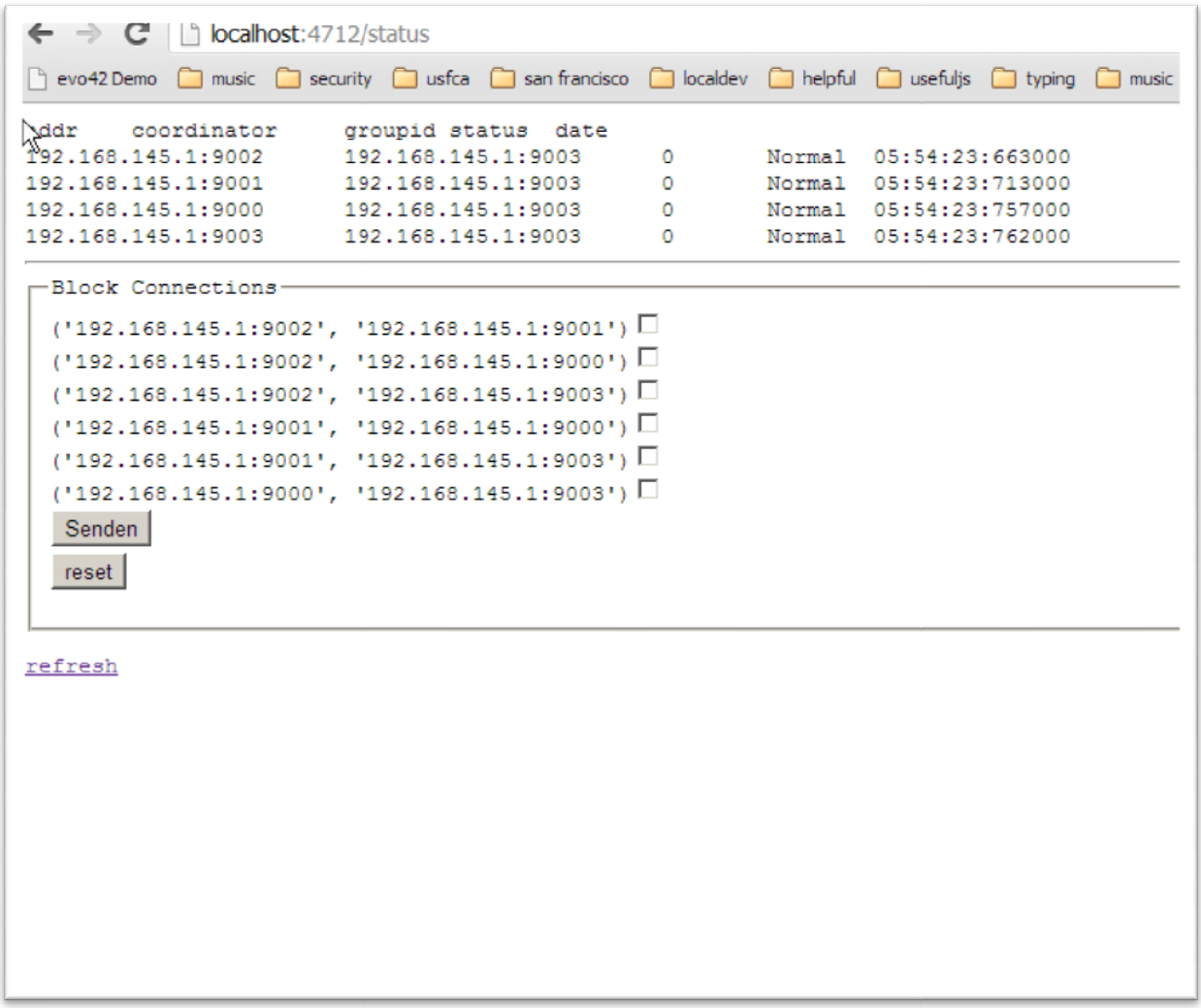
CS636 Leader Election Algorithms

Overview

This project implements three different algorithms for Leader Elections in Python. In every algorithm nodes report to a central log server (see Logserver.py). In addition to keeping a central log of node activities this server has a web interface that allows to keep track of node states. State reported by single nodes is saved to MongoDb which has to be running on the same node as the logs server.

The invitation algorithm as well as the asynchronous bully algorithm can build groups if the network is partitioned – this partitioning can be simulated by blocking connections between groups over the web interface.



Bully Algorithm

The Bully algorithm as described by Hector Garcia Molina is implemented in the file bully.py. To run it fist start the log server running Logserver.py from the command line. Per default it runs on localhost and port 4711 but this can be changed by supplying a port number as the first argument.

Usage Logserver.py [portnummer]

After running the log server nodes can be started individually or in groups. All nodes have to be identified by an ip number and a port in a file called server_config that has to be found in the same directory as the one the bully process is started from. The server_config files simply lists ip:portnumber per line where priorities are assigned to nodes according to the position of the line in the file. A sample configuration file can be found in the leaderelection directory

To start a single node run bully.py provide an ip address and a port as the first argument. These values must match an entry in the server_config file.

The bully.py file can run on different servers, so if you are using the log server on a different machine you must provide ip address and port of the log server as a second parameter to the program.

Usage bully.py [ip:port] [logserver_ip:logserverport]

The processrunner.py script can be used to start up all the nodes from the server_config file at once. This can be done on different servers, since the process runner only starts nodes with an ip entry that matches the current server.

Usage: process_runner.py "bully" [logserverip:logserverport]

After processes have been started you can watch the evolution to a leader over the web interface – to do so direct your browser to

http://logserverip:logserverport/status

Invitation Algorithm

The invitation algorithm described by Hector Garcia Molina is implemented in the file invitation.py. To run it start the Logserver first, then the script invitation_proxy.py and finally the invitation.py itself. If you don't specify a port number for the log server it defaults to localhost port 4711, the invitation_proxy.py defaults to localhost port 4712.

When you start the log server for the invitation algorithm it has to know where to send its commands for blocking the ips so you have to specify the ip address and the port of the log server.

Logserver.py [portnummer] [proxy_ip:proxy_port]

proxy_invitation.py [proxy_ip:proxy_port]

As in the bully algorithm you can start all the nodes either individually or all at once using the process _runner

Usage:

process_runner.py "invitation" [logserverip:logserverport] " [proxyip :proxyport]

Ansychronous bully Algorithm

The ansynchronous bully algorithm invented by Scott Stoller is implemented in the file bully_async.py and works in the same way as the invitation algorithm. The steps are exactly the same as described above, just use bully_async.py and bully_async_proxy.py instead of the corresponding invitation scripts.