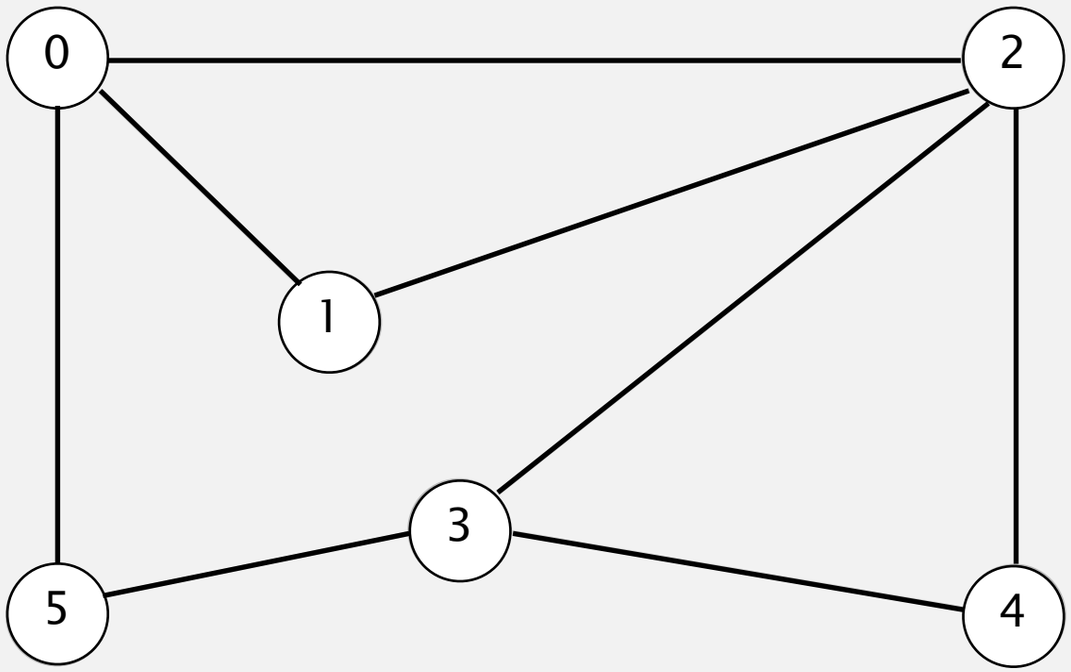
http://algs4.cs.princeton.edu

4.1 BREADTH-FIRST SEARCH DEMO

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



tinyCG.txt

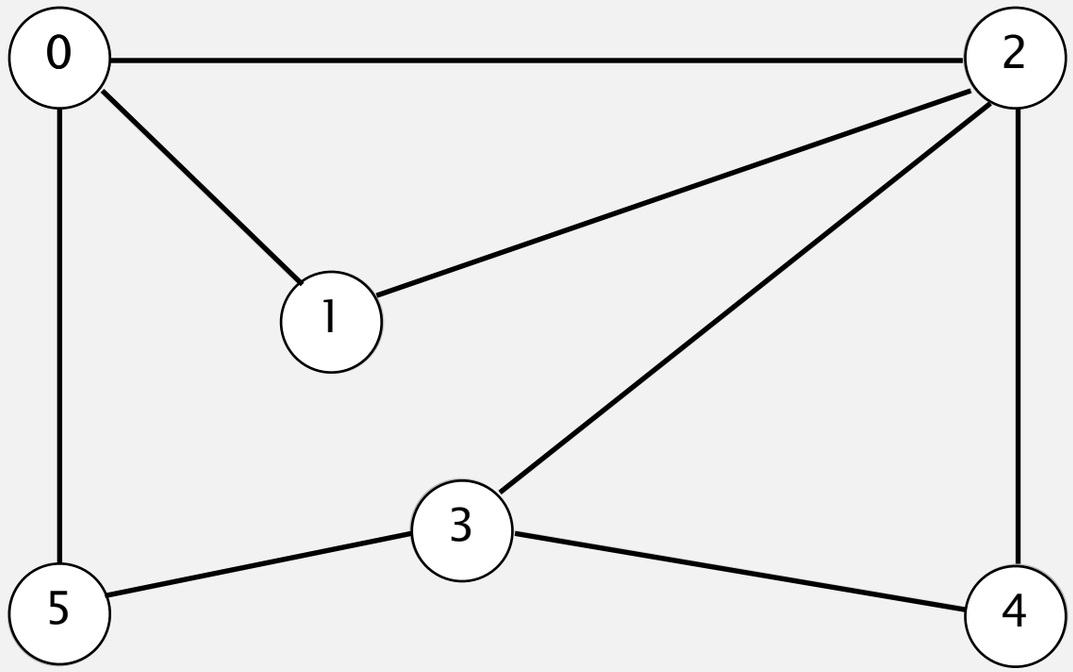
```
V
6
8   E
0 5
2 4
2 3
1 2
0 1
3 4
3 5
0 2
```

graph G

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



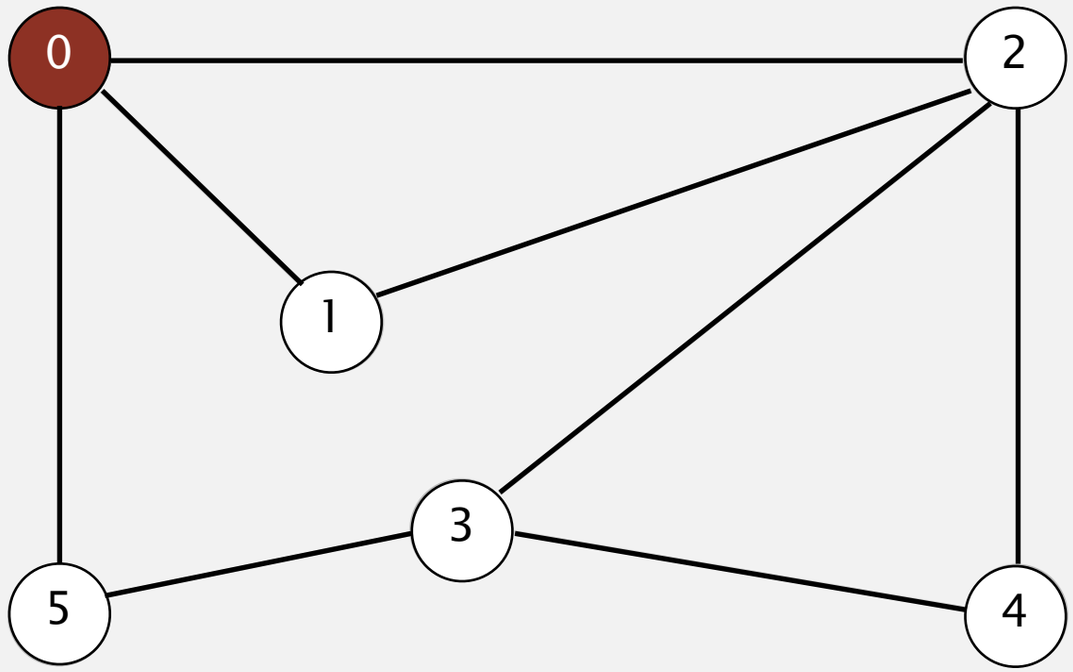
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	–	–
	2	–	–
	3	–	–
	4	–	–
	5	–	–

add 0 to queue

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



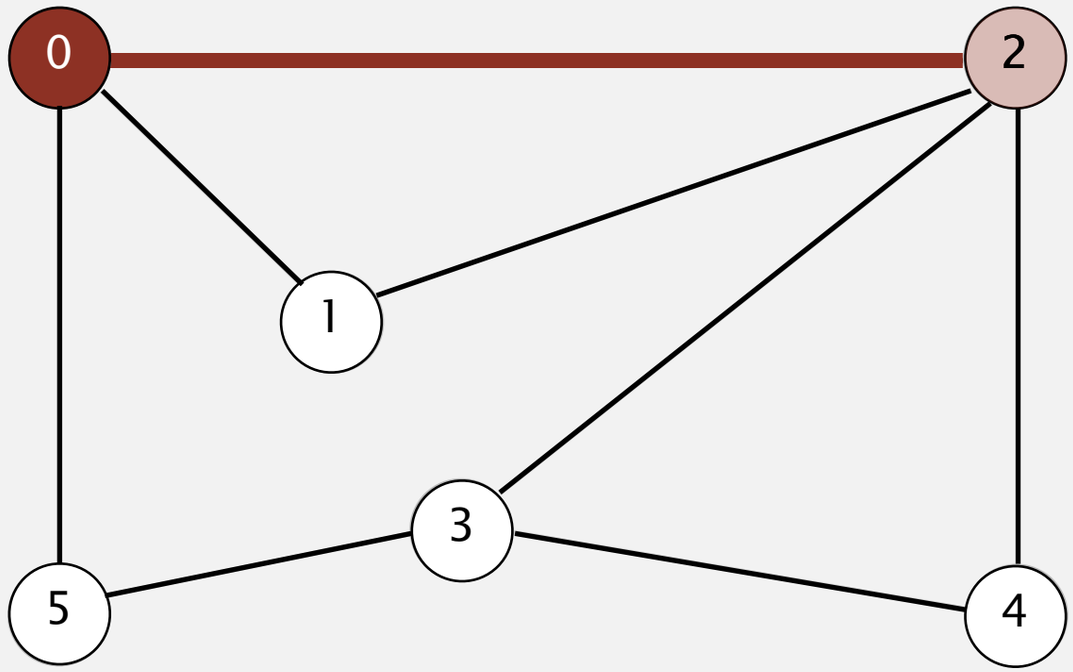
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	–	–
	2	–	–
	3	–	–
	4	–	–
	5	–	–
0			

