

Red-black Tree

dalinaum@gmail.com

Inventor

- Rudolf Bayer

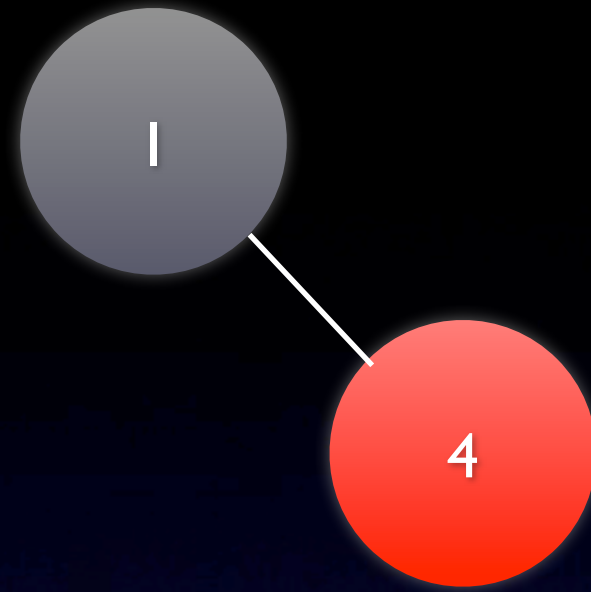


Red-black Tree 삽입 예제

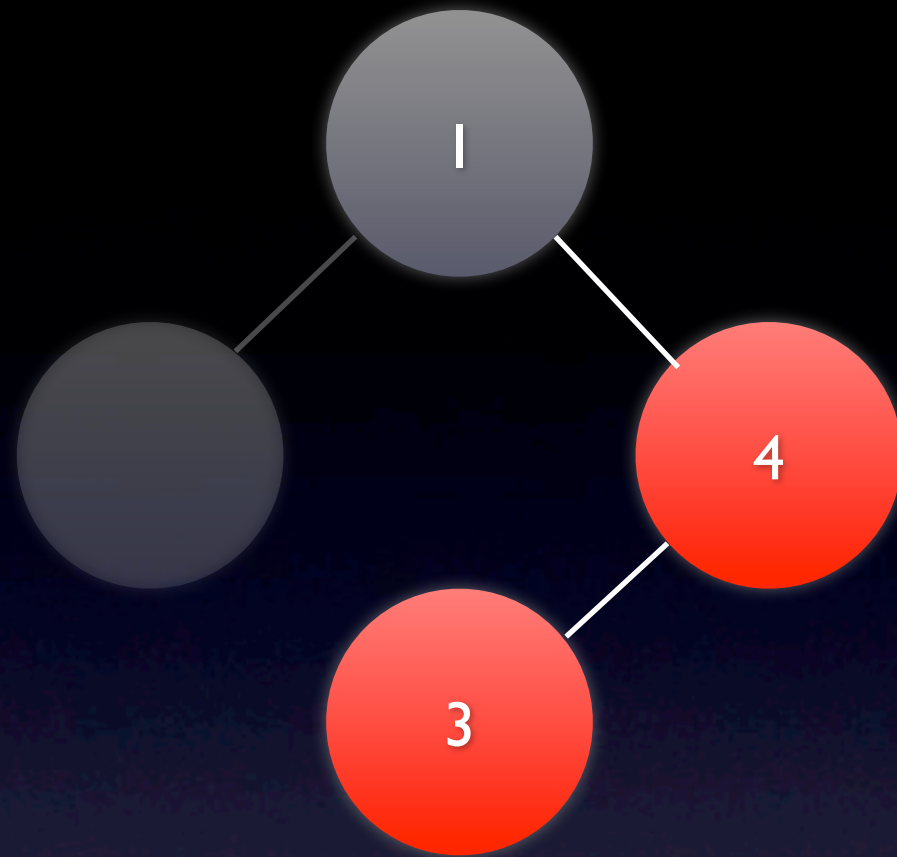
- 1, 4, 3, 2, 5, 9, 10, 6, 7, 8을 차례대로 삽입



루트는 블랙

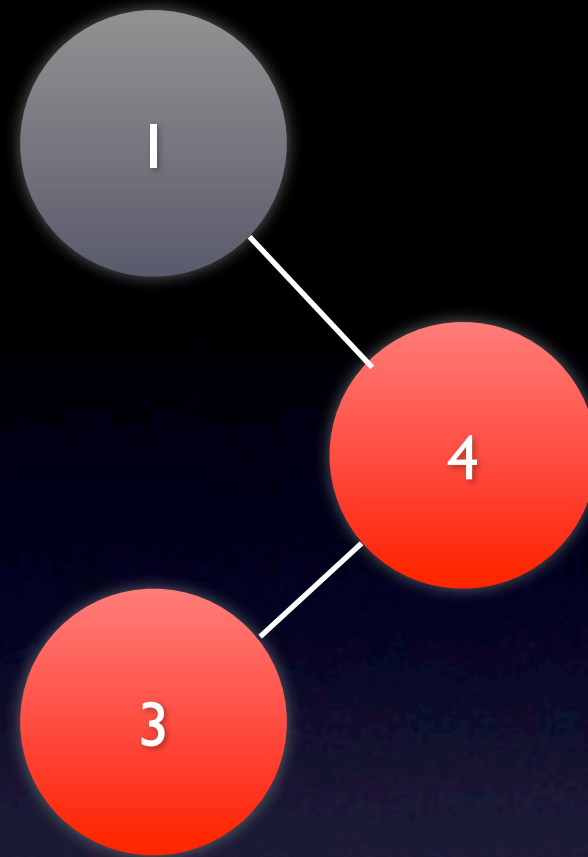


부모가 black이면 OK



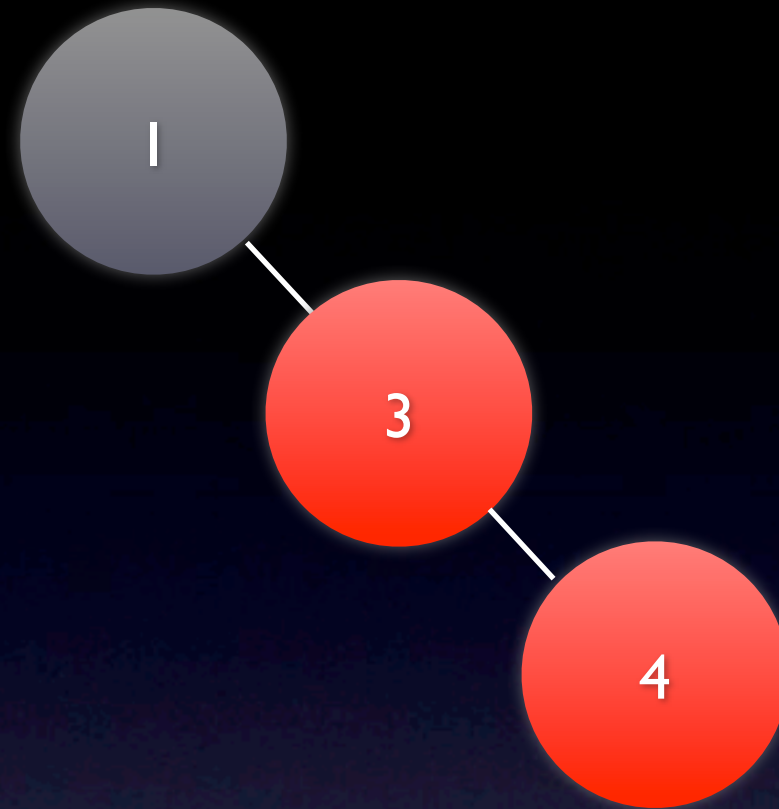
없는 삼촌은 블랙 취급

부모만 레드고...



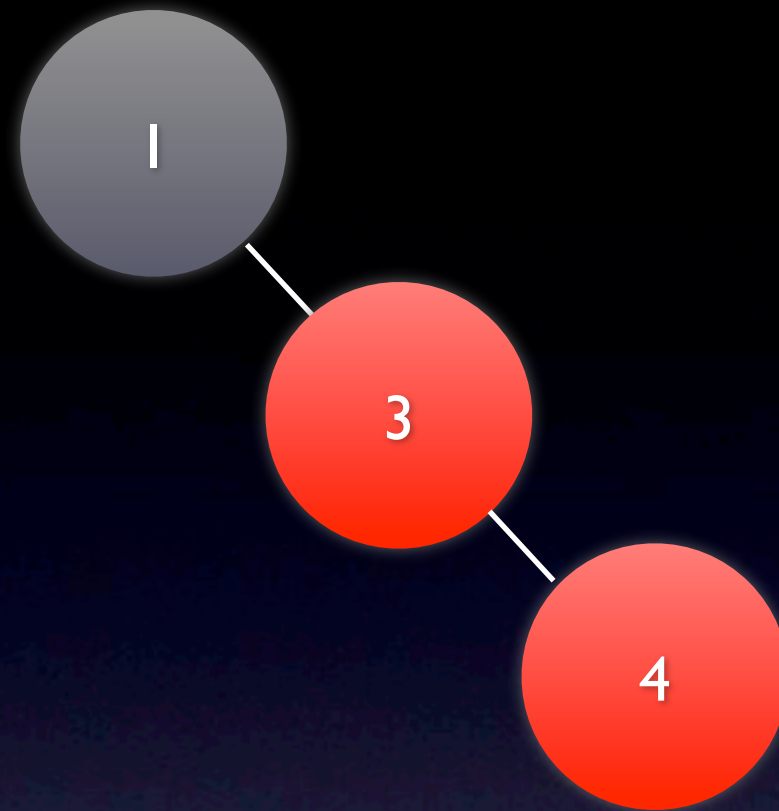
부모는 오른쪽, 자식은 왼쪽

부모와 자식 방향 다르면..



