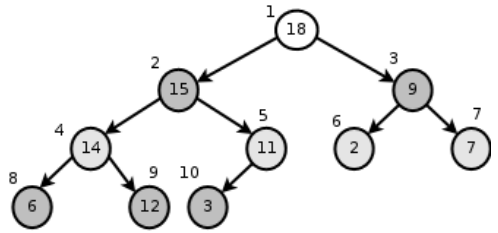
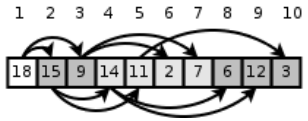
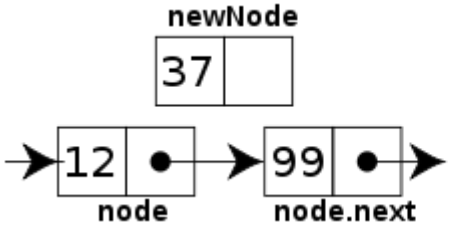
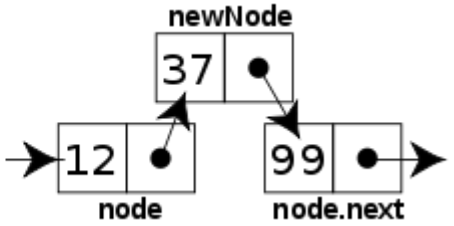




INSERTION-SORT(A)

		cost	times
1	**for** $j = 2$ **to** $A.length$	c_1	n
2	$key = A[j]$	c_2	$n-1$
3	// Insert $A[j]$ into the sorted sequence $A[1..j-1]$.	0	$n-1$
4	$i = j-1$	c_4	$n-1$
5	**while** $i > 0$ and $A[i] > key$	c_5	$\sum_{j=2}^{n} t_j$
6	$A[i+1] = A[i]$	c_6	$\sum_{j=2}^{n}(t_j-1)$
7	$i = i-1$	c_7	$\sum_{j=2}^{n}(t_j-1)$
8	$A[i+1] = key$	c_8	$n-1$





WELCOME TO CS 24!

Problem Solving with Computers-II

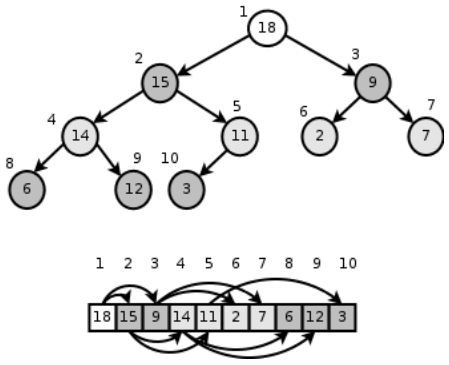
Instructor: Diba Mirza

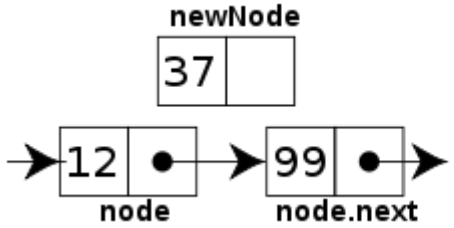
Read the syllabus. Know what's required. Know how to get help.

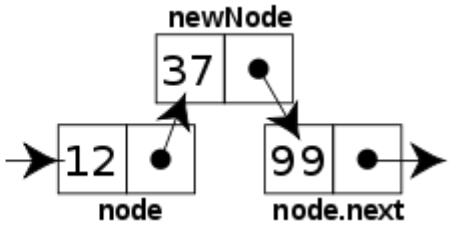
About this course

You will learn to:

- Design and implement **larger programs** that **run fast**
- Organize **data** in programs using **data structures**
- **Analyze** the **complexity** of your programs
- Understand what goes on **under the hood** of programs







INSERTION-SORT(A)	*cost*	*times*
1 **for** $j = 2$ **to** $A.length$	c_1	n
2 $key = A[j]$	c_2	$n-1$
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Data Structures **C++** **Complexity Analysis**

