ISEN | école d'ingénieurs
LILLE

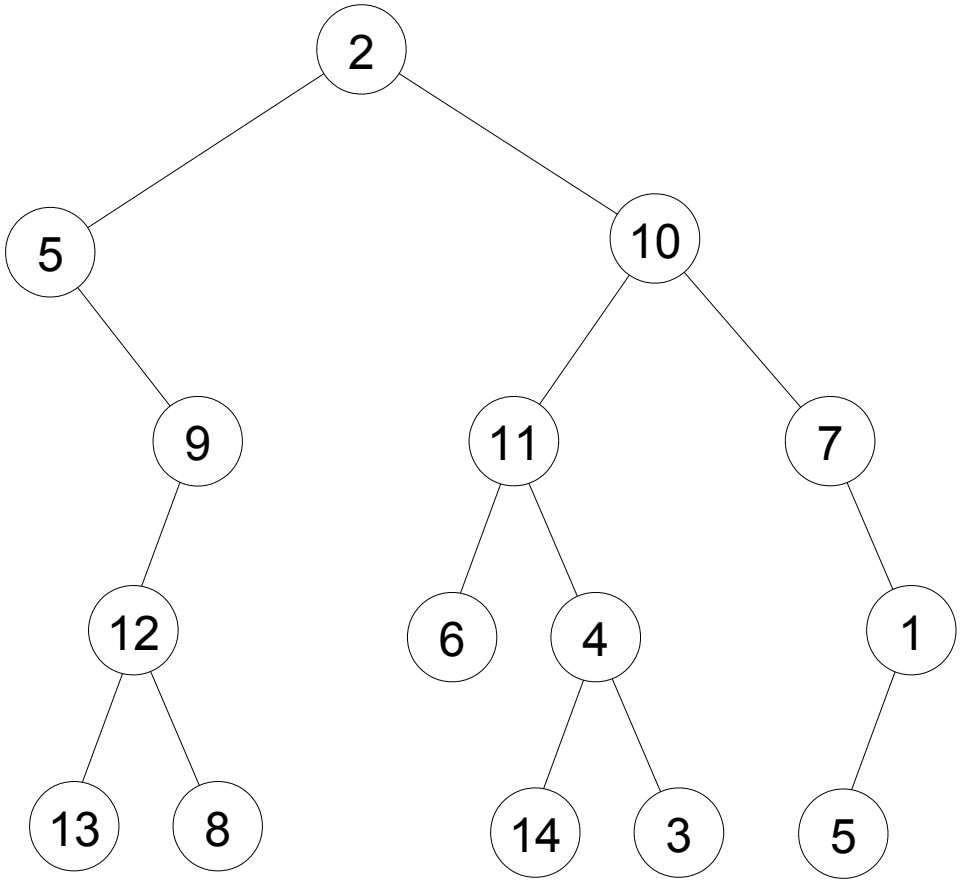
Tree Traversal algorithms

Depth-first traversal

Principle

Depth-first traversal

Principle

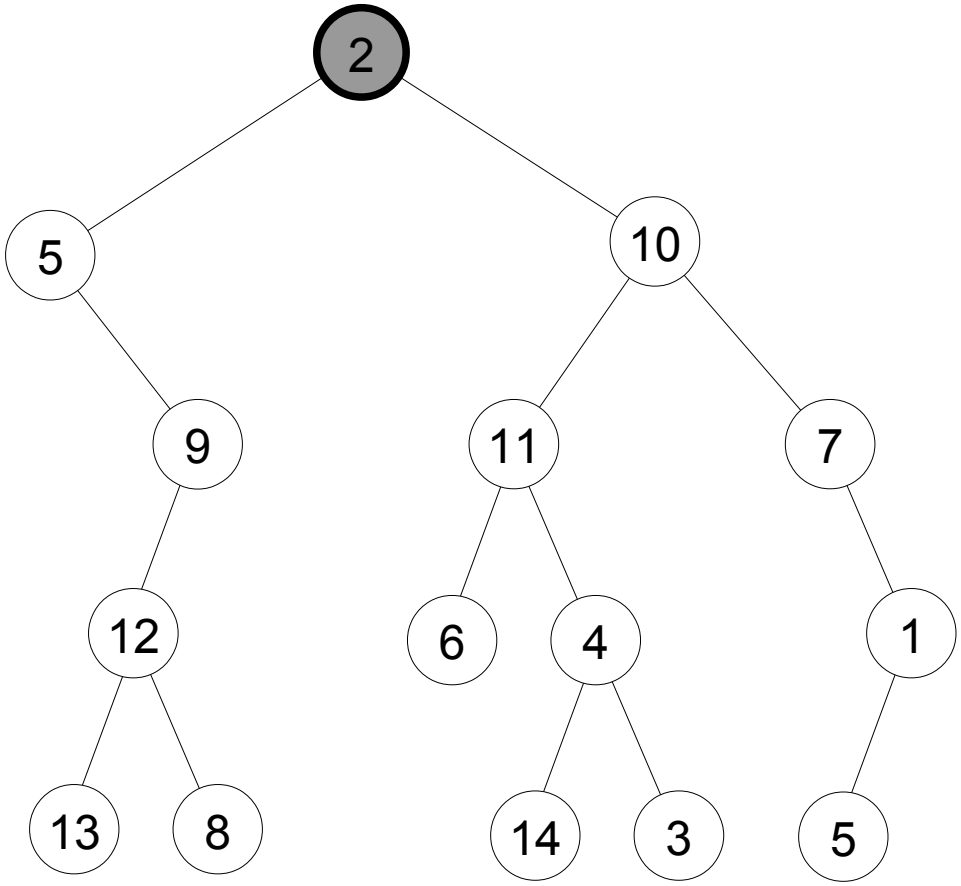


Each branch of the tree is traversed ad far as possible (until reaching a leaf)

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle

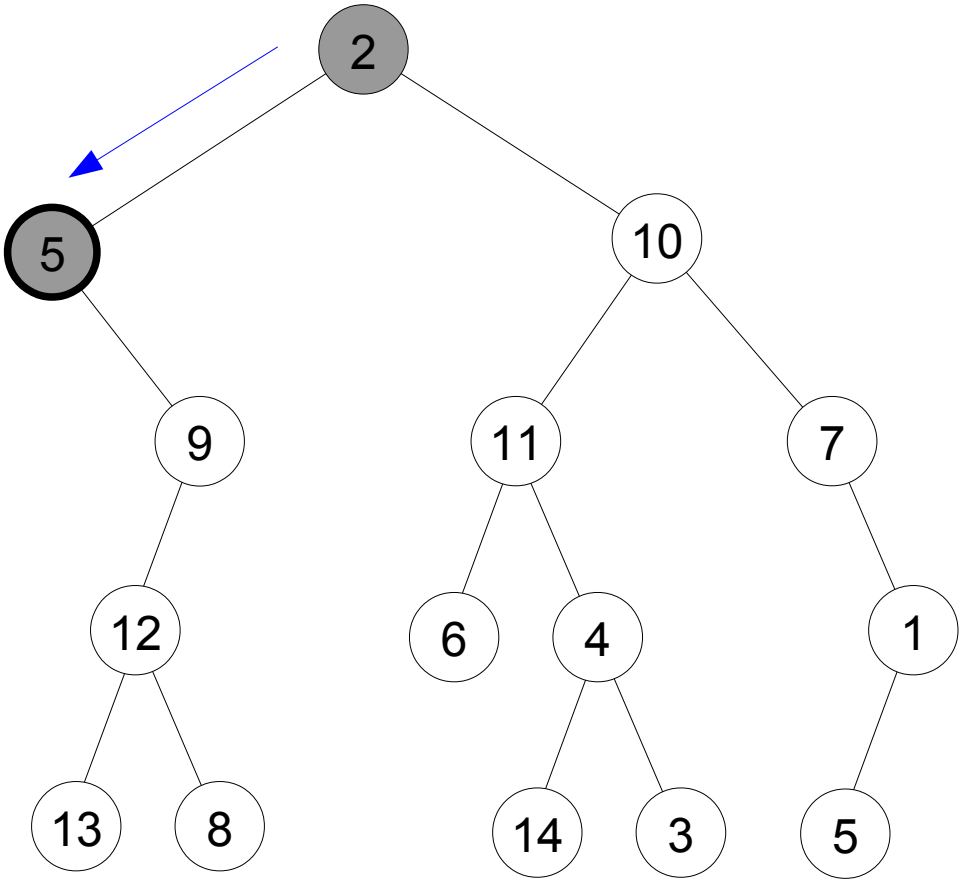


Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2
```

Depth-first traversal

Principle

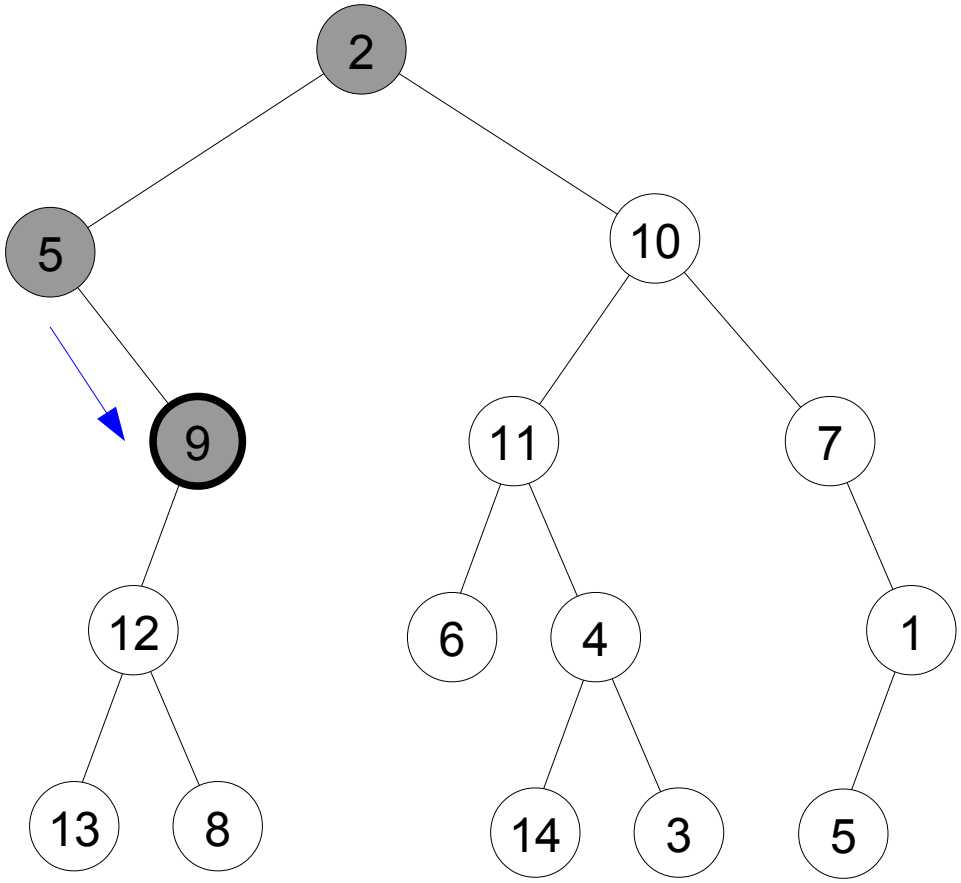


Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5
```

Depth-first traversal

Principle



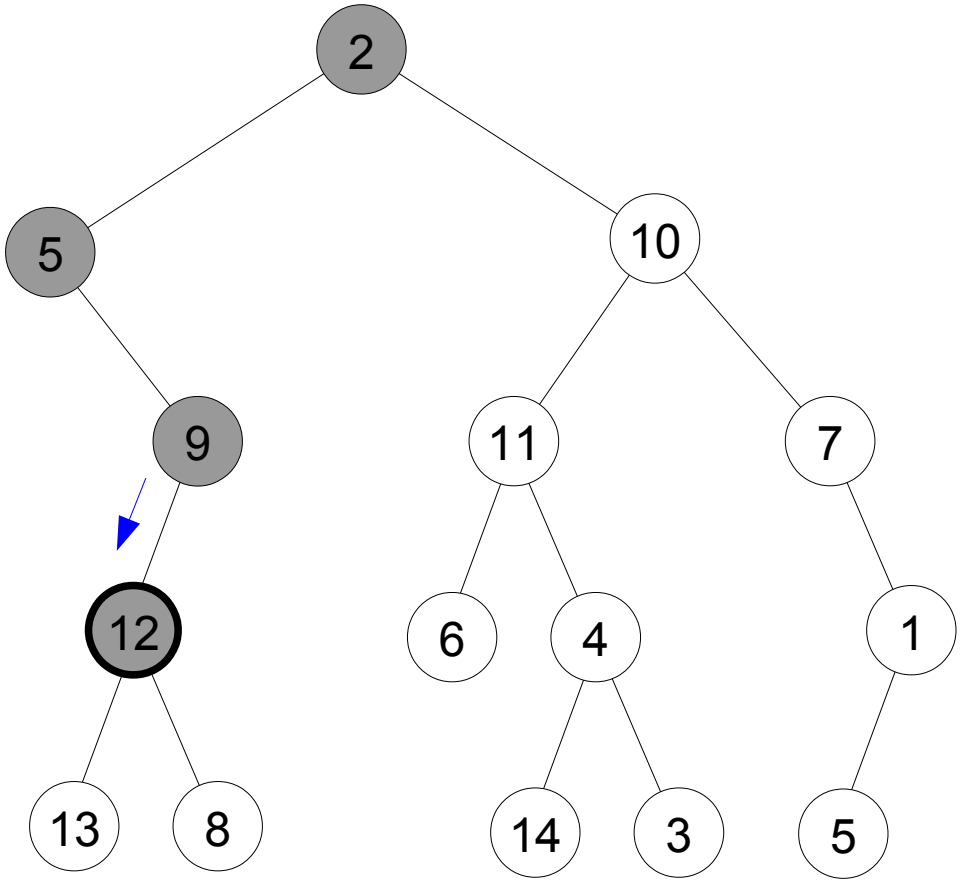
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs LILLE

Depth-first traversal

Principle



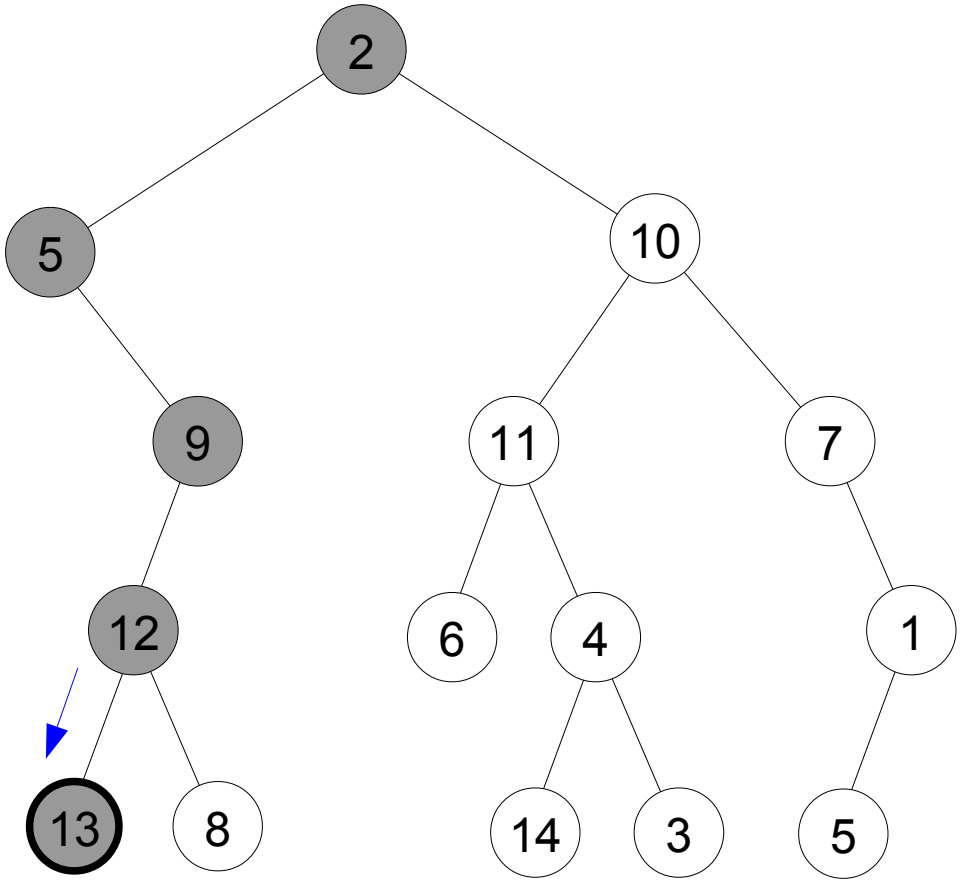
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



