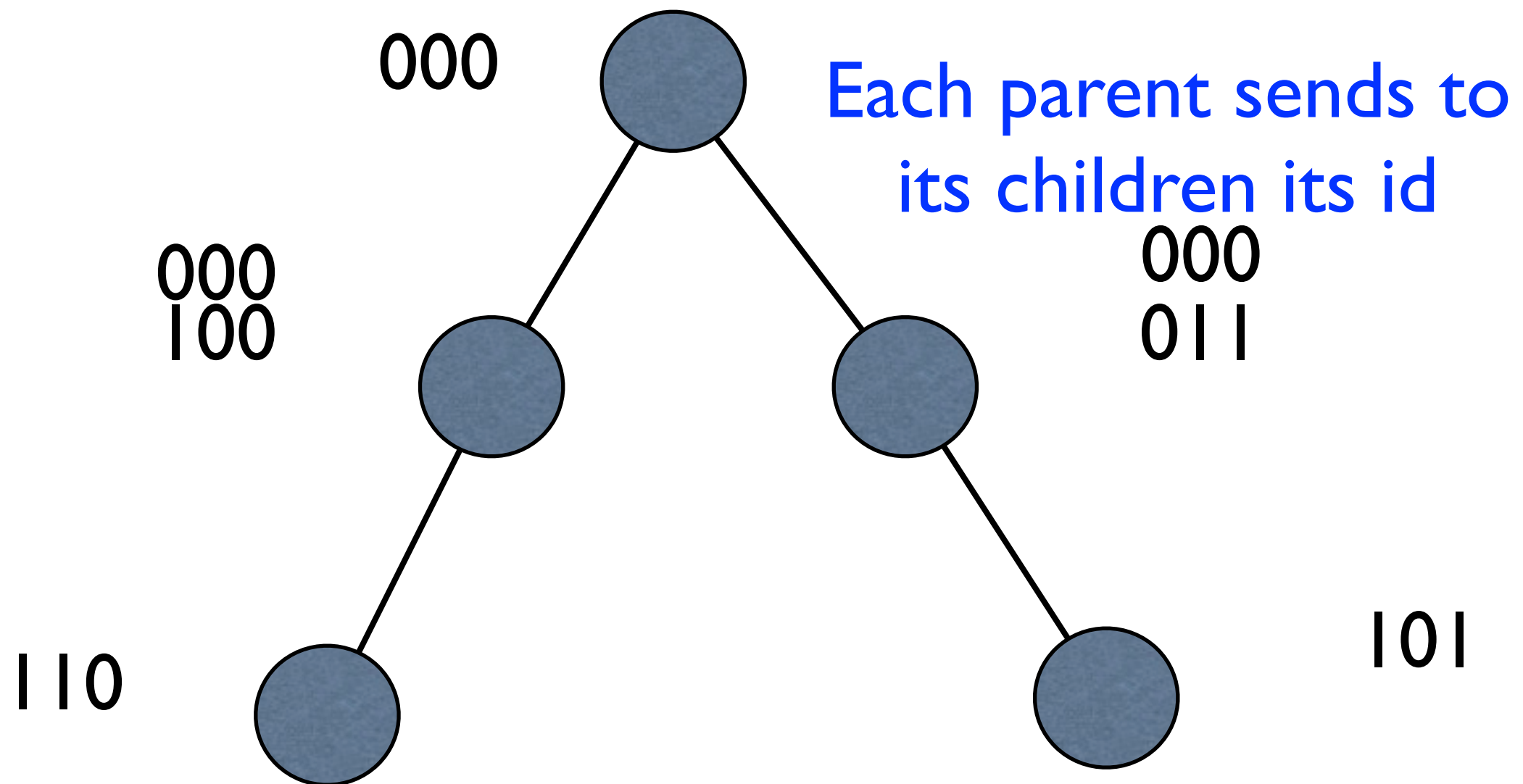
Faster tree coloring



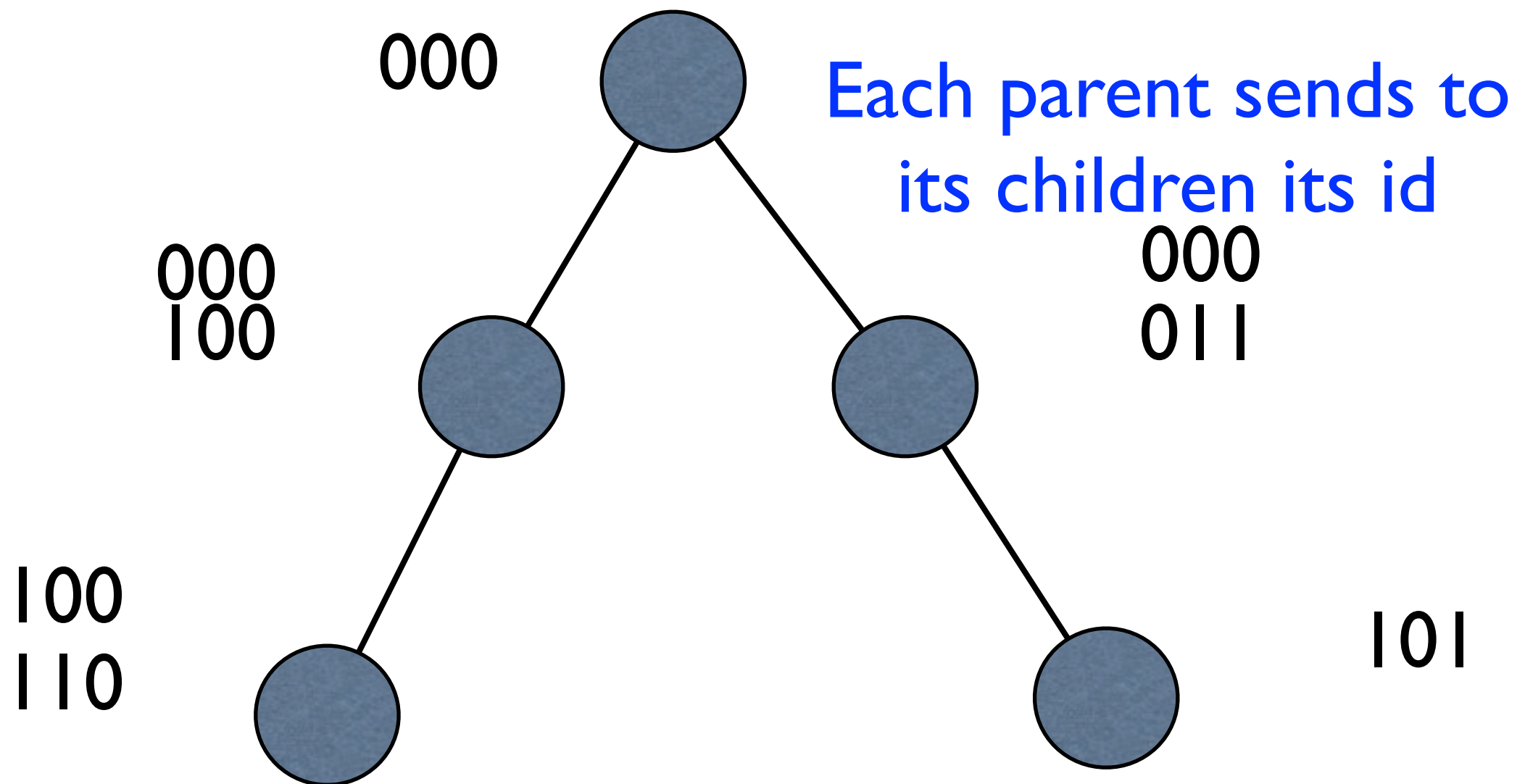
Faster tree coloring



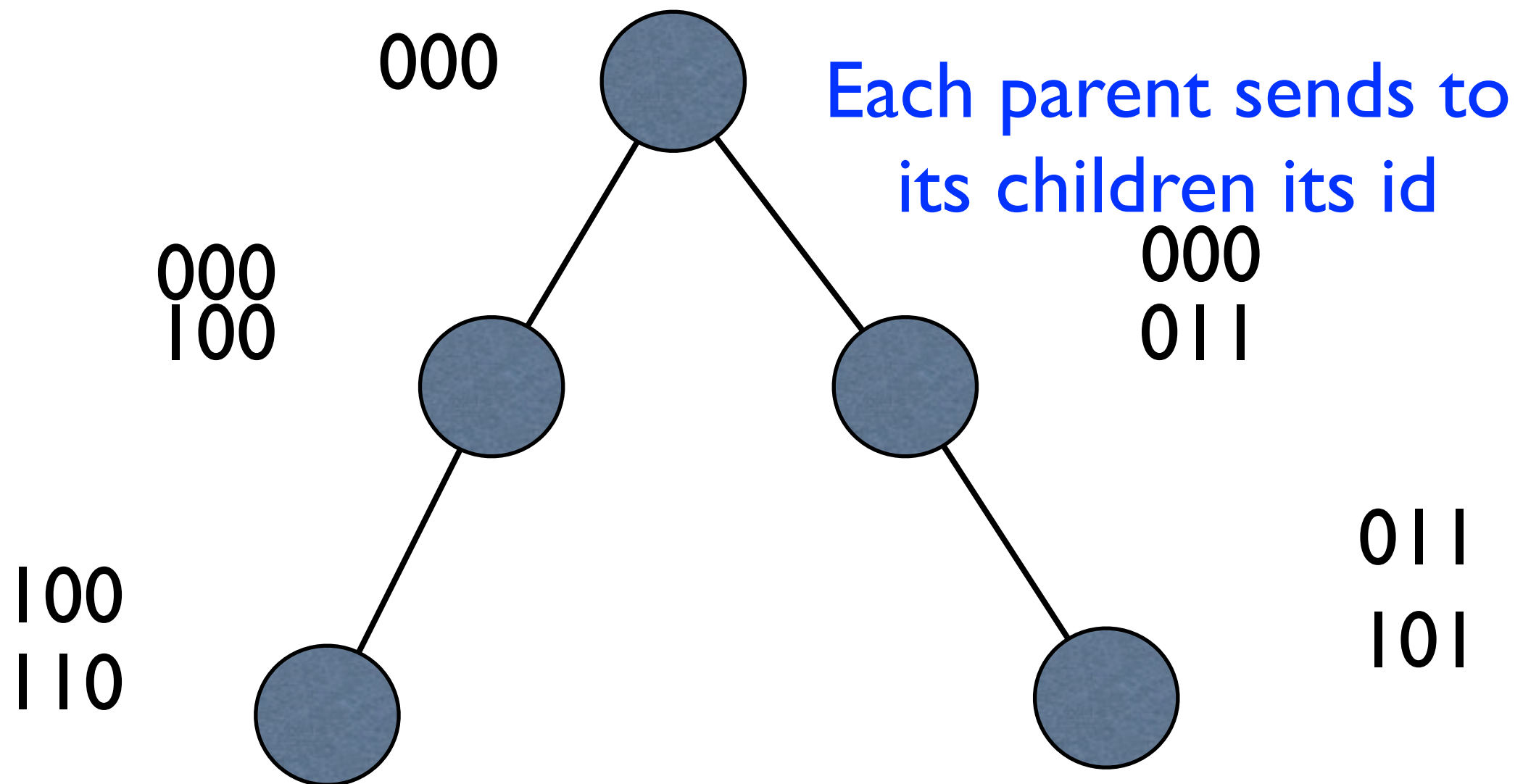
Faster tree coloring