dequeue 0

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



queue

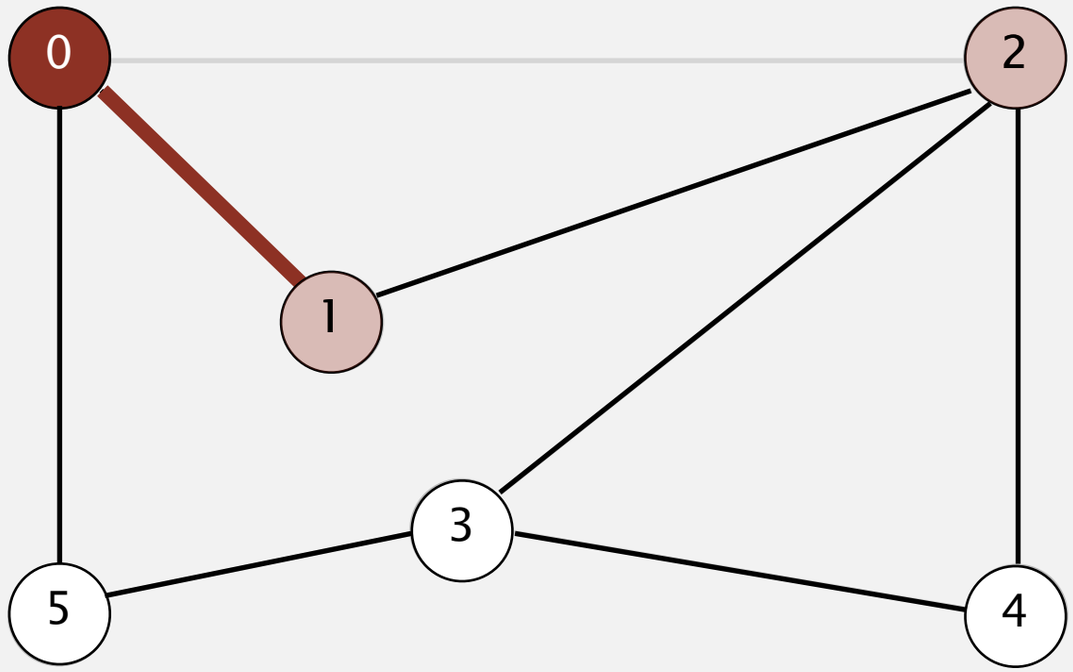
v	edgeTo[]	distTo[]
0	–	0
1	–	–
2	0	1
3	–	–
4	–	–
5	–	–

dequeue 0

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



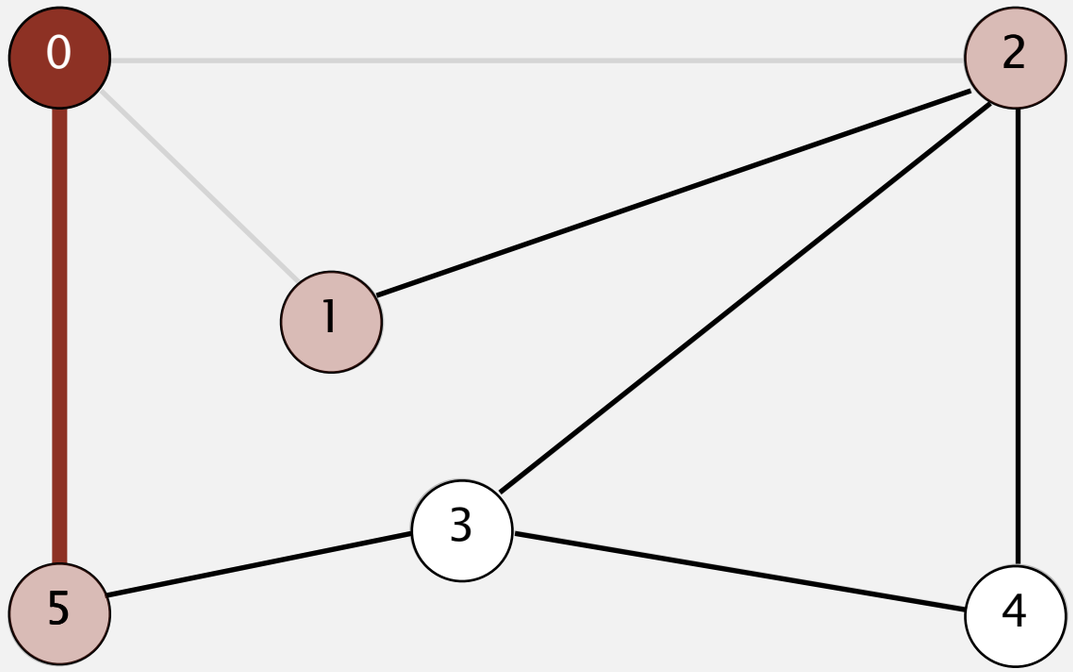
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	–	–
	4	–	–
	5	–	–
2			

dequeue 0

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



queue
1
2

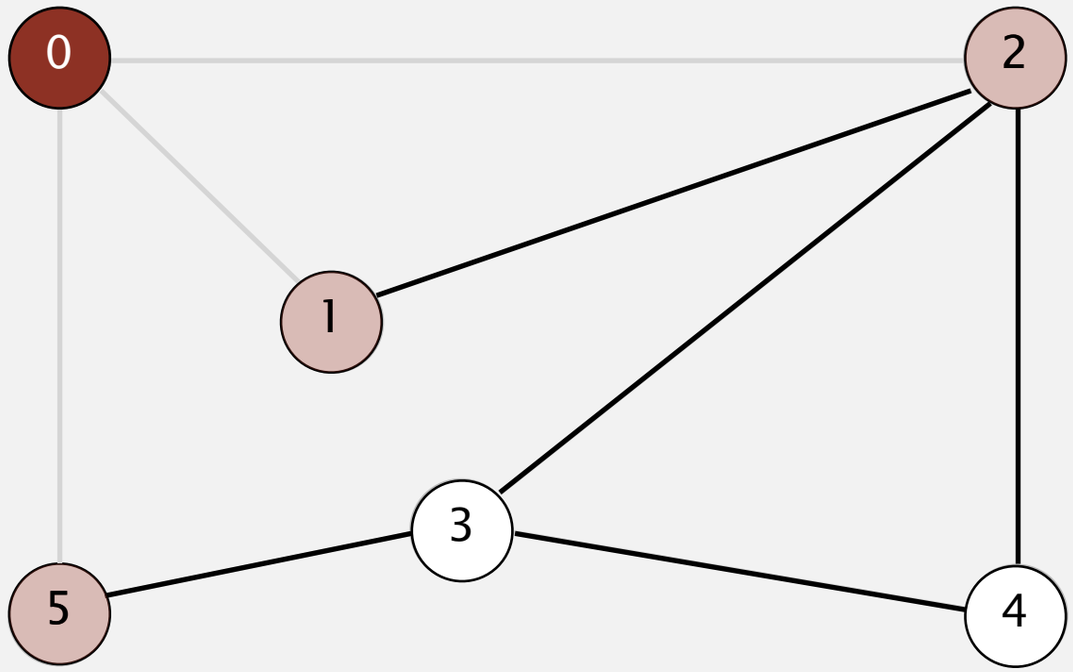
v	edgeTo[]	distTo[]
0	–	0
1	0	1
2	0	1
3	–	–
4	–	–
5	0	1

dequeue 0

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



queue
5
1
2

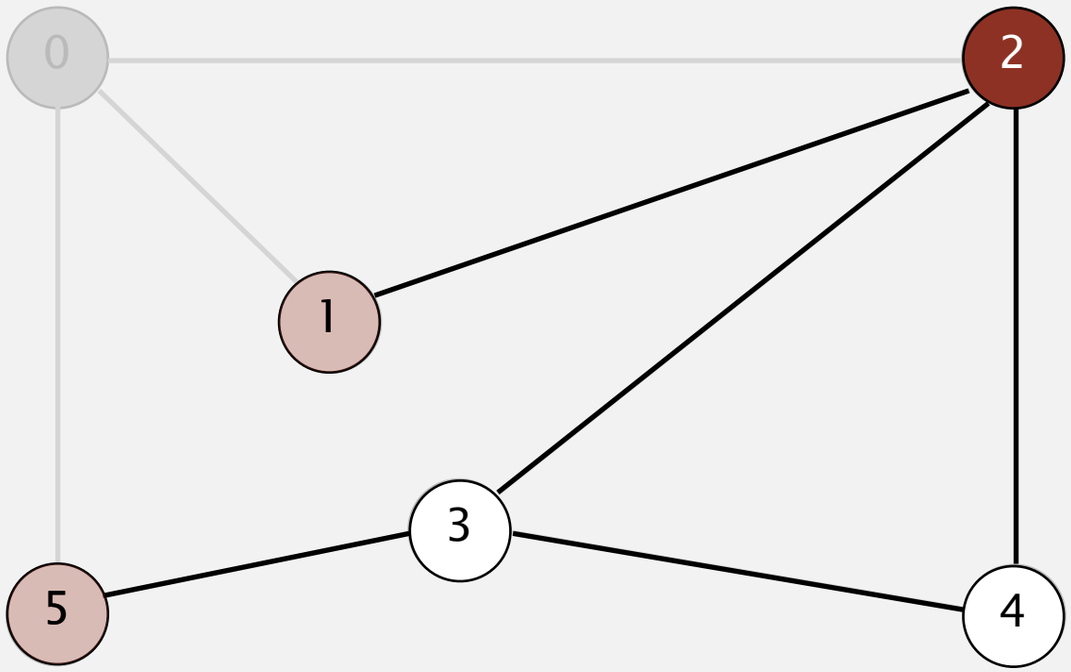
v	edgeTo[]	distTo[]
0	–	0
1	0	1
2	0	1
3	–	–
4	–	–
5	0	1

