ISEN | école d'ingénieurs
LILLE

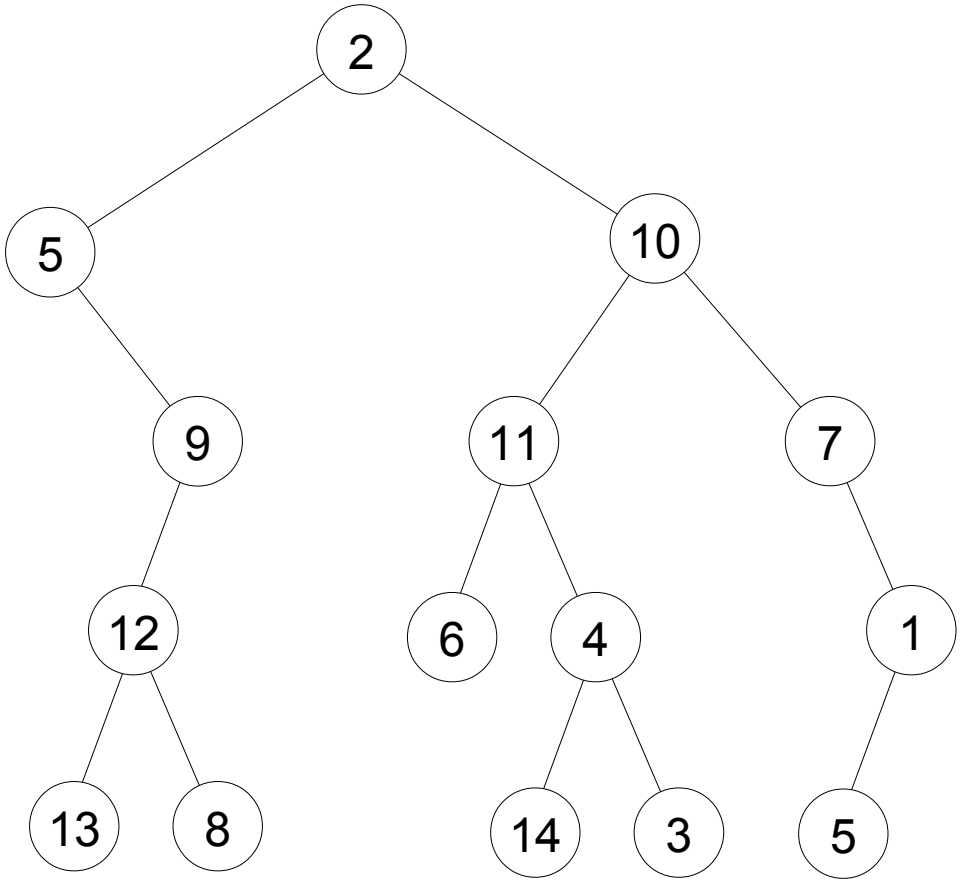
Tree Traversal algorithms

Breadth-first traversal

Principle

Breadth-first traversal

Principle

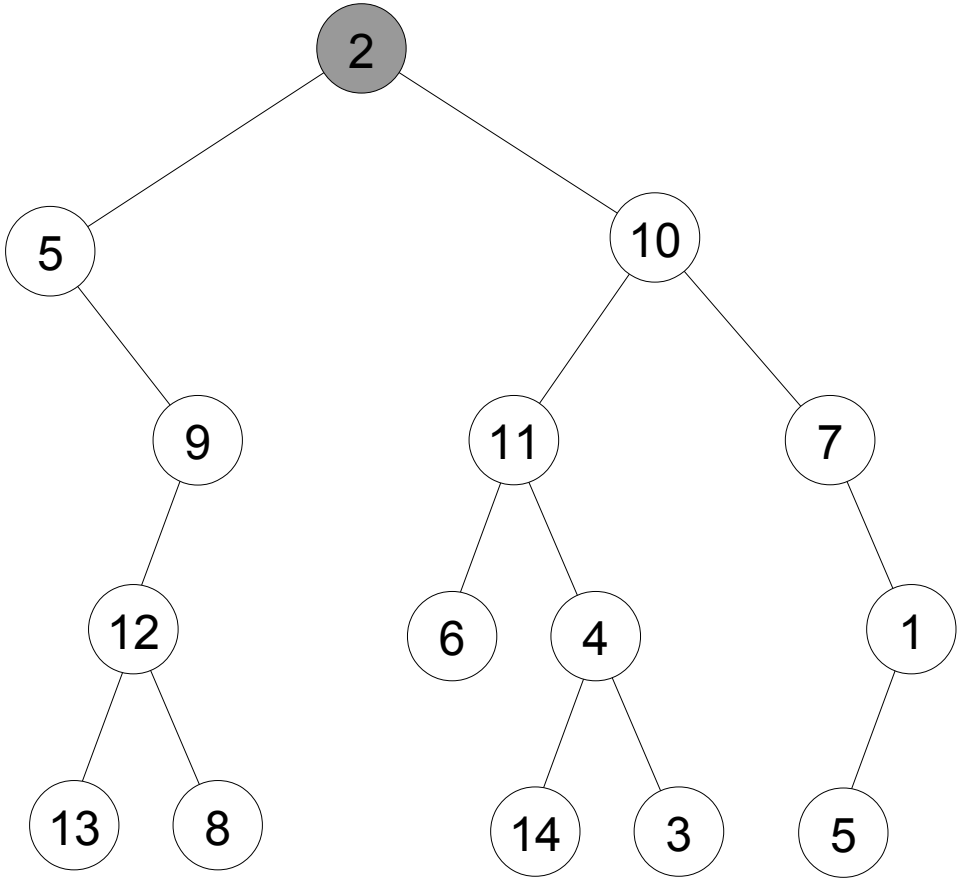


The tree is traversed level by level

```
Visited nodes:
```

Breadth-first traversal

Principle



The tree is traversed level by level

```
Visited nodes:
2
```

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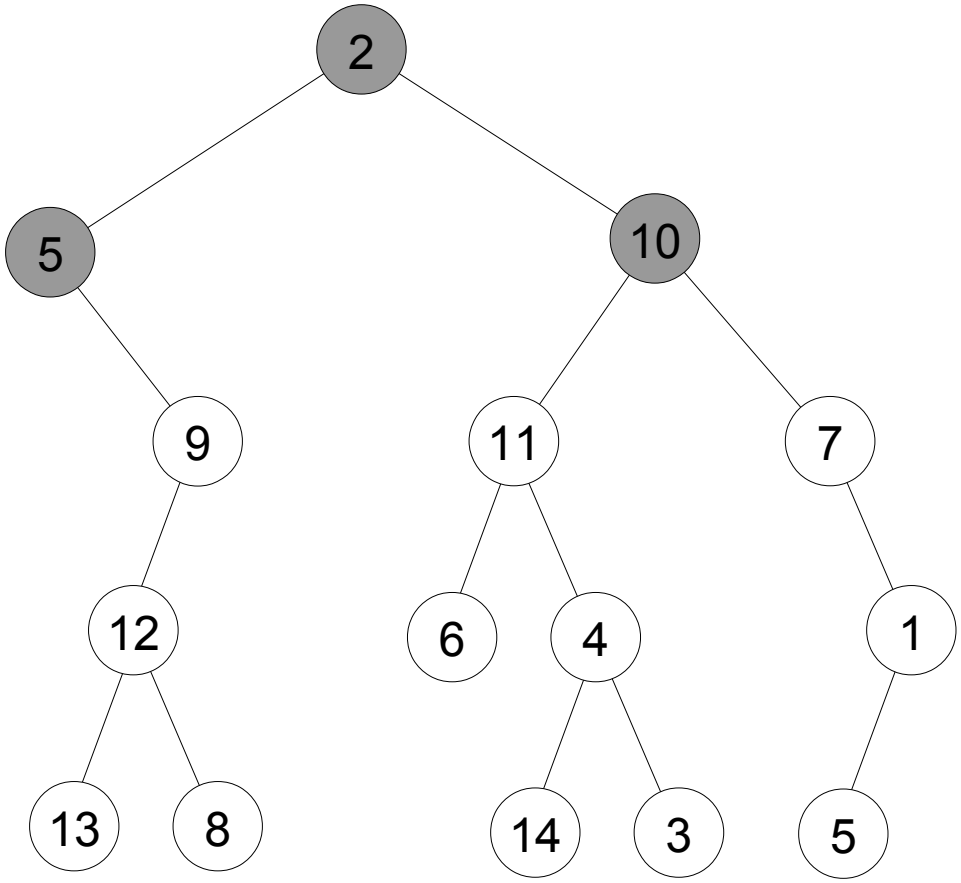
Breadth-first traversal

Principle



The tree is traversed level by level

```
Visited nodes:
2 5 10
```

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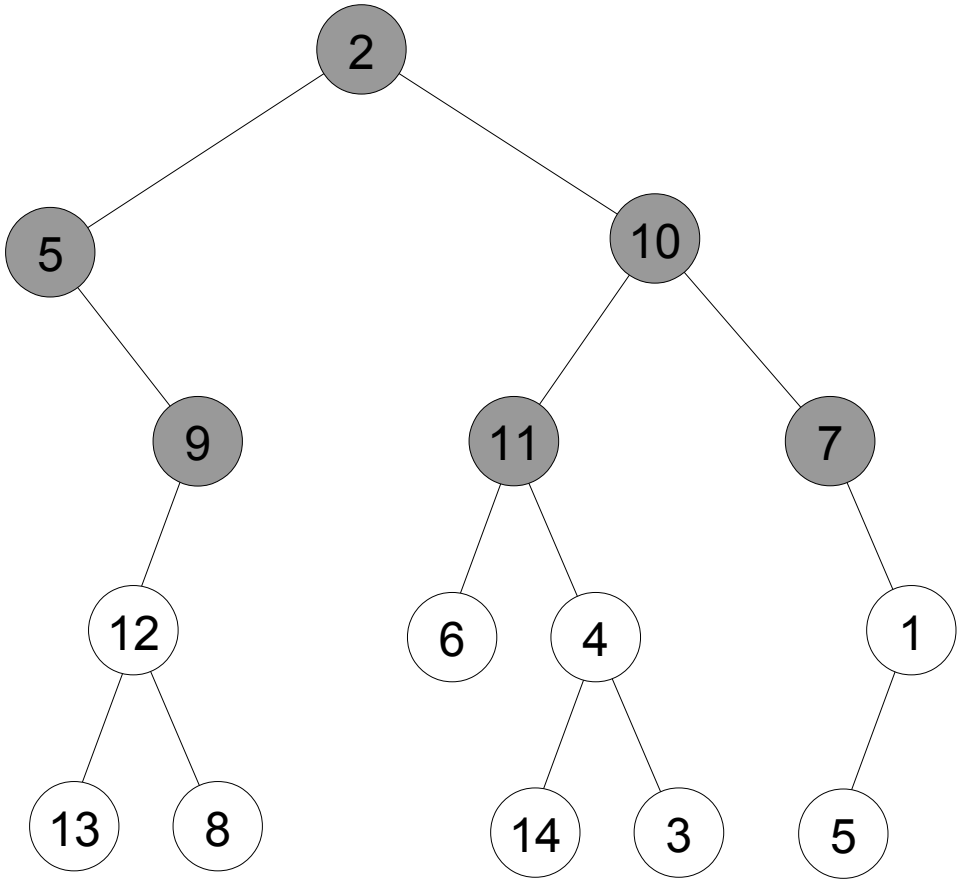
LILLE

