Distributed Hash

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Protocol

The Distributed Hash consists of two main entities: a client utilizing the dhash library, and a network of dhash servers. The dhash system utilized a transaction package definition which is transmitted over the network between client and server, and between servers in a forwarding scenario.

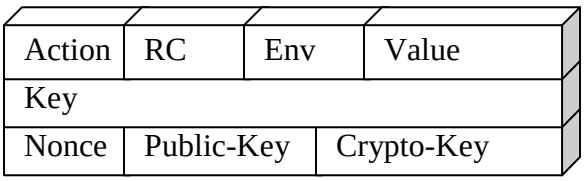


Figure 1: dhash transaction package

Action – where A ∈ {'R','W','L','U'} for read, write, lock, and unlock
RC – Return Code where E ∈ {0,1..9} 1 is for Success, 0 is for Unknown Error, 2-9 are for specific errors
Env – Envelope. Specifies a group envelope whereas multiple unique hash values may exist on the same key, but are differentiated by envelope number
Value – Value to insert into hash table for *Write* actions, and value returned from *Read* actions
Key – Key to be hashed uniquely identifying a hash bucket which contains the value
Nonce, Public-Key, Crypto-Key – not yet implemented, but will allow for secure storage of values in the hash table. With a public key you can Read a hash value, and with a Crypto-key you can write to the hash bucket

Network

The client (unless otherwise configured) will contact the dhash server on the local host with the transaction request. The server than applies the first hash function $h_1()$ to the transaction's key. If the local node is not the owner of that hash bucket, then the transaction package is forwarded to the host corresponding with the result of $h_1()$. Once the transaction package has reached is proper host destination, the host will then apply hash function $h_2()$ to insert or read the value in local memory.

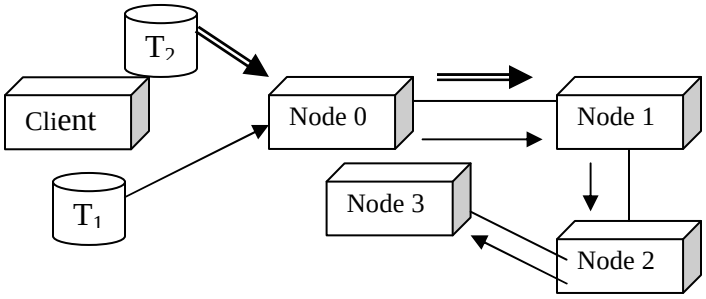
We define the first hash function as:

$h_1() = \Sigma(\text{val}(\text{character}_i)) \bmod n$
where $0 < i < \text{length}(\text{key})$
and n = number of nodes

We leave the definition of $h_2()$ to the individual hash table implementations on the nodes.

Failure Tolerance

Although node insertion and removal tolerance has not yet been implemented, network failure tolerance has. If a server cannot be contacted, the transaction package is sent to the next server in the ring to attempt communication.



Let $h_1(T1) = 1$ and $h_1(T1) = 2$