The Reputation-Based Resource Management on Peer-to-Peer Network

Presented by Shao-Feng Wu

2004/11/04

# Outline

- Resource management.
   - -Goal : to improve the problem of searching
        efficiency
   - -Using reputation model.
   - -Defining reputation score.
   - -How this management works?
- Peer selection.
- Incentive mechanism.
- Searching priority.
- Conclusion.

Resource Management

- Reputation Model:
  - Each servent rates the partner according
    to its experience during the transaction.
  - Two reputation value :
    1. Resource reputation
       - Summarizes the past record of evaluations
         submitted for the resource.
    2. Servent reputation
       - Servent contribution score (SC)
         According to the resource a servent provides.
       - Servent evaluation score (SE)
         According to the evaluation from other servents.
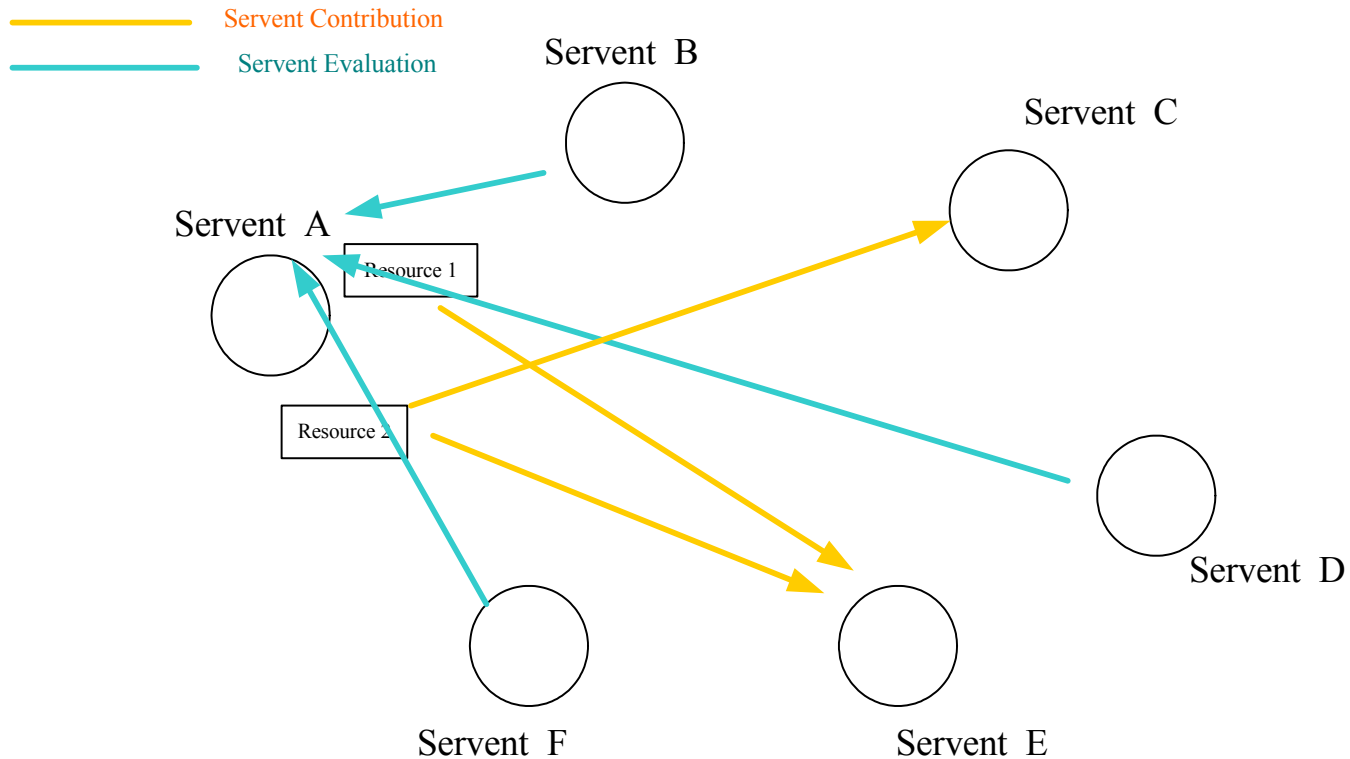
Resource Management