Breadth-first traversal

Principle



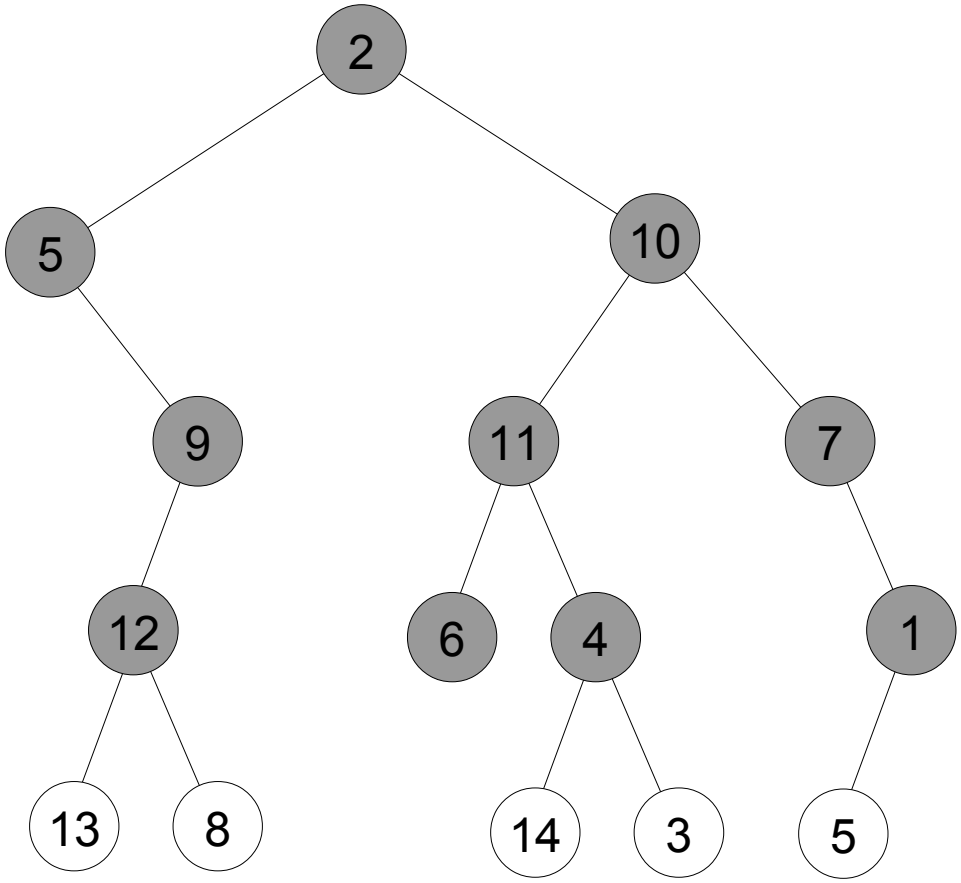
The tree is traversed level by level

```
Visited nodes:
2 5 10 9 11 7
```

ISEN école d'ingénieurs
LILLE

Breadth-first traversal

Principle



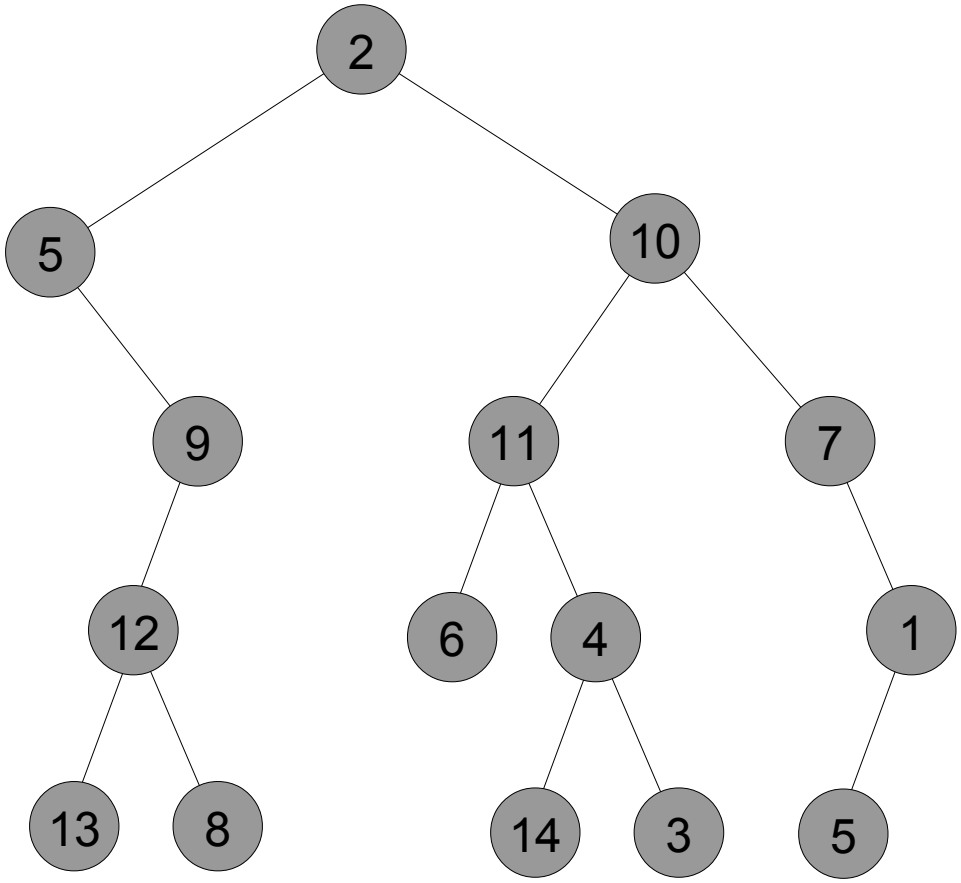
The tree is traversed level by level

```
Visited nodes:
2 5 10 9 11 7 12
6 4 1
```

ISEN école d'ingénieurs
LILLE

Breadth-first traversal

Principle



The tree is traversed level by level

```
Visited nodes:
2 5 10 9 11 7 12
6 4 1 13 8 14 3 5
```

Implementation

Breadth-first traversal

Implementation

Iterative algorithm based on a queue:

1. *Create an empty queue*
2. *Enqueue the root node*
3. *While the queue is not empty:*
   - *dequeue a node*
   - *treat this node (here: print its id)*
   - *enqueue its children*

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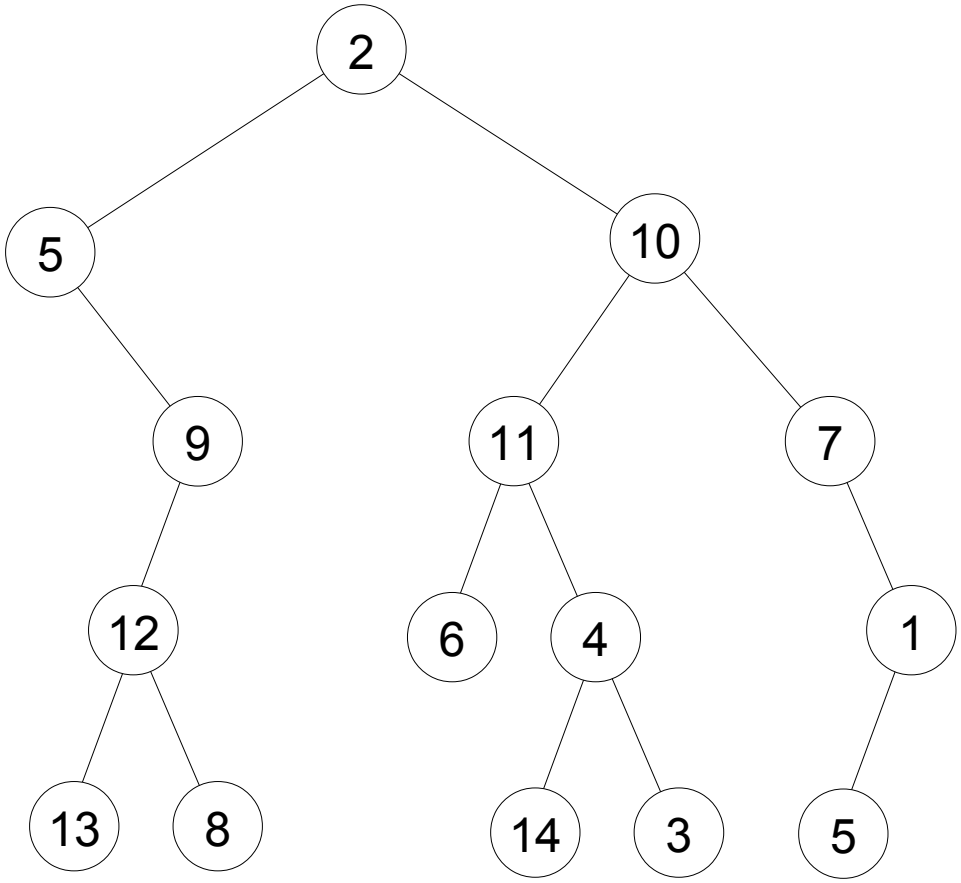
LILLE