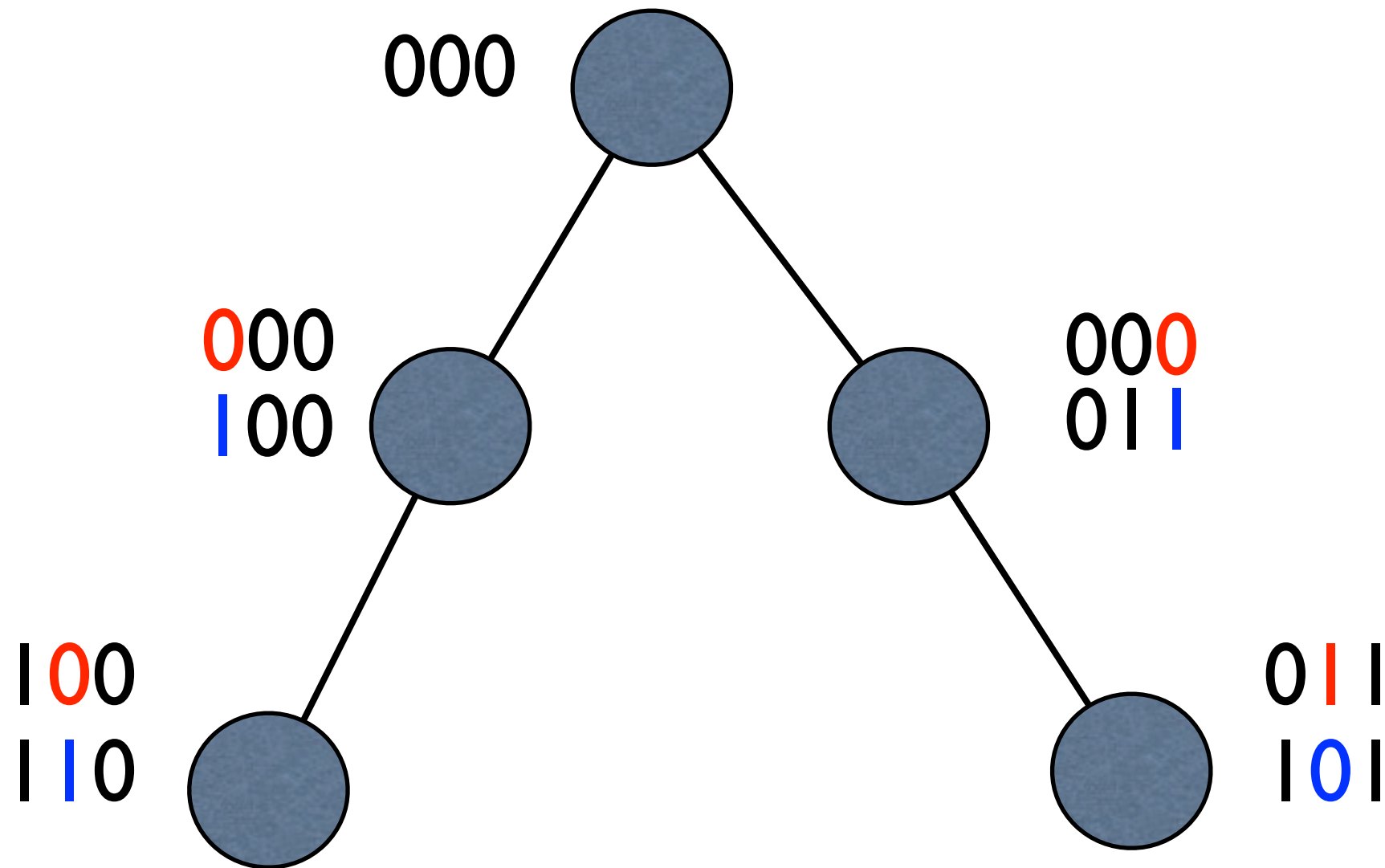
Faster tree coloring



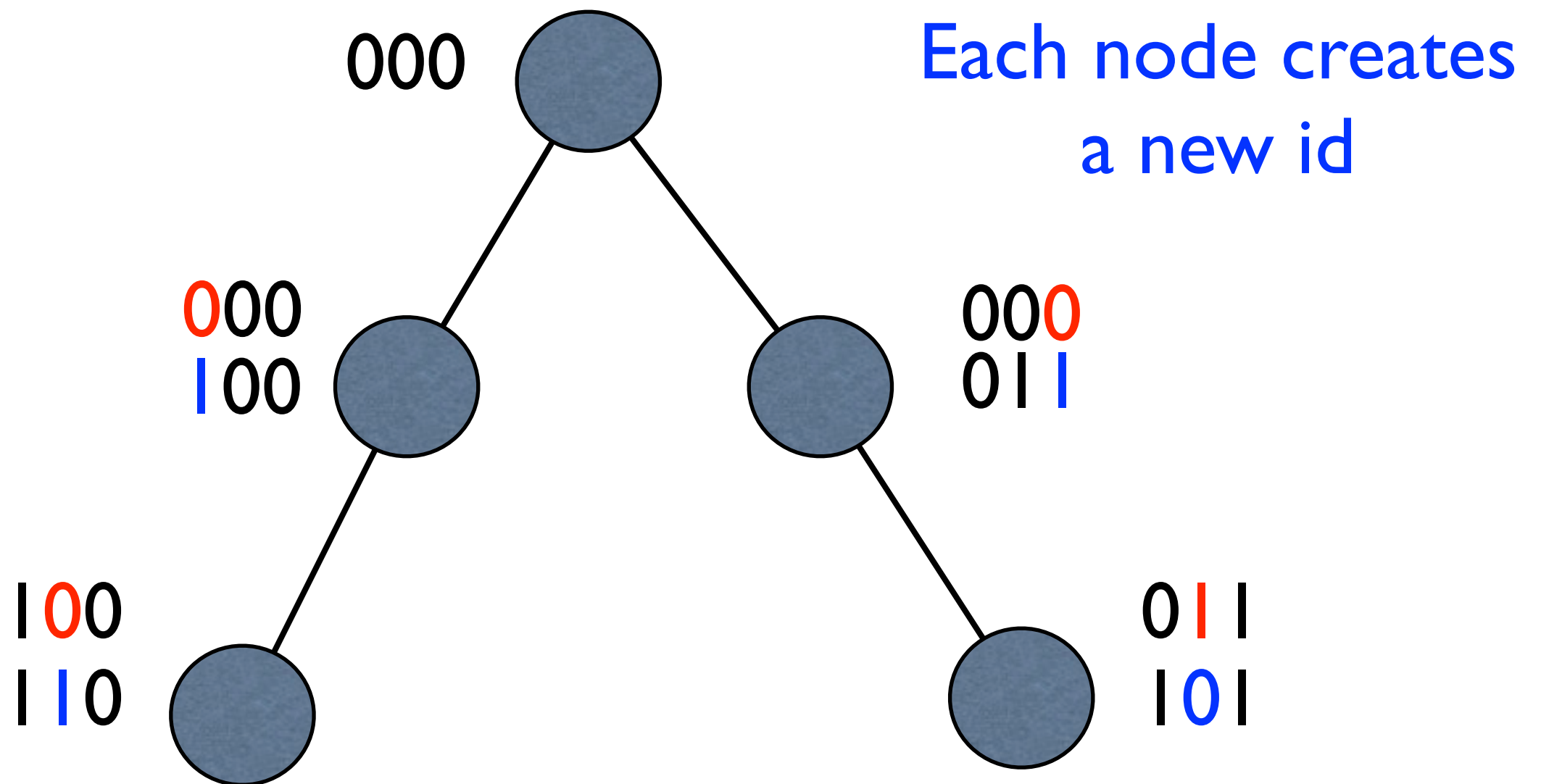
Faster tree coloring



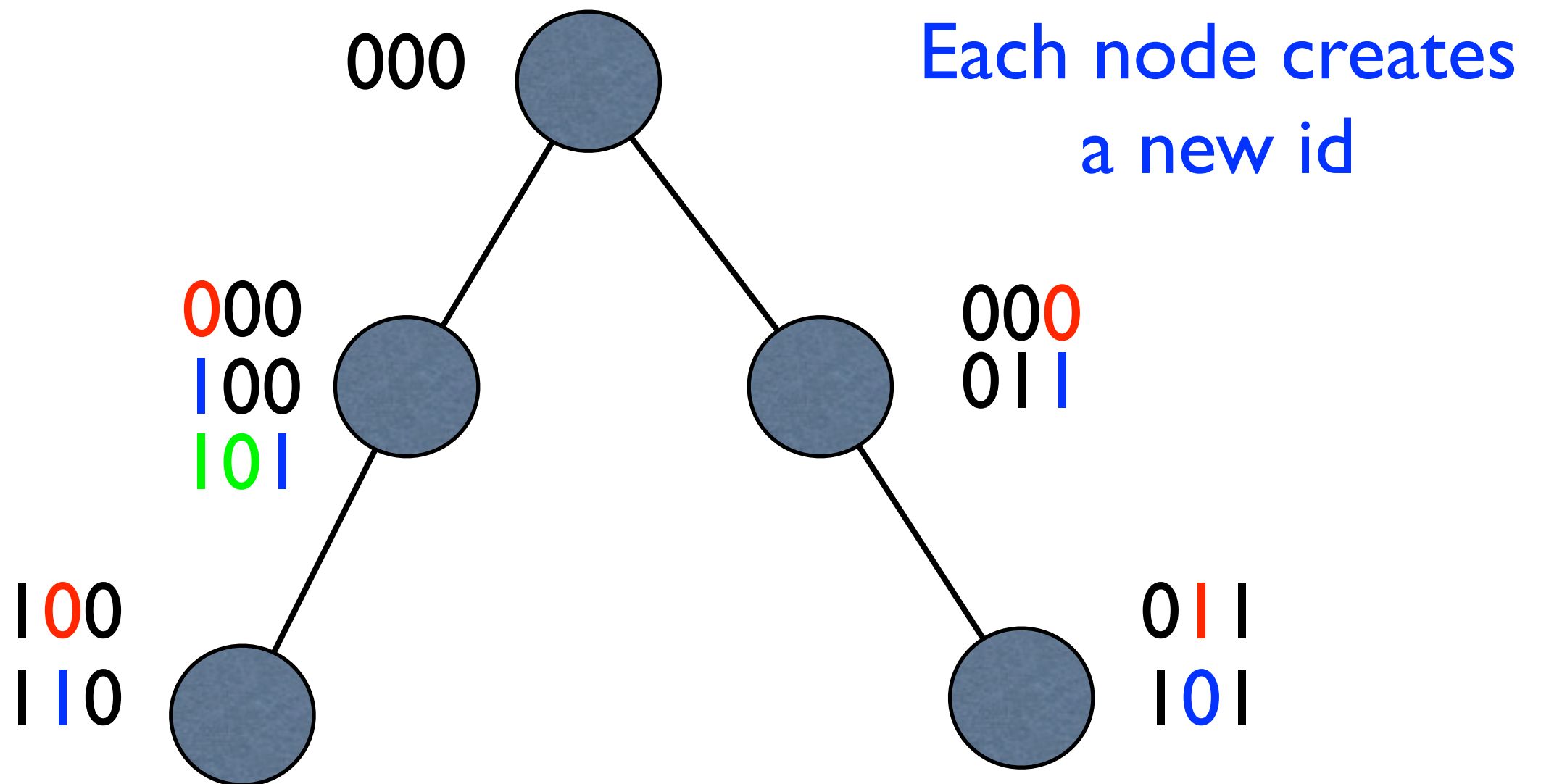
Faster tree coloring



