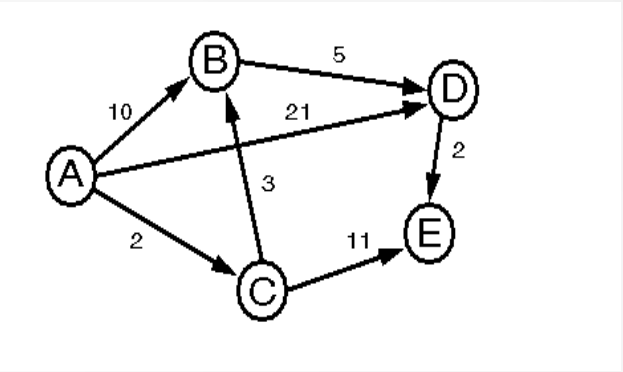
All pair shortest path using Rkleene algorithm

-Abhyodaya

All pair shortest path

- Floyd Warshall Algorithm.
- Dijikstra.
- Recursive Kleene Algorithm.

  (exploits data locality).



(source:R-Kleene: A High-Performance Divide-and-Conquer Algorithm for the All-Pair Shortest Path for Densely Connected Networks)

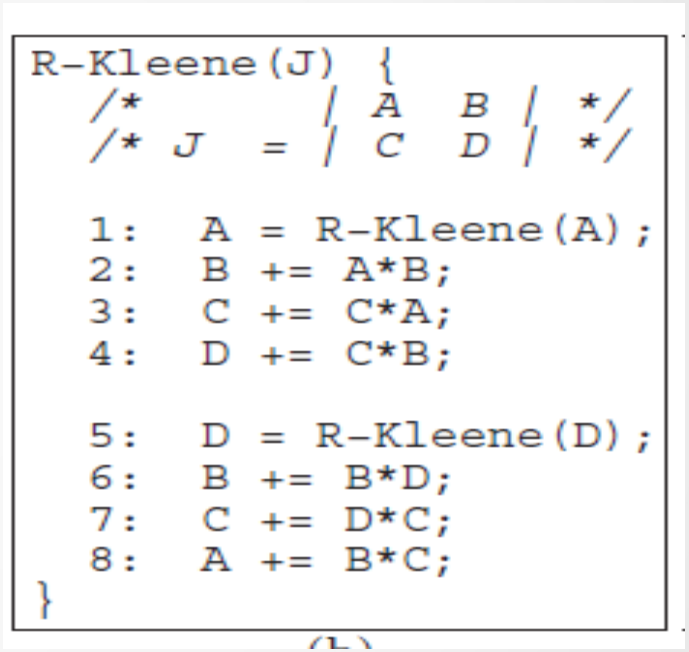
RKleene

- It is a divide and conquer algorithm.
- Based on matrix multiplication.

  Replaced operations

  Multiply with **Add**

  Addition with **Min**



(Source : R-Kleene: A High-Performance Divide-and-Conquer Algorithm for the All-Pair Shortest Path for Densely Connected Networks)

Rkleene

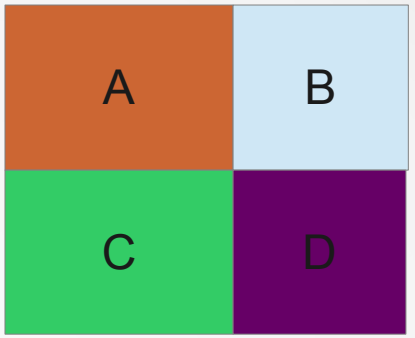
- **Steps**

  a) Division of adj mat to 4 components

  b) Call Rkleene on all 4 parts.

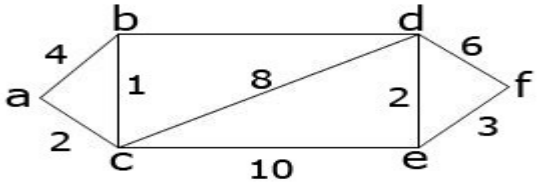
  c) Perform MM on results of 4 parts.