Breadth-first traversal

Detailed example



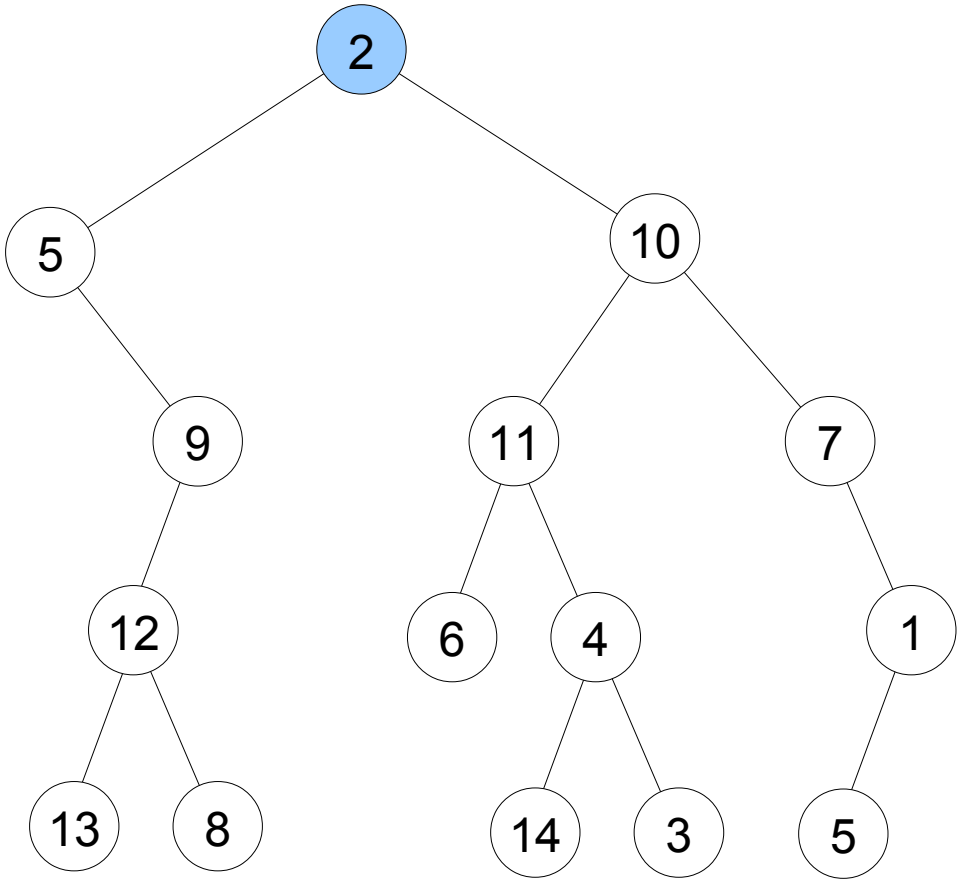

```
Visited nodes:
```

Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



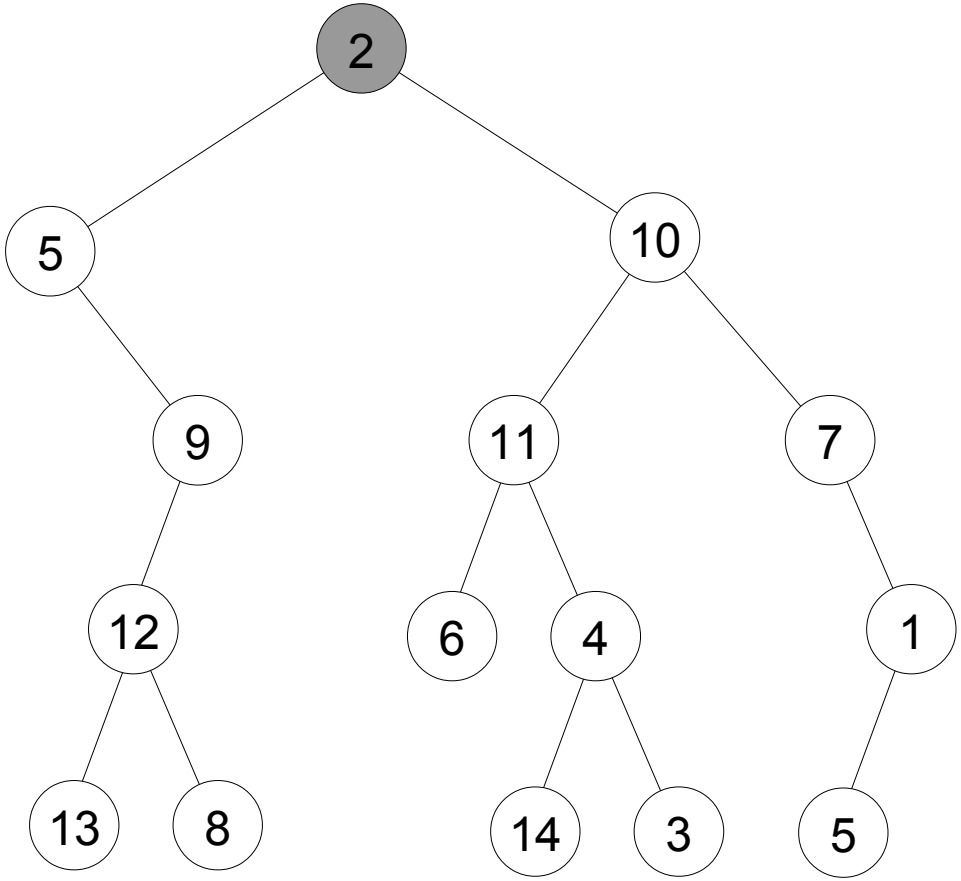

```
Visited nodes:
```

Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



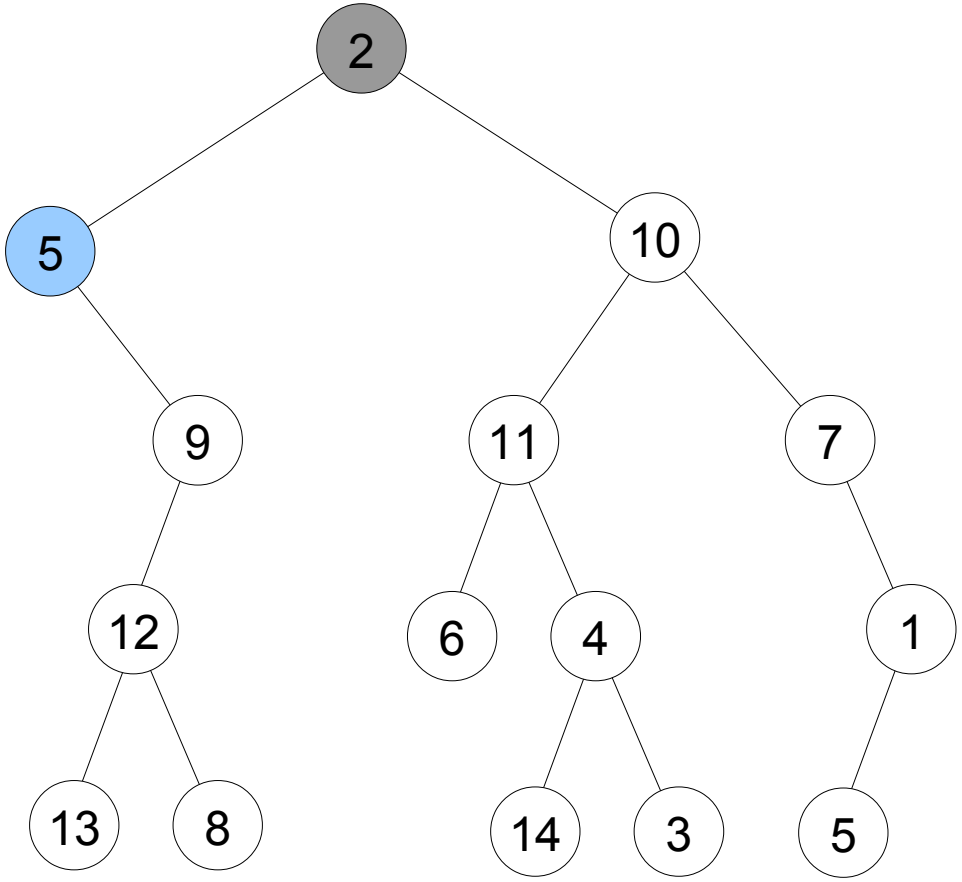

```
Visited nodes:
2
```

Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2
```

Queue

2

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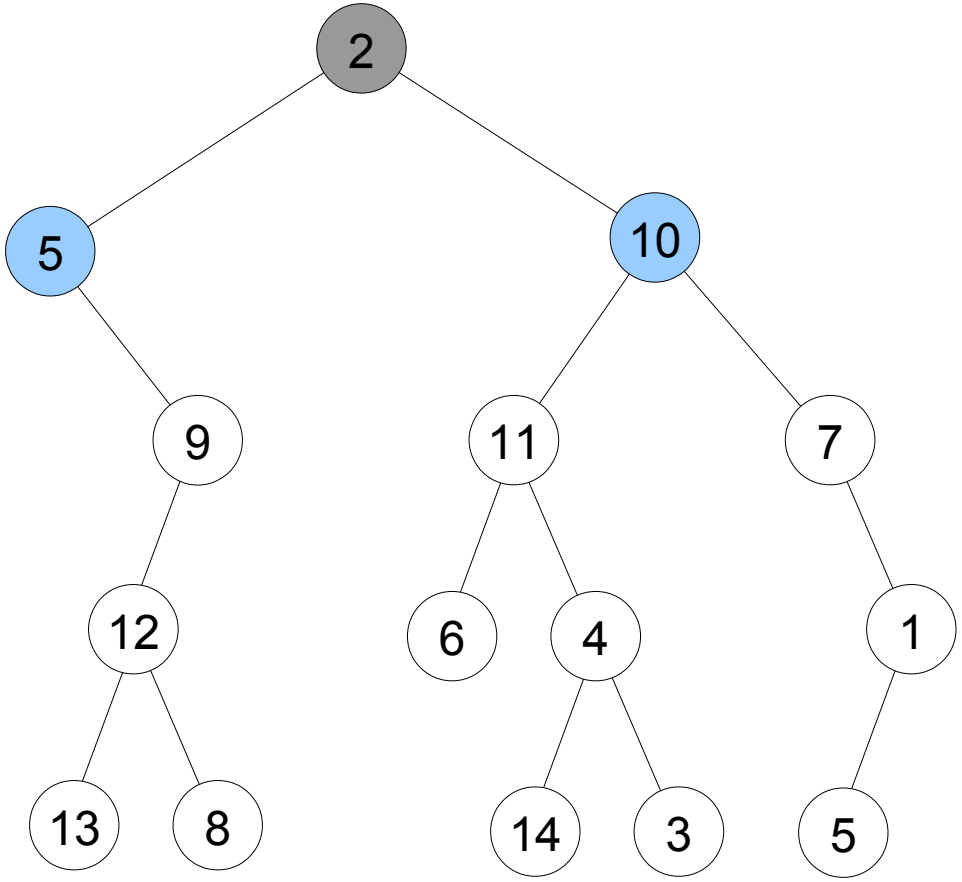
Breadth-first traversal

Detailed example




```
Visited nodes:
2
```

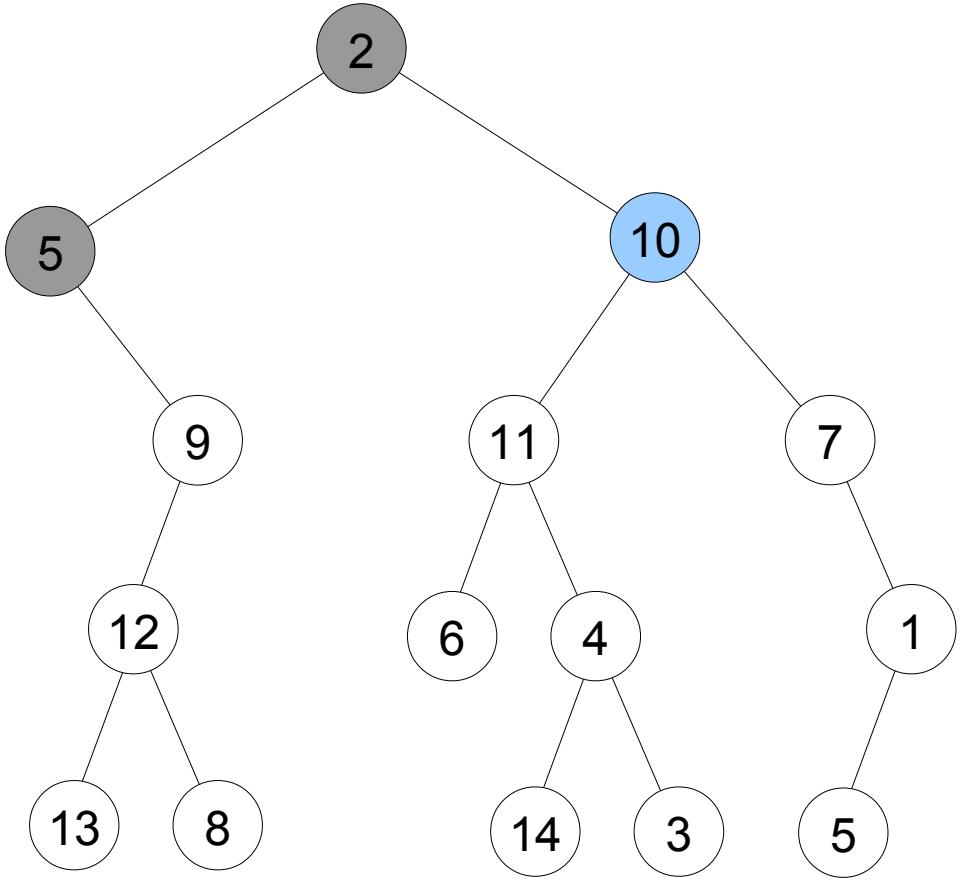
Queue

2

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



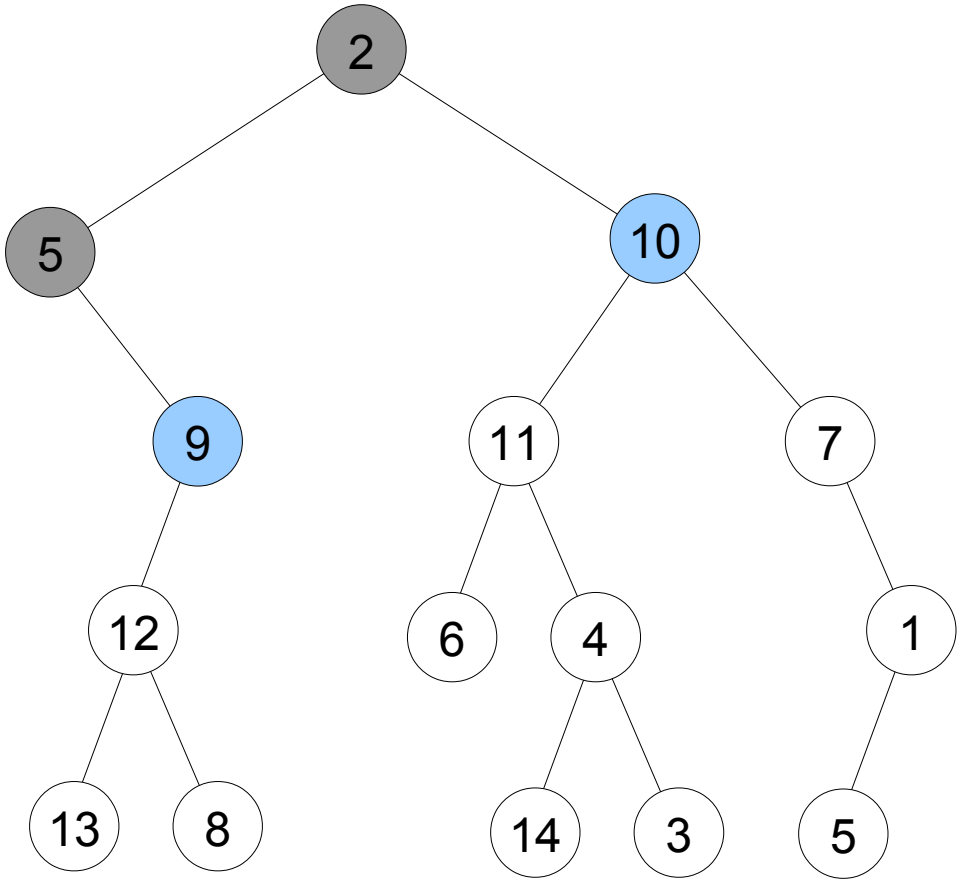

```
Visited nodes:
2 5
```

Queue

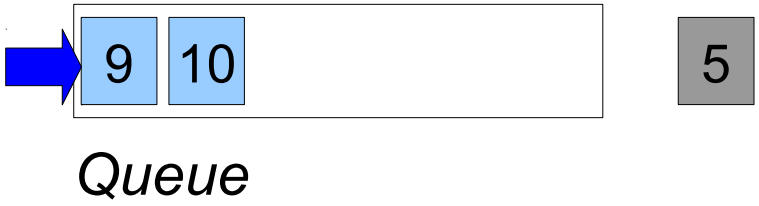
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5
```

