

Grant Proposal

Andrew Rosen

Abstract

1 What are DHTs

My dissertation focusing on creating a generalized framework for distributed computing based on Distributed Hash Tables (DHTs). Distributed Hash Tables are a tool which allows a computers (nodes) to self-organize into a decentralized network for storing and retrieving data.

There are many different types of DHTs, but all DHTs share very important qualities. They are *scalable*, which means that each additional node in the network minimally impacts the cost of keeping the network organized. DHTs are also highly *fault-tolerant*. Unlike many other systems, DHTs assume that nodes will be continuously entering and leaving the network. Because of the way DHTs are organized, DHTs can handle large scale failures, such as power outage affecting an entire city. The last quality of DHTs is that they are *load-balancing*. This mean the data the is stored in a DHTs is evenly distributed among nodes in the network.

2 What Have We done so far and why should the reader care

All of these qualities are highly desirable in a distributed computing, so it was a natural step for us to build distributed computing framework based on DHTs. We have shown in previous work that DHTs can be used to distribute work among nodes the same way data is distributed [1].

3 What do we plan on doing

3.1 Why is this exciting

Some example problems are Monte-Carlo Methods (of interest to mathematicians and economists), Our framework would not only be of interest to computer scientists. The “plug-and-play” nature we envision would make it easy for experts in other fields to use our framework to solve computationally intensive problems.

4 What do I need funding for?

Heterogeneous networks

We have successfully developed our software to achieve this, but need funding to do real world network tests. These tests would allow us to experimentally show that our software conclusively works on a large scale and on heterogeneous networks.

I need hardware of different types and locations.

This project would help by enabling allowing both organizations with large amounts of computing power and average developers with a fewer resources spend less time setting up and configuring their hardware to work together; the goal is for our software to make distributed computing more of matter of “plug-and-play.”

References

- [1] Andrew Rosen, Brendan Benshoof, Robert W Harrison, and Anu G. Bourgeois. Mapreduce on a chord distributed hash table. In *2nd International IBM Cloud Academy Conference*.

5 Vita goes here

Education

Ph.D. in Computer Science, Georgia State University. May 2016 (Expected)

M.S. in Computer Science, Georgia State University. May 2014, 3.89 GPA

B.S. in Computer Science, Georgia Institute of Technology. May 2010, 3.00 GPA

Minor in Music, Georgia Institute of Technology. May 2010

Appointments

2CI Astroinformatics Fellow, Georgia State University, Aug 2012 - Present

Graduate Research Assistant, Georgia State University, Aug 2011 - Present

Graduate Lab Assistant, Georgia State University, May 2011 - 2013

Publications

1. Andrew Rosen, Brendan Benshoof, Robert W. Harrison, Anu G. Bourgeois “MapReduce on a Chord Distributed Hash Table” Presentation ICA CON 2014, Poster at IPDPS 2014 PhD Forum
2. Brendan Benshoof, Andrew Rosen, Anu G. Bourgeois, Robert W. Harrison “VHASH: Spatial DHT based on Voronoi Tessellation” ICA CON 2014
3. Erin-Elizabeth A. Durham, Andrew Rosen, Robert W. Harrison “A Model Architecture for Big Data applications using Relational Databases” 2014 IEEE BigData - C4BD2014 - Workshop on Complexity for Big Data
4. Chinua Umoja, J.T. Torrance, Erin-Elizabeth A. Durham, Andrew Rosen, Dr. Robert Harrison “A Novel Approach to Determine Docking Locations Using Fuzzy Logic and Shape Determination” 2014 IEEE BigData - Poster and Short Paper
5. Erin-Elizabeth A. Durham, Andrew Rosen, Robert W. Harrison “Optimization of Relational Database Usage Involving Big Data” IEEE SSCI 2014 - CIDM 2014 - The IEEE Symposium Series on Computational Intelligence and Data Mining
6. Brendan Benshoof, Andrew Rosen, Anu G. Bourgeois, Robert W. Harrison “A Distributed Greedy Heuristic for Computing Voronoi Tessellations With Applications Towards Peer-to-Peer Network” IEEE IPDPS 2015 - Workshop on Dependable Parallel, Distributed and Network-Centric Systems
7. Chaoyang Li, Andrew Rosen, and Anu G. Bourgeois “A Novel Approach to Efficiently Detect 3D Full-View Coverage for Camera Sensor Networks” Submitted to IPDPS 2016
8. Andrew Rosen, Brendan Benshoof, Robert W. Harrison, Anu G. Bourgeois “UrDHT: A Unified Model for Distributed Hash Tables” Submitted to IPDPS 2016
9. Andrew Rosen, Brendan Benshoof, Robert W. Harrison, Anu G. Bourgeois “The Sybil Attack on Peer-to-Peer Networks From the Attacker’s Perspective” In preparation

Service

Vice Chair, Georgia State University Chapter of the Association for Computing Machinery (ACM), May 2012 - Present

Treasurer, Georgia State University Chapter of the Association for Computing Machinery (ACM), May 2012 - May 2014

New Graduate Student Orientation Panelist, Georgia State University, 2014-2015

Department Representative, Georgia State University Arts and Sciences Tech Fee Committee, 2013 - 2015

Employment

Developer Georgia Tech Sonification Lab, Atlanta, GA May-Dec 2010

Undergraduate Researcher Georgia Tech Sonification Lab, Atlanta, GA Fall 2007 -Dec 2009

6 Budget goes here

Item	Amount requested
Cloud Computing Server Time	\$1200
10x Raspberry PI 2	\$400
Raspberry PI peripherals	\$250
Volunteer Recruitment	\$150
Total Amount requested	\$2000