COMPUTER SCIENCE 1027b

COMPUTER SCIENCE FUNDAMENTALS II

Lecturers:

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What is CS1027 about?

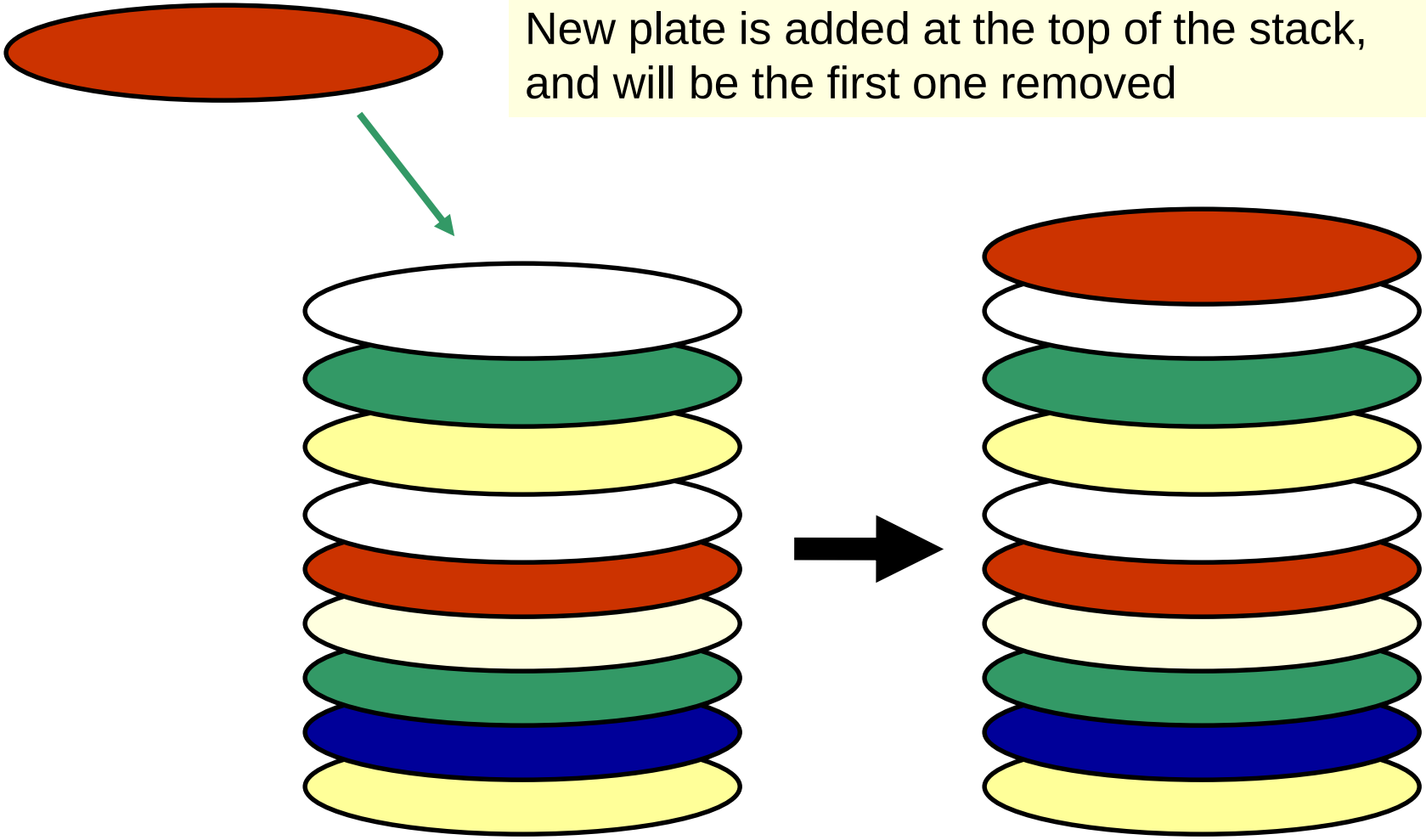
Main focus:

- The design of algorithms and their implementation in an OOP enviroment
- The organization and manipulation of *data.*

  Choosing how to organize data into collections such as
  - *stacks*
  - *queues*
  - *lists*
  - *trees*

