

Graphs



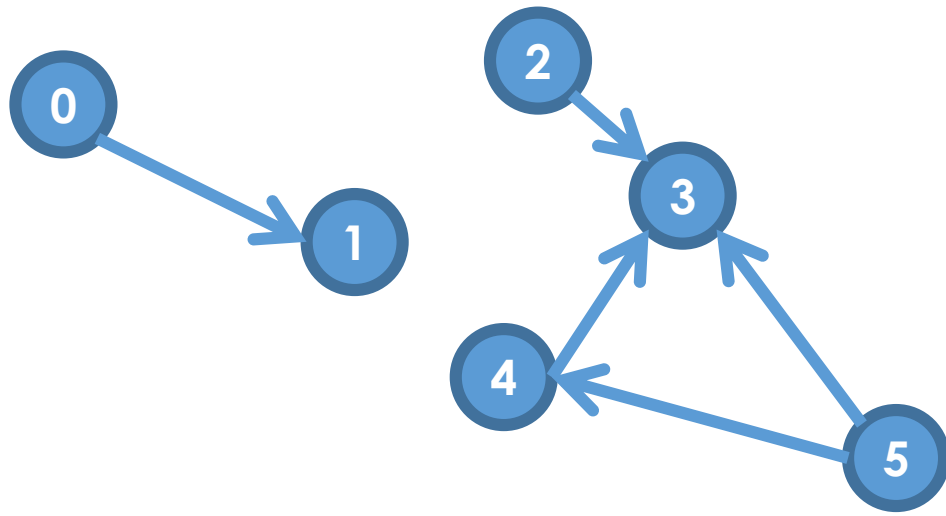
Representation: Adjacency List



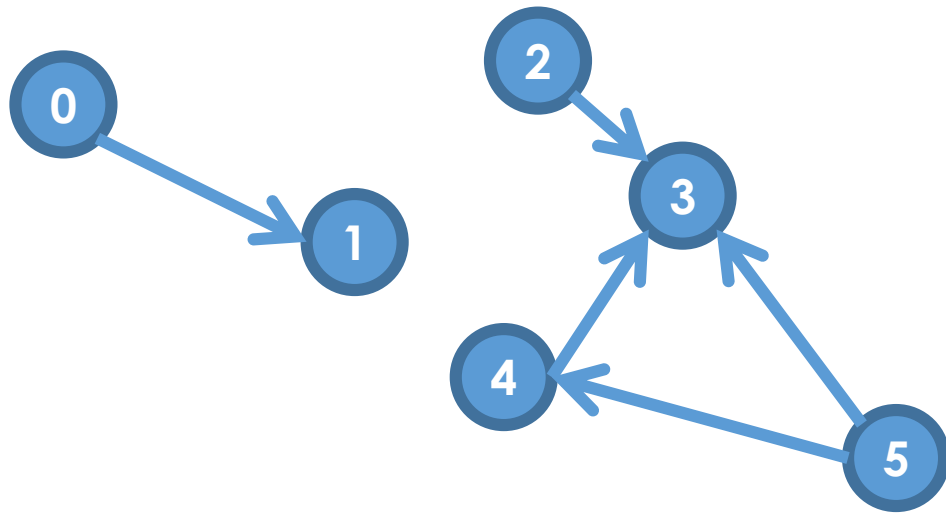
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by Christine Alvarado, Mia Minnes, and Leo Porter, 2015.

By the end of this video you will be able to...

- Implement graphs in Java using adjacency lists
- Describe advantages and disadvantages of adjacency list and adjacency matrix representations.



