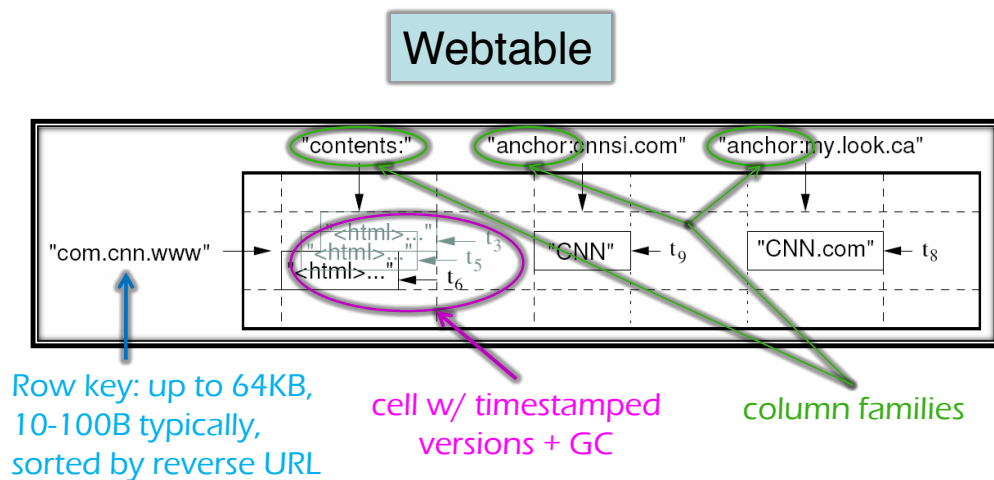


Distributed Storage Systems



Bigtable Data Model

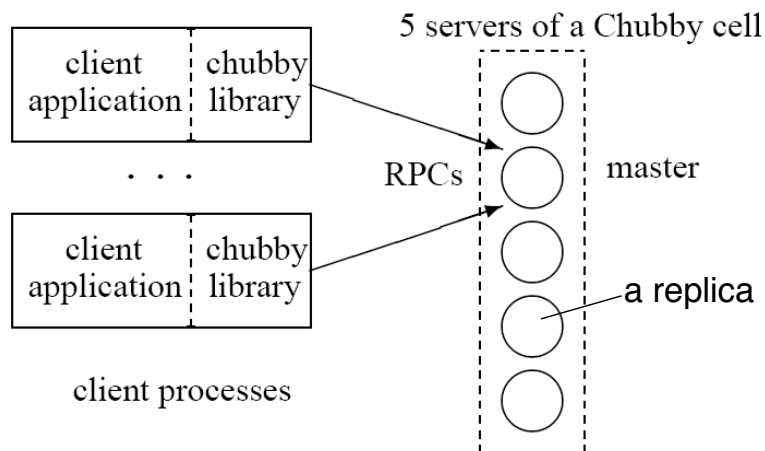
(row:string, column:string, time:int64) → string



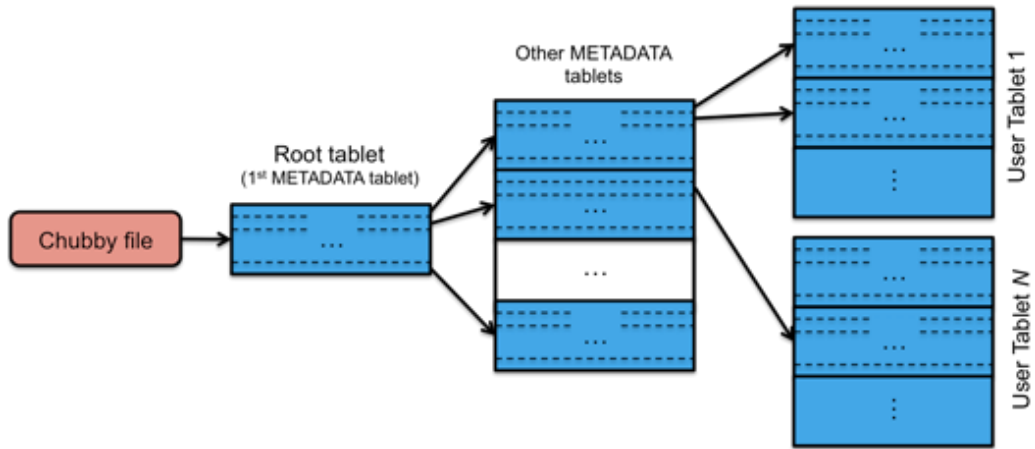
Bigtable API Example

```
// 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);
```

