UNIVERSITY OF CAMBRIDGE
Computer Laboratory

Data Centric Networking (R202)

Open source project study

On the complex network clustering using DryadLINQ

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Motivation

Why going parallel in complex networks analysis?

- Online social networks, Internet graph
  - millions of users (Facebook, Twitter ...)
  - increased computational complexity
- Why is prospective?
  - some actions are fully independent
  - increased hardware performance
    - multi-core
    - network clusters, global cloud clusters

Motivation

Why using PLINQ/DryadLINQ?

- Inherited LINQ behaviour
  - o declarative and imperative programming
  - o T-SQL syntax in your code
    - no more SQL server store-procedures
    - optimized performance
    - inherited SELECT, GROUP/ORDER BY
- + Dryad/Parallel processing
  - o optimized job management

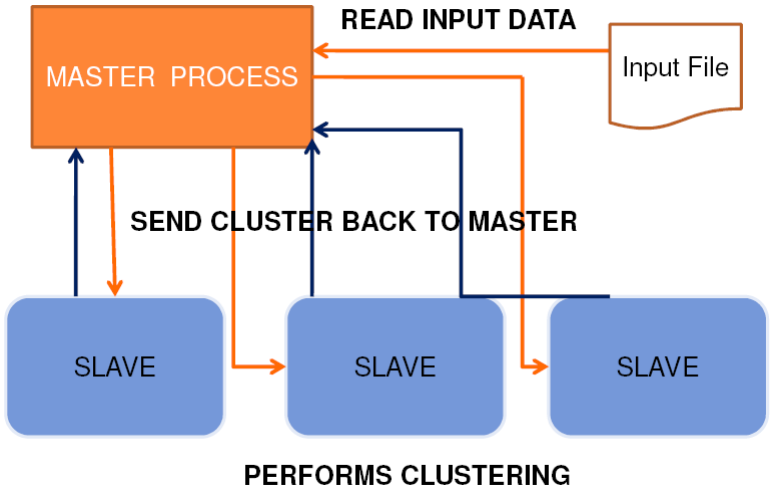
Why not (mainly pure technical reasons)?

- problems even with Microsoft concepts
  - o requires .NET environment anyway
  - o evaluated only on newest Microsoft OSs
  - o head node:
    - >Windows Server ’08 OS (problems with ‘03)
    - more than 500G HD, 8 MB memory
  - o computational nodes (at least Windows 7)
  - o no Windows Azure support ☹
  - o Someone mentioned Linux/MacOS? ☺

My application/solution?

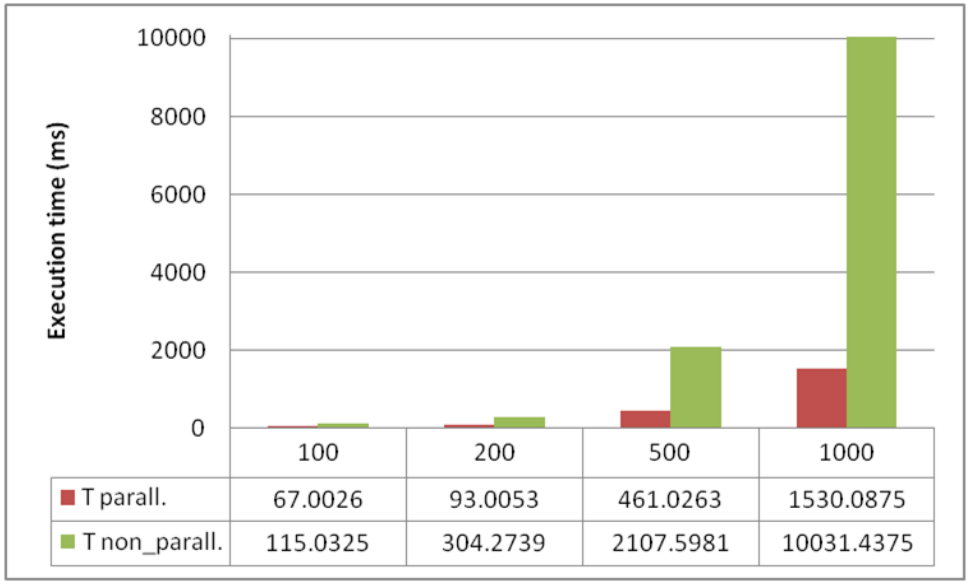
Using PLINQ/DryadLINQ for network clustering?

- K-means clustering
  - o parallel performs better
  - o the approach:
    - parallelize the method
  - o the results
    - significantly better time performance
  - o TO DO
    - more clustering approaches, comparison ...



Some plots

Parallel vs. non parallel LINQ (*dataset:*)



	100	200	500	1000
T parall.	67.0026	93.0053	461.0263	1530.0875
T non_parall.	115.0325	304.2739	2107.5981	10031.4375

different values of N={100,200,500,1000}

- Questions??

- Short Discussion
  - still work in progress ...