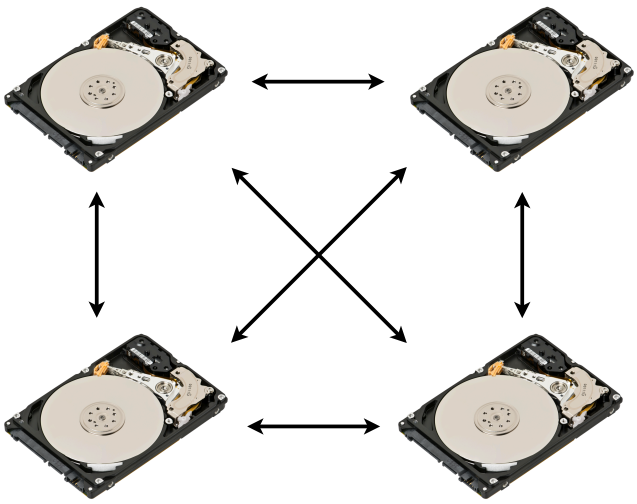
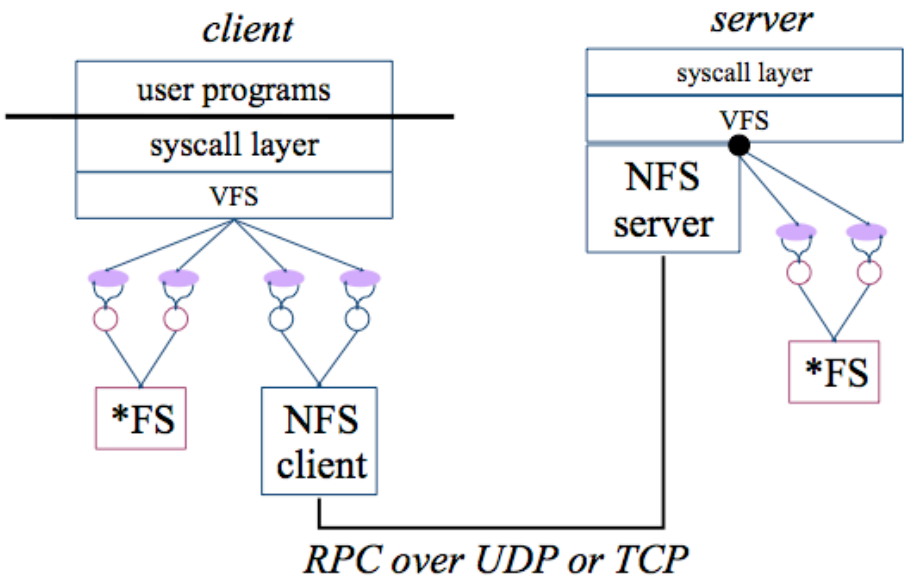
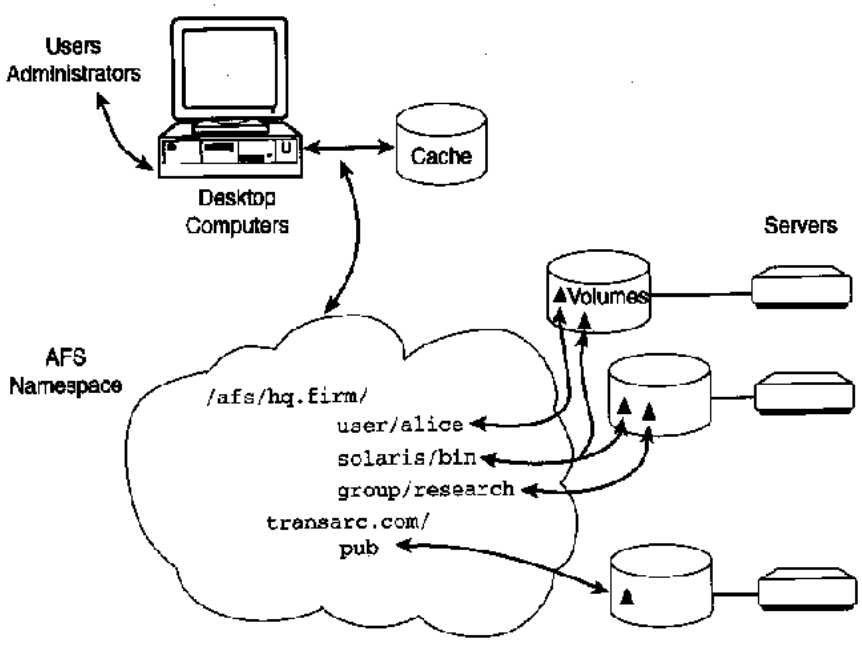
Distributed Storage Systems