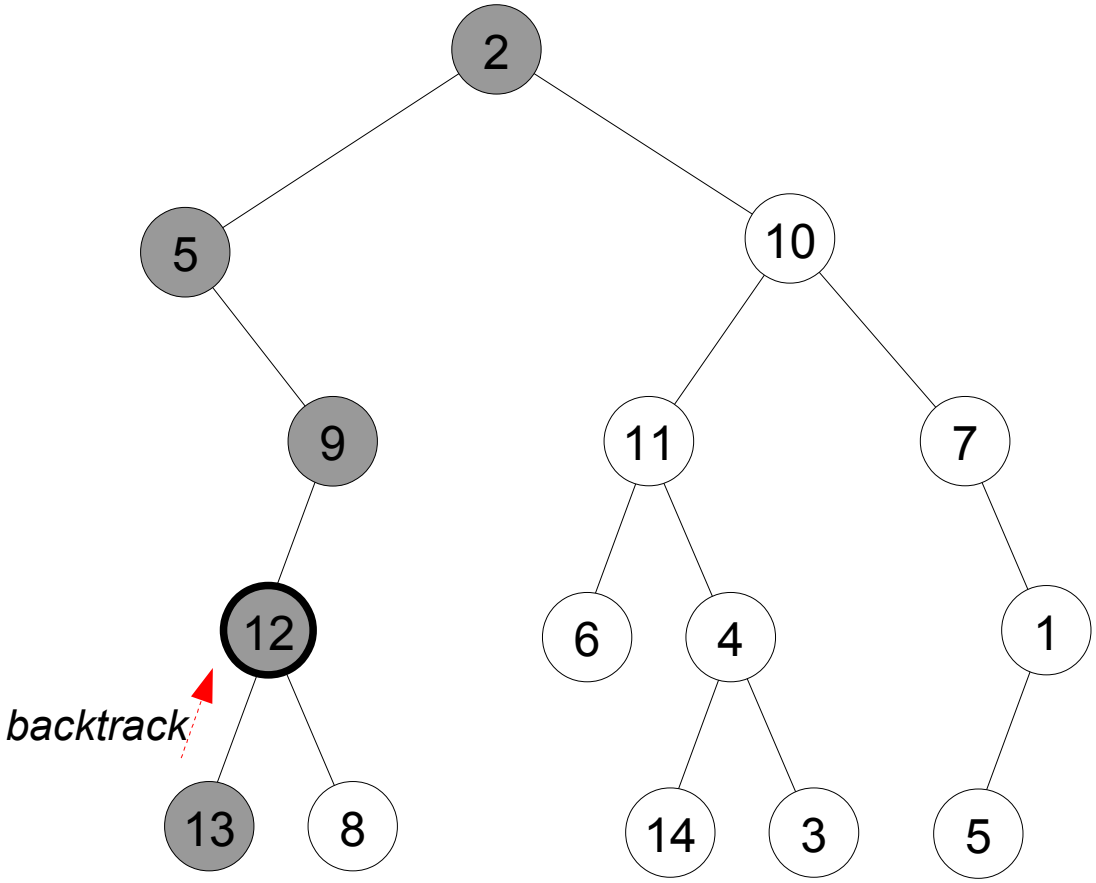
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13
```

ISEN école d'ingénieurs LILLE

Depth-first traversal

Principle



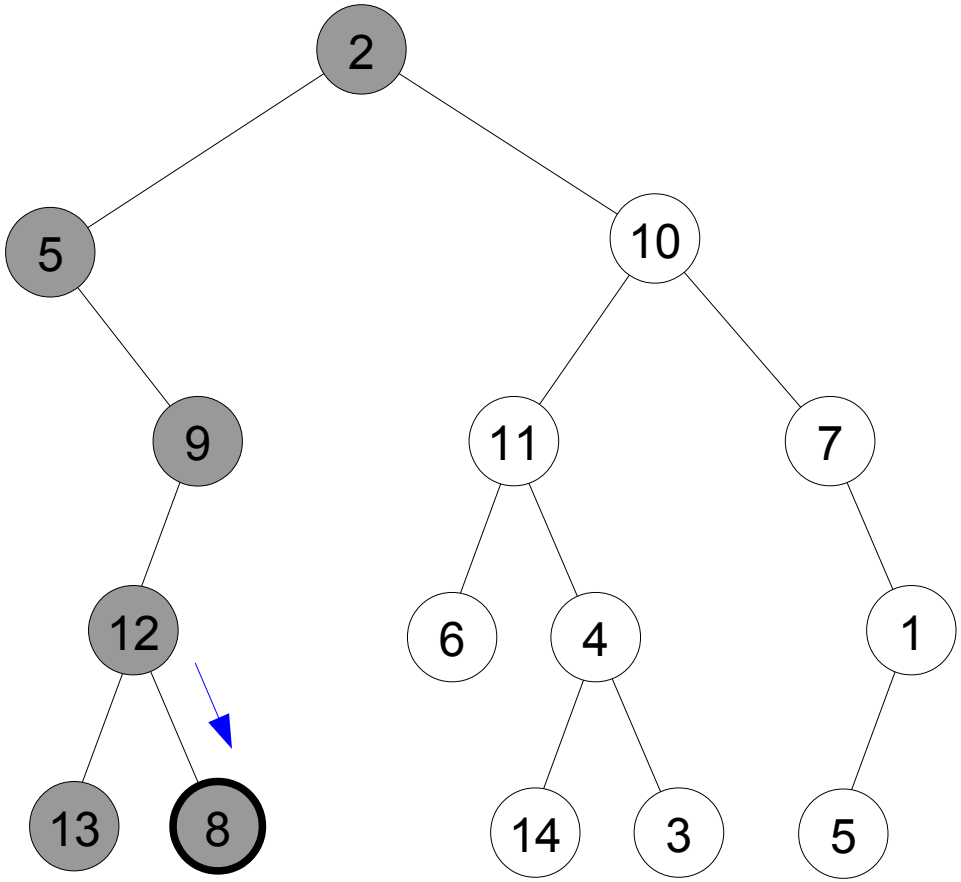
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



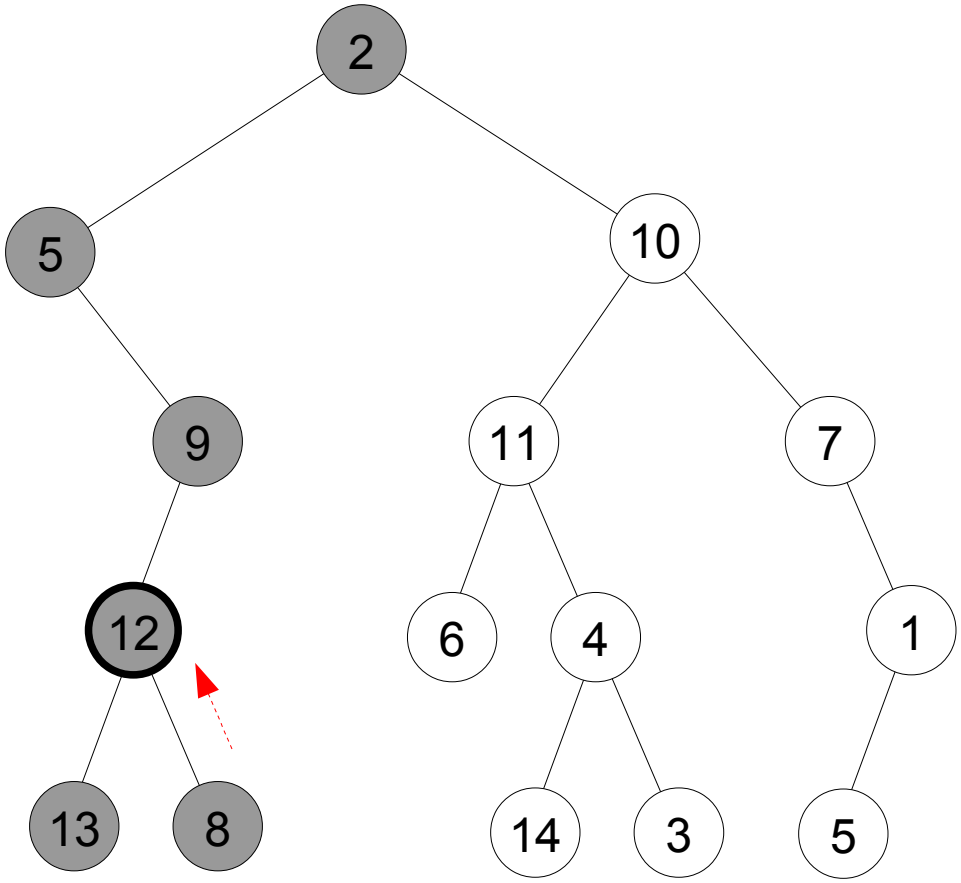
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13 8
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



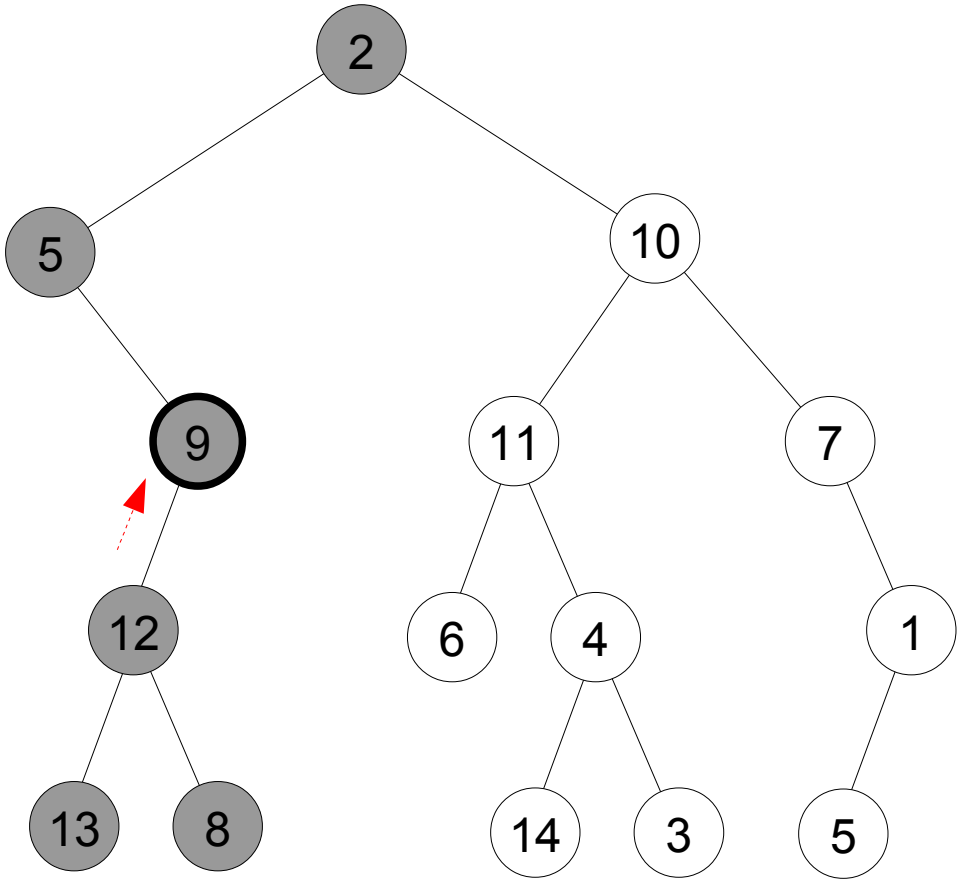
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13 8
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



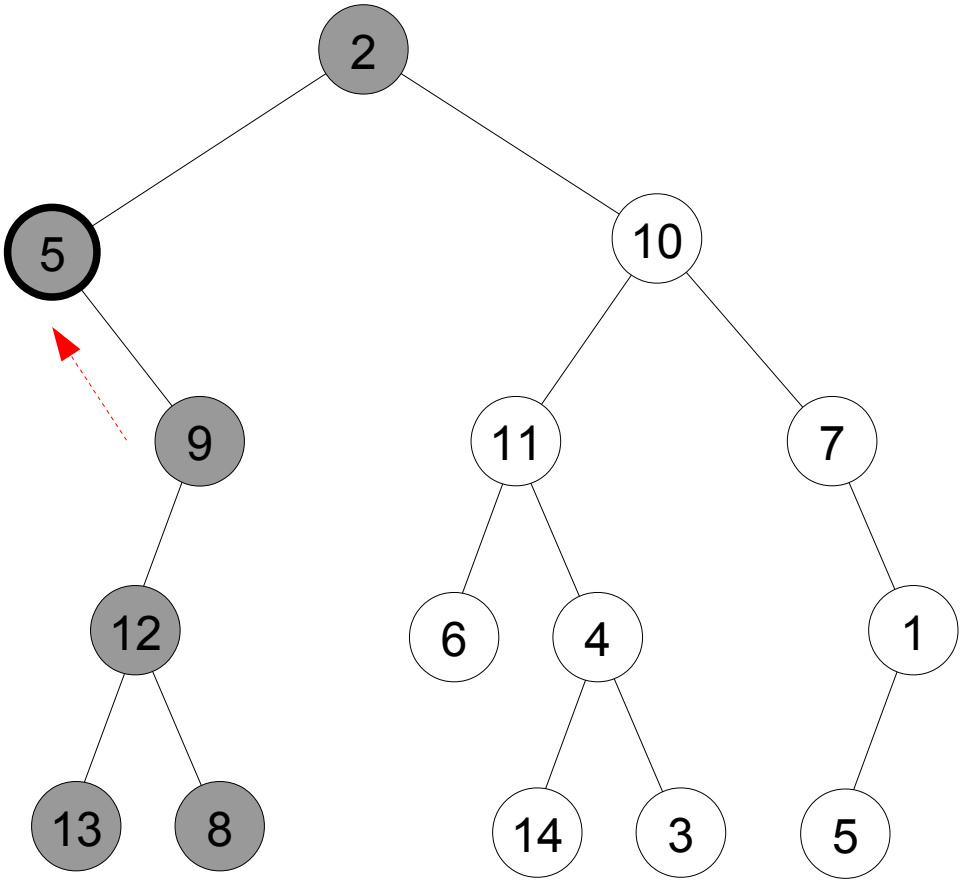
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13 8
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



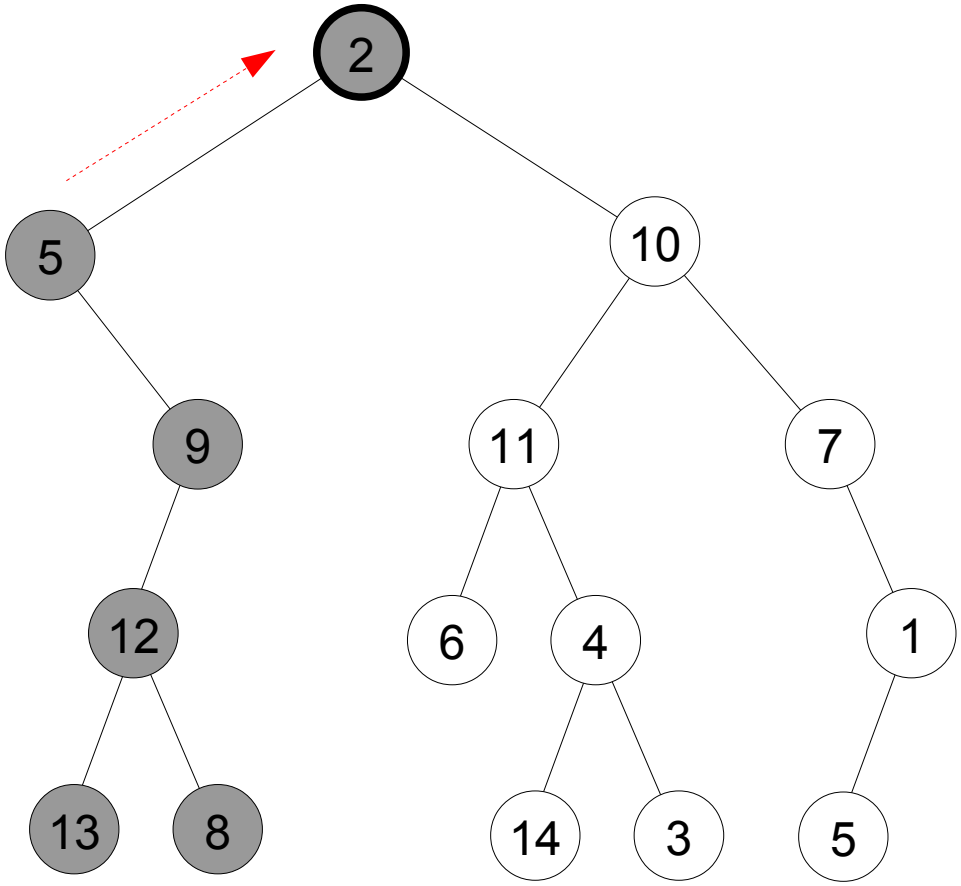
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13 8
```

ISEN école d'ingénieurs LILLE

Depth-first traversal

Principle



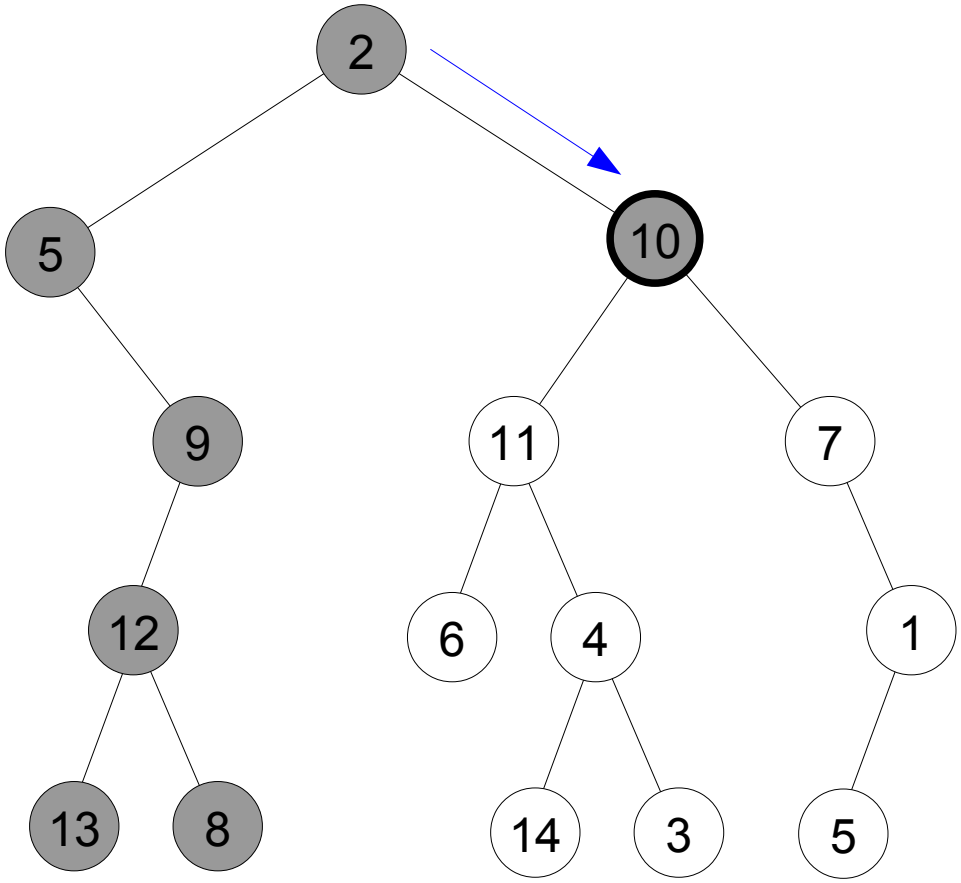
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13 8
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