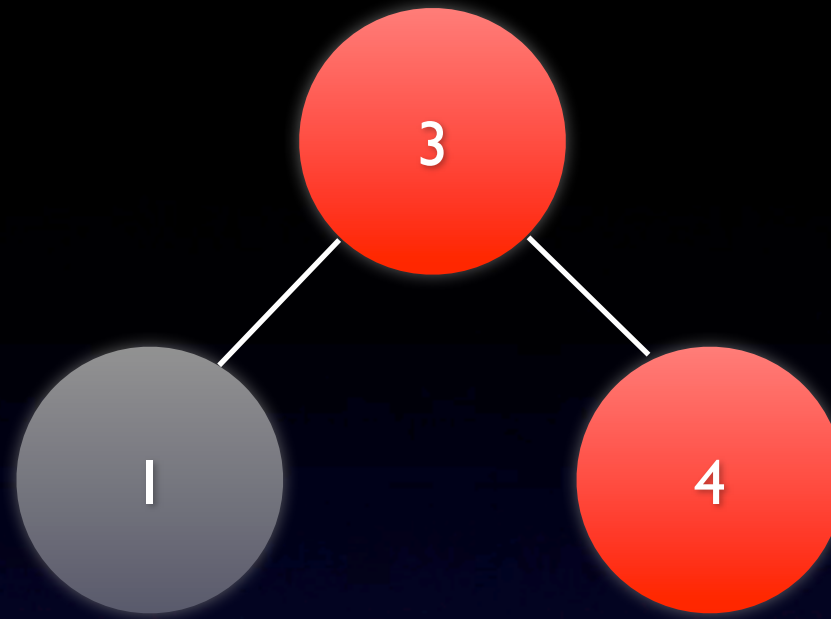
부모를 기준으로 오른쪽으로 돌렸습니다.

부모의 방향으로 돌립니다.



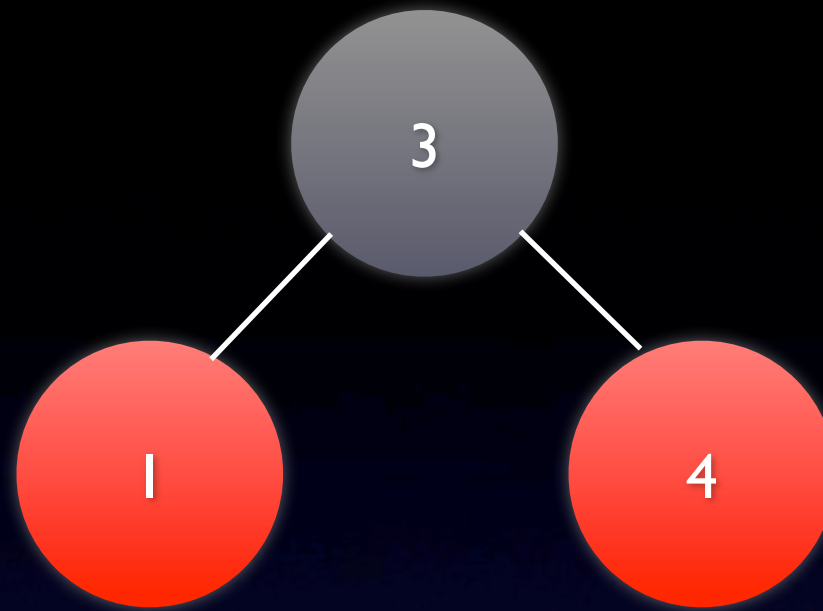
레드는 연속될 수 없음.

부모와 자식이 같은 방향이면...

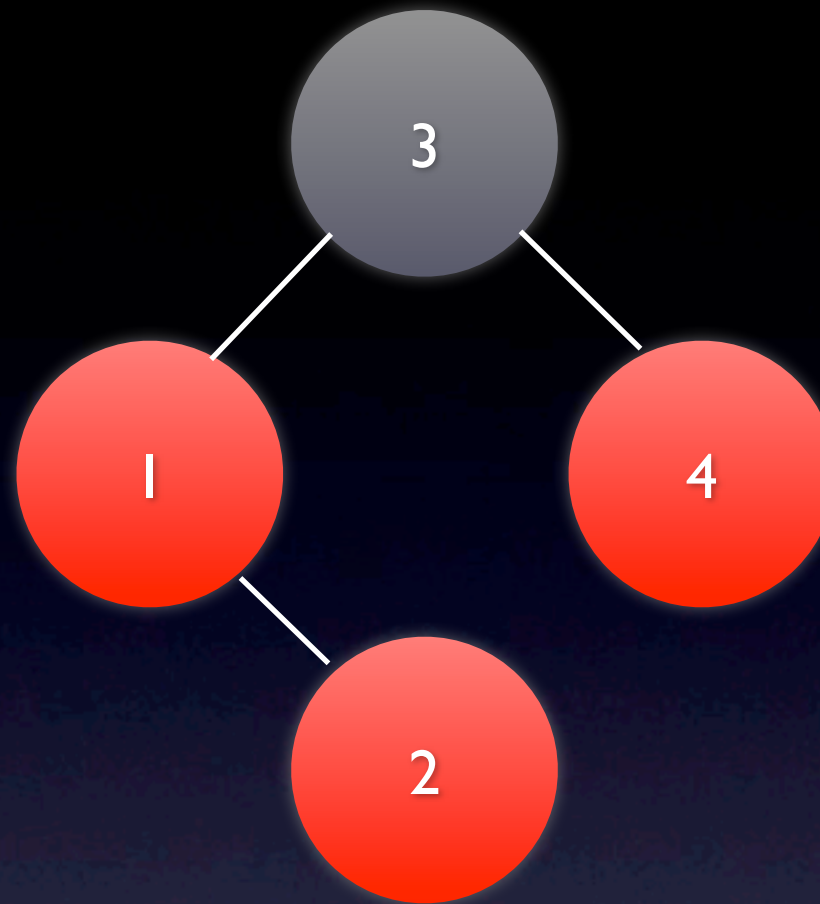


모두 오른쪽에 있으니 왼쪽으로 돌립니다.

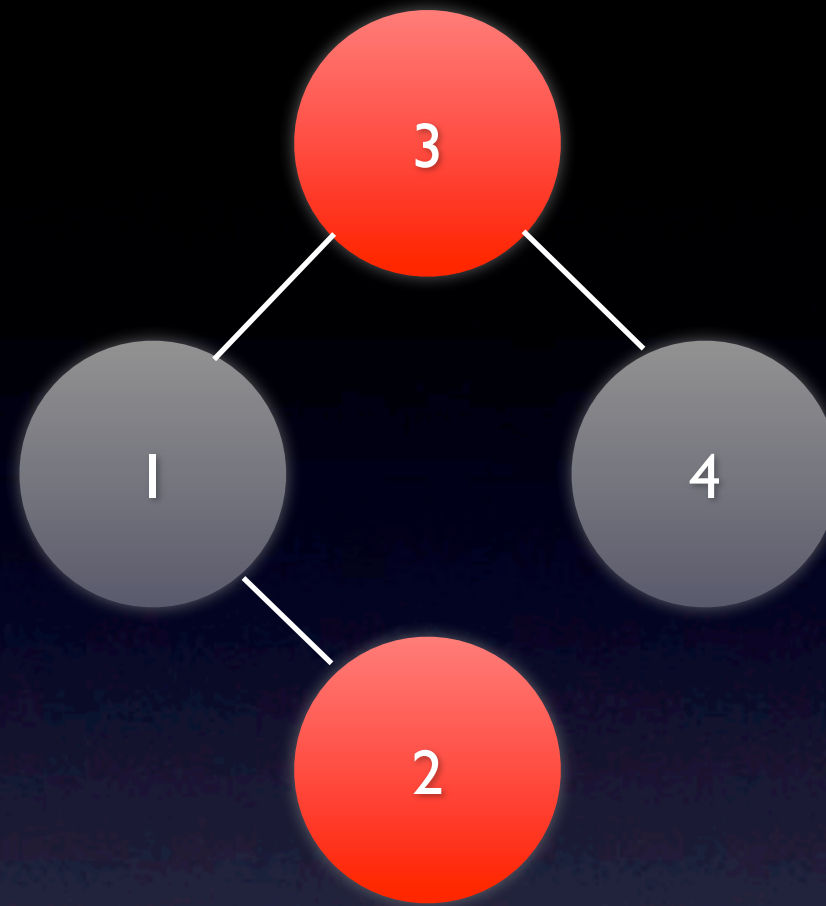
할아버지를 돌립니다.



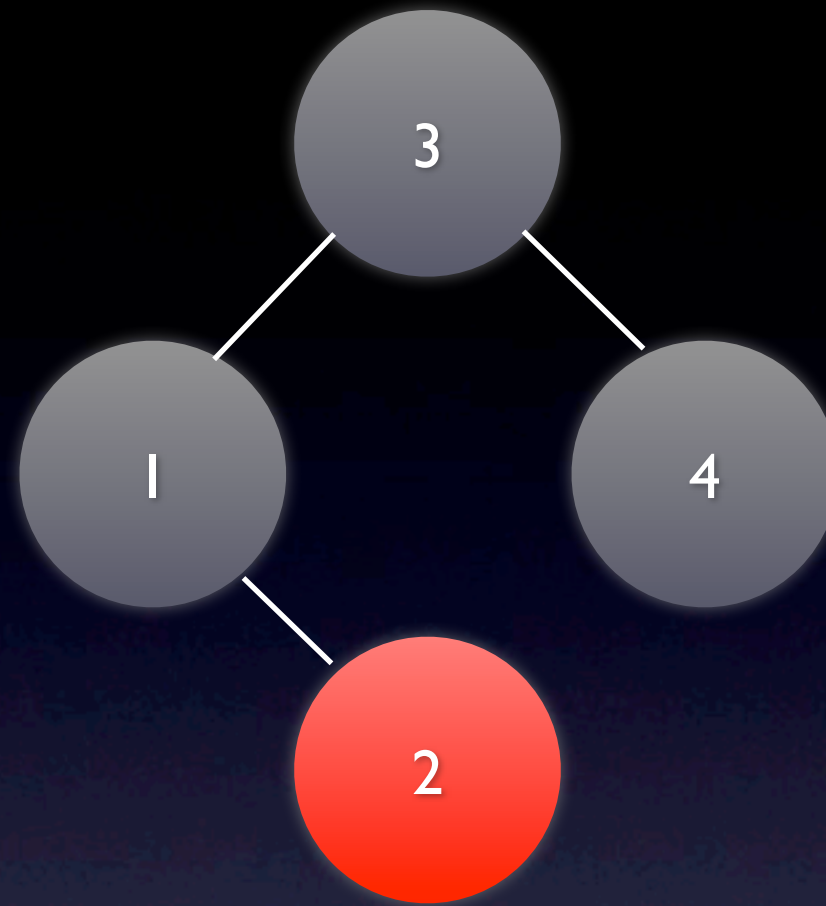
할아버지와 부모의 색을 바꿉니다.