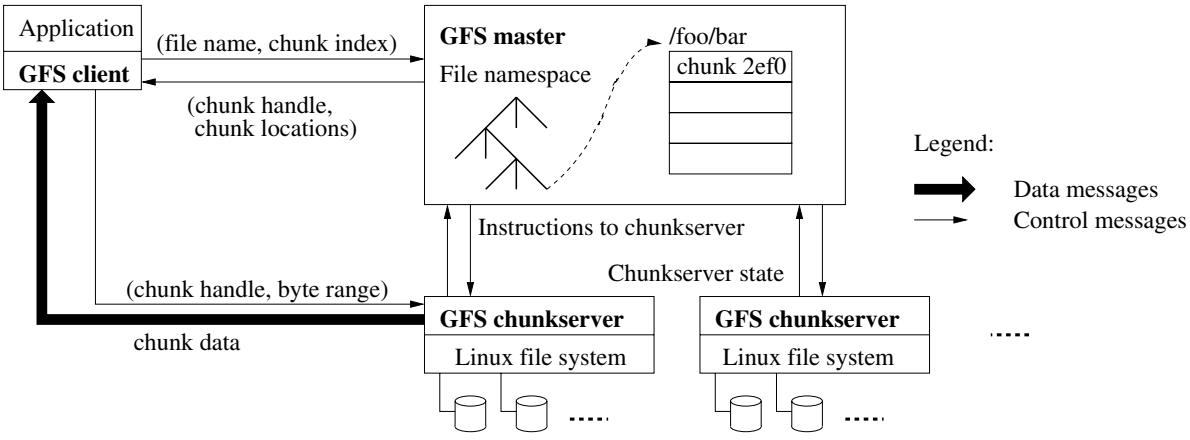
Network File System (NFS)



Andrew File System (AFS)



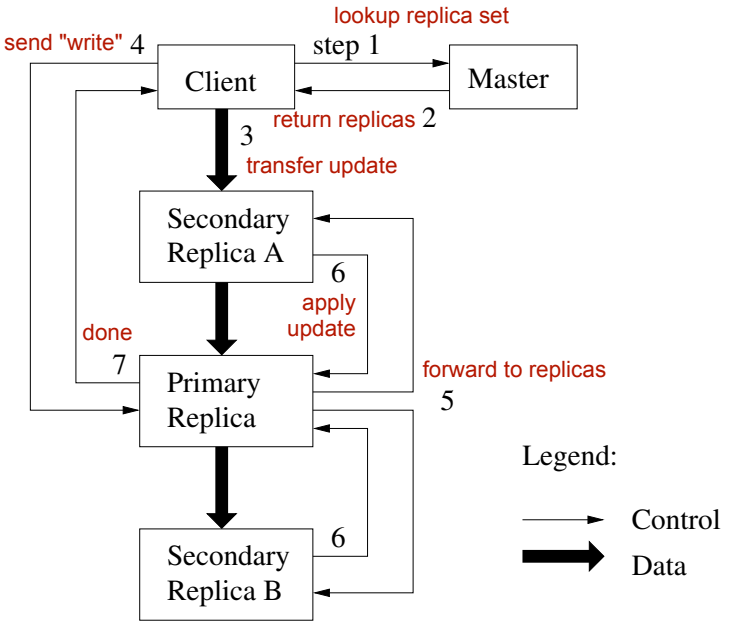
Google File System (GFS)