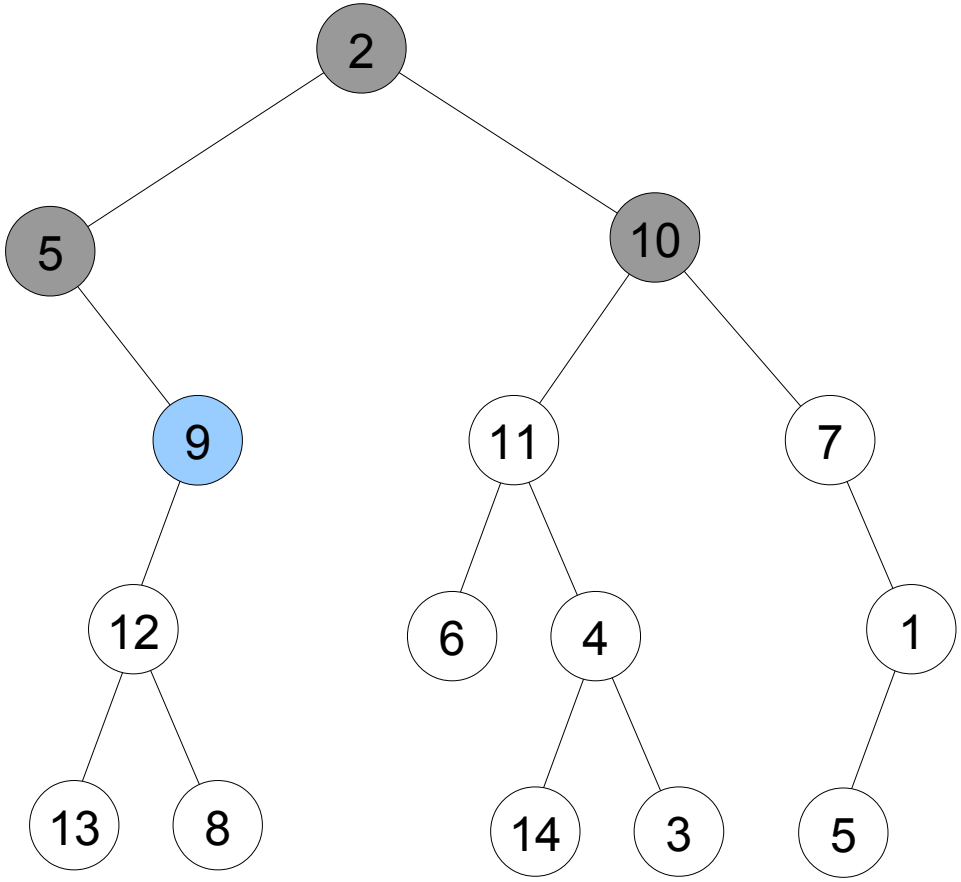


Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



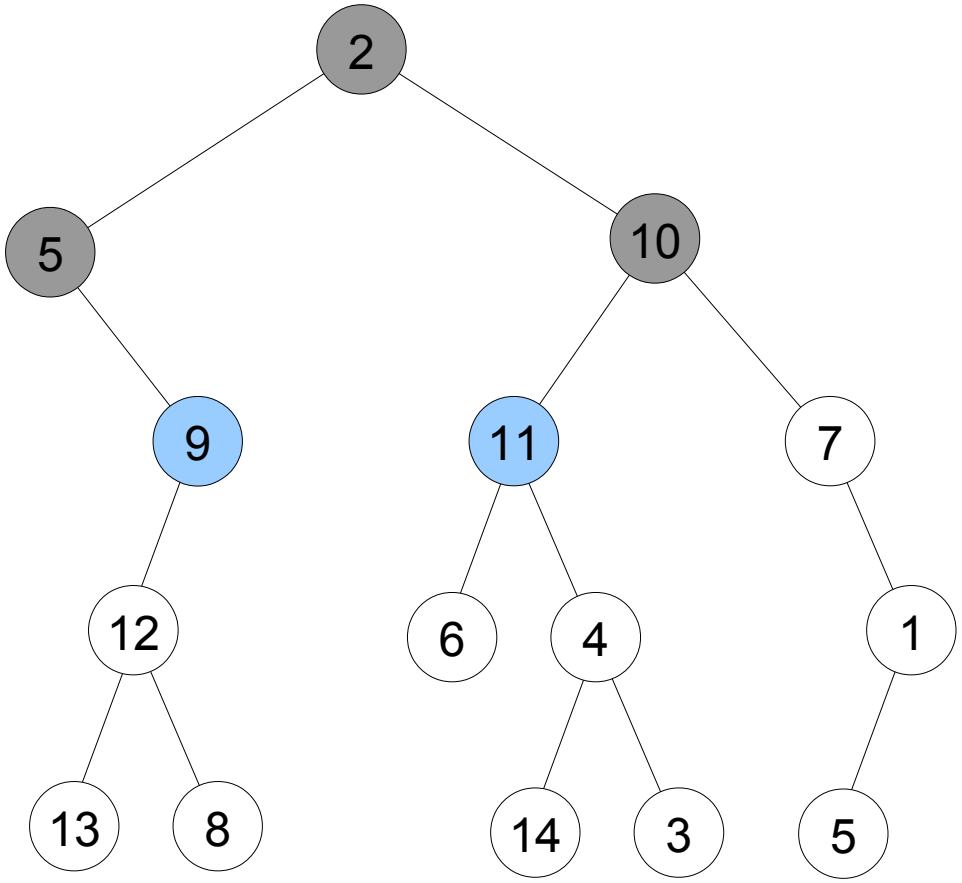

```
Visited nodes:
2 5 10
```

Queue

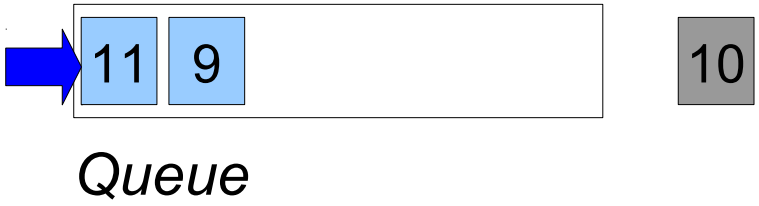
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



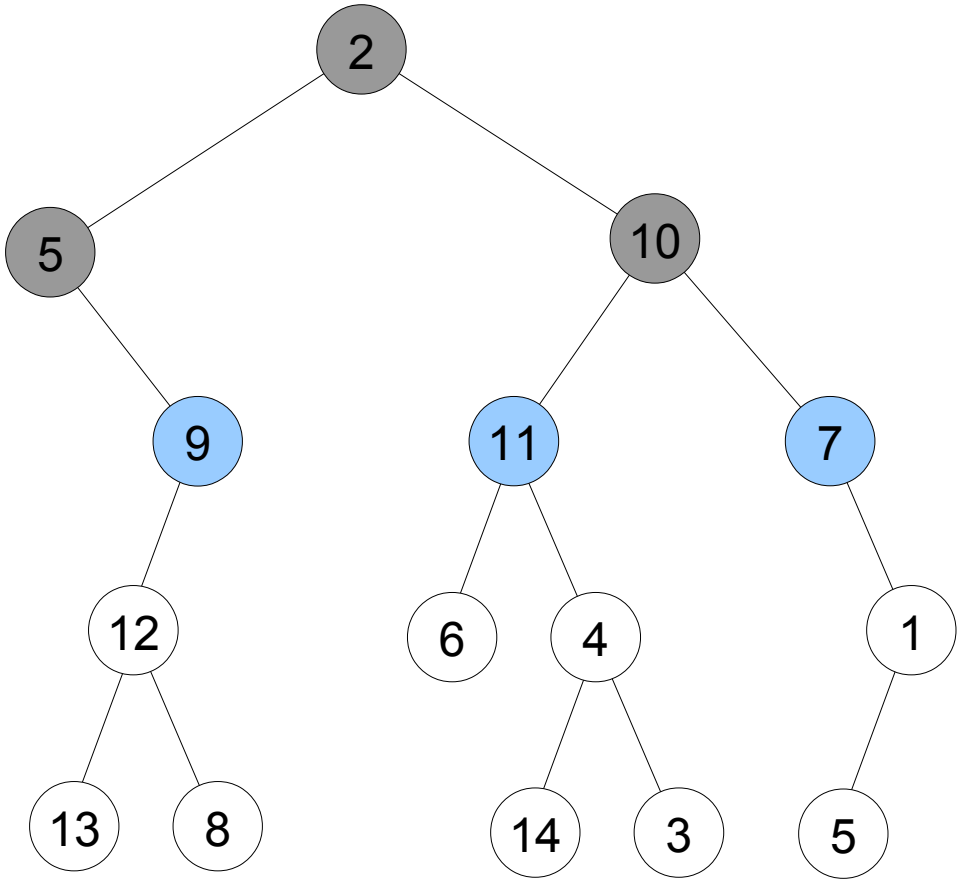

```
Visited nodes:
2 5 10
```



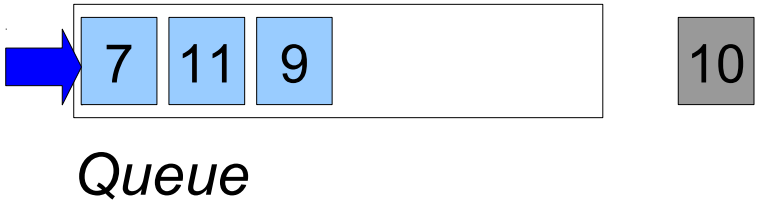
Queue

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10
```



Queue

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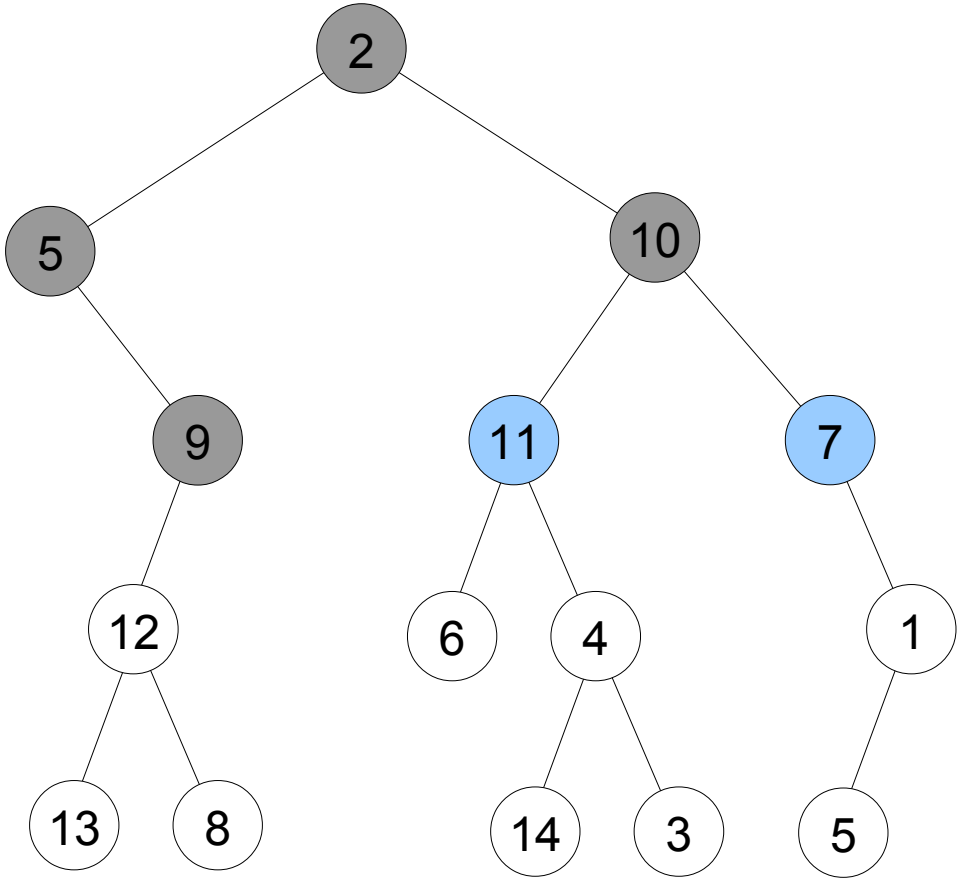
Breadth-first traversal

Detailed example



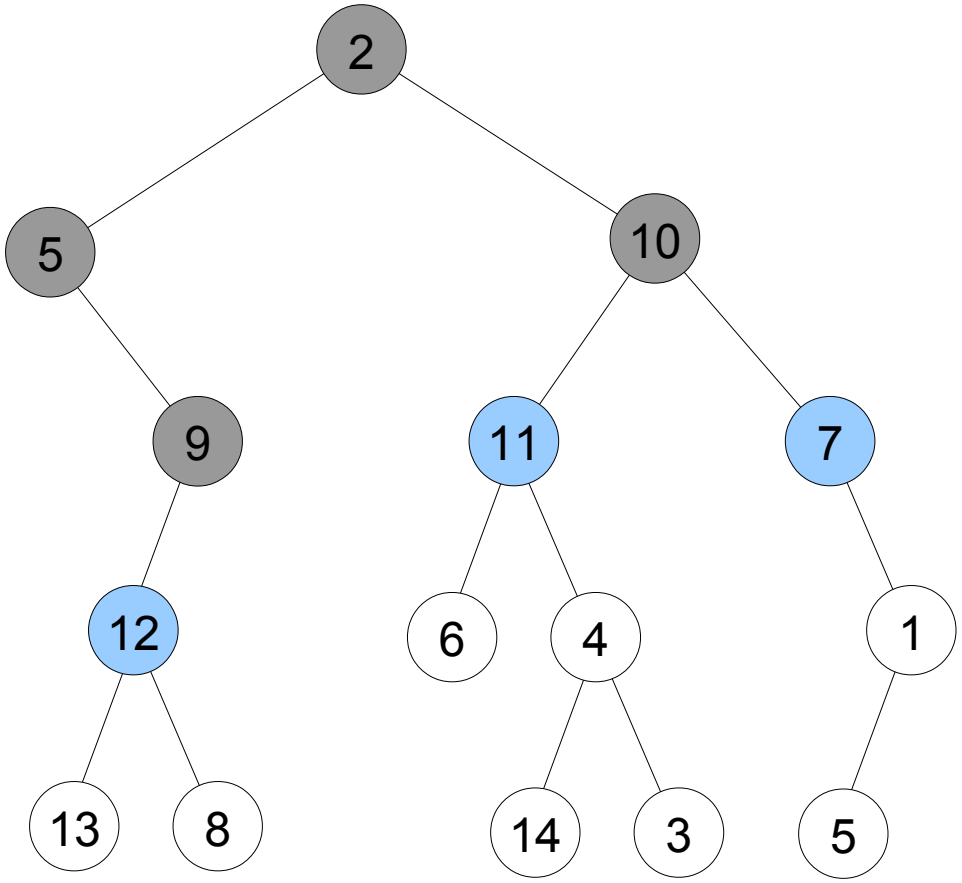