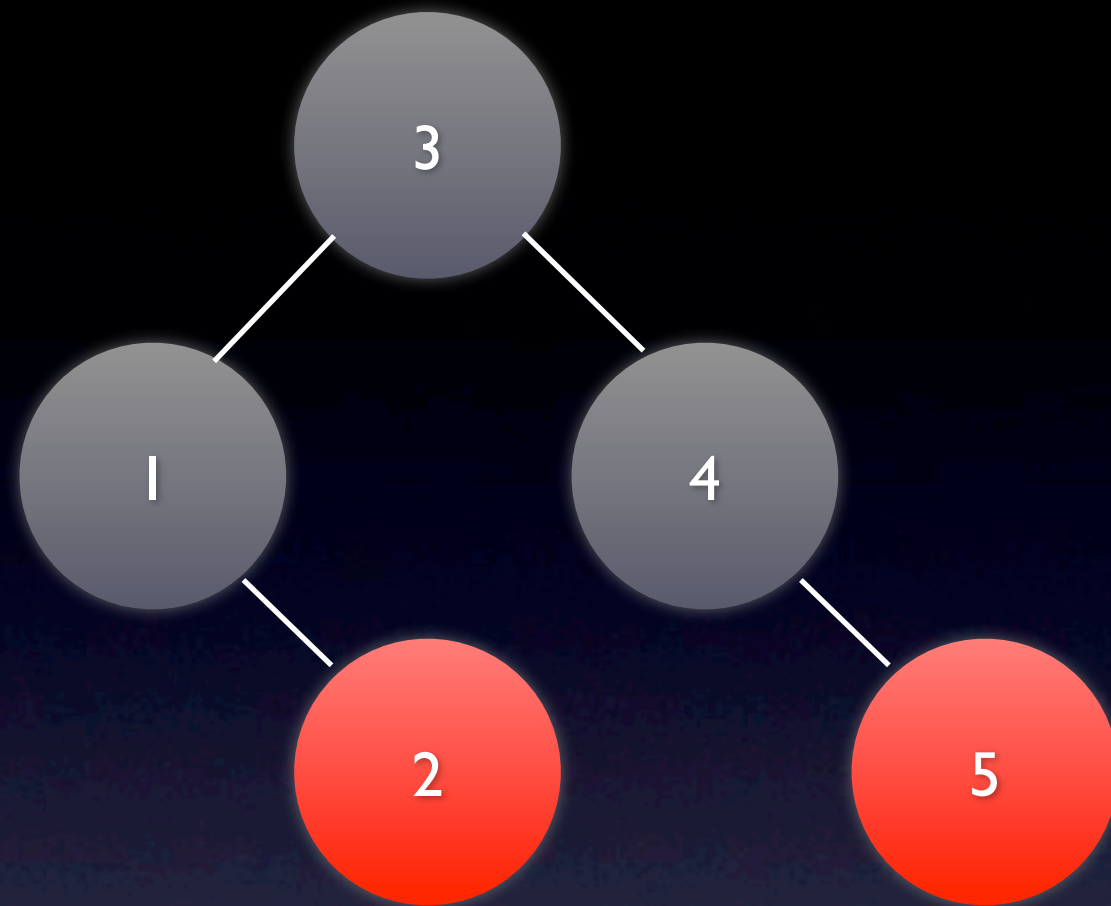
부모와 삼촌 모두 레드입니다.