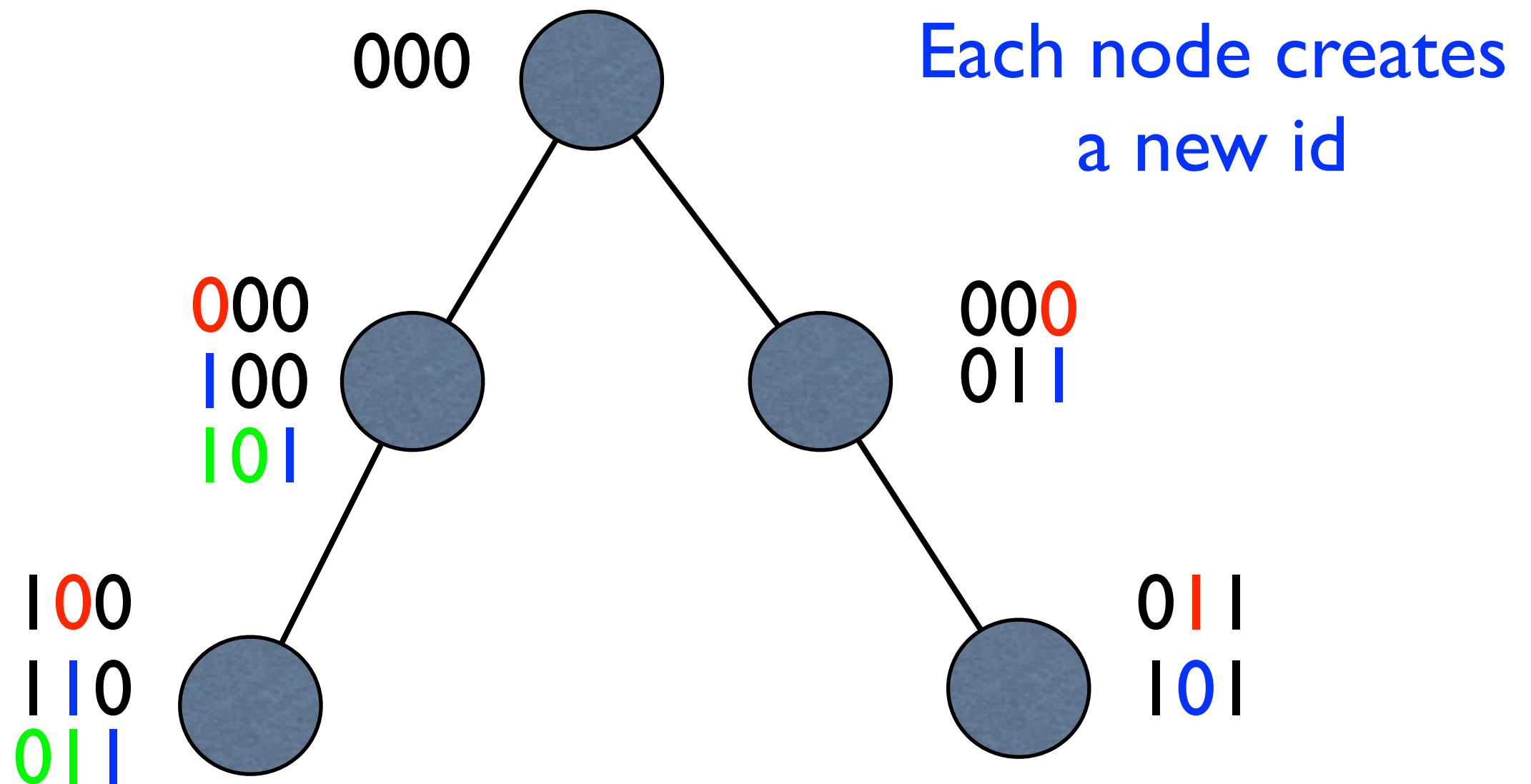
Faster tree coloring



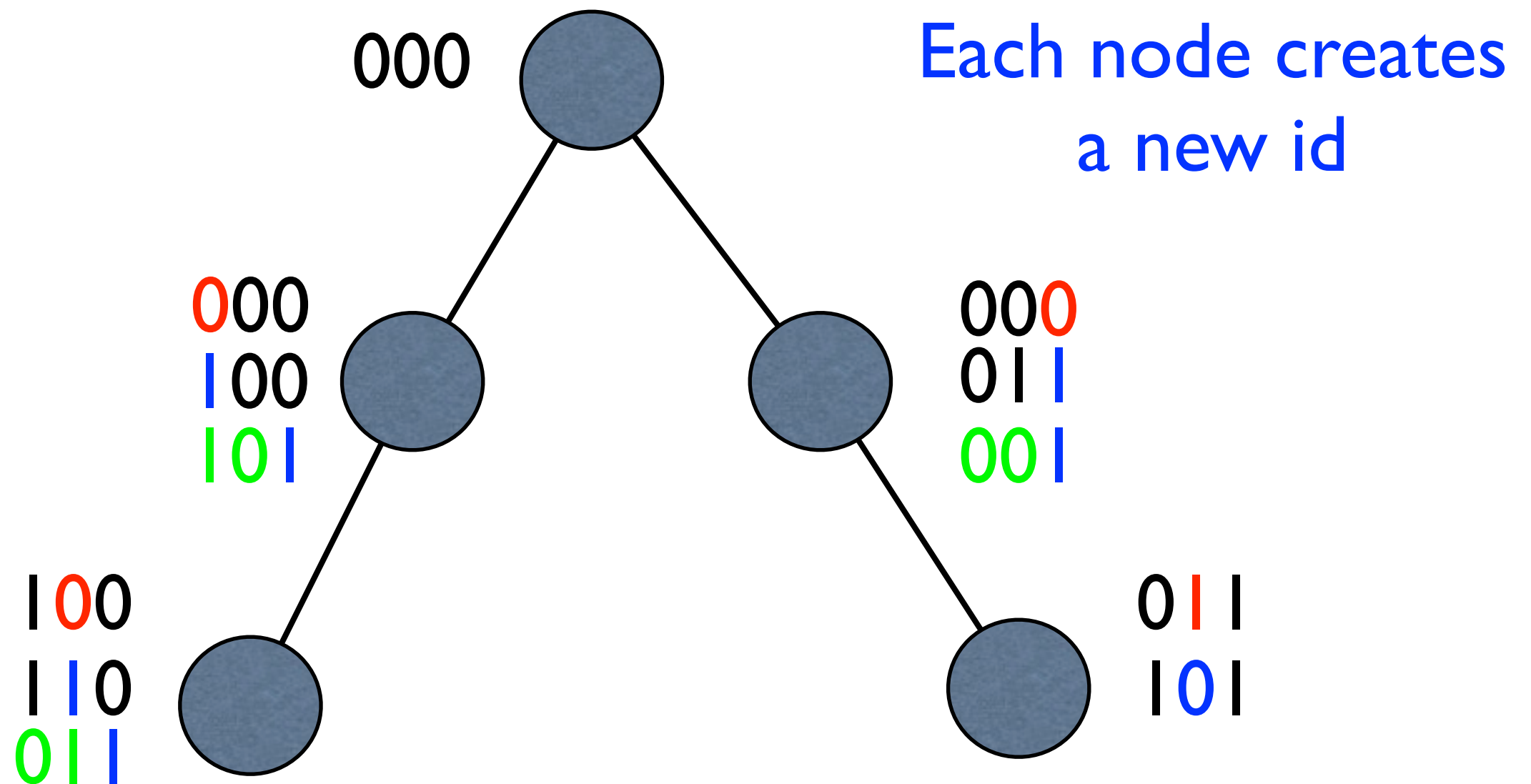
Faster tree coloring



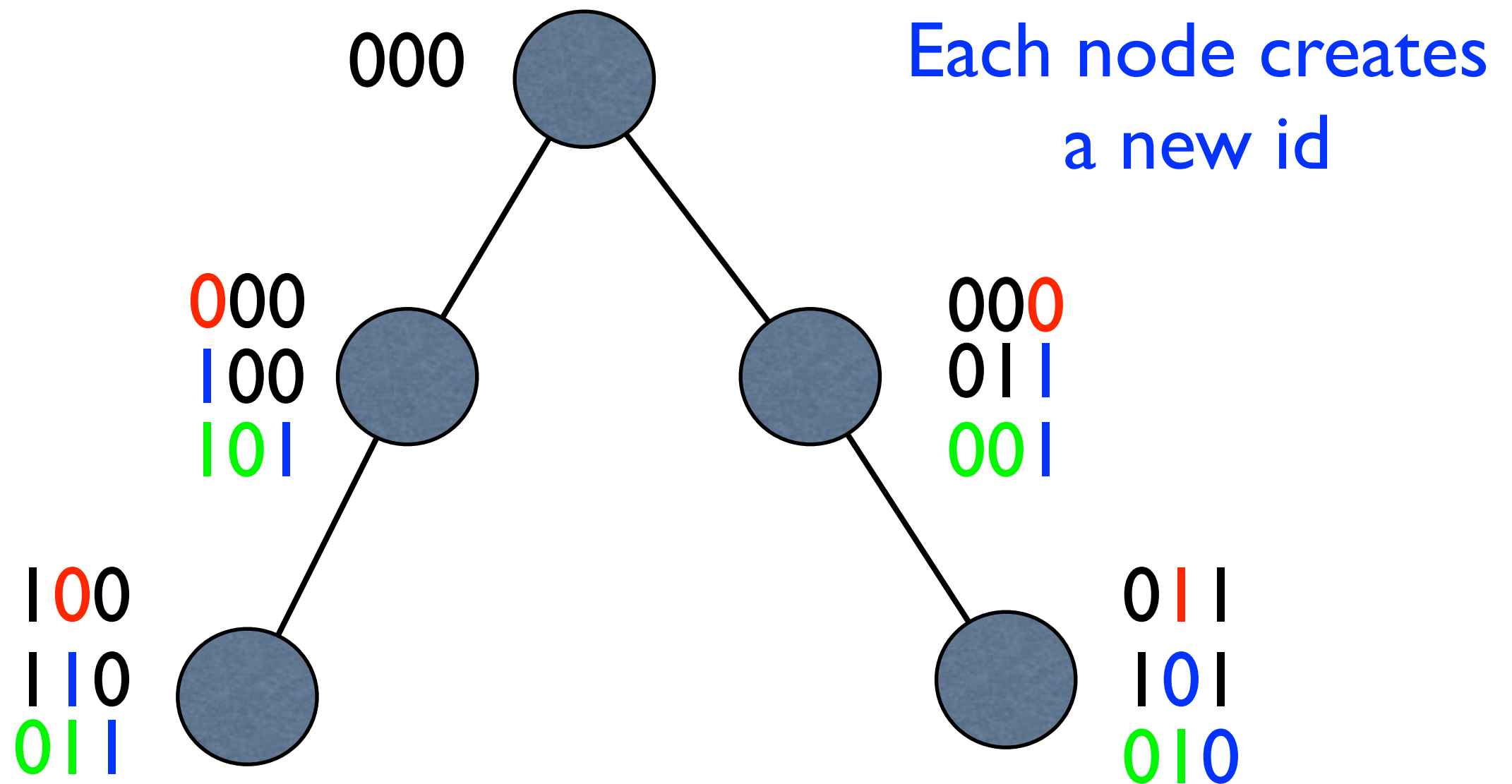
Faster tree coloring