```
Visited nodes:
2 5 10 9
```

Queue

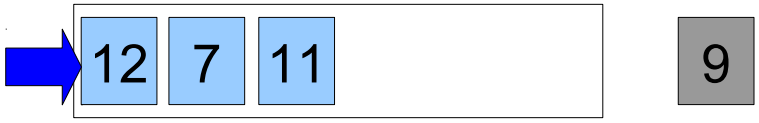
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9
```

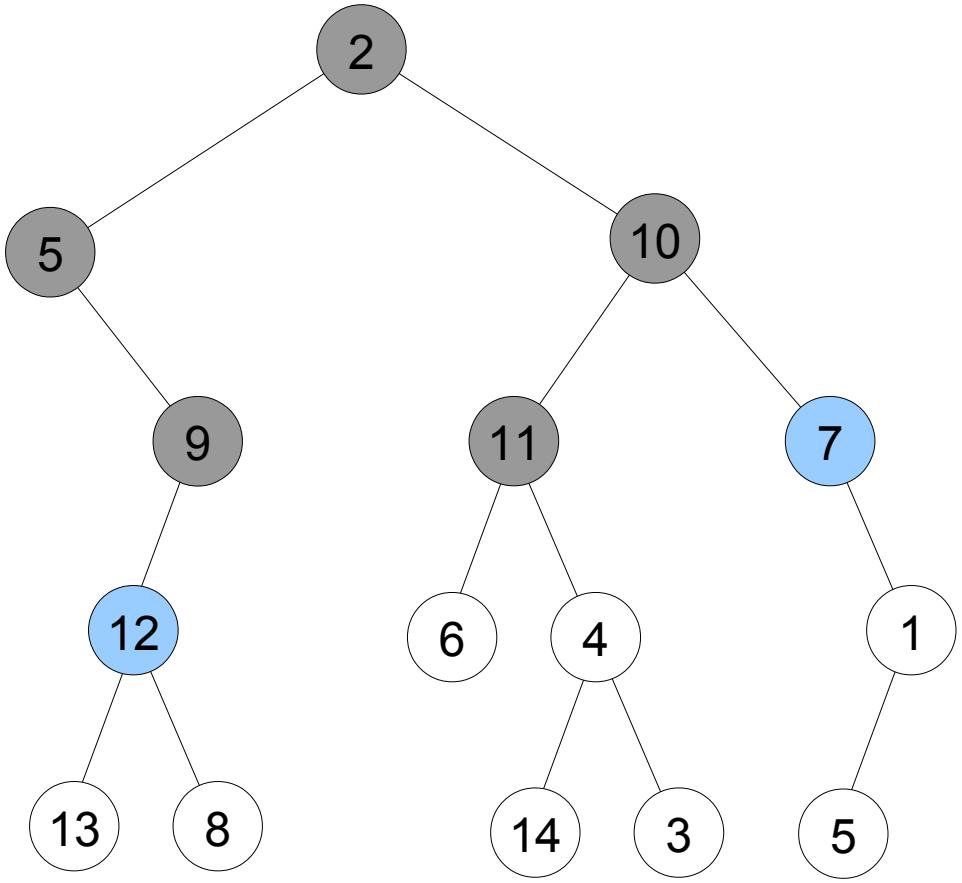


Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



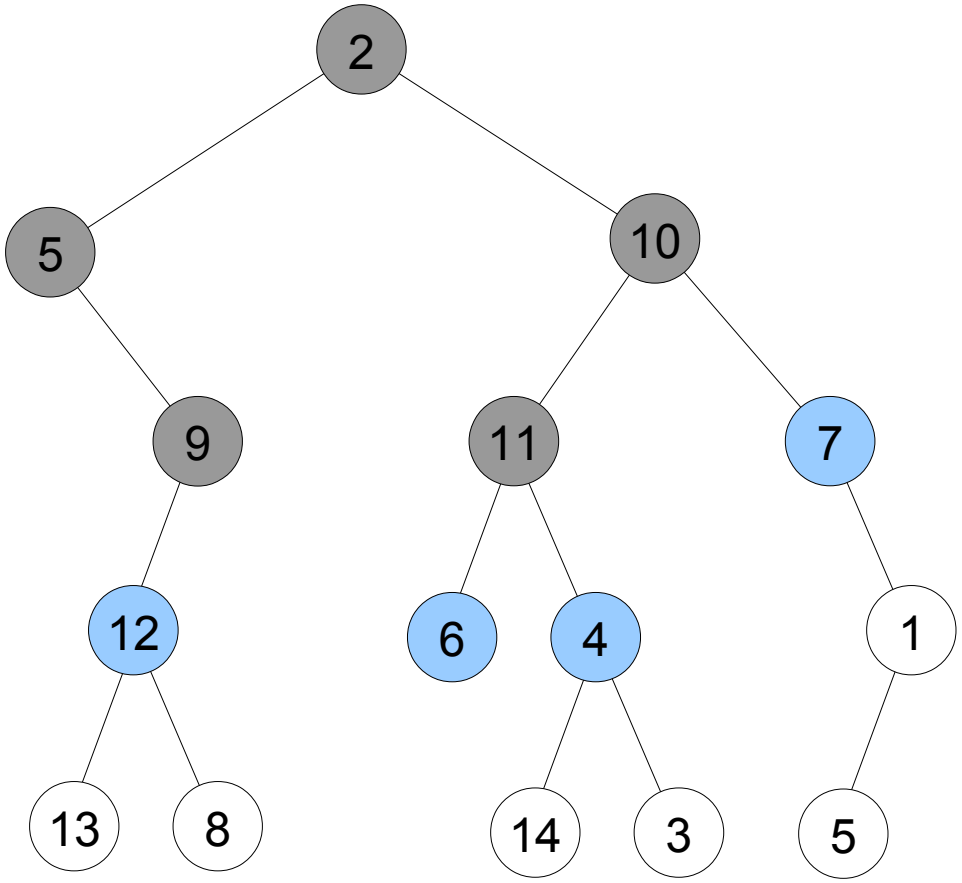

```
Visited nodes:
2 5 10 9 11
```

Queue

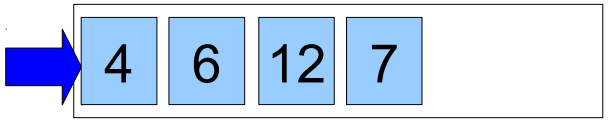
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11
```



11

Queue

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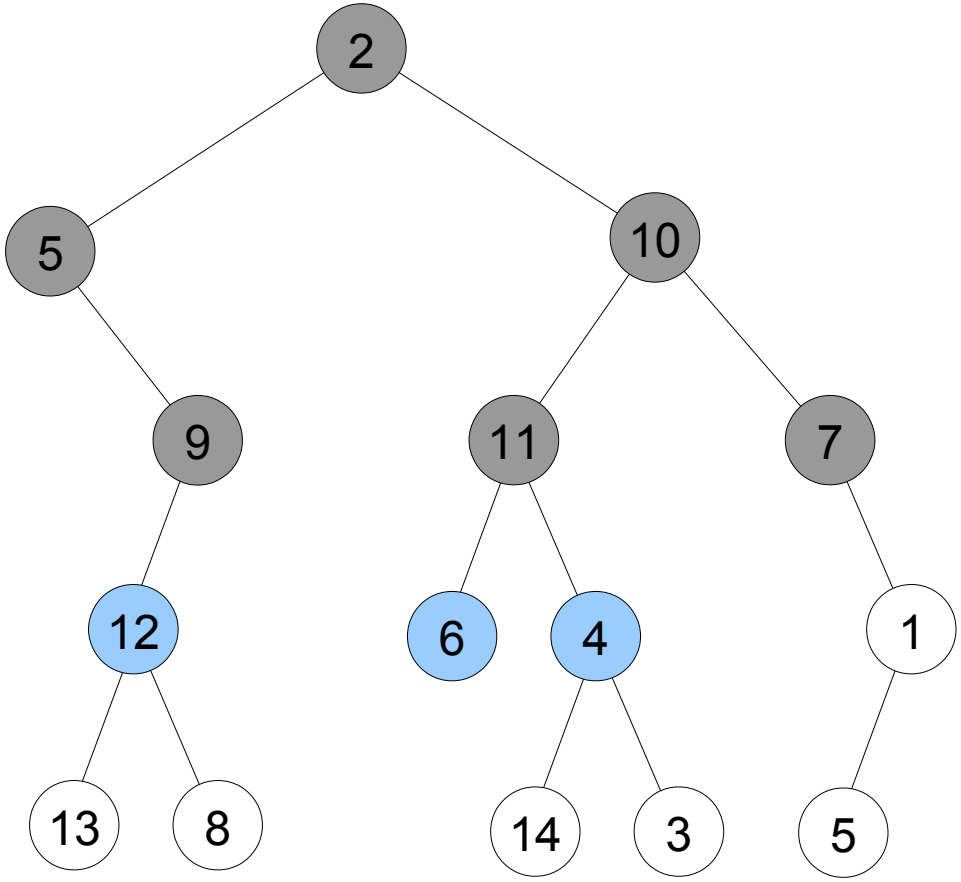
Breadth-first traversal

Detailed example



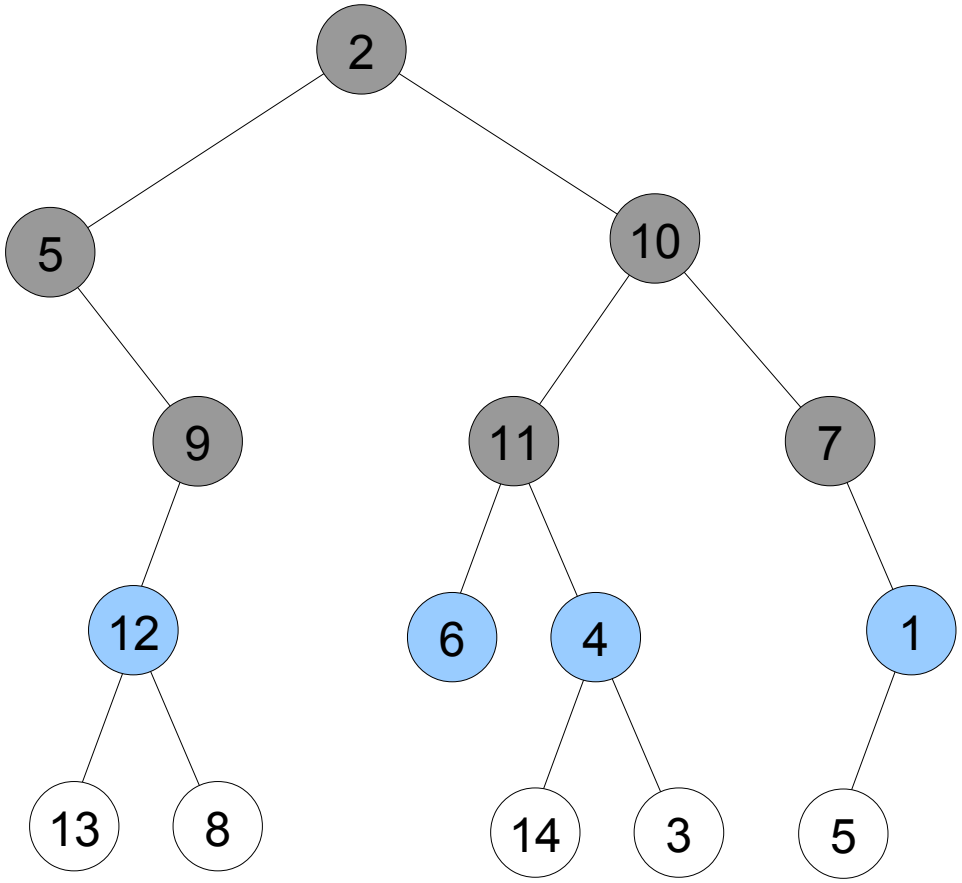