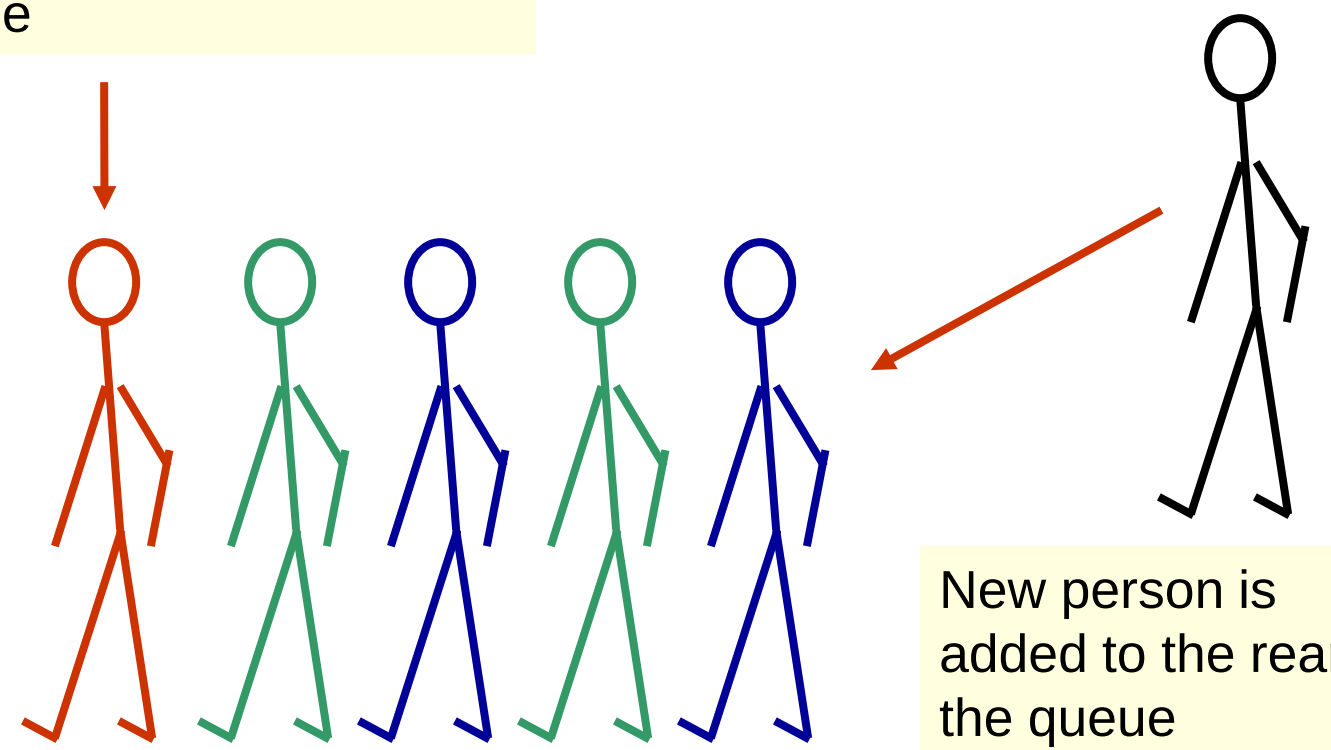
A Stack of Plates

New plate is added at the top of the stack, and will be the first one removed



A Queue of People

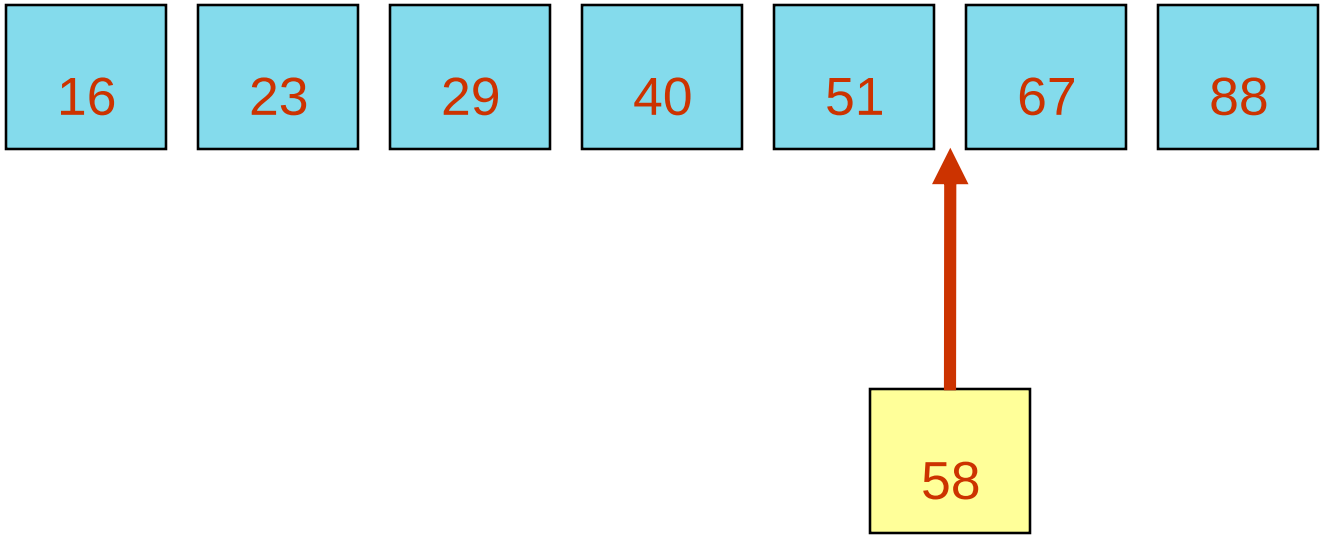
First person served will be the one at the front of queue



New person is added to the rear of the queue

A List of Numbers

This is an example of an Ordered List, so a new number must be added such that the numbers remain in order



…What is CS1027 about?

Collections
(or Abstract Data Types)

- What would we use them for?
- Why would we use them?
- How are they implemented?

…What is CS1027 about?

plus:

- Sorting and searching techniques
- Recursion *(methods calling themselves)*

and, continuing from CS1025 / 1026:

- Good object-oriented design
- Good programming practices

COMPUTING ENVIRONMENT

- Programming will be done in *Java*
- The Java computing environment for CS1027 is *Eclipse*

Should you be here?

- *Prerequisite*:

  Comp Sci 1025a/b or 1026a/b

- *You should be comfortable with programming syntax in Python or Java.*
- *Note*: “Unless you have either the prerequisite for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees.” Instructor Permission is also acceptable

COURSE TOPICS

- Revisit Object-Oriented programming
- Object-Oriented design concepts:

  inheritance
- Abstract data types and their implementations:

  stacks, *queues*, *lists*, *trees*
- Recursion
- Sorting and searching techniques