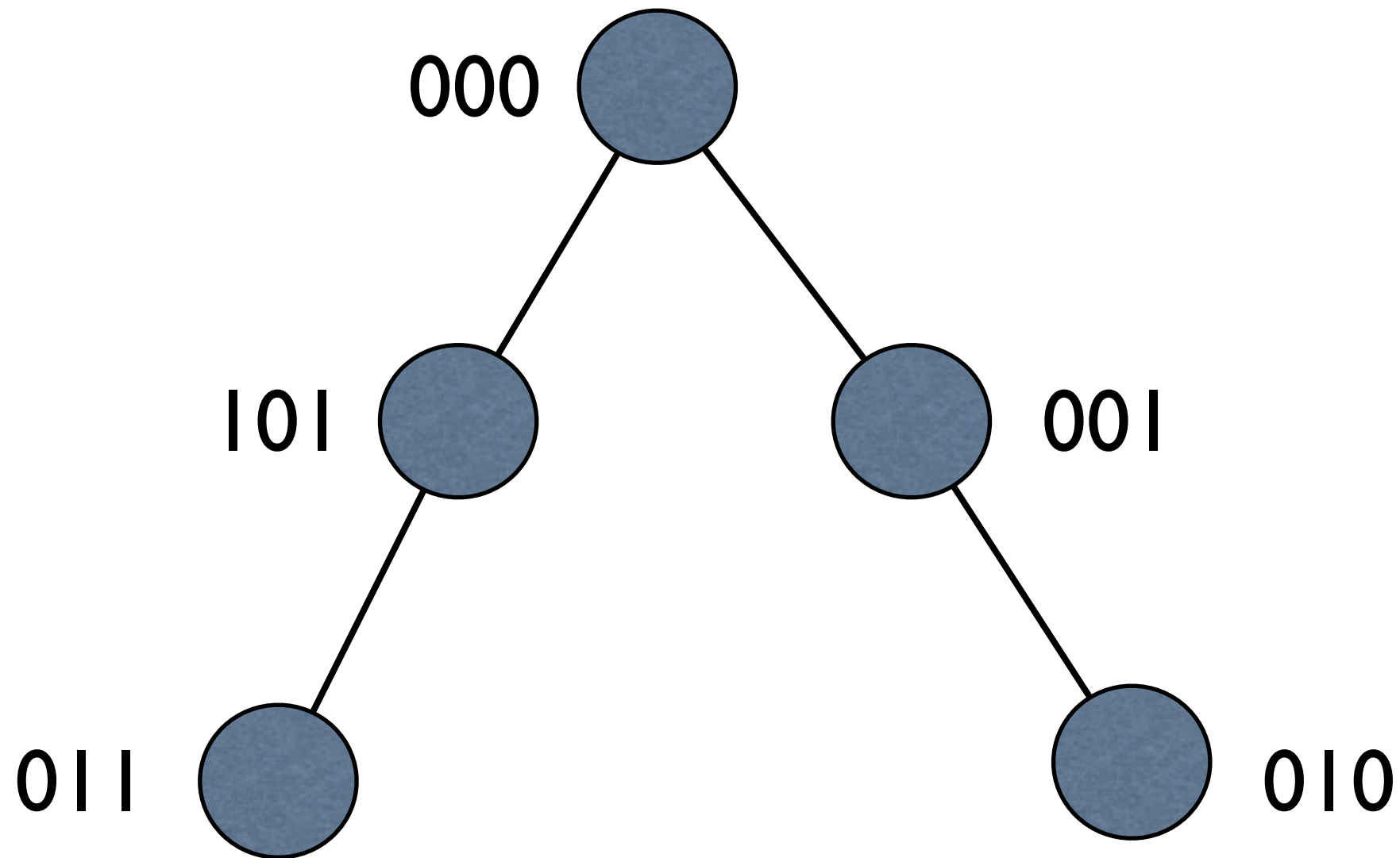
Faster tree coloring



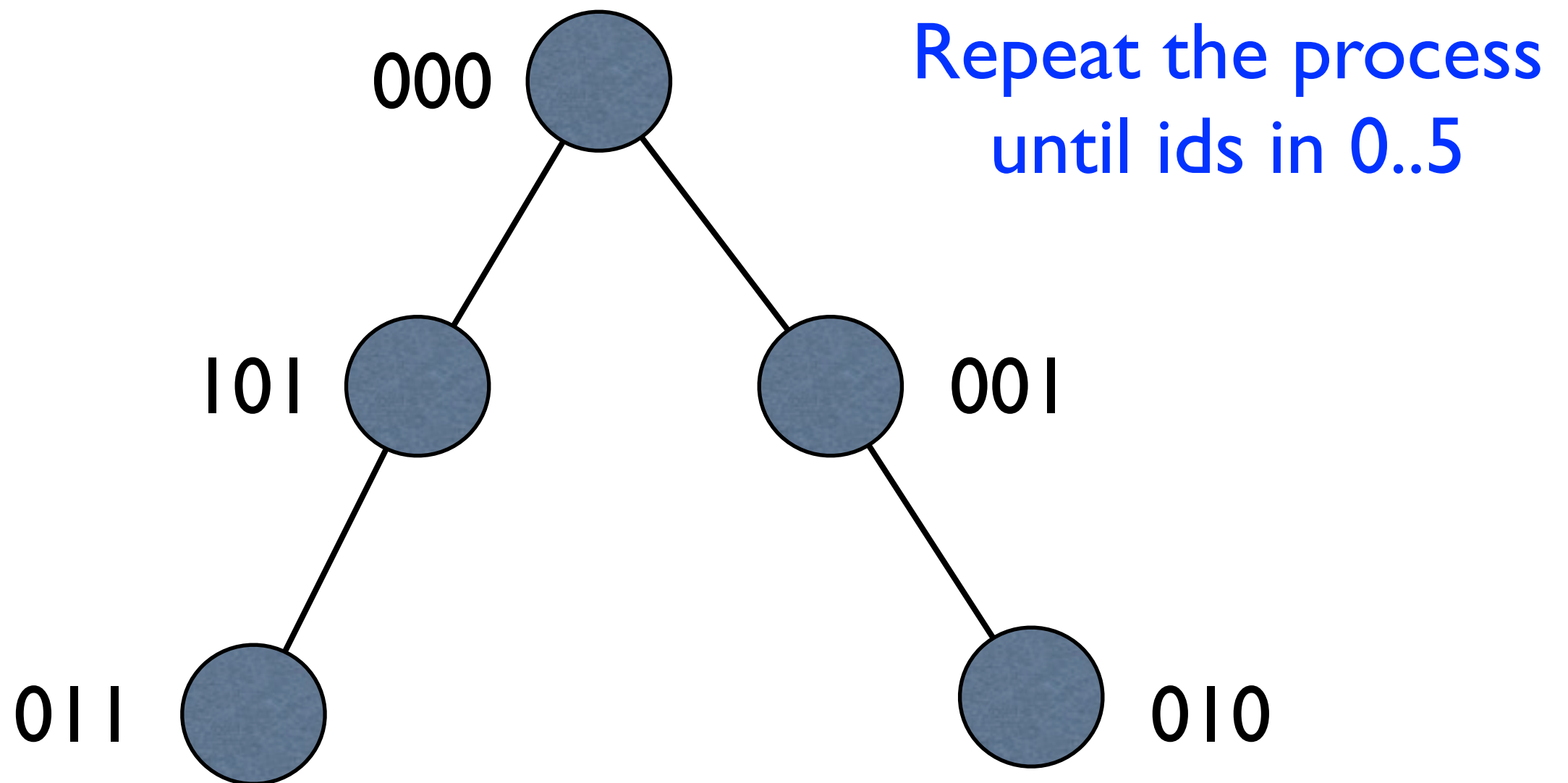
Faster tree coloring



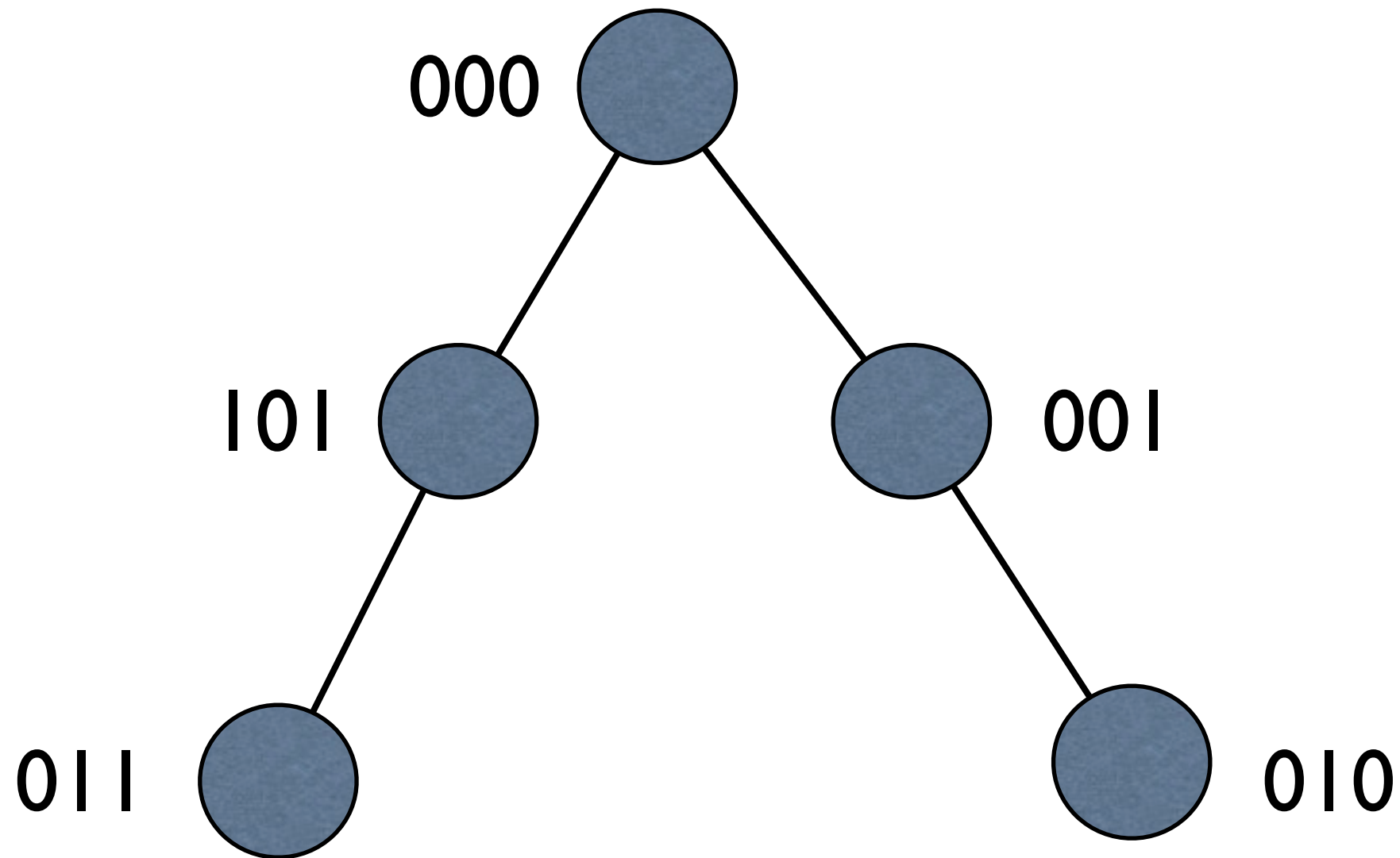
Faster tree coloring