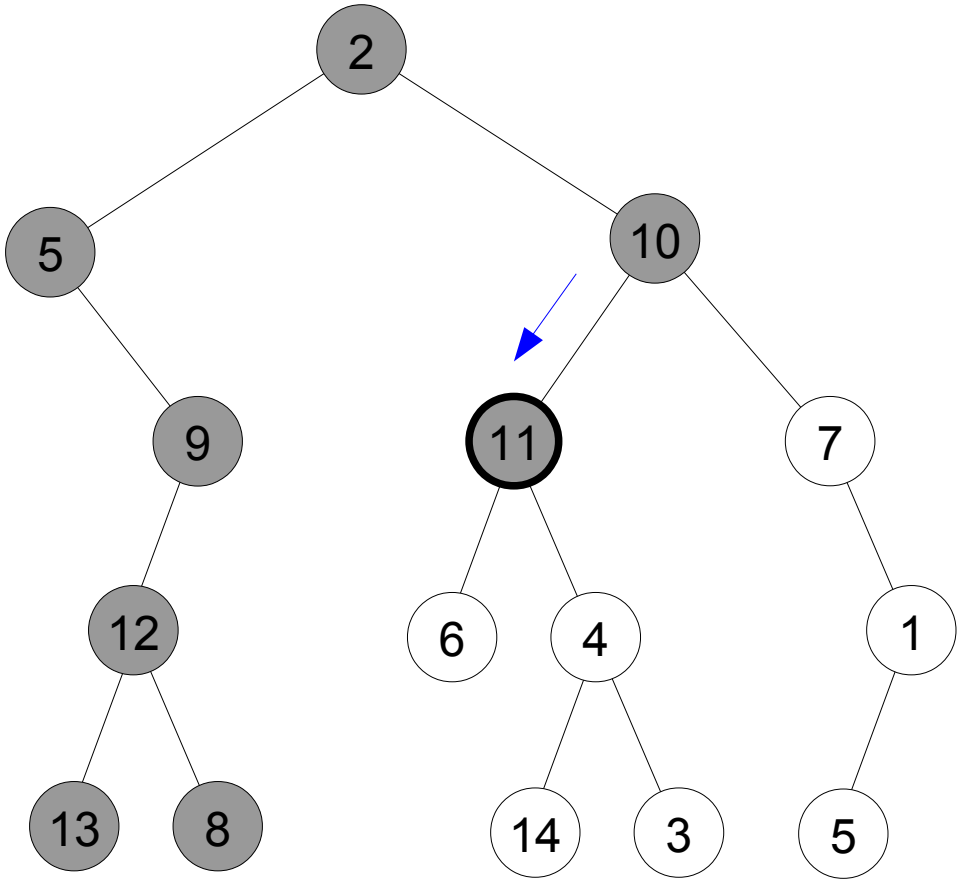
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13 8 10
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



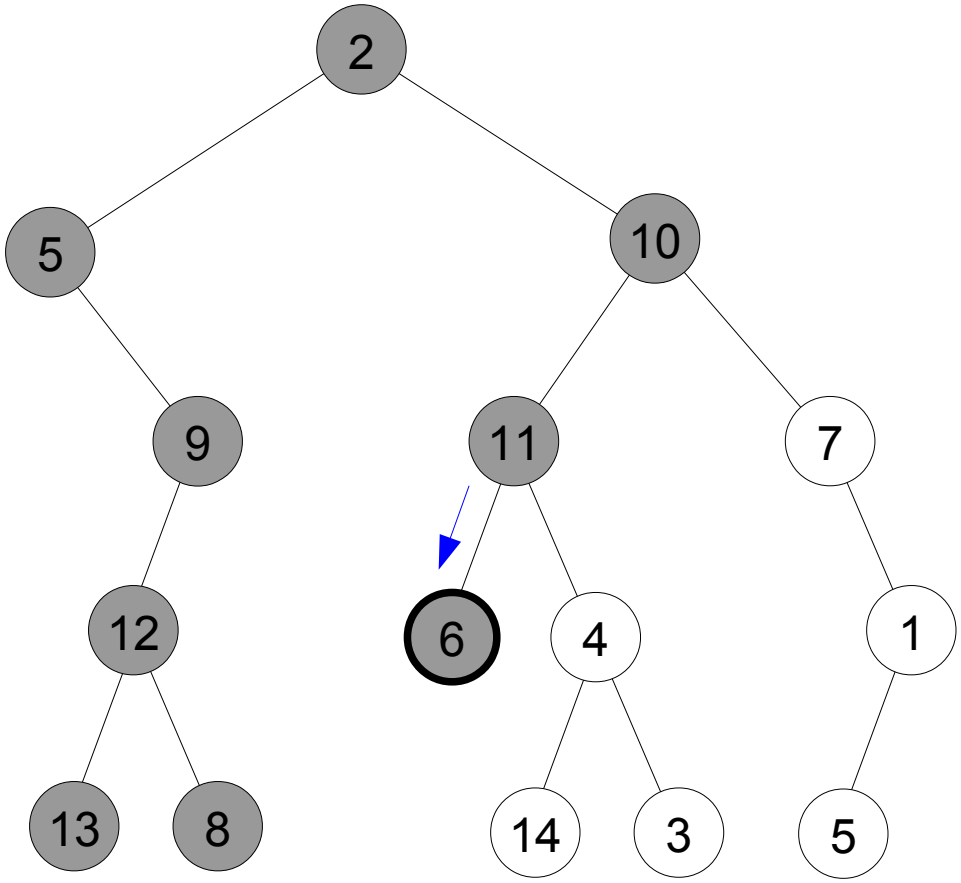
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

```
Visited nodes:
2 5 9 12 13 8 10
11
```

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



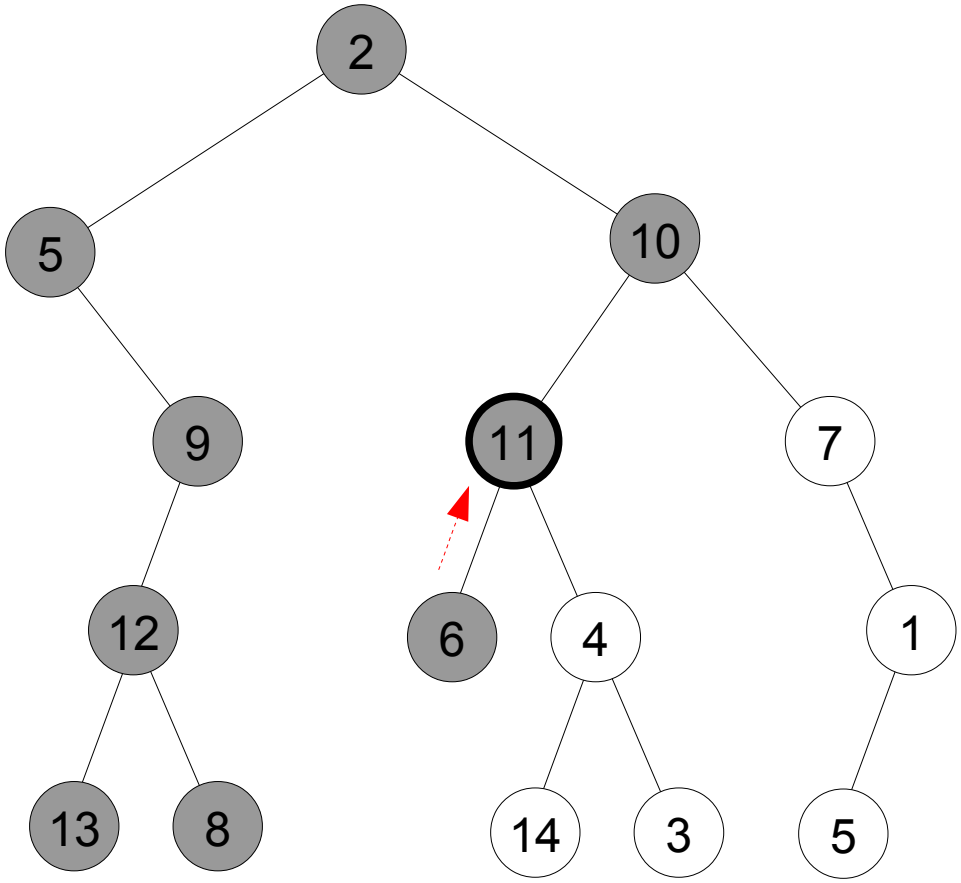
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



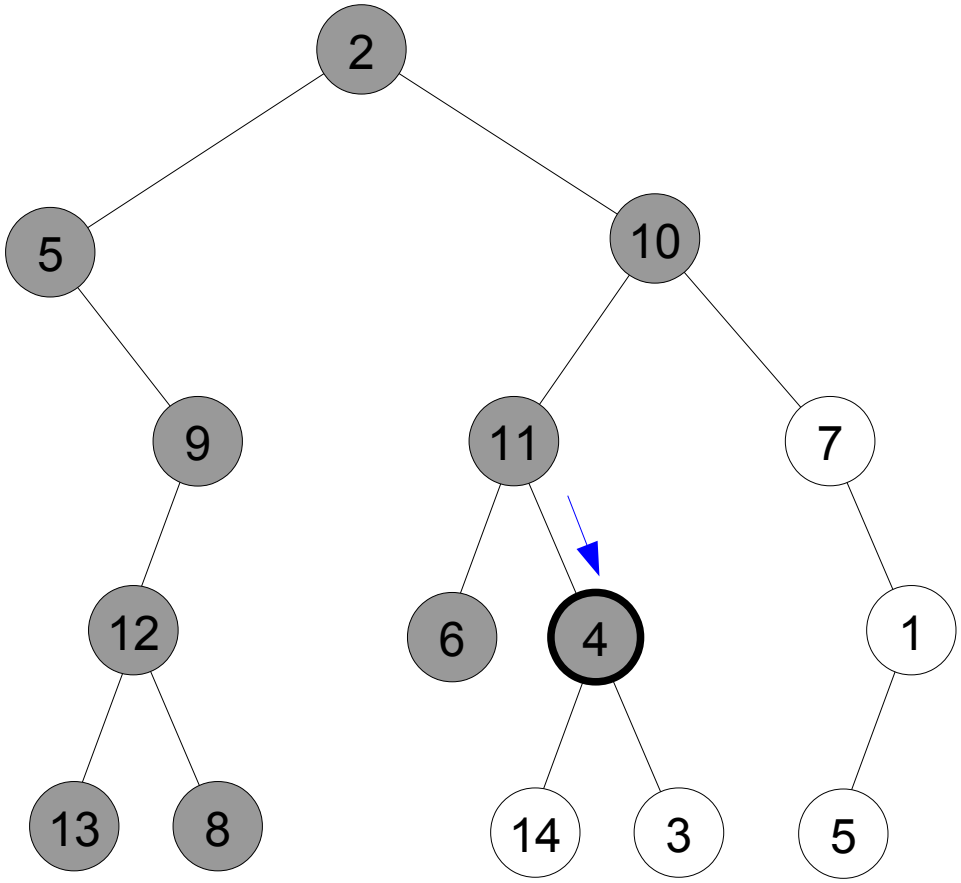
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



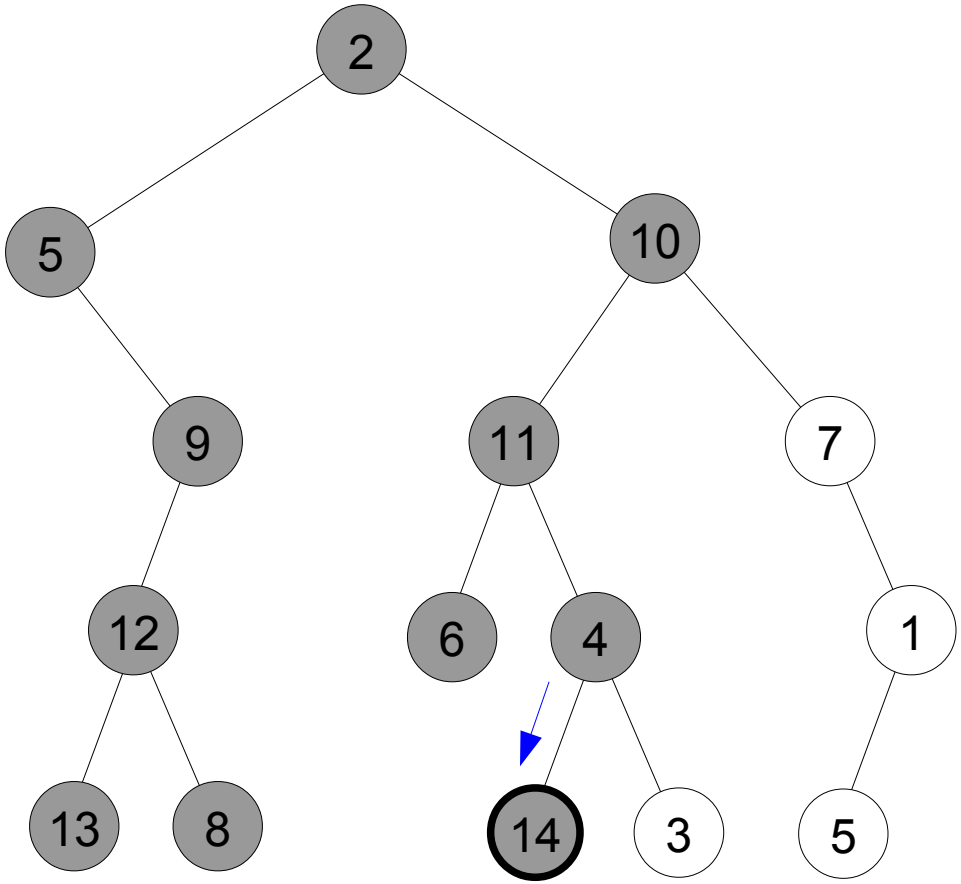
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



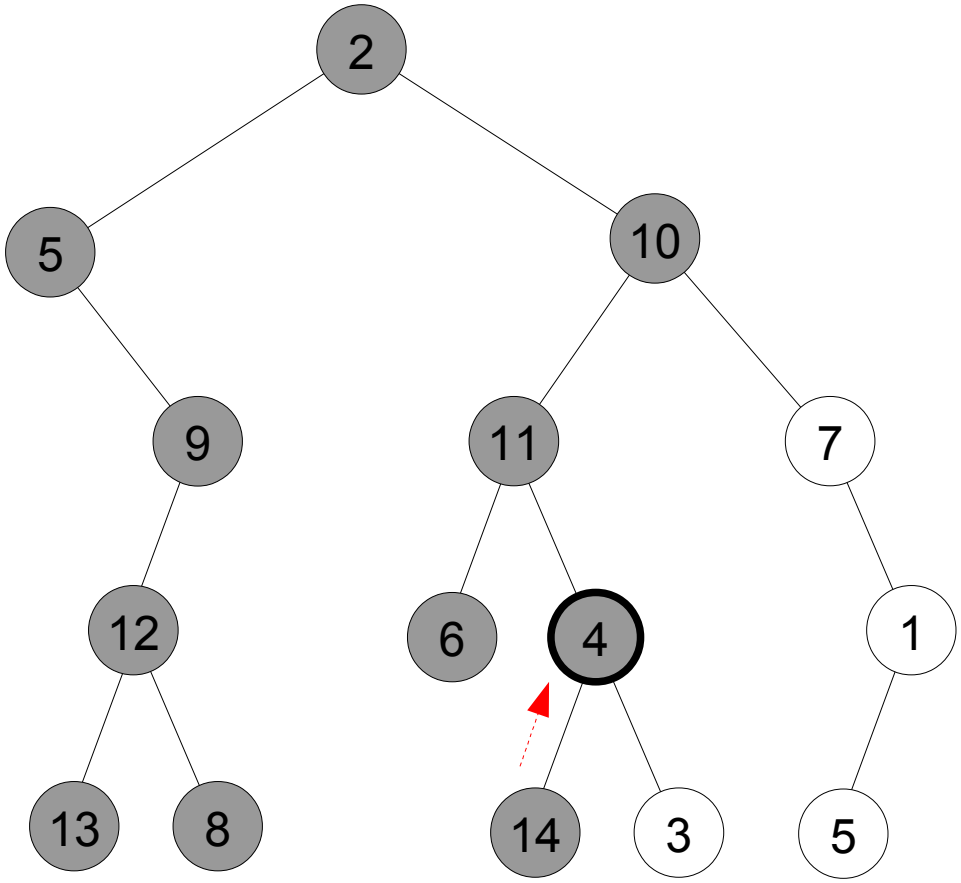
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



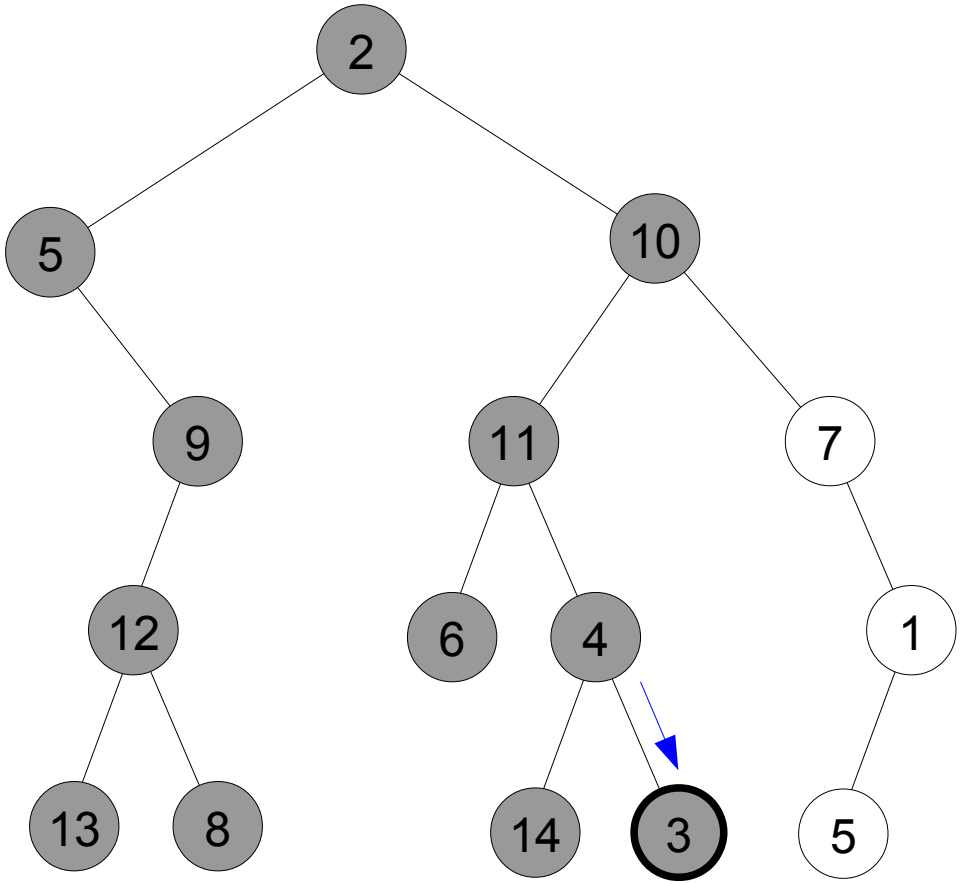
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