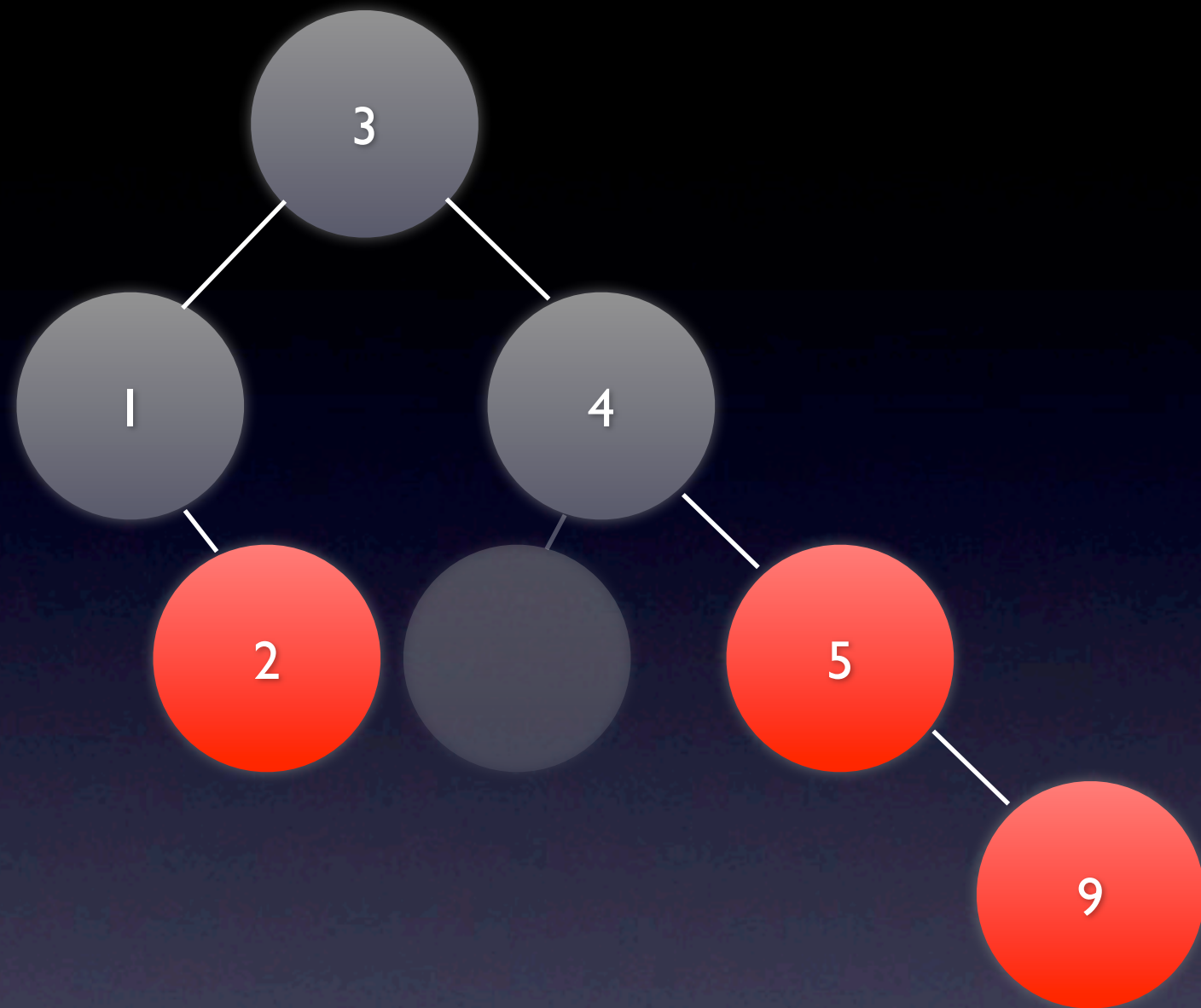
부모와 삼촌을 블랙, 할아버지 레드



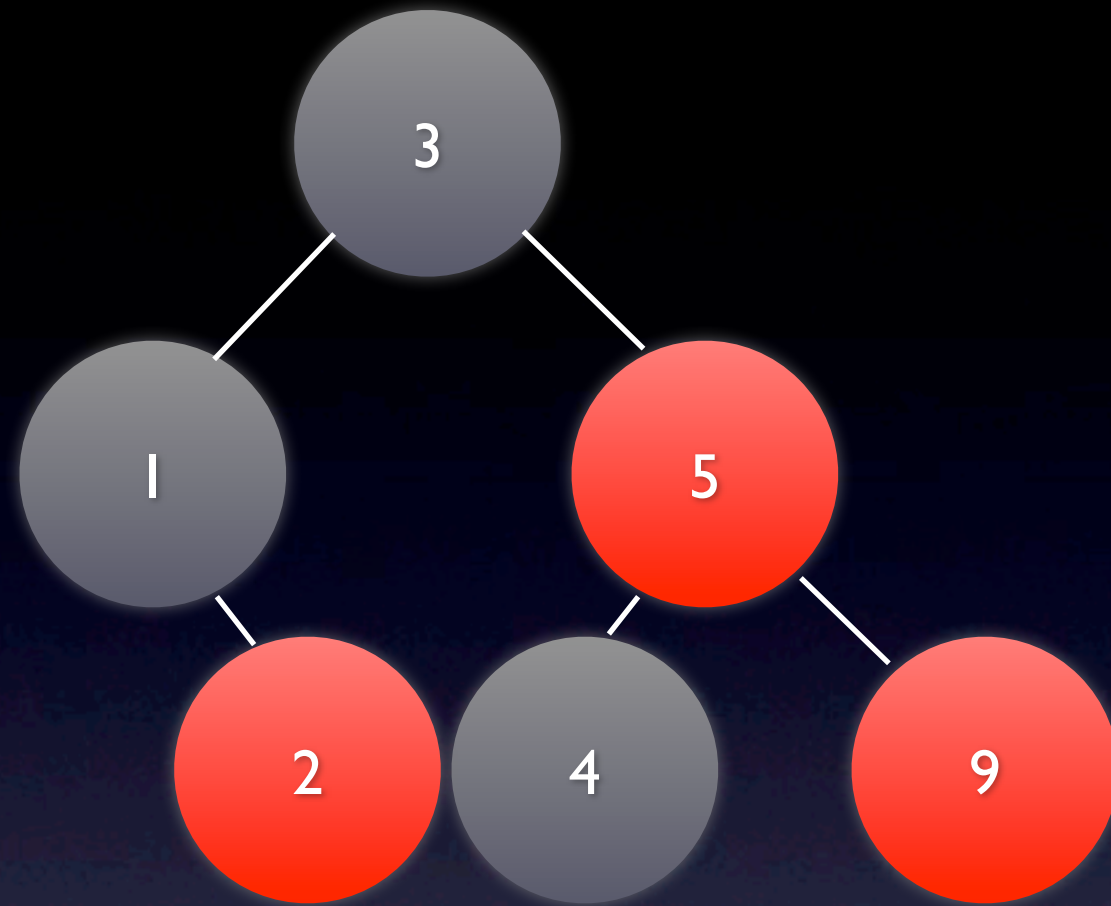
할아버지 루트니깐 블랙



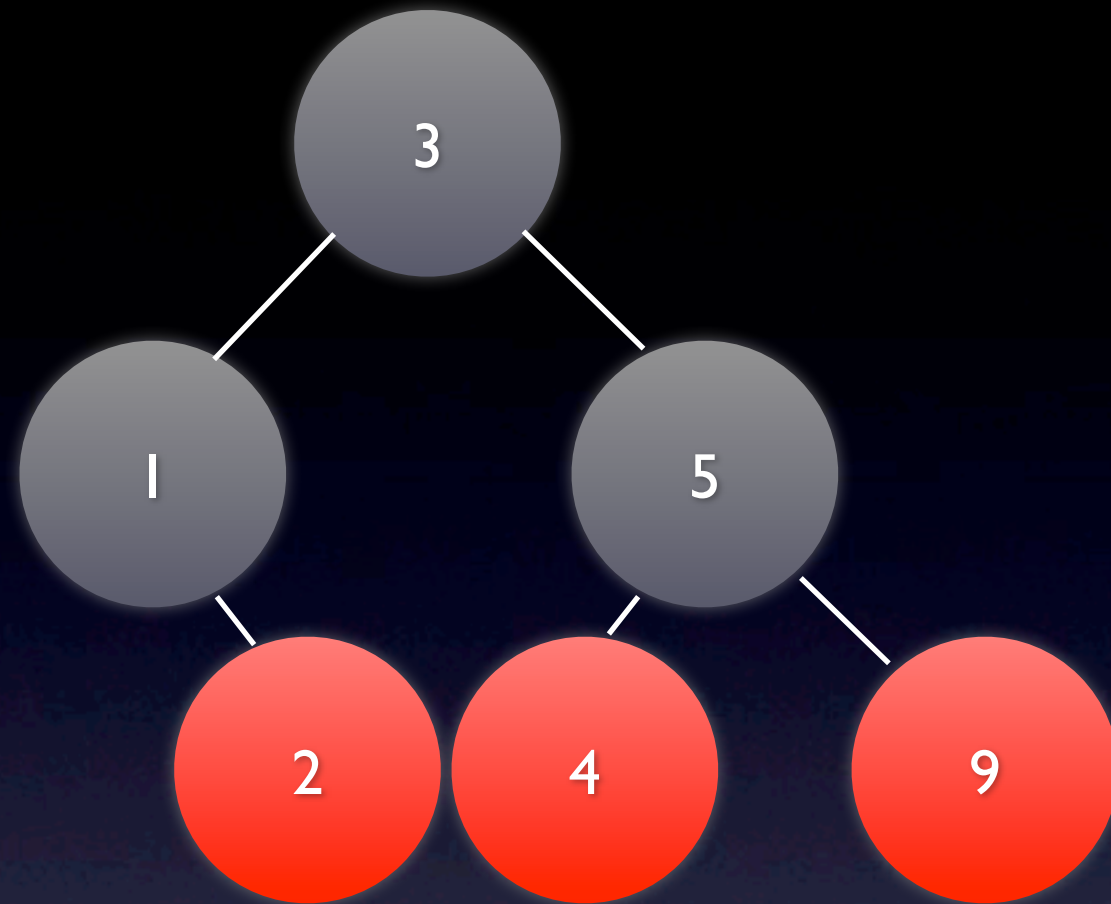
아버지가 블랙이니 OK



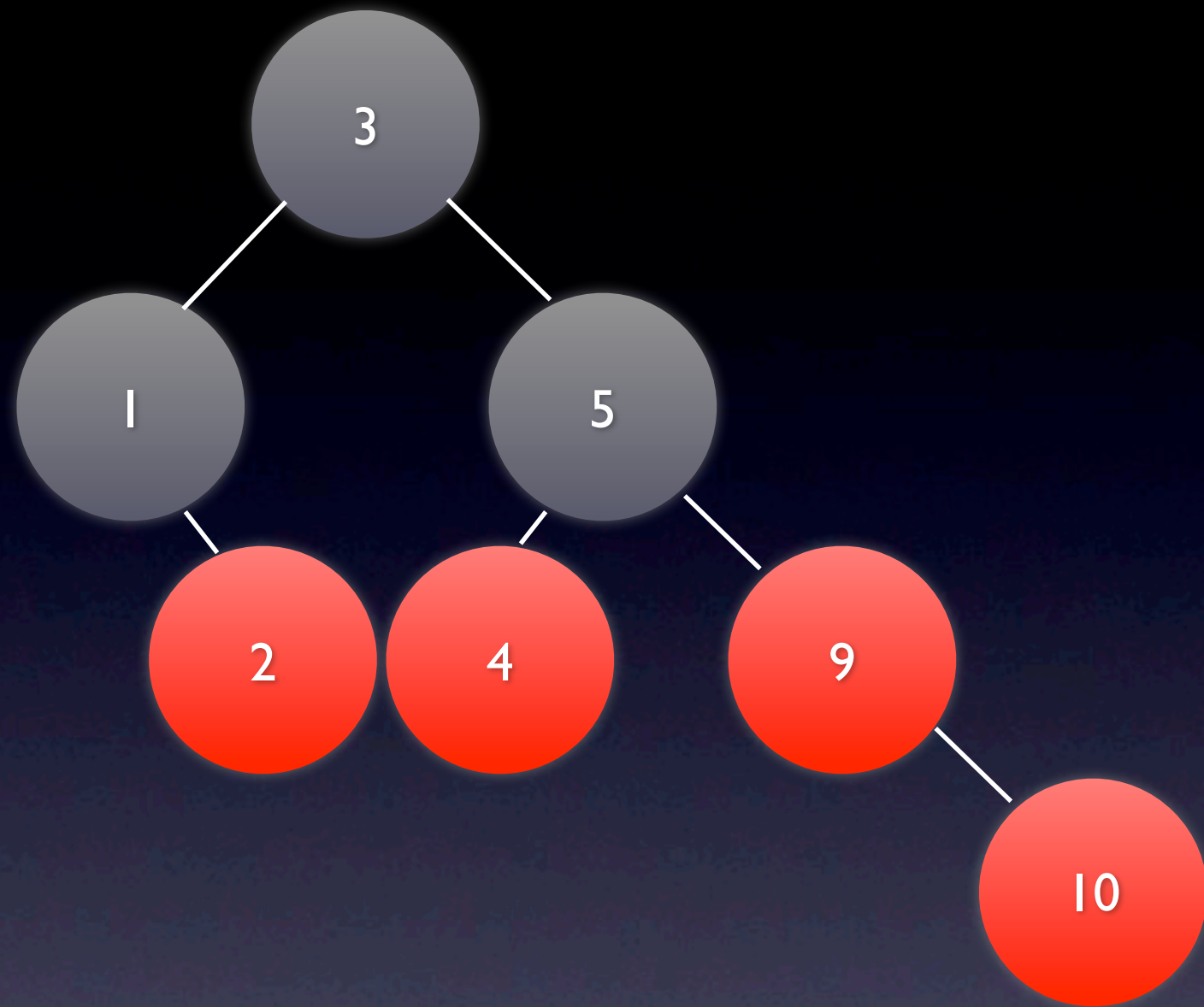
아버지만 레드, 방향이 같으니깐...



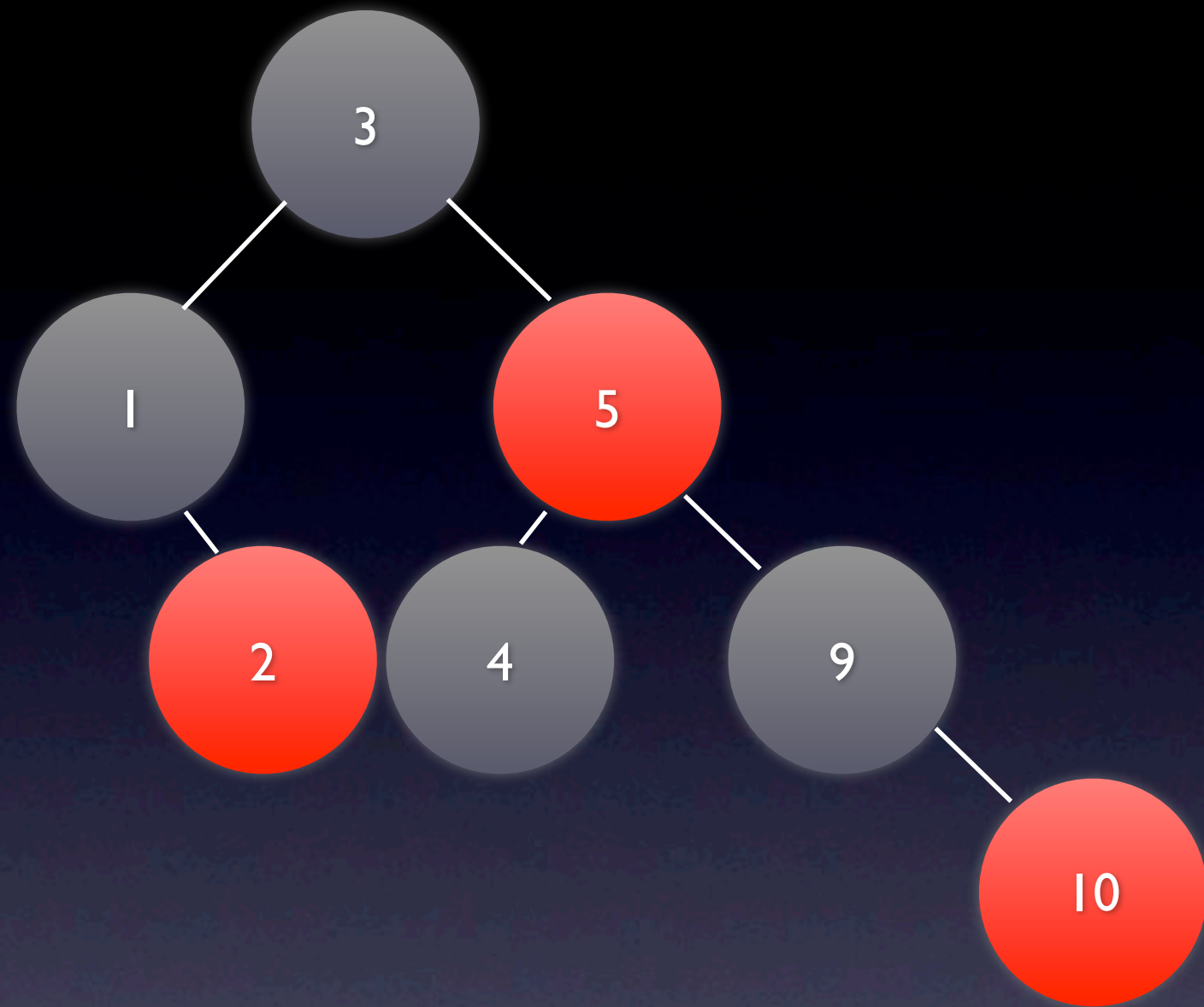
할아버지를 왼쪽으로 돌립니다.



