Algorithm Design Manual Notes

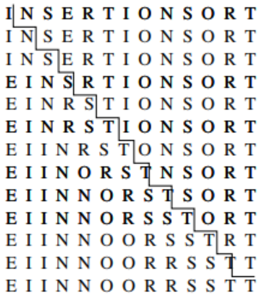
Zachary William Grimm
Notes for ADM by Skiena
zwgrimm@gmail.com

February 10, 2019

Contents

1 Introduction To Algorithm Design

the algorithmic *problem* known as *sorting* is defined as follows:
Problem: Sorting
Input: A sequence of n keys $a_1, ..., a_n$.
Output: The permutation (reordering) of the input sequence such that $a_1^{'} \leq a_2^{'} \leq ... \leq a_{n-1}^{'} \leq a_n^{'}$



I N S E R T I O N S O R T

I N S E R T I O N S O R T

I N S E R T I O N S O R T

E I N S R T I O N S O R T

E I N R S T I O N S O R T

E I N R S T I O N S O R T

E I I N R S T O N S O R T

E I I N O R S T N S O R T

E I I N N O R S T S O R T

E I I N N O R S S T O R T

E I I N N O O R S S T R T

E I I N N O O R R S S T T

E I I N N O O R R S S T T

Figure 1: Animation of insertion sort in action (time flows down)

```
insertion_sort(item s[], int n)
{
    int i,j; /* counters */

    for (i=1; i<n; i++) {
        j=i;
        while ((j>0) && (s[j] < s[j-1])) {
            swap(&s[j],&s[j-1]);
            j = j-1;
        }
    }
}
```

1.1 Robot Tour Optimization

aaa

1.2 Selecting the Right Jobs

bbb

1.2.1 test, delete this

1.3 Reasoning about Correctness

1.3.1 Expressing Algorithms

1.3.2 Problems and Properties

1.3.3 Demonstrating Incorrectness

1.3.4 Induction and Recursion

1.3.5 Summations

1.4 Modeling The Problem

1.4.1 Combinatorial Objects

1.4.2 Recursive Objects

1.5 About the War Stories

1.6 War Story: Psychic Modeling