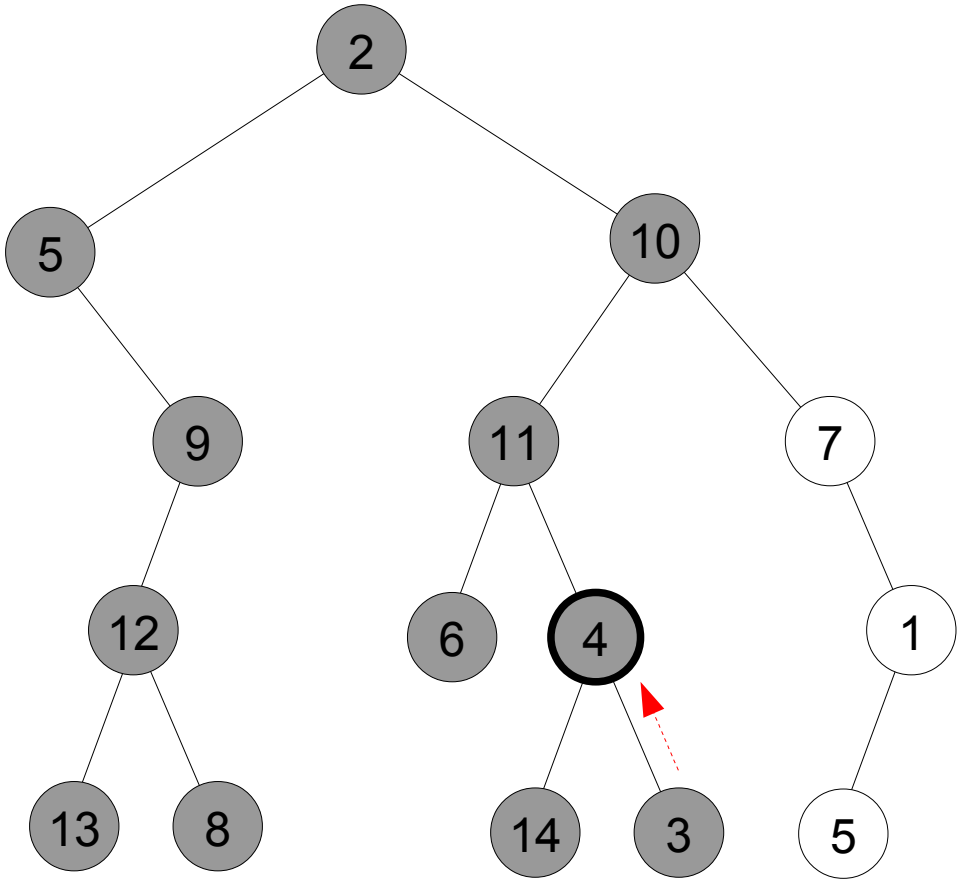
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



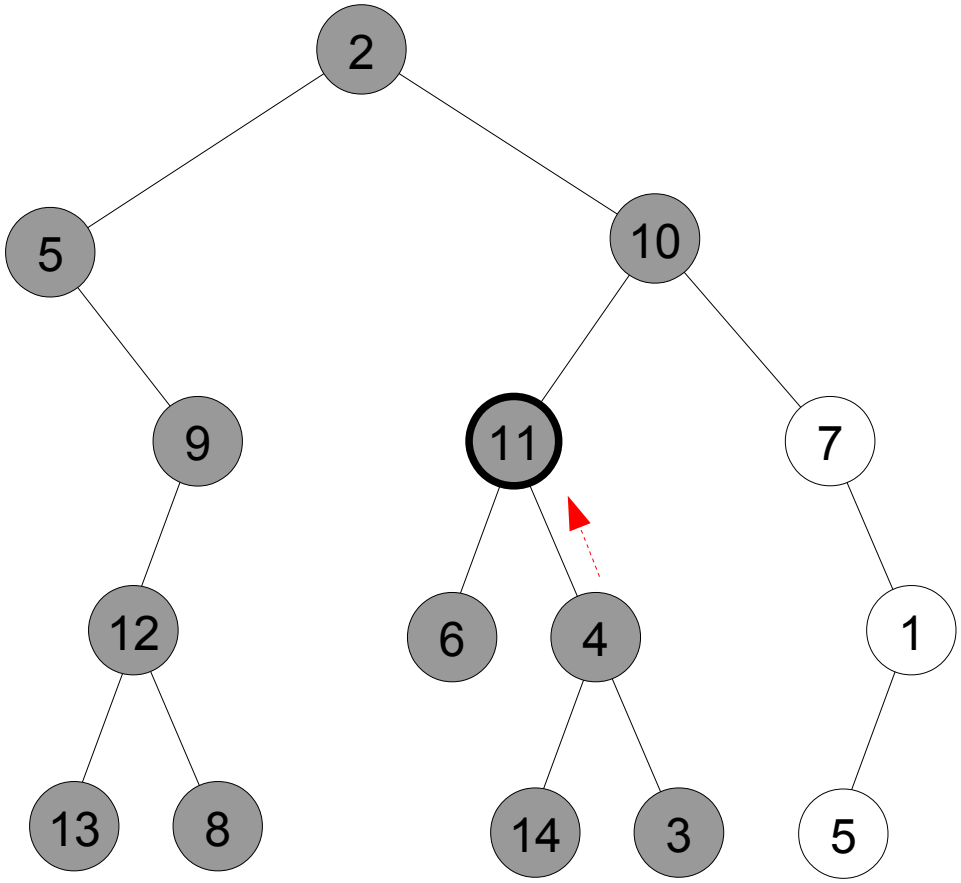
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



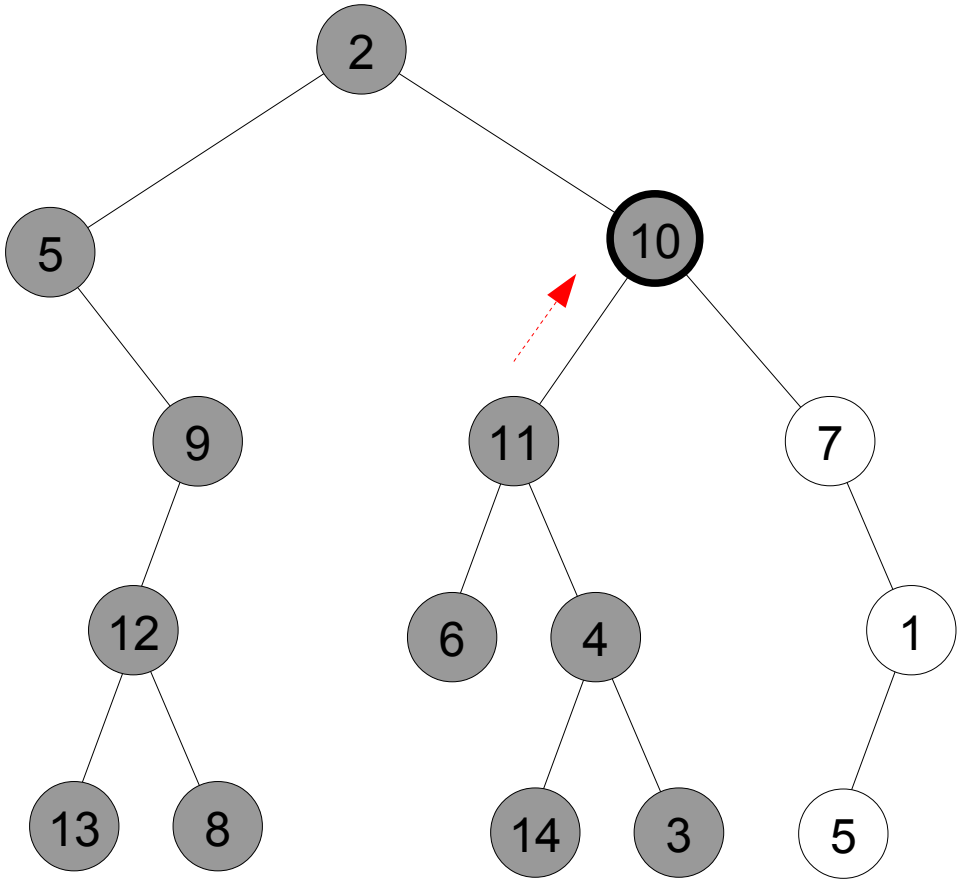
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



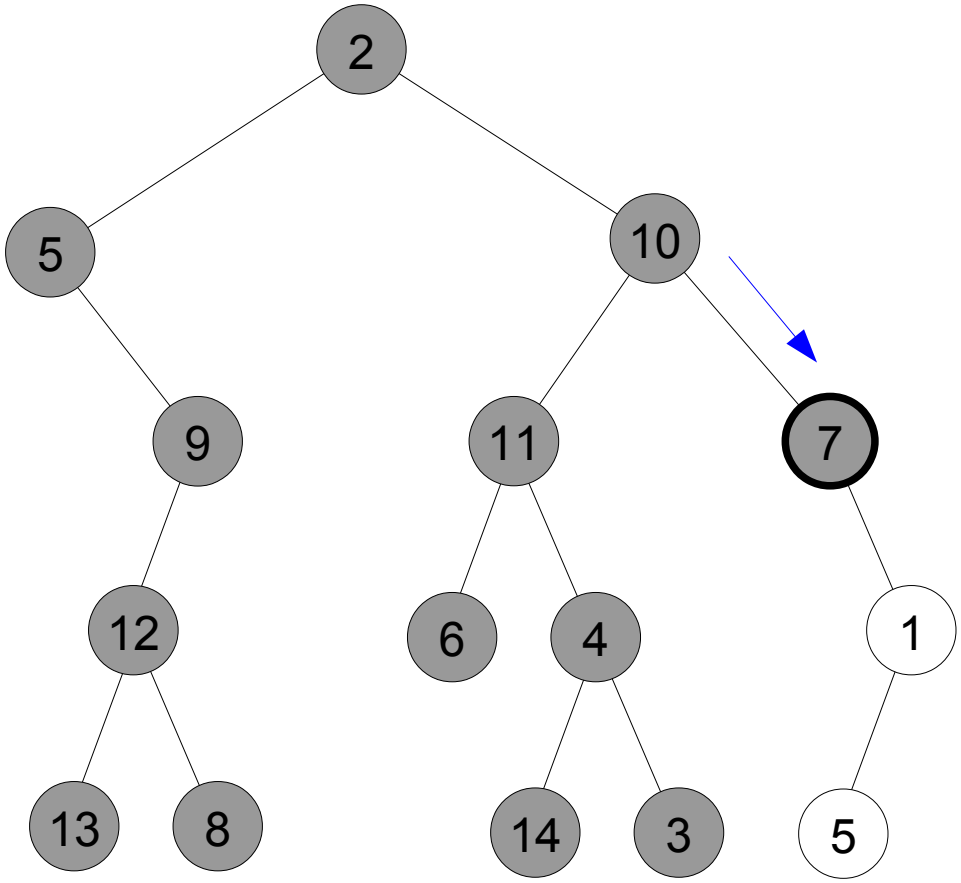
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



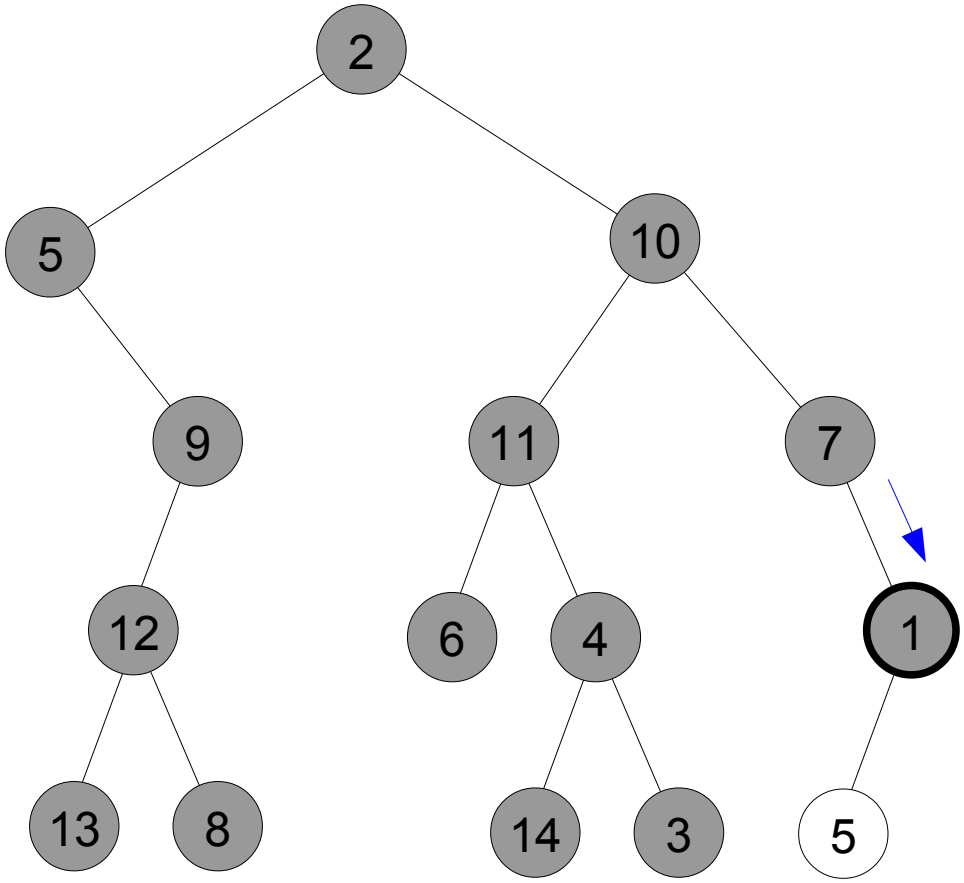
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



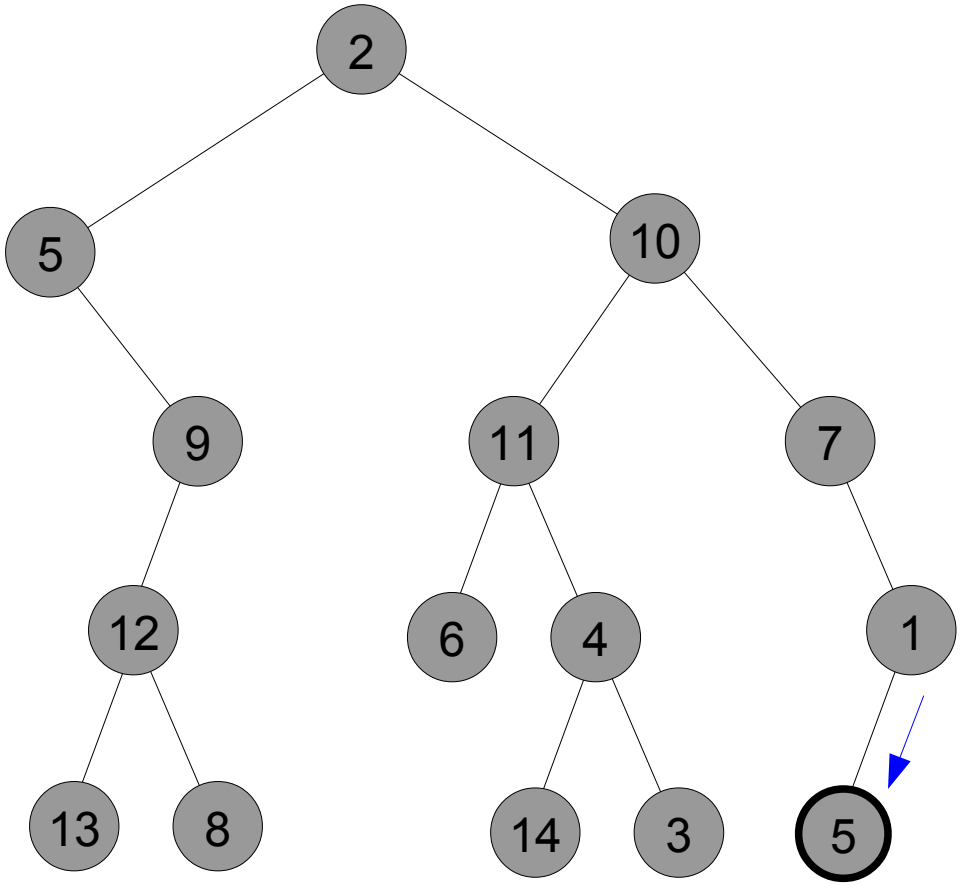
Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Principle



Each branch of the tree is traversed ad far as possible (until reaching a leaf)

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

Implementation

Depth-first traversal

Implementation

Algorithm based on a stack:

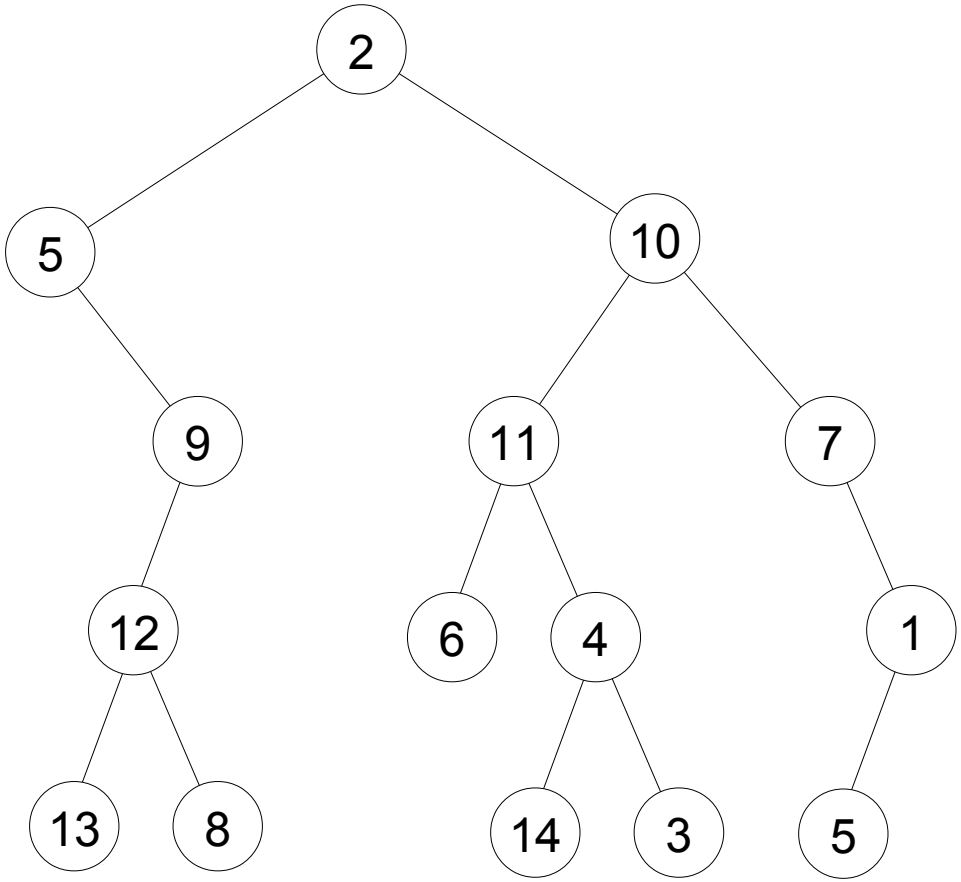
1. Create an empty stack
2. Push the root node
3. While the stack is not empty:
- pop a node
- treat this node (here: print its id)
- push its children

The stack can be:
- explicit: iterative version
- implicit (call stack): recursive version

