Design and Analysis of Algorithms I

Introduction

Integer Multiplication

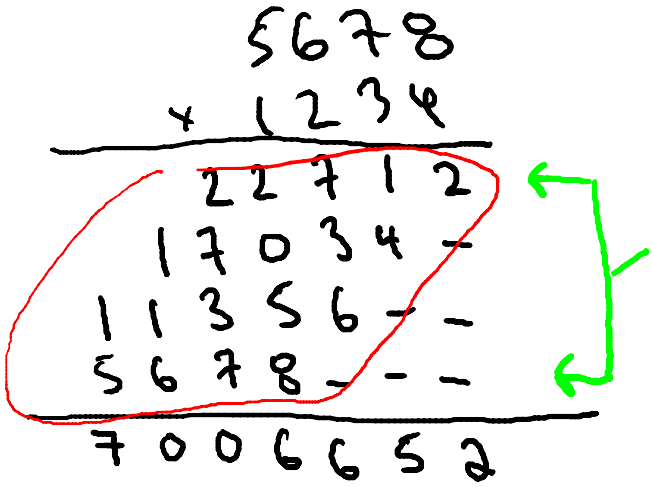
Integer Multiplication

Input : 2 n-digit numbers x and y

Output : product x*y

“Primitive Operation” - add or multiply 2 single-digit numbers

The Grade-School Algorithm



Roughly n operations per row up to a constant

每一行是≤2n operations (n乘法+n加法)，
一共有n行，所以total operation = constant * n^2

# of operations overall ~ constant* n^2

The Algorithm Designer's Mantra

"Perhaps the most important principle for the good algorithm designer is to refuse to be content."

-Aho, Hopcroft, and Ullman, *The Design and Analysis of Computer Algorithms*, 1974

CAN WE DO BETTER ?
[than the "obvious" method]