- **MM operation explained**



source img : dijisktra eg http://programming-technique.blogspot.com/)

w(u,v)	a	b	c	d	d	f
a	0	4	2	INF	INF	INF
b	4	0	1	5	INF	INF
c	2	1	0	8	10	INF
d	INF	5	8	0	2	6
e	INF	INF	10	2	0	3
f	INF	INF	INF	6	3	0



Consider Example for . B += A*B

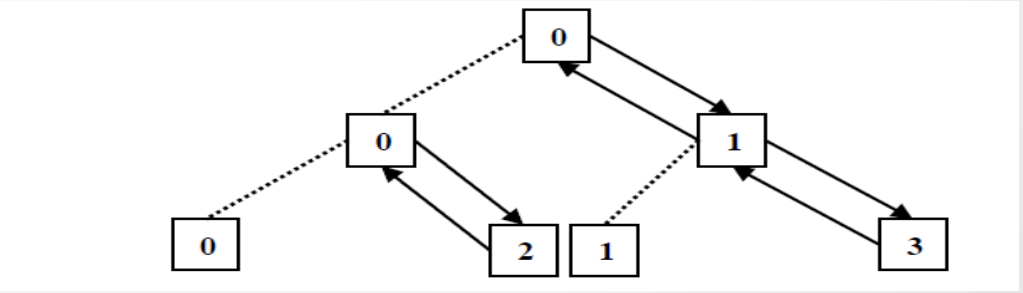
Intial (a,d) = INFINITE
(a,d) = min ((a,d) ,((a,c) + (c,d))
= min(INFINTE + (2+8)) = 10

MPI RKleene

- Assumption : all nodes have access to input graph data.
- MPI_Send to send matrix indexs to work on.

  MPI_Recv to receive data from process.
- Partition algorithm needed for MPI process as number of process is fixed.

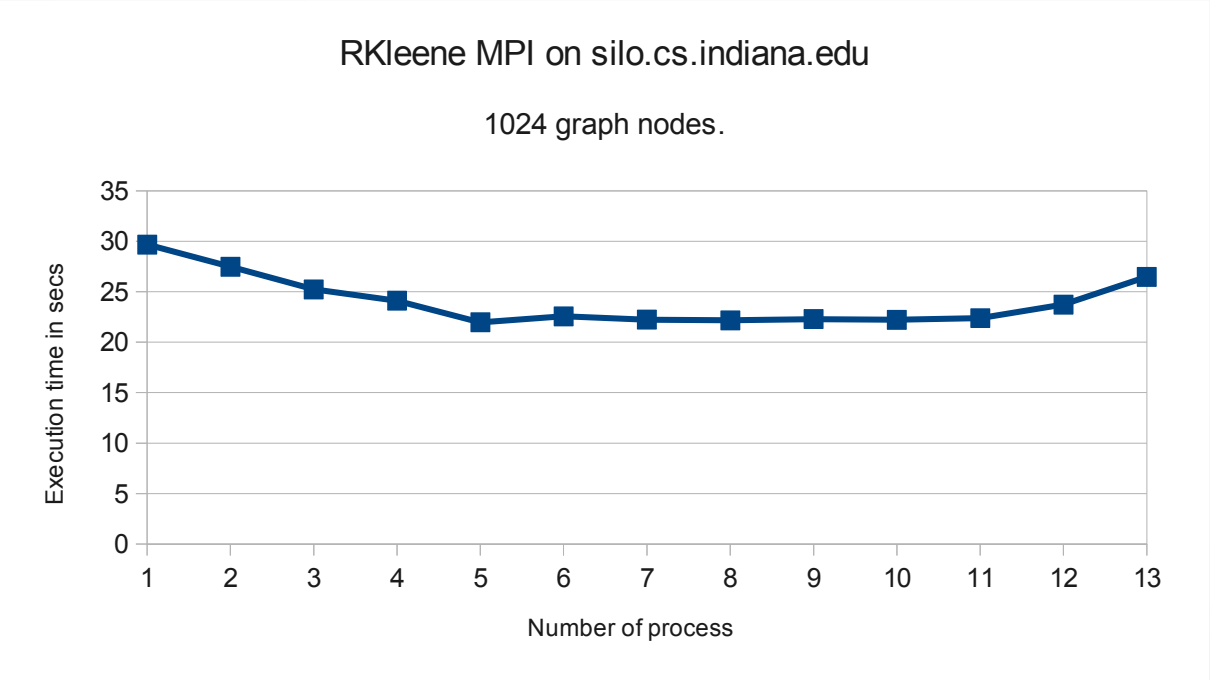
Source : Shared Memory, Message Passing, and Hybrid Merge Sorts Standalone and Clustered SMPs.



int helper_rank = my_rank + pow(2, level);

Initial test MPI Rkleene.

- Initial test with 1024 graph nodes on silo.cs.indiana.edu.



Thanks