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



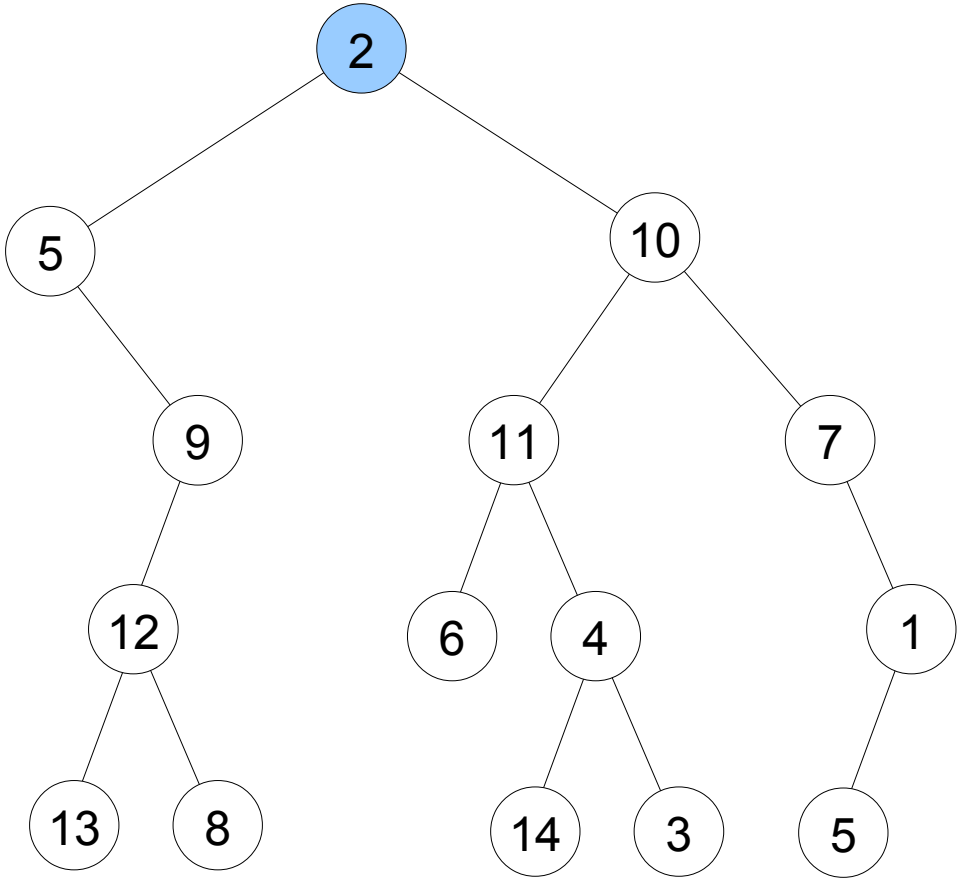

```
Visited nodes:
```

Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



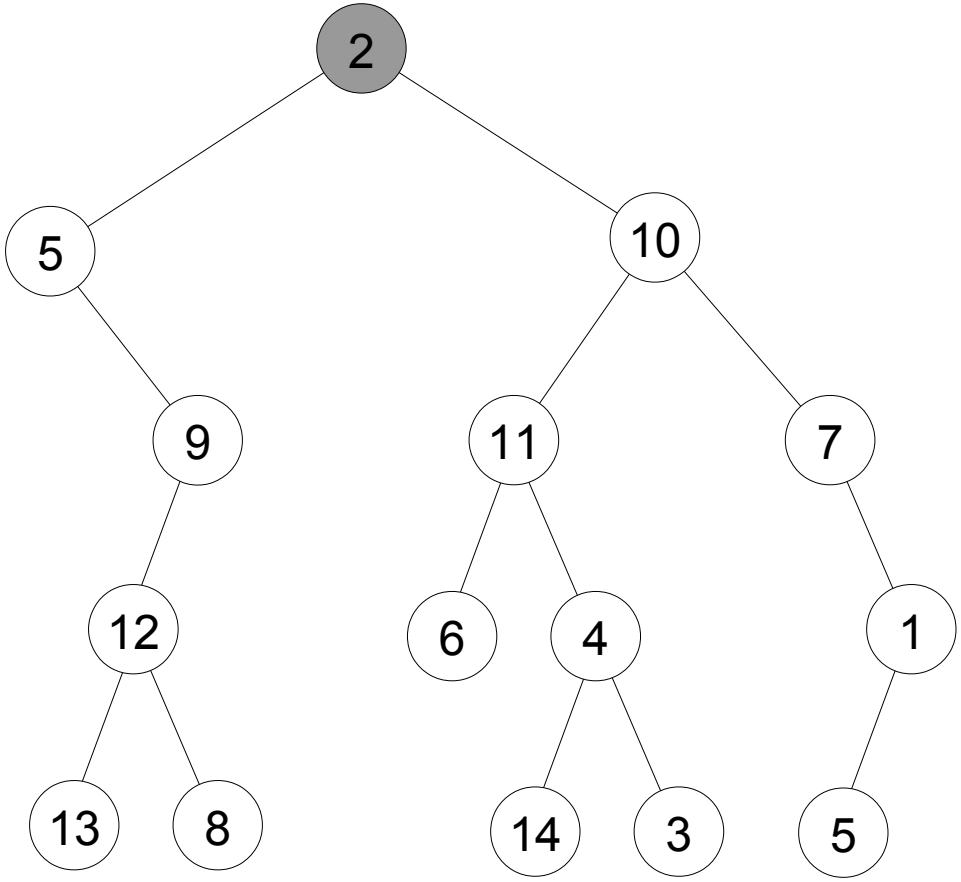

```
Visited nodes:
```

Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



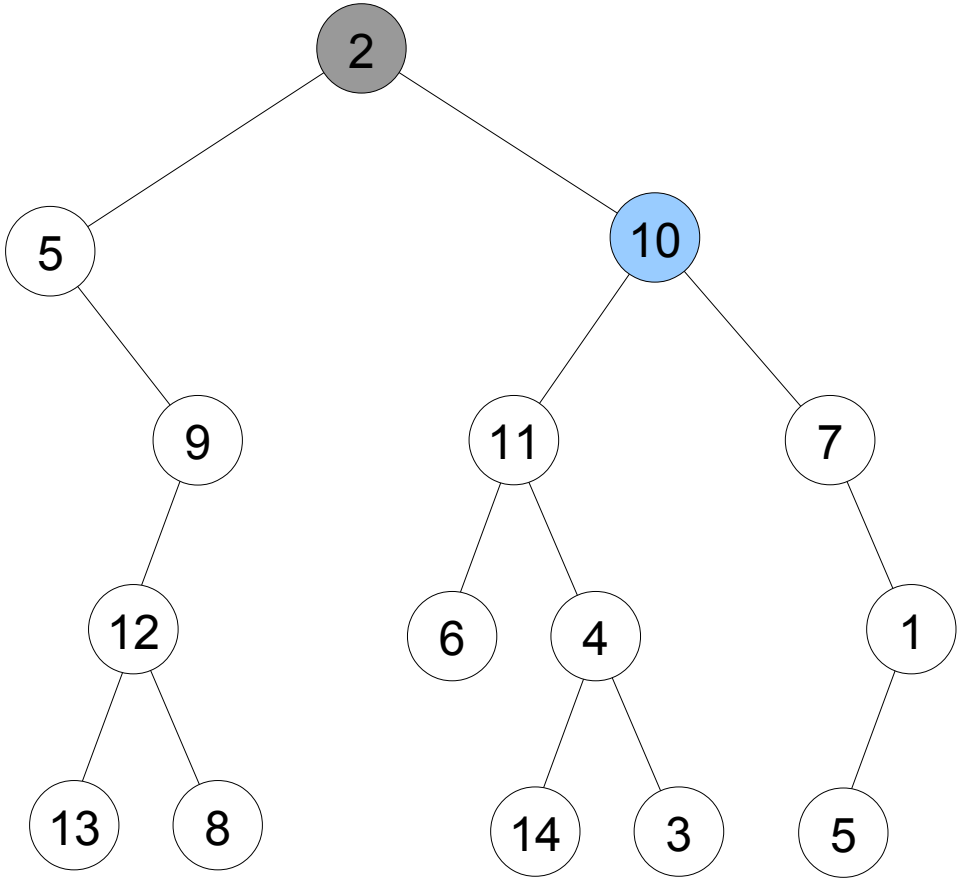

```
Visited nodes:
2
```

Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



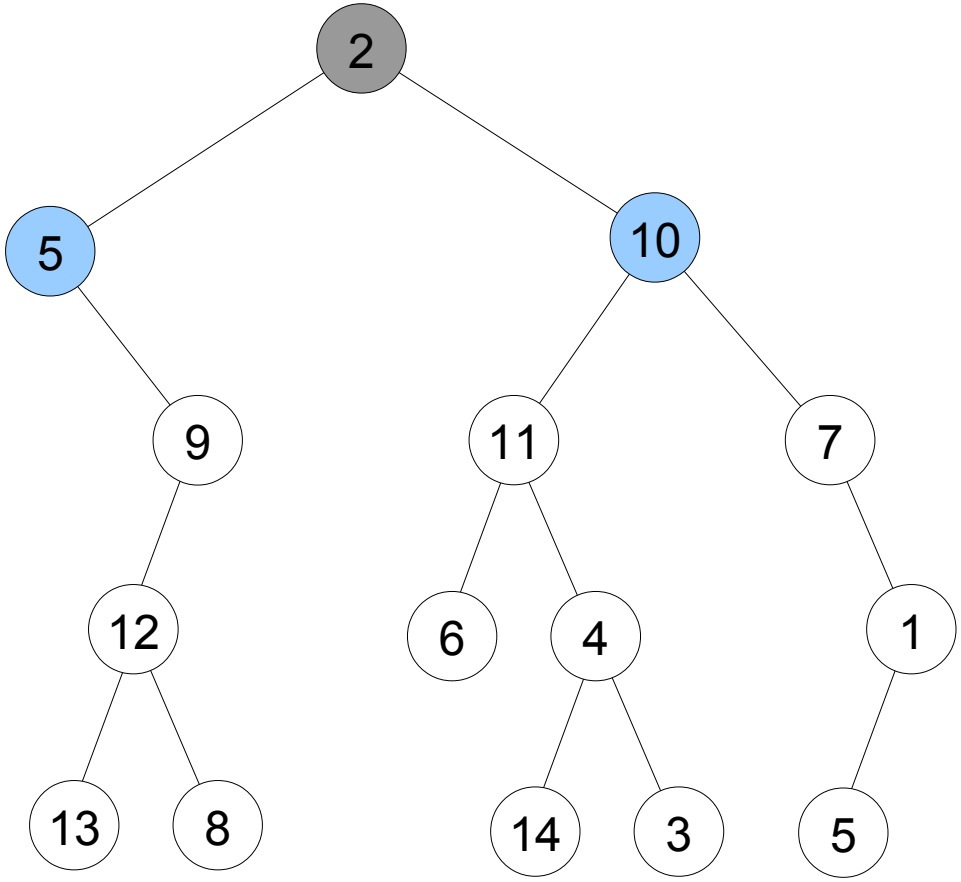

```
Visited nodes:
2
```

Stack

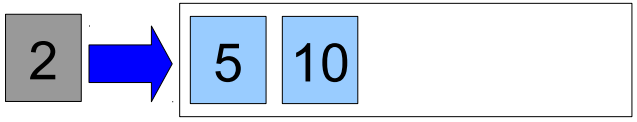
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




```
Visited nodes:
2
```

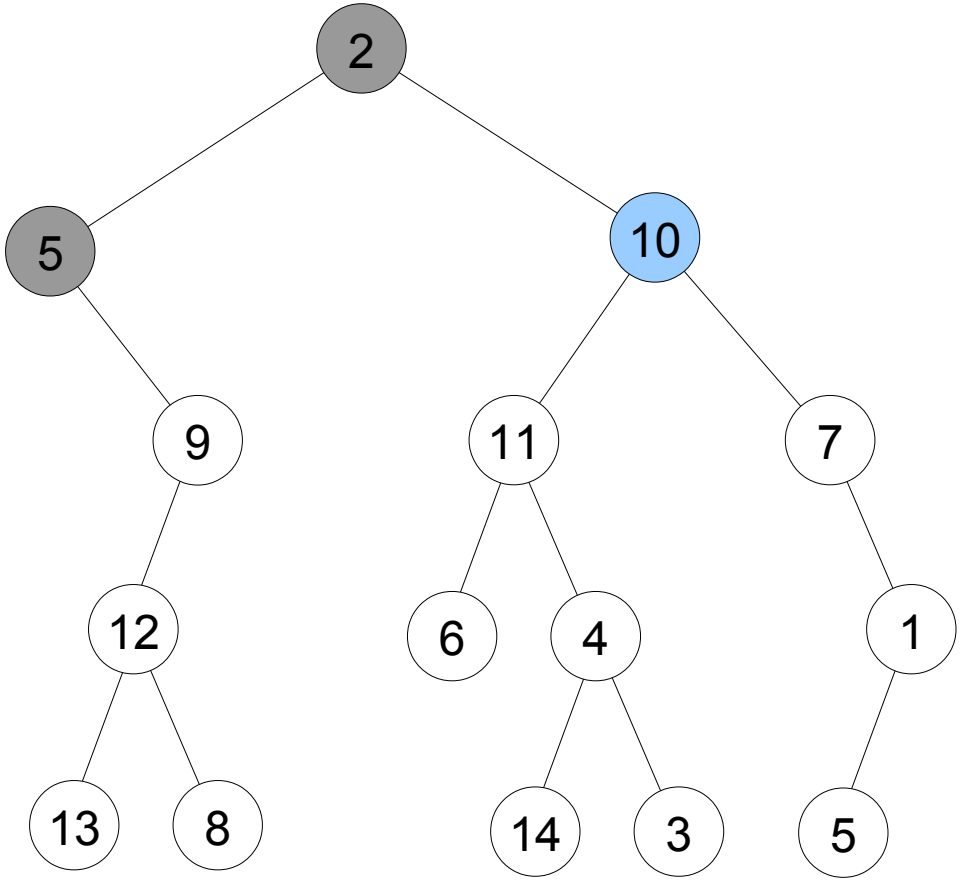


Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



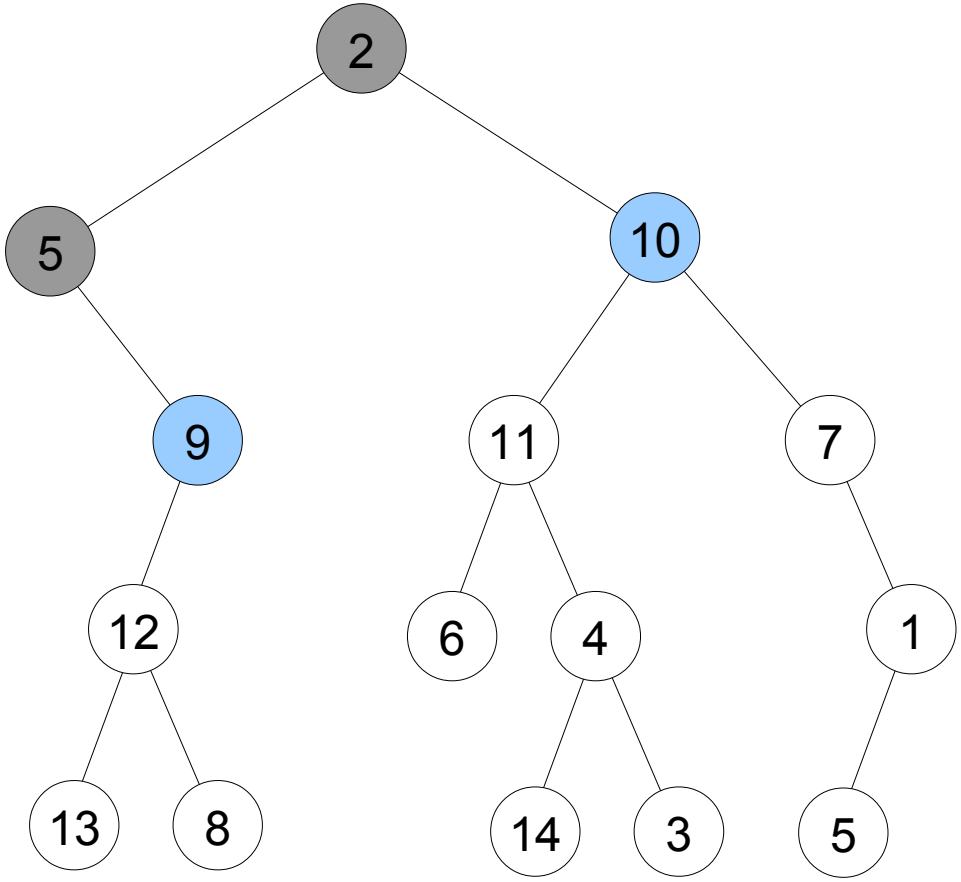

```
Visited nodes:
2 5
```

Stack

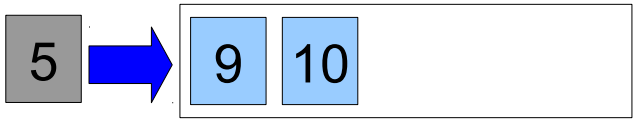
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




```
Visited nodes:
2 5
```

