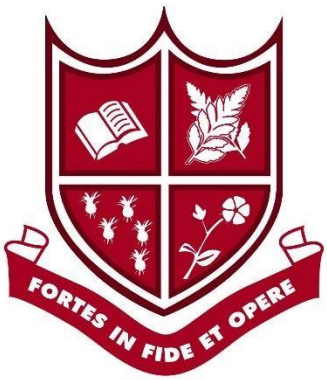

CAMPION COLLEGE

CAMPION ENGINEERING

(Summer Term 2023-24)

The Art of Computer Science – An Introduction

Problem Sets

Pset1 – The Fundamentals of Computer Networks
Pset2- An Introduction to Problem Solving
Pset3 – The Fundamentals of Algorithms
Pset4 – The Art of Pseudocode and Flowcharts
Pset5 – The Art of Python

Description of Project

In this new educational landscape. the necessity for internet access in schools is imperative for fostering academic excellence and comprehensive student development. The internet provides instant access to a vast array of educational resources, enabling diverse teaching methodologies and interactive learning. It promotes collaborative learning, enhances digital literacy skills, and prepares students for the technology-driven demands of the modern workforce. Internet access in schools is not only crucial for academic enrichment but also empowers students to navigate an interconnected world with confidence and proficiency.

Campion College is experiencing recurring issues with its Wi-Fi network. Students and staff have reported slow internet speeds, frequent disconnections, and challenges in connecting multiple devices simultaneously. In response to these concerns, the school administration has initiated a project to optimize the Wi-Fi network for improved performance and reliability.

The FortesWiFi Optimization project is a collaborative effort to identify, address, and implement practical solutions to enhance the WiFi experience for all users on campus.

You are required to utilize suitable word processing, as well as a programming application to design and implement a computerized-based solution to accomplish the following:

Create a report to discuss the internet structure utilized by Campion College. This report should state the overall composition of this network, it's practical application and the issues observed by users of this network. – MS Word

Create a report to inform the school administration about the findings of The FortesWiFi Optimization Team and to outline the plans to address these issues – MS Word

Problem Solving involving:

Create an algorithm – Pseudocode.

Create a trace table (optional).

Implement a Python program designed to manage network usage effectively

The Fundamentals of Computer Networks

Network structures in schools are integral for managing administrative tasks, enabling collaborative learning through shared resources, and ensuring reliable connectivity for various educational technologies employed in modern classrooms.

Problem Set 1

As a part of the FortesWiFi team, you are tasked with creating a report discussing the internet structure utilized by Campion College. This report should state the overall composition of this network including the various technologies employed to facilitate it use. This report must also include a description of the practical application of this network in relation to Students, Teachers, School Administration and Guests.

(20 Marks)

Note: This report must not be more than 300 words long

Total marks for Pset1 – 20 marks

An Introduction to Problem Solving

Schools typically employ a variety of network structures to facilitate seamless communication, resource sharing, and administrative tasks. Additionally, many schools implement wireless local area networks (WLANs) to provide ubiquitous internet access within the school premises. These WLANs support the increasing use of laptops, tablets, and other wireless devices for educational purposes.

Problem Set 2

During your investigations, you noticed that many users of this network have experienced recurring issues with this network. Your task is to create a report to inform the school administration about these findings. You are required to outline these issues and to provide a framework to address these issues.

(20 Marks)

Note: This report must not be more than 300 words long

Total Marks for Pset2 – 20 marks

The Fundamentals of Algorithms

Problem Set 3

In this problem set, students will leverage the information gathered from their research on school network structures and use it to formulate the basic steps required to create an algorithm for optimizing a school's network.

Question 1

Based on the information gathered, outline the basic steps required to create an algorithm (narrative algorithm) for optimizing a school's network. Also ensure to consider factors such as centralized resource management, scalability, and efficient administration in your explanation.

(8 marks)

Question 2

Consider the practical feasibility and potential challenges of implementing the algorithm in a real school network environment.

(12 marks)

Note: Prepare a well-organized document that includes clear explanations, diagrams if necessary, and references to the research findings.

Total Marks for Pset3 – 20 marks

The Art of Pseudocode and Flowcharts

Problem Set 4

Following your research, you are tasked to create an algorithm that will manage the allocation of resources on a network by managing the number of users on that network. Implement user authentication to ensure secure access to the network. For this algorithm you are required to develop session control mechanisms to monitor and limit the duration of each user's network session, implement idle period tracking to automatically disconnect users after a specified period of inactivity, ensure that the program adheres to the maximum user limit defined for the network and provide real-time monitoring of current network usage, displaying the number of connected users.

(20 Marks)

Required Variables

Variable Name	Description
Uname	A variable to store the unique username of each network user.
Pword	A variable to store the password associated with each username for secure authentication.
Sstart	A variable to record the start time of a user's network session.
Sduration	A variable to determine the maximum duration of a user's network session.
Itimeout	A variable to set the time threshold for idle periods before automatic disconnection.
lat	A variable to record the timestamp of the user's last network activity.
Musers	A variable defining the maximum number of simultaneous users allowed on the network.
Cusers	A variable to keep track of the current number of users connected to the network.

Total Marks for Pset4 – 20 marks

The Art of Python

Problem Set 5

Part A

Using the programming language Python, write program code to implement the algorithm in Task A above. Complete with inline comments (e.g., headings in some sections of code) and general comments containing the author, date created, and statement of problem.

(15 Marks)

Part B

Create a word document that will contain the following:

1. Cover Page This must have your full name, year group, form class, IT teacher name, Project Type: Python.
2. Problem Statement – a description of the reason FortesWiFi needs you to create this software.
3. Algorithm – This should contain:
    a. Data Dictionary - A table listing the variables, datatype, and description of all the variables used in the algorithm.
    b. The Pseudocode/Flowchart Algorithm. If the pseudocode is chosen each line should be numbered and all indentation/spacing rules adhered to.
4. The Python Code – a copy of the code with the line numbers and associated correct code formatting.
5. The Working Program – This section contains screenshots of the working program at each stage of the data entry process to conclusion of the execution of the software. A total of at least 5 screenshots.

Name the document, **FortesWiFi – Python** and save as a PDF file

(5 Marks)

Total Marks for Pset5 – 20 marks

SUBMISSION GUIDELINES

Operation FortesWiFi will be submitted during the remainder of the Summer Term with persons submitting to our email: engineeringclub@campioncollege.com

Files to be submitted:

- ✓ **Problem Set 1** - *LastName_FirstName_Pset1.pdf*
- ✓ **Problem Set 2**
  - *LastName_FirstName_Pset2.pdf*
- ✓ **Problem Set 3**
  - *LastName_FirstName_Pset3.pdf*
- ✓ **Problem Set 4**
  - *LastName_FirstName_Pset4.pdf*
- ✓ **Problem Set 5**
  - *LastName_FirstName_FortesWiFi-Python.pdf*

THIS IS A MANDATORY PROJECT FOR CLUB MEMBERSHIP FOR THE SUMMER TERM!

This project is due on the June 5, 2024 at 11:59pm