```
Visited nodes:
2 5 10 9 11 7
```

Queue

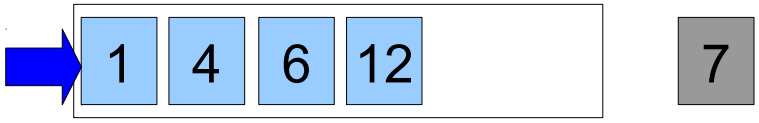
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7
```

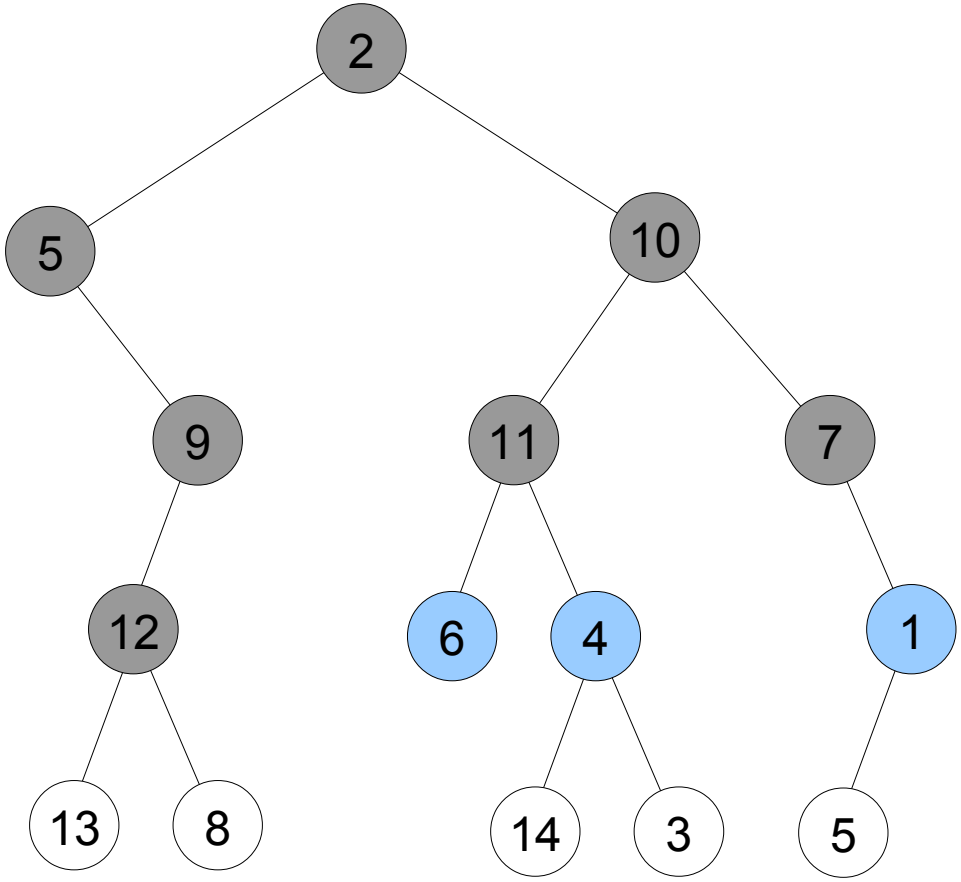


Queue

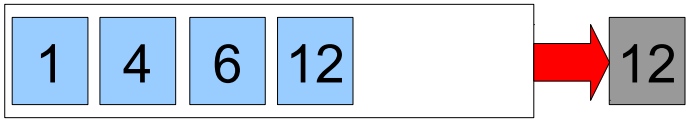
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7 12
```

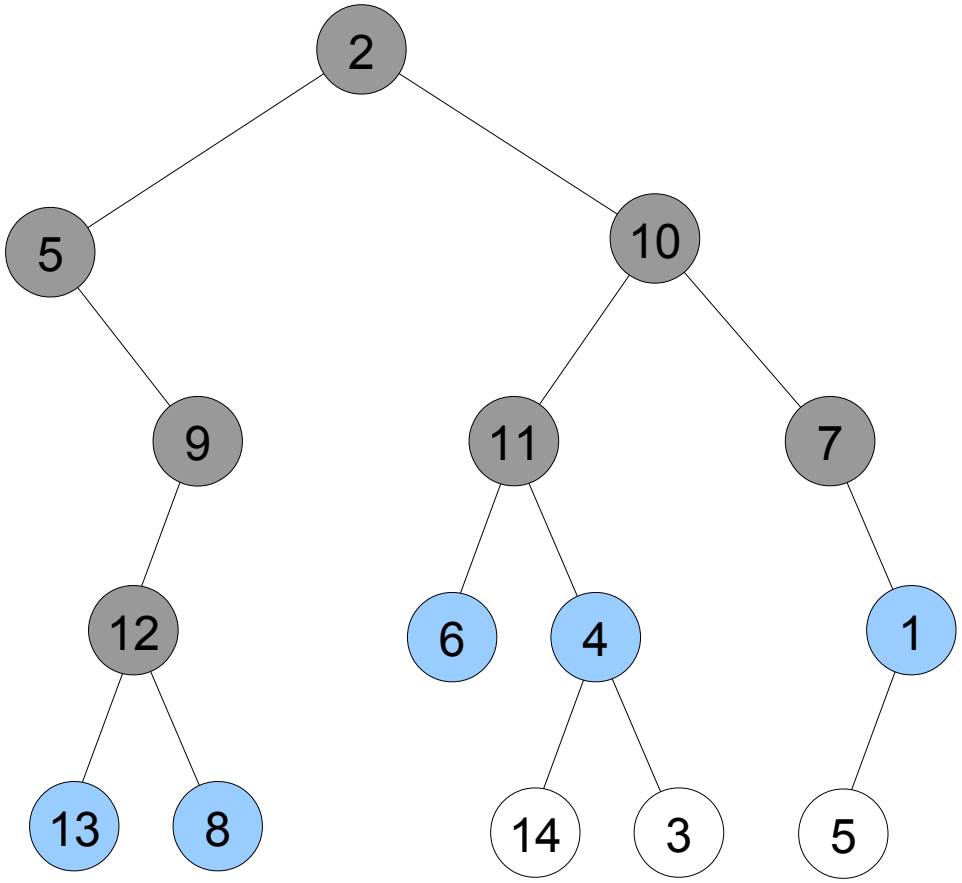


Queue

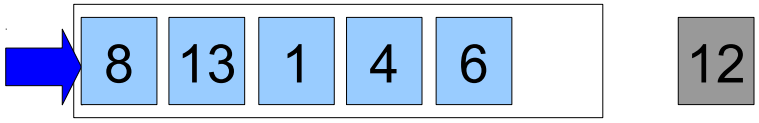
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7 12
```

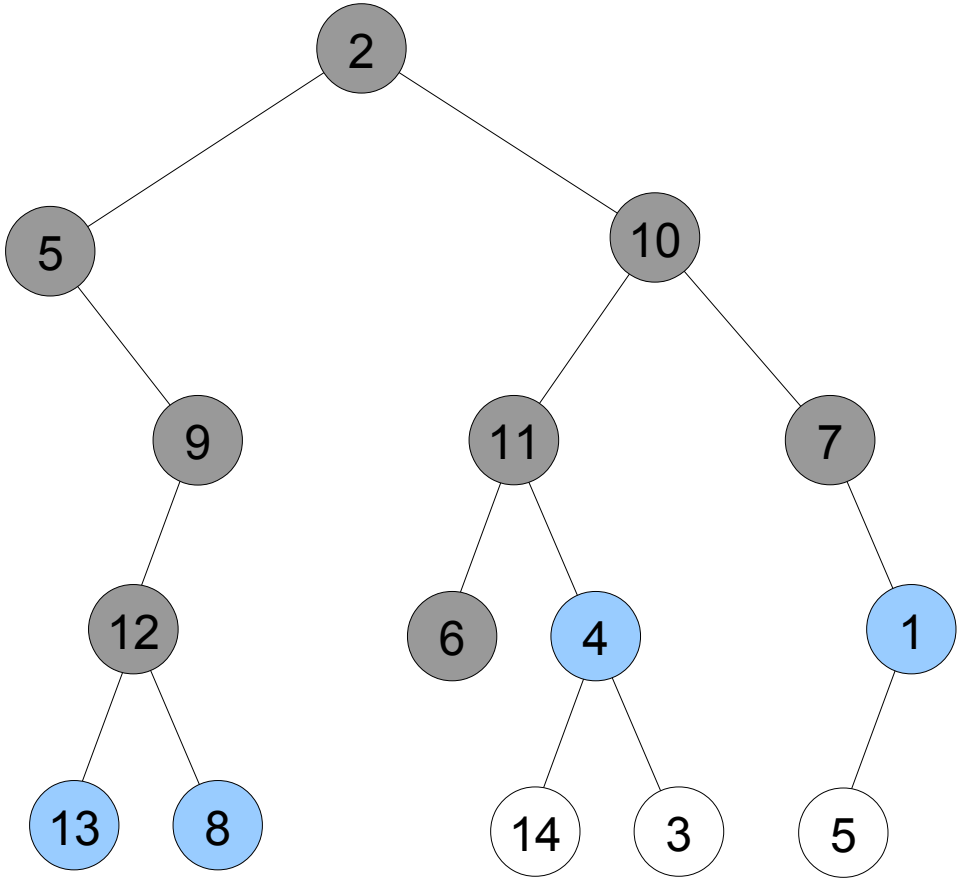


Queue

ISEN école d'ingénieurs
LILLE

Breadth-first traversal

Detailed example



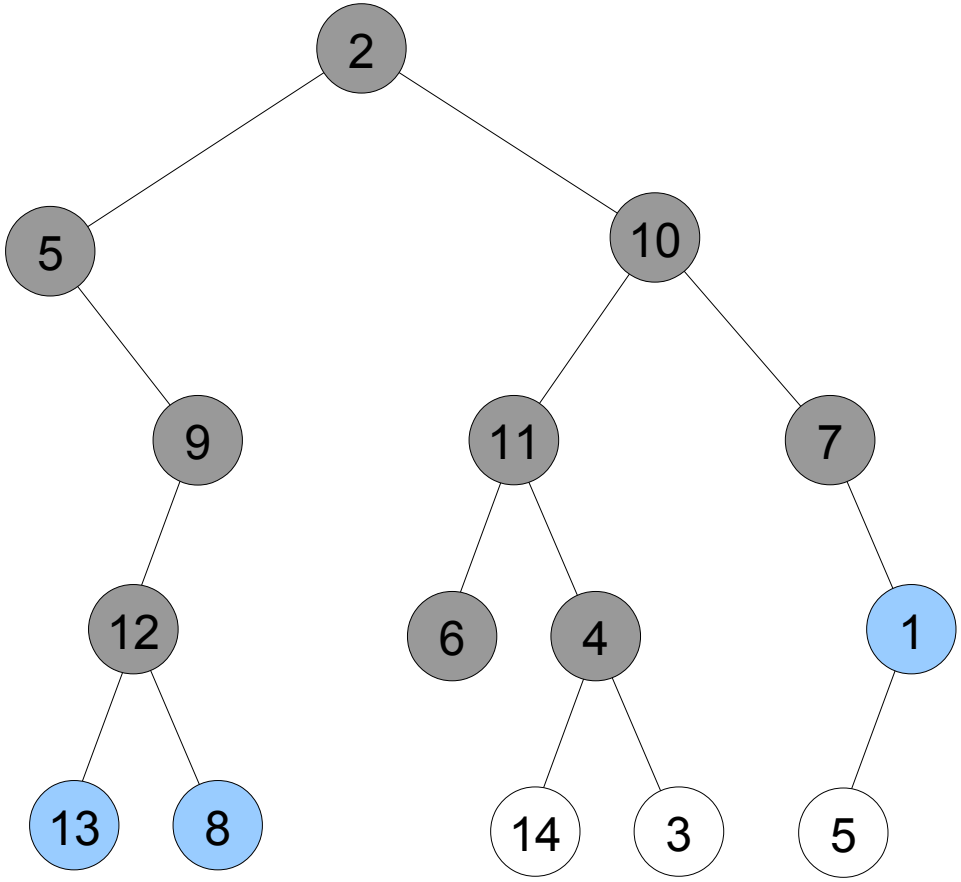

```
Visited nodes:
2 5 10 9 11 7 12 6
```