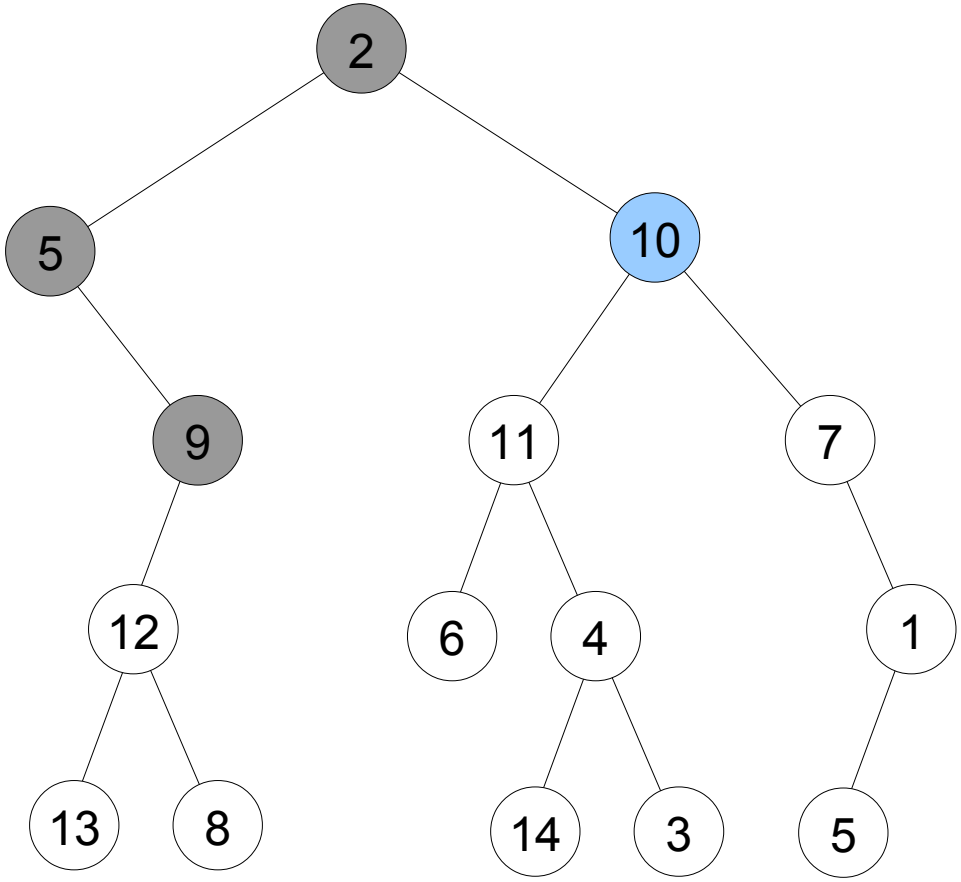


Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



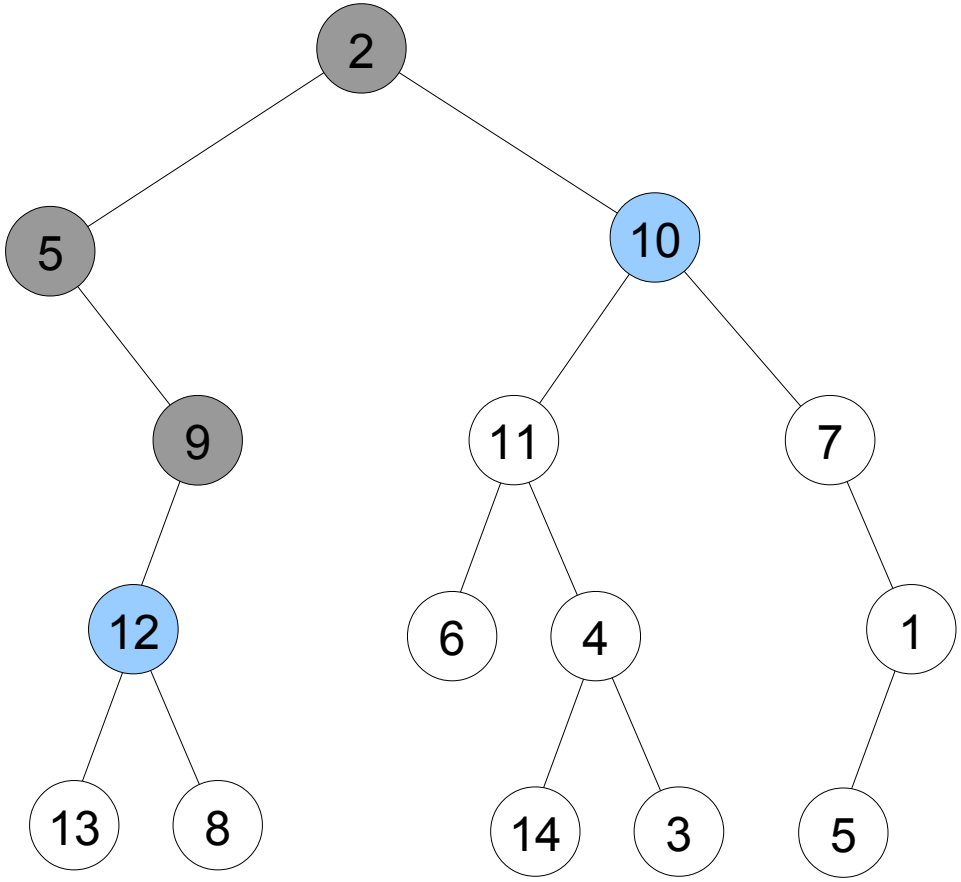

```
Visited nodes:
2 5 9
```

Stack

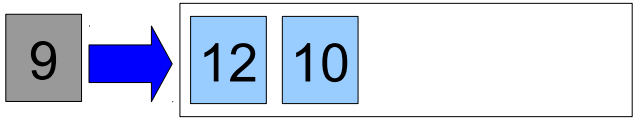
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




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

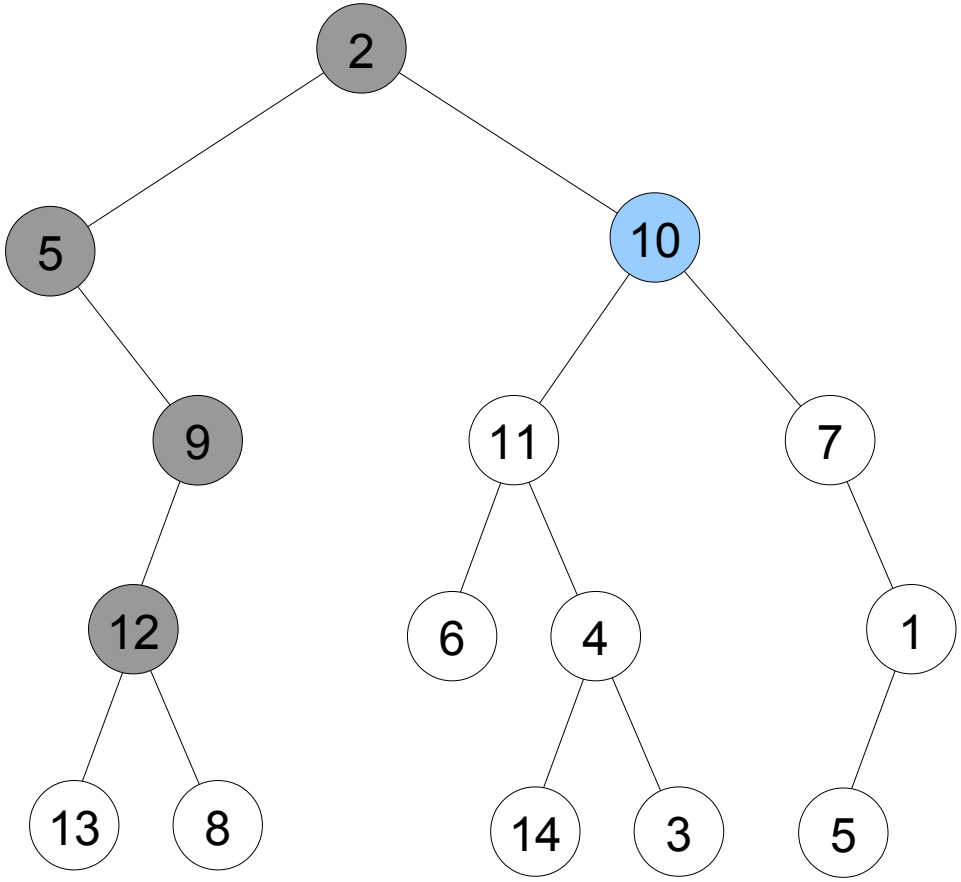


Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



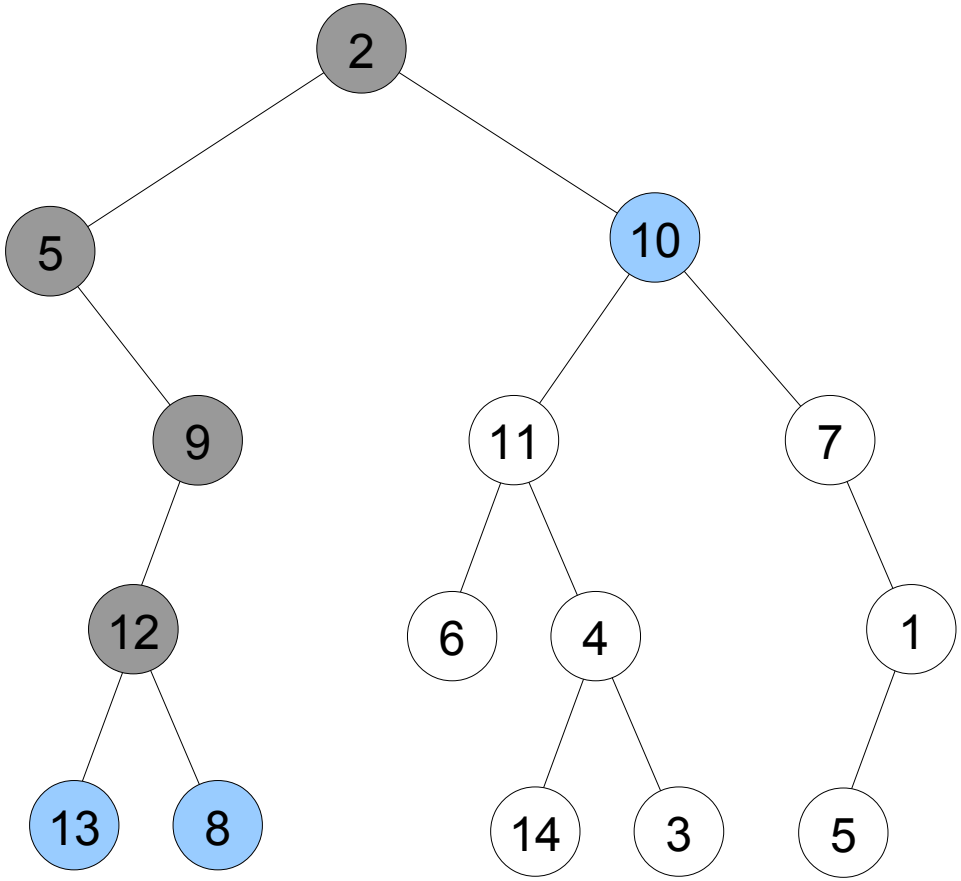

```
Visited nodes:
2 5 9 12
```

Stack

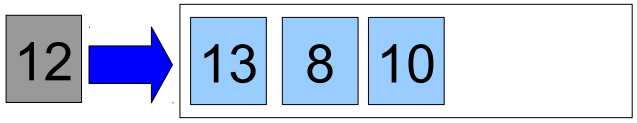
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




```
Visited nodes:
2 5 9 12
```

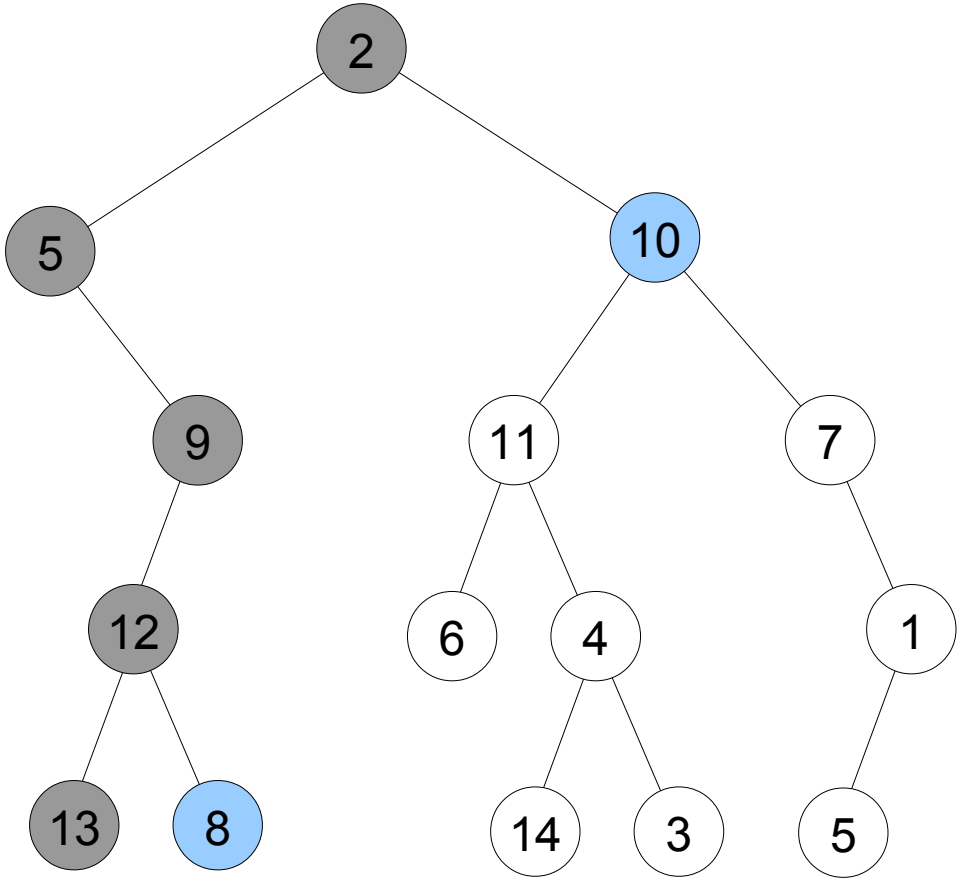


Stack

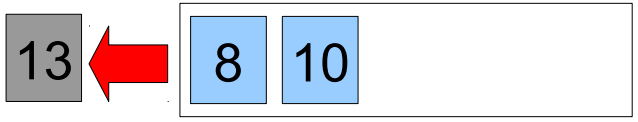
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




```
Visited nodes:
2 5 9 12 13
```

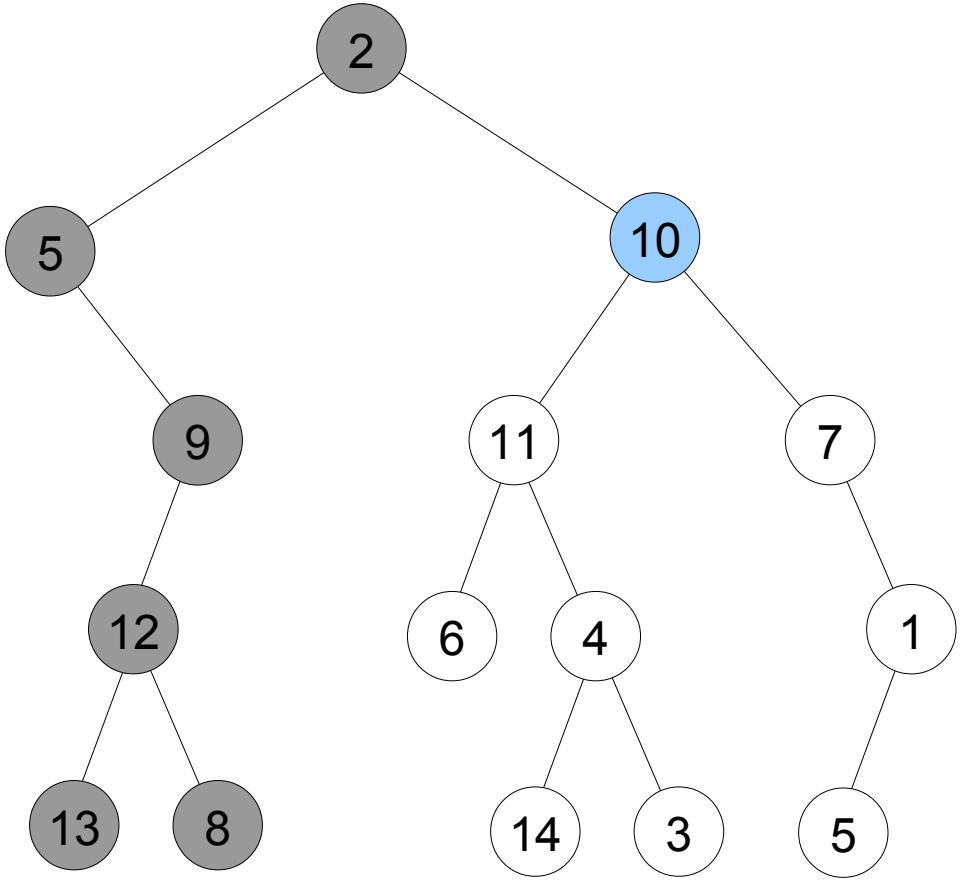


Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



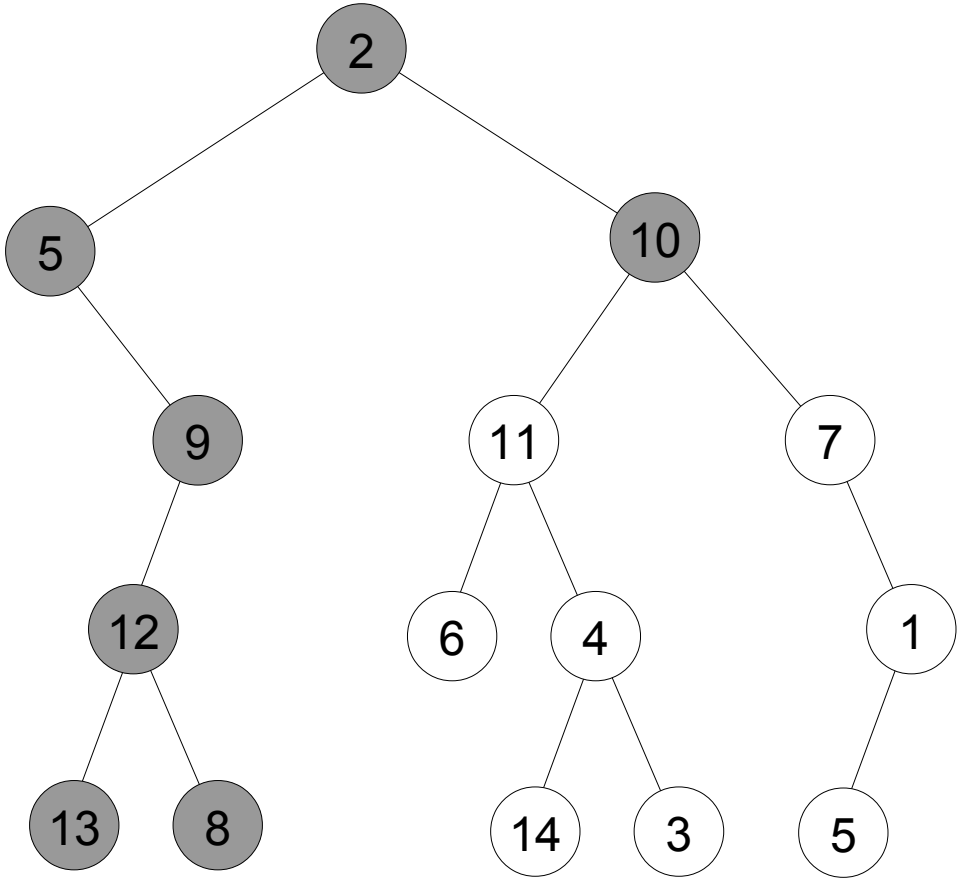

```
Visited nodes:
2 5 9 12 13 8
```

Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



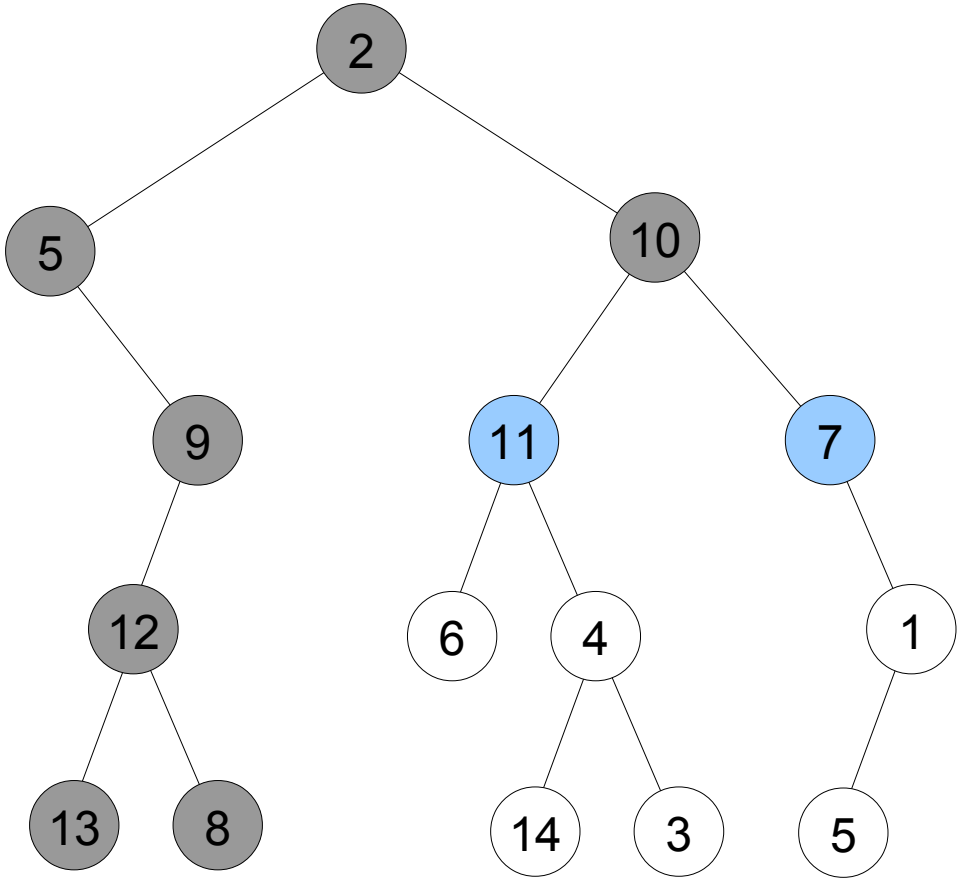

```
Visited nodes:
2 5 9 12 13 8 10
```