0 done

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



queue
5
1
2

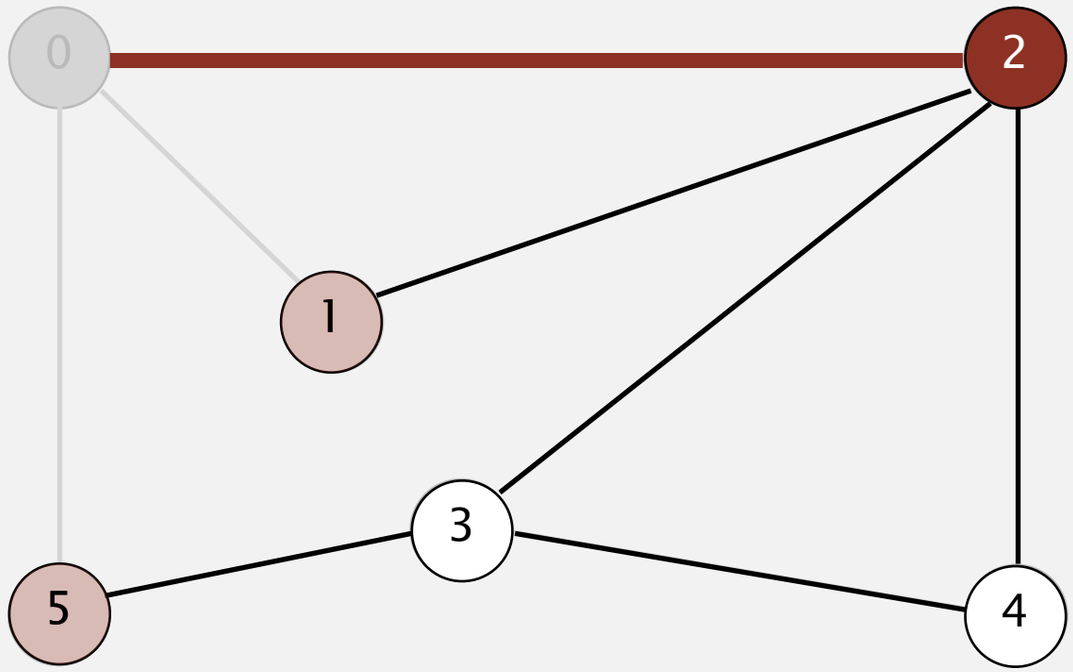
v	edgeTo[]	distTo[]
0	–	0
1	0	1
2	0	1
3	–	–
4	–	–
5	0	1

dequeue 2

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



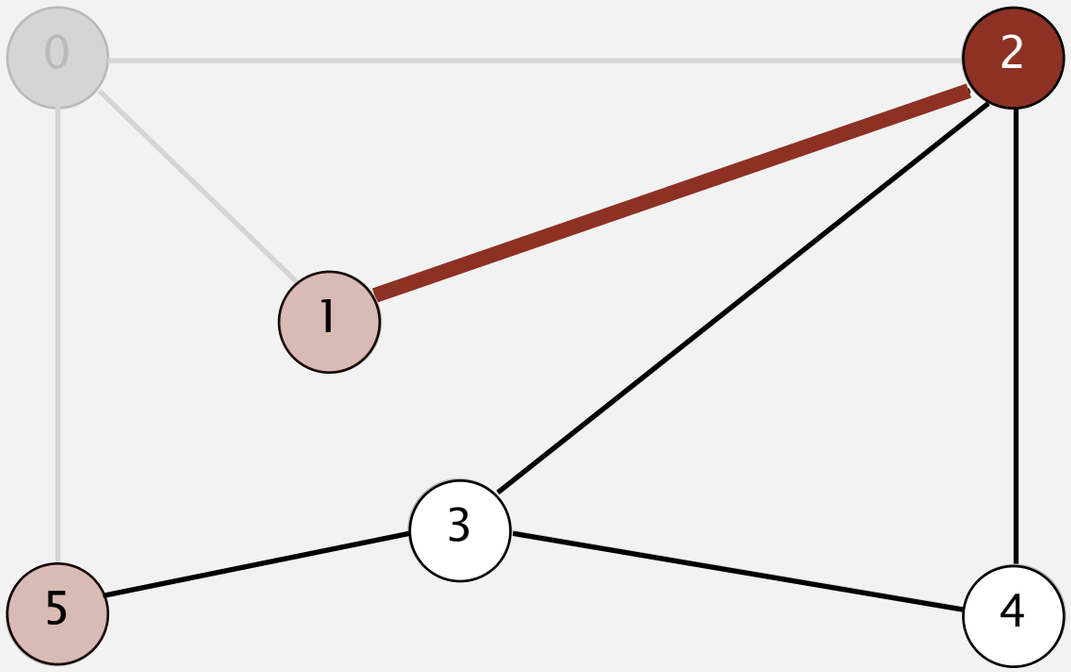
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	–	–
	4	–	–
5	5	0	1
1			

dequeue 2

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



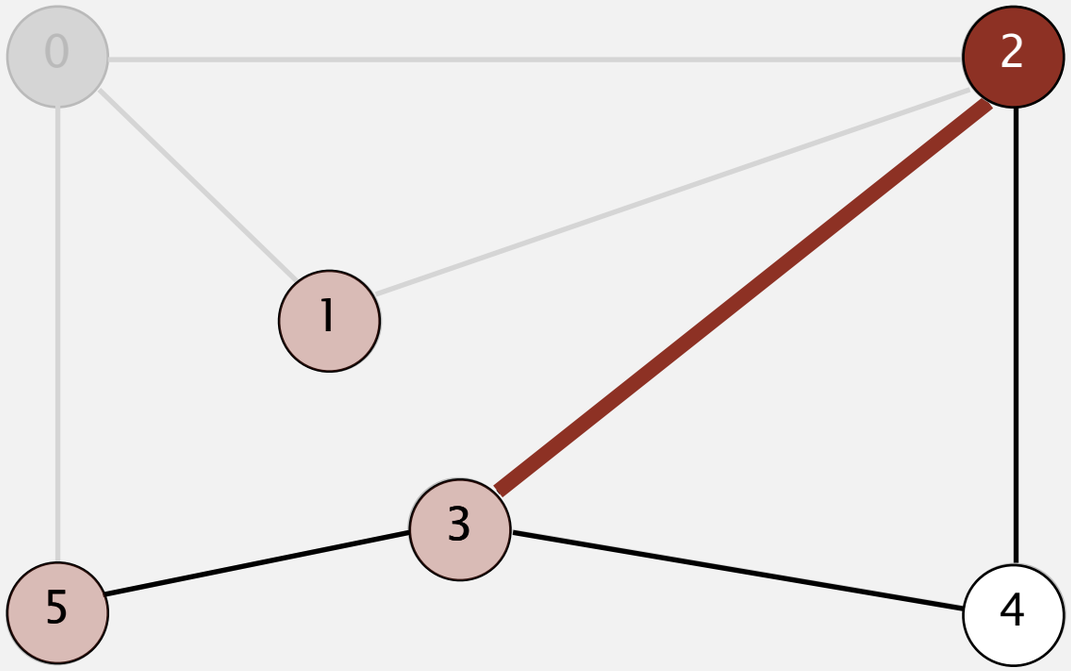
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	–	–
	4	–	–
5	5	0	1
1			

dequeue 2

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



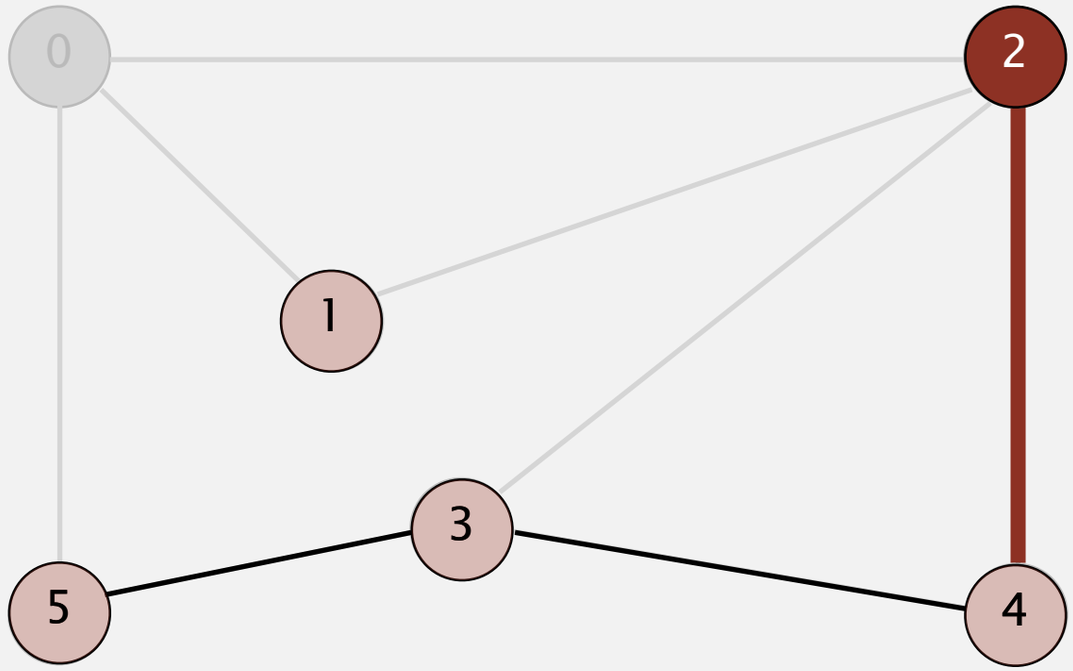
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	–	–
5	5	0	1
1			