GFS Cluster Statistics (c. 2003)

Cluster	A	B
Chunkservers	342	227
Available disk space	72 TB	180 TB
Used disk space	55 TB	155 TB
Number of Files	735 k	737 k
Number of Dead files	22 k	232 k
Number of Chunks	992 k	1550 k
Metadata at chunkservers	13 GB	21 GB
Metadata at master	48 MB	60 MB

GFS Mutations

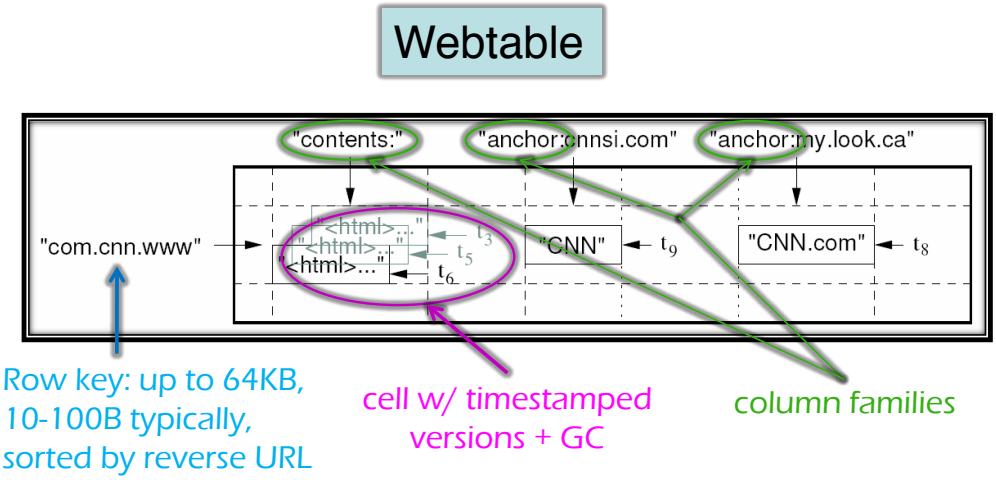


Bigtable



Bigtable Data Model

(row:string, column:string, time:int64) → string



Bigtable API Example

```
// Open the table

Table *T = OpenOrDie("/bigtable/web/webtable");

// Write a new anchor and delete an old anchor

RowMutation r1(T, "com.cnn.www");

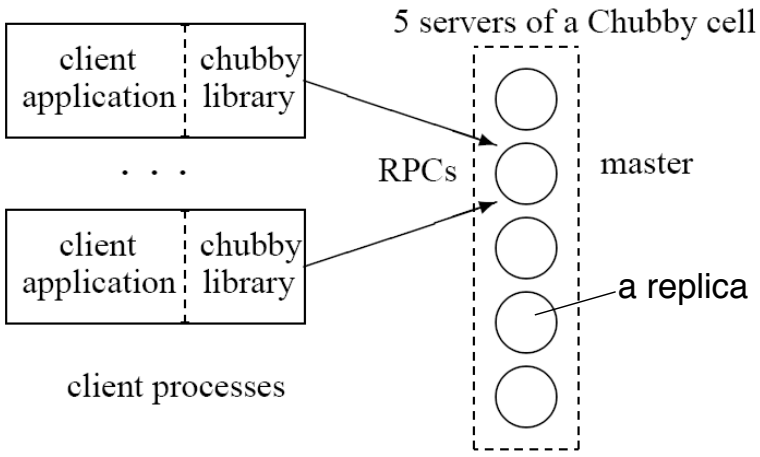
r1.Set("anchor:www.c-span.org", "CNN");

r1.Delete("anchor:www.abc.com");

Operation op;

Apply(&op, &r1);
```


Chubby Lock Service



Bigtable Hierarchy