ADMINISTRATIVE DETAILS

Textbook

Java Software Structures: Designing and Using Data Structures, Lewis and Chase, 4th Edition

ADMINISTRATIVE DETAILS

Java Reference Books

- *The Java Programming Language*, Arnold, Gosling
- *Java, an Object Oriented Approach*, Arnow and Weiss
- *Java how to Program*, Deitel and Deitel
- *Core Java*, Cornell and Horstmann
- The Java Tutorials website:
  http://docs.oracle.com/javase/tutorial

CS 1027b Website

- http://www.csd.uwo.ca/courses/CS1027b
- Contains course related information:
  - Lecture notes
  - Lab instructions
  - Assignments
  - Links to other sites
  - Sample code
- *Check it frequently for announcements*
- *OWL will contain relevant information as well*

Lecture Notes

- Available from the CS1027b website
- They are intended to help in note-taking during lectures
- They are **NOT** a substitute for attending lectures
- There may be other material presented in lectures also

Labs

- 1 lab hour per week, in MC235
- Labs start on Monday January 13, 2020
- Purpose of labs: to introduce or expand on practical material + programming exercises
- Lab instructions will be posted on the course website
  - Read through the lab instructions before going to the lab.
  - Do the pre-lab preparation.
  - Bring a printed copy of the lab instructions to the lab.
  - No makeup Labs
  - You must show your work to the TA and you must submit your lab code through OWL to get credit for a lab.

