



COMPSCI 340 / SOFTENG 370

Operating Systems

Assignment 1 – Distributed,
Networked, or Cloud Operating
Systems

Worth 5%

final date 09:30pm 13th of August, 2018

Introduction

An operating system is system software that acts as an intermediary between the user of a computer and the computer hardware, providing an environment in which a user can execute programs in a convenient and efficient manner. In this assignment, you are going to present your understanding of operating systems that are accessed by users locally or remotely.

Part I

Question 1. In week 1, we introduce an overview of the general topic of operating systems with an emphasis on the history of their development so as to explain how they came to be as they are today. In operating systems, as in much of computer science, we are led to the present by the paths we took in the past, and we can better understand both the present and the future by understanding the past. Describe three major purposes of an operating system that need to take into account when designing an operating system. **(3 marks)**

Answer:

Convenient: the operating system makes the computer easier to use.

Effective: the operating system allows for the use of computer system resources in a more efficient way.

Extension capabilities: When constructing an operating system, it should be allowed to open effectively without compromising the service

Develop, test and introduce new system functions.

Question 2. A handful of important concepts such as multiprogramming, time sharing, distributed systems, etc. are also overviewed in this week. Time-sharing or multitasking is a logical extension of multiprogramming. The sharing of processor time between multiple simultaneous users is termed “time-sharing”. While multi-programming and time-sharing are the central themes of modern operating systems, single-user systems are still widely used. Discuss under what circumstances, a user would be better off using a time-sharing system rather than a PC or a single-user workstation?

(3 marks)

Answer :

When the number of user using time-sharing system is small, the task is very huge, also the hardware is very fast then using time-sharing system will be meaningful. It can use hardware's performance completely, and solve problem faster than personal computer.

Another situation is there are so many people using resources at the same time.

Part II

In Week 2, distributed operating systems, networked operating systems, and their principle technologies are introduced. A distributed system is a collection of processors that do not share memory or a clock. Instead, each processor has its own local memory. The processors communicate with one another through various communication networks, such as high-speed buses or telephone lines. A networked operating system provides an environment in which users, who are aware of the multiplicity of machines, can access remote resources by either logging into the appropriate remote machines or transferring data from the remote machine to their own machine.

Question 3. OpenAFS is a distributed file system that offers a client-server architecture for federated file sharing and replicated read-only content distribution. NFS (see Chapter 12.8) is also a distributed file system that enables users to access remote data and files in the same way they are accessed locally. Describe five distinctive differences between OpenAFS and NFS. (5 marks)

Answer:

1. OpenAFS have many servers, but NFS usually only have one.
2. NFS is location-independent and maps local directories to remote file system locations. OpenAFS hides file locations from users.
3. OpenAFS and NFS is different in process at concurrent write operations. NFS is stateless system, OpenAFS is the callback system.
4. OpenAFS is a distributed file system, and NFS is network file system. OpenAFS can be mounted as an NFS file system for use, but NFS can't.
5. NFS is location-independent and maps local directories to remote file system locations. OpenAFS hides file locations from users. OpenAFS is organized around a set of file servers called cells. The identity of each server is usually hidden in the file system.

Question 4. Determine the IP addresses of the following host names

- www.cs.auckland.ac.nz
- www.apple.com
- www.harvard.edu
- www.ietf.org

1) by running the program below

```
import java.net.*;
/**
 * Usage: java DNSLookup <IP name>
 * i.e. java DNSLookup www.wiley.com
 */
public class DNSLookup {
    public static void main (String[] args){ InetAddress hostAddress;
    try {
    }
    hostAddress = InetAddress.getByName (args[0]); System.out.println
    (hostAddress.getHostAddress());catch (UnknownHostException uhe) {
    System.err.println ("Unknown host: " + args[0]);
    }
    }
}
```

Note: To compile any java programs, you will need to download and install the Java Development Kit (JDK), e.g. from here <http://www.oracle.com/technetwork/java/javase/downloads/jdk10-downloads-4416644.html> (2 marks)

Answer:

- www.cs.auckland.ac.nz -----130.216.158.22
- www.apple.com -----104.113.199.239
- www.harvard.edu -----104.16.151.6
- www.ietf.org -----104.20.1.85

2) Propose another way to obtain the IP addresses of the above host names. (1 mark)

Answer:

1. In terminal (mac os) or CMD(windows), we can use command “ping” + “link address” to get ip.
2. Also we can use “nslookup” in CMD to check it.

Question 5. The two-phase commit protocol is a distributed algorithm that coordinates the processes participating in a distributed atomic transaction. It decides whether to *commit* or *abort* a transaction. Given that a server and two participants run the two-phase commit protocol, if the transaction is aborted, discuss two potential reasons this might happen and how each could be handled. **(4 marks)**

Answer:

One reason is one of the participant is error, time out. So it can check network connection.

The other reason is server is error, in this case, it can use backup server.

Part III

In Week 3, the general concepts of cloud computing, major cloud service models (i.e., SaaS, PaaS, IaaS), and cloud operating systems are introduced. Cloud operating systems are used to manage cloud resources so that they can be used efficiently and effectively. Compared to traditional operating systems, a cloud operating system has its own characteristics in terms of resource management and task scheduling to support various kinds of cloud applications.

Question 6. List six major components of a cloud OS which allow it to support different cloud applications. **(3 marks)**

Answer:

the six major components is: Virtual Machine Manager, Network Manager, Storage Manager, Image Manager, Information Manager, Authentication and Authorization.

Question 7. An IT company based in Auckland is going to develop a cloud to provide services for higher education institutions in New Zealand. Which type of clouds (i.e., public or private) would you recommend and why? Taking the application and service requirements of higher education institutions into account, if you were a member of the project team, which one of the three cloud computing delivery models (i.e., SaaS, PaaS, or IaaS) you would design for the public cloud to embrace. Describe your reason(s). **(7 marks)**

Answer:

1) I will recommend private cloud, because a higher education institution will more focus security rather than cost, the data storage in private cloud is more safety than others.

In the other hand the date of institution should be isolated to internet, so private cloud will more suitable for this situation.

higher education institutions will open for years and its stable than many other company, for long-term use, the private cloud will support more comfortable user experience than other cloud, it can deeply modify.

2) I will embrace IaaS, a higher education institution should have their own IT apartment, so they may need to design their own application even operation system, IaaS is most suitable for them. For another reason, if the system is built by the institution, the bug repair will be more easy, more safety and hardly been hacked by internet hackers.