Taller ProgComp: Track Básico

Algoritmos de Ordenamiento

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PROBLEMA

Definición

Dado un arreglo de n enteros, queremos ordenarlo según un método de comparación. Por ejemplo, de menor a mayor.

4	2	3	5	8	2

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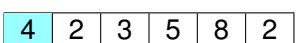
4	2	3	5	8	2

2	2	3	4	5	8

Part I

Fuerza Bruta

Insertion Sort



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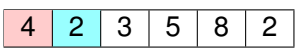

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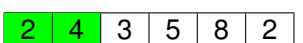

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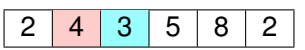

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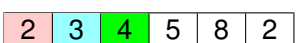

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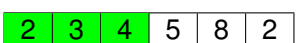

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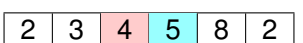

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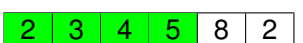

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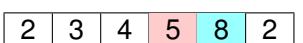

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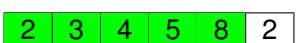

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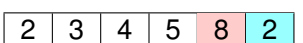

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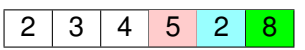

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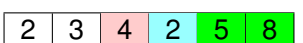

Insertion Sort

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Insertion Sort - Código

```cpp
void insertion_sort(vector< int > &nums) {
  for(int i = 1; i < nums.size(); i++) {
    int x = nums[i];
    int j = i;
    while(j > 0 && nums[j - 1] > x) {
      nums[j] = nums[j - 1];
      j--;
    }
    nums[j] = x;
  }
}
```

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¿Cuál sería la complejidad?

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¿Cuál sería la complejidad?
$O(n^2)$

Part II

SORT DE C++

Sort de C++

- La librería estándar de C++ viene con su propio Sort
- Este usa un algoritmo llamado introspection sort, que tiene complejidad $O(n \log n)$
- Puede comparar cualquier cosa que tenga función de comparación

```
1 sort(comienzo, final);
2 sort(comienzo, final, funci n comparaci n);
```

Uso en arreglos

```cpp
int main() {
  int n;
  cin >> n;
  int arr[n];
  for(int i = 0; i < n; i++) {
    cin >> arr[i];
  }

  sort(arr, arr + n);

  for(int i = 0; i < n; i++) {
    cout << arr[i] << " ";
  }
  cout << "\n";
  return 0;
}
```

Uso en vectores

```cpp
int main() {
  int n;
  cin >> n;
  vector< int > arr(n);
  for(int i = 0; i < n; i++) {
    cin >> arr[i];
  }

  sort(arr.begin(), arr.end());

  for(int i = 0; i < n; i++) {
    cout << arr[i] << " ";
  }
  cout << "\n";
  return 0;
}
```

Función de comparación propia

```cpp
bool fun(pair< int, int > &a, pair< int, int > &b) {
  if(a.first == b.first) {
    return a.second < b.second;
  }
  return a.first > b.first;
}

int main() {
  int n;
  cin >> n;
  vector< pair< int, int > > arr(n);
  for(int i = 0; i < n; i++) {
    cin >> arr[i].first;
    cin >> arr[i].second;
  }

  sort(arr.begin(), arr.end(), fun);

  for(int i = 0; i < n; i++) {
    cout << "{" << arr[i].first << " " << arr[i].second << "} ";
  }
  cout << "\n";
  return 0;
}
```

REFERENCES I