Queue

ISEN école d'ingénieurs
LILLE

Breadth-first traversal

Detailed example



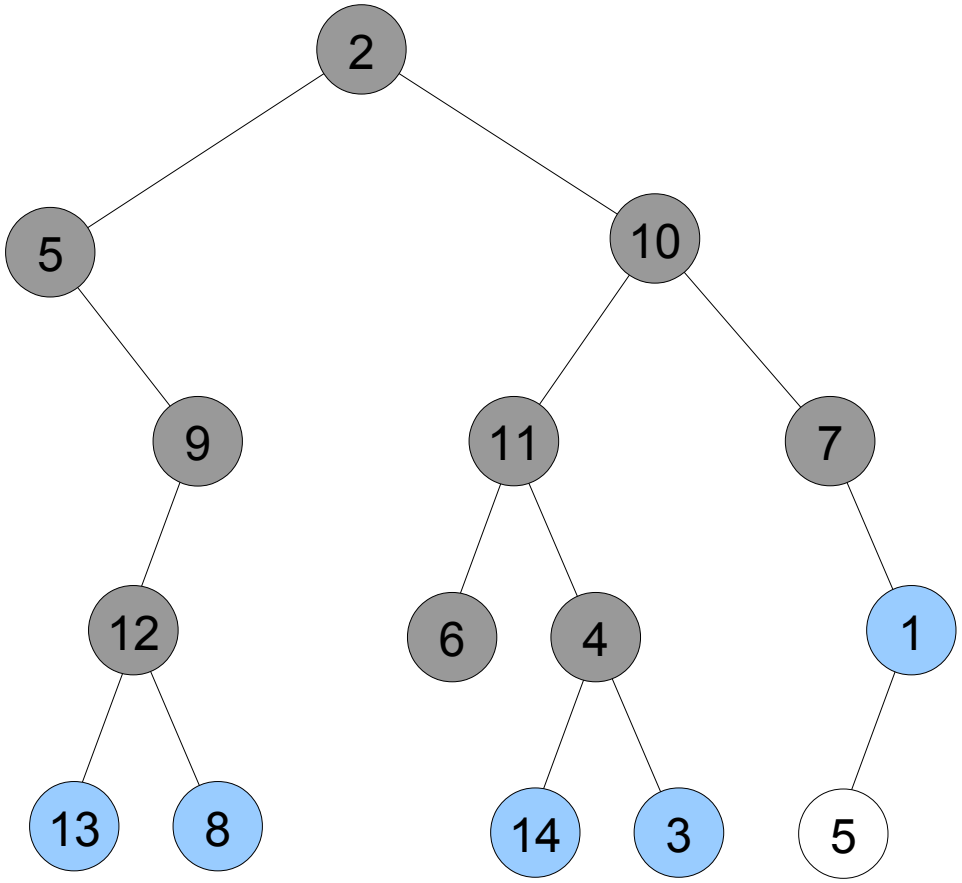

```
Visited nodes:
2 5 10 9 11 7 12 6
4
```

Queue

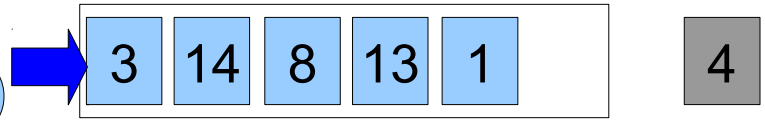
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7 12 6
4
```

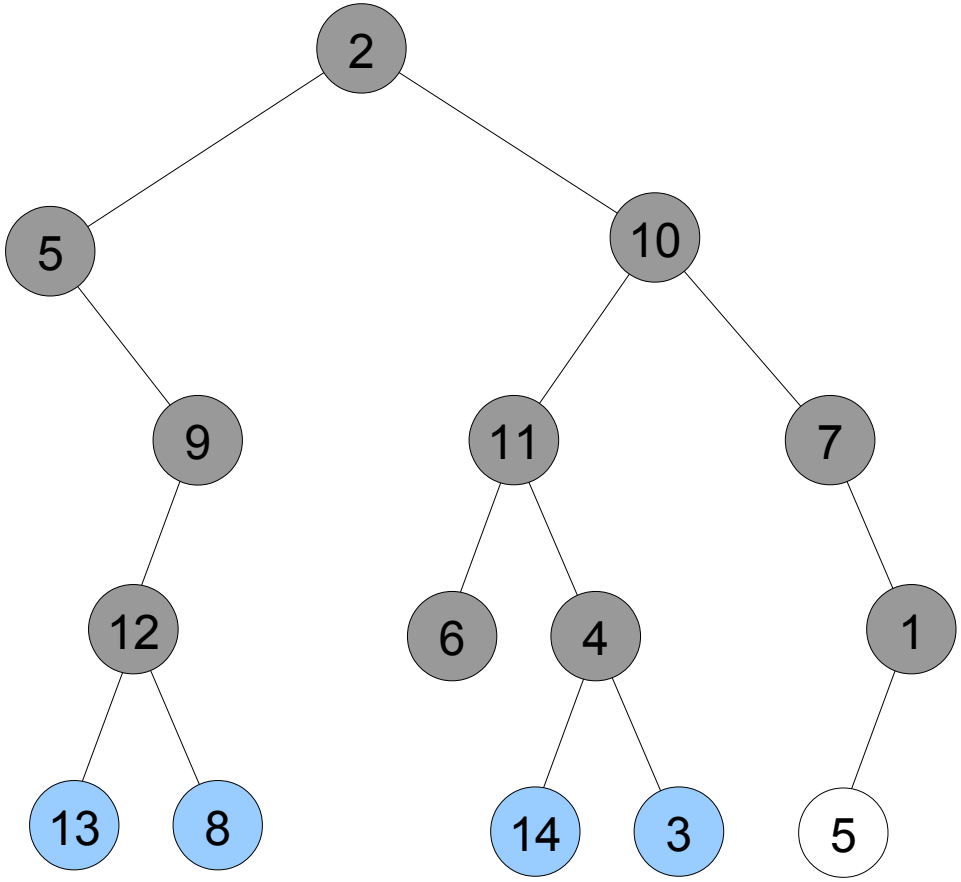


Queue

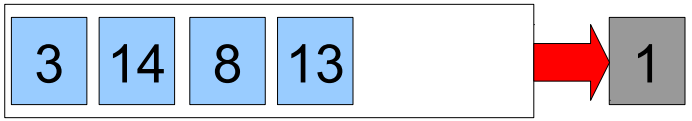
ISEN école d'ingénieurs
LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7 12 6
4 1
```

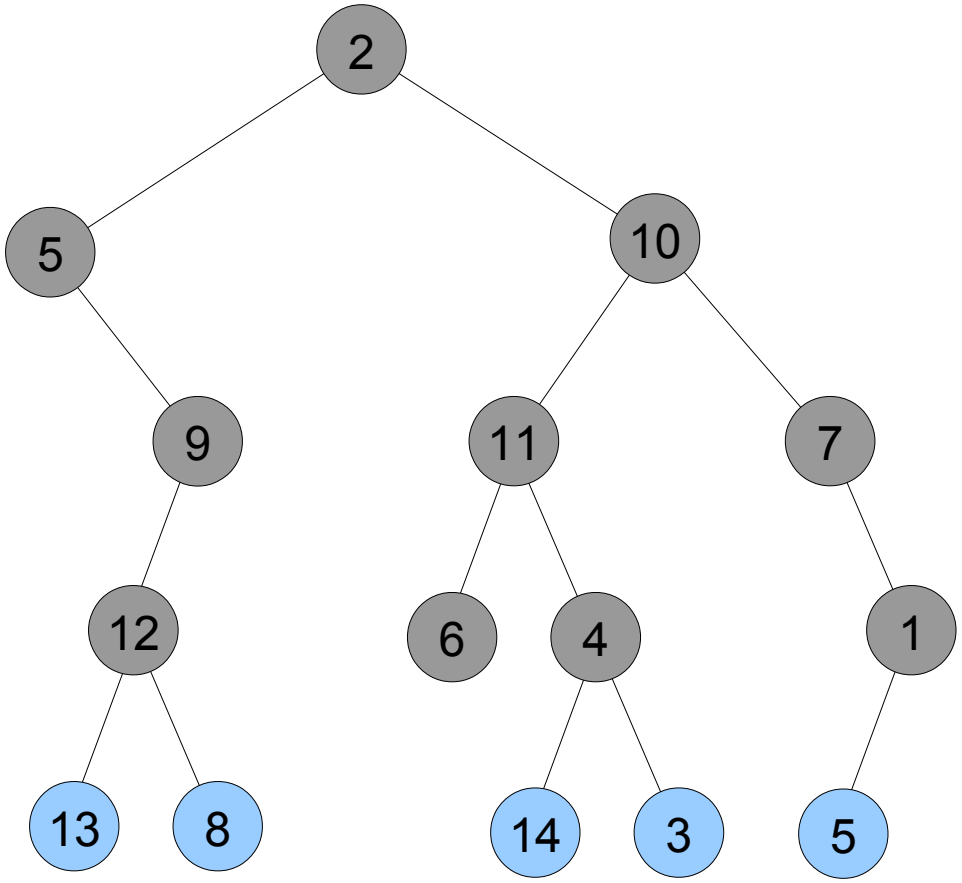


Queue

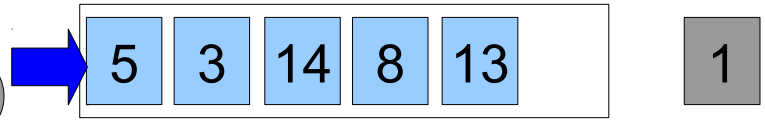
ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7 12 6
4 1
```

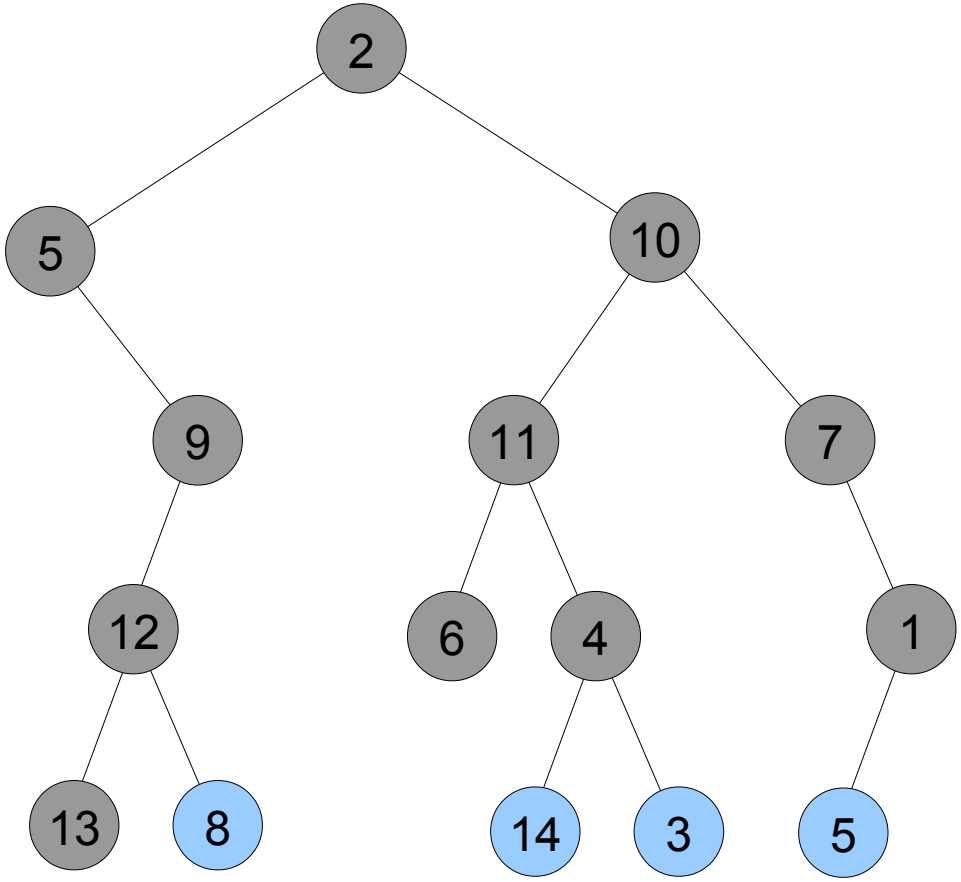


Queue

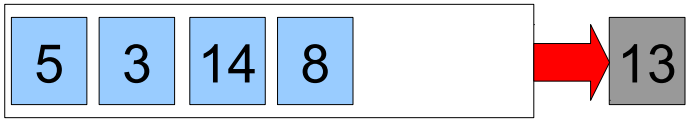
ISEN école d'ingénieurs
LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7 12 6
4 1 13
```