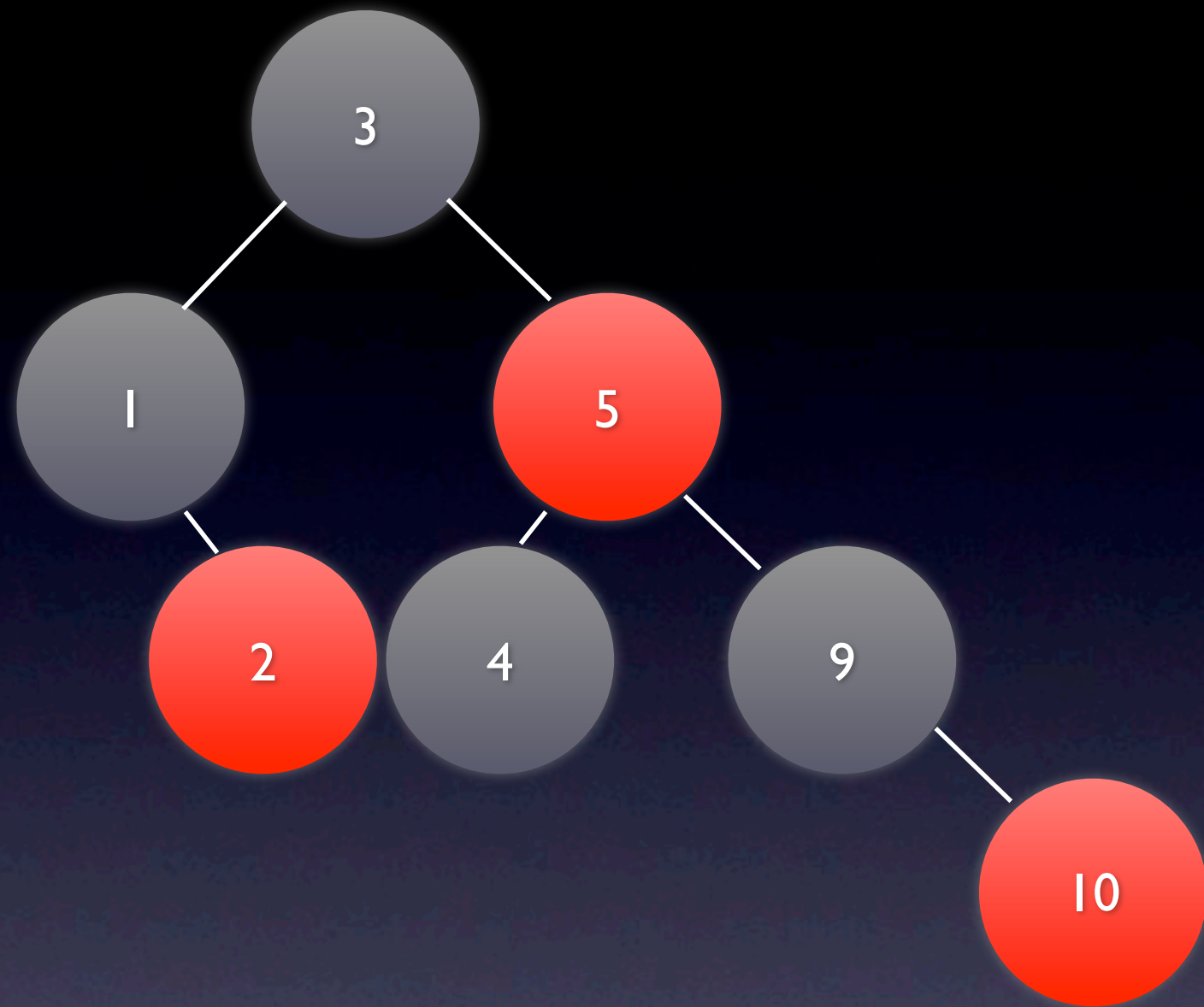
할아버지와 자식 색상 교체



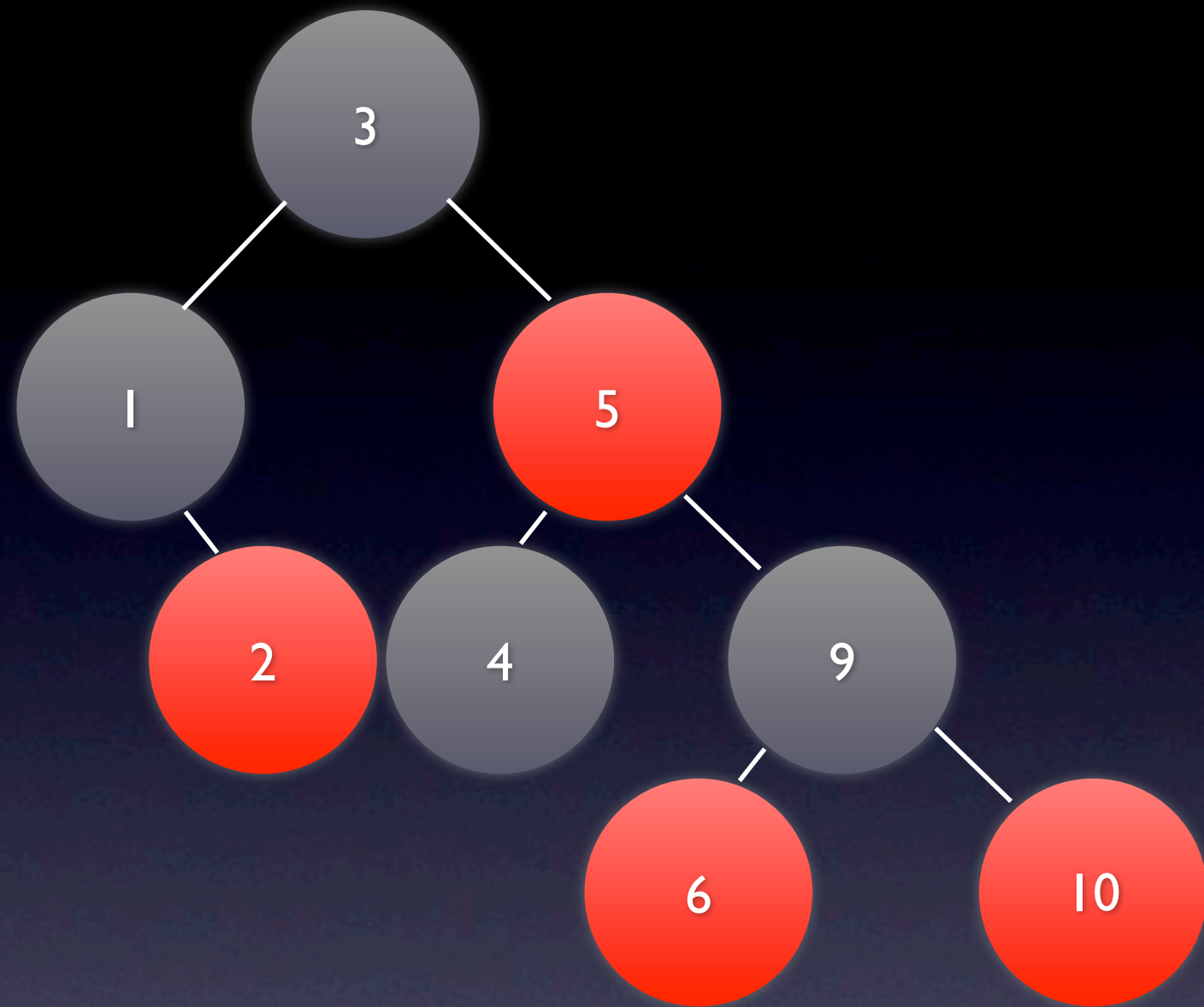
부모와 삼촌 모두 레드...