- Example of resource reputation
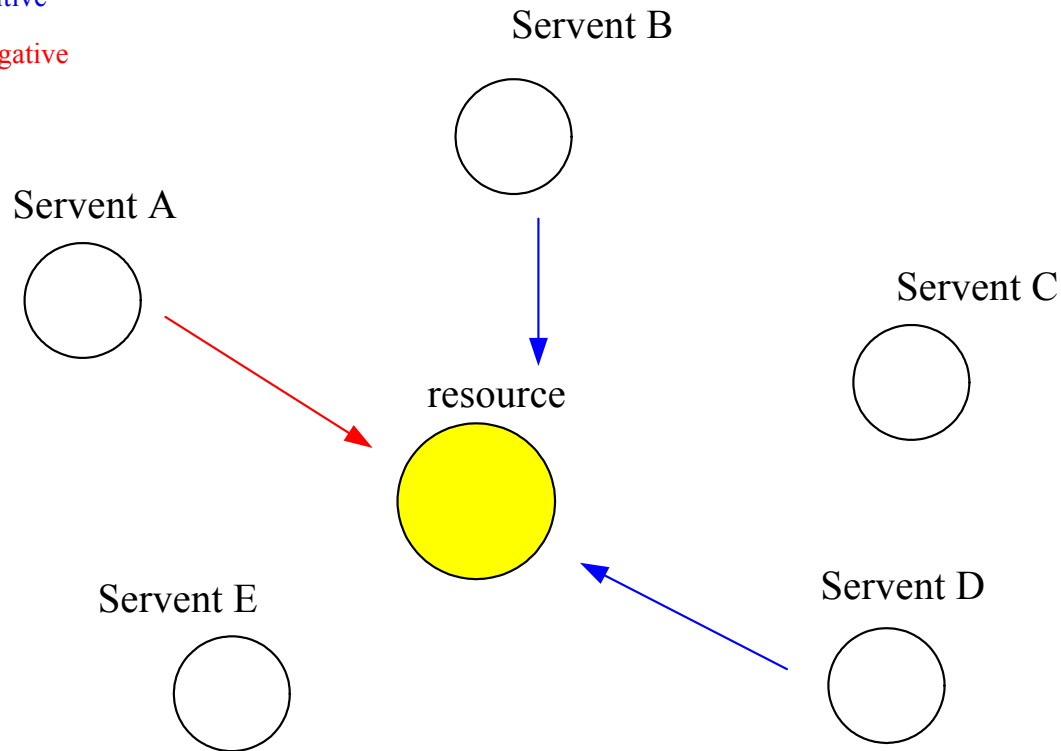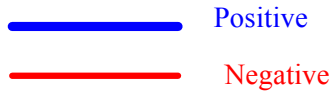
The evaluation is mainly depend on the latest rating.

Resource Management

- Example of servent reputation

Resource Management

- Implementation

  - For each resource, the server maintains a set of resource ID and resource reputation score.

  - The server also maintains a set of servent ID, servent contribution score and servent evaluation score.

How the Resource Management Model Work?

When a new servent joins the network:

Phase 1

  - Sending a file list to the central server.

Phase 2

  - Locating target resource/servent.

Phase 3

  - Selecting and downloading target resource.

Phase 4

  - Voting and updating resource/servent reputation.

Peer Selection

- To select the "better peers" to be supplier.

- Better peers have higher probability to be selected.

- The quality of service of a peer may depend on some characteristics of this peer such as : reputation score, reliability, availability.

Peer Selection

- The idea of peer selection benefits the searching efficiency.

- The query message could be sent more correctly and properly.

- Much redundant message could be avoided.

Incentive Mechanism

- To encourage peers to contribute to the system.
- To promote peer cooperation in the system.
- To avoid the condition of free-riding.
- Like the concept of reputation model.