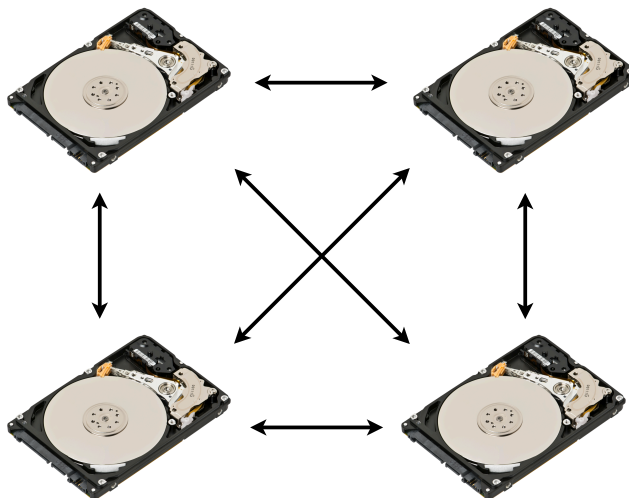
Chubby Lock Service



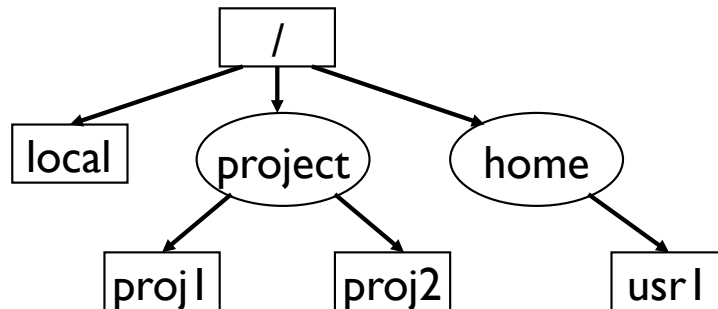
Bigtable Hierarchy



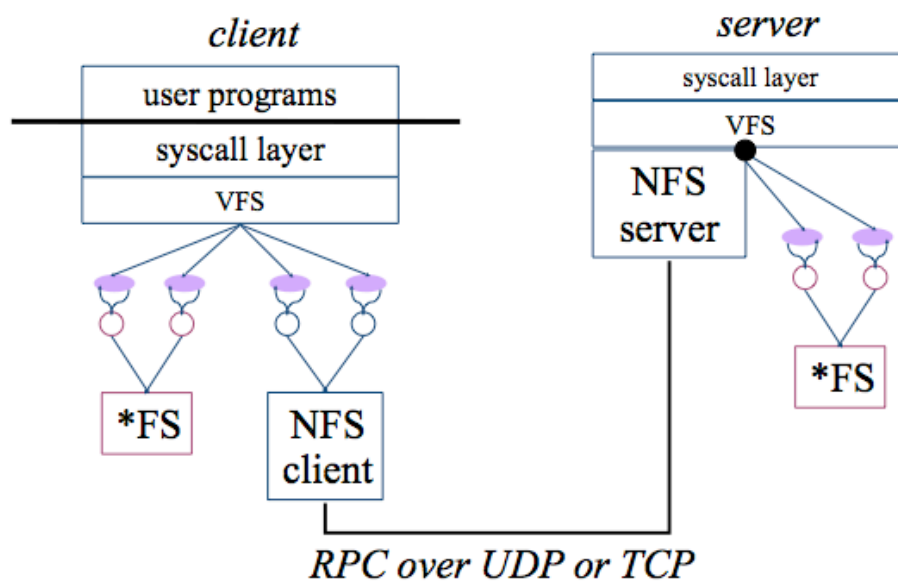
Distributed File Systems