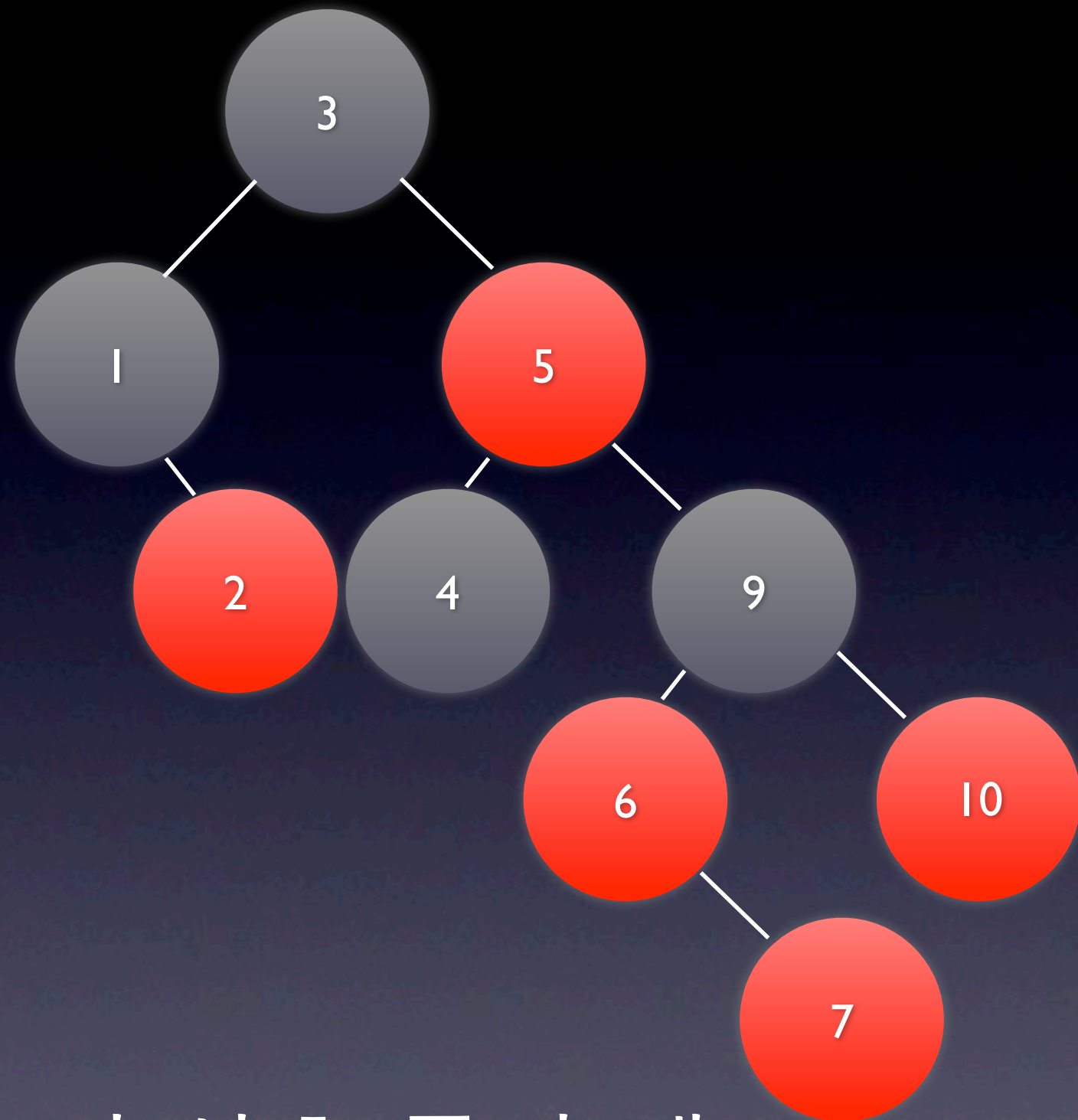
부모 삼촌 블랙, 할아버지 레드



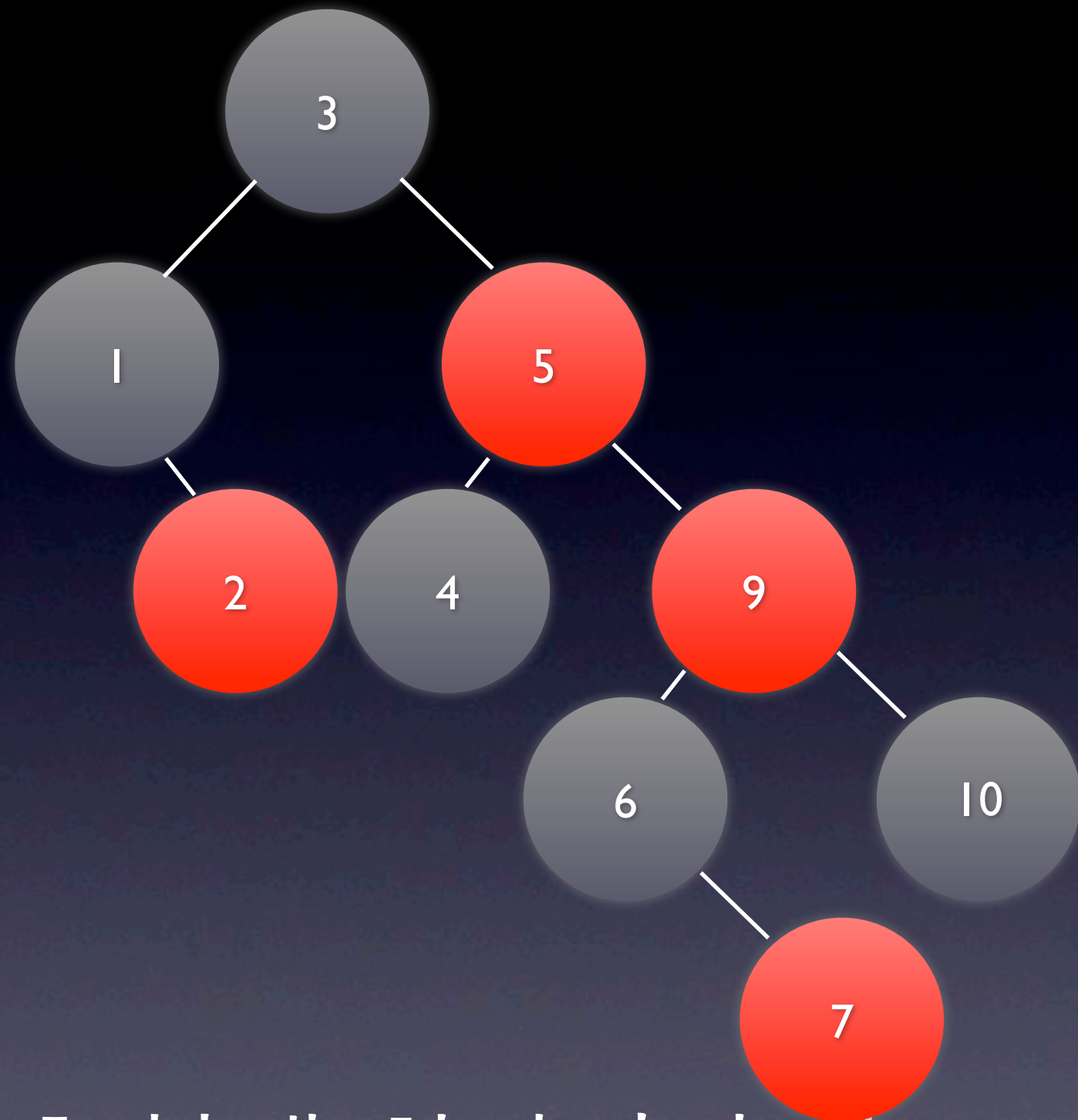
할아버지(5)는 부모가 블랙이니 OK



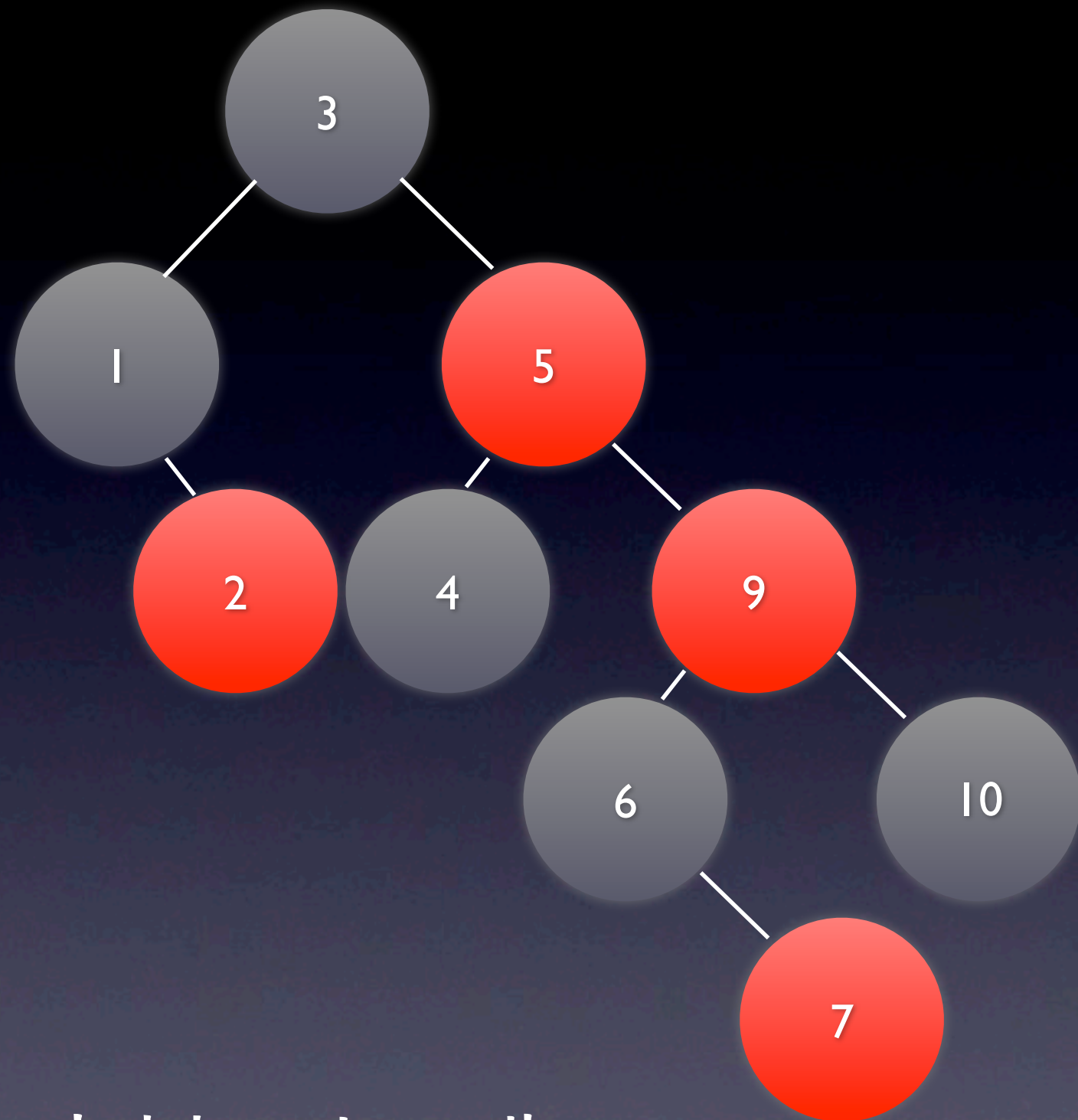
부모가 블랙이니 OK



