WebNFS

The Filesystem for the Internet

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NFS Now

- **Established**
  - Mature - 12 years
  - 12 million nodes (Dataquest)
  - High performance (Vendors compete for SPEC SFS numbers)
  - Multi-platform
- **Trend**
  - More NFS over TCP
  - NFS version 3
    - Unlimited transfer size (was 8k).
    - Fast writes
    - 64 bit file offsets (was 32 bit).
    - READDIRPLUS

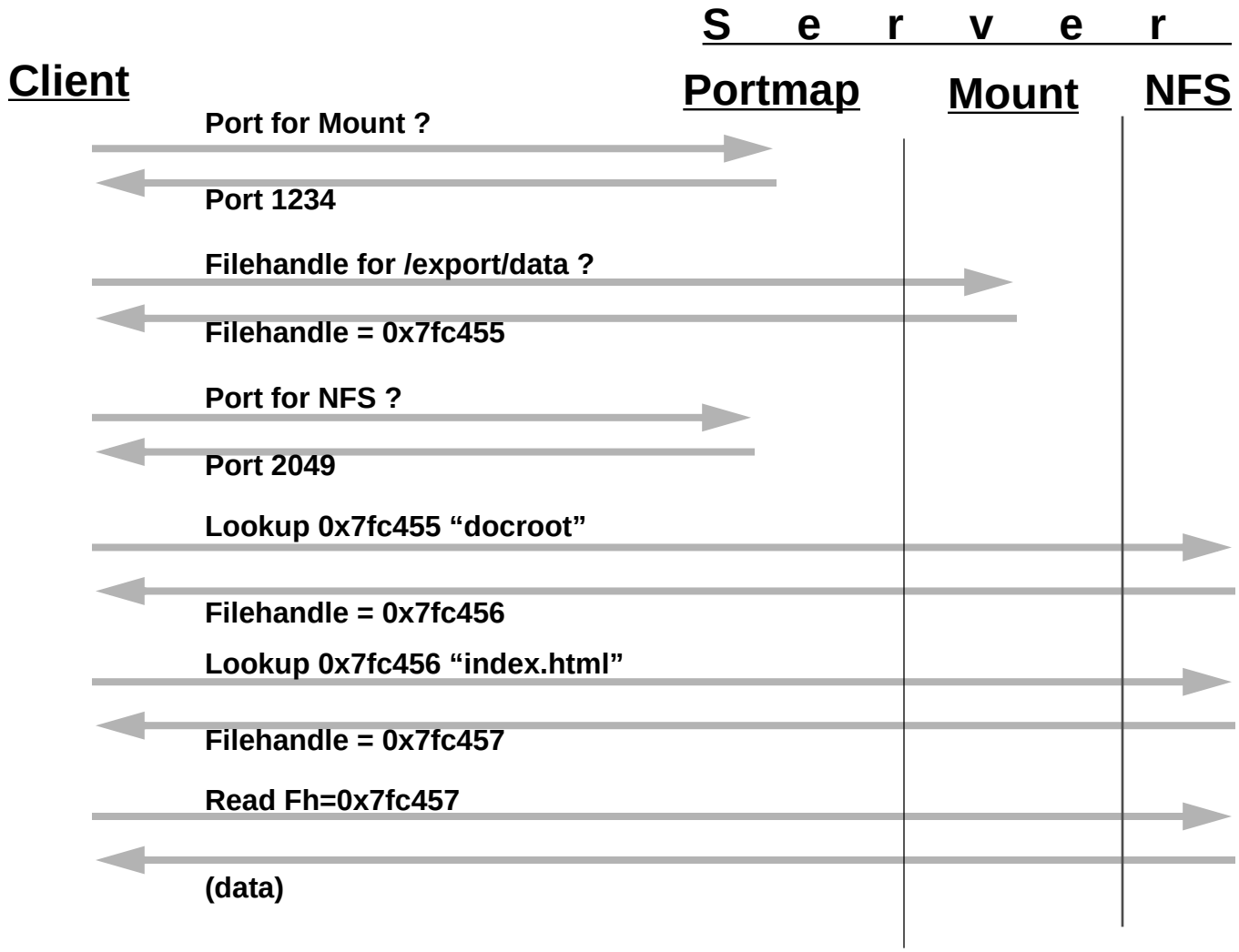
NFS on Internet

- First implementations were UDP based.
- Vendors moving toward TCP implementations for better performance over wide area networks.
- NFS servers are on the Internet now.
- NFS clients can browse remote archives with file browser.
- Access files without file transfer.