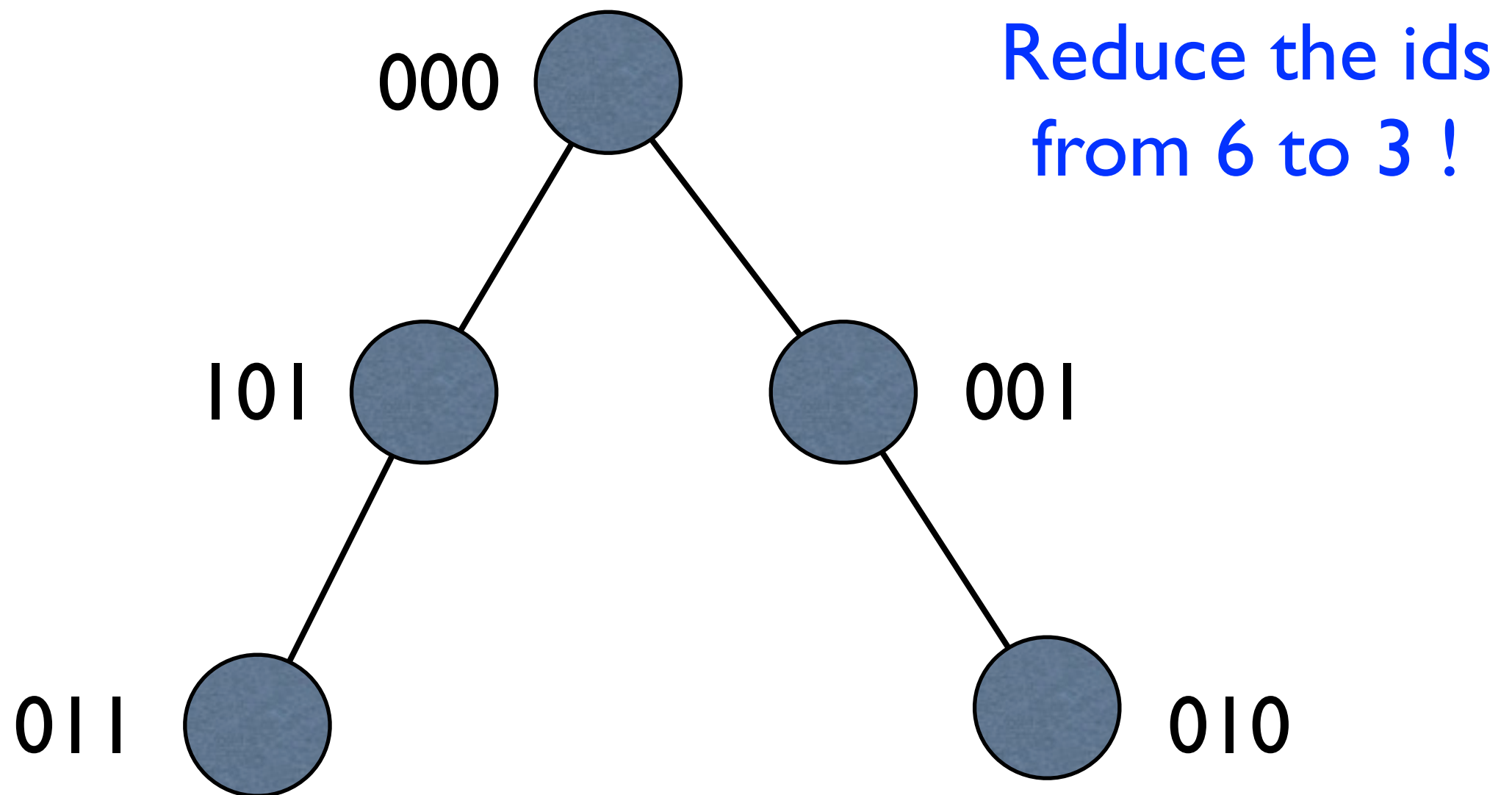
Faster tree coloring



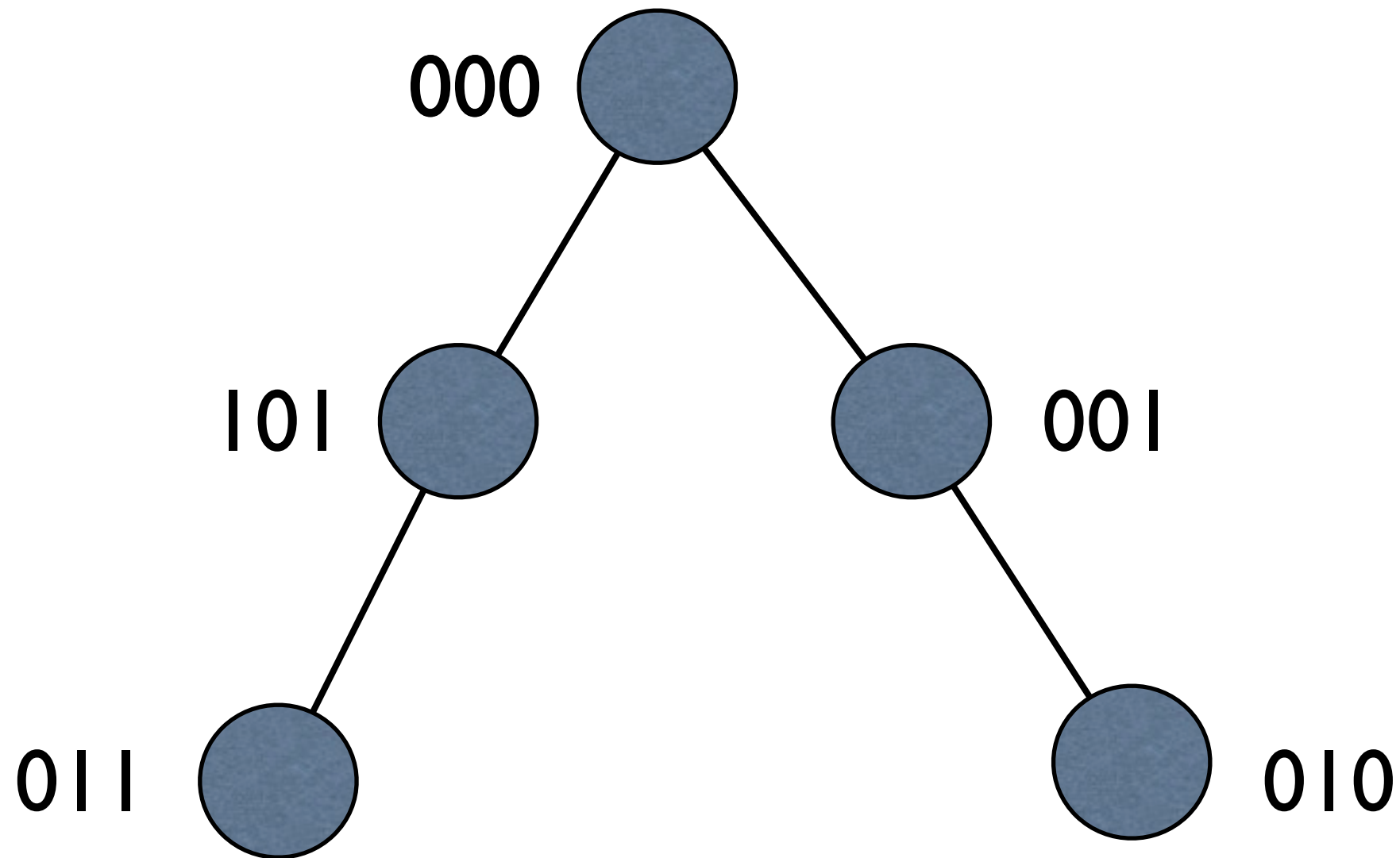
Faster tree coloring



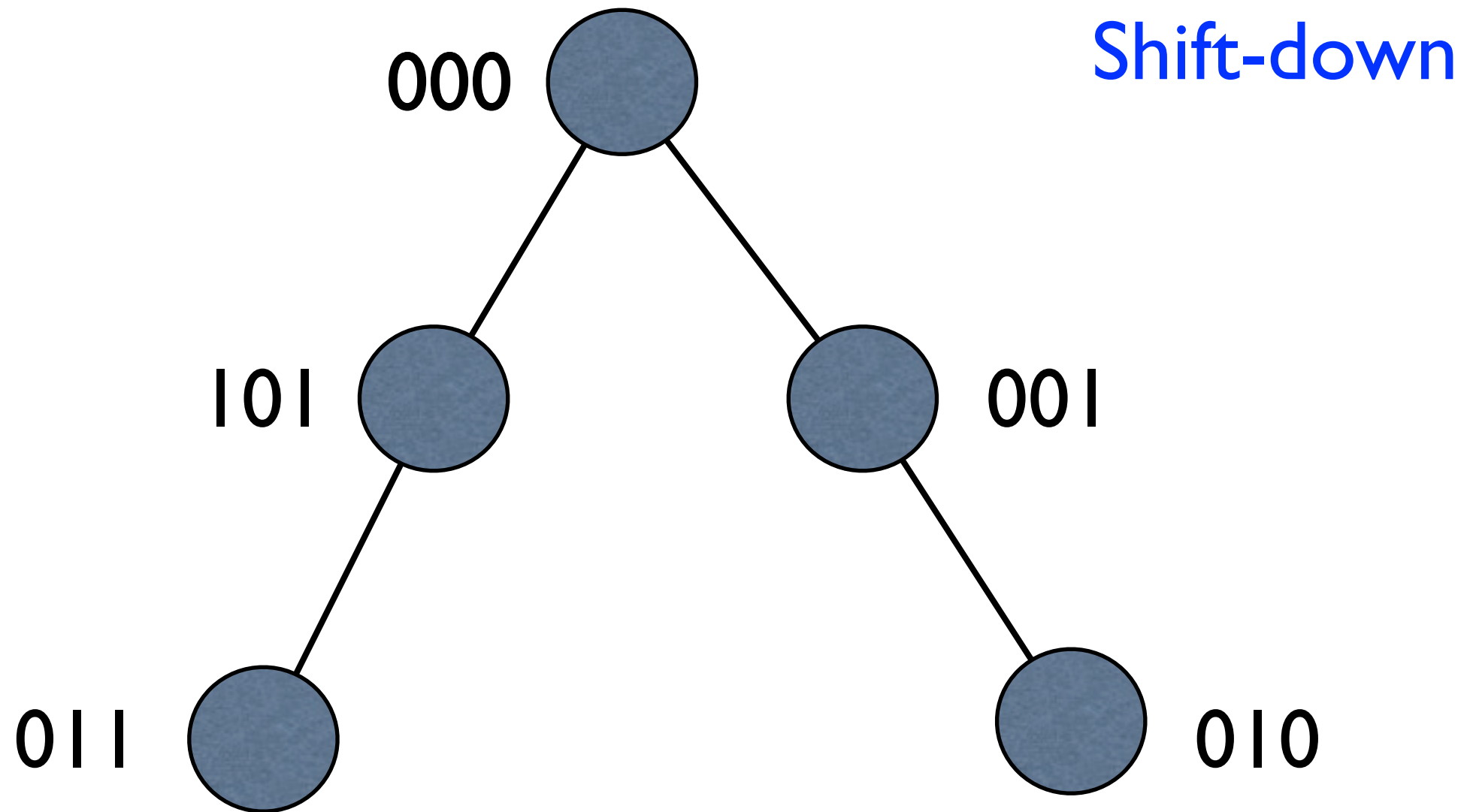
Faster tree coloring