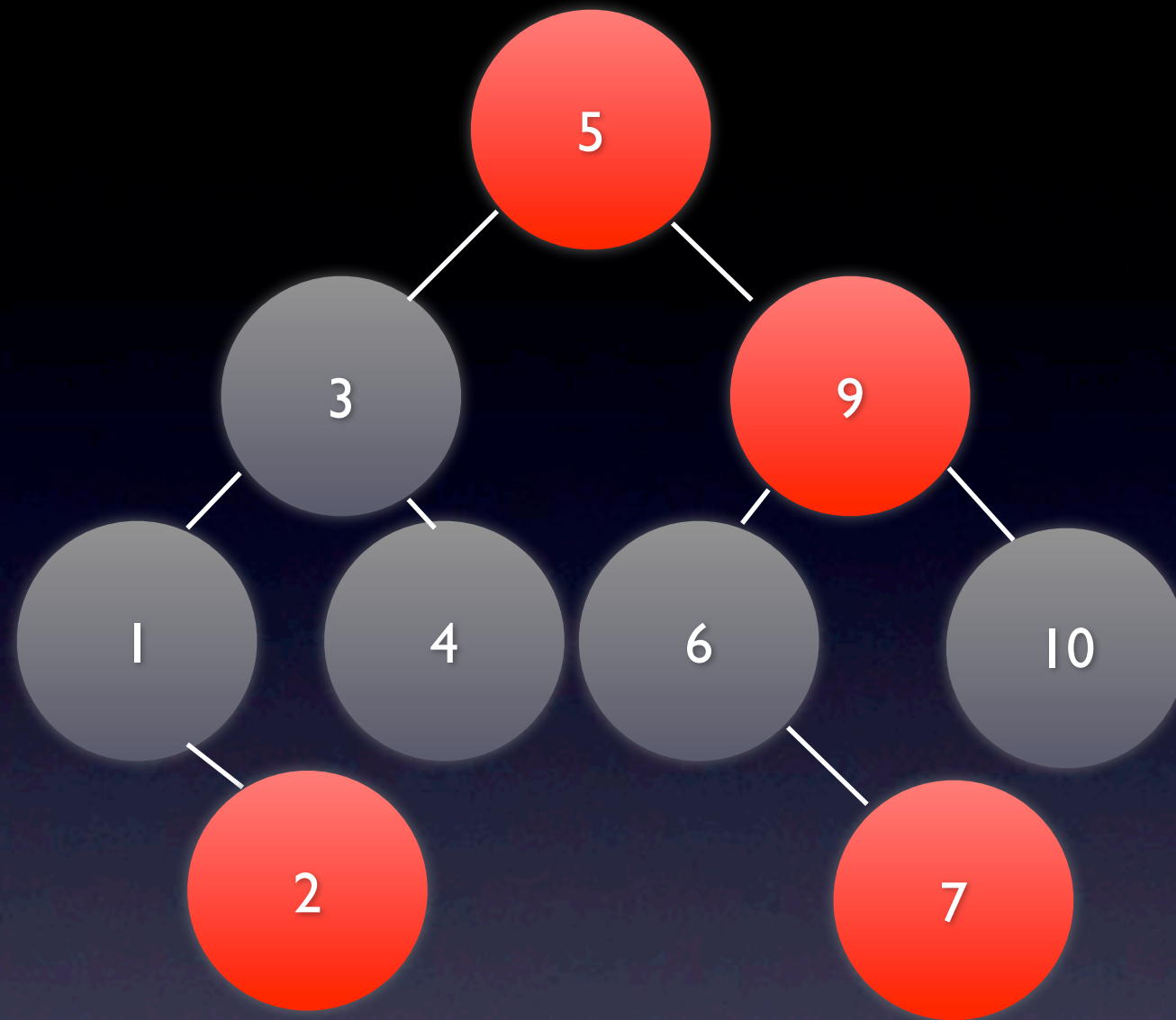
부모와 삼촌 둘다 레드



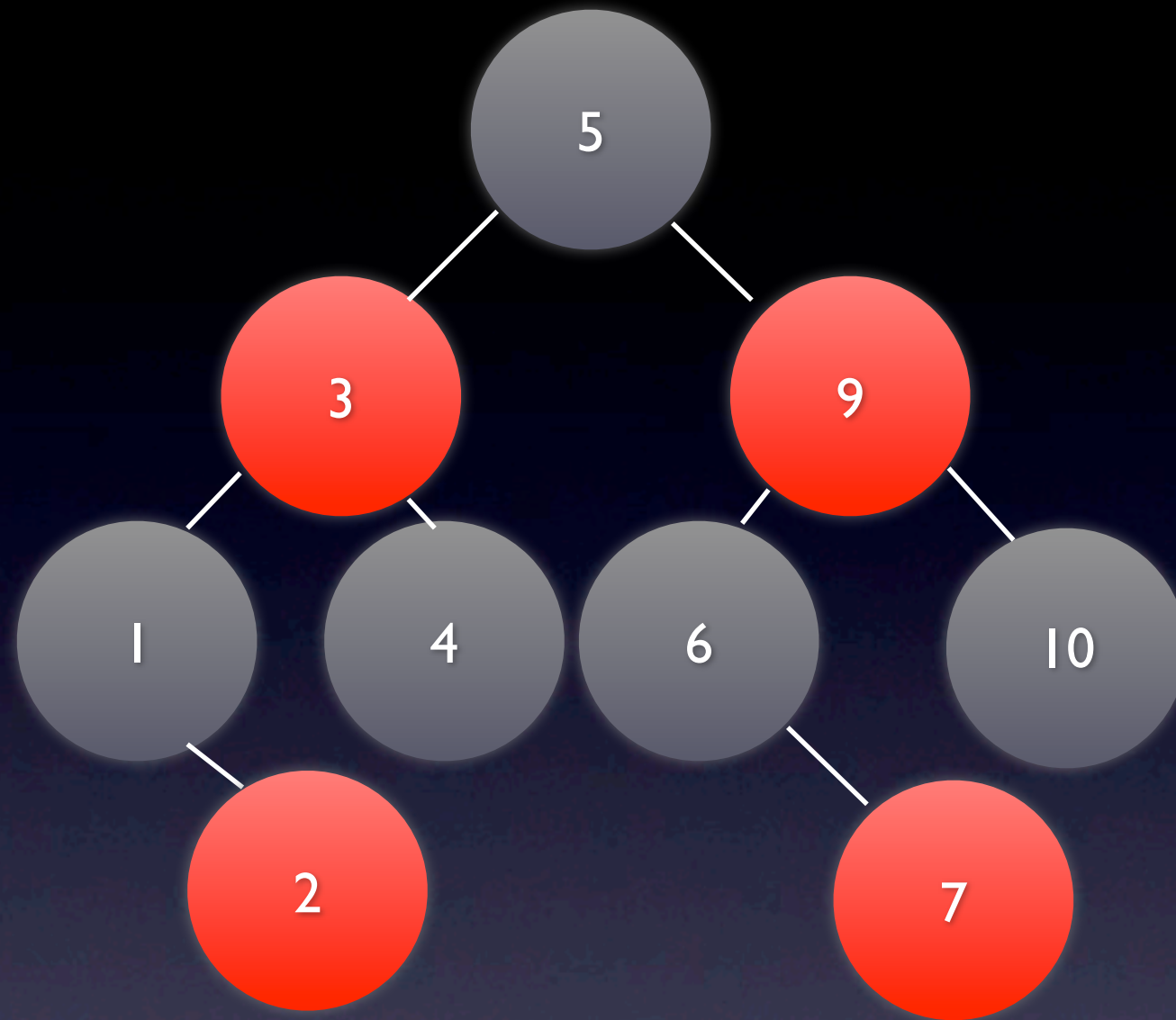
부모, 삼촌 블랙, 할아버지 레드



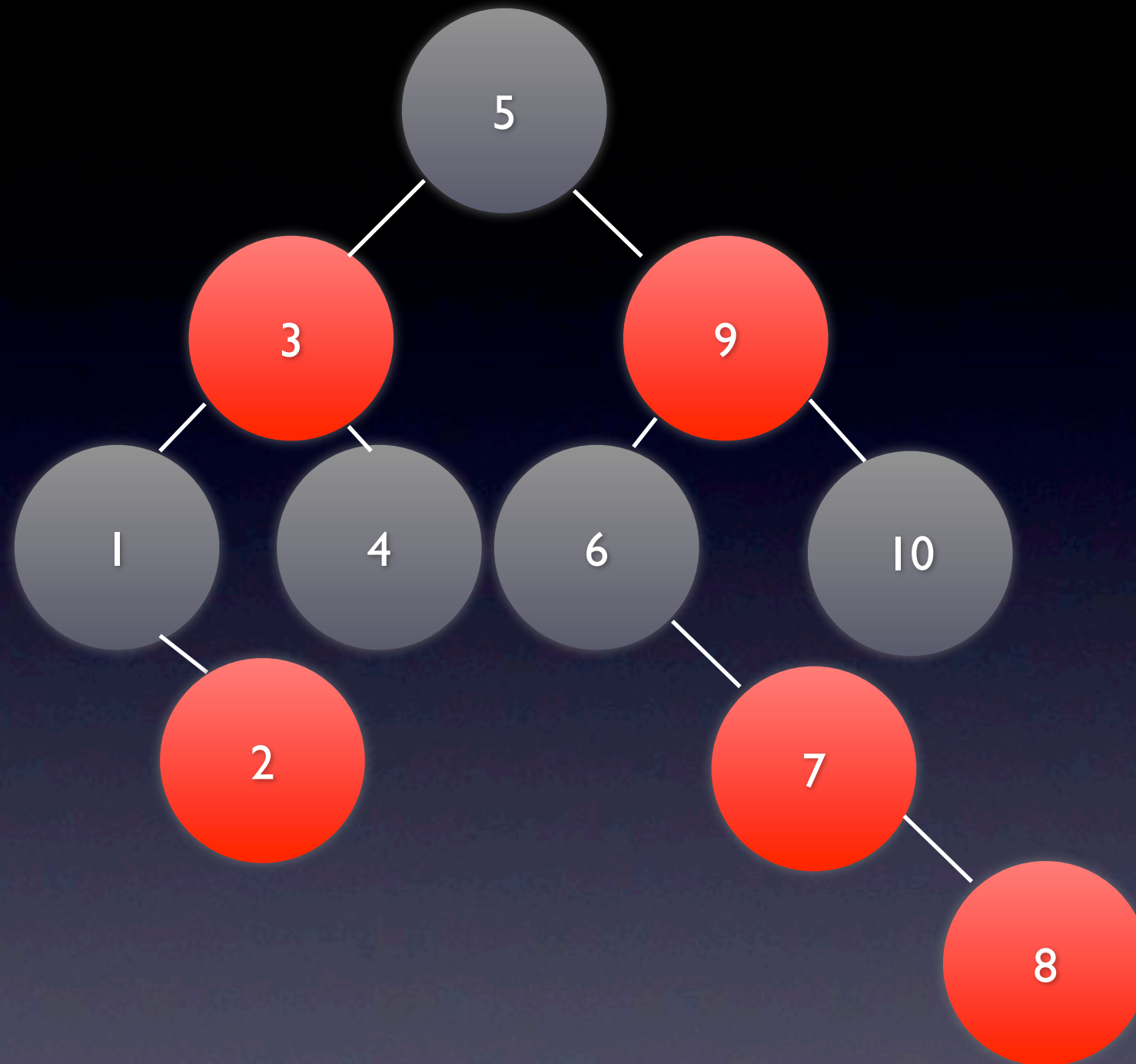
9의 부모는 레드...