dequeue 2

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



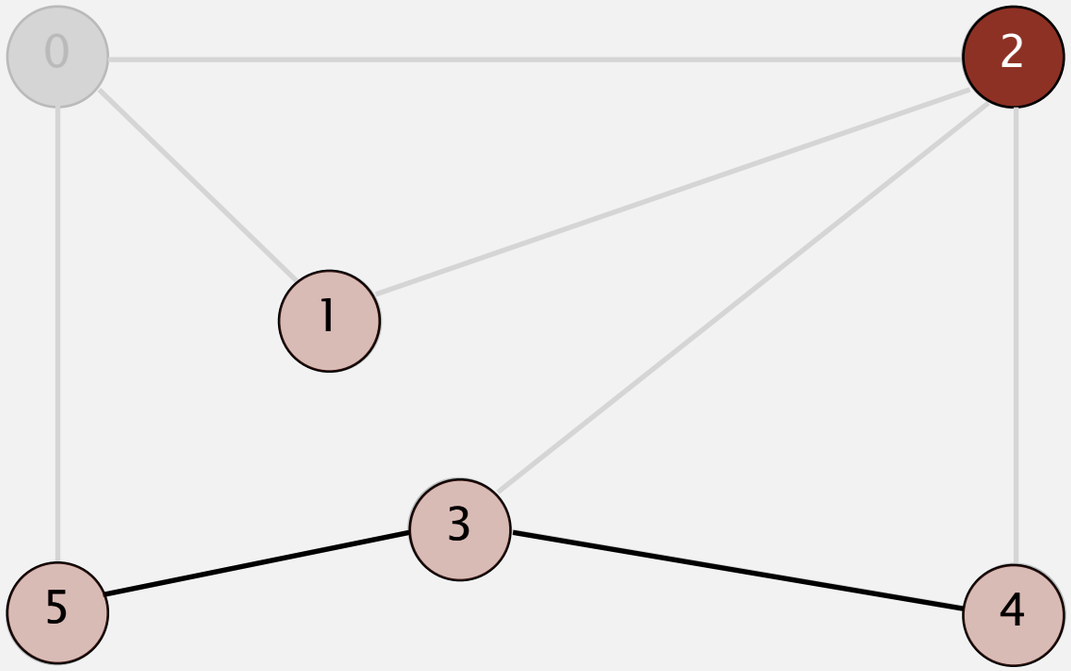
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
3	3	2	2
5	4	2	2
1	5	0	1

dequeue 2

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



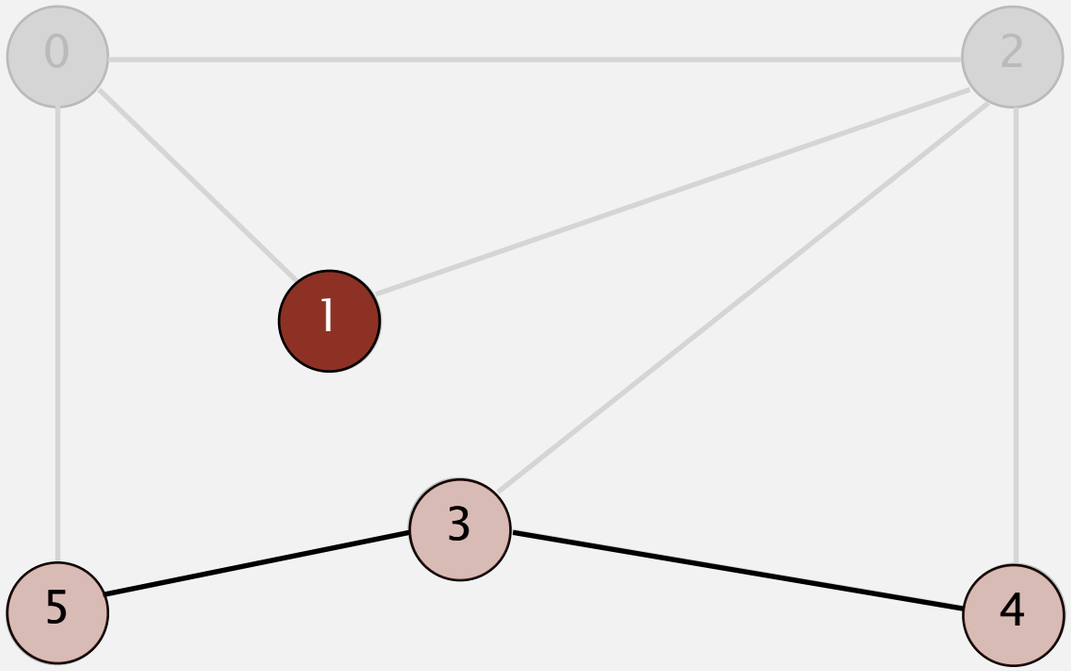
queue	v	edgeTo[]	distTo[]
	0	–	0
1	1	0	1
4	2	0	1
3	3	2	2
5	4	2	2
	5	0	1

2 done

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



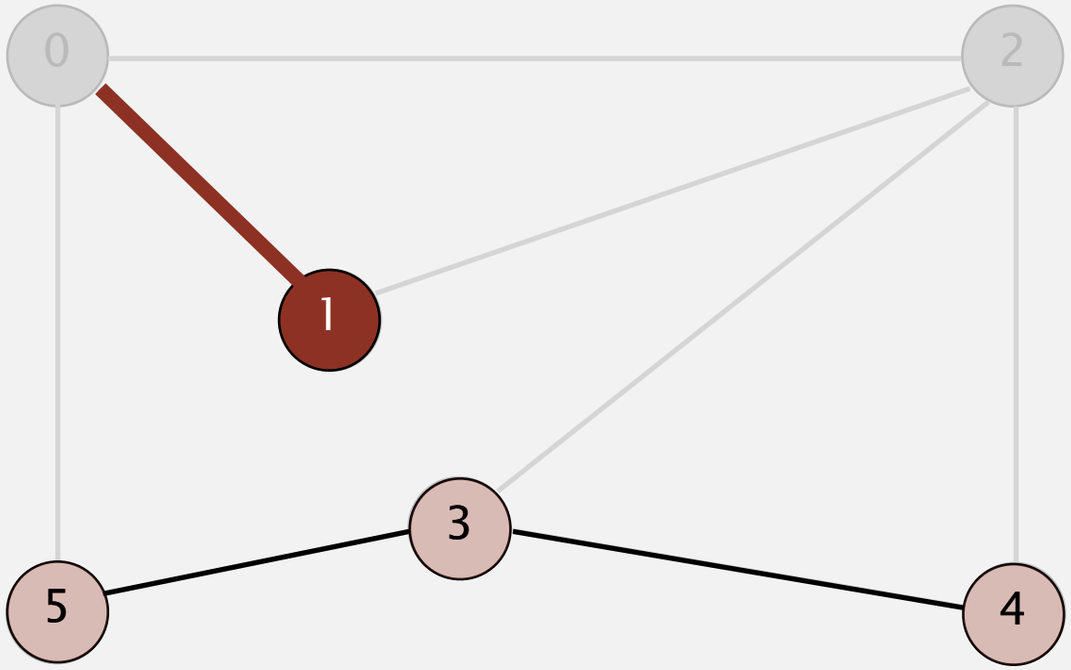
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
4	2	0	1
	3	2	2
3	4	2	2
	5	0	1
5			
1			

