Data Structure and Algorithms

Workshop

Problem Solving with Algorithm Design Techniques

# Objectives

* Reinforcing the algorithm design techniques.
* Using algorithm design techniques to solve problems.

# Introduction

Algorithm design techniques are proven methods or processes to design and construct algorithms. Most common techniques include Greedy, Brute Force and Dynamic Programming.

In this workshop, you are given problems and asked to apply one of the design techniques to solve them.

# Problem

A child is going up a staircase with *n* steps, and can hop either *1* step, *2* steps, or *3* steps at a time. Implement a program to count how many possible ways the child can go up the stairs.

**Input**: 1

**Output**: 1

**Input**: 3

**Output**: 4

**Explanation**: 111 (she hops 1 step, then 1 step, then 1 step), 12, 21, 3

**Input**: 4

**Output**: 7

**Explanation**: 1111, 112, 121, 13, 211, 22, 31

**Input**: 5

**Output**: 13

**Explanation**: 11111, 1112, 1121, 113, 1211, 122, 131, 2111, 212, 221, 23, 311, 32