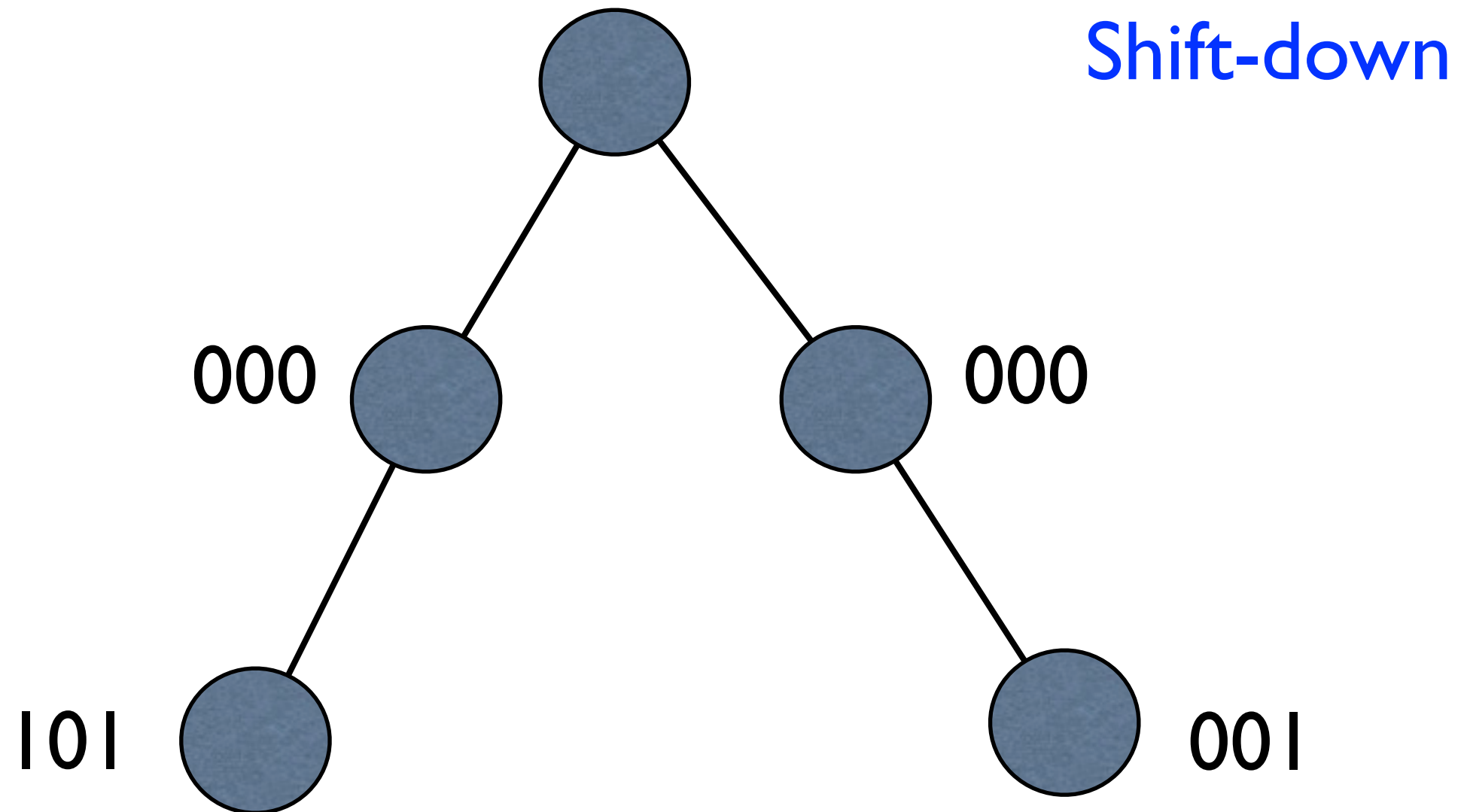
Faster tree coloring



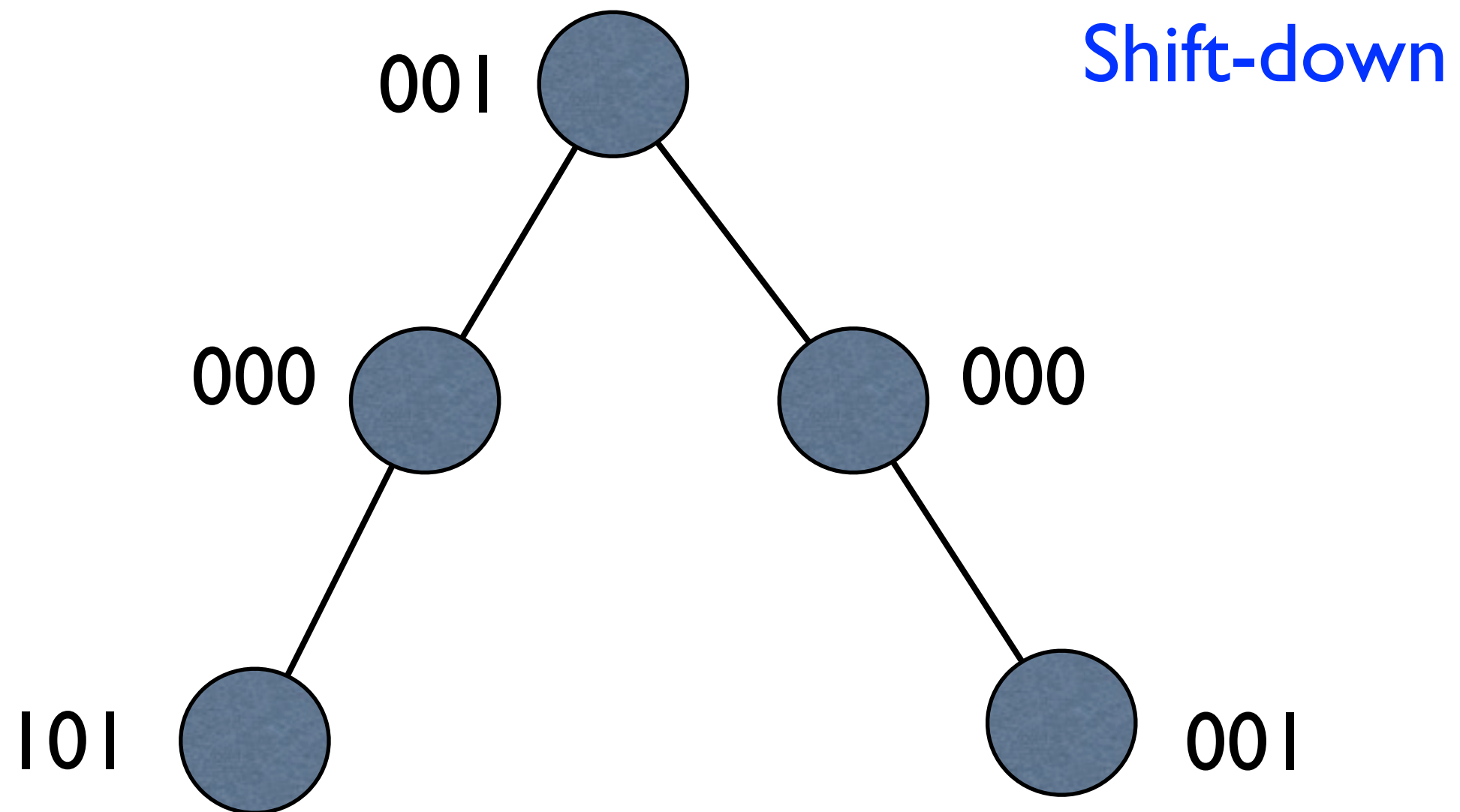
Faster tree coloring



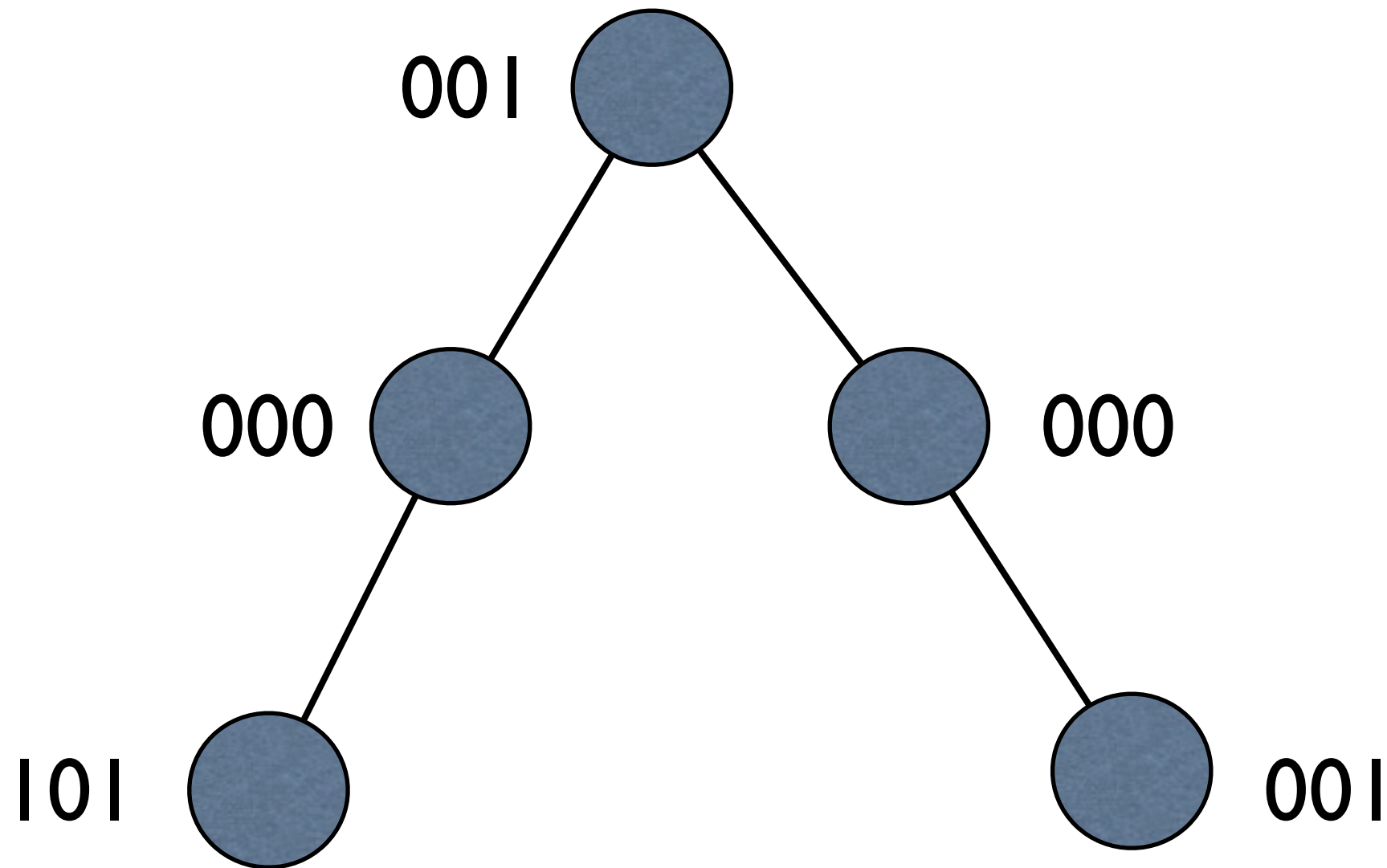
Faster tree coloring



