CS2021 ASSIGNMENT 9 (Due Date: Dec 3, 2021)

Question 1

An executable file is in essence a file full of machine codes. For instance, word.exe and chrome.exe are two executable files.

(a) To develop an executable file, which type of programming language – interpreted language or compiled language – should be applied?

(b) State two programming languages which are compiled languages.

(c) State two programming languages which are interpreted languages.

(d) State a system software and an application software which have an interpreter inside.

Answer:

(a) Compiled language.

(b) Any two of the following languages: C, Java, Assembly language, Basic, Pascal and others.

(c) Any two of the following languages: SPSS, SAS, HTML and XML, Matlab, Python, and others.

(d) System software: Windows OS, MacOS, Unix, Linux, FTP server and others. Application software: Google Chrome, Microsoft Edge, SPSS, SAS, Matlab and others.

Question 2

An operating system is a system software. Today, there are a number of families (or series) of operating systems.

(a) State five functions which are handled by an operating system.

(b) In the lecture, a few families of operating systems have been introduced. State three of them.

(c) For each family stated in (b), state the names of the operating systems which are installed in (i) notebook computer and (ii) smart phone respectively.

Answer:

(a) (i) Memory management, (ii) file management, (iii) process management, (iv) system initialization, (v) graphical user interface control, (vi) networking process management and others.

(b) Unix family, MacOS family and Windows family.

(c) Unix: Linux for notebook computer and android for smart phone. MacOS: MacOS for notebook computer and iOS for iPhone. Windows: Windows for notebook computer and Windows Mobile for Nokia Lumia.

Question 3

An operating system is able to manage multiple processes running in a computer.

(a) Once an operating system has completed a service request from a process, how does it know which service queue the result should be sent to?

(b) What is the purpose of a watch-dog program?

(c) From the hardware point of view, which component is actually executing the instructions for the operating system and the application softwares?

Answer:

(a) Process ID of the process requesting for service.

(b) To check routinely the service request queue if there is any incoming service request.

(c) CPU.

Question 4

Imagine that a number of mobile devices, say a smart phone X and a notebook computer Y, have been connected via a WiFi access point to the Internet. Both devices have open a browser. Browser in X is accessing the webpage `www.nchu.edu.tw`, while the browser in Y is accessing the webpage `webmail.nchu.edu.tw`.

(a) State three wireless communication technologies which have been applied in an iPhone or android phone.

(b) Now, the web server of `www.nchu.edu.tw` has returned the webpage file to the access point. How does the access point know that the webpage file is sent to the smart phone X?

Answer:

(a) 3G/4G/5G, WiFi and Bluetooth.

(b) The MAC address of X.

Question 5

Bus topology is a popular network structure for connection a number of computers via a cable wire (i.e. medium). Imagine that three computers X, Y and Z are connected to the medium. Suppose computer X would like to send a message to computer Y. Describe what computer X needs to do before the message is sent to the cable (i.e. medium).

Answer: X needs to send a short message 'RTS' to the medium together with its MAC address and the MAC address of Y. (i) If X has then received a short message 'CTS' from Y, X can thus send out the message to the medium. (ii) If X has not received the 'RTS' or X has detected 'noisy signal', X re-sends the short message 'RTS' to the medium and wait for the reply 'CTS'. This step repeats until the short message 'CTS' has been received and thus send out the message to the medium.