# Chapter 11-1 – Sorting Algorithms and Their Efficiency

Internal Sort – collection of data fits in memory
External Sort – collection of data does not fit in memory

- Must reside on secondary storage

## Basic Sorting Algorithms

1. Selection Sort

   Example) Trace the selection sort (ascending order)

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Initial Array | 29 | 10 | 14 | 37 | 13 |
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2. Bubble Sort

Example) Trace the bubble sort (ascending order)

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Initial Array | 29 | 10 | 14 | 37 | 13 |
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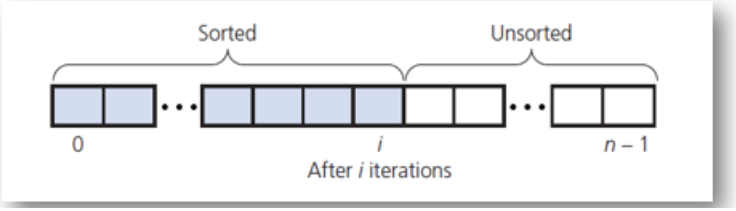
3. Insertion sort

- Take each item from unsorted region
  - Insert it into correct order in sorted region



```
void insertionSort(int theArray[], int n)
{
	for (int unsorted = 0; unsorted < n; unsorted++)
	{
		int nextItem = theArray[unsorted];
		int loc = unsorted;
		while ((loc) > 0 && (theArray[loc - 1] > nextItem))
		{
			theArray[loc] = theArray[loc - 1];
			loc--;
		}
		theArray[loc] = nextItem;
	}
}
```

Example)

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Initial Array | 29 | 14 | 13 | 10 | 5 |
| | | | | | |
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Quiz: Trace the following array into ascending order:

Array A ={20, 80, 40, 25, 60, 30}

1. Bubble Sort
2. Insertion Sort