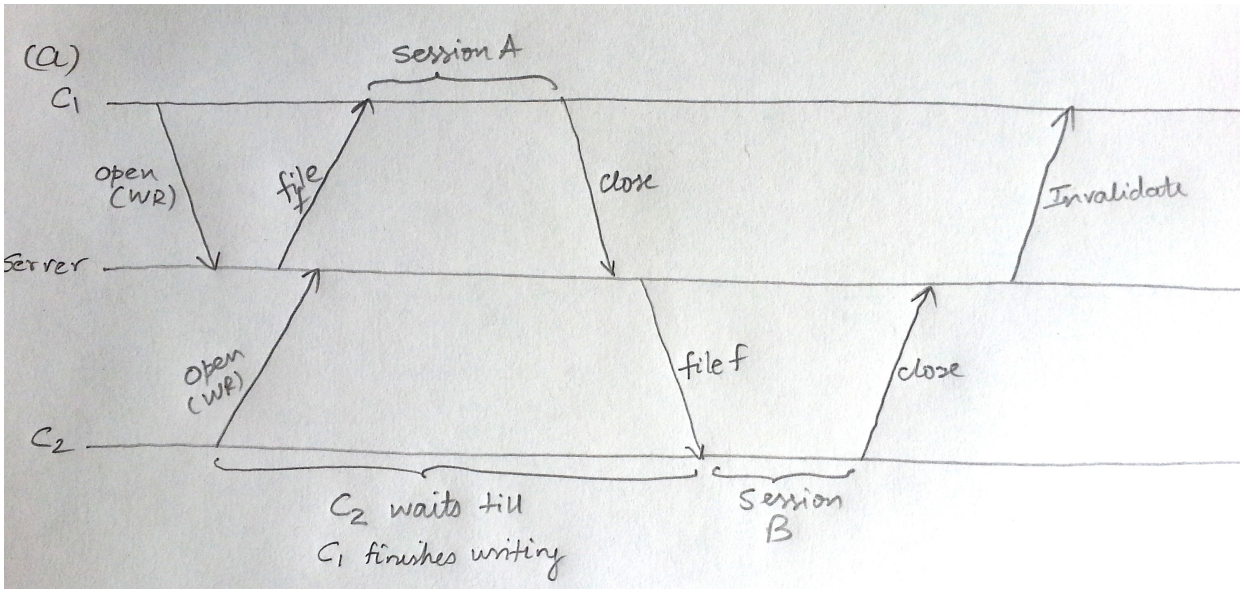
Homework Assignment 8 – Solutions

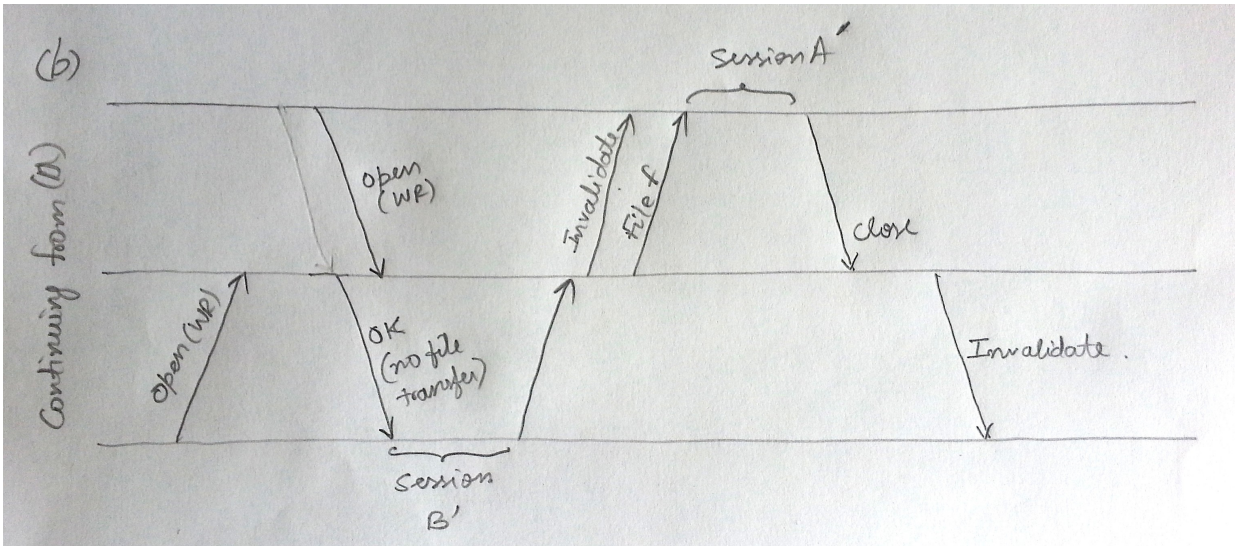
1. (a) Individual files are not copied because:
   - Wastage of space
   - File duplication (NFS uses local namespaces)
   - Latest version of the file can be accessed
   - File maintenance becomes easier

(b) Client gets access to individual files using RPCs. Client looks up a file using **lookup** request and then issues a **read** request (in Version 3). In NFSv4, the client uses a compound procedure in which **lookup, open** and **read** are performed in a single RPC.

(c) File sharing by clients is difficult in NFC because of the absence of a global namespace. Clients may have different directory hierarchies and thus the entire path of the file maybe different.

2.





3. **Differences between Web Server and Web Service**

A Web Server is infrastructure software on the server-side that produces Web pages in the form of HTML documents, when clients issue requests. A client uses HTTP to communicate with a Web Server and request documents on the Web. The Web Server then fetches a static Web page from its file system, or creates a dynamic Web page with dynamic content retrieved from a database or other sites on the Web.

A Web Service is application software that provides a service to other applications on the Web. A SOAP Web Service uses the SOAP protocol, which operates over HTTP, whereas a REST Web Service uses HTTP directly. Both are intended to provide interoperability between applications on the Web, so that applications on different platforms can communicate and interact with each other.

3 (b) HTTP is an application layer protocol over TCP which is used to access documents on the web.

SOAP is an application layer protocol over HTTP which allows easy exchange of XML documents across the Internet.

TCP is a transport layer protocol which provides service to HTTP layer (which in turn provides service to SOAP) in the form of reliable communication.

SOAP
HTTP
TCP

4. (a) **How do Web Services address portability and interoperability**

SOAP Web Services are based on the XML, SOAP, WSDL and UDDI standards.

XML, using name-value pairs, makes the data self-describing and, thus, provides portability of data across the Web.

SOAP is based on XML, including both the headers and the content of SOAP messages and, thus, provides interoperability among diverse platforms between which the SOAP messages are communicated.

WSDL provides a standard way of describing Web Services, based on XML, and, thus, makes the descriptions of Web Services are portable between providers and consumers.

UDDI provides a standard for the Service Registry, where WSDL descriptions are stored, so that providers can publish and advertise their services and consumers can query and search for services that are available.

REST Web Services are also based on XML They are not based on SOAP but, rather, they use HTTP directly and a uniform set of stateless operations. They use WADL instead of WSDL. Thus, they are

lighter-weight and provide somewhat less interoperability and portability than SOAP Web Services.

4 (b) **Differences between SOAP and REST**

SOAP
- Relies on XML to service requests
- Provides reliable messaging with its built-in successful/retry logic
- Written in WSDL

REST
- Relies on URI to service requests
- Lightweight compared to SOAP
- Faster than SOAP
- Requires little infrastructure support other than HTTP and XML
- Messages are in XML format but are confined to a particular schema
- Written in WADL