$V = \{0,1,2,3,4,5\}$

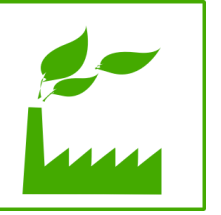


$V = \{0,1,2,3,4,5\}$

0	1	0	0	0	0
0	0	0	0	0	0
0	0	0	1	0	0
0	0	0	0	0	0
0	0	0	1	0	0
0	0	0	1	1	0

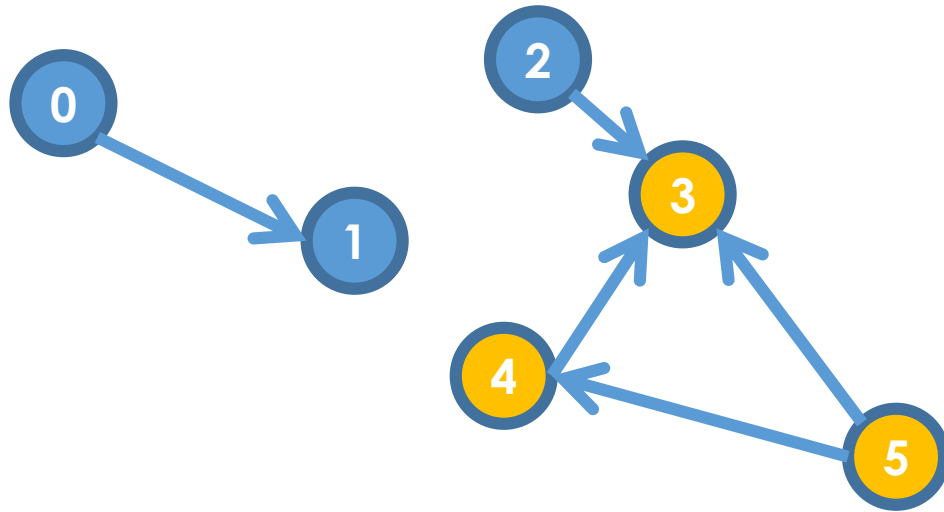
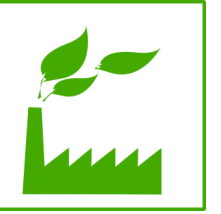
```
public class GraphAdjList extends Graph {
```

```
    private Map<Integer, ArrayList<Integer>> adjListsMap;
```



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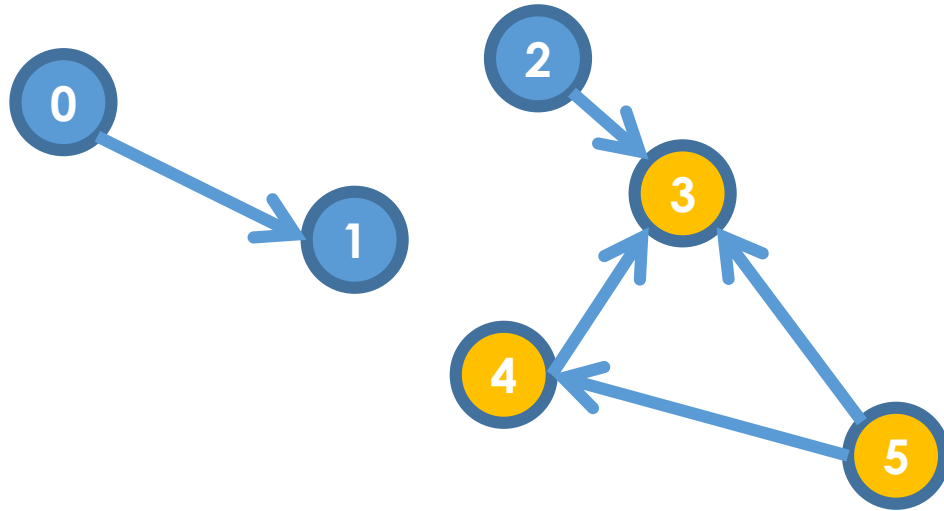
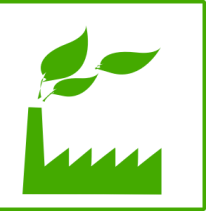
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    private Map<Integer, ArrayList<Integer>> adjListsMap;
```



5 → {3,4}

```
public class GraphAdjList extends Graph {
```

```
    private Map<Integer, ArrayList<Integer>> adjListsMap;
```



0 → {1}

1 → null

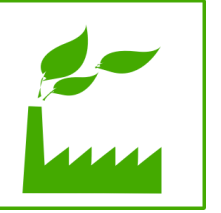
2 → {3}

3 → null

4 → {3}

5 → {3,4}

```
public class GraphAdjList extends Graph {
```



```
...
```

```
    public void implementAddVertex() {  
        int v = getNumVertices();  
        ArrayList<Integer> neighbors = new ArrayList<Integer>();  
        adjListsMap.put(v, neighbors);  
    }
```

```
    public void implementAddEdge(int v, int w) {  
        (adjListsMap.get(v)).add(w);  
    }
```


Recap: Adjacency lists

- Easy to add vertices.
- Easy to add/remove edges.
- May use a lot less memory than adjacency matrices.

Recap: Adjacency lists

- Easy to add vertices.
- Easy to add/remove

But is it fast?

- May use a lot less memory than adjacency matrices.

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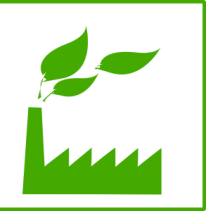
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Class ArrayList docs.oracle.com/javase/7/docs/api/java/util/ArrayList.html

Overview Package **Class** Use Tree Deprecated Index Help

Prev Class Next Class Frames No Frames All Classes

Summary: Nested | Field | Constr | Method Detail: Field | Constr | Method

java.util

Class ArrayList<E>

java.lang.Object

java.util.AbstractCollection<E>

java.util.AbstractList<E>

java.util.ArrayList<E>

**Constant time
operations:**

**size, isEmpty,
get, set, add***



Why use anything else?