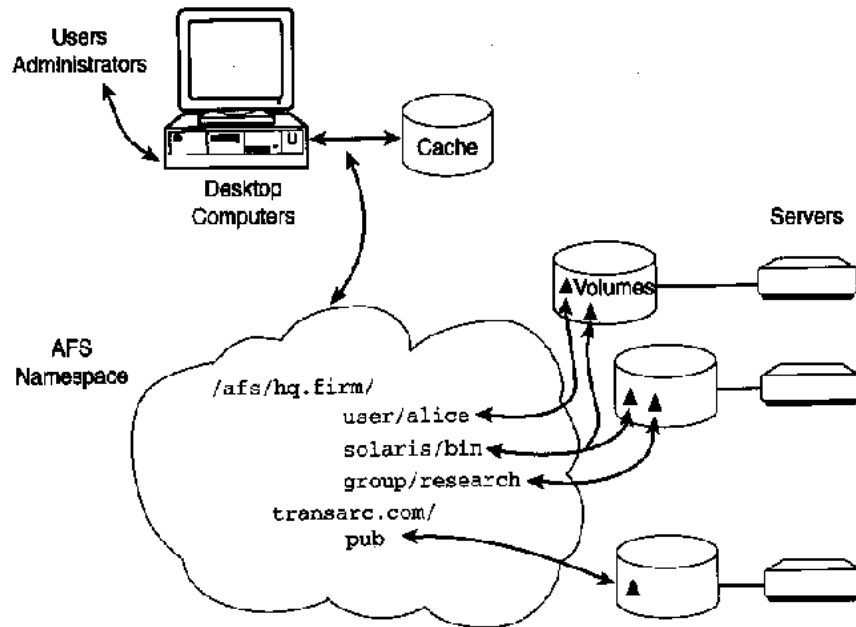
Naming: Mount Points



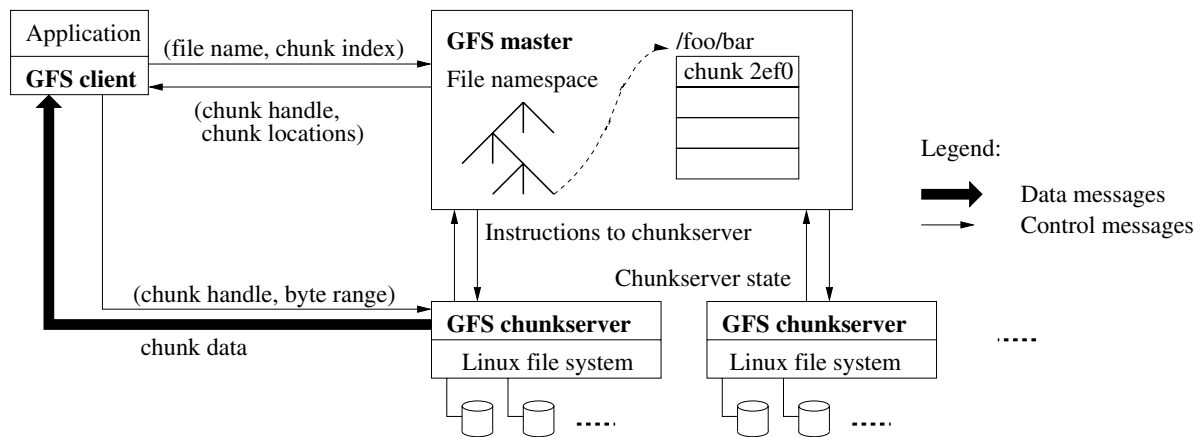
Network File System (NFS)



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