Stack

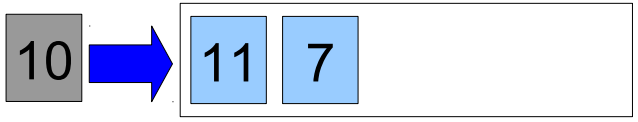
ISEN école d'ingénieurs
LILLE

Depth-first traversal

Detailed example




```
Visited nodes:
2 5 9 12 13 8 10
```

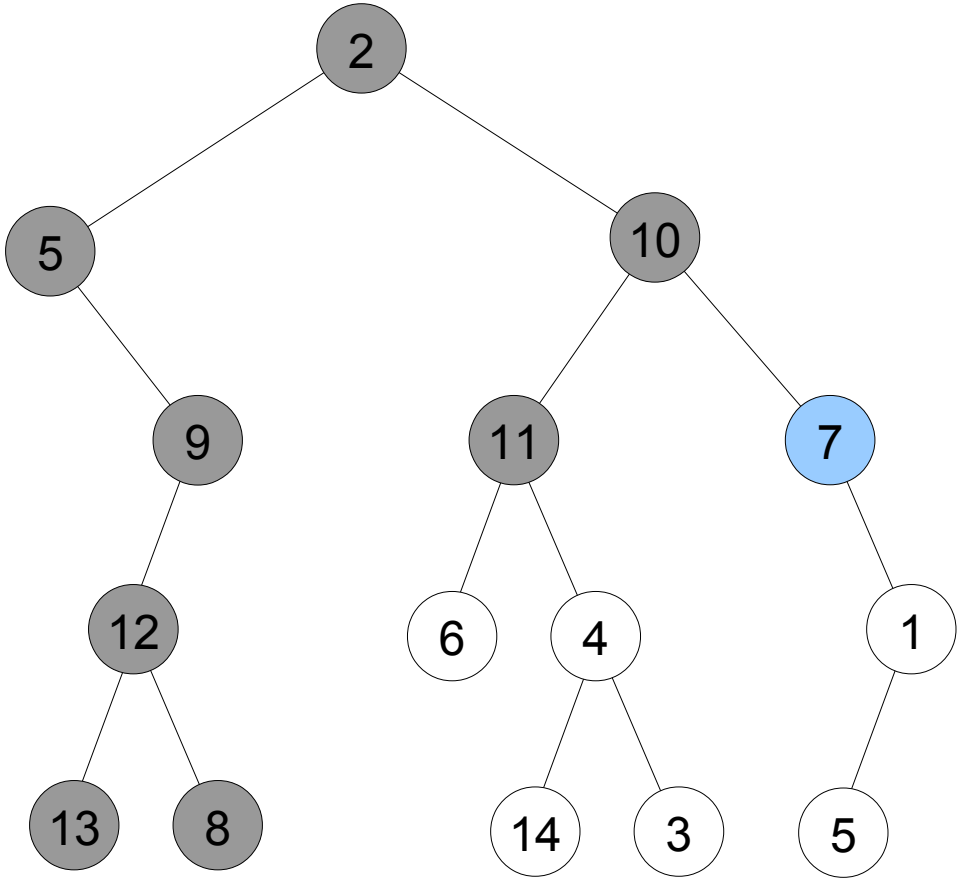


Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



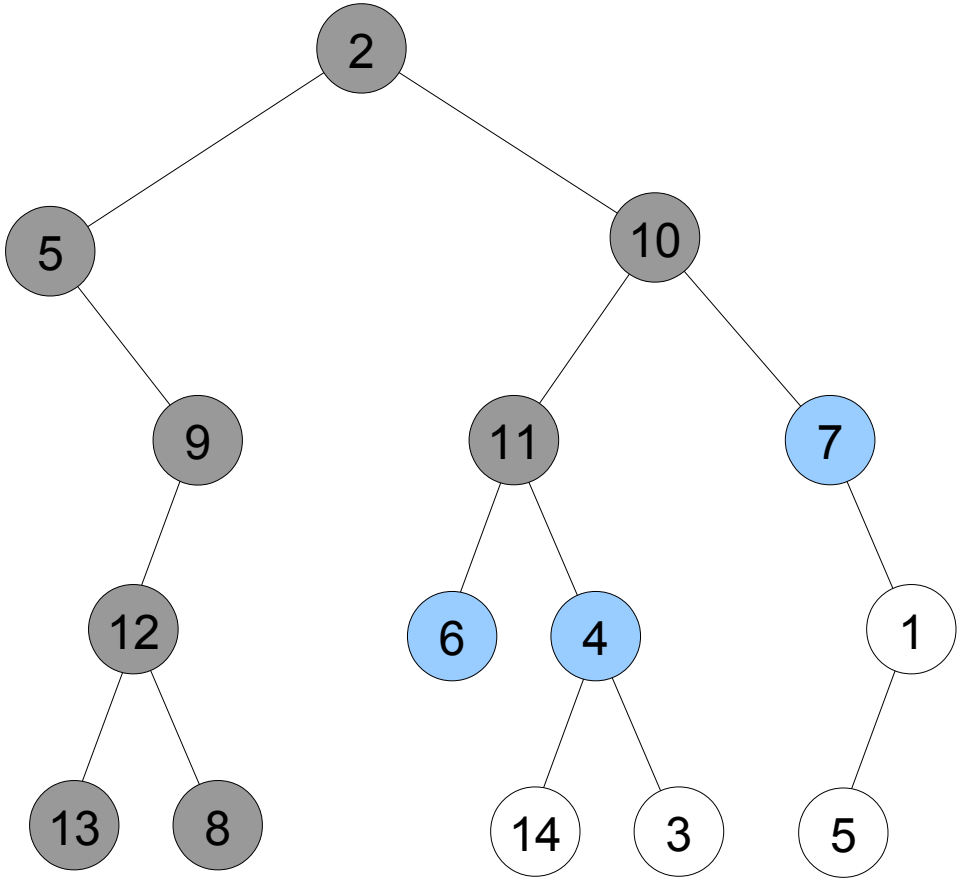

```
Visited nodes:
2 5 9 12 13 8 10
11
```

Stack

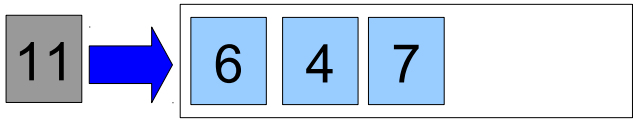
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




```
Visited nodes:
2 5 9 12 13 8 10
11
```

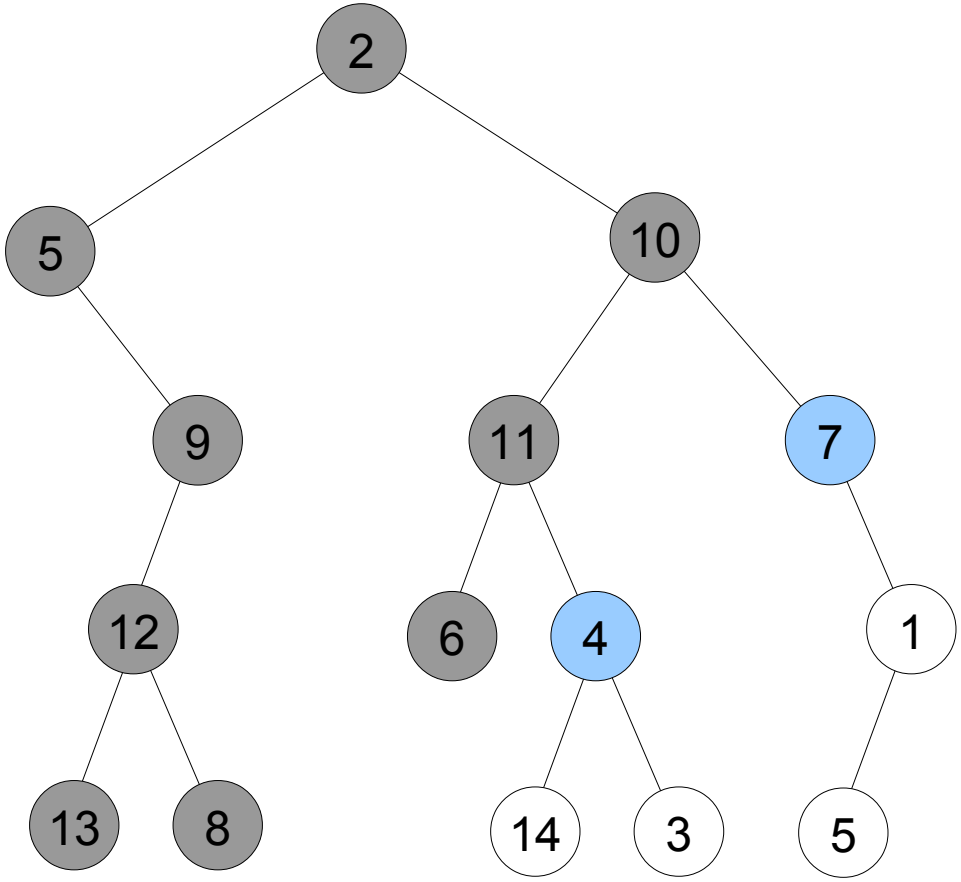


Stack

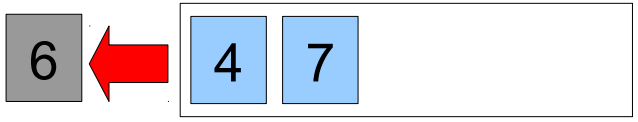
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




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

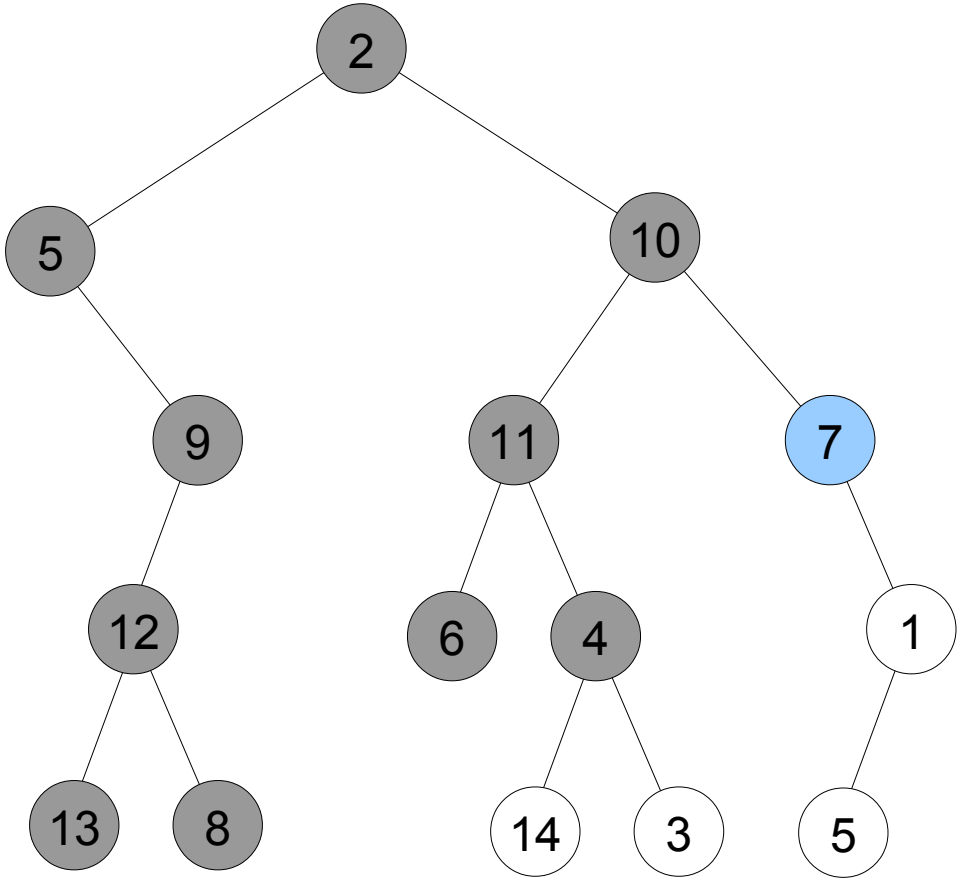


Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



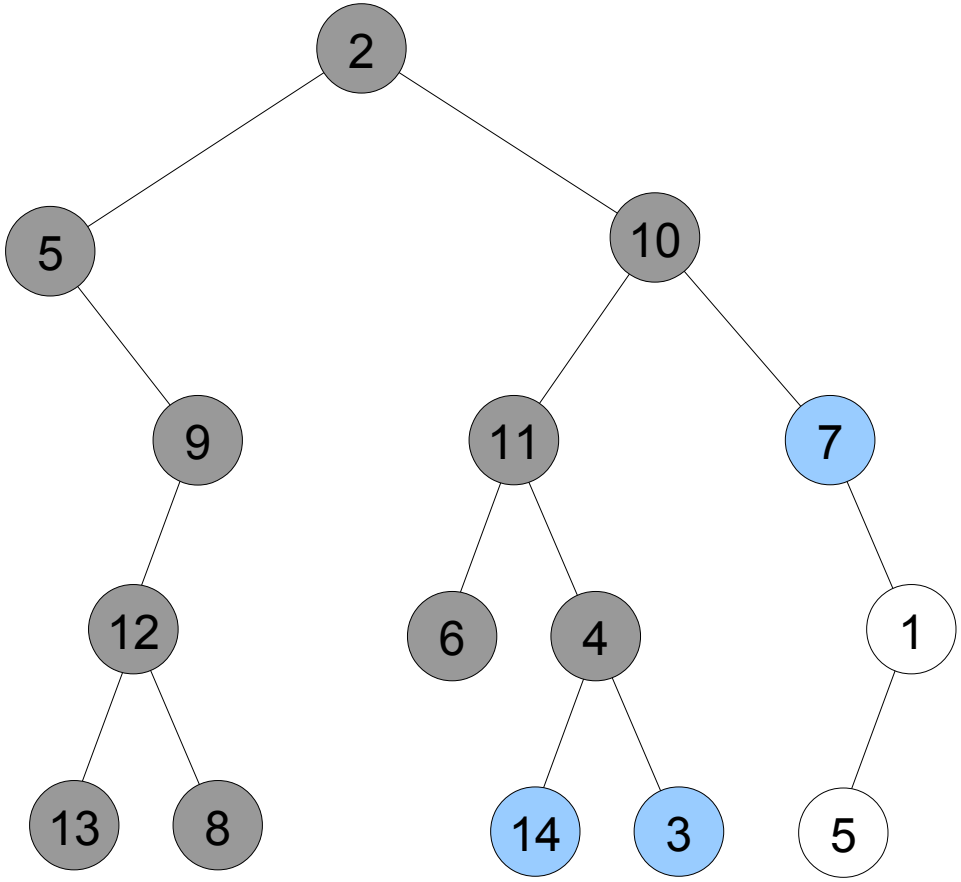

```
Visited nodes:
2 5 9 12 13 8 10
11 6 4
```

Stack

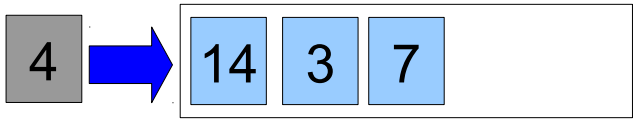
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