HOWEVER!

- Firewalls are a problem: portmap and MOUNT protocol

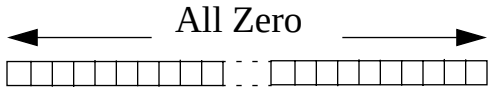
Access without WebNFS



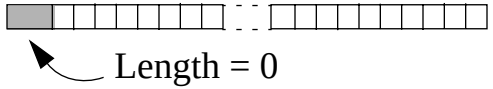
Public Filehandle

- **It's nothing really**

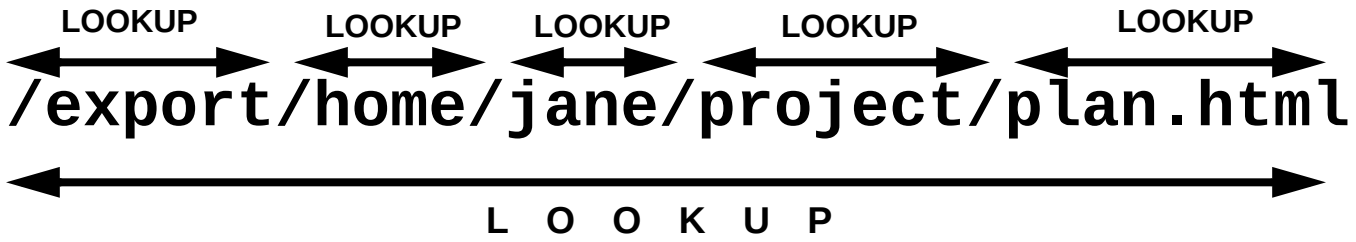
Version 2



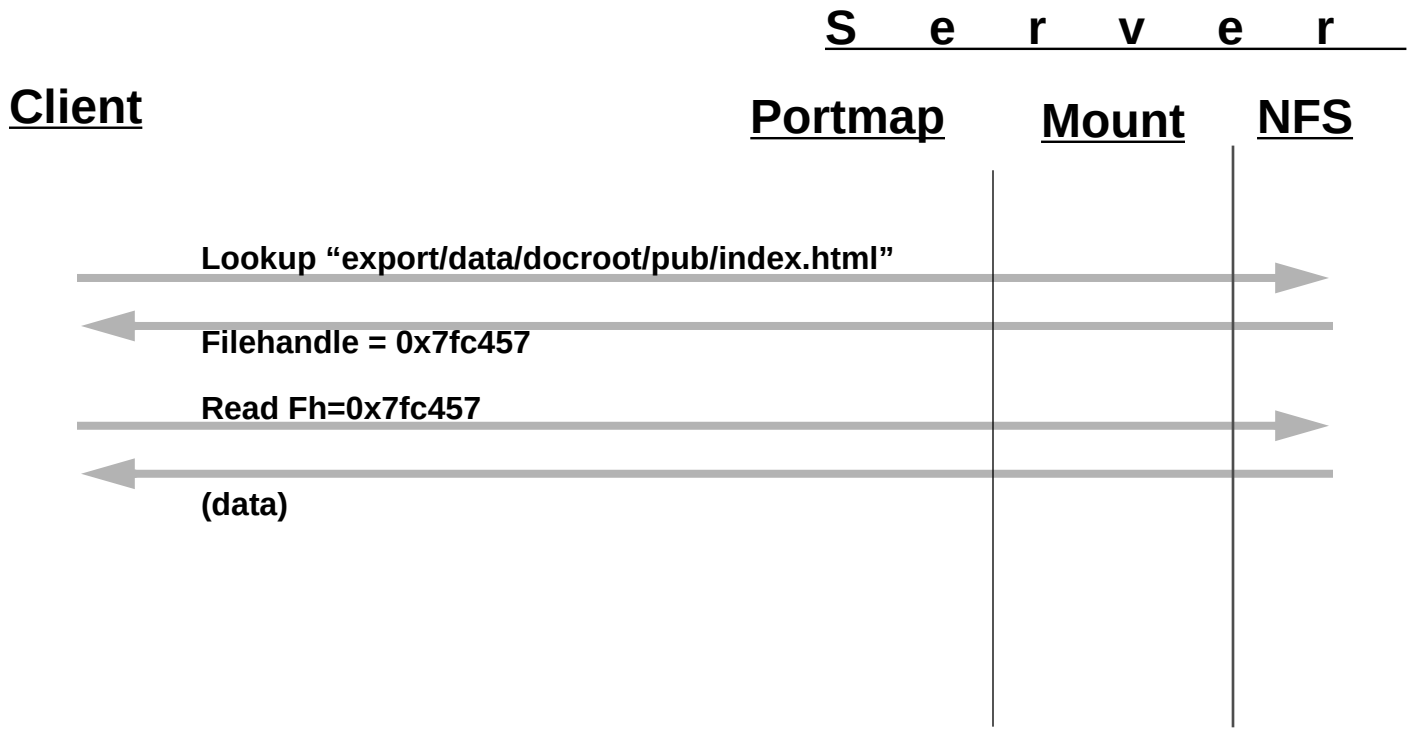
Version 3



- **Multi-component Lookup**



Access with WebNFS



WebNFS - Clients

- **WebNFS client RFC 2054**
- **Web browsers enable use of NFS URL's `nfs://server/path`**
- **File transfer program like FTP but better**
- **Windows - ActiveX URL Moniker**
- **Regular NFS clients - mount/automount from Internet servers.**

WebNFS - Server

- **WebNFS server RFC 2055**
- **Small modification to existing v2 & v3 servers.**
- **New Solaris share options "`public`" and "`index`"**

```
# share -o ro,public /export/home/ftp

# share -o ro,public,index=index.html /export/docroot
```

- **Not a complete HTTP replacement!**
  - **No CGI**
  - **No MIME headers**

NFS URL

- **Syntax:** `nfs://server:port/pathname`
- **Locates a file on NFS servers anywhere**
- **Platform independent, slashes in the same direction even on Microsoft OS's**
- **Java applications: "*write once, run anywhere.*"**
- **URL's are location dependent, however IETF has:**
  - **Uniform Resource Names (RFC 1737)**
  - **Service Location Protocol**

NFS in Web Browsers

- **NFS URL's supported in Solaris 2.6 Hotjava, will be in Netscape Navigator:** `nfs://server/path`
- **An NFS client on every desktop**
- **Browse/upload/download files on any NFS servers**
- **In-place editing of Web pages**
- **NFS servers >> faster than Web servers!**

- **Not an HTTP replacement!**
  - **No MIME support**
  - **No proxy caching**
