CS250 Intro to CS II

Doug Ryan

ryand@pacific.edu

Strain 201

Office hours: MWF 10-11am

Or by appointment

Welcome!

- Web Page   http://zeus.cs.pacificu.edu/ryand/cs250/2018

- Syllabus

- Calendar

- Text Book

- Visual Studio 2017 Professional

Progression!

- ## CS 150
  - C++ mechanics
  - Visual Studio mechanics, Debugger

- ## CS 250
  - C++ mechanics (structs, classes)
  - Object oriented programming and design
  - Graphics (SDL 2)

- ## CS 485 (Spring 2019)
  - C++ mechanics (C++11, C++14, templates, STL)
  - Object oriented design
  - Design patterns

What I think you know

- Variables & data types
- Relational & logical operators
- Decision statements
- Repetition statements including nesting
- Functions
- Files
- Arrays
- Character processing
- Visual Studio
- Debugger

This class

- More C++ mechanics
  - Arrays
  - Structs
  - Classes
  - Pointers

- Graphics programming
  - SDL

- Object Oriented Design

Review

- Review Reading: pp. 265-284 (files)
  pp. 375-425 (arrays)

- Topics to Review
  - Files (Reading & Writing)
  - Arrays (1D & 2D)
  - Character Processing

Files

- What is a stream?

- How do we create a stream for reading from a file?
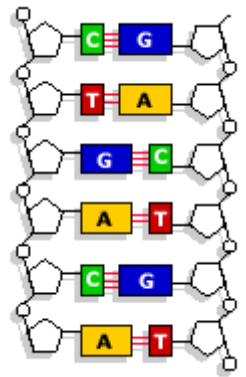
One-dimensional arrays

- Consider
  ```
  int aIntArry[] = {1, 2, 3, 4, 5};
  double aDoubleArry[10];
  ```

1. What are the index values for each array?

2. How many elements does each array have?

3. Arrays consist of *homogeneous* data. What does this mean?

Problem #1
DNA Length

- A DNA string represents the order of nucleobases along one strand of a double-stranded DNA molecule

- The other strand is the *reverse complement* of the string

- DNA strings are constructed from the alphabet {A, C, G, T} representing the bases adenine, cytosine, guanine, and thymine
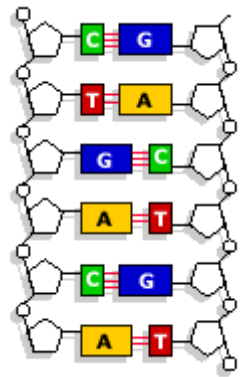
Problem #1
DNA Length

- The DNA string AAGATGCCGT has length 10 nucleobases (or just bases)

- Write a function **getDNALength** that accepts a character array (that ends with null) and returns the length of a DNA string

Problem #2
Reverse Complement

- In DNA strings, the symbols A and T are complements of each other as are C and G

- The reverse complement of a DNA string s is formed by reversing the contents of s and then taking the complement of each symbol

- The DNA string AAAACCCGGT has the reverse complement ACCGGGTTTT

Problem #2
Reverse Complement

- The data file dnastrings.txt contains an unknown number of DNA strings where each string has length at most 1000 bases

- Write a program to output

  - each DNA string

  - the reverse complement of each DNA string

- Let's write

  - well-defined function prototypes

  - each function definition

  - main function for solving the stated problem