Course Logistics

- Coure website: https://ucsb-cs24.github.io/s21/
- NO MAKEUPS ON QUIZZES and FINAL EXAM!
- Keep track of assignment due dates by reviewing the “weekly pattern” posted on Gauchospace
- No extensions on lab/programming assignments. Please plan to submit before the due date
- To complete the labs you need a college of engineering account. If you don’t have one yet, send an email to help@engineering.ucsb.edu

About you…

What is your familiarity/confidence with Object Oriented Programming?

A. Know nothing or almost nothing about it.
B. Used it a little, beginner level.
C. Some expertise, lots of gaps though.
D. Lots of expertise, a few gaps.
E. Know too much; I have no life.

About you…

What is your familiarity/confidence with C++?

A. Know nothing or almost nothing about it.
B. Used it a little, beginner level.
C. Some expertise, lots of gaps though.
D. Lots of expertise, a few gaps.
E. Know too much; I have no life.

About you…

What is your familiarity/confidence with using version control – git or subversion?

A. Know nothing or almost nothing about it.
B. Used it a little, beginner level.
C. Some expertise, lots of gaps though.
D. Lots of expertise, a few gaps.
E. Know too much; I have no life.

About lectures

- I will not be a talking textbook.
- I love interaction: Ask questions anytime over chat but wait for a few minutes to get them answered.
- I'll ask you questions too! Be ready to discuss and participate over chat or by turning on your audio

- Practice: Ask me a question or share something interesting that happened over Spring break :)

Today's Learning Goals

- Integrate git command line into programming workflow.
  - Creating and cloning repos.
  - Git commands: git <status, log, add, commit, push>
- Review basics of classes
  - Defining classes and declaring objects
  - Access specifiers: private, public
  - Different ways of initializing objects and when to use each:
    - Default constructor
    - Parametrized constructor
    - Parameterized constructor with default values
    - Initialization lists
- Keep code organized: Write a simple Makefile

Git Demo

From lab00

Visit our Github Sign Up Tool: https://ucsb-cs-github-linker.herokuapp.com/, login with your github.com account, click "Home", find this course (CS24-S21), and click the "join course button". That will automatically send you an invitation to join the course organization on github.

- *Create a git repo in our class organization "ucsb-cs24-mirza-s21"*
- *Clone the repo on your local computer or one of the CSIL machines*
- *Learn about what a git repo looks like in your file system (on a linux/unix/MAC) environment.*
- *Learn git commands:*
  - *Git status*
  - *git add .*
  - *Gitcomiit*
  - *Git push*

Concept: Classes describe objects

- Every object belongs to (is an instance of) a class
- An object may have fields, or variables
  - The class describes those fields
- An object may have methods
  - The class describes those methods
- A class is like a template, or cookie cutter

Concept: Classes are like Abstract Data Types

- An Abstract Data Type (ADT) bundles together:
  - some data, representing an object or "thing"
  - the operations on that data
- The operations defined by the ADT are the *only* operations permitted on its data
- ADT = classes + information hiding

```
class Dish{
public:
      void pourIn( double amount);
      void pourOut(double amount);
private:
      double capacity;
      double currentAmount;
};
```

Approximate Terminology

- instance = object
- field = instance variable
- method = function
- sending a message to an object = calling a function

Some advice on designing classes

- Always, *always* strive for a narrow interface
- Follow the principle of information hiding:
  - the caller should know as little as possible about how the method does its job
  - the method should know little or nothing about where or why it is being called
- Make as much as possible private
- Your class is responsible for it's own data; don't allow other classes to easily modify it!

What we have spoken about so far?

- Class = Data + Member Functions.
- Abstract Data Type = Class + information hiding
- How to activate member functions.
- But you still need to learn how to write the bodies of a class's methods.

Next time

- C++ Memory Model, Pointers and References