Computing Facilities

CSD First Year Teaching Environment (FYTE)

- FYTE computer labs are in *Middlesex College Rooms 8, 10, 230, 235*
- Logging in to FYTE
  - Use your GAUL *user name* and *password*
    - User name is same as that assigned to you by UWO (your “uwo” account)
    - Password emailed to your uwo account (same as your CS1025a/1026a password)
- By using your first-year account, you agree to abide by the Department's Rules of Ethical Conduct

Email contact

- *Email from instructors to you:*
  - Course email will be sent to your *uwo* email accounts
  - You are responsible for information sent via email to your account
  - See caveats in Course Outline re: forwarding email and mailboxes filling up
- *Email from you to instructors:*
  - Feel free to email with *brief* questions re. lecture material or clarification of assignments
  - Send email from your *uwo* account
  - Please include "*CS1027*" in the Subject line
  - Please use plaintext format
  - Instructors usually do not read email at night or during weekends!

Student Evaluation

	Weight	***Due Date (tentative)***
Assignment 1	*8%*	*February 10*
Assignment 2	*8%*	*February 27*
Assignment 3	*8%*	*March 19*
Assignment 4	*8%*	*April 2*
Labs	*11%*	*Weekly*
Midterm Exam	*22%*	*Friday, March 6*
Final Exam	*35%*	*TBA*

All assignments are due at 11:55 pm.

Important Conditions

To pass the course:

- Weighted average of exams must be at least 45%
- Weighted average of assignments must be at least 45%
- Otherwise your maximum course grade is 48%

To achieve a final grade of 60% or higher:

- Weighted average of exams must be at least 50%
- Weighted average of assignments must be at least 50%
- Otherwise your maximum course grade is 58%

Student Evaluation

If for any reason an assignment has to be cancelled, the weights of the other assignments will be prorated to add up to 32%.

If for any reason the midterm exam has to be cancelled the final exam will be worth 57% of the final mark.

Midterm Exam

March 6

- There is *no* makeup midterm exam, except for students requesting a Special Midterm Exam for religious reasons (must request a Special Midterm Exam *and* file documentation with their Dean's office at least *two weeks* before the midterm exam date)
- If you miss the Midterm Exam for any other reason, and present valid documentation to the Dean's office, your Final Exam mark will be reweighted to include the weight of the Midterm Exam.

Programming Assignments

Assignment Submission: details will be posted on our website

Late Assignments:

- Late penalty is 10 % of the max. assignment mark per day late
- Maximum *two* days late
- No extensions given
- In cases of lengthy illness etc. take documentation to your Dean's office

Assignment Marking

- Your assignments may be prepared on a computing system other than those of the Department. However, programs will be marked by teaching assistants on the equipment of the Department
- Two weeks limit time limit on requesting adjustment in an assignment mark

Assignment Marking

- For questions regarding an assignment mark, you must first contact and discuss your concerns with your teaching assistant.
  If the matter remains unresolved, you may then take your concerns with your course instructor.
- Keep a duplicate copy of all your assignments, just in case …

Ethical Conduct

- Assignments are to be completed by *individuals*, *not pairs or groups*
- Discussing approaches to problems is OK, but writing code that looks the same is not!
- *Collaboration that results in assignments that are more than coincidentally alike is unacceptable and will be regarded as an occurrence of academic dishonesty*

Ethical Conduct

We have sophisticated software in place that will examine your code against everyone else in both sections and report any incidents of copying.

What is academic dishonesty?

- Collaboration
- Copying another student's assignment
- Allowing another student to copy
- Using code from books, the Internet
- Paying someone to write your code
- *Penalty for academic dishonesty*: reported to Dean and you will receive a mark of 0%

Java vs Python

- 1026 uses Python so why are we switching to Java?
- 4 /5 TOP used programming languages are statically typed (Python is dynamically typed)
- Java allows us to look more under the hood to see how things are done
- For example: how are lists dynamically expanded in python?

Java vs Python

A classic example in both Python and Java

Java:

```
public class HelloWorld {
        public static void main(String [] args){
                System.out.println(“Hello World”);
        }
}
```

Python:

```
print(“Hello World”)
```

What is public? What is class? What is static? What is void? What is String [] args?

Python allows us to teach concepts without losing students in syntax

Java vs Python

Speed? **Source: http://benchmarksgame.alioth.debian.org/**

Program	Java	Python
Generate Pi Digits to 10000	3.12 seconds	2.20 seconds
Binary Tree stress test	5.75 seconds	152.06 seconds
n-body simulation	22.66 seconds	923.74 seconds

Java vs Python

Additional Links

Infographic of Java vs Python

http://bit.ly/1LLoBgq

Another speed test

http://benchmarksgame.alioth.debian.org/u64q/python.html

Programming language rankings

http://bit.ly/19fhRoL