  - **No CGI**

Java NFS

- Java applications - no remote file access through java.io.*
- NFS in JDK - any Java app can access NFS files!
- Use NFS URL: `nfs://server/path` for global, platform-independent naming.
- Use latest NFS technology:
  - Fast, firewall-friendly WebNFS connections with fallback to MOUNT protocol
  - TCP connections fallback to UDP
  - NFS version 3 fallback to version 2
- Rapid deployment of NFS technology, e.g. version 4

Security ?

- **Currently: most access control assumes trusted hosts:**

```
# share -o rw=ping:pong /export/things
```

  - Inflexible, subject to address spoofing
- **RPC already supports flexible *user* authentication**
- **IETF working group for ONC RPC**
  - **RPCSEC_GSS** supports IETF's **GSS-API**
  - **Secure authentication, integrity, privacy**
  - Pluggable security: e.g. Kerberos v5 authentication or SSL cipher suites.
- **NFS version 4**
  - **Built-in security negotiation & req for strong security**

WebNFS vs CIFS

- CIFS: renamed SMB protocol (LAN Manager)
- Supports only Win95, NT & OS/2 clients
- Security is weak, inflexible.
- Pathnames must have backslashes
- Reserved characters: . / \ []:+|<>=;,*?
- No symbolic links or POSIX file attributes
- WebNFS will evolve to NFS Version 4:
  - An IETF standard
  - Non proprietary

WebNFS becomes NFS Version 4

- **Incorporate WebNFS into the protocol**
  - Firewall friendly
  - Fast connection to server
- **Scale from LAN to high-latency WAN or Internet**
- **Security: strong and negotiated within protocol**
- **Unicode support**
- **Integrated file locking**
- **Improved cross-platform support**
- **Design for incremental, backward-compatible extensions**
- **To be an Internet Standard**