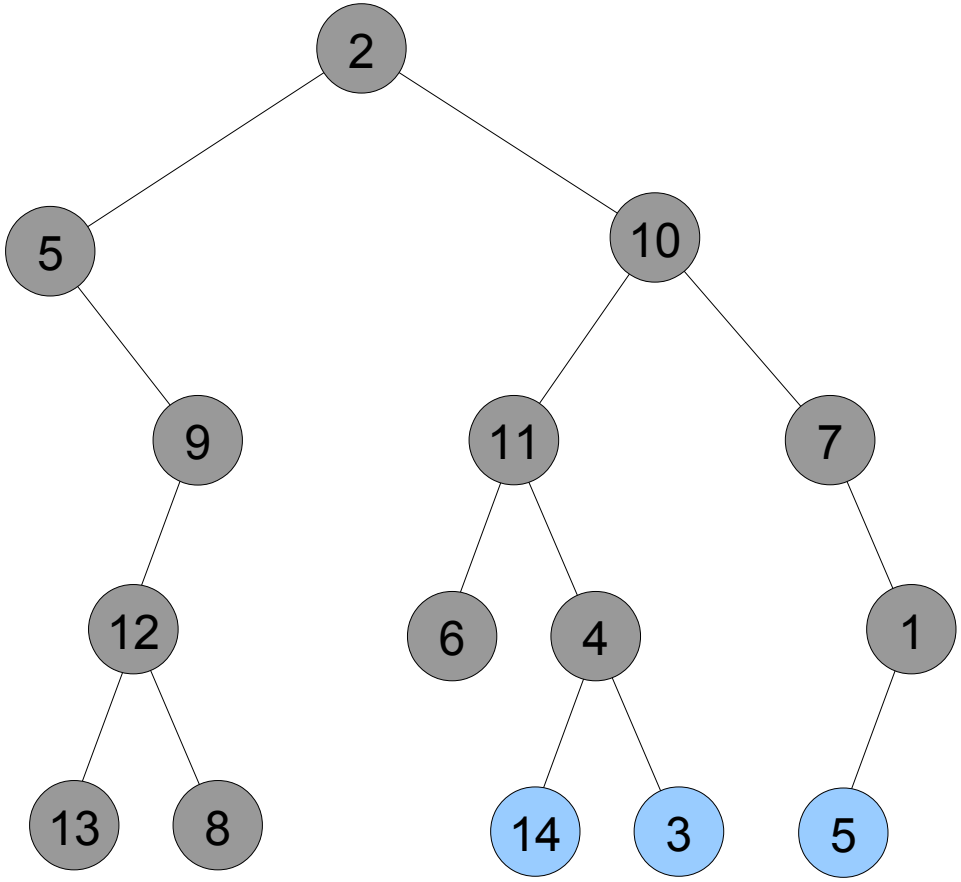


Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



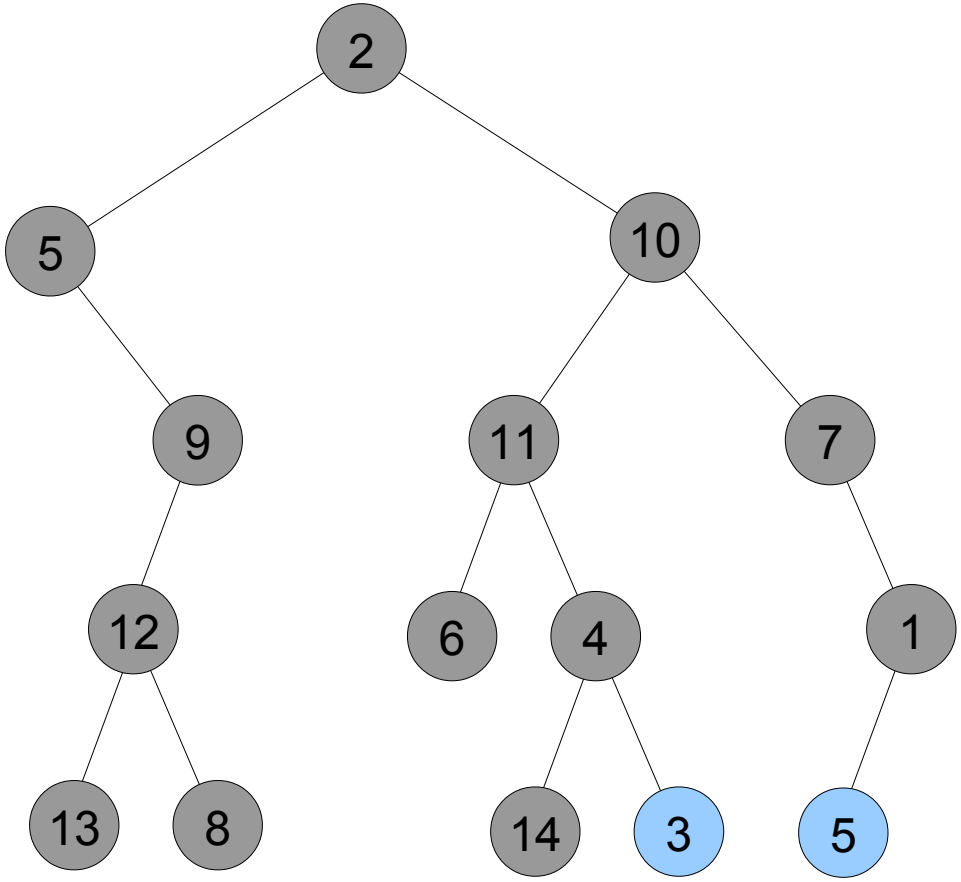

```
Visited nodes:
2 5 10 9 11 7 12 6
4 1 13 8
```

Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



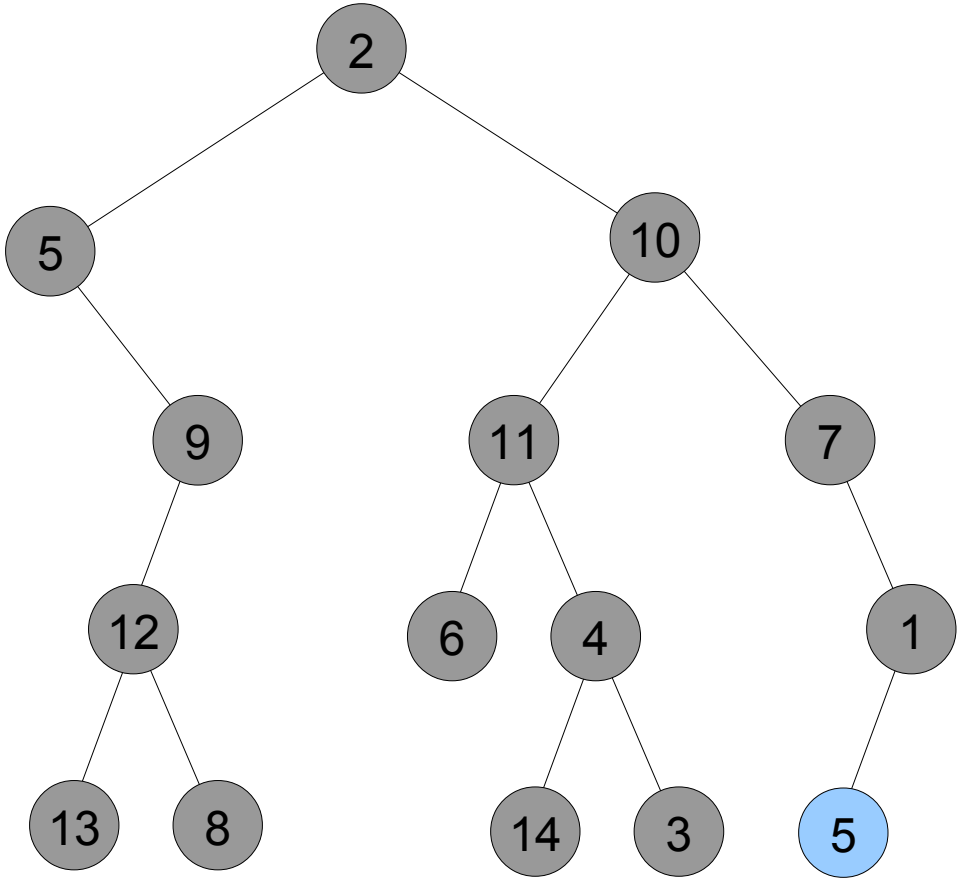

```
Visited nodes:
2 5 10 9 11 7 12 6
4 1 13 8 14
```

Queue

ISEN école d'ingénieurs LILLE

Breadth-first traversal

Detailed example



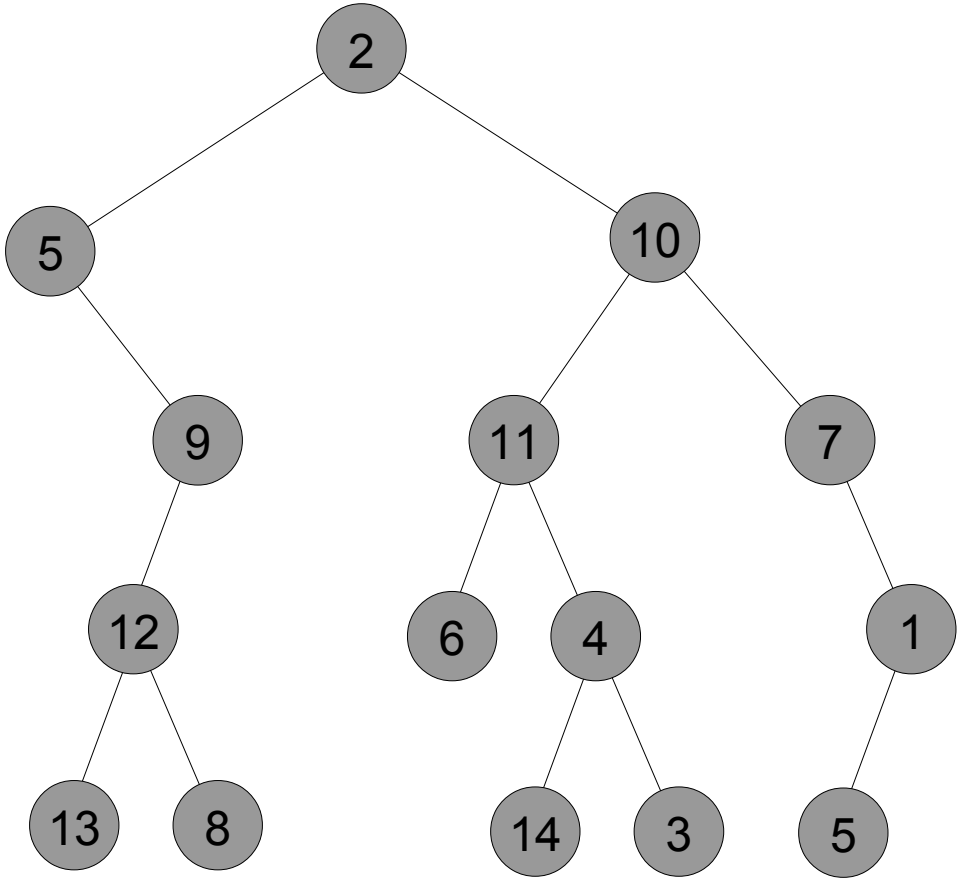

```
Visited nodes:
2 5 10 9 11 7 12 6
4 1 13 8 14 3
```

Queue

ISEN école d'ingénieurs
LILLE

Breadth-first traversal

Detailed example




```
Visited nodes:
2 5 10 9 11 7 12 6
4 1 13 8 14 3 5
```

Queue