dequeue 1

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



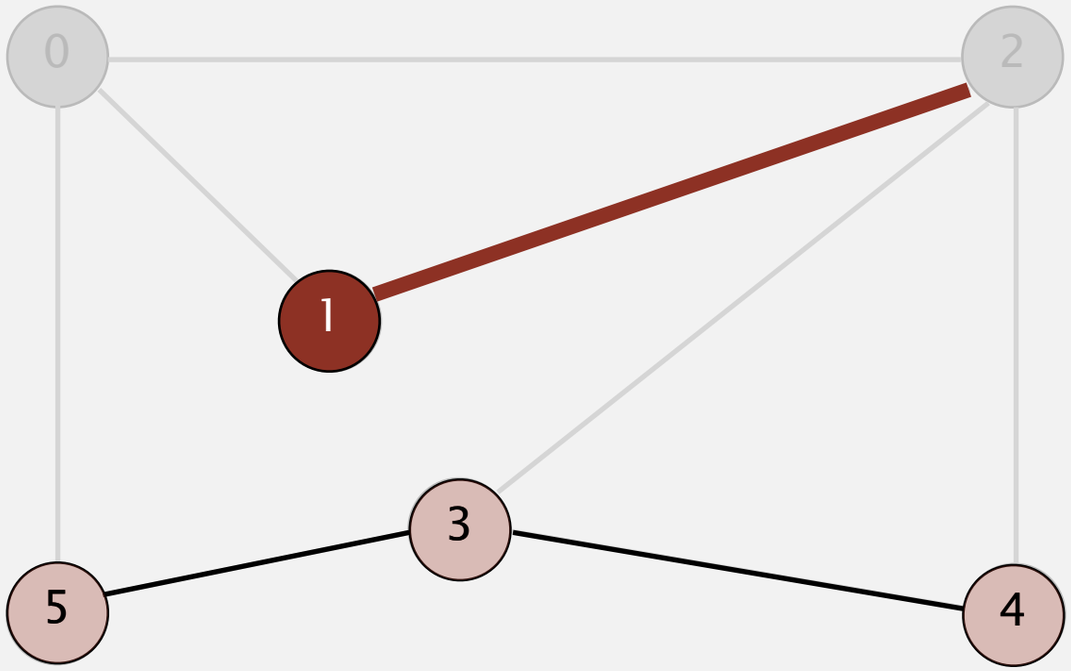
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
4	4	2	2
3	5	0	1
5			

dequeue 1

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



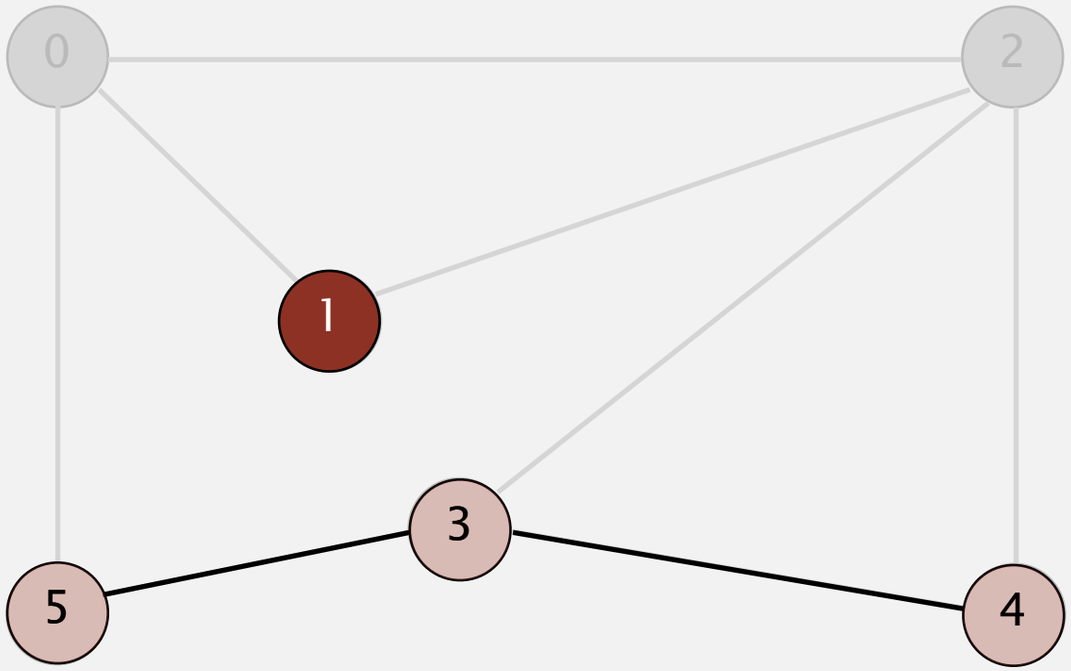
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
4	4	2	2
3	5	0	1
5			

dequeue 1

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



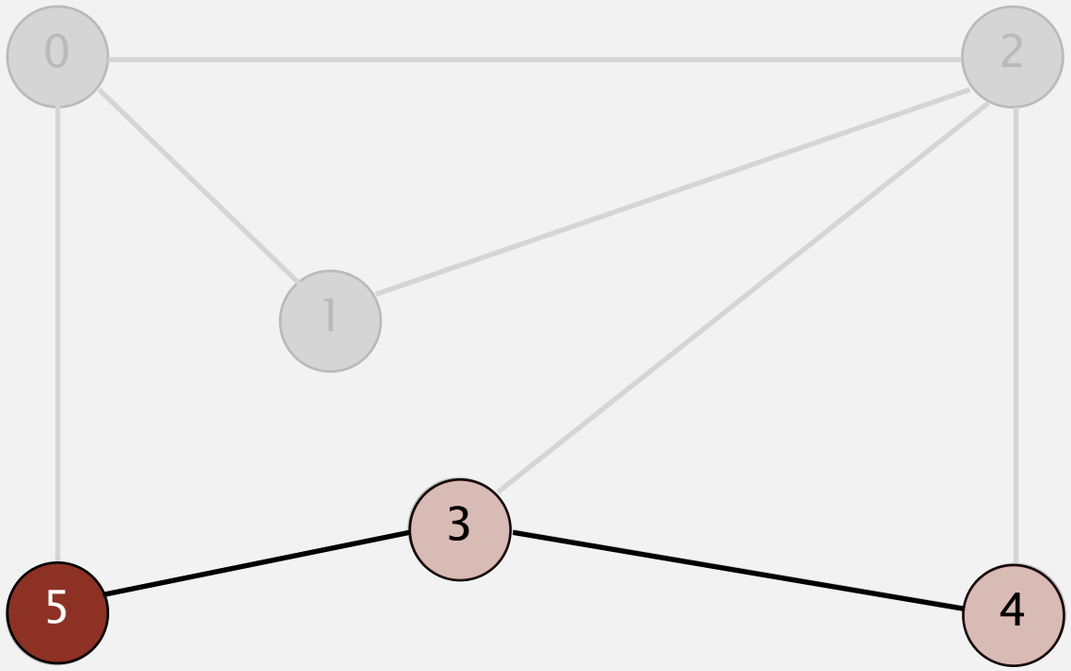
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
4	3	2	2
	4	2	2
3	5	0	1
5			

1 done

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



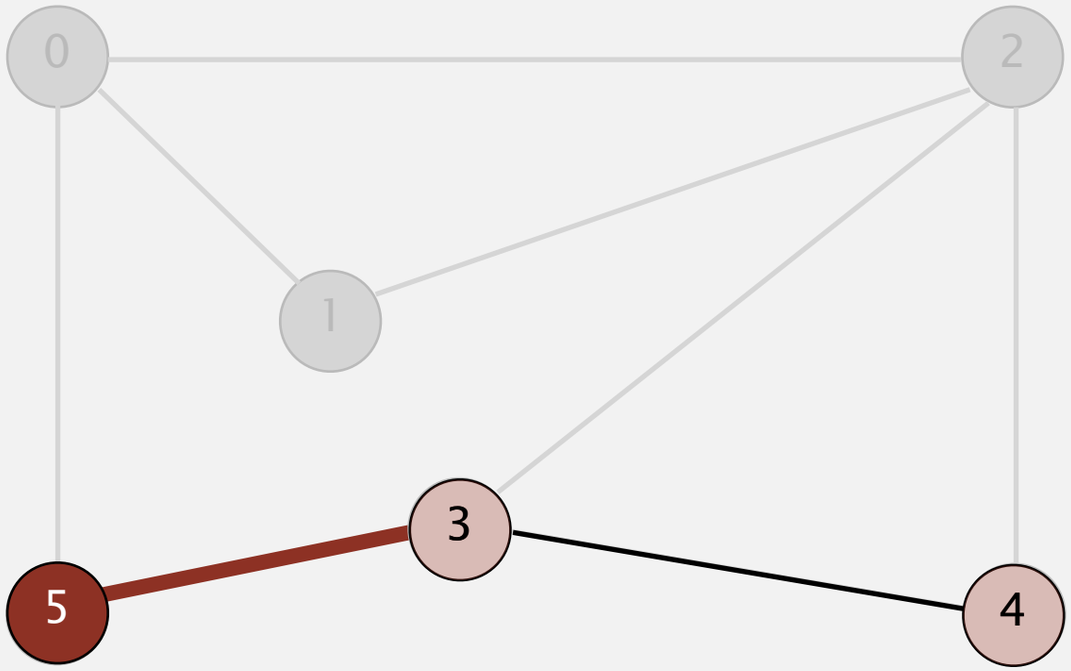
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
4	3	2	2
	4	2	2
3	5	0	1
5			