Example 1

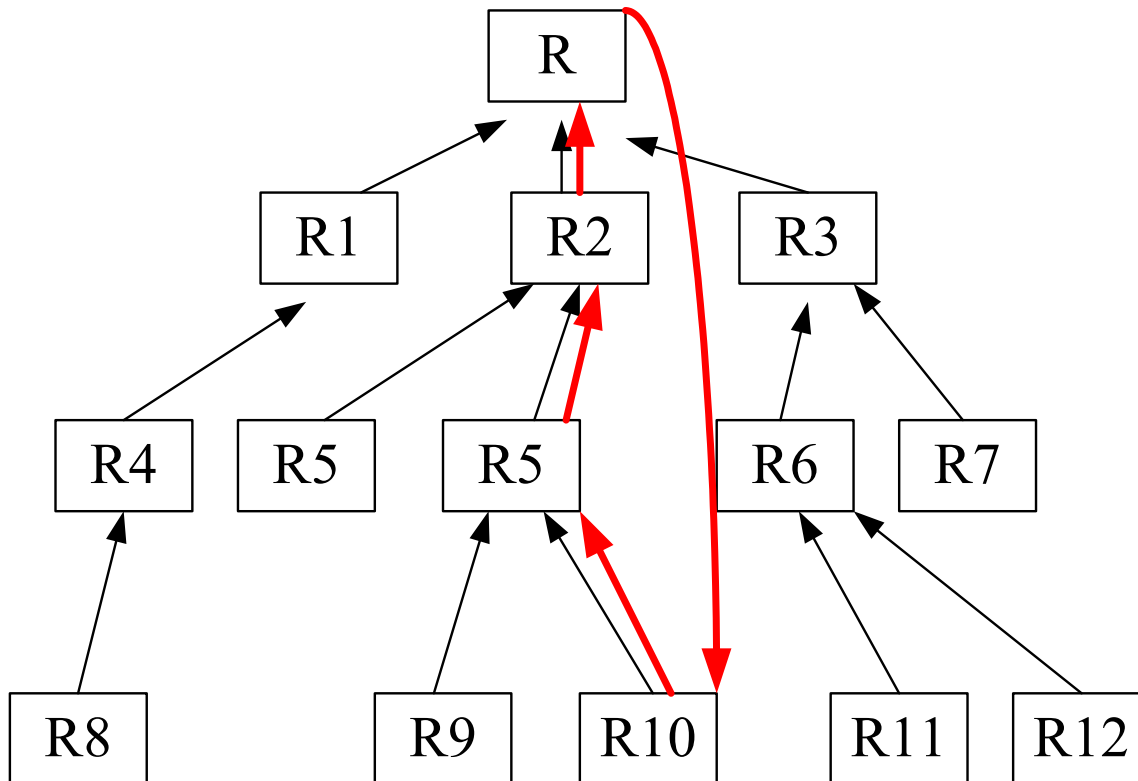Like the idea of reputation :

Rank-Based:

- Contribution → Score → Rank → Peer selection priority

- The utility is a function of streaming session quality and the contribution cost:

  for Peer i $U_i(x_i) = Q_i(x_i) - C_i(x_i)$

  where U is utility, Q is quality and C is cost.

Example 2

- Exchange-based:

Comparison

- Rank-Based:

  - adv: more precise computation.

  - disadv : much computation cost.

- Exchange-Based:

  - adv: no complex computation.

  -disadv: is not precise.

Searching Priority

- The concept of "searching priority" achieves the goal of peer selection.

- The idea of searching priority is adopted by many searching mechanism that the searching efficiency could be improved.

- Peers with higher priority will be selected with higher probability.

Conclusion

- The resource management model uses the concept the reputation.

- The concept of reputation helps us to do peer selection.

- Peer selection achieves the goal of improving the searching efficiency of p2p network.

Reference

[1] A.Habib, J.Chuang,"Incentive Mechanism for Peer-to-Peer Media Streaming", IWQOS 2004.Twelfth IEEE International Workshop on , 7-9 June 2004.

[2] K.G.Anagnostakis, M.B.Greenwald, " Exchange-based incentive mechanisms for peer-to-peer file sharing" Distributed Computing Systems, 2004. Proceedings. 24th International Conference on , 24-26 March 2004.

[3] M.Iguchi, M.Terada, K.Fujimura, "Managing Resource and Servent Reputation in P2p Networks", System sciences, 2004. Proceedings of the 37th Annual Hawaii International.

[4] M.Bawa, B.F. Cooper, A.Crespo, N.Daswani, P.Ganesan, H.Garcia-Molina, S.Kamvar, S.Marti, M.Schlosser, Q.Sun, P.Vinograd, B.Yang "Peer-to-Peer Research at Stanford" SIGMOD Record, Vol. 32, No. 3, September 2003.

[5] M.Gupta, P.Judge, M.Ammar, "A Reputation System for Peer-to-Peer Networks", NOSSDAV'03.

[6] A.A.*Selcuk, E.Uzun, M.R.Pariente,* "A Reputation-Based Trust Management System for P2p Networks ", CCGrid 2004. IEEE International Symposium on , April 19-22, 2004.