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

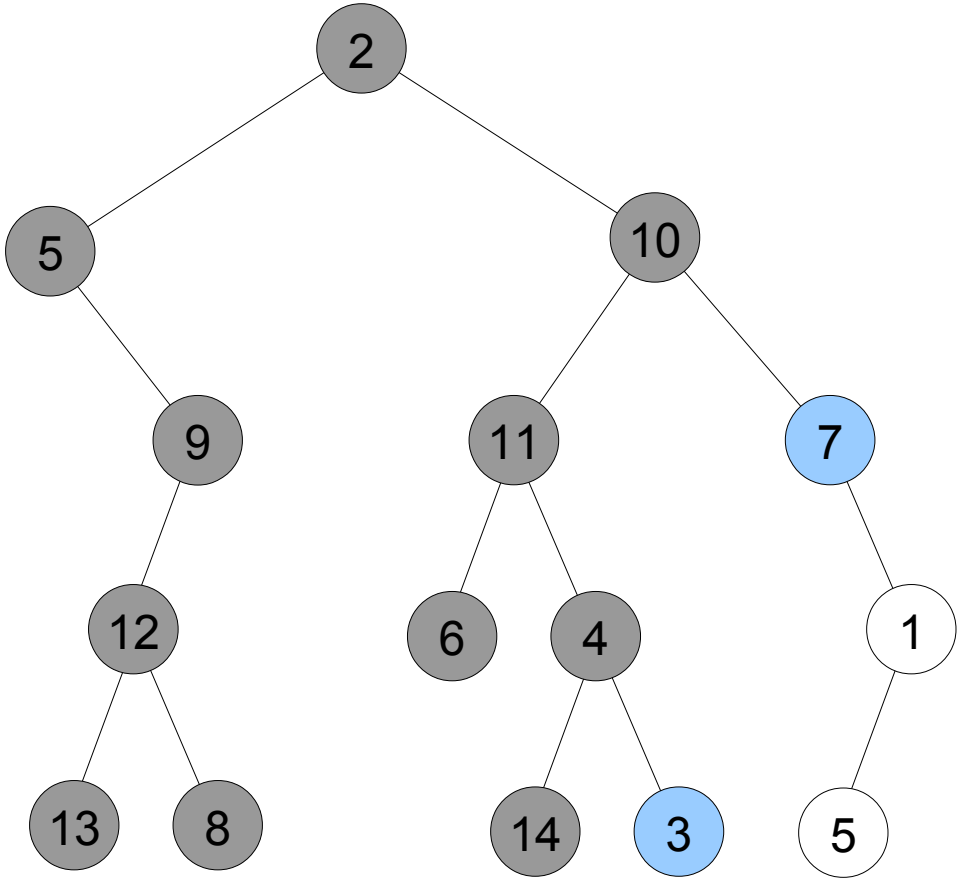


Stack

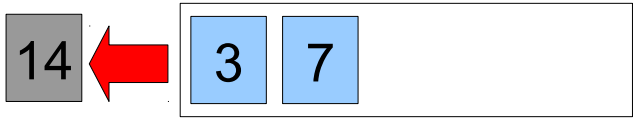
ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example




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

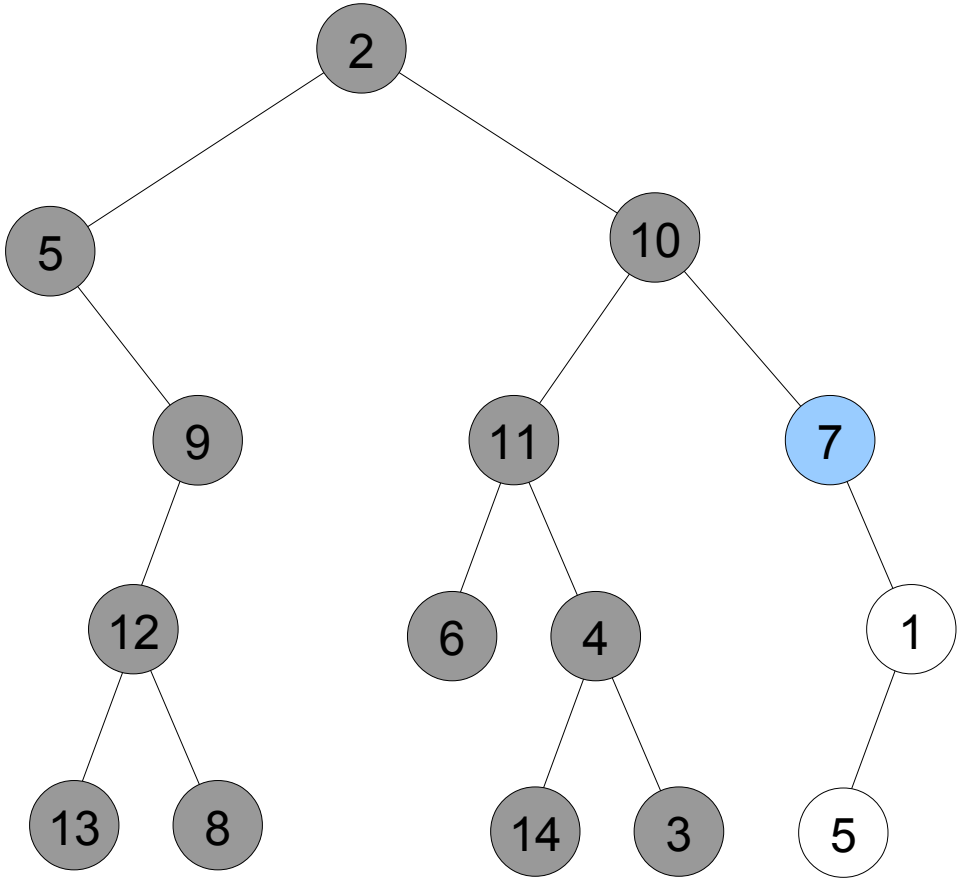


Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



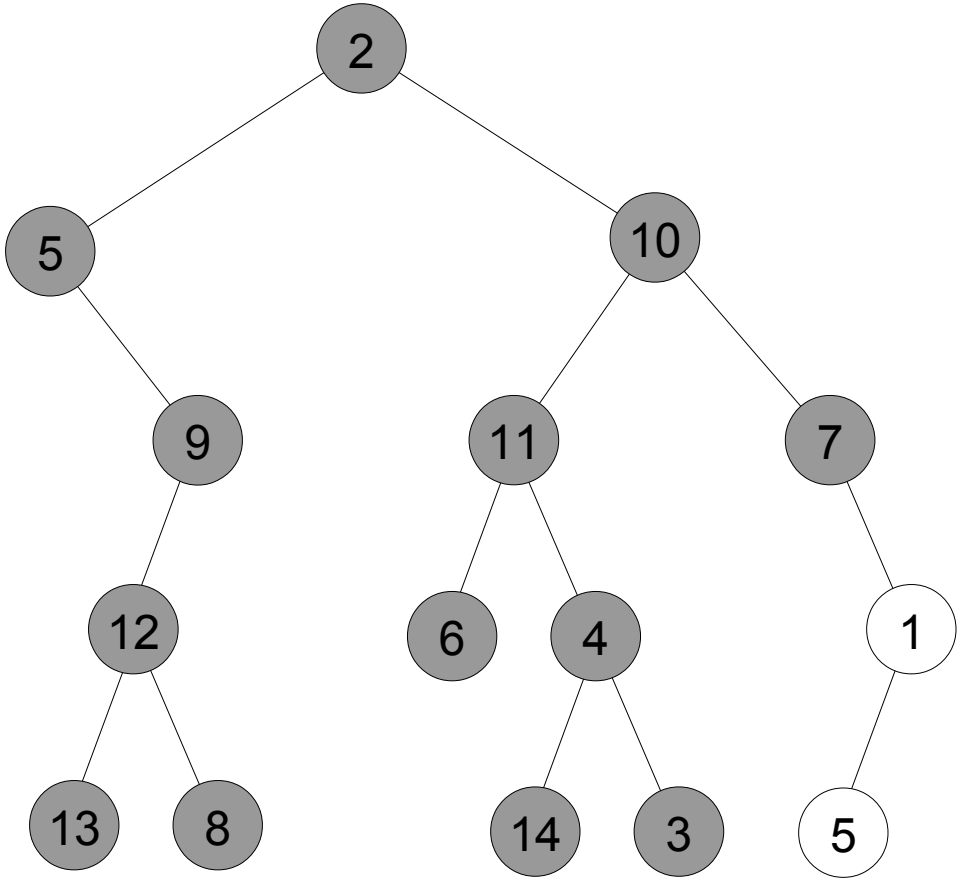

```
Visited nodes:
2 5 9 12 13 8 10
11 6 4 14 3
```

Stack

ISEN école d'ingénieurs LILLE

Depth-first traversal

Detailed example



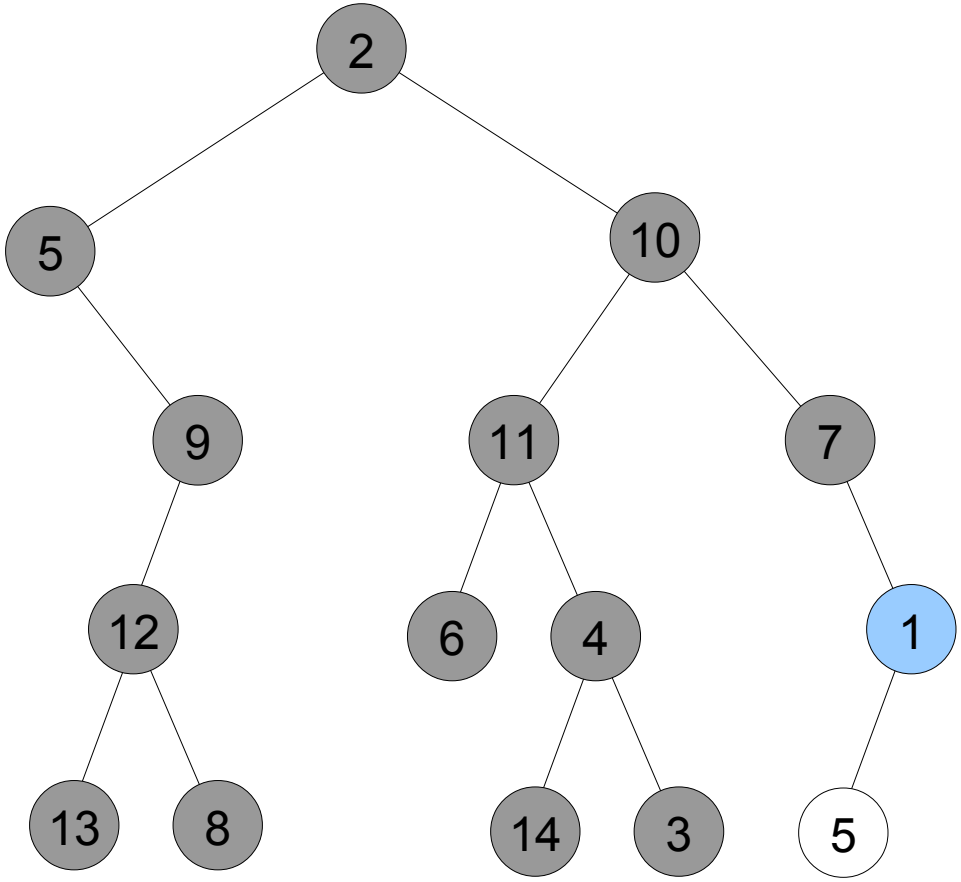

```
Visited nodes:
2 5 9 12 13 8 10
11 6 4 14 3 7
```

Stack

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Detailed example



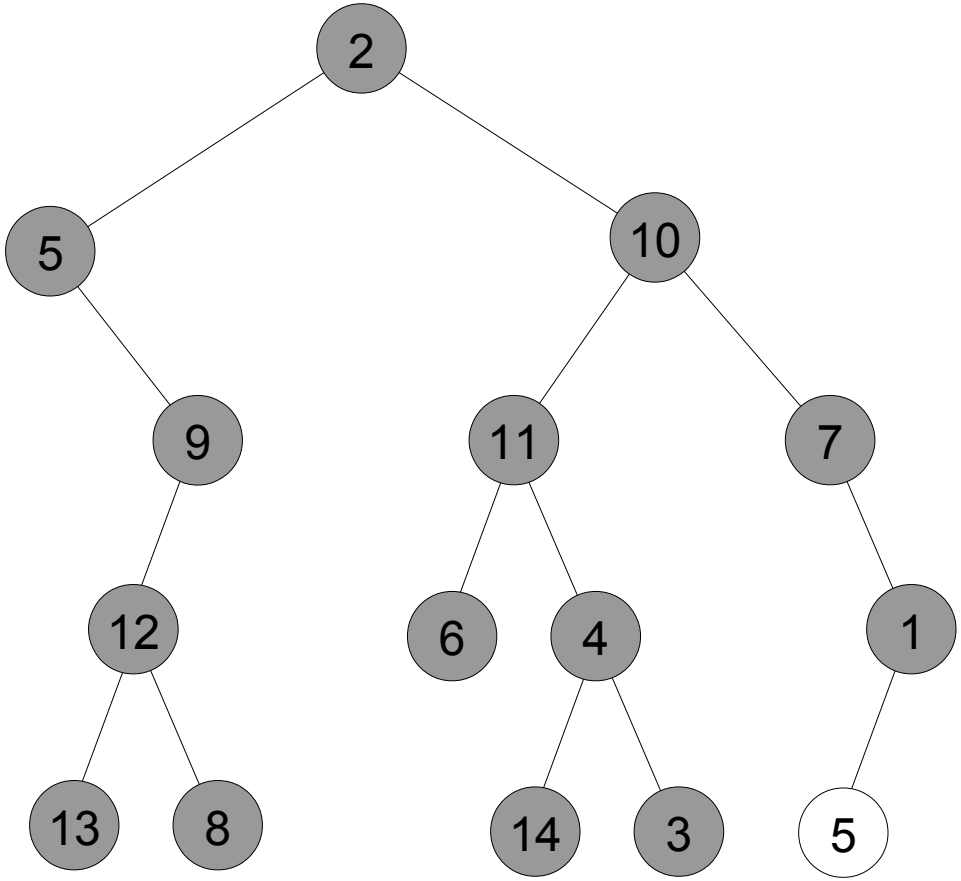

```
Visited nodes:
2 5 9 12 13 8 10
11 6 4 14 3 7
```

Stack

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Detailed example



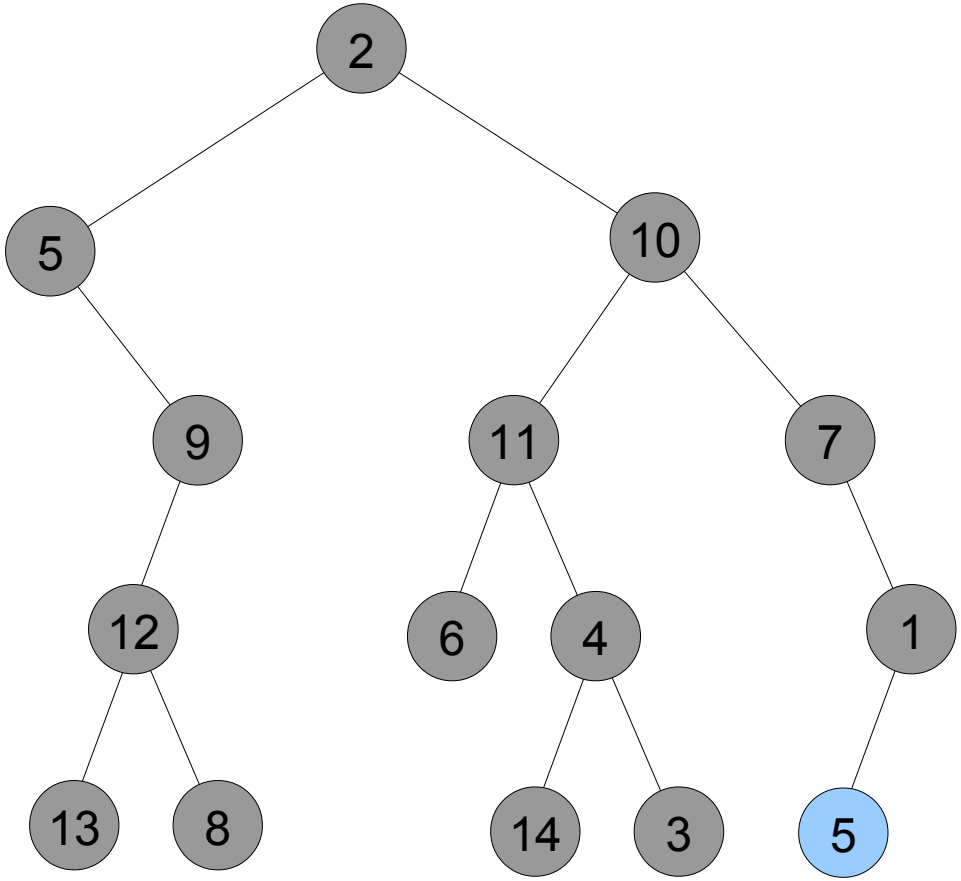

```
Visited nodes:
2 5 9 12 13 8 10
11 6 4 14 3 7 1
```

Stack

ISEN école d'ingénieurs
LILLE

Depth-first traversal

Detailed example



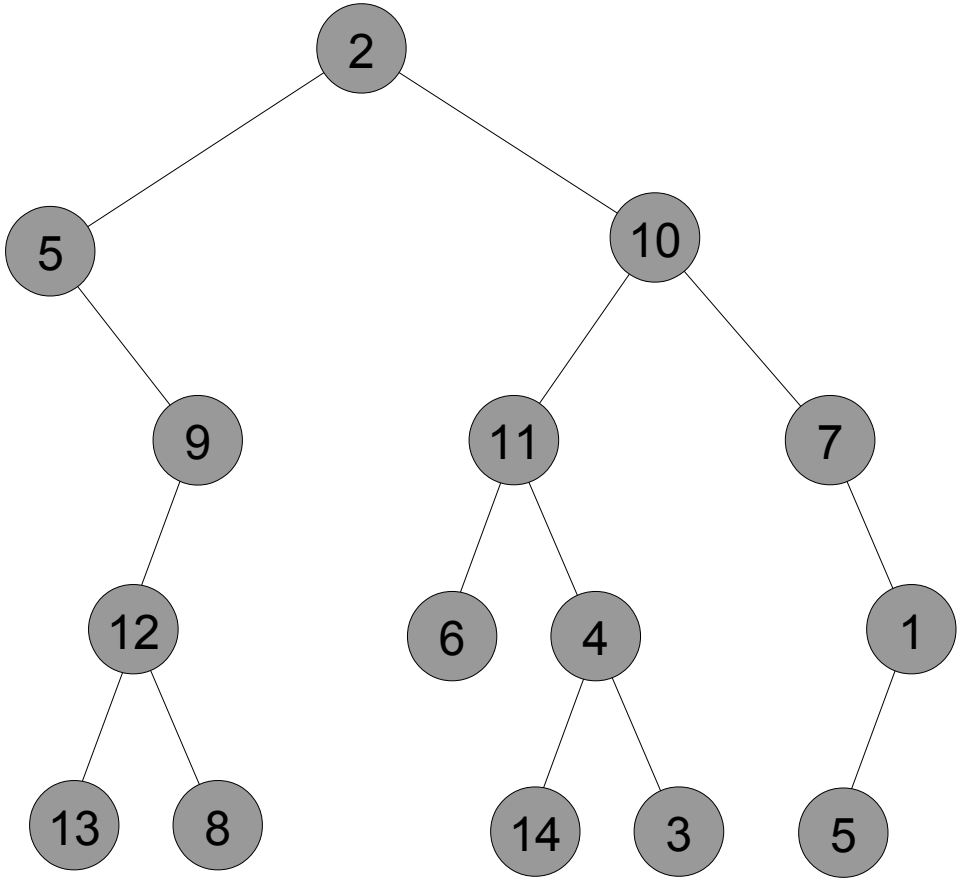

```
Visited nodes:
2 5 9 12 13 8 10
11 6 4 14 3 7 1
```

Stack

ISEN | école d'ingénieurs
LILLE

Depth-first traversal

Detailed example




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

Stack