dequeue 5

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



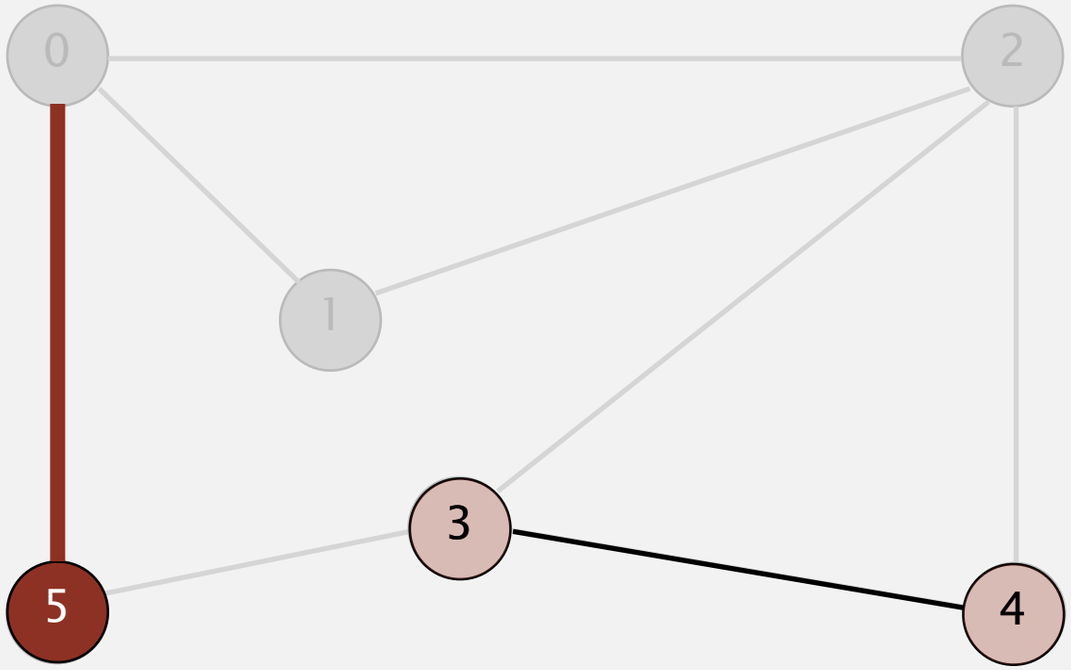
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
4	5	0	1
3			

dequeue 5

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



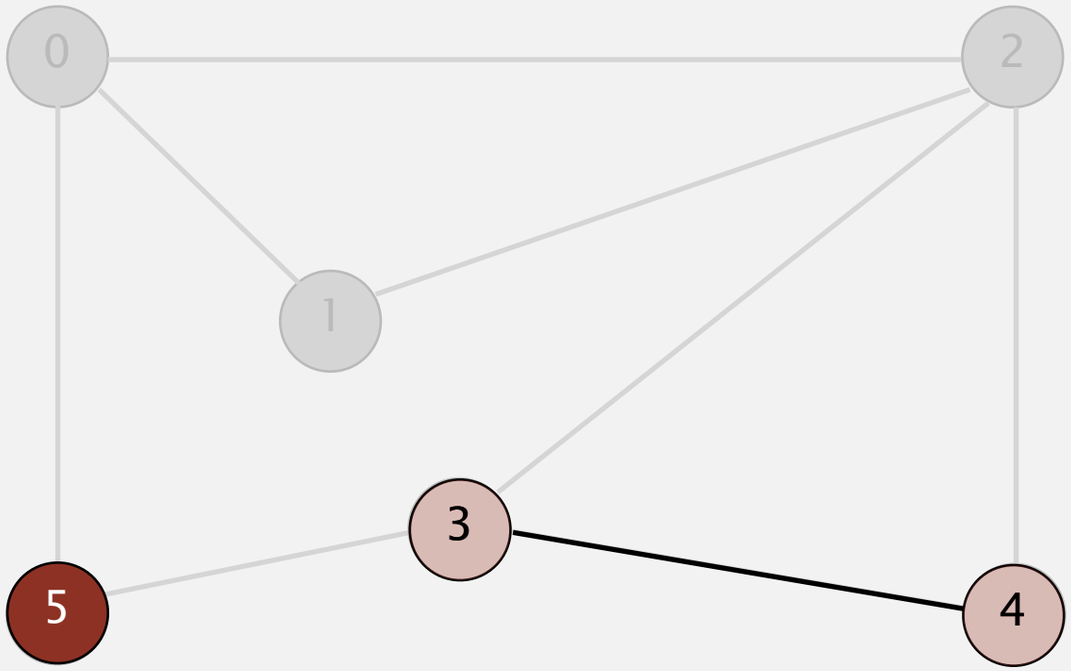
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
4	5	0	1
3			

dequeue 5

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



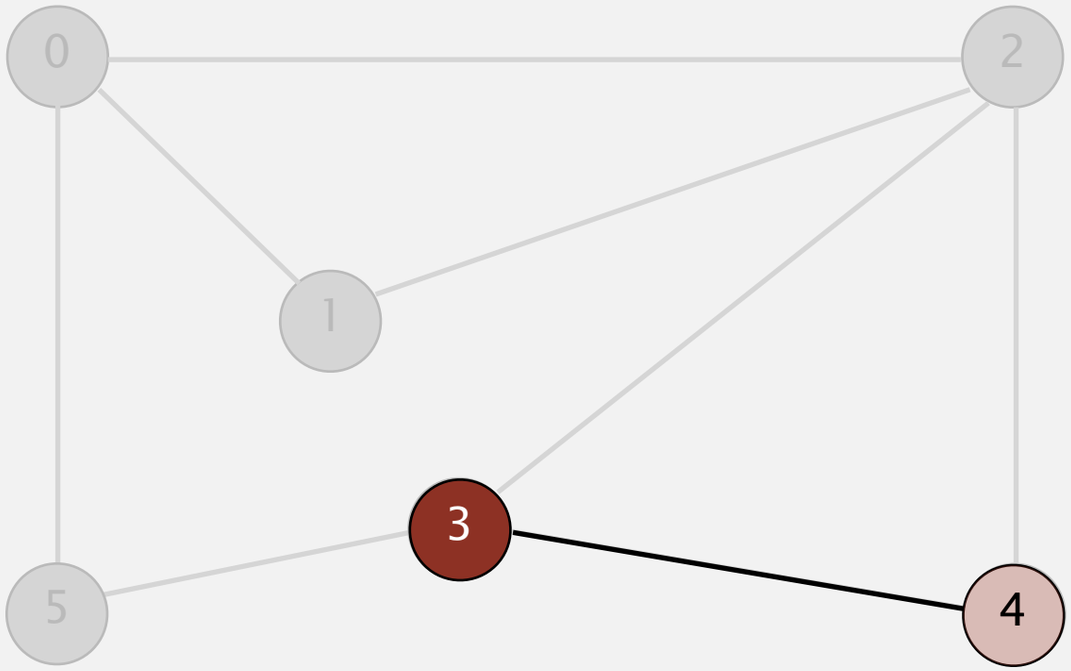
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1
4			
3			

5 done

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



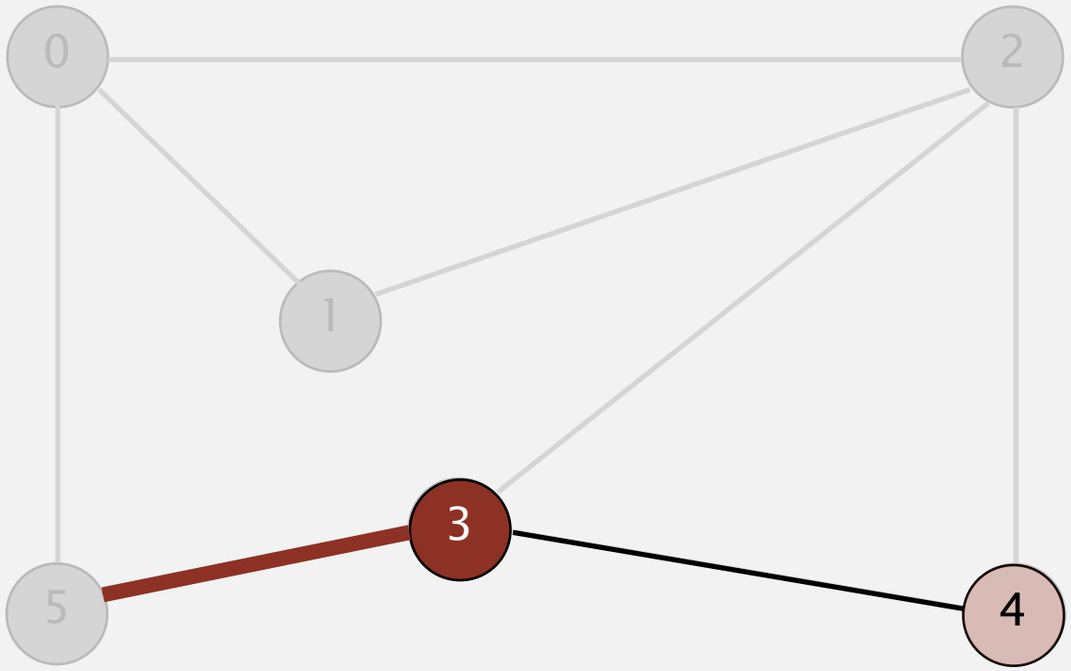
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
4	5	0	1
3			

