

# Pendekatan collective rejoin untuk penanganan normal peer yang efisien pada kegagalan superpeer dalam jaringan overlay P2P heterogen terstruktur = The collective rejoin approach for efficient normal peer handling in case of the superpeer failure in structured heterogeneous P2P overlay network / Sri Wahjuni

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## Abstrak

[<b>ABSTRAK</b><br>

Arsitektur jaringan overlay P2P berjenjang terstruktur (structured hierarchical P2P) sangat sesuai untuk jaringan heterogen karena mempertimbangkan keberagaman kapabilitas peer. Pada penelitian ini diusulkan pendekatan baru mekanisme rejoin yang dinamakan collective rejoin, dimana proses rejoin dilakukan secara per kelompok, sebagai alternatif dari pendekatan individual rejoin yang selama ini diterapkan pada arsitektur P2P berjenjang terstruktur berbasis Chord. Setiap kelompok yang mengalami kegagalan superpeer akan menunjuk normal peer dengan kapabilitas tertinggi dalam kelompoknya sebagai superpeer baru. Superpeer baru ini yang akan mengirimkan pesan rejoin ke sistem. Dengan pendekatan ini, jumlah trafik rejoin akan jauh berkurang dibandingkan pendekatan individual rejoin, sehingga konsumsi bandwidth untuk overhead trafik pengelolaan dapat dikurangi.

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Kinerja pendekatan collective rejoin ini dievaluasi dengan menggunakan parameter: variasi nilai rasio superpeer, tingkat dinamika jaringan (churn), ukuran jaringan, dan tingkat kesibukan jaringan (lookup query rate). Evaluasi kinerja dilakukan dengan mengamati jumlah trafik yang dihasilkan oleh proses rejoin pada saat terjadi kegagalan superpeer (rejoin traffic load), rasio antara lookup query yang berhasil diselesaikan terhadap seluruh lookup query yang terjadi (successful lookup rate), dan banyaknya hop yang harus ditempuh untuk menyelesaikan sebuah lookup query (lookup query cost). Nilai efisiensi diperoleh berdasarkan penghitungan penghematan penggunaan bandwidth yang dapat dilakukan oleh pendekatan collective rejoin.

Pada seluruh parameter yang diujikan, pendekatan collective rejoin menghasilkan jumlah trafik rejoin yang lebih sedikit dibandingkan dengan pendekatan individual rejoin. Hal ini dibarengi juga dengan successful lookup rate yang rata-rata lebih baik, dengan tanpa meningkatkan lookup query cost. Rasio superpeer dan ukuran jaringan berpengaruh signifikan terhadap nilai efisiensi. Sedangkan pada pengujian terhadap parameter tingkat dinamika jaringan dan tingkat kesibukan jaringan, nilai efisiensi relatif tetap. Hasil simulasi menunjukkan bahwa pendekatan collective rejoin efektif jika diterapkan pada

jaringan P2P berjenjang terstruktur dengan ukuran kelompok yang besar (pada penelitian ini, dengan rasio superpeer terbesar adalah 10%).;

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research, a new approach of rejoin mechanism is proposed, called collective rejoin, whereby rejoin process is done per group. Each group that experiences a superpeer failure will appoint a normal peer that has highest capabilities in the group as the group's new superpeer.

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This new superpeer will send rejoin message

to the system. Using this approach, the number of rejoin traffic is less than individual rejoin. In turn, it will decrease the bandwidth consumption of management traffic overhead

The collective rejoin approach performance is evaluated using parameters: variety of superpeer ratio, network dynamics level (churn), network size, and overlay network activities level (lookup query rate). Performance evaluation is conducted by observing the number of rejoin traffic, the successful lookup rate, and the lookup query cost. The efficiency value is obtained by calculating bandwidth consumption saving by the collective rejoin approach.

On all tested parameters, the collective rejoin approach produces fewer rejoin traffics than the individual rejoin approach. The successful lookup rate of collective rejoin is outperform the individual rejoin. The lookup query cost of the collective rejoin can be maintained at the same value as in the individual rejoin.

Superpeer ratio and network size significantly impact the efficiency. Meanwhile, networks dynamic and activities provide a relative stable efficiency. The results show that the collective rejoin approach is useful for large group size hierarchical structured P2P (in this research the maximum superpeer ratio is 10%).;

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