Zice Wei
C73880993

Pre-class assignment 1

Relevant Materials:
OSPP textbook, chapter 1
chapter 1 slides

1. Give the definition (note: not the roles) for an operating system as stated in the textbook. (12 pts.)

According to the textbook, an operating system is the layer of software that manage a computer's resources for its users and their applications**.**

2. Give the definitions of the three roles for an operating system as stated in the textbook. (21 pts.)

1. Referee:
    a. Manage resources shared between different applications running on the same physical machine.
    b. Isolate applications from each other.
    c. Protect itself and other applications from malicious computer viruses.
    d. Communicate between users and applications

2. Illusionist:
    a. Provide an abstraction of physical hardware to simplify application design.
    b. Provide higher-level objects.
    c. Mask physical limitations and details.

3. Glue:
    a. Provides a set of common service that facilitate sharing among applications.
    b. Provide a layer separating applications from hardware I/O devices so applications can be written independently. And Files written by one app can be read by other.

3. For the following items, circle the relevant role of an operating system acting as a Referee, Illusionist, or Glue: (21 pts.)
(a) R Resource allocation among users and applications.
(b) I Higher-level objects are provided, such as files.
(c) G Files written by one application can be read by another application.

4. Define virtualization. (6 pts.)
Provide an application with the illusion of resources that are not physically present.
May be within a physical machine, such as virtual memory or may be a full virtual machine.

5. Define the following terms: (40 pts.)
(a) availability

The percentage of time that the system is usable.

$$Availability = \frac{MTTF}{(MTTF + MTTR)}$$

$MTTF : MeanTimeToFailure$
$MTTR : MeanTimetoRepair$

(b) efficiency

The lack of overhead in implementing an abstraction.

(c) overhead

Numbers of extra works are done by the IO or the added resource cost of implementing an abstraction presented to applications.

(d) predictability

How consistent is the performance over time.

(e) response time

Numbers of time an operation takes to complete.

(f) reliability

It means that a system does exactly what it is designed to do.

(g) throughput

Numbers of operations can be done per unit of time.

(h) utilization

The fraction of time a resource is busy.