dequeue 3

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



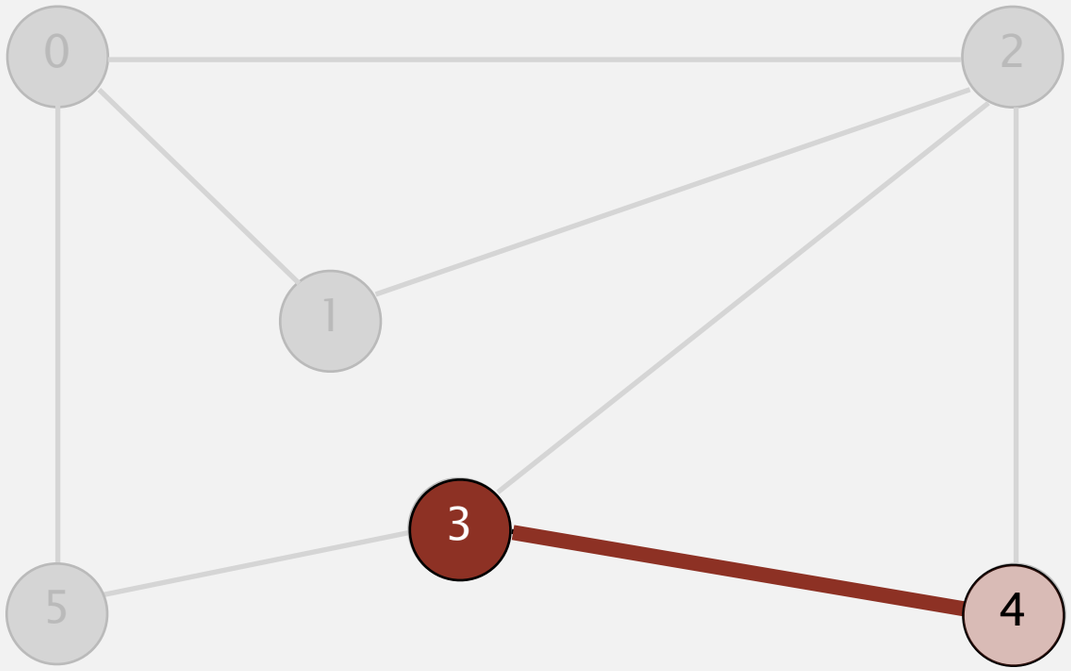
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1
4			

dequeue 3

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



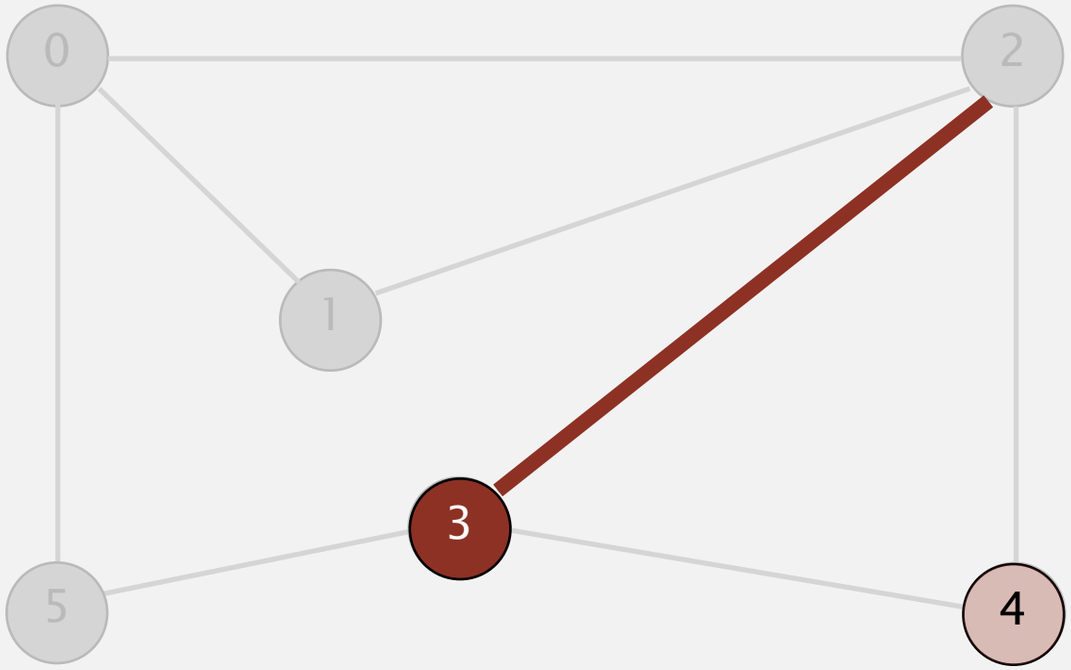
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1
4			

dequeue 3

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



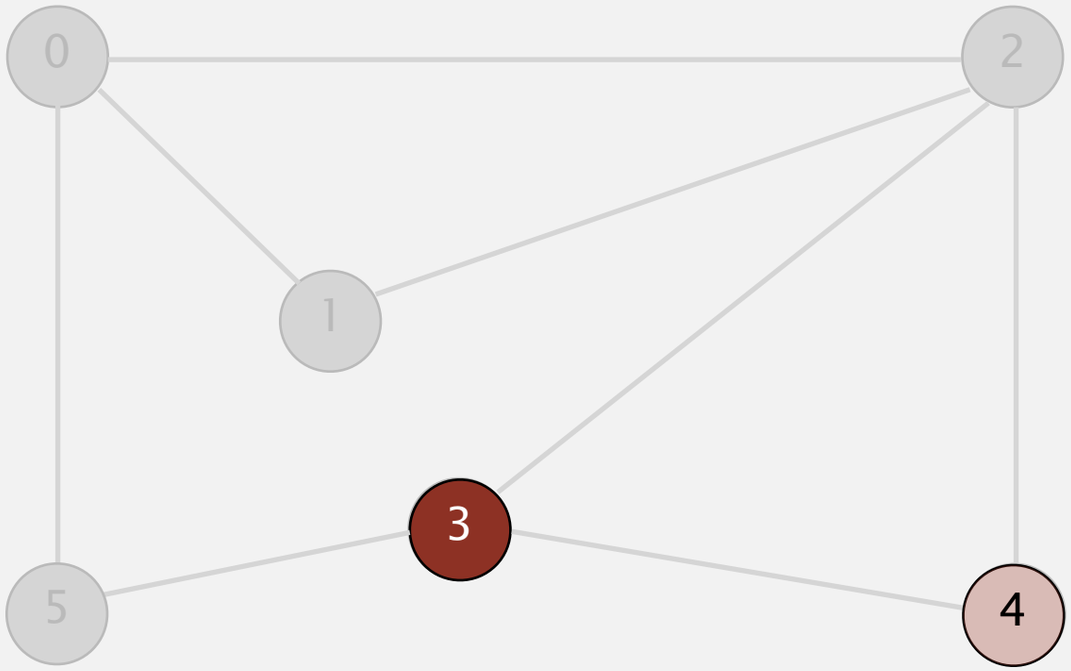
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1
4			

dequeue 3

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



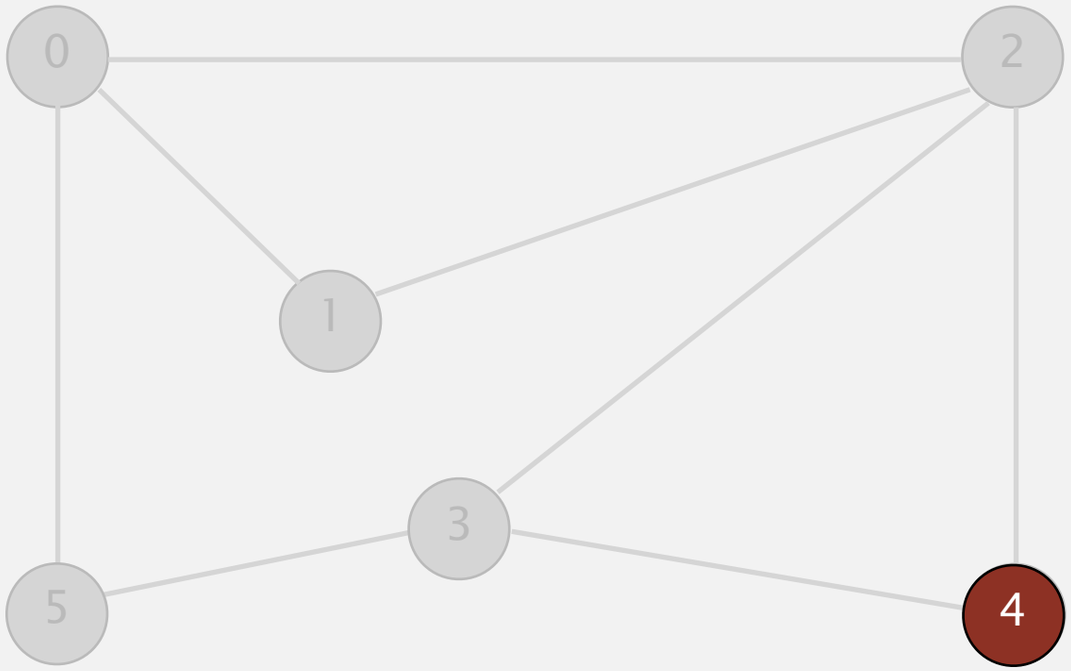
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1
4			