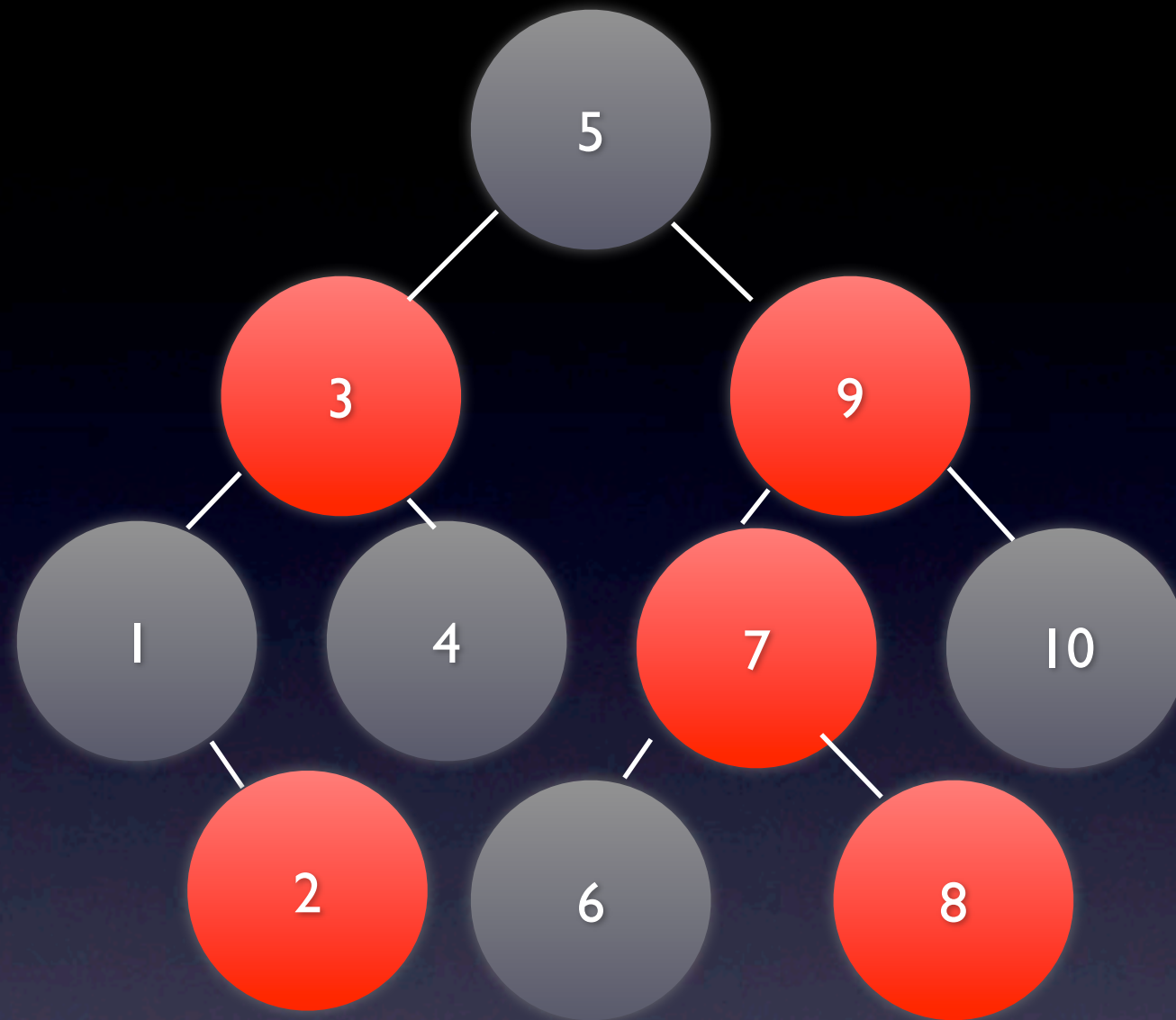
4가 왼편의 자식으로 이동
왼쪽으로 할아버지(3)를 돌림



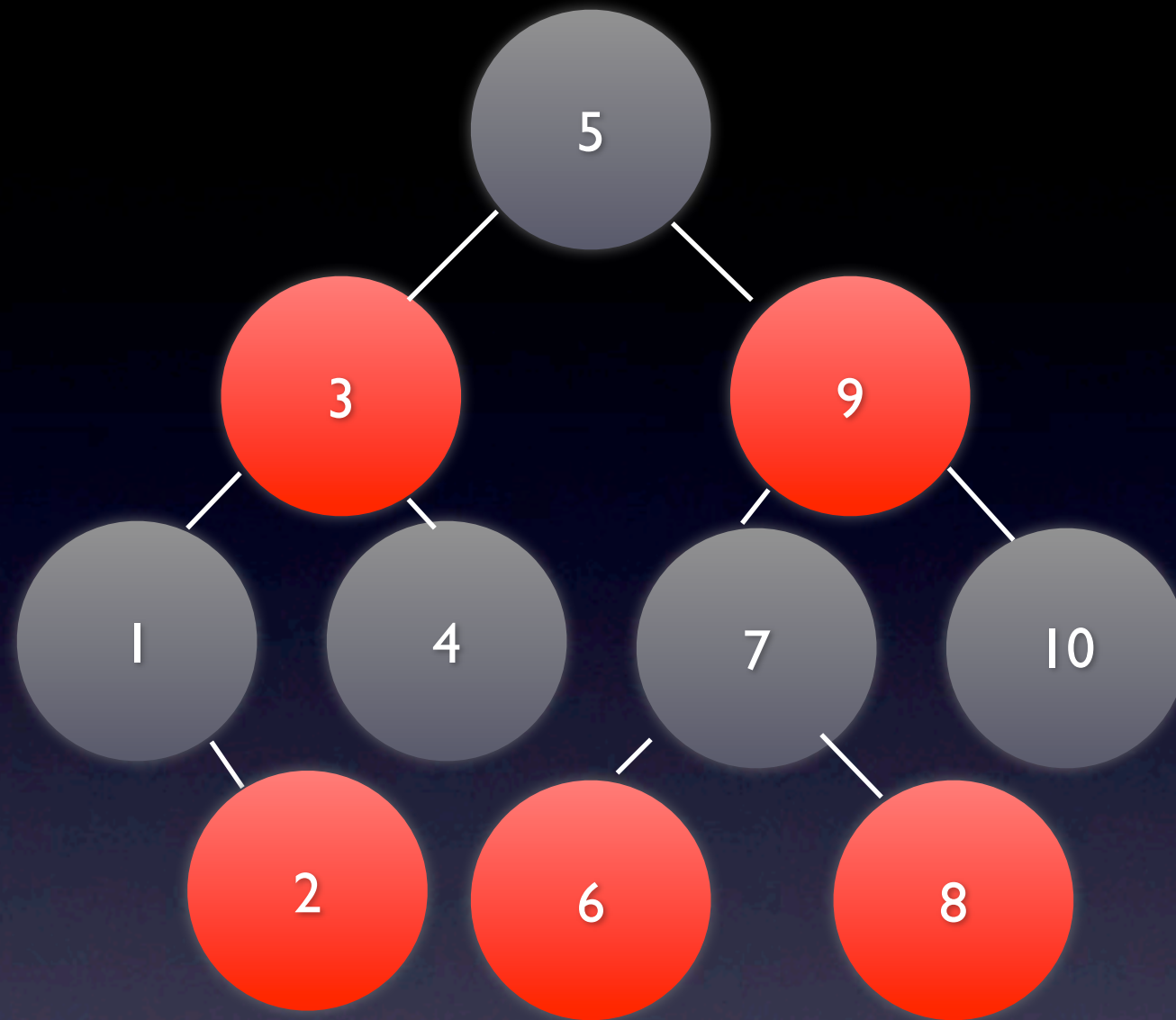
할아버지와 부모의 색상을 교체



부모, 자식 레드...



할아버지(6) 회전



색상 교체

nil