

# CS250 Intro to CS II

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# Review

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- Review Reading: pp. 265-284; 377-424
- Topics
  - Files (Reading & Writing)
  - Arrays (1D & 2D)
  - Character Processing

# Files

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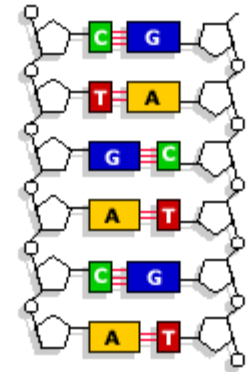
- What is a stream?
- How do we create a stream for reading from a file?

# Bioinformatics

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- bioinformatics
  - is the study of methods for storing, retrieving, and analyzing biological data
  - generates new knowledge useful in fields such as drug design and drug discovery
  - develops tools to help study how normal cellular activities are altered in different disease states
  - Perl is a language of choice for solving many bioinformatics problems but C++ can also be used quite effectively

# Problem #1



- 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
- The DNA string AAGATGCCGT has length 10 nucleobases (or just bases).
- Write a function `dnaLength` that accepts a character array and returns the length of a DNA string

# One-dimensional arrays

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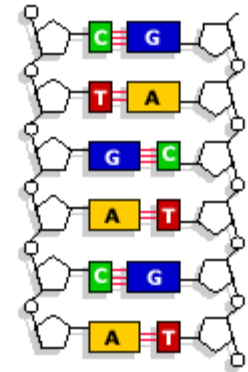
- Consider

```
int intArray[] = {1, 2, 3, 4, 5};
```

```
double doubleArray[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 #2



- 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
- The data file dnastrings.txt contains an unknown number of DNA strings where each string has length at most 1000 bases. Output each DNA string and the reverse complement of each DNA string.
- Let's write well-defined function prototypes for solving the above problem and then write each function definition as well as the main function for solving the stated problem

# Two-dimensional arrays

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- Consider

```
int intArray[][2] = {{1, 2}, {3, 4}};  
double doubleArray[10][5];
```

1. What are the index values for each array?
2. How many elements does each array have?
3. Show how **doubleArray** is passed to a function and what a function prototype might look like.



# Problem #3

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- A data file lottery.txt contains an unknown number (but at most 1000) of lottery ticket data where each ticket contains 6 lottery numbers between 1 and 52.
- Write a C++ program that loads a 2D array with the lottery numbers and then has the user enter the actual winning lottery numbers from the keyboard into a 1D array.
- Print the number of winning (matched all numbers) lottery tickets. The ticket numbers and the winning numbers must match exactly (i.e. order is important)

# Problem #3

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- Here are some other functions you might wish to consider:
  1. Print the number of tickets that matched 0, 1, ... 6 numbers
  2. Print the number of winning tickets where order is not important
  3. Print the number of tickets that matched 0, 1, ... 6 numbers where order is not important