3 done

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



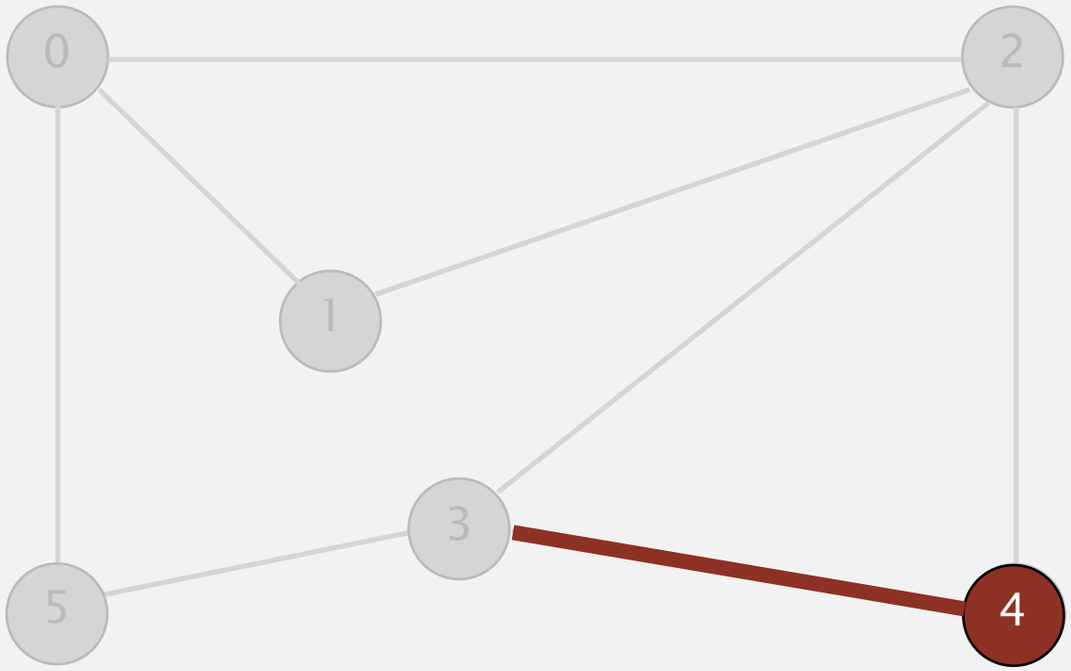
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1
4			

dequeue 4

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



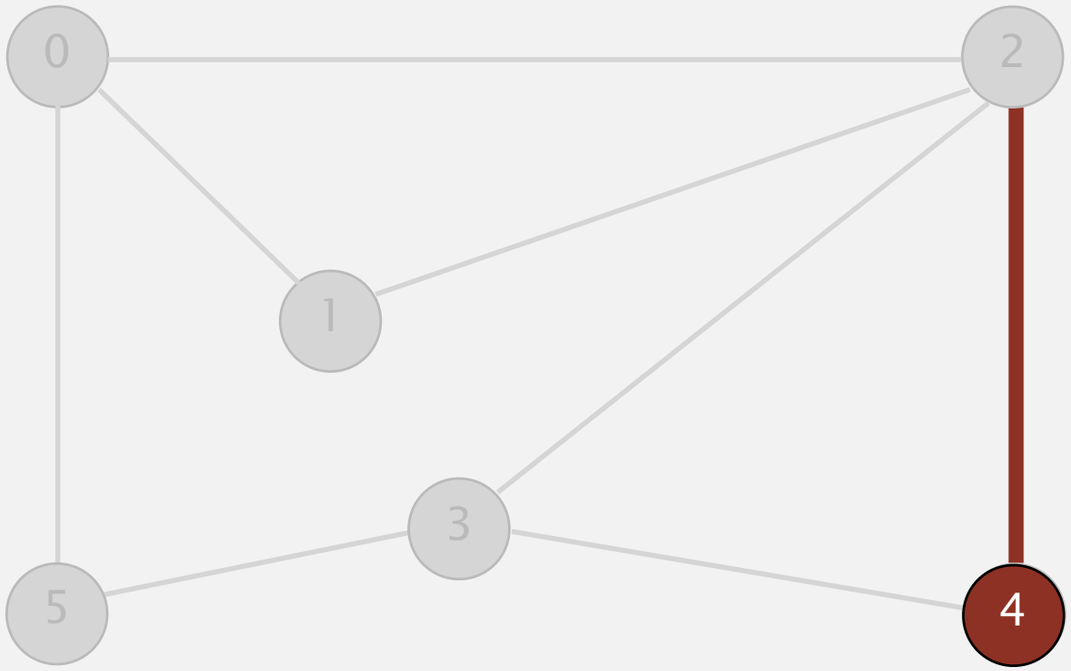
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1

dequeue 4

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



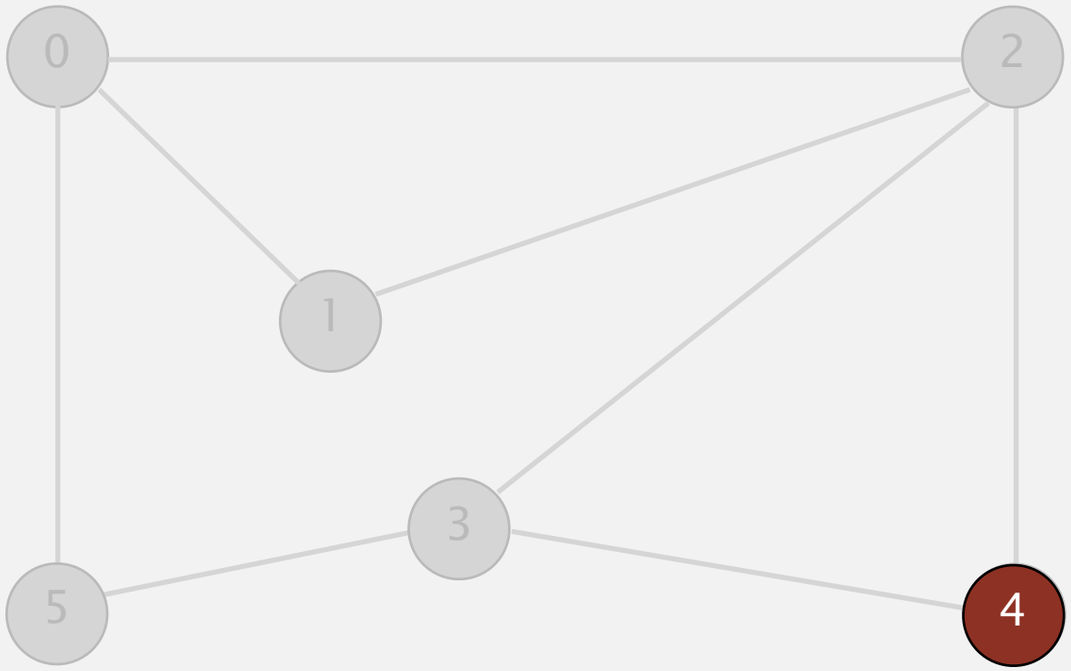
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1

dequeue 4

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



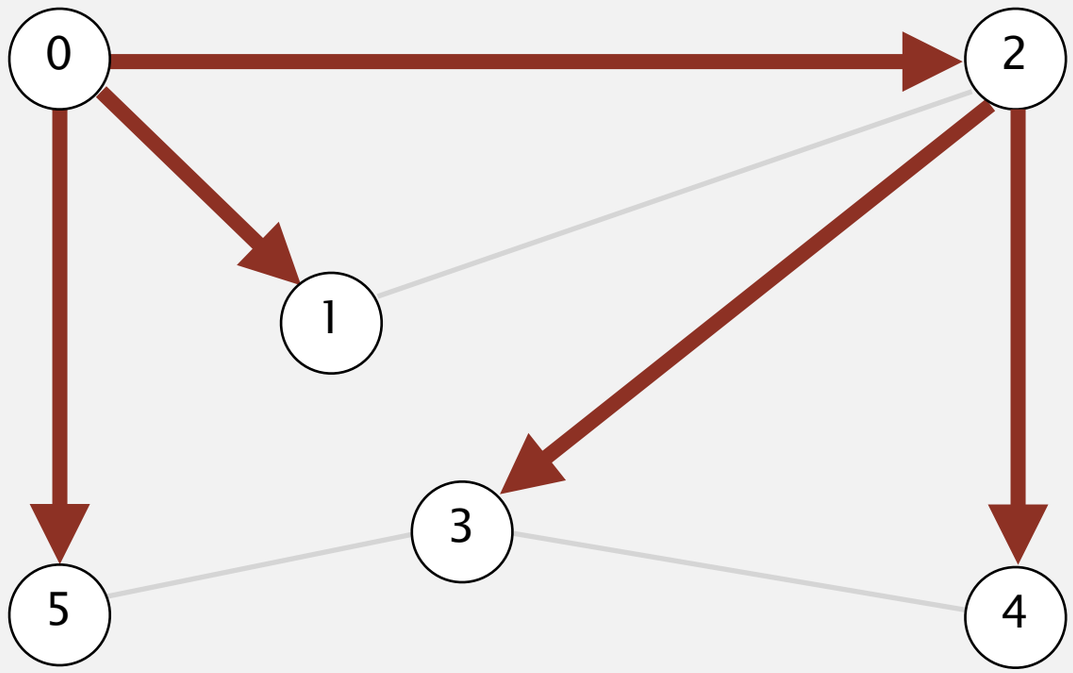
queue	v	edgeTo[]	distTo[]
	0	–	0
	1	0	1
	2	0	1
	3	2	2
	4	2	2
	5	0	1

4 done

Breadth-first search demo

Repeat until queue is empty:

- Remove vertex v from queue.
- Add to queue all unmarked vertices adjacent to v and mark them.



v	edgeTo[]	distTo[]
0	–	0
1	0	1
2	0	1
3	2	2
4	2	2
5	0	1

done