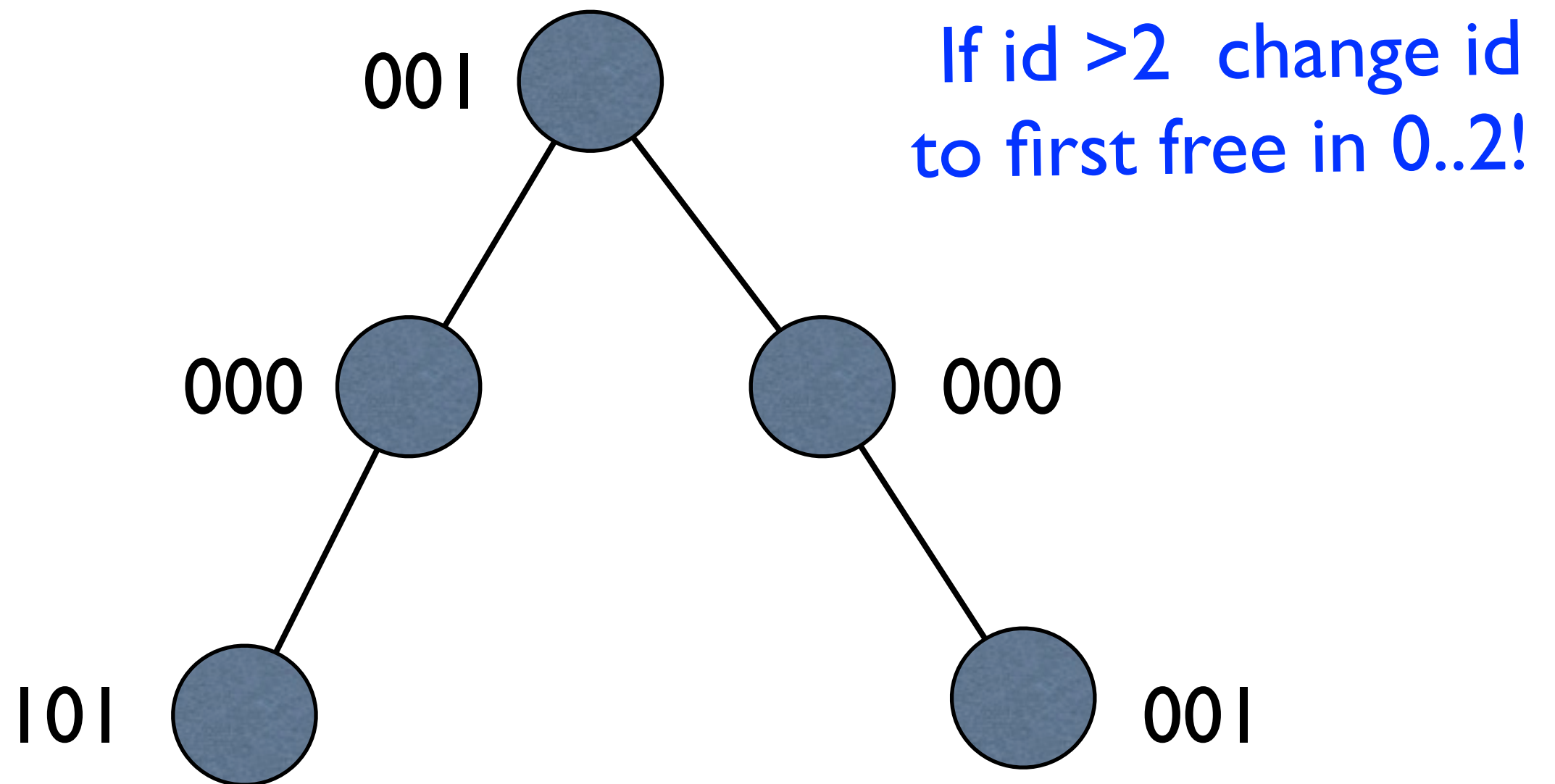
Faster tree coloring



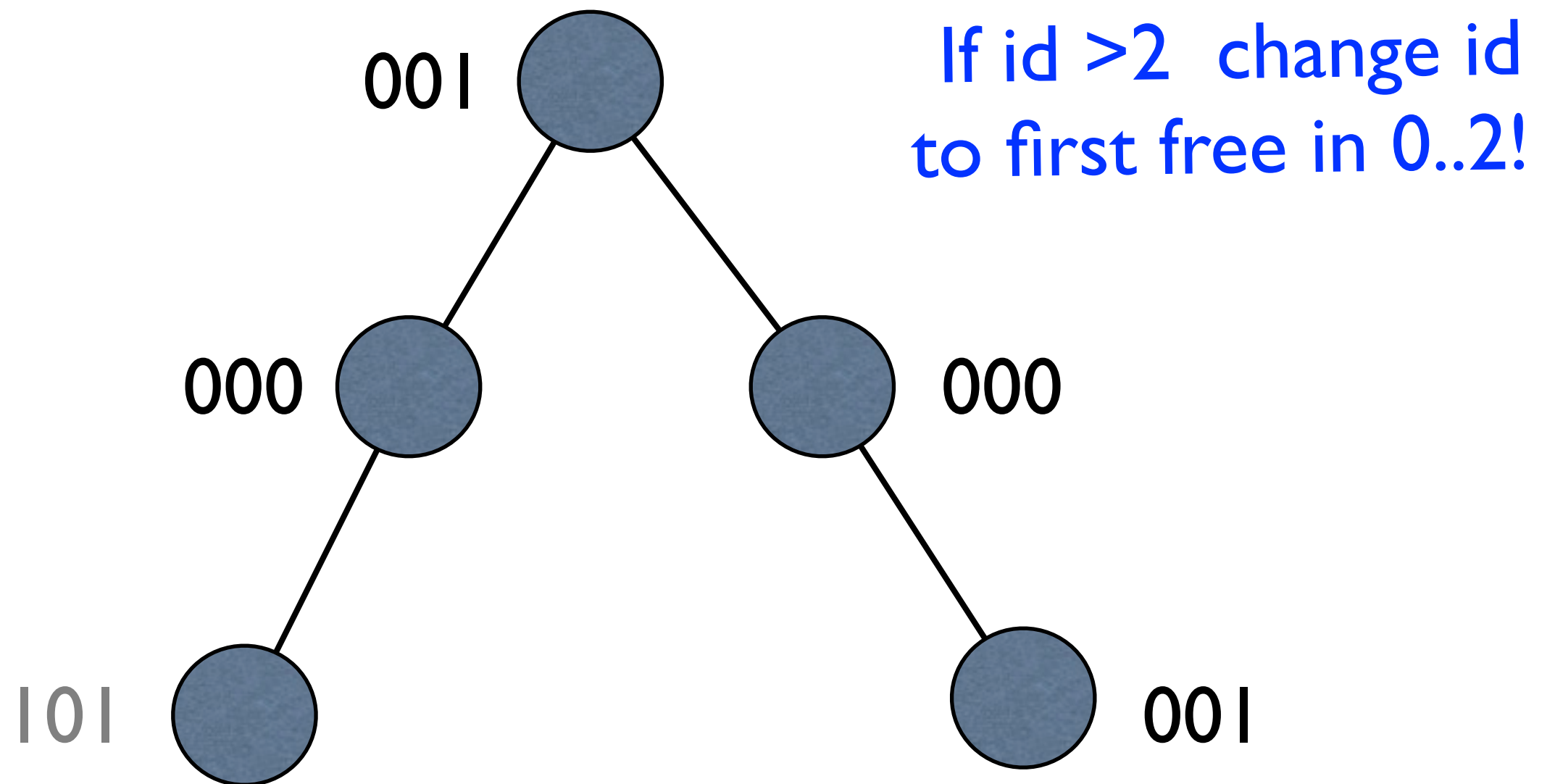
Faster tree coloring



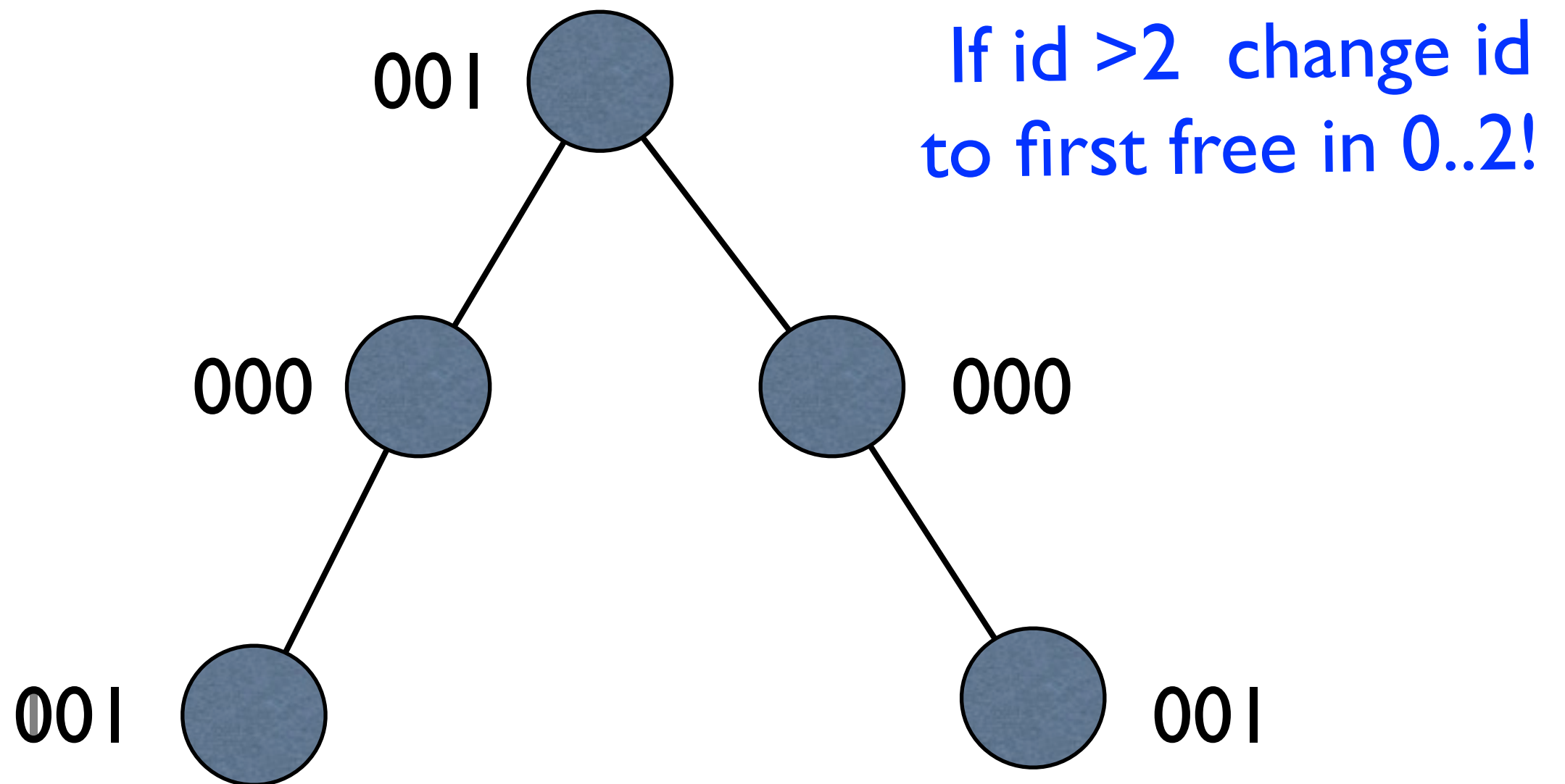
Faster tree coloring



Faster tree coloring



Faster tree coloring



Faster tree coloring

- 3 colors
- Complexity : $O(\log^*(n))$ exercice TD !!!!

$$\log^*(n) = \min\{i, \log^{(i)}(n) \leq 2\}$$
$$\log^{(1)}(n) = \log(n)$$