Introduction to CS21

Canvas => Course home page (grades, assignments, information, syllabus, etc)

- Course syllabus is on Canvas
- Read the academic integrity document
- Information survey is on Canvas, submit it by next week

Lab hours (5%) => Self scheduled extra practice

- Work on whatever you want to review that week
- Watching videos related to what we are learning, reading unassigned textbook section, or writing practice programs are examples of activities which can count for lab hours
- Assignments and assigned reading does not count for lab hours

Programming assignments (50%) => 8 assignments, 1 extra credit

- Assignments are due @7:00pm
- There is no "turn-in process" for assignments, just work on the server and use the naming conventions
- Two late day passes, extra credit if you do not use them

Exams (45%) => Midterm and final on paper

- Midterm => Week 8
- Final => Week 16

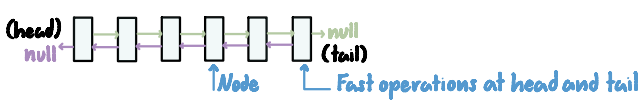
Pengo => Official class programming environment

- ssh username@pengo.cabrillo.edu
- Default password: usernamep
- Programming must be done on the server using vim or emacs (you may upload your own configs)

(Doubly) linked list

What is a doubly linked list

- A doubly linked list is a linear collection of elements called nodes. Each node contains some data and a reference the next and prev node
- Provides linear access to elements
- One-to-one relationship between data and nodes. There is always one node for each piece of data stored



Data structure operations

- Time complexity

Average			
Access	Search	Insert	Delete
O(n)	O(n)	O(1)	O(1)

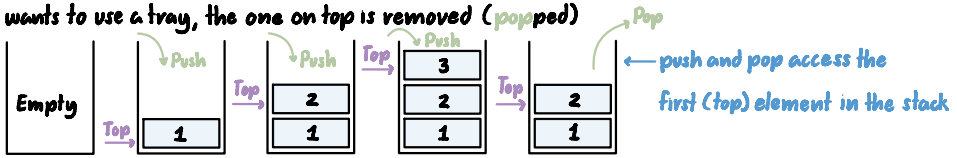
Worst			
Access	Search	Insert	Delete
O(n)	O(n)	O(1)	O(1)

- Space complexity (worst) => O(n)

Stack

What is a stack

- A stack is a linear data structure which follows LIFO (last in first out). It has two main operations — pop and push
- pop => Removes the most recently added element (at the top)
- push => Add an element to the top
- Imagine a stack as a stack of lunch trays. A tray gets placed (pushed) on the top of the stack. If someone wants to use a tray, the one on top is removed (popped)



- Uses => Reversing things

Data structure operations

- Time complexity

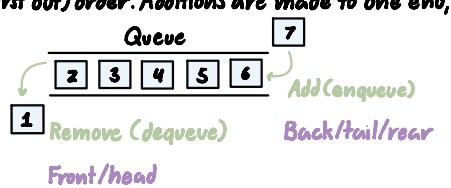
Average			
Access	Search	Insert	Delete
O(n)	O(n)	O(1)	O(1)

Worst			
Access	Search	Insert	Delete
O(n)	O(n)	O(1)	O(1)

- Space complexity (worst) => O(n)

Queue

- A queue is a linear data structure that is open at both ends and the operations are performed in FIFO (first in first out) order. Additions are made to one end, and deletions the other



New elements are always added to the rear and elements are deleted from the head. Elements in the middle of the queue cannot be reordered

- Uses => Buffer

Data structure operations

- Time complexity

Average			
Access	Search	Insert	Delete
O(n)	O(n)	O(1)	O(1)

Worst			
Access	Search	Insert	Delete
O(n)	O(n)	O(1)	O(1)

- Space complexity (worst) => O(n)

Interfase and implementation

Interface => How you see it — Implementation => How it works

- Stack → Linked list or array
- Queue → Linked list or array
- Priority queue → Heap (array)
- Set → Array

Composition and inheritance

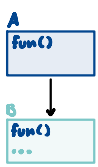
- Base a new class off one which already exists

Composition => "has a" relationship

- No functions from the origional class exist in the new class. The old class is "walled off"

```
function push(element)
    myList.incertRear(element)
```

Inheritance => "is a" relationship.



- Members in the base class exist in the derived class. The derived class can use or overwrite base class attributes

```
function push(element)
    incertRear(element)
```

- The advantage is polymorphism

Unix commands review

w	List logged in users on pengo.cabrillo.edu
pwd	Print working directory
ls	List files
passwd	Change password
cd	Change directory
mkdir	Make directory