

## Module 1 - Activity 7

### Question:

Show the contents of the `id[ ]` array and the number of times the array is accessed for each input pair when you use quick-find, quick-union, weighted quick-union, weighted quick-union path compression, for the sequence of inputs 9-0 3-4 5-8 7-2 2-1 5-7 0-3 4-2.

### Solution:

#### Quick Find :

Indexes :	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
union(9,0)	0	1	2	3	4	5	6	7	8	0
union(3,4)	0	1	2	4	4	5	6	7	8	0
union(5,8)	0	1	2	4	4	8	6	7	8	0
union(7,2)	0	1	2	4	4	8	6	2	8	0
union(2,1)	0	1	1	4	4	8	6	1	8	0
union(5,7)	0	1	1	4	4	1	6	1	1	0
union(0,3)	4	1	1	4	4	1	6	1	1	4
union(4,2)	1	1	1	1	1	1	6	1	1	1

#### Quick Union :

Indexes :	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
union(9,0)	0	1	2	3	4	5	6	7	8	0
union(3,4)	0	1	2	4	4	5	6	7	8	0
union(5,8)	0	1	2	4	4	8	6	7	8	0
union(7,2)	0	1	2	4	4	8	6	2	8	0

union(2,1)	0	1	1	4	4	8	6	2	8	0
union(5,7)	0	1	1	4	4	8	6	2	1	0
union(0,3)	4	1	1	4	4	8	6	2	1	0
union(4,2)	4	1	1	4	1	8	6	2	1	0

### Weighted Quick Union :

Indexes :	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
weights:	1	1	1	1	1	1	1	1	1	1
<b>union(9,0)</b>	<b>9</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
weights:	1	1	1	1	1	1	1	1	1	2
<b>union(3,4)</b>	<b>9</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
weights:	1	1	1	2	1	1	1	1	1	2
<b>union(5,8)</b>	<b>9</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>9</b>
weights:	1	1	1	2	1	2	1	1	1	2
<b>union(7,2)</b>	<b>9</b>	<b>1</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>9</b>
weights:	1	1	1	2	1	2	1	2	1	2
<b>union(2,1)</b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>9</b>
weights:	1	1	2	2	1	2	1	2	1	2
<b>union(5,7)</b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>9</b>
weights:	1	1	2	2	1	4	1	2	1	2
<b>union(0,3)</b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>9</b>	<b>3</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>9</b>
weights:	1	1	2	3	1	4	1	2	1	2
<b>union(4,2)</b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>9</b>	<b>3</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>7</b>
weights:	1	1	3	3	1	4	1	2	1	2

### Weighted Quick Union - Path Compression:

Indexes :	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
union(9,0)	9	1	2	3	4	5	6	7	8	9
union(3,4)	9	1	2	3	3	5	6	7	8	9
union(5,8)	9	1	2	3	3	5	6	7	5	9
union(7,2)	9	1	7	3	3	5	6	7	5	9
union(2,1)	9	7	7	3	3	5	6	7	5	9
union(5,7)	9	7	7	3	3	7	6	7	5	9
union(0,3)	9	7	7	9	3	7	6	7	5	9
union(4,2)	9